

How to use this catalog

TO FIND INFORMATION ON A CORNING OR MILITARY PART NUMBER —

- A. Look to the color coded index to the right and thumb to the corresponding color coded section in the catalog — or
- B. Turn the page to the alphabetical parts listing and military cross-reference to find the page number for the part.

TO FIND PERFORMANCE CHARACTERISTICS OR TECHNICAL DATA

- A. Look in the catalog section for the part — or
- B. Look in the introduction section for the part.

PART MARKING EXAMPLES, PART NUMBER EXPLANATIONS AND ORDERING INFORMATION

Are found in each section for every style of part.

FOR FURTHER INFORMATION ON

- Availability
- Pricing
- Product Capabilities
- Product Performance
- Product Specifications or Applications — see "Need More Information" section on page 58.

Sales Offices and Manufacturing Locations — Page 59

The Fill-in Directory (page 60) may be used to keep the names, addresses and phone numbers of your Corning Representatives and Distributors.

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ALPHABETICAL LISTING OF CORNING PART NUMBERS

Corning Part No.	Military Part No.	Component Type	Page No.	Corning Part No.	Military Part No.	Component Type	Page No.
C07	RL07	Resistor	50	HH4	RNC55H	Resistor	48
C3 (and new C05)	None	Resistor	50	HH5	RNC60H	Resistor	48
C4	RL07	Resistor	50	HK4	RNC55K	Resistor	48
C5	RL20	Resistor	50	HK5	RNC60K	Resistor	48
C6	RL32	Resistor	50	None	MCF	Tantalum	38
CAC-X7R	None	Ceramic Capacitor	26	MCJ	None	Tantalum	38
CAC-Z5U	None	Ceramic Capacitor	26	MCL	None	Tantalum	38
CAM-X7R	None	Ceramic Capacitor	24	MCM	None	Tantalum	38
CAM-Z5U	None	Ceramic Capacitor	24	MCS	None	Tantalum	38
CK12	CK12	Ceramic Capacitor	20	MCU	None	Tantalum	38
CK13	CK13	Ceramic Capacitor	20	MD2	None	Tantalum	36
CK14	CK14	Ceramic Capacitor	20	MD3	None	Tantalum	36
CKR11	CKR11	Ceramic Capacitor	22	MD4	None	Tantalum	36
CKR12	CKR12	Ceramic Capacitor	22	MMF	None	Tantalum	30
CKR14	CKR14	Ceramic Capacitor	22	MMJ	None	Tantalum	30
CS20	None	Resistor	50	MML	None	Tantalum	30
CYFM10	CY10	Glass Capacitor	6	MMM	None	Tantalum	30
CYFM15	CY15	Glass Capacitor	6	MMS	None	Tantalum	30
CYFM20	CY20	Glass Capacitor	6	MMU	None	Tantalum	30
CYFM30	CY30	Glass Capacitor	6	MMW	None	Tantalum	30
CYFR10	None	Glass Capacitor	10	MNA	None	Tantalum	34
CYFR15	None	Glass Capacitor	10	MNB	None	Tantalum	34
CYFR20	None	Glass Capacitor	10	MNF	None	Tantalum	34
CYFR30	None	Glass Capacitor	10	MNG	None	Tantalum	34
CYK01	CK31	Glass-K Capacitor	18	MNL	None	Tantalum	34
CYK02	CK32	Glass-K Capacitor	18	MNM	None	Tantalum	34
CYR10	CYR10	Glass Capacitor	12	MNP	None	Tantalum	34
CYR15	CYR15	Glass Capacitor	12	MNS	None	Tantalum	34
CYR20	CYR20	Glass Capacitor	12	MNY	None	Tantalum	34
CYR30	CYR30	Glass Capacitor	12	MZA	None	Tantalum	32
CYR51	CYR51	Glass Capacitor	12	MZB	None	Tantalum	32
CYR52	CYR52	Glass Capacitor	12	MZG	None	Tantalum	32
CYR53	CYR53	Glass Capacitor	12	MZP	None	Tantalum	32
FP 1/2	None	Resistor	52	MZY	None	Tantalum	32
FP 1	None	Resistor	52	NA55	RN55D	Resistor	46
FP 2	None	Resistor	52	NA60	RN60D	Resistor	46
FP 3	None	Resistor	52	NA65	RN65D	Resistor	46
FP 4	None	Resistor	52	NA70	RN70D	Resistor	46
FP 5	None	Resistor	52	NC3	RN50C	Resistor	46
FP 7	None	Resistor	52	NC4	RN55C	Resistor	46
FP 10	None	Resistor	52	NC5	RN60C	Resistor	46
FP 32	RL32	Resistor	50	NC6	RN65C	Resistor	46
FP 42	RL42	Resistor	50	NC7	RN70C	Resistor	46
FP 55	None	Resistor	52	NC55	RN55C	Resistor	44
FP 60	None	Resistor	52	NC60	RN60C	Resistor	44
FP 67	None	Resistor	52	NC65	RN65C	Resistor	44
FP 69	None	Resistor	52	NE55	RN55E	Resistor	44
GTH 801	None	Heater	56	NE60	RN60E	Resistor	44
GTH 802	None	Heater	56	NE65	RN65E	Resistor	44
HC3	RLR05	Resistor	48	TSR5	None	Resistor	54
HC4	RLR07	Resistor	48	TY06	CY06	Glass Capacitor	8
HC5	RLR20	Resistor	48	TY07	CY07	Glass Capacitor	8
HC6	RLR32	Resistor	48	TY08	CY08	Glass Capacitor	8

ALPHABETICAL LISTING OF MILITARY PART NUMBERS

Military Part No.	Corning Part No.	Component Type	Page No.	Military Part No.	Corning Part No.	Component Type	Page No.
CK12	CK12	Ceramic Capacitor	20	RL20	C5	Resistor	50
CK13	CK13	Ceramic Capacitor	20	RL32	C6/FP32	Resistor	50
CK14	CK14	Ceramic Capacitor	20	RL42	FP42	Resistor	50
CK31	CYK01	Ceramic Capacitor	18	RLR05	HC3	Resistor	48
CK32	CYK02	Ceramic Capacitor	18	RLR07	HC4	Resistor	48
CKR11	CKR11	Ceramic Capacitor	22	RLR20	HC5	Resistor	48
CKR12	CKR12	Ceramic Capacitor	22	RLR32	HC6	Resistor	48
CKR14	CKR14	Ceramic Capacitor	22	RN50C	NC3	Resistor	46
CY06	TY06	Glass Capacitor	8	RN55C	NC4/NC55	Resistor	46/44
CY07	TY07	Glass Capacitor	8	RN60C	NC5/NC60	Resistor	46/44
CY08	TY08	Glass Capacitor	8	RN65C	NC6/NC65	Resistor	46/44
CY10	CYFM10	Glass Capacitor	6	RN70C	NC7	Resistor	46
CY15	CYFM15	Glass Capacitor	6	RN55D	NA55	Resistor	46
CY20	CYFM20	Glass Capacitor	6	RN60D	NA60	Resistor	46
CY30	CYFM30	Glass Capacitor	6	RN65D	NA65	Resistor	46
CYR10	CYR10	Glass Capacitor	12	RN70D	NA70	Resistor	46
CYR15	CYR15	Glass Capacitor	12	RN55E	NE55	Resistor	44
CYR20	CYR20	Glass Capacitor	12	RN60E	NE60	Resistor	44
CYR30	CYR30	Glass Capacitor	12	RN65E	NE65	Resistor	44
CYR51	CYR51	Glass Capacitor	12	RNC55H	HH4	Resistor	48
CYR52	CYR52	Glass Capacitor	12	RNC55K	HK4	Resistor	48
CYR53	CYR53	Glass Capacitor	12	RNC60H	HH5	Resistor	48
RL07	C07/C4	Resistor	50	RNC60K	HK5	Resistor	48

MILITARY SPECIFICATION CROSS-REFERENCE

Military Specification	Military Part No.	Corning Part No.	Page No.	Military Specification	Military Part No.	Corning Part No.	Page No.
MIL-C-11015 (Ceramic Capacitors)	CK12	CK12	20	MIL-R-10509 (Precision Metal Film Resistors)	RN50C	NC3	46
	CK13	CK13	20		RN55C	NC4/NC55	46/44
	CK14	CK14	20		RN60C	NC5/NC60	46/44
	CK31	CYK01	18		RN65C	NC6/NC65	46/44
	CK32	CYK02	18		RN70C	NC7	46
MIL-C-11272 (Glass Capacitors)	CY06	TY06	8	RN55D	NA55	46	
	CY07	TY07	8	RN60D	NA60	46	
	CY08	TY08	8	RN65D	NA65	46	
	CY10	CYFM10	6	RN70D	NA70	46	
	CY15	CYFM15	6	RN55E	NE55	44	
	CY20	CYFM20	6	RN60E	NE60	44	
MIL-C-23269 (Established Reliability Glass Capacitors)	CY30	CYFM30	6	RN65E	NE65	44	
	CYR10	CYR10	12	MIL-R-22684 (Semi-Precision Metal Film Resistors)	RL07	C07/C4	50
	CYR15	CYR15	12	RL20	C5	50	
	CYR20	CYR20	12	RL32	C6/FP32	50	
	CYR30	CYR30	12	RL42	FP42	50	
MIL-C-39014 (Established Reliability Ceramic Capacitors)	CYR51	CYR51	12	MIL-R-39017 (Established Reliability Semi-Precision Metal Film Resistors)	RLR05	HC3	48
	CYR52	CYR52	12	RLR07	HC4	48	
	CYR53	CYR53	12	RLR20	HC5	48	
	CKR11	CKR11	22	RLR32	HC6	48	
MIL-R-55182 (Established Reliability Precision Metal Film Resistors)	CKR12	CKR12	22	RNC55H	HH4	48	
	CKR14	CKR14	22	RNC55K	HK4	48	
				RNC60H	HH5	48	
			RNC60K	HK5	48		

Capacitor Selector Guide

CAPACITOR CHARACTERISTICS		DIELECTRIC TYPES										
		GLASS		GLASS-K	CERAMIC			TANTALUM				
CORNING TYPES		CYFM10-30 CYFR10-30 CYR10-30	TY06-08 CYR51-53	CK31 CK32	CK12, 13, 14 CKR11, 12, 14	CAM	CAC	MINITAN MODULAR	MINITAN CORDWOOD	MINITAN NONPOLAR	MINIDIPS	CHIPS
CAPACITANCE	Capacitance Range	.5 - 10,000 pF.	1 - 2400 pF.	270 - 100,000 pF.	10 to 100,000 pF.	10 to 220,000 pF.	10 to 220,000 pF.	.001 to 220 μF.	.001 to 47 μF.	.001 to 33 μF.	.1 to 10 μF.	.1 to 100 μF.
	Standard Tolerance	±1 to 10%	±1 to 20%	±10 or 20%	±10 or 20%	X7R = ±10 or 20% Z5U = ±20% or +80, -20%	X7R = ±10 or 20% Z5U = ±20% or +80, -20%	±5 to 20%	±5 to 20%	±5 to 20%	±20%	±10 or 20%
	Minimum Tolerance	±1% or ±.25 pF.	±1% or ±.25 pF.	±5% on "T" Char. others ±10%	±10%	X7R = ±10% Z5U = ±20%	X7R = ±10% Z5U = ±20%	±5%	±5%	±5%	±20%	±10%
VOLTS	DC Operating Volts	300 VDC and 500 VDC	300 VDC	50 VDC	50 VDC and 100 VDC	50 VDC and 100 VDC	50 VDC and 100 VDC	2 to 35 VDC	2 to 50 VDC	2 to 50 VDC	2 to 35 VDC	2 to 35 VDC
	Operating Frequency	DC to VHF	DC to VHF	DC to VHF	DC to VHF	DC to VHF	DC to VHF	DC to 1 MHz	DC to 1 MHz	DC to 1 MHz	DC to 1 MHz	DC to 1 MHz
DISSIPATION FACTOR	% @ 120 Hz.							6 to 15%	6 to 10%	6 to 10%	8 to 10%	6 to 10%
	% @ 1 KHz.	.1% @ 25°C.	.1% > 100 pF. .2% < 100 pF.	1 to 3%	2.5% Max.	X7R = 2.5% Max. Z5U = 3.0% Max.	X7R = 2.5% Max. Z5U = 3.0% Max.					
INSULATION RESISTANCE	Meg Ω	100,000 @ 25°C.	100,000 @ 25°C.	100,000 Meg Ω	100,000 Meg Ω	X7R = 100,000 MegΩ or 1000 MΩ-μF. whichever is less Z5U = 10,000 MegΩ or 100 MΩ-μF. whichever is less		Seldom Used	Seldom Used	Seldom Used	Seldom Used	Seldom Used
	MΩ - μF.			1000 MΩ-μF. whichever is less	1000 MΩ-μF. whichever is less							
TEMPERATURE	Operating Range	-55°C. to +125°C.	-55°C. to +125°C.	-55°C. to +125°C.	-55°C. to +125°C.	X7R = -55° to +125°C Z5U = +10° to +85°C		-55°C. to +125°C.	-55°C. to +125°C.	-55°C. to +125°C.	-55°C. to +85°C.	-55°C. to +125°C.
	Temperature Characteristic	+140 ±25 PPM/°C	+140 ±25 PPM/°C	Dependent on Characteristic	±15%	X7R = ±15% Z5U = +22, -56%		Seldom Used	Seldom Used	Seldom Used	Seldom Used	Seldom Used
PHYSICAL CHARACTERISTICS	Volumetric Efficiency	Low	Low	Moderate	Moderate	High	High	Very High	Very High	High	High	High
	Lead Type	Axial	Radial	Axial	Axial	Axial	Axial	Axial and Radial	Axial and Radial	Axial and Radial	Radial	None (Chip)
RELATIVE COST FOR EQUIVALENT CV RATING		High	High	Moderate	Moderate	Low	Low	Moderate	Moderate	Moderate	Low	Moderate
MIL-SPECS MIL-C-		11272 and 23269	11272 and 23269	11015	CK12-14 (11015) CKR11, 12, 14 (39014/5)			Tested to MIL-C-55365				
CATALOG PAGE NUMBERS		6, 10, 12	8, 12	18	20, 22	24	26	30	32	34	36	38

Introduction to Corning Glass Capacitors

CORNING
ELECTRONICS

The first material used as a capacitor was glass in a Leyden jar back in 1745!

As capacitors have evolved from the Leyden jar into the products of today, glass has remained the most dependable dielectric known. The reasons are simple — when specifying a capacitor you look for a dielectric material that's durable and reproducible; one with good insulating properties, high dielectric strength, low power factor, high volume and surface resistivity, controlled expansion coefficients, high thermal strength, high insulation resistance, and a good dielectric constant. Glass has all of these.

Corning has developed a method to formulate ideal dielectric glasses for varied applications. Properties of these glasses are precisely controlled on a continuous basis as the glass is rolled into ribbon form. It is this resultant ribbon of glass that has made mass production of glass capacitors practical as well as economical. Because there is no chance of "batch" variation in the continuous operation, you get the same high reliability in CORNING® capacitors from part to part, week to week, month to month, and year to year.

The CORNING Glass Capacitor gives you performance that exceeds today's most rigorous load-life requirements, not to mention rigid high frequency applications. The electrical ultrastability of the fused glass and foil capacitive element is frozen in glass in a special sealing process. True glass-to-metal sealing at the leads made them virtually indestructible under environmental stresses.

The right Glass Capacitor for your applications

CORNING® CYFM Capacitors give you environment-proof performance at substantial savings. They provide economical stability and reliability in coupling, decoupling, filtering, timing, switching, and many other critical circuits. The CYFMs are electrically and environmentally interchangeable with the CYFR type. We have boiled them in salt water, immersed them in saturated steam and subjected them to

What the Corning® Glass Capacitor can do for you

Stability and Durability — This rugged glass capacitor is practically immune to environment, temperature, time, voltage, moisture, frequency, vibration, and shock — are just a few. This means hours and days can be saved in worst-case design. It means circuit sophistication previously not attainable. It means reliability of the highest order. Tuned circuits stay tuned, RC time constants stay constant, coupled circuits stay coupled, decoupled circuits stay decoupled, and phase shifters stay fixed.

Predictability — Every CORNING glass capacitor performs exactly like every other CORNING glass capacitor. From day to day, year to year, performance is identical because of total control in manufacturing the dielectric. Materials and process are foremost in producing a quality capacitor. Corning uses optical quality glass in the dielectric that lasts forever and fuses aluminum foil plates and Dumet leads into it. Because of the resulting monolithic structure, very few materials are needed — only important ones. Materials and processes going into all CORNING glass capacitors are the same as those used on our Minuteman capacitors.

Versatility — There are practically no applications which cannot be improved by using a CORNING glass capacitor assuming size and capacitance values are compatible. Glass capacitors come close to being a "perfect circuit symbol".

Construction — Three elements: glass dielectric and case, aluminum electrodes, wire terminals. What can go wrong? No radiation problems, no fungus, no storage problems, no melting wax, no solder to melt or crystallize, no seals to fail, no

96-hour salt spray and 1200 hours of moisture resistance tests without failure or degradation.

CORNING® TYO Capacitors are ideal for printed circuit applications because of their miniaturization and radial lead configuration. Their design permits upright, flush mounting on circuit boards. Standard gold plated Dumet leads give reliable soldering or welding, and are spaced symmetrically with the case on .1" grids for fast installation on printed circuit boards. The lower prices of CORNING TYO Capacitors now provide a glass capacitor at comparable ceramic prices.

CORNING® CYFR Capacitors give you guaranteed reliability. They have contri-

buted, and continue to contribute to marked improvement in MTBF in many military and space programs such as Titan, Surveyor, Syncom, Mariner, Apollo, and Gemini. Over 64-million unit-hours from lot acceptance tests over a five year period for Minuteman have demonstrated the reliability and reproducibility of the CYFR capacitor from a process under control.

problems with vacuum, no pressure problems, no metallizing to come loose, no capacitance "jumps" — plates are "frozen" in glass, no electrolyte to leak, nothing to burn, nothing to dissolve.

Size and Weight — Glass capacitors are the smallest and lightest available for the job they do. This helps eliminate excess baggage on critical systems.

Extremely Low Losses — Means higher Q and narrower bandwidths in your filters and tuned circuits. It also means you can use this small capacitor to handle appreciable RF currents. If you need low loss circuits, you need CORNING capacitors.

Retraceable TC — Capacitance is always exactly where you expect it to be — absolutely no hysteresis during temperature cycling and every unit is identical in characteristics.

Weldable Leads — Dumet type are standard. They can be soldered or welded. (That simplifies purchasing.)

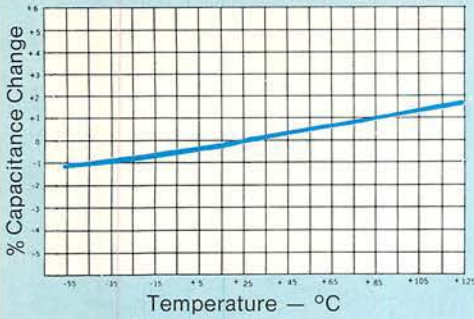
When to Use a Glass Capacitor

- When *reliability* is critical and replacement of a failed part is neither possible nor practicable.
- When *stability* is requisite, even in severe environments.
- Where *small size* and *light weight* are important.
- Where *economy* through worst-case design is sought.
- Where *economy* through type consolidation is sought.
- Where *economy* through possible elimination of trimming is sought.
- Where *economy* of maintenance is sought.
- Where your *customer's satisfaction* is paramount.

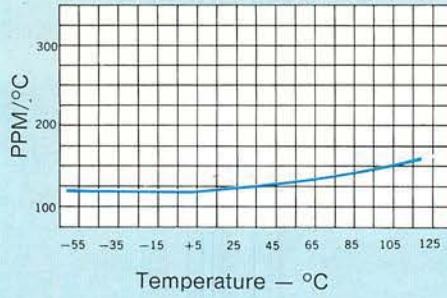
buted, and continue to contribute to marked improvement in MTBF in many military and space programs such as Titan, Surveyor, Syncom, Mariner, Apollo, and Gemini. Over 64-million unit-hours from lot acceptance tests over a five year period for Minuteman have demonstrated the reliability and reproducibility of the CYFR capacitor from a process under control.

CORNING® CYR Capacitors are the established reliability versions of our CYFM and TYO/CYO series in accordance with MIL-C-23269. They are built to the same exacting standards of performance with the added plus of an established reliability rating. They are ideal for military programs and industrial applications where component failure cannot be tolerated.

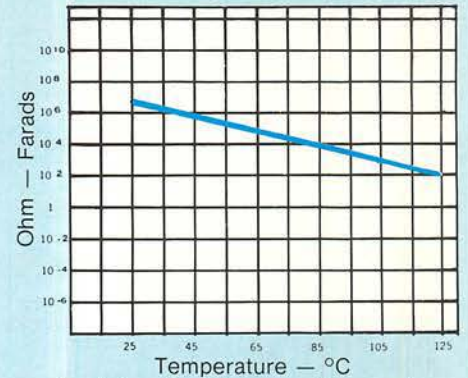
Performance curves for all Glass Capacitors



% Capacitance Change vs. Temperature

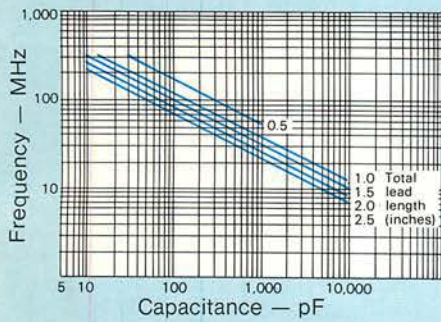


Temperature Coefficient vs. Temperature

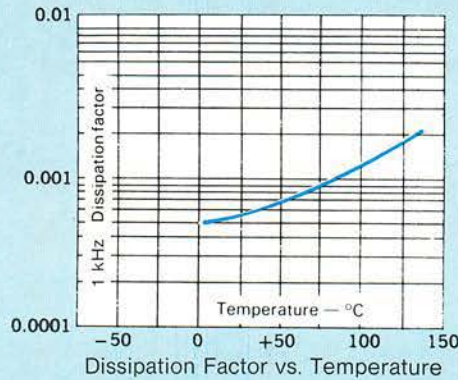


Insulation Resistance vs. Temperature

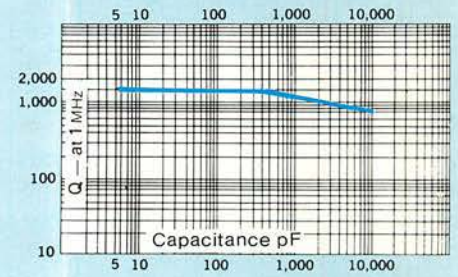
Performance curves for CYFM, CYR, CYFR Capacitors



Resonant Frequency

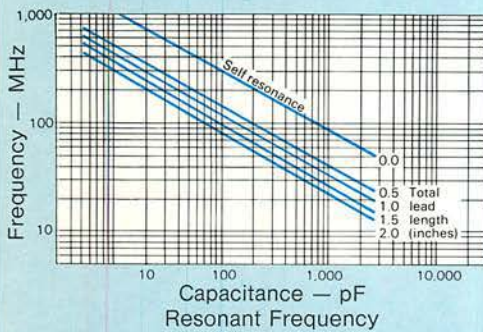


Dissipation Factor vs. Temperature

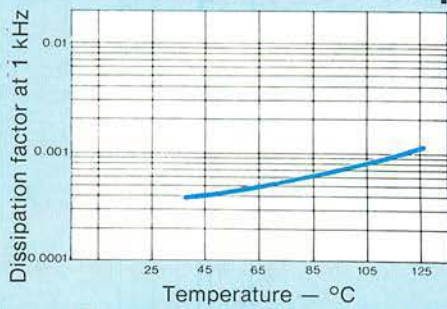


Q (Min.) vs. Capacitance

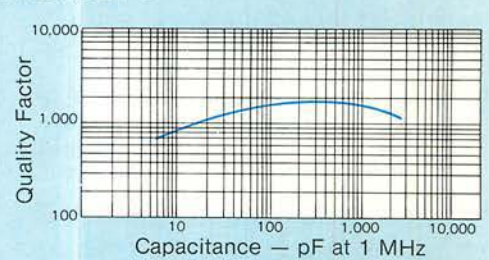
Performance curves for TYO/CYO Capacitors



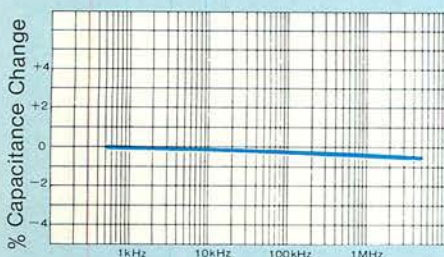
Resonant Frequency



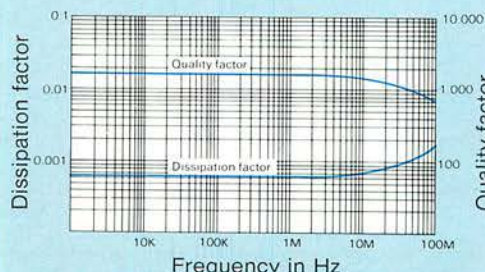
Dissipation Factor vs. Temperature



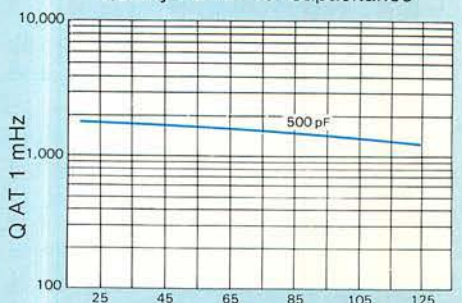
Quality Factor vs. Capacitance



% Capacitance Change vs. Frequency



Quality Factor and Dissipation Factor vs. Frequency



Quality Factor vs. Temperature

Glass Capacitors

CYFM10, 15, 20, 30 (INDUSTRIAL)
CY10, 15, 20, 30 (QPL to MIL-C-11272)

CORNING
ELECTRONICS

APPLICATIONS

These extremely stable glass capacitors, CORNING® style CYFM, meet or exceed all requirements of MIL-C-11272. With glass dielectric, fused monolithic construction and true glass-to-metal seals at the leads, they have very low losses and are virtually immune to severe environmental stresses.

PERFORMANCE CHARACTERISTICS

Tolerance — Available tolerances for each value of capacitance are shown in the ordering information table. For codes, refer to the Part Numbers paragraph.

Temperature Coefficient — $+140 \pm 25$ ppm/ $^{\circ}$ C at 100 kHz. TC will track and retrace to within ± 5 ppm. Capacitance drift is less than 0.1% or 0.1 pF whichever is greater.

Voltage Coefficient — zero

Losses — Extremely low, and remain relatively low at elevated temperatures. Dissipation factor is less than 0.001 at 1.0 kHz and 25 $^{\circ}$ C.

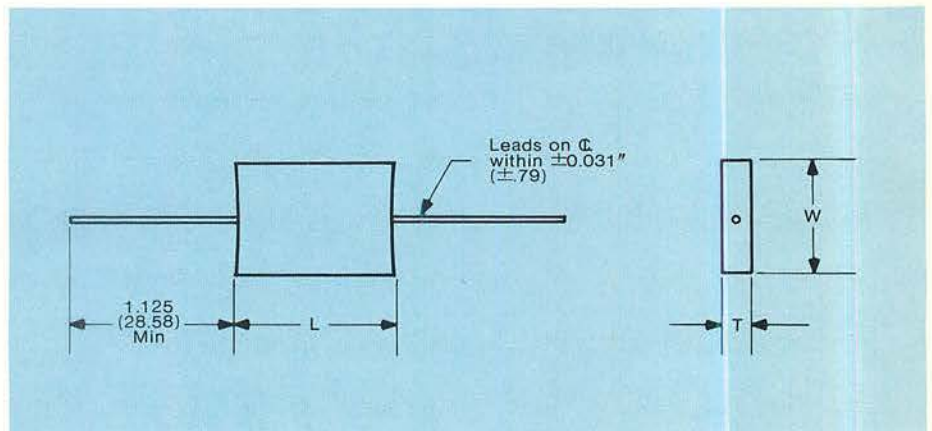
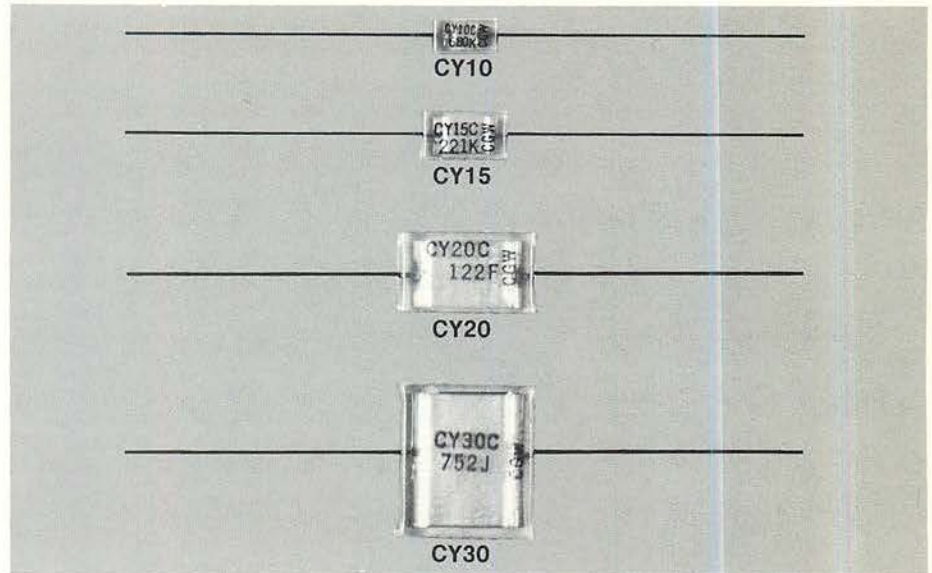
Life — After 2,000 hours at 125 $^{\circ}$ C with 150% of rated voltage applied, capacitance change is less than 0.5% or 0.5 pF whichever is greater.

Insulation Resistance — Greater than 100,000 megohms at 25 $^{\circ}$ C; greater than 10,000 megohms at 125 $^{\circ}$ C.

Voltage/Temperature Ratings — Voltage ratings are shown in the ordering information table. The operating temperature range is -55 $^{\circ}$ C to +125 $^{\circ}$ C with no derating required.

Moisture Resistance — Exceeds all requirements of MIL-C-11272 and MIL-STD-202, Method 106.

Part Numbers — Basic part numbers are shown in the ordering information table. Add the appropriate suffix to specify tolerance. Suffix codes: "C" = ± 0.25 pF, "D" = ± 0.5 pF, "F" = $\pm 1\%$, "G" = $\pm 2\%$, "J" = $\pm 5\%$, "K" = $\pm 10\%$, "M" = $\pm 20\%$.



Dimensions — Inches (Millimeters)

Style	L Min — Max	W Min — Max	T Min — Max	Lead Dia	Weight (Grams)
CY10	.2969 — .3906 (7.54 — 9.93)	.1406 — .2031 (3.58 — 5.16)	.0469 — .1093 (1.19 — 2.77)	.020 24 AWG (.51)	.25 — .50
CY15	.4219 — .5156 (10.72 — 13.11)	.2344 — .2968 (5.94 — 7.54)	.0625 — .1562 (1.60 — 3.96)	.020 24 AWG (.51)	.75 — 1.25
CY20	.6719 — .7968 (17.07 — 20.24)	.3750 — .4687 (9.52 — 11.91)	.0938 — .1875 (2.39 — 4.78)	.025 22 AWG (.63)	2.50 — 4.00
CY30	.7032 — .8281 (17.86 — 21.03)	.6719 — .8281 (17.07 — 21.03)	.0938 — .1875 (2.39 — 4.78)	.025 22 AWG (.63)	5.00 — 7.00

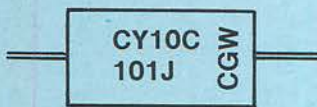
Note: Leads are solder coated Dumet.

PART NUMBERS AND ORDERING INFORMATION

Capacitance Value (pF)	Military Type Designation	Corning Part No.	DC Working Voltage	Tolerances Available	Capacitance Value (pF)	Military Type Designation	Corning Part No.	DC Working Voltage	Tolerances Available
STANDARD VALUES CYFM-10					STANDARD VALUES CYFM-15				
0.5	CY10C0R5 *	CYFM10C0R5 *	500	C	220	CY15C221 *	CYFM15C221 *	500	F,G,J,K,M
1.0	CY10C010	CYFM10C010	500	C,D	240	CY15C241	CYFM15C241	500	F,G,J,K,M
1.5	CY10C1R5	CYFM10C1R5	500	C,D	270	CY15C271	CYFM15C271	500	F,G,J,K,M
2.2	CY10C2R2	CYFM10C2R2	500	C,D	300	CY15C301	CYFM15C301	500	F,G,J,K,M
2.7	CY10C2R7	CYFM10C2R7	500	C,D	330	CY15C331	CYFM15C331	500	F,G,J,K,M
3.0	CY10C030	CYFM10C030	500	C,D	360	CY15C361	CYFM15C361	500	F,G,J,K,M
3.3	CY10C3R3	CYFM10C3R3	500	C,D	390	CY15C391	CYFM15C391	500	F,G,J,K,M
3.6	CY10C3R6	CYFM10C3R6	500	C,D	430	CY15C431	CYFM15C431	500	F,G,J,K,M
3.9	CY10C3R9	CYFM10C3R9	500	C,D	470	CY15C471	CYFM15C471	500	F,G,J,K,M
4.3	CY10C4R3	CYFM10C4R3	500	C,D	510	CY15C511	CYFM15C511	500	F,G,J,K,M
4.7	CY10C4R7	CYFM10C4R7	500	C,K	560	CY15C561	CYFM15C561	300	F,G,J,K,M
5.1	CY10C5R1	CYFM10C5R1	500	C,J,K	620	CY15C621	CYFM15C621	300	F,G,J,K,M
5.6	CY10C5R6	CYFM10C5R6	500	C,J,K	680	CY15C681	CYFM15C681	300	F,G,J,K,M
6.2	CY10C6R2	CYFM10C6R2	500	C,J,K	750	CY15C751	CYFM15C751	300	F,G,J,K,M
6.8	CY10C6R8	CYFM10C6R8	500	C,J,K	820	CY15C821	CYFM15C821	300	F,G,J,K,M
7.5	CY10C7R5	CYFM10C7R5	500	C,J,K	910	CY15C911	CYFM15C911	300	F,G,J,K,M
8.2	CY10C8R2	CYFM10C8R2	500	C,J,K	1000	CY15C102	CYFM15C102	300	F,G,J,K,M
9.1	CY10C9R1	CYFM10C9R1	500	C,J,K	1100	CY15C112	CYFM15C112	300	F,G,J,K,M
10	CY10C100	CYFM10C100	500	C,J,K,M	1200	CY15C122	CYFM15C122	300	F,G,J,K,M
11	CY10C110	CYFM10C110	500	C,J,K,M	STANDARD VALUES CYFM-20				
12	CY10C120	CYFM10C120	500	C,J,K,M	560	CY20C561 *	CYFM20C561 *	500	F,G,J,K,M
13	CY10C130	CYFM10C130	500	C,G,J,K,M	620	CY20C621	CYFM20C621	500	F,G,J,K,M
15	CY10C150	CYFM10C150	500	C,G,J,K,M	680	CY20C681	CYFM20C681	500	F,G,J,K,M
16	CY10C160	CYFM10C160	500	C,G,J,K,M	750	CY20C751	CYFM20C751	500	F,G,J,K,M
18	CY10C180	CYFM10C180	500	C,G,J,K,M	820	CY20C821	CYFM20C821	500	F,G,J,K,M
20	CY10C200	CYFM10C200	500	C,G,J,K,M	910	CY20C911	CYFM20C911	500	F,G,J,K,M
22	CY10C220	CYFM10C220	500	C,G,J,K,M	1000	CY20C102	CYFM20C102	500	F,G,J,K,M
24	CY10C240	CYFM10C240	500	C,G,J,K,M	1100	CY20C112	CYFM20C112	500	F,G,J,K,M
27	CY10C270	CYFM10C270	500	F,G,J,K,M	1200	CY20C122	CYFM20C122	500	F,G,J,K,M
30	CY10C300	CYFM10C300	500	F,G,J,K,M	1300	CY20C132	CYFM20C132	500	F,G,J,K,M
33	CY10C330	CYFM10C330	500	F,G,J,K,M	1500	CY20C152	CYFM20C152	500	F,G,J,K,M
36	CY10C360	CYFM10C360	500	F,G,J,K,M	1600	CY20C162	CYFM20C162	500	F,G,J,K,M
39	CY10C390	CYFM10C390	500	F,G,J,K,M	1800	CY20C182	CYFM20C182	500	F,G,J,K,M
43	CY10C430	CYFM10C430	500	F,G,J,K,M	2000	CY20C202	CYFM20C202	500	F,G,J,K,M
47	CY10C470	CYFM10C470	500	F,G,J,K,M	2200	CY20C222	CYFM20C222	500	F,G,J,K,M
51	CY10C510	CYFM10C510	500	F,G,J,K,M	2400	CY20C242	CYFM20C242	500	F,G,J,K,M
56	CY10C560	CYFM10C560	500	F,G,J,K,M	2700	CY20C272	CYFM20C272	500	F,G,J,K,M
62	CY10C620	CYFM10C620	500	F,G,J,K,M	3000	CY20C302	CYFM20C302	500	F,G,J,K,M
68	CY10C680	CYFM10C680	500	F,G,J,K,M	3300	CY20C332	CYFM20C332	500	F,G,J,K,M
75	CY10C750	CYFM10C750	500	F,G,J,K,M	3600	CY20C362	CYFM20C362	300	F,G,J,K,M
82	CY10C820	CYFM10C820	500	F,G,J,K,M	3900	CY20C392	CYFM20C392	300	F,G,J,K,M
91	CY10C910	CYFM10C910	500	F,G,J,K,M	4300	CY20C432	CYFM20C432	300	F,G,J,K,M
100	CY10C101	CYFM10C101	500	F,G,J,K,M	4700	CY20C472	CYFM20C472	300	F,G,J,K,M
110	CY10C111	CYFM10C111	500	F,G,J,K,M	5100	CY20C512	CYFM20C512	300	F,G,J,K,M
120	CY10C121	CYFM10C121	500	F,G,J,K,M	STANDARD VALUES CYFM-30				
130	CY10C131	CYFM10C131	500	F,G,J,K,M	3600	CY30C362 *	CYFM30C362 *	500	F,G,J,K,M
150	CY10C151	CYFM10C151	500	F,G,J,K,M	3900	CY30C392	CYFM30C392	500	F,G,J,K,M
160	CY10C161	CYFM10C161	500	F,G,J,K,M	4300	CY30C432	CYFM30C432	500	F,G,J,K,M
180	CY10C181	CYFM10C181	500	F,G,J,K,M	4700	CY30C472	CYFM30C472	500	F,G,J,K,M
200	CY10C201	CYFM10C201	500	F,G,J,K,M	5100	CY30C512	CYFM30C512	500	F,G,J,K,M
220	CY10C221	CYFM10C221	300	F,G,J,K,M	5600	CY30C562	CYFM30C562	500	F,G,J,K,M
240	CY10C241	CYFM10C241	300	F,G,J,K,M	6200	CY30C622	CYFM30C622	500	F,G,J,K,M
270	CY10C271	CYFM10C271	300	F,G,J,K,M	6800	CY30C682	CYFM30C682	300	F,G,J,K,M
300	CY10C301	CYFM10C301	300	F,G,J,K,M	7500	CY30C752	CYFM30C752	300	F,G,J,K,M
					8200	CY30C822	CYFM30C822	300	F,G,J,K,M
					9100	CY30C912	CYFM30C912	300	F,G,J,K,M
					10000	CY30C103	CYFM30C103	300	F,G,J,K,M

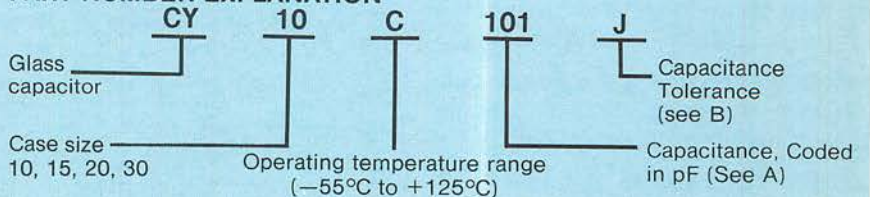
*Add letter for tolerance code above lines.

PART MARKING



- CY — Glass Capacitor
- 10 — Case Size
- C — Operating Temperature Range
- 101 — Capacitance, Coded in pF
- J — Tolerance
- CGW — Corning Glass Works

PART NUMBER EXPLANATION



A. Capacitance Code is expressed in picofarads (pF). The first two digits represent significant figures and the third digit specifies the number of zeros to follow; i.e. 101 indicates 100 pF. For fractional values below 10pF, R = decimal point; i.e. 1R5 indicates 1.5 pF.

B. Tolerance Code:

- C = ±.25 pF F = ±1% J = ± 5%
- D = ±.50 pF G = ±2% K = ±10%
- M = ±20%

Glass Capacitors

CORNING
ELECTRONICS

TY06, 07, 08 (INDUSTRIAL)
CY06, 07, 08 (QPL to MIL-C-11272)

APPLICATIONS

These precision miniature glass capacitors, CORNING® style TY0, meet or exceed all requirements of MIL-C-11272. Constructed of a fused monolithic capacitive element in a rectangular case with gold-plated radial Dumet leads, this series permits high packaging efficiency for printed circuit applications where extremely stable, low-loss capacitors are required.

PERFORMANCE CHARACTERISTICS

Tolerance — Available tolerances are "C" = $\pm 0.25\text{pF}$, "D" = $\pm 0.5\text{pF}$, "F" = $\pm 1\%$, "G" = $\pm 2\%$, "J" = $\pm 5\%$, "K" = $\pm 10\%$, and "M" = $\pm 20\%$ as shown in the ordering information table. Standard tolerance for 5.1pF and above is $\pm 5\%$, below 5.1pF the standard tolerance is $\pm 0.25\text{pF}$.

Temperature Coefficient — +140 ± 25 ppm/ $^{\circ}\text{C}$ at 100 kHz. TC will track and retrace to within ± 5 ppm. Capacitance drift is less than 0.1% or 0.1 pF, whichever is greater.

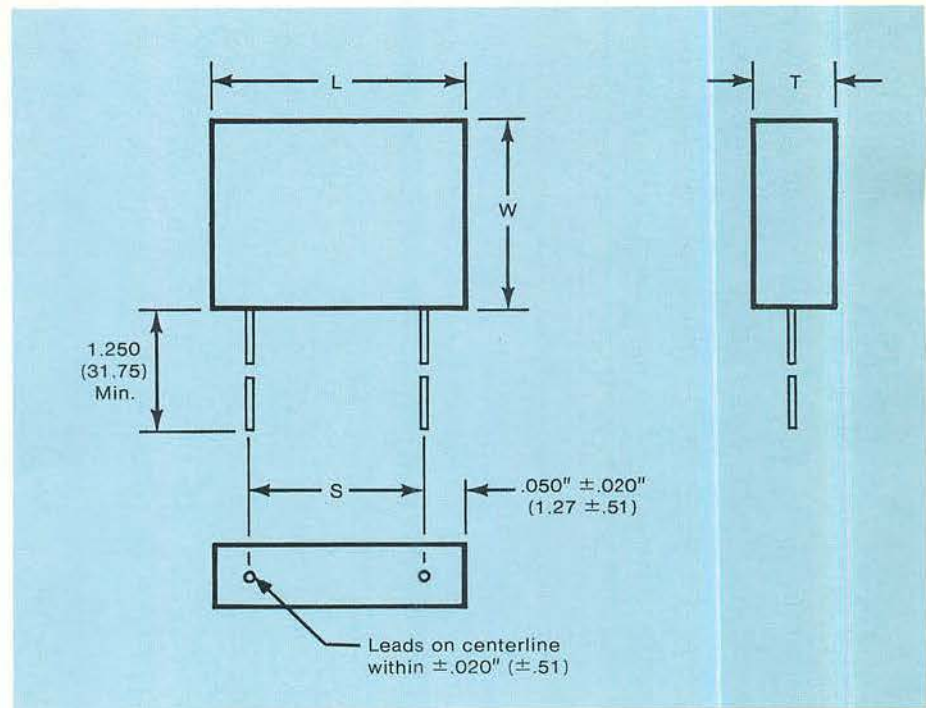
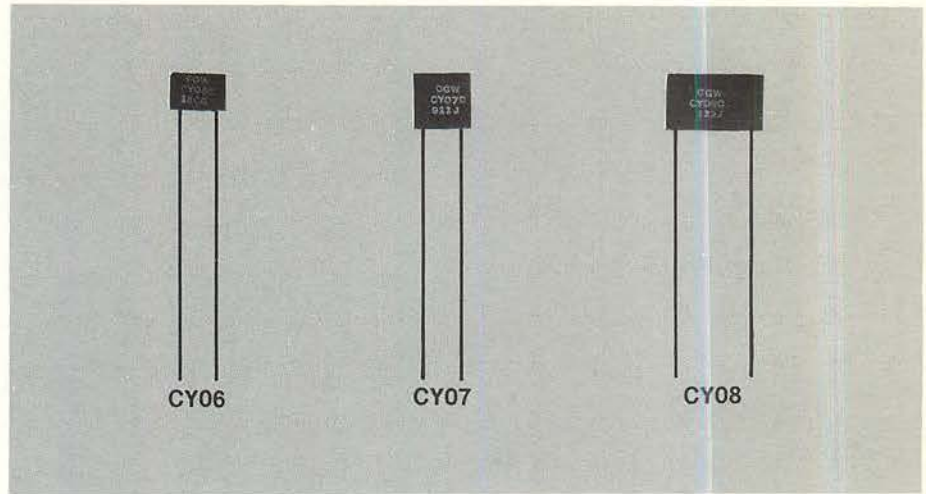
Voltage Coefficient — Zero.

Losses — Extremely low, and remain relatively low at elevated temperatures. Dissipation factor at 1 kHz and 25 $^{\circ}\text{C}$ is less than 0.001 for values greater than 100 pF and less than 0.002 for values of 100 pF and below.

Life — After 2,000 hours at 125 $^{\circ}\text{C}$ with 150% of rated voltage applied, capacitance change is less than 0.5% or 0.5 pF; dissipation factor is less than 0.0025 for values above 100 pF and less than 0.0045 for values of 100 pF and below; insulation resistance is greater than 100,000 megohms.

Insulation Resistance — Greater than 100,000 megohms at 25 $^{\circ}\text{C}$; greater than 10,000 megohms at 125 $^{\circ}\text{C}$.

Voltage/Temperature Rating — 300 WVDC over the temperature range of -55 $^{\circ}\text{C}$ to +125 $^{\circ}\text{C}$ with no derating required.



Dimensions — Inches (Millimeters)

Case Size	L $\pm .005$ ($\pm .13$)	W $\pm .010$ ($\pm .25$)	T $\pm .005$ ($\pm .13$)	S $\pm .020$ ($\pm .51$)	Weight (Grams)
CY06	.300 (7.62)	.200 (5.08)	.115 (2.92)	.200 (5.08)	.3 — .4
CY07	.300 (7.62)	.300 (7.62)	.115 (2.92)	.200 (5.08)	.4 — .5
CY08	.500 (12.70)	.300 (7.62)	.115 (2.92)	.400 (10.16)	.7 — .8

Note: All leads are 24 AWG, $.020 \pm .002$ ($.51 \pm .05$) diameter. Leads are solderable and weldable gold-plated Dumet, per MIL-STD-1276, Type D.

Glass Capacitors

CORNING
ELECTRONICS

CYFR 10, 15, 20, 30 (HIGH RELIABILITY)

APPLICATIONS

CORNING® style CYFR high reliability glass capacitors have failure rates among the lowest available. Outstanding stability, reliability and electrical performance are provided by the fused monolithic construction, which is virtually immune to environmental stresses. These capacitors meet or exceed all requirements of Corning specifications J-950 and J-951, which combine the most exacting features of many specifications and substantially exceed most.

PERFORMANCE CHARACTERISTICS

Tolerance — Available tolerances for each value of capacitance are shown in the Ordering Information table. For codes, refer to the Part Numbers paragraph.

Temperature Coefficient — $+140 \pm 25$ ppm/°C at 100 kHz. TC will track and retrace to within ± 5 ppm. Capacitance drift is less than 0.1% or 0.1 pf, whichever is greater.

Voltage Coefficient — Zero.

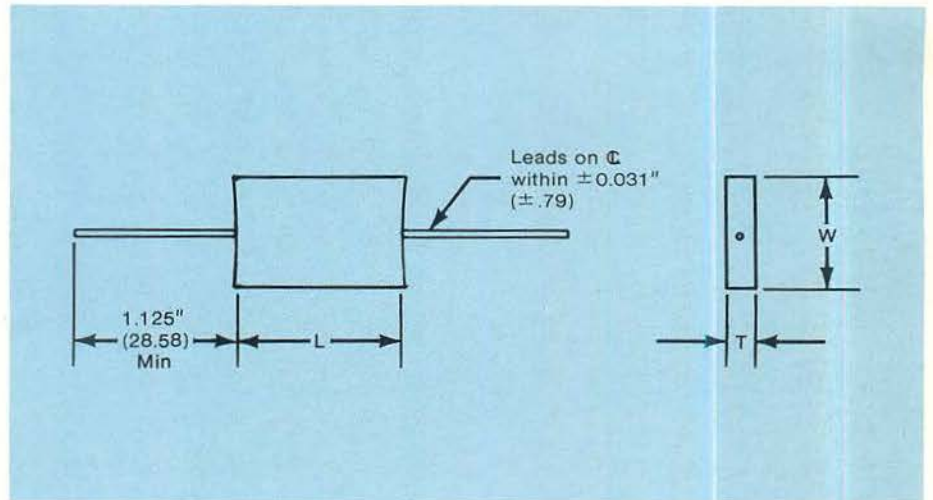
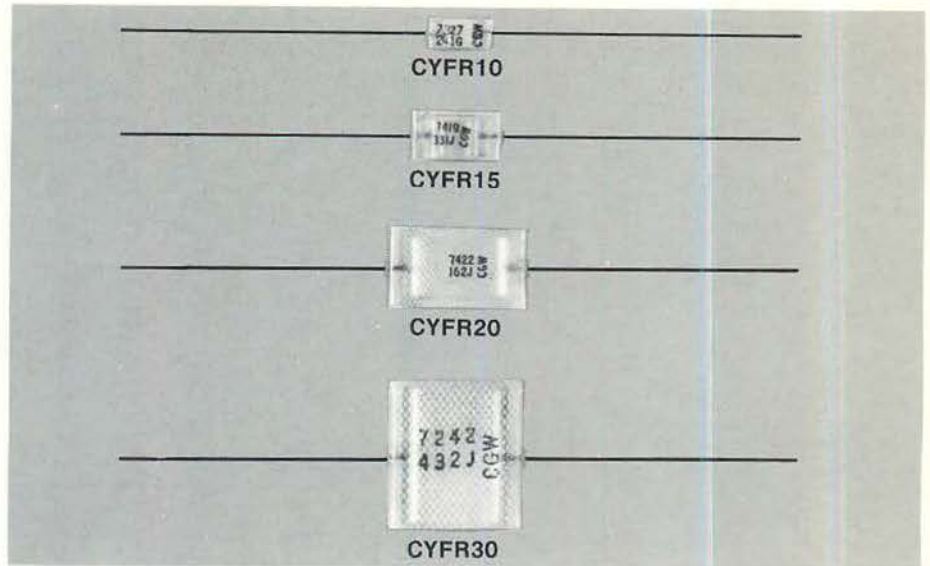
Losses — Extremely low, and remain relatively low at elevated temperatures and high frequencies. Dissipation factor is less than 0.001 at 1 kHz and 25°C.

Life — After 2,000 hours at 125°C with 150% of rated voltage applied, capacitance change is less than 0.5% or 0.5 pf, dissipation factor is less than 0.0015, and insulation resistance is greater than 500,000 megohms.

Insulation Resistance — Greater than 500,000 megohms at 25°C; greater than 10,000 megohms at 125°C.

Voltage/Temperature Ratings — Voltage ratings are shown in the ordering information table. The operating temperature range is -55°C to $+125^\circ\text{C}$ with no derating required.

Moisture Resistance — Exceeds all requirements of MIL-C-11272 and MIL-STD-202, Method 106.



Dimensions — Inches (Millimeters)			Lead Dia		Weight (Grams)
Style	L Min - Max	W Min - Max	T Min - Max	+ .004 (+0.1) - .001 (-0.03)	
CYFR10	.2969 — .3906 (7.54 — 9.93)	.1406 — .2031 (3.58 — 5.16)	.0469 — .1093 (1.19 — 2.77)	.020 24 AWG (.51)	.25 — .50
CYFR15	.4219 — .5156 (10.72 — 13.11)	.2344 — .2968 (5.94 — 7.54)	.0625 — .1562 (1.60 — 3.96)	.020 24 AWG (.51)	.75 — 1.25
CYFR20	.6719 — .7968 (17.07 — 20.24)	.3750 — .4687 (9.52 — 11.91)	.0938 — .1875 (2.39 — 4.78)	.025 22 AWG (.63)	2.50 — 4.00
CYFR30	.7032 — .8281 (17.86 — 21.03)	.6719 — .8281 (17.07 — 21.03)	.0938 — .1875 (2.39 — 4.78)	.025 22 AWG (.63)	5.00 — 7.00

Note: Leads are solderable and weldable Dumet.

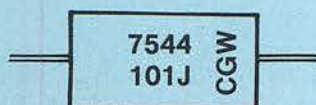
PART NUMBERS AND ORDERING INFORMATION

Capacitance Value (pF)	Corning Part Number	DC Working Voltage	Tolerances Available	Capacitance Value (pF)	Corning Part Number	DC Working Voltage	Tolerances Available
STANDARD VALUES CYFR10				STANDARD VALUES CYFR15, con't.			
0.5	CYFR10 * 0R5 **	500	C	240	CYFR15 * 241 **	500	F,G,J
1.0	CYFR10 010	500	C	270	CYFR15 271	500	F,G,J
1.5	CYFR10 1R5	500	C	300	CYFR15 301	500	F,G,J
2.2	CYFR10 2R2	500	C,D	330	CYFR15 331	500	F,G,J
2.7	CYFR10 2R7	500	C	360	CYFR15 361	500	F,G,J
3.0	CYFR10 030	500	C,D	390	CYFR15 391	500	F,G,J
3.3	CYFR10 3R3	500	C	430	CYFR15 431	500	F,G,J
3.6	CYFR10 3R6	500	C,D	470	CYFR15 471	500	F,G,J
3.9	CYFR10 3R9	500	C	510	CYFR15 511	500	F,G,J
4.3	CYFR10 4R3	500	C,D	560	CYFR15 561	300	F,G,J
4.7	CYFR10 4R7	500	C	620	CYFR15 621	300	F,G,J
5.1	CYFR10 5R1	500	C	680	CYFR15 681	300	F,G,J
5.6	CYFR10 5R6	500	C	750	CYFR15 751	300	F,G,J
6.2	CYFR10 6R2	500	C,J	820	CYFR15 821	300	F,G,J
6.8	CYFR10 6R8	500	C,J	910	CYFR15 911	300	F,G,J
7.5	CYFR10 7R5	500	C,J	1000	CYFR15 102	300	F,G,J
8.2	CYFR10 8R2	500	C,J	1100	CYFR15 112	300	F,G,J
9.1	CYFR10 9R1	500	C,J	1200	CYFR15 122	300	F,G,J
10	CYFR10 100	500	C,J	STANDARD VALUES CYFR20			
11	CYFR10 110	500	C,J	560	CYFR20 * 561 **	500	F,G,J
12	CYFR10 120	500	C,J	620	CYFR20 621	500	F,G,J
13	CYFR10 130	500	G,J	680	CYFR20 681	500	F,G,J
15	CYFR10 150	500	G,J	750	CYFR20 751	500	F,G,J
16	CYFR10 160	500	G,J	820	CYFR20 821	500	F,G,J
18	CYFR10 180	500	G,J	910	CYFR20 911	500	F,G,J
20	CYFR10 200	500	G,J	1000	CYFR20 102	500	F,G,J
22	CYFR10 220	500	G,J	1100	CYFR20 112	500	F,G,J
24	CYFR10 240	500	G,J	1200	CYFR20 122	500	F,G,J
27	CYFR10 270	500	F,G,J	1300	CYFR20 132	500	F,G,J
30	CYFR10 300	500	F,G,J	1500	CYFR20 152	500	F,G,J
33	CYFR10 330	500	F,G,J	1600	CYFR20 162	500	F,G,J
36	CYFR10 360	500	F,G,J	1800	CYFR20 182	500	F,G,J
39	CYFR10 390	500	F,G,J	2000	CYFR20 202	500	F,G,J
43	CYFR10 430	500	F,G,J	2200	CYFR20 222	500	F,G,J
47	CYFR10 470	500	F,G,J	2400	CYFR20 242	500	F,G,J
51	CYFR10 510	500	F,G,J	2700	CYFR20 272	500	F,G,J
56	CYFR10 560	500	F,G,J	3000	CYFR20 302	500	F,G,J
62	CYFR10 620	500	F,G,J	3300	CYFR20 332	500	F,G,J
68	CYFR10 680	500	F,G,J	3600	CYFR20 362	300	F,G,J
75	CYFR10 750	500	F,G,J	3900	CYFR20 392	300	F,G,J
82	CYFR10 820	500	F,G,J	4300	CYFR20 432	300	F,G,J
91	CYFR10 910	500	F,G,J	4700	CYFR20 472	300	F,G,J
100	CYFR10 101	500	F,G,J	5100	CYFR20 512	300	F,G,J
110	CYFR10 111	500	F,G,J	STANDARD VALUES CYFR30			
120	CYFR10 121	500	F,G,J	3600	CYFR30 * 362 **	500	F,G,J
130	CYFR10 131	500	F,G,J	3900	CYFR30 392	500	F,G,J
150	CYFR10 151	500	F,G,J	4300	CYFR30 432	500	F,G,J
160	CYFR10 161	300	F,G,J	4700	CYFR30 472	500	F,G,J
180	CYFR10 181	300	F,G,J	5100	CYFR30 512	500	F,G,J
200	CYFR10 201	300	F,G,J	5600	CYFR30 562	500	F,G,J
220	CYFR10 221	300	F,G,J	6200	CYFR30 622	500	F,G,J
240	CYFR10 241	300	F,G,J	6800	CYFR30 682	300	F,G,J
STANDARD VALUES CYFR15				7500	CYFR30 752	300	F,G,J
160	CYFR15 * 161 **	500	F,G,J	8200	CYFR30 822	300	F,G,J
180	CYFR15 181	500	F,G,J	9100	CYFR30 912	300	F,G,J
200	CYFR15 201	500	F,G,J	10000	CYFR30 103	300	F,G,J
220	CYFR15 221	500	F,G,J				

*Add S or G for lead finish

**Add letter for tolerance code

PART MARKING



75 — Year
44 — Lot Code
101 — Capacitance, Coded in pF
J — Tolerance
CGW — Corning Glass Works

PART NUMBER EXPLANATION

CYFR 10 G 101 J A Test Level
 A = J-950 Specification
 No designator = J-951 Specification
 Capacitance Tolerance (See B)
 Capacitance, Coded in pF (See A)

A. Capacitance Code is expressed in picofarads (pF). The first two digits represent significant figures and the third digit specifies the number of zeros to follow; i.e. 561 indicates 560 pF. For fractional values below 10pF, R = decimal point; i.e. 1R5 indicates 1.5 pF.

B. Tolerance Code:
 C = ± .25 pF
 D = ± .50 pF
 F = ± 1%
 G = ± 2%
 J = ± 5%

High Reliability Glass Capacitor
 Case Size 10, 15, 20, 30
 Lead Finish
 S = Solder Coated Dumet
 G = Gold Plated Dumet (50 μinch minimum)

Glass Capacitors

CYR10, 15, 20, 30, 51, 52, 53 (ESTABLISHED RELIABILITY)
M23269/01, 02, 03, 04, 10 (QPL TO MIL-C-23269)
FAILURE RATE LEVELS L, M, AND S

APPLICATIONS

These precision glass-dielectric capacitors are QPL to Established Reliability specification MIL-C-23269. Fused monolithic construction provides excellent electrical performance, environmental immunity, stability and retraceability. These capacitors are available in both axial and radial configurations.

PERFORMANCE CHARACTERISTICS

Temperature Coefficient — +140 ± 25 ppm/°C from -55°C to +125°C. TC of all units will track and retrace to within ± 5 ppm.

Life — At rated conditions (100% rated voltage, 125°C), capacitance change is less than:

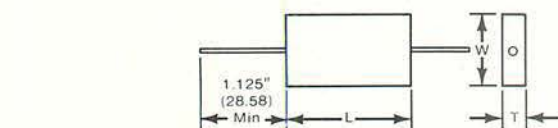
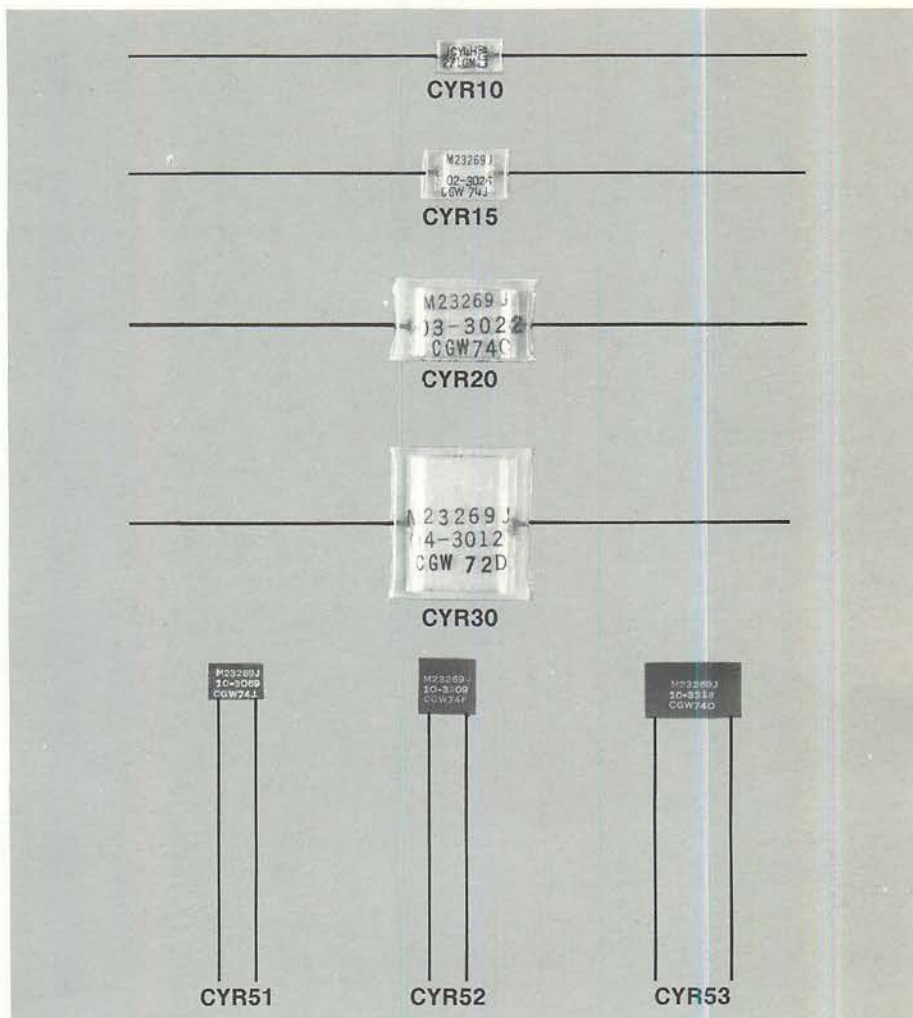
- ± 0.5% after 2,000 hours
- ± 2.0% after 30,000 hours

At accelerated conditions (150% rated voltage, 125°C), capacitance change is less than:

- ± 0.5% after 2,000 hours
- ± 2.0% after 6,000 hours

Insulation Resistance — A minimum of 100,000 megohms at 25°C and 10,000 megohms at 125°C.

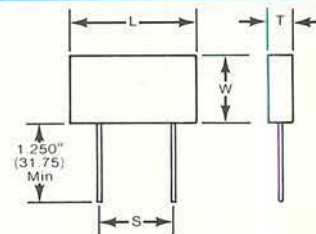
Voltage/Temperature Ratings — Voltage ratings are shown in the part number tables. The operating temperature range is -55°C to +125°C.



Dimensions — Inches (Millimeters)

Case Size	L	W	T	Lead Dia. +.004 (+0.1) -.001 (-0.03)
CYR10	.344 ± .047 (8.74 ± 1.19)	.172 ± .031 (4.37 ± .79)	.078 ± .031 (1.98 ± .79)	.020 (.51)
CYR15	.469 ± .047 (11.91 ± 1.19)	.266 ± .031 (6.76 ± .79)	.109 ± .047 (2.77 ± 1.19)	.020 (.51)
CYR20	.734 ± .062 (18.64 ± 1.57)	.422 ± .047 (10.72 ± 1.19)	.141 ± .047 (3.58 ± 1.19)	.025 (.63)
CYR30	.766 ± .062 (19.46 ± 1.57)	.750 ± .078 (19.05 ± 1.98)	.141 ± .047 (3.58 ± 1.19)	.025 (.63)

NOTE: All leads are solder coated, copper-clad nickel-iron.



Dimensions — Inches (Millimeters)

Case Size	L ±.005 (±.13)	W ±.010 (±.25)	T ±.005 (±.13)	Lead Dia. ±.002 (±.051)	S ±.020 (±.51)
CYR51	.300 (7.62)	.200 (5.08)	.115 (2.92)	.020 (.51)	.200 (5.08)
CYR52	.300 (7.62)	.300 (7.62)	.115 (2.92)	.020 (.51)	.200 (5.08)
CYR53	.500 (12.70)	.300 (7.62)	.115 (2.92)	.020 (.51)	.400 (10.16)

NOTE: All leads are copper-clad nickel-iron, in accordance with MIL-STD-1276 TYPE D.

Glass Capacitors



PART NUMBERS AND ORDERING INFORMATION (AXIAL LEAD)

Value (pF)	Part Number* Capacitance Tolerance			Value (pF)	Part Number* Capacitance Tolerance			Value (pF)	Part Number* Capacitance Tolerance		
STYLE CYR10 M23269/01-				STYLE CYR10 M23269/01- (cont'd.)				STYLE CYR20 M23269/03-			
500 Volts	±.25pF	±.5pF	±5%	500 Volts	±1%	±2%	±5%	500 Volts	±1%	±2%	±5%
.5	*.001	—	—	68	*.079	*.080	*.081	560	*.001	*.002	*.003
1.0	—002	—	—	75	—082	—083	—084	620	—004	—005	—006
1.5	—003	—	—	82	—085	—086	—087	680	—007	—008	—009
2.2	—004	*.005	—	91	—088	—089	—090	750	—010	—011	—012
2.7	—006	—	—	100	—091	—092	—093	820	—013	—014	—015
3.0	—007	—008	—	110	—094	—095	—096	910	—016	—017	—018
3.3	—009	—	—	120	—097	—098	—099	1000	—019	—020	—021
3.6	—010	—011	—	130	—100	—101	—102	1100	—022	—023	—024
3.9	—012	—	—	150	—103	—104	—105	1200	—025	—026	—027
4.3	—013	—014	—	160	—106	—107	—108	1300	—028	—029	—030
4.7	—015	—	—	180	—109	—110	—111	1500	—031	—032	—033
5.1	—016	—	—	200	—112	—113	—114	1600	—034	—035	—036
5.6	—017	—	*.018	300 Volts				1800	—037	—038	—039
6.2	—019	—	—020	220	—115	—116	—117	2000	—040	—041	—042
6.8	—021	—	—022	240	—118	—119	—120	2200	—043	—044	—045
7.5	—023	—	—024	270	—121	—122	—123	2400	—046	—047	—048
8.2	—025	—	—026	300	—124	—125	—126	2700	—049	—050	—051
9.1	—027	—	—028	STYLE CYR15 M23269/02-				3000	—052	—053	—054
10	—029	—	—030	500 Volts	±1%	±2%	±5%	3300	—055	—056	—057
11	—031	—	—032	220	*.001	*.002	*.003	300 Volts			
12	—033	—	—034	240	—004	—005	—006	3600	—058	—059	—060
	±1%	±2%	±5%	270	—007	—008	—009	3900	—061	—062	—063
13	—	*.035	*.036	300	—010	—011	—012	4300	—064	—065	—066
15	—	—037	—038	330	—013	—014	—015	4700	—067	—068	—069
16	—	—039	—040	360	—016	—017	—018	5100	—070	—071	—072
18	—	—041	—042	390	—019	—020	—021	STYLE CYR30 M23269/04-			
20	—	—043	—044	430	—022	—023	—024	500 Volts	±1%	±2%	±5%
22	—	—045	—046	470	—025	—026	—027	3600	*.001	*.002	*.003
24	—	—047	—048	510	—028	—029	—030	3900	—004	—005	—006
27	*.049	—050	—051	300 Volts				4300	—007	—008	—009
30	—052	—053	—054	560	—031	—032	—033	4700	—010	—011	—012
33	—055	—056	—057	620	—034	—035	—036	5100	—013	—014	—015
36	—058	—059	—060	680	—037	—038	—039	5600	—016	—017	—018
39	—061	—062	—063	750	—040	—041	—042	6200	—019	—020	—021
43	—064	—065	—066	820	—043	—044	—045	300 Volts			
47	—067	—068	—069	910	—046	—047	—048	6800	—022	—023	—024
51	—070	—071	—072	1000	—049	—050	—051	7500	—025	—026	—027
56	—073	—074	—075	1100	—052	—053	—054	8200	—028	—029	—030
62	—076	—077	—078	1200	—055	—056	—057	9100	—031	—032	—033
								10000	—034	—035	—036

PART NUMBERS AND ORDERING INFORMATION (RADIAL LEAD)

Value (pF)	Part Number* Capacitance Tolerance			Value (pF)	Part Number* Capacitance Tolerance			Value (pF)	Part Number* Capacitance Tolerance		
STYLE CYR51 M23269/10-				STYLE CYR51 M23269/10-				STYLE CYR51 M23269/10- (cont'd.)			
300 Volts	±.25pF	±2%	±5%	300 Volts	±1%	±2%	±5%	300 Volts	±1%	±2%	±5%
1	*.001	—	—	27	*.052	*.053	*.054	300	*.127	*.128	*.129
1.5	—002	—	—	30	—055	—056	—057	330	—130	—131	—132
2.2	—003	—	—	33	—058	—059	—060	360	—133	—134	—135
2.7	—004	—	—	36	—061	—062	—063	390	—136	—137	—138
3.0	—005	—	—	39	—064	—065	—066	430	—139	—140	—141
3.3	—006	—	—	43	—067	—068	—069	470	—142	—143	—144
3.6	—007	—	—	47	—070	—071	—072	510	—145	—146	—147
3.9	—008	—	—	51	—073	—074	—075	560	—148	—149	—150
4.3	—009	—	—	56	—076	—077	—078	STYLE CYR52 M23269/10-			
4.7	—010	—	—	62	—079	—080	—081	300 Volts	±1%	±2%	±5%
5.1	—011	—	*.012	68	—082	—083	—084	620	*.201	*.202	*.203
5.6	—013	—	—014	75	—085	—086	—087	680	—204	—205	—206
6.2	—015	—	—016	82	—088	—089	—090	750	—207	—208	—209
6.8	—017	—	—018	91	—091	—092	—093	820	—210	—211	—212
7.5	—019	—	—020	100	—094	—095	—096	910	—213	—214	—215
8.2	—021	—	—022	110	—097	—098	—099	1000	—216	—217	—218
9.1	—023	—	—024	120	—100	—101	—102	STYLE CYR53 M23269/10-			
10	—025	—	—026	130	—103	—104	—105	300 Volts	±1%	±2%	±5%
11	—027	—	—028	150	—106	—107	—108	1100	*.301	*.302	*.303
12	—029	—	—030	160	—109	—110	—111	1200	—304	—305	—306
13	—031	*.032	—033	180	—112	—113	—114	1300	—307	—308	—309
15	—034	—035	—036	200	—115	—116	—117	1500	—310	—311	—312
16	—037	—038	—039	220	—118	—119	—120	1600	—313	—314	—315
18	—040	—041	—042	240	—121	—122	—123	1800	—316	—317	—318
20	—043	—044	—045	270	—124	—125	—126	2000	—319	—320	—321
22	—046	—047	—048					2200	—322	—323	—324
24	—049	—050	—051					2400	—325	—326	—327

*Add first digit to indicate failure rate, as follows:

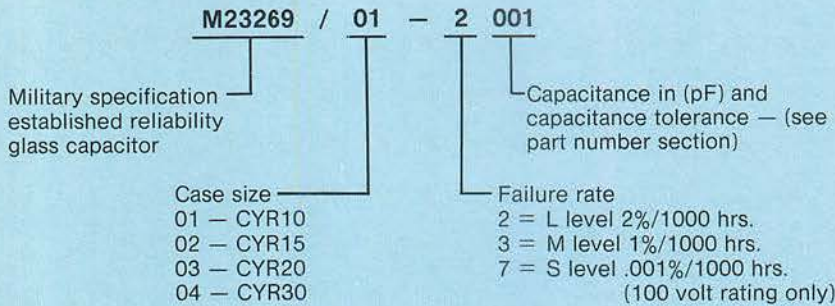
Examples:

M23269/01-3007 M23269/10-2053
 CYR10 3pF ±.25pF CYR51 27pF ±2%
 M Failure Rate L Failure Rate

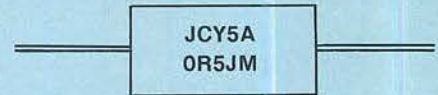
Failure Rate (90% Confidence)

2 - L 2%/1000 Hours
 3 - M 1%/1000 Hours
 7 - S .001%/1000 Hours. NOTE: Available only in CYR10-30 styles with 100 wvdc rating.

PART NUMBER EXPLANATION FOR CYR10-30

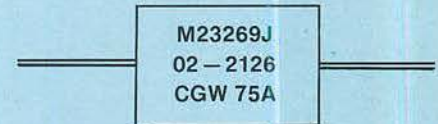


PART MARKING - CYR10



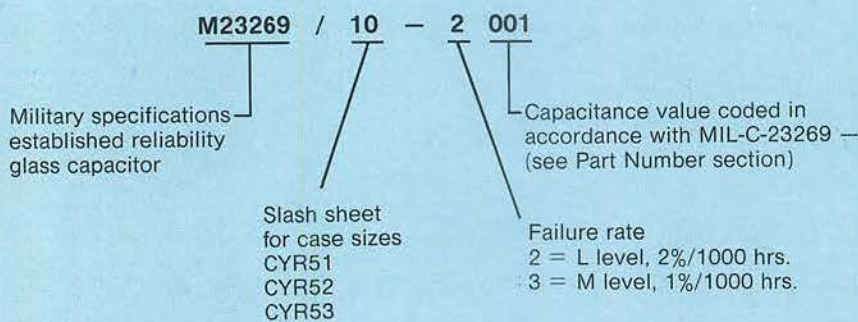
J—Jan Trademark OR5—Capacitance code—
C—Capacitor OR5 = 0.5pF
Y—Glass Dielectric J—Capacitance tolerance—
5—Last digit of year J = ±5%
A—4 week lot code M—Failure level

PART MARKING - CYR15-30

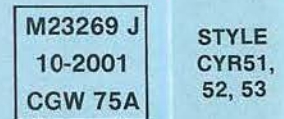


M23269—Military specification established reliability glass capacitor
J—Jan trademark
02—Case size (CYR15)
2—Failure rate (L level)
126—Dash Number—(capacitance in pF and capacitance tolerance)
CGW—Corning Glass Works
75—Year
A—Lot Code

PART NUMBER EXPLANATION FOR CYR51-53



PART MARKING



M23269 - Military specification established reliability glass capacitor
J - Jan
10 - Case size
2 - Failure rate (L level)
001 - Capacitance, coded in (pF) and capacitance tolerance
CGW - Corning Glass Works
75 - Year
A - Lot Code

Cross-Reference Information

MIL-C-23269	MIL-C-11272
Style	Style
CYR10	CY10
CYR15	CY15
CYR20	CY20
CYR30	CY30
CYR51	CY06
CYR52	CY07
CYR53	CY08

Ceramic/GLASS-K™ Capacitors

Introduction

CORNING® Monolithic Capacitors for All Applications:

Monolithic capacitors have been experiencing a tremendous increase in usage in the last several years. Originally developed for high reliability aerospace and government programs, this space age technology is now economically feasible for general industry usage. The inherent reliability and volumetric efficiency of this capacitor type is now proving itself in high volume industrial and commercial products as it did in military and space applications.

Highest Quality Construction:

a. Chip

Monolithic construction gives CORNING Ceramic and Glass-K Capacitors all the advantages of their state-of-the-art design. Alternate layers of conductor and

dielectric are fused into a solid monolithic chip assuring reliability and volumetric efficiency.

b. Lead Attach

A unique, tightly controlled, highly automated lead attach process results in a reliable bonding of leads to the capacitor chip. Axial lead configurations for high volume automatic insertion applications are available.

c. Coating

Silicone and epoxy coatings are tailored to specific product needs and styles to complete the leaded monolithic capacitor. Our spin-seal axial capacitor coating process represents advancement in the state-of-the-art necessary to provide both quality and high volume production.

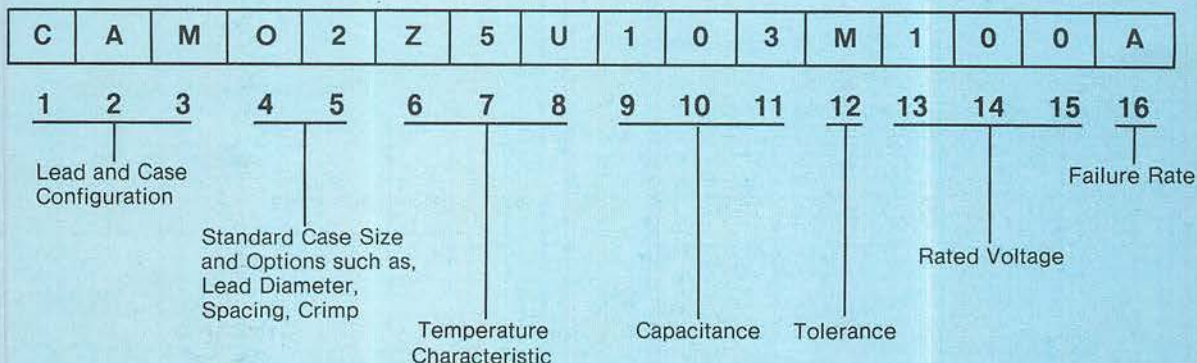
Dielectrics:

Ceramic dielectrics are available in two standard EIA characteristics. Corning's long experience with manufacturing high volume components assures a quality product and dependable service.

Glass-K is a proprietary material especially formulated to give a high dielectric constant with the inherent stability of glass. Corning's leadership in glass technology assures performance and reliability.

INDUSTRIAL CERAMIC CAPACITOR PART NUMBERING SYSTEM

All industrial ceramic capacitor numbers will consist of a 16-character code. The significance of the individual characters in the code is shown in the Character Key. (Does not apply to GLASS-K products.)



CHARACTER KEY — (Based on standard EIA part numbering system)

1. Always "C" (for Corning Ceramic Capacitor)

2. Lead Configuration

- "A" — Axial
- "R" — Radial
- "C" — Chip

3. Case Configuration

- "M" — Molded
- "C" — Conformal Coat
- "U" — Uncased (un-insulated)

4 & 5. Standard leads and spacing indicated by character 4 = "0". Other digits would indicate listed options such as lead size, spacing, crimp. Character 5 indicates the case size.

6. Low Temperature Limit, °C

Symbol	Low Temp. Limit, °C
Z	+10
Y	-30
X	-55

7. High Temperature Limit, °C

Symbol	High Temp. Limit, °C
2	+45
4	+65
5	+85
6	+105
7	+125

Symbol	% TC	Symbol	% TC
A	±1.0	P	±10.0
B	±1.5	R	±15.0
C	±2.2	S	±22.0
D	±3.3	T	+22, -33
E	±4.7	U	+22, -56
F	±7.5	V	+22, -82

9. 10 & 11. Capacitance in Picofarads.

9 = 1st significant figure. 10 = 2nd significant figure.
11 = Multiplier (number of zeros).

12. Tolerance Designator

- C = ±.25 pF
- D = ±.5 pF
- F = ±1%
- G = ±2%
- J = ±5%
- K = ±10%
- M = ±20%
- Z = +80, -20%

13, 14 & 15. Voltage Rating — Vdc

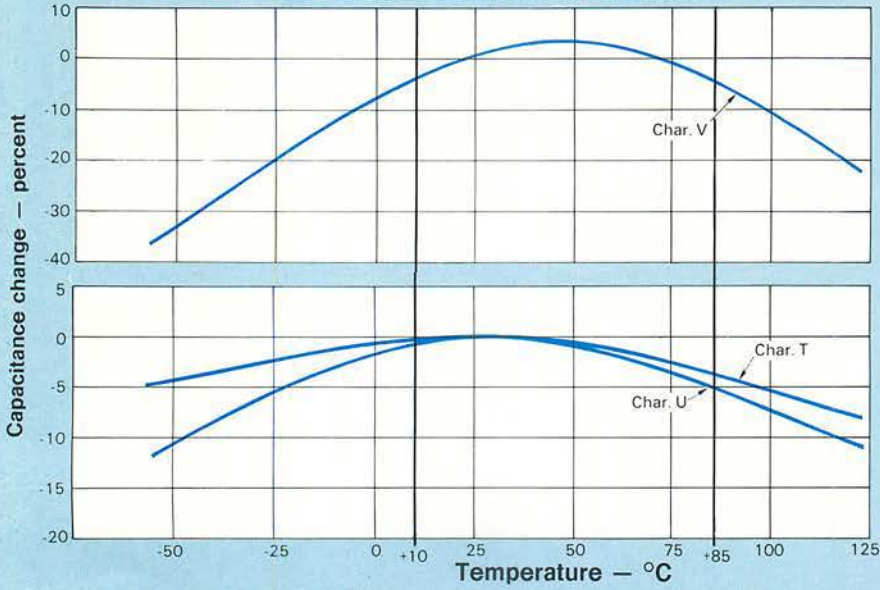
- 200 = 200 Vdc
- 100 = 100 Vdc
- 050 = 50 Vdc
- 025 = 25 Vdc

16. Failure Rate

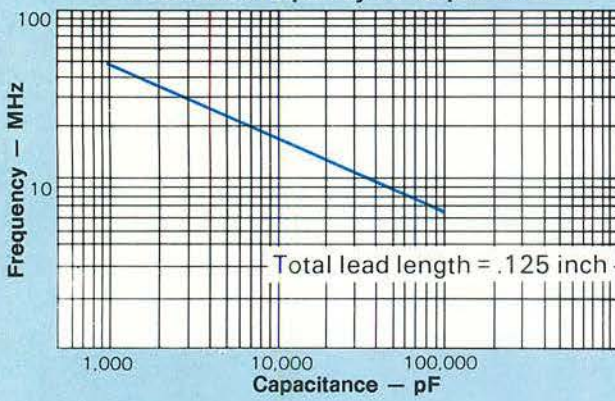
- A = Not Applicable
- L = 2% per 1,000 hours
- M = 1% per 1,000 hours
- P = 0.1% per 1,000 hours
- R = .01% per 1,000 hours
- S = .001% per 1,000 hours

GLASS-K CAPACITOR PERFORMANCE CURVES

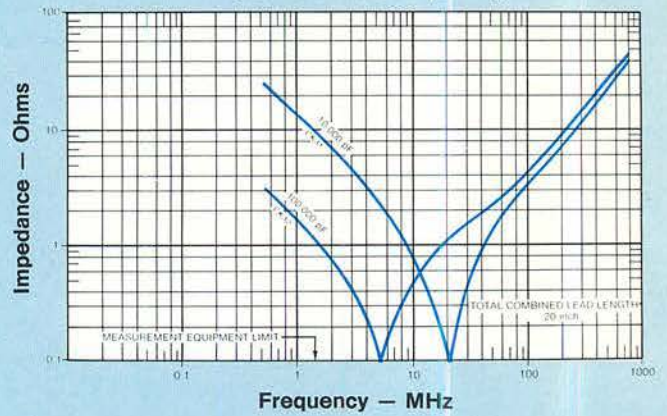
% Capacitance Change vs. Temperature



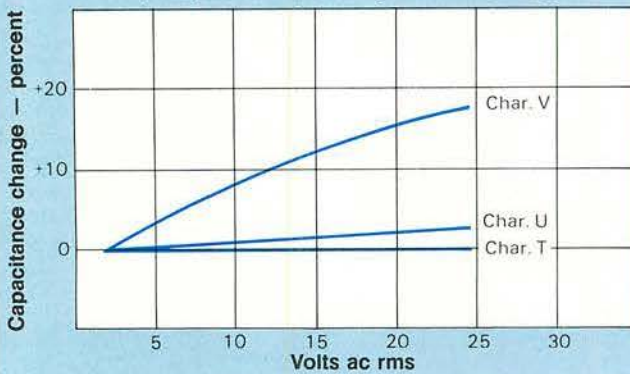
Resonant Frequency vs. Capacitance



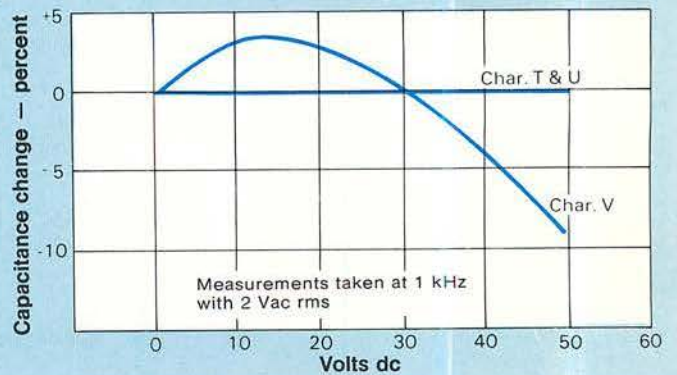
Impedance vs. Frequency



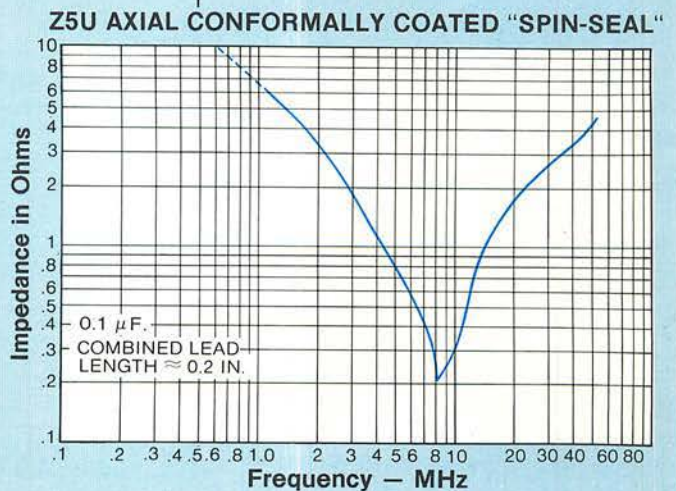
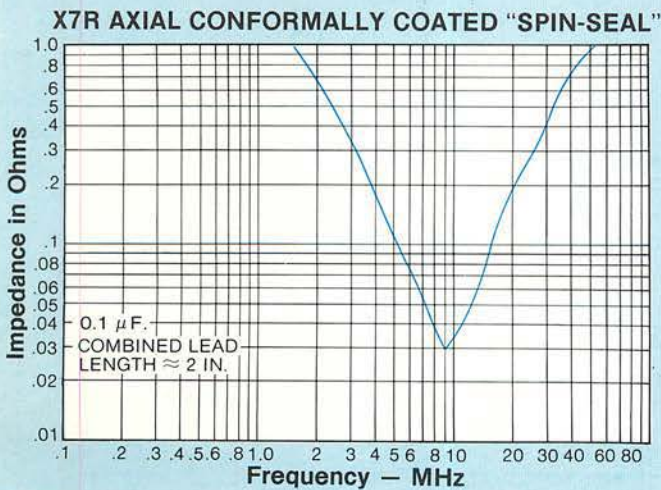
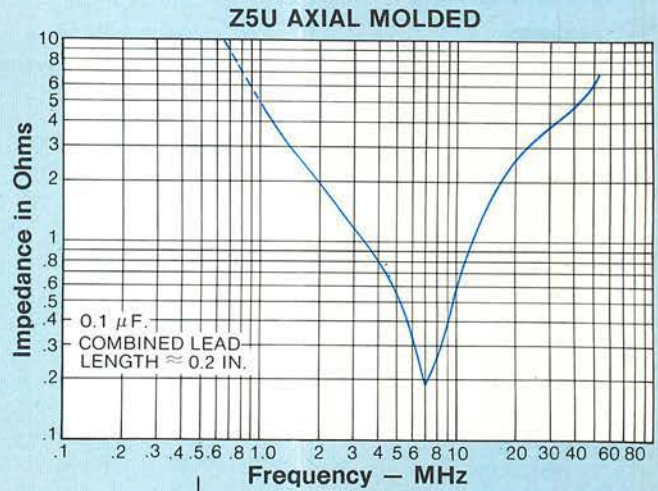
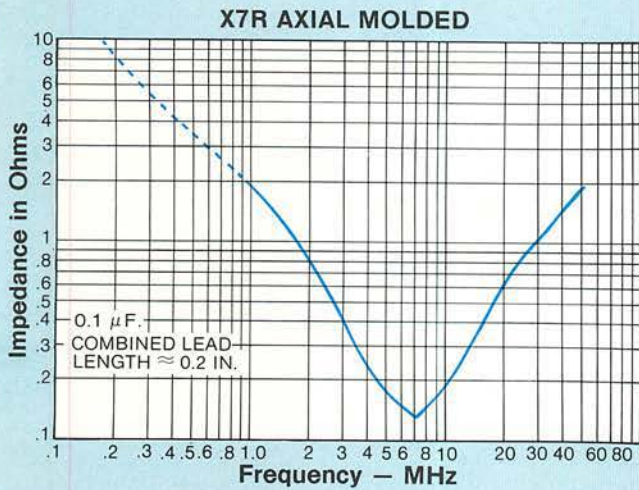
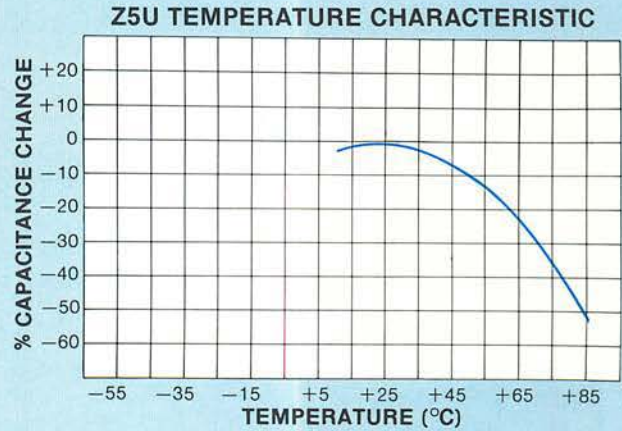
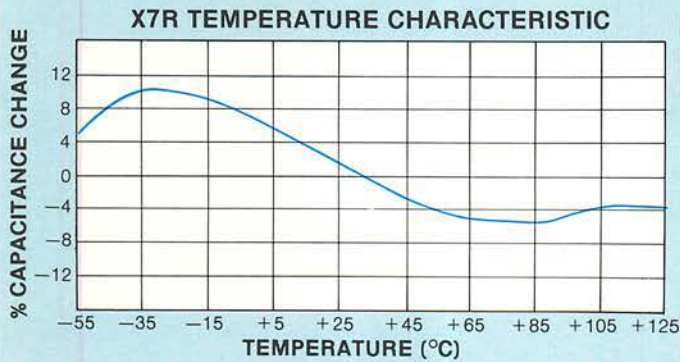
**Applied rms voltage at 1 kHz
% Capacitance Change vs. ac Voltage**



**Applied dc voltage
% Capacitance Change vs. dc Voltage**



CERAMIC CAPACITOR PERFORMANCE CURVES



GLASS-K™ Capacitors

CORNING
ELECTRONICS

CYK01, 02 (INDUSTRIAL)
CK31, 32 (QPL to MIL-C-11015/25)

APPLICATIONS

These miniature multilayer ceramic capacitors, CORNING® style CYK01 and CYK02, meet or exceed all requirements of MIL-C-11015/25. High volumetric efficiency and reliable performance result from the special GLASS-K™ dielectric, which is fused into a compact monolithic structure, sized for automatic insertion. Available in three different stability characteristics, these capacitors are suitable for both military and commercial applications in miniature circuitry.

PERFORMANCE CHARACTERISTICS

Tolerance — $\pm 20\%$ and $\pm 10\%$ in characteristics "U" and "V", and $\pm 10\%$ and $\pm 5\%$ in characteristic "T".

Stability Characteristics — Available as follows:

T-TC: +2, -10%; TVC: +2, -10%
U-TC: +2, -15%; TVC: +2, -15%
V-TC: +20, -45%; TVC: +20, -50%

Dissipation Factor:

T: <1.0%
U: <1.5%
V: <3.0%

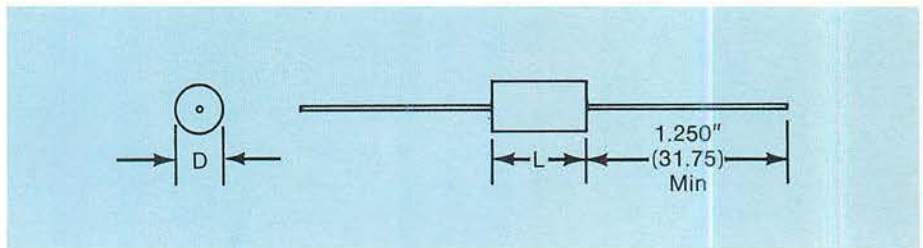
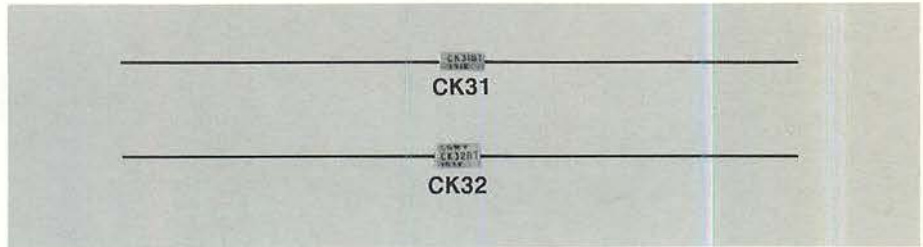
Life — Meets or exceeds requirements of MIL-C-11015. At 200% of rated voltage, 125°C, the capacitance change for each stability characteristic is as follows:

T: <2%
U: <5%
V: <20%

Insulation Resistance — 100,000 megohms or 1,000 megohm-microfarads, whichever is less.

Voltage/Temperature Ratings — Rated voltage is 50 Vdc. The operating temperature range is -55°C to +125°C.

Moisture Resistance — Meets or exceeds requirements of MIL-C-11015 and MIL-STD-202, Method 106. The capacitance change is less than 2% for stability characteristics T and U, and less than 5% for characteristic V.



Dimensions — Inches (Millimeters)

Case Size	L Max	D Max	Lead Dia. +.004 (.10) -.001 (.03)	Weight (Grams)
CK31	.250 (6.35)	.100 (2.54)	.016 (.41)	.2
CK32	.250 (6.35)	.140 (3.56)	.016 (.41)	.3

Note: Leads are gold-plated, solderable and weldable Dumet per MIL-STD-1276, Type D.

Quick Selection Guide

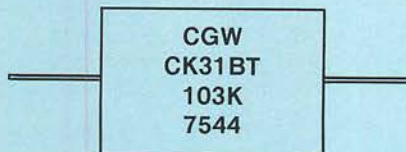
Capacitance — pF	Style CK	Stability Char.
270 — 10,000	31	T
12,000 — 20,000	31 32	U T
22,000 — 39,000	31 32	V U
47,000 — 51,000	31	V
56,000 — 100,000	32	V

PART NUMBERS AND ORDERING INFORMATION

Capacitance Value (pF)	Corning Part No.	Military Type Designation	DC Working Voltage	Tolerances Available	Capacitance Value (pF)	Corning Part No.	Military Type Designation	DC Working Voltage	Tolerances Available
STANDARD VALUES CK31					STANDARD VALUES CK31 (Con't.)				
270	CYK01BT271 *	CK31BT271 *	50	J, K	22000	CYK01BV223 *	CK31BV223 *	50	K, M
330	CYK01BT331	CK31BT331	50	J, K	27000	CYK01BV273	CK31BV273	50	K, M
390	CYK01BT391	CK31BT391	50	J, K	33000	CYK01BV333	CK31BV333	50	K, M
470	CYK01BT471	CK31BT471	50	J, K	39000	CYK01BV393	CK31BV393	50	K, M
560	CYK01BT561	CK31BT561	50	J, K	47000	CYK01BV473	CK31BV473	50	K, M
680	CYK01BT681	CK31BT681	50	J, K	51000	CYK01BV513	CK31BV513	50	K, M
820	CYK01BT821	CK31BT821	50	J, K	STANDARD VALUES CK32				
1000	CYK01BT102	CK31BT102	50	J, K	12000	CYK02BT123 *	CK32BT123 *	50	J, K
1200	CYK01BT122	CK31BT122	50	J, K	15000	CYK02BT153	CK32BT153	50	J, K
1500	CYK01BT152	CK31BT152	50	J, K	18000	CYK02BT183	CK32BT183	50	J, K
1800	CYK01BT182	CK31BT182	50	J, K	20000	CYK02BT203	CK32BT203	50	J, K
2200	CYK01BT222	CK31BT222	50	J, K	22000	CYK02BU223 *	CK32BU223 *	50	K, M
2700	CYK01BT272	CK31BT272	50	J, K	27000	CYK02BU273	CK32BU273	50	K, M
3300	CYK01BT332	CK31BT332	50	J, K	33000	CYK02BU333	CK32BU333	50	K, M
3900	CYK01BT392	CK31BT392	50	J, K	39000	CYK02BU393	CK32BU393	50	K, M
4700	CYK01BT472	CK31BT472	50	J, K	56000	CYK02BV563 *	CK32BV563 *	50	K, M
5600	CYK01BT562	CK31BT562	50	J, K	68000	CYK02BV683	CK32BV683	50	K, M
6800	CYK01BT682	CK31BT682	50	J, K	82000	CYK02BV823	CK32BV823	50	K, M
8200	CYK01BT822	CK31BT822	50	J, K	100000	CYK02BV104	CK32BV104	50	K, M
10000	CYK01BT103	CK31BT103	50	J, K					
12000	CYK01BU123 *	CK31BU123 *	50	K, M					
15000	CYK01BU153	CK31BU153	50	K, M					
18000	CYK01BU183	CK31BU183	50	K, M					
20000	CYK01BU203	CK31BU203	50	K, M					

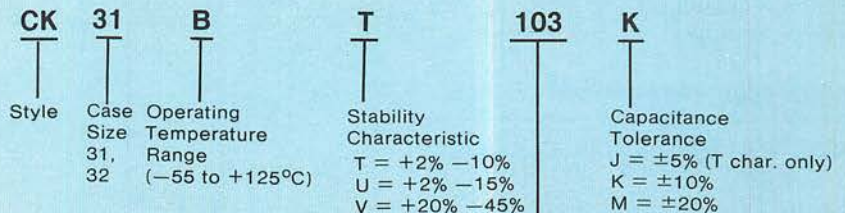
*Add Letter for Tolerance Code above line: J = ±5%, K = ±10%, M = ±20%

PART MARKING



CGW — Corning Glass Works
 CK — Style
 31 — Case Size
 B — Operating Temperature Range
 T — Stability Characteristic
 103 — Capacitance, Coded in pF
 K — Tolerance
 7544 — Date and Lot Code

PART NUMBER EXPLANATION



Capacitance Code expressed in picofarads (pF). The first two digits represent significant figures and the third digit specifies the number of zeros to follow; i.e. 103 indicates 10,000 pF.

Ceramic Capacitors

CK12, 13, 14 (QPL to MIL-C-11015/20)

CORNING
ELECTRONICS

APPLICATIONS

These miniature multilayer ceramic capacitors are QPL to MIL-C-11015/20. The exclusive dielectric provides high volumetric efficiency and superior reliability. The monolithic units are molded into rugged flame-retardant cases, ideally suited for automatic insertion.

PERFORMANCE CHARACTERISTICS

Tolerance — $\pm 20\%$ and $\pm 10\%$.

Stability Characteristics — Available as follows:

X — TC: $\pm 15\%$; TVC: +15, -25%

R — TC: $\pm 15\%$; TVC: +15, -40%

Dissipation Factor — 2.5% maximum @1 kHz.

Life — Meets or exceeds requirements of MIL-C-11015, 200% of rated voltage, 125°C, for 2,000 hours.

Insulation Resistance — 100,000 megohms or 1,000 megohm-microfarads.

Voltage/Temperature Ratings — Voltage ratings are shown in the decade table. The operating temperature range is -55°C to +125°C.

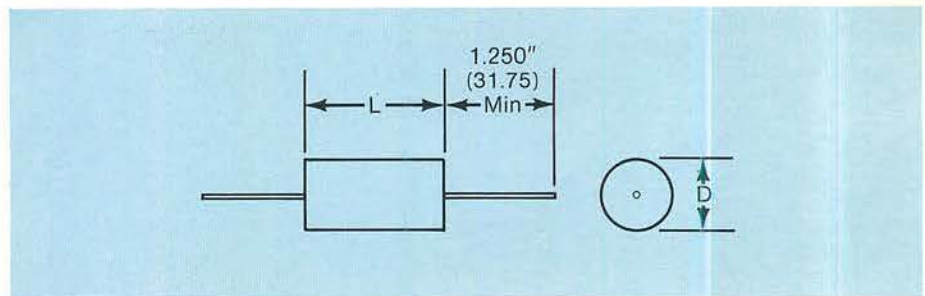
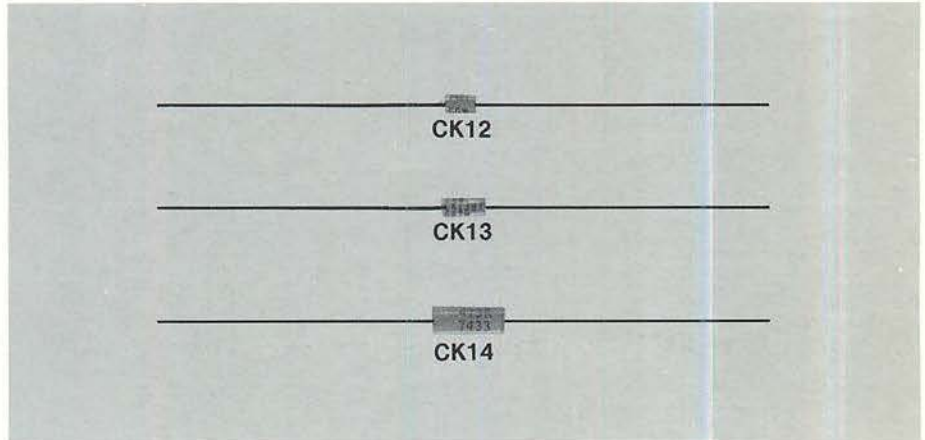
Moisture Resistance — Meets or exceeds requirements of MIL-C-11015 and MIL-STD-202, Method 106.

Dielectric Withstanding Voltage — 250% of rated dc voltage.

Part Numbers — Part numbers are shown in the ordering information table. Use suffix "M" for $\pm 20\%$ tolerance if available, and suffix "K" for $\pm 10\%$ tolerance.

Cross-Reference Information

MIL-C-11015/20 Style	MIL-C-39014/5 Style
CK12	CKR11
CK13	CKR12
CK14	CKR14



Dimensions — Inches (Millimeters)

Case Size	L $\pm .010$ ($\pm .25$)	D $\pm .010$ ($\pm .25$)	Lead Dia. +.004(.10) -.001(.03)	Weight (Grams)
CK12	.160 (4.06)	.090 (2.29)	.016 (.41)	.2
CK13	.250 (6.35)	.090 (2.29)	.016 (.41)	.2
CK14	.390 (9.91)	.140 (3.56)	.025 (.63)	.5

Note: All leads are solder-coated dumet per MIL-STD-1276, Type D.

PART NUMBERS AND ORDERING INFORMATION

Capacitance Values (pF)	Military Type Designation	DC Working Voltage	Tolerances Available	Capacitance Values (pF)	Military Type Designation	DC Working Voltage	Tolerances Available
STANDARD VALUES CK12				STANDARD VALUES CK12 (con't.)			
10	CK12BX100 *	100	K, M	6800	CK12BX682 *	50	K, M
12	CK12BX120	100	K	8200	CK12BX822	50	K
15	CK12BX150	100	K, M	10000	CK12BX103	50	K, M
18	CK12BX180	100	K	STANDARD VALUES CK13			
22	CK12BX220	100	K, M	5600	CK13BX562 *	100	K
27	CK12BX270	100	K	6800	CK13BX682	100	K, M
33	CK12BX330	100	K, M	8200	CK13BX822	100	K
39	CK12BX390	100	K	10000	CK13BX103	100	K, M
47	CK12BX470	100	K, M	12000	CK13BX123	50	K
56	CK12BX560	100	K	15000	CK13BX153	50	K, M
68	CK12BX680	100	K, M	18000	CK13BX183	50	K
82	CK12BX820	100	K	22000	CK13BX223	50	K, M
100	CK12BX101	100	K, M	27000	CK13BR273	50	K
120	CK12BX121	100	K	33000	CK13BR333	50	K, M
150	CK12BX151	100	K, M	39000	CK13BR393	50	K
180	CK12BX181	100	K	47000	CK13BR473	50	K, M
220	CK12BX221	100	K, M	STANDARD VALUES CK14			
270	CK12BX271	100	K	12000	CK14BX123 *	100	K
330	CK12BX331	100	K, M	15000	CK14BX153	100	K, M
390	CK12BX391	100	K	18000	CK14BX183	100	K
470	CK12BX471	100	K, M	22000	CK14BX223	100	K, M
560	CK12BX561	100	K	27000	CK14BX273	100	K
680	CK12BX681	100	K, M	33000	CK14BX333	100	K, M
820	CK12BX821	100	K	39000	CK14BX393	100	K
1000	CK12BX102	100	K, M	47000	CK14BX473	100	K, M
1200	CK12BX122	100	K	56000	CK14BR563	100	K
1500	CK12BX152	100	K, M	68000	CK14BR683	100	K, M
1800	CK12BX182	100	K	82000	CK14BR823	100	K
2200	CK12BX222	100	K, M	100000	CK14BR104	100	K, M
2700	CK12BX272	100	K	120000	CK14BR124	50	K
3300	CK12BX332	100	K, M	150000	CK14BR154	50	K, M
3900	CK12BX392	100	K	180000	CK14BR184	50	K
4700	CK12BX472	100	K, M	220000	CK14BR224	50	K, M
5600	CK12BX562	50	K	270000	CK14BR274	50	K

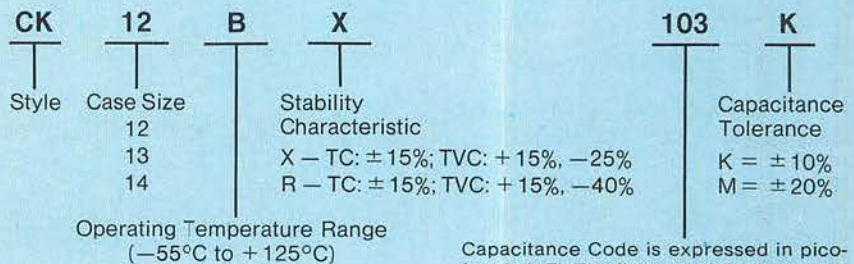
*Add letter for tolerance code above lines.

PART MARKING



- CGW — Corning Glass Works
- CK — Style
- 12 — Case Size
- B — Operating Temperature Range
- X — Stability Characteristic
- 103 — Capacitance
- K — Tolerance
- 7514 — Date and Lot Code

MILITARY PART NUMBER EXPLANATION



Capacitance Code is expressed in picofarads (pF). The first two digits represent significant figures and the third digit specifies the number of zeros to follow; i.e. 103 indicates 10000 pF.

Ceramic Capacitors

CKR11, 12, 14 (QPL to MIL-C-39014/5)

Established Reliability

CORNING
ELECTRONICS

APPLICATIONS

These miniature multilayer ceramic capacitors are QPL to Established Reliability specification MIL-C-39014/5. The dielectric is fused into a monolithic structure, which is then molded into a tough, flameproof case, sized for automatic insertion. These units offer excellent frequency characteristics, superior voltage coefficients and high volumetric efficiency.

PERFORMANCE CHARACTERISTICS

Tolerance — $\pm 20\%$ and $\pm 10\%$.

Stability Characteristics — Available as follows:

BX — TC: $\pm 15\%$; TVC: +15, -25%

BR — TC: $\pm 15\%$; TVC: +15, -40%

Dissipation Factor — 2.5% maximum.

Insulation Resistance — At 25°C, 100,000 megohms or 1,000 megohm-microfarads. At 125°C, 10,000 megohms or 100 megohm-microfarads.

Voltage/Temperature Ratings — Voltage ratings are shown in the decade tables. The operating temperature range is -55°C to +125°C.

Part Numbers — Part numbers are formed by adding a dash number from the part number table to the basic mil spec number — M39014/05 — (add dash number)

Examples:

M39014/05-2401

CKR11 10pF $\pm 10\%$ 100V

L Failure Rate (BX)

M39014/05-2698

CKR14 100,000 pF $\pm 20\%$ 100V

M Failure Rate (BR)

Cross-Reference Information

MIL-C-39014/5	MIL-C-11015/20
Style	Style
CKR11	CK12
CKR12	CK13
CKR14	CK14

Failure Rate

(90% Confidence)

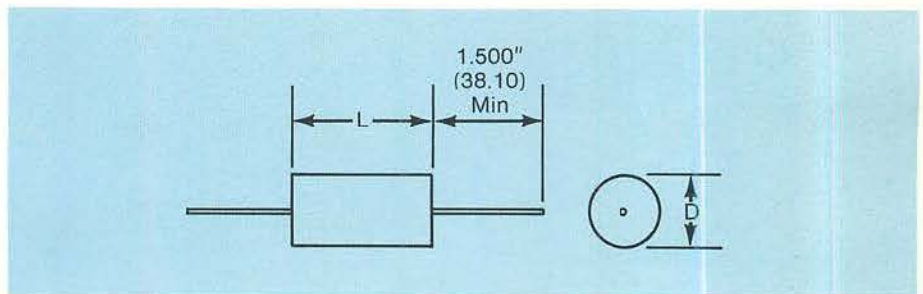
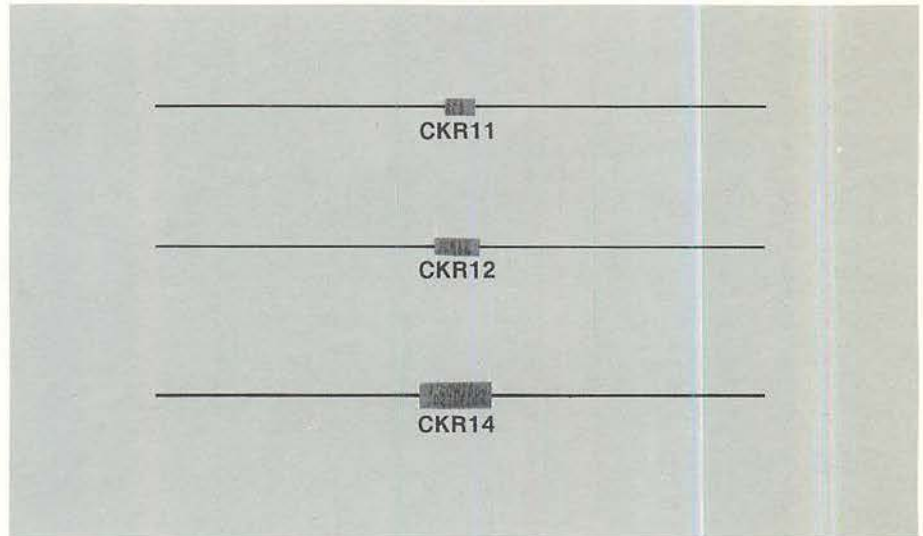
L = 2%/1000 Hours

M = 1%/1000 Hours

P = .1%/1000 Hours

R = .01%/1000 Hours

S = .001%/1000 Hours



Dimensions — Inches (Millimeters)

Case Size	L $\pm .010$ ($\pm .25$)	D $\pm .010$ ($\pm .25$)	Lead Dia
CKR11	.160 (4.06)	.090 (2.29)	.016 \pm .001 (.41 \pm .03)
CKR12	.250 (6.35)	.090 (2.29)	.016 \pm .001 (.41 \pm .03)
CKR14	.390 (9.91)	.140 (3.56)	.025 \pm .002 (.63 \pm .05)

Note — Leads are solder coated Dumet per MIL-STD-1276 Type D.

PART NUMBERS AND ORDERING INFORMATION

M39014/05 - (Dash Number)					Capacitance Value (pF)	Capacitance Tolerance ± Percent	DC Rated Voltage	M39014/05 - (Dash Number)					Capacitance Value (pF)	Capacitance Tolerance ± Percent	DC Rated Voltage				
Failure Rate Level - (%/1,000 hours)	2.0(L)	1.0(M)	0.1(P)	0.01(R)				0.001(S)	Failure Rate Level - (%/1,000 hours)	2.0(L)	1.0(M)	0.1(P)				0.01(R)	0.001(S)		
Style CKR11 BX								Style CKR12 BX											
2401	2601	2801	2001	2201	10	10	100	2457	2657	2857	2057	2257	5600	10	100				
2402	2602	2802	2002	2202	10	20	100	2458	2658	2858	2058	2258	6800	10	100				
2403	2603	2803	2003	2203	12	10	100	2459	2659	2859	2059	2259	6800	20	100				
2404	2604	2804	2004	2204	15	10	100	2460	2660	2860	2060	2260	8200	10	100				
2405	2605	2805	2005	2205	15	20	100	2461	2661	2861	2061	2261	10000	10	100				
2406	2606	2806	2006	2206	18	10	100	2462	2662	2862	2062	2262	10000	20	100				
2407	2607	2807	2007	2207	22	10	100	2463	2663	2863	2063	2263	12000	10	50				
2408	2608	2808	2008	2208	22	20	100	2464	2664	2864	2064	2264	15000	10	50				
2409	2609	2809	2009	2209	27	10	100	2465	2665	2865	2065	2265	15000	20	50				
2410	2610	2810	2010	2210	33	10	100	2466	2666	2866	2066	2266	18000	10	50				
2411	2611	2811	2011	2211	33	20	100	2467	2667	2867	2067	2267	22000	10	50				
2412	2612	2812	2012	2212	39	10	100	2468	2668	2868	2068	2268	22000	20	50				
2413	2613	2813	2013	2213	47	10	100	2469	2669	2869	2069	2269	27000	10	50				
2414	2614	2814	2014	2214	47	20	100	2470	2670	2870	2070	2270	33000	10	50				
2415	2615	2815	2015	2215	56	10	100	2471	2671	2871	2071	2271	33000	20	50				
2416	2616	2816	2016	2216	68	10	100	2472	2672	2872	2072	2272	39000	10	50				
2417	2617	2817	2017	2217	68	20	100	2473	2673	2873	2073	2273	47000	10	50				
2418	2618	2818	2018	2218	82	10	100	2474	2674	2874	2074	2274	47000	20	50				
2419	2619	2819	2019	2219	100	10	100												
2420	2620	2820	2020	2220	100	20	100												
2421	2621	2821	2021	2221	120	10	100												
2422	2622	2822	2022	2222	150	10	100												
2423	2623	2823	2023	2223	150	20	100												
2424	2624	2824	2024	2224	180	10	100												
2425	2625	2825	2025	2225	220	10	100												
2426	2626	2826	2026	2226	220	20	100												
2427	2627	2827	2027	2227	270	10	100												
2428	2628	2828	2028	2228	330	10	100												
2429	2629	2829	2029	2229	330	20	100												
2430	2630	2830	2030	2230	390	10	100												
2431	2631	2831	2031	2231	470	10	100												
2432	2632	2832	2032	2232	470	20	100												
2433	2633	2833	2033	2233	560	10	100												
2434	2634	2834	2034	2234	680	10	100												
2435	2635	2835	2035	2235	680	20	100												
2436	2636	2836	2036	2236	820	10	100												
2437	2637	2837	2037	2237	1000	10	100												
2438	2638	2838	2038	2238	1000	20	100												
2439	2639	2839	2039	2239	1200	10	100												
2440	2640	2840	2040	2240	1500	10	100												
2441	2641	2841	2041	2241	1500	20	100												
2442	2642	2842	2042	2242	1800	10	100												
2443	2643	2843	2043	2243	2200	10	100												
2444	2644	2844	2044	2244	2200	20	100												
2445	2645	2845	2045	2245	2700	10	100												
2446	2646	2846	2046	2246	3300	10	100												
2447	2647	2847	2047	2247	3300	20	100												
2448	2648	2848	2048	2248	3900	10	100												
2449	2649	2849	2049	2249	4700	10	100												
2450	2650	2850	2050	2250	4700	20	100												
2451	2651	2851	2051	2251	5600	10	50												
2452	2652	2852	2052	2252	6800	10	50												
2453	2653	2853	2053	2253	6800	20	50												
2454	2654	2854	2054	2254	8200	10	50												
2455	2655	2855	2055	2255	10000	10	50												
2456	2656	2856	2056	2256	10000	20	50												
								Style CKR14 BX											
								2475	2675	2875	2075	2275	12000	10	100				
								2476	2676	2876	2076	2276	15000	10	100				
								2477	2677	2877	2077	2277	15000	20	100				
								2478	2678	2878	2078	2278	18000	10	100				
								2479	2679	2879	2079	2279	22000	10	100				
								2480	2680	2880	2080	2280	22000	20	100				
								2481	2681	2881	2081	2281	27000	10	100				
								2482	2682	2882	2082	2282	33000	10	100				
								2483	2683	2883	2083	2283	33000	20	100				
								2484	2684	2884	2084	2284	39000	10	100				
								2485	2685	2885	2085	2285	47000	10	100				
								2486	2686	2886	2086	2286	47000	20	100				
								2487	2687	2887	2087	2287	56000	10	50				
								2488	2688	2888	2088	2288	68000	10	50				
								2489	2689	2889	2089	2289	68000	20	50				
								2490	2690	2890	2090	2290	82000	10	50				
								2491	2691	2891	2091	2291	100000	10	50				
								2492	2692	2892	2092	2292	100000	20	50				
								Style CKR14 BR											
								2493	2693	2893	2093	2293	56000	10	100				
								2494	2694	2894	2094	2294	68000	10	100				
								2495	2695	2895	2095	2295	68000	20	100				
								2496	2696	2896	2096	2296	82000	10	100				
								2497	2697	2897	2097	2297	100000	10	100				
								2498	2698	2898	2098	2298	100000	20	100				
								2499	2699	2899	2099	2299	120000	10	50				
								2500	2700	2900	2100	2300	150000	10	50				
								2501	2701	2901	2101	2301	150000	20	50				
								2502	2702	2902	2102	2302	180000	10	50				
								2503	2703	2903	2103	2303	220000	10	50				
								2504	2704	2904	2104	2304	220000	20	50				
								2505	2705	2905	2105	2305	270000	10	50				

PART MARKING

STYLE
CKR11

JCK
100
KM5
ACGW

STYLE
CKR12

JCK12
103KM
7501A
CGW

STYLE
CKR14

M39014
5-2490
16299
7501A
J50V
823K

- J - JAN Trademark
- C - Capacitor
- K - Ceramic Dielectric
- 100 - Capacitance, Code in pF (10pF)
- K - Capacitance Tolerance (± 10%)
- M - Failure Rate Level (1%/1000 hrs.)
- 5 - Last Digit of Year
- A - 3 Week Lot Code
- CGW - Corning Glass Works

- J - JAN Trademark
- C - Capacitor
- K - Ceramic Dielectric
- 12 - Size
- 103 - Capacitance (10,000 pF)
- K - Capacitance Tolerance (± 10%)
- M - Failure Rate Level (1%/1000 hrs.)
- 75 - Last 2 Digits of Year
- 01 - Week of Year
- A - Lot Code
- CGW - Corning Glass Works

- M39014 - General Specification
- 5 - Specification Sheet
- 2490 - Dash Number
- 16299 - CGW ID Number
- 75 - Year
- 01 - Week
- A - Lot code
- J - JAN Trademark
- 50V - Voltage Rating
- 823 - Coded Capacitance
- K - Capacitance Tolerance

Ceramic Capacitors

CAM02, 03, 04, 05 (INDUSTRIAL) AXIAL, MOLDED

The CORNING® style CAM miniature multilayer ceramic capacitors provide increased volumetric efficiency and an extended range of capacitance values. This series is available in four automatically insertable case sizes and two EIA temperature characteristics.

EIA TEMPERATURE CHARACTERISTICS

Available as follows:

X7R (Stable) = $\pm 15\%$
from -55°C to $+125^{\circ}\text{C}$.

Z5U (General Purpose) = $+22\%$,
 -56% from $+10^{\circ}\text{C}$ to $+85^{\circ}\text{C}$.

PERFORMANCE CHARACTERISTICS

Standard Capacitance Tolerances available:

X7R K = $\pm 10\%$
M = $\pm 20\%$

Z5U M = $\pm 20\%$
Z = $+80\%$, -20%

Tighter tolerances are available for quantity orders. Please consult Product Engineering at (919) 876-1100.

Dissipation Factor:

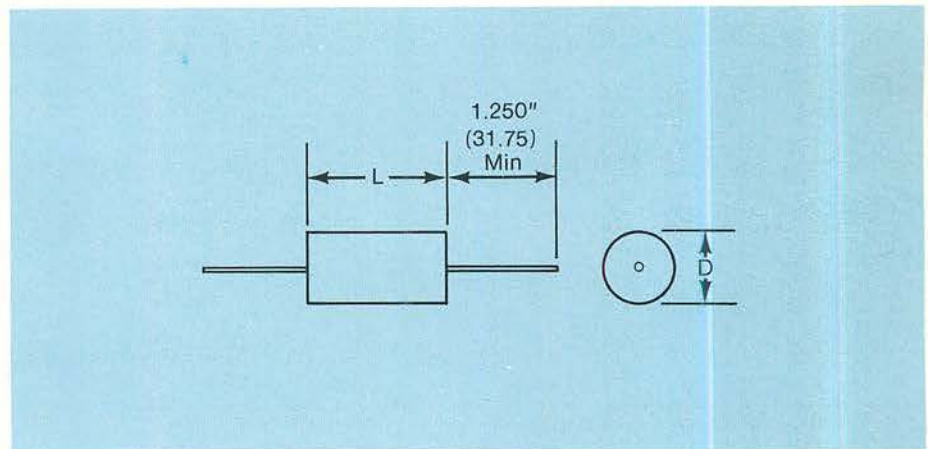
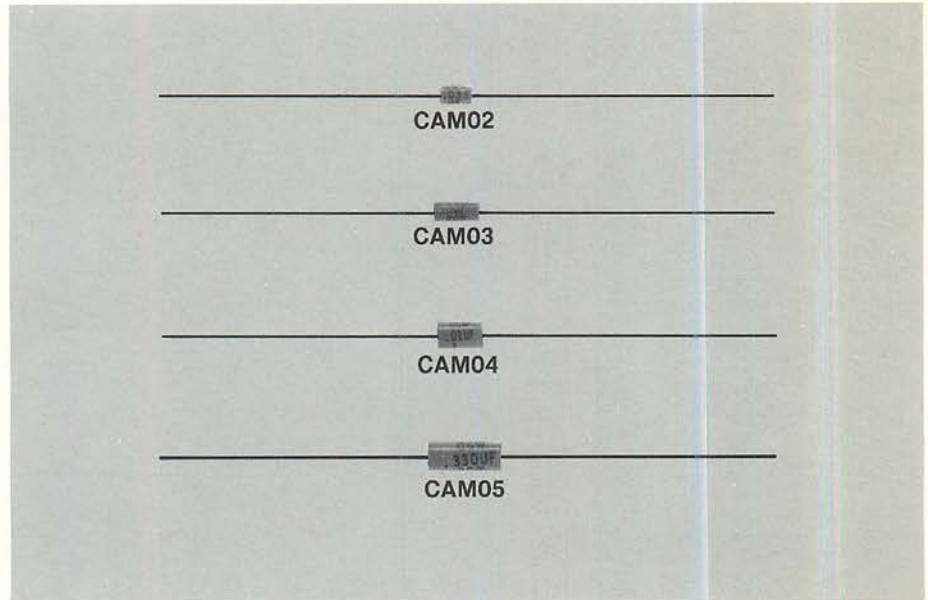
X7R — 2.5% maximum
Z5U — 3.0% maximum

Insulation Resistance:

X7R — 100,000 megohms or 1,000 megohm-microfarads, whichever is less.

Z5U — 10,000 megohms or 100 megohm-microfarads, whichever is less.

Voltage Ratings: 50 and 100 volts dc.



Case Size	DIMENSIONS		Lead Diameter +.004 (.10) -.001 (.03)	Voltage Rating	X7R Capacitance Range	Z5U Capacitance Range
	Length $\pm .010$ ($\pm .25$)	Diameter $\pm .010$ ($\pm .25$)				
CAM02	.160 (4.06)	.090 (2.29)	.016 (.41)	50 100	5600 pF - .022 μF 10 pF - 6800 pF	.027 μF - .047 μF .001 μF - .022 μF
CAM03	.250 (6.35)	.090 (2.29)	.016 (.41)	50 100	.01 μF - .047 μF 5600 pF - .015 μF	.056 μF - .12 μF .01 μF - .056 μF
CAM04	.250 (6.35)	.130 (3.30)	.016 (.41)	50 100	.047 μF - .1 μF .01 μF - .047 μF	.1 μF - .27 μF .068 μF - .12 μF
CAM05	.390 (9.91)	.140 (3.56)	.025 (.63)	50 100	.047 μF - .27 μF .01 μF - .1 μF	.27 μF - .47 μF .1 μF - .22 μF

Dimensions — Inches (Millimeters)
NOTE: Leads are solder-coated domet.

Ceramic Capacitors

CORNING
ELECTRONICS

CAC02, 03, 04, 05 (SPINSEAL™)
AXIAL, CONFORMAL COATED

INTRODUCING SPINSEAL™

These miniature monolithic ceramic capacitors are designed for high volume commercial and industrial applications where space and weight are at a premium. The Spinseal technology permits us to manufacture axials at high speeds while closely controlling uniformity and performance. Especially suited for automatic insertion applications, Spinseal is *the* low cost axial ceramic capacitor.

EIA TEMPERATURE CHARACTERISTICS

Available as follows:

X7R (stable) = $\pm 15\%$
from -55°C to $+125^{\circ}\text{C}$

Z5U (general purpose) = $+22\%$,
 -56% from $+10^{\circ}\text{C}$ to $+85^{\circ}\text{C}$

PERFORMANCE CHARACTERISTICS

Standard capacitance tolerances available.

X7R K = $\pm 10\%$
M = $\pm 20\%$

Z5U M = $\pm 20\%$
Z = $+80, -20\%$

Dissipation Factor:

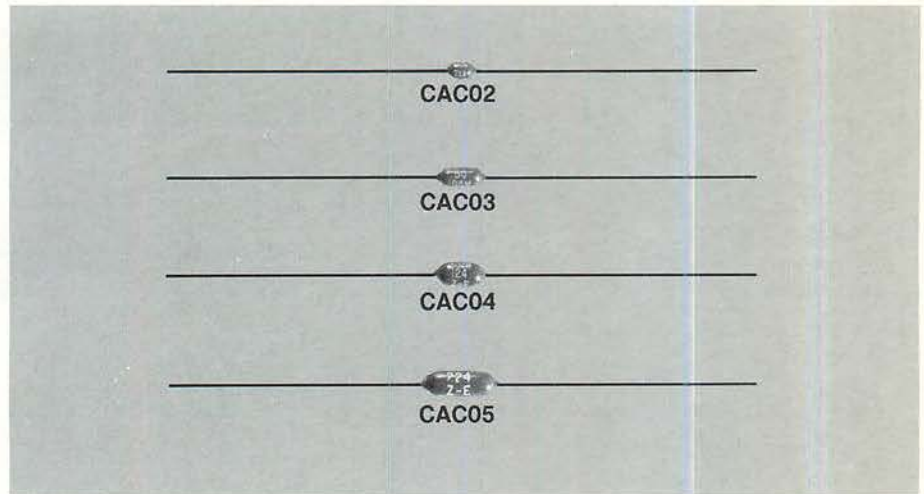
X7R — 2.5% maximum

Z5U — 3.0% maximum

Insulation Resistance:

X7R — 100,000 megohms or 1000 megohm-microfarads, whichever is less.

Z5U — 10,000 megohms or 100 megohm-microfarads, whichever is less.



Voltage Ratings: 50 and 100 volts dc.

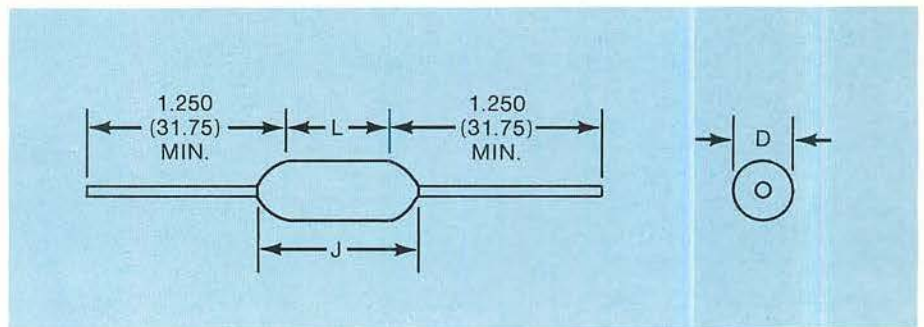
Dielectric Strength: 2.5 times rated voltage for 1 to 5 seconds.

QUALITY ASSURANCE REQUIREMENTS

Our Spinseal miniature monolithic capacitors are tested in accordance

with EIA RS-198. Each lot is inspected for:

- Capacitance
- Dissipation Factor
- Insulation Resistance
- Dielectric Strength
- Visual Examination



Case Size	J MAX	Dimensions L MAX	D MAX	Lead Dia. $\pm 002 (.05)$	Voltage Rating	X7R Capacitance Range	Z5U Capacitance Range
CAC02	.190 (4.83)	.145 (3.68)	.100 (2.54)	.020 (.51)	50	5600 pF - .022 μF	.027 μF - .047 μF
					100	10 pF - 6800 pF	.001 μF - .022 μF
CAC03	.290 (7.37)	.230 (5.84)	.100 (2.54)	.020 (.51)	50	.01 μF - .047 μF	.056 μF - .12 μF
					100	5600 pF - .015 μF	.01 μF - .056 μF
CAC04	.290 (7.37)	.260 (6.60)	.145 (3.68)	.020 (.51)	50	.047 μF - .1 μF	.1 μF - .27 μF
					100	.01 μF - .047 μF	.068 μF - .12 μF
CAC05	.420 (10.67)	.370 (9.40)	.145 (3.68)	.025 (.64)	50	.047 μF - .27 μF	.27 μF - .47 μF
					100	.01 μF - .1 μF	.1 μF - .22 μF

Dimensions — Inches (Millimeters)
NOTE: Leads are solder-coated dumet.

Introduction to Solid Tantalum Capacitors

CORNING® solid tantalum capacitors are manufactured by Components, Incorporated, a wholly owned subsidiary of Corning Glass Works. Products and packaging bear CI or CORNING/Components, Inc. markings.

Corning offers a broad line of micro-miniature solid tantalum capacitors which are available in a variety of shapes, sizes, and styles.

The microminiature MINITAN® capacitors, encased in polyester sleeves and sealed with special moisture-

resistant, epoxy resin, are used where space is a premium. A very favorable capacitance to volume ratio makes them especially well suited for high-density applications. Both the cylindrical Cordwood series and the rectangular Modular series are available in both polar and non-polar construction with either axial or radial leads.

The MC series microminiature chip capacitors, whose solder coating makes them suitable for reflow solder mounting, are designed specifically

for hybrid, thick film, and microcircuit applications where mounting space is critical and conventionally packaged capacitors may not be used. These polar tantalum chips are available in six basic case sizes.

The MINIDIP MD series features sub-miniature tantalum anodes, sealed in high stability moisture resistant epoxy. These radial leaded capacitors offer subminiature size and superior performance and are specifically intended for commercial and industrial applications.

WVDC vs Temperature — The product tables specify working voltage at ambient temperatures up to 85°C. Above 85°C, working voltage must be linearly derated to $\frac{2}{3}$ WVDC at 125°C for those products rated for 125°C operation.

Ripple Voltage vs Temperature and Frequency — Ripple voltage must be limited to keep internal heating within allowable limits. Maximum ripple voltage vs frequency is specified in the curves on the product pages. For 125°C rated products, linearly derate the maximum ripple voltage above 25°C to 33% at 125°C. For 85°C rated products, linearly derate the maximum ripple voltage above 25°C to 60% at 85°C.

DC Leakage vs Temperature and Voltage — In general, DCL increases with an increase in either temperature or voltage. The characteristic is quite

similar for all solid tantalum capacitors; thus, the normalized curves can be used quite successfully. Since product leakage specifications are referenced to rated WVDC and 25°C, the curves are normalized with respect to this value. The curves show typical leakage at various voltages and temperatures with respect to the actual value at 25°C and rated WVDC.

Capacitance vs Temperature, Voltage, and Frequency — Nominal capacitance as specified for each product is measured at 25°C with a maximum dc bias of 2.2 volts and a maximum ac signal of 1 vrms. Since these are seldom the actual operating conditions, the graphs show typical capacitance change vs temperature, voltage, and frequency. These characteristics are somewhat variable with capacitance value, case size, and working voltage, but the referenced curves give a

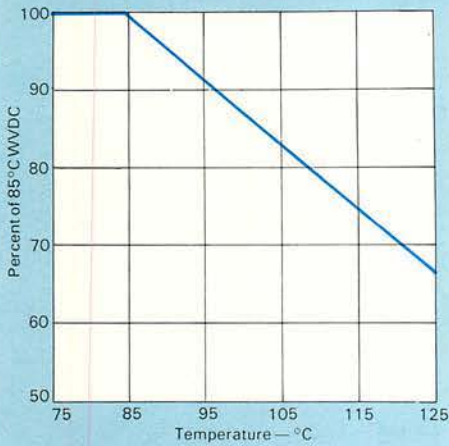
good indication of direction and magnitude of typical capacitance change.

Dissipation Factor and ESR vs Frequency and Voltage — Product limits for dissipation factor are specified under the same measurement conditions as used for capacitance. Although ESR (equivalent series resistance) is not specified, it can be calculated from capacitance and DF.

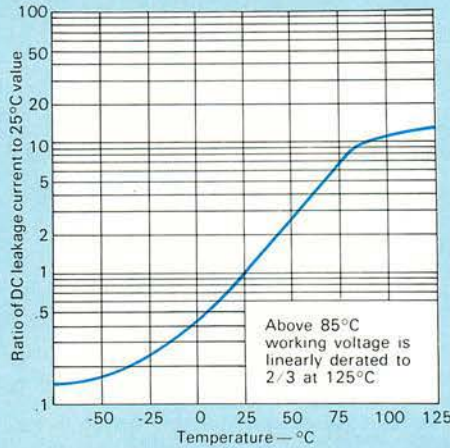
Dissipation factor at voltages and frequencies other than those specified can be determined from the graphs. ESR vs frequency, normalized with respect to the 120 hz value, is also shown.

Impedance vs Frequency — Typical impedance vs frequency curves are shown on the product pages. At the higher frequencies it is necessary to correct for resistance and inductance of the measuring equipment to achieve valid results.

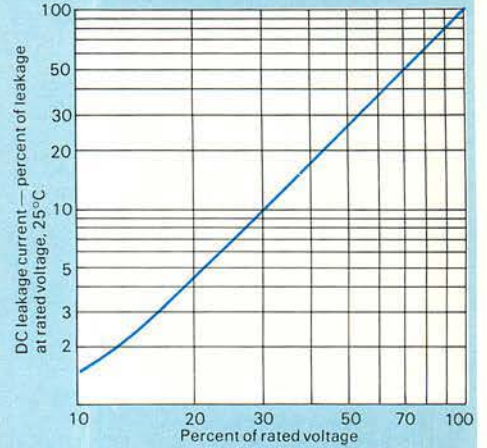
Maximum Rated Voltage vs. Temperature



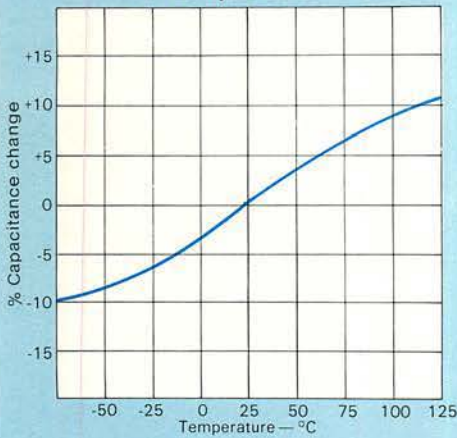
Typical DC Leakage Current vs. Temperature



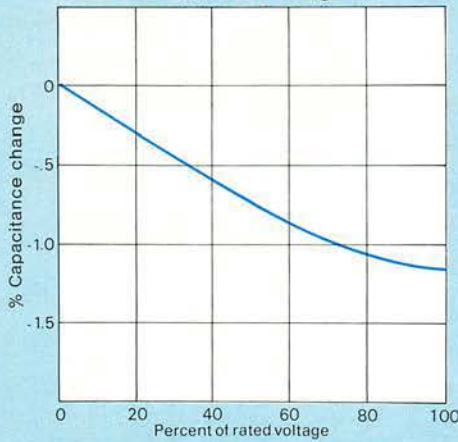
Typical DC Leakage Current vs. Applied Voltage



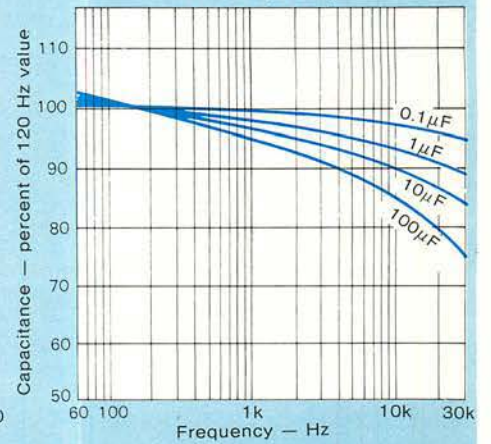
Typical Capacitance Change vs. Temperature



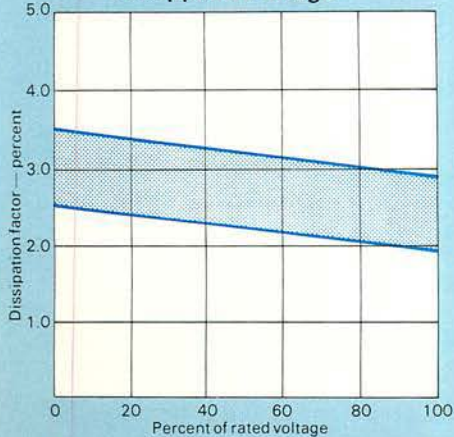
Typical Capacitance Change vs. Applied Voltage



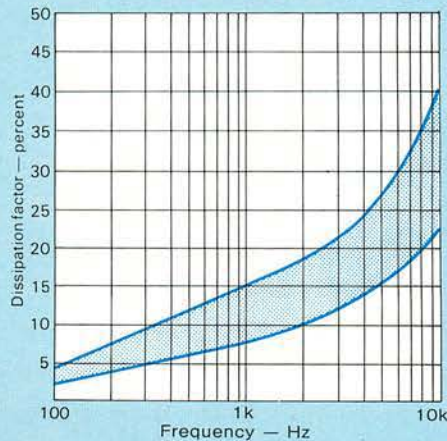
Typical Capacitance Change vs. Frequency



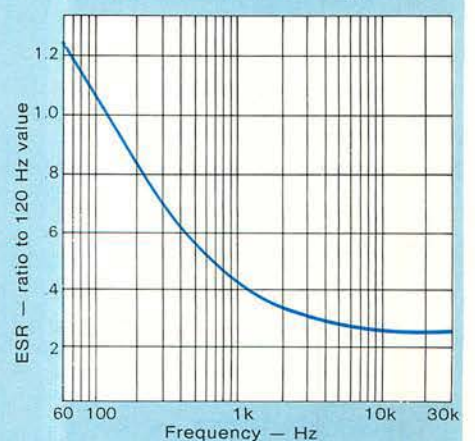
Typical Dissipation Factor vs. Applied Voltage



Dissipation Factor vs. Frequency



Normalized ESR vs. Frequency



Solid Tantalum Capacitors

SUBMINIATURE MINITAN MODULAR MM SERIES

CORNING COMPONENTS
INCORPORATED
A SUBSIDIARY OF CORNING GLASS WORKS

FOR FILTERING • COUPLING • BY-PASSING • TIMING

CORNING® solid tantalum capacitors are manufactured by Components Incorporated, a wholly owned subsidiary of Corning Glass Works. Products and packaging bear CI or CORNING/Components Incorporated markings.

These precision, microminiature polar capacitors are suitable for general filtering, coupling, by-passing, and noncritical RC timing applications to +85°C without derating and to +125°C with derating to ½ WVDC (Except MMW case size). Very favorable capacitance to volume ratios make them especially well suited to high density applications such as found in avionics systems, subminiature communications equipment, and thick film circuitry.

PERFORMANCE CHARACTERISTICS

Capacitance — Measured at +25°C and 120Hz on a polarized capacitance bridge with a maximum polarizing voltage of 2.2 vdc and a maximum ac signal of 1.0 volts rms.

Tolerance — Except for the MMW and MMU case sizes, standard tolerance is ±20% with ±10% or ±5% tolerance available in all case sizes (.01 MFD and above in the W case size). 10% decade values are offered in ±10% or ±5% tolerance.

Dissipation Factor — Measured simultaneously with capacitance as above. See Part Number Table for maximum +25°C, 120 Hz values.

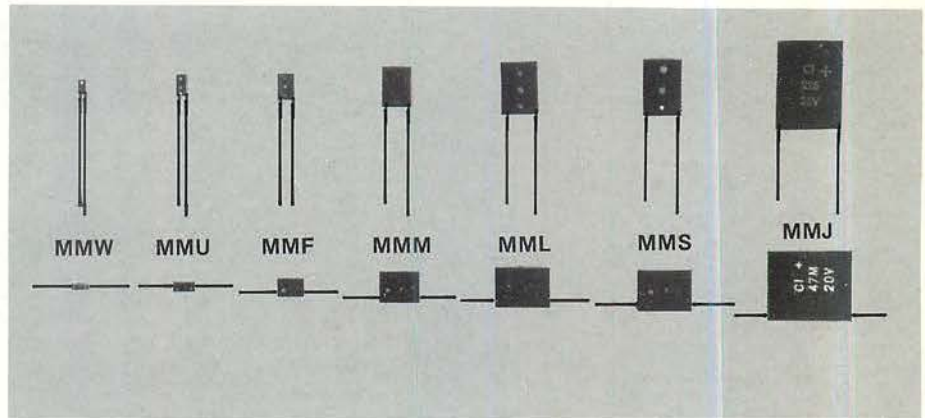
DC Leakage Current — With rated WVDC applied through a 1000 ohm resistor for 5 minutes maximum, DCL values in μA at +25°C will not exceed those shown in the Part Number Table. At +85°C, DCL values will not exceed 10 times Part Number Table values. At +125°C with ¾ rated WVDC applied, DCL values will not exceed 15 times Part Number Table values.

Operating Voltage — Capacitors will operate reliably up to rated WVDC at +85°C and to +125°C with linear derating to ¾ WVDC (With the exception of the MMW case size which is limited to +85°C operation). Capacitors will withstand peak voltages in the reverse direction equal to 15% of the dc rating at +25°C, 10% at +55°C, and 5% at +85°C. Ac ripple voltage should be limited so that the forward dc voltage plus peak ac voltage does not exceed rated WVDC.

Surge Voltage — At +85°C and at 60-second intervals, capacitors withstand 1000 30-second applications at 130% rated WVDC.

Temperature — No derating is required between -55°C and +85°C. Between +85°C and +125°C, derate linearly to ¾ WVDC (With the exception of the MMW case size which is limited to +85°C operation).

Moisture Resistance — Following Method 106, MIL-STD-202 testing, capacitors will meet initial dc leakage requirements. Capacitance will be within ±10% of initial values.



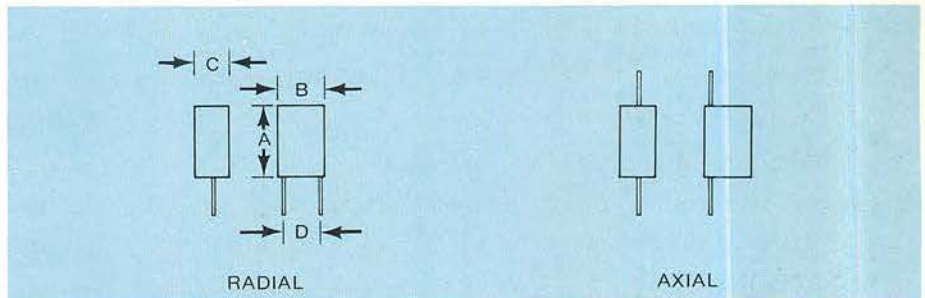
Life Test — After 2000 hours at +85°C with rated WVDC applied, capacitors will meet initial dc leakage and DF requirements. Capacitance will not change more than ±10% from original values.

MECHANICAL

Construction — Tantalum pellets are encased in polyester sleeves and sealed with a special moisture resistant epoxy resin. This rugged, fully insulated package withstands a one minute application of a 100

volt potential applied between the leads shorted together and an encircling metal foil envelope.

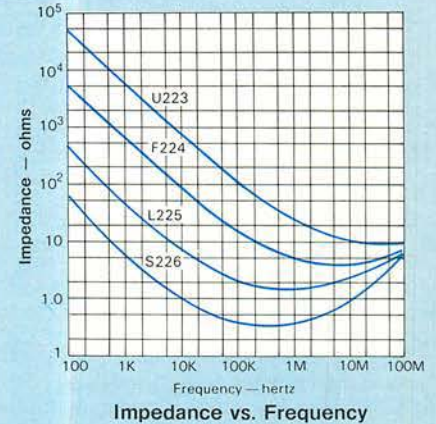
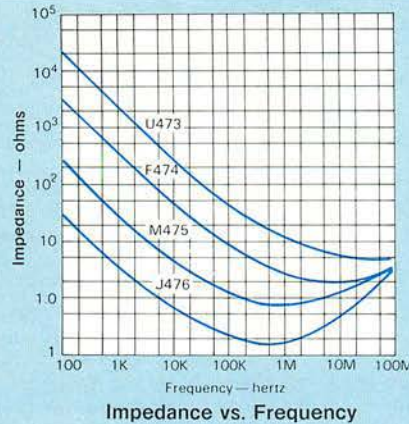
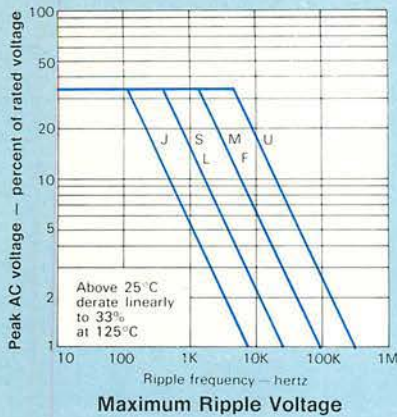
Leads — Leads are solder coated (W case size leads are gold plated) pure nickel wire suitable for soldering or welding. Tested in accordance with MIL-C-55365, .007 diameter leads withstand an 8 oz. pull, .010 diameter leads a 1 lb. pull, and .016 diameter leads a 3 lb. pull. All lead diameters withstand 5 rotations twist. Ribbon leads are available.



Dimensions — Inches (Millimeters)

Case Size	A Max.	B Max.	C Max.	D
MMW	.100 (2.54)	.050 (1.27)	.040 (1.02)	.030 (.76) ±.015 (±.38)
MMU	.125 (3.18)	.070 (1.78)	.040 (1.02)	.050 (1.27) ±.015 (±.38)
MMF	.165 (4.19)	.120 (3.05)	.070 (1.78)	.100 (2.54) ±.020 (±.51)
MMM	.225 (5.72)	.185 (4.70)	.075 (1.91)	.150 (3.81) ±.020 (±.51)
MML	.290 (7.37)	.220 (5.59)	.110 (2.79)	.180 (4.57) ±.025 (±.64)
MMS	.310 (7.87)	.230 (5.84)	.130 (3.30)	.200 (5.08) ±.025 (±.64)
MMJ	.475 (12.07)	.375 (9.53)	.150 (3.81)	.300 (7.62) ±.025 (±.64)

Leads: W leads are 33 AWG, .007 ±.001 (.18 ±.025) diameter
U, F, M leads are 30 AWG, .010 ±.002 (.25 ±.051) diameter
L, S, J leads are 26 AWG, .016 ±.002 (.41 ±.051) diameter
All anode leads are 1.625 ±.125 (41.3 ±3.18) long
All cathode leads are 1.375 ±.125 (34.9 ±3.18) long



PART NUMBERS AND ORDERING INFORMATION

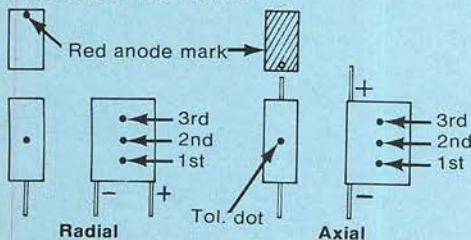
P/N	μF Cap.	Max. WVDC	Max. % DF	Max. DCL	P/N	μF Cap.	Max. WVDC	Max. % DF	Max. DCL	P/N	μF Cap.	Max. WVDC	Max. % DF	Max. DCL
W Case Size					F Case Size					L Case Size				
MMW-020-472	.0047	20	10	0.5	MMF-035-472	.0047	35	6	0.5	MML-035-225	2.2	35	6	2.0
MMW-020-682	.0068	20	10	0.5	MMF-035-682	.0068	35	6	0.5	MML-035-335	3.3	35	6	2.0
MMW-020-103	.010	20	10	0.5	MMF-035-103	.010	35	6	0.5	MML-035-475	4.7	35	6	2.0
MMW-020-153	.015	20	10	0.5	MMF-035-153	.015	35	6	0.5	MML-025-685	6.8	25	6	2.0
MMW-020-223	.022	20	10	0.5	MMF-035-223	.022	35	6	0.5	MML-020-106	10	20	6	2.0
MMW-020-333	.033	20	10	0.5	MMF-035-333	.033	35	6	0.5	MML-015-156	15	15	6	2.0
MMW-020-473	.047	20	10	0.5	MMF-035-473	.047	35	6	0.5	MML-010-226	22	10	6	2.0
MMW-020-683	.068	20	10	0.5	MMF-035-683	.068	35	6	0.5	MML-006-336	33	6	6	2.0
MMW-015-104	.10	15	10	0.5	MMF-035-104	.10	35	6	0.5	MML-004-476	47	4	8	2.0
MMW-010-154	.15	10	10	0.5	MMF-035-154	.15	35	6	0.5	S Case Size				
MMW-006-224	.22	6	10	0.5	MMF-035-224	.22	35	6	0.5	MMS-035-685	6.8	35	6	3.0
MMW-004-334	.33	4	10	0.5	MMF-035-334	.33	35	6	0.5	MMS-025-106	10	25	6	3.0
MMW-002-474	.47	2	10	0.5	MMF-035-474	.47	35	6	0.5	MMS-020-156	15	20	6	3.0
U Case Size					M Case Size					J Case Size				
MMU-020-102	.0010	20	6	0.5	MMM-035-684	.68	35	6	1.0	MMJ-035-106	10	35	6	9.0
MMU-020-152	.0015	20	6	0.5	MMM-035-105	1.0	35	6	1.0	MMJ-035-156	15	35	6	9.0
MMU-020-222	.0022	20	6	0.5	MMM-035-155	1.5	35	6	1.0	MMJ-035-226	22	35	6	9.0
MMU-020-332	.0033	20	6	0.5	MMM-025-225	2.2	25	6	1.0	MMJ-020-336	33	25	6	9.0
MMU-020-472	.0047	20	6	0.5	MMM-020-335	3.3	20	6	1.0	MMJ-020-476	47	20	8	9.0
MMU-020-682	.0068	20	6	0.5	MMM-020-475	4.7	20	6	1.0	MMJ-015-686	68	15	8	9.0
MMU-020-103	.010	20	6	0.5	MMM-010-685	6.8	10	6	1.0	MMJ-010-107	100	10	8	9.0
MMU-020-153	.015	20	6	0.5						MMJ-006-157	150	6	10	9.0
MMU-020-223	.022	20	6	0.5						MMJ-003-227	220	3	15	9.0
MMU-020-333	.033	20	6	0.5										
MMU-020-473	.047	20	6	0.5										
MMU-020-683	.068	20	6	0.5										
MMU-020-104	.10	20	6	0.5										
MMU-020-154	.15	20	6	0.5										
MMU-020-224	.22	20	6	0.5										
MMU-015-334	.33	15	6	0.5										
MMU-010-474	.47	10	6	0.5										
MMU-006-684	.68	6	6	0.5										

*Add "A" — for Axial leads, "R" — for Radial leads

**Add tolerance symbol from Part Number Explanation.

PART MARKING

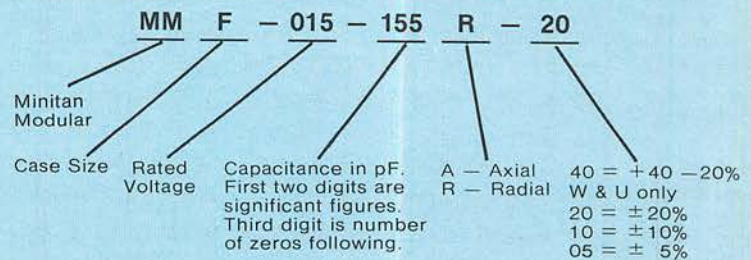
MMJ case size is type marked, all others are color coded.



EIA COLOR DOT CODING

0 Black (omitted)	1 Brown	2 Red
3 Orange	4 Yellow	5 Green
6 Blue	7 Violet	8 Gray
9 White		

PART NUMBER EXPLANATION



Capacitance value is shown by means of standard EIA color code dots except for the MMJ case size where all data is printed. Because the polyester cases are black, black dots are omitted. ±10% tolerance is indicated by a silver dot. ±5% tolerance by a gold dot. No tolerance dot is used for ±20%.

Solid Tantalum Capacitors

CORNING | COMPONENTS
INCORPORATED
A SUBSIDIARY OF CORNING GLASS WORKS

SUBMINIATURE MINITAN CORDWOOD MZ SERIES

FOR FILTERING • COUPLING • BY-PASSING • TIMING

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These precision, microminiature polar capacitors are suitable for general filtering, coupling, by-passing, and noncritical RC timing applications to +85°C without derating and to +125°C with derating to 2/3 WVDC. Very favorable capacitance to volume ratios make them especially well suited to high density applications such as found in avionics systems, subminiature communications equipment, and thick film circuitry.

PERFORMANCE CHARACTERISTICS

Capacitance — Measured at +25°C and 120Hz on a polarized capacitance bridge with a maximum polarizing voltage of 2.2 vdc and a maximum ac signal of 1.0 volts rms.

Tolerance — Except for the MZY and MZP case sizes, standard tolerance is ±20% with ±10% or ±5% tolerance available in all case sizes. 10% decade values are offered in ±10% or ±5% tolerance.

Dissipation Factor — Measured simultaneously with capacitance as above. See Part Number Section for maximum +25°C, 120Hz values.

DC Leakage Current — With rated WVDC applied through a 1000 ohm resistor for a maximum of 5 minutes, at 25°C. DCL values in μA will not exceed those shown in the part number section.

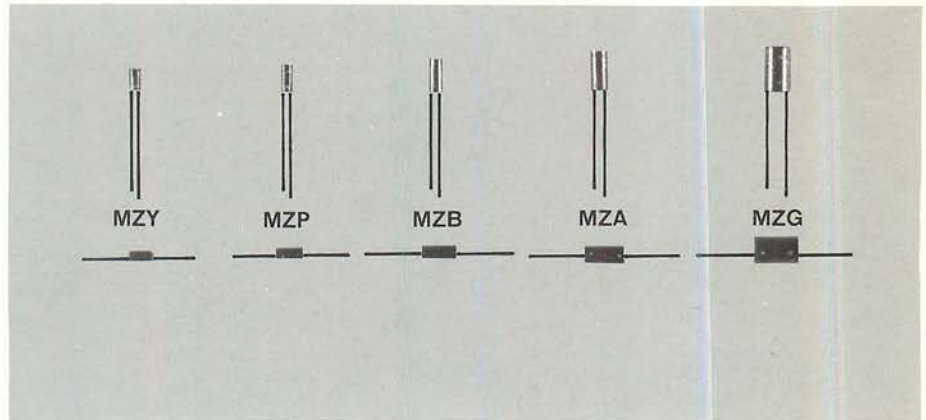
at 85°C — 10 times the value
at 125°C — 15 times the value (at 2/3 rated voltage).

Operating Voltage — Capacitors will operate reliably up to rated WVDC at +85°C and to +125°C with linear derating to 2/3 WVDC. Capacitors will withstand peak voltages in the reverse direction equal to 15% of the dc rating at +25°C, 10% at +55°C, and 5% at +85°C. Ac ripple voltage should be limited so that the forward dc voltage plus peak ac voltage does not exceed rated WVDC.

Surge Voltage — At +85°C and at 60-second intervals, capacitors withstand 1000 30-second applications of 130% rated WVDC.

Temperature — No derating is required between -55°C and +85°C. Between +85°C and +125°C, derate linearly to 2/3 WVDC.

Moisture Resistance — Following Method 106, MIL-STD-202 testing, capacitors will meet initial dc leakage requirements. Capacitance will be within ±10% of initial values.



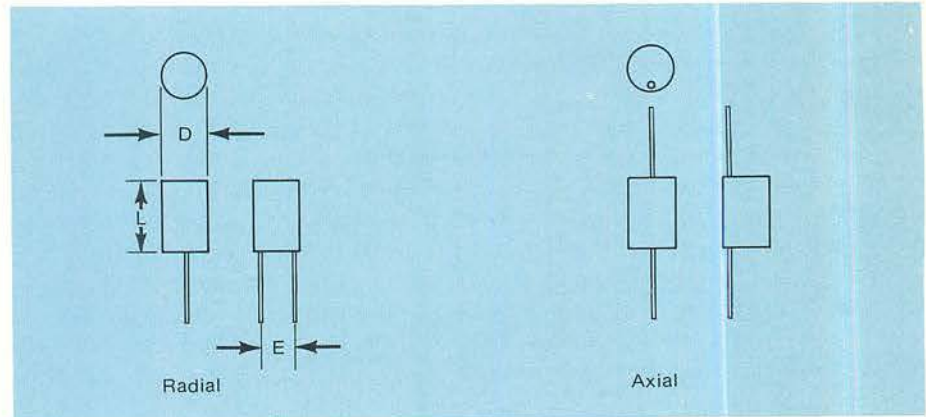
Life Test — After 2000 hours at +85°C with rated WVDC applied, capacitors will meet initial dc leakage and DF requirements. Capacitance will not change more than ±10% from original values.

MECHANICAL

Construction — Tantalum pellets are encased in polyester sleeves and sealed with a special moisture resistant epoxy resin. This rugged, fully insulated package with-

stands a one minute application of a 100 volt potential applied between the leads shorted together and an encircling metal foil envelope.

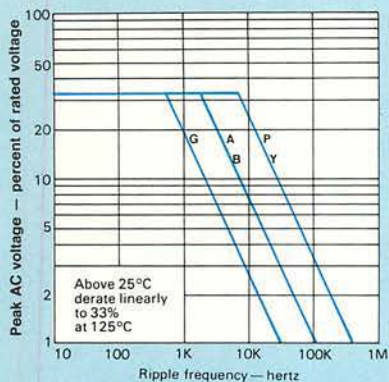
Leads — Leads are solder coated pure nickel wire suitable for soldering or welding. Tested in accordance with MIL-C-55365, .010 diameter leads withstand a 1 lb. pull and .016 diameter leads a 3 lb. pull. All lead diameters withstand 5 rotations twist.



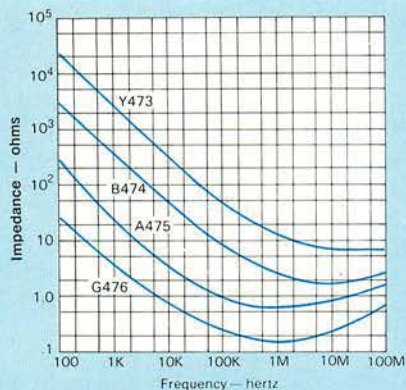
Dimensions — Inches (Millimeters)

Case Size	L Max.	D Max.	E
MZY	.125 (3.18)	.070 (1.78)	.050 (1.27) ±.015 (±.38)
MZP	.160 (4.06)	.070 (1.78)	.050 (1.27) ±.015 (±.38)
MZB	.200 (5.08)	.080 (2.03)	.050 (1.27) ±.015 (±.38)
MZA	.225 (5.72)	.100 (2.54)	.070 (1.78) ±.020 (±.51)
MZG	.250 (6.35)	.150 (3.81)	.120 (3.05) ±.025 (±.64)

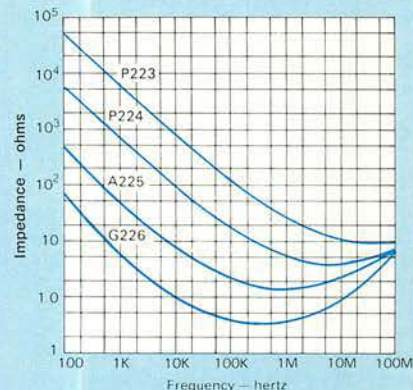
Leads: Y, P, B, A leads are 30 AWG, .010 ±.002 (.25 ±.051) Diameter
G leads are 26 AWG, .016 ±.002 (.41 ±.051) Diameter
All anode leads are 1.625 ±.125 (41.3 ±3.18) Long
All cathode leads are 1.375 ±.125 (34.9 ±3.18) Long



Maximum Ripple Voltage



Impedance vs. Frequency



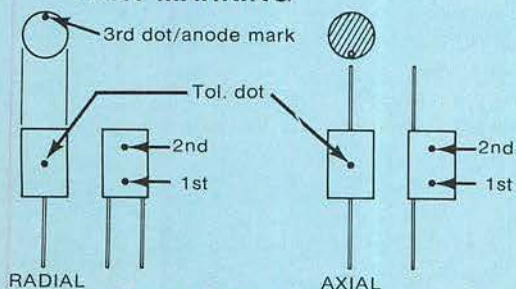
Impedance vs. Frequency

PART NUMBERS AND ORDERING INFORMATION

P/N	μF Cap.	Max. WVDC	Max. % DF	Max. DCL	P/N	μF Cap.	Max. WVDC	Max. % DF	Max. DCL	P/N	μF Cap.	Max. WVDC	Max. % DF	Max. DCL
Y Case Size					MZP Case Size					MZB Case Size				
MZY-020-102	.0010	20	6	0.5	MZP-050-332	.0033	50	6	0.5	MZB-035-334	.33	35	6	0.5
MZY-020-152	.0015	20	6	0.5	MZP-050-472	.0047	50	6	0.5	MZB-035-474	.47	35	6	0.5
MZY-020-222	.0022	20	6	0.5	MZP-050-682	.0068	50	6	0.5	MZB-020-684	.68	20	6	0.5
MZY-020-332	.0033	20	6	0.5	MZP-050-103	.010	50	6	0.5	MZB-020-105	1.0	20	6	0.5
MZY-020-472	.0047	20	6	0.5	MZP-035-153	.015	35	6	0.5	MZB-015-155	1.5	15	6	0.5
MZY-020-682	.0068	20	6	0.5	MZP-035-223	.022	35	6	0.5	MZB-010-225	2.2	10	6	0.5
MZY-020-103	.010	20	6	0.5	MZP-035-333	.033	35	6	0.5	MZG Case Size				
MZY-020-153	.015	20	6	0.5	MZP-035-473	.047	35	6	0.5	Std. Cap. Tol. ±20%				
MZY-020-223	.022	20	6	0.5	MZP-035-683	.068	35	6	0.5	MZA-035-684	.68	35	6	1.0
MZY-020-333	.033	20	6	0.5	MZP-035-104	.10	35	6	0.5	MZA-035-105	1.0	35	6	1.0
MZY-020-473	.047	20	6	0.5	MZP-035-154	.15	35	6	0.5	MZA-020-155	1.5	20	6	1.0
MZY-020-683	.068	20	6	0.5	MZP-035-224	.22	35	6	0.5	MZA-020-225	2.2	20	6	1.0
MZY-020-104	.10	20	6	0.5	MZP-020-334	.33	20	6	0.5	MZA-015-335	3.3	15	6	1.0
MZY-020-154	.15	20	6	0.5	MZP-020-474	.47	20	6	0.5	MZA-010-475	4.7	10	6	1.0
MZY-020-224	.22	20	6	0.5	MZP-015-684	.68	15	6	0.5	MZA-006-685	6.8	6	6	1.0
MZY-015-334	.33	15	6	0.5	MZP-010-105	1.0	10	6	0.5	MZA-004-106	10.	4	8	1.0
MZY-010-474	.47	10	6	0.5	MZP-006-155	1.5	6	6	0.5	MZA-003-156	15.	3	10	1.0
MZY-006-684	.68	6	6	0.5	MZP-004-225	2.2	4	8	0.5	MZA-002-226	22.	2	10	1.0
MZY-004-105	1.0	4	8	0.5	MZP-003-335	3.3	3	10	0.5	MZG Case Size				
MZY-003-155	1.5	3	10	0.5	MZP-002-475	4.7	2	10	0.5	Std. Cap. Tol. ±20%				
MZY-002-225	2.2	2	10	0.5						MZG-035-155	1.5	35	6	1.5
										MZG-035-225	2.2	35	6	1.5
										MZG-020-335	3.3	20	6	1.5
										MZG-020-475	4.7	20	6	1.5
										MZG-020-685	6.8	20	6	1.5
										MZG-015-106	10.	15	6	1.5
										MZG-010-156	15.	10	6	1.5
										MZG-006-226	22.	6	6	1.5
										MZG-004-336	33.	4	8	1.5
										MZG-003-476	47.	3	10	1.5

*Add — "A" for Axial, "R" for Radial. **Add Tolerance Symbol from Part Number Table.

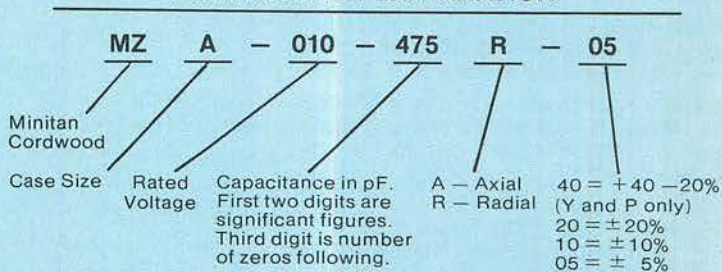
PART MARKING



EIA COLOR DOT CODING

0 Black (omitted)	5 Green
1 Brown	6 Blue
2 Red	7 Violet
3 Orange	8 Gray
4 Yellow	9 White

PART NUMBER EXPLANATION



Marking — Capacitance value is shown by means of standard EIA color code dots. The anode indicator dot also serves as the third color dot. Because the Polyester cases are black, black dots are omitted. ±10% tolerance is indicated by a silver dot, ±5% tolerance by a gold dot. No tolerance dot is used for ±20%.

Solid Tantalum Capacitors

CORNING | COMPONENTS
INCORPORATED
A SUBSIDIARY OF CORNING GLASS WORKS

SUBMINIATURE MINITAN NONPOLAR MN SERIES

FOR FILTERING • COUPLING • BY-PASSING • TIMING

CORNING® solid tantalum capacitors are manufactured by Components Incorporated, a wholly owned subsidiary of Corning Glass Works. Products and packaging bear CI or CORNING/Components Incorporated markings.

These precision, microminiature nonpolar capacitors are intended specifically for high density packaging applications where occasional or continuous voltage reversals occur. No dc bias is required. Weldable/solderable leads and a wide range of shapes, case sizes, and lead configurations facilitate application to a broad range of miniaturized electronic circuitry.

PERFORMANCE CHARACTERISTICS

Capacitance — Measured at +25°C and 120Hz on a polarized capacitance bridge with a maximum polarizing voltage of 2.2 vdc and a maximum ac signal of 1.0 volts rms.

Tolerance — Standard tolerance is ±20% with ±10% or ±5% tolerance available in all case sizes. 10% decade values are offered in ±10% or ±5% tolerance.

Dissipation Factor — Measured simultaneously with capacitance as above. See Part Number Table for maximum +25°C, 120 Hz values.

DC Leakage Current — With rated WVDC applied through a 1000 ohm resistor for 5 minutes maximum, DCL values in μA at +25°C will not exceed those shown in Part Number Table. At +85°C, DCL values will not exceed 10 times Part Number Table values. At +125°C with $\frac{1}{2}$ rated WVDC applied, DCL values will not exceed 15 times Part Number Table values.

Operating Voltage — Capacitors will operate at +85°C and to +125°C with linear derating to $\frac{1}{2}$ rated voltage. Dc biasing is not necessary. Peak ac voltage plus dc voltage should not exceed rated voltage.

Surge Voltage — At +85°C and at 60-second intervals, capacitors withstand 1000 30-second applications of 130% rated WVDC.

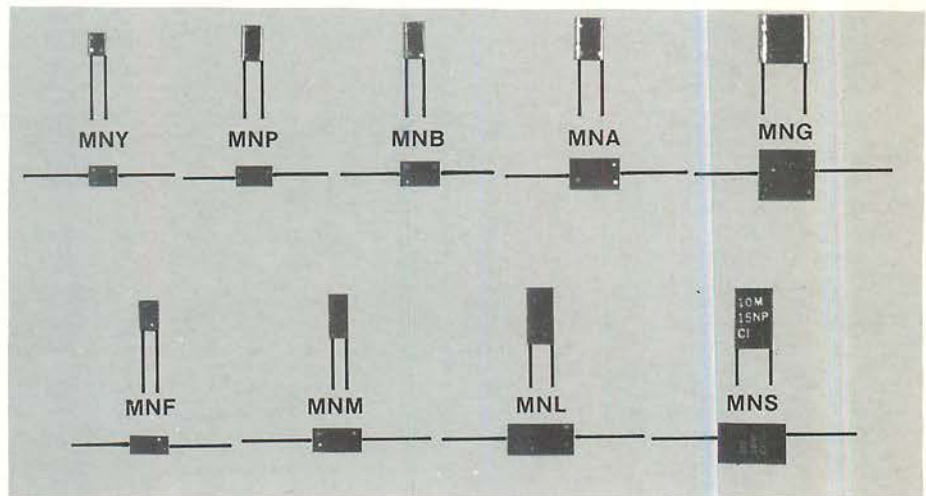
Temperature — No derating is required between -55°C and +85°C. Between +85°C and +125°C, derate linearly to $\frac{1}{2}$ WVDC.

Moisture Resistance — Following Method 106, MIL-STD-202 testing, capacitors will meet initial dc leakage requirements. Capacitance will be within ±10% of initial values.

Life Test — After 2000 hours at +85°C with rated WVDC applied, capacitors will meet initial dc leakage and DF requirements. Capacitance will not change more than ±10% from original values.

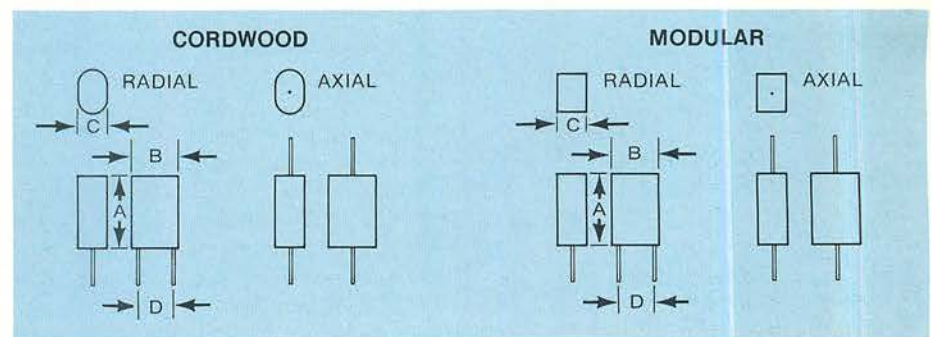
MECHANICAL

Construction — Tantalum pellets are encased in polyester sleeves and sealed with



a special moisture resistant epoxy resin. This rugged, fully insulated package withstands a one minute application of a 100 volt potential applied between the leads shorted together and an encircling metal foil envelope.

Leads — Leads are solder coated pure nickel wide suitable for soldering or welding. Tested in accordance with MIL-C-55365, .010 diameter leads withstand a 1 lb. pull and .016 diameter leads a 3 lb. pull. All lead diameters withstand 5 rotations twist.



Dimensions — Inches (Millimeters)

Case Size	A Max. (Axial)	A Max. (Radial)	B Max.	C Max.	D
MNY	.175 (4.45)	.135 (3.43)	.120 (3.05)	.070 (1.78)	.100 (2.54) ±.020 (±.51)
MNP	.210 (5.33)	.160 (4.06)	.120 (3.05)	.070 (1.78)	.100 (2.54) ±.020 (±.51)
MNB	.240 (6.10)	.200 (5.08)	.140 (3.56)	.080 (2.03)	.100 (2.54) ±.020 (±.51)
MNA	.275 (6.99)	.235 (5.97)	.190 (4.83)	.105 (2.67)	.125 (3.18) ±.020 (±.51)
MNG	.310 (7.87)	.270 (6.86)	.290 (7.37)	.155 (3.94)	.200 (5.08) ±.025 (±.64)
MNF	.220 (5.59)	.180 (4.57)	.125 (3.18)	.125 (3.18)	.100 (2.54) ±.020 (±.51)
MNM	.280 (7.11)	.240 (6.10)	.140 (3.56)	.180 (4.57)	.100 (2.54) ±.020 (±.51)
MNL	.370 (9.40)	.315 (8.00)	.180 (4.57)	.220 (5.59)	.150 (3.81) ±.025 (±.64)
MNS	.390 (9.91)	.335 (8.51)	.230 (5.84)	.230 (5.84)	.200 (5.08) ±.025 (±.64)

Leads: NG, NL and NS leads are 26 AWG, .016 ±.002 (.41 ±.051) diameter
All others are 30 AWG, .010 ±.002 (.25 ±.051) diameter
All leads are 1.625 ±.125 (41.3 ±3.18) long
Cap and WVDC are printed on NS case

PART NUMBERS AND ORDERING INFORMATION

P/N	μF Cap.	Max. WVDC	Max. % DF	Max. DCL	P/N	μF Cap.	Max. WVDC	Max. % DF	Max. DCL	P/N	μF Cap.	Max. WVDC	Max. % DF	Max. DCL					
MNY Case Size					MNB Case Size					MNF Case Size									
Std. Cap. Tol. ±20%					Std. Cap. Tol. ±20%					Std. Cap. Tol. ±20%									
MNY-020-102 ±-.**	.0010	20	6	0.5	MNB-035-154 ±-.**	.15	35	6	0.5	MNF-020-474 ±-.**	.47	20	6	0.5					
MNY-020-152 ----	.0015	20	6	0.5	MNB-035-224 ----	.22	35	6	0.5	MNF-015-684 ----	.68	15	6	0.5					
MNY-020-222 ----	.0022	20	6	0.5	MNB-020-334 ----	.33	20	6	0.5	MNF-010-105 ----	1.0	10	6	0.5					
MNY-020-332 ----	.0033	20	6	0.5	MNB-020-474 ----	.47	20	6	0.5	MNF-006-155 ----	1.5	6	6	0.5					
MNY-020-472 ----	.0047	20	6	0.5	MNB-015-684 ----	.68	15	6	0.5	MNF-004-225 ----	2.2	4	8	0.5					
MNY-020-682 ----	.0068	20	6	0.5	MNB-010-105 ----	1.0	10	6	0.5	MNF-003-335 ----	3.3	3	10	0.5					
MNY-020-103 ----	.010	20	6	0.5	MNB-006-155 ----	1.5	6	6	0.5	MNF-002-475 ----	4.7	2	10	0.5					
MNY-020-153 ----	.015	20	6	0.5	MNB-004-225 ----	2.2	4	8	0.5	MNM Case Size									
MNY-020-223 ----	.022	20	6	0.5	MNB-003-335 ----	3.3	3	10	0.5	Std. Cap. Tol. ±20%									
MNY-020-333 ----	.033	20	6	0.5	MNB-002-475 ----	4.7	2	10	0.5	MNM-035-334 ±-.**	.33	35	6	1.0					
MNY-020-473 ----	.047	20	6	0.5	MNA Case Size					Std. Cap. Tol. ±20%									
MNY-020-683 ----	.068	20	6	0.5	MNA-035-334 ±-.**					.33 35 6 1.0									
MNY-020-104 ----	.10	20	6	0.5	MNA-035-474 ----					.47 35 6 1.0									
MNY-015-154 ----	.15	15	6	0.5	MNA-020-684 ----					.68 20 6 1.0									
MNY-010-224 ----	.22	10	6	0.5	MNA-020-105 ----					1.0 20 6 1.0									
MNY-006-334 ----	.33	6	6	0.5	MNA-015-155 ----					1.5 15 6 1.0									
MNY-004-474 ----	.47	4	8	0.5	MNA-010-225 ----					2.2 10 6 1.0									
MNY-003-684 ----	.68	3	10	0.5	MNA-006-335 ----					3.3 6 6 1.0									
MNY-002-105 ----	1.0	2	10	0.5	MNA-004-475 ----					4.7 4 8 1.0									
MNP Case Size					MNG Case Size					MNL Case Size									
Std. Cap. Tol. ±20%					Std. Cap. Tol. ±20%					Std. Cap. Tol. ±20%									
MNP-050-102 ±-.**	.0010	50	6	0.5	MNG-035-684 ±-.**	.68	35	6	1.5	MNL-035-105 ±-.**	1.0	35	6	2.0					
MNP-050-152 ----	.0015	50	6	0.5	MNG-035-105 ----	1.0	35	6	1.5	MNL-035-155 ----	1.5	35	6	2.0					
MNP-050-222 ----	.0022	50	6	0.5	MNG-020-155 ----	1.5	20	6	1.5	MNL-025-225 ----	2.2	35	6	2.0					
MNP-050-332 ----	.0033	50	6	0.5	MNG-020-225 ----	2.2	20	6	1.5	MNL-025-335 ----	3.3	25	6	2.0					
MNP-050-472 ----	.0047	50	6	0.5	MNG-020-335 ----	3.3	20	6	1.5	MNL-020-475 ----	4.7	20	6	2.0					
MNP-035-682 ----	.0068	35	6	0.5	MNG-015-475 ----	4.7	15	6	1.5	MNL-015-685 ----	6.8	15	6	2.0					
MNP-035-103 ----	.010	35	6	0.5	MNG-010-685 ----	6.8	10	6	1.5	MNL-010-106 ----	10	10	6	2.0					
MNP-035-153 ----	.015	35	6	0.5	MNG-006-106 ----	10	6	6	1.5	MNL-006-156 ----	15	6	6	2.0					
MNP-035-223 ----	.022	35	6	0.5	MNG-004-156 ----	15	4	8	1.5	MNL-004-226 ----	22	4	8	2.0					
MNP-035-333 ----	.033	35	6	0.5	MNG-003-226 ----	22	3	10	1.5	MNS Case Size									
MNP-035-473 ----	.047	35	6	0.5	MNF Case Size					Std. Cap. Tol. ±20%									
MNP-035-683 ----	.068	35	6	0.5	MNF-035-104 ±-.**					.10 35 6 0.5									
MNP-035-104 ----	.10	35	6	0.5	MNF-035-154 ----					.15 35 6 0.5									
MNP-020-154 ----	.15	20	6	0.5	MNF-035-224 ----					.22 35 6 0.5									
MNP-020-224 ----	.22	20	6	0.5	MNF-025-334 ----					.33 25 6 0.5									
MNP-015-334 ----	.33	15	6	0.5															
MNP-010-474 ----	.47	10	6	0.5															
MNP-006-684 ----	.68	6	6	0.5															
MNP-004-105 ----	1.0	4	8	0.5															
MNP-003-155 ----	1.5	3	10	0.5															
MNP-002-225 ----	2.2	2	10	0.5															

*Add "A" — for Axial leads, "R" — for Radial leads **Add tolerance symbol from Part Number Explanation.

PART MARKING

MNS case size is type marked all other case sizes are color coded.

CORDWOOD

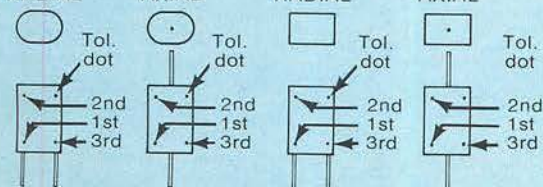
RADIAL

AXIAL

MODULAR

RADIAL

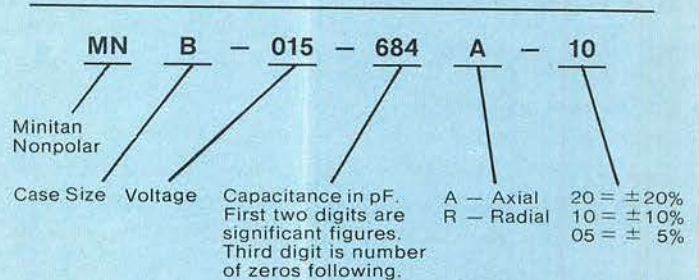
AXIAL



EIA COLOR DOT CODING

- | | |
|-------------------|----------|
| 0 Black (Omitted) | 5 Green |
| 1 Brown | 6 Blue |
| 2 Red | 7 Violet |
| 3 Orange | 8 Gray |
| 4 Yellow | 9 White |

PART NUMBER EXPLANATION



MARKING — Capacitance value is shown by means of standard EIA color code dots. Because the polyester cases are black, black dots are omitted. ±10% tolerance is indicated by a silver dot, ±5% tolerance by a gold dot. No tolerance dot is used for ±20%.

Solid Tantalum Capacitors

SUBMINIATURE MINIDIPS
MD SERIES

CORNING | COMPONENTS
INCORPORATED
A SUBSIDIARY OF CORNING GLASS WORKS

**For Filtering • Coupling •
By-Passing • Timing**

CORNING® solid tantalum capacitors are manufactured by Components Incorporated, a wholly owned subsidiary of Corning Glass Works. Products and packaging bear CI or CORNING/Components Incorporated markings.

These subminiature, polar tantalum capacitors are suitable for general filtering, coupling, by-passing and non-critical RC timing applications to +85°C without voltage derating. Intended specifically for commercial and industrial applications, Minidip Series capacitors feature subminiature size and superior performance at a reasonable cost.

**PERFORMANCE
CHARACTERISTICS**

Capacitance — Measured on a polarized capacitance bridge at 25°C and 120 Hz with a maximum polarizing voltage of 2.2 vdc and a maximum ac signal of 1.0 volts rms.

Tolerance — Standard tolerance is ±20%.

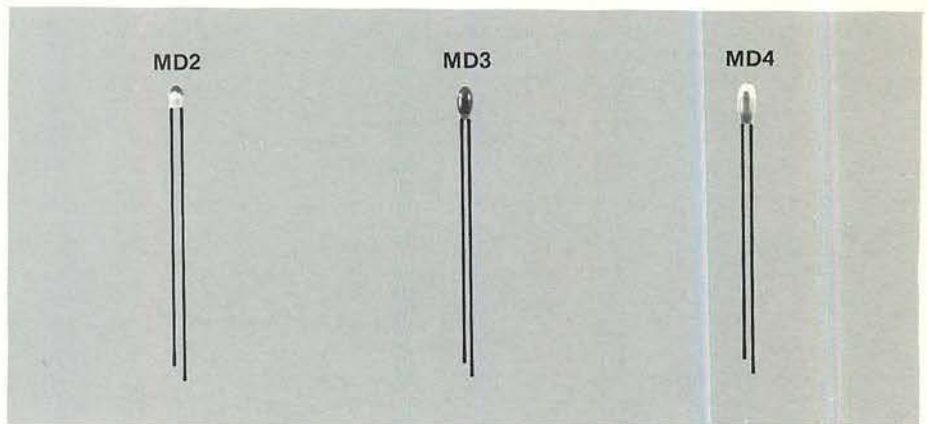
Dissipation Factor — Measured simultaneously with capacitance as above.

Operating Voltage — Capacitors will operate reliably up to rated WVDC at +85°C without derating. Ac ripple voltage should be limited so that the forward dc voltage plus peak ac voltage does not exceed rated WVDC.

Temperature Range — (-55°C to +85°C) without voltage derating.

Surge Voltage — At +85°C and at 60-second intervals, capacitors withstand 1000 30-second applications of 130% rated WVDC.

Life Test — After 2000 hours at +85°C with rated WVDC applied, capacitors will not exceed 150% of the initial dc leakage and D.F. limits. Capacitance



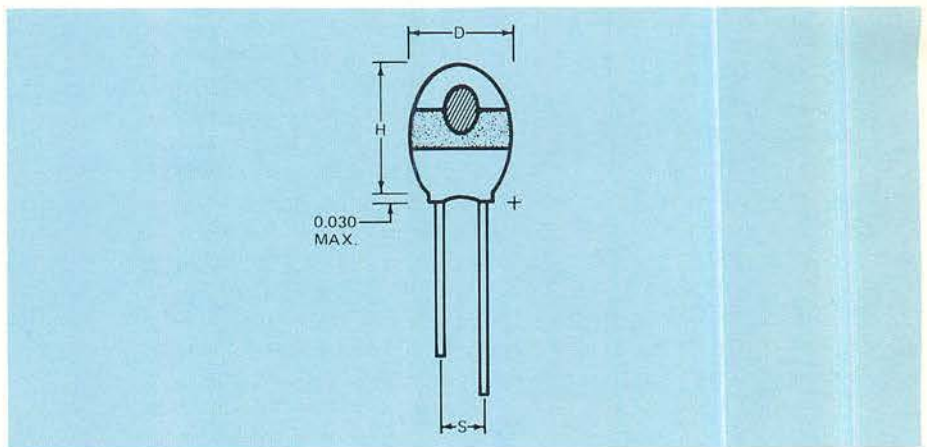
will not change more than ±10% from the initial value.

anodes, sealed in high stability, moisture-resistant epoxy.

MECHANICAL

Construction — Minidip Series capacitors feature subminiature tantalum

Leads — Leads are solder-coated, high purity nickel wire suitable for either soldering or welding. They will withstand a 1 lb. pull.



Dimensions — Inches (Millimeters)

Case Size	H Max.	D Max.	S ±0.015 (0.38)	Lead Length ±0.125 (±3.18)		Lead Diameter ±0.001 (±0.025)
				Anode	Cathode	
MD2	0.175 (4.44)	0.095 (2.41)	0.050 (1.27)	1.625 (41.3)	1.375 (34.9)	30 AWG 0.010 (0.250)
MD3	0.210 (5.33)	0.110 (2.79)	0.050 (1.27)	1.625 (41.3)	1.375 (34.9)	30 AWG 0.010 (0.250)
MD4	0.260 (6.60)	0.125 (3.18)	0.050 (1.27)	1.625 (41.3)	1.375 (34.9)	30 AWG 0.010 (0.250)

Solid Tantalum Capacitors

SUBMINIATURE TANTALUM CHIPS
MC SERIES

CORNING | COMPONENTS
INCORPORATED
A SUBSIDIARY OF CORNING GLASS WORKS

FOR FILTERING • COUPLING • BY-PASSING • TIMING

CORNING® solid tantalum capacitors are manufactured by Components Incorporated, a wholly owned subsidiary of Corning Glass Works. Products and packaging bear CI or CORNING/Components Incorporated markings.

Microminiature MC chip capacitors are designed specifically for hybrid, thick film, and microcircuit applications where mounting space is critical and where conventionally packaged capacitors may not be used. The MC series capacitors are suitable for general coupling, filtering, by-passing, and non-critical timing applications over the temperature range of -55°C to $+125^{\circ}\text{C}$ and over the capacitance range .1 to $100\mu\text{F}$. Extended capacitance values are available on special order.

PERFORMANCE CHARACTERISTICS

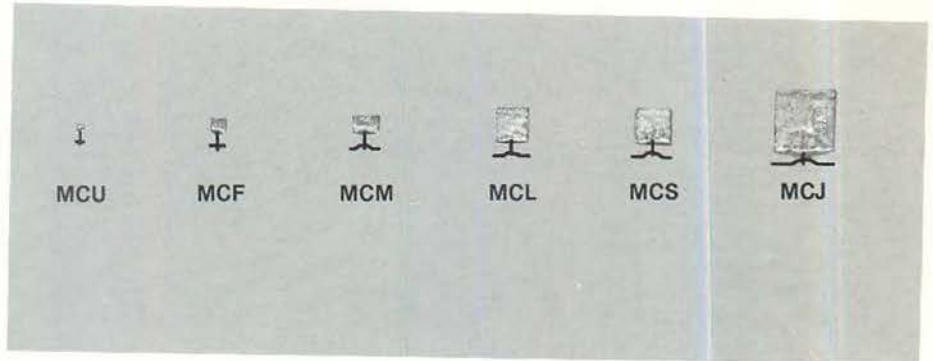
Capacitance — Measured on a polarized capacitance bridge with a maximum polarizing voltage of 2.2 vdc and a maximum ac signal 1.0 volts rms. See Part Number Table for available ratings.

Tolerance — Standard tolerance is $\pm 20\%$, except for the MCU case size ($+40, -20\%$). $\pm 10\%$ and $\pm 5\%$ tolerances are available in all case sizes. 10% decade values are offered in $\pm 10\%$ or $\pm 5\%$ tolerances.

DC Leakage Current — With rated dc voltage applied through a 1000 ohm resistor in series with the capacitor, DCL will not exceed the values shown in Part Number Table. At $+85^{\circ}\text{C}$, DCL values will not exceed 10 times Part Number Table values. At $+125^{\circ}\text{C}$ with $\frac{2}{3}$ rated WVDC applied, DCL values will not exceed 15 times Part Number Table values.

Dissipation Factor — Measured simultaneously with capacitance as above. See Part Number Table for maximum $+25^{\circ}\text{C}$ values.

Operating Voltage — Capacitors will operate reliably up to rated WVDC at $+85^{\circ}\text{C}$ and $+125^{\circ}\text{C}$ with linear derating to $\frac{2}{3}$ WVDC. Ac ripple voltage should be limited so that the forward dc voltage plus peak ac voltage does not exceed rated WVDC.



Temperature — No derating is required between -55°C and $+85^{\circ}\text{C}$. Between $+85^{\circ}\text{C}$ and $+125^{\circ}\text{C}$, derate linearly to $\frac{2}{3}$ WVDC.

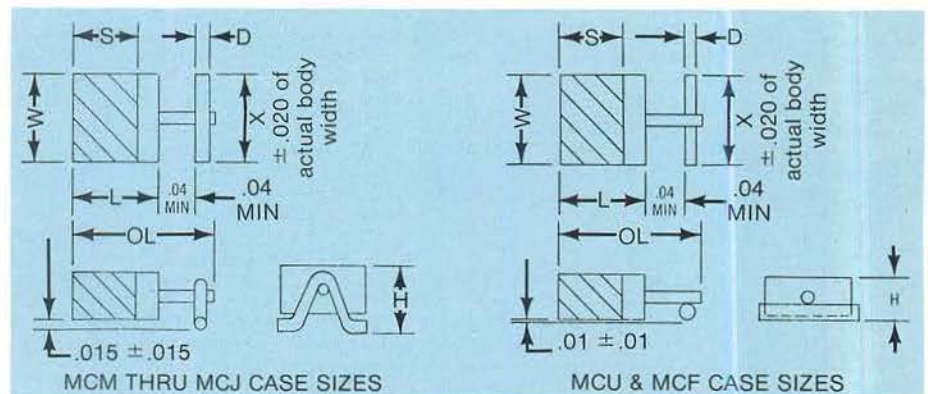
Surge Voltage — At $+85^{\circ}\text{C}$ and at 60-second intervals, capacitors withstand 1000 30-second applications of 130% rated WVDC.

Life Test — After 2000 hours at $+85^{\circ}\text{C}$ with rated WVDC applied, capacitors will meet initial dc leakage and DF requirements. Capacitance will not change more than $\pm 10\%$ from initial values.

MECHANICAL

Construction — Tantalum pellets are coated with 60/38/2 (2% silver) eutectic solder suitable for reflow solder mounting. The negative terminal is the capacitor body itself. The positive terminal is a solder coated nickel wire.

Lead Attachment — Positive leads may be attached by conventional welding or soldering techniques. Negative terminal attachment is accomplished by reflow soldering. Soldering technique, time, and temperature are critical to reliable performance and circuit yields.



Dimensions — Inches (Millimeters)

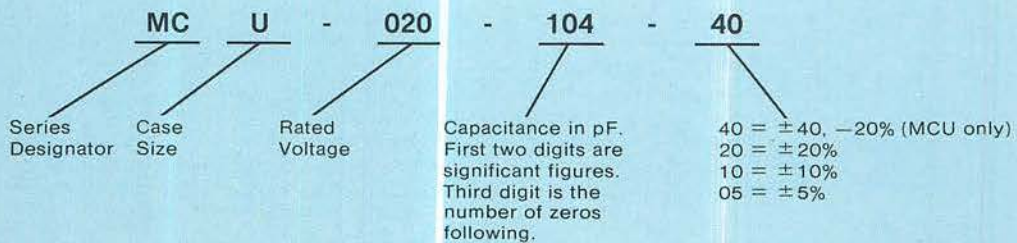
Case Size	H Max.	W Max.	L Max.	OL Max.	D $\pm .002$ ($\pm .051$)	S Min.
MCU	.060 (1.52)	.056 (1.65)	.085 (2.16)	.155 (3.94)	.016 (.41)	75%
MCF	.085 (2.16)	.110 (2.79)	.110 (2.79)	.180 (4.57)	.020 (.51)	75%
MCM	.100 (2.54)	.170 (4.32)	.175 (4.44)	.245 (6.22)	.020 (.51)	75%
MCL	.120 (3.05)	.205 (5.21)	.230 (5.84)	.300 (7.62)	.020 (.51)	75%
MCS	.145 (3.68)	.210 (5.33)	.240 (6.10)	.310 (7.87)	.020 (.51)	75%
MCJ	.170 (4.32)	.355 (9.02)	.390 (9.91)	.460 (11.68)	.020 (.51)	75%

PART NUMBERS AND ORDERING INFORMATION

Part Number	Cap. in μ F @25°C 120 Hz	WVDC @ 85°C	Max. DF % @25°C 120 Hz	Max. DCL In μ A @ 25°C	Part Number	Cap. in μ F @25°C 120 Hz	WVDC @ 85°C	Max. DF % @25°C 120 Hz	Max. DCL In μ A @ 25°C
MCU Case Size					MCL Case Size				
MCU-020-104-*	.10	20	6	0.5	MCL-035-225-*	2.2	35	6	2.0
MCU-020-154-—	.15	20	6	0.5	MCL-035-335-—	3.3	35	6	2.0
MCU-020-224-—	.22	20	6	0.5	MCL-035-475-—	4.7	35	6	2.0
MCU-015-334-—	.33	15	6	0.5	MCL-025-685-—	6.8	25	6	2.0
MCU-010-474-—	.47	10	6	0.5	MCL-020-106-—	10.0	20	6	2.0
MCU-006-684-—	.68	6	6	0.5	MCL-015-156-—	15.0	15	6	2.0
MCU-004-105-—	1.0	4	8	0.5	MCL-010-226-—	22.0	10	6	2.0
MCU-003-155-—	1.5	3	10	0.5	MCL-006-336-—	33.0	6	6	2.0
MCF Case Size					MCS Case Size				
MCF-035-104-*	.10	35	6	0.5	MCS-035-685-*	6.8	35	6	3.0
MCF-035-154-—	.15	35	6	0.5	MCS-025-106-—	10.0	25	6	3.0
MCF-035-224-—	.22	35	6	0.5	MCS-020-156-—	15.0	20	6	3.0
MCF-035-334-—	.33	35	6	0.5	MCS-015-226-—	22.0	15	6	3.0
MCF-035-474-—	.47	35	6	0.5	MCS-010-336-—	33.0	10	6	3.0
MCF-025-684-—	.68	25	6	0.5	MCS-006-476-—	47.0	6	6	3.0
MCF-020-105-—	1.0	20	6	0.5	MCS-004-686-—	68.0	4	8	3.0
MCF-015-155-—	1.5	15	6	0.5	MCJ Case Size				
MCF-010-225-—	2.2	10	6	0.5	MCJ-035-106-*	10.0	35	8	9.0
MCF-006-335-—	3.3	6	6	0.5	MCJ-035-156-—	15.0	35	8	9.0
MCF-004-475-—	4.7	4	8	0.5	MCJ-035-226-—	22.0	35	8	9.0
MCF-003-685-—	6.8	3	10	0.5	MCJ-025-336-—	33.0	25	8	9.0
MCF-002-106-—	10.0	2	10	0.5	MCJ-020-476-—	47.0	20	8	9.0
MCM Case Size					MCJ-015-686-—				
MCM-035-684-*	.68	35	6	1.0	MCJ-010-107-—	100.00	10	8	9.0
MCM-035-105-—	1.0	35	6	1.0					
MCM-035-155-—	1.5	35	6	1.0					
MCM-025-225-—	2.2	25	6	1.0					
MCM-020-335-—	3.3	20	6	1.0					
MCM-020-475-—	4.7	20	6	1.0					
MCM-010-685-—	6.8	10	6	1.0					
MCM-006-106-—	10.0	6	6	1.0					
MCM-004-156-—	15.0	4	8	1.0					
MCM-003-226-—	22.0	3	10	1.0					

*Tolerance is indicated by adding suffix "-40" for +40%, -20% tolerance, "-20" for \pm 20%, "-10" for \pm 10%, and "-05" for \pm 5% tolerance, i.e., MCU-020-104-40, MCS-035-685-10, etc.

PART NUMBER EXPLANATION



Introduction

The exacting performance requirements of today's electronic systems demand the use of only the most stable and reliable components. At Corning, our direction has been to reduce the burden placed on the circuit designer by developing metal film resistors that produce precision performance and high levels of reliability for the life of any circuit.

For example: Long term reliability in precision resistors was a problem until Corning introduced the NE, NC and NA style resistors. How much precision to buy was often a question until we developed the C3, C4, and C5 style multi-purpose resistors, opening

the way to performance with economy. Shorts and flaming failures worried many users until Corning developed the exclusive FP resistors. Entirely flame-proof, these resistors will not flame or short, even under the most severe overloads.

By anticipating the designer's resistor problems, we have developed the precision, reliability, quality, and usefulness of CORNING® metal film resistors.

Established Reliability

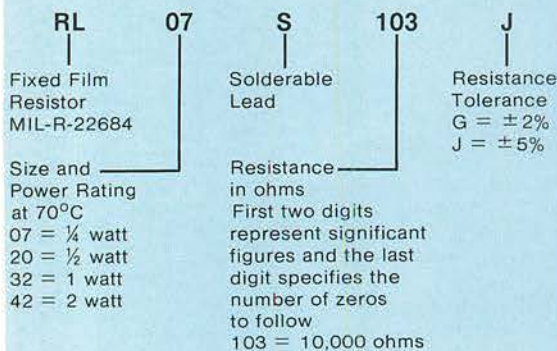
CORNING metal film resistors have demonstrated a failure rate of 0.00013%/1000 hours, based on approximately one billion unit test hours.

The quality Corning builds into its resistors has been demonstrated by field performance in high reliability programs such as: Minuteman, Safeguard, Mercury, Gemini, Apollo, Mariner, and Poseidon, as well as our involvement in virtually every other military program requiring resistors.

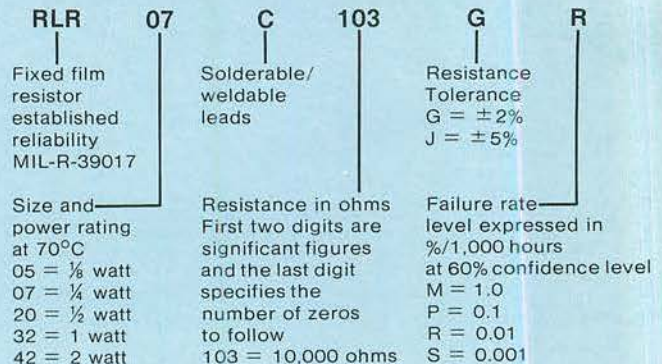
MIL-R-22684 and MIL-R-10509 are now inactive for new design, and are superseded by Established Reliability specifications MIL-R-39017 and MIL-R-55182, respectively — failure level M. Corning is qualified to supply to these specifications.

MILITARY PART NUMBER EXPLANATION

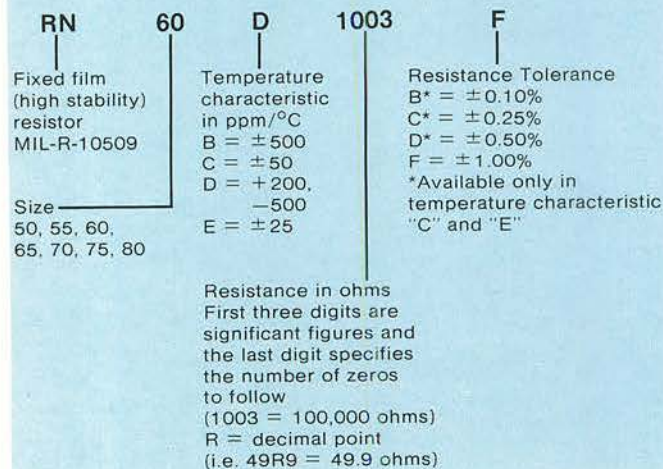
MIL-R-22684 (RL07S103J)



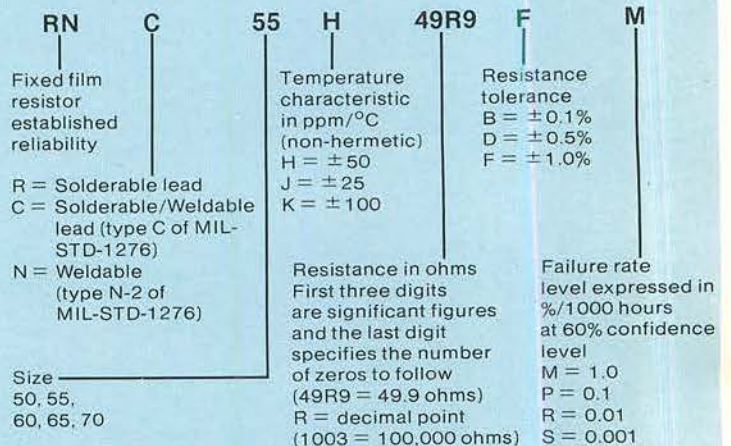
MIL-R-39017 (RLR07C103GR)



MIL-R-10509 (RN60D1003F)



MIL-R-55182 (RNC55H49R9FM)



CUSTOM NON-STANDARD CAPABILITIES

Many special resistor requirements can be fulfilled by calling the Resistor Product Engineering Department in Bradford, Pennsylvania, (814) 362-5571. Some of these "special" capabilities are:

- Non-standard marking, serialization, date code
- Weldable leads, gold-plated nickel and dumet
- Non-standard lead diameters
- Packaging, blister, vial

With our addition of more sophisticated test equipment, Corning can now offer custom testing or screening such as:

- 100% noise sort, temperature cycle
- Burn-in @ various power overload levels
- Group A, B, C type tests
- Customer acceptance programs
- Tolerance distributions
- Life test
- Degradation tests
- Temperature Coefficient Matching

Corning is also equipped to perform 100% non-destructive radiographic (x-ray) inspection of finished components. Characteristics that can be detected are:

- Resistive element alignment
 - Coating voids
 - Foreign materials
 - Heterogenities of materials
 - Broken, abraded, distorted element
- Details of x-ray equipment such as focal points are available upon request.

Precision (MIL-R-55182 & MIL-R-10509)						Standard Resistance Values						Semi-Precision (MIL-R-39017 & MIL-R-22684)	
PURCHASE TOLERANCE													
B-.1% C-.25% D-.5%	F-1%	B-.1% C-.25% D-.5%	F-1%	B C D	F-1%	B-.1% C-.25% D-.5%	F-1%	B-.1% C-.25% D-.5%	F-1%	B-.1% C-.25% D-.5%	F-1%	G-2% J-5%	
10.0	10.0	14.7	14.7	21.5	21.5	31.6	31.6	46.4	46.4	68.1	68.1	10	
10.1	.....	14.9	.....	21.8	.....	32.0	.....	47.0	.....	69.0	.....	11
10.2	10.2	15.0	15.0	22.1	22.1	32.4	32.4	47.5	47.5	69.8	69.8	12	
10.4	.....	15.2	.....	22.3	.....	32.8	.....	48.1	.....	70.6	.....	13
10.5	10.5	15.4	15.4	22.6	22.6	33.2	33.2	48.7	48.7	71.5	71.5	15	
10.6	.....	15.6	.....	22.9	.....	33.6	.....	49.3	.....	72.3	.....	16
10.7	10.7	15.8	15.8	23.2	23.2	34.0	34.0	49.9	49.9	73.2	73.2	18	
10.9	.....	16.0	.....	23.4	.....	34.4	.....	50.5	.....	74.1	.....	20
11.0	11.0	16.2	16.2	23.7	23.7	34.8	34.8	51.1	51.1	75.0	75.0	22	
11.1	.....	16.4	.....	24.0	.....	35.2	.....	51.7	.....	75.9	.....	24
11.3	11.3	16.5	16.5	24.3	24.3	35.7	35.7	52.3	52.3	76.8	76.8	27	
11.4	.....	16.7	.....	24.6	.....	36.1	.....	53.0	.....	77.7	.....	30
11.5	11.5	16.9	16.9	24.9	24.9	36.5	36.5	53.6	53.6	78.7	78.7	33	
11.7	.....	17.2	.....	25.2	.....	37.0	.....	54.2	.....	79.6	.....	36
11.8	11.8	17.4	17.4	25.5	25.5	37.4	37.4	54.9	54.9	80.6	80.6	39	
12.0	.....	17.6	.....	25.8	.....	37.9	.....	55.6	.....	81.6	.....	43
12.1	12.1	17.8	17.8	26.1	26.1	38.3	38.3	56.2	56.2	82.5	82.5	47	
12.3	.....	18.0	.....	26.4	.....	38.8	.....	56.9	.....	83.5	.....	51
12.4	12.4	18.2	18.2	26.7	26.7	39.2	39.2	57.6	57.6	84.5	84.5	56	
12.6	.....	18.4	.....	27.1	.....	39.7	.....	58.3	.....	85.6	.....	62
12.7	12.7	18.7	18.7	27.4	27.4	40.2	40.2	59.0	59.0	86.6	86.6	68	
12.9	.....	18.9	.....	27.7	.....	40.7	.....	59.7	.....	87.6	.....	75
13.0	13.0	19.1	19.1	28.0	28.0	41.2	41.2	60.4	60.4	88.7	88.7	82	
13.2	.....	19.3	.....	28.4	.....	41.7	.....	61.2	.....	89.8	.....	91
13.3	13.3	19.6	19.6	28.7	28.7	42.2	42.2	61.9	61.9	90.9	90.9	.....
13.5	.....	19.8	.....	29.1	.....	42.7	.....	62.6	.....	92.0	.....	.....
13.7	13.7	20.0	20.0	29.4	29.4	43.2	43.2	63.4	63.4	93.1	93.1	.....
13.8	.....	20.3	.....	29.8	.....	43.7	.....	64.2	.....	94.2	.....	.....
14.0	14.0	20.5	20.5	30.1	30.1	44.2	44.2	64.9	64.9	95.3	95.3	.....
14.2	.....	20.8	.....	30.5	.....	44.8	.....	65.7	.....	96.5	.....	.....
14.3	14.3	21.0	21.0	30.9	30.9	45.3	45.3	66.5	66.5	97.6	97.6	.....
14.5	.....	21.3	.....	31.2	.....	45.9	.....	67.3	.....	98.8	.....	.....

Standard resistance values are obtained from the decade table by multiplying by powers of 10. As an example, 13.3 can represent ohms, 133 ohms, 1.33K, 13.3K, 133K, 1.33 megohms.

EIA Color Code

Significant Figures	Multiplier (number of zeros to follow)	Tolerance
Black = 0	Black = None	Brown = ±1%
Green = 5	Yellow = 0000	Red = ±2%
Brown = 1	Green = 00000	Gold = ±5%
Blue = 6	Blue = 000000	Silver = ±10%
Red = 2	Orange = 000	No Band = ±20%
Violet = 7		
Grey = 8		
White = 9		

STATISTICAL DESIGN TOLERANCE

CONCEPT

From the designer's standpoint, circuits will continue to perform their function providing their components operate within the limits established during design. Optimum circuit design thus depends on predictability of total excursion from nominal characteristics.

Corning's statistical design tolerances introduce opportunities for circuit simplification, savings on associated components through predictable resistor performance, and standardizations in both inventories and manufacturing.

Corning has established statistical summations of all resistance deviations from nominal, both transitory and permanent, which provide dependable, low cost circuit design.

These summations include:

1. Initial resistance distribution related to purchase tolerance.
2. Changes in resistance resulting from temperature coefficient effects.
3. Changes in resistance due to environmental testing (moisture, temperature cycling, solder heat effect, and 1,000-hour load life).
4. 10,000-hour load life changes due to rated power dissipation.

Theory

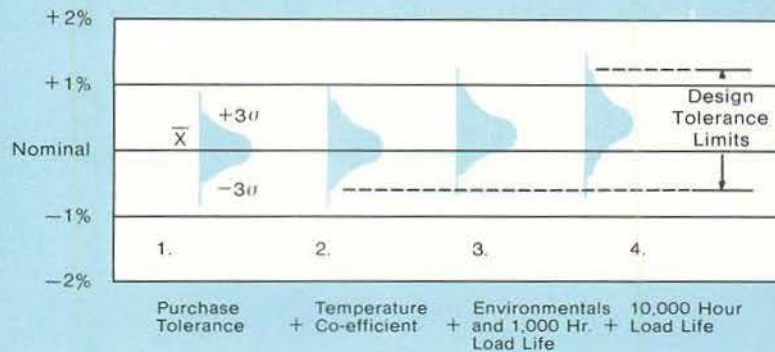
A continual sampling of resistance deviations due to purchase tolerance, temperature coefficient, environmental stress, and load life can be combined statistically when these characteristics have a normal or Gaussian distribution.

The end product is not sorted or selected for desired characteristics, but rather produced to specification. CORNING® resistors display normal distributions primarily due to manufacturing techniques that adhere rigidly to specified purchase tolerance and temperature coefficient specifications.

The curves illustrate the development of CORNING design tolerances, using accepted statistical techniques. The design tolerance is the calculated ΔR limit from first application of power through 10,000 hours load life.

APPLICATION

The circuit designer can apply CORNING metal film resistors within the design tolerance limits shown by the table below. These limits are given for the NC, NA, and C style resistors.



NC Style T.C. — 50 ppm				NA Style T.C. — 100 ppm				C Style Multi-Use Resistors — 100 ppm			
Corning Type	Rating Watts	Purch. Tol.	Design Tolerance Limits %	Corning Type	Rating Watts	Purch. Tol.	Design Tolerance Limits %	Corning Type	Rating Watts	Purch. Tol.	Design Tolerance Limits %
NC4	1/8 w @ 70°C	1/2 %	+1.14, -0.53	NA55	1/8 w @ 70°C	1/2 %	+1.25, -0.67	C3	1/8 w @ 70°C	1%, 2%	+2.82, -1.84
	1/10 w @ 125°C	1/2 %	+1.54, -1.01		1/10 w @ 125°C	1/2 %	+1.63, -1.00		1/20 w @ 125°C	1%, 2%	+3.12, -2.52
NC5	1/4 w @ 70°C	1/2 %	+1.45, -0.66	NA60	1/4 w @ 70°C	1/2 %	+1.64, -1.13	C4	1/4 w @ 70°C	1%, 2%	+2.72, -1.84
	1/8 w @ 125°C	1/2 %	+1.77, -1.10		1/8 w @ 125°C	1/2 %	+1.91, -1.45		1/8 w @ 125°C	1%, 2%	+3.35, -2.52
NC6	1/4 w @ 70°C	1/2 %	+1.39, -0.50	NA65	1/4 w @ 70°C	1/2 %	+1.49, -0.50	C5	1/4 w @ 70°C	1%, 2%	+2.01, -1.24
	1/8 w @ 125°C	1/2 %	+1.78, -1.00		1/8 w @ 125°C	1/2 %	+1.88, -1.00		1/8 w @ 125°C	1%, 2%	+2.81, -2.16
			+1.25, -0.59				+1.57, -0.62				+2.10, -1.42
			+1.62, -1.03				+1.90, -1.01				+2.87, -2.27
			+1.65, -0.62				+2.00, -0.86				+2.20, -1.00
			+1.98, -1.00				+2.29, -1.00				+3.05, -1.88
			+1.27, -0.68				+1.74, -0.76				+2.24, -1.14
			+1.60, -1.06				+2.01, -1.07				+3.06, -2.02

PROVEN STABILITY

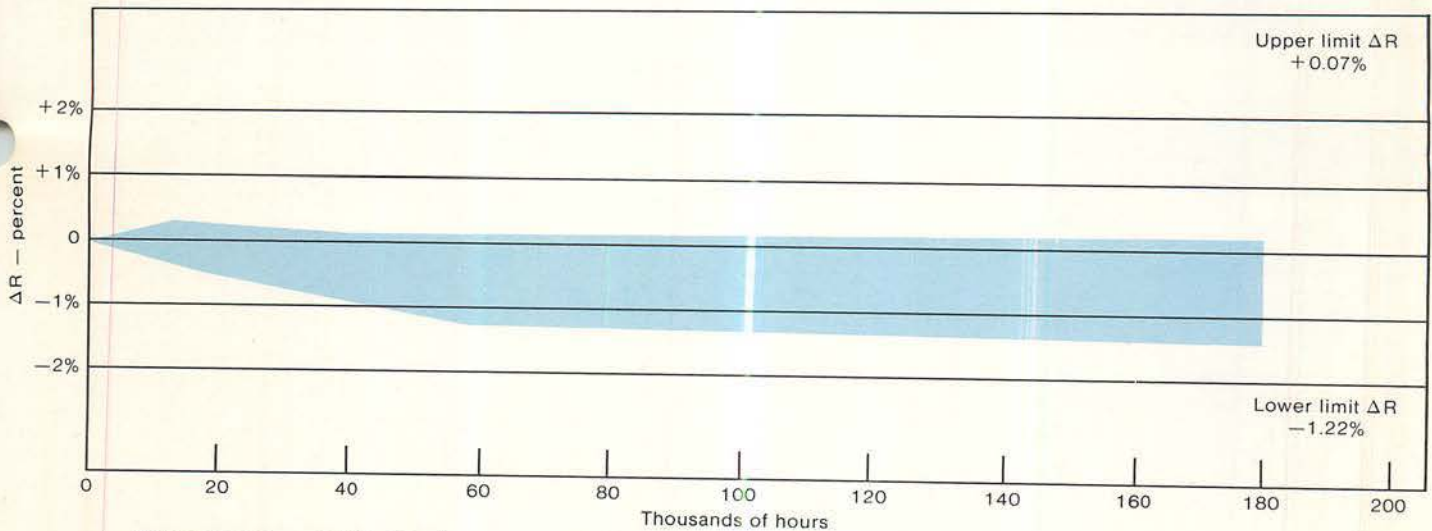
In 1956, Remington Rand Univac Division of Sperry Rand Corporation began testing 1500 CORNING® N20, ½ watt, 1% resistors in a 40°C ambient under various power stressing conditions. Resistance deviations resulting from this program were minimal

and unsurpassed in the industry. To confirm the stability characteristics demonstrated in the Remington Rand Univac test, Corning remounted 600 of the original resistors in an uncontrolled 25°C ambient early in 1962, accumulating over 180,000

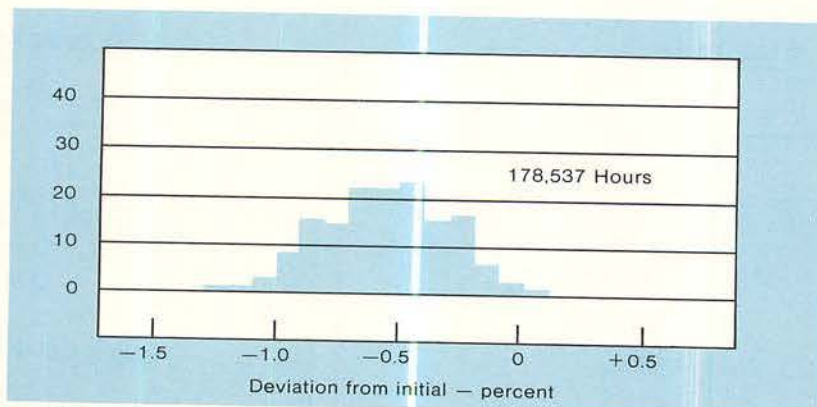
total test hours to date. Not a single unit has exceeded a 2% ΔR from initial resistance at time zero. The results of this added testing are shown below and will be of great value in evaluating CORNING metal film resistors for your circuit requirements.

Testing Procedures (Closely Simulating Typical Application)

Nominal Resistance (Ohms)	No. of Units in Group	Power Dissipation (Watts)	Percent of Rated Power	Total Test Hours To Present	Unit Hours
10,000	150	0.1	20	177,913	26,686,950
10,000	150	0.2	40	176,837	26,525,550
10,000	150	0.3	60	178,537	26,780,550
115,000	150	0.6	120	182,537	27,380,550
TOTALS	600			715,824	107,373,600



Extended Load Life Performance, CORNING Metal Film Resistors (10K, ½ Watt) at 0.3 Watt



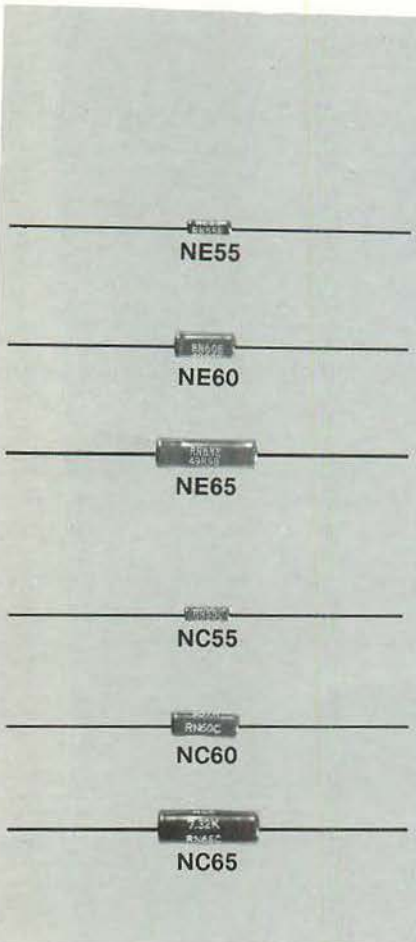
Deviation Percentage at 0.3 Watt Dissipation for CORNING Resistors, 10K, 1% Purchase Tolerance, 150 Piece Life Test

Metal Film Resistors—Precision

NE55, 60, 65 (Commercial) RN55E, 60E, 65E (QPL to MIL-R-10509) ± 25 PPM
 NC55, 60, 65 (Commercial) RN55C, 60C, 65C (QPL to MIL-R-10509) ± 50 PPM

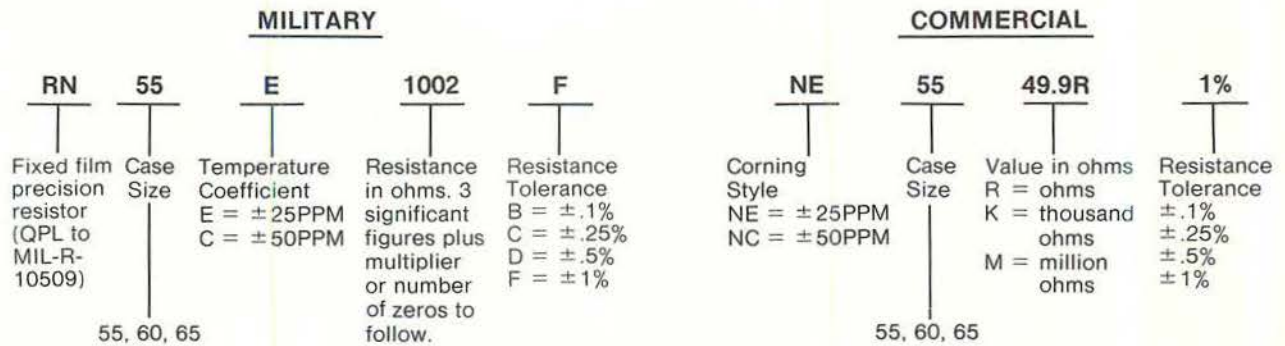
Corning's ± 25 and ± 50 ppm resistors provide the tight tolerance, tight temperature coefficient and operating stability required in today's precision circuits. These resistors feature the

low noise and low inductance characteristics of metal film technology. Standard resistance tolerances are 0.1, .25, .5, and 1%.

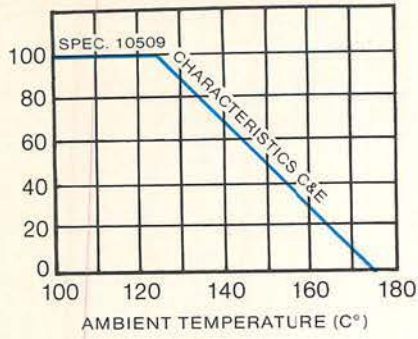


Military Type	Corning Type	Military (Commercial) Wattage Rating		Voltage Rating	Resistance Range	Standard Tolerance	Temperature Coefficient	Dimensions—Inches (mm) Body Length
		70°C	125°C					
RN55E	(NE55)	(1/4)	1/10 (3/8)	200	49.9Ω-1 Meg	.1, .25, .5, 1%	25PPM/°C	.245 ± .020 (6.1 ± .51)
RN60E	(NE60)	(1/2)	1/8 (1/4)	250	49.9Ω-1 Meg	.1, .25, .5, 1%	25PPM/°C	.375 + .025 - .055 (9.5 + .63 - 1.4)
RN65E	(NE65)	(1)	1/4 (1/2)	300	49.9Ω-1 Meg	.1, .25, .5, 1%	25PPM/°C	.575 + .030 - .040 (14.6 + .76 - 1.3)
RN55C	(NC55)	(1/4)	1/10 (3/8)	200	49.9Ω-1 Meg	.1, .25, .5, 1%	50PPM/°C	.245 ± .020 (6.1 ± .51)
RN60C	(NC60)	(1/2)	1/8 (1/4)	250	49.9Ω-1 Meg	.1, .25, .5, 1%	50PPM/°C	.375 + .025 - .055 (9.5 + .63 - 1.4)
RN65C	(NC65)	(1)	1/4 (1/2)	300	49.9Ω-1 Meg	.1, .25, .5, 1%	50PPM/°C	.575 + .030 - .040 (14.6 + .76 - 1.3)

PART NUMBER EXPLANATION



DERATING CURVE



Dimensions— Inches (mm)		Load Life 1000 Hours Rated Cond.	Moisture Resistance	Temp. Cycle	Short Time Overload	Low Temp. Operation	D.W.V.	Effect Solder Heat	Terminal Strength	Shock	Vibration
Body Diameter	Lead Diameter	ΔR Max. ±%	ΔR Max. ±%	ΔR Max. ±%	ΔR Max. ±%	ΔR Max. ±%	ΔR Max. ±%	ΔR Max. ±%	ΔR Max. ±%	ΔR Max. ±%	ΔR Max. ±%
.088 ± .010 (2.24 ± .25)	.025 (.63)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
.135 ± .020 (3.4 ± .51)	.025 (.63)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
.185 + .015 — .025 (4.70 + .38 — .63)	.025 (.63)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
.088 ± .010 (2.24 ± .25)	.025 (.63)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
.135 ± .020 (3.4 ± .51)	.025 (.63)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
.185 + .015 — .025 (4.70 + .38 — .63)	.025 (.63)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1

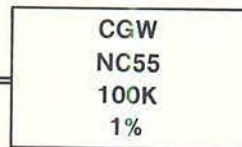
PART MARKING EXAMPLES

**MILITARY
(STANDARD)**



CGW — Corning Glass Works
 NC55 — Style and Case Size
 RN55C — MIL Designation
 1003F — Value & tolerance

**COMMERCIAL
(OPTIONAL)**



CGW — Corning Glass Works
 NC55 — Style and Case Size
 100K — Value in Ohms
 1% — Tolerance

OTHER MARKING AVAILABLE — Customer part number; color banding.

INSULATING COATING — Epoxy resin.

COLOR — Dark gray.

LEAD MATERIAL — Type C, per MIL-STD-1276 (weldable types available).

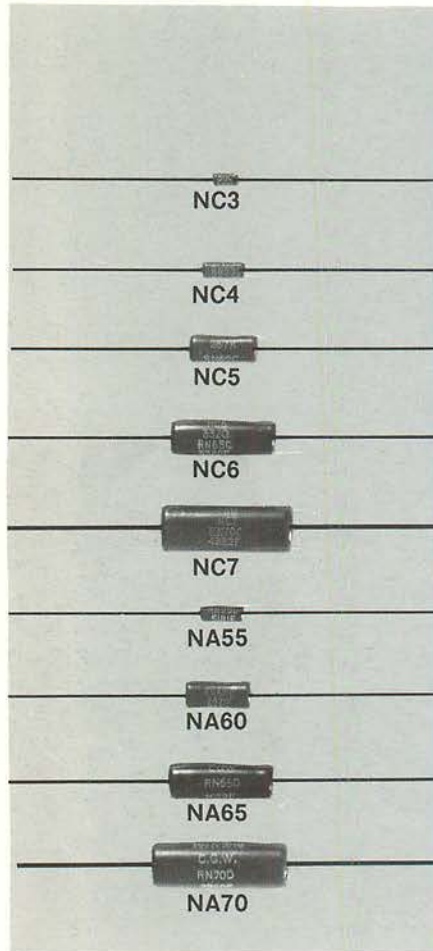
OTHER INFORMATION AVAILABLE — Frequency, characteristics, inductance, noise.

Metal Film Resistors—Precision

NC3, 4, 5, 6, 7 (Commercial) RN50C, 55C, 60C, 65C, 70C (QPL to MIL-R-10509) ± 50 PPM
 NA55, 60, 65, 70 (Commercial) RN55D, 60D, 65D, 70D (QPL to MIL-R-10509) ± 100 PPM

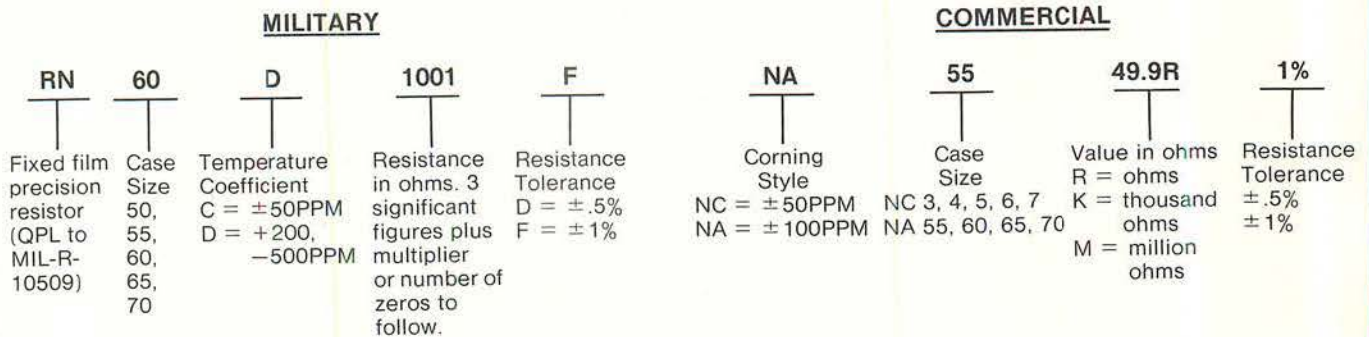
Precision metal film resistors for all circuit applications. Specifications meet or exceed those of MIL-R-10509.

These resistors feature low noise and low inductance characteristics.

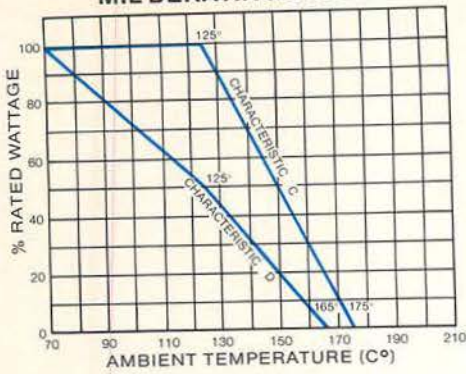


Military Type	Corning Type	Military (Commercial)		Voltage Rating	Resistance Range	Standard Tolerance	Temperature Coefficient	Dimensions—Inches (mm) Body Length
		Wattage 70°C	Rating 125°C					
RN50C	(NC3)	1/10	1/20	200	49.9Ω-100K	1%	± 50 PPM/°C	.145 \pm .015 (3.68 \pm .38)
RN55C	(NC4)	1/8	1/10	200	49.9Ω-150K 10Ω-301K	1/2% 1%	± 50 PPM/°C	.225 \pm .020 (5.71 \pm .51)
RN60C	(NC5)	1/4	1/8	250	49.9Ω-499K 49.9Ω-1 Meg	1/2% 1%	± 50 PPM/°C	.355 \pm .020 (9.02 \pm .51)
RN65C	(NC6)	1/2	1/4	300	49.9Ω-1 Meg 49.9Ω-1 Meg	1/2% 1%	± 50 PPM/°C	.554 \pm .021 (14.07 \pm .53)
RN70C	(NC7)	3/4	1/2	350	51.1Ω-1 Meg	1/2% 1%	± 50 PPM/°C	.719 \pm .031 (18.26 \pm .79)
RN55D	(NA55)	1/8 (1/4)	1/10 (1/8)	200	49.9Ω-150K 10Ω-301K	1/2% 1%	± 100 PPM/°C	.225 \pm .020 (5.71 \pm .51)
RN60D	(NA60)	1/4 (1/2)	1/8 (1/4)	300	49.9Ω-499K 10Ω-1 Meg	1/2% 1%	± 100 PPM/°C	.355 \pm .020 (9.0 \pm .51)
RN65D	(NA65)	1/2	1/4	350	49.9Ω-1 Meg 10Ω-2 Meg	1/2% 1%	± 100 PPM/°C	.554 \pm .021 (14.07 \pm .53)
RN70D	(NA70)	3/4	1/2	500	51.1Ω-1 Meg	1/2% 1%	± 100 PPM/°C	.719 \pm .031 (18.26 \pm .79)

PART NUMBER EXPLANATION



MIL DERATING CURVES



Dimensions — Inches (mm) Body Diameter	Lead Diameter	Load Life 1000 Hours Rated Cond. ΔR Max. ±%	Moisture Resistance ΔR Max. ±%	Temp. Cycle ΔR Max. ±%	Short Time Overload ΔR Max. ±%	Low Temp. Operation ΔR Max. ±%	D.W.V. ΔR Max. ±%	Effect Solder Heat ΔR Max. ±%	Terminal Strength ΔR Max. ±%	Shock ΔR Max. ±%	Vibration ΔR Max. ±%
.062 ± .004 (1.57 ± .10)	.016 (.41)	0.5	0.5	0.25	0.25	0.25	0.25	0.1	0.1	0.25	0.25
.090 ± .008 (2.29 ± .20)	.025 (.63)	0.5	0.5	0.25	0.25	0.25	0.25	0.25	0.1	0.1	0.1
.148 + .000 — .023 (3.76 + .000 — .58)	.025 (.63)	0.5	0.5	0.25	0.25	0.25	0.1	0.25	0.1	0.1	0.1
.190 + .010 — .015 (4.83 + .25 — .38)	.025 (.63)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
.248 ± .015 (6.30 ± .38)	.032 (.81)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
.090 ± .008 (2.29 ± .20)	.025 (.63)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
.148 + .000 — .023 (3.76 + .000 — .58)	.025 (.63)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
.190 + .010 — .015 (4.83 + .25 — .38)	.025 (.63)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1
.248 ± .015 (6.30 ± .38)	.032 (.81)	0.5	0.5	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.1

PART MARKING EXAMPLES

MILITARY (STANDARD)

CGW
RN60D
1000F
NA60
100R ± 1%

CGW — Corning Glass Works
RN60D — MIL designation
1000F — Resistance value & tolerance
NA60 — Style and Case Size
100R ± 1% — Value & Tolerance

COMMERCIAL (OPTIONAL)

CGW
NA60
100R
1%

CGW — Corning Glass Works
NA60 — Style and Case Size
100R — Value in ohms
1% — Tolerance

OTHER MARKING AVAILABLE — Customer part number; color banding.

INSULATING COATING — Copolymer silicone.

COLOR — Dark gray.

LEAD MATERIAL — Type C, per MIL-STD-1276 (weldable types available).

OTHER INFORMATION AVAILABLE — Frequency, characteristics, inductance, noise.

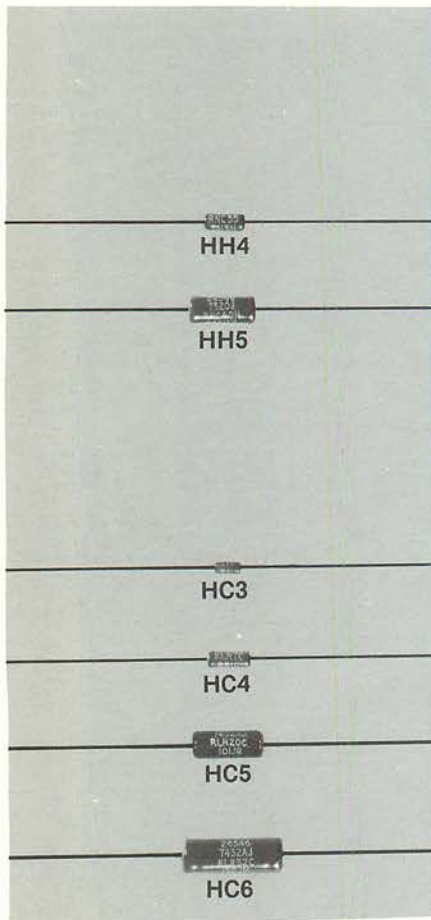
Metal Film Resistors—Established Reliability

RNC55H/K, 60H/K (QPL to MIL-R-55182) Precision

RLR05C, 07C, 20C, 32C (QPL to MIL-R-39017) Semi-Precision

CORNING® HH, HK, and HC Style resistors are designed for the many military applications where established reliability is a must.

Extended life tests of over one-half billion unit test hours have proven the reliability inherent in Corning's manufacturing process. This is confirmed by the inclusion of these parts in many past and ongoing military applications.



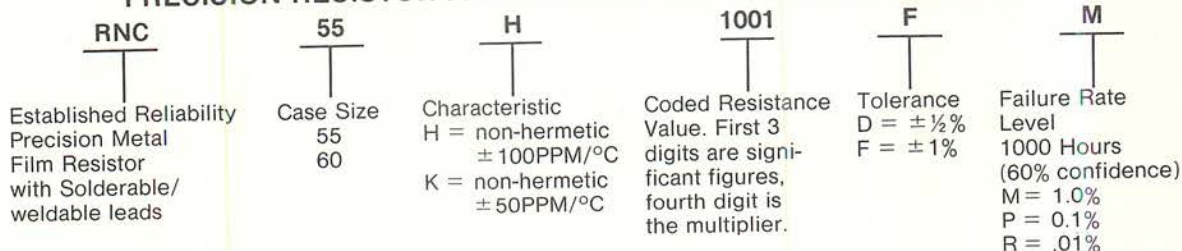
ESTABLISHED RELIABILITY MIL-R-55182, PRECISION

Military Type	Corning Type	Wattage 70°C	Rating 125°C	Voltage Rating	Resistance Range	Standard Tolerance	Temperature Coefficient	Dimensions—Inches (mm) Body Length
RNC55H/K	(HH4/HK4)		1/10	200	49.9Ω-100K	1%	±50/ ±100PPM/°C	.225 ± .020 (5.71 ± .51)
RNC60H/K	(HH5/HK5)		1/8	250	49.9Ω-499K	1/2% 1%	±50/ ±100PPM/°C	.355 ± .020 (9.02 ± .51)

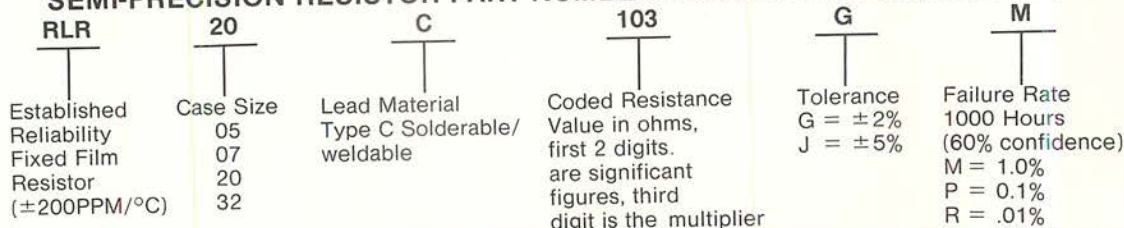
ESTABLISHED RELIABILITY MIL-R-39017, SEMI-PRECISION

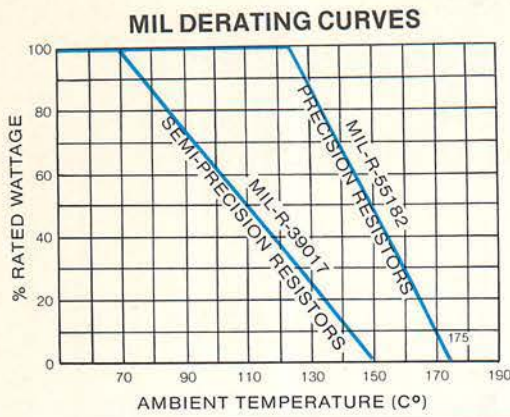
Military Type	Corning Type	Wattage 70°C	Rating 125°C	Voltage Rating	Resistance Range	Standard Tolerance	Temperature Coefficient	Dimensions—Inches (mm) Body Length
RLR05C	(HC3)			200	10Ω-150K	2, 5%	±100PPM/°C	.145 ± .015 (3.68 ± .38)
RLR07C	(HC4)			250	10Ω-300K	2, 5%	±100PPM/°C	.225 ± .020 (5.71 ± .51)
RLR20C	(HC5)			350	10Ω-1 Meg	2, 5%	±100PPM/°C	.355 ± .020 (9.02 ± .51)
RLR32C	(HC6)	1		500	10Ω-1 Meg	2, 5%	±100PPM/°C	.554 + .026 - .021 (14.07 + .66) - .53)

PRECISION RESISTOR PART NUMBER EXPLANATION (MIL-R-55182)



SEMI-PRECISION RESISTOR PART NUMBER EXPLANATION (MIL-R-39017)





Dimensions — Inches (mm)		Load Life 2000 Hours Rated Cond. ΔR Max. ±%	Moisture Resistance ΔR Max. ±%	Overload & Temp. Cycle ΔR Max. ±%	Low Temp. Operation ΔR Max. ±%	Short Time Overload ΔR Max. ±%	D.W.V. ΔR Max. ±%	Effect Solder Heat ΔR Max. ±%	Terminal Strength ΔR Max. ±%	Shock ΔR Max. ±%	Vibration ΔR Max. ±%	High Temp. Exposure ΔR Max. ±%
Body Diameter	Lead Diameter											
.090 ± .008 (2.29 ± .20)	.025 (.63)	0.5	0.4	0.2	0.15		0.1	0.1	0.1	0.1	0.1	5
.149 + .000 - .023 (3.76 + .58 - .81)	.025 (.63)	0.5	0.4	0.2	0.15		0.1	0.1	0.1	0.1	0.1	5

Dimensions — Inches (mm)		Load Life 2000 Hours Rated Cond. ΔR Max. ±%	Moisture Resistance ΔR Max. ±%	Temp. Cycle ΔR Max. ±%	Low Temp. Storage ΔR Max. ±%	Low Temp. Operation ΔR Max. ±%	Short Time Overload ΔR Max. ±%	D.W.V. ΔR Max. ±%	Effect Solder Heat ΔR Max. ±%	Terminal Strength ΔR Max. ±%	Shock & Vibration ΔR Max. ±%	Power Conditioning ΔR Max. ±%
Body Diameter	Lead Diameter											
.062 ± .004 (1.57 ± .10)	.016 (.41)	2.0	.5	.25	.25	.25	.5	.25	.25	.25	.25	.5
.090 ± .008 (2.29 ± .20)	.025 (.81)	2.0	.5	.25	.25	.25	.5	.1	.1	.1	.1	.5
.148 + .000 - .023 (3.76 + .000 - .58)	.032 (.81)	2.0	.5	.25	.25	.25	.25	.1	.1	.1	.1	.5
.190 + .010 - .015 (4.83 + .25 - .38)	.040 (1.02)	2.0	.5	.25	.25	.25	.25	.1	.1	.1	.1	.5

PRECISION RESISTOR PART MARKING

24546
74
42
J
RNR60
C
49R9
F
R
AB

24546 — Source Code
74 — Year
42 — Week of Year
J — JAN
RNR60 — Style, Case Size and Lead Material
C — Characteristic
49R9 — Coded Resistance
F — Tolerance
R — Reliability Rating
AB — Manufacturers Lot Code

Life failure rate level (established at 60-percent confidence)

Failure-rate-level designation	Failure-rate percent/1,000 hours
M	1.0
P	0.1
R	0.01
S	0.001

MIL-R-55182

INSULATING COATING — Epoxy, resin.
COLOR — Dark gray.
LEAD MATERIAL — Type C, per MIL-STD-1276 (weldable types available).

MIL-R-39017

INSULATING COATING — Polyester resin.
COLOR — Dark gray.
LEAD MATERIAL — Type C, per MIL-STD-1276 (weldable types available).

MARKING — TC and date code indicator available.

OTHER INFORMATION AVAILABLE — Frequency characteristics, noise, inductance and failure rate levels.

SEMI-PRECISION RESISTOR PART MARKING

24546
7433
A
J
RLR32
C
103
G
R

24546 — Source Code
7433 — Year and Week of Manufacture
A — Lot Symbol
J — JAN
RLR32 — Style and Case Size
C — Lead Material
103 — Coded Resistance Value
G — Tolerance
R — Reliability Rating

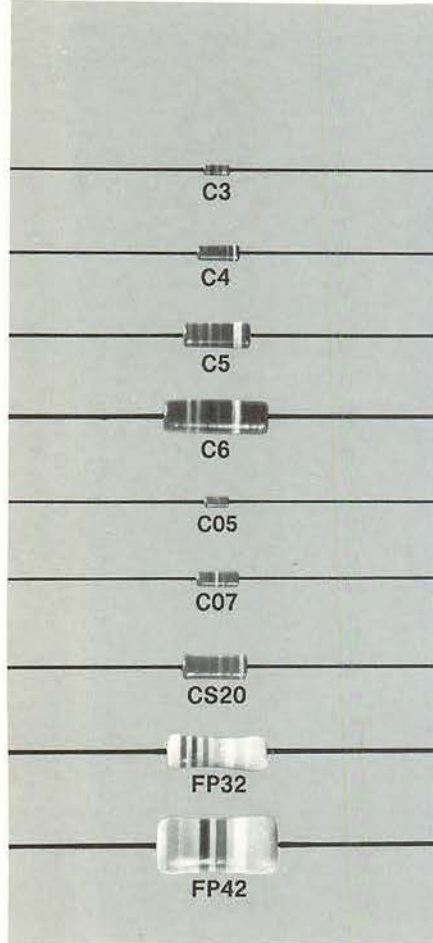
Metal Film Resistors - Semi-Precision

C3, C4, C5, C6 (Commercial) RL07, 20, 32, (QPL to MIL-R-22684)

C05, C07, CS20, FP32, 42 (Commercial) RL07, 20, 32, 42 (QPL to MIL-R-22684)

Corning's Semi-Precision Resistors offer • Long Term Stability • Low Inductance • Low Noise • Low Cost • QPL to MIL-R-22684

Ideal for preamplifiers, RF and IF circuits, and other general purpose usage.

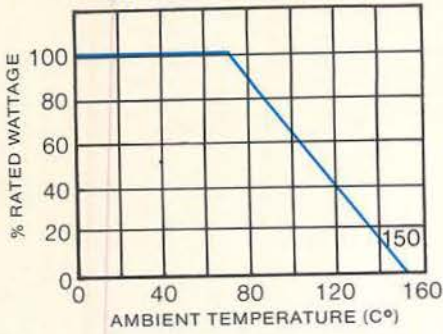


Military Type	Corning Type	Military (Commercial)		Voltage Rating	Resistance Range	Standard Tolerance	Temperature Coefficient	Dimensions—Inches (mm) Body Length
		Wattage 70°C	Rating 125°C					
—	(C3)	(1/8)	(1/8)	200	10Ω-150K	1, 2, 5%	±100PPM/°C	.145 ± .015 (3.68 ± .38)
RL07S	(C4)	1/4	(1/8)	250	10Ω-301K	1, 2, 5%	±100PPM/°C	.225 ± .020 (5.71 ± .51)
RL20S	(C5)	1/2	(1/4)	350	10Ω-1 Meg	1, 2, 5%	±100PPM/°C	.355 ± .020 (9.02 ± .51)
RL32S	(C6)	1	(1/2)	500	10Ω-2 Meg	1, 2, 5%	±100PPM/°C	.554 ± .021 (14.07 ± .53)
—	(C05)	(1/8)		200	10Ω-150K	2, 5, 10%	±200PPM/°C	.145 ± .015 (3.68 ± .38)
RL07S	(C07)	1/4		250	10Ω-301K	2, 5, 10%	±200PPM/°C	.225 ± .020 (5.71 ± .51)
RL20S	(CS20)	1/2		350	10Ω-470K	2, 5, 10%	±200PPM/°C	.355 ± .020 (9.02 ± .51)
RL32S	(FP32)	1		500	10Ω-1 Meg	2, 5, 10%	±200PPM/°C	.560 ± .030 (14.27 ± .79)
RL42S	(FP42)	2		500	10Ω-1.5 Meg	2, 5, 10%	±200PPM/°C	.687 ± .031 (17.45 ± .79)

PART NUMBER EXPLANATION

MILITARY					COMMERCIAL				
RL	20	S	104	G	C	5	100K	2%	
Fixed Film Resistor (QPL to MIL-R 22684)	Case Size 07 20 32 42	Solderable Lead	Resistance Value in ohms. First 2 digits are significant figures, 3rd digit is the multiplier	Resistance Tolerance G = ±2% J = ±5%	Style C CS FP	Case Size 3 4 5 6 05 07 20 32 42	Value in ohms R = ohms K = thousand ohms M = million ohms	Resistance Tolerance ±1% ±2% ±5% ±10%	

MIL DERATING CURVE



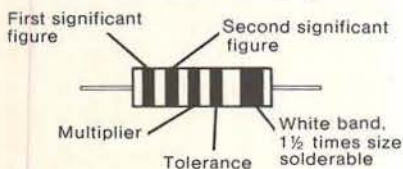
Dimensions— Inches (mm) Body Diameter	Lead Diameter	Load Life 1000 Hours Rated Cond. ΔR Max. ±%	Moisture Resistance ΔR Max. ±%	Temp. Cycle ΔR Max. ±%	Short Time Overload ΔR Max. ±%	Low Temp. Operation ΔR Max. ±%	D.W.V. ΔR Max. ±%	Effect Solder Heat ΔR Max. ±%	Terminal Strength ΔR Max. ±%	Shock ΔR Max. ±%	Vibration ΔR Max. ±%
.062 ± .004 (1.57 ± .10)	.016* (.41)	1.0	0.5	0.25	0.5	0.25	0.25	0.1	0.2	0.25	0.25
.090 ± .008 (2.29 ± .20)	.025 (.63)	1.0	0.5	0.25	.025	0.25	0.1	0.1	0.1	0.1	0.1
.148 + .000 — .023 (3.76 + .00 — .58)	.032 (.81)	1.0	0.5	0.25	0.25	0.5	0.1	0.1	0.1	0.1	0.1
.190 + .010 — .015 (4.83 + .25 — .38)	.040 (1.02)	1.0	0.5	0.25	0.25	0.5	0.1	0.1	0.1	0.1	0.1
.062 ± .004 (1.57 ± .10)	.016 (.41)	1.0	0.5	0.25	0.5	0.25	0.25	0.1	0.2	0.25	0.25
.090 ± .008 (2.29 ± .20)	.025 (.63)	2.0	0.5	0.25	0.5	0.25	0.25	0.1	0.1	0.1	0.25
.148 + .000 — .023 (3.76 + .000 — .58)	.032 (.81)	1.5	1.5	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
.190 + .010 — .015 (4.83 + .25 — .38)	.040 (1.02)	2.0	1.5	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
.315 ± .010 (8.00 ± .25)	.045** (1.14)	3.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5

*.020" also available

**0.032" also available

PART MARKING EXAMPLES

MILITARY

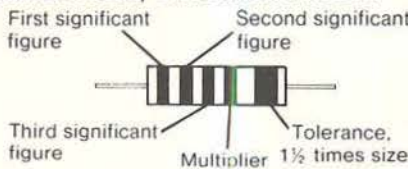


5 Band, MIL-R-22684

COLOR CODE — For color code explanation see page 41.

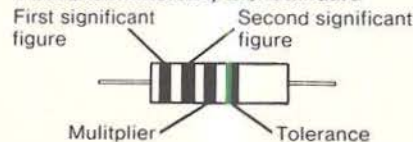
COMMERCIAL

1% Tolerance Parts are marked with 5 color bands. 5 band, EIA Standard RS279.



2, 5 & 10% Tolerance Parts are marked with 4 color bands.

4 band Commercial, EIA Standard



OTHER MARKING AVAILABLE — Type marking.

INSULATING COATING — Copolymer silicone for "C" styles, flameproof ceramic for "FP" styles.

COLOR — Dark gray for "C" styles, medium blue for "FP" styles.

LEAD MATERIAL — Type C, per MIL-STD-1276 (weldable types available).

OTHER INFORMATION AVAILABLE — Frequency characteristics, inductance, noise.

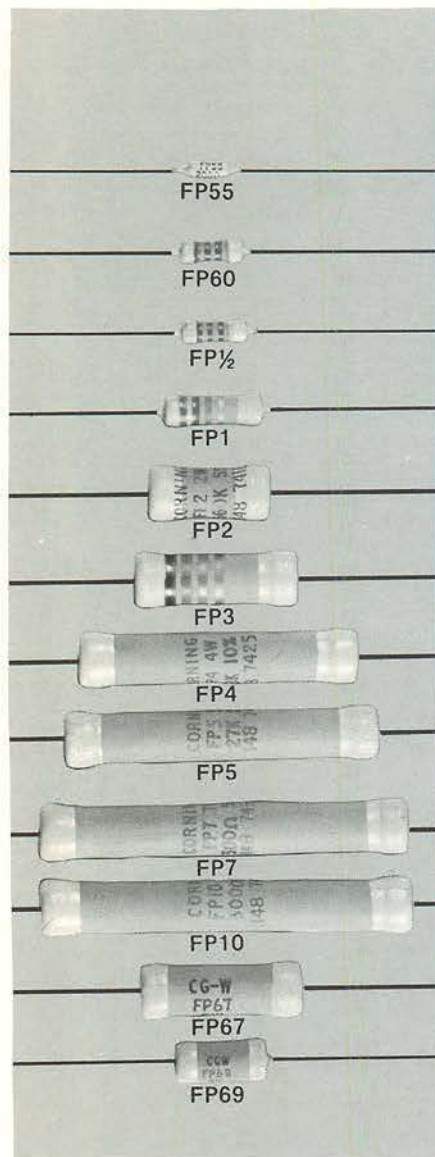
Metal Film Resistors—Flameproof

FP55, 60, 1/2, 1, 2, 3, 4, 5, 7, 10, 67, 69 Commercial Flameproof

CORNING® FP Style Resistors are especially suited for circuitry where functions, environments and duty

cycles demand small, low-power resistors with exceptional frequency characteristics, low end cost and the

ability to withstand overloads up to 100 times rated power without any trace of flame.



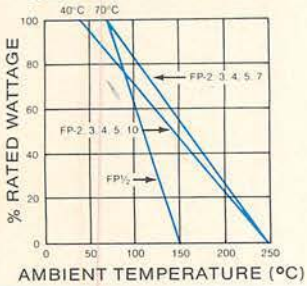
Corning Type	Wattage Rating 25°C 40°C 70°C	Voltage Rating	Resistance Range	Standard Tolerance	Temperature Coefficient	Dimensions—Inches (mm) Body Length
FP55	1/4 W	250	10Ω-301K	1, 2, 5, 10%	±100PPM/°C	.380 Max.* (9.65 Max.)
FP60	1/2 W	350	10Ω-1 Meg	1%	±100PPM/°C	.360 ± .020 (9.14 ± .51)
FP1/2	1/2 W	350	10Ω-1 Meg	1, 2, 5, 10%	±150PPM/°C	.360 ± .020 (9.14 ± .51)
FP1	1 W	500	10Ω-1 Meg	1, 2, 5, 10%	±150PPM/°C	.560 ± .031 (14.22 ± .79)
FP2	3 1/2 3 2	500	9Ω-1.5 Meg	1, 2, 5, 10%	±200PPM/°C	.687 ± .031 (17.45 ± .79)
FP3	4 4 3	500	9Ω-125K	1, 2, 5, 10%	±200PPM/°C	.900 ± .055 (22.86 ± 1.40)
FP4	5 1/2 5 4	500	16Ω-125K	1, 2, 5, 10%	±200PPM/°C	1.530 ± .035 (38.86 ± .89)
FP5	6 1/2 6 5	600	19Ω-125K	1, 2, 5, 10%	±200PPM/°C	1.710 ± .035 (43.43 ± .89)
FP7	7 1/2 — 7	700	24Ω-125K	1, 2, 5, 10%	±200PPM/°C	2.040 ± .035 (51.82 ± .89)
FP10	— 10 —	700	24Ω-125K	1, 2, 5, 10%	±200PPM/°C	2.040 ± .035 (51.82 ± .89)
FP67	5 — —	500	5Ω-19K	1, 2, 5, 10%	±200PPM/°C	.900 ± .055 (22.86 ± 1.40)
FP69	3 — —	350	2.6Ω-1 Meg	1, 2, 5, 10%	±200PPM/°C	.516 ± .021 (13.11 ± .53)

*Clean Lead to Clean Lead

PART NUMBER EXPLANATION

FP	2	51.1K	J
Flame-Proof Resistor	Case Size 55, 60 1/2, 1 2, 3 4, 5 7, 10 67, 69	Value in ohms R = Ohms K = Thousand Ohms M = Million Ohms 51.1K = 51100 Ohms 51.1R = 51.1 Ohms	Tolerance F = ±1% G = ±2% J = ±5% K = ±10%

DERATING CURVES

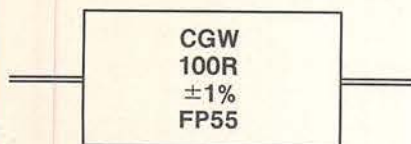


CORNING
ELECTRONICS

Dimensions Inches (mm) Body Diameter	Lead Diameter	Load Life 1000 Hours Rated Cond. ΔR Max. $\pm\%$	Moisture Resistance ΔR Max. $\pm\%$	Temp. Cycle ΔR Max. $\pm\%$	Short Time Overload ΔR Max. $\pm\%$	Low Temp. Operation ΔR Max. $\pm\%$	D.W.V. ΔR Max. $\pm\%$	Effect Solder Heat ΔR Max. $\pm\%$	Terminal Strength ΔR Max. $\pm\%$	Shock ΔR Max. $\pm\%$	Vibration ΔR Max. $\pm\%$
.088 \pm .008 (2.24 \pm .20)	.025 (.63)	1.0	1.0	0.5	0.5	0.5	0.5	0.25	0.25	0.5	0.5
.148" Max. (3.76 Max.)	.025 (.63)	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
.138 + .012 - .023 (3.51 + .30 - .58)	.032 (.81)	1.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
.190 + .010 - .015 (4.83 + .25 - .38)	.032** (.81)	2.0	1.5	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5
.315 \pm .010 (8.00 \pm .25)	.032*** (.81)	5.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
.315 \pm .010 (8.00 \pm .25)	.032 (.81)	5.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
.315 \pm .010 (8.00 \pm .25)	.032 (.81)	5.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
.315 \pm .010 (8.00 \pm .25)	.032 (.81)	5.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
.315 \pm .010 (8.00 \pm .25)	.032 (.81)	5.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
.315 \pm .010 (8.00 \pm .25)	.032 (.81)	5.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
.315 \pm .010 (8.00 \pm .25)	.032 (.81)	5.0	1.0	1.0	0.5	0.25	0.25	0.25	0.25	0.5	0.5
.225 \pm .012 (5.71 \pm .30)	.032 (.81)	3.0	1.0	0.5	0.5	0.25	0.25	0.25	0.5	0.5	0.5

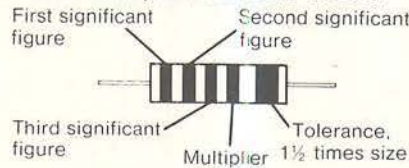
Available .040" lead *Available .045" lead

PART MARKING EXAMPLES

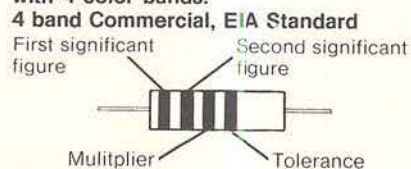


CGW — Corning Glass Works
100R — Value in ohms
 $\pm 1\%$ — Tolerance
FP55 — Style and Case Size
(Date and source code
included on some styles)

1% Tolerance Parts are marked with 5 color bands. 5 band, EIA Standard RS279.



2, 5 & 10% Tolerance Parts are marked with 4 color bands.



INSULATING COATING — Flame-proof ceramic.

COLOR — Medium blue.

LEAD MATERIAL — Type C, per MIL-STD-1276 (weldable types available).

OTHER INFORMATION AVAILABLE — Frequency characteristics, inductance, noise.

COLOR CODE — For color code explanation see page 41.

Special Products

TSR — Temperature Sensitive Resistor

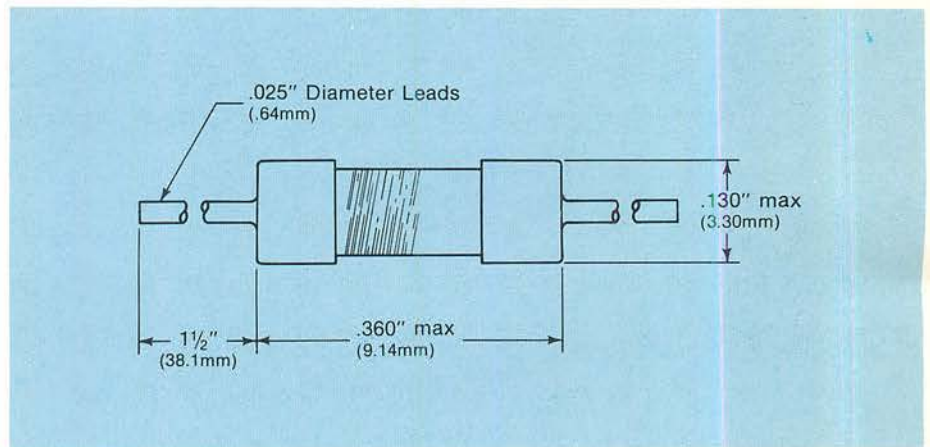
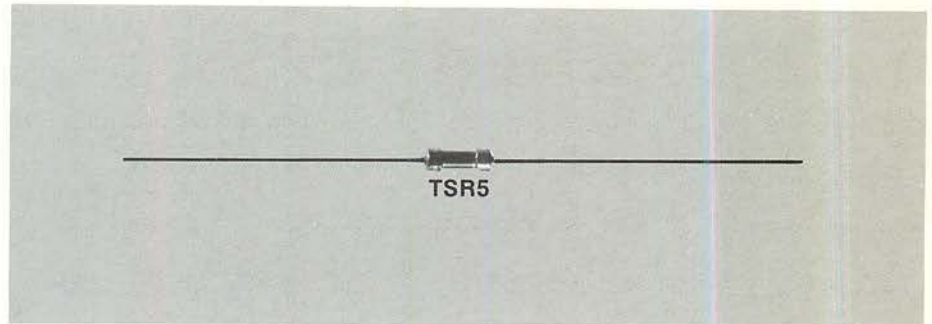
CORNING
ELECTRONICS

A two terminal component that increases resistance linearly with temperature, the TSR is ideal for sensing, compensation, and control applications where temperature is the independent variable. In addition to its linearity and fast thermal response time, the TSR is ideally suited for high volume usage because of its low cost and specified part-to-part interchangeability.

Specific applications for the TSR include:

- Temperature input for system control applications
- Temperature compensation for circuits or components subjected to wide ambient changes
- Electronic temperature indication
- Fluid level detection (using devices self-heating characteristics)
- Rate of rise detection

Construction — Nickel film on glass substrate, polyimide-coated for environmental protection.



PERFORMANCE CHARACTERISTICS

Operating Temperature Range	-55°C to +250°C
Resistance ¹	1000Ω @25°C
Resistance Tolerance ²	±1% or ±5% @ 25°C
Temperature Coefficient of Resistance ³	+5900 ppm/°C

Zero — Power Resistance Ratio	$\frac{R_{25^{\circ}\text{C}}}{R_{125^{\circ}\text{C}}}$	1% unit — .645 ± 2½%
		5% unit — .645 ± 12½%
Thermal Time Constant ⁴		<1 Second

(1) Lower ohmic values available on special order.

(2) Intermediate values on special order.

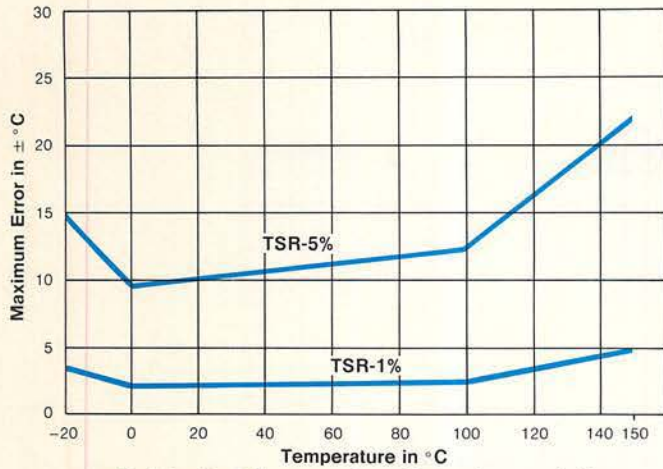
$$(3) \text{ TCR} = \frac{R(@100^{\circ}\text{C}) - R(@0^{\circ}\text{C})}{R(@0^{\circ}\text{C}) \times 100^{\circ}\text{C}} \times 10^6$$

(4) Time required to reach 63% of final resistance moving from a liquid bath at 0°C to a 100°C bath.

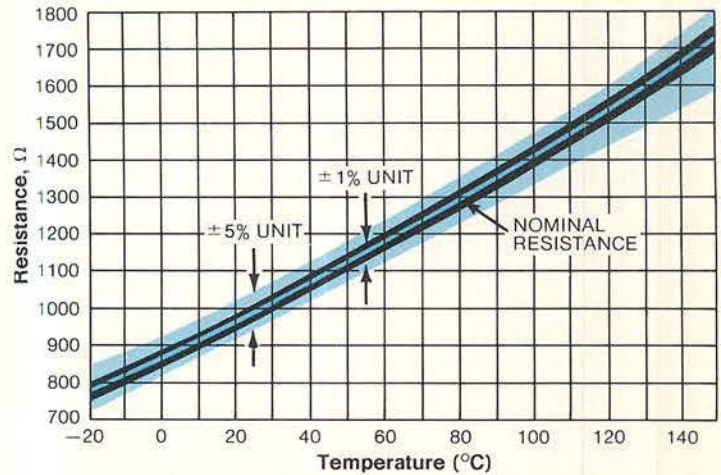
Self-Heating	}	.17 °C/mW in 1 ft./sec. air flow
		.1 °C/mW in 25 ft./sec.
		.035 °C/mW in agitated liquid

Maximum Power Dissipation	}	[Ambient Temperature + (Self-heating coefficient) × (Power dissipation)] <250°C
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Response Characterizations	}	From -20°C to +150°C
		$R = 880.6 + 4.654T + 5.016 \times 10^{-3}T^2 + 5.783 \times 10^{-6}T^3$
		Maximum deviation from linear: +3.7%, -1.4%
	}	From -20°C to +60°C
		$R = 881.6 + 4.867T$
		Maximum deviation of nominal from this line: +.7%, -.4%



Part-to-Part Temperature Interchangeability



Part-to-Part Resistance Interchangeability

Note: Interchangeabilities are specified from -20°C to $+150^{\circ}\text{C}$. However, the trends shown on the above graphs can typically be extrapolated over the full operating temperature range of -55°C to $+250^{\circ}\text{C}$.

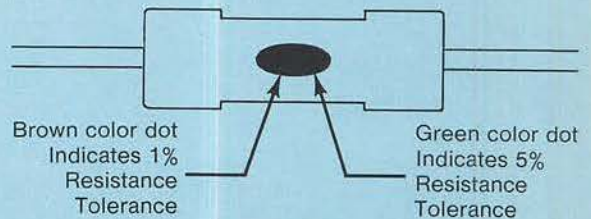
Part-to-Part Resistance Interchangeability Table

Temp °C	Nominal Resist- ance	TSR-1%		TSR-5%		Temp °C	Nominal Resist- ance	TSR-1%		TSR-5%	
		Max Resist- ance	Min Resist- ance	Max Resist- ance	Min Resist- ance			Max Resist- ance	Min Resist- ance	Max Resist- ance	Min Resist- ance
-20	789.6	804.9	779.4	855.7	747.9	70	1232.9	1245.0	1220.3	1294.3	1171.0
-10	834.3	847.0	825.3	890.1	792.0	80	1288.0	1300.6	1274.8	1352.1	1223.3
0	881.0	890.3	872.6	925.5	837.4	90	1344.3	1357.5	1330.5	1411.2	1276.8
10	927.5	937.2	918.7	974.4	881.6	100	1401.8	1415.6	1387.5	1471.6	1331.5
20	975.9	985.4	965.9	1024.5	926.9	110	1461.2	1477.0	1443.6	1535.4	1377.3
25	1000.0	1010.0	990.0	1050.0	950.0	120	1521.2	1539.6	1500.9	1600.5	1424.1
30	1024.8	1034.9	1014.4	1075.9	973.4	130	1582.9	1603.5	1559.4	1666.9	1471.9
40	1075.2	1085.5	1064.0	1128.5	1021.1	140	1646.3	1668.6	1619.1	1734.6	1520.6
50	1126.5	1137.5	1114.9	1182.5	1069.9	150	1711.2	1735.1	1679.9	1803.7	1570.2
60	1179.3	1190.6	1167.0	1237.7	1119.9						

Mechanical and Part Numbers

Part Numbers	Value @ 25°C	Resistance Tolerance	Marking
TSR5-1001F	1000 Ω	1%	Brown color dot
TSR5-1001J	1000 Ω	5%	Green color dot

NOTE: Values below 1000 Ω available on special request.



TYPE MARKING AVAILABLE

Special Products

GTH-Glass Tube Heater Resistors

CORNING
ELECTRONICS

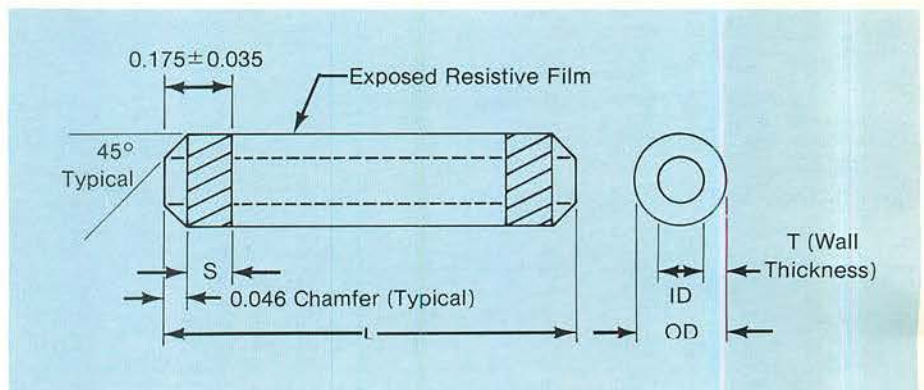
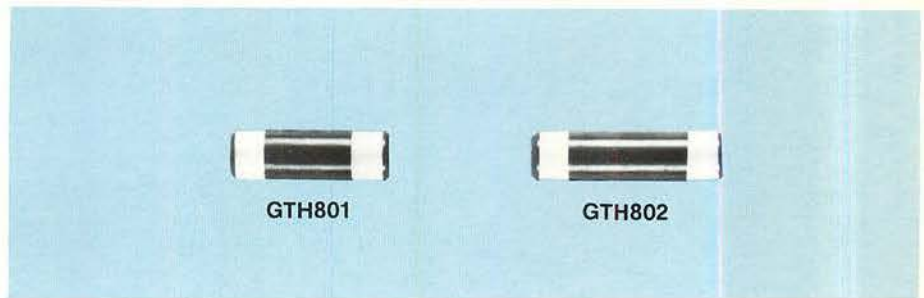
CORNING® Glass Tube Heater resistors (GTH devices) are tubular resistors which can be used to heat thermally sensitive control elements placed inside. They use the same film deposition technology that has qualified standard CORNING resistors to military specifications.

Thermally sensitive control elements which can be placed inside GTH devices are:

- Thermal Cutoffs
- Thermally sensitive reed switches
- Resistive devices having large temperature coefficients
- Bimetals
- Fusing alloys

MOUNTING CONSIDERATIONS

GTH devices are supplied with silver banded ends. These heater devices are easily mounted using fuse clips, clamps, etc.



NOTES:

1. Rim ends may show a slightly irregular finish.
2. Maximum out of round 0.004" (0.1 mm).
3. No coating.
4. No marking.

Part Number	Dimensions — Inches (Millimeters)					Continuous Power Rating at 70°C	Resistance in Ohms	Resistance Tolerance
	Inside Diameter (ID) ± 0.004 (± 0.1)	Outside Diameter (OD) ± 0.005 (± 0.13)	Typical Wall Thickness (T)	Silver-Band Width (S) ± 0.035 (± 0.89)	Length (L) ± 0.020 (± 0.5)			
GTH801-3R-20	0.168 (4.267)	0.258 (6.553)	0.046 (1.17)	0.130 (3.30)	0.850 (21.59)	3 Watts	3	± 20%
GTH801-6.5R-20	0.168 (4.267)	0.258 (6.553)	0.046 (1.17)	0.130 (3.30)	0.850 (21.59)	3 Watts	6.5	± 20%
GTH801-10R-20	0.168 (4.267)	0.258 (6.553)	0.046 (1.17)	0.130 (3.30)	0.850 (21.59)	3 Watts	10	± 20%
GTH802-6.5R-20	0.168 (4.267)	0.258 (6.553)	0.046 (1.17)	0.130 (3.30)	1.000 (25.4)	4 Watts	6.5	± 20%
GTH802-100R-20	0.168 (4.267)	0.258 (6.553)	0.046 (1.17)	0.130 (3.30)	1.000 (25.4)	4 Watts	100	± 20%
GTH802-150R-20	0.168 (4.267)	0.258 (6.553)	0.046 (1.17)	0.130 (3.30)	1.000 (25.4)	4 Watts	150	± 20%

Other values, lengths and tolerances are available on special request.

APPLICATIONS

Safety Protection

Against Catastrophic Failures

In the normal state, the GTH is wired to carry little or no current, and the thermally sensitive control element allows the circuit to operate in a normal manner. If a failure occurs, such as a ground fault or an over-current condition, a large current passes through the heater element causing a rise in internal temperature which activates the control element. The control element then cuts off main power, or activates an alarm etc., depending upon circuit configuration.

Thermal Time Delays

The GTH is subjected to a step current and after a time delay the inside tem-

perature will reach the "triggering temperature" of the control element.

Maintaining Constant Internal Temperatures

An inexpensive way of maintaining a relatively constant temperature around an element is to place it inside a GTH powered at a specific level.

ADVANTAGES

GTH devices are made by a continuous, low cost process.

Higher Mid-Point Temperature

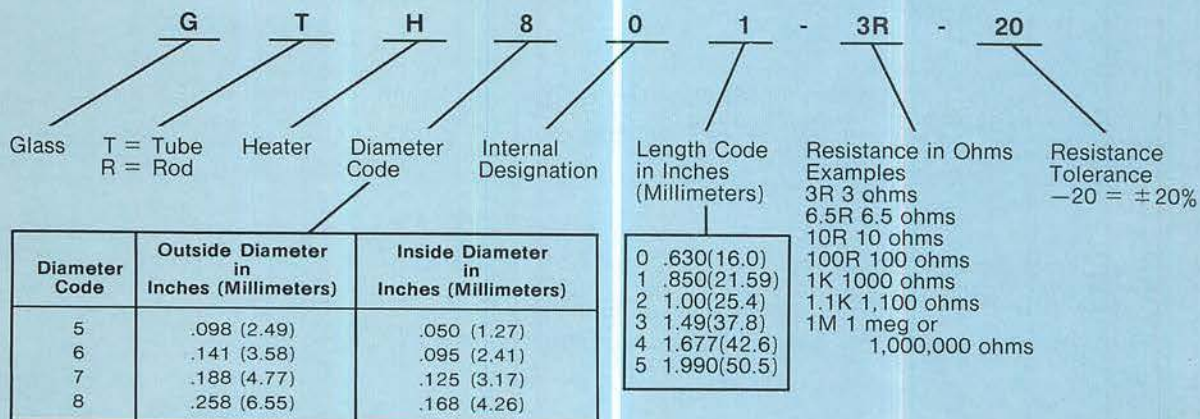
The relatively low thermal conductivity of glass causes the mid-point temperature (the temperature at the middle of the tube) to be significantly higher than at the ends. The user-provided termination at the ends will

generally act as a heat sink. The temperature distribution for a glass tube heater will, in general, be less uniform across the length of the tube than with most non-glass substrates. This higher mid-point temperature using a glass tube is definitely an advantage when the internal element is to sense "triggering points" via temperature.

Low Inductance

The fundamental principle on which thermally sensitive reed switches operate is changes in strength of a magnetic field in the vicinity of the contact gap. GTH devices, because they are virtually noninductive, can be used with these reed switches whereas wirewound resistors cannot due to high inductance.

PART NUMBER EXPLANATION



NEED MORE INFORMATION?

FOR MORE INFORMATION ON CORNING® ELECTRONIC COMPONENTS ...

1. Contact your nearest Corning Sales Office... (See list of sales offices on opposite page)

2. Contact your nearest franchised Corning distributor or representative.

3. Contact:
Corning Glass Works
Electronic Products Division
Corning, New York 14830
(607) 974-8652

IF YOU CANNOT REACH YOUR NEAREST CORNING SALES OFFICE, FOR MORE INFORMATION ON ...

**AVAILABILITIES or
PRICING of**

Glass, GLASS/K or Ceramic Capacitors

Call your local franchised Corning distributor, or... Call Customer Service at (919) 876-1100.

Resistors

Call your local franchised Corning distributor, or... Call Customer Service at (814) 362-5571.

Tantalum Capacitors

Call your local franchised Corning distributor, or... Call Customer Service at (207) 282-5111.

**PRODUCT CAPABILITIES or
PRODUCT PERFORMANCE or
PRODUCT SPECIFICATIONS of**

Glass, GLASS/K or Ceramic Capacitors

Call Product Engineering at (919) 876-1100.

Resistors

Call Product Engineering at (814) 362-5571.

Tantalum Capacitors

Call Product Engineering at (207) 282-5111.

**APPLICATIONS of all
PRODUCTS**

Call Applications Engineering at (607) 974-8679.

SALES OFFICES AND MANUFACTURING FACILITIES

HEADQUARTERS

Corning Glass Works
Electronic Products Division
Corning, New York 14830
(607) 974-8652

SALES OFFICES

Corning Glass Works
Electronic Products Division
225 Great Road
Littleton, MA 01460
(617) 486-3125

Corning Glass Works
5725 East River Road
O'Hare Plaza, Suite 525
Chicago, IL 60631
(312) 693-6830

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500 South Main Street
P.O. Box 1467
Orange, CA 92668
(714) 541-5275
(213) 628-7220

Corning Glass Works
Central Building, Suite 104
363 Taaffe Avenue
Sunnyvale, CA 94086
(408) 732-5050

Corning Glass Works
3900 Electronics Drive
Raleigh, NC 27604
(919) 876-1100

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550 High Street
Bradford, PA 16701
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Components Incorporated
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(207) 282-5111

Corning Glass Works
Highway 132
Wilmington, NC 28401
(919) 791-5040

Corning Glass Works
3900 Electronics Drive
Raleigh, NC 27604
(919) 876-1100

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Leaside Plant
135 Vanderhoof Avenue
Toronto, Ontario, Canada
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11, Chemin de Ronde
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Ph: 804834, 804691, 801420

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Corning International Services, S.A.
Kowa Building No. 16 Annex
9-20 Akasaka, 1-Chome
Minato-Ku, Tokyo, Japan
Ph: 586-1051

DIRECTORY

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