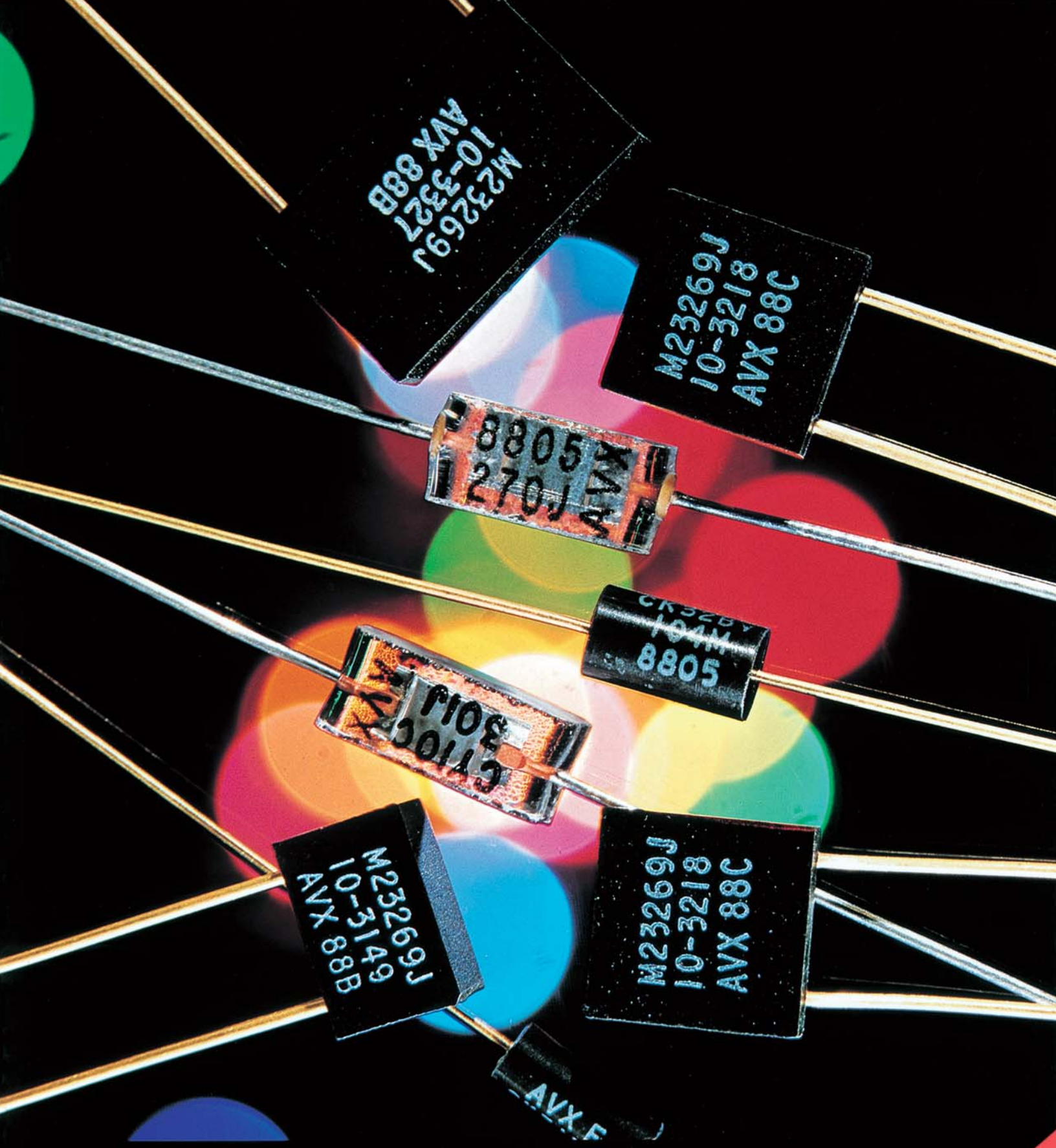


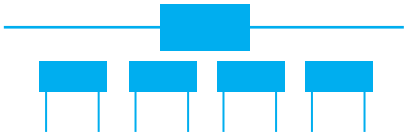
AVX

Glass Dielectric Capacitors

<Version 6.1>

Glass Dielectric Caps

Index



For the following:

- Placement of Orders
- Delivery
- Specifications of Drawing Reviews
- Location of Franchised Distributors
- Technical Information
  - Product Capabilities
  - Applications Assistance

Contact:

AVX Corporation
A Kyocera Group Company
P.O. Box 867
Myrtle Beach, SC 29577
Tel: (843) 448-9411
FAX: (843) 448-1373

AVX Corporation
A Kyocera Group Company
3900 Electronics Drive
Raleigh, NC 27604
Tel: (919) 878-6200
FAX: (919) 878-6218

AVX/Kyocera: your source for multilayer capacitors, glass capacitors, and tantalum capacitors. See other MLC parts in AVX's standard Leaded and Chip catalogs.

Glass Capacitors

Military Cross Reference and Alphabetical Parts Listing

CAPACITORS – ALPHABETICAL LISTING OF MILITARY PART NUMBERS

Military Part No.	AVX Part No.	Component Type	Page No.	Military Part No.	AVX Part No.	Component Type	Page No.
CY06	CY06	Glass Capacitor	10	CYR10	CYR10	Glass Capacitor	14
CY07	CY07	Glass Capacitor	10	CYR15	CYR15	Glass Capacitor	14
CY08	CY08	Glass Capacitor	10	CYR51	CYR51	Glass Capacitor	16
CY10	CY10	Glass Capacitor	8	CYR52	CYR52	Glass Capacitor	16
CY15	CY15	Glass Capacitor	8	CYR53	CYR53	Glass Capacitor	16

CAPACITORS – MILITARY SPECIFICATION CROSS-REFERENCE

Military Specification	Military Part No.	AVX Part No.	Page No.	Military Specification	Military Part No.	AVX Part No.	Page No.
MIL-C-11272	CY06	CY06	10	MIL-PRF-23269	CYR10	CYR10	14
(Glass Capacitors)	CY07	CY07	10	(Established Reliability)	CYR15	CYR15	14
	CY08	CY08	10	(Glass Capacitors)	CYR51	CYR51	16
	CY10	CY10	8		CYR52	CYR52	16
	CY15	CY15	8		CYR53	CYR53	16

CAPACITORS – ALPHABETICAL LISTING OF AVX PART NUMBERS

AVX Part No.	Military Part No.	Component Type	Page No.	Military Part No.	AVX Part No.	Component Type	Page No.
CY06	CY06	Glass Capacitor	10	CYR52	CYR52	Glass Capacitor	16
CY07	CY07	Glass Capacitor	10	CYR53	CYR53	Glass Capacitor	16
CY08	CY08	Glass Capacitor	10	ET10	None	Glass Capacitor	20
CY10	CY10	Glass Capacitor	8	ET15	None	Glass Capacitor	20
CY15	CY15	Glass Capacitor	8	ETR10	None	Glass Capacitor	20
CYFR10	None	Glass Capacitor	12	ETR15	None	Glass Capacitor	20
CYFR15	None	Glass Capacitor	12	ET06	None	Glass Capacitor	22
CYR10	CYR10	Glass Capacitor	14	ET07	None	Glass Capacitor	22
CYR15	CYR15	Glass Capacitor	14	ET08	None	Glass Capacitor	22
CYR51	CYR51	Glass Capacitor	16				

Glass Capacitors

Selector Guide

CAPACITOR CHARACTERISTICS		DIELECTRIC TYPES			
		GLASS		ELEVATED TEMPERATURE GLASS	
AVX TYPES		CY10-15 CYFR10-15 CYR10-15	CY06-08 CYR51-53	ET10 ET15	ET06 ET07 ET08
Capacitance	Capacitance Range	.5 - 1200 pF	1 - 2400 pF	0.5 to 1200 pF	1.0 to 2400 pF
	Standard Tolerance	±1 to 20% CYR ±1 to 5%	TY0 ±1 to 20% CYR ±1 to 5%	±.25 to ±20%	±.25 to ±20%
	Minimum Tolerance	±1% or ±.25pF	±1% or ±.25pF	±.25%	±.25%
Volts	DC Operating Volts	300 VDC and 500 VDC	300 VDC	50 VDC	50 VDC
Frequency	Operating Frequency	DC to UHF	DC to UHF	DC to VHF	DC to VHF
Dissipation Factor	% @ 1kHz >100pF 1MHz <100pF	.1% @ 25°C	.1%>100pF .2%<100pF	@ 25°C 1kHz: .1% @ 200°C 1kHz: 1%	@ 25°C 1kHz: <.1% @ 200°C 1kHz: <1%
Insulation Resistance	Meg Ω	500,000 100,000 @25°C	100,000 @25°C	>100,000 @ 25°C >1 x 10^8 Ohms @ 200°C	>100,000 @ 25°C >1 x 10^8 Ohms @ 200°C
Temperature	Operating Range	-55°C to +125°C	-55°C to +125°C	-75°C to +200°C	-75°C to +200°C
	Temperature Characteristics	+140 ±25 PPM/°C	+140 ±25 PPM/°C	+140 PPM ±25 PPM/°C	+140 PPM ±25 PPM/°C
Form Factor	Lead Type	Axial	Radial	Axial	Radial
MIL-SPECS MIL-C- and MIL-PRF-		11272 and 23269	11272 and 23269	—	—
CATALOG PAGE NUMBERS		8, 12, 14	10, 16	20	22

INTRODUCTION

For the 1% of designs where you can't stand failures: In most types of electronic equipment, the occasional failure of a capacitor is tolerable – though it is inconvenient and often costly. For these applications, an acceptable level of reliability is provided by many of the excellent types of capacitors available today.

But in a few designs you can't stand failures – satellite systems, undersea cable repeaters, mountaintop microwave relay stations, to name just a few. For these designs AVX glass capacitors may be the optimum choice.

Where reliability is critical and replacement of a failed part is not possible or practical, consider glass capacitors.

Where stability is essential, even in severe environments, consider glass capacitors.

Glass capacitors have experienced over four decades of usage in some of America's most demanding circuit applications. Among these are:

TDRSS	Saturn IV	Phalnyx
GOES	Trident	Standard Missile
Cassini	Space Shuttle	Minuteman Missile
Mercury	Galileo	AWACS
Gemini	Matrix	Delta II
Titan II	Hubble Space Telescope	MK-46 Torpedo

OVER 4 DECADES OF MAJOR PROGRAM EXPERIENCE

RELIABILITY

AVX Glass capacitors are qualified to MIL-C-11272 and MIL-PRF-23269, failure rate levels M and S.

For the maximum in reliability, AVX makes the CYFR series, designed to Minuteman specifications. The CYFR series glass capacitors meet or exceed all requirements of AVX specifications J-950 and J-951, available on request.

The reasons for the high reliability of glass capacitors are straightforward.

- Simple construction — few things to go wrong.
- Glass dielectric — one of the most stable, inert materials available.
- Thorough inspection — every glass capacitor is individually inspected during production. This testing includes visual inspection, capacitance check, rated voltage check, and hermetic seal check (for glass case types).

AVX glass capacitors have been used in virtually all critical military and space programs for the past twenty-five years. Increasingly, they are also being used in non-military applications where failures can't be tolerated and circuit performance is critical.

STABILITY

Capacitor stability, or lack of it, is an inherent characteristic of the dielectric used. Few materials can match glass for stability, and few companies can match AVX Corporation for glass technology.

Glass doesn't corrode or degrade in any way. Glass is not subject to microfractures, delaminations, and other problems associated with certain crystalline materials. In addition, axial glass capacitors are hermetically encased in glass, with a true glass-to-metal seal at the leads. This construction is practically immune to severe environmental effects such as shock, vibration, radiation resistance, moisture, salt spray, and solder heat.

RADIATION RESISTANCE

The unique materials and construction techniques involved with glass capacitors make them ideal for use in radiation environments. After a total dose of nearly 10^8 rads (H_2O) glass capacitors exhibit only a minor change in capacitance. (≤.5%) and an 8% change in dissipation factor. Furthermore, glass capacitors can operate in fast neutron flux environments of $1 \times 10^{15} cm^{-2} sec^{-1}$ and experience little or no damage in component parameters.

PREDICTABILITY

The dielectric is formed as a continuous ribbon of glass. Physical and electrical properties and dimensions are precisely controlled.

This results in every AVX glass capacitor being just like every other, part-to-part, and lot-to-lot. Couple this built-in predictability with complete performance specifications and you know what performance to expect before the first prototype is built.

CONSTRUCTION

Simplicity is the key to reliable construction. There are only three materials in axial glass capacitors: glass dielectric and case, aluminum foil electrodes, and wire leads. (Radial capacitors have a molded case.)

The leads are welded to the electrodes so there are no pressure connections to come loose and no solder connections to melt.

PERFORMANCE

Quality control and simplicity of design mean that AVX glass capacitors are close to being a "perfect circuit symbol capacitance." Here is what you get with AVX glass capacitors:

- Nuclear Radiation Resistance
- Zero Aging Rate
- High Q Factor
- Large RF Current Capability
- No Piezoelectric Noise
- Low Dielectric Absorption
- ±5ppm Temperature Coefficient Retraceability
- High Breakdown Voltage
- Zero Voltage Coefficient

Specific electrical performance details are given in the AVX "Performance Characteristics of Multilayer Glass Dielectric Capacitors" technical paper.

The following glass capacitors are described in this brochure:

Qualified to MIL-C-11272, standard military specification, and used in industrial applications:

CY10, CY15 — Axial Leads
CY06, CY07, CY08 — Radial Leads

Glass Capacitors
Introduction

Qualified to MIL-PRF-23269, established reliability specification, used primarily in military applications:

CYR10, CYR15 — Axial Leads
CYR51, CYR52, CYR53 — Radial Leads

AVX also makes the CYFR series, ultra-high reliability types designed to Minuteman specifications.

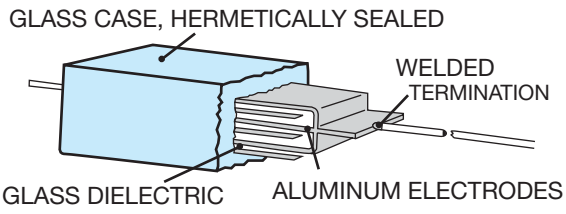
Elevated temperature glass capacitors with a working temperature of -75°C to +200°C:

ET10, ET15 — Axial Leads
ET06, ET07, ET08 — Radial Leads

High reliability elevated temperature glass capacitors:

ETR10, ETR15 — Axial Leads
ETR06, ETR07, ETR08 — Radial Leads

Although all AVX glass capacitors are of similar construction, performance characteristics vary slightly between axial and radial types due to differences in form factor and lead configuration. The performance descriptions and curves that follow are identified as applying to axial or radial types or both.



Simplicity of construction, combined with the excellent dielectric characteristics of glass, make AVX Glass Capacitors outstanding performers.

Temperature Coefficient: The actual temperature coefficient for glass capacitors is shown in Figure 1. It is a slightly nonlinear curve varying from +115ppm/°C at -55°C to +165ppm/°C at +125°C. Temperature coefficient can be accurately represented by the linear approximation 140±25ppm/°C.

Temperature coefficient is not affected by DC bias voltage nor by measurement frequency over the range of 1kHz to 1MHz. There is no hysteresis in the T.C. curve and part-to-part and lot-to-lot variations are no greater than ±5ppm.

Capacitance drift over the temperature range -55°C to 125°C is no greater than 0.1% or 0.1pF, whichever is larger.

Capacitance Change vs. Temperature: Derived from the T.C. curve, ΔC vs. temperature is shown in Figure 2 for both axials and radials.

Losses vs. Temperature: Maximum dissipation factor (DF) is 0.1% at 0.1kHz and 25°C. The variation of DF vs. temperature is shown in Figure 3 for radials and Figure 4 for axials. There is no significant variation in DF or Q with different capacitance values when measured at 1.0kHz. See losses vs. capacitance, below, for variations with capacitance value when measured at 1.0MHz.

Insulation Resistance vs.Temperature: Insulation resistance is greater than 100,000 megohms at 25°C (500,000 megohms for the CYFR series). At 125°C, insulation resistance is greater than 10,000 megohms.

Capacitance Change vs. Frequency: Capacitance change vs. frequency is typically less than one percent up to 1MHz. See Figure 5.

Losses vs. Frequency: Dissipation factor at 1.0kHz and 25°C is 0.1% maximum for all axials and for radials greater than 100pF. DF is 0.2% for radials 100pF and below. The variation of DF and its reciprocal Q vs. frequency is shown in Figure 6 for radials and Figure 7 for axials. There is no significant variation in DF or Q with capacitance value when measured at 1.0kHz. See below for losses vs. capacitance value when measured at 1.0MHz.

Losses vs. Capacitance Value: The variation of Q with capacitance value when measured at 1.0MHz is shown in Figure 8 for radials and Figure 9 for axials.

Resonant Frequency vs. Capacitance Value: The frequency at which the capacitor becomes self-resonant is a function of both capacitance value and lead length. Typical curves are given in Figure 10 and radials and Figure 11 for axials.

Voltage Coefficient: Voltage coefficient is zero. There is no measurable change in capacitance from 0 to full working voltage. Voltage coefficient remains zero over the full temperature range and at all useful frequencies.

Surge Voltage: CYR types are tested in accordance with MIL-PRF-23269 and withstand a surge voltage of 1500±30 VDC.

Temperature Range: The operating temperature range for all glass capacitors is -55°C to 125°C with no voltage derating required. Elevated Temperature (ET) capacitor operating temperature range -75°C to +200°C (with overexposure to +250°C ≤1 hour (axial) with no performance degradation).

Moisture Resistance: Meets or exceeds all requirements of MIL-C-11272 or MIL-PRF-23269, as applicable.

Life: When tested under accelerated conditions of 125°C with 150% of rated voltage applied for 2,000 hours, glass capacitors meet the requirements listed below. Pre- and post-test measurements are at 25°C.

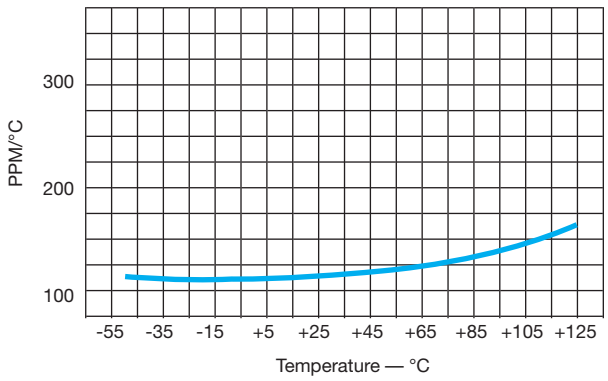
Capacitance Change — Less than 0.5% or 0.5pF, whichever is greater, for all glass capacitors.

Dissipation Factor —
CY10, 15 — 0.20% maximum
CY06, 07, 08 — 0.25% maximum for values above 100pF, 0.45% maximum for 100pF and below
CYR10, 15 — 0.15% maximum
CYR51, 52, 53 — 0.25% maximum for values above 100pF, 0.45% for 100pF and below
CYR10, 15 — 0.15% maximum

Insulation Resistance: Greater than 100,000 megohms (500,000 megohms for CYFR series).

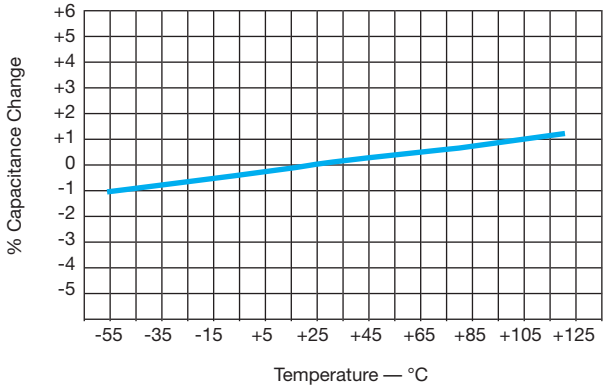
Noise: Glass dielectric capacitors have zero piezoelectric noise due to their unique dielectric material construction.

FIGURE 1



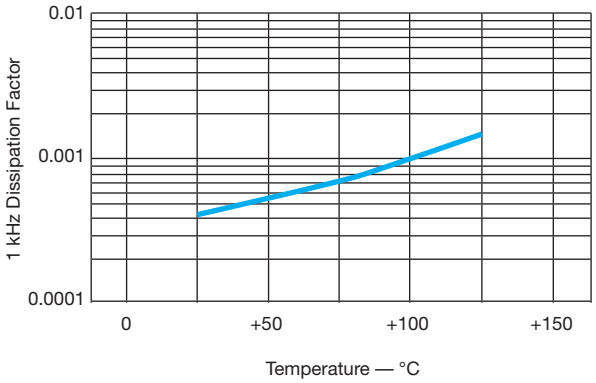
Temperature Coefficient vs. Temperature
Radial and Axial

FIGURE 2



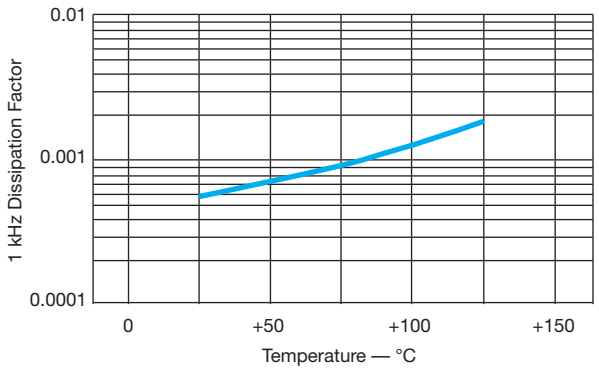
% Capacitance Change vs. Temperature
Radial and Axial

FIGURE 3



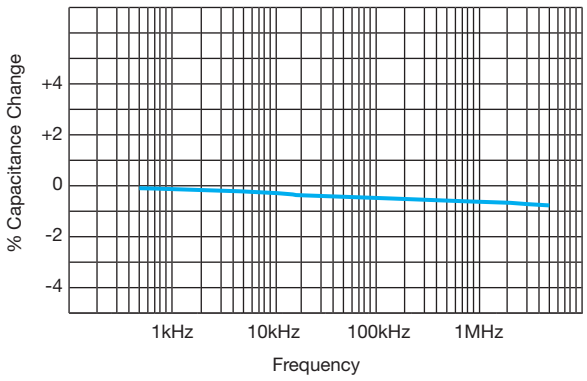
Dissipation Factor vs. Temperature
Radial

FIGURE 4



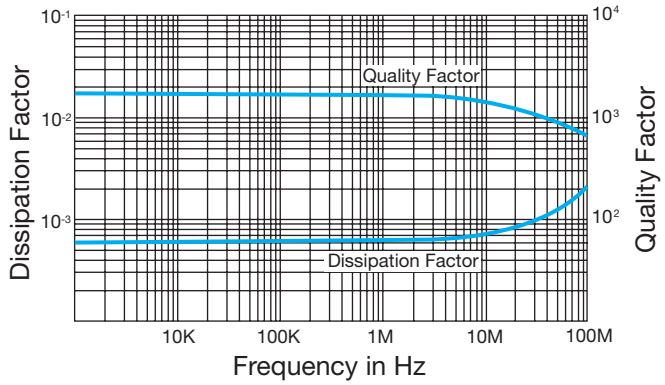
Dissipation Factor vs. Temperature
Axial

FIGURE 5



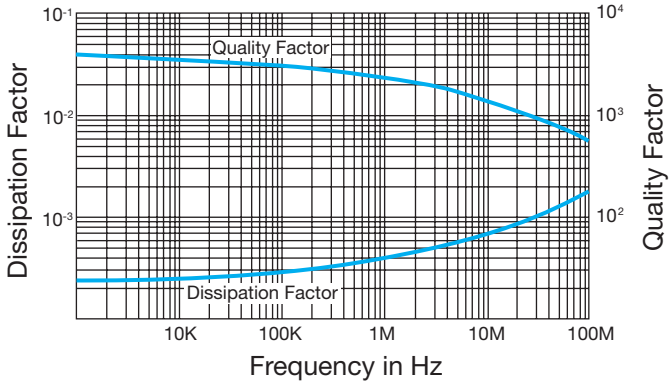
% Capacitance Change vs. Frequency
Radial and Axial

FIGURE 6



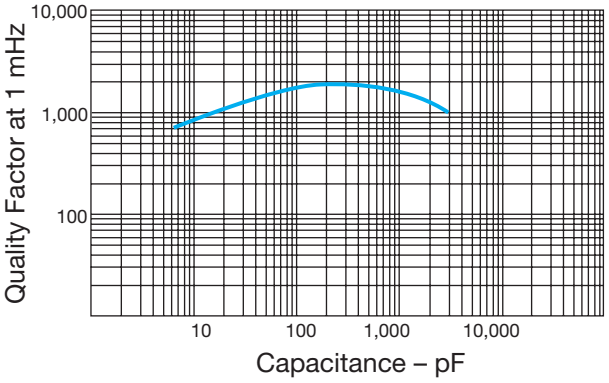
Quality Factor and Dissipation Factor vs. Frequency Radial

FIGURE 7



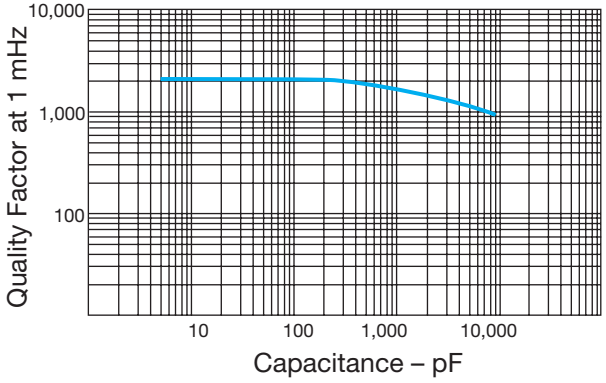
Quality Factor and Dissipation Factor vs. Frequency Axial

FIGURE 8



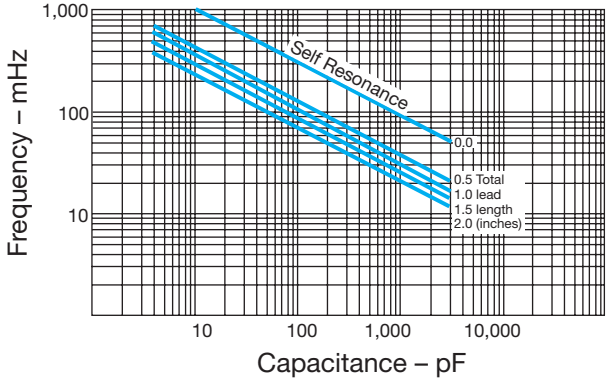
Quality Factor vs. Capacitance Radial

FIGURE 9



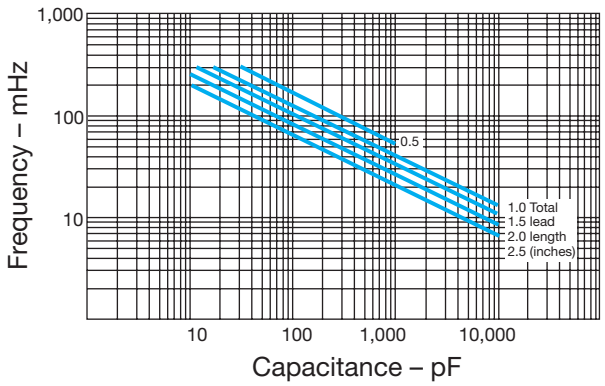
Quality Factor vs. Capacitance Axial

FIGURE 10



Resonant Frequency vs. Capacitance Radial

FIGURE 11



Resonant Frequency vs. Capacitance Axial

Glass Capacitors
CY10, 15 (QPL to MIL-C-11272/01/02)

APPLICATIONS

These extremely stable glass capacitors, AVX style CY, 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 ±25 ppm/°C at 100kHz. TC will track and retrace to within ±5 ppm. Capacitance drift is less than 0.1% or 0.1pF, whichever is greater.

Voltage Coefficient: Zero.

Losses: Extremely low, and remain relatively low at elevated temperatures. Dissipation factor is not more than 0.001 at 1.0kHz 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 0.5pF, whichever is greater.

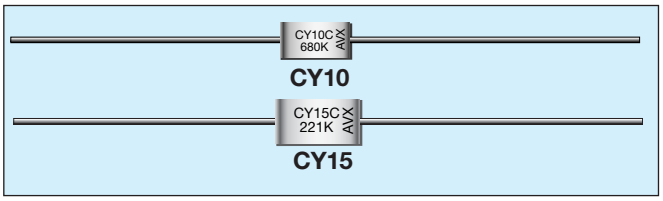
Insulation Resistance: Greater than 100,000 megohms at 25°C; greater than 10,000 megohms at 125°C.

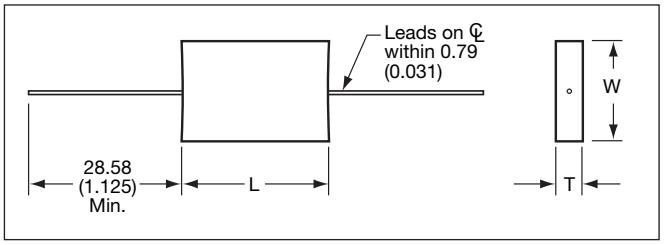
Voltage/Temperature Rating: Voltage ratings are shown in the ordering information table. The operating temperature range is -55°C to +125°C with no derating required.

Moisture Resistance: Meets or exceeds all requirements of MIL-C-11272 and MIL-STD-202, Method 106.

Radiation Resistance: The unique materials and construction techniques involved with glass capacitors make them ideal for use in radiation environments. After a total dose of nearly 10^8 rads (H_2O) glass capacitors exhibit only a minor change in capacitance (≤.5%) and an 8% change in dissipation factor. Furthermore, glass capacitors can operate in fast neutron flux environments of 10^{15} N $cm^{-2}sec^{-1}$ and experience little or no damage in component parameters.

Additional performance details are given in the AVX "Performance Characteristics of Multilayer Glass Dielectric Capacitors" technical paper.





DIMENSIONS:

millimeters (inches)

Case Size	L	W	T	Lead Dia. +0.1 (+0.004) -0.03 (-0.001)	Weight (Grams)
CY10	8.74 ± 1.19 (0.344 ± 0.047)	4.37 ± .79 (0.172 ± 0.031)	1.98 ± .79 (0.078 ± 0.031)	.51 (0.020)	.25 – .50
CY15	11.91 ± 1.19 (0.469 ± 0.047)	6.76 ± .79 (0.266 ± 0.031)	2.77 ± 1.19 (0.109 ± 0.047)	.51 (0.020)	.75 – 1.25

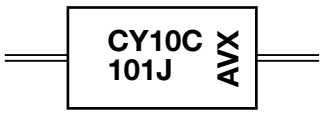
Note: Standard leads are solder-coated Dumet.

Glass Capacitors
Part Numbers and Ordering Information

HOW TO ORDER

CY	10	C	101	J
Style Glass Capacitor	**Case Size** 10 15	**Operating Temperature Range** -55°C to +125°C	**Capacitance Code** 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 values below 10 pF, R = decimal point; i.e. 1R5 indicates 1.5 pF.	**Capacitance Tolerance** C = ±.25 pF D = ±.50 pF F = ±1% G = ±2% J = ±5% K = ±10% M = ±20%

MARKING



CY = Glass Capacitor
10 = Case Size
C = Operating Temperature Range
101 = Capacitance, Coded in pF
J = Tolerance
AVX = AVX Corporation

RATINGS & PART NUMBER REFERENCE (Standard Values)

Military Type Designation	Cap. (pF)	Tolerances Available	DC Working Voltage
	CY10		
CY10C0R5_	0.5	C	500
CY10C1R0_	1.0	C, D	500
CY10C1R5_	1.5	C, D	500
CY10C2R2_	2.2	C, D	500
CY10C2R7_	2.7	C, D	500
CY10C3R0_	3.0	C, D	500
CY10C3R3_	3.3	C, D	500
CY10C3R6_	3.6	C, D	500
CY10C3R9_	3.9	C, D	500
CY10C4R3_	4.3	C, D	500
CY10C4R7_	4.7	C, K	500
CY10C5R1_	5.1	C, J, K	500
CY10C5R6_	5.6	C, J, K	500
CY10C6R2_	6.2	C, J, K	500
CY10C6R8_	6.8	C, J, K	500
CY10C7R5_	7.5	C, J, K	500
CY10C8R2_	8.2	C, J, K	500
CY10C9R1_	9.1	C, J, K	500
CY10C100_	10	C, J, K, M	500
CY10C110_	11	C, J, K, M	500
CY10C120_	12	C, J, K, M	500
CY10C130_	13	C, G, J, K, M	500
CY10C150_	15	C, G, J, K, M	500
CY10C160_	16	C, G, J, K, M	500
CY10C180_	18	C, G, J, K, M	500
CY10C200_	20	C, G, J, K, M	500
CY10C220_	22	C, G, J, K, M	500
CY10C240_	24	C, G, J, K, M	500
CY10C270_	27	F, G, J, K, M	500
CY10C300_	30	F, G, J, K, M	500
CY10C330_	33	F, G, J, K, M	500
CY10C360_	36	F, G, J, K, M	500
CY10C390_	39	F, G, J, K, M	500
CY10C430_	43	F, G, J, K, M	500
CY10C470_	47	F, G, J, K, M	500
CY10C510_	51	F, G, J, K, M	500
CY10C560_	56	F, G, J, K, M	500
CY10C620_	62	F, G, J, K, M	500
CY10C680_	68	F, G, J, K, M	500
CY10C750_	75	F, G, J, K, M	500
CY10C820_	82	F, G, J, K, M	500
CY10C910_	91	F, G, J, K, M	500
CY10C101_	100	F, G, J, K, M	500
CY10C111_	110	F, G, J, K, M	500
CY10C121_	120	F, G, J, K, M	500
CY10C131_	130	F, G, J, K, M	500
CY10C151_	150	F, G, J, K, M	500
CY10C161_	160	F, G, J, K, M	500
CY10C181_	180	F, G, J, K, M	500
CY10C201_	200	F, G, J, K, M	500
CY10C221_	220	F, G, J, K, M	300
CY10C241_	240	F, G, J, K, M	300
CY10C271	270	F, G, J, K, M	300
CY10C301_	300	F, G, J, K, M	300

Add letter for tolerance code above lines.

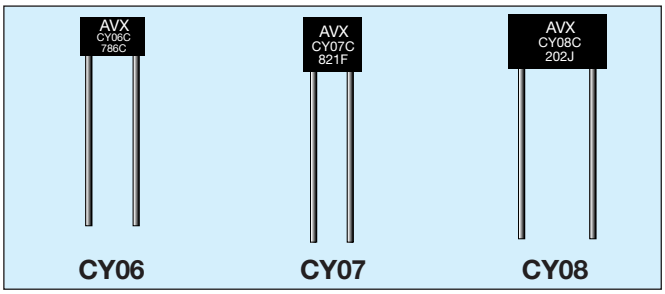
Military Type Designation	Cap. (pF)	Tolerances Available	DC Working Voltage
	CY15		
CY15C221_	220	F, G, J, K, M	500
CY15C241_	240	F, G, J, K, M	500
CY15C271_	270	F, G, J, K, M	500
CY15C301_	300	F, G, J, K, M	500
CY15C331_	330	F, G, J, K, M	500
CY15C361_	360	F, G, J, K, M	500
CY15C391_	390	F, G, J, K, M	500
CY15C431_	430	F, G, J, K, M	500
CY15C471_	470	F, G, J, K, M	500
CY15C511_	510	F, G, J, K, M	500
CY15C561_	560	F, G, J, K, M	300
CY15C621_	620	F, G, J, K, M	300
CY15C681_	680	F, G, J, K, M	300
CY15C751_	750	F, G, J, K, M	300
CY15C821_	820	F, G, J, K, M	300
CY15C911_	910	F, G, J, K, M	300
CY15C102_	1,000	F, G, J, K, M	300
CY15C112_	1,100	F, G, J, K, M	300
CY15C122_	1,200	F, G, J, K, M	300

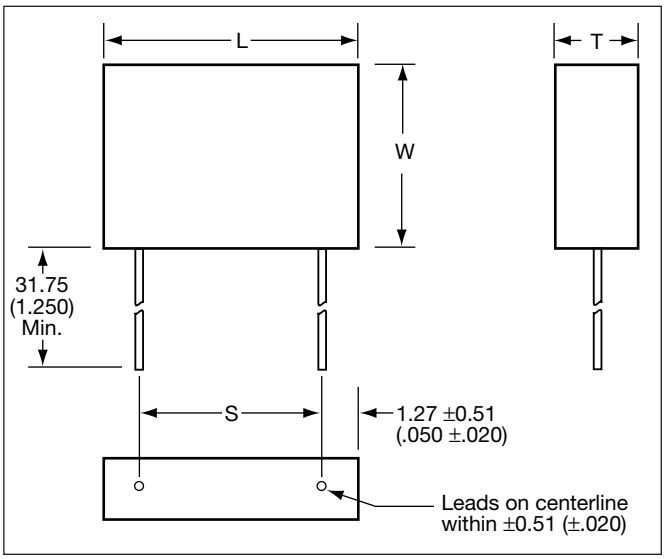
Add letter for tolerance code above lines.

Glass Capacitors
CY06, 07, 08 (QPL to MIL-C-11272/13/14/15)

APPLICATIONS

These precision miniature glass capacitors, AVX style CY0, 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 for each value of capacitance are shown in the ordering information table. For codes, refer to the Part Numbers paragraph.

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

Voltage Coefficient: Zero.

Losses: Extremely low, and remain relatively low at elevated temperatures. Dissipation factor at 1kHz and 25°C is less than 0.001 for values greater than 100pF and less than 0.002 for values of 100pF and below.

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 0.0025 for values above 100 pF and less than 0.0045 for values of 100 pF and below.

Insulation Resistance: Greater than 100,000 megohms at 25°C; greater than 10,000 megohms at 125°C.

Voltage/Temperature Rating: 300 WVDC over the temperature range of -55°C to +125°C with no derating required.

Additional performance details are given in the AVX "Performance Characteristics of Multilayer Glass Dielectric Capacitors" technical paper.

DIMENSIONS:

millimeters (inches)

Case Size	L ±0.13 (±0.005)	W ±0.25 (±0.010)	T ±0.13 (±0.005)	S ±0.51 (±0.020)	Weight (Grams)
CY06	7.62 (0.300)	5.08 (0.200)	2.92 (0.115)	5.08 (0.200)	.3 – .4
CY07	7.62 (0.300)	7.62 (0.300)	2.92 (0.115)	5.08 (0.200)	.4 – .5
CY08	12.70 (0.500)	7.62 (0.300)	2.92 (0.115)	10.16 (0.400)	.7 – .8

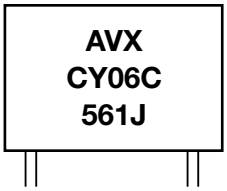
Note: All leads are 24 AWG, 0.51 ± .05 (0.020 ± 0.002) diameter. Leads are solderable and weldable gold-plated Dumet, per MIL-STD-1276, Type D.

Glass Capacitors
Part Numbers and Ordering Information

HOW TO ORDER

CY	06	C	561	J
Style Glass Capacitor	**Case Size** 06 07 08	**Operating Temperature Range** -55°C to +125°C	**Capacitance Code** 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 values below 10 pF, R = decimal point; i.e. 1R5 indicates 1.5 pF.	**Capacitance Tolerance** C = ±.25 pF D = ±.50 pF F = ±1% G = ±2% J = ±5% K = ±10% M = ±20%

MARKING



AVX = AVX Corporation
CY = Glass Capacitor
06 = Case Size
C = Operating Temperature Range
561 = Capacitance, Coded in pF
J = Tolerance

RATINGS & PART NUMBER REFERENCE (Standard Values)

Military Type Designation	Capacitance (pF)	Tolerances Available	DC Working Voltage
	CY06		
CY06C1R0_	1.0	C, D	300
CY06C1R5_	1.5	C, D	300
CY06C2R2_	2.2	C, D	300
CY06C2R7_	2.7	C, D	300
CY06C3R0_	3.0	C, D	300
CY06C3R3_	3.3	C, D	300
CY06C3R6_	3.6	C, D	300
CY06C3R9_	3.9	C, D	300
CY06C4R3_	4.3	C, D	300
CY06C4R7_	4.7	C, K	300
CY06C5R1_	5.1	C, J, K	300
CY06C5R6_	5.6	C, J, K	300
CY06C6R2_	6.2	C, J, K	300
CY06C6R8_	6.8	C, J, K	300
CY06C7R5_	7.5	C, J, K	300
CY06C8R2_	8.2	C, J, K	300
CY06C9R1_	9.1	C, J, K	300
CY06C100_	10	C, J, K, M	300
CY06C110_	11	C, J, K, M	300
CY06C120_	12	C, J, K, M	300
CY06C130_	13	C, G, J, K, M	300
CY06C150_	15	C, G, J, K, M	300
CY06C160_	16	C, G, J, K, M	300
CY06C180_	18	C, G, J, K, M	300
CY06C200_	20	C, G, J, K, M	300
CY06C220_	22	C, G, J, K, M	300
CY06C240_	24	C, G, J, K, M	300
CY06C270_	27	F, G, J, K, M	300
CY06C300_	30	F, G, J, K, M	300
CY06C330_	33	F, G, J, K, M	300
CY06C360_	36	F, G, J, K, M	300
CY06C390_	39	F, G, J, K, M	300
CY06C430_	43	F, G, J, K, M	300
CY06C470_	47	F, G, J, K, M	300
CY06C510_	51	F, G, J, K, M	300
CY06C560_	56	F, G, J, K, M	300
CY06C620_	62	F, G, J, K, M	300
CY06C680_	68	F, G, J, K, M	300
CY06C750_	75	F, G, J, K, M	300
CY06C820_	82	F, G, J, K, M	300

Add letter for tolerance code above lines.

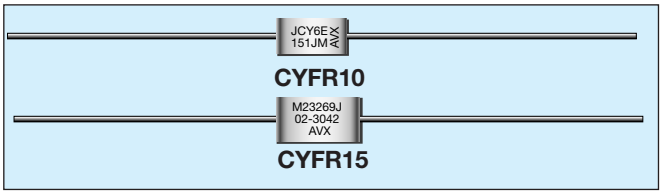
Military Type Designation	Capacitance (pF)	Tolerances Available	DC Working Voltage
	CY06 (cont)		
CY06C910_	91	F, G, J, K, M	300
CY06C101_	100	F, G, J, K, M	300
CY06C111_	110	F, G, J, K, M	300
CY06C121_	120	F, G, J, K, M	300
CY06C131_	130	F, G, J, K, M	300
CY06C151_	150	F, G, J, K, M	300
CY06C161_	160	F, G, J, K, M	300
CY06C181_	180	F, G, J, K, M	300
CY06C201_	200	F, G, J, K, M	300
CY06C221_	220	F, G, J, K, M	300
CY06C241_	240	F, G, J, K, M	300
CY06C271_	270	F, G, J, K, M	300
CY06C301_	300	F, G, J, K, M	300
CY06C331_	330	F, G, J, K, M	300
CY06C361_	360	F, G, J, K, M	300
CY06C391_	390	F, G, J, K, M	300
CY06C431_	430	F, G, J, K, M	300
CY06C471_	470	F, G, J, K, M	300
CY06C511_	510	F, G, J, K, M	300
CY06C561_	560	F, G, J, K, M	300
	CY07		
CY07C621_	620	F, G, J, K, M	300
CY07C681_	680	F, G, J, K, M	300
CY07C751_	750	F, G, J, K, M	300
CY07C821_	820	F, G, J, K, M	300
CY07C911_	910	F, G, J, K, M	300
CY07C102_	1,000	F, G, J, K, M	300
	CY08		
CY08C112_	1,100	F, G, J, K, M	300
CY08C122_	1,200	F, G, J, K, M	300
CY08C132_	1,300	F, G, J, K, M	300
CY08C152_	1,500	F, G, J, K, M	300
CY08C162_	1,600	F, G, J, K, M	300
CY08C182_	1,800	F, G, J, K, M	300
CY08C202_	2,000	F, G, J, K, M	300
CY08C222_	2,200	F, G, J, K, M	300
CY08C242_	2,400	F, G, J, K, M	300

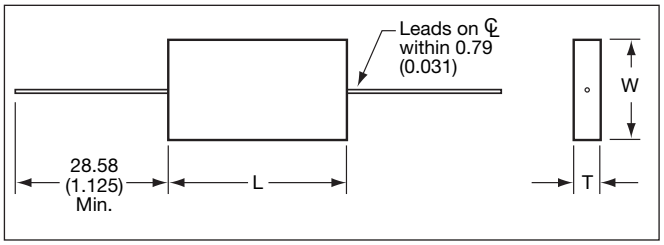
Add letter for tolerance code above lines.

Glass Capacitors
CYFR10, 15 (High Reliability)

APPLICATIONS

AVX 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 AVX specifications J-950 and J-951, which combine the most exciting features of many military 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 ±25 ppm/°C at 100kHz. 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 1kHz and 25°C.

Life: At 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 Rating: Voltage ratings are shown in the ordering information table. The operating temperature range is -55°C to +125°C with no derating required.

Moisture Resistance: Meets or exceeds all requirements of J-951 and MIL-STD-202, Method 106 for 50 cycles.

Radiation Resistance: The unique materials and construction techniques involved with glass capacitors make them ideal for use in radiation environments. After a total dose of nearly 10^8 rads (H_2O) AVX glass capacitors exhibit only a minor change in capacitance (≤.5%) and an 8% change in dissipation factor. Furthermore, glass capacitors can operate in fast neutron flux environments of 10^{15} N $cm^{-2}sec^{-1}$ and experience little or no damage in component parameters.

Additional performance details are given in the AVX "Performance Characteristics of Multilayer Glass Dielectric Capacitors" technical paper.

DIMENSIONS:

millimeters (inches)

Case Size	L	W	T	Lead Dia. +0.1(+0.004) -0.03(±0.001)	Weight (grams)
CYFR10	8.74 ± 1.19 (0.344 ± 0.047)	4.37 ± .79 (0.172 ± 0.031)	1.98 ± .79 (0.078 ± 0.031)	.51 (0.020)	.25 - .50
CYFR15	11.91 ± 1.19 (0.469 ± 0.047)	6.76 ± .79 (0.266 ± 0.031)	2.77 ± 1.19 (0.109 ± 0.047)	.51 (0.020)	.75 - 1.25

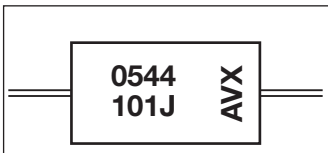
Note: Leads are solder-coated Dumet.

Glass Capacitors
Part Numbers and Ordering Information

HOW TO ORDER

CYFR	10	S	101	J	A
Style High Reliability Glass Capacitor	**Case Size** 10 15	**Lead Finish** 3 = Solder Coated Dumet	**Capacitance Code** 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 values below 10 pF, R = decimal point; i.e. 1R5 indicates 1.5 pF.	**Capacitance Tolerance** C = ±.25 pF D = ±.50 pF F = ±1% G = ±2% J = ±5%	**Test Level** A = J-950 Specification No designator = J-951 Specification

MARKING



05 = Year
44 = Lot Code
101 = Capacitance, Coded in pF
J = Tolerance
AVX = AVX Corporation

RATINGS & PART NUMBER REFERENCE (Standard Values)

AVX Part Number	Capacitance (pF)	Tolerances Available	DC Working Voltage
	CYFR10		
CYFR10S0R5_	0.5	C	500
CYFR10S1R0_	1.0	C	500
CYFR10S1R5_	1.5	C	500
CYFR10S2R2_	2.2	C, D	500
CYFR10S2R7_	2.7	C	500
CYFR10S3R0_	3.0	C, D	500
CYFR10S3R3_	3.3	C	500
CYFR10S3R6_	3.6	C, D	500
CYFR1053R9_	3.9	C	500
CYFR10S4R3_	4.3	C	500
CYFR10S4R7_	4.7	C	500
CYFR10S5R1_	5.1	C	500
CYFR10S5R6_	5.6	C	500
CYFR10S6R2_	6.2	C, J	500
CYFR10S6R8_	6.8	C, J	500
CYFR10S7R5_	7.5	C, J	500
CYFR10S8R2_	8.2	C, J	500
CYFR10S9R1_	9.1	C, J	500
CYFR10S100_	10	C, J	500
CYFR10S110_	11	C, J	500
CYFR10S120_	12	C, J	500
CYFR10S130_	13	G, J	500
CYFR10S150_	15	G, J	500
CYFR10S160_	16	G, J	500
CYFR10S180_	18	G, J	500
CYFR10S200_	20	G, J	500
CYFR10S220_	22	G, J	500
CYFR10S240_	24	G, J	500
CYFR10S270_	27	F, G, J	500
CYFR10S300_	30	F, G, J	500
CYFR10S330_	33	F, G, J	500
CYFR10S360_	36	F, G, J	500
CYFR10S390_	39	F, G, J	500
CYFR10S430_	43	F, G, J	500
CYFR10S470_	47	F, G, J	500
CYFR10S510_	51	F, G, J	500
CYFR10S560_	56	F, G, J	500
CYFR10S620_	62	F, G, J	500
CYFR10S680_	68	F, G, J	500
CYFR10S750_	75	F, G, J	500
CYFR10S820_	82	F, G, J	500
CYFR10S910_	91	F, G, J	500
CYFR10S101_	100	F, G, J	500
CYFR10S111_	110	F, G, J	500
CYFR10S121_	120	F, G, J	500
CYFR10S131_	130	F, G, J	500
CYFR10S151_	150	F, G, J	500
CYFR10S161_	160	F, G, J	300
CYFR10S181_	180	F, G, J	300
CYFR10S201_	200	F, G, J	300
CYFR10S221_	220	F, G, J	300
CYFR10S241_	240	F, G, J	300

Add letter for tolerance code above lines.

AVX Part Number	Capacitance (pF)	Tolerances Available	DC Working Voltage
	CYFR15		
CYFR15S161_	160	F, G, J	500
CYFR15S181_	180	F, G, J	500
CYFR15S201_	200	F, G, J	500
CYFR15S221_	220	F, G, J	500
CYFR15S241_	240	F, G, J	500
CYFR15S271_	270	F, G, J	500
CYFR15S301_	300	F, G, J	500
CYFR15S331_	330	F, G, J	500
CYFR15S361_	360	F, G, J	500
CYFR15S391_	390	F, G, J	500
CYFR15S431_	430	F, G, J	500
CYFR15S471_	470	F, G, J	500
CYFR15S511_	510	F, G, J	500
CYFR15S561_	560	F, G, J	300
CYFR15S621	620	F, G, J	300
CYFR15S681_	680	F, G, J	300
CYFR15S751_	750	F, G, J	300
CYFR15S821_	820	F, G, J	300
CYFR15S911_	910	F, G, J	300
CYFR15S102_	1000	F, G, J	300
CYFR15S112_	1100	F, G, J	300
CYFR15S122_	1200	F, G, J	300

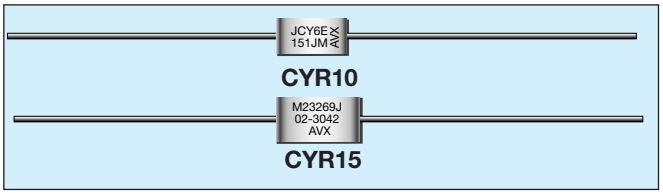
Add letter for tolerance code above lines.

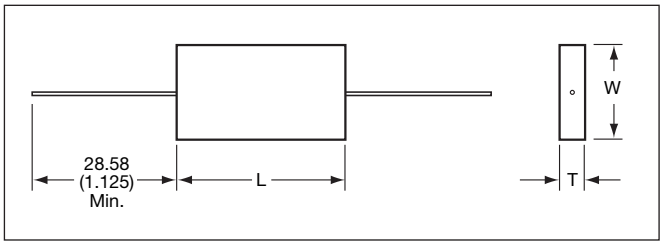
Glass Capacitors
CYR10, 15 (Established Reliability)
M23269/01, 02 (QPL to MIL-PRF-23269)

FAILURE RATE LEVELS M AND S

APPLICATIONS

These precision glass dielectric capacitors are QPL to Established Reliability specification MIL-PRF-23269. Fused monolithic construction provides excellent electrical performance, environmental immunity, stability and retraceability. These capacitors have axial leads.





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 Rating: Voltage ratings are shown in the part number tables. The operating temperature range is -55°C to +125°C.

Radiation Resistance: The unique materials and construction techniques involved with glass capacitors make them ideal for use in radiation environments. After a total dose of nearly 10^8 rads (H_2O) glass capacitors exhibit only a minor change in capacitance (≤.5%) and an 8% change in dissipation factor. Furthermore, glass capacitors can operate in fast neutron flux environments of 10^{15} N $cm^{-2}sec^{-1}$ and experience little or no damage in component parameters.

Voltage Coefficient: Zero.

Additional performance details are given in the AVX "Performance Characteristics of Multilayer Glass Dielectric Capacitors" technical paper.

DIMENSIONS:

millimeters (inches)

Case Size	L	W	T	Lead Dia. +0.1(+0.004) -0.03(±0.001)
CYR10	8.74 ± 1.19 (0.344 ± 0.047)	4.37 ± .79 (0.172 ± 0.031)	1.98 ± .79 (0.078 ± 0.031)	.51 (0.020)
CYR15	11.91 ± 1.19 (0.469 ± 0.047)	6.76 ± .79 (0.266 ± 0.031)	2.77 ± 1.19 (0.109 ± 0.047)	.51 (0.020)

Note: Standard leads are solder-coated Dumet.

Glass Capacitors
Part Numbers and Ordering Information

HOW TO ORDER

M23269 / **01** — **3** **001**

Style
Military Specification
Established Reliability
Glass Capacitor

Case Size
01 = CYR10
02 = CYR15

Failure Rate
3 = M level 1%/1000 hrs.
7 = S level .001%/1000 hrs.
(100 volt rating only)

Capacitance Code
Capacitance value coded in accordance with MIL-PRF-23269 –
(see Part Number section)

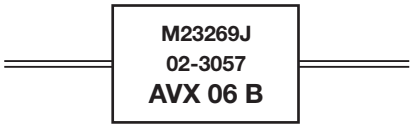
MARKING

CYR10

J = JAN Trademark
C = Capacitor
Y = Glass Dielectric
5 = Last digit of year
A = 4 week lot code

0R5 = Capacitance code –
0R5 = 0.5pF
J = Capacitance tolerance –
J = ±5%, G = ±2%, F = ±1%
M = Failure level
AVX = AVX Corporation

CYR15



M23269 = Military specification established reliability glass capacitor
J = JAN Trademark
02 = Case size (CYR15)
3 = Failure rate (M level)

057 = Dash Number – (capacitance in pF and capacitance tolerance)
AVX = AVX Corporation
06 = Year
B = Lot Code

RATINGS & PART NUMBER REFERENCE

Cap. Value (pF)	Part Number* Capacitance Tolerance		
	CYR10 M23269/01-		
500 Volts**	±.25pF	±.5pF	±5%
.5	*001	–	–
1.0	002	–	–
1.5	003	–	–
2.2	004	*005	–
2.7	006	–	–
3.0	007	008	–
3.3	009	–	–
3.6	010	011	–
3.9	012	–	–
4.3	013	014	–
4.7	015	–	–
5.1	016	–	–
5.6	017	–	*018
6.2	019	–	020
6.8	021	–	022
7.5	023	–	024
8.2	025	–	026
9.1	027	–	028
10	029	–	030
11	031	–	032
12	033	–	034
	±1%	±2%	±5%
13	–	*035	*036
15	–	037	038
16	–	039	040
18	–	041	042
20	–	043	044
22	–	045	046
24	–	047	048
27	*049	050	051
30	052	053	054
33	055	056	057
36	058	059	060
39	061	062	063
43	064	065	066
47	067	068	069
51	070	071	072
56	073	074	075
62	076	077	078

* Add first digit to indicate failure rate.
** S LEVEL = 100V rating for all values.

Cap. Value (pF)	Part Number* Capacitance Tolerance		
	CYR10 M23269/01- (cont'd.)		
500 Volts**	±1%	±2%	±5%
68	*079	*080	*081
75	082	083	084
82	085	086	087
91	088	089	090
100	091	092	093
110	094	095	096
120	097	098	099
130	100	101	102
150	103	104	105
160	106	107	108
180	109	110	111
200	112	113	114
300 Volts**	±1%	±2%	±5%
220	115	116	117
240	118	119	120
270	121	122	123
300	124	125	126
	CYR15 M23269/02-		
500 Volts**	±1%	±2%	±5%
220	*001	*002	*003
240	004	005	006
270	007	008	009
300	010	011	012
330	013	014	015
360	016	017	018
390	019	020	021
430	022	023	024
470	025	026	027
510	028	029	030
300 Volts**	±1%	±2%	±5%
560	031	032	033
620	034	035	036
680	037	038	039
750	040	041	042
820	043	044	045
910	046	047	048
1,000	049	050	051
1,100	052	053	054
1,200	055	056	057

* Add first digit to indicate failure rate.
** S LEVEL = 100V rating for all values.

Glass Capacitors
CYR51, 52, 53 (Established Reliability)
M23269/10 (QPL to MIL-PRF-23269)

FAILURE RATE LEVEL M

APPLICATIONS

These precision glass dielectric capacitors are QPL to Established Reliability specification MIL-PRF-23269. Fused monolithic construction provides excellent electrical performance, environmental immunity, stability and retraceability. These capacitors have radial leads.

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:

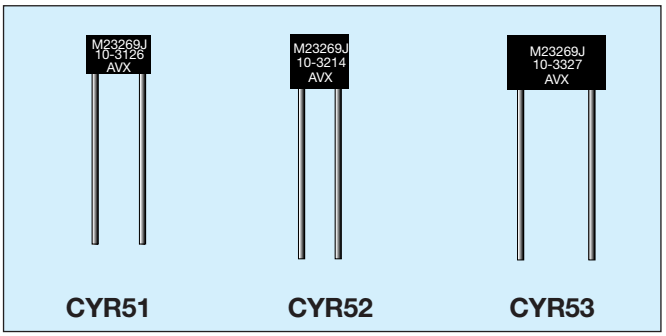
±0.5% after 2,000 hours
±2.0% after 6,000 hours

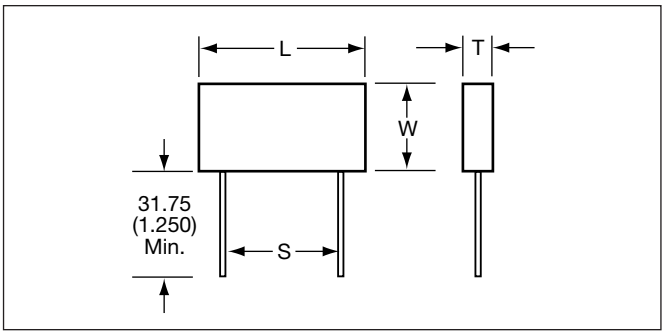
Insulation Resistance: A minimum of 100,000 megohms at 25°C and 10,000 megohms at 125°C.

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

Voltage Coefficient: Zero

Additional performance details are given in the AVX "Performance Characteristics of Multilayer Glass Dielectric Capacitors" technical paper.





DIMENSIONS:

millimeters (inches)

Case Size	L ±0.13 (±0.005)	W ±0.25 (±0.010)	T ±0.13 (±0.005)	S ±0.51 (±0.020)	Lead Dia. ±0.051 (±0.002)
CYR51	7.62 (0.300)	5.08 (0.200)	2.92 (0.115)	5.08 (0.200)	.51 (0.020)
CYR52	7.62 (0.300)	7.62 (0.300)	2.92 (0.115)	5.08 (0.200)	.51 (0.020)
CYR53	12.70 (0.500)	7.62 (0.300)	2.92 (0.115)	10.16 (0.400)	.51 (0.020)

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

Glass Capacitors
Part Numbers and Ordering Information

HOW TO ORDER

M23269	/	10	—	3	001
Style Military Specification Established Reliability Glass Capacitor		**Case Size** Slash sheet CYR51 CYR52 CYR53		**Failure Rate** 3 = M level, 1%/1000 hrs.	**Capacitance Code** Capacitance value coded in accordance with MIL-PRF-23269 – (see Part Number section)

MARKING

CYR51, 52, 53

M23269 = Military specification established reliability glass capacitor
J = JAN Trademark
10 = Slash sheet for case sizes – CYR51, CYR52, CYR53
3 = Failure rate (M level)
001 = Capacitance value coded in accordance with MIL-PRF-23269
AVX = AVX Corporation
06 = Year
B = Lot Code

CROSS REFERENCE

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

RATINGS & PART NUMBER REFERENCE

Cap. Value (pF)	Part Number Capacitance Tolerance		
CYR51 M23269/10-			
300 Volts	±.25pF	±2%	±5%
1	3001	—	—
1.5	3002	—	—
2.2	3003	—	—
2.7	3004	—	—
3.0	3005	—	—
3.3	3006	—	—
3.6	3007	—	—
3.9	3008	—	—
4.3	3009	—	—
4.7	3010	—	—
5.1	3011	—	3012
5.6	3013	—	3014
6.2	3015	—	3016
6.8	3017	—	3018
7.5	3019	—	3020
8.2	3021	—	3022
9.1	3023	—	3024
10	3025	—	3026
11	3027	—	3028
12	3029	—	3030
13	3031	3032	3033
15	3034	3035	3036
16	3037	3038	3039
18	3040	3041	3042
20	3043	3044	3045
22	3046	3047	3048
24	3049	3050	3051

*Add first digit to indicate failure rate.

Cap. Value (pF)	Part Number Capacitance Tolerance		
CYR51 M23269/10- (cont'd)			
300 Volts	±1%	±2%	±5%
27	3052	3053	3054
30	3055	3056	3057
33	3058	3059	3060
36	3061	3062	3063
39	3064	3065	3066
43	3067	3068	3069
47	3070	3071	3072
51	3073	3074	3075
56	3076	3077	3078
62	3079	3080	3081
68	3082	3083	3084
75	3085	3086	3087
82	3088	3089	3090
91	3091	3092	3093
100	3094	3095	3096
110	3097	3098	3099
120	3100	3101	3102
130	3103	3104	3105
150	3106	3107	3108
160	3109	3110	3111
180	3112	3113	3114
200	3115	3116	3117
220	3118	3119	3120
240	3121	3122	3123
270	3124	3125	3126
300	3127	3128	3129
330	3130	3131	3132
360	3133	3134	3135
390	3136	3137	3138
430	3139	3140	3141
470	3142	3143	3144
510	3145	3146	3147
560	3148	3149	3150

*Add first digit to indicate failure rate.

Cap. Value (pF)	Part Number Capacitance Tolerance		
CYR52 M23269/10-			
300 Volts	±1%	±2%	±5%
620	3201	3202	3203
680	3204	3205	3206
750	3207	3208	3209
820	3210	3211	3212
910	3213	3214	3215
1,000	3216	3217	3218
CYR53 M23269/10-			
1,100	3301	3302	3303
1,200	3304	3305	3306
1,300	3307	3308	3309
1,500	3310	3311	3312
1,600	3313	3314	3315
1,800	3316	3317	3318
2,000	3319	3320	3321
2,200	3322	3323	3324
2,400	3325	3326	3327

*Add first digit to indicate failure rate.

Glass/ET Series Caps
Elevated Temperature

HEAT

It's the enemy of reliable, long-term circuit performance. In many applications, very high temperatures are not a consideration in circuit design. But in a few specialized areas, elevated temperatures create very real design problems.

That's why AVX ET-Series capacitors keep working at temperatures where more ordinary capacitors usually fail...up to 200°C.

And, of course, AVX ET-Series capacitors provide all the high performance, high reliability characteristics you've come to expect from all AVX glass capacitors...excellent stability, outstanding capacitance retraceability, rugged, simple construction to eliminate mechanical problems, and electrical performance specifications among the best available at any price.

So when the heat's on your next design and you can't alter the environment, choose AVX ET-Series glass capacitors. That'll be one less problem you'll have to solve.

FEATURES

- Available in both axial and radial leaded configurations
- Values from 0.5 pF to 2400 pF
- Working temperature range -75°C to 200°C
- "Burned In" versions available – 50 hours @ 1500 VDC, 25°C
- Simple, rugged design and construction
- Short lead times for most values

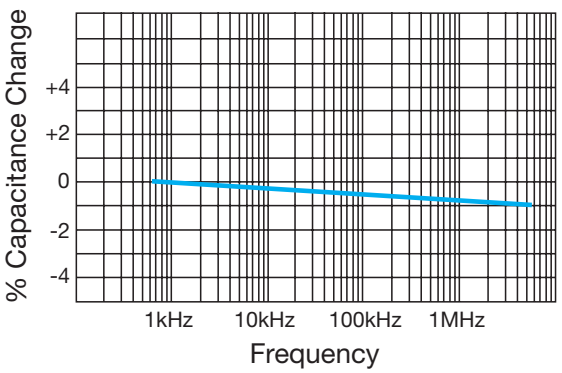
STANDARD OPERATING CHARACTERISTICS OF AVX ET-SERIES AXIAL AND RADIAL LEADED GLASS CAPACITORS

Working Temperature Range	-75°C to 200°C
Voltage Rating	50 VDC
Capacitance Range	0.5 pF to 2400 pF
Insulation Resistance	@ 25°C > 100,000 Megohms @ 200°C > 100 Megohms
Dissipation Factor	@ 25°C < .1% at 1kHz @ 200°C < 1% at 1kHz
Life	(1000 hours at rated voltage at 200°C) Post Test Delta C @ 25°C < 2% DF @ 25°C < 2.5% IR > 100 Megohms (axials) IR > 10 Megohms (radials)
Short Time (1 Hour) Exposure to Overtemperature (250°C)	No degradation
Voltage Coefficient	0

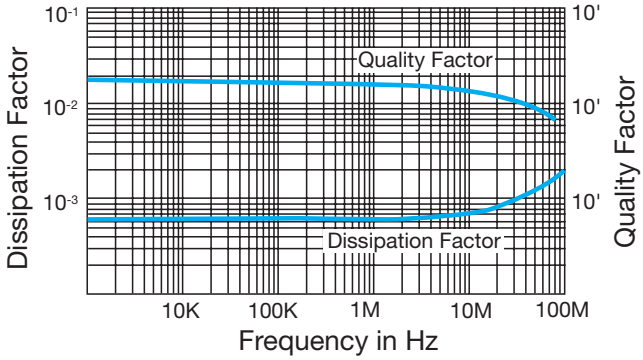
TYPICAL APPLICATIONS

In general, AVX ET-Series glass capacitors are ideally suited for any environment where high temperature could alter or destroy circuit performance. And since they are rated down to -75°C, ET-Series capacitors are also useful where cycling to colder temperatures may be a problem. Some applications where AVX ET-Series capacitors have already proven themselves include:

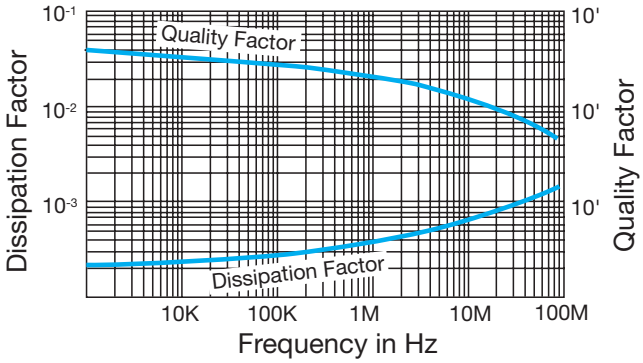
- Oil, well logging and downhole instrumentation, where frictional or geothermal heat is a problem.
- Geophysical pressure probes.
- Missile or aerospace applications where engine or environmental heat needs to be monitored or may cause circuit failure.
- Radar or other microwave applications.
- RF output circuitry where conduction or fan cooling cannot be entirely relied upon to remove all of the heat.
- Space and satellite applications where temperature changes are extreme and "zero failures" are a must.
- Industrial chemical process instrumentation where heat is a part of the process.
- Instrumentation for monitoring at-the-tool performance in metal cutting machinery.
- Fire-safe alarm or control circuitry.



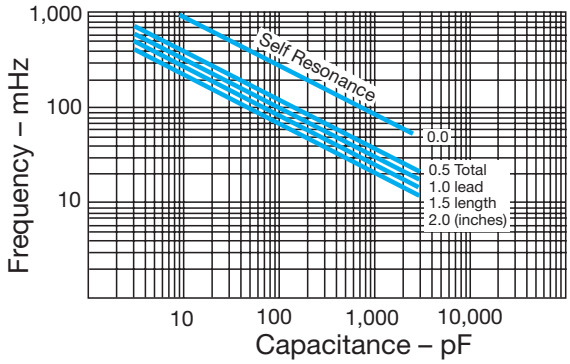
% Capacitance Change vs. Frequency
Radial and Axial



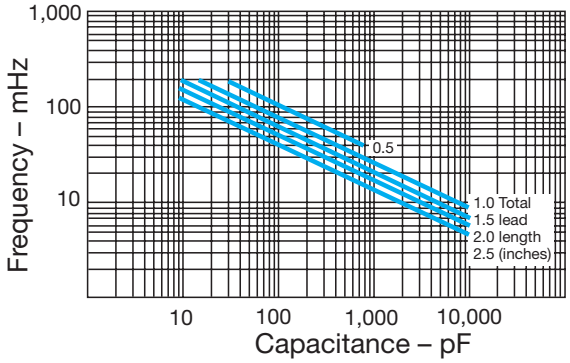
Quality Factor and Dissipation Factor vs. Frequency
Radial



Quality Factor and Dissipation Factor vs. Frequency
Axial



Resonant Frequency vs. Capacitance
Radial

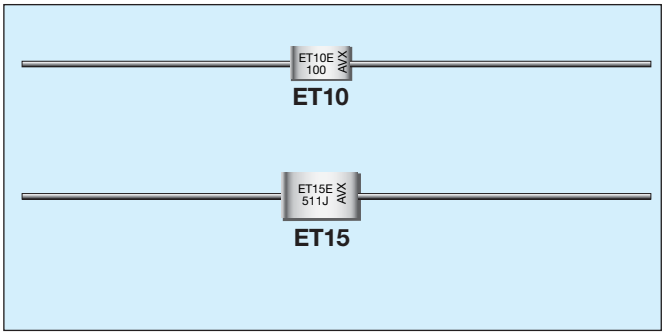


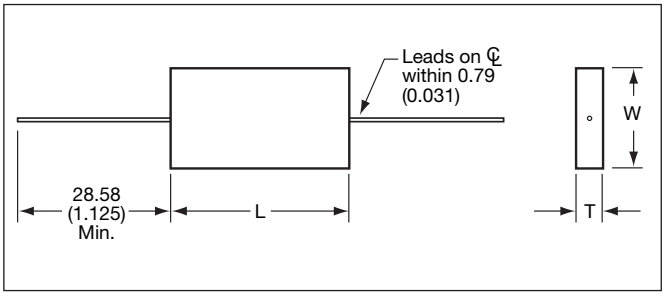
Resonant Frequency vs. Capacitance
Axial

Glass/ET Series Caps
Axial Lead Elevated Temperature

INTRODUCTION

AVX ET-Series axial leaded glass capacitors* are available in two standard case sizes and in a wide range of values and tolerances. All feature extremely stable glass dielectric, fused monolithic construction and true glass-to-metal hermetic seals at the leads for moisture resistance. All case sizes conform to industry dimensional standards.





PERFORMANCE CHARACTERISTICS

Tolerance: Available tolerances for each capacitance value are shown in the ordering information table on following page. Part marking codes are also provided.

Temperature Coefficient: Capacitance exhibits retraceability to within 10 ppm/°C over the temperature range -75°C to +200°C. See graph on following page.

Voltage Coefficient: Zero

Losses: Extremely low over the entire specified operating temperature range. Dissipation factor is 1% or less at 200°C at 1kHz.

Life: Delta C is less than 2% after 1000 hours at rated voltage, 200°C.

Insulation Resistance: Greater than 100,000 megohms at 25°C; greater than 100 megohms at 200°C. More than 100 megohms after life-testing.

Voltage/Temperature Rating: All ET-Series capacitors are rated at 50 VDC over their operating temperature range of -75°C to 200°C. No derating is required.

High Voltage Stabilization Screening: A special version of ET-Series axial leaded capacitors – designated ETR – is available. These capacitors have been "burned in" at room temperature for 50 hours at 1500 VDC.

Short Time Overtemperature Exposure: After exposure to 250°C for one hour, ET-Series capacitors have continued to perform to specification.

Moisture Resistance: Axial glass capacitors are hermetically sealed in glass, with a true metal-to-glass seal at the leads. This construction provides practical immunity to environmental effects such as shock, moisture, salt spray and solder heat.

Additional performance details are given in the AVX "Performance Characteristics of Multilayer Glass Dielectric Capacitors" technical paper.

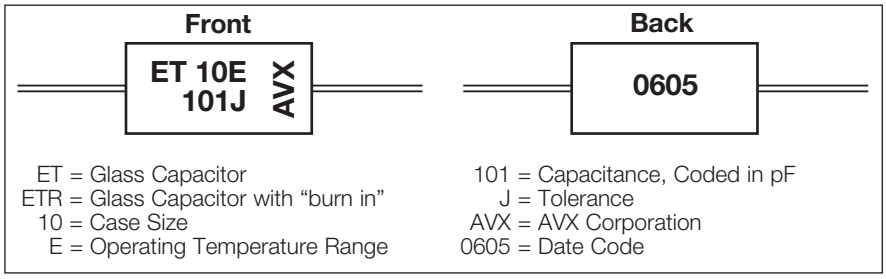
DIMENSIONS:

millimeters (inches)

Case Size	L	W	T	Lead Dia. +0.1 (+0.004) -0.03 (-0.001)	Weight (grams)
ET10	8.74 ± 1.19 (0.344 ± 0.047)	4.37 ± 0.79 (0.172 ± 0.031)	1.98 ± 0.79 (0.078 ± 0.031)	5.08 (0.200)	.25 - .50
ET15	11.91 ± 1.19 (0.469 ± 0.047)	6.76 ± 0.79 (0.266 ± 0.031)	2.77 ± 1.19 (0.109 ± 0.047)	5.08 (0.200)	.75 - 1.25

Note: Standard leads are solder-coated Dumet.

MARKING



*Radiation Resistance to the same level as the CY, CYR axial series.

Glass/ET Series Caps
Part Numbers and Ordering Information

HOW TO ORDER

ET	10	E	101	J
Style Glass Capacitor	**Case Size** 10 15	**Operating Temperature Range** -75°C to +200°C	**Capacitance Code** 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 values below 10 pF, R = decimal point; i.e. 1R5 indicates 1.5 pF.	**Capacitance Tolerance** C = ±.25 pF D = ±.50 pF F = ±1% G = ±2% J = ±5% K = ±10% M = ±20%

RATINGS & PART NUMBER REFERENCE (Standard Values)

ET Part No.	ETR Part No.	Cap (pF)	Tolerances Available Voltage	DC Working
	ET10, ETR10			
ET10E0R5_*	ETR10E0R5_**	0.5	C	50
ET10E1R0__	ETR10E1R0___	1.0	C, D	50
ET10E1R5__	ETR10E1R5___	1.5	C, D	50
ET10E2R2__	ETR10E2R2___	2.2	C, D	50
ET10E2R7__	ETR10E2R7___	2.7	C, D	50
ET10E3R0__	ETR10E3R0___	3.0	C, D	50
ET10E3R3__	ETR10E3R3___	3.3	C, D	50
ET10E3R6__	ETR10E3R6___	3.6	C, D	50
ET10E3R9__	ETR10E3R9___	3.9	C, D	50
ET10E4R3__	ETR10E4R3___	4.3	C, D	50
ET10E4R7__	ETR10E4R7___	4.7	C, K	50
ET10E5R1__	ETR10E5R1___	5.1	C, J, K	50
ET10E5R6__	ETR10E5R6___	5.6	C, J, K	50
ET10E6R2__	ETR10E6R2___	6.2	C, J, K	50
ET10E6R8__	ETR10E6R8___	6.8	C, J, K	50
ET10E7R5__	ETR10E7R5___	7.5	C, J, K	50
ET10E8R2__	ETR10E8R2___	8.2	C, J, K	50
ET10E9R1__	ETR10E9R1___	9.1	C, J, K	50
ET10E100__	ETR10E100___	10	C, J, K, M	50
ET10E110__	ETR10E110___	11	C, J, K, M	50
ET10E120__	ETR10E120___	12	C, J, K, M	50
ET10E130__	ETR10E130___	13	C, G, J, K, M	50
ET10E150__	ETR10E150___	15	C, G, J, K, M	50
ET10E160__	ETR10E160___	16	C, G, J, K, M	50
ET10E180__	ETR10E180___	18	C, G, J, K, M	50
ET10E200__	ETR10E200___	20	C, G, J, K, M	50
ET10E220__	ETR10E220___	22	C, G, J, K, M	50
ET10E240__	ETR10E240___	24	C, G, J, K, M	50
ET10E270__	ETR10E270___	27	F, G, J, K, M	50
ET10E300__	ETR10E300___	30	F, G, J, K, M	50
ET10E330__	ETR10E330___	33	F, G, J, K, M	50
ET10E360__	ETR10E360___	36	F, G, J, K, M	50
ET10E390__	ETR10E390___	39	F, G, J, K, M	50
ET10E430__	ETR10E430___	43	F, G, J, K, M	50
ET10E470__	ETR10E470___	47	F, G, J, K, M	50
ET10E510__	ETR10E510___	51	F, G, J, K, M	50
ET10E560__	ETR10E560___	56	F, G, J, K, M	50
ET10E620__	ETR10E620___	62	F, G, J, K, M	50
ET10E680__	ETR10E680___	68	F, G, J, K, M	50
ET10E750__	ETR10E750___	75	F, G, J, K, M	50

Add letter for tolerance code above lines.

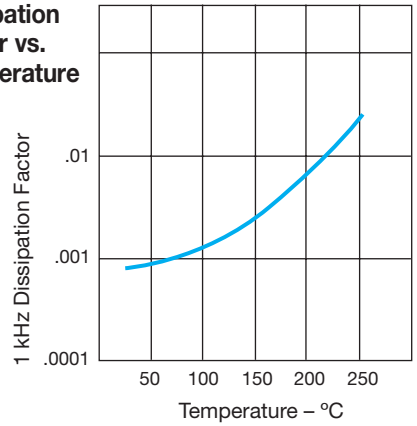
These capacitors include a "burn in", see page 20 High Voltage Stablization Screening.

ET Part No.	ETR Part No.	Cap (pF)	Tolerances Available Voltage	DC Working
	ET10, ETR10 (cont'd)			
ET10E820__	ETR10E820___	82	F, G, J, K, M	50
ET10E910__	ETR10E910___	91	F, G, J, K, M	50
ET10E101__	ETR10E101___	100	F, G, J, K, M	50
ET10E111__	ETR10E111___	110	F, G, J, K, M	50
ET10E121__	ETR10E121___	120	F, G, J, K, M	50
ET10E131__	ETR10E131___	130	F, G, J, K, M	50
ET10E151__	ETR10E151___	150	F, G, J, K, M	50
ET10E161__	ETR10E161___	160	F, G, J, K, M	50
ET10E181__	ETR10E181___	180	F, G, J, K, M	50
ET10E201__	ETR10E201___	200	F, G, J, K, M	50
ET10E221__	ETR10E221___	220	F, G, J, K, M	50
ET10E241__	ETR10E241___	240	F, G, J, K, M	50
ET10E271__	ETR10E271___	270	F, G, J, K, M	50
ET10E301__	ETR10E301___	300	F, G, J, K, M	50
	ET15, ETR15			
ET15E221__	ETR15E221___	220	F, G, J, K, M	50
ET15E241__	ETR15E241___	240	F, G, J, K, M	50
ET15E271__	ETR15E271___	270	F, G, J, K, M	50
ET15E301__	ETR15E301___	300	F, G, J, K, M	50
ET15E331__	ETR15E331___	330	F, G, J, K, M	50
ET15E361__	ETR15E361___	360	F, G, J, K, M	50
ET15E391__	ETR15E391___	390	F, G, J, K, M	50
ET15E431__	ETR15E431___	430	F, G, J, K, M	50
ET15E471__	ETR15E471___	470	F, G, J, K, M	50
ET15E511__	ETR15E511___	510	F, G, J, K, M	50
ET15E561__	ETR15E561___	560	F, G, J, K, M	50
ET15E621__	ETR15E621___	620	F, G, J, K, M	50
ET15E681__	ETR15E681___	680	F, G, J, K, M	50
ET15E751__	ETR15E751___	750	F, G, J, K, M	50
ET15E821__	ETR15E821___	820	F, G, J, K, M	50
ET15E911__	ETR15E911___	910	F, G, J, K, M	50
ET15E102__	ETR15E102___	1000	F, G, J, K, M	50
ET15E112__	ETR15E112___	1100	F, G, J, K, M	50
ET15E122__	ETR15E122___	1200	F, G, J, K, M	50

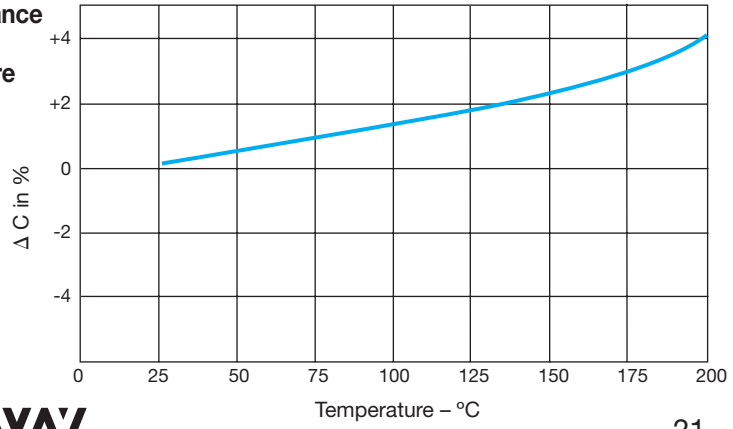
Add letter for tolerance code above lines.

These capacitors include a "burn in", see page 20 High Voltage Stablization Screening.

Dissipation Factor vs. Temperature
Axial



% Capacitance Change vs. Temperature
Axial



Glass/ET Series Caps
Radial Lead Elevated Temperature

INTRODUCTION

AVX ET-Series radial leaded glass capacitors are available in a broad range of tolerances and values in three case sizes. The fused monolithic capacitive element is housed in a miniature rectangular molded case for high packaging efficiency in circuit board applications. The gold-plated Dumet leads can be soldered or welded.

PERFORMANCE CHARACTERISTICS

Tolerance: The ordering information table on the opposite page gives the available tolerances and values. An explanation of the part marking code is also provided.

Temperature Coefficient: Capacitance exhibits retraceability to within 10 ppm/°C over the temperature range -75°C to 200°C. See graph on following page.

Voltage Coefficient: Zero

Losses: Over the specified temperature range, losses are very low. At 200°C, 1kHz, the dissipation factor is 1% or less.

Life: Delta C is less than 2% after 1000 hours at rated voltage, 200°C.

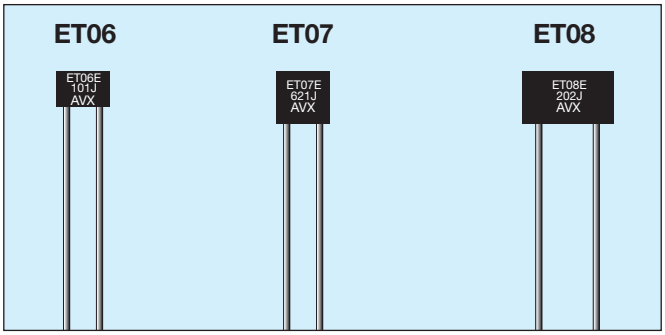
Insulation Resistance: 100,000 megohms or greater at 25°C; 100 megohms or greater at 200°C. More than 10 megohms after 1000 hour life-test.

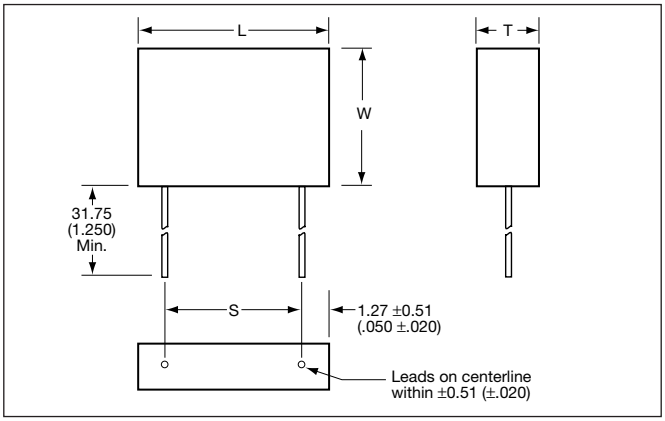
Voltage/Temperature Rating: All ET-Series capacitors are rated at 50 VDC over the operating temperature range of -75°C to 200°C. Derating is not required.

High Voltage Stabilization Screening: A special version of ET-Series radial leaded capacitors – designated ETR – is available. These capacitors have been "burned in" at room temperature for 50 hours at 1500 VDC.

Short Time Overtemperature Exposure: After exposure to 250°C for one hour, ET-Series capacitors have continued to perform to specification.

Additional performance details are given in the AVX "Performance Characteristics of Multilayer Glass Dielectric Capacitors" technical paper.





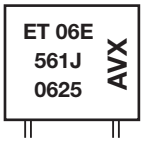
DIMENSIONS:

millimeters (inches)

Case Size	L ±0.13 (±0.005)	W ±0.25 (±0.010)	T ±0.13 (±0.005)	S +0.51 (±0.020)	Weight (grams)
ET06	7.62 (0.300)	5.08 (0.200)	2.92 (0.115)	5.08 (0.200)	.3 - .4
ET07	7.62 (0.300)	7.62 (0.300)	2.92 (0.115)	5.08 (0.200)	.4 - .5
ET08	12.7 (0.500)	7.62 (0.300)	2.92 (0.115)	10.16 (0.400)	.7 - .8

Note: All leads are 24 AWG, 0.51± 0.05 (0.020±0.002) diameter. Leads are solderable and welded gold-plated Dumet.

MARKING



AVX = AVX Corporation
ET = Glass Capacitor
ETR = Glass Capacitor with "burn in"
06 = Case Size
E = Operating Temperature Range
561 = Capacitance, Coded in pF
J = Tolerance
0625 = Date Code

Glass/ET Series Caps
Part Numbers and Ordering Information

HOW TO ORDER

ET

Style
Glass Capacitor

06

Case Size
06
07
08

E

Operating Temperature Range
-75°C to +200°C

561

Capacitance Code
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 values below 10 pF, R = decimal point; i.e. 1R5 indicates 1.5 pF.

J

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

RATINGS & PART NUMBER REFERENCE (Standard Values)

ET Part No.	ETR Part No.	Cap (pF)	Tolerances Available Voltage	DC Working
	ET06, ETR06			
ET06E1R0 *	ETR06E1R0 **	1.0	C, D	50
ET06E1R5__	ETR06E1R5__	1.5	C, D	50
ET06E2R2__	ETR06E2R2__	2.2	C, D	50
ET06E2R7__	ETR06E2R7__	2.7	C, D	50
ET06E3R0__	ETR06E3R0__	3.0	C, D	50
ET06E3R3__	ETR06E3R3__	3.3	C, D	50
ET06E3R6__	ETR06E3R6__	3.6	C, D	50
ET06E3R9__	ETR06E3R9__	3.9	C, D	50
ET06E4R3__	ETR06E4R3__	4.3	C, D	50
ET06E4R7__	ETR06E4R7__	4.7	C, K	50
ET06E5R1__	ETR06E5R1__	5.1	C, J, K	50
ET06E5R6__	ETR06E5R6__	5.6	C, J, K	50
ET06E6R2__	ETR06E6R2__	6.2	C, J, K	50
ET06E6R8__	ETR06E6R8__	6.8	C, J, K	50
ET06E7R5__	ETR06E7R5__	7.5	C, J, K	50
ET06E8R2__	ETR06E8R2__	8.2	C, J, K	50
ET06E9R1__	ETR06E9R1__	9.1	C, J, K	50
ET06E100__	ETR06E100__	10	C, J, K, M	50
ET06E110__	ETR06E110__	11	C, J, K, M	50
ET06E120__	ETR06E120__	12	C, J, K, M	50
ET06E130__	ETR06E130__	13	C, G, J, K, M	50
ET06E150__	ETR06E150__	15	C, G, J, K, M	50
ET06E160__	ETR06E160__	16	C, G, J, K, M	50
ET06E180__	ETR06E180__	18	C, G, J, K, M	50
ET06E200__	ETR06E200__	20	C, G, J, K, M	50
ET06E220__	ETR06E220__	22	C, G, J, K, M	50
ET06E240__	ETR06E240__	24	C, G, J, K, M	50
ET06E270__	ETR06E270__	27	F, G, J, K, M	50
ET06E300__	ETR06E300__	30	F, G, J, K, M	50
ET06E330__	ETR06E330__	33	F, G, J, K, M	50
ET06E360__	ETR06E360__	36	F, G, J, K, M	50
ET06E390__	ETR06E390__	39	F, G, J, K, M	50
ET06E430__	ETR06E430__	43	F, G, J, K, M	50
ET06E470__	ETR06E470__	47	F, G, J, K, M	50
ET06E510__	ETR06E510__	51	F, G, J, K, M	50
ET06E560__	ETR06E560__	56	F, G, J, K, M	50
ET06E620__	ETR06E620__	62	F, G, J, K, M	50
ET06E680__	ETR06E680__	68	F, G, J, K, M	50
ET06E750__	ETR06E750__	75	F, G, J, K, M	50
ET06E820__	ETR06E820__	82	F, G, J, K, M	50

Add letter for tolerance code above lines.

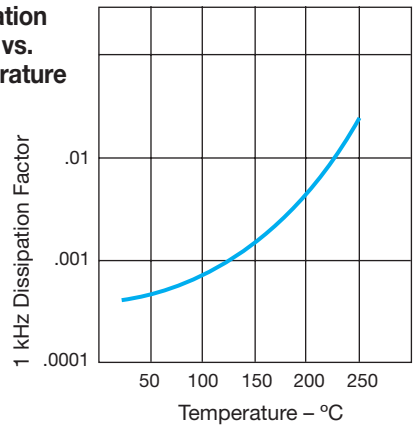
These capacitors include a "burn in", see page 22 High Voltage Stablization Screening.

ET Part No.	ETR Part No.	Cap (pF)	Tolerances Available Voltage	DC Working
	ET06, ETR06 (cont'd)			
ET06E910__	ETR06E910__	91	F, G, J, K, M	50
ET06E101__	ETR06E101__	100	F, G, J, K, M	50
ET06E111__	ETR06E111__	110	F, G, J, K, M	50
ET06E121__	ETR06E121__	120	F, G, J, K, M	50
ET06E131__	ETR06E131__	130	F, G, J, K, M	50
ET06E151__	ETR06E151__	150	F, G, J, K, M	50
ET06E161__	ETR06E161__	160	F, G, J, K, M	50
ET06E181__	ETR06E181__	180	F, G, J, K, M	50
ET06E201__	ETR06E201__	200	F, G, J, K, M	50
ET06E221__	ETR06E221__	220	F, G, J, K, M	50
ET06E241__	ETR06E241__	240	F, G, J, K, M	50
ET06E271__	ETR06E271__	270	F, G, J, K, M	50
ET06E301__	ETR06E301__	300	F, G, J, K, M	50
ET06E331__	ETR06E331__	330	F, G, J, K, M	50
ET06E361__	ETR06E361__	360	F, G, J, K, M	50
ET06E391__	ETR06E391__	390	F, G, J, K, M	50
ET06E431__	ETR06E431__	430	F, G, J, K, M	50
ET06E471__	ETR06E471__	470	F, G, J, K, M	50
ET06E511__	ETR06E511__	510	F, G, J, K, M	50
ET06E561__	ETR06E561__	560	F, G, J, K, M	50
	ET07, ETR07			
ET07E621 *	ETR07E621 **	620	F, G, J, K, M	50
ET07E681__	ETR07E681__	680	F, G, J, K, M	50
ET07E751__	ETR07E751__	750	F, G, J, K, M	50
ET07E821__	ETR07E821__	820	F, G, J, K, M	50
ET07E911__	ETR07E911__	910	F, G, J, K, M	50
ET07E102__	ETR07E102__	1000	F, G, J, K, M	50
	ET08, ETR08			
ET08E112 *	ETR08E112 **	1100	F, G, J, K, M	50
ET08E122__	ETR08E122__	1200	F, G, J, K, M	50
ET08E132__	ETR08E132__	1300	F, G, J, K, M	50
ET08E152__	ETR08E152__	1500	F, G, J, K, M	50
ET08E162__	ETR08E162__	1600	F, G, J, K, M	50
ET08E182__	ETR08E182__	1800	F, G, J, K, M	50
ET08E202__	ETR08E202__	2000	F, G, J, K, M	50
ET08E222__	ETR08E222__	2200	F, G, J, K, M	50
ET08E242__	ETR08E242__	2400	F, G, J, K, M	50

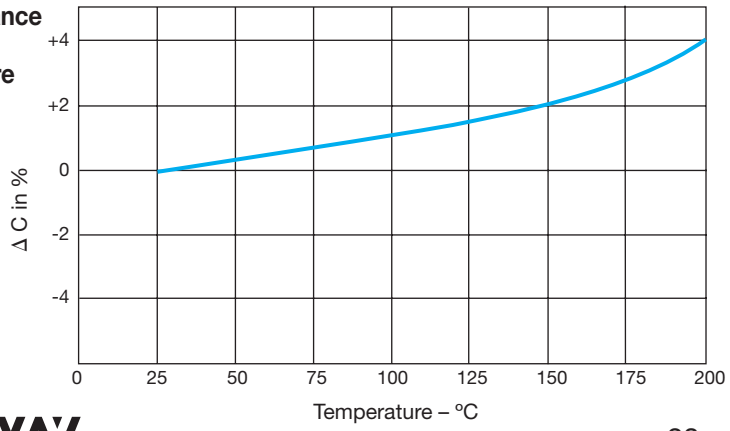
Add letter for tolerance code above lines.

These capacitors include a "burn in", see page 22 High Voltage Stablization Screening.

Dissipation Factor vs. Temperature
Radial



% Capacitance Change vs. Temperature
Radial



AMERICAS

AVX Myrtle Beach, SC
Corporate Offices
Tel: 843-448-9411
FAX: 843-448-1943

AVX Northwest, WA
Tel: 360-699-8746
FAX: 360-699-8751

AVX North Central, IN
Tel: 317-848-7153
FAX: 317-844-9314

AVX Midwest, MN
Tel: 952-974-9155
FAX: 952-974-9179

AVX Mid/Pacific, CA
Tel: 510-661-4100
FAX: 510-661-4101

AVX Southwest, AZ
Tel: 602-678-0384
FAX: 602-678-0385

AVX South Central, TX
Tel: 972-669-1223
FAX: 972-669-2090

AVX Southeast, GA
Tel: 404-608-8151
FAX: 770-972-0766

AVX Canada
Tel: 905-238-3151
FAX: 905-238-0319

AVX South America
Tel: ++55-11-2193-7200
FAX: ++55-11-2193-7210

EUROPE

AVX Limited, England
European Headquarters
Tel: ++44 (0) 1252-770000
FAX: ++44 (0) 1252-770001

AVX/ELCO, England
Tel: ++44 (0) 1638-675000
FAX: ++44 (0) 1638-675002

AVX S.A., France
Tel: ++33 (1) 69-18-46-00
FAX: ++33 (1) 69-28-73-87

AVX GmbH, Germany
Tel: ++49 (0) 8131-9004-0
FAX: ++49 (0) 8131-9004-44

AVX srl, Italy
Tel: ++390 (0)2 614-571
FAX: ++390 (0)2 614-2576

AVX Czech Republic
Tel: ++420 57 57 57 521
FAX: ++420 57 57 57 109

ASIA-PACIFIC

AVX/Kyocera, Singapore
Asia-Pacific Headquarters
Tel: (65) 6286-7555
FAX: (65) 6488-9880

AVX/Kyocera, Hong Kong
Tel: (852) 2-363-3303
FAX: (852) 2-765-8185

AVX/Kyocera, Korea
Tel: (82) 2-785-6504
FAX: (82) 2-784-5411

AVX/Kyocera, Taiwan
Tel: (886) 2-2698-8778
FAX: (886) 2-2698-8777

AVX/Kyocera, Malaysia
Tel: (60) 4-228-1190
FAX: (60) 4-228-1196

Elco, Japan
Tel: 045-943-2906/7
FAX: 045-943-2910

Kyocera, Japan - AVX
Tel: (81) 75-604-3426
FAX: (81) 75-604-3425

Kyocera, Japan - KDP
Tel: (81) 75-604-3424
FAX: (81) 75-604-3425

AVX/Kyocera, Shanghai, China
Tel: 86-21 6341 0300
FAX: 86-21 6341 0330

AVX/Kyocera, Beijing, China
Tel: 86-10 8458 3385
Fax: 86-10 8458 3382

ASIA-KED

KED, Hong Kong
Tel: (852) 2305 1080
FAX: (852) 2305 1405

KED, Shanghai
Tel: (86) 21 6859 9898
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KED, Beijing
Tel: (86) 10 5869 4655
FAX: (86) 10 5869 4677

KED, South Korea
Tel: (82) 2 783 3288
FAX: (82) 2 783 3207

KED, Taiwan
Tel: (886) 2 2950 0268
FAX: (886) 2 2950 0520

KED, Singapore
Tel: (65) 6255 3122
FAX: (65) 6255 5092

Contact:

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http://www.avx.com