

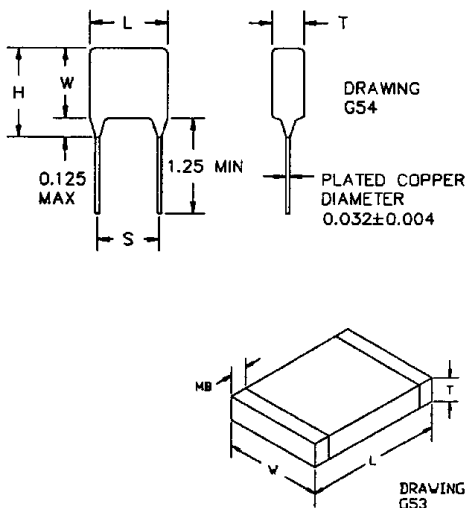
January 23, 1998

TEL:805-498-2111 FAX:805-498-3804 WEB:http://www.semtech.com

### SEMTECH PREMIUM DIELECTRIC HIGH VOLTAGE CAPACITORS MONOLITHIC CERAMIC TYPE

- X7R dielectric
- 1 to 5kV voltage range
- 200°C capability

Semtech's Premium Dielectric Capacitors demonstrate minimum capacitance change over the operation voltage and temperature range, high current carrying capability and high volumetric efficiency. This X7R body has been designed into the most demanding applications: from the one extreme of satellite, missile, space shuttle, and avionics programs to the other extreme of "down hole" oil exploration equipment.



### GENERAL SPECIFICATIONS

- **OPERATING TEMPERATURE RANGE**  
-55°C to 125°C
- **AGING RATE**  
<1.0% per decade hour
- **INSULATION RESISTANCE**  
100k megΩ or 1000 megΩ-microfarads, whichever is less, at 500VDC, 25°C
- **DISSIPATION FACTOR**  
2.5% Max at 1kHz  
1 VAC, 25°C
- **DIELECTRIC WITHSTANDING VOLTAGE**  
1.2 x Rated Voltage at 25°C  
(Test conducted with charging current limited to 10mA and discharge current limited to 10A.)
- **TEMPERATURE COEFFICIENT**  
±15% over -55°C to 125°C range

G53 CHIP DIMENSIONS

Size Code	L(Nom) In.(mm)	W(Nom) In.(mm)	T(Max) In.(mm)	MB(Max) In.(mm)
2	.270 (6.90)	.250 (6.40)	.250 (6.40)	.040 (1.10)
3	.370 (9.40)	.350 (8.90)	.250 (6.40)	.040 (1.10)
4	.470 (12.0)	.450 (11.5)	.300 (7.60)	.040 (1.10)
5	.570 (14.5)	.550 (14.0)	.300 (7.60)	.040 (1.10)
6	.670 (17.0)	.650 (16.6)	.300 (7.60)	.040 (1.10)

G54 ENCAPSULATED DIMENSIONS

Size Code	L(Max) In.(mm)	S In.(mm)	T(Max) In.(mm)	H (Ref) <sup>1</sup> In.(mm)
2	.400 (10.2)	.300±.032 (7.62±.82)	.275 (7.00)	.475 (12.1)
3	.500 (12.7)	.400±.032 (10.2±.82)	.300 (7.62)	.575 (14.6)
4	.600 (15.3)	.500±.032 (12.7±.82)	.375 (9.53)	.675 (17.1)
5	.700 (17.8)	.600±.032 (15.3±.82)	.375 (9.53)	.775 (19.7)
6	.800 (20.4)	.700±.032 (17.8±.82)	.375 (9.53)	.875 (22.2)

Note 1: Maximum mounting height, leads shall be solderable beyond this point.

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### CAPABILITY MATRIX

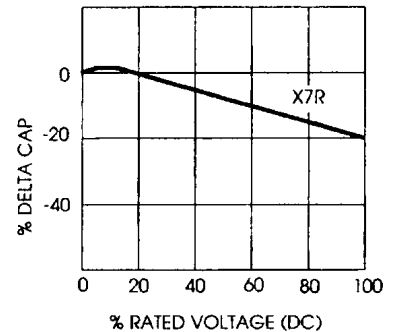
VALUE	1 kV					2 kV					3 kV					4 kV					5 kV					EIA CODE
	2	3	4	5	6	2	3	4	5	6	2	3	4	5	6	2	3	4	5	6	2	3	4	5	6	
180pF																									181	
220pF																									221	
270pF																									271	
330pF																									331	
390pF																									391	
470pF																									471	
560pF																									561	
680pF																									681	
820pF																									821	
1000pF																									102	
1200pF																									122	
1500pF																									152	
1800pF																									182	
2200pF																									222	
2700pF																									272	
3300pF																									332	
3900pF																									392	
4700pF																									472	
5600pF																									562	
6800pF																									682	
8200pF																									822	
.010uF																									103	
.012uF																									123	
.015uF																									153	
.018uF																									183	
.022uF																									223	
.027uF																									273	
.033uF																									333	
.039uF																									393	
.047uF																									473	
.056uF																									563	
.068uF																									683	
.082uF																									823	
.10uF																									104	
.12uF																									124	
.15uF																									154	
.18uF																									184	
.22uF																									224	
.27uF																									274	
.33uF																									334	
.39uF																									394	

STANDARD RANGE K TOLERANCE AVAILABLE FROM STOCK
  NON STANDARD CAPABILITIES

### ORDERING INSTRUCTIONS

3	A		X	103	K	2
PART SIZE CODE	FORM		DIELECTRIC MATERIAL	CAPACITANCE (EIA CODE)	CAPACITANCE TOLERANCE	VOLTAGE RATING
2	CHIP		X=X7R	Last digit indicates number of zeroes following the first two digits Ex. 103=1000pF	K=10% M=20% V=+100%-0% Z=+80%-20%	1=1kV
3	A=Silver	LEADED				2=2kV
4	Termination	E=Epoxy				3=3kV
5	D=Palladium	Encapsulated				4=4kV
6	Silver Termination	L=Leaded only				5=5kV
		H=High Temperature version for 200°C operation with gold plated copper leads.				

PREMIUM DIELECTRIC DC VOLTAGE COEFFICIENT



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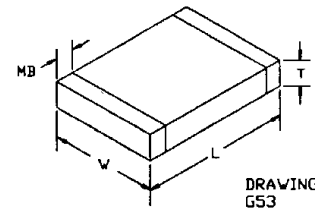
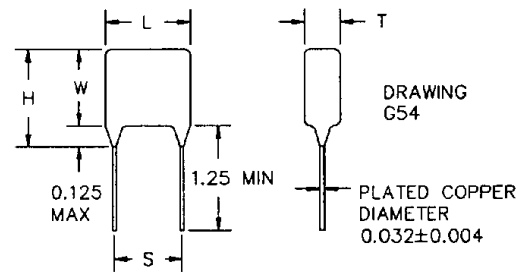
### SEMTECH INDUSTRIAL HIGH VOLTAGE CAPACITORS MONOLITHIC CERAMIC TYPE

- X7R and NPO dielectrics
- 100pF to .47μF capacitance range
- 1 to 10kV voltage range
- 14 Chip sizes

Semtech's Industrial Capacitors employ a new body design for cost efficient, volume manufacturing. This capacitor body design also expands our voltage capability to 10kV and our capacitance range to .47μF. If your requirement exceeds our single device ratings, Semtech can build a custom capacitor assembly to reach the values you need.

Size	Bias Voltage (Note 2,3)	Type	Maximum Capacitance - EIA Code (Note 1)																		
			1kV	2kV	3kV	4kV	5kV	6kV	7kV	8kV	9kV	10kV									
1515	- VDCW 0	NPO	102	561	271	181	121														
		X7R	562	222	102	471	271														
		X7R	123	472	222	821	561														
2020	- VDCW 0	NPO	182	122	561	331	221	181													
		X7R	103	472	182	681	471	271													
		X7R	223	103	392	152	102	561													
2520	- VDCW 0	NPO	222	152	681	391	271	221	101												
		X7R	153	682	222	821	561	331	181												
		X7R	333	123	472	182	122	681	391												
3333	- VDCW 0	NPO	682	472	222	122	821	561	271												
		X7R	473	153	562	272	182	102	561												
		X7R	104	333	123	562	392	222	122												
3530	- VDCW 0	NPO	562	392	182	102	681	471	221												
		X7R	393	153	562	272	182	102	561												
		X7R	823	333	123	562	392	222	122												
4020	- VDCW 0	NPO	152	102	821	681	391	331	271	181	121	101									
		X7R	123	562	272	122	821	681	471	391	391	331									
		X7R	223	123	562	272	182	152	102	821	102	681	561								
4040	- VDCW 0	NPO	103	682	332	222	122	102	391	331											
		X7R	563	273	103	392	272	182	471	471											
		X7R	124	563	223	822	562	392	102	102											
4540	- VDCW 0	NPO	123	822	332	222	152	122	471	331											
		X7R	683	333	123	472	332	222	102	561											
		X7R	154	683	273	103	682	472	222	122											
5040	- VDCW 0	NPO	182	122	102	681	471	391	271	221	151	121									
		X7R	153	682	332	152	102	821	561	471	391	391									
		X7R	273	153	682	332	222	182	122	102	821	681	561								
5440	- VDCW 0	NPO	153	103	472	272	182	122	561	391											
		X7R	104	333	153	562	392	272	122	681											
		X7R	224	683	333	123	822	562	272	152											
5550	- VDCW 0	NPO	183	123	562	332	222	152	681	561											
		X7R	124	393	183	682	472	332	152	821											
		X7R	274	823	393	153	103	682	332	182											
6560	- VDCW 0	NPO	273	183	822	562	332	272	122	821											
		X7R	184	563	273	103	682	472	272	122											
		X7R	394	124	563	223	153	103	562	272											
6666	- VDCW 0	NPO	123	682	562	472	272	222	152	122	102	681									
		X7R	823	473	183	822	682	472	332	272	182	122									
		X7R	154	104	393	183	153	103	682	562	392	272									
7565	- VDCW 0	NPO	333	223	103	682	392	332	152	102											
		X7R	224	683	333	123	822	562	332	152											
		X7R	474	154	683	273	183	123	682	332											

Notes: 1 EIA Capacitance codes: Value in Picofarads; two significant digits followed by number of zeroes: 562=5600pF, 273=2700pF (.027μF).  
 2 Class 1 Dielectric (NPO) has zero voltage coefficient.  
 3 Class II Dielectric (X7R) has voltage coefficient, and capacitance values derate at VDCW by up to 50% of value at 0 volt bias. Capacitance at VDCW is a function of design of unit and may vary.



### GENERAL SPECIFICATIONS

- **OPERATING TEMPERATURE RANGE**  
-55°C to 125°C
- **TEMPERATURE COEFFICIENT**  
NPO: ±30ppm/°C  
X7R: ±15% ΔC Max
- **DISSIPATION FACTOR**  
NPO: 0.1% Max, 0.02% Typical  
X7R: 2.5% Max, 1.5% Typical
- **INSULATION RESISTANCE**  
@25°C, 1.0kV: >100GΩ or 1000ΩF, whichever is less  
@125°C, 1.0kV: >10GΩ or 100ΩF, whichever is less
- **DIELECTRIC WITHSTANDING VOLTAGE**  
1.2 x VDCW Min, 50mA Max, 5 seconds
- **AGING RATE**  
NPO: 0% per decade hour  
X7R: <2.0% per decade hour
- **TEST PARAMETERS**  
1kHz, 1.0VRMS±0.2VRMS, 25°C, 0 Volts

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Chip Dimensions				
Size Code	L In. (mm)	W In. (mm)	T(Max) In. (mm)	MB(Max) In. (mm)
1515	.150±.015 (3.81±.38)	.150±.015 (3.81±.38)	.120 (3.05)	.040 (.800)
2020	.200±.020 (5.08±.51)	.200±.020 (5.08±.51)	.120 (3.05)	.040 (1.10)
2520	.230±.023 (5.84±.58)	.190±.019 (4.82±.48)	.120 (3.05)	.040 (1.10)
3333	.330±.033 (8.38±.84)	.330±.033 (8.38±.84)	.150 (3.90)	.040 (1.10)
3530	.350±.035 (8.89±.89)	.300±.030 (7.62±.76)	.150 (3.90)	.040 (1.10)
4020	.400±.040 (10.2±1.0)	.200±.020 (5.08±.51)	.150 (3.90)	.030 (.800)
4040	.400±.040 (10.2±1.0)	.400±.040 (10.2±1.0)	.150 (3.90)	.040 (1.10)
4540	.450±.045 (11.4±1.1)	.400±.040 (10.2±1.0)	.150 (3.90)	.040 (1.10)
5040	.460±.046 (11.7±1.2)	.380±.038 (9.65±.97)	.150 (3.90)	.040 (1.10)
5440	.540±.054 (13.7±1.4)	.400±.040 (10.2±1.0)	.150 (3.90)	.040 (1.10)
5550	.550±.055 (14.0±1.4)	.500±.050 (12.7±1.3)	.150 (3.90)	.040 (1.10)
6560	.650±.065 (16.5±1.7)	.600±.060 (15.2±1.5)	.175 (4.45)	.040 (1.10)
6666	.660±.066 (16.8±1.7)	.660±.066 (16.8±1.7)	.175 (4.45)	.040 (1.10)
7565	.750±.075 (19.0±1.9)	.650±.065 (16.5±1.7)	.175 (4.45)	.040 (1.10)

Encapsulated Dimensions				
Size Code	L In. (mm)	W In. (mm)	T(Max) In. (mm)	S In. (mm)
1515	.300 (7.62)	.300 (7.62)	.220 (5.59)	.180±.03 (4.57±.76)
2020	.350 (8.89)	.350 (8.89)	.220 (5.59)	.230±.03 (5.84±.76)
2520	.380 (9.65)	.340 (8.64)	.220 (5.59)	.260±.03 (6.60±.76)
3333	.480 (12.2)	.480 (12.2)	.250 (6.35)	.360±.033 (9.65±.84)
3530	.500 (12.7)	.450 (11.4)	.250 (6.35)	.380±.035 (9.65±.89)
4020	.550 (14.0)	.350 (8.89)	.250 (6.35)	.430±.040 (10.9±1.0)
4040	.550 (14.0)	.550 (14.0)	.250 (6.35)	.430±.040 (10.9±1.0)
4540	.600 (15.2)	.550 (14.0)	.250 (6.35)	.480±.045 (12.2±1.1)
5040	.610 (15.5)	.530 (12.5)	.250 (6.35)	.490±.046 (12.4±1.2)
5440	.690 (17.5)	.550 (14.0)	.250 (6.35)	.570±.054 (14.5±1.4)
5550	.700 (17.8)	.650 (16.5)	.250 (6.35)	.580±.055 (14.7±1.4)
6560	.800 (20.3)	.750 (19.0)	.275 (6.99)	.680±.065 (17.3±1.7)
6666	.810 (20.6)	.810 (20.6)	.275 (6.99)	.690±.066 (17.5±1.7)
7565	.900 (22.9)	.800 (20.3)	.275 (6.99)	.780±.075 (19.8±1.9)

### ORDERING INSTRUCTIONS

2020	A	X	103	K	2	
PART SIZE CODE	FORM		DIELECTRIC MATERIAL	CAPACITANCE (EIA CODE)	CAPACITANCE TOLERANCE	VOLTAGE RATING
1515	CHIP		X=X7R	Last digit indicates number of zeroes following the first two digits	J=5%	1=1kV
2020	A=Silver Termination	E=Epoxy Encapsulated	N=NPO	Ex. 103=10000pF	K=10%	2=2kV
.	D=Palladium Silver Termination	L=Leaded only			M=20%	.
7565					Z=+80%-20%	10=10kV

INDUSTRIAL DIELECTRIC DC VOLTAGE COEFFICIENT

