Discoidal Ceramic Capacitors

Miniature designs down to 0.050 OD.

Applications

- Medical implantable devices
- EMI/RF suppression filters
- AC applications up to 240V
- DC applications up to 500V

Ceramic discoidal feedthrough capacitors are thebuilding blocks of the EMI filter industry. APITech's discoidal capacitors provide great versatility in meeting varied voltage, capacitance, and dimensional requirements. These non-polar, multilayer capacitors are small, reliable, and high in dielectric strength.

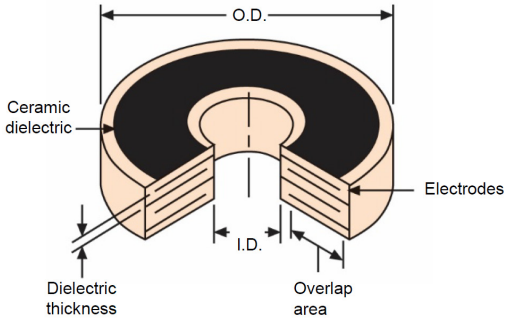
The versatile nature of our discoidals makes them ideally suited for by-pass and filtering applications. Due to their low inductance construction, these capacitors perform extremely well in high frequency applications. The circular geometry of a discoidal feedthrough capacitor offers many paths to ground, resulting in lower impedance and better filtering performance.

Metallization

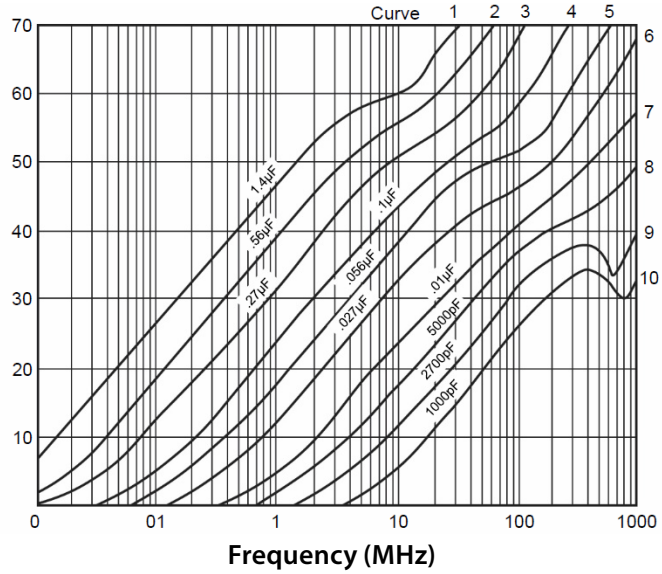
Standard metallization is solderable silver.
Other metallization is available upon request.

Features

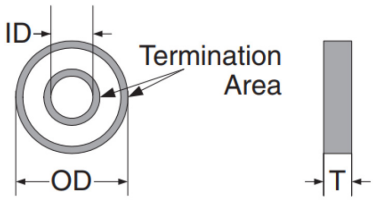
- Various OD, ID, and thickness configurations
- Excellent high frequency performance
- Low profile design
- Rugged construction
- Low impedance, many paths to ground
- Low inductance, non-polar
- Operational temperatures of –55°C to +125°C with no voltage de-rating
- Custom designs available including multi-hole, EMI filter arrays and assemblies, high voltage, and high temperature



Insertion Loss (dB) Per MIL-STD-220



Discoidal NPO



Note: AC voltage determined upon request

OD	(in)	0.05±0.005				0.080±0.005				0.100±0.005				0.135±0.005				0.150±0.010				0.195±0.010				0.340±0.010				0.595±0.010			
	(mm)	1.27±0.13				2.03±0.13				2.54±0.13				3.43±0.13				3.81±0.25				4.95±0.25				8.64±0.25				15.11±0.25			
ID	(in)	0.014±0.005				0.030±0.005				0.040±0.005				0.040±0.005				0.045±0.005				0.062±0.005				0.055±0.005				0.055±0.005			
	(mm)	0.36±0.13				0.76±0.13				1.02±0.13				1.02±0.13				1.14±0.13				1.52±0.13				1.40±0.13				2.41±0.13			
T MAX	(in)	0.035				0.045				0.060				0.060				0.110				0.120				0.120				0.125			
	(mm)	0.89				1.14				1.52				1.52				2.79				3.05				3.05				3.18			
TERM BW	(in)	0				0.000-0.015				0.000-0.020				0.000-0.025				0.000-0.025				0.002-0.025				0.005-0.045				0.005-0.055			
	(mm)	0				0.00-0.38				0.00-0.51				0.00-0.64				0.00-0.64				0.05-0.64				0.13-1.14				0.13-1.40			
WV(VDC) / Cap(pF)		500	200	100	50	500	200	100	50	500	200	100	50	500	200	100	50	500	200	100	50	500	200	100	50	500	200	100	50	500	200	100	50
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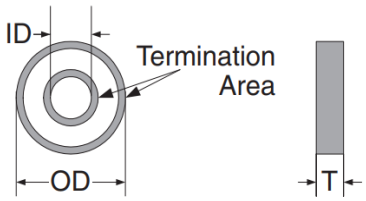
Discoidal X7R



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T MAX	(in)	0.035				0.045				0.060				0.060				0.110				0.120				0.120				0.125			
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	(mm)	0				0.00-0.38				0.00-0.51				0.00-0.64				0.00-0.64				0.05-0.64				0.13-1.14				0.13-1.40			
WV(VDC) / Cap(pF)		500	200	100	50	500	200	100	50	500	200	100	50	500	200	100	50	500	200	100	50	500	200	100	50	500	200	100	50	500	200	100	50
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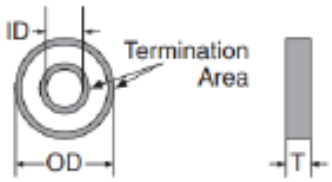
Discoidal Z5U



Note: AC voltage determined upon request

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T MAX	(in)	0.045				0.060				0.060				0.110				0.120				0.120				0.125			
	(mm)	1.14				1.52				1.52				2.79				3.05				3.05				3.18			
TERM BW	(in)	0.000-0.015				0.000-0.020				0.000-0.025				0.000±0.025				0.002-0.025				0.005-0.045				0.005-0.055			
	(mm)	0.00-0.38				0.00-0.51				0.00-0.64				0.00-0.64				0.05-0.64				0.13-1.14				0.13-1.40			
WV(VDC) / Cap(pF)		500	200	100	50	500	200	100	50	500	200	100	50	500	200	100	50	500	200	100	50	500	200	100	50	500	200	100	50
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Discoidal Electrical Testing

Electrical Parameter	Test Method	Temperature Coefficient		
		NPO	X7R	Z5U
Temperature Coefficient	EIA 198	±30 ppm/°C, -55 to 125°C	±15%, -55 to 125°C	+22, -56%, +10 to +85°C
Capacitance Tolerance	EIA Tolerance Code	K, M, P	K, M, P	M, P, Z
Capacitance Test @25°C	MIL-STD-202, Method 305	Cap≤100pF; 1 MHz 1 Vrms Cap≥100pF: 1 KHz, 1 Vrms	1 KHZ, 1 Vrms	1 KHZ, 0.5 Vrms
Dissipation Factor @25°C	MIL-STD-202, Method 305	.015% max.	3.5% max.	3.5% max.
Aging Rate (per decade)		0%	< 2.0%	< 3.5%
Insulation Resistance @25°C	MIL-STD-202, Method 302	1000 MΩ · µF or 100 KMΩ whichever is less	1000 MΩ · µF or 100 KMΩ whichever is less	1000 MΩ · µF or 100 KMΩ whichever is less
Insulation Resistance @25°C	MIL-STD-202, Method 302	100MΩ · µF or 10 KMΩ whichever is less	100MΩ · µF or 10 KMΩ whichever is less	100MΩ · µF or 10 KMΩ whichever is less
Dielectric Withstanding Voltage	MIL-STD-202, Method 301	250% of rated voltage 5 second hold, 30-50 mA	250% of rated voltage 5 second hold, 30-50 mA	250% of rated voltage 5 second hold, 30-50 mA

Discoidal Part Numbering System

After determining the capacitor properties required for a given application, use the part numbering system below to place order. If there are any questions, do no hesitate to contact APITech's customer service team.

Example: **340055AX145P6B0**

The part number shown represents a discoidal with an outer diameter of 0.340" and inner diameter of 0.055". The voltage rating for this part is 50 VDC. The ceramic type will be X7R. The capacitance value is 1,400,000 pF with tolerance of +100, -0%. The termination will be silver and the parts will receive bulk packaging. Since the last identifier in the part number is "0," there are no special requirements.

340 — **Outer Diameter**
Example:
0.340" = 340

055 — **Inner Diameter**
Example:
0.055" = 055

A — **Voltage Rating**
A: 50 VDC
B: 100 VDC
C: 200 VDC
E: 500 VDC

X — **Ceramic Code**
N: NP0
X: X7R
Z: Z5U

145 — **EIA Cap Code**
Example:
1400000 pF
= 145

P — **EIA Cap Tolerance**
K: ± 10%
M: ± 20%
P: +100-0%
Z: +80 -20%

6 — **Termination**
6: Silver

B — **Packaging**
B: Bulk

0 — **Special Requirements**
0: None
D: Class B
G: Custom

Processing & Soldering Notes

General Soldering Recommendations for Leadless Ceramic Capacitors

Soldering Ceramic Capacitors with High Temperature Process

SN10 Solder

Ramp Rate, Heating and Cooling:	Approx. 30°C/min.
Peak Temperature:	Approx. 320°C
Dwell at Peak:	<30 Seconds

Soldering Ceramic Capacitors with Medium Temperature Process

SN96 Solder

Ramp Rate, Heating and Cooling:	Approx. 30°C/min.
Peak Temperature:	Approx. 250°C
Dwell at Peak:	<30 Seconds

Soldering Ceramic Capacitors with Low Temperature wProcess

SN62 Solder

Ramp Rate, Heating and Cooling:	Approx. 30°C/min.
Peak Temperature:	Approx. 220°C
Dwell at Peak:	<30 Seconds

Notes

Care must be taken to minimize the time silver terminations are exposed to molten solder to avoid leaching (amalgamation of the silver into molten solder). APITech recommends the use of a silver (Ag) bearing solder when terminating directly to ceramic ceramic capacitors to reduce the potential for leeching. Gradual heating and cooling of the components are essential to prevent thermal stresses to the ceramic.

Application Note: Soldering Recommendations for Switch Mode Power Supply Capacitors

- SMPS capacitors are highly durable structures designed to provide long service per lifetime, however they require attention to basic considerations during assembly. Like all ceramic components, SMPS capacitors are subject to thermal stresses. For this reason, preheating of the capacitor assemblies is recommended. Preheat components using hot plate to 120 to 150°C, or within 50 to 60°C of the soldering temperature being applied. Avoid over-exposure to high temperatures during assembly and allow for gradual, post-assembly cooling.
- For hand iron soldering, recommended soldering iron tip temperature is 330 to 350°C. Contact the pad adjacent to the pre-tinned lead should be made from below the PCB (opposite of the component side), and the dwell time on the solder joint should be less than five seconds. An aluminum heat sink plate may be placed adjacent to the SMPS lead frame to protect the ceramic body during assembly. Avoid direct contact between soldering iron and ceramic during assembly process. Soldering time is dependant upon heat sinking provided by the chasis and boardmaterial, so a longer preheat cycle may be required.
- Standard solders (Sn60, Sn63, Sn60/38/2) may be used. Please consult the factory for use with RoHS compliant solders.
- Use a controlled temperature profile ramp not exceeding 4°C per second as measured by an attached low mass thermocouple.
- Soldering time and temperatures can vary with component size, board material and layout. Please consult the factory for assistance.