Common Mode EMI Choke Series

50µH to 20mH, Up to 9.9A_{RMS} Common Mode Choke

PICO Electronics, Inc.

PRODUCT OVERVIEW

Pico's Common Mode EMI Chokes are highly effective in suppressing electromagnetic interference and radio frequency interference, where high-frequency noises are blocked to allow DC and low-frequency AC signals to pass through. These noise suppression devices can be offered in common mode or differential mode operations. They are extremely reliable in the performance of electronic systems where security of data and information are crucial, as well as mechanically durable to the integrity of mission systems.

Typical applications:

- DC-DC Converters
- Switching Power Supplies
- Communication Interfaces
- Aviation Power Systems
- Automotive & EVs
- Medical Equipment
- Lighting Systems

FEATURES

- Extreme resistance to impact, shock, and vibration
- Manufactured to MIL-PRF-27 Grade 5, Class S (Except Size 0 which is Class V)
- High reliability for space and mission critical applications
- Ultra miniature in size and minimalistic design
- Design layouts in through-hole, or surface mount
- Magnetically shielded (through-hole only)
- Terminal solderability per MIL-STD-202, Method 208

Contact Pico for part number of available options:

- Screening and qualification criteria to flight standard
- Fully RoHS compliant or with exemption 7(a)
- Modifications to mechanical design and electrical characteristics
- Custom new design and parameters

SPECIFICATIONS - THROUGH HOLE MODELS

Part Number	Inductance Per Winding (3) [mH]	RMS Current +60°C temp rise [A]	RMS Current +40°C temp rise [A]	RMS Current +25°C temp rise [A]	DC Resistance Per Winding [Ω]	Leakage Inductance [µH] typ.	Figure Reference
46283	0.075	1.95	1.57	1.29	0.051	3.5	A1
47291		2.57	2.2	1.9	0.033	3.5	A2
48381		4.43	3.79	3.23	0.015	4	A3
46263	0.185	1.25	1	0.959	0.125	5	A1
47271		1.61	1.39	1.19	0.083	5	A2
48361		2.8	2.39	2.04	0.038	4.5	A3
49461		4.58	3.83	3.06	0.019	4.5	A4
46243	0.375	0.862	0.691	0.572	0.263	9	A1
47251		1.14	0.986	0.851	0.163	8	A2
48341		1.98	1.7	1.44	0.075	8	A3
49441		3.23	2.7	2.16	0.037	7.5	A4
50241		4.7	4.18	3.04	0.021	6.5	A5
46223	0.55	0.711	0.568	0.472	0.31	10.3	A1
47231		0.924	0.792	0.686	0.2	8.9	A2
48321		1.62	1.38	1.18	0.09	8.4	A3
49421		2.64	2.2	1.77	0.045	7.7	A4
50221		3.8	3.39	2.46	0.026	7.5	A5
46203	0.75	0.619	0.495	0.41	0.41	13.8	A1
47211		0.814	0.694	0.601	0.26	11.9	A2
48301		1.4	1.2	1.02	0.12	11.3	A3
49401		2.29	1.91	1.53	0.06	10.3	A4
50201		3.33	2.96	2.15	0.034	10	A5
51303		5.1	4.23	3.77	0.022	9.4	A6

Note 1: Inductance measured at 0.1VRMS and 10kHz.
Note 2: Maximum ambient plus temperature rise is limited 130ºC.
Note 3: Minimum inductance is 80% of listed value with no maximum value.
Note 4: Winding balance at ±1%.

SPECIFICATIONS - THROUGH HOLE MODELS

Part Number	Inductance Per Winding (3) [mH]	RMS Current +60°C temp rise [A]	RMS Current +40°C temp rise [A]	RMS Current +25°C temp rise [A]	DC Resistance Per Winding [Ω]	Leakage Inductance [µH] typ.	Size Reference
46183	1.5	0.437	0.349	0.29	0.82	27.5	A1
47191		0.575	0.491	0.425	0.52	23.8	A2
48281		0.986	0.847	0.722	0.24	22.5	A3
49381		1.61	1.36	1.08	0.12	20.6	A4
50181		2.31	2.06	1.5	0.07	20	A5
51283		3.78	3.14	2.8	0.04	18.8	A6
46163	3	0.308	0.246	0.204	1.65	55	A1
47171		0.405	0.345	0.299	1.05	47.5	A2
48261		0.708	0.605	0.516	0.47	45	A3
49361		1.14	0.959	0.766	0.24	41.3	A4
50161		1.64	1.45	1.06	0.14	40	A5
51263		2.53	2.09	1.86	0.09	37.5	A6
46143	6.75	0.205	0.165	0.136	3.71	123.8	A1
47151		0.27	0.231	0.2	2.36	106.9	A2
48241		0.468	0.401	0.342	1.07	101.3	A3
49341		0.769	0.643	0.516	0.53	92.8	A4
50141		1.1	0.977	0.711	0.31	90	A5
51243		1.69	1.41	1.25	0.2	84.4	A6
46123	12	0.154	0.123	0.101	6.6	220	A1
47131		0.202	0.172	0.15	4.2	190	A2
48221		0.352	0.299	0.255	1.9	180	A3
49321		0.572	0.48	0.378	0.95	165	A4
50121		0.827	0.73	0.528	0.55	160	A5
51223		1.28	1.06	0.942	0.35	150	A6

Note 1: Inductance measured at 0.1VRMS and 10kHz.
Note 2: Maximum ambient plus temperature rise is limited 130°C.
Note 3: Minimum inductance is 80% of listed value with no maximum value.
Note 4: Winding balance at ±1%.

SPECIFICATIONS - SURFACE MOUNT MODELS

Part Number	Inductance Per Winding (3) [mH]	RMS Current +60°C temp rise [A]	RMS Current +40°C temp rise [A]	RMS Current +25°C temp rise [A]	DC Resistance Per Winding [Ω]	Leakage Inductance [µH] typ.	Size Reference
52070	0.05	1.02	0.82	0.72	0.009	0.35	B0
46470		3.4	2.8	2.6	0.0125	0.4	B1
47570		6	5.2	4.4	0.0063	0.34	B2
48670		9.9	8.2	7.2	0.0033	0.29	B3
52065	0.75	0.78	0.62	0.54	0.15	0.52	B0
46465		2.6	2.1	1.9	0.0212	0.6	B1
47565		4.8	4.2	3.6	0.0094	0.54	B2
48665		8	6.7	5.9	0.0085	0.43	B3
52060	0.1	0.69	0.55	0.49	0.02	0.7	B0
46460		2.3	1.8	1.7	0.0288	0.8	B1
47560		4.2	3.7	3.1	0.0125	0.68	B2
48660		6.9	5.7	5	0.0066	0.58	B3
52055	0.25	0.42	0.34	0.3	0.056	1.8	B0
46455		1.4	1.1	1.1	0.07	2	B1
47555		2.6	2.3	1.9	0.0313	1.7	B2
48655		4.4	3.7	3.3	0.0163	1.4	B3
52050	0.5	0.33	0.27	0.24	0.13	3.5	B0
46450		1.1	0.9	0.8	0.125	4	B1
47550		1.8	1.7	1.4	0.0625	3.4	B2
48650		3.1	2.6	2.3	0.0325	2.9	B3
52045	0.75	0.24	0.19	0.17	0.17	5.25	B0
46445		0.8	0.7	0.6	0.2125	6	B1
47545		1.5	1.3	1.1	0.0938	5.1	B2
48645		2.6	1.1	1.8	0.0488	4.3	B3

Note 1: Inductance measured at 0.1VRMS and 10kHz.
Note 2: Maximum ambient plus temperature rise is limited 130ºC.
Note 3: Minimum inductance is 80% of listed value with no maximum value.
Note 4: Winding balance at ±1%.

SPECIFICATIONS - SURFACE MOUNT MODELS

Part Number	Inductance Per Winding (3) [mH]	RMS Current +60°C temp rise [A]	RMS Current +40°C temp rise [A]	RMS Current +25°C temp rise [A]	DC Resistance Per Winding [Ω]	Leakage Inductance [µH] typ.	Size Reference
52040	1	0.16	0.13	0.11	0.55	0.75	B0
46440		0.81	0.66	0.61	0.23	8	B1
47540		1.5	1.3	1.1	0.1	6.8	B2
48640		2.5	2.1	1.8	0.053	5.75	B3
52035	2.5	0.18	0.07	0.06	0.88	17.5	B0
46435		0.52	0.42	0.39	0.56	20	B1
47535		0.96	0.84	0.71	0.25	17	B2
48635		1.6	1.3	1.2	0.131	14.4	B3
52030	5	0.06	0.48	0.03	1.62	37	B0
46430		0.37	0.3	0.28	1.1	40	B1
47530		0.68	0.59	0.5	0.5	34	B2
48630		1.1	0.9	0.82	0.263	28.8	B3
46425	7.5	0.3	0.24	0.22	1.7	60	B1
47525		0.55	0.48	0.41	0.75	51	B2
48625		0.9	0.8	0.67	0.394	43.1	B3
46420	10	0.26	0.21	0.19	2.3	80	B1
47520		0.48	0.42	0.35	1	68	B2
48620		0.8	0.7	0.57	0.53	57.5	B3
46415	15	0.21	0.17	0.16	3.4	120	B1
47515		0.39	0.34	0.29	1.5	102	B2
48615		0.64	0.53	0.47	0.79	86	B3
46410	17.5	0.2	0.16	0.15	3.94	140	B1
47510		0.36	0.32	0.27	1.75	119	B2
48610		0.59	0.49	0.44	0.919	101	B3
46405	20	0.18	0.15	0.14	4.5	160	B1
47505		0.34	0.3	0.25	2	136	B2
48605		0.56	0.46	0.41	1.05	115	B3

Note 1: Inductance measured at 0.1VRMS and 10kHz.
Note 2: Maximum ambient plus temperature rise is limited 130°C.
Note 3: Minimum inductance is 80% of listed value with no maximum value.
Note 4: Winding balance at ±1%.

SPECIFICATIONS

GENERAL

Parameter	Condition		Min.	Typ.	Max.	Units
Dielectric Withstanding Voltage	60Hz		-	1500	-	V_{RMS}
Operating Temperature Range	Ambient with temperature rise		-55	-	+130	°C
Storage Temperature Range	Ambient		-55	-	+130	°C
Size	See mechanical drawings					
Weight	See mechanical drawings					
Case	Through hole models		Epoxy Insulated Metal			
	Surface mount models		Glass Reinforced Polymer			
Potting	Vacuum Impregnated Epoxy					
Box Packaging (L x W x H)	Through hole models		10.5 x 6.42 x 0.79 (266.7 x 163.068 x 20.066)			inches (mm)
Tube Packaging (W x H x L)	Surface Mount	52000 Series	0.77 x 0.49 x 20.0 (19.660 x 12.446 x 508)			inches (mm)
		46000 Series	0.83 x 0.46 x 20.0 (21.184 x 11.684 x 508)			
		47000 Series	0.93 x 0.52 x 20.0 (23.724 x 13.081 x 508)			
		48000 Series	1.03 x 0.60 x 20.0 (26.264 x 15.113 x 508)			
Tape & Reel Packaging	Upon request					
Moisture Sensitivity Level	Surface Mount only		Level 3			

OPTIONAL DESIGN CRITERIA

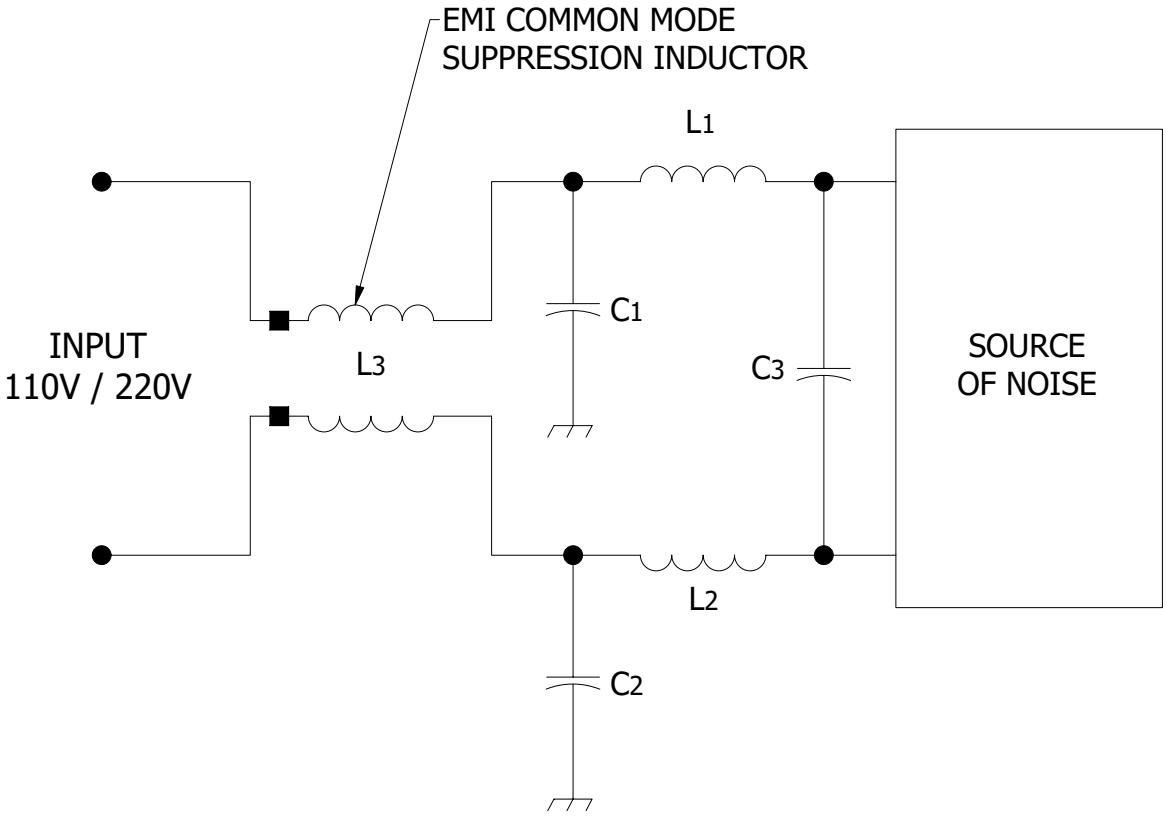
Test	Standard	Description
Vibration	MIL-STD-202	Method 204, Vibration, High Frequency
Shock	MIL-STD-202	Method 213, Shock (Specified Pulse)
Immersion	MIL-STD-202	Method 104, Immersion
Moisture Resistance	MIL-STD-202	Method 106, Moisture Resistance
Flammability	MIL-STD-202	Method 111, Flammability (External Flame)
Thermal Shock	MIL-STD-202	Method 107, Thermal Shock

OPTIONAL SCREENING AND QUALIFICATION

Standard	Screening & Qualification	Test [2]
MIL-PRF-27	a.) Group A inspection Level-T - Table VII b.) Qualification inspection, Grade 5 - Table V	I. Thermal Shock II. Vibration III. Burn-in IV. Induced Voltage V. Shock VI. Dielectric Withstanding Voltage (at reduced pressure) VII. Insulation Resistance VIII. Electrical Characteristics IX. Visual and Mechanical Examination (External) X. Life XI. Radiographic Inspection
MIL-STD-981	a.) Group A screening tests – Table VI b.) Group B tests – Table XII, Class S	
EEE-INST-002, Section M1	a.) Magnetics Screening Req. – Table 2 b.) Magnetics Part Qual. – Table 3	

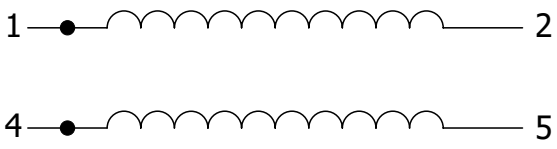
Note 4: Screening and qualification tests are not limited to the options in the chart above. Each standard may also be stringent or exclude certain tests from one another. Please contact Pico for specific application needs and for Pico part number.

TYPICAL APPLICATION CIRCUITS

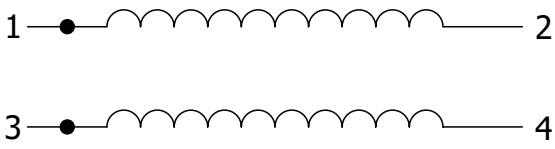


ELECTRICAL SCHEMATIC

SIZE A1, A2, A3



SIZE A4, A5, A6, B0, B1, B2, B3

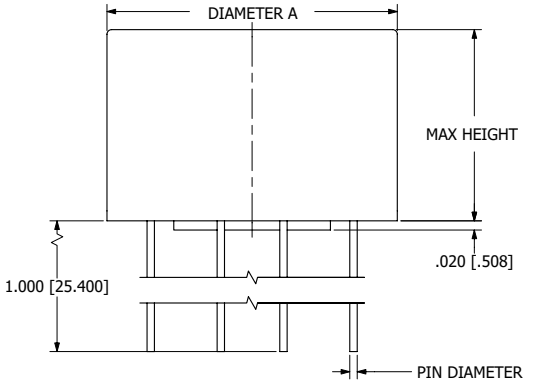


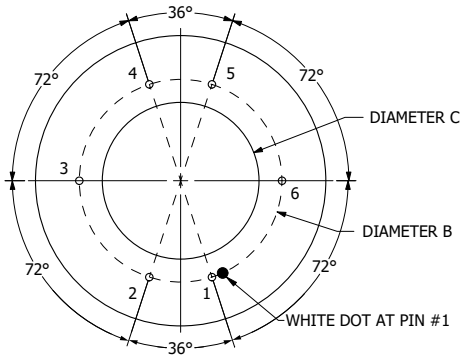
NOTES
a. FOR SIZES A1, A2, AND A3, TERMINALS 3 & 6 HAVE NO CONNECTION. MECHANICAL STABILITY ONLY.

MECHANICAL DRAWINGS

THROUGH HOLE MODELS

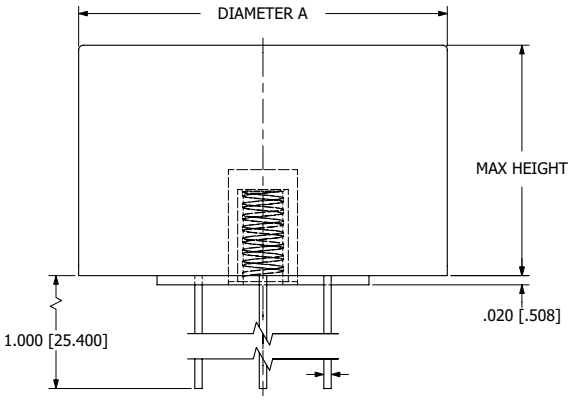
FIGURE 1

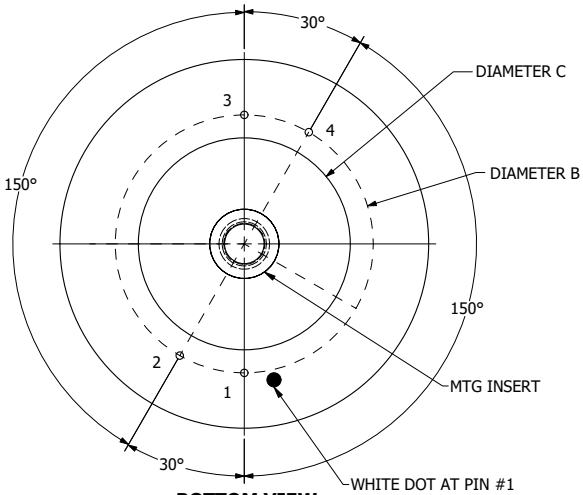




BOTTOM VIEW

FIGURE 2





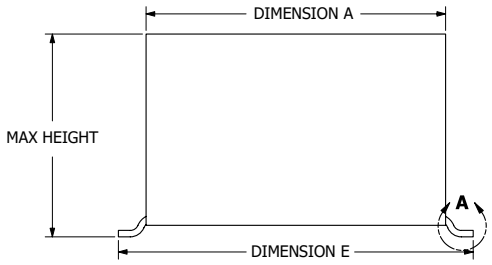
BOTTOM VIEW

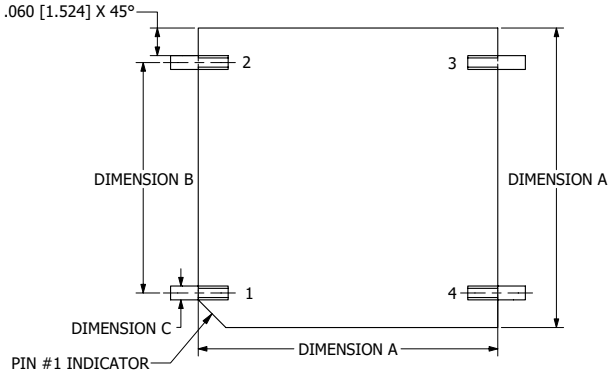
Series	Max Height	Diameter Dimension A	B	C	PIN	Insert	Typ. Weight (grams)	Size	Figure
46000	.280 (7.110)	.410 (10.410)	.260 (6.600)	.160 (4.060)	.012 (.310)	-	2.0	A1	1
47000	.340 (8.640)	.500 (12.700)	.350 (8.890)	.250 (6.350)	.012 (.310)	-	3.5	A2	
48000	.415 (10.540)	.630 (16.000)	.440 (11.170)	.340 (8.640)	.016 (.410)	-	6.8	A3	
49000	.500 (12.700)	.800 (20.320)	.560 (14.220)	.460 (11.680)	.016 (.410)	2 - 56 UNC 6 threads min	15.5	A4	2
50000	.650 (16.510)	.950 (24.130)	.670 (17.000)	.570 (14.480)	.020 (.510)	6 - 32 UNC 6 threads min	26.3	A5	
51000	.745 (18.920)	1.125 (28.570)	.800 (20.320)	.700 (17.780)	.020 (.510)	6 - 32 UNC 6 threads min	42.9	A6	

NOTES
a. ALL DIMENSIONS ARE IN INCHES, [ ] = MM
b. TERMINALS ARE CLOCKWISE FROM PIN #1
c. FOR FIGURE 1, PINS # 3 AND #6 HAVE NO CONNECTION

MECHANICAL DRAWINGS

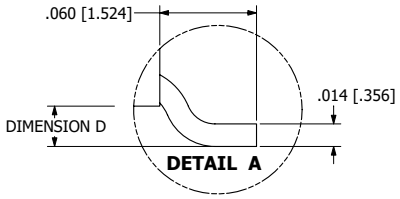
SURFACE MOUNT MODELS





BOTTOM VIEW

LEAD DETAILS

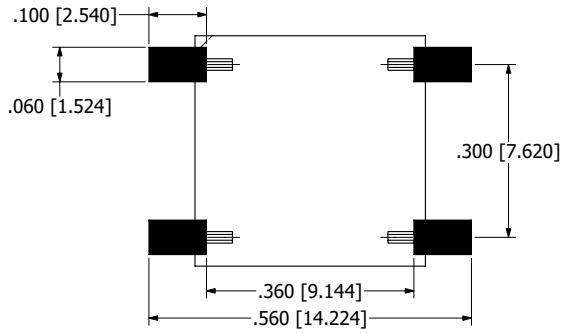


Series	Max Height	Dimension					Typ. Weight (grams)	Size
		A	B	C	D	E		
52000	.260 (6.600)	.400 (10.160)	.300 (7.620)	.020 (.508)	.015 (.381)	.520 (13.208)	1.4	B0
46000	.305 (7.747)	.450 (11.430)	.300 (7.620)	.027 (.686)	.020 (.508)	.570 (14.478)	2.2	B1
47000	.360 (9.144)	.550 (13.970)	.400 (10.160)	.030 (.762)	.025 (.635)	.670 (17.018)	4.1	B2
48000	.440 (11.176)	.650 (16.510)	.500 (12.700)	.030 (.762)	.025 (.635)	.770 (19.558)	7.7	B3

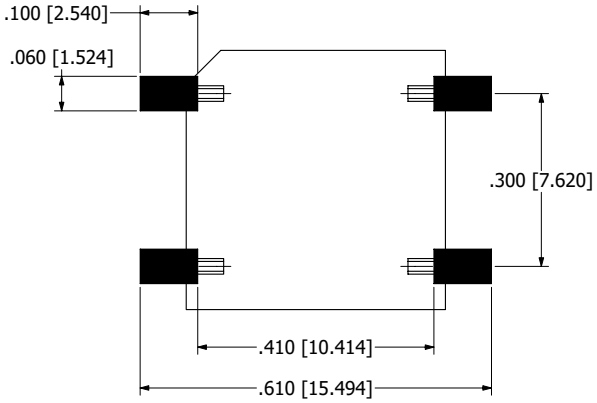
NOTES
a. ALL DIMENSIONS ARE IN INCHES, [ ] = MM
b. TERMINALS ARE CLOCKWISE FROM PIN #1

RECOMMENDED LAND PATTERN DIMENSIONS

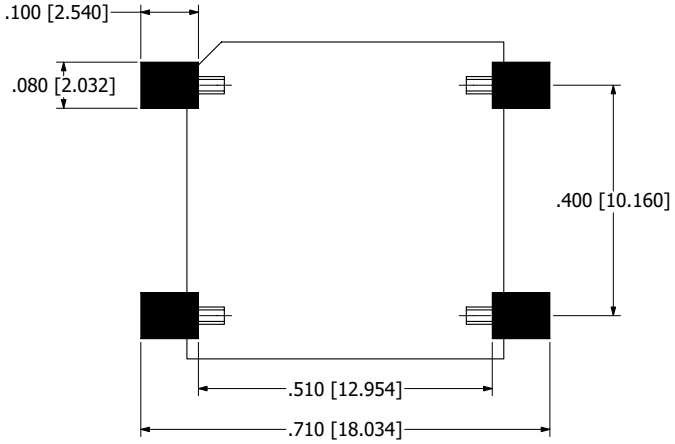
52000 SERIES (SIZE B0)



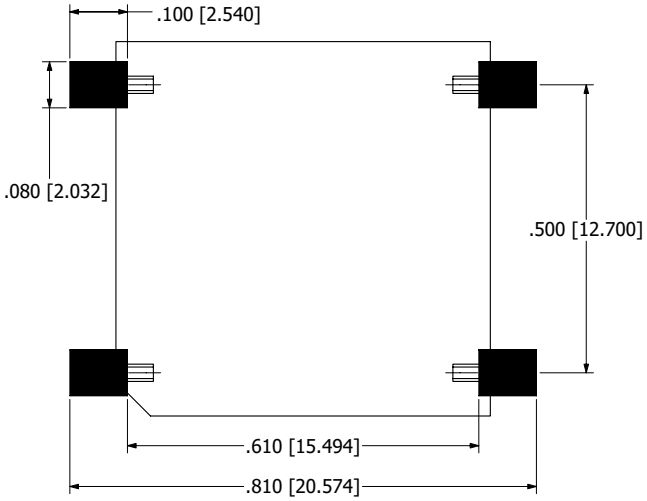
46000 SERIES (SIZE B1)

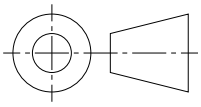


47000 SERIES (SIZE B2)

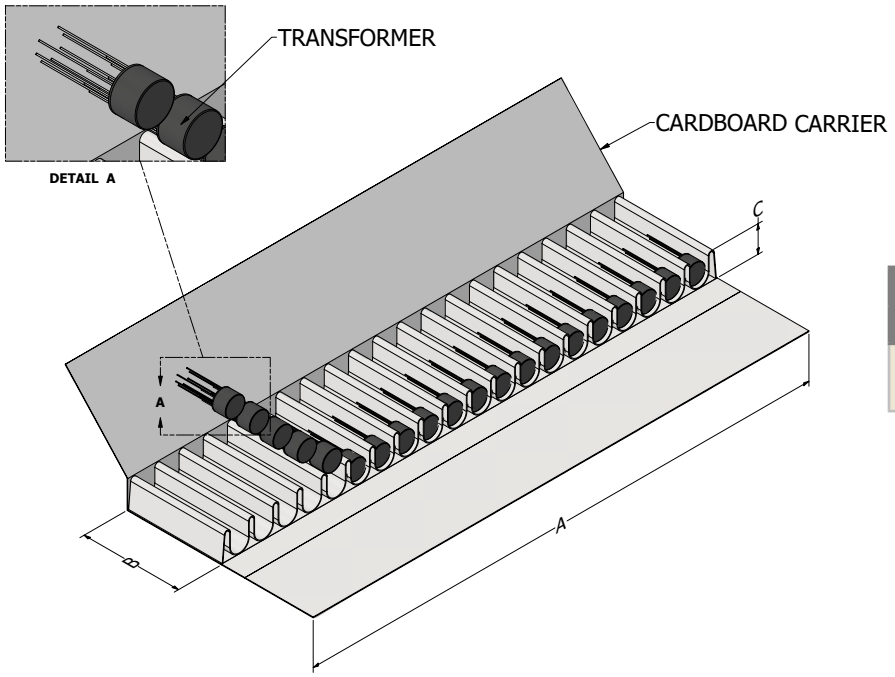


48000 SERIES (SIZE B3)



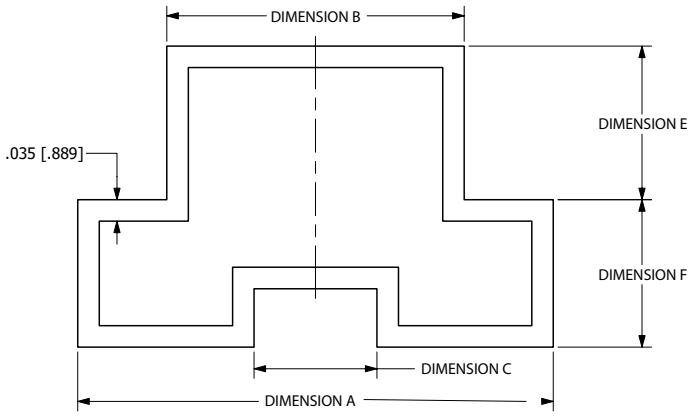


BOX PACKAGING - THROUGH HOLE MODELS

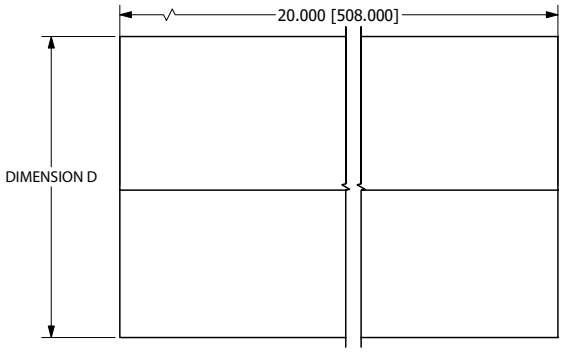


Dimension		
A	B	C
10.5 [266.7]	6.42 [163.068]	0.79 [20.066]

TUBE PACKAGING - SURFACE MOUNT MODELS



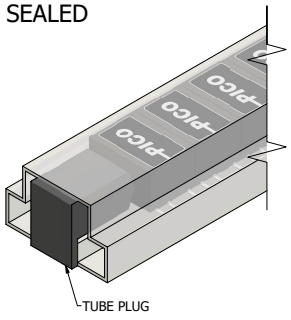
PLAN VIEW



ELEVATION VIEW

Series	Dimension					
	A	B	C	D	E	F
52000	.774 [19.660]	.484 [12.294]	.200 [5.080]	.490 [12.446]	.250 [6.350]	.240 [6.096]
46000	.834 [21.184]	.544 [13.818]	.160 [4.064]	.460 [11.684]	.220 [5.588]	.240 [6.096]
47000	.934 [23.724]	.644 [16.358]	.240 [6.096]	.515 [13.081]	.275 [6.985]	.240 [6.096]
48000	1.034 [26.264]	.744 [18.898]	.340 [8.636]	.595 [15.113]	.355 [9.017]	.240 [6.096]

SEALED



UNSEALED