

# LL-68500-TH & LL-68500-SM Series

Low Leakage MIL-STD-1553 Multiplex Data Bus Transformer

## PRODUCT OVERVIEW

The LL-68500-TH & LL-68500-SM series are Low Leakage MIL-STD-1553 Interface / Multiplex Data Bus Pulse transformers in an encapsulated package with design layouts as through-hole or surface mount types. These transformers are designed for the lowest possible leakage inductance and DC resistance. The transparent signal processing for data transfer with minimal distortion making them ideal for aerospace and military applications.

Typical applications:

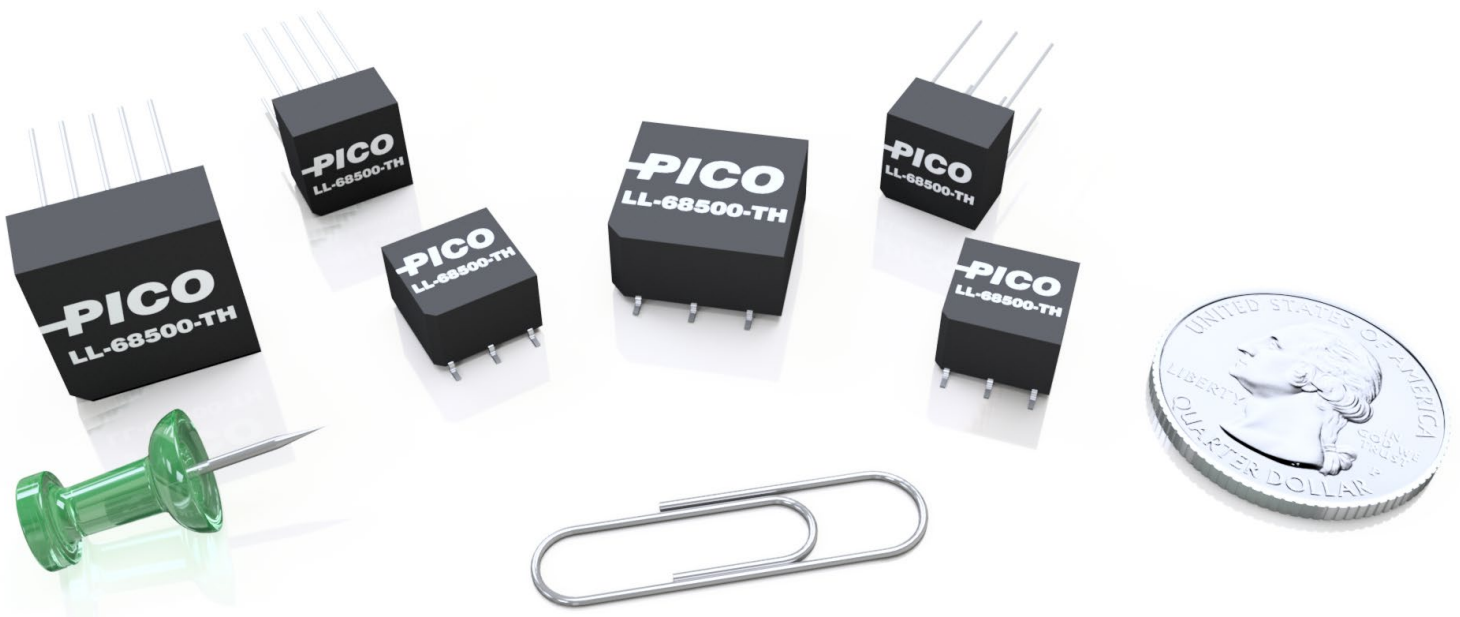
- Propulsion Control
- Precision Guiding Systems
- Air Traffic Control
- Communication
- Sensors
- Data Management
- MIL-STD-1553 Interfaces

## FEATURES

- Extreme resistance to impact, shock, and vibration
- Manufactured to MIL-PRF-21038 and MIL-STD-1553
- High reliability for space and mission critical applications
- Ultra miniature in size and minimalistic design
- Design layouts in through-hole or surface mount types

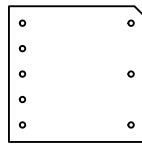
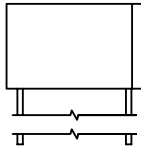
Contact Pico for part number of available options:

- 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

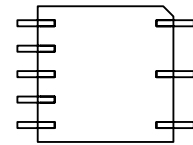
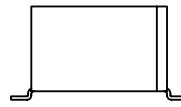


## SPECIFICATIONS

### LL-68500-TH SERIES - THROUGH HOLE



### LL-68500-SM SERIES - SURFACE MOUNT



Through Hole	Surface Mount	Turns Ratio	Primary Pins	Secondary Pins	DC Resistance		Impedance		Leakage Inductance		Schematic Reference	Size Reference
					Pins	[ $\Omega$ ] min.	Pins	[ $M\Omega$ ] min.	Pins	$\mu H$		
LL-68500-TH	LL-68500-SM	1:1 1:0.707	1-3 1-3	4-8 5-7	1-3 4-8	2.90 1.42	1-3 4	1-3 4.7	1	A		
LL-68505-TH	LL-68505-SM	1.41:1 2:1	1-3 1-3	4-8 5-7	1-3 4-8	2.90 1.08	1-3 7.2	1-3 4.7	1	A		
LL-68510-TH	LL-68510-SM	1.25:1 1.66:1	1-3 1-3	4-8 5-7	1-3 4-8	2.90 1.20	1-3 4	1-3 4.7	1	A		
LL-68520-TH	LL-68520-SM	1:1.41	1-3	4-6	1-3 4-6	0.82 1.95	4-6 3	4-6 2.73	3	C		
LL-68525-TH	LL-68525-SM	1:1	1-3	4-6	1-3 4-6	2.05 2.14	1-3 3	1-3 2.73	2	C		
LL-68530-TH	LL-68530-SM	1:1.41	1-3	4-6	1-3 4-6	0.80 2.05	4-6 3	4-6 2.73	2	C		
LL-68535-TH	LL-68535-SM	1:1.66	1-3	4-6	1-3 4-6	0.72 2.05	4-6 3	4-6 2.73	2	C		
LL-68540-TH	LL-68540-SM	1:2	1-3	4-6	1-3 4-6	0.52 2.05	4-6 3	4-6 4.5	1	C		
LL-68545-TH	LL-68545-SM	2.12:1 1.5:1	4-8 5-7	1-3 1-3	1-3 4-8	0.82 2.12	4-8 4	4-8 8	1	A		
LL-68550-TH	LL-68550-SM	1:2.5 1:1.79	1-3 1-3	4-8 5-7	1-3 4-8	0.87 2.52	4-8 4	4-8 7.1	1	A		
LL-68555-TH	LL-68555-SM	1:1.5	1-3	4-6	1-3 4-6	0.75 2.05	4-6 3	4-6 5.2	2	C		
LL-68560-TH	LL-68560-SM	1:1.79	1-3	4-6	1-3 4-6	0.71 2.05	4-6 3	4-6 5.2	2	C		
LL-68565-TH	LL-68565-SM	1:2.5	1-3	4-6	1-3 4-6	0.50 2.10	4-6 3	4-6 5.2	2	C		
LL-68570-TH	LL-68570-SM	1:1 1:0.707	1-3 1-3	4-8 5-7	1-3 4-8	2.07 1.32	4-8 3	4-8 4.2	1	B		
LL-68575-TH	LL-68575-SM	1:2.5 1:1.79	1-3 1-3	4-8 5-7	1-3 4-8	0.72 2.75	4-8 3	4-8 4.2	1	B		
LL-68580-TH	LL-68580-SM	2.12:1 1.5:1	4-8 5-7	1-3 1-3	1-3 4-8	0.81 2.82	4-8 3	4-8 10.2	1	B		
LL-68585-TH	LL-68585-SM	1.41:1 2:1	1-3 1-3	4-8 5-7	1-3 4-8	2.07 0.98	1-3 3	1-3 4.5	1	B		

## SPECIFICATIONS

### GENERAL

Parameter	Condition		Min.	Typ.	Max.	Units
Impedance	75 kHz to 1 MHz		3	-	-	kΩ
Dielectric Withstanding Voltage	60Hz		-	100	-	V <sub>RMS</sub>
Droop			-	10	20	%
Overshoot	Peak		-1	-	1	V
Common Mode Rejection			45	-	-	dB
Insulation Resistance	200VDC		10	-	-	GΩ
Operating Temperature Range	Ambient with temperature rise		-55	-	+130	°C
Storage Temperature Range	Ambient		-55	-	+105	°C
Size (L x W x H)	LL-68500-TH Series	Size A	0.625 x 0.625 x 0.29 (15.875 x 15.875 x 7.366)			inches (mm)
		Size B & C	0.4 x 0.4 x 0.25 (10.16 x 10.16 x 6.35)			
	LL-68500-SM Series	Size A	0.625 x 0.625 x 0.315 (15.875 x 15.875 x 8.001)			
		Size B & C	0.4 x 0.4 x 0.275 (10.16 x 10.16 x 6.985)			
Weight	Size A		-	4.2	-	grams
	Size B		-	1.8	-	
	Size C		-	1.6	-	
Case	LL-68500-SM & TH		Glass Reinforced Polymer			
Potting	Vacuum Impregnated Epoxy					
Box Packaging (L x W x H)	LL-68500-TH Series		10.65 x 2.49 x 0.95 (270.51 x 63.246 x 24.13)			inches (mm)
Tube Packaging (W x H x L)	LL-68500-SM Series	Size A	0.93 x 0.52 x 20.0 (23.724 x 13.081 x 508)			
		Size B & C	0.77 x 0.49 x 20.0 (19.660 x 12.446 x 508)			
Tape & Reel Packaging	Upon request					
Moisture Sensitivity Level	Surface mount only		Level 3			
Tape & Reel Packaging (Upon request)	70000 & 80000 Series	Tape Width	-	1.26 (32)	-	inches (mm)
		Tape Pitch	-	0.157 (4)	-	
		Reel Diameter	-	13 (330.2)	-	
Moisture Sensitivity Level	Surface Mount only		Level 3			

### OPTIONAL DESIGN CRITERIA

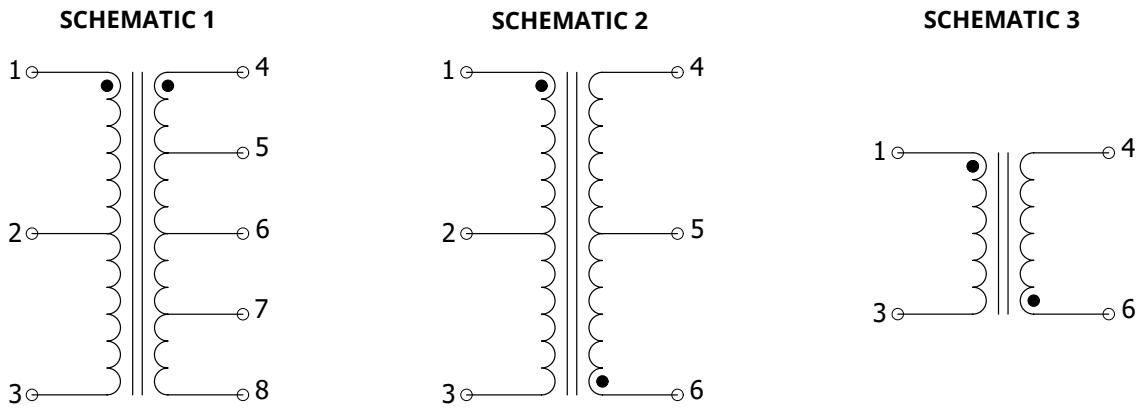
Test	Standard	Description
Vibration	MIL-STD-202	Method 204, Vibration, High Frequency
Shock	MIL-STD-202	Method 213, Shock (Specified Pulse)
Immersion	MIL-STD-202	Method 104, Immersion
Moisture Resistance	MIL-STD-202	Method 106, Moisture Resistance
Flammability	MIL-STD-202	Method 111, Flammability (External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

### OPTIONAL SCREENING AND QUALIFICATION

Standard	Screening & Qualification	Test <sup>(2)</sup>
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	

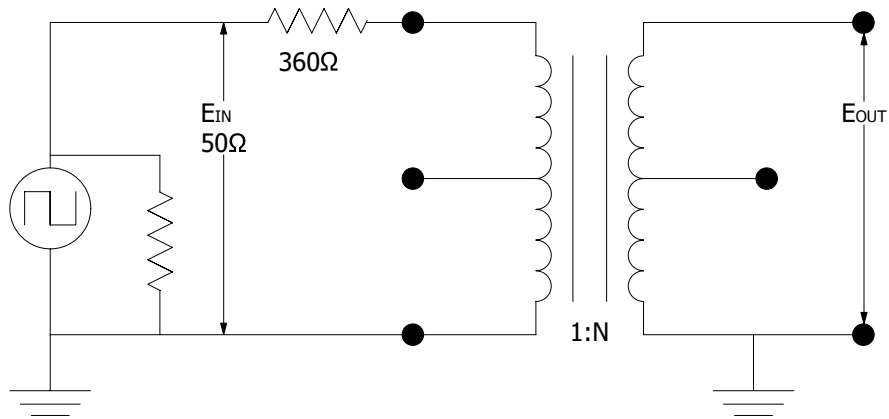
Note 2: Screening and qualification tests are not limited to the options in the chart above. Each standard may also be stringent or exclude certain tests from one another. Please contact Pico for specific application needs and for Pico part number.

**ELECTRICAL SCHEMATIC**

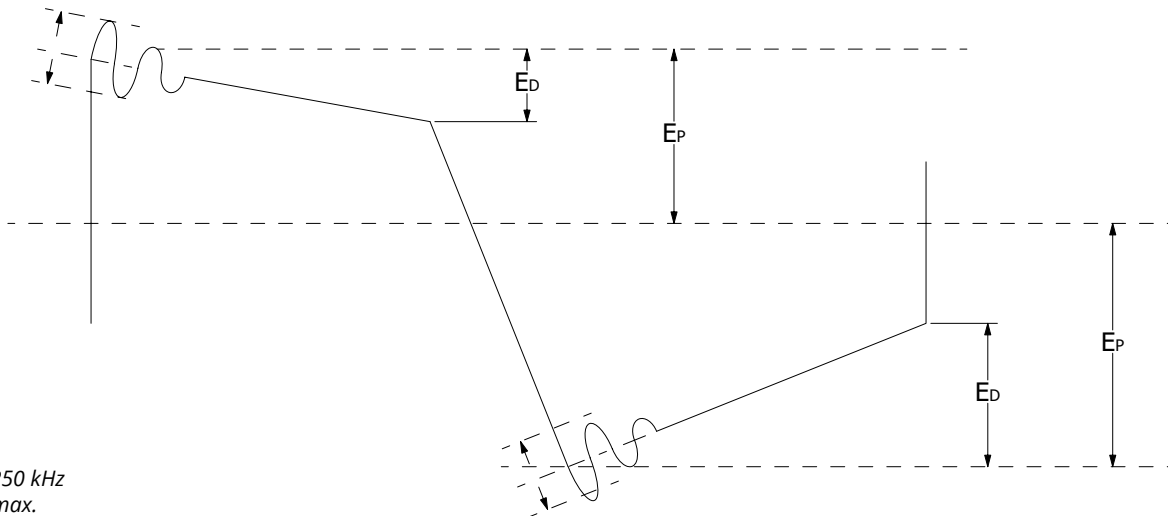


**MEASUREMENT SCHEMATICS**

**DROOP**



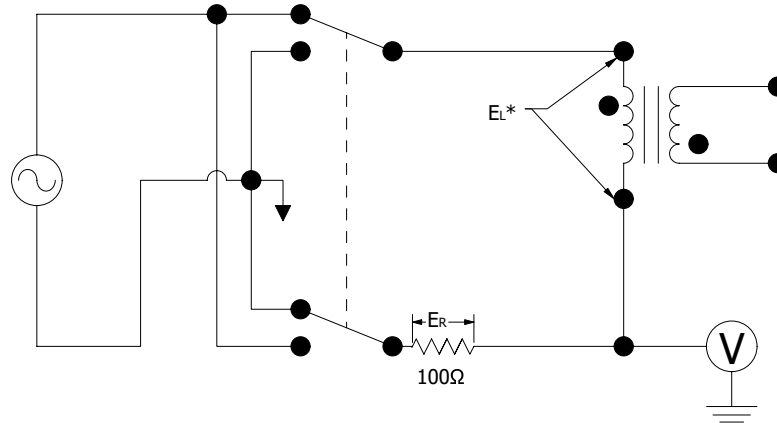
**DROOP GRAPH**



**Notes**  
 $E_{IN} = 27 V_{P-P}$   
 Frequency = 250 kHz  
 $T_{AIN} = 100 ns \text{ max.}$

MEASUREMENT SCHEMATICS

IMPEDANCE

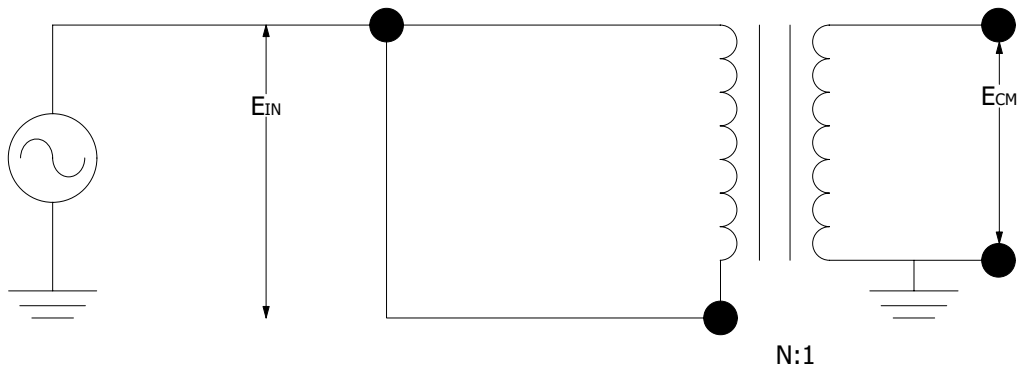


\* ACROSS HIGH TURN SIDE

Notes

$$Z = \frac{E_L \times 100\Omega}{E_R}$$

COMMON MODE REJECTION

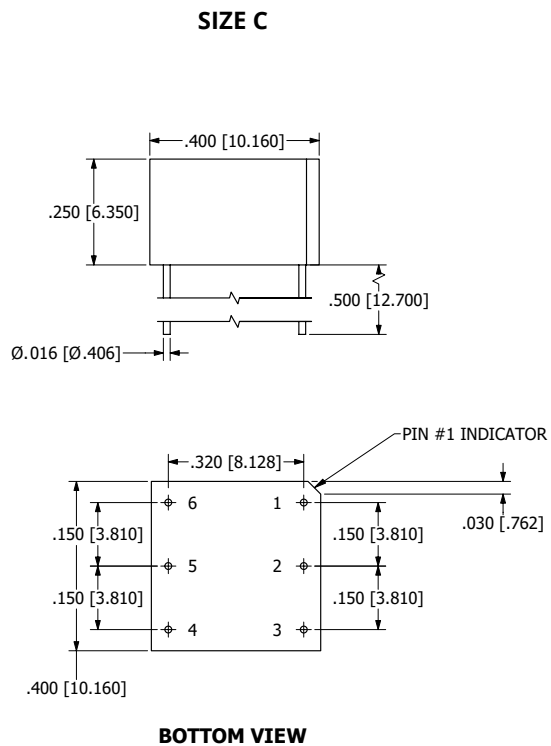
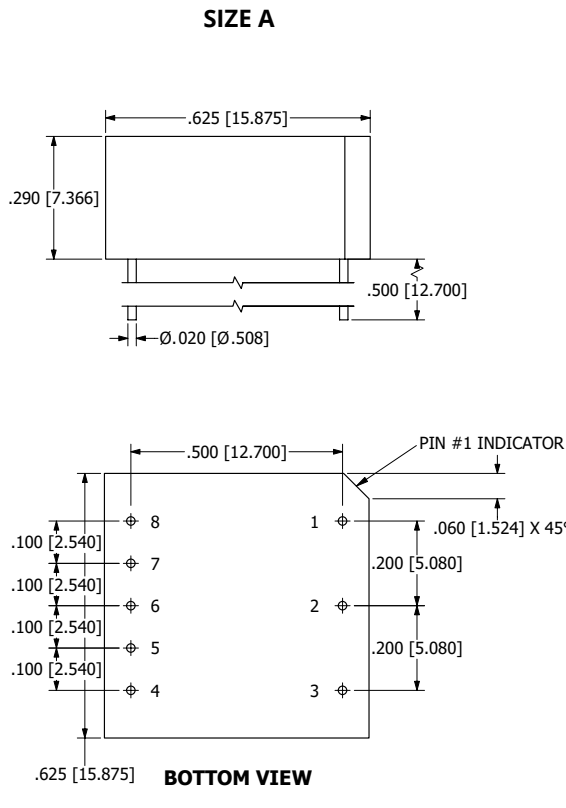


Notes

$E_{IN} = 10 V_{RMS}$   
 Frequency = 1 MHz  
 $CMR = 20 \text{ Log}_{10} (E_{LIN} / E_{CM})$

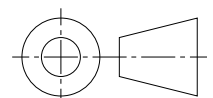
MECHANICAL DRAWINGS

LL-68500-TH SERIES - THROUGH HOLE



NOTES

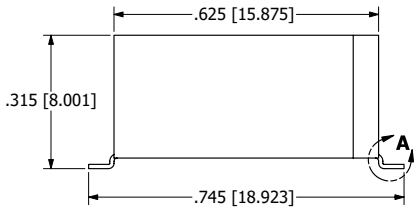
- a. ALL DIMENSIONS ARE IN INCHES, [ ] = MM
- b. TERMINALS ARE CLOCKWISE FROM PIN #1



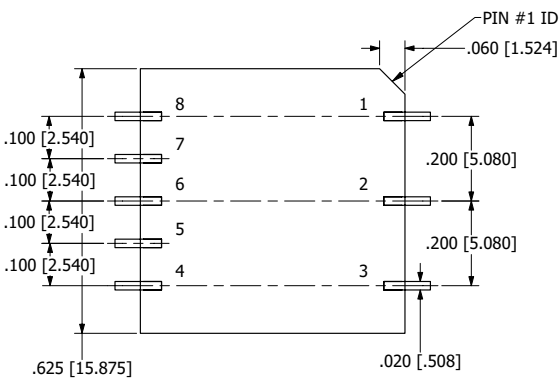
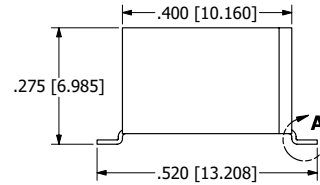
MECHANICAL DRAWINGS

LL-68500-SM - SURFACE MOUNT

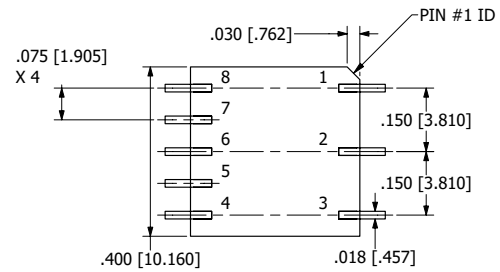
SIZE A



SIZE B

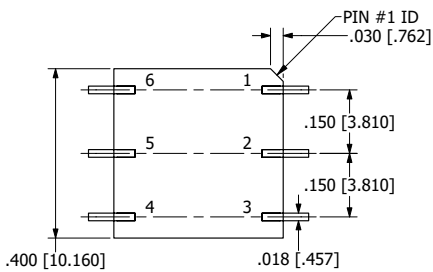
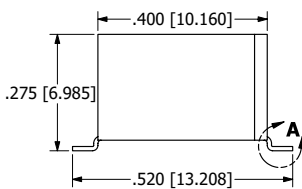


BOTTOM VIEW



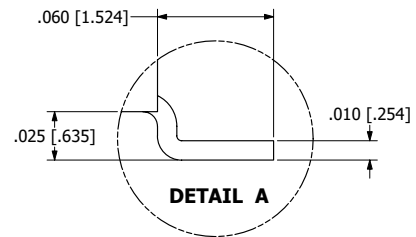
BOTTOM VIEW

SIZE C



BOTTOM VIEW

LEAD DETAILS

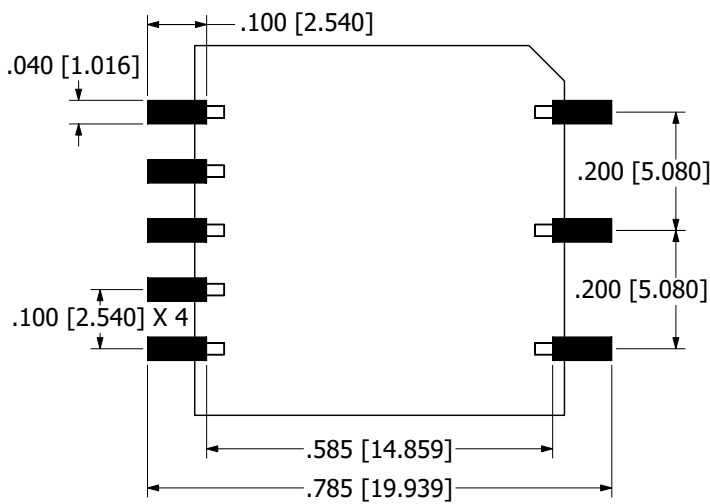


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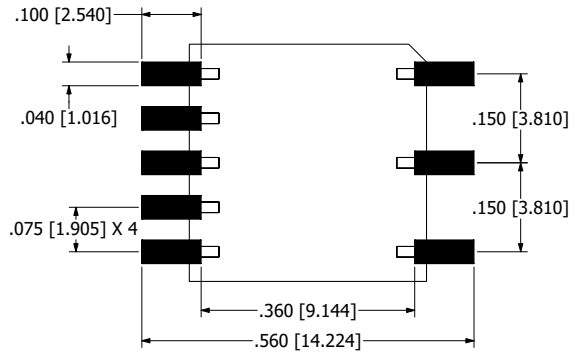
- a. ALL DIMENSIONS ARE IN INCHES, [ ] = MM
- b. TERMINALS ARE CLOCKWISE FROM PIN #1

RECOMMENDED LAND PATTERN DIMENSIONS

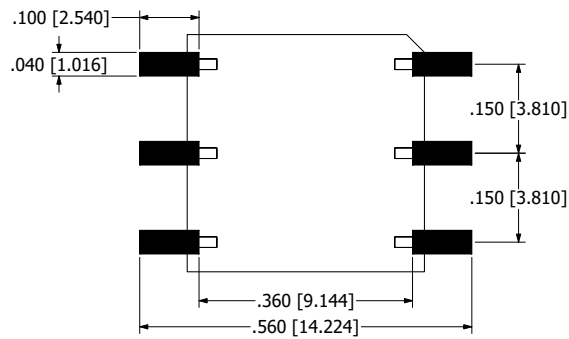
LL-68500-SM - SURFACE MOUNT SIZE A



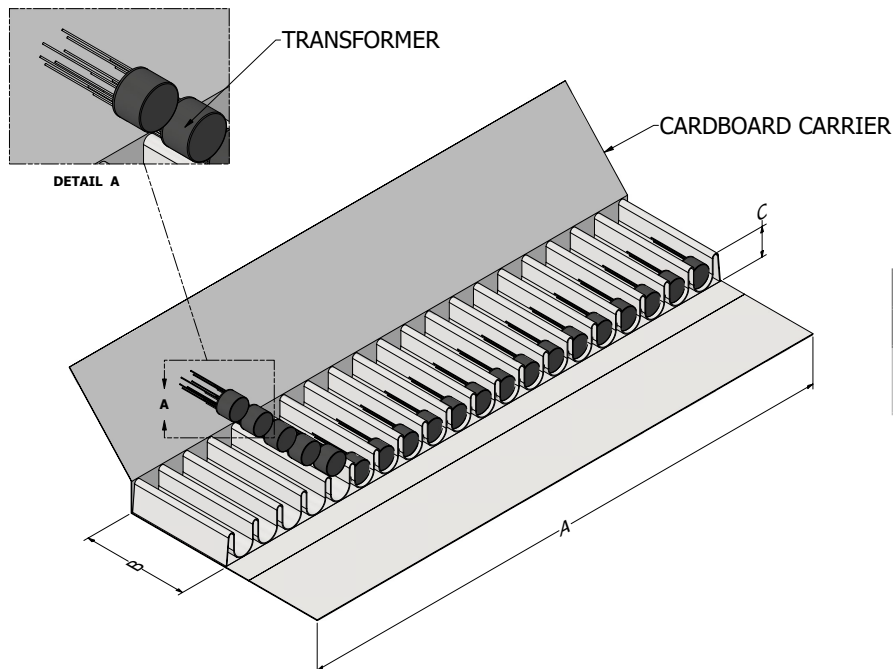
LL-68500-SM - SURFACE MOUNT SIZE B



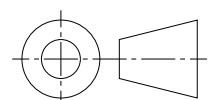
LL-68500-SM - SURFACE MOUNT SIZE C



BOX PACKAGING - LL-68500-TH SERIES - THROUGH HOLE

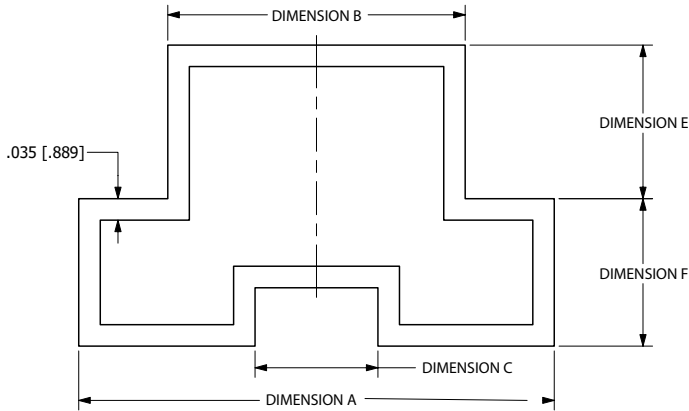


Dimension		
A	B	C
10.65	2.49	0.95
[270.51]	[63.246]	[24.13]

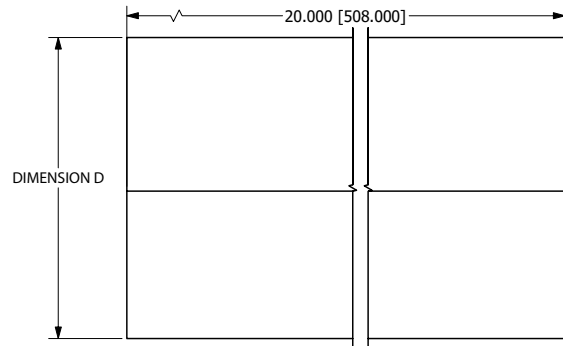




TUBE PACKAGING - LL-68500-SM - SURFACE MOUNT

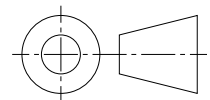
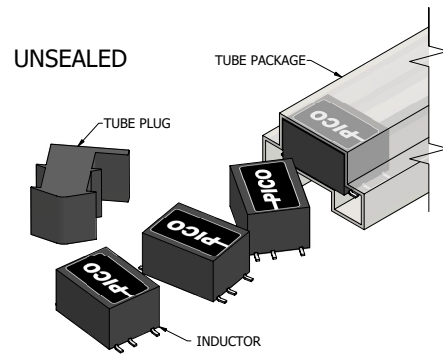
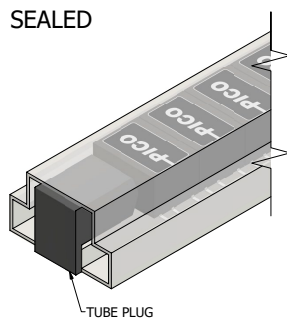


PLAN VIEW



ELEVATION VIEW

LL-68500-SM Size	Dimension					
	A	B	C	D	E	F
A	.934 [23.724]	.644 [16.358]	.240 [6.096]	.515 [13.081]	.275 [6.985]	.240 [6.096]
B & C	.774 [19.660]	.484 [12.294]	.200 [5.080]	.490 [12.446]	.250 [6.350]	.240 [6.096]



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