# **69000** Series

25-10000µH, 0.25-11.5A, Shielded Power Inductor

PICO Electronics, Inc.

## PRODUCT OVERVIEW

Pico power inductors are built to smoothly transmit direct current across various DC-DC converters and switching regulators. They can provide low core losses and are used to store energy, which the electromotive force can filter out frequency noise and reduce signal loss. Energy storage can also allow higher power consumption in system designs. These power inductors are ideal for filtering out noise and ripple spikes in many applications. Pico has a diverse portfolio of power inductors ranging in mechanical size, mounting options, current rating, and inductance rating.

Typical applications:

- DC-DC Converters
- Switching Regulators
- Radar & Communication Systems
- Step-up or Step-down Transformers
- Aviation Power Systems
- Automotive & EVs
- Medical Equipment

## FEATURES

- Extreme resistance to impact, shock, and vibration
- Manufactured to MIL-PRF-27 Grade 5, Class S
- High reliability for space and mission critical applications
- Miniature in size and minimalistic design
- Handle large transient direct currents
- Magnetically shielded

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

### SIZE AA

| Part Number [1] | Inductance [µH] | DC Current 10% drop in L [A] | DC Current 20% drop in L [A] | DC Current 30% drop in L [A] | DC Resistance [Ω] | Self Resonant Frequency [MHz] |
|---|---|---|---|---|---|---|
| 69410 | 25 | 3.53 | 4.8 | 5.94 | 0.012 | 4 |
| 69420 | 50 | 2.5 | 3.4 | 4.2 | 0.024 | 3 |
| 69430 | 75 | 2.04 | 2.78 | 3.43 | 0.036 | 2.4 |
| 69440 | 100 | 1.77 | 2.4 | 2.99 | 0.048 | 2 |
| 69450 | 250 | 1.12 | 1.52 | 1.88 | 0.12 | 1.3 |
| 69460 | 750 | 0.65 | 0.88 | 1.08 | 0.36 | 0.75 |
| 69470 | 1000 | 0.56 | 0.76 | 0.94 | 0.48 | 0.65 |
| 69480 | 1500 | 0.46 | 0.62 | 0.77 | 0.72 | 0.55 |
| 69490 | 2500 | 0.35 | 0.48 | 0.59 | 1.2 | 0.4 |
| 69500 | 5000 | 0.25 | 0.34 | 0.42 | 2.4 | 0.3 |

### SIZE A

| Part Number [1] | Inductance [µH] | DC Current 10% drop in L [A] | DC Current 20% drop in L [A] | DC Current 30% drop in L [A] | DC Resistance [Ω] | Self Resonant Frequency [MHz] |
|---|---|---|---|---|---|---|
| 69010 | 130 | 3 | 4.5 | 5.5 | 0.06 | 1.7 |
| 69020 | 210 | 2.5 | 3.5 | 4.5 | 0.11 | 1.4 |
| 69030 | 260 | 2.2 | 3.2 | 3.9 | 0.14 | 1.25 |
| 69040 | 315 | 2 | 2.9 | 3.5 | 0.17 | 1.14 |
| 69050 | 525 | 1.6 | 2.2 | 2.7 | 0.28 | 0.9 |
| 69060 | 790 | 1.2 | 1.8 | 2.2 | 0.42 | 0.7 |
| 69070 | 1050 | 1 | 1.6 | 1.9 | 0.56 | 0.6 |
| 69080 | 1300 | 0.95 | 1.4 | 1.7 | 0.7 | 0.4 |

### SIZE B

| Part Number [1] | Inductance [µH] | DC Current 10% drop in L [A] | DC Current 20% drop in L [A] | DC Current 30% drop in L [A] | DC Resistance [Ω] | Self Resonant Frequency [MHz] |
|---|---|---|---|---|---|---|
| 69105 | 228 | 3.5 | 5.2 | 6.8 | 0.07 | 1.1 |
| 69115 | 323 | 2.7 | 4 | 5 | 0.105 | 0.9 |
| 69125 | 460 | 2.5 | 3.7 | 4.8 | 0.15 | 0.8 |
| 69135 | 787 | 1.9 | 2.8 | 3.7 | 0.26 | 0.6 |
| 69145 | 1050 | 1.6 | 2.4 | 3.2 | 0.34 | 0.5 |
| 69155 | 1310 | 1.5 | 2.2 | 2.8 | 0.43 | 0.45 |
| 69165 | 1600 | 1.3 | 2 | 2.6 | 0.52 | 0.4 |
| 69175 | 1840 | 1.2 | 1.8 | 2.4 | 0.6 | 0.38 |
| 69185 | 2100 | 1.1 | 1.7 | 2.2 | 0.7 | 0.33 |

## SPECIFICATIONS

### SIZE C

| Part Number [1] | Inductance [µH] | DC Current 10% drop in L [A] | DC Current 20% drop in L [A] | DC Current 30% drop in L [A] | DC Resistance [Ω] | Self Resonant Frequency [MHz] |
|---|---|---|---|---|---|---|
| 69205 | 165 | 5 | 7 | 9.5 | 0.04 | 1.4 |
| 69215 | 191 | 4.7 | 7 | 8.8 | 0.05 | 1.3 |
| 69225 | 262 | 4 | 5.6 | 7.5 | 0.07 | 1.1 |
| 69235 | 390 | 3.3 | 4.6 | 6.2 | 0.1 | 0.9 |
| 69245 | 525 | 2.8 | 4 | 5.3 | 0.14 | 0.8 |
| 69255 | 790 | 2.3 | 3.2 | 4.3 | 0.2 | 0.6 |
| 69265 | 1050 | 2 | 2.8 | 3.8 | 0.27 | 0.55 |
| 69275 | 1310 | 1.8 | 2.5 | 3.4 | 0.34 | 0.5 |
| 69285 | 1580 | 1.6 | 2.3 | 3 | 0.41 | 0.45 |
| 69295 | 1838 | 1.5 | 2.1 | 2.8 | 0.48 | 0.4 |

### SIZE D

| Part Number [1] | Inductance [µH] | DC Current 10% drop in L [A] | DC Current 20% drop in L [A] | DC Current 30% drop in L [A] | DC Resistance [Ω] | Self Resonant Frequency [MHz] |
|---|---|---|---|---|---|---|
| 69310 | 150 | 6.35 | 9.23 | 11.5 | 0.027 | 1.4 |
| 69320 | 250 | 4.9 | 7.15 | 9 | 0.045 | 1.2 |
| 69330 | 500 | 3.5 | 5 | 6.32 | 0.09 | 0.8 |
| 69340 | 750 | 2.8 | 4.13 | 5.16 | 0.135 | 0.65 |
| 69350 | 1000 | 2.5 | 3.6 | 4.5 | 0.18 | 0.55 |
| 69360 | 2500 | 1.55 | 2.26 | 2.8 | 0.45 | 0.35 |
| 69370 | 5000 | 1.1 | 1.6 | 2 | 0.9 | 0.25 |

### SIZE E

| Part Number [1] | Inductance [µH] | DC Current 10% drop in L [A] | DC Current 20% drop in L [A] | DC Current 30% drop in L [A] | DC Resistance [Ω] | Self Resonant Frequency [MHz] |
|---|---|---|---|---|---|---|
| 69605 | 1500 | 2.6 | 4.5 | 6 | 0.13 | 0.4 |
| 69615 | 2000 | 2.25 | 3.9 | 5.2 | 0.17 | 0.35 |
| 69625 | 3000 | 1.85 | 3.2 | 4.25 | 0.26 | 0.3 |
| 69635 | 4000 | 1.6 | 2.8 | 3.7 | 0.35 | 0.25 |
| 69645 | 5000 | 1.45 | 2.5 | 3.3 | 0.45 | 0.2 |
| 69655 | 7500 | 1.15 | 2 | 2.7 | 0.65 | 0.18 |
| 69665 | 10,000 | 1 | 1.75 | 2.35 | 0.85 | 0.15 |

Note 1: For RoHS compliance, please consult with Pico's engineer and provide the part number.
Note 2: All Inductors have split windings (except size AA). Ratings shown in table are for series connection. Parallel connection will have 1/4 inductance at twice the DC current and 1/4 the DC resistance.
ie. Parallel connection of PICO # 69010 will have 32.5 µH, 15mΩ DC resistance, 6A DC current at 10% drop in L.

## SPECIFICATIONS

### GENERAL

| Parameter | Condition | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Dielectric Withstanding Voltage | 60Hz | - | 200 | - | $V_{RMS}$ |
| Insulation Resistance | 200VDC | 10 | - | - | GΩ |
| 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 | Epoxy Insulated Metal | | | | |
| Potting | Vacuum Impregnated Epoxy | | | | |
| Box Packaging | Length x Width x Height | 11.56 x 8.92 x 1.4 (293.624 x 226.568 x 35.56) | | | inches (mm) |

### 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 |

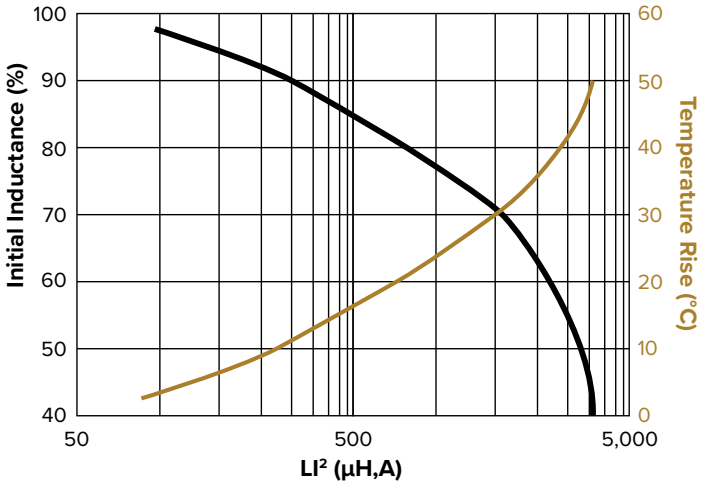
### OPTIONAL SCREENING AND QUALIFICATION

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

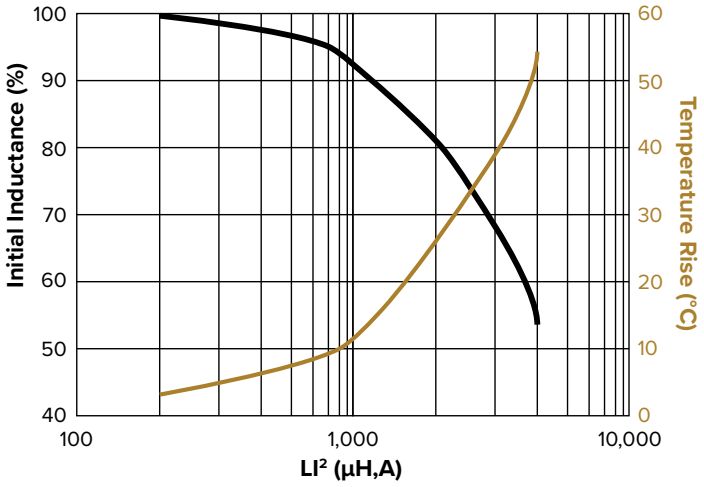
Note 3: Screening and qualification tests are not limited to the options in the chart above. Each standard may also be stringent or exclude certain tests from one another. Please contact Pico for specific application needs and for Pico part number.

## DATA CURVES

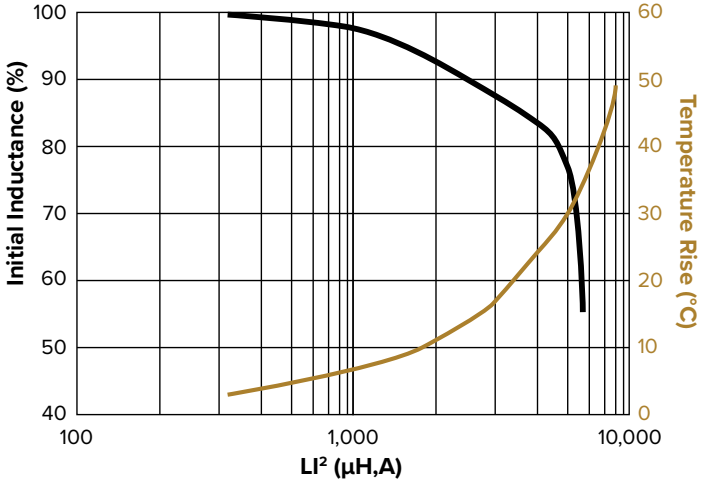
### Size AA



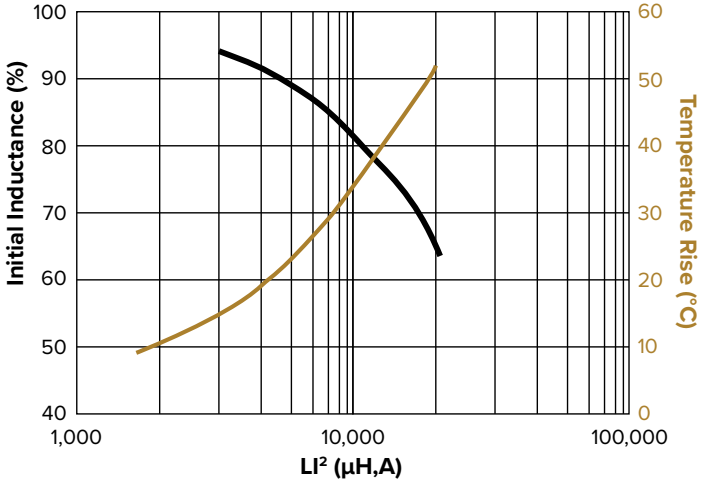

### Size A



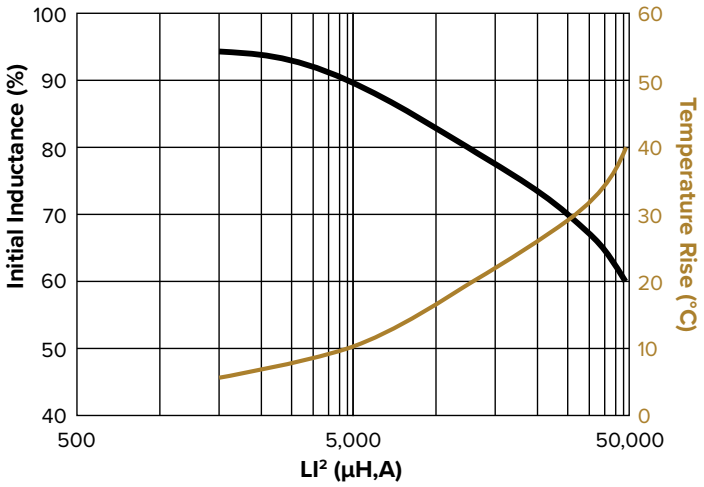

### Size B



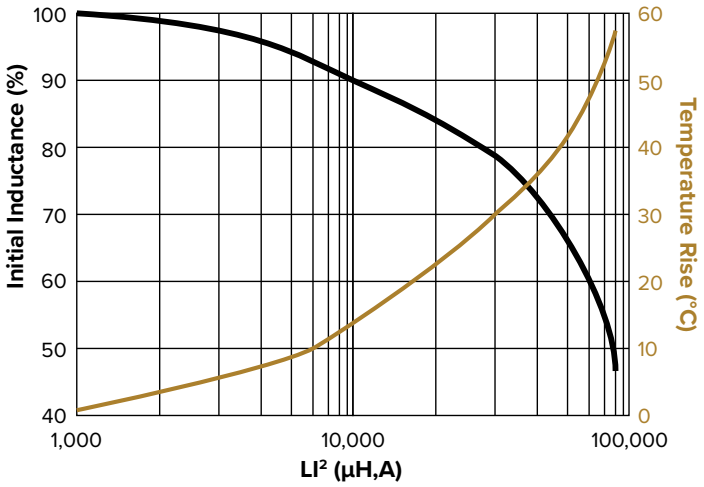

### Size C



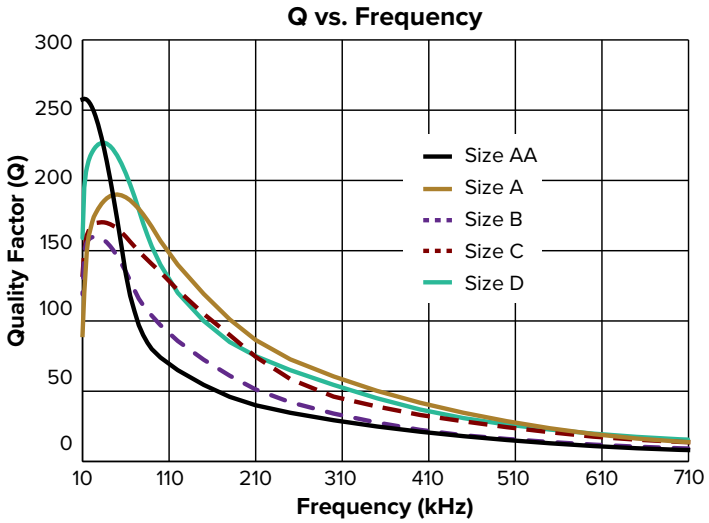

### Size D




### Size E



## DATA CURVES



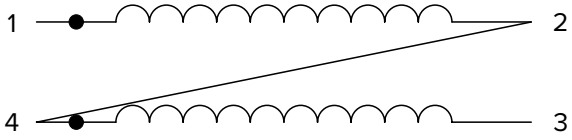

## ELECTRICAL SCHEMATIC

### SIZE AA

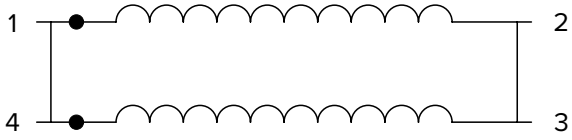


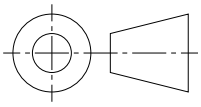

### SIZE A, B, C, D & E

**SERIES CONNECTION**



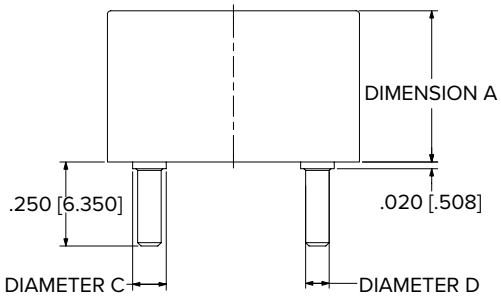

**PARALLEL CONNECTION**

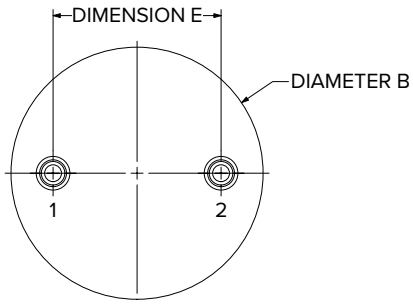


## MECHANICAL DRAWINGS

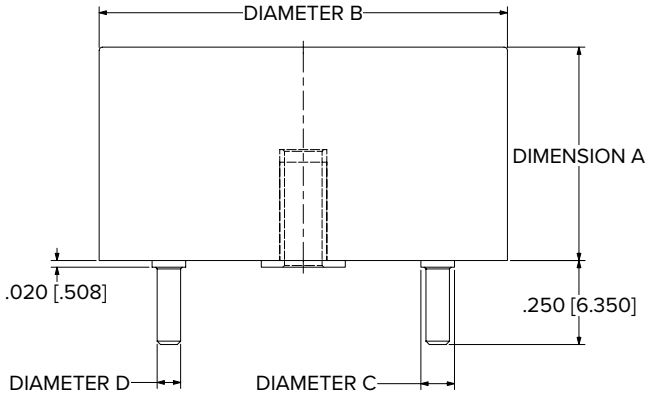
### SIZE AA

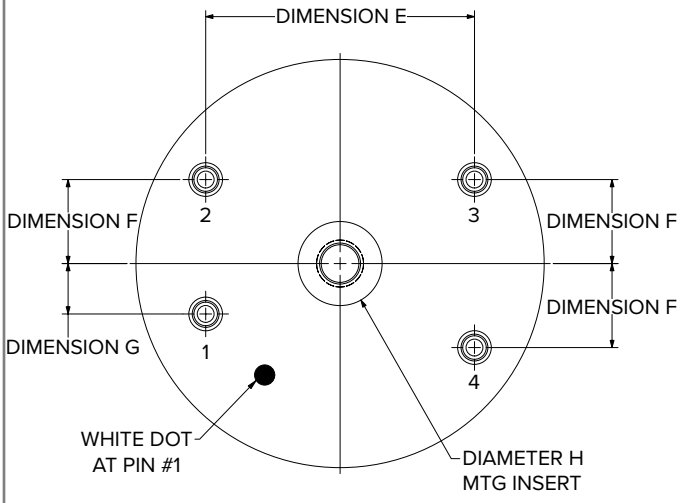



**BOTTOM VIEW**

### SIZE A TO E

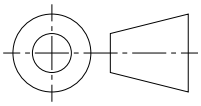


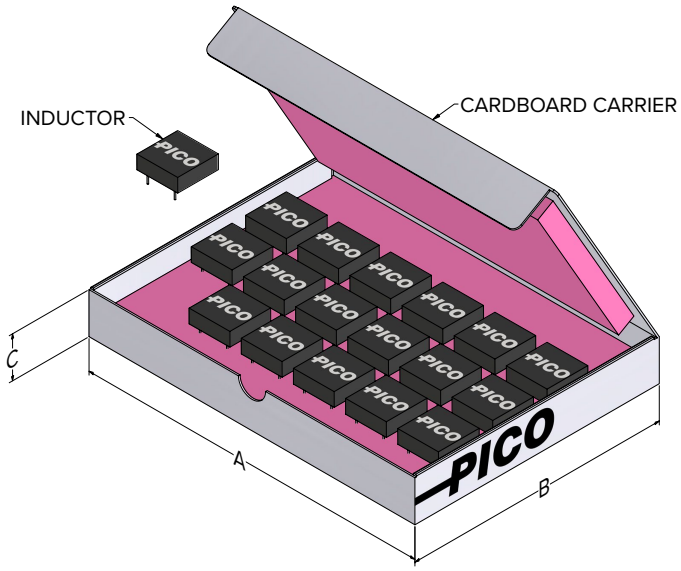

**BOTTOM VIEW**

| Size | Dimension / Diameter | | | | | | | | Insert | Typ. Weight (grams) |
|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | G | H | | |
| AA | .450 (11.400) | .750 (19.100) | .100 (2.540) | .070 (1.780) | .500 (12.700) | - | - | - | - | 7 |
| A | .560 (14.200) | .960 (24.00) | .100 (2.540) | .070 (1.780) | .600 (15.200) | .200 (5.100) | .100 (2.500) | .250 (6.350) | 4 - 40 UNC 5 Threads min. | 23 |
| B | .635 (16.100) | 1.215 (30.900) | .100 (2.540) | .070 (1.780) | .800 (20.300) | .250 (6.400) | .150 (3.800) | .250 (6.350) | 4 - 40 UNC 5 Threads min. | 44 |
| C | .720 (18.300) | 1.330 (33.800) | .125 (3.200) | .094 (2.400) | .900 (22.900) | .250 (6.400) | .150 (3.800) | .312 (7.920) | 6 - 32 UNC 6 Threads min. | 60 |
| D | .760 (19.300) | 1.500 (38.100) | .125 (3.200) | .094 (2.400) | 1.100 (27.900) | .300 (7.600) | .200 (5.100) | .312 (7.920) | 6 - 32 UNC 6 Threads min. | 80 |
| E | 1.100 (27.900) | 2.150 (54.600) | .150 (3.800) | .125 (3.200) | 1.700 (43.200) | .400 (10.200) | .300 (7.600) | .312 (7.920) | 6 - 32 UNC 6 Threads min. | 170 |

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



## BOX PACKAGING




| Dimension | | |
|---|---|---|
| A | B | C |
| 11.56 [293.624] | 8.92 [226.568] | 1.4 [35.56] |

Pico warrants each product manufactured by us and sold by us or an authorized representative, to be free from defects in material and workmanship. If properly used, it will perform within its applicable specifications for a period of one year after original shipment. Pico's obligation under this guarantee is limited to repairing or replacing our product to the original purchaser. This warranty is in lieu of all other warranties, express or implied and constitutes fulfillment of our obligations to the purchaser. We do not guarantee that the products can be used for a particular purpose other than those solely covered by the product's specifications. Pico must be notified if the product must meet particular certifications and/or standards. We assume no liability, in any event, for consequential damages, for anticipated or lost profits, incidental damages or loss of time or other losses incurred by the purchaser or any third party in connection with products covered by this warranty or otherwise. The purchaser will indemnify and hold Pico harmless for any damages, losses, costs, etc. from usage not within the product's specifications. Pico must be consulted before usage of its products in a nuclear, radioactive or space environment.

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