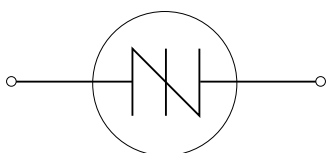


RoHS

Kxxx0yH Series



Schematic Symbol



Description

The new Kxxx0yH is a higher energy SIDAC switch for gas ignition applications requiring higher current pulse current especially at low repetition rate. It is offered in a DO-15 and TO-92 leaded packages as well as DO-214 surface mount package. Voltage activation of this solid state switch is accomplished with peak voltage level of 190 to 280Volts. The SIDAC is a silicon bilateral voltage triggered Thyristor switch that switches on through a negative resistance region to a low on-state voltage. Conduction will continue until current is interrupted or lowered below minimum holding current of the device.

Features

- AC Circuit Oriented
- Triggering Voltage of 190 to 280V
- 280A Pulse Current Capability
- RoHS Compliant

Applications

Suitable for high voltage power supplies, natural gas igniters, and Xenon flash ignition.

Electrical Specifications ($T_J = 25^\circ\text{C}$, unless otherwise specified)

| Symbol | Parameters | Test Conditions | Min | Max | Unit |
|-----------------|---|--|------|-----|--------------------|
| V_{BO} | Breakover/Trigger Voltage | K2000yH | 190 | 215 | V |
| | | K2200yH | 205 | 230 | |
| | | K2400yH | 220 | 250 | |
| | | K2500yH | 240 | 280 | |
| V_{DRM} | Repetitive Peak Off-state Voltage | K2000yH | 180 | | V |
| | | K2200yH | 180 | | |
| | | K2400yH | 190 | | |
| | | K2500yH | 200 | | |
| $I_{T(RMS)}$ | On-state RMS Current | 50/60Hz, $T_J < 125^\circ\text{C}$ | | 1 | A |
| V_{TM} | Peak On-state Voltage | $I_T = 1\text{A}$ | | 1.5 | V |
| I_H | Dynamic Holding Current | $R_T = 100\Omega$ 50/60Hz Sine Wave | | 150 | mA |
| R_S | Switching Resistance, $R_S = \frac{(V_{BO} - V_S)}{(I_S - I_{BO})}$ | 50/60Hz Sine Wave | | 100 | Ω |
| I_{BO} | Breakover Current | 50/60Hz Sine Wave | | 50 | μA |
| I_{TRM} | Peak Repetitive Pulse Current (refer to figure 4) | $t_p = 10\mu\text{s}$ | 60Hz | 120 | A |
| | | | 5Hz | 280 | |
| di/dt | Critical Rate of Rise of On-State Current | | | 150 | A/ μs |
| dv/dt | Critical Rate of Rise of Off-State Voltage | | 1500 | | V/ μs |
| T_S | Storage Temperature Range | | -40 | 150 | $^\circ\text{C}$ |
| T_J | Junction Temperature Range | | -40 | 125 | $^\circ\text{C}$ |
| $R_{\theta JL}$ | Thermal Resistance, Junction to Lead | DO-15 | | 18 | $^\circ\text{C/W}$ |
| | | DO-214 | | 30 | |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | DO-92 | | 35 | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | DO-15 | | 75 | $^\circ\text{C/W}$ |
| | | DO-92 | | 95 | |

Note: xxx - voltage, y = package

Figure 1: V-I Characteristics

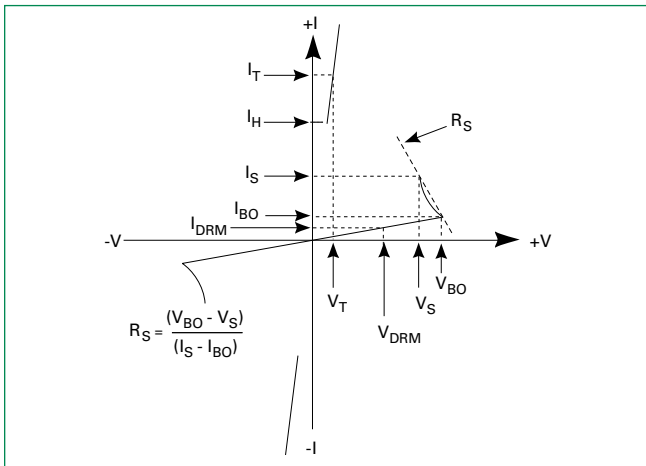


Figure 2: On-state Current vs. On-state Voltage (Typical)

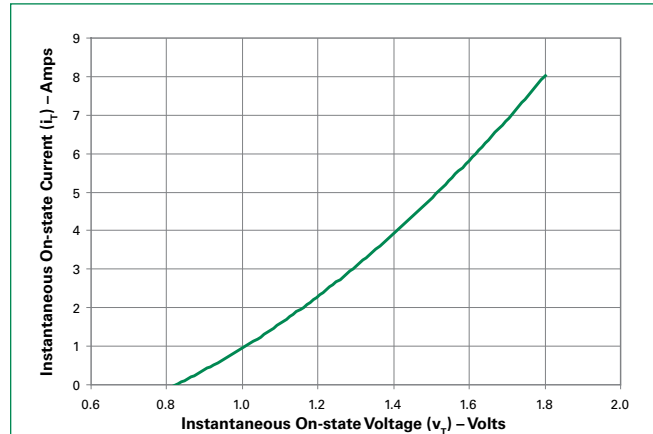


Figure 3: Power Dissipation vs. On-state Current (Typical)

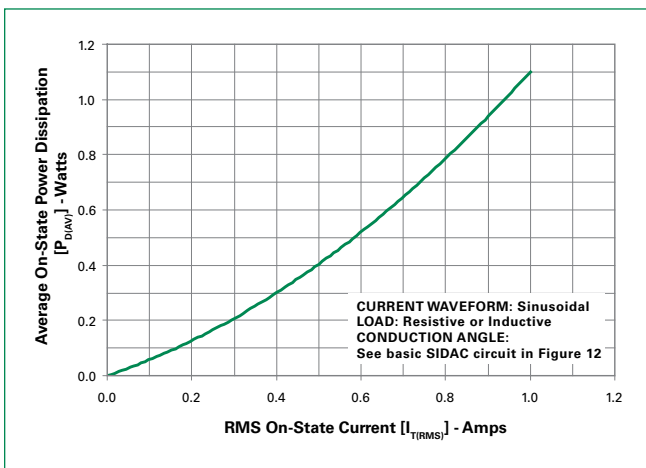


Figure 4: Repetitive Peak On-state Current (I_{TRM}) vs. Pulse Width at Various Frequencies

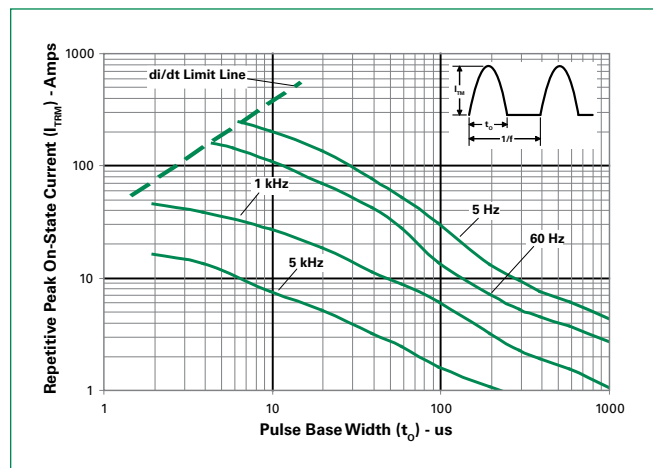


Figure 5: Surge Peak On-state Current vs. Number of Cycles

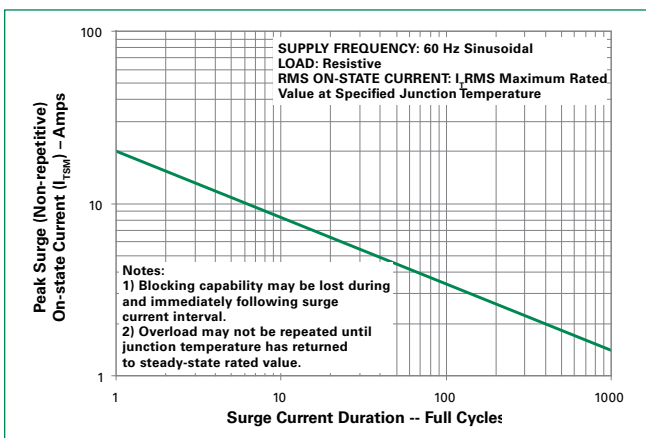


Figure 6: Normalized V_{BO} Change vs. Junction Temperature

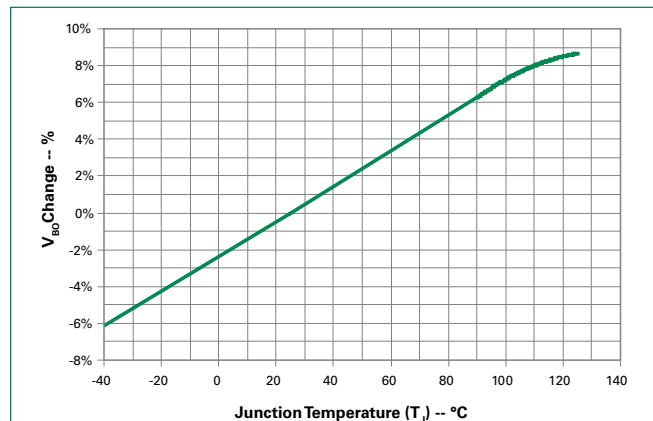


Figure 7: Normalized DC Holding Current vs. Junction Temperature

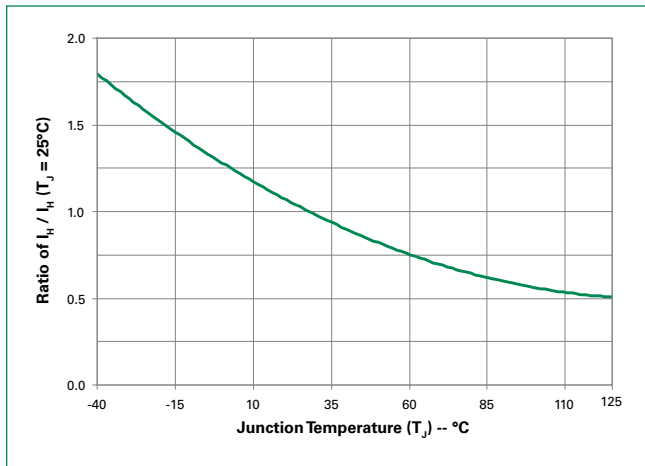


Figure 8: Maximum Allowable Case Temperature vs. RMS On-State Current

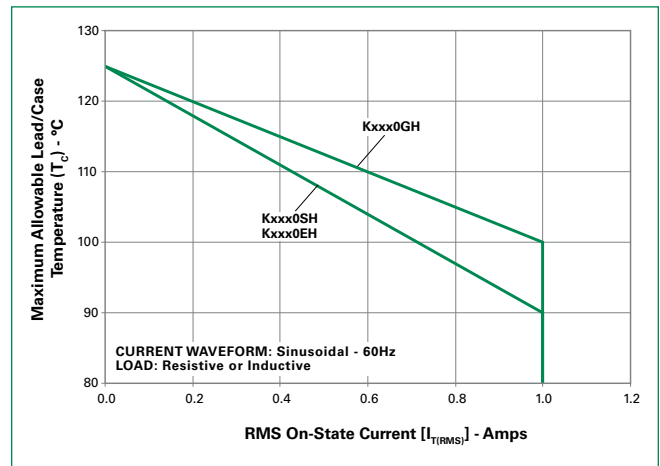


Figure 9: Maximum Allowable Ambient Temperature vs. RMS On-State Current

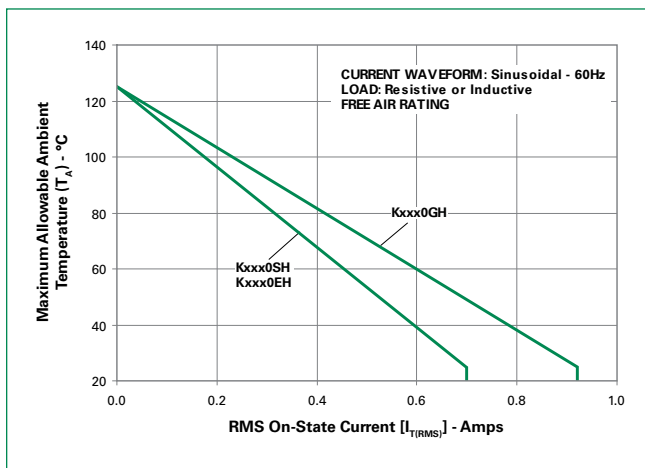


Figure 10: Normalized Repetitive Peak Breakover Current (I_{BO}) vs. Junction Temperature

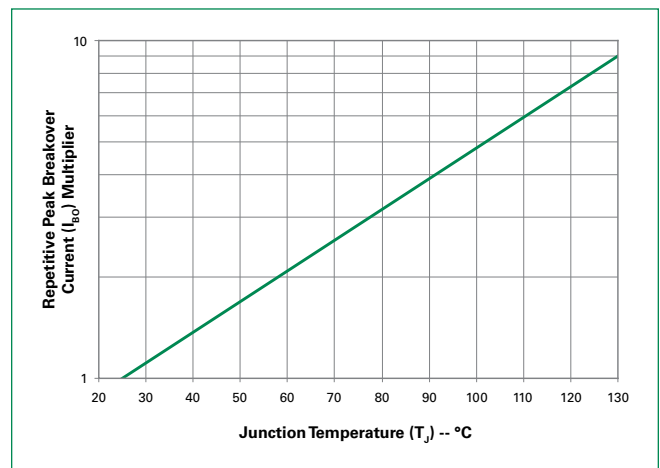


Figure 11: Dynamic Holding Current Test Circuit for SIDACs

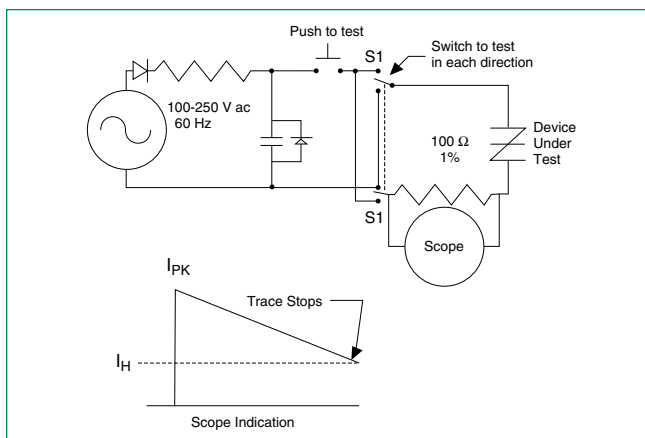


Figure 12: Basic SIDAC Circuit

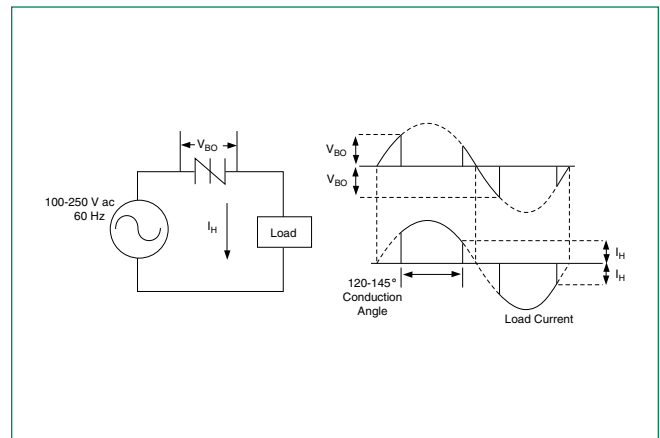


Figure 13: Relaxation Oscillator Using a SIDAC

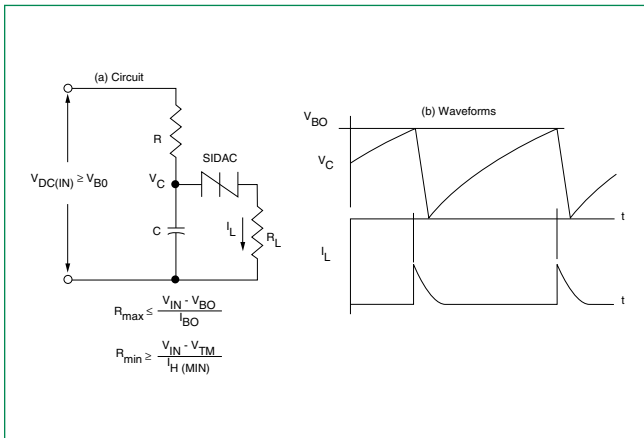
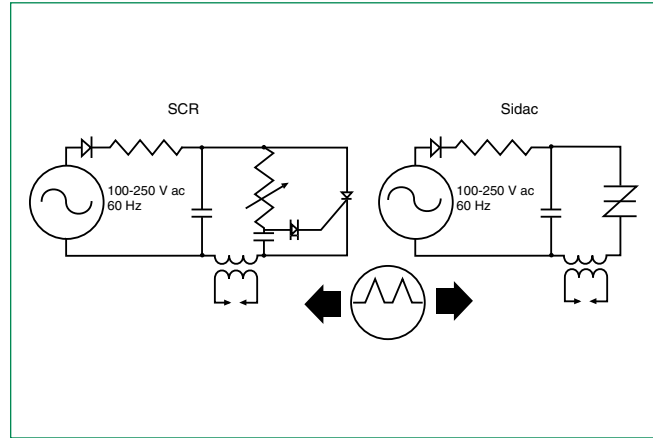
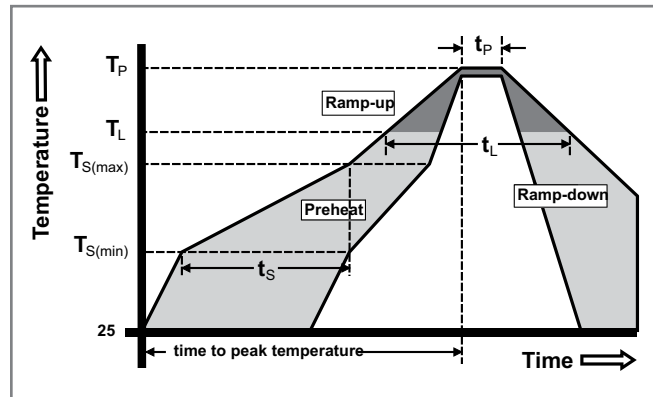


Figure 14: General Gas Ignitor Circuit



Soldering Parameters

| Reflow Condition | | Pb – Free assembly |
|--|------------------------------------|-------------------------|
| Pre Heat | - Temperature Min ($T_{s(min)}$) | 150°C |
| | - Temperature Max ($T_{s(max)}$) | 200°C |
| | - Time (min to max) (t_s) | 60 – 180 secs |
| Average ramp up rate (Liquidus Temp) (T_L) to peak | | 5°C/second max |
| $T_{s(max)}$ to T_L - Ramp-up Rate | | 5°C/second max |
| Reflow | - Temperature (T_L) (Liquidus) | 217°C |
| | - Temperature (t_L) | 60 – 150 seconds |
| Peak Temperature (T_p) | | 260 ^{+0/-5} °C |
| Time within 5°C of actual peak Temperature (t_p) | | 20 – 40 seconds |
| Ramp-down Rate | | 5°C/second max |
| Time 25°C to peak Temperature (T_p) | | 8 minutes Max. |
| Do not exceed | | 280°C |



Physical Specifications

| | |
|--------------------------|--|
| Terminal Material | Copper Alloy |
| Terminal Finish | 100% Matte Tin-plated /Pb Free solder dipped. |
| Body Material | UL recognized epoxy meeting flammability classification 94V-0. |

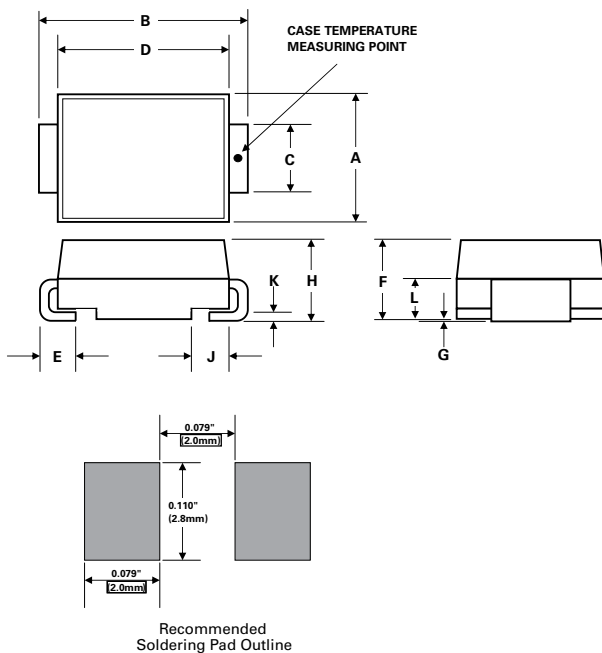
Design Considerations

Careful selection of the correct device for the application's operating parameters and environment will go a long way toward extending the operating life of the Thyristor. Overheating and surge currents are the main killers of SIDACs. Correct mounting, soldering, and forming of the leads also help protect against component damage.

Reliability/Environmental Tests

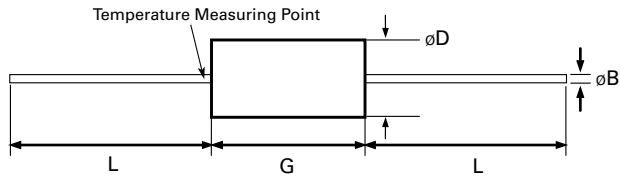
| Test | Specifications and Conditions |
|--|--|
| High Temperature Voltage Blocking | MIL-STD-750: Method 1040, Condition A Rated V_{DRM} (VAC-peak), 125°C, 1008 hours |
| Temperature Cycling | MIL-STD-750: Method 1051 -40°C to 150°C, 15-minute dwell, 100 cycles |
| Biased Temperature & Humidity | EIA/JEDEC: JESD22-A101 (VDC), 85°C, 85%RH, 1008 hours |
| High Temp Storage | MIL-STD-750: Method 1031 150°C, 1008 hours |
| Low-Temp Storage | -40°C, 1008 hours |
| Thermal Shock | MIL-STD-750: Method 1056 0°C to 100°C, 5-minute dwell, 10-second transfer, 10 cycles |
| Autoclave (Pressure Cooker Test) | EIA/JEDEC: JESD22-A102 121°C, 100%RH, 2atm, 168 hours |
| Resistance to Solder Heat | MIL-STD-750: Method 2031 260°C, 10 seconds |
| Solderability | ANSI/J-STD-002: Category 3 |
| Repetitive Surge Life Testing | MIL-STD-750: Method 2036, Condition E |

Dimensions — DO-214



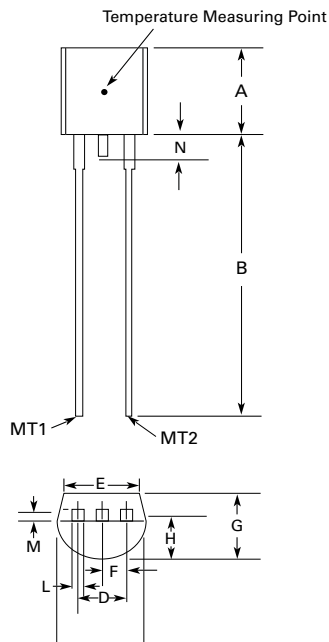
| Dimension | Inches | | Millimeters | |
|-----------|--------|-------|-------------|------|
| | Max | Max | Min | Max |
| A | 0.130 | 0.156 | 3.30 | 3.95 |
| B | 0.201 | 0.220 | 5.10 | 5.60 |
| C | 0.077 | 0.087 | 1.95 | 2.20 |
| D | 0.159 | 0.181 | 4.05 | 4.60 |
| E | 0.030 | 0.063 | 0.75 | 1.60 |
| F | 0.075 | 0.096 | 1.90 | 2.45 |
| G | 0.002 | 0.008 | 0.05 | 0.20 |
| H | 0.077 | 0.104 | 1.95 | 2.65 |
| J | 0.043 | 0.053 | 1.09 | 1.35 |
| K | 0.006 | 0.016 | 0.15 | 0.41 |
| L | 0.030 | 0.055 | 0.76 | 1.40 |

Dimensions — DO-15



| Dimension | Inches | | Millimeters | |
|-----------|--------|-------|-------------|-------|
| | Max | Max | Min | Max |
| øB | 0.028 | 0.034 | 0.711 | 0.864 |
| øD | 0.120 | 0.140 | 3.048 | 3.556 |
| G | 0.235 | 0.270 | 5.969 | 6.858 |
| L | 1.000 | | 25.400 | |

Dimensions - TO-92 with Type 70 Lead Form



| Dimension | Inches | | Millimeters | |
|-----------|--------|-------|-------------|------|
| | Max | Max | Min | Max |
| A | 0.176 | 0.196 | 4.47 | 4.98 |
| B | 0.500 | | 12.70 | |
| D | 0.095 | 0.105 | 2.41 | 2.67 |
| E | 0.150 | | 3.81 | |
| F | 0.046 | 0.054 | 1.16 | 1.37 |
| G | 0.135 | 0.145 | 3.43 | 3.68 |
| H | 0.088 | 0.096 | 2.23 | 2.44 |
| J | 0.176 | 0.186 | 4.47 | 4.73 |
| K | 0.088 | 0.096 | 2.23 | 2.44 |
| L | 0.013 | 0.019 | 0.33 | 0.48 |
| M | 0.013 | 0.017 | 0.33 | 0.43 |
| N | | 0.060 | | 1.52 |

Notes:

1. Type 70 lead form as shown is standard for the E package.
2. All leads are insulated from case. Case is electrically nonconductive (rated at 16000V ac rms for one minute from leads to case over the operating temperature range.)
3. Mold flash shall not exceed 0.13 mm per side.

Product Selector

| Part Number | Switching Voltage Range | | Blocking Voltage | Packages | | |
|-------------|-------------------------|-------------------------|------------------|----------|---------|-----------|
| | V _{BO} Minimum | V _{BO} Maximum | V _{DRM} | DO-15 | DO-214 | TO-92 |
| K2000yH | 190V | 215V | 180V | K2000GH | K2000SH | K2000EH70 |
| K2200yH | 205V | 230V | 180V | K2200GH | K2200SH | K2200EH70 |
| K2400yH | 220V | 250V | 190V | K2400GH | K2400SH | K2400EH70 |
| K2500yH | 240V | 280V | 200V | K2500GH | K2500SH | K2500EH70 |

Note: y = package

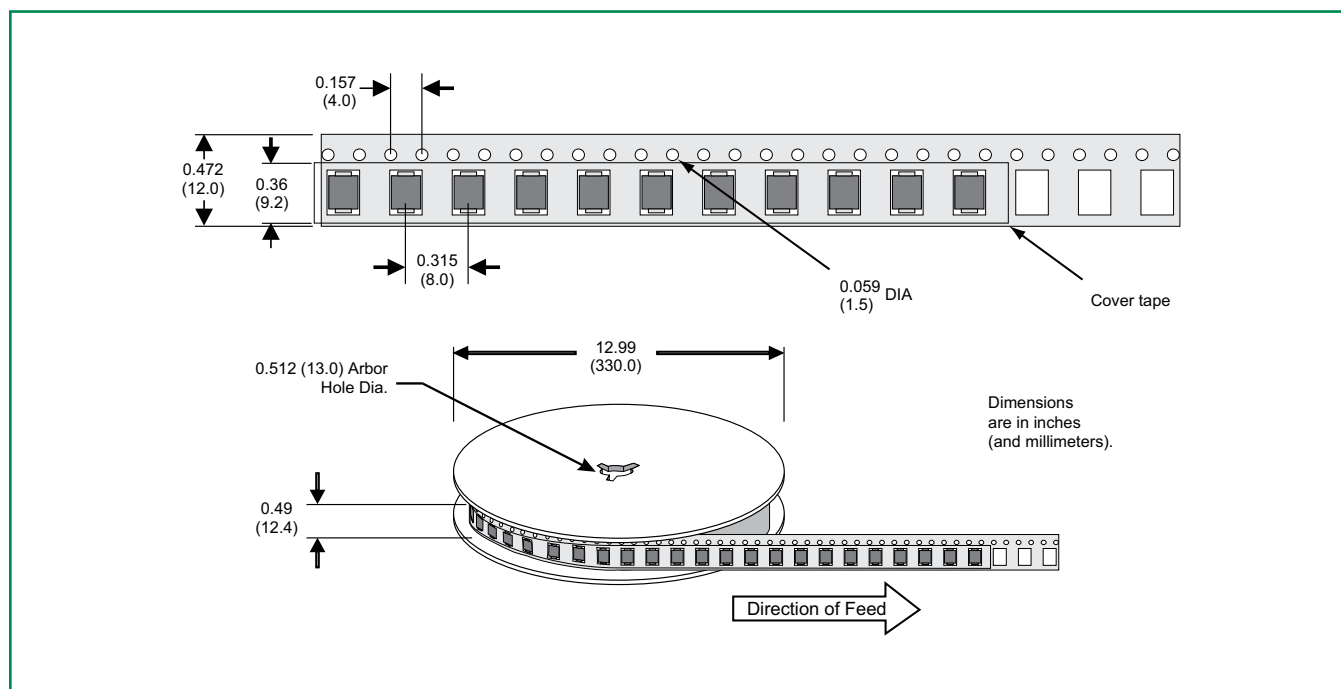
Packing Options

| Part Number | Marking | Weight | Packaging Mode | Base Quantity |
|--------------|---------|--------|----------------|---------------|
| Kxxx0GH | Kxxx0GH | 0.38g | Bulk | 1000 |
| Kxxx0GHRP | Kxxx0GH | 0.38g | Reel Pack | 5000 |
| Kxxx0SHRP | KxxSH | 0.1g | Reel Pack | 2500 |
| Kxxx0EH70 | Kxxx0EH | 0.17g | Bulk | 2000 |
| Kxxx0EH70AP | Kxxx0EH | 0.17g | Ammo Pack | 2000 |
| Kxxx0EH70RP2 | Kxxx0EH | 0.17g | Reel Pack | 2000 |
| Kxxx0EH70RP3 | Kxxx0EH | 0.17g | Reel Pack | 2000 |

Note: xxx or xx = voltage

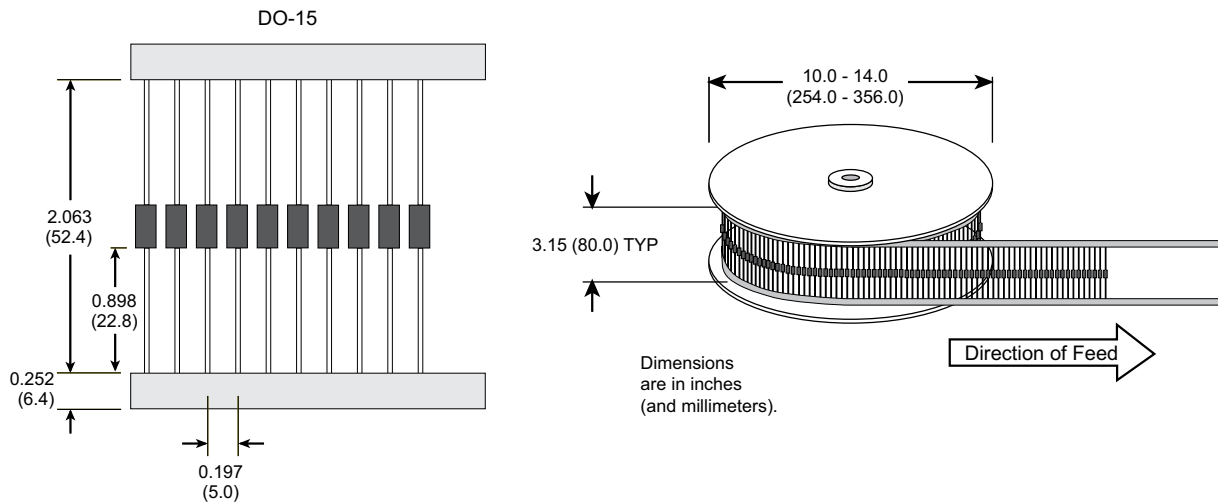
DO-214 Embossed Carrier Reel Pack (RP) Specifications

Meets all EIA-481-1 Standards



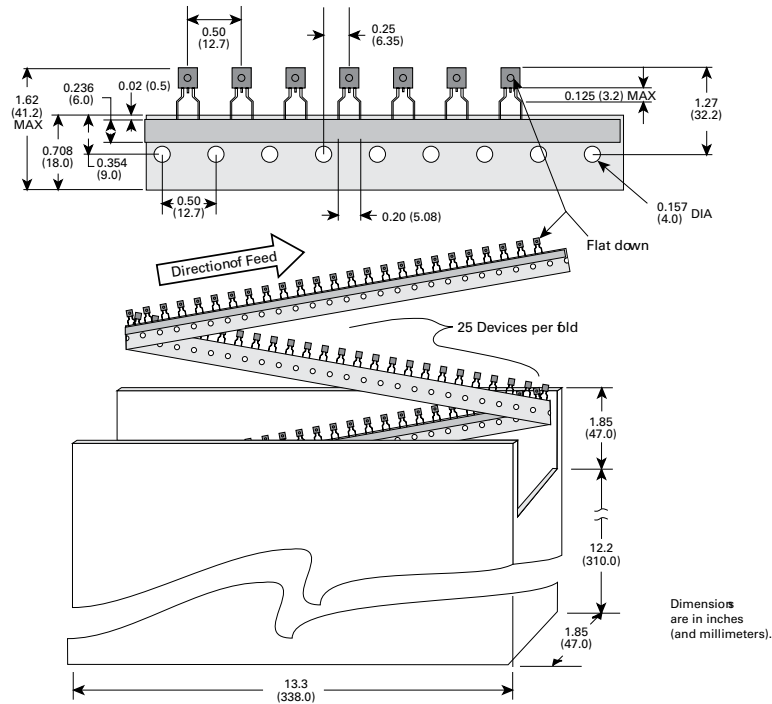
DO-15 Reel Pack (RP) Specifications

Meets all EIA RS-296 Standards

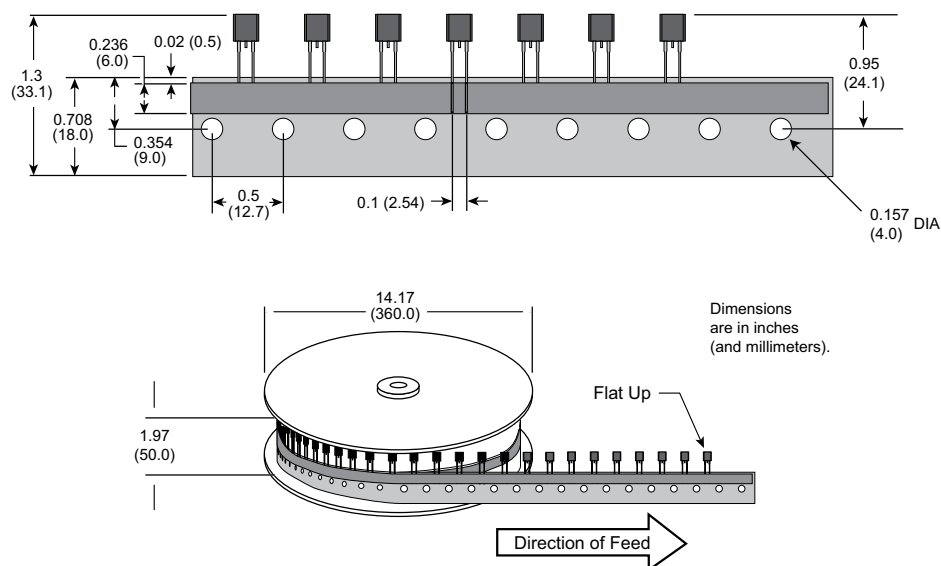


TO-92 Type 70 Ammo Pack (AP) Radial Leaded Specifications

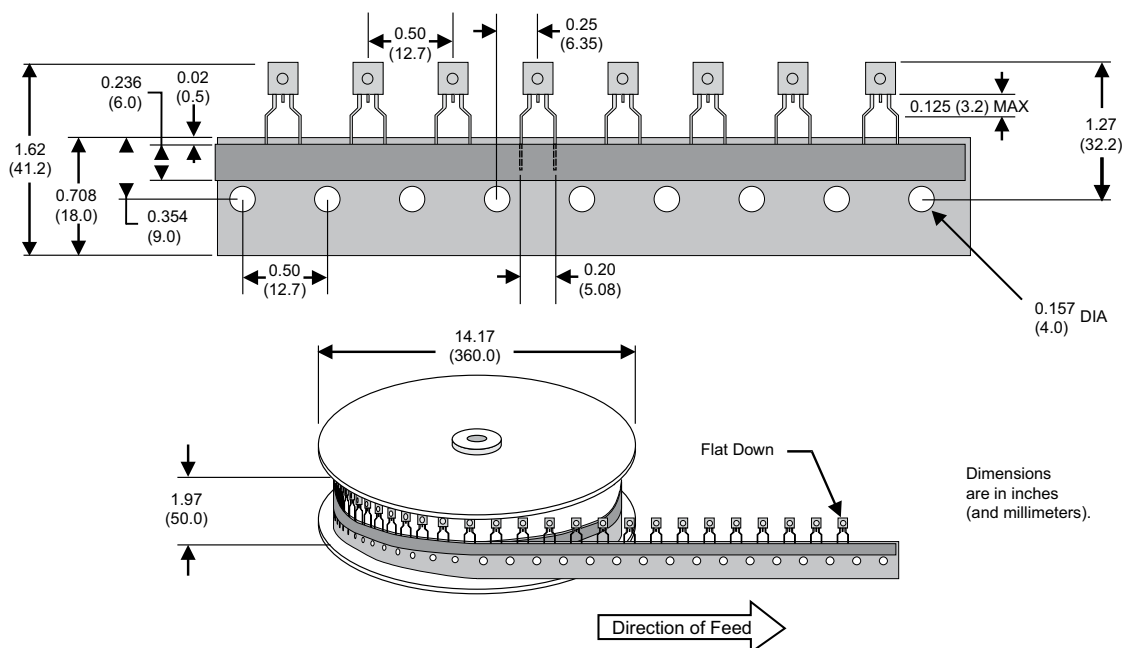
Meets all EIA-468-B 1994 Standards



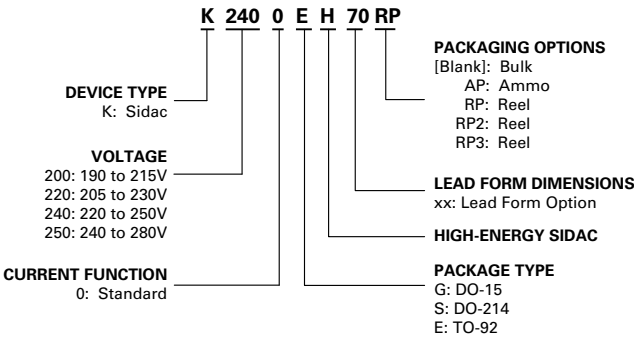
TO-92 Type 70 Reel Pack (RP3) Optional Specifications



TO-92 Type 70 Reel Pack (RP2) Standard Specifications



Part Numbering System



Part Marking System

