

Kxxx0yU SIDAC Series

RoHS



Description

The SIDAC is a silicon unilateral voltage triggered switch. Upon application of a voltage exceeding the SIDAC breakover voltage point, the SIDAC switches on through a negative resistance region to a low on-state voltage. Conduction continues until the current is interrupted or drops below the minimum holding current of the device.

SIDACs feature glass-passivated junctions to ensure a rugged and dependable device capable of withstanding harsh environments.

Features

- Rectified AC/DC Circuit Oriented
- RoHS Compliant
- Triggering Voltage of 75V to 260V

Applications

Suitable for capacitor-discharge HV generator circuit

Schematic Symbol



Electrical Specifications (T_j = 25°C, unless otherwise specified)

| Symbol | Parameters | Test Conditions | min | max | Unit |
|------------------|-----------------------------------|-----------------|-----|-----|------|
| V _{BO} | Breakover/Trigger Voltage | K0820yURP | 75 | 90 | V |
| | | K0900yURP | 79 | 97 | |
| | | K1050yURP | 95 | 110 | |
| | | K1100yURP | 104 | 118 | |
| | | K1200yURP | 110 | 125 | |
| | | K1300yURP | 120 | 138 | |
| | | K1400yURP | 130 | 146 | |
| | | K1500yURP | 142 | 157 | |
| | | K2000yURP | 190 | 210 | |
| | | K2200yURP | 210 | 230 | |
| | | K2300yURP | 220 | 240 | |
| | | K2400yURP | 230 | 250 | |
| K2500yURP | 240 | 260 | | | |
| V _{DRM} | Repetitive Peak Off-state Voltage | K0820yURP | 70 | | V |
| | | K0900yURP | 70 | | |
| | | K1050yURP | 90 | | |
| | | K1100yURP | 90 | | |
| | | K1200yURP | 100 | | |
| | | K1300yURP | 110 | | |
| | | K1400yURP | 115 | | |
| | | K1500yURP | 120 | | |
| | | K2000yURP | 170 | | |
| | | K2200yURP | 190 | | |
| | | K2300yURP | 200 | | |
| | | K2400yURP | 210 | | |
| K2500yURP | 220 | | | | |

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

| Symbol | Parameters | Test Conditions | Min | Max | Unit | |
|-----------------|---|--|--|-------------|--------------------|---|
| $I_{T(RMS)}$ | On-state RMS Current | 50/60Hz | | 1 | A | |
| I_{DRM} | Repetitive Peak Off-state Current | $V = V_{DRM}$ 50/60Hz Sine Wave | | 5 | μA | |
| V_{TM} | Peak On-state Voltage | $I_T = 1\text{A}$ | | 1.2 | V | |
| I_H | Dynamic Holding Current | $R_L = 100\Omega$ 50/60Hz Sine Wave | 10 | 80 | 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 | | 10 | μA | |
| I_{TRM} | Peak Repetitive Pulse Current (refer to figure 4) | K0820yU~ K0900yU | $T_P = 10\mu\text{s}$ $T_A = 125^\circ\text{C}$ | 60Hz 5Hz | 80 160 | A |
| | | K1050yU~ K2000yU | $T_P = 10\mu\text{s}$ $T_A = 125^\circ\text{C}$ | 60Hz 5Hz | 120 280 | |
| | | K2200yU~ K2500yU | $T_P = 10\mu\text{s}$ $T_A = 135^\circ\text{C}$ | 60Hz 5Hz | 120 280 | |
| | | | | | | |
| I_{TSM} | Peak Non-repetitive Surge Current (refer to figure 5) | Single Cycle | 60Hz 50Hz | 20 16.7 | A | |
| 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 | K0820yU~K2000yU | -40 | 125 | $^\circ\text{C}$ | |
| | | K2200yU~K2500yU | -40 | 150 | | |
| $R_{\theta JL}$ | Thermal Resistance, Junction to Lead | DO-214 | | 30 | $^\circ\text{C/W}$ | |
| | | DO-15 | | 18 | | |

Figure 1: V-I Characteristics



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



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

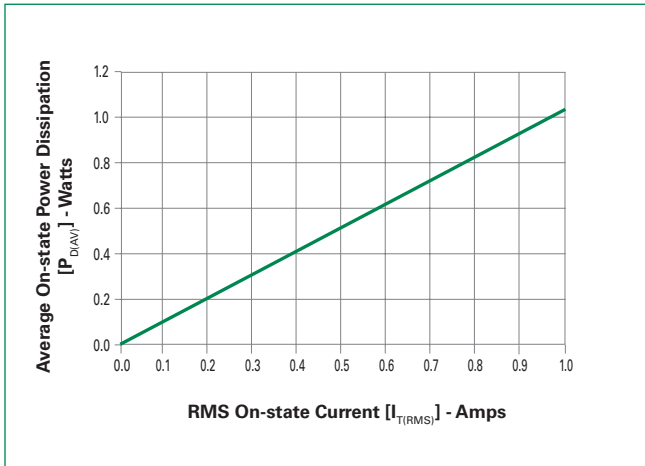


Figure 4: Peak Non-repetitive Surge Current (I_{TSM}) vs. Number of Cycles



Figure 5: Repetitive Peak On-state Current (I_{TRM}) vs. Pulse Width at Various Frequencies of K0820yU/K0900yU

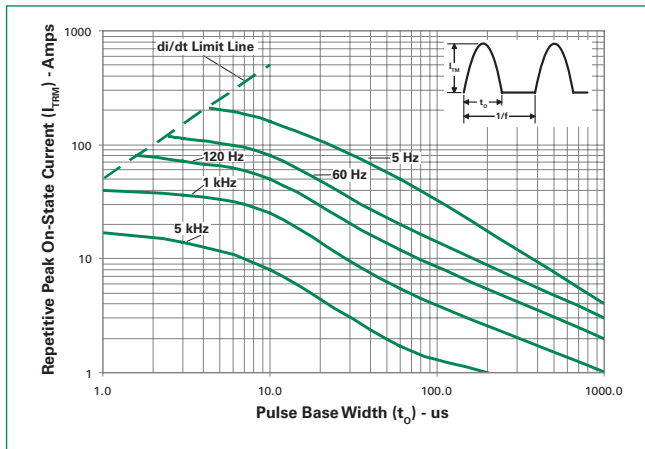


Figure 6: Repetitive Peak On-state Current (I_{TRM}) vs. Pulse Width at Various Frequencies of K1050yU~K2500yU



Figure 7: Normalized V_{BO} Change vs. Junction Temperature

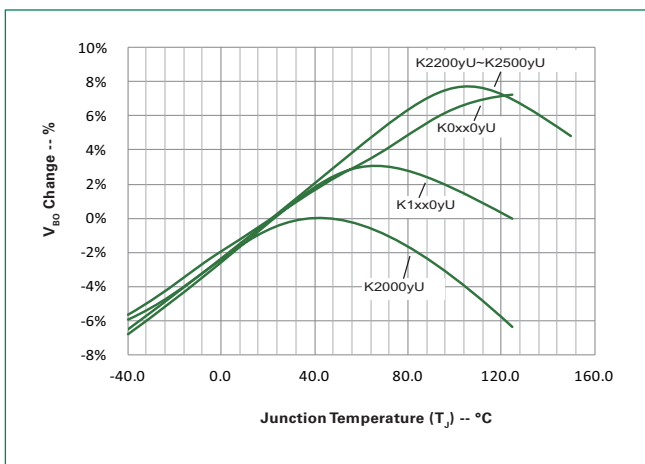


Figure 8: Normalized DC Holding Current vs. Junction Temperature

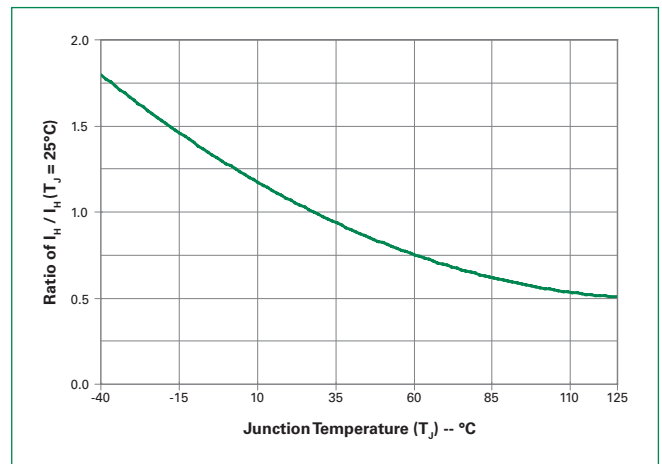


Figure 9: Maximum Allowable Case Temperature vs. RMS On-State Current

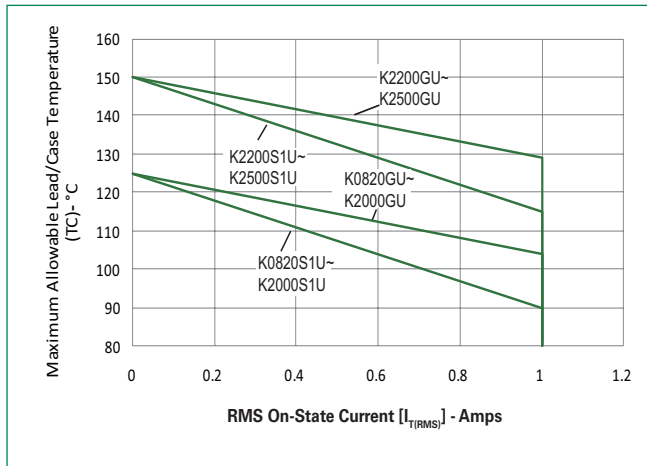


Figure 10: Maximum Allowable Ambient Temperature vs. RMS On-State Current

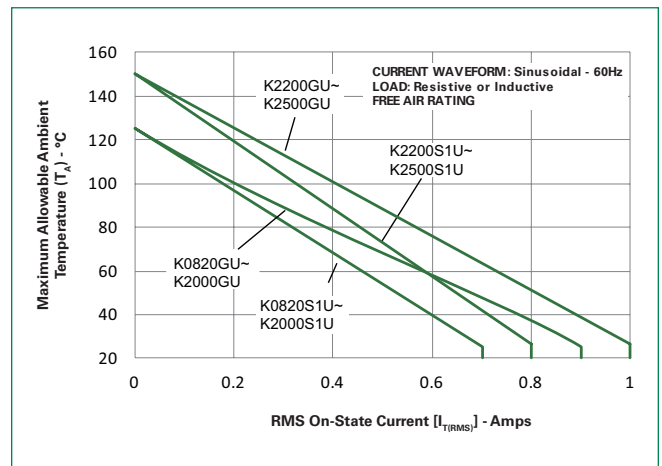


Figure 11: Normalized Repetitive Peak Breakover Current (I_{BO}) vs. Junction Temperature



Figure 12: Dynamic Holding Current Test Circuit for SIDACs



Figure 13: Basic SIDAC Circuit

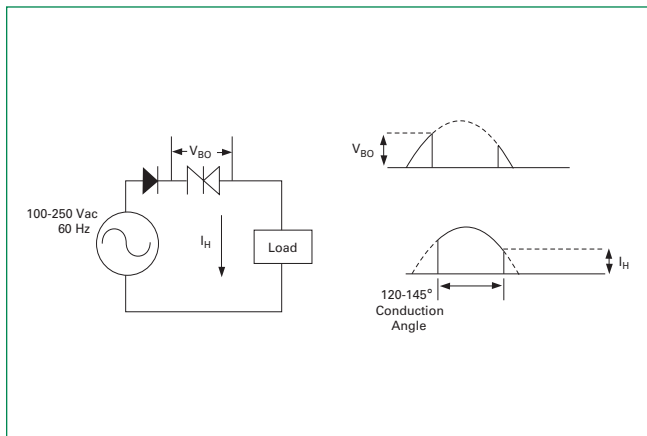


Figure 14: Relaxation Oscillator Using a SIDAC

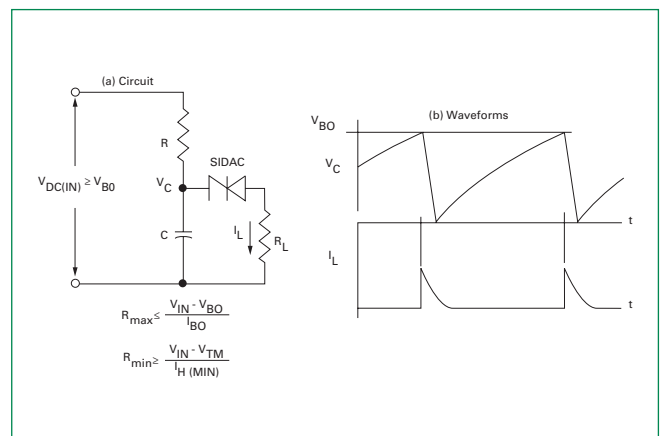


Figure 15: Low-voltage Input Circuit for Gas Ignition

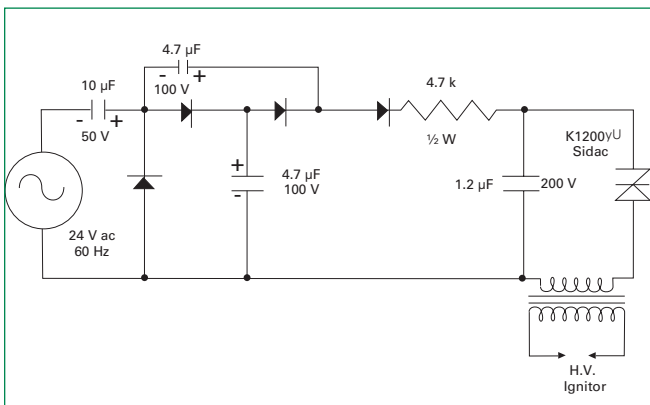


Figure 16: Comparison of SIDAC versus SCR for Gas Ignitor Circuit

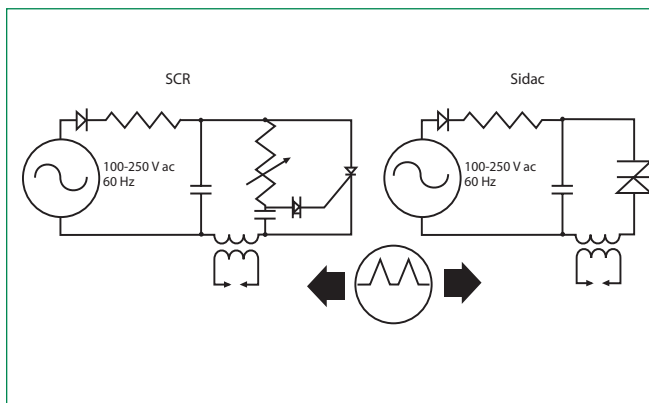


Figure 17: SIDAC Circuit for High-power Igniter

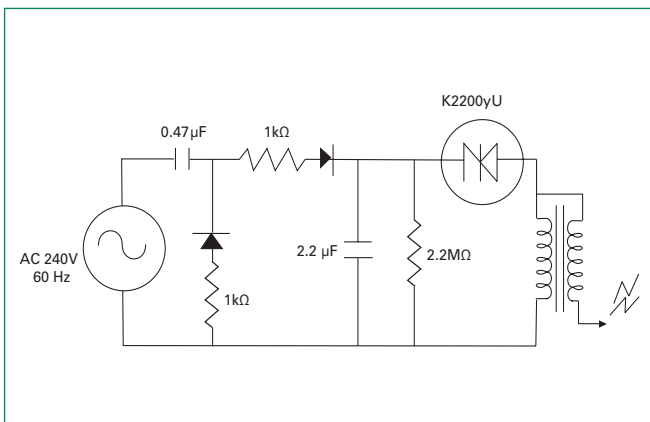
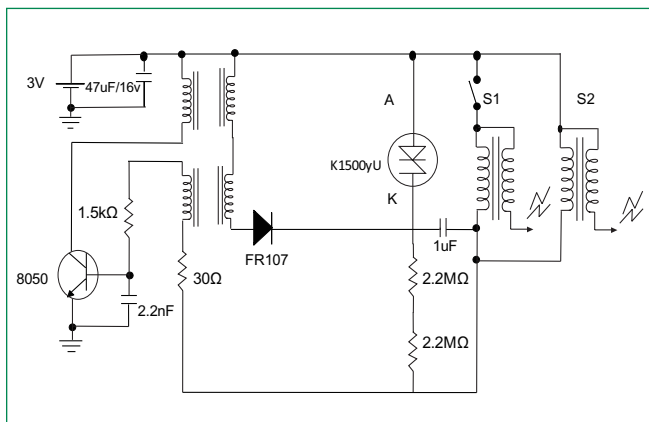
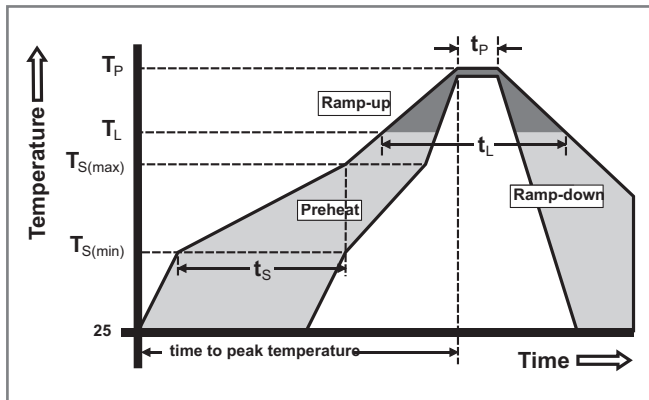


Figure 18: SIDAC Circuit for Gas Ignition



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 Finish | 100% Matte Tin Plated |
| Body Material | UL recognized epoxy meeting flammability classification 94V-0 |
| Lead Material | Copper Alloy |

Design Considerations

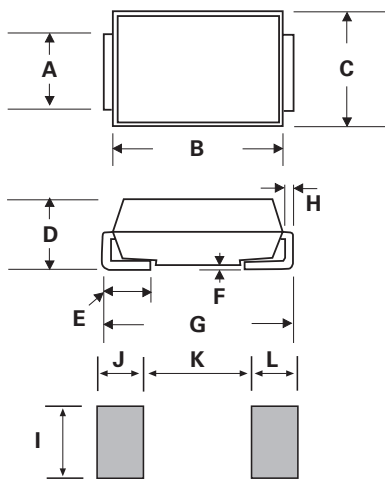
Careful selection of the correct device for the application's operating parameters and environment will go a long way toward extending the operating life of the Thyristor. Overheating and surge currents are the main killers of SIDACs. Correct mounting, soldering, and forming of the leads also help protect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

Reliability/Environmental Tests

| Test | Specifications and Conditions |
|--|---|
| High Temperature Voltage Blocking | MIL-STD-750: Method 1040, Condition A Rated V_{DRM} (Rectified VAC-peak), T_J , 504 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 80% min V_{BO} (V_{DC}), 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 |
| Resistance to Solder Heat | MIL-STD-750: Method 2031 260°C, 10 seconds |
| Solderability | ANSI/J-STD-002: Category 3 |
| Lead Bend | MIL-STD-750: Method 2036, Condition E |

Dimensions

DO-214AC (SMA)



| Dimensions | Inches | | Millimeters | |
|------------|--------|-------|-------------|-------|
| | Min | Max | Min | Max |
| A | 0.049 | 0.065 | 1.250 | 1.650 |
| B | 0.157 | 0.177 | 3.990 | 4.500 |
| C | 0.100 | 0.110 | 2.540 | 2.790 |
| D | 0.078 | 0.090 | 1.980 | 2.290 |
| E | 0.030 | 0.060 | 0.780 | 1.520 |
| F | - | 0.008 | - | 0.203 |
| G | 0.194 | 0.208 | 4.930 | 5.280 |
| H | 0.006 | 0.012 | 0.152 | 0.305 |
| I | 0.070 | - | 1.800 | - |
| J | 0.082 | - | 2.100 | - |
| K | - | 0.090 | - | 2.300 |
| L | 0.082 | - | 2.100 | - |

Dimensions — DO-15



| Dimension | Inches | | Millimeters | |
|-----------|--------|-------|-------------|------|
| | Max | Max | Min | Max |
| A | 1.000 | - | 25.40 | - |
| B | 0.230 | 0.300 | 5.80 | 7.60 |
| C | 0.028 | 0.034 | 0.71 | 0.86 |
| D | 0.104 | 0.140 | 2.60 | 3.60 |

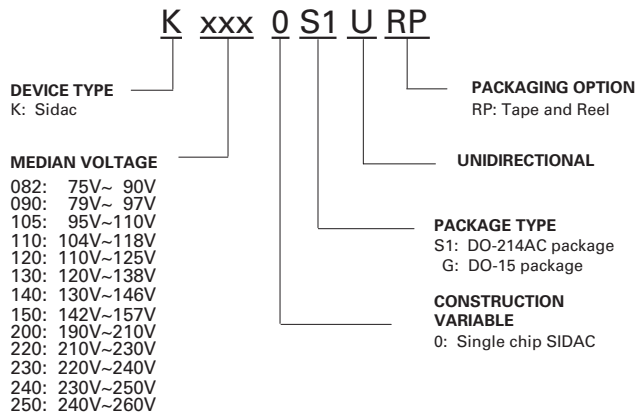
Product Selector

| Part Number | Switching Voltage Range | | Blocking Voltage | Packages | |
|-------------|-------------------------|-------------------------|------------------|-----------|------------|
| | V _{BO} Minimum | V _{BO} Maximum | V _{DRM} | DO-15 | DO-214 |
| K0820yURP | 75 | 90 | 70 | K0820GURP | K0820S1URP |
| K0900yURP | 79 | 97 | 70 | K0900GURP | K0900S1URP |
| K1050yURP | 95 | 110 | 90 | K1050GURP | K1050S1URP |
| K1100yURP | 104 | 118 | 90 | K1100GURP | K1100S1URP |
| K1200yURP | 110 | 125 | 100 | K1200GURP | K1200S1URP |
| K1300yURP | 120 | 138 | 110 | K1300GURP | K1300S1URP |
| K1400yURP | 130 | 146 | 115 | K1400GURP | K1400S1URP |
| K1500yURP | 142 | 157 | 120 | K1500GURP | K1500S1URP |
| K2000yURP | 190 | 210 | 170 | K2000GURP | K2000S1URP |
| K2200yURP | 210 | 230 | 190 | K2200GURP | K2200S1URP |
| K2300yURP | 220 | 240 | 200 | K2300GURP | K2300S1URP |
| K2400yURP | 230 | 250 | 210 | K2400GURP | K2400S1URP |
| K2500yURP | 240 | 260 | 220 | K2500GURP | K2500S1URP |

Packing Options

| Part Number | Marking | Weight | Package Mode | Packages | Base Quantity |
|-------------|---------|--------|--------------|----------|---------------|
| Kxxx0S1URP | Kxxx | 0.062g | Reel Pack | DO-214AC | 5000 |
| Kxxx0GURP | Kxxx | 0.38g | Reel Pack | DO-15 | 5000 |

Part Numbering System



Part Marking System



Tape and Reel Specification — DO-214AC



DO-15 Reel Pack (RP) Specifications

Meets all EIA RS-296 Standards

