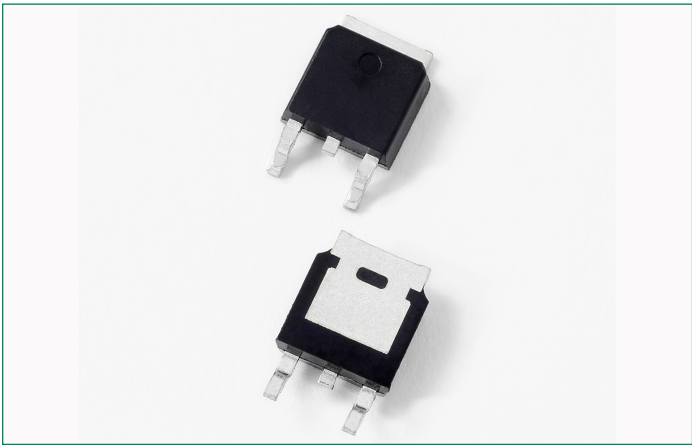


# SRU6008xSx

8 A Sensitive SCR (reverse undefined)

RoHS



## Description:

The SRU6008xSx SCR series is specifically designed for high voltage capacitor discharge applications.

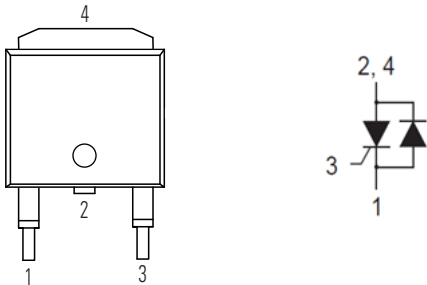
## Features and Benefits:

- High forward blocking voltage of 600 V
- High pulse current handling capacity
- High di/dt of 100 A/μs
- Reverse direction not designed to function

## Applications:

Typical applications are high voltage pulse generation by capacitor discharge for electric fences, CEWs (contact electric weapon) and high-power strobe lights.

## Pinout Diagram



1: Cathode; 2: Anode; 3: Gate; 4: Anode

## Product Summary

| Characteristic | Value | Unit |
|----------------|-------|------|
| $I_{T(RMS)}$   | 8     | A    |
| $V_{DRM}$      | 600   | V    |
| $V_{RRM}$      | N/A   | V    |
| $I_{GT}$       | 0.2   | mA   |

## Absolute Maximum Ratings – Sensitive SCRs

| Symbol       | Characteristics                           | Conditions                                                                         | Value      | Units                  |
|--------------|-------------------------------------------|------------------------------------------------------------------------------------|------------|------------------------|
| $V_{DSM}$    | Non-repetitive Peak Off-state Voltage     | $T_J = 25^{\circ}\text{C}$                                                         | 800        | V                      |
| $I_{T(RMS)}$ | RMS On-state Current                      | $T_C = 130^{\circ}\text{C}$                                                        | 8          | A                      |
| $I_{T(AV)}$  | Average On-state Current                  |                                                                                    | 5.1        |                        |
| $I_{TSM}$    | Peak Non-repetitive Surge Current         | Single Half Cycle, $f = 50\text{ Hz}$ , $T_J(\text{initial}) = 25^{\circ}\text{C}$ | 83         | A                      |
|              |                                           | Single Half Cycle, $f = 60\text{ Hz}$ , $T_J(\text{initial}) = 25^{\circ}\text{C}$ | 100        |                        |
| $I^2t$       | $I^2t$ Value for Fusing                   | $t_p = 8.3\text{ ms}$                                                              | 41         | $\text{A}^2\text{s}$   |
| $di/dt$      | Critical Rate-of-Rise of On-state Current | $T_J = 150^{\circ}\text{C}$<br>$f = 60\text{ Hz}$                                  | 100        | $\text{A}/\mu\text{s}$ |
| $I_{GM}$     | Peak Gate Current                         | $P_W = 20\text{ }\mu\text{s}$<br>$T_J = 150^{\circ}\text{C}$                       | 0.5        | A                      |
| $P_{G(AV)}$  | Average Gate Power Dissipation            | $T_J = 150^{\circ}\text{C}$                                                        | 0.1        | W                      |
| $T_{stg}$    | Storage Temperature Range                 | –                                                                                  | –40 to 150 | $^{\circ}\text{C}$     |
| $T_J$        | Operating Junction Temperature Range      | –                                                                                  | –40 to 150 | $^{\circ}\text{C}$     |

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

| Symbol    | Characteristic                             | Conditions                                                                                                           | Value |      |      | Unit                   |
|-----------|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-------|------|------|------------------------|
|           |                                            |                                                                                                                      | Min.  | Typ. | Max. |                        |
| $I_{GT}$  | Gate Trigger Current                       | $V_D = 12\text{ V}$ $R_L = 60\text{ }\Omega$                                                                         | 20    | –    | –    | $\mu\text{A}$          |
|           |                                            |                                                                                                                      | –     | –    | 200  |                        |
| $V_{GT}$  | Gate Trigger Voltage                       |                                                                                                                      | –     | –    | 0.8  | V                      |
| $dv/dt$   | Critical Rate of Rise of Off-stage Voltage | $V_D = V_{DRM}$ ; $RGK = 220\text{ }\Omega$ ; $T_J = 125^{\circ}\text{C}$                                            | 15    | –    | –    | $\text{V}/\mu\text{s}$ |
| $V_{GD}$  | Gate Non-trigger Voltage                   | $V_D = V_{DRM}$ $R_L = 3.3\text{ k}\Omega$ $T_J = 150^{\circ}\text{C}$                                               | 0.1   | –    | –    | V                      |
| $I_H$     | Holding Current                            | $I_T = 200\text{ mA}$ (initial)                                                                                      | –     | –    | 6    | mA                     |
| $t_q$     | Turn-off Time                              | $I_T = 0.5\text{ A}$ ; $t_p = 50\text{ }\mu\text{s}$ ; $dv/dt = 5\text{ V}/\mu\text{s}$ ; $di/dt = -30\text{ A}/\mu$ | –     | 55   | –    | $\mu\text{s}$          |
| $t_{gt}$  | Turn-on Time                               | $I_G = 2 \times I_{GT}$ $P_W = 15\text{ }\mu\text{s}$ $I_T = 16\text{ A}$                                            | –     | 1    | –    | $\mu\text{s}$          |
| $V_{GRM}$ | Peak Reverse Gate Voltage                  | $I_{GR} = 10\text{ }\mu\text{A}$                                                                                     | 6     | –    | –    | V                      |

## Static Characteristics

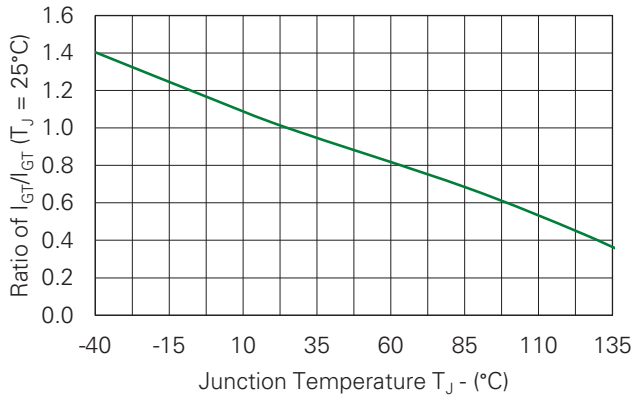
| Symbol    | Characteristic                    | Conditions                                                | Value |      |      | Unit          |
|-----------|-----------------------------------|-----------------------------------------------------------|-------|------|------|---------------|
|           |                                   |                                                           | Min.  | Typ. | Max. |               |
| $V_{TM}$  | Peak On-state Voltage Drop        | $I_T = 16\text{ A}$ ; $t_p = 380\text{ }\mu\text{s}$      | –     | –    | 1.6  | V             |
| $I_{DRM}$ | Repetitive Peak Off-state Current | $V_D = V_{DRM} = 600\text{ V}$ $T_J = 25^{\circ}\text{C}$ | –     | –    | 5    | $\mu\text{A}$ |
|           |                                   | $T_J = 150^{\circ}\text{C}$ ; $RGK = 220\text{ }\Omega$   | –     | –    | 2    | mA            |

## Thermal Resistances

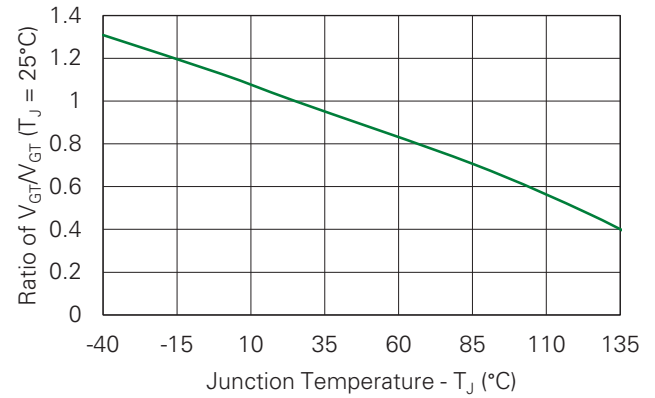
| Symbol           | Characteristic                            | Conditions | Value | Unit                        |
|------------------|-------------------------------------------|------------|-------|-----------------------------|
| $R_{\theta(JC)}$ | Thermal Resistance, Junction to case (AC) | –          | 1.2   | $^{\circ}\text{C}/\text{W}$ |

## Characteristic Curves

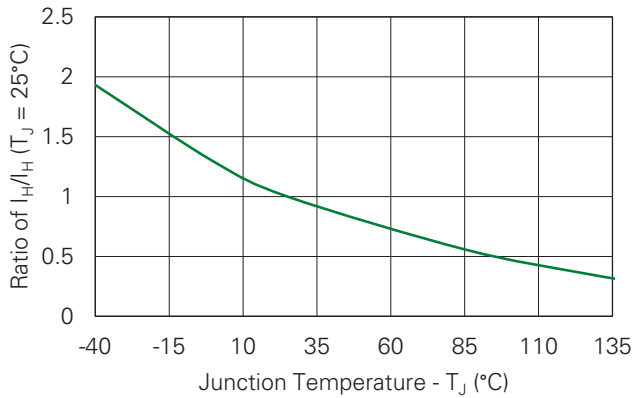
**Fig. 1. Normalized DC Gate Trigger Current vs. Junction Temperature**



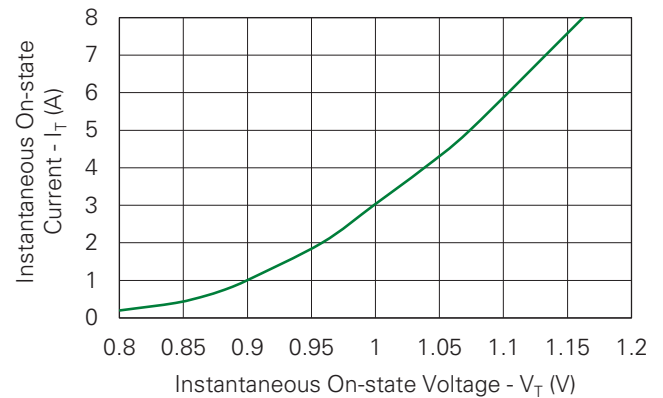
**Fig. 2. Normalized DC Gate Trigger Voltage vs. Junction Temperature**



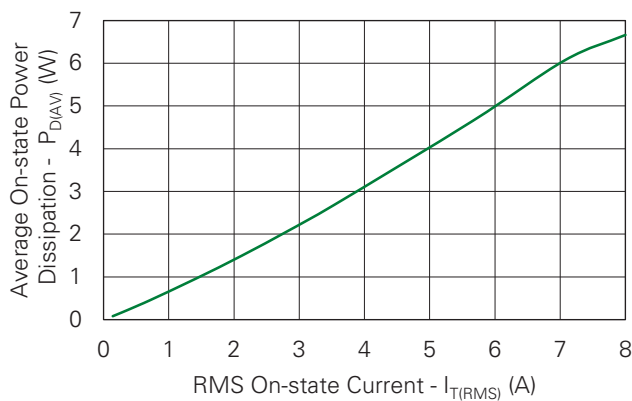
**Fig. 3. Normalized DC Holding Current vs. Junction Temperature**



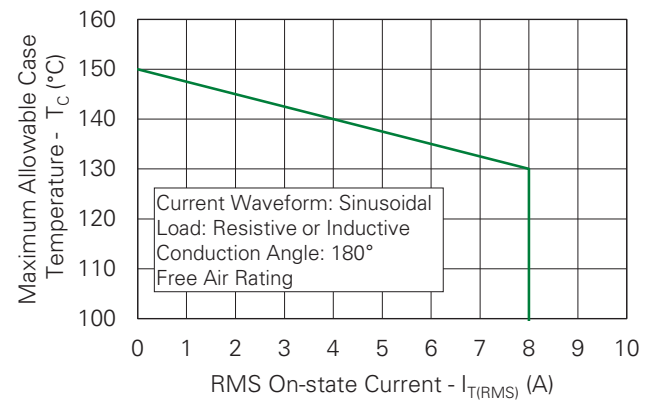
**Fig. 4. Typical On-state Current vs. On-state Voltage**



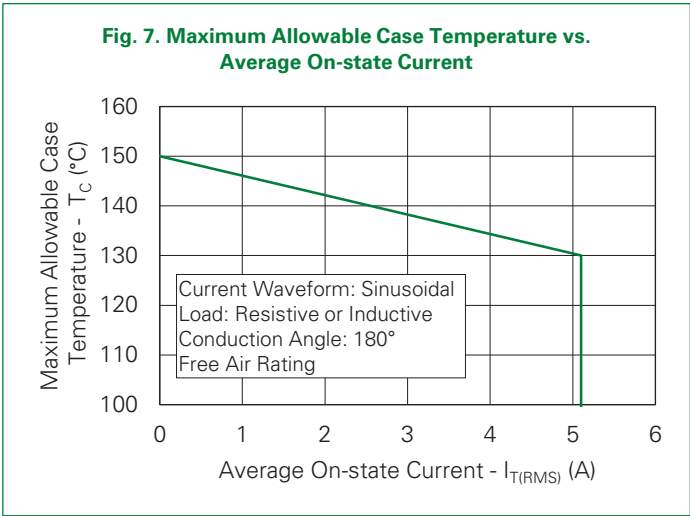
**Fig. 5. Typical Power Dissipation vs. RMS On-state Current**



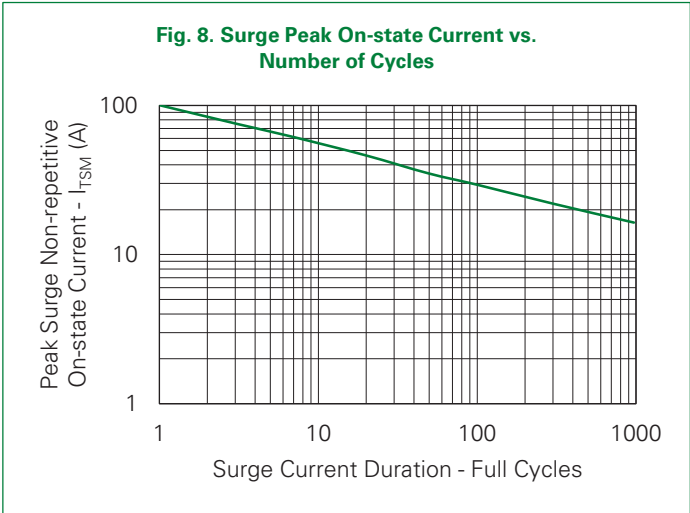
**Fig. 6. Maximum Allowable Case Temperature vs. RMS On-state Current**



**Fig. 7. Maximum Allowable Case Temperature vs. Average On-state Current**



**Fig. 8. Surge Peak On-state Current vs. Number of Cycles**

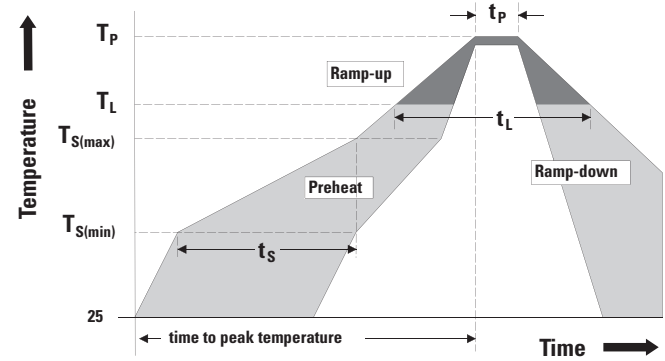


SUPPLY FREQUENCY: 60 Hz Sinusoidal  
LOAD: Resistive  
RMS On-State Current: [ $I_{T(RMS)}$ ]: Maximum Rated Value at Specified Case Temperature

- Notes:
1. Gate control may be lost during and immediately following surge current interval.
  2. Overload may not be repeated until junction temperature has returned to steady-state rated value.

## Soldering Parameters

| Characteristic                                        |                                  | Value                   |
|-------------------------------------------------------|----------------------------------|-------------------------|
| 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 – 120 secs           |
| Average ramp up rate (Liquidus Temp)( $T_L$ ) to peak |                                  | 3°C/second max          |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                  |                                  | 3°C/second max          |
| Reflow                                                | Temperature ( $T_L$ ) (Liquidus) | 217°C                   |
|                                                       | Time ( $t_L$ )                   | 60 – 150 seconds        |
| Peak Temperature ( $T_p$ )                            |                                  | 260 <sup>+0/-5</sup> °C |
| Time within 5°C of actual peak Temperature ( $t_p$ )  |                                  | 30 seconds max          |
| Ramp-down Rate                                        |                                  | 6°C/second max          |
| Time 25°C to peak Temperature ( $T_p$ )               |                                  | 8 minutes max           |
| Do Not Exceed                                         |                                  | 260°C                   |



## Physical Specifications

| Characteristic  | Value                                                  |
|-----------------|--------------------------------------------------------|
| Terminal Finish | 100% Matte Tin-plated                                  |
| Body Material   | UL Recognized compound meeting flammability rating V-0 |
| Lead Material   | Copper Alloy                                           |

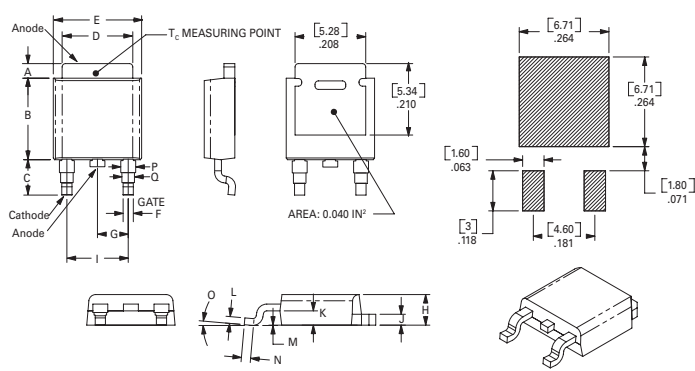
## Design Considerations

Careful selection of the correct component for the application's operating parameters and environment will go a long way toward extending the operating life of the Thyristor. Good design practice should limit the maximum continuous current through the main terminals to 75% of the component rating. Other ways to ensure long life for a power discrete semiconductor are proper heat sinking and selection of voltage ratings for worst case conditions. Overheating, overvoltage (including  $dv/dt$ ), and surge currents are the main killers of semiconductors. Correct mounting, soldering, and forming of the leads also help protect against component damage.

## Environmental Specifications

| Test                       | Specifications and Conditions                                                |
|----------------------------|------------------------------------------------------------------------------|
| AC Blocking                | MIL-STD-750, M-1040, Cond A Applied Peak AC voltage for 1008 hours           |
| Temperature/Humidity       | EIA / JEDEC, JESD22-A101, 1008 hours; 160V - DC: 85°C; 85% relative humidity |
| Temperature Cycling        | MIL-STD-750, M-1051, 1000 cycles; -55°C to +150°C; 15-min dwell-time         |
| Resistance to Solder Heat  | MIL-STD-750 Method 2031                                                      |
| Solderability              | ANSI/J-STD-002, category 3, Test A                                           |
| Moisture Sensitivity Level | Level 1                                                                      |

Part Outline Drawing (TO-252AA) (D Package) – DPAK Surface Mount)

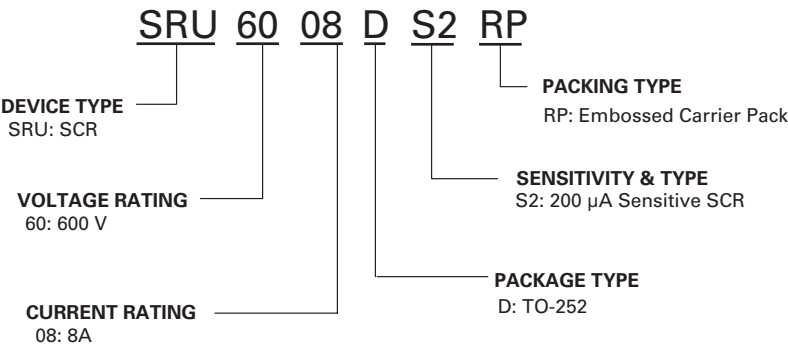


| Symbol | Inches |         |       | Millimeters |         |      |
|--------|--------|---------|-------|-------------|---------|------|
|        | Min.   | Typical | Max.  | Min.        | Typical | Max  |
| A      | 0.037  | 0.040   | 0.043 | 0.94        | 1.01    | 1.09 |
| B      | 0.235  | 0.243   | 0.245 | 5.97        | 6.16    | 6.22 |
| C      | 0.106  | 0.108   | 0.113 | 2.69        | 2.74    | 2.87 |
| D      | 0.205  | 0.208   | 0.213 | 5.21        | 5.29    | 5.41 |
| E      | 0.255  | 0.262   | 0.265 | 6.48        | 6.65    | 6.73 |
| F      | 0.027  | 0.031   | 0.033 | 0.69        | 0.80    | 0.84 |
| G      | 0.087  | 0.090   | 0.093 | 2.21        | 2.28    | 2.36 |
| H      | 0.085  | 0.092   | 0.095 | 2.16        | 2.33    | 2.41 |
| I      | 0.176  | 0.179   | 0.184 | 4.47        | 4.55    | 4.67 |
| J      | 0.018  | 0.020   | 0.023 | 0.46        | 0.51    | 0.58 |
| K      | 0.035  | 0.037   | 0.039 | 0.90        | 0.95    | 1.00 |
| L      | 0.018  | 0.020   | 0.023 | 0.46        | 0.51    | 0.58 |
| M      | 0.000  | 0.000   | 0.004 | 0.00        | 0.00    | 0.10 |
| N      | 0.021  | 0.026   | 0.027 | 0.53        | 0.67    | 0.69 |
| O      | 0°     | 0°      | 5°    | 0°          | 0°      | 5°   |
| P      | 0.042  | 0.047   | 0.052 | 1.06        | 1.20    | 1.32 |
| Q      | 0.034  | 0.039   | 0.044 | 0.86        | 1.00    | 1.11 |

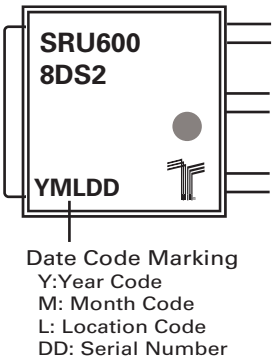
Packing Options

| Part Number  | Marking    | Package | Type          | Weight | Packing Mode     | Base Quantity |
|--------------|------------|---------|---------------|--------|------------------|---------------|
| SRU6008DS2RP | SRU6008DS2 | TO-252  | Sensitive SCR | 0.3 g  | Embossed Carrier | 2500          |

Part Numbering and Marking

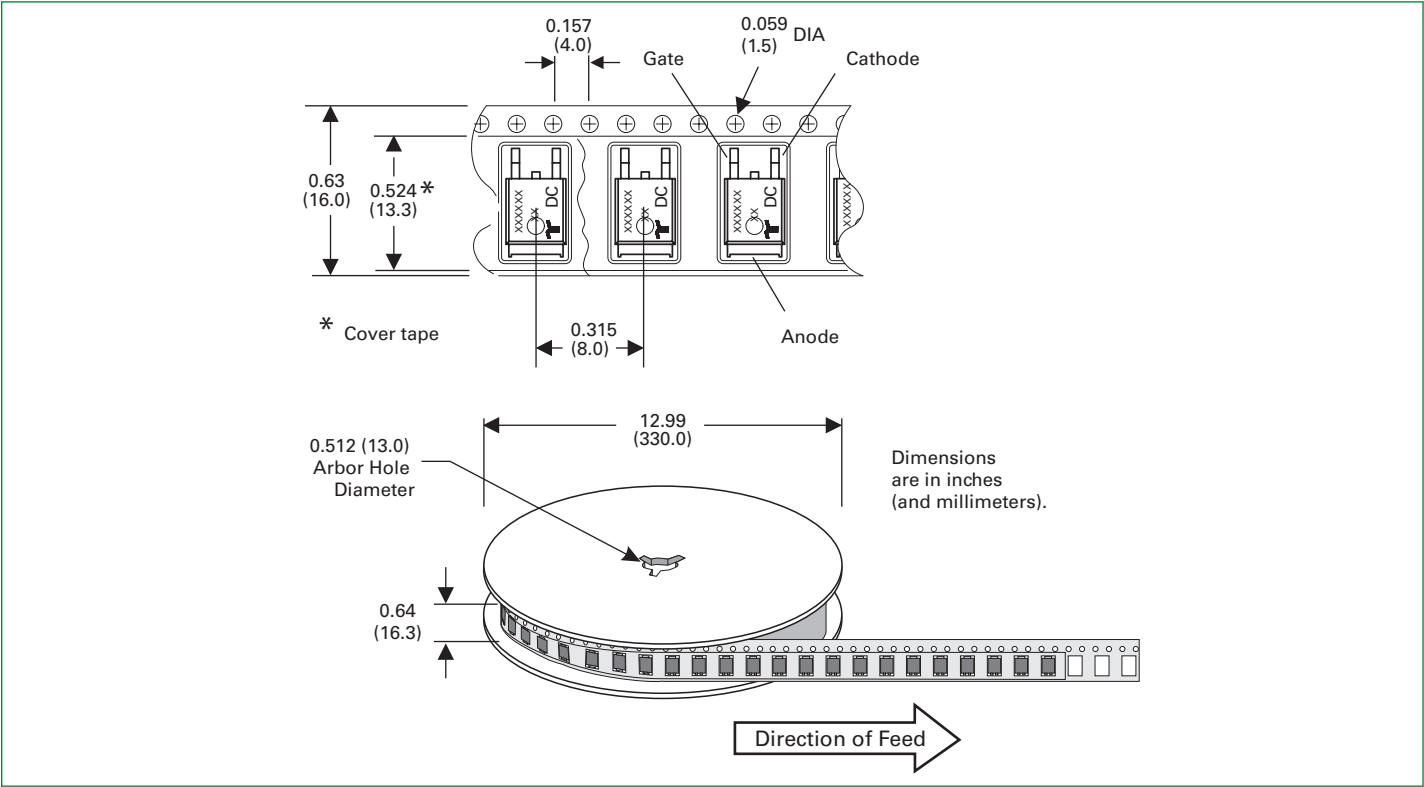


TO-252AA - (D Package)



TO-252 Embossed Carrier Reel Pack (RP) Specifications

Meets all EIA-418-2 Standards



**Disclaimer Notice**

Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications.

Read complete Disclaimer Notice at <http://www.littelfuse.com/disclaimer-electronics>.



Part of:

