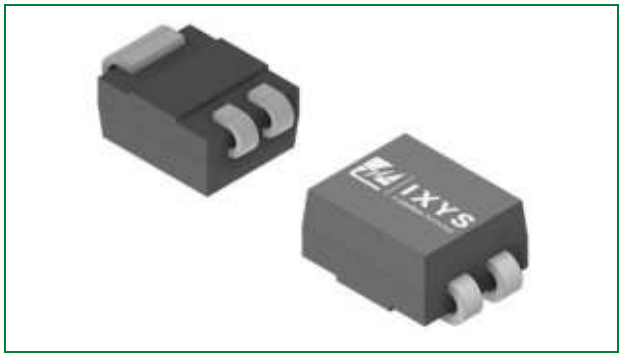
Teccor® brand Thyristors
Sx02CSx Series 1.25 Amp Sensitive SCRs



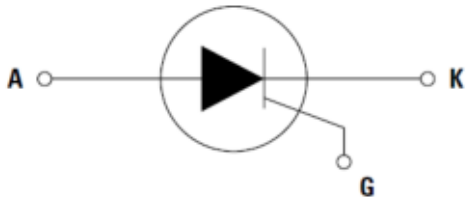
Agency Approvals and Environmental

Environmental Approvals
RoHS

Product Summary

Characteristic	Value	Unit
$I_{T(RMS)}$	1.25	A
V_{DRM} / V_{RRM}	800	V
I_{GT}	50 to 200	µA

Schematic Symbol



Product Description

The Sx02CSx offers excellent unidirectional switches for phase control applications such as heating and motor speed controls.

Sensitive gate SCRs are easily triggered with microAmps of current as furnished by sense coils, proximity switches, and microprocessors.

Features

- RoHS compliant
- Glass-passivated junctions
- Voltage capability up to 800 V
- Surge capability up to 20 A

Applications

Typical applications are capacitive discharge systems for strobe lights and gas engine ignition. They also include controls for power tools, home/brown goods, and white goods appliances

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1. Maximum Ratings

Symbol	Characteristic	Conditions	Value	Unit
V_{DSM}	Non-repetitive Peak Off-state Voltage	T_J = 25°C, t_p = 1 ms, R_{GK} = 220 Ω	1250	V
V_{RSM}	Non-repetitive Peak Reverse Voltage	T_J = 25°C, t_p = 1 ms, R_{GK} = 220 Ω	900	V
$I_{T(RMS)}$	RMS On-state Current	T_C = 75 °C	1.25	A
$I_{T(AV)}$	Average On-state Current	T_C = 75 °C	0.8	A
I_{TSM}	Peak Non-repetitive Surge Current (Single Half Cycle, $T_{J,Initial}$ = 25 °C)	f = 50 Hz	16	A
		f = 60 Hz	20	
I^2t	I^2t Value for Fusing	t_p = 8.3 ms	1.6	A^2s
di/dt	Critical Rate of Rise of On-state Current	f = 60 Hz, T_J = 110 °C	50	A/µs
I_{GM}	Peak Gate Current	T_J = 110 °C	1.0	A
$P_{G(AV)}$	Average Gate Power Dissipation	T_J = 110 °C	0.1	W
T_{STG}	Storage Temperature	-	-40 to 150	°C
T_J	Operating Junction Temperature	-	-40 to 110	°C

2. Thermal Characteristics

Symbol	Characteristic	Value	Unit
$R_{th(JC)}$	Thermal Resistance, junction-to-case (AC)	60[1]	°C/W

Footnote 1: Mounted on 1 cm^2 copper (two-ounce) foil surface

3. Electrical Characteristics (T_J = 25 °C unless otherwise specified)

Symbol	Description	Conditions	S802CS1			S802CS2			Unit
			Min	Typ	Max	Min	Typ	Max	
I_{GT}	DC Gate Trigger Current	V_D = 6 V, R_L = 100 Ω	-	-	50	-	-	200	µA
V_{GT}	DC Gate Trigger Voltage	V_D = 6 V, R_L = 100 Ω	-	-	0.8	-	-	0.8	V
V_{GRM}	Peak Reverse Gate Voltage	I_{RG} = 10 µA	5	-	-	5	-	-	V
I_H	Holding Current	I_T = 20 mA (initial), R_{GK} = 1 kΩ	-	-	3	-	-	5	mA
dv/dt	Critical Rate-of-rise of Off-stage Voltage	V_D = V_{DRM}, R_{GK} = 1 kΩ, T_J = 110°C	10	-	-	15	-	-	V/µs
t_q	Turn-off Time	I_T = 1 A, t_p = 50 µs, dv/dt = 5 V/µs, di/dt = 5 A/µs	-	-	50	-	-	50	µs
t_{gt}	Turn-on Time	I_G = 2 x I_{GT}, PW = 15 µs, I_T = 1.6 A	-	3	-	-	20	-	µs
V_{GD}	Gate Non-trigger Voltage	V_D = V_{DRM}, R_L = 3.3 kΩ, T_J = 110°C	0.25	-	-	0.25	-	-	V

4. Static Characteristics

Symbol	Description	Conditions	Value (Max)	Unit
V_{TM}	Peak On-state Voltage	I_T = 2.5 A; t_p = 380 µs	1.70	V
I_{DRM}/I_{RRM}	Off-state Current, Peak Repetitive (V_{DRM} = V_{RRM}, R_{GK} = 1 kΩ)	T_J = 25°C	1	µA
		T_J = 100°C	50	
		T_J = 110°C	500	

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5. Performance Curves

Figure 1. Normalized DC Gate Trigger Current vs. Junction Temperature

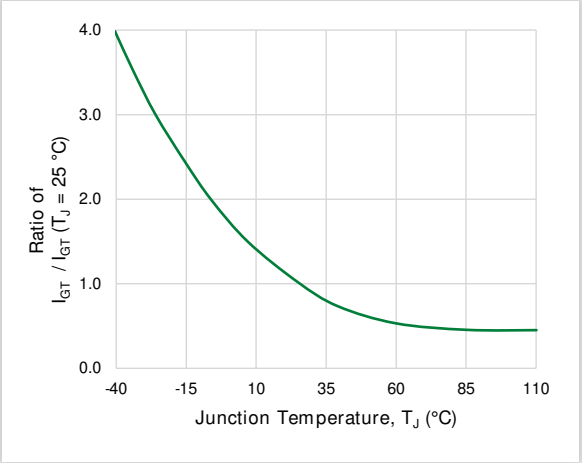


Figure 2. Normalized DC Gate Trigger Voltage vs. Junction Temperature

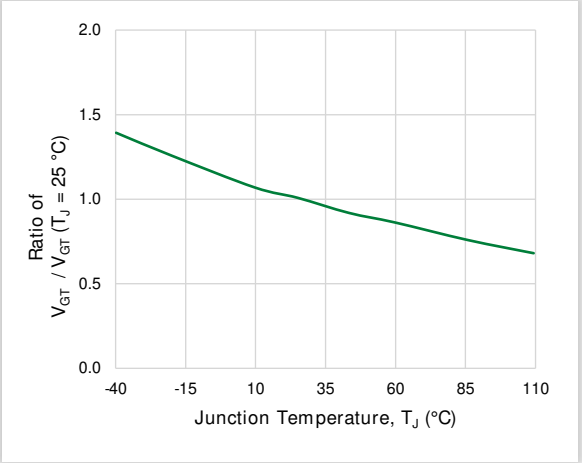


Figure 3. Normalized DC Holding Current vs. Junction Temperature

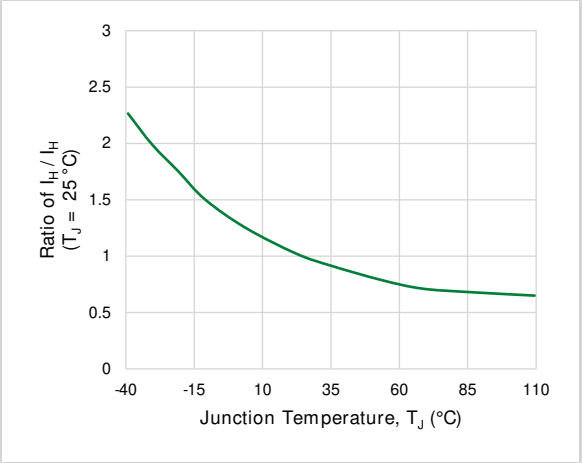
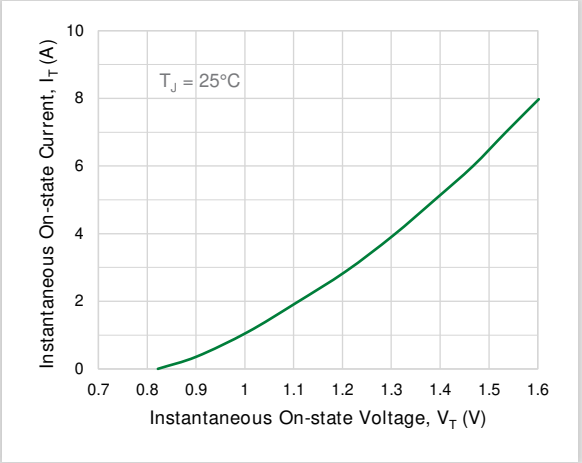


Figure 4. Typical On-state Current vs. On-state Voltage



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Figure 5. Typical Power Dissipation vs. RMS On-state Current

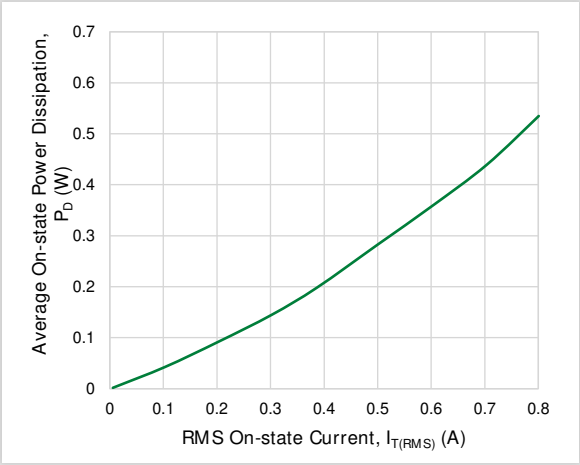


Figure 6. Maximum Allowable Case Temperature vs. RMS On-state Current

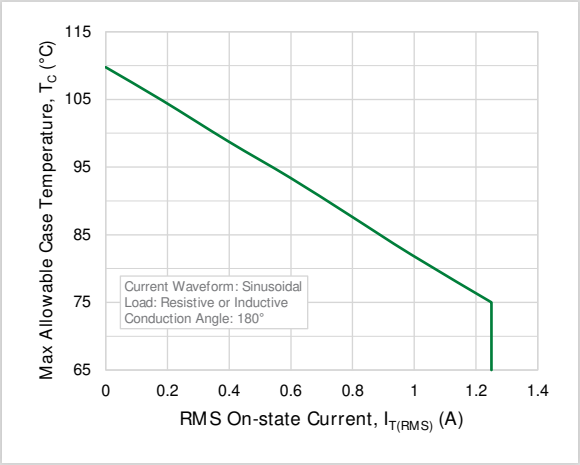


Figure 7. Maximum Allowable Case Temperature vs. Average On-state Current

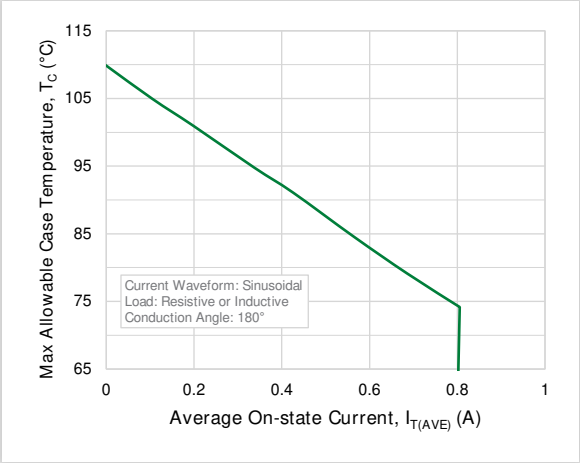


Figure 8. Peak Capacitor Discharge Current

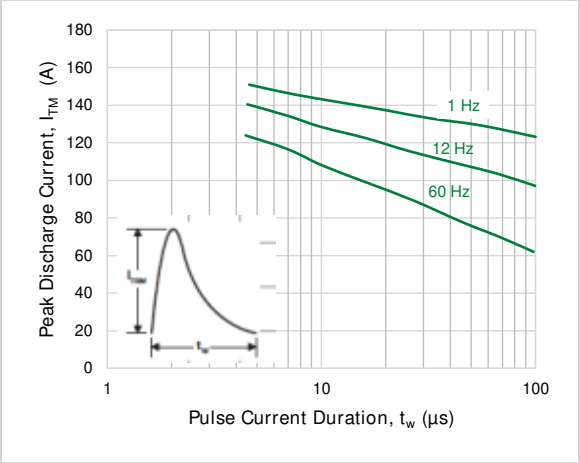
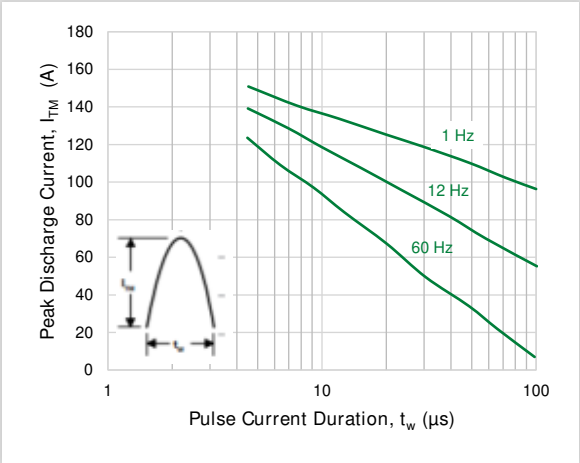
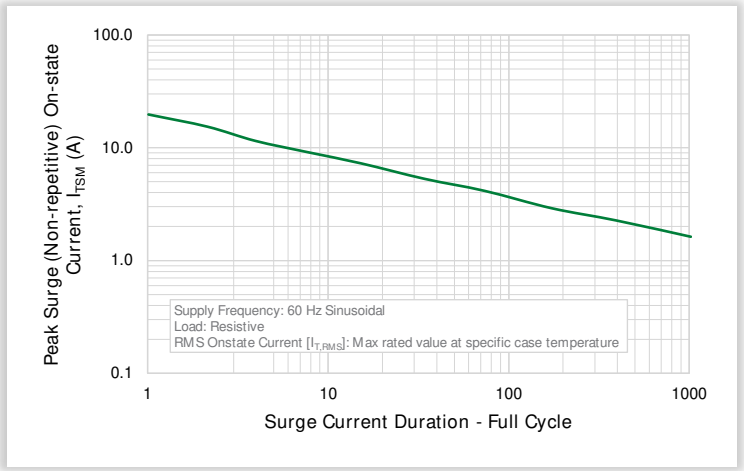


Figure 9. Peak Repetitive Sinusoidal Pulse Current



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Figure 10. Surge Peak On-state Current vs. Number of Cycles

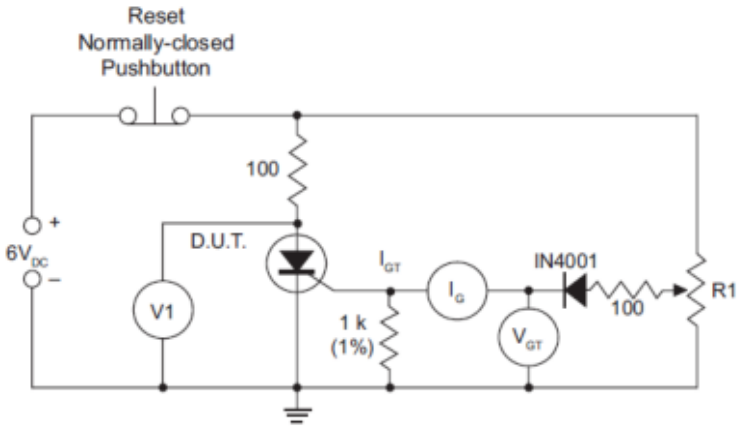


Notes

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.

Figure 11. Simple Test Circuit for Gate Trigger Voltage and Current



Notes

V1 — 0 V to 10 V dc meter

V_{GT} — 0 V to 1 V dc meter

I_G — 0 mA to 1 mA dc milliammeter

R1 — 1 k potentiometer

To measure gate trigger voltage and current, raise gate voltage (V_{GT}) until meter reading V1 drops from 6 V to 1 V. Gate trigger voltage is the reading on V_{GT} just prior to V1 dropping. Gate trigger current I_{GT} Can be computed from the relationship.

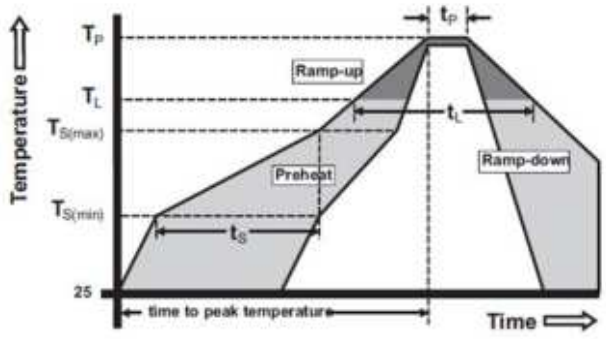
$I_{GT} = I_G - V_{GT} / 1000$ A

where I_G is reading (in amperes) on meter just prior to V1 dropping.

2. I_{GT} may turn out to be a negative quantity (trigger current flows out from gate lead). If negative current occurs, I_{GT} value is not a valid reading. Remove 1 k resistor and use I_G as the more correct I_{GT} value. This will occur on 12 µA gate products.

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6. Soldering Parameters



Parameter		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 to 180 s
Average Ramp-up Rate Liquidus Temp., T_L to peak		5 °C/s (Max)
$T_{S(Max)}$ to T_L Ramp-up Rate		5 °C/s (Max)
Reflow	Temperature, T_L Liquidus	217 °C
	Time, t_S	60 to 150 s
Peak Temperature, T_P		260 °C (±5 °C)
Time within 5 °C of Actual Peak Temperature, t_P		20 to 40 s
Ramp-down Rate		5 °C/s (Max)
Time 25 °C to Peak Temperature, T_P		8 minutes (Max)
Do Not Exceed		280 °C

7. Physical Specifications

Device Feature	Detail
Terminal Finish	100% Matte Tin-plated/ Pb-free Solder Dipped
Body Material	UL Recognized epoxy meeting Flammability Rating V-0
Lead Material	Copper Alloy

8. Environmental Specifications

Test	Specifications and Conditions
AC Blocking	MIL-STD-750, M-1040, Cond A Applied Peak AC voltage @110°C for 1008 hours
Temperature Cycling	MIL-STD-750, M-1051, 100 cycles, -40°C to +150°C, 15 min dwell time
Temperature/Humidity	EIA / JEDEC, JESD22-A101 1008 hours; 320V - DC: 85°C; 85% relative humidity
High Temperature Storage	MIL-STD-750, M-1031, 1008 hours, 150°C
Low Temperature Storage	1008 hours, -40°C
Resistance to Solder Heat	MIL-STD-750 Method 2031
Solderability	ANSI/J-STD-002, category 3, Test A
Lead Bend	MIL-STD-750, M-2036 Cond E

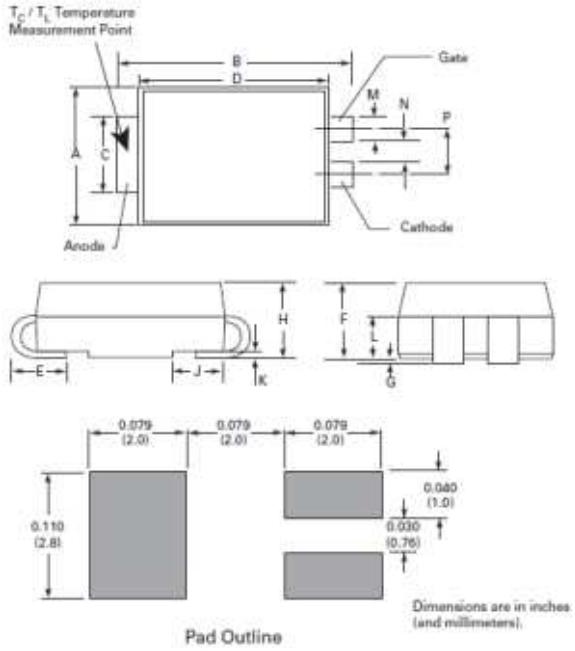
9. Design Considerations

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.

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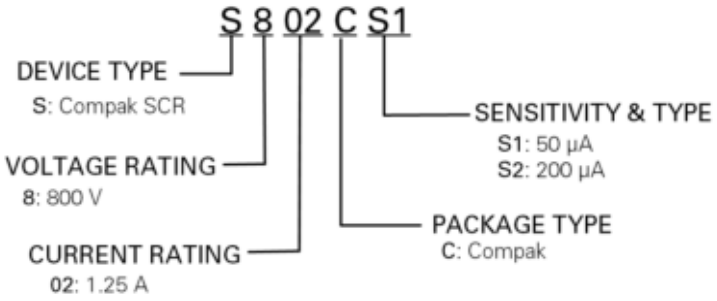
10. Package Dimensions

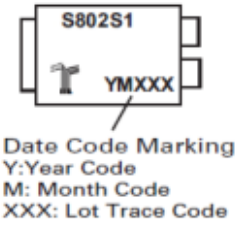
Compak (C Package)



Dimension	Inches		Millimeters	
	Min	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
M	0.022	0.028	0.56	0.71
N	0.027	0.033	0.69	0.84
P	0.052	0.058	1.32	1.47

11. Part Numbering and Marking





12. Packing Options

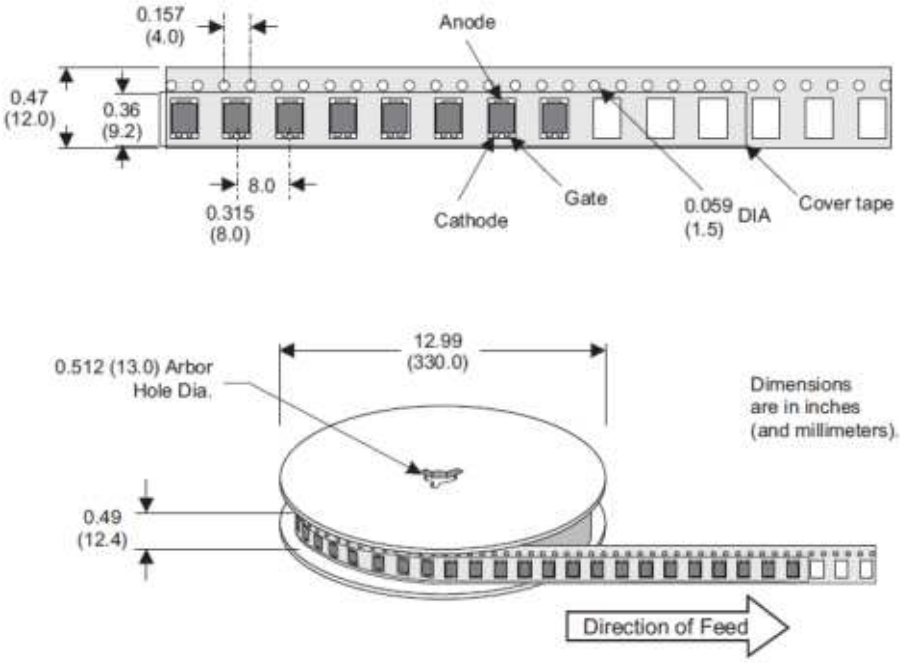
Part Number	Marking	Gate Sensitivity	Weight	Packing Mode	Base Quantity
S802CS1RP	S802S1	50 µA	0.08 g	Embossed Carrier	2500
S802CS2RP	S802S2	200 µA	0.08 g	Embossed Carrier	2500

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13. Packing Specifications

Compak Embossed Carrier Reel Pack (RP) Specifications

Meets all EIA-481-1 Standards



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