Surface Mount Surgector™ Transient Voltage Suppressors

The Harris Surgector family has been extended to include a series of two-terminal surface mount devices as described in this data sheet. Surgectors are designed to suppress lightning and other transients that are induced on the telecommunication system as described in various international safety and compatibility standards. These devices can help provide the secondary protection for telecommunication equipment such as telephone, MODEM, line card and other devices subject to damage from transient over voltage. Surgectors can be an integral part of a Telephone Line Protector Unit, meeting AC Power Cross criteria when used in association with properly selected resistor/PTC/fuse combinations.

Harris Surface Mount Surgectors are manufactured using a silicon thyristor technology, offering bidirectional voltage clamping for transients of either polarity from a single chip.

The Surgector devices described in this data sheet are manufactured with the DO-214AA low profile case style and are second source equivalent parts to industry "SIDAC" types. Surface Mount Surgectors are supplied in embossed carrier tape on 330mm (13in) reels.

Ordering Information

PART NUMBER	TEMP. RANGE (°C)	PACKAGE	PKG. NO.
SGT0640SBT	-40 to 85	2 Ld Surface Mount J-Bend	DO-214AA
SGT0720SBT	-40 to 85	2 Ld Surface Mount J-Bend	DO-214AA
SGT2300SBT	-40 to 85	2 Ld Surface Mount J-Bend	DO-214AA
SGT2900SBT	-40 to 85	2 Ld Surface Mount J-Bend	DO-214AA
SGT3100SBT	-40 to 85	2 Ld Surface Mount J-Bend	DO-214AA
SGT0640SCT	-40 to 85	2 Ld Surface Mount J-Bend	DO-214AA
SGT0720SCT	-40 to 85	2 Ld Surface Mount J-Bend	DO-214AA
SGT1300SCT	-40 to 85	2 Ld Surface Mount J-Bend	DO-214AA
SGT2300SCT	-40 to 85	2 Ld Surface Mount J-Bend	DO-214AA
SGT2900SCT	-40 to 85	2 Ld Surface Mount J-Bend	DO-214AA
SGT3100SCT	-40 to 85	2 Ld Surface Mount J-Bend	DO-214AA
SGT3500SCT	-40 to 85	2 Ld Surface Mount J-Bend	DO-214AA

NOTE: T Suffix indicates Tape and Reel.

Features

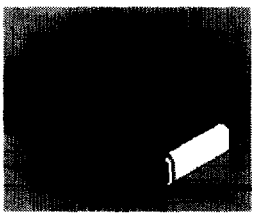
- UL Recognized Component Listed to UL497B, File E135010
- Rated for Telecom Industry Transient Surge Levels:
  - Bell Core GR-1089
  - ITU CCITT K.20/.21
  - FCC PART 68
- Low Profile Package, Compatible with PCMCIA Cards, UL-94V-0 Listed
- Offered in the Most Common V_{DRM} Voltage Types
- Low On-State Voltage
- Cross to Common Industry Types
- High Minimum Holding Current

Applications

- - Secondary Protectors for:
  - Telephone
  - FAX
  - Modem
  - Line Cards
  - SLIC
  - TLPU Modules
- Alarm Systems
- CATV Lines
- Remote Sensors
- Power Supplies

Packaging

DO-214AA



Symbol

Absolute Maximum Ratings

Continuous Reverse Voltage, V_{DRM} . . . . . 58V to 300V

Transient Peak Surge Current, I_{PP}	B Types	C Types
8 x 20µs	200A	250A
10 x 160µs	150A	200A
10 x 560µs	100A	150A
10 x 1000µs	50A	100A

Critical Rate of Rise of Voltage, dv/dt 2000V/µs

Operating Conditions

Temperature Range, (T_A) . . . . . -40°C to 85°C

Thermal Information

Thermal Resistance (Typical, Note 1)	θ_{JA} (°C/W)
J-Bend Package	
C Types	85
B Types	90

Maximum Storage Temperature Range . . . . . - 65°C to 150°C

Maximum Junction Temperature (Plastic Package) . . . . . 150°C

Maximum Lead Temperature (Soldering 5s) . . . . . 300°C

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

NOTE:

1. θ_{JA} is measured with the component mounted on an evaluation PC board in free air.

Electrical Specifications T_C = 25°C, Unless Otherwise Specified

MODEL NUMBER	V_{DRM} (MAX) V	I_{DRM} (MAX) AT V_{DRM} µA	V_T (MAX) AT 2 A V	(NOTE 2) V_{BO} (MAX) AT I_{BO} = 800mA V	I_H (MIN) mA	(NOTE 3) I_{PP} (MAX) FOR 10 x 1000µs PULSE A	(NOTE 4) I_{TSM} A	C_O (Typ) AT 1MHz / 1V_{RMS} pF
B TYPES								
SGT0640SBT	58	5	5	77	150	50	25	80
SGT0720SBT	63	5	5	88	150	50	25	80
SGT2300SBT	190	5	5	260	150	50	25	30
SGT2900SBT	250	5	5	330	150	50	25	30
SGT3100SBT	275	5	5	350	150	50	25	30
C TYPES								
SGT0640SCT	58	5	5	77	150	100	65	280
SGT0720SCT	63	5	5	88	150	100	65	280
SGT1300SCT	120	5	5	160	150	100	65	150
SGT2300SCT	190	5	5	260	150	100	65	100
SGT2900SCT	250	5	5	330	150	100	65	70
SGT3100SCT	275	5	5	350	150	100	65	70
SGT3500SCT	300	5	5	400	150	100	65	55

NOTES:

2. dv/dt = 100V/µs.
3. Double exponential current waveform.
4. One half cycle, 50 to 60Hz sine, non repetitive.

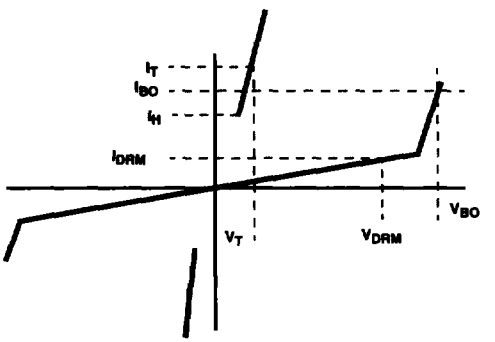
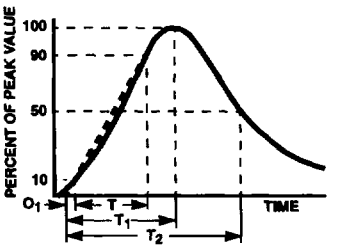


FIGURE 1. V-I CHARACTERISTICS



O_1 = Virtual Origin of Wave
T = Time From 10% to 90% of Peak
T_1 = Virtual Front Time = 1.25 • t
T_2 = Virtual Time to Half Value (Impulse Duration)

Example: For an 8/20µs Current Waveform:
8µs = T_1 = Virtual Front Time
20µs = T_2 = Virtual Time to Half Value

FIGURE 2. PEAK PULSE CURRENT TEST WAVEFORM

TABLE 1. ELECTRICAL CHARACTERISTICS

MODEL NUMBER	(NOTE 5) VARIATION OF V_{BO} vs TEMP T_A = -40°C TO 85°C (%)	(NOTE 6) TYPICAL V_T AT PEAK I_T, T_A = 25°C VOLTS (V)	(NOTE 7) VARIATION OF C_O vs FREQUENCY (%)	(NOTE 8) MAXIMUM CRITICAL RATE OF RISE OF ON-STATE CURRENT (dI/dT) (A/µs)	(NOTE 9) MAXIMUM I_{PP} FOR 2x10µs WAVEFORM (A)
SGT0640SBT	-6 to +6	4.2 at 50A	1	120	320
SGT0720SBT	-6 to +6	4.2 at 50A	1	120	320
SGT2300SBT	-5 to +4	3.2 at 50A	1	120	200
SGT2900SBT	-4 to +4	3.3 at 50A	1	120	200
SGT3100SBT	-4 to +4	3.3 at 50A	1	120	200
SGT0640SCT	-6 to +6	5.2 at 100A	1	250	600
SGT0720SCT	-6 to +6	5.2 at 100A	1	250	600
SGT1300SCT	-5 to +1	4.1 at 100A	1	250	600
SGT2300SCT	-5 to +4	4.9 at 100A	1	250	250
SGT2900SCT	-4 to +4	7.2 at 100A	1	250	250
SGT3100SCT	-4 to +4	7.2 at 100A	1	250	250
SGT3500SCT	-3 to +4	7.7 at 100A	2	250	250

NOTES:

5. Typical percentage shift from normalized 25°C value (positive coefficient).
6. Typical maximum peak forward voltage drop at specified peak current.
7. Typical percentage shift with test frequency ranging from 1kHz to 1MHz/1V_{RMS} (for two constant DC bias voltages of 0V and 50V).
8. dI/dT for leading edge of sine wave where 1/2 rated I_{PP} is reached at initial 30° of the sine.
9. Rated I_{PP} value for the 2x10 waveform above which could cause device damage.

Typical Performance Curves

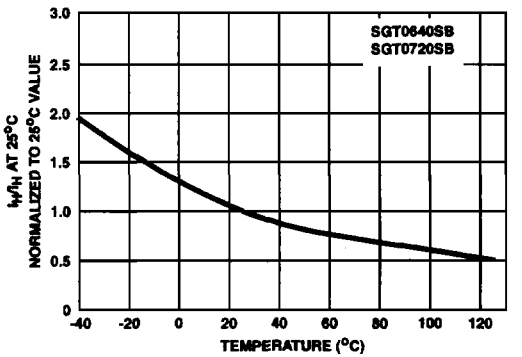


FIGURE 3. TYPICAL HOLDING CURRENT vs JUNCTION TEMPERATURE

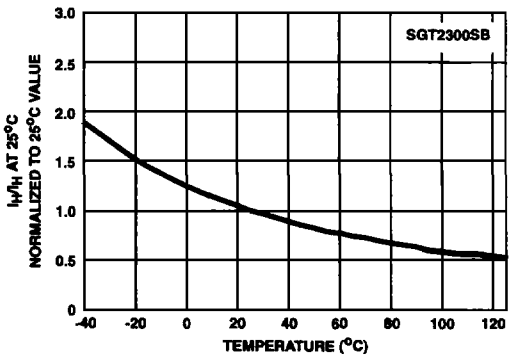


FIGURE 4. TYPICAL HOLDING CURRENT vs JUNCTION TEMPERATURE

Typical Performance Curves (Continued)

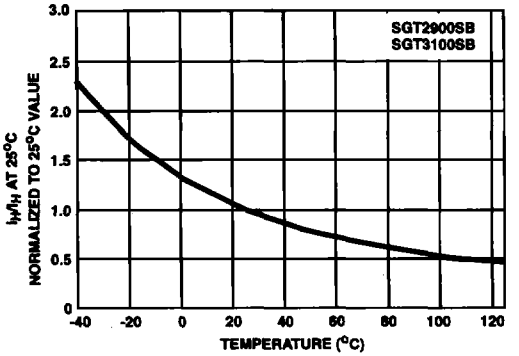


FIGURE 5. TYPICAL HOLDING CURRENT vs JUNCTION TEMPERATURE

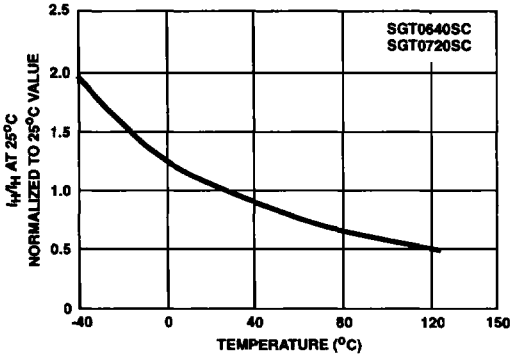


FIGURE 6. TYPICAL HOLDING CURRENT vs JUNCTION TEMPERATURE

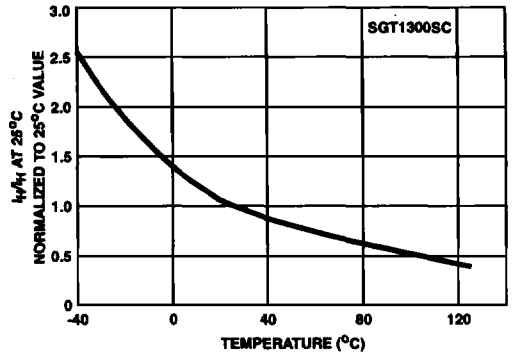


FIGURE 7. TYPICAL HOLDING CURRENT vs JUNCTION TEMPERATURE

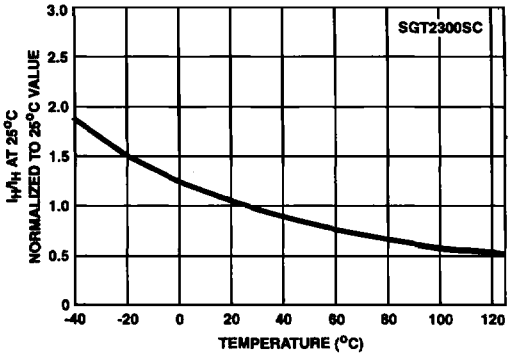


FIGURE 8. TYPICAL HOLDING CURRENT vs JUNCTION TEMPERATURE

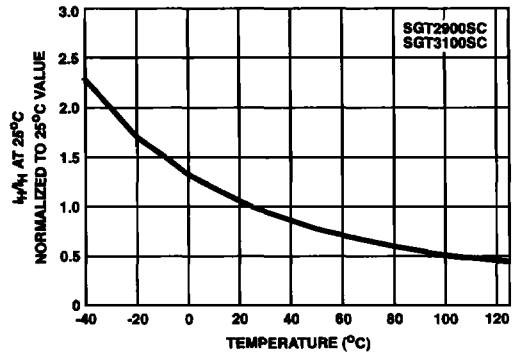


FIGURE 9. TYPICAL HOLDING CURRENT vs JUNCTION TEMPERATURE

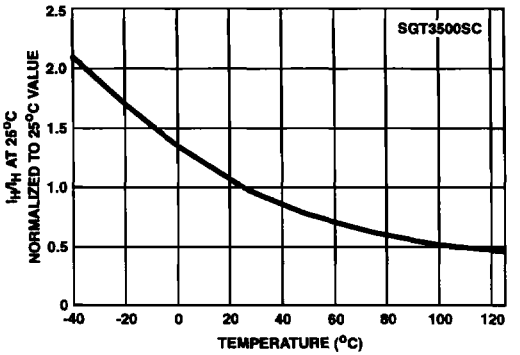


FIGURE 10. TYPICAL HOLDING CURRENT vs JUNCTION TEMPERATURE

Typical Performance Curves (Continued)

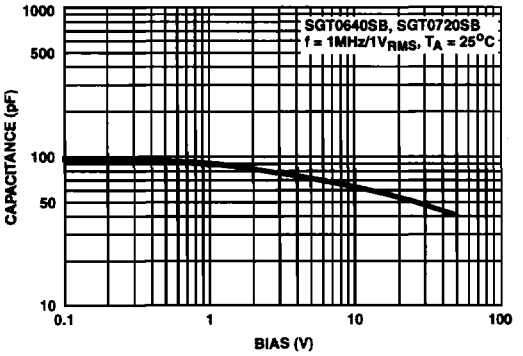


FIGURE 11. TYPICAL CAPACITANCE vs BIAS VOLTAGE

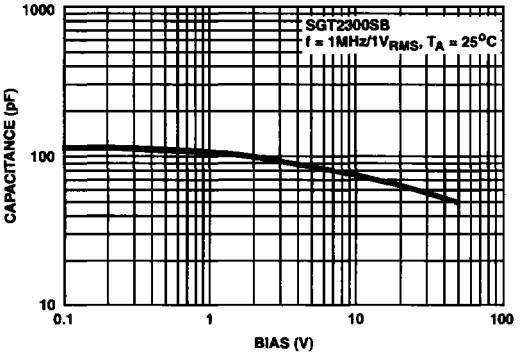


FIGURE 12. TYPICAL CAPACITANCE vs BIAS VOLTAGE

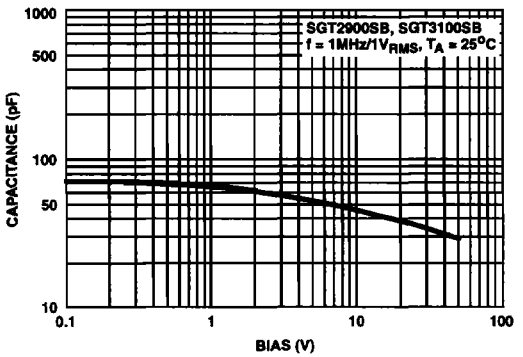


FIGURE 13. TYPICAL CAPACITANCE vs BIAS VOLTAGE

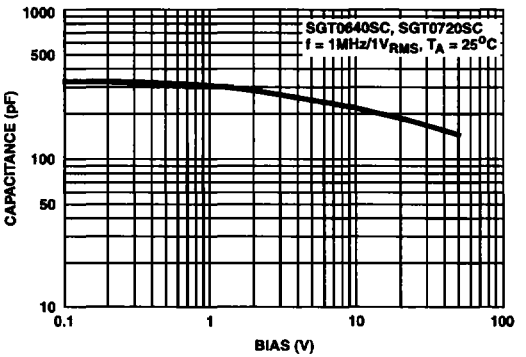


FIGURE 14. TYPICAL CAPACITANCE vs BIAS VOLTAGE

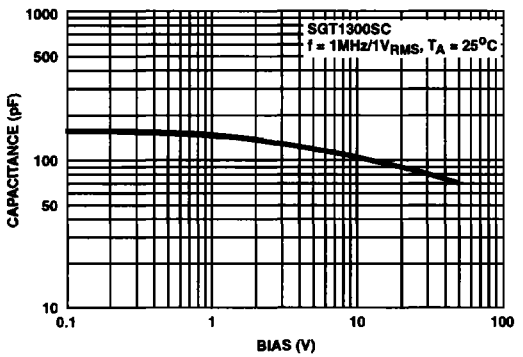


FIGURE 15. TYPICAL CAPACITANCE vs BIAS VOLTAGE

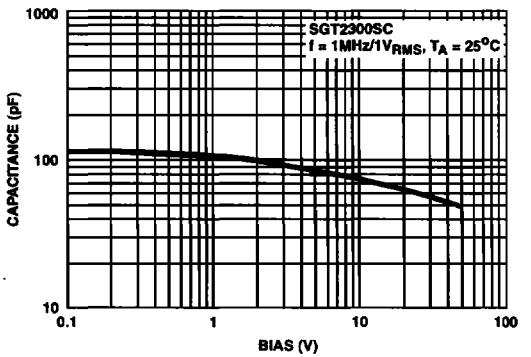


FIGURE 16. TYPICAL CAPACITANCE vs BIAS VOLTAGE

Typical Performance Curves (Continued)

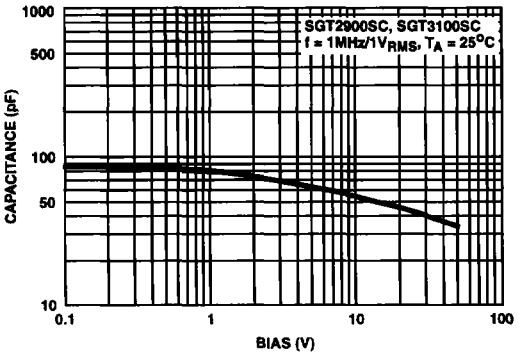


FIGURE 17. TYPICAL CAPACITANCE vs BIAS VOLTAGE

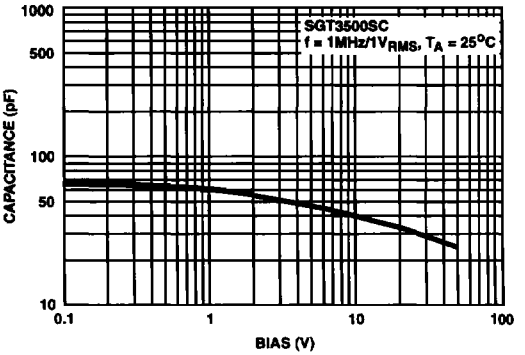


FIGURE 18. TYPICAL CAPACITANCE vs BIAS VOLTAGE

Recommended Surgectors for Typical Industry Standard Transient Specifications

INDUSTRY STANDARD	SPECIFIED PEAK VOLTAGE	SPECIFIED PEAK CURRENT	SPECIFIED CURRENT WAVESHAPE	RECOMMENDED SURGECTOR I_{PP} TYPE
Bell Core 1089	600V	100A	10 x 1000µs	C
Bell Core 1089	1000V	100A	10 x 360µs	C
Bell Core 1089	1000V	100A	10 x 1000µs	C
Bell Core 1089	2500V	500A	2 x 10µs	C
Bell Core 1089	1000V	25A	10 x 360µs	B, C
FCC PART 68	800V	100A	10 x 560µs	C
FCC PART 68	1500V	200A	10 x 160µs	C
FCC PART 68	1000V	25A	5 x 320µs	B, C
FCC PART 68	1500V	38A	5 x 320µs	B, C
ITU K.20	1000V	25A	5 x 310µs	B, C
ITU K.20	1000V	50A	5 x 310µs	B, C
ITU K.20	4000V	100A	5 x 310µs	C
ITU K.20	4000V	200A	5 x 310µs	C
ITU K.21	1500V	75A	5 x 310µs	B, C
ITU K.21	4000V	200A	5 x 310µs	C
ITU K.21	1000V	25A	5 x 310µs	B, C
ITU K.21	4000V	100A	5 x 310µs	C

Terms and Parameter Definitions

V_{DRM} - Maximum Off-State Voltage (DC or Peak) which may be applied continuously.

I_{DRM} - Maximum Reverse Current measured with V_{DRM} applied. (Off-State Current)

V_T - Forward Voltage drop at the specified Forward Current I_T, in the On-State latched mode.

V_{BO} - Maximum Breakover Voltage at which the device switches to the On-State latched mode.

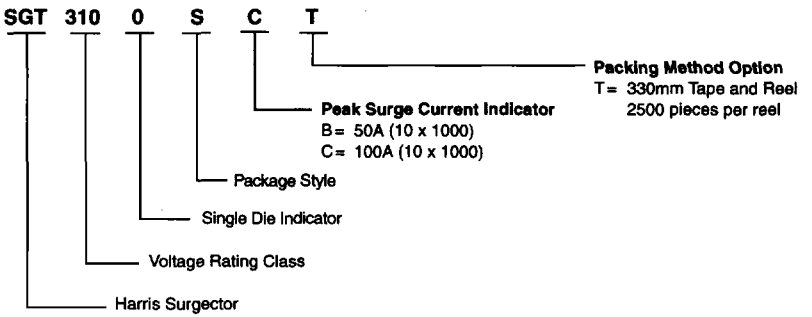
I_H - Minimum On-State Current required to maintain the device in the latched-on state.

C_O - Terminal Capacitance measured at the specified off-state bias Voltage.

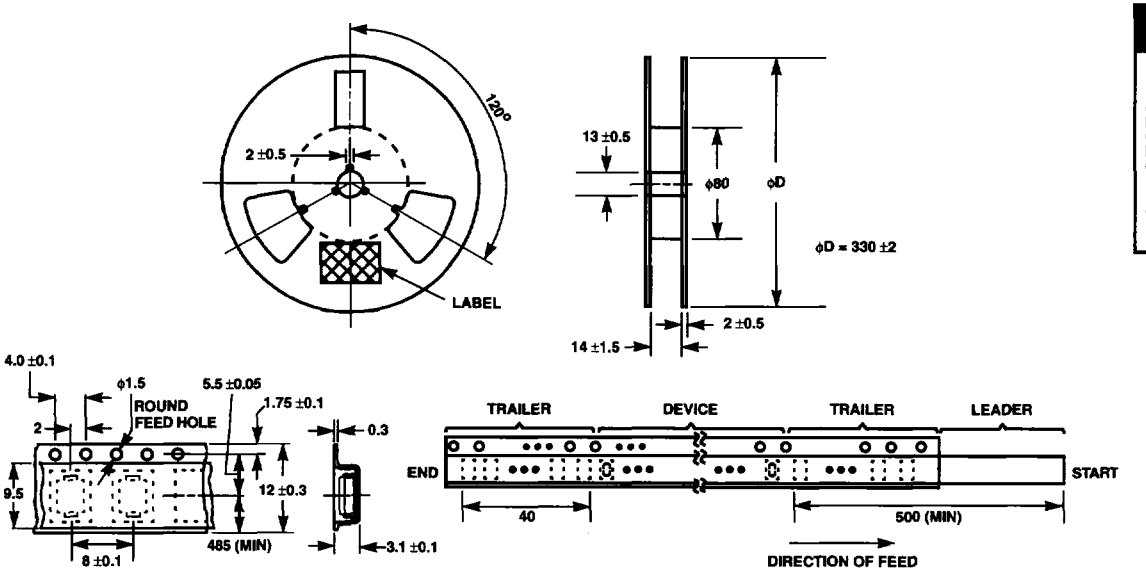
I_{TSM} - Maximum Peak Surge Current at the specified AC cycle waveform.

I_{PP} - Peak Pulse Surge Current rating of a designated waveform.

Ordering Information

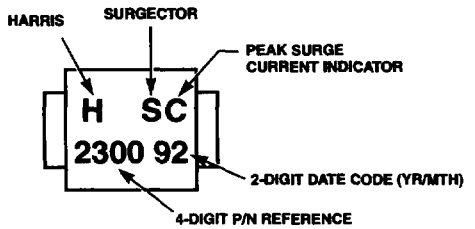


Tape and Reel Specifications (Meets EIA-481-1)



7 SURGECTOR PRODUCTS

Branding Layout



SGT2300SC (TOP VIEW - NOT TO SCALE)

Soldering Recommendations

Surface Mount Surgectors may be soldered with wave or reflow methods, and are compatible with common industry time-temperature profiles that include a preheat stage. When hand soldering, a 30W iron with a 1mm tip is recommended. The temperature should not exceed 300°C or a maximum 5 second duration.

Mechanical Outline Dimensions and Recommended Solder Pad Layout