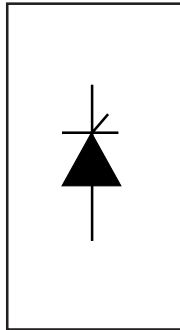


SURFACE MOUNTABLE PHASE CONTROL SCR
Lead-Free ("PbF" suffix)

Description/ Features

The 16TTS...SPbF **SAFEIR** series of silicon controlled rectifiers are specifically designed for medium power switching and phase control applications. The glass passivation technology used has reliable operation up to 125° C junction temperature.

Typical applications are in input rectification (soft start) and these products are designed to be used with International Rectifier input diodes, switches and output rectifiers which are available in identical package outlines.



V_T	< 1.4V @ 10A
I_{TSM}	= 200A
V_{RRM}	= 800V - 1200V

Output Current in Typical Applications

Applications	Single-phase Bridge	Three-phase Bridge	Units
NEMA FR-4 or G10 glass fabric-based epoxy with 4oz (140µm) copper	2.5	3.5	A
Aluminum IMS, $R_{thCA} = 15^\circ C/W$	6.3	9.5	
Aluminum IMS with heatsink, $R_{thCA} = 5^\circ C/W$	14.0	18.5	

$T_A = 55^\circ C, T_J = 125^\circ C, \text{footprint } 300\text{mm}^2$

Major Ratings and Characteristics

Characteristics	Values	Units
$I_{T(AV)}$ Sinusoidal waveform	10	A
I_{RMS}	16	A
V_{RRM}/V_{DRM}	800-1200	V
I_{TSM}	200	A
V_T @ 16A, $T_J = 25^\circ C$	1.4	V
dv/dt	500	V/µs
di/dt	150	A/µs
T_J	-40 to 125	°C



Voltage Ratings

Part Number	V_{RRM} , maximum peak reverse voltage V	V_{DRM} , maximum peak direct voltage V	I_{RRM}/I_{DRM} 125°C mA
16TTS08S	800	800	10
16TTS12S	1200	1200	10

Absolute Maximum Ratings

Parameters	16TTS..S	Units	Conditions	
$I_{T(AV)}$ Max. Average On-state Current	10	A	@ $T_C = 93^\circ\text{C}$, 180° conduction half sine wave	
I_{RMS} Max. RMS On-state Current	16			
I_{TSM} Max. Peak One Cycle Non-Repetitive Surge Current	170 200		10ms Sine pulse, rated V_{RRM} applied 10ms Sine pulse, no voltage reappplied	
I^2t Max. I^2t for fusing	144 200	A^2s	10ms Sine pulse, rated V_{RRM} applied 10ms Sine pulse, no voltage reappplied	
$I^2\sqrt{t}$ Max. $I^2\sqrt{t}$ for fusing	2000		$A^2\sqrt{s}$	t=0.1 to 10ms, no voltage reappplied
V_{TM} Max. On-state Voltage Drop	1.4	V	@ 16A, $T_J = 25^\circ\text{C}$	
r_t On-state slope resistance	24.0	$m\Omega$	$T_J = 125^\circ\text{C}$	
$V_{T(TO)}$ Threshold Voltage	1.1	V		
I_{RM}/I_{DM} Max. Reverse and Direct Leakage Current	0.5 10	mA	$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$	$V_R = \text{rated } V_{RRM} / V_{DRM}$
I_H Holding Current	Typ. Max. -- 100		mA	
I_L Max. Latching Current	200	mA		Anode Supply = 6V, Resistive load
dv/dt Max. Rate of Rise of off-state Voltage	500	V/ μs		
di/dt Max. Rate of Rise of turned-on Current	150	A/ μs		

Triggering

Parameters	16TTS..S	Units	Conditions
P_{GM} Max. peak Gate Power	8.0	W	
$P_{G(AV)}$ Max. average Gate Power	2.0		
$+I_{GM}$ Max. peak positive Gate Current	1.5	A	
$-V_{GM}$ Max. peak negative Gate Voltage	10	V	
I_{GT} Max. required DC Gate Current to trigger	90	mA	Anode supply = 6V, resistive load, $T_J = -10^\circ\text{C}$
	60		Anode supply = 6V, resistive load, $T_J = 25^\circ\text{C}$
	35		Anode supply = 6V, resistive load, $T_J = 125^\circ\text{C}$
V_{GT} Max. required DC Gate Voltage to trigger	3.0	V	Anode supply = 6V, resistive load, $T_J = -10^\circ\text{C}$
	2.0		Anode supply = 6V, resistive load, $T_J = 25^\circ\text{C}$
	1.0		Anode supply = 6V, resistive load, $T_J = 125^\circ\text{C}$
V_{GD} Max. DC Gate Voltage not to trigger	0.25		$T_J = 125^\circ\text{C}$, $V_{DRM} = \text{rated value}$
I_{GD} Max. DC Gate Current not to trigger	2.0	mA	$T_J = 125^\circ\text{C}$, $V_{DRM} = \text{rated value}$

Switching

Parameters	16TTS..S	Units	Conditions
t_{gt} Typical turn-on time	0.9	μs	$T_J = 25^\circ\text{C}$
t_{rr} Typical reverse recovery time	4		$T_J = 125^\circ\text{C}$
t_q Typical turn-off time	110		

Thermal-Mechanical Specifications

Parameters	16TTS..S	Units	Conditions
T_J Max. Junction Temperature Range	-40 to 125	$^\circ\text{C}$	
T_{stg} Max. Storage Temperature Range	-40 to 125	$^\circ\text{C}$	
	Soldering Temperature	240	$^\circ\text{C}$ for 10 seconds (1.6mm from case)
R_{thJC} Max. Thermal Resistance Junction to Case	1.3	$^\circ\text{C}/\text{W}$	DC operation
R_{thJA} Typ. Thermal Resistance Junction to Ambient (PCB Mount)**	40	$^\circ\text{C}/\text{W}$	
wt Approximate Weight	2 (0.07)	g (oz.)	
T Case Style	D ² Pak (SMD-220)		

** When mounted on 1" square (650mm²) PCB of FR-4 or G-10 material 4 oz (140 μm) copper 40 $^\circ\text{C}/\text{W}$
For recommended footprint and soldering techniques refer to application note #AN-994

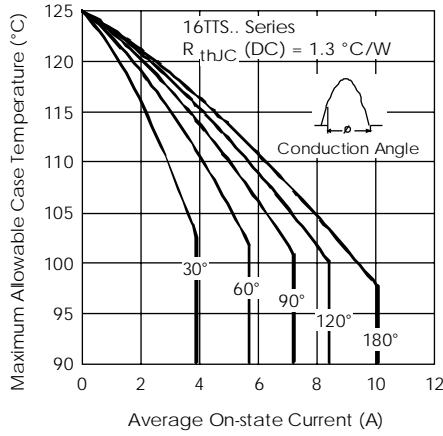


Fig. 1 - Current Rating Characteristics

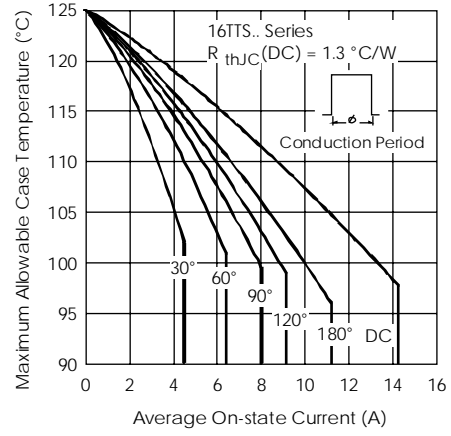


Fig. 2 - Current Rating Characteristics

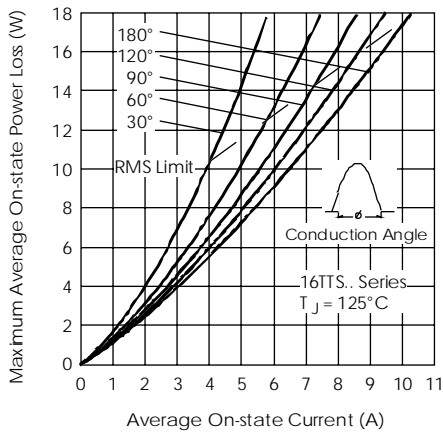


Fig. 3 - On-state Power Loss Characteristics

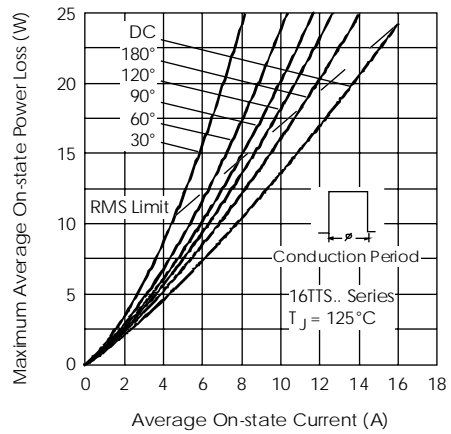


Fig. 4 - On-state Power Loss Characteristics

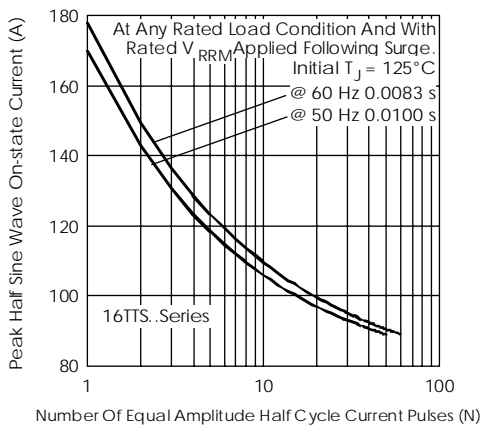


Fig. 6 - Maximum Non-Repetitive Surge Current

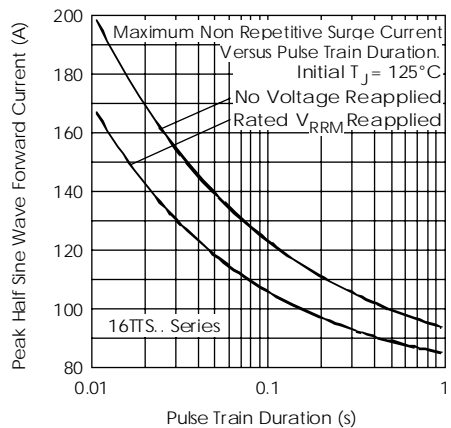


Fig. 7 - Maximum Non-Repetitive Surge Current

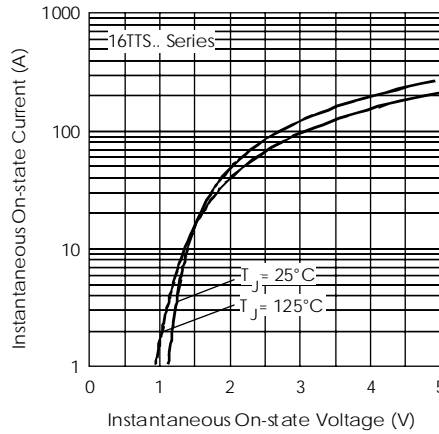


Fig. 7 - On-state Voltage Drop Characteristics

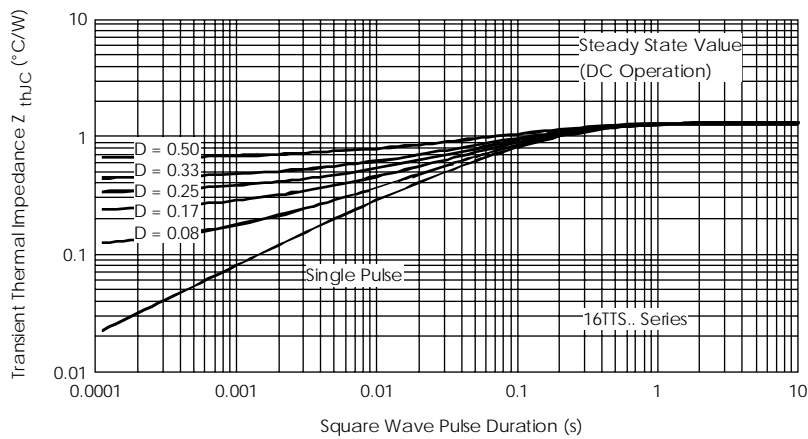


Fig. 8 - Thermal Impedance Z_{thJC} Characteristics

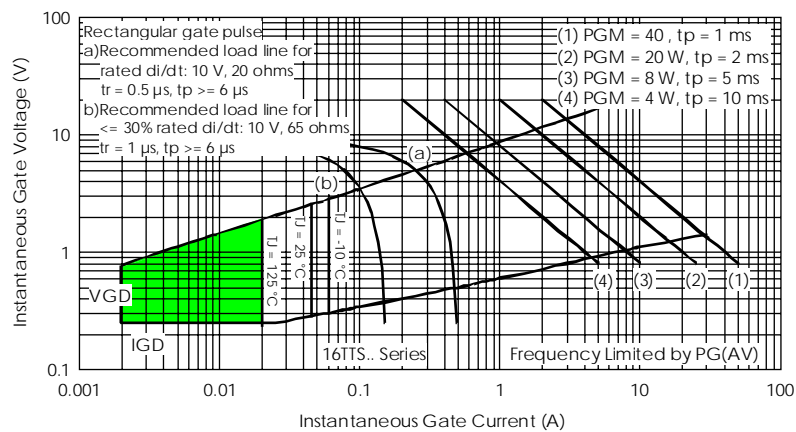
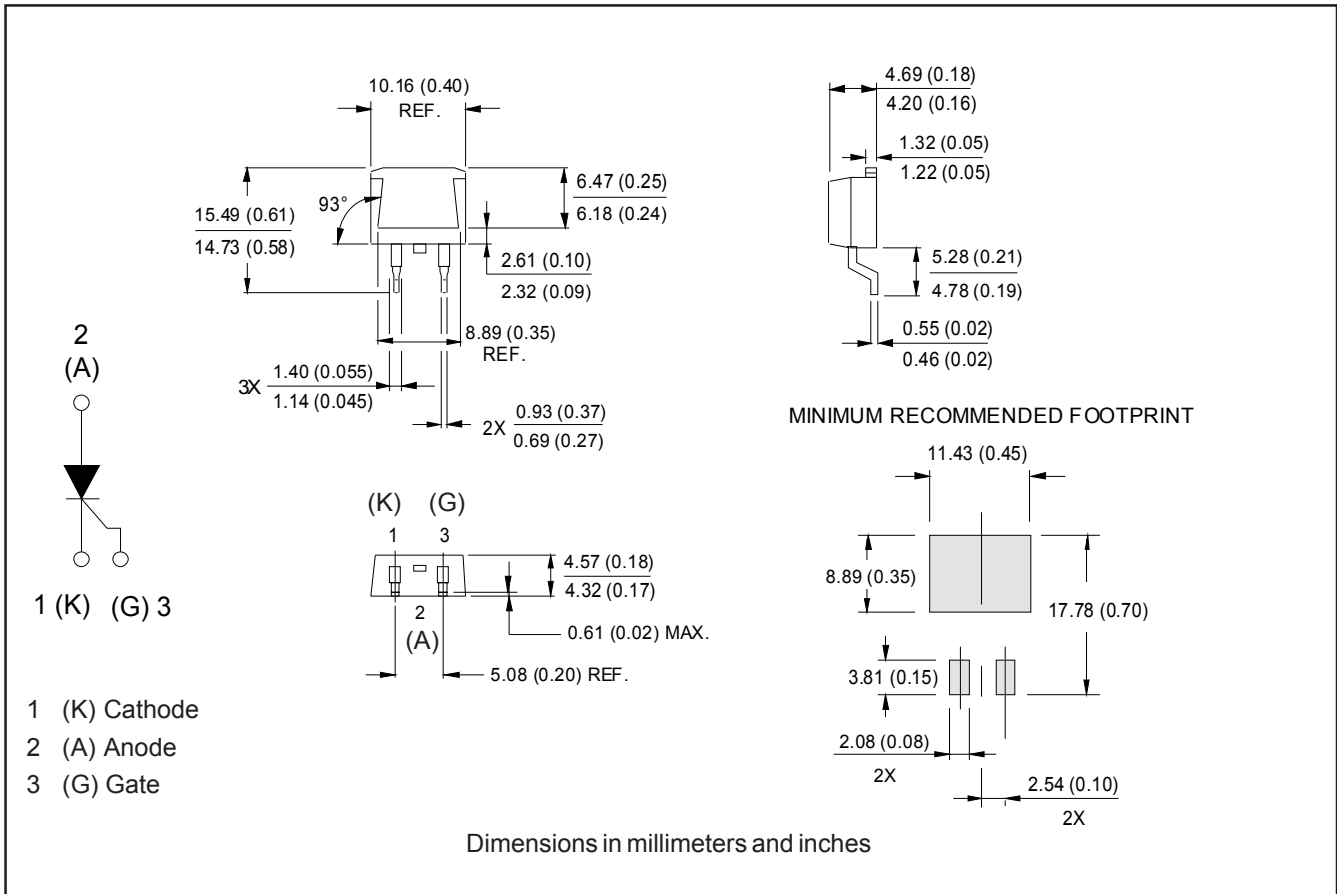
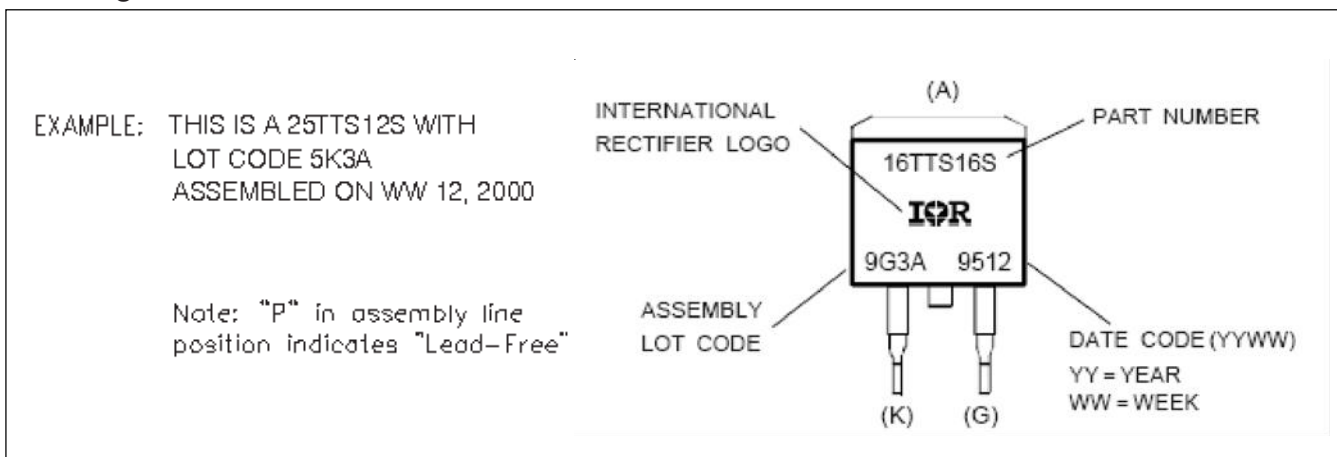


Fig. 9 - Gate Characteristics

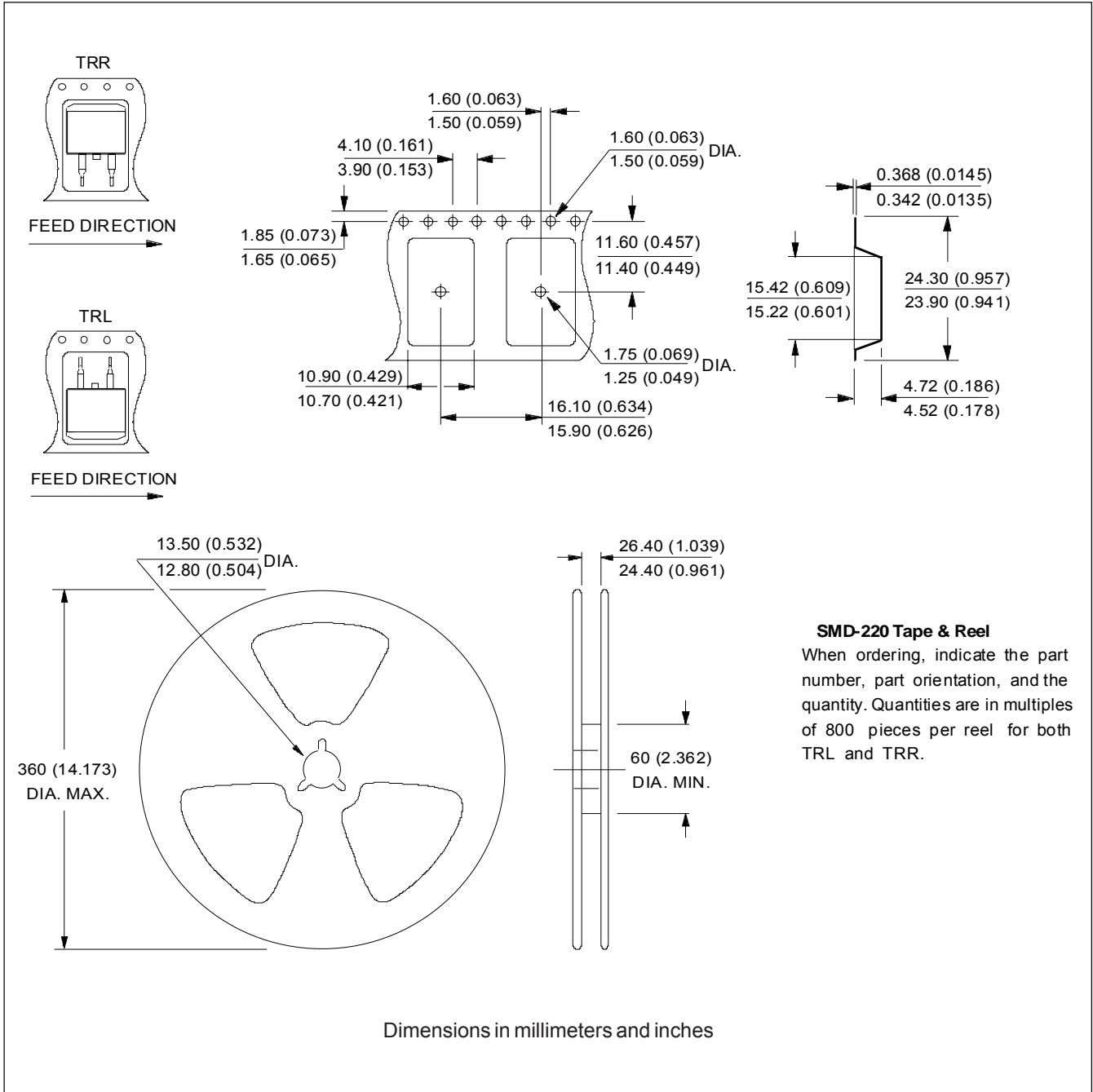
Outline Table



Marking Information



Tape & Reel Information



SMD-220 Tape & Reel
When ordering, indicate the part number, part orientation, and the quantity. Quantities are in multiples of 800 pieces per reel for both TRL and TRR.

Ordering Information Table

Device Code							
16	T	T	S	12	S	TR	PbF
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	-	Current Rating					
2	-	Circuit Configuration					
		T = Single Thyristor					
3	-	Package					
		T = TO-220AC					
4	-	Type of Silicon					
		S = Standard Recovery Rectifier					
5	-	Voltage Rating = Voltage Code X 100 = V_{RRM}					
		08 = 800V					
		12 = 1200V					
6	-	S = TO-220 D ² Pak (SMD-220) Version					
7	-	• none = Tube					
		• TRL = Tape & Reel (Left Oriented)					
		• TRR = Tape & Reel (Right Oriented)					
8	-	• none = Standard Production					
		• PbF = Lead-Free					

Data and specifications subject to change without notice.
 This product has been designed and qualified for Industrial Level and Lead-Free.
 Qualification Standards can be found on IR's Web site.



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