

SURFACE MOUNTABLE PHASE CONTROL SCR

Description/Features

The 16TTS..S new 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.

Output Current in Typical Applications

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

$T_A = 55^{\circ}\text{C}$, $T_J = 125^{\circ}\text{C}$, footprint 300mm²

Major Ratings and Characteristics

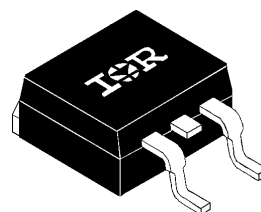
Characteristics	16TTS..S	Units
$I_{T(AV)}$ Sinusoidal waveform	10	A
I_{RMS}	16	A
V_{RRM}/V_{DRM}	800 and 1200	V
I_{TSM}	200	A
V_T @ 10 A, $T_J = 25^{\circ}\text{C}$	1.4	V
dv/dt	500	V/µs
di/dt	150	A/µs
T_J	-40 to 125	°C



$$V_T < 1.4\text{V @ } 10\text{A}$$

$$I_{TSM} = 200\text{A}$$

$$V_R/V_D = 1200\text{V}$$



D² PAK (SMD-220)

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	5
16TTS12S	1200	1200	

Absolute Maximum Ratings

Parameters		16TTS..S	Units	Conditions	
I _{T(AV)}	Max. Average On-state Current	10	A	50% duty cycle @ T _C = 98° C, sinusoidal wave form	
I _{RMS}	Max. RMS On-state Current	16			
I _{TSM}	Max. Peak One Cycle Non-Repetitive	170		10ms Sine pulse, rated V _{RRM} applied	
	Surge Current	200		10ms Sine pulse, no voltage reapplied	
I ² t	Max. I ² t for fusing	144	A ² s	10ms Sine pulse, rated V _{RRM} applied	
		200		10ms Sine pulse, no voltage reapplied	
I ² √t	Max. I ² √t for fusing	2000	A ² √s	t=0.1 to 10ms, no voltage reapplied	
V _{TM}	Max. On-state Voltage Drop	1.4	V	@ 10A, T _J = 25°C	
r _t	On-state slope resistance	24.0	mΩ	T _J = 125°C	
V _{T(TO)}	Threshold Voltage	1.1	V		
I _{RM} /I _{DM}	Max.Reverse and Direct	0.5	mA	T _J = 25 °C	V _R = rated V _{RRM} / V _{DRM}
	Leakage Current	5.0		T _J = 125 °C	
I _H	Max. Holding Current	100	mA	Anode Supply = 6V, Resistive load, Initial I _T =1A	
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	$^{\circ}\text{C/W}$	DC operation
R_{thJA} Typ. Thermal Resistance Junction to Ambient (PCB Mount)**	40	$^{\circ}\text{C/W}$	
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 (140μm) copper 40°C/W
For recommended footprint and soldering techniques refer to application note #AN-994

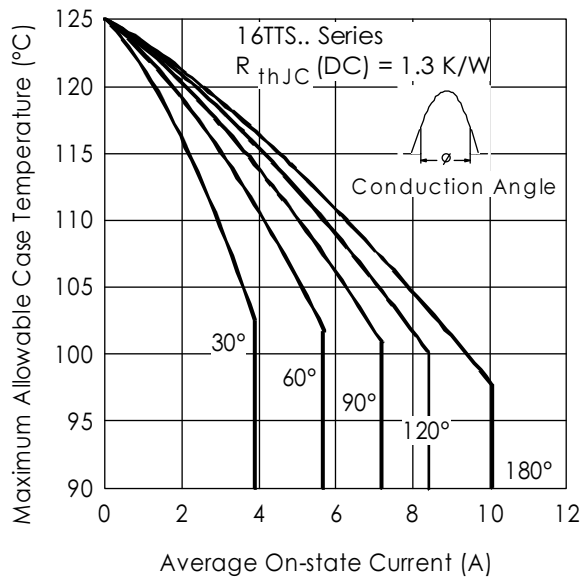


Fig. 1 - Current Rating Characteristics

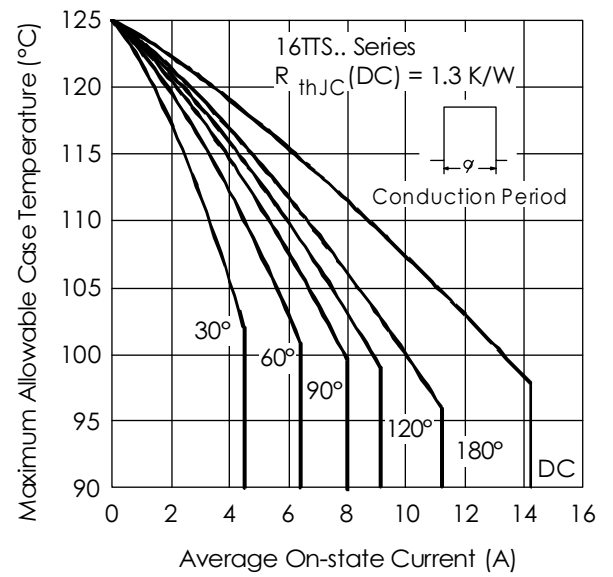


Fig. 2 - Current Rating Characteristics

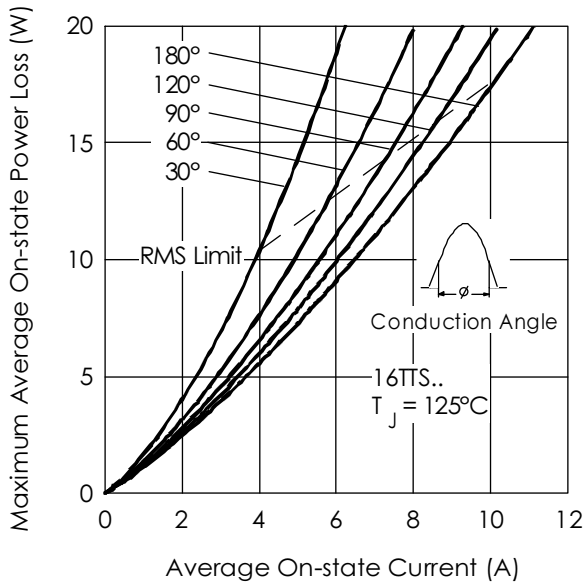


Fig. 3 - On-state Power Loss Characteristics

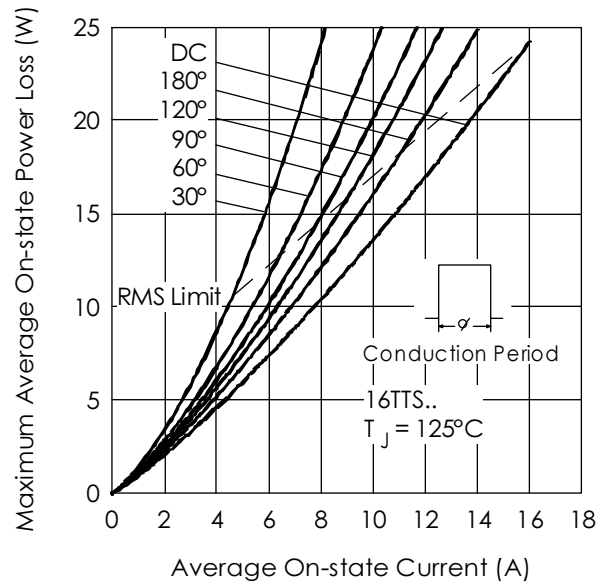


Fig. 4 - On-state Power Loss Characteristics

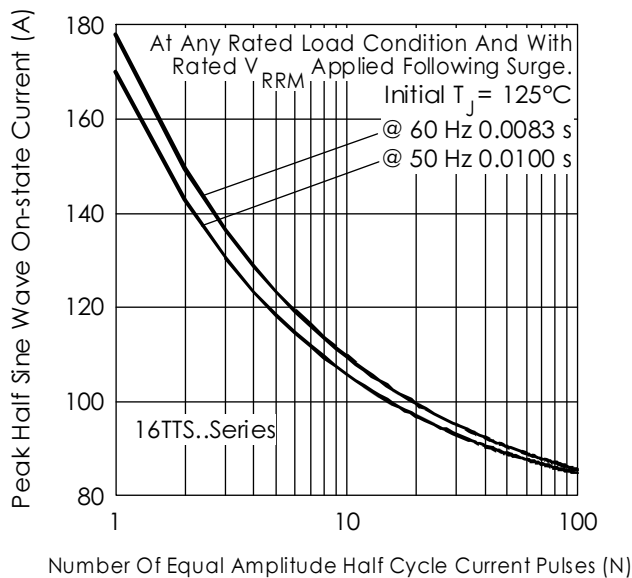


Fig. 6 - Maximum Non-Repetitive Surge Current

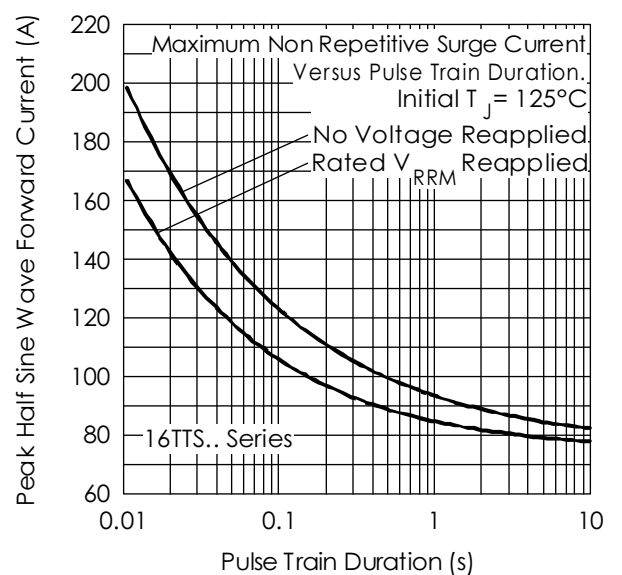


Fig. 7 - Maximum Non-Repetitive Surge Current

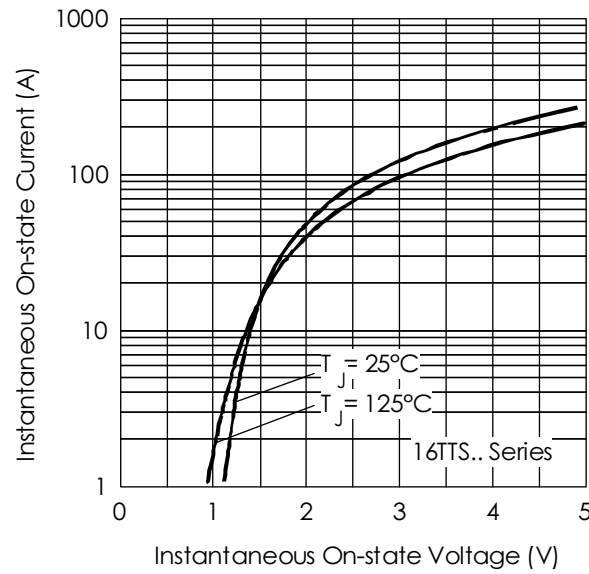


Fig. 7 - On-state Voltage Drop Characteristics

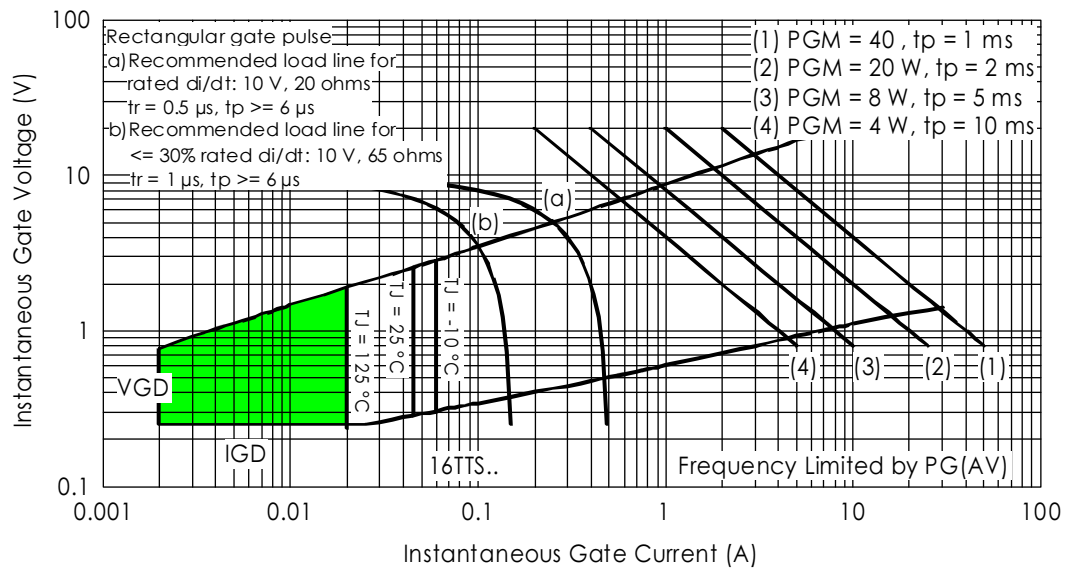
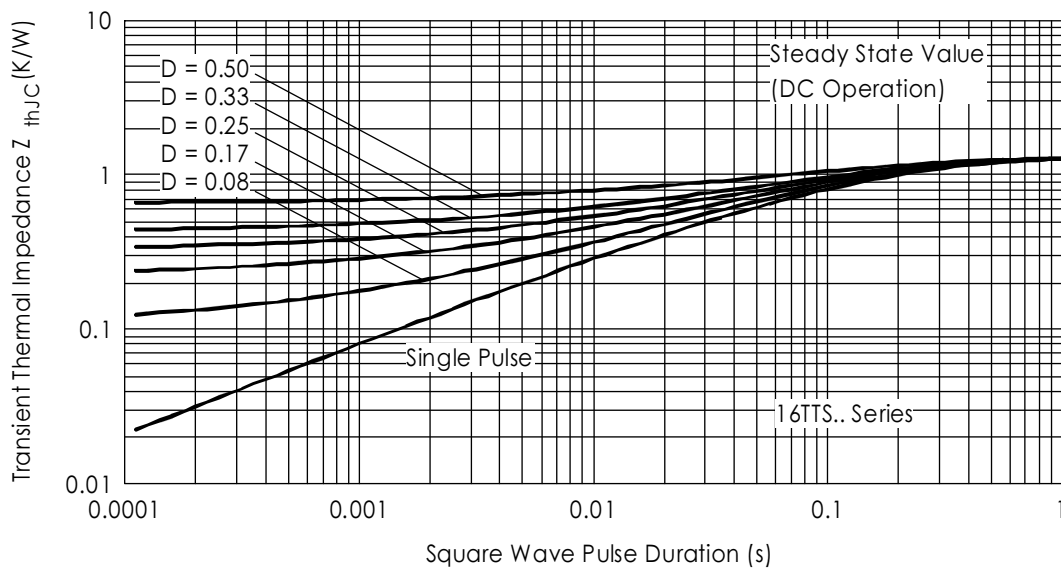
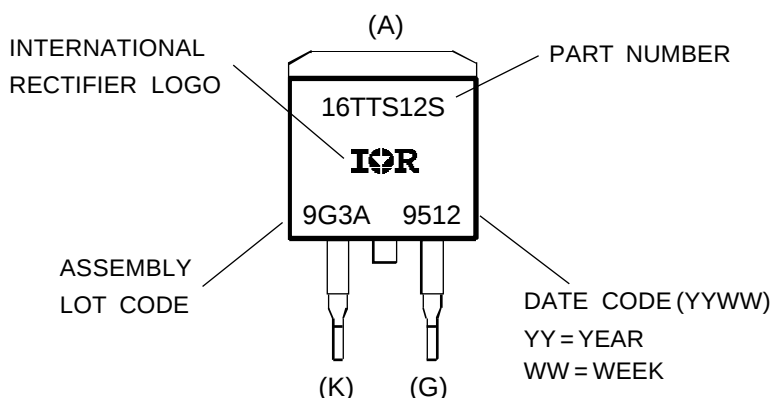


Fig. 8 - Gate Characteristics

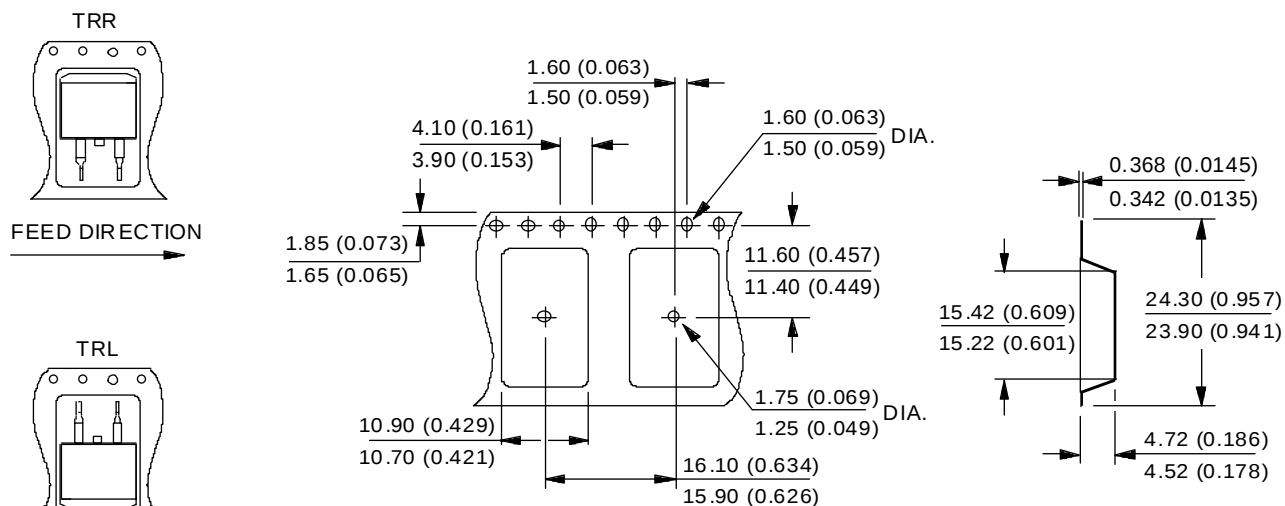

Fig. 9 - Thermal Impedance Z_{thJC} Characteristics

Marking Information

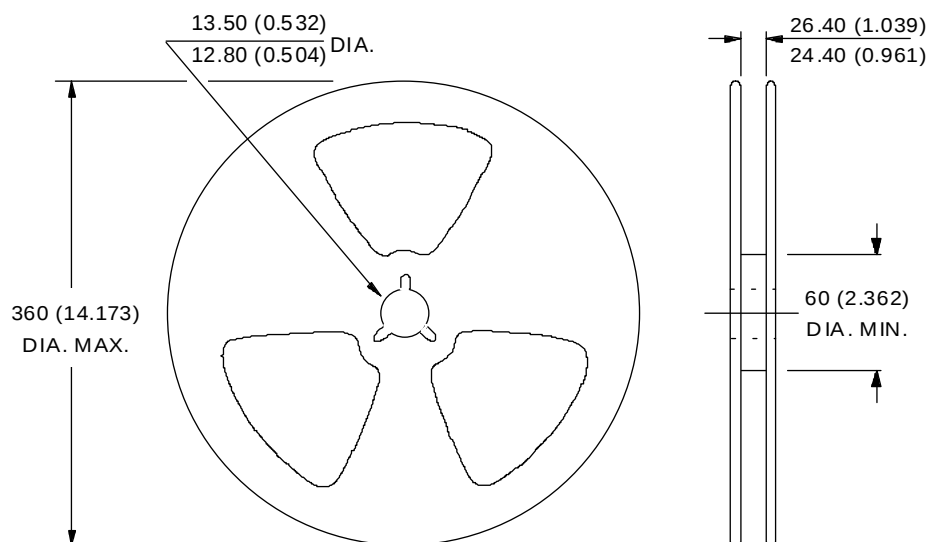
EXAMPLE: THIS IS AN 16TTS12S



Tape & Reel Information

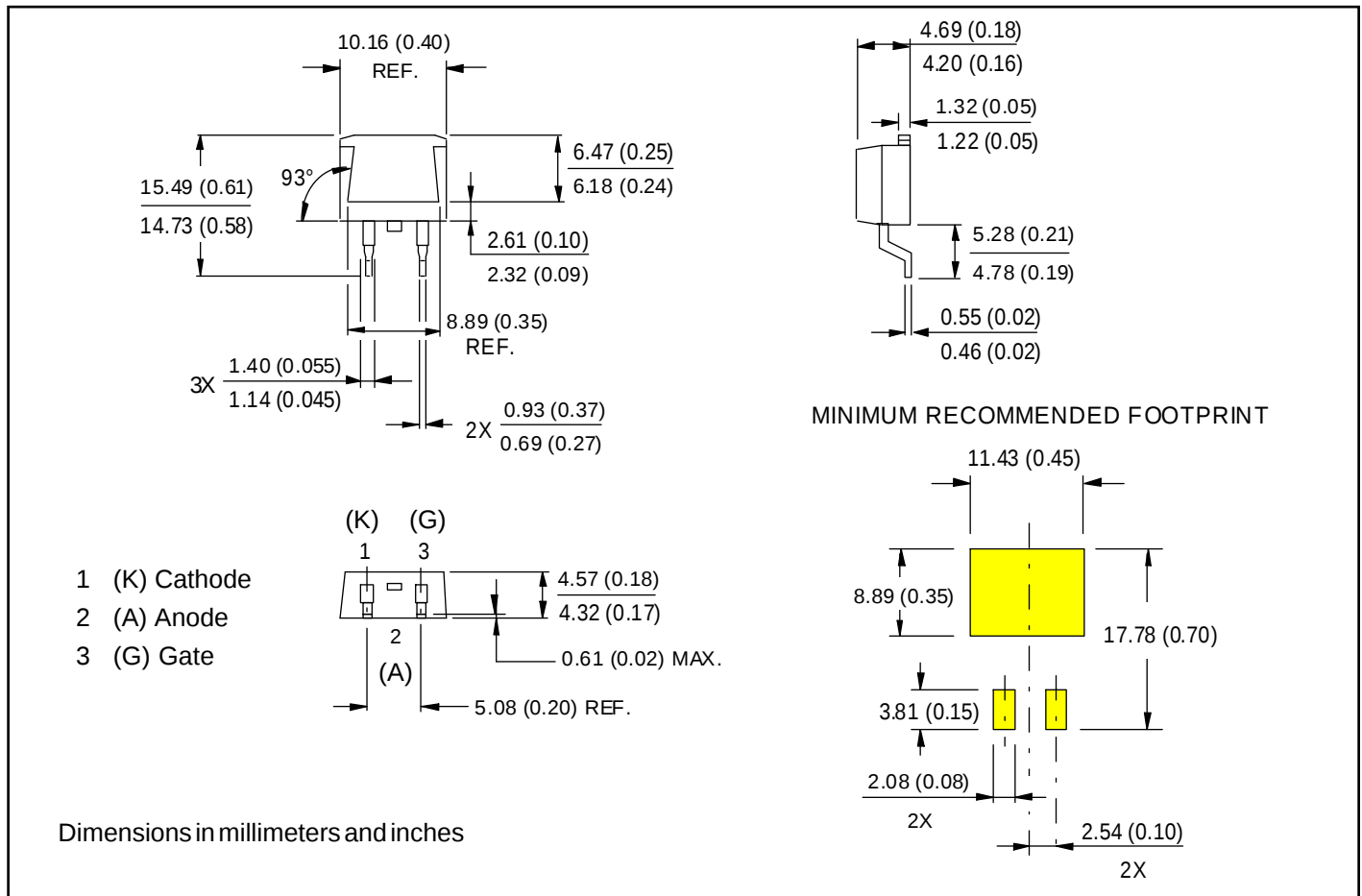


Dimensions in millimeters and inches

**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.

Outline Table



Ordering Information Table

Device Code						
16	T	T	S	12	S	TRL
①	②	③	④	⑤	⑥	
1	Current Rating, RMS value					
2	Circuit Configuration					
	T = Single Thyristor					
3	Package					
	T = TO-220AC					
4	Type of Silicon					
	S = Converter Grade					
5	Voltage code: Code x 100 = V_{RRM}					
6	S = TO-220 D ² Pak (SMD 220) Version					
7	Tape and Reel Option					
	TRL = Left Reel					
	TRR = Right Orientation Reel					

08 = 800V
12 = 1200V