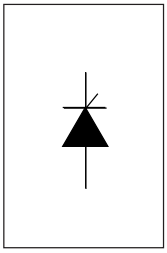
Bulletin I2115 rev. D 12/98

International
IOR Rectifier

*SAFE**IR*** Series
16TTS..

PHASE CONTROL SCR



V_T < 1.4V @ 10A
I_{TSM} = 200A
V_{RRM} = 800 to 1600V

Description/Features

The 16TTS.. *SAFE**IR*** 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.

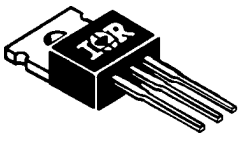
Output Current in Typical Applications

Applications	Single-phase Bridge	Three-phase Bridge	Units
Capacitive input filter T_A = 55°C, T_J = 125°C, common heatsink of 1°C/W	13.5	17	A

Major Ratings and Characteristics

Characteristics		16TTS..	Units
$I_{T(AV)}$	Sinusoidal waveform	10	A
I_{RMS}		16	A
V_{RRM}/V_{DRM}		up to 1600	V
I_{TSM}		200	A
V_T	@ 10 A, T_J = 25°C	1.4	V
dv/dt		500	V/µs
di/dt		150	A/µs
T_J	range	-40 to 125	°C

Package Outline



TO-220AC

Also available in SMD-220 package (series 16TTS..S)

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
16TTS08	800	800	10
16TTS12	1200	1200	
16TTS16	1600	1600	

Absolute Maximum Ratings

	Parameters	16TTS..		Units	Conditions	
$I_{T(AV)}$	Max. Average On-state Current	10		A	@ T_C = 98° C, 180° conduction half sine wave	
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^2t	Max. I^2t for fusing	144		A^2s	10ms Sine pulse, rated V_{RRM} applied	
		200			10ms Sine pulse, no voltage reapplied	
$I^2\sqrt{t}$	Max. $I^2\sqrt{t}$ for fusing	2000		$A^2\sqrt{s}$	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	10			T_J = 125 °C	
I_H	Holding Current	Typ.	Max.		Anode Supply = 6V, Resistive load, Initial I_T=1A	
		–	100	mA	16TTS08, 16TTS12	
		100	150		16TTS16	
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..	Units	Conditions
P_{GM}	Max. peak Gate Power	8.0	W	
$P_{G(AV)}$	Max. average Gate Power	2.0		
$+ I_{GM}$	Max. paek positive Gate Current	1.5	A	
$- V_{GM}$	Max. paek negative Gate Voltage	10	V	
I_{GT}	Max. required DC Gate Current	90	mA	Anode supply = 6V, resistive load, T_J = - 65°C
	to trigger	60		Anode supply = 6V, resistive load, T_J = 25°C
		35		Anode supply = 6V, resistive load, T_J = 125°C
V_{GT}	Max. required DC Gate Voltage	3.0	V	Anode supply = 6V, resistive load, T_J = - 65°C
	to trigger	2.0		Anode supply = 6V, resistive load, T_J = 25°C
		1.0		Anode supply = 6V, resistive load, T_J = 125°C
V_{GD}	Max. DC Gate Voltage not to trigger	0.2		T_J = 125°C, V_{DRM} = rated value
I_{GD}	Max. DC Gate Current not to trigger	2.0	mA	T_J = 125°C, V_{DRM} = rated value

Switching

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

Thermal-Mechanical Specifications

Parameters			16TTS..	Units	Conditions
T_J	Max. Junction Temperature Range		-40 to 125	°C	
T_{stg}	Max. Storage Temperature Range		-40 to 125		
R_{thJC}	Max. Thermal Resistance Junction to Case		1.3	°C/W	DC operation
R_{thJA}	Max. Thermal Resistance Junction to Ambient		62		
R_{thCS}	Typ. Thermal Resistance Case to Heatsink		0.5		Mounting surface, smooth and greased
wt	Approximate Weight		2 (0.07)	g (oz.)	
T	Mounting Torque	Min.	6 (5)	Kg-cm (lbf-in)	
		Max.	12 (10)		
	Case Style		TO-220AC		

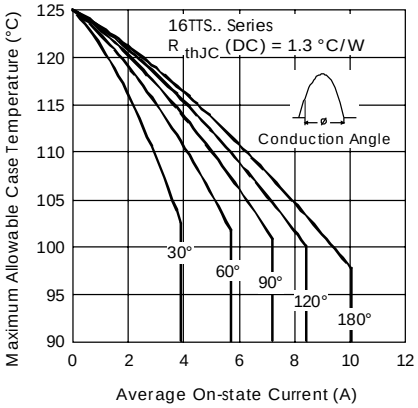


Fig. 1 - Current Rating Characteristics

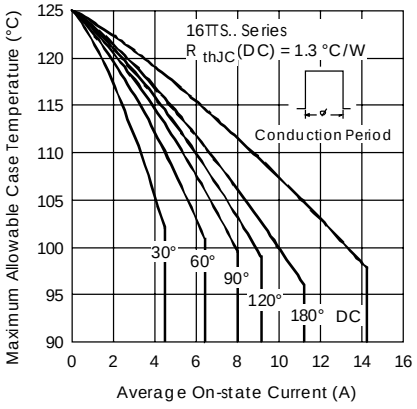


Fig. 2 - Current Rating Characteristics

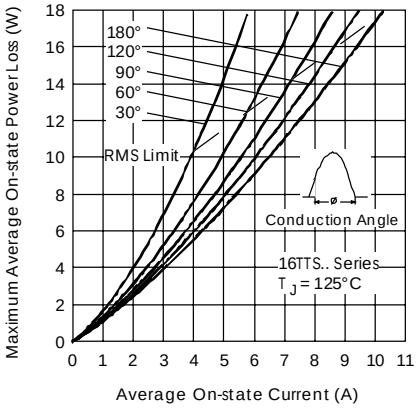


Fig. 3 - On-state Power Loss Characteristics

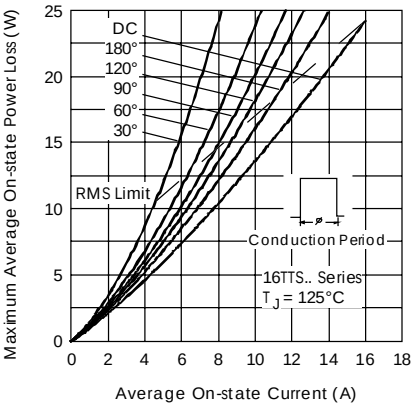


Fig. 4 - On-state Power Loss Characteristics

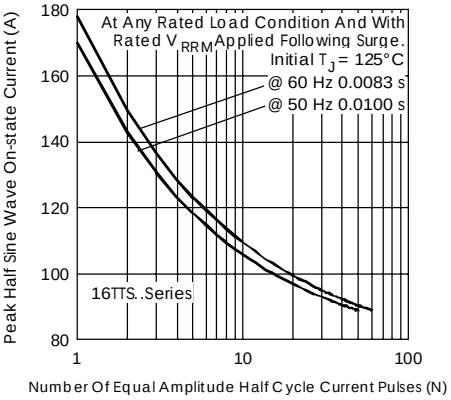


Fig. 6 - Maximum Non-Repetitive Surge Current

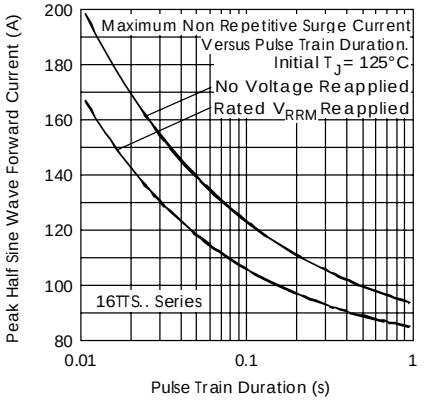


Fig. 7 - Maximum Non-Repetitive Surge Current

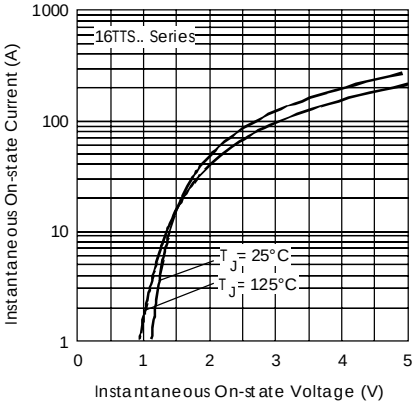


Fig. 7 - On-state Voltage Drop Characteristics

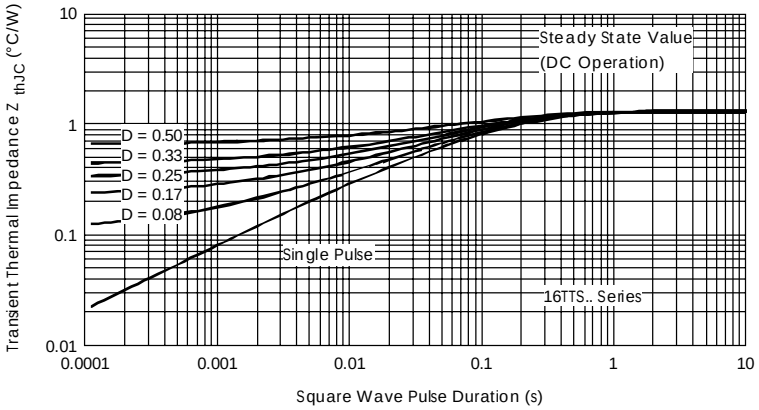


Fig. 8 - Thermal Impedance Z_{thJC} Characteristics

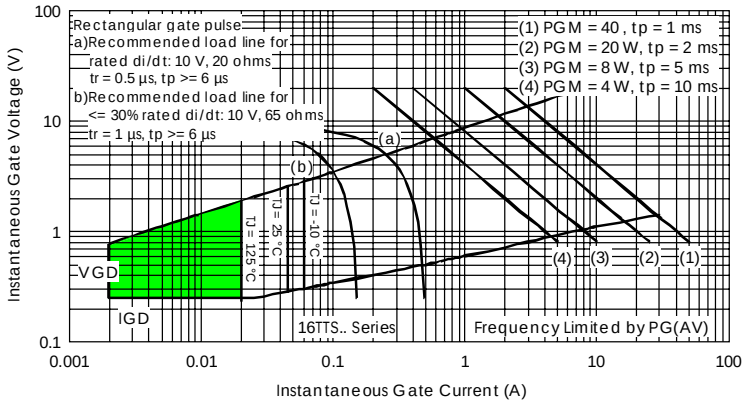
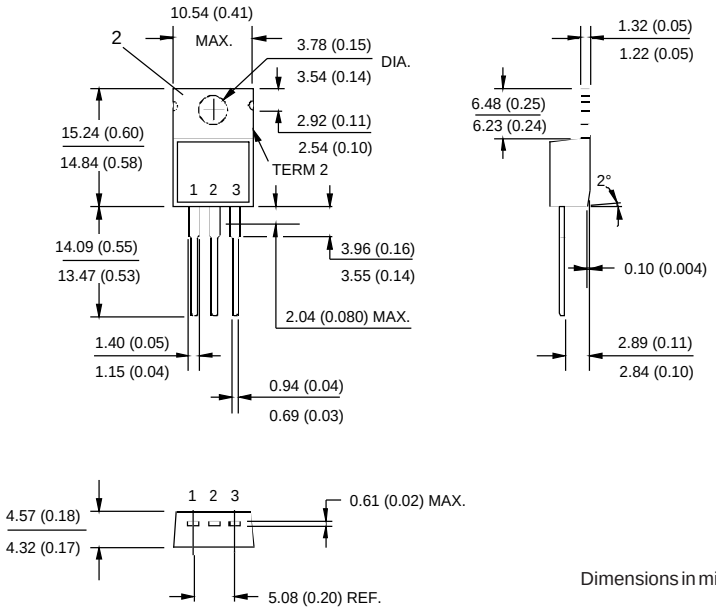


Fig. 9 - Gate Characteristics

Outline Table

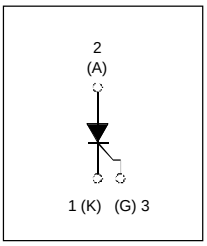


Dimensions in millimeters (and inches)

Ordering Information Table

Device Code

16	T	T	S	16
1	2	3	4	5



1 - Current Rating

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}

08	=	800V
12	=	1200V
16	=	1600V

International
IOR Rectifier

WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245 U.S.A. Tel: (310) 322 3331. Fax: (310) 322 3332.
EUROPEAN HEADQUARTERS: Hurst Green, Oxted, Surrey RH8 9BB, U.K. Tel: ++ 44 1883 732020. Fax: ++ 44 1883 733408.
IR CANADA: 15 Lincoln Court, Brampton, Markham, Ontario L6T3Z2. Tel: (905) 453 2200. Fax: (905) 475 8801.
IR GERMANY: Saalburgstrasse 157, 61350 Bad Homburg. Tel: ++ 49 6172 96590. Fax: ++ 49 6172 965933.
IR ITALY: Via Liguria 49, 10071 Borgaro, Torino. Tel: ++ 39 11 4510111. Fax: ++ 39 11 4510220.
IR FAR EAST: K&H Bldg., 2F, 30-4 Nishi-Ikebukuro 3-Chome, Toshima-Ku, Tokyo, Japan 171. Tel: 81 3 3983 0086.
IR SOUTHEAST ASIA: 1 Kim Seng Promenade, Great World City West Tower,13-11, Singapore 237994. Tel: ++ 65 838 4630.
IR TAIWAN: 16 Fl. Suite D.207, Sec. 2, Tun Haw South Road, Taipei, 10673, Taiwan. Tel: 886 2 2377 9936.