

International  
**IR** Rectifier


**SAFEIR** Series  
 40TTS12PbF

**PHASE CONTROL SCR**  
 Lead-Free ("PbF" suffix)

**Description/ Features**

The 40TTS12PbF **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 140°C junction temperature.

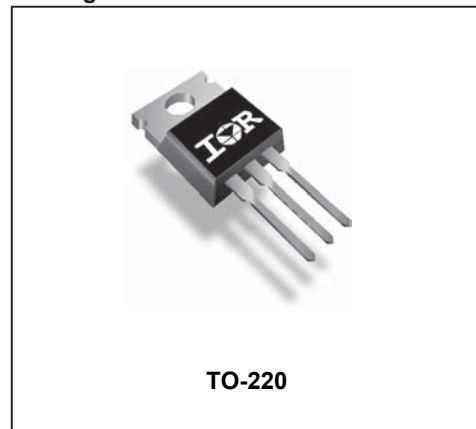
Typical applications are in input rectification (soft start) and these products are designed to be used with International Rectifier input diodes, switches and output rectifiers which are available in identical package outlines.

	$V_T$	< 1.6V @ 80A
	$I_{TSM}$	= 350A
	$V_{RRM}$	= 1200V

**Major Ratings and Characteristics**

Characteristics	Values	Units
$I_{T(AV)}$ Sinusoidal waveform	25	A
$I_{RMS}$	40	A
$V_{RRM}/V_{DRM}$	1200	V
$I_{TSM}$	350	A
$V_T$ $T_J = 25^\circ\text{C}$	1.6	V
dv/dt	500	V/ $\mu\text{s}$
di/dt	150	A/ $\mu\text{s}$
$T_J$	-40 to 140	$^\circ\text{C}$

**Package Outline**



## Voltage Ratings

Part Number	$V_{RRM}$ , maximum peak reverse voltage V	$V_{DRM}$ , maximum peak direct voltage V	$T_J$ °C
40TTS12PbF	1200	1200	-25 to 140

## Absolute Maximum Ratings

Parameters	40TTS..	Units	Conditions
$I_{T(AV)}$ Max. Average On-state Current	25	A	@ $T_C = 93^\circ\text{C}$ , 180° conduction half sine wave
$I_{RMS}$ Max. RMS On-state Current	40		
$I_{TSM}$ Max. Peak One Cycle Non-Repetitive Surge Current	300 350		10ms Sine pulse, rated $V_{RRM}$ applied 10ms Sine pulse, no voltage reapplied
$I^2t$ Max. $I^2t$ for fusing	450 630	$A^2s$	10ms Sine pulse, rated $V_{RRM}$ applied 10ms Sine pulse, no voltage reapplied
$I^2\sqrt{t}$ Max. $I^2\sqrt{t}$ for fusing	6300		$A^2\sqrt{s}$
$V_{TM}$ Max. On-state Voltage Drop	1.6	V	@ 80A, $T_J = 25^\circ\text{C}$
$r_t$ On-state slope resistance	11.4	$m\Omega$	$T_J = 140^\circ\text{C}$
$V_{T(TO)}$ Threshold Voltage	0.96	V	
$I_{RM}/I_{DM}$ Max. Reverse and Direct Leakage Current	0.5 10	mA	$T_J = 25^\circ\text{C}$ $T_J = 140^\circ\text{C}$ $V_R = \text{rated } V_{RRM} / V_{DRM}$
$I_H$ Holding Current	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	$V/\mu s$	
$di/dt$ Max. Rate of Rise of turned-on Current	150	$A/\mu s$	

### Triggering

Parameters	40TTS..	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	35	mA	Anode supply = 6V, resistive load, $T_J = 25^\circ\text{C}$
$V_{GT}$ Max. required DC Gate Voltage to trigger	1.3	V	Anode supply = 6V, resistive load, $T_J = 25^\circ\text{C}$
$V_{GD}$ Max. DC Gate Voltage not to trigger	0.2		$T_J = 140^\circ\text{C}$ , $V_{DRM} = \text{rated value}$
$I_{GD}$ Max. DC Gate Current not to trigger	1.5	mA	$T_J = 140^\circ\text{C}$ , $V_{DRM} = \text{rated value}$

### Switching

Parameters	40TTS..	Units	Conditions
$t_{gt}$ Typical turn-on time	0.9	$\mu\text{s}$	$T_J = 25^\circ\text{C}$
$t_{rr}$ Typical reverse recovery time	4		$T_J = 140^\circ\text{C}$
$t_q$ Typical turn-off time	110		

### Thermal-Mechanical Specifications

Parameters	40TTS..	Units	Conditions
$T_J$ Max. Junction Temperature Range	-40 to 140	$^\circ\text{C}$	
$T_{stg}$ Max. Storage Temperature Range	-40 to 140		
$R_{thJC}$ Max. Thermal Resistance Junction to Case	0.8	$^\circ\text{C}/\text{W}$	DC operation
$R_{thJA}$ Max. Thermal Resistance Junction to Ambient	60		
$R_{thCS}$ 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		

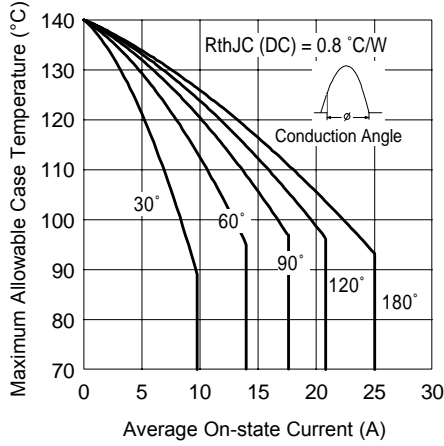


Fig. 1 - Current Rating Characteristics

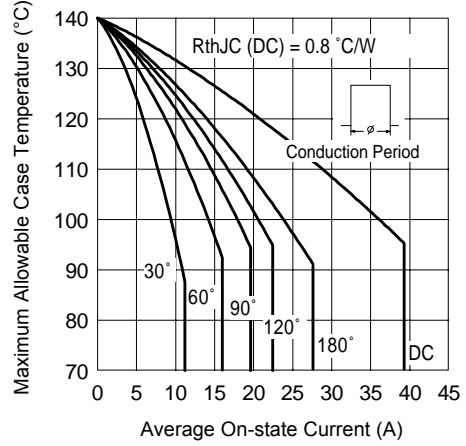


Fig. 2 - Current Rating Characteristics

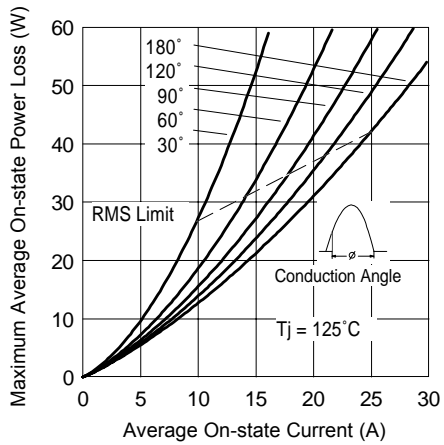


Fig. 3 - On-state Power Loss Characteristics

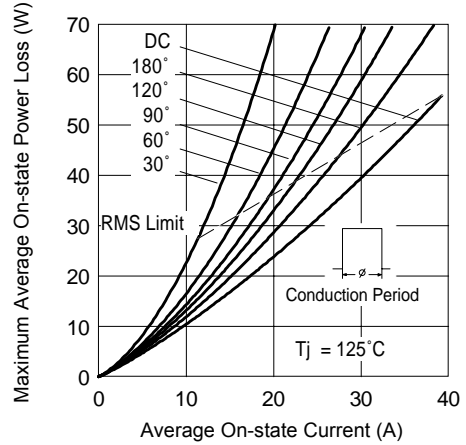


Fig. 4 - On-state Power Loss Characteristics

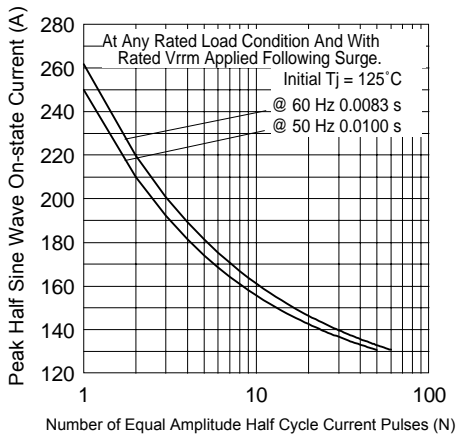


Fig. 5 - Maximum Non-Repetitive Surge Current

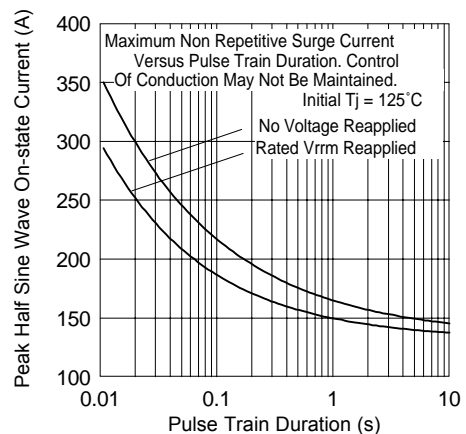


Fig. 6 - Maximum Non-Repetitive Surge Current

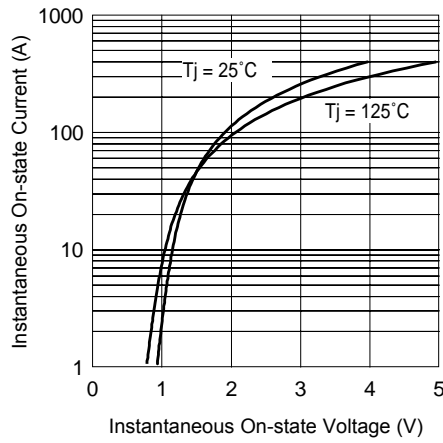


Fig. 7 - On-state Voltage Drop Characteristics

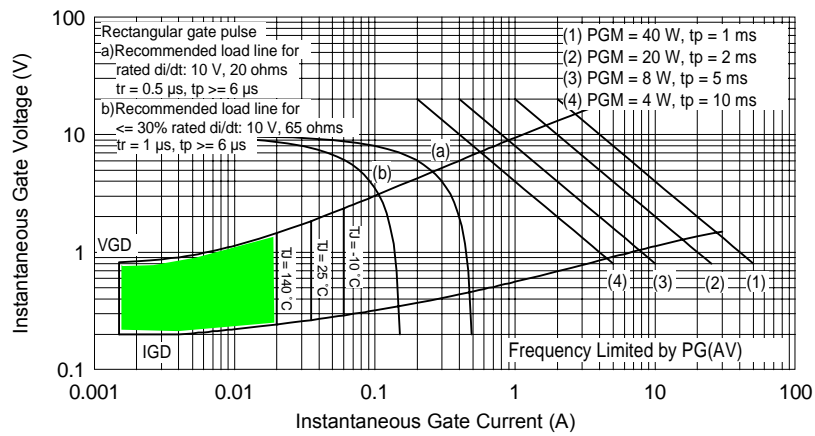


Fig. 8 - Gate Characteristics

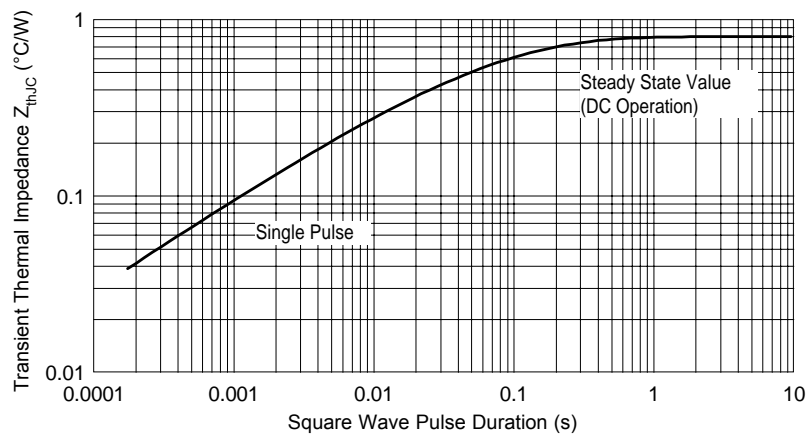
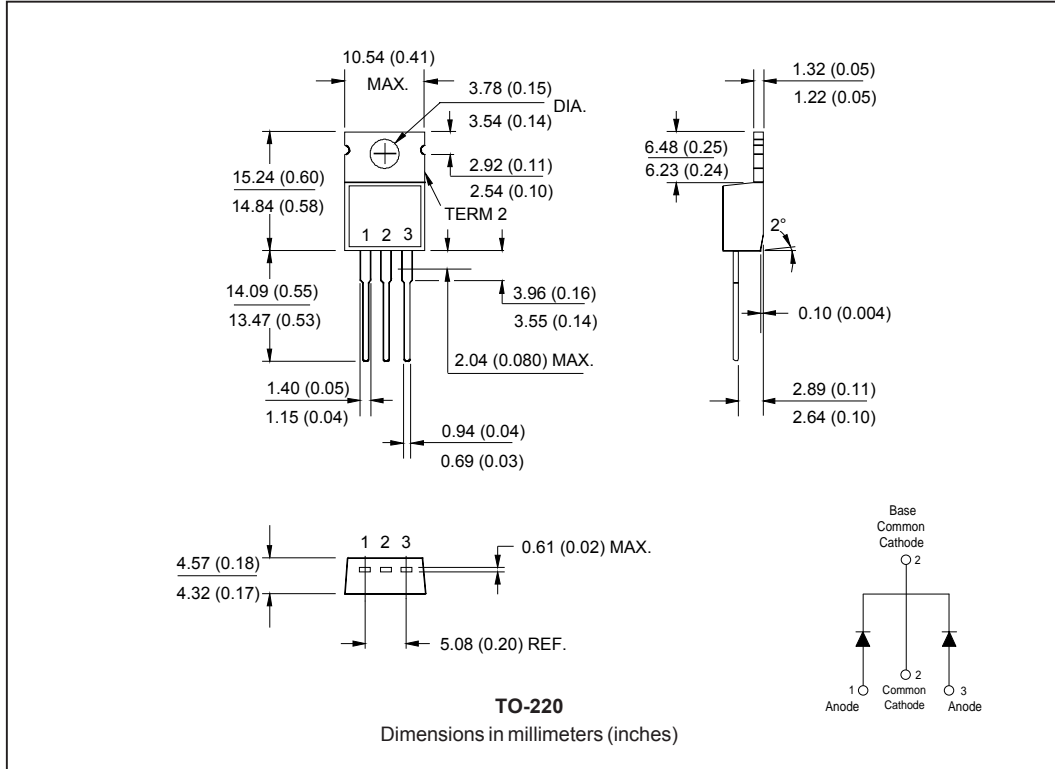
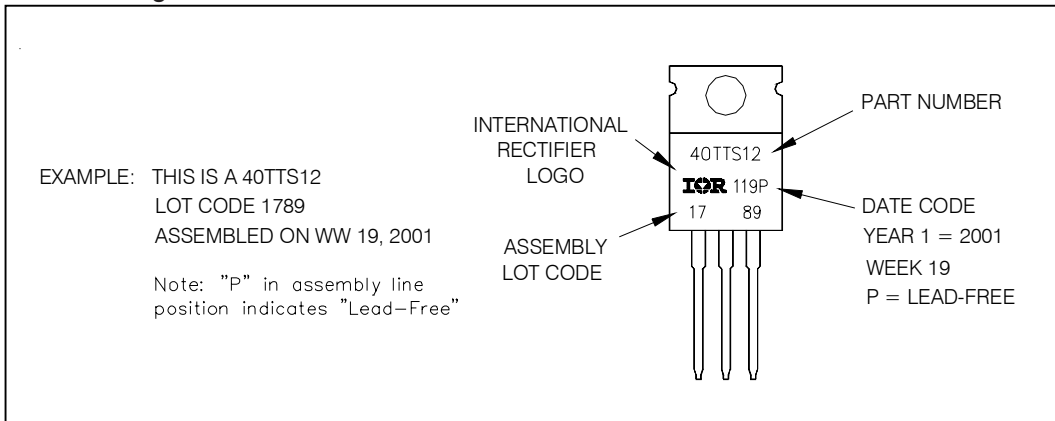


Fig. 9 - Thermal Impedance  $Z_{thJC}$  Characteristics

Outline Table



Part Marking Information



Ordering Information Table

Device Code													
	<table border="1" style="margin: auto;"> <tr> <td style="padding: 5px;">40</td> <td style="padding: 5px;">T</td> <td style="padding: 5px;">T</td> <td style="padding: 5px;">S</td> <td style="padding: 5px;">12</td> <td style="padding: 5px;">PbF</td> </tr> <tr> <td style="text-align: center;">①</td> <td style="text-align: center;">②</td> <td style="text-align: center;">③</td> <td style="text-align: center;">④</td> <td style="text-align: center;">⑤</td> <td style="text-align: center;">⑥</td> </tr> </table>	40	T	T	S	12	PbF	①	②	③	④	⑤	⑥
40	T	T	S	12	PbF								
①	②	③	④	⑤	⑥								
<b>1</b>	- Current Rating, RMS value												
<b>2</b>	- Circuit Configuration T = Single Thyristor												
<b>3</b>	- Package T = TO-220												
<b>4</b>	- Type of Silicon S = Standard Recovery Rectifier												
<b>5</b>	- Voltage Rating (12 = 1200V)												
<b>6</b>	- • 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.