


International  
**IR** Rectifier

**SAFEIR** Series  
40TPS16PbF

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

	$V_T < 1.45V @ 40A$
	$I_{TSM} = 500A$
	$V_{RRM} = 1600V$

**Description/ Features**

The 40TPS16PbF **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.

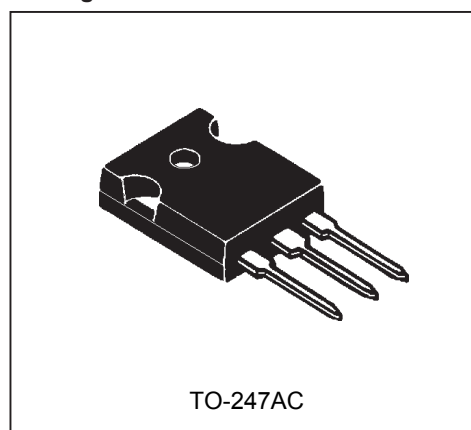
Low lgt parts available.

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.

**Major Ratings and Characteristics**

Characteristics	Values	Units
$I_{T(AV)}$ Sinusoidal waveform	35	A
$I_{RMS}$	55	A
$V_{RRM}/V_{DRM}$	1600	V
$I_{TSM}$	500	A
$V_T @ 40A, T_J = 25^\circ C$	1.45	V
dv/dt	1000	V/ $\mu s$
di/dt	100	A/ $\mu s$
$T_J$	-40 to 125	$^\circ C$

**Package Outline**



## 40TPS16PbF *SAFEIR* Series

Bulletin I2183 11/04

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### Voltage Ratings

Part Number	$V_{RRM}/V_{DRM}$ max. repetitive peak and off-state voltage V	$V_{RSM}$ , maximum non repetitive peak reverse voltage V	$I_{RRM}/I_{DRM}$ 125°C mA
40TPS16PbF	1600	1700	10

### Absolute Maximum Ratings

Parameters	40TPS16	Units	Conditions	
$I_{T(AV)}$ Max. Average On-state Current		35	A @ $T_C = 79^\circ\text{C}$ , 180° conduction half sine wave	
$I_{T(RMS)}$ Max. Continuous RMS On-state Current As AC switch	55			
$I_{TSM}$ Max. Peak One Cycle Non-Repetitive Surge Current	500	A	10ms Sine pulse, rated $V_{RRM}$ applied	Initial $T_J = T_J \text{ max.}$
	600		10ms Sine pulse, no voltage reapplied	
$I^2t$ Max. $I^2t$ for Fusing	1250	$A^2s$	10ms Sine pulse, rated $V_{RRM}$ applied	
	1760		10ms Sine pulse, no voltage reapplied	
$I^2\sqrt{t}$ Max. $I^2\sqrt{t}$ for Fusing	12500	$A^2\sqrt{s}$	t = 0.1 to 10ms, no voltage reapplied	
$V_{T(TO)1}$ Low Level Value of Threshold Voltage	1.02	V	$T_J = 125^\circ\text{C}$	
$V_{T(TO)2}$ High Level Value of Threshold Voltage	1.23			
$r_{t1}$ Low Level Value of On-state Slope Resistance	9.74	$m\Omega$		
$r_{t2}$ High Level Value of On-state Slope Resistance	7.50			
$V_{TM}$ Max. Peak On-state Voltage	1.85	V	@ 110A, $T_J = 25^\circ\text{C}$	
$di/dt$ Max. Rate of Rise of Turned-on Current	100	$A/\mu s$	$T_J = 25^\circ\text{C}$	
$I_H$ Max. Holding Current	150	mA		
$I_L$ Max. Latching Current	300			
$I_{RRM}/I_{DRM}$ Max. Reverse and Direct Leakage Current	0.5/10		$T_J = 25^\circ\text{C}$	$V_R = \text{rated } V_{RRM}/V_{DRM}$
			$T_J = 125^\circ\text{C}$	
$dv/dt$ Max. Rate of Rise of Off-state Voltage	1000	$V/\mu s$	$T_J = T_J \text{ max.}$ , linear to 80% $V_{DRM}$ , $R_g - k = \text{open}$	

### Triggering

Parameters	40TPS16	Units	Conditions	
$P_{GM}$ Max. peak Gate Power	10	W		
$P_{G(AV)}$ Max. average Gate Power	2.5			
$I_{GM}$ Max. peak Gate Current	2.5	A		
$-V_{GM}$ Max. peak negative Gate Voltage	10	V	$T_J = -40^{\circ}\text{C}$	Anode supply = 6V resistive load
$V_{GT}$ Max. required DC Gate Voltage to trigger	4.0		$T_J = 25^{\circ}\text{C}$	
	2.5		$T_J = 125^{\circ}\text{C}$	
	1.7			
$I_{GT}$ Max. required DC Gate Current to trigger	270	mA	$T_J = -40^{\circ}\text{C}$	
	150		$T_J = 25^{\circ}\text{C}$	
	80		$T_J = 125^{\circ}\text{C}$	
	40		$T_J = 25^{\circ}\text{C}$ , for 40TPS08A	
$V_{GD}$ Max. DC Gate Voltage not to trigger	0.25	V	$T_J = 125^{\circ}\text{C}$ , $V_{DRM}$ = rated value	
$I_{GD}$ Max. DC Gate Current not to trigger	6	mA		

### Thermal-Mechanical Specifications

Parameters	40TPS16	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	0.6	°C/W	DC operation	
$R_{thJA}$ Max. Thermal Resistance Junction to Ambient	40			
$R_{thCS}$ Max. Thermal Resistance Case to Heatsink	0.2		Mounting surface, smooth and greased	
wt Approximate Weight	6 (0.21)	g (oz.)		
T Mounting Torque	Min.	6 (5)	Kg-cm (lbf-in)	
	Max.	12 (10)		
Case Style	TO-247AC			
Marking Device	40TPS16			

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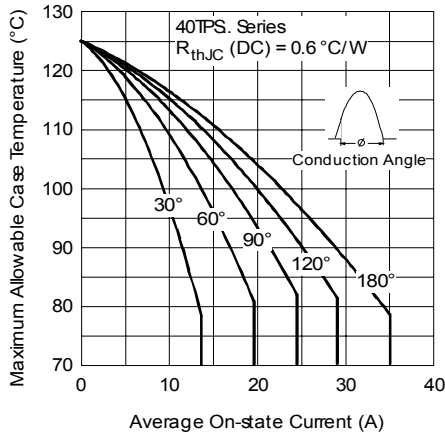


Fig. 1 - Current Rating Characteristics

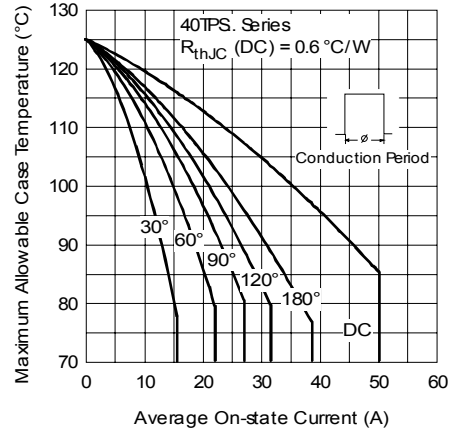


Fig. 2 - Current Rating Characteristics

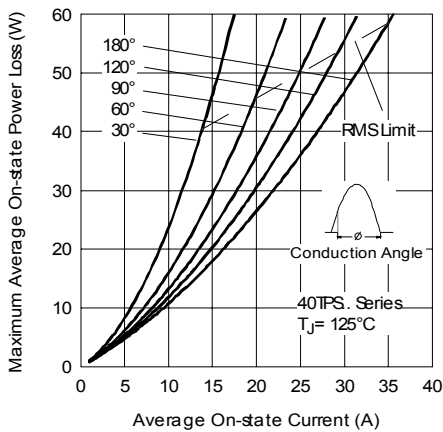


Fig. 3 - On-state Power Loss Characteristics

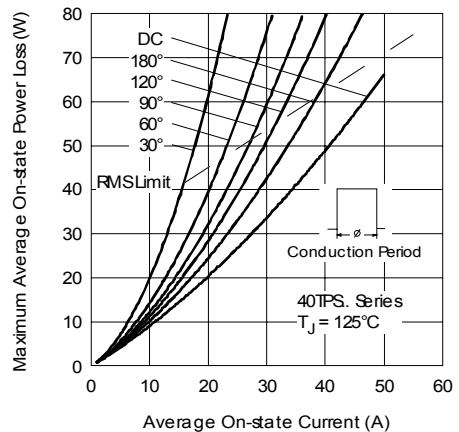


Fig. 4 - On-state Power Loss Characteristics

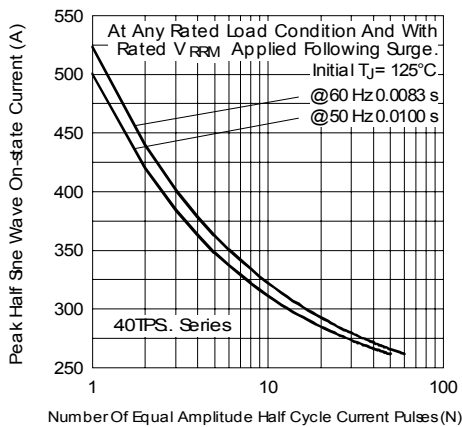


Fig. 5 - Maximum Non-Repetitive Surge Current

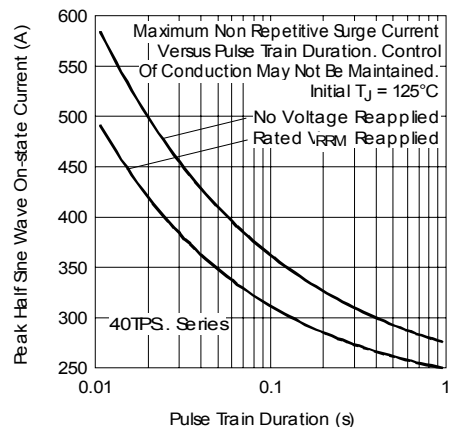


Fig. 6 - Maximum Non-Repetitive Surge Current

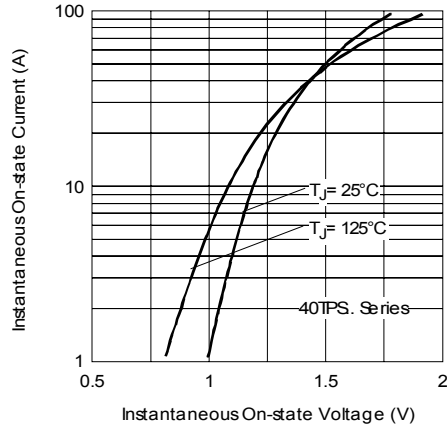


Fig. 7 - On-state Voltage Drop Characteristics

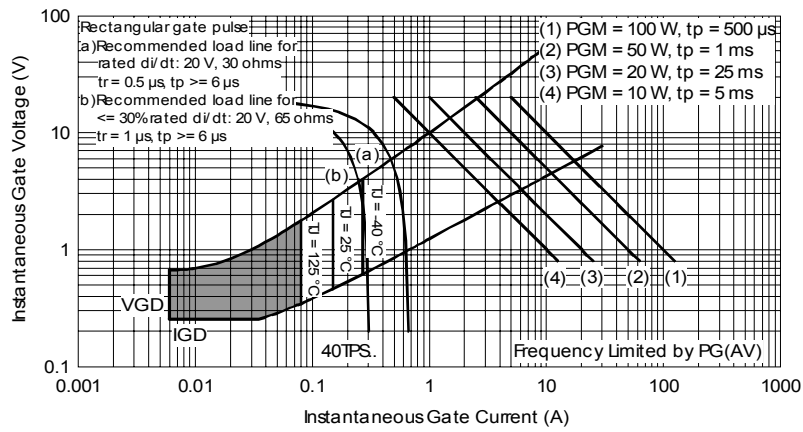


Fig. 8 - Gate Characteristics

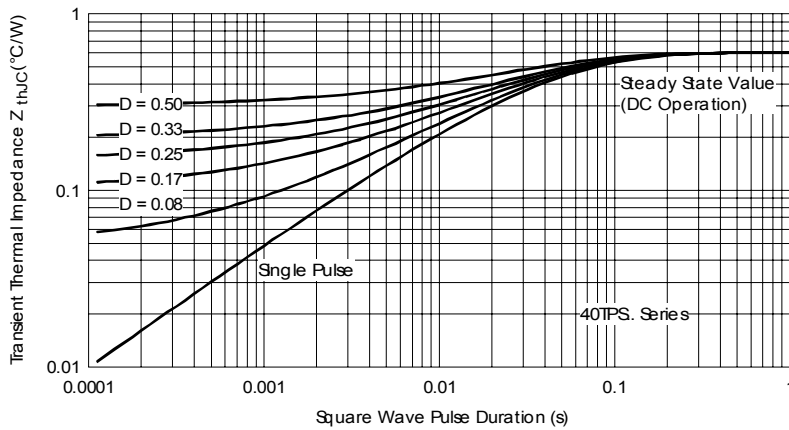


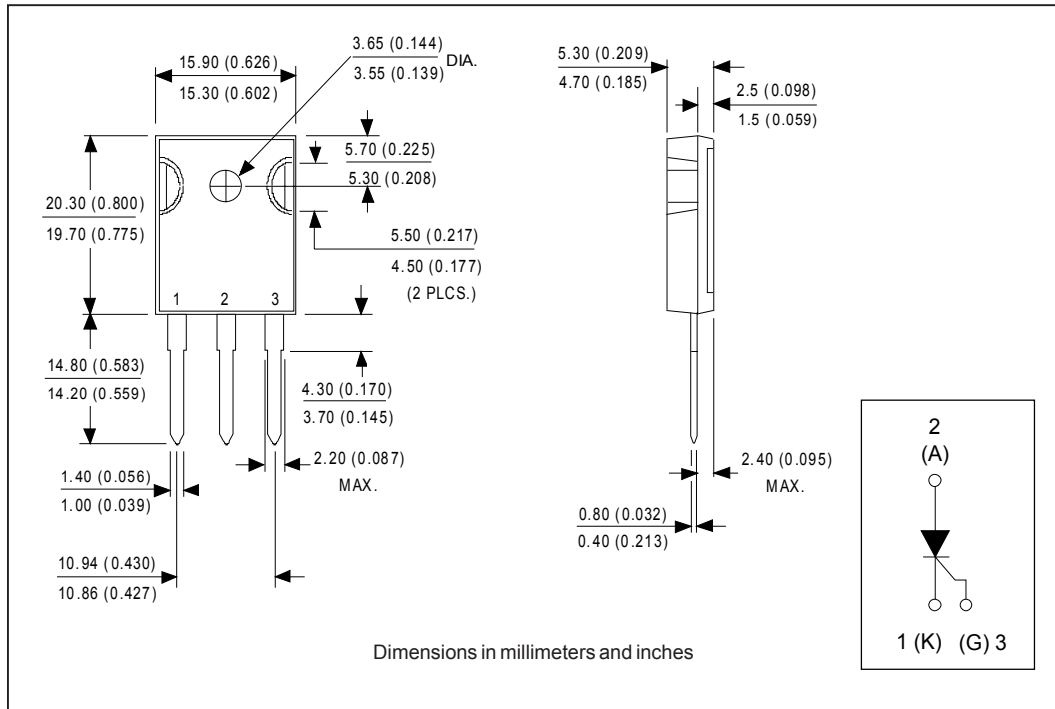
Fig. 9 - Thermal Impedance  $Z_{thJC}$  Characteristics

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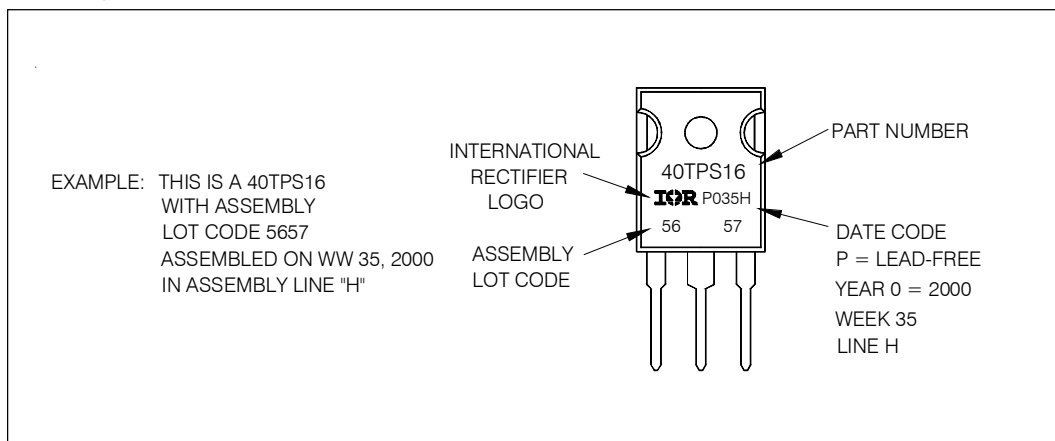
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Outline Table



Marking Information



Ordering Information Table

Device Code					
40	T	P	S	16	PbF
①	②	③	④	⑤	⑥
<b>1</b>	-	Current Rating (40 = 40A)			
<b>2</b>	-	Circuit Configuration:			
		T = Thyristor			
<b>3</b>	-	Package:			
		T = TO-247			
<b>4</b>	-	Type of Silicon:			
		S = Standard Recovery Rectifier			
<b>5</b>	-	Voltage Rating (16 = 1600V)			
<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.