

International  
**IR** Rectifier

## 40HF(R) SERIES

**STANDARD RECOVERY DIODES**

**Stud Version**

### Features

- High surge current capability
- Stud cathode and stud anode version
- Leaded version available
- Types up to 1600V  $V_{RRM}$

40 A

### Typical Applications

- Battery charges
- Converters
- Power supplies
- Machine tool controls
- Welding

### Major Ratings and Characteristics

Parameters	40HF(R)		Units
	10 to 120	140, 160	
$I_{F(AV)}$	40	40	A
@ $T_C$	140	110	°C
$I_{F(RMS)}$	62		A
$I_{FSM}$	@ 50Hz	570	A
	@ 60Hz	595	A
$I^2t$	@ 50Hz	1600	A <sup>2</sup> s
	@ 60Hz	1450	A <sup>2</sup> s
$V_{RRM}$ range	100 to 1200	1400, 1600	V
$T_J$ range	- 65 to 190	- 65 to 160	°C



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Bulletin I20201 rev. D 01/05

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### ELECTRICAL SPECIFICATIONS

#### Voltage Ratings

Type number	Voltage Code	$V_{RRM}$ , maximum repetitive peak reverse voltage V	$V_{RSM}$ , maximum non-repetitive peak reverse voltage V	$I_{RRM}$ max. @ $T_J = T_J$ max. mA
40HF(R)	10	100	200	9
	20	200	300	
	40	400	500	
	60	600	700	
	80	800	900	
	100	1000	1100	
	120	1200	1300	
	140	1400	1500	4.5
160	1600	1700		

#### Forward Conduction

Parameter	40HF(R)		Units	Conditions				
	10 to 120	140, 160						
$I_{F(AV)}$ Max. average forward current @ Case temperature	40	40	A	180° conduction, half sine wave				
	140	110	°C					
$I_{F(RMS)}$ Max. RMS forward current	62		A	Sinusoidal half wave, Initial $T_J = T_J$ max.				
$I_{FSM}$ Max. peak, one-cycle forward, non-repetitive surge current	570		A				t = 10ms	No voltage reappplied
	595						t = 8.3ms	
	480						t = 10ms	100% $V_{RRM}$ reappplied
	500						t = 8.3ms	
$I^2t$ Maximum $I^2t$ for fusing	1600		A <sup>2</sup> s				t = 10ms	No voltage reappplied
	1450						t = 8.3ms	
	1150						t = 10ms	100% $V_{RRM}$ reappplied
	1050			t = 8.3ms				
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing	16000		A <sup>2</sup> /s	t = 0.1 to 10ms, no voltage reappplied				
$V_{F(TO)}$ Value of threshold voltage (up to 1200V)	0.65		V	$T_J = T_J$ max.				
$V_{F(TO)}$ Value of threshold voltage (for 1400V, 1600V)	0.76		V	$T_J = T_J$ max.				
$r_f$ Value of forward slope resistance (up to 1200V)	4.29		mΩ	$T_J = T_J$ max.				
$r_f$ Value of forward slope resistance (for 1400V, 1600V)	3.8			$T_J = T_J$ max.				
$V_{FM}$ Max. forward voltage drop	1.30	1.50	V	$I_{pk} = 125A$ , $T_J = 25^\circ C$ , $t_p = 400\mu s$ rectangular wave				

Thermal and Mechanical Specifications

Parameter	40HF(R)		Units	Conditions
	10 to 120	140 to 160		
T <sub>J</sub> Max. junction operating temperature range	-65 to 190	-65 to 160	°C	
T <sub>stg</sub> Max. storage temperature range	-65 to 190	-65 to 160		
R <sub>thJC</sub> Max. thermal resistance, junction to case	0.95		K/W	DC operation
R <sub>thCS</sub> Max. thermal resistance, case to heatsink	0.25			Mounting surface, smooth, flat and greased
T Allowable mounting torque	3.4 <sup>+0-10%</sup>		Nm	Not lubricated threads
	30		lbf·in	
	2.3 <sup>+0-10%</sup>		Nm	Lubricated threads
	20		lbf·in	
wt Approximate weight	17 (0.6)		g (oz)	unleaded device
Case style	DO-203AB (DO5)			See Outline Table

$\Delta R_{thJC}$  Conduction

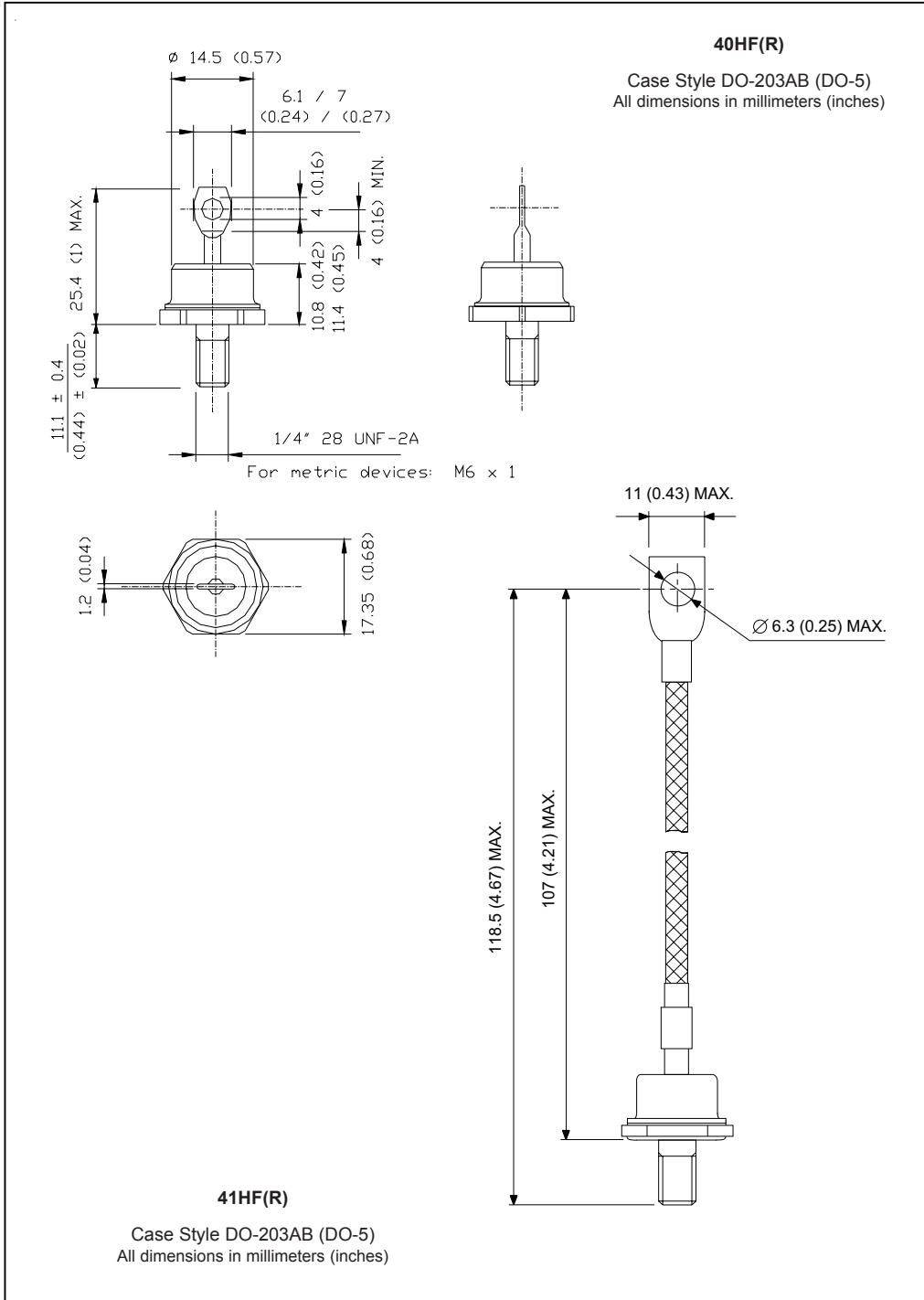
(The following table shows the increment of thermal resistance R<sub>thJC</sub> when devices operate at different conduction angles than DC)

Conduction angle	Sinusoidal conduction	Rectangular conduction	Units	Conditions
180°	0.14	0.10	K/W	T <sub>J</sub> = T <sub>J</sub> max.
120°	0.16	0.17		
90°	0.21	0.22		
60°	0.30	0.31		
30°	0.50	0.50		

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## Outlines Table



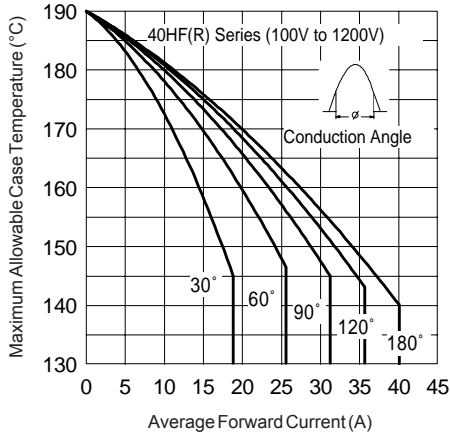


Fig. 1 - Current Ratings Characteristics

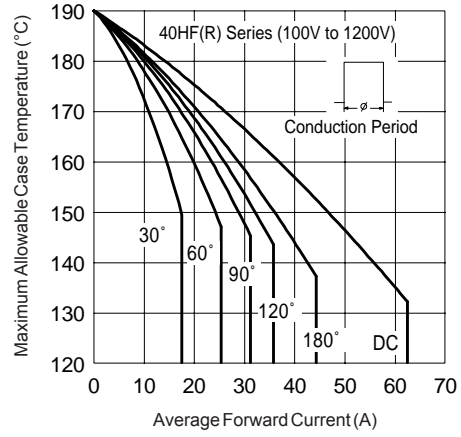


Fig. 2 - Current Ratings Characteristics

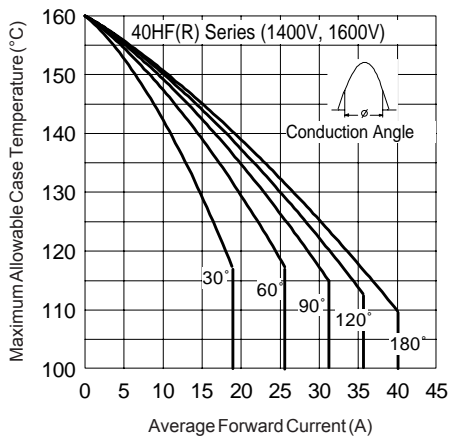


Fig. 3 - Current Ratings Characteristics

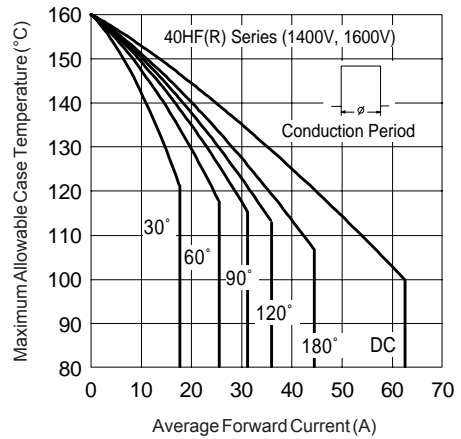


Fig. 4 - Current Ratings Characteristics

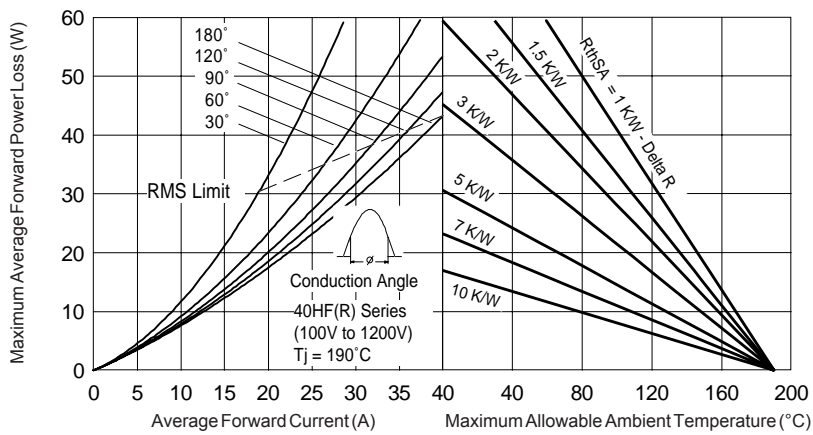


Fig. 5 - Forward Power Loss Characteristics

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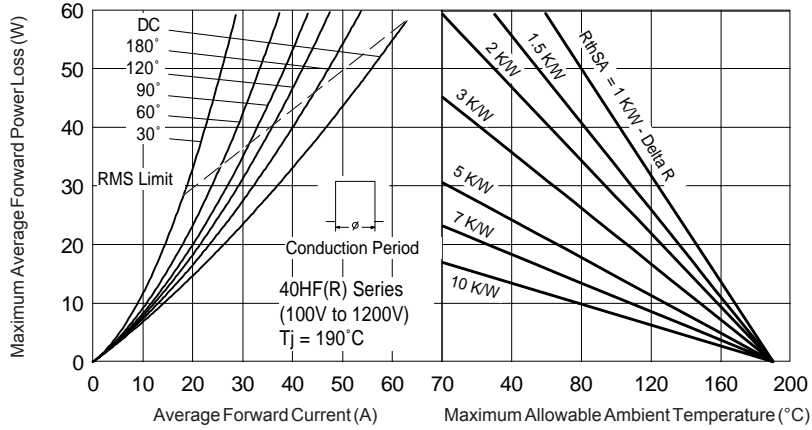


Fig. 6 - Forward Power Loss Characteristics

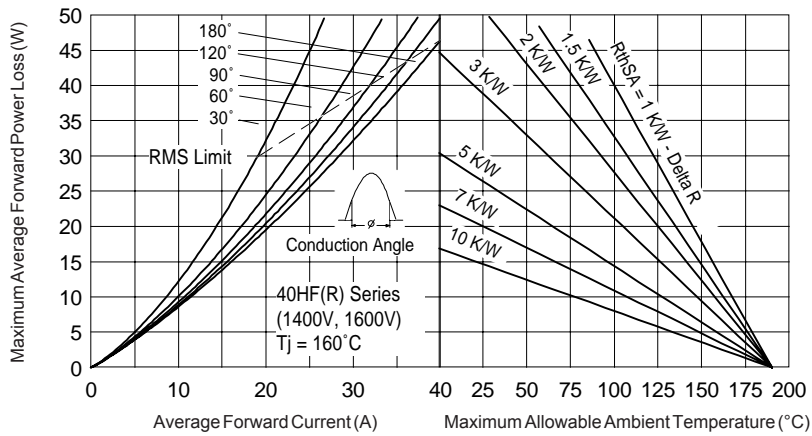


Fig. 7 - Forward Power Loss Characteristics

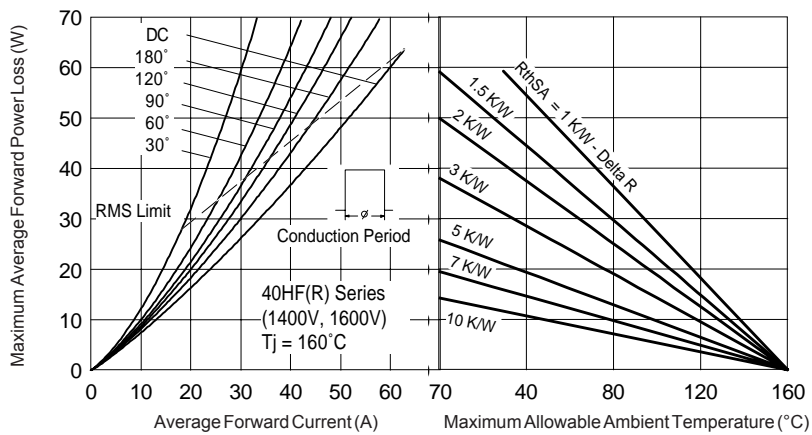


Fig. 8 - Forward Power Loss Characteristics

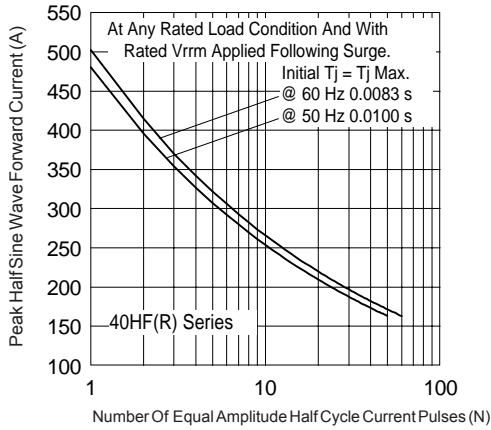


Fig. 9 - Maximum Non-Repetitive Surge Current

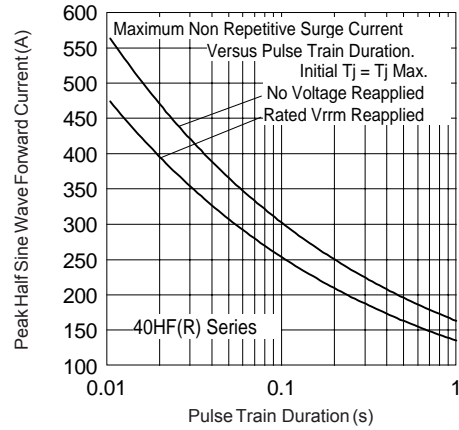


Fig. 10 - Maximum Non-Repetitive Surge Current

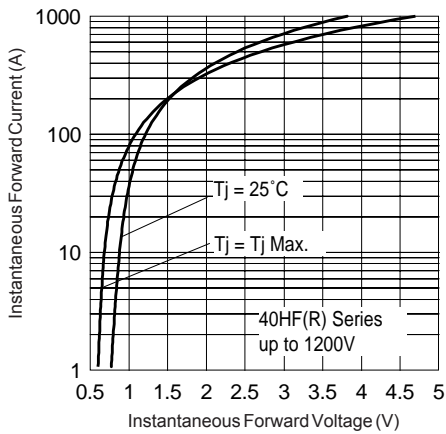


Fig. 11 - Forward Voltage Drop Characteristics (up to 1200V)

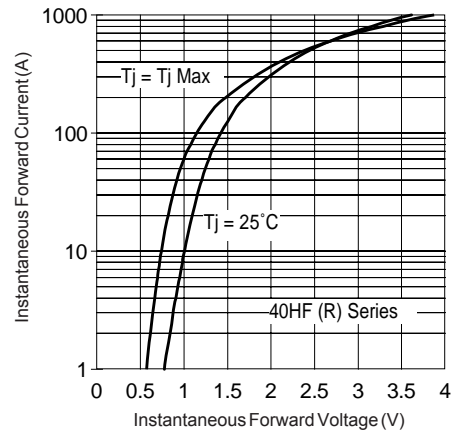


Fig. 12 - Forward Voltage Drop Characteristics (for 1400V, 1600V)

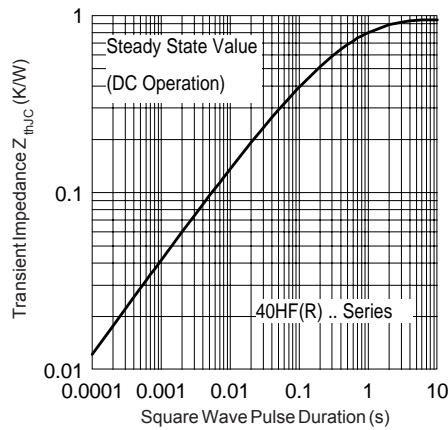


Fig. 13 - Thermal Impedance  $Z_{th,JC}$  Characteristics

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### Ordering Information Table

Device Code	40	HF	R	160	M
	①	②	③	④	⑤
<b>1</b>	- 40 = Standard device				
	41 = Not isolated lead				
	42 = Isolated lead with silicone sleeve				
	(Red = Reverse polarity)				
	(Blue = Normal polarity)				
<b>2</b>	- Standard diode				
<b>3</b>	- None = Stud Normal Polarity (Cathode to Stud)				
	R = Stud Reverse Polarity (Anode to Stud)				
<b>4</b>	- Voltage code: Code x 10 = $V_{RRM}$ (See Voltage Ratings table)				
<b>5</b>	- None = Stud base DO-203AB (DO-5) 1/4" 28UNF-2A				
	M = Stud base DO-203AB (DO-5) M6 X 1				

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

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