

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. C 03/04

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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. @ $T_J = T_{J \text{ max.}}$ 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 $T_J = T_{J \text{ max.}}$				
$I_{FSM}$ Max. peak, one-cycle forward, non-repetitive surge current	570		A				t = 10ms	No voltage reappplied
	595						t = 8.3ms	100% $V_{RRM}$ reappplied
	480						t = 10ms	100% $V_{RRM}$ reappplied
	500						t = 8.3ms	100% $V_{RRM}$ reappplied
$I^2t$ Maximum $I^2t$ for fusing	1600		A <sup>2</sup> s				t = 10ms	No voltage reappplied
	1450						t = 8.3ms	100% $V_{RRM}$ reappplied
	1150		A <sup>2</sup> s				t = 10ms	100% $V_{RRM}$ reappplied
	1050			t = 8.3ms	100% $V_{RRM}$ reappplied			
$I^2vt$ Maximum $I^2vt$ 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	$T_J = T_{J \text{ max.}}$				
$V_{F(TO)}$ Value of threshold voltage (for 1400V, 1600V)	0.76		V	$T_J = T_{J \text{ max.}}$				
$r_f$ Value of forward slope resistance (up to 1200V)	4.29		mΩ	$T_J = T_{J \text{ max.}}$				
$r_f$ Value of forward slope resistance (for 1400V, 1600V)	3.8			$T_J = T_{J \text{ max.}}$				
$V_{FM}$ 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 Max. allowed mounting torque ±10%	2.3 - 3.4		Nm	Not lubricated threads
	20 - 30		lbf · in	
wt Approximate weight	17 (0.6)		g (oz)	unleaded device
Case style	DO-203AB (DO5)			See Outline Table

**ΔR<sub>thJC</sub> 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		

**Ordering Information Table**

Device Code											
	<table border="1" style="margin: auto;"> <tr> <td style="padding: 5px;"><b>40</b></td> <td style="padding: 5px;"><b>HF</b></td> <td style="padding: 5px;"><b>R</b></td> <td style="padding: 5px;"><b>160</b></td> <td style="padding: 5px;"><b>M</b></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> </tr> </table>	<b>40</b>	<b>HF</b>	<b>R</b>	<b>160</b>	<b>M</b>	①	②	③	④	⑤
<b>40</b>	<b>HF</b>	<b>R</b>	<b>160</b>	<b>M</b>							
①	②	③	④	⑤							
<b>1</b>	<ul style="list-style-type: none"> <li>- 40 = Standard device</li> <li>41 = Not isolated lead</li> <li>42 = Isolated lead with silicone sleeve (Red = Reverse polarity) (Blue = Normal polarity)</li> </ul>										
<b>2</b>	- Standard diode										
<b>3</b>	<ul style="list-style-type: none"> <li>- None = Stud Normal Polarity (Cathode to Stud)</li> <li>R = Stud Reverse Polarity (Anode to Stud)</li> </ul>										
<b>4</b>	- Voltage code: Code x 10 = V <sub>RRM</sub> (See Voltage Ratings table)										
<b>5</b>	<ul style="list-style-type: none"> <li>- None = Stud base DO-203AB (DO-5) 1/4" 28UNF-2A</li> <li>M = Stud base DO-203AB (DO-5) M6 X 1</li> </ul>										

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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

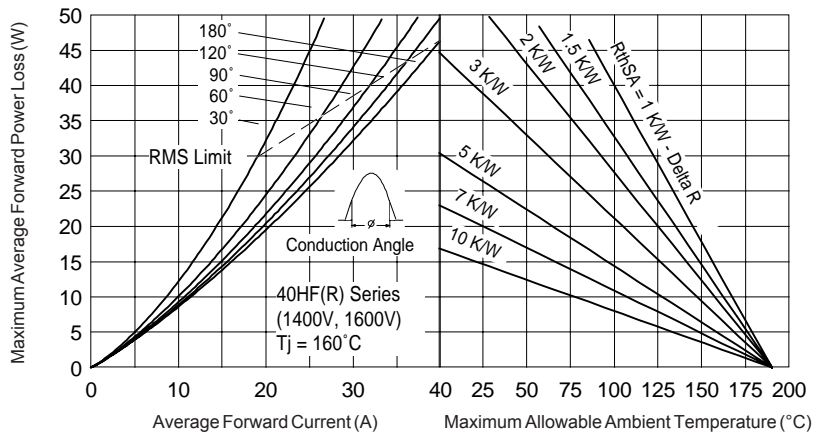


Fig. 7 - Forward Power Loss Characteristics

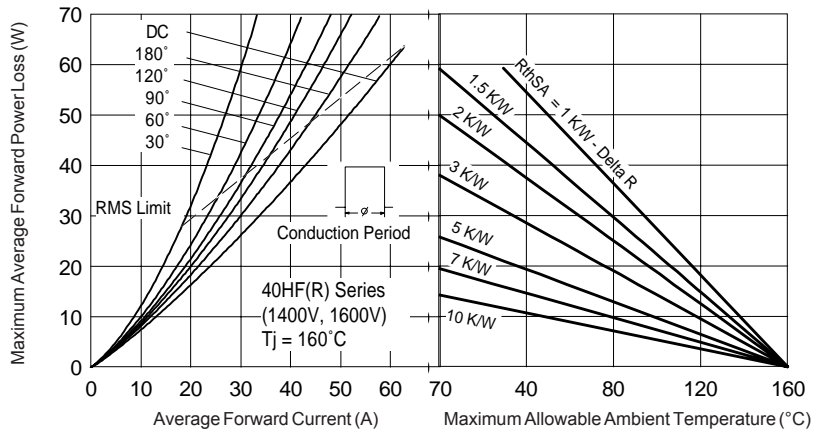


Fig. 8 - Forward Power Loss Characteristics

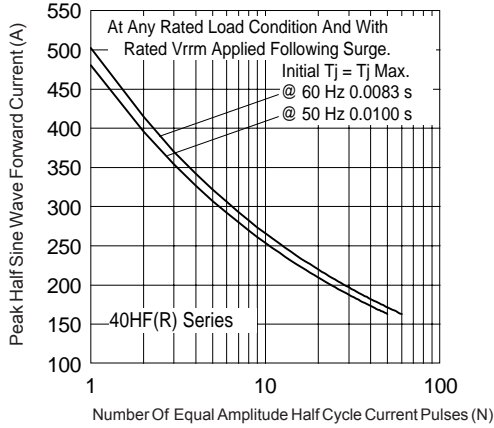


Fig. 9 - Maximum Non-Repetitive Surge Current

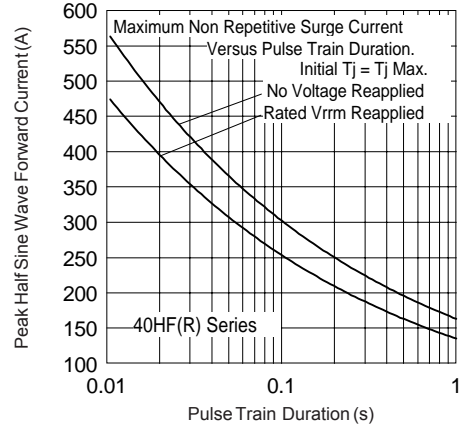


Fig. 10 - Maximum Non-Repetitive Surge Current

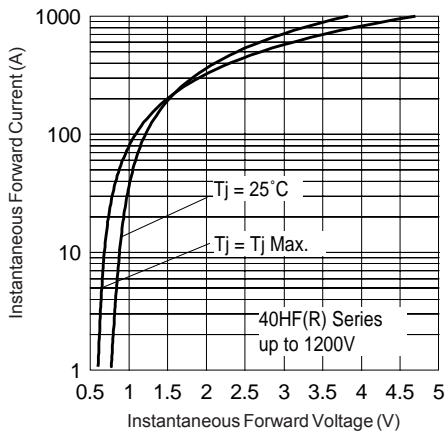


Fig. 11 - Forward Voltage Drop Characteristics (up to 1200V)

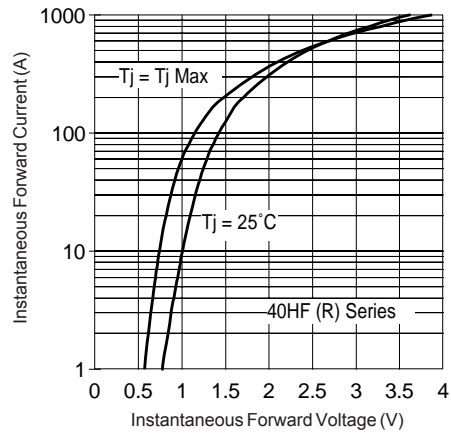


Fig. 12 - Forward Voltage Drop Characteristics (for 1400V, 1600V)



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

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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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