



**THE DATASHEET OF  
SD253R04S15PV**



### FAST RECOVERY DIODES

Stud Version

#### Features

- High power FAST recovery diode series
- 1.5 to 2.0  $\mu\text{s}$  recovery time
- High voltage ratings up to 1600V
- High current capability
- Optimized turn on and turn off characteristics
- Low forward recovery
- Fast and soft reverse recovery
- Compression bonded encapsulation
- Stud version JEDEC DO-205AB (DO-9)
- Maximum junction temperature 125°C
- RoHS Compliant

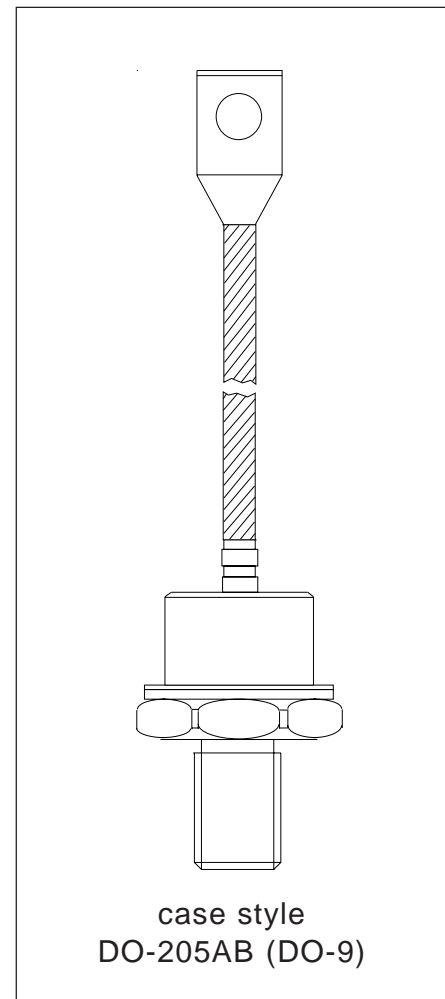
250A

#### Typical Applications

- Snubber diode for GTO
- High voltage free-wheeling diode
- Fast recovery rectifier applications

#### Major Ratings and Characteristics

Parameters	SD253N/R	Units
$I_{F(AV)}$	250	A
@ $T_C$	85	°C
$I_{F(RMS)}$	392	A
$I_{FSM}$ @ 50Hz	5350	A
@ 60Hz	5600	A
$I^2t$ @ 50Hz	143	KA <sup>2</sup> s
@ 60Hz	130	KA <sup>2</sup> s
$V_{RRM}$ range	400 to 1600	V
$t_{rr}$ range	1.5 to 2.0	$\mu\text{s}$
@ $T_J$	25	°C
$T_J$	- 40 to 125	°C



**ELECTRICAL SPECIFICATIONS**

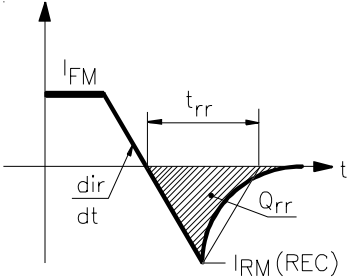
Voltage Ratings

Type number	Voltage Code	$V_{RRM}$ max. repetitive peak and off-state voltage V	$V_{RSM}$ , maximum non-repetitive peak voltage V	$I_{RRM}$ max. $T_J = 125^\circ\text{C}$ mA
SD253N/R..S15	04	400	500	35
	08	800	900	
	10	1000	1100	
SD253N/R..S20	12	1200	1300	
	14	1400	1500	
	16	1600	1700	

Forward Conduction

Parameter	SD253N/R	Units	Conditions		
$I_{F(AV)}$ Max. average forward current @ Case temperature	250	A	180° conduction, half sine wave.		
	85	°C			
$I_{F(RMS)}$ Max. RMS current	392	A	DC @ 74°C case temperature		
$I_{FSM}$ Max. peak, one-cycle non-repetitive forward current	5350	A	t = 10ms No voltage		
	5600		t = 8.3ms reappplied		
	4500		t = 10ms 100% $V_{RRM}$		
	4710		t = 8.3ms reappplied		
$I^2t$ Maximum $I^2t$ for fusing	143	$\text{KA}^2\text{s}$	t = 10ms No voltage		
	130		t = 8.3ms reappplied		
	101		t = 10ms 100% $V_{RRM}$		
	92		t = 8.3ms reappplied		
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing	1430	$\text{KA}^2\sqrt{\text{s}}$	t = 0.1 to 10ms, no voltage reappplied		
	$V_{F(TO)1}$ Low level of threshold voltage		0.87	V	(16.7% $\times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}$ ), $T_J = T_J \text{ max.}$
	$V_{F(TO)2}$ High level of threshold voltage		1.17		( $I > \pi \times I_{F(AV)}$ ), $T_J = T_J \text{ max.}$
	$r_{f1}$ Low level of forward slope resistance		0.62	$\text{m}\Omega$	(16.7% $\times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}$ ), $T_J = T_J \text{ max.}$
$r_{f2}$ High level of forward slope resistance	0.29	( $I > \pi \times I_{F(AV)}$ ), $T_J = T_J \text{ max.}$			
$V_{FM}$ Max. forward voltage	1.38	V	$I_{pk} = 785\text{A}$ , $T_J = 25^\circ\text{C}$ , $t_p = 400 \mu\text{s}$ square pulse		

Recovery Characteristics

Code	$T_J = 25^\circ\text{C}$ typical $t_{rr}$ @ 25% $I_{RRM}$ ( $\mu\text{s}$ )	Testconditions			Max. values @ $T_J = 125^\circ\text{C}$			
		$I_{pk}$ Square Pulse (A)	$di/dr/dt$ (A/ $\mu\text{s}$ )	$V_r$ (V)	$t_{rr}$ @ 25% $I_{RRM}$ ( $\mu\text{s}$ )	$Q_{rr}$ ( $\mu\text{C}$ )	$I_{rr}$ (A)	
S15	1.5	750	25	-30	2.9	90	44	
S20	2.0				3.2	107	46	

### Thermal and Mechanical Specification

Parameter	SD253N/R	Units	Conditions
T <sub>J</sub> Max. operating temperature range	-40 to 125	°C	
T <sub>stg</sub> Max. storage temperature range	-40 to 150		
R <sub>thJC</sub> Max. thermal resistance, junction to case	0.115	K/W	DC operation
R <sub>thCS</sub> Max. thermal resistance, case to heatsink	0.08		Mounting surface, smooth, flat and greased
T Mounting torque ± 10%	31	N m	Not lubricated threads
	24.5		Lubricated threads
wt Approximate weight	250	g	
Case style	DO-205AB (DO-9)		See Outline Table

### ΔR<sub>thJC</sub> Conduction

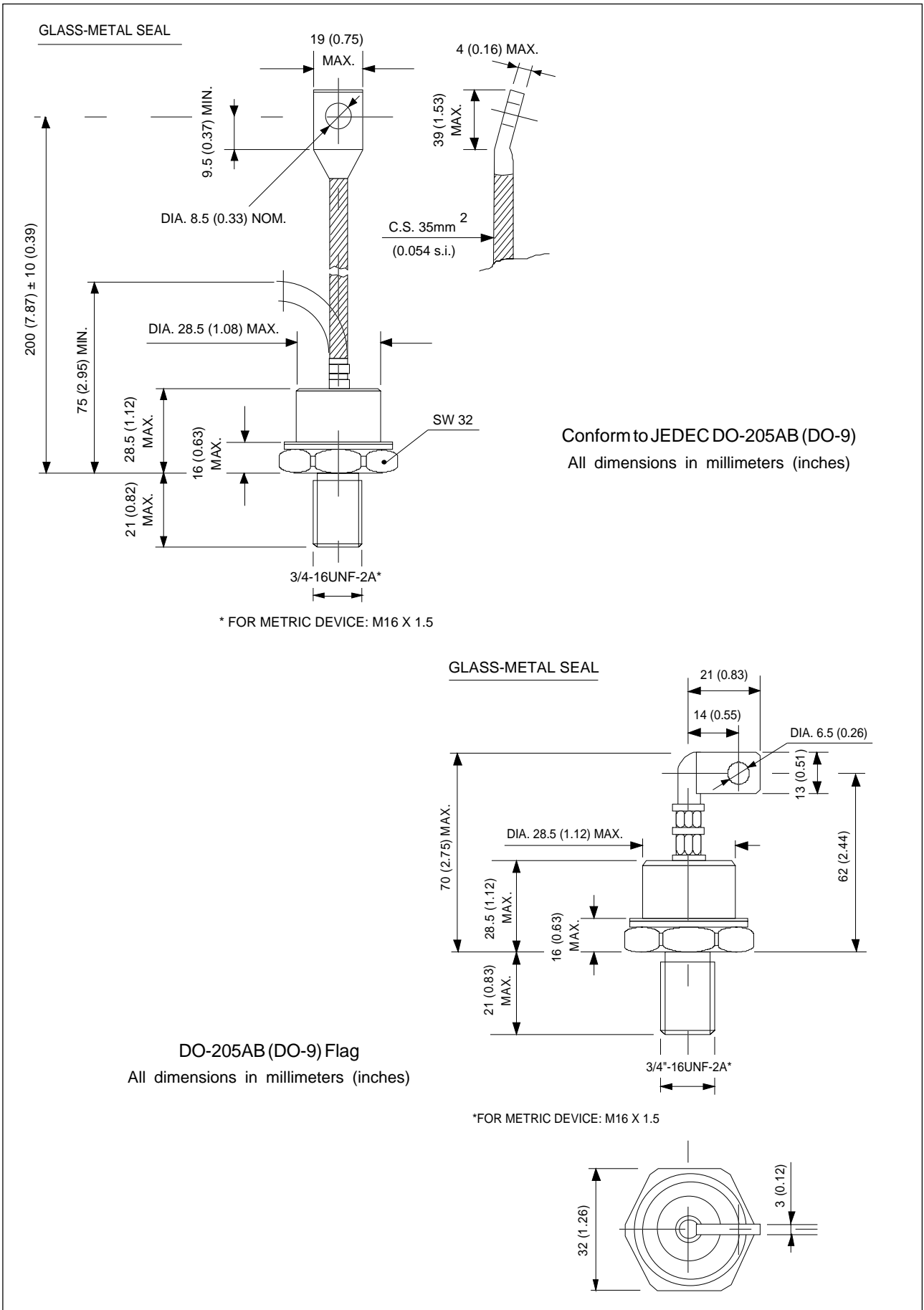
(The following table shows the increment of thermal resistance R<sub>thJC</sub> when devices operate at different conduction angles than DC)

Conduction angle	Sinusoidal conduction	Rectangular conduction	Units	Conditions
180°	0.010	0.008	K/W	T <sub>J</sub> = T <sub>J</sub> max.
120°	0.013	0.014		
90°	0.017	0.019		
60°	0.025	0.027		
30°	0.044	0.044		

### Ordering Information Table

Device Code	
	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px; background-color: #333; color: white;">SD</div> <div style="border: 1px solid black; padding: 2px 5px; background-color: #333; color: white;">25</div> <div style="border: 1px solid black; padding: 2px 5px; background-color: #333; color: white;">3</div> <div style="border: 1px solid black; padding: 2px 5px; background-color: #333; color: white;">R</div> <div style="border: 1px solid black; padding: 2px 5px; background-color: #333; color: white;">16</div> <div style="border: 1px solid black; padding: 2px 5px; background-color: #333; color: white;">S20</div> <div style="border: 1px solid black; padding: 2px 5px; background-color: #333; color: white;">P</div> <div style="border: 1px solid black; padding: 2px 5px; background-color: #333; color: white;">B</div> <div style="border: 1px solid black; padding: 2px 5px; background-color: #333; color: white;">V</div> </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> <span>①</span><span>②</span><span>③</span><span>④</span><span>⑤</span><span>⑥</span><span>⑦</span><span>⑧</span><span>⑨</span> </div>
<b>1</b>	- Diode
<b>2</b>	- Essential part number
<b>3</b>	- 3 = Fast recovery
<b>4</b>	- N = Stud Normal Polarity (Cathode to Stud) R = Stud Reverse Polarity (Anode to Stud)
<b>5</b>	- Voltage code: Code x 100 = V <sub>RRM</sub> (see Voltage Ratings table)
<b>6</b>	- t <sub>rr</sub> code (see Recovery Characteristics table)
<b>7</b>	- P = Stud base DO-205AB (DO-9) 3/4" 16UNF-2A M = Stud base DO-205AB (DO-9) M16 X 1.5
<b>8</b>	- B = Flag top terminals (for Cathode/ Anode Leads) S = Isolated lead with silicone sleeve (Red = Reverse Polarity; Blue = Normal Polarity) None = Not isolated lead
<b>9</b>	- V = Glass-metal seal

**Outline Table**



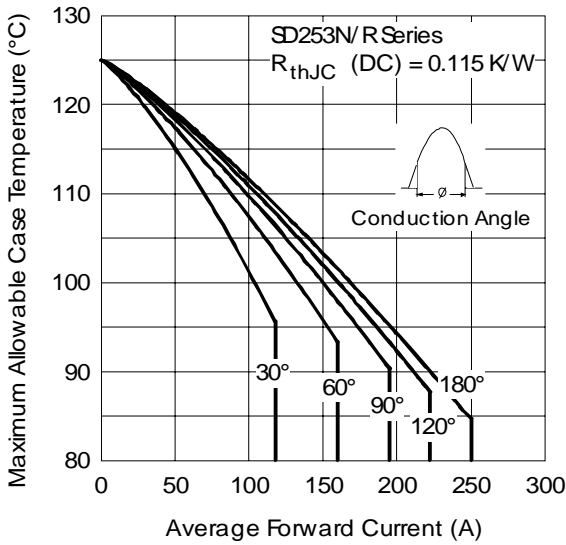


Fig. 1 - Current Ratings Characteristics

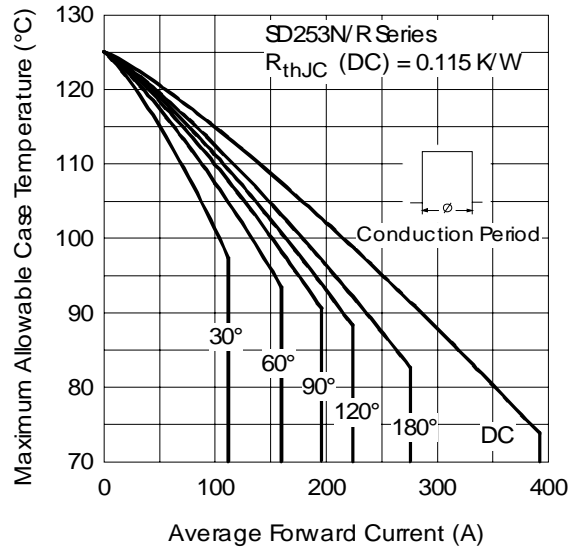


Fig. 2 - Current Ratings Characteristics

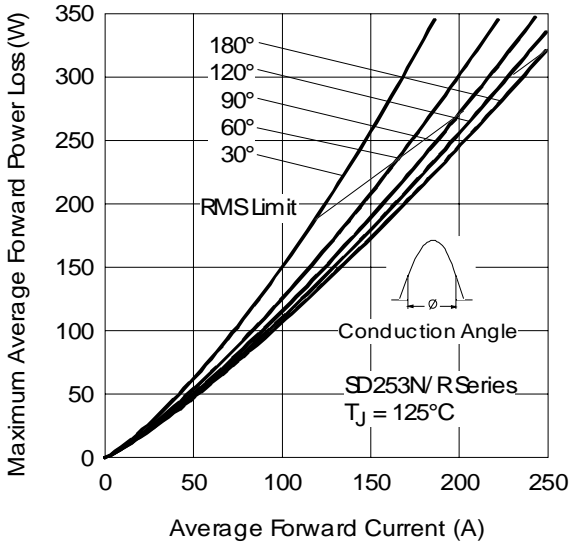


Fig. 3 - Forward Power Loss Characteristics

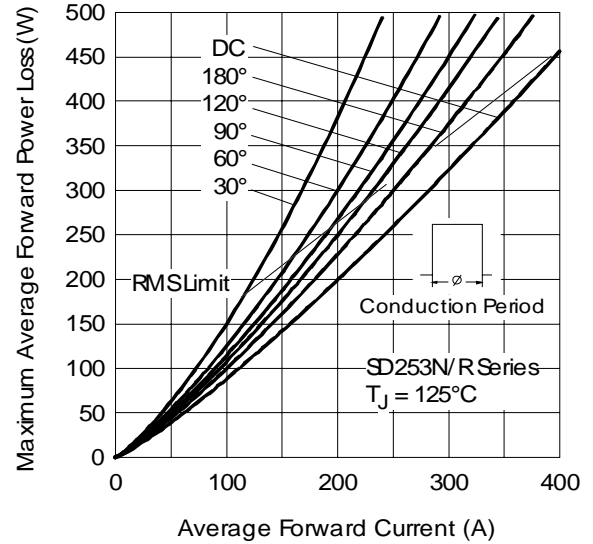


Fig. 4 - Forward Power Loss Characteristics

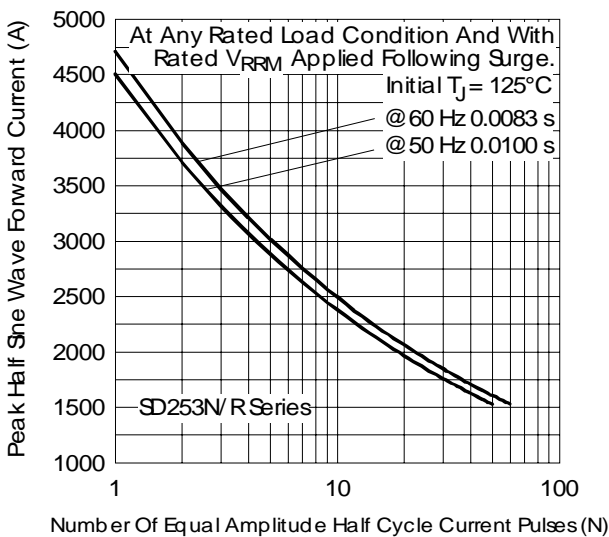


Fig. 5 - Maximum Non-repetitive Surge Current

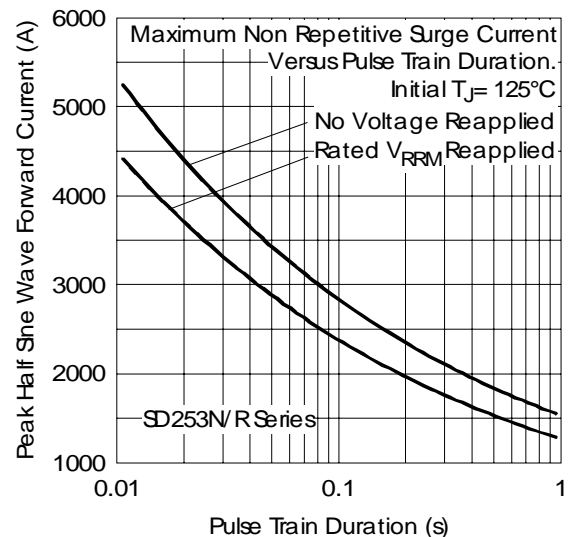


Fig. 6 - Maximum Non-repetitive Surge Current

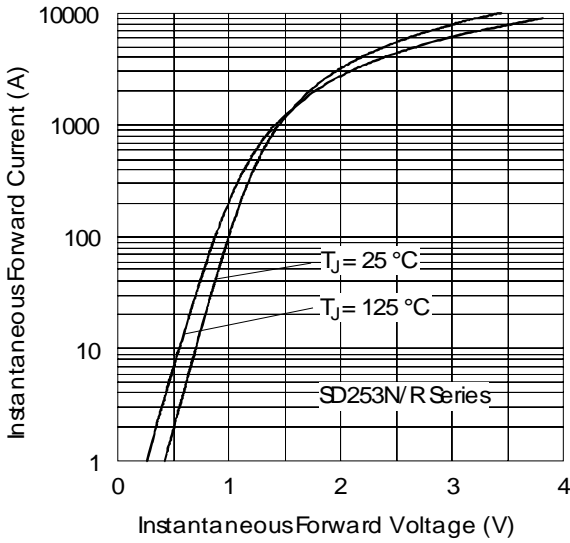


Fig. 7 - Forward Voltage Drop Characteristics

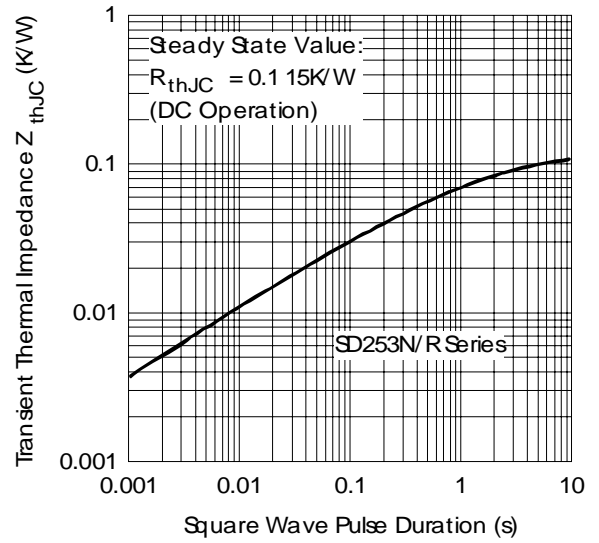


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristic

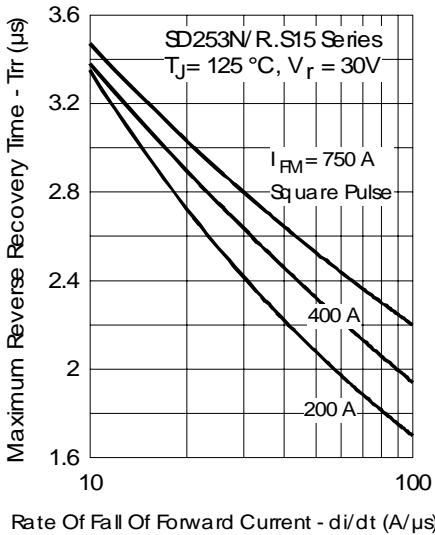


Fig. 9 - Recovery Time Characteristics

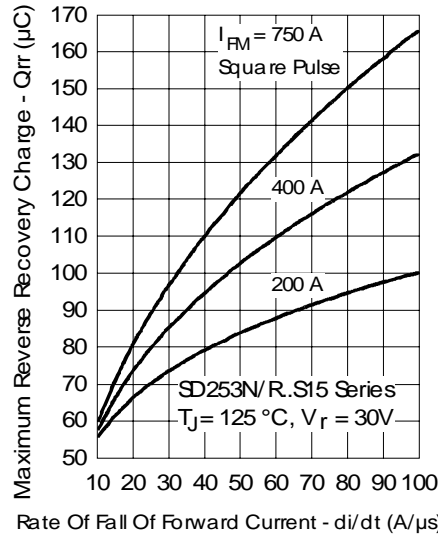


Fig. 10 - Recovery Charge Characteristics

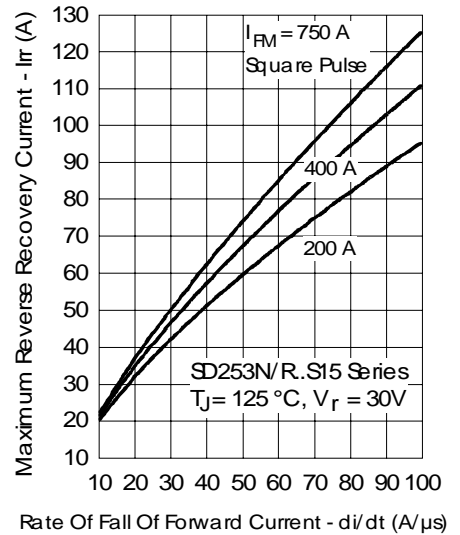


Fig. 11 - Recovery Current Characteristics

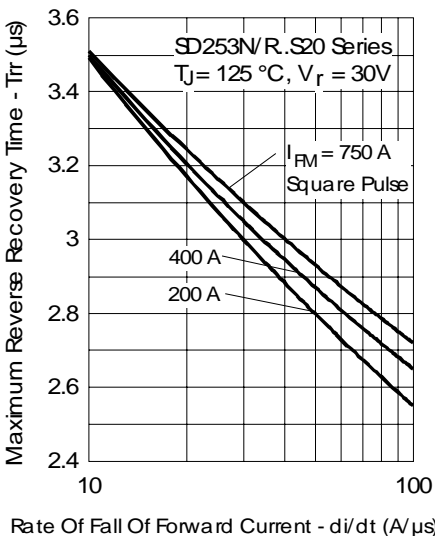


Fig. 12 - Recovery Time Characteristics

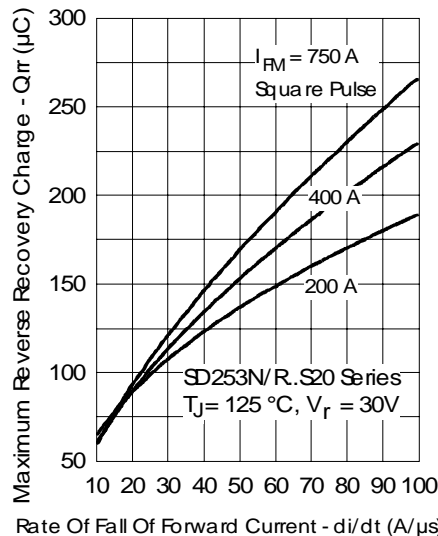


Fig. 13 - Recovery Charge Characteristics

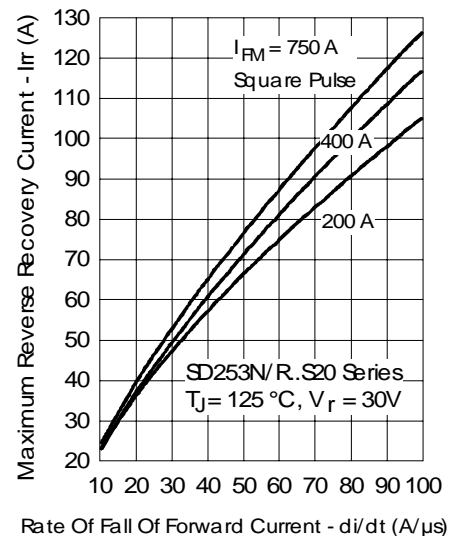


Fig. 14 - Recovery Current Characteristics

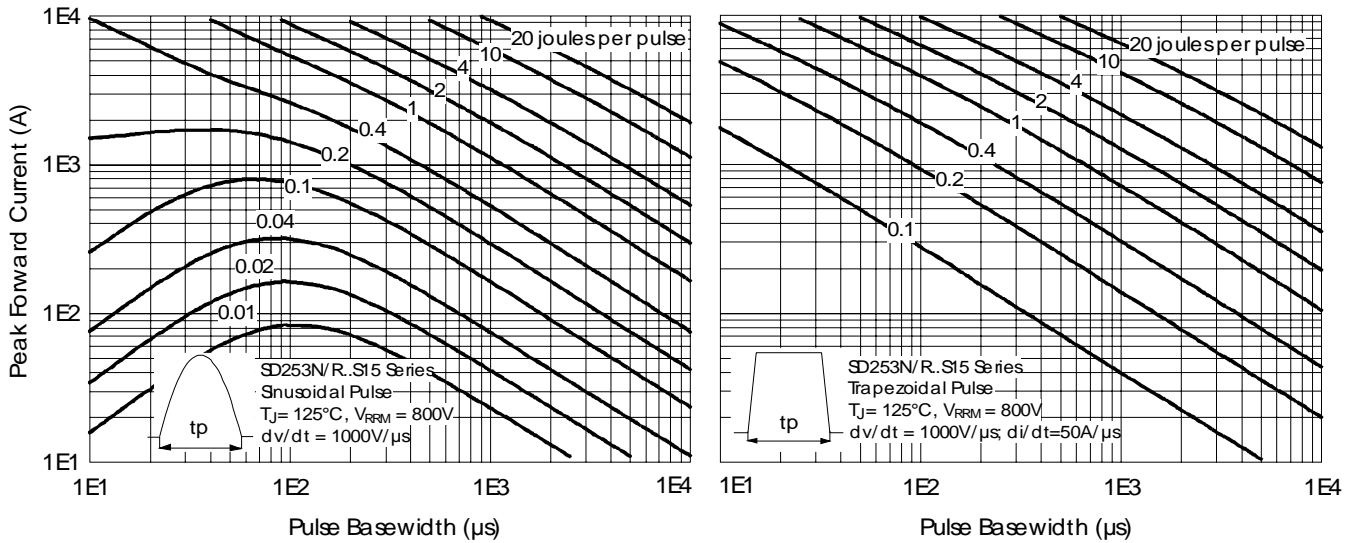


Fig. 15 - Maximum Total Energy Loss Per Pulse Characteristics

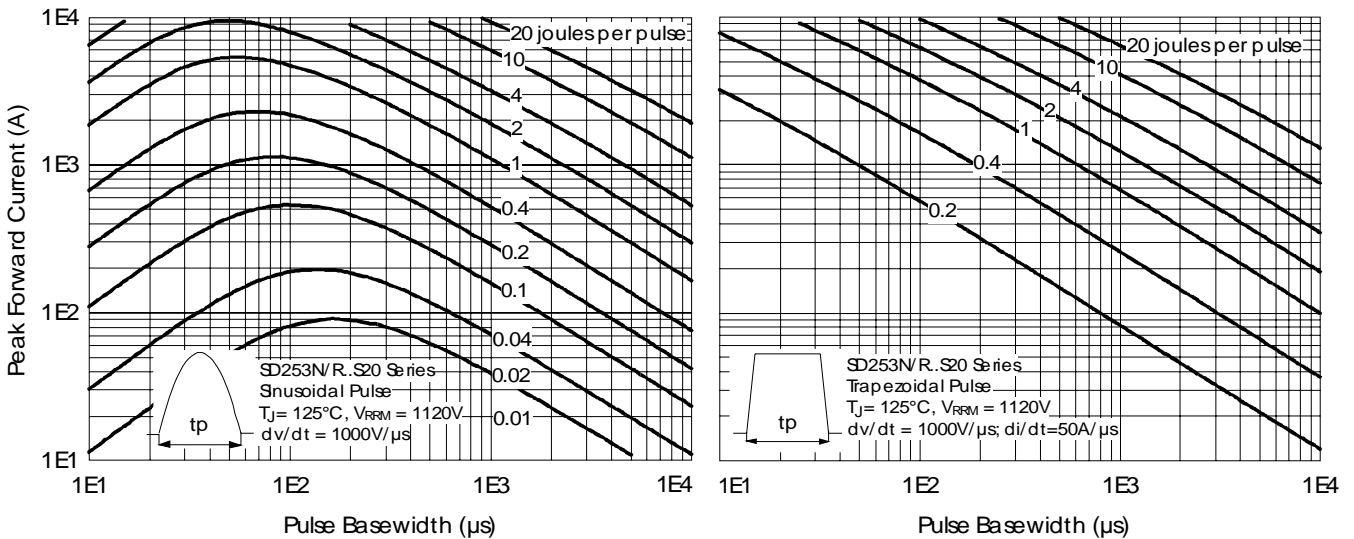




Fig. 16 - Maximum Total Energy Loss Per Pulse Characteristics

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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