



# Fast Recovery Diodes (Hockey PUK Version), 810 A/910 A



B-43



RoHS  
COMPLIANT

### FEATURES

- High power FAST recovery diode series
- 2.0  $\mu$ s to 3.0  $\mu$ s recovery time
- High voltage ratings up to 2500 V
- High current capability
- Optimized turn-on and turn-off characteristics
- Low forward recovery
- Fast and soft reverse recovery
- Press PUK encapsulation
- Hockey PUK version case style B-43
- Maximum junction temperature 150 °C
- Designed and qualified for industrial level
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

PRODUCT SUMMARY	
$I_{F(AV)}$	810A /910 A
Package	B-43
Circuit configuration	Single diode

### TYPICAL APPLICATIONS

- Snubber diode for GTO
- High voltage freewheeling diode
- Fast recovery rectifier applications

MAJOR RATINGS AND CHARACTERISTICS				
PARAMETER	TEST CONDITIONS	SD823C..C		UNITS
		S20	S30	
$I_{F(AV)}$		810	910	A
	$T_{hs}$	55	55	°C
$I_{F(RMS)}$		1500	1690	A
$I_{FSM}$	50 Hz	9300	9600	
	60 Hz	9730	10 050	
$V_{RRM}$	Range	1200 to 2500	1200 to 2500	V
$t_{rr}$		2.0	3.0	$\mu$ s
	$T_J$	25		°C
$T_J$	- 40 to 150			

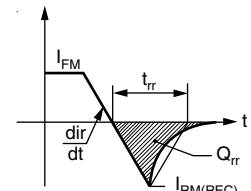
### ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS				
TYPE NUMBER	VOLTAGE CODE	$V_{RRM}$ , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE V	$V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	$I_{RRM}$ MAXIMUM AT $T_J = T_J$ MAXIMUM mA
VS-SD823C..C	12	1200	1300	50
	16	1600	1700	
	20	2000	2100	
	25	2500	2600	



FORWARD CONDUCTION							
PARAMETER	SYMBOL	TEST CONDITIONS		SD823C..C		UNITS	
				S20	S30		
Maximum average forward current at heatsink temperature	$I_{F(AV)}$	180° conduction, half sine wave Double side (single side) cooled		810 (425)	910 (470)	A	
Maximum RMS forward current	$I_{F(RMS)}$	25 °C heatsink temperature double side cooled		1500	1690	°C	
Maximum peak, one-cycle forward, non-repetitive current	$I_{FSM}$	t = 10 ms	Sinusoidal half wave, initial $T_J = T_J$ maximum	No voltage reapplied	9300	9600	A
		t = 8.3 ms		100 % $V_{RRM}$ reapplied	9730	10 050	
		t = 10 ms		100 % $V_{RRM}$ reapplied	7820	8070	
		t = 8.3 ms		100 % $V_{RRM}$ reapplied	8190	8450	
Maximum $I^2t$ for fusing	$I^2t$	t = 10 ms	Sinusoidal half wave, initial $T_J = T_J$ maximum	No voltage reapplied	432	460	kA <sup>2</sup> s
		t = 8.3 ms		100 % $V_{RRM}$ reapplied	395	420	
		t = 10 ms		100 % $V_{RRM}$ reapplied	306	326	
		t = 8.3 ms		100 % $V_{RRM}$ reapplied	279	297	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 to 10 ms, no voltage reapplied		4320	4600	kA <sup>2</sup> √s	
Low level value of threshold voltage	$V_{F(TO)1}$	(16.7 % $\times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}$ , $T_J = T_J$ maximum)		1.00	0.95	V	
High level value of threshold voltage	$V_{F(TO)2}$	(I > $\pi \times I_{F(AV)}$ , $T_J = T_J$ maximum)		1.11	1.06		
Low level value of forward slope resistance	$r_{f1}$	(16.7 % $\times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}$ , $T_J = T_J$ maximum)		0.80	0.60	mW	
High level value of forward slope resistance	$r_{f2}$	(I > $\pi \times I_{F(AV)}$ , $T_J = T_J$ maximum)		0.76	0.57		
Maximum forward voltage drop	$V_{FM}$	$I_{pk} = 1500$ A, $T_J = T_J$ maximum $t_p = 10$ ms sinusoidal wave		2.20	1.85	V	

RECOVERY CHARACTERISTICS								
CODE	MAXIMUM VALUE AT $T_J = 25$ °C		TEST CONDITIONS			TYPICAL VALUES AT $T_J = 125$ °C		
	$t_{rr}$ AT 25 % $I_{RRM}$ (μs)	$I_{pk}$ SQUARE PULSE (A)	$dI/dt$ (A/μs)	$V_r$ (V)	$t_{rr}$ AT 25 % $I_{RRM}$ (μs)	$Q_{rr}$ (μC)	$I_{rr}$ (A)	
S20	2.0	1000	50	- 50	3.5	240	110	
S30	3.0				5.0	380	130	



THERMAL AND MECHANICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction operating and storage temperature range	$T_J, T_{Stg}$		- 40 to 150	°C
Maximum thermal resistance, case junction to heatsink	$R_{thJ-hs}$	DC operation single side cooled	0.076	K/W
		DC operation double side cooled	0.038	
Mounting force, ± 10 %			9800 (1000)	N (kg)
Approximate weight			83	g
Case style		See dimensions - link at the end of datasheet	B-43	

$\Delta R_{thJ-hs}$ CONDUCTION						
CONDUCTION ANGLE	SINUSOIDAL CONDUCTION		RECTANGULAR CONDUCTION		TEST CONDITIONS	UNITS
	SINGLE SIDE	DOUBLE SIDE	SINGLE SIDE	DOUBLE SIDE		
180°	0.007	0.007	0.005	0.005	$T_J = T_J$ maximum	K/W
120°	0.008	0.008	0.008	0.008		
90°	0.010	0.010	0.011	0.011		
60°	0.015	0.015	0.016	0.016		
30°	0.026	0.026	0.026	0.026		

Note

- The table above shows the increment of thermal resistance  $R_{thJ-hs}$  when devices operate at different conduction angles than DC

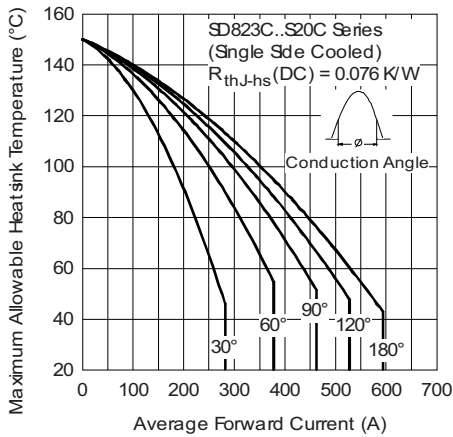


Fig. 1 - Current Ratings Characteristics

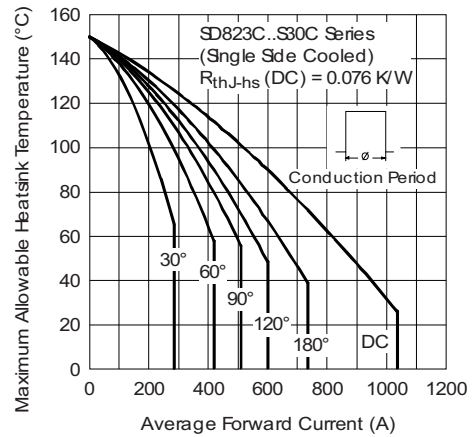


Fig. 4 - Current Ratings Characteristics

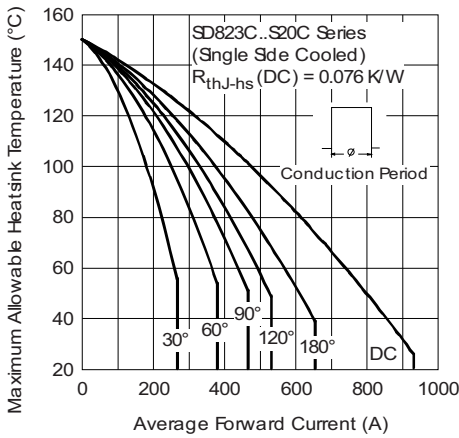


Fig. 2 - Current Ratings Characteristics

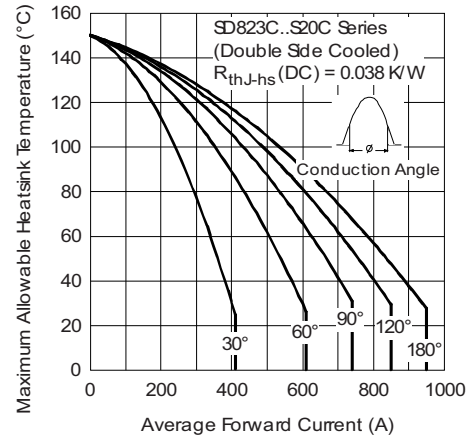


Fig. 5 - Current Ratings Characteristics

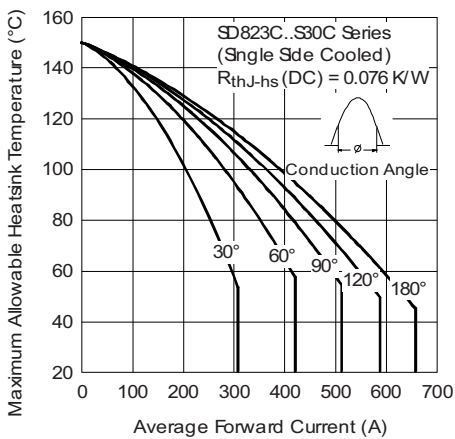


Fig. 3 - Current Ratings Characteristics

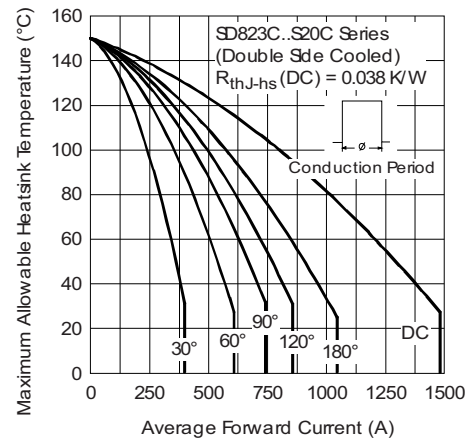


Fig. 6 - Current Ratings Characteristics

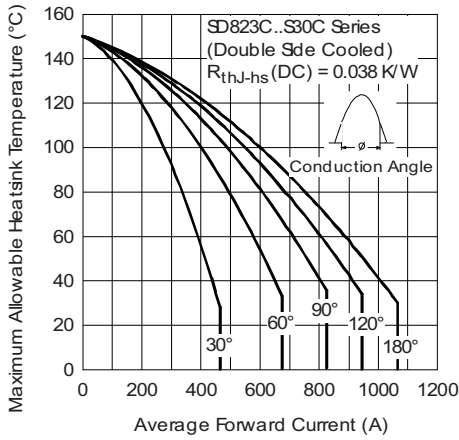


Fig. 7 - Current Ratings Characteristics

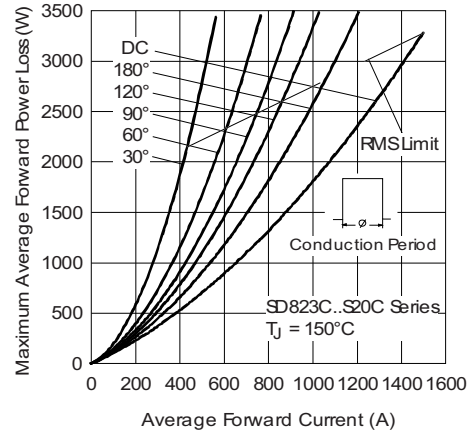


Fig. 10 - Forward Power Loss Characteristics

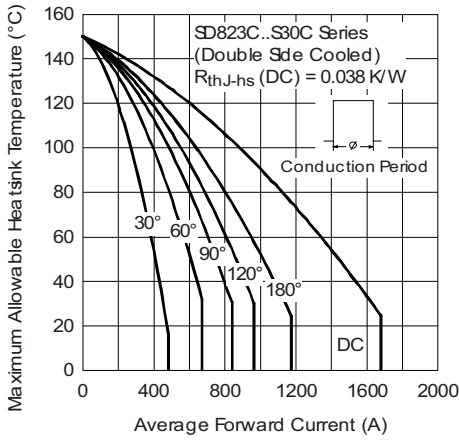


Fig. 8 - Current Ratings Characteristics

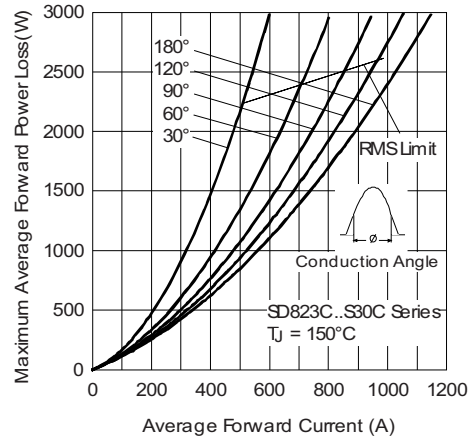


Fig. 11 - Forward Power Loss Characteristics

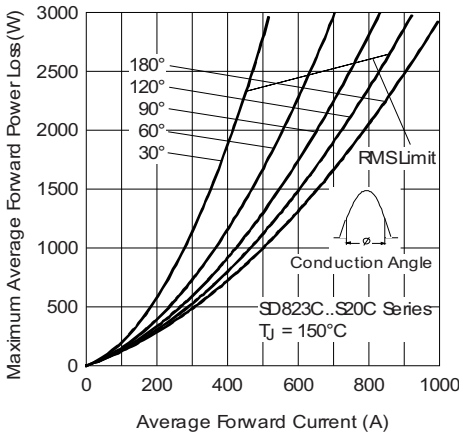


Fig. 9 - Forward Power Loss Characteristics

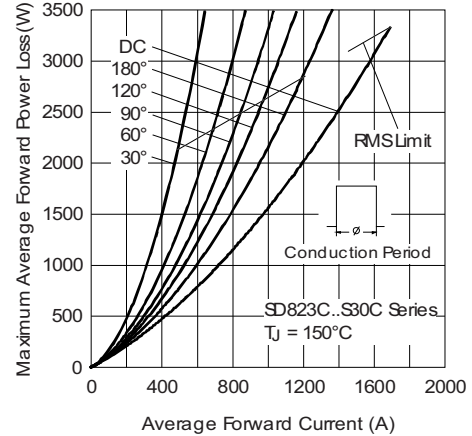


Fig. 12 - Forward Power Loss Characteristics

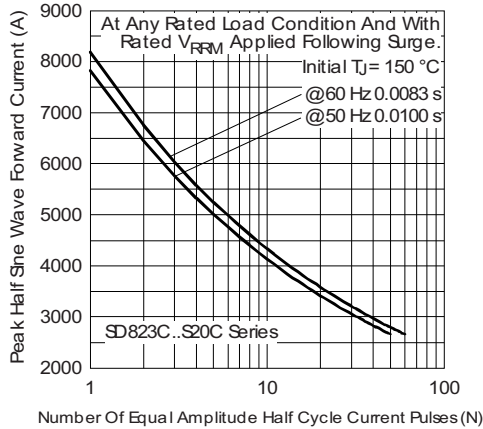


Fig. 13 - Maximum Non-Repetitive Surge Current

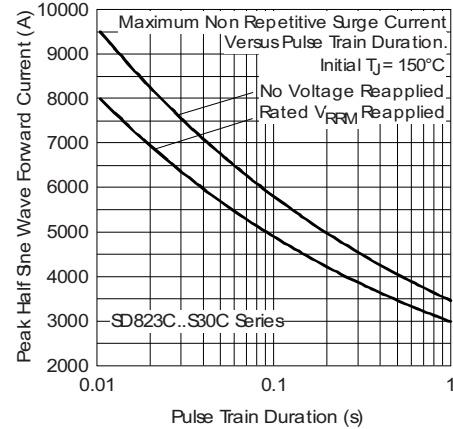


Fig. 16 - Maximum Non-Repetitive Surge Current

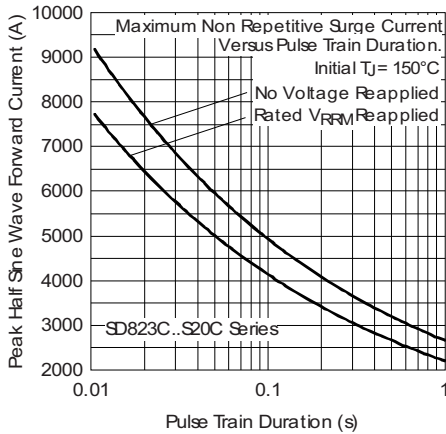


Fig. 14 - Maximum Non-Repetitive Surge Current

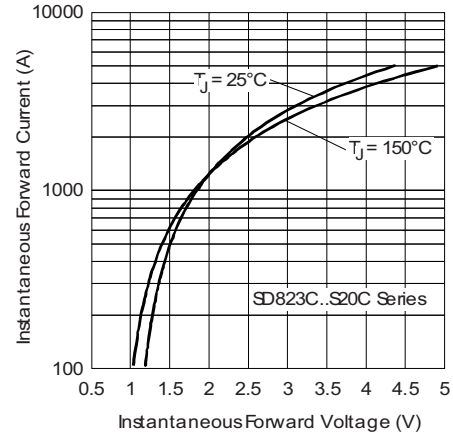


Fig. 17 - Forward Voltage Drop Characteristics

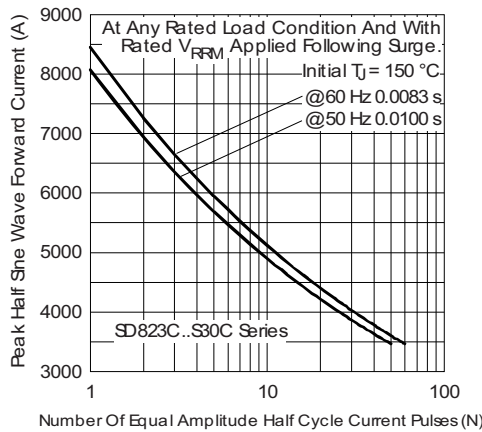


Fig. 15 - Maximum Non-Repetitive Surge Current

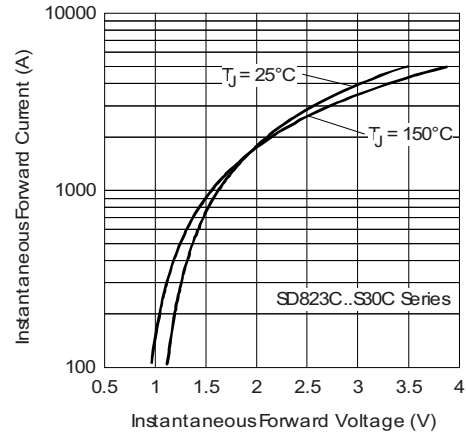


Fig. 18 - Forward Voltage Drop Characteristics

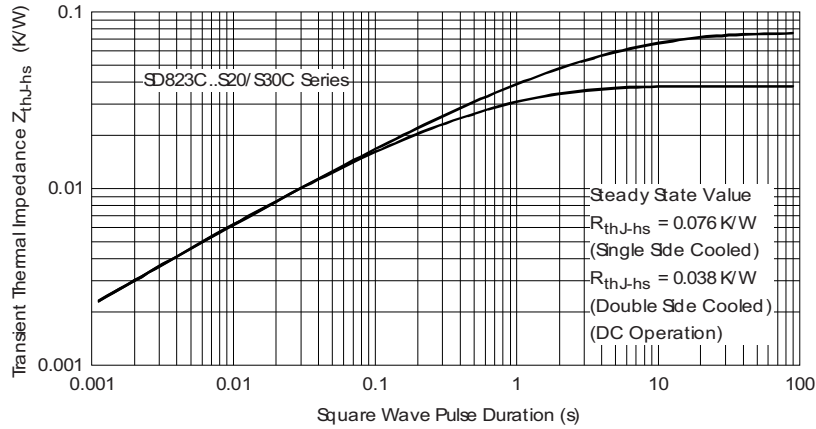


Fig. 19 - Thermal Impedance  $Z_{thJ-hs}$  Characteristic

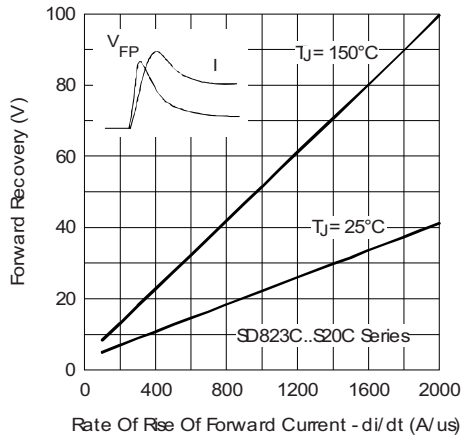


Fig. 20 - Typical Forward Recovery Characteristics

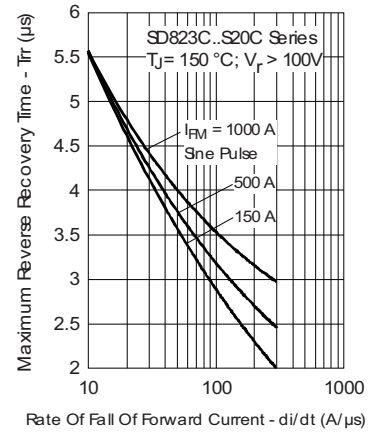


Fig. 22 - Recovery Time Characteristics

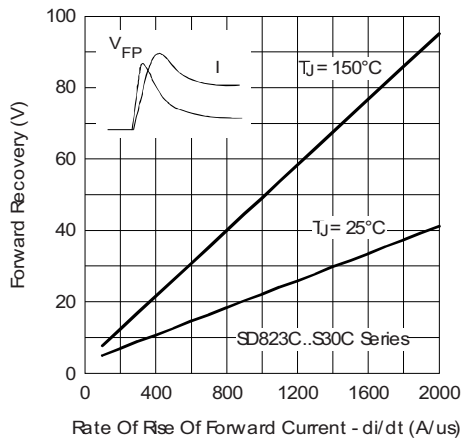


Fig. 21 - Typical Forward Recovery Characteristics

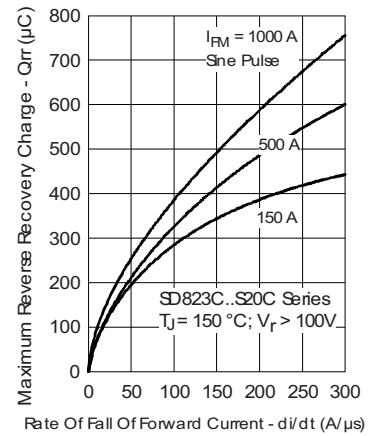


Fig. 23 - Recovery Charge Characteristics

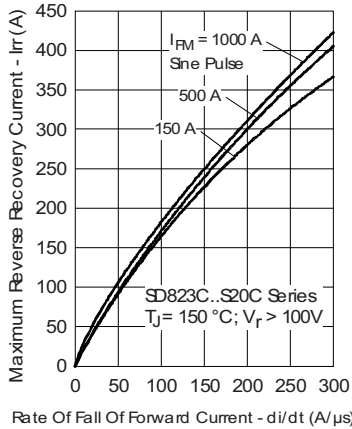


Fig. 24 - Recovery Current Characteristics

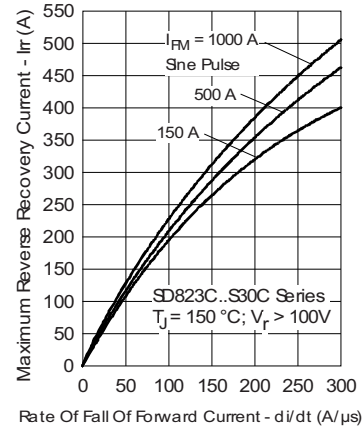


Fig. 27 - Recovery Current Characteristics

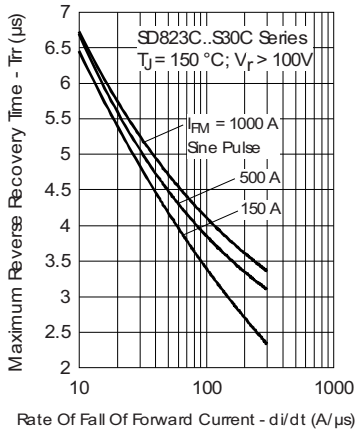


Fig. 25 - Recovery Time Characteristics

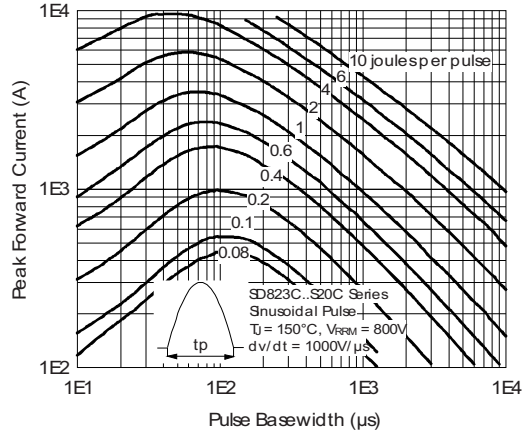


Fig. 28 - Maximum Total Energy Loss Per Pulse Characteristics

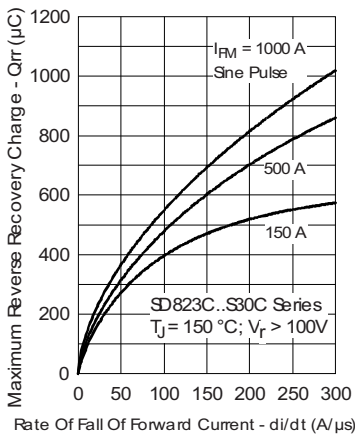


Fig. 26 - Recovery Charge Characteristics

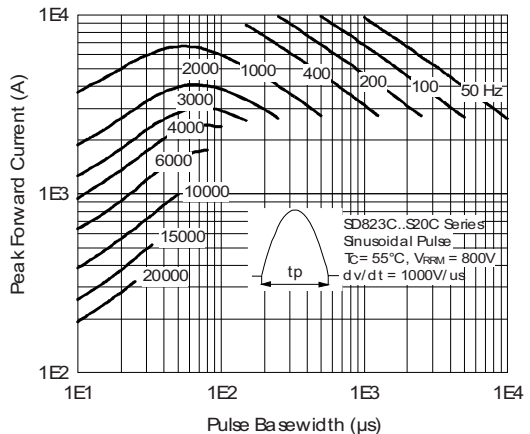


Fig. 29 - Frequency Characteristics

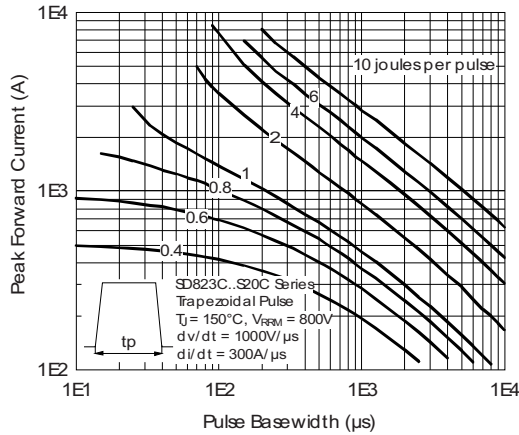


Fig. 30 - Maximum Total Energy Loss Per Pulse Characteristics

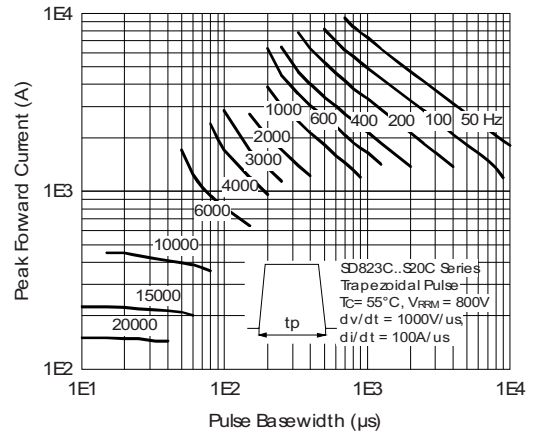


Fig. 33 - Frequency Characteristics

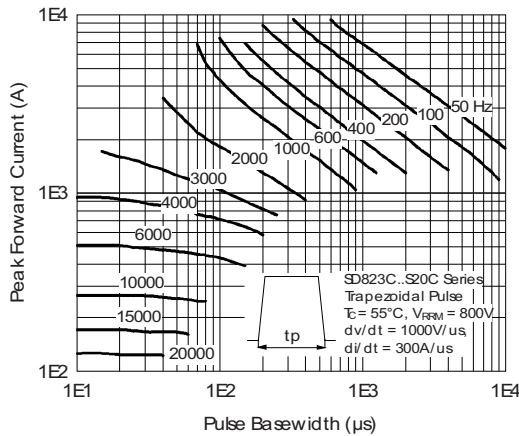


Fig. 31 - Frequency Characteristics

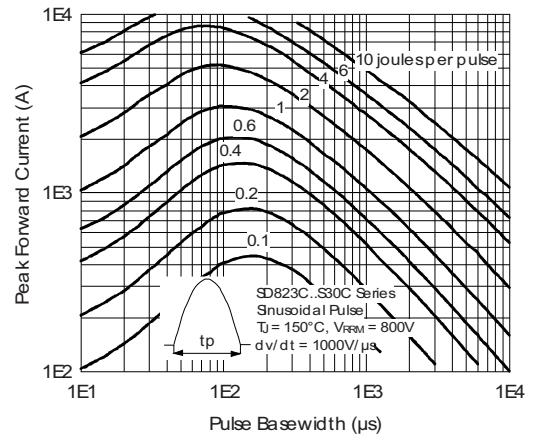


Fig. 34 - Maximum Total Energy Loss Per Pulse Characteristics

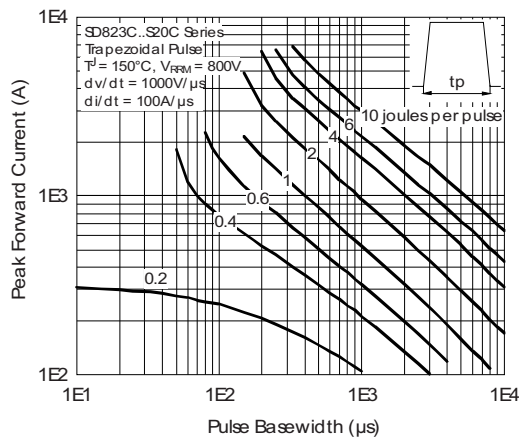


Fig. 32 - Maximum Total Energy Loss Per Pulse Characteristics

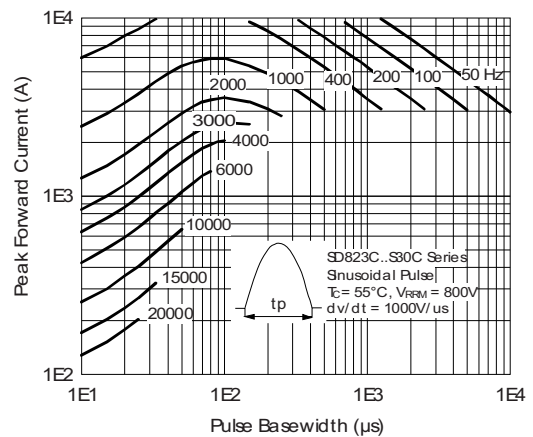


Fig. 35 - Frequency Characteristics



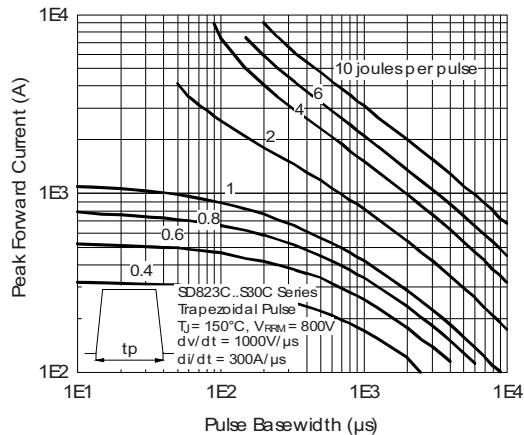


Fig. 36 - Maximum Total Energy Loss Per Pulse Characteristics

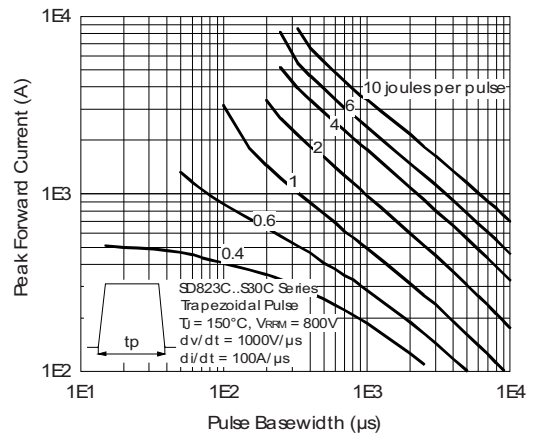


Fig. 38 - Maximum Total Energy Loss Per Pulse Characteristics

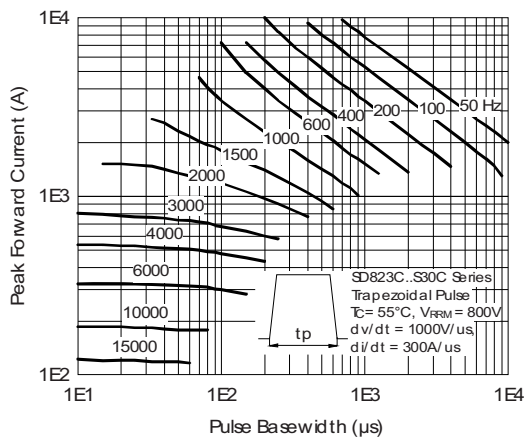


Fig. 37 - Frequency Characteristics

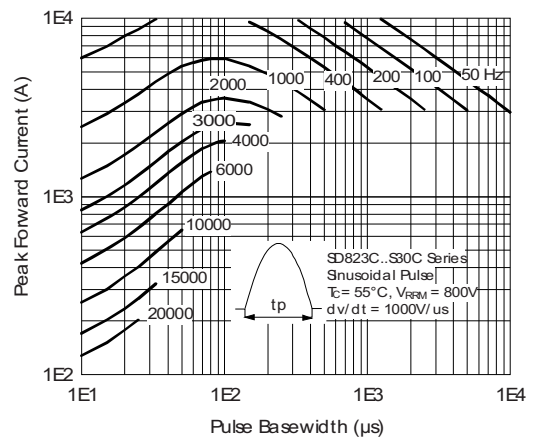


Fig. 39 - Frequency Characteristics

## ORDERING INFORMATION TABLE

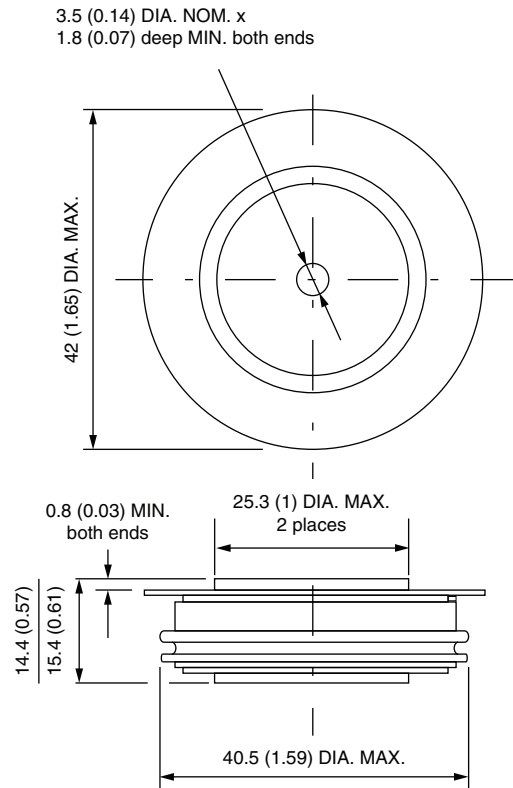
Device code	<b>VS-</b>	<b>SD</b>	<b>82</b>	<b>3</b>	<b>C</b>	<b>25</b>	<b>S20</b>	<b>C</b>
	①	②	③	④	⑤	⑥	⑦	⑧
<b>1</b>	-	Vishay Semiconductors product						
<b>2</b>	-	Diode						
<b>3</b>	-	Essential part number						
<b>4</b>	-	3 = Fast recovery						
<b>5</b>	-	C = Ceramic PUK						
<b>6</b>	-	Voltage code x 100 = $V_{RRM}$ (see Voltage Ratings table)						
<b>7</b>	-	$t_{rr}$ code						
<b>8</b>	-	C = PUK case B-43						

### LINKS TO RELATED DOCUMENTS

Dimensions	<a href="http://www.vishay.com/doc?95249">www.vishay.com/doc?95249</a>
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## B-43

**DIMENSIONS** in millimeters (inches)



Quote between upper and lower pole pieces has to be considered after application of mounting force (see Thermal and Mechanical Specifications)



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