

## Fast Recovery Diodes (Hockey PUK Version), 600 A


**B-43**

### FEATURES

- High power fast recovery diode series
- 1.0  $\mu$ s to 2.0  $\mu$ s recovery time
- High voltage ratings up to 2200 V
- High current capability
- Optimized turn-on and turn-off characteristics
- Low forward recovery
- Fast and soft reverse recovery
- Press PUK encapsulation
- Case style conform to JEDEC® B-43
- Maximum junction temperature 125 °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)


**RoHS  
COMPLIANT**

### PRIMARY CHARACTERISTICS

$I_{F(AV)}$	600 A
Package	B-43
Circuit configuration	Single

### TYPICAL APPLICATIONS

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

### MAJOR RATINGS AND CHARACTERISTICS

PARAMETER	TEST CONDITIONS	VS-SD603C..C			UNITS
		S10	S15	S20	
$I_{F(AV)}$		600	600	600	A
	$T_{hs}$	55	55	55	°C
$I_{F(RMS)}$		942	942	942	A
	$T_{hs}$	25	25	25	°C
$I_{FSM}$	50 Hz	8320	8320	8320	A
	60 Hz	8715	8715	8715	
$I^2t$	50 Hz	346	346	346	kA <sup>2</sup> s
	60 Hz	316	316	316	
$V_{RRM}$	Range	400 to 1000	1200 to 1600	2000 to 2200	V
$t_{rr}$		1.0	1.5	2.0	$\mu$ s
	$T_J$	25	25	25	°C
$T_J$		-40 to +125	-40 to +125	-40 to +125	

### ELECTRICAL SPECIFICATIONS

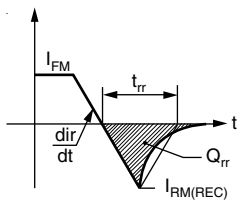
#### VOLTAGE RATINGS

TYPE NUMBER	VOLTAGE CODE	$V_{RRM}$ , MAXIMUM REPETITIVE PEAK AND OFF-STATE VOLTAGE V	$V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK VOLTAGE V	$I_{RRM}$ MAXIMUM AT $T_J = 125$ °C mA
VS-SD603C..S10C	04	400	500	45
	08	800	900	
	10	1000	1100	
VS-SD603C..S15C	12	1200	1300	
	14	1400	1500	
	16	1600	1700	
VS-SD603C..S20C	20	2000	2100	
	22	2200	2300	

**FORWARD CONDUCTION**

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current at heatsink temperature	$I_{F(AV)}$	180° conduction, half sine wave Double side (single side) cooled	600 (300)	A
Maximum RMS current	$I_{F(RMS)}$	25 °C heatsink temperature double side cooled	942	°C
Maximum peak, one-cycle non-repetitive forward current	$I_{FSM}$	<div> <div> <math>t = 10\text{ ms}</math>  <math>t = 8.3\text{ ms}</math> </div> <div> No voltage reapplied </div> </div> <div> <math>t = 10\text{ ms}</math>  <math>t = 8.3\text{ ms}</math> </div> <div> 100 % <math>V_{RRM}</math> reapplied </div>	8320 8715 7000 7330	A
Maximum $I^2t$ for fusing	$I^2t$	<div> <math>t = 10\text{ ms}</math>  <math>t = 8.3\text{ ms}</math> </div> <div> No voltage reapplied </div> <div> <math>t = 10\text{ ms}</math>  <math>t = 8.3\text{ ms}</math> </div> <div> 100 % <math>V_{RRM}</math> reapplied </div>	346 316 245 224	kA <sup>2</sup> s
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1$ to 10 ms, no voltage reapplied	3460	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	1.36	V
High level value of threshold voltage	$V_{F(TO)2}$	$(I > \pi \times I_{F(AV)})$ , $T_J = T_J$ maximum	1.81	V
Low level 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	0.87	mW
High level of forward slope resistance	$r_{f2}$	$(I > \pi \times I_{F(AV)})$ , $T_J = T_J$ maximum	0.67	mW
Maximum forward voltage drop	$V_{FM}$	$I_{pk} = 1885\text{ A}$ , $T_J = 25\text{ °C}$ ; $t_p = 10\text{ ms}$ sinusoidal wave	2.97	V

**RECOVERY CHARACTERISTICS**

CODE	MAXIMUM VALUE AT $T_J = 25\text{ °C}$	TEST CONDITIONS			TYPICAL VALUES AT $T_J = 125\text{ °C}$			
	$t_{rr}$ 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)	
S10	1.0	1000	25	-30	2.0	45	34	
S15	1.5				3.2	87	51	
S20	2.0				3.5	97	55	

**THERMAL AND MECHANICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum operating junction temperature range	$T_J$		-40 to 125	°C
Maximum storage temperature range	$T_{Stg}$		-40 to 150	
Maximum thermal resistance, 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°	0.006	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	0.015		
30°	0.026	0.025	0.026	0.025		

**Note**

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

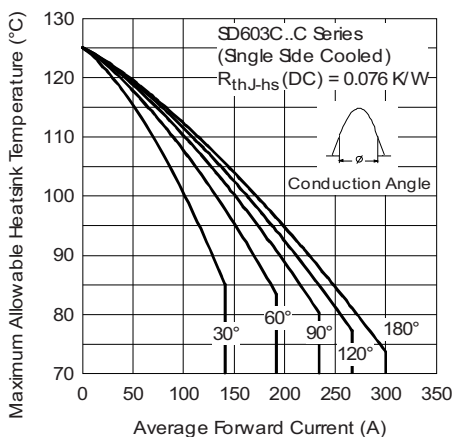


Fig. 1 - Current Ratings Characteristics

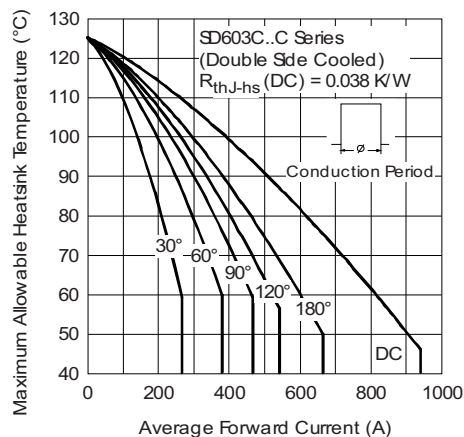


Fig. 4 - Current Ratings Characteristics

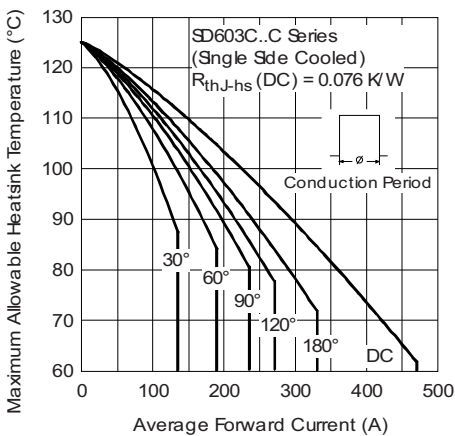


Fig. 2 - Current Ratings Characteristics

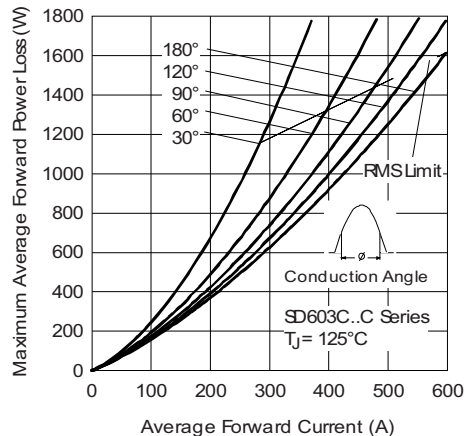


Fig. 5 - Forward Power Loss Characteristics

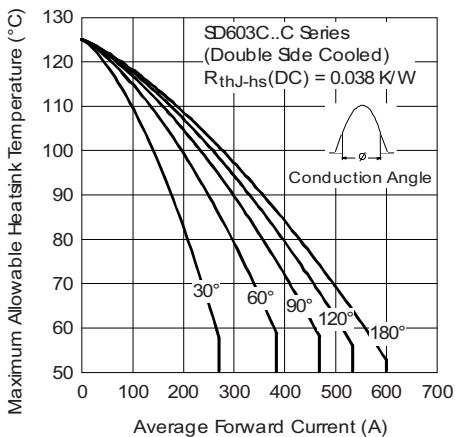


Fig. 3 - Current Ratings Characteristics

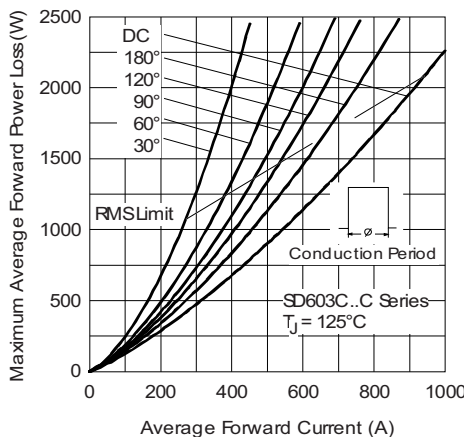


Fig. 6 - Forward Power Loss Characteristics

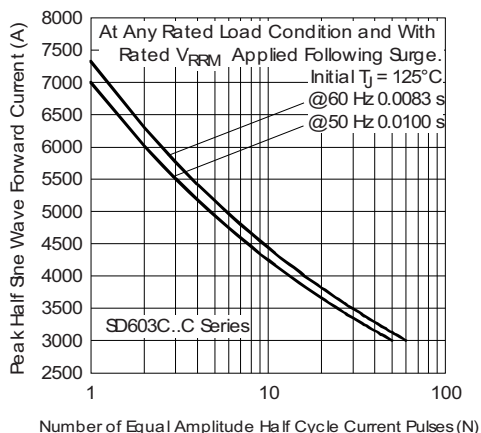


Fig. 7 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

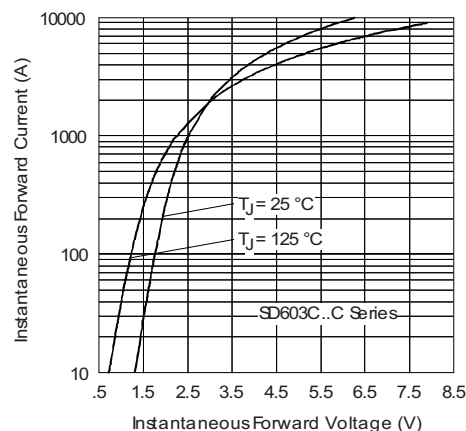


Fig. 9 - Forward Voltage Drop Characteristics

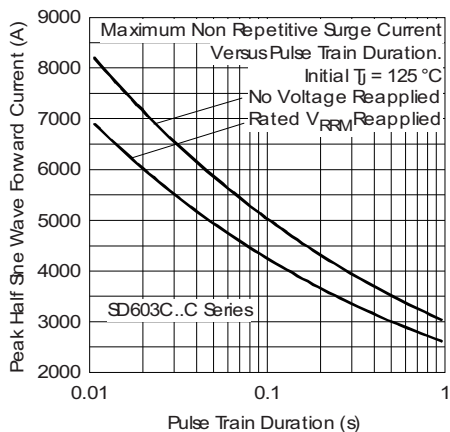


Fig. 8 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

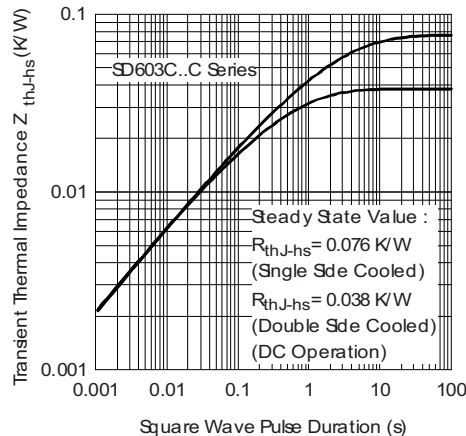


Fig. 10 - Thermal Impedance  $Z_{thJ-hs}$  Characteristics

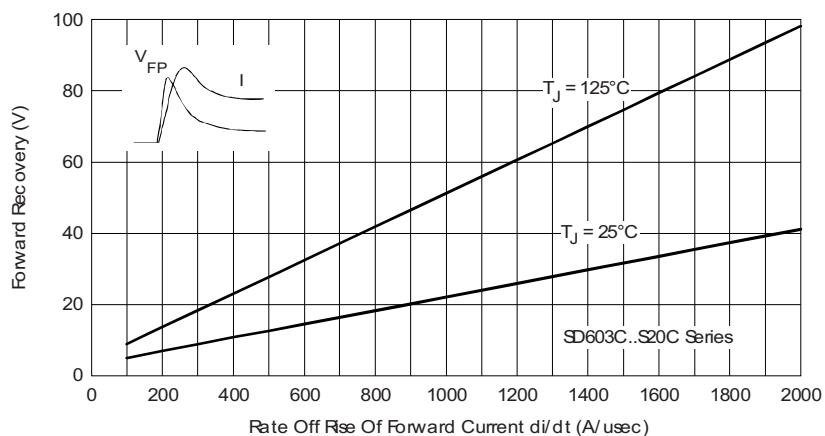


Fig. 11 - Typical Forward Recovery Characteristics

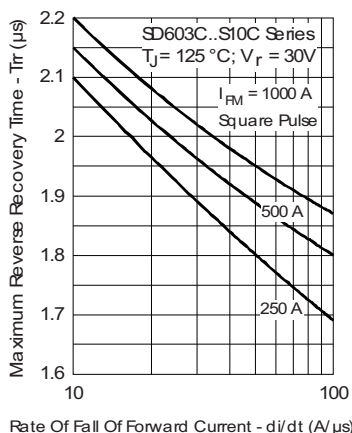


Fig. 12 - Recovery Time Characteristics

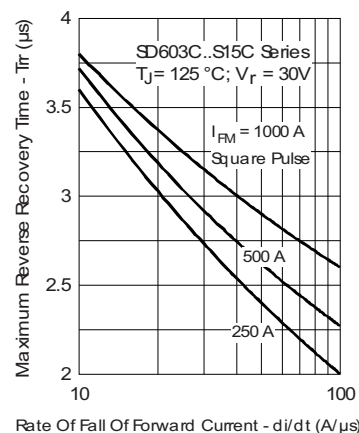


Fig. 15 - Recovery Time Characteristics

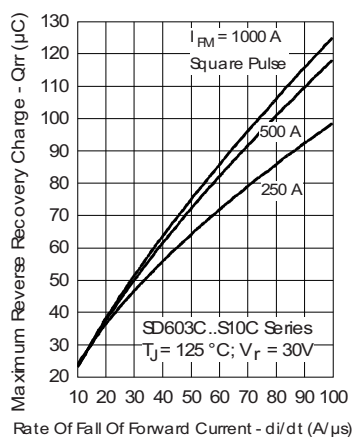


Fig. 13 - Recovery Charge Characteristics

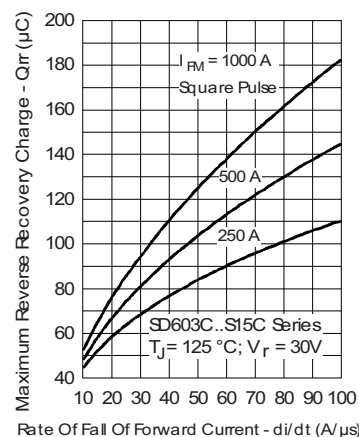


Fig. 16 - Recovery Charge Characteristics

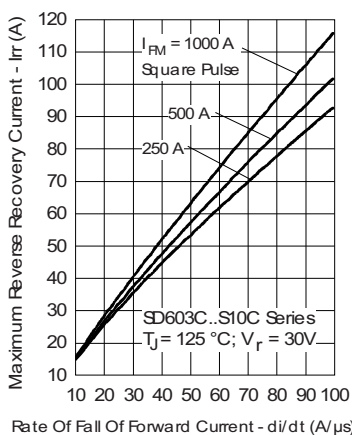


Fig. 14 - Recovery Current Characteristics

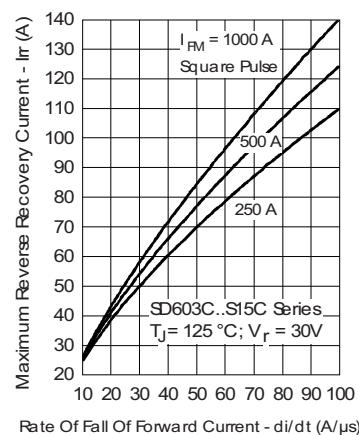


Fig. 17 - Recovery Current Characteristics

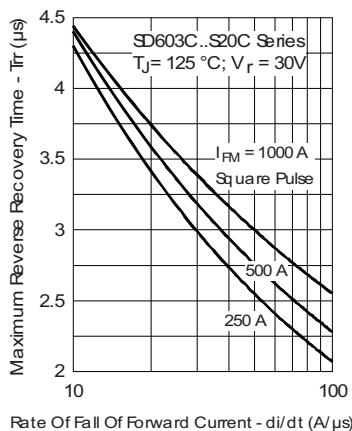


Fig. 18 - Recovery Time Characteristics

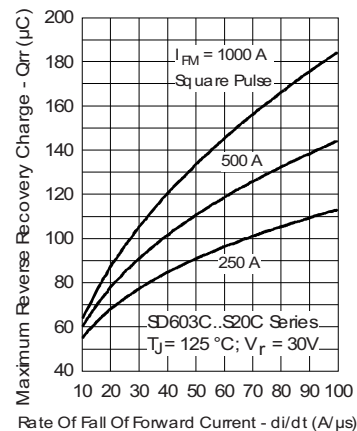


Fig. 19 - Recovery Charge Characteristics

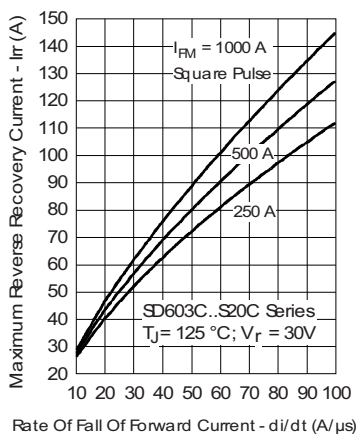


Fig. 20 - Recovery Current Characteristics

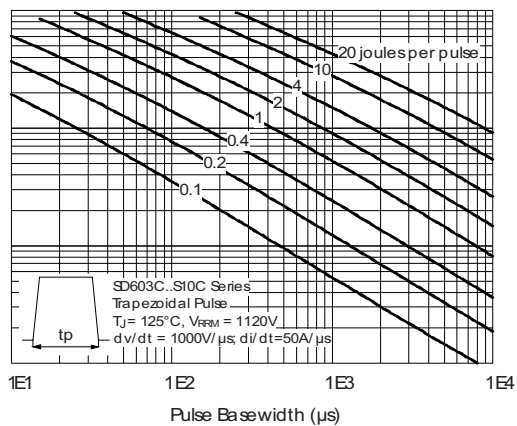
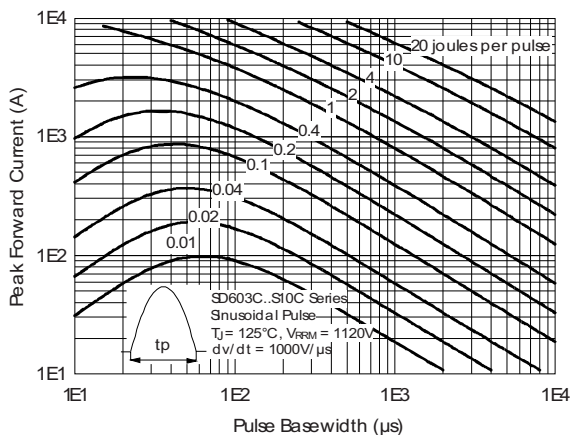


Fig. 21 - Maximum Total Energy Loss Per Pulse Characteristics

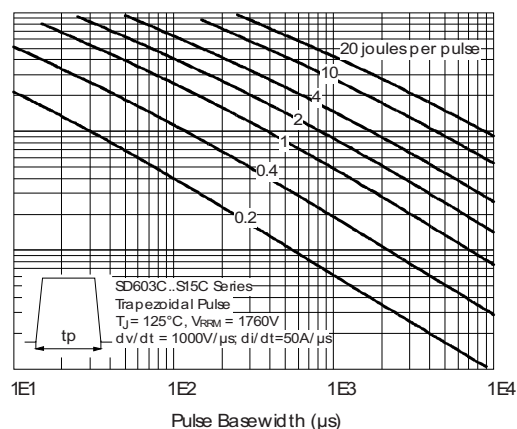
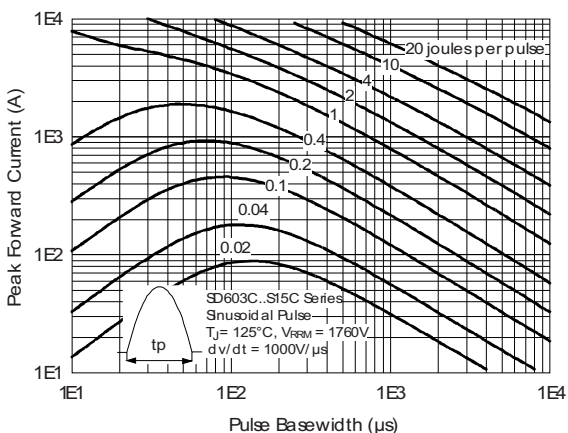


Fig. 22 - Maximum Total Energy Loss Per Pulse Characteristics

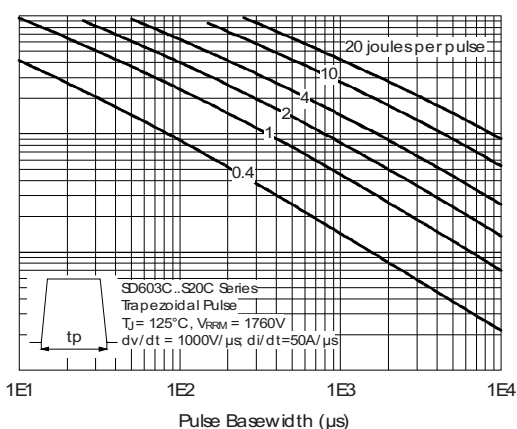
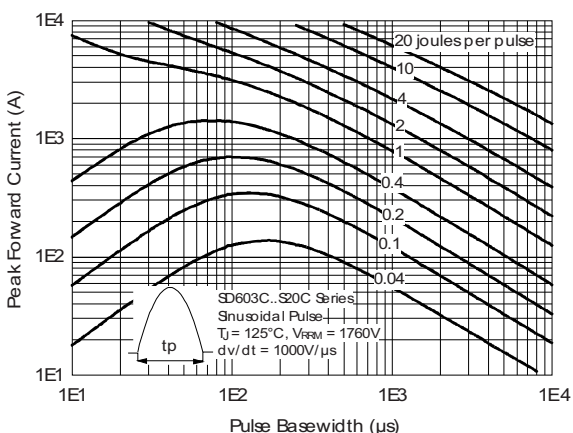


Fig. 23 - Maximum Total Energy Loss Per Pulse Characteristics

## ORDERING INFORMATION TABLE

Device code	VS-	SD	60	3	C	22	S20	C
	①	②	③	④	⑤	⑥	⑦	⑧

- ① - Vishay Semiconductors product
- ② - Diode
- ③ - Essential part number
- ④ - 3 = fast recovery
- ⑤ - C = ceramic PUK
- ⑥ - Voltage code x 100 =  $V_{RRM}$  (see Voltage Ratings table)
- ⑦ -  $t_{rr}$  code (see Recovery Characteristics table)
- ⑧ - C = PUK case B-43

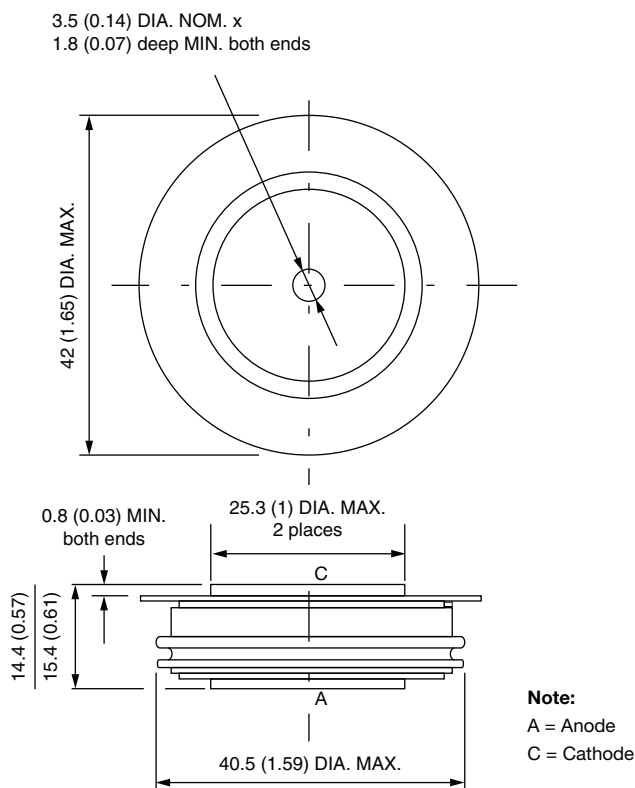
## LINKS TO RELATED DOCUMENTS

Dimensions

[www.vishay.com/doc?95249](http://www.vishay.com/doc?95249)

## 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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