Fast Recovery Diodes (Hockey PUK Version), 600 A

B-43

FEATURES

- High power fast recovery diode series
- 1.0 µs to 2.0 µs 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

Pb-free
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^2s
	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	µs
	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	

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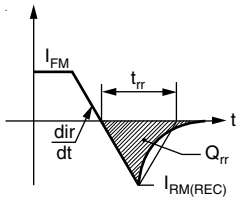
FORWARD CONDUCTION

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
					55 (75)	°C
Maximum RMS current	$I_{F(RMS)}$	25 °C heatsink temperature double side cooled			942	A
Maximum peak, one-cycle non-repetitive forward current	I_{FSM}	t = 10 ms	No voltage reapplied	Sinusoidal half wave, initial $T_J = T_J$ maximum	8320	
		t = 8.3 ms			8715	
		t = 10 ms	100 % V_{RRM} reapplied		7000	
		t = 8.3 ms			7330	
Maximum I^2t for fusing	I^2t	t = 10 ms	No voltage reapplied		346	kA^2s
		t = 8.3 ms			316	
		t = 10 ms	100 % V_{RRM} reapplied		245	
		t = 8.3 ms			224	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 to 10 ms, no voltage reapplied			3460	$kA^2\sqrt{s}$
Low level value of threshold voltage	$V_{F(TO)1}$	(16.7 % x π x $I_{F(AV)}$ < I < π x $I_{F(AV)}$), $T_J = T_J$ maximum			1.36	V
High level value of threshold voltage	$V_{F(TO)2}$	(I > π x $I_{F(AV)}$), $T_J = T_J$ maximum			1.81	
Low level of forward slope resistance	r_{f1}	(16.7 % x π x $I_{F(AV)}$ < I < π x $I_{F(AV)}$), $T_J = T_J$ maximum			0.87	mW
High level of forward slope resistance	r_{f2}	(I > π x $I_{F(AV)}$), $T_J = T_J$ maximum			0.67	
Maximum forward voltage drop	V_{FM}	I_{pk} = 1885 A, T_J = 25 °C; t_p = 10 ms sinusoidal wave			2.97	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)
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	

ΔR_{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

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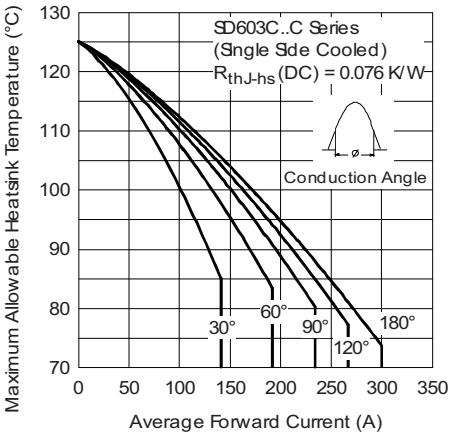

Fig. 1 - Current Ratings Characteristics

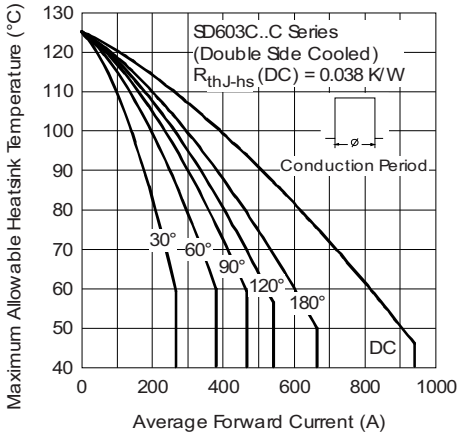

Fig. 4 - Current Ratings Characteristics

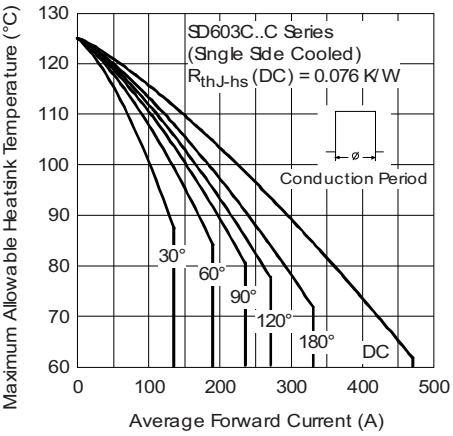

Fig. 2 - Current Ratings Characteristics

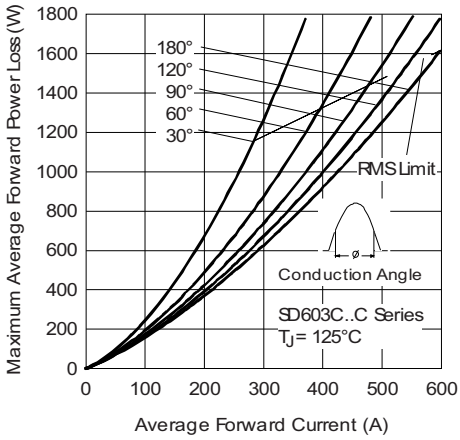

Fig. 5 - Forward Power Loss Characteristics

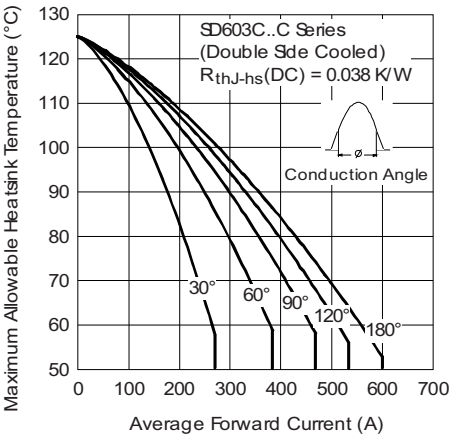

Fig. 3 - Current Ratings Characteristics

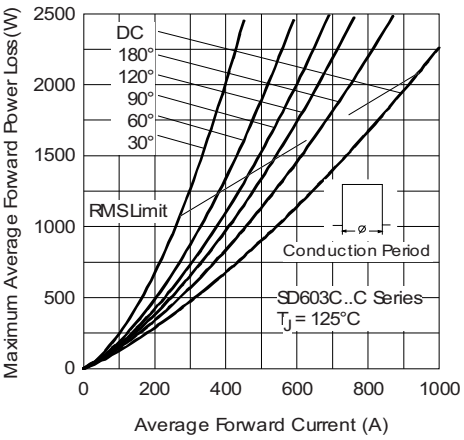

Fig. 6 - Forward Power Loss Characteristics

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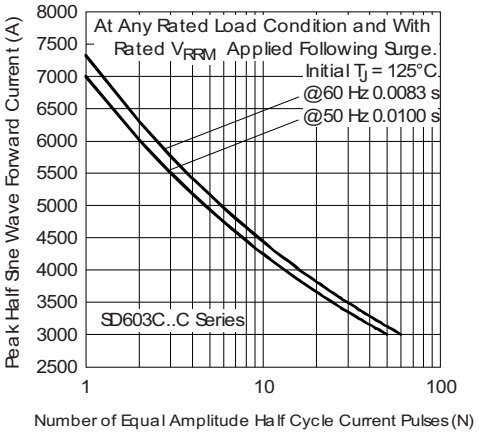

Fig. 7 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

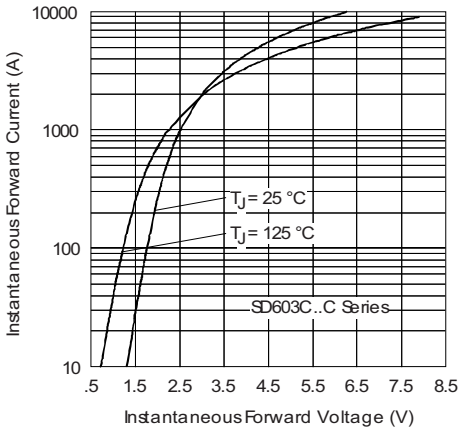

Fig. 9 - Forward Voltage Drop Characteristics

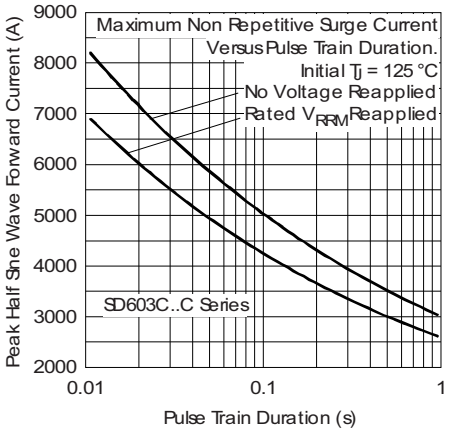

Fig. 8 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

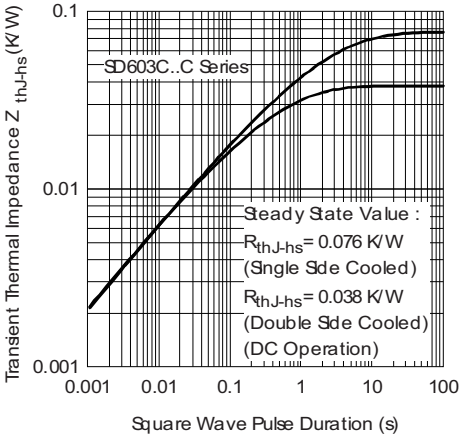

Fig. 10 - Thermal Impedance Z_{thJ-hs} Characteristics

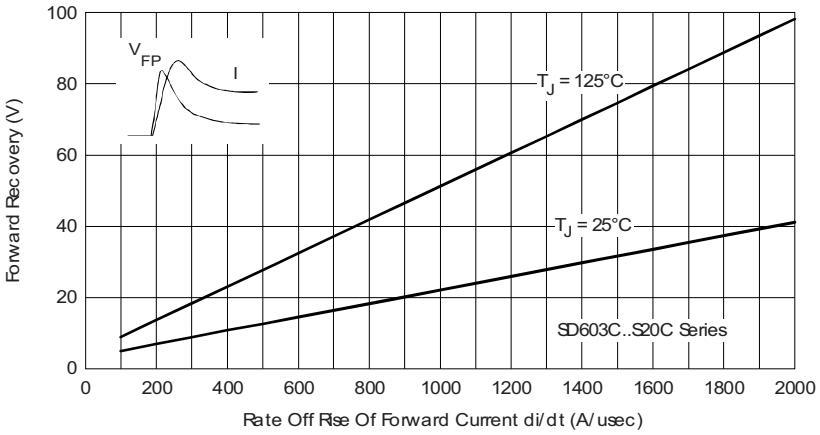

Fig. 11 - Typical Forward Recovery Characteristics

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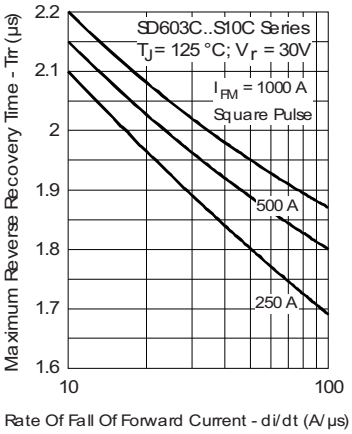

Fig. 12 - Recovery Time Characteristics

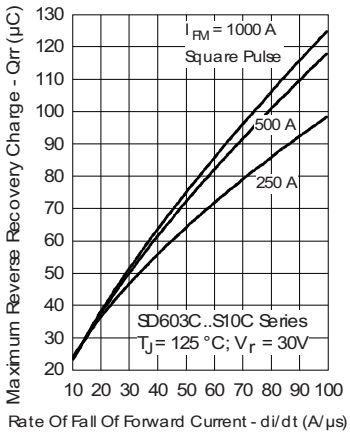

Fig. 13 - Recovery Charge Characteristics

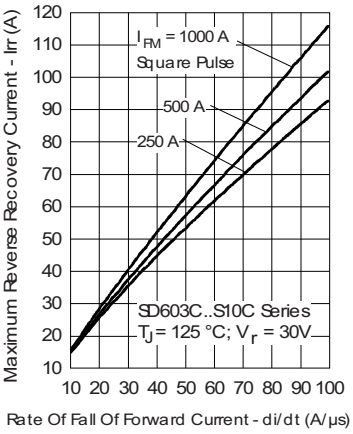

Fig. 14 - Recovery Current Characteristics

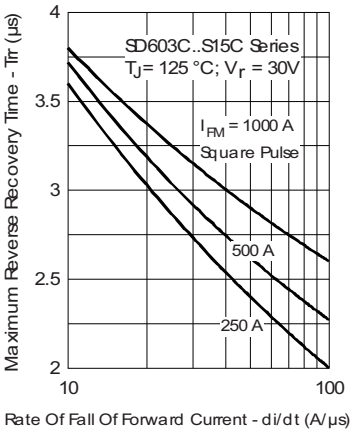

Fig. 15 - Recovery Time Characteristics

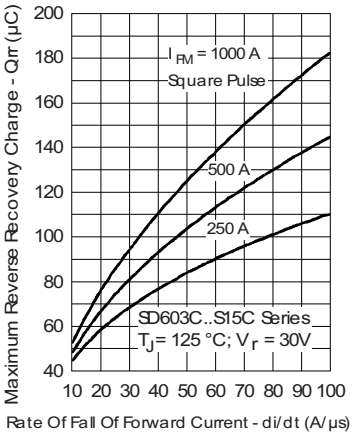

Fig. 16 - Recovery Charge Characteristics

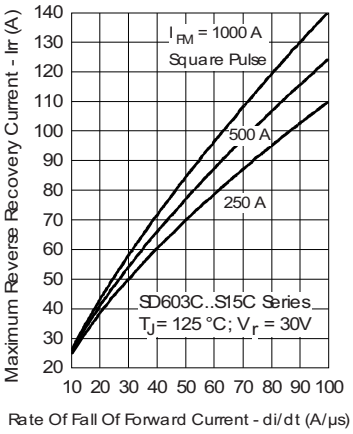

Fig. 17 - Recovery Current Characteristics

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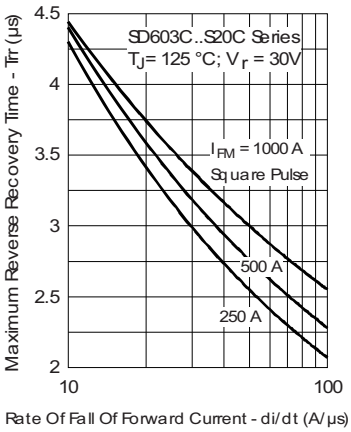


Fig. 18 - Recovery Time Characteristics

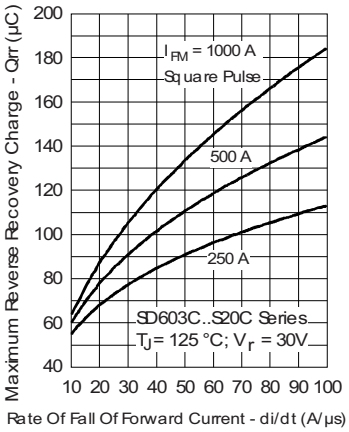


Fig. 19 - Recovery Charge Characteristics

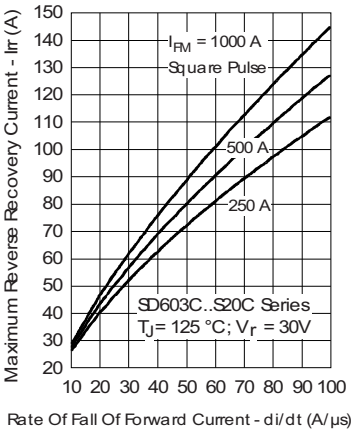
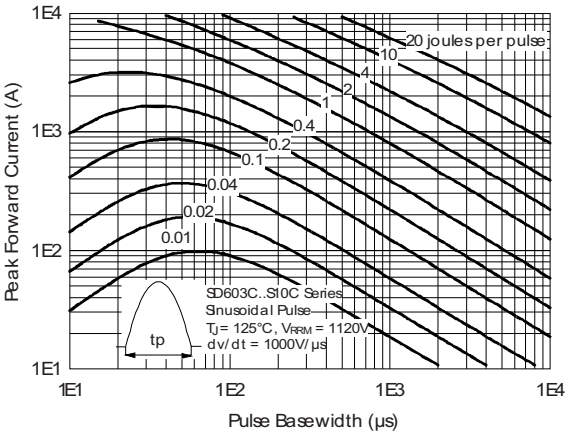


Fig. 20 - Recovery Current Characteristics



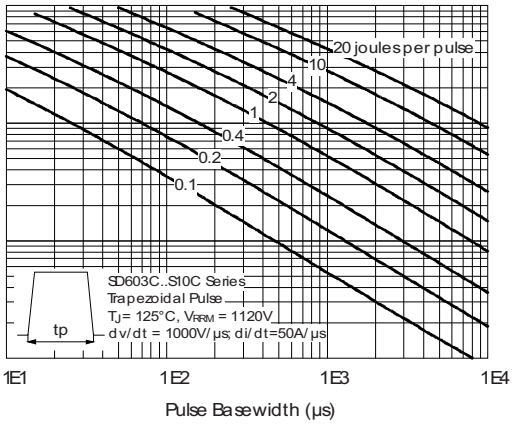


Fig. 21 - Maximum Total Energy Loss Per Pulse Characteristics

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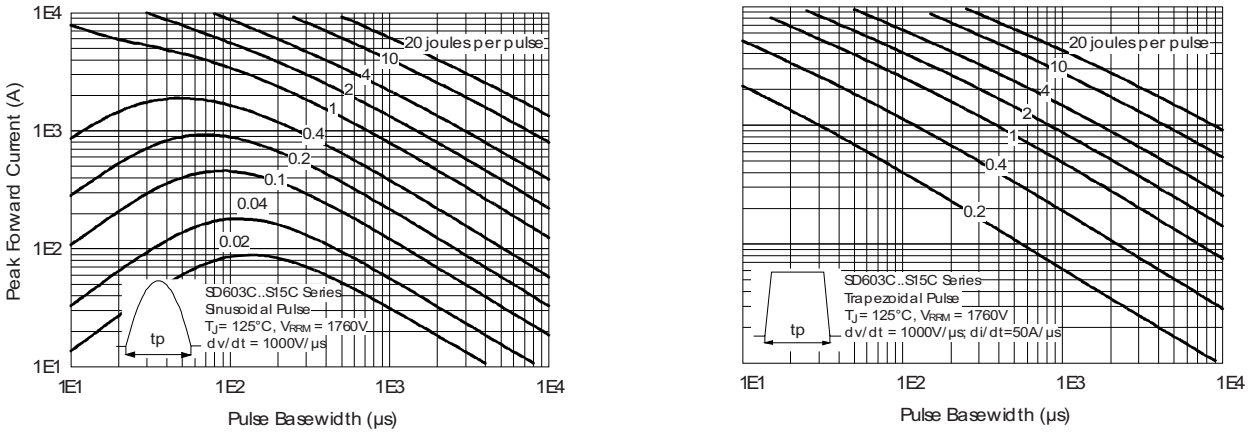

Fig. 22 - Maximum Total Energy Loss Per Pulse Characteristics

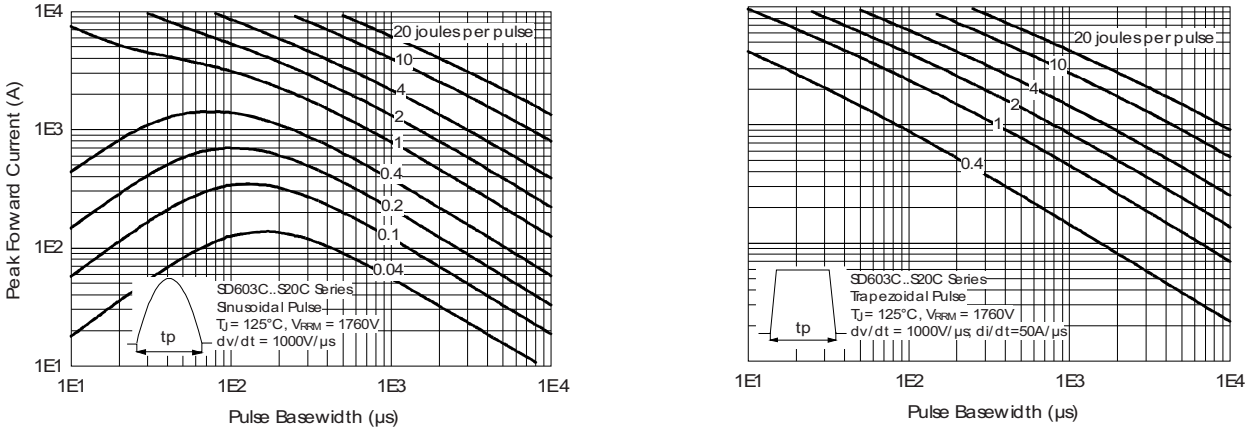

Fig. 23 - Maximum Total Energy Loss Per Pulse Characteristics

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

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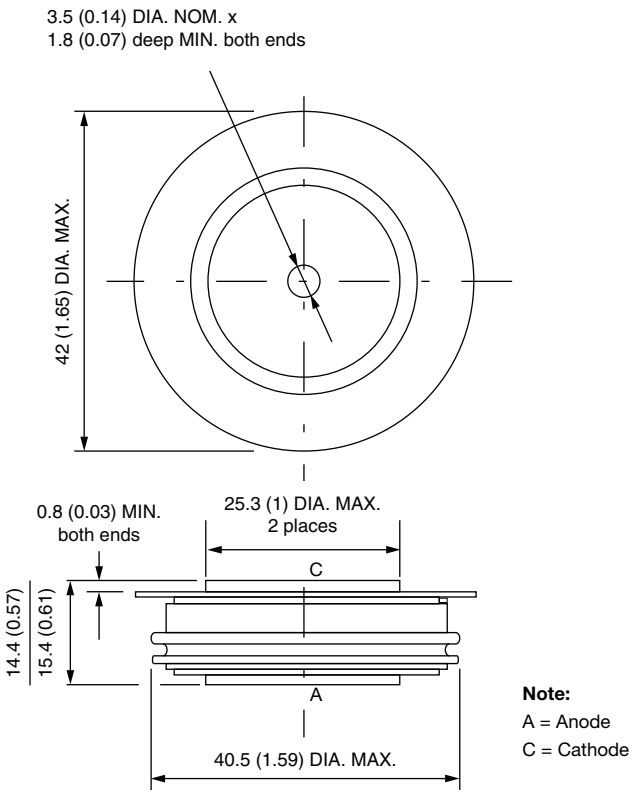
DIMENSIONS in millimeters (inches)



Note:
A = Anode
C = Cathode

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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