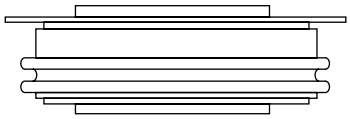
Fast Recovery Diodes (Hockey PUK Version), 600 A



B-43

FEATURES

- High power FAST recovery diode series
- 1.0 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
- Lead (Pb)-free
- Designed and qualified for industrial level

Pb-free
RoHS COMPLIANT

PRODUCT SUMMARY	
$I_{F(AV)}$	600 A

TYPICAL APPLICATIONS

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

MAJOR RATINGS AND CHARACTERISTICS			
PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{F(AV)}$		600	A
	T_{hs}	55	°C
$I_{F(RMS)}$		942	A
	T_{hs}	25	°C
I_{FSM}	50 Hz	8320	A
	60 Hz	8715	
I^2t	50 Hz	346	kA^2s
	60 Hz	316	
V_{RRM}	Range	400 to 2200	V
t_{rr}		1.0 to 2.0	µs
	T_J	25	°C
T_J		- 40 to 125	

ELECTRICAL SPECIFICATIONS

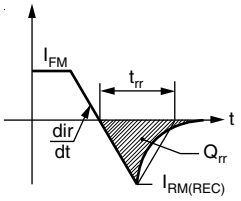
VOLTAGE RATINGS

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
SD603C..S10C	04	400	500	45
	08	800	900	
	10	1000	1100	
SD603C..S15C	12	1200	1300	
	14	1400	1500	
	16	1600	1700	
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
					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	mΩ
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

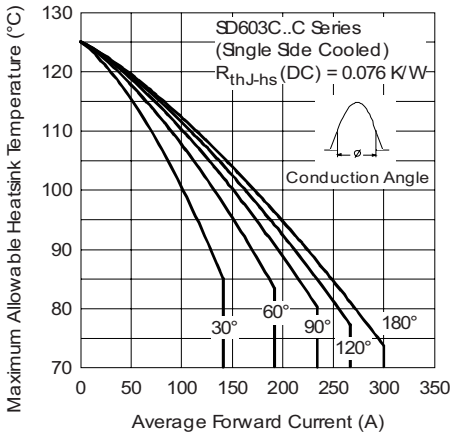


Fig. 1 - Current Ratings Characteristics

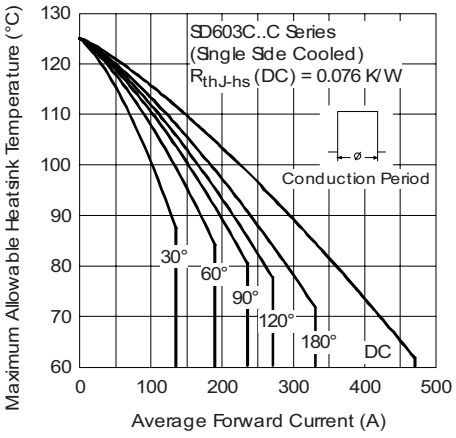


Fig. 2 - Current Ratings Characteristics

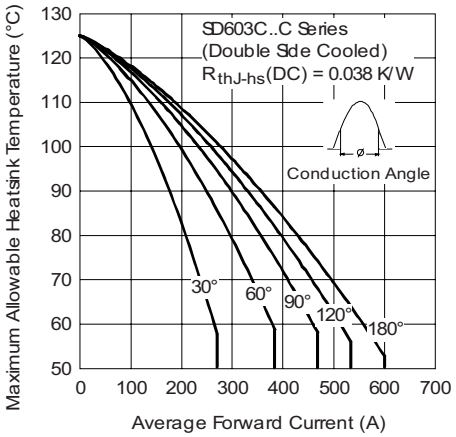


Fig. 3 - Current Ratings Characteristics

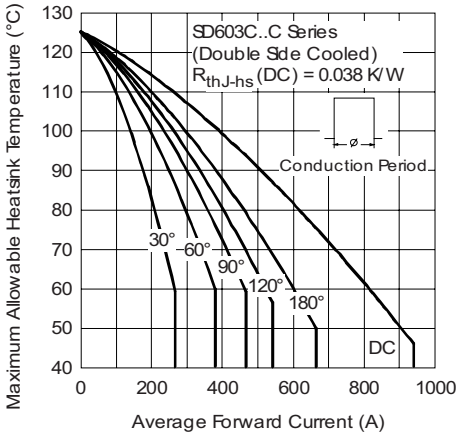


Fig. 4 - Current Ratings Characteristics

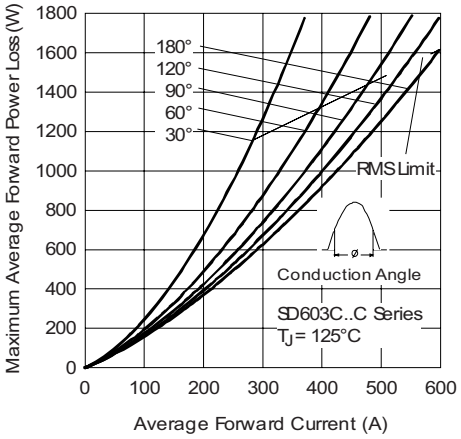


Fig. 5 - Forward Power Loss Characteristics

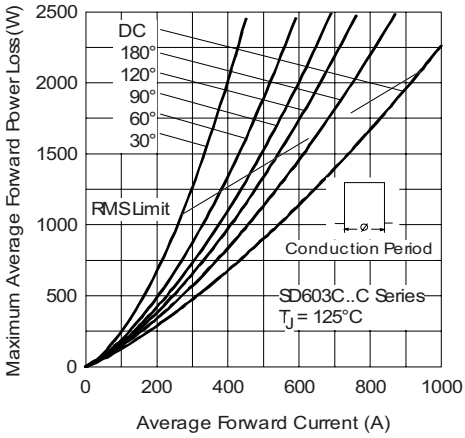


Fig. 6 - Forward Power Loss Characteristics

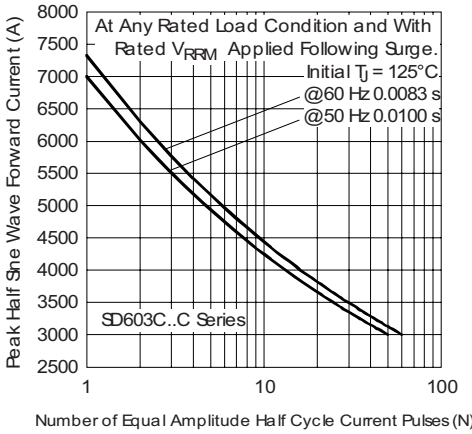


Fig. 7 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

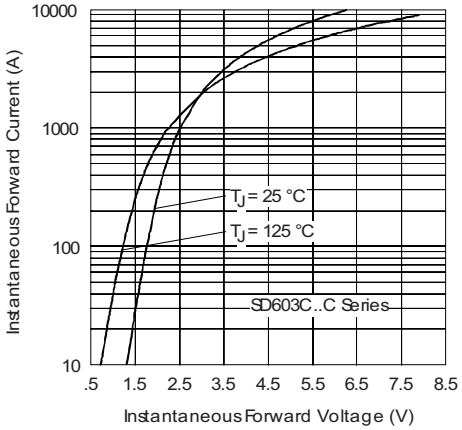


Fig. 9 - Forward Voltage Drop Characteristics

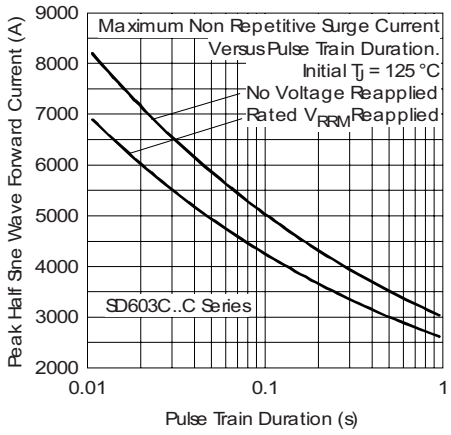


Fig. 8 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

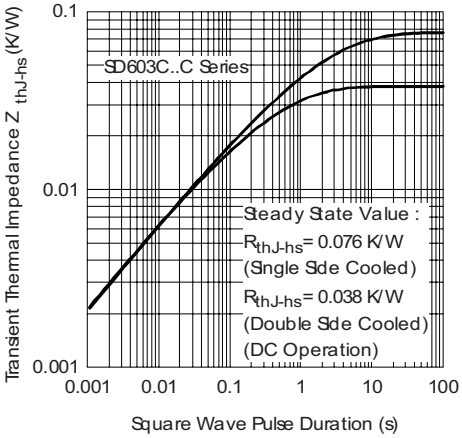


Fig. 10 - Thermal Impedance Z_{thJ-hs} Characteristics

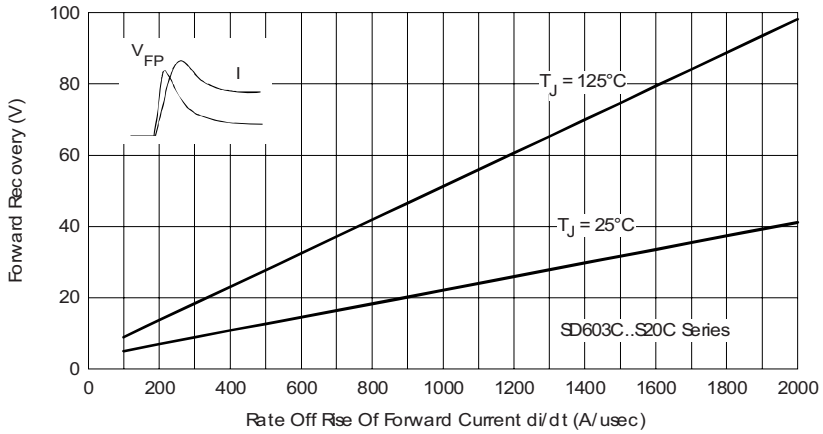


Fig. 11 - Typical Forward Recovery Characteristics

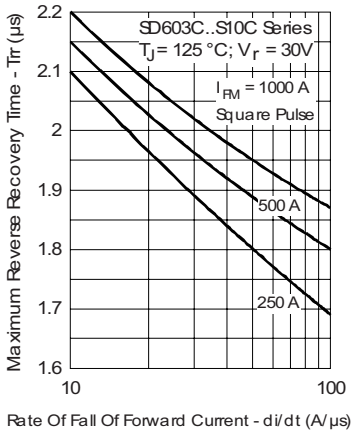


Fig. 12 - Recovery Time Characteristics

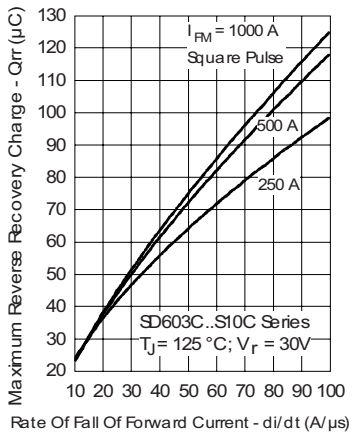


Fig. 13 - Recovery Charge Characteristics

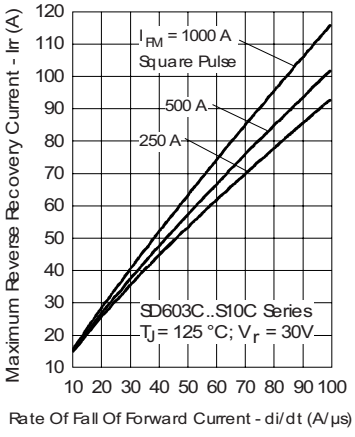


Fig. 14 - Recovery Current Characteristics

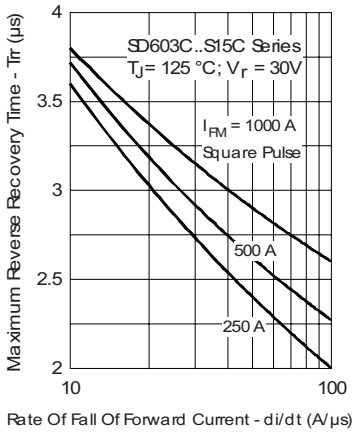


Fig. 15 - Recovery Time Characteristics

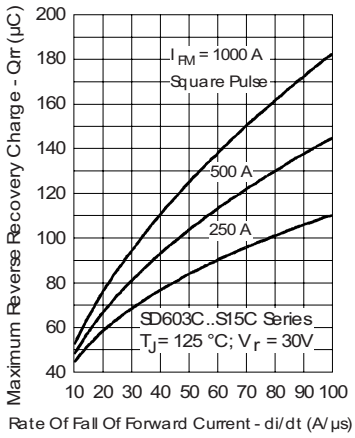


Fig. 16 - Recovery Charge Characteristics

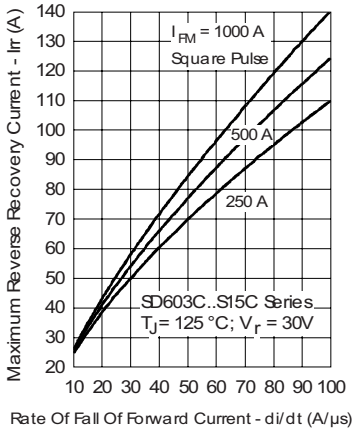


Fig. 17 - Recovery Current Characteristics

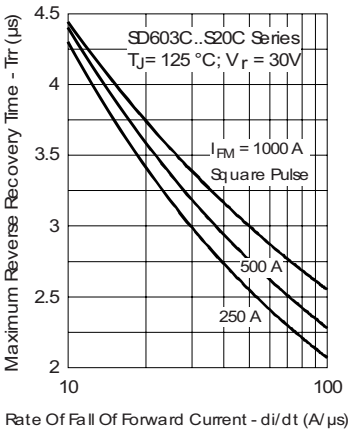


Fig. 18 - Recovery Time Characteristics

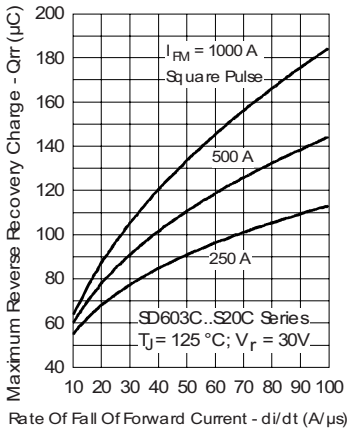


Fig. 19 - Recovery Charge Characteristics

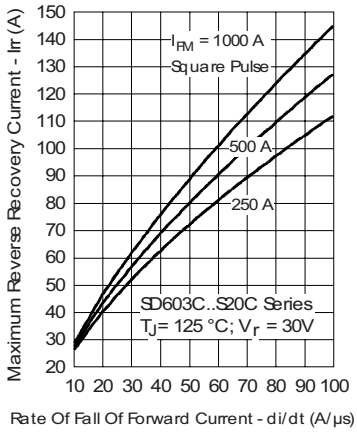


Fig. 20 - Recovery Current Characteristics

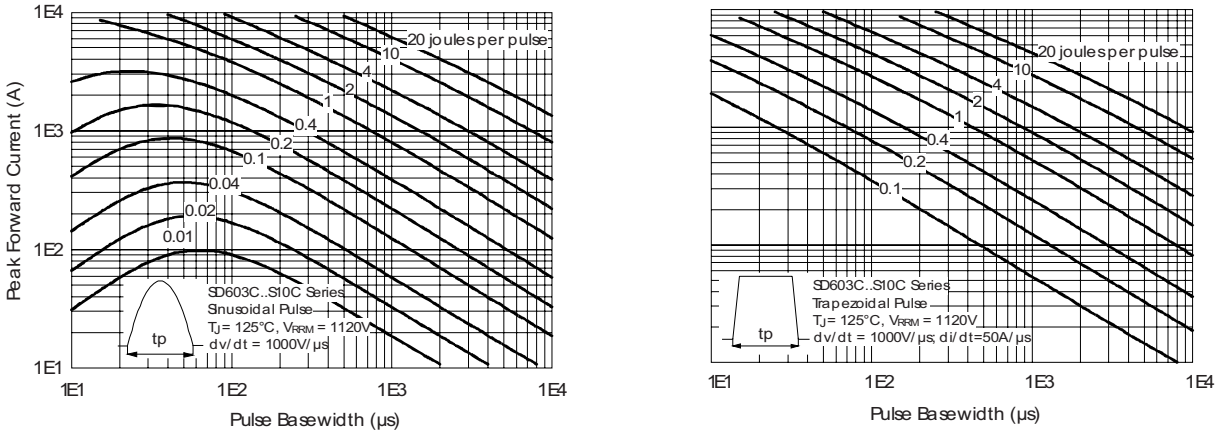


Fig. 21 - Maximum Total Energy Loss Per Pulse Characteristics

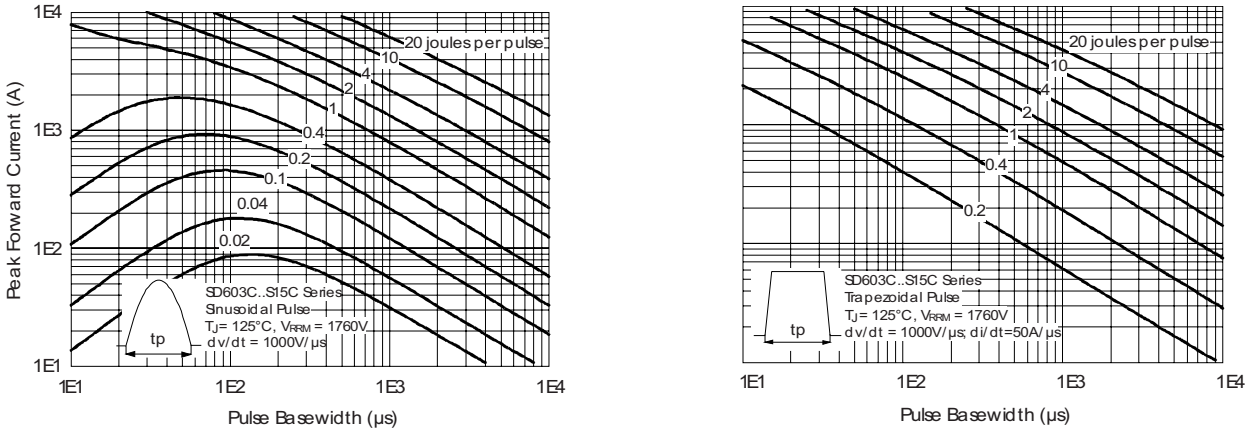


Fig. 22 - Maximum Total Energy Loss Per Pulse Characteristics

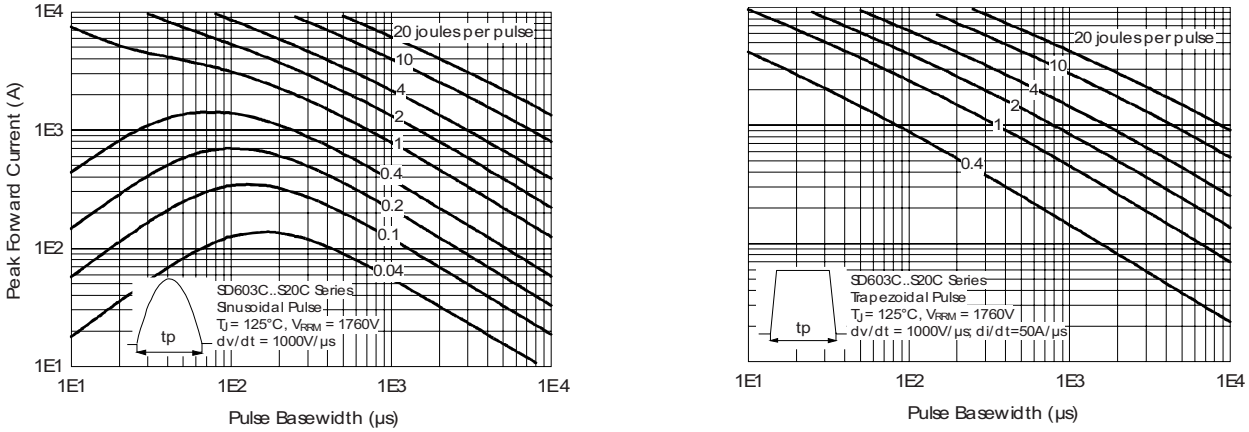


Fig. 23 - Maximum Total Energy Loss Per Pulse Characteristics

ORDERING INFORMATION TABLE

Device code

SD	60	3	C	22	S20	C
1	2	3	4	5	6	7

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

LINKS TO RELATED DOCUMENTS	
Dimensions	http://www.vishay.com/doc?95249

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