Bulletin I2068 rev. C 04/00

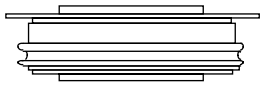
International
IOR Rectifier

SD603C..C SERIES

FAST RECOVERY DIODES

Hockey Puk Version

600A



case style B-43

Features

- High power FAST recovery diode series
- 1.0 to 2.0 µs recovery time
- High voltage ratings up to 2200V
- 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

Typical Applications

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

Major Ratings and Characteristics

Parameters		SD603C..C	Units
$I_{F(AV)}$		600	A
	@ T_{hs}	55	°C
$I_{F(RMS)}$		942	A
	@ T_{hs}	25	°C
I_{FSM}	@ 50Hz	8320	A
	@ 60Hz	8715	A
I^2t	@ 50Hz	346	KA^2s
	@ 60Hz	316	KA^2s
V_{RRM} range		400 to 2200	V
t_{rr} range		1.0 to 2.0	µs
	@ T_J	25	°C
T_J		- 40 to 125	°C

ELECTRICAL SPECIFICATIONS

Voltage Ratings

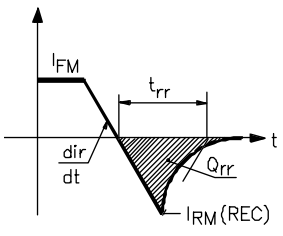
Type number	Voltage Code	V_{RRM} max. repetitive peak and off-state voltage V	V_{RSM}, maximum non-repetitive peak voltage V	I_{RRM} max. T_J = 125°C mA
SD603C..S10C	04	400	500	45
	08	800	900	
	10	1000	1100	
SD603C..S15C	12	1200	1300	
	14	1400	1500	
	16	1600	1700	
SD603C..S20C	20	2000	2100	
	22	2200	2300	

Forward Conduction

	Parameter	SD603C..C	Units	Conditions		
$I_{F(AV)}$	Max. average forward current	600(300)	A	180° conduction, half sine wave.		
	@ Heatsink temperature	55(75)	°C	Double side (single side) cooled		
$I_{F(RMS)}$	Max. RMS current	942	A	@ 25°C heatsink temperature double side cooled		
I_{FSM}	Max. peak, one-cycle non-repetitive forward current	8320	A	t = 10ms	No voltage reapplied	Sinusoidal half wave, Initial $T_J = T_J$ max.
		8715		t = 8.3ms		
		7000		t = 10ms	100% V_{RRM} reapplied	
		7330		t = 8.3ms		
I^2t	Maximum I^2t for fusing	346	KA^2s	t = 10ms	No voltage reapplied	
		316		t = 8.3ms		
		245		t = 10ms	100% V_{RRM} reapplied	
		224		t = 8.3ms		
$I^2\sqrt{t}$	Maximum $I^2\sqrt{t}$ for fusing	3460	$KA^2\sqrt{s}$	t = 0.1 to 10ms, no voltage reapplied		
$V_{F(TO)1}$	Low level of threshold voltage	1.36	V	($16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}$), $T_J = T_J$ max.		
$V_{F(TO)2}$	High level of threshold voltage	1.81		($I > \pi \times I_{F(AV)}$), $T_J = T_J$ max.		
r_{f1}	Low level of forward slope resistance	0.87	mΩ	($16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}$), $T_J = T_J$ max.		
r_{f2}	High level of forward slope resistance	0.67		($I > \pi \times I_{F(AV)}$), $T_J = T_J$ max.		
V_{FM}	Max. forward voltage	2.97	V	I_{pk}= 1885A, T_J = 25°C, t_p = 10ms sinusoidal wave		

Recovery Characteristics

Code	T_J=25°C typical t_{rr} @ 25% I_{RRM} (µs)	Test conditions I_{pk} Square Pulse (A)	di/dt (A/µs)	V_r (V)	Max. values @ T_J=125°C t_{rr} @ 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	SD603C..C	Units	Conditions
T_J	Max. operating temperature range	-40 to 125	°C	
T_{stg}	Max. storage temperature range	-40 to 150		
R_{thJ-hs}	Max. thermal resistance, junction to heatsink	0.076	K/W	DC operation single side cooled
		0.038		DC operation double side cooled
F	Mounting force, ± 10%	9800 (1000)	N (Kg)	
wt	Approximate weight	83	g	
	Case style	B-43		See Outline Table

ΔR_{thJ-hs} Conduction

(The following table shows the increment of thermal resistence R_{thJ-hs} when devices operate at different conduction angles than DC)

Conduction angle	Sinusoidal conduction		Rectangular conduction		Units	Conditions
	Single Side	Double Side	Single Side	Double Side		
180°	0.006	0.007	0.005	0.005	K/W	$T_J = T_J$ max.
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		

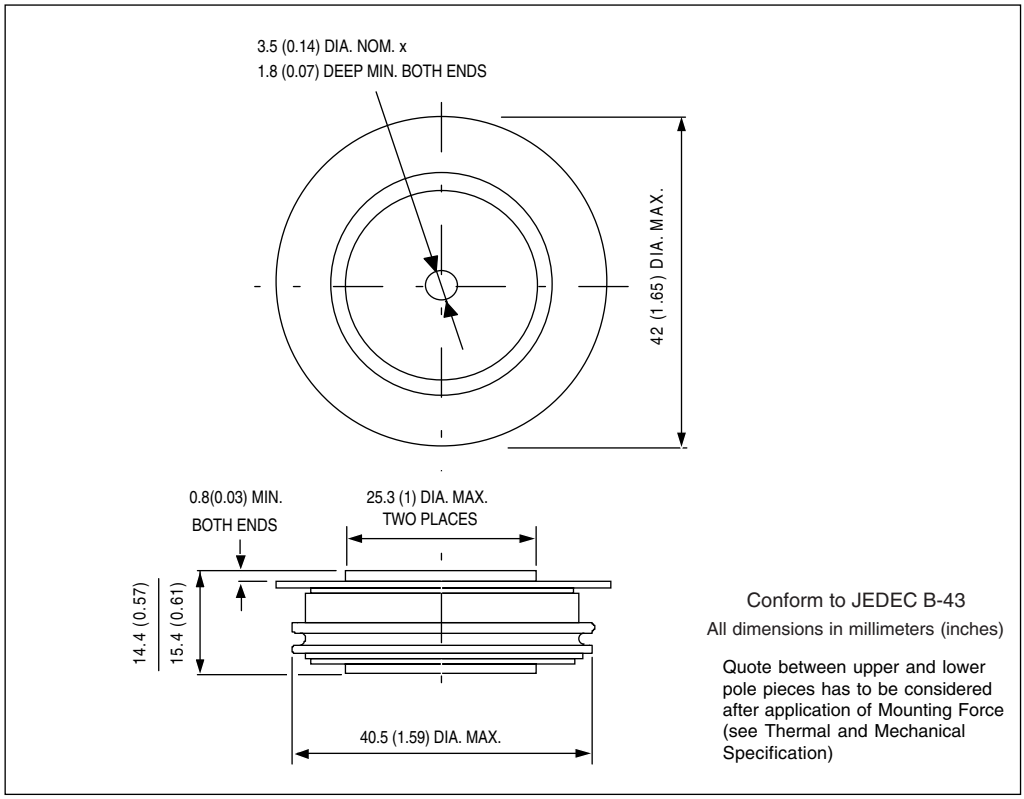
Ordering Information Table

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: Code x 100 = V_{RRM} (see Voltage Ratings table)
6 - t_{rr} code (see Recovery Characteristics table)
7 - C = Puk Case B-43

Outline Table



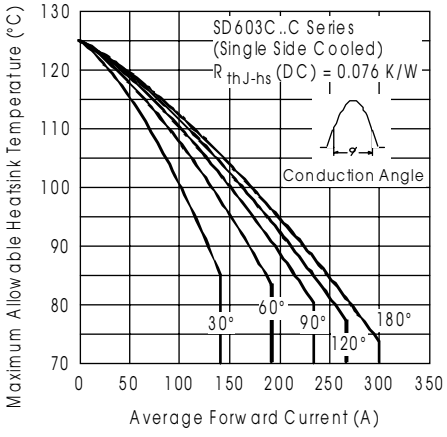


Fig. 1 - Current Ratings Characteristics

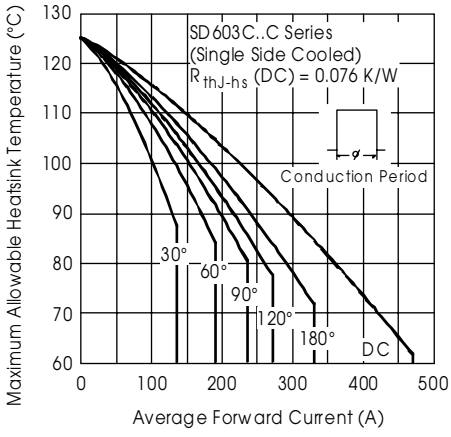


Fig. 2 - Current Ratings Characteristics

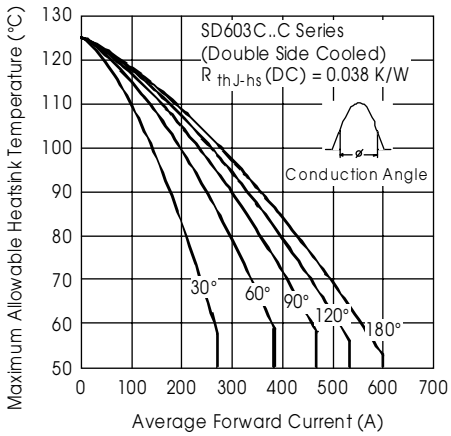


Fig. 3 - Current Ratings Characteristics

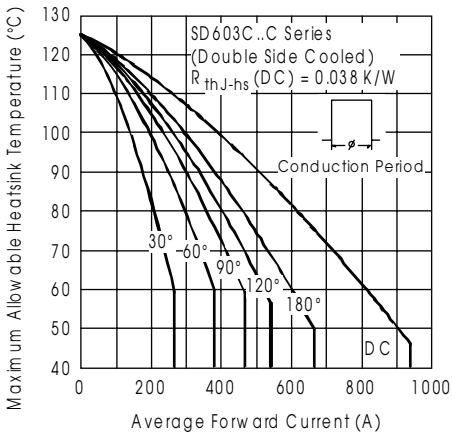


Fig. 4 - Current Ratings Characteristics

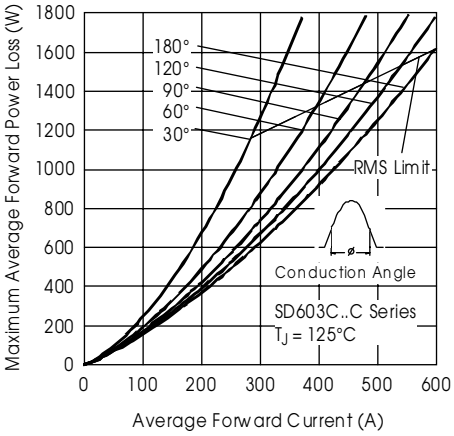


Fig. 5 - Forward Power Loss Characteristics

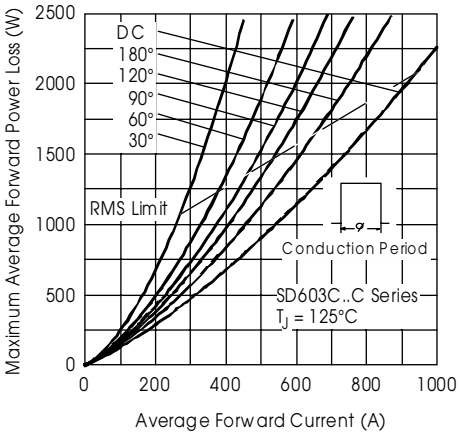


Fig. 6 - Forward Power Loss Characteristics

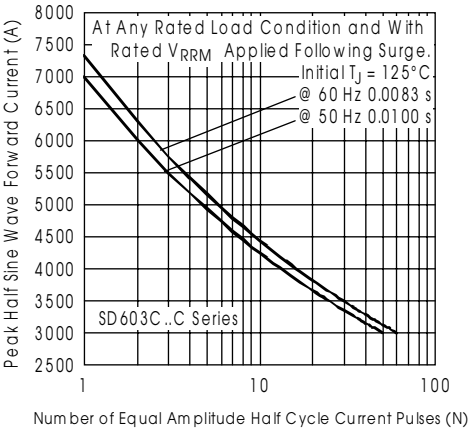


Fig. 7 - Maximum Non-repetitive Surge Current
Single and Double Side Cooled

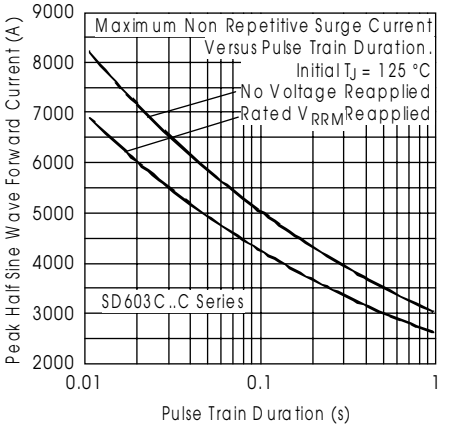


Fig. 8 - Maximum Non-repetitive Surge Current
Single and Double Side Cooled

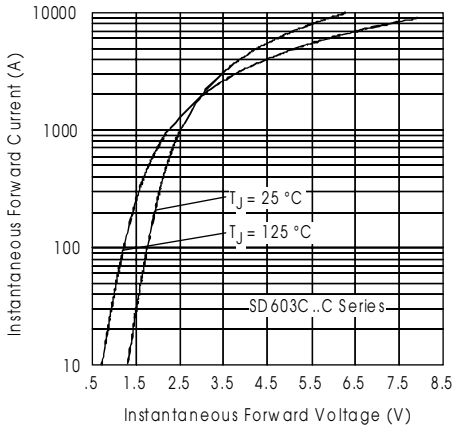


Fig. 9 - Forward Voltage Drop Characteristics

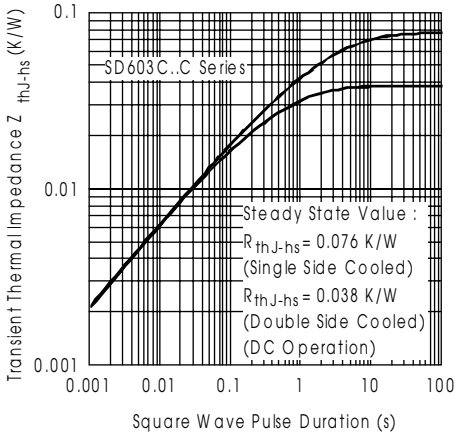


Fig. 10 - Thermal Impedance Z_{thJ-hs} Characteristic

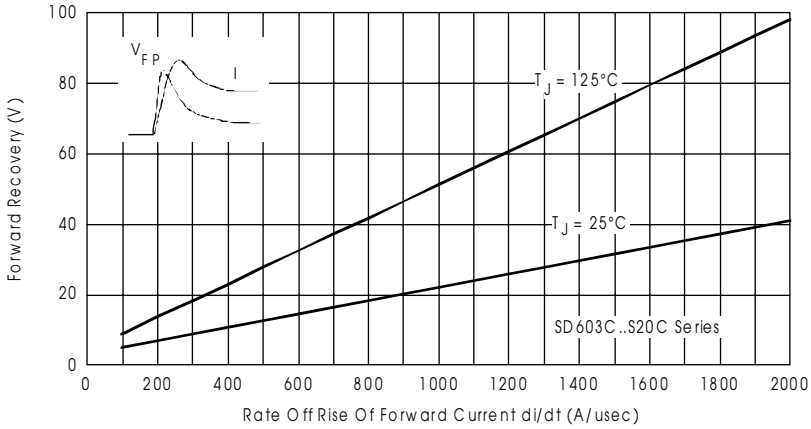


Fig. 11 - Typical Forward Recovery Characteristics

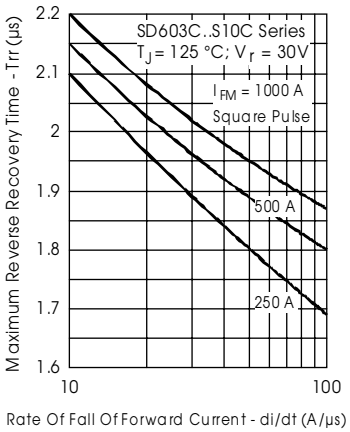


Fig. 12 - Recovery Time Characteristics

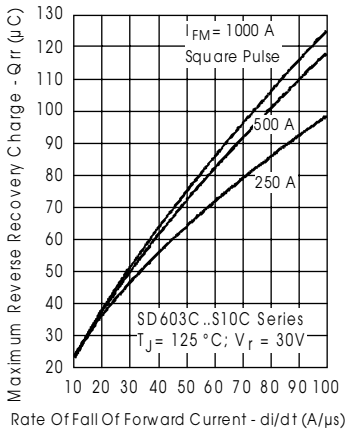


Fig. 13 - Recovery Charge Characteristics

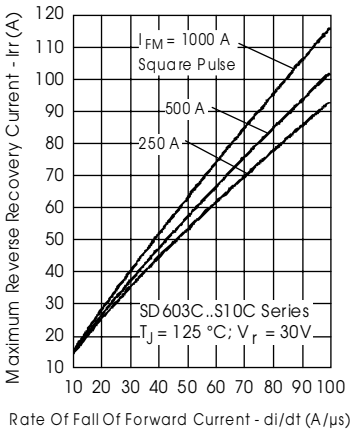


Fig. 14 - Recovery Current Characteristics

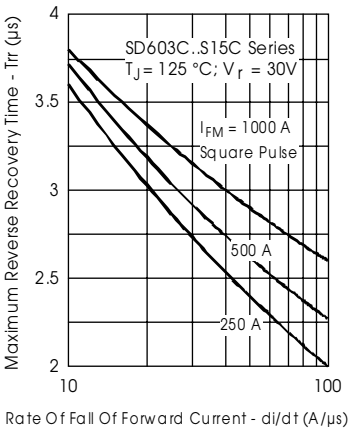


Fig. 15 - Recovery Time Characteristics

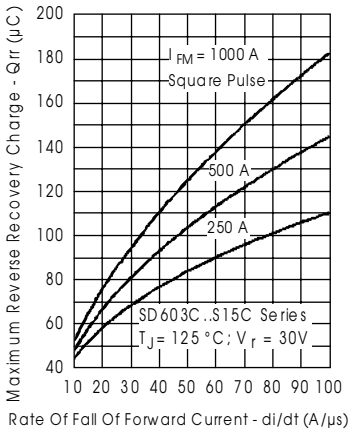


Fig. 16 - Recovery Charge Characteristics

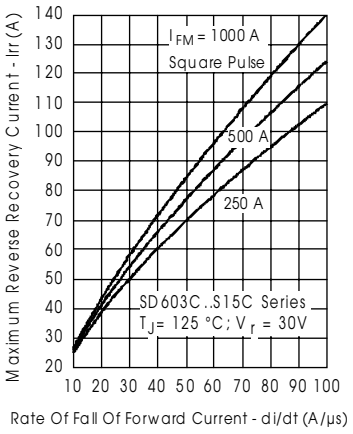


Fig. 17 - Recovery Current Characteristics

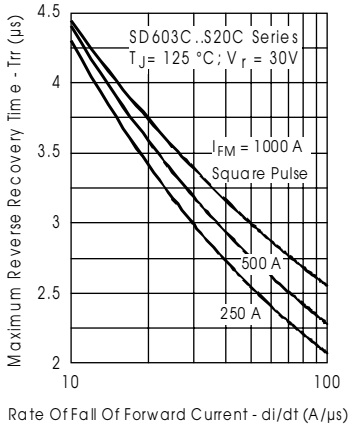


Fig. 18 - Recovery Time Characteristics

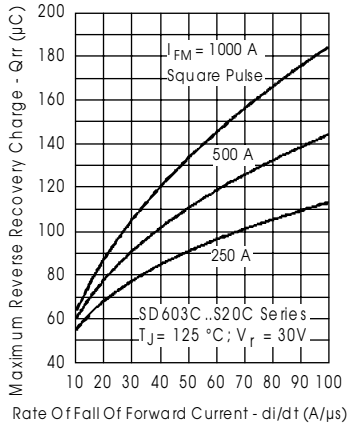


Fig. 19 - Recovery Charge Characteristics

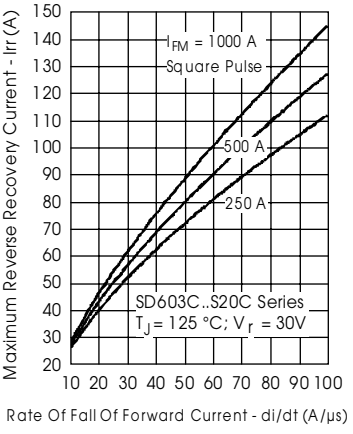


Fig. 20 - Recovery Current Characteristics

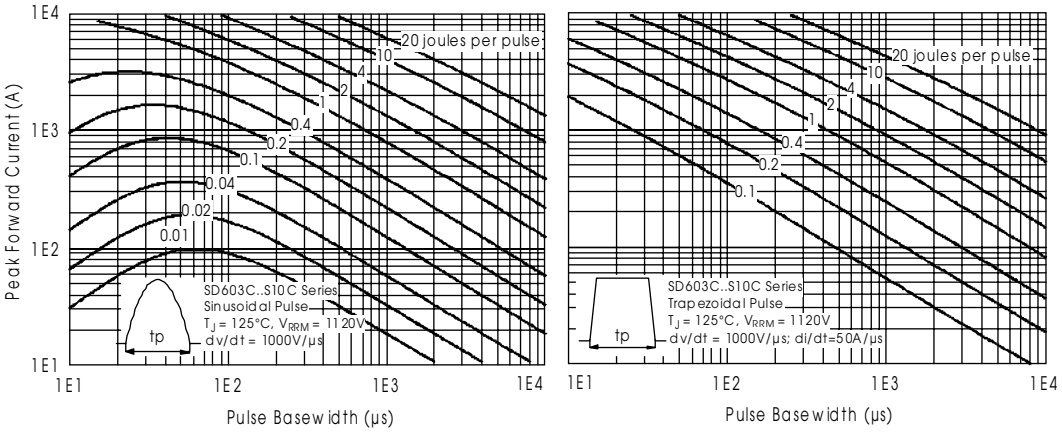


Fig. 21 - Maximum Total Energy Loss Per Pulse Characteristics

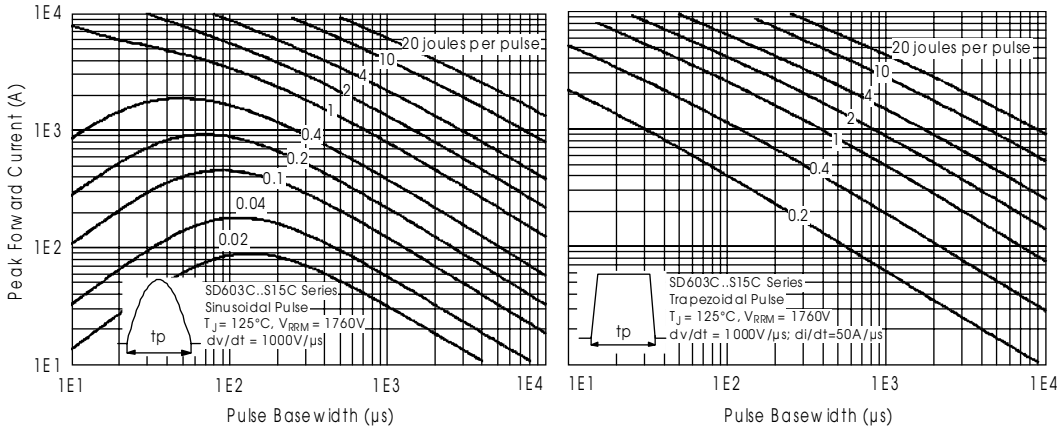


Fig. 22 - Maximum Total Energy Loss Per Pulse Characteristics

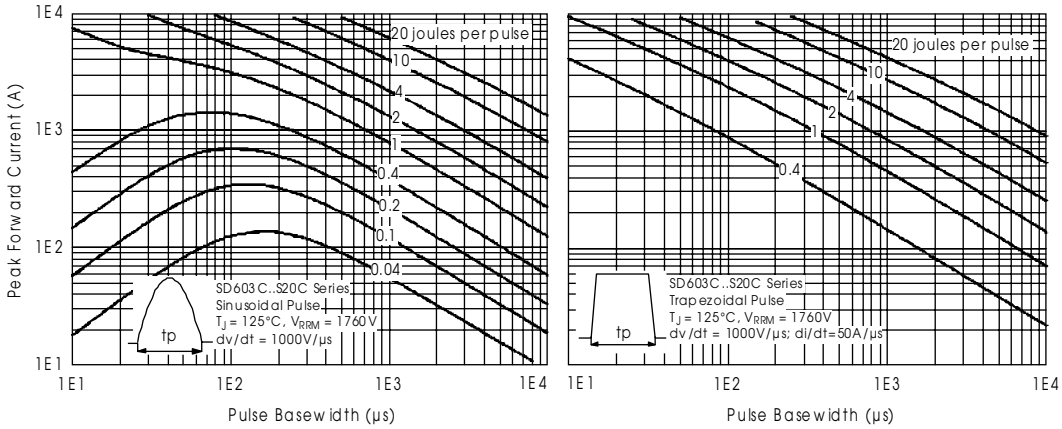


Fig. 23 - Maximum Total Energy Loss Per Pulse Characteristics