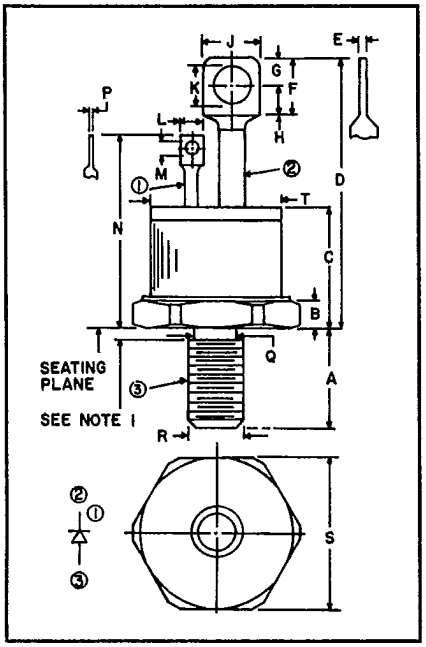
T-25-17

POWEREX

C148

Powerex, Inc., Hillis Street, Youngwood, Pennsylvania 15697 (412) 925-7272
Powerex Europe, S.A., 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 41.14.14

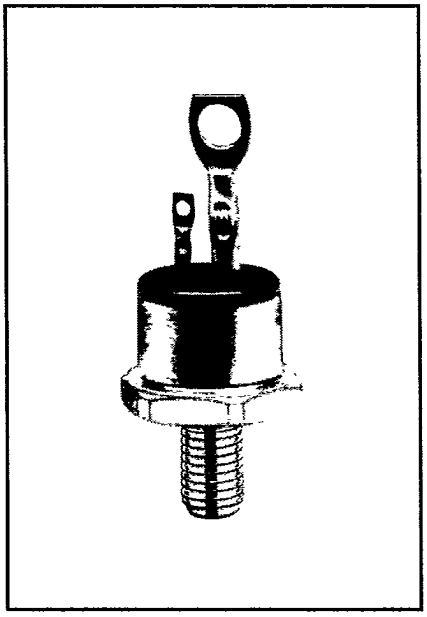
Inverter Grade SCR
63 Amperes RMS
600-1200 Volts/30-40 μsec



600-1200 Volts, C148 Outline Drawing Modified TO-65

Dimensions	Inches		Millimeters	
	Min.	Max.	Min.	Max
A	.422	.452	10.72	11.47
B	.120	.135	3.05	3.42
C	.534	.565	13.57	14.34
D	1.230	1.290	31.25	32.78
E	.029	0.62	.74	1.56
F	.258	Ref.	6.55	Ref.
G	.138	Ref.	3.50	Ref.
H	.115	—	2.83	—
J	.240	.300	6.10	7.62
K	.169	.182	4.30	4.62
L	.090	.115	2.29	2.91
M	.055	.066	1.40	1.67
N	.831	.901	21.11	22.88
P	.012	—	.31	—
Q	.220	—	5.59	—
R	¼-28		UNF-2A	
S	.676	.684	17.18	17.36
T	—	.597	—	15.15

Note:
1. Complete threads to within 2½ thd. of seating plane.
2. One steel, cadmium plated nut and one steel, cadmium plated lockwasher supplied with each device.



C148
Inverter Grade SCR
63 Amperes/600-1200 Volts/
30-40 μsec

Description
Powerex Inverter Grade Silicon Controlled Rectifiers (SCR) are designed for applications. These are all-diffused, compression bonded encapsulated (CBE) devices employing the field-proven amplifying (di/namic) gate.

Features:
- ☐ Center fired Di/Namic Gate
- ☐ High dv/dt With Soft Gate Control
- ☐ High Frequency Operation
- ☐ Sinusoidal Waveform Operation To 20kHz
- ☐ Rectangular Waveform Operation To 20kHz
- ☐ Low Dynamic Forward Voltage Drop
- ☐ Low Switching Losses At High Frequency

Applications:
- ☐ UPS Inverters
- ☐ Induction Heating Inverters
- ☐ High Frequency Lighting
- ☐ Cycloconverters
- ☐ Choppers
- ☐ DC To DC Conversion

Ordering Information
Example: Select the complete 7 or 8 digit part number you desire from the table — i.e. C148N40 is an 800 Volt, 63 Ampere Inverter Grade SCR, 40 μs T_q.

Type	Voltage V_{DRM}/V_{RRM}	Code	Turn-Off t_q (μsec)	Code
C148	600	M	30	30
	800	N	40	40
	1000	P		
	1200	PB		

Note: All voltages not available in all current ratings.

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63 Amperes RMS/600-1200 Volts/30-40 μsec

Absolute Maximum Ratings

Ratings	Symbol	C148M	C148N	Units
Repetitive Peak Off-State Voltage	V_{DRM}	600	800	Volts
Repetitive Peak Reverse Voltage	V_{RRM}	600	800	Volts
Non-repetitive Peak Reverse Voltage	V_{RSM}	720	960	Volts

Ratings	Symbol	C148P	C148PB	Units
Repetitive Peak Off-State Voltage	V_{DRM}	1000	1200	Volts
Repetitive Peak Reverse Voltage	V_{RRM}	1000	1200	Volts
Non-repetitive Peak Reverse Voltage	V_{RSM}	1200	1440	Volts

		C148	
RMS On-State Current	$I_{T(RMS)}$	63	Amperes
Peak One-Cycle Surge (Non-Repetitive) On-State Current (60 Hz) ③	I_{TSM}	700	Amperes
Peak One-Cycle Surge (Non-Repetitive) On-State Current (50 Hz) ③	I_{TSM}	670	Amperes
Critical Rate-of-Rise of On-State Current (Non-Repetitive) ①④⑥	di/dt	100	Amperes/μs
Critical Rate-of-Rise of On-State Current (Repetitive)	di/dt	75	Amperes/μs
I^2t (for Fusing), 8.3 ms	I^2t	2000	A^2sec
Average Gate Power Dissipation	$P_{G(AV)}$	2	Watts
Storage Temperature	T_{stg}	−40 to 150	°C
Operating Temperature	T_j	−40 to 125	°C
Mounting Torque ①		30	in.-lb.
Mounting Torque ①		3.4	N-m

① Consult recommended mounting procedures.
② Applies for zero or negative gate bias.
③ Per JEDEC RS-397, 5.2.2.1.
④ With recommended gate drive.
⑤ Higher dv/dt ratings available, consult factory.
⑥ Per JEDEC standard RS-397, 5.2.2.6.

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63 Amperes RMS/600-1200 Volts/30-40 μsec

Electrical Characteristics

Characteristics	Symbol	Test Conditions	C148 Min.	C148 Typ.	C148 Max.	Units
Current—Conducting State Maximums						
Peak On-State Voltage	V_{TM}	T_c=25°C, I_T=500A	—	—	4.0	Volts
Voltage—Blocking State Maximums						
Forward Leakage, Peak	I_{DRM}	T_j=125°C, V_D=V_{DRM}	—	7	12	mA
Reverse Leakage, Peak	I_{RRM}	T_j=125°C, V_R=V_{RRM}	—	7	12	mA
Typical Critical dv/dt exponential to V_{DRM} ②⑤	dv/dt	T_j=125°C, V_D=V_{DRM}	200	—	—	V/μsec
Thermal						
Maximum Thermal Resistance ① Junction to Case	$R_{th(j-c)}$		200	—	—	°C/Watt
Gate—Maximum Parameters						
Gate Current to Trigger	I_{GT}	T_c=25°C, V_D=6V, R_L=3Ω	—	—	150	mA
Gate Voltage to Trigger	V_{GT}	T_c=25°C, V_D=6V, R_L=3Ω	—	—	3.0	Volts
Non-Triggering Gate Voltage	V_{GD}	T_c=125°C, V_D=V_{DRM}, R_L=1kΩ	0.25	—	—	Volts

① Consult recommended mounting procedures.
② Applies for zero or negative gate bias.
③ Per JEDEC RS-397, 5.2.2.1.
④ With recommended gate drive.
⑤ Higher dv/dt ratings available, consult factory.
⑥ Per JEDEC standard RS-397, 5.2.2.6.

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C148
Inverter Grade SCR
63 Amperes RMS/600-1200 Volts/30-40 μsec

Electrical Characteristics

Characteristics	Symbol	Test Conditions	C148-30 Min.	C148-30 Typ.	C148-30 Max.	C148-40 Min.	C148-40 Typ.	C148-40 Max.	Units
Switching Circuit									
Turn-Off Time	t_q	T_c = +125°C, I_{TM} = 150A, V_R = 50V/min., di/dt = 5A/μs, reapplied dv/dt = 20V/μs linear Repetition Rate = I pps Gate Bias During Turn-Off Interval V_D = 0V, R_L = 100Ω	—	—	30	—	—	40	μsec
Turn-Off Time	t_q	T_c = +125°C, I_{TM} = 150A, V_R = 50V/min., di/dt = 5A/μs, reapplied dv/dt = 200V/μs linear Repetition Rate = I pps Gate Bias During Turn-Off Interval V_D = 0V, R_L = 100Ω	—	38	†	—	48	†	μsec
Turn-Off Time (with Feedback Diode)	t_q	T_C = +125°C, I_{TM} = 150A, V_R = 1V, di/dt = 5A/μs, Repetition Rate = I pps Gate Bias During Turn-Off Interval V_D = 0V, R_L = 100Ω	—	45	—	—	55	—	μsec

†Consult factory for a specified maximum turn-off time.

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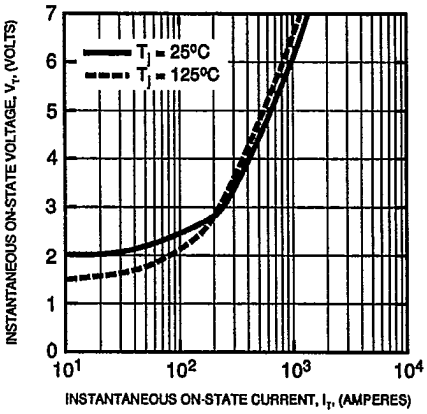
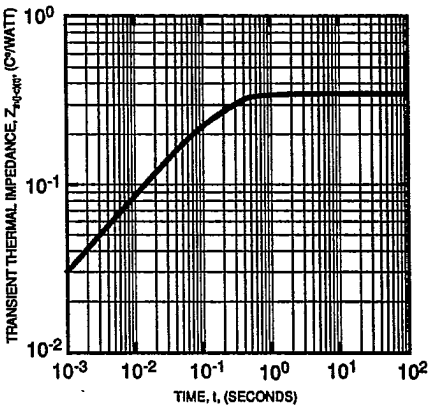
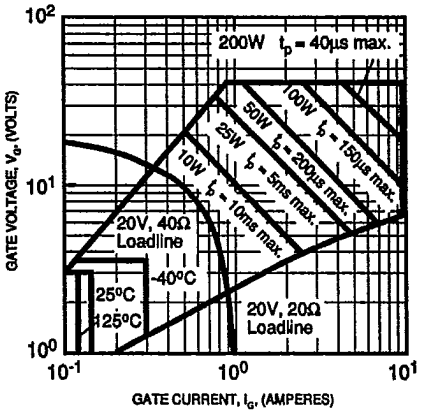
MAXIMUM ON-STATE CHARACTERISTICS



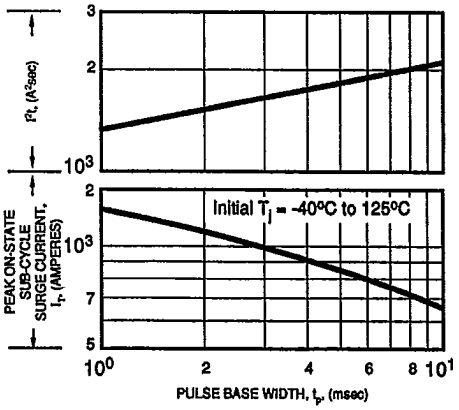
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (JUNCTION TO CASE)



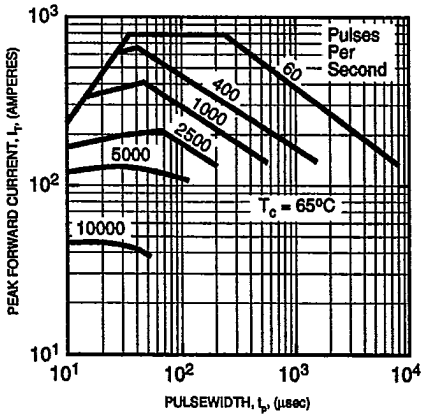
GATE CHARACTERISTICS AND POWER RATINGS



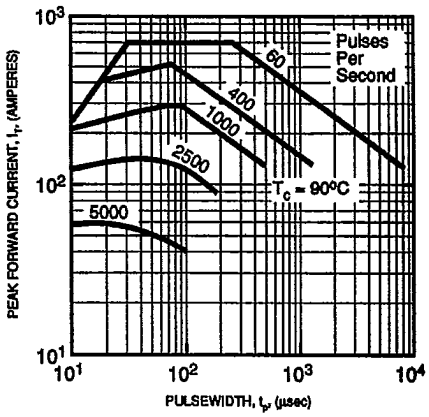
MAXIMUM ALLOWABLE NON-REPETITIVE SUB-CYCLE SURGE ON-STATE CURRENT AND I^2t RATINGS



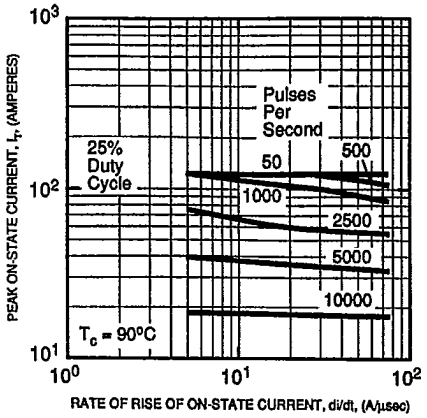
MAXIMUM ALLOWABLE PEAK FORWARD CURRENT



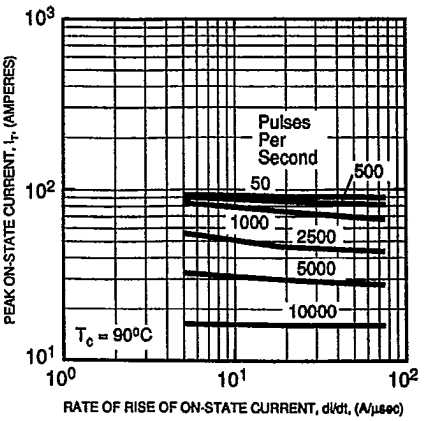
MAXIMUM ALLOWABLE PEAK FORWARD CURRENT



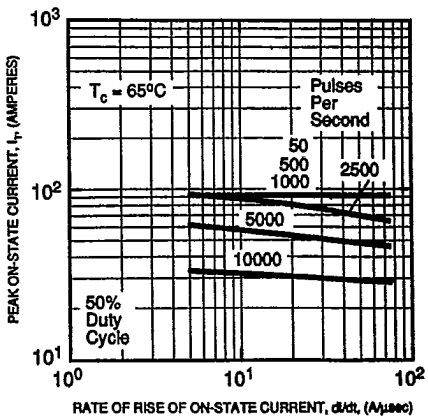
MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT VS. dI/dt



MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT VS. dI/dt



MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT VS. dI/dt



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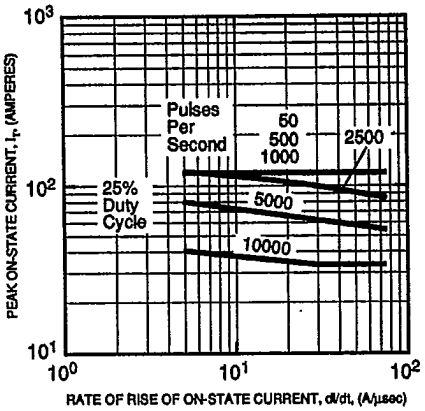
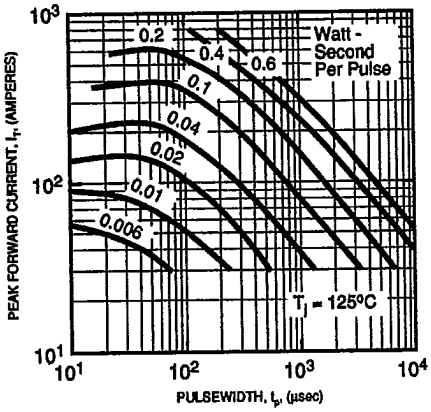
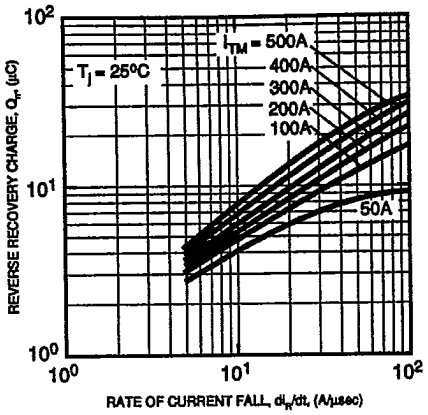
MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT VS. di/dt



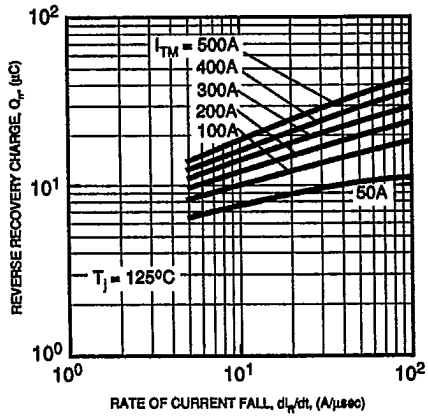
SINUSOIDAL PULSE ENERGY



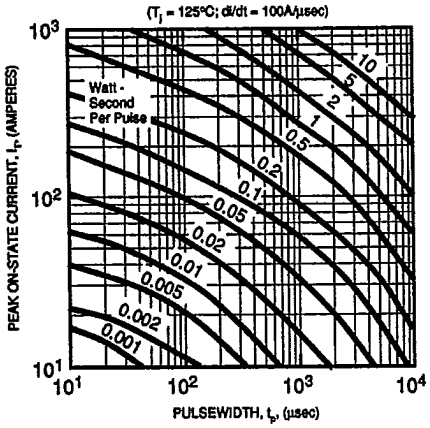
REVERSE RECOVERY CHARGE CHARACTERISTICS (SINUSOIDAL WAVEFORM)



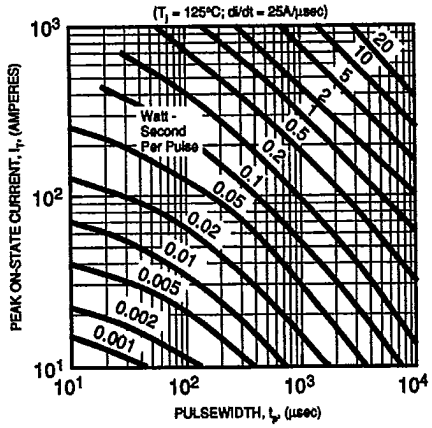
REVERSE RECOVERY CHARGE CHARACTERISTICS (SINUSOIDAL WAVEFORM)



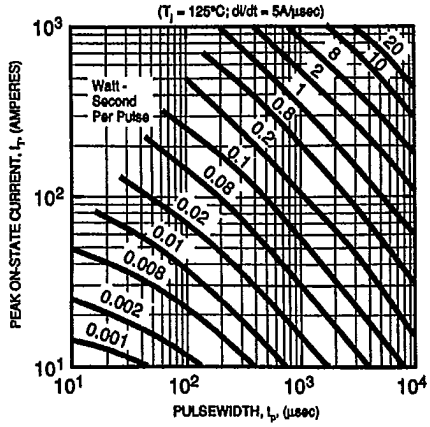
ENERGY PER PULSE VS. PEAK CURRENT AND PULSEWIDTH
(T_j = 125°C; di/dt = 100A/μsec)



ENERGY PER PULSE VS. PEAK CURRENT AND PULSEWIDTH
(T_j = 125°C; di/dt = 25A/μsec)



ENERGY PER PULSE VS. PEAK CURRENT AND PULSEWIDTH
(T_j = 125°C; di/dt = 5A/μsec)



POWEREX

T-91-01

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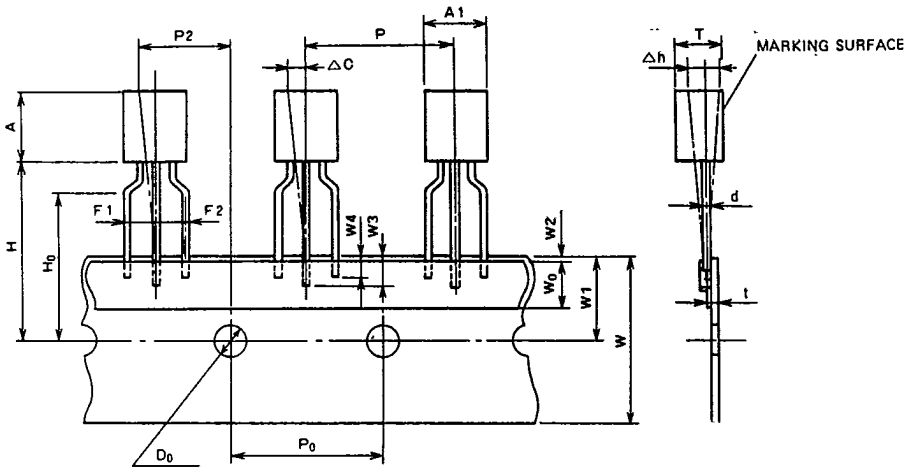
Taping

STANDARD SPECIFICATIONS FOR TAPING OF MOLDED PACKAGE THYRISTORS AND TRIACS

TO-92 Package

Thyristor
CR02AM, CR03AM, CR04AM
Triac
BCR1AM



Taping dimensions

Description of symbol	Symbol	Dimensions (Unit:mm)	Remark
Product width	A1	5.0 MAX	
Product height	A	5.0 MAX	
Product thickness	T	3.7 MAX	
Lead wire diameter	d	0.6 MAX	
Sticker lead wire length (1)	W3	2.5 MIN	
Sticker lead wire length (2)	W4	2.0 MIN	
Pitch between products	P	12.7 ± 1.0	
Feed hole pitch	P_0	12.7 ± 0.3	The cumulative pitch error is ±1mm per 20 pitches.
Feed hole deviation (1)	P2	6.35 ± 1.3	
Distance between lead wires	F1, F2	2.5 ± 0.4	
Defective product (1)	△h	0 ± 2.0	
Tape width	W	$18.0 \pm {}^{1.0}_{0.5}$	
Sticker tape width	W_0	6.0 ± 0.5	
Feed hole deviation (2)	W1	9.0 ± 0.5	
Sticker tape deviation	W2	0.5 MAX	
Position of product bottom surface	H	17.5 MIN	
Lynch height of lead wire	H_0	16.0 ± 0.5	
Feed hole diameter	D_0	4.0 ± 0.2	
Tape thickness	t	0.7 ± 0.2	
Defective product (2)	△C	0 ± 1.0	

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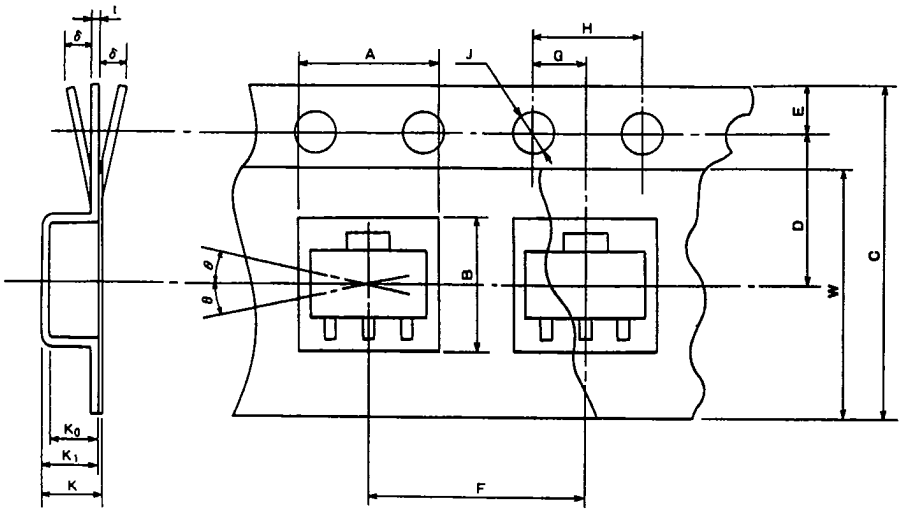
Powerex Semiconductor Data Book
Taping



SOT-89 Package

Thyristor
CR08AS

Taping dimensions

Description of symbol		Symbol	Dimensions/angles Unit:mm	Remark
Parts insertion Concave square hole	Height	A	$5.0 \pm^{0.1}_{0.1}$	Cross-section of the surface 0.5mm above the inner bottom
	Width	B	$4.6 \pm^{0.1}_{0.1}$	Cross-section of the surface 0.5mm above the inner bottom
	Depth	K_0	1.8 ± 0.1	Inner space
	Pitch	F	8.0 ± 0.1	Cumulative error +0.1/–0.3 MAX/10 pitches
Round feed hole	Diameter	J	$\phi 1.5 \pm^{0.1}_{0.05}$	
	Pitch	H	4.0 ± 0.1	Cumulative error +0.1/–0.3 MAX/10 pitches
	Position	E	1.5 ± 0.1	Distance between the tape edge and the hole center
Distance between center lines	Vertical	G	2.0 ± 0.5	Center line of concave square hole and round feed hole
	Horizontal	D	5.65 ± 0.05	Center line of concave square hole and round feed hole
Cover tape	Width	W	$9.5 + 0.3/-0$	Thickness: 0.1 MAX
Carrier tape	Width	C	12 ± 0.2	Warp δ0.3 MAX
	Thickness	t	0.3 ± 0.05	
	Package hole depth	K_1	2.1 ± 0.1	
Device	Package dimensions	—	—	As shown in (e)
	Inclination	θ	30° MAX.	
Total Thickness		K	2.3 ± 0.1	Total thickness including cover and carrier tapes