

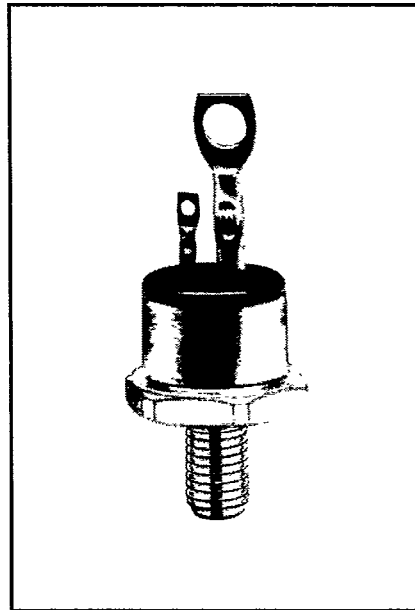
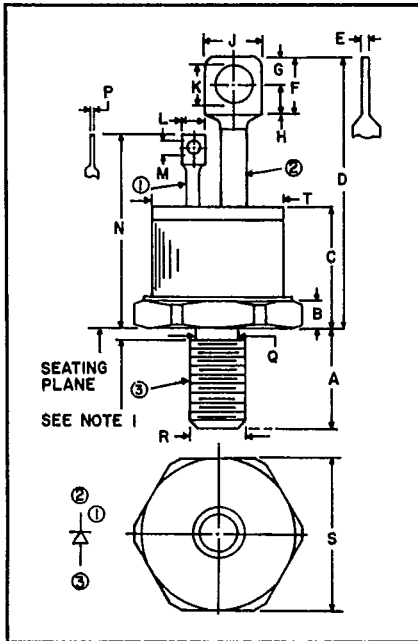


T-25-17

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 μ sec



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

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	1/4-28		UNF-2A	
S	.676	.684	17.18	17.36
T	—	.597	—	15.15

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

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 μ s T_q .

Type	Voltage V_{DRM}/V_{RRM}	Code	Turn-Off	
			t_q (μ sec)	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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C148**Inverter Grade SCR**

63 Amperes RMS/600-1200 Volts/30-40 μ sec

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) ②	I_{TSM}	700		Amperes
Peak One-Cycle Surge (Non-Repetitive) On-State Current (50 Hz) ②	I_{TSM}	670		Amperes
Critical Rate-of-Rise of On-State Current (Non-Repetitive) ①④⑤	di/dt	100		Amperes/ μ s
Critical Rate-of-Rise of On-State Current (Repetitive)	di/dt	75		Amperes/ μ s
I^2t (for Fusing), 8.3 ms	I^2t	2000		A ² sec
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 di/dt ratings available, consult factory.

⑥ Per JEDEC standard RS-397, 5.2.2.8.



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C148

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Electrical Characteristics

Characteristics	Symbol	Test Conditions	C148			Units
			Min.	Typ.	Max.	
Current—Conducting State Maximums						
Peak On-State Voltage	V_{TM}	$T_c = 25^\circ\text{C}$, $I_T = 500\text{A}$	—	—	4.0	Volts
Voltage—Blocking State Maximums						
Forward Leakage, Peak	I_{DRM}	$T_j = 125^\circ\text{C}$, $V_D = V_{DRM}$	—	7	12	mA
Reverse Leakage, Peak	I_{RRM}	$T_j = 125^\circ\text{C}$, $V_R = V_{RRM}$	—	7	12	mA
Typical Critical dv/dt exponential to V_{DRM} ②③	dv/dt	$T_j = 125^\circ\text{C}$, $V_D = V_{DRM}$	200	—	—	V/ μ sec
Thermal						
Maximum Thermal Resistance ① Junction to Case	$R_{th(j-c)}$		200	—	—	$^\circ\text{C}/\text{Watt}$
Gate—Maximum Parameters						
Gate Current to Trigger	I_{GT}	$T_c = 25^\circ\text{C}$, $V_D = 6\text{V}$, $R_L = 3\Omega$	—	—	150	mA
Gate Voltage to Trigger	V_{GT}	$T_c = 25^\circ\text{C}$, $V_D = 6\text{V}$, $R_L = 3\Omega$	—	—	3.0	Volts
Non-Triggering Gate Voltage	V_{GD}	$T_c = 125^\circ\text{C}$, $V_D = V_{DRM}$, $R_L = 1\text{k}\Omega$	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

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63 Amperes RMS/600-1200 Volts/30-40 μ sec

Electrical Characteristics

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

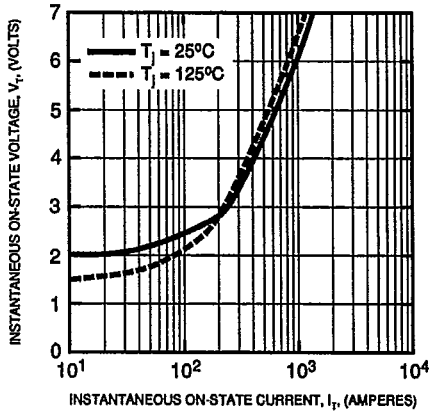
†Consult factory for a specified maximum turn-off time.



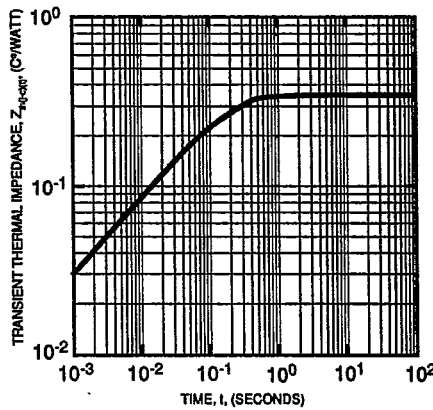
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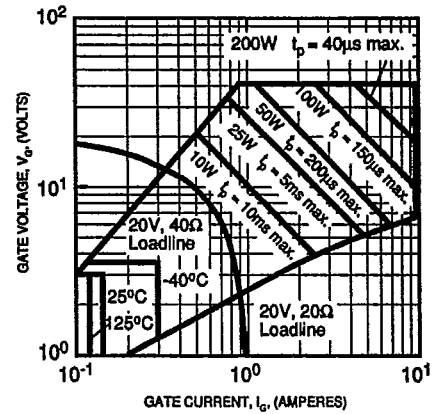
MAXIMUM ON-STATE CHARACTERISTICS



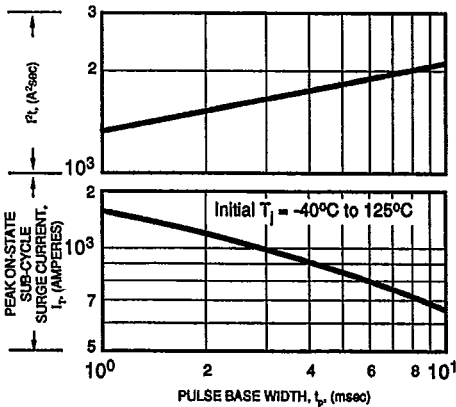
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (JUNCTION TO CASE)



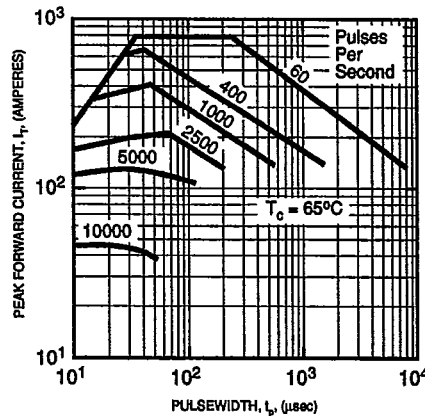
GATE CHARACTERISTICS AND POWER RATINGS



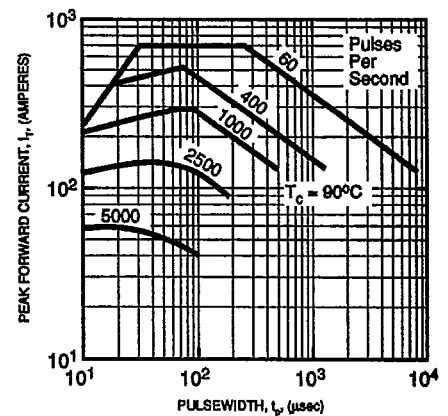
MAXIMUM ALLOWABLE NON-REPETITIVE SUB-CYCLE SURGE ON-STATE CURRENT AND I^2t RATINGS



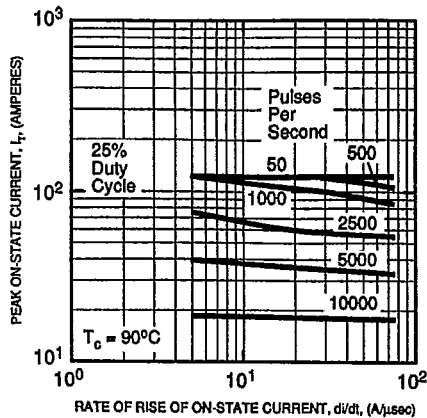
MAXIMUM ALLOWABLE PEAK FORWARD CURRENT



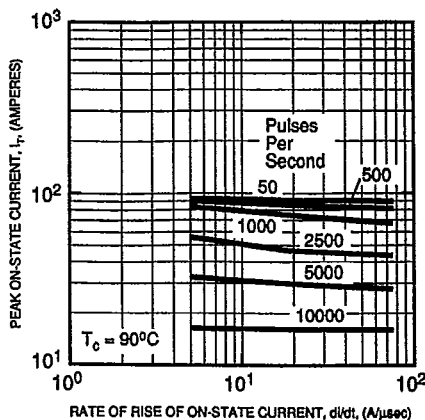
MAXIMUM ALLOWABLE PEAK FORWARD CURRENT



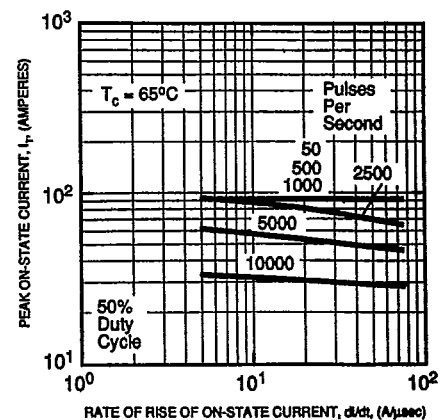
MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT VS. di/dt



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



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



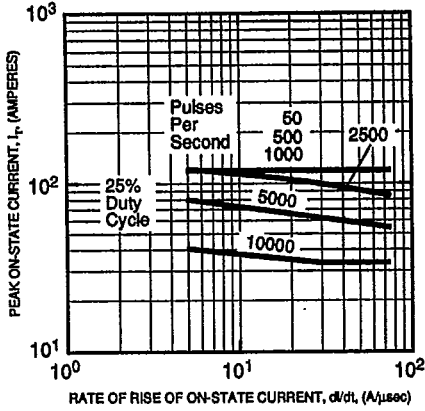


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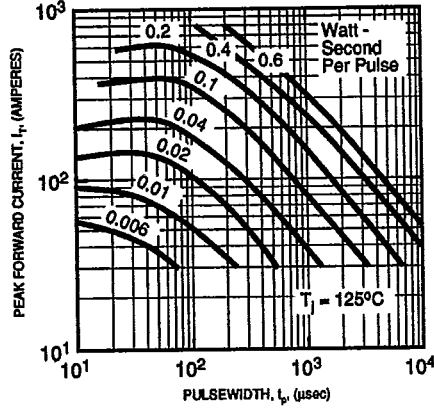
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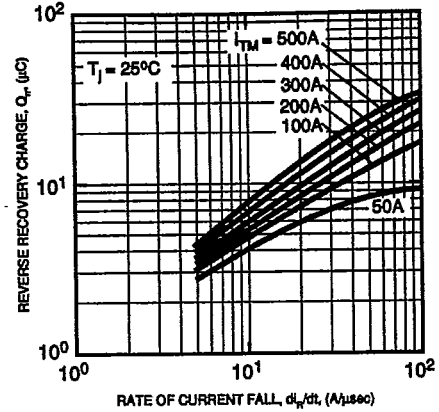
MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT VS. dI/dt



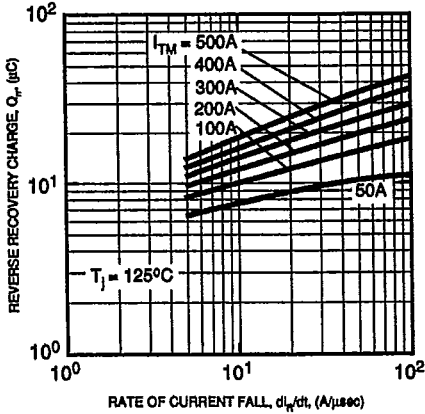
SINUSOIDAL PULSE ENERGY



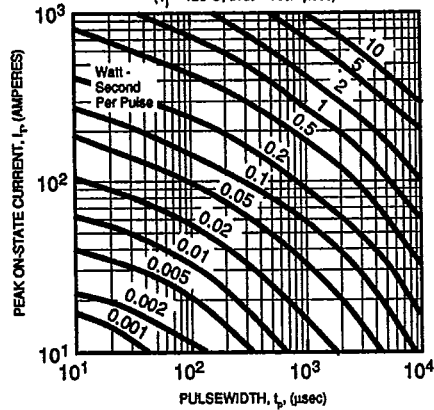
REVERSE RECOVERY CHARGE CHARACTERISTICS (SINUSOIDAL WAVEFORM)



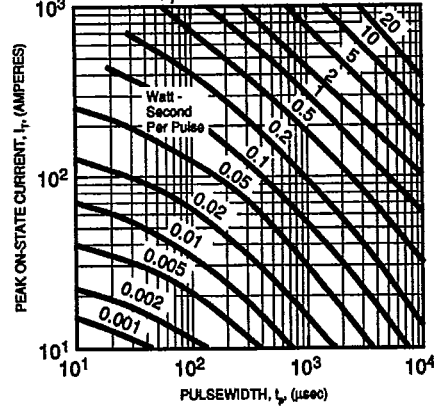
REVERSE RECOVERY CHARGE CHARACTERISTICS (SINUSOIDAL WAVEFORM)



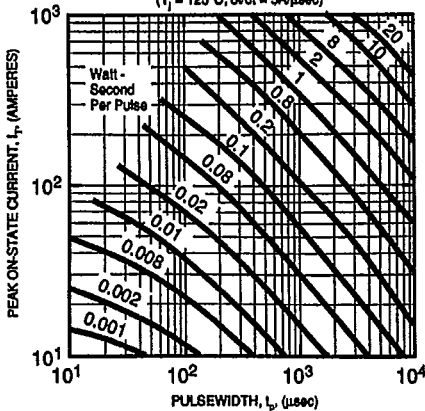
ENERGY PER PULSE VS. PEAK CURRENT AND PULSEWIDTH
 (T_J = 125°C; dI/dt = 100A/μsec)



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)





T-91-01

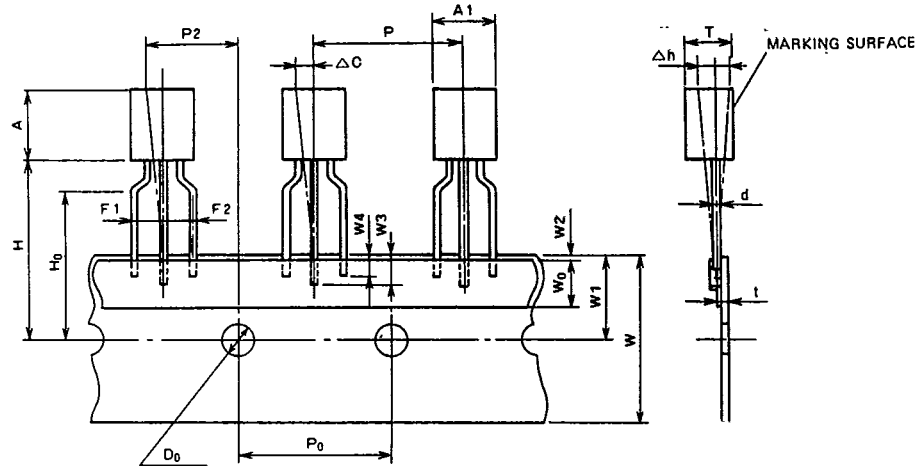
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Taping

STANDARD SPECIFICATIONS FOR TAPING OF MOLDED PACKAGE THYRISTORS AND TRIACS

TO-92 Package

Thyristor
CR02AM, CR03AM, CR04AM
Triac
BCR1AM



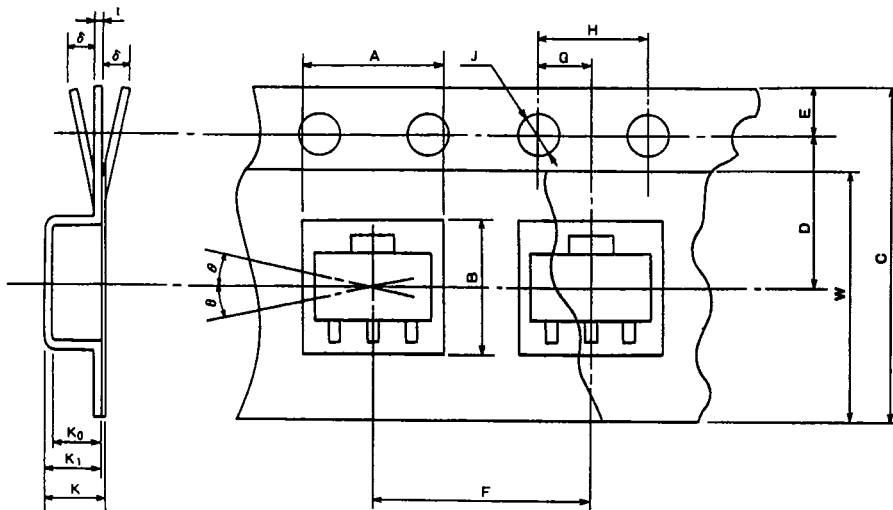
Taping dimensions

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)	Δh	0 ± 2.0	
Tape width	W	18.0 ± ^{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)	ΔC	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	Height	A	5.0 ± 0.1	Cross-section of the surface 0.5mm above the Inner bottom
	Width	B	4.6 ± 0.1	Cross-section of the surface 0.5mm above the inner bottom
Concave square hole	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	$\phi 1.5 \pm 0.05$	
	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 ± 0.3 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

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