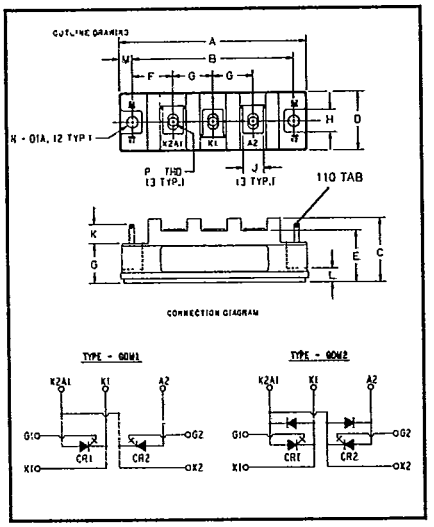
POWEREX

GDM11220
GDM21220

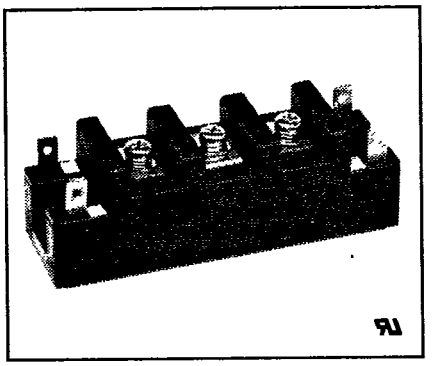
Powerex, Inc., Hillis Street, Youngwood, Pennsylvania 15697 (412) 925-7272
Powerex Europe, S.A., 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 72.75.15

Gate Turn-Off (GTO) Thyristor Modules
200 Amperes/1200 Volts



1200 Volts GDM11220, GDM21220 Outline Drawing

Dimension	Inches	Millimeters
A	4.252 Max	108 Max
B	3.661 ± .012	93 ± 0.3
C	1.457	37
D	1.338 Max	34 Max
E	1.181	30
F	.925	23.5
G	.906	23
H	.512	13
J	.472	12
K	.433	11
L	.315	8
M	.295	7.5
N	.256 Dia.	Dia. 6.5
P	M5 Metric	M5



GDM11220, GDM21220
Gate Turn-Off (GTO)
Thyristor Modules
200 Amperes/1200 Volts

Description
Powerex GTO modules are medium powered devices designed for switching applications. The modules consist of two gate turn-off thyristors with optional reverse parallel connected high speed diodes, all with isolation to the base plate. The GDM21220 has been tested and recognized by Underwriters Laboratories (QQQX2 Power Switching Semiconductors).

Features:
- ☐ Isolated Mounting
- ☐ Glass Passivated Chips
- ☐ Optional Fast Recovery Diodes
- ☐ High Repetitive Turn-Off Current
- ☐ UL Recognized

Applications:
- ☐ Inverters
- ☐ DC Motor Control
- ☐ Switching Power Supplies
- ☐ AC Motor Control

Ordering Information
Example: Select the complete eight digit module part number you desire from the table — i.e. GDM21220 is a 1200 Volt, 200 Ampere Gate Turn-Off (GTO) Thyristor Module.

Type	V_{DRM} Volts (x100)	Current Rating Amperes (x10)
GDM1 GDM2	12	20

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GDM11220, GDM21220
Gate Turn-Off (GTO) Thyristor Modules
200 Amperes/1200 Volts

Absolute Maximum Ratings

Characteristics	Symbol	GDM11220 GDM21220	Units
Peak Forward Blocking Voltage (Repetitive) ①	V_{DRM}	1200	Volts
Transient Peak Forward Blocking Voltage (Non-Repetitive) t<5ms ①	V_{DSM}	1200	Volts
DC Forward Blocking Voltage ①	$V_{D(DC)}$	960	Volts
Peak Reverse Blocking Voltage (Repetitive)	V_{RRM}	15	Volts
Transient Peak Reverse Blocking Voltage (Non-Repetitive) t<5ms	V_{RSM}	15	Volts
Gate Controlled Turn-off Current (Repetitive) ②	I_{TGQ}	200	Amperes
RMS On-State Current	$I_{T(RMS)}$	70	Amperes
Average On-State Current	$I_{T(AV)}$	45	Amperes
Peak One-Cycle Surge (Non-Repetitive) On-State Current (60 Hz)	I_{TSM}	500	Amperes
Peak Three-Cycle Surge (Non-Repetitive) On-State Current (60Hz)	I_{TSM}	380	Amperes
Peak Ten-Cycle Surge (Non-Reptitive) On-State Current (60Hz)	I_{TSM}	280	Amperes
Peak One-Cycle Surge (Non-Repetitive) On-State Current (50 Hz)	I_{TSM}	455	Amperes
I^2t (for Fusing), 8.3 milliseconds	I^2t	1040	A^2sec
Critical Rate-of-Rise of On-State Current ③	di/dt	200	Amperes/μs
Peak Gate Forward Power Dissipation	P_{GFM}	36	Watts
Peak Gate Reverse Power Dissipation	P_{GRM}	1500	Watts
Average Gate Forward Power Dissipation	$P_{GF(AV)}$	12	Watts
Average Gate Reverse Power Dissipation	$P_{GR(AV)}$	20	Watts
Peak Forward Gate Voltage	V_{GFM}	10	Volts
Peak Reverse Gate Voltage	V_{GRM}	15	Volts
Peak Forward Gate Current	I_{GFM}	12	Amperes
Peak Reverse Gate Current	I_{GRM}	75	Amperes
Storage Temperature	T_{STG}	-40 to 150	°C
Operating Temperature	T_J	-40 to 125	°C
Maximum Mounting Torque M6 Mounting Screw	—	50	in.-lb.
Maximum Terminal Torque M5 Terminal Screw	—	35	in.-lb.
Module Weight (Typical)	—	250	Grams
V Isolation	V_{RMS}	2500	Volts

① V_{GK} = -2V
② V_D = ½V_{DRM}, I_{GQ} = -40A, T_J = 125°C, C_S = 0.47μF, L_S = 0.1μH
③ T_J = 125°C, I_{GM} = 4A, V_D = ½ V_{DRM}, di_G/dt = 5A/μs

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GDM11220, GDM21220
Gate Turn-Off (GTO) Thyristor Modules
200 Amperes/1200 Volts

Electrical and Thermal Characteristics, T_J=25°C unless otherwise specified

Characteristic	Symbol	Test Conditions	GDM11220 GDM21220	Units
Blocking State Maximums				
Forward Leakage Current, Peak	I_{DRM}	T_J=125°C, V_{DRM}=rated, V_{GK}=-2V	30	mA
Reverse Leakage Current, Peak	I_{RRM}	T_J=125°C, V_{RRM}=rated	30	mA
Reverse Gate Leakage Current	I_{GRM}	T_J=125°C, V_{GR}=15V	30	mA
Conducting State Maximums				
Peak On-State Voltage	V_{TM}	I_{TM}=200A	3.8	Volts
Peak On-State Voltage	V_{TM}	I_{TM}=200A, T_J=125°C	4.3	Volts
Switching Minimums				
Critical Rate of Rise of Off-State Voltage	dv/dt	T_J=125°C, V_D=½V_{DRM}, V_{GK}=-2V	1000	Volts/μsec
Switching Maximums				
Turn-on Time	t_{gt}	I_{TM}=200 A, I_{GM}=4A, V_D=½ V_{DRM}, T_J=125°C	4.0	μsec
Turn-off Time	t_{gq}	I_{TM}=200 A, -dI_G/dt=15 A/μsec, V_D=½ V_{DRM}, T_J=125°C, V_{GK}=-15V, C_S=0.47μF, L_S=0.1μH	10	μsec
Thermal Maximums				
Thermal Resistance, Junction to Case	$R_{\theta JC}$	Per GTO	0.35	°C/Watt
Thermal Resistance, Case to Sink Lubricated	$R_{\theta CS}$	Per Device	0.13	°C/Watt
Gate Parameters Maximums				
Gate Current to Trigger	I_{GT}	V_D=24 V, R_L=2 Ω	900	mA
Gate Voltage to Trigger	V_{GT}	V_D=24 V, R_L=2 Ω	1.5	Volts

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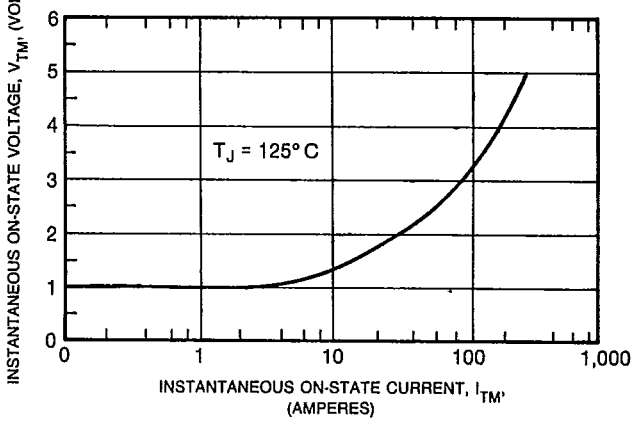
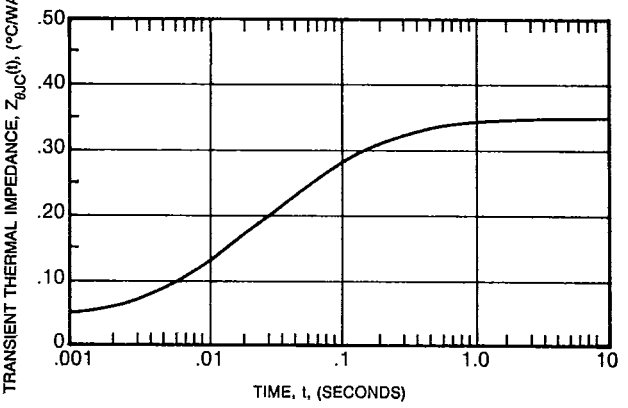
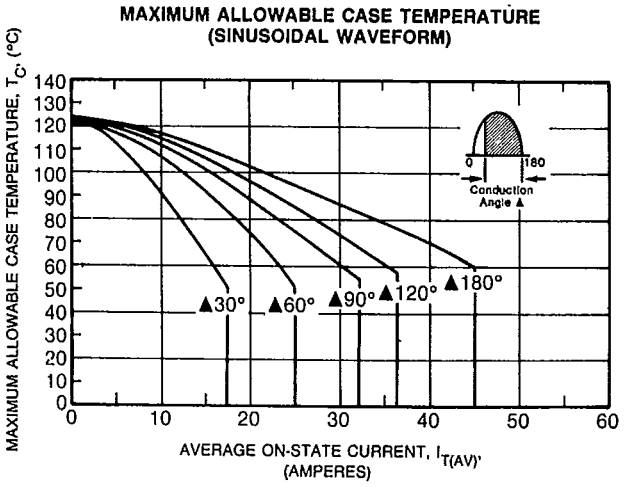
MAXIMUM ON-STATE CHARACTERISTICS



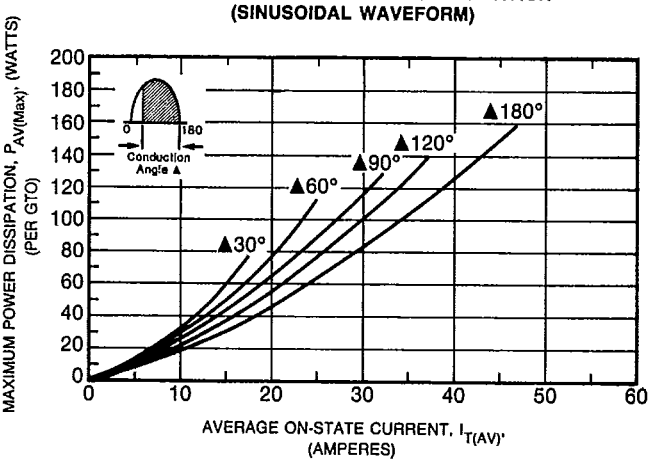
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (JUNCTION TO CASE)



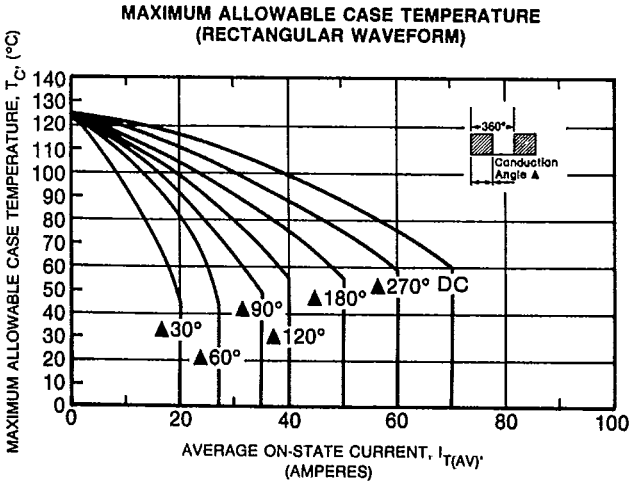
MAXIMUM ALLOWABLE CASE TEMPERATURE (SINUSOIDAL WAVEFORM)



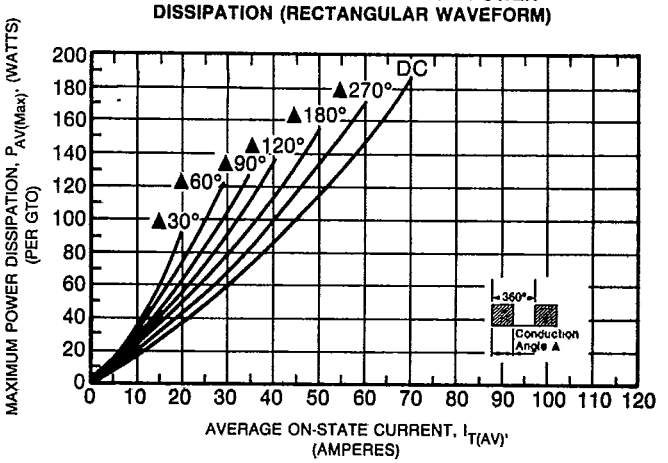
MAXIMUM ON-STATE POWER DISSIPATION (SINUSOIDAL WAVEFORM)



MAXIMUM ALLOWABLE CASE TEMPERATURE (RECTANGULAR WAVEFORM)



MAXIMUM AVERAGE ON-STATE POWER DISSIPATION (RECTANGULAR WAVEFORM)



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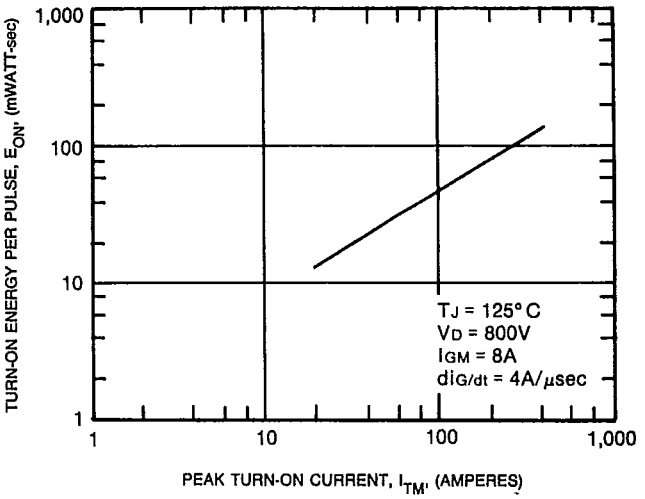
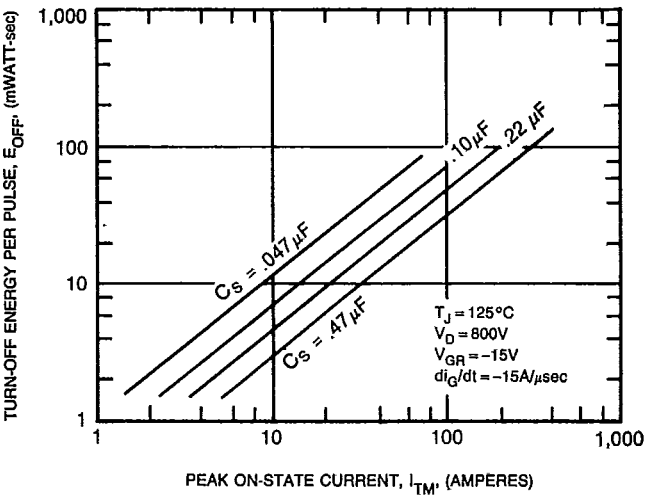
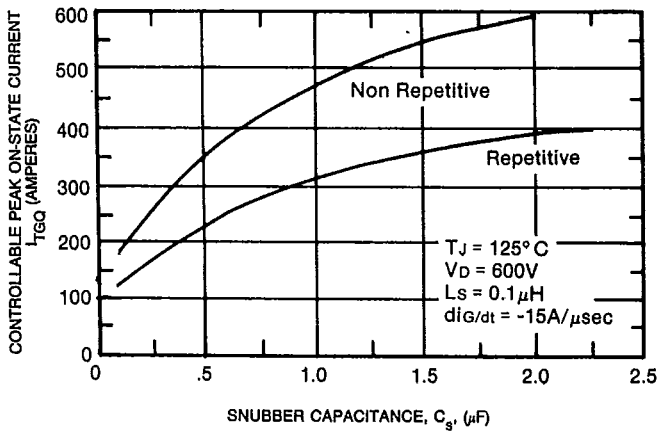
TYPICAL TURN-ON ENERGY LOSS



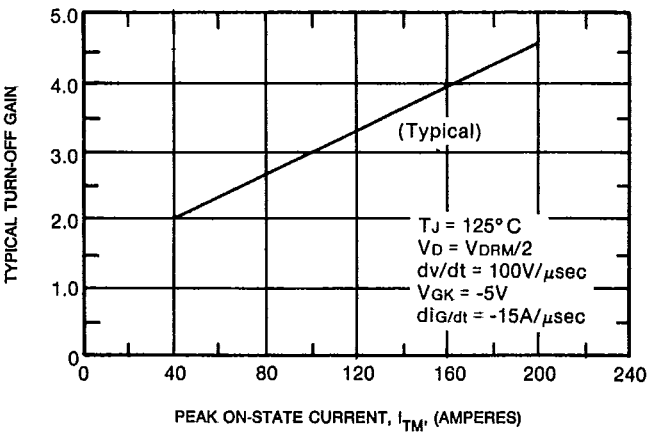
TYPICAL TURN-OFF ENERGY LOSS



CONTROLLABLE CURRENT VS. SNUBBER CAPACITANCE



TYPICAL TURN-OFF GAIN



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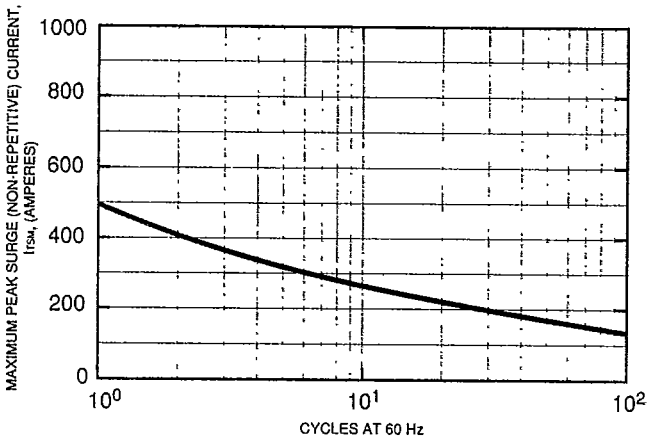
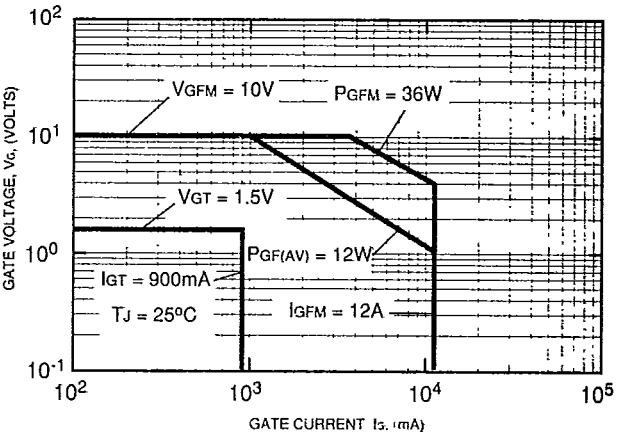
MAXIMUM ALLOWABLE PEAK SURGE (NON-REPETITIVE) CURRENT



GATE CHARACTERISTICS



POWEREX

T-91-01

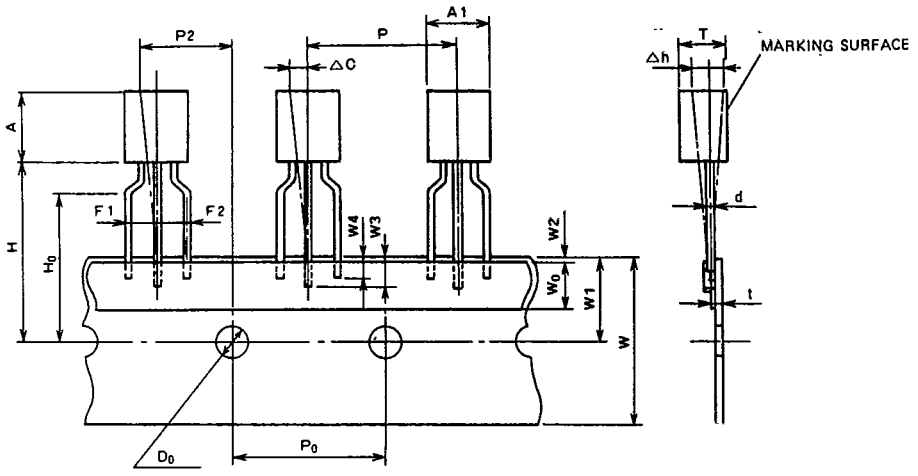
Powerex, Inc., Hillis Street, Youngwood, Pennsylvania 15697 (412) 925-7272
Powerex Europe, S.A., 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 41.14.14

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	$18.0 \pm^{1.0}_{0.5}$	
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)	ΔC	0 ± 1.0	

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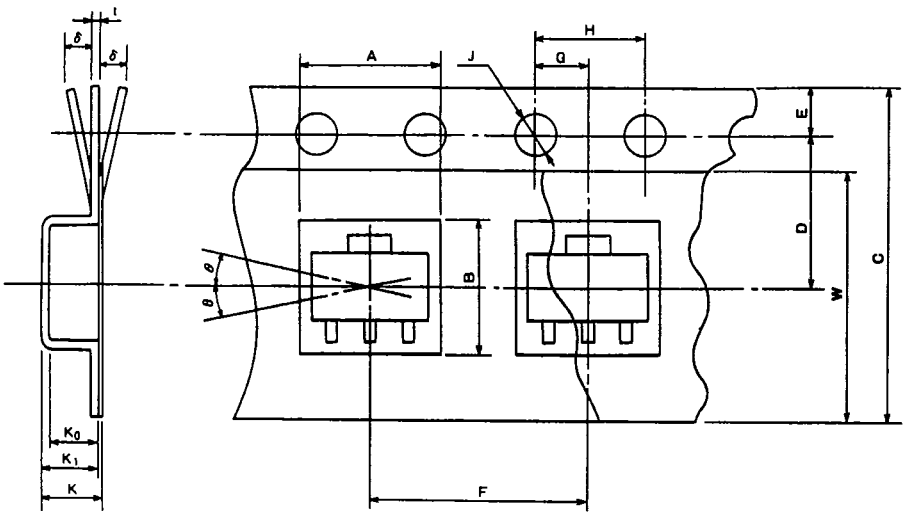
Powerex Semiconductor Data Book
Taping



SOT-89 Package

Thyristor
CR08AS

Taping dimensions

Description of symbol		Symbol	Dimensions/angles Unit:mm	Remark
Parts insertion 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