

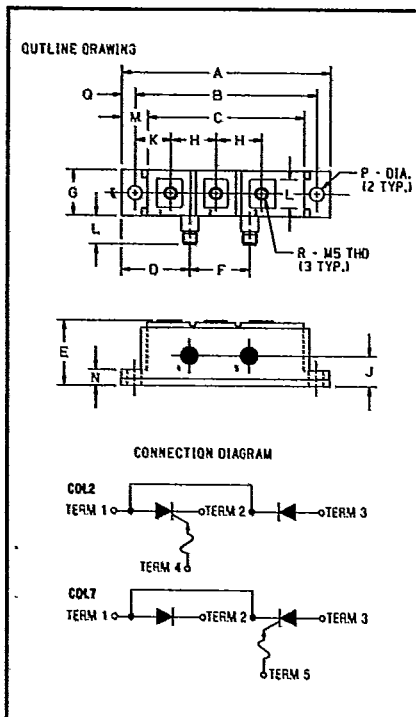


Powerex, Inc., Hillis Street, Youngwood, Pennsylvania 15697 (412) 925-7272

Powerex Europe, S.A., 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 72.75.15

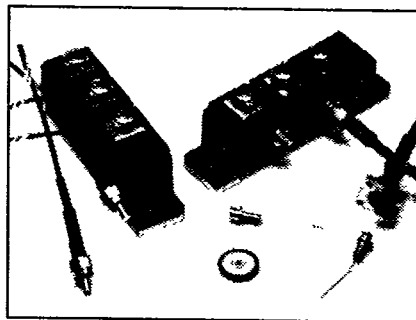
CDL2 — 90
CDL7 — 90 Tentative

SCR/Diode Light-Triggered POW-R-BLOK™ Modules 90 Amperes/100-1400 Volts



100-1400 Volts
CDL2 — 90, CDL7 — 90
Outline Drawing

Dimension	Inches		Millimeters	
	Min.	Max.	Min.	Max.
A	3.602	3.640	91.49	92.45
B	3.146	3.154	79.91	80.11
C	2.705	2.735	68.71	69.47
D	1.180	1.200	29.97	30.48
E	1.125	1.165	28.58	29.59
F	1.025	1.055	26.04	26.80
G	.795	.805	20.19	20.45
H	.788	.798	19.76	20.27
J	.650	.670	16.51	17.02
K	.608	.628	15.44	15.95
L	.480	.520	12.19	13.21
M	.43	.47	10.92	11.94
N	.265	.285	6.73	7.24
PØ	.245	.255	6.22	6.48
Q	.227	.246	5.59	6.25
R	—	—	M5 x 0.8	



CDL2 — 90, CDL7 — 90
SCR/Diode Light-Triggered
POW-R-BLOK™ Modules
90 Amperes/100-1400 Volts

Description

Powerex SCR/Diode CDL2 and CDL7 are light-triggered isolated POW-R-BLOK™ modules. The directly light-triggered thyristor module is gated on with a Gallium Arsenide (GaAs) laser diode or a high-power Gallium Aluminum Arsenide (GaAlAs) light emitting diode (LED).

Features:

- ☐ Glass Passivated Chips
- ☐ Hybrid Construction
- ☐ Fiber Optic Receptacles
- ☐ Fiber Optic Pigtails

Applications:

- ☐ High Degree of Gate Isolation
- ☐ Remote Location of Thyristor From Gate Circuits
- ☐ High Immunity from Deleterious Effects of Electromagnetic Interference (EMI)

Ordering Information

Example: Select the complete eight digit rating module part number you desire from the table — i.e.
CDL21290 is a 1200 Volt,
90 Ampere SCR/Diode Light-Triggered
POW-R-BLOK™ Module.

Type	V _{RRM} Volts (x100)	Current Rating Amperes (90)
CDL2	01	90
CDL7	02	
	04	
	06	
	08	
	10	
	12	
	14	



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SCR/Diode

Light-Triggered POW-R-BLOK™ Modules

90 Amperes/100-1400 Volts

Absolute Maximum Ratings

Characteristics	Symbol	CDL20190 CDL70190	CDL20290 CDL70290	CDL20490 CDL70490	CDL20690 CDL70690	Units
Peak Forward Blocking Voltage	V_{DRM}	100	200	400	600	Volts
Peak Reverse Blocking Voltage	V_{RRM}	100	200	400	600	Volts
Transient Peak Reverse Blocking Voltage (Non-Repetitive) $t < 5$ ms	V_{RSM}	200	300	500	700	Volts
		CDL20890 CDL70890	CDL21090 CDL71090	CDL21290 CDL71290	CDL21490 CDL71490	
Peak Forward Blocking Voltage	V_{DRM}	800	1000	1200	1400	Volts
Peak Reverse Blocking Voltage	V_{RRM}	800	1000	1200	1400	Volts
Transient Peak Reverse Blocking Voltage (Non-Repetitive) $t < 5$ ms	V_{RSM}	950	1200	1450	1700	Volts
		CDL2 — 90	CDL7 — 90			
RMS On-State Current	$I_{T(RMS)}, I_{F(RMS)}$		145			Amperes
Average On-State Current	$I_{T(AV)}, I_{F(AV)}$		90			Amperes
Peak One-Cycle Surge (Non-Repetitive) On-State Current (60Hz)	I_{TSM}, I_{FSM}		1925			Amperes
Peak One-Cycle Surge (Non-Repetitive) On-State Current (50Hz)	I_{TSM}, I_{FSM}		1755			Amperes
I^2t (for Fusing), 8.3 milliseconds	I^2t		15375			A ² sec
Critical Rate-of-Rise of On-State Current $\odot$ (Non-Repetitive)	di/dt		100			Amperes/ μ s
Peak Gate Power Dissipation	P_{GM}		16			Watts
Average Gate Power Dissipation	$P_{G(AV)}$		3.0			Watts
Peak Forward Gate Voltage	V_{GFM}		10			Volts
Peak Reverse Gate Voltage	V_{GRM}		5.0			Volts
Peak Forward Gate Current	I_{GFM}		4.0			Amperes
Storage Temperature	T_{STG}		-40 to 125			°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)	—		142			Grams
V Isolation	V_{RMS}		2500			Volts

 $\odot$ Per JEDEC STD RS-397, 5.2.2.6.



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CDL2 — 90, CDL7 — 90

SCR/Diode

Light-Triggered POW-R-BLOK™ Modules

90 Amperes/100-1400 Volts

Electrical and Thermal Characteristics $T_J = 25^\circ\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	CDL2 — 90	CDL7 — 90	Units
Blocking State Maximums					
Forward Leakage Current, Peak	I_{DRM}	$T_J = 125^\circ\text{C}$, $V_{\text{DRM}} = \text{rated}$	15		mA
Reverse Leakage Current, Peak	I_{RRM}	$T_J = 125^\circ\text{C}$, $V_{\text{RRM}} = \text{rated}$	15		mA
Conducting State Maximums					
Peak On-State Voltage	V_{TM}	$I_{\text{TM}} = 250\text{A}$	1.55		Volts
Peak On-State Voltage	V_{FM}	$I_{\text{FM}} = 250\text{A}$	1.3		Volts
Switching Minimums					
Critical Rate of Rise of Off-State Voltage	dv/dt	$T_J = 125^\circ\text{C}$, Exponential to V_{DRM}	300		Volts/ μsec
Typical Turn-Off Time	t_q	$I_{\text{TM}} = 50\text{A}$, $T_J = 125^\circ\text{C}$, $di_F/dt = 5\text{A}/\mu\text{s}$ reapplied $dv/dt = 20\text{V}/\mu\text{s}$ linear to $0.8 V_{\text{DRM}}$	100		μsec
Typical Turn-On Time	t_{on}	$I_{\text{TM}} = 100\text{A}$, $V_D = 100\text{V}$	4		μsec
Thermal Maximums					
Thermal Resistance, Junction to Case	$R_{\theta\text{JC}}$	Per Device	0.28		$^\circ\text{C}/\text{Watt}$
Thermal Resistance, Case to Sink Lubricated	$R_{\theta\text{CS}}$	Per Device	0.2		$^\circ\text{C}/\text{Watt}$
Gate Parameters Maximums					
Optical Energy to Trigger	E_{LT}	Trigger at $V_D = 40\text{V}$, Wavelength = 904 nm $t_p = 0.2 \mu\text{s}$	0.500		μJ
Recommended Optical Gate Drive Energy	E_{LTrec}	—	0.750		μJ
Interconnecting Optical Fiber Diameter	—	—	600		μm
Fiber Optical Pigtail	—	—	1000		μm
Integral Fiber Optic Connector	—	—			
Interconnecting Optical Fiber Numerical Aperture	—	—	.37		NA

CAUTION:

The user should be careful not to over-tighten the nut on the fiber optic plug when coupling it to the module.

After insertion of the fiber optic plug into the receptacle, the nut should be tightened finger tight. If additional tightening is required, the nut may be turned a *maximum of 1/16th of a turn or a maximum torque of 4 inch pounds applied*. Damage to the fiber optic receptacle, internal optical fiber and fiber optic plug may result if the nut is overtightened.

It is recommended that a high pressure air jet be used to remove any particles from the inside of the fiber optic receptacle prior to insertion of the fiber optic plug in order to prevent damage to the glass fibers.

WARNING:

Internal insulation used is Beryllium Oxide. User should avoid grinding, crushing or abrading these portions. Care must be exercised in properly disposing of unwanted modules.



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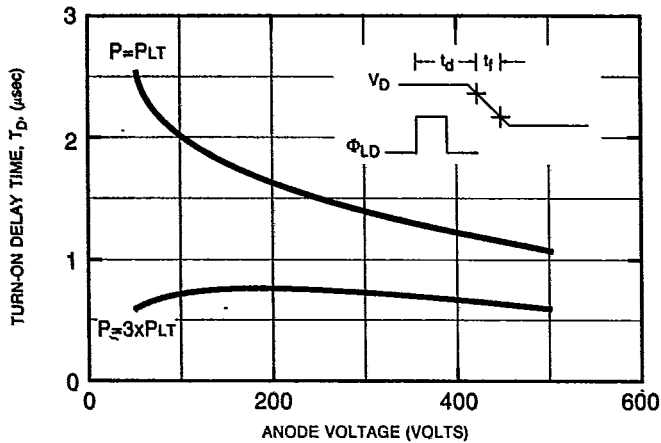
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SCR/Diode

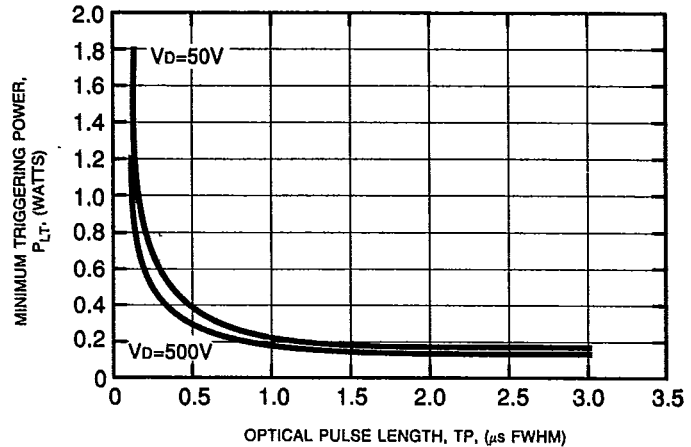
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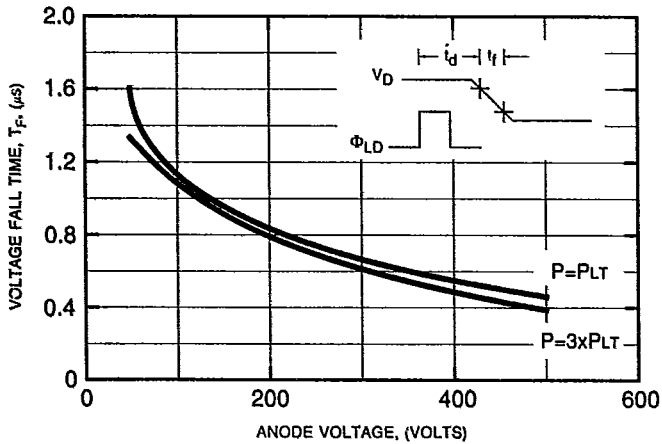
TURN-ON DELAY VS. ANODE VOLTAGE



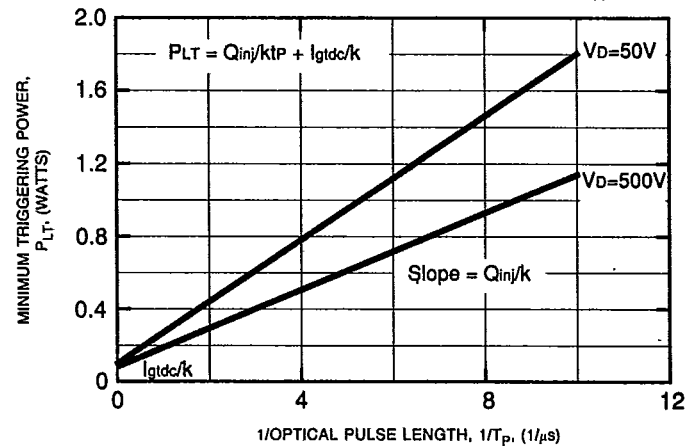
TRIGGERING POWER VS. PULSE LENGTH



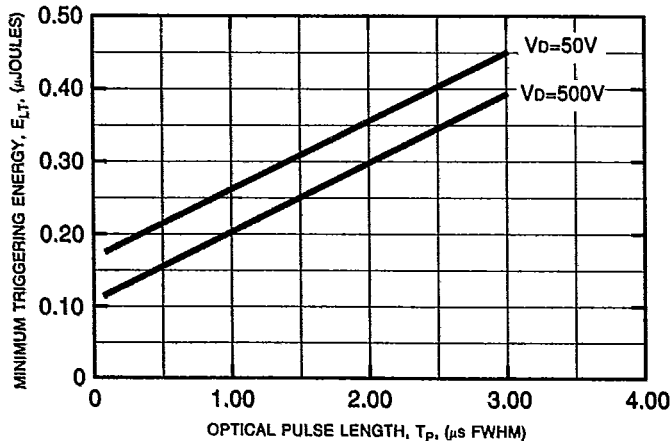
FALL TIME VS. ANODE VOLTAGE



TRIGGERING POWER VS. 1/PULSE LENGTH



TRIGGERING ENERGY VS. PULSE LENGTH





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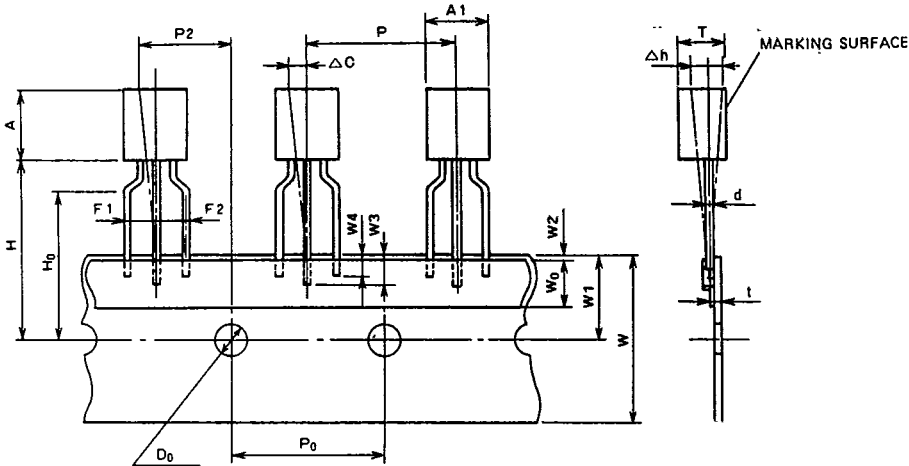
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Taping

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	P0	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	W0	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	H0	16.0 ± 0.5	
Feed hole diameter	D0	4.0 ± 0.2	
Tape thickness	t	0.7 ± 0.2	
Defective product (2)	ΔC	0 ± 1.0	

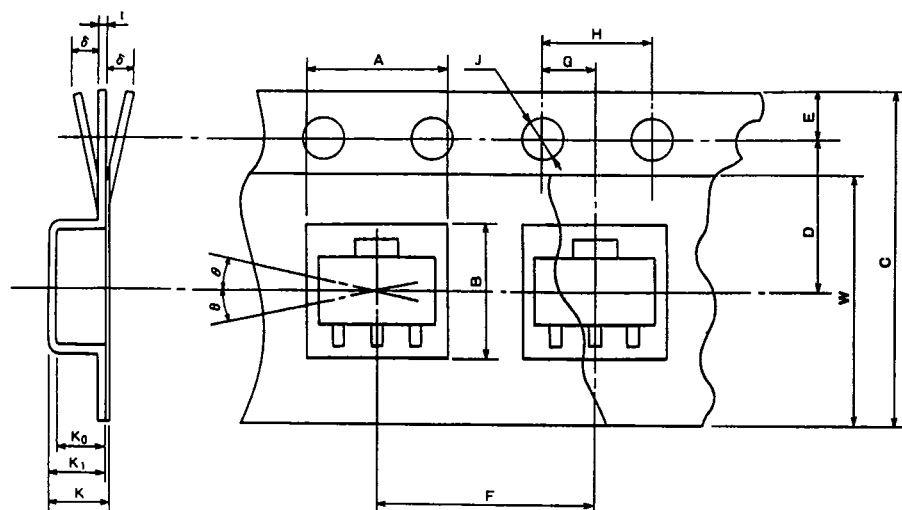


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Powerex Semiconductor Data Book

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