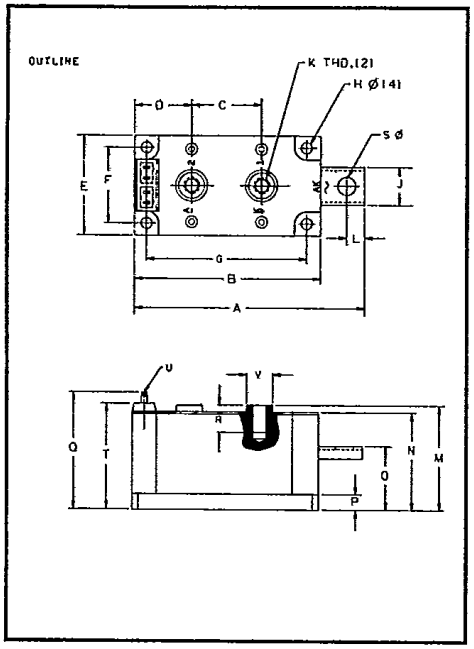
Powerex, Inc., Hillis Street, Youngwood, Pennsylvania 15697 (412) 925-7272
Powerex Europe, S.A., 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 72.75.15

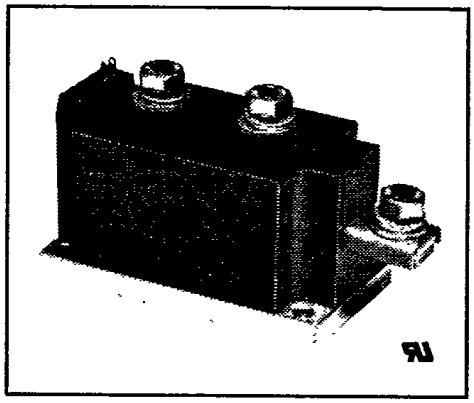
Dual SCR SCR/Diode Isolated Modules

130-160-200 Amperes 100-2400 Volts



Dual SCR, SCR/Diode Isolated Modules Outline Drawing

Dimension	Inches	Millimeters
A	4.52	115
B	3.66	93
C	1.38	35
D	1.12	28.5
E	1.97	50
F	1.50	38
G	3.15	80
H	.22	5.5
J	.74	18.5
K	—	M8
L	.35	9
M	2.05	52
N	1.93	49
O	1.26	32
P	.31	8
Q	2.16	55
R	.55	14
S	—	M8
T	2.09	53.1
U	.110 X .032	2.8 X 0.8
V	.52	13



Dual SCR, SCR/Diode Isolated Modules
130-160-200 Amperes/100-2400 Volts

Ordering Information
Example: Select the complete eight digit rating module part number you desire from the table — i.e. ED430816 is an 800 Volt, 160 Ampere Dual SCR Phase Control Module.

Type	V_{DRM} Volts (x100)	Current Rating Amperes (x10)
ED41	01	13
ED42	02	16
ED43	04	20*
ED45**	06	
ED46**	08	
ED47	10	
ED48*	12	
ED72	14	
ED77	16	
	18	
	20	

Note: All voltages are not available in every type. Insert code in digits 5 and 6 of part number to specify voltage (example: ED430616 is a 600 Volt, 160 Ampere dual SCR module). Diode voltage is same as SCR except for ED72, ED77, where suffix OY or OZ is added to denote 1.7 times SCR or 2.0 times SCR (example: ED721213OZ provides 1200 Volts SCR, 2400 Volt Diode).

*200A rating available in ED41 type only.

**Consult factory for available rating.

Description
The POW-R-BLOK™ combines multiple power semiconductor devices in a single, electrically isolated module.

POW-R-BLOK™ can serve as the essential circuit element in many industrial applications, such as motor speed control, battery chargers, tap changers, transfer switches, and lighting controls. A variety of dual diode and SCR and diode combinations are available for use in 120, 240, 480 or 575 volt power line applications.

Semiconductor elements are secured by CBE (Compression Bonded Encapsulation) for excellent cycling performance.

POW-R-BLOK™ features a self-contained electrical isolation system. By using high thermal conductivity BeO ceramic isolators, excellent circuit-to-baseplate isolation (≥2500 volts RMS) has been achieved, while maintaining efficient cooling of the semiconductors. POW-R-BLOK™ has been tested and recognized by Underwriters Laboratories (QQQX2 Power Switching Semiconductors).

All ED Series SCR's use the "di/Namic" gate structure for ease of triggering and high di/dt capability.

Features:
- ☐ Compression Bonded Encapsulation
- ☐ Isolated Base Plate
- ☐ Insulated Package
- ☐ Low Thermal Impedance
- ☐ Metal Base Plate
- ☐ UL Recognized

Benefits:
- ☐ No Additional Insulating Components Required
- ☐ Easy Installation
- ☐ Reduced Engineering Time
- ☐ Improved Heat Transfer
- ☐ Voltage Stability

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ED __ __ __ __ 13, ED __ __ __ __ 16, ED41 __ __ 20
Dual SCR, SCR/Diode Isolated Modules
130-160-200 Amperes/100-2400 Volts

Absolute Maximum Ratings

Characteristics	Symbol	ED _____ 13	ED _____ 16	ED41 __ __ 20	Units
Peak Forward Blocking Voltage	V_{DRM}	SCR to 1600			Volts
Peak Reverse Blocking Voltage	V_{RRM}	SCR to 1600, Diode to 2400			Volts
Transient Peak Reverse Blocking Voltage (Non-Repetitive) t<5 ms	V_{RSM}	SCR to 1800, Diode to 2600			Volts
DC Reverse Blocking Voltage	$V_{R(DC)}$	SCR to 1280, Diode to 1920			Volts
RMS On-State Current	$I_{T(RMS)}$, $I_{F(RMS)}$	200	250	314	Amperes
Average On-State Current	$I_{T(AV)}$, $I_{F(AV)}$	130	160	200	Amperes
Peak One-Cycle Surge (Non-Repetitive) On-State Current (60Hz)	I_{TSM}, I_{FSM}	5000	5400	5800	Amperes
Peak Three-Cycle Surge (Non-Repetitive) On-State Current (60Hz)	I_{TSM}, I_{FSM}	3500	3800	4100	Amperes
Peak Ten-Cycle Surge (Non-Repetitive) On-State Current (60 Hz)	I_{TSM}, I_{FSM}	3100	3350	3600	Amperes
I^2t (for Fusing), 8.3 milliseconds	I^2t	103,750	121,000	139,600	A^2sec
Critical Rate-of-Rise of On-State Current ① (Non-Repetitive)	di/dt	800	800	800	Amperes/μs
Peak Gate Power Dissipation	P_{GM}	16	16	16	Watts
Average Gate Power Dissipation	$P_{G(AV)}$	3.0	3.0	3.0	Watts
Peak Forward Gate Voltage	V_{GFM}	10	10	10	Volts
Peak Reverse Gate Voltage	V_{GRM}	5.0	5.0	5.0	Volts
Peak Forward Gate Current	I_{GFM}	4.0	4.0	4.0	Amperes
Storage Temperature	T_{STG}	-40 to 150	-40 to 150	-40 to 150	°C
Operating Temperature	T_J	-40 to 130	-40 to 130	-40 to 130	°C
Maximum Mounting Torque M6 Mounting Screw	—	50	50	50	in.-lb.
Maximum Terminal Torque M8 Terminal Screw	—	130	130	130	in.-lb.
V Isolation	V_{RMS}	2500	2500	2500	Volts

① Per JEDEC STD RS-397, 5.2.2.6.

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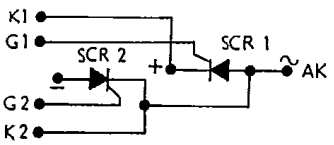
ED __ __ __ __ 13, ED __ __ __ __ 16, ED41 __ __ 20
Dual SCR, SCR/Diode Isolated Modules
130-160-200 Amperes/100-2400 Volts

Electrical and Thermal Characteristics T_j=25°C unless otherwise specified

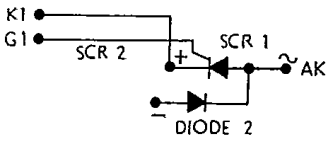
Characteristics	Symbol	Test Conditions	ED __ __ __ __ 13	ED __ __ __ __ 16	ED41 __ __ 20	Units
Blocking State Maximums						
Forward Leakage Current, Peak	I_{DRM}	T_J=130°C, V_{DRM}=rated	50	50	50	mA
Reverse Leakage Current, Peak	I_{RRM}	T_J=130°C, V_{RRM}=rated	50	50	50	mA
Conducting State Maximums						
Peak On-State Voltage	V_{TM}	I_{TM}=625A	1.55	1.45	—	Volts
Peak On-State Voltage	V_{FM}	I_{FM}=800A	1.35	1.35	1.35	Volts
Switching Minimums						
Critical Rate of Rise of Off-State Voltage	dv/dt	T_J=130°C, V_D=2/3 V_{DRM}	300	300	—	Volts/μsec
Turn-Off Time (Typical)	t_q	I_{TM}=150A, T_J=130°C Reapplied dv/dt=20V/μsec linear to 0.8 V_{DRM}	100	100	—	μsec
Turn-On Time (Typical)	t_{on}	I_{TM}=100A, V_D=100V	5	5	—	μsec
Diode Reverse Recovery Time (Typical)	t_{rr}	I_{FM}=785A, T_P=100μsec −dI/dt=25 A/μs	10	10	10	μsec
Thermal Maximums						
Thermal Resistance, Junction to Case	$R_{\theta JC}$	Per Module	0.11	0.11	0.11	°C/Watt
Thermal Resistance, Case to Sink Lubricated	$R_{\theta CS}$	Per Module	0.03	0.03	0.03	°C/Watt
Gate Parameters Maximums						
Gate Current to Trigger	I_{GT}	V_D=12V	150	150	—	mA
Gate Voltage to Trigger	V_{GT}	V_D=12V	3	3	—	Volts
Non-Triggering Gate Voltage	V_{GDM}	T_J=130°C, V_D=1/2 V_{DRM}	0.15	0.15	—	Volts

Connection Diagrams

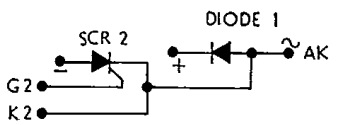
ED43	Dual SCR Phase Control
ED46	Dual SCR Fast Switch*



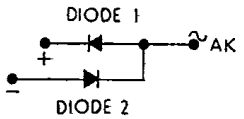
ED42	SCR/Diode Phase Control
ED45	SCR/Diode Fast Switch*
ED72	SCR/Diode Current Source**



ED47	Diode/SCR Phase Control
ED48	Diode/SCR Fast Switch*
ED77	Diode/SCR Current Source**



ED41	Diode/Diode Standard Recovery
ED44	Diode/Diode Fast Recovery*



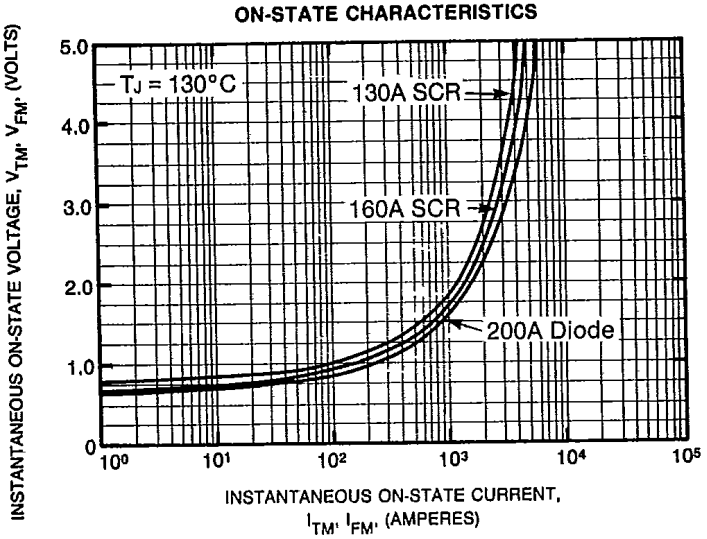
*Consult factory for available ratings
**Ratings identical to ED42/ED47

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.

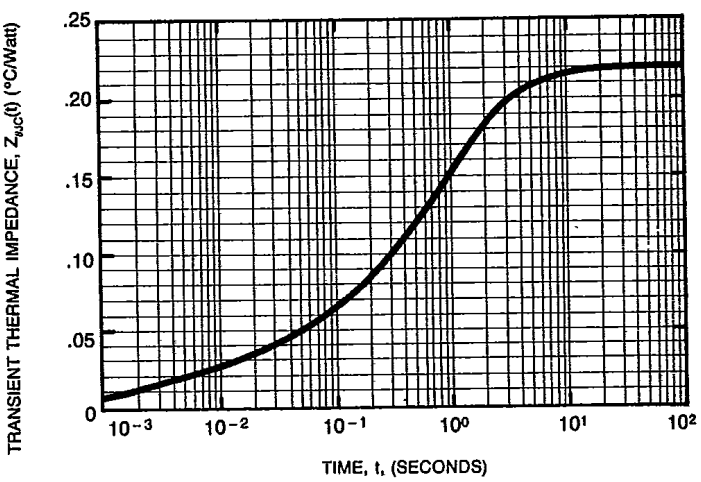
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ED __ __ __ __ 13, ED __ __ __ __ 16, ED41 __ __ 20
Dual SCR, SCR/Diode Isolated Modules
130-160-200 Amperes/100-2400 Volts

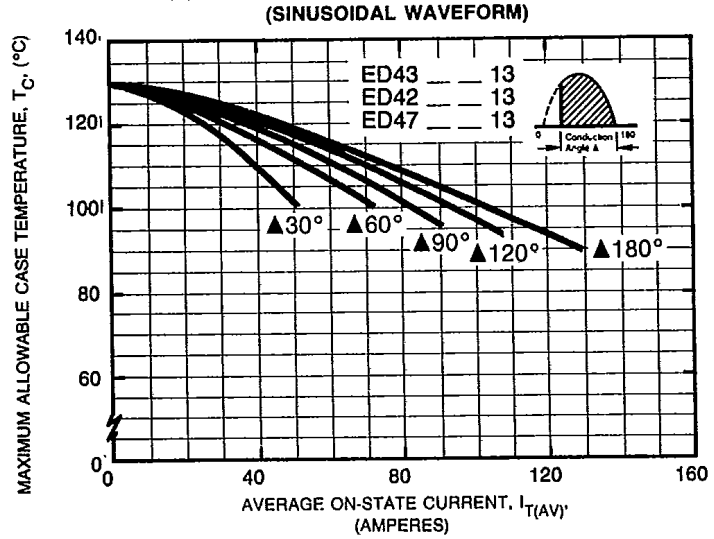
MAXIMUM ON-STATE CHARACTERISTICS



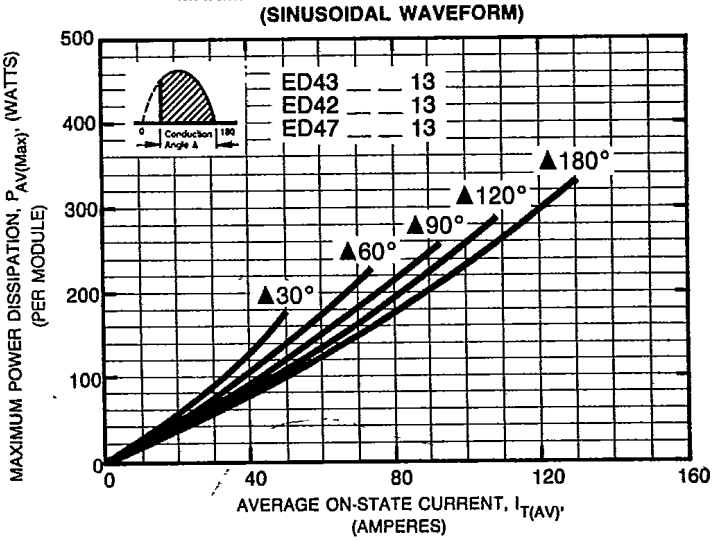
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (JUNCTION TO CASE)



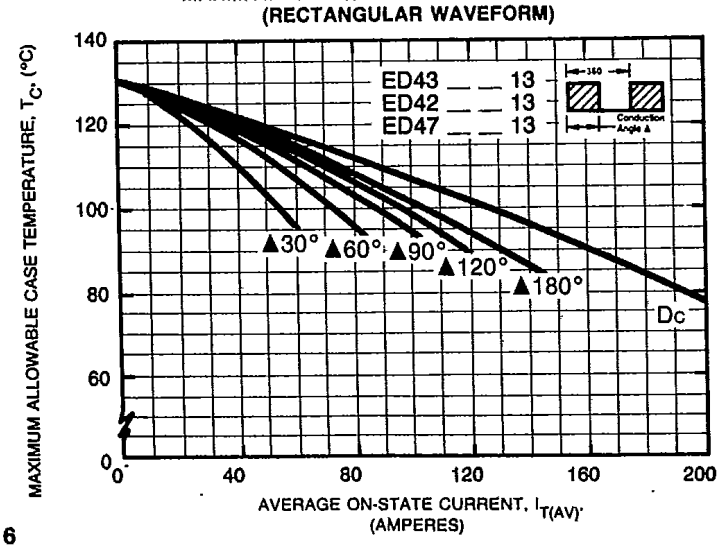
MAXIMUM ALLOWABLE CASE TEMPERATURE (SINUSOIDAL WAVEFORM)



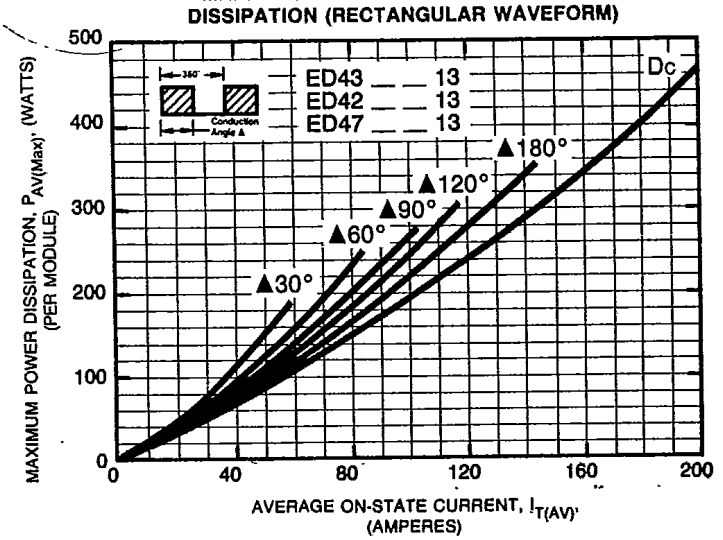
MAXIMUM ON-STATE POWER DISSIPATION (SINUSOIDAL WAVEFORM)



MAXIMUM ALLOWABLE CASE TEMPERATURE (RECTANGULAR WAVEFORM)



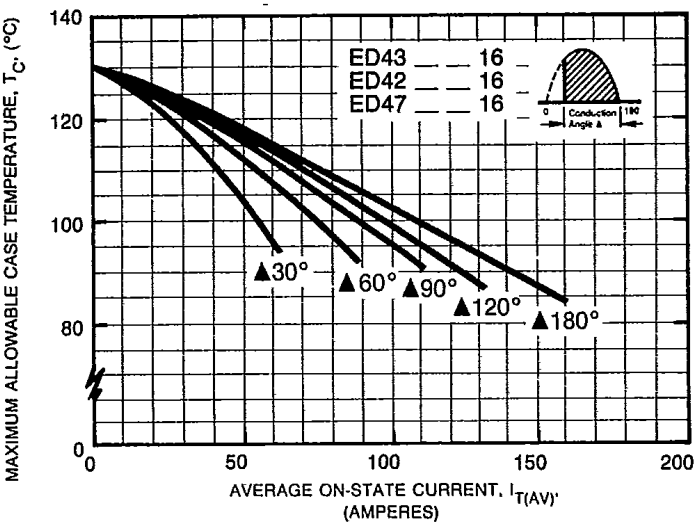
MAXIMUM AVERAGE ON-STATE POWER DISSIPATION (RECTANGULAR WAVEFORM)



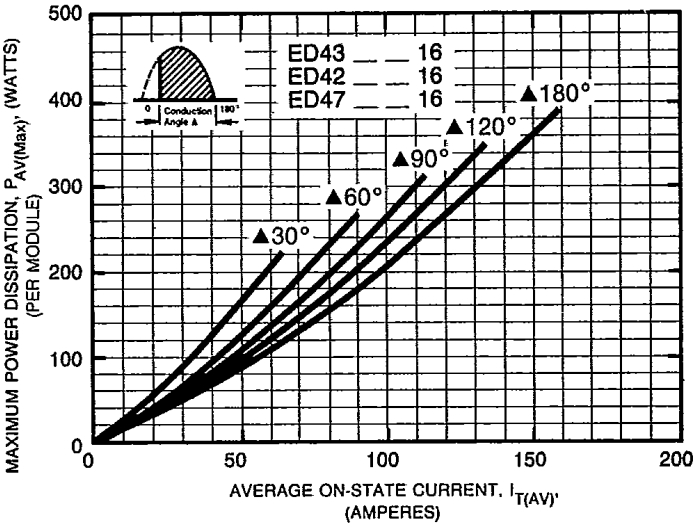
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ED ___ ___ 13, ED ___ ___ 16, ED41 ___ 20
Dual SCR, SCR/Diode Isolated Modules
130-160-200 Amperes/100-2400 Volts

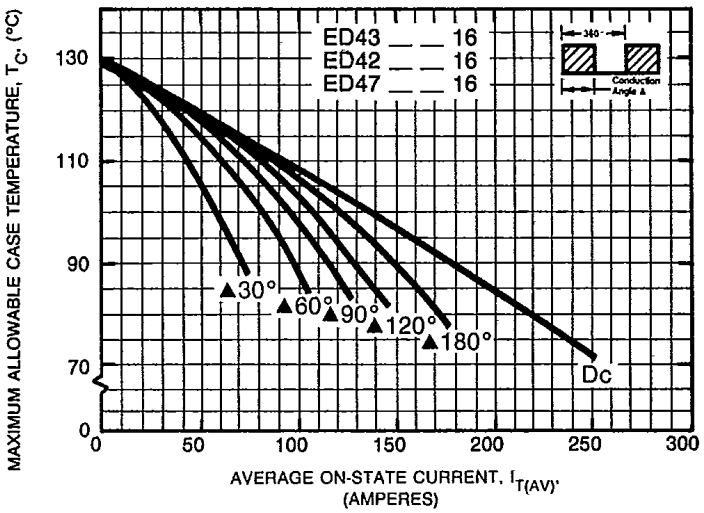
MAXIMUM ALLOWABLE CASE TEMPERATURE (SINUSOIDAL WAVEFORM)



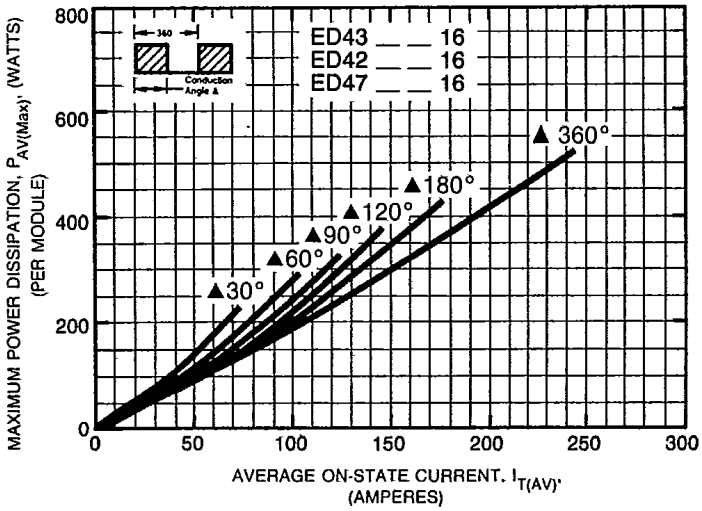
MAXIMUM ON-STATE POWER DISSIPATION (SINUSOIDAL WAVEFORM)



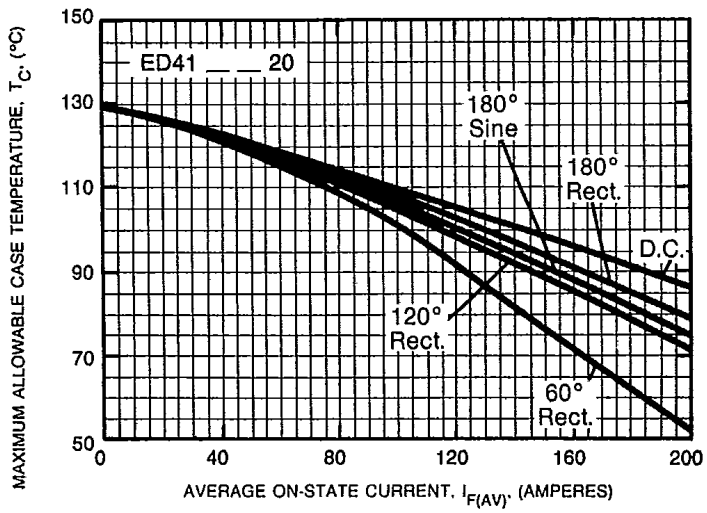
MAXIMUM ALLOWABLE CASE TEMPERATURE (RECTANGULAR WAVEFORM)



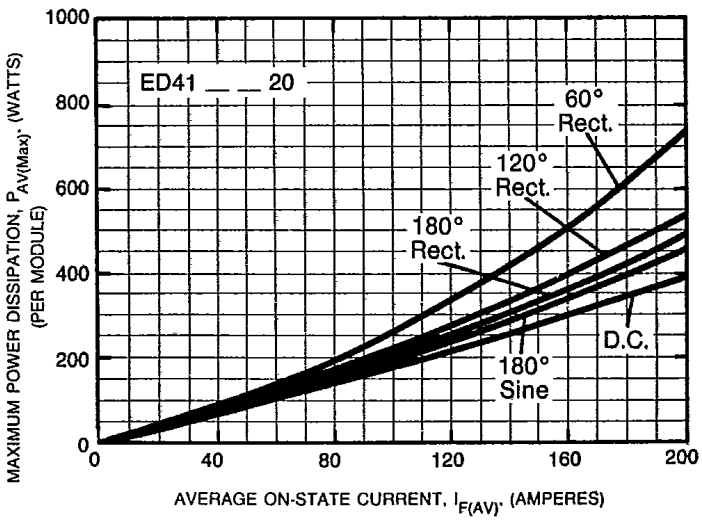
MAXIMUM AVERAGE ON-STATE POWER DISSIPATION (RECTANGULAR WAVEFORM)



MAXIMUM ALLOWABLE CASE TEMPERATURE



MAXIMUM ON-STATE POWER DISSIPATION

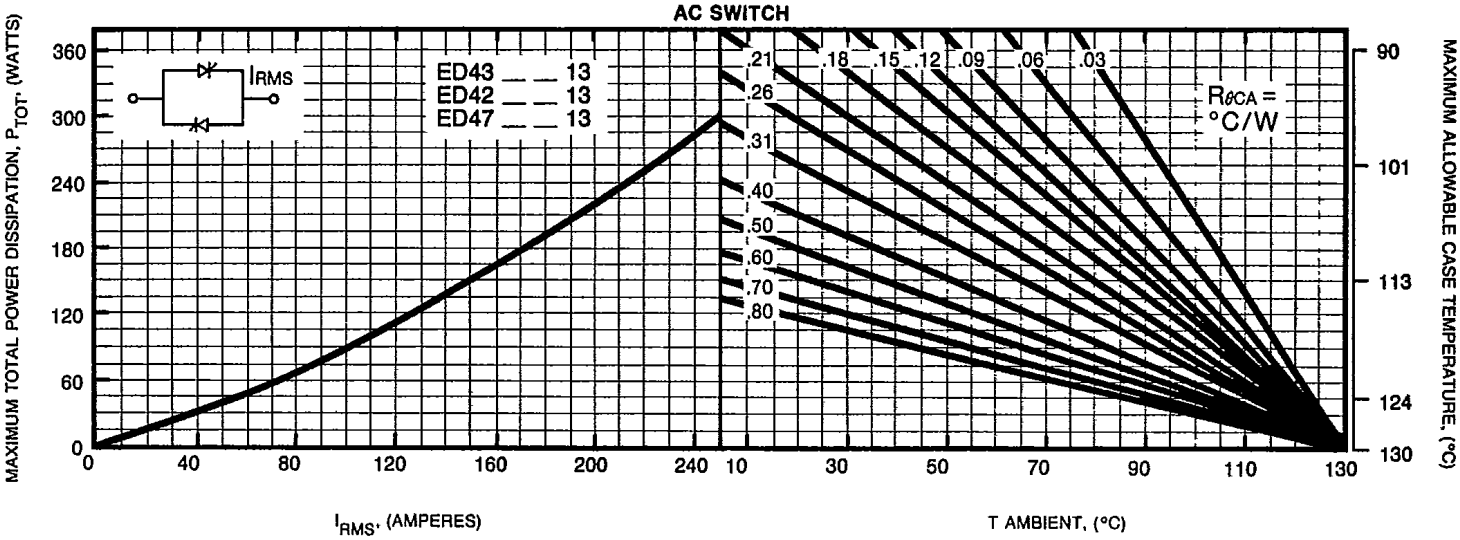


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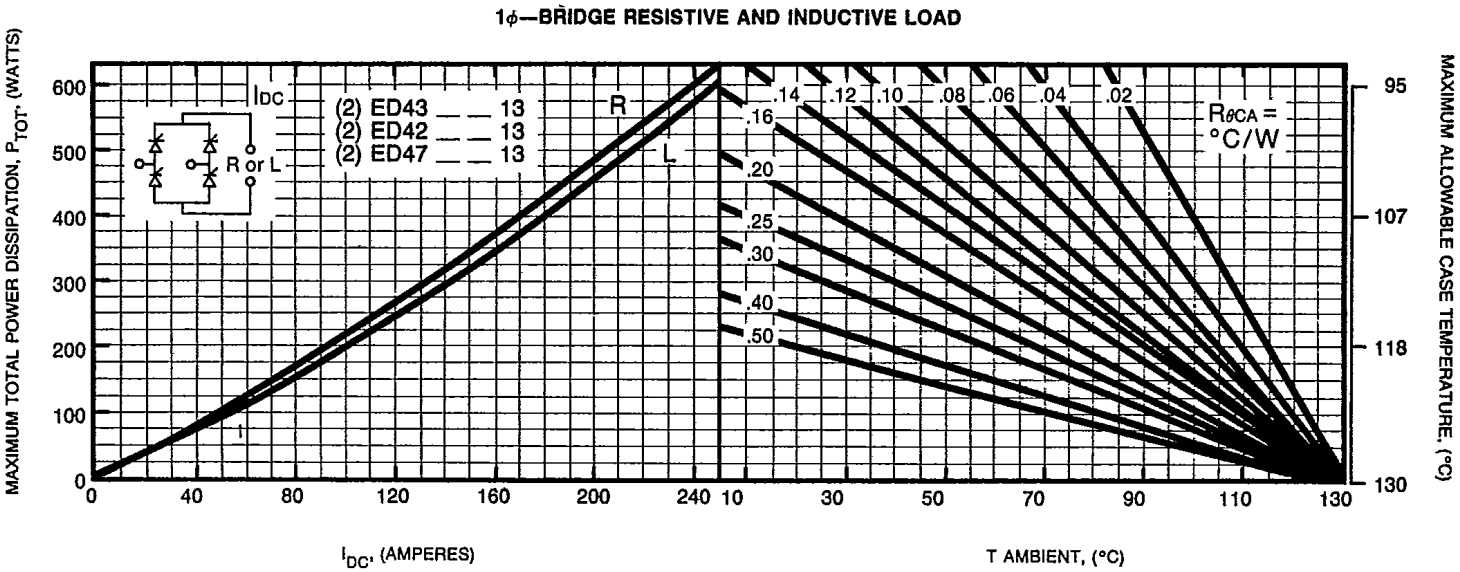
ED __ __ __ __ 13, ED __ __ __ __ 16, ED41 __ __ 20
Dual SCR, SCR/Diode Isolated Modules
130-160-200 Amperes/100-2400 Volts

MAXIMUM TOTAL POWER DISSIPATION AND MAXIMUM AMBIENT TEMPERATURES

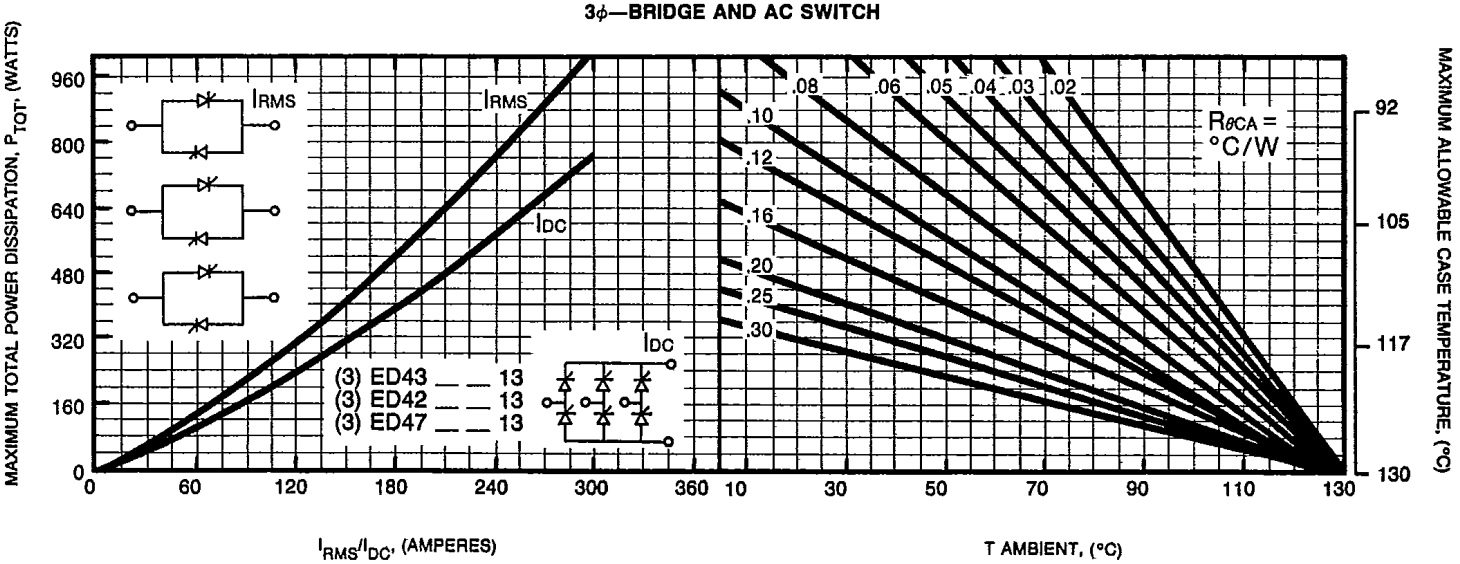
AC SWITCH



1ϕ—BRIDGE RESISTIVE AND INDUCTIVE LOAD



3ϕ—BRIDGE AND AC SWITCH

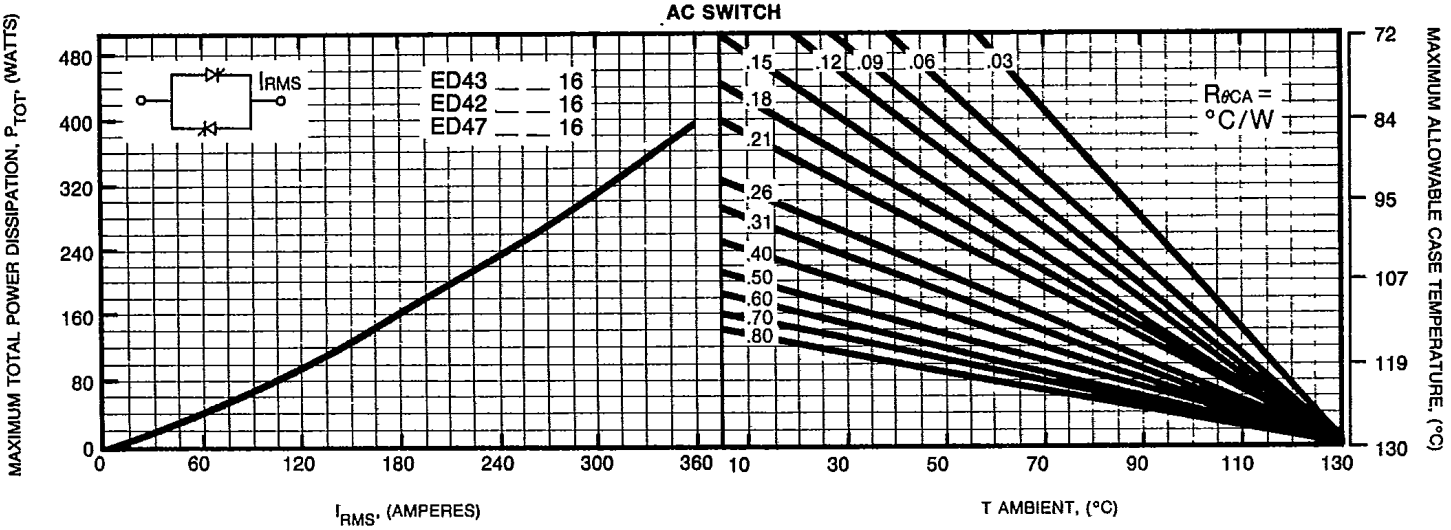


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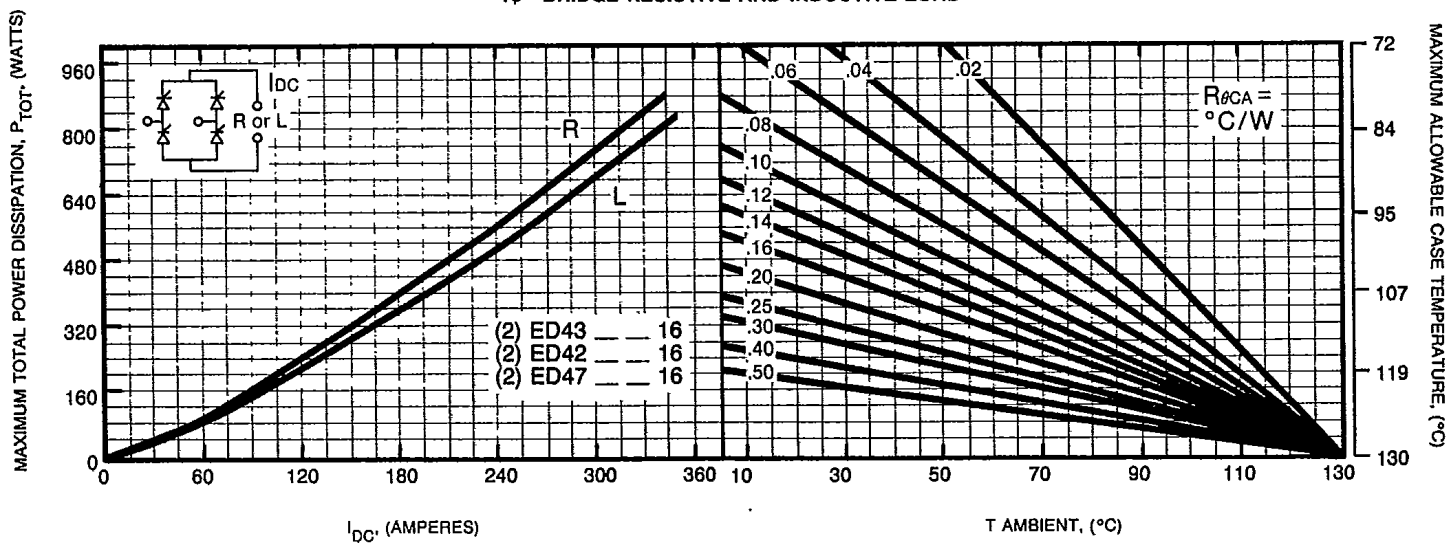
ED ___ 13, ED ___ 16, ED41 __ 20
Dual SCR, SCR/Diode Isolated Modules
130-160-200 Amperes/100-2400 Volts

MAXIMUM TOTAL POWER DISSIPATION AND MAXIMUM AMBIENT TEMPERATURES

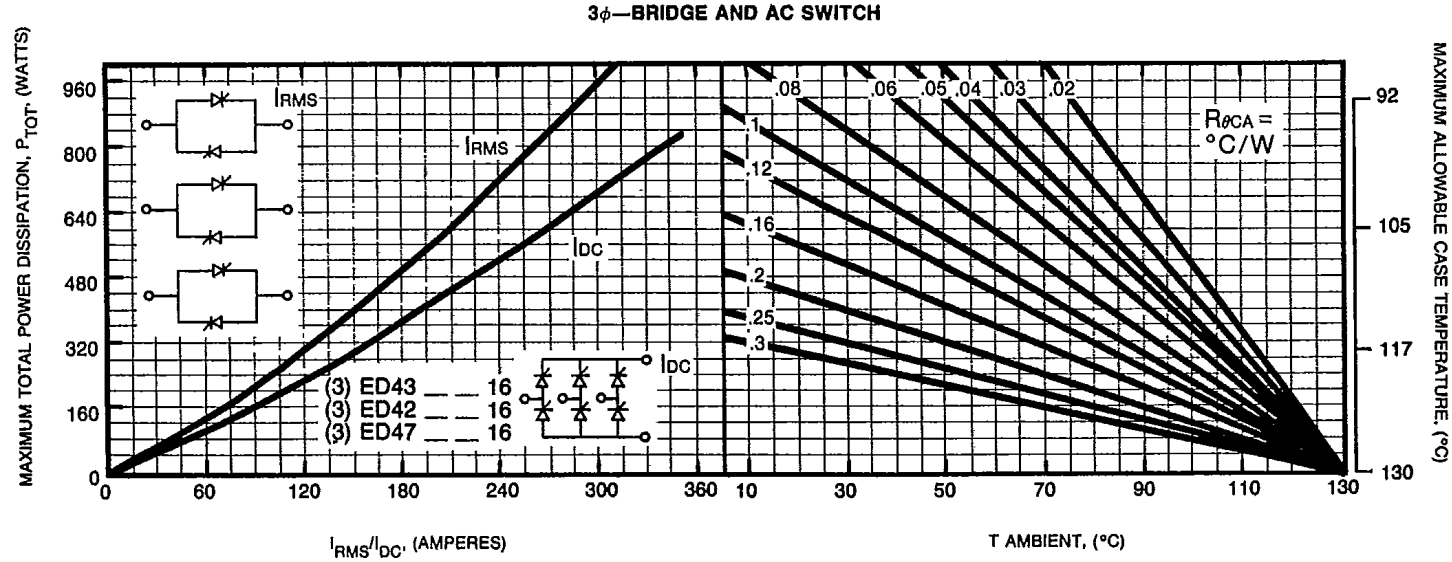
AC SWITCH



1ϕ—BRIDGE RESISTIVE AND INDUCTIVE LOAD



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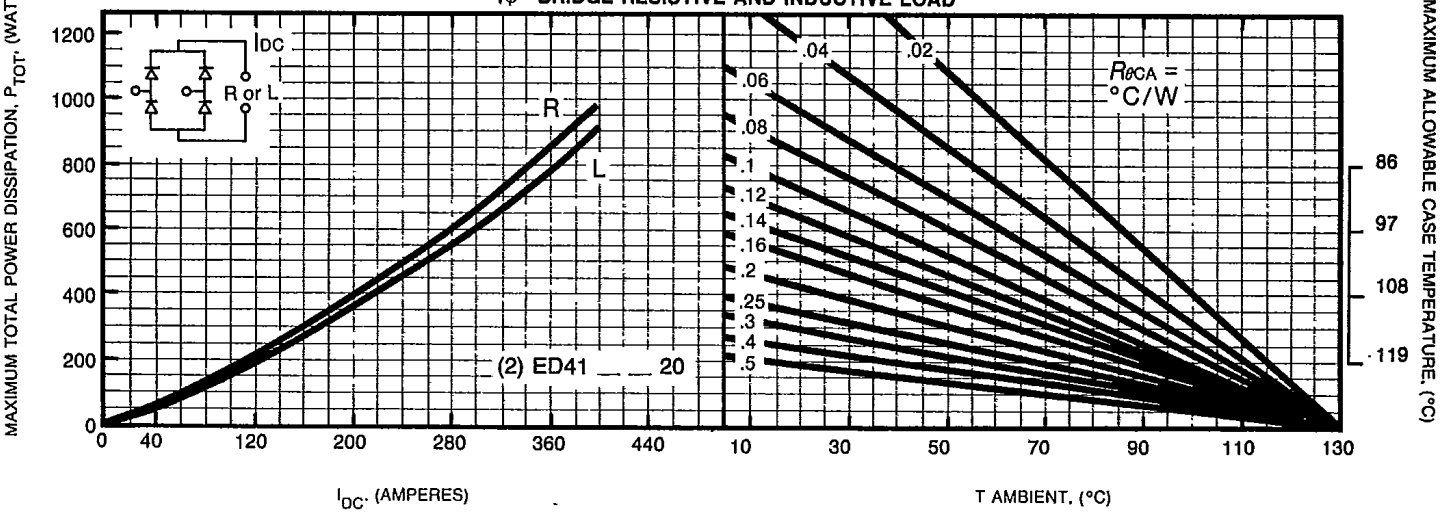


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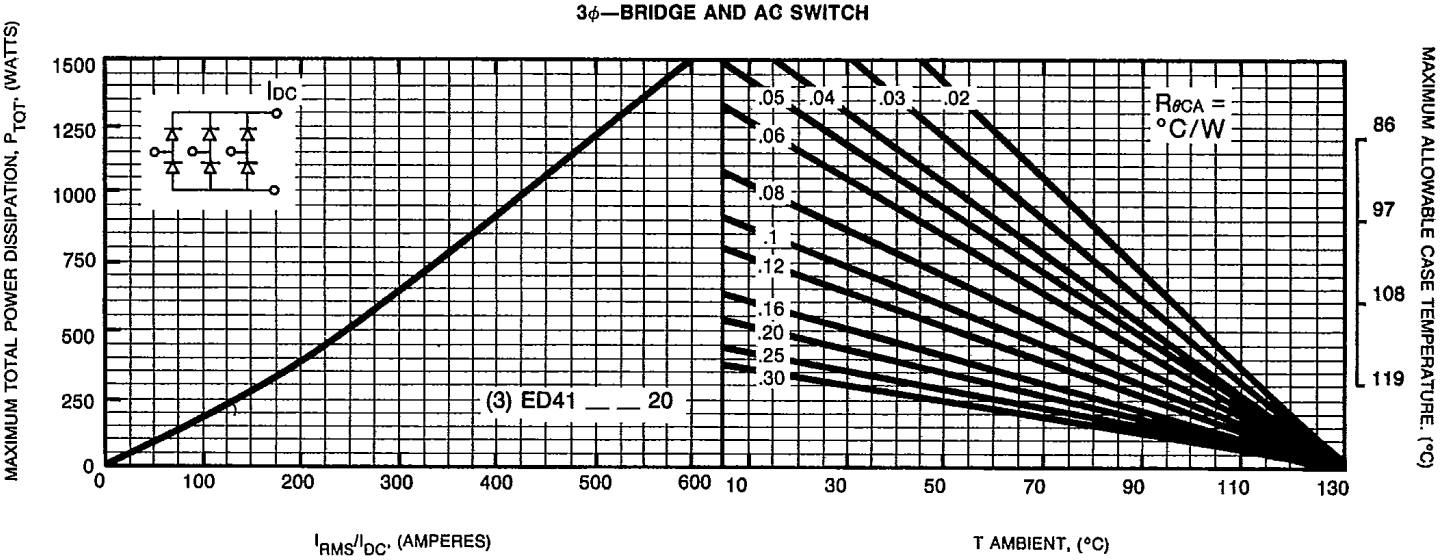
ED __ __ __ __ 13, ED __ __ __ __ 16, ED41 __ __ 20
Dual SCR, SCR/Diode Isolated Modules
130-160-200 Amperes/100-2400 Volts

MAXIMUM TOTAL POWER DISSIPATION AND MAXIMUM AMBIENT TEMPERATURES

1φ—BRIDGE RESISTIVE AND INDUCTIVE LOAD



3φ—BRIDGE AND AC SWITCH



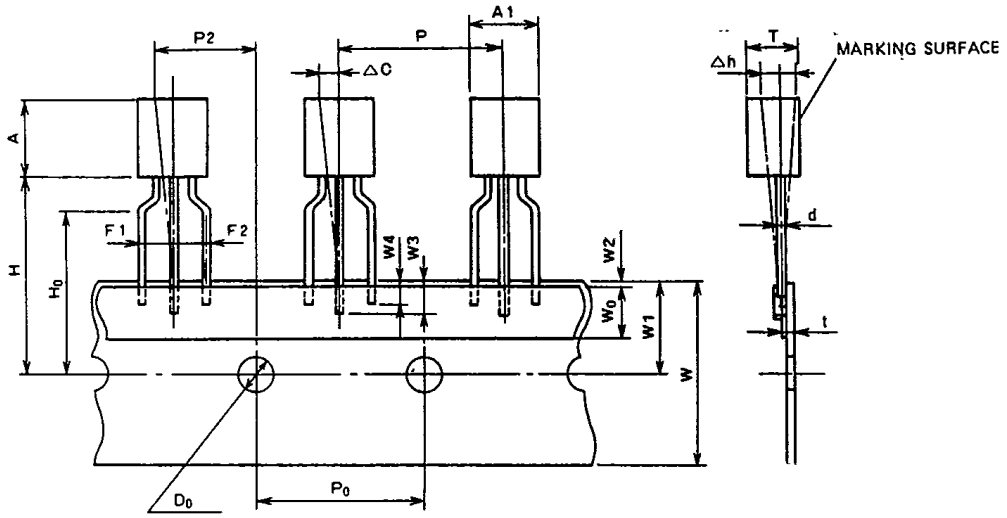
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Taping

STANDARD SPECIFICATIONS FOR TAPING OF MOLDED PACKAGE THYRISTORS AND TRIACS

TO-92 Package

Thyristor
CR02AM, CR03AM, CR04AM
Triac
BCR1AM

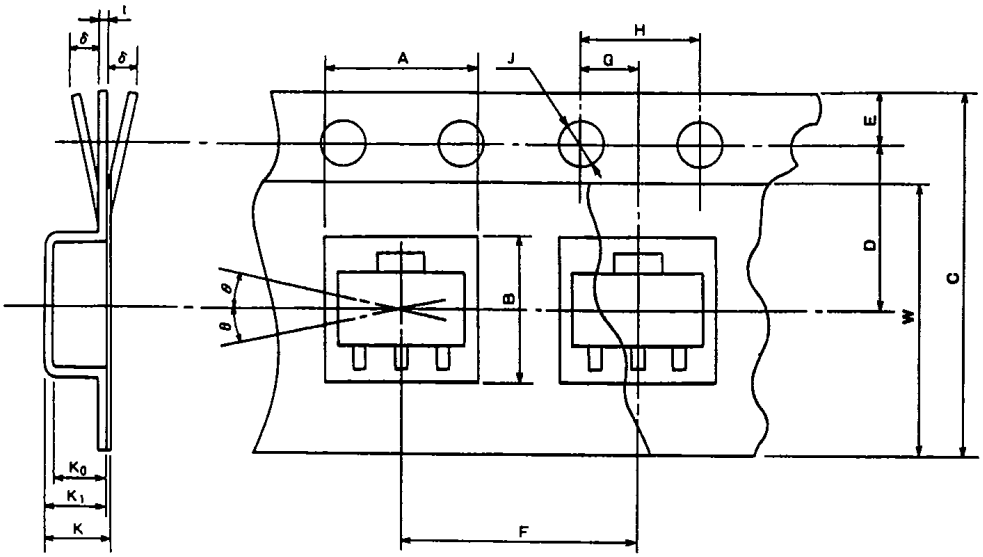


Taping dimensions

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	$18.0 \pm {}^{1.0}_{0.5}$	
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