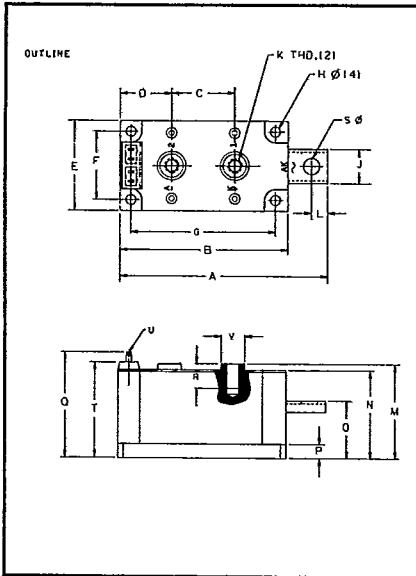




ED _____ 13
ED _____ 16
ED41 _____ 20

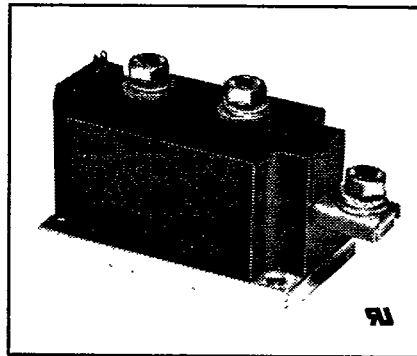
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**Dual SCR
SCR/Diode
Isolated Modules
130-160-200 Amperes
100-2400 Volts**



**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 (QQX2 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



T-25-23

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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 ² sec |
| Critical Rate-of-Rise of On-State Current ① (Non-Repetitive) | di/dt | 800 | 800 | 800 | Amperes/ μ s |
| 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.



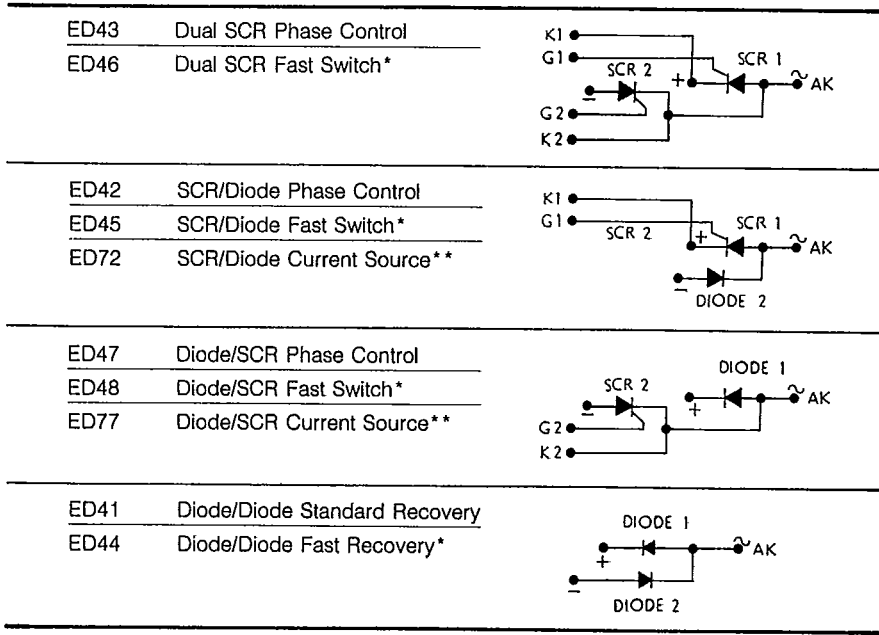
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ED _____ 13, ED _____ 16, ED41 _____ 20
Dual SCR, SCR/Diode Isolated Modules
130-160-200 Amperes/100-2400 Volts

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

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

Connection Diagrams



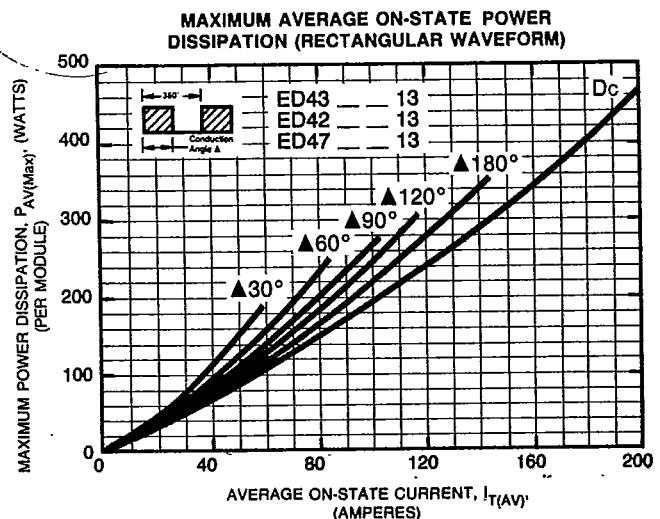
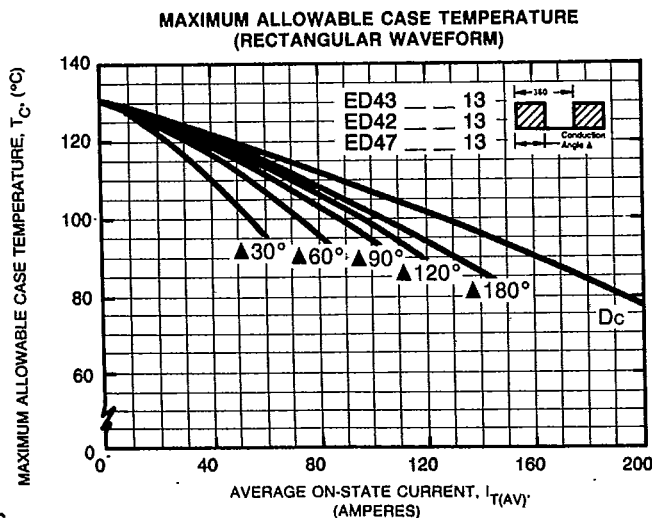
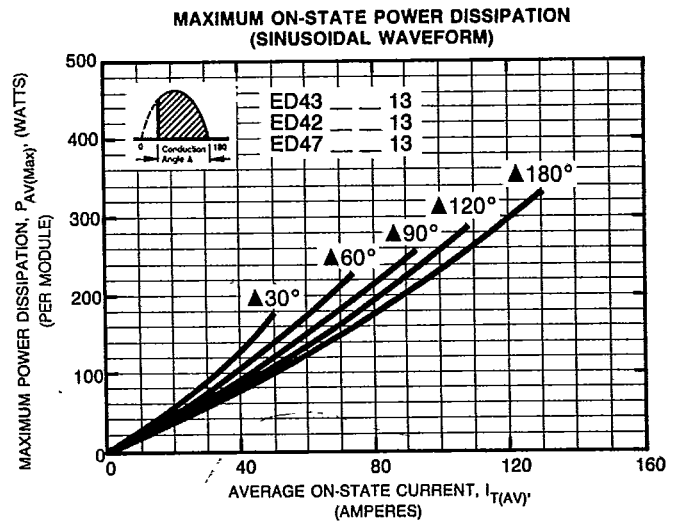
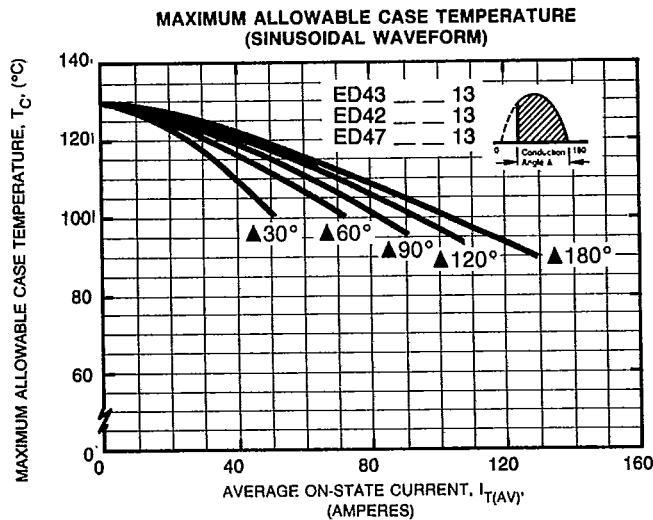
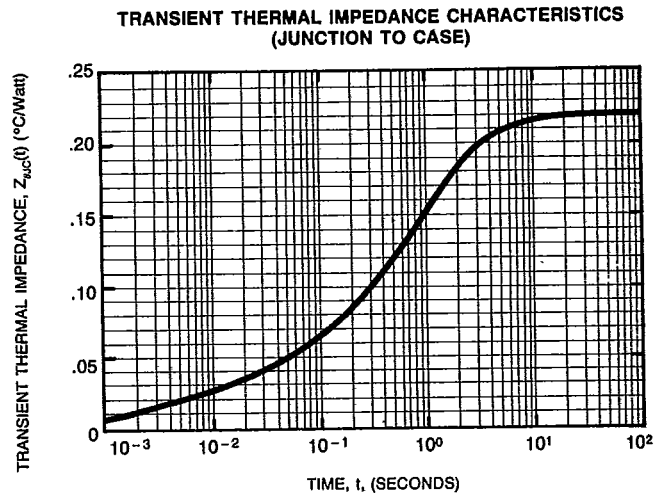
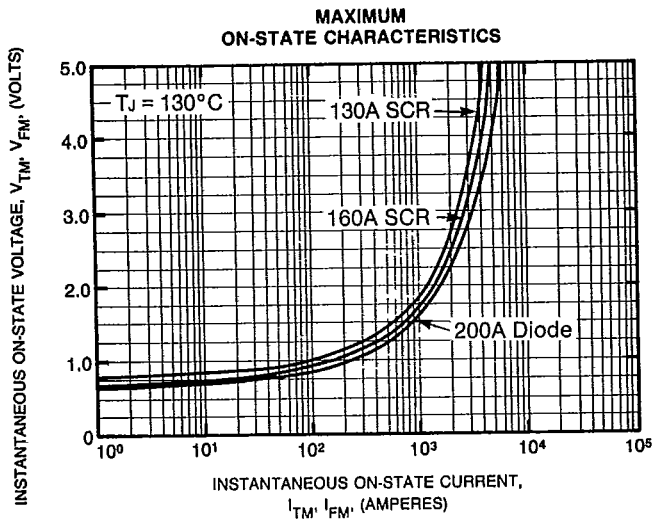
WARNING:
Internal insulation used is Beryllium Oxide. User should avoid grinding, crushing or abrading these portions. Care must be exercised in properly disposing of unwanted modules.

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



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

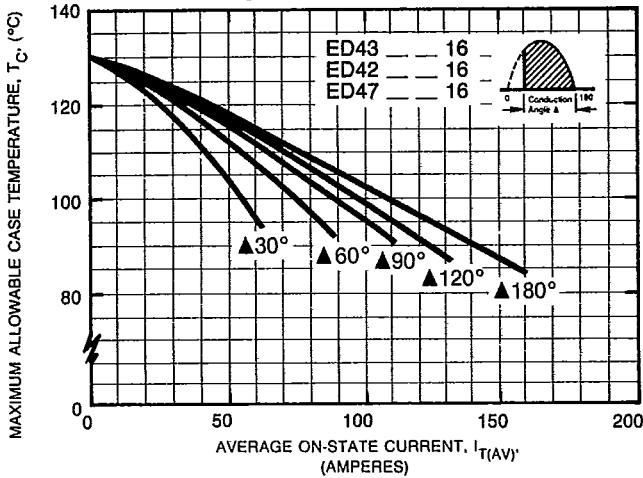




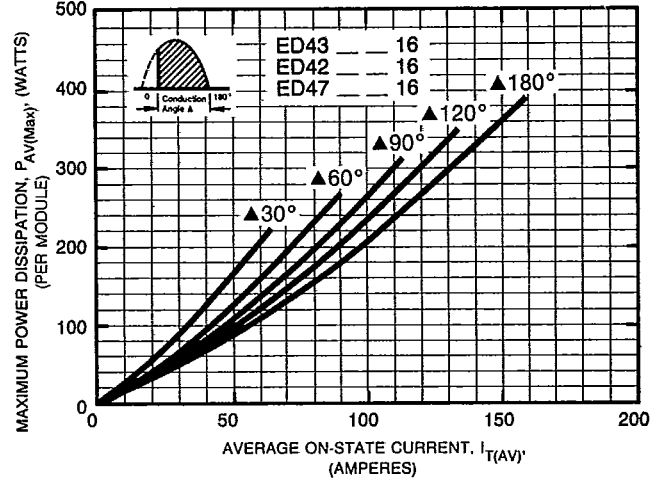
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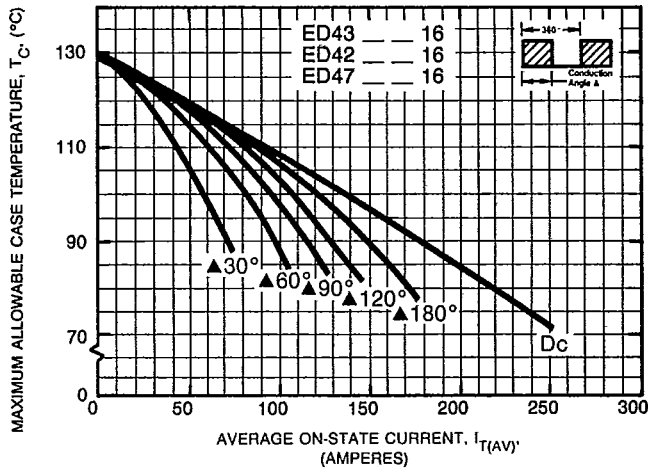
MAXIMUM ALLOWABLE CASE TEMPERATURE (SINUSOIDAL WAVEFORM)



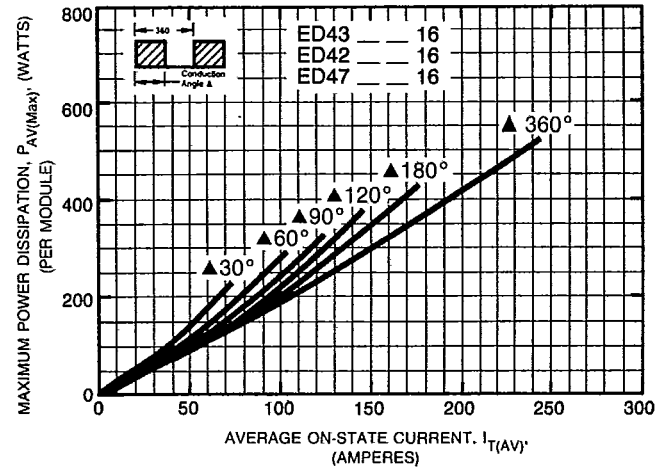
MAXIMUM ON-STATE POWER DISSIPATION (SINUSOIDAL WAVEFORM)



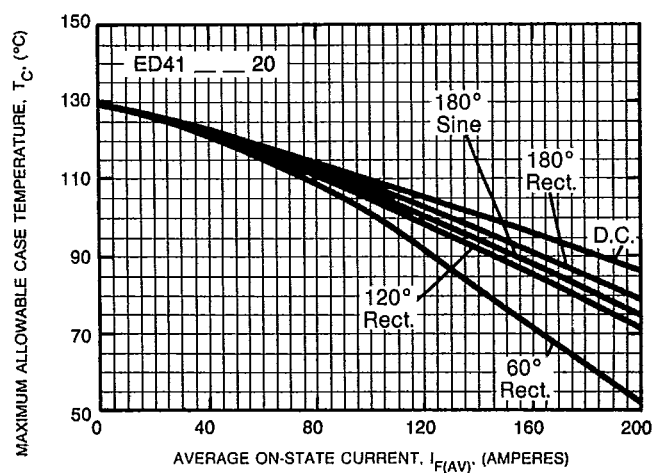
MAXIMUM ALLOWABLE CASE TEMPERATURE (RECTANGULAR WAVEFORM)



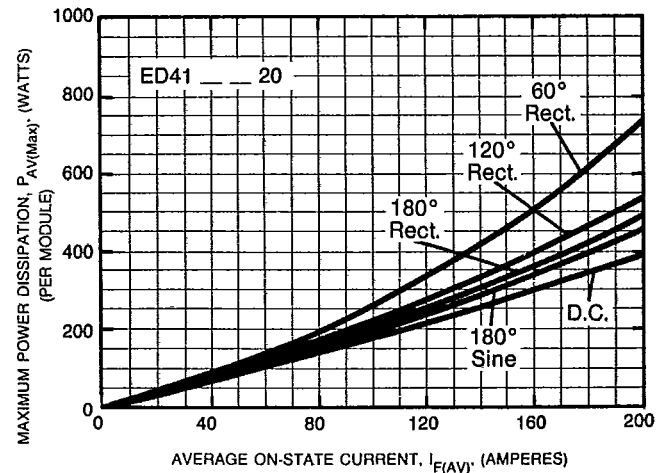
MAXIMUM AVERAGE ON-STATE POWER DISSIPATION (RECTANGULAR WAVEFORM)



MAXIMUM ALLOWABLE CASE TEMPERATURE



MAXIMUM ON-STATE POWER DISSIPATION

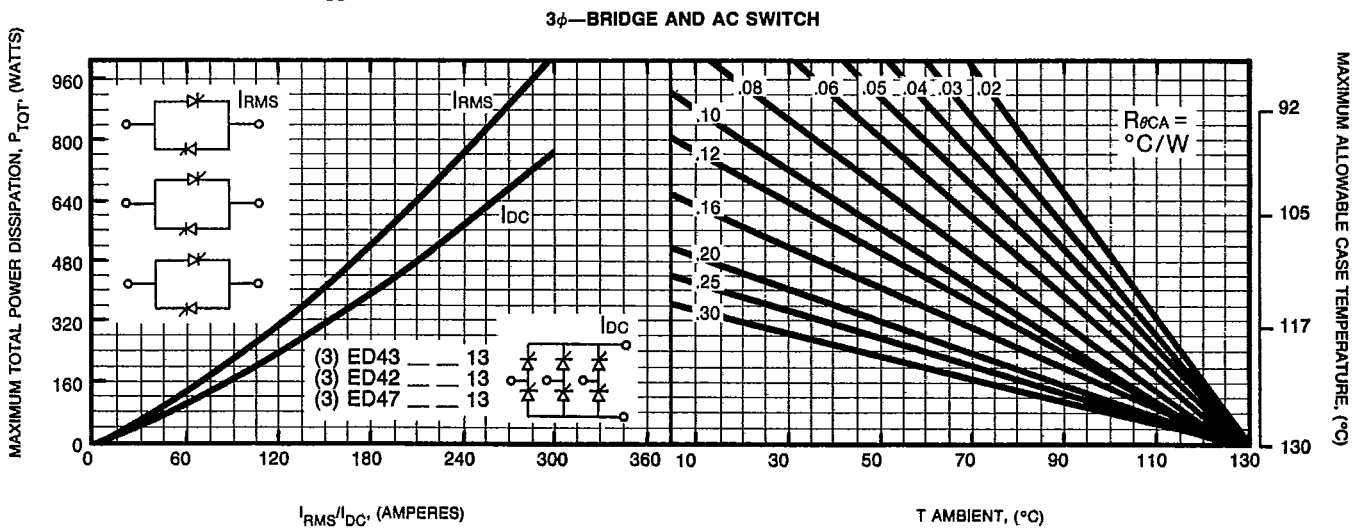
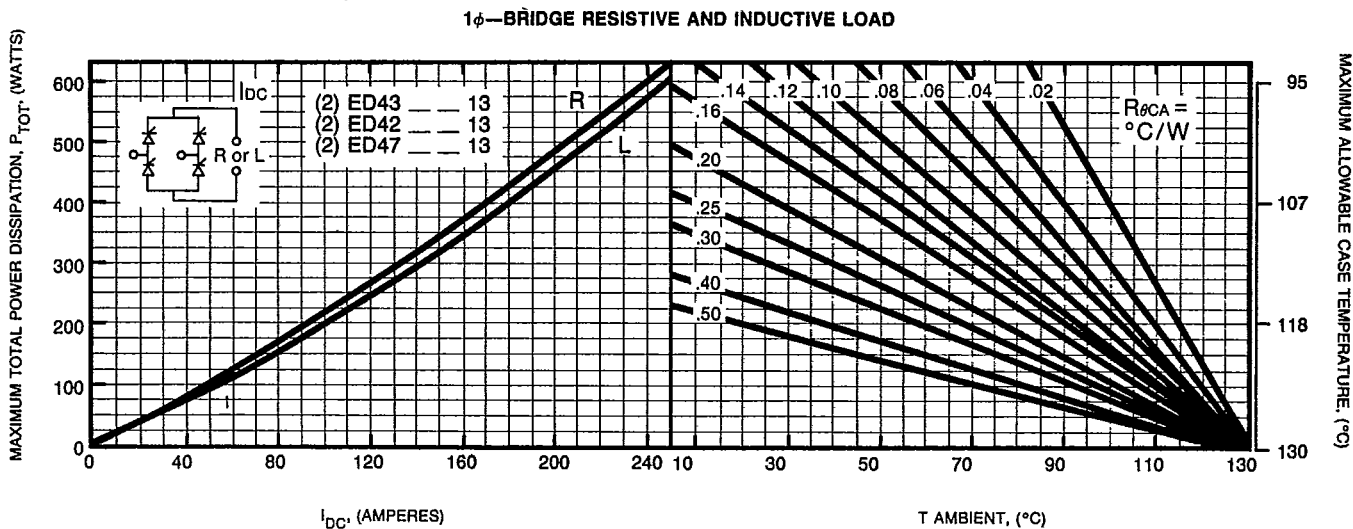
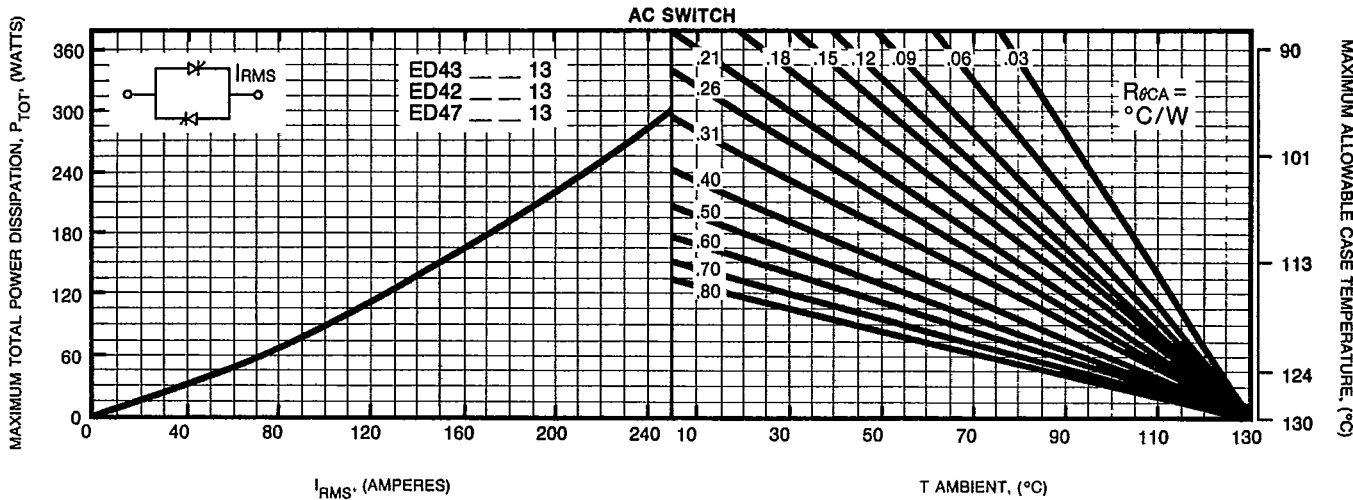




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Dual SCR, SCR/Diode Isolated Modules
130-160-200 Amperes/100-2400 Volts

MAXIMUM TOTAL POWER DISSIPATION AND MAXIMUM AMBIENT TEMPERATURES





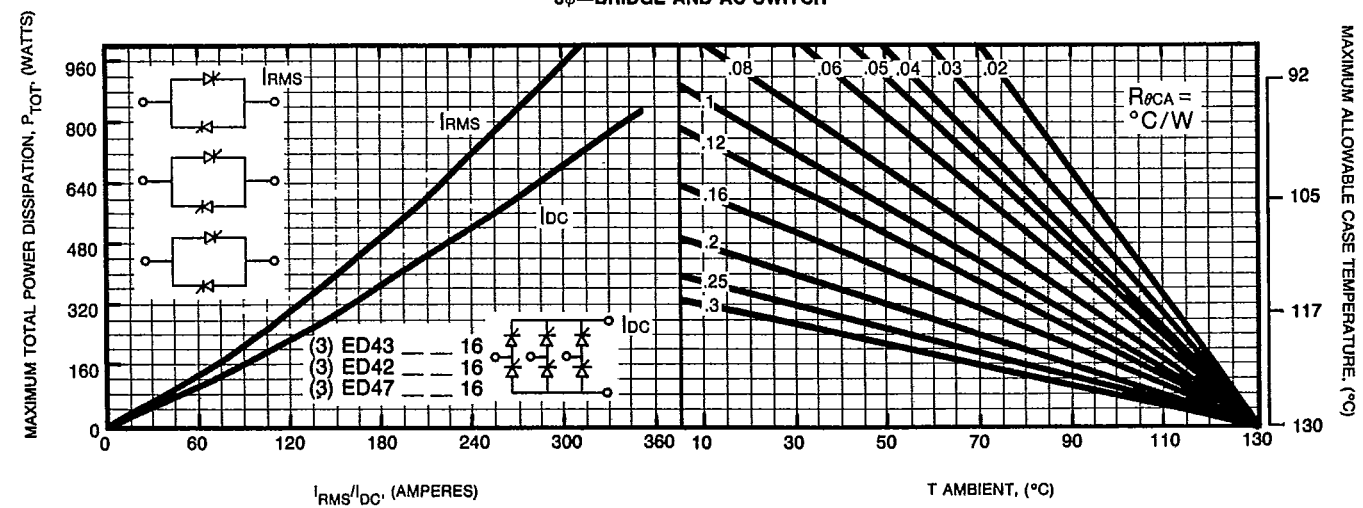
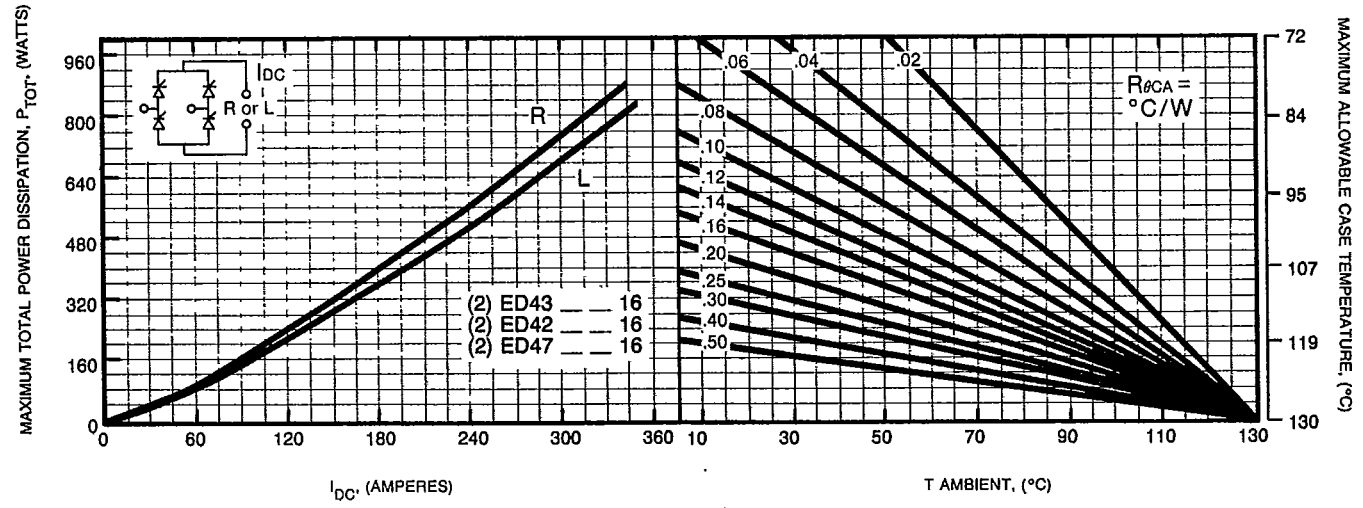
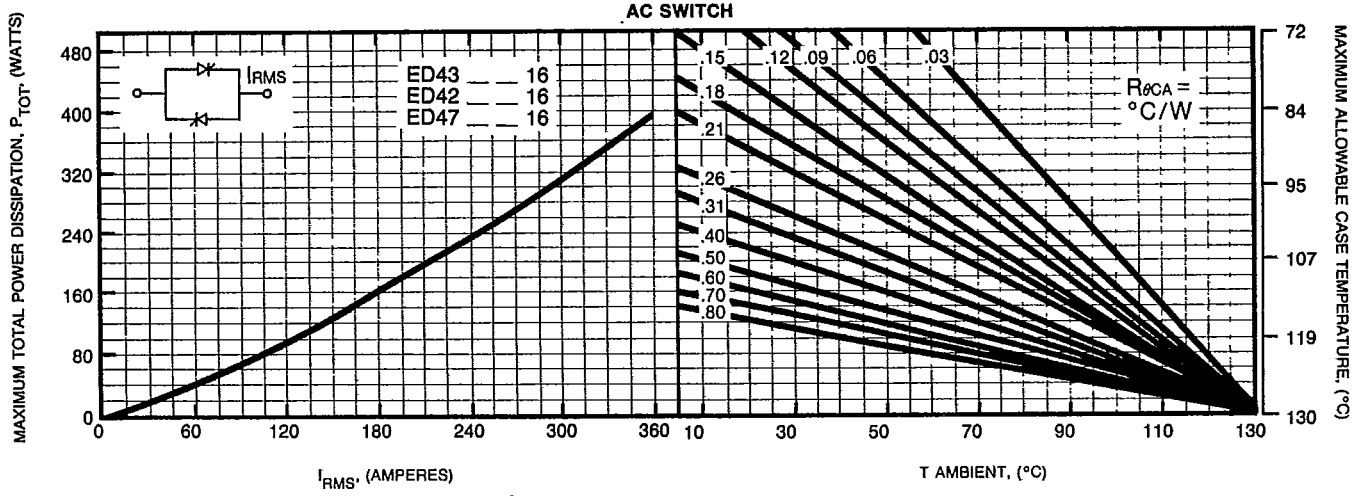
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Dual SCR, SCR/Diode Isolated Modules
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MAXIMUM TOTAL POWER DISSIPATION AND MAXIMUM AMBIENT TEMPERATURES



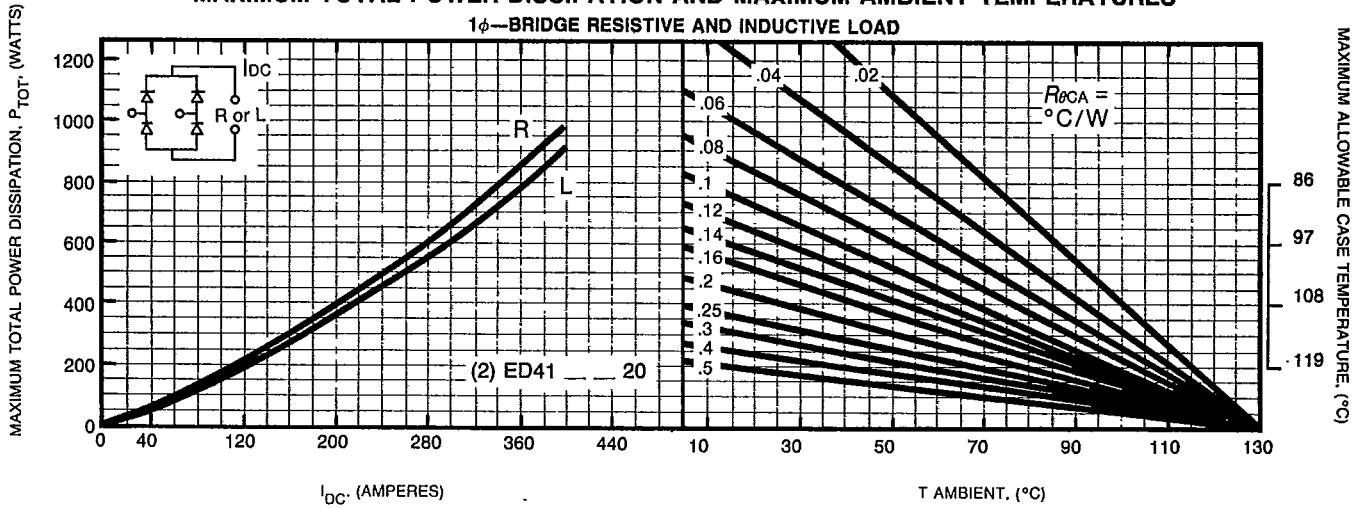


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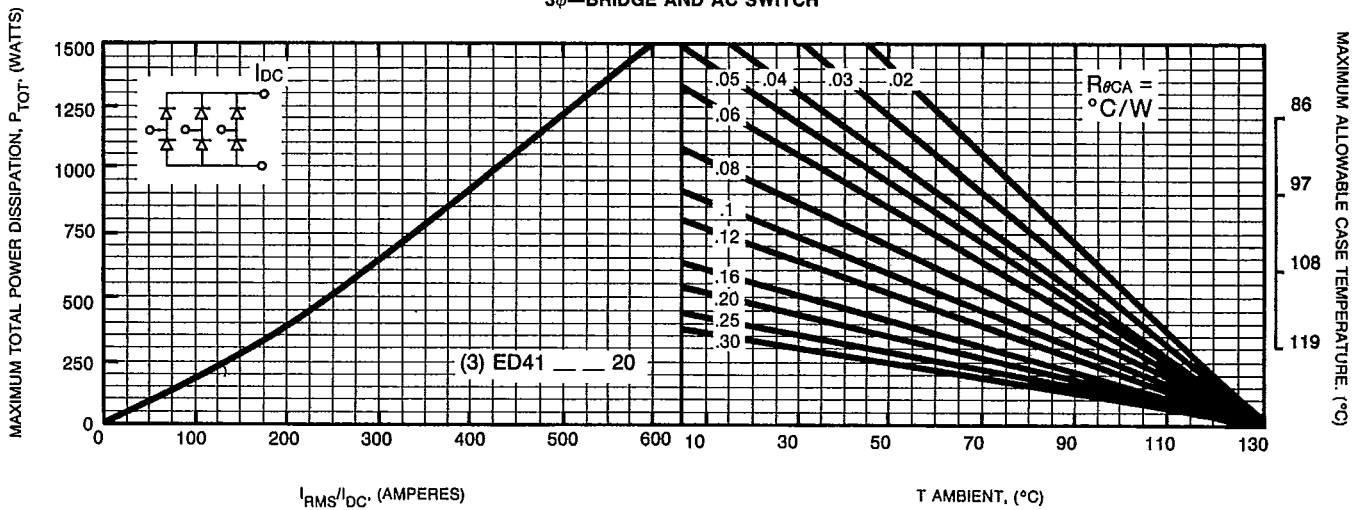
ED _____ 13, ED _____ 16, ED41 _____ 20
 Dual SCR, SCR/Diode Isolated Modules
 130-160-200 Amperes/100-2400 Volts

MAXIMUM TOTAL POWER DISSIPATION AND MAXIMUM AMBIENT TEMPERATURES

1 ϕ —BRIDGE RESISTIVE AND INDUCTIVE LOAD



3 ϕ —BRIDGE AND AC SWITCH





T-91-01

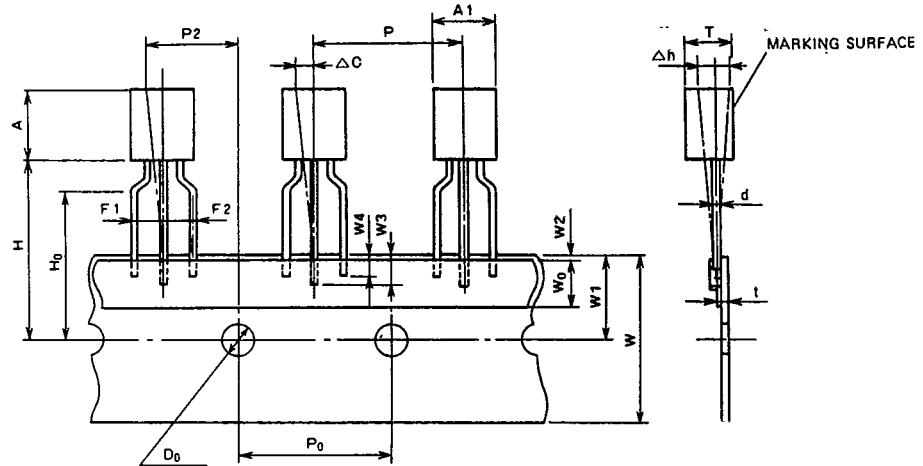
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Taping

STANDARD SPECIFICATIONS FOR TAPING OF MOLDED PACKAGE THYRISTORS AND TRIACS

TO-92 Package

Thyristor
CR02AM, CR03AM, CR04AM
Triac
BCR1AM



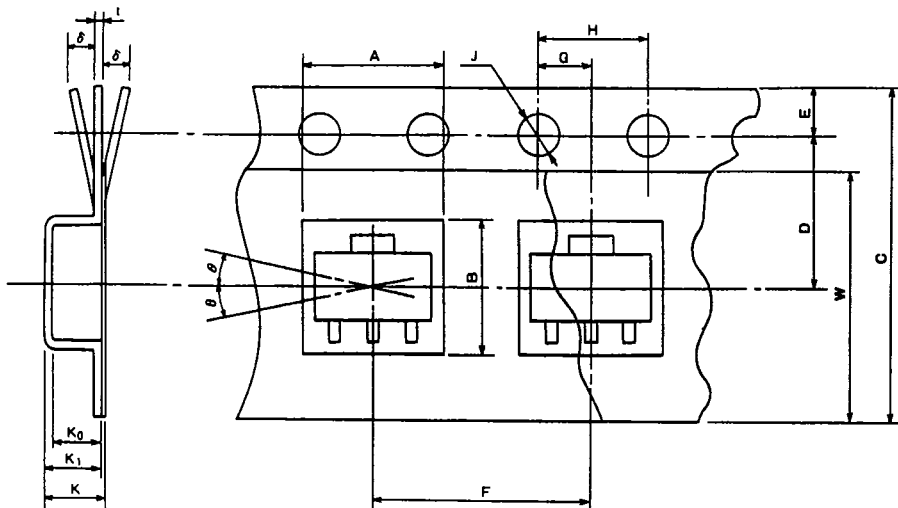
Taping dimensions

| 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 |