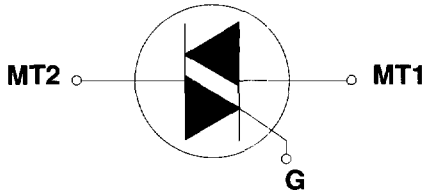


A SIEBE COMPANY  
 1801 HURD DRIVE  
 IRVING, TEXAS 75038-4385  
 PHONE 214/580-1515  
 FAX 214/550-1309



# ALTERNISTOR TRIACS

(15 - 40 AMPS)

**GENERAL DESCRIPTION**

Teccor offers bidirectional alternistors with current ratings from 15 to 40 amperes with voltages from 200 to 800 volts as part of Teccor's broad line of thyristors. Teccor's alternistor has been specifically designed for applications which are required to switch highly inductive loads. To accomplish this, a special chip has been designed which effectively offers the same performance as two thyristors (SCRs) wired inverse parallel (back-to-back); hence, the alternistor has better turn-off behavior than a standard triac. An alternistor may be triggered from a blocking to conduction state for either polarity of applied AC voltage with operating modes in Quadrants I, II, and III.

This new chip construction provides two electrically separate SCR structures, providing enhanced dv/dt characteristics while retaining the advantages of a single chip device.

All alternistors have glass-passivated junctions to ensure long term reliability and parameter stability. Teccor's glass offers a reliable barrier against junction contamination.

These alternistors are offered in three basic package configurations: TO-218X, TO-218AC, and TO-220AB. Teccor's

TO-218X package has been designed for heavy, steady power-handling capability. The TO-218X features large eyelet terminals for ease of soldering heavy gauge hook-up wire. All the isolated packages have a standard isolation voltage rating of 2500V<sub>RMS</sub>.

Variations of devices covered in this data sheet are available for custom design applications. Please consult factory for further information.

- Features**
- High Surge Current Capability
  - Glass-Passivated Junctions
  - 2500VAC Isolation for "L," "J," and "K" Packages
  - High Commutating dv/dt
  - High Static dv/dt

# Electrical Specifications

$I_T(RMS)$	Part Number						$V_{DRM}$	$I_{GT}$			$I_{DRM}$			$V_{GT}$	
	Isolated			Non-Isolated				mAmps			mAmps			Volts	
RMS On-State Current Conduction Angle of 360° (4) (16)							Repetitive Peak Blocking Voltage (1)	DC Gate Trigger Current in Specific Operating Quadrants $V_D = 12VDC$ (3) (7) (15) (17)			Peak Off-State Current Gate Open $V_{DRM} = \text{Max Rated Value}$ (1) (18)			DC Gate Trigger Voltage $V_D = 12VDC$ (2) (6) (15) (17)	
	THERMOTAB TO-220AB	TO-218AC	TO-218X	FASTPAK TO-3 BASE	TO-220AB	TO-218X	Volts								
MAX	For Package Dimensions & Variations. See Page 96						MIN	MAX			MAX			MIN	MAX
15 Amps	Q2015L6				Q2015R6		200	80	80	80	.05	0.5	2.0	0.2	2.5
	Q4015L6				Q4015R6		400	80	80	80	.05	0.5	2.0	0.2	2.5
	Q5015L6				Q5015R6		500	80	80	80	.05	0.5	2.0	0.2	2.5
	Q6015L6				Q6015R6		600	80	80	80	.05	0.5	2.0	0.2	2.5
	Q7015L6				Q7015R6		700	80	80	80	0.1	1.0	3.0	0.2	2.5
	Q8015L6				Q8015R6		800	80	80	80	0.1	1.0	3.0	0.2	2.5
25 Amps	Q2025L6	Q2025K6	Q2025J6	Q2025P	Q2025R6		200	80	80	80	.05	0.5	2.0	0.2	2.5
	Q4025L6	Q4025K6	Q4025J6	Q4025P	Q4025R6		400	80	80	80	.05	0.5	2.0	0.2	2.5
	Q5025L6	Q5025K6	Q5025J6	Q5025P	Q5025R6		500	80	80	80	.05	0.5	2.0	0.2	2.5
	Q6025L6	Q6025K6	Q6025J6	Q6025P	Q6025R6		600	80	80	80	.05	0.5	2.0	0.2	2.5
	Q7025L6	Q7025K6	Q7025J6	Q7025P	Q7025R6		700	80	80	80	0.1	1.0	3.0	0.2	2.5
	Q8025L6	Q8025K6	Q8025J6	Q8025P	Q8025R6		800	80	80	80	0.1	1.0	3.0	0.2	2.5
40 Amps	Q2040K7	Q2040J7	Q2040P		Q2040W7		200	100	100	100	0.2	2.0	5.0	0.2	2.5
	Q4040K7	Q4040J7	Q4040P		Q4040W7		400	100	100	100	0.2	2.0	5.0	0.2	2.5
	Q5040K7	Q5040J7	Q5040P		Q5040W7		500	100	100	100	0.2	2.0	5.0	0.2	2.5
	Q6040K7	Q6040J7	Q6040P		Q6040W7		600	100	100	100	0.2	2.0	5.0	0.2	2.5
	Q7040K7	Q7040J7	Q7040P		Q7040W7		700	100	100	100	0.2	2.0	5.0	0.2	2.5
	Q8040K7	Q8040J7	Q8040P		Q8040W7		800	100	100	100	0.2	2.0	5.0	0.2	2.5

## GENERAL NOTES

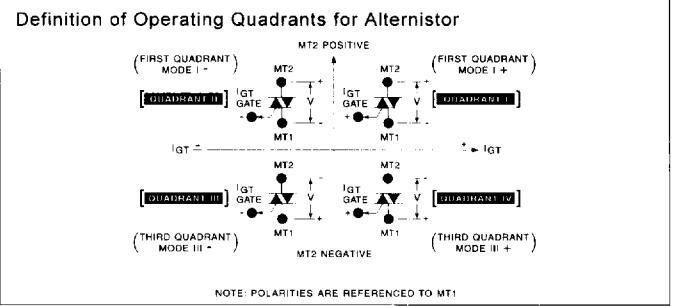
- All measurements are made at 60Hz with a resistive load at an ambient temperature of +25°C unless specified otherwise
- Operating temperature range ( $T_J$ ) is -40°C to +125°C except 0°C to +125°C for FastPaks.
- Storage temperature range ( $T_S$ ) is -40°C to +125°C except -20°C to +125°C for FastPaks.
- Lead solder temperature is a maximum of 230°C for 10 seconds maximum  $\geq 1/16"$  (1.59mm) from case.
- The case temperature ( $T_C$ ) is measured as shown on the dimensional outline drawings. See "Package Dimensions" section of this catalog on Page 96.

Type	THERMAL RESISTANCE (Steady State) $R_{\theta JC}^{\circ}C/W(TYP)$					
15 amps			2.1	1.3		
25 amps	1.35	1.3	2.0	1.1	1.32	
40 amps	0.97	0.9			0.95	0.85

\*\* UL Recognized Product per UL File E71639

ELECTRICAL ISOLATION FROM LEADS TO MOUNTING TAB U.L. RECOGNIZED FILE #E71639					
TYPE VAC(RMS)	ISOLATED TO-218AC	ISOLATED FASTPAK	ISOLATED TO-220AB		ISOLATED TO-218X
2500	Standard	Standard	Standard		Standard
4000	N/A	N/A	Optional*		N/A

\*For 4000V Isolation use "V" Suffix in part number.



## GATE CHARACTERISTICS

Teccor alternistors may be gated with in-phase signals (using standard AC line) in which Quadrants I & III are used, or by applying unipolar pulses (gate always positive or negative), where if a negative pulse is applied, Quadrants II & III are used. In all cases, if maximum surge capability is required, pulses should be a minimum of one magnitude above minimum  $I_{GT}$  rating with a steep rising waveform (1 $\mu$ s rise time.)

## ELECTRICAL ISOLATION

Teccor isolated Alternistor packages will withstand a minimum high potential test of 2500 VAC (RMS) from leads to mounting tab, over the operating temperature range of the device. See isolation table for standard and optional isolation ratings.

# Alternistor Triacs

$V_{TM}$	$I_H$	$I_{GTM}$	$P_{GM}$	$P_{G(AV)}$	$I_{TSM}$		$dv/dt (c)$	$dv/dt$		$t_{gt}$	$I^2t$	$di/dt$
					Amps			Volts/ $\mu$ Sec				
Peak On-State Voltage at Max Rated RMS Current $T_C = 25^\circ C$ (1) (5)	Holding Current (DC) Gate Open (1) (8) (12)	Peak Gate Trigger Current (14)	Peak Gate Power Dissipation (14) $I_{GT} \leq I_{GTM}$	Average Gate Power Dissipation	Peak One Cycle Surge (9) (13)		Critical Rate-of-Rise of Commutation Voltage at Rated $V_{DRM}$ and $I_T(RMS)$ Commutating $di/dt = 0.54$ Rated $I_T(RMS)/ms$ Gate Unenergized (1) (4) (13)	Critical Rate-of-Rise of Off-State Voltage at Rated $V_{DRM}$ Gate Open (1)	Gate Controlled Turn-On Time $I_{GT} = 300mA$ 0.1 $\mu s$ Rise Time (10)	RMS Surge (Non-Repetitive) On-State Current for period of 8.3 ms for Fusing	Maximum Rate-of-Change of On-State Current $I_{GT} = 500mA$ with 0.1 $\mu s$ Rise Time	
Volts	mAmps	Amps	Watts	Watts	60Hz	50Hz						Volts/ $\mu$ Sec
MAX	MAX						MIN	MIN	TYP			
1.6	70	2.0	20	0.5	200	167	30	875	600	5	166	100
1.6	70	2.0	20	0.5	200	167	30	875	600	5	166	100
1.6	70	2.0	20	0.5	200	167	30	800	520	5	166	100
1.6	70	2.0	20	0.5	200	167	30	800	520	5	166	100
1.6	70	2.0	20	0.5	200	167	30	700	475	5	166	100
1.6	70	2.0	20	0.5	200	167	30	700	475	5	166	100
1.8	100	2.0	20	0.5	250	208	30	875	600	5	259	100
1.8	100	2.0	20	0.5	250	208	30	875	600	5	259	100
1.8	100	2.0	20	0.5	250	208	30	800	520	5	259	100
1.8	100	2.0	20	0.5	250	208	30	800	520	5	259	100
1.8	100	2.0	20	0.5	250	208	30	700	475	5	259	100
1.8	100	2.0	20	0.5	250	208	30	700	475	5	259	100
1.8	120	4.0	40	0.8	400	335	50	1100	700	5	664	150
1.8	120	4.0	40	0.8	400	335	50	1100	700	5	664	150
1.8	120	4.0	40	0.8	400	335	50	1000	625	5	664	150
1.8	120	4.0	40	0.8	400	335	50	1000	625	5	664	150
1.8	120	4.0	40	0.8	400	335	50	900	575	5	664	150
1.8	120	4.0	40	0.8	400	335	50	900	575	5	664	150

## NOTES TO ELECTRICAL SPECIFICATIONS

- For either polarity of MT2 with reference to MT1 terminal.
- For either polarity of gate voltage ( $V_{GT}$ ) with reference to MT1 terminal.
- See Definition of Quadrants.
- See Figures 1A and 1B for current rating at specific operating temperature.
- See Figure 3 for  $I_T$  and  $V_T$ .
- See Figure 5 for  $V_{GT}$  vs  $T_C$ .
- See Figure 4 for  $I_{GT}$  vs  $T_C$ .
- See Figure 6 for  $I_H$  vs  $T_C$ .
- See Figure 7 for surge rating with specific durations.
- See Figure 8 for  $t_{gt}$  vs  $I_{GT}$ .
- See package outlines for lead form configurations. When ordering special lead forming, add type number as suffix to part number.
- Initial on-state current = 400 mA(DC).
- See Figures 1(A and B) for maximum allowable case temperature at maximum rated current.
- Pulse width  $\leq 10\mu s$ .
- $R_L = 30\Omega$ .
- 40 Amp pin terminal leads on K & M packages can run  $100^\circ C$  to  $125^\circ C$ .
- Alternistor does not turn on in Quadrant IV.
- $T_C = T_J$  for test conditions in off-state

Figure 1A — Maximum Allowable Case Temperature vs On-State Current

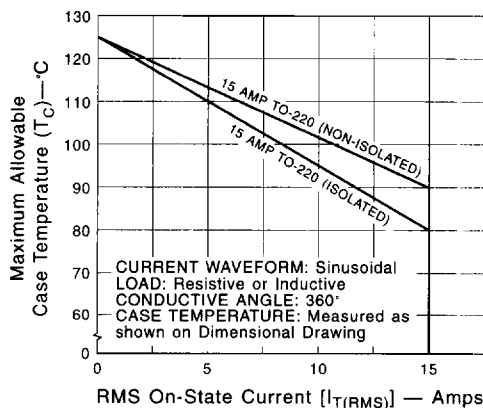
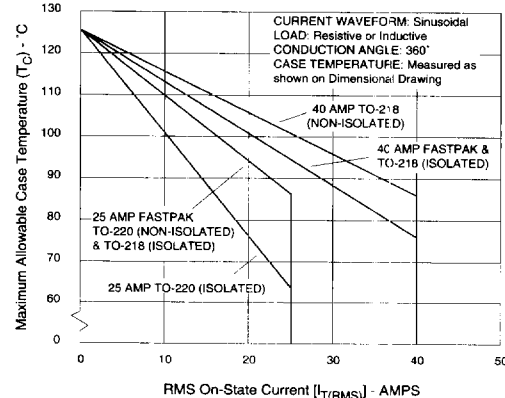


Figure 1B — Maximum Allowable Case Temperature vs On-State Current



# Electrical Specifications

Figure 3 — On-State Current vs On-State Voltage (Typical)

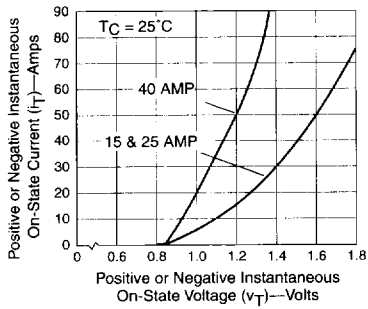


Figure 4 — Normalized DC Gate Trigger Current for all Quadrants vs Case Temperature

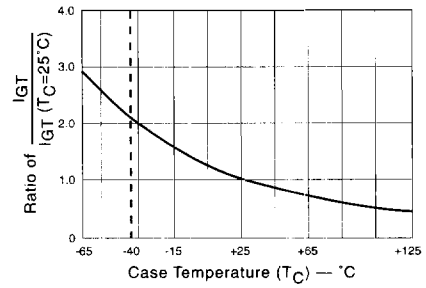


Figure 5 — Normalized DC Gate Trigger Voltage for all Quadrants vs Case Temperature

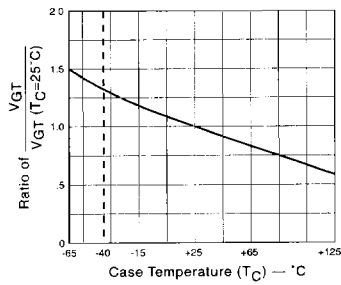


Figure 6 — Normalized DC Holding Current vs Case Temperature

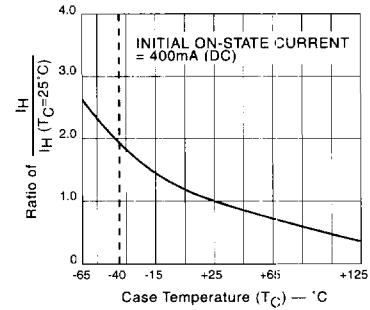


Figure 7 — Peak Surge Current vs Surge Current Duration

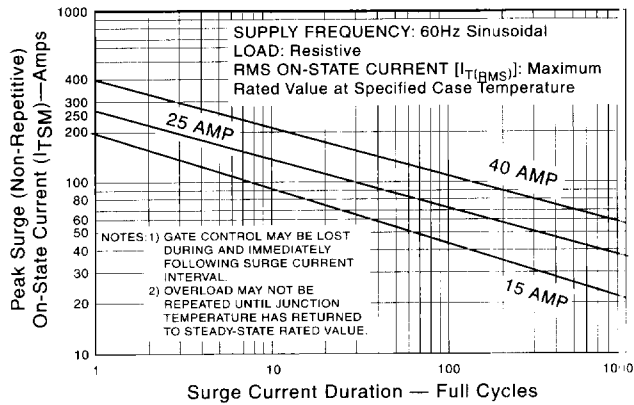


Figure 8 — Turn-On Time vs Gate Trigger Current (Typical)

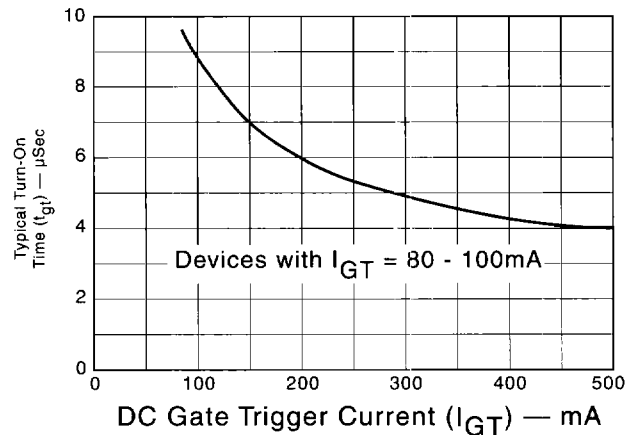


Figure 9A — Power Dissipation (Typ.) vs On-State Current

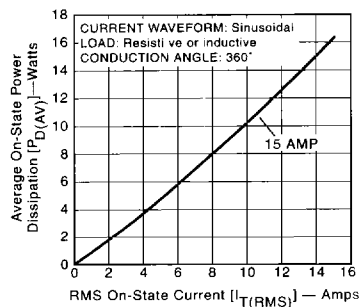


Figure 9B — Power Dissipation (Typ.) vs On-State Current

