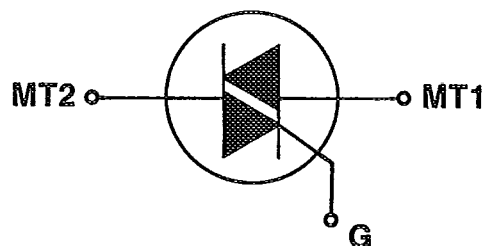


T-25-23


**TECCOR**  
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# ALTERNISTORS (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 (SCR's) 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, & 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 insure 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 2500 VRMS.

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
- 2500 VAC Isolation for "L", "J" and "K" Packages
- High Commutating  $dv/dt$
- High Static  $dv/dt$
- High Temperature Construction

# ALTERNISTORS (15-40 AMP)

ITRMS	Part Number						VDRM	IGT	IDRM	VTM	VGT					
	Isolated			Non-Isolated												
RMS On-State Current Conduction Angle of 360° (4) (16) Amps							Repetitive Peak Blocking Voltage (1) Volts	DC Gate Trigger Current in Specific Operating Quadrants V <sub>D</sub> = 12 VDC (3) (7) (15) (17) mA	Peak Off-State Current Gate Open V <sub>DRM</sub> = Max Rated Value (1) mA	Peak On-State Voltage at Max Rated RMS Current T <sub>C</sub> = 25°C (1) (5) Volts	DC Gate Trigger Voltage V <sub>D</sub> = 12VDC (2) (6) (15) (17) Volts					
MAX	FOR PACKAGE DIMENSIONS & VARIATIONS SEE PAGE 81						MIN	QI MAX	QII MAX	QIII MAX	T <sub>C</sub> = 25°C	T <sub>C</sub> = 100°C	T <sub>C</sub> = 125°C	MAX	MIN	MAX
15 Amps	Q2015L9			Q2015R9			200	125	125	125	.05	0.5	2.0	1.6	0.2	2.5
	Q4015L9			Q4015R9			400	125	125	125	.05	0.5	2.0	1.6	0.2	2.5
	Q5015L9			Q5015R9			500	125	125	125	.05	0.5	2.0	1.6	0.2	2.5
	Q6015L9			Q6015R9			600	125	125	125	.05	0.5	2.0	1.6	0.2	2.5
	Q7015L9			Q7015R9			700	125	125	125	0.1	1.0	3.0	1.6	0.2	2.5
	Q8015L9			Q8015R9			800	125	125	125	0.1	1.0	3.0	1.6	0.2	2.5
25 Amps	Q2025L9			Q2025R9			200	125	125	125	.05	0.5	2.0	1.8	0.2	2.5
	Q4025L9			Q4025R9			400	125	125	125	.05	0.5	2.0	1.8	0.2	2.5
	Q5025L9			Q5025R9			500	125	125	125	.05	0.5	2.0	1.8	0.2	2.5
	Q6025L9			Q6025R9			600	125	125	125	.05	0.5	2.0	1.8	0.2	2.5
	Q7025L9			Q7025R9			700	125	125	125	0.1	1.0	3.0	1.8	0.2	2.5
	Q8025L9			Q8025R9			800	125	125	125	0.1	1.0	3.0	1.8	0.2	2.5
40 Amps	Q2040K9	Q2040J9		Q2040M9	Q2040W9		200	125	125	125	0.2	2.0	5.0	1.8	0.2	2.5
	Q4040K9	Q4040J9		Q4040M9	Q4040W9		400	125	125	125	0.2	2.0	5.0	1.8	0.2	2.5
	Q5040K9	Q5040J9		Q5040M9	Q5040W9		500	125	125	125	0.2	2.0	5.0	1.8	0.2	2.5
	Q6040K9	Q6040J9		Q6040M9	Q6040W9		600	125	125	125	0.2	2.0	5.0	1.8	0.2	2.5
	Q7040K9	Q7040J9		Q7040M9	Q7040W9		700	125	125	125	0.2	2.0	5.0	1.8	0.2	2.5
	Q8040K9	Q8040J9		Q8040M9	Q8040W9		800	125	125	125	0.2	2.0	5.0	1.8	0.2	2.5

**GENERAL NOTES**

- All measurements are made at 60 Hz with a resistive load at an ambient temperature of +25°C unless specified otherwise
- Operating temperature range (T<sub>J</sub>) is -40°C to +125°C

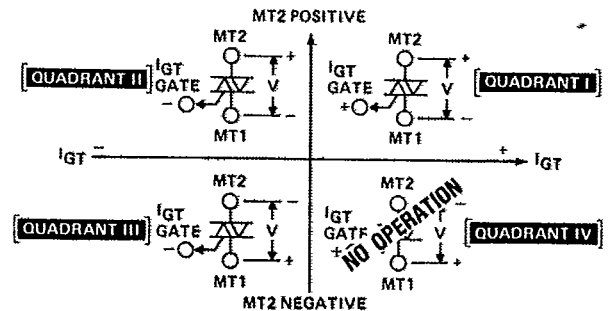
- Storage temperature range (T<sub>S</sub>) is -40°C to +125°C
- Lead solder temperature is a maximum of 230°C for 10 seconds maximum; ≥ 1/16" from case
- The case temperature (T<sub>C</sub>) is measured as shown on the dimensional outline drawings. See "Package Dimensions" section of this catalog

Type						
15.0 Amp			2.0	1.3		
25.0 Amp			1.4	1.1		
40.0 Amp	0.97	0.87			0.95	0.85

TYPE VAC(RMS)	ISOLATED TO-218AC	ISOLATED TO-220AB	ISOLATED TO-218X
2500	Standard	Standard	Standard
4000	No	Optional*	No

\*For 4000V Isolation use "V" Suffix.

**Definition of Operating Quadrants for Alternistor**



**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 IGT rating with a steep rising waveform (1μsec rise time).

**ELECTRICAL ISOLATION**

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

# Electrical Specifications

I <sub>H</sub>	I <sub>GTM</sub>	PGM	PG(AV)	I <sub>TSM</sub>		dv/dt (c)		dv/dt		t <sub>gt</sub>	I <sup>2</sup> t	di/dt
				60Hz	50Hz	Volts/μs		Volts/μs				
Holding Current (DC) Gate Open (1) (8) (12)	Peak Gate Trigger Current (14)	Peak Gate Power Dissipation (14) I <sub>GT</sub> ≤ I <sub>GTM</sub>	Average Gate Power Dissipation	Peak One Cycle Surge (9) (13)		Critical Rate of Rise of Commutation Voltage at Rated V <sub>DRM</sub> and I <sub>T</sub> (RMS) Commutating di/dt = .54 Rated I <sub>T</sub> (RMS)/msec. Gate Unenergized (1) (4) (13)		Critical Rate of Rise of Off-State Voltage at Rated V <sub>DRM</sub> Gate Open (1)		Gate Controlled Turn-On Time I <sub>GT</sub> = 500mA 0.1 μs Rise Time (10)	RMS Surge (Non-Repetitive) On-State Current For period of 8.3 msec for Fusing	Maximum Rate of Change of On-State Current I <sub>GT</sub> = 500 mA With 0.1 μs Rise Time
mA	Amps	Watts	Watts	Amps		Volts/μs		Volts/μs		μs	Amps <sup>2</sup> sec.	Amps/μs
MAX				60Hz	50Hz	MIN		T <sub>C</sub> = 100°C	T <sub>C</sub> = 125°C	MAX		
70	2.0	20	0.5	150	125	30		625	375	5	93	100
70	2.0	20	0.5	150	125	30		625	375	5	93	100
70	2.0	20	0.5	150	125	30		550	325	5	93	100
70	2.0	20	0.5	150	125	30		550	325	5	93	100
70	2.0	20	0.5	150	125	30		500	300	5	93	100
70	2.0	20	0.5	150	125	30		500	300	5	93	100
80	2.0	20	0.5	250	208	30		625	375	5	259	100
80	2.0	20	0.5	250	208	30		625	375	5	259	100
80	2.0	20	0.5	250	208	30		550	325	5	259	100
80	2.0	20	0.5	250	208	30		550	325	5	259	100
80	2.0	20	0.5	250	208	30		500	300	5	259	100
80	2.0	20	0.5	250	208	30		500	300	5	259	100
100	4.0	40	0.8	400	335	50		1000	600	5	664	150
100	4.0	40	0.8	400	335	50		1000	600	5	664	150
100	4.0	40	0.8	400	335	50		900	550	5	664	150
100	4.0	40	0.8	400	335	50		900	550	5	664	150
100	4.0	40	0.8	400	335	50		800	500	5	664	150
100	4.0	40	0.8	400	335	50		800	500	5	664	150

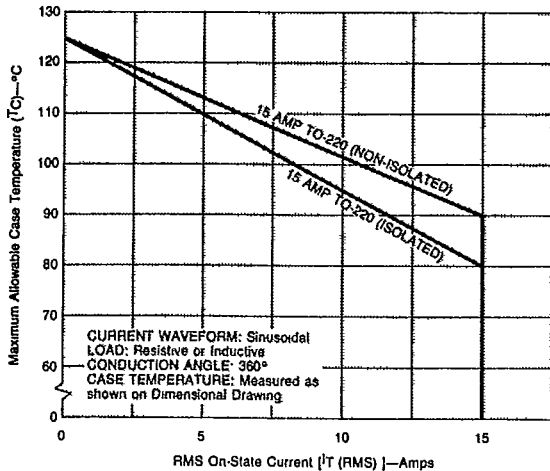
**NOTES TO ELECTRICAL SPECIFICATIONS**

- For either polarity of MT2 with reference to MT1 terminal.
- For either polarity of gate voltage (VGT) with reference to MT1 terminal.
- See definition of quadrants
- See figures 1A and 1B for current rating at specific operating temperature.
- See figures 3 for I<sub>T</sub> vs V<sub>T</sub>

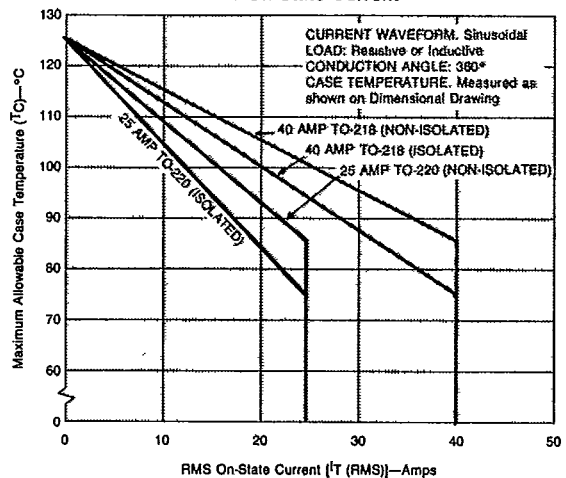
- See figure 5 for VGT vs T<sub>C</sub>
- See figure 4 for I<sub>GT</sub> vs T<sub>C</sub>
- See figure 6 for I<sub>H</sub> vs T<sub>C</sub>
- See figure 7 for surge rating with specific durations
- See figures 8 for I<sub>gt</sub> vs I<sub>GT</sub>
- See package outlines for lead form configurations. When ordering special lead forming, add type number as suffix to part number.

- Initial on-state current = 400 mA(DC).
- See figure 1(A and B) for maximum allowable case temperature @ maximum rated current.
- Pulse width ≤ 3μsec
- R<sub>L</sub> = 30Ω.
- 40 Amp Pin terminal leads on K & M packages can run 100°C to 125°C.
- Alternistor does not turn on in Quadrant IV.

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

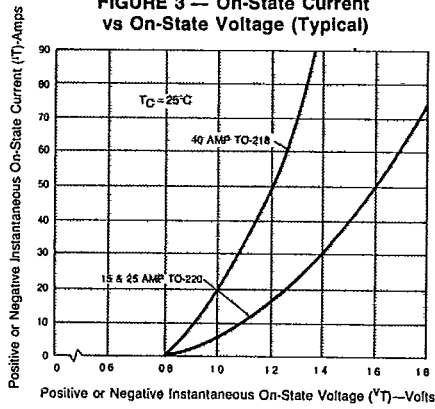


**FIGURE 1B — Maximum Allowable Case Temperature vs On-State Current**

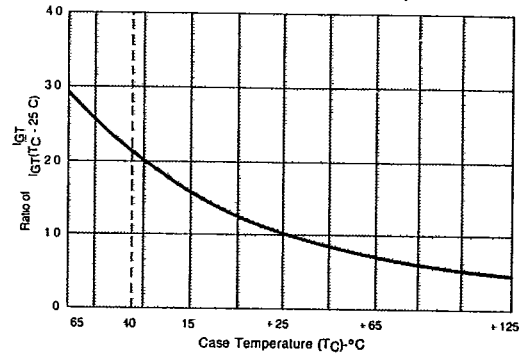


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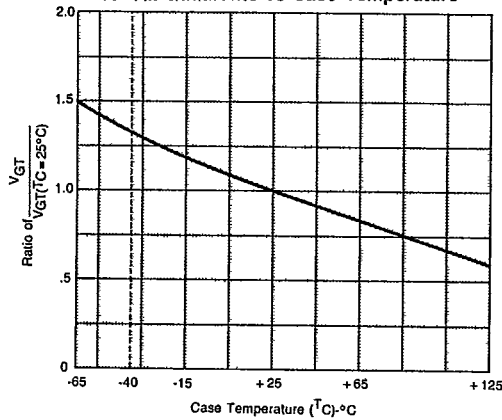
**FIGURE 3 — On-State Current vs On-State Voltage (Typical)**



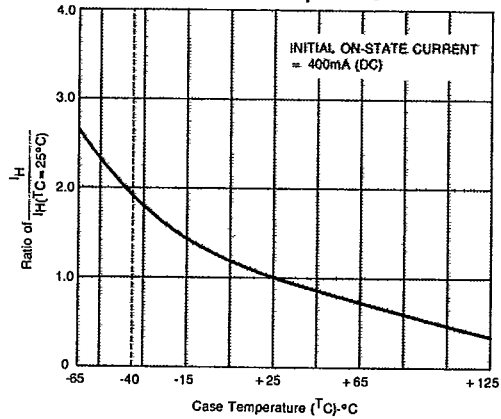
**FIGURE 4 — Normalized DC Gate Trigger Current For All Quadrants vs Case Temperature**



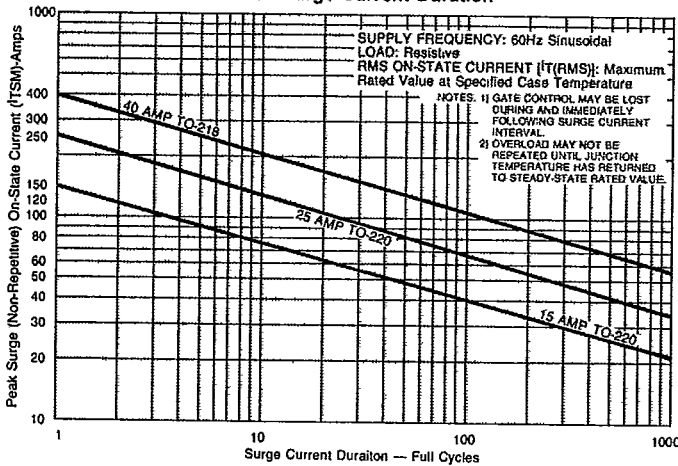
**FIGURE 5 — Normalized DC Gate Trigger Voltage for All Quadrants vs Case Temperature**



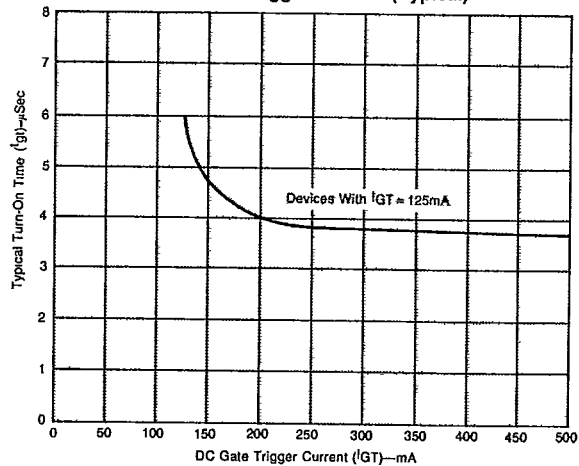
**FIGURE 6 — Normalized DC Holding Current vs Case Temperature**



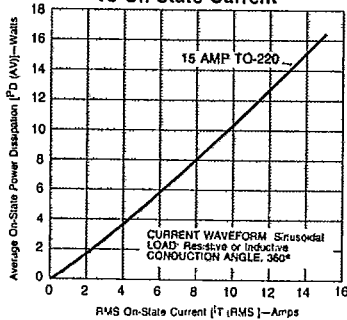
**FIGURE 7 — Peak Surge Current vs Surge Current Duration**



**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**

