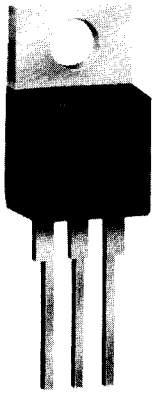
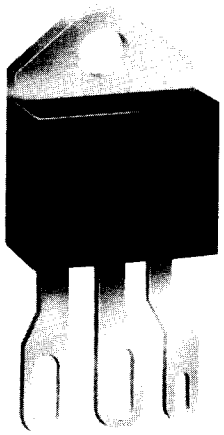
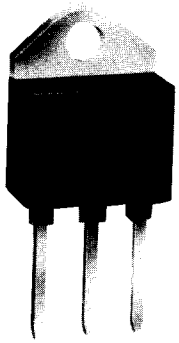
Selected Packages*
U.L. RECOGNIZED
File #E71639



TO-220AB
THERMOTAB®

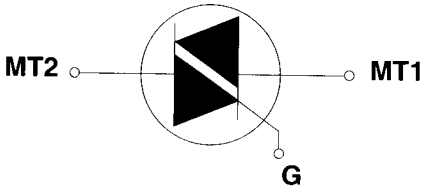


TO-218X



TO-218AC

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



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 (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.

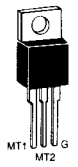
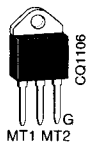
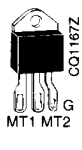
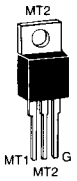
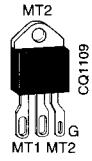
These Alternistors are offered in three basic package configurations: TO-218X, TO-218AC, and TO-220AB. Teccor's TO-218X package has been designed for heavy steady power-handling capability. The TO-218X features large eyelet terminals for ease of soldering heavy gauge hook-up wire. All the isolated packages have a standard isolation voltage rating of 2500 V_{RMS}.

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**

Electrical Specifications

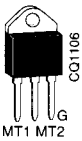
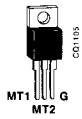
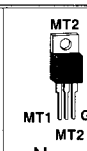
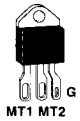
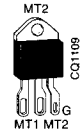
I_{TRMS}	Part Number					V_{DRM}	I_{GT}			I_{DRM}			V_{TM}	V_{GT}	
	Isolated			Non-Isolated											
RMS On-State Current Conduction Angle of 360° (4) (16)						Repetitive Peak Blocking Voltage (1)	DC Gate Trigger Current in Specific Operating Quadrants V_D=12VDC (3) (7) (15) (17)			Peak Off-State Current Gate Open V_{DRM}=Max Rated Value (1) (18)			Peak On-State Voltage at Max Rated RMS Current T_C=25°C (1) (5)	DC Gate Trigger Voltage V_D=12VDC (2) (6) (15) (17)	
Amps	Thermotab TO-220AB	Isolated TO-218AC	Isolated TO-218X	Non-Isolated TO-220AB	Non-Isolated TO-218X	Volts	mA			mA			Volts	Volts	
										MAX				T_C= 125°C	T_C= 25°C
MAX	For Package Dimensions & Variations See Page 98					MIN	QI MAX	QII MAX	QIII MAX	T_C= 25°C	T_C= 100°C	T_C= 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		Q2040W9	200	125	125	125	0.2	2.0	5.0	1.8	0.2	2.5
		Q4040K9	Q4040J9		Q4040W9	400	125	125	125	0.2	2.0	5.0	1.8	0.2	2.5
		Q5040K9	Q5040J9		Q5040W9	500	125	125	125	0.2	2.0	5.0	1.8	0.2	2.5
		Q6040K9	Q6040J9		Q6040W9	600	125	125	125	0.2	2.0	5.0	1.8	0.2	2.5
		Q7040K9	Q7040J9		Q7040W9	700	125	125	125	0.2	2.0	5.0	1.8	0.2	2.5
		Q8040K9	Q8040J9		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_J) is -40°C to +125°C
- Storage temperature range (T_S) 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_C) is measured as shown on the dimensional outline drawings. See "Package Dimensions" section of this catalog on Page 98.

THERMAL RESISTANCE (Steady Rate)

$R_{\theta JC}$ ° C/W (TYP)

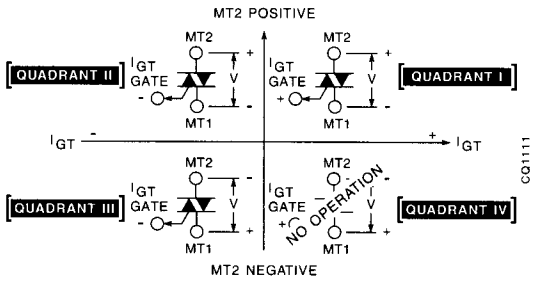
Type	 Isolated TO-218AC	 Thermotab TO-220AB	 Non-Isolated TO-220AB	 Isolated TO-218X	 Non-Isolated TO-218X
15 Amps		2.1	1.3		
25 Amps		2.0	1.1		
40 Amps	0.97			0.95	0.85

ELECTRICAL ISOLATION FROM LEADS TO CASE
U.L. RECOGNIZED FILE #E71639

TYPE / VAC(RMS)	ISOLATED TO-218AC		ISOLATED TO-220AB		ISOLATED TO-218X	
2500	Standard		Standard		Standard	
4000	N/A		Optional*		N/A	

*For 4000V Isolation use "V" Suffix in part number. CQ1110

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 I_{GT} 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.

I_H	I_{GTM}	P_{GM}	$P_{G(AV)}$	I_{TSM}		dv/dt (c)	dv/dt		t_{gt}	I^2t	di/dt
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 = .54 Rated $I_{T(RMS)}$/msec Gate Unenergized (1) (4) (13)	Critical Rate of Rise of Off-State Voltage at Rated V_{DRM} Gate Open (1) Volts/μS		Gate Controlled Turn-On Time I_{GT}=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_{GT} = 500mA with 0.1 μS Rise Time
mA	Amps	Watts	Watts	Amps		Volts/μS	MIN		μS	$Amps^2sec.$	Amps/μS
MAX				60Hz	50Hz	MIN	T_C = 100°C	T_C = 125°C	MAX		
70	2.0	20	0.5	200	167	30	625	375	5.5	166	100
70	2.0	20	0.5	200	167	30	625	375	5.5	166	100
70	2.0	20	0.5	200	167	30	550	325	5.5	166	100
70	2.0	20	0.5	200	167	30	550	325	5.5	166	100
70	2.0	20	0.5	200	167	30	500	300	5.5	166	100
70	2.0	20	0.5	200	167	30	500	300	5.5	166	100
100	2.0	20	0.5	250	208	30	625	375	5.5	259	100
100	2.0	20	0.5	250	208	30	625	375	5.5	259	100
100	2.0	20	0.5	250	208	30	550	325	5.5	259	100
100	2.0	20	0.5	250	208	30	550	325	5.5	259	100
100	2.0	20	0.5	250	208	30	500	300	5.5	259	100
100	2.0	20	0.5	250	208	30	500	300	5.5	259	100
120	4.0	40	0.8	400	335	50	1000	600	5.5	664	150
120	4.0	40	0.8	400	335	50	1000	600	5.5	664	150
120	4.0	40	0.8	400	335	50	900	550	5.5	664	150
120	4.0	40	0.8	400	335	50	900	550	5.5	664	150
120	4.0	40	0.8	400	335	50	800	500	5.5	664	150
120	4.0	40	0.8	400	335	50	800	500	5.5	664	150

NOTES TO ELECTRICAL SPECIFICATIONS

1. For either polarity of MT2 with reference to MT1 terminal.
2. For either polarity of gate voltage (V_{GT}) with reference to MT1 terminal.
3. See Definition of Quadrants.
4. See Figures 1A and 1B for current rating at specific operating temperature.
5. See Figure 3 for I_T and V_T.
6. See Figure 5 for V_{GT} vs T_C.
7. See Figure 4 for I_{GT} vs T_C.
8. See Figure 6 for I_H vs T_C.
9. See Figure 7 for for surge rating with specific durations.
10. See Figure 8 for t_{gt} vs I_{GT}.
11. See package outlines for lead form configurations. When ordering special lead forming, add type number as suffix to part number.
12. Initial on-state current = 400 mA(DC).
13. See Figures 1(A and B) for maximum allowable case temperature @ maximum rated current.
14. Pulse width ≤ 10μsec.
15. $R_L = 30\Omega$.
16. 40 Amp pin terminal leads on K & M packages can run 100°C to 125°C.
17. Alternistor does not turn on in Quadrant IV.
18. $T_C = T_J$ for test conditions in off-state

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

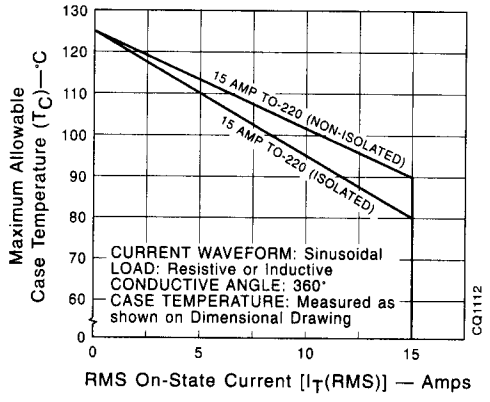
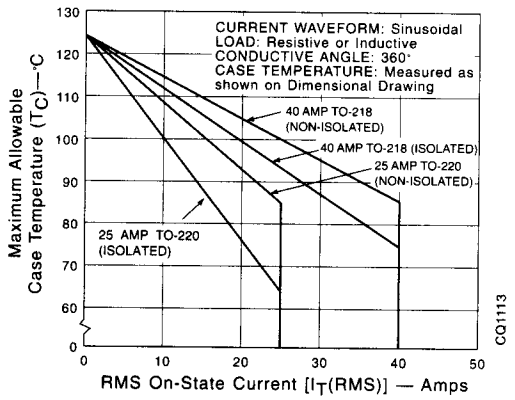


Figure 1B — Maximum Allowable Case Temperature vs On-State Current



Electrical Specifications

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

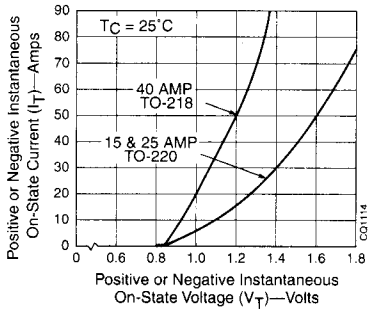


Figure 4 — Normalized DC Gate Trigger Current for all Quadrants vs Case Temperature

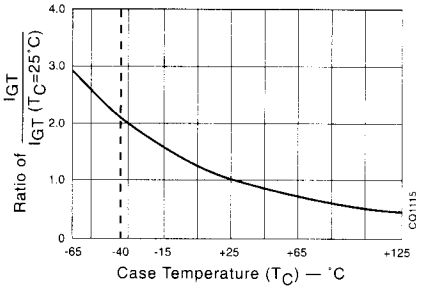


Figure 5 — Normalized DC Gate Trigger Voltage for all Quadrants vs Case Temperature

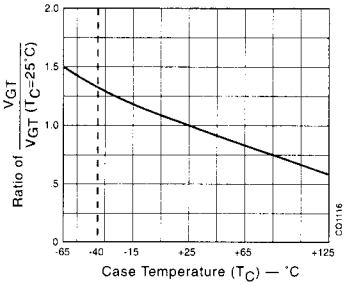


Figure 6 — Normalized DC Holding Current vs Case Temperature

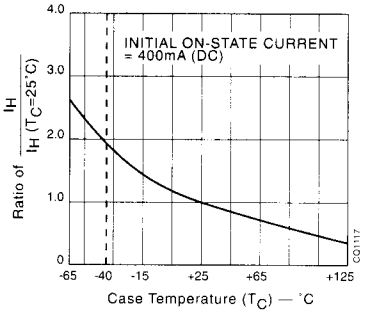


Figure 7 — Peak Surge Current vs Surge Current Duration

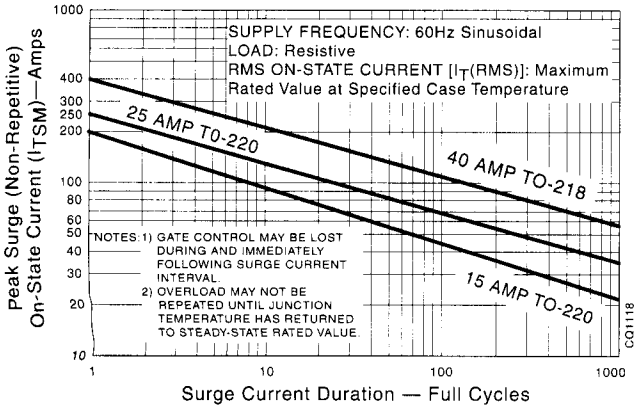


Figure 8 — Turn-On Time vs Gate Trigger Current (Typical)

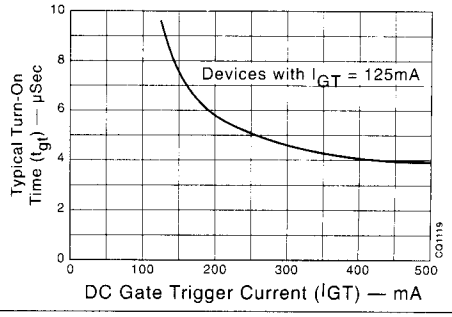


Figure 9A — Power Dissipation (Typ.) vs On-State Current

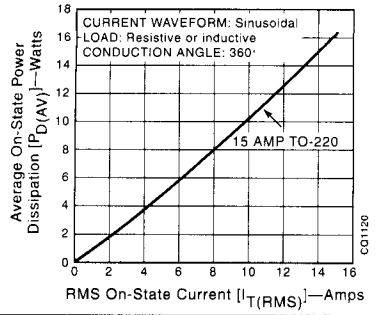


Figure 9B — Power Dissipation (Typ.) vs On-State Current