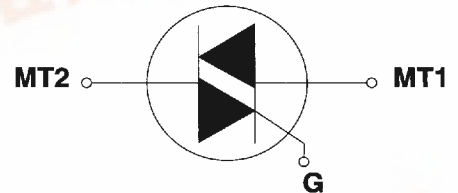




A SIEBE COMPANY
1801 HURD DRIVE
IRVING, TEXAS 75038-4385
PHONE 214/580-1515
FAX 214/550-1309



TRIACS

(1- 25 AMPS)

GENERAL DESCRIPTION

These gated triacs from Teccor Electronics are part of a broad line of bidirectional semiconductors. The devices range in current ratings from 1 to 25 amperes and in voltages from 200 to 800 volts.

The triac may be gate triggered from a blocking to conduction state for either polarity of applied voltage and is designed for AC switching and phase control applications such as speed and temperature modulation controls, lighting controls and static switching relays. The triggering signal is normally applied between the gate and MT1.

Teccor's gated triacs are available in a choice of different packages as shown above. Most packages are offered in the electrically-isolated construction where the case or tab is electrically-isolated from the semiconductor chip. This feature facilitates the use of low-cost assembly and convenient packaging techniques. Tape-and-reel capability is available. Please consult factory for more information.

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

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

Features

- Electrically-isolated packages
- Glass-passivated junctions
- Voltage capability — up to 800 volts
- Surge capability — up to 230 amps

Electrical Specifications

$I_{T(RMS)}$	Part Number				V_{DRM}	I_{GT}					I_{BRM}			V_{TM}	V_{GT}	
	Isolated		Non-Isolated													
RMS On-State Current Conduction Angle of 360° (4)					Repetitive Peak Blocking Voltage (1) Volts	DC Gate Trigger Current in Specific Operating Quadrants $V_D = 12VDC$ $R_L = 60\Omega$ (3) (7) mAmps					Peak Off-State Current Gate Open $V_{DRM} = \text{Max Rated Value}$ (1) (16) mAmps			Peak On-State Voltage at Max Rated RMS Current $T_C = 25^\circ C$ (1) (5) Volts	DC Gate Trigger Voltage $V_D = 12VDC$ $R_L = 60\Omega$ (2) (6) (18) Volts	
	TO-92	THERMOTAB TO-220AB	TO-202AB	TO-220AB		QI	QII	QIII	QIV	QIV	$T_C = 25^\circ C$	$T_C = 100^\circ C$	$T_C = 125^\circ C$		$T_C = 125^\circ C$	$T_C = 25^\circ C$
MAX	For Package Dimensions & Variations, See Page 95.				MIN	MAX				TYP	MAX			MAX	MIN	MAX
1.0 Amp	Q201E3				200	10	10	10		25	.02	0.5	1.0	1.6	0.2	2.0
	Q401E3				400	10	10	10		25	.02	0.5	1.0	1.6	0.2	2.0
	Q501E3				500	10	10	10		25	.02	0.5	1.0	1.6	0.2	2.0
	Q601E3				600	10	10	10		25	.02	0.5	1.0	1.6	0.2	2.0
	Q201E4				200	25	25	25		50	.02	0.5	1.0	1.6	0.2	2.5
	Q401E4				400	25	25	25		50	.02	0.5	1.0	1.6	0.2	2.5
	Q501E4				500	25	25	25		50	.02	0.5	1.0	1.6	0.2	2.5
	Q601E4				600	25	25	25		50	.02	0.5	1.0	1.6	0.2	2.5
4.0 Amps		Q2004L3	Q2004F31		200	10	10	10		25	.05	0.5	2.0	1.6	0.2	2.0
		Q4004L3	Q4004F31		400	10	10	10		25	.05	0.5	2.0	1.6	0.2	2.0
		Q5004L3	Q5004F31		500	10	10	10		25	.05	0.5	2.0	1.6	0.2	2.0
		Q6004L3	Q6004F31		600	10	10	10		25	.05	0.5	2.0	1.6	0.2	2.0
		Q2004L4	Q2004F41		200	25	25	25		50	.05	0.5	2.0	1.6	0.2	2.5
		Q4004L4	Q4004F41		400	25	25	25		50	.05	0.5	2.0	1.6	0.2	2.5
		Q5004L4	Q5004F41		500	25	25	25		50	.05	0.5	2.0	1.6	0.2	2.5
		Q6004L4	Q6004F41		600	25	25	25		50	.05	0.5	2.0	1.6	0.2	2.5
		Q7004L4			700	25	25	25		50	.05	0.5	2.0	1.6	0.2	2.5
		Q8004L4			800	25	25	25		50	.05	0.5	2.0	1.6	0.2	2.5
6.0 Amps		Q2006L4	Q2006F41	Q2006R4	200	25	25	25		50	.05	0.5	2.0	1.6	0.2	2.5
		Q4006L4	Q4006F41	Q4006R4	400	25	25	25		50	.05	0.5	2.0	1.6	0.2	2.5
		Q5006L4	Q5006F41	Q5006R4	500	25	25	25		50	.05	0.5	2.0	1.6	0.2	2.5
		Q6006L5	Q6006F51	Q6006R5	600	50	50	50		75	.05	0.5	2.0	1.6	0.2	2.5
		Q7006L5		Q7006R5	700	50	50	50		75	.05	0.5	2.0	1.6	0.2	2.5
		Q8006L5		Q8006R5	800	50	50	50		75	.05	0.5	2.0	1.6	0.2	2.5
8.0 Amps		Q2008L4	Q2008F41	Q2008R4	200	25	25	25		50	.05	0.5	2.0	1.6	0.2	2.5
		Q4008L4	Q4008F41	Q4008R4	400	25	25	25		50	.05	0.5	2.0	1.6	0.2	2.5
		Q5008L4	Q5008F41	Q5008R4	500	25	25	25		50	.05	0.5	2.0	1.6	0.2	2.5
		Q6008L5	Q6008F51	Q6008R5	600	50	50	50		75	.05	0.5	2.0	1.6	0.2	2.5
		Q7008L5		Q7008R5	700	50	50	50		75	.05	0.5	2.0	1.6	0.2	2.5
		Q8008L5		Q8008R5	800	50	50	50		75	.05	0.5	2.0	1.6	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 -65°C to +125°C for TO-92, and -40°C to +125°C for all other devices
- Storage temperature range (T_S) is -65°C to +150°C for TO-92, and -40°C to +150°C for TO-202 devices, and -40°C to +125°C for all other devices.
- 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 95.

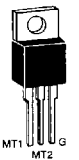
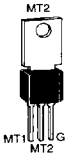
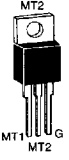
Triacs

I_H	I_{GT}	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 Watts	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) Volts/ μ Sec		Gate Controlled Turn-On Time $I_{GT} = 200mA$ 0.1 μ s Rise Time (10)	RMS Surge (Non-Repetitive) On-State Current for Period of 8.3ms for Fusing	Maximum Rate-of-Change of On-State Current $I_{GT} = 200mA$ with 0.1 μ s Rise Time
mAmps	Amps	Watts		Amps		Volts/ μ Sec	$T_C = 100^\circ C$	$T_C = 125^\circ C$	μ Sec	Amp ² Sec	Amps/ μ Sec
MAX				60Hz	50Hz	TYP	MIN		TYP		
15	1.0	10	0.2	20	16.7	1.0	40	30	2.5	1.6	30
15	1.0	10	0.2	20	16.7	1.0	40	30	2.5	1.6	30
15	1.0	10	0.2	20	16.7	1.0	30	20	2.5	1.6	30
15	1.0	10	0.2	20	16.7	1.0	30	20	2.5	1.6	30
25	1.0	10	0.2	20	16.7	1.0	50	40	3	1.6	30
25	1.0	10	0.2	20	16.7	1.0	50	40	3	1.6	30
25	1.0	10	0.2	20	16.7	1.0	40	30	3	1.6	30
25	1.0	10	0.2	20	16.7	1.0	40	30	3	1.6	30
20	1.2	15	0.3	55	46	2.0	50	40	2.5	12.5	50
20	1.2	15	0.3	55	46	2.0	50	40	2.5	12.5	50
20	1.2	15	0.3	55	46	2.0	40	30	2.5	12.5	50
20	1.2	15	0.3	55	46	2.0	40	30	2.5	12.5	50
30	1.2	15	0.3	55	46	2.0	100	75	3	12.5	50
30	1.2	15	0.3	55	46	2.0	100	75	3	12.5	50
30	1.2	15	0.3	55	46	2.0	75	50	3	12.5	50
30	1.2	15	0.3	55	46	2.0	75	50	3	12.5	50
30	1.2	15	0.3	55	46	2.0	60	40	3	12.5	50
30	1.2	15	0.3	55	46	2.0	60	40	3	12.5	50
50	1.6	18	0.5	80	65	4.0	200	120	3	26.5	70
50	1.6	18	0.5	80	65	4.0	200	120	3	26.5	70
50	1.6	18	0.5	80	65	4.0	150	100	3	26.5	70
50	1.6	18	0.5	80	65	4.0	150	100	3	26.5	70
50	1.6	18	0.5	80	65	4.0	125	85	3	26.5	70
50	1.6	18	0.5	80	65	4.0	125	85	3	26.5	70
50	1.8	20	0.5	100	83	4.0	250	150	3	41	70
50	1.8	20	0.5	100	83	4.0	250	150	3	41	70
50	1.8	20	0.5	100	83	4.0	220	125	3	41	70
50	1.8	20	0.5	100	83	4.0	220	125	3	41	70
50	1.8	20	0.5	100	83	4.0	150	100	3	41	70
50	1.8	20	0.5	100	83	4.0	150	100	3	41	70

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, B, C, D, E, F and Figure 2 for current rating at specific operating temperature.
- See Figures 3A, B and C for I_T vs 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 Figures 8A and 8B 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 = 200mA(DC) for 1-10 amp devices, 400 mA(DC) for 15 amp to 25 amp devices.
- See Figure 1(A,B,C,D,E and F) for maximum allowable case temperature at maximum rated current.
- Pulse width $\leq 10\mu s$.
- $R_L = 60\Omega$ for 1-10 amp triacs; $R_L = 30\Omega$ for 15-25 amp triacs.
- $T_C = T_J$ for test conditions in off-state.
- $I_{GT} = 500$ mA for 25 amp devices.
- Quadrants I, II, and III only.

Electrical Specifications

$I_T(RMS)$	Part Number			V_{DRM}	I_{GT}					I_{DRM}			V_{GT}	
	Isolated	Non-Isolated												
RMS On-State Current Conduction Angle of 360° (4) (16)	 THERMOTAB TO-220AB	 TO-202AB	 TO-220AB	Repetitive Peak Blocking Voltage (1) Volts	DC Gate Trigger Current In Specific Operating Quadrants $V_D = 12VDC$ (3) (7) (15) mAmps					Peak Off-State Current Gate Open $V_{DRM} = \text{Max Rated Value}$ (1) (16) mAmps			DC Gate Trigger Voltage $V_D = 12VDC$ (2) (6) (15) (18) Volts	
					QI	QII	QIII	QIV	QIV	$T_C = 25^\circ C$	$T_C = 100^\circ C$	$T_C = 125^\circ C$	$T_C = 125^\circ C$	$T_C = 25^\circ C$
MAX	For Package Dimensions & Variations, See Page 95.			MIN	MAX				TYP	MAX			MIN	MAX
10.0 Amps	Q2010L5	Q2010F51	Q2010R5	200	50	50	50		75	.05	0.5	2.0	0.2	2.5
	Q4010L5	Q4010F51	Q4010R5	400	50	50	50		75	.05	0.5	2.0	0.2	2.5
	Q5010L5	Q5010F51	Q5010R5	500	50	50	50		75	.05	0.5	2.0	0.2	2.5
	Q6010L5	Q6010F51	Q6010R5	600	50	50	50		75	.05	0.5	2.0	0.2	2.5
	Q7010L5		Q7010R5	700	50	50	50		75	.05	0.5	2.0	0.2	2.5
	Q8010L5		Q8010R5	800	50	50	50		75	0.1	0.5	2.0	0.2	2.5
15.0 Amps	Q2015L5		Q2015R5	200	50	50	50			.05	0.5	2.0	0.2	2.5
	Q4015L5		Q4015R5	400	50	50	50			.05	0.5	2.0	0.2	2.5
	Q5015L5		Q5015R5	500	50	50	50			.05	0.5	2.0	0.2	2.5
	Q6015L5		Q6015R5	600	50	50	50			.05	0.5	2.0	0.2	2.5
	Q7015L5		Q7015R5	700	50	50	50			0.1	1.0	3.0	0.2	2.5
	Q8015L5		Q8015R5	800	50	50	50			0.1	1.0	3.0	0.2	2.5
25.0 Amps			Q2025R5	200	50	50	50			0.1	1.0	3.0	0.2	2.5
			Q4025R5	400	50	50	50			0.1	1.0	3.0	0.2	2.5
			Q5025R5	500	50	50	50			0.1	1.0	3.0	0.2	2.5
			Q6025R5	600	50	50	50			0.1	1.0	3.0	0.2	2.5
			Q7025R5	700	50	50	50			0.1	1.0	3.0	0.2	2.5
			Q8025R5	800	50	50	50			0.1	1.0	3.0	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 -65°C to +125°C for TO-92, and -40°C to +125°C for all other devices
- Storage temperature range (T_S) is -65°C to +150°C for TO-92, and -40°C to +150°C for TO-202 devices, and -40°C to +125°C for all other devices.
- 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 95.

Triacs

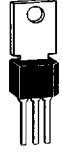
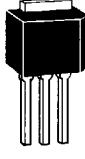
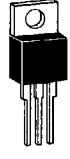
V_{TM}	I_H	I_{GTM}	P_{GM}	$P_{G(AV)}$	I_{TSM}		$dv/dt(c)$	dv/dt		t_{gt}	I^2t	di/dt
Peak On-State Voltage at Maximum Rated RMS Current $T_C = 25^\circ C$ (1) (5)	Holding Current (DC) Gate Open (1) (8) (12)	Peak Gate Trigger Current (14)	Peak Gate Power Dissipation (14) $I_{GT} \leq I_{GTM}$	Average Gate Power Dissipation	Peak One-Cycle Surge (9) (13) Amps		Critical Rate-of-Rise of Commutation Voltage at Rated V_{DRM} & $I_T(RMS)$ Commutating $di/dt = 0.54$ Rated $I_T(RMS)$ Gate Unenergized (1) (4) (13)	Critical Rate-of-Rise of Off-State Voltage at Rated V_{DRM} Gate Open (1) Volts/ μ Sec		Gate Controlled Turn-On Time $I_{GT} = 200mA$ 0.1 μ s Rise Time (10) (17)	RMS Surge (Non-Repetitive) On-State for Period of 8.3ms For Fusing	Maximum Rate-of-Change of On-State Current $I_{GT} = 200mA$ with 0.1 μ s Rise Time
Volts	Amps	Amps	Watts	Watts	60Hz	50Hz	Volts/ μ Sec	$T_C = 100^\circ C$	$T_C = 125^\circ C$	μ Sec	Amps ² Sec	Amps/mSec
MAX	MAX						TYP	MIN		TYP		
1.6	50	1.8	20	0.5	120	100	4	350	225	3	60	70
1.6	50	1.8	20	0.5	120	100	4	350	225	3	60	70
1.6	50	1.8	20	0.5	120	100	4	300	200	3	60	70
1.6	50	1.8	20	0.5	120	100	4	300	200	3	60	70
1.6	50	1.8	20	0.5	120	100	4	250	175	3	60	70
1.6	50	1.8	20	0.5	120	100	4	250	175	3	60	70
1.6	70	2.0	20	0.5	200	167	4	400	275	4	166	100
1.6	70	2.0	20	0.5	200	167	4	400	275	4	166	100
1.6	70	2.0	20	0.5	200	167	4	350	225	4	166	100
1.6	70	2.0	20	0.5	200	167	4	350	225	4	166	100
1.6	70	2.0	20	0.5	200	167	4	300	200	4	166	100
1.6	70	2.0	20	0.5	200	167	4	300	200	4	166	100
1.8	100	2.0	20	0.5	230	200	5	400	275	4	220	100
1.8	100	2.0	20	0.5	230	200	5	400	275	4	220	100
1.8	100	2.0	20	0.5	230	200	5	350	225	4	220	100
1.8	100	2.0	20	0.5	230	200	5	350	225	4	220	100
1.8	100	2.0	20	0.5	230	200	5	300	200	4	220	100
1.8	100	2.0	20	0.5	230	200	5	300	200	4	220	100

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, B, C, D, E, F and Figure 2 for current rating at specific operating temperature.
- See Figures 3A, B and C for I_T vs 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 Figures 8A and 8B 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 = 200mA(DC) for 1-10 amp devices, 400 mA(DC) for 15 amp to 25 amp devices.
- See Figure 1(A,B,C,D,E and F) for maximum allowable case temperature at maximum rated current.
- Pulse width $\leq 10\mu s$.
- $R_L = 60\Omega$ for 1-10 amp triacs; $R_L = 30\Omega$ for 15-25 amp triacs.
- $T_C = T_J$ for test conditions in off-state.
- $I_{GT} = 500$ mA for 25 amp devices.
- Quadrants I, II, and III only.

Electrical Specifications

THERMAL RESISTANCE (STEADY STATE) $R_{\theta JC}$ [$R_{\theta JA}$] (TYP.) °C/W

Type					
	TO-92	TYPE 1 TO-202AB	TYPE 2 TO-202AB	THERMOTAB TO-220AB	NON-ISOLATED TO-220AB
1.0 amp	50 [95]				
4.0 amps		3.5 [45]	6 [70]	3.6 [50]	
6.0 amps		3.8		3.3	2.1 [45]
8.0 amps		3.3		2.8	1.8
10.0 amps		3.5		2.6	1.5
15.0 amps				2.1	1.3
25.0 amps				2.0	1.1

ELECTRICAL ISOLATION FROM LEADS TO MOUNTING TAB

VAC (RMS)	TYPE	TO-92		Isolated ** TO-220AB	
1600		Standard		—	
2500		N/A		Standard	
4000		N/A		Optional *	

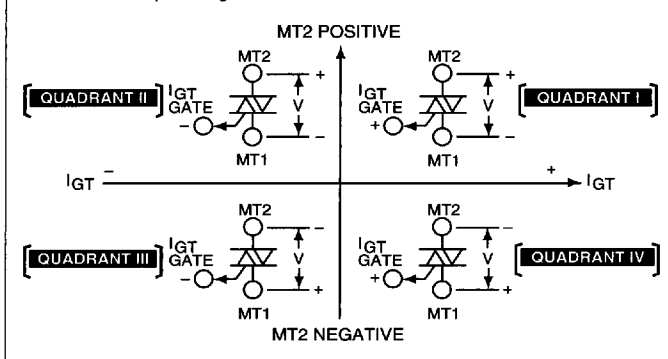
* For 4000V isolation, use V suffix in part number.

** UL Recognized File E71639

GATE CHARACTERISTICS

Teccor triacs 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, and Quadrants I & IV are used when a positive pulse is applied. However, due to higher gate requirements for Quadrant IV, it is recommended that only negative pulses be applied. If positive pulses are required, see logic triac sections of catalog or contact factory. 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 μ sec rise time).

Definition of Operating Quadrants



ELECTRICAL ISOLATION

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

Figure 2 — Maximum Allowable Ambient Temperature vs On-State Current

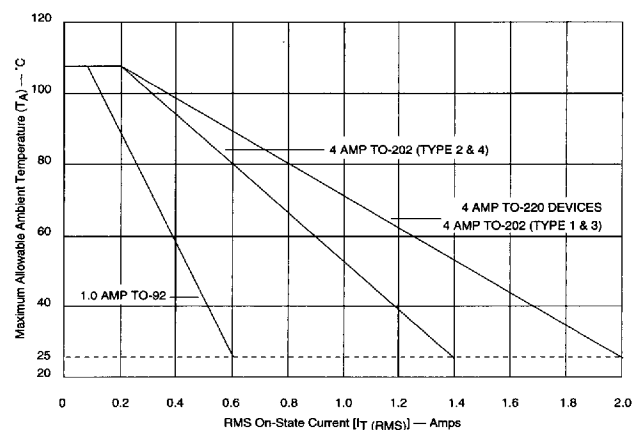


Figure 1A — Maximum Allowable Case Temperature vs On-State Current

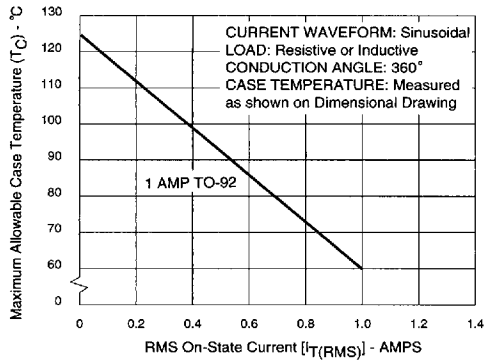


Figure 1B — Maximum Allowable Case Temperature vs On-State Current

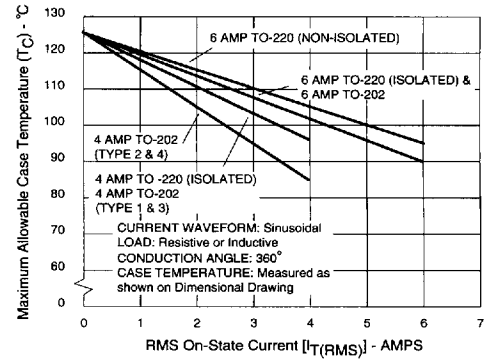


Figure 1C — Maximum Allowable Case Temperature vs On-State Current

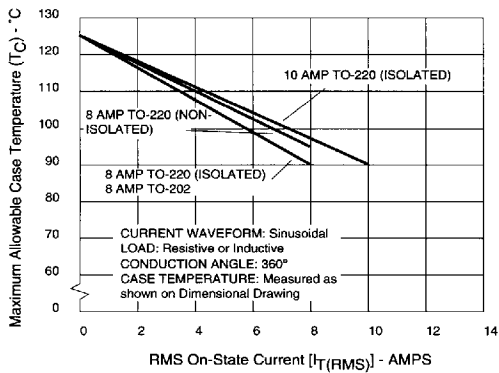


Figure 1D — Maximum Allowable Case Temperature vs On-State Current

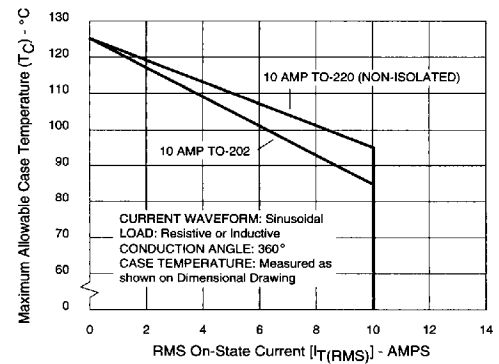


Figure 1E — Maximum Allowable Case Temperature vs On-State Current

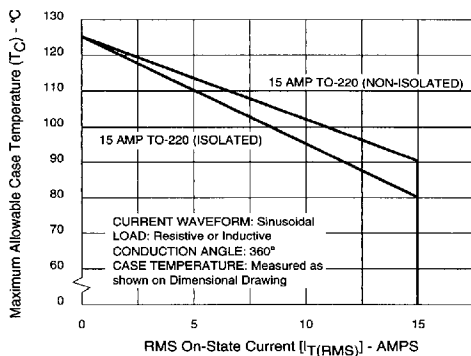
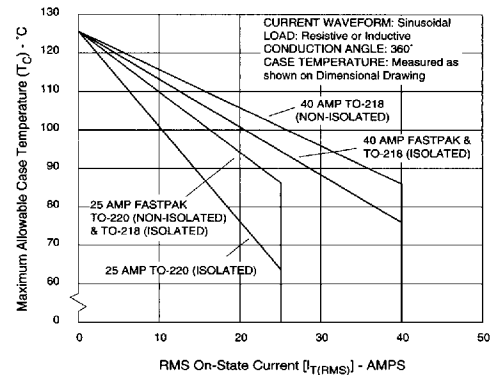


Figure 1F — Maximum Allowable Case Temperature vs On-State Current



Electrical Specifications

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

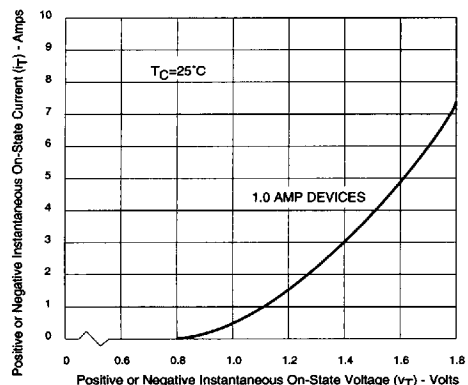


Figure 3B — On-State Current vs On-State Voltage (Typical)

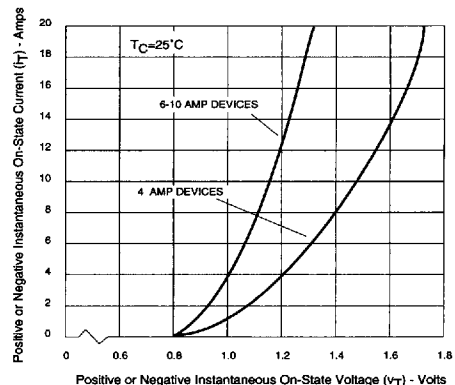


Figure 3C — On-State Current vs On-State Voltage (Typical)

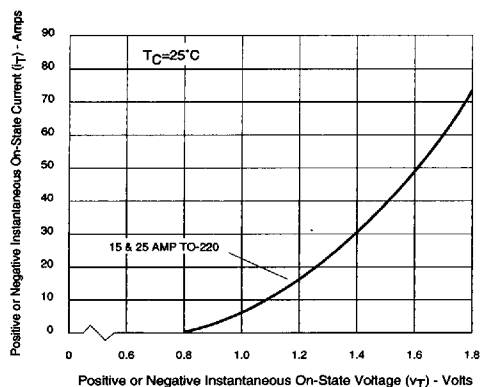


Figure 4 — Normalized DC Gate Trigger Current for All Quadrants vs Case Temperature

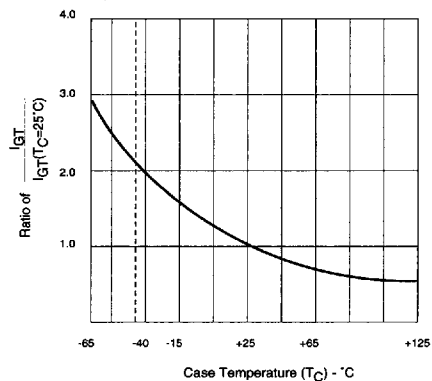


Figure 5 — Normalized DC Gate Trigger Voltage for All Quadrants vs Case Temperature

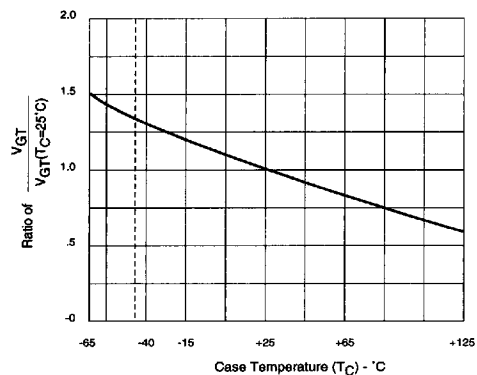


Figure 6 — Normalized DC Holding Current vs Case Temperature

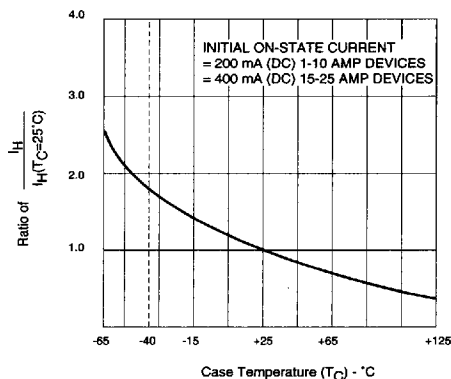
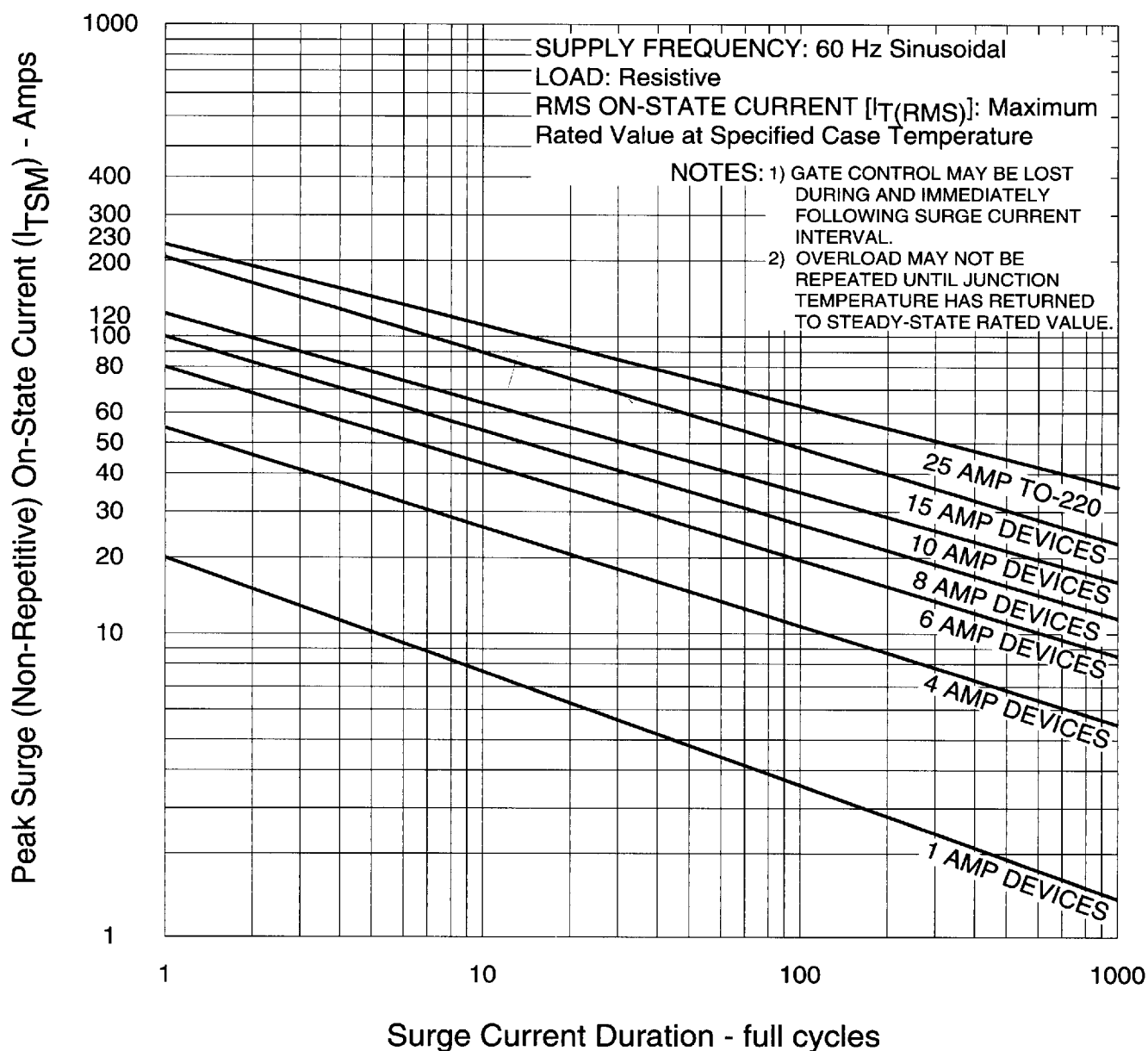


Figure 7 — Peak Surge Current vs Surge Current Duration



Electrical Specifications

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

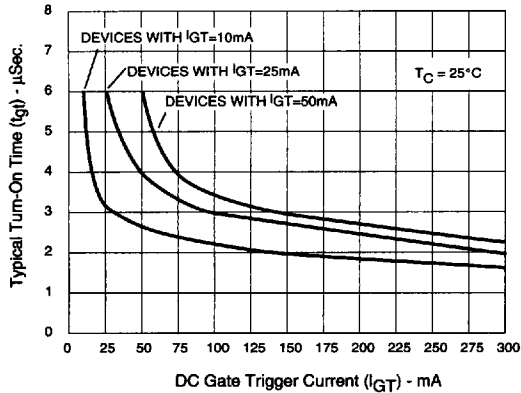


Figure 8B — Turn-On Time vs Gate Trigger Current (Typical)

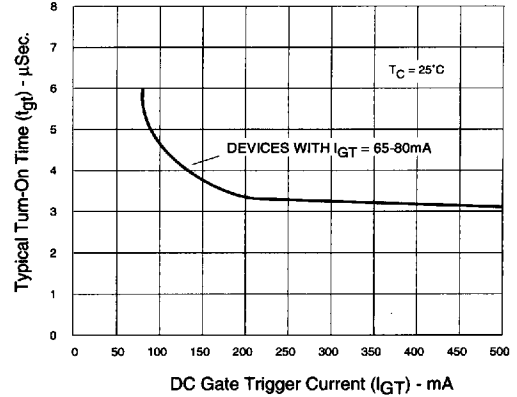


Figure 9A — Power Dissipation (Typical) vs On-State Current

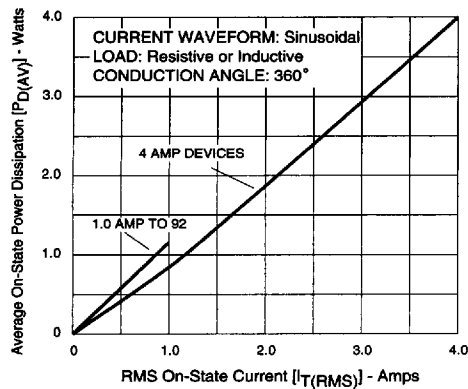


Figure 9B — Power Dissipation (Typical) vs On-State Current

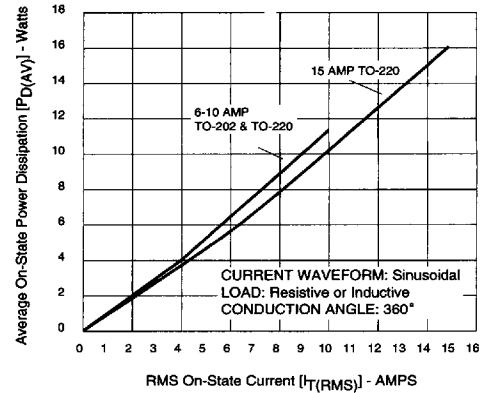


Figure 9C — Power Dissipation (Typical) vs On-State Current

