U.L. RECOGNIZED
File #E71639

TO-220
Isolated

E3

MT2 MT1

T

Quadrac

Internally Triggered Triacs (4 A to 15 A)

General Description

Teccor's *Quadrac* devices are triacs that include a diac trigger mounted inside the same package. This device, developed by Teccor, saves the user the expense and assembly time of buying a discrete diac and assembling in conjunction with a gated triac. Also, the alternistor *Quadrac* device (QxxxxLTH) eliminates the need for a snubber network.

The *Quadrac* device is a bidirectional AC switch and is gate controlled for either polarity of main terminal voltage. Its primary purpose is for AC switching and phase control applications such as speed controls, temperature modulation controls, and lighting controls where noise immunity is required.

Triac current capacities range from 4 A to 15 A with voltage ranges from 200 V to 600 V. *Quadrac* devices are available in the TO-220 package.
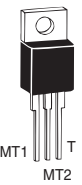
The TO-220 package is electrically isolated to 2500 V rms from the leads to mounting surface. 4000 V rms is available on special order. This means that no external isolation is required, thus eliminating the need for separate insulators and insulator-mounting steps and saving dollars over "hot tab" devices.

All Teccor triac and diac chips have glass-passivated junctions to ensure long-term device reliability and parameter stability.

Variations of devices in this data sheet are available for custom design applications. Consult the factory for more information.

Features

- **Glass-passivated junctions**
- **Electrically-isolated package**
- **Internal trigger diac**
- **High surge capability — up to 200 A**
- **High voltage capability — 200 V to 600 V**

I$_{T(RMS)}$	Part No. Isolated	V$_{DRM}$	I$_{DRM}$			V$_{TM}$	Trigger Diac Specifications (T–MT1)					
							ΔV$_{BO}$	V$_{BO}$		[ΔV±]	I$_{BO}$	C$_T$
(5)		(1)	(1) (10)			(1) (3)	(7)	(6)		(6)		(11)
			mAmps			Volts						
			T$_C$ = 25 °C	T$_C$ = 100 °C	T$_C$ = 125 °C							
	TO-220	Volts				T$_C$ = 25 °C	Volts	Volts		Volts	µAmps	µFarads
See "Package Dimensions" section for variations. (12)		MIN	MAX			MAX	MAX	MIN	MAX	MIN	MAX	MAX
4 A	Q2004LT	200	0.05	0.5	2	1.6	3	33	43	5	25	0.1
	Q4004LT	400	0.05	0.5	2	1.6	3	33	43	5	25	0.1
	Q6004LT	600	0.05	0.5	2	1.6	3	33	43	5	25	0.1
6 A	Q2006LT	200	0.05	0.5	2	1.6	3	33	43	5	25	0.1
	Q4006LT	400	0.05	0.5	2	1.6	3	33	43	5	25	0.1
	Q6006LT	600	0.05	0.5	2	1.6	3	33	43	5	25	0.1
	Q4006LTH	400	0.05	0.5	2	1.6	3	33	43	5	25	0.1
	Q6006LTH	600	0.05	0.5	2	1.6	3	33	43	5	25	0.1
8 A	Q2008LT	200	0.05	0.5	2	1.6	3	33	43	5	25	0.1
	Q4008LT	400	0.05	0.5	2	1.6	3	33	43	5	25	0.1
	Q6008LT	600	0.05	0.5	2	1.6	3	33	43	5	25	0.1
	Q4008LTH	400	0.05	0.5	2	1.6	3	33	43	5	25	0.1
	Q6008LTH	600	0.05	0.5	2	1.6	3	33	43	5	25	0.1
10 A	Q2010LT	200	0.05	0.5	2	1.6	3	33	43	5	25	0.1
	Q4010LT	400	0.05	0.5	2	1.6	3	33	43	5	25	0.1
	Q6010LT	600	0.05	0.5	2	1.6	3	33	43	5	25	0.1
	Q4010LTH	400	0.05	0.5	2	1.6	3	33	43	5	25	0.1
	Q6010LTH	600	0.05	0.5	2	1.6	3	33	43	5	25	0.1
15 A	Q2015LT	200	0.05	0.5	2	1.6	3	33	43	5	25	0.1
	Q4015LT	400	0.05	0.5	2	1.6	3	33	43	5	25	0.1
	Q6015LT	600	0.05	0.5	2	1.6	3	33	43	5	25	0.1
	Q4015LTH	400	0.05	0.5	2	1.6	3	33	43	5	25	0.1
	Q6015LTH	600	0.05	0.5	2	1.6	3	33	43	5	25	0.1

Specific Test Conditions

[ΔV±] — Dynamic breakback voltage (forward and reverse)

ΔV$_{BO}$ — Breakover voltage symmetry

C$_T$ — Trigger firing capacitance

di/dt — Maximum rate-of-change of on-state current

dv/dt — Critical rate-of-rise of off-state voltage at rated V$_{DRM}$ gate open

dv/dt(c) — 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

I²t — RMS surge (non-repetitive) on-state current for period of 8.3 ms for fusing

I$_{BO}$ — Peak breakover current

I$_{DRM}$ — Peak off-state current gate open; V$_{DRM}$ = maximum rated value

I$_{GTM}$ — Peak gate trigger current (10 µs Max)

I$_H$ — Holding current; gate open

I$_{T(RMS)}$ — RMS on-state current, conduction angle of 360°

I$_{TSM}$ — Peak one-cycle surge

t$_{gt}$ — Gate controlled turn-on time

V$_{BO}$ — Breakover voltage (forward and reverse)

V$_{DRM}$ — Repetitive peak blocking voltage

V$_{TM}$ — Peak on-state voltage at maximum rated RMS current

General Notes

- All measurements are made at 60 Hz with resistive load at an ambient temperature of +25 °C unless otherwise specified.

- 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" (1.59 mm) from case.

- The case temperature (T$_C$) is measured as shown on dimensional outline drawings. See "Package Dimensions" section of this catalog.

Electrical Specification Notes

(1) For either polarity of MT2 with reference to MT1

(2) See Figure E3.1 for I$_H$ versus T$_C$.

(3) See Figure E3.4 and Figure E3.5 for i$_T$ versus v$_T$.

(4) See Figure E3.9 for surge ratings with specific durations.

I_H	I_{TSM}	dv/dt(c)	dv/dt		t_{gt}	I^2t	I_{GTM}	di/dt
(1) (2)	(4) (8)	(1) (5) (8)	(1)		(6) (9)			(9)
			Volts/µSec					
			$T_C =$ 100 °C	$T_C =$ 125 °C				
mAmps	Amps	Volts/µSec			µSec	Amps²Sec	Amps	Amps/µSec
MAX	60/50Hz	MIN	MIN		TYP			
40	55/46	3	75	50	3	12.5	1.2	50
40	55/46	3	75	50	3	12.5	1.2	50
40	55/46	3	50	50	3	12.5	1.2	50
50	80/65	4	150	100	3	26.5	1.5	70
50	80/65	4	150	100	3	26.5	1.5	70
50	80/65	4	125	85	3	26.5	1.5	70
50	80/65	25	575	450	3	26.5	1.5	70
50	80/65	25	425	350	3	26.5	1.5	70
60	100/83	4	175	120	3	41	1.5	70
60	100/83	4	175	120	3	41	1.5	70
60	100/83	4	150	100	3	41	1.5	70
60	100/83	25	575	450	3	41	1.5	70
60	100/83	25	425	350	3	41	1.5	70
60	120/100	4	200	150	3	60	1.5	70
60	120/100	4	200	150	3	60	1.5	70
60	120/100	4	175	120	3	60	1.5	70
60	120/100	30	925	700	3	60	1.5	70
60	120/100	30	775	600	3	60	1.5	70
70	200/167	4	300	200	3	166	1.5	100
70	200/167	4	300	200	3	166	1.5	100
70	200/167	4	200	150	3	166	1.5	100
70	200/167	30	925	700	3	166	1.5	100
70	200/167	30	775	600	3	166	1.5	100

(5) See Figure E3.6, Figure E3.7, and Figure E3.8 for current rating at specific operating temperature.

(6) See Figure E3.2 and Figure E3.3 for test circuit.

(7) $\Delta V_{BO} = [+ V_{BO}] - [- V_{BO}]$

(8) See Figure E3.7 and Figure E3.8 for maximum allowable case temperature at maximum rated current.

(9) Trigger firing capacitance = 0.1 µF with 0.1 µs rise time

(10) $T_C = T_J$ for test conditions in off state

(11) Maximum required value to ensure sufficient gate current

(12) See package outlines for lead form configurations. When ordering special lead forming, add type number as suffix to part number.

Thermal Resistance (Steady State) $R_{\theta JC}$ [$R_{\theta JA}$] °C/W (TYP)	
TYPE	Isolated TO-220
4 A	3.6 [50]
6 A	3.3
8 A	2.8
10 A	2.6
15 A	2.1

Electrical Isolation

All Teccor isolated *Quadrac* packages withstand a minimum high potential test of 2500 V ac rms from leads to mounting tab over the operating temperature range of the device. The following isolation table shows standard and optional isolation ratings.

Electrical Isolation from Leads to Mounting Tab *	
V AC RMS	TYPE
2500	Standard
4000	Optional **

* UL Recognized File #E71639
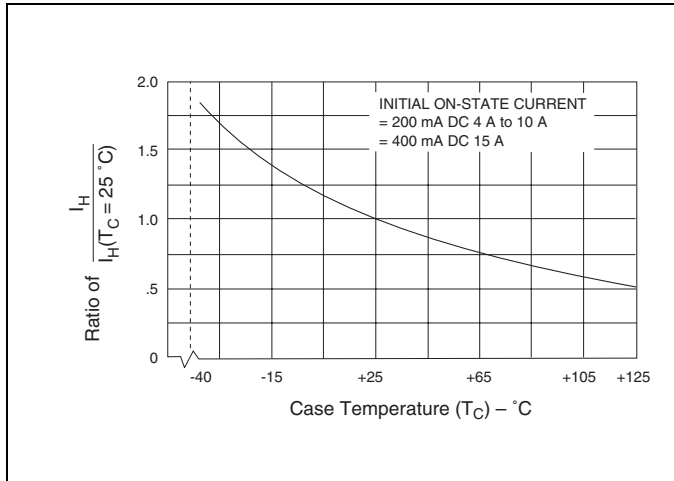**For 4000 V isolation, use "V" suffix in part number.

Figure E3.1   Normalized DC Holding Current versus Case Temperature
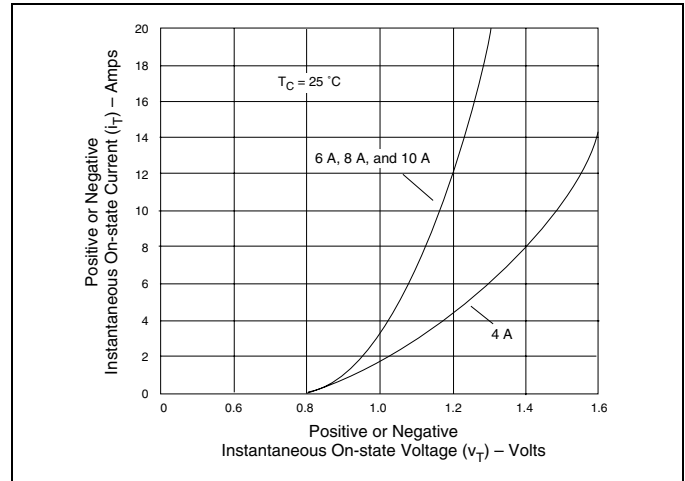

Figure E3.4   On-state Current versus On-state Voltage (Typical) (4 A to 10 A)
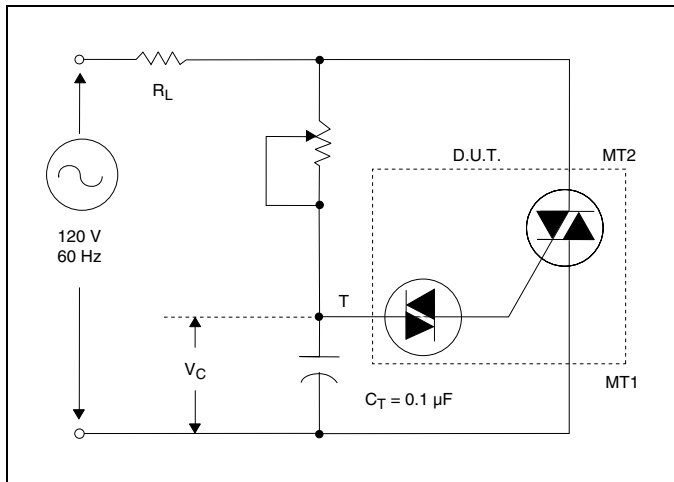

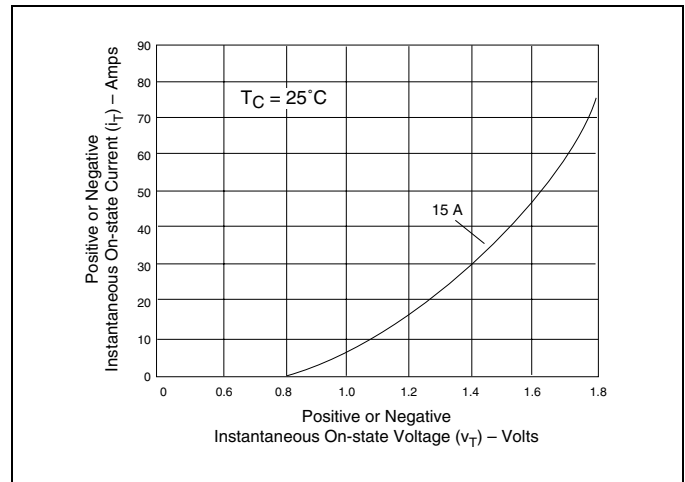Figure E3.2   Test Circuit

Figure E3.5   On-state Current versus On-state Voltage (Typical) (15 A)
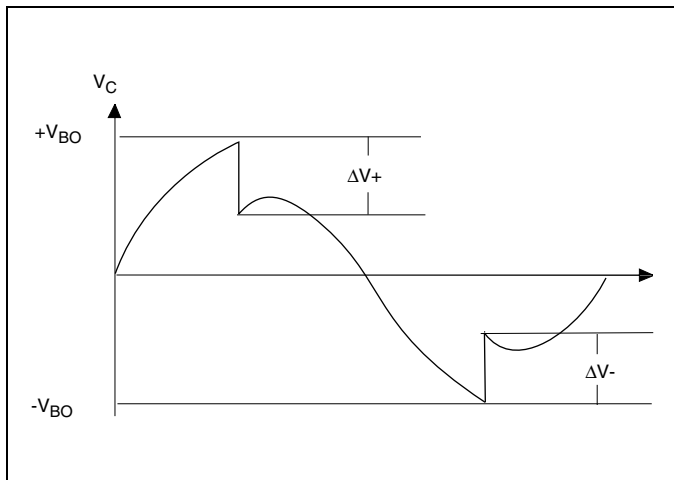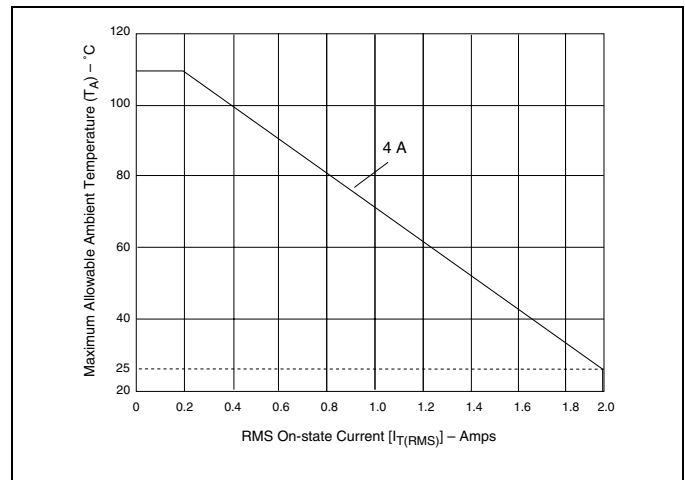

Figure E3.3   Test Circuit Waveforms

Figure E3.6   Maximum Allowable Ambient Temperature versus On-state Current
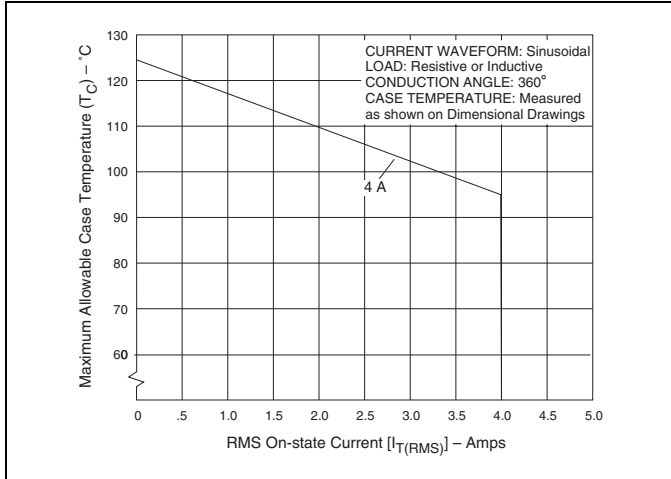
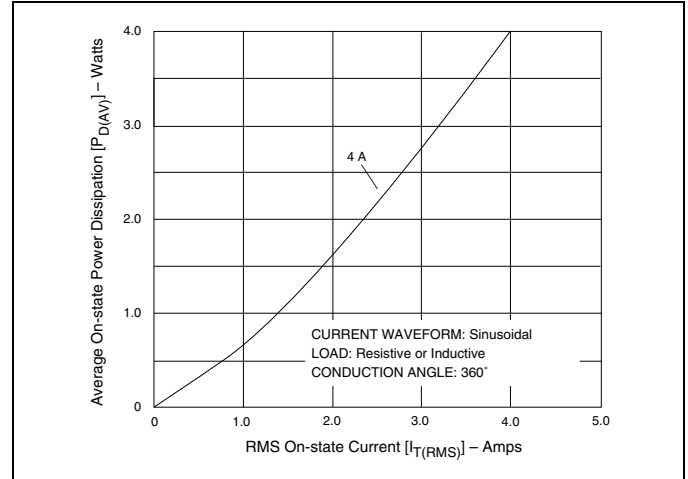Figure E3.7   Maximum Allowable Case Temperature versus
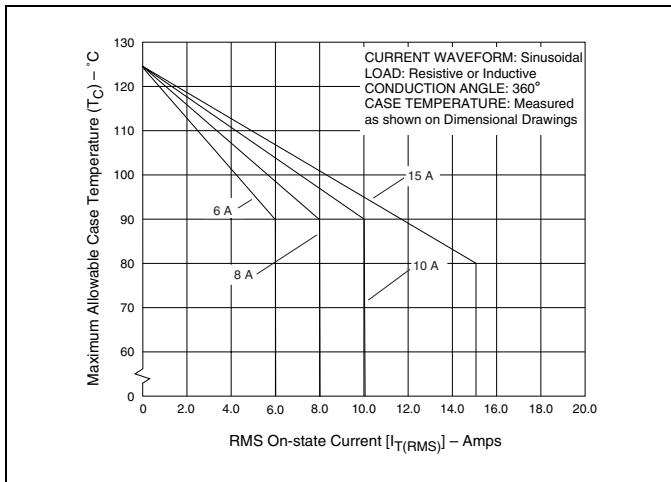On-state Current (4 A)

Figure E3.10 Power Dissipation (Typical) versus On-state Current (4 A)

Figure E3.8   Maximum Allowable Case Temperature versus
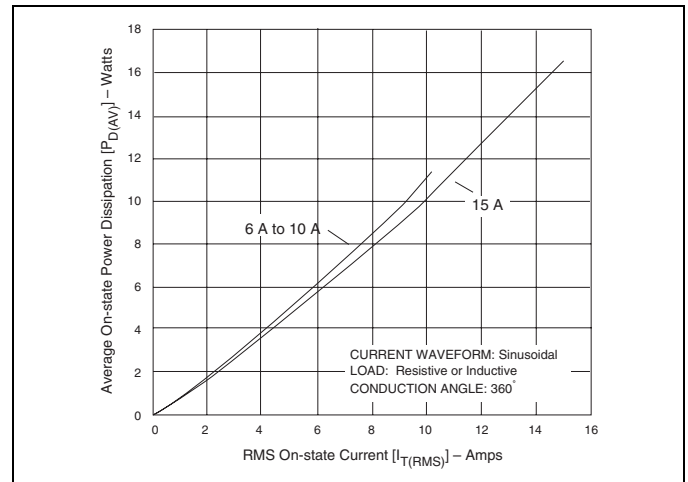On-state Current (6 A to 15 A)

Figure E3.11 Power Dissipation (Typical) versus On-state Current
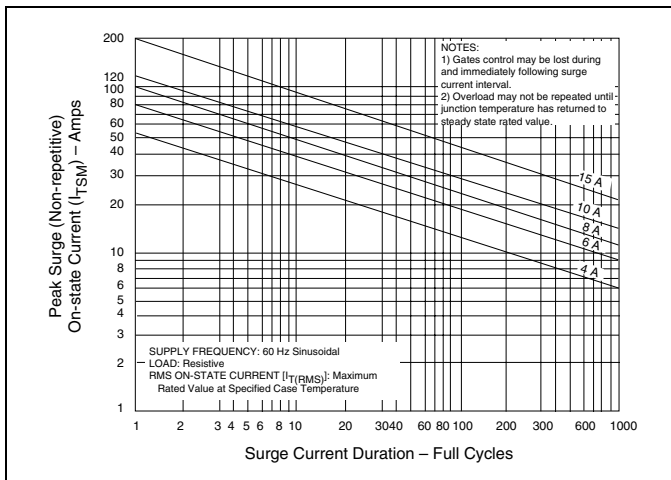(6 A to 10 A and 15 A)

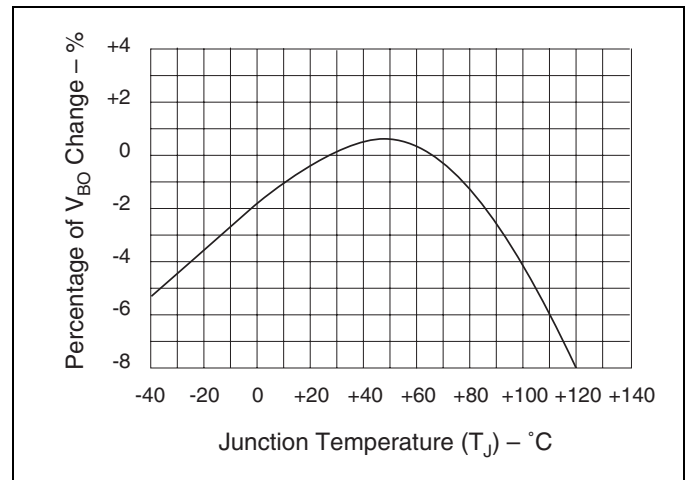Figure E3.9   Peak Surge Current versus Surge Current Duration

Figure E3.12 Normalized diac V_{BO} versus Junction Temperature

Notes