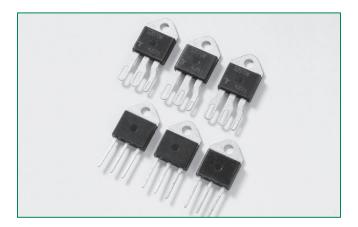


RoHS Qxx40xx Series





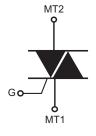
Agency Approval

Agency	Agency File Number
<i>I</i> R ®	K & J Packages: E71639

Main Features

Symbol	Value	Unit
I _{T(RMS)}	40	А
V_{DRM}/V_{RRM}	400 to 1000	V
 GT (Q1)	50 to 100	mA

Schematic Symbol



Description

40 Amp bi-directional solid state switch series is designed for AC switching and phase control applications such as motor speed and temperature modulation controls, lighting controls, and static switching relays.

Alternistor type devices only operate in quadrants I, II, & III and are used in circuits requiring high dv/dt capability.

Features & Benefits

- RoHS Compliant
- Glass passivated junctions
- Voltage capability up to 1000V
- Surge capability up to 400A
- Electrically isolated
 K & J -Packages are UL
 recognized for 2500Vrms

Applications

Excellent for AC switching and phase control applications such as heating, lighting, and motor speed controls.

Typical applications are AC solid-state switches, industrial power tools, exercise equipment, white goods and commercial appliances.

Alternistor Triacs (no snubber required) are used in applications with extremely inductive loads requiring highest commutation performance.

Internally constructed isolated packages are offered for ease of heat sinking with highest isolation voltage.

Teccor® brand Thyristors 40 Amp Alternistor (High Commutation) Triacs



Absolute Maximum Ratings — Alternistor Triac (3 Quadrants)

Symbol	Paramete	Value	Unit		
I _{T(RMS)}	RMS on-state current (full sine wave)	Qxx40x7 Qxx40xH6	T _C = 75°C	40	А
1	Non repetitive surge peak on-state current	f = 50 Hz	t = 20 ms	335	A
TSM	(full cycle, T _J initial = 25°C)	t = 16.7 ms	400		
l ² t	I²t Value for fusing	$t_p = 8.3 \text{ ms}$	664	A ² s	
di/dt	Critical rate of rise of on-state current $(I_G = 2 \times I_{GT}, tr \le 100 \text{ ns})$	T = 1201 H2			A/µs
I _{GTM}	Peak gate trigger current	$t_p \le 10 \ \mu s \ I_{GT} \le I_{GTM}$	T _J = 125°C	4	А
P _{G(AV)}	Average gate power dissipation	T _J = 125°C	0.8	W	
T _{stg}	Storage temperature range	-40 to 150	°C		
T _J	Operating junction temperature range			-40 to 125	°C

Note: xx = voltage, x = package

Electrical Characteristics (T₁ = 25°C, unless otherwise specified) — Alternistor Triac (3 Quadrants)

Symbol	Test Conditions	Quad	Quadrant		Value			
Symbol	rest Conditions			Qxx40xH6	Qxx40K5	Qxx40x7	Unit	
I _{GT}	V - 12V P - 60 O	1 – 11 – 111	MAX.	80	50	100	mA	
V _{GT}	$V_D = 12V R_L = 60 \Omega$	1 – 11 – 111	MAX.	1.3	1.3	2.0	V	
$V_{\sf GD}$	$V_D = V_{DRM} R_L = 3.3 \text{ k}\Omega T_J = 125^{\circ}\text{C}$	1 – 11 – 111	MIN.		0.2		V	
I _H	$I_{T} = 400 \text{mA}$		MAX.	80	75	100	mA	
		400V		600	500	700		
1.716	$V_D = V_{DRM}$ Gate Open $T_J = 125$ °C	600V		500	475	625		
d∨/dt		800V	MIN.	475	400	575	V/µs	
	$V_D = V_{DRM}$ Gate Open $T_J = 100^{\circ}C$	1000V				500		
(dv/dt)c	(di/dt)c = 21.6 A/µs T _J = 125°C	MIN.	30	20	50	V/µs		
t _{gt}	$I_{\rm G} = 2 \times I_{\rm GT} \text{ PW} = 15 \mu \text{s} I_{\rm T} = 56.6 \text{A(p)}$	<)	TYP.		5		μs	

Static Characteristics

Symbol	Т	Value	Unit			
V _{TM}	$I_{TM} = 56.6A t_p = 380 \mu s$	T _J = 25°C		MAX.	1.8	V
		T _J = 25°C	400 –1000V	MAX.	20	μΑ
DRM RRM	$V_{D} = V_{DRM} / V_{RRM}$	T _J = 125°C	400 – 800V	MAX.	5	mA
KKM		T _J = 100°C	1000V	MAX.	5	mA

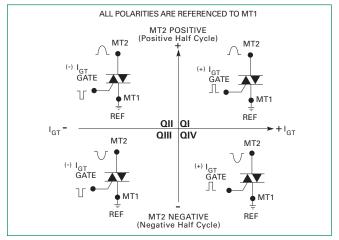
Thermal Resistances

	Symbol	Parameter	Value	Unit	
	$R_{_{\boldsymbol{\theta}(J-C)}}$	Junction to case (AC)	Qxx40KH6 Qxx40K5 Qxx40K7	0.97	°C/W
		Junction to case (AC)	Qxx40JH6 Qxx40J7	0.95	5, * *

Note: xx = voltage



Figure 1: Definition of Quadrants



Note: Alternistors will not operate in QIV

Figure 3: Normalized DC Holding Current vs. Junction Temperature

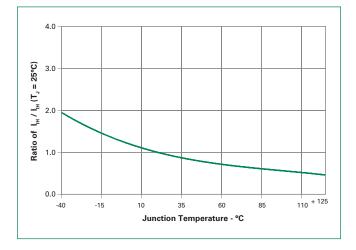


Figure 5: Power Dissipation (Typical) vs. RMS On-State Current

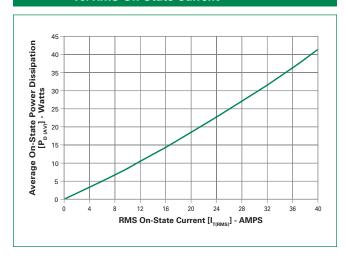


Figure 2: Normalized DC Gate Trigger Current for All Quadrants vs. Junction Temperature

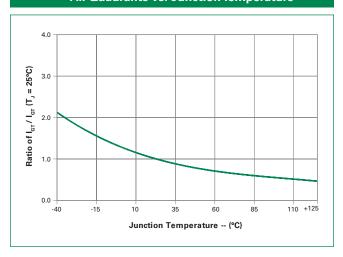


Figure 4: Normalized DC Gate Trigger Voltage for All Quadrants vs. Junction Temperature

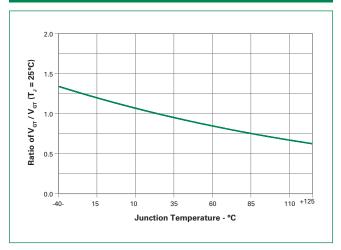


Figure 6: Maximum Allowable Case Temperature vs. On-State Current

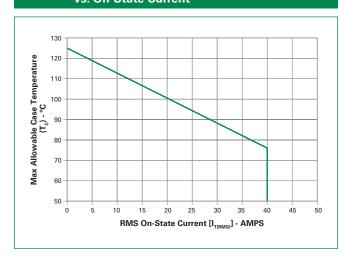




Figure 7: On-State Current vs. On-State Voltage (Typical)

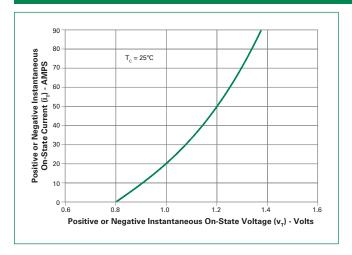
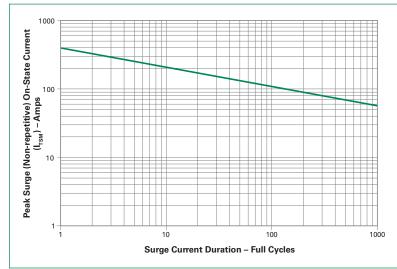


Figure 8: Surge Peak On-State Current vs. Number of Cycles



Supply Frequency: 60Hz Sinusoidal Load: Resistive RMS On-State II 1: Max Rated Value

RMS On-State $[I_{T(RMS)}]$: Max Rated Value at Specific Case Temperature

Notes:

- Gate control may be lost during and immediately following surge current interval.
- 2) Overload may not be repeated until junction temperature has returned to steady-state rated value.

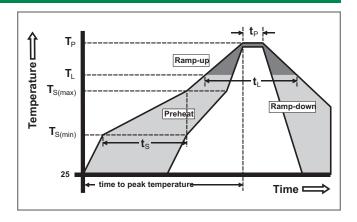
Note: xx = voltage

Teccor® brand Thyristors 40 Amp Alternistor (High Commutation) Triacs



Soldering Parameters

Reflow Co	ndition	Pb – Free assembly
	-Temperature Min (T _{s(min)})	150°C
Pre Heat	-Temperature Max (T _{s(max)})	200°C
	-Time (min to max) (t _s)	60 – 180 secs
Average ra	amp up rate (LiquidusTemp) k	5°C/second max
T _{S(max)} to T _L	- Ramp-up Rate	5°C/second max
Reflow	-Temperature (T _L) (Liquidus)	217°C
nellow	-Time (min to max) (t _s)	60 – 150 seconds
PeakTemp	perature (T _P)	260+ ^{0/-5} °C
Time with Temperatu	in 5°C of actual peak ure (t _p)	20 - 40 seconds
Ramp-dov	vn Rate	5°C/second max
Time 25°C	to peakTemperature (T _P)	8 minutes Max.
Do not exc	ceed	280°C



Physical Specifications

Terminal Finish	100% Matte Tin-plated.
Body Material	UL recognized epoxy meeting flammability classification 94V-0.
Lead Material	Copper Alloy

Design Considerations

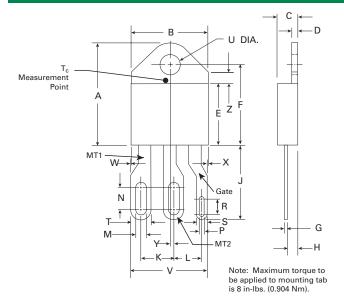
Careful selection of the correct device for the application's operating parameters and environment will go a long way toward extending the operating life of the Thyristor. Good design practice should limit the maximum continuous current through the main terminals to 75% of the device rating. Other ways to ensure long life for a power discrete semiconductor are proper heat sinking and selection of voltage ratings for worst case conditions. Overheating, overvoltage (including dv/dt), and surge currents are the main killers of semiconductors. Correct mounting, soldering, and forming of the leads also help protect against component damage.

Environmental Specifications

Test	Specifications and Conditions
AC Blocking	MIL-STD-750, M-1040, Cond A Applied Peak AC voltage @ 125°C for 1008 hours
Temperature Cycling	MIL-STD-750, M-1051, 100 cycles; -40°C to +150°C; 15-min dwell-time
Temperature/ Humidity	EIA / JEDEC, JESD22-A101 1008 hours; 320V - DC: 85°C; 85% rel humidity
High Temp Storage	MIL-STD-750, M-1031, 1008 hours; 150°C
Low-Temp Storage	1008 hours; -40°C
Thermal Shock	MIL-STD-750, M-1056 10 cycles; 0°C to 100°C; 5-min dwell- time at each temperature; 10 sec (max) transfer time between temperature
Autoclave	EIA / JEDEC, JESD22-A102 168 hours (121°C at 2 ATMs) and 100% R/H
Resistance to Solder Heat	MIL-STD-750 Method 2031
Solderability	ANSI/J-STD-002, category 3, Test A
Lead Bend	MIL-STD-750, M-2036 Cond E

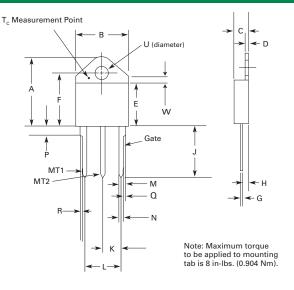


Dimensions — TO-218X (J Package) — Isolated Mounting Tab



Dimension	Inc	hes	Millimeters		
Dimension	Min	Max	Min	Max	
А	0.810	0.835	20.57	21.21	
В	0.610	0.630 15.49		16.00	
С	0.178	0.188	4.52	4.78	
D	0.055	0.070	1.40	1.78	
Е	0.487	0.497	12.37	12.62	
F	0.635	0.655	16.13	16.64	
G	0.022	0.029	0.56	0.74	
Н	0.075	0.095	1.91	2.41	
J	0.575	0.625	14.61	15.88	
K	0.256	0.264	6.50	6.71	
L	0.220	0.228	5.58	5.79	
М	0.080	0.088	2.03	2.24	
N	0.169	0.177	4.29	4.49	
Р	0.034	0.042	0.86	1.07	
R	0.113	0.121	2.87	3.07	
S	0.086	0.096	2.18	2.44	
Т	0.156	0.166	3.96	4.22	
U	0.164	0.165	4.10	4.20	
V	0.603	0.618	15.31	15.70	
W	0.000	0.005	0.00	0.13	
X	0.003	0.012	0.07	0.30	
Υ	0.028	0.032	0.71	0.81	
Z	0.085	0.095	2.17	2.42	

Dimensions — TO-218AC (K Package) — Isolated Mounting Tab



Dimension	Inc	hes	Millimeters		
Dimension	Min	Max	Min	Max	
А	0.810	0.835	20.57	21.21	
В	0.610	0.630	15.49	16.00	
С	0.178	0.188	4.52	4.78	
D	0.055	0.070	1.40	1.78	
Е	0.487	0.497	12.37	12.62	
F	0.635	0.655	16.13	16.64	
G	0.022	0.029	0.56	0.74	
Н	0.075	0.095	1.91	2.41	
J	0.575	0.625	14.61	15.88	
K	0.211	0.219	5.36	5.56	
L	0.422	0.437	10.72	11.10	
М	0.058	0.068	1.47	1.73	
N	0.045	0.055	1.14	1.40	
Р	0.095	0.115	2.41	2.92	
Q	0.008	0.016	0.20	0.41	
R	0.008	0.016	0.20	0.41	
U	0.164	0.165	4.10	4.20	
W	0.085	0.095	2.17	2.42	

Teccor® brand Thyristors 40 Amp Alternistor (High Commutation) Triacs



Product Selector

Part Number		Volt	Oltage Gate Sensitivity Quadrants			Туре	Package		
rait Number	400V	600V	800V	1000V	I – II – III	IV	T(RMS)) Type	гаскауе
Qxx40KH6	Х	X	X	X	80mA		40A	Alternistor Triac	TO-218AC
Qxx40JH6	Х	X	Х		80mA		40A	Alternistor Triac	TO-218X
Qxx40K5	Х	X	X		50mA		40A	Alternistor Triac	TO-218AC
Qxx40K7	Х	X	Х	X	100 mA		40A	Alternistor Triac	TO-218AC
Qxx40J7	Х	X	Х		100 mA		40A	Alternistor Triac	TO-218X

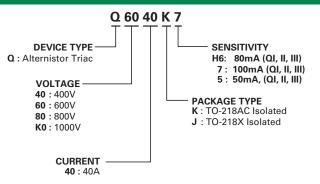
Note: xx = Voltage

Packing Options

Part Number	Marking	Weight	Packing Mode	Base Quantity
Qxx40KH6TP	Qxx40KH6	4.40g	Tube	250 (25 per tube)
Qxx40JH6TP	Qxx40JH6	5.23g	Tube	250 (25 per tube)
Qxx40K5TP	Qxx40K5	4.40g	Tube	250 (25 per tube)
Qxx40K7TP	Qxx40K7	4.40g	Tube	250 (25 per tube)
Qxx40J7TP	Qxx40J7	5.23g	Tube	250 (25 per tube)

Note: xx = Voltage

Part Numbering System



Part Marking System

TO-218 AC (K Package) TO-218 X – (J Package)

