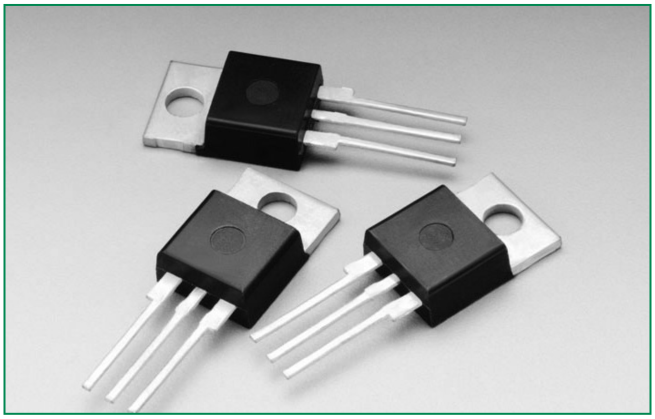
QJxx30LH4 series

HF RoHS



Description

This 30A high temperature Alternistor TRIAC series enables easier thermal management and higher surge handling capability in AC power control applications such as heater control, motor speed control, lighting controls, and static switching relays.

Alternistor TRIAC operates in quadrants I, II, & III and offers high performance in applications requiring high commutation capability.

Agency Recognitions

Agency	Agency File Number
UL	E71639

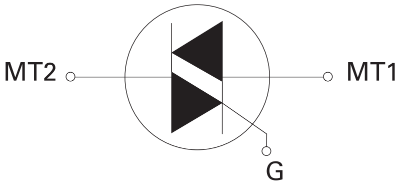
Features & Benefits

- High T_J of 150°C
- Voltage capability up to 800V
- Surge capability of 350A at 60Hz half cycle
- Mechanically and thermally robust TO-220 clip-attach assembly
- Electrically isolated for 2500Vrms
- UL Recognized to UL 1557 as an Electrically Isolated Semiconductor Device.
- Halogen-free and RoHS-compliant

Main Features

Symbol	Value	Unit
$I_{T(RMS)}$	30	A
V_{DRM}/V_{RRM}	600 or 800	V
$I_{GT\ (Q1)}$	35	mA

Schematic Symbol



Applications

TRIAC is an excellent AC switch in applications such as heating, lighting, and motor speed controls.

Typical applications are

- Heater control such as coffee brewer, tankless water heater and infrared heater
- AC solid-state relays
- Light dimmers including incandescent and LED lighting
- Motor speed control in kitchen appliances, power tools, home/brow/white goods and light industrial applications as compressor motor control

Alternistor TRIAC is used with high inductive loads requiring the high commutation capability. Internally isolated packages offer better heat sinking with higher isolation voltage.

Absolute Maximum Ratings — Alternistor Triac (3 Quadrants)

Symbol	Parameter			Value	Unit
V_{DSM}/V_{RSM}	Peak non-repetitive blocking voltage	pulse width = 100 µs		V_{DRM}+200V	V
$I_{T(RMS)}$	RMS on-state current (full sine wave)	T_C = 105 °C		30	A
I_{TSM}	Non repetitive surge peak on-state current (Single half cycle, T_J initial = 25°C)	f = 50Hz	t = 20 ms	290	A
		f = 60Hz	t = 16.7 ms	350	
I²t	I²t Value for fusing		t_p = 8.3 ms	508	A²s
di/dt	Critical rate of rise of on-state current	f = 60Hz	T_J = 150 °C	100	A/µs
I_{GTM}	Peak gate trigger current	t_p ≤ 20µs; I_{GT} ≤ I_{GTM}	T_J = 150°C	4.0	A
$P_{G(AV)}$	Average gate power dissipation		T_J = 150 °C	1.0	W
T_{stg}	Storage temperature range			-40 to 150	°C
T_J	Operating junction temperature range			-40 to 150	°C

y = sensitivity

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

Symbol	Test Conditions	Quadrant		Value	Unit
I_{GT}	V_D = 12V R_L = 60Ω	I – II – III	MAX.	35	mA
V_{GT}		I – II – III	MAX.	1.0	V
V_{GD}	V_D = V_{DRM} R_L = 3.3kΩ T_J = 150°C	I – II – III	MIN.	0.2	V
I_H	I_T = 100mA		MAX.	60	mA
dv/dt	V_D = 2/3 V_{DRM} Gate Open T_J = 150°C		MIN.	1500	V/µs
(dv/dt)c	(di/dt)c = 18.9 A/ms T_J = 150°C		MIN.	20	V/µs
t_{gt}	I_G = 2 x I_{GT} PW = 15µs I_T = 42.4 A(pk)		TYP.	3	µs

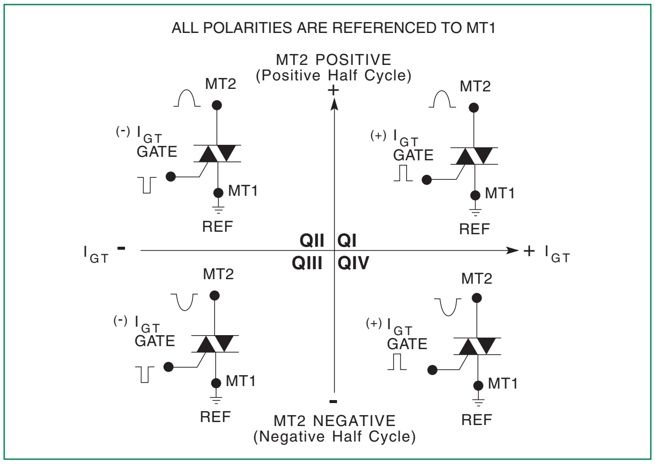
Static Characteristics

Symbol	Test Conditions			Value	Unit
V_{TM}	I_T = 42.4A t_p = 380µs		MAX	1.5	V
I_{DRM} / I_{RRM}	@ V_{DRM} / V_{RRM}	T_J = 25°C	MAX	5	µA
		T_J = 150°C		3	mA

Thermal Resistances

Symbol	Parameter	Value	Unit
$R_{\theta(JC)}$	Junction to case (AC)	3.2	°C/W

Figure 1: Definition of Quadrants



Note: Alternistors will not operate in QIV

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

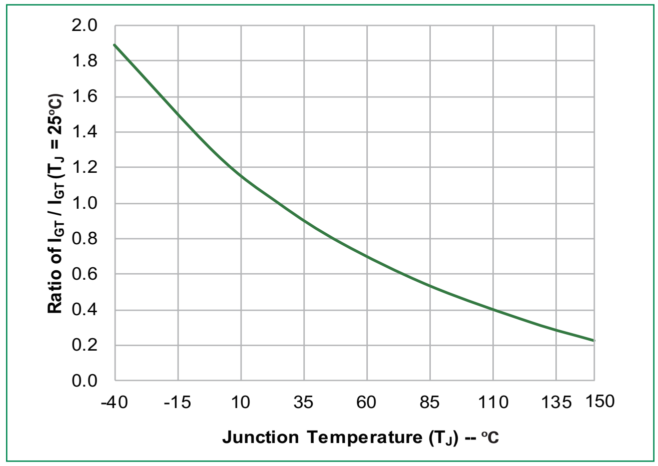


Figure 3: Normalized DC Holding Current vs. Junction Temperature

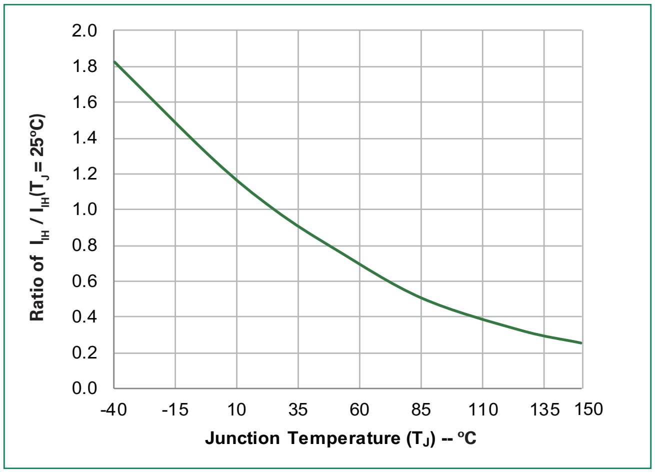


Figure 4: Normalized DC Gate Trigger Voltage for All Quadrants vs. Junction Temperature

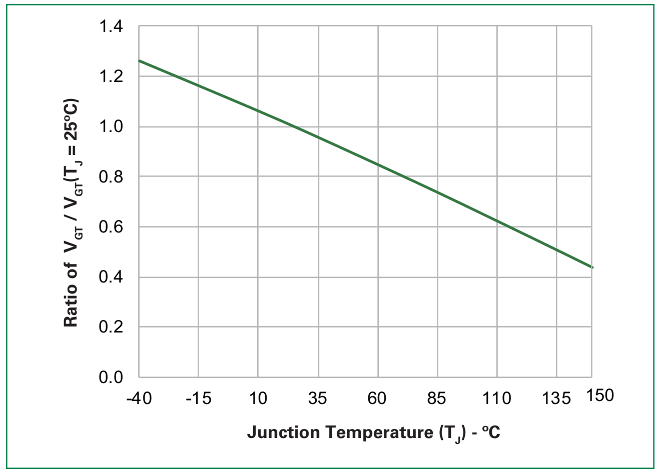


Figure 5: Power Dissipation (Typical) vs. RMS On-State Current

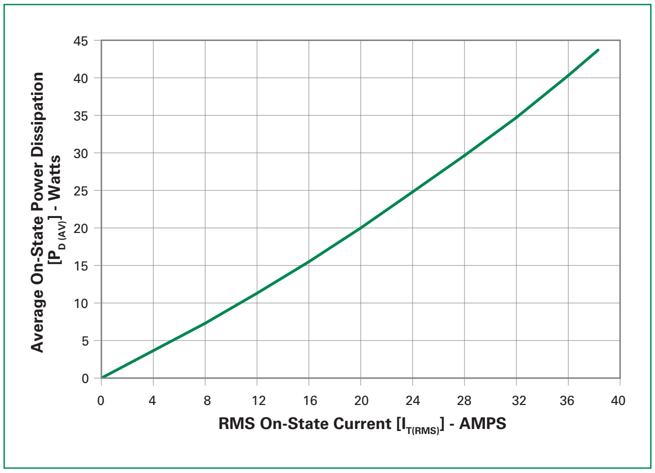


Figure 6: On-State Current vs. On-State Voltage (Typical)

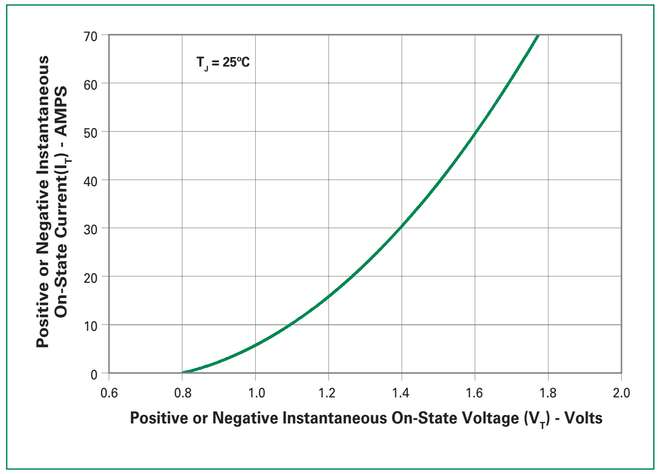


Figure 7: Maximum Allowable Case Temperature vs. RMS On-State Current

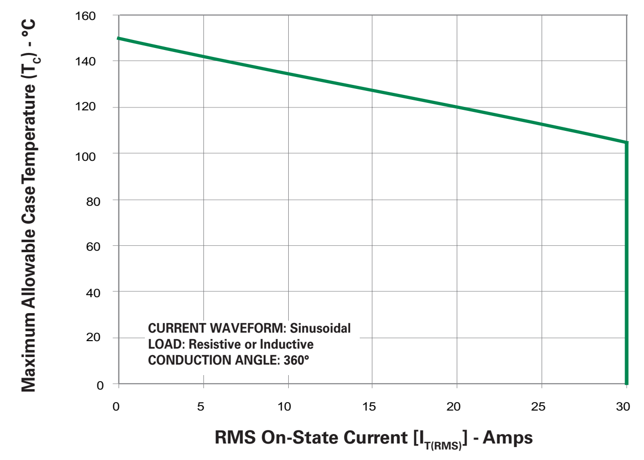
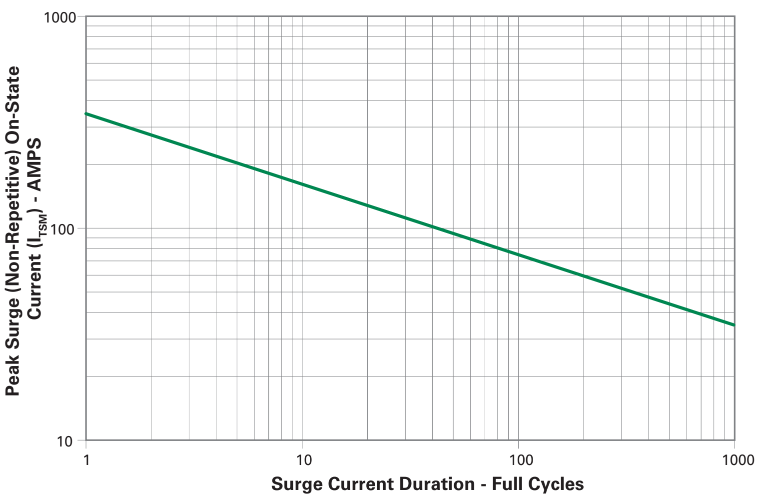


Figure 8: Surge Peak On-State Current vs. Number of Cycles

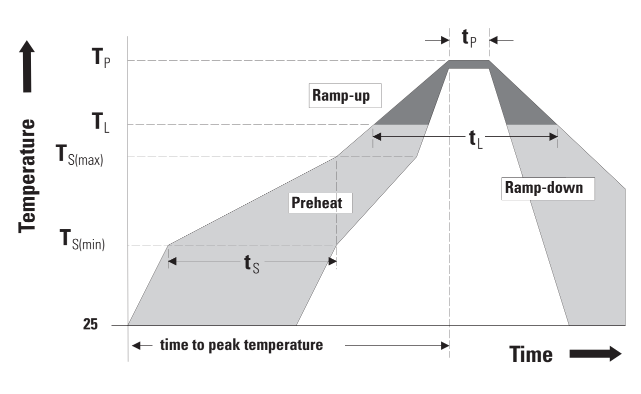


Supply Frequency: 60Hz Sinusoidal
Load: Resistive
RMS On-State [$I_{T(RMS)}$]: Max Rated Value at Specific Case Temperature

Notes:
1. 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.

Soldering Parameters

Reflow Condition		Pb – Free assembly
Pre Heat	**- Temperature Min ($T_{s(min)}$)**	150°C
	- Temperature Max ($T_{s(max)}$)	200°C
	- Time (min to max) (t_s)	60 – 180 secs
Average ramp up rate (Liquidus Temp) (T_L) to peak		5°C/second max
$T_{S(max)}$ to T_L - Ramp-up Rate		5°C/second max
Reflow	**- Temperature (T_L) (Liquidus)**	217°C
	- Time (t_L)	60 – 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °C
Time within 5°C of actual peak Temperature (t_p)		20 – 40 seconds
Ramp-down Rate		5°C/second max
Time 25°C to peak Temperature (T_P)		8 minutes Max.
Do not exceed		280°C



Physical Specifications

Terminal Finish	100% Matte Tin-plated
Body Material	UL Recognized compound meeting flammability rating V-0
Terminal Material	Copper Alloy

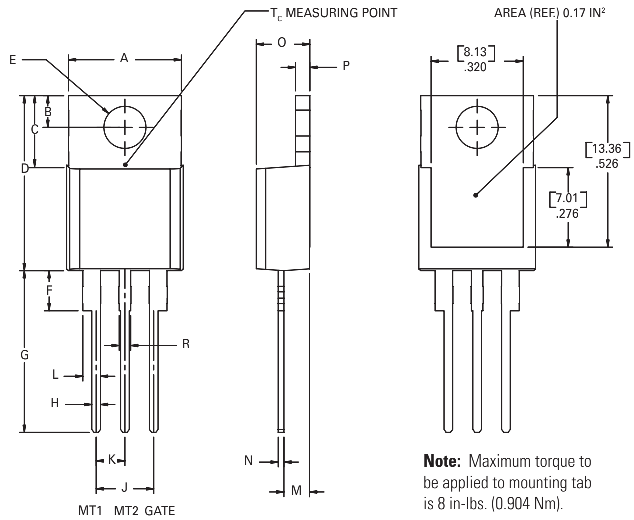
Design Considerations

Careful selection of the correct component 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 component 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 @ 150°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
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
Moisture Sensitivity Level	Level 1, JEDEC-J-STD-020

Dimensions — TO-220AB (L-Package) — Isolated Mounting Tab



Note: Maximum torque to be applied to mounting tab is 8 in-lbs. (0.904 Nm).

Dimension	Inches		Millimeters	
	Min	Max	Min	Max
A	0.380	0.420	9.65	10.67
B	0.105	0.115	2.67	2.92
C	0.230	0.250	5.84	6.35
D	0.590	0.620	14.99	15.75
E	0.142	0.147	3.61	3.73
F	0.110	0.130	2.79	3.30
G	0.540	0.575	13.72	14.60
H	0.025	0.035	0.64	0.89
J	0.195	0.205	4.95	5.21
K	0.095	0.105	2.41	2.67
L	0.060	0.075	1.52	1.91
M	0.085	0.095	2.16	2.41
N	0.018	0.024	0.46	0.61
O	0.178	0.188	4.52	4.78
P	0.045	0.060	1.14	1.52
R	0.038	0.048	0.97	1.22

Product Selector

Part Number	Voltage				Gate Sensitivity		$I_{T(RMS)}$	Type	Package
	400V	600V	800V	1000V	I-II-III	IV			
QJxx30LH4	-	x	x	-	35mA		30A	Alternostor Triac	TO-220L

Note: xx = Voltage/10

Packing Options

Part Number	Marking	Weight	Packing Mode	Base Quantity
QJxx30LH4	QJxx30LH4	2.2	Tube	1000 (50 per tube)

y = Sensitivity

Part Numbering System

QJ 80 30 L H4 56

COMPONENT TYPE
QJ: High T_J TRIAC or Alternistor

VOLTAGE RATING
60:600V
80:800V

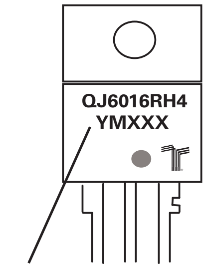
CURRENT RATING
30: 30A

PACKAGE TYPE
L: TO-220 Isolated

LEAD FORM DIMENSIONS
xx: Lead Form Option

SENSITIVITY & TYPE
Alternistor Triac
H4: 35mA (QI, II, III)

Part Marking System



Date Code Marking
Y:Year Code
M: Month Code
XXX: Lot Trace Code