Teccor® brand Thyristors

8 Amp Alternistor (High Commutation) Triac for LED dimmer application

Q6008LH1LED Series







Description

Q6008LH1LED series is designed to meet low load current characteristics typical in LED lighting applications.

By keeping holding current at 6mA maximum, this Triac series is characterized and specified to perform best with LED loads. The Q6008LH1LED series is best suited for LED dimming controls to obtain the lowest levels of light output with a minimum probability of flickering.

Q6008LH1LED series is offered in the industry standard TO-220AB package with an isolated mounting tab that makes it best suited for adding an external heat sink.

Agency Approval

Agency	Agency File Number
9 4	L Package: E71639

Main Features

Symbol	Value	Unit
I _{T(RMS)}	8	А
V _{DRM} /V _{RRM}	600	V
I _{GT}	10	mA

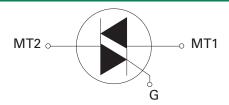
Features

- As low as 6mA max holding current
- UL recognized TO-220AB package
- 110°C rated junction temperature
- di/dt performance of 70A/µs
- QUADRAC version includes intergrated DIAC

Benefits

- Provides full control of light out put at the extreme low end of load conditions.
- 2500V AC min isolation between mounting tab and active terminals
- Improves margin of safe operation with less heat sinking required
- Enable survivability of typically LED load operating characteristics
- Simplicity of circuit design & layout

Schematic Symbol



Applications

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

Typical applications are AC solid-state switches, lighting controls with LED lamp loads, small low current motor in power tools, and low current motors in home/brown goods appliances.

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

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Absolute Maximum Ratings

Symbol	Parameter	Test Conditions		Value	Unit
I _{T(RMS)}	RMS on-state current (full sine wave)		T _C = 80°C	8	А
1	Non repetitive surge peak on-state current	f = 50 Hz	t = 20 ms	80	А
'тѕм	(full cycle, T _J initial = 25°C)	f = 60 Hz	t = 16.7 ms	85	
l²t	l²t Value for fusing		$t_p = 8.3 \text{ ms}$	30	A²s
di/dt	Critical rate of rise of on-state current	f = 120 Hz	T _J = 110°C	70	A/µs
I _{GTM}	Peak gate trigger current	t _p ≤ 10 μs; I _{GT} ≤ I _{GTM}	T _J = 110°C	1.6	А
$P_{G(AV)}$	Average gate power dissipation $T_J = 110^{\circ}\text{C}$ $I_{GT} = 35\text{mA}$		0.5	W	
T _{stg}	Storage temperature range			-40 to 150	°C
T _J	Operating junction temperature range				°C

Electrical Characteristics (T_J = 25°C, unless otherwise specified)

Symbol	Test Conditions	Quadran	t	Value	Unit
I _{GT}	$V_D = 12V R_1 = 60 \Omega$	1 – 11 – 111	MAX.	10	mA
V _{GT}	V _D = 12 V 11 _L = 30 32	1 – 11 – 111	IVII VX.	1.3	V
V _{GD}	$V_D = V_{DRM} R_L = 3.3 \text{ k}\Omega T_J = 110^{\circ}\text{C}$ $I - II - III$		MIN.	0.2	V
I _H	$I_{\tau} = 15\text{mA}$		MAX.	6	mA
dv/dt	$V_D = V_{DRM}$ Gate Open $T_J = 110$ °C		MIN.	50	V/µs
(dv/dt)c	$(di/dt)c = 4.3 \text{ A/ms } T_J = 110^{\circ}\text{C}$		MIN.	10	V/µs
t _{gt}	$I_{g} = 100 \text{mA PW} = 15 \mu \text{s} \ I_{T} = 11.3 \ \text{A(pk)}$		TYP.	4.0	μs

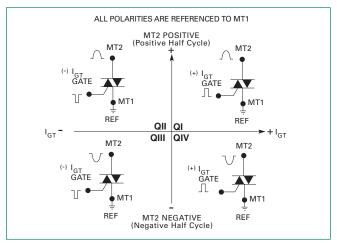
Static Characteristics

Symbol	Test Conditions			Value	Unit
V _{TM}	$I_{TM} = 11.3 A t_p = 380 \mu s$ MAX.		1.60	V	
I _{DRM}	$V_{DRM} = V_{RRM}$	T _J = 110°C	MAX.	500	μΑ

Thermal Resistances

Symbol	Parameter	Value	Unit
R _{e(J-C)}	Junction to case (AC)	2.8	°C/W
$R_{\theta(J-A)}$	Junction to ambient	50	°C/W

Figure 1: Definition of Quadrants



Note: Alternistors will not operate in QIV

Figure 3: Normalized DC Holding Current vs. Junction Temperature

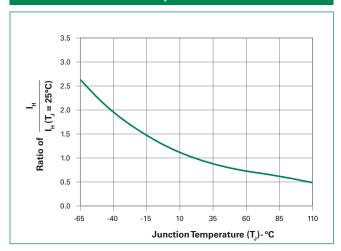


Figure 5: Power Dissipation (Typical) vs. RMS On-State Current

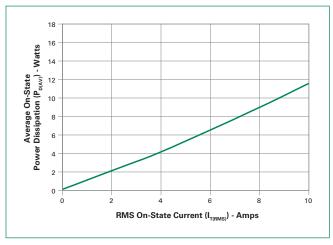


Figure 2: Normalized DC Gate Trigger Current for All Quadrants vs. Junction Temperature

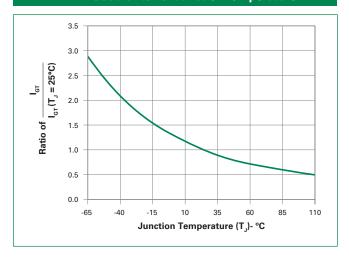


Figure 4: Normalized DC Gate Trigger Voltage for All Quadrants vs. Junction Temperature

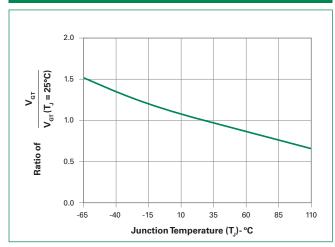
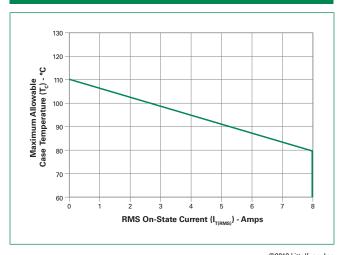


Figure 6: Maximum Allowable Case Temperature vs. On-State Current (Standard / Alternistor Triac)



O6008I H1I FD Series

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

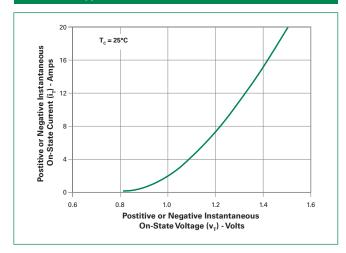


Figure 8: Maximum Allowable Ambient Temperature vs.
On-State Current

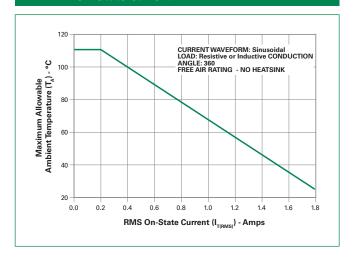
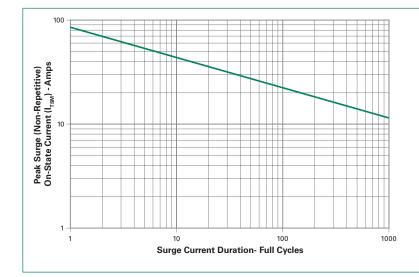


Figure 9: Surge Peak On-State Current vs. Number of Cycles



SUPPLY FREQUENCY: 60 Hz Sinusoidal LOAD: Resistive

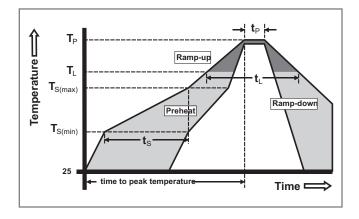
RMS On-State Current: [I_{T(RMS)}]: Maximum Rated Value at Specified Case Temperature

Notes

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

Soldering Parameters

Reflow Condition		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 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	
Reliow	-Temperature (t _L)	60 – 150 seconds	
PeakTemp	erature (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 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
Terminal Material	Copper Alloy

Design Considerations

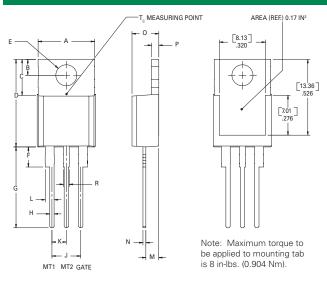
Careful selection of the correct device for the application's operating parameters and environment will go a long way toward extending the operating life of the Thyristor. Good design practice should limit the maximum continuous current through the main terminals to 75% of the device rating. Other ways 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 (V _{DRM})	MIL-STD-750, M-1040, Cond A Applied Peak AC voltage @ 110°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		

Please refer to http://www.littelfuse.com for current information.

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



Dimension	Incl	hes	Millin	neters
Dimension	Min	Max	Min	Max
А	0.380	0.420	9.65	10.67
В	0.105	0.115	2.67	2.92
С	0.230	0.250	5.84	6.35
D	0.590	0.620	14.99	15.75
Е	0.142	0.147	3.61	3.73
F	0.110	0.130	2.79	3.30
G	0.540	0.575	13.72	14.61
Н	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
М	0.085	0.095	2.16	2.41
N	0.018	0.024	0.46	0.61
0	0.178	0.188	4.52	4.78
Р	0.045	0.060	1.14	1.52
R	0.038	0.048	0.97	1.22

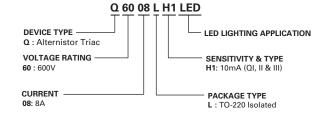
Product Selector

Dout Number	Gate Sensitivity Quadrants	Time	Package	
Part Number	I – II – III	- Type		
Q6008LH1LED	10 mA	Alternistor Triac	TO-220L	

Packing Options

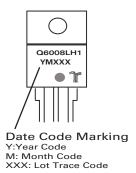
Part Number	Marking	Weight	Packing Mode	Base Quantity
Q6008LH1LED	Q6008LH1	2.2 g	Bulk	500
Q6008LH1LEDTP	Q6008LH1	2.2 g	Tube Pack	500 (50 per tube)

Part Numbering System



Part Marking System

TO-220 AB - (L Package)



Q6008LH1LED Series

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