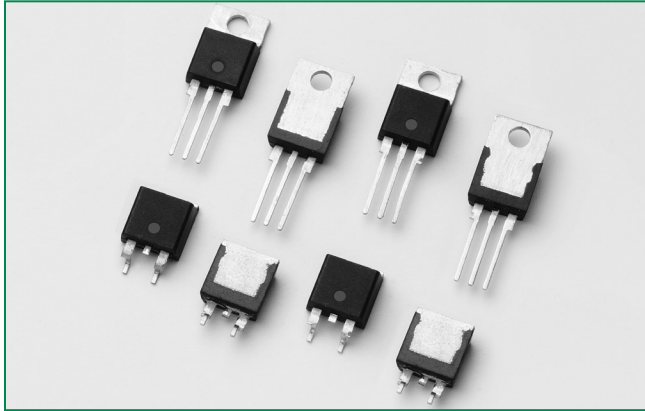



QJxx30xH4 & QJxx35xH4 series



Agency Recognitions

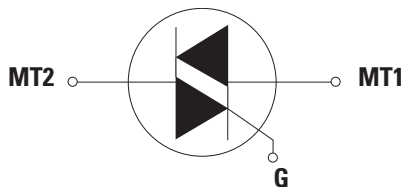
Agency	Agency File Number
	E71639*

* L package

Main Features

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

Schematic Symbol



Description

This 30A/35A high temperature Alternistor TRIAC has 150°C maximum junction temperature and 350A I_{TSM} (60Hz). This 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.

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
- Halogen free and RoHS compliant

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 μ s	$V_{DRM}+200V$	V	
$I_{T(RMS)}$	RMS on-state current (full sine wave)	QJxx30LH4	$T_c = 90^\circ C$	30	A
		QJxx30RH4/QJxx30NH4	$T_c = 115^\circ C$		
		QJxx35LH4	$T_c = 80^\circ C$	35	A
		QJxx35RH4/QJxx35NH4	$T_c = 110^\circ C$		
I_{TSM}	Non repetitive surge peak on-state current (Full cycle, T_J initial = 25°C)	f = 50Hz	t = 20 ms	290	A
		f = 60Hz	t = 16.7 ms	350	
I^2t	I^2t Value for fusing		$t_p = 8.3$ ms	508	A ² s
di/dt	Critical rate of rise of on-state current	f = 60Hz	$T_J = 150^\circ C$	100	A/ μ s
I_{GTM}	Peak gate trigger current	$t_p \leq 20\mu s$; $I_{GT} \leq I_{GTM}$	$T_J = 150^\circ C$	4.0	A
$P_{G(AV)}$	Average gate power dissipation		$T_J = 150^\circ C$	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 ($T_J = 25^\circ C$, unless otherwise specified) — Alternistor Triac (3 Quadrants)

Symbol	Test Conditions		Quadrant	Value	Unit	
I_{GT}	$V_D = 12V$ $R_L = 60\Omega$		I – II – III	MAX.	35	mA
V_{GT}			I – II – III	MAX.	1.0	V
V_{GD}	$V_D = V_{DRM}$ $R_L = 3.3k\Omega$ $T_J = 150^\circ C$		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 $T_J = 150^\circ C$ $V_{DRM} = 800V$			MIN.	900	V/ μ s
	$V_D = 1/2 V_{DRM}$ Gate Open $T_J = 150^\circ C$ $V_{DRM} = 800V$			MIN.	1500	
(dv/dt)c	(di/dt)c = 9 A/ms $T_J = 150^\circ C$			MIN.	20	V/ μ s
t_{gt}	30A device	$I_G = 2 \times I_{GT}$ PW = 15 μ s $I_T = 42.4$ A(pk)	TYP.	3	μ s	
	35A device	$I_G = 2 \times I_{GT}$ PW = 15 μ s $I_T = 49.5$ A(pk)				

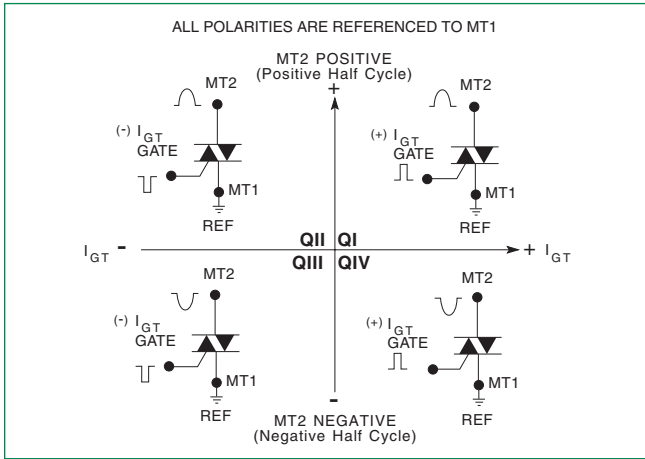
Static Characteristics

Symbol	Test Conditions		Value	Unit		
V_{TM}	30A device	$I_T = 42.4A$ $t_p = 380\mu s$	MAX	1.5	V	
	35A device	$I_T = 49.5A$ $t_p = 380\mu s$		1.55		
I_{DRM}/I_{RRM}	@ V_{DRM}/V_{RRM}		MAX	$T_J = 25^\circ C$	5	μA
				$T_J = 150^\circ C$	3	mA

Thermal Resistances

Symbol	Parameter		Value	Unit
$R_{\theta(JC)}$	Junction to case (AC)	QJxx30LH4/QJxx35LH4	1.8	°C/W
		QJxx30RH4/QJxx30NH4	1.0	
		QJxx35RH4/QJxx35NH4		

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

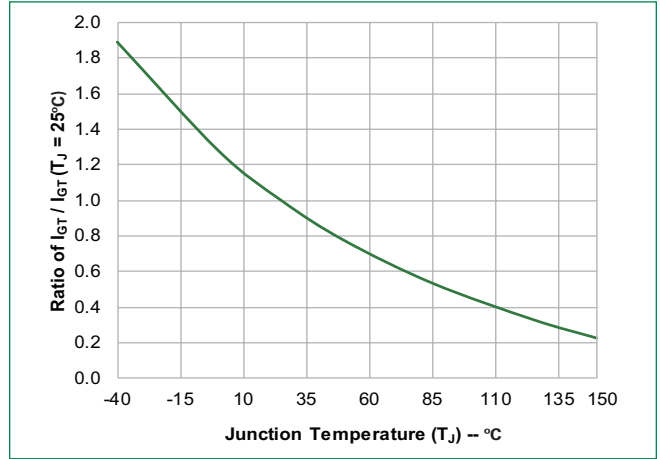


Figure 3: Normalized DC Holding Current vs. Junction Temperature

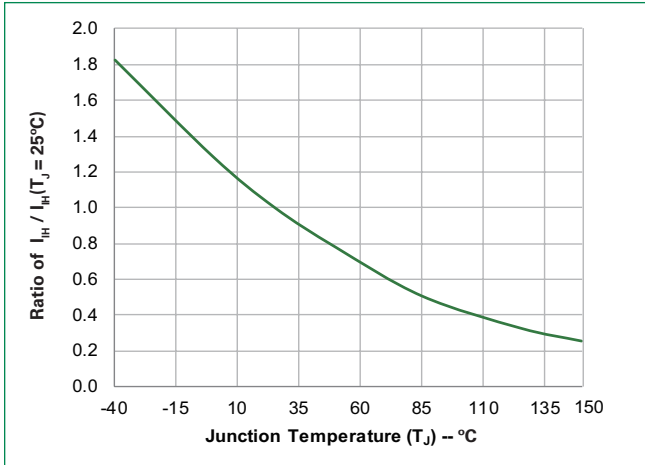


Figure 4: Normalized DC Gate Trigger Voltage for All Quadrants vs. Junction Temperature

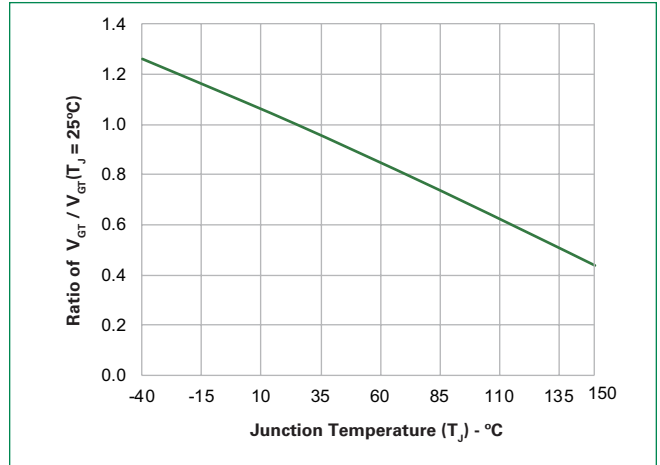


Figure 5: Power Dissipation (Typical) vs. RMS On-State Current

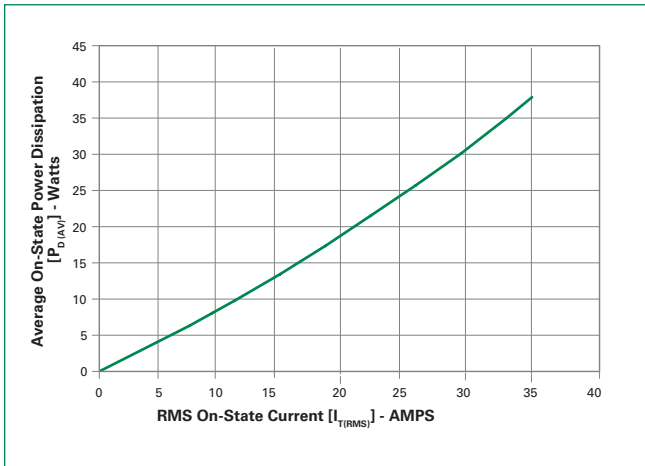


Figure 6: On-State Current vs. On-State Voltage (Typical)

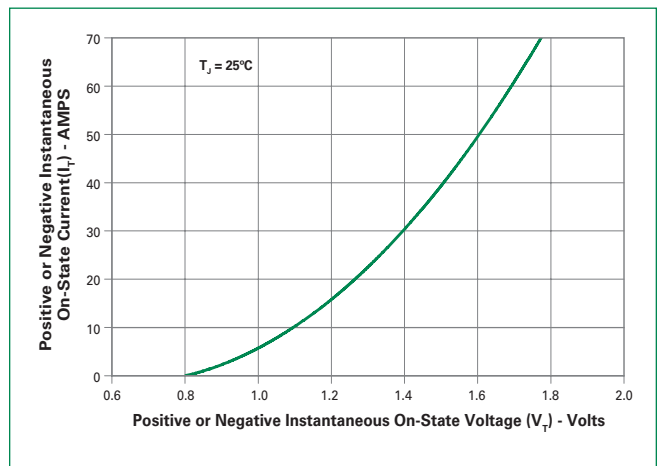


Figure 7: Maximum Allowable Case Temperature vs. RMS On-State Current

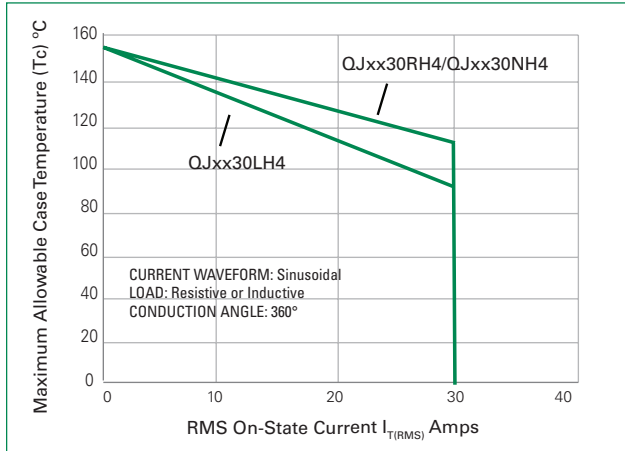


Figure 8: Maximum Allowable Case Temperature vs. RMS On-State Current

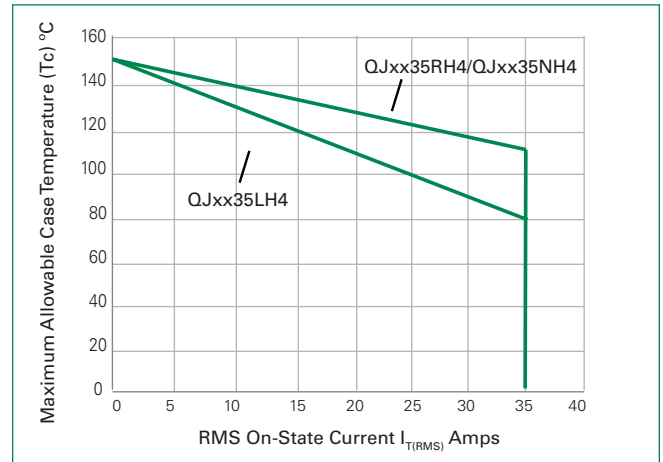
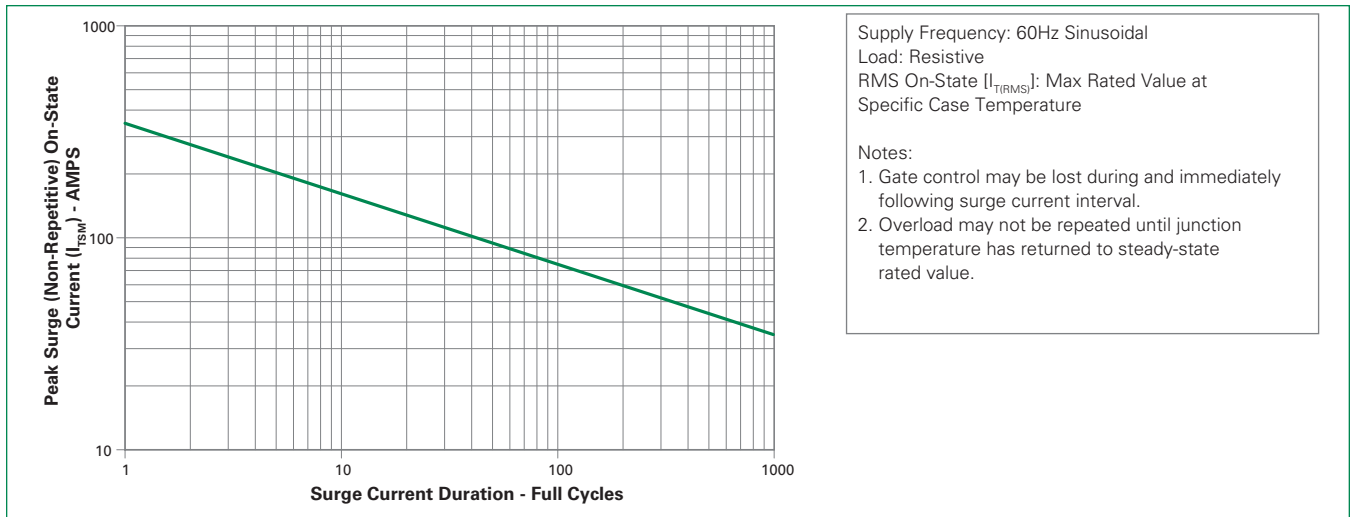
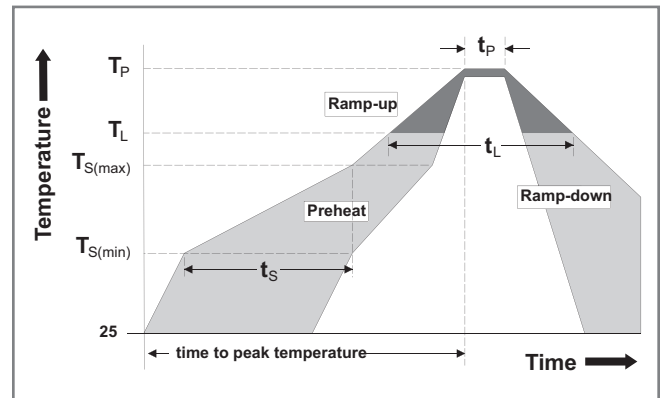


Figure 9: Surge Peak On-State Current vs. Number of Cycles



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

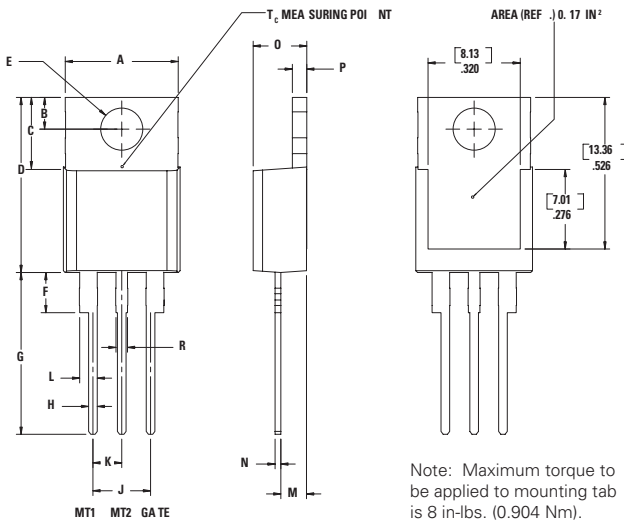
Design Considerations

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

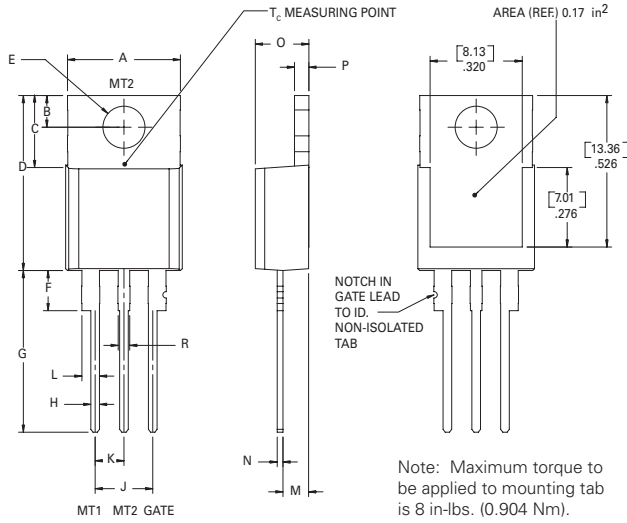
Test	Specifications and Conditions
AC Blocking	MIL-STD-750, M-1040, Cond A Applied Peak AC voltage @ 150°C for 1008 hours
Temperature Cycling	MIL-STD-750, M-1051, 1000 cycles; -55°C to +150°C; 15-min dwell time
Temperature/Humidity	EIA / JEDEC, JESD22-A101 1008 hours; 320V - DC: 85°C; 85% rel humidity
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
UHASt	JESD22A-118, 96 hrs, 130°C/85% RH
IOL	MIL-STD-750 Method 1037

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



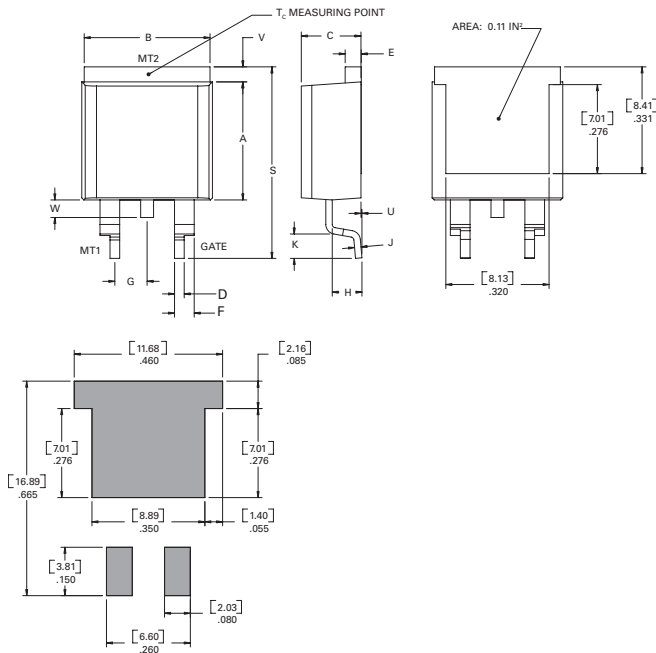
Dimension	Inches		Millimeters	
	Min	Max	Min	Max
A	0.380	0.420	9.65	10.67
B	0.105	0.115	2.67	2.92
C	0.230	0.250	5.84	6.35
D	0.590	0.620	14.99	15.75
E	0.142	0.147	3.61	3.73
F	0.110	0.130	2.79	3.30
G	0.540	0.575	13.72	14.60
H	0.025	0.035	0.64	0.89
J	0.195	0.205	4.95	5.21
K	0.095	0.105	2.41	2.67
L	0.060	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

Dimensions — TO-220AB (R-Package) — Non-Isolated Mounting Tab Common with Center Lead



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	14.61
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

Dimensions — TO-263 (N-Package) — D² Pak Surface Mount



Dimension	Inches		Millimeters	
	Min	Max	Min	Max
A	0.360	0.370	9.14	9.40
B	0.380	0.420	9.65	10.67
C	0.178	0.188	4.52	4.78
D	0.025	0.035	0.64	0.89
E	0.045	0.060	1.14	1.52
F	0.060	0.075	1.52	1.91
G	0.095	0.105	2.41	2.67
H	0.092	0.102	2.34	2.59
J	0.018	0.024	0.46	0.61
K	0.090	0.110	2.29	2.79
S	0.590	0.625	14.99	15.88
V	0.035	0.045	0.89	1.14
U	0.002	0.010	0.05	0.25
W	0.040	0.070	1.016	1.78

Product Selector

Part Number	Voltage		Gate Sensitivity Quadrants I – II – III	I _{T(RMS)}	Type	Package
	600V	800V				
QJxx30LH4	x	x	35mA	30A	Alternistor Triac	TO-220L
QJxx30RH4	x	x	35mA	30A	Alternistor Triac	TO-220R
QJxx30NH4	x	x	35mA	30A	Alternistor Triac	TO-263 D ² -PAK
QJxx35LH4	x	x	35mA	35A	Alternistor Triac	TO-220L
QJxx35RH4	x	x	35mA	35A	Alternistor Triac	TO-220R
QJxx35NH4	x	x	35mA	35A	Alternistor Triac	TO-263 D ² -PAK

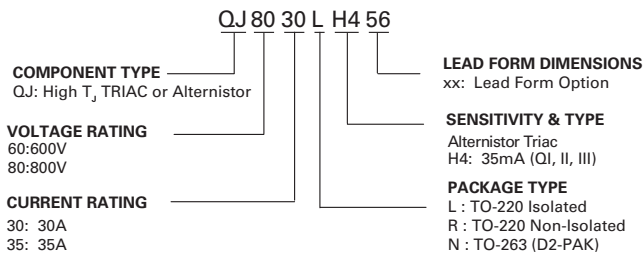
Note: xx = Voltage/10

Packing Options

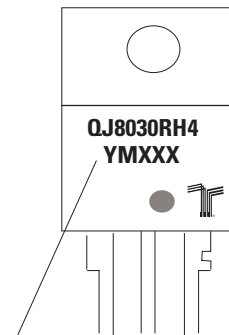
Part Number	Marking	Weight	Packing Mode	Base Quantity
QJxx30LH4TP	QJxx30LH4	2.2	Tube	1000(50 per tube)
QJxx30RH4TP	QJxx30RH4	2.2	Tube	1000(50 per tube)
QJxx30NH4TP	QJxx30NH4	1.6	Tube	1000(50 per tube)
QJxx30NH4RP	QJxx30NH4	1.6	Embossed Carrier	500
QJxx35LH4TP	QJxx35LH4	2.2	Tube	1000(50 per tube)
QJxx35RH4TP	QJxx35RH4	2.2	Tube	1000(50 per tube)
QJxx35NH4TP	QJxx35NH4	1.6	Tube	1000(50 per tube)
QJxx35NH4RP	QJxx35NH4	1.6	Embossed Carrier	500

Note: xx = Voltage/10

Part Numbering System



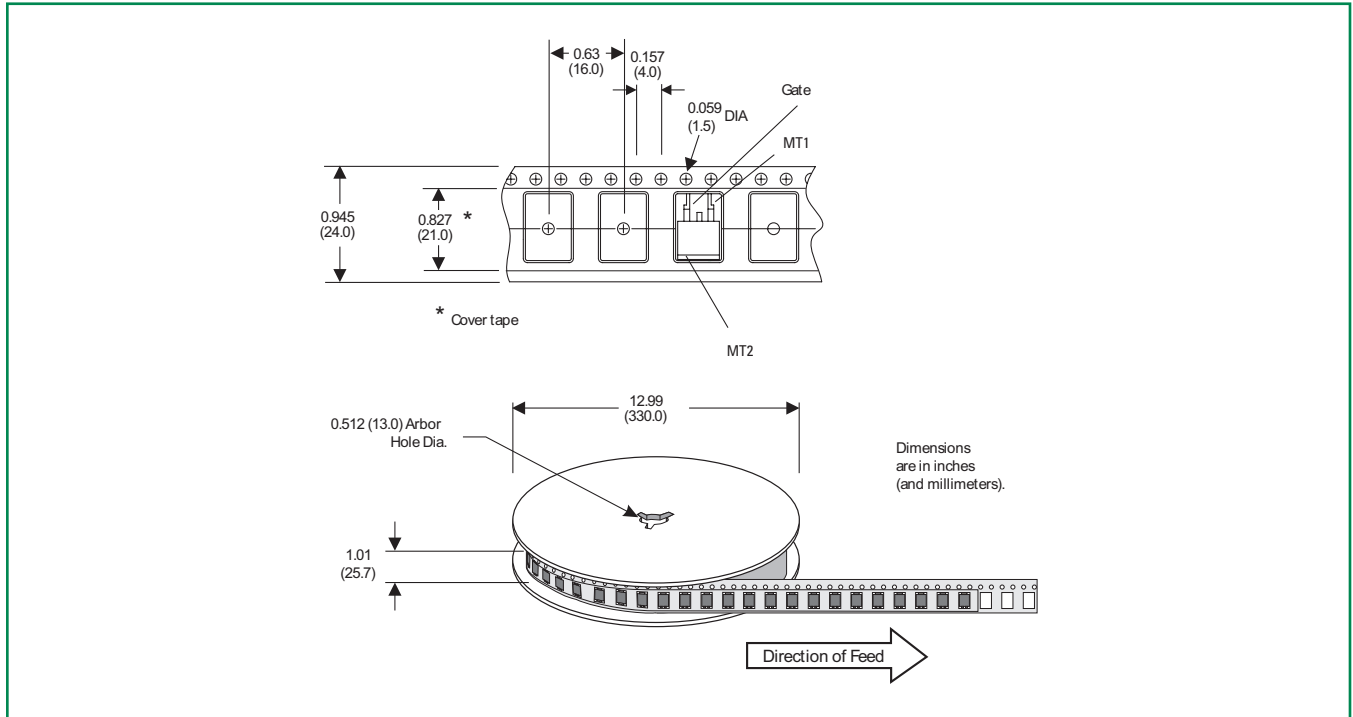
Part Marking System

 TO-220 AB - (L and R Package)
 TO-263 AB - (N Package)


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

TO-263 Embossed Carrier Reel Pack (RP) Specifications

Meets all EIA-481-2 Standards



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