

LJxx06xx & QJxx06xHx & QJxx06xx Series

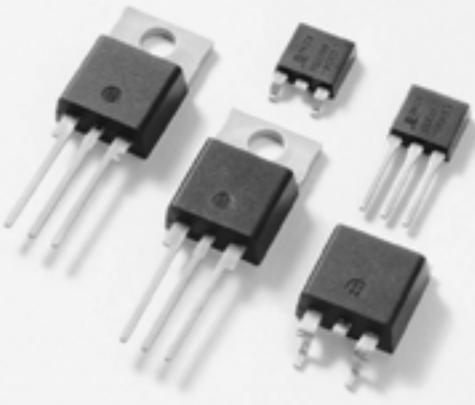
6 A High Temp Sensitive, Standard, and Alternistor (High Communication) TRIACs



RoHS



*L Package UL recognized under E71639



Product Summary

Symbol	Value	Unit
I _{T(RMS)}	6	A
V _{DRM/V_{RRM}}	400 to 800	V
I _{GT(Q1)}	10 to 50	mA

Description

This 6 A High Temperature Alternistor TRIAC 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.

Sensitive type components guarantee gate control in Quadrants I and IV as needed for digital control circuitry.

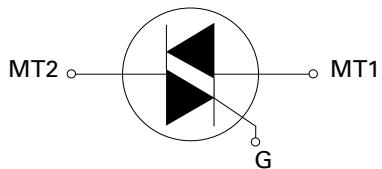
Alternistor type components only operate in quadrants I, II, and III and are used in circuits requiring high dv/dt capability.

Standard type devices normally operate in Quadrants I and III triggered from AC line.

Features

- 150°C maximum junction temperature
- Voltage capability up to 800 V
- Surge capability up to 80 A at 60 Hz half cycle
- Solid-state switching eliminates arcing or contact bounce that create voltage transients
- No contacts to wear out from reaction of switching events
- Restricted (or limited) RFI generation, depending on activation point of sine wave
- Requires only a short gate activation pulse in each half-cycle
- Recognized to UL 1557 as an Electrically Isolated Semiconductor Device
- Halogen-free and RoHS compliant

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, light dimmers, power tools, home/brown goods and white goods appliances.

Alternistor TRIACs (no snubber required) are used in applications with high inductive loads requiring the highest commutation performance.

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

LJxx06xx & QJxx06xHx & QJxx06xx Series

6 A High Temp Sensitive, Standard, and Alternistor (High Communication) TRIACs

Absolute Maximum Ratings — Sensitive TRIAC (4 Quadrants)

Symbol	Parameter	Value	Unit
V_{DSM}/V_{RSM}	Peak non-repetitive blocking voltage	700	V
$I_{(RMS)}$	RMS on-state current (full sine wave)	6	A
I_{TSM}	Non repetitive surge peak on-state current (full cycle, T_{vJ} initial = 25°C)	60	A
I^2t	I^2t Value for fusing	21.5	A ² s
di/dt	Critical rate of rise of on-state current $I_G = 50$ mA with 0.1 µs rise time	70	A/µs
I_{GTM}	Peak gate trigger current	4	A
$P_{G(AV)}$	Average gate power dissipation	0.4	W
T_{stg}	Storage temperature range	-40 to 150	°C
T_{vJ}	Operating junction temperature range	-40 to 150	°C

Note: xx=voltage/10, y = sensitivity

Absolute Maximum Ratings — Alternistor TRIAC (3 Quadrants)

Symbol	Parameter	Value	Unit
V_{DSM}/V_{RSM}	Peak non-repetitive blocking voltage	700	V
$I_{(RMS)}$	RMS on-state current (full sine wave)	6	A
I_{TSM}	Non repetitive surge peak on-state current (full cycle, T_{vJ} initial = 25°C)	60	A
I^2t	I^2t Value for fusing	21.5	A ² s
di/dt	Critical rate of rise of on-state current	70	A/µs
I_{GTM}	Peak gate trigger current	4	A
$P_{G(AV)}$	Average gate power dissipation	0.5	W
T_{stg}	Storage temperature range	-40 to 150	°C
T_{vJ}	Operating junction temperature range	-40 to 150	°C

Note: xx=voltage/10, x = sensitivity

Absolute Maximum Ratings — Standard TRIAC (4 Quadrants)

Symbol	Parameter	Value	Unit
V_{DSM}/V_{RSM}	Peak non-repetitive blocking voltage	700	V
$I_{(RMS)}$	RMS on-state current (full sine wave)	6	A
I_{TSM}	Non repetitive surge peak on-state current (full cycle, T_{vJ} initial = 25°C)	100	A
I^2t	I^2t Value for fusing	26.5	A ² s
di/dt	Critical rate of rise of on-state current	70	A/µs
I_{GTM}	Peak gate trigger current	4	A
$P_{G(AV)}$	Average gate power dissipation	0.5	W
T_{stg}	Storage temperature range	-40 to 150	°C
T_{vJ}	Operating junction temperature range	-40 to 150	°C

Note: xx=voltage/10, y = sensitivity

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6 A High Temp Sensitive, Standard, and Alternistor (High Communication) TRIACs

Electrical Characteristics ($T_{VJ} = 25^\circ C$, unless otherwise specified) — **Sensitive TRIAC** (4 Quadrants)

Symbol	Test Conditions	Quadrant		Value LJxx06x8	Unit
		I - II - III	IV		
I_{GT}	$V_D = 12 V$ $R_L = 60 \Omega$	MAX.		10 20	mA
V_{GT}		ALL	MAX.	1.2	V
V_{GD}	$V_D = V_{DRM}$ $R_L = 3.3 k\Omega$ $T_{VJ} = 150^\circ C$	ALL	MIN.	0.15	V
I_H	$I_T = 100 mA$		MAX.	25	mA
dv/dt	$V_D = V_{DRM}$ Gate Open $T_{VJ} = 150^\circ C$	400 V 600 V	TYP.	80 50	V/ μ s
(dv/dt)c	(di/dt)c = 3.2 A/ms $T_{VJ} = 150^\circ C$		TYP.	2	V/ μ s
t_{gt}	$I_G = 2 \times I_{GT}$ $P_W = 15 \mu s$ $I_T = 8.5 A(pk)$		TYP.	12	μ s

Note: xx=voltage/10, x = package

Electrical Characteristics ($T_{VJ} = 25^\circ C$, unless otherwise specified) — **Alternistor TRIAC** (3 Quadrants)

Symbol	Test Conditions	Quadrant		Value			Unit
		QJxx06xH2	QJxx06xH3	QJxx06xH4			
I_{GT}	$V_D = 12 V$ $R_L = 60 \Omega$	I - II - III	MAX.	10	20	35	mA
V_{GT}		I - II - III	MAX.		1.3		V
V_{GD}	$V_D = V_{DRM}$ $R_L = 3.3 k\Omega$ $T_{VJ} = 150^\circ C$	I - II - III	MIN.		0.15		V
I_H	$I_T = 100 mA$		MAX.	25	30	35	mA
dv/dt	$V_D = V_{DRM}$ Gate Open $T_{VJ} = 150^\circ C$	QJxx06xHy	MIN.	400 V 600 V 800 V	150 100 -	250 200 -	350 250 450
(dv/dt)c	(di/dt)c = 3.2 A/ms $T_{VJ} = 150^\circ C$		MIN.		15	18	20
t_{gt}	$I_G = 2 \times I_{GT}$ $P_W = 15 \mu s$ $I_T = 8.5 A(pk)$		TYP.		10	10	10

Note: xx=voltage/10, x = package

Electrical Characteristics ($T_{VJ} = 25^\circ C$, unless otherwise specified) - **Standard TRIAC**

Symbol	Test Conditions	Quadrant		Value QJxx06x5	Unit
		I - II - III	IV		
I_{GT}	$V_D = 12 V$ $R_L = 60 \Omega$	MAX.	TYP.	50 75	mA
V_{GT}		ALL	MAX.	1.3	V
V_{GD}	$V_D = V_{DRM}$ $R_L = 3.3 k\Omega$ $T_{VJ} = 150^\circ C$	ALL	MIN.	0.2	V
I_H	Initial $I_T = 100 mA$		MAX.	50	mA
dv/dt	$V_D = V_{DRM}$ Gate Open $T_{VJ} = 150^\circ C$	600 V 800 V	MIN.	800 1000	V/ μ s
(dv/dt)c	(di/dt)c = 3.2 A/ms $T_{VJ} = 150^\circ C$		MIN.	4	V/ μ s
t_{gt}	$I_G = 2 \times I_{GT}$ $P_W = 15 \mu s$ $I_T = 8.5 A(pk)$		TYP.	3	μ s

Note: xx=voltage/10, x = package

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Static Characteristics

Symbol	Test Conditions			Value	Unit		
V_{TM}	$I_{TM} = 8.4 \text{ A}$, $t_p = 380 \mu\text{s}$	LJxx06xy	$T_{VJ} = 25^\circ\text{C}$	400 - 600 V	MAX.		
			$T_{VJ} = 125^\circ\text{C}$	400 - 600 V			
			$T_{VJ} = 150^\circ\text{C}$	400 - 600 V			
I_{DRM} / I_{RRM}		QJxx06xHy	$T_{VJ} = 25^\circ\text{C}$	400 - 800 V			
			$T_{VJ} = 125^\circ\text{C}$	400 - 800 V			
			$T_{VJ} = 150^\circ\text{C}$	400 - 800 V			
		QJxx06x5	$T_{VJ} = 25^\circ\text{C}$	600 - 800 V			
			$T_{VJ} = 125^\circ\text{C}$				
			$T_{VJ} = 150^\circ\text{C}$				

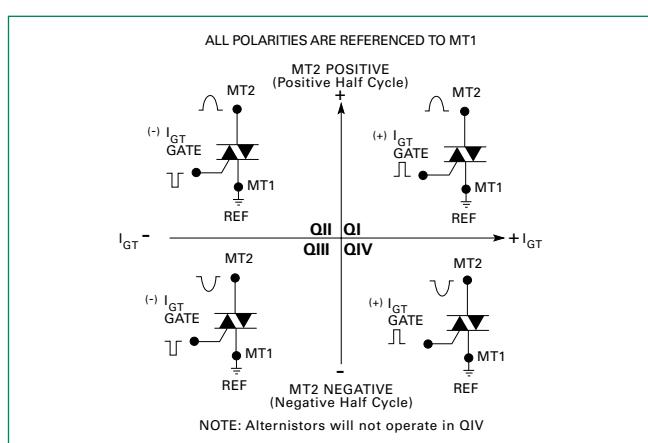
Note: xx=voltage/10, x = package, y = sensitivity

Thermal Resistances

Symbol	Parameter	Value	Unit
$R_{th(JC)}$	Junction to case (AC)	$LJ/QJxx06Vyy$	K/W
		$LJ/QJxx06Dyy$	
		$QJxx06R5/QJxx06N5$	
$R_{th(JA)}$	Junction to ambient	$QJxx06L5$	K/W
		$LJ/QJxx06Vyy$	
		$LJ/QJxx06Dyy$	
		$QJxx06R5$	

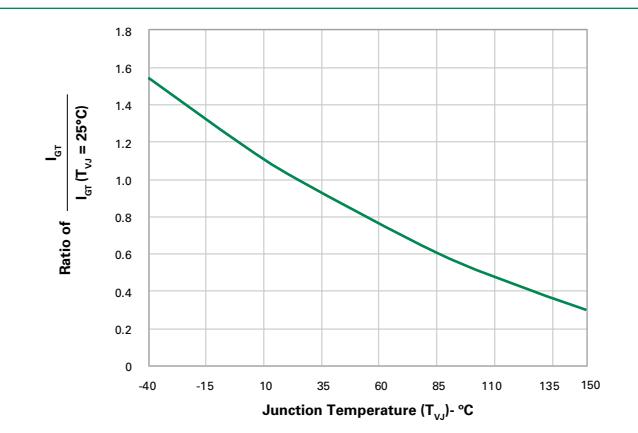
Note: xx=voltage/10, y = sensitivity

Figure 1:
Definition of Quadrants



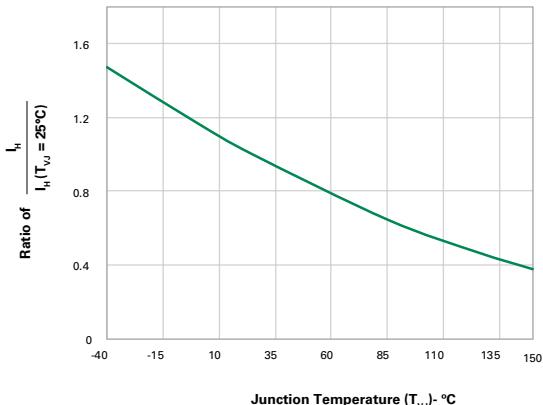
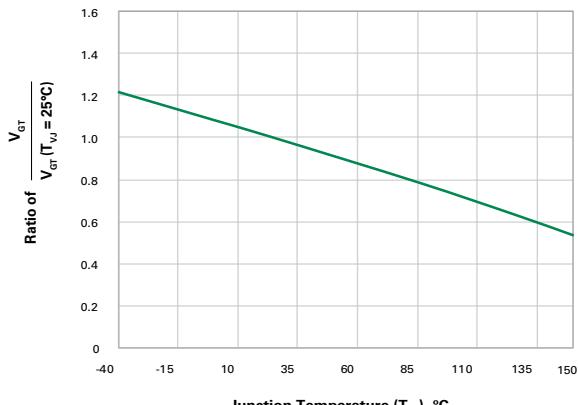
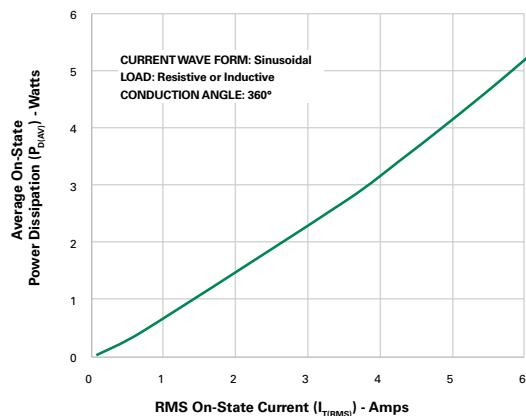
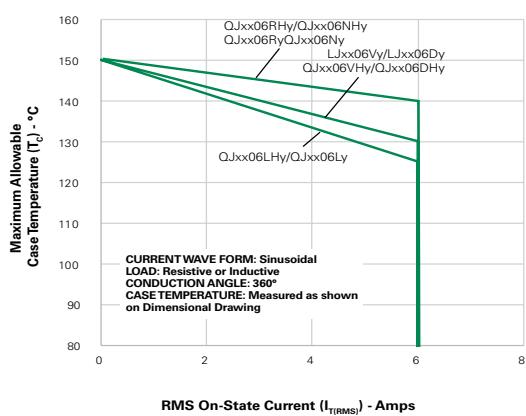
Note: Alternistors will not operate in QIV

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

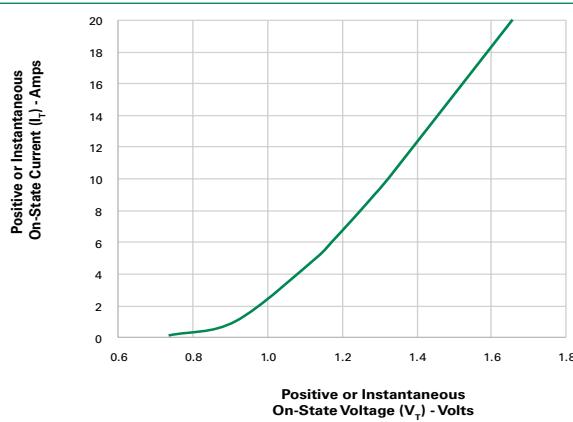


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Figure 3:Normalized DC Holding Current
vs. Junction Temperature**Figure 4:**Normalized DC Gate Trigger Voltage for
All Quadrants vs. Junction Temperature**Figure 5:**Power Dissipation (Typical)
vs. RMS On-State Current**Figure 6:**Maximum Allowable Case Temperature
vs. On-State Current**Figure 7:**

On-State Current vs. On-State Voltage (Typical)

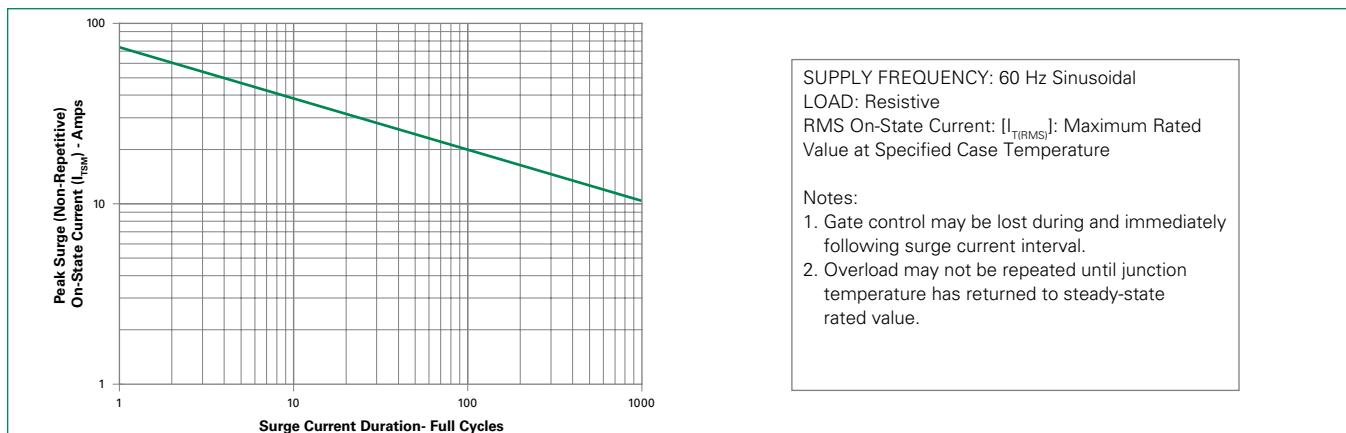


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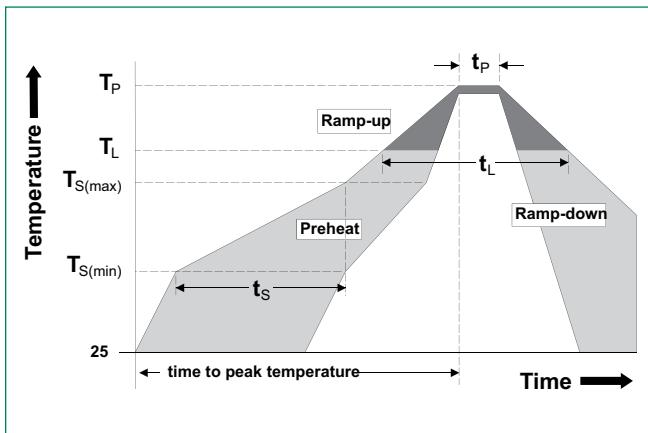
Figure 8:

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
Reflow	$T_{S(max)}$ to T_L - Ramp-up Rate	5°C/second max
	- 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



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Physical Specifications

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

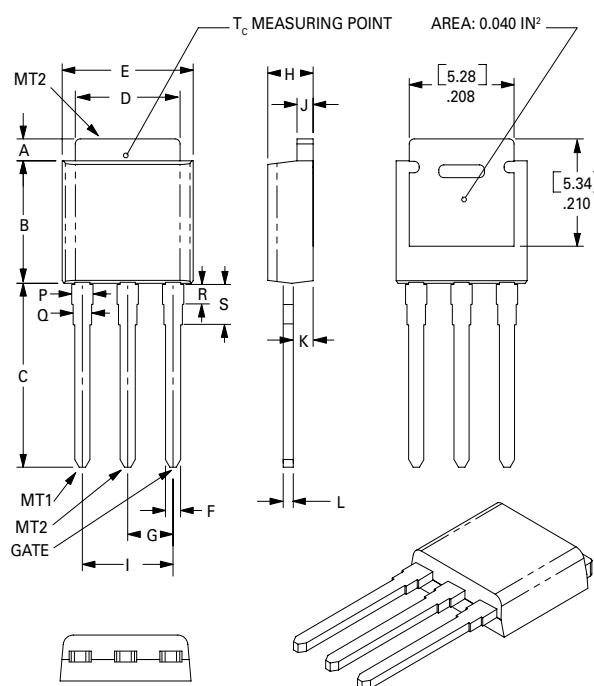
Design Considerations

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 (V_{DRM})	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; 160V - DC: 85°C; 85% relative 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

Dimensions — TO-251AA (V-Package) — V-PAK Through Hole

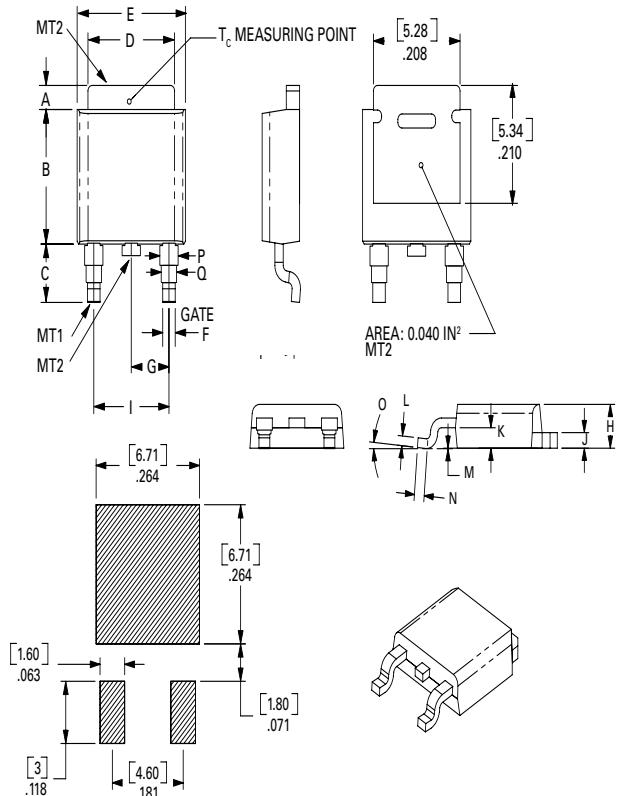


Dimension	Inches			Millimeters		
	Min	Typ	Max	Min	Typ	Max
A	0.037	0.040	0.043	0.94	1.01	1.09
B	0.235	0.242	0.245	5.97	6.15	6.22
C	0.350	0.361	0.375	8.89	9.18	9.53
D	0.205	0.208	0.213	5.21	5.29	5.41
E	0.255	0.262	0.265	6.48	6.66	6.73
F	0.027	0.031	0.033	0.69	0.80	0.84
G	0.087	0.090	0.093	2.21	2.28	2.36
H	0.085	0.092	0.095	2.16	2.34	2.41
I	0.176	0.180	0.184	4.47	4.57	4.67
J	0.018	0.020	0.023	0.46	0.51	0.58
K	0.035	0.037	0.039	0.90	0.95	1.00
L	0.018	0.020	0.023	0.46	0.52	0.58
P	0.042	0.047	0.052	1.06	1.20	1.32
Q	0.034	0.039	0.044	0.86	1.00	1.11
R	0.034	0.039	0.044	0.86	1.00	1.11
S	0.074	0.079	0.084	1.86	2.00	2.11

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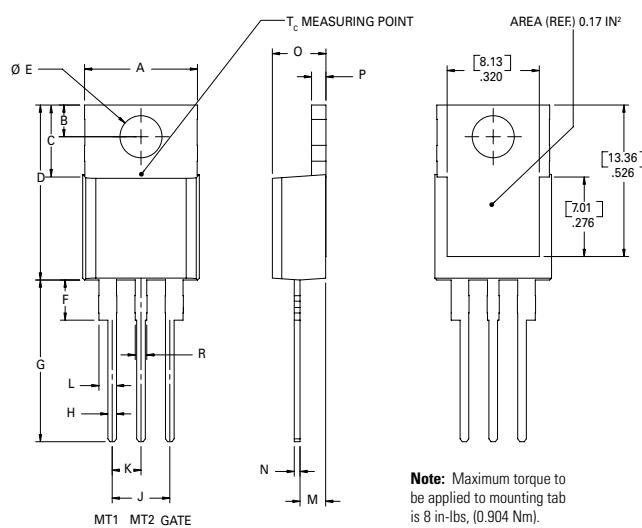
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Dimensions — TO-252AA (D-Package) — D-PAK Surface mount



Dimension	Inches			Millimeters		
	Min	Typ	Max	Min	Typ	Max
A	0.037	0.040	0.043	0.94	1.01	1.09
B	0.235	0.243	0.245	5.97	6.16	6.22
C	0.106	0.108	0.113	2.69	2.74	2.87
D	0.205	0.208	0.213	5.21	5.29	5.41
E	0.255	0.262	0.265	6.48	6.65	6.73
F	0.027	0.031	0.033	0.69	0.80	0.84
G	0.087	0.090	0.093	2.21	2.28	2.36
H	0.085	0.092	0.095	2.16	2.33	2.41
I	0.176	0.179	0.184	4.47	4.55	4.67
J	0.018	0.020	0.023	0.46	0.51	0.58
K	0.035	0.037	0.039	0.90	0.95	1.00
L	0.018	0.020	0.023	0.46	0.51	0.58
M	0.000	0.000	0.004	0.00	0.00	0.10
N	0.021	0.026	0.027	0.53	0.67	0.69
O	0°	0°	5°	0°	0°	5°
P	0.042	0.047	0.052	1.06	1.20	1.32
Q	0.034	0.039	0.044	0.86	1.00	1.11

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

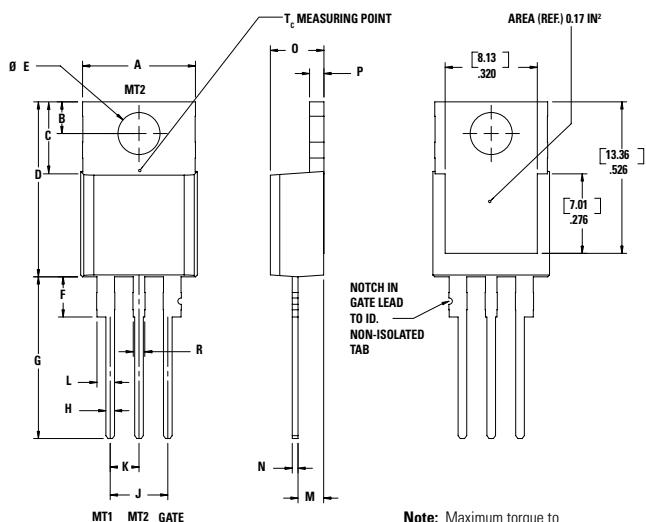


Dimension	Inches		Millimeters	
	Min	Max	Min	Max
A	0.380	0.420	9.65	10.67
B	0.105	0.115	2.67	2.92
C	0.230	0.250	5.84	6.35
D	0.590	0.620	14.99	15.75
E	0.142	0.147	3.61	3.73
F	0.110	0.130	2.79	3.30
G	0.540	0.575	13.72	14.61
H	0.025	0.035	0.64	0.89
J	0.195	0.205	4.95	5.21
K	0.095	0.105	2.41	2.67
L	0.060	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

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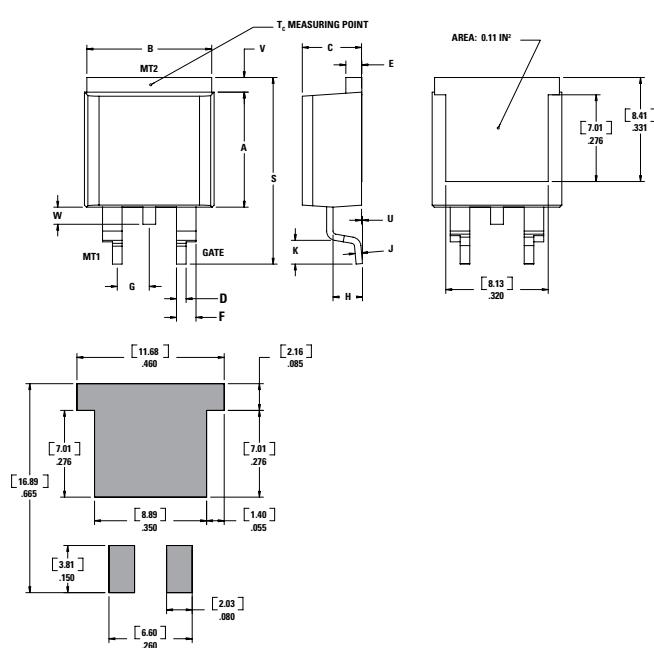
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Dimensions — TO-220 AB (R- Package) — Non-isolated Mounting Tab



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	14.61
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 AB (N- Package) — D2Pak 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	1.02	1.78

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Product Selector

Part Number	Voltage			Gate Sensitivity Quadrants		Type	Package
	400 V	600 V	800 V	I - II - III	IV		
LJxx06D8	x	x	-	10	20	Sensitive TRIAC	TO-252 D-PAK
LJxx06V8	x	x	-	10	20	Sensitive TRIAC	TO-251 V-PAK
QJxx06DH2	x	x	-	10	-	Alternistor TRIAC	TO-252 D-PAK
QJxx06VH2	x	x	-	10	-	Alternistor TRIAC	TO-251 V-PAK
QJxx06DH3	x	x	-	20	-	Alternistor TRIAC	TO-252 D-PAK
QJxx06VH3	x	x	-	20	-	Alternistor TRIAC	TO-251 V-PAK
QJxx06DH4	x	x	-	35	-	Alternistor TRIAC	TO-252 D-PAK
QJxx06VH4	x	x	-	35	-	Alternistor TRIAC	TO-251 V-PAK
QJxx06LH4	-	x	x	35	-	Alternistor TRIAC	TO-220L
QJxx06RH4	-	x	x	35	-	Alternistor TRIAC	TO-220R
QJxx06NH4	-	x	x	35	-	Alternistor TRIAC	TO-220N
QJxx06L5	-	x	x	50	-	Standard TRIAC	TO-220L
QJxx06R5	-	x	x	50	-	Standard TRIAC	TO-220R
QJxx06N5	-	x	x	50	-	Standard TRIAC	TO-220N

Note: xx = voltage/10**Packing Options**

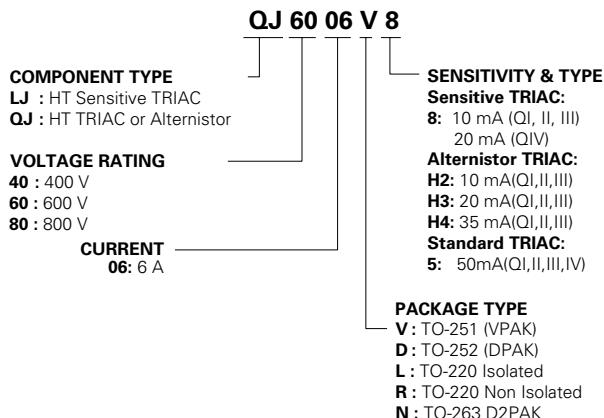
Part Number	Marking	Weight	Packing Mode	Base Quantity
LJxx06D8TP	LJxx06D8	0.3 g	Tube Pack	750 (75 per tube)
LJxx06D8RP	LJxx06D8	0.3 g	Embossed Carrier	2500
QJxx06DH2TP	QJxx06DH2	0.3 g	Tube Pack	750 (75 per tube)
QJxx06DH2RP	QJxx06DH2	0.3 g	Embossed Carrier	2500
QJxx06VH2TP	QJxx06VH2	0.3 g	Tube Pack	750 (75 per tube)
LJxx06V8TP	LJxx06V8	0.4 g	Tube Pack	750 (75 per tube)
QJxx06DH3TP	QJxx06DH3	0.3 g	Tube Pack	750 (75 per tube)
QJxx06DH3RP	QJxx06DH3	0.3 g	Embossed Carrier	2500
QJxx06VH3TP	QJxx06VH3	0.4 g	Tube Pack	750 (75 per tube)
QJxx06DH4TP	QJxx06DH4	0.3 g	Tube Pack	750 (75 per tube)
QJxx06DH4RP	QJxx06DH4	0.3 g	Embossed Carrier	2500
QJxx06VH4TP	QJxx06VH4	0.4 g	Tube Pack	750 (75 per tube)
QJxx06LH4TP	QJxx06LH4	2.2 g	Tube Pack	1000 (50 per tube)
QJxx06RH4TP	QJxx06RH4	2.2 g	Tube Pack	1000 (50 per tube)
QJxx06NH4TP	QJxx06NH4	1.6 g	Tube Pack	1000 (50 per tube)
QJxx06NH4RP	QJxx06NH4	1.6 g	Embossed Carrier	500
QJxx06L5TP	QJxx06L5	2.2 g	Tube Pack	1000 (50 per tube)
QJxx06R5TP	QJxx06R5	2.2 g	Tube Pack	1000 (50 per tube)
QJxx06N5TP	QJxx06N5	1.6 g	Tube Pack	1000 (50 per tube)
QJxx06N5RP	QJxx06N5	1.6 g	Embossed Carrier	500

Note: xx = voltage/10

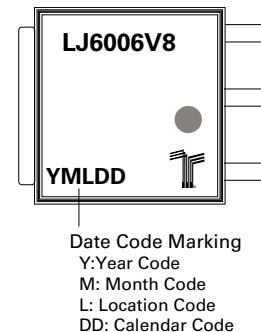
LJxx06xx & QJxx06xHx & QJxx06xx Series

6 A High Temp Sensitive, Standard, and Alternistor (High Communication) TRIACs

Part Numbering System

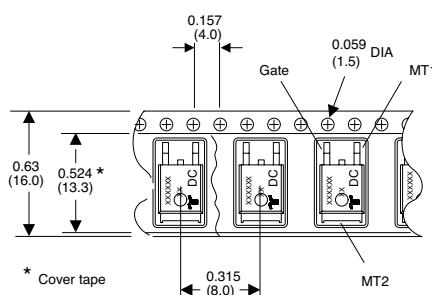
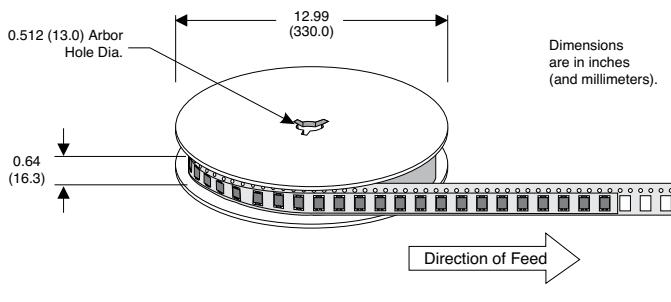


Part Marking System



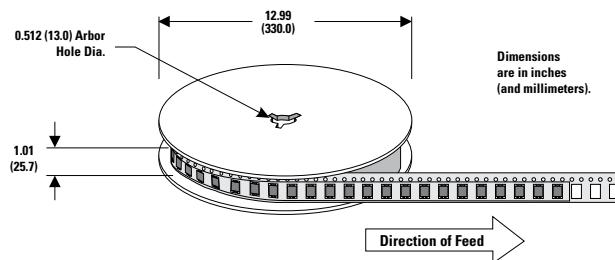
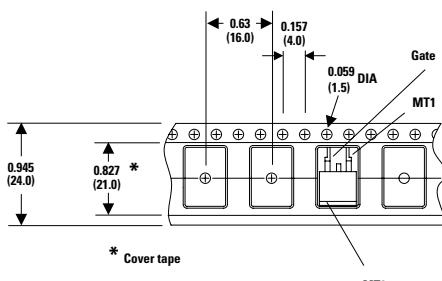
TO-252 Embossed Carrier Reel Pack (RP) Specifications

Meets all EIA-481-2 Standards



TO-263 Embossed Carrier Reel Pack (RP) Specifications

Meets all EIA-481-2 Standards



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