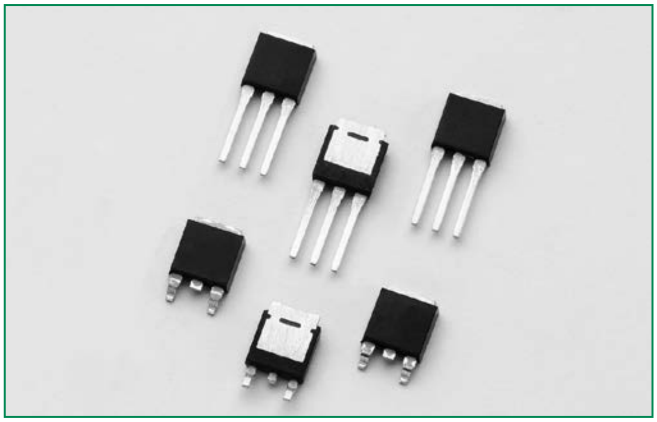
LJxx04xx & QJxx04xx Series

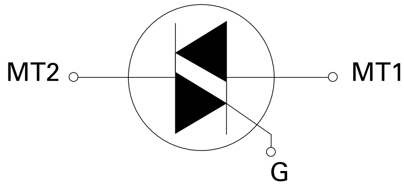
HF RoHS



Main Features

Symbol	Value	Unit
$I_{T(RMS)}$	4	A
V_{DRM}/V_{RRM}	400 or 600	V
$I_{GT\ (Q1)}$	10 to 25	mA

Schematic Symbol



Description

This 4 A High Temperature 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 & IV needed for digital control circuitry.

Standard type components normally operate in Quadrants I & III triggered from AC line.

Features & Benefits

- 150°C maximum junction temperature
- Voltage capability up to 600V
- Surge capability up to 48A at 60HZ half cycle
- Solid-state switching eliminates arcing or contact bounce that create voltage transients 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
- Halogen free and RoHS compliant
- No contacts to wear out

Applications

Typical applications are AC solid-state switches, power tools, home/brown goods and white goods appliances.

Sensitive gate Triacs can be directly driven by microprocessor or popular opto-couplers/isolators.

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

Absolute Maximum Ratings — Sensitive Triacs (4 Quadrants)

Symbol	Parameter			Value	Unit
V_{DSM}/V_{RSM}	Peak non-repetitive blocking voltage	PW=100 μs		700	V
$I_{T(RMS)}$	RMS on-state current (full sine wave)	LJxx04Vy/LJxx04Dy	T_C = 135 °C	4	A
I_{TSM}	Non repetitive surge peak on-state current (full cycle, T_J initial = 25°C)	f = 50 Hz	t = 20 ms	40	A
		f = 60 Hz	t = 16.7 ms	48	
I^2t	I^2t Value for fusing	t_p = 8.3 ms		9.5	A^2s
di/dt	Critical rate of rise of on-state current (I_G = 50mA with ≤ 0.1μs rise time)	f = 60 Hz	T_J = 150 °C	50	A/μs
I_{GTM}	Peak gate trigger current	t_p=20μs	T_J = 150 °C	4	A
$P_{G(AV)}$	Average gate power dissipation		T_J = 150 °C	0.3	W
T_{stg}	Storage temperature range			-40 to 150	°C
T_J	Operating junction temperature range			-40 to 150	°C

Note: xx=voltage/10, y = sensitivity

©2018 Littelfuse, Inc.
Specifications are subject to change without notice.
Revision: 11/29/18

Absolute Maximum Ratings — Standard Triacs

Symbol	Parameter			Value	Unit
V_{DSM}/V_{RSM}	Peak non-repetitive blocking voltage	PW=100 μs		700	V
$I_{T(RMS)}$	RMS on-state current (full sine wave)	QJxx04Vy/QJxx04Dy	T_C = 135 °C	4	A
I_{TSM}	Non repetitive surge peak on-state current (full cycle, T_J initial = 25°C)	f = 50 Hz	t = 20 ms	40	A
		f = 60 Hz	t = 16.7 ms	48	
I^2t	I^2t Value for fusing	t_p = 8.3 ms		9.5	A^2s
di/dt	Critical rate of rise of on-state current (I_G = 50mA with ≤ 0.1μs rise time)	f = 60 Hz	T_J = 150 °C	50	A/μs
I_{GTM}	Peak gate trigger current	t_p=20μs	T_J = 150 °C	4	A
$P_{G(AV)}$	Average gate power dissipation		T_J = 150 °C	0.3	W
T_{stg}	Storage temperature range			-40 to 150	°C
T_J	Operating junction temperature range			-40 to 150	°C

Note: xx=voltage/10, y = sensitivity

Electrical Characteristics (T_J = 25°C, unless otherwise specified) — Sensitive Triac (4 Quadrants)

Symbol	Test Conditions	Quadrant		LJxx04x8	Unit
I_{GT}	V_D = 12V R_L = 60 Ω	I – II – III	MAX.	10	mA
		IV		20	
V_{GT}	V_D = 12V R_L = 60 Ω	ALL	MAX.	1.3	V
V_{GD}	$V_D = V_{DRM}$ R_L = 3.3 kΩ T_J = 150°C	ALL	MIN.	0.2	V
I_H	I_T = 100mA		MAX.	20	mA
dv/dt	$V_D = V_{DRM}$ Gate Open T_J = 150°C	400V	TYP.	75	V/μs
		600V		45	
(dv/dt)c	(di/dt)c = 2.16 A/ms T_J = 150°C		TYP.	1	V/μs
t_{gt}	I_G = 2 x I_{GT} PW = 15μs I_T = 5.6 A(pk)		TYP.	10	μs

Note: xx=voltage/10, x = package

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

Symbol	Test Conditions	Quadrant		QJxx04x3	QJxx04x4	Unit
I_{GT}	V_D = 12V R_L = 60 Ω	I – II – III	MAX.	10	25	mA
		IV	TYP.	25	50	
V_{GT}	V_D = 12V R_L = 60 Ω	I – II – III	MAX.	1.3	1.3	V
V_{GD}	$V_D = V_{DRM}$ R_L = 3.3 kΩ T_J = 150°C	ALL	MIN.	0.2	0.2	V
I_H	I_T = 200mA		MAX.	20	30	mA
dv/dt	$V_D = V_{DRM}$ Gate Open T_J = 150°C	400V	MIN.	75	150	V/μs
		600V		45	100	
(dv/dt)c	(di/dt)c = 2.16 A/ms T_J = 150°C		TYP.	2	2	V/μs
t_{gt}	I_G = 2 x I_{GT} PW = 15μs I_T = 5.6 A(pk)		TYP.	10	15	μs

Note: xx=voltage/10, x = package

©2018 Littelfuse, Inc.
Specifications are subject to change without notice.
Revision: 11/29/18

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

Symbol	Test Conditions				Value	Unit
V_{TM}	I_{TM} = 5.6A t_p = 380 µs	MAX.			1.40	V
I_{DRM} I_{RRM}	$V_{DRM} = V_{RRM}$	MAX.	LJxx04xy	T_J = 25°C	5	µA
				T_J = 125°C	0.5	mA
				T_J = 150°C	3	mA
			QJxx04xy	T_J = 25°C	5	µA
				T_J = 125°C	0.5	mA
				T_J = 150°C	3	mA

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

Thermal Resistances

Symbol	Parameter		Value	Unit
$R_{\Theta(JC)}$	Junction to case (AC)	LJ/QJxx04Dy	1.5	°C/W
		LJ/QJxx04Vy	1.5	°C/W
$R_{\Theta(J-A)}$	Junction to ambient	LJ/QJxx04Vy LJ/QJxx04Dy	70	°C/W

Note: xx=voltage/10, y = sensitivity

Figure 1: Definition of Quadrants

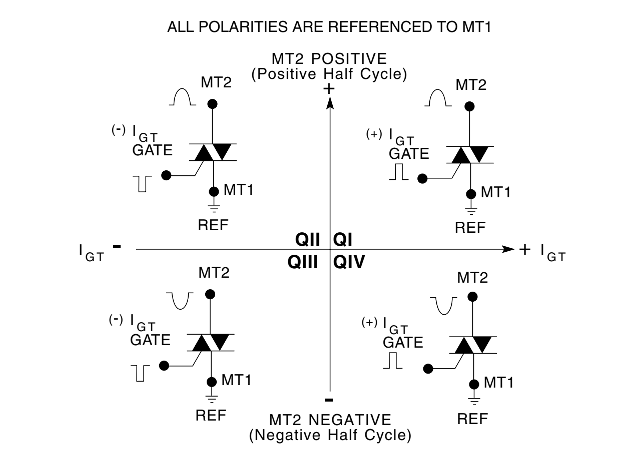
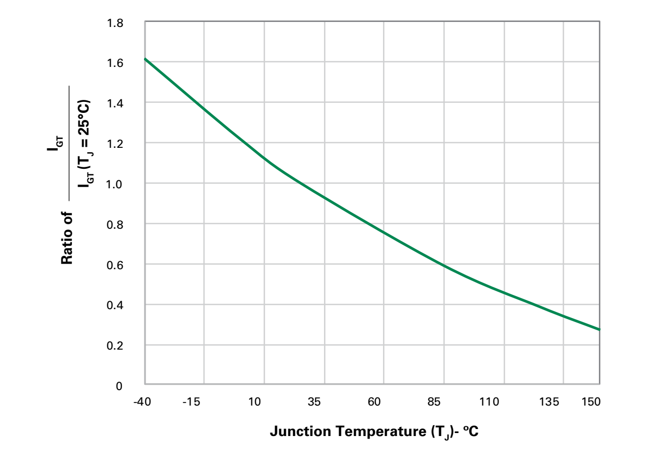


Figure 2: Normalized DC Gate Trigger Current for All Quadrants vs. Junction Temperature



©2018 Littelfuse, Inc.
Specifications are subject to change without notice.
Revision: 11/29/18

Figure 3: Normalized DC Holding Current vs. Junction Temperature

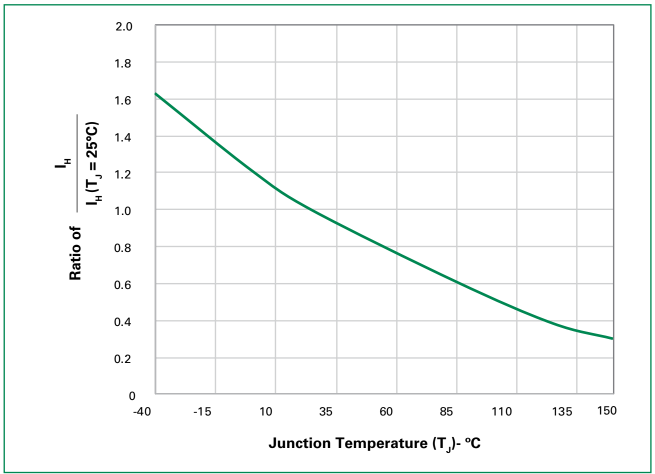


Figure 4: Normalized DC Gate Trigger Voltage for All Quadrants vs. Junction Temperature

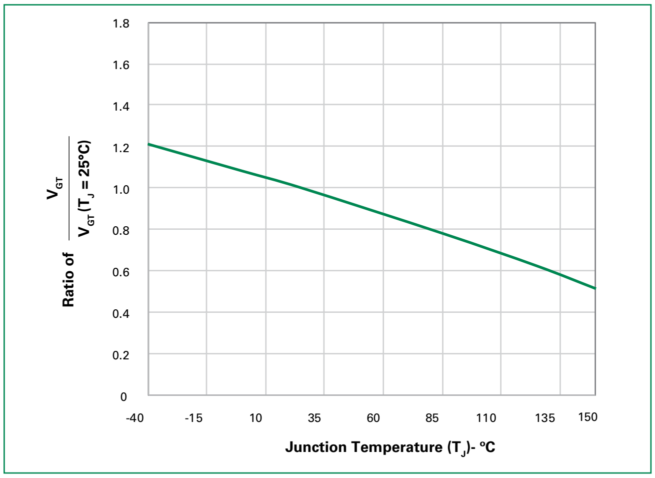


Figure 5: Power Dissipation (Typical) vs. RMS On-State Current

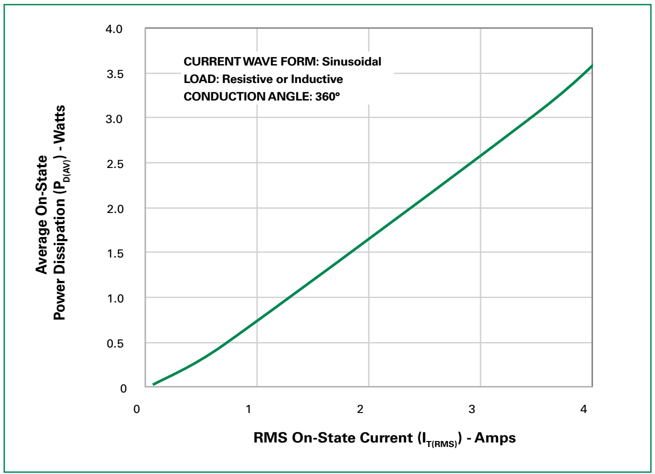


Figure 6: Maximum Allowable Case Temperature vs. On-State Current

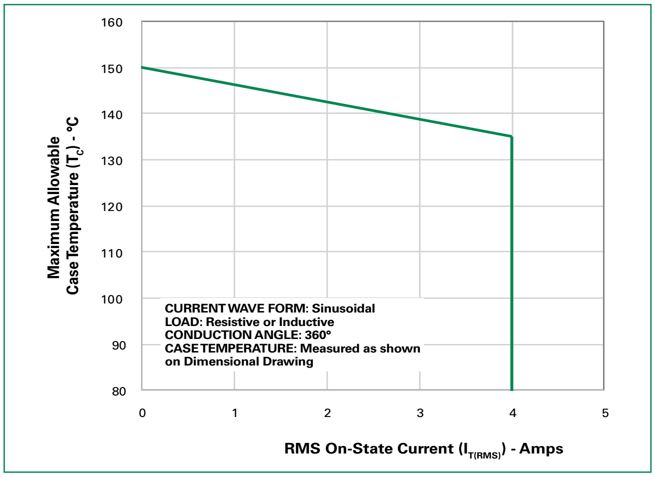
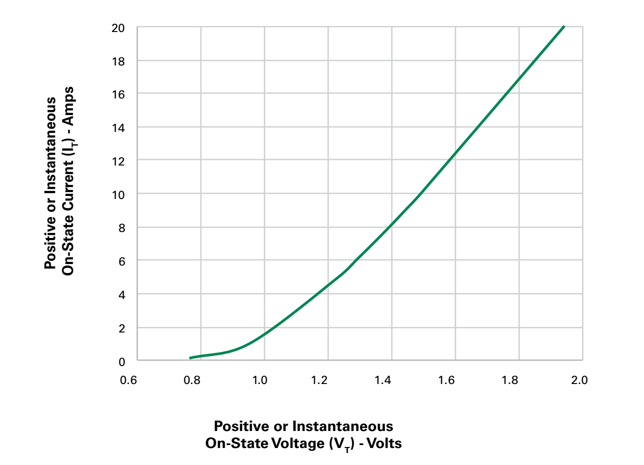
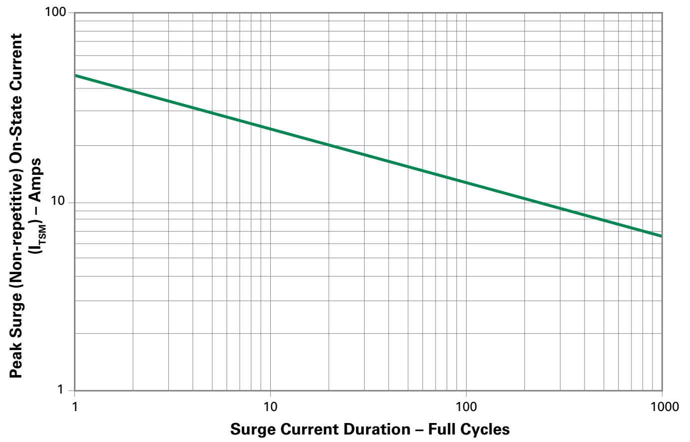


Figure 7: On-State Current vs. On-State Voltage (Typical)



©2018 Littelfuse, Inc.
Specifications are subject to change without notice.

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

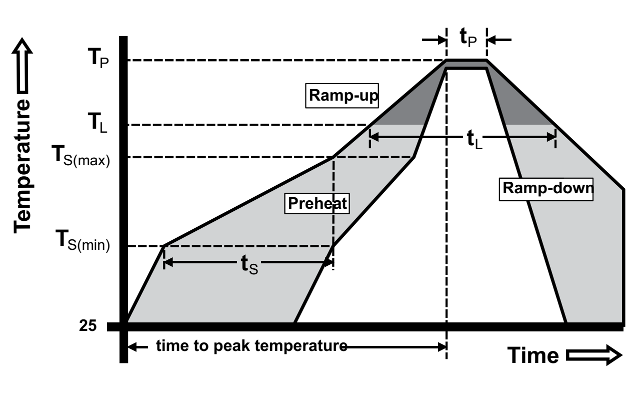


Supply Frequency: 60Hz Sinusoidal
Load: Resistive
RMS On-State [$I_{T(RMS)}$]: Max Rated Value at Specific Case Temperature

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

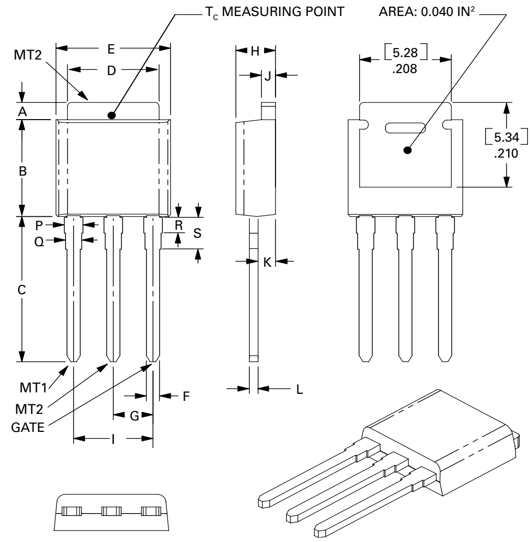
Careful selection of the correct component for the application's operating parameters and environment will go a long way toward extending the operating life of the Thyristor. Good design practice should limit the maximum continuous current through the main terminals to 75% of the component rating. Other 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 (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, 100 cycles; -55°C to +150°C; 15-min dwell-time
Temperature/ Humidity	EIA / JEDEC, JESD22-A101 1008 hours; 160V - 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

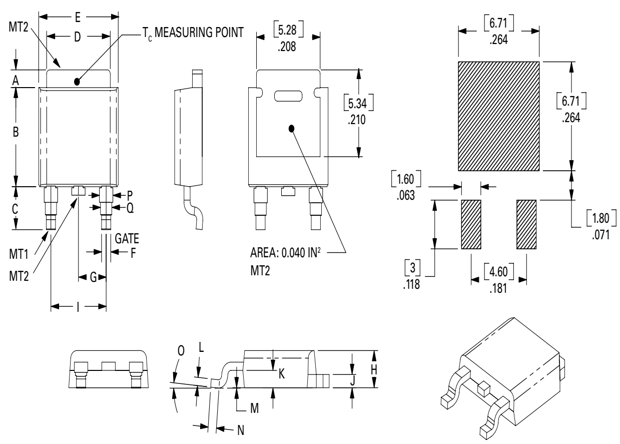
©2018 Littelfuse, Inc.
Specifications are subject to change without notice.

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

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

©2018 Littelfuse, Inc.
Specifications are subject to change without notice.
Revision: 11/29/18

Product Selector

Part Number	Voltage		Gate Sensitivity Quadrants		Type	Package
	400V	600V	I – II – III	IV		
LJxx04D8	x	x	10mA	20mA	Sensitive Triac	TO-252 D-PAK
LJxx04V8	x	x	10mA	20mA	Sensitive Triac	TO-251 V-PAK
QJxx04D3	x	x	10mA	25mA	Standard Triac	TO-252 D-PAK
QJxx04V3	x	x	10mA	25mA	Standard Triac	TO-251 V-PAK
QJxx04D4	x	x	25mA	50mA	Standard Triac	TO-252 D-PAK
QJxx04V4	x	x	25mA	50mA	Standard Triac	TO-251 V-PAK

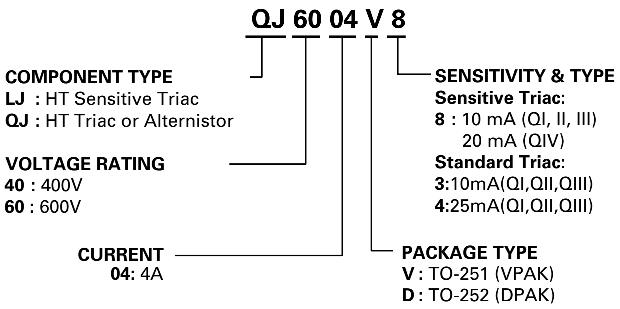
Note: xx=voltage/10

Packing Options

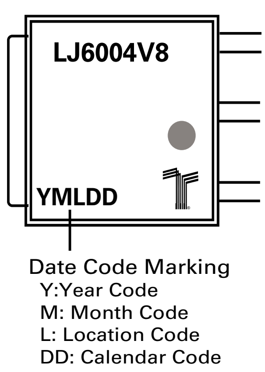
Part Number	Marking	Weight	Packing Mode	Base Quantity
LJxx04D8TP	LJxx04D8	0.3g	Tube Pack	750(75 per tube)
LJxx04D8RP	LJxx04D8	0.3g	Embossed Carrier	2500
LJxx04V8TP	LJxx04V8	0.4g	Tube Pack	750(75 per tube)
QJxx04D3TP	QJxx04D3	0.3g	Tube Pack	750(75 per tube)
QJxx04D3RP	QJxx04D3	0.3g	Embossed Carrier	2500
QJxx04V3TP	QJxx04V3	0.4g	Tube Pack	750(75 per tube)
QJxx04D4TP	QJxx04D4	0.3g	Tube Pack	750(75 per tube)
QJxx04D4RP	QJxx04D4	0.3g	Embossed Carrier	2500
QJxx04V4TP	QJxx04V4	0.4g	Tube Pack	750(75 per tube)

Note: xx=voltage/10

Part Numbering System



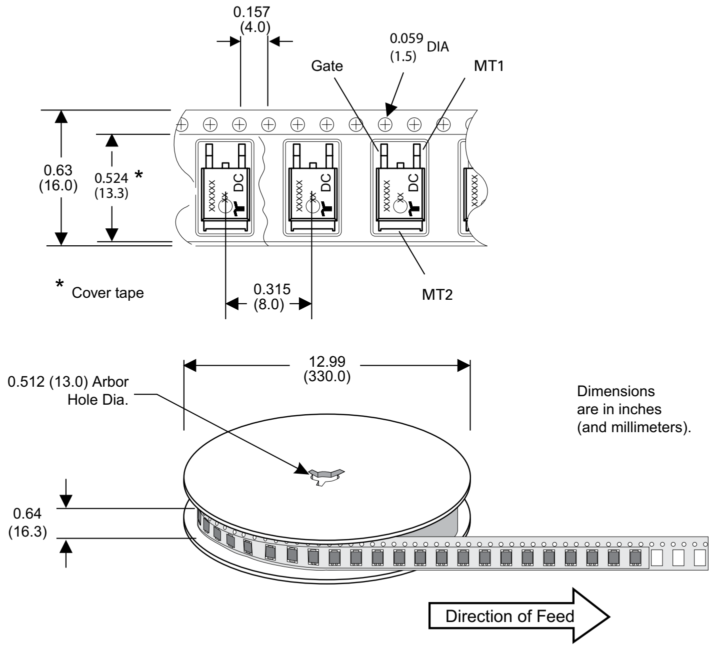
Part Marking System



©2018 Littelfuse, Inc.
Specifications are subject to change without notice.
Revision: 11/29/18

TO-252 Embossed Carrier Reel Pack (RP) Specifications

Meets all EIA-481-2 Standards



Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications.
Read complete Disclaimer Notice at http://www.littelfuse.com/disclaimer-electronics.

©2018 Littelfuse, Inc.
Specifications are subject to change without notice.
Revision: 11/29/18

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Littelfuse:

LJ4004V8TP QJ4004D3RP LJ6004V8TP QJ6004V4TP LJ4004D8TP QJ4004D4TP QJ6004V3TP QJ6004D4TP QJ4004D4RP QJ6004D3RP QJ6004D4RP QJ4004V3TP LJ4004D8RP QJ6004D3TP QJ4004D3TP LJ6004D8RP LJ6004D8TP QJ4004V4TP