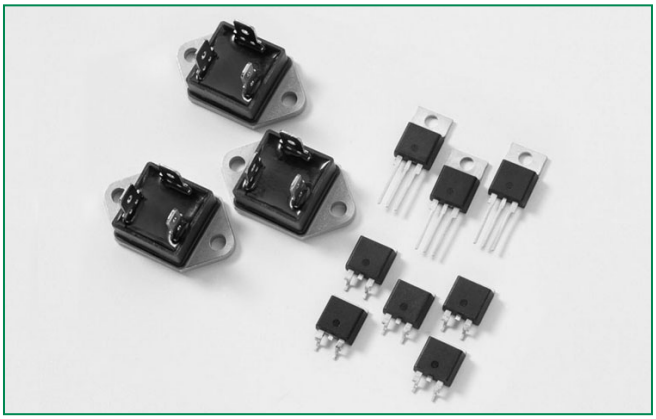
RoHS Qxx30xHx & Qxx35xx & Qxx35xHx Series



Description

30 Amp / 35 Amp bi-directional 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.

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

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

Features & Benefits

- RoHS Compliant
- Glass – passivated junctions
- Voltage capability up to 800V
- Surge capability up to 350A
- Electrically isolated package "FASTPAK" & "L - Package" are UL recognized for 2500Vrms

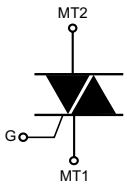
Agency Approval

Agency	Agency File Number
®	FASTPAK & L Package: E71639

Main Features

Symbol	Value	Unit
$I_{T(RMS)}$	30 & 35	A
V_{DRM}/V_{RRM}	400 to 800	V
$I_{GT\ (Q1)}$	50	mA

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, industrial power tools, exercise equipment, white goods and commercial appliances.

Alternistor Triacs (no snubber required) are used in applications with extremely inductive loads requiring highest commutation performance.

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

Absolute Maximum Ratings —Standard Triac

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	RMS on-state current (full sine wave)	Qxx35P5	T_C = 55°C	35	A
I_{TSM}	Non repetitive surge peak on-state current (full cycle, T_J initial = 25°C)	f = 50 Hz	t = 20 ms	300	A
		f = 60 Hz	t = 16.7 ms	350	
I^2t	I^2t Value for fusing		t_p = 8.3 ms	508	A^2s
di/dt	Critical rate of rise of on-state current (I_G = 200mA with ≤ 0.1µs rise time)	f = 120 Hz	T_J = 125°C	100	A/µs
I_{GTM}	Peak gate trigger current	t_p ≤ 10 µs $I_{GT} \le I_{GTM}$	T_J = 125°C	2	A
$P_{G(AV)}$	Average gate power dissipation		T_J = 125°C	0.5	W
T_{stg}	Storage temperature range			-40 to 125	°C
T_J	Operating junction temperature range			-25 to 125	°C

Note: xx = voltage

©2010 Littelfuse, Inc
Specifications are subject to change without notice.
Please refer to http://www.littelfuse.com for current information.

Absolute Maximum Ratings — Alternistor Triac (3 Quadrants)

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	RMS on-state current (full sine wave)	Qxx35RH5/Qxx35NH5	T_C = 90°C	35	A
		Qxx30LH5	T_C = 50°C	30	
I_{TSM}	Non repetitive surge peak on-state current (full cycle, T_J initial = 25°C)	f = 50 Hz	t = 20 ms	290	A
		f = 60 Hz	t = 16.7 ms	350	
I^2t	I^2t Value for fusing		t_p = 8.3 ms	508	A^2s
di/dt	Critical rate of rise of on-state current (I_G = 200mA with ≤ 0.1µs rise time)	f = 120 Hz	T_J = 125°C	100	A/µs
I_{GTM}	Peak gate trigger current	t_p ≤ 10 µs $I_{GT} \le I_{GTM}$	T_J = 125°C	2	A
$P_{G(AV)}$	Average gate power dissipation		T_J = 125°C	0.5	W
T_{stg}	Storage temperature range			-40 to 150	°C
T_J	Operating junction temperature range			-25 to 125	°C

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

Symbol	Test Conditions	Quadrant		Qxx35P5	Unit
I_{GT}	V_D = 12V R_L = 30 Ω	I – II – III	MAX.	50	mA
		IV	TYP.	120	
V_{GT}		I – II – III	MAX.	2.75	V
V_{GD}	$V_D = V_{DRM}$ R_L = 3.3 kΩ T_J = 110°C	ALL	MIN.	0.2	V
I_H	I_T = 400mA		MAX.	50	mA
dv/dt	$V_D = V_{DRM}$ Gate Open T_J = 125°C	600V	MIN.	475	V/µs
		800V		400	
(dv/dt)c	(di/dt)c = 18.9 A/ms T_J = 125°C		TYP.	5	V/µs
t_{gt}	$I_G = 2 \times I_{GT}$ PW = 15µs I_T = 49.5A(pk)		TYP.	3	µs

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

Symbol	Test Conditions	Quadrant		Qxx35RH5 Qxx35NH5 Qxx30LH5	Unit
I_{GT}	V_D = 12V R_L = 30 Ω	I – II – III	MAX.	50	mA
V_{GT}		I – II – III	MAX.	2	V
V_{GD}	$V_D = V_{DRM}$ R_L = 3.3 kΩ T_J = 125°C	I – II – III	MIN.	0.2	V
I_H	I_T = 400mA		MAX.	75	mA
dv/dt	$V_D = V_{DRM}$ Gate Open T_J = 125°C	400V	MIN.	475	V/µs
		600V		400	
(dv/dt)c	(di/dt)c = 18.9 A/ms T_J = 125°C		MIN.	20	V/µs
t_{gt}	35A device $I_G = 2 \times I_{GT}$ PW = 15µs I_T = 49.5A(pk)		TYP.	3	µs
	30A device $I_G = 2 \times I_{GT}$ PW = 15µs I_T = 42.4A(pk)				

Note: xx = voltage

©2010 Littelfuse, Inc
Specifications are subject to change without notice.
Please refer to http://www.littelfuse.com for current information.

Static Characteristics

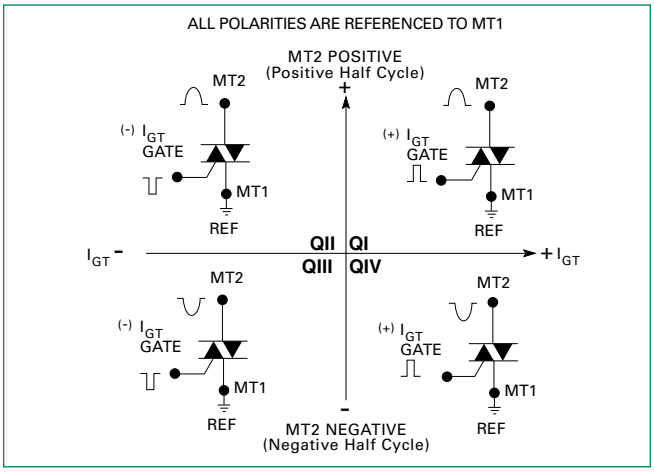
Symbol	Test Conditions				Value	Unit
V_{TM}	35A device I_{TM} = 49.5A t_p = 380 µs			MAX.	1.5	V
	30A device I_{TM} = 42.4A t_p = 380 µs				1.4	
I_{DRM} I_{RRM}	$V_D = V_{DRM} / V_{RRM}$	Qxx35P5	T_J = 25°C	600 - 800V	MAX.	100	µA
			T_J = 125°C	600 - 800V		5	mA
		Qxx35R/NH5 Qxx30LH5	T_J = 25°C	400 - 600V	MAX.	10	µA
			T_J = 125°C	400 - 600V		2	mA

Thermal Resistances

Symbol	Parameter		Value	Unit
$R_{\theta(J-C)}$	Junction to case (AC)	Qxx35P5	1.50	°C/W
		Qxx35RH5 / Qxx35NH5	0.85	
		Qxx30LH5	2.30	
$R_{\theta(J-A)}$	Junction to ambient	Qxx35RH5	45	°C/W
		Qxx30LH5	50	

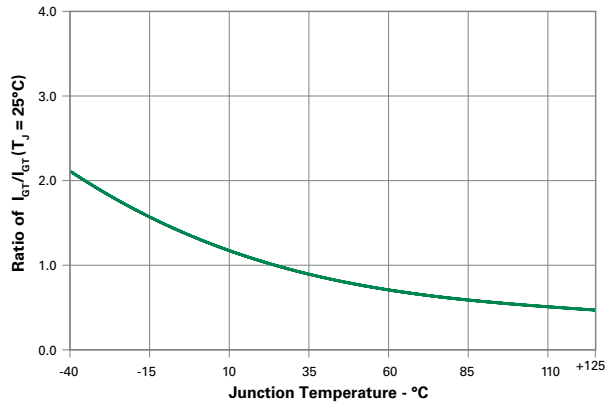
Note: xx = voltage

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



©2010 Littelfuse, Inc
Specifications are subject to change without notice.
Please refer to http://www.littelfuse.com for current information.

Figure 3: Normalized DC Holding Current vs. Junction Temperature

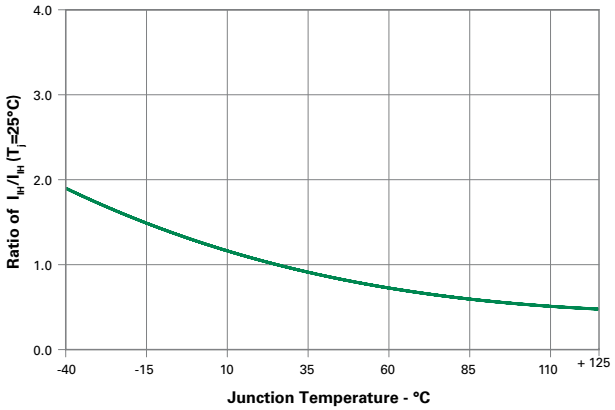


Figure 4: Normalized DC Gate Trigger Voltage for All Quadrants vs. Junction Temperature

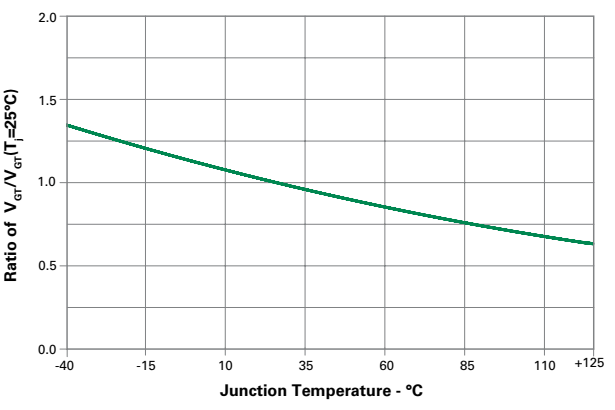
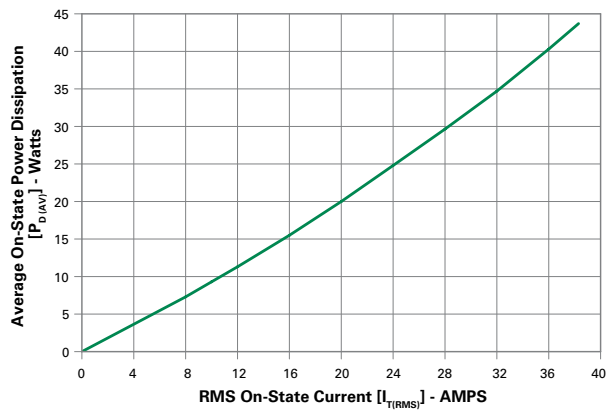


Figure 5: Power Dissipation (Typical) vs. RMS On-State Current



Note: xx = voltage

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

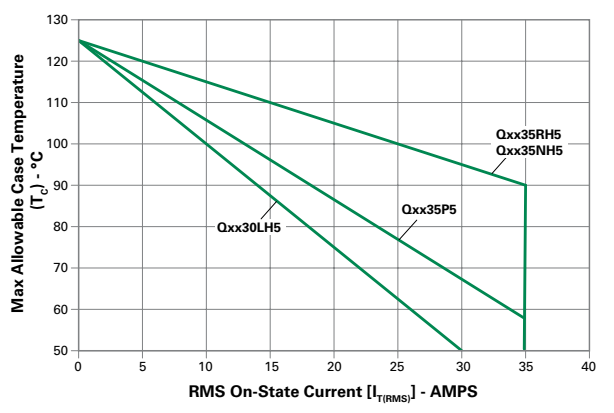
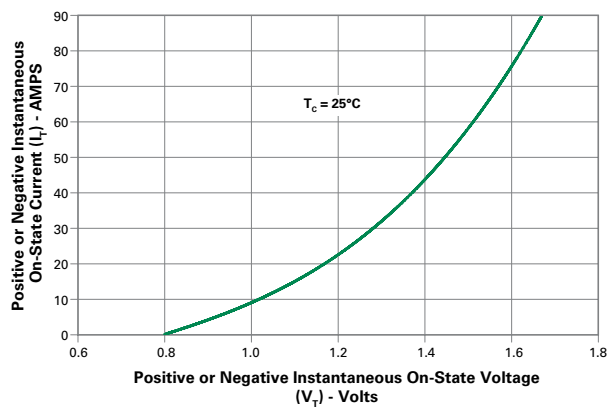
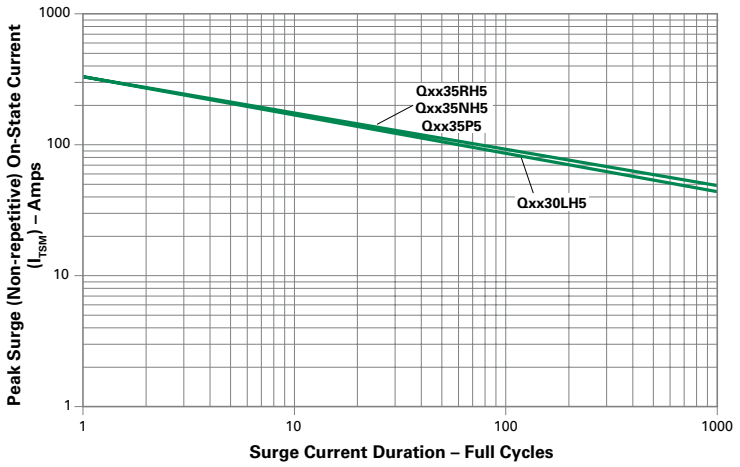


Figure 7: On-State Current vs. On-State Voltage (Typical)



©2010 Littelfuse, Inc
Specifications are subject to change without notice.
Please refer to http://www.littelfuse.com for current information.

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



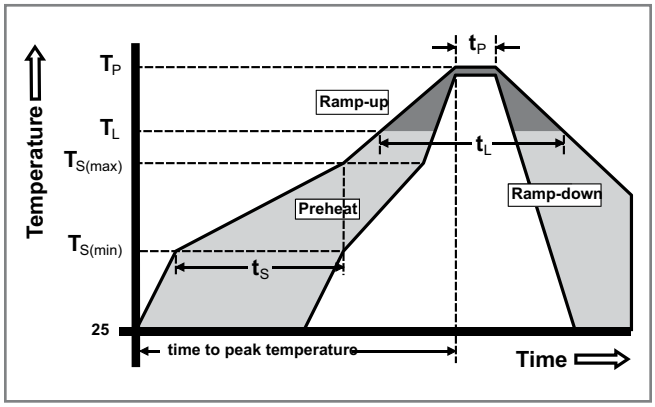
Supply Frequency: 60Hz Sinusoidal
Load: Resistive
RMS On-State [$I_{T(RMS)}$]: Max Rated Value at Specific Case Temperature

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.

Note: xx = voltage

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 (min to max) (t_s)	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



©2010 Littelfuse, Inc
Specifications are subject to change without notice.
Please refer to http://www.littelfuse.com for current information.

Physical Specifications

Terminal Finish	100% Matte Tin-plated.
Body Material	UL recognized epoxy meeting flammability classification 94V-0.
Terminal Material	Copper Alloy

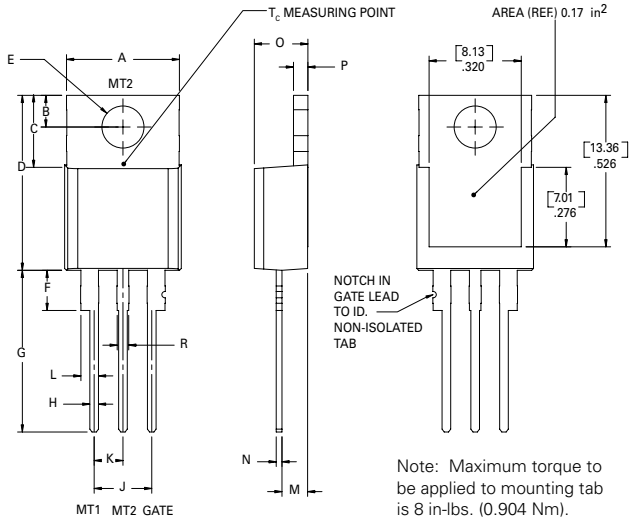
Design Considerations

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	MIL-STD-750, M-1040, Cond A Applied Peak AC voltage @ 125°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

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

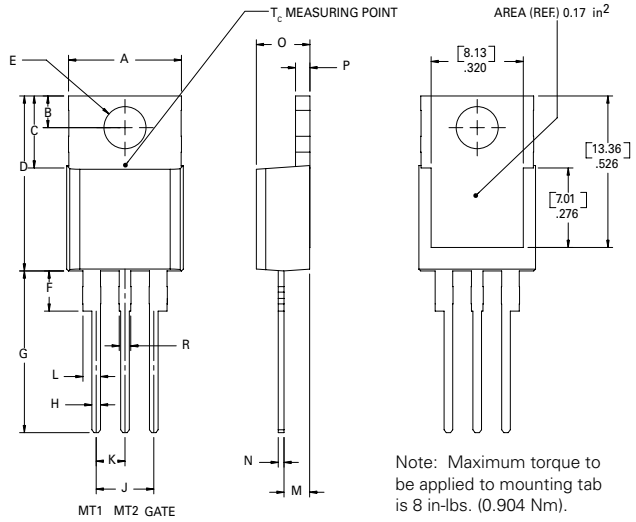


Note: Maximum torque to be applied to mounting tab is 8 in-lbs. (0.904 Nm).

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	14.61
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

©2010 Littelfuse, Inc
Specifications are subject to change without notice.
Please refer to http://www.littelfuse.com for current information.

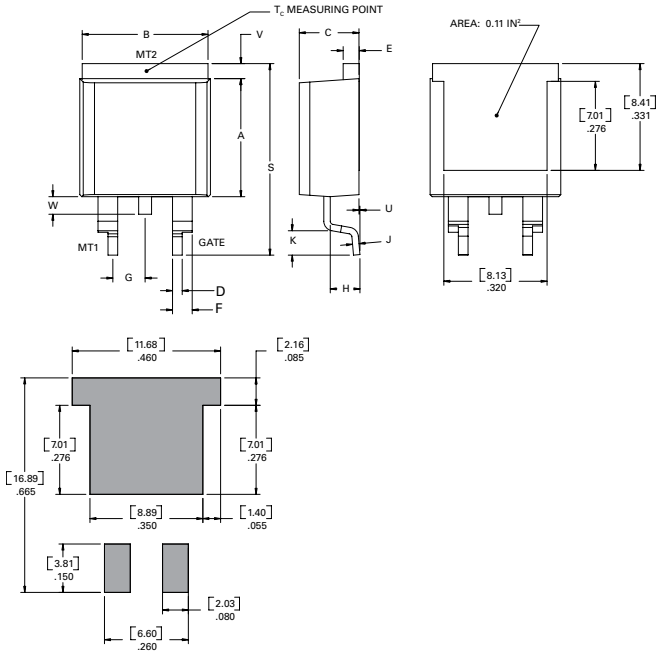
Dimensions — TO-220AB (L-Package) — Isolated Mounting Tab



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	14.61
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

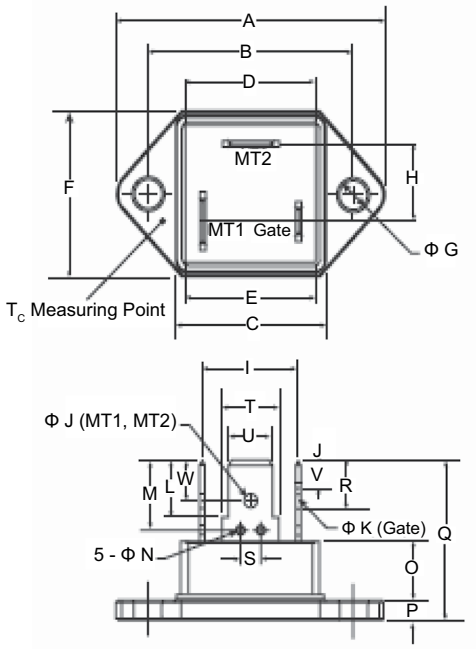
Dimensions — TO-263 (N-Package) — D² Pak Surface Mount



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

©2010 Littelfuse, Inc
Specifications are subject to change without notice.
Please refer to http://www.littelfuse.com for current information.

Dimensions — TO-3 Fastpak (P Package) — Isolated Mounting Tab



Thickness of all three copper-alloy terminals is .032"(0.81mm)

Dimension	Inches		Millimeters	
	Min	Max	Min	Max
A	1.531	1.543	38.90	39.20
B	1.177	1.185	29.90	30.10
C	0.843	0.850	21.40	21.60
D	0.780	0.795	19.80	20.20
E	0.783	0.791	19.90	20.10
F	0.874	0.906	22.20	23.00
G	0.161	0.169	4.10	4.30
H	0.386	0.465	9.80	11.80
I	0.508	0.587	12.90	14.90
J	0.079	0.087	2.00	2.20
K	0.047	0.055	1.20	1.40
L	0.307	0.319	7.80	8.10
M	0.372	0.396	9.45	10.05
N	0.043	0.059	1.10	1.50
O	0.315	0.331	8.00	8.40
P	0.098	0.106	2.50	2.70
Q	0.846	0.886	21.50	22.50
R	0.244	0.256	6.20	6.50
S	0.106	0.130	2.70	3.30
T(MT1)	0.321	0.329	8.15	8.35
T(MT2)	0.321	0.329	8.15	8.35
T(Gate)	0.220	0.228	5.60	5.80
U(MT1)	0.246	0.254	6.25	6.45
U(MT1)	0.246	0.254	6.25	6.45
U(Gate)	0.183	0.191	4.65	4.85
V	0.120	0.130	3.05	3.30
W	0.175	0.185	4.45	4.70

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

Product Selector

Part Number	Voltage			Gate Sensitivity Quadrants		$I_{T(RMS)}$	Type	Package
	400V	600V	800V	I – II – III	IV			
Qxx35P5		X	X	50 mA	120 mA (TYP)	35A	Standard Triac	FASTPACK
Qxx35RH5	X	X		50 mA		35A	Alternistor Triac	TO-220R
Qxx35NH5	X	X		50 mA		35A	Alternistor Triac	TO-263 D^2-PAK
Qxx30LH5	X	X		50 mA		30A	Alternistor Triac	TO-220L

Note: xx = Voltage

©2010 Littelfuse, Inc
Specifications are subject to change without notice.
Please refer to http://www.littelfuse.com for current information.

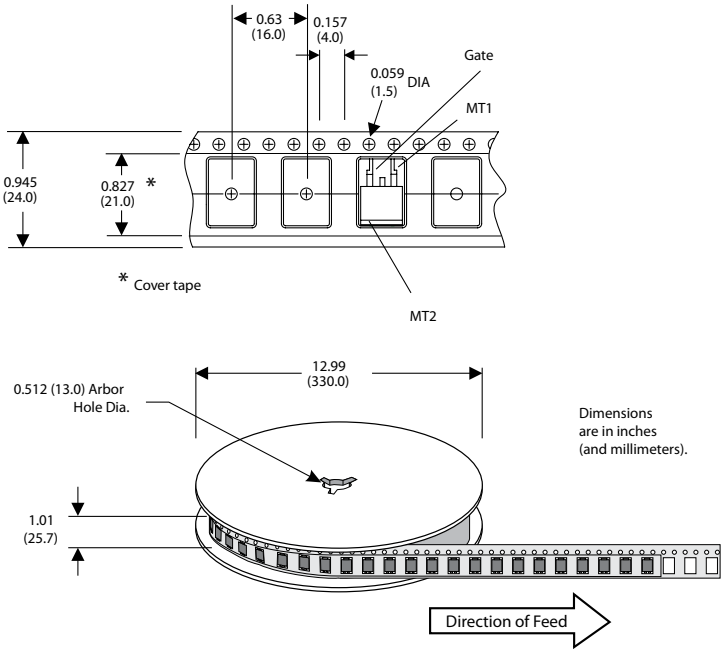
Packing Options

Part Number	Marking	Weight	Packing Mode	Base Quantity
Qxx30LH5	Qxx30LH5	2.20 g	Bulk	500
Qxx30LH5TP	Qxx30LH5	2.20 g	Tube	500 (50 per tube)
Qxx35RH5	Qxx35RH5	2.20 g	Bulk	500
Qxx35RH5TP	Qxx35RH5	2.20 g	Tube	500 (50 per tube)
Qxx35NH5TP	Qxx35NH5	1.60 g	Tube	500 (50 per tube)
Qxx35NH5RP	Qxx35NH5	1.60 g	Embossed Carrier	500
Qxx35P5	Qxx35P5	21.4 g	Bulk	200

Note: xx = Voltage

TO-263 Embossed Carrier Reel Pack (RP) Specifications

Meets all EIA-481-2 Standards



Part Numbering System

Q 60 35 P 5

DEVICE TYPE
Q : Triac or Alternistor Triac

VOLTAGE
40 : 400V
60 : 600V
80 : 800V

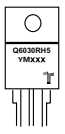
CURRENT
30 : 30A
35 : 35A

PACKAGE TYPE
L : TO-220 Isolated
R : TO-220 Non-Isolated
N : TO-263 (D^2-PAK)
P : FASTPAK

SENSITIVITY & TYPE
Standard Triac
5 : 50mA (QI, II, III)
Alternistor Triac
H5 : 50mA (QI, II, III)

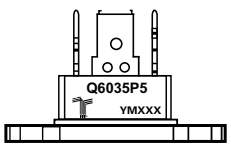
Part Marking System

TO-220 AB – (R Package)
TO-263 AB – (N Package)



TO-220 AB – (L Package)

FASTPAK (P Package)



©2010 Littelfuse, Inc
Specifications are subject to change without notice.
Please refer to http://www.littelfuse.com for current information.

OCEAN CHIPS
Океан Электроники
Поставка электронных компонентов

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «**JONHON**», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «**FORSTAR**».

AVIC JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).

FORSTAR®

Телефон: 8 (812) 309-75-97 (многоканальный)
Факс: 8 (812) 320-03-32
Электронная почта: ocean@oceanchips.ru
Web: http://oceanchips.ru/
Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А