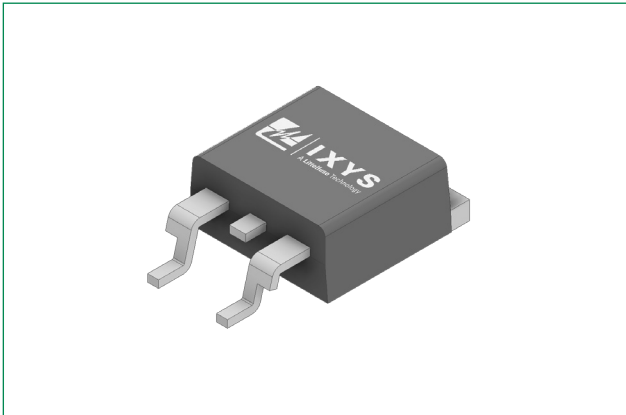


Q6035NAH5

RoHS



### Description

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

Standard alternistor triac components operate with in-phase signals in Quadrants I or III and ONLY unipolar negative gate pulses for Quadrant II or III. The alternistor triac will not operate in Quadrant IV. These are used in circuit applications requiring a high dv/dt capability.

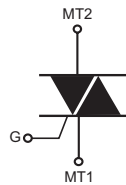
### Main Features

Symbol	Value	Unit
$I_{T(RMS)}$	35	A
$V_{DRM}/V_{RRM}$	600	V
$I_{GT(Q1)}$	50	mA

### Features & Benefits

- RoHS Compliant
- AEC-Q101 Qualified
- Glass – passivated junctions
- Surge capability up to 350A at 60 Hz half cycle
- Voltage capability up to 600V
- Automotive Level Manufacture Control

### 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.

### Absolute Maximum Ratings — Alternistor Triac (3 Quadrants)

Symbol	Parameter			Value	Unit
I <sub>T(RMS)</sub>	RMS on-state current (full sine wave)	Q6035NAH5	T <sub>c</sub> = 90°C	35	A
I <sub>TSM</sub>	Non repetitive surge peak on-state current (full cycle, T <sub>J</sub> initial = 25°C)	f = 50 Hz f = 60 Hz	t = 20 ms t = 16.7 ms	290 350	A
I <sup>2</sup> t	I <sup>2</sup> t Value for fusing	-	t <sub>p</sub> = 8.3 ms	508	A <sup>2</sup> s
di/dt	Critical rate of rise of on-state current (I <sub>G</sub> = 200mA with ≤ 0.1μs rise time)	f = 120 Hz	T <sub>J</sub> = 125°C	100	A/μs
I <sub>GTM</sub>	Peak gate trigger current	t <sub>p</sub> =20μs	T <sub>J</sub> = 125°C	4	A
P <sub>G(AV)</sub>	Average gate power dissipation		T <sub>J</sub> = 125°C	0.5	W
T <sub>stg</sub>	Storage temperature range			-40 to 125	°C
T <sub>J</sub>	Operating junction temperature range			-25 to 125	°C

### Electrical Characteristics ( $T_J = 25^\circ\text{C}$ , unless otherwise specified) — Alternistor Triac (3 Quadrants)

Symbol	Test Conditions	Quadrant		Q6035NAH5	Unit
$I_{GT}$	$V_D = 12\text{V}$ $R_L = 30\ \Omega$	I – II – III	MAX.	50	mA
$V_{GT}$	$V_D = 12\text{V}$ $R_L = 30\ \Omega$	I – II – III	MAX.	2	V
$V_{GD}$	$V_D = V_{DRM}$ $R_L = 3.3\text{ k}\Omega$ $T_J = 125^\circ\text{C}$	I – II – III	MIN.	0.2	V
$I_H$	$I_T = 400\text{mA}$		MAX.	75	mA
$dv/dt$	$V_D = V_{DRM}$ Gate Open $T_J = 125^\circ\text{C}$	600V	MIN.	400	$\text{V}/\mu\text{s}$
$(dv/dt)_c$	$(di/dt)_c = 18.9\text{ A/ms}$ $T_J = 125^\circ\text{C}$		MIN.	20	$\text{V}/\mu\text{s}$
$t_{gt}$	35A device $I_G = 2 \times I_{GT}$ $PW = 15\mu\text{s}$ $I_T = 49.5\text{A(pk)}$	I – II III	TYP.	3 11	$\mu\text{s}$

Note: xx = voltage/10

### Static Characteristics

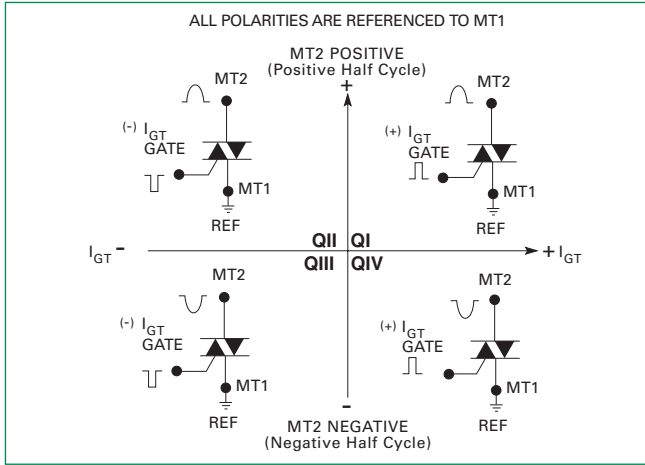
Symbol	Test Conditions				Value	Unit	
$V_{TM}$	35A device $I_{TM} = 49.5A$ $t_p = 380\ \mu s$				MAX.	1.5	V
$I_{DRM}$ $I_{RRM}$	$V_D = V_{DRM} / V_{RRM}$	Q6035NAH5	$T_J = 25^{\circ}C$	600V	MAX.	10	$\mu A$
			$T_J = 125^{\circ}C$	600V		2	mA

### Thermal Resistances

Symbol	Parameter		Value	Unit
$R_{\theta(J-C)}$	Junction to case (AC)	Q6035NAH5	0.85	$^\circ\text{C}/\text{W}$

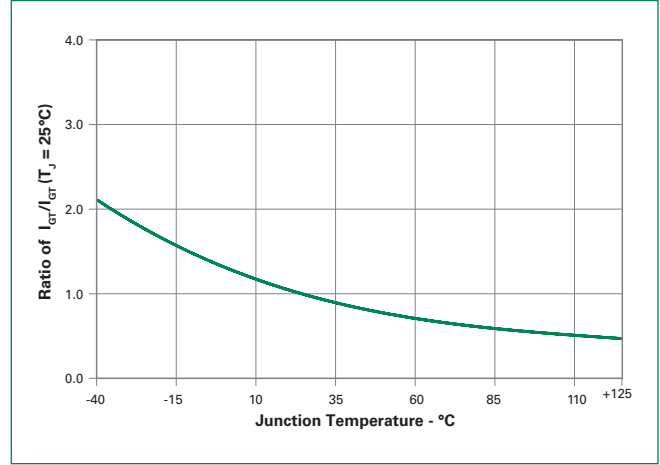
Note: xx = voltage/10

**Figure 1: Definition of Quadrants**

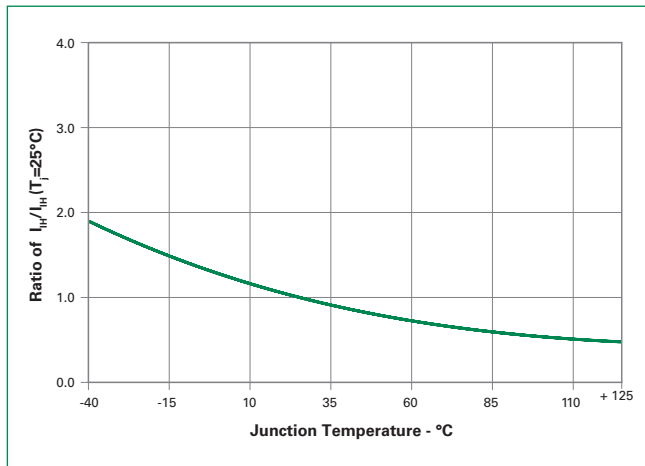


**Note:** Alternistors will not operate in QIV

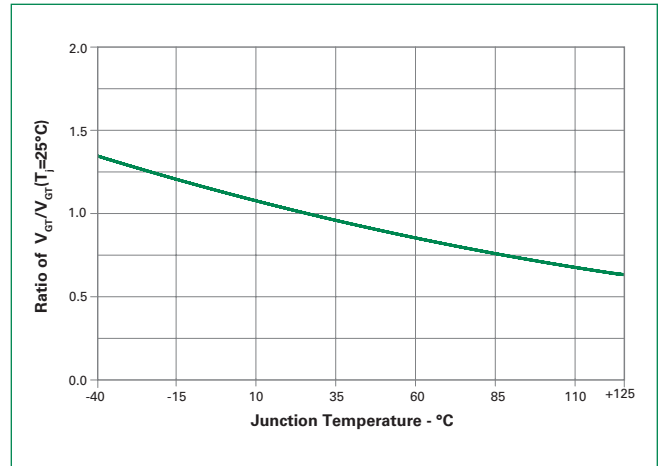
**Figure 2: Normalized DC Gate Trigger Current for All Quadrants vs. Junction Temperature**



**Figure 3: Normalized DC Holding Current vs. Junction Temperature**

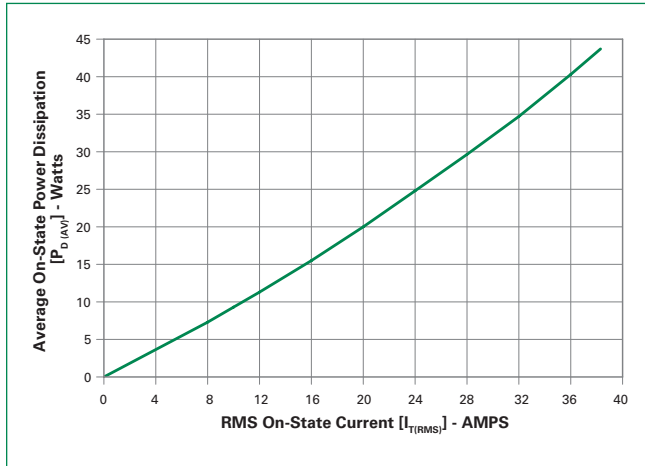


**Figure 4: Normalized DC Gate Trigger Voltage for All Quadrants vs. Junction Temperature**



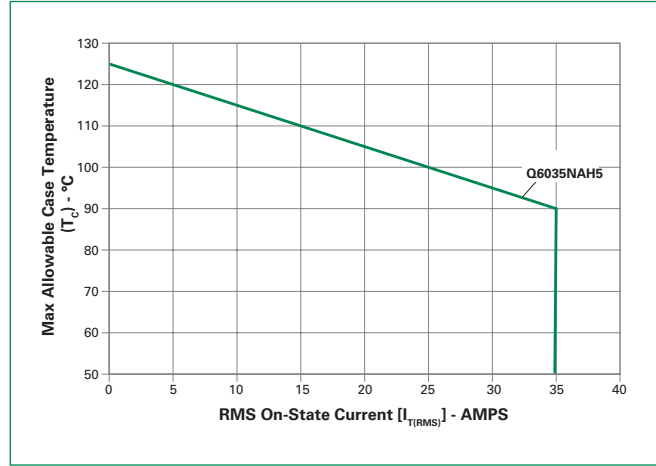


**Figure 5: Power Dissipation (Typical)  
vs. RMS On-State Current**

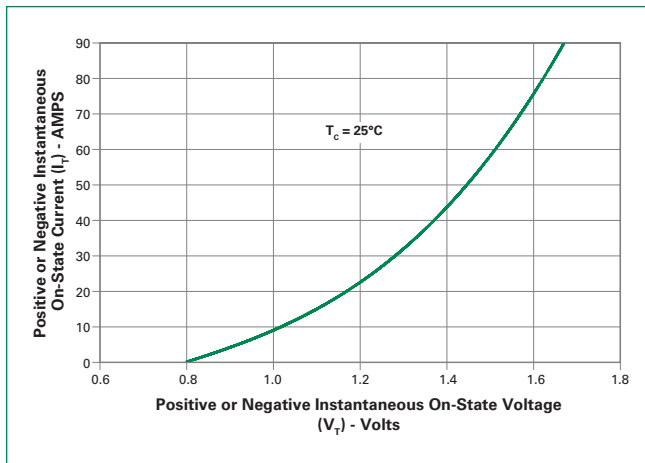


Note: xx = voltage

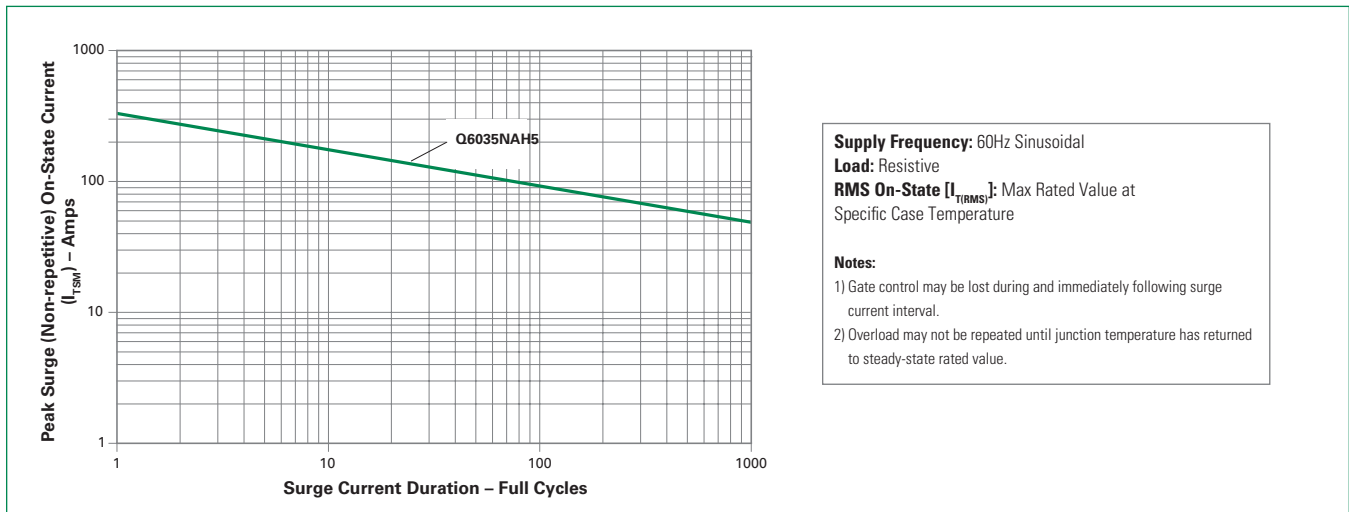
**Figure 6: Maximum Allowable Case Temperature  
vs. On-State Current**



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



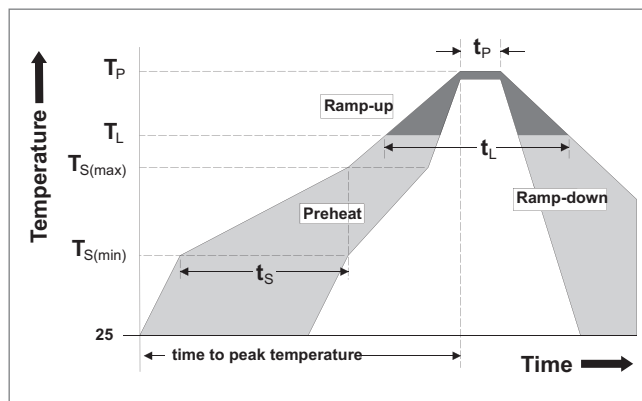
**Figure 8: Surge Peak On-State Current vs. Number of Cycles**



Note: xx = voltage

### Soldering Parameters

<b>Reflow Condition</b>		Pb – Free assembly
<b>Pre Heat</b>	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_s$ )	60 – 180 secs
<b>Average ramp up rate (Liquidus Temp) (<math>T_L</math>) to peak</b>		5°C/second max
<b><math>T_{s(max)}</math> to <math>T_L</math> - Ramp-up Rate</b>		5°C/second max
<b>Reflow</b>	- Temperature ( $T_L$ ) (Liquidus)	217°C
	- Time (min to max) ( $t_s$ )	60 – 150 seconds
<b>Peak Temperature (<math>T_p</math>)</b>		260 <sup>+0/-5</sup> °C
<b>Time within 5°C of actual peak Temperature (<math>t_p</math>)</b>		20 – 40 seconds
<b>Ramp-down Rate</b>		5°C/second max
<b>Time 25°C to peak Temperature (<math>T_p</math>)</b>		8 minutes Max.
<b>Do not exceed</b>		280°C



### Physical Specifications

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

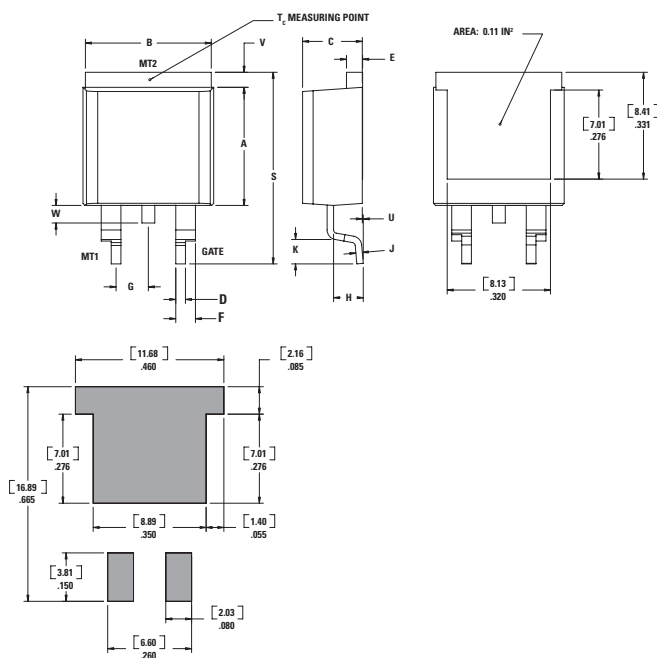
### Design Considerations

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
<b>AC Blocking</b>	MIL-STD-750, M-1040, Cond A Applied Peak AC voltage @ 125°C for 1008 hours
<b>Temperature Cycling</b>	MIL-STD-750, M-1051, 1000 cycles; -55°C to +150°C; 15-min dwell-time
<b>Temperature/Humidity</b>	EIA / JEDEC, JESD22-A101 1008 hours; 160V - DC: 85°C; 85% rel humidity
<b>UHAFT</b>	JESD22A-118, 96 hrs, 130°C/ 85% RH
<b>Resistance to Solder Heat</b>	MIL-STD-750 Method 2031
<b>Solderability</b>	ANSI/J-STD-002, category 3, Test A
<b>Lead Bend</b>	MIL-STD-750, M-2036 Cond E
<b>Moisture Sensitivity Level</b>	Level 1, JEDEC-J-STD-020

### Dimensions — TO-263 (N-Package) — D<sup>2</sup> 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	600V	Gate Sensitivity Quadrants		$I_{T(RMS)}$	Type	Package
		I – II – III	IV			
Q6035NAH5	X	50 mA		35A	Alternistor Triac	TO-263 D <sup>2</sup> -PAK

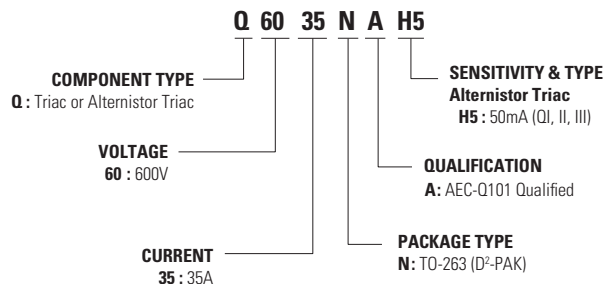
Note: xx = Voltage/10

### Packing Options

Part Number	Marking	Weight	Packing Mode	Base Quantity
Q6035NAH5RP	Q6035NAH5	1.60 g	Embossed Carrier	500

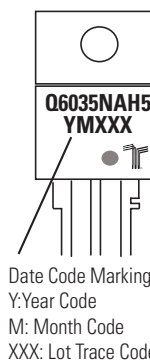
xx = voltage/10

### Part Numbering System



### Part Marking System

#### TO-263 AB - (N Package)



### TO-263 Embossed Carrier Reel Pack (RP) Specifications

#### Meets all EIA-481-2 Standards

