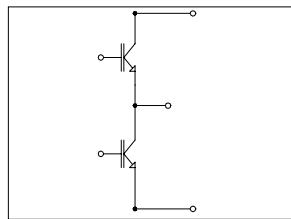


**Features**

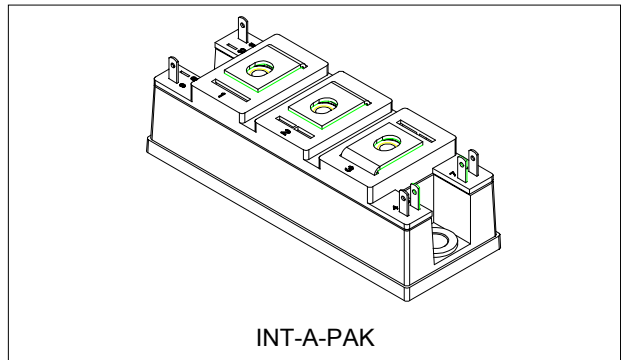
- Generation 4 IGBT Technology
- Standard speed: optimized for hard switching operating frequencies up to 1000 Hz
- Very Low Conduction Losses
- Industry standard package



$V_{CES} = 600V$   
 $V_{CE(on) typ.} = 1.19V @$   
 $V_{GE} = 15V, I_C = 200A$   
 $T_J = 25^\circ C$

**Benefits**

- Increased operating efficiency
- Direct mounting to heatsink
- Performance optimized as output inverter stage for TIG welding machines



**Absolute Maximum Ratings**

Parameters		Max	Units
$V_{CES}$	Collector-to-Emitter Voltage	600	V
$I_C$	Continuos Collector Current	@ $T_C = 25^\circ C$	470
		@ $T_C = 110^\circ C$	200
$I_{CM}$	Pulsed Collector Current	800	
$I_{LM}$	Peak Switching Current	800	
$V_{GE}$	Gate-to-Emitter Voltage	$\pm 20$	V
$V_{ISOL}$	RMS Isolation Voltage, Any Terminal to Case, $t = 1 \text{ min}$	2500	
$P_D$	Maximum Power Dissipation	@ $T_C = 25^\circ C$	830
		@ $T_C = 85^\circ C$	430

**Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)**

Parameters		Min	Typ	Max	Units	Test Conditions
V <sub>CE(S)</sub>	Collector-to-Emitter Breakdown Voltage	600			V	V <sub>GE</sub> = 0V, I <sub>C</sub> = 1mA
V <sub>CE(on)</sub>	Collector-to-Emitter Voltage		1.19	1.25		V <sub>GE</sub> = 15V, I <sub>C</sub> = 200A
			1.17	-		V <sub>GE</sub> = 15V, I <sub>C</sub> = 200A, T <sub>J</sub> = 125°C
V <sub>GE(th)</sub>	Gate Threshold Voltage	3		6		I <sub>C</sub> = 0.5mA
I <sub>CE(S)</sub>	Collector-to-Emitter Leakage Current			1	mA	V <sub>GE</sub> = 0V, V <sub>CE</sub> = 600V
				10		V <sub>GE</sub> = 0V, V <sub>CE</sub> = 600V, T <sub>J</sub> = 125°C
I <sub>GES</sub>	Gate-to-Emitter Leakage Current			± 250	nA	V <sub>GE</sub> = ± 20V

**Switching Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)**

Parameters		Min	Typ	Max	Units	Test Conditions
Q <sub>g</sub>	Total Gate Charge		1600	1700	nC	I <sub>C</sub> = 200A V <sub>CC</sub> = 400V V <sub>GE</sub> = 15V
Q <sub>ge</sub>	Gate-Emitter Charge		260	340		
Q <sub>gc</sub>	Gate-Collector Charge		580	670		
E <sub>on</sub>	Turn-On Switching Loss		27		mJ	I <sub>C</sub> = 200A, V <sub>CC</sub> = 480V, V <sub>GE</sub> = 15V R <sub>g</sub> = 10Ω free-wheeling DIODE: 30ETH06
E <sub>off</sub>	Turn-Off Switching Loss		47			
E <sub>ts</sub>	Total Switching Loss		74			
E <sub>on</sub>	Turn-On Switching Loss		29	31	mJ	I <sub>C</sub> = 200A, V <sub>CC</sub> = 480V, V <sub>GE</sub> = 15V R <sub>g</sub> = 10Ω free-wheeling DIODE: 30ETH06, T <sub>J</sub> = 125°C
E <sub>off</sub>	Turn-Off Switching Loss		77	90		
E <sub>ts</sub>	Total Switching Loss		106	121		
C <sub>ies</sub>	Input Capacitance		32500		pF	V <sub>GE</sub> = 0V V <sub>CC</sub> = 30V f = 1.0 MHz
C <sub>oes</sub>	Output Capacitance		2080			
C <sub>res</sub>	Reverse Transfer Capacitance		380			

**Thermal- Mechanical Specifications**

Parameters		Min	Typ	Max	Units
T <sub>J</sub>	Operating Junction Temperature Range	- 40		150	°C
T <sub>STG</sub>	Storage Temperature Range	- 40		125	
R <sub>thJC</sub>	Junction-to-Case			0.15	°C/ W
R <sub>thCS</sub>	Case-to-Sink		0.1		
T	Mounting torque	Case to heatsink		4	Nm
		Case to terminal 1, 2, 3		3	
	Weight		185		g

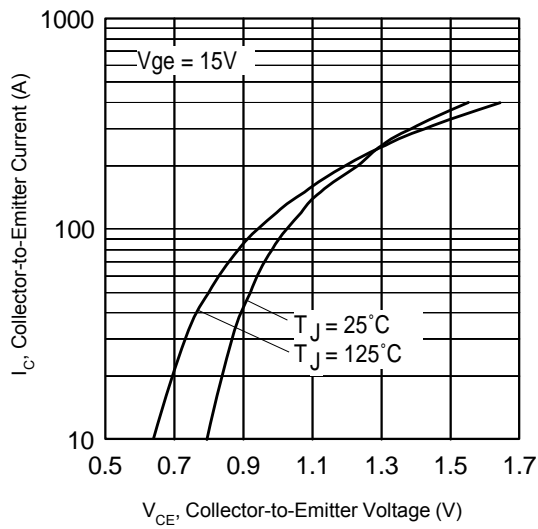


Fig. 1 - Typical Output Characteristics

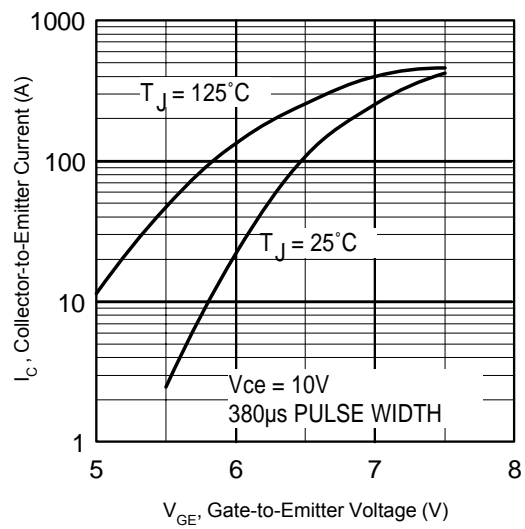


Fig. 2 - Typical Transfer Characteristics

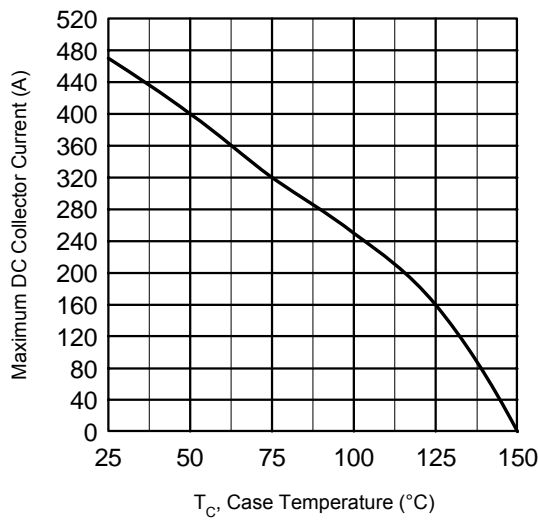


Fig. 3 - Maximum Collector Current vs. Case Temperature

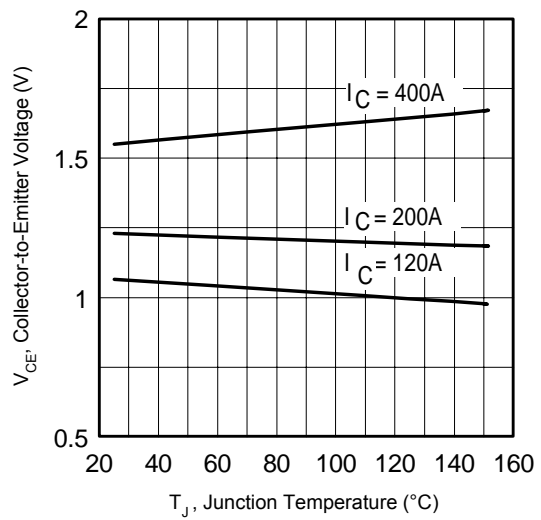


Fig. 4 - Typical Collector-to-Emitter Voltage vs. Junction Temperature

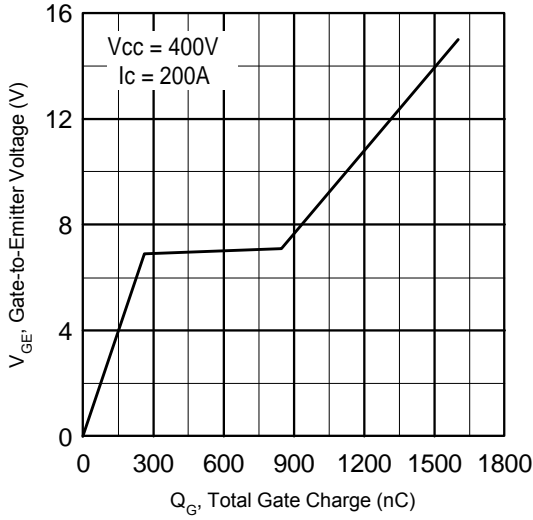


Fig. 5 - Typical Gate Charge vs. Gate-to-Emitter Voltage

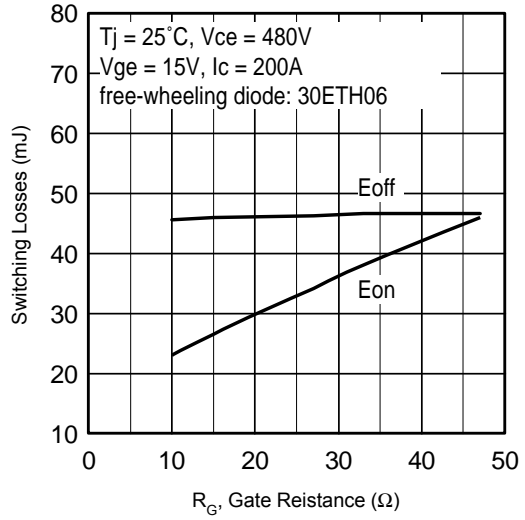


Fig. 6 - Typical Switching Losses vs Gate Resistance

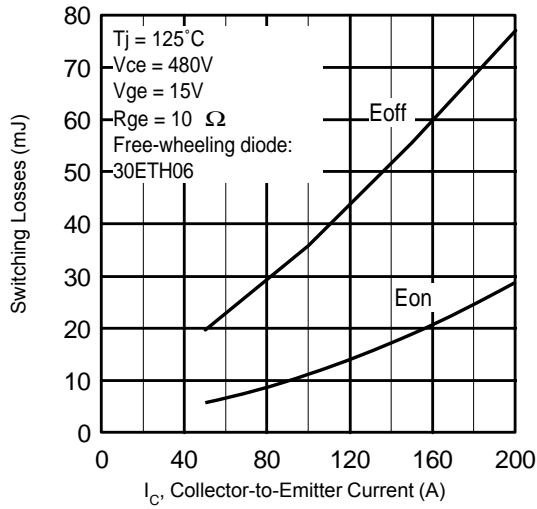
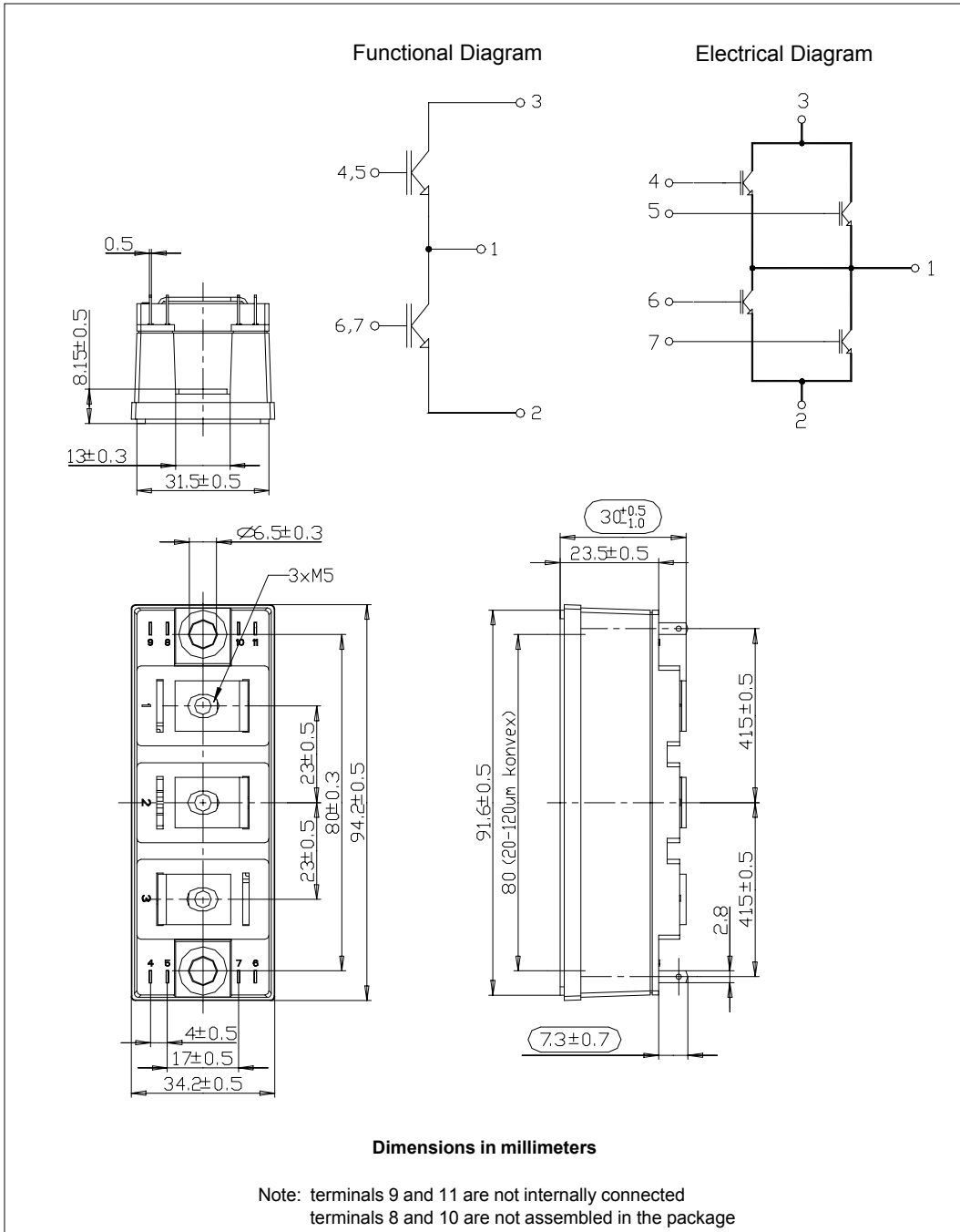


Fig. 7 - Typical Switching Losses vs Collector-to-Emitter Current

**Outline Table**



**Ordering Information Table**

Device Code													
	<table border="1" style="margin: auto;"> <tr> <td style="padding: 5px;">GA</td> <td style="padding: 5px;">200</td> <td style="padding: 5px;">H</td> <td style="padding: 5px;">S</td> <td style="padding: 5px;">60</td> <td style="padding: 5px;">S</td> </tr> <tr> <td style="text-align: center;">①</td> <td style="text-align: center;">②</td> <td style="text-align: center;">③</td> <td style="text-align: center;">④</td> <td style="text-align: center;">⑤</td> <td style="text-align: center;">⑥</td> </tr> </table>	GA	200	H	S	60	S	①	②	③	④	⑤	⑥
GA	200	H	S	60	S								
①	②	③	④	⑤	⑥								
<b>1</b>	- Essential Part Number IGBT modules												
<b>2</b>	- Current rating (200 = 200A)												
<b>3</b>	- Circuit Configuration (H = Half Bridge without f/w diode)												
<b>4</b>	- Int-A-Pak												
<b>5</b>	- Voltage Code (60 = 600V)												
<b>6</b>	- Speed/ Type (S = Standard Speed IGBT)												

Data and specifications subject to change without notice.  
 This product has been designed and qualified for Industrial Level.  
 Qualification Standards can be found on IR's Web site.

International  
**IR** Rectifier

**IR WORLD HEADQUARTERS:** 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105  
 TAC Fax: (310) 252-7309  
 Visit us at [www.irf.com](http://www.irf.com) for sales contact information. 07/02