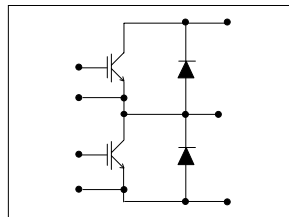


**Features**

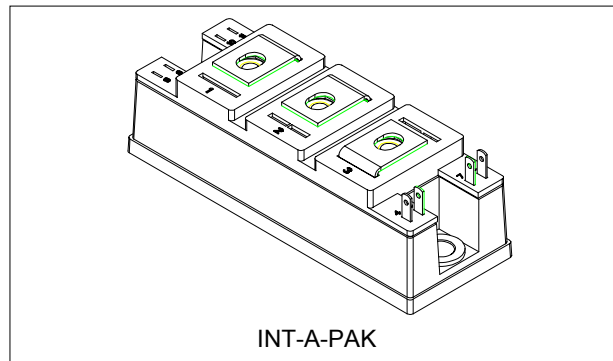
- Generation 4 Standard Speed IGBT Technology
- Quiet/*R* Antiparallel diodes with Fast Soft recovery
- Very Low Conduction Losses
- Industry Standard Package
- Aluminum Nitride DBC
- UL approved (file E78996)



$V_{CES} = 600V$   
 $I_C = 220A DC$   
 $V_{CE(on)} typ. = 1.39V$   
 @  $I_C = 200A T_J = 25^\circ C$

**Benefits**

- Optimized for high current inverter stages (AC TIG welding machines)
- Direct mounting to heatsink
- Hard switching operation frequency up to 1 KHz
- Very low junction-to-case thermal resistance
- Low EMI



**Absolute Maximum Ratings**

Parameters		Max	Units
$V_{CES}$	Collector-to-Emitter Voltage	600	V
$I_C$	Continuous Collector Current	@ $T_C = 25^\circ C$	220
		@ $T_C = 130^\circ C$	100
$I_{CM}$	Pulsed Collector Current	440	
$I_{LM}$	Peak Switching Current	440	
$V_{GE}$	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	@ $T_C = 25^\circ C$	780
		@ $T_C = 100^\circ C$	312

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

Parameters	Min	Typ	Max	Units	Test Conditions
V <sub>BRCEs</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		1.11	1.21		V <sub>GE</sub> = 15V, I <sub>C</sub> = 100A
		1.39			I <sub>C</sub> = 200A
		1.08	1.17		V <sub>GE</sub> = 15V, I <sub>C</sub> = 100A, T <sub>J</sub> = 125°C
V <sub>GE(th)</sub> Gate Threshold Voltage	3		6		I <sub>C</sub> = 0.25mA
I <sub>CEs</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
V <sub>FM</sub> Diode Forward Voltage drop		1.21	1.28	V	I <sub>C</sub> = 100A, V <sub>GE</sub> = 0V
		1.16	1.24		I <sub>C</sub> = 100A, V <sub>GE</sub> = 0V, 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		640	700	nC	I <sub>C</sub> = 100A V <sub>CC</sub> = 400V V <sub>GE</sub> = 15V
Q <sub>ge</sub> Gate-Emitter Charge		108	120		
Q <sub>gc</sub> Gate-Collector Charge		230	300		
t <sub>r</sub> Rise Time		0.45		μs	I <sub>C</sub> = 100A, V <sub>CC</sub> = 480V, V <sub>GE</sub> = 15V R <sub>g</sub> = 15Ω
t <sub>f</sub> Fall Time		1.0			
E <sub>on</sub> Turn-On Switching Energy		4	6	mJ	I <sub>C</sub> = 100A, V <sub>CC</sub> = 480V, V <sub>GE</sub> = 15V R <sub>g</sub> = 15Ω, T <sub>J</sub> = 125°C
E <sub>off</sub> Turn-Off Switching Energy		23	29		
E <sub>ts</sub> Total Switching Energy		27	35		
E <sub>on</sub> Turn-On Switching Energy		6	12	mJ	I <sub>C</sub> = 100A, V <sub>CC</sub> = 480V, V <sub>GE</sub> = 15V R <sub>g</sub> = 15Ω, T <sub>J</sub> = 125°C
E <sub>off</sub> Turn-Off Switching Energy		35	40		
E <sub>ts</sub> Total Switching Energy		41	52		
C <sub>ies</sub> Input Capacitance		16250		pF	V <sub>GE</sub> = 0V V <sub>CC</sub> = 30V f = 1.0 MHz
C <sub>oes</sub> Output Capacitance		1040			
C <sub>res</sub> Reverse Transfer Capacitance		190			
t <sub>rr</sub> Diode Reverse Recovery Time		440	480	ns	I <sub>F</sub> = 50A, dI <sub>F</sub> /dt = 50A/μs
I <sub>rr</sub> Diode Peak Reverse Current		15	18	A	V <sub>RR</sub> = 200V
Q <sub>rr</sub> Diode Recovery Charge		3400	4000	nC	T <sub>J</sub> = 125°C

**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	per Switch		0.16	°C/ W
	Per Diode		0.48	
R <sub>thCS</sub> Case-to-Sink	Per Module		0.1	
T Mounting torque	Case to heatsink		4	Nm
	Case to terminal 1, 2, 3		3	
Weight			185	g

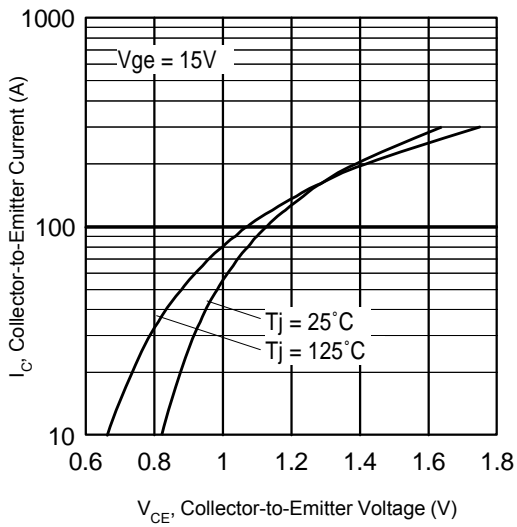


Fig. 1 - Typical Output Characteristics

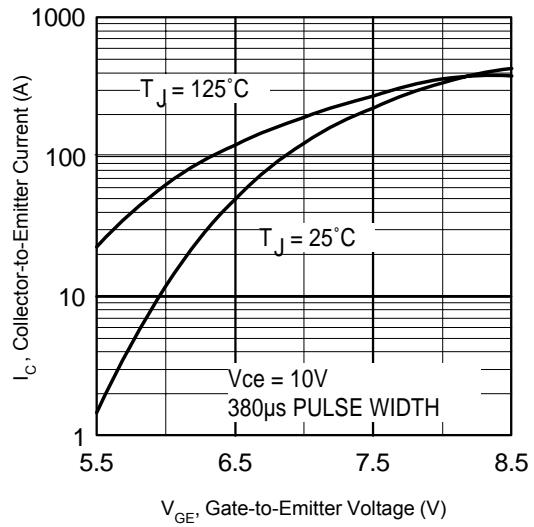


Fig. 2 - Typical Transfer Characteristics

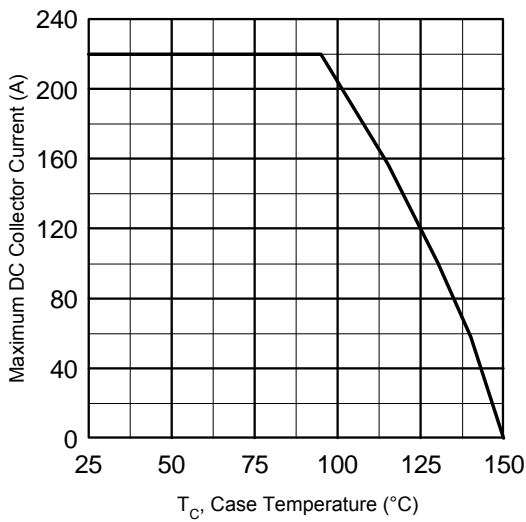


Fig. 3 - Maximum Collector Current vs. Case Temperature

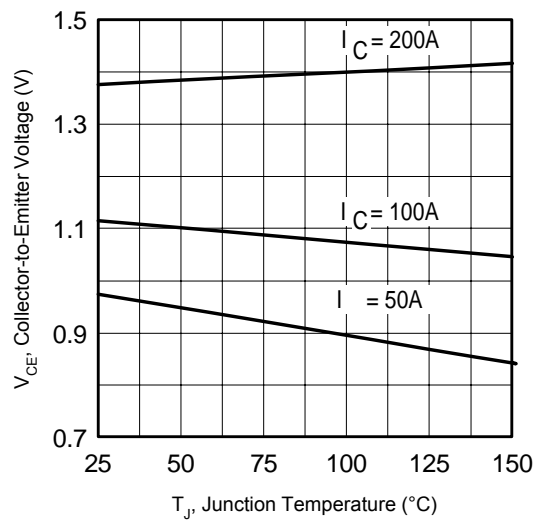


Fig. 4 - Typical Collector-to-Emitter Voltage vs. Junction Temperature

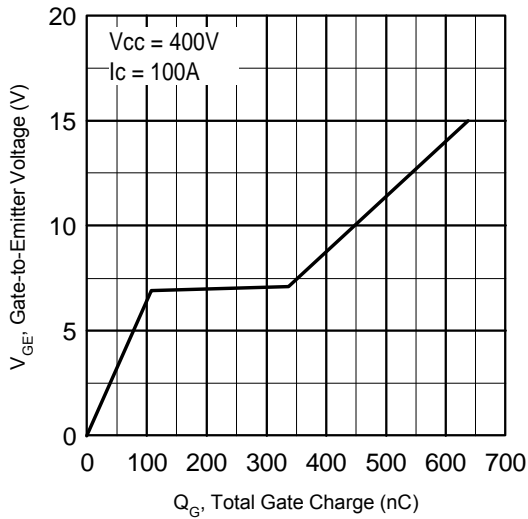


Fig. 5 - Typical Gate Charge vs. Gate-to-Emitter Voltage

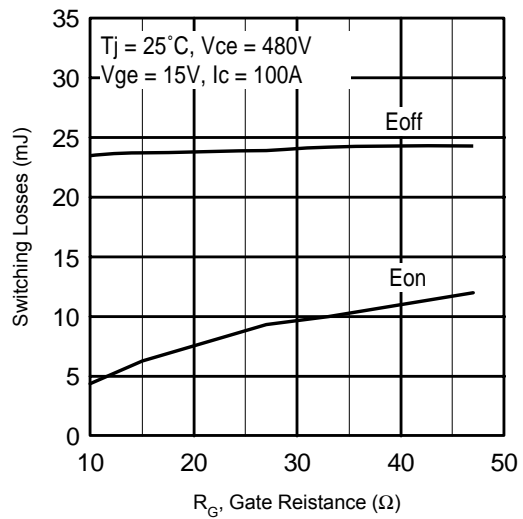


Fig. 6 - Typical Switching Losses vs Gate Resistance

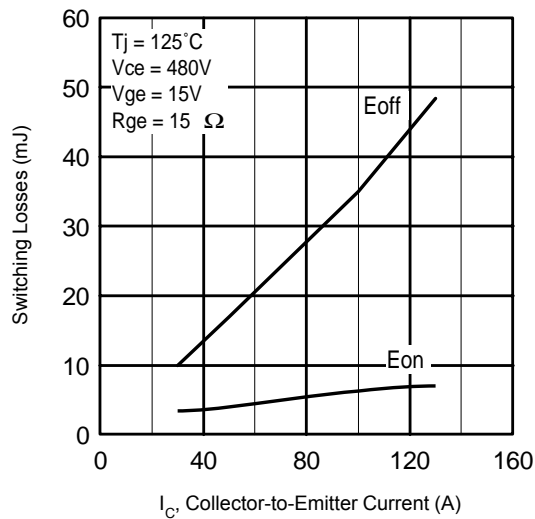


Fig. 7 - Typical Switching Losses vs Collector-to-Emitter Current

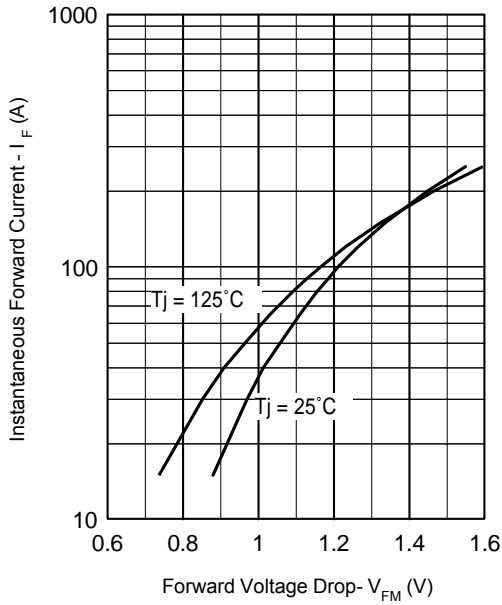


Fig. 8 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

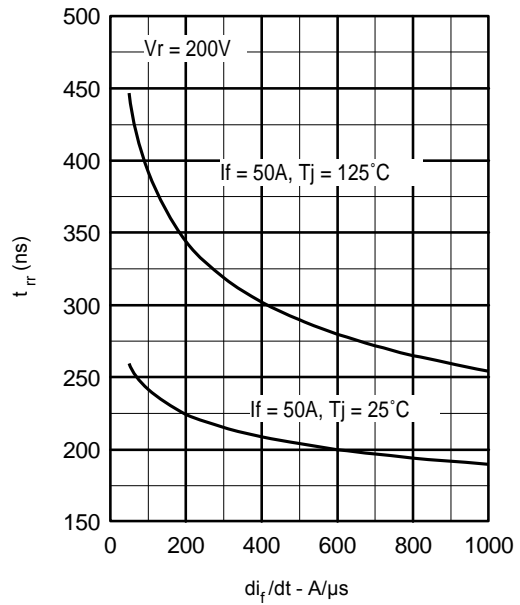


Fig. 9 - Typical Reverse Recovery vs.  $di_r/dt$

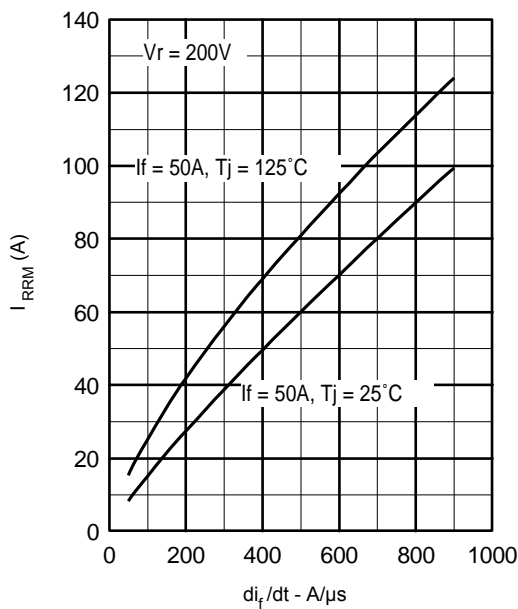


Fig. 10 - Typical Reverse Recovery Current vs.  $di_r/dt$

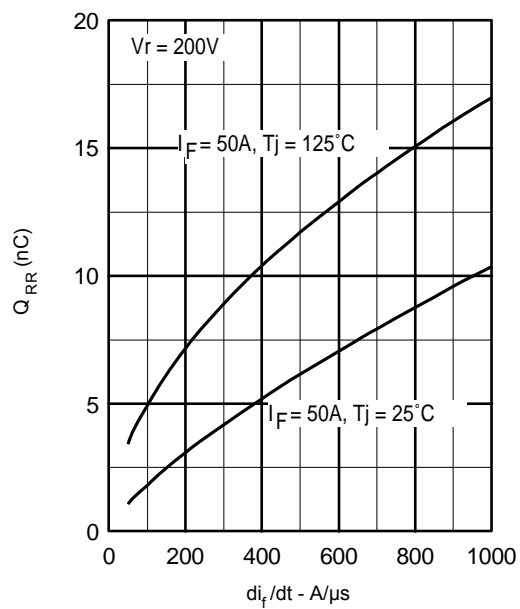
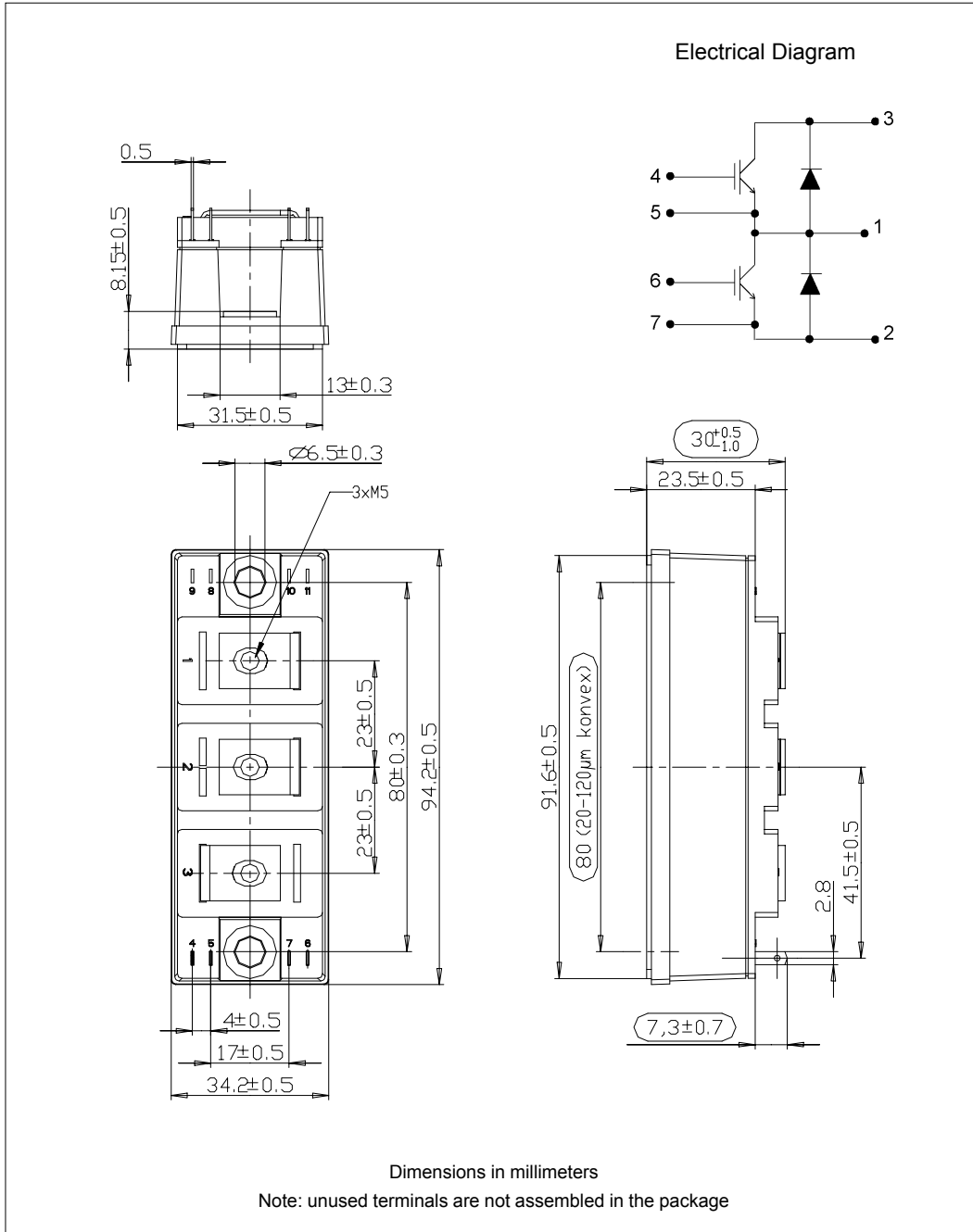


Fig. 11 - Typical Stored Charge vs.  $di_r/dt$

**Outline Table**



**Ordering Information Table**

Device Code						
<b>GA</b>	<b>100</b>	<b>T</b>	<b>S</b>	<b>60</b>	<b>S</b>	<b>Q</b>
①	②	③	④	⑤	⑥	⑦
<b>1</b>	- Essential Part Number IGBT modules					
<b>2</b>	- Current rating (100 = 100A)					
<b>3</b>	- Circuit Configuration (T = Half Bridge)					
<b>4</b>	- Int-A-Pak					
<b>5</b>	- Voltage Code (60 = 600V)					
<b>6</b>	- Speed/ Type (S = Standard Speed IGBT)					
<b>7</b>	- Diode Type (Moat Fast S02)					

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.