


## "Half-Bridge" IGBT INT-A-PAK (Standard Speed IGBT), 200 A



INT-A-PAK

### FEATURES

- Generation 4 IGBT technology
- Standard: Optimized for hard switching speed DC to 1 kHz
- Very low conduction losses
- Industry standard package
- UL approved file E78996 
- Compliant to RoHS directive 2002/95/EC
- Designed and qualified for industrial level


**RoHS  
COMPLIANT**

### PRODUCT SUMMARY

$V_{CES}$	600 V
$I_C$ DC	480 A
$V_{CE(on)}$ at 200 A, 25 °C	1.13 V

### BENEFITS

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

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Collector to emitter voltage	$V_{CES}$		600	V
Continuous collector current	$I_C$	$T_C = 25\text{ °C}$	480	A
		$T_C = 116\text{ °C}$	200	
Pulsed collector current	$I_{CM}$		800	
Peak switching current	$I_{LM}$		800	
Gate to emitter voltage	$V_{GE}$		± 20	V
RMS isolation voltage	$V_{ISOL}$	Any terminal to case, t = 1 minute	2500	
Maximum power dissipation	$P_D$	$T_C = 25\text{ °C}$	830	W
		$T_C = 85\text{ °C}$	430	

### ELECTRICAL SPECIFICATIONS ( $T_J = 25\text{ °C}$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Collector to emitter breakdown voltage	$V_{BR(CES)}$	$V_{GE} = 0\text{ V}, I_C = 1\text{ mA}$	600	-	-	V
Collector to emitter voltage	$V_{CE(on)}$	$V_{GE} = 15\text{ V}, I_C = 200\text{ A}$	-	1.13	1.21	
		$V_{GE} = 15\text{ V}, I_C = 200\text{ A}, T_J = 125\text{ °C}$	-	1.08	1.18	
Gate threshold voltage	$V_{GE(th)}$	$I_C = 0.25\text{ mA}$	3	4.5	6	
Collector to emitter leakage current	$I_{CES}$	$V_{GE} = 0\text{ V}, V_{CE} = 600\text{ V}$	-	0.025	1	mA
		$V_{GE} = 0\text{ V}, V_{CE} = 600\text{ V}, T_J = 125\text{ °C}$	-	-	10	
Gate to emitter leakage current	$I_{GES}$	$V_{GE} = \pm 20\text{ V}$	-	-	± 250	nA

SWITCHING CHARACTERISTICS ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Total gate charge	$Q_g$	$I_C = 200\text{ A}$ $V_{CC} = 400\text{ V}$ $V_{GE} = 15\text{ V}$	-	1600	1700	nC
Gate to emitter charge	$Q_{ge}$		-	260	340	
Gate to collector charge	$Q_{gc}$		-	580	670	
Turn-on switching loss	$E_{on}$	$I_C = 200\text{ A}$ , $V_{CC} = 480\text{ V}$ , $V_{GE} = 15\text{ V}$ $R_g = 10\ \Omega$ Freewheeling diode: 30EPH06, $T_J = 25\text{ }^\circ\text{C}$	-	30	-	mJ
Turn-off switching loss	$E_{off}$		-	50	-	
Total switching loss	$E_{ts}$		-	80	-	
Turn-on switching loss	$E_{on}$	$I_C = 200\text{ A}$ , $V_{CC} = 480\text{ V}$ , $V_{GE} = 15\text{ V}$ $R_g = 10\ \Omega$ Freewheeling diode: 30EPH06, $T_J = 125\text{ }^\circ\text{C}$	-	34	-	mJ
Turn-off switching loss	$E_{off}$		-	104	-	
Total switching loss	$E_{ts}$		-	138	151	
Input capacitance	$C_{ies}$	$V_{GE} = 0\text{ V}$ $V_{CC} = 30\text{ V}$ $f = 1.0\text{ MHz}$	-	32 500	-	pF
Output capacitance	$C_{oes}$		-	2080	-	
Reverse transfer capacitance	$C_{res}$		-	380	-	

THERMAL AND MECHANICAL SPECIFICATIONS					
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS
Operating junction temperature range	$T_J$	- 40	-	150	$^\circ\text{C}$
Storage temperature range	$T_{Stg}$	- 40	-	125	
Junction to case per leg	$R_{thJC}$	-	-	0.15	$^\circ\text{C/W}$
Case to sink	$R_{thCS}$	-	0.1	-	
Mounting torque	case to heatsink	-	-	4	Nm
	case to terminal 1, 2, 3	-	-	3	
Weight		-	185	-	g

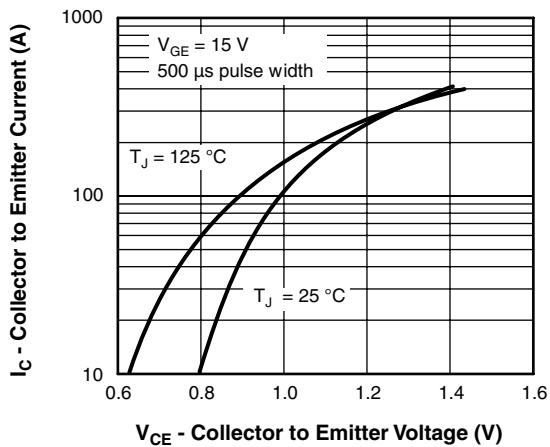


Fig. 1 - Typical Output Characteristics

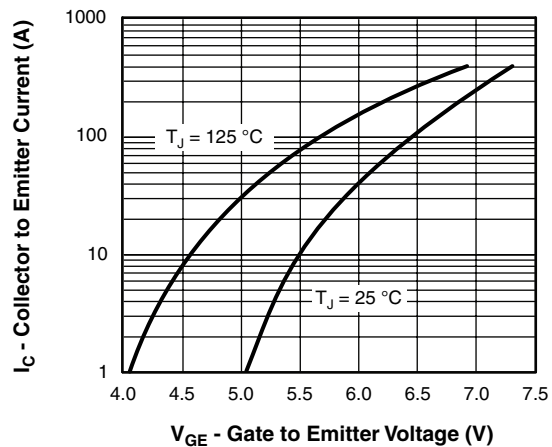


Fig. 2 - Typical Transfer Characteristics

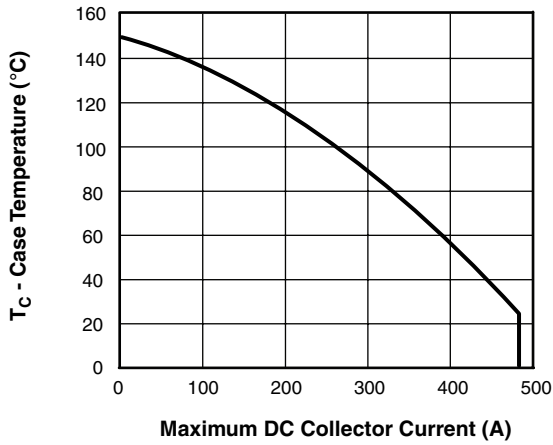


Fig. 3 - Case Temperature vs. Maximum Collector Current

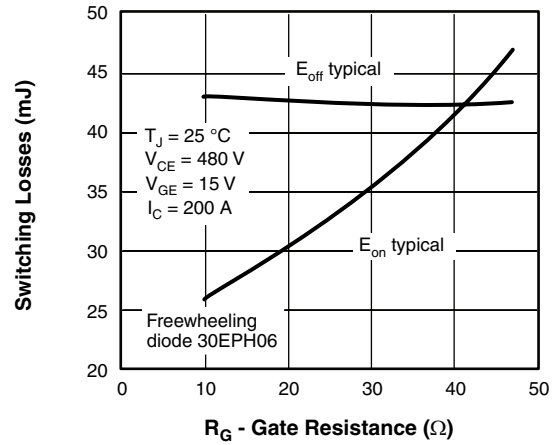


Fig. 6 - Typical Switching Losses vs. Gate Resistance

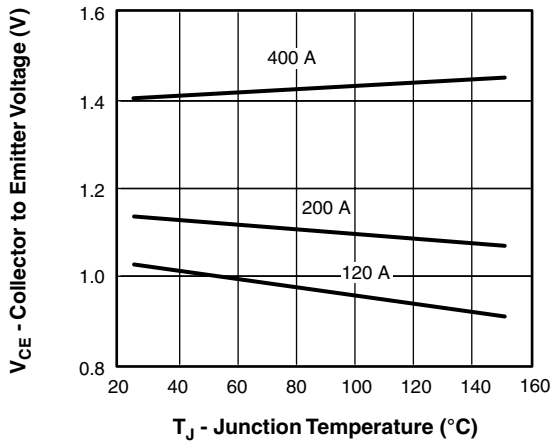


Fig. 4 - Typical Collector to Emitter Voltage vs. Junction Temperature

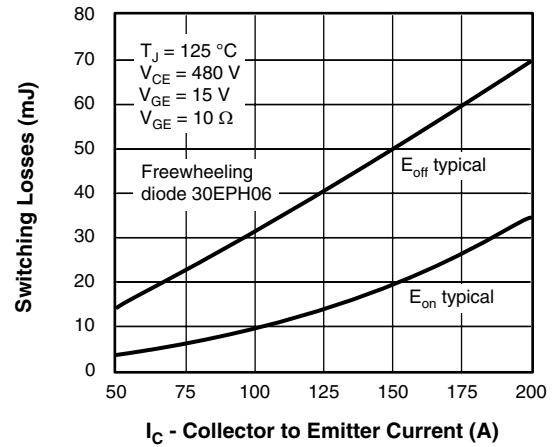


Fig. 7 - Typical Switching Losses vs. Collector to Emitter Current

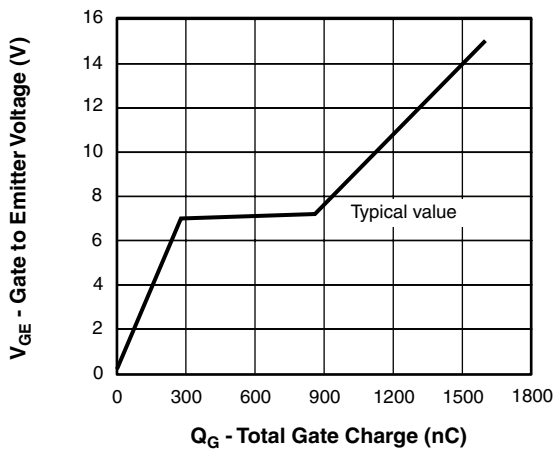
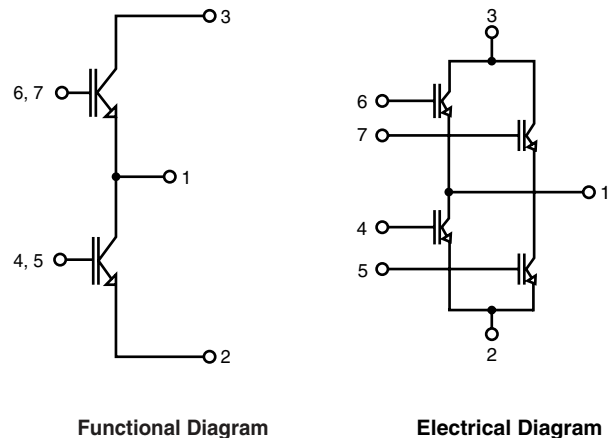


Fig. 5 - Typical Gate Charge vs. Gate to Emitter Voltage



Functional Diagram

Electrical Diagram

# GA200HS60S1PbF



Vishay High Power Products "Half-Bridge" IGBT INT-A-PAK  
(Standard Speed IGBT), 200 A

## ORDERING INFORMATION TABLE

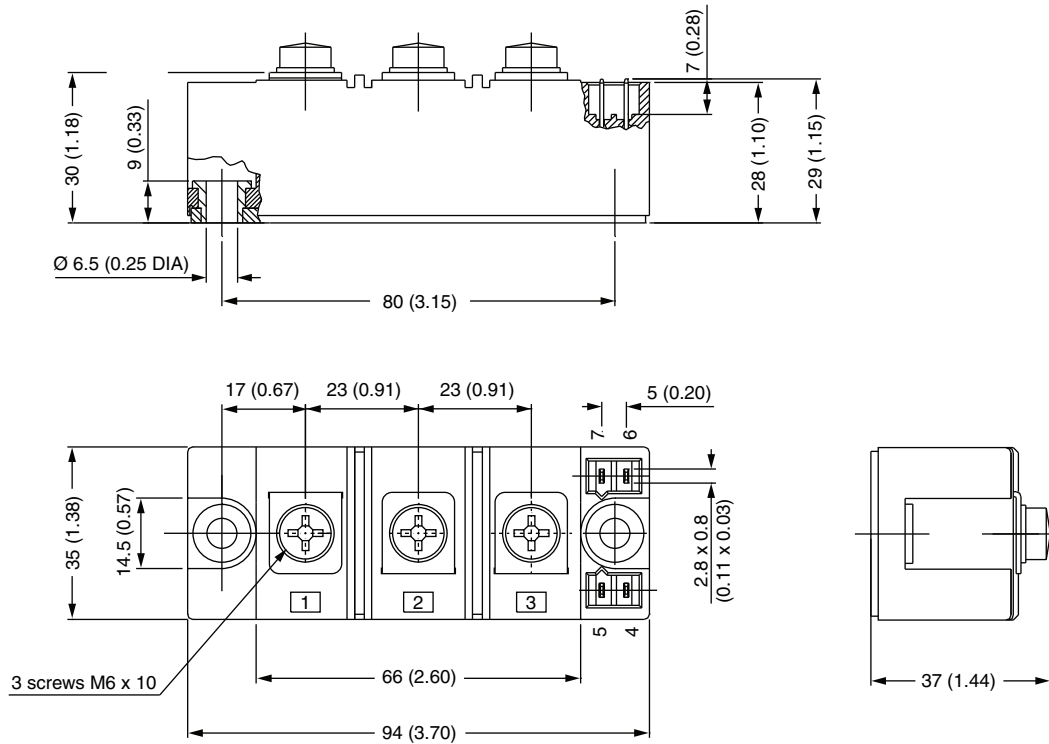
Device code	GA	200	H	S	60	S	1	PbF
	①	②	③	④	⑤	⑥	⑦	⑧
	1	2	3	4	5	6	7	8

- 1 - Essential part number IGBT modules
- 2 - Current rating (200 = 200 A)
- 3 - Circuit configuration (H = Half bridge without f/w diode)
- 4 - INT-A-PAK
- 5 - Voltage code (60 = 600 V)
- 6 - Speed/type (S = Standard speed IGBT)
- 7 - Assy location Italy
- 8 - PbF = Lead (Pb)-free

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95067">www.vishay.com/doc?95067</a>

## INT-A-PAK IGBT/Thyristor

**DIMENSIONS** in millimeters (inches)





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