


## "Half-Bridge" IGBT INT-A-PAK (Standard Speed IGBT), 100 A


**INT-A-PAK**

### FEATURES

- Standard speed PT IGBT technology
- Standard speed: DC to 1 kHz, optimized for hard switching speed
- FRED Pt® antiparallel diodes with fast recovery
- Very low conduction losses
- Al<sub>2</sub>O<sub>3</sub> DBC
- UL approved file E78996 
- Compliant to RoHS directive 2002/95/EC
- Designed for industrial level


**RoHS**  
COMPLIANT

### PRODUCT SUMMARY

V <sub>CES</sub>	600 V
I <sub>C</sub> DC	220 A
V <sub>CE(on)</sub> at 100 A, 25 °C	1.11 V

### BENEFITS

- Optimized for high current inverter stages (AC TIG welding machines)
- Direct mounting to heatsink
- Very low junction to case thermal resistance
- Low EMI

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Collector to emitter voltage	V <sub>CES</sub>		600	V
Continuous collector current	I <sub>C</sub>	T <sub>C</sub> = 25 °C	220	A
		T <sub>C</sub> = 130 °C	100	
Pulsed collector current	I <sub>CM</sub>		440	
Peak switching current	I <sub>LM</sub>		440	
Gate to emitter voltage	V <sub>GE</sub>		± 20	V
RMS isolation voltage	V <sub>ISOL</sub>	Any terminal to case, t = 1 min	2500	
Maximum power dissipation	P <sub>D</sub>	T <sub>C</sub> = 25 °C	780	W
		T <sub>C</sub> = 100 °C	312	

### ELECTRICAL SPECIFICATIONS (T<sub>J</sub> = 25 °C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Collector to emitter breakdown voltage	V <sub>BR(CES)</sub>	V <sub>GE</sub> = 0 V, I <sub>C</sub> = 1 mA	600	-	-	V
Collector to emitter voltage	V <sub>CE(on)</sub>	V <sub>GE</sub> = 15 V, I <sub>C</sub> = 100 A	-	1.11	1.28	
		I <sub>C</sub> = 200 A	-	1.39	-	
		V <sub>GE</sub> = 15 V, I <sub>C</sub> = 100 A, T <sub>J</sub> = 125 °C	-	1.08	1.22	
Gate threshold voltage	V <sub>GE(th)</sub>	I <sub>C</sub> = 0.25 mA	3	-	6	
Collector to emitter leakage current	I <sub>CES</sub>	V <sub>GE</sub> = 0 V, V <sub>CE</sub> = 600 V	-	-	1	mA
		V <sub>GE</sub> = 0 V, V <sub>CE</sub> = 600 V, T <sub>J</sub> = 125 °C	-	-	10	
Diode forward voltage drop	V <sub>FM</sub>	I <sub>C</sub> = 100 A, V <sub>GE</sub> = 0 V	-	1.44	1.96	V
		I <sub>C</sub> = 100 A, V <sub>GE</sub> = 0 V, T <sub>J</sub> = 125 °C	-	1.25	1.54	
Gate to emitter leakage current	I <sub>GES</sub>	V <sub>GE</sub> = ± 20 V	-	-	± 250	nA

Vishay High Power Products "Half-Bridge" IGBT INT-A-PAK  
(Standard Speed IGBT), 100 A

<b>SWITCHING CHARACTERISTICS</b> ( $T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Total gate charge	$Q_g$	$I_C = 100\text{ A}$ $V_{CC} = 400\text{ V}$ $V_{GE} = 15\text{ V}$	-	640	700	nC
Gate to emitter charge	$Q_{ge}$		-	108	120	
Gate to collector charge	$Q_{gc}$		-	230	300	
Rise time	$t_r$	$I_C = 100\text{ A}$ $V_{CC} = 480\text{ V}$ $V_{GE} = 15\text{ V}$	-	0.45	-	$\mu\text{s}$
Fall time	$t_f$		-	1.0	-	
Turn-on switching energy	$E_{on}$		-	4	6	mJ
Turn-off switching energy	$E_{off}$	$R_g = 15\text{ }\Omega$ $T_J = 25\text{ }^{\circ}\text{C}$	-	23	29	
Total switching energy	$E_{ts}$		-	27	35	
Turn-on switching energy	$E_{on}$	$I_C = 100\text{ A}, V_{CC} = 480\text{ V}$ $V_{GE} = 15\text{ V}, R_g = 15\text{ }\Omega$ $T_J = 125\text{ }^{\circ}\text{C}$	-	6	12	
Turn-off switching energy	$E_{off}$		-	35	40	
Total switching energy	$E_{ts}$		-	41	52	
Input capacitance	$C_{ies}$	$V_{GE} = 0\text{ V}$ $V_{CC} = 30\text{ V}$ $f = 1.0\text{ MHz}$	-	16 250	-	pF
Output capacitance	$C_{oes}$		-	1040	-	
Reverse transfer capacitance	$C_{res}$		-	190	-	
Diode reverse recovery time	$t_{rr}$	$I_F = 50\text{ A}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $V_{RR} = 200\text{ V}$	-	91	155	ns
Diode peak reverse current	$I_{rr}$		-	10.6	15	A
Diode recovery charge	$Q_{rr}$		-	500	900	nC
Diode reverse recovery time	$t_{rr}$	$I_F = 50\text{ A}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $V_{RR} = 200\text{ V}, T_J = 125\text{ }^{\circ}\text{C}$	-	180	344	ns
Diode peak reverse current	$I_{rr}$		-	17	20.5	A
Diode recovery charge	$Q_{rr}$		-	1633	2315	nC

<b>THERMAL AND MECHANICAL SPECIFICATIONS</b>					
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	$R_{thJC}$	-	-	0.16	$^{\circ}\text{C}/\text{W}$
per switch		-	-	0.48	
per diode		-	-	-	
Case to sink per module	$R_{thCS}$	-	0.1	-	Nm
Mounting torque	case to heatsink	-	-	4	
case to terminal 1, 2, 3		-	-	3	
Weight		-	185	-	g

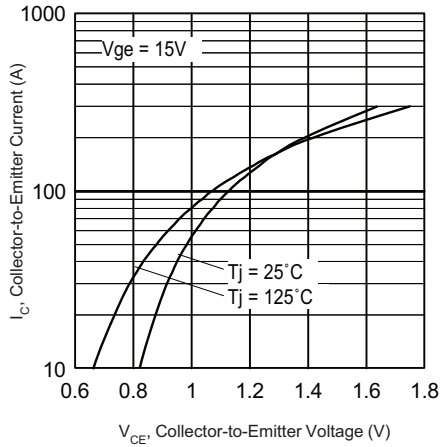


Fig. 1 - Typical Output Characteristics

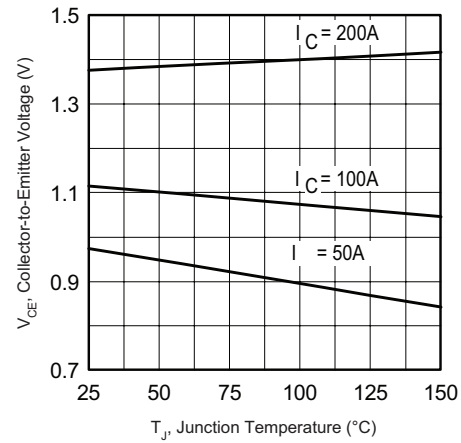


Fig. 4 - Typical Collector to Emitter Voltage vs. Junction Temperature

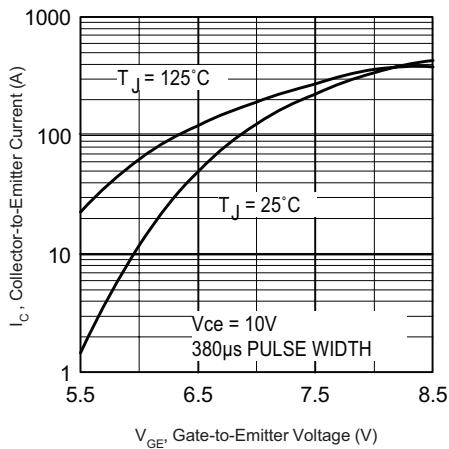


Fig. 2 - Typical Transfer Characteristics

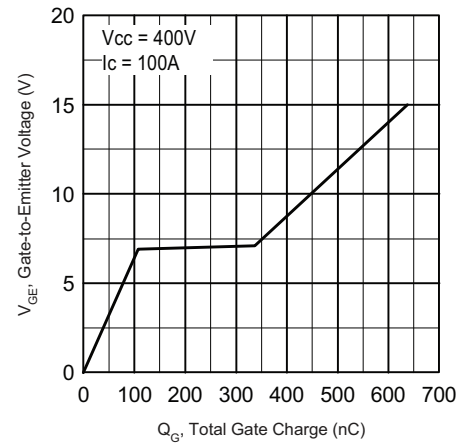


Fig. 5 - Typical Gate Charge vs. Gate to Emitter Voltage

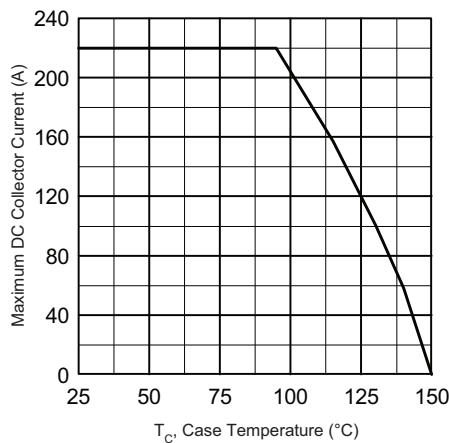


Fig. 3 - Maximum Collector Current vs. Case Temperature

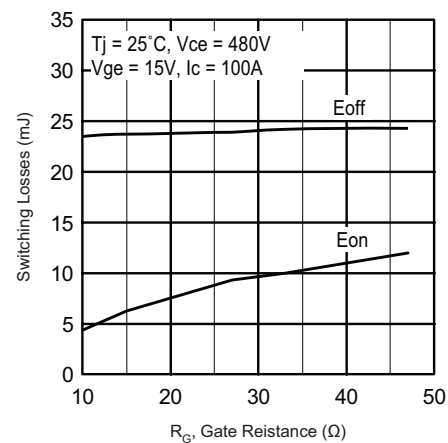


Fig. 6 - Typical Switching Losses vs. Gate Resistance

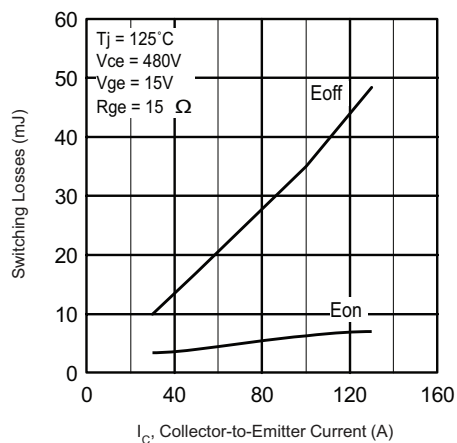


Fig. 7 - Typical Switching Losses vs. Collector to Emitter Current

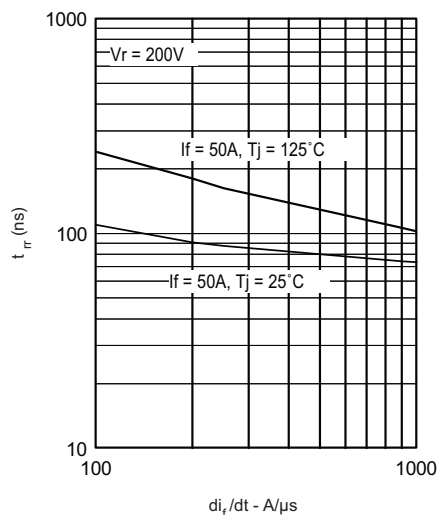


Fig. 9 - Typical Reverse Recovery Time vs.  $di_F/dt$

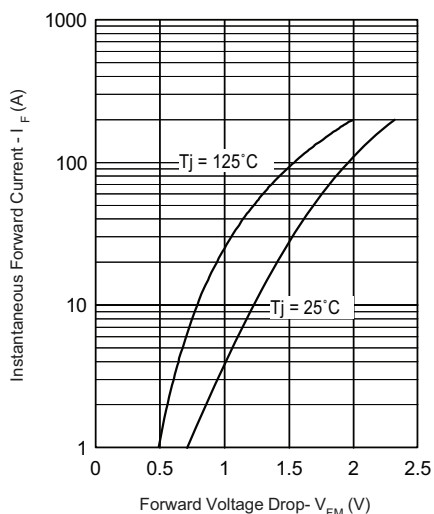


Fig. 8 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

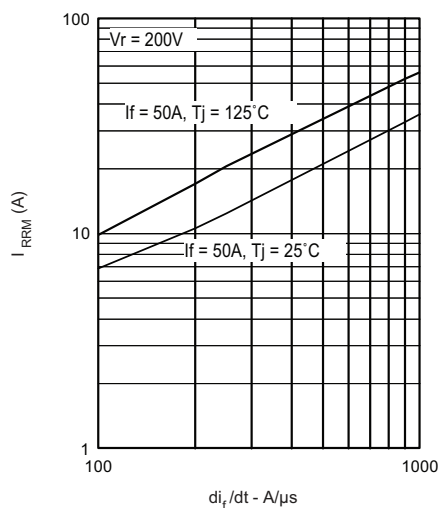


Fig. 10 - Typical Reverse Recovery Current vs.  $di_F/dt$

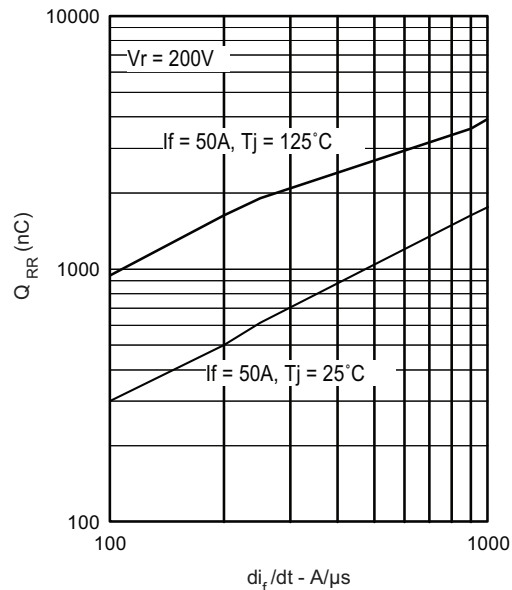
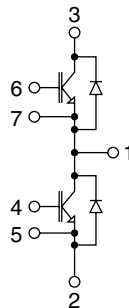


Fig. 11 - Typical Stored Charge vs.  $di_T/dt$

### ORDERING INFORMATION TABLE

Device code	GA	100	T	S	60	S	F	PbF
	1	2	3	4	5	6	7	8
1	Essential part number IGBT modules							
2	Current rating (100 = 100 A)							
3	Circuit configuration (T = Half bridge)							
4	INT-A-PAK							
5	Voltage code (60 = 600 V)							
6	Speed/type (S = Standard speed IGBT)							
7	Diode type							
8	PbF = Lead (Pb)-free							

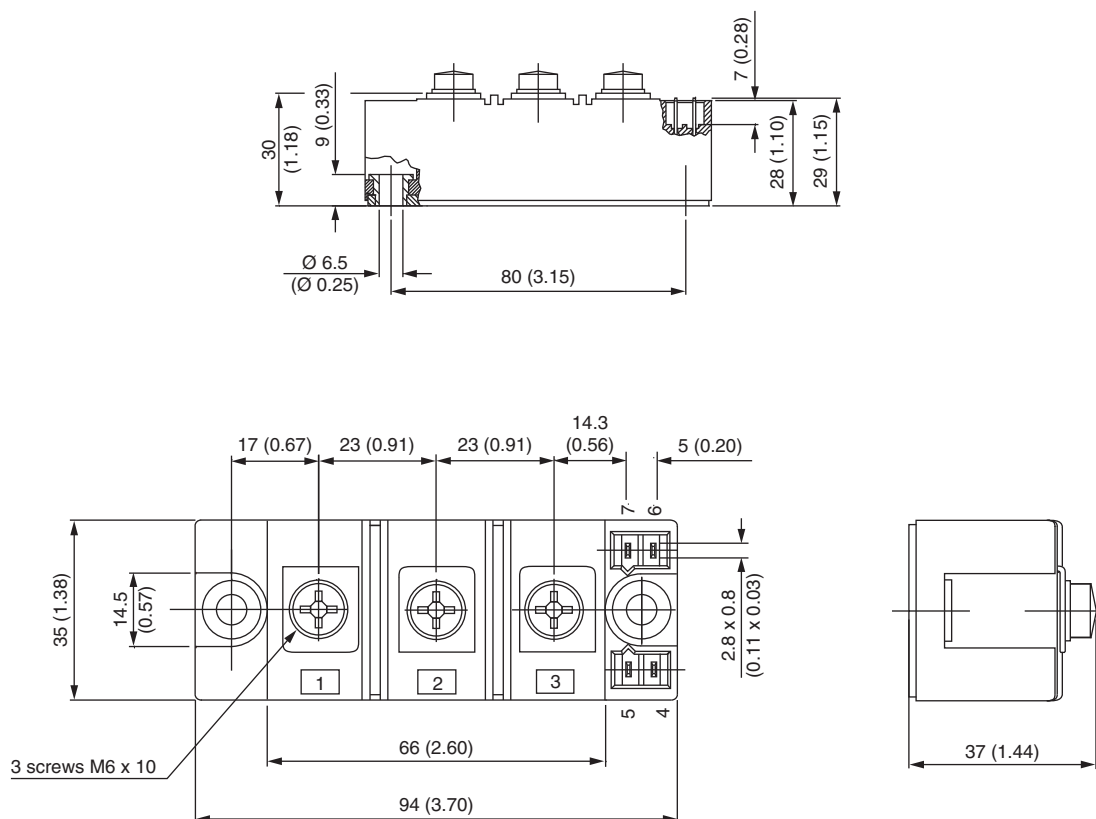
### CIRCUIT CONFIGURATION



LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95173">www.vishay.com/doc?95173</a>

## INT-A-PAK IGBT

**DIMENSIONS** in millimeters (inches)





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