


## "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

$V_{CES}$	600 V
$I_C$ DC	220 A
$V_{CE(on)}$ 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	$V_{CES}$		600	V
Continuous collector current	$I_C$	$T_C = 25\text{ °C}$	220	A
		$T_C = 130\text{ °C}$	100	
Pulsed collector current	$I_{CM}$		440	
Peak switching current	$I_{LM}$		440	
Gate to emitter voltage	$V_{GE}$		± 20	V
RMS isolation voltage	$V_{ISOL}$	Any terminal to case, t = 1 min	2500	
Maximum power dissipation	$P_D$	$T_C = 25\text{ °C}$	780	W
		$T_C = 100\text{ °C}$	312	

### 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	$V_{CE(on)}$	$V_{GE} = 15\text{ V}$ , $I_C = 100\text{ A}$	-	1.11	1.28	
		$I_C = 200\text{ A}$	-	1.39	-	
		$V_{GE} = 15\text{ V}$ , $I_C = 100\text{ A}$ , $T_J = 125\text{ °C}$	-	1.08	1.22	
Gate threshold voltage	$V_{GE(th)}$	$I_C = 0.25\text{ mA}$	3	-	6	
Collector to emitter leakage current	$I_{CES}$	$V_{GE} = 0\text{ V}$ , $V_{CE} = 600\text{ V}$	-	-	1	mA
		$V_{GE} = 0\text{ V}$ , $V_{CE} = 600\text{ V}$ , $T_J = 125\text{ °C}$	-	-	10	
Diode forward voltage drop	$V_{FM}$	$I_C = 100\text{ A}$ , $V_{GE} = 0\text{ V}$	-	1.44	1.96	V
		$I_C = 100\text{ A}$ , $V_{GE} = 0\text{ V}$ , $T_J = 125\text{ °C}$	-	1.25	1.54	
Gate to emitter leakage current	$I_{GES}$	$V_{GE} = \pm 20\text{ V}$	-	-	± 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

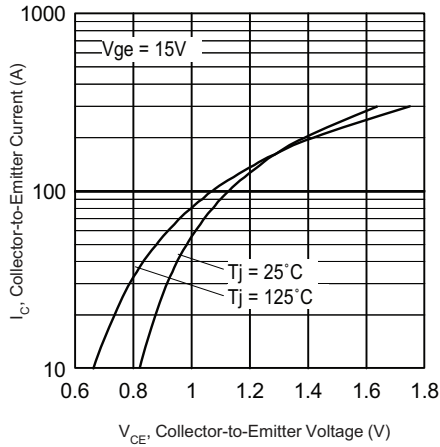


Fig. 1 - Typical Output Characteristics

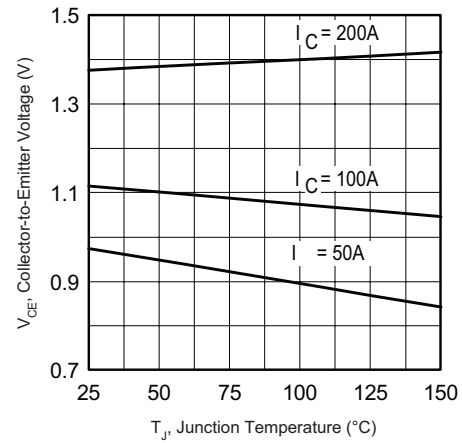


Fig. 4 - Typical Collector to Emitter Voltage vs. Junction Temperature

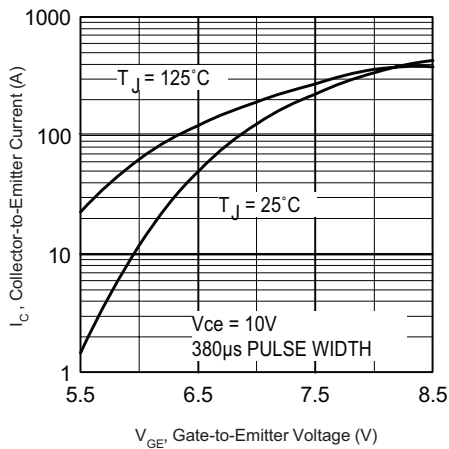


Fig. 2 - Typical Transfer Characteristics

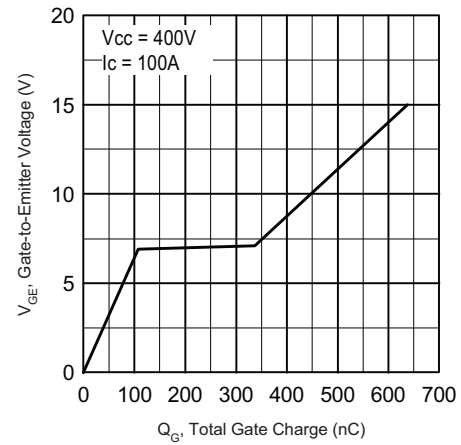


Fig. 5 - Typical Gate Charge vs. Gate to Emitter Voltage

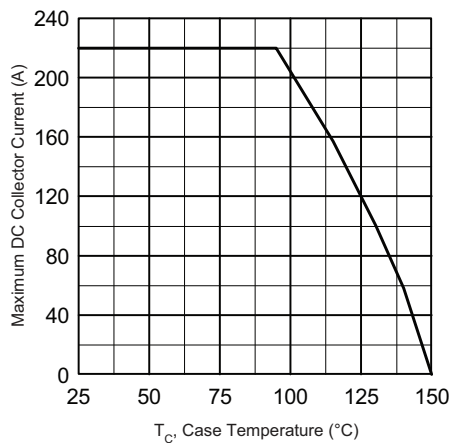


Fig. 3 - Maximum Collector Current vs. Case Temperature

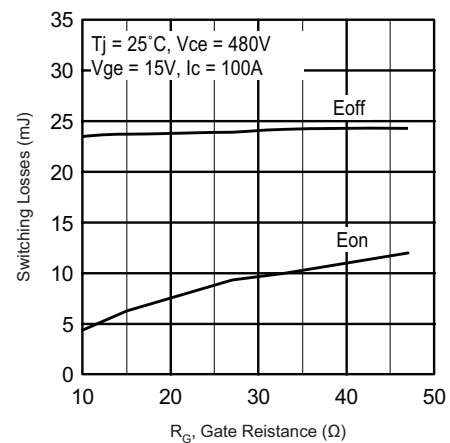


Fig. 6 - Typical Switching Losses vs. Gate Resistance

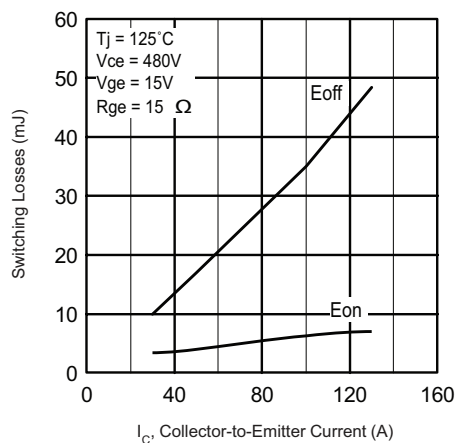


Fig. 7 - Typical Switching Losses vs. Collector to Emitter Current

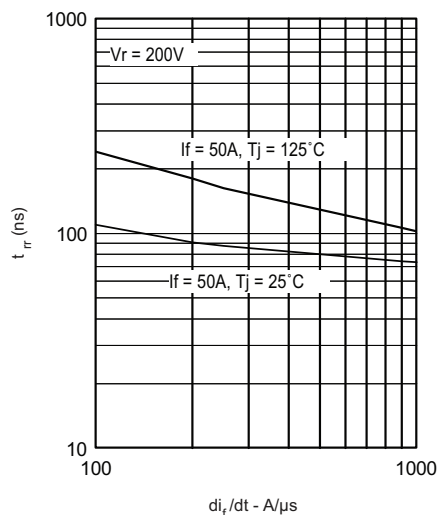


Fig. 9 - Typical Reverse Recovery Time vs.  $di_F/dt$

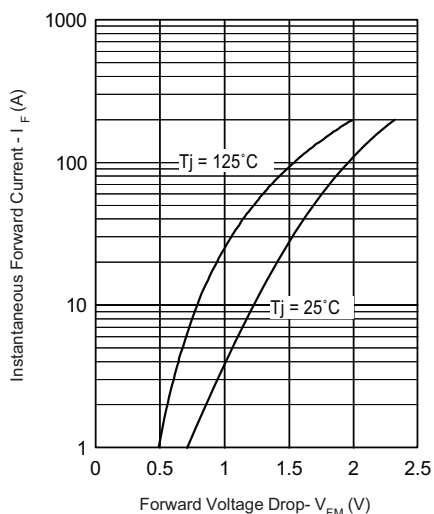


Fig. 8 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

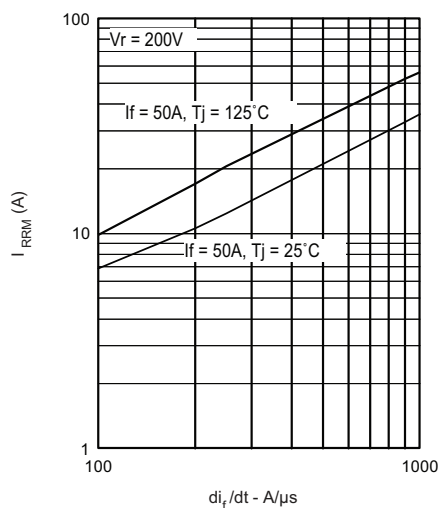


Fig. 10 - Typical Reverse Recovery Current vs.  $di_F/dt$

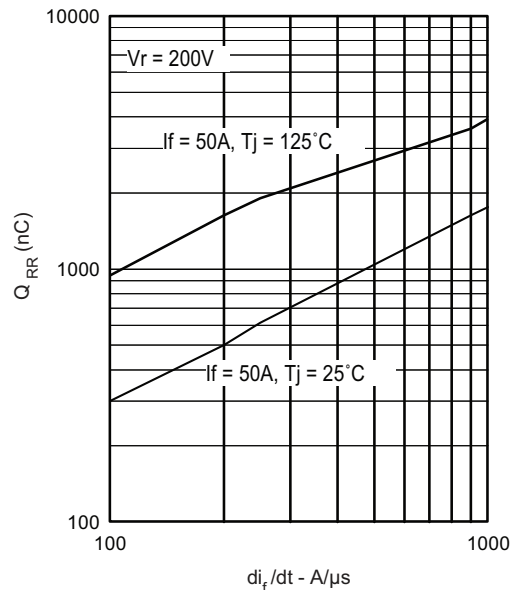
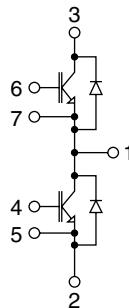


Fig. 11 - Typical Stored Charge vs.  $di_T/dt$

## ORDERING INFORMATION TABLE

Device code	GA	100	T	S	60	S	F	PbF
	1	2	3	4	5	6	7	8
	1	2	3	4	5	6	7	8
	1	2	3	4	5	6	7	8
	1	2	3	4	5	6	7	8
	1	2	3	4	5	6	7	8
	1	2	3	4	5	6	7	8
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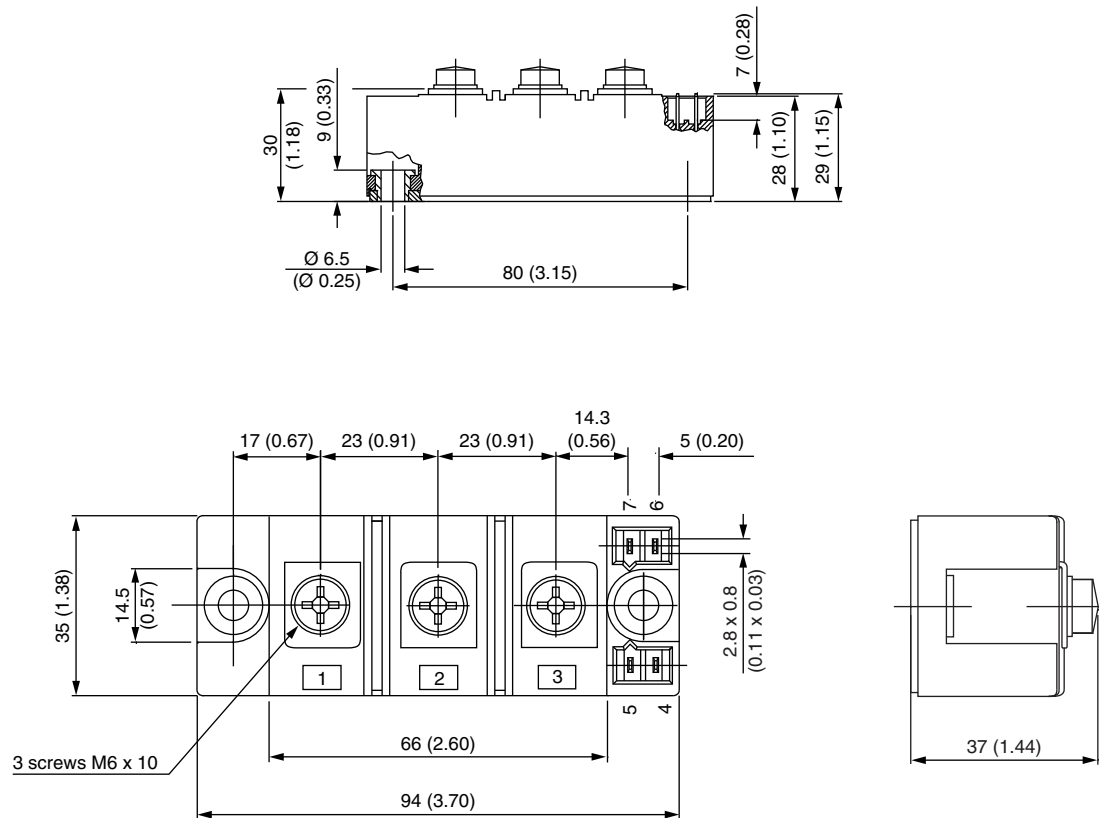
## CIRCUIT CONFIGURATION



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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