


"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
- Al₂O₃ 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, $t = 1\text{ min}$	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

GA100TS60SFPbF



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

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

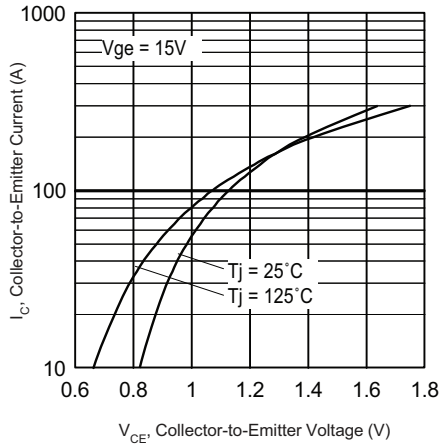


Fig. 1 - Typical Output Characteristics

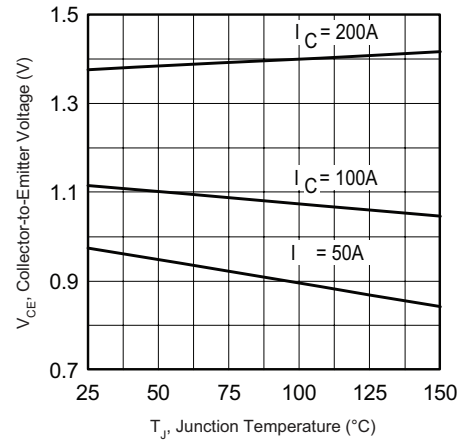


Fig. 4 - Typical Collector to Emitter Voltage vs. Junction Temperature

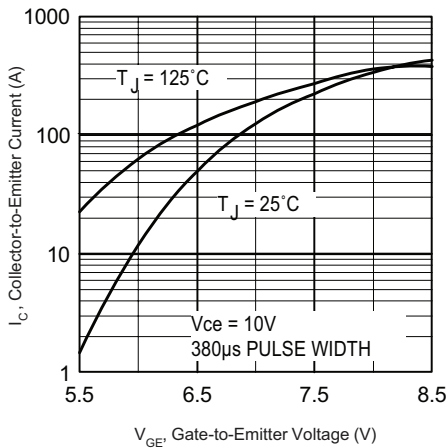


Fig. 2 - Typical Transfer Characteristics

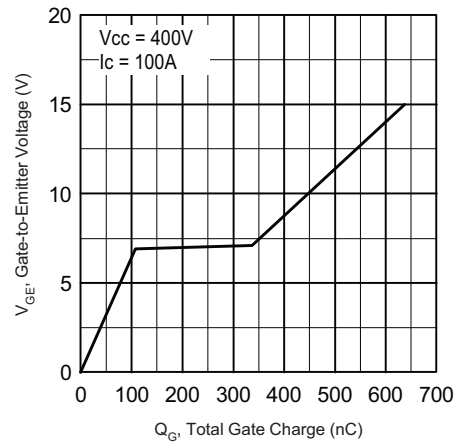


Fig. 5 - Typical Gate Charge vs. Gate to Emitter Voltage

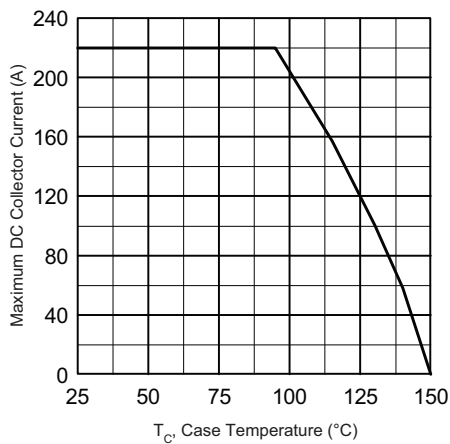


Fig. 3 - Maximum Collector Current vs. Case Temperature

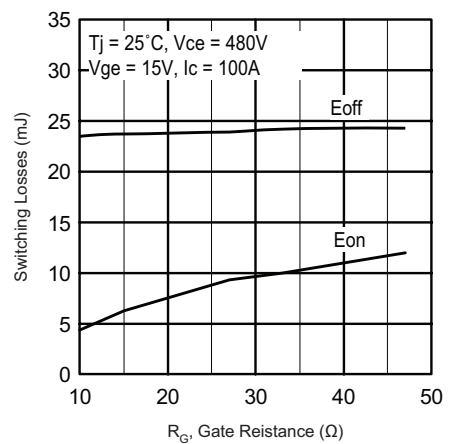


Fig. 6 - Typical Switching Losses vs. Gate Resistance

GA100TS60SFPbF



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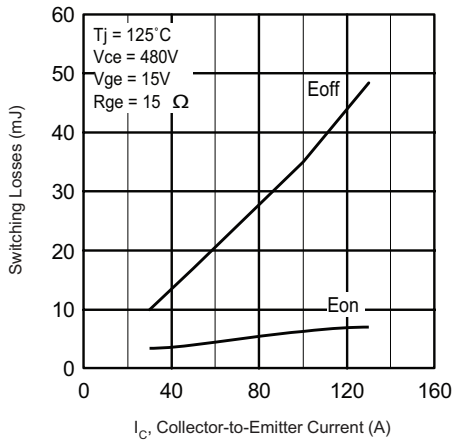


Fig. 7 - Typical Switching Losses vs. Collector to Emitter Current

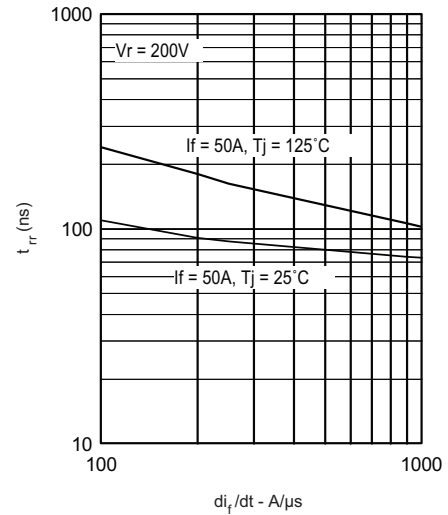


Fig. 9 - Typical Reverse Recovery Time vs. di_F/dt

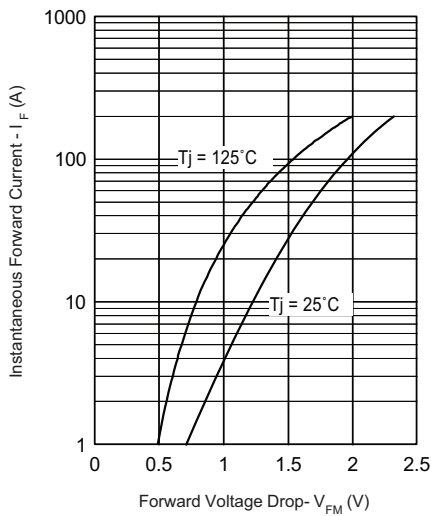


Fig. 8 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

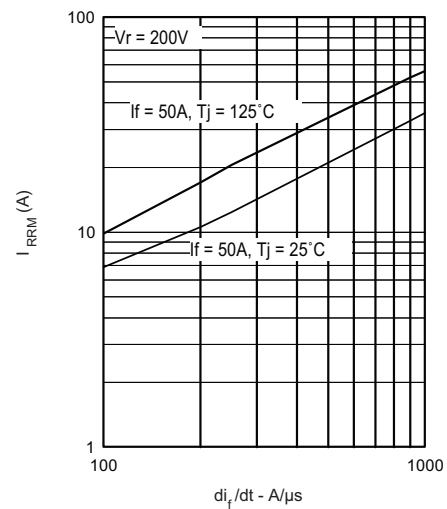


Fig. 10 - Typical Reverse Recovery Current vs. di_F/dt

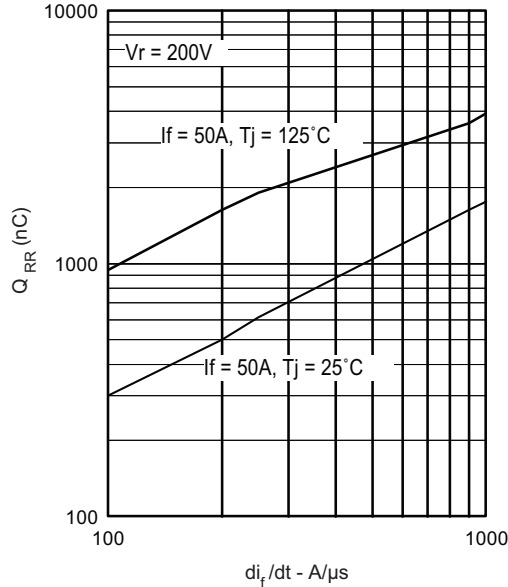
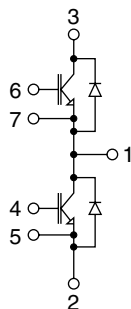


Fig. 11 - Typical Stored Charge vs. di_F/dt

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

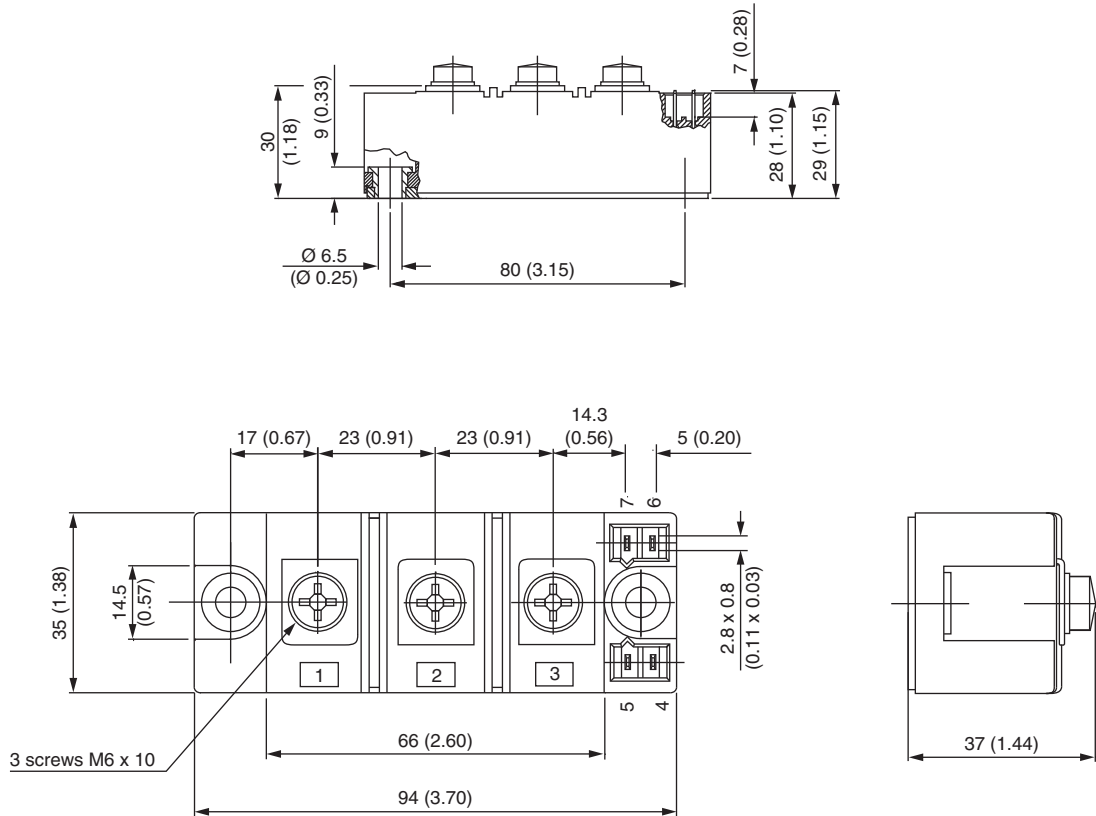


LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95173



INT-A-PAK IGBT

DIMENSIONS in millimeters (inches)





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