

## "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
- $\text{Al}_2\text{O}_3$  DBC
- UL approved file E78996 
- Compliant to RoHS directive 2002/95/EC
- Designed for industrial level


**RoHS  
COMPLIANT**

### BENEFITS

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

<b>PRODUCT SUMMARY</b>	
$V_{\text{CES}}$	600 V
$I_{\text{C}}$ DC	220 A
$V_{\text{CE(on)}}$ at 100 A, 25 °C	1.11 V

<b>ABSOLUTE MAXIMUM RATINGS</b>						
PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS		
Collector to emitter voltage	$V_{\text{CES}}$			600		
Continuous collector current	$I_{\text{C}}$	$T_{\text{C}} = 25$ °C	220	A		
		$T_{\text{C}} = 130$ °C	100			
Pulsed collector current	$I_{\text{CM}}$			440		
Peak switching current	$I_{\text{LM}}$			440		
Gate to emitter voltage	$V_{\text{GE}}$			± 20		
RMS isolation voltage	$V_{\text{ISOL}}$	Any terminal to case, $t = 1$ min	2500	V		
Maximum power dissipation	$P_{\text{D}}$	$T_{\text{C}} = 25$ °C	780	W		
		$T_{\text{C}} = 100$ °C	312			

<b>ELECTRICAL SPECIFICATIONS</b> ( $T_{\text{J}} = 25$ °C unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Collector to emitter breakdown voltage	$V_{\text{BR}(\text{CES})}$	$V_{\text{GE}} = 0$ V, $I_{\text{C}} = 1$ mA	600	-	-	V
Collector to emitter voltage	$V_{\text{CE}(\text{on})}$	$V_{\text{GE}} = 15$ V, $I_{\text{C}} = 100$ A	-	1.11	1.28	
		$I_{\text{C}} = 200$ A	-	1.39	-	
		$V_{\text{GE}} = 15$ V, $I_{\text{C}} = 100$ A, $T_{\text{J}} = 125$ °C	-	1.08	1.22	
Gate threshold voltage	$V_{\text{GE}(\text{th})}$	$I_{\text{C}} = 0.25$ mA	3	-	6	mA
Collector to emitter leakage current	$I_{\text{CES}}$	$V_{\text{GE}} = 0$ V, $V_{\text{CE}} = 600$ V	-	-	1	
		$V_{\text{GE}} = 0$ V, $V_{\text{CE}} = 600$ V, $T_{\text{J}} = 125$ °C	-	-	10	V
Diode forward voltage drop	$V_{\text{FM}}$	$I_{\text{C}} = 100$ A, $V_{\text{GE}} = 0$ V	-	1.44	1.96	
		$I_{\text{C}} = 100$ A, $V_{\text{GE}} = 0$ V, $T_{\text{J}} = 125$ °C	-	1.25	1.54	
Gate to emitter leakage current	$I_{\text{GES}}$	$V_{\text{GE}} = \pm 20$ V	-	-	± 250	nA

# GA100TS60SFPbF



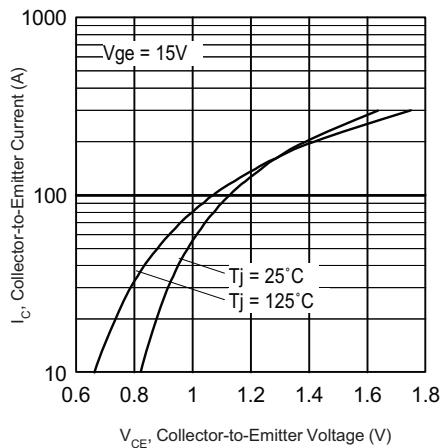
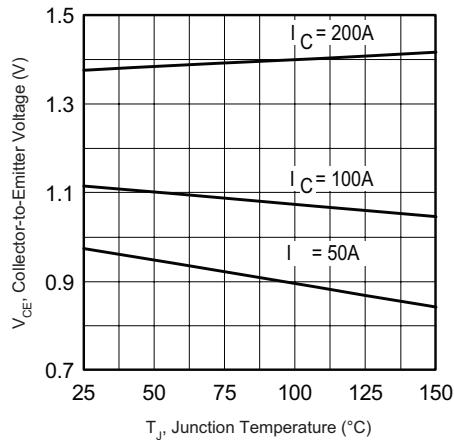
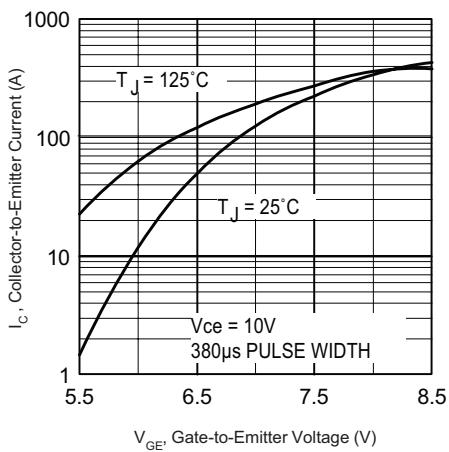
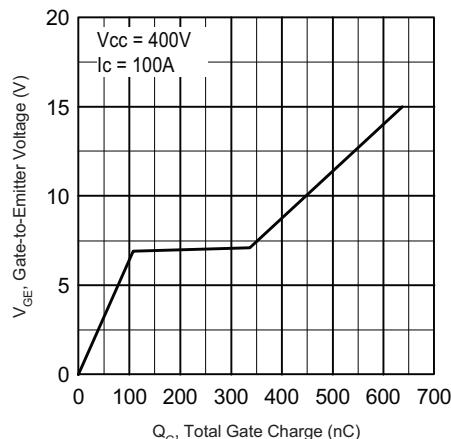
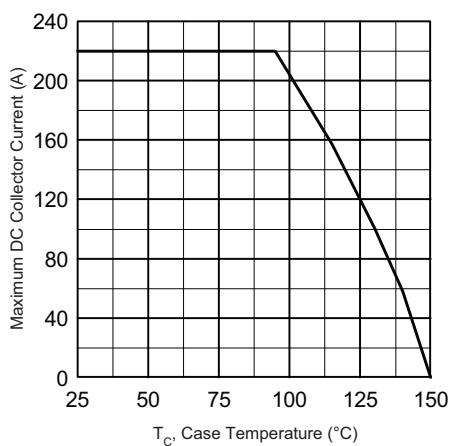
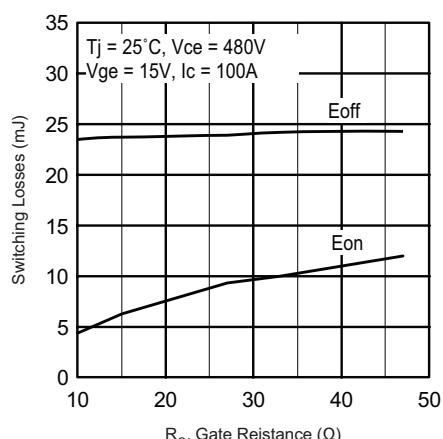
Vishay High Power Products "Half-Bridge" IGBT INT-A-PAK  
(Standard Speed IGBT), 100 A

## SWITCHING CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ 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	$t_r$	$I_C = 100 \text{ A}$ $V_{CC} = 480 \text{ V}$ $V_{GE} = 15 \text{ V}$ $R_g = 15 \Omega$ $T_J = 25^\circ\text{C}$	-	0.45	-	$\mu\text{s}$
Fall time	$t_f$		-	1.0	-	
Turn-on switching energy	$E_{on}$		-	4	6	
Turn-off switching energy	$E_{off}$		-	23	29	
Total switching energy	$E_{ts}$		-	27	35	
Turn-on switching energy	$E_{on}$	$I_C = 100 \text{ A}, V_{CC} = 480 \text{ V}$ $V_{GE} = 15 \text{ V}, R_g = 15 \Omega$ $T_J = 125^\circ\text{C}$	-	6	12	mJ
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	$t_{rr}$	$I_F = 50 \text{ A}$ $dl_F/dt = 200 \text{ A}/\mu\text{s}$ $V_{RR} = 200 \text{ V}$	-	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	$t_{rr}$	$I_F = 50 \text{ A}$ $dl_F/dt = 200 \text{ A}/\mu\text{s}$ $V_{RR} = 200 \text{ V}, T_J = 125^\circ\text{C}$	-	180	344	ns
Diode peak reverse current	$I_{rr}$		-	17	20.5	A
Diode recovery charge	$Q_{rr}$		-	1633	2315	nC

## THERMAL AND MECHANICAL SPECIFICATIONS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS
Operating junction temperature range	$T_J$	- 40	-	150	°C
Storage temperature range	$T_{Stg}$	- 40	-	125	
Junction to case	$R_{thJC}$ per switch per diode	-	-	0.16	°C/W
Case to sink per module		-	0.1	-	
Mounting torque	case to heatsink case to terminal 1, 2, 3	-	-	4	Nm
		-	-	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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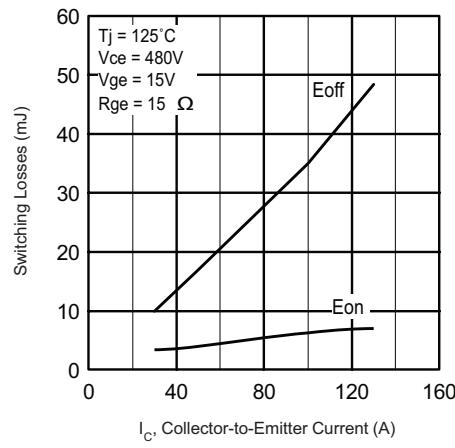


Fig. 7 - Typical Switching Losses vs.  
Collector to Emitter Current

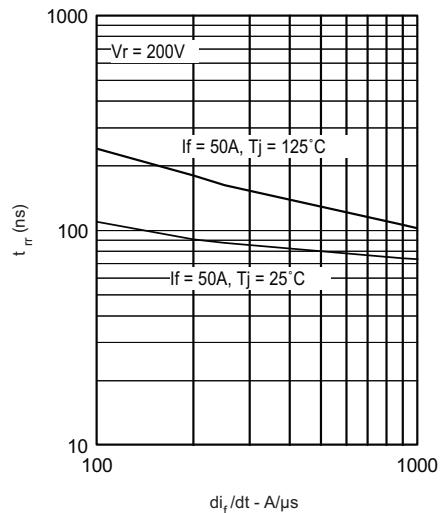


Fig. 9 - Typical Reverse Recovery Time vs.  $dI_F/dt$

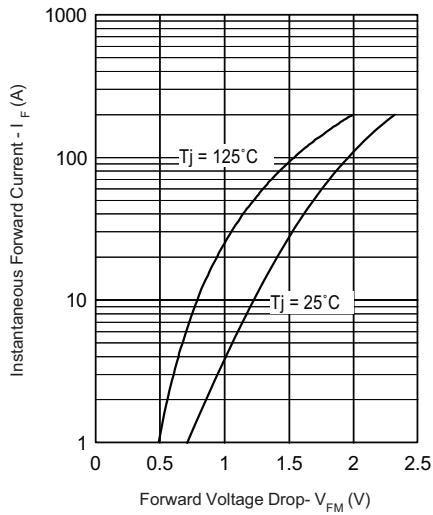


Fig. 8 - Maximum Forward Voltage Drop vs.  
Instantaneous Forward Current

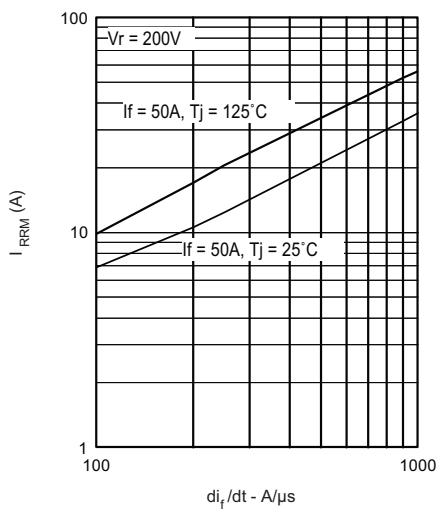
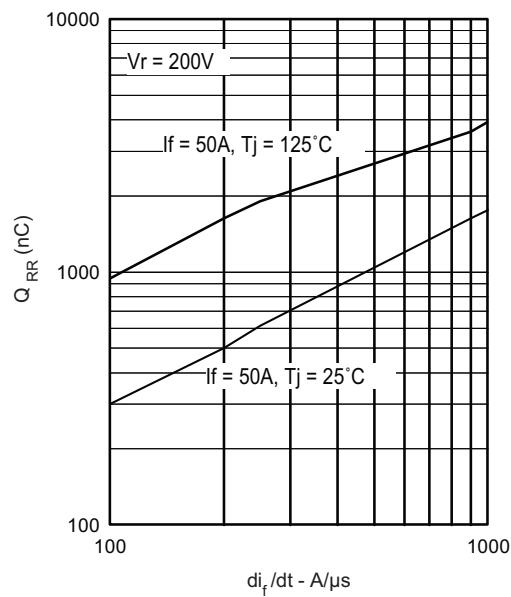
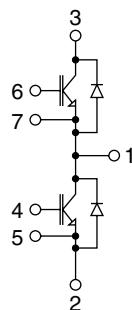


Fig. 10 - Typical Reverse Recovery Current vs.  $dI_F/dt$


 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

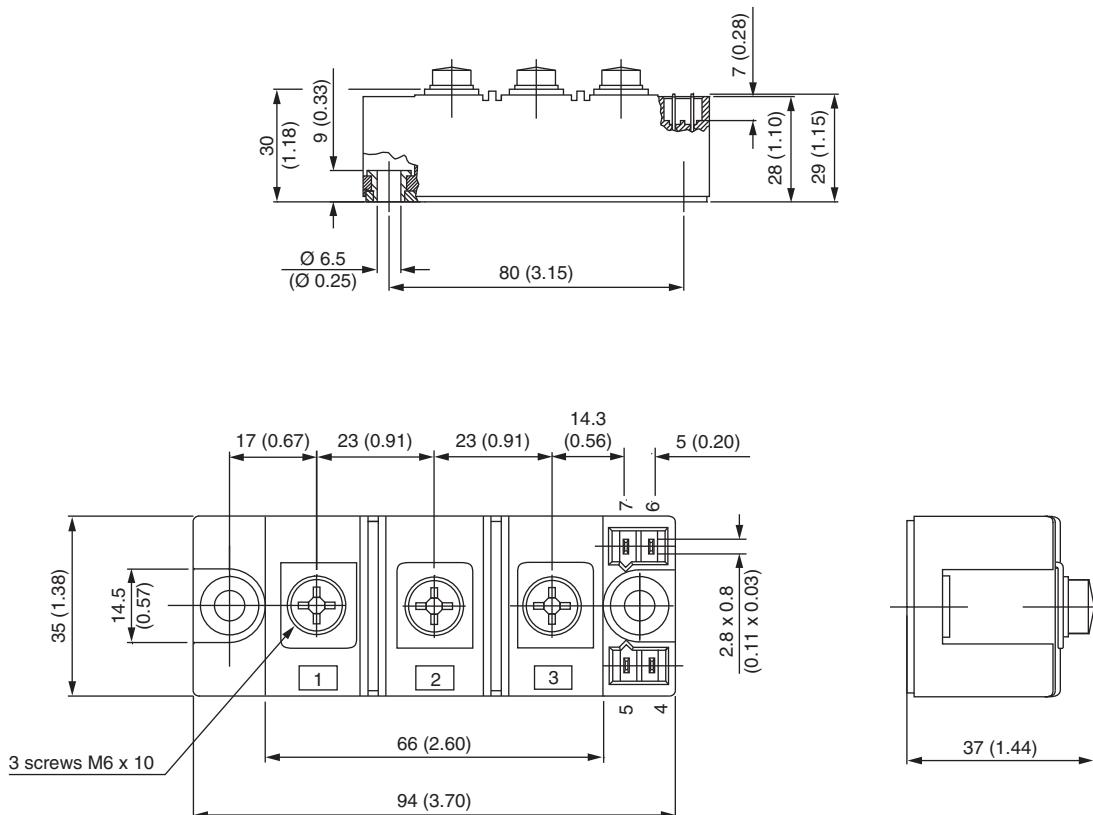
- 1** - Essential part number IGBT modules
- 2** - Current rating (100 = 100 A)
- 3** - Circuit configuration (T = Half bridge)
- 4** - INT-A-PAK
- 5** - Voltage code (60 = 600 V)
- 6** - Speed/type (S = Standard speed IGBT)
- 7** - Diode type
- 8** - PbF = Lead (Pb)-free

**CIRCUIT CONFIGURATION**


LINKS TO RELATED DOCUMENTS	
Dimensions	<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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