

“Half-Bridge” IGBT INT-A-PAK, (Standard Speed IGBT), 100 A



INT-A-PAK

FEATURES

- Standard speed PT IGBT technology
- Optimized for hard switching speed
- FRED Pt® antiparallel diodes with fast recovery
- Very low conduction losses
- Al₂O₃ DBC
- UL approved file E78996 
- Designed for industrial level
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


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

PRODUCT SUMMARY

V _{CES}	600 V
I _C DC	220 A
V _{CE(on)} at 100 A, 25 °C	1.11 V
Speed	DC to 1 kHz
Package	INT-A-PAK
Circuit	Half bridge

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 °C	220	A
		T _C = 130 °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 °C	780	W
		T _C = 100 °C	312	
Operating junction temperature range	T _J		-40 to +150	°C
Storage temperature range	T _{Stg}		-40 to +125	

ELECTRICAL SPECIFICATIONS (T_J = 25 °C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Collector to emitter breakdown voltage	V _{BR(CES)}	V _{GE} = 0 V, I _C = 1 mA	600	-	-	V
Collector to emitter voltage	V _{CE(on)}	V _{GE} = 15 V, I _C = 100 A	-	1.11	1.28	
		I _C = 200 A	-	1.39	-	
		V _{GE} = 15 V, I _C = 100 A, T _J = 125 °C	-	1.08	1.22	
Gate threshold voltage	V _{GE(th)}	I _C = 0.25 mA	3	-	6	
Collector to emitter leakage current	I _{CES}	V _{GE} = 0 V, V _{CE} = 600 V	-	-	1	mA
		V _{GE} = 0 V, V _{CE} = 600 V, T _J = 125 °C	-	-	10	
Diode forward voltage drop	V _{FM}	I _C = 100 A, V _{GE} = 0 V	-	1.44	1.96	V
		I _C = 100 A, V _{GE} = 0 V, T _J = 125 °C	-	1.25	1.54	
Gate to emitter leakage current	I _{GES}	V _{GE} = ± 20 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	$I_C = 100\text{ A}$ $V_{CC} = 400\text{ V}$ $V_{GE} = 15\text{ V}$	-	640	700	nC
Gate to emitter charge	Q_{ge}		-	108	120	
Gate to collector charge	Q_{gc}		-	230	300	
Rise time	t_r	$I_C = 100\text{ A}$ $V_{CC} = 480\text{ V}$ $V_{GE} = 15\text{ V}$ $R_g = 15\text{ }\Omega$ $T_J = 25\text{ }^{\circ}\text{C}$	-	0.45	-	μs
Fall time	t_f		-	1.0	-	
Turn-on switching energy	E_{on}		-	4	6	
Turn-off switching energy	E_{off}	$I_C = 100\text{ A}, V_{CC} = 480\text{ V}$ $V_{GE} = 15\text{ V}, R_g = 15\text{ }\Omega$ $T_J = 125\text{ }^{\circ}\text{C}$	-	23	29	mJ
Total switching energy	E_{ts}		-	27	35	
Turn-on switching energy	E_{on}		-	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

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	$^{\circ}\text{C}/\text{W}$	
		-	-	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	

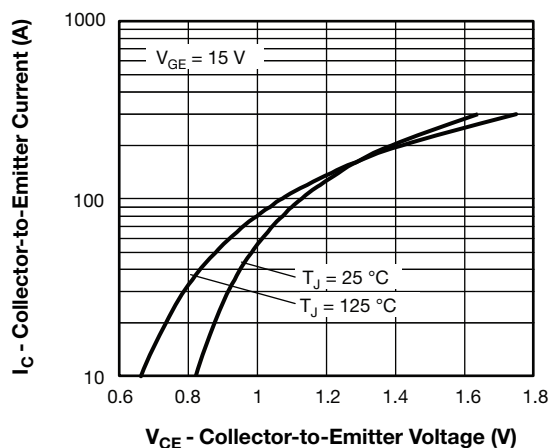


Fig. 1 - Typical Output Characteristics

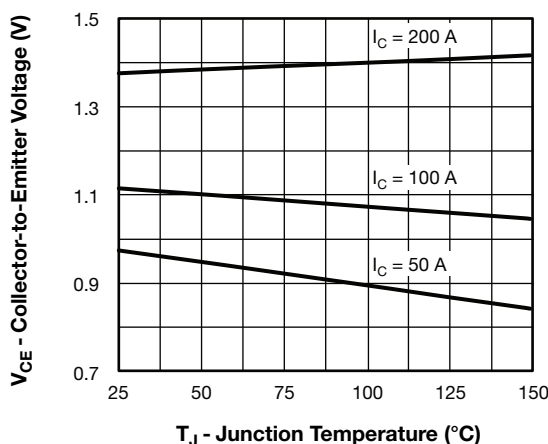


Fig. 4 - Typical Collector to Emitter Voltage vs. Junction Temperature

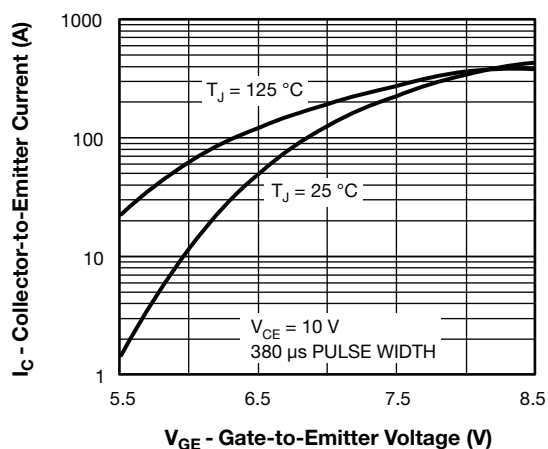


Fig. 2 - Typical Transfer Characteristics

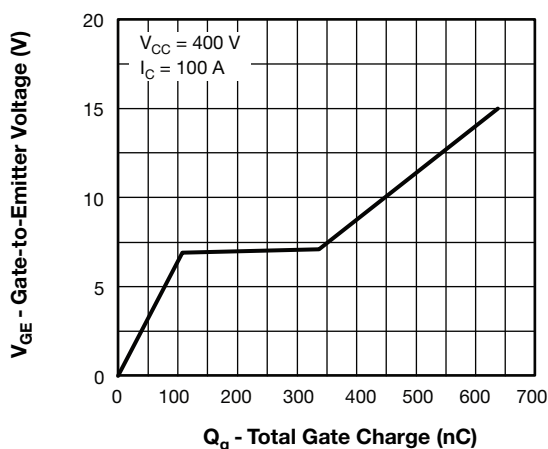


Fig. 5 - Typical Gate Charge vs. Gate to Emitter Voltage

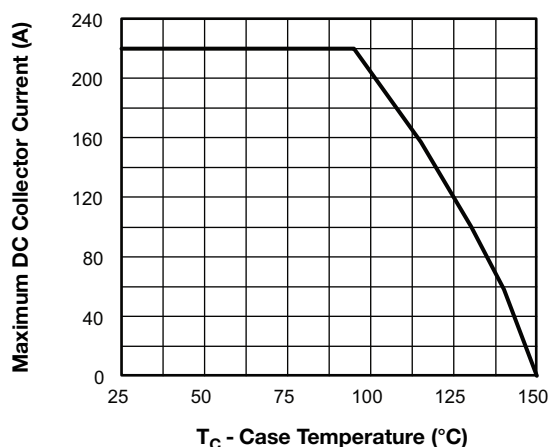


Fig. 3 - Maximum Collector Current vs. Case Temperature

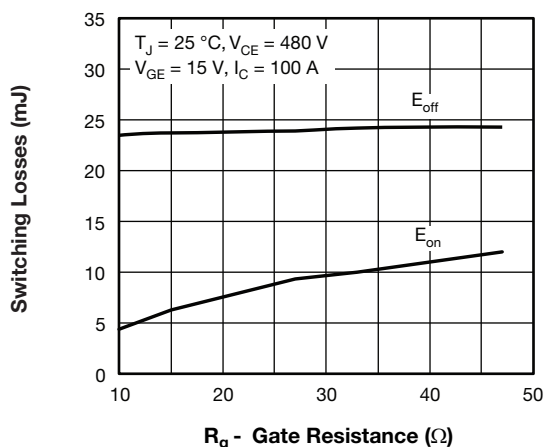


Fig. 6 - Typical Switching Losses vs. Gate Resistance

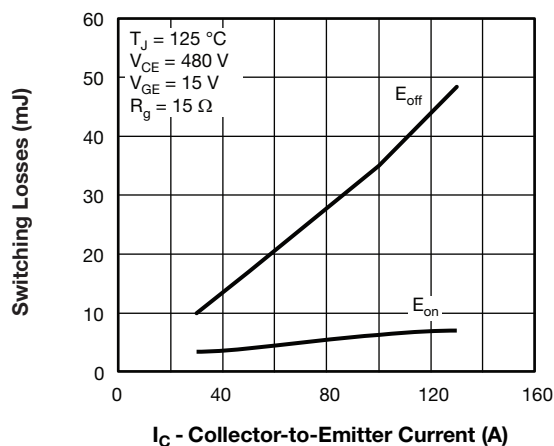


Fig. 7 - Typical Switching Losses vs. Collector to Emitter Current

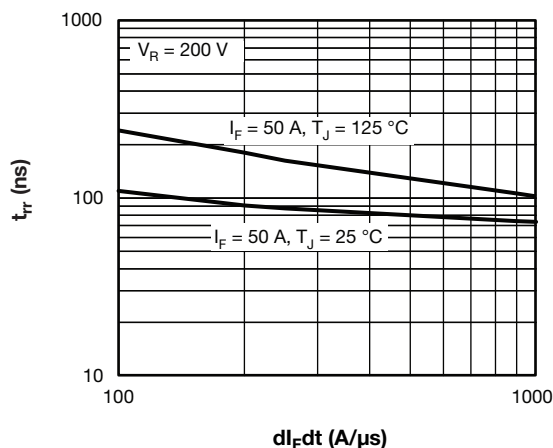


Fig. 9 - Typical Reverse Recovery Time vs. dI_F/dt

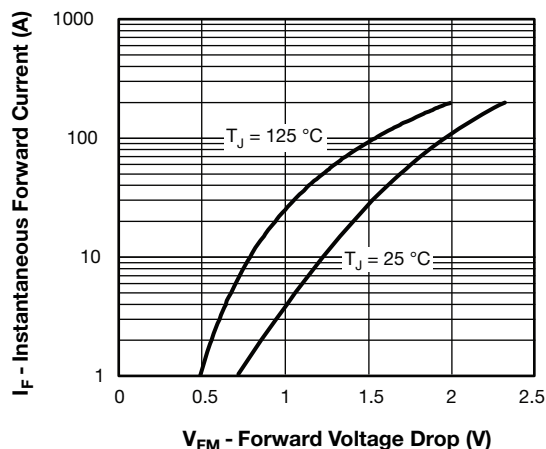


Fig. 8 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

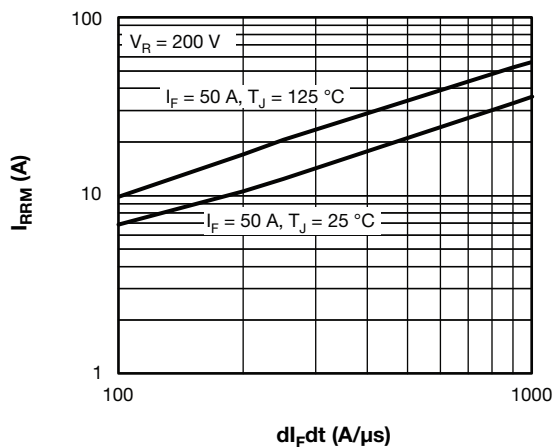


Fig. 10 - Typical Reverse Recovery Current vs. dI_F/dt

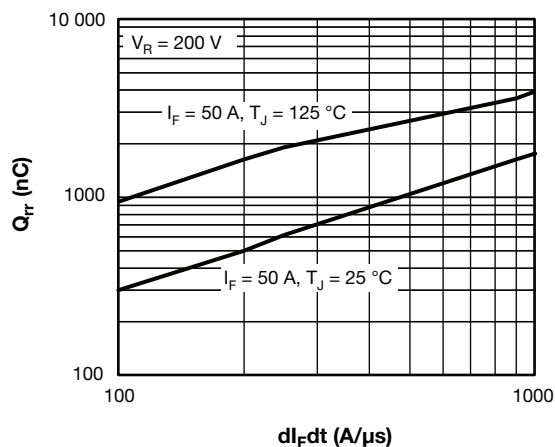


Fig. 11 - Typical Stored Charge vs. dI_F/dt

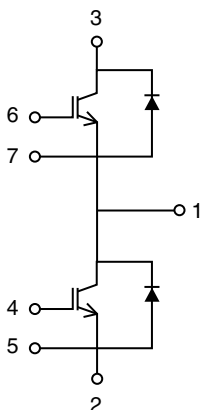


ORDERING INFORMATION TABLE

Device code	VS-	GA	100	T	S	60	S	F	PbF
	1	2	3	4	5	6	7	8	9

- | | | |
|----------|---|--|
| 1 | - | Vishay Semiconductors product |
| 2 | - | Essential part number IGBT modules |
| 3 | - | Current rating (100 = 100 A) |
| 4 | - | Circuit configuration (T = Half bridge) |
| 5 | - | INT-A-PAK |
| 6 | - | Voltage code (60 = 600 V) |
| 7 | - | Speed/type (S = Standard speed IGBT) |
| 8 | - | Diode type |
| 9 | - | None = Standard production; PbF = Lead (Pb)-free |

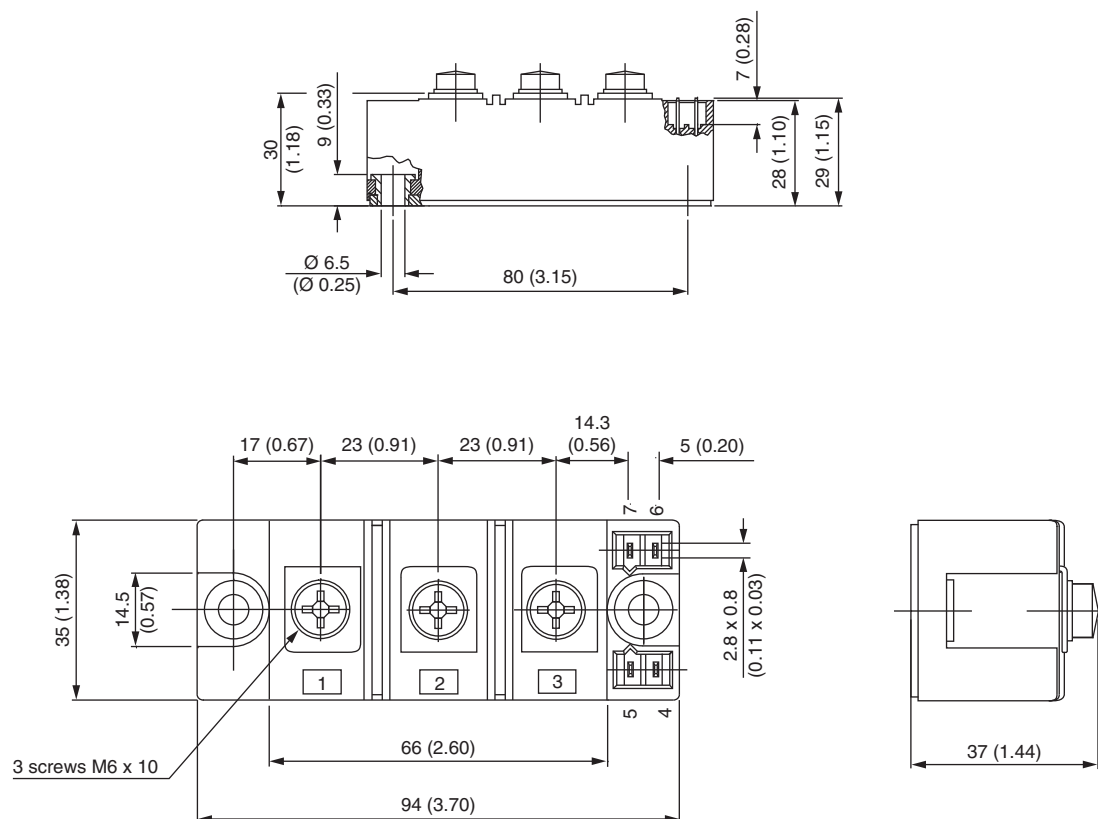
CIRCUIT CONFIGURATION



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

INT-A-PAK IGBT

DIMENSIONS in millimeters (inches)





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