"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
- Al_2O_3 DBC
- UL approved file E78996
- Designed for industrial level
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

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 °C unless otherwise specified)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Total gate charge	Q_g	I_C = 100 A V_{CC} = 400 V V_{GE} = 15 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 A V_{CC} = 480 V V_{GE} = 15 V R_g = 15 Ω T_J = 25 °C	-	0.45	-	µs
Fall time	t_f		-	1.0	-	
Turn-on switching energy	E_{on}		-	4	6	mJ
Turn-off switching energy	E_{off}		-	23	29	
Total switching energy	E_{ts}		-	27	35	
Turn-on switching energy	E_{on}	I_C = 100 A, V_{CC} = 480 V V_{GE} = 15 V, R_g = 15 Ω T_J = 125 °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 V V_{CC} = 30 V f = 1.0 MHz	-	16 250	-	pF
Output capacitance	C_{oes}		-	1040	-	
Reverse transfer capacitance	C_{res}		-	190	-	
Diode reverse recovery time	t_{rr}	I_F = 50 A dI_F/dt = 200 A/µs V_{rr} = 200 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 A dI_F/dt = 200 A/µs V_{rr} = 200 V, T_J = 125 °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	per switch	R_{thJC}	-	-	0.16	°C/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

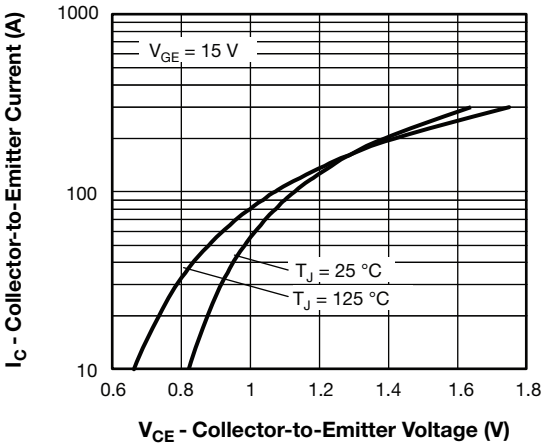


Fig. 1 - Typical Output Characteristics

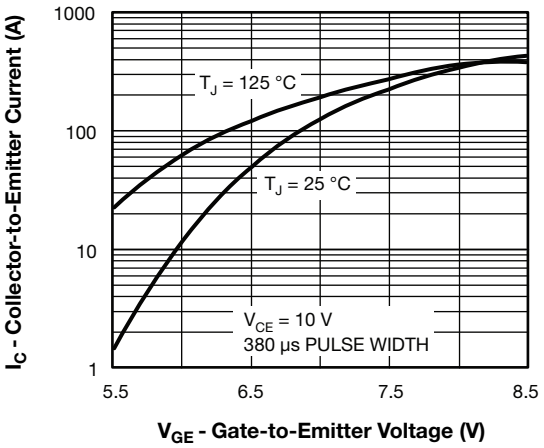


Fig. 2 - Typical Transfer Characteristics

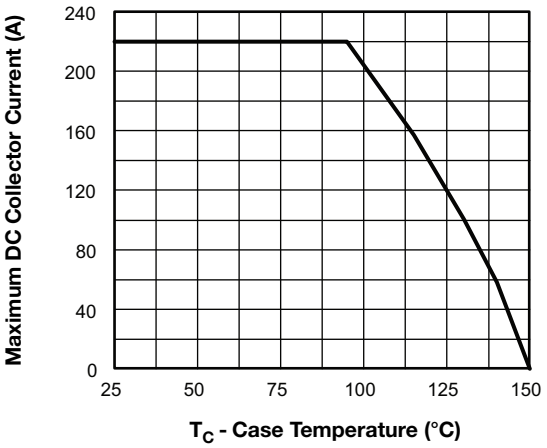


Fig. 3 - Maximum Collector Current vs. Case Temperature

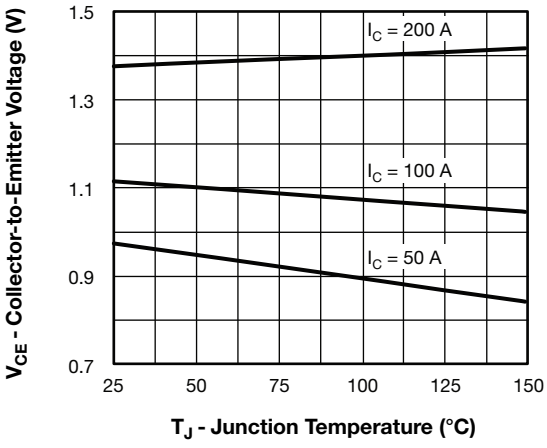


Fig. 4 - Typical Collector to Emitter Voltage vs. Junction Temperature

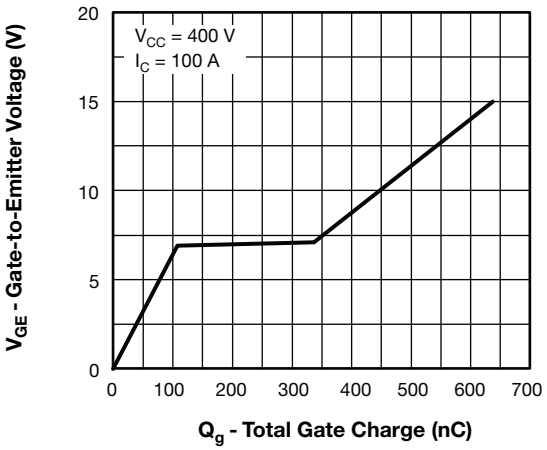


Fig. 5 - Typical Gate Charge vs. Gate to Emitter Voltage

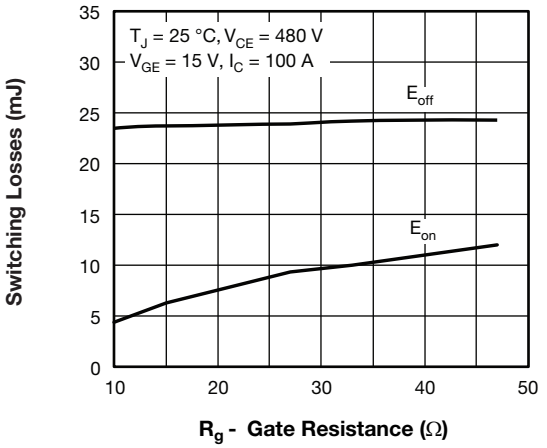


Fig. 6 - Typical Switching Losses vs. Gate Resistance

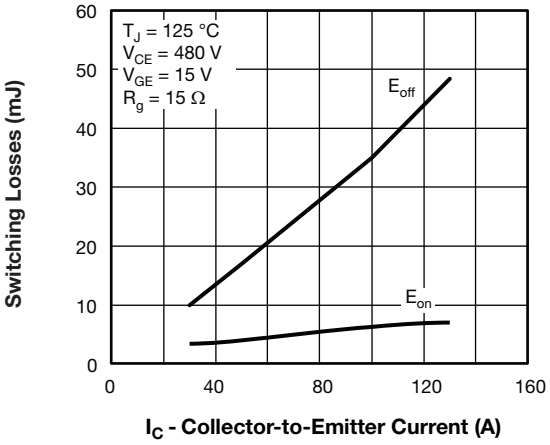


Fig. 7 - Typical Switching Losses vs. Collector to Emitter Current

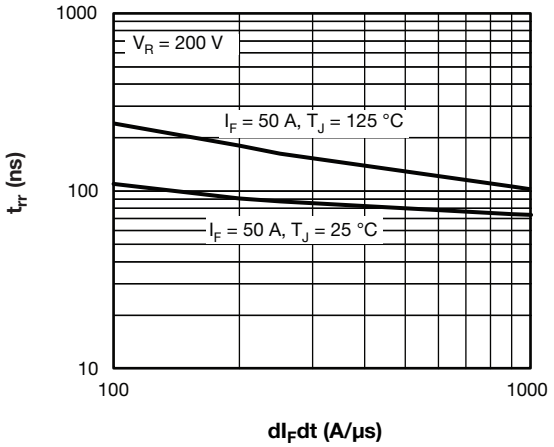


Fig. 9 - Typical Reverse Recovery Time vs. dI_F/dt

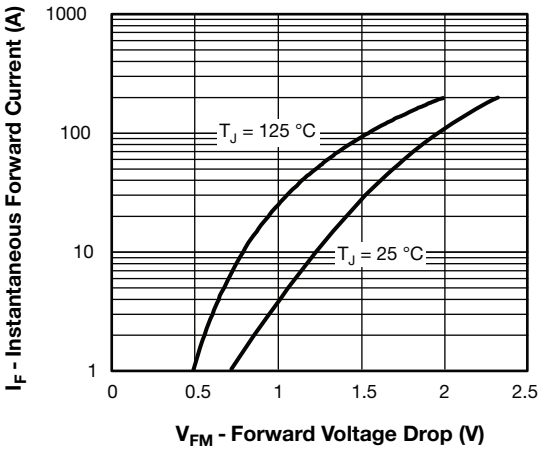


Fig. 8 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

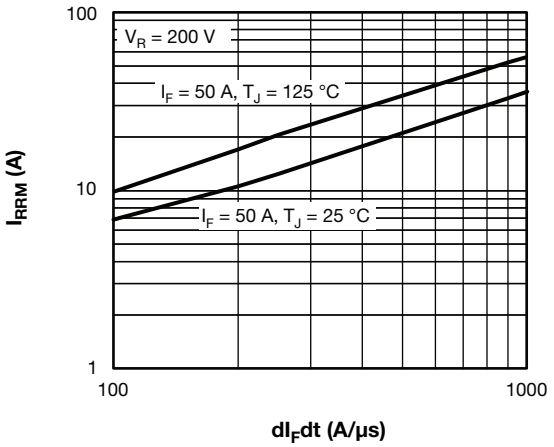


Fig. 10 - Typical Reverse Recovery Current vs. dI_F/dt

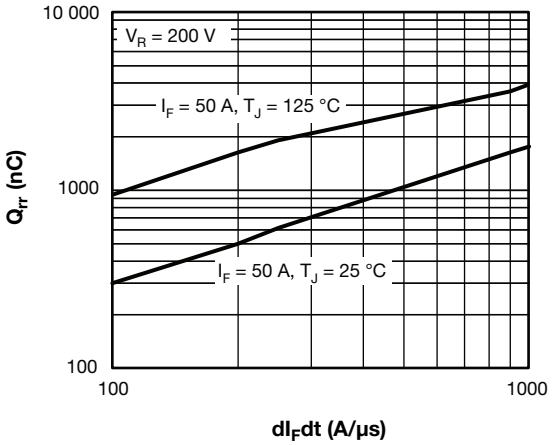


Fig. 11 - Typical Stored Charge vs. dI_F/dt

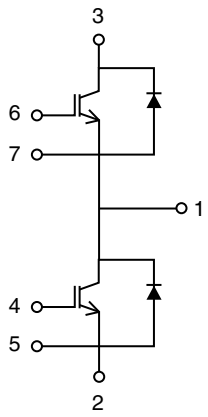
ORDERING INFORMATION TABLE

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

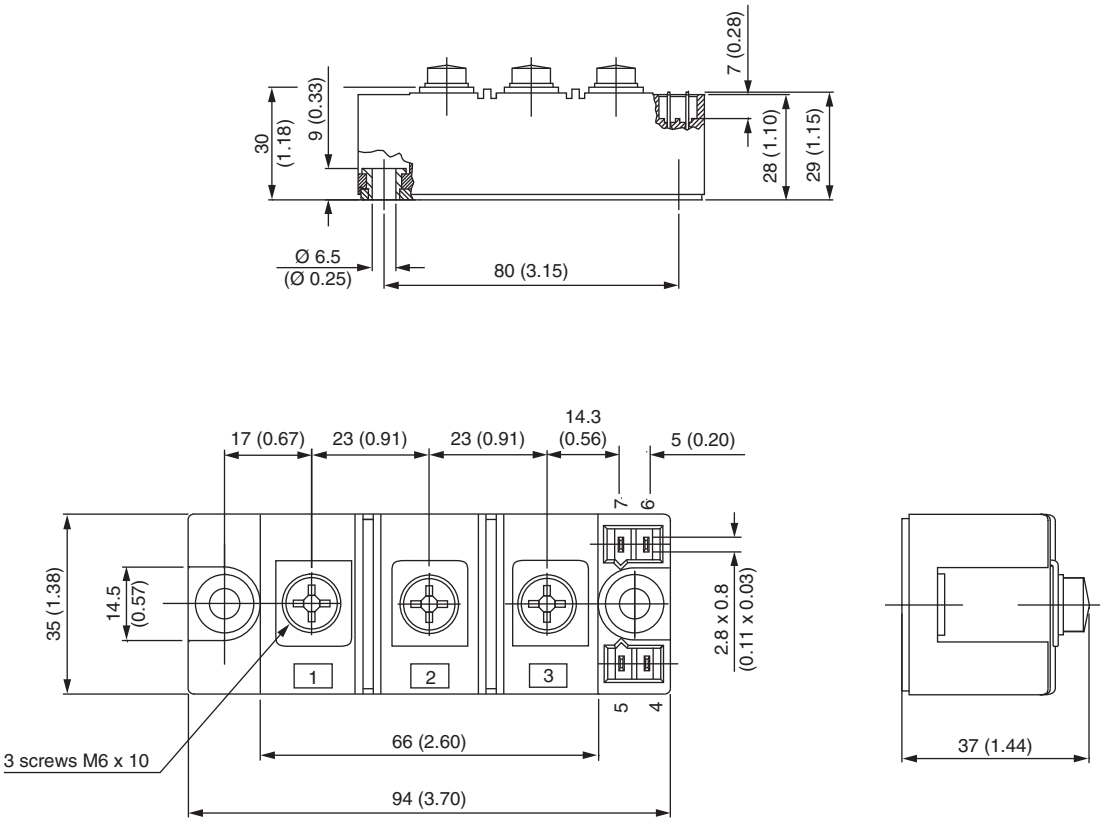
CIRCUIT CONFIGURATION



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

INT-A-PAK IGBT

DIMENSIONS in millimeters (inches)



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