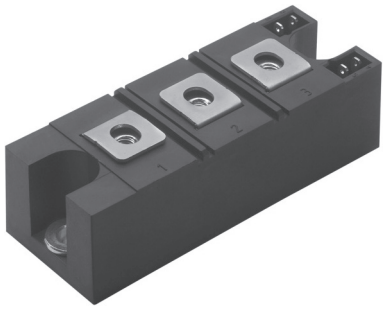
"Half-Bridge" IGBT INT-A-PAK, (Standard Speed IGBT), 100 A



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_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
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

For technical questions within your region: DiodesAmericas@vishay.com, DiodesAsia@vishay.com, DiodesEurope@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

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

For technical questions within your region: DiodesAmericas@vishay.com, DiodesAsia@vishay.com, DiodesEurope@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

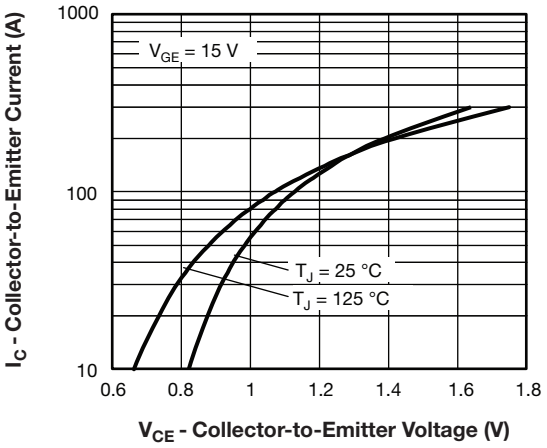


Fig. 1 - Typical Output Characteristics

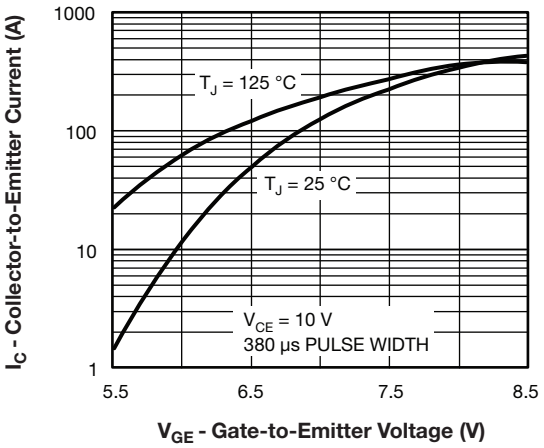


Fig. 2 - Typical Transfer Characteristics

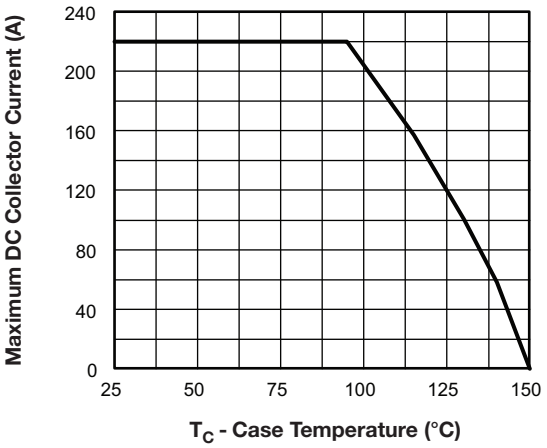


Fig. 3 - Maximum Collector Current vs. Case Temperature

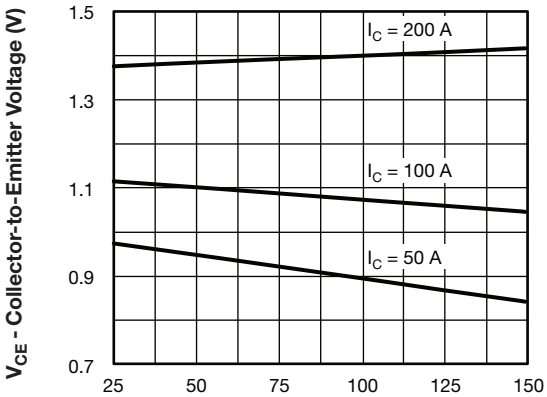


Fig. 4 - Typical Collector to Emitter Voltage vs. Junction Temperature

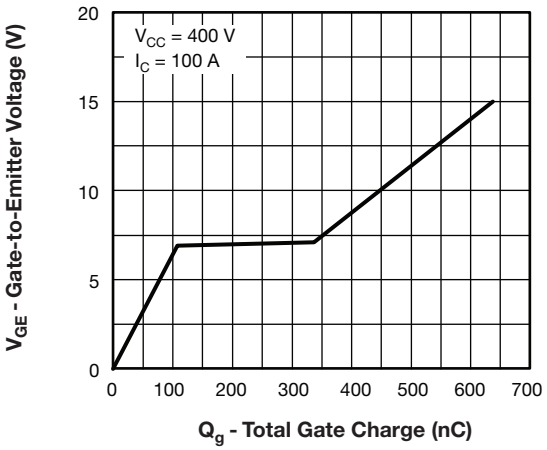


Fig. 5 - Typical Gate Charge vs. Gate to Emitter Voltage

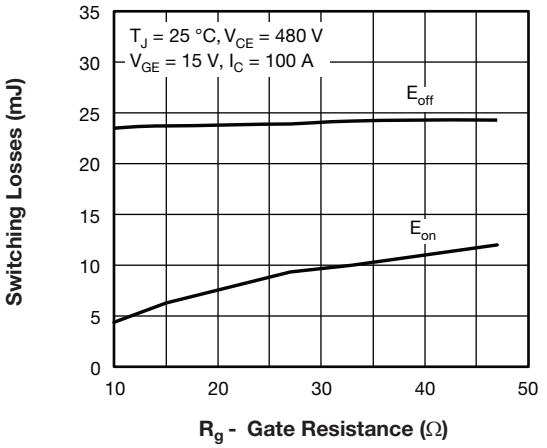


Fig. 6 - Typical Switching Losses vs. Gate Resistance

For technical questions within your region: DiodesAmericas@vishay.com, DiodesAsia@vishay.com, DiodesEurope@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

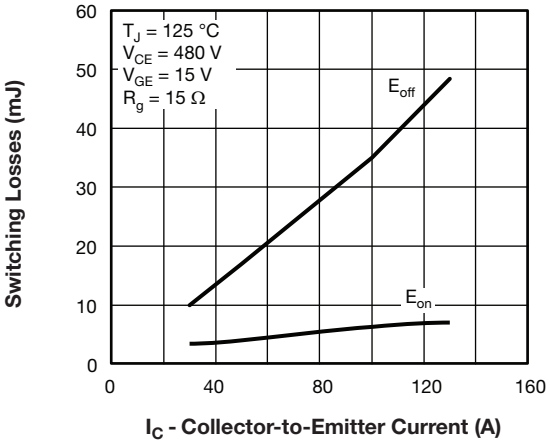


Fig. 7 - Typical Switching Losses vs. Collector to Emitter Current

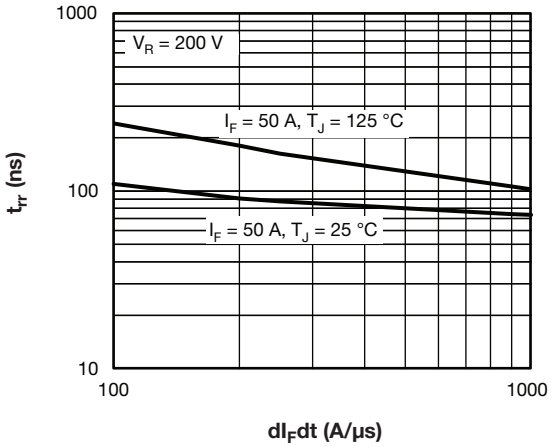


Fig. 9 - Typical Reverse Recovery Time vs. dI_F/dt

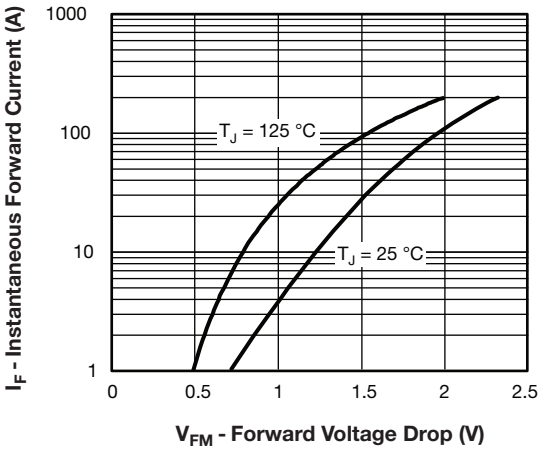


Fig. 8 - Maximum Forward Voltage Drop vs. Instantaneous Forward Current

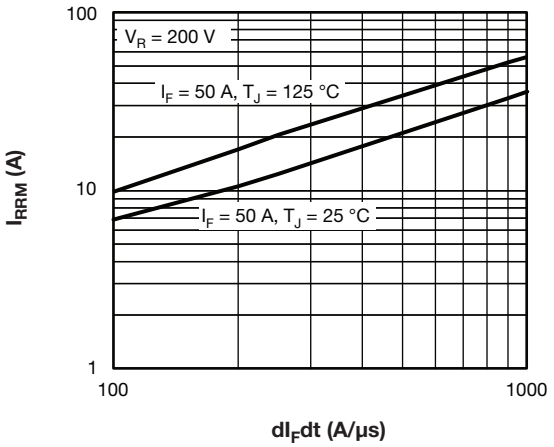


Fig. 10 - Typical Reverse Recovery Current vs. dI_F/dt

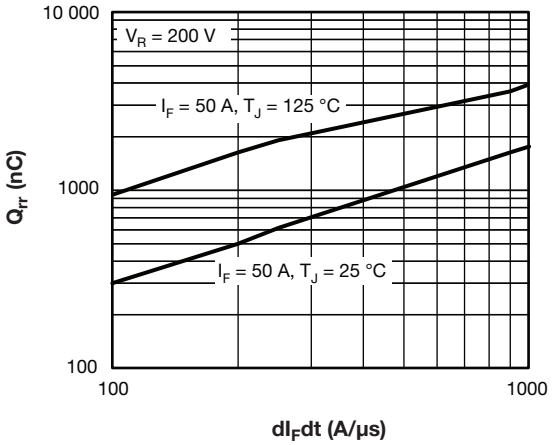


Fig. 11 - Typical Stored Charge vs. dI_F/dt

For technical questions within your region: DiodesAmericas@vishay.com, DiodesAsia@vishay.com, DiodesEurope@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

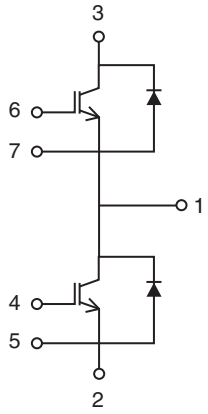
ORDERING INFORMATION TABLE

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

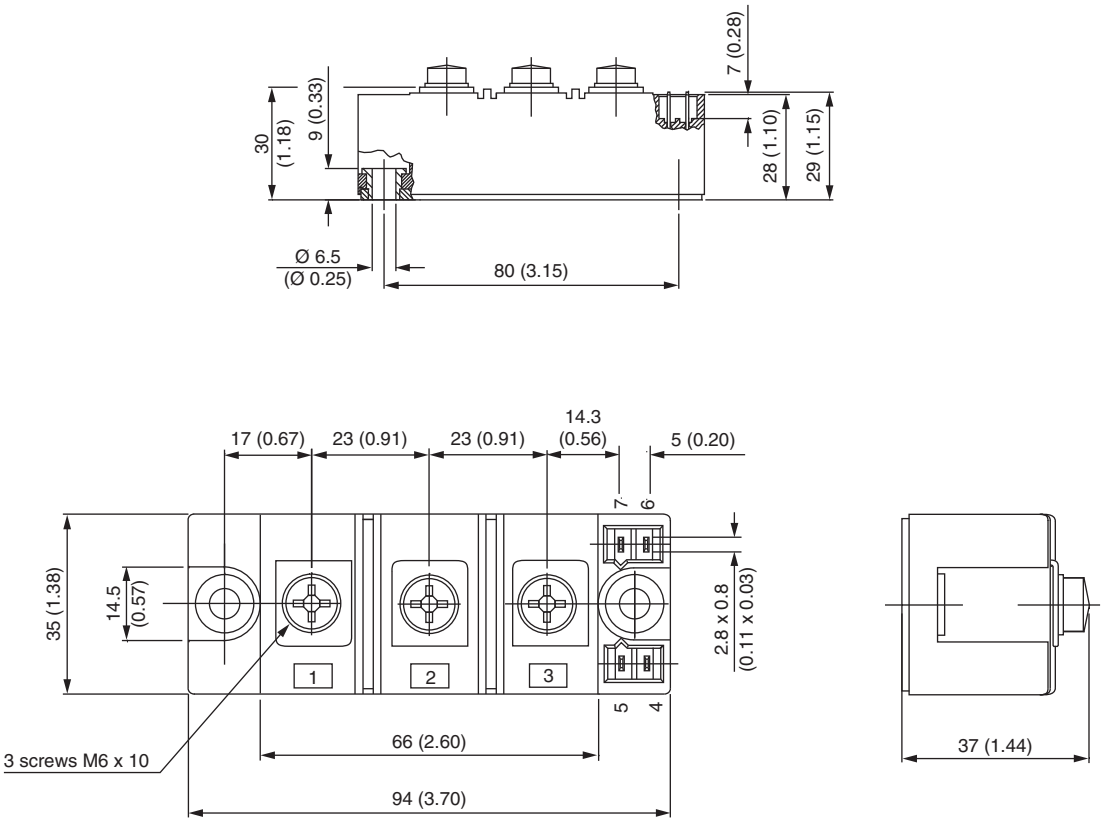


LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95173

For technical questions within your region: DiodesAmericas@vishay.com, DiodesAsia@vishay.com, DiodesEurope@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

INT-A-PAK IGBT

DIMENSIONS in millimeters (inches)



For technical questions within your region: DiodesAmericas@vishay.com, DiodesAsia@vishay.com, DiodesEurope@vishay.com

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay’s knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer’s responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer’s technical experts. Product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

Material Category Policy

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.