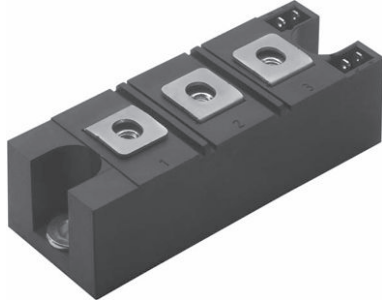



INT-A-PAK “Half-Bridge” (Ultrafast Speed IGBT), 108 A


INT-A-PAK

PRODUCT SUMMARY	
V_{CES}	600 V
I_C DC	108 A
$V_{CE(on)}$ at 100 A, 25 °C	2.6 V
Speed	8 kHz to 30 kHz
Package	INT-A-PAK
Circuit	Half bridge

FEATURES

- Generation 5 Non Punch Through (NPT) technology
- Ultrafast: optimized for hard switching speed
- Low $V_{CE(on)}$
- 10 μ s short circuit capability
- Square RBSOA
- Positive $V_{CE(on)}$ temperature coefficient
- HEXFRED® antiparallel diode with ultrasoft reverse recovery characteristics
- Industry standard package
- 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


**RoHS
COMPLIANT**

BENEFITS

- Benchmark efficiency for UPS and welding application
- Rugged transient performance
- Direct mounting on heatsink
- Very low junction to case thermal resistance

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Collector to emitter voltage	V_{CES}		600	V
Continuous collector current	I_C	$T_C = 25\text{ °C}$	108	A
		$T_C = 80\text{ °C}$	74	
Pulsed collector current	I_{CM}		200	
Clamped inductive load current	I_{LM}		200	
Diode continuous forward current	I_F	$T_C = 25\text{ °C}$	106	
		$T_C = 80\text{ °C}$	69	
Gate to emitter voltage	V_{GE}		± 20	V
Maximum power dissipation	P_D	$T_C = 25\text{ °C}$	390	W
		$T_C = 80\text{ °C}$	219	
Isolation voltage	V_{ISOL}	Any terminal to case, $t = 1\text{ min}$	2500	V
Operating junction temperature range	T_J		-40 to +150	°C
Storage temperature range	T_{Stg}		-40 to +150	



ELECTRICAL SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Collector to emitter breakdown voltage	$V_{BR(CES)}$	$V_{GE} = 0\text{ V}, I_C = 500\text{ }\mu\text{A}$	600	-	-	V
Collector to emitter voltage	$V_{CE(on)}$	$V_{GE} = 15\text{ V}, I_C = 50\text{ A}$	-	1.95	2.1	
		$V_{GE} = 15\text{ V}, I_C = 100\text{ A}$	-	2.6	2.85	
		$V_{GE} = 15\text{ V}, I_C = 50\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	2.21	2.44	
		$V_{GE} = 15\text{ V}, I_C = 100\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	3.05	3.38	
Gate threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C = 500\text{ }\mu\text{A}$	3	4.6	6	
Collector to emitter leakage current	I_{CES}	$V_{GE} = 0\text{ V}, V_{CE} = 600\text{ V}$	-	0.01	0.1	mA
		$V_{GE} = 0\text{ V}, V_{CE} = 600\text{ V}, T_J = 150\text{ }^\circ\text{C}$	-	3.7	10	
Diode forward voltage drop	V_{FM}	$I_C = 50\text{ A}$	-	1.35	1.66	V
		$I_C = 100\text{ A}$	-	1.57	1.96	
		$I_C = 50\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	1.27	1.50	
		$I_C = 100\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	1.57	1.89	
Gate to emitter leakage current	I_{GES}	$V_{GE} = \pm 20\text{ V}$	-	-	± 200	nA

SWITCHING CHARACTERISTICS ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Turn-on switching loss	E_{on}	$I_C = 100\text{ A}, V_{CC} = 360\text{ V}, V_{GE} = 15\text{ V}, R_g = 4.7\text{ }\Omega, L = 200\text{ }\mu\text{H}, T_J = 25\text{ }^\circ\text{C}$	-	0.6	-	mJ
Turn-off switching loss	E_{off}		-	1.1	-	
Total switching loss	E_{tot}		-	1.7	-	
Turn-on switching loss	E_{on}	$I_C = 100\text{ A}, V_{CC} = 360\text{ V}, V_{GE} = 15\text{ V}, R_g = 4.7\text{ }\Omega, L = 200\text{ }\mu\text{H}, T_J = 125\text{ }^\circ\text{C}$	-	0.8	-	ns
Turn-off switching loss	E_{off}		-	1.3	-	
Total switching loss	E_{tot}		-	2.1	-	
Turn-on delay time	$t_{d(on)}$		-	197	-	
Rise time	t_r		-	50	-	
Turn-off delay time	$t_{d(off)}$		-	225	-	
Fall time	t_f	-	72	-		
Reverse bias safe operating area	RBSOA	$T_J = 150\text{ }^\circ\text{C}, I_C = 200\text{ A}, R_g = 27\text{ }\Omega, V_{GE} = 15\text{ V to }0$	Fullsquare			
Short circuit safe operating area	SCSOA	$T_J = 150\text{ }^\circ\text{C}, V_{CC} = 400\text{ V}, V_P = 600\text{ V}, R_g = 27\text{ }\Omega, V_{GE} = 15\text{ V to }0$	10	-	-	
Diode reverse recovery time	t_{rr}	$I_F = 50\text{ A}, di_F/dt = 200\text{ A}/\mu\text{s}, V_{CC} = 400\text{ V}, T_J = 25\text{ }^\circ\text{C}$	-	116	140	ns
Diode peak reverse current	I_{rr}		-	11	15	A
Diode recovery charge	Q_{rr}		-	600	1050	nC
Diode reverse recovery time	t_{rr}	$I_F = 50\text{ A}, di_F/dt = 200\text{ A}/\mu\text{s}, V_{CC} = 400\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	152	190	ns
Diode peak reverse current	I_{rr}		-	16	20	A
Diode recovery charge	Q_{rr}		-	1215	1900	nC

THERMAL AND MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	
Operating junction and storage temperature range	T_J, T_{Stg}	-40	-	150	$^\circ\text{C}$	
Junction to case per leg	IGBT	-	0.23	0.32	$^\circ\text{C}/\text{W}$	
	Diode	-	0.38	0.64		
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	

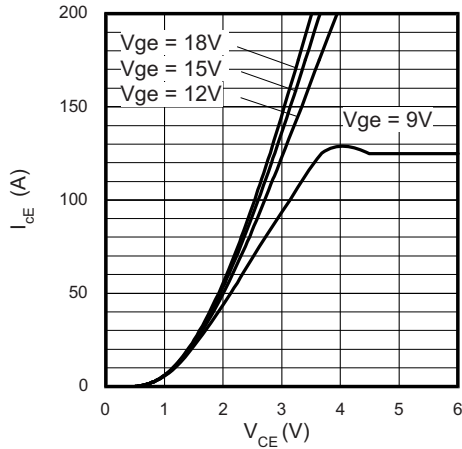


Fig. 1 - Typical IGBT Output Characteristics
 $T_J = 25^\circ\text{C}$, $t_p = 500\ \mu\text{s}$

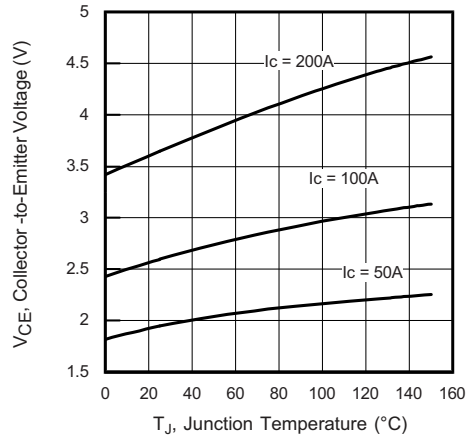


Fig. 4 - Typical Collector to Emitter Voltage vs. Junction Temperature,
 $V_{GE} = 15\ \text{V}$, $500\ \mu\text{s}$ pulse width

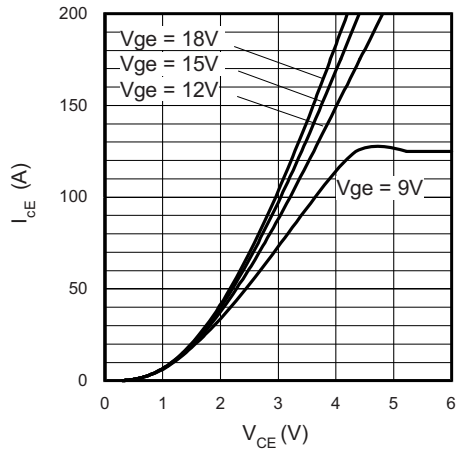


Fig. 2 - Typical IGBT Output Characteristics
 $T_J = 125^\circ\text{C}$, $t_p = 500\ \mu\text{s}$

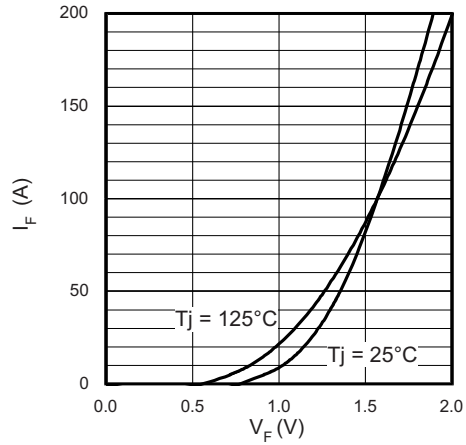


Fig. 5 - Diode Forward Characteristics, $t_p = 500\ \mu\text{s}$

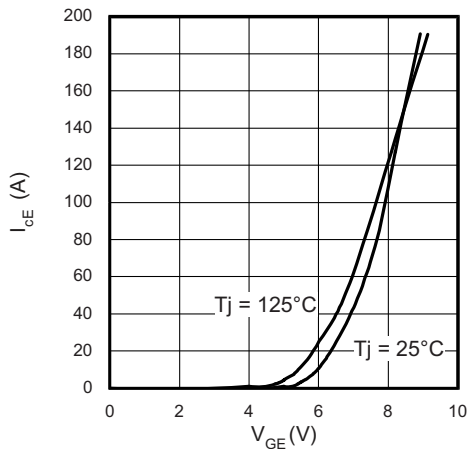


Fig. 3 - Typical Transfer Characteristics
 $V_{CE} = 20\ \text{V}$, $t_p = 500\ \mu\text{s}$

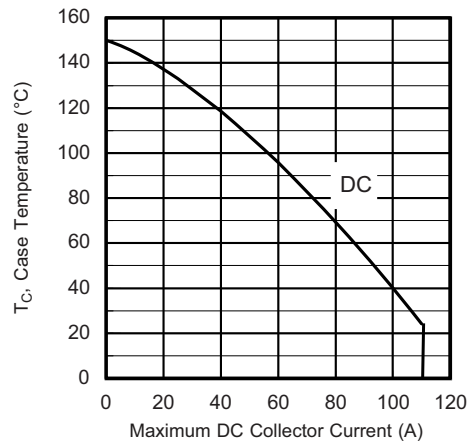


Fig. 6 - Maximum Collector Current vs. Case Temperature

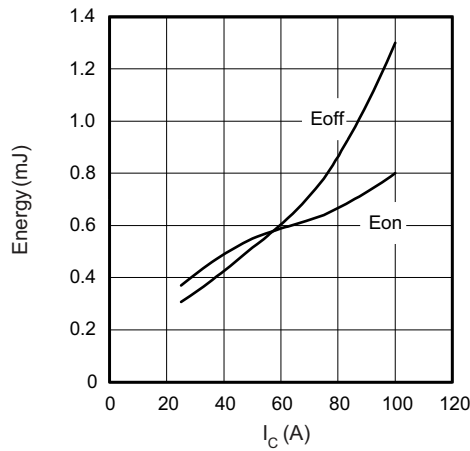


Fig. 7 - Typical Energy Loss vs. I_C , $T_J = 125\text{ }^\circ\text{C}$, $L = 200\text{ }\mu\text{H}$, $V_{CC} = 360\text{ V}$, $R_g = 4.7\text{ }\Omega$, $V_{GE} = 15\text{ V}$

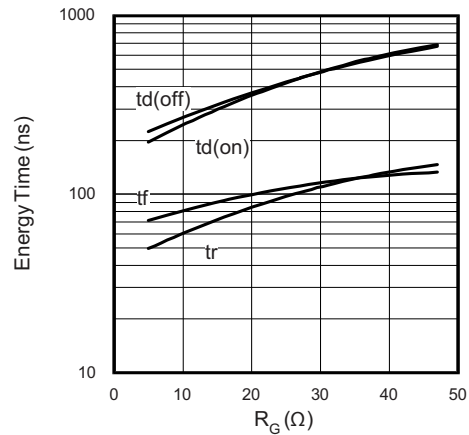


Fig. 10 - Typical Switching Time vs. R_g , $T_J = 125\text{ }^\circ\text{C}$, $L = 200\text{ }\mu\text{H}$, $V_{CC} = 360\text{ V}$, $I_{CE} = 100\text{ A}$, $V_{GE} = 15\text{ V}$

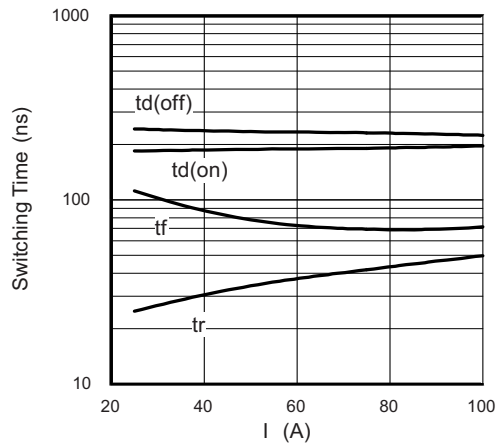


Fig. 8 - Typical Switching Time vs. I_C , $T_J = 125\text{ }^\circ\text{C}$, $L = 200\text{ }\mu\text{H}$, $V_{CC} = 360\text{ V}$, $R_g = 4.7\text{ }\Omega$, $V_{GE} = 15\text{ V}$

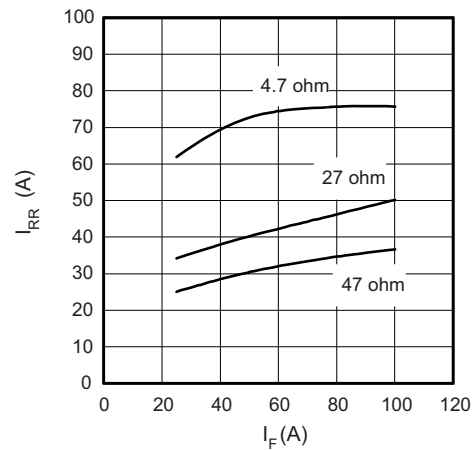


Fig. 11 - Typical Diode I_{rr} vs. I_F , $T_J = 125\text{ }^\circ\text{C}$

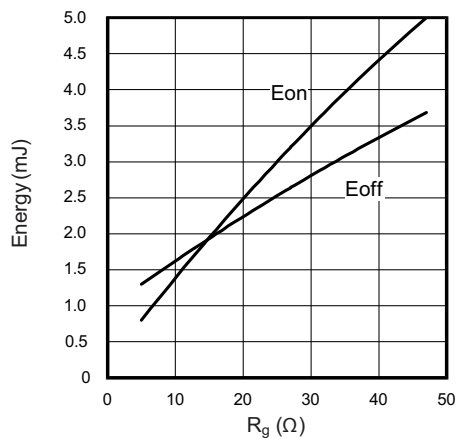


Fig. 9 - Typical Energy Loss vs. R_g , $T_J = 125\text{ }^\circ\text{C}$, $L = 200\text{ }\mu\text{H}$, $V_{CC} = 360\text{ V}$, $I_{CE} = 100\text{ A}$, $V_{GE} = 15\text{ V}$

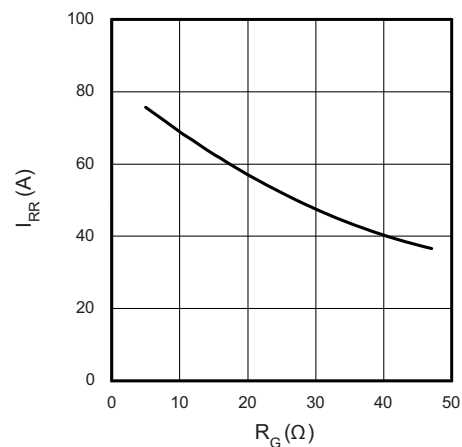


Fig. 12 - Typical Diode I_{rr} vs. R_g , $T_J = 125\text{ }^\circ\text{C}$, $I_F = 100\text{ A}$

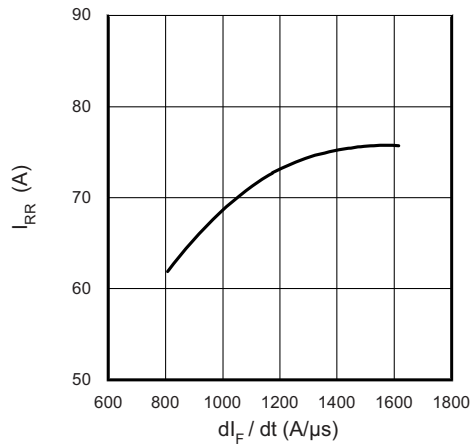


Fig. 13 - Typical Diode I_{RR} vs. dI_F/dt ,
 $T_J = 125^\circ\text{C}$, $V_{CC} = 360\text{ V}$, $I_F = 150\text{ A}$, $V_{GE} = 15\text{ V}$

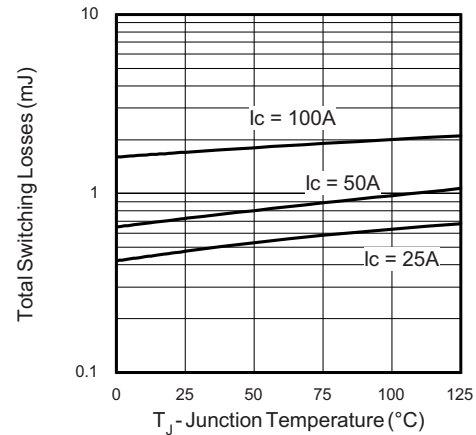


Fig. 15 - Typical Switching Losses vs. Junction Temperature,
 $L = 200\ \mu\text{H}$, $R_g = 10\ \Omega$, $V_{CC} = 360\text{ V}$, $V_{GE} = 15\text{ V}$

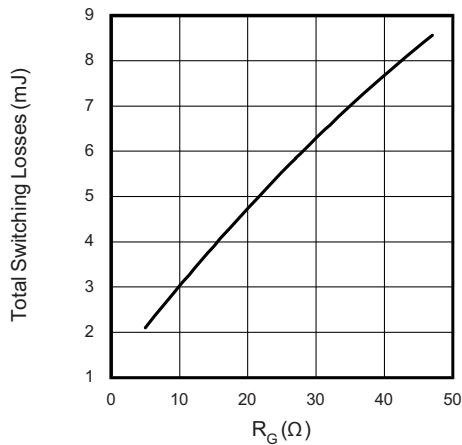


Fig. 14 - Typical Switching Losses vs. Gate Resistance,
 $T_J = 125^\circ\text{C}$, $L = 200\ \mu\text{H}$, $R_g = 10\ \Omega$,
 $V_{CC} = 360\text{ V}$, $V_{GE} = 15\text{ V}$

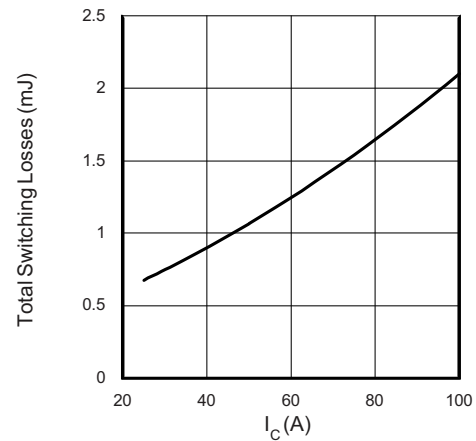


Fig. 16 - Typical Switching Losses vs. Collector to Emitter Current,
 $T_J = 125^\circ\text{C}$, $R_{g1} = 4.7\ \Omega$, $R_{g2} = 0\ \Omega$, $V_{CC} = 360\text{ V}$, $V_{GE} = 15\text{ V}$

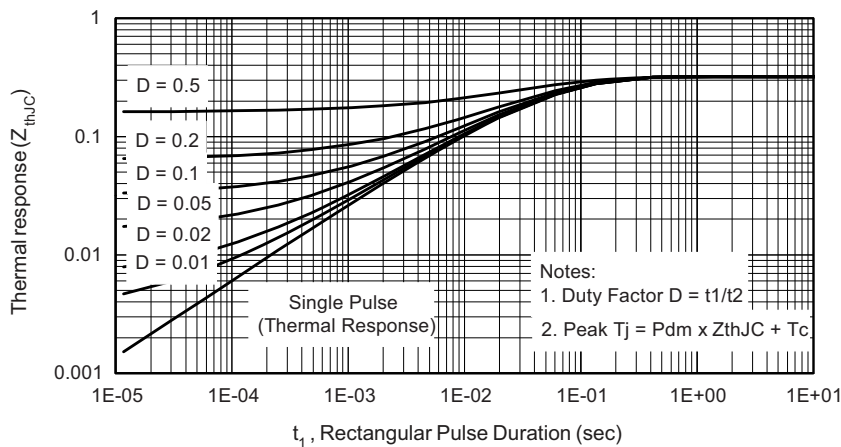


Fig. 17 - Maximum Transient Thermal Impedance, Junction to Case (IGBT)

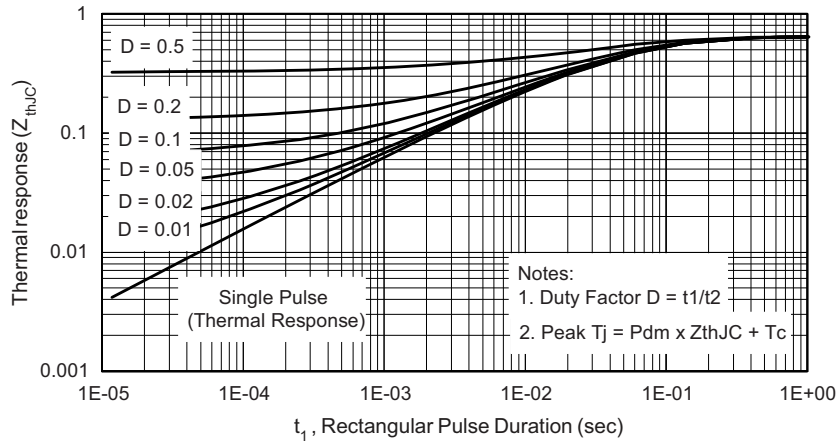
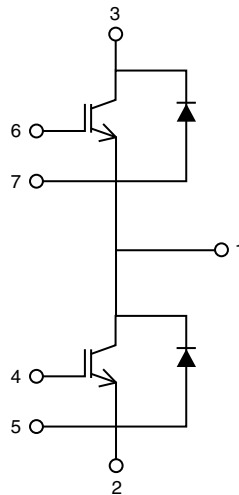


Fig. 18 - Maximum Transient Thermal Impedance, Junction to Case (HEXFRED®)

ORDERING INFORMATION TABLE

Device code	VS-	G	B	100	T	S	60	N	PbF
	①	②	③	④	⑤	⑥	⑦	⑧	⑨

- 1** - Vishay Semiconductors product
- 2** - Insulated Gate Bipolar Transistor (IGBT)
- 3** - B = IGBT Generation 5 NPT
- 4** - Current rating (100 = 100 A)
- 5** - Circuit configuration (T = Half-bridge)
- 6** - Package indicator (S = INT-A-PAK)
- 7** - Voltage rating (60 = 600 V)
- 8** - Speed/type (N = Ultrafast IGBT)
- 9** - Lead (Pb)-free

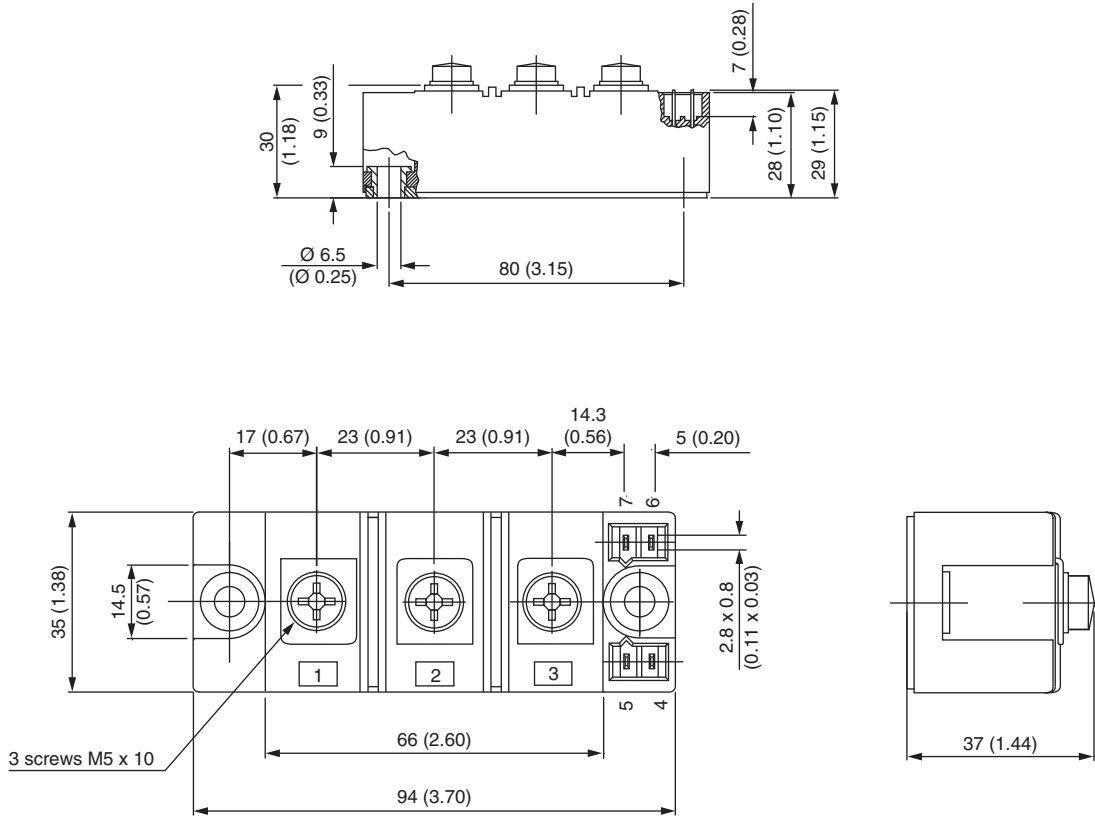
CIRCUIT CONFIGURATION

LINKS TO RELATED DOCUMENTS

Dimensions	www.vishay.com/doc?95543
------------	--



INT-A-PAK IGBT

DIMENSIONS in millimeters (inches)





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.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Vishay:](#)

[VS-GB100TS60NPBF](#)