

## Molding Type Module IGBT, 2 in 1 Package, 1200 V, 50 A


**INT-A-PAK**

### FEATURES

- High short circuit capability, self limiting to  $6 \times I_C$
- $10 \mu s$  short circuit capability
- $V_{CE(on)}$  with positive temperature coefficient
- Maximum junction temperature  $150^\circ C$
- Low inductance case
- Fast and soft reverse recovery antiparallel FWD
- Isolated copper baseplate using DCB (Direct Copper Bonding) technology
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



PRODUCT SUMMARY	
$V_{CES}$	1200 V
$I_C$ at $T_C = 80^\circ C$	50 A
$V_{CE(on)}$ (typical) at $I_C = 50 A, 25^\circ C$	1.75 V
Speed	8 kHz to 30 kHz
Package	INT-A-PAK
Circuit	Half bridge

### TYPICAL APPLICATIONS

- AC inverter drives
- Switching mode power supplies
- Electronic welders

### DESCRIPTION

Vishay's IGBT power module provides ultra low conduction loss as well as short circuit ruggedness. It is designed for applications such as general inverters and UPS.

ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ C$ unless otherwise noted)				
PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Collector to emitter voltage	$V_{CES}$		1200	V
Gate to emitter voltage	$V_{GES}$		$\pm 20$	
Collector current	$I_C$	$T_C = 25^\circ C$	100	A
		$T_C = 80^\circ C$	50	
Pulsed collector current	$I_{CM}^{(1)}$	$t_p = 1 \text{ ms}$	100	
Diode continuous forward current	$I_F$		50	
Diode maximum forward current	$I_{FM}$		100	
Maximum power dissipation	$P_D$	$T_J = 150^\circ C$	446	W
Short circuit withstand time	$t_{sc}$	$T_J = 125^\circ C$	10	$\mu s$
RMS isolation voltage	$V_{ISOL}$	$f = 50 \text{ Hz}, t = 1 \text{ min}$	2500	V
$I^2t$ -value, diode	$I^2t$	$V_R = 0 \text{ V}, t = 10 \text{ ms}, T_J = 125^\circ C$	420	$A^2s$

#### Note

<sup>(1)</sup> Repetitive rating: pulse width limited by maximum junction temperature.

IGBT ELECTRICAL SPECIFICATIONS ( $T_C = 25^\circ C$ unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Collector to emitter breakdown voltage	$V_{(BR)CES}$	$V_{GE} = 0 \text{ V}, I_C = 1.0 \text{ mA}, T_J = 25^\circ C$	1200	-	-	V
Collector to emitter voltage	$V_{CE(on)}$	$V_{GE} = 15 \text{ V}, I_C = 50 \text{ A}, T_J = 25^\circ C$	-	1.75	2.15	
		$V_{GE} = 15 \text{ V}, I_C = 50 \text{ A}, T_J = 125^\circ C$	-	2.0	-	
Gate to emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C = 2.0 \text{ mA}, T_J = 25^\circ C$	5.0	6.2	7.0	
Collector cut-off current	$I_{CES}$	$V_{CE} = V_{CES}, V_{GE} = 0 \text{ V}, T_J = 25^\circ C$	-	-	5.0	mA
Gate to emitter leakage current	$I_{GES}$	$V_{GE} = V_{GES}, V_{CE} = 0 \text{ V}, T_J = 25^\circ C$	-	-	400	nA

SWITCHING CHARACTERISTICS								
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS	
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600 \text{ V}$ , $I_C = 50 \text{ A}$ , $R_g = 15 \Omega$ , $V_{GE} = \pm 15 \text{ V}$ , $T_J = 25 \text{ }^\circ\text{C}$		-	382	-	ns	
Rise time	$t_r$			-	74	-		
Turn-off delay time	$t_{d(off)}$			-	379	-		
Fall time	$t_f$			-	380	-		
Turn-on switching loss	$E_{on}$			-	6.28	-	mJ	
Turn-off switching loss	$E_{off}$			-	3.23	-		
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600 \text{ V}$ , $I_C = 50 \text{ A}$ , $R_g = 15 \Omega$ , $V_{GE} = \pm 15 \text{ V}$ , $T_J = 125 \text{ }^\circ\text{C}$		-	403	-	ns	
Rise time	$t_r$			-	72	-		
Turn-off delay time	$t_{d(off)}$			-	404	-		
Fall time	$t_f$			-	381	-		
Turn-on switching loss	$E_{on}$			-	7.30	-	mJ	
Turn-off switching loss	$E_{off}$			-	5.22	-		
Input capacitance	$C_{ies}$	$V_{GE} = 0 \text{ V}$ , $V_{CE} = 25 \text{ V}$ , $f = 1.0 \text{ MHz}$ , $T_J = 25 \text{ }^\circ\text{C}$		-	4.29	-	nF	
Output capacitance	$C_{oes}$			-	0.30	-		
Reverse transfer capacitance	$C_{res}$			-	0.20	-		
SC data	$I_{SC}$	$t_{sc} \leq 10 \mu\text{s}$ , $V_{GE} = 15 \text{ V}$ , $T_J = 125 \text{ }^\circ\text{C}$ , $V_{CC} = 900 \text{ V}$ , $V_{CEM} \leq 1200 \text{ V}$		-	270	-	A	
Internal gate resistance	$R_{gint}$			-	10	-	$\Omega$	
Stray inductance	$L_{CE}$			-	-	30	nH	
Module lead resistance, terminal to chip	$R_{CC'EE'}$			-	0.75	-	$\text{m}\Omega$	

DIODE ELECTRICAL SPECIFICATIONS ( $T_C = 25 \text{ }^\circ\text{C}$ unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Diode forward voltage	$V_F$	$I_F = 50 \text{ A}$	$T_J = 25 \text{ }^\circ\text{C}$	-	2.05	2.45	V
			$T_J = 125 \text{ }^\circ\text{C}$	-	2.10	-	
Diode reverse recovery charge	$Q_{rr}$	$I_F = 50 \text{ A}$ , $V_R = 600 \text{ V}$ , $dI_F/dt = -830 \text{ A}/\mu\text{s}$ , $V_{GE} = -15 \text{ V}$	$T_J = 25 \text{ }^\circ\text{C}$	-	3.32	-	$\mu\text{C}$
Diode peak reverse recovery current	$I_{rr}$		$T_J = 125 \text{ }^\circ\text{C}$	-	6.51	-	
Diode reverse recovery energy	$E_{rec}$		$T_J = 25 \text{ }^\circ\text{C}$	-	33.8	-	A
			$T_J = 125 \text{ }^\circ\text{C}$	-	46.9	-	
			$T_J = 25 \text{ }^\circ\text{C}$	-	1.28	-	mJ
			$T_J = 125 \text{ }^\circ\text{C}$	-	2.03	-	

THERMAL AND MECHANICAL SPECIFICATIONS								
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS	
Operating junction temperature	$T_J$			-	-	150	${}^\circ\text{C}$	
Storage temperature range	$T_{STG}$			-40	-	125		
Junction to case IGBT (per 1/2 module) Diode (per 1/2 module)	$R_{thJC}$			-	-	0.28	K/W	
				-	-	0.49		
Case to sink	$R_{thCS}$	Conductive grease applied		-	0.05	-	Nm	
Mounting torque		Power terminal screw: M5		2.5 to 5.0				
		Mounting screw: M6		3.0 to 5.0				
Weight of module				150			g	

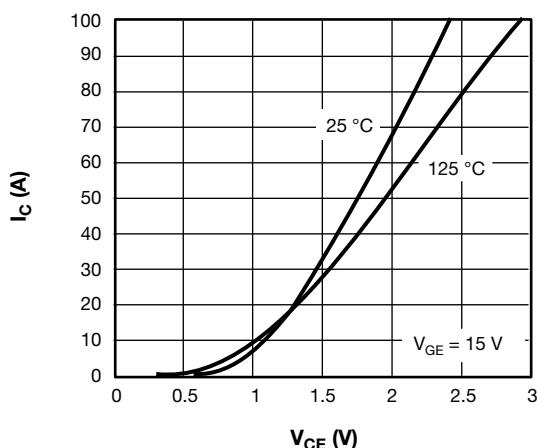


Fig. 1 - Typical Output Characteristics

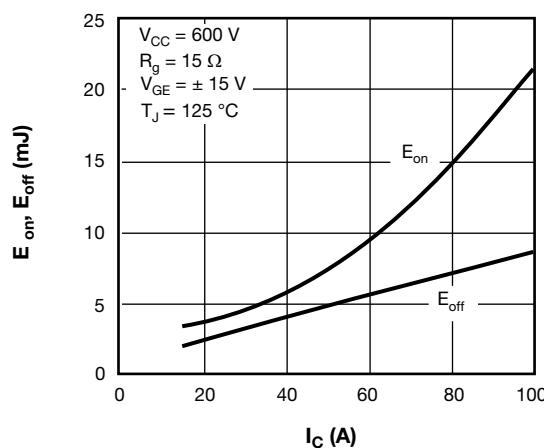


Fig. 3 - Switching Loss vs.  $I_C$

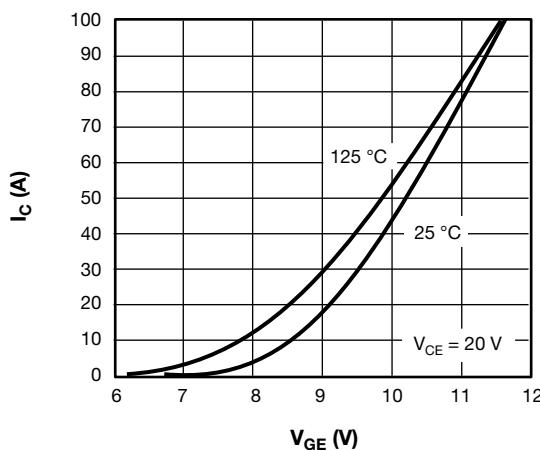


Fig. 2 - Typical Transfer Characteristics

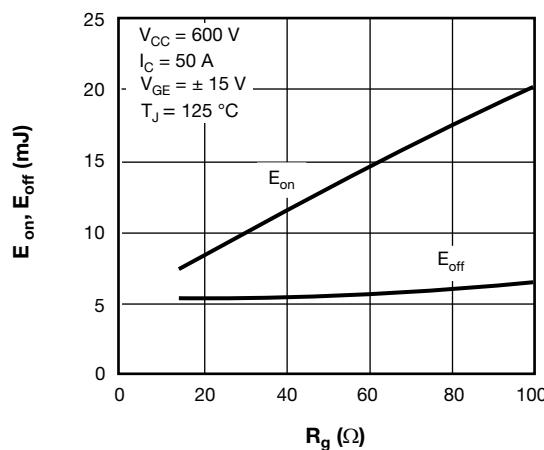


Fig. 4 - Switching Loss vs.  $R_g$

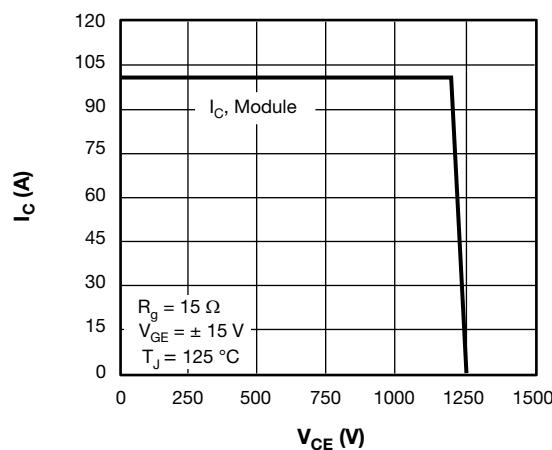


Fig. 5 - RBSOA

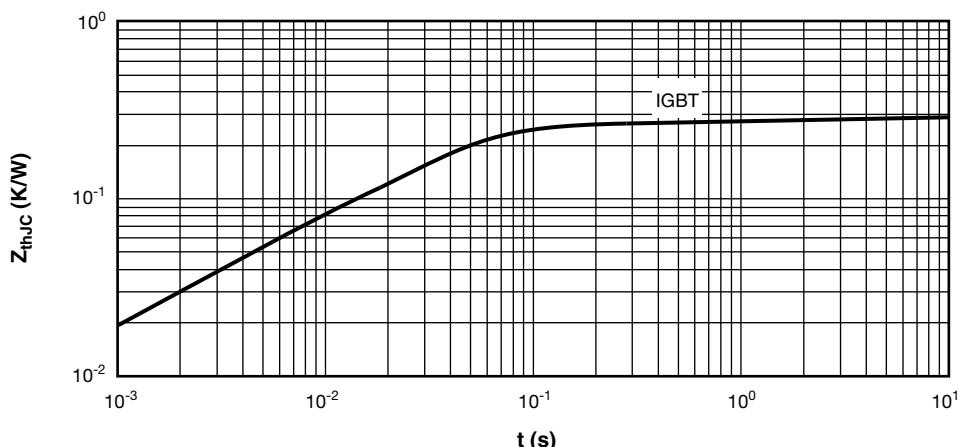


Fig. 6 - IGBT Transient Thermal Impedance

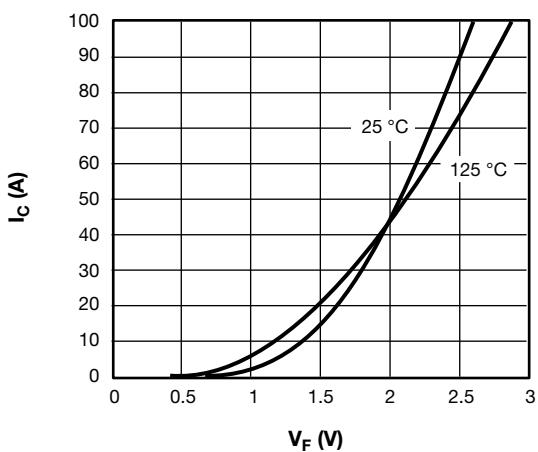


Fig. 7 - Diode Forward Characteristics

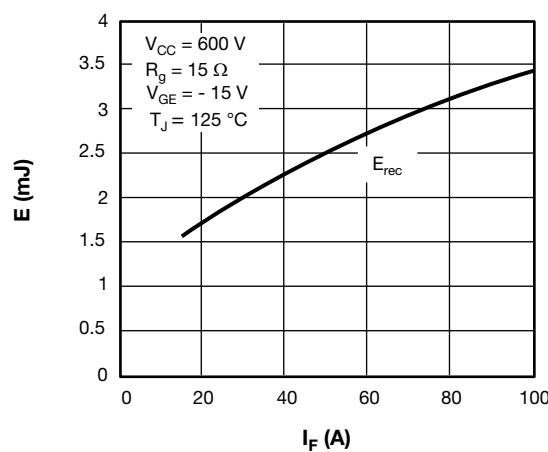


Fig. 8 - Diode Switching Loss vs. I\_C

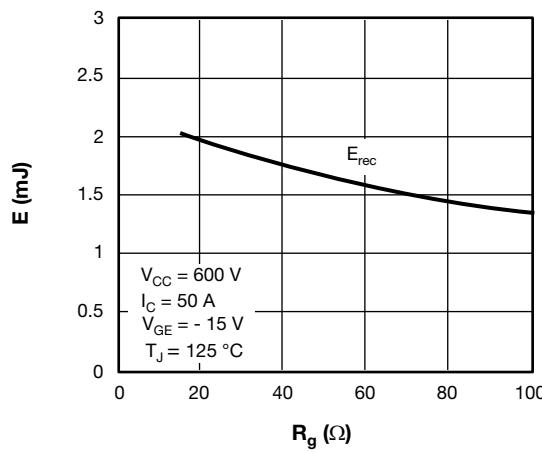


Fig. 9 - Diode Switching Loss vs. R\_g

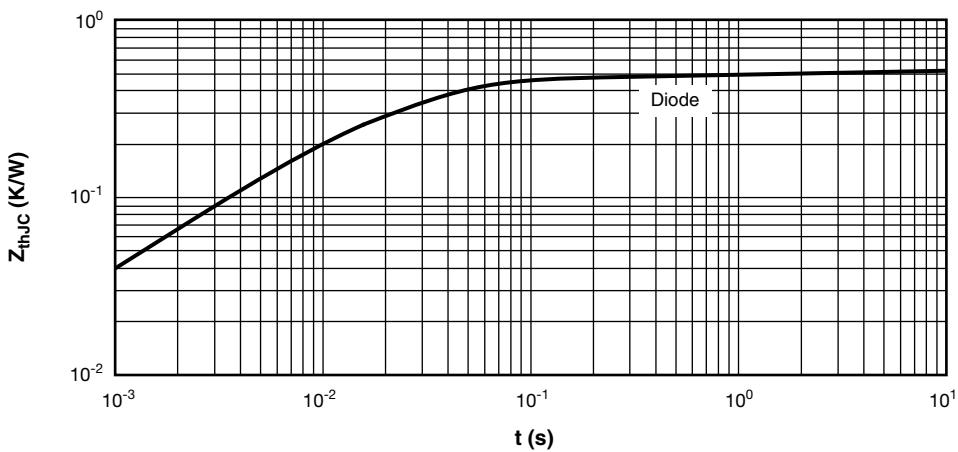
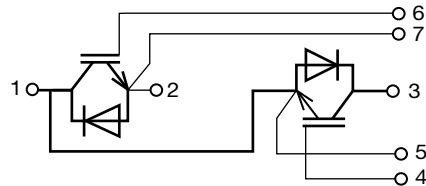


Fig. 10 - Diode Transient Thermal Impedance

## CIRCUIT CONFIGURATION



LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95524">www.vishay.com/doc?95524</a>

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