

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


**INT-A-PAK**

### FEATURES

- Low  $V_{CE(on)}$  trench IGBT technology
- Low switching losses
- 10  $\mu$ s short circuit capability
- $V_{CE(on)}$  with positive temperature coefficient
- Maximum junction temperature 175 °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)


**RoHS**  
COMPLIANT

### PRIMARY CHARACTERISTICS

$V_{CES}$	1200 V
$I_C$ at $T_C = 80$ °C	50 A
$V_{CE(on)}$ (typical) at $I_C = 50$ A, 25 °C	1.65 V
Speed	8 kHz to 30 kHz
Package	INT-A-PAK
Circuit configuration	Half bridge

### TYPICAL APPLICATIONS

- UPS (Uninterruptible Power Supply)
- Electronic welders
- Switching mode power supplies

### DESCRIPTION

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

### ABSOLUTE MAXIMUM RATINGS ( $T_C = 25$ °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	$I_C$	$T_C = 25$ °C	100	A
		$T_C = 80$ °C	50	
Pulsed collector current	$I_{CM}^{(1)}$	$t_p = 1$ ms	100	
Diode continuous forward current	$I_F$		50	
Diode maximum forward current	$I_{FM}^{(1)}$		100	
Maximum power dissipation	$P_D$	$T_J = 175$ °C	405	W
RMS isolation voltage	$V_{ISOL}$	$f = 50$ Hz, $t = 1$ min	2500	V

**Note**

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

### IGBT ELECTRICAL SPECIFICATIONS ( $T_C = 25$ °C unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Collector to emitter breakdown voltage	$V_{(BR)CES}$	$T_J = 25$ °C	1200	-	-	V
Collector to emitter voltage	$V_{CE(on)}$	$V_{GE} = 15$ V, $I_C = 50$ A, $T_J = 25$ °C	-	1.90	2.35	
		$V_{GE} = 15$ V, $I_C = 50$ A, $T_J = 175$ °C	-	2.50	-	
Gate to emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$ , $I_C = 1.4$ mA, $T_J = 25$ °C	5.0	5.5	7.5	
Collector cut-off current	$I_{CES}$	$V_{CE} = V_{CES}$ , $V_{GE} = 0$ V, $T_J = 25$ °C	-	-	5.0	mA
Gate to emitter leakage current	$I_{GES}$	$V_{GE} = V_{GES}$ , $V_{CE} = 0$ V, $T_J = 25$ °C	-	-	400	nA

**SWITCHING CHARACTERISTICS**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600\text{ V}$ , $I_C = 50\text{ A}$ , $R_g = 15\ \Omega$ , $V_{GE} = \pm 15\text{ V}$ , $T_J = 25\text{ }^\circ\text{C}$	-	148	-	ns
Rise time	$t_r$		-	84	-	
Turn-off delay time	$t_{d(off)}$		-	245	-	
Fall time	$t_f$		-	251	-	
Turn-on switching loss	$E_{on}$		-	5.51	-	mJ
Turn-off switching loss	$E_{off}$		-	2.70	-	
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600\text{ V}$ , $I_C = 50\text{ A}$ , $R_g = 15\ \Omega$ , $V_{GE} = \pm 15\text{ V}$ , $T_J = 125\text{ }^\circ\text{C}$	-	263	-	ns
Rise time	$t_r$		-	81	-	
Turn-off delay time	$t_{d(off)}$		-	256	-	
Fall time	$t_f$		-	292	-	
Turn-on switching loss	$E_{on}$		-	6.63	-	mJ
Turn-off switching loss	$E_{off}$		-	3.25	-	
Input capacitance	$C_{ies}$	$V_{GE} = 0\text{ V}$ , $V_{CE} = 30\text{ V}$ , $f = 1.0\text{ MHz}$	-	6.24	-	nF
Output capacitance	$C_{oes}$		-	0.23	-	
Reverse transfer capacitance	$C_{res}$		-	0.15	-	
SC data	$I_{SC}$	$t_p \leq 10\ \mu\text{s}$ , $V_{GE} = 15\text{ V}$ , $T_J = 125\text{ }^\circ\text{C}$ , $V_{CC} = 600\text{ V}$ , $V_{CEM} \leq 1200\text{ V}$	-	450	-	A
Stray inductance	$L_{CE}$		-	-	30	nH
Module lead resistance, terminal to chip	$R_{CC'+EE'}$		-	0.75	-	m $\Omega$

**DIODE ELECTRICAL SPECIFICATIONS** ( $T_C = 25\text{ }^\circ\text{C}$  unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Forward voltage	$V_F$	$I_F = 50\text{ A}$	$T_J = 25\text{ }^\circ\text{C}$ $T_J = 125\text{ }^\circ\text{C}$	- 1.85 1.95	2.25 -	V
Reverse recovery charge	$Q_{rr}$	$I_F = 50\text{ A}$ , $V_R = 600\text{ V}$ , $di_F/dt = -654\text{ A}/\mu\text{s}$ , $V_{GE} = -15\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$ $T_J = 125\text{ }^\circ\text{C}$	- 3.1 6.1	- -	$\mu\text{C}$
Peak reverse recovery current	$I_{rr}$		$T_J = 25\text{ }^\circ\text{C}$ $T_J = 125\text{ }^\circ\text{C}$	- 24 31	- -	A
Reverse recovery energy	$E_{rec}$		$T_J = 25\text{ }^\circ\text{C}$ $T_J = 125\text{ }^\circ\text{C}$	- 0.98 2.06	- -	mJ

**THERMAL AND MECHANICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Operating junction temperature	T <sub>J</sub>		-	-	175	°C
Storage temperature range	T <sub>Stg</sub>		-40	-	125	°C
Junction to case	R <sub>thJC</sub>	IGBT	-	-	0.37	K/W
Diode			-	-	0.49	
Case to sink (conductive grease applied)	R <sub>thCS</sub>		-	0.05	-	
Mounting torque		Power terminal screw: M5	2.5 to 5.0			Nm
		Mounting screw: M6	3.0 to 5.0			
Weight		Weight of module	-	150	-	g

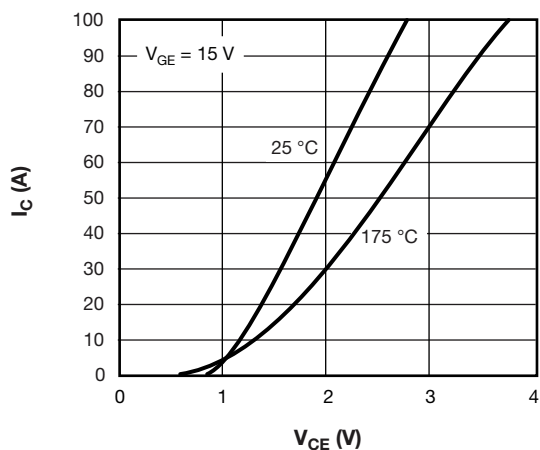


Fig. 1 - IGBT Typical Output Characteristics

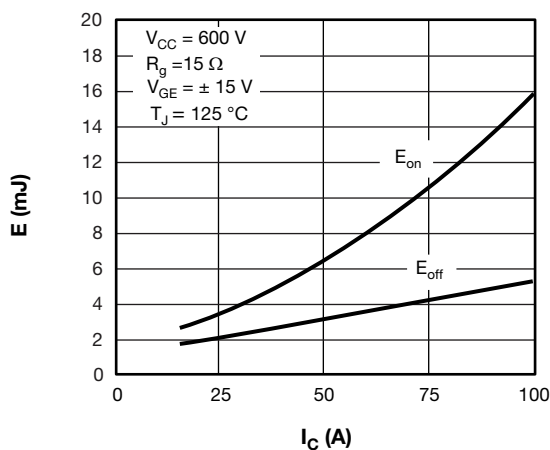


Fig. 3 - IGBT Switching Loss vs.  $I_C$

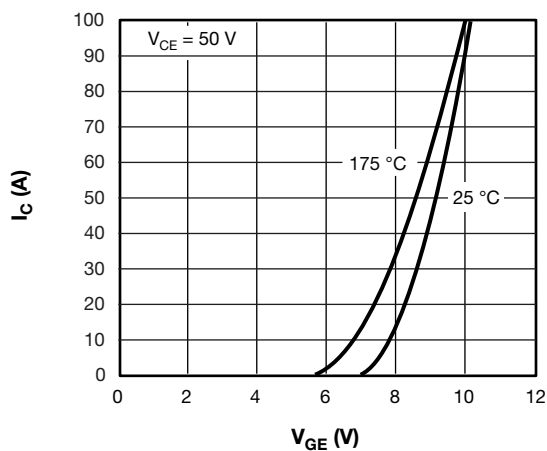


Fig. 2 - IGBT Transfer Characteristics

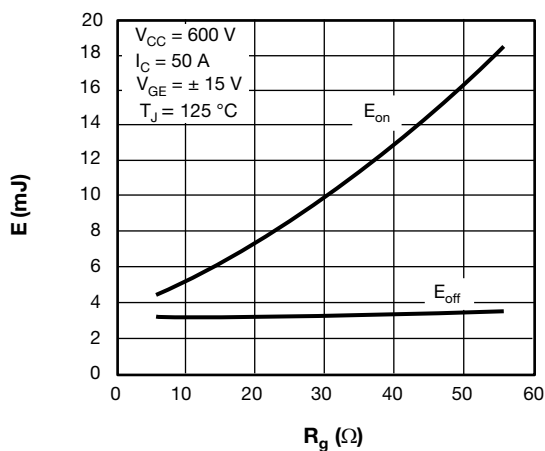


Fig. 4 - IGBT Switching Loss vs.  $R_g$

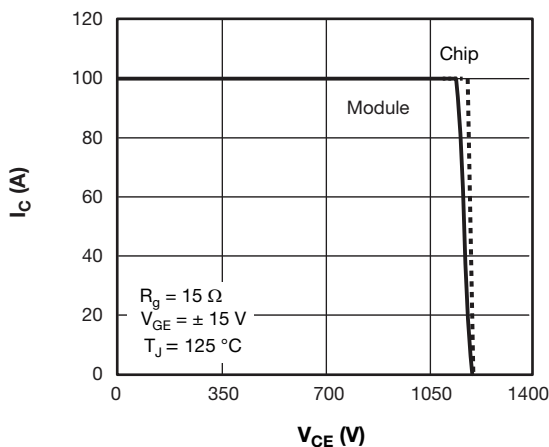


Fig. 5 - RBSOA

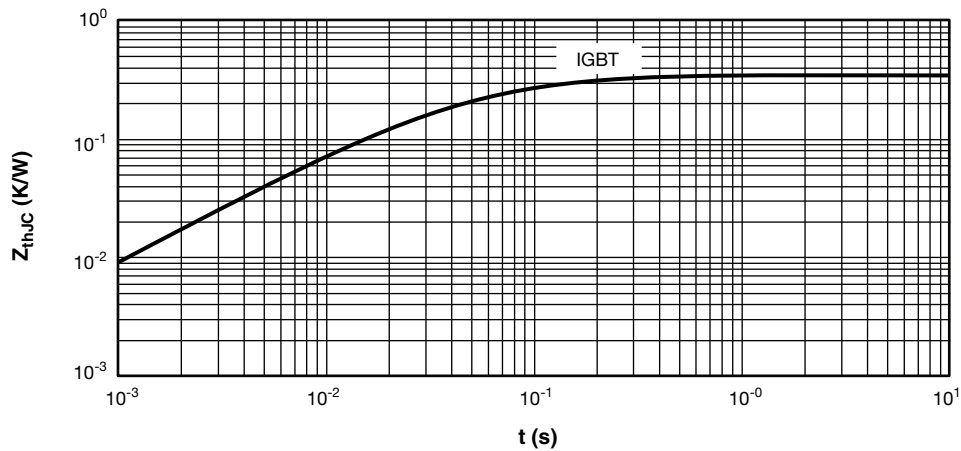


Fig. 6 - IGBT Transient Thermal Impedance

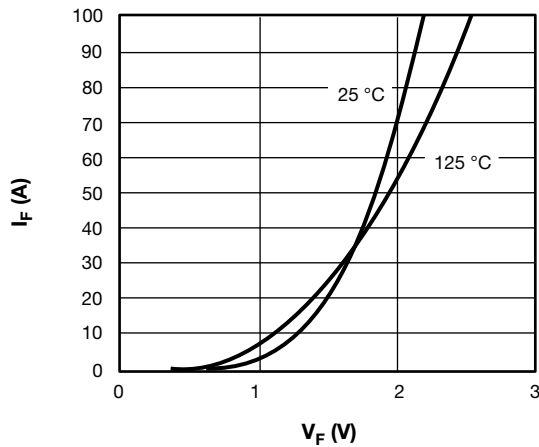


Fig. 7 - Diode Forward Characteristics

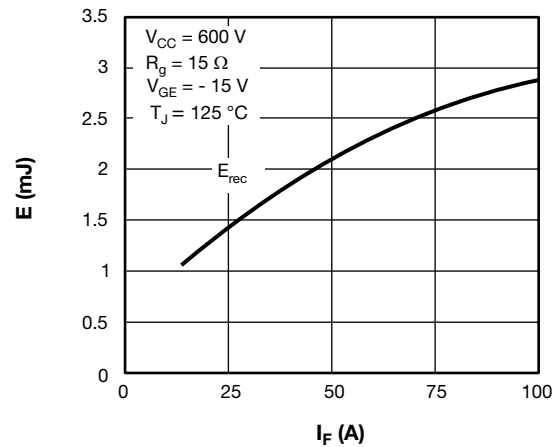


Fig. 8 - Diode Switching Loss vs.  $I_F$

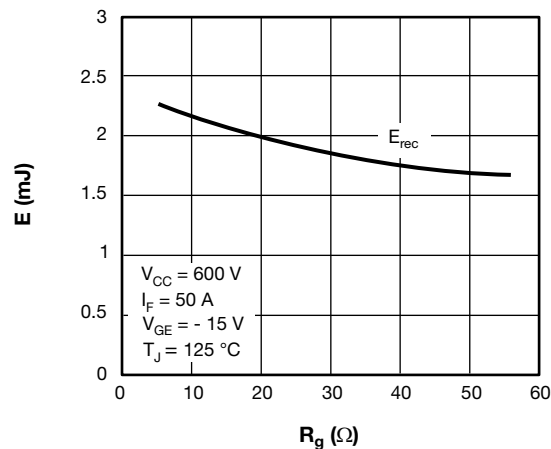


Fig. 9 - Diode Switching Loss vs.  $R_G$

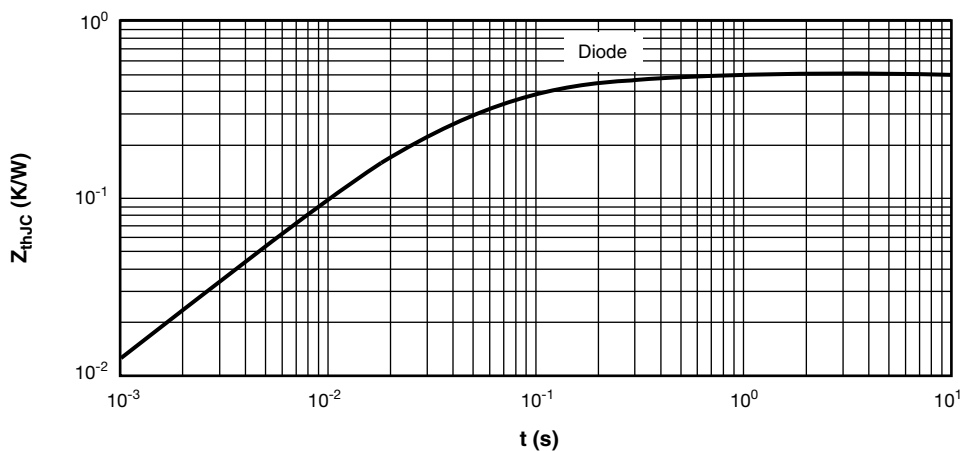
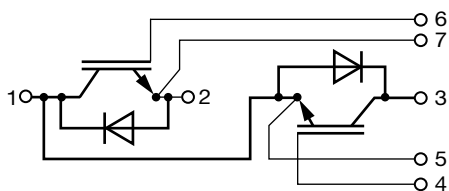


Fig. 10 - Diode Transient Thermal Impedance

## 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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