

## Molding Type Module IGBT, 2-in-1 Package, 1200 V and 300 A



Double INT-A-PAK

### FEATURES

- 10  $\mu$ s short circuit capability
- $V_{CE(on)}$  with positive temperature coefficient
- Maximum junction temperature 150 °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

PRODUCT SUMMARY	
$V_{CES}$	1200 V
$I_C$ at $T_C = 80\text{ °C}$	300 A
$V_{CE(on)}$ (typical) at $I_C = 300\text{ A}$ , $25\text{ °C}$	2.00 V
Speed	8 kHz to 30 kHz
Package	Double INT-A-PAK
Circuit	Half bridge

### TYPICAL APPLICATIONS

- UPS
- Inverter for motor drive
- AC and DC servo drive amplifier

### 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 ( $T_C = 25\text{ °C}$ 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	$I_C$	$T_C = 25\text{ °C}$	500	A
		$T_C = 80\text{ °C}$	300	
Pulsed collector current	$I_{CM}^{(1)}$	$t_p = 1\text{ ms}$	600	
Diode continuous forward current	$I_F$	$T_C = 80\text{ °C}$	300	
Diode maximum forward current	$I_{FM}$	$t_p = 1\text{ ms}$	600	
Maximum power dissipation	$P_D$	$T_J = 150\text{ °C}$	1645	
Short circuit withstand time	$t_{SC}$	$T_J = 125\text{ °C}$	10	$\mu$ s
RMS isolation voltage	$V_{ISOL}$	$f = 50\text{ Hz}$ , $t = 1\text{ min}$	2500	V

#### Note

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



IGBT ELECTRICAL SPECIFICATIONS (T <sub>C</sub> = 25 °C unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Collector to emitter breakdown voltage	V <sub>(BR)CES</sub>	T <sub>J</sub> = 25 °C	1200	-	-	V
Collector to emitter voltage	V <sub>CE(on)</sub>	V <sub>GE</sub> = 15 V, I <sub>C</sub> = 300 A, T <sub>J</sub> = 25 °C	-	2.00	2.45	
		V <sub>GE</sub> = 15 V, I <sub>C</sub> = 300 A, T <sub>J</sub> = 125 °C	-	2.20	-	
Gate to emitter threshold voltage	V <sub>GE(th)</sub>	V <sub>CE</sub> = V <sub>GE</sub> , I <sub>C</sub> = 12 mA, T <sub>J</sub> = 25 °C	5.0	6.2	7.0	
Collector cut-off current	I <sub>CES</sub>	V <sub>CE</sub> = V <sub>CES</sub> , V <sub>GE</sub> = 0 V, T <sub>J</sub> = 25 °C	-	-	5.0	mA
Gate to emitter leakage current	I <sub>GES</sub>	V <sub>GE</sub> = V <sub>GES</sub> , V <sub>CE</sub> = 0 V, T <sub>J</sub> = 25 °C	-	-	400	nA

SWITCHING CHARACTERISTICS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Turn-on delay time	t <sub>d(on)</sub>	V <sub>CC</sub> = 600 V, I <sub>C</sub> = 300 A, R <sub>g</sub> = 4.7 Ω, V <sub>GE</sub> = ± 15 V, T <sub>J</sub> = 25 °C	-	574	-	ns
Rise time	t <sub>r</sub>		-	133	-	
Turn-off delay time	t <sub>d(off)</sub>		-	563	-	
Fall time	t <sub>f</sub>		-	120	-	
Turn-on switching loss	E <sub>on</sub>	V <sub>CC</sub> = 600 V, I <sub>C</sub> = 300 A, R <sub>g</sub> = 4.7 Ω, V <sub>GE</sub> = ± 15 V, T <sub>J</sub> = 125 °C	-	23.9	-	mJ
Turn-off switching loss	E <sub>off</sub>		-	25.3	-	
Turn-on delay time	t <sub>d(on)</sub>		-	604	-	
Rise time	t <sub>r</sub>		-	137	-	
Turn-off delay time	t <sub>d(off)</sub>	V <sub>CC</sub> = 600 V, I <sub>C</sub> = 300 A, R <sub>g</sub> = 4.7 Ω, V <sub>GE</sub> = ± 15 V, T <sub>J</sub> = 125 °C	-	629	-	ns
Fall time	t <sub>f</sub>		-	167	-	
Turn-on switching loss	E <sub>on</sub>		-	31.5	-	
Turn-off switching loss	E <sub>off</sub>		-	35.9	-	
Input capacitance	C <sub>ies</sub>	V <sub>GE</sub> = 0 V, V <sub>CE</sub> = 25 V, f = 1.0 MHz	-	21.2	-	nF
Output capacitance	C <sub>oes</sub>		-	1.42	-	
Reverse transfer capacitance	C <sub>res</sub>		-	0.94	-	
SC data	I <sub>SC</sub>	t <sub>sc</sub> ≤ 10 μs, V <sub>GE</sub> = 15 V, T <sub>J</sub> = 125 °C, V <sub>CC</sub> = 900 V, V <sub>CEM</sub> ≤ 1200 V	-	1800	-	A
Internal gate resistance	R <sub>gint</sub>		-	1.0	-	Ω
Stray inductance	L <sub>CE</sub>		-	-	20	nH
Module lead resistance, terminal to chip	R <sub>CC'+EE'</sub>	T <sub>C</sub> = 25 °C	-	0.35	-	mΩ

DIODE ELECTRICAL SPECIFICATIONS (T <sub>C</sub> = 25 °C unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Diode forward voltage	V <sub>F</sub>	I <sub>F</sub> = 300 A	T <sub>J</sub> = 25 °C	-	1.82	2.25	V
			T <sub>J</sub> = 125 °C	-	1.95	-	
Diode reverse recovery charge	Q <sub>rr</sub>	I <sub>F</sub> = 300 A, V <sub>R</sub> = 600 V, di/dt = -2360 A/μs, V <sub>GE</sub> = -15 V	T <sub>J</sub> = 25 °C	-	20.2	-	μC
			T <sub>J</sub> = 125 °C	-	40.1	-	
Diode peak reverse recovery current	I <sub>rr</sub>	I <sub>F</sub> = 300 A, V <sub>R</sub> = 600 V, di/dt = -2360 A/μs, V <sub>GE</sub> = -15 V	T <sub>J</sub> = 25 °C	-	170	-	A
			T <sub>J</sub> = 125 °C	-	250	-	
Diode reverse recovery energy	E <sub>rec</sub>	I <sub>F</sub> = 300 A, V <sub>R</sub> = 600 V, di/dt = -2360 A/μs, V <sub>GE</sub> = -15 V	T <sub>J</sub> = 25 °C	-	8.2	-	mJ
			T <sub>J</sub> = 125 °C	-	21.7	-	



THERMAL AND MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Operating junction temperature range	$T_J$		-	-	150	°C
Storage temperature range	$T_{STG}$		-40	-	125	
Junction to case	IGBT	$R_{thJC}$	-	-	0.076	K/W
	Diode		-	-	0.100	
Case to sink	$R_{thCS}$	Conductive grease applied	-	0.035	-	
Mounting torque		Power terminal screw: M6	2.5 to 5.0			Nm
		Mounting screw: M6	3.0 to 5.0			
Weight			300			g

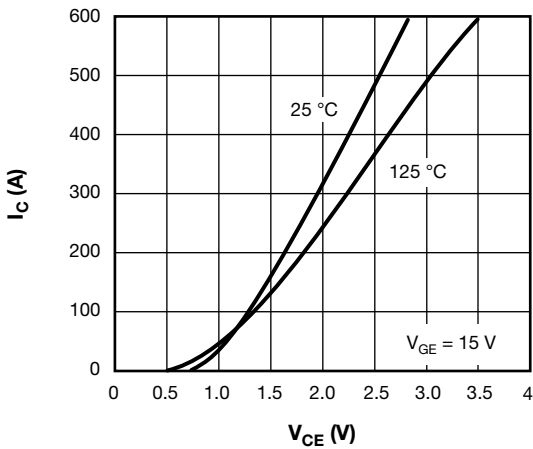


Fig. 1 - IGBT Typical Output Characteristics

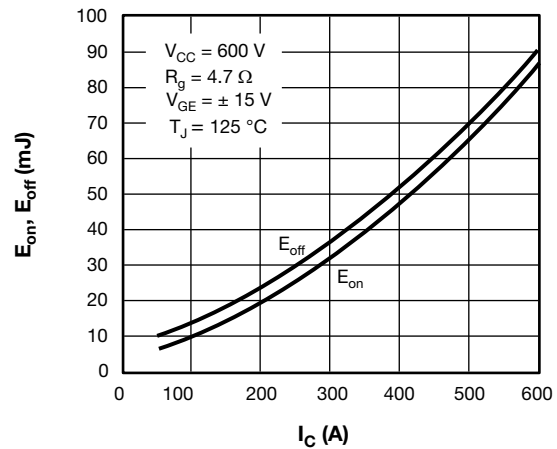


Fig. 3 - IGBT Switching Loss vs.  $I_C$

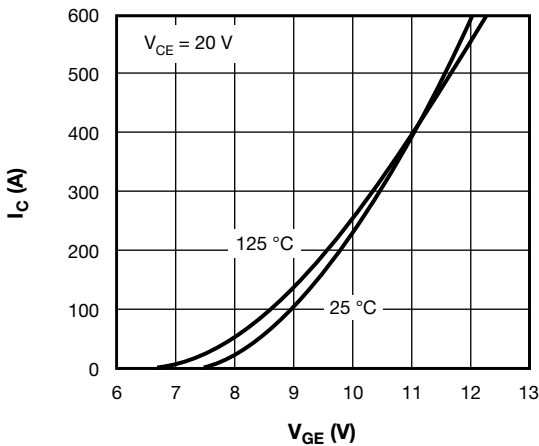


Fig. 2 - IGBT Typical Transfer Characteristics

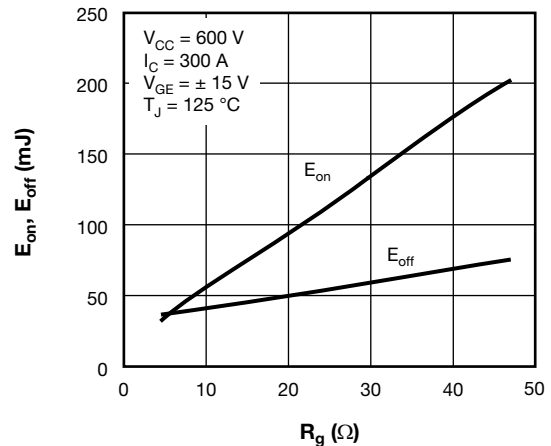
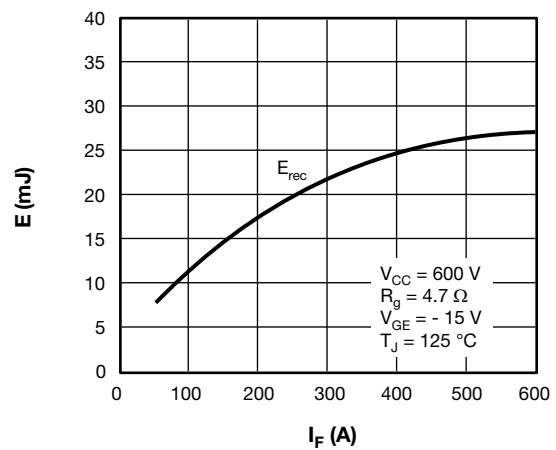
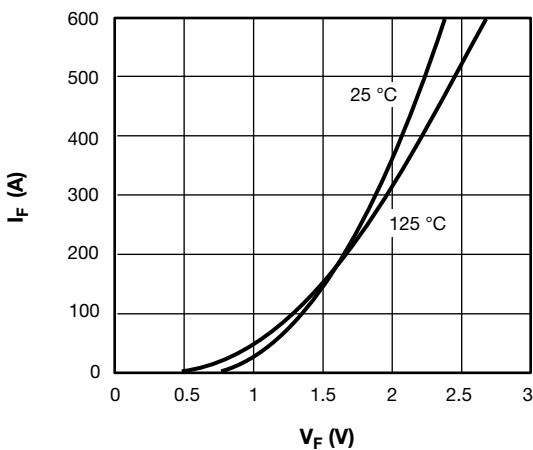
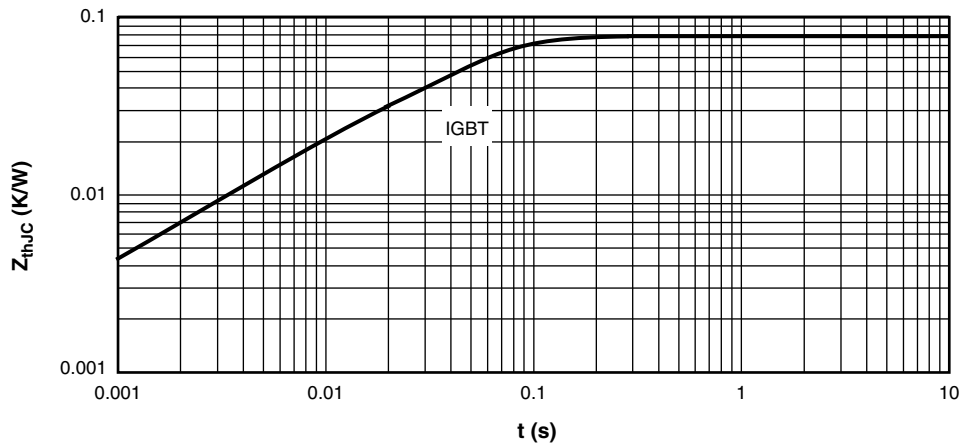
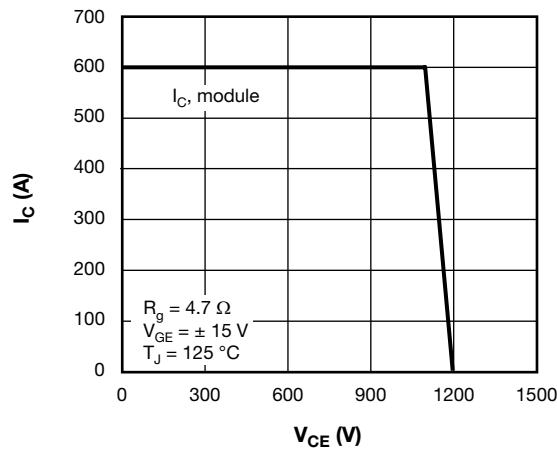


Fig. 4 - IGBT Switching Loss vs.  $R_g$



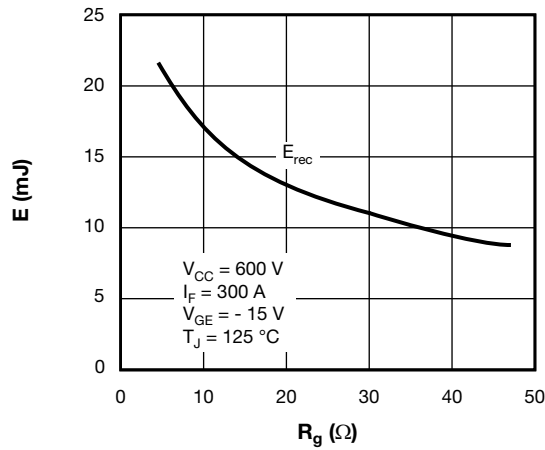


Fig. 9 - Diode Switching Loss vs. Gate Resistance  $R_g$

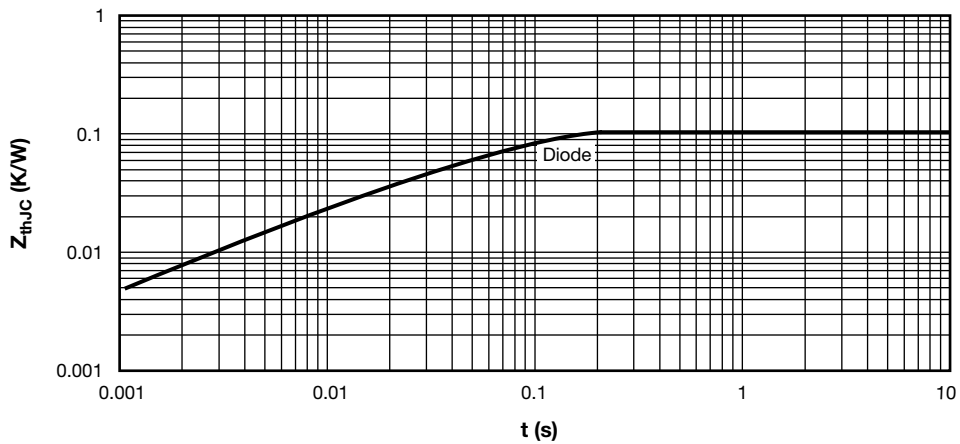
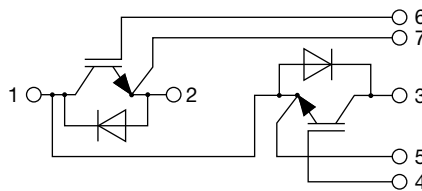


Fig. 10 - Diode Transient Thermal Impedance

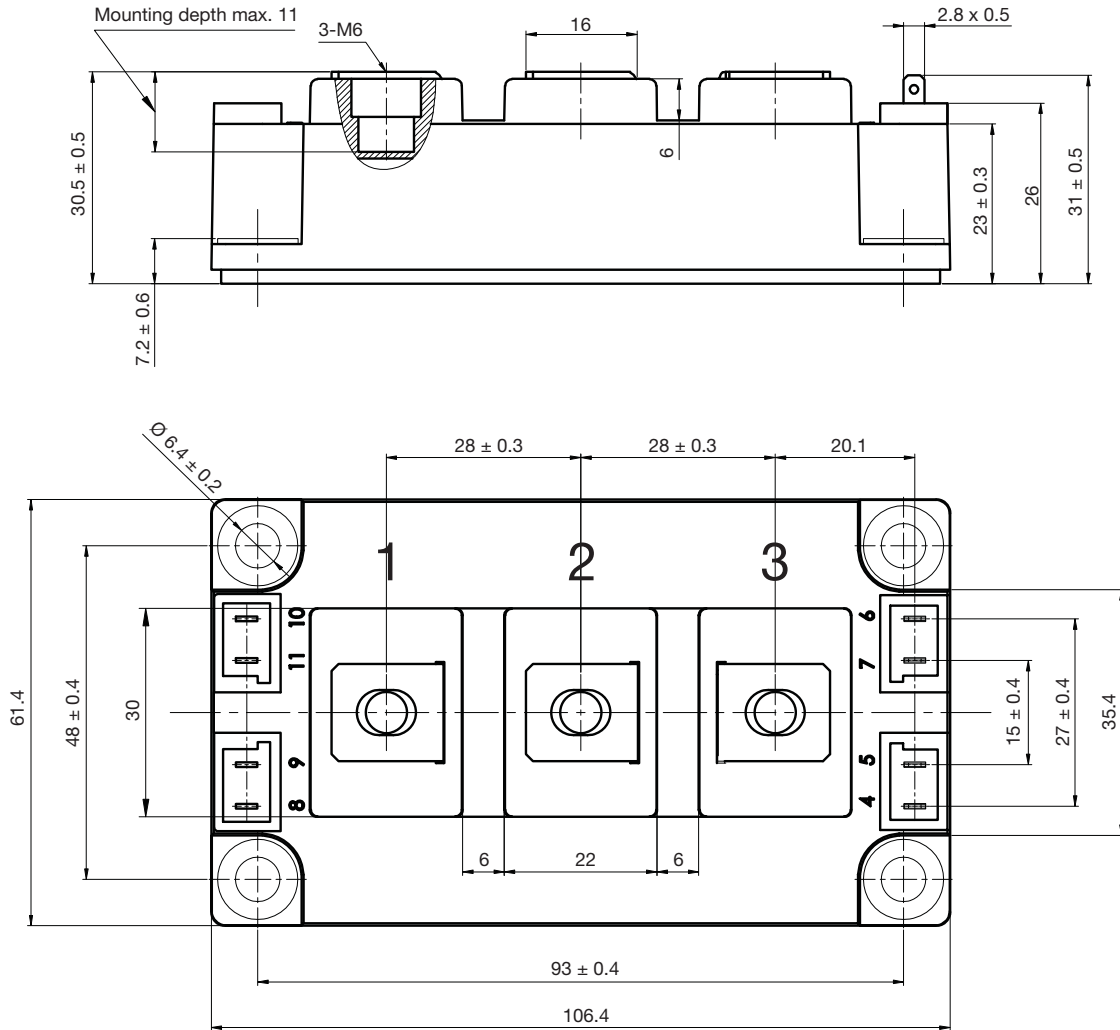
**CIRCUIT CONFIGURATION**



LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95525">www.vishay.com/doc?95525</a>

## Double INT-A-PAK

**DIMENSIONS** in millimeters (inches)





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