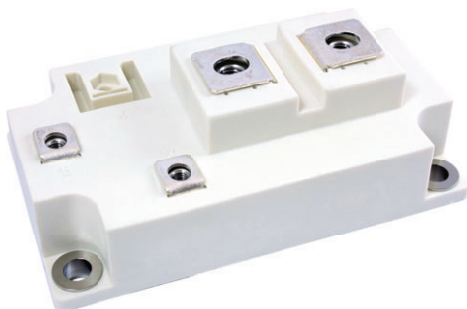


## Molding Type Module IGBT, 1-in-1 Package, 1200 V and 600 A



Dual 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
- 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

### TYPICAL APPLICATIONS

- AC inverter drives
- Switching mode power supplies
- Electronic welder at  $f_{sw}$  up to 20 kHz

### DESCRIPTION

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

PRIMARY CHARACTERISTICS	
$V_{CES}$	1200 V
$I_C$ at $T_C = 80^\circ\text{C}$	600 A
$V_{CE(on)}$ (typical) at $I_C = 600\text{ A}$ , $25^\circ\text{C}$	1.9 V
Speed	8 kHz to 30 kHz
Package	Dual INT-A-PAK
Circuit configuration	Single switch with AP diode

ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ 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 at $T_J = 150^\circ\text{C}$	$I_C$	$T_C = 25^\circ\text{C}$	910	A
		$T_C = 80^\circ\text{C}$	600	
Pulsed collector current	$I_{CM}^{(1)}$	$T_C = 80^\circ\text{C}$	1200	
Diode continuous forward current	$I_F$		600	
Diode maximum forward current	$I_{FM}$		1200	
Maximum power dissipation	$P_D$	$T_J = 150^\circ\text{C}$	3125	W
Short circuit withstand time	$t_{SC}$	$T_J = 125^\circ\text{C}$	10	$\mu$ s
RMS isolation voltage	$V_{ISOL}$	$f = 50\text{ Hz}$ , $t = 1\text{ min}$	2500	V
$I^2t$ -value, diode	$I^2t$	$V_R = 0\text{ V}$ , $t = 10\text{ ms}$ , $T_J = 125^\circ\text{C}$	74 000	$\text{A}^2\text{s}$

#### Note

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

IGBT ELECTRICAL SPECIFICATIONS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Collector to emitter breakdown voltage	$V_{(BR)CES}$	$T_J = 25^\circ\text{C}$	1200	-	-	V
Collector to emitter voltage	$V_{CE(on)}$	$V_{GE} = 15\text{ V}$ , $I_C = 600\text{ A}$ , $T_J = 25^\circ\text{C}$	-	1.9	-	
		$V_{GE} = 15\text{ V}$ , $I_C = 600\text{ A}$ , $T_J = 125^\circ\text{C}$	-	2.1	-	
Gate to emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GES}$ , $I_C = 24\text{ mA}$ , $T_J = 25^\circ\text{C}$	5.0	6.2	7.0	
Collector cut-off current	$I_{CES}$	$V_{CE} = V_{CES}$ , $V_{GE} = 0\text{ V}$ , $T_J = 25^\circ\text{C}$	-	-	5.0	mA
Gate to emitter leakage current	$I_{GES}$	$V_{GE} = V_{GES}$ , $V_{CE} = 0\text{ V}$ , $T_J = 25^\circ\text{C}$	-	-	400	nA

**SWITCHING CHARACTERISTICS**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600\text{ V}$ , $I_C = 600\text{ A}$ , $R_g = 3\ \Omega$ , $V_{GE} = \pm 15\text{ V}$ , $T_J = 25\text{ }^\circ\text{C}$	-	200	-	ns
Rise time	$t_r$		-	62	-	
Turn-off delay time	$t_{d(off)}$		-	510	-	
Fall time	$t_f$		-	60	-	
Turn-on switching loss	$E_{on}$		-	39	-	mJ
Turn-off switching loss	$E_{off}$		-	48	-	
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600\text{ V}$ , $I_C = 600\text{ A}$ , $R_g = 3\ \Omega$ , $V_{GE} = \pm 15\text{ V}$ , $T_J = 125\text{ }^\circ\text{C}$	-	210	-	ns
Rise time	$t_r$		-	65	-	
Turn-off delay time	$t_{d(off)}$		-	600	-	
Fall time	$t_f$		-	75	-	
Turn-on switching loss	$E_{on}$		-	45	-	mJ
Turn-off switching loss	$E_{off}$		-	60	-	
Input capacitance	$C_{ies}$	$V_{GE} = 0\text{ V}$ , $V_{CE} = 25\text{ V}$ , $f = 1.0\text{ MHz}$	-	41.0	-	nF
Output capacitance	$C_{oes}$		-	3.1	-	
Reverse transfer capacitance	$C_{res}$		-	2.0	-	
SC data	$I_{SC}$	$t_{SC} \leq 10\ \mu\text{s}$ , $V_{GE} = 15\text{ V}$ , $T_J = 25\text{ }^\circ\text{C}$ , $V_{CC} = 900\text{ V}$ , $V_{CEM} \leq 1200\text{ V}$	-	2600	-	A
Stray inductance	$L_{CE}$		-	-	20	nH
Module lead resistance, terminal to chip	$R_{CC'+EE'}$	$T_C = 25\text{ }^\circ\text{C}$	-	0.18	-	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	$V_F$	$I_F = 600\text{ A}$ $T_J = 25\text{ }^\circ\text{C}$ $T_J = 125\text{ }^\circ\text{C}$	-	1.8 1.9	2.4 -	V
Diode reverse recovery charge	$Q_{rr}$	$I_F = 600\text{ A}$ , $V_R = 600\text{ V}$ , $di_F/dt = -6000\text{ A}/\mu\text{s}$ , $V_{GE} = -15\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	65	$\mu\text{C}$
			$T_J = 125\text{ }^\circ\text{C}$	-	100	
Diode peak reverse recovery current	$I_{rr}$		$T_J = 25\text{ }^\circ\text{C}$	-	450	A
			$T_J = 125\text{ }^\circ\text{C}$	-	510	
Diode reverse recovery energy	$E_{rec}$		$T_J = 25\text{ }^\circ\text{C}$	-	35	mJ
			$T_J = 125\text{ }^\circ\text{C}$	-	42	

**THERMAL AND MECHANICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Operating temperature range	T <sub>J</sub>		-40	-	150	°C
Storage temperature range	T <sub>Stg</sub>		-40	-	125	°C
Junction to case per module	R <sub>thJC</sub>	IGBT	-	-	0.04	K/W
		Diode	-	-	0.09	
Case to sink	R <sub>thCS</sub>	Conductive grease applied	-	0.035	-	
Mounting torque		Power terminal screw: M6	2.5 to 5.0			Nm
		Mounting screw: M6	3.0 to 6.0			
Weight			310			g

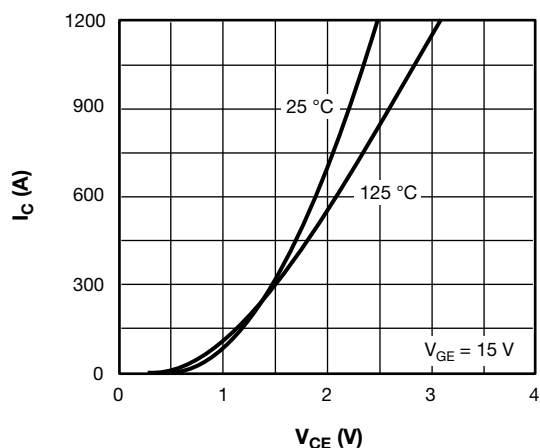


Fig. 1 - Typical Output Characteristics

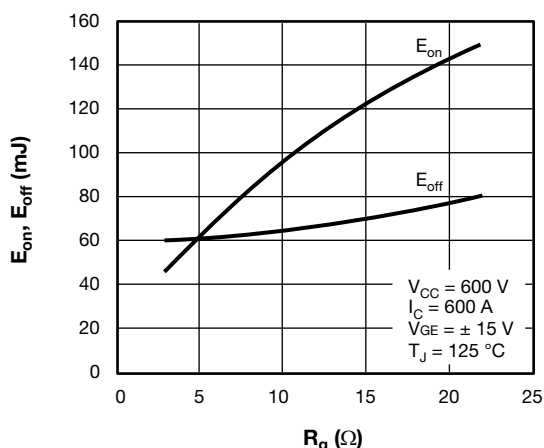


Fig. 4 - Switching Loss vs. Gate Resistor

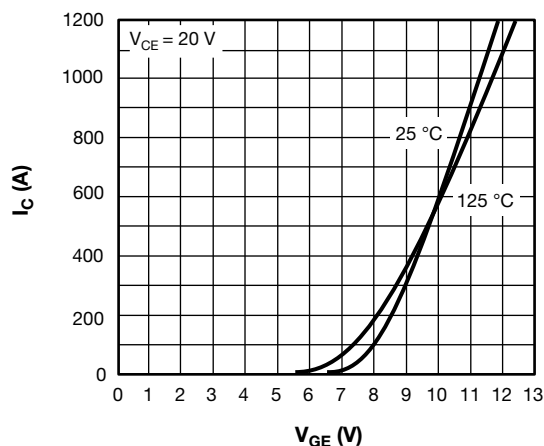


Fig. 2 - Typical Transfer Characteristics

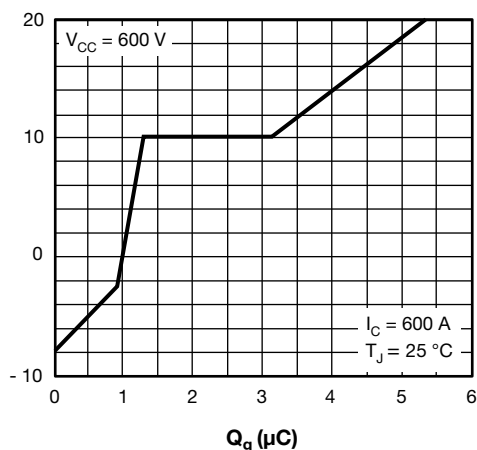


Fig. 5 - Gate Charge Characteristics

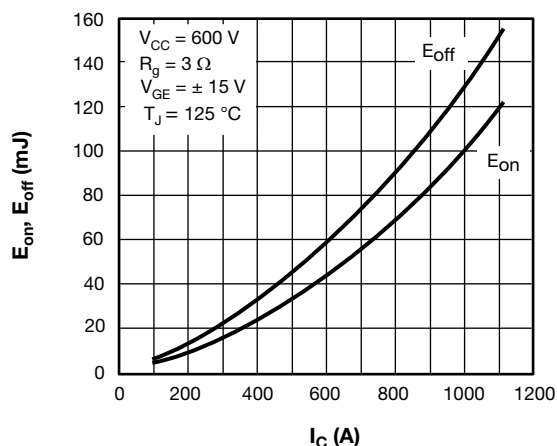


Fig. 3 - Switching Loss vs. Collector Current

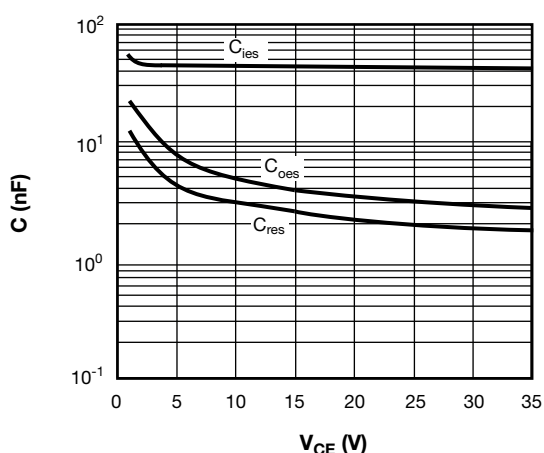


Fig. 6 - Typical Capacitance vs. Collector-Emitter Voltage

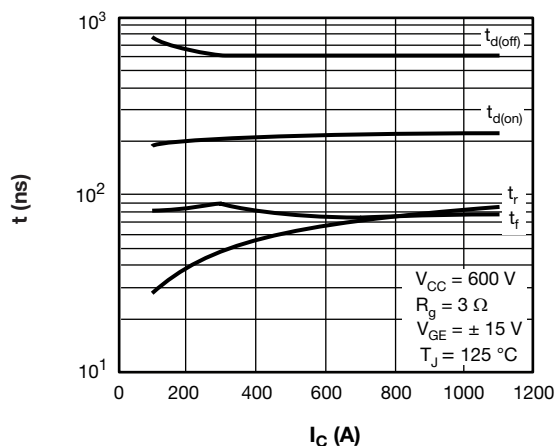


Fig. 7 - Typical Switching Times

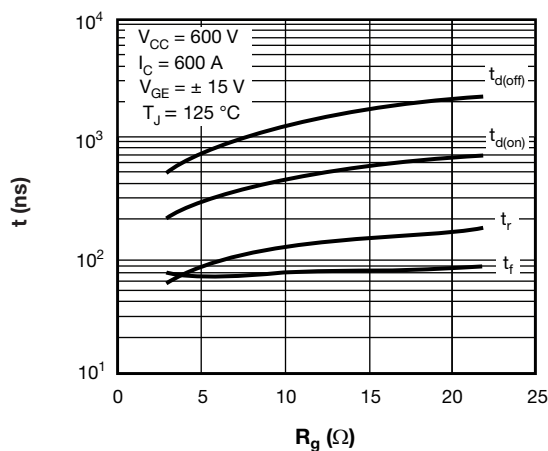
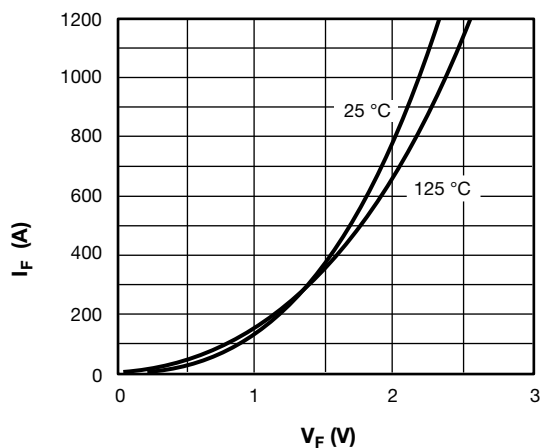

Fig. 8 - Typical Switching Times vs. Gate Resistance  $R_g$ 


Fig. 9 - Typical forward Characteristics (Diode)

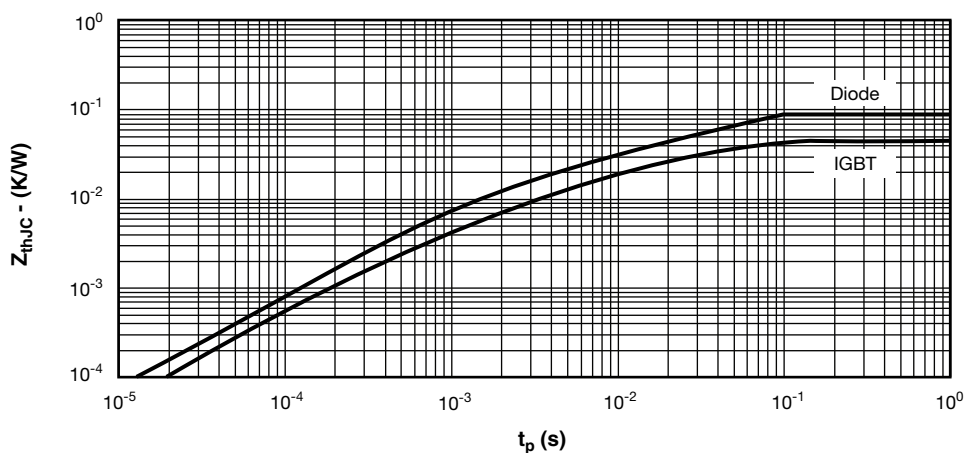
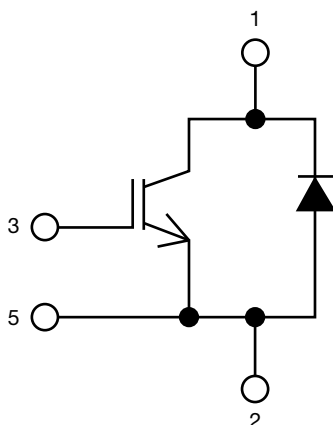


Fig. 10 - Transient Thermal Impedance



**CIRCUIT CONFIGURATION**



**LINKS TO RELATED DOCUMENTS**

Dimensions		<a href="http://www.vishay.com/doc?95526">www.vishay.com/doc?95526</a>
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