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Molding Type Module IGBT, 2-in-1 Package, 1200 V and 400 A



Double INT-A-PAK


RoHS
COMPLIANT

FEATURES

- Low $V_{CE(on)}$ trench IGBT technology
- Low switching losses
- 10 μ 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

TYPICAL APPLICATIONS

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

DESCRIPTION

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

PRODUCT SUMMARY	
V_{CES}	1200 V
I_C at $T_C = 80$ °C	400 A
$V_{CE(on)}$ (typical) at $I_C = 400$ A, 25 °C	1.70 V
Speed	8 kHz to 30 kHz
Package	Double INT-A-PAK
Circuit	Half bridge

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}		± 20	
Collector current	I_C	$T_C = 25$ °C	600	A
		$T_C = 80$ °C	400	
Pulsed collector current	$I_{CM}^{(1)}$	$t_p = 1$ ms	800	
Diode continuous forward current	I_F	$T_C = 80$ °C	400	
Diode maximum forward current	I_{FM}	$t_p = 1$ ms	800	
Maximum power dissipation	P_D	$T_J = 150$ °C	2119	
Short circuit withstand time	t_{SC}	$T_J = 125$ °C	10	μ s
RMS isolation voltage	V_{ISOL}	$f = 50$ Hz, $t = 1$ min	2500	V

Note

(1) Repetitive rating; pulse width limited by maximum junction temperature.



IGBT ELECTRICAL SPECIFICATIONS ($T_C = 25\text{ }^\circ\text{C}$ unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Collector to emitter breakdown voltage	$V_{(BR)CES}$	$T_J = 25\text{ }^\circ\text{C}$	1200	-	-	V
Collector to emitter voltage	$V_{CE(on)}$	$V_{GE} = 15\text{ V}, I_C = 400\text{ A}, T_J = 25\text{ }^\circ\text{C}$	-	1.70	2.15	
		$V_{GE} = 15\text{ V}, I_C = 400\text{ A}, T_J = 125\text{ }^\circ\text{C}$	-	2.0	-	
Gate to emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C = 16\text{ mA}, T_J = 25\text{ }^\circ\text{C}$	5.0	5.8	6.5	
Collector cut-off current	I_{CES}	$V_{CE} = V_{CES}, V_{GE} = 0\text{ V}, T_J = 25\text{ }^\circ\text{C}$	-	-	5.0	mA
Gate to emitter leakage current	I_{GES}	$V_{GE} = V_{GES}, V_{CE} = 0\text{ V}, T_J = 25\text{ }^\circ\text{C}$	-	-	400	nA

SWITCHING CHARACTERISTICS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600\text{ V}, I_C = 400\text{ A}, R_g = 1.8\text{ }\Omega, V_{GE} = \pm 15\text{ V}, T_J = 25\text{ }^\circ\text{C}$	-	250	-	ns
Rise time	t_r		-	39	-	
Turn-off delay time	$t_{d(off)}$		-	500	-	
Fall time	t_f		-	100	-	
Turn-on switching loss	E_{on}		$V_{CC} = 600\text{ V}, I_C = 400\text{ A}, R_g = 1.8\text{ }\Omega, V_{GE} = \pm 15\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	17.0	-
Turn-off switching loss	E_{off}	-		42.0	-	
Turn-on delay time	$t_{d(on)}$	-		299	-	ns
Rise time	t_r	-		46	-	
Turn-off delay time	$t_{d(off)}$	-		605	-	
Fall time	t_f	-	155	-		
Turn-on switching loss	E_{on}	$V_{GE} = 0\text{ V}, V_{CE} = 25\text{ V}, f = 1.0\text{ MHz}$	-	25.1	-	mJ
Turn-off switching loss	E_{off}		-	61.9	-	
Input capacitance	C_{ies}		-	28.8	-	nF
Output capacitance	C_{oes}		-	1.51	-	
Reverse transfer capacitance	C_{res}		-	1.31	-	
SC data	I_{SC}	$t_{sc} \leq 10\text{ }\mu\text{s}, V_{GE} = 15\text{ V}, T_J = 125\text{ }^\circ\text{C}, V_{CC} = 600\text{ V}, V_{CEM} \leq 1200\text{ V}$	-	1600	-	A
Internal gate resistance	R_{gint}		-	1.9	-	Ω
Stray inductance	L_{CE}		-	-	20	nH
Module lead resistance, terminal to chip	$R_{CC'+EE'}$	$T_C = 25\text{ }^\circ\text{C}$	-	0.35	-	m Ω

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	$I_F = 400\text{ A}$	$T_J = 25\text{ }^\circ\text{C}$	-	1.65	2.15	V
			$T_J = 125\text{ }^\circ\text{C}$	-	1.65	-	
Diode reverse recovery charge	Q_{rr}	$I_F = 400\text{ A}, V_R = 600\text{ V}, dI/dt = -6000\text{ A}/\mu\text{s}, V_{GE} = -15\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	44	-	μC
			$T_J = 125\text{ }^\circ\text{C}$	-	78	-	
Diode peak reverse recovery current	I_{rr}	$I_F = 400\text{ A}, V_R = 600\text{ V}, dI/dt = -6000\text{ A}/\mu\text{s}, V_{GE} = -15\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	490	-	A
			$T_J = 125\text{ }^\circ\text{C}$	-	555	-	
Diode reverse recovery energy	E_{rec}	$I_F = 400\text{ A}, V_R = 600\text{ V}, dI/dt = -6000\text{ A}/\mu\text{s}, V_{GE} = -15\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	19.0	-	mJ
			$T_J = 125\text{ }^\circ\text{C}$	-	35.1	-	



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}	-	-	0.059	K/W
	Diode		-	-	0.106	
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

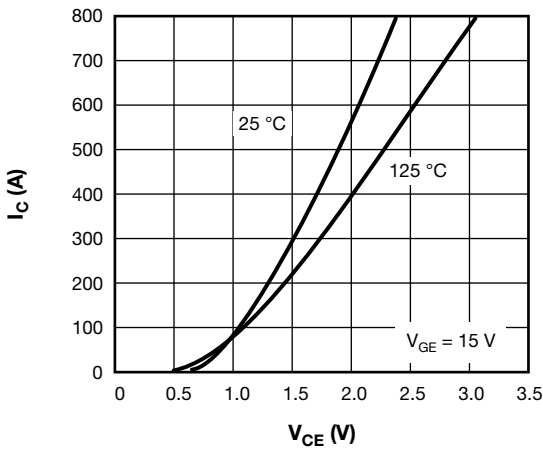


Fig. 1 - IGBT Typical Output Characteristics

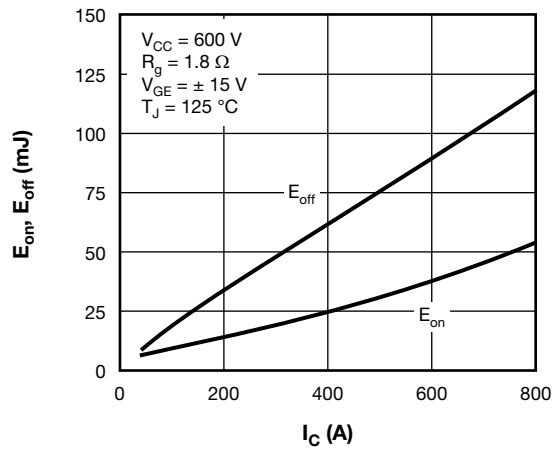


Fig. 3 - IGBT Switching Loss vs. I_C

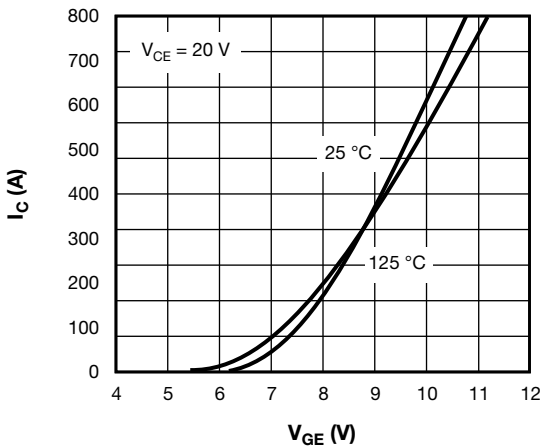


Fig. 2 - IGBT Typical Transfer Characteristics

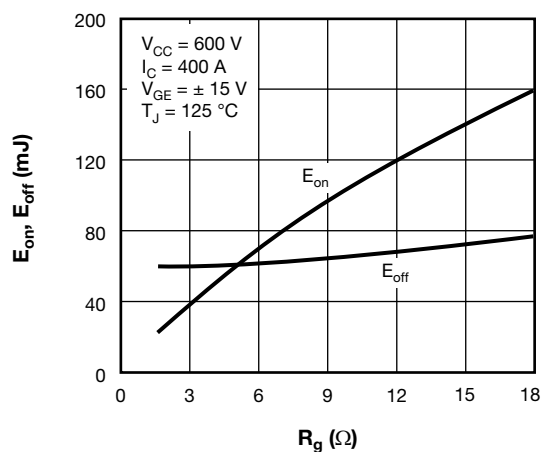


Fig. 4 - Switching Loss vs. P_g

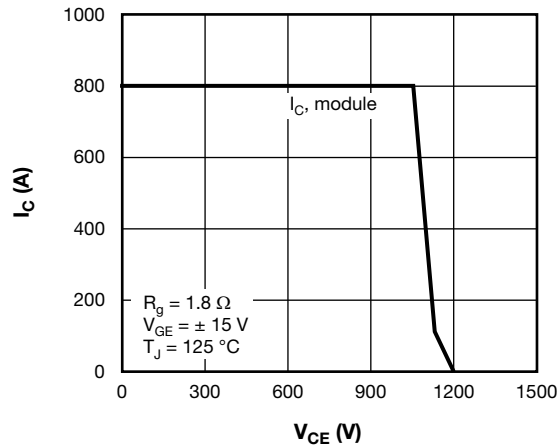


Fig. 5 - RBSOA

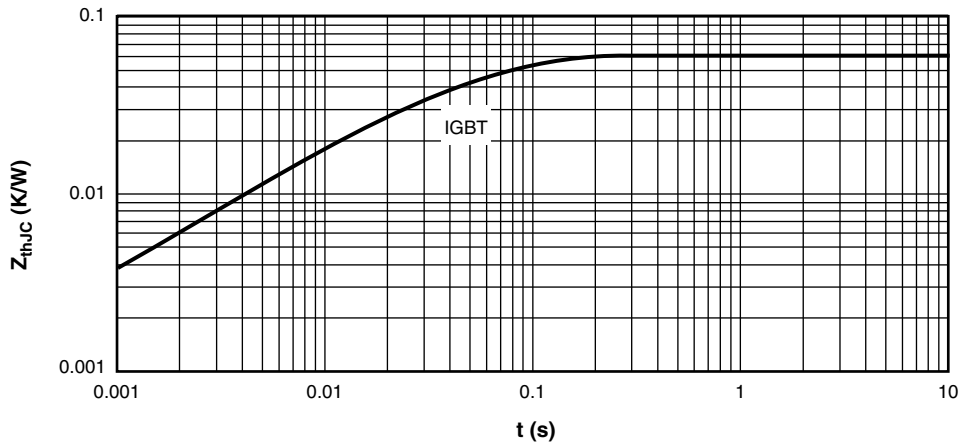


Fig. 6 - IGBT Transient Thermal Impedance

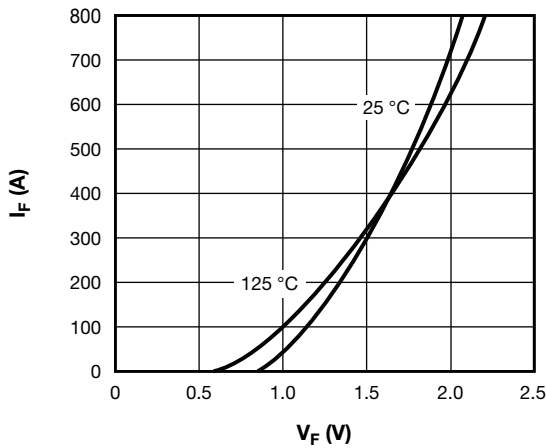


Fig. 7 - Typical Forward Characteristics

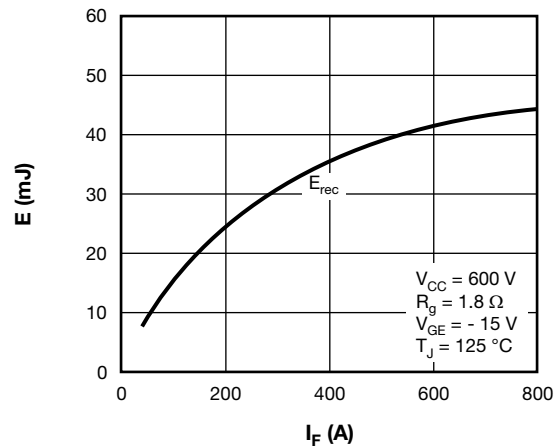


Fig. 8 - Diode Switching Loss vs. I_F

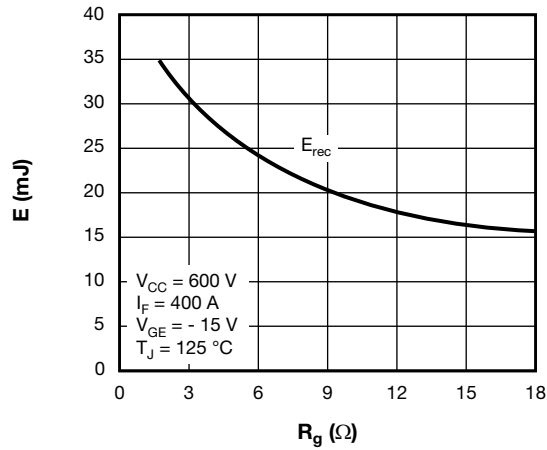


Fig. 9 - Diode Switching Loss vs. Gate Resistance

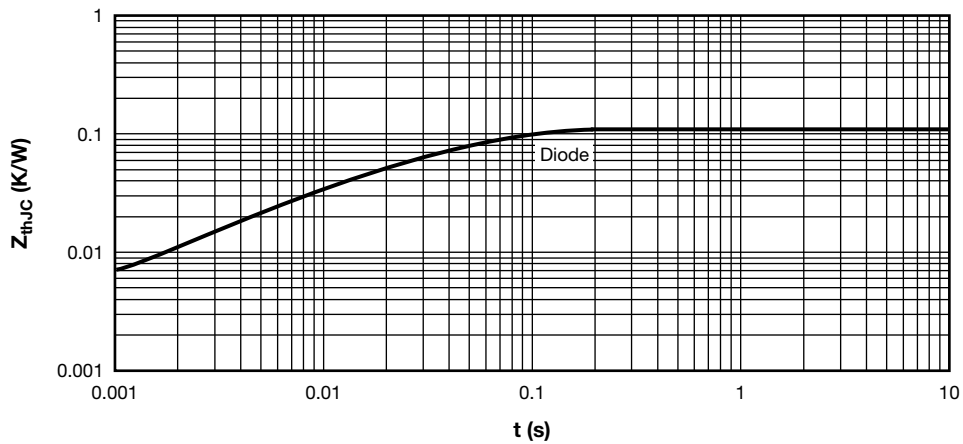
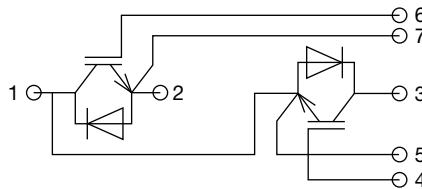


Fig. 10 - Diode Transient Thermal Impedance

CIRCUIT CONFIGURATION



LINKS TO RELATED DOCUMENTS

Dimensions	www.vishay.com/doc?95538
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