Molding Type Module IGBT, Chopper in 1 Package, 1200 V and 150 A

Dual INT-A-PAK

FEATURES

- High short circuit capability, self limiting to 6 x I_C
- 10 µs 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

RoHS COMPLIANT

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.

PRIMARY CHARACTERISTICS	
V_{CES}	1200 V
I_C at T_C = 80 °C	150 A
$V_{CE(on)}$ (typical) at I_C = 150 A, 25 °C	1.87 V
Speed	8 kHz to 30 kHz
Package	Dual INT-A-PAK
Circuit configuration	Low side chopper

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	300	A
		T_C = 80 °C	150	
Pulsed collector current	I_{CM} (1)	t_p = 1 ms	300	
Diode continuous forward current	I_F	T_C = 80 °C	150	
Diode maximum forward current	I_{FM}	t_p = 1 ms	300	
Maximum power dissipation	P_D	T_J = 150 °C	1389	W
Short circuit withstand time	t_{SC}	T_J = 125 °C	10	µs
RMS isolation voltage	V_{ISOL}	f = 50 Hz, t = 1 min	2500	V
I^2t-value, diode	I^2t	V_R = 0 V, t = 10 ms, T_J = 125 °C	4800	A^2s

Note

(1) 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 = 150 A, T_J = 25 °C	-	1.87	-	
		V_{GE} = 15 V, I_C = 150 A, T_J = 125 °C	-	2.08	-	
Gate to emitter threshold voltage	$V_{GE(th)}$	V_{CE} = V_{GE}, I_C = 12.0 mA, T_J = 25 °C	5.0	6.3	7.0	
Collector cut-off current	I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0 V, T_J = 25 °C	-	-	1.0	mA
Gate to emitter leakage current	I_{GES}	V_{GE} = V_{GES}, V_{CE} = 0 V, T_J = 25 °C	-	-	400	nA

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SWITCHING CHARACTERISTICS						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Turn-on delay time	$t_{d(on)}$	V_{CC} = 600 V, I_C = 150 A, R_g = 6.8 Ω, V_{GE} = ± 15 V, T_J = 25 °C	-	190	-	ns
Rise time	t_r		-	60	-	
Turn-off delay time	$t_{d(off)}$		-	460	-	
Fall time	t_f		-	55	-	
Turn-on switching loss	E_{on}		-	11.2	-	mJ
Turn-off switching loss	E_{off}		-	9.8	-	
Turn-on delay time	$t_{d(on)}$	V_{CC} = 600 V, I_C = 150 A, R_g = 6.8 Ω, V_{GE} = ± 15 V, T_J = 125 °C	-	220	-	ns
Rise time	t_r		-	60	-	
Turn-off delay time	$t_{d(off)}$		-	530	-	
Fall time	t_f		-	75	-	
Turn-on switching loss	E_{on}		-	16.7	-	mJ
Turn-off switching loss	E_{off}		-	15.3	-	
Input capacitance	C_{ies}	V_{GE} = 0 V, V_{CE} = 25 V, f = 1.0 MHz	-	10.6	-	nF
Output capacitance	C_{oes}		-	0.71	-	
Reverse transfer capacitance	C_{res}		-	0.47	-	
SC data	I_{SC}	t_{sc} ≤ 10 µs, V_{GE} = 15 V, T_J = 125 °C, V_{CC} = 900 V, V_{CEM} ≤ 1200 V	-	650	-	A
Internal gate resistance	R_{gint}		-	1.5	-	Ω
Stray inductance	L_{CE}		-	-	20	nH
Module lead resistance, terminal to chip	$R_{CC'+EE'}$	T_C = 25 °C	-	0.35	-	mΩ

DIODE ELECTRICAL SPECIFICATIONS (T_C = 25 °C unless otherwise noted)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNITS**
Diode forward voltage	V_F	I_F = 150 A	T_J = 25 °C	-	2.05	-	V
			T_J = 125 °C	-	2.26	-	
Diode reverse recovery charge	Q_{rr}	I_F = 150 A, V_R = 600 V, dI/dt = -4800 A/µs, V_{GE} = -15 V	T_J = 25 °C	-	7	-	µC
			T_J = 125 °C	-	18	-	
Diode peak reverse recovery current	I_{rr}		T_J = 25 °C	-	150	-	A
			T_J = 125 °C	-	190	-	
Diode reverse recovery energy	E_{rec}		T_J = 25 °C	-	4.0	-	mJ
			T_J = 125 °C	-	8.0	-	

THERMAL AND MECHANICAL SPECIFICATIONS						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Operating junction temperature range	T_J		-40	-	150	°C
Storage temperature range	T_{STG}		-40	-	125	
Junction to case — IGBT (per 1/2 module)	R_{thJC}		-	-	0.09	K/W
Junction to case — Diode (per 1/2 module)			-	-	0.24	
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 6.0			
Weight			300			g

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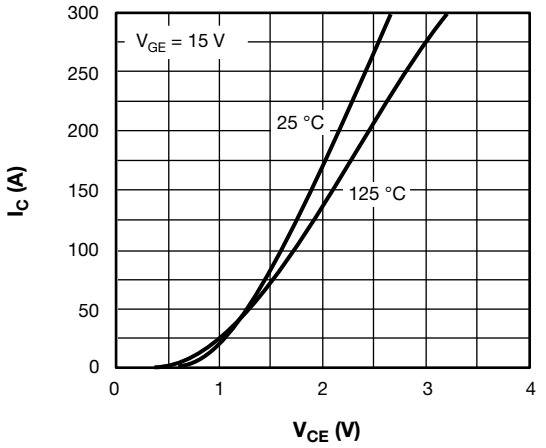

Fig. 1 - Typical Output Characteristics

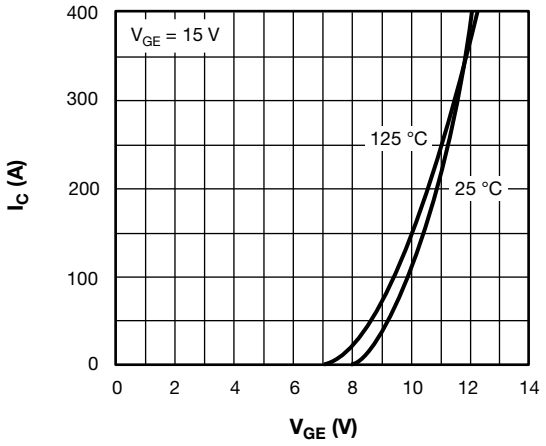

Fig. 2 - Typical Transfer Characteristics

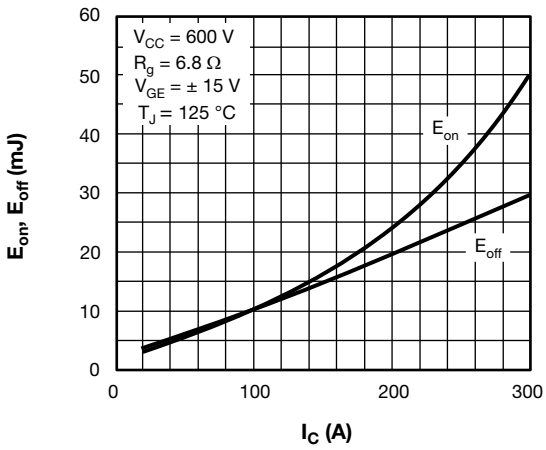

Fig. 3 - Switching Loss vs. Collector Current

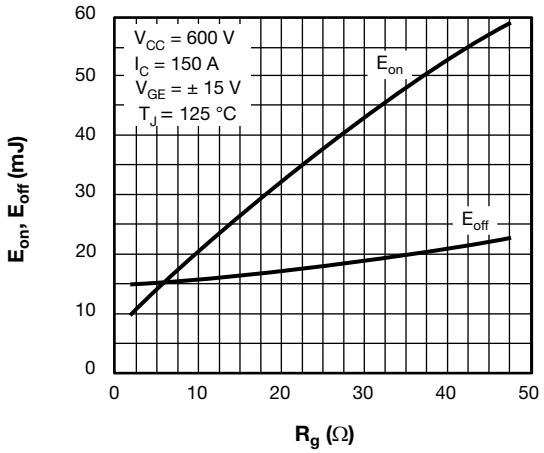

Fig. 4 - Switching Loss vs. gate Resistor

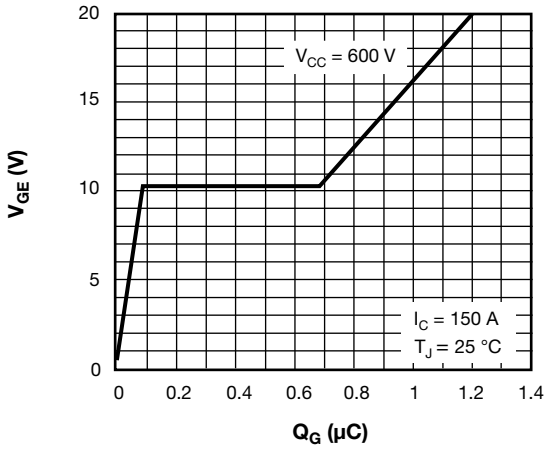

Fig. 5 - Gate Charge Characteristics

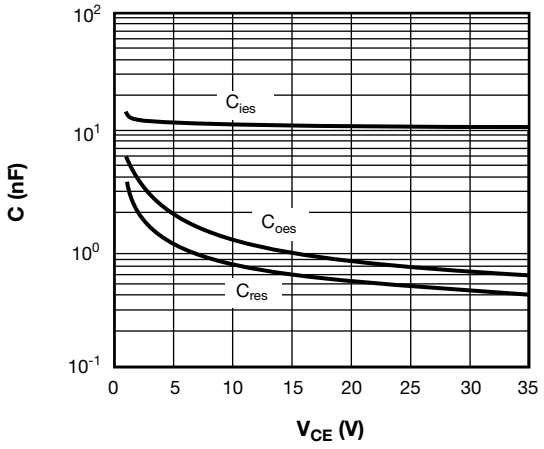

Fig. 6 - Typical Capacitance vs. Collector to Emitter Voltage

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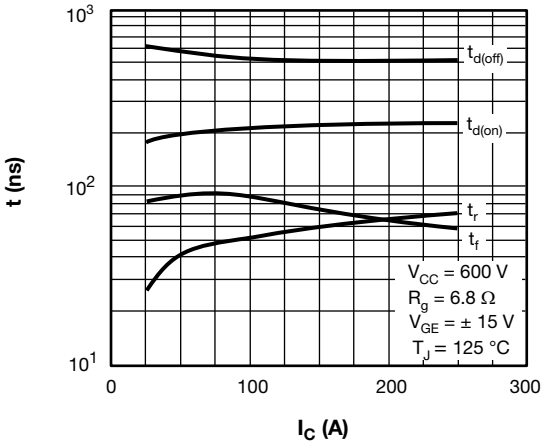

Fig. 7 - Typical Switching Times vs. I_C

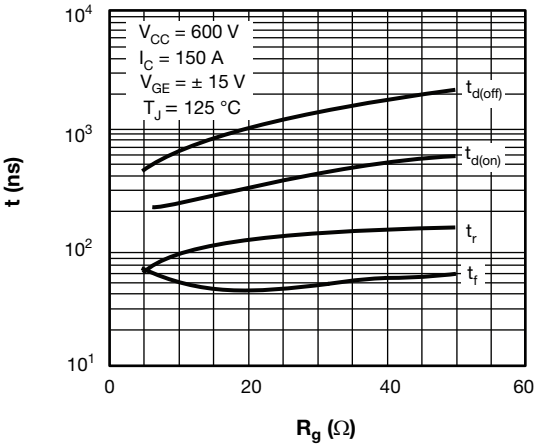

Fig. 8 - Typical Switching Times vs. Gate Resistance R_g

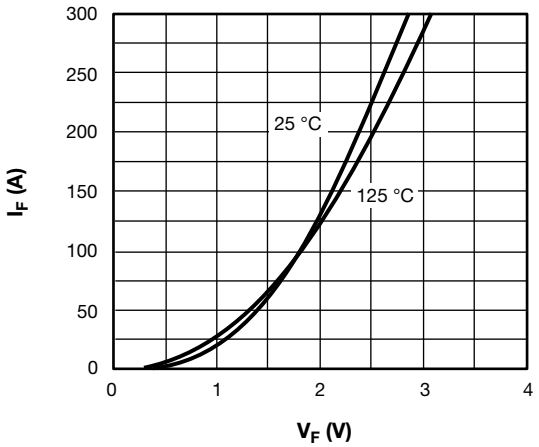

Fig. 9 - Typical Forward Characteristics, Diode

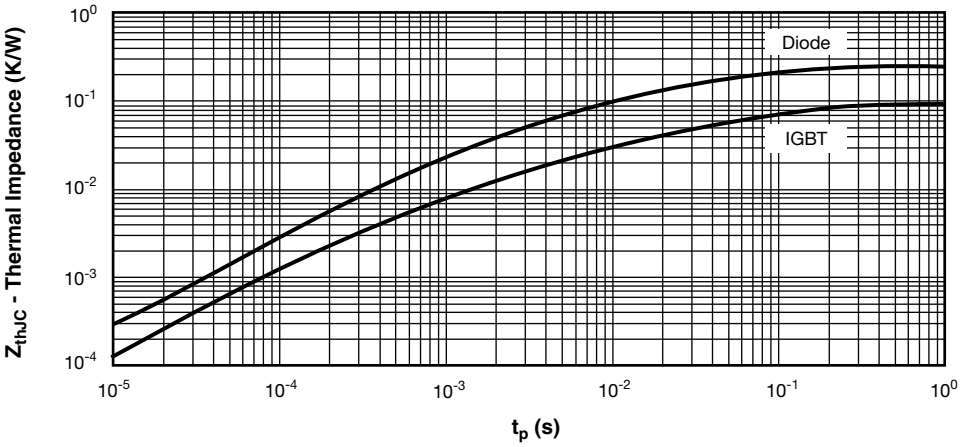

Fig. 10 - Transient Thermal Impedance

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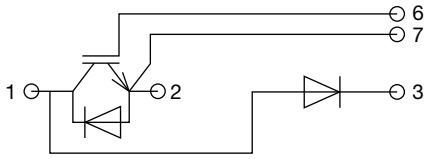
CIRCUIT CONFIGURATION



LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95525

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