

650V 75A 2-Pack IGBT Module

Features

- Trench IGBT technology
 - Low $V_{CE(sat)}$
 - Low switching losses
 - Positive $V_{CE(sat)}$ temperature coefficient
- Free wheeling diodes with very low forward voltage drop and soft recovery
- Industrial standard package with copper base plate

Applications

- Welder / Power supply
- UPS / Inverter
- Industrial motor driver

Preliminary data



34mm

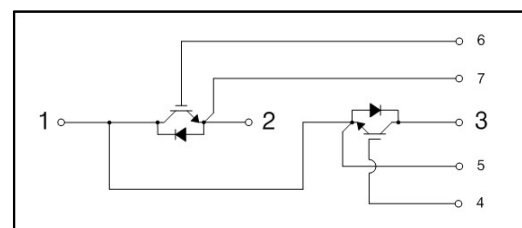
94.5 x 34.5 x 31.1 mm

Absolute Maximum Ratings $T_j = 25\text{ °C}$ unless otherwise noted

Item	Symbol	Conditions	Value	Units	
IGBT	V_{CES}		650	V	
	V_{GES}		± 30	V	
	I_C		$T_C = 25\text{ °C}$, Continuous	150	A
			$T_C = 80\text{ °C}$, Continuous	75	A
	I_{CM}		$t_P = 1\text{ ms}$	150	A
	T_{SC}		$V_{GE} = 15\text{ V}$, $V_{CES} < 300\text{ V}$	-	μs
	T_j		Operating Junction Temperature ⁽¹⁾	-40~125	$^{\circ}\text{C}$
	PD		@ $T_j = 175\text{ °C}$, $T_C = 25\text{ °C}$	280	W
@ $T_j = 175\text{ °C}$, $T_C = 80\text{ °C}$			180	W	
Diode	V_{RRM}		650	V	
	I_F		$T_C = 80\text{ °C}$	75	A
	I_{FRM}		$t_P = 1\text{ ms}$	150	A
	T_j		Operating Junction Temperature ⁽¹⁾	-40~125	$^{\circ}\text{C}$
Module	T_{stg}		Storage Temperature	-40~125	$^{\circ}\text{C}$
	V_{iso}		@AC 1minute	2500	V
	M_t		Main Terminal Mounting torque (M5)	2.5~5	Nm
	M_s		Heat sink Mounting torque (M6)	3.0~5	Nm
	W		Weight	180	g

Internal Circuit & Pin Description

Pin Number	Pin Name	Pin Description
1	C2E1	Output
2	E2	Negative DC Link Output
3	C1	Positive DC Link Output
4	G1	Gate Input for High-side
5	E1	Emitter Input for High-side
6	G2	Gate Input for Low-side
7	E2	Emitter Input for Low-side



(Note *1) The Maximum junction temperature of chip is 175 $^{\circ}\text{C}$

Electrical Characteristics of IGBT and Diode $T_j = 25^\circ\text{C}$ unless otherwise noted

Static Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
BV _{CES}	C-E Breakdown Voltage	$V_{GE} = 0\text{ V}, I_C = 250\ \mu\text{A}$	650	-		
I _{CES}	C-E Cut-Off Current	$V_{CE} = V_{CES}, V_{GE} = 0\text{ V}$	-	-	10	μA
I _{GES}	G-E Leakage Current(Chip level)	$V_{GE} = V_{GES}, V_{CE} = 0\text{ V}$	-	-	± 600	nA
V _{GE(th)}	G-E Threshold Voltage	$V_{GE} = V_{CE}, I_C = 100\text{ mA}$	5.0	-	7.0	V
V _{CE(sat)}	Collector to Emitter Saturation Voltage	$I_C = 75\text{ A}, V_{GE} = 15\text{ V}, T_j = 25^\circ\text{C}$	-	1.5	1.9	V
		$I_C = 75\text{ A}, V_{GE} = 15\text{ V}, T_j = 125^\circ\text{C}$	-	1.85	-	V

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
C _{ies}	Input Capacitance	$V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$ $f = 1\text{ MHz}, T_j = 25^\circ\text{C}$	-	4.8	-	nF
C _{oes}	Output Capacitance		-	0.2	-	nF
C _{res}	Reverse Transfer Capacitance		-	0.1	-	nF
t _{d(on)}	Turn-On Delay Time	$T_j = 125^\circ\text{C}, R_G = 6.3\ \Omega$ $L = 100\ \mu\text{H}, V_{DC} = 300\text{ V}$ $V_{GE} = 15\text{ V} \sim -15\text{ V}$ $I_C = 75\text{ A}$	-	45	-	ns
t _r	Rise Time		-	29	-	ns
t _{d(off)}	Turn-Off Delay Time		-	201	-	ns
t _f	Fall Time		-	34	-	ns
E _{on}	Turn-On Switching Loss		-	2.6	-	mJ
E _{off}	Turn-Off Switching Loss		-	1.8	-	mJ
E _{ts}	Total Switching Loss		-	-	-	mJ
Q _g	Total Gate Charge	$V_{GE} = 0\text{ V} \sim +15\text{ V}$	-	171	-	nC
Q _{ge}	Gate-Emitter Charge		-	33	-	nC
Q _{gc}	Gate-Collector Charge		-	59	-	nC

Electrical Characteristics of Diode

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units	
V _F	Diode Forward Voltage	$I_F = 75\text{ A}$ $V_{GE} = 0\text{ V}$	$T_j = 25^\circ\text{C}$	-	1.45	1.9	V
			$T_j = 125^\circ\text{C}$	-	1.55	-	
t _{rr}	Diode Reverse Recovery Time	$R_G = 6.3\ \Omega$ $L = 100\ \mu\text{H}$ $V_{DC} = 300\text{ V}$ $V_{GE} = 15\text{ V} \sim -15\text{ V}$ $I_C = 75\text{ A}$	$T_j = 25^\circ\text{C}$	-	73	-	ns
			$T_j = 125^\circ\text{C}$	-	148	-	
I _{RRM}	Diode Peak Reverse Recovery Current		$T_j = 25^\circ\text{C}$	-	-	-	A
			$T_j = 125^\circ\text{C}$	-	-	-	
Q _{rr}	Diode Reverse Recovery Charge		$T_j = 25^\circ\text{C}$	-	-	-	μC
			$T_j = 125^\circ\text{C}$	-	-	-	
E _{rr}	Diode Reverse Recovery Energy	$T_j = 25^\circ\text{C}$	-	-	-	mJ	
		$T_j = 125^\circ\text{C}$	-	-	-		

Thermal Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
R _{th(J-C)}	Thermal Resistance (IGBT Part)	Junction-to-Case	-	0.39	-	$^\circ\text{C/W}$
R _{th(J-C)D}	Thermal Resistance (Diode Part)	Junction-to-Case	-	0.65	-	$^\circ\text{C/W}$

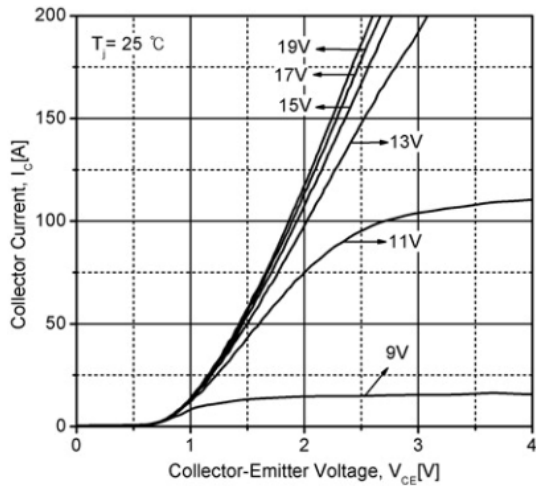


Fig 1. Typical IGBT Output Characteristics

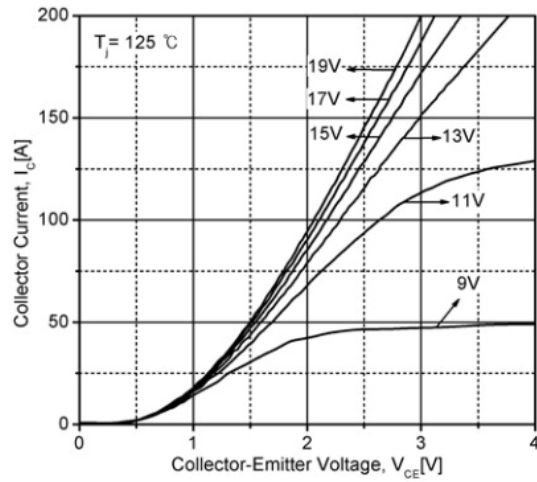


Fig 2. Typical IGBT Output Characteristics

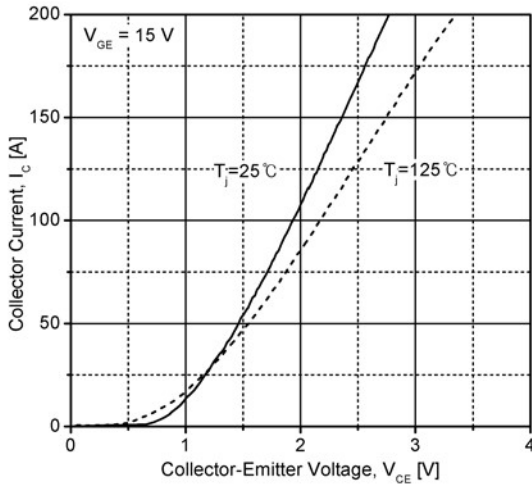


Fig 3. Typical IGBT Output Characteristics

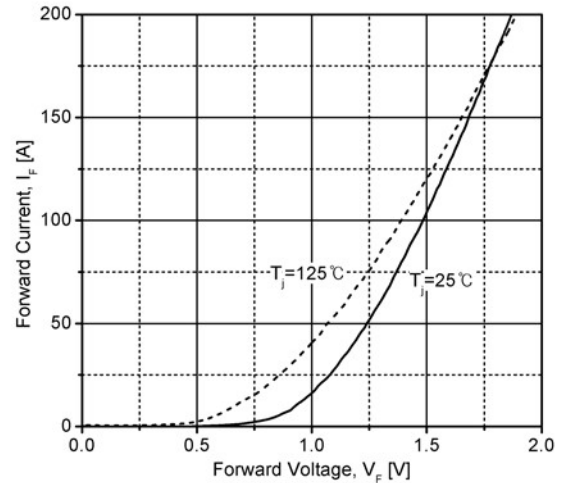


Fig 4. Typical Diode Forward Characteristics

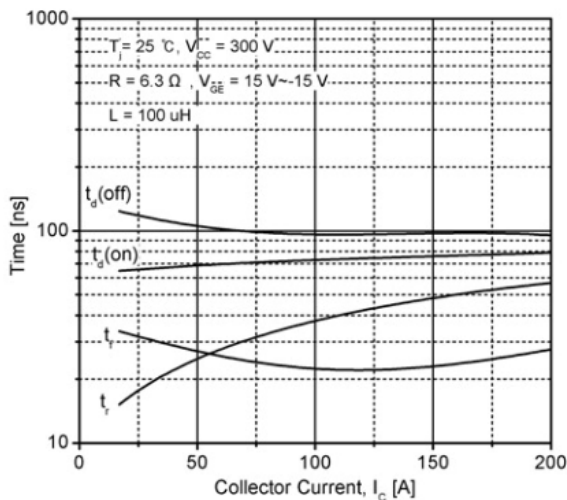


Fig 5. Typical Switching Time vs. Collector Current

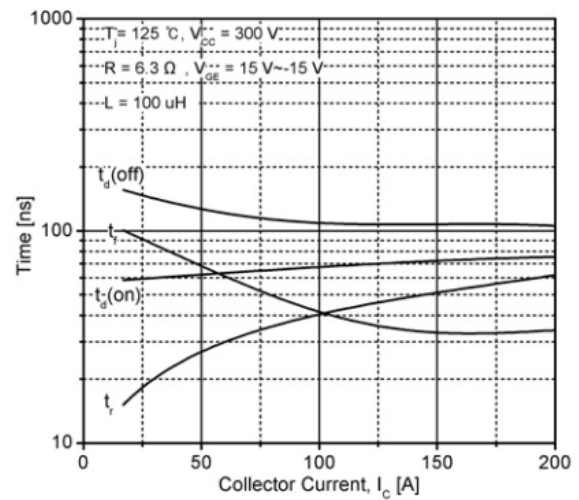


Fig 6. Typical Switching Time vs. Collector Current

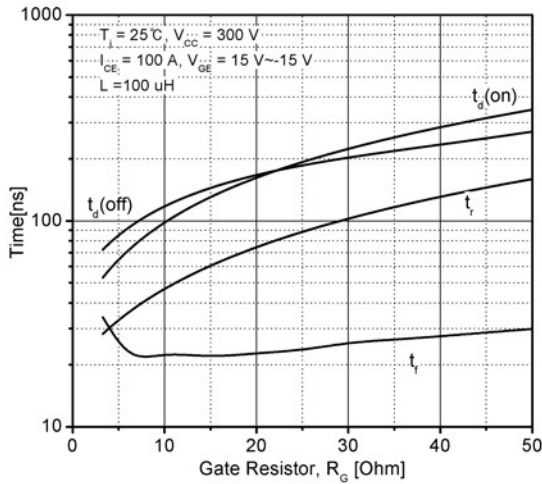


Fig 7. Typical Switching Time vs. Gate Resistor

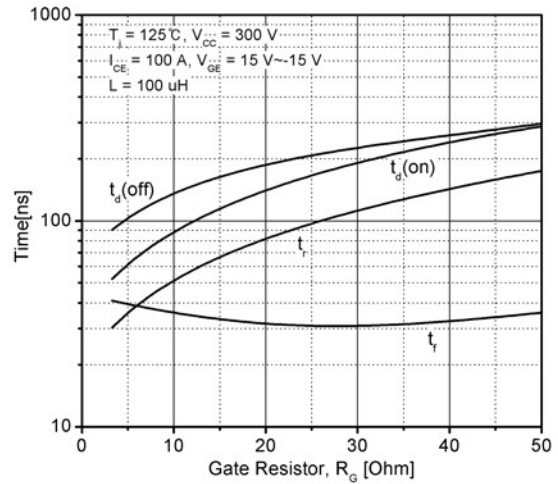


Fig 8. Typical Switching Time vs. Gate Resistor

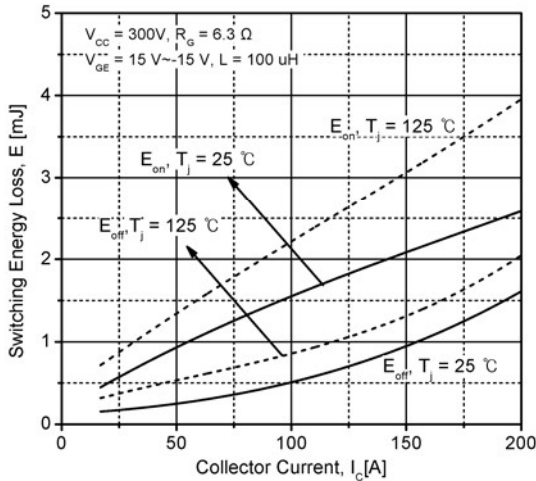


Fig 9. Typical IGBT Switching Loss

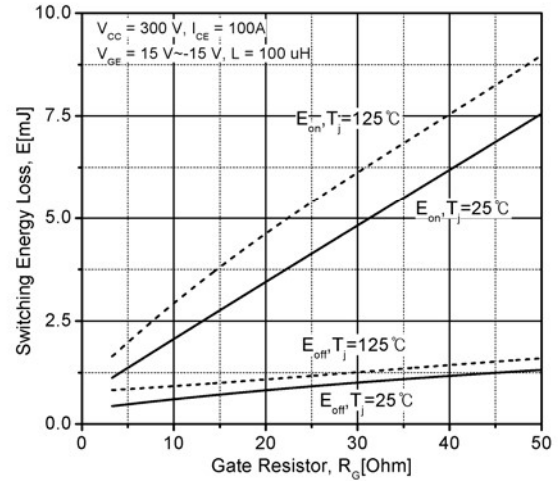


Fig 10. Typical IGBT Switching Loss

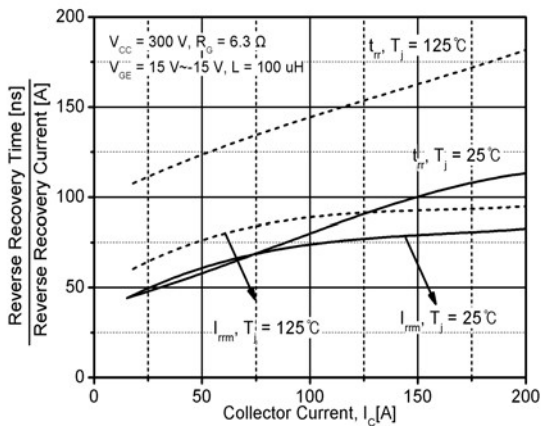


Fig 11. Typical Recovery Characteristics of Diode

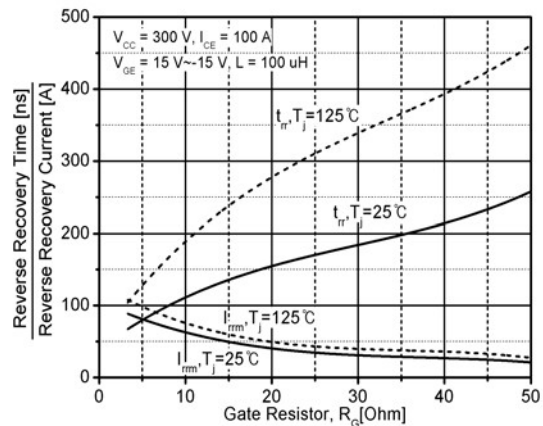


Fig 12. Typical Recovery Characteristics of Diode

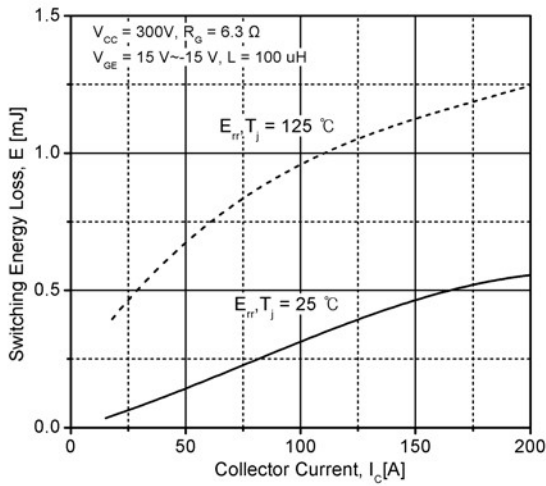


Fig 13. Typical Diode Switching Loss

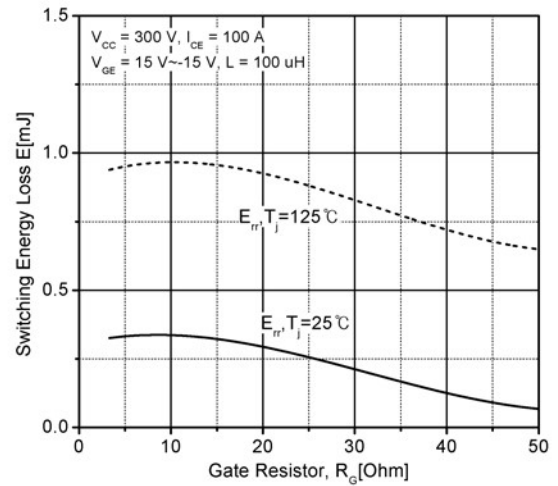


Fig 14. Typical Diode Switching Loss

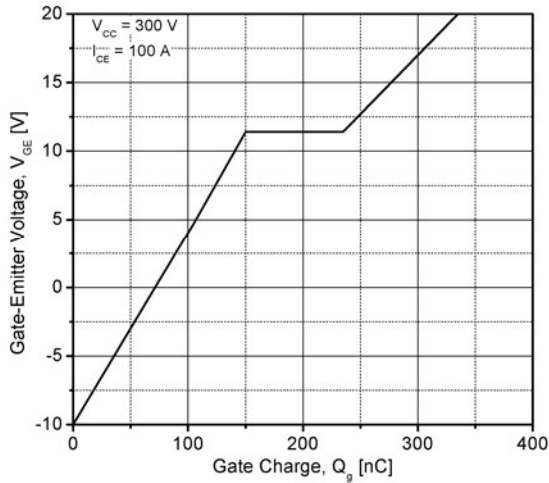


Fig 15. Typical Gate Charge Characteristics

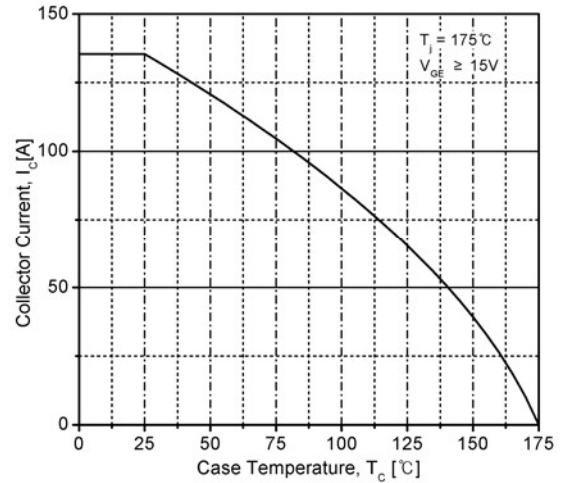


Fig 16. Case Temperature vs. Collector Current

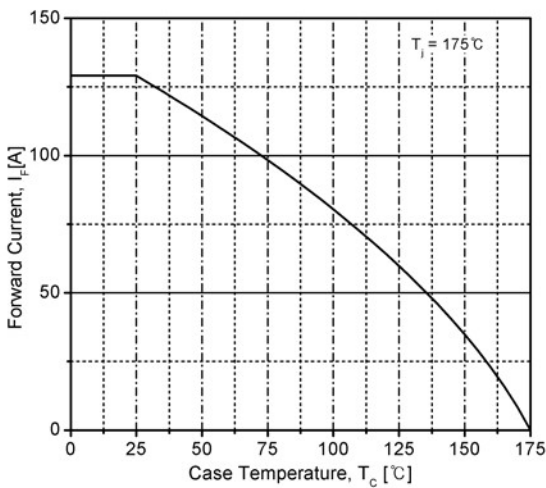


Fig 17. Case Temperature vs. Diode Current

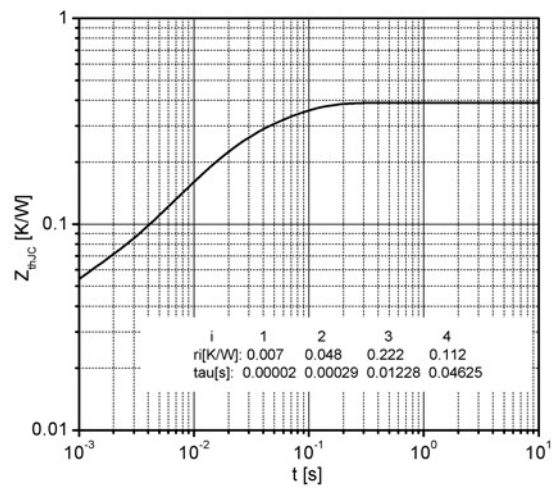


Fig 18. Typical IGBT Thermal Impedance

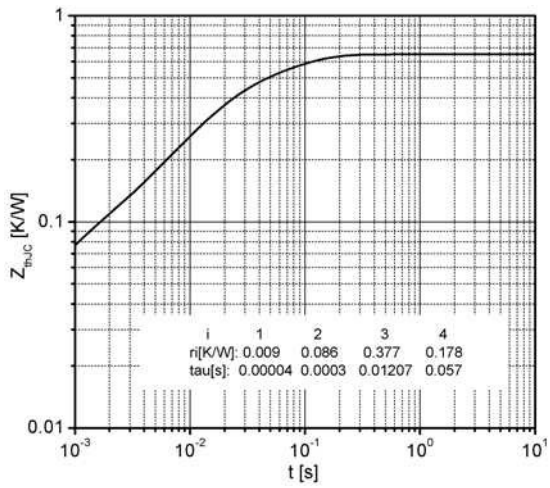


Fig 19. Typical Diode Thermal Impedance

Package Dimension(Dimension in mm)

