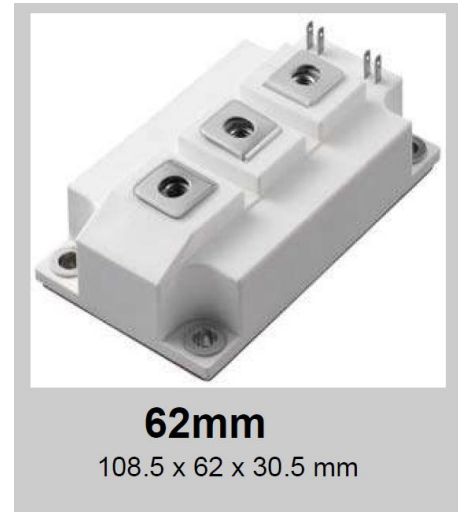


Features

- Trench & Field Stop technology
 - Low saturation voltage
 - 10 μ s Short Circuit current
 - Low turn-off losses
 - Positive temperature coefficient
- Free wheeling diodes with fast and soft reverse recovery
- Industrial standard package with copper base plate

Applications

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

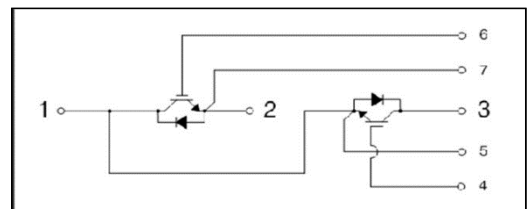


Absolute Maximum Ratings $T_j = 25^\circ\text{C}$ unless otherwise noted

Item	Symbol	Conditions	Value	Units
IGBT	VCES		1250	V
	VGES		± 30	V
	IC	@ $T_j = 175^\circ\text{C}$, $T_C = 25^\circ\text{C}$, Continuous	450	A
		@ $T_j = 175^\circ\text{C}$, $T_C = 80^\circ\text{C}$, Continuous	300	A
	ICM	$t_P = 1\text{ ms}$	600	A
	TSC	Chip Level, @ $T_j = 125^\circ\text{C}$, $V_{GE} = 15\text{ V}$, $V_{CC} = 720\text{ V}$, $V_{CE} < V_{CES}$	10	μs
	T_j	Operating Junction Temperature *(1)	-40~175	$^\circ\text{C}$
	PD	@ $T_j = 175^\circ\text{C}$, $T_C = 25^\circ\text{C}$	1650	W
@ $T_j = 175^\circ\text{C}$, $T_C = 80^\circ\text{C}$		1050	W	
Diode	VRRM		1200	V
	IF		300	A
	IFRM	$t_P = 1\text{ ms}$	600	A
	T_j	Operating Junction Temperature *(1)	-40~175	$^\circ\text{C}$
Module	Tstg	Storage Temperature	-40~175	$^\circ\text{C}$
	Viso	@ AC 1 minute	2500	V
	Mt	Main Terminal Mounting Torque (M6)	2.5~6.0	Nm
	MS	Heat Sink Mounting Torque (M6)	3.0~6.0	Nm
	W	Weight	310	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°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
BVCES	C-E Breakdown Voltage	$V_{GE} = 0\text{ V}, I_C = 1\text{ mA}$	1250	-	-	V
ICES	C-E Cut-Off Current	$V_{CE} = V_{CES}, V_{GE} = 0\text{ V}$	-	-	4	mA
IGES	G-E Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0\text{ V}$	-	-	± 1.6	μA
$V_{GE(th)}$	G-E Threshold Voltage	$V_{GE} = V_{CE}, I_C = 200\text{ mA}$	5.0	5.8	6.6	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C = 300\text{ A}, V_{GE} = 15\text{ V}, T_j = 25^\circ\text{C}$	-	1.75	2.0	V
		$I_C = 300\text{ A}, V_{GE} = 15\text{ V}, T_j = 175^\circ\text{C}$	-	1.95	-	V

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
C_{ies}	Input Capacitance	$V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$ $f = 1\text{ MHz}, T_j = 25^\circ\text{C}$	-	25.1	-	nF
C_{oes}	Output Capacitance		-	-	-	nF
C_{res}	Reverse Transfer Capacitance		-	1.0	-	nF
$t_{d(on)}$	Turn-On Delay Time	$T_j = 125^\circ\text{C}, R_G = 5.1\ \Omega$ $L = 100\ \mu\text{H}, V_{DC} = 600\text{ V}$ $V_{GE} = 15\text{ V} \sim -15\text{ V}$ $I_C = 300\text{ A}$	-	160	-	ns
t_r	Rise Time		-	72	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	450	-	ns
t_f	Fall Time		-	240	-	ns
E_{on}	Turn-On Switching Loss		-	31	-	mJ
E_{off}	Turn-Off Switching Loss		-	23	-	mJ
E_{ts}	Total Switching Loss		-	-	-	mJ
Q_g	Total Gate Charge		-	-	-	nC
Q_{ge}	Gate-Emitter Charge	$V_{GE} = 0\text{ V} \sim +15\text{ V}$	-	-	-	nC
Q_{gc}	Gate-Collector Charge		-	-	-	nC

Electrical Characteristics of Diode

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units	
VF	Diode Forward Voltage	$I_F = 300\text{ A}$ $V_{GE} = 0\text{ V}$	$T_j = 25^\circ\text{C}$	-	1.7	2.2	V
			$T_j = 125^\circ\text{C}$	-	-	-	
t_{rr}	Diode Reverse Recovery Time		$T_j = 25^\circ\text{C}$	-	-	-	ns
			$T_j = 125^\circ\text{C}$	-	-	-	
IRRM	Diode Peak Reverse Recovery Current	$R_G = 1.1\ \Omega$ $L = 100\ \mu\text{H}$ $V_{DC} = 600\text{ V}$	$T_j = 25^\circ\text{C}$	-	350	-	A
			$T_j = 125^\circ\text{C}$	-	380	-	
Qrr	Diode Reverse Recovery Charge	$V_{GE} = 15\text{ V} \sim -15\text{ V}$	$T_j = 25^\circ\text{C}$	-	-	-	μC
			$T_j = 125^\circ\text{C}$	-	-	-	
Err	Diode Reverse Recovery Energy	$I_C = 300\text{ A}$	$T_j = 25^\circ\text{C}$	-	-	-	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	-	0.12	-	$^\circ\text{C/W}$
$R_{th(J-C)D}$	Thermal Resistance (Diode Part)	Junction-to-Case	-	0.26	-	$^\circ\text{C/W}$

* This specifications may not be considered as an assurance of characteristics and may not have same characteristics in case of using different test systems from @ JIAENSEMI. We therefore recommend prior consultation of our engineers.

Typical Performance Characteristics

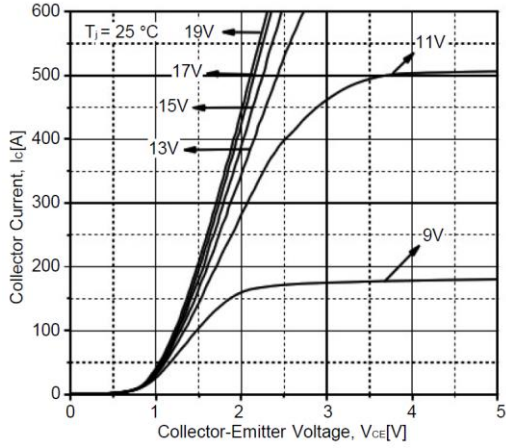


Fig 1. Typical IGBT Output Characteristics

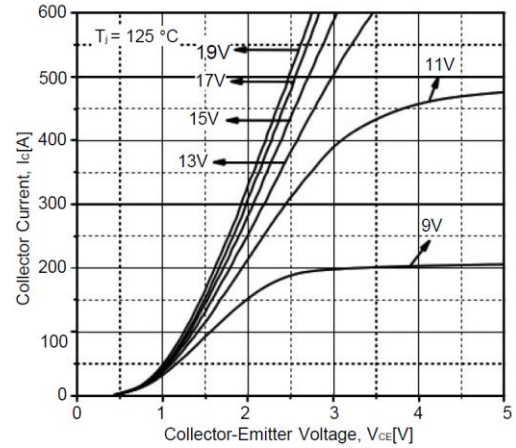


Fig 2. Typical IGBT Output Characteristics

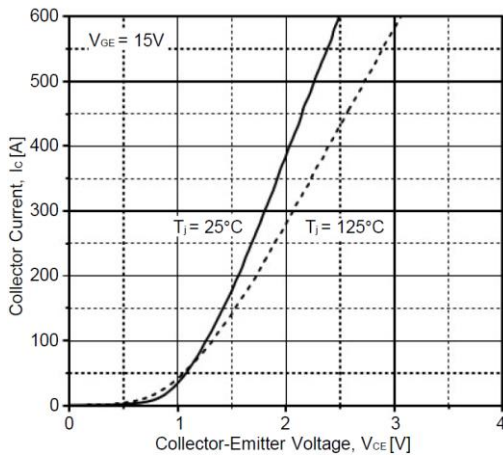


Fig 3. Typical IGBT Output Characteristics

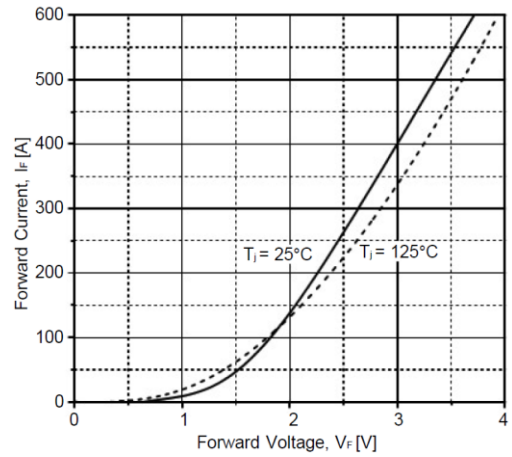


Fig 4. Typical Diode Forward Characteristics

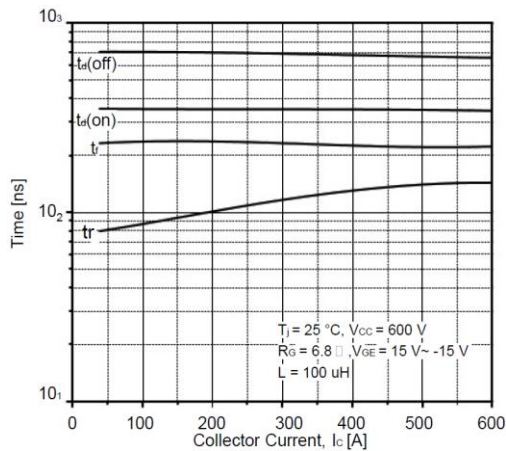


Fig 5. Typical Switching Time vs. Collector Current

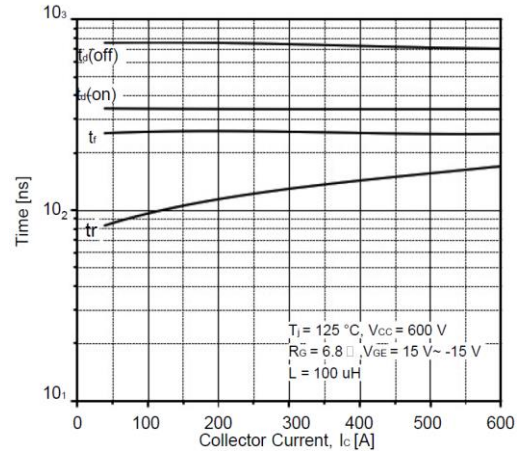


Fig 6. Typical Switching Time vs. Collector Current

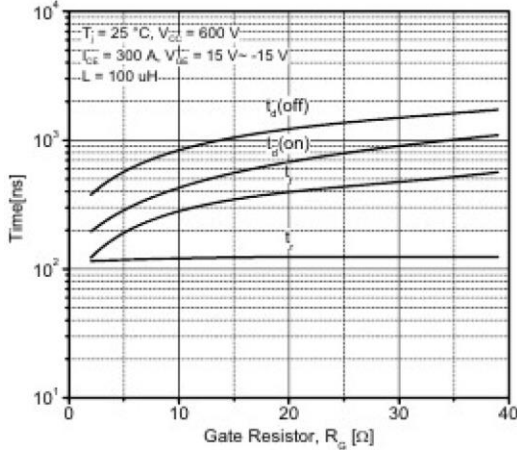


Fig 7. Typical Switching Time vs. Gate Resistor

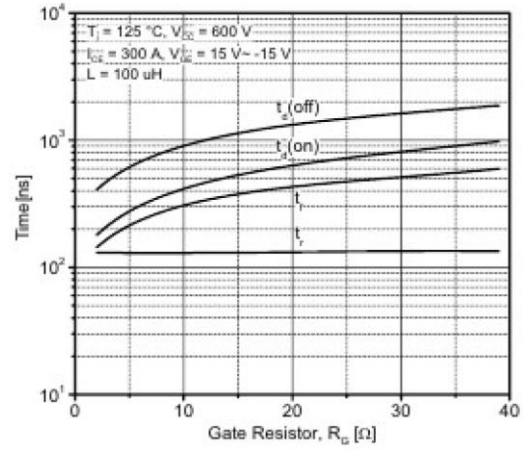


Fig 8. Typical Switching Time vs. Gate Resistor

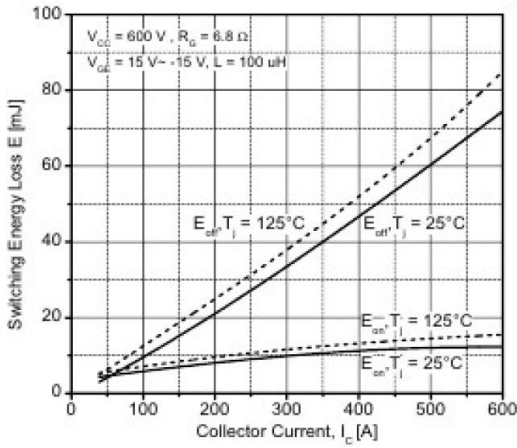


Fig 9. Typical IGBT Switching Loss

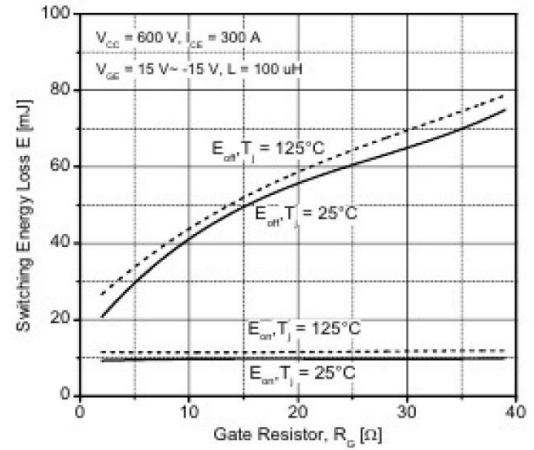


Fig 10. Typical IGBT Switching Loss

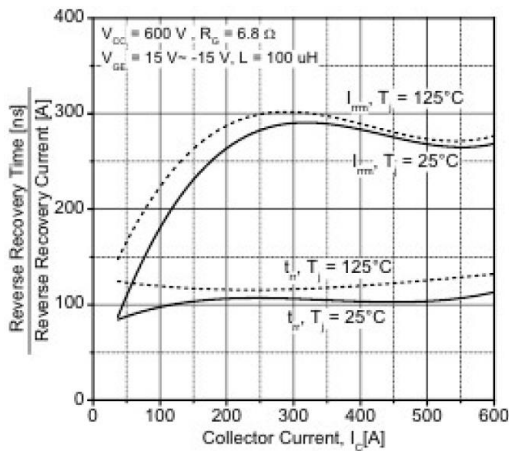


Fig 11. Typical Recovery Characteristics of Diode

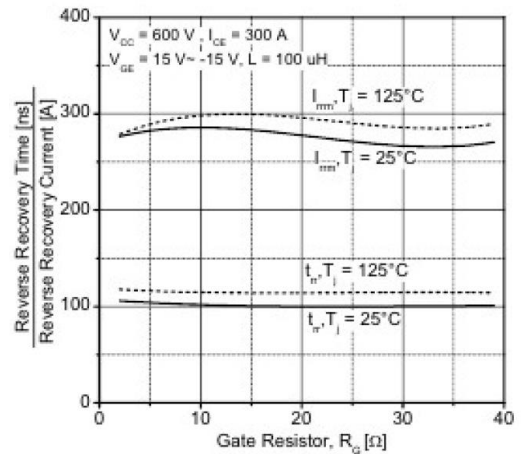


Fig 12. Typical Recovery Characteristics of Diode

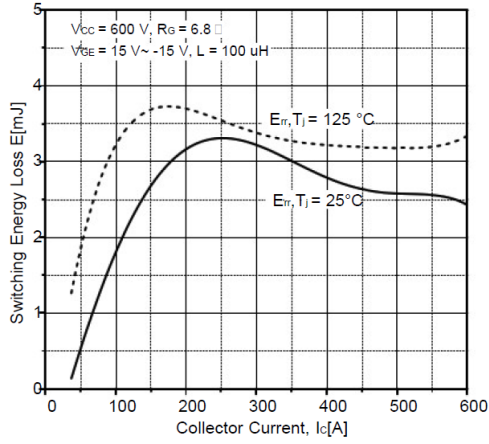


Fig 13. Typical Diode Switching Loss

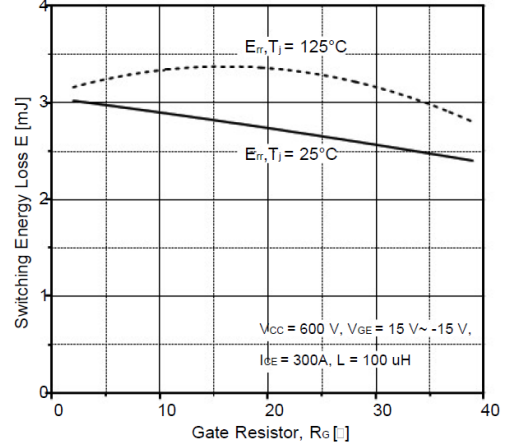


Fig 14. Typical Diode Switching Loss

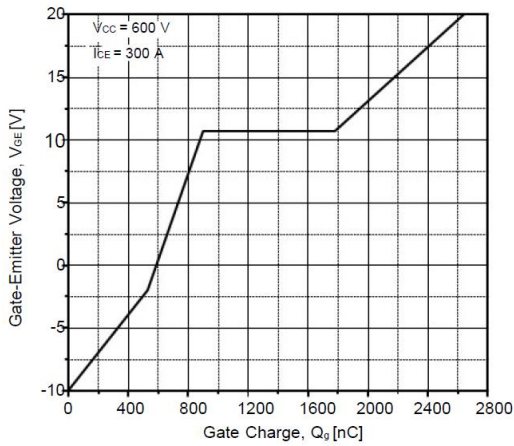


Fig 15. Typical Gate Charge Characteristics

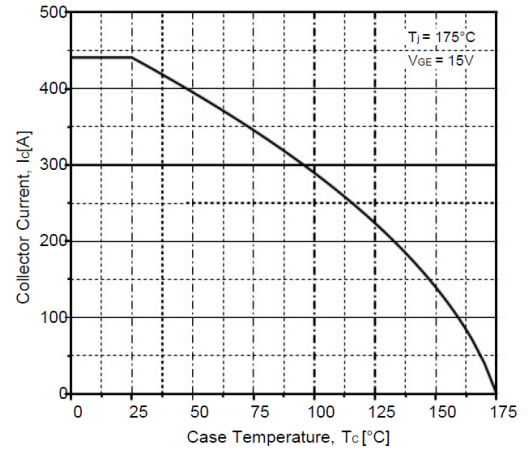


Fig 16. Case Temperature vs. Collector Current

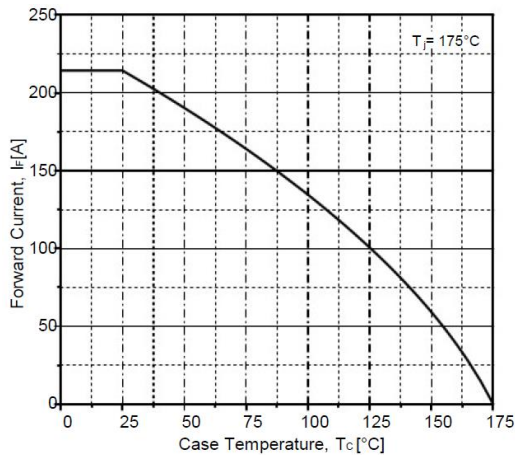


Fig 17. Case Temperature vs. Diode Current

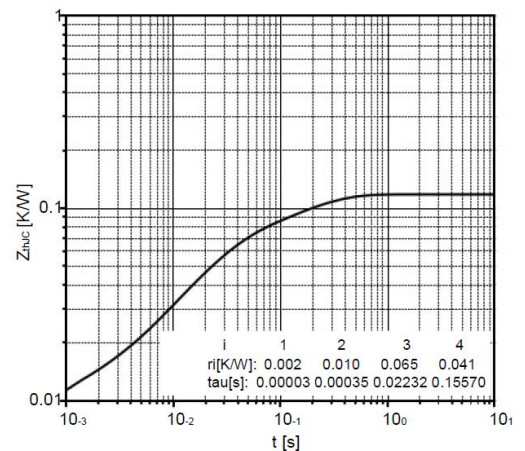


Fig 18. Typical IGBT Thermal Impedance

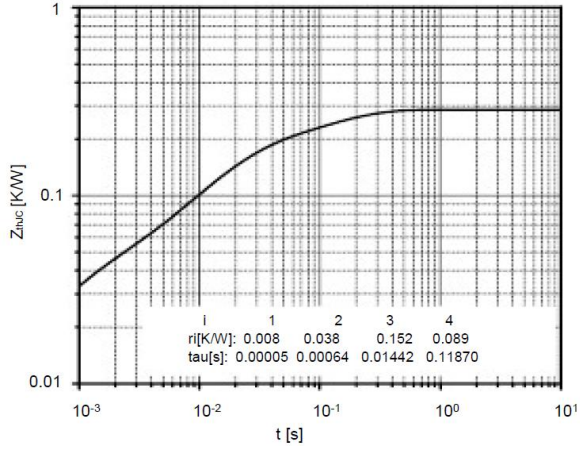


Fig 19. Typical Diode Thermal Impedance

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