

IGBT Module

Features:

- Short Circuit Rated 10 μ s
- Low Saturation Voltage: $V_{CE(sat)} = 1.80V @ I_C = 200A, T_C = 25^\circ C$
- Low Switching Loss
- 100% RBSOA Tested ($2 \times I_C$)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement



Applications:

- Welding Machine, Cutting Machine
- Plating Power Supply, Induction Heating
- SMPS, UPS

IGBT, Inverter

Maximum Rated Values ($T_C = 25^\circ C$ Unless otherwise specified)

V_{CES}	Collector-Emitter Blocking Voltage		1200	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_C	Continuous Collector Current	$T_C = 80^\circ C,$	200	A
		$T_C = 25^\circ C$	400	A
I_{CM}	Repetitive Peak Collector Current	$T_J = 175^\circ C$	400	A
t_{SC}	Short Circuit Withstand Time		>10	μs
P_D	Maximum Power Dissipation per IGBT	$T_C = 25^\circ C$ $T_{Jmax} = 175^\circ C$	1040	W

Electrical Characteristics of IGBT ($T_C=25^{\circ}\text{C}$ Unless otherwise specified)

Static characteristics

Symbol	Description	Conditions	Min	Typ	Max	Unit
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C = 1 \text{ mA}, V_{CE} = V_{GE}$	5.0	5.5	6.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 200\text{A}, V_{GE} = 15\text{V}$	$T_J = 25^{\circ}\text{C}$	1.80	2.00	V
			$T_J = 125^{\circ}\text{C}$	2.10		V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE} = 0\text{V}, V_{CE} = V_{CES}, T_J = 25^{\circ}\text{C}$			1	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE} = \pm 20\text{V}, V_{CE} = 0\text{V}, T_J = 25^{\circ}\text{C}$			200	nA
C_{ies}	Input Capacitance	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		18.1		nF
C_{oes}	Output capacitance			1.10		nF

Switching Characteristics

Switching Characteristics							
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=200A,$ $R_G=15\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		1050		ns
			$T_J=125^{\circ}C$		1025		
t_r	Rise Time		$T_J=25^{\circ}C$		110		ns
			$T_J=125^{\circ}C$		115		
$t_{d(off)}$	Turn-off Delay Time		$T_J=25^{\circ}C$		805		ns
			$T_J=125^{\circ}C$		845		
t_f	Fall Time		$T_J=25^{\circ}C$		120		ns
			$T_J=125^{\circ}C$		140		
E_{on}	Turn-on Switching Loss		$T_J=25^{\circ}C$		5.9		mJ
			$T_J=125^{\circ}C$		10.2		
E_{off}	Turn-off Switching Loss		$T_J=25^{\circ}C$		24.3		mJ
			$T_J=125^{\circ}C$		29.5		
Q_g	Total Gate Charge	$T_J=25^{\circ}C$		1790		nC	
RBSOA	Reverse Bias Safe Operation Area	$I_C=400A, V_{CC}=960V, V_p=1200V,$ $R_g=15\Omega, V_{GE}=+15V \text{ to } 0V, T_J=150^{\circ}C$			Trapezoid		
SCSOA	Short Circuit Safe Operation Area	$V_{CC}=600V, V_{GE}=15V,$ $T_J=150^{\circ}C$			10		μs
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-To-Case				0.14		$^{\circ}C/W$

Diode, Inverter

Maximum Rated Values ($T_C=25^{\circ}\text{C}$ Unless otherwise specified)

V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	200	A
I_{FM}	Diode Maximum Forward Current	400	A

Electrical Characteristics of FWD ($T_C=25^{\circ}\text{C}$ Unless otherwise specified)

Symbol	Description	Conditions		Min	Typ	Max	Unit
V _{FM}	Forward Voltage	I _F = 200A , V _{GE} = 15V	T _J = 25°C		2.0		V
			T _J = 125°C		2.2		
I _{rr}	Peak Reverse Recovery Current	I _F = 200A, di/dt = 1720A/μs, V _{rr} = 600V, V _{GE} = -15V	T _J = 25°C		130		A
			T _J = 125°C		170		
Q _{rr}	Reverse Recovery Charge		T _J = 25°C		12.9		μC
			T _J = 125°C		25.3		
E _{rec}	Reverse Recovery Energy		T _J = 25°C		4.9		mJ
			T _J = 125°C		10.4		
R _{θJC}	Diode Thermal Resistance: Junction-To-Case				0.29		°C/W

Module

Symbol	Description	Conditions	Min	Typ	Max	Unit
V_{iso}	Isolation Voltage(All Terminals Shorted)	$f = 50\text{Hz}$, 1minute			2500	V
T_J	Maximum Junction Temperature				175	$^{\circ}\text{C}$
T_{JOP}	Maximum Operating Junction Temperature Range		-40		+150	$^{\circ}\text{C}$
T_{stg}	Storage Temperature		-40		+125	$^{\circ}\text{C}$
$R_{\theta CS}$	Case-To-Sink (Conductive Grease Applied)			0.10		$^{\circ}\text{C}/\text{W}$
T	Power Terminals Screw:M5		3.0		5.0	N·m
T	Mounting Screw:M6		4.0		6.0	N·m
G	Weight			200		g

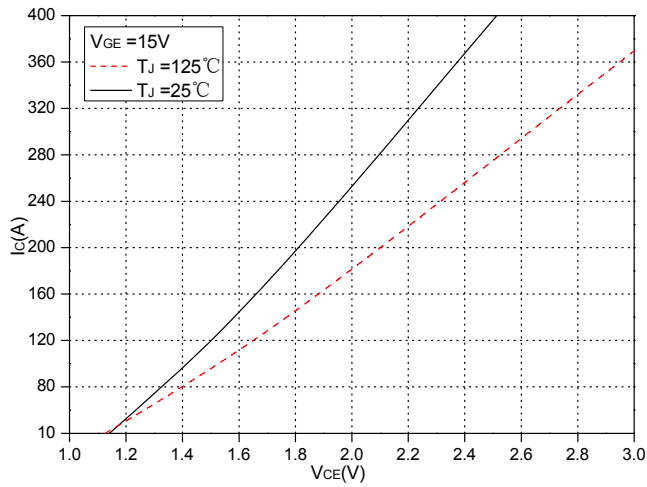


Fig.1 Typical Saturation Voltage Characteristics

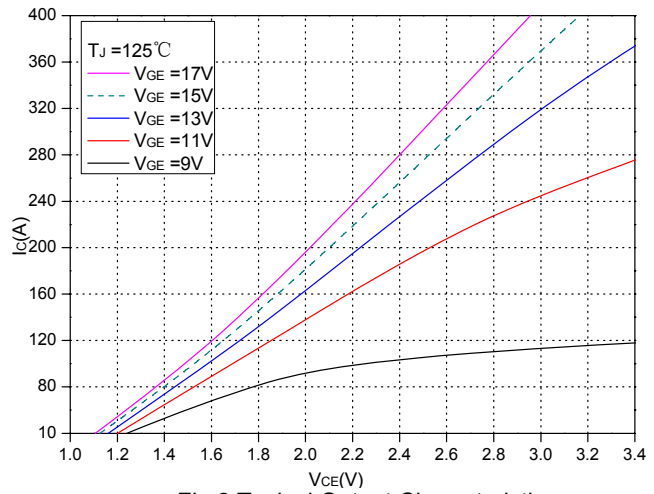


Fig.2 Typical Output Characteristics

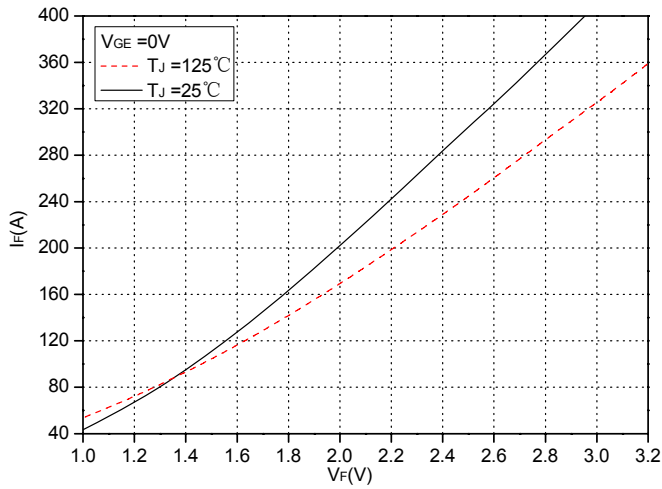


Fig.3 Forward Characteristics of FWD

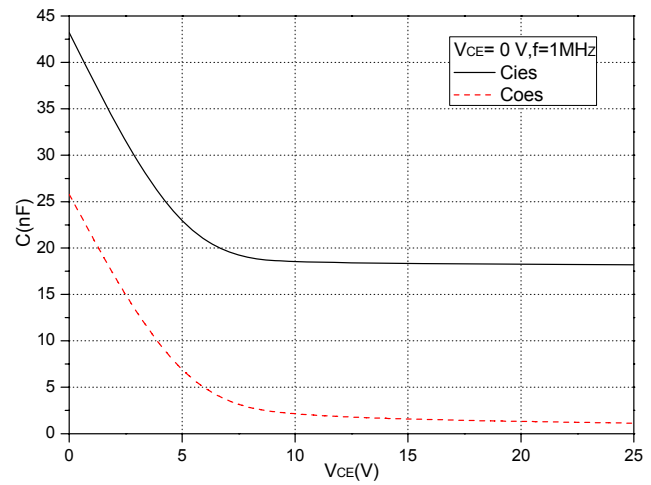


Fig.4 Capacitance Characteristics

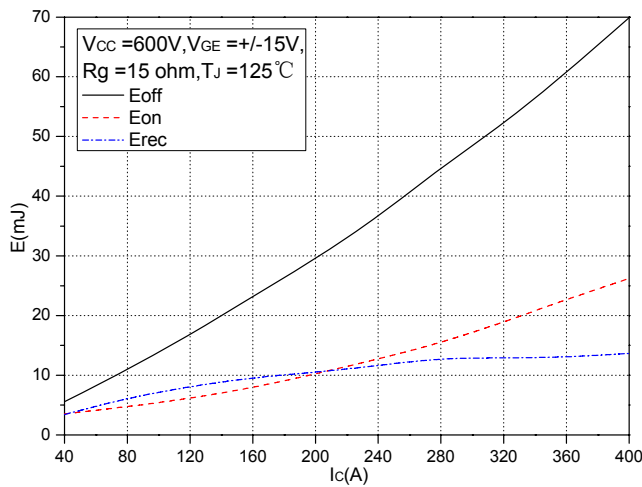


Fig.5 Typical Switching Loss vs. Collector Current

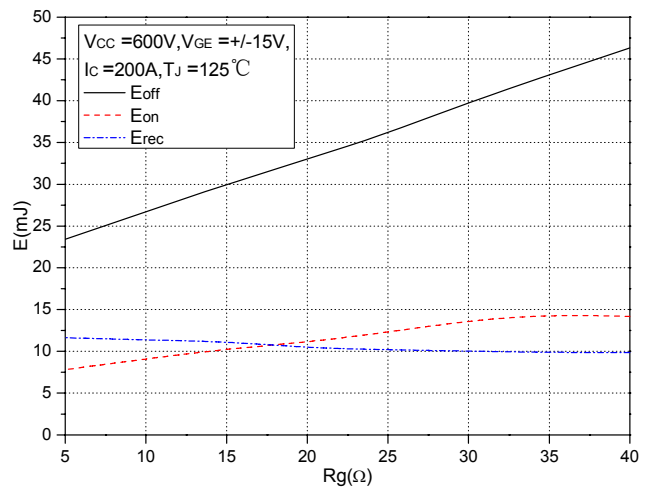


Fig.6 Typical Switching Losses vs. Gate Resistance

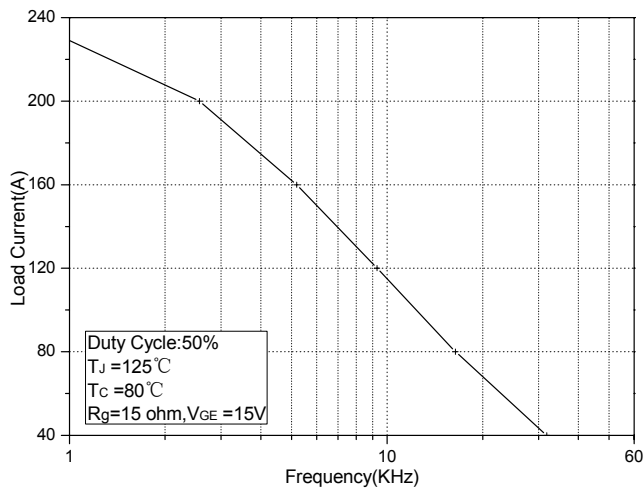


Fig.7 Typical Load Current vs. Frequency

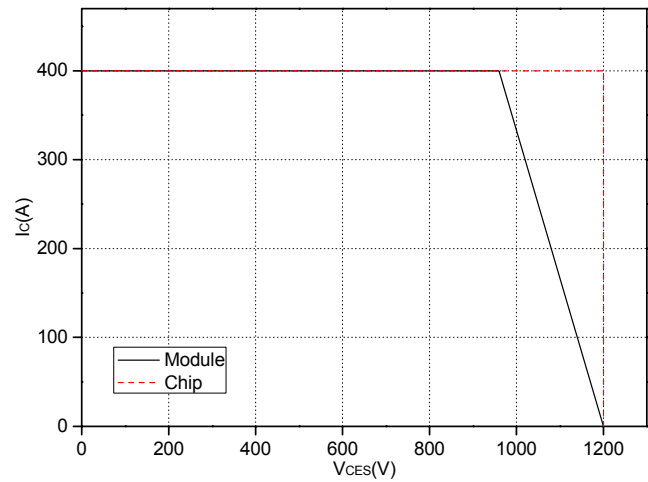


Fig.8 Reverse Bias Safe Operation Area (RBSOA)

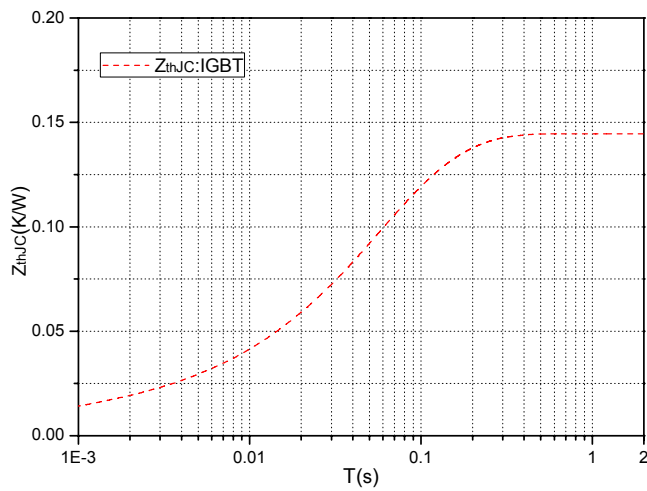


Fig.9 Transient thermal impedance (IGBT)

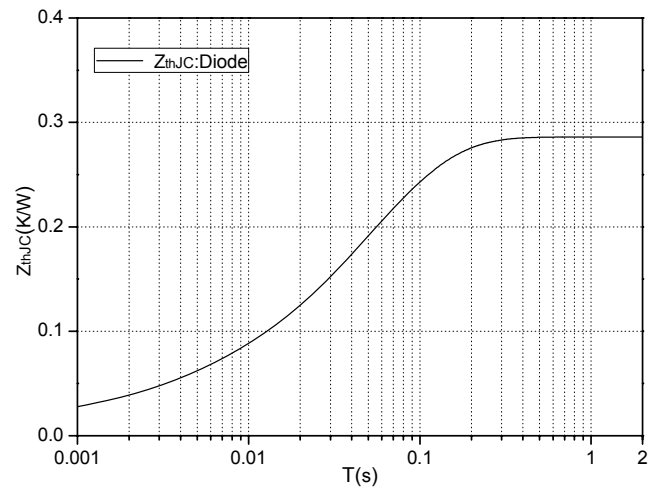
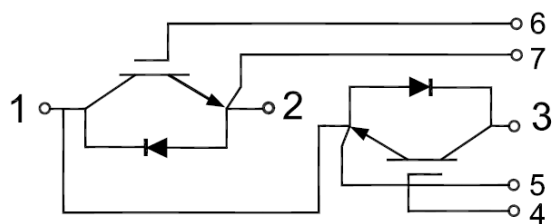


Fig.10 Transient thermal impedance (Diode)

Internal Circuit:



Package Outline (Unit: mm):

