

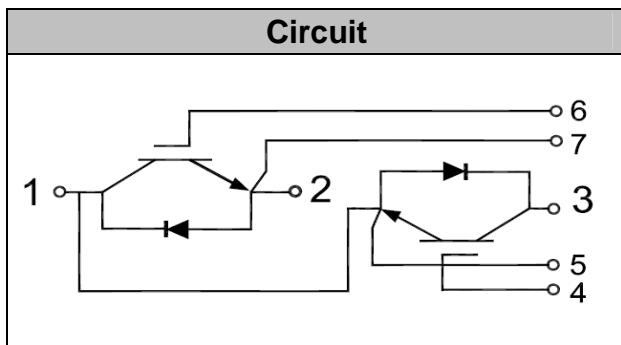
## IGBT Modules



**V<sub>CES</sub>**            1200V  
**I<sub>C</sub>**                 150A

### Applications

- Industrial Inverters
- Servo Applications
- SMPS UPS
- Induction Heating



### Features

- Short Circuit Rated 10 $\mu$ s
- Low Stray Inductance
- Low Saturation Voltage
- Ultra Low loss
- HI-REL Power Terminals
- Lead Free, Compliant With RoHS Requirement

### Absolute Maximum Ratings (T<sub>C</sub> = 25°C unless otherwise specified)

Symbol	Description	Values	Units
V <sub>CES</sub>	Collector - Emitter Voltage	1200	V
V <sub>GES</sub>	Gate-Emitter Voltage	±20	V
I <sub>C</sub>	DC Collector Current	T <sub>C</sub> =25°C	210 A
		T <sub>C</sub> =80°C	150 A
I <sub>Cpuls</sub>	Pulsed Collector Current	T <sub>C</sub> =25°C, t <sub>p</sub> =1ms	420 A
		T <sub>C</sub> =80°C, t <sub>p</sub> =1ms	300 A
P <sub>tot</sub>	P <sub>tot</sub> Power Dissipation Per IGBT	880	W
T <sub>J</sub>	Junction Temperature Range	40 to +150	°C
T <sub>STG</sub>	Storage Temperature Range	40 to +125	°C
Viso	Insulation Test Voltage	AC, t=1min	3000 V
Mounting Torque	Power Terminals Screw: M6	5±15%	N*m
	Mounting Screw:M6	5±15%	N*m

Notes :

(1) Repetitive Rating: Pulse width limited by max. junction temperature



## Electrical Characteristics of IGBT ( $T_J = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Item	Conditions	Values			Units
			Min.	Typ.	Max.	
<b>OFF Characteristics</b>						
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	$V_{GE} = 0V, I_C = 1mA$	1200			V
$I_{CES}$	Collector Leakage Current	$V_{CE}=1200V, V_{GE}=0V, T_J=25^\circ\text{C}$			0.5	mA
		$V_{CE}=1200V, V_{GE}=0V, T_J=125^\circ\text{C}$			2	mA
$I_{GES}$	Gate Leakage Current	$V_{CE}=0V, V_{GE}=\pm 20V$	-200		200	nA
<b>ON Characteristics</b>						
$V_{GE(th)}$	Gate - Emitter Threshold Voltage	$V_{CE}=V_{GE}, I_C=6mA$	5	6.1	7	V
$V_{CE(sat)}$	Collector – Emitter Saturation Voltage	$I_C=150A, V_{GE}=15V, T_J=25^\circ\text{C}$		2.0	2.3	V
		$I_C=150A, V_{GE}=15V, T_J=125^\circ\text{C}$		2.3	2.6	V
<b>Dynamic Characteristics</b>						
$C_{ies}$	Input Capacitance	$V_{CE}=25V, V_{GE}=0V, f=1MHz$		8.8		nF
$C_{res}$	Reverse Transfer Capacitance			0.48		nF
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=150A$ $R_G=15\Omega, V_{GE}=\pm 15V$ $T_J=25^\circ\text{C}$ Inductive Load		150		ns
$t_r$	Rise Time			70		ns
$t_{d(off)}$	Turn-off Delay Time			420		ns
$T_f$	Fall Time			50		ns
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=150A$ $R_G=15\Omega, V_{GE}=\pm 15V$ $T_J=125^\circ\text{C}$ Inductive Load		170		ns
$t_r$	Rise Time			80		ns
$t_{d(off)}$	Turn-off Delay Time			470		ns
$T_f$	Fall Time			60		ns
$E_{on}$	Turn-on Switching Loss	$V_{CC}=600V, R_G=15\Omega, I_C=150A$	$T_J=25^\circ\text{C}$		22	mJ
			$T_J=125^\circ\text{C}$		24	mJ
$E_{off}$	Turn-off Switching Loss	$V_{CC}=600V, R_G=15\Omega, I_C=150A$	$T_J=25^\circ\text{C}$		9	mJ
			$T_J=125^\circ\text{C}$		9.6	mJ
$Q_{ge}$	Gate Charge	$V_{CC}=600V, I_C=150A, V_{GE}=\pm 15V$		700		nC
RBSOA	Reverse Bias Safe Operating Area	$I_C = 200A, V_{CC} = 600V,$ $V_p = 1200V, R_g = 10\Omega,$ $V_{GE}=+15V \text{ to } 0V, T_J = 150^\circ\text{C}$	Trapezoid			
SCSOA	Short Circuit Safe Operating Area	$V_{CC} = 600V, V_{GE} = 15V,$ $T_J = 150^\circ\text{C}$	10			$\mu\text{s}$



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

Symbol	Item	Conditions	Min.	Typ.	Max.	Units	
$V_{FM}$	Forward Voltage	$I_F = 150\text{A}$ , $V_{GE} = 0\text{V}$	$T_J = 25^\circ\text{C}$		2.0	2.48	V
			$T_J = 125^\circ\text{C}$		1.7	2.20	
$t_{rr}$	Reverse Recovery Time	$I_F = 150\text{A}$ , $V_R = 600\text{V}$ , $di_F/dt = -3000\text{A}/\mu\text{s}$ , $T_{Vj} = 125^\circ\text{C}$ ,		350		ns	
$I_{RRM}$	Max. Reverse Recovery			160		A	
$E_{rec}$	Reverse Recovery Energy			11.5		mJ	

### Thermal Resistance Characteristics

Symbol	Description	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-To-Case (IGBT Part, Per Leg)			0.17	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Junction-To-Case (Diode Part, Per Leg)			0.3	$^\circ\text{C}/\text{W}$
$M_t$	Power Terminals Screw:M6	3		5	N·m
$M_s$	Mounting Screw:M6	3		5	N·m
Weight	Weight Of Module			300	g

### Performance Curves

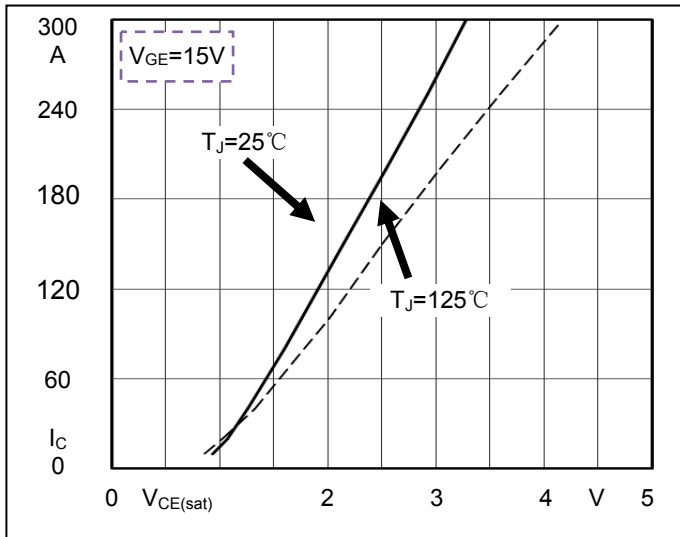


Fig1. Typical Output Characteristics

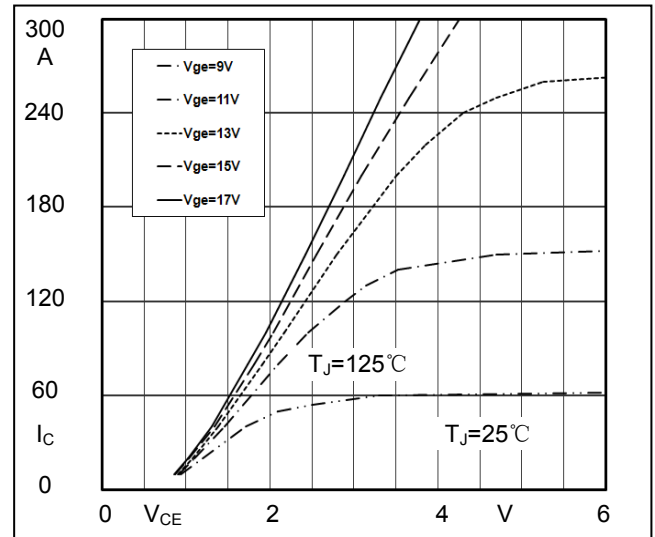


Fig2. Typical Output Characteristics

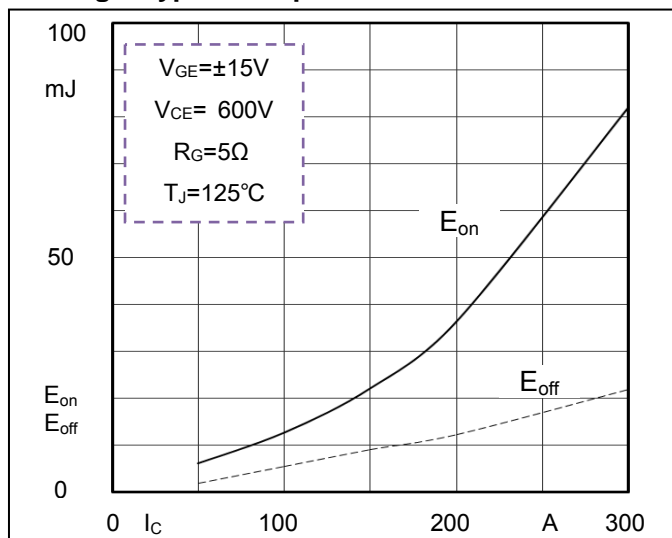


Fig3. Switching Energy vs. Collector Current

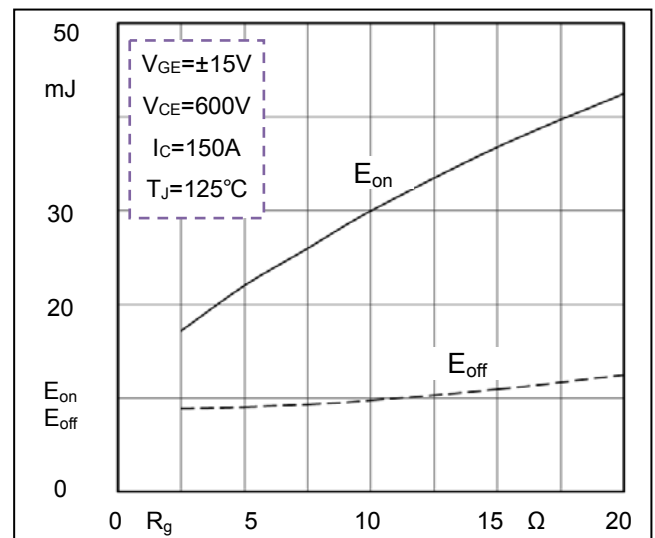
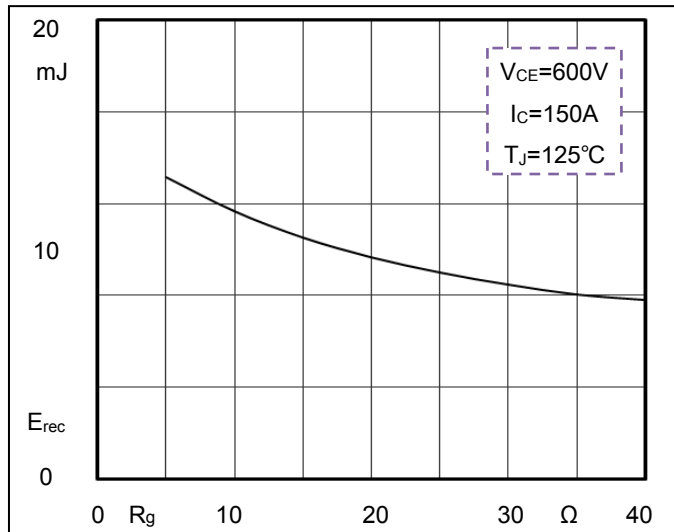
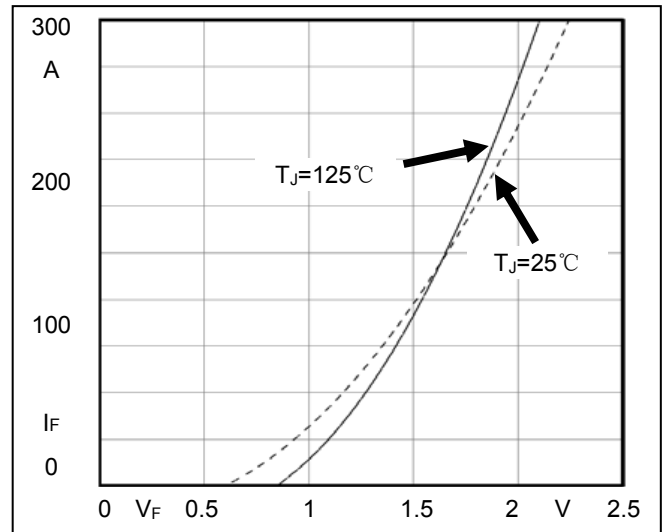


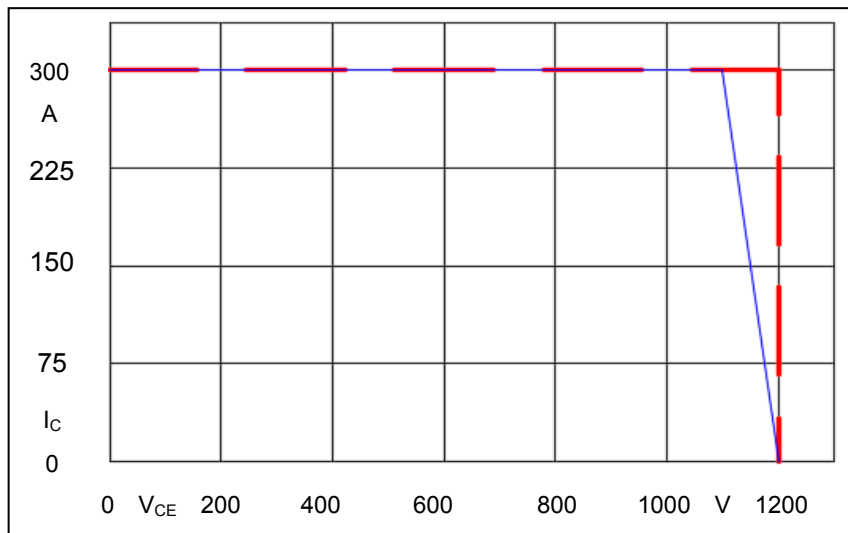
Fig4. Switching Energy vs. Gate Resistor



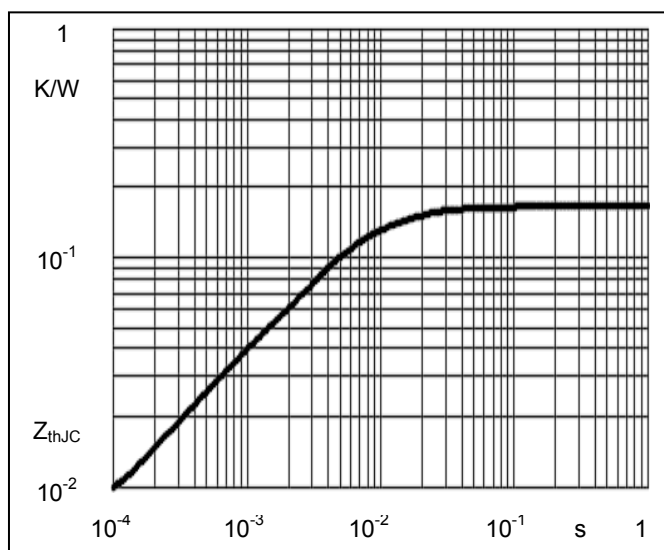
**Fig5. Switching Energy vs. Gate Resistor**



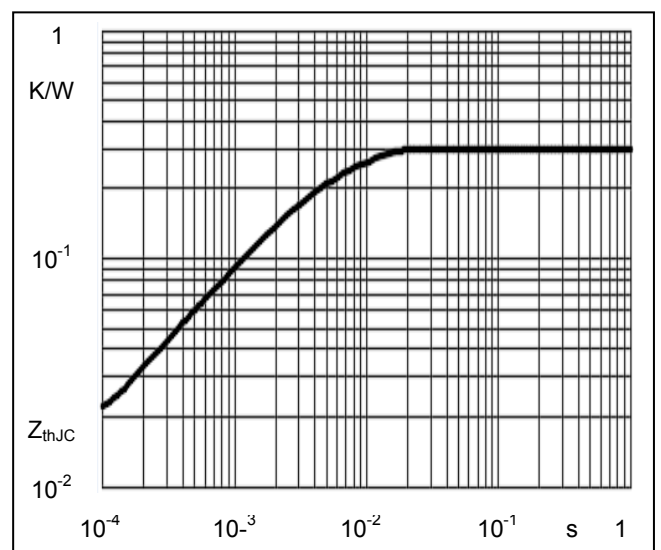
**Fig6. Diode Forward Characteristics**



**Fig7. Reverse Bias Safe Operation Area (RBSOA)**



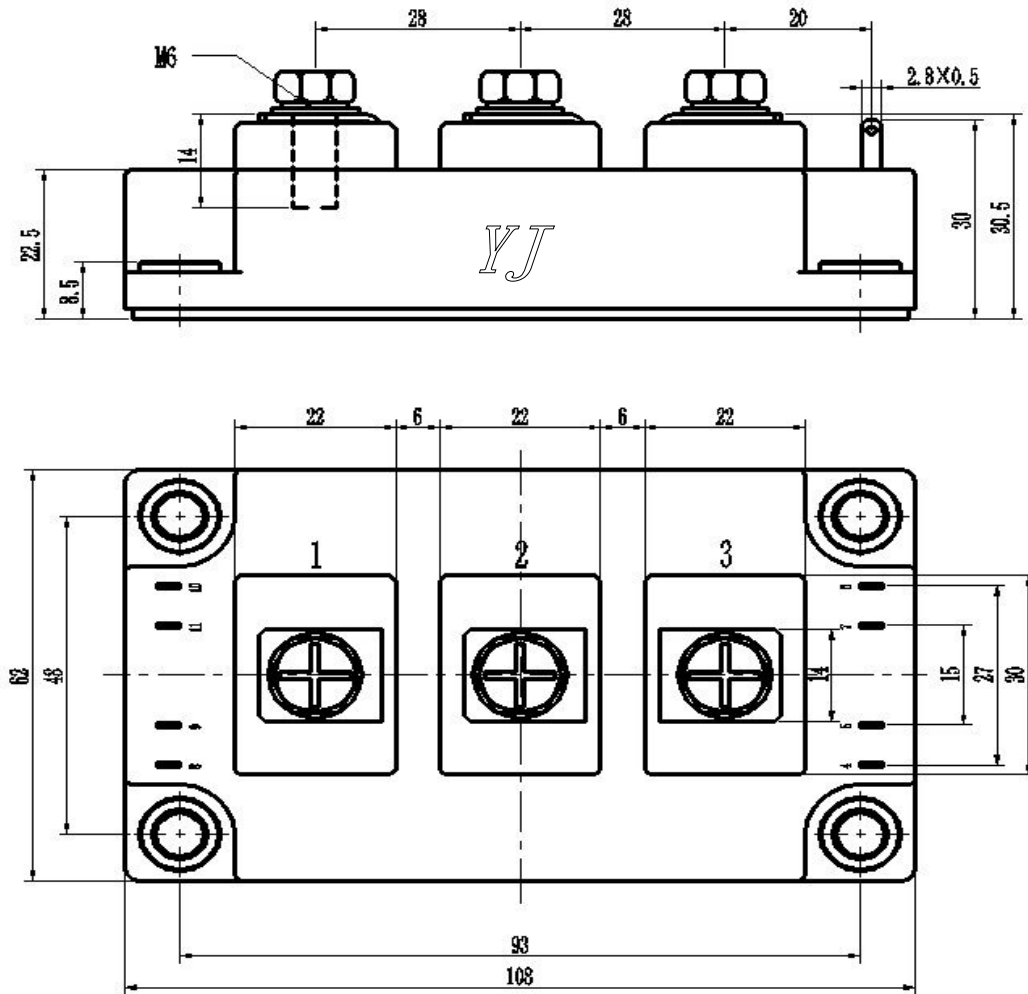
**Fig8. Transient Thermal Impedance of IGBT**



**Fig9. Transient Thermal Impedance of Diode**

## Package Outline Information

CASE: C2



Dimensions in mm