

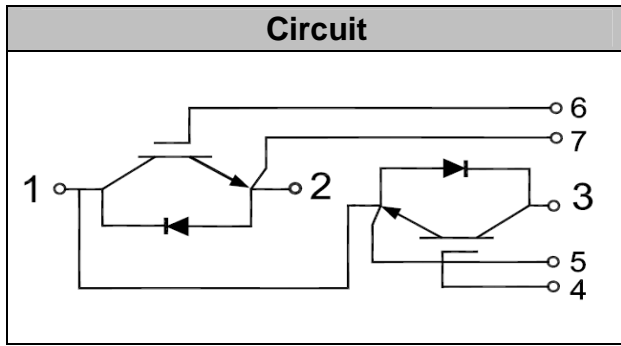
## IGBT Modules

**V<sub>CES</sub>**            1200V  
**I<sub>c</sub>**                 100A



### 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	200	A
		T <sub>c</sub> =80°C	100	A
I <sub>CM(1)</sub>	Peak Collector Current Repetitive	T <sub>J</sub> = 125°C	200	A
I <sub>F</sub>	Diode Continuous Forward Current	T <sub>J</sub> = 125°C	100	A
I <sub>FM</sub>	Peak FWD Current Repetitive		200	A
t <sub>SC</sub>	Short Circuit Withstand Time		>10	μs
P <sub>D</sub>	Maximum Power Dissipation (IGBT)	T <sub>c</sub> = 25°C, T <sub>Jmax</sub> =150°C	415	W
T <sub>J</sub>	Maximum Junction Temperature		150	°C
T <sub>JOP</sub>	Operating Temperature		-40 ~ +150	°C
T <sub>stg</sub>	Storage Temperature		-40 ~ +125	°C
Viso	Isolation Voltage (All Terminals Shorted)	f=50Hz, 1min	3000	V
Mounting Torque	Power Terminals Screw:M5		5	N*m
	Mounting Screw:M6		6	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	$V_{CE}=V_{CES}, V_{GE}=0V,$			100	$\mu A$
		$V_{CE}=V_{CES}, V_{GE}=0V,$ $T_J=125^\circ C$			1	mA
$I_{GES}$	Gate Leakage Current	$V_{CE}=0V, V_{GE}=\pm 20V$	-400		400	nA
<b>ON Characteristics</b>						
$V_{GE(th)}$	Gate - Emitter Threshold Voltage	$V_{CE}=V_{GE}, I_C=3mA$	5	6	6.8	V
$V_{CE(sat)}$	Collector – Emitter Saturation Voltage	$I_C=100A, V_{GE}=15V$		1.9	2.1	V
		$I_C=100A, V_{GE}=15V,$ $T_J=125^\circ C$		2.2	2.4	V
<b>Dynamic Characteristics</b>						
$C_{ies}$	Input Capacitance	$V_{CE} = 25V, V_{GE} = 0V,$ $f = 1MHz$		10		nF
$C_{oes}$	Output Capacitance			0.78		nF
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-on Delay Time	$V_{CC} = 600V, I_C = 100A,$ $R_G = 10\Omega, V_{GE} = \pm 15V,$ Inductive Load, $T_J = 25^\circ C$		85		ns
$t_r$	Rise Time			94		ns
$t_{d(off)}$	Turn-off Delay Time			268		ns
$T_f$	Fall Time			246		ns
$E_{on}$	Turn-on Switching Loss			4.81		mJ
$E_{off}$	Turn-off Switching Loss			5.37		mJ
$t_{d(on)}$	Turn-on Delay Time	$V_{CC} = 600V, I_C = 100A,$ $R_G = 15\Omega, V_{GE} = \pm 15V,$ Inductive Load, $T_J = 125^\circ C$		93		ns
$t_r$	Rise Time			98		ns
$t_{d(off)}$	Turn-off Delay Time			297		ns
$T_f$	Fall Time			344		ns
$E_{on}$	Turn-on Switching Loss			7.6		mJ
$E_{off}$	Turn-off Switching Loss			10.1		mJ
$Q_{ge}$	Gate Charge	$V_{CC}=600V, I_C=100A,$ $V_{GE}=\pm 15V$		950		nC
RBSOA	Reverse Bias Safe Operating Area	$I_C = 200A, V_{CC} = 600V,$ $V_p = 1200V, R_g = 10\Omega,$ $V_{GE} = +15V \text{ to } 0V, T_J$ $= 150^\circ C$	Trapezoid			
SCSOA	Short Circuit Safe Operating Area	$V_{CC} = 600V, V_{GE} = 15V,$ $T_J = 150^\circ C$	10			$\mu s$



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

Symbol	Item	Conditions	Min.	Typ.	Max.	Units
$V_{FM}$	Forward Voltage	$I_F = 100\text{A}$ , $V_{GE} = 0\text{V}$	$T_J = 25^\circ\text{C}$	2.3		V
			$T_J = 125^\circ\text{C}$	2.1		
$t_{rr}$	Reverse Recovery Time	$I_F = 100\text{A}$ , $R_g =$ $10\Omega$ , $di/dt$ $= 1000\text{A}/\mu\text{s}$ , $V_{rr} = 600\text{V}$ , $V_{GE} = -15\text{V}$	$T_J = 25^\circ\text{C}$	180		ns
			$T_J = 125^\circ\text{C}$	220		
$I_{rr}$	Peak Reverse Recovery Current		$T_J = 25^\circ\text{C}$	60		A
			$T_J = 125^\circ\text{C}$	85		
$Q_{rr}$	Reverse Recovery Charge		$T_J = 25^\circ\text{C}$	8.6		$\mu\text{C}$
			$T_J = 125^\circ\text{C}$	17.1		

## Thermal Resistance Characteristics

Symbol	Description	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-To-Case (IGBT Part, Per Leg)			0.26	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Junction-To-Case (Diode Part, Per Leg)			0.38	$^\circ\text{C}/\text{W}$
$R_{\theta CS}$	Case-To-Sink (Conductive Grease Applied)			0.1	$^\circ\text{C}/\text{W}$
Mt	Power Terminals Screw:M5	3		5	N·m
Ms	Mounting Screw:M6	4		6	N·m
Weight	Weight Of Module			180	g



## Performance Curves

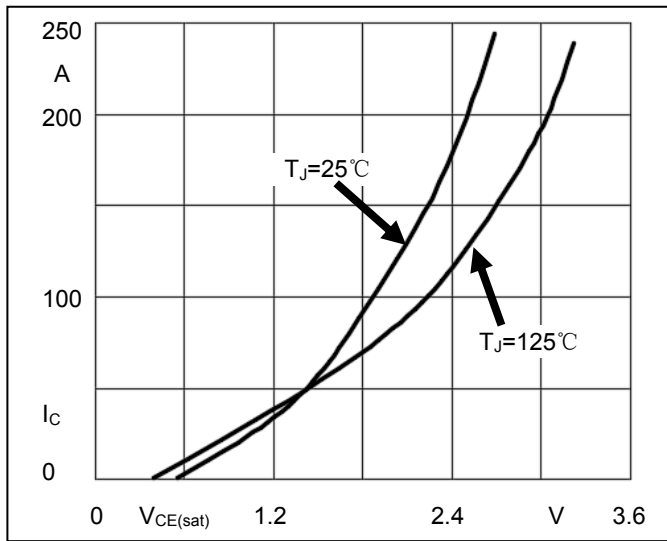


Fig1. Typical Output Characteristics

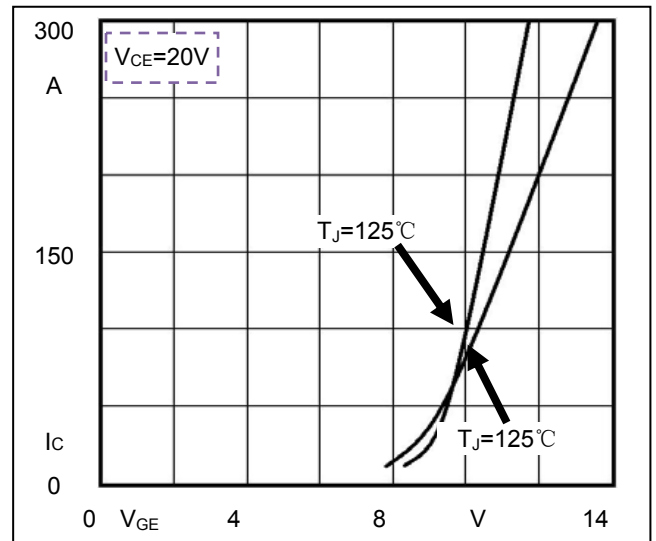


Fig2. Typical Transfer Characteristics

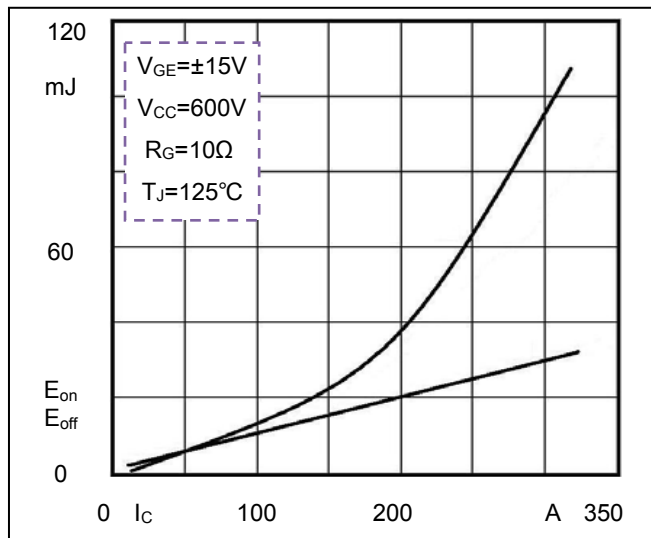


Fig3. Switching Energy vs. Collector Current

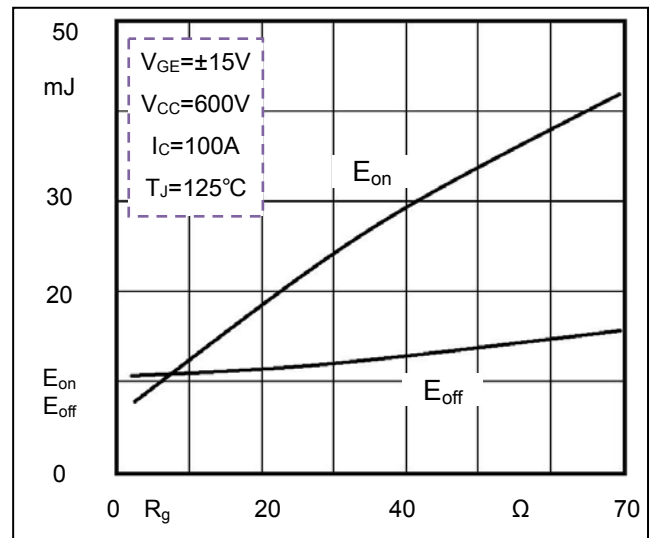


Fig4. Switching Energy vs. Gate Resistor

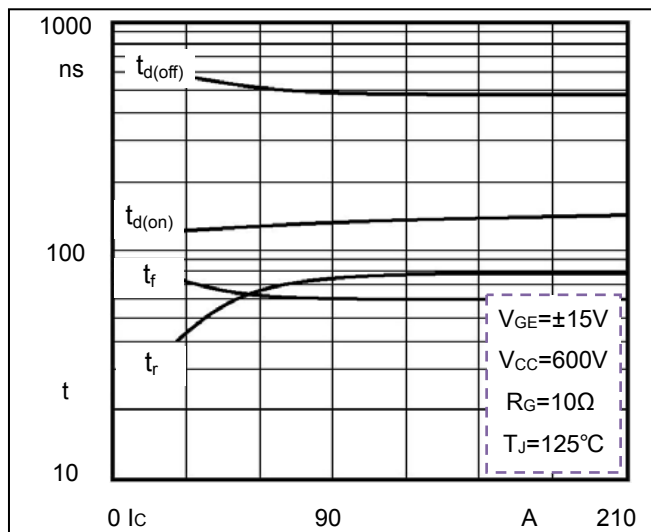


Fig5. Switching Times vs. Collector Current

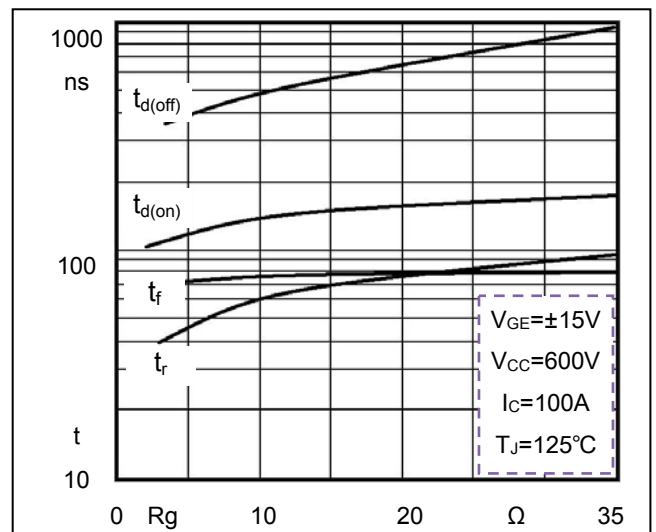
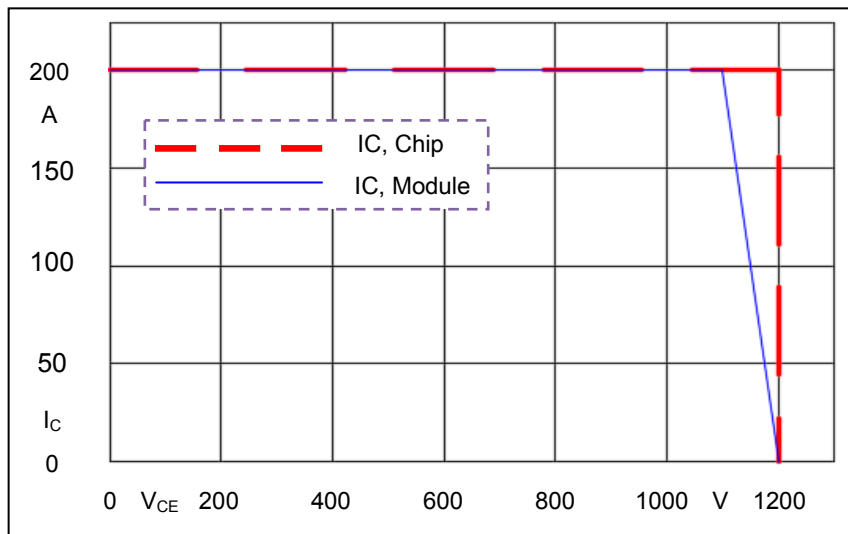
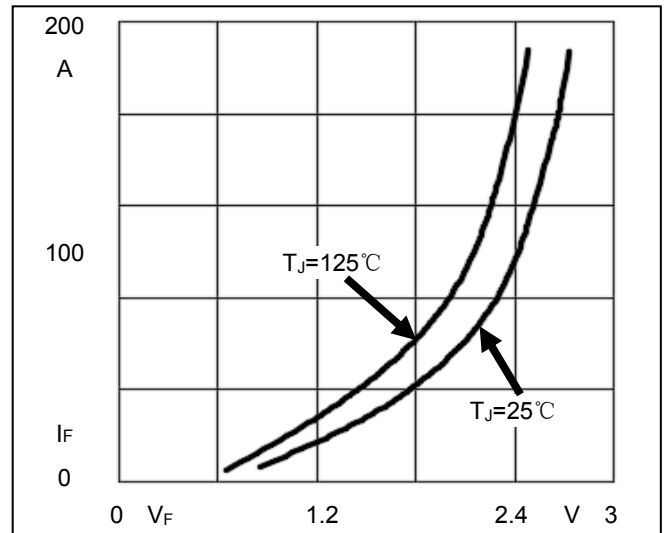
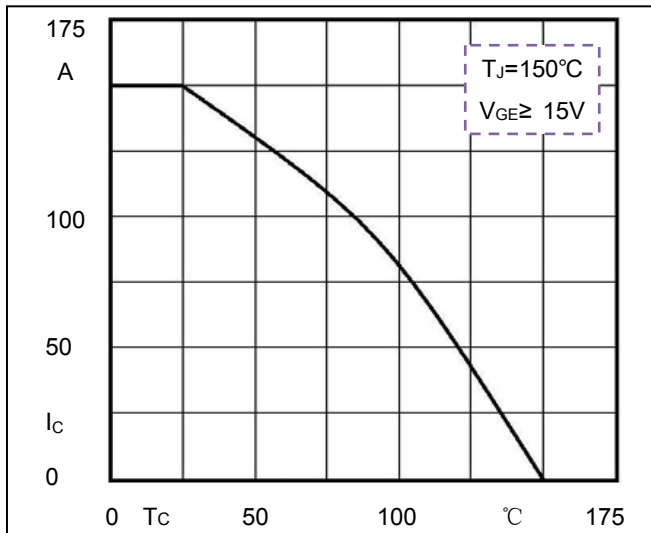
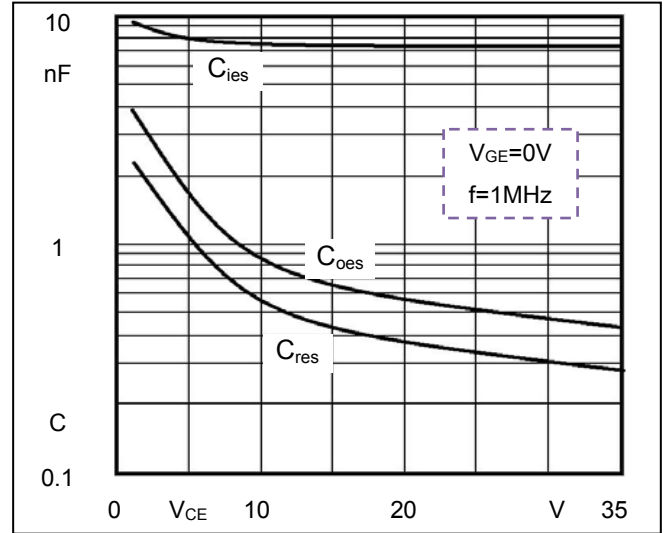
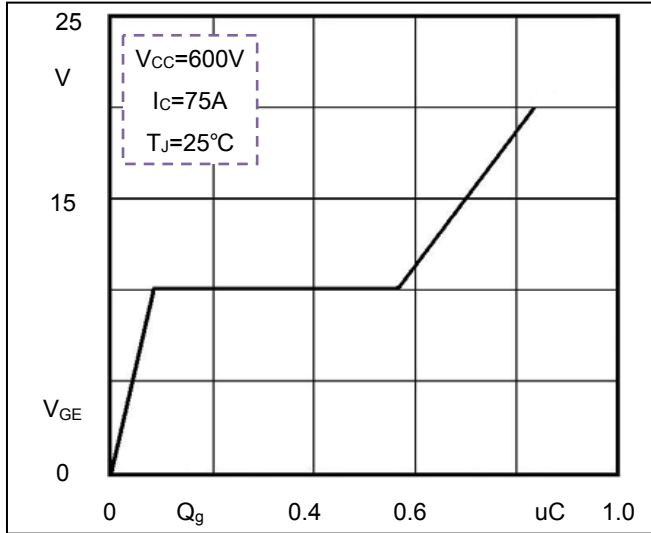


Fig6. Switching Times vs. Gate Resistor



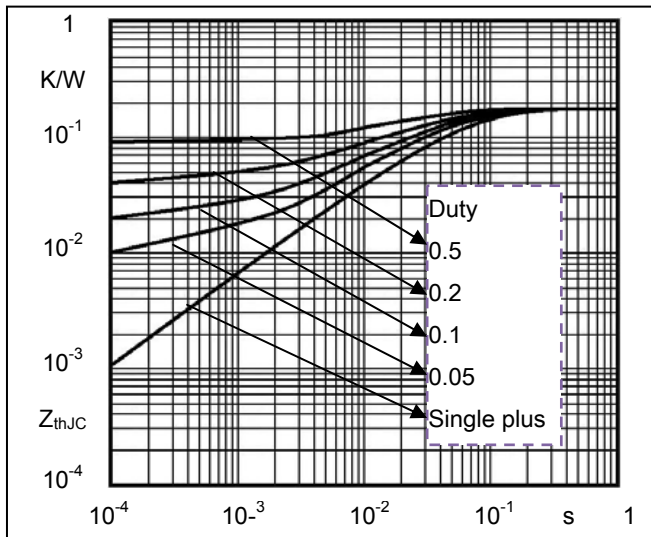


Fig12. Transient Thermal Impedance of IGBT

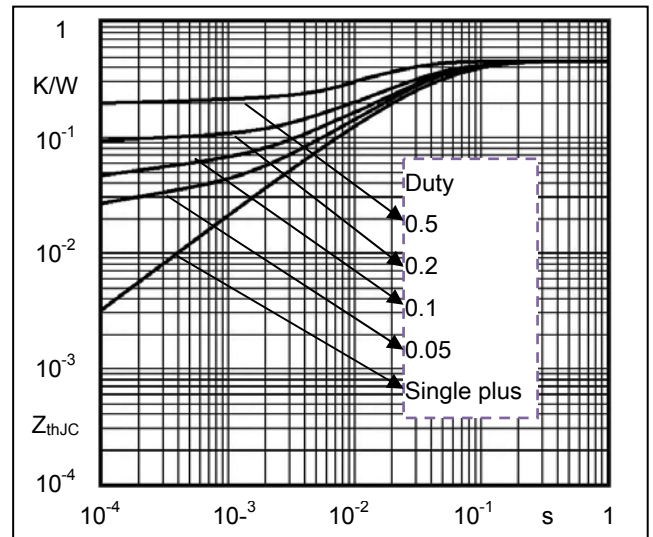


Fig13. Transient Thermal Impedance of Diode

## Package Outline Information

