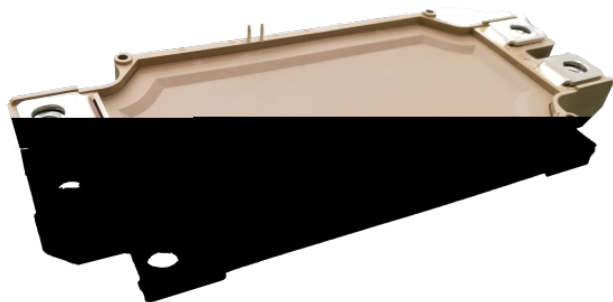




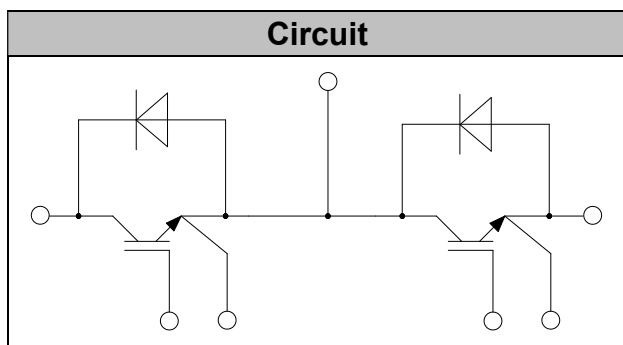
IGBT Modules



V_{CES} 9
I_C \$

Applications

- ,QYHUWHU IRU PRWRU GULYH
- \$& DQG '& VHUYR GULYH DPSOLIL
- 836 8QLQWHUUXSWLEOH 3RZHU 6
- 6RIW VZLWFKLQJ ZHOGLQJ PDFKL



Features

- /RZ 9 ZLWK 3ODQQHU WHFKQRO
- 9_{FH} V_{DZ} LWK SRVLWLYH WHPSHUDWX
- +LJK VKRUW FLUFXLW FDSDELOLV
- ,QFOXGLQJ IDVW VRIW UHFYHU
- /RZ LQGXFWDQFH PRGXOH VWUXF

● Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Collector-Emitter Voltage	V _{CES}	V _{GE} =0V, I _C =1mA, T _{vj} =25°C	1200	V
Continuous Collector Current	I _C	T _c =100°C	450	A
Peak Collector Current	I _{CRM}	t _p =1ms	900	A
Gate-Emitter Voltage	V _{GES}	T _{vj} =25°C	±20	V
Total Power Dissipation (IGBT-inverter)	P _{tot}	T _c =25°C T _{vjmax} =175°C	2500	W



● IGBT Characteristics

Parameter	Symbol	Conditions	Value			Unit	
			Min.	Typ.	Max.		
Gate-emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=9mA, T_{vj}=25^{\circ}C$	5.6	6.2	7.0	V	
Collector-Emitter Cut-off Current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V, T_{vj}=25^{\circ}C$			3	mA	
		$V_{CE}=1200V, V_{GE}=0V, T_{vj}=125^{\circ}C$			15	mA	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=600A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.70	2.20	V	
		$I_C=600A, V_{GE}=15V, T_{vj}=125^{\circ}C$		2.05		V	
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V,$ $f=1MHz, T_{vj}=25^{\circ}C$		32.4		nF	
Reverse Transfer Capacitance	C_{res}			1.85		nF	
Internal Gate Resistance	R_{gint}			0.85		Ω	
Gate-Emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			400	nA	
Turn-on Delay Time	$t_{d(on)}$	$I_C=450A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=1.7\Omega$ $T_{vj}=25^{\circ}C$		180		ns	
Rise Time	t_r			105		ns	
Turn-off Delay Time	$t_{d(off)}$			640		ns	
Fall Time	t_f			98		ns	
Energy Dissipation During Turn-on Time	E_{on}				30		mJ
Energy Dissipation During Turn-off Time	E_{off}				42		mJ
Turn-on Delay Time	$t_{d(on)}$	$I_C=450A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=1.7\Omega$ $T_{vj}=125^{\circ}C$		200		ns	
Rise Time	t_r			110		ns	
Turn-off Delay Time	$t_{d(off)}$			680		ns	
Fall Time	t_f			135		ns	
Energy Dissipation During Turn-on Time	E_{on}				43		mJ
Energy Dissipation During Turn-off Time	E_{off}				61		mJ
SC Data	I_{sc}	$T_p \leq 10\mu s, V_{GE}=15V,$ $T_{vj}=150^{\circ}C, V_{cc}=600V,$ $V_{CEM} \leq 1200V$		2200		A	



● Diode Characteristics

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Diode DC Forward Current	I_F	$T_c=100^\circ\text{C}$		450		A
Diode Peak Forward Current	I_{FRM}			900		A
Forward Voltage	V_F	$I_F=450\text{A}, T_{vj}=25^\circ\text{C}$		1.80		V
		$I_F=450\text{A}, T_{vj}=125^\circ\text{C}$		1.85		V

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Recovered Charge	Q_{rr}	$I_F=450\text{A}$ $V_R=600\text{V}$ $-di_F/dt=3600\text{A}/\mu\text{s}$ $T_{vj}=25^\circ\text{C}$		40		μC
Peak Reverse Recovery Current	I_{rr}			320		A
Reverse Recovery Energy	E_{rec}			18		mJ
Recovered Charge	Q_{rr}	$I_F=450\text{A}$ $V_R=600\text{V}$ $-di_F/dt=3600\text{A}/\mu\text{s}$ $T_{vj}=125^\circ\text{C}$		72		μC
Peak Reverse Recovery Current	I_{rr}			410		A
Reverse Recovery Energy	E_{rec}			36		mJ

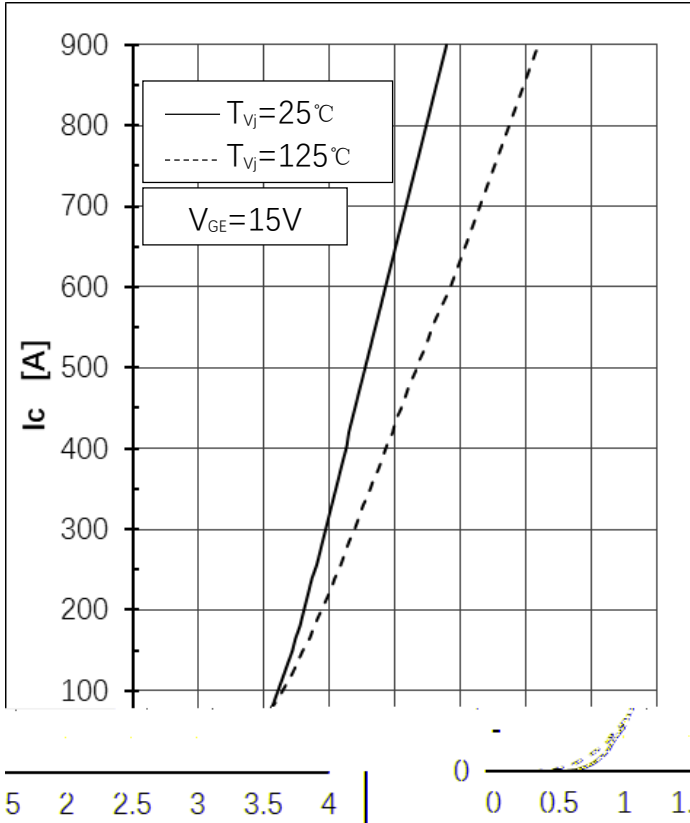


● **Module Characteristics** $T_c=25^{\circ}\text{C}$ unless otherwise specified

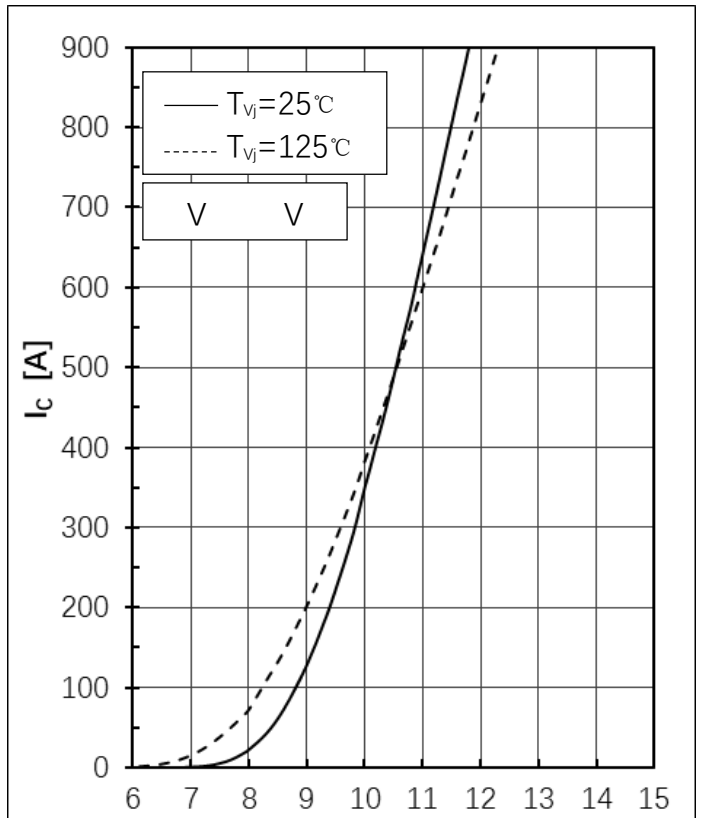
Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Isolation voltage	V_{isol}	$t=1\text{min}, f=50\text{Hz}$	2500			V
Maximum Junction Temperature	T_{jmax}				175	$^{\circ}\text{C}$
Operating Junction Temperature	$T_{\text{vj op}}$		-40		150	$^{\circ}\text{C}$
Storage Temperature	T_{stg}		-40		125	$^{\circ}\text{C}$
Stray Inductance	L_{CE}			20		nH
Module Lead Resistance , Terminal to Chip	$R_{\text{CC'+EE'}}$			1.1		$\text{m}\Omega$
Junction-to Case	$R_{\theta \text{jc}}$	per IGBT			0.060	K/W
		per Diode			0.096	K/W
Case to Sink (Conductive grease applied)	$R_{\theta \text{cs}}$	per IGBT		0.030		K/W
		per Diode		0.045		K/W
Module Electrodes Torque	M_{t}	Recommended(M6)	2.5		5.0	N·m
Module-to-Sink Torque	M_{s}	Recommended(M6)	3.0		6.0	N·m
Weight of Module	G			340		g



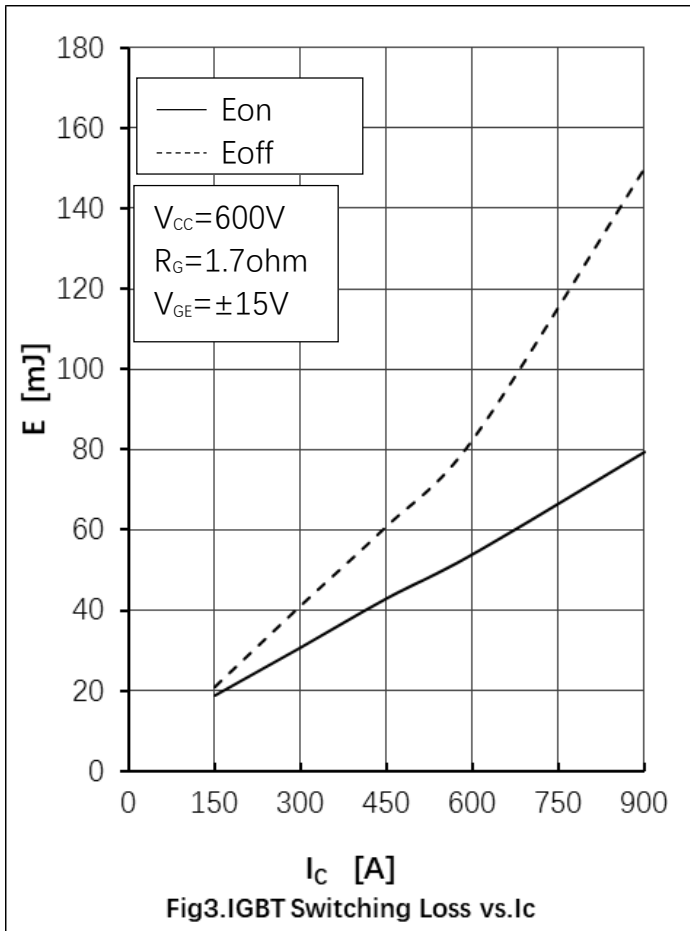
Performance Curves



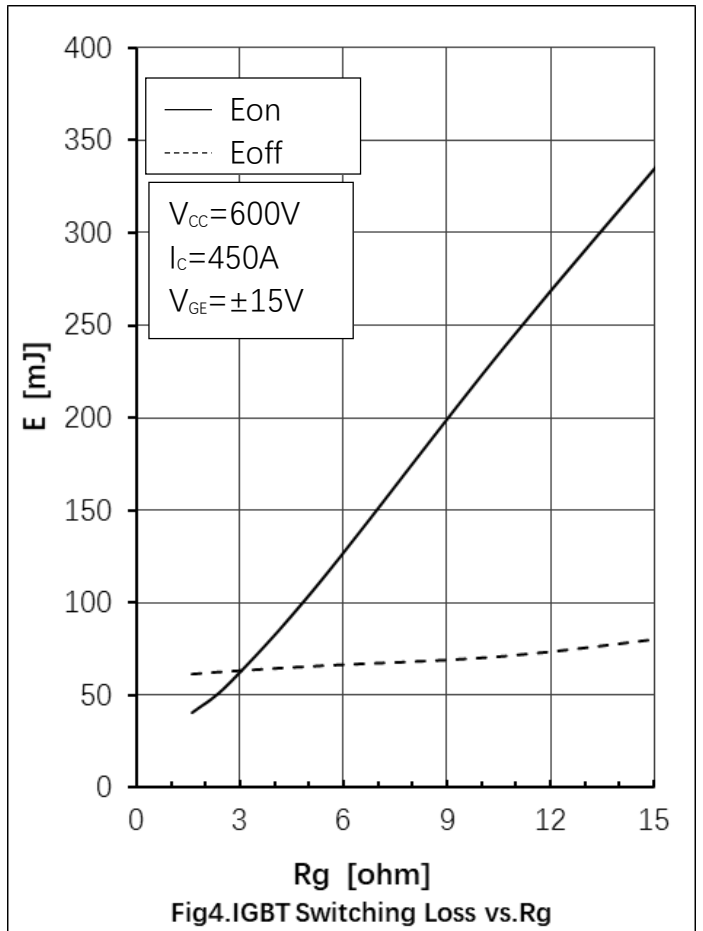
V_{CE} [V]
Output Characteristics



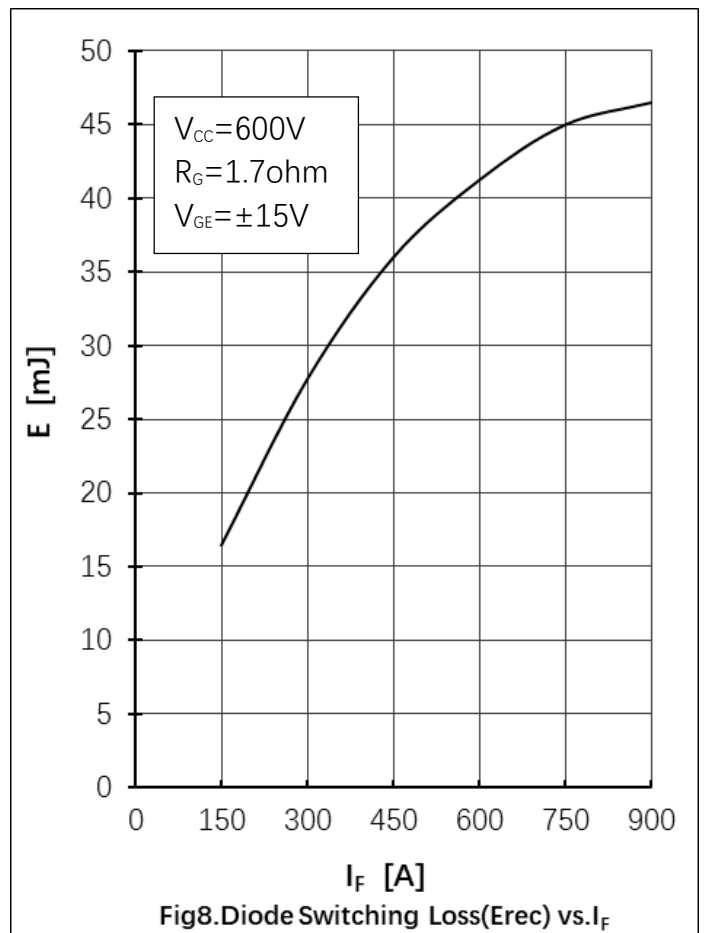
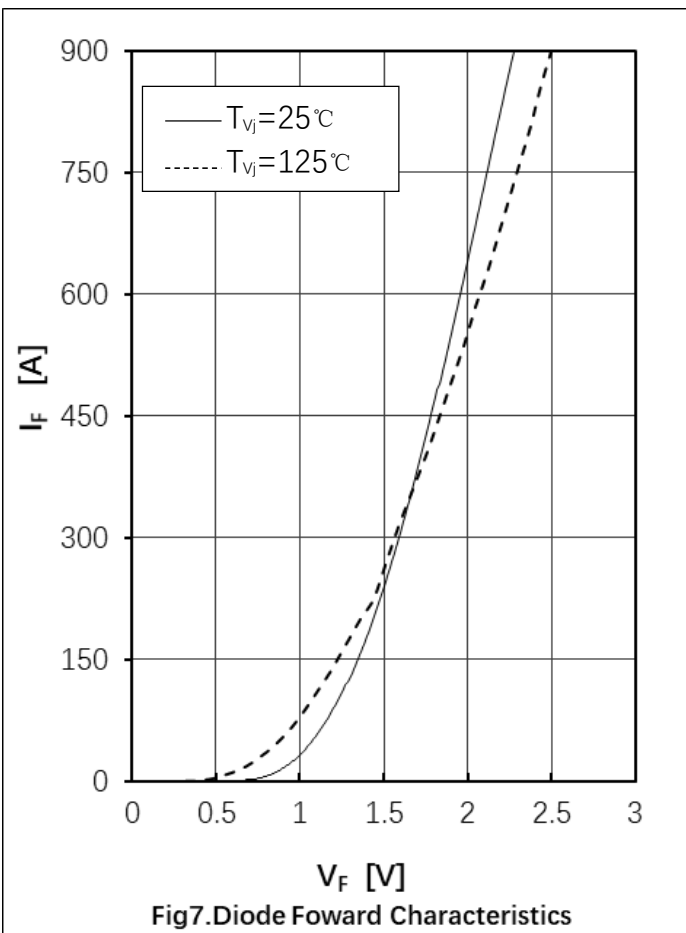
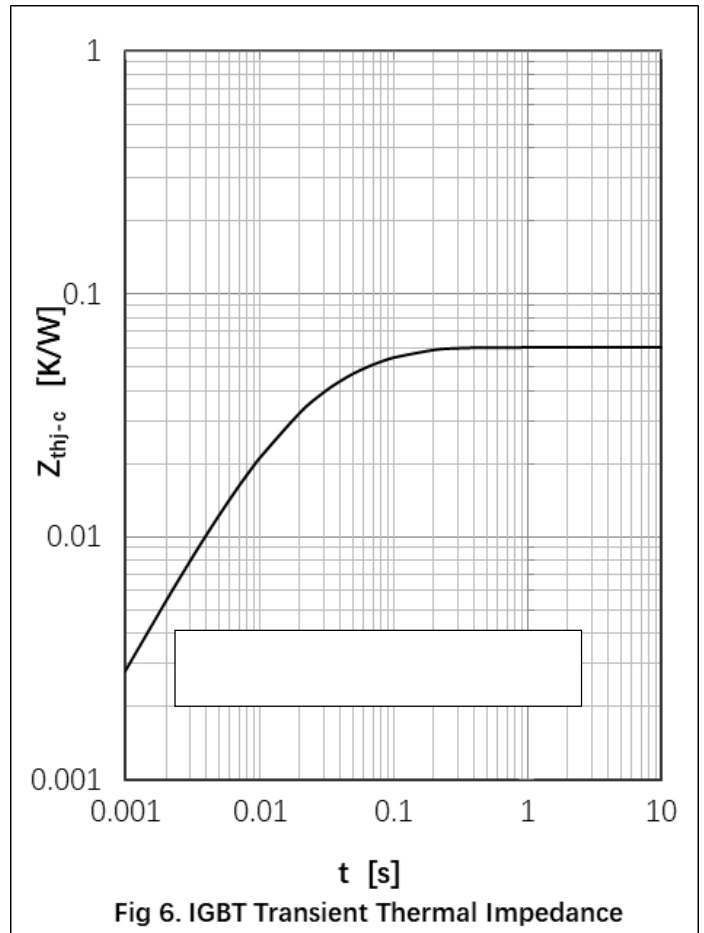
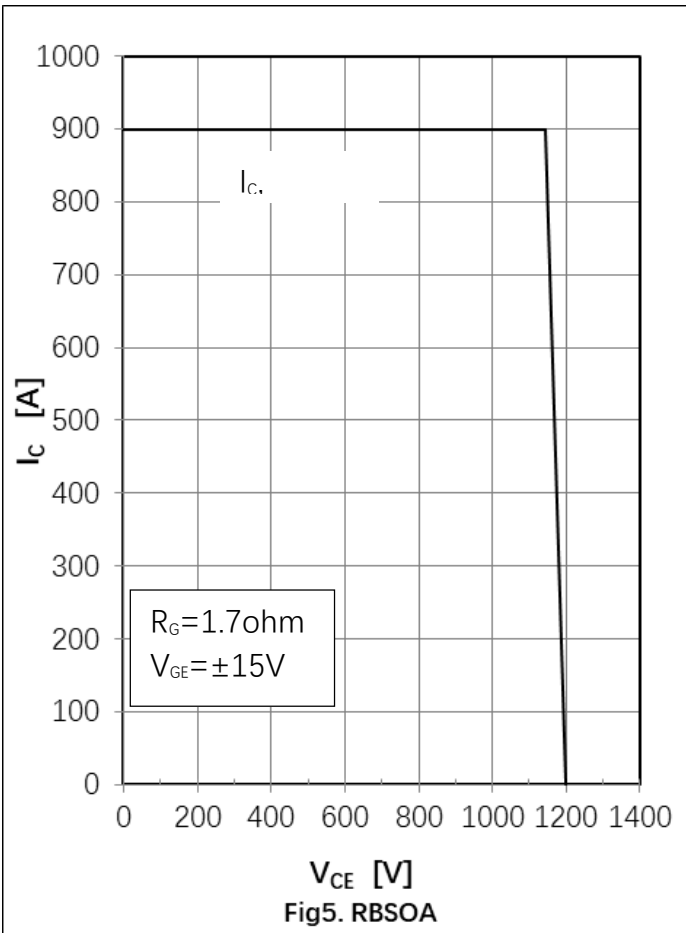
V_{GE} [V]
Transfer Characteristics

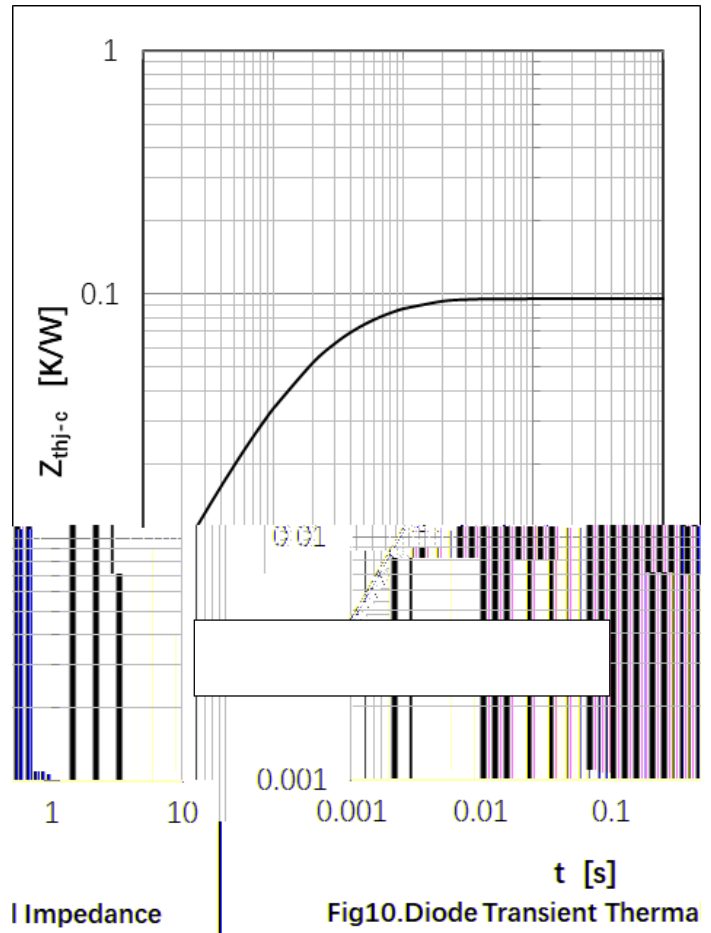
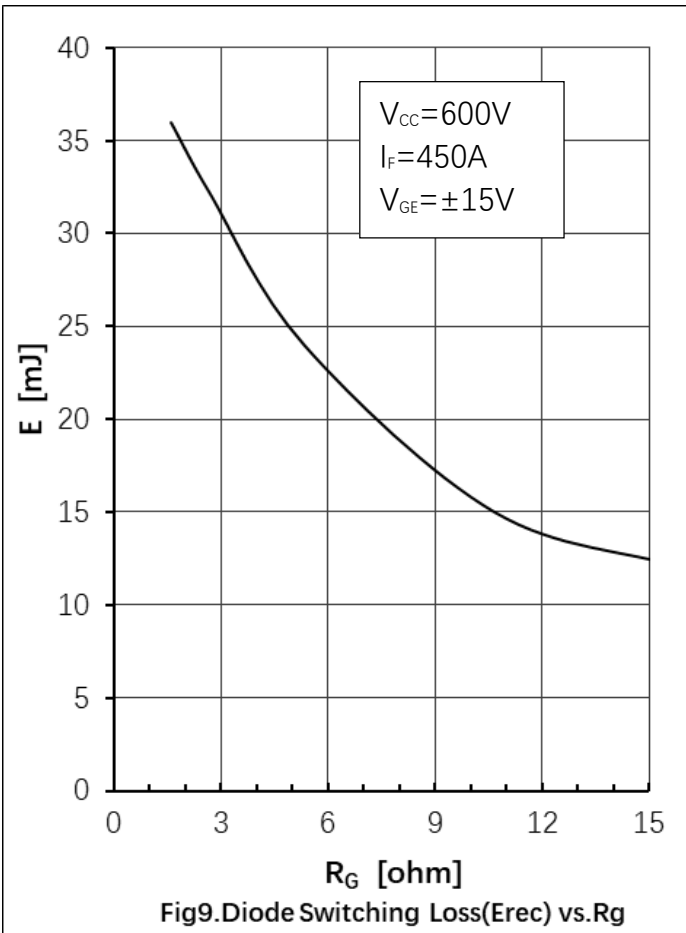


Switching Loss vs. I_c



Switching Loss vs. R_g



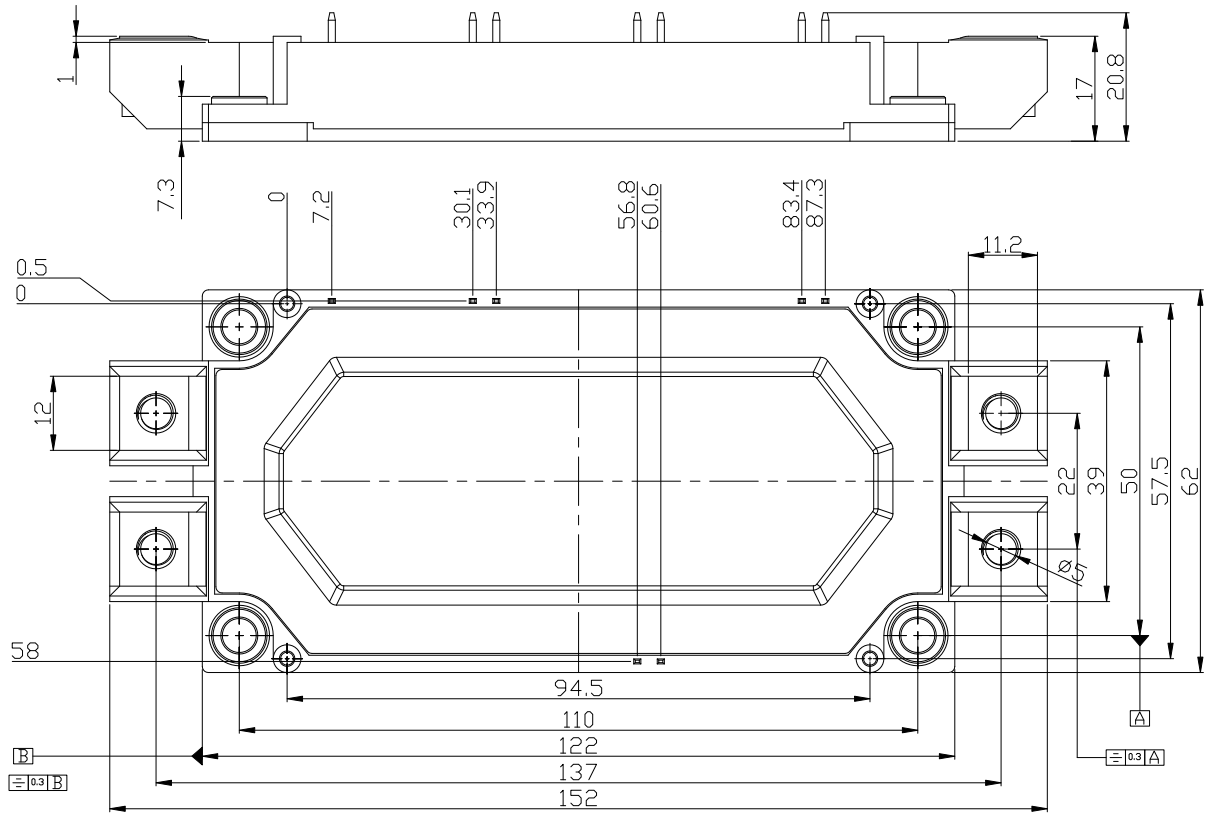




Package Outline Information

CASE: E3

Dimensions in Millimeters



Dimensions in mm