

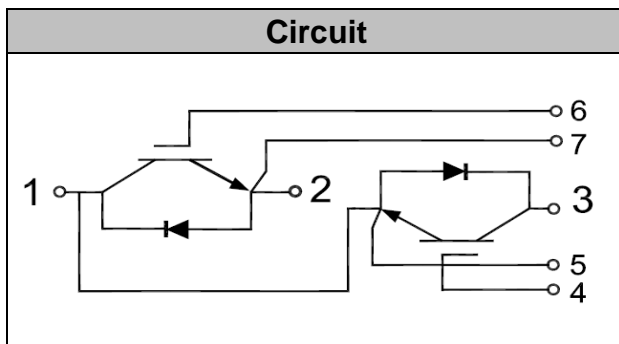
## IGBT Modules



**V<sub>CES</sub>**            1200V  
**I<sub>c</sub>**                 40A

### Applications

- High frequency drivers
- Solar inverters
- UPS (Uninterruptible Power Supplies)
- Electric welding machine



### Features

- High speed IGBT in NPT technology
- Low switching losses
- High short circuit capability(10us)
- Including ultra fast & soft recovery anti-parallel FWD
- Low inductance

### ● Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Collector-Emitter Voltage	V <sub>CES</sub>	V <sub>GE</sub> =0V, I <sub>c</sub> =1mA, T <sub>vj</sub> =25°C	1200	V
Continuous Collector Current	I <sub>c</sub>	T <sub>c</sub> =80°C	40	A
Peak Collector Current	I <sub>CRM</sub>	t <sub>p</sub> =1ms	80	A
Gate-Emitter Voltage	V <sub>GES</sub>	T <sub>vj</sub> =25°C	±20	V
Total Power Dissipation (IGBT-inverter)	P <sub>tot</sub>	T <sub>c</sub> =25°C T <sub>vjmax</sub> =150°C	312	W



## ● IGBT Characteristics

Parameter	Symbol	Conditions	Value			Unit	
			Min.	Typ.	Max.		
Gate-emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=1.6mA, T_{vj}=25^{\circ}C$	5.0	5.8	6.6	V	
Collector-Emitter Cut-off Current	$I_{CES}$	$V_{CE}=1200V, V_{GE}=0V, T_{vj}=25^{\circ}C$			1	mA	
		$V_{CE}=1200V, V_{GE}=0V, T_{vj}=125^{\circ}C$			5	mA	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=40A, V_{GE}=15V, T_{vj}=25^{\circ}C$		2.00		V	
		$I_C=40A, V_{GE}=15V, T_{vj}=125^{\circ}C$		2.30		V	
Input Capacitance	$C_{ies}$	$V_{CE}=25V, V_{GE}=0V, f=1MHz, T_{vj}=25^{\circ}C$		3.5		nF	
Output Capacitance	$C_{oes}$			0.45		nF	
Reverse Transfer Capacitance	$C_{res}$			0.21		nF	
Internal Gate Resistance	$R_{g-int}$			2.5		$\Omega$	
Gate-Emitter leakage current	$I_{GES}$	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			400	nA	
Turn-on Delay Time	$t_{d(on)}$	$I_C=40A, V_{CE}=600V, V_{GE}=\pm 15V, R_{GON}=10\Omega, R_{GOFF}=5.1\Omega, L_s=35nH, L_d=320uH, T_{vj}=25^{\circ}C$		21		ns	
Rise Time	$t_r$			42		ns	
Turn-off Delay Time	$t_{d(off)}$			192		ns	
Fall Time	$t_f$			28		ns	
Energy Dissipation During Turn-on Time	$E_{on}$			3.7		mJ	
Energy Dissipation During Turn-off Time	$E_{off}$			1.5		mJ	
Turn-on Delay Time	$t_{d(on)}$				28		ns
Rise Time	$t_r$				45		ns
Turn-off Delay Time	$t_{d(off)}$				250		ns
Fall Time	$t_f$				30		ns
Energy Dissipation During Turn-on Time	$E_{on}$	$T_{vj}=125^{\circ}C$		5.1		mJ	
Energy Dissipation During Turn-off Time	$E_{off}$			2.2		mJ	
SC Data	$I_{sc}$	$T_p \leq 10\mu s, V_{GE}=15V, T_{vj}=125^{\circ}C, V_{cc}=600V, V_{CEM} \leq 1200V$		240		A	



## ● Diode Characteristics

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Diode DC Forward Current	$I_F$	$T_c=80^\circ\text{C}$		40		A
Diode Peak Forward Current	$I_{FRM}$	$t_p=1\text{ms}$		80		A
Forward Voltage	$V_F$	$I_F=40\text{A}, T_{vj}=25^\circ\text{C}$		1.85		V
		$I_F=40\text{A}, T_{vj}=125^\circ\text{C}$		1.80		V

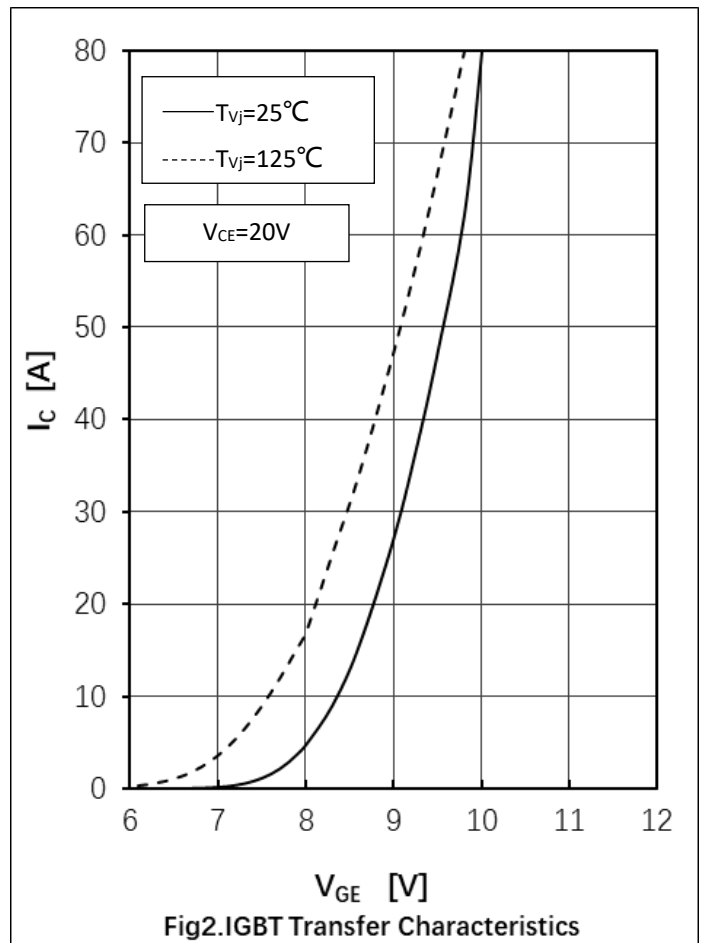
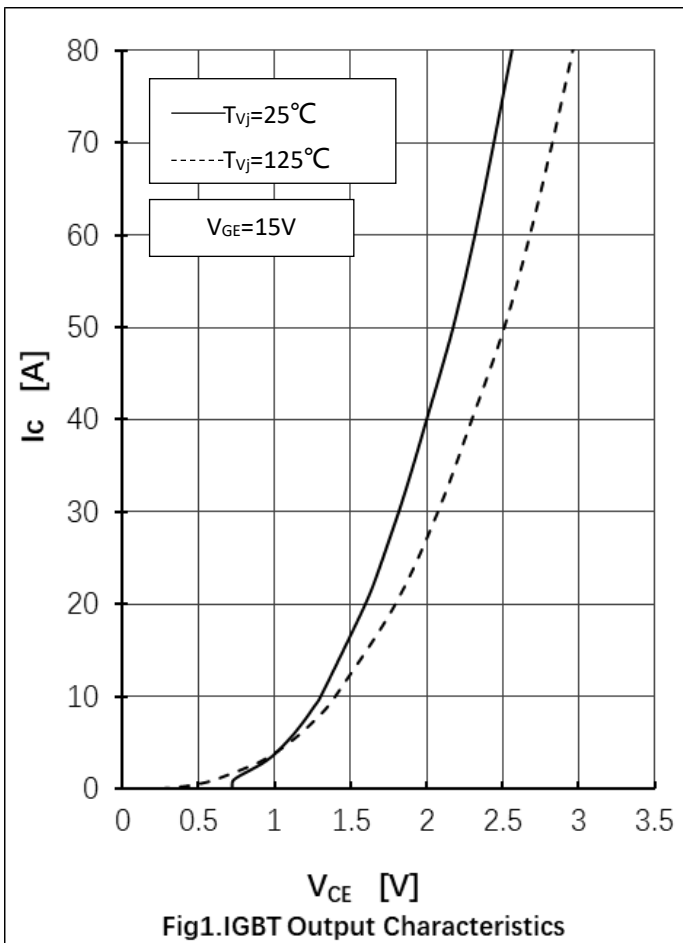
Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Recovered Charge	$Q_{rr}$	$I_F=40\text{A}$ $V_R=600\text{V}$ $-di_F/dt=900\text{A}/\mu\text{s}$ $T_{vj}=25^\circ\text{C}$		2.85		$\mu\text{C}$
Peak Reverse Recovery Current	$I_{rr}$			45		A
Reverse Recovery Energy	$E_{rec}$			0.80		mJ
Recovered Charge	$Q_{rr}$	$I_F=40\text{A}$ $V_R=600\text{V}$ $-di_F/dt=900\text{A}/\mu\text{s}$ $T_{vj}=125^\circ\text{C}$		5.16		$\mu\text{C}$
Peak Reverse Recovery Current	$I_{rr}$			50		A
Reverse Recovery Energy	$E_{rec}$			1.55		mJ

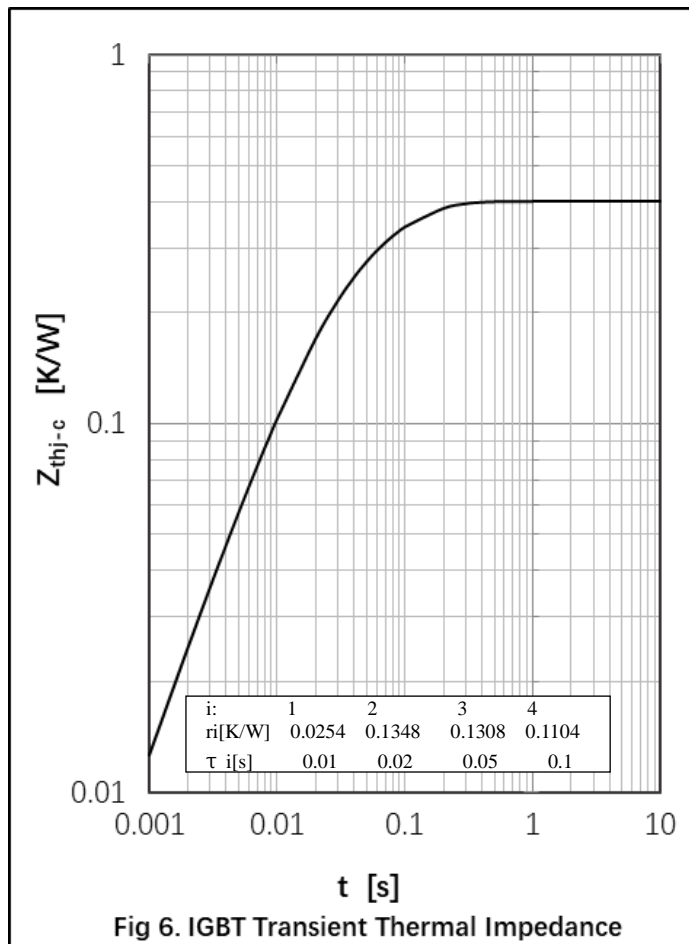
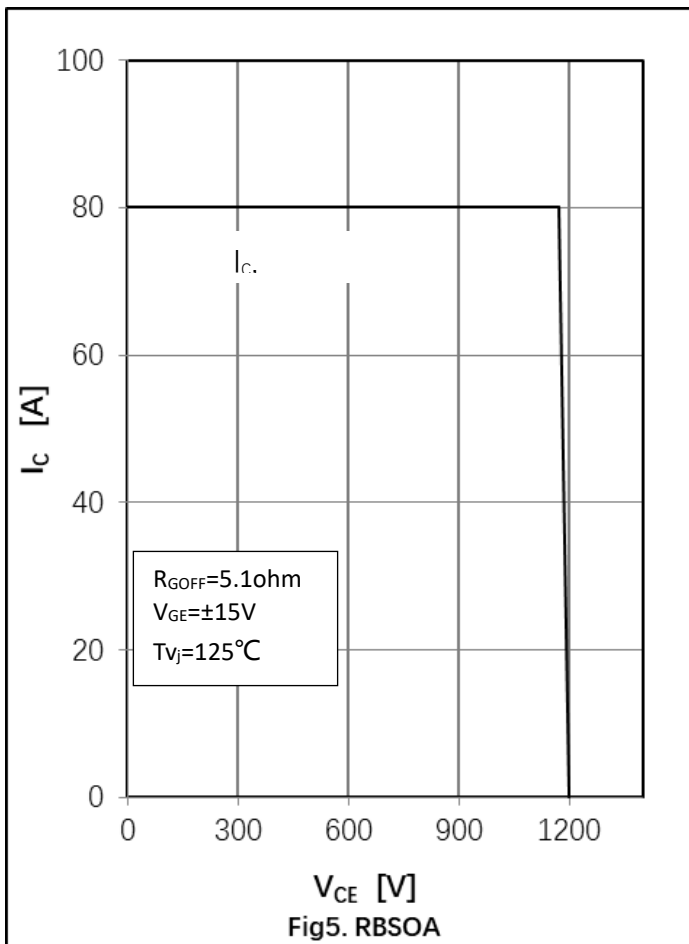
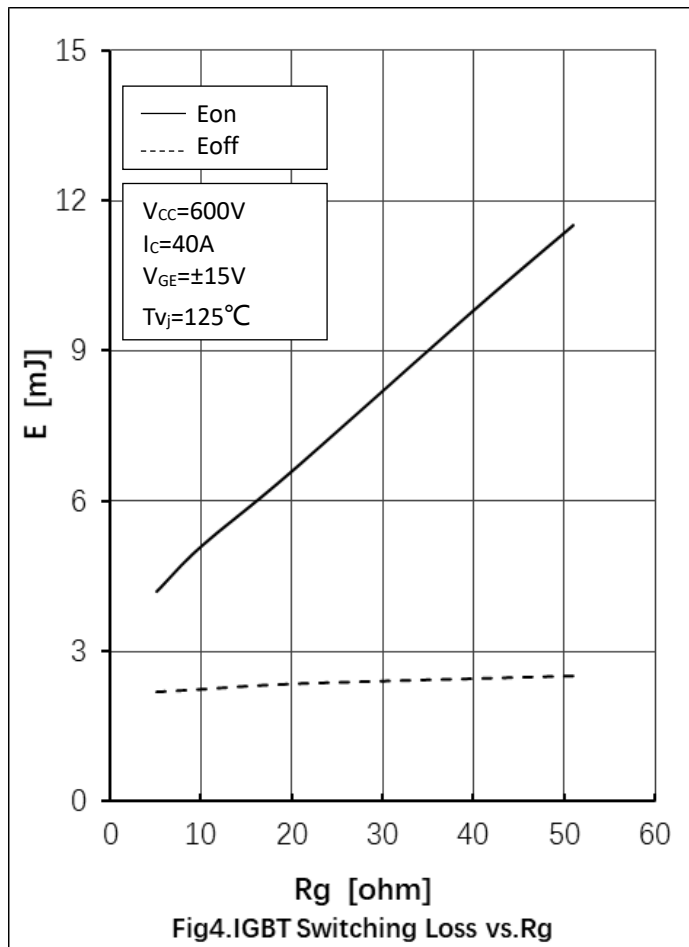
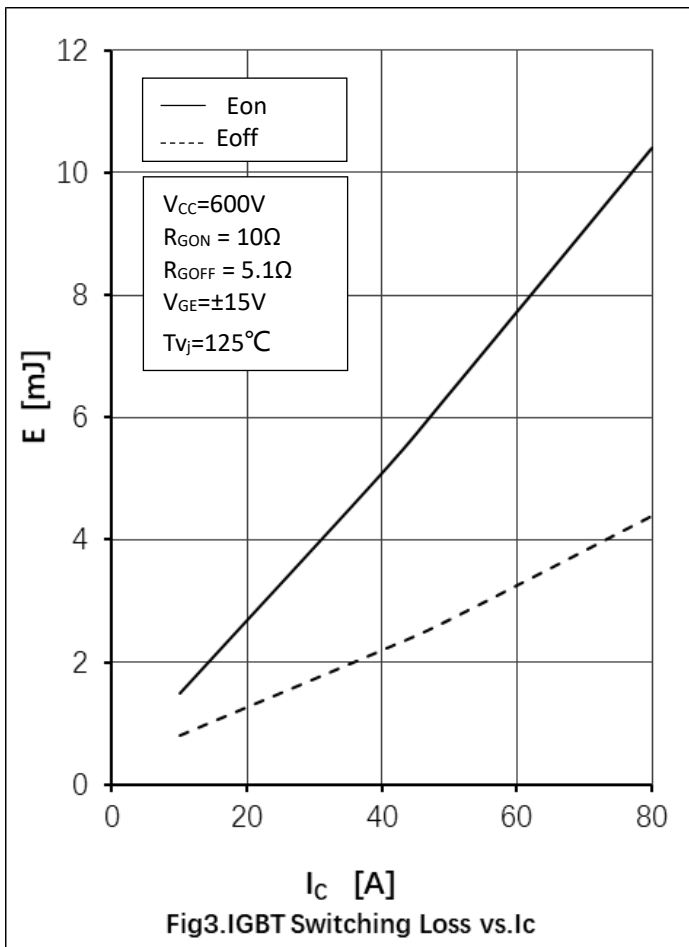


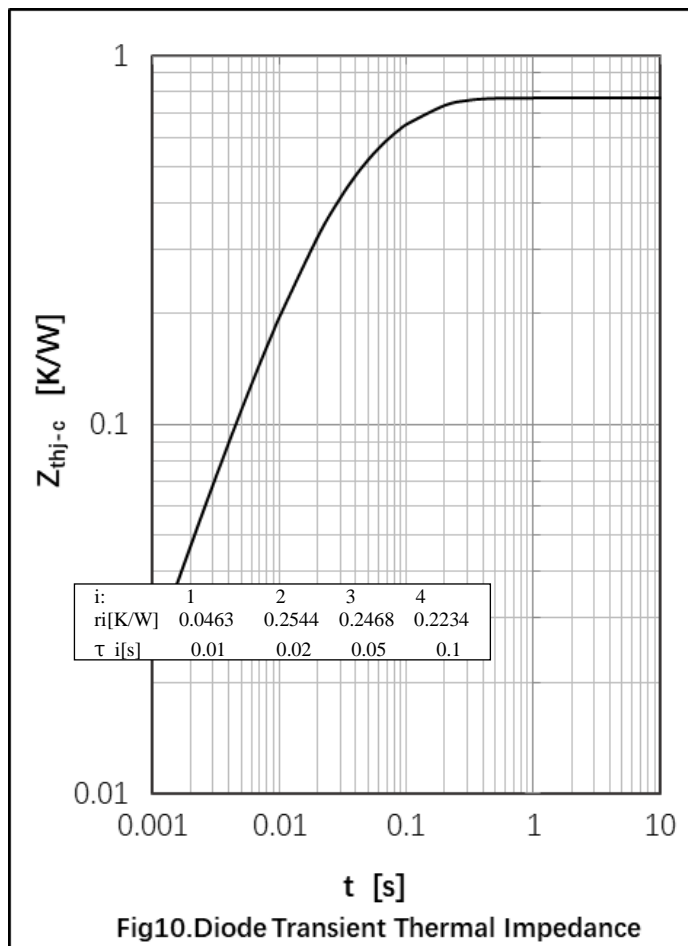
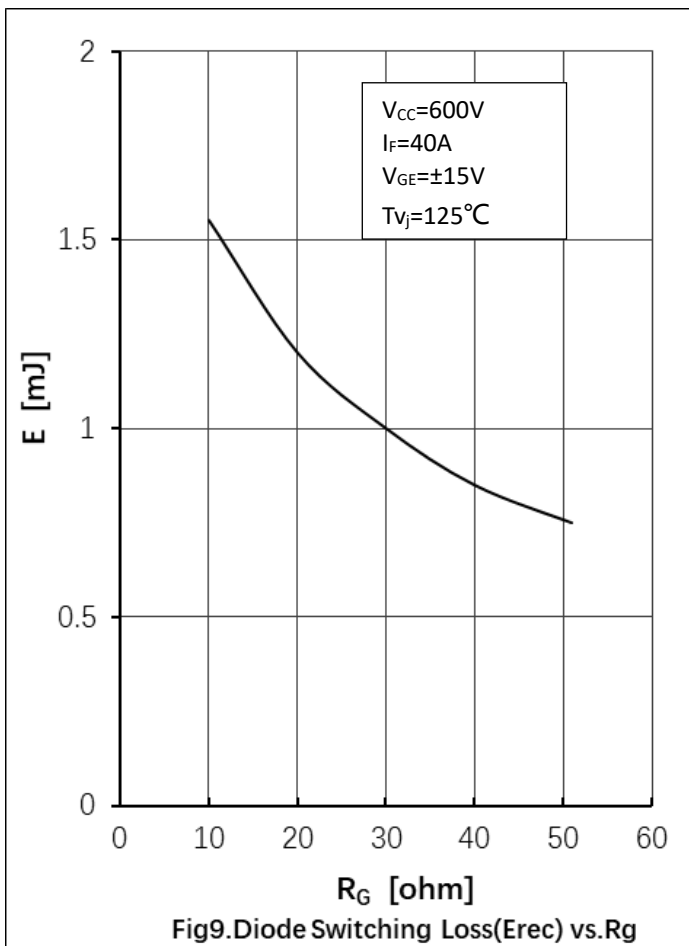
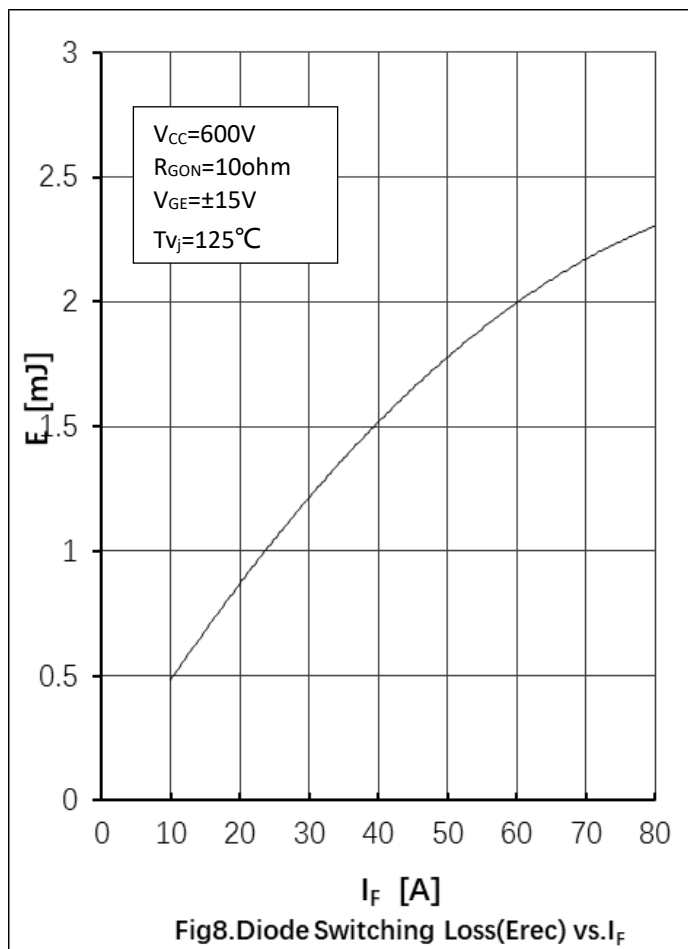
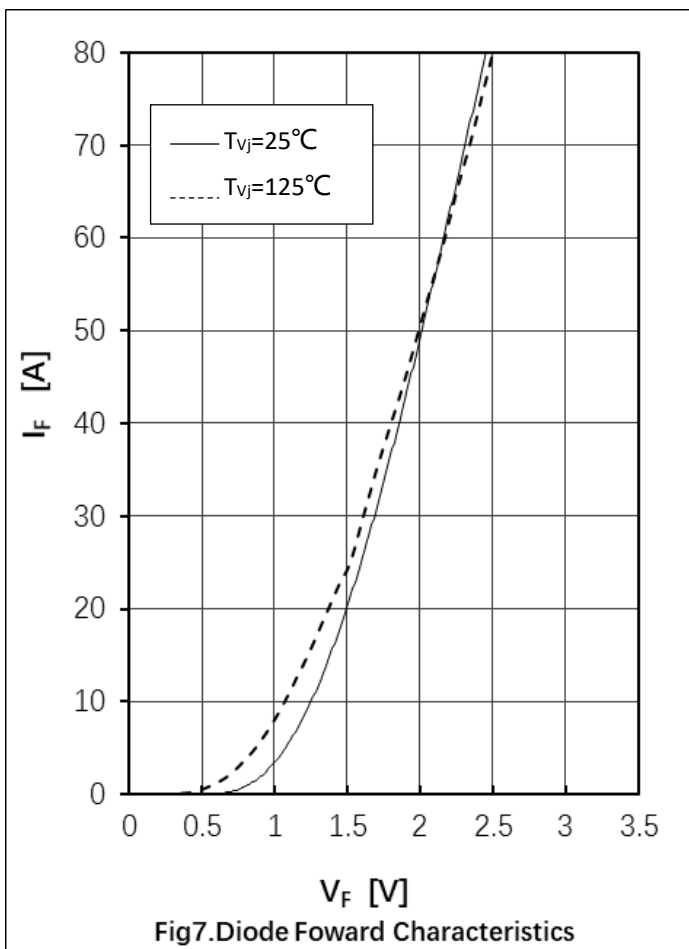
● **Module Characteristics**  $T_C=25^\circ\text{C}$  unless otherwise specified

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	$T_{jmax}$				150	$^\circ\text{C}$
Operating Junction Temperature	$T_{vj\text{op}}$		-40		125	$^\circ\text{C}$
Storage Temperature	$T_{stg}$		-40		125	$^\circ\text{C}$
Stray-inductance-module	$L_{SCE}$			30		nH
Module lead resistance, terminals-chip	$R_{cc'+EE'}$	$T_C=25^\circ\text{C}$ , per switch		0.75		$\text{m}\Omega$
Junction-to Case	$R_{\theta jc}$	per IGBT-inverter			0.40	K/W
		per Diode-inverter			0.78	K/W
Case to Sink	$R_{\theta cs}$	Conductive grease applied		0.05		K/W
Module Electrodes Torque	$M_t$	Recommended(M5)	2.5		5.0	N·m
Module-to-Sink Torque	$M_s$	Recommended(M6)	3.0		5.0	N·m
Weight of Module	G			150		g

## Performance Curves

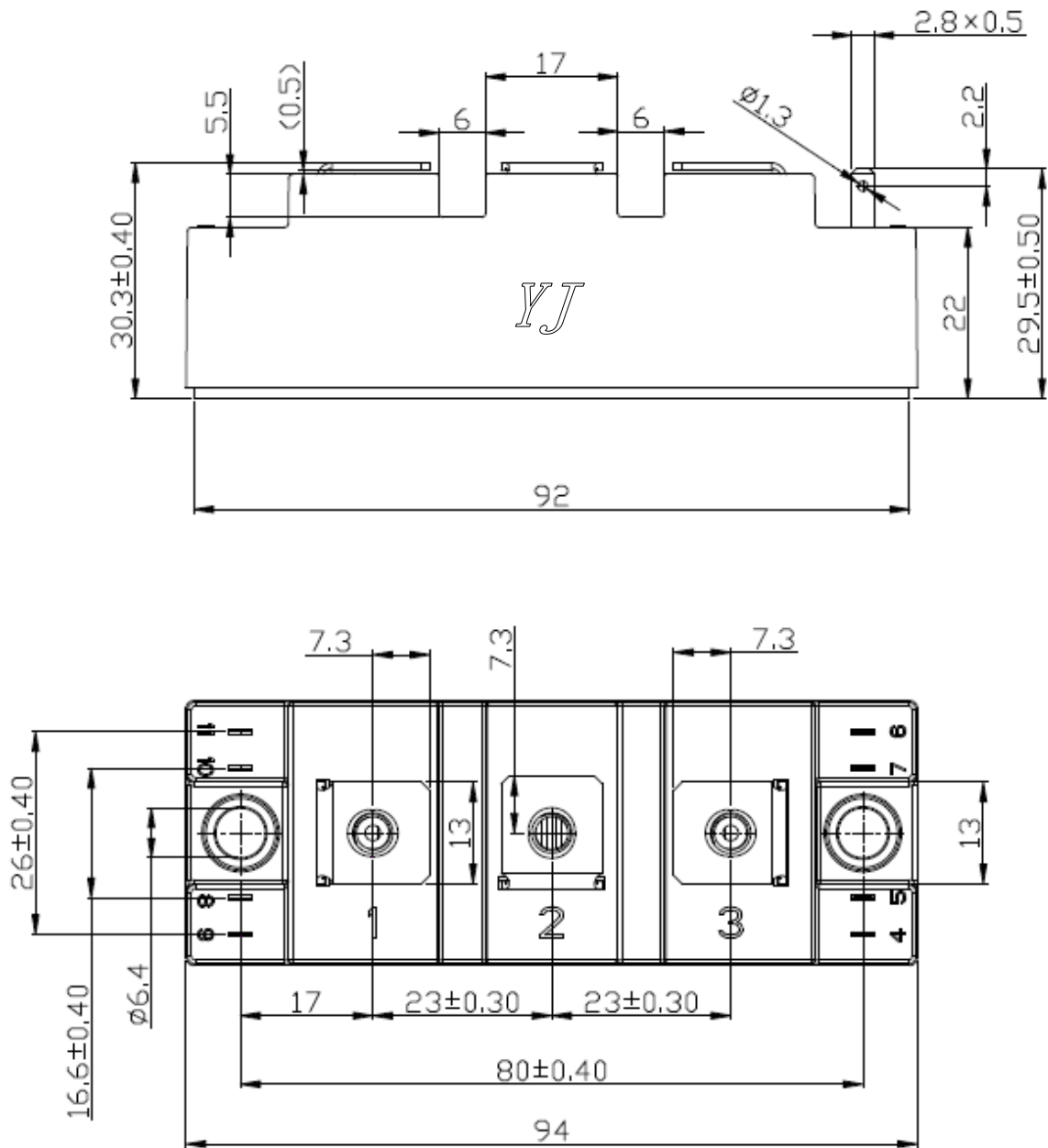






## Package Outline Information

CASE: C1



Dimensions in mm