

1700V 100A IGBT Module

PRODUCT FEATURES

- High short circuit capability, self limiting short circuit current
- IGBT CHIP(Highly rugged SPT+ design)
- $V_{CE(sat)}$ with positive temperature coefficient
- Ultra Low Loss, High Ruggedness
- Free wheeling diodes with fast and soft reverse recovery



APPLICATIONS

- AC motor control
- Motion/servo control
- Inverter and power supplies
- Photovoltaic/Fuel cell

IGBT-inverter

ABSOLUTE MAXIMUM RATINGS ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions	Values	Unit
V_{CES}	Collector Emitter Voltage	$T_J=25^\circ\text{C}$	V
V_{GES}	Gate Emitter Voltage		
I_C	DC Collector Current	$T_C=25^\circ\text{C}, T_{Jmax}=175^\circ\text{C}$	A
		$T_C=100^\circ\text{C}, T_{Jmax}=175^\circ\text{C}$	
I_{CM}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	
P_{tot}	Power Dissipation Per IGBT	$T_C=25^\circ\text{C}, T_{Jmax}=175^\circ\text{C}$	W

Diode-inverter

ABSOLUTE MAXIMUM RATINGS ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions	Values	Unit
V_{RRM}	Repetitive Reverse Voltage	$T_J=25^\circ\text{C}$	V
$I_{F(AV)}$	Average Forward Current		A
I_{FRM}	Repetitive Peak Forward Current	$t_p=1\text{ms}$	
I^2t		$T_J=150^\circ\text{C}, t=10\text{ms}, V_R=0\text{V}$	A^2S

IGBT-inverter

ELECTRICAL CHARACTERISTICS ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
$V_{GE(th)}$	Gate Emitter Threshold Voltage	$V_{CE}=V_{GE}, I_C=4\text{mA}$	5.4	6.2	7.4	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$I_C=100\text{A}, V_{GE}=15\text{V}, T_J=25^{\circ}\text{C}$		2.3	2.7	
		$I_C=100\text{A}, V_{GE}=15\text{V}, T_J=125^{\circ}\text{C}$		2.65		
		$I_C=100\text{A}, V_{GE}=15\text{V}, T_J=150^{\circ}\text{C}$		2.7		
I_{CES}	Collector Leakage Current	$V_{CE}=1700\text{V}, V_{GE}=0\text{V}, T_J=25^{\circ}\text{C}$			1	mA
		$V_{CE}=1700\text{V}, V_{GE}=0\text{V}, T_J=150^{\circ}\text{C}$			10	mA
I_{GES}	Gate Leakage Current	$V_{CE}=0\text{V}, V_{GE}=\pm 15\text{V}, T_J=25^{\circ}\text{C}$	-500		500	nA
Q_g	Gate Charge	$V_{CE}=900\text{V}, I_C=100\text{A}, V_{GE}=\pm 15\text{V}$		0.9		μC
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		7.3		nF
C_{res}	Reverse Transfer Capacitance			0.28		nF
$t_{d(on)}$	Turn on Delay Time	$V_{CC}=900\text{V}, I_C=100\text{A}$ $R_G=10\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^{\circ}\text{C}$		150	ns
			$T_J=150^{\circ}\text{C}$		170	ns
t_r	Rise Time	$V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^{\circ}\text{C}$		105	ns
			$T_J=150^{\circ}\text{C}$		110	ns
$t_{d(off)}$	Turn off Delay Time	$V_{CC}=900\text{V}, I_C=100\text{A}$ $R_G=10\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^{\circ}\text{C}$		400	ns
			$T_J=150^{\circ}\text{C}$		460	ns
t_f	Fall Time	$V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^{\circ}\text{C}$		180	ns
			$T_J=150^{\circ}\text{C}$		310	ns
E_{on}	Turn on Energy	$V_{CC}=900\text{V}, I_C=100\text{A}$ $R_G=10\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^{\circ}\text{C}$		36	mJ
			$T_J=125^{\circ}\text{C}$		45	mJ
			$T_J=150^{\circ}\text{C}$		47.5	mJ
E_{off}	Turn off Energy	$V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^{\circ}\text{C}$		16	mJ
			$T_J=125^{\circ}\text{C}$		25	mJ
			$T_J=150^{\circ}\text{C}$		27.5	mJ
I_{SC}	Short Circuit Current	$t_{psc}\leq 10\mu\text{s}, V_{GE}=15\text{V}$ $T_J=150^{\circ}\text{C}, V_{CC}=1000\text{V}$		320		A
R_{thJC}	Junction to Case Thermal Resistance (Per IGBT)				0.19	K/W

Diode-inverter

ELECTRICAL CHARACTERISTICS ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F=100\text{A}, V_{GE}=0\text{V}, T_J=25^{\circ}\text{C}$		1.75	2.3	V
		$I_F=100\text{A}, V_{GE}=0\text{V}, T_J=125^{\circ}\text{C}$		1.85		
		$I_F=100\text{A}, V_{GE}=0\text{V}, T_J=150^{\circ}\text{C}$		1.9		
t_{rr}	Reverse Recovery Time	$I_F=100\text{A}, V_R=900\text{V}$ $di_F/dt=-1100\text{A}/\mu\text{s}$ $T_J=150^{\circ}\text{C}$		1000		ns
I_{RRM}	Max. Reverse Recovery Current			84		A
Q_{RR}	Reverse Recovery Charge			48.3		μC
E_{rec}	Reverse Recovery Energy			28.5		mJ
R_{thJCD}	Junction to Case Thermal Resistance (Per Diode)				0.31	K/W

MODULE CHARACTERISTICS ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Values	Unit
T_{Jmax}	Max. Junction Temperature		175	°C
T_{Jop}	Operating Temperature		-40~150	
T_{stg}	Storage Temperature		-40~125	
V_{isol}	Isolation Breakdown Voltage	AC, 50Hz(R.M.S), t=1minute	4000	V
CTI	Comparative Tracking Index		> 225	
Torque	to heatsink	Recommended (M6)	3~5	Nm
	to terminal	Recommended (M6)	2.5~5	Nm
Weight			300	g

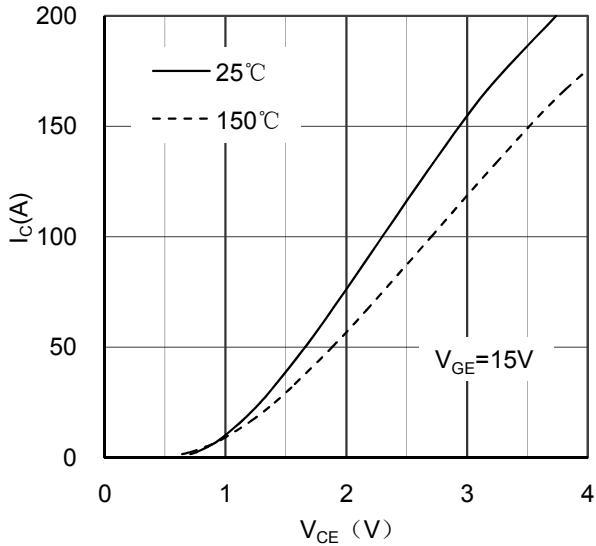


Figure 1. Typical Output Characteristics IGBT-inverter

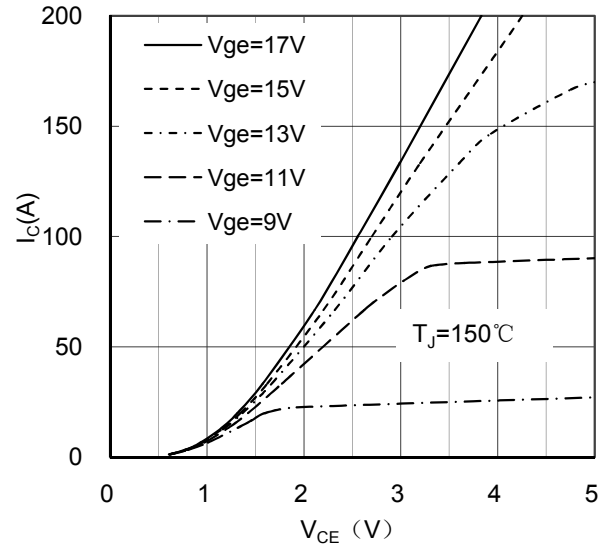


Figure 2. Typical Output Characteristics IGBT-inverter

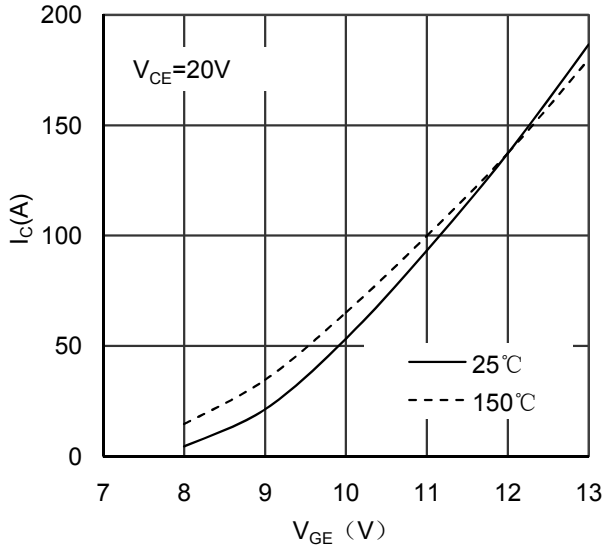


Figure 3. Typical Transfer characteristics IGBT-inverter

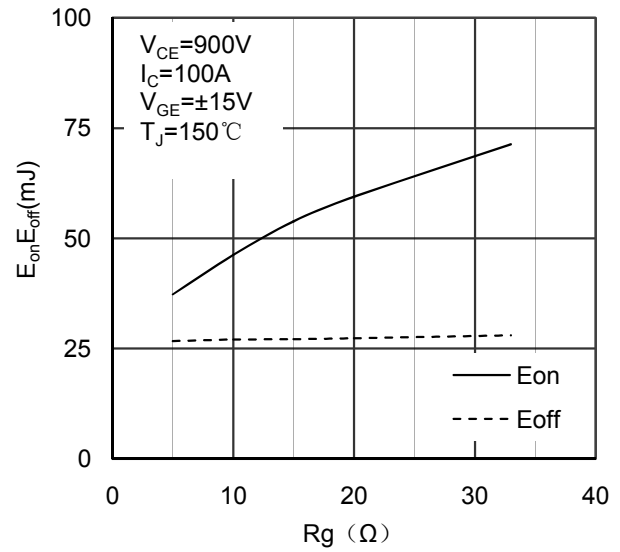


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

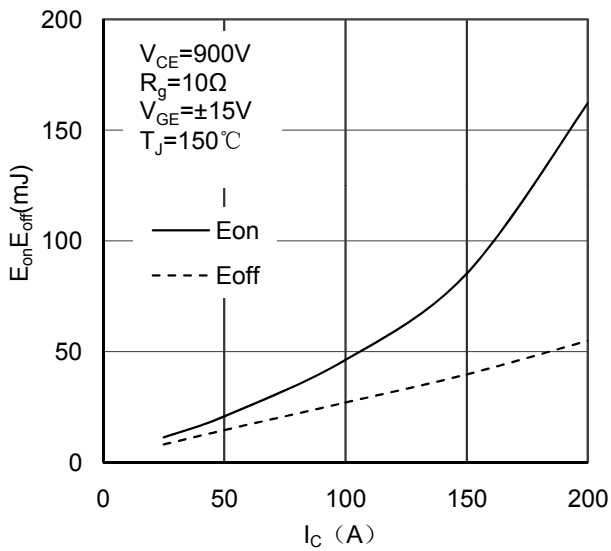


Figure 5. Switching Energy vs Collector Current IGBT-inverter

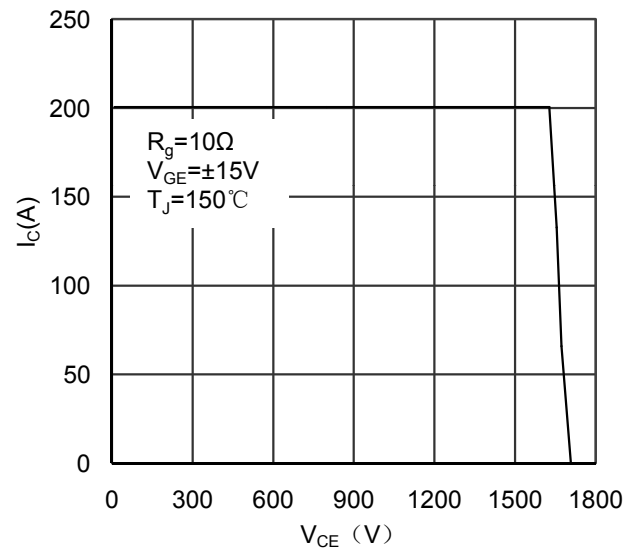


Figure 6. Reverse Biased Safe Operating Area IGBT-inverter

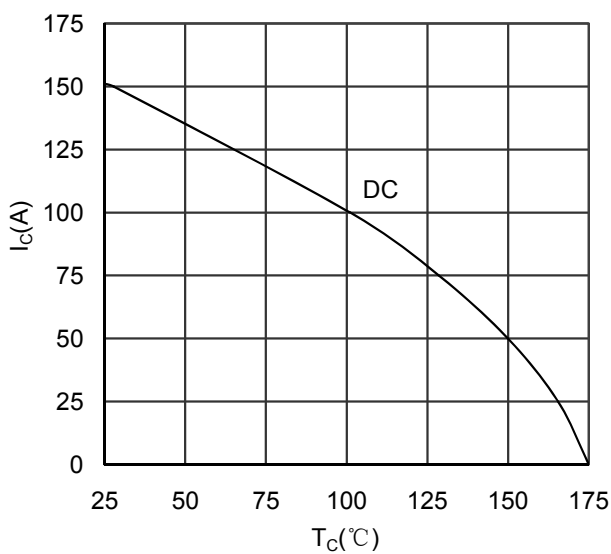


Figure 7. Collector Current vs Case temperature IGBT-inverter

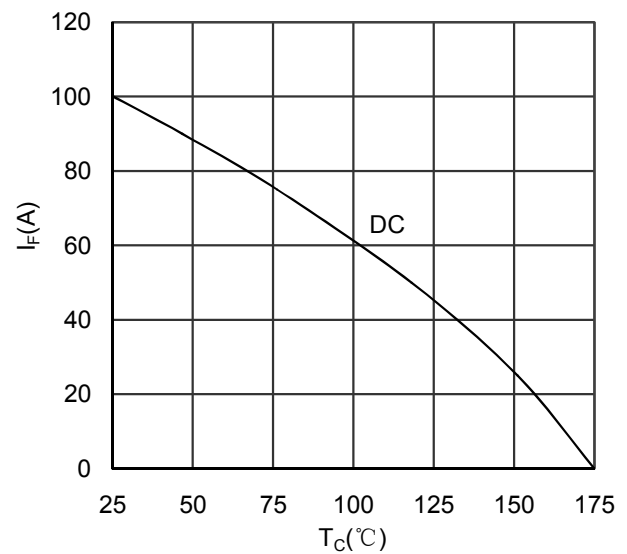


Figure 8. Forward current vs Case temperature Diode-inverter

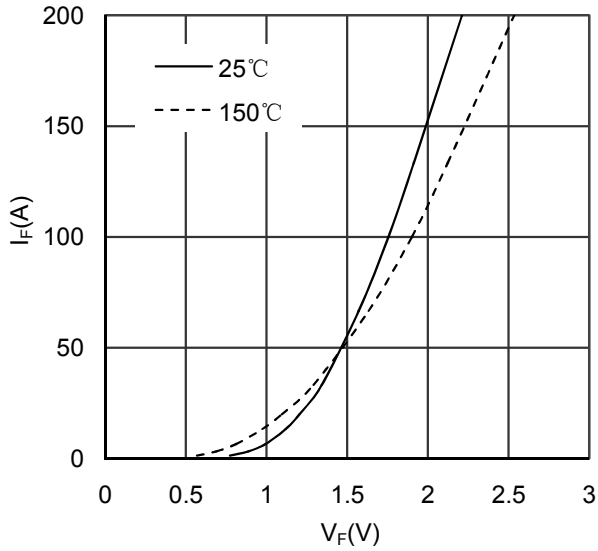


Figure 9. Diode Forward Characteristics Diode -inverter

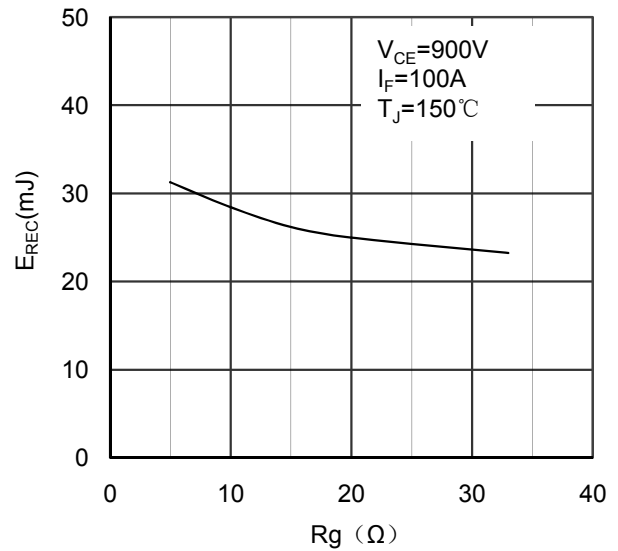


Figure 10. Switching Energy vs Gate Resistor Diode -inverter

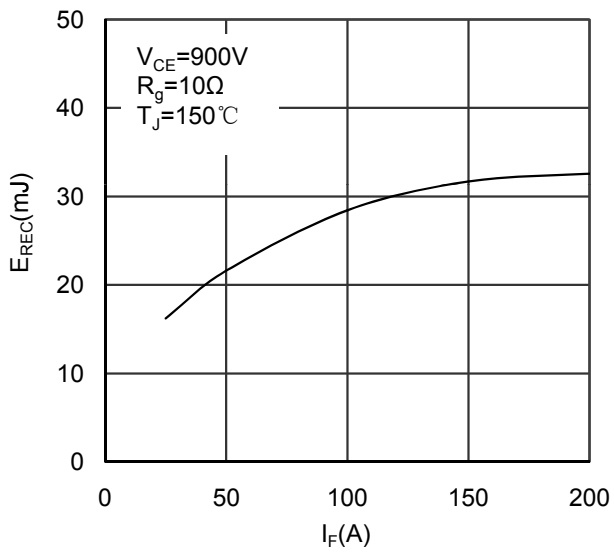


Figure 11. Switching Energy vs Forward Current Diode-inverter

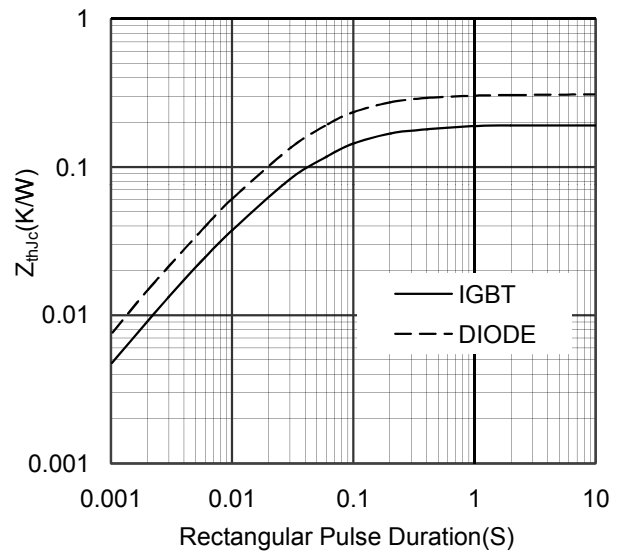


Figure 12. Transient Thermal Impedance of Diode and IGBT-inverter

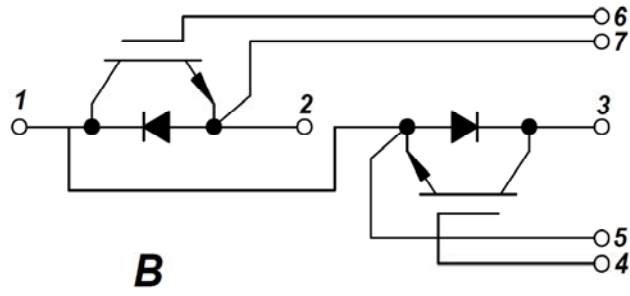
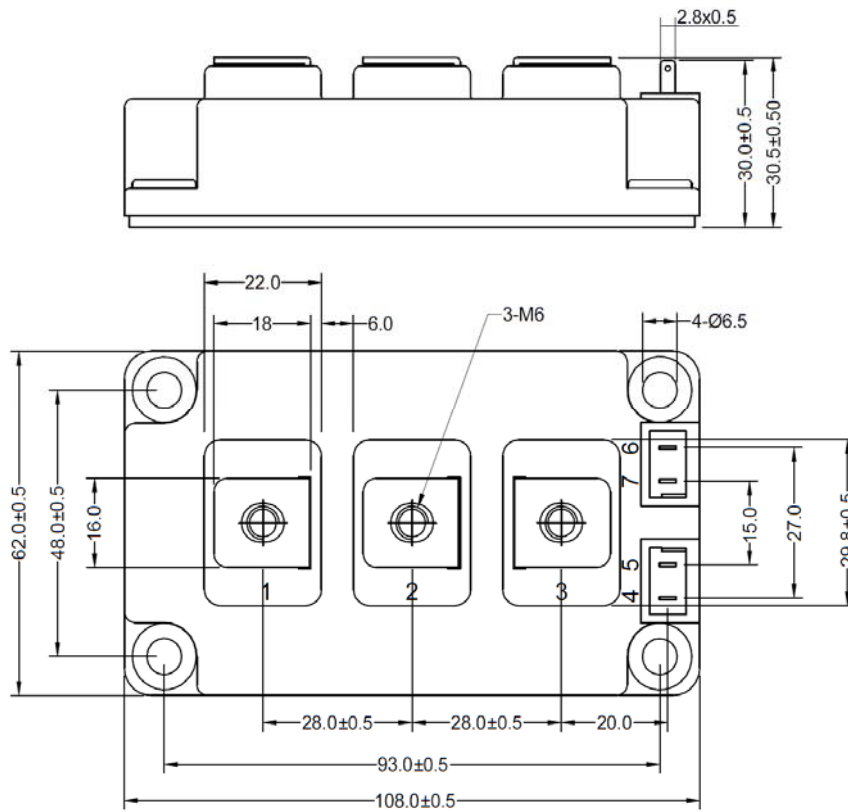


Figure 13. Circuit Diagram



Dimensions in (mm)

Figure 14. Package Outline