

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	$T_J=25^\circ\text{C}$	1700
V_{GES}	Gate Emitter Voltage		± 20
I_C	DC Collector Current	$T_C=25^\circ\text{C}, T_{Jmax}=175^\circ\text{C}$	450
		$T_C=100^\circ\text{C}, T_{Jmax}=175^\circ\text{C}$	300
I_{CM}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	600
P_{tot}	Power Dissipation Per IGBT	$T_C=25^\circ\text{C}, T_{Jmax}=175^\circ\text{C}$	1875

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	$T_J=25^\circ\text{C}$	1700
$I_{F(AV)}$	Average Forward Current		300
I_{FRM}	Repetitive Peak Forward Current	$t_p=1\text{ms}$	600
I^2t		$T_J=150^\circ\text{C}, t=10\text{ms}, V_R=0\text{V}$	11250

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MMG300D170B

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	$V_{CE}=V_{GE}, I_C=12\text{mA}$	5.4	6.2	7.4	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$I_C=300\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$		2.3	2.7	
		$I_C=300\text{A}, V_{GE}=15\text{V}, T_J=125^\circ\text{C}$		2.65		
		$I_C=300\text{A}, V_{GE}=15\text{V}, T_J=150^\circ\text{C}$		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	$V_{CE}=900\text{V}, I_C=300\text{A}, V_{GE}=\pm 15\text{V}$		2.1		μC
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		18.5		nF
C_{res}	Reverse Transfer Capacitance			0.72		nF
$t_{d(on)}$	Turn on Delay Time	$V_{CC}=900\text{V}, I_C=300\text{A}$ $R_G=4.7\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		190	ns
			$T_J=150^\circ\text{C}$		230	ns
t_r	Rise Time	$V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		160	ns
			$T_J=150^\circ\text{C}$		170	ns
$t_{d(off)}$	Turn off Delay Time	$V_{CC}=900\text{V}, I_C=300\text{A}$ $R_G=4.7\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		560	ns
			$T_J=150^\circ\text{C}$		680	ns
t_f	Fall Time	$V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		170	ns
			$T_J=150^\circ\text{C}$		310	ns
E_{on}	Turn on Energy	$V_{CC}=900\text{V}, I_C=300\text{A}$ $R_G=4.7\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		126	mJ
			$T_J=125^\circ\text{C}$		160	mJ
			$T_J=150^\circ\text{C}$		173	mJ
E_{off}	Turn off Energy	$V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		67	mJ
			$T_J=125^\circ\text{C}$		93	mJ
			$T_J=150^\circ\text{C}$		100	mJ
I_{SC}	Short Circuit Current	$t_{psc}\leq 10\mu\text{S}, V_{GE}=15\text{V}$ $T_J=150^\circ\text{C}, V_{CC}=1000\text{V}$		960		A
R_{thJC}	Junction to Case Thermal Resistance (Per IGBT)				0.08	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	$I_F=300\text{A}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$		1.75	2.3	V
		$I_F=300\text{A}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$		1.85		
		$I_F=300\text{A}, V_{GE}=0\text{V}, T_J=150^\circ\text{C}$		1.9		
t_{rr}	Reverse Recovery Time	$I_F=300\text{A}, V_R=900\text{V}$ $dI_F/dt=-1800\text{A}/\mu\text{s}$ $T_J=150^\circ\text{C}$		750		ns
I_{RRM}	Max. Reverse Recovery Current			250		A
Q_{RR}	Reverse Recovery Charge			117		μC
E_{rec}	Reverse Recovery Energy			87.5		mJ
R_{thJCD}	Junction to Case Thermal Resistance (Per Diode)				0.14	K/W

MMG300D170B

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

Symbol	Parameter/Test Conditions	Values	Unit	
T_{Jmax}	Max. Junction Temperature	175	$^\circ\text{C}$	
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

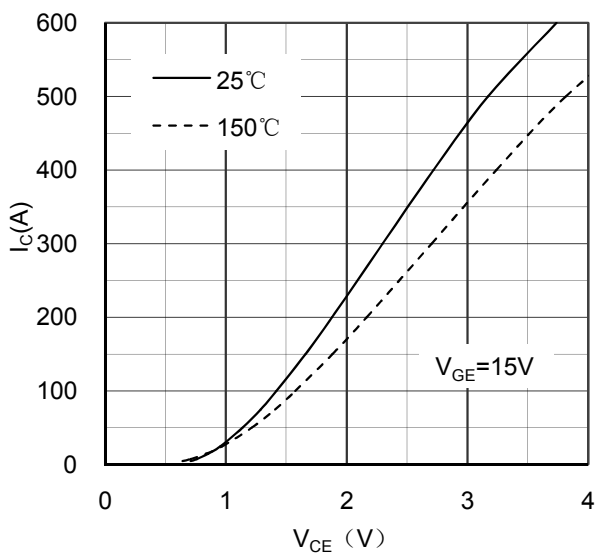


Figure 1. Typical Output Characteristics IGBT-inverter

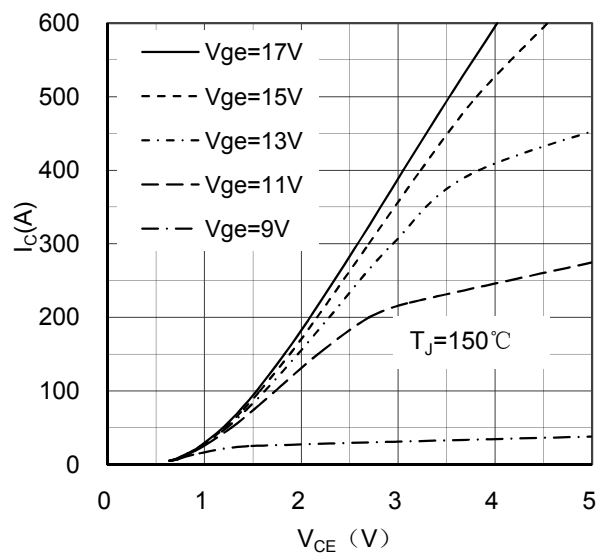


Figure 2. Typical Output Characteristics IGBT-inverter

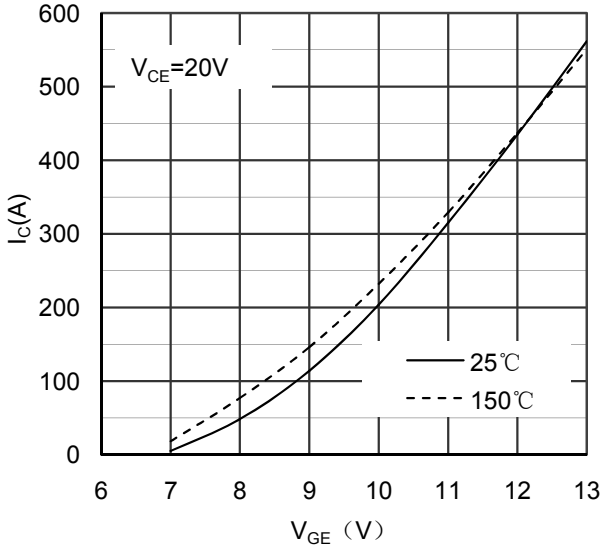


Figure 3. Typical Transfer characteristics IGBT-inverter

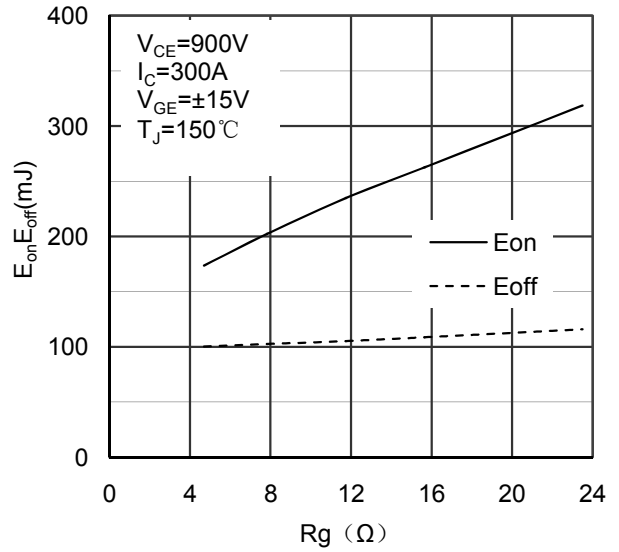


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

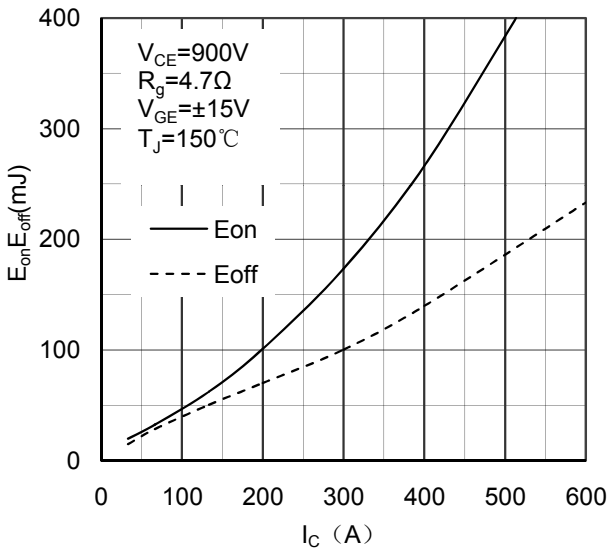


Figure 5. Switching Energy vs Collector Current IGBT-inverter

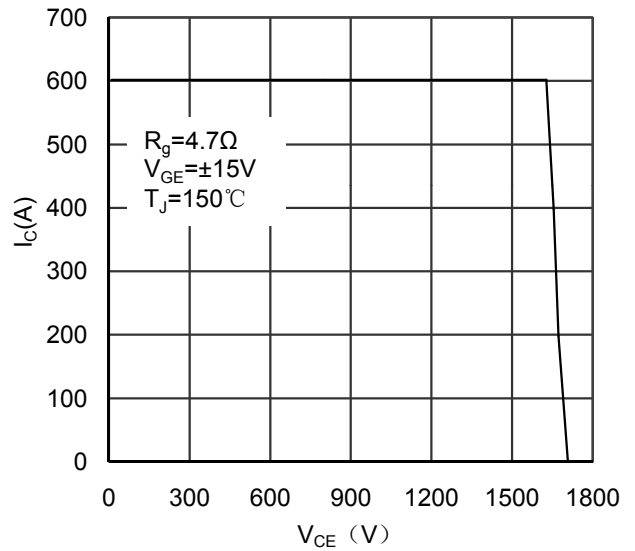


Figure 6. Reverse Biased Safe Operating Area IGBT-inverter

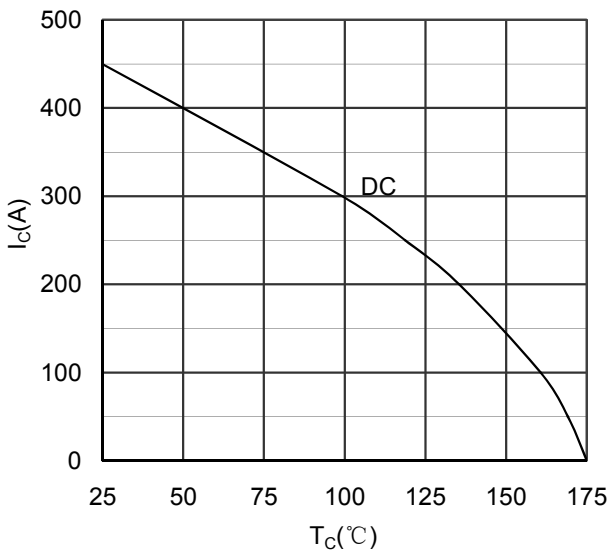


Figure 7. Collector Current vs Case temperature IGBT-inverter

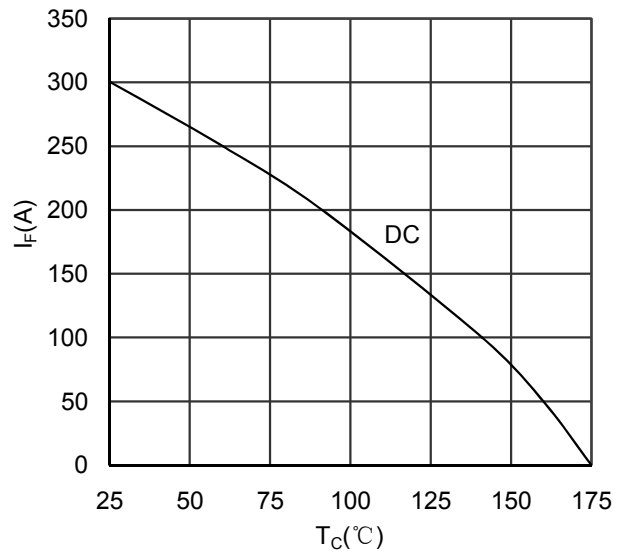


Figure 8. Forward current vs Case temperature Diode-inverter

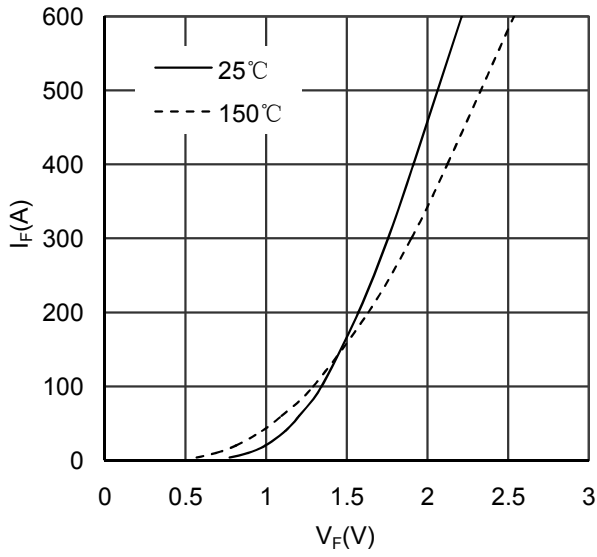


Figure 9. Diode Forward Characteristics Diode -inverter

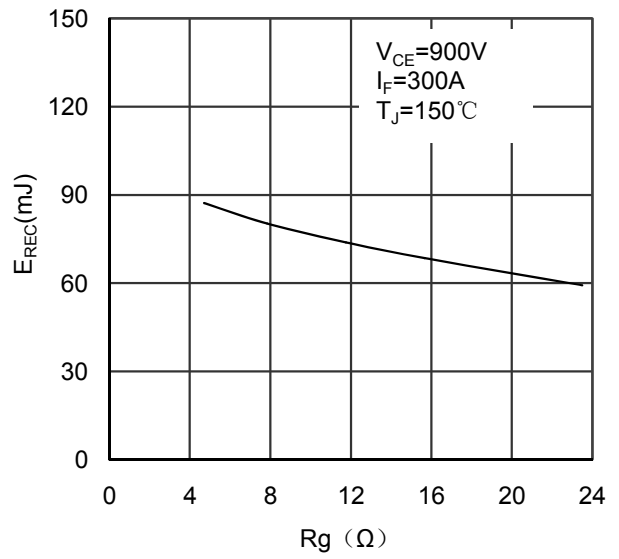


Figure 10. Switching Energy vs Gate Resistor Diode - inverter

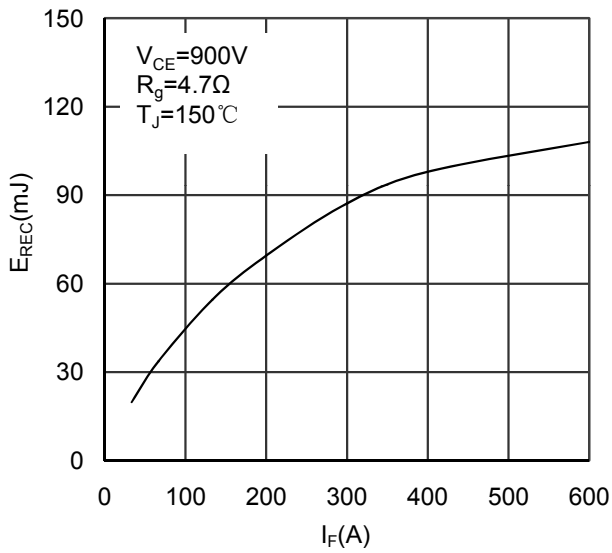


Figure 11. Switching Energy vs Forward Current Diode-inverter

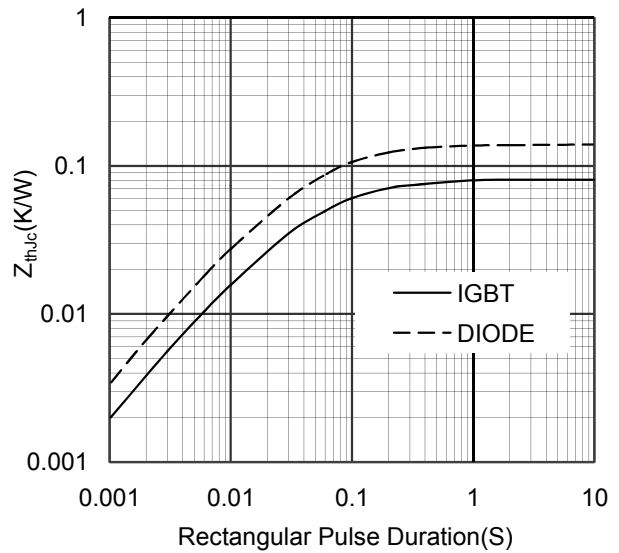
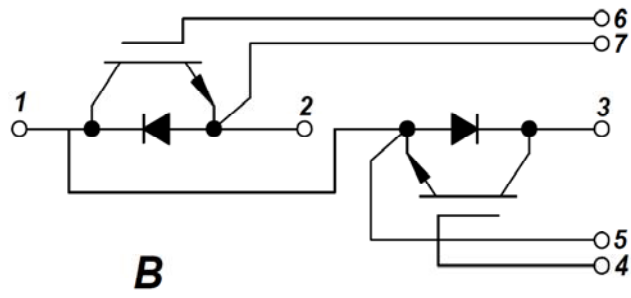
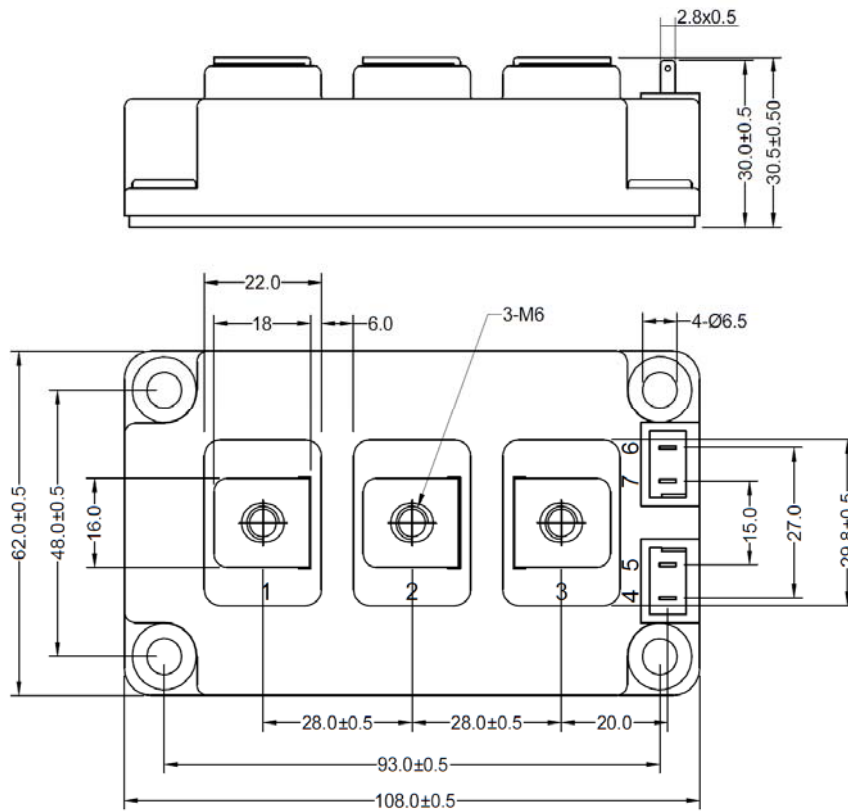


Figure 12. Transient Thermal Impedance of Diode and IGBT-inverter



B

Figure 13. Circuit Diagram



Dimensions in (mm)

Figure 14. Package Outline