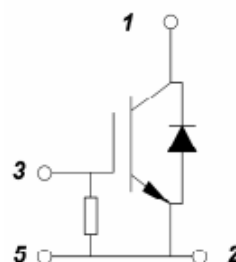


PRODUCT FEATURES

- ☐ IGBT CHIP(Trench+Field Stop technology)
- ☐ High short circuit capability
- ☐ $V_{CE(sat)}$ with positive temperature coefficient
- ☐ Fast switching and short tail current
- ☐ Free wheeling diodes with fast and soft reverse recovery
- ☐ Low switching losses
- ☐ 10K Ω Gate Protected Resistance Inside

APPLICATIONS

- ☐ High Power Converters
- ☐ Medical applications
- ☐ Motion/servo control
- ☐ UPS systems/Wind Turbines



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	$T_J=25^{\circ}\text{C}$	600	V
V_{GES}	Gate Emitter Voltage		± 20	
I_C	DC Collector Current	$T_C=25^{\circ}\text{C}, T_{Jmax}=175^{\circ}\text{C}$	690	A
		$T_C=55^{\circ}\text{C}, T_{Jmax}=175^{\circ}\text{C}$	600	
I_{CM}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	1200	
P_{tot}	Power Dissipation Per IGBT	$T_C=25^{\circ}\text{C}, T_{Jmax}=175^{\circ}\text{C}$	1650	W

Reverse-Diode

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

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Reverse Voltage	$T_J=25^{\circ}\text{C}$	600	V
$I_{F(AV)}$	Average Forward Current		600	A
I_{FRM}	Repetitive Peak Forward Current	$t_p=1\text{ms}$	1200	
I^2t		$T_J=125^{\circ}\text{C}, t=10\text{ms}, V_R=0\text{V}$	32	KA ² S

MMG600K060U6TC

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	$V_{CE}=V_{GE}, I_C=9.6\text{mA}$	5.0	6.0	6.5	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$I_C=600\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$		1.55	2.0	
		$I_C=600\text{A}, V_{GE}=15\text{V}, T_J=125^\circ\text{C}$		1.75		
		$I_C=600\text{A}, V_{GE}=15\text{V}, T_J=150^\circ\text{C}$		1.8		
I_{CES}	Collector Leakage Current	$V_{CE}=600\text{V}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$			1	mA
		$V_{CE}=600\text{V}, V_{GE}=0\text{V}, T_J=150^\circ\text{C}$			10	mA
I_{GES}	Gate Leakage Current	$V_{CE}=0\text{V}, V_{GE}=\pm 20\text{V}, T_J=25^\circ\text{C}$	-2		2	mA
R_{gint}	Integrated Gate Resistor			0.5		Ω
Q_g	Gate Charge	$V_{CE}=300\text{V}, I_C=600\text{A}, V_{GE}=15\text{V}$		2.9		μC
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		39		nF
C_{res}	Reverse Transfer Capacitance			1.6		nF
$t_{d(on)}$	Turn on Delay Time	$V_{CC}=300\text{V}, I_C=600\text{A}$ $R_G=2.7\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$	80		ns
			$T_J=150^\circ\text{C}$	90		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	$V_{CC}=300\text{V}, I_C=600\text{A}$ $R_G=2.7\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$	600		ns
			$T_J=150^\circ\text{C}$	650		ns
t_f	Fall Time	$V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$	100		ns
			$T_J=150^\circ\text{C}$	110		ns
E_{on}	Turn on Energy	$V_{CC}=300\text{V}, I_C=600\text{A}$ $R_G=2.7\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$	18.3		mJ
			$T_J=150^\circ\text{C}$	22.1		mJ
E_{off}	Turn off Energy	$V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$	31.3		mJ
			$T_J=150^\circ\text{C}$	34.1		mJ
I_{SC}	Short Circuit Current	$t_{psc} \leq 6\mu\text{s}, V_{GE}=15\text{V}$ $T_J=125^\circ\text{C}, V_{CC}=360\text{V}$		2800		A
R_{thJC}	Junction to Case Thermal Resistance (Per IGBT)				0.09	K /W

Reverse-Diode

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 =600A , V _{GE} =0V, T _J =25℃		1.7	2.1	V
		I _F =600A , V _{GE} =0V, T _J =125℃		1.55		
		I _F =600A , V _{GE} =0V, T _J =150℃		1.45		
t _{rr}	Reverse Recovery Time	I _F =600A , V _R =300V di _F /dt=-3800A/μs T _J =150℃		330		ns
I _{RRM}	Max. Reverse Recovery Current			316		A
Q _{RR}	Reverse Recovery Charge			62		μC
E _{rec}	Reverse Recovery Energy			16		mJ
R _{thJC} D	Junction to Case Thermal Resistance （ Per Diode ）				0.15	K /W

MMG600K060U6TC

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	3000	V
Torque	to heatsink	Recommended (M6)	3~5	Nm
	to terminal	Recommended (M6)	2.5~5	Nm
	to terminal	Recommended (M4)	0.7~1.1	Nm
Weight			330	g

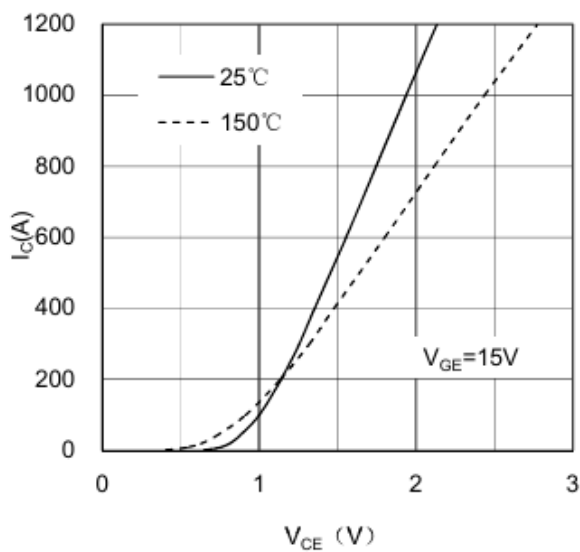


Figure 1. Typical Output Characteristics IGBT-inverter

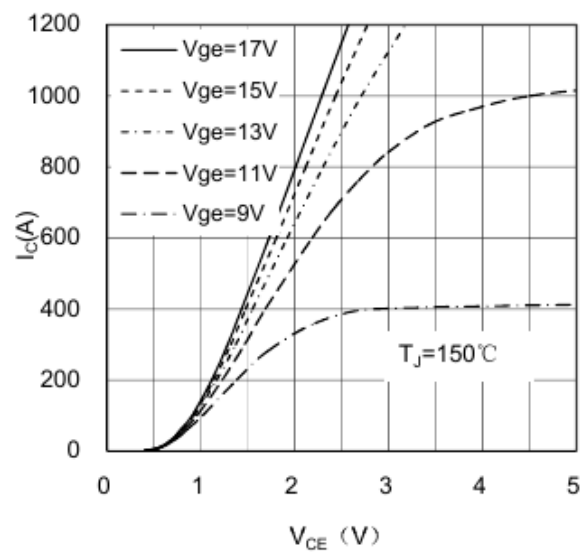


Figure 2. Typical Output Characteristics IGBT-inverter

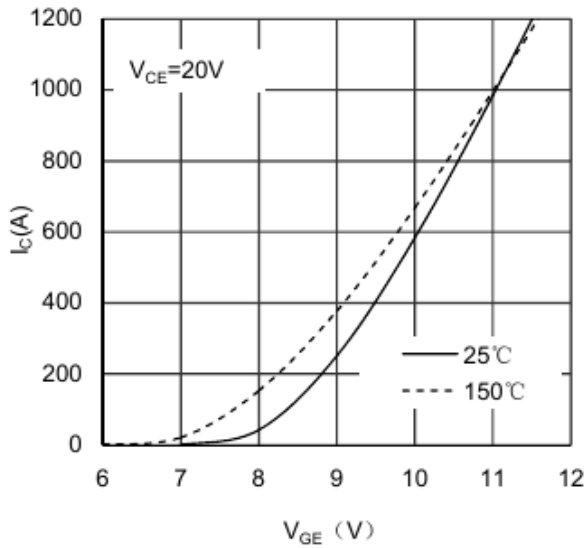


Figure 3. Typical Transfer characteristics IGBT-inverter

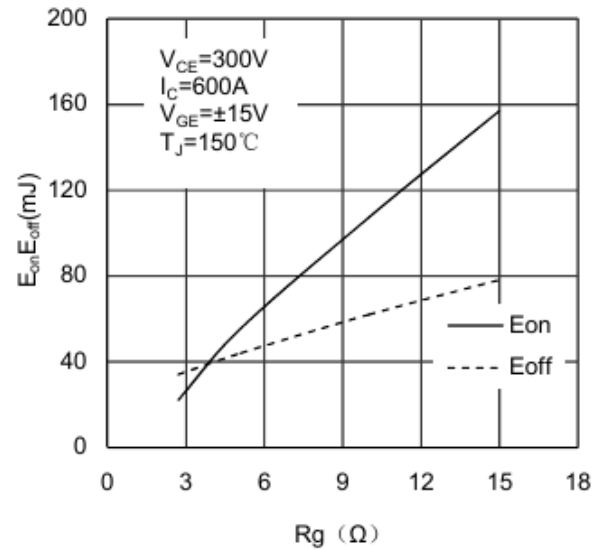


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

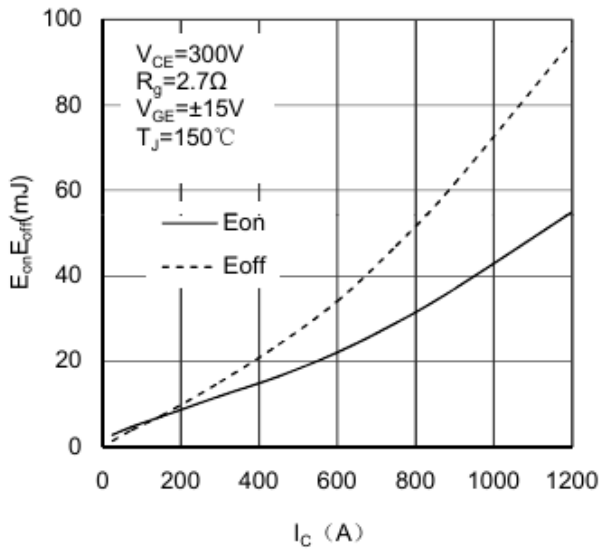


Figure 5. Switching Energy vs Collector Current IGBT-inverter

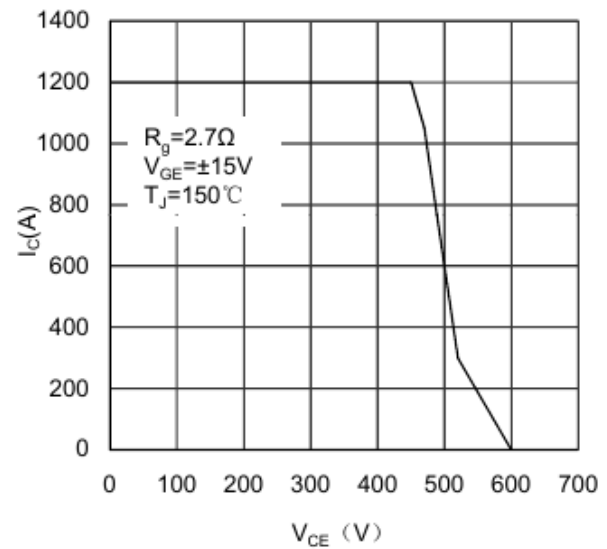


Figure 6. Reverse Biased Safe Operating Area IGBT-inverter

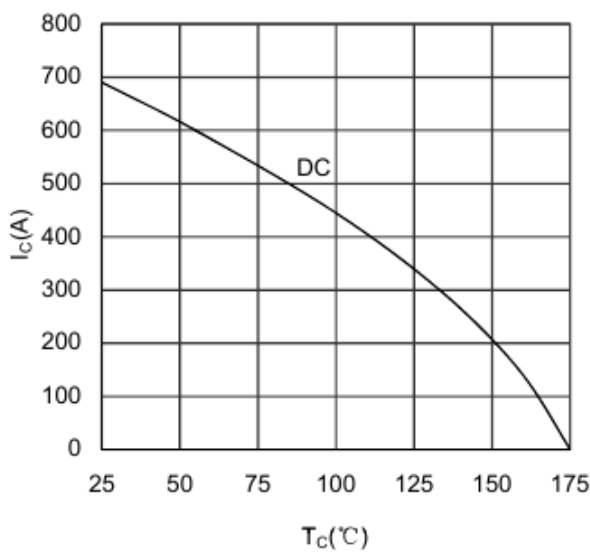


Figure 7. Collector Current vs Case temperature IGBT-inverter

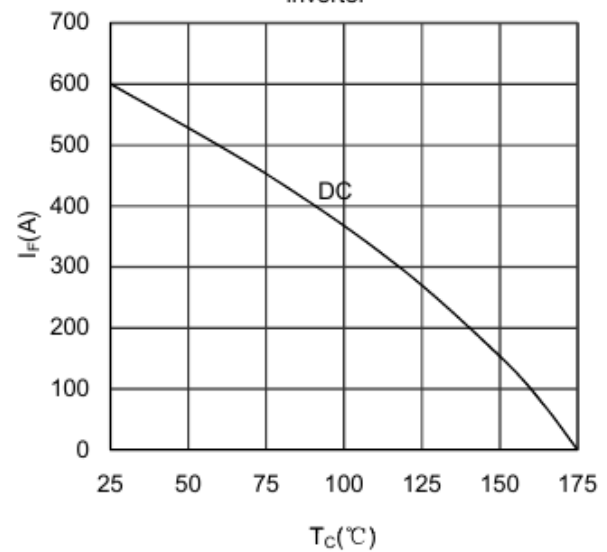


Figure 8. Forward current vs Case temperature Reverse-Diode

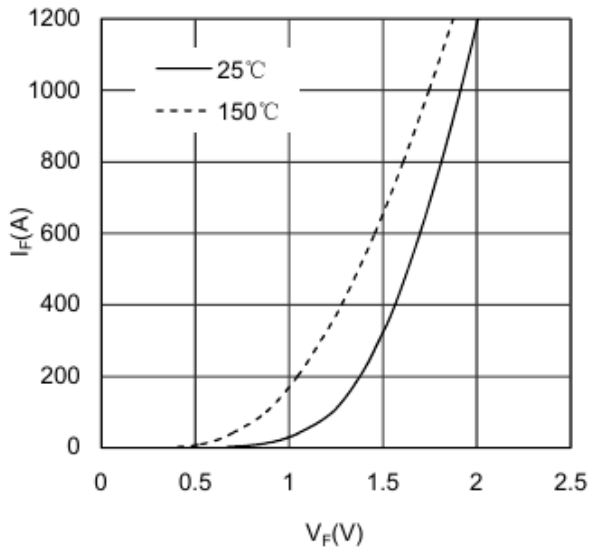


Figure 9. Diode Forward Characteristics Reverse-Diode

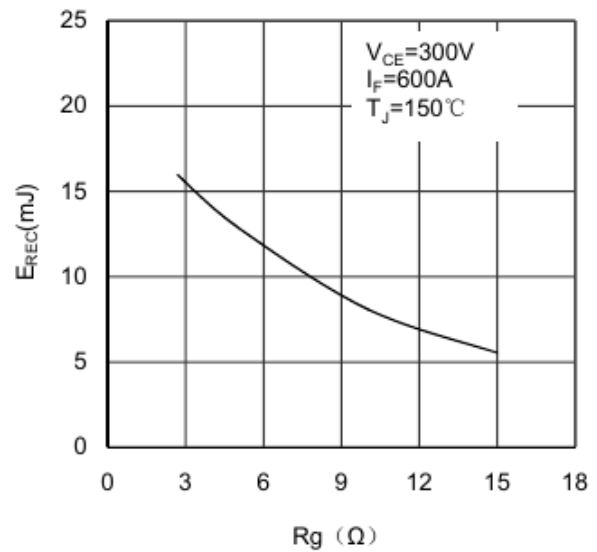


Figure 10. Switching Energy vs Gate Resistor Reverse-Diode

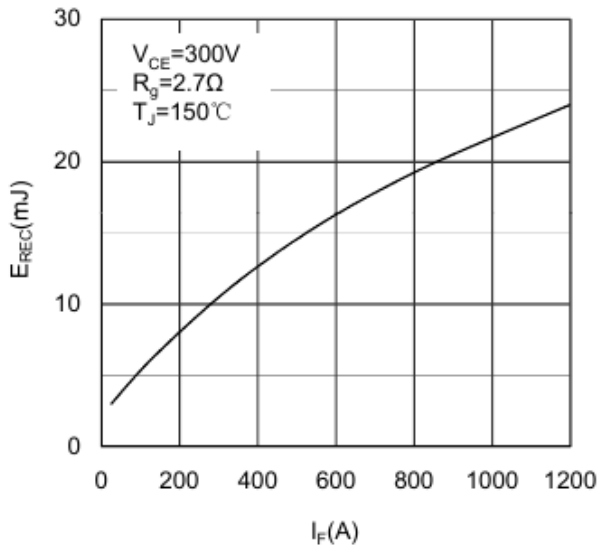


Figure 11. Switching Energy vs Forward Current Reverse-Diode

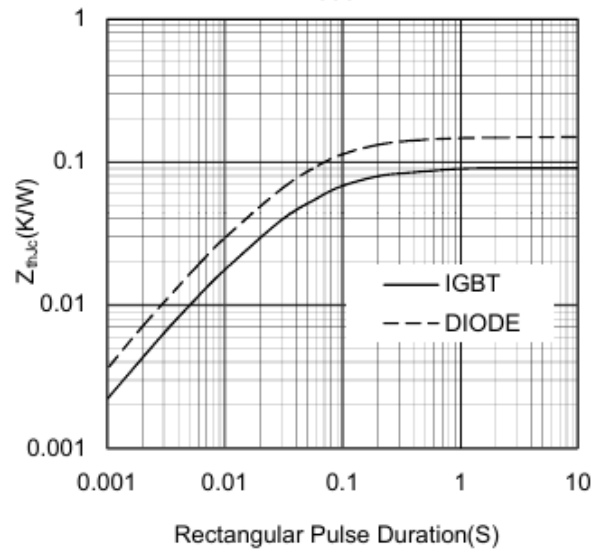
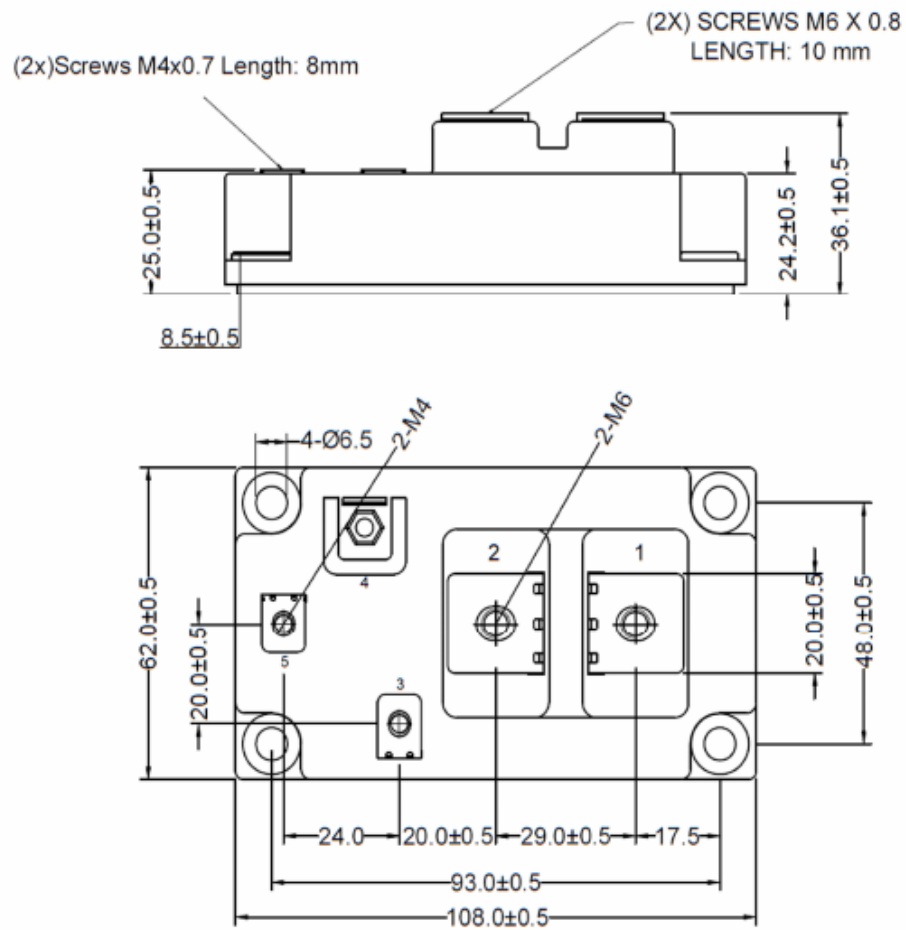


Figure 12. Transient Thermal Impedance of Reverse-Diode and IGBT-inverter



Dimensions in (mm)

Figure 13. Package Outline