

## PRODUCT FEATURES

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



## APPLICATIONS

- High frequency switching application
- Medical applications
- Motion/servo control
- UPS systems

### 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	$T_J=25^\circ\text{C}$	1200	V
$V_{GES}$	Gate Emitter Voltage		$\pm 20$	
$I_C$	DC Collector Current	$T_C=25^\circ\text{C}, T_{Jmax}=175^\circ\text{C}$	438	A
		$T_C=95^\circ\text{C}, T_{Jmax}=175^\circ\text{C}$	300	
$I_{CM}$	Repetitive Peak Collector Current	$t_p=1\text{ms}$	600	
$P_{tot}$	Power Dissipation Per IGBT	$T_C=25^\circ\text{C}, T_{Jmax}=175^\circ\text{C}$	1500	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	$T_J=25^\circ\text{C}$	1200	V
$I_{F(AV)}$	Average Forward Current		300	A
$I_{FRM}$	Repetitive Peak Forward Current	$t_p=1\text{ms}$	600	
$I^2t$		$T_J=125^\circ\text{C}, t=10\text{ms}, V_R=0\text{V}$	19000	$\text{A}^2\text{s}$

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# MMG300D120B6TC

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	$V_{CE}=V_{GE}, I_C=12\text{mA}$	5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector - Emitter Saturation Voltage	$I_C=300\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$		1.85	2.25	
		$I_C=300\text{A}, V_{GE}=15\text{V}, T_J=125^\circ\text{C}$		2.15		
		$I_C=300\text{A}, V_{GE}=15\text{V}, T_J=150^\circ\text{C}$		2.2		
$I_{CES}$	Collector Leakage Current	$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$			1	mA
		$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_J=150^\circ\text{C}$			10	
$I_{GES}$	Gate Leakage Current	$V_{CE}=0\text{V}, V_{GE}=\pm 20\text{V}, T_J=25^\circ\text{C}$	-400		400	nA
$R_{Gint}$	Integrated Gate Resistor			1.8		$\Omega$
$Q_G$	Gate Charge	$V_{CE}=600\text{V}, I_C=300\text{A}, V_{GE}=15\text{V}$		1.5		$\mu\text{C}$
$C_{ies}$	Input Capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		21		nF
$C_{res}$	Reverse Transfer Capacitance				1	
$t_{d(on)}$	Turn on Delay Time	$V_{CC}=600\text{V}, I_C=300\text{A}$ $R_G=2.7\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		120	ns
			$T_J=125^\circ\text{C}$		140	ns
			$T_J=150^\circ\text{C}$		150	ns
$t_r$	Rise Time	$V_{CC}=600\text{V}, I_C=300\text{A}$ $R_G=2.7\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		70	ns
			$T_J=125^\circ\text{C}$		75	ns
			$T_J=150^\circ\text{C}$		80	ns
$t_{d(off)}$	Turn off Delay Time	$V_{CC}=600\text{V}, I_C=300\text{A}$ $R_G=2.7\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		440	ns
			$T_J=125^\circ\text{C}$		500	ns
			$T_J=150^\circ\text{C}$		520	ns
$t_f$	Fall Time	$V_{CC}=600\text{V}, I_C=300\text{A}$ $R_G=2.7\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		100	ns
			$T_J=125^\circ\text{C}$		180	ns
			$T_J=150^\circ\text{C}$		200	ns
$E_{on}$	Turn on Energy	$V_{CC}=600\text{V}, I_C=300\text{A}$ $R_G=2.7\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=125^\circ\text{C}$		52	mJ
			$T_J=150^\circ\text{C}$		54	mJ
$E_{off}$	Turn off Energy	$V_{CC}=600\text{V}, I_C=300\text{A}$ $R_G=2.7\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=125^\circ\text{C}$		29	mJ
			$T_J=150^\circ\text{C}$		32	mJ
$I_{SC}$	Short Circuit Current	$t_{psc} \leq 10\mu\text{s}, V_{GE}=15\text{V}$ $T_J=150^\circ\text{C}, V_{CC}=800\text{V}$		1100		A
$R_{thJC}$	Junction to Case Thermal Resistance (Per IGBT)				0.1	K/W

# MMG300D120B6TC

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	$I_F=300\text{A}$ , $V_{GE}=0\text{V}$ , $T_J=25^\circ\text{C}$		1.7	2.15	V
		$I_F=300\text{A}$ , $V_{GE}=0\text{V}$ , $T_J=125^\circ\text{C}$		1.65		
		$I_F=300\text{A}$ , $V_{GE}=0\text{V}$ , $T_J=150^\circ\text{C}$		1.65		
$t_{rr}$	Reverse Recovery Time		600		ns	
$I_{RRM}$	Max. Reverse Recovery Current	$I_F=300\text{A}$ , $V_R=600\text{V}$	201		A	
$Q_{RR}$	Reverse Recovery Charge	$di_F/dt=-3000\text{A}/\mu\text{s}$	49.4		$\mu\text{C}$	
$E_{rec}$	Reverse Recovery Energy	$T_J=150^\circ\text{C}$	17		mJ	
$R_{thJCD}$	Junction to Case Thermal Resistance (Per Diode)			0.15	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	$^\circ\text{C}$	
$T_{Jop}$	Operating Temperature	-40~150		
$T_{stg}$	Storage Temperature	-40~125		
$V_{isol}$	Isolation Breakdown Voltage	AC, 50Hz(R.M.S), t=1minute	3000	V
CTI	Comparative Tracking Index		> 225	
Torque	to heatsink	Recommended (M6)	3~5	Nm
	to terminal	Recommended (M6)	2.5~5	Nm
Weight			300	g

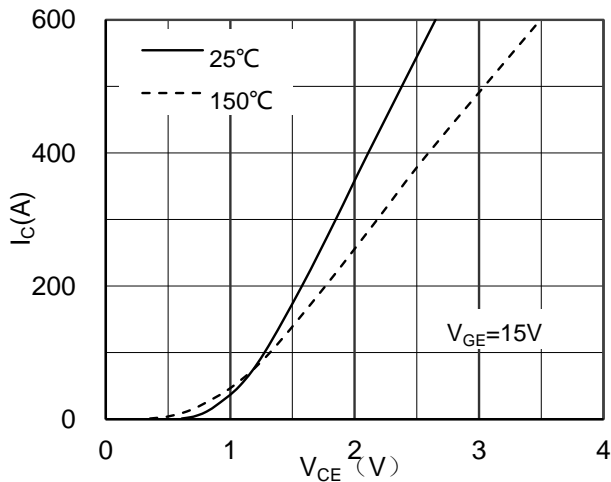


Figure 1. Typical Output Characteristics IGBT-inverter

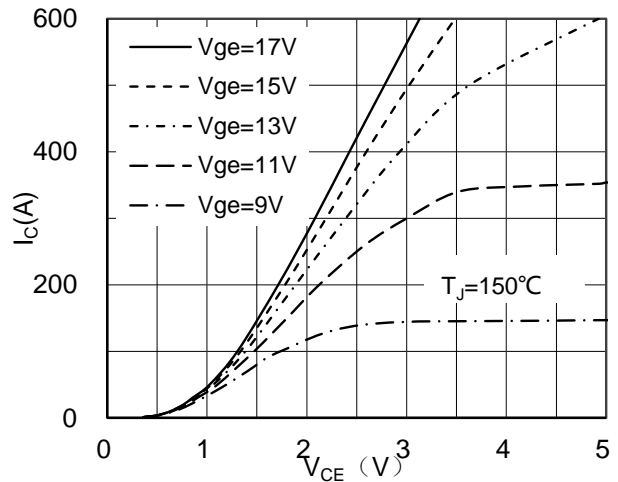


Figure 2. Typical Output Characteristics IGBT-inverter

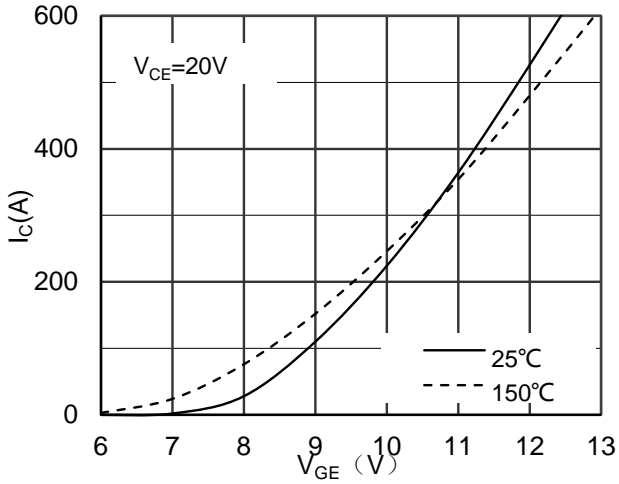


Figure 3. Typical Transfer characteristics IGBT-inverter

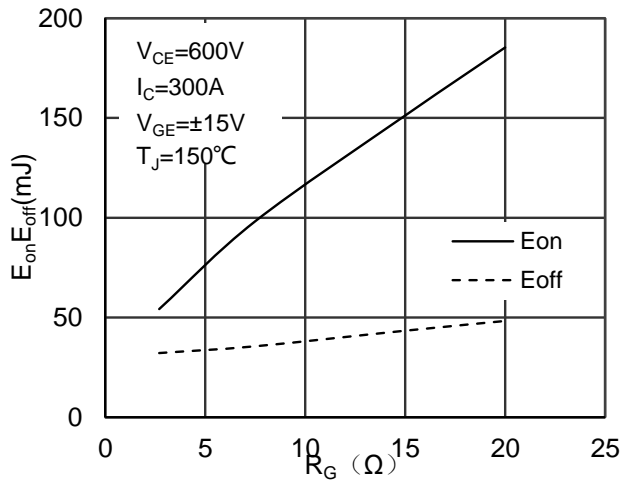


Figure 4. Switching Energy vs Gate Resistor IGBT-

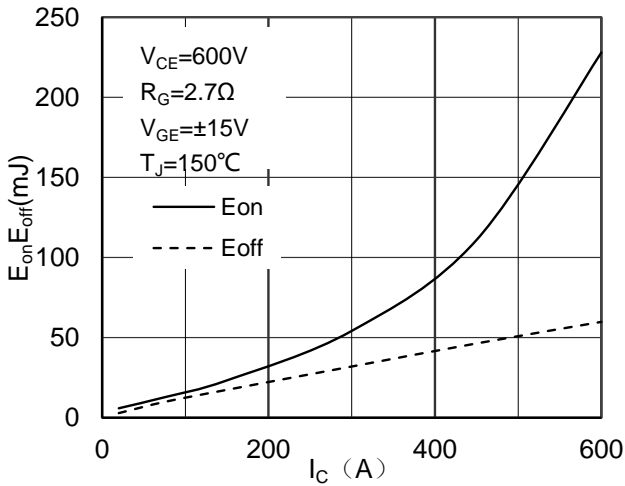


Figure 5. Switching Energy vs Collector Current IGBT-inverter

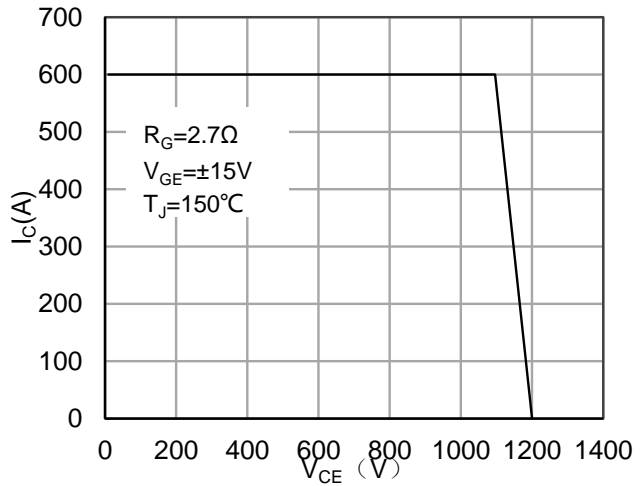


Figure 6. Reverse Biased Safe Operating Area IGBT-inverter

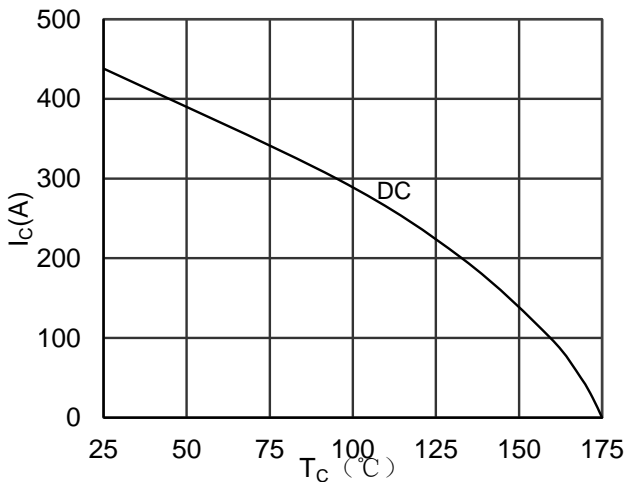


Figure 7. Collector Current vs Case temperature IGBT -inverter

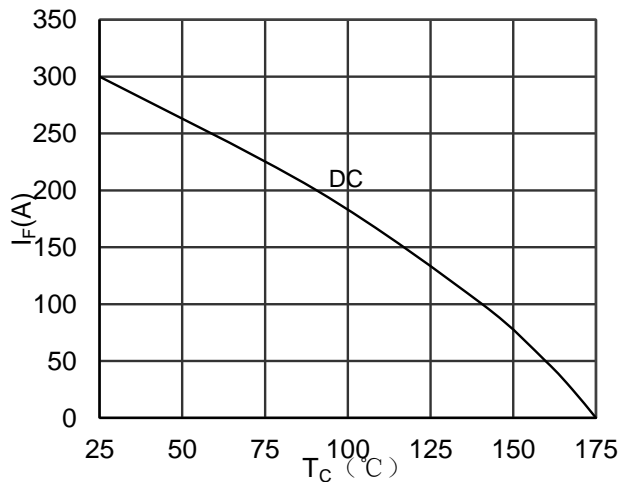


Figure 8. Forward current vs Case temperature Diode -inverter

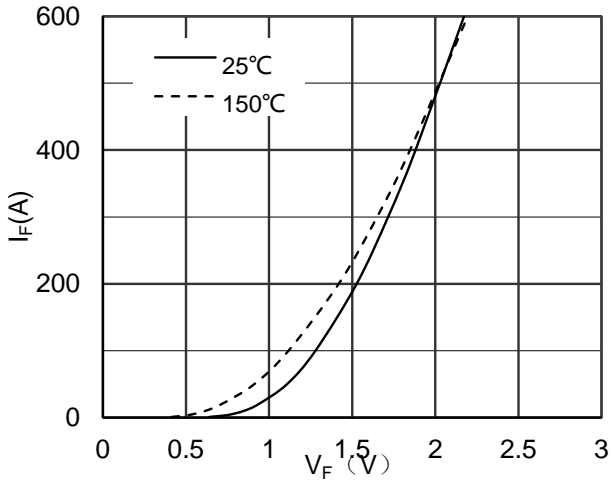


Figure 9. Diode Forward Characteristics Diode -inverter

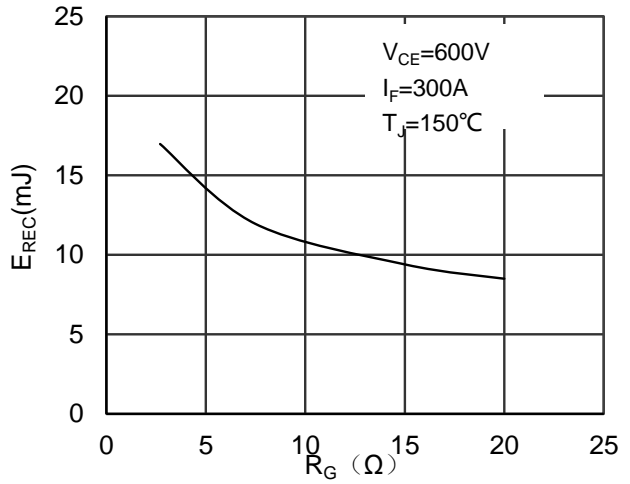


Figure 10. Switching Energy vs Gate Resistor Diode - inverter

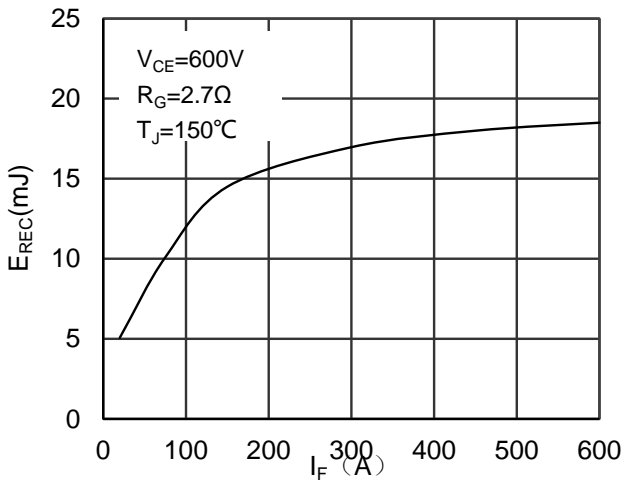


Figure 11. Switching Energy vs Forward Current Diode-

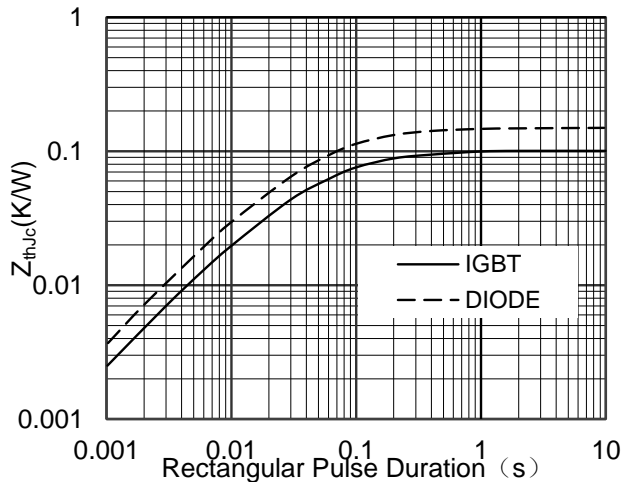
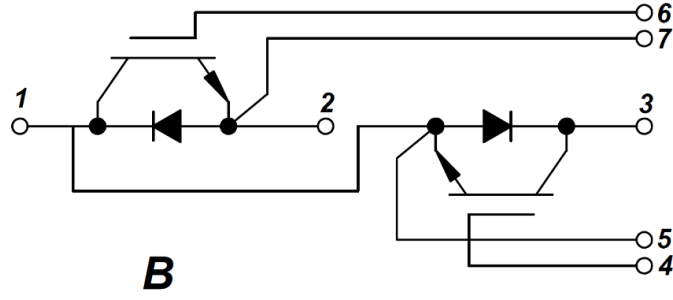
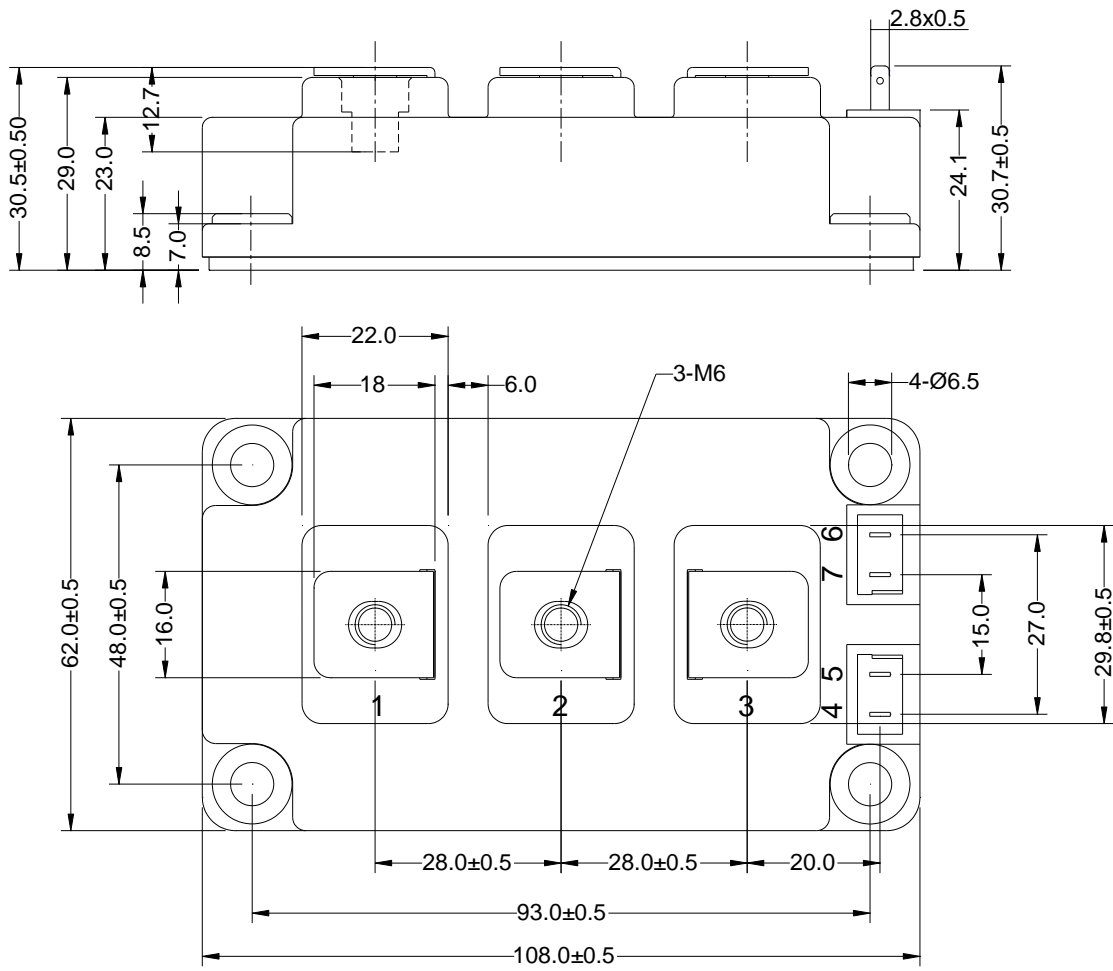


Figure 12. Transient Thermal Impedance of Diode and IGBT-inverter



**B**

Figure 13. Circuit Diagram



Dimensions in (mm)  
Figure 14. Package Outline