

## PRODUCT FEATURES

- IGBT<sup>3</sup> CHIP(Trench+Field Stop technology)
- High short circuit capability,self limiting short circuit current
- $V_{CE(sat)}$  with positive temperature coefficient
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery
- Low switching losses



## 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	$T_J=25^{\circ}\text{C}$	600	V
$V_{GES}$	Gate Emitter Voltage		$\pm 20$	
$I_C$	DC Collector Current	$T_C=25^{\circ}\text{C}$	700	A
		$T_C=50^{\circ}\text{C}$	600	
$I_{CM}$	Repetitive Peak Collector Current	$t_p=1\text{ms}$	1200	
$P_{tot}$	Power Dissipation Per IGBT		1578	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	$T_J=25^{\circ}\text{C}$	600	V
$I_{F(AV)}$	Average Forward Current	$T_C=25^{\circ}\text{C}$	600	A
$I_{FRM}$	Repetitive Peak Forward Current	$t_p=1\text{ms}$	1200	
$i^2t$		$T_J=125^{\circ}\text{C}$ , $t=10\text{ms}$ , $V_R=0\text{V}$	17	$\text{KA}^2\text{S}$

## 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		$V_{CE}=V_{GE}, I_C=9.6\text{mA}$	4.9	5.8	6.5	V	
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	chip	$I_C=600\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$		1.45	1.9		
			$I_C=600\text{A}, V_{GE}=15\text{V}, T_J=125^\circ\text{C}$		1.6			
$I_{CES}$	Collector Leakage Current		$V_{CE}=600\text{V}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$			1	mA	
			$V_{CE}=600\text{V}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$			5	mA	
$I_{GES}$	Gate Leakage Current		$V_{CE}=0\text{V}, V_{GE}=\pm 15\text{V}, T_J=25^\circ\text{C}$	-400		400	nA	
$R_{gint}$	Integrated Gate Resistor				0.68		$\Omega$	
$Q_g$	Gate Charge		$V_{CE}=300\text{V}, I_C=600\text{A}, V_{GE}=\pm 15\text{V}$		6.5		$\mu\text{C}$	
$C_{ies}$	Input Capacitance		$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		39		nF	
$C_{res}$	Reverse Transfer Capacitance				1.15		nF	
$t_{d(on)}$	Turn on Delay Time		$V_{CC}=300\text{V}, I_C=600\text{A}$ $R_G=2.4\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		100		ns
				$T_J=125^\circ\text{C}$		110		ns
$t_r$	Rise Time		$V_{CC}=300\text{V}, I_C=600\text{A}$ $R_G=2.4\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		90		ns
				$T_J=125^\circ\text{C}$		95		ns
$t_{d(off)}$	Turn off Delay Time		$V_{CC}=300\text{V}, I_C=600\text{A}$ $R_G=2.4\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		670		ns
				$T_J=125^\circ\text{C}$		710		ns
$t_f$	Fall Time		$V_{CC}=300\text{V}, I_C=600\text{A}$ $R_G=2.4\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		70		ns
				$T_J=125^\circ\text{C}$		75		ns
$E_{on}$	Turn on Energy		$V_{CC}=300\text{V}, I_C=600\text{A}$ $R_G=2.4\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		8.9		mJ
				$T_J=125^\circ\text{C}$		9.9		mJ
$E_{off}$	Turn off Energy		$V_{CC}=300\text{V}, I_C=600\text{A}$ $R_G=2.4\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		21.5		mJ
				$T_J=125^\circ\text{C}$		25.0		mJ
$I_{sc}$	Short Circuit Current		$t_{psc}\leq 6\mu\text{s}, V_{GE}=15\text{V}$ $T_J=125^\circ\text{C}, V_{CC}=360\text{V}$		3000		A	
$R_{thJC}$	Junction to Case Thermal Resistance ( Per IGBT )					0.095	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	chip	$I_F=600\text{A}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$		1.55	1.95	V
			$I_F=600\text{A}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$		1.50		
$t_{rr}$	Reverse Recovery Time		$I_F=600\text{A}, V_R=300\text{V}$		400		ns
$I_{RRM}$	Max. Reverse Recovery Current		$di_F/dt=-6000\text{A}/\mu\text{s}$ $T_J=125^\circ\text{C}$		300		A
$E_{rec}$	Reverse Recovery Energy				9.3		mJ
$R_{thJCD}$	Junction to Case Thermal Resistance ( Per Diode )					0.16	K/W

## NTC CHARACTERISTICS

 $T_C=25^\circ\text{C}$  unless otherwise specified

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit	
$R_{25}$	Resistance		$T_C=25^\circ\text{C}$		5		K $\Omega$
$B_{25/50}$	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298.15 \text{ K}))]$				3375		K

**MODULE CHARACTERISTICS**

*T<sub>C</sub>=25°C unless otherwise specified*

Symbol	Parameter/Test Conditions		Values	Unit
T <sub>Jmax</sub>	Max. Junction Temperature		175	°C
T <sub>Jop</sub>	Operating Temperature		-40~150	
T <sub>stg</sub>	Storage Temperature		-40~125	
V <sub>isol</sub>	Isolation Breakdown Voltage	AC, 50Hz(R.M.S), t=1minute	3000	V
CTI	Comparative Tracking Index		> 200	
Torque	to heatsink	Recommended (M5)	2.5~5	Nm
	to terminal	Recommended (M6)	3~5	Nm
Weight			350	g

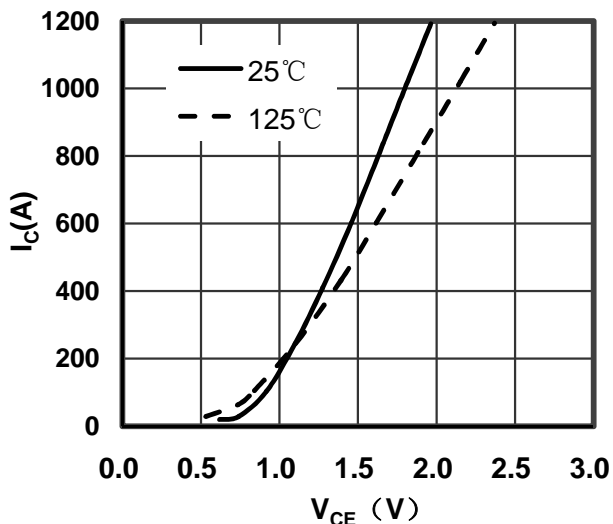


Figure 1. Typical Output Characteristics IGBT-inverter

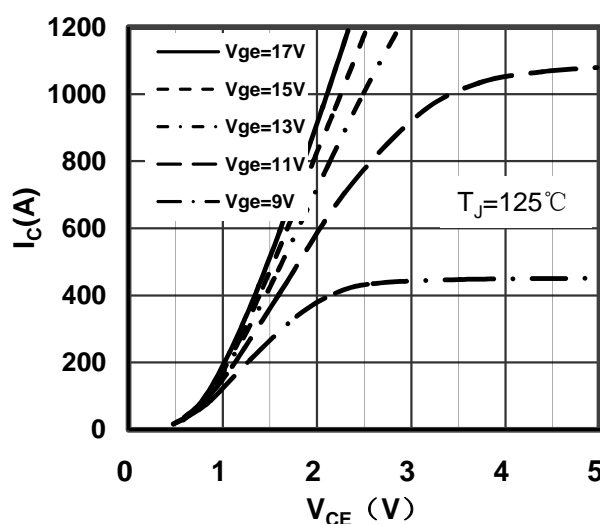


Figure 2. Typical Output Characteristics IGBT-inverter

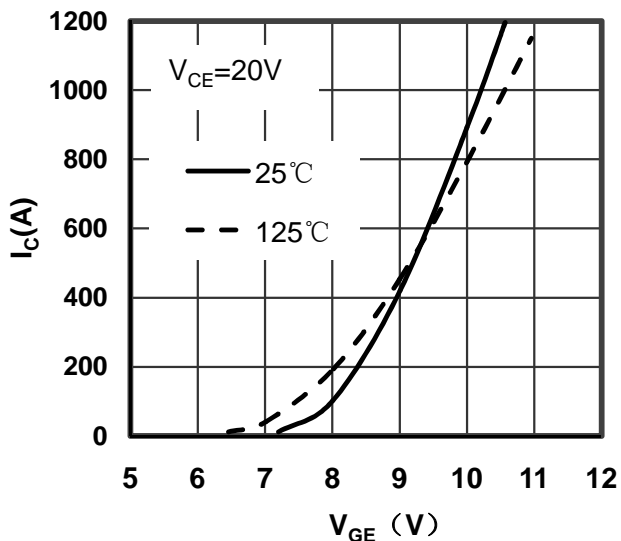


Figure 3. Typical Transfer Characteristics IGBT-inverter

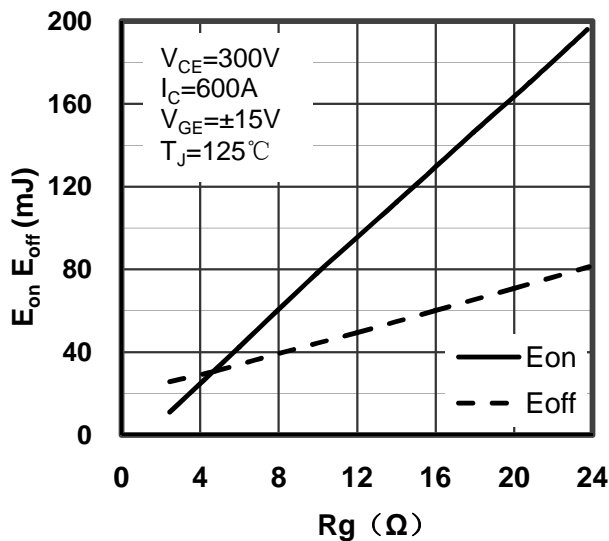


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

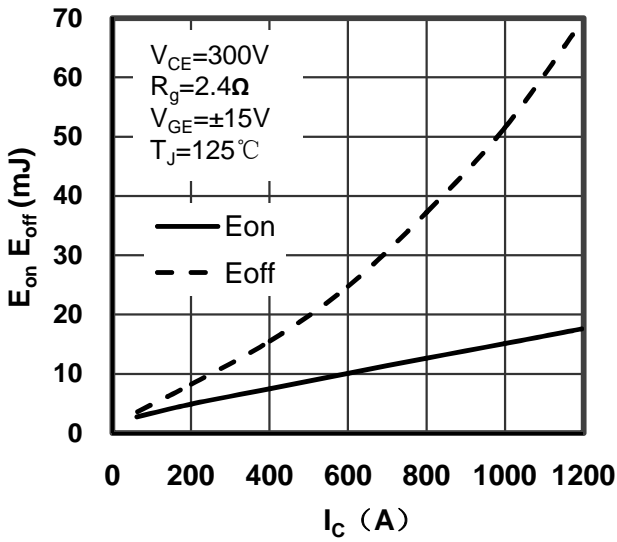


Figure 5. Switching Energy vs Collector Current IGBT-inverter

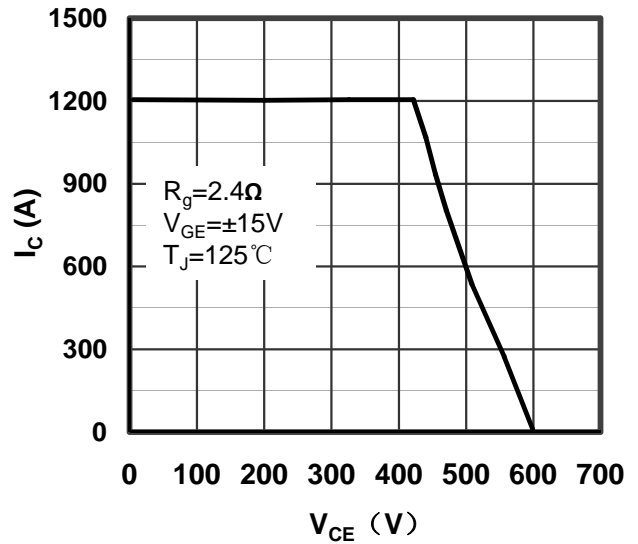


Figure 6. Reverse Biased Safe Operating Area IGBT-inverter

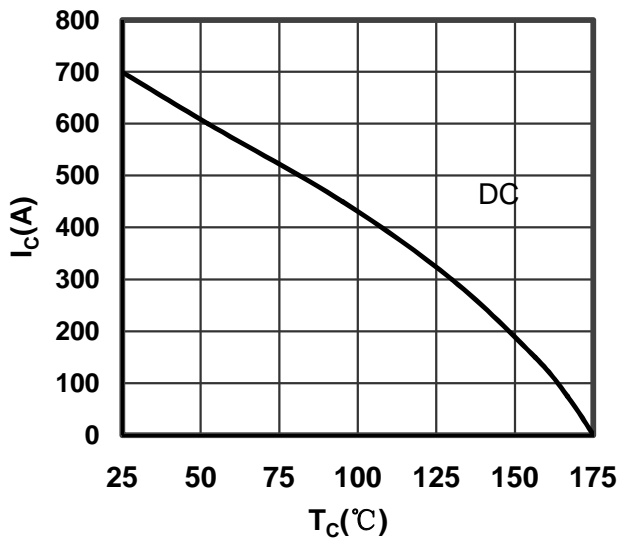


Figure 7. Collector Current vs Case temperature IGBT-inverter

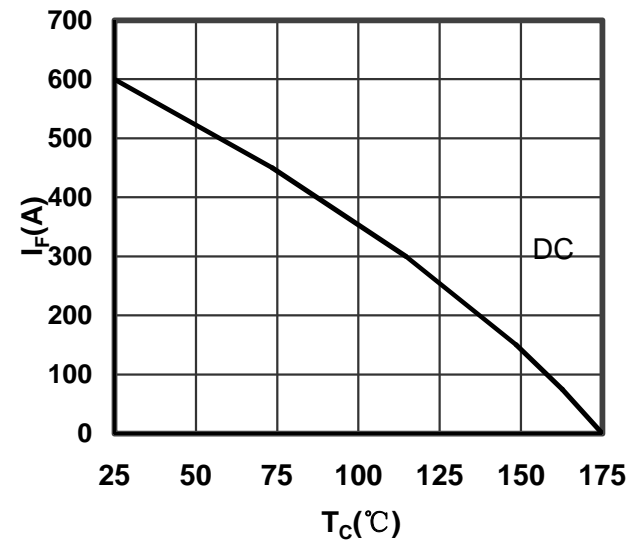


Figure 8. Forward current vs Case temperature Diode-inverter

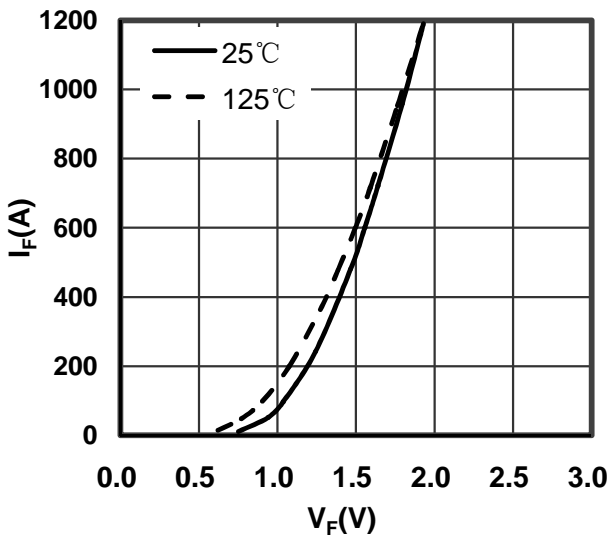


Figure 9. Diode Forward Characteristics Diode-inverter

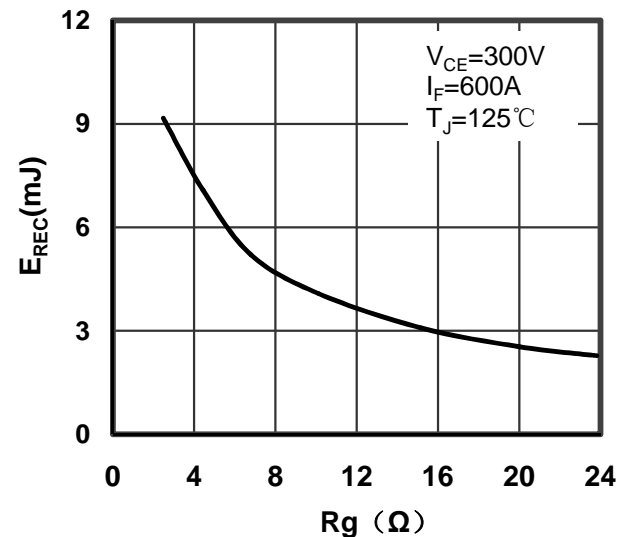


Figure 10. Switching Energy vs Gate Resistor Diode-inverter

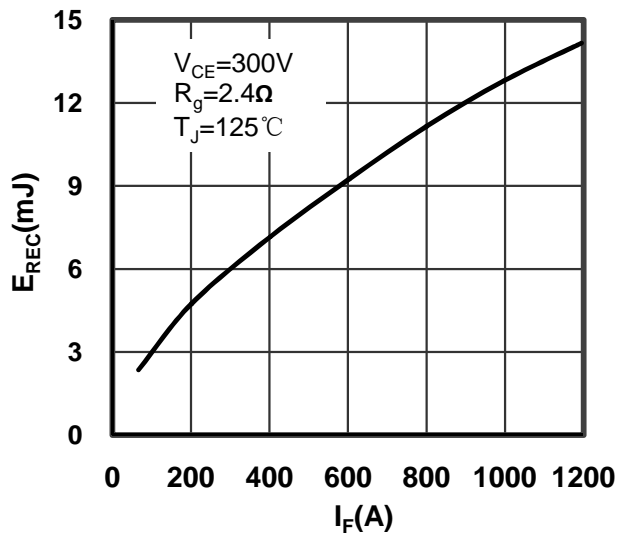


Figure 11. Switching Energy vs Forward Current Diode-inverter

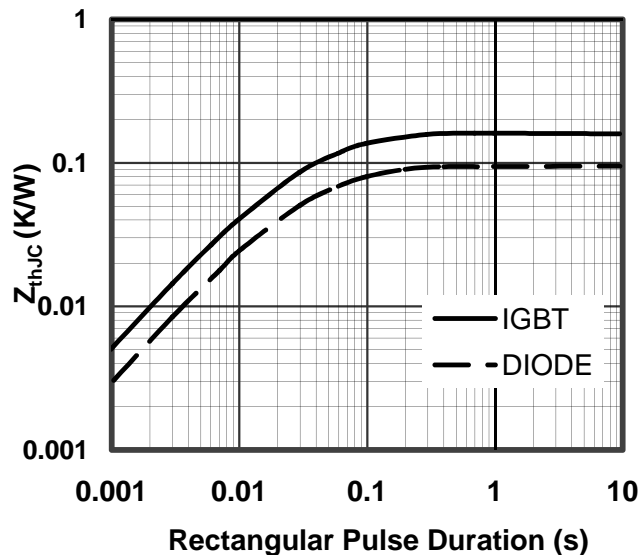


Figure 12. Transient Thermal Impedance of Diode and IGBT-inverter

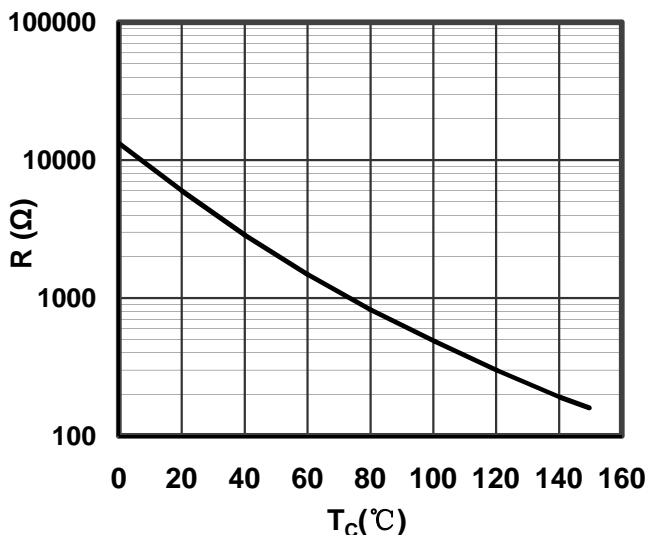


Figure 13. NTC Characteristics

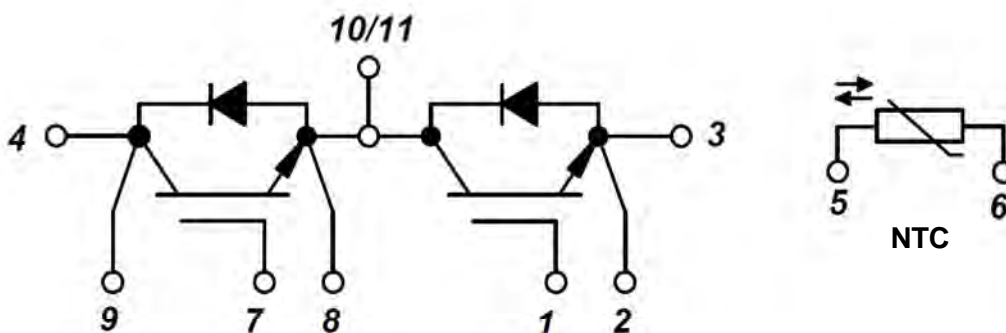
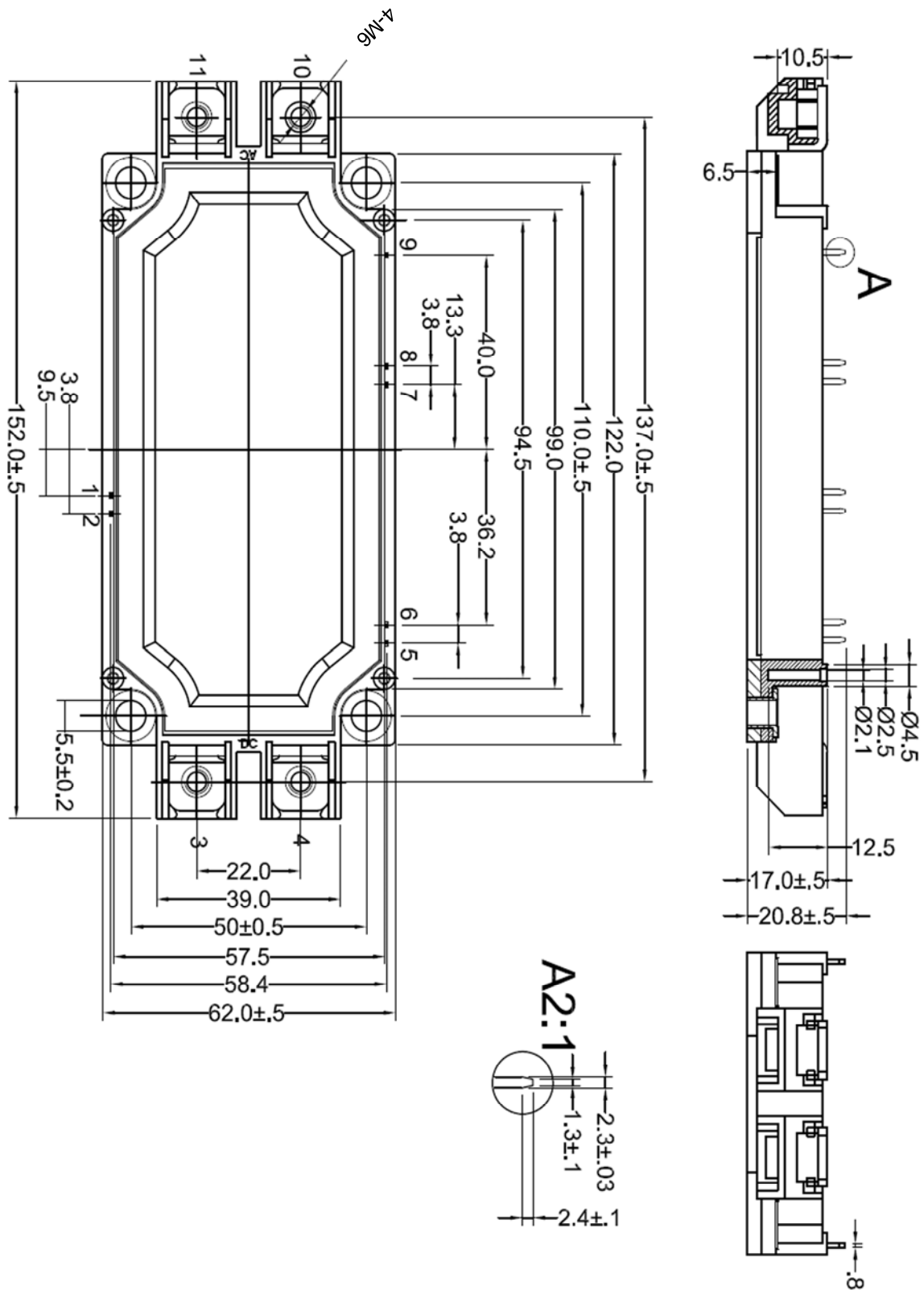


Figure 14. Circuit Diagram



Dimensions in (mm)  
Figure 15. Package Outline