

IGBT Module

PRODUCT FEATURES

- ☐ IGBT3 CHIP(1700V Trench+Field Stop technology)
- ☐ Low turn-off losses, short tail current
- ☐ $V_{CE(sat)}$ with positive temperature coefficient
- ☐ DIODE CHIP(1700V EMCON 3 technology)
- ☐ Free wheeling diodes with fast and soft reverse recovery
- ☐ Temperature sense included



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	t
V_{CES}	Collector Emitter Voltage	$T_J = 25^\circ\text{C}$	1700	V
V_{GES}	Gate Emitter Voltage		± 20	
I_C	DC Collector Current	$T_C = 25^\circ\text{C}$	600	A
		$T_C = 95^\circ\text{C}$	450	
I_{CM}	Repetitive Peak Collector Current	$t_p = 1\text{ms}$	900	
P_{tot}	Power Dissipation Per IGBT		2700	W

Diode-inverter

ABSOLUTE MAXIMUM RATINGS

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

Symbol	Parameter/Test Conditions		Values	t
V_{RRM}	Repetitive Reverse Voltage	$T_J = 25^\circ\text{C}$	1700	V
$I_{F(AV)}$	Average Forward Current	$T_C = 25^\circ\text{C}$	450	A
I_{FRM}	Repetitive Peak Forward Current	$t_p = 1\text{ms}$	900	
I^2t		$T_J = 125^\circ\text{C}$, $t = 10\text{ms}$, $V_R = 0\text{V}$	20000	A^2S

IGBT-inverter

ELECTRICAL CHARACTERISTICS

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

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	t
$V_{GE(th)}$	Gate Emitter Threshold Voltage	$V_{CE}=V_{GE}, I_C=18\text{mA}$	5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	chip $I_C=450\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$ $I_C=450\text{A}, V_{GE}=15\text{V}, T_J=125^\circ\text{C}$		2	2.45	
				2.4		
I_{CES}	Collector Leakage Current	$V_{CE}=1700\text{V}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$			3	mA
		$V_{CE}=1700\text{V}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$			20	mA
I_{GES}	Gate Leakage Current	$V_{CE}=0\text{V}, V_{GE}=\pm 15\text{V}, T_J=125^\circ\text{C}$	-400		400	nA
R_{gint}	Integrated Gate Resistor			1.7		Ω
Q_g	Gate Charge	$V_{CE}=900\text{V}, I_C=450\text{A}, V_{GE}=\pm$		5.1		μC
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		40.5		nF
C_{res}	Reverse Transfer Capacitance			1.3		nF
$t_{d(on)}$	Turn on Delay Time	$V_{CC}=900\text{V}, I_C=450\text{A}$ $R_G=3.3\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$	280		ns
			$T_J=125^\circ\text{C}$	300		ns
t_r	Rise Time		$T_J=25^\circ\text{C}$	80		ns
			$T_J=125^\circ\text{C}$	100		ns
$t_{d(off)}$	Turn off Delay Time		$T_J=25^\circ\text{C}$	810		ns
			$T_J=125^\circ\text{C}$	1000		ns
t_f	Fall Time		$T_J=25^\circ\text{C}$	180		ns
			$T_J=125^\circ\text{C}$	300		ns
E_{on}	Turn on Energy	$V_{CC}=900\text{V}, I_C=450\text{A}$ $R_G=3.3\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$	96.5		mJ
			$T_J=125^\circ\text{C}$	140		mJ
E_{off}	Turn off Energy		$T_J=25^\circ\text{C}$	96		mJ
			$T_J=125^\circ\text{C}$	140		mJ
I_{SC}	Short Circuit Current	$tpsc \leq 10\mu\text{s}, V_{GE}=15\text{V}$ $T_J=125^\circ\text{C}, V_{CC}=1000\text{V}$		1800		A
R_{thJC}	Junction to Case Thermal Resistance (Per IGBT)				0.055	K/W

Diode-inverter

ELECTRICAL CHARACTERISTICS

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

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	t
V_F	Forward Voltage	chip $I_F=450\text{A}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$ $I_F=450\text{A}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$		1.8	2.2	V
				1.9		
I_{RRM}	Max. Reverse Recovery Current	$I_F=450\text{A}, V_R=900\text{V}$		570		A
Q_{RR}	Reverse Recovery Charge	$di_F/dt=-4500\text{A}/\mu\text{s}$		195		μC
E_{rec}	Reverse Recovery Energy	$T_J=125^\circ\text{C}$		110		mJ
R_{thJCD}	Junction to Case Thermal Resistance (Per Diode)				0.1	K/W

NTC CHARACTERISTICS

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

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

MODULE CHARACTERISTICS

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

Symbol	Parameter/Test Conditions		Values	t
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 (M5)	2.5~5	Nm
	to terminal	Recommended (M6)	3~5	Nm
Weight			350	g

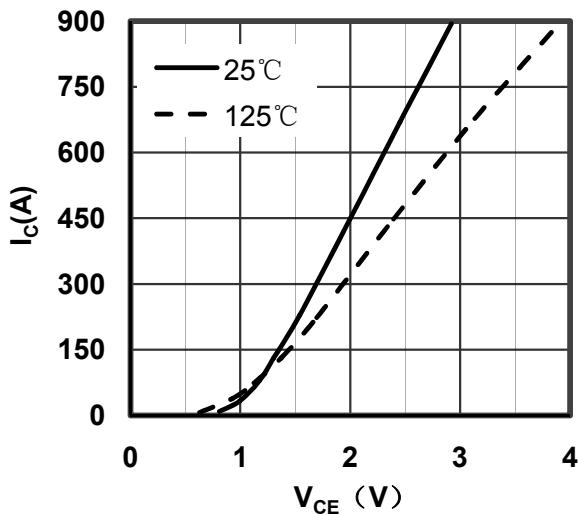


Figure 1. Typical Output Characteristics IGBT-inverter

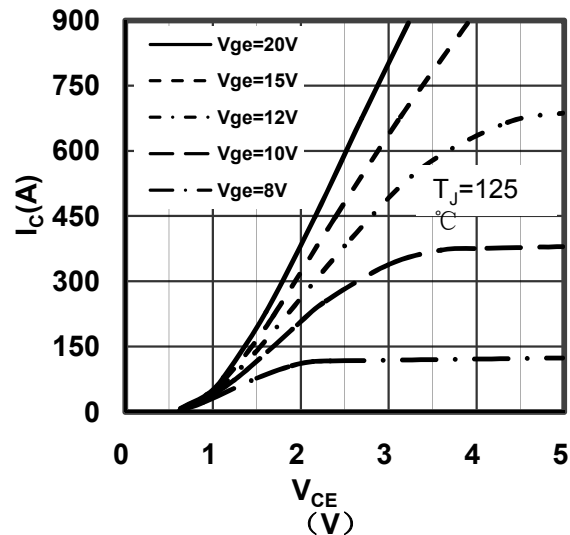


Figure 2. Typical Output Characteristics IGBT-inverter

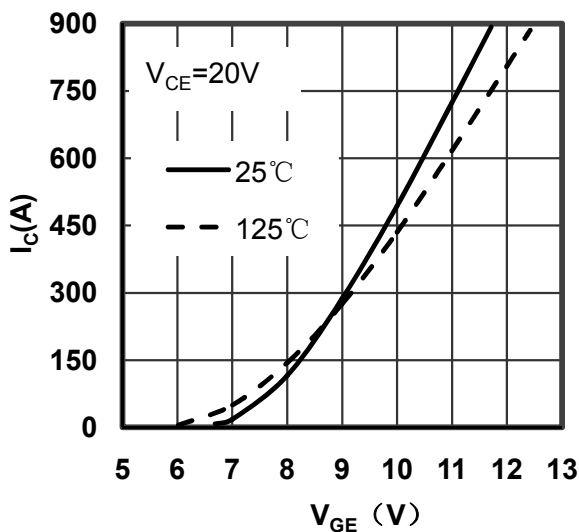


Figure 3. Typical Transfer Characteristics IGBT-inverter

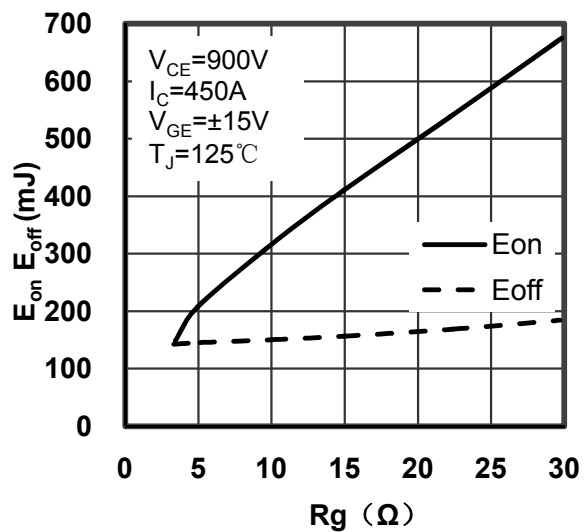


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

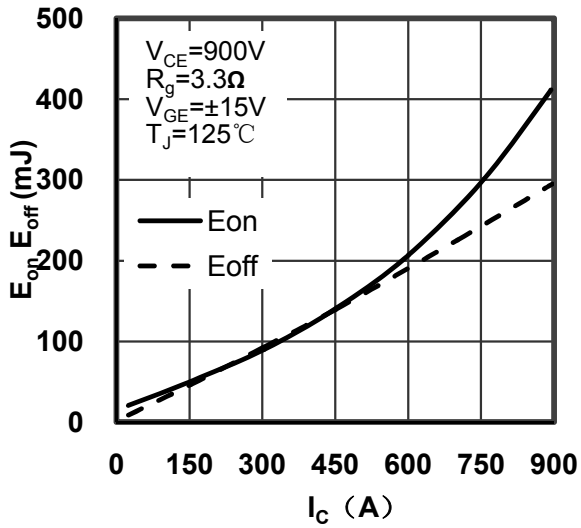


Figure 5. Switching Energy vs Collector Current IGBT-inverter

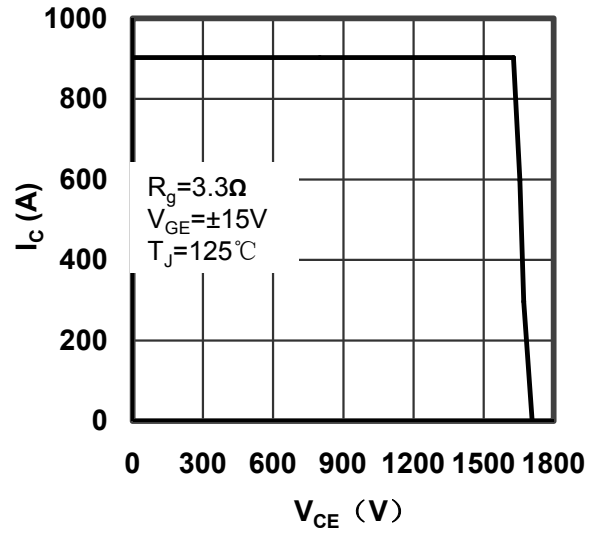


Figure 6. Reverse Biased Safe Operating Area

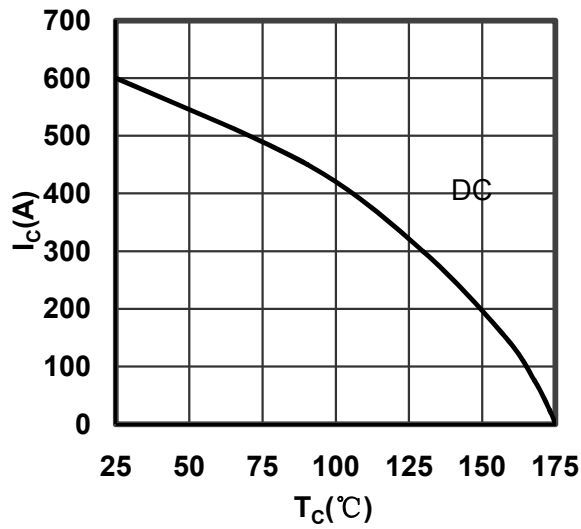


Figure 7. Collector Current vs Case temperature IGBT-inverter

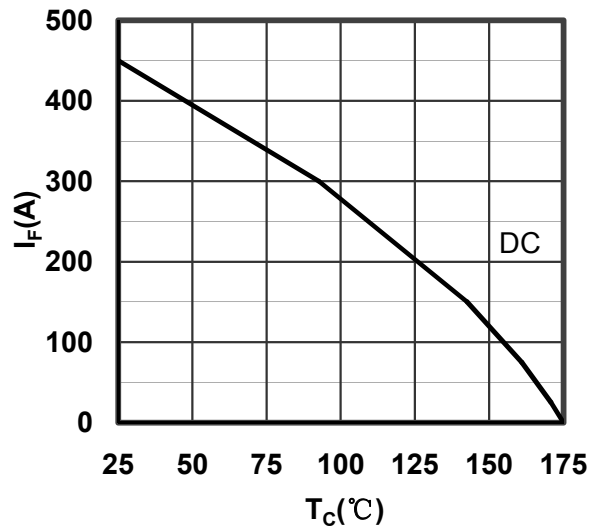


Figure 8. Forward current vs Case temperature

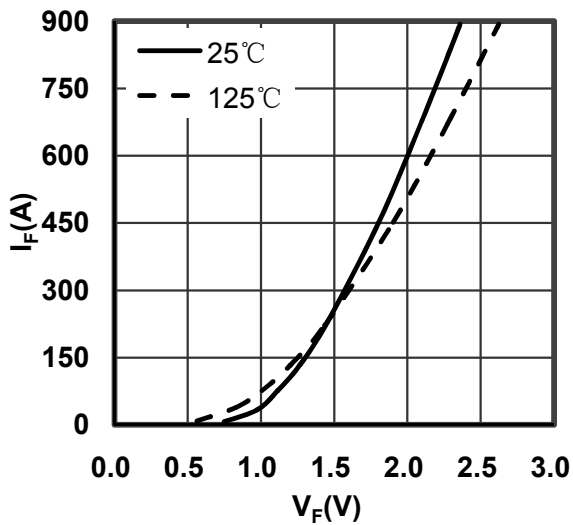


Figure 9. Diode Forward Characteristics Diode-inverter

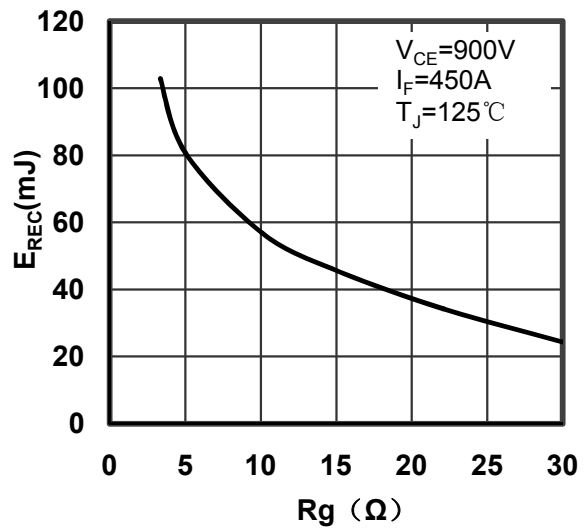


Figure 10. Switching Energy vs Gate Resistor Diode-inverter

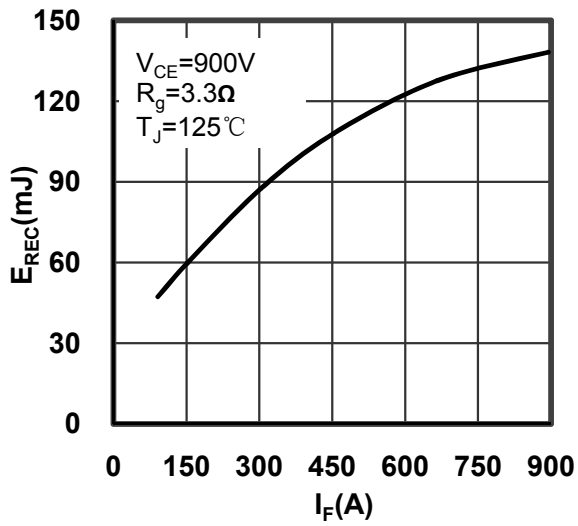


Figure 11. Switching Energy vs Forward Current Diode-inverter

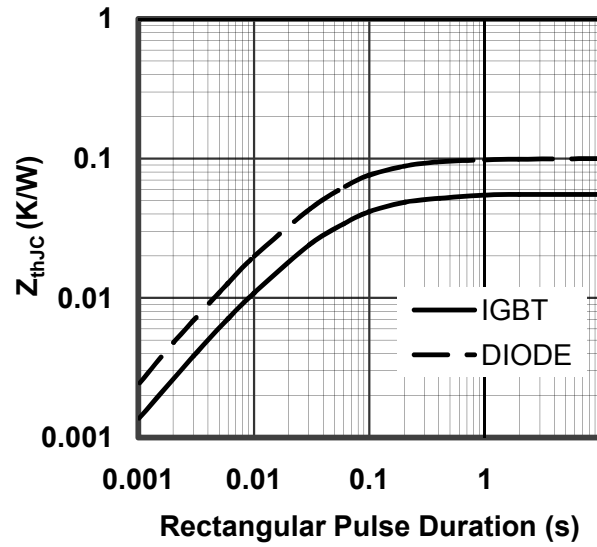


Figure 12. Transient Thermal Impedance of Diode and IGBT-inverter

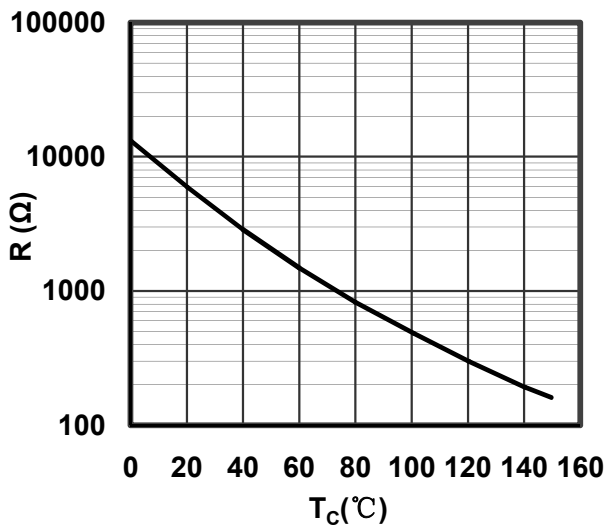


Figure 13. NTC Characteristics

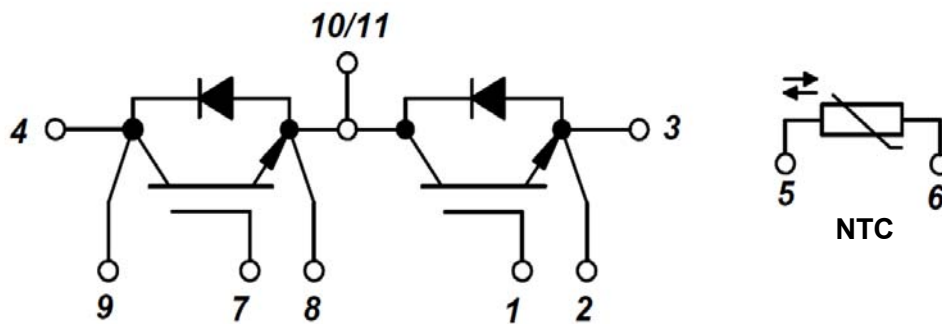
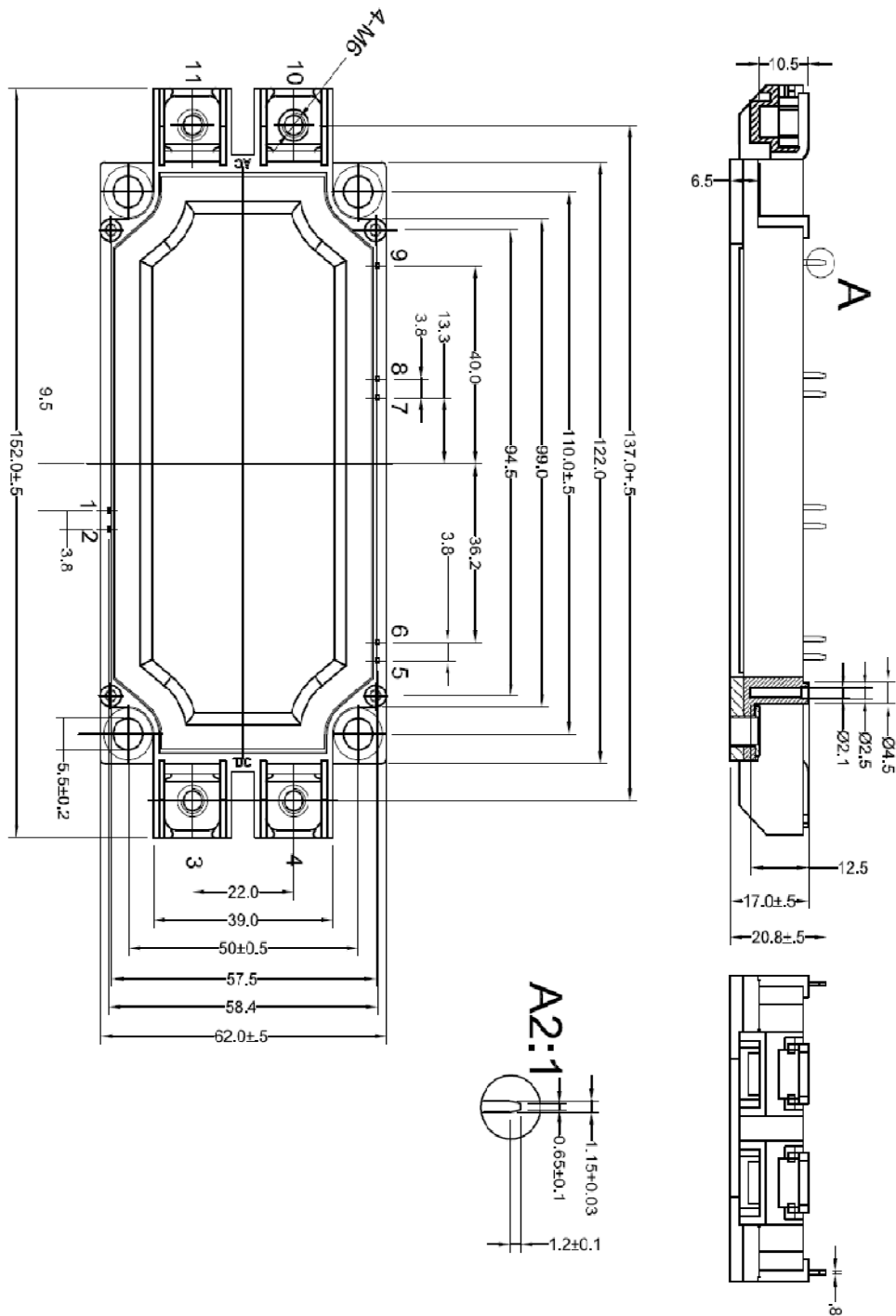


Figure 14. Circuit Diagram



Dimensions in (mm)
Figure 15. Package Outline