MMG150H160UX6TN

3-Phase Rectifier Bridge with Brake Module

June 2015 **Version 01** **RoHS Compliant**

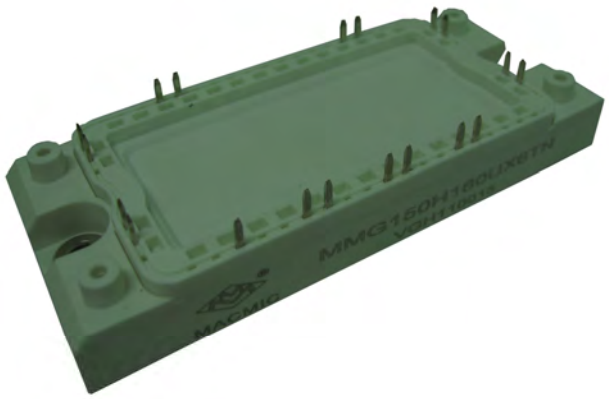
PRODUCT FEATURES

☐ Low saturation voltage and positive temperature coefficient

☐ Fast switching and short tail current

☐ Free wheeling diodes with fast and soft reverse recovery

☐ Low switching losses



APPLICATIONS

☐ Drive inverters with brake system

BRAKE-CHOPPER SECTOR

IGBT-CHOPPER ABSOLUTE MAXIMUM RATINGS

T_C=25°C unless otherwise specified

Symbol	Parameter/Test Conditions		Values	Unit
V_{CES}	Collector Emitter Voltage	T_J=25℃	1200	V
V_{GES}	Gate Emitter Voltage		±20	
I_C	DC Collector Current	T_C=25℃	105	A
		T_C=80℃	75	
I_{CM}	Repetitive Peak Collector Current	tp=1ms	150	
P_{tot}	Power Dissipation Per IGBT		348	W

Diode ABSOLUTE MAXIMUM RATINGS

T_C=25°C unless otherwise specified

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Reverse Voltage	T_J=25℃	1200	V
$I_{F(AV)}$	Average Forward Current	T_C=25℃	75	A
I_{FRM}	Repetitive Peak Forward Current	tp=1ms	150	
I^2t		T_J=125℃, t=10ms, V_R=0V	1150	A^2S

BRAKE-CHOPPER SECTOR
IGBT-CHOPPER ELECTRICAL CHARACTERISTICS

T_C=25°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=3mA		5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	I_C=75A, V_{GE}=15V, T_J=25℃			1.7	2.15	
		I_C=75A, V_{GE}=15V, T_J=125℃			1.9		
I_{CES}	Collector Leakage Current	V_{CE}=1200V, V_{GE}=0V, T_J=25℃				1	mA
		V_{CE}=1200V, V_{GE}=0V, T_J=125℃				10	mA
I_{GES}	Gate Leakage Current	V_{CE}=0V,V_{GE}=±15V, T_J=25℃		-400		400	nA
R_{gint}	Integrated Gate Resistor				10		Ω
Q_g	Gate Charge	V_{CE}=600V, I_C=75A , V_{GE}=±15V			0.7		μC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz			5.3		nF
C_{res}	Reverse Transfer Capacitance				200		pF
$t_{d(on)}$	Turn on Delay Time	V_{CC}=600V,I_C=75A R_G =4.7Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		260		ns
			T_J=125℃		290		ns
t_r	Rise Time		T_J=25℃		30		ns
			T_J=125℃		50		ns
$t_{d(off)}$	Turn off Delay Time	V_{CC}=600V,I_C=75A R_G =4.7Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		420		ns
			T_J=125℃		520		ns
t_f	Fall Time		T_J=25℃		70		ns
			T_J=125℃		90		ns
E_{on}	Turn on Energy	V_{CC}=600V,I_C=75A R_G =4.7Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		6.6		mJ
			T_J=125℃		9.4		mJ
E_{off}	Turn off Energy		T_J=25℃		6.8		mJ
			T_J=125℃		8.0		mJ
I_{SC}	Short Circuit Current	tpsc≤10μS , V_{GE}=15V T_J=125℃,V_{CC}=900V			300		A
R_{thJC}	Junction to Case Thermal Resistance （Per IGBT）					0.36	K /W

Diode ELECTRICAL CHARACTERISTICS

T_C=25°C unless otherwise specified

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F=75A , V_{GE}=0V, T_J=25℃		1.65	2.15	V
		I_F=75A , V_{GE}=0V, T_J=125℃		1.65		
t_{rr}	Reverse Recovery Time	I_F=75A , V_R=600V dI_F/dt=-2000A/μs T_J =125℃		300		ns
I_{RRM}	Max. Reverse Recovery Current			83		A
Q_{RR}	Reverse Recovery Charge			13		μC
E_{rec}	Reverse Recovery Energy			6.5		mJ
R_{thJCD}	Junction to Case Thermal Resistance （Per Diode）				0.6	K /W

Diode-RECTIFIER
ABSOLUTE MAXIMUM RATINGS

T_C=25°C unless otherwise specified

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Reverse Voltage	T_J=25℃	1600	V
I_D	Output Current(D.C.)	Three phase, half wave, Tc= 95°C	150	A
I_{FSM}	Non Repetitive Surge Forward Current	T_J=45℃, t=10ms, 50Hz	910	A
		T_J=45℃, t=8.3ms, 60Hz	1000	A
I^2t		T_J=45℃, t=10ms, 50Hz	4140	A^2S
		T_J=45℃, t=8.3ms, 60Hz	4150	A^2S

Diode-RECTIFIER
ELECTRICAL CHARACTERISTICS

T_C=25°C unless otherwise specified

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F=75A , T_J=25℃		1.15	1.35	V
		I_F=75A , T_J=125℃		1.1		V
I_R	Reverse Leakage Current	V_R=1600V, T_J=25℃			50	μA
		V_R=1600V, T_J=125℃			1	mA
V_{TO}	For power-loss calculations only , T_J = 125℃				0.87	V
r_T					6.0	mΩ
R_{thJCD}	Junction to Case Thermal Resistance （ Per Diode）				0.55	K /W

NTC CHARACTERISTICS

T_C=25°C unless otherwise specified

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

MODULE CHARACTERISTICS

T_C=25°C unless otherwise specified

Symbol	Parameter/Test Conditions		Values	Unit
T_{Jmax}	Max. Junction Temperature		150	℃
T_{Jop}	Operating Temperature		-40~125	℃
T_{stg}	Storage Temperature		-40~125	℃
V_{isol}	Isolation Breakdown Voltage	AC, 50Hz(R.M.S), t=1minute	3000	V
Md	Mounting Torque	Recommended（M5）	2.5~5	Nm
Weight			180	g

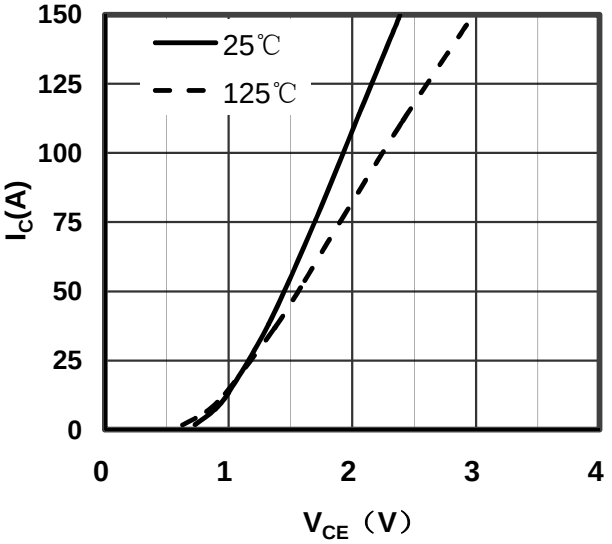


Figure 1. Typical Output Characteristics
IGBT

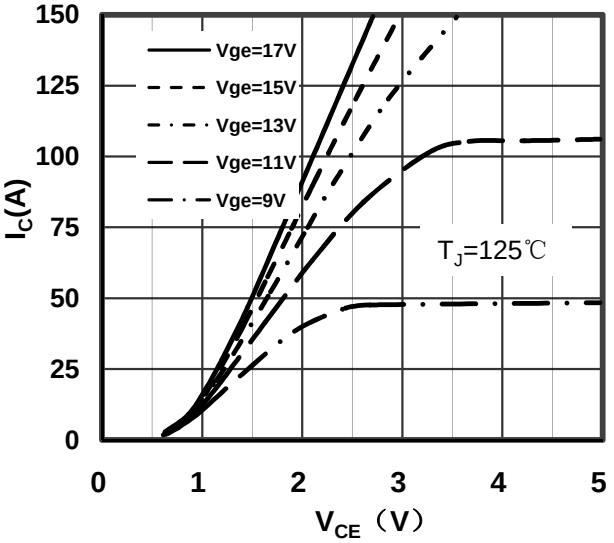


Figure 2. Typical Output Characteristics
IGBT

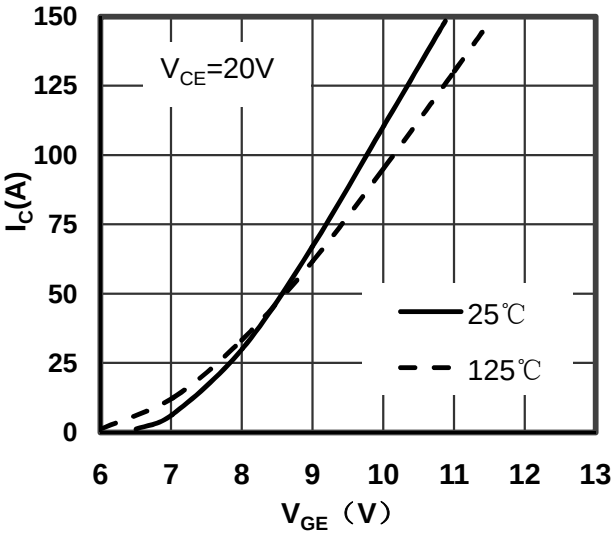


Figure 3. Typical Transfer characteristics
IGBT

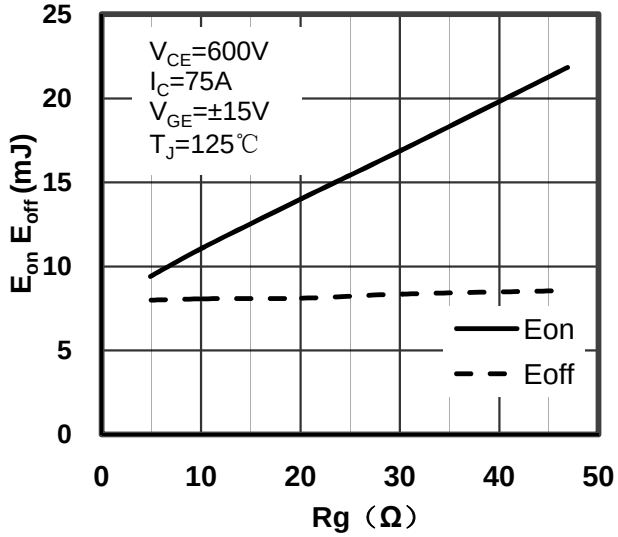


Figure 4. Switching Energy vs Gate Resistor
IGBT

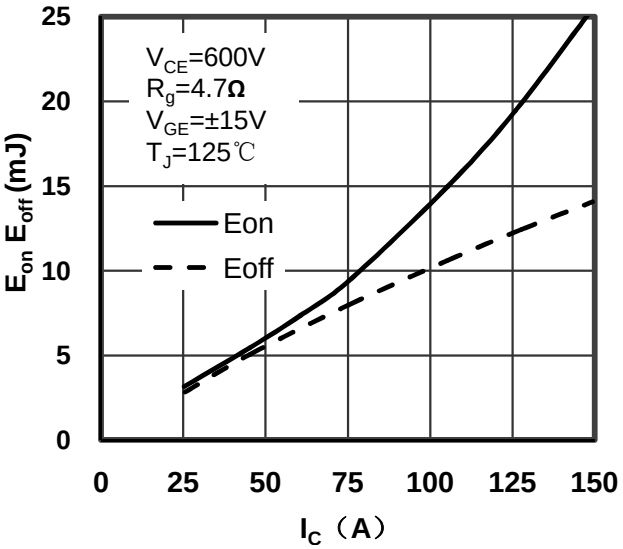


Figure 5. Switching Energy vs Collector Current
IGBT

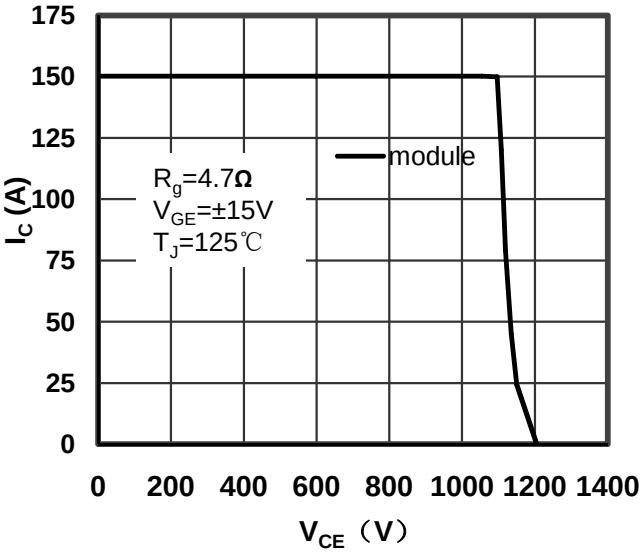


Figure 6. Reverse Biased Safe Operating Area
IGBT

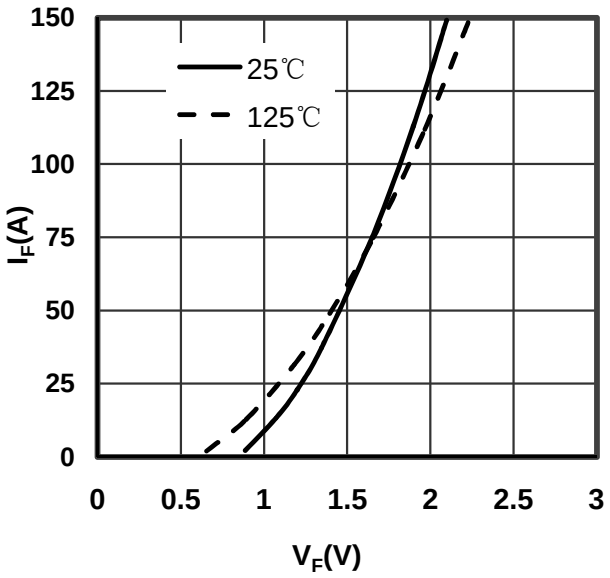


Figure 7. Diode Forward Characteristics

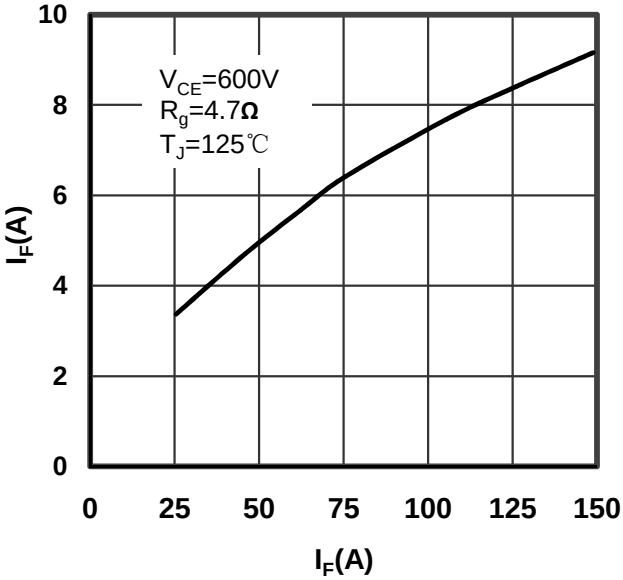


Figure 8. Switching Energy vs Forward Current

Diode

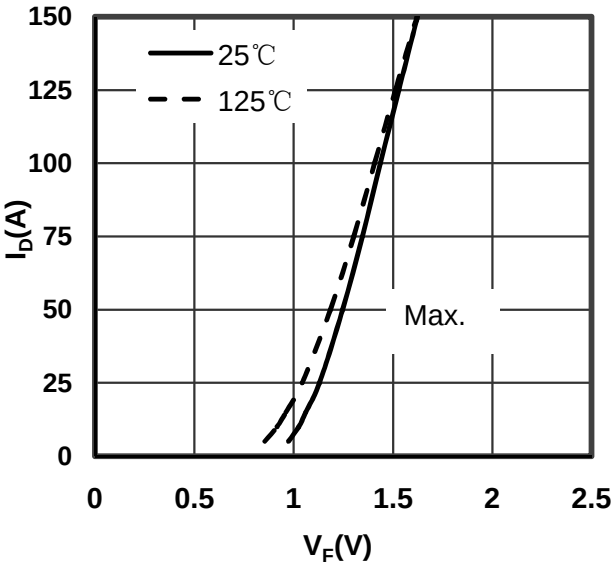


Figure 9. Forward Voltage Drop vs Output Current

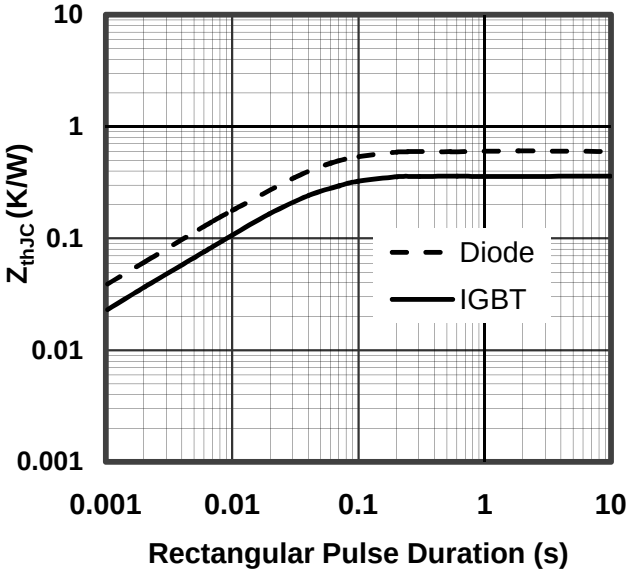


Figure 10. Transient Thermal Impedance of Diode and IGBT

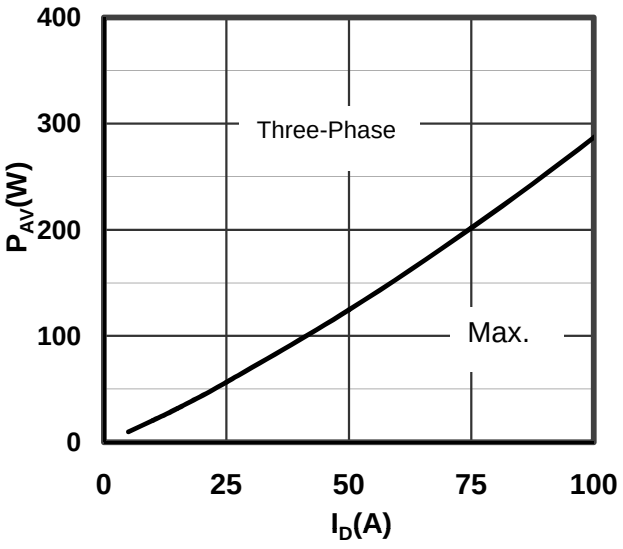


Figure 11. Power dissipation vs Output Current

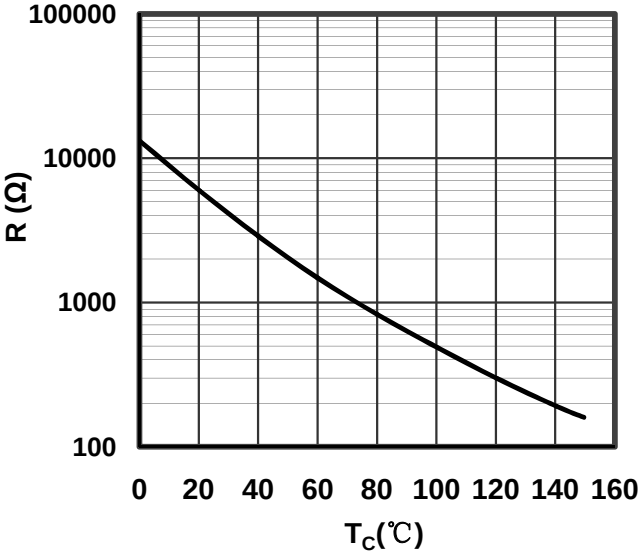


Figure 12. NTC Characteristics

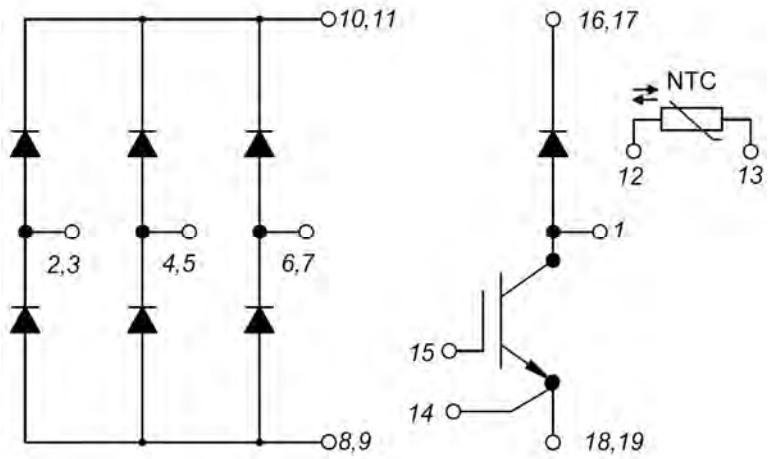
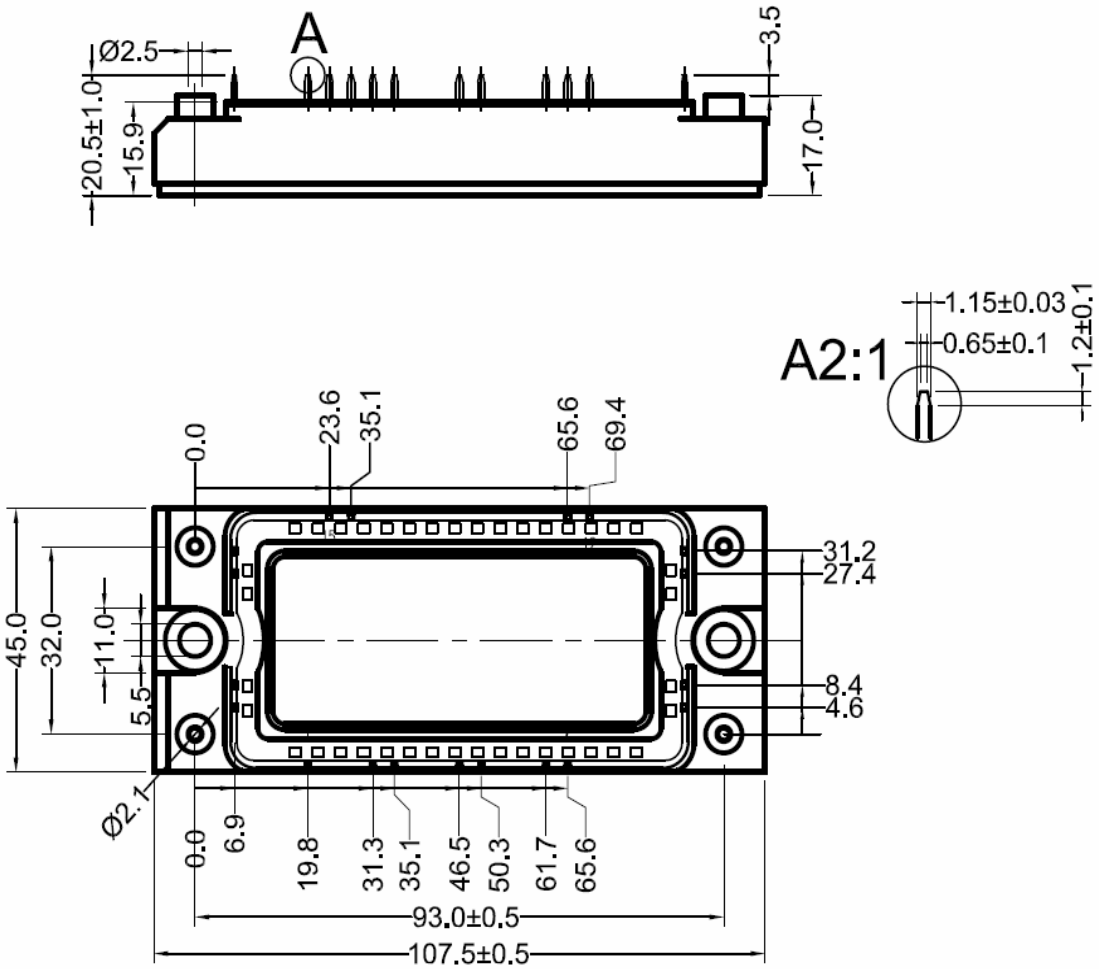


Figure 13. Circuit Diagram



Dimensions in (mm)

Figure 14. Package Outline