MMG820V075X6T7

750V IGBT Module

November 2024 Version 01 RoHS Compliant

PRODUCT FEATURES

☐ 750V Field Stop Trench IGBT

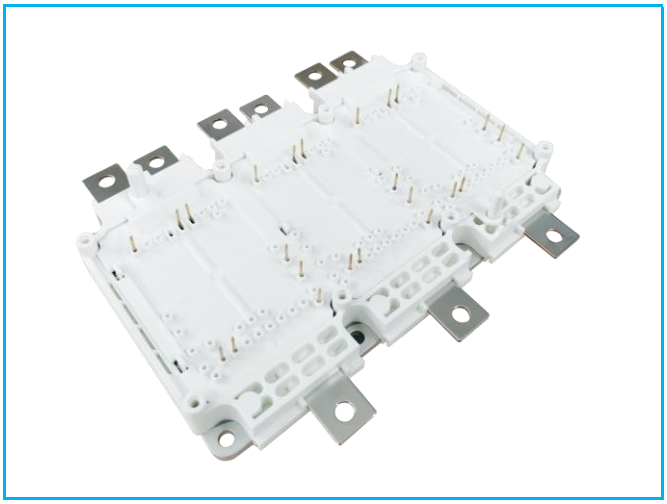
☐ $V_{CE(sat)}$ with positive temperature coefficient

☐ Fast switching and short tail current

☐ Free wheeling diodes with fast and soft reverse recovery

☐ Max Junction Temperature 175°C

☐ Temperature sense included



APPLICATIONS

☐ Automotive Traction Modules

☐ General Power Modules

IGBT-inverter

ABSOLUTE MAXIMUM RATINGS(T_F *=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Values	Unit
V_{CES}	Collector Emitter Voltage	T_J=25℃	750	V
V_{GES}	Gate Emitter Voltage		±20	
I_{CN}	Implemented Collector Current		820	A
I_C	DC Collector Current	T_F=80℃, T_{Jmax}=175℃	450	
I_{CM}	Repetitive Peak Collector Current	tp=1ms	1640	
P_{tot}	Power Dissipation Per IGBT	T_F=25℃, T_{Jmax}=175℃	1250	W

Diode-inverter

ABSOLUTE MAXIMUM RATINGS (T_F *=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Reverse Voltage	T_J=25℃	750	V
I_{FN}	Implemented Forward Current		820	A
$I_{F(AV)}$	Average Forward Current		450	
I_{FRM}	Repetitive Peak Forward Current	tp=1ms	1640	
I^2t		T_J=125℃, t=10ms, V_R=0V	28.8	KA^2s

IGBT-inverter

ELECTRICAL CHARACTERISTICS *(T_F=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=9.6mA		5.1	5.9	6.7	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	I_C=450A, V_{GE}=15V, T_J=25℃			1.1		
		I_C=450A, V_{GE}=15V, T_J=150℃			1.14		
		I_C=820A, V_{GE}=15V, T_J=25℃			1.3		
		I_C=820A, V_{GE}=15V, T_J=150℃			1.5		
I_{CES}	Collector Leakage Current	V_{CE}=750V, V_{GE}=0V, T_J=25℃				1	mA
		V_{CE}=750V, V_{GE}=0V, T_J=150℃				5	mA
I_{GES}	Gate Leakage Current	V_{CE}=0V,V_{GE}=±20V, T_J=25℃		-400		400	nA
R_{Gint}	Integrated Gate Resistor				0.6		Ω
Q_G	Gate Charge	V_{CE}=400V, I_C=450A , V_{GE}=15V			2.3		μC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz			86		nF
C_{oes}	Output Capacitance				2.3		nF
C_{res}	Reverse Transfer Capacitance				0.38		nF
$t_{d(on)}$	Turn on Delay Time	V_{CC}=400V,I_C=450A R_G =2.7Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		175		ns
			T_J=150℃		185		ns
t_r	Rise Time		T_J=25℃		70		ns
			T_J=150℃		80		ns
$t_{d(off)}$	Turn off Delay Time	V_{CC}=400V,I_C=450A R_G =2.7Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		520		ns
			T_J=150℃		580		ns
t_f	Fall Time		T_J=25℃		60		ns
			T_J=150℃		110		ns
E_{on}	Turn on Energy	V_{CC}=400V,I_C=450A R_G =2.7Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		11.6		mJ
			T_J=150℃		20.2		mJ
E_{off}	Turn off Energy		T_J=25℃		19.0		mJ
			T_J=150℃		26.4		mJ
I_{SC}	Short Circuit Current	tpsc≤6μs , V_{GE}=15V T_J=150℃,V_{CC}=400V			4000		A
R_{thJF}	Junction to cooling fluid, △V/△t = 10 dm³/min, T_F = 25°C （Per IGBT）					0.12	K /W

Diode-inverter

ELECTRICAL CHARACTERISTICS *(T_F=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F=450A , V_{GE}=0V, T_J=25℃		1.4		V
		I_F=450A , V_{GE}=0V, T_J=150℃		1.4		
		I_F=820A , V_{GE}=0V, T_J=25℃		1.7		
		I_F=820A , V_{GE}=0V, T_J=150℃		1.8		
t_{rr}	Reverse Recovery Time	I_F=450A , V_R=400V dI_F/dt=-8000A/μs T_J =150℃		200		ns
I_{RRM}	Max. Reverse Recovery Current			440		A
Q_{RR}	Reverse Recovery Charge			60		μC
E_{rec}	Reverse Recovery Energy			19.5		mJ
R_{thJF}	Junction to cooling fluid, △V/△t = 10 dm³/min, T_F = 25°C （Per Diode）				0.2	K /W

NTC CHARACTERISTICS *(T_F=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
R_{25}	Resistance	T_F =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_F=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Values	Unit
T_{Jmax}	Max. Junction Temperature		175	℃
T_{Jop}	Operating Temperature		-40~150	
T_{stg}	Storage Temperature		-40~125	
V_{isol}	Isolation Breakdown Voltage	RMS, f = 0 Hz, t = 1 sec	4200	V
CTI	Comparative Tracking Index		＞200	
Torque	baseplate to heatsink	Recommended（M4）	1.8~2.2	Nm
	PCB to frame	Recommended（M3）	0.4~0.6	Nm
Weight			775	g

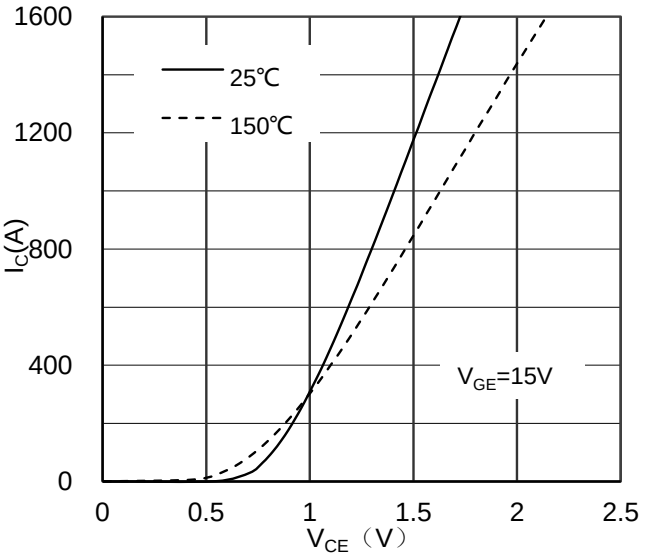


Figure 1. Typical Output Characteristics IGBT-inverter

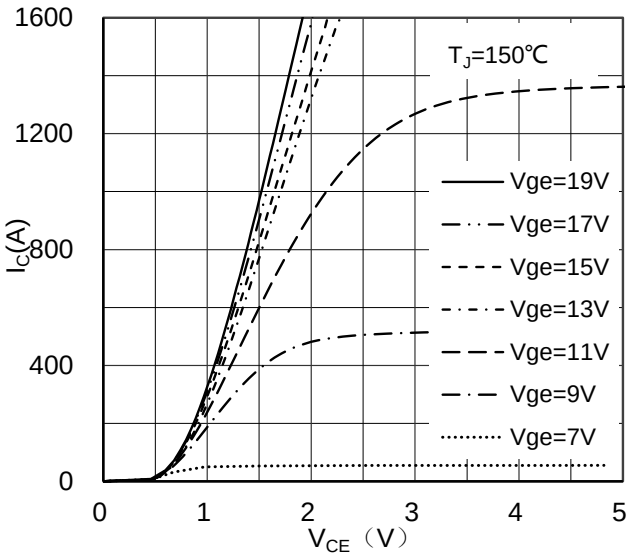


Figure 2. Typical Output Characteristics IGBT-inverter

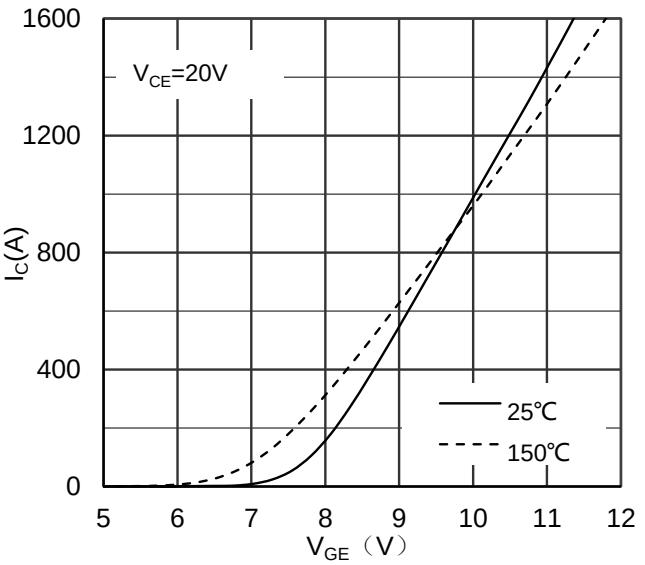


Figure 3. Typical Transfer characteristics IGBT-inverter

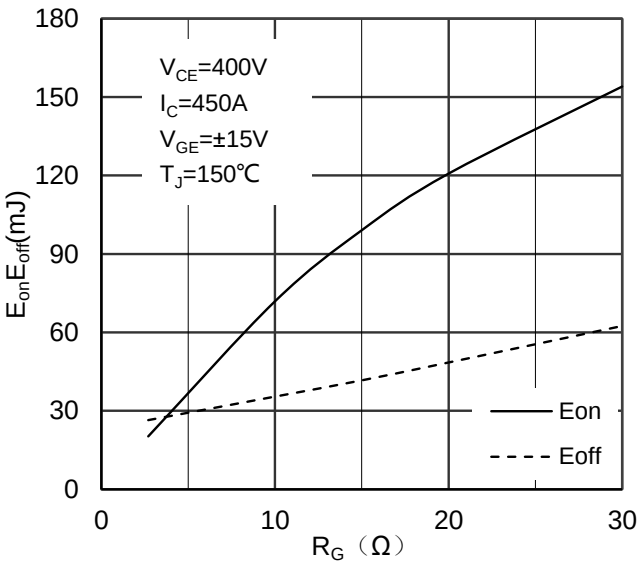


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

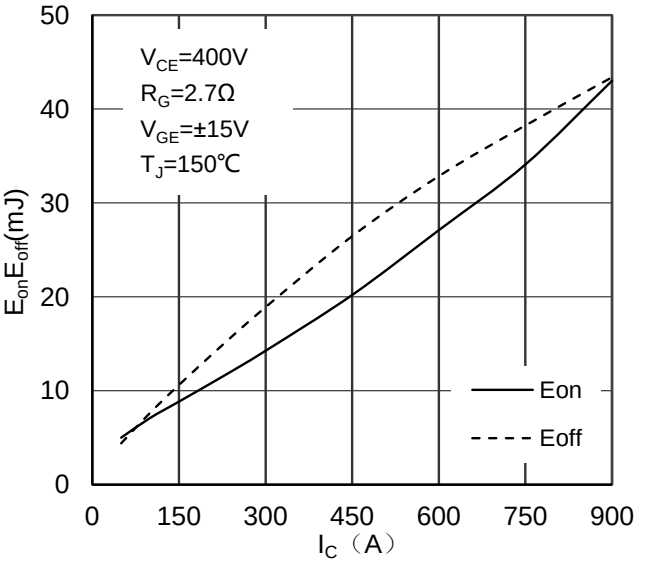


Figure 5. Switching Energy vs Collector Current IGBT-inverter

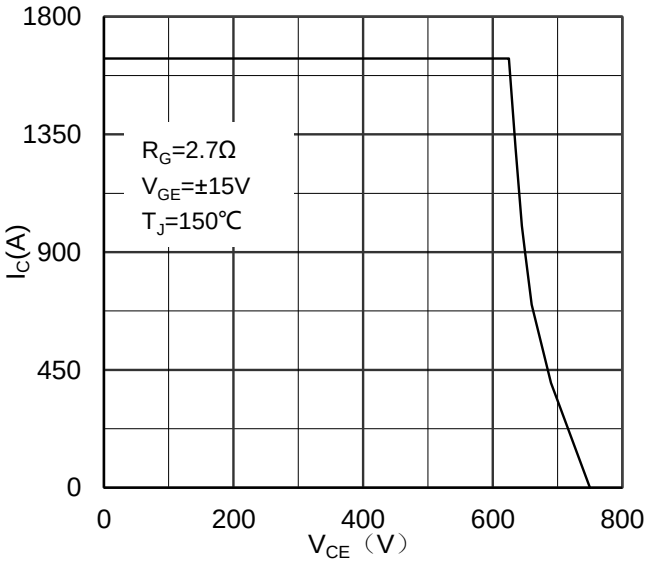


Figure 6. Reverse Biased Safe Operating Area IGBT-inverter

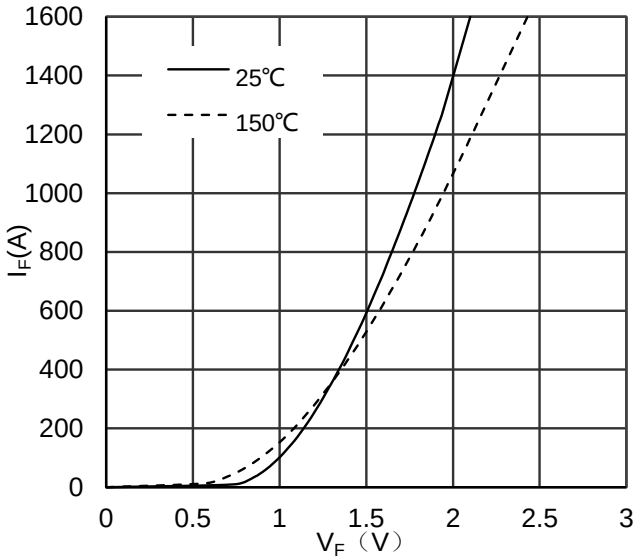


Figure 7. Diode Forward Characteristics Diode-inverter

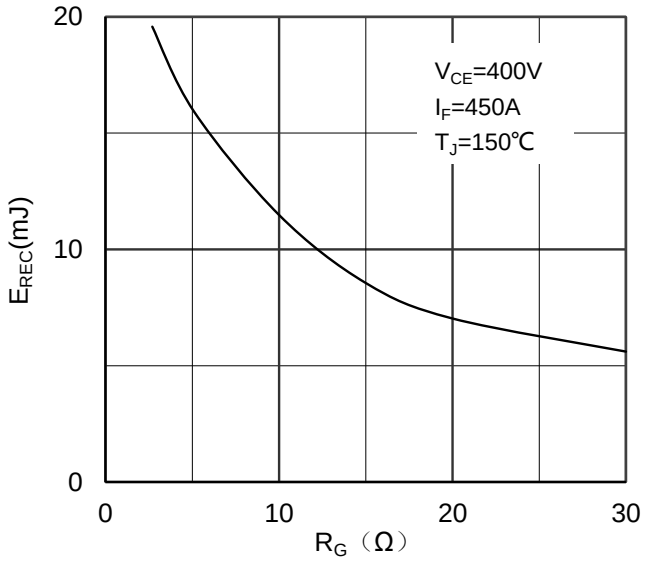


Figure 8. Switching Energy vs Gate Resistor Diode-inverter

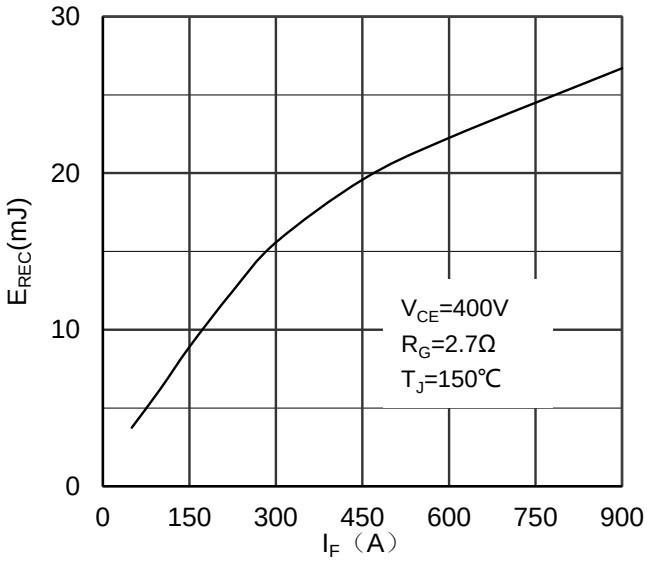


Figure 9. Switching Energy vs Forward Current Diode-inverter

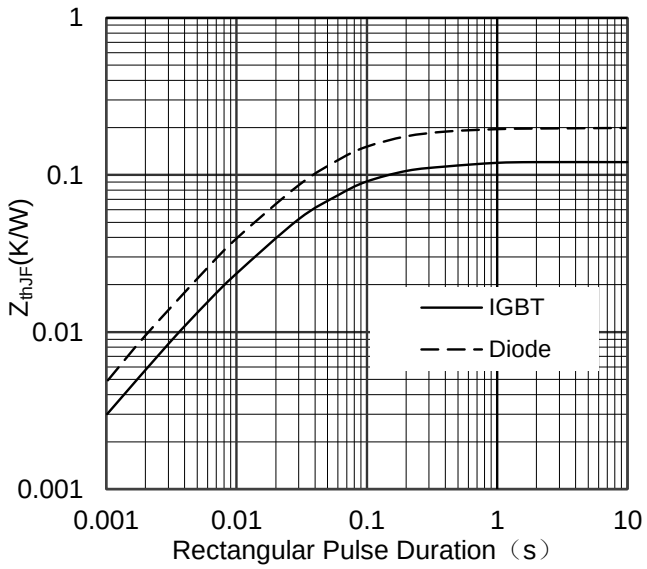


Figure 10. Transient Thermal Impedance of Diode and IGBT-inverter

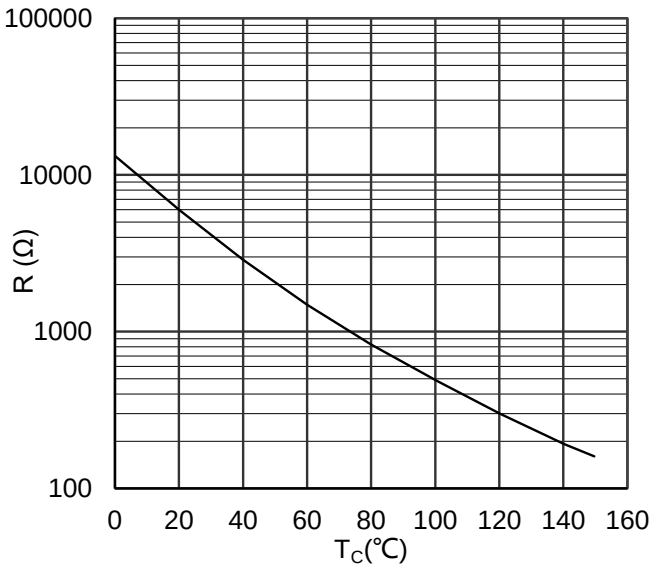


Figure 11. NTC Characteristics

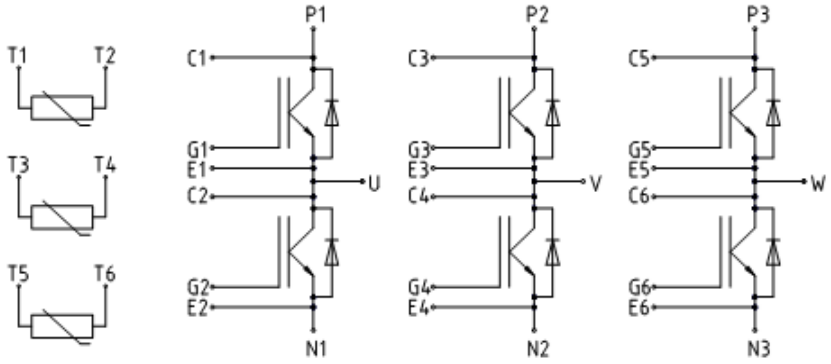
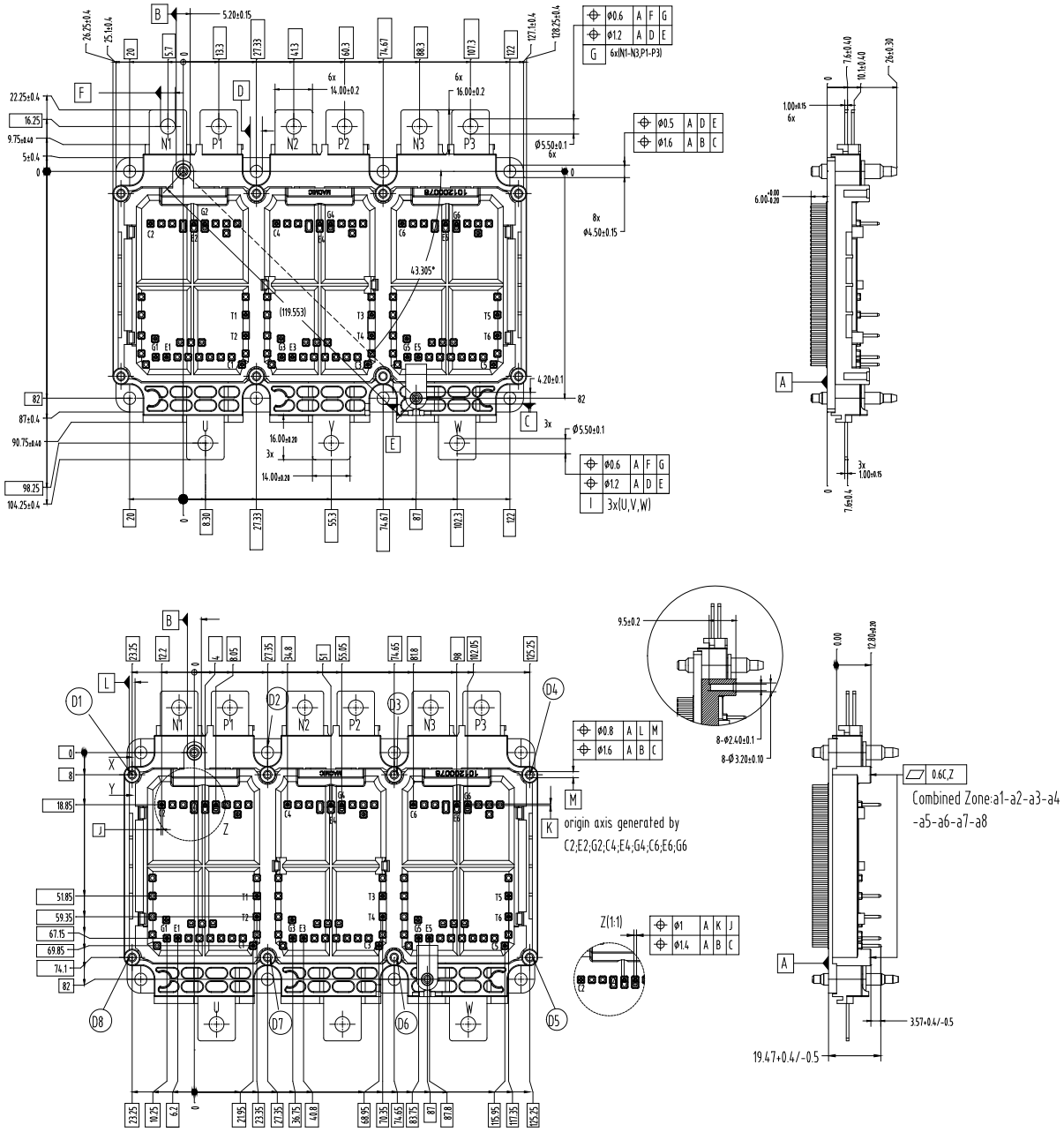


Figure 12. Circuit Diagram



Dimensions in (mm)

Figure 13. Package Outline