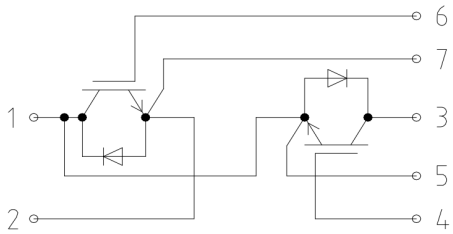
ANGM400B120R6

1200V 400A IGBT Module

PRODUCT FEATURES

- ☐ IGBT CHIP(Trench+FS)
- ☐ Low saturation voltage and positive temperature coefficient
- ☐ Fast switching and short tail current
- ☐ Free wheeling diodes with fast and soft reverse recovery
- ☐ Temperature sense included
- ☐ High short circuit capability



APPLICATIONS

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

IGBT

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

Symbol	Parameter/ Test Conditions		Values	Unit
V_{CES}	Collector Emitter Voltage	T_J= 25 °C	1200	V
V_{GES}	Gate Emitter Voltage		±20	
I_C	DC Collector Current	T_C= 25 °C, T_{Jmax}= 175 °C	588	A
		T_C= 100 °C, T_{Jmax}= 175 °C	400	
I_{CM}	Repetitive Peak Collector Current	tp= 1 ms	800	
P_{tot}	Power Dissipation Per IGBT	T_C= 25 °C, T_{Jmax}= 175 °C	2	kW

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 °C	1200	V
$I_{F(AV)}$	Average Forward Current		400	A
I_{FRM}	Repetitive Peak Forward Current	tp= 1 ms	800	
I^2t		T_J= 150 °C，t=10ms，V_R=0V	37.6	kA^2s

MODULE CHARACTERISTICS(T_C = 25 °C *unless otherwise specified)*

Symbol	Parameter/ Test Conditions		Values	Unit
T_{Jmax}	Max. Junction Temperature		175	°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		＞200	
Torque	to heatsink	Recommended （M6）	3~5	Nm
	to terminal	Recommended （M6）	3~5	Nm
Weight			320	g

IGBT

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=6mA		5.5	6.0	6.5	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	I_C=400A, V_{GE}=15V, T_J=25°C			1.70	2.05	
		I_C=400A, V_{GE}=15V, T_J=125°C			2.15		
		I_C=400A, V_{GE}=15V, T_J=150°C			2.25		
I_{CES}	Collector Leakage Current	V_{CE}=1200V, V_{GE}=0V, T_J=25°C				1	mA
		V_{CE}=1200V, V_{GE}=0V, T_J=150°C				10	mA
I_{GES}	Gate Leakage Current	V_{CE}=0V, V_{GE}=±20V, T_J=25°C				±500	nA
R_{gint}	Integrated Gate Resistor				1.1		Ω
Q_g	Gate Charge	V_{CE}=600V, I_C=400A, V_{GE}=15V			4.5		μC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz			30.5		nF
C_{res}	Reverse Transfer Capacitance				1.35		pF
$t_{d(on)}$	Turn on Delay Time	V_{CC}=600V, I_C=400A, R_G =1.5Ω, V_{GE}=±15V, Inductive Load	T_J= 25 °C		90		ns
			T_J= 150 °C		110		ns
t_r	Rise Time		T_J= 25 °C		70		ns
			T_J= 150 °C		80		ns
$t_{d(off)}$	Turn off Delay Time	V_{CC}=600V, I_C=400A, R_G =1.5Ω, V_{GE}=±15V, Inductive Load	T_J= 25 °C		520		ns
			T_J= 150 °C		570		ns
t_f	Fall Time		T_J= 25 °C		120		ns
			T_J= 150 °C		225		ns
E_{on}	Turn on Energy	V_{CC}=600V, I_C=400A, R_G =1.5Ω, V_{GE}=±15V, Inductive Load	T_J= 25 °C		25		mJ
			T_J= 150 °C		40		mJ
E_{off}	Turn off Energy		T_J= 25 °C		28		mJ
			T_J= 150 °C		50		mJ
I_{SC}	Short Circuit Current	tpsc≤10μS, V_{GE}=15V T_J=150°C, V_{CC}=800V			2800		A
R_{thJC}	Junction to Case Thermal Resistance （ Per IGBT）					0.076	K /W

Diode-inverter

ELECTRICAL CHARACTERISTICS (T C =25°C unless otherwise specified)

Symbol	Parameter/ Test Conditions		Min.	Typ.	Max.	Unit
V_F	Collector Emitter Voltage	I_F=400A,V_{GE}=0V,T_J= 2 5 °C		1.9	2.3	V
		IF=400A,VGE=0V,T_J= 1 2 5 °C		1.65		
		IF=400A,VGE=0V,T_J= 1 5 0 °C		1.6		
Trr	Gate Emitter Voltage	I_F=400A , V_R=600V dI_F/dt=-5600A/μs TJ =150℃		550		nS
I_{RRM}	DC Collector Current			520		A
Q_{RR}	Repetitive Peak Collector Current			130		μC
E_{rec}	Power Dissipation Per IGBT			54		mJ
R_{thJCD}	Junctionto CaseThermal Resistance（Per Diode）				0.08	kW

IGBT Typical Performance

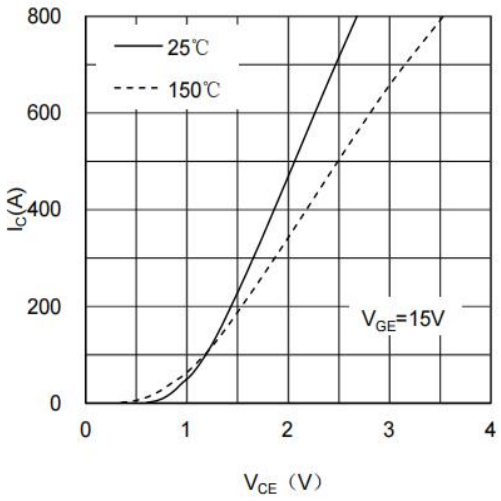


Figure1 Typical IGBT output characteristics

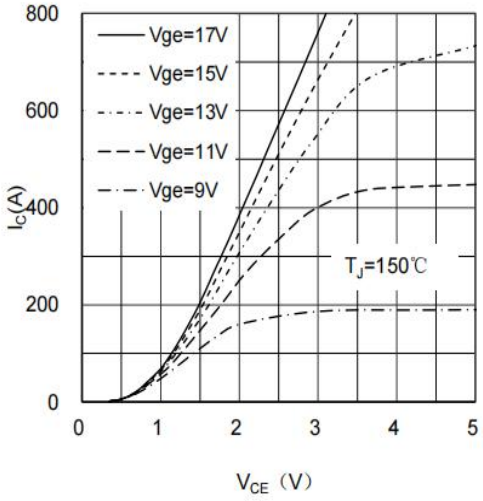


Figure2 Typical IGBT output characteristics

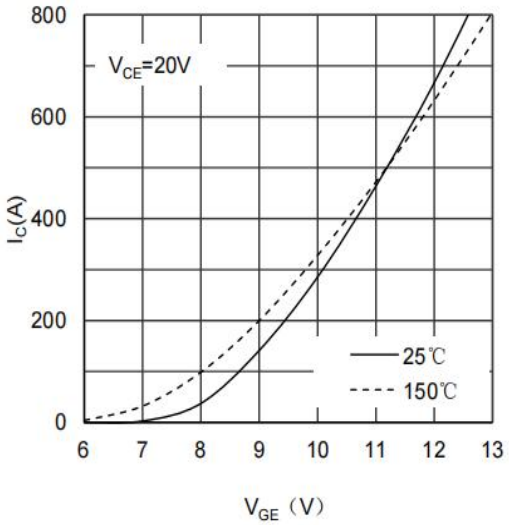


Figure3 Typical IGBT transfer characteristics

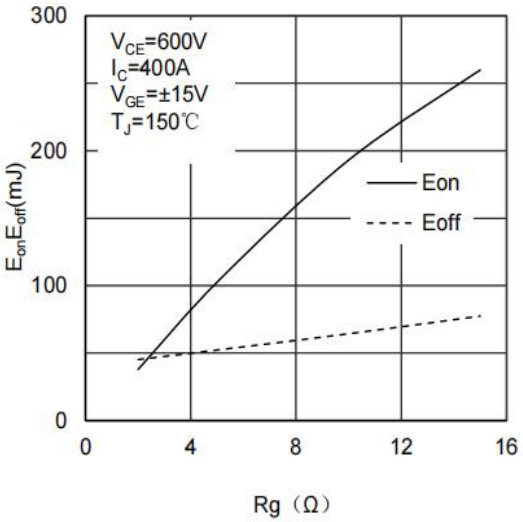


Figure4 Switching Energy vs Gate Resistor IGBT

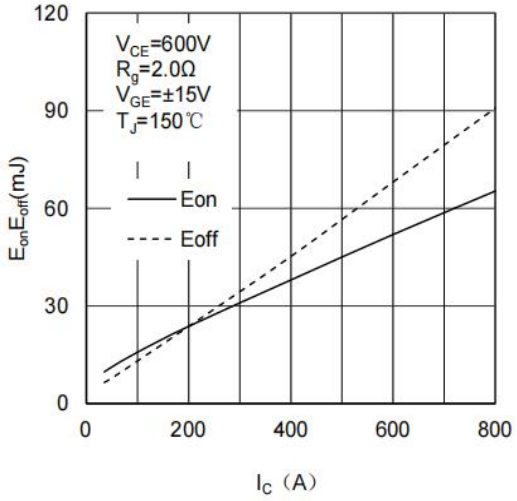


Figure5 Switching Energy vs Collector Current IGBT

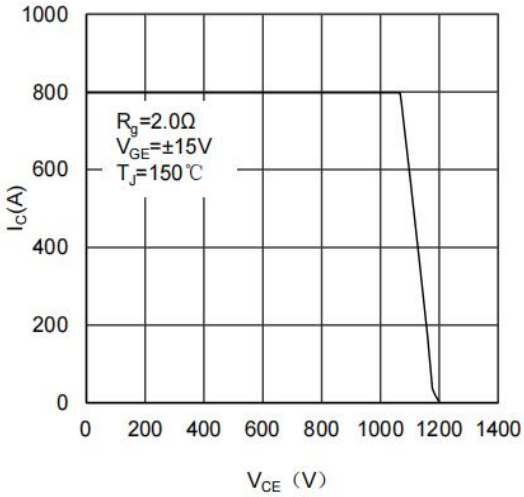


Figure6 Reverse Biased Safe Operating Area IGBT

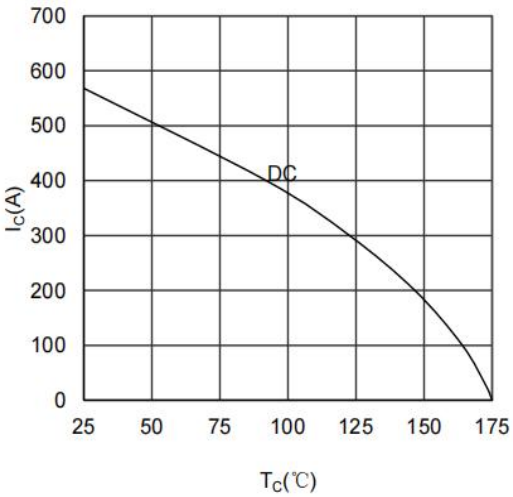


Figure7 Collector Current vs Case temperature IGBT

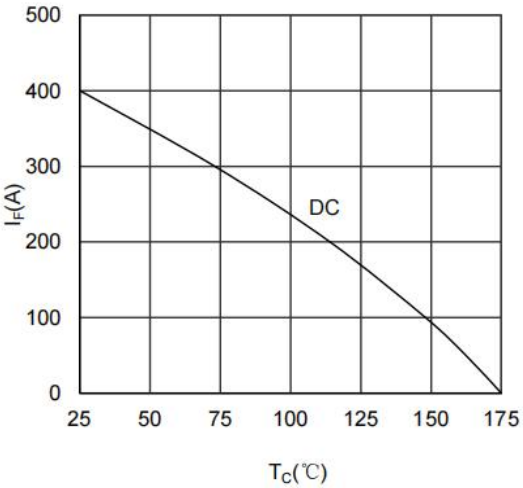


Figure8 Forward current vs Case temperature Diode

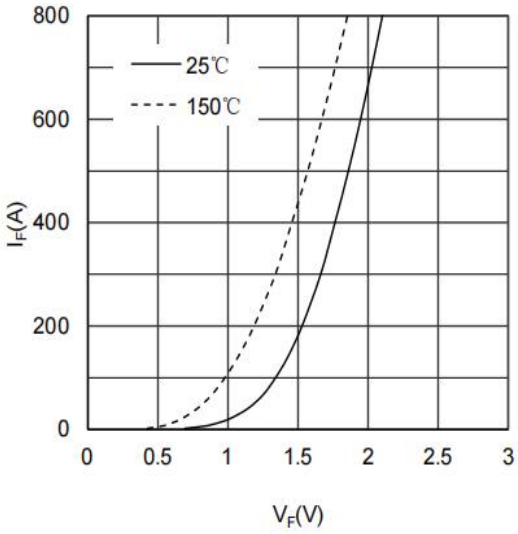


Figure9 Diode Forward Characteristics Diode

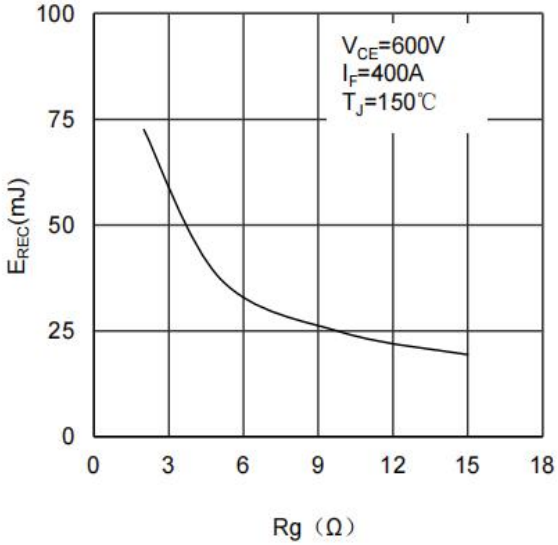


Figure10 Switching Energy vs Gate Resistor Diode

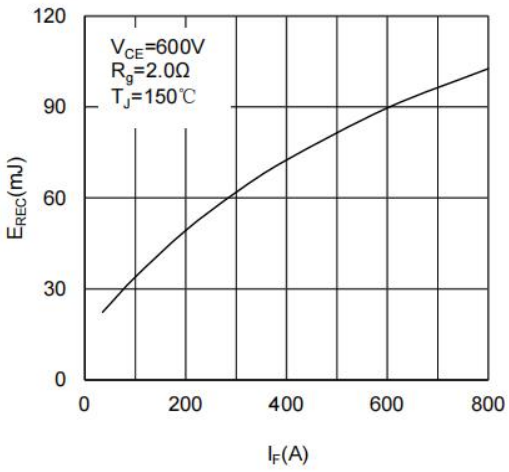


Figure11 Switching Energy vs Forward Current Diode

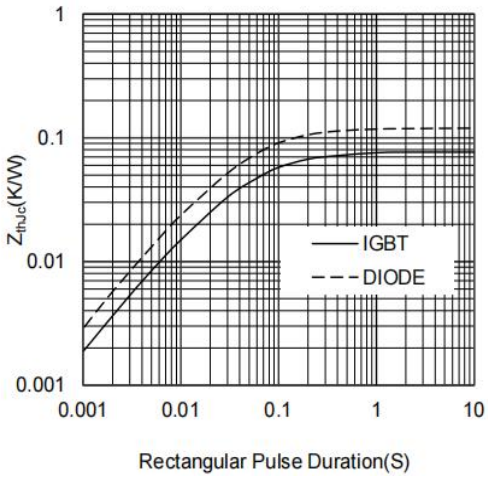
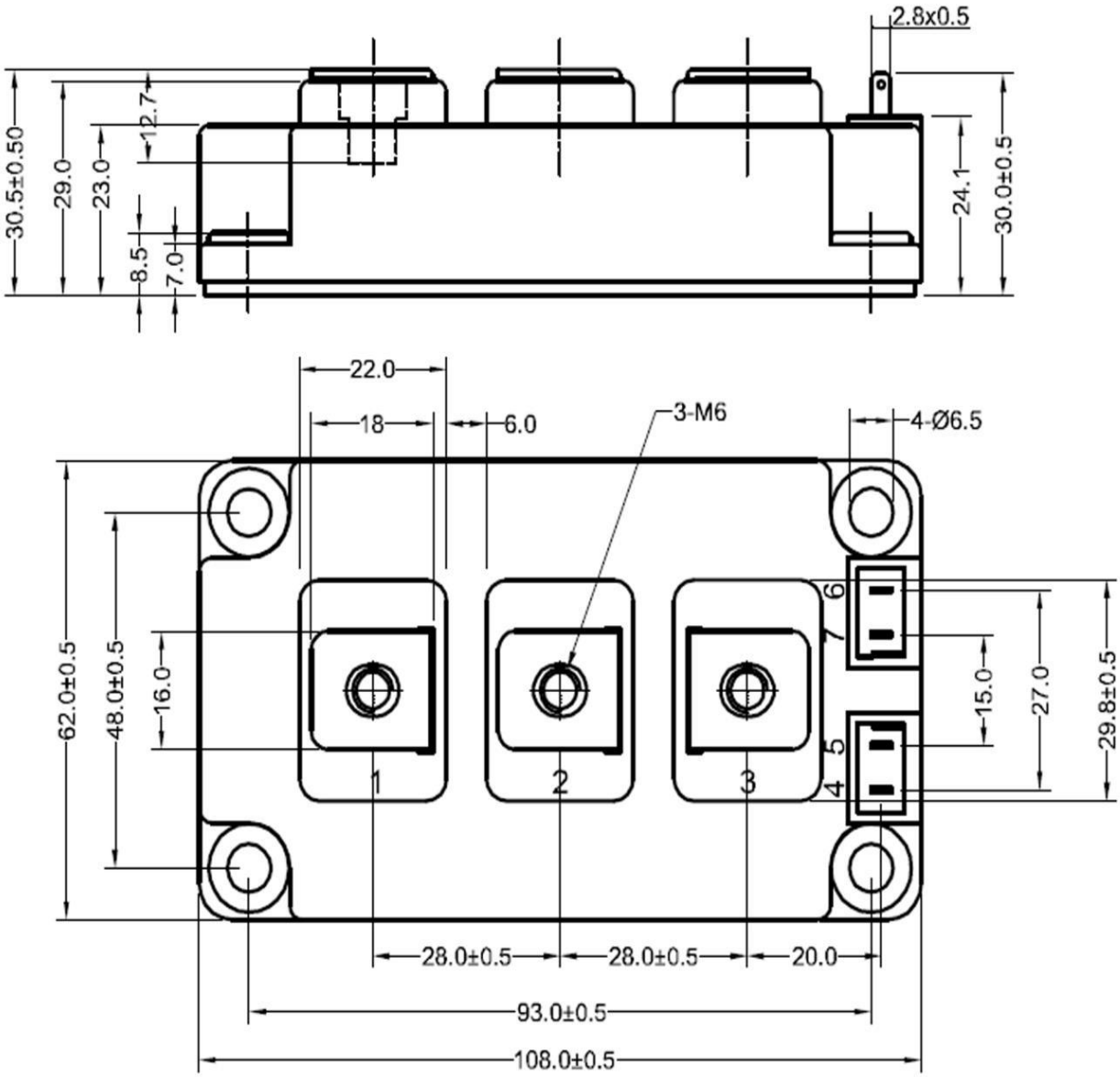


Figure12 Transient Thermal Impedance of Diode and IGBT

Package Dimensions: 62MM



Dimensions in (mm)
Figure 13 Package Outline