ANGM600B120ED3

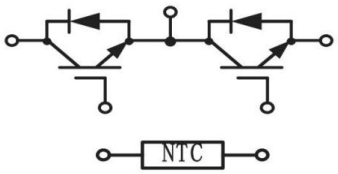
1200V 600A IGBT Module

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
- ☐ 10μs Short Circuit Withstand

APPLICATIONS

- ☐ Motor Drives
- ☐ Power Charging Equipment
- ☐ Solar Power
- ☐ Electric Vehicle



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	880	A
		T_C= 100 °C, T_{Jmax}= 175 °C	600	
I_{CM}	Repetitive Peak Collector Current	tp= 1 ms	1200	
P_{tot}	Power Dissipation Per IGBT	T_C= 25 °C, T_{Jmax}= 175 °C	3	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		600	A
I_{FRM}	Repetitive Peak Forward Current	tp= 1 ms	1200	
I^2t		T_J= 150 °C，t=10ms，V_R=0V	45	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 （M5）	2.5~5	Nm
	to terminal	Recommended （M6）	3~5	Nm
Weight			350	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=600A, V_{GE}=15V, T_J=25°C			1.75	2.25	
		I_C=600A, V_{GE}=15V, T_J=125°C			2.15	2.55	
		I_C=600A, V_{GE}=15V, T_J=150°C			2.25	2.65	
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				0.3		Ω
Q_g	Gate Charge	V_{CE}=600V, I_C=600A, V_{GE}=15V			4.6		μC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz			93		nF
C_{res}	Reverse Transfer Capacitance				1.0		pF
$t_{d(on)}$	Turn on Delay Time	V_{CC}=600V, I_C=600A, R_G =1.5Ω, V_{GE}=±15V, Inductive Load	T_J= 25 °C		310		ns
			T_J= 150 °C		335		ns
t_r	Rise Time		T_J= 25 °C		110		ns
			T_J= 150 °C		115		ns
$t_{d(off)}$	Turn off Delay Time	V_{CC}=600V, I_C=600A, R_G =1.5Ω, V_{GE}=±15V, Inductive Load	T_J= 25 °C		725		ns
			T_J= 150 °C		785		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=600A, R_G =1.5Ω, V_{GE}=±15V, Inductive Load	T_J= 25 °C		22		mJ
			T_J= 150 °C		31		mJ
E_{off}	Turn off Energy		T_J= 25 °C		66		mJ
			T_J= 150 °C		84		mJ
I_{SC}	Short Circuit Current	tpsc≤10μS, V_{GE}=15V T_J=150°C, V_{CC}=800V			2200		A
R_{thJC}	Junction to Case Thermal Resistance (Per IGBT)					0.049	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=600A,V_{GE}=0V,T_J= 2 5 °C		1.9	2.3	V
		IF=600A,VGE=0V,T_J= 1 2 5 °C		1.65		
		IF=600A,VGE=0V,T_J= 1 5 0 °C		1.6		
Trr	Gate Emitter Voltage	I_F=600A , V_R=600V dI_F/dt=-4700A/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

NTC CHARACTERISTICS (TC=25°C unless otherwise specified)

Symbol	Parameter/ Test Conditions		Min.	Typ.	Max.	Unit
R_{25}	Rated resistance	T_C= 2 5 °C		5		KΩ
△R/R	Deviation of R100	T_C= 100 °C, R_{100}=493Ω	-5		5	%
P_{25}	Power dissipation	T_C= 2 5 °C			20	mW
$B_{25/50}$	B-value	R_2= R_{25}exp [$B_{25/50}$(1/T_2-1/(298.15 K))]		3375		K

IGBT Typical Performance

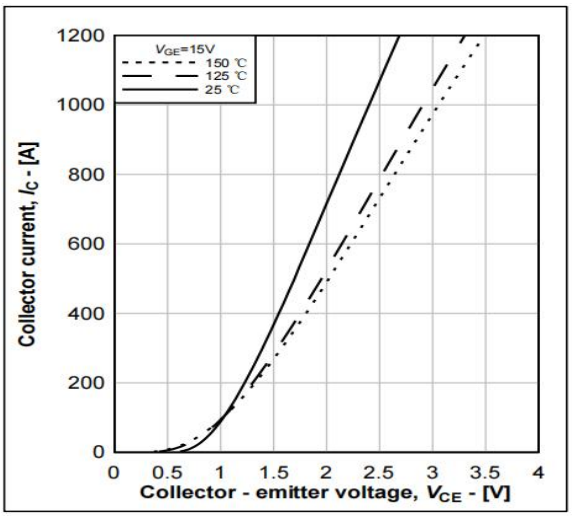


Figure1 Typical IGBT output characteristics

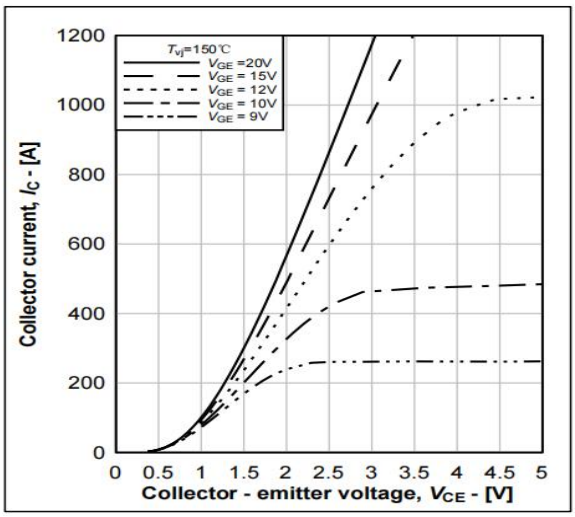


Figure2 Typical IGBT output characteristics

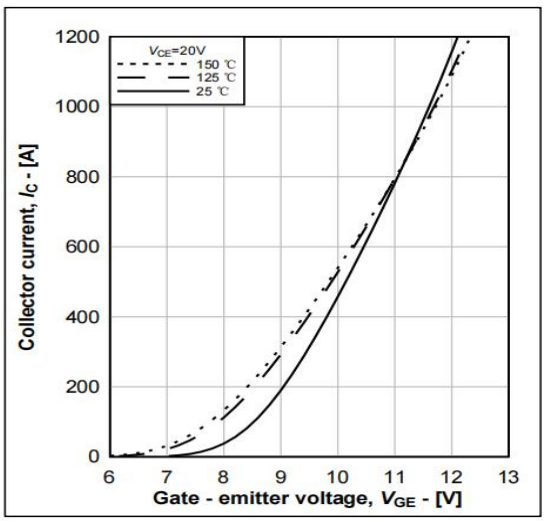


Figure3 Typical IGBT transfer characteristics

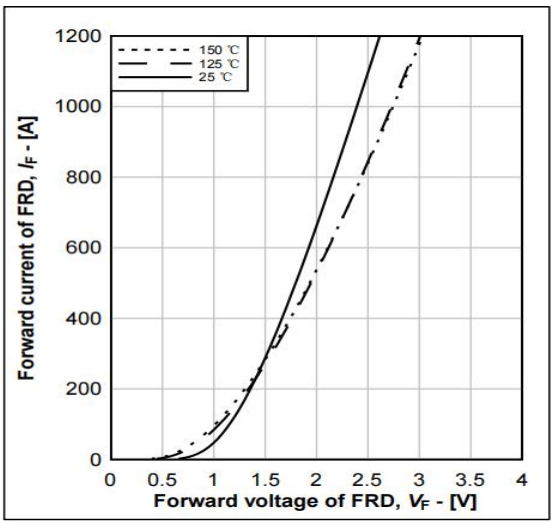


Figure4 Typical FRD output characteristics

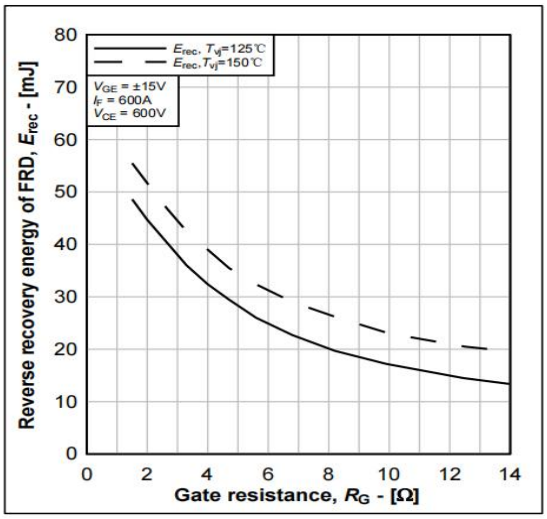


Figure5 Typical FRD Erec

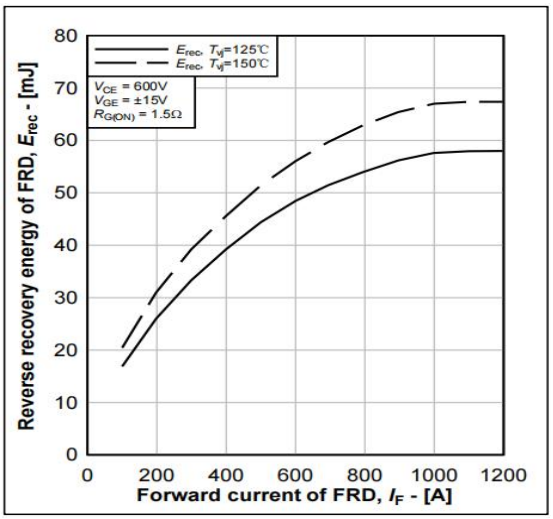


Figure6 Typical FRD Erec

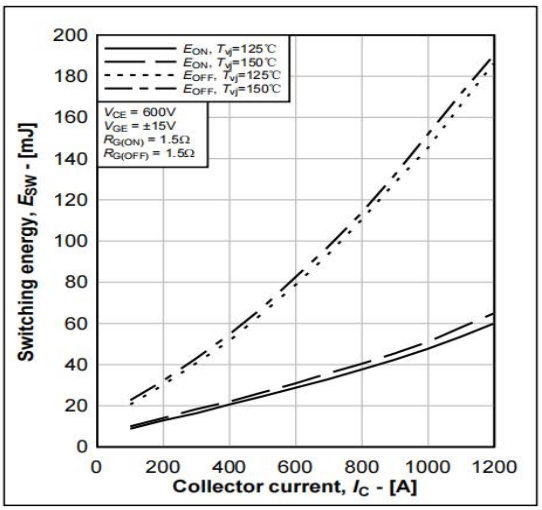


Figure7 Typical IGBT switching energy

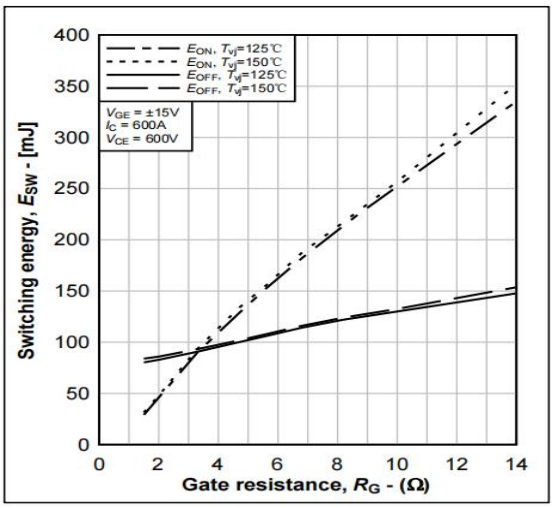


Figure8 Typical IGBT switching energy

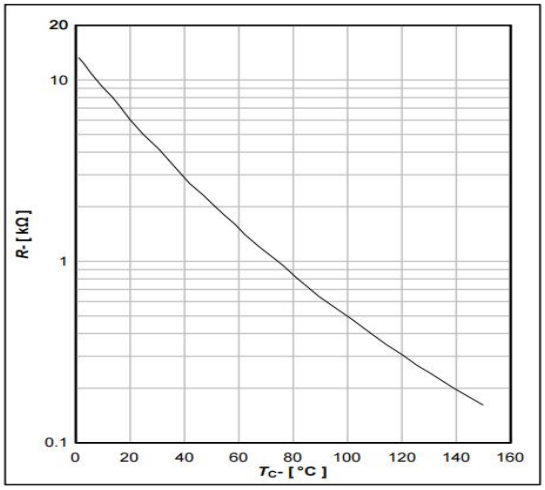


Figure9 Typical NTC thermistor characteristic

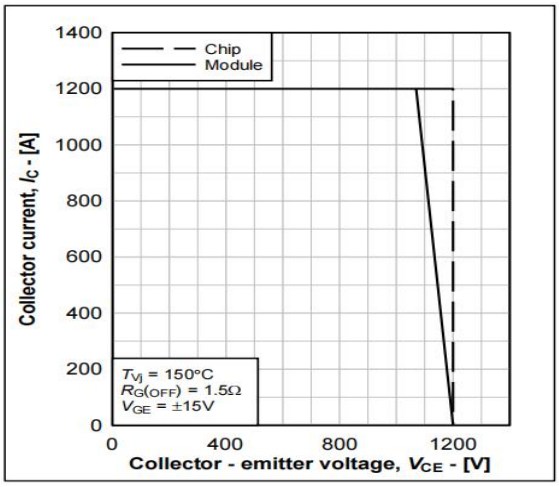


Figure10 Reverse bias safe operating area of IGBT

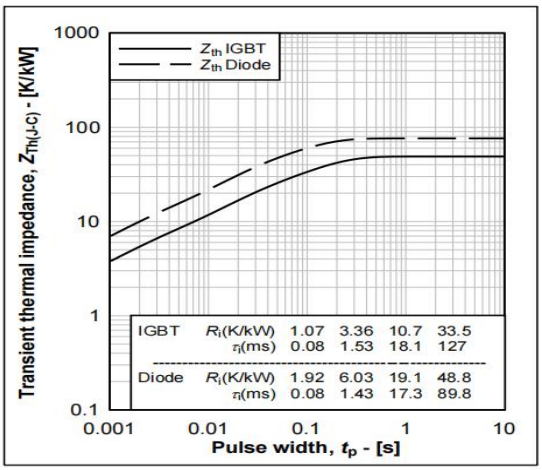
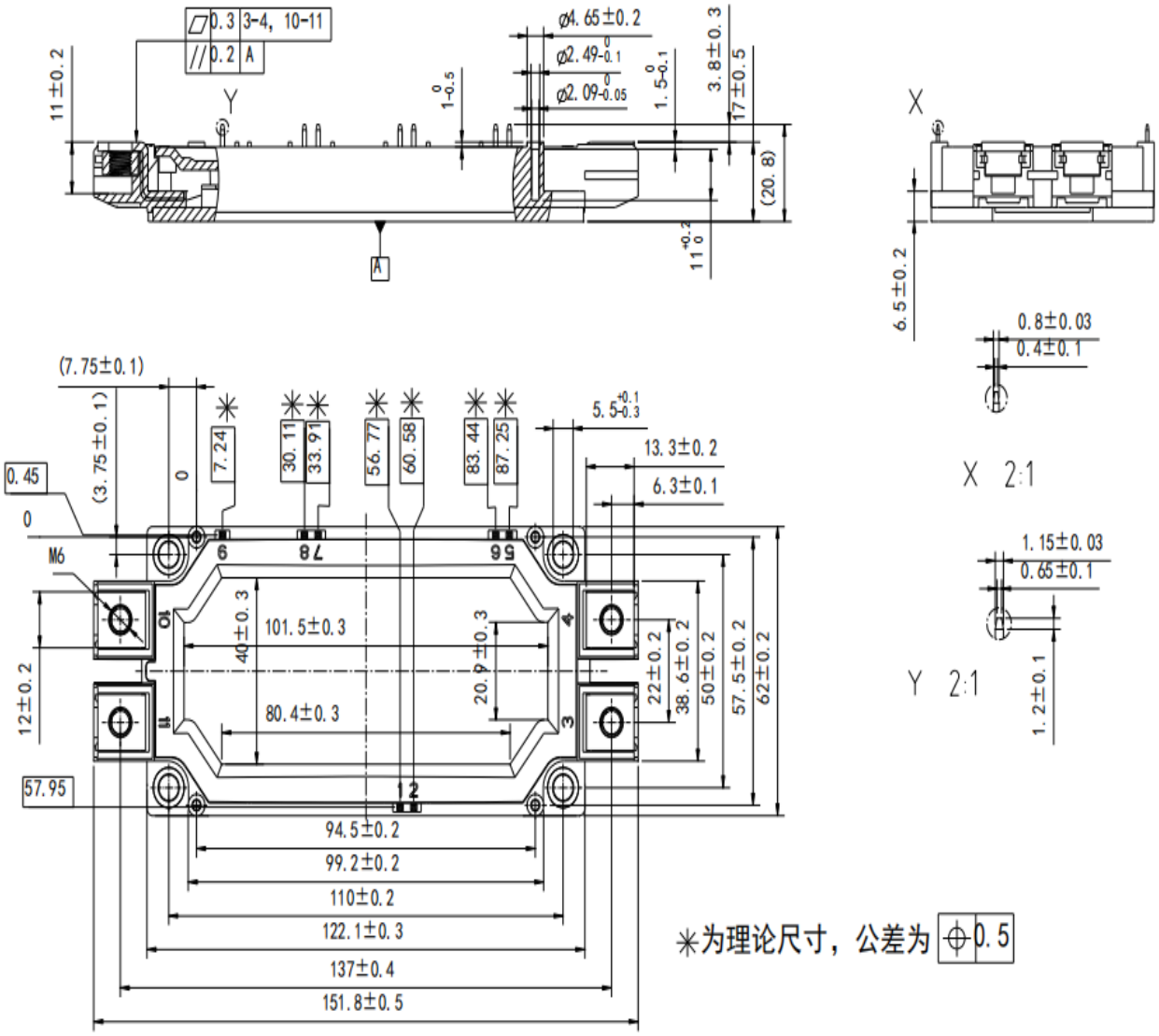


Figure11 Transient thermal impedance

Package Dimensions: ED3



Dimensions in (mm)

Figure 12 Package Outline