• General Description

Through advanced trench and field cutoff technology to provide very low $V_{CE(sat)}$, low gate charge, and excellent switching performance.

• Features

■Very low $V_{CE(sat)}$

■Low switching power loss

■Low switching surge and noise

■Low thermal resistance

■High short curcuit capability (10us)

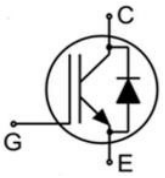
•Application

■Energy Generation

■Industrial power supplies

■Welding

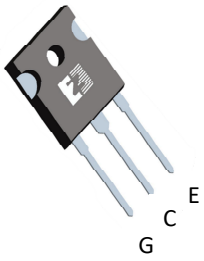
• Product Summary



V_{CE}= 1200V

$V_{CE(sat)}$= 1.85V

I_C= 15A



TO-247

RoHS

REACH COMPLIANT

HF

•Ordering Information:

Part NO.	ZMBG15N120SD1AC
Marking	BG15N120SD1A
Packing information	TUBE BULK
Basic ordering unit (pcs)	600

•Absolute Maximum Ratings (T_C=25℃)

Parameter	Symbol	Conditions	Value	Unit
Collector-emitter voltage	V_{CE}		1200	V
Gate-emitter voltage	V_{GE}		±30	V
Collector current	I_C	T_C=25℃	30	A
	I_C	T_C=100℃	15	A
Pulsed collector current	I_{CM}	T_C=25℃	45	A
Diode forward current	I_F	T_C=25℃	30	A
	I_F	T_C=100℃	15	A
	$I_{F,pulse}$	T_C=25℃	45	A
Total power Dissipation	P_D	T_C=25℃	203	W
Total Power Dissipation	P_D	T_A=25℃	3.8	W
Short Circuit Withstand Time	Tsc	V_{GE}=15 V, V_{CE}=600 V, T_J=25°C	10	us
Operating Junction Temperature	T_J		-55 to +175	℃
Storage Temperature	T_{STG}		-55 to +175	℃

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case IGBT	R_{thJC}	-	-	0.74	°C/W
Thermal resistance, junction - case diode	R_{thJC}	-	-	2.4	°C/W
Thermal resistance, junction-ambient	R_{thJA} ①	-	-	40	°C/W
Soldering temperature（total time<10s)	Tsold	-	-	260	°C

•Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Collector-emitter breakdown voltage	$V_{(BR)CES}$	V_{GE} =0V, I_C =250uA	1200	-	-	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	V_{GE} = 15 V, I_C = 15 A	-	1.85	2.30	V
		V_{GE} = 15 V, I_C = 15 A, T_J = 175 °C	-	2.3	-	
Gate-emitter threshold voltage	$V_{GE(th)}$	V_{CE} =V_{GE}, I_C =1.5mA	5.0	6.0	7.0	V
Forward on-voltage	V_F	I_F=15A, T_J=25°C		1.9	2.3	V
		I_F=15A, T_J=125°C		1.6	2.2	
		I_F=15A, T_J=175°C		1.45	2.0	
Zero gate voltage collector current	I_{CES}	V_{GE}=0V, V_{CE}=1200V,T_J=25°C	-	-	10.0	uA
Zero gate voltage collector current	I_{CES}	V_{GE}=0V, V_{CE}=1200V,T_J=175°C	-	-	10.0	mA
Gate-emitter leakage current	I_{GES}	V_{GE}=±30V, V_{CE} = 0V	-	-	100	nA

•Dynamic characteristics , at T_J=25℃

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	C_{ies}	f = 1MHz, V_{CE}=600V	-	1325	-	pF
Output capacitance	C_{oes}		-	21	-	
Reverse transfer capacitance	C_{res}		-	4	-	
Total gate charge	Q_g	V_{CC}=600V, I_C=15.0A, V_{GE}=15V	-	68	-	nC
Gate-emitter charge	Q_{ge}		-	12	-	nC
Gate-collector charge	Q_{gc}		-	40	-	nC

SwitchingCharacteristic, at T_J=25℃

Turn-on delay time	$t_{D(on)}$	T_J=25°C, V_{CC}=600V, I_C=15A, V_{GE}=-8/15V, R_g=6.2Ω, L=200uH	-	27.9	-	ns
Turn-on rise time	t_r		-	58.5	-	ns
Turn-off delay time	$t_{D(off)}$		-	76.2	-	ns
Turn-off fall time	t_f		-	29.4	-	ns
Turn-on energy	E_{on}		-	0.772	-	mJ
Turn-off energy	E_{off}		-	0.499	-	mJ
Total switching energy	E_{ts}		-	1.271	-	mJ

SwitchingCharacteristic, at T_J=150℃

Turn-on delay time	$t_{D(on)}$	T_J=150°C, V_{CC}=600V, I_C=15A, V_{GE}=-8/15V, R_g=6.2Ω, L=200uH	-	29.6	-	ns
Turn-on rise time	t_r		-	58	-	ns
Turn-off delay time	$t_{D(off)}$		-	99.5	-	ns
Turn-off fall time	t_f		-	130.5	-	ns
Turn-on energy	E_{on}		-	1.006	-	mJ
Turn-off energy	E_{off}		-	0.571	-	mJ
Total switching energy	E_{ts}		-	1.577	-	mJ

Diode switching characteristics (inductive load)

Reverse recovery time	t_{rr}	I_F=15A, V_R=600V, di/dt =-200 A/μs T_J=25 °C	-	68	-	ns
Reverse recovery charge	Q_{rr}		-	787	-	nC
Reverse recovery current	I_{rrm}		-	20.6	-	A

Fig.1 Gate-Charge characteristics

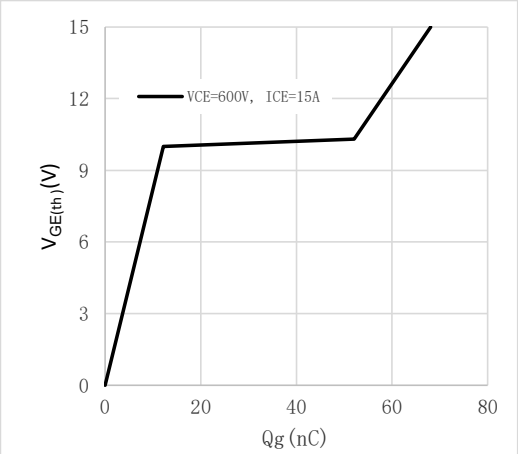


Fig.2 Capacitance characteristics

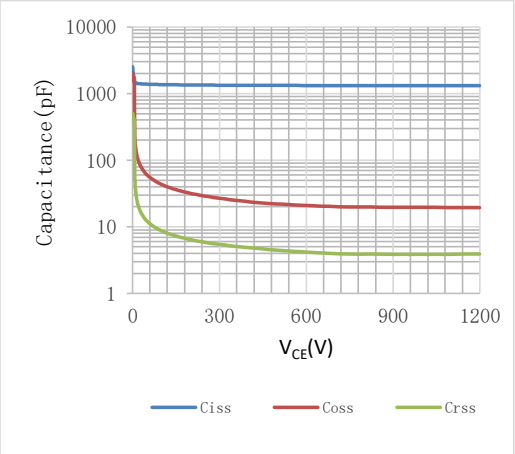


Fig.3 Power dissipation

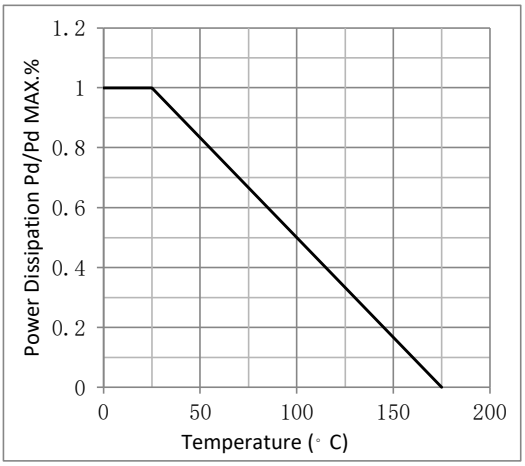


Fig.4 Typical output characteristics

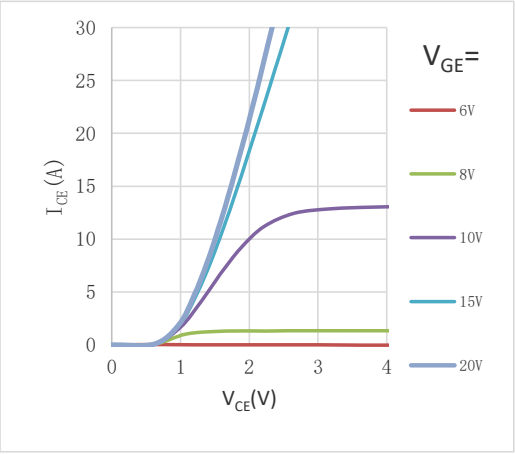


Fig.5 Threshold voltage V.S junction temperature

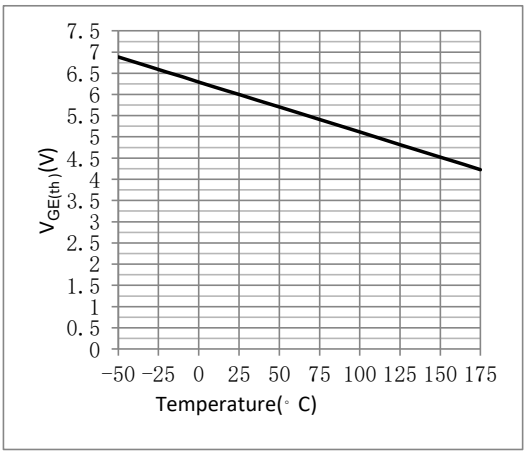


Fig.6 IC vs. Junction Temperature③

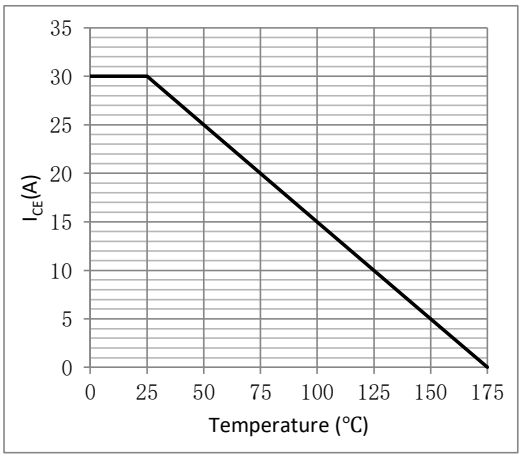


Fig.7 Collector-Emitter VS gate source voltage

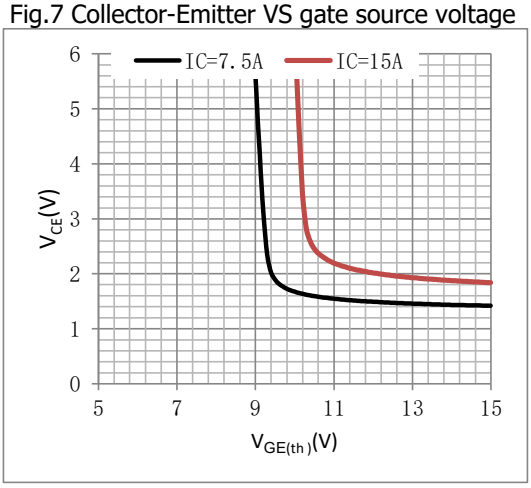


Figure 8. Transfer characteristics

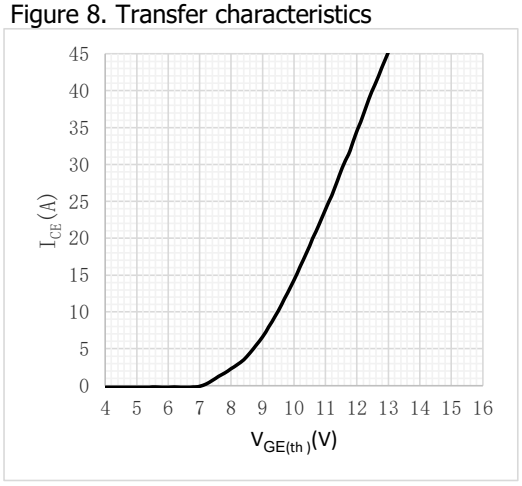


Fig.9 Safe operating area

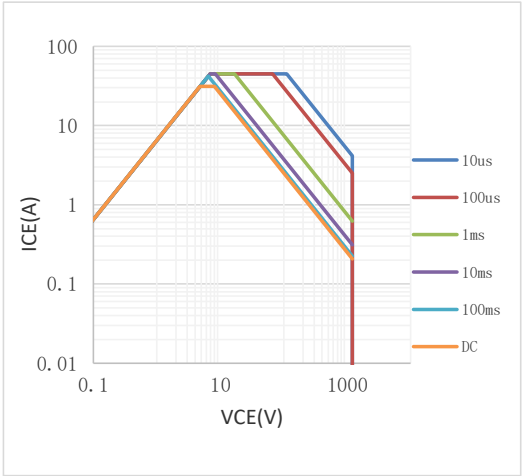


Fig.10 Max transient thermal impedance for IGBT

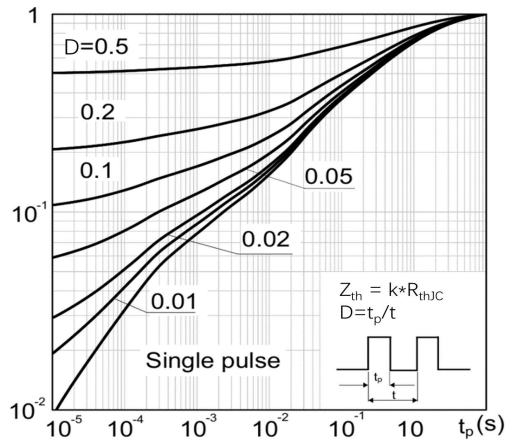


Fig.11 Max transient thermal impedance for Diode

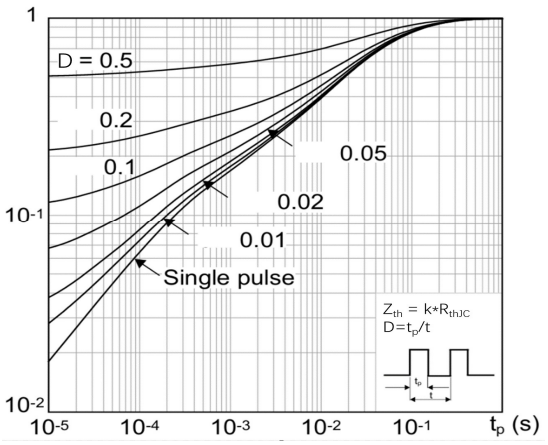
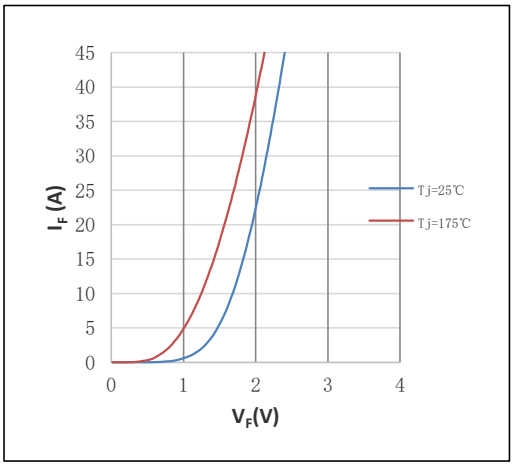
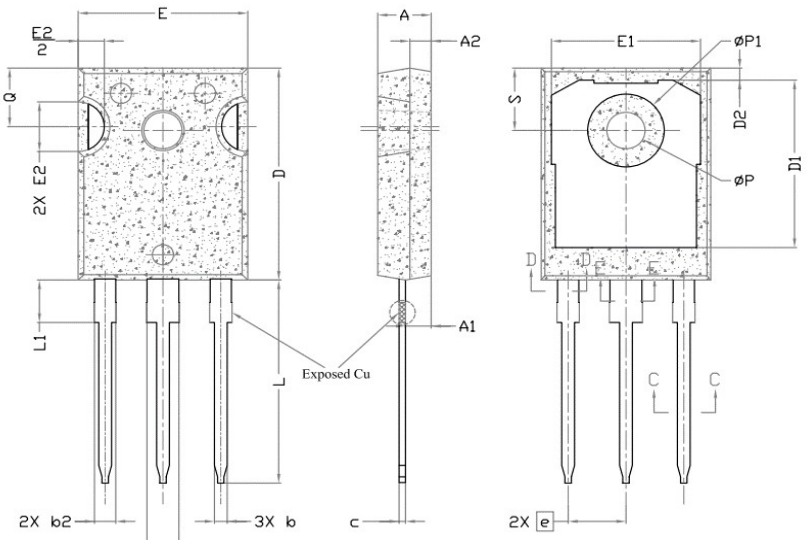


Fig.12 Typical diode forward current as a function of forward voltage



●TO-247 Package Outline



SYMBOL	DIMENSIONS			NOTES
	MIN.	NOM.	MAX.	
A	4.83	5.02	5.21	
A1	2.29	2.41	2.55	
A2	1.50	2.00	2.49	
b	1.12	1.20	1.33	
b1	1.12	1.20	1.28	
b2	1.91	2.00	2.39	6
b3	1.91	2.00	2.34	
b4	2.87	3.00	3.22	6, 8
b5	2.87	3.00	3.18	
c	0.55	0.60	0.69	6
c1	0.55	0.60	0.65	
D	20.80	20.95	21.10	4
D1	16.25	16.55	17.65	5
D2	0.51	1.19	1.35	
E	15.75	15.94	16.13	4
E1	13.46	14.02	14.16	5
E2	4.32	4.91	5.49	3
e	5.44BSC			
L	19.81	20.07	20.32	
L1	4.10	4.19	4.40	6
ØP	3.56	3.61	3.65	7
ØP1	7.19REF.			
Q	5.39	5.79	6.20	
S	6.04	6.17	6.30	

Note:

① Practically the current will be limited by PCB, thermal design and operating temperature.
VGE=15V.

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Revision History

Version	Date	Change
A	2025/4/15	New