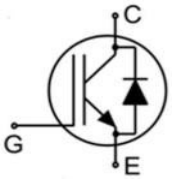
• General Description

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

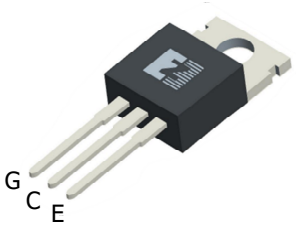
• Product Summary



V_{CE}= 650V
$V_{CE(sat)}$= 1.6V
I_C= 15A

• Features

■Very low $V_{CE(sat)}$
■Low switching power loss
■Low switching surge and noise
■Low thermal resistance
■Short curcuit capability (5us)



TO-220

•Application

■Energy Generation
■Industrial Power Suppliers
■Welding

•Ordering Information:

Part NO.	ZMBG15N065SD1AP
Marking	BG15N065SD1A
Packing information	TUBE BULK
Basic ordering unit (pcs)	1000

•Absolute Maximum Ratings (T_C=25℃)

Parameter	Symbol	Conditions	Value	Unit
Collector-emitter voltage	V_{CE}		650	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℃	60	A
Diode forward current	I_F	T_C=25℃	30	A
	I_F	T_C=100℃	15	A
	$I_{F,pulse}$	T_C=25℃	60	A
Total power Dissipation	P_D	T_C=25℃	107	W
Total Power Dissipation	P_D	T_A=25℃	2.4	W
Short Circuit Withstand Time	Tsc	V_{GE}=15 V, V_{CE}=400 V, T_J=25°C	5	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	R_{thJC}	-	-	1.4	°C/W
Thermal resistance, junction - case diode	R_{thJC}	-	-	2.9	°C/W
Thermal resistance, junction-ambient	R_{thJA} ②	-	-	62.5	°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	650	-	-	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	V_{GE} = 15 V, I_C = 15 A	-	1.6	2.0	V
		V_{GE} = 15 V, I_C = 15 A, T_J = 175 °C	-	2.0	-	
Gate-emitter threshold voltage	$V_{GE(th)}$	V_{CE} =V_{GE}, I_C =250uA	4	5	6	V
Forward on-voltage	V_F	I_F=15A, T_J=25℃		1.29	1.55	V
		I_F=15A, T_J=175℃		1.35	1.65	
Zero gate voltage collector current	I_{CES}	V_{GE}=0V, V_{CE}=650V,T_J=25°C	-	-	10	uA
Zero gate voltage collector current	I_{CES}	V_{GE}=0V, V_{CE}=650V,T_J=175°C	-	5	-	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}	V_{GE}=0V,f = 100KHz, V_{CE}=400V	-	760	-	pF
Output capacitance	C_{oes}		-	14	-	
Reverse transfer capacitance	C_{res}		-	6	-	
Total gate charge	Q_g	V_{CC}=400V, I_C=15A, V_{GE}=15V	-	42	-	nC
Gate-emitter charge	Q_{ge}		-	6	-	nC
Gate-collector charge	Q_{gc}		-	22	-	nC

SwitchingCharacteristic, at T_J=25℃

Turn-on delay time	$t_{D(on)}$	T_J=25°C, V_{CC}=400V, I_C=15A, V_{GE}=-8/15V, R_g=10Ω, L=100uH	-	10	-	ns
Turn-on rise time	t_r		-	41	-	ns
Turn-off delay time	$t_{D(off)}$		-	70	-	ns
Turn-off fall time	t_f		-	80	-	ns
Turn-on energy	E_{on}		-	0.71	-	mJ
Turn-off energy	E_{off}		-	0.34	-	mJ
Total switching energy	E_{ts}		-	1.05	-	mJ

SwitchingCharacteristic, at T_J=150°C

Turn-on delay time	$t_{D(on)}$	T_J=150°C, $V_{CC=}$400V, I_C=15A, V_{GE}=-8/15V, R_g=10Ω, L=100uH	-	12	-	ns
Turn-on rise time	t_r		-	35	-	ns
Turn-off delay time	$t_{D(off)}$		-	59	-	ns
Turn-off fall time	t_f		-	146	-	ns
Turn-on energy	E_{on}		-	0.89	-	mJ
Turn-off energy	E_{off}		-	0.44	-	mJ
Total switching energy	E_{ts}		-	1.33	-	mJ

Diode switching characteristics (inductive load)

Reverse recovery time	t_{rr}	TJ=25°C, VCC=400V, IC=15A, VGE=-8/15V, Rg=10Ω, L=100uH	-	45	-	ns
Reverse recovery charge	Q_{rr}		-	1.87	-	uC
Reverse recovery current	I_{rrm}		-	21.8	-	A
Reverse recovery energy	E_{rr}		-	0.54	-	mJ

Fig.1 Gate-Charge characteristics

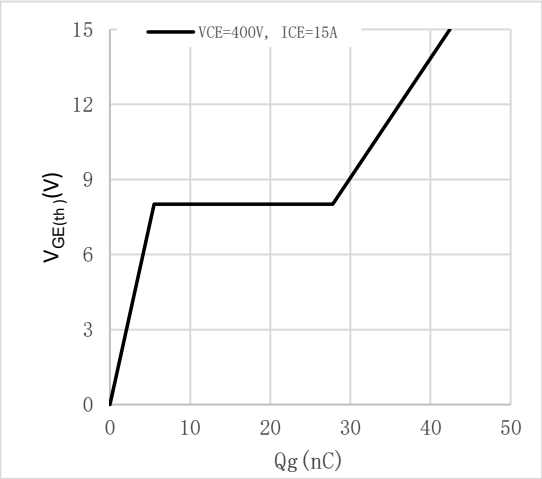


Fig.2 Capacitance characteristics

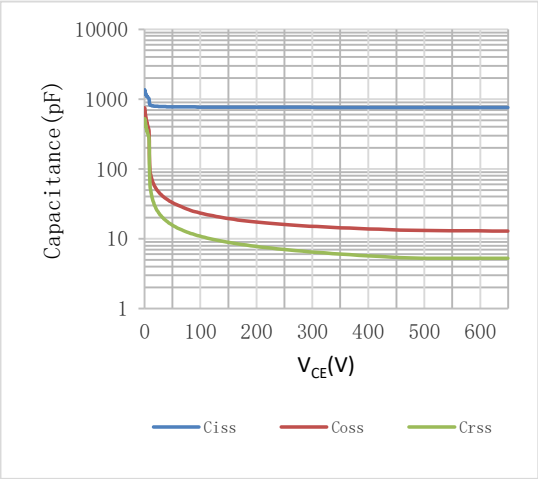


Fig.3 Power dissipation

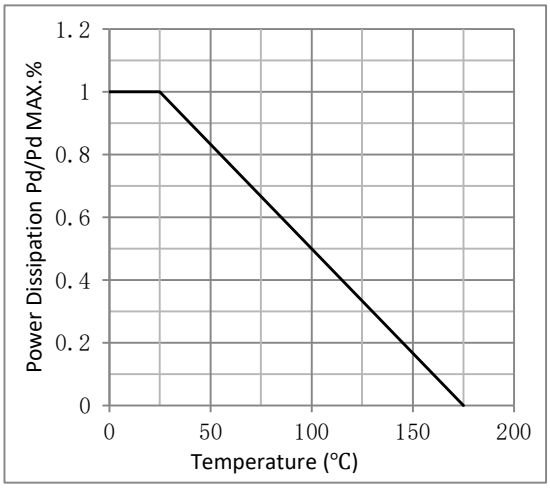


Fig.4 Typical output characteristics

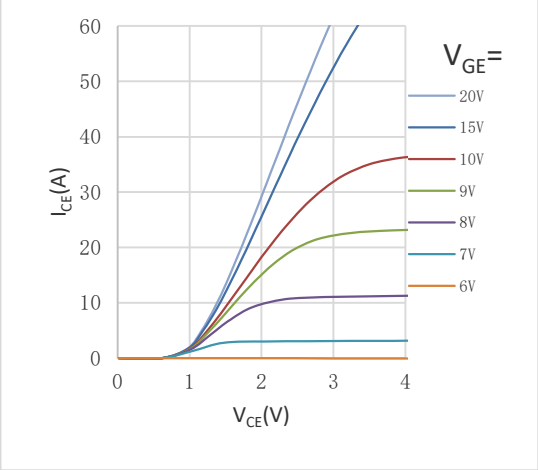


Fig.5 Threshold voltage V.S junction temperature

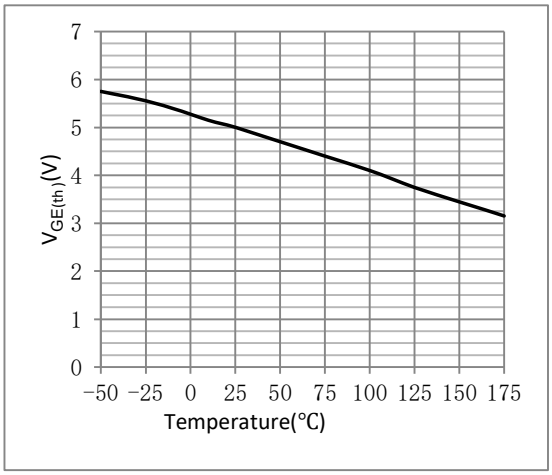


Fig.6 IC vs. Junction Temperature③

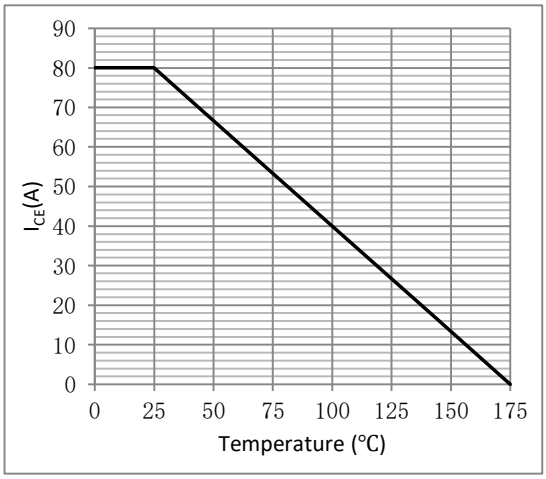


Fig.7 Collector-Emitter VS gate source voltage

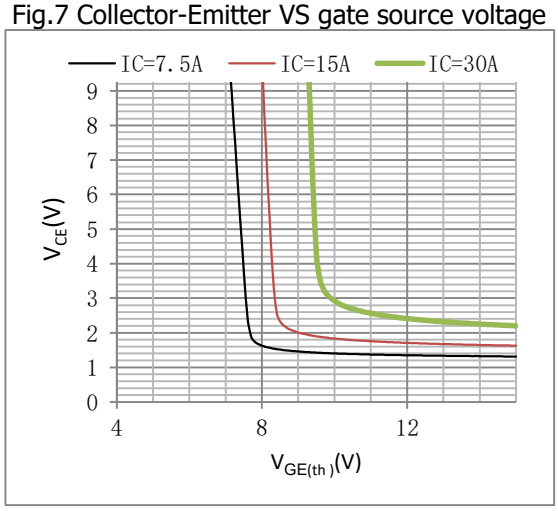


Figure 8. Transfer characteristics

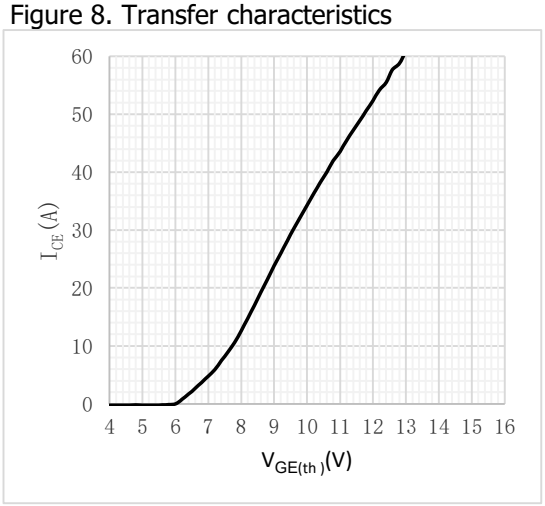


Fig.9 Safe operating area

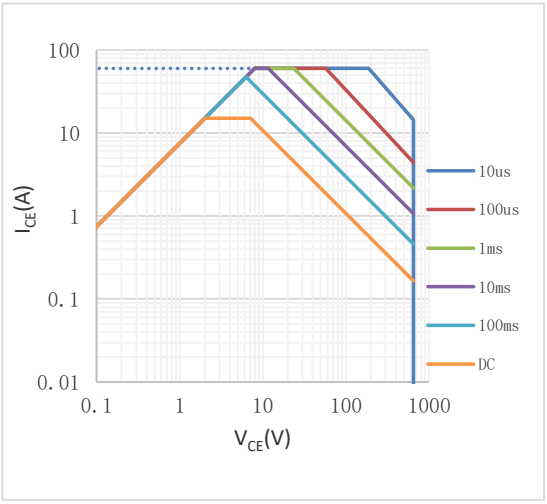


Fig.10 Max transient thermal impedance for IGBT

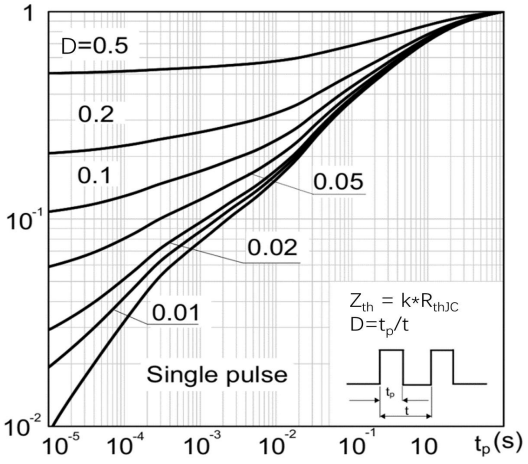
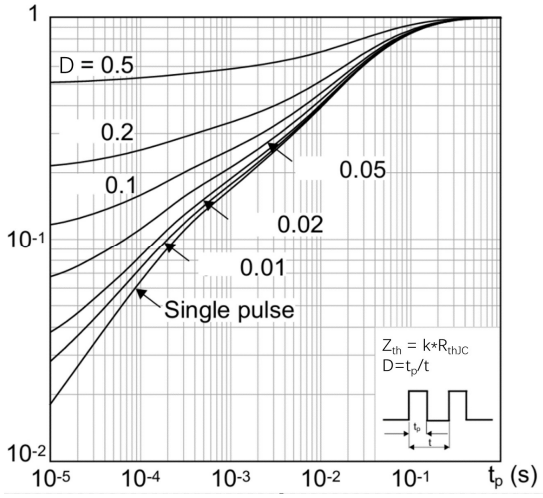
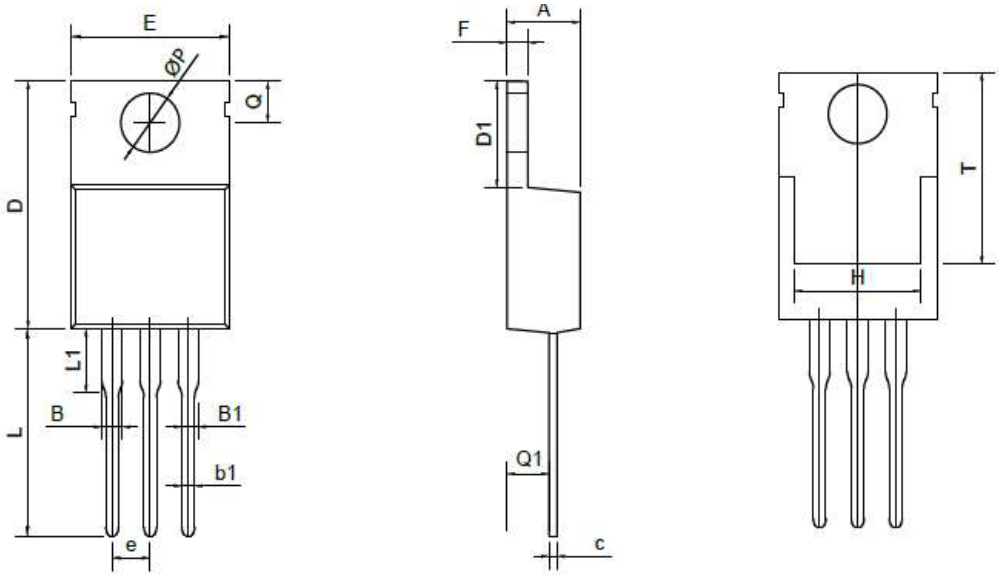
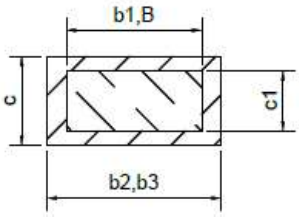


Fig.11 Max transient thermal impedance for Diode



●TO-220 Package Outline





SYMBOLS	COMMON	
	UNIT: mm	
	MIN.	MAX.
A	4.385	4.685
B	1.183	1.478
B1	1.000	1.450
b1	0.688	1.016
b2	1.143	1.778
b3	1.143	1.727
c	0.456	0.610
c1	0.456	0.559
D	14.224	16.510
D1	5.842	6.858
E	9.685	10.385
e	2.540BSC	
F	1.200	1.400
L	12.600	14.732
L1	3.560	4.060
Q	2.500	3.048
Q1	2.032	2.921
ØP	3.600	3.900
T	12.042	12.878
H	6.858	8.890

Note:

① Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%, Accumulation time ≤50 hours; For DC， the following test conditions can be passed: VGE=20V/-10V, Tj=175℃, t=1000 hours；

② 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	2025/4/2	New