

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
- Short circuit capability (5us)

Application

- Energy Generation
- Industrial Power Suppliers
- Welding

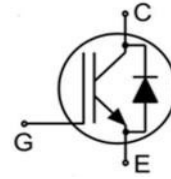
Ordering Information:

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

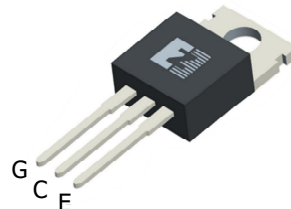
Absolute Maximum Ratings (T_C=25°C)

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°C	30	A
	I_C	T _C =100°C	15	A
Pulsed collector current	I_{CM}	T _C =25°C	60	A
Diode forward current	I_F	T _C =25°C	30	A
	I_F	T _C =100°C	15	A
	$I_{F,pulse}$	T _C =25°C	60	A
Total power Dissipation	P_D	T _C =25°C	107	W
Total Power Dissipation	P_D	T _A =25°C	2.4	W
Short Circuit Withstand Time	T _{sc}	$V_{GE}=15\text{ V}$, $V_{CE}=400\text{ V}$, T _J =25°C	5	us
Operating Junction Temperature	T _J		-55 to +175	°C
Storage Temperature	T _{STG}		-55 to +175	°C

Product Summary



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



TO-220



•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)	T_{sold}	-	-	260	°C

•Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Collector-emitter breakdown voltage	$V_{(BR)CES}$	$V_{GE}=0V, I_C=250\mu A$	650	-	-	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=15A$	-	1.6	2.0	V
		$V_{GE}=15V, I_C=15A, T_J=175^\circ C$	-	2.0	-	
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_C=250\mu A$	4	5	6	V
Forward on-voltage	V_F	$I_F=15A, T_J=25^\circ C$		1.29	1.55	V
		$I_F=15A, T_J=175^\circ C$		1.35	1.65	
Zero gate voltage collector current	I_{CES}	$V_{GE}=0V, V_{CE}=650V, T_J=25^\circ C$	-	-	10	μA
Zero gate voltage collector current	I_{CES}	$V_{GE}=0V, V_{CE}=650V, T_J=175^\circ C$	-	5	-	mA
Gate-emitter leakage current	I_{GES}	$V_{GE}=\pm 30V, V_{CE}=0V$	-	-	100	nA

•Dynamic characteristics , at $T_J=25^\circ C$

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 $T_J=25^\circ C$

Turn-on delay time	$t_{D(on)}$	$T_J=25^\circ C, V_{CC}=400V, I_C=15A, V_{GE}=-8/15V, R_g=10\Omega, L=100\mu H$	-	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

Switching Characteristic, at $T_J=150^{\circ}\text{C}$

Turn-on delay time	$t_{D(on)}$	$T_J=150^{\circ}\text{C},$ $V_{CC}=400\text{V}, I_C=15\text{A},$ $V_{GE}=-8/15\text{V},$ $R_g=10\Omega,$ $L=100\mu\text{H}$	-	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}	$T_J=25^{\circ}\text{C},$ $V_{CC}=400\text{V}, I_C=15\text{A},$ $V_{GE}=-8/15\text{V},$ $R_g=10\Omega,$ $L=100\mu\text{H}$	-	45	-	ns
Reverse recovery charge	Q_{rr}		-	1.87	-	μC
Reverse recovery current	I_{rrm}		-	21.8	-	A
Reverse recovery energy	E_{rr}		-	0.54	-	mJ

Fig.1 Gate-Charge characteristics

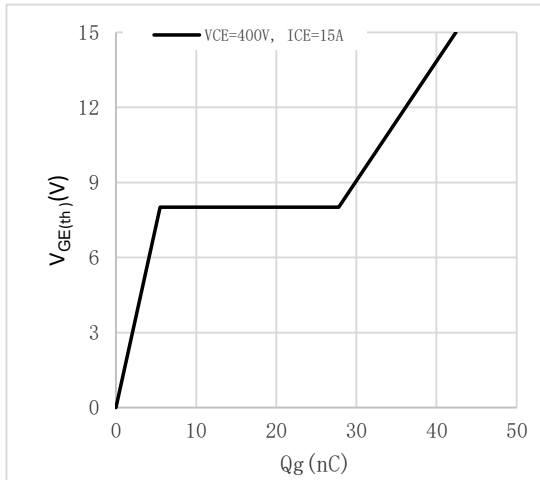


Fig.2 Capacitance characteristics

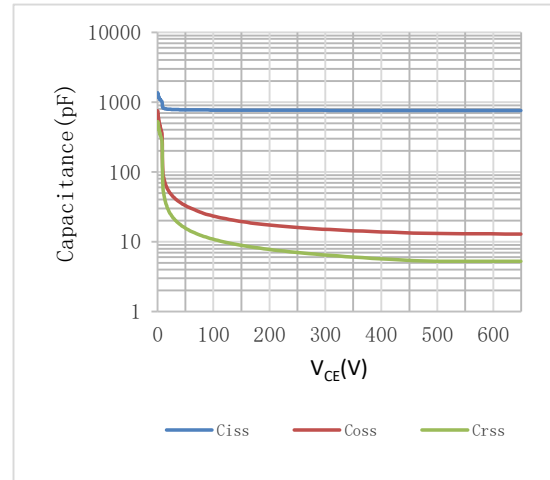


Fig.3 Power dissipation

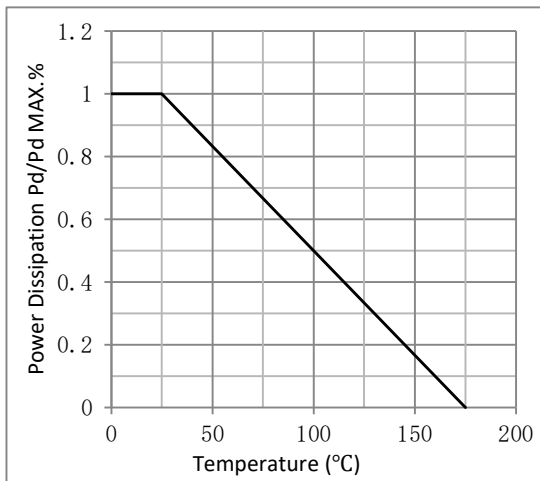


Fig.4 Typical output characteristics

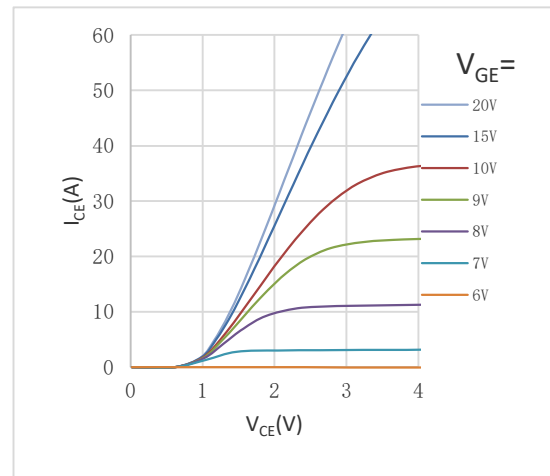


Fig.5 Threshold voltage V.S junction temperature

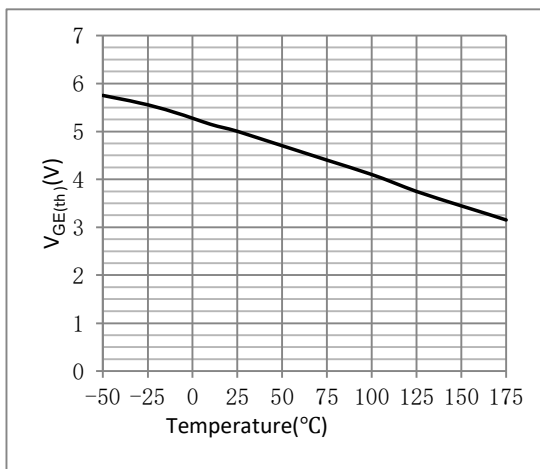


Fig.6 I_C vs. Junction Temperature^③

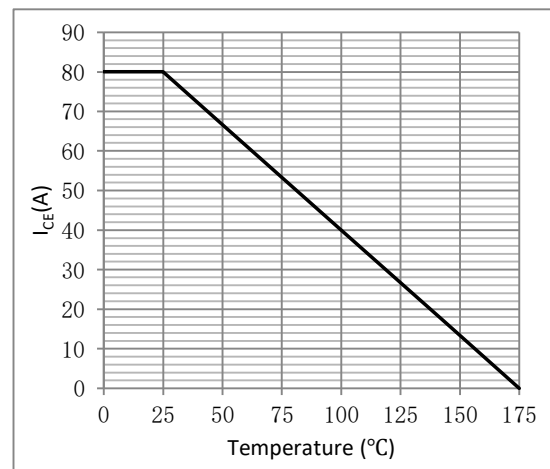


Fig.7 Collector-Emitter VS gate source voltage

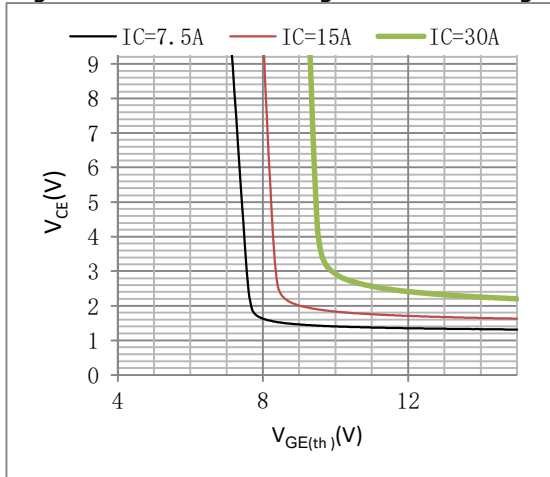


Figure 8. Transfer characteristics

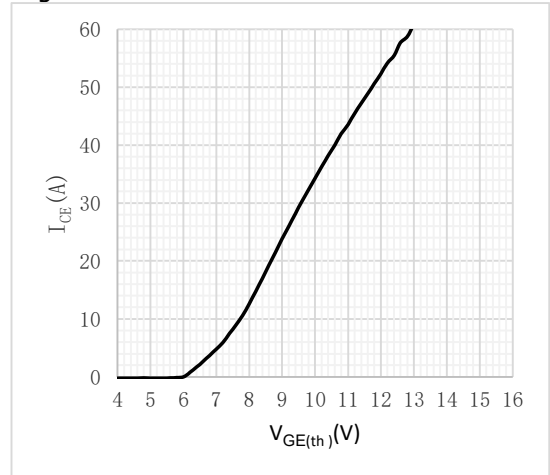


Fig.9 Safe operating area

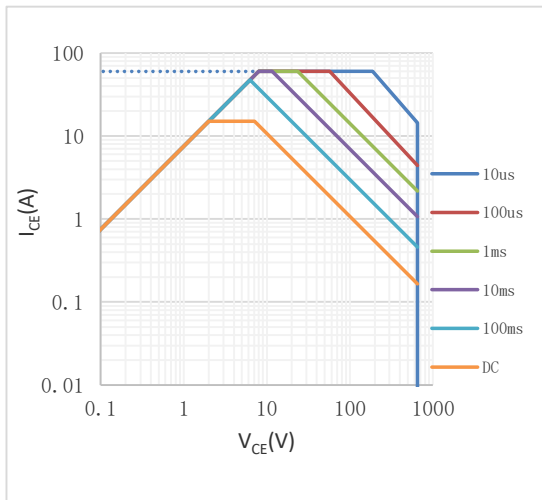


Fig.10 Max transient thermal impedance for IGBT

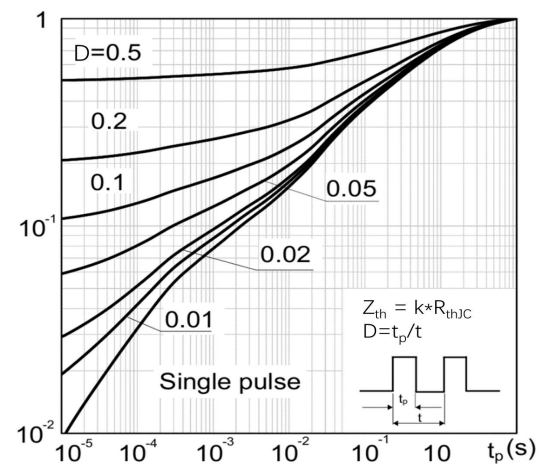
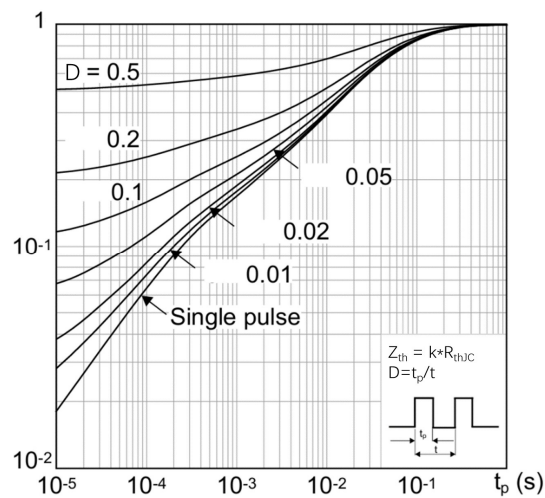
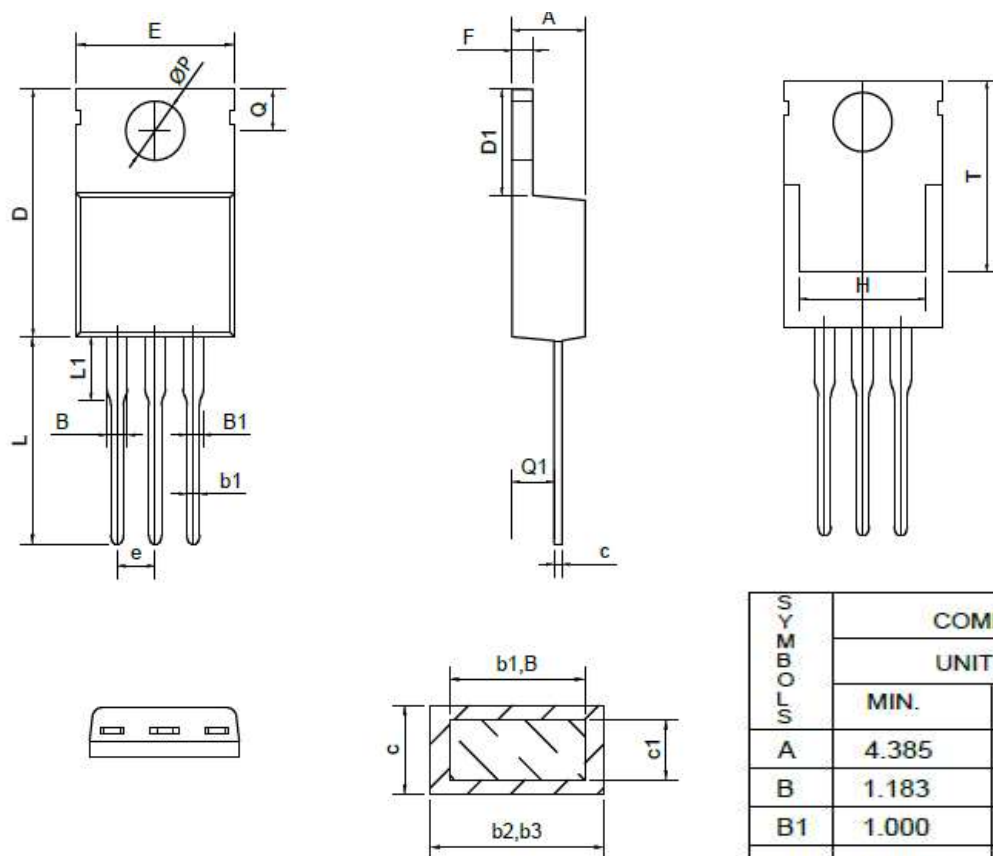


Fig.11 Max transient thermal impedance for Diode



•TO-220 Package Outline



S Y M B O L S	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 $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$, Accumulation time ≤ 50 hours; For DC , the following test conditions can be passed: $V_{GE}=20V/-10V$, $T_j=175^\circ\text{C}$, $t=1000$ hours;

② Practically the current will be limited by PCB, thermal design and operating temperature.
 $V_{GE}=15V$.

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Revision History

Version	Date	Change
A	2025/4/2	New