

● 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
- AEC-Q101 Qualified

● Application

- Energy Generation
- Industrial power supplies
- Welding

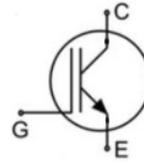
● Ordering Information:

Part NO.	ZMGA30N065T1AC
Marking	BG30N065T1A
Packing information	TUBE BULK
Basic ordering unit (pcs)	600

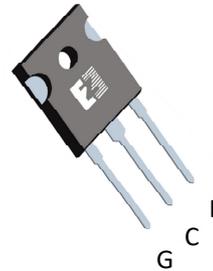
● Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ )

Parameter	Symbol	Conditions	Value	Unit
Collector-emitter voltage	$V_{CE}$		650	V
Gate-emitter voltage	$V_{GE}$		$\pm 20$	V
Collector current	$I_C$	$T_C=25^\circ\text{C}$	60	A
	$I_C$	$T_C=100^\circ\text{C}$	30	A
Pulsed collector current	$I_{CM}$	$T_C=25^\circ\text{C}$	90	A
Total power Dissipation	$P_D$	$T_C=25^\circ\text{C}$	250	W
Total Power Dissipation	$P_D$	$T_A=25^\circ\text{C}$	3.8	W
Operating Junction Temperature	$T_J$		-55 to +175	$^\circ\text{C}$
Storage Temperature	$T_{STG}$		-55 to +175	$^\circ\text{C}$

● Product Summary



$V_{CE} = 650\text{V}$   
 $V_{CE(sat)} = 1.5\text{V}$   
 $I_C = 30\text{A}$



TO-247



**•Thermal resistance**

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case IGBT	$R_{thJC}$		-	0.6	°C/W
Thermal resistance, junction-ambient	$R_{thJA}$ <sup>②</sup>		-	40	°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	$V_{CE(sat)}$	$V_{GE}=15V, I_C=30A$		1.5	2.1	V
		$V_{GE}=15V, I_C=30A, T_J=125^\circ C$		2		
		$V_{GE}=15V, I_C=30A, T_J=175^\circ C$		2.15		
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_C=4mA$	4.0	5.0	6.0	V
Zero gate voltage collector current	$I_{CES}$	$V_{GE}=0V, V_{CE}=650V$			50.0	$\mu A$
Gate-emitter leakage current	$I_{GES}$	$V_{GE}=\pm 20V, V_{CE}=0V$			100	nA

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

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	$C_{ies}$	$f=1MHz, V_{CE}=25V$	-	2440	-	pF
Output capacitance	$C_{oes}$		-	163	-	
Reverse transfer capacitance	$C_{res}$		-	30	-	
Total gate charge	$Q_g$	$V_{CC}=520V, I_C=30A, V_{GE}=15V$	-	82	-	nC
Gate-emitter charge	$Q_{ge}$		-	18	-	nC
Gate-collector charge	$Q_{gc}$		-	31	-	nC

**SwitchingCharacteristic, at  $T_J=25^\circ C$** 

Turn-on delay time	$t_{D(on)}$	$T_J=25^\circ C, V_{CC}=400V, I_C=30A, V_{GE}=-15/15V, R_g=10\Omega, L=105\mu H$	-	20	-	ns
Turn-on rise time	$t_r$		-	23	-	ns
Turn-off delay time	$t_{D(off)}$		-	65	-	ns
Turn-off fall time	$t_f$		-	47	-	ns
Turn-on energy	$E_{on}$		-	730	-	$\mu J$
Turn-off energy	$E_{off}$		-	435	-	$\mu J$
Total switching energy	$E_{ts}$		-	1165	-	$\mu J$

Switching Characteristic, at  $T_J=175^\circ\text{C}$

Turn-on delay time	$t_{D(on)}$	$T_J=175^\circ\text{C}$ , $V_{CC}=400\text{V}$ , $I_C=30\text{A}$ , $V_{GE}=-15/15\text{V}$ , $R_g=10\Omega$ , $L=105\mu\text{H}$	-	19	-	ns
Turn-on rise time	$t_r$		-	25	-	ns
Turn-off delay time	$t_{D(off)}$		-	70	-	ns
Turn-off fall time	$t_f$		-	133	-	ns
Turn-on energy	$E_{on}$		-	846	-	$\mu\text{J}$
Turn-off energy	$E_{off}$		-	849	-	$\mu\text{J}$
Total switching energy	$E_{ts}$		-	1960	-	$\mu\text{J}$

Fig.1 Gate-Charge characteristics

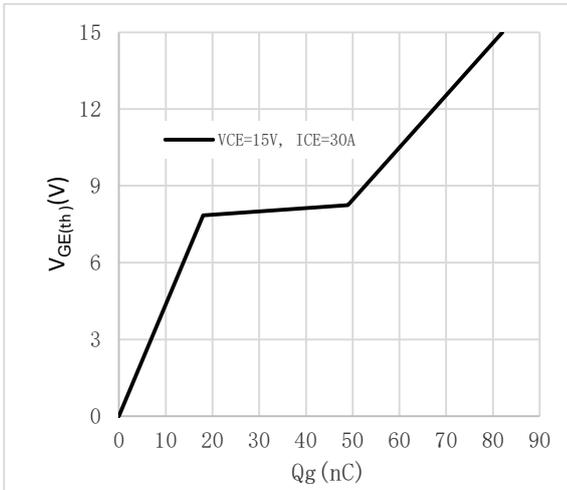


Fig.2 Capacitance characteristics

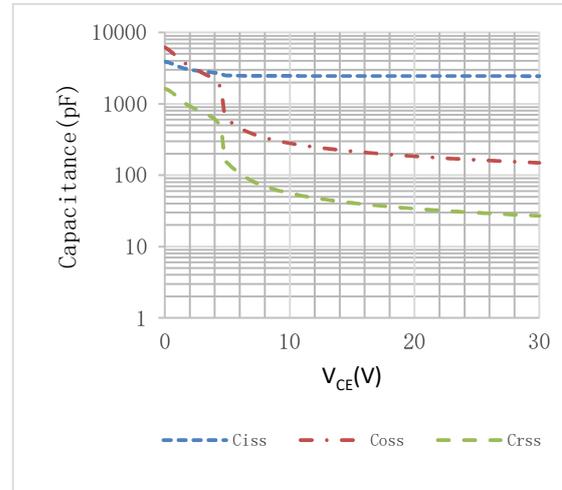


Fig.3 Power dissipation

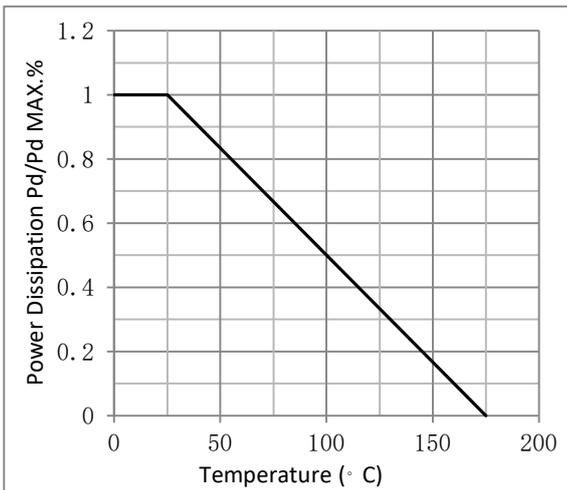


Fig.4 Typical output characteristics

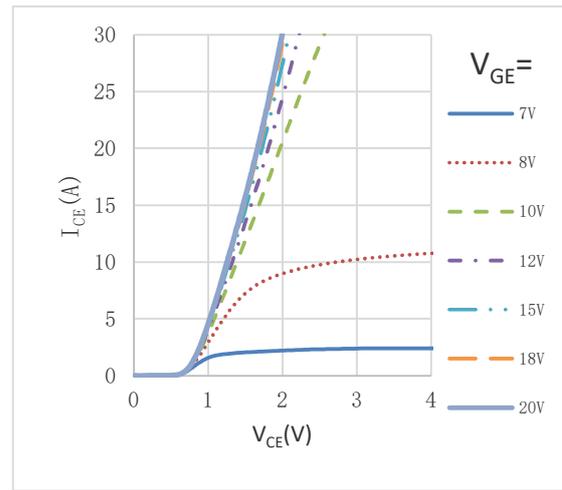


Fig.5 Threshold voltage V.S junction temperature

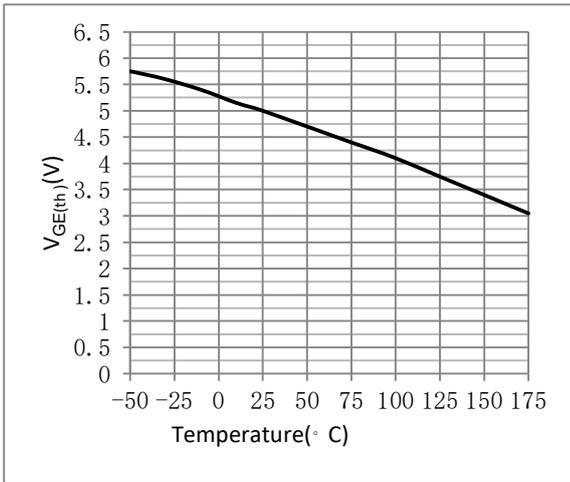


Fig.6 IC vs. Junction Temperature<sup>③</sup>

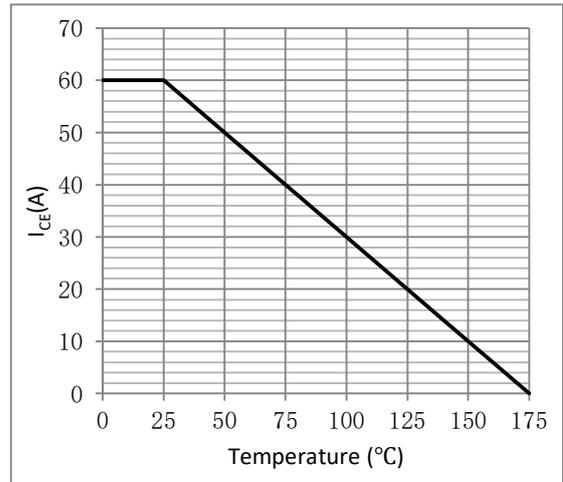


Fig.7 Collector-Emitter VS gate source voltage

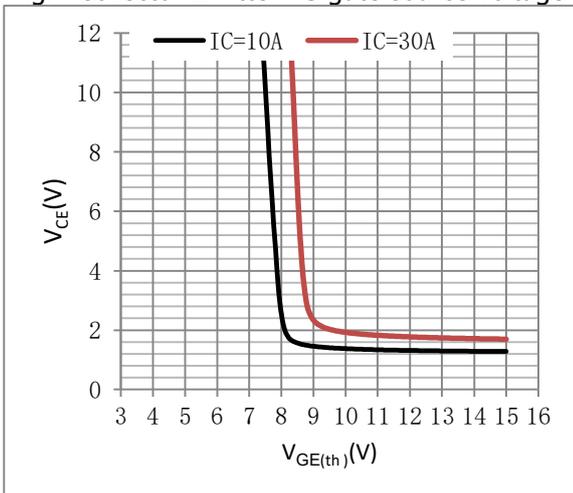


Figure 8. Transfer characteristics

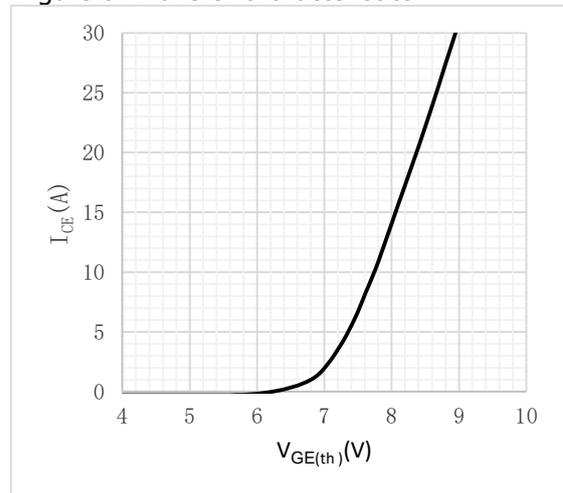


Fig.9 Safe operating area

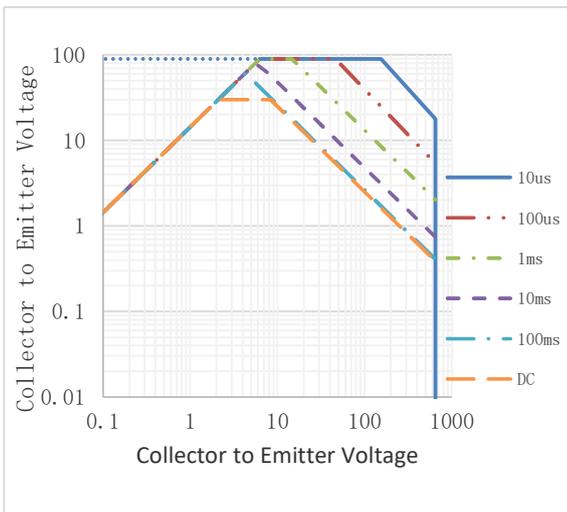
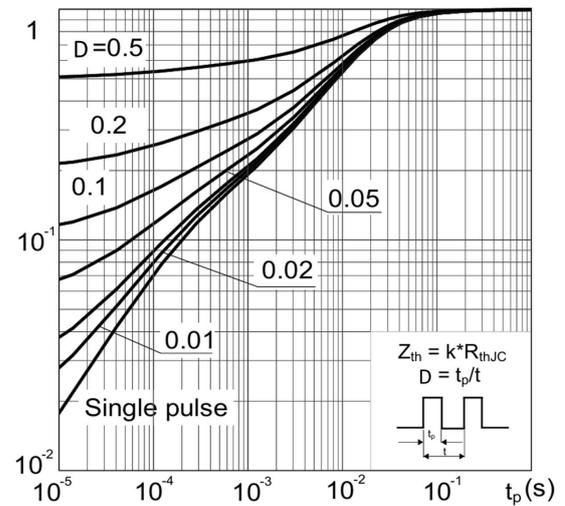
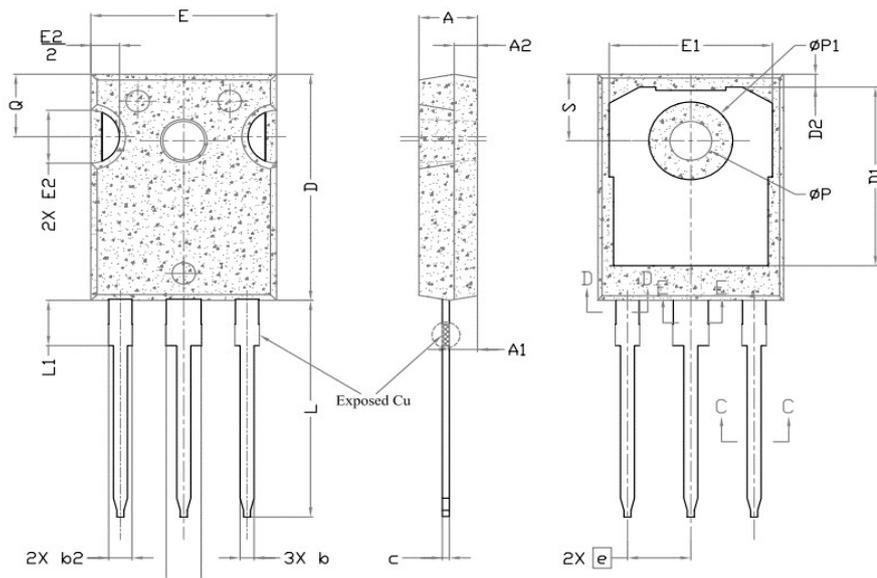


Fig.10 Max transient thermal impedance for IGBT



•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 Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$ , Accumulation time  $\leq 50$  hours; For DC , the following test conditions can be passed: VGE=20V/-10V, Tj=175°C, 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	2024/11/26	New