

• 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

- On-board charger
- DC/DC converter
- Power-Factor correction

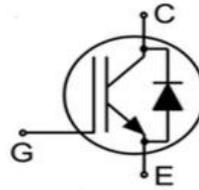
• Ordering Information:

Part NO.	ZMGA30N065TD1AC
Marking	BG30N065TD1A
Packing information	TUBE BULK
Basic ordering unit (pcs)	600

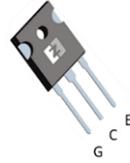
• Absolute Maximum Ratings ($T_C=25^\circ\text{C}$)

Parameter	Symbol	Conditions	Value	Unit
Collector-emitter voltage	V_{CE}		650	V
Gate-emitter voltage	V_{GE}		± 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
Diode forward current	I_F	$T_C=25^\circ\text{C}$	60	A
	I_F	$T_C=100^\circ\text{C}$	30	A
	$I_{F,pulse}$	$T_C=25^\circ\text{C}$	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



$V_{CE} = 650\text{V}$
 $V_{CE(sat)} = 1.6\text{V}$
 $I_C = 30\text{A}$



TO-247



•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case IGBT	R_{thJC}		-	0.6	°C/W
Thermal resistance, junction - case diode	R_{thJC}		-	1.6	°C/W
Thermal resistance, junction-ambient	$R_{thJA}^{\textcircled{2}}$		-	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	$V_{CE(sat)}$	$V_{GE} = 15V, I_C = 30A$		1.6	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
Forward on-voltage	V_F	$I_F = 15A, T_J = 25^\circ C$		1.2	1.5	V
		$I_F = 15A, T_J = 125^\circ C$		1.1	1.4	
		$I_F = 15A, T_J = 175^\circ C$		1.0	1.3	
Zero gate voltage collector current	I_{CES}	$V_{GE} = 0V, V_{CE} = 650V$			50.0	uA
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

Switching Characteristic, at $T_J=25^\circ\text{C}$

Turn-on delay time	$t_{D(on)}$	$T_J=25^\circ\text{C}$, $V_{CC}=400\text{V}$, $I_C=30\text{A}$, $V_{GE}=-15/15\text{V}$, $R_g=10\Omega$, $L=105\mu\text{H}$	-	20	-	ns
Turn-on rise time	t_r		-	20	-	ns
Turn-off delay time	$t_{D(off)}$		-	70	-	ns
Turn-off fall time	t_f		-	65	-	ns
Turn-on energy	E_{on}		-	945	-	μJ
Turn-off energy	E_{off}		-	484	-	μJ
Total switching energy	E_{ts}		-	1429	-	μJ

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		-	17	-	ns
Turn-off delay time	$t_{D(off)}$		-	83	-	ns
Turn-off fall time	t_f		-	95	-	ns
Turn-on energy	E_{on}		-	1047	-	μJ
Turn-off energy	E_{off}		-	655	-	μJ
Total switching energy	E_{ts}		-	1702	-	μJ

Diode switching characteristics (inductive load)

Reverse recovery time	t_{rr}	$I_F=30\text{A}$, $V_R=400\text{V}$, $di/dt = 1000 \text{ A}/\mu\text{s}$ $T_J=25^\circ\text{C}$	-	28	-	ns
Reverse recovery charge	Q_{rr}		-	189	-	nC
Reverse recovery current	I_{rrm}		-	11.8	-	A
Reverse recovery energy	E_{rr}		-	78	-	μJ
Reverse recovery time	t_{rr}	$I_F=30\text{A}$, $V_R=400\text{V}$, $di/dt = 1000 \text{ A}/\mu\text{s}$, $T_J=175^\circ\text{C}$	-	139	-	ns
Reverse recovery charge	Q_{rr}		-	1160	-	nC
Reverse recovery current	I_{rrm}		-	16.8	-	A
Reverse recovery energy	E_{rr}		-	167	-	μJ

Fig.1 Gate-Charge characteristics

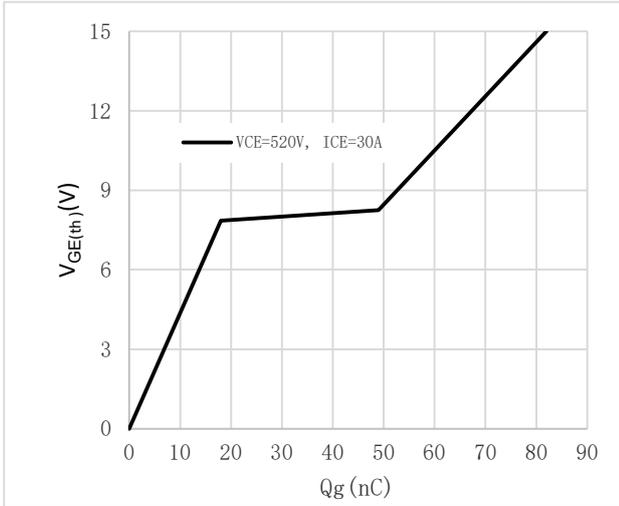


Fig.2 Capacitance characteristics

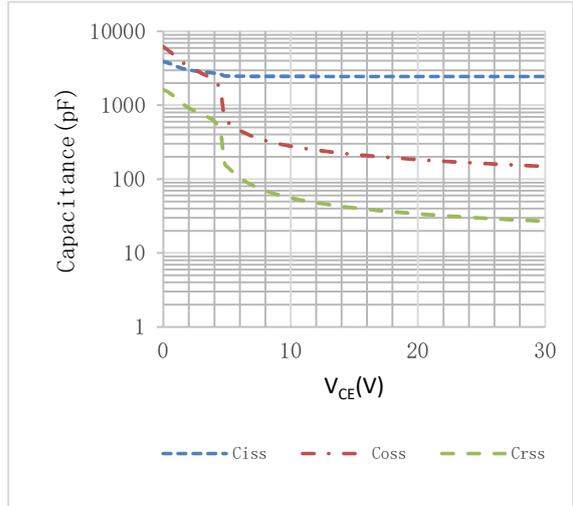


Fig.3 Power dissipation

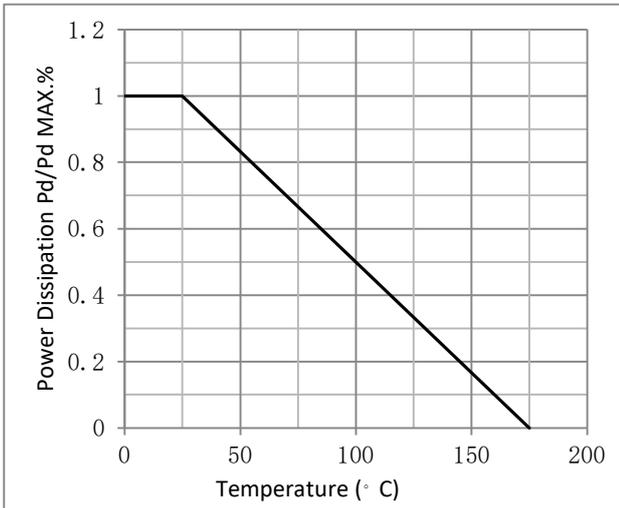


Fig.4 Typical output characteristics

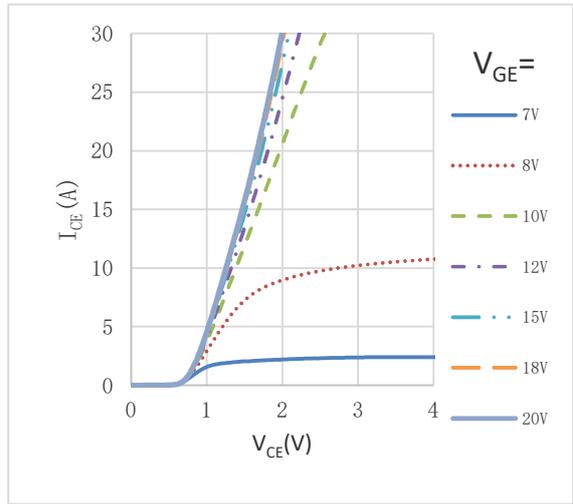


Fig.5 Threshold voltage V.S junction temperature

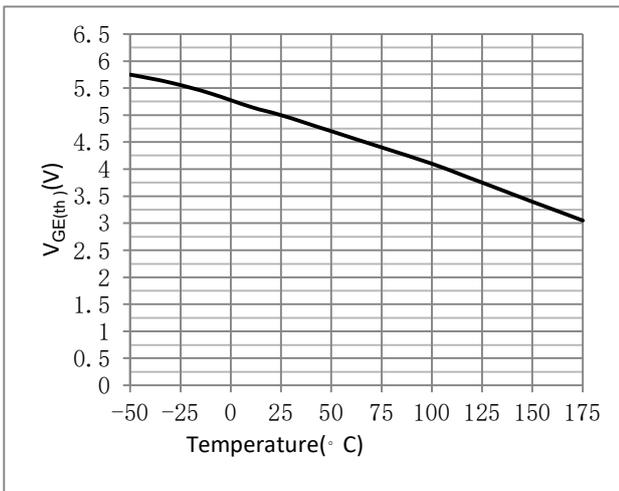


Fig.6 IC vs. Junction Temperature^③

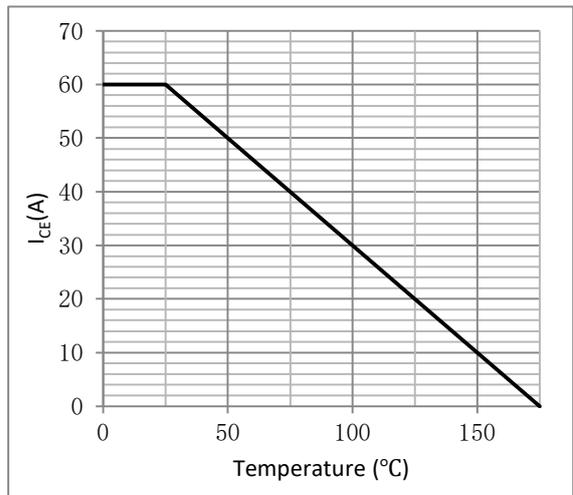


Fig.7 Collector-Emitter VS gate source voltage

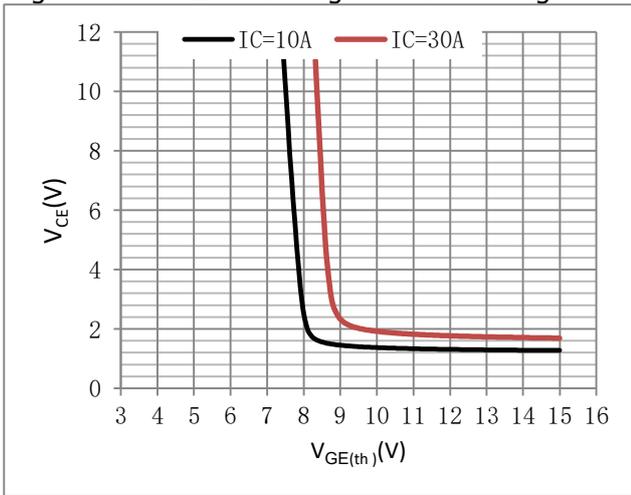


Figure 8. Transfer characteristics

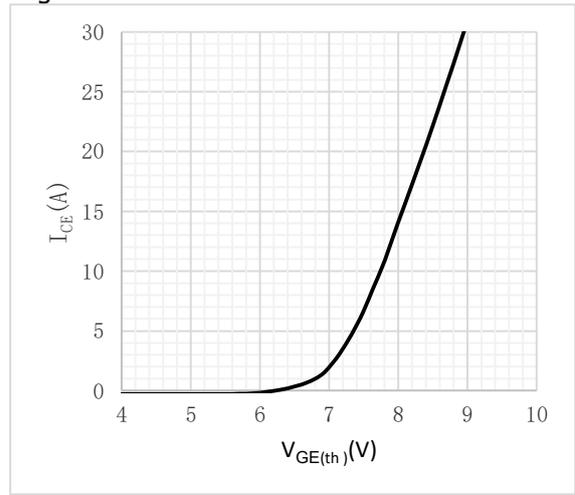


Fig.9 Safe operating area

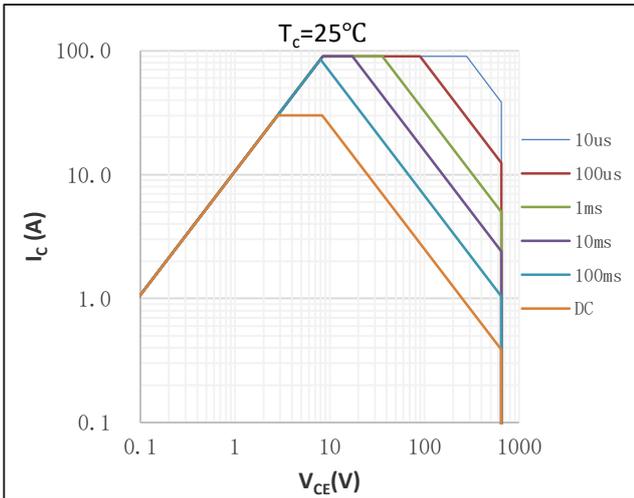


Fig.10 Max transient thermal impedance for IGBT

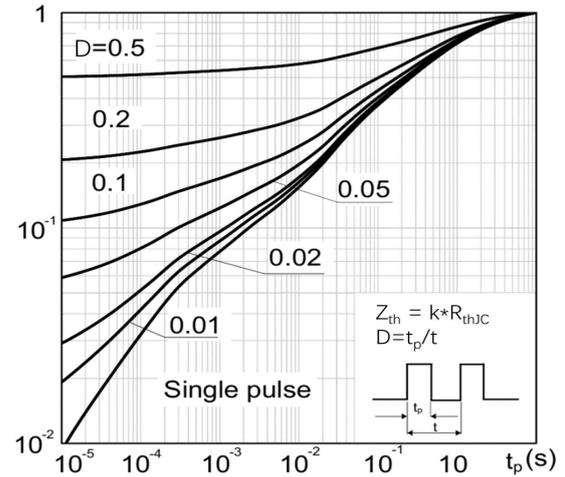
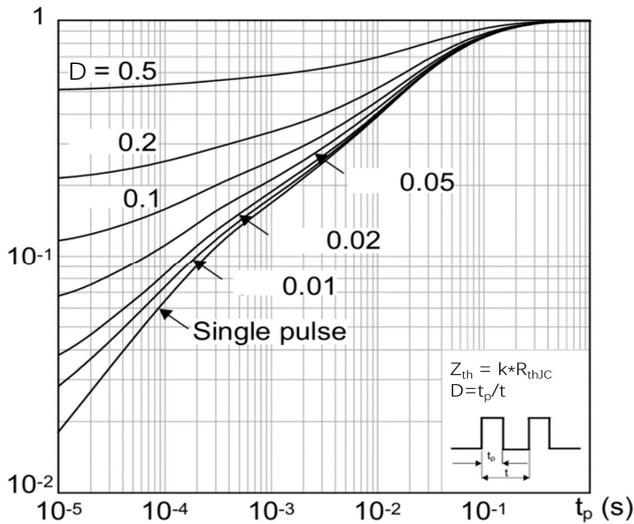
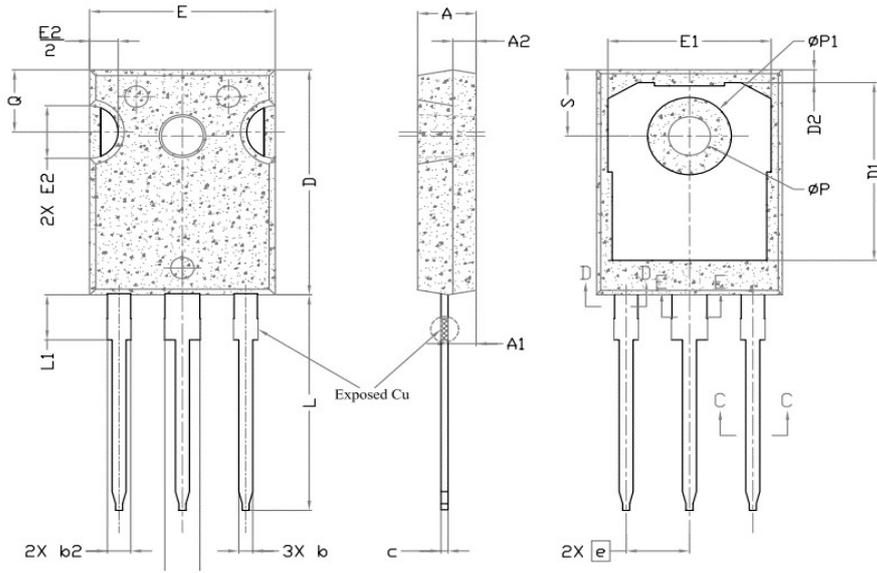


Fig.11 Max transient thermal impedance for Diode



•TO-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 ≤ 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	2024/9/6	New