

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

Application

- Energy Generation
- Industrial power supplies
- Welding

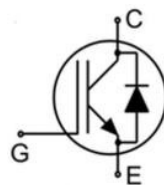
Ordering Information:

Part NO.	ZMBG30N065TD1AF
Marking	BG30N065TD1A
Packing information	TUBE BULK
Basic ordering unit (pcs)	1000

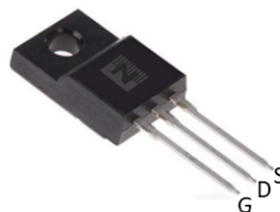
Absolute Maximum Ratings ($T_C=25^{\circ}\text{C}$)

Parameter	Symbol	Conditions	Value	Unit
Collector-emitter voltage	V_{CE}		650	V
Gate-emitter voltage ^①	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	$T_C=25^{\circ}\text{C}$	38	W
Total Power Dissipation	P_D	$T_A=25^{\circ}\text{C}$	2.4	W
Operating Junction Temperature	T_J		-55 to +175	$^{\circ}\text{C}$
Storage Temperature	T_{STG}		-55 to +175	$^{\circ}\text{C}$

Product Summary



$V_{CE} = 650\text{V}$
 $V_{CE(sat)} = 1.45\text{V}$
 $I_C = 30\text{A}$



TO-220F



•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case IGBT	R_{thJC}	-	-	4	°C/W
Thermal resistance, junction - case diode	R_{thJC}	-	-	5	°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	$V_{CE(sat)}$	$V_{GE}=15V, I_C=30A$	-	1.45	1.85	V
		$V_{GE}=15V, I_C=30A, T_J=125^\circ C$	-	1.75	-	
		$V_{GE}=15V, I_C=30A, T_J=175^\circ C$	-	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	$I_F=15A, T_J=25^\circ C$	-	1.45	1.9	V
		$I_F=15A, T_J=125^\circ C$	-	1.25	1.6	
		$I_F=15A, T_J=175^\circ C$	-	1.15	1.55	
Zero gate voltage collector current	I_{CES}	$V_{GE}=0V, V_{CE}=650V$	-	-	50	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}	$V_{GE}=0V, f=1MHz, V_{CE}=25V$	-	2547	-	pF
Output capacitance	C_{oes}		-	152	-	
Reverse transfer capacitance	C_{res}		-	24	-	
Total gate charge	Q_g	$V_{CC}=520V, I_C=30A, V_{GE}=15V$	-	80	-	nC
Gate-emitter charge	Q_{ge}		-	19	-	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	-	uJ
Turn-off energy	E_{off}		-	484	-	uJ
Total switching energy	E_{ts}		-	1429	-	uJ

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

Turn-on delay time	$t_{D(on)}$	$T_J=150^\circ\text{C},$ $V_{CC}=400\text{V}, I_C=30\text{A},$ $V_{GE}=-15/15\text{V},$ $R_g=10\Omega,$ $L=105\mu\text{H}$	-	19	-	ns
Turn-on rise time	t_r		-	18	-	ns
Turn-off delay time	$t_{D(off)}$		-	81	-	ns
Turn-off fall time	t_f		-	90	-	ns
Turn-on energy	E_{on}		-	1030	-	uJ
Turn-off energy	E_{off}		-	627	-	uJ
Total switching energy	E_{ts}		-	1657	-	uJ

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	-	uJ
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	-	uJ

Fig.1 Gate-Charge characteristics

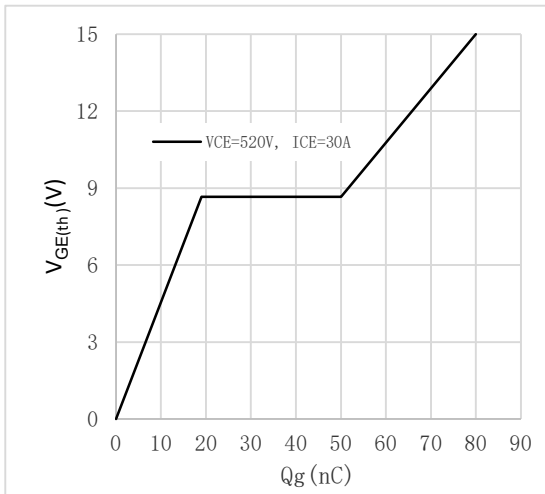


Fig.2 Capacitance characteristics

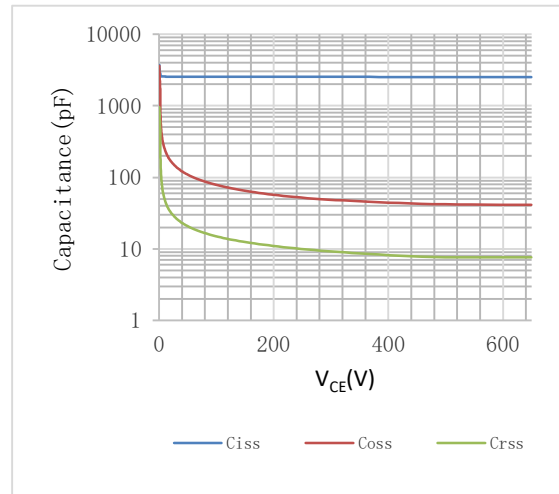


Fig.3 Power dissipation

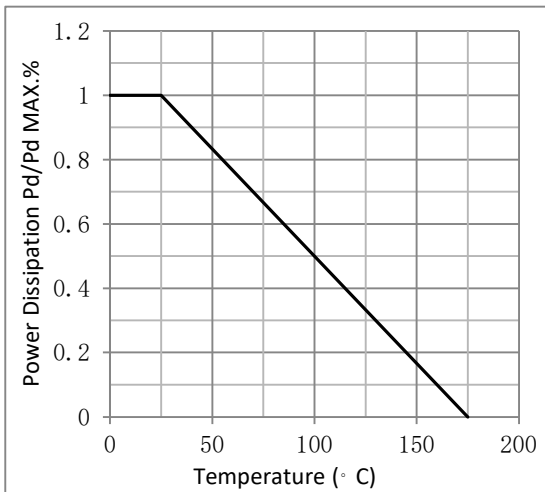


Fig.4 Typical output characteristics

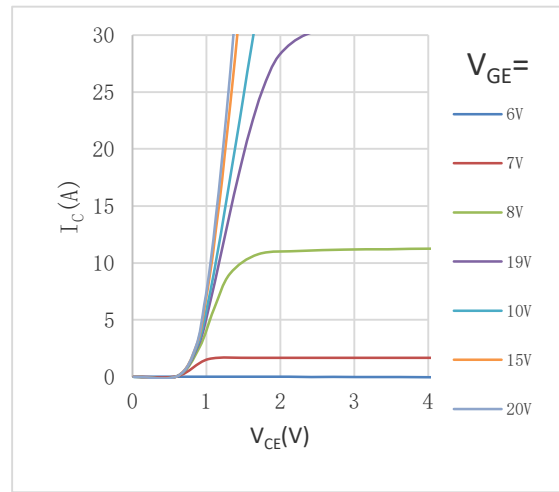


Fig.5 Threshold voltage V.S junction temperature

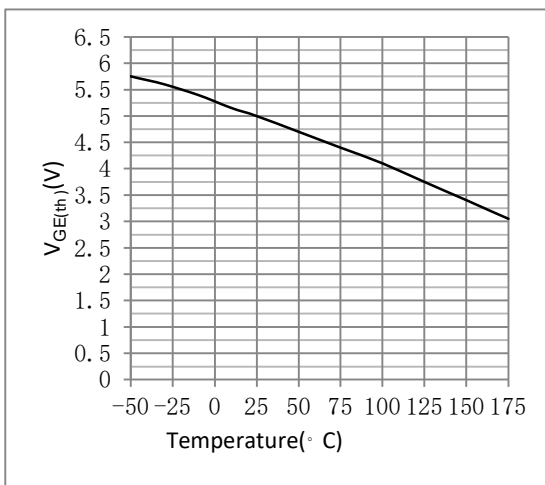


Fig.6 IC vs. Junction Temperature^③

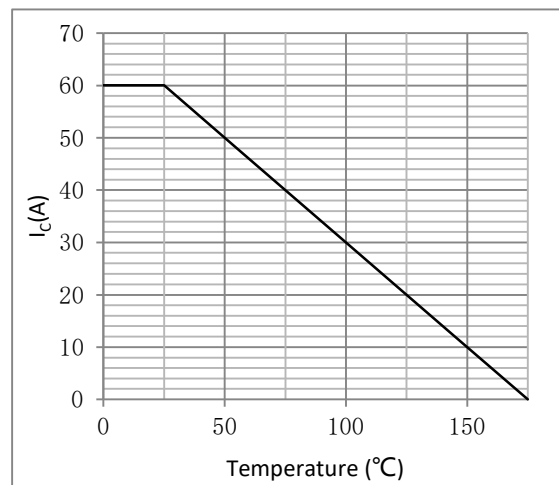


Fig.7 Collector-Emitter VS gate source voltage

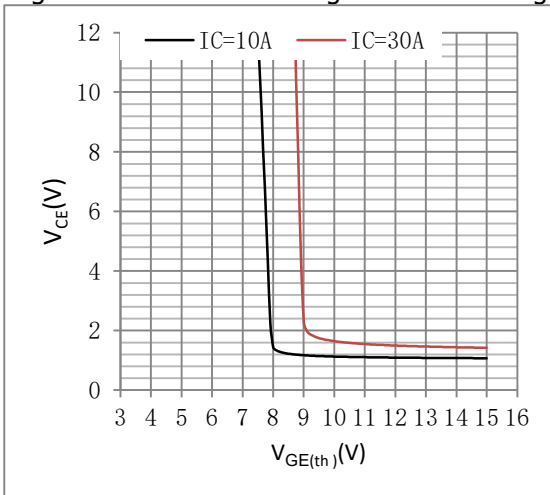


Figure 8. Transfer characteristics

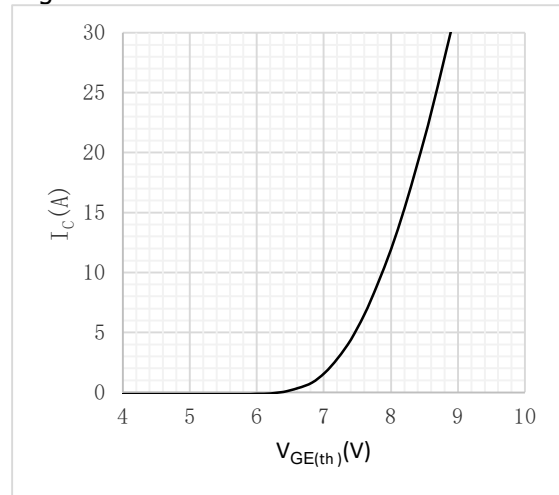
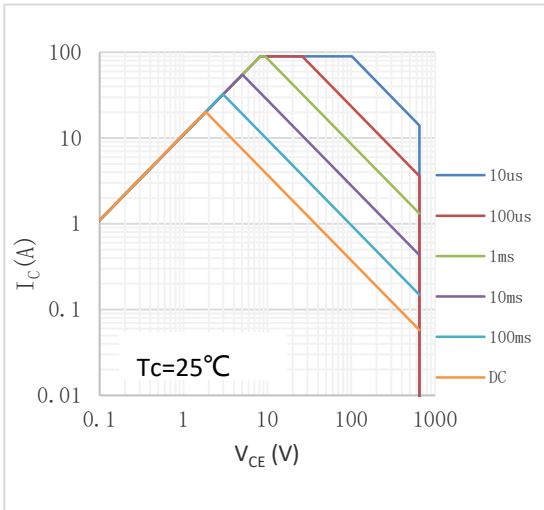
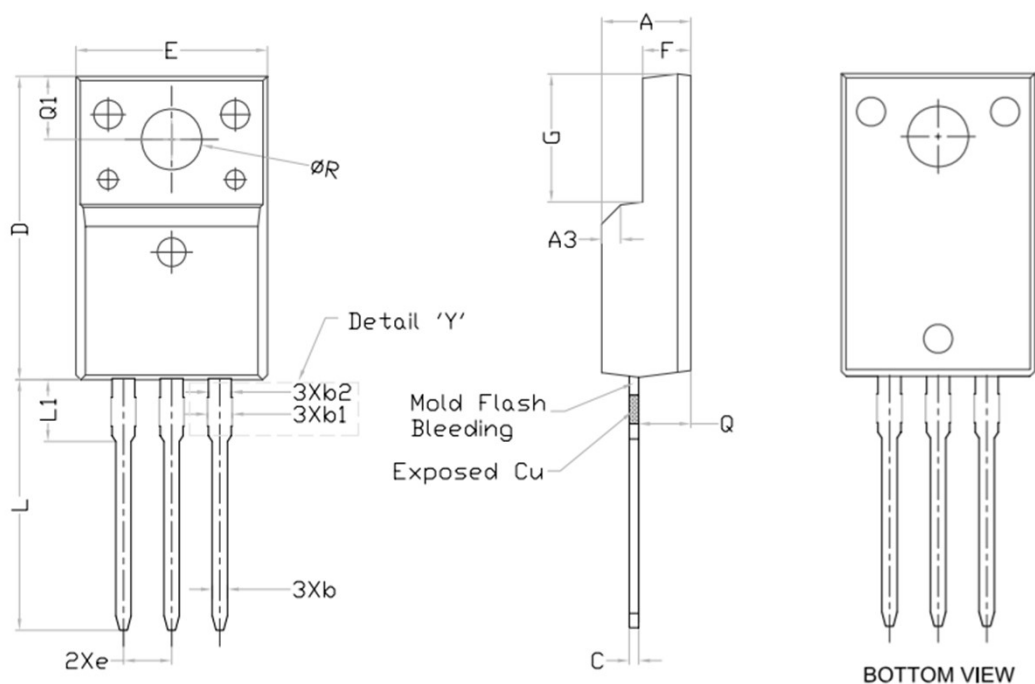


Fig.9 Safe operating area



•TO-220F Package Outline



Detail 'Y'
2/1

Note:

1. All Dimension Are In mm.
2. Package Body Sizes Exclude Mold Flash And Burrs
Mold Flash Should Be Less Than 6 Mil.

SYMBOL	DIMENSIONS		
	Min.	Nom.	Max.
A	4.60	4.70	4.80
b	0.70	0.80	0.91
b1	1.20	1.30	1.47
b2	1.10	1.20	1.30
C	0.45	0.50	0.63
D	15.80	15.87	15.97
e	2.54		
E	10.00	10.10	10.30
F	2.44	2.54	2.64
G	6.50	6.70	6.90
L	12.90	13.10	13.30
L1	3.13	3.23	3.33
Q	2.65	2.75	2.85
Q1	3.20	3.30	3.40
ΦR	3.08	3.18	3.28

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.
 $V_{GE}=15V$.

Disclaimer

- Reproducing and modifying information of the document is prohibited without permission from ZMJ SEMICONDDUCTORS CO.,LTD.

- ZMJ SEMICONDDUCTORS CO.,LTD. reserves the rights to make changes of the content herein the document anytime without notification. Please refer to our website for the latest document.

- ZMJ SEMICONDDUCTORS CO.,LTD. disclaims any and all liability arising out of the application or use of any product including damages incidentally and consequentially occurred.

- ZMJ SEMICONDDUCTORS CO.,LTD. does not assume any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

- Applications shown on the herein document are examples of standard use and operation. Customers are responsible in comprehending the suitable use in particular applications. ZMJ SEMICONDDUCTORS CO.,LTD. makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

- The products shown herein are not designed and authorized for equipments relating to human life and for any applications concerning life-saving or life-sustaining, such as medical instruments, aerospace machinery et cetera. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify ZMJ SEMICONDDUCTORS CO.,LTD. for any damages resulting from such improper use or sale.

- Since ZMJ uses lot number as the tracking base, please provide the lot number for tracking when complaining.

Revision History

Version	Date	Change
A	2024/12/28	New