• 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

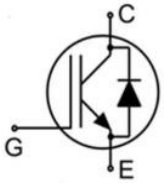
•Application

■Energy Generation

■Industrial power supplies

■Welding

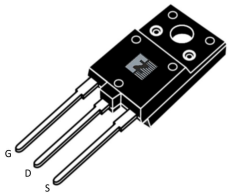
• Product Summary



V_{CE}= 650V

$V_{CE(sat)}$= 1.6V

I_C= 30A



TO-3PF

RoHS

REACH COMPLIANT

HF

•Ordering Information:

Part NO.	ZMBG030N065DAZF
Marking	BG030N065DA
Packing information	TUBE BULK
Basic ordering unit (pcs)	450

•Absolute Maximum Ratings (T_C=25℃)

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℃	60	A
	I_C	T_C=100℃	30	A
Pulsed collector current	I_{CM}	T_C=25℃	90	A
Diode forward current	I_F	T_C=25℃	60	A
	I_F	T_C=100℃	30	A
	$I_{F,pulse}$	T_C=25℃	90	A
Total power Dissipation	P_D	T_C=25℃	74	W
Total Power Dissipation	P_D	T_A=25℃	3.1	W
Operating Junction Temperature	T_J		-55 to +150	℃
Storage Temperature	T_{STG}		-55 to +150	℃

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case IGBT	R_{thJC}		-	1.7	°C/W
Thermal resistance, junction - case diode	R_{thJC}		-	1.6	°C/W
Thermal resistance, junction-ambient	R_{thJA} ②		-	40	°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 = 30 A		1.6	2.1	V
		V_{GE} = 15 V, I_C = 30 A, T_J = 125 °C		2		
		V_{GE} = 15 V, I_C = 30 A, T_J = 175 °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℃		1.2	1.5	V
		I_F=15A, T_J=125℃		1.1	1.4	
		I_F=15A, T_J=175℃		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}=±20V, V_{CE} = 0V			100	nA

●Dynamic characteristics , at T_J=25℃

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=30.0A, V_{GE}=15V	-	82	-	nC
Gate-emitter charge	Q_{ge}		-	18	-	nC
Gate-collector charge	Q_{gc}		-	31	-	nC

SwitchingCharacteristic, at T_J=25℃

Turn-on delay time	$t_{D(on)}$	T_J=25°C, V_{CC}=400V, I_C=30.0A, V_{GE}=-15.0/15.0V, R_g=10.0Ω, L=105uH	-	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

SwitchingCharacteristic, at T_J=150℃

Turn-on delay time	$t_{D(on)}$	T_J=150°C, V_{CC}=400V, I_C=30.0A, V_{GE}=-15.0/15.0V, R_g=10.0Ω, L=105uH	-	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=30A, V_R=400V, di/dt =1000 A/μs T_J=25 °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=30A, V_R=400V, di/dt =1000 A/μs, T_J=175 °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

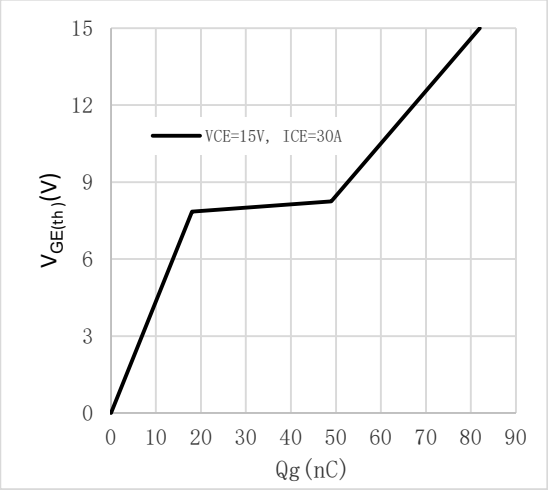


Fig.2 Capacitance characteristics

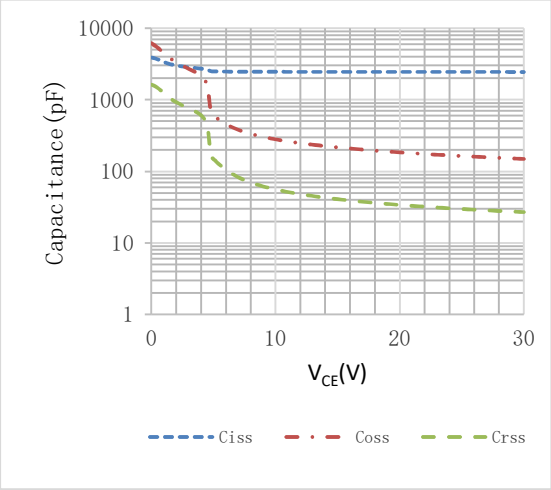


Fig.3 Power dissipation

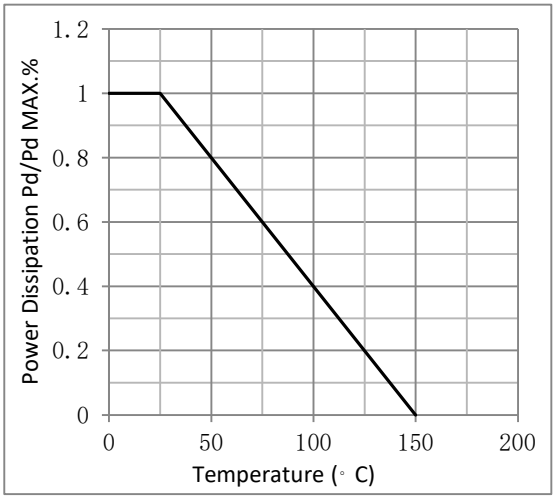


Fig.4 Typical output characteristics

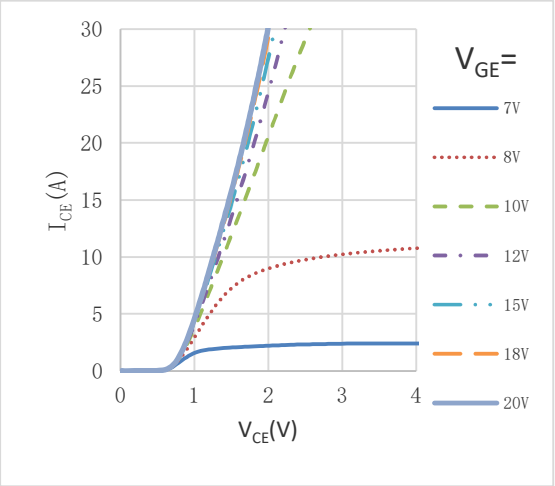


Fig.5 Threshold voltage V.S junction temperature

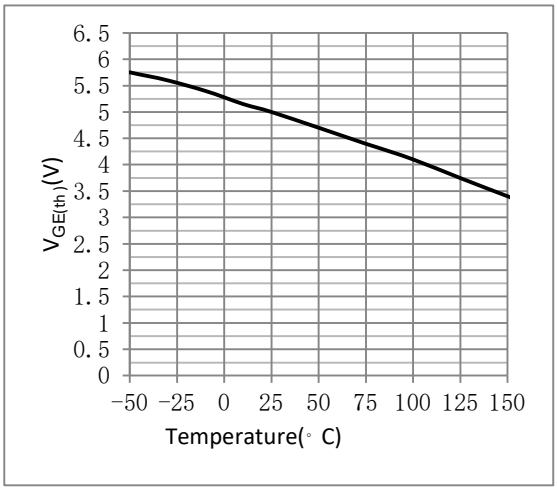


Fig.6 IC vs. Junction Temperature③

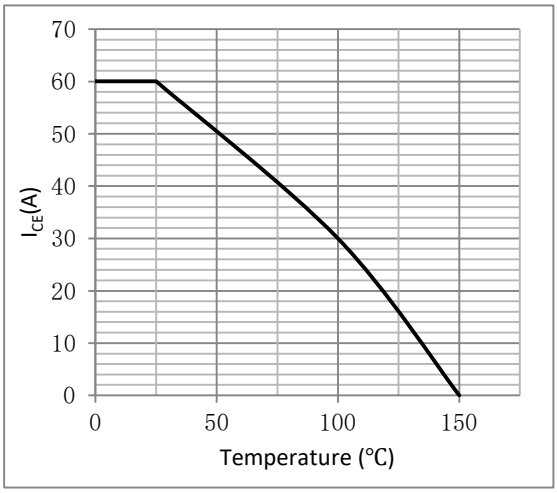


Fig.7 Collector-Emitter VS gate source voltage

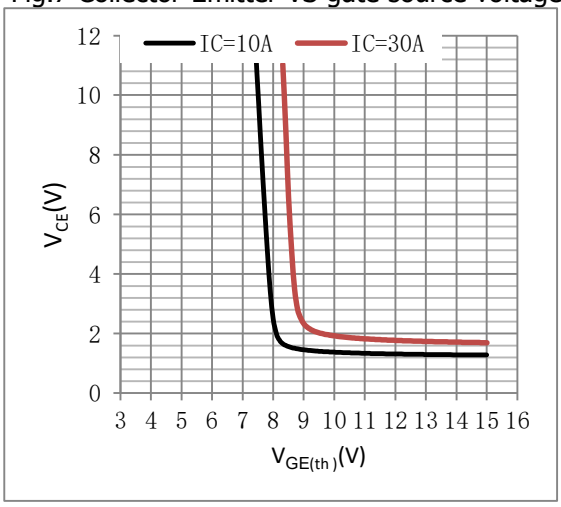


Figure 8. Transfer characteristics

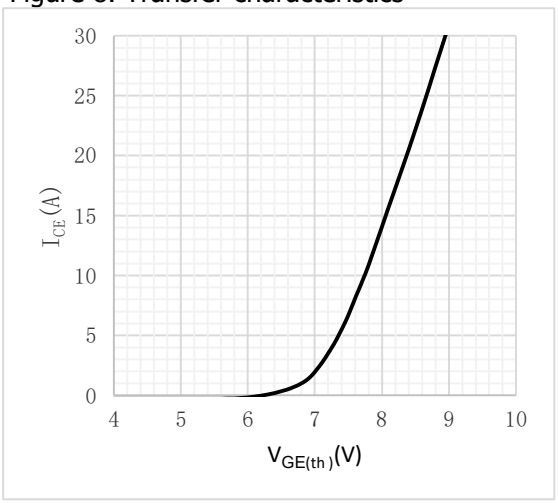


Fig.9 Safe operating area

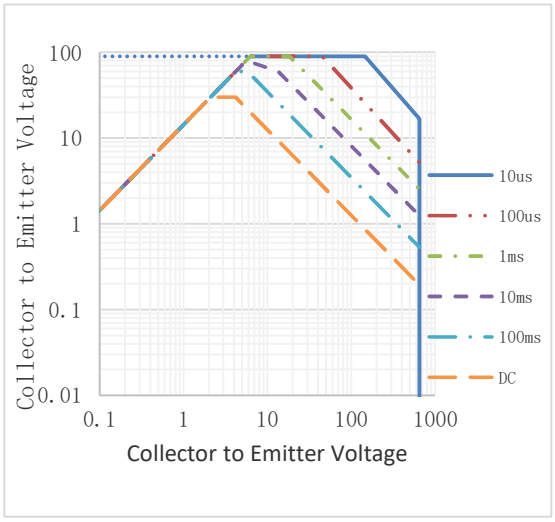


Fig.10 Max transient thermal impedance for IGBT

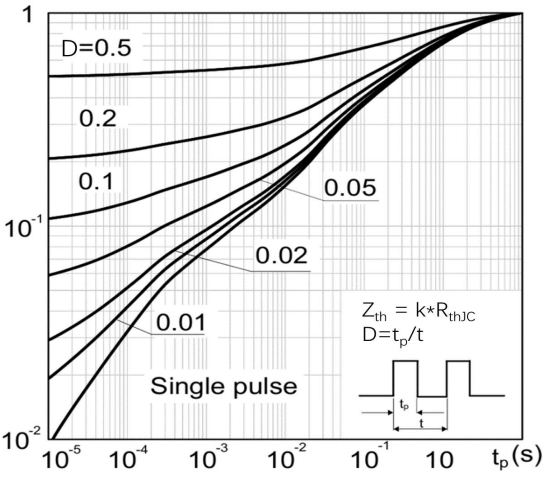
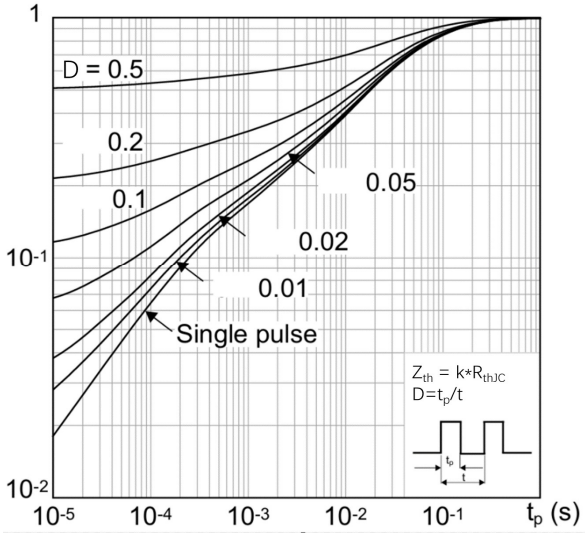
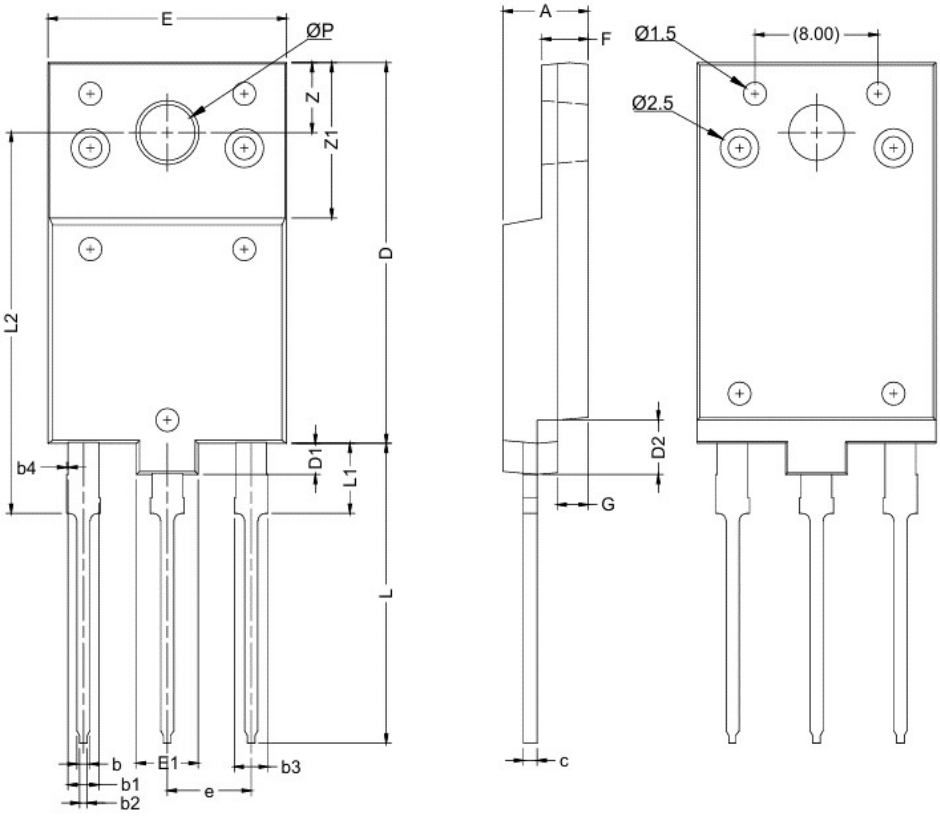


Fig.11 Max transient thermal impedance for Diode



●TO-3PF Package Outline



SYMBOL	MIN	MAX
A	5.30	5.70
b	0.65	0.95
b1	1.81	2.19
b2	0.30	0.70
b3	1.81	2.40
b4	-	0.20
c	0.80	1.00
D	24.20	24.80
D1	1.80	2.20
D2	3.30	3.70
E	15.30	15.70
E1	3.80	4.20
F	2.80	3.20
e	5.45 BSC	
L	19.00	19.60
L1	4.20	4.80
L2	24.20	24.80
P	3.40	3.80
Z	4.30	4.70
Z1	9.70	10.30
G	1.80	2.20
S	3.10	3.50

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	2024/9/6	New