●General Description

Through advanced trench and field stop technology to provide very low $V_{CE(sat)}$, low gate charge, and excellent switching performance.

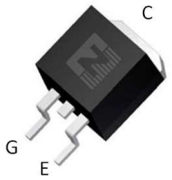
●Features

- ■Very low $V_{CE(sat)}$
- ■Low switching power loss
- ■Low switching surge and noise
- ■Low thermal resistance
- ■AEC-Q101 qualified

●Application

- ■Motor drives

●Product Summary



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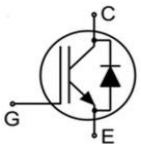


V_{CE}=650V

$V_{CE(sat)}$ =1.47V

I_C=30A

RoHS REACH COMPLIANT HF

●Ordering Information

Part NO.	ZMBGA30N065TD1AB
Marking	BG30N065TD1A
Packing information	REEL TAPE
Basic ordering unit (pcs)	800

●Absolute Maximum Ratings（T_A=25℃,unless otherwise specified）

Parameter	Symbol	Conditions	Min.	Max.	Unit
Collector-emitter voltage	V_{CE}		-	650	V
Gate-emitter voltage①	V_{GE}		-20	20	V
Continuous collector current	I_C	V_{GE}=15V, T_C=25℃	-	60	A
	I_C	V_{GE}=15V, T_C=100℃	-	30	A
Pulsed collector current ①	I_{CM}	Pulsed; t_p ≤ 10 μs; T_C = 25 °C	-	120	A
Diode forward current	I_F	V_{GE}=0V, T_C=25℃	-	60	A
		V_{GE}=0V, T_C=100℃	-	30	A
Pulsed diode forward current	$I_{F,pulse}$	Pulsed; t_p ≤ 10 μs; T_C = 25 °C	-	120	A
Total power dissipation	P_D	T_C=25℃	-	417	W
Total power dissipation	P_D	T_A=25℃	-	3.8	W
Operating junction temperature	T_J		-55	175	℃
Storage temperature	T_{STG}		-55	175	℃

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case IGBT	R_{thJC}	-	-	0.36	°C/W
Thermal resistance, junction - case diode	R_{thJC}	-	-	0.88	°C/W
Thermal resistance, junction - ambient	R_{thJA}②	-	-	40	°C/W
Soldering temperature（total time<10s)	T_{sold}	-	-	260	°C

●Electronic Characteristics (T_j=25°C, unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Collector-emitter breakdown voltage	BV_{CES}	V_{GE} =0V, I_C =250uA	650	-	-	V
Gate-emitter threshold voltage	$V_{GE(th)}$	V_{GE}=V_{CE}, I_C=1mA	4	5.3	6	V
Zero gate voltage collector current	I_{CES}	V_{GE}=0V, V_{CE}=650V, T_j=25℃	-	-	10	uA
		V_{GE}=0V, V_{CE}=650V, T_j=175℃	-	-	10	mA
Gate- emitter leakage current	I_{GES}	V_{GE}=±20V, V_{CE} =0V	-	-	100	nA
Collector-emitter saturation voltage	$V_{CE(sat)}$	V_{GE}=15V, I_C=30A, T_j=25℃	-	1.47	1.75	V
		V_{GE}=15V, I_D=30A, T_j=175℃	-	1.87	-	V
Forward transconductance	gFS	V_{CE} =20V, I_C = 30A	-	22	-	S
Diode forward voltage	V_F	I_F=30A, T_C=25℃	-	1.4	1.8	V
		I_F=30A, T_C=175℃	-	1.1	1.5	V

●Dynamic characteristics (T_j=25°C, unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	C_{ies}	f = 100KHz, V_{CE}=400V, V_{GE}=0V	-	2521	-	pF
Output capacitance	C_{oes}		-	44	-	pF
Reverse transfer capacitance	C_{res}		-	6.5	-	pF
Gate resistance	R_g	f = 1MHz	-	1.6	-	Ω
Total gate charge	Q_g	V_{CC} =400V, I_C = 30A, V_{GE} = 15V	-	78.4	-	nC
Gate-emitter charge	Q_{ge}		-	20.5	-	nC
Gate-collector charge	Q_{gc}		-	29.3	-	nC

●Switching characteristics (T_j=25°C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Turn-on delay time	$t_{d(on)}$	T_j=25℃ V_{GE}=15/-15V, V_{CE}=400V, R_G =10Ω, I_C =30A, 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}		-	0.95	-	mJ
Turn-off energy	E_{off}		-	0.48	-	mJ
Total switching energy	E_{ts}		-	1.43	-	mJ

●Switching characteristics (T_j=150°C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Turn-on delay time	$t_{d(on)}$	T_j=150℃ V_{GE}=15/-15V, V_{CE}=400V, R_G =10Ω, I_C =30A, 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}		-	1.03	-	mJ
Turn-off energy	E_{off}		-	0.63	-	mJ
Total switching energy	E_{ts}		-	1.66	-	mJ

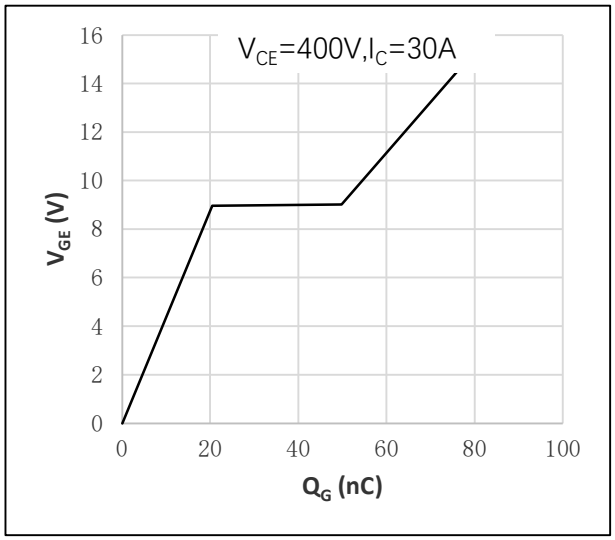
●Diode switching characteristics (T_j=25°C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse recovery time	t_{rr}	T_j=25℃ V_R=400V,I_F =30A, di_F/dt=1000A/us,	-	28	-	ns
Reverse recovery charge	Q_{rr}		-	189	-	nC
Reverse recovery	I_{rrm}		-	11.8	-	A
Reverse recovery energy	E_{rr}		-	78	-	uJ

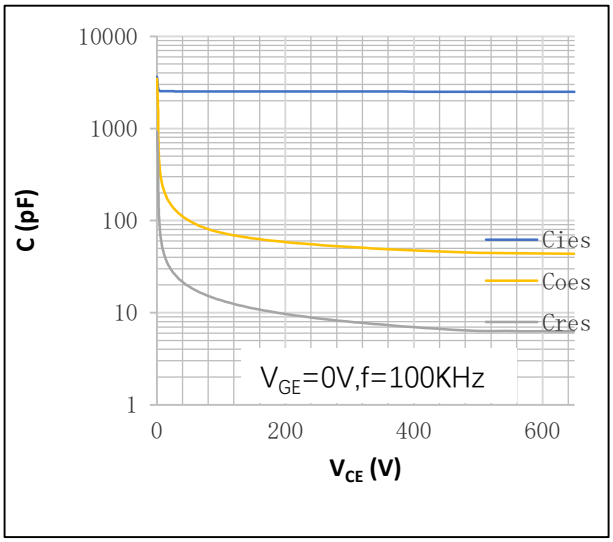
●Switching characteristics (T_j=150°C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse recovery time	t_{rr}	T_j=150℃ V_R=400V,I_F =30A, di_F/dt=1000A/us,	-	139	-	ns
Reverse recovery charge	Q_{rr}		-	1160	-	nC
Reverse recovery	I_{rrm}		-	16.8	-	A
Reverse recovery energy	E_{rr}		-	167	-	uJ

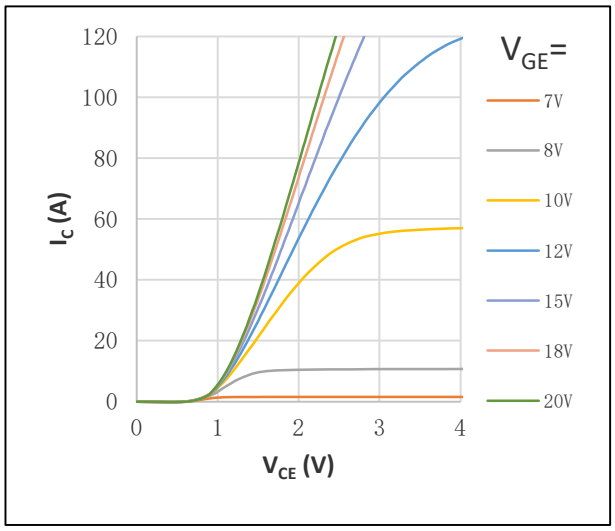
●Fig.1 Gate-emitter voltage as a function of gate charge; Typical values; T_j=25℃



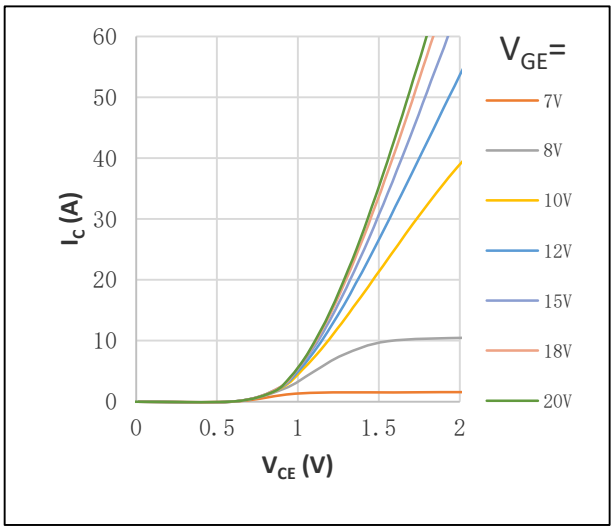
●Fig.2 Input, output and reverse transfer capacitances as a function of collector-emitter voltage; Typical values; T_j=25℃



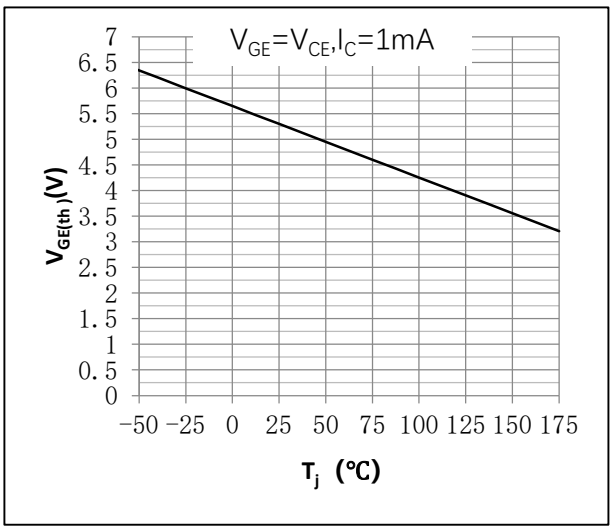
●Fig.3 Output characteristics: collector current as a function of collector-emitter voltage; Typical values; T_j=25℃



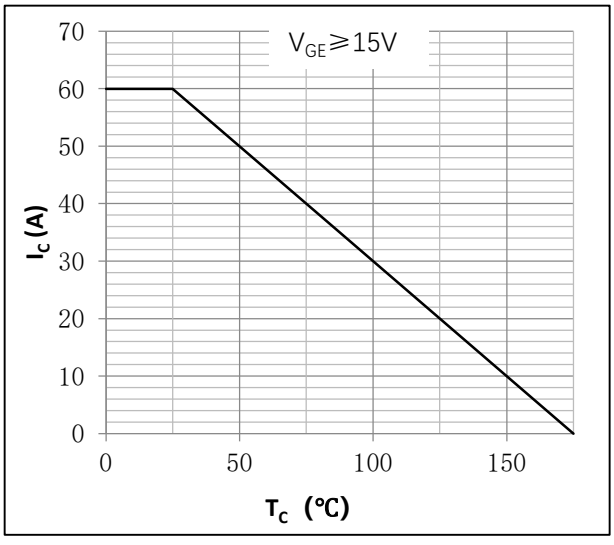
●Fig.4 Output characteristics: collector current as a function of collector-emitter voltage; Typical values: Expanded curve; T_j=25℃



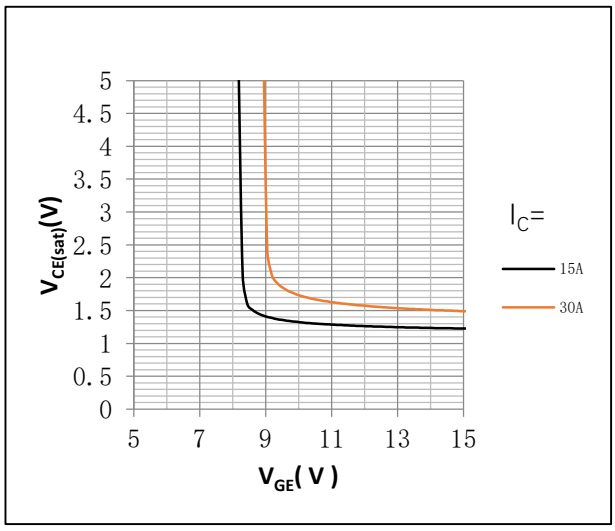
●Fig.5 Gate-emitter threshold voltage as a function of junction temperature; Typical values



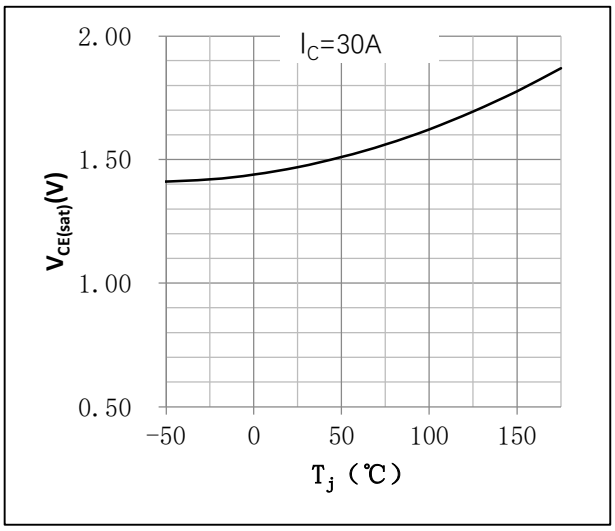
●Fig.6 Continuous collector current as a function of case temperature[3];Calculative values



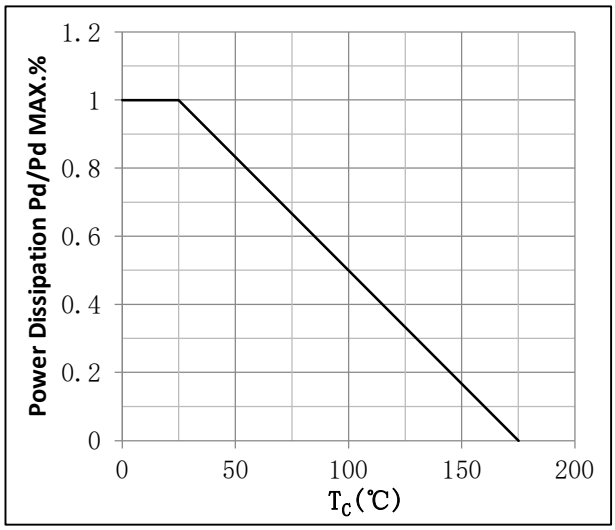
●Fig.7 Collector-emitter saturation voltage as a function of gate-emitter voltage; Typical values



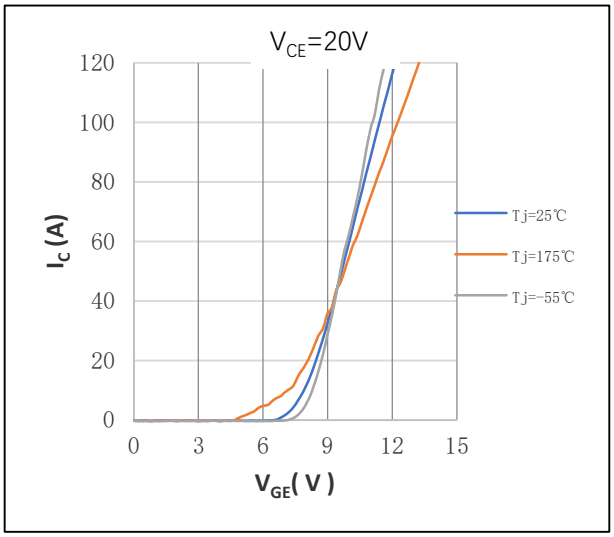
●Fig.8 Fig.6 Collector-emitter saturation voltage as a function of junction temperature; Typical values; Tj=25℃



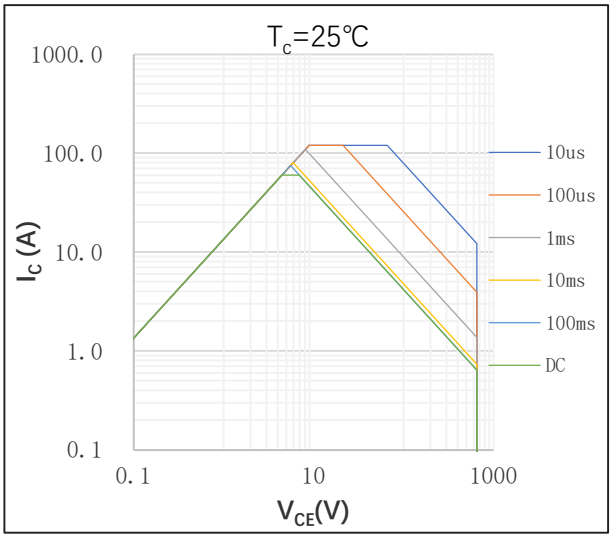
●Figure 9. Normalized total power dissipation as a function of case temperature; Calculative values Normalized Power Dissipation =P_d/P_d(25℃)



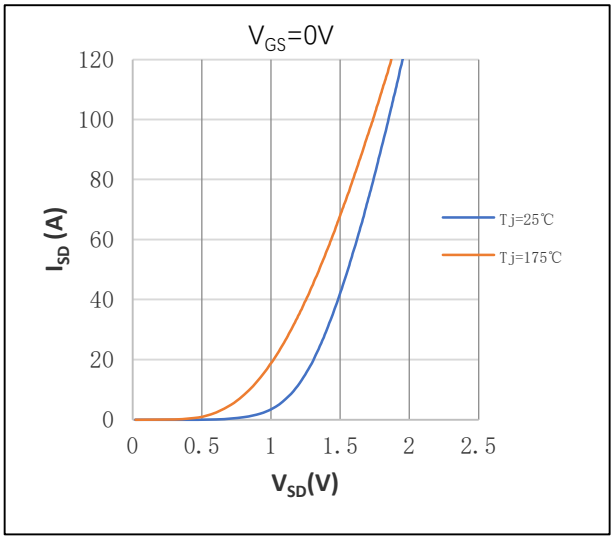
●Figure 10. Transfer characteristics: Collector current as a function of gate-emitter voltage; Typical values



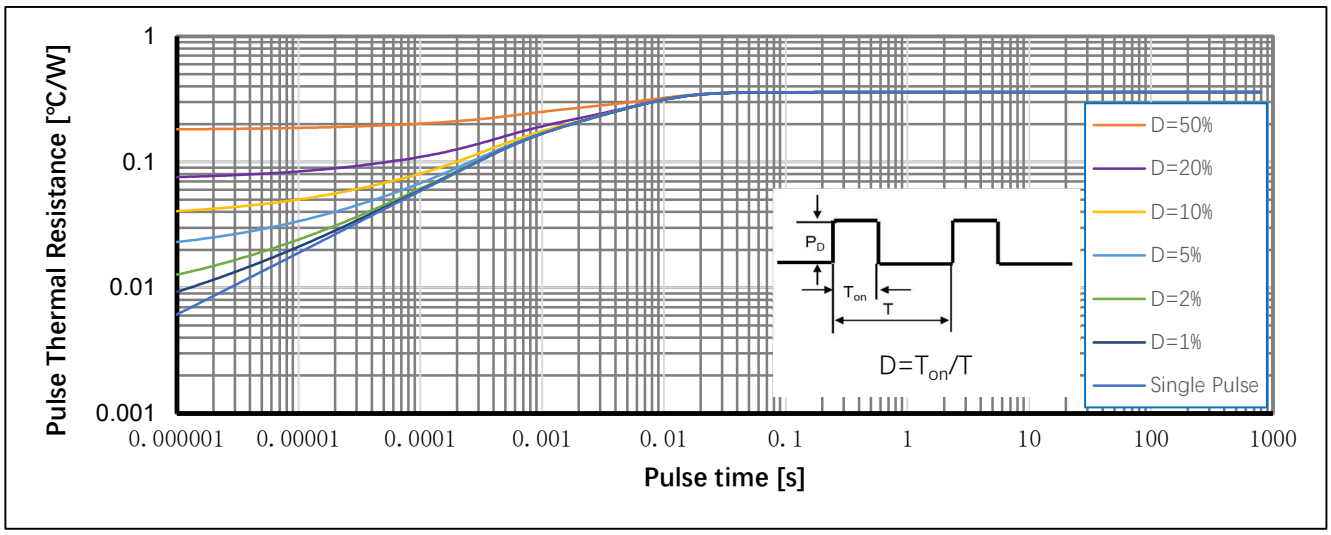
●Fig.11 Safe operating area: continuous and peak collector currents as a function of collector-emitter voltage; Calculative values



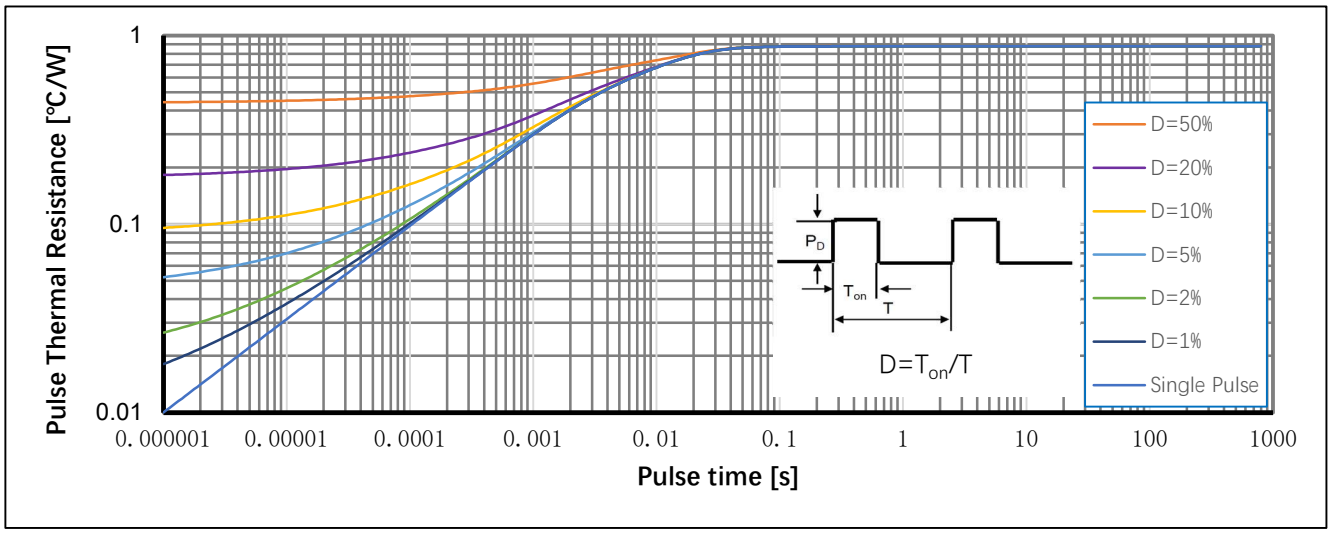
●Fig.12 Source (diode forward) current as a function of source-drain (diode forward) voltage; Typical values



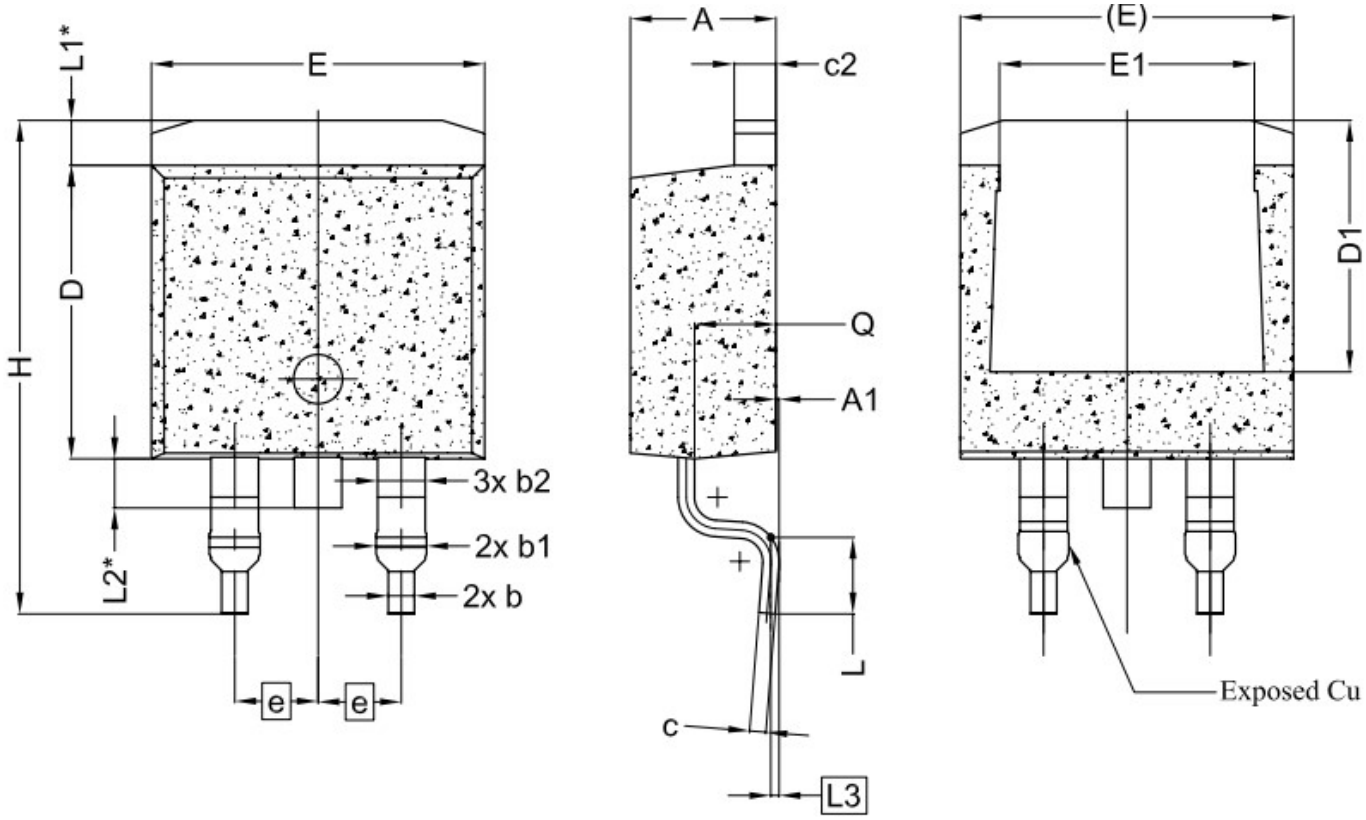
●Fig.13 Transient thermal impedance from junction to case -IGBT as a function of pulse duration; max values

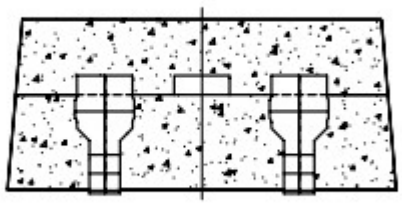


●Fig.14 Transient thermal impedance from junction to case -diode as a function of pulse duration; max values



●Package Outline





SYMBOL	DIMENSIONS		
	MIN.	NOM.	MAX.
A	4.24	4.44	4.64
A1	0.00	0.10	0.25
b	0.70	0.80	0.90
b1	1.20	1.55	1.75
b2	1.20	1.45	1.70
c	0.40	0.50	0.60
c2	1.15	1.27	1.40
D	8.82	8.92	9.02
D1	6.86	7.65	--
E	9.96	10.16	10.36
E1	6.89	7.77	7.89
e	2.54 BSC		
H	14.61	15.00	15.88
L	1.78	2.32	2.79
L1	1.36 REF.		
L2	1.50 REF.		
L3	0.25 BSC		
Q	2.30	2.48	2.70

Note

① Pulse : V_{GE}=+20V/-20V, Duty cycle=50%,T_j=175℃, t=1000 hours; For DC ， the following test conditions can be passed: V_{GE}=+20V/-10V, T_j=175℃, t=1000 hours;

② Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate;

③ 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	2025/6/30	New