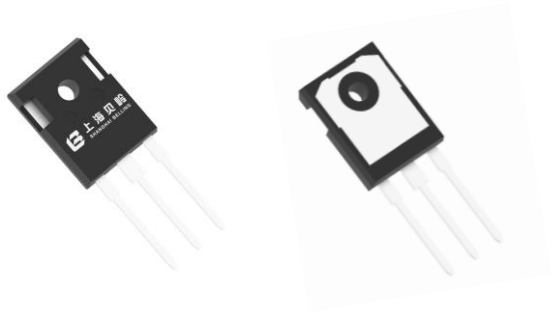
650V IGBT BLG100T65FDL7

1. Product Features

- Fast Switching
- Low $V_{CE(sat)}$
- Positive temperature coefficient
- Fast recovery anti-parallel diode
- RoHS product



TO247

Key characteristics

Parameter	Value	Unit
V_{CES}	650	V
I_C	100	A
$V_{CE(sat).typ}$	1.55	V

2. Product Applications

- Motor Control
- UPS
- Solar

3. Description

BLG100T65FDL7 is obtained by advanced Trench Field Stop (T-FS) technology which is characteristic with low $V_{CE(sat)}$, optimized switching performance and low gate charge Q_g. The IGBT is suitable device for Motor Control，Solar and UPS.

4. Ordering Guide

Product Number	Package	Operating Temp.	Eco Status	MSL	Minimum Pack Qty
BLG100T65FDL7-F	Tube	-40~175°C	Green	NA	25/Tube

Contents

5. Pin Description

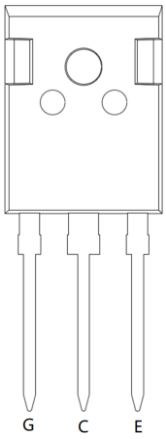


Figure 1 Pin Description

6. Specifications

6.1 Absolute Ratings

At T_C = 25°C, unless otherwise specified.

Table 1 Absolute Ratings

Symbol	Parameter	Rating	Units
V_{CES}	Collector-Emitter Voltage	650	V
I_C	Collector Current @T_C=25°C	200	A
	Collector Current @T_C=100°C	100	A
I_{CM}	Pulsed Collector Current, tp limited by T_{VJmax}	300	A
I_F	Diode Continuous Forward Current @T_C=25°C	200	A
	Diode Continuous Forward Current @T_C=100°C	100	A
I_{FM}	Diode Maximum Forward Current, limited by T_{VJmax}	300	A
V_{GES}	Gate-Emitter Voltage	±30	V
t_{SC}	Short circuit withstand time V_{GE}=15V, V_{CC}≤400V, Allowed number of short circuits<1000,Times between short circuits: ≥ 1.0s,T_{VJ}≤ 150°C	5	μs
P_D	Power Dissipation @T_C=25°C	555	W
T_{VJ}	Operating Junction Temperature Range	-40 to 175	°C
T_{stg}	Storage Temperature Range	-55 to 175	°C
T_L	Maximum Temperature for Soldering	260	°C

6.2 Thermal Characteristics

Table 2 Thermal Characteristics

Symbol	Parameter	Values	Units
$R_{th(j-c)}$	Junction-to-Case (IGBT)	0.27	°C/W
$R_{th(j-c)}$	Junction-to-Case (Diode)	0.35	°C/W
$R_{th(j-a)}$	Thermal resistance, Junction-Ambient	40	°C/W

6.3 Electrical Characteristics

At T_C = 25°C, unless otherwise specified.

6.3.1 Static Characteristics

Table 3 Static Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
V_{CES}	Collector-Emitter Breakdown Voltage	V_{GE} = 0V, I_C=250μA	650	--	--	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=15V,I_C =100A T_{VJ}=25℃ T_{VJ}=125℃ T_{VJ}=175℃	 -- -- --	 1.55 1.85 2.00	 1.95 -- --	V
$V_{GE(TH)}$	Gate Threshold Voltage	V_{CE} = V_{GE},I_C = 1mA	4.3	5.0	5.7	V
V_F	Diode Forward Voltage	I_F=50A T_{VJ}=25℃ T_{VJ}=125℃ T_{VJ}=175℃	 -- -- --	 1.35 1.15 1.05	 1.85 -- --	V
V_F	Diode Forward Voltage	I_F=100A T_{VJ}=25℃ T_{VJ}=125℃ T_{VJ}=175℃	 -- -- --	 1.60 1.45 1.35	 2.10 -- --	V
I_{CES}	Collector-Emitter Leakage Current	V_{CE} = 650V, V_{GE} = 0V	--	--	30	μA
$I_{GES(F)}$	Gate-Emitter Forward Leakage Current	V_{GE} = +30V	--	--	200	nA
$I_{GES(R)}$	Gate-Emitter Reverse Leakage Current	V_{GE} = -30V	--	--	-200	nA

Pulse width tp≤300μs, δ≤2%

6.3.2 Dynamic Characteristics

Table 4 Dynamic Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
C_{ies}	Input Capacitance	V_{GE}=0V V_{CE}=25V f =1.0MHz	--	6055	--	pF
C_{oes}	Output Capacitance		--	208	--	
C_{res}	Reverse Transfer Capacitance		--	29	--	
Q_G	Gate charge	Vcc=520V I_{CE}=100A V_{GE}=15V	--	246	--	nC
Q_{GE}	Gate-emitter charge		--	44	--	
Q_{GC}	Gate-collector charge		--	125	--	
$I_{C(SC)}$	Short circuit collector current Max.1000 short circuits, Times between short circuits: ≥ 1.0s	V_{GE}=15V,V_{CC}≤400V ,t_{SC}≤5us,T_{VJ}≤150℃	--	370	--	A

6.3.3 IGBT Switching Characteristics, at T_{VJ}=25℃

Table 5 Switching Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$t_{d(on)}$	Turn-On Delay Time	I_C =100A V_{CE} = 400V V_{GE} = 15V R_G =5Ω	--	35	--	ns
tr	Rise Time		--	59	--	
$t_{d(off)}$	Turn-Off Delay Time		--	195	--	

t_f	Fall Time	T_{VJ}=25°C Inductive Load Energy losses include collector current tail and diode reverse recovery	--	92	--	
E_{on}	Turn-On Switching Loss		--	3.50	--	mJ
E_{off}	Turn-Off Switching Loss		--	2.60	--	
E_{ts}	Total Switching Loss		--	6.10	--	

6.3.4 IGBT Switching Characteristics, at T_{VJ}=175℃

Table 6 Switching Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$t_{d(on)}$	Turn-On Delay Time	I_C=100A V_{CE}=400V V_{GE}=15V R_G=5Ω T_{VJ}=175°C Inductive Load Energy losses include collector current tail and diode reverse recovery	--	35	--	ns
tr	Rise Time		--	54	--	
$t_{d(off)}$	Turn-Off Delay Time		--	240	--	
t_f	Fall Time		--	160	--	
E_{on}	Turn-On Switching Loss		--	3.80	--	mJ
E_{off}	Turn-Off Switching Loss		--	4.10	--	
E_{ts}	Total Switching Loss		--	7.90	--	

6.3.5 Diode Characteristics, at T_{VJ}=25℃

Table 7 Source-Drain Diode Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
t_{rr}	Reverse Recovery Time	V_R=400V, I_F=50A, R_G= 5Ω, T_{VJ}=25°C	--	66	--	ns
Q_{rr}	Reverse Recovery Charge		--	1.30	--	μC
I_{rrm}	Reverse Recovery Current		--	29	--	A
t_{rr}	Reverse Recovery Time	V_R=400V, I_F=100A, R_G= 5Ω, T_{VJ}=25°C	--	95	--	ns
Q_{rr}	Reverse Recovery Charge		--	1.65	--	μC
I_{rrm}	Reverse Recovery Current		--	29	--	A

6.3.6 Diode Characteristics, at T_{VJ}=175℃

Table 8 Source-Drain Diode Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
t_{rr}	Reverse Recovery Time	V_R=400V, I_F=50A, R_G= 5Ω, T_{VJ}=175°C	--	130	--	ns
Q_{rr}	Reverse Recovery Charge		--	4.45	--	μC
I_{rrm}	Reverse Recovery Current		--	53	--	A
t_{rr}	Reverse Recovery Time	V_R=400V, I_F=100A, R_G= 5Ω, T_{VJ}=175°C	--	180	--	ns
Q_{rr}	Reverse Recovery Charge		--	6.00	--	μC
I_{rrm}	Reverse Recovery Current		--	57	--	A

6.4 Characteristics Curves

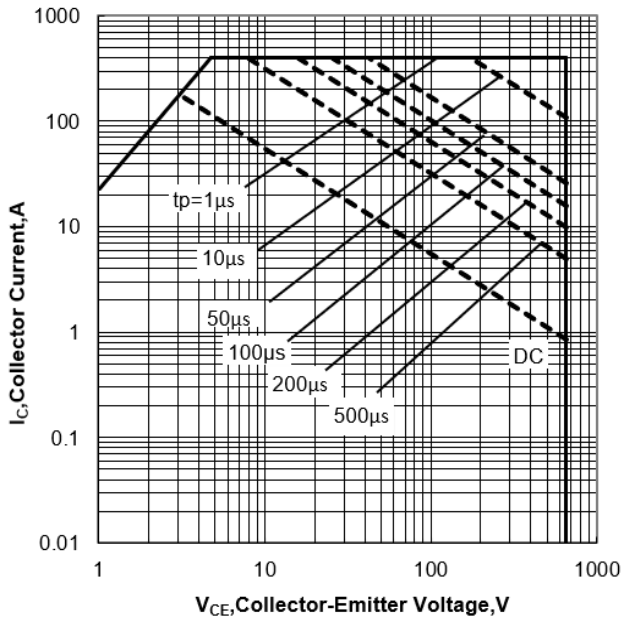


Figure 2 Forward Bias Safe Operating Area

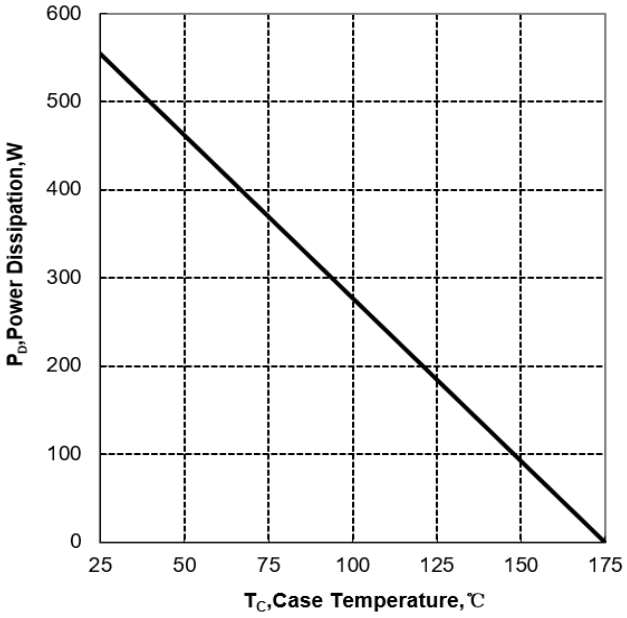


Figure 3 Power Dissipation vs Case Temperature

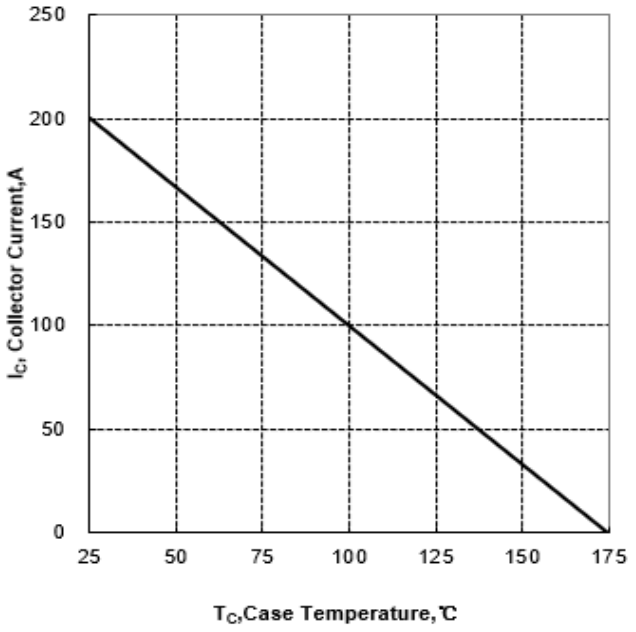


Figure 4 Collector Current vs Case Temperature

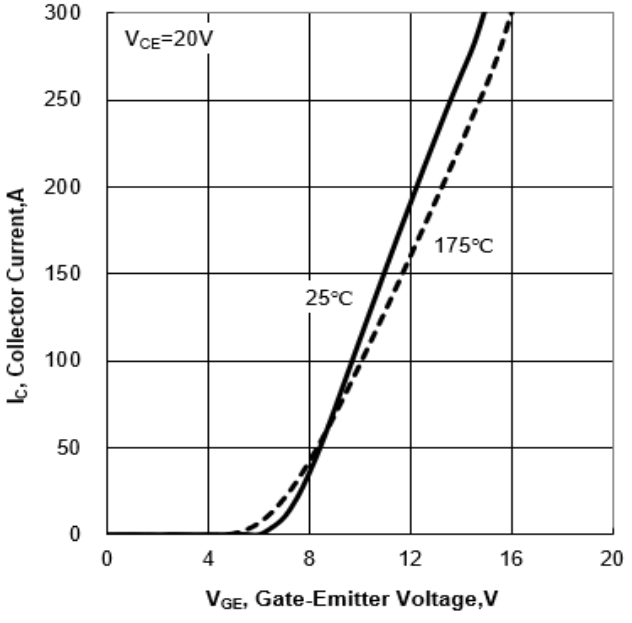


Figure 5 Typical Transfer Characteristics

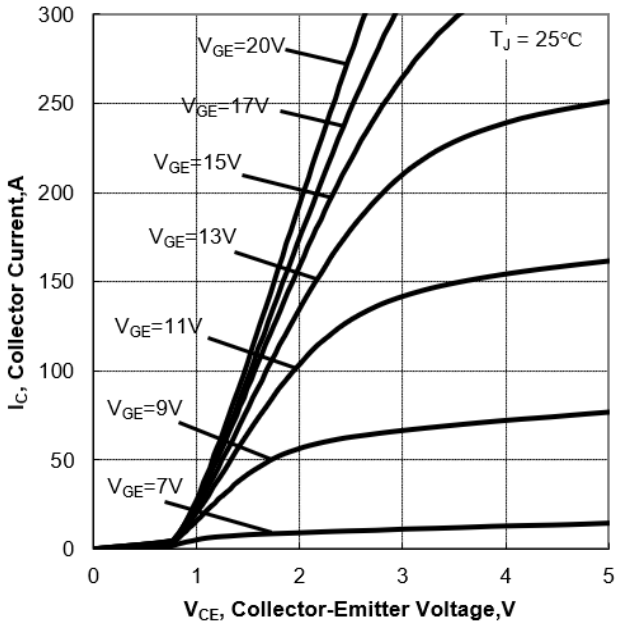


Figure 6 Typical Output Characteristics (T_{VJ}=25℃)

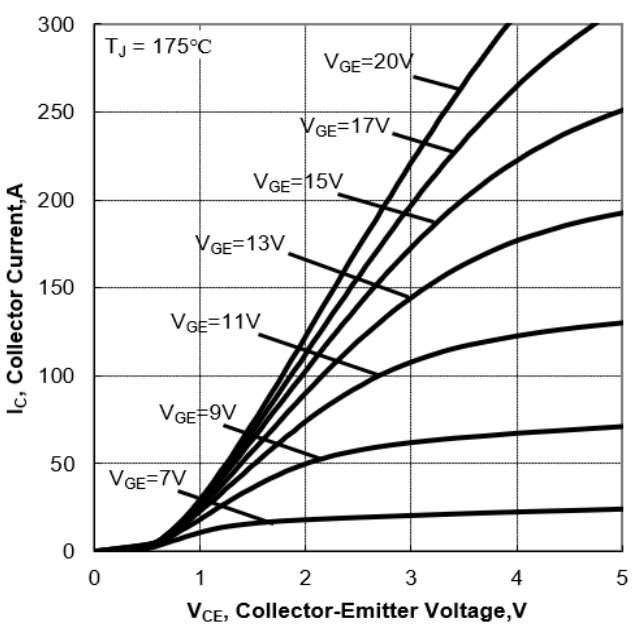


Figure 7 Typical Output Characteristics (T_{VJ}=175℃)

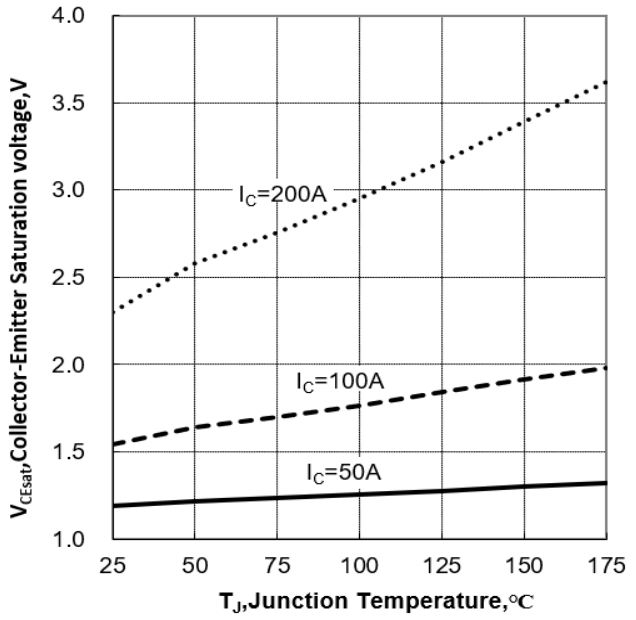


Figure 8 Typical Collector-Emitter Saturation Voltage vs Junction temperature

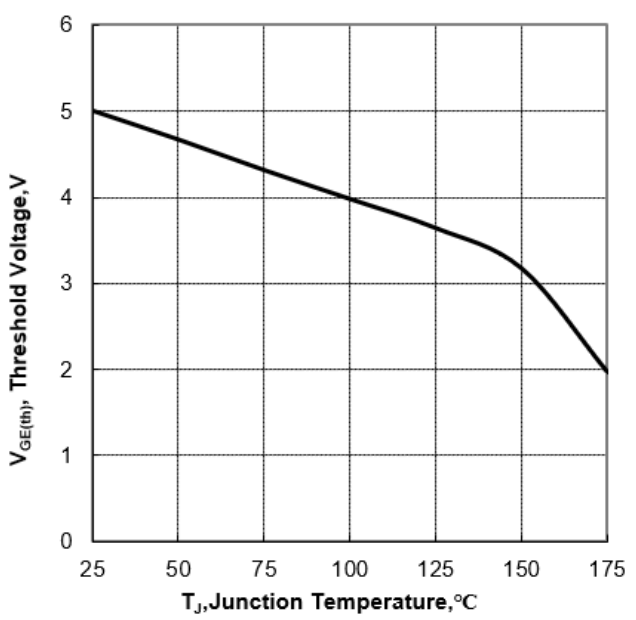


Figure 9 Threshold Voltage vs Junction Temperature

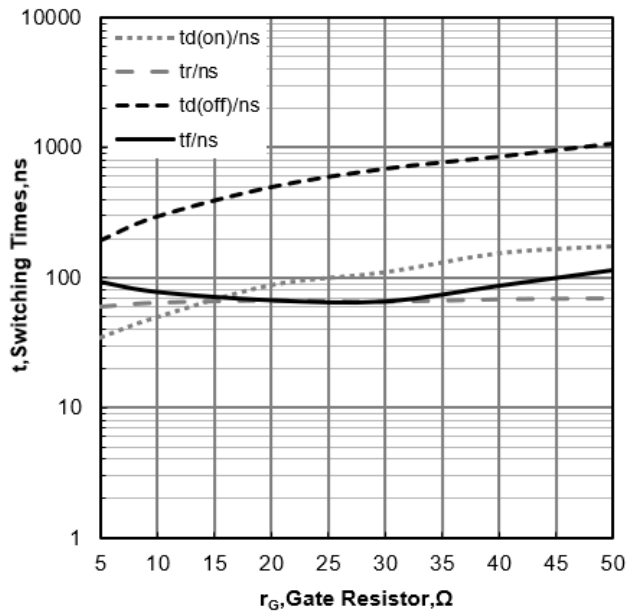


Figure 10 Typical Switching Times vs Gate Resistor
(T_{VJ}=25℃, V_{CE}=400V, V_{GE}=15/0V, I_C=100A)

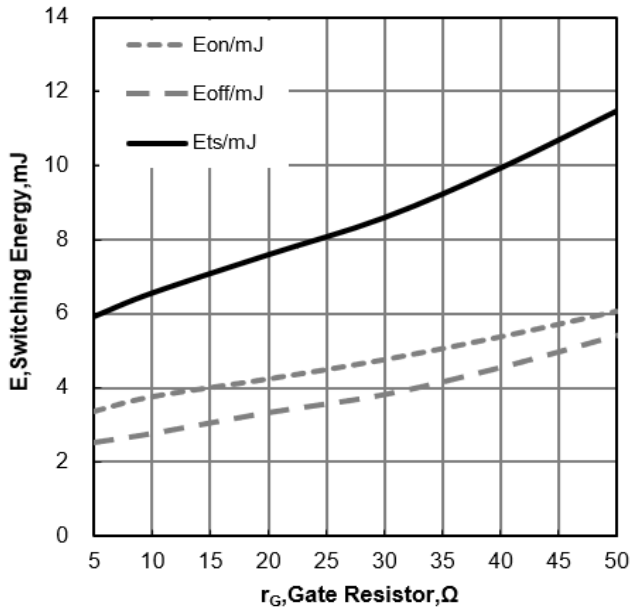


Figure 11 Typical Switching Energy vs Gate Resistor
(T_{VJ}=25℃,V_{CE}=400V, V_{GE}=15/0V, I_C=100A)

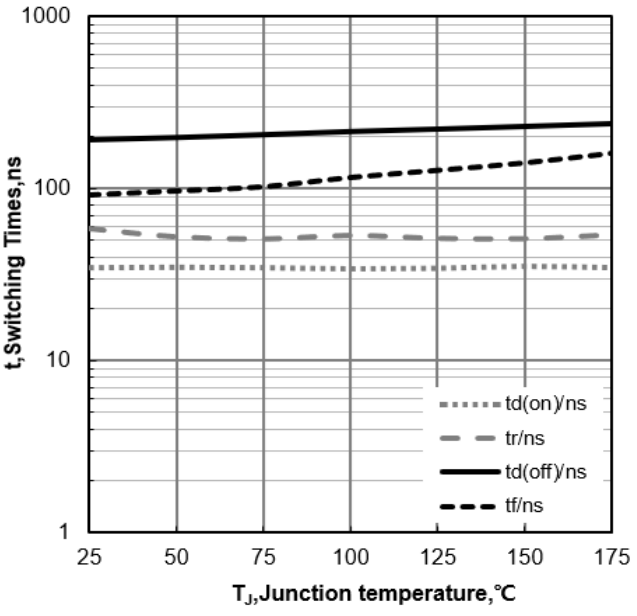


Figure 12 Typical Switching Times vs Junction Temperature
(V_{CE}=400V, V_{GE}=15/0V, I_C=100A, R_G=5Ω)

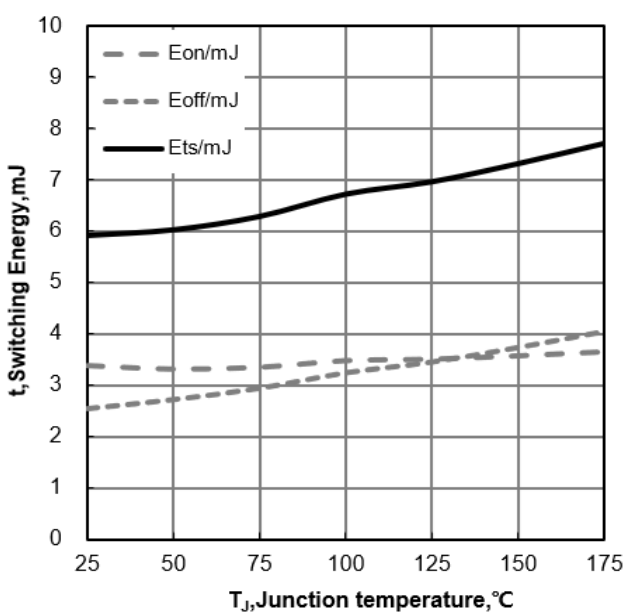


Figure 13 Typical Switching Energy vs Junction Temperature
(V_{CE}=400V, V_{GE}=15/0V, I_C=100A, R_G=5Ω)

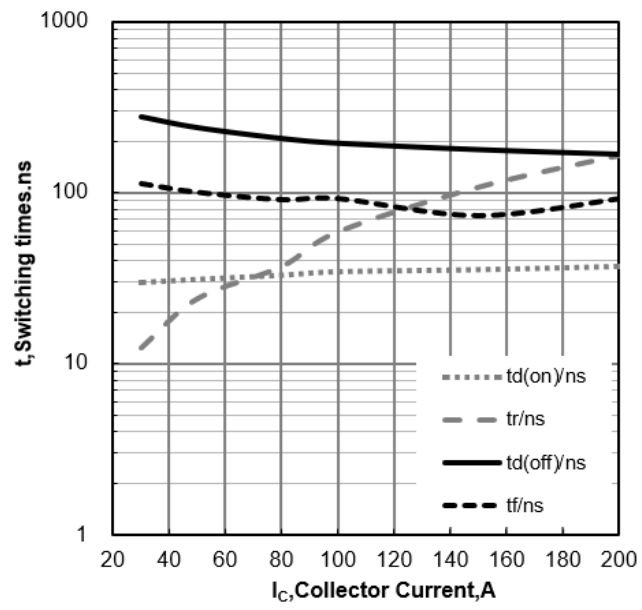


Figure 14 Typical Switching Times vs Collector Current (T_{VJ}=25℃,V_{CE}=400V, V_{GE}=15/0V, R_G=5Ω)

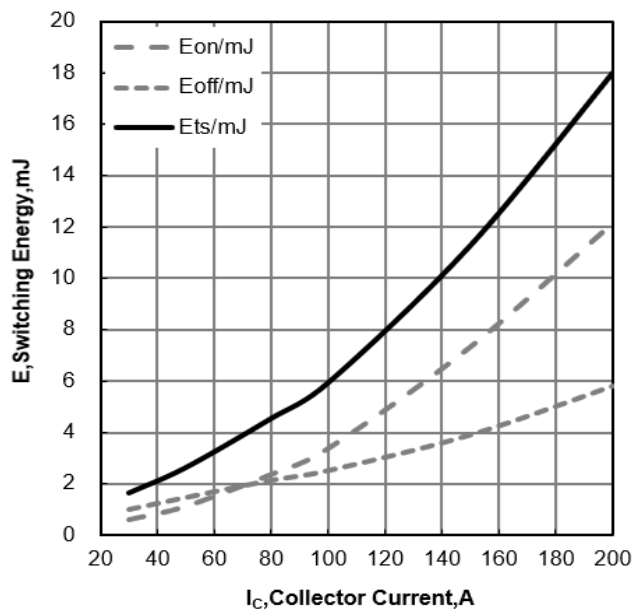


Figure 15 Typical Switching Energy vs Collector Current (T_{VJ}=25℃,V_{CE}=400V, V_{GE}=15/0V, R_G=5Ω)

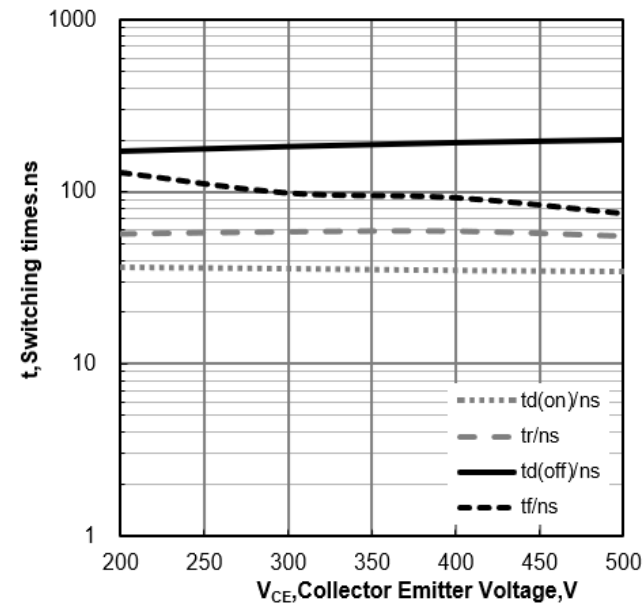


Figure 16 Typical Switching Times vs VCE (T_{VJ}=25℃, V_{GE}=15/0V, I_C=100A, R_G=5Ω)

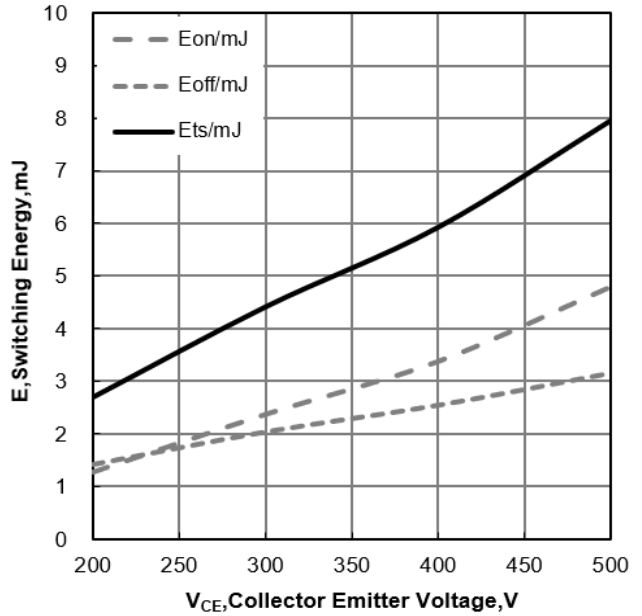


Figure 17 Typical Switching Energy vs VCE (T_{VJ}=25℃, V_{GE}=15/0V, I_C=100A, R_G=5Ω)

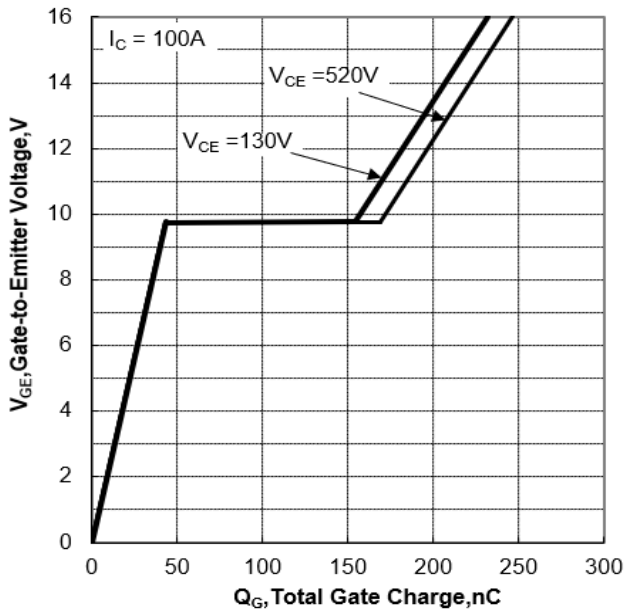


Figure 18 Typical Gate Charge

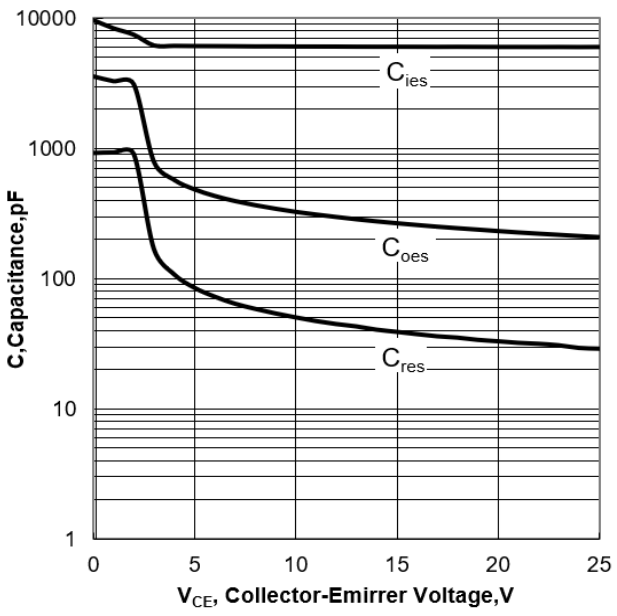


Figure 19 Typical Capacitance vs Collector-Emitter Voltage

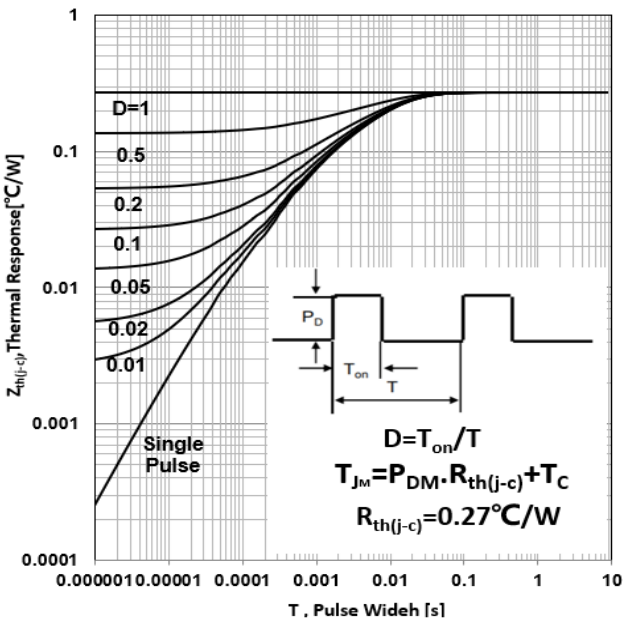


Figure 20 IGBT Transient Thermal Impedance vs Pulse Width

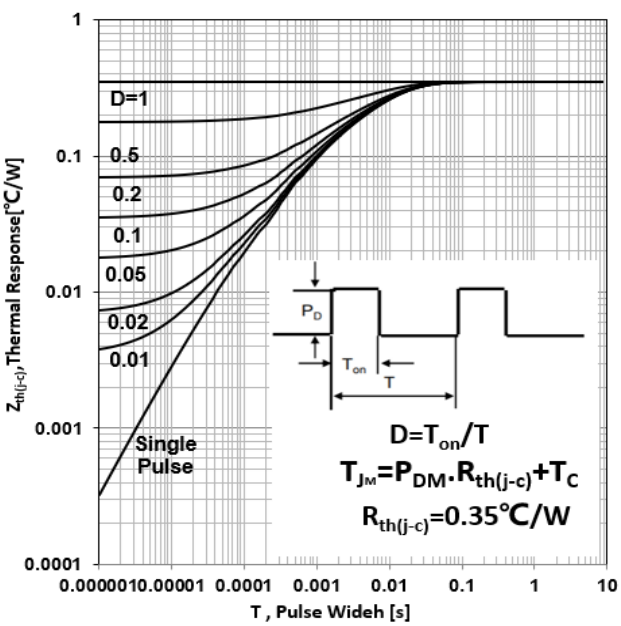


Figure 21 Diode Transient Thermal Impedance vs Pulse Width

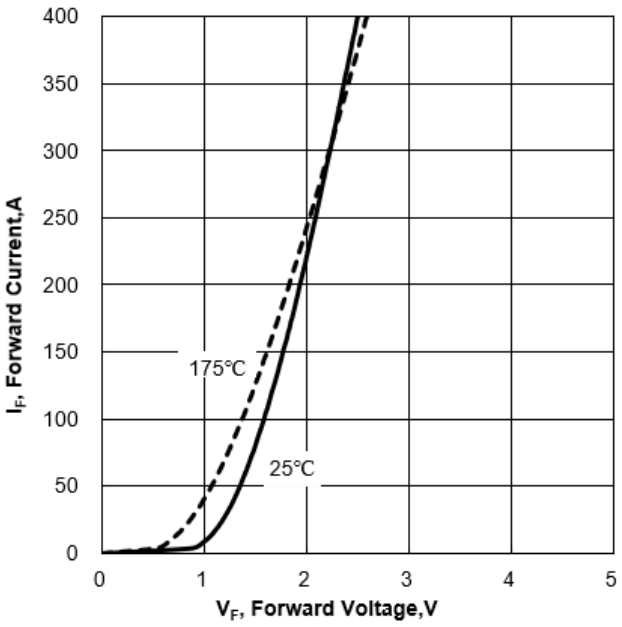


Figure 22 Typical Diode Forward Current vs Forward Voltage

7. Detailed Description

7.1 Test Circuit and Waveform

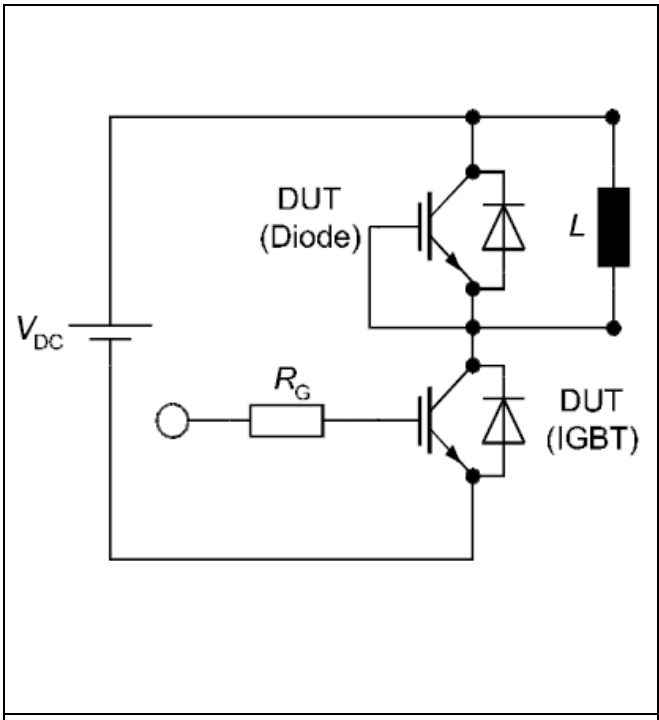


Figure 23 Resistive Switching Test Circuit

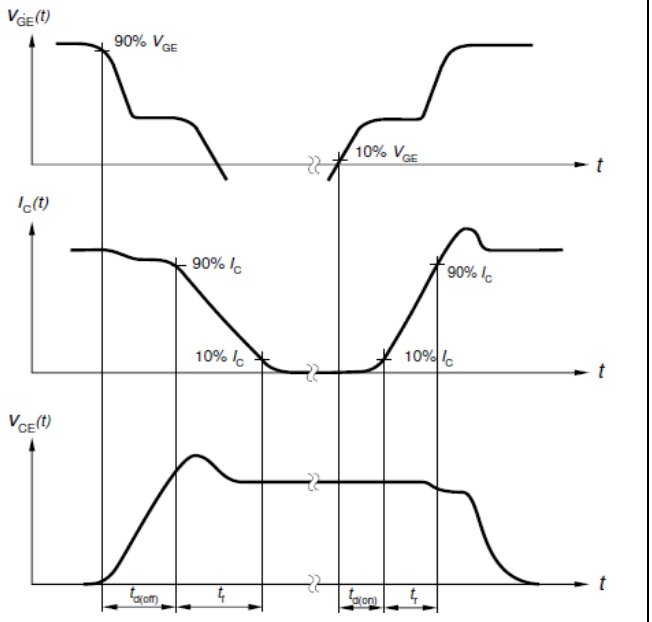


Figure 24 Resistive Switching Waveforms

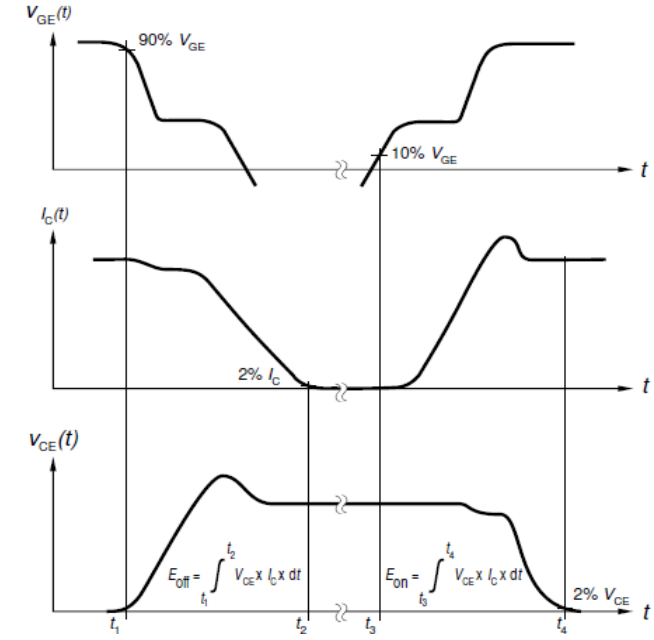


Figure 25 Definition of switching losses

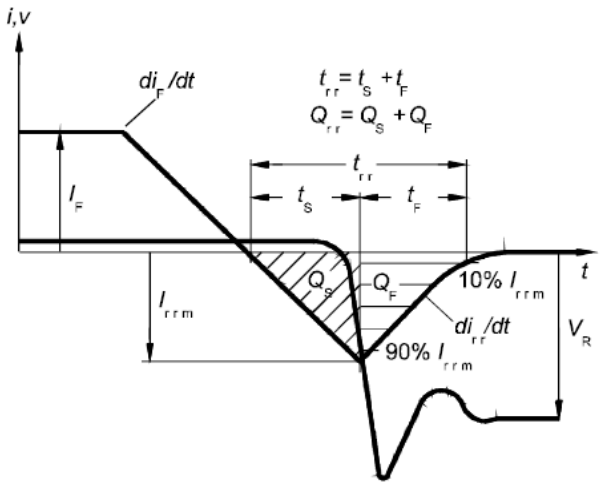
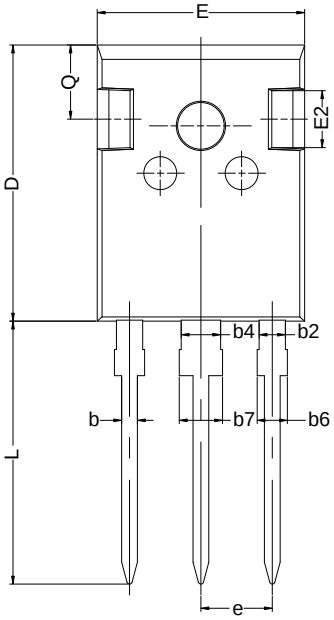


Figure 26 Definition of diode switching characteristics

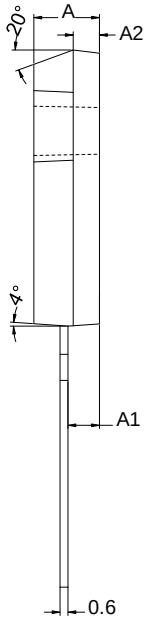
8. Package Information

8.1 Package Outline Dimensions

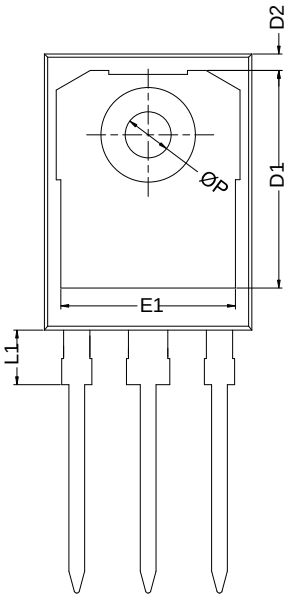
8.1.1 TO247



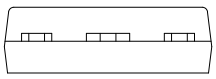
TOP VIEW



SIDE VIEW



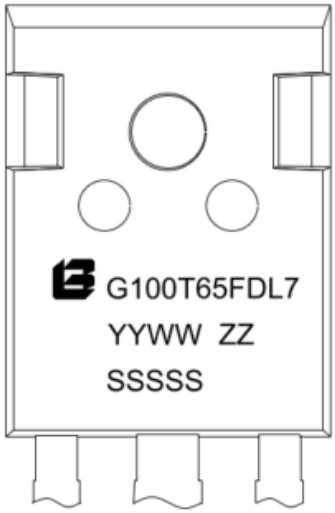
BOTTOM VIEW



SIDE VIEW

SYMBOL	ALL DIMENSION IN MILLIMETERS		
	MIN	NOM	MAX
A	4.90	5.00	5.10
A1	2.30	2.40	2.50
A2	1.90	2.00	2.10
b	1.10	1.20	1.30
b2	---	2.00	2.20
b4	---	3.00	3.20
b6	---	2.20	2.35
b7	---	3.20	3.35
c	0.50	0.60	0.70
D	20.90	21.00	21.10
D1	16.55 REF		
D2	1.20 REF		
E	15.70	15.80	15.90
E1	13.30 REF		
E2	4.23	---	5.10
e	5.44 BSC		
L	19.80	20.00	20.20
L1	3.95	4.15	4.30
ØP	3.40	3.50	3.70
Q	5.54	---	6.00

8.2 Marking

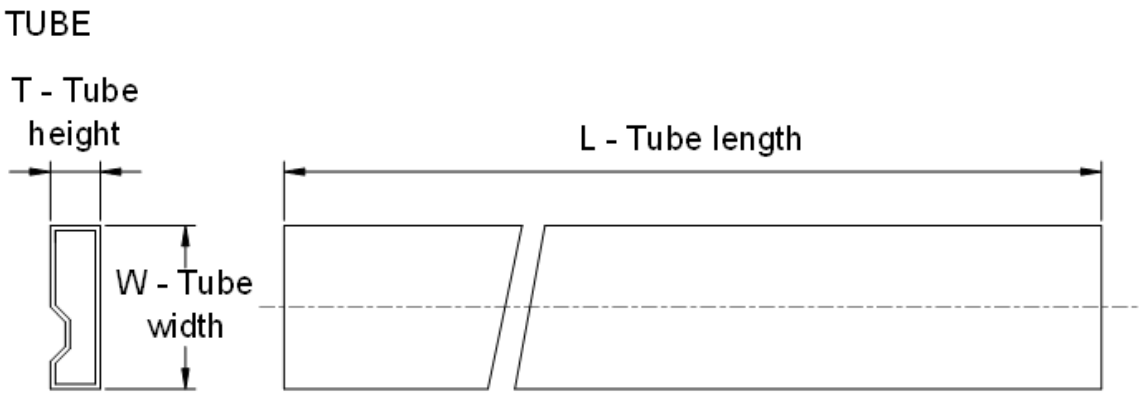


Marking Drawing

Content	Note
G100T65FDL7	Device mark
YY	Calender year code
WW	Workweek date code
ZZ	Assembly factory code
SSSSS	Lot ID

9. Packing specification

9.1 TO247 Tube Package



*All dimensions are nominal

Device	Package Type	Pins	SPQ	L (mm)	W (mm)	T (mm)
BLG100T65FDL7-F	TO247	3	25	417	44.9	7.5

Revision History

Revision	Date	Changes
Version 01	2025-11	Initial Version

Important Notice

a. Exceeding Maximum Ratings: Operation beyond the device's maximum rated performance may result in damage to the device, including permanent failure, which could affect system reliability. Do not exceed the absolute maximum ratings during circuit design. Belling shall not be liable for any personal injury, property damage, or other adverse consequences arising from user misuse, including but not limited to incorrect operation, negligence, or similar circumstances.

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c. Technical Data & Product Selection: The technical parameters provided in this document are based on initial data and are intended solely for customer convenience in selecting and testing Belling products for development. Belling provides no warranties regarding the performance or suitability resulting from the customer's own product selection and testing. Belling shall not be liable for any consequences resulting from improper product selection by the user.

d. Revisions & No Warranty: Belling reserves the right to revise or update product specifications at any time. No warranty, whether express or implied, is granted by this specification.

e. Governing Terms: The procurement of Belling products shall be subject to Belling 's Terms of Sale and Quality Terms.

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