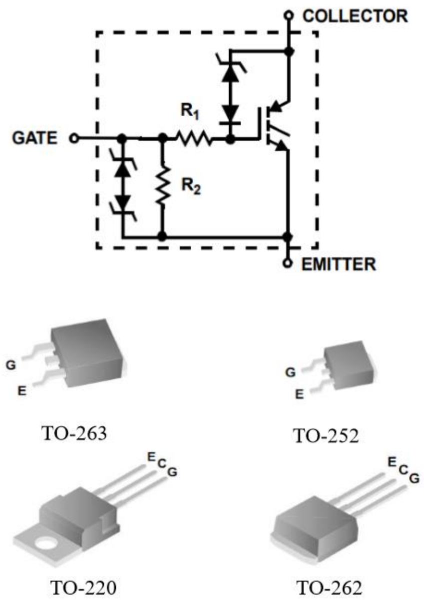
BLG3040

IGBT

1. Description

BLG3040 is obtained by advanced ignition IGBTs technology which reduce the conduction loss, enhance the SCIS capability. Internally integrated diodes can provide the voltage clamping without the need for external components. The IGBT is suitable device for automotive ignition circuits, specifically as a coil driver.



KEY CHARACTERISTICS

Parameter	Value	Unit
V_{CES}	400	V
$V_{CE(sat).Typ}$	1.25	V
E_{SCIS}@T_J=25 ℃	300	mJ
ESD	4	kV

FEATURES

- Low V_{CEsat}
- High SCIS Energy
- Logic Level Gate Drive

APPLICATIONS

- Automotive ignition Coil Driver Circuits
- Coil-On Plug Application

ORDERING INFORMATION

Ordering Codes	Package	Product Code	Packing
BLG3040-D	TO-252	G3040	Tape Reel
BLG3040-P	TO-220		Tube
BLG3040-I	TO-262		Tube
BLG3040-B	TO-263		Tape Reel

BLG3040-D

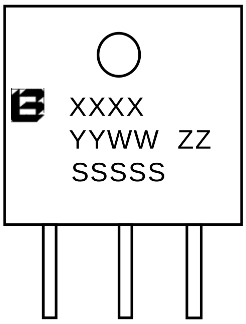
(2) Package type

(1) Chip name

(1) BLG3040:400V 300mJ

(2) D:TO-252 P: TO-220

I:TO-262 B：TO-263



XXXX：Product Code

YYWW：Year & Week

ZZ：Assembly Code

SSSSS：Lot Code

2. ABSOLUTE RATINGS

at T_C = 25°C, unless otherwise specified

Symbol	Parameter	Rating	Units
V_{CES}	Collector-Emitter Voltage（I_C=1mA）	430	V
V_{ECS}	Emitter to Collector Voltage（I_C=10mA）	24	V
E_{SCIS}	SCIS Energy@ T_J=25 °C，I_{SCIS}=14.2A	300	mJ
	SCIS Energy@ T_J=150 °C，I_{SCIS}=10.6A	170	mJ
I_C	Collector Current @T_C=25 °C	21	A
	Collector Current @T_C=100 °C	17	A
ESD	Electrostatic Discharge Voltage (HBM) at 100pF,1500Ω	4	kV
V_{GEM}	Gate- Emitter Voltage Continuous	±10	V
P_D	Power Dissipation @TC = 25 °C	150	W
T_J， T_{stg}	Operating Junction and Storage Temperature Range	-40 to 175	°C
T_L	Maximum Temperature for Soldering	260	°C

3. Thermal characteristics

Symbol	Parameter	Package	RATINGS	Units
$R_{\theta JC}$	Junction-to-Case	TO-252/TO-220/TO-262/TO-263	1.0	°C /W

4. Electrical Characteristics

at T_C = 25°C, unless otherwise specified

OFF Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
BV_{CER}	Collector to Emitter Breakdown Voltage	V_{GE}=0V, I_C=2mA, R_G=1kΩ	370	400	430	V
BV_{CES}	Collector to Emitter Breakdown Voltage	V_{GE}=0V, I_C =10mA, R_G=0Ω	390	420	450	V
BV_{ECS}	Emitter to Collector Breakdown Voltage	V_{GE}=0V, I_C=-75mA	30	--	--	V
BV_{GES}	Gate to Emitter Breakdown Voltage	I_{GES}=±2mA	±12	±14		V
I_{CER}	Collector to Emitter Leakage Current	V_{CE}=250V, R_G=1kΩ, T_J=25°C	--	--	25	μA
		V_{CE}=250V, R_G=1kΩ, T_J=150°C	--	--	1	mA

I_{ECS}	Emitter to Collector Leakage Current	V_{EC}=24V, T_J=25°C	--	--	1	mA
		V_{EC}=24V, T_J=150°C			40	mA
R_1	Series Gate Resistance		--	70		Ω
R_2	Gate to Emitter Resistance		10		26	kΩ

ON Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=4V, I_C=6A, T_J=25°C	--	1.20	1.60	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=4.5V,I_C=10A,T_J=175°C	--	1.52	1.80	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=4.5V,I_C=15A,T_J=175°C	--	1.90	2.20	V
$V_{GE(TH)}$	Gate Threshold Voltage	V_{CE} = V_{GE}, I_C = 1mA	1.30	--	2.20	V

Pulse width tp≤300μs, δ≤2%

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	V_{GE} = 0V V_{CE} = 25V f=1.0MHz	--	1250	--	pF
C_{oss}	Output Capacitance		--	69	--	
C_{rss}	Reverse Transfer Capacitance		--	15	--	
Q_g	Total Gate Charge	I_C=10A, V_{CE}=12V, V_{GE}=5V	--	7.2	--	nC

Switching Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	V_{CE} = 14V, RL=1Ω, V_{GE} = 5V, R_G =1kΩ, T_J=25°C	--	0.85	4	μs
tr	Rise Time		--	2.50	7	
$t_{d(OFF)}$	Turn-Off Delay Time	V_{CE} = 300V, L=500μH, V_{GE} = 5V, R_G =1kΩ, T_J=25°C	--	4.40	15	
t_f	Fall Time		--	1.90	15	

5. Characteristics Curves

Figure 1 Collector-Emitter Saturation Voltage vs Junction Temperature

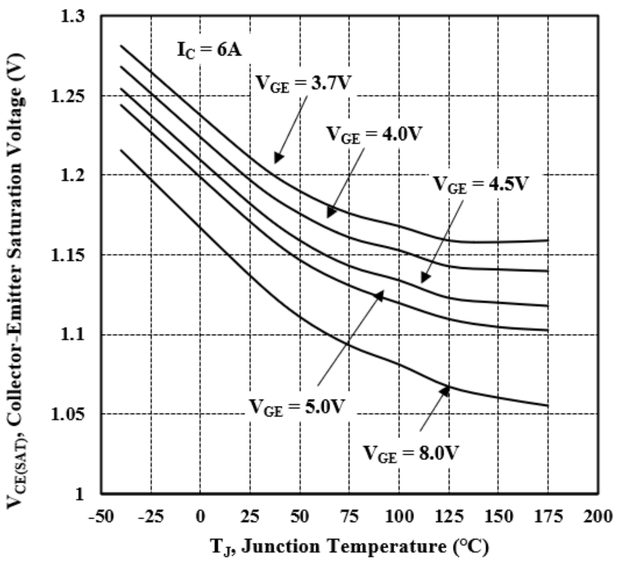


Figure 2 Collector-Emitter Saturation Voltage vs Junction Temperature

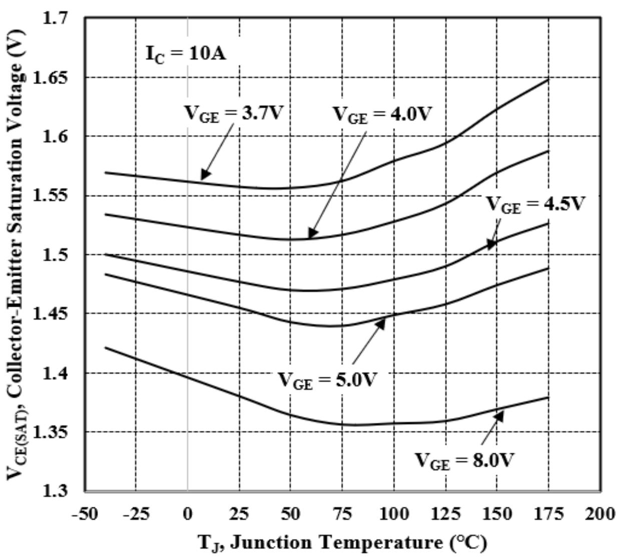


Figure 3 Self Clamped Inductive Switching Current vs Inductance

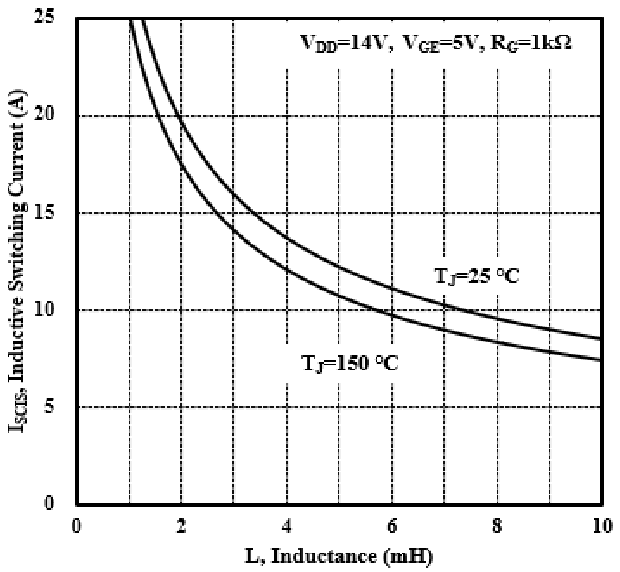


Figure 4 Self Clamped Inductive Switching Current vs Inductance

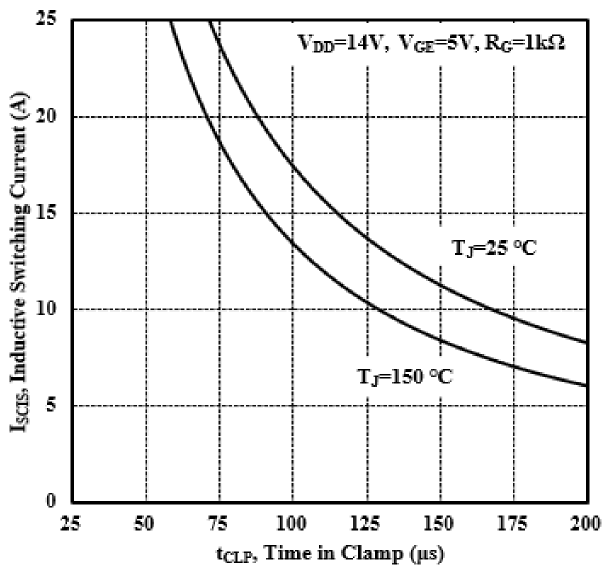


Figure 5 Power Dissipation vs Case Temperature

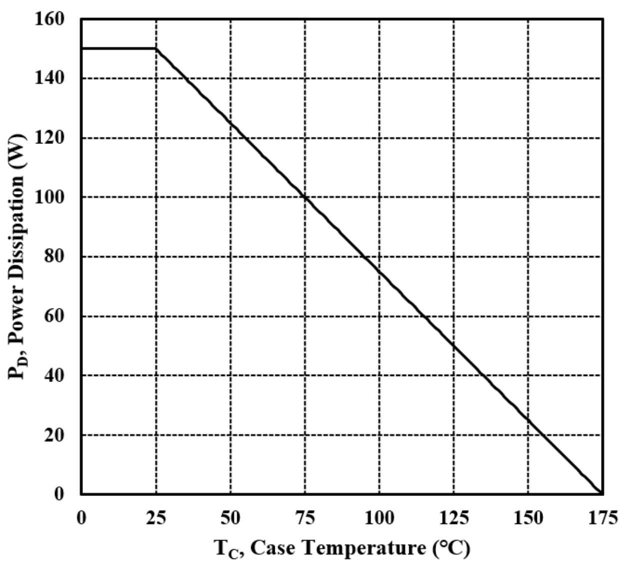


Figure 6. DC Collector Current vs Case Temperature

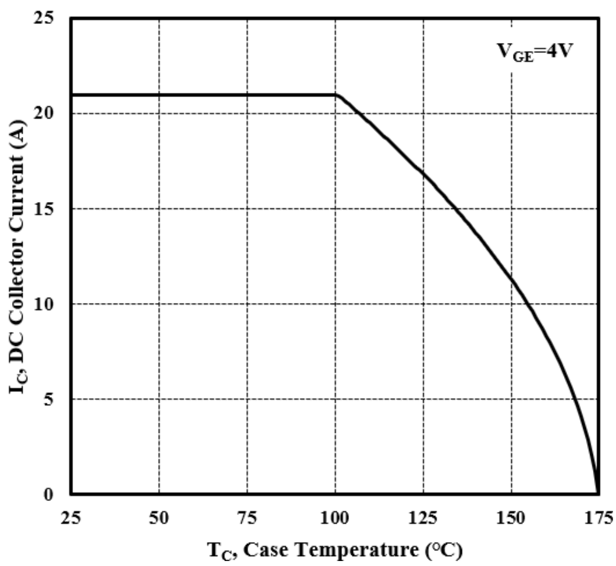


Figure 7 Threshold Voltage vs Junction Temperature

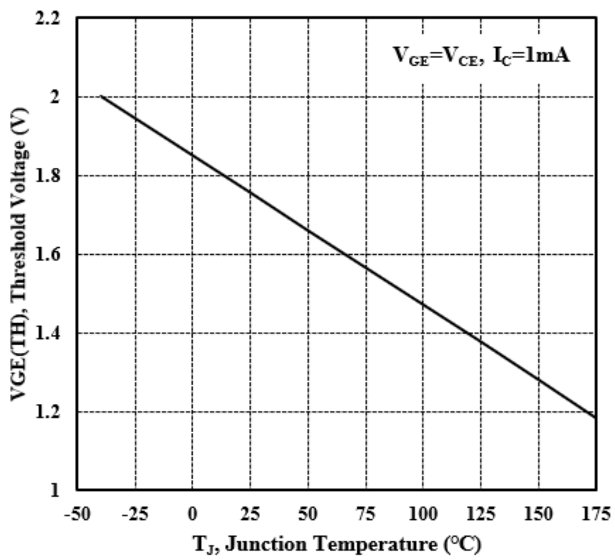


Figure 8 Breakdown Voltage vs Series Gate Resistance

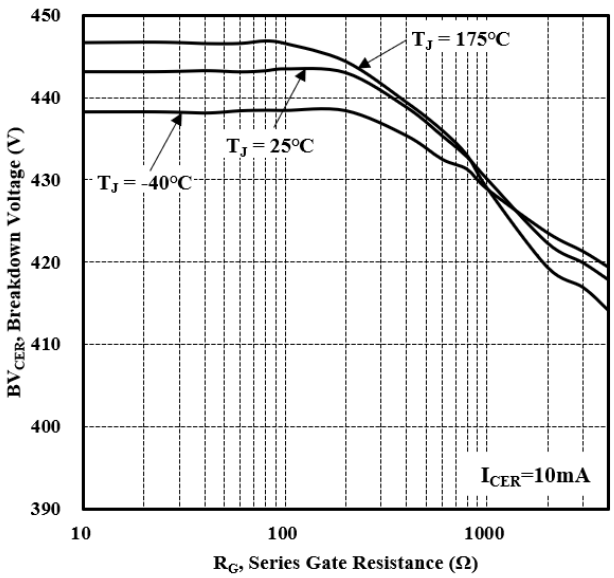


Figure 9 Leakage Current vs Junction Temperature

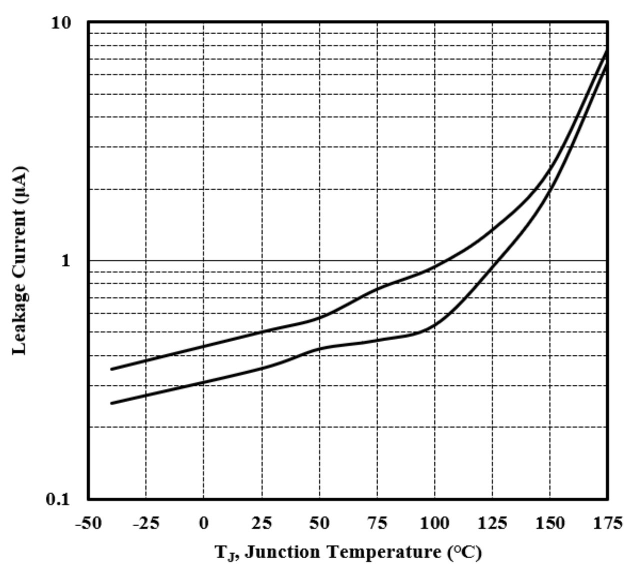


Figure 10 Collector-Emitter Voltage vs Collector Current

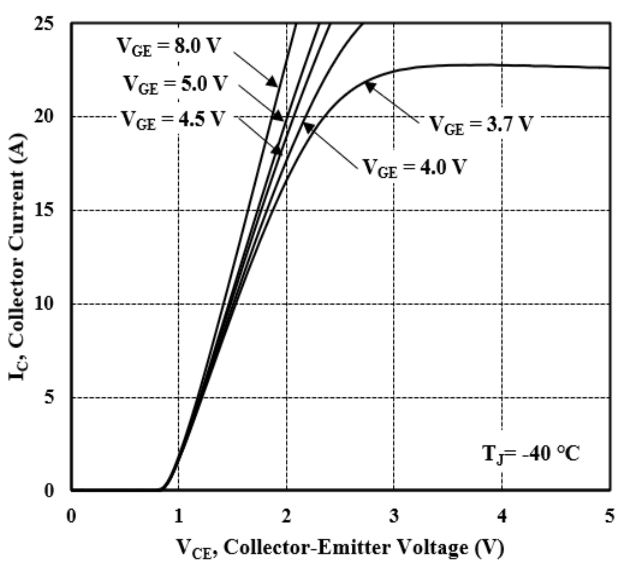


Figure 11 Collector-Emitter Voltage vs Collector Current

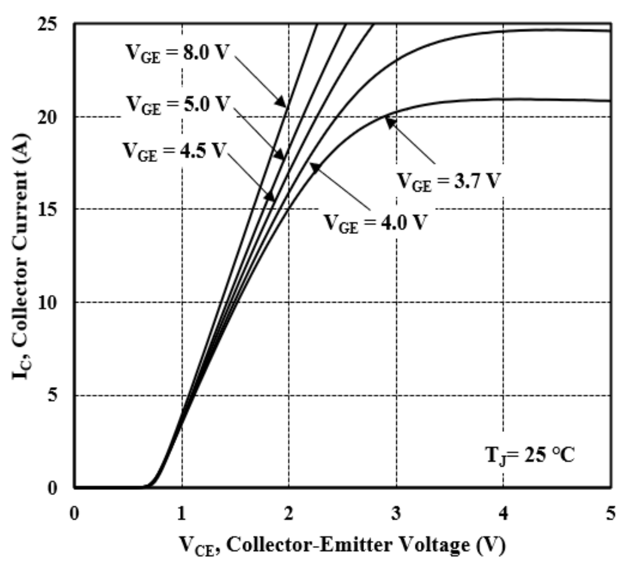


Figure 12 Collector-Emitter Voltage vs Collector Current

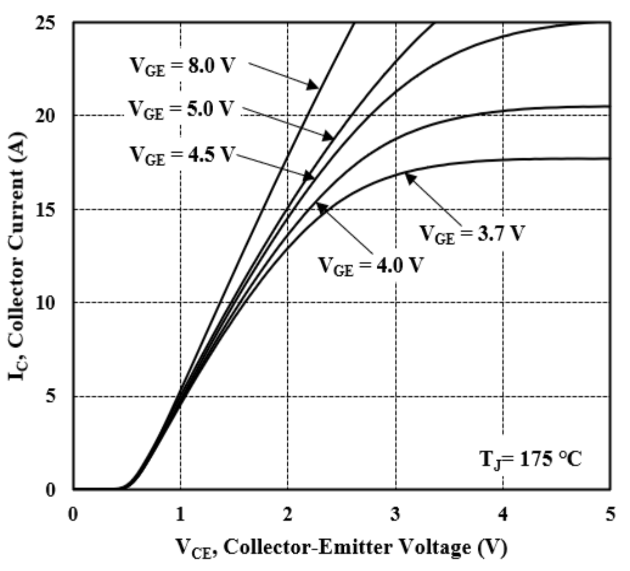


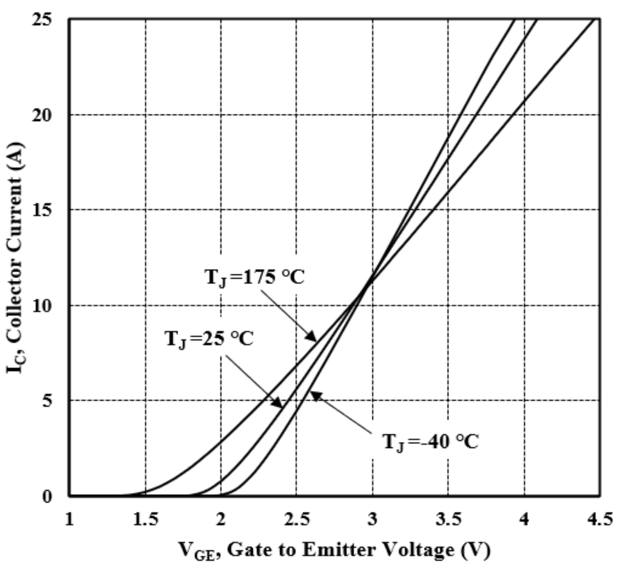
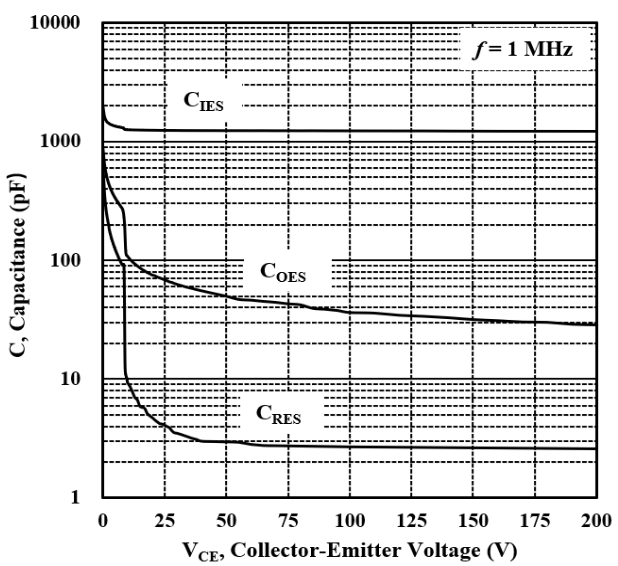
Figure 13 Transfer Characteristics	Figure 14 Capacitance vs Collector to Emitter Voltage
	

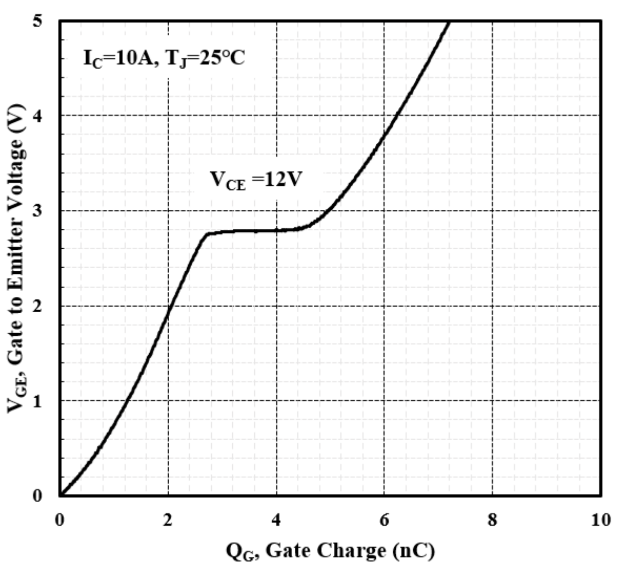
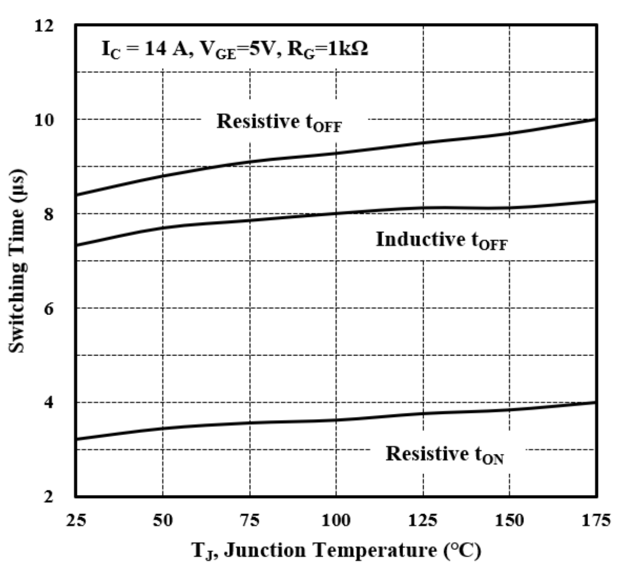
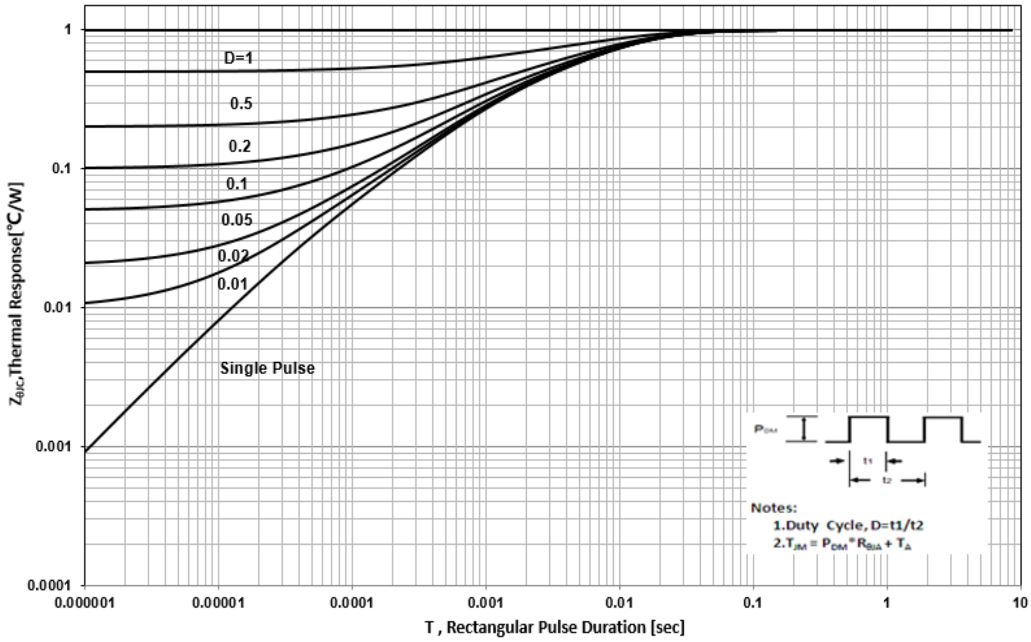
Figure 15 Gate Charge vs Gate to Emitter Voltage	Figure 16 Switching Time vs Junction Temperature
	

Figure 17 Transient Thermal Impedance, Junction to Case



6. Test Circuit and Waveform

Figure 18 Inductive Switching Test Circuit

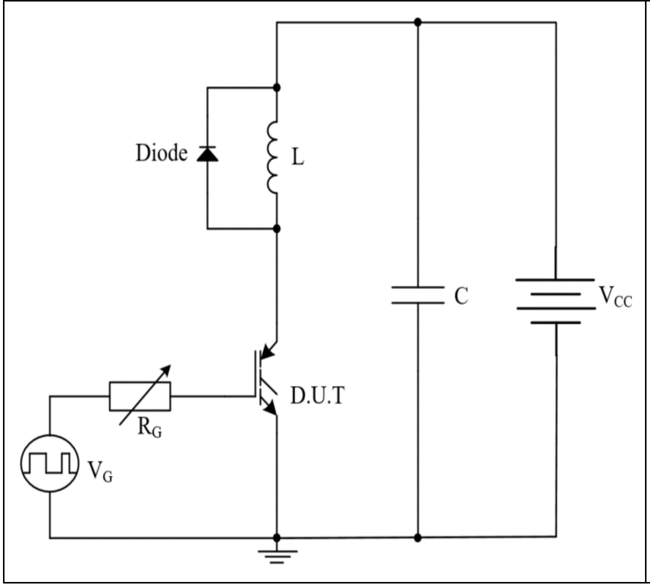


Figure 19 Resistive Switching Test Circuit

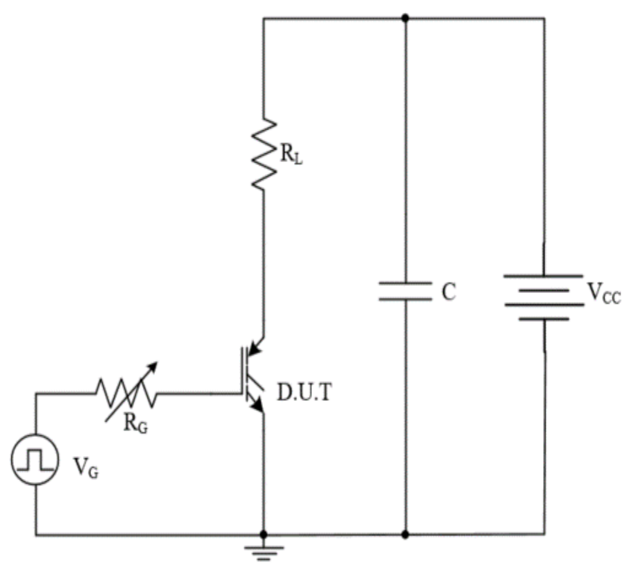


Figure 20 Switching Waveforms

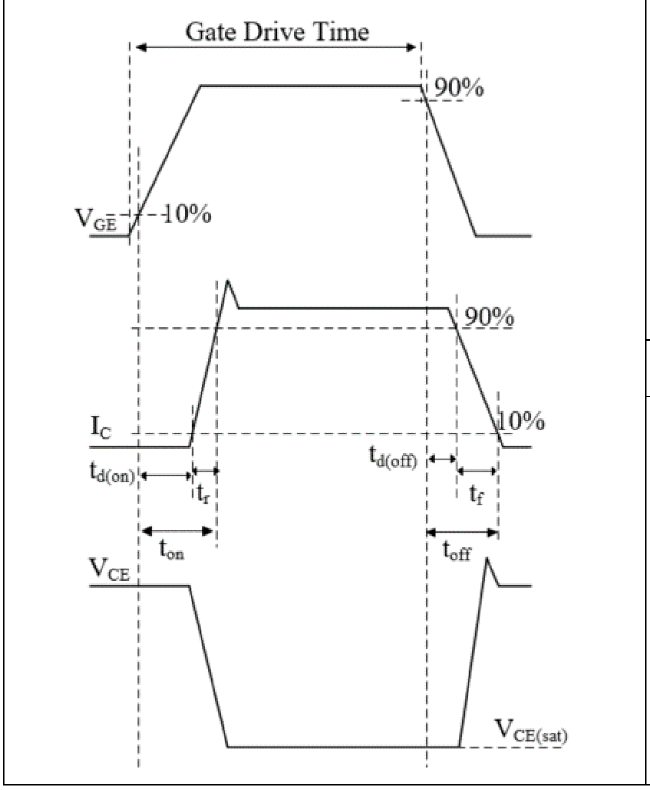


Figure 21 Self Clamped Inductive Switching Circuit

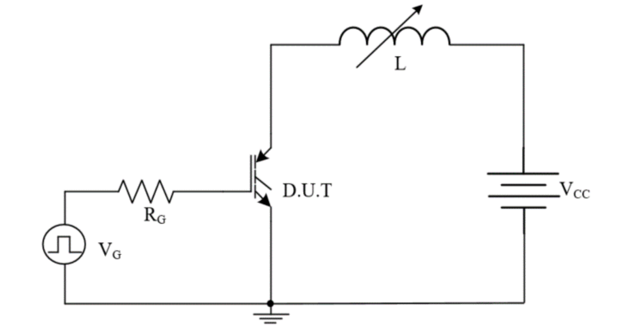
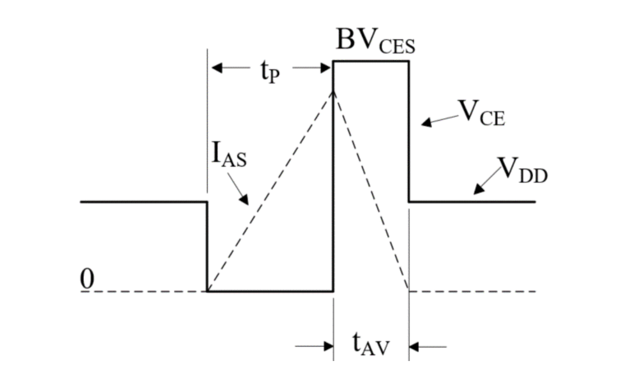
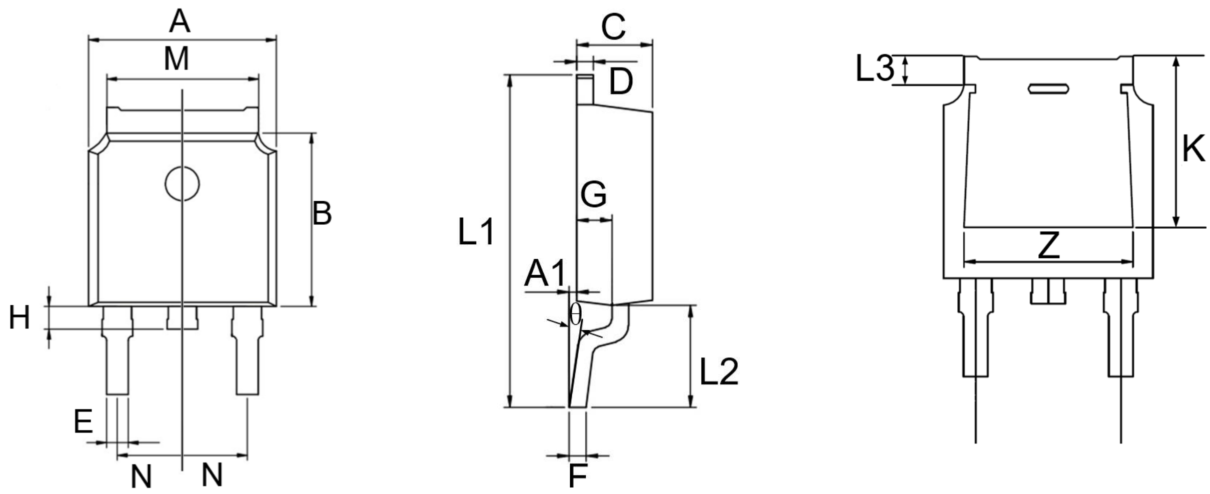


Figure 22 Self Clamped Inductive Switching Waveform

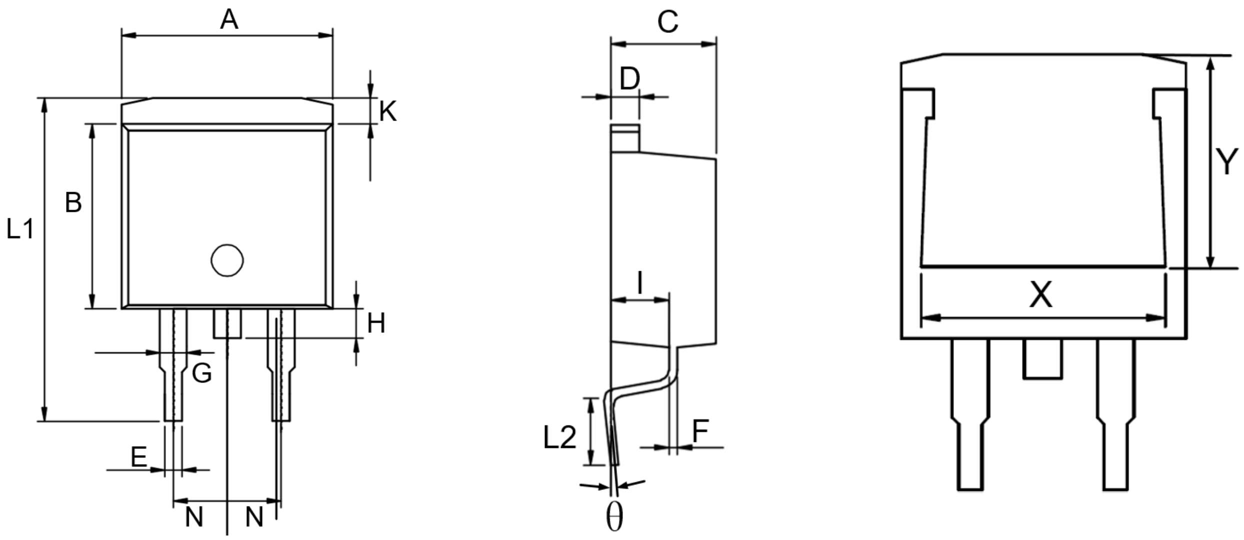


7. Package Description



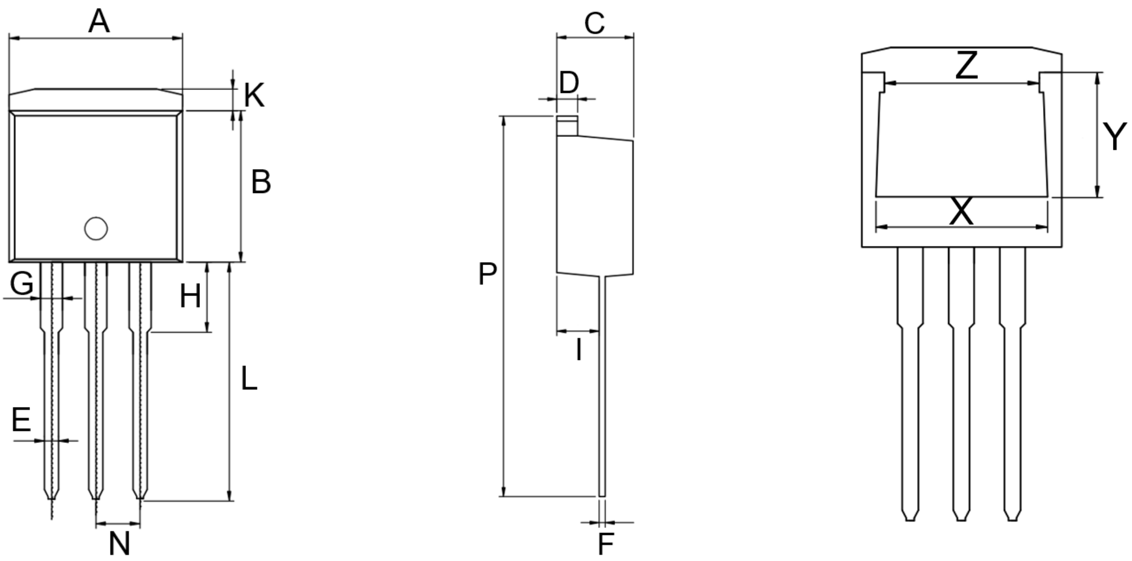
TO-252 Package

Items	Values(mm)		
	MIN	NOM	MAX
A	6.45	6.60	6.75
A1	0.05	0.10	0.20
B	5.95	6.10	6.25
C	2.15	2.30	2.45
D	0.40	0.50	0.60
E	0.66	0.76	0.86
F	0.40	0.500	0.6
G	0.91	1.07	1.22
H	0.60	0.80	1.00
K		3.80	
L1	9.80	10.10	10.40
L2	2.80	3.10	3.40
L3	0.70	0.80	1.00
H	0.60	0.80	1.00
M	5.12	5.32	5.52
2N		4.57	
Z		4.80	
θ	0°	-	8°



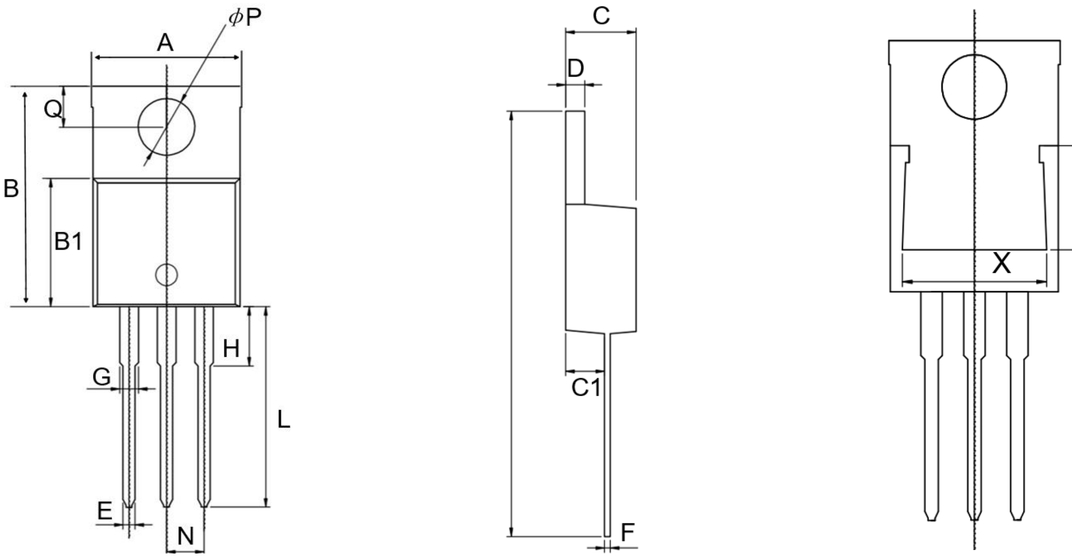
TO-263 Package

Items	**Values (mm)**		
	MIN	NOM	MAX
A	9.85	10.15	10.45
B	8.46	8.66	8.86
C	4.50	4.70	4.90
D	1.17	1.27	1.37
E	0.72	0.82	0.92
F	0.28	0.38	0.48
G	1.12	1.27	1.42
H	1.20	1.40	1.60
I	2.45	2.60	2.70
K	1.01	1.23	1.50
L1	14.75	15.15	15.55
L2	2.30	2.55	2.80
2N		5.08	
X	7.90	8.10	8.40
Y	5.50	5.70	5.90
θ	0°	7°	8°



TO-262 Package

Items	Values (mm)		
	MIN	NOM	MAX
A	9.85	10.15	10.45
B	8.46	8.66	8.86
C	4.50	4.70	4.90
D	1.17	1.27	1.37
E	0.72	0.82	0.92
F	0.28	0.38	0.48
G	1.12	1.27	1.42
H	3.85	4.05	4.35
I	2.45	2.60	2.70
K	1.01	1.23	1.50
L	13.10	13.60	14.10
N	-	2.54	-
P	23.20	23.60	24.00
X	7.90	8.10	8.40
Y	5.50	5.70	5.90
Z	7.10	7.30	7.50



TO-220 Package

Items	Values (mm)		
	MIN	NOM	MAX
A	9.70	10.00	10.30
B	15.10	15.60	16.10
B1	8.80	9.10	9.40
C	4.37	4.57	4.70
C1	2.20	2.40	2.60
D	1.25	1.30	1.40
E	0.70	0.80	0.95
F	0.45	0.50	0.60
G	1.17	1.27	1.47
H	-	3.10	3.40
L	12.75	13.50	13.80
N	2.54		
Q	2.60	2.80	3.00
ΦP	3.40	3.60	3.80
X	7.00	-	-
Y	5.50	-	-

Revision History:

BLG3040 Revision: 2022-03-31, Rev. 2.0-I

Previous Revision

Revision	Date	Revision Date Subjects (major changes since last revision)
1.0	2019-10-21	-
1.1	2021-07-06	Some key Information has been added below. (1) Switching characteristics (2) Self-clamped Inductive switching current curves (3) Breakdown voltage curves have been added
2.0	2022-03-31	The major changes are as follow. (1) In Section 4, the data of ON characteristics and dynamic characteristics have been updated (2) In Section 5, P_D vs T_J curve and I_{SCIS} vs T_{CLP} curve have been added. (3) In Section 5, all figures of characteristics curves have been reformatted and adjusted in sequence. (4) In Section 6, all figures of test circuit and typical waveform have been redrawn and rearranged. (5) In Section 7, all diagrams of different package and some dimensions information have been redrawn and updated. (6) Formatting and spelling errors in this document have been corrected (7) Revision history is firstly added in the BLG3040 datasheet

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Your feedback will help us to continuously improve the quality of this document.

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NOTE:

1. Any use beyond the maximum ratings of the device in performance may cause damage to the device or even the permanent failure, which may affect the dependability of the machine. Please do not exceed the absolute maximum ratings of the device when designing circuit.
2. When installing the heat sink, please pay attention to the torsional moment and the smoothness of the heat sink.
3. Semiconductor device is sensitive to the ESD, it is necessary to protect the device from being damaged by the ESD when using it.
4. Shanghai Belling reserves the right to make changes in this specification sheet and is subject to change without prior notice.

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