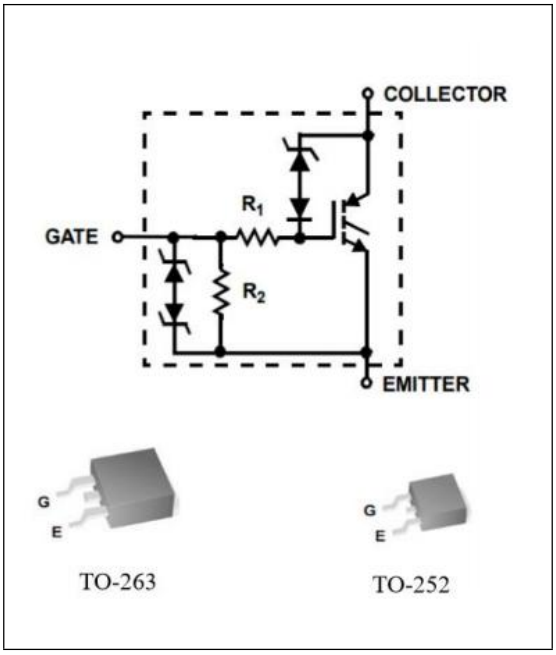
# 1. Description

## ➢ Advantages

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 |
|---|---|---|
| $V_{CES.Typ}$ | 425 | 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
- AEC-Q101 Qualified

## ➢ Applications

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

## ➢ Ordering Informations

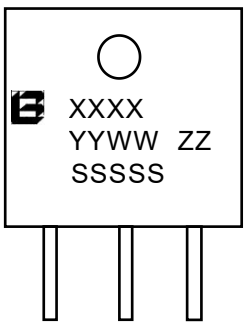
| Ordering Codes | Package | Product Code | Packing |
|---|---|---|---|
| BLG3040-D | TO-252 | G3040 | Tape Reel |
| BLG3040-B | TO-263 | | Tape Reel |

BLG3040-D

(2) Package type

(1) Chip name

(1) BLG3040:425V 300mJ
(2) D:TO-252 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（$I_C$=2mA, $R_G$=1kΩ） | 455 | V |
| $V_{ECS}$ | Emitter to Collector Voltage（$I_C$=10mA） | 24 | V |
| $E_{SCIS}$ | SCIS Energy@ $T_J$=25 °C,$I_{SCIS}$=14.2A,L=3mH,Rg=1KΩ | 300 | mJ |
| | SCIS Energy@ $T_J$=150 °C,$I_{SCIS}$=10.6A,L=3mH,Rg=1KΩ | 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 | 175，-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-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 | 395 | 425 | 455 | V |
| $BV_{CES}$ | Collector to Emitter Breakdown Voltage | $V_{GE}$=0V, $I_C$ =10mA, $R_G$=0Ω | 410 | 440 | 470 | 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<br>$V_{CE}$ = 25V<br>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,<br>$V_{GE}$ = 5V, $R_G$ =1kΩ,<br>$T_J$=25°C | -- | 0.85 | 4 | μs |
| tr | Rise Time | | -- | 2.50 | 7 | |
| $t_{d(OFF)}$ | Turn-Off Delay Time | $V_{CE}$ = 300V, L=500μH,<br>$V_{GE}$ = 5V, $R_G$ =1kΩ,<br>$T_J$=25°C | -- | 4.40 | 15 | |
| $t_f$ | Fall Time | | -- | 1.90 | 15 | |

## 5. Characteristics Curves

**Figure 1 Collector-Emitter Saturation Voltage vs Junction Temperature**

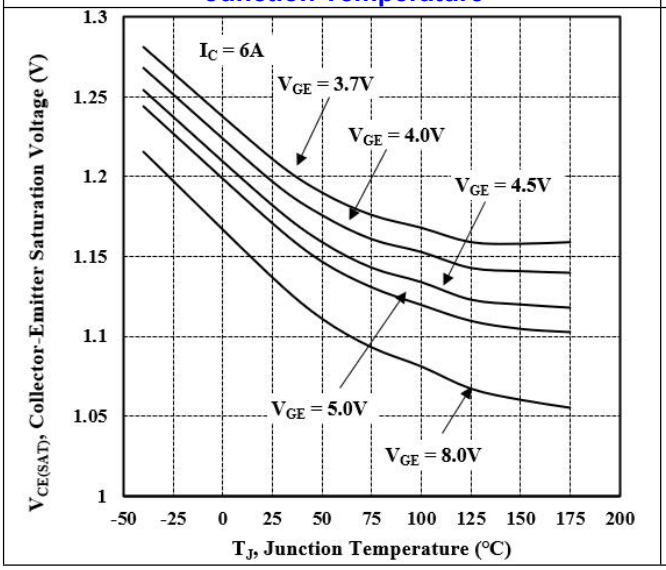



**Figure 2 Collector-Emitter Saturation Voltage vs Junction Temperature**

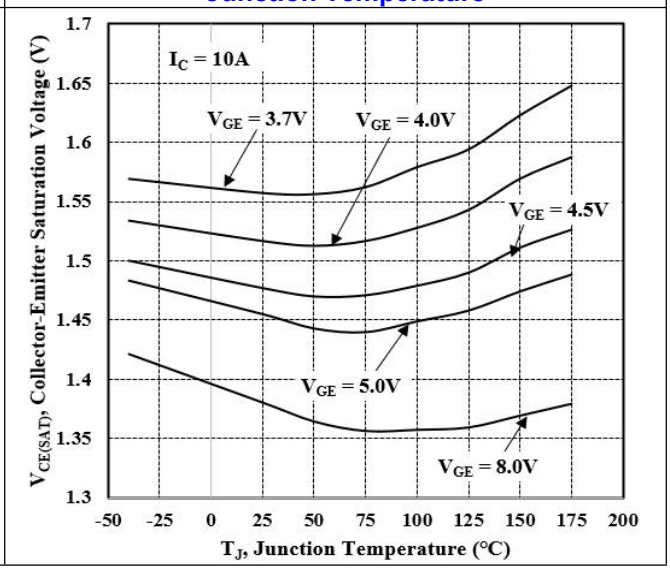



**Figure 3 Self Clamped Inductive Switching Current vs Inductance**

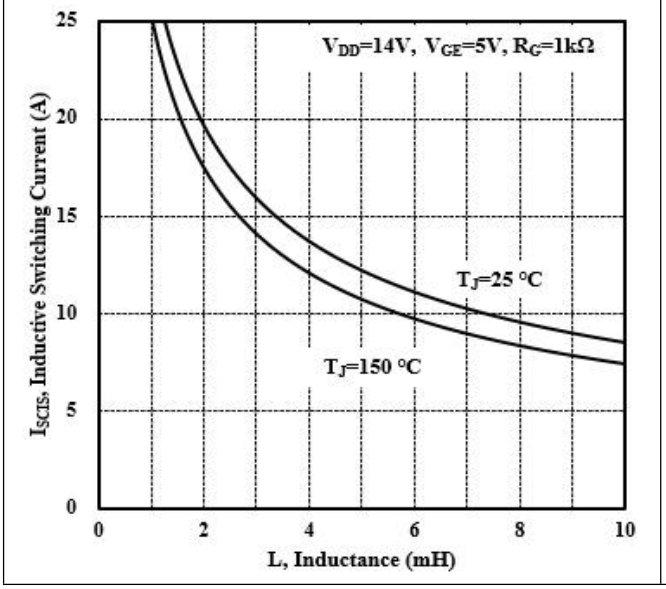



**Figure 4 Self Clamped Inductive Switching Current vs Inductance**

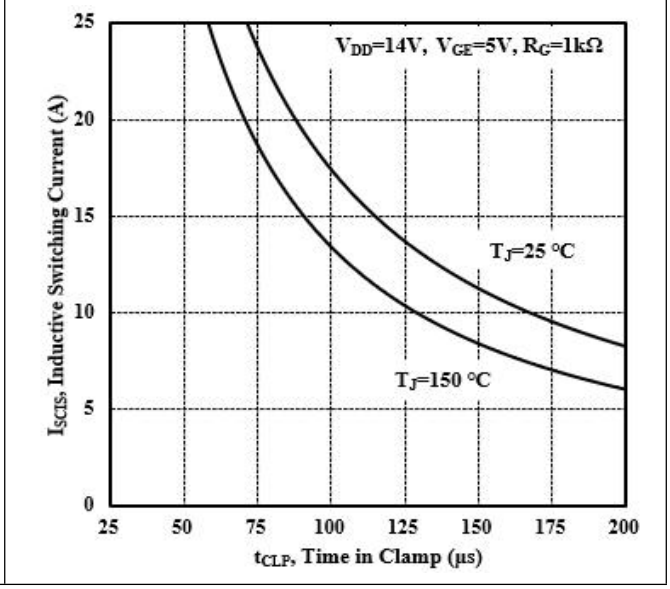


**Figure 5 Power Dissipation vs Case Temperature**

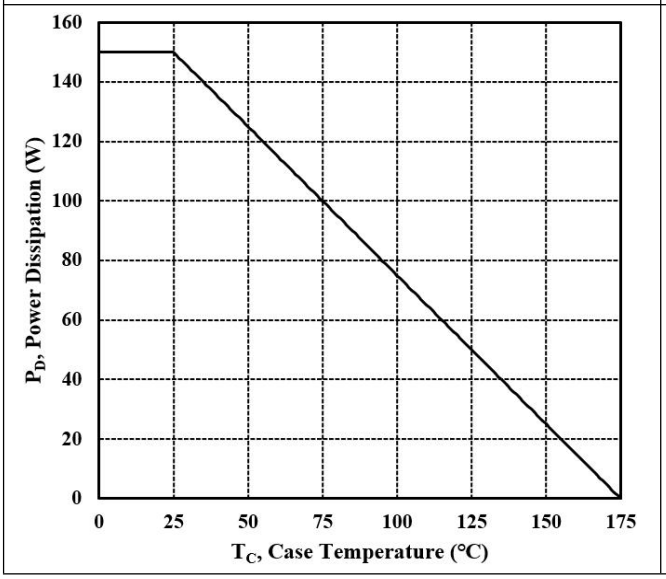



**Figure 6. DC Collector Current vs Case Temperature**

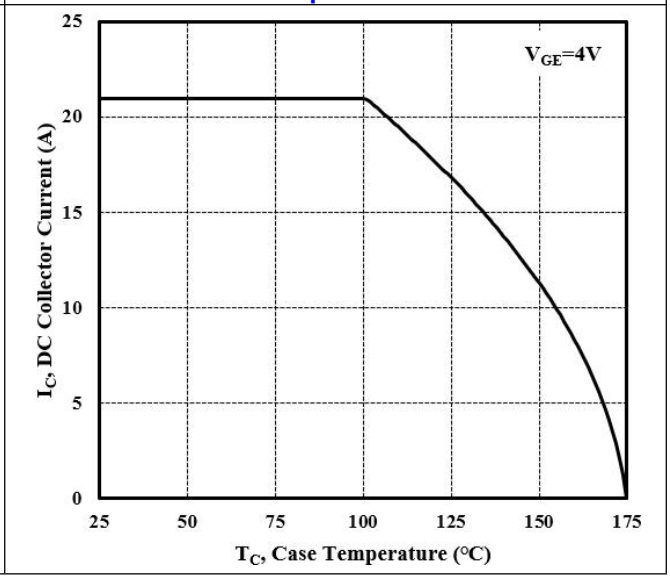



**Figure 7 Threshold Voltage vs Junction Temperature**

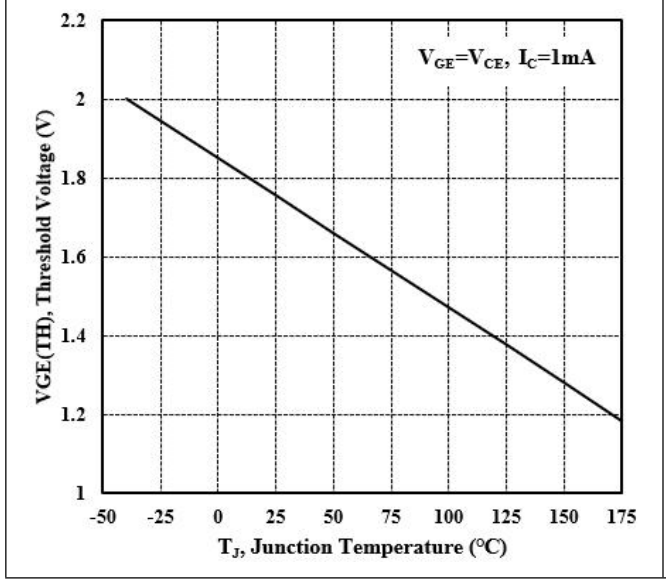



**Figure 8 Breakdown Voltage vs Series Gate Resistance**

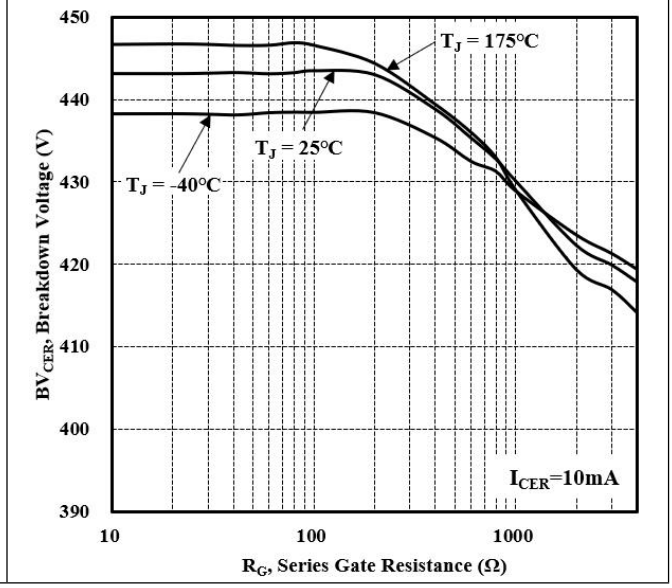


**Figure 9 Leakage Current vs Junction Temperature**

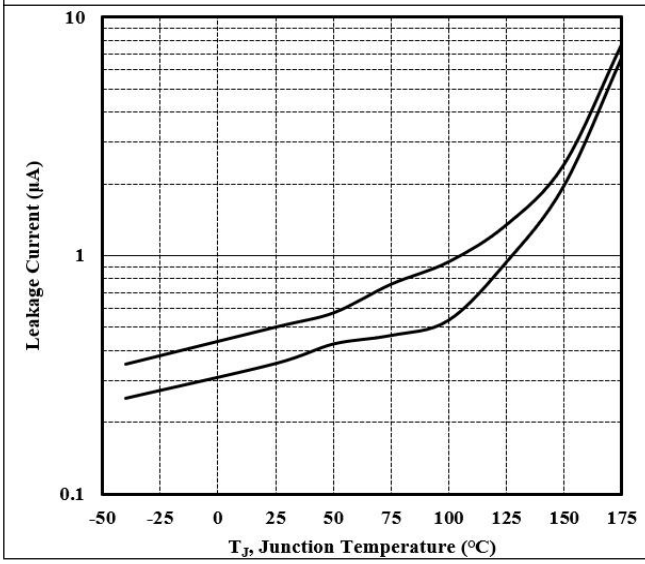



**Figure 10 Collector-Emitter Voltage vs Collector Current**

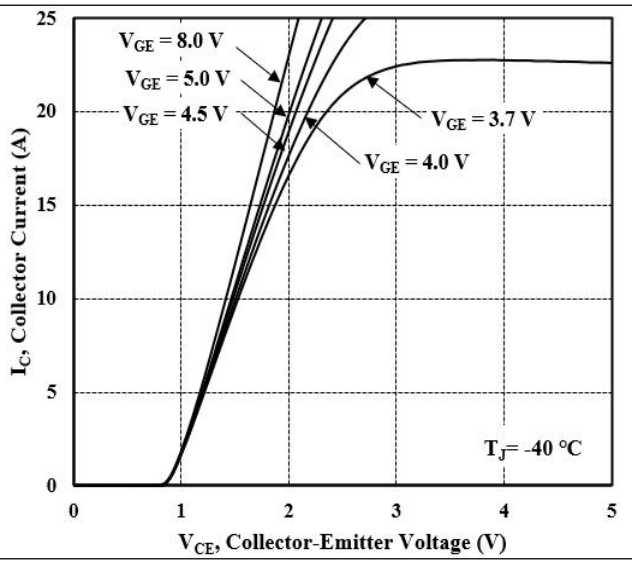



**Figure 11 Collector-Emitter Voltage vs Collector Current**

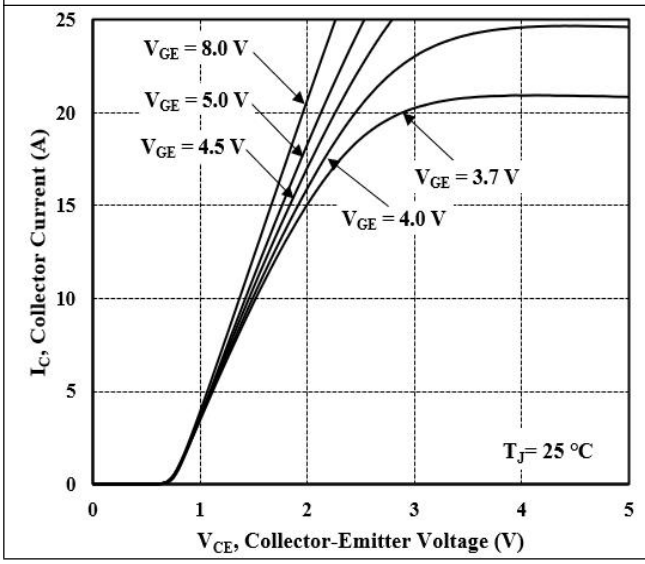
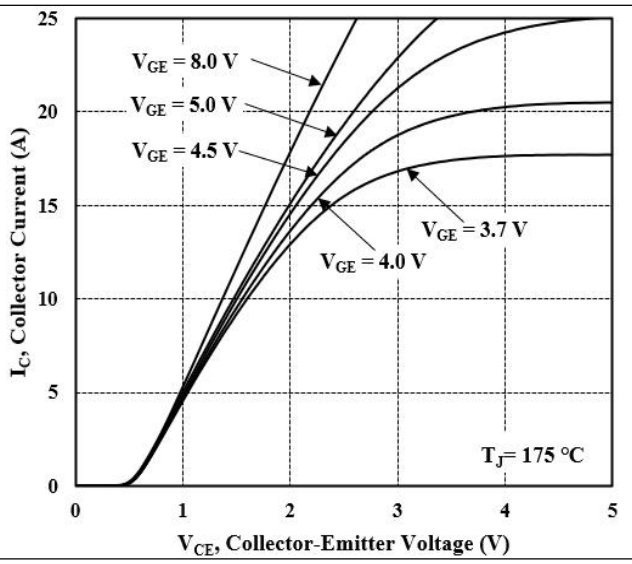
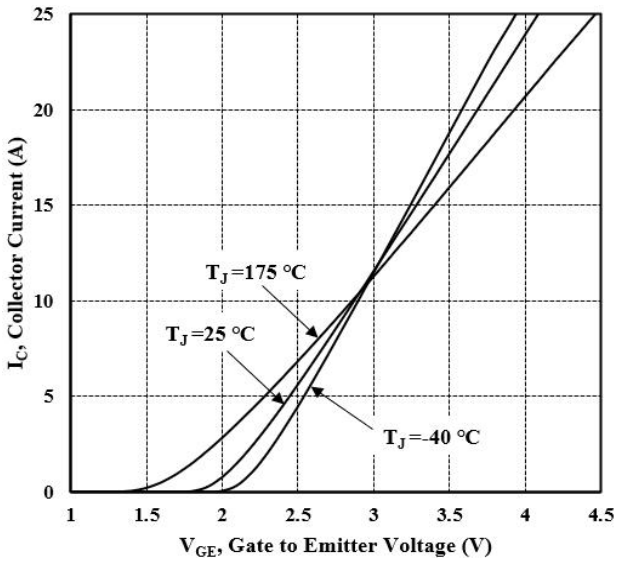


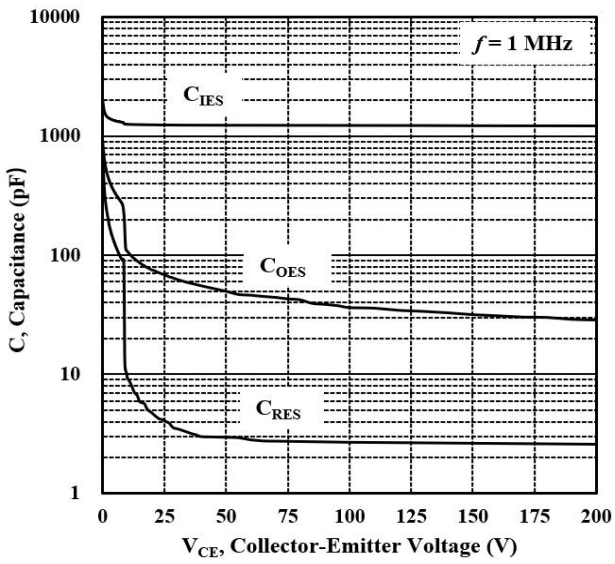

**Figure 12 Collector-Emitter Voltage vs Collector Current**



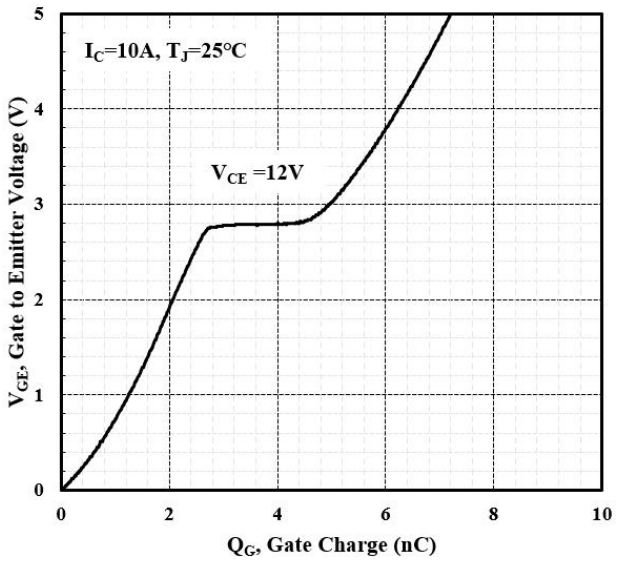
### Figure 13 Transfer Characteristics




### Figure 14 Capacitance vs Collector to Emitter Voltage




### Figure 15 Gate Charge vs Gate to Emitter Voltage




### Figure 16 Switching Time vs Junction Temperature

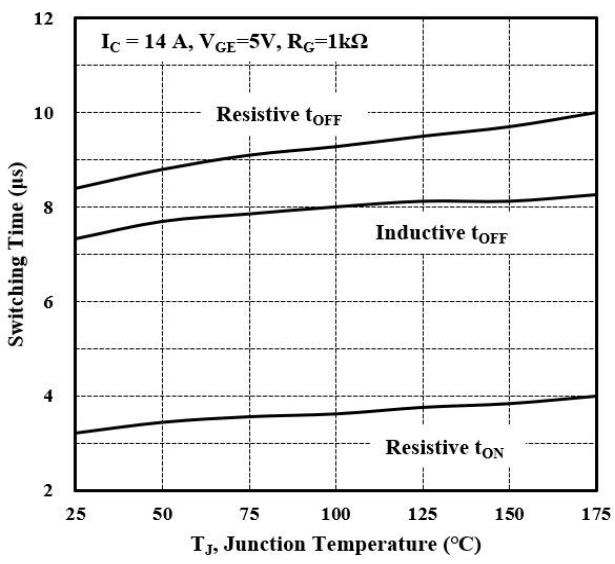
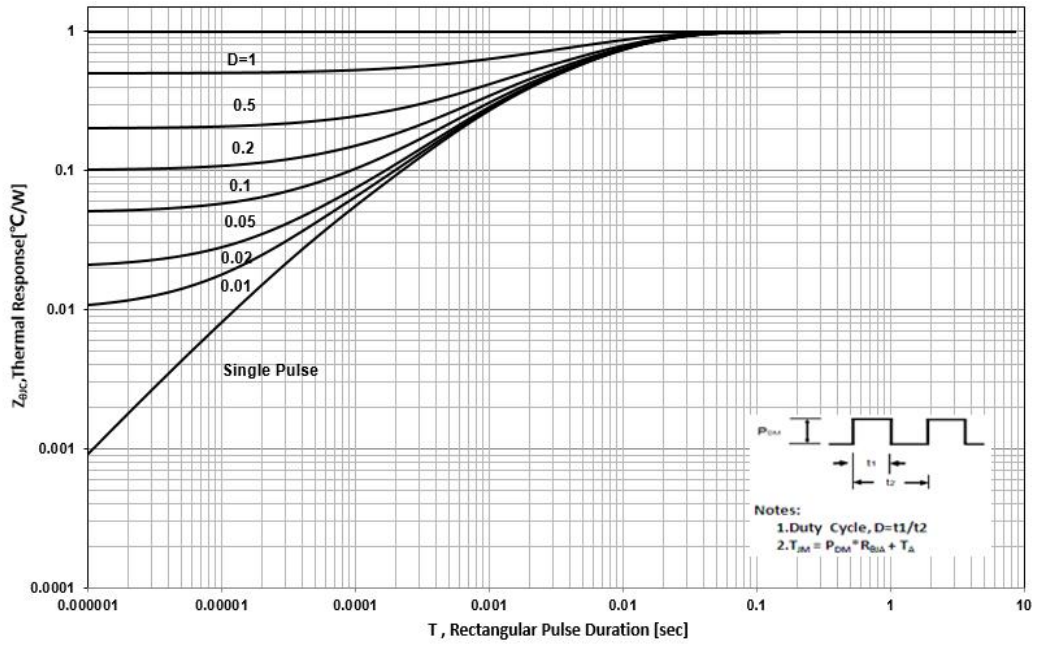


**Figure 17 Transient Thermal Impedance, Junction to Case**



## 6. Test Circuit and Waveform

Figure 18 Inductive Switching Test Circuit

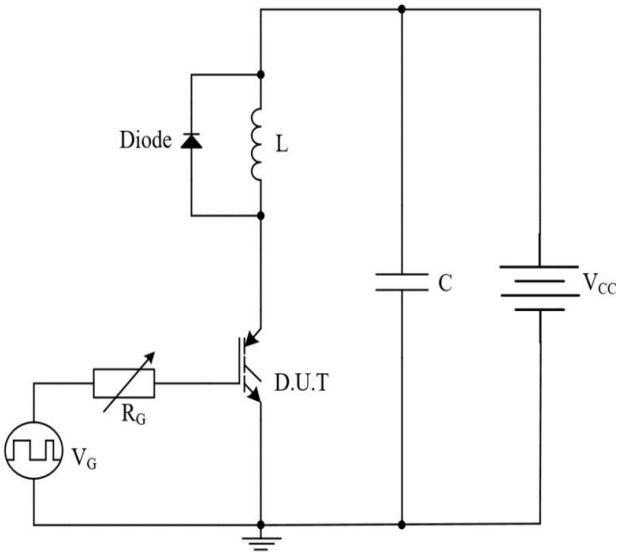



Figure 19 Resistive Switching Test Circuit

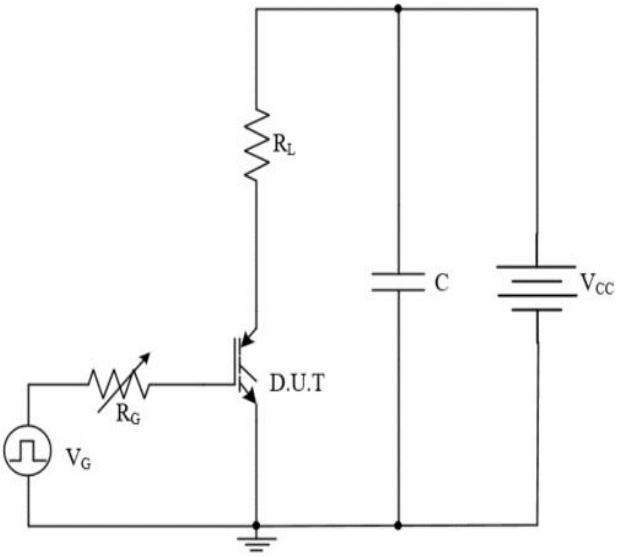



Figure 20 Switching Waveforms

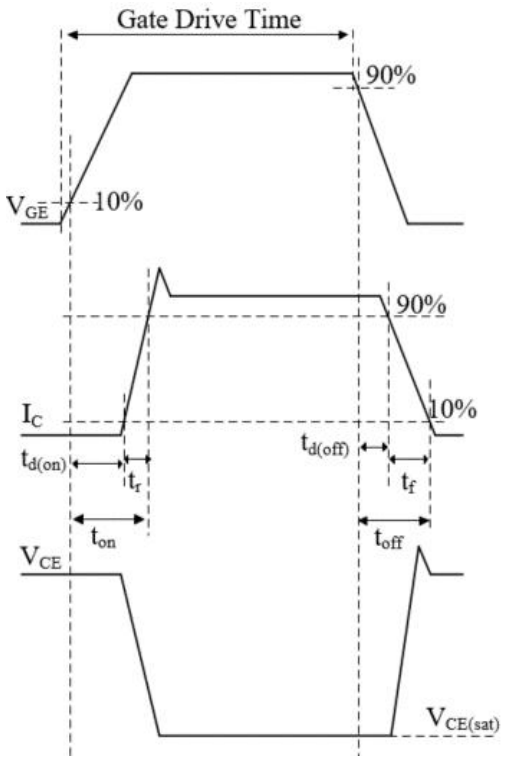



Figure 21 Self Clamped Inductive Switching Circuit

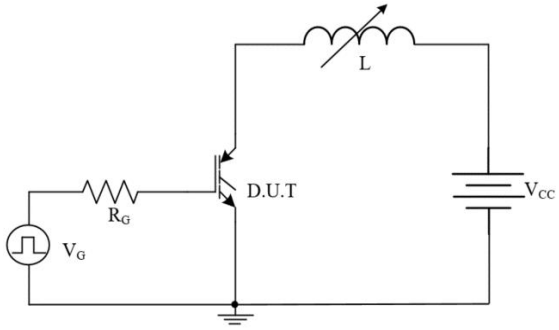
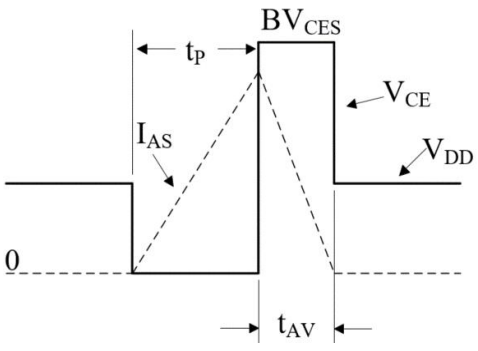
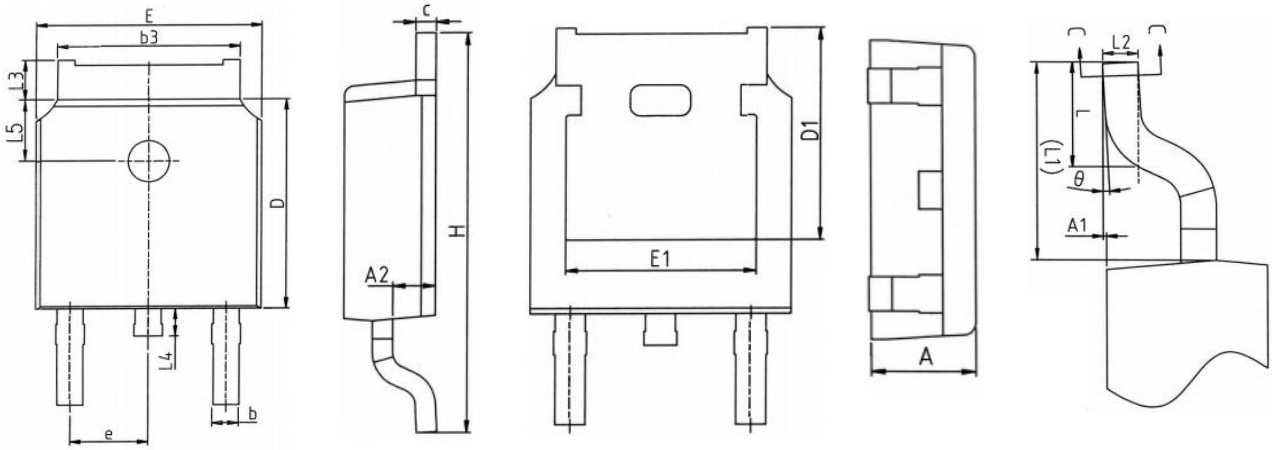



Figure 22 Self Clamped Inductive Switching Waveform

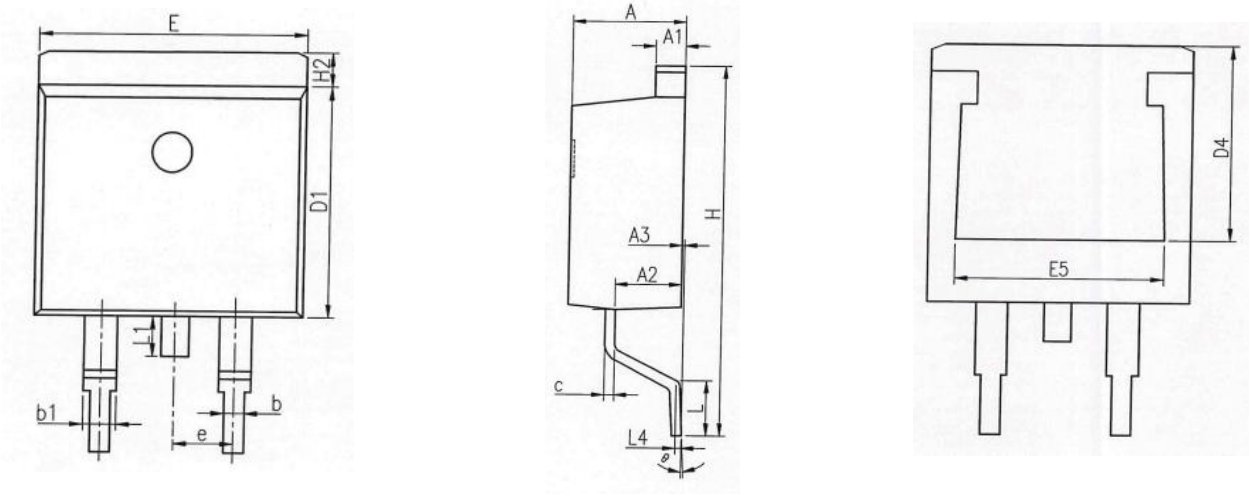


## 7. Package Description




**TO-252 Package**

| SYMBOL | Values(mm) | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| A | 2.20 | 2.30 | 2.38 |
| A1 | 0.00 | - | 0.12 |
| A2 | 0.97 | 1.07 | 1.17 |
| b | 0.68 | 0.78 | 0.90 |
| b3 | 5.20 | 5.33 | 5.46 |
| c | 0.43 | 0.53 | 0.61 |
| D | 5.98 | 6.10 | 6.22 |
| D1 | 5.30REF | | |
| E | 6.40 | 6.60 | 6.73 |
| E1 | 4.63 | - | - |
| e | 2.286BSC | | |
| H | 9.40 | 10.10 | 10.50 |
| L | 1.38 | 1.50 | 1.75 |
| L1 | 2.90REF | | |
| L2 | 0.51BSC | | |
| L3 | 0.88 | - | 1.28 |
| L4 | 0.50 | - | 1.00 |
| L5 | 1.65 | 1.80 | 1.95 |
| θ | 0° | - | 8° |




**TO-263 Package**

| Items | Values (mm) | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| A | 4.37 | 4.57 | 4.77 |
| A1 | 1.22 | 1.27 | 1.42 |
| A2 | 2.49 | 2.69 | 2.89 |
| A3 | 0.00 | 0.13 | 0.25 |
| b | 0.70 | 0.81 | 0.96 |
| b1 | 1.17 | 1.27 | 1.47 |
| c | 0.30 | 0.38 | 0.53 |
| D1 | 8.50 | 8.70 | 8.90 |
| D4 | 6.60 | - | - |
| E | 9.86 | 10.16 | 10.36 |
| E5 | 7.06 | - | - |
| e | 2.54 BSC | | |
| H | 14.70 | 15.10 | 15.50 |
| H2 | 1.07 | 1.27 | 1.47 |
| L | 2.00 | 2.30 | 2.60 |
| L1 | 1.40 | 1.55 | 1.70 |
| L4 | 0.25 BSC | | |
| θ | 0° | 5° | 9° |

## Revision History:

BLG3040 Revision: 2025-04-01, Rev. 2.4(A)

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.<br>(1) Switching characteristics.<br>(2) Self-clamped Inductive switching current curves.<br>(3) Breakdown voltage curves have been added. |
| 2.0 | 2022-03-31 | The major changes are as follow.<br>(1) In Section 4, the data of ON characteristics and dynamic characteristics have been updated.<br>(2) In Section 5, $P_D$ vs $T_J$ curve and $I_{SCIS}$ vs $T_{CLP}$ curve have been added.<br>(3) In Section 5, all figures of characteristics curves have been reformatted and adjusted in sequence.<br>(4) In Section 6, all figures of test circuit and typical waveform have been redrawn and rearranged.<br>(5) In Section 7, all diagrams of different package and some dimensions information have been redrawn and updated.<br>(6) Formatting and spelling errors in this document have been corrected.<br>(7) Revision history is firstly added in the BLG3040 datasheet . |
| 2.1 | 2024-01-31 | The major changes are as follow.<br>(1) In Section 4, the data of OFF characteristics has been updated.<br>(2) the CONTACT has been updated.<br>(3) The catalog index has been updated. |
| 2.2 | 2024-07-11 | The major changes are as follow.<br>(1) Corrected the value of $V_{CES}$ on the homepage and marked '$_{Typ.}$'.<br>(2) Updated the testing conditions and values for $V_{CES}$ in '2. Absolute Ratings' on page 2. |
| 2.3 | 2024-10-23 | The major changes are as follow.<br>(1) Additional description of ESCIS: using 3mH inductor and 1KΩ Rg.<br>(2) Additional description of Operating Junction. |
| 2.4 | 2025-04-01 | The major changes are as follow.<br>(1) Updated the package outline drawing of TO-263.<br>(2) Updated the package outline drawing of TO-252. |

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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.

## CONTACT:

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