

## 1. Description

BLQG3040 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

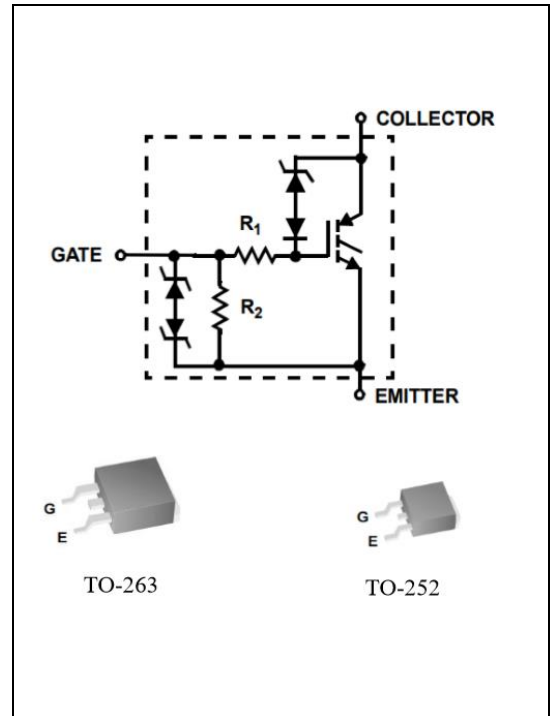
Parameter	Value	Unit
$V_{CES}$	400	V
$V_{CE(sat).Typ}$	1.1	V
$E_{SCIS@T_J=25\text{ }^\circ\text{C}}$	300	mJ
ESD	4	kV

### FEATURES

- Low  $V_{CEsat}$
- High SCIS Energy
- Logic Level Gate Drive
- AEC-Q101 Qualified

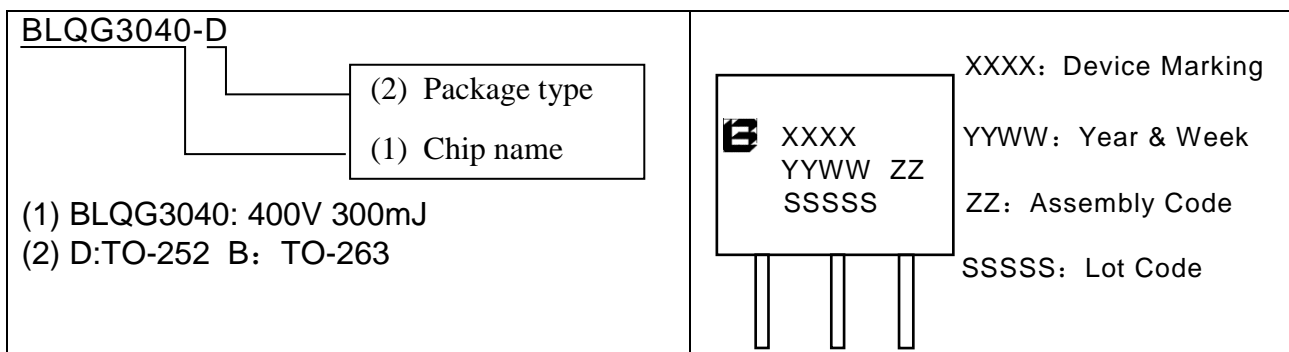
### APPLICATIONS

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



### ORDERING INFORMATION

Ordering Codes	Product Code	Package	Device Marking	Packing
BLQG3040-D	BLQG3040	TO-252	QG3040	Reel
BLQG3040-B		TO-263		Reel



## 2. ABSOLUTE RATINGS

at  $T_C = 25^\circ\text{C}$ , unless otherwise specified

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

## 3. Thermal characteristics

Symbol	Parameter	Package	RATINGS	Units
$R_{\theta JC}$	Junction-to-Case	TO-252/TO-263	1.0	$^\circ\text{C/W}$

## 4. Electrical Characteristics

at  $T_C = 25^\circ\text{C}$ , unless otherwise specified

OFF Characteristics						
Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$BV_{CER}$	Collector to Emitter Breakdown Voltage	$V_{GE}=0\text{V}$ , $I_C=2\text{mA}$ , $R_G=1\text{k}\Omega$	370	400	430	V
$BV_{CES}$	Collector to Emitter Breakdown Voltage	$V_{GE}=0\text{V}$ , $I_C=10\text{mA}$ , $R_G=0\Omega$	390	410	450	V
$BV_{ECS}$	Emitter to Collector Breakdown Voltage	$V_{GE}=0\text{V}$ , $I_C=-75\text{mA}$	30	--	--	V
$BV_{GES}$	Gate to Emitter Breakdown Voltage	$I_{GES}=\pm 2\text{mA}$	$\pm 12$	$\pm 14$		V
$I_{CER}$	Collector to Emitter Leakage Current	$V_{CE}=250\text{V}$ , $R_G=1\text{k}\Omega$ , $T_J=25^\circ\text{C}$	--	--	25	$\mu\text{A}$
		$V_{CE}=250\text{V}$ , $R_G=1\text{k}\Omega$ , $T_J=150^\circ\text{C}$	--	--	1	mA

$I_{ECS}$	Emitter to Collector Leakage Current	$V_{EC}=24V, T_J=25^{\circ}C$	--	--	1	mA
		$V_{EC}=24V, T_J=150^{\circ}C$			40	mA
$R_1$	Series Gate Resistance		--	70		$\Omega$
$R_2$	Gate to Emitter Resistance		10		26	k $\Omega$

## ON Characteristics

Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$V_{GE}=4V, I_C=6A, T_J=25^{\circ}C$	--	1.10	1.30	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$V_{GE}=4.5V, I_C=10A, T_J=175^{\circ}C$	--	1.35	1.60	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$V_{GE}=4.5V, I_C=15A, T_J=175^{\circ}C$	--	1.70	1.90	V
$V_{GE(TH)}$	Gate Threshold Voltage	$V_{CE} = V_{GE}, I_C = 1mA$	1.30	--	2.20	V

Pulse width  $t_p \leq 300\mu s, \delta \leq 2\%$

## Dynamic Characteristics

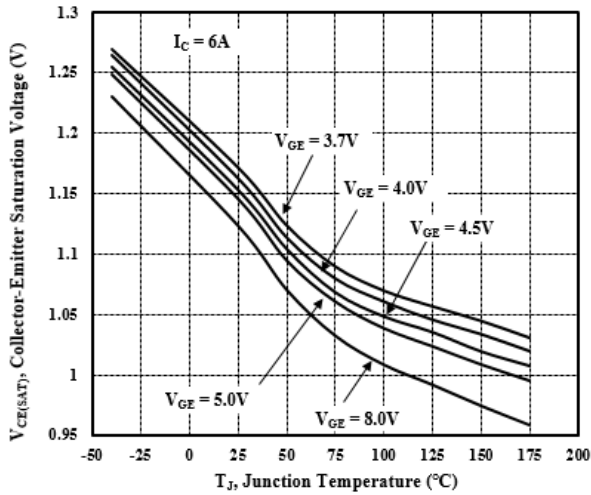
Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$C_{iss}$	Input Capacitance	$V_{GE} = 0V$ $V_{CE} = 25V$ $f=1.0MHz$	--	1165	--	pF
$C_{oss}$	Output Capacitance		--	68	--	
$C_{rss}$	Reverse Transfer Capacitance		--	8	--	
$Q_g$	Total Gate Charge		$I_C=10A, V_{CE}=12V, V_{GE}=5V$	--	7.5	--

## Switching Characteristics

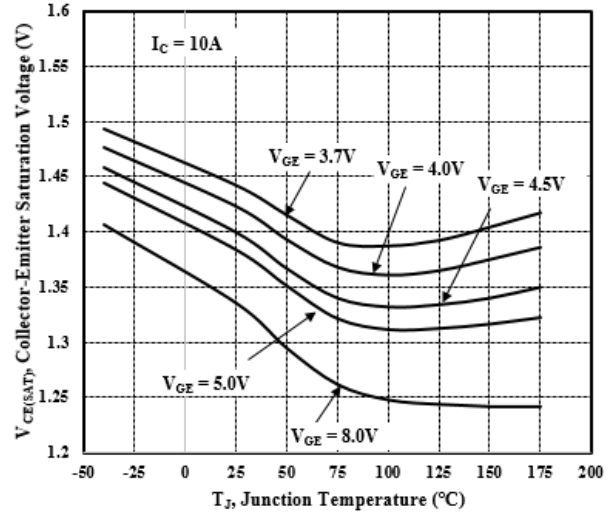
Symbol	Parameter	Test Conditions	Values			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$V_{CE} = 14V, R_L=1\Omega,$ $V_{GE} = 5V, R_G = 1k\Omega,$ $T_J=25^{\circ}C$	--	1	4	$\mu s$
$t_r$	Rise Time		--	2.6	7	
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{CE} = 300V, L=500\mu H,$ $V_{GE} = 5V, R_G = 1k\Omega,$ $T_J=25^{\circ}C$	--	6.5	15	
$t_f$	Fall Time		--	2.8	15	

**5. Characteristics Curves**

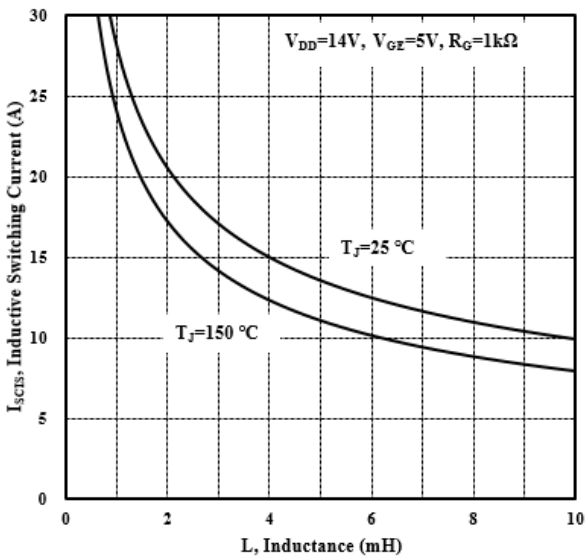
**Figure 1 Collector-Emitter Saturation Voltage vs Junction Temperature**



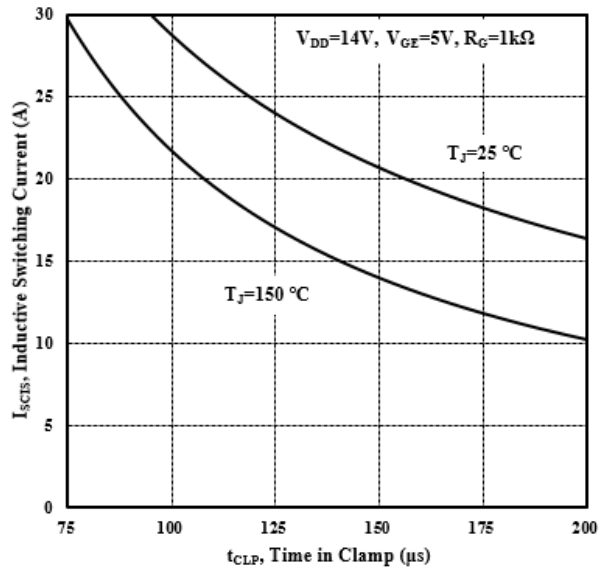
**Figure 2 Collector-Emitter Saturation Voltage vs Junction Temperature**



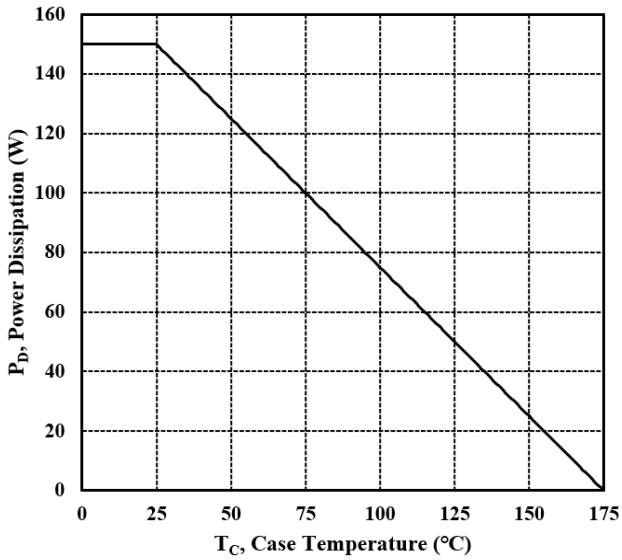
**Figure 3 Self Clamped Inductive Switching Current vs Inductance**



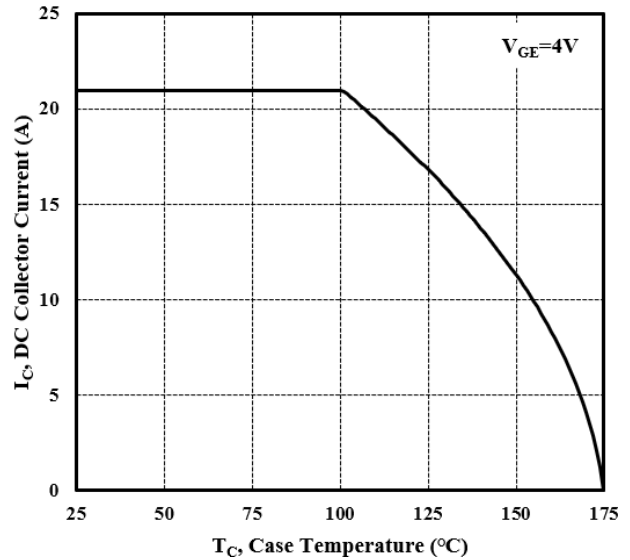
**Figure 4 Self Clamped Inductive Switching Current vs Inductance**



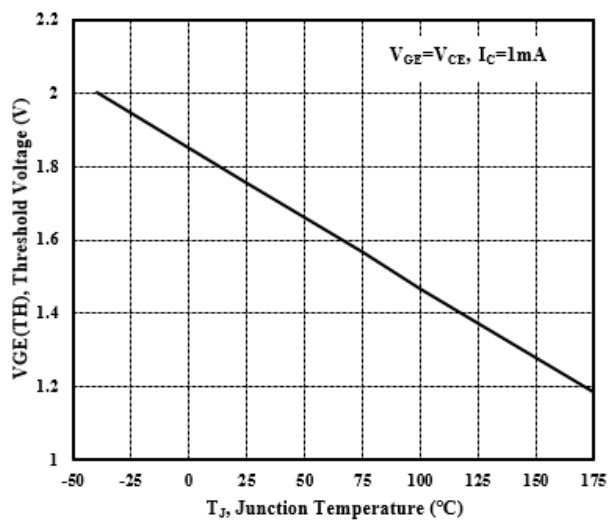
**Figure 5 Power Dissipation vs Case Temperature**



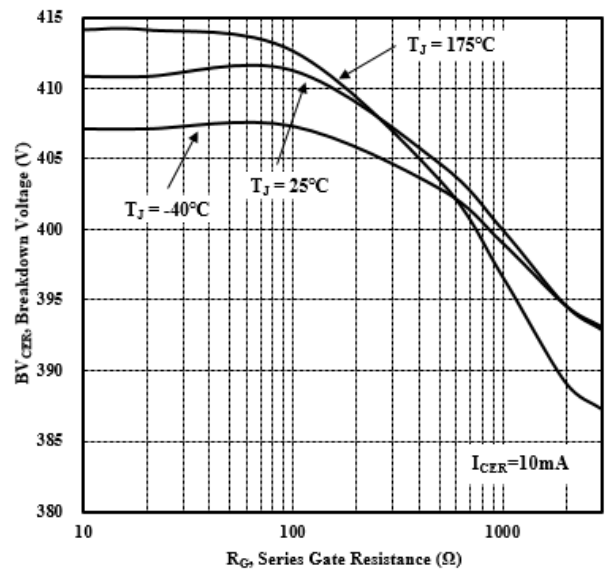
**Figure 6. DC Collector Current vs Case Temperature**



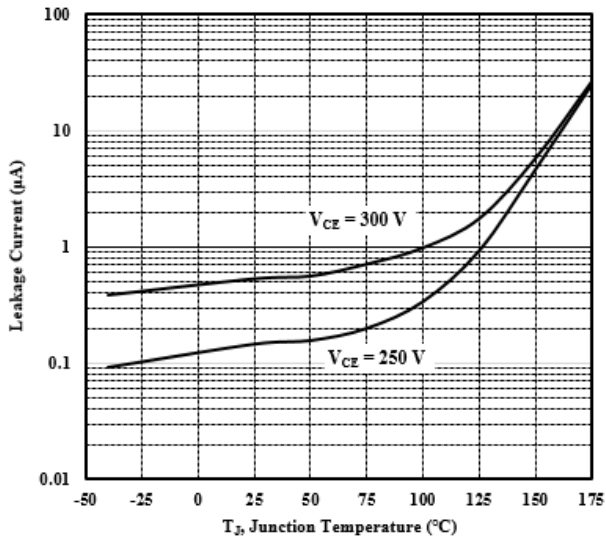
**Figure 7 Threshold Voltage vs Junction Temperature**



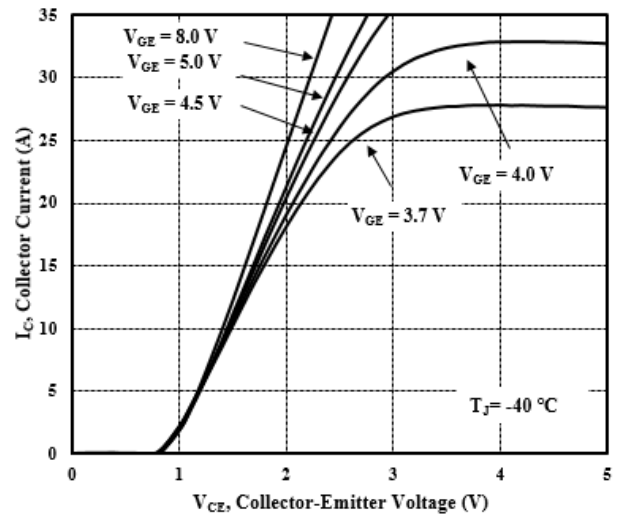
**Figure 8 Breakdown Voltage vs Series Gate Resistance**



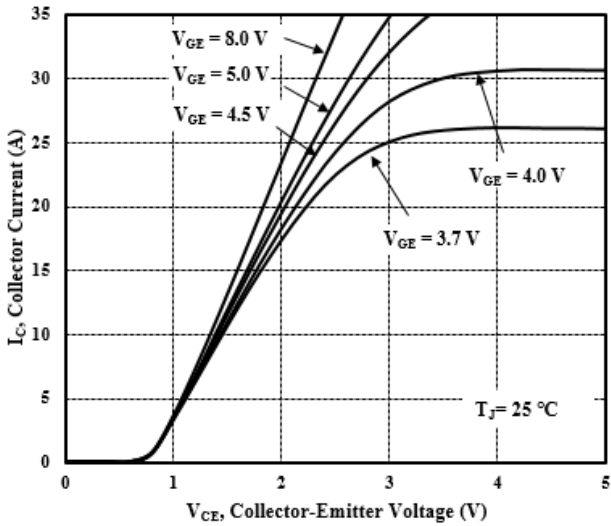
**Figure 9 Leakage Current vs Junction Temperature**



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



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



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

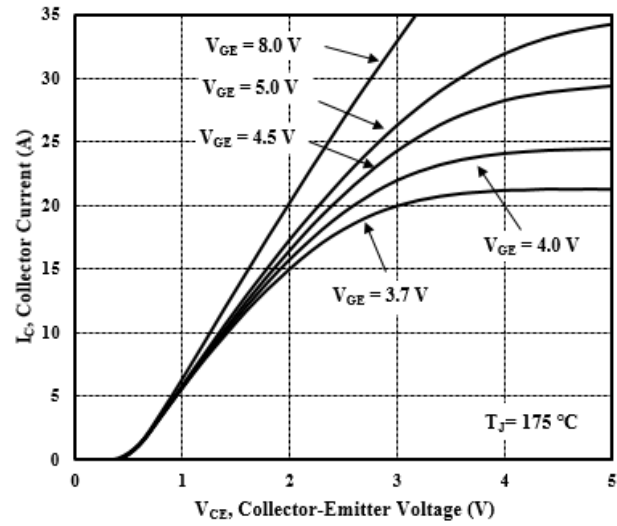


Figure 13 Transfer Characteristics

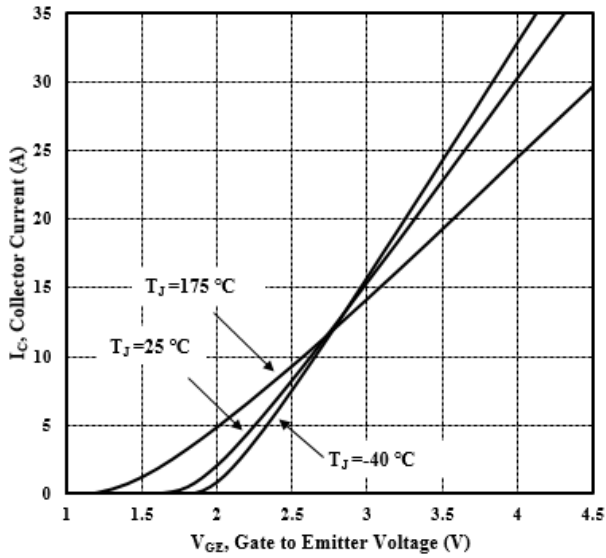


Figure 14 Capacitance vs Collector to Emitter Voltage

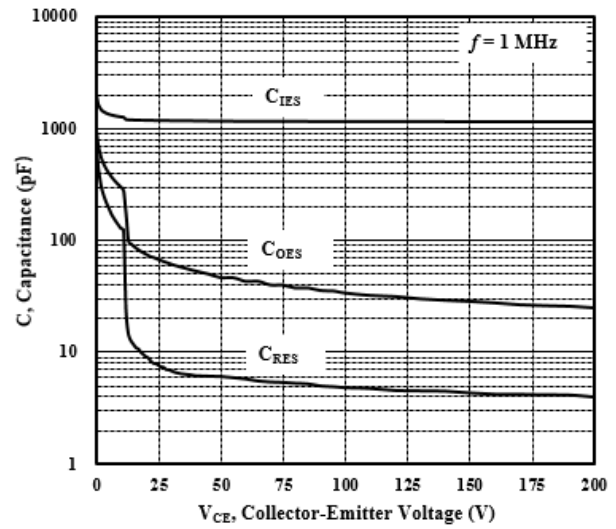


Figure 15 Gate Charge vs Gate to Emitter Voltage

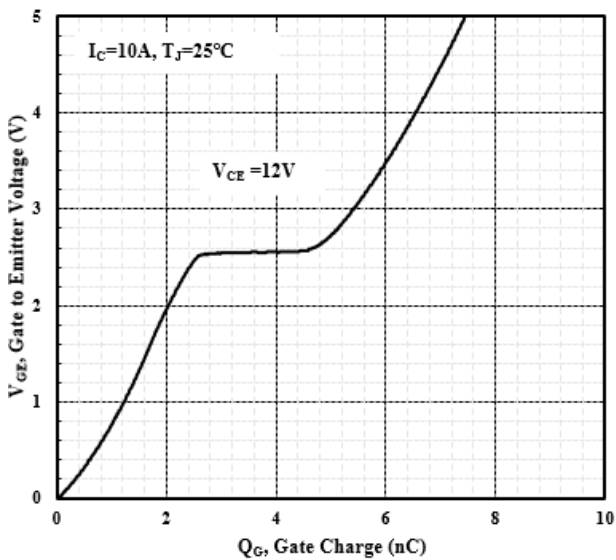


Figure 16 Switching Time vs Junction Temperature

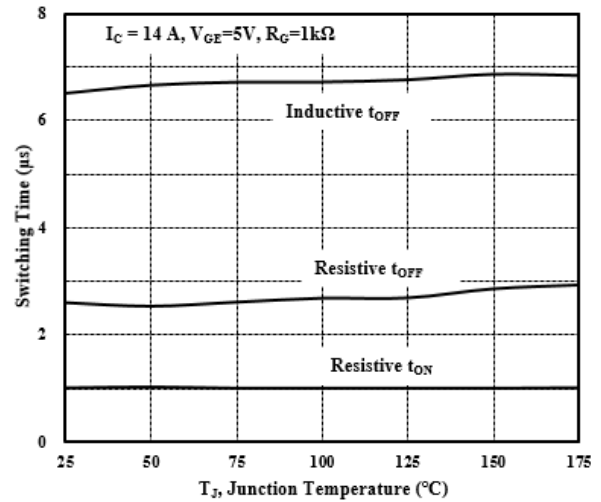
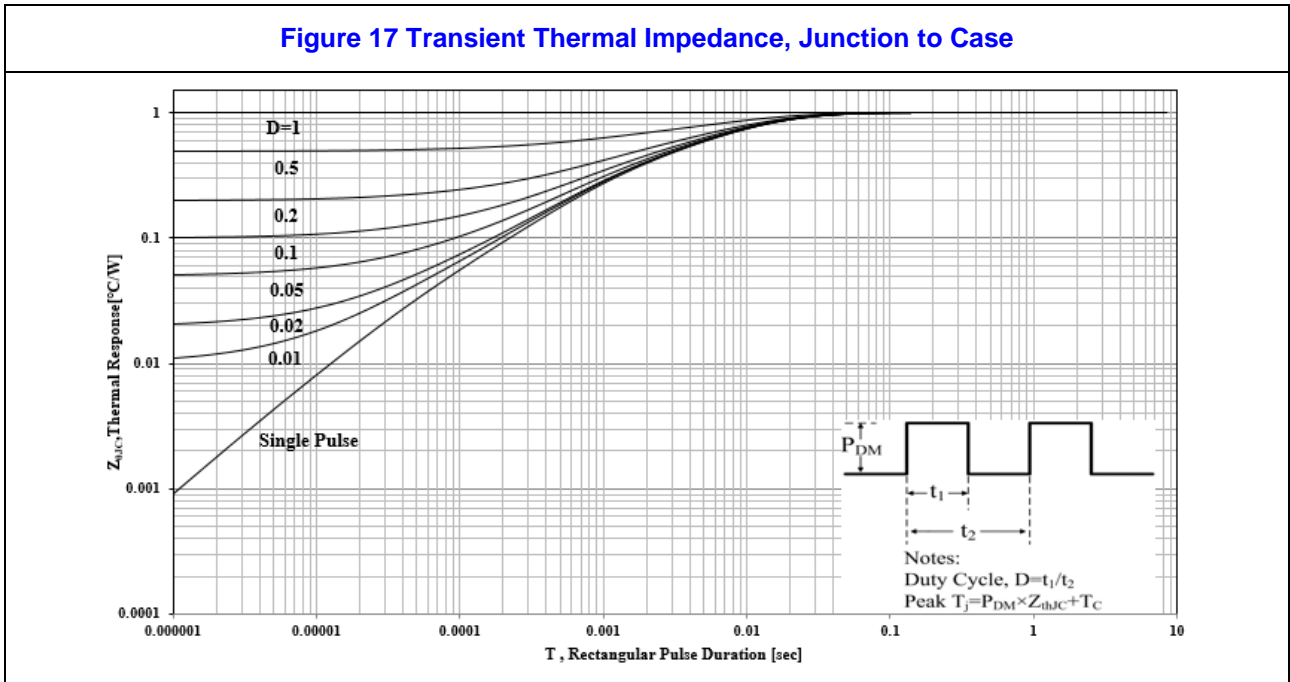
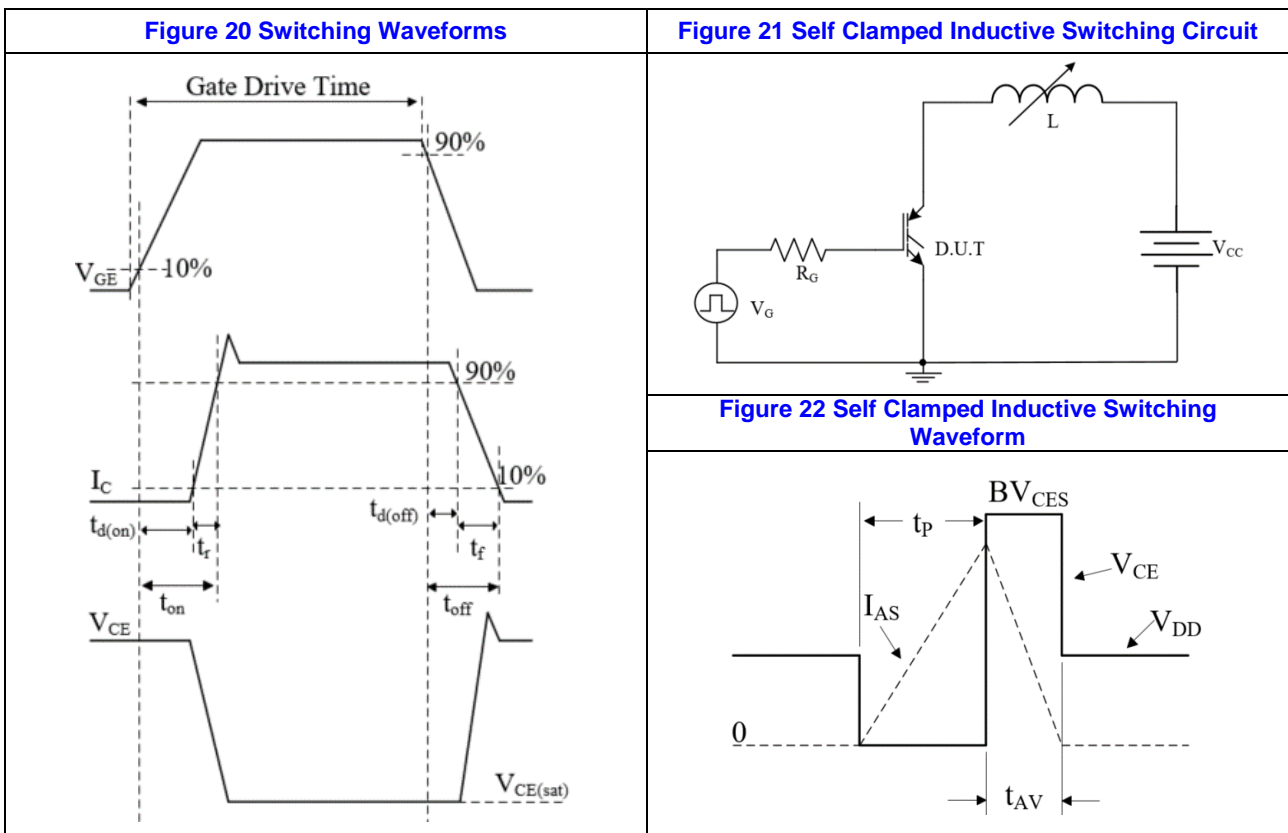
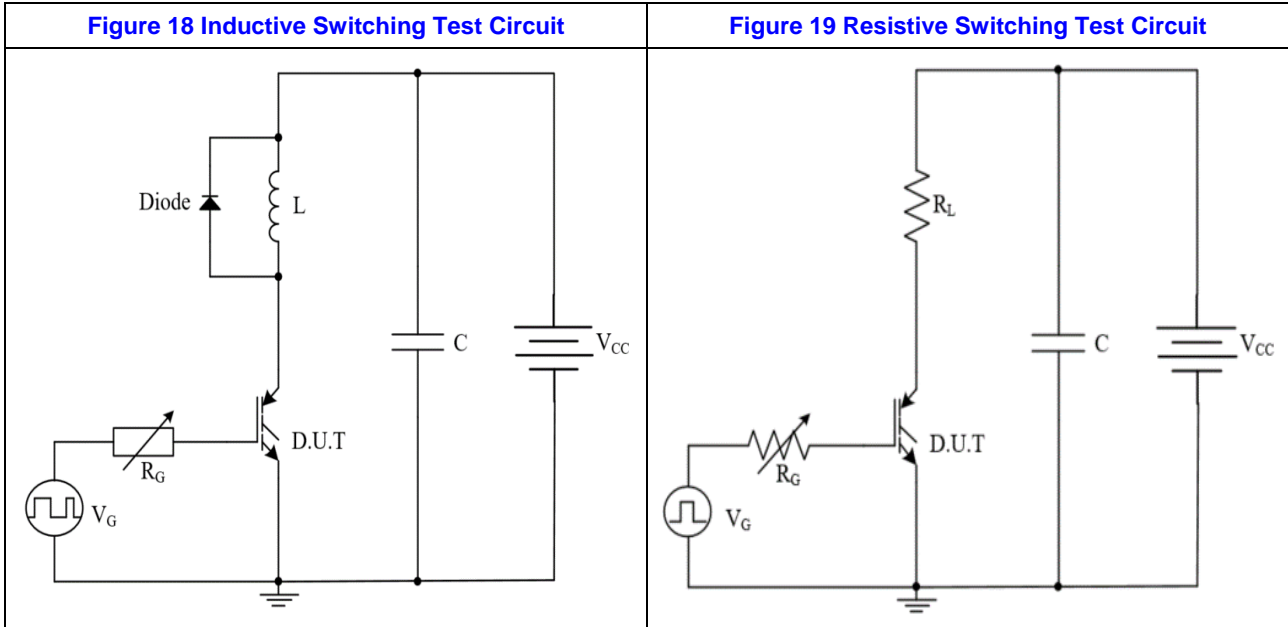


Figure 17 Transient Thermal Impedance, Junction to Case

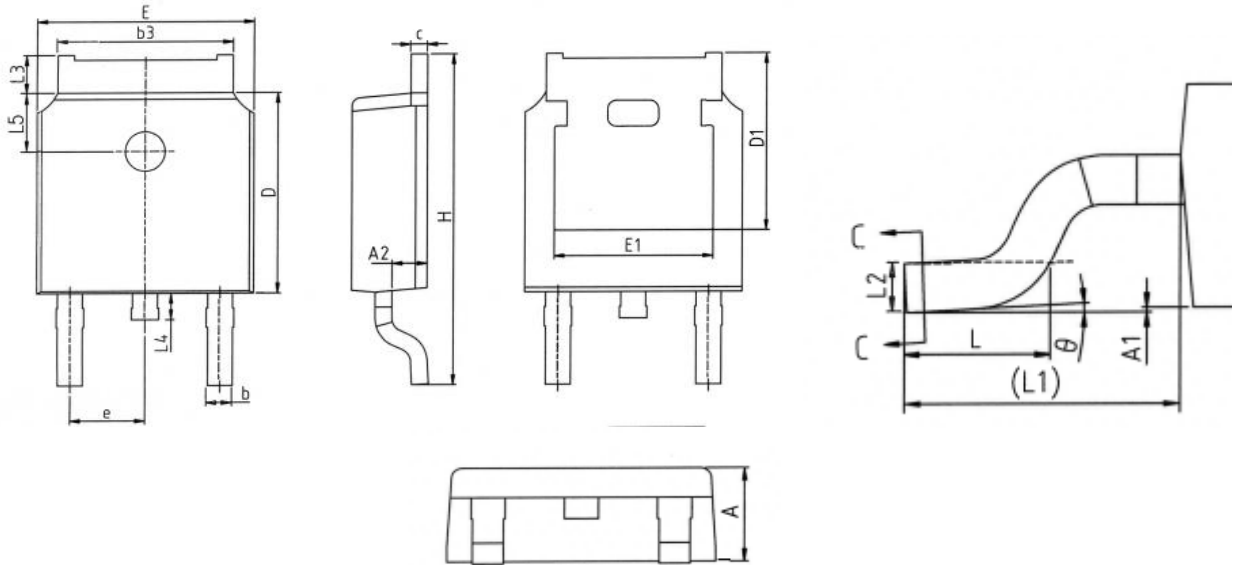




## 6. Test Circuit and Waveform

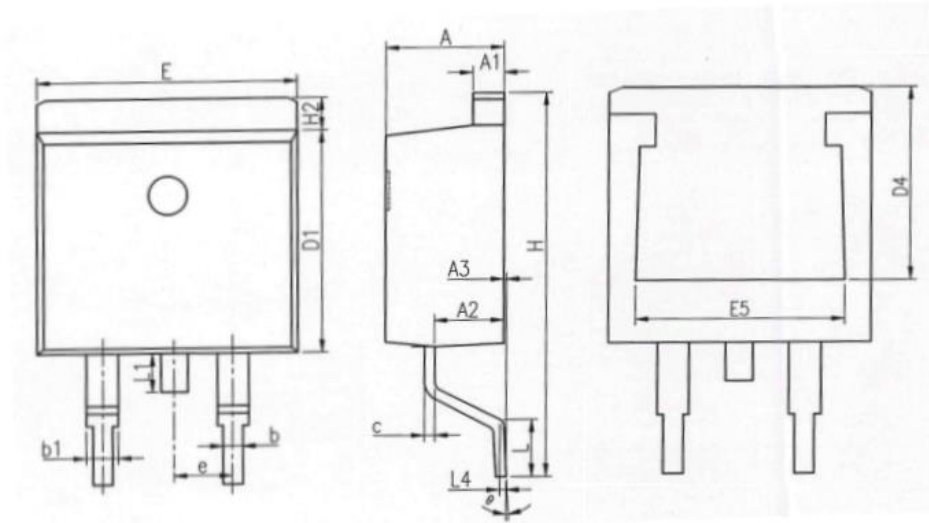


## 7. Package Description



**TO-252 Package**

Items	Values (mm)		
	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0.00	-	0.20
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	1.8	1.95
$\theta$	0°	-	8°


**TO-263 Package**

Items	Values(mm)	
	MIN	MAX
A	4.37	4.77
A1	1.22	1.42
A2	2.49	2.89
A3	0.00	0.25
b	0.70	0.96
b1	1.17	1.47
c	0.30	0.53
D1	8.5	8.9
D4	6.60	
E	9.86	10.36
E5	7.06	
e	2.54BCS	
H	14.7	15.5
H2	1.07	1.47
L	2.00	2.60
L1	1.40	1.70
L4	0.25BCS	
θ	0°	9°

**Revision History:**

BLQG3040 Revision: 2023-2-27, Rev. 1.0

Previous Revision

Revision	Date	Revision Date Subjects (major changes since last revision)
1.0	2022-11-21	-
1.1	2023-2-27	(1) Add Device Marking (2) Modify $V_{CE(sat)}$ under different conditions (3) Update TO-263 outline package dimensions

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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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