$V_{BR(CES)}$ = 400 V, I_C = 15 A
N-channel Ignition IGBT

DGG4015A

Data Sheet

Description

The DGG4015A is 400 V IGBT with Zener diodes between collector and gate, and achieves an ignition coil drive circuit without an external clamped circuit. The IGBT has low saturation characteristic, and can improve the efficiency of the circuit.

Features

- Suitable for High Reliability and Automotive Requirement
- Bare Lead Frame: Pb-free (RoHS Compliant)
- Built-in Zener Diodes between Collector and Gate
- Low Saturation Voltage

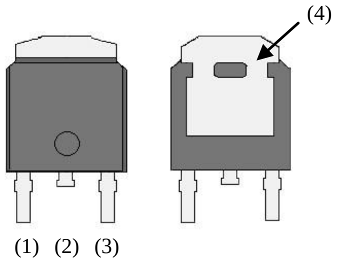
- $V_{(BR)CES}$ --- 400 V
- I_C--15 A
- $V_{CE(sat)}$---1.2 V typ.

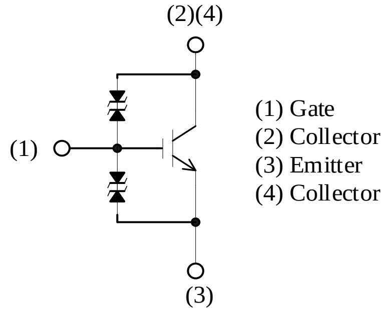
Applications

- Ignition Coil Driver Circuits

Packages

TO252





Not to scale

Absolute Maximum Ratings

Unless otherwise specified, T_A = 25 °C.

Parameter	Symbol	Conditions	Rating	Unit	Remarks
Collector to Emitter Voltage	V_{CE}		$V_{(BR)CES}$	V	
Gate to Emitter Voltage	V_{GE}		±20	V	
Continuous Collector Current	I_C		15	A	
Power Dissipation	P_D	T_C = 25 °C	55	W	
Operating Junction Temperature	T_J		150	°C	
Storage Temperature	T_{STG}		−55 to 150	°C	

Thermal Characteristics

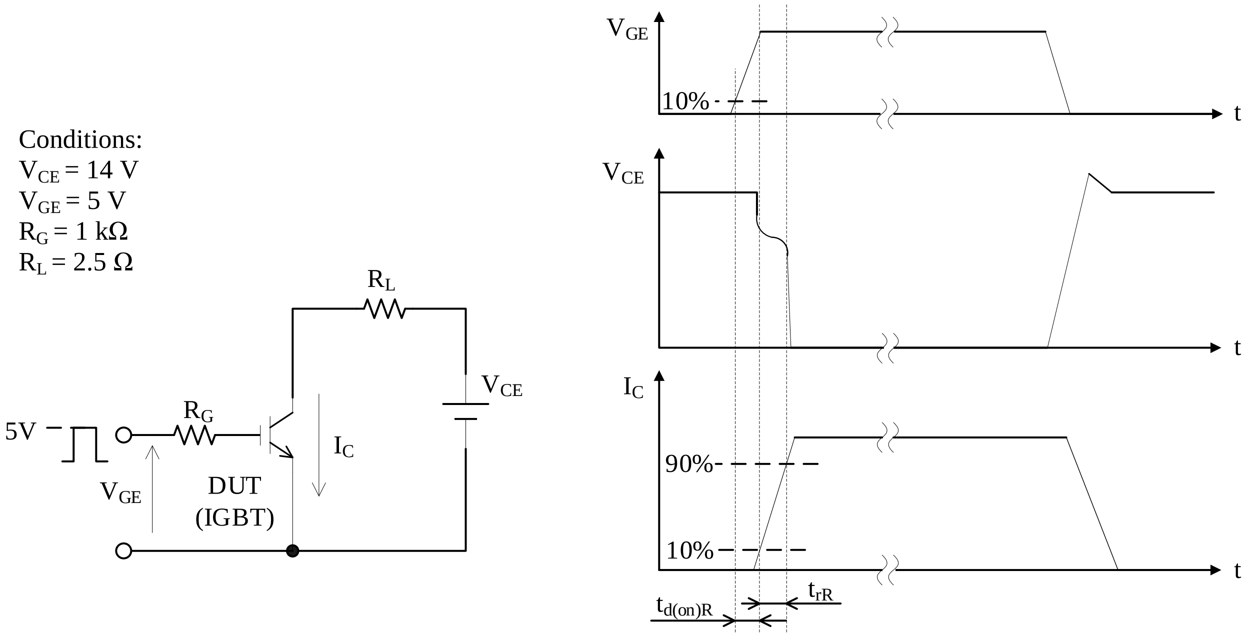
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	Remarks
Thermal Resistance (Junction to Case)	$R_{\theta JC}$		—	—	2.27	°C/W	

Electrical Characteristics

Unless otherwise specified, T_A = 25 °C.

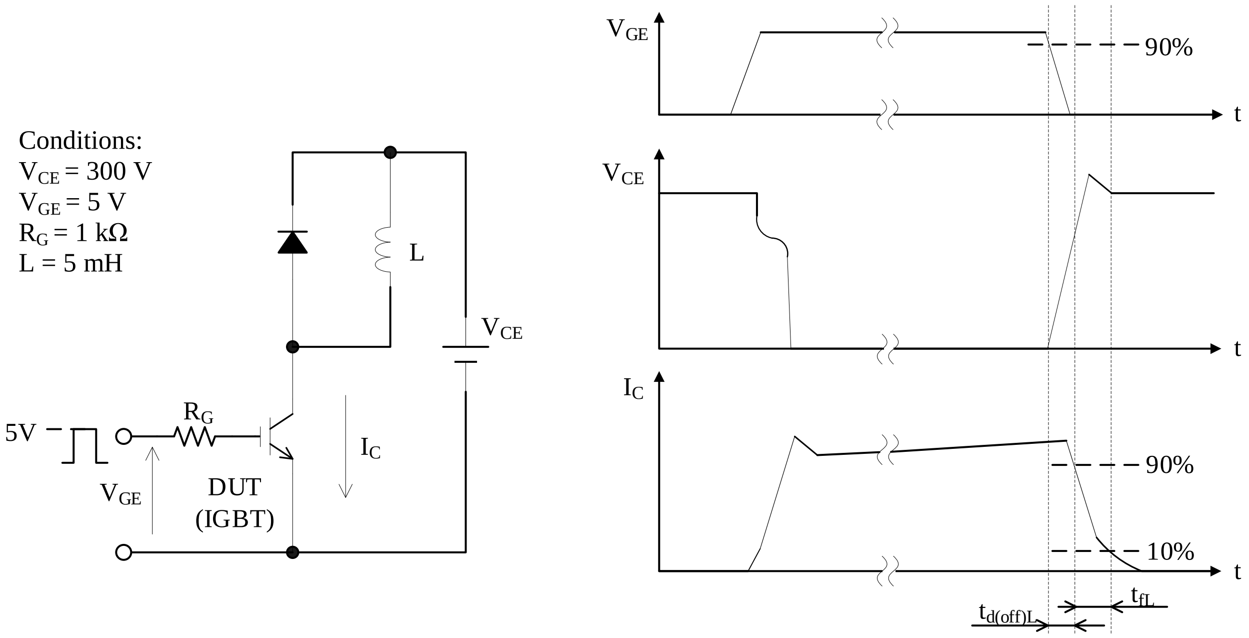
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Collector to Emitter Breakdown Voltage	$V_{(BR)CES}$	I_C = 2 mA, V_{GE} = 0 V	375	400	425	V
Gate to Emitter Breakdown Voltage	$V_{(BR)GES}$	I_G = ±100 µA, V_{GE} = 0 V	±20	—	—	V
Emitter to Collector Breakdown Voltage	$V_{(BR)ECS}$	I_{CE} = 10 mA, V_{GE} = 0 V	20	—	—	V
Collector to Emitter Leakage Current	I_{CES}	V_{CE} = 300 V, V_{GE} = 0 V	—	—	100	µA
Gate to Emitter Leakage Current	I_{GES}	V_{GE} = ±20 V, V_{CE} = 0 V	—	—	±100	µA
Gate Threshold Voltage	$V_{GE(TH)}$	V_{CE} = 10 V, I_C = 1 mA	1.4	1.7	2.2	V
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE} = 4.5 V, I_C = 5 A	—	1.2	1.5	V
		V_{GE} = 10 V, I_C = 5 A	—	1.1	1.4	
		V_{GE} = 10 V, I_C = 10 A	—	1.4	1.7	
Input Capacitance	C_{ies}	V_{CE} = 10 V, V_{GE} = 0 V, f = 1.0 MHz	—	700	—	pF
Output Capacitance	C_{oes}		—	300	—	pF
Reverse Transfer Capacitance	C_{res}		—	220	—	pF
Turn-on Delay Time (Resistive)	$t_{d(on)R}$	Resistive load, see Figure 1	—	0.7	—	µs
Rise Time (Resistive)	t_{rR}		—	4.2	—	µs
Turn-off Delay Time (Inductive)	$t_{d(off)L}$	Inductive load, see Figure 2	—	10	—	µs
Fall Time (Inductive)	t_{fL}		—	1.8	—	µs
Self-clamped Inductive Switching Energy	E_{SCIS}	See Figure 3 and Equation (1)	150	—	—	mJ

Test Circuits and Waveforms



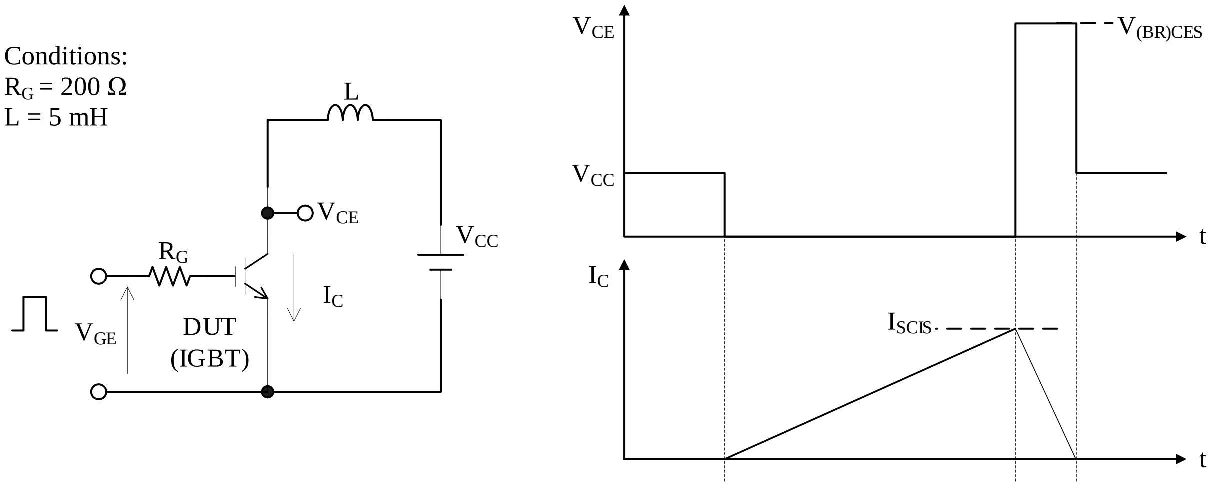
(a) Test Circuit (b) Waveform

Figure 1. Resistive Load Test Circuits and Switching Time Waveforms



(a) Test Circuit (b) Waveform

Figure 2. Inductive Load Test Circuits and Switching Time Waveforms



(a) Test Circuit (b) Waveform

Figure 3. E_{SCIS} Test Circuits and Switching Time Waveforms

$$E_{SCIS} = \frac{1}{2} \times L \times {I_{SCIS}}^2 \times \frac{V_{(BR)CES}}{V_{(BR)CES} - V_{CC}} \quad (1)$$

Rating and Characteristic Curves

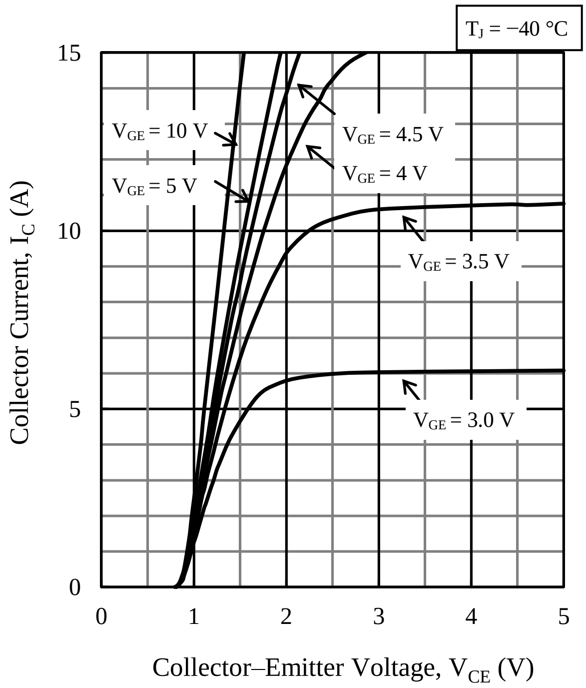


Figure 4. Output Characteristics (T_J = −40 °C)

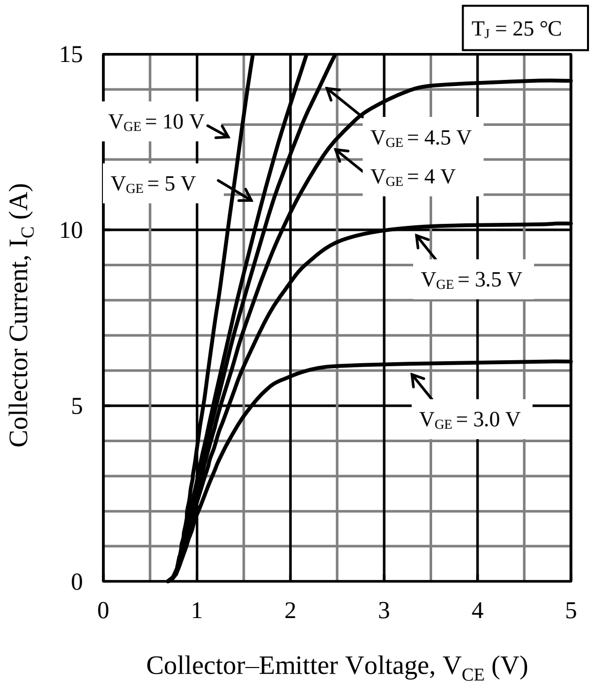


Figure 5. Output Characteristics (T_J = 25 °C)

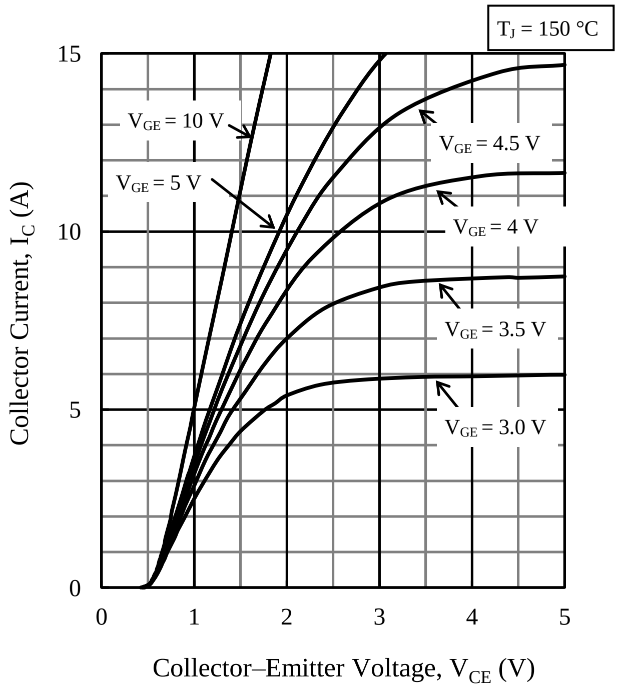


Figure 6. Output Characteristics (T_J = 150 °C)

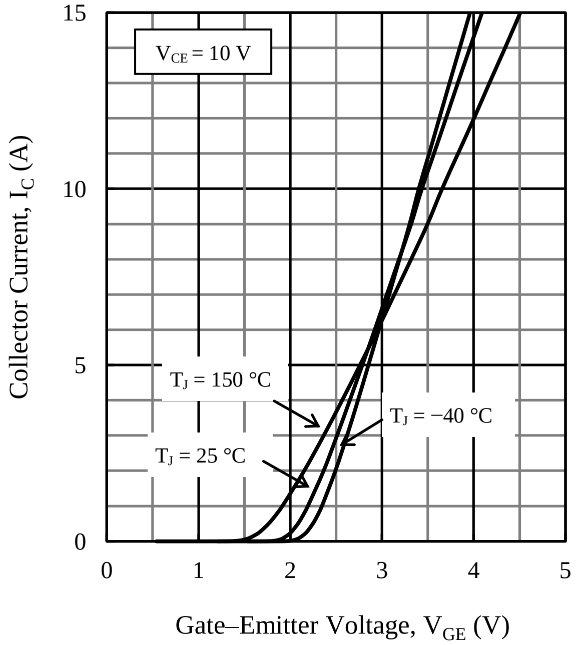


Figure 7. Transfer Characteristics

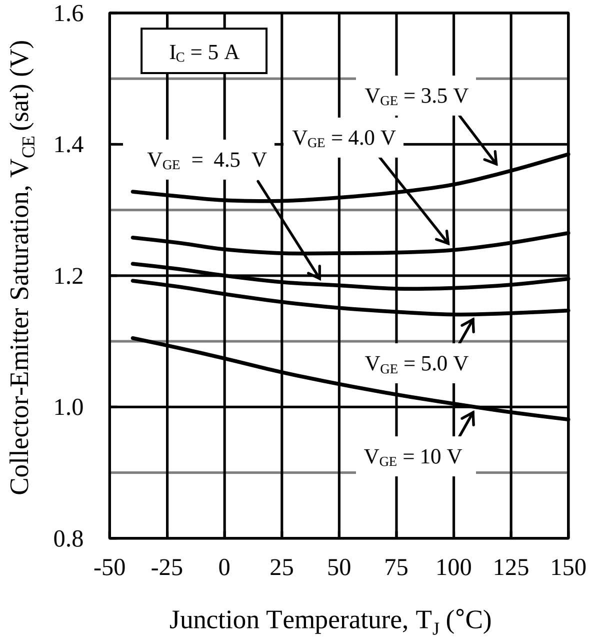


Figure 8. Saturation Voltage vs. Junction Temperature

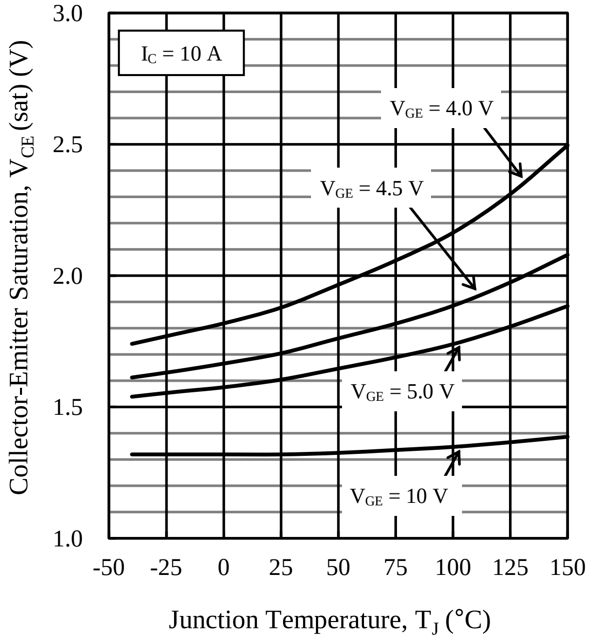


Figure 9. Saturation Voltage vs. Junction Temperature

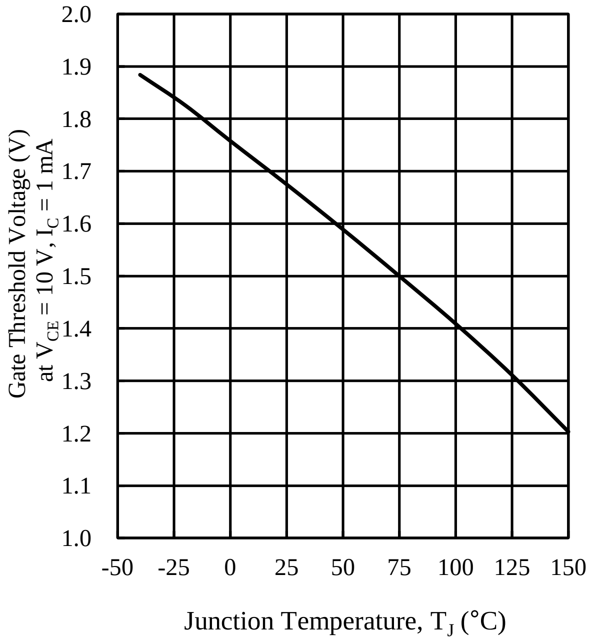


Figure 10. Gate Threshold Voltage vs. Junction Temperature

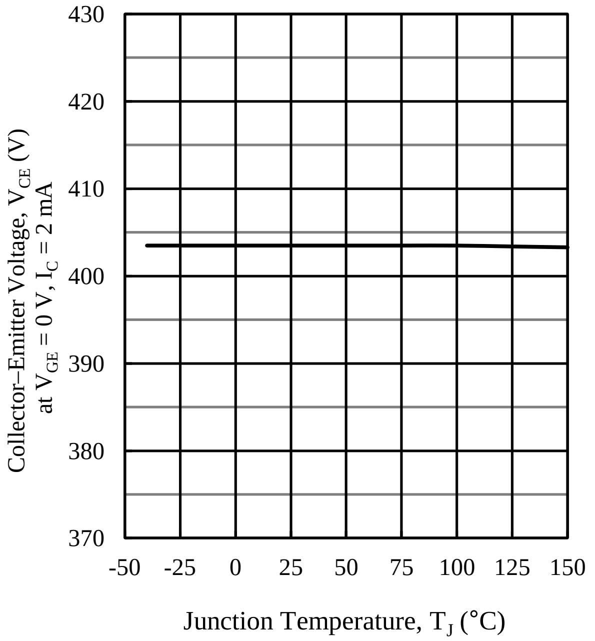


Figure 11. Collector–Emitter Voltage vs. Junction Temperature

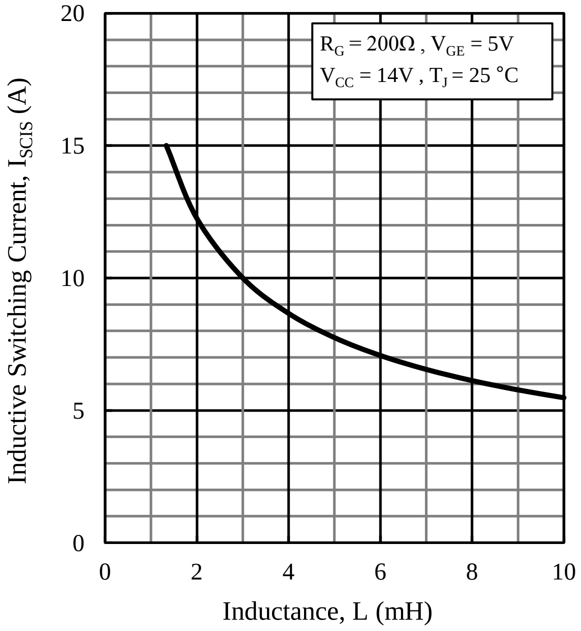


Figure 12. Inductive Switching Current vs. Inductance

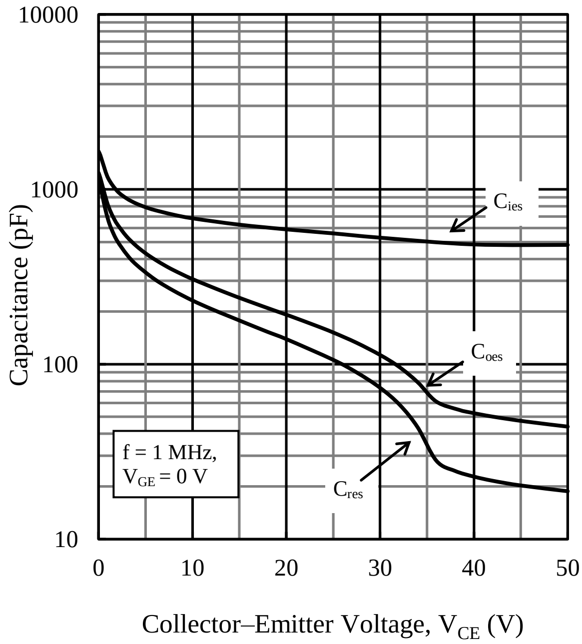


Figure 13. Capacitance Characteristics

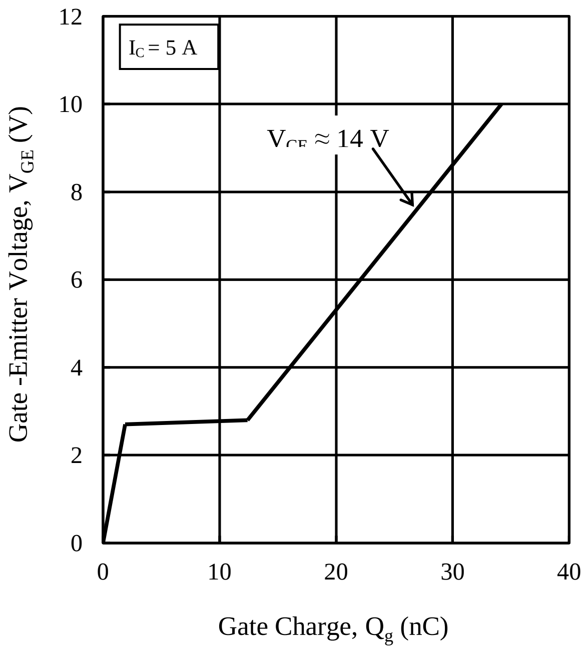


Figure 14. Typical Gate Charge

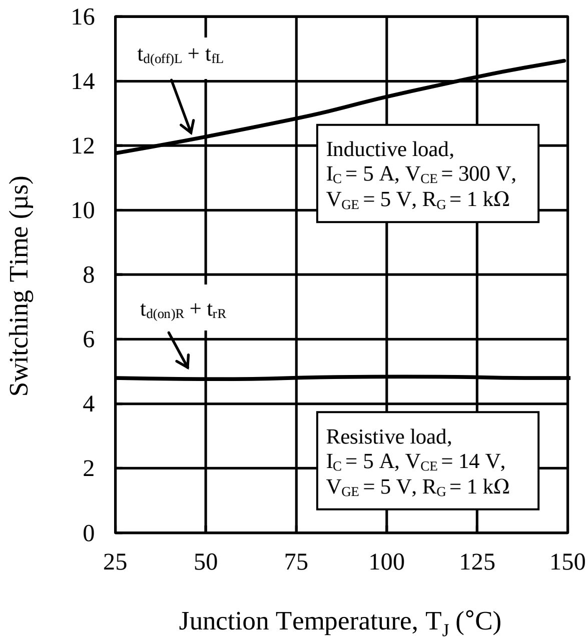


Figure 15. Switching Time vs. Junction Temperature

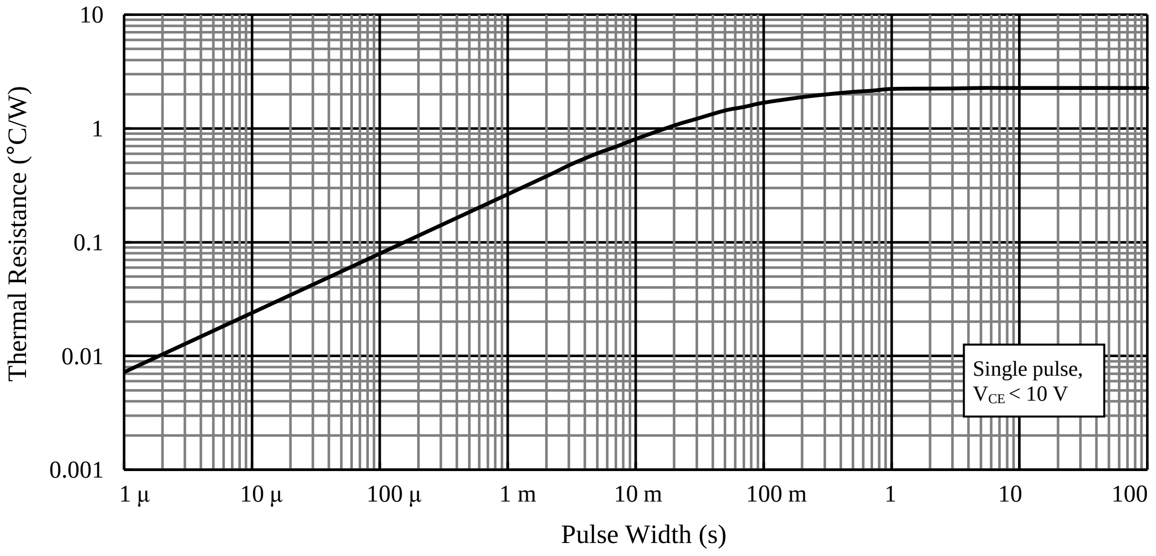
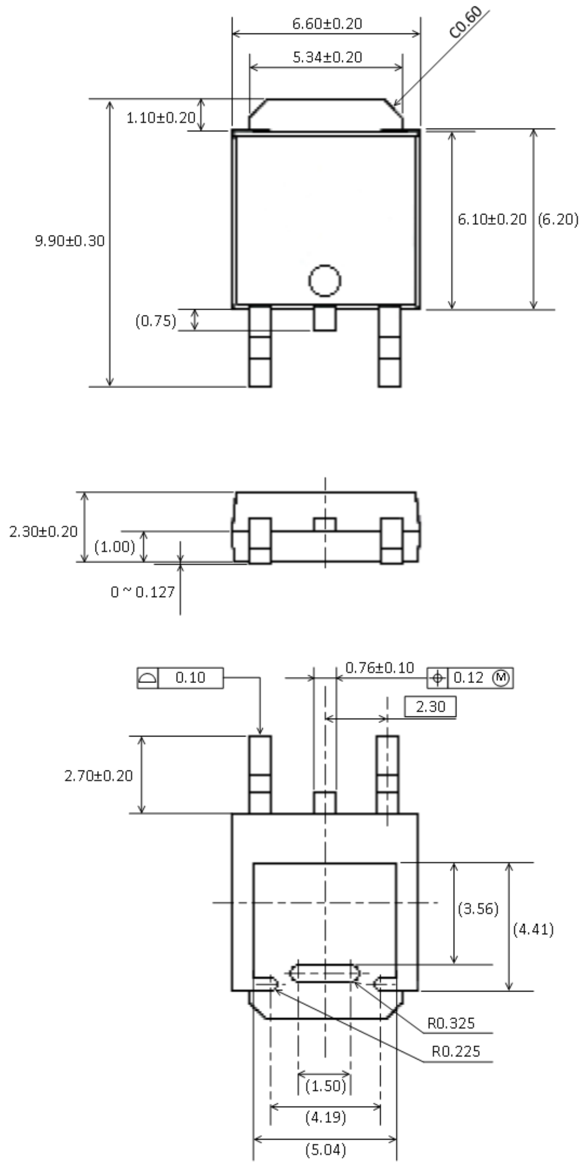
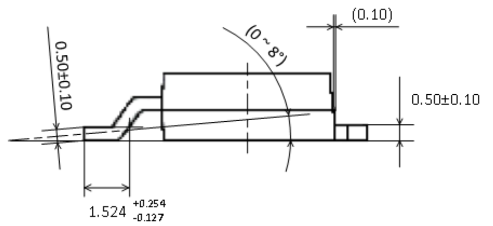


Figure 16. Transient Thermal Resistance

Physical Dimensions

- **TO252**

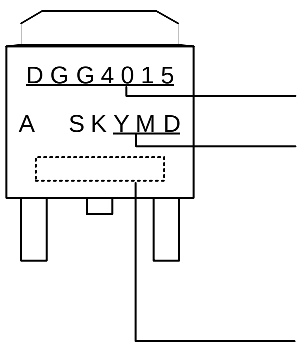




NOTES:

- Dimensions in millimeters
- Bare lead frame: Pb-free (RoHS compliant)
- When soldering the products, it is required to minimize the working time within the following limits:
  Reflow
  Preheat: 180 °C / 90 ± 30 s
  Solder heating: 250 °C / 10 ± 1s, 2 times (260 °C peak)
  Soldering Iron: 380 ± 10 °C / 3.5 ± 0.5 s, 1 time

Marking Diagram



Part Number

Lot Number:
Y is the last digit of the year of manufacture (0 to 9)
M is the month of the year (1 to 9, O, N, or D)
D is the day of the month
1-digit number: 1 to 9
2-digit number: A to Z (excluding B, I, O, and Q)

Control Number

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