

V_{CES}	1200V
I_C (100°C)	40A
$V_{CE(sat)}$ (Typ.)	1.7V
P_D	555W

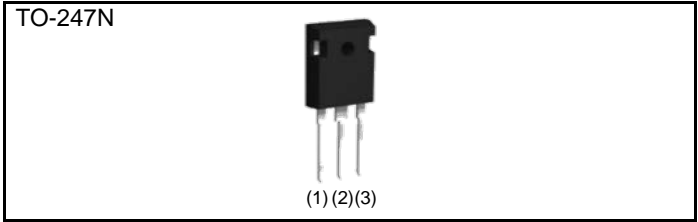
●Features

- 1) Low Collector - Emitter Saturation Voltage
- 2) Short Circuit Withstand Time 10 μ s
- 3) Qualified to AEC-Q101
- 4) Pb - free Lead Plating ; RoHS Compliant

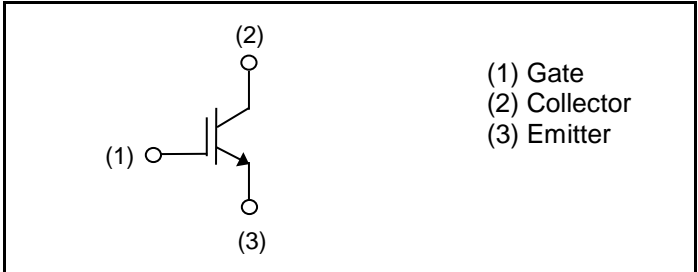
●Application

Heater for Automotive

●Outline



●Inner Circuit



●Packaging Specifications

Type	Packaging	Tube
	Reel Size (mm)	-
	Tape Width (mm)	-
	Basic Ordering Unit (pcs)	450
	Packing Code	C11
	Marking	RGS80TSX2

●Absolute Maximum Ratings (at $T_C = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit	
Collector - Emitter Voltage	V_{CES}	1200	V	
Gate - Emitter Voltage	V_{GES}	± 30	V	
Collector Current	$T_C = 25^\circ\text{C}$	I_C	80	A
	$T_C = 100^\circ\text{C}$	I_C	40	A
Pulsed Collector Current	I_{CP}^{*1}	120	A	
Power Dissipation	$T_C = 25^\circ\text{C}$	P_D	555	W
	$T_C = 100^\circ\text{C}$	P_D	277	W
Operating Junction Temperature	T_j	-40 to +175	$^\circ\text{C}$	
Storage Temperature	T_{stg}	-55 to +175	$^\circ\text{C}$	

*1 Pulse width limited by T_{jmax} .

●Thermal Resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal Resistance IGBT Junction - Case	$R_{\theta(j-c)}$	-	-	0.27	°C/W

●IGBT Electrical Characteristics (at $T_j = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Collector - Emitter Breakdown Voltage	BV_{CES}	$I_C = 10\mu\text{A}$, $V_{GE} = 0\text{V}$	1200	-	-	V
Collector Cut - off Current	I_{CES}	$V_{CE} = 1200\text{V}$, $V_{GE} = 0\text{V}$, $T_j = 25^\circ\text{C}$ $T_j = 175^\circ\text{C}^{*2}$	-	-	10	μA
			-	-	5	mA
Gate - Emitter Leakage Current	I_{GES}	$V_{GE} = \pm 30\text{V}$, $V_{CE} = 0\text{V}$	-	-	± 500	nA
Gate - Emitter Threshold Voltage	$V_{GE(th)}$	$V_{CE} = 5\text{V}$, $I_C = 6.1\text{mA}$	5.0	6.0	7.0	V
Collector - Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 40\text{A}$, $V_{GE} = 15\text{V}$, $T_j = 25^\circ\text{C}$ $T_j = 175^\circ\text{C}$	-	1.70	2.10	V
			-	2.20	-	V

●IGBT Electrical Characteristics (at $T_j = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input Capacitance	C_{ies}	$V_{CE} = 30\text{V}$,	-	2820	-	pF
Output Capacitance	C_{oes}	$V_{GE} = 0\text{V}$,	-	161	-	
Reverse transfer Capacitance	C_{res}	$f = 1\text{MHz}$	-	25	-	
Total Gate Charge	Q_g	$V_{CE} = 500\text{V}$,	-	104	-	nC
Gate - Emitter Charge	Q_{ge}	$I_C = 40\text{A}$,	-	25	-	
Gate - Collector Charge	Q_{gc}	$V_{GE} = 15\text{V}$	-	42	-	
Turn - on Delay Time	$t_{d(on)}$	$I_C = 40\text{A}$, $V_{CC} = 600\text{V}$, $V_{GE} = 15\text{V}$, $R_G = 10\Omega$, $T_j = 25^\circ\text{C}$ Inductive Load * E_{on} include diode reverse recovery	-	49	-	ns
Rise Time	t_r		-	27	-	
Turn - off Delay Time	$t_{d(off)}$		-	199	-	
Fall Time	t_f		-	227	-	
Turn - on Switching Loss	E_{on}		-	3.00	-	mJ
Turn - off Switching Loss	E_{off}		-	3.10	-	
Turn - on Delay Time	$t_{d(on)}$	$I_C = 40\text{A}$, $V_{CC} = 600\text{V}$, $V_{GE} = 15\text{V}$, $R_G = 10\Omega$, $T_j = 175^\circ\text{C}$ Inductive Load * E_{on} include diode reverse recovery	-	49	-	ns
Rise Time	t_r		-	40	-	
Turn - off Delay Time	$t_{d(off)}$		-	258	-	
Fall Time	t_f		-	371	-	
Turn - on Switching Loss	E_{on}		-	3.80	-	mJ
Turn - off Switching Loss	E_{off}		-	4.50	-	
Reverse Bias Safe Operating Area	RBSOA	$I_C = 120\text{A}$, $V_{CC} = 1050\text{V}$, $V_P = 1200\text{V}$, $V_{GE} = 15\text{V}$, $R_G = 50\Omega$, $T_j = 175^\circ\text{C}$	FULL SQUARE			-
Short Circuit Withstand Time	t_{sc}	$V_{CC} \leq 600\text{V}$, $V_{GE} = 15\text{V}$, $T_j = 25^\circ\text{C}$	10	-	-	μs
Short Circuit Withstand Time	t_{sc}^{*2}	$V_{CC} \leq 600\text{V}$, $V_{GE} = 15\text{V}$, $T_j = 150^\circ\text{C}$	8	-	-	μs

*2 Design assurance without measurement

●Electrical Characteristic Curves

Fig.1 Power Dissipation vs. Case Temperature

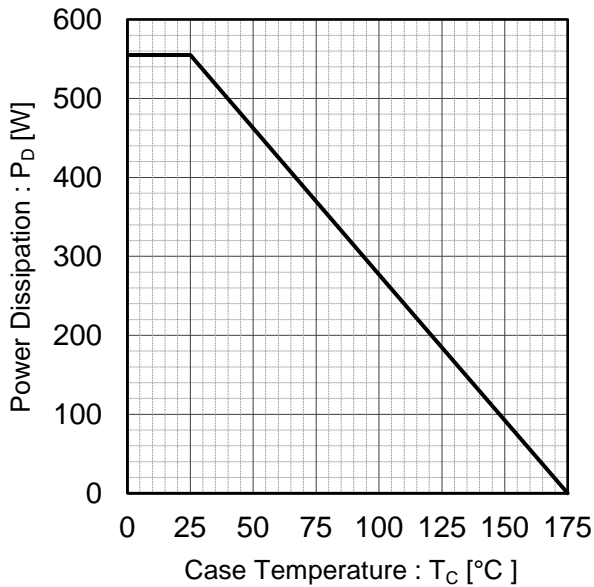


Fig.2 Collector Current vs. Case Temperature

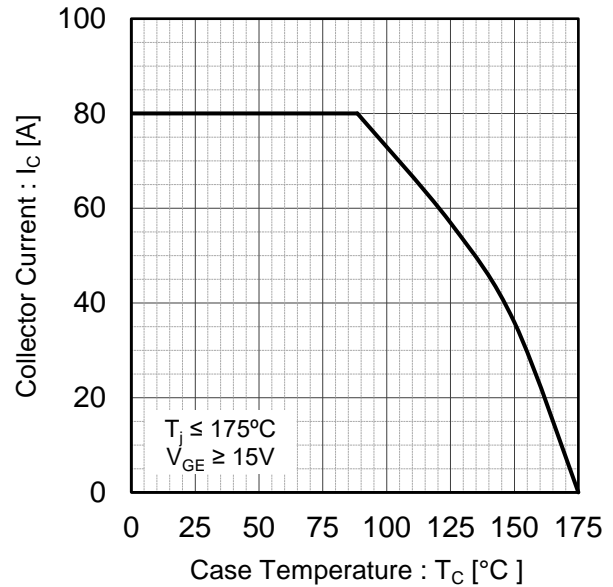


Fig.3 Forward Bias Safe Operating Area

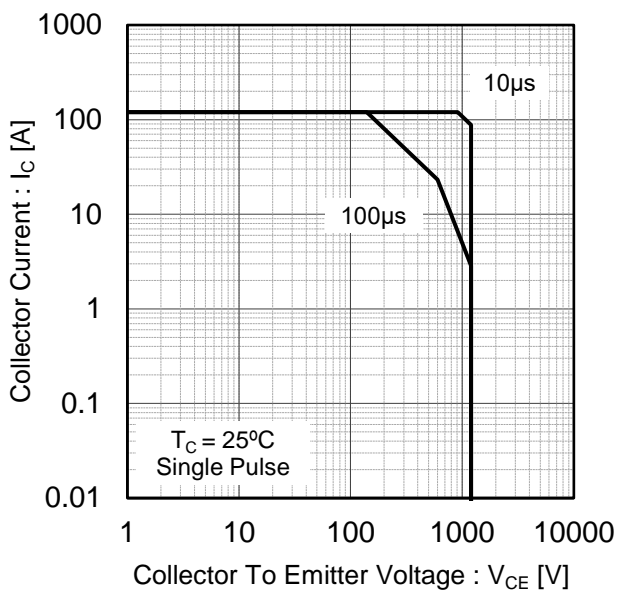
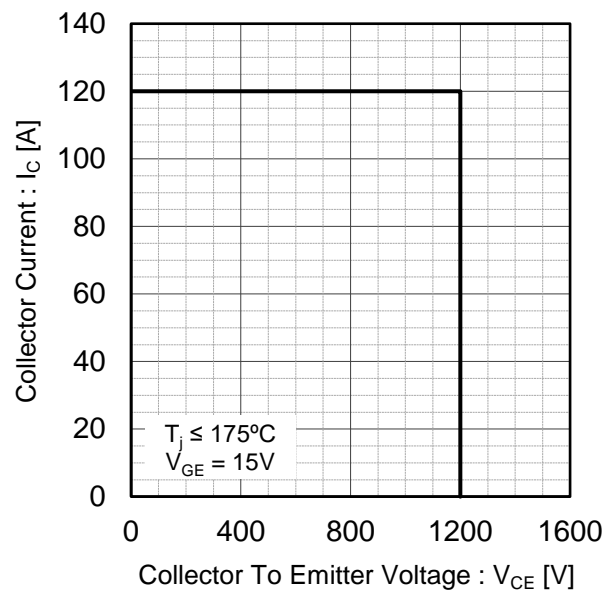


Fig.4 Reverse Bias Safe Operating Area



●Electrical Characteristic Curves

Fig.5 Typical Output Characteristics

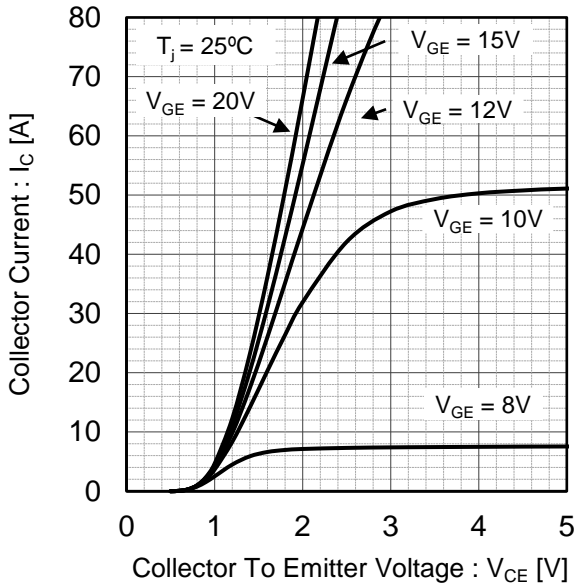


Fig.6 Typical Output Characteristics

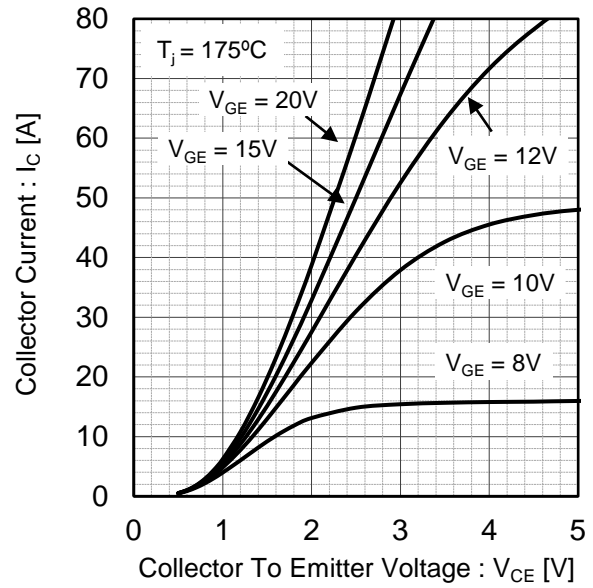


Fig.7 Typical Transfer Characteristics

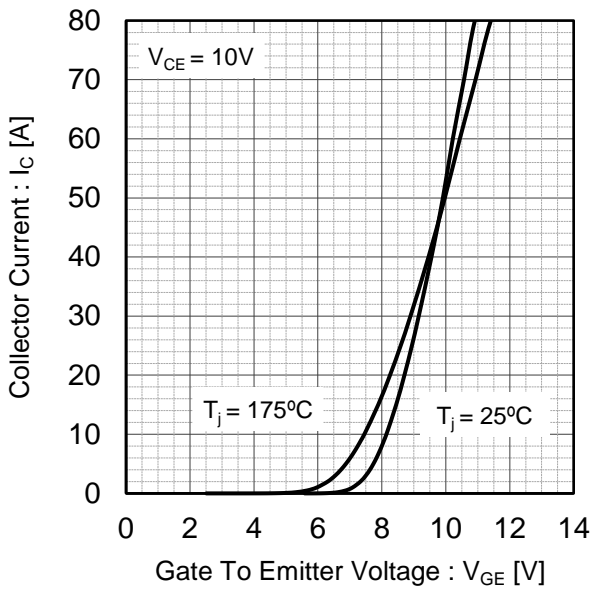
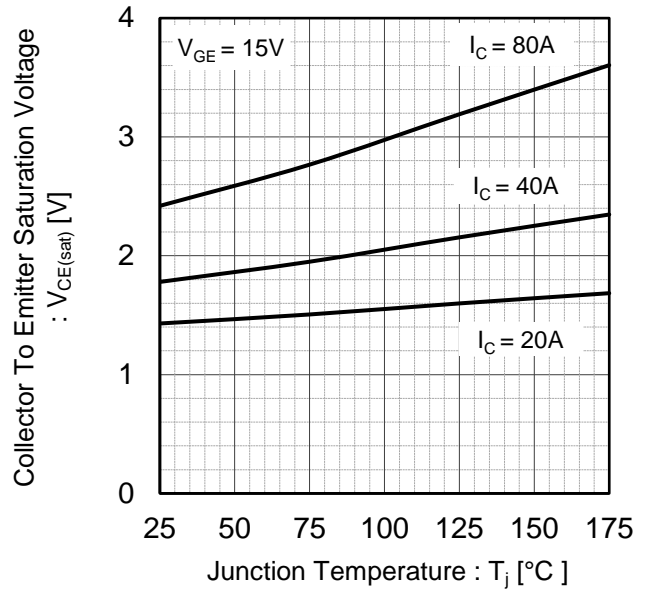


Fig.8 Typical Collector To Emitter Saturation Voltage vs. Junction Temperature



●Electrical Characteristic Curves

Fig.9 Typical Collector To Emitter Saturation Voltage vs. Gate To Emitter Voltage

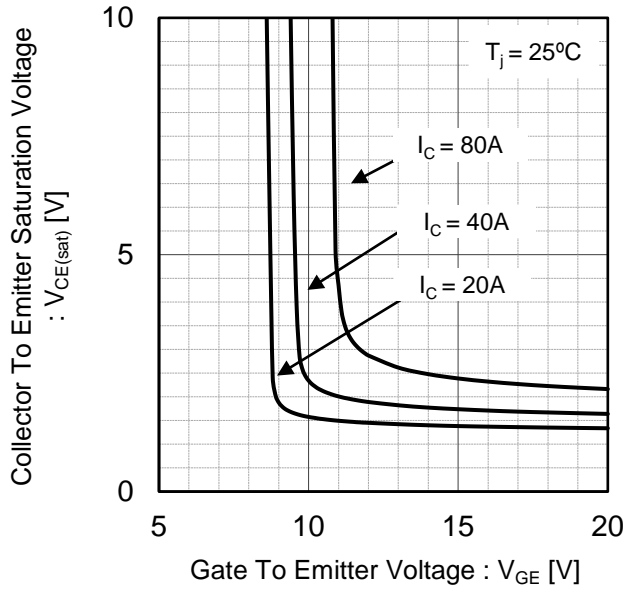


Fig.10 Typical Collector To Emitter Saturation Voltage vs. Gate To Emitter Voltage

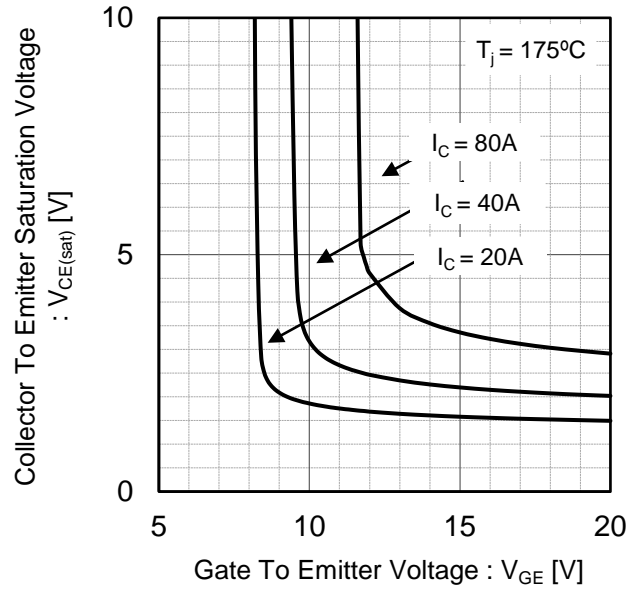


Fig.11 Typical Switching Time vs. Collector Current

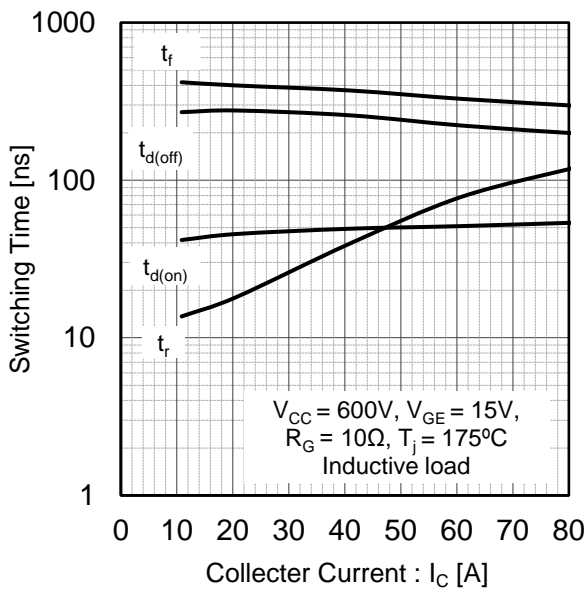
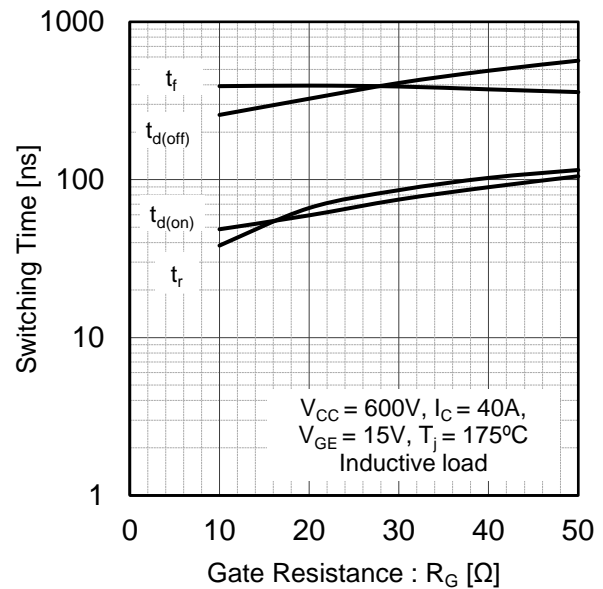


Fig.12 Typical Switching Time vs. Gate Resistance



●Electrical Characteristic Curves

Fig.13 Typical Switching Energy Losses vs. Collector Current

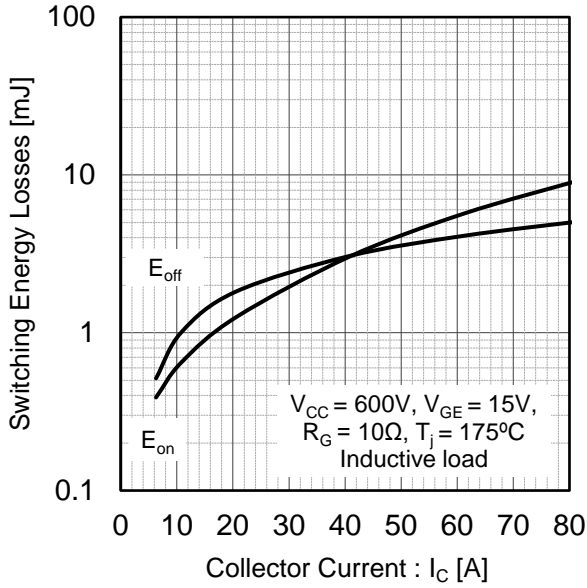


Fig.14 Typical Switching Energy Losses vs. Gate Resistance

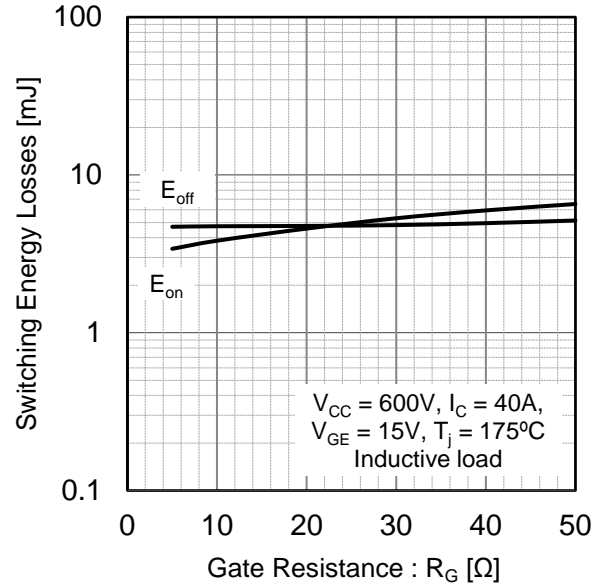


Fig.15 Typical Capacitance vs. Collector To Emitter Voltage

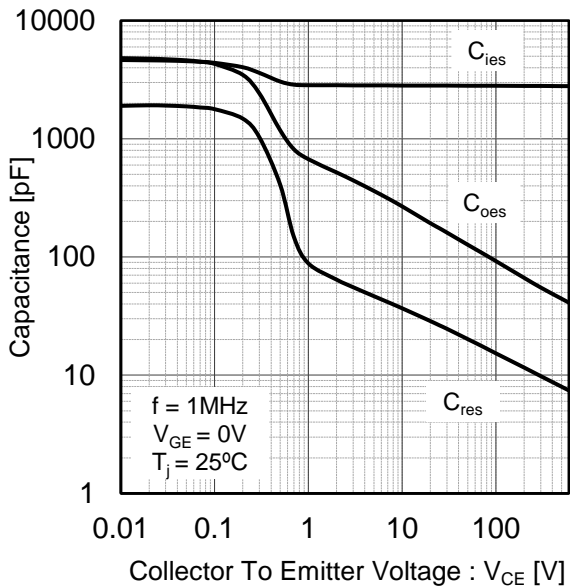
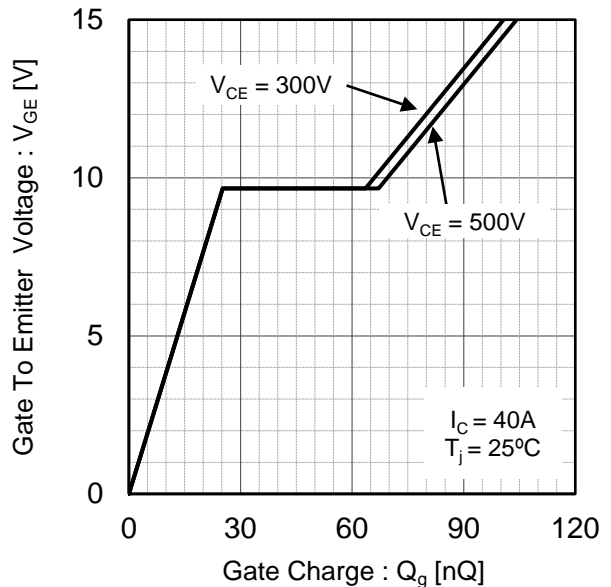
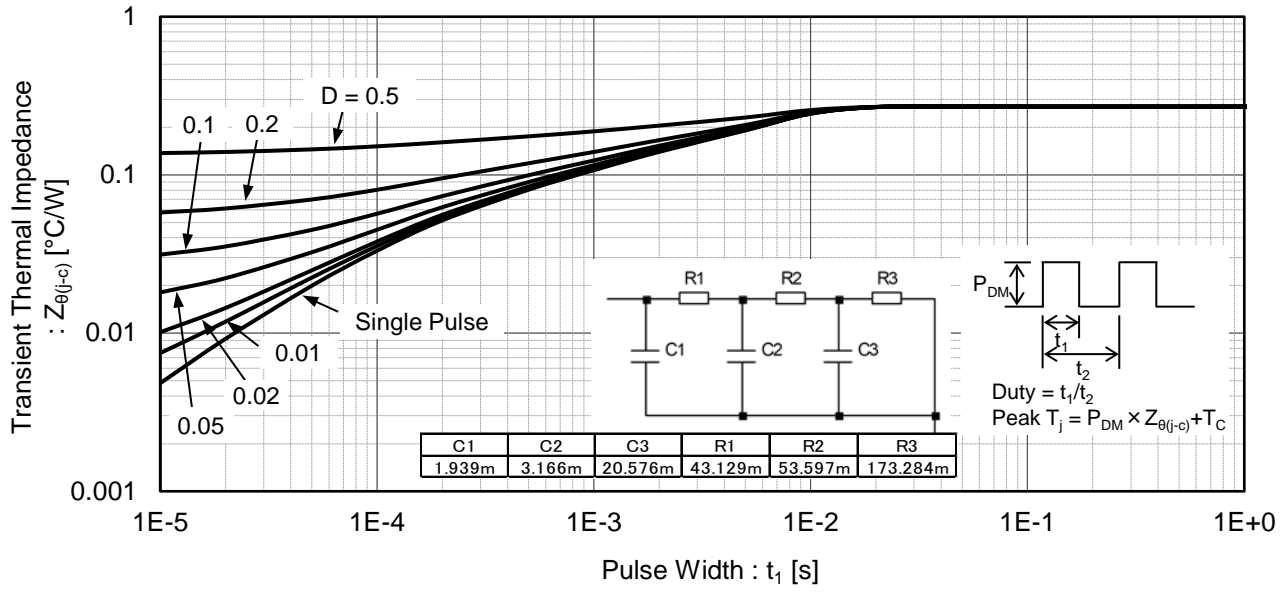


Fig.16 Typical Gate Charge



●Electrical Characteristic Curves

Fig.17 IGBT Transient Thermal Impedance



● Inductive Load Switching Circuit and Waveform

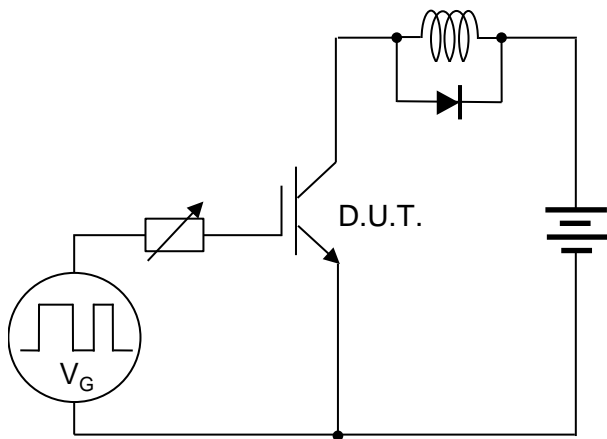


Fig.18 Inductive Load Circuit

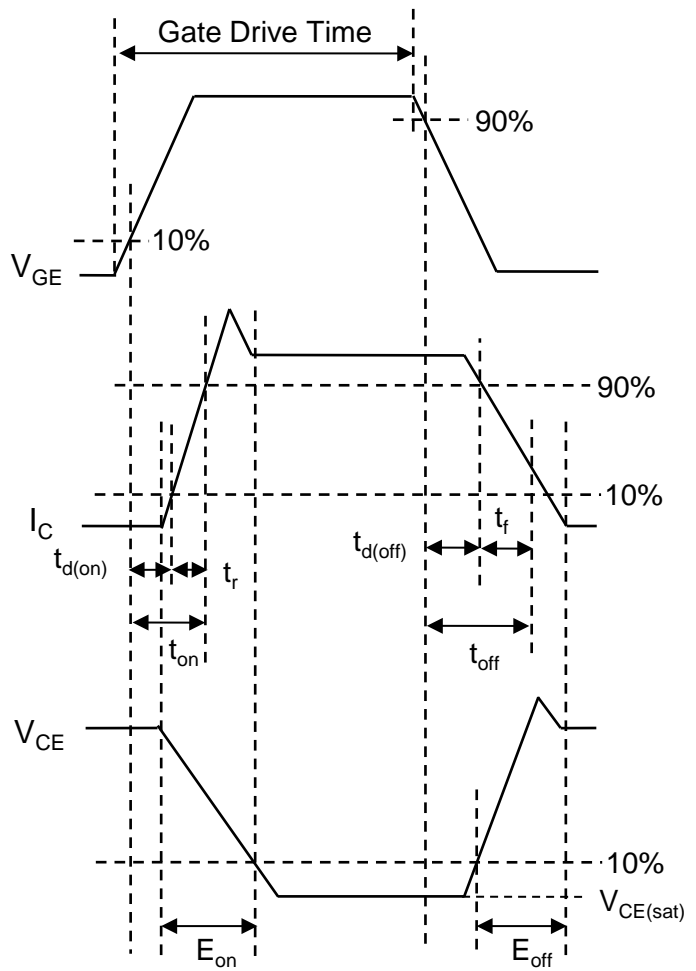


Fig.19 Inductive Load Waveform

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1. If you intend to use our Products in devices requiring extremely high reliability (such as medical equipment ^(Note 1), aircraft/spacecraft, nuclear power controllers, etc.) and whose malfunction or failure may cause loss of human life, bodily injury or serious damage to property ("Specific Applications"), please consult with the ROHM sales representative in advance. Unless otherwise agreed in writing by ROHM in advance, ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of any ROHM's Products for Specific Applications.

(Note1) Medical Equipment Classification of the Specific Applications

JAPAN	USA	EU	CHINA
CLASS III	CLASS III	CLASS II b	CLASS III
CLASS IV		CLASS III	

2. ROHM designs and manufactures its Products subject to strict quality control system. However, semiconductor products can fail or malfunction at a certain rate. Please be sure to implement, at your own responsibilities, adequate safety measures including but not limited to fail-safe design against the physical injury, damage to any property, which a failure or malfunction of our Products may cause. The following are examples of safety measures:
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 - [b] Installation of redundant circuits to reduce the impact of single or multiple circuit failure
3. Our Products are not designed under any special or extraordinary environments or conditions, as exemplified below. Accordingly, ROHM shall not be in any way responsible or liable for any damages, expenses or losses arising from the use of any ROHM's Products under any special or extraordinary environments or conditions. If you intend to use our Products under any special or extraordinary environments or conditions (as exemplified below), your independent verification and confirmation of product performance, reliability, etc. prior to use, must be necessary:
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 - [b] Use of our Products outdoors or in places where the Products are exposed to direct sunlight or dust
 - [c] Use of our Products in places where the Products are exposed to sea wind or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂
 - [d] Use of our Products in places where the Products are exposed to static electricity or electromagnetic waves
 - [e] Use of our Products in proximity to heat-producing components, plastic cords, or other flammable items
 - [f] Sealing or coating our Products with resin or other coating materials
 - [g] Use of our Products without cleaning residue of flux (Exclude cases where no-clean type fluxes is used. However, recommend sufficiently about the residue.); or Washing our Products by using water or water-soluble cleaning agents for cleaning residue after soldering
 - [h] Use of the Products in places subject to dew condensation
4. The Products are not subject to radiation-proof design.
5. Please verify and confirm characteristics of the final or mounted products in using the Products.
6. In particular, if a transient load (a large amount of load applied in a short period of time, such as pulse, is applied, confirmation of performance characteristics after on-board mounting is strongly recommended. Avoid applying power exceeding normal rated power; exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.
7. De-rate Power Dissipation depending on ambient temperature. When used in sealed area, confirm that it is the use in the range that does not exceed the maximum junction temperature.
8. Confirm that operation temperature is within the specified range described in the product specification.
9. ROHM shall not be in any way responsible or liable for failure induced under deviant condition from what is defined in this document.

Precaution for Mounting / Circuit board design

1. When a highly active halogenous (chlorine, bromine, etc.) flux is used, the residue of flux may negatively affect product performance and reliability.
2. In principle, the reflow soldering method must be used on a surface-mount products, the flow soldering method must be used on a through hole mount products. If the flow soldering method is preferred on a surface-mount products, please consult with the ROHM representative in advance.

For details, please refer to ROHM Mounting specification

Precautions Regarding Application Examples and External Circuits

1. If change is made to the constant of an external circuit, please allow a sufficient margin considering variations of the characteristics of the Products and external components, including transient characteristics, as well as static characteristics.
2. You agree that application notes, reference designs, and associated data and information contained in this document are presented only as guidance for Products use. Therefore, in case you use such information, you are solely responsible for it and you must exercise your own independent verification and judgment in the use of such information contained in this document. ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of such information.

Precaution for Electrostatic

This Product is electrostatic sensitive product, which may be damaged due to electrostatic discharge. Please take proper caution in your manufacturing process and storage so that voltage exceeding the Products maximum rating will not be applied to Products. Please take special care under dry condition (e.g. Grounding of human body / equipment / solder iron, isolation from charged objects, setting of Ionizer, friction prevention and temperature / humidity control).

Precaution for Storage / Transportation

1. Product performance and soldered connections may deteriorate if the Products are stored in the places where:
 - [a] the Products are exposed to sea winds or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂
 - [b] the temperature or humidity exceeds those recommended by ROHM
 - [c] the Products are exposed to direct sunshine or condensation
 - [d] the Products are exposed to high Electrostatic
2. Even under ROHM recommended storage condition, solderability of products out of recommended storage time period may be degraded. It is strongly recommended to confirm solderability before using Products of which storage time is exceeding the recommended storage time period.
3. Store / transport cartons in the correct direction, which is indicated on a carton with a symbol. Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.
4. Use Products within the specified time after opening a humidity barrier bag. Baking is required before using Products of which storage time is exceeding the recommended storage time period.

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Precaution for Disposition

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RGS80TSX2HR - Web Page

Part Number	RGS80TSX2HR
Package	TO-247N
Unit Quantity	450
Minimum Package Quantity	30
Packing Type	Tube
Constitution Materials List	inquiry
RoHS	Yes