

# RJH60A81RDPD-A0

600V - 5A - IGBT

Application: Inverter

R07DS1092EJ0200

Rev.2.00

Mar 24, 2015

## Features

- Reverse conducting IGBT with monolithic diode
- Short circuit withstand time (5  $\mu$ s typ.)
- Low collector to emitter saturation voltage  
 $V_{CE(sat)} = 2.0$  V typ. (at  $I_C = 5$  A,  $V_{GE} = 15$  V,  $T_a = 25^\circ\text{C}$ )
- Built-in fast recovery diode ( $t_{tr} = 100$  ns typ.) in one package
- Trench gate and thin wafer technology
- High speed switching  
 $t_f = 75$  ns typ. (at  $V_{CC} = 300$  V,  $V_{GE} = 15$  V,  $I_C = 5$  A,  $R_g = 5$   $\Omega$ ,  $T_a = 25^\circ\text{C}$ , inductive load)

## Outline

RENESAS Package code: PRSS0004ZK-A  
 (Package name : TO-252A)

1. Gate
2. Collector
3. Emitter
4. Collector

## Absolute Maximum Ratings

( $T_a = 25^\circ\text{C}$ )

Item	Symbol	Ratings	Unit
Collector to emitter voltage / diode reverse voltage	$V_{CES} / V_R$	600	V
Gate to emitter voltage	$V_{GES}$	$\pm 30$	V
Collector current	$T_c = 25^\circ\text{C}$	$I_C$	10
	$T_c = 100^\circ\text{C}$	$I_C$	5
Collector peak current	$I_{c(peak)}$ <sup>Note1</sup>	15	A
Collector to emitter diode forward current	$i_{DF}$	5	A
Collector to emitter diode forward peak current	$i_{DF(peak)}$ <sup>Note1</sup>	15	A
Collector dissipation	$P_C$ <sup>Note2</sup>	29.4	W
Junction to case thermal resistance (IGBT)	$\theta_{j-c}$ <sup>Note2</sup>	4.25	$^\circ\text{C}/\text{W}$
Junction temperature	$T_j$	150	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

Notes: 1.  $PW \leq 10$   $\mu$ s, duty cycle  $\leq 1\%$

2. Value at  $T_c = 25^\circ\text{C}$

## Electrical Characteristics

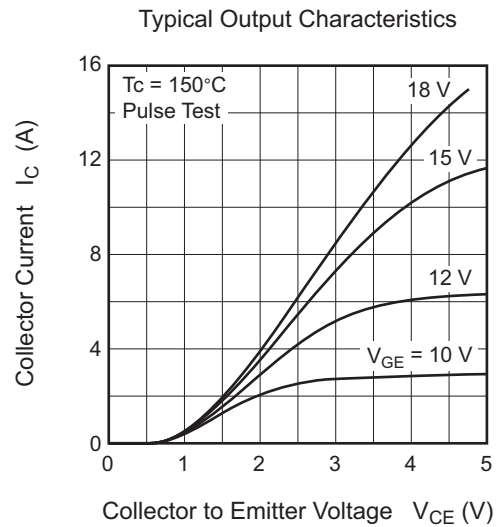
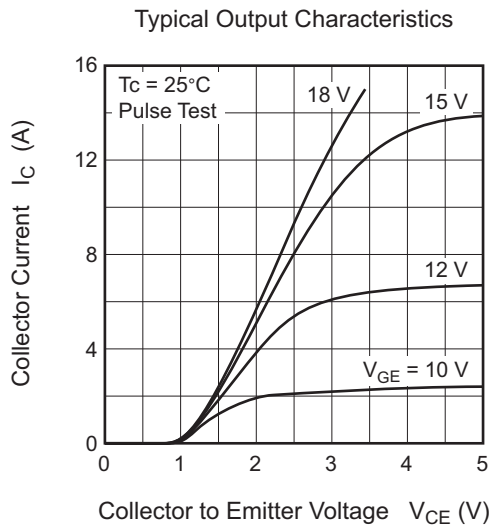
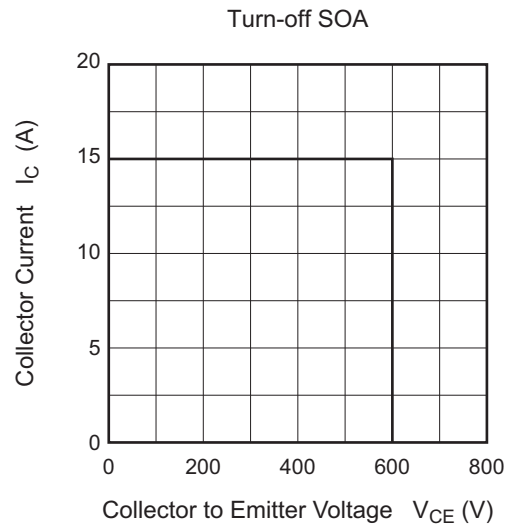
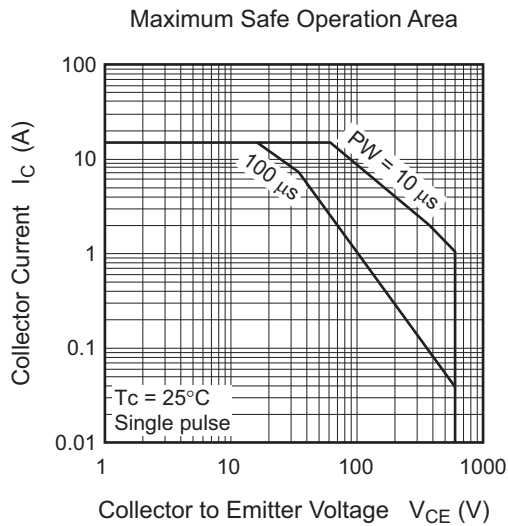
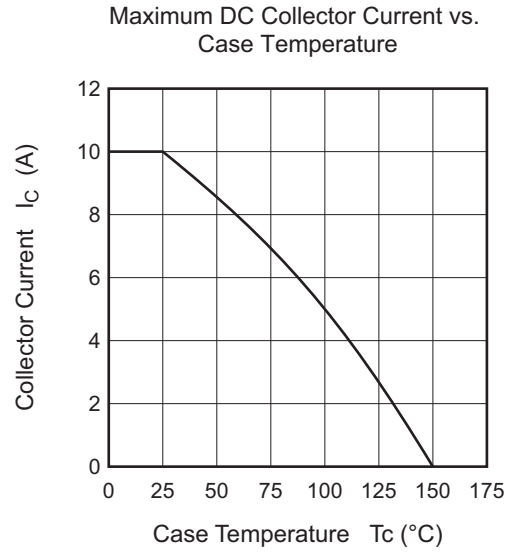
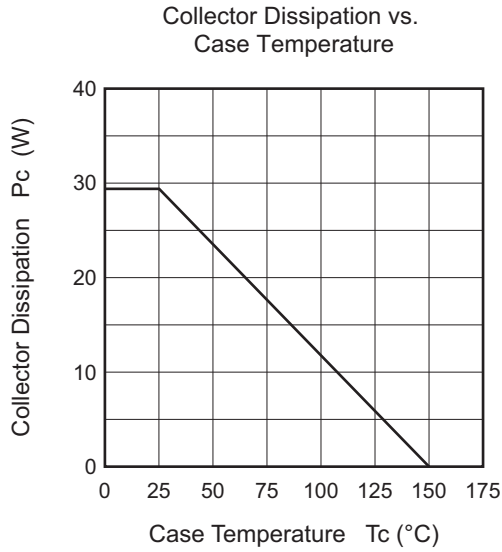
(Ta = 25°C)

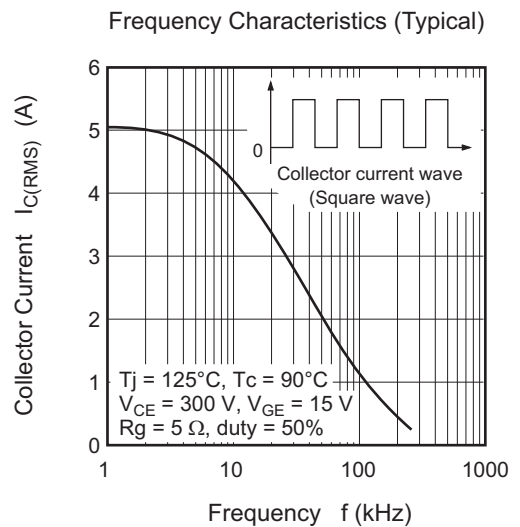
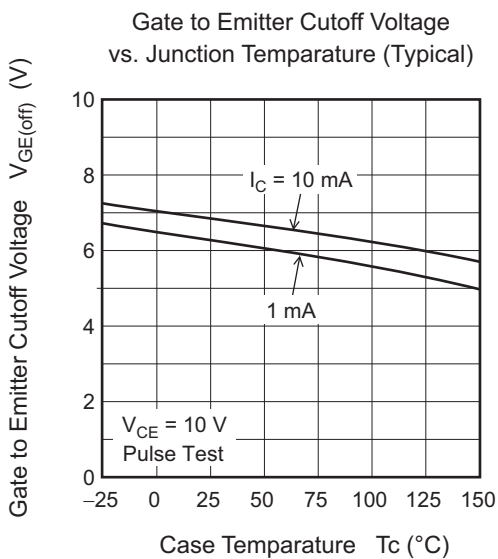
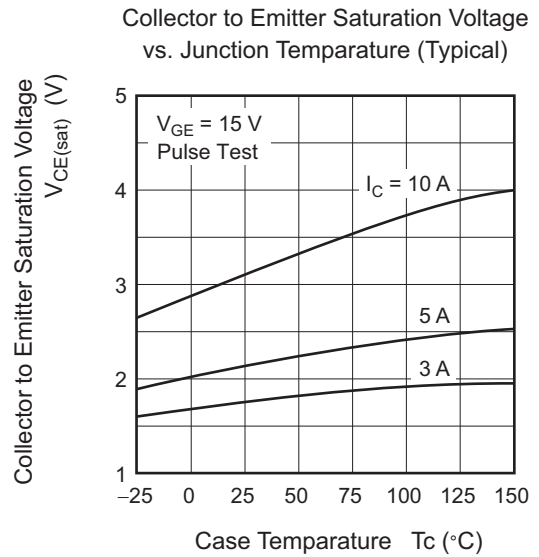
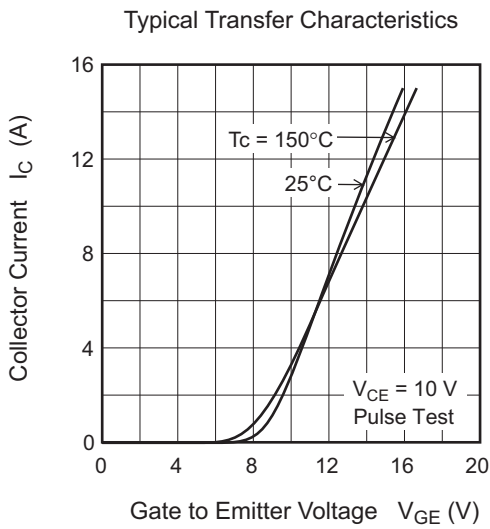
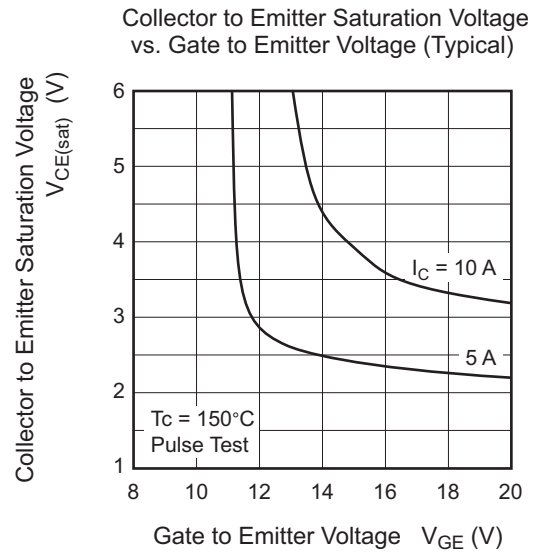
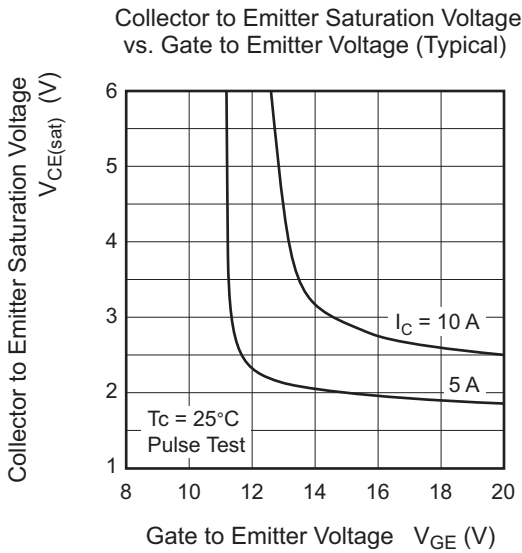
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Zero gate voltage collector current / diode reverse current	$I_{CES} / I_R$	—	—	1	$\mu\text{A}$	$V_{CE} = 600 \text{ V}, V_{GE} = 0 \text{ V}$
Gate to emitter leak current	$I_{GES}$	—	—	$\pm 100$	nA	$V_{GE} = \pm 30 \text{ V}, V_{CE} = 0 \text{ V}$
Gate to emitter cutoff voltage	$V_{GE(off)}$	4.5	—	7.5	V	$V_{CE} = 10 \text{ V}, I_C = 1 \text{ mA}$
Collector to emitter saturation voltage	$V_{CE(sat)}$	—	2.0	2.4	V	$I_C = 5 \text{ A}, V_{GE} = 15 \text{ V}$ Note3
	$V_{CE(sat)}$	—	2.9	—	V	$I_C = 10 \text{ A}, V_{GE} = 15 \text{ V}$ Note3
Input capacitance	$C_{ies}$	—	160	—	pF	$V_{CE} = 25 \text{ V}$
Output capacitance	$C_{oes}$	—	12	—	pF	$V_{GE} = 0 \text{ V}$
Reveres transfer capacitance	$C_{res}$	—	6	—	pF	$f = 1 \text{ MHz}$
Total gate charge	$Q_g$	—	11	—	nC	$V_{GE} = 15 \text{ V}$
Gate to emitter charge	$Q_{ge}$	—	2.5	—	nC	$V_{CE} = 300 \text{ V}$
Gate to collector charge	$Q_{gc}$	—	6.7	—	nC	$I_C = 5 \text{ A}$
Turn-on delay time	$t_{d(on)}$	—	30	—	ns	$V_{CC} = 300\text{V}$
Rise time	$t_r$	—	10	—	ns	$V_{GE} = 15 \text{ V}$
Turn-off delay time	$t_{d(off)}$	—	40	—	ns	$I_C = 5 \text{ A},$
Fall time	$t_f$	—	75	—	ns	$R_g = 5 \Omega$
Turn-on energy	$E_{on}$	—	0.13	—	mJ	Inductive load
Turn-off energy	$E_{off}$	—	0.06	—	mJ	
Total switching energy	$E_{total}$	—	0.19	—	mJ	
Short circuit withstand time	$t_{sc}$	3.0	5.0	—	$\mu\text{s}$	$V_{CE} \leq 360 \text{ V}, V_{GE} = 15 \text{ V}$ $T_j = 100^\circ\text{C}$

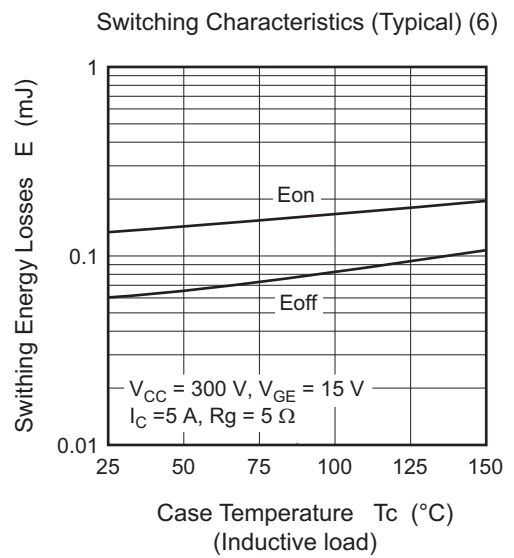
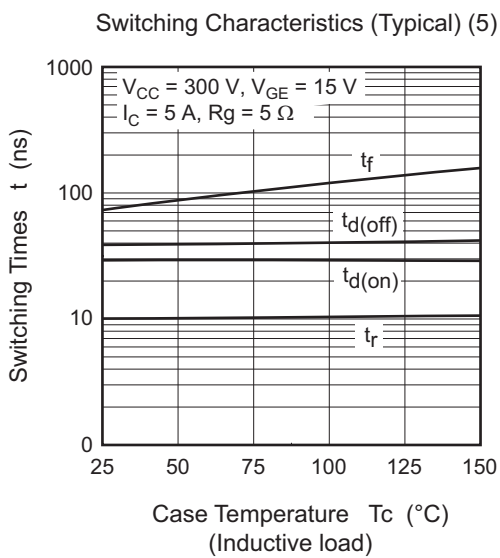
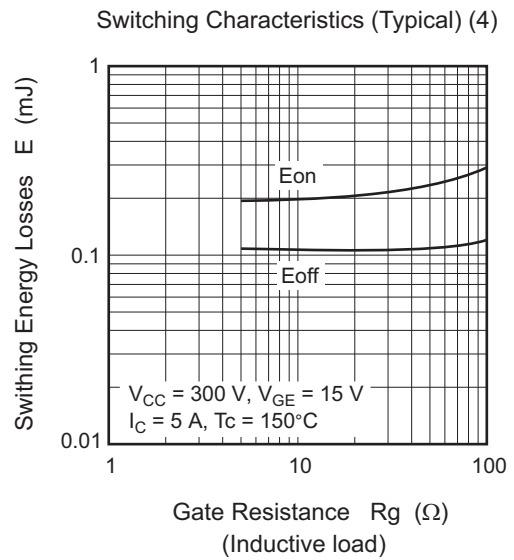
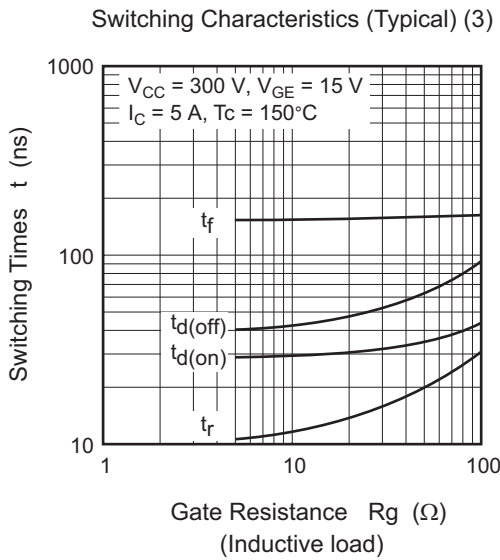
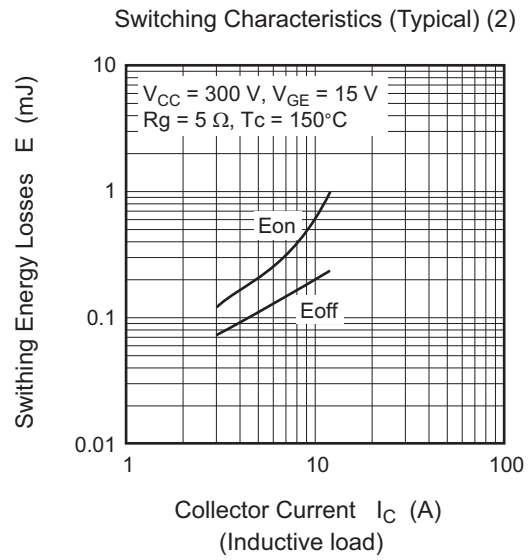
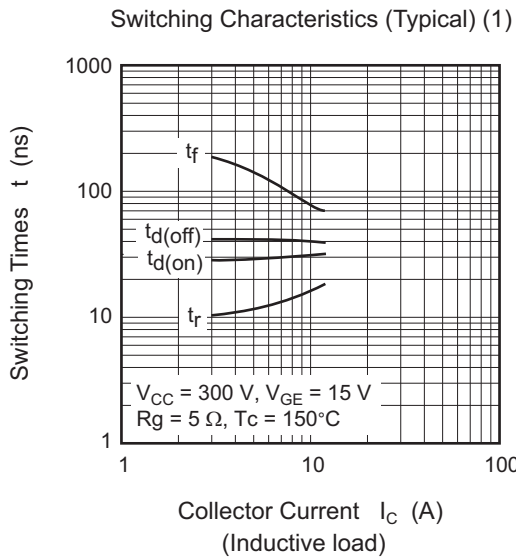
FRD Forward voltage	$V_F$	—	1.9	—	V	$I_F = 5 \text{ A}$ Note3
FRD reverse recovery time	$t_{rr}$	—	100	—	ns	$I_F = 5 \text{ A}$ $di_F/dt = 100 \text{ A}/\mu\text{s}$
FRD reverse recovery charge	$Q_{rr}$	—	0.26	—	$\mu\text{C}$	
FRD peak reverse recovery current	$I_{rr}$	—	5.2	—	A	

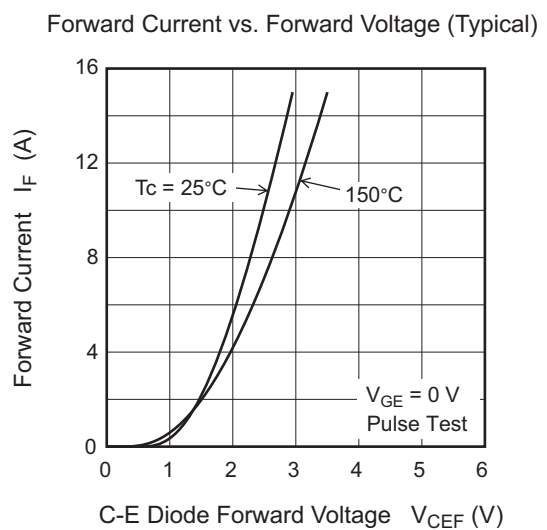
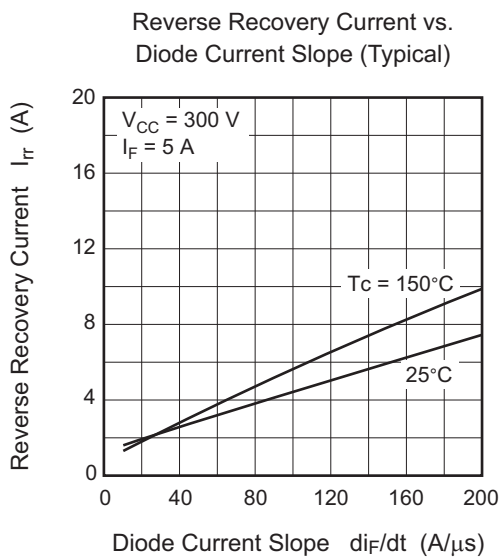
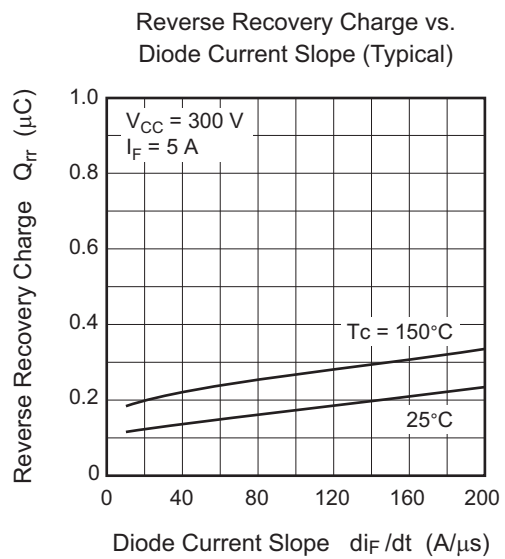
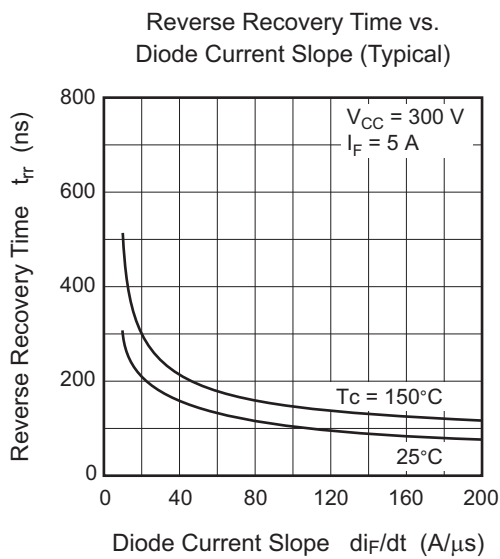
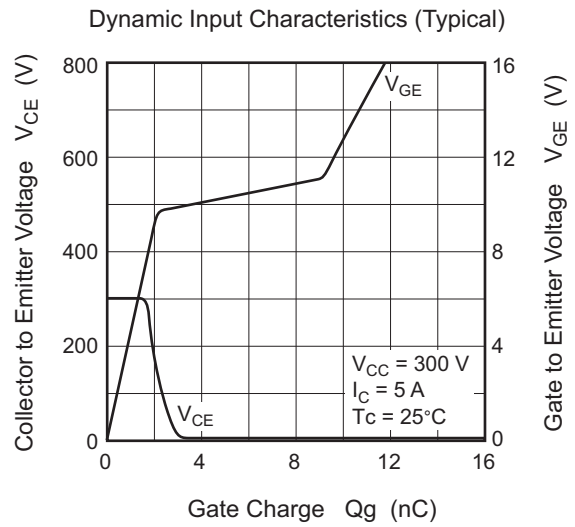
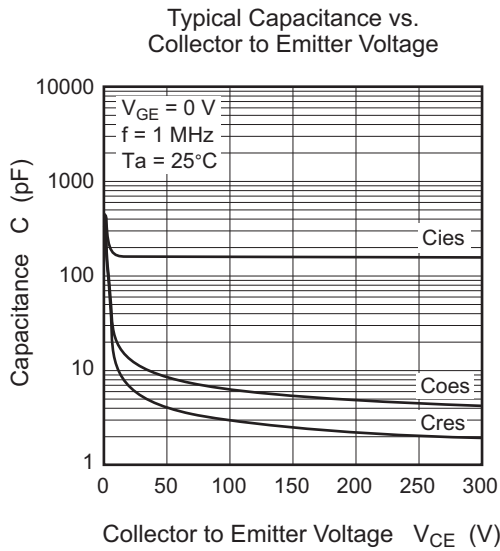
Notes: 3. Pulse test.

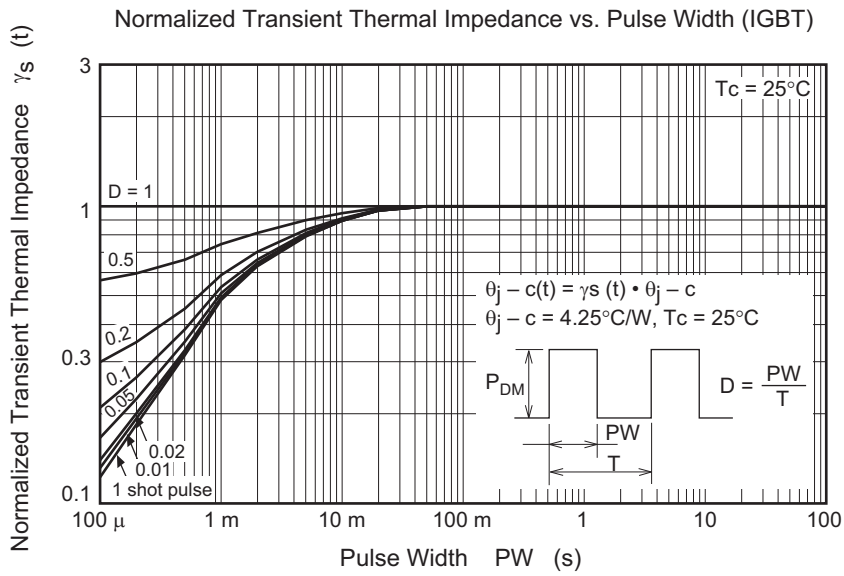
## Main Characteristics



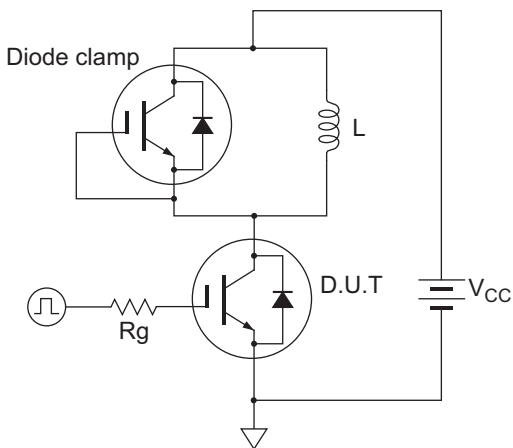




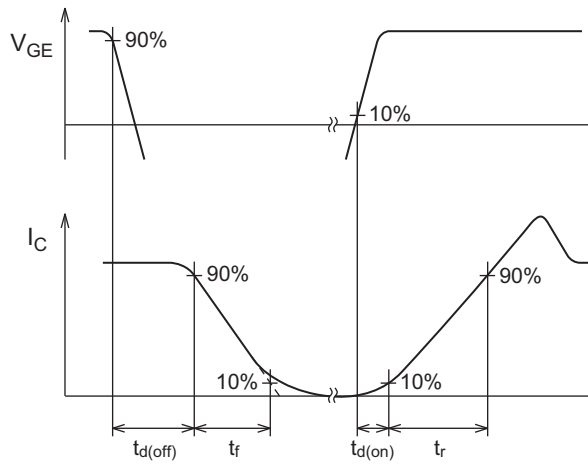




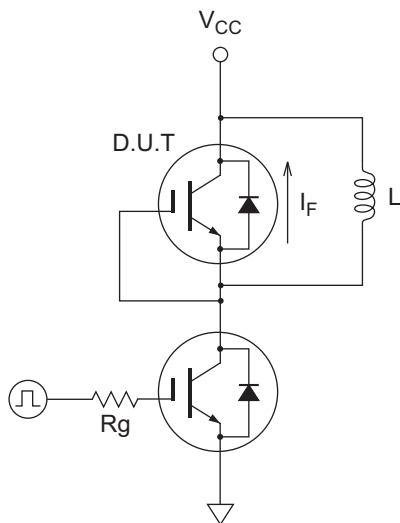
Switching Time Test Circuit



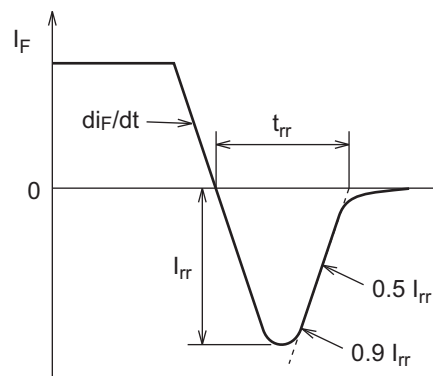
Waveform



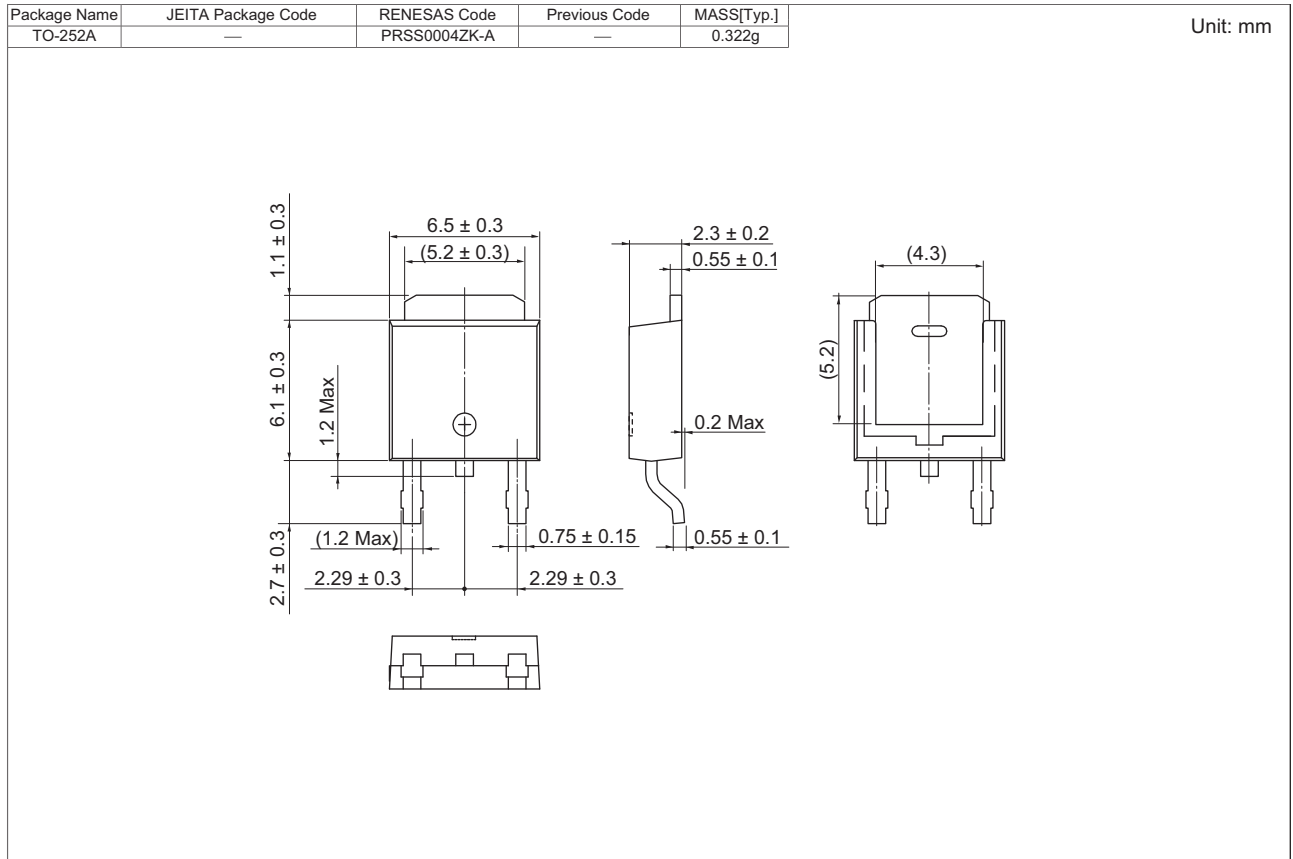
Diode Reverse Recovery Time Test Circuit



Waveform



Package Dimension



Ordering Information

Orderable Part Number	Quantity	Shipping Container
RJH60A81RDPD-E0#J2	3000 pcs	Taping



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