

# RJH60T04DPQ-A1

600V - 30A - IGBT

Application: Current resonance circuit

R07DS1191EJ0200

Rev.2.00

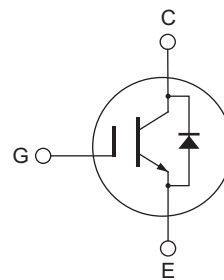
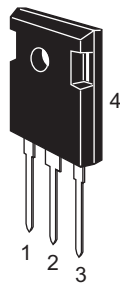
Apr 02, 2014

## Features

- Optimized for current resonance application
- Low collector to emitter saturation voltage  
 $V_{CE(sat)} = 1.5 \text{ V typ. (at } I_C = 30 \text{ A, } V_{GE} = 15 \text{ V, } T_a = 25^\circ\text{C)}$
- Built in fast recovery diode in one package
- Trench gate and thin wafer technology
- High speed switching  
 $t_f = 45 \text{ ns typ. (at } V_{CC} = 400 \text{ V, } V_{GE} = 15 \text{ V, } I_C = 30 \text{ A, } R_g = 10 \Omega, T_a = 25^\circ\text{C, Inductive load)}$
- Low tail loss  
 $E_{tail} = 160 \mu\text{J typ. (at } V_{CC} = 300 \text{ V, } V_{GE} = 20 \text{ V, } I_C = 50 \text{ A, } R_g = 15 \Omega, T_c = 125^\circ\text{C, current resonance circuit)}$

## Outline

RENESAS Package code: PRSS0003ZH-A  
 (Package name: TO-247A)



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

## Absolute Maximum Ratings

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

Item	Symbol	Ratings	Unit	
Collector to emitter voltage	$V_{CES}$	600	V	
Gate to emitter voltage	$V_{GES}$	$\pm 30$	V	
Collector current	$I_C$ <sup>Note1</sup>	$T_c = 25^\circ\text{C}$	60	A
		$T_c = 100^\circ\text{C}$	30	A
Collector peak current	$I_{C(peak)}$ <sup>Note1</sup>	180	A	
Collector to emitter diode forward peak current	$I_{DF(peak)}$ <sup>Note2</sup>	80	A	
Collector dissipation	$P_C$	208.3	W	
Junction to case thermal impedance (IGBT)	$\theta_{j-c}$	0.6	$^\circ\text{C/W}$	
Junction to case thermal impedance (Diode)	$\theta_{j-cd}$	2.1	$^\circ\text{C/W}$	
Junction temperature	$T_j$	150	$^\circ\text{C}$	
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$	

Notes: 1. Pulse width limited by safe operating area.

2.  $PW \leq 5 \mu\text{s}$ , duty cycle  $\leq 1\%$

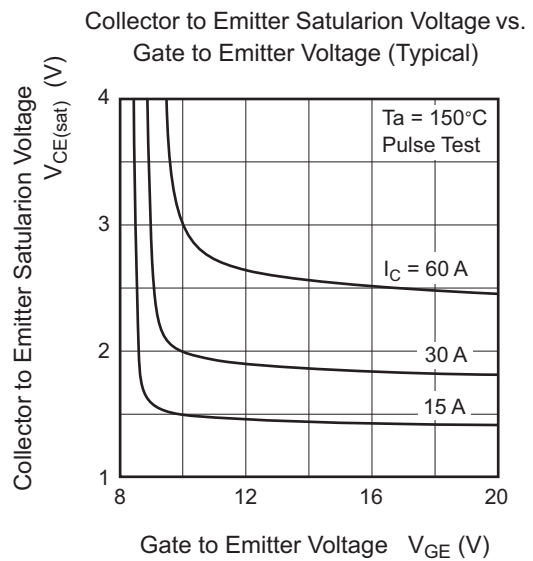
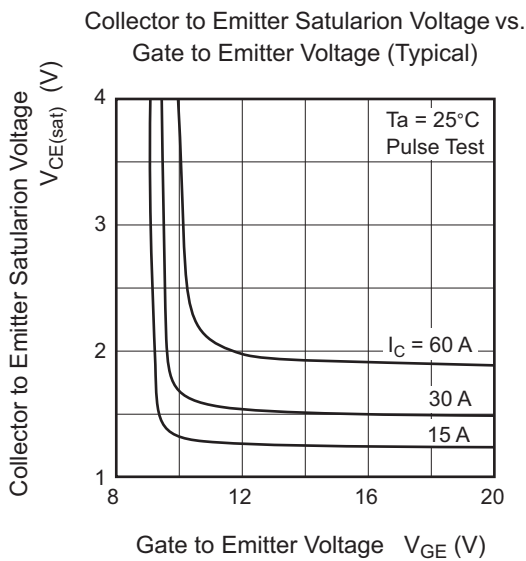
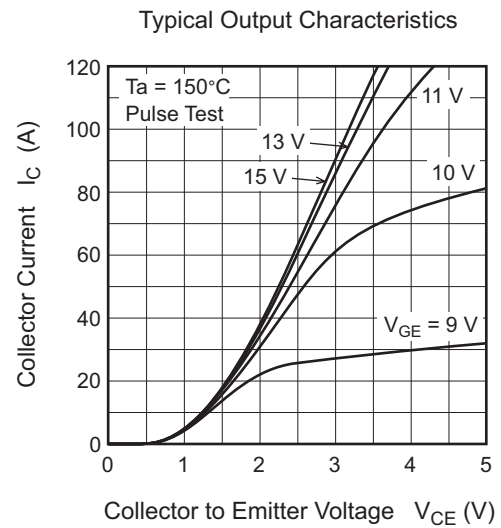
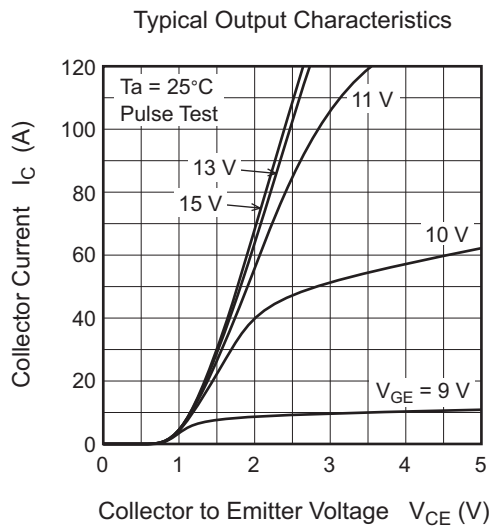
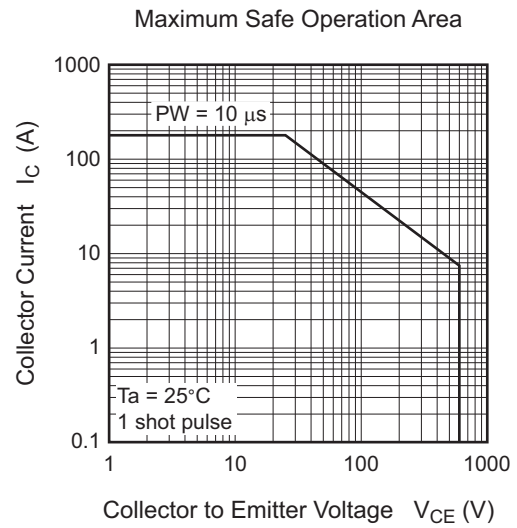
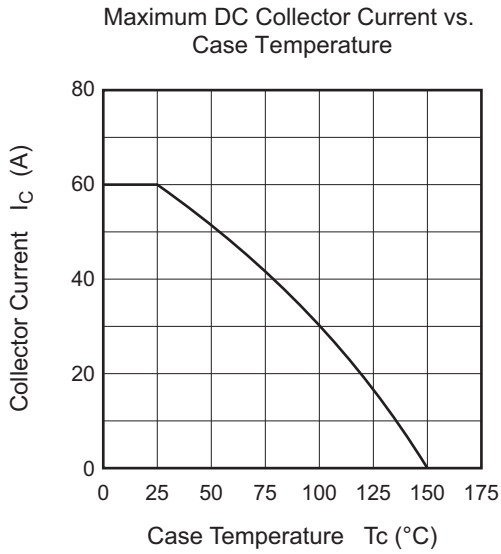
## Electrical Characteristics

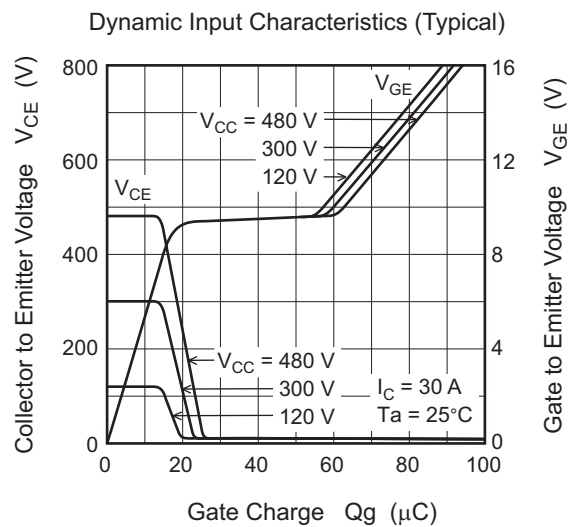
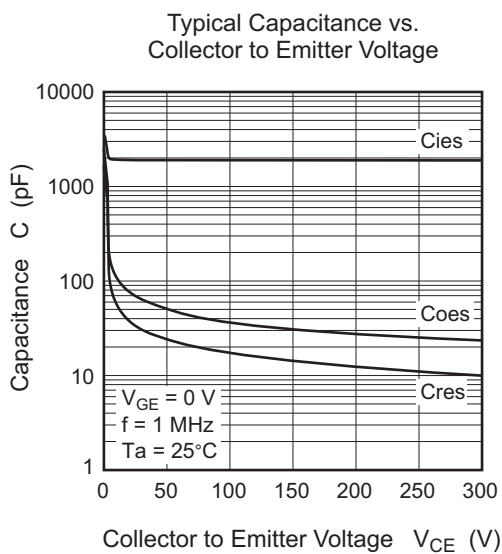
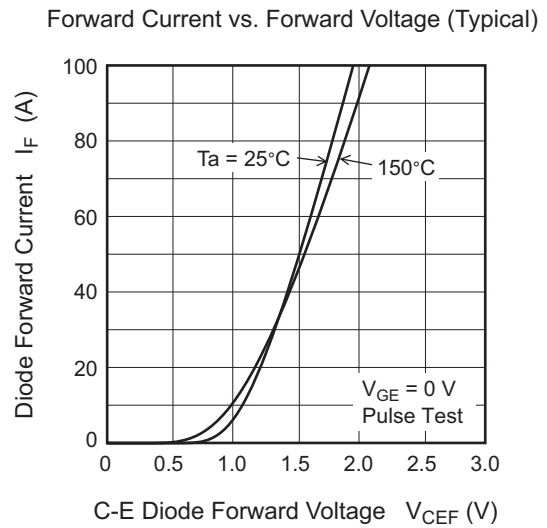
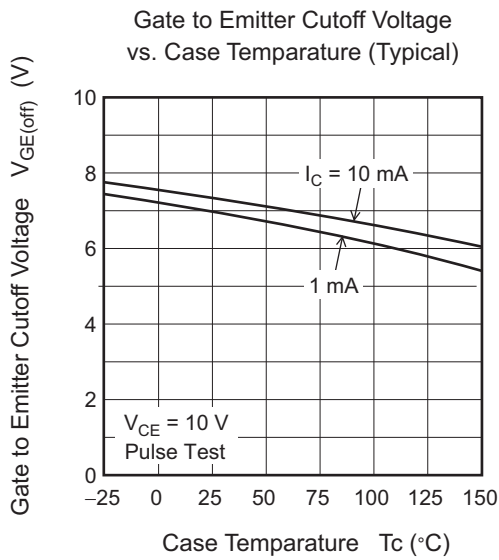
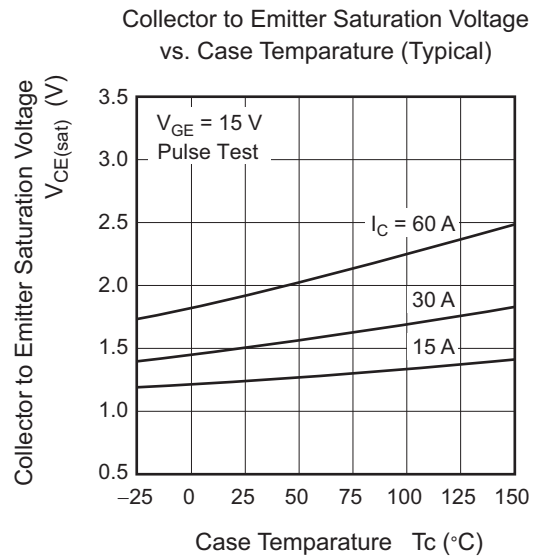
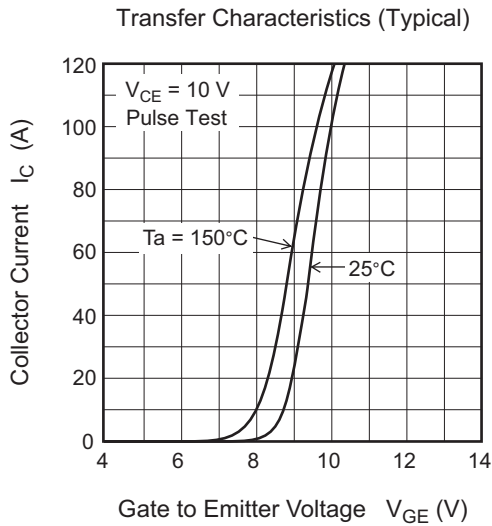
(Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Zero gate voltage collector current	$I_{CES}$	—	—	100	$\mu\text{A}$	$V_{CE} = 600\text{ V}, V_{GE} = 0$
Gate to emitter leak current	$I_{GES}$	—	—	$\pm 1$	$\mu\text{A}$	$V_{GE} = \pm 30\text{ V}, V_{CE} = 0$
Gate to emitter cutoff voltage	$V_{GE(\text{off})}$	4	—	8	V	$V_{CE} = 10\text{ V}, I_C = 1\text{ mA}$
Collector to emitter saturation voltage	$V_{CE(\text{sat})}$	—	1.50	1.95	V	$I_C = 30\text{ A}, V_{GE} = 15\text{ V}$ <sup>Note3</sup>
Input capacitance	$C_{ies}$	—	1910	—	pF	$V_{CE} = 25\text{ V}$ $V_{GE} = 0$ $f = 1\text{ MHz}$
Output capacitance	$C_{oes}$	—	69	—	pF	
Reveres transfer capacitance	$C_{res}$	—	34	—	pF	
Total gate charge	$Q_g$	—	87	—	nC	$V_{GE} = 15\text{ V}$
Gate to emitter charge	$Q_{ge}$	—	18	—	nC	$V_{CE} = 300\text{ V}$
Gate to collector charge	$Q_{gc}$	—	41	—	nC	$I_C = 30\text{ A}$
Turn-on delay time	$t_{d(\text{on})}$	—	54	—	ns	$V_{CC} = 400\text{ V}$ $V_{GE} = 15\text{ V}$ $I_C = 30\text{ A}, R_g = 10\ \Omega$ Inductive load
Rise time	$t_r$	—	52	—	ns	
Turn-off delay time	$t_{d(\text{off})}$	—	136	—	ns	
Fall time	$t_f$	—	45	—	ns	
Tail loss	$E_{\text{tail}}$	—	160	—	$\mu\text{J}$	$V_{CC} = 300\text{ V}, V_{GE} = 20\text{ V}$ $I_C = 50\text{ A}, R_g = 15\ \Omega$ $T_c = 125^\circ\text{C}$ Current resonance circuit
C-E diode forward voltage	$V_{ECF}$	—	1.2	1.6	V	$I_F = 20\text{ A}$ <sup>Note3</sup>
C-E diode reverse recovery time	$t_{rr}$	—	100	—	ns	$I_F = 10\text{ A}$ $di_F/dt = -100\text{ A}/\mu\text{s}$

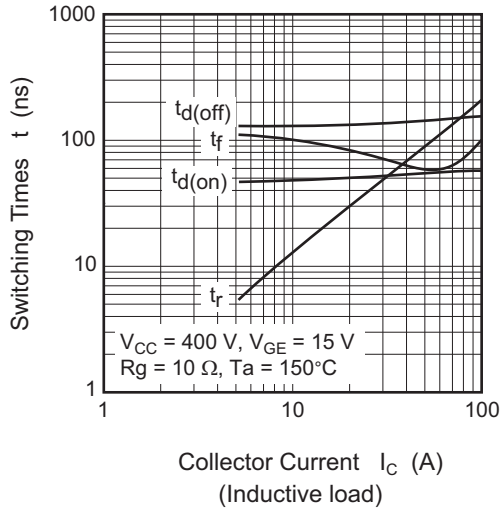
Notes: 3. Pulse test

Main Characteristics

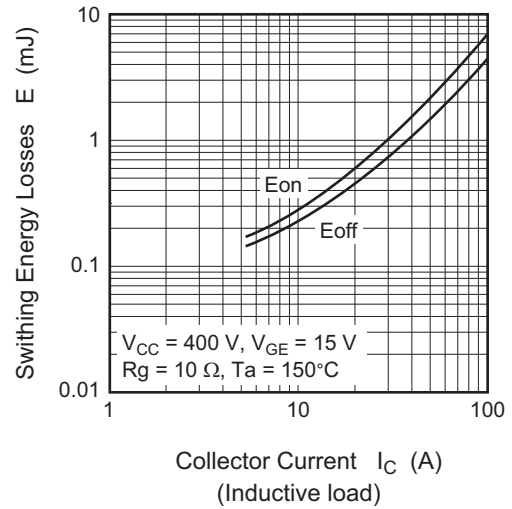




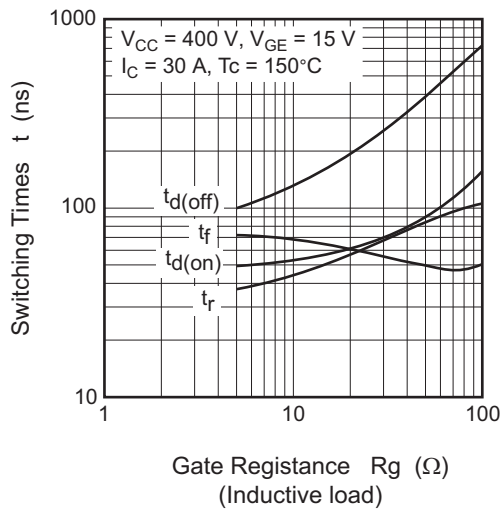
Switching Characteristics (Typical) (1)



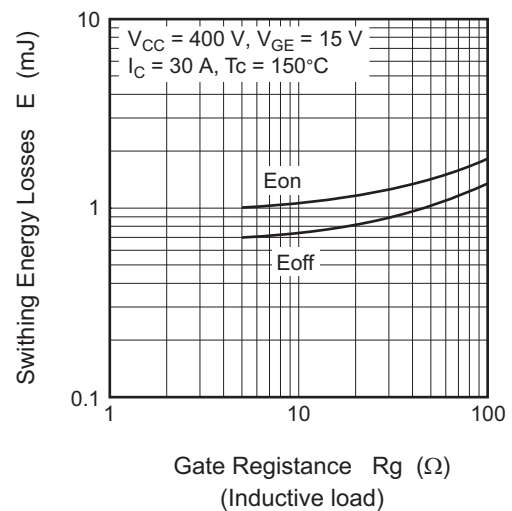
Switching Characteristics (Typical) (2)



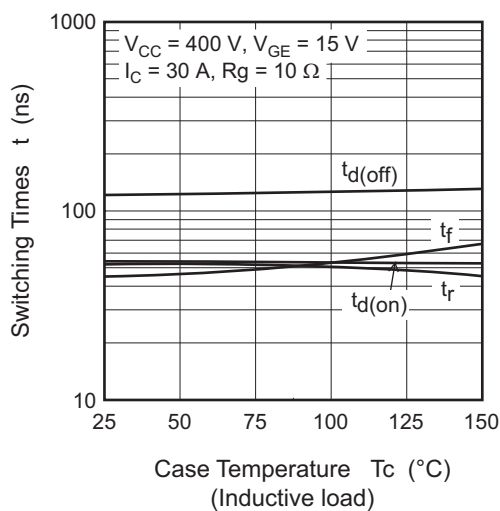
Switching Characteristics (Typical) (3)



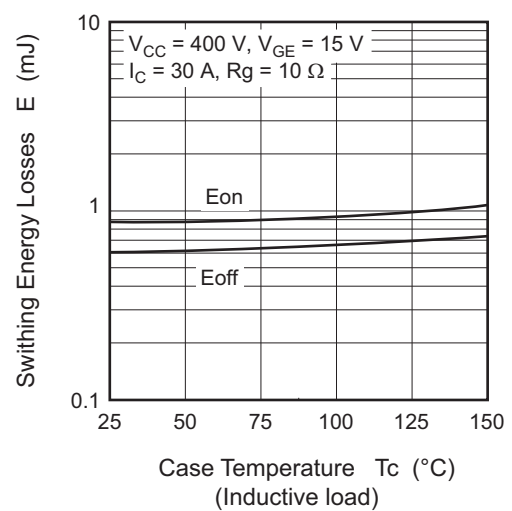
Switching Characteristics (Typical) (4)

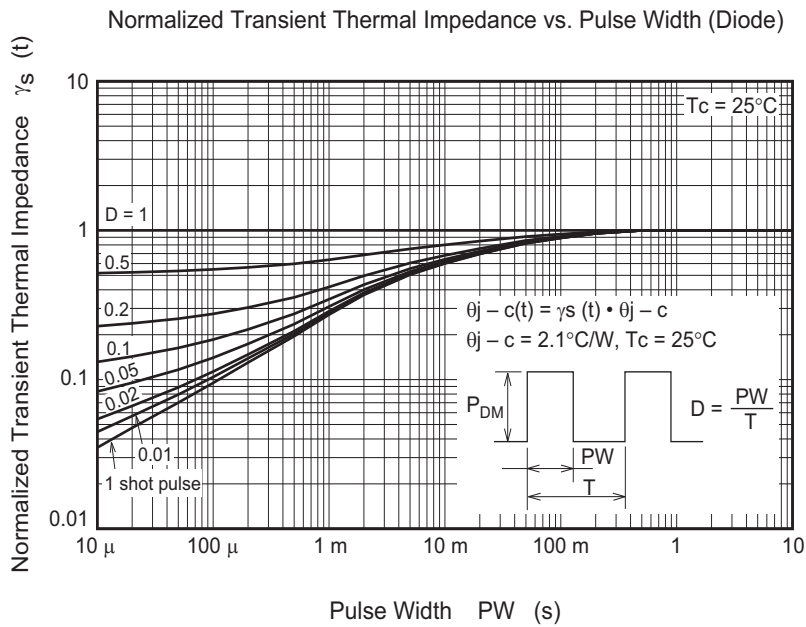
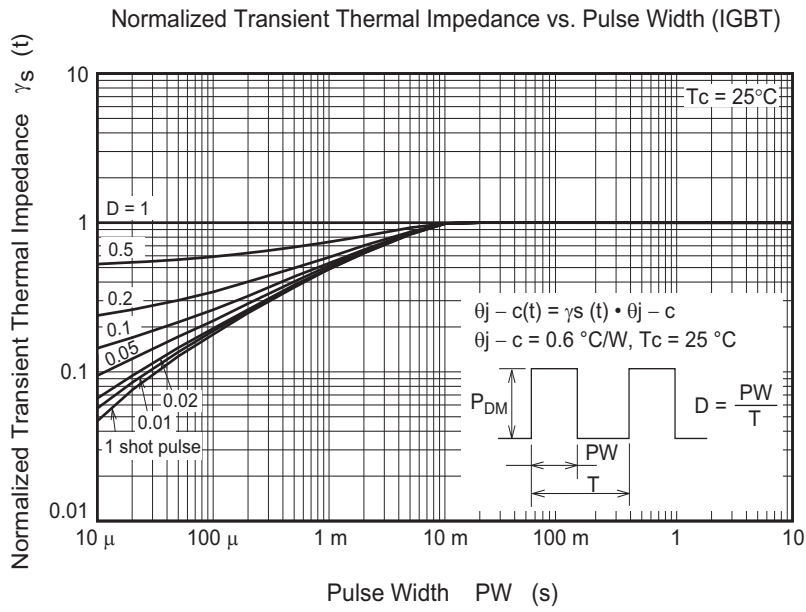


Switching Characteristics (Typical) (5)

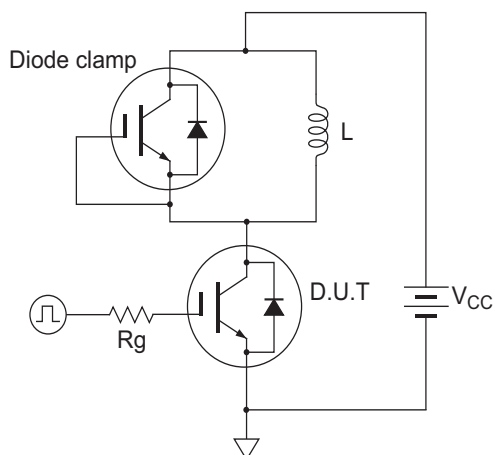


Switching Characteristics (Typical) (6)

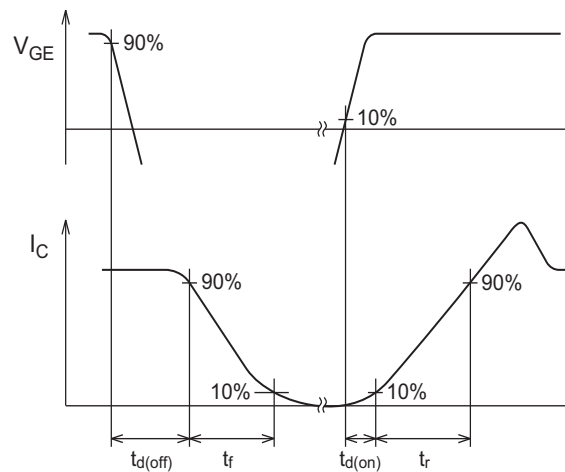




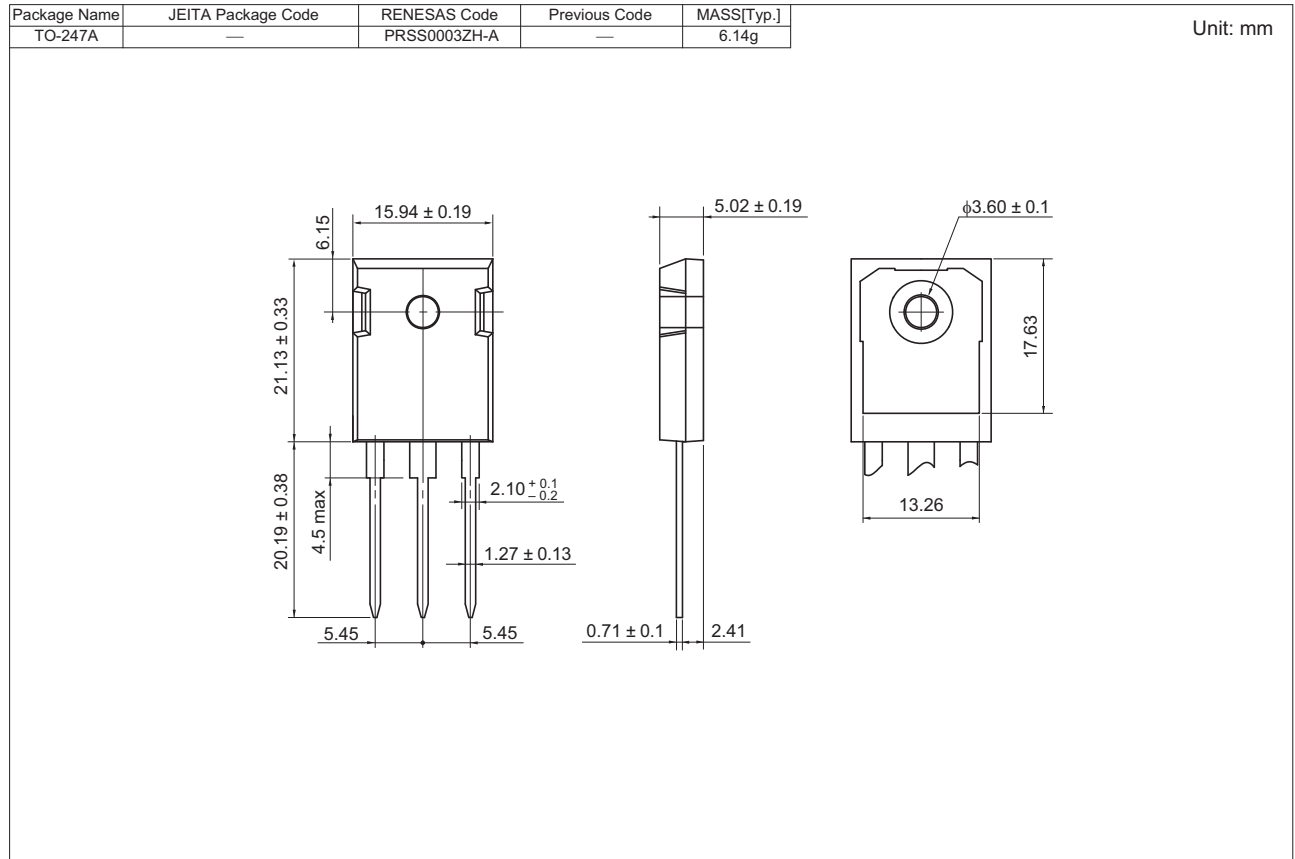
Switching Time Test Circuit



Waveform



### Package Dimensions



### Ordering Information

Orderable Part Number	Quantity	Shipping Container
RJH60T04DPQ-A1#T0	240 pcs	Box (Tube)

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