

# RJH60F5BDPQ-A0

600V - 40A - IGBT  
High Speed Power Switching

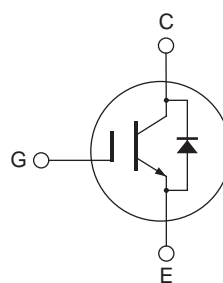
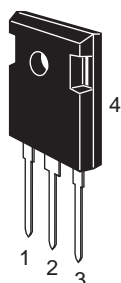
R07DS0631EJ0100  
Rev.1.00  
Feb 17, 2012

## Features

- Low collector to emitter saturation voltage  
 $V_{CE(sat)} = 1.37 \text{ V typ. (} I_C = 40 \text{ A, } V_{GE} = 15 \text{ V, } T_a = 25^\circ\text{C)}$
- Built in fast recovery diode in one package
- Trench gate and thin wafer technology
- High speed switching  
 $t_f = 68 \text{ ns typ. (at } I_C = 30 \text{ A, } V_{CE} = 400 \text{ V, } V_{GE} = 15 \text{ V, } R_g = 5 \Omega, T_a = 25^\circ\text{C, inductive load)}$

## 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	$T_c = 25^\circ\text{C}$	$I_C$	80	A
	$T_c = 100^\circ\text{C}$	$I_C$	40	A
Collector peak current	$i_{c(peak)}$ <sup>Note1</sup>	160	A	
Collector to emitter diode forward peak current	$i_{DF(peak)}$ <sup>Note2</sup>	100	A	
Collector dissipation	$P_C$	260.4	W	
Junction to case thermal impedance (IGBT)	$\theta_{j-c}$	0.48	$^\circ\text{C/W}$	
Junction to case thermal impedance (Diode)	$\theta_{j-cd}$	1.1	$^\circ\text{C/W}$	
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  $\leq 1\%$

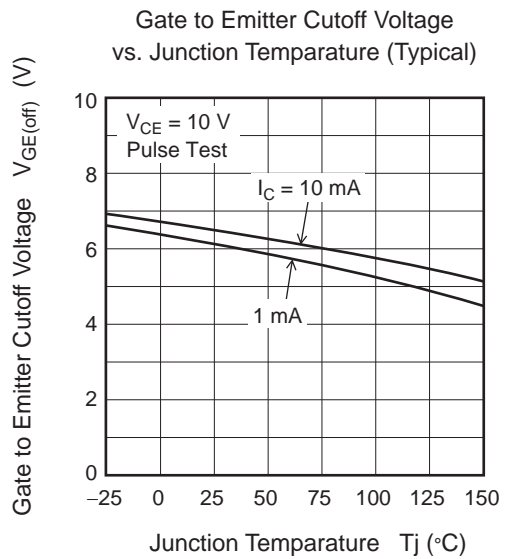
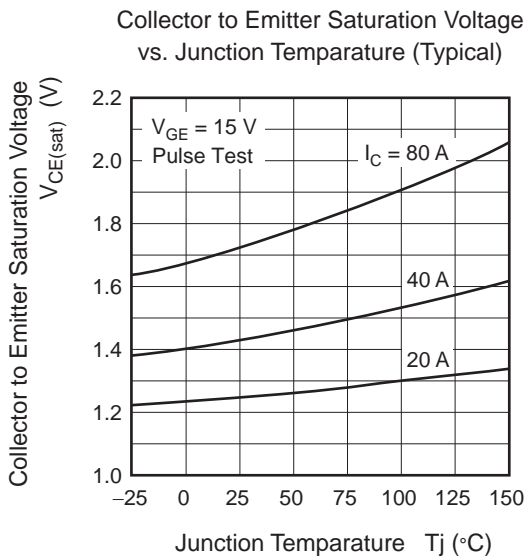
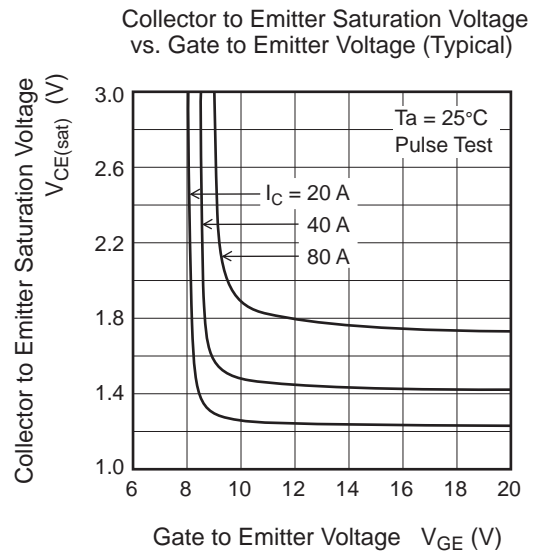
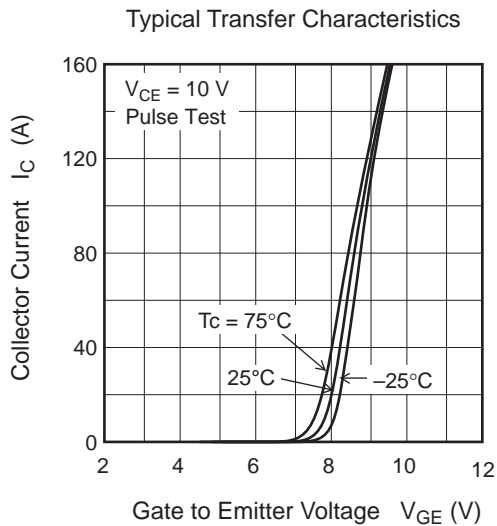
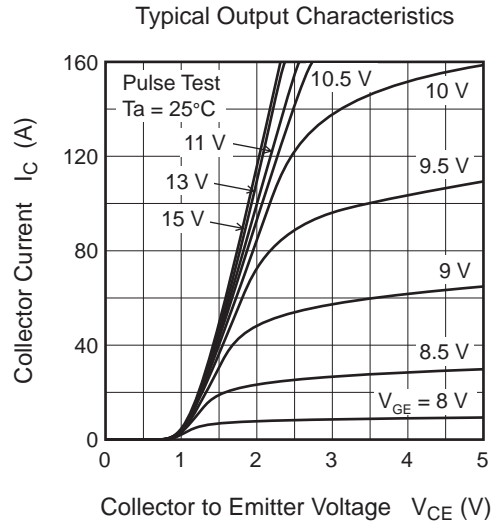
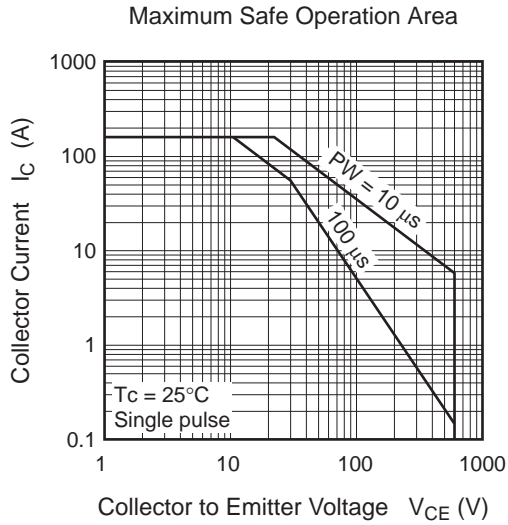
## Electrical Characteristics

(T<sub>j</sub> = 25°C)

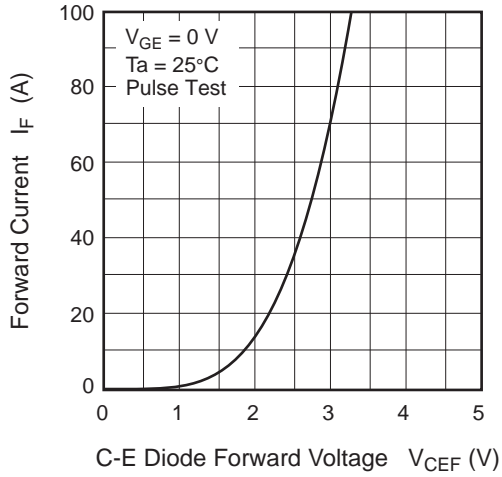
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Zero gate voltage collector current	I <sub>CEs</sub>	—	—	100	μA	V <sub>CE</sub> = 600V, V <sub>GE</sub> = 0
Gate to emitter leak current	I <sub>GES</sub>	—	—	±1	μA	V <sub>GE</sub> = ±30 V, V <sub>CE</sub> = 0
Gate to emitter cutoff voltage	V <sub>GE(off)</sub>	4	—	8	V	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 1 mA
Collector to emitter saturation voltage	V <sub>CE(sat)</sub>	—	1.37	1.8	V	I <sub>C</sub> = 40 A, V <sub>GE</sub> = 15 V <sup>Note3</sup>
	V <sub>CE(sat)</sub>	—	1.7	—	V	I <sub>C</sub> = 80 A, V <sub>GE</sub> = 15 V <sup>Note3</sup>
Input capacitance	C <sub>ies</sub>	—	2780	—	pF	V <sub>CE</sub> = 25 V V <sub>GE</sub> = 0 V f = 1 MHz
Output capacitance	C <sub>oes</sub>	—	122	—	pF	
Reverse transfer capacitance	C <sub>res</sub>	—	43	—	pF	
Switching time	t <sub>d(on)</sub>	—	53	—	ns	I <sub>C</sub> = 30 A, V <sub>CE</sub> = 400 V, V <sub>GE</sub> = 15 V R <sub>g</sub> = 5 Ω <sup>Note3</sup> , Inductive load
	t <sub>r</sub>	—	34	—	ns	
	t <sub>d(off)</sub>	—	95	—	ns	
	t <sub>f</sub>	—	68	—	ns	
C-E diode forward voltage	V <sub>ECF</sub>	—	2.5	3.0	V	I <sub>F</sub> = 30 A <sup>Note3</sup>
C-E diode reverse recovery time	t <sub>rr</sub>	—	25	—	ns	I <sub>F</sub> = 30 A di <sub>F</sub> /dt = 100 A/μs

Notes: 3. Pulse test

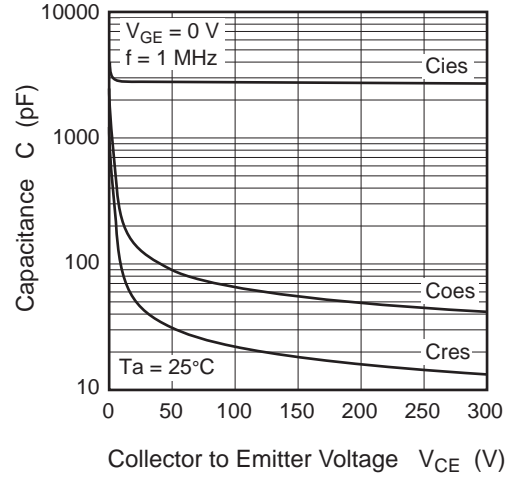
Main Characteristics



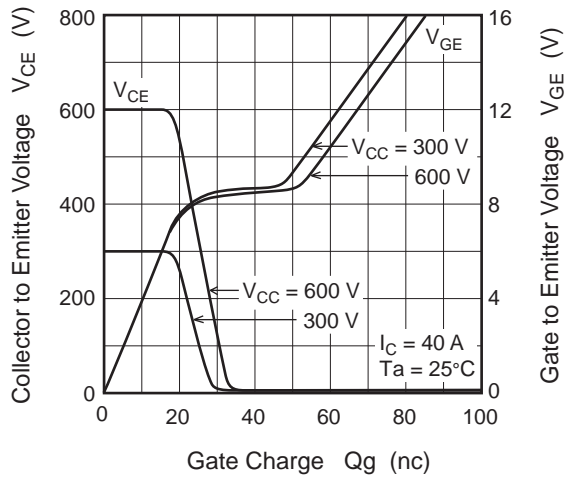
Forward Current vs. Forward Voltage (Typical)



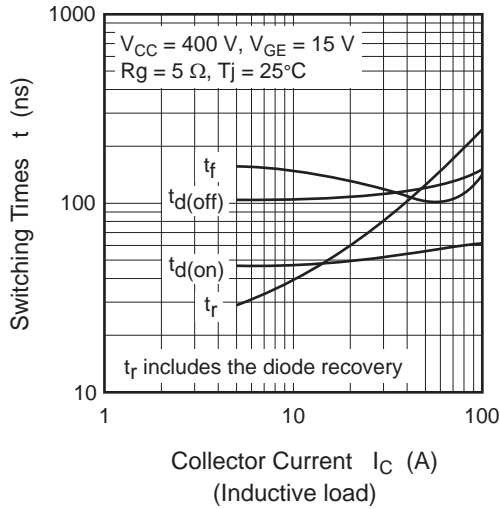
Typical Capacitance vs. Collector to Emitter Voltage



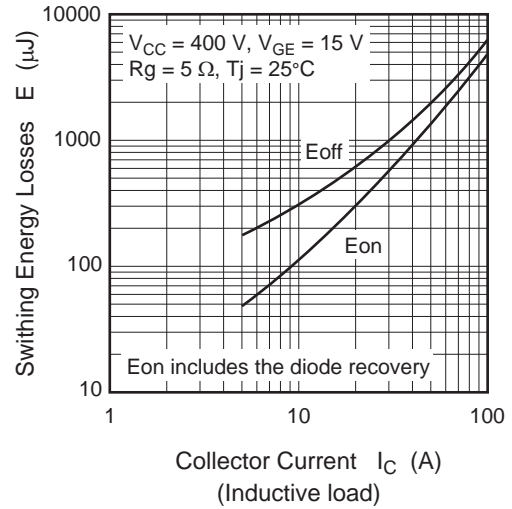
Dynamic Input Characteristics (Typical)



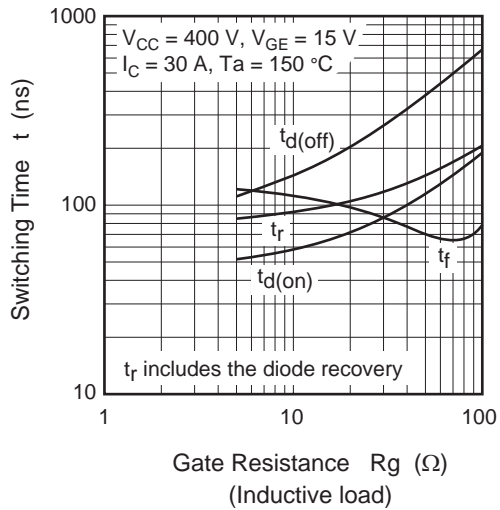
Switching Characteristics (Typical) (1)



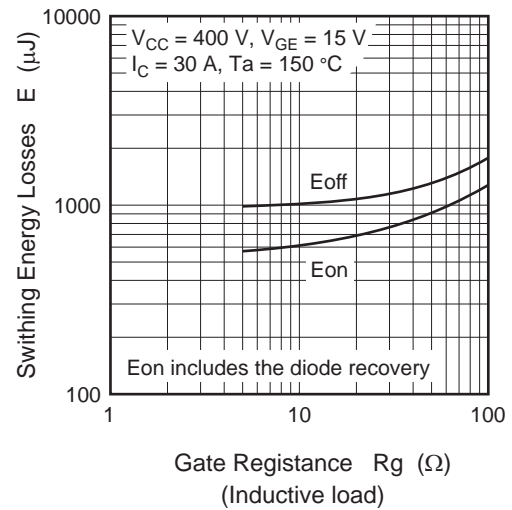
Switching Characteristics (Typical) (2)



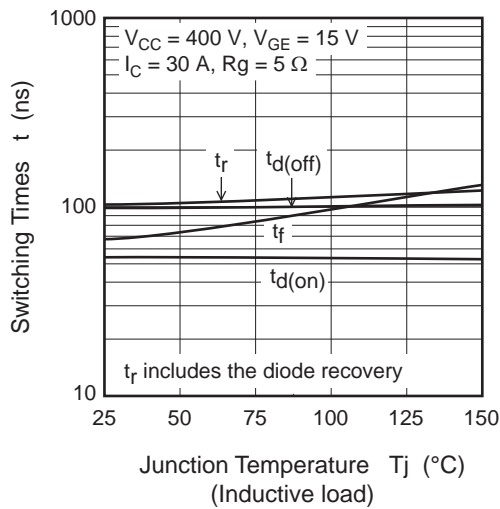
Switching Characteristics (Typical) (3)



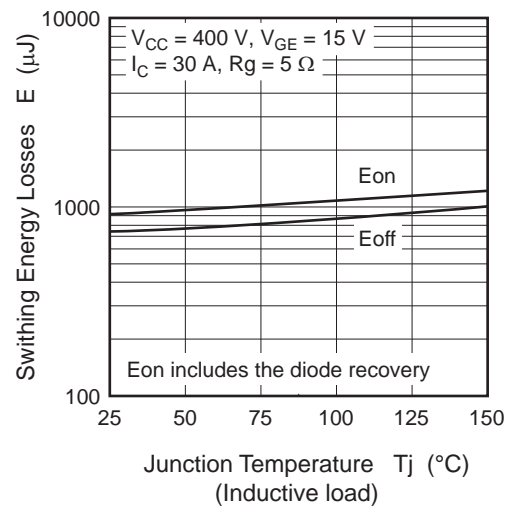
Switching Characteristics (Typical) (4)

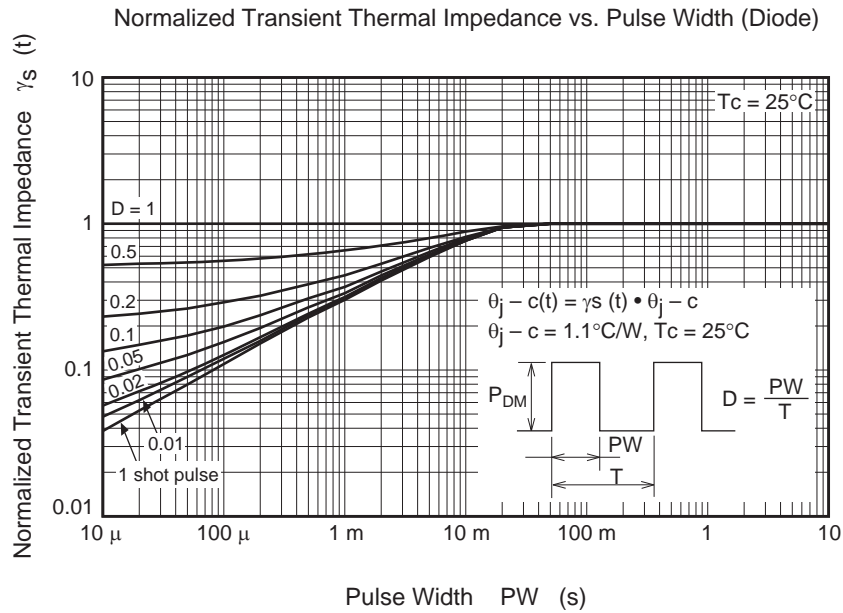
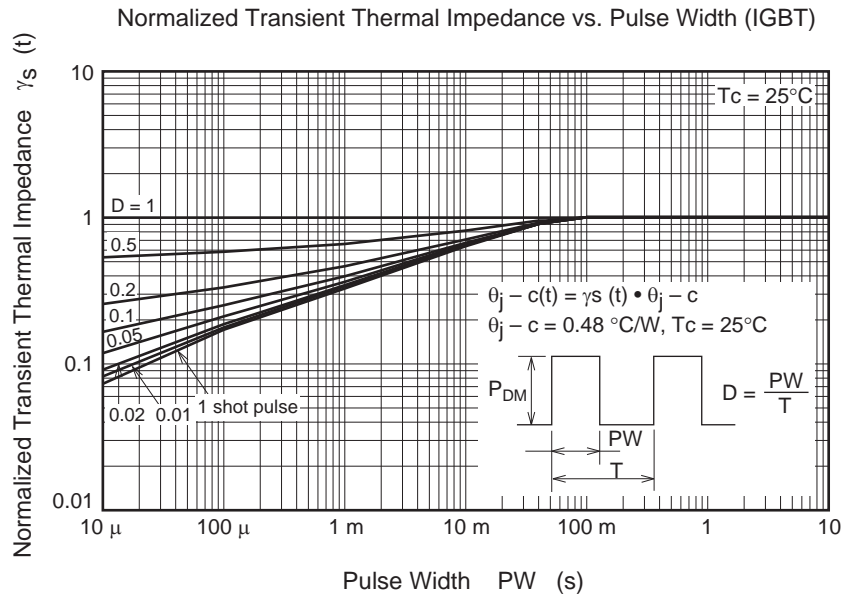


Switching Characteristics (Typical) (5)

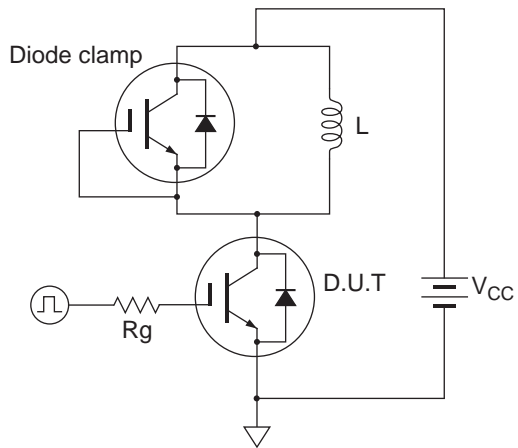


Switching Characteristics (Typical) (6)

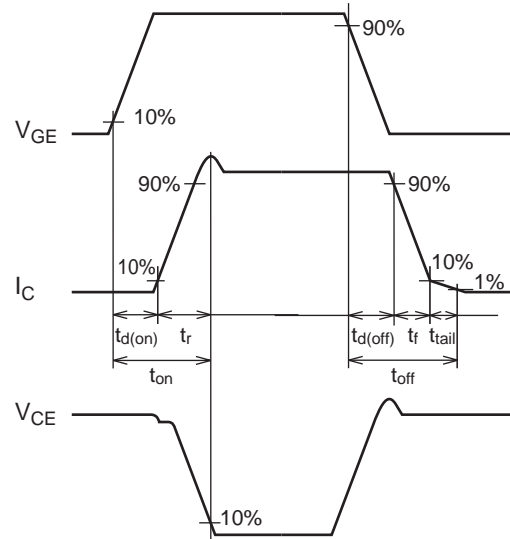




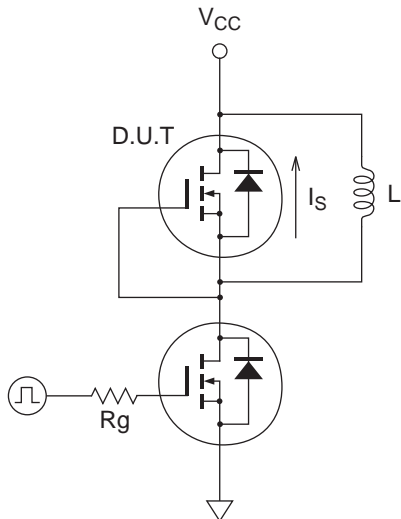
Switching Time Test Circuit



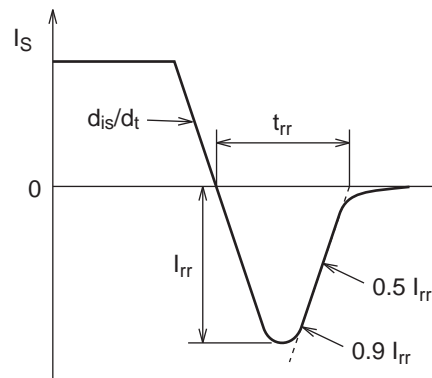
Waveform



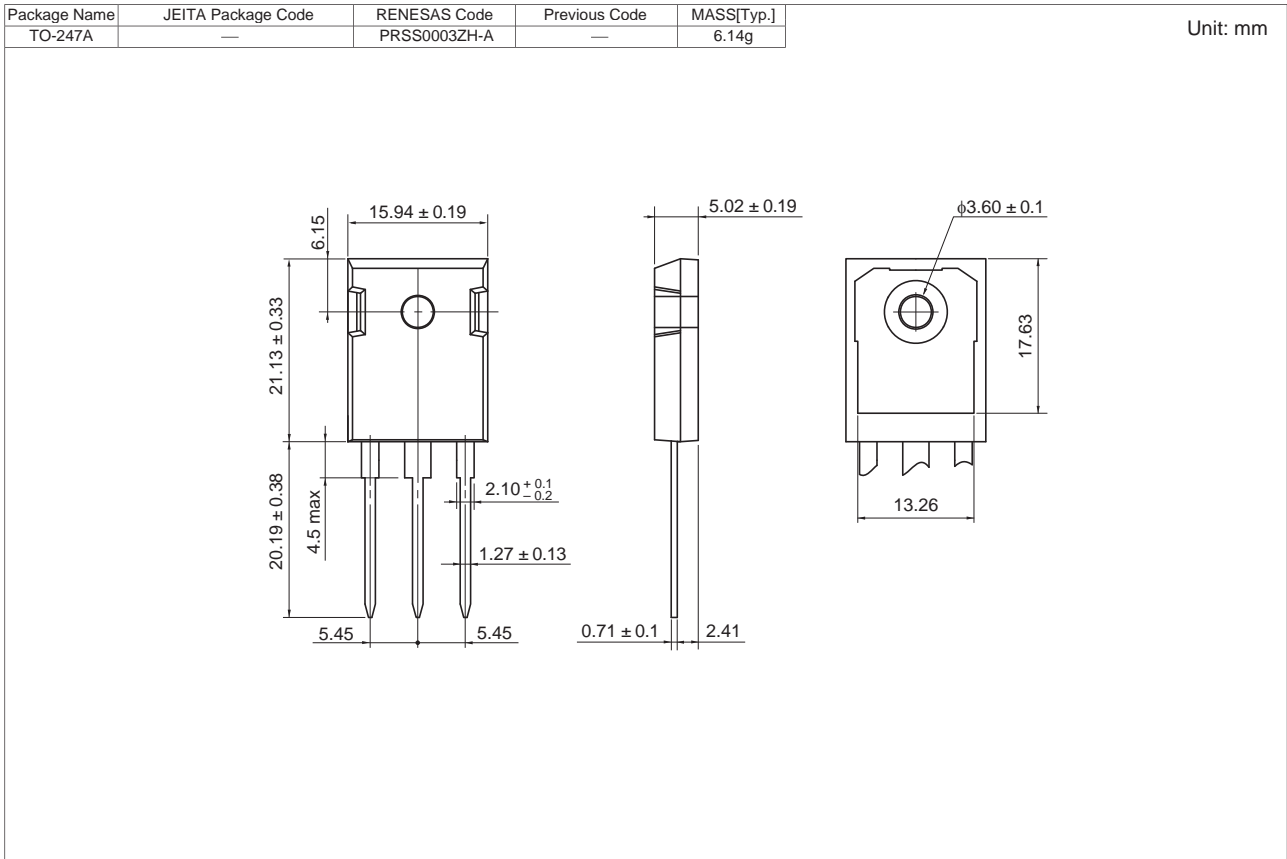
Diode Reverse Recovery Time Test Circuit



Waveform



### Package Dimensions



### Ordering Information

Orderable Part Number	Quantity	Shipping Container
RJH60F5BDPQ-A0#T0	240 pcs	Box (Tube)

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