

# RJH60F0DPK

## Silicon N Channel IGBT High Speed Power Switching

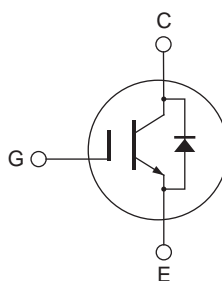
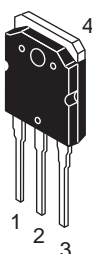
R07DS0234EJ0200  
(Previous: REJ03G1834-0100)  
Rev.2.00  
Dec 14, 2010

### Features

- Low collector to emitter saturation voltage  
 $V_{CE(sat)} = 1.4 \text{ V typ. (at } I_C = 25 \text{ A, } V_{GE} = 15 \text{ V, } T_a = 25^\circ\text{C)}$
- Built in fast recovery diode in one package
- Trench gate and thin wafer technology
- High speed switching  
 $t_f = 90 \text{ ns typ. (at } I_C = 30 \text{ A, } V_{CC} = 400 \text{ V, } V_{GE} = 15 \text{ V, } R_g = 5 \Omega, T_a = 25^\circ\text{C, inductive load)}$

### Outline

RENESAS Package code: PRSS0004ZE-A  
(Package name: TO-3P)



1. Gate
2. Collector
3. Emitter
4. Collector (Flange)

### 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                               | $T_c = 25^\circ\text{C}$        | $I_C$ <sup>Note1</sup> | 50                 | A |
|   | $T_c = 100^\circ\text{C}$       | $I_C$ <sup>Note1</sup> | 25                 | A |
| Collector peak current                          | $i_{c(peak)}$ <sup>Note1</sup>  | 100                    | A                  |   |
| Collector to emitter diode forward peak current | $i_{DF(peak)}$ <sup>Note2</sup> | 100                    | A                  |   |
| Collector dissipation                           | $P_C$                           | 201.6                  | W                  |   |
| Junction to case thermal impedance              | $\theta_{j-c}$                  | 0.62                   | $^\circ\text{C/W}$ |   |
| Channel 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

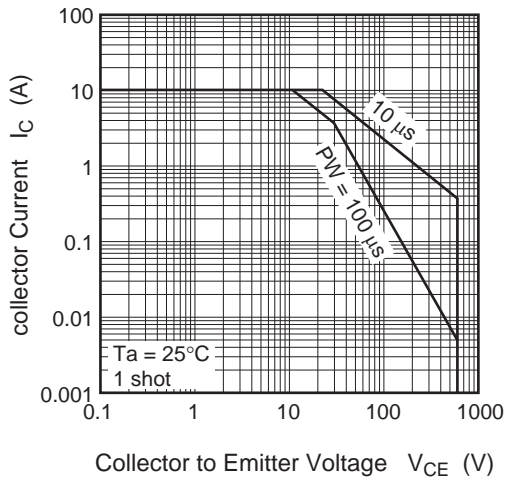
(T<sub>j</sub> = 25°C)

| 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> = 10V, I <sub>C</sub> = 1 mA                  |
| Collector to emitter saturation voltage | V <sub>CE(sat)</sub> | —   | 1.4  | 1.82 | V    | I <sub>C</sub> = 25 A, V <sub>GE</sub> = 15V <sup>Note3</sup> |
|   |                      | —   | 1.7  | —    | V    | I <sub>C</sub> = 50 A, V <sub>GE</sub> = 15V <sup>Note3</sup> |
| Input capacitance                       | C <sub>ies</sub>     | —   | 1550 | —    | pF   | V <sub>CE</sub> = 25 V  |
| Output capacitance                      | C <sub>oes</sub>     | —   | 82   | —    | pF   | V <sub>GE</sub> = 0 V   |
| Reverse transfer capacitance            | C <sub>res</sub>     | —   | 26   | —    | pF   | f = 1 MHz   |
| Switching time                          | t <sub>d(on)</sub>   | —   | 46   | —    | ns   | I <sub>C</sub> = 30 A,  |
|   | t <sub>r</sub>       | —   | 92   | —    | ns   | V <sub>CE</sub> = 400 V, V <sub>GE</sub> = 15 V               |
|   | t <sub>d(off)</sub>  | —   | 70   | —    | ns   | R <sub>g</sub> = 5 Ω <sup>Note3</sup>                         |
|   | t <sub>f</sub>       | —   | 90   | —    | ns   | Inductive load  |
| C-E diode forward voltage               | V <sub>ECF1</sub>    | —   | 1.6  | 2.1  | V    | I <sub>F</sub> = 20 A <sup>Note3</sup>                        |
| C-E diode forward voltage               | V <sub>ECF2</sub>    | —   | 1.9  | —    | V    | I <sub>F</sub> = 40 A <sup>Note3</sup>                        |
| C-E diode reverse recovery time         | t <sub>rr</sub>      | —   | 140  | —    | ns   | I <sub>F</sub> = 20 A<br>di <sub>F</sub> /dt = 100 A/μs       |

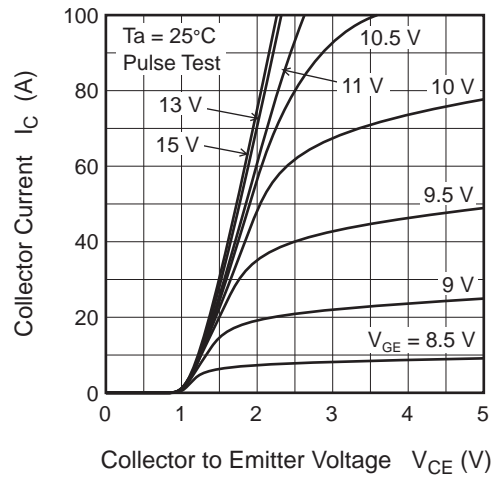
Notes: 3. Pulse test

Main Characteristics

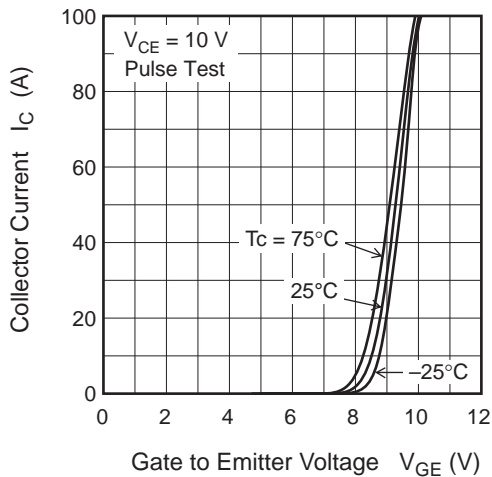
Maximum Safe Operation Area



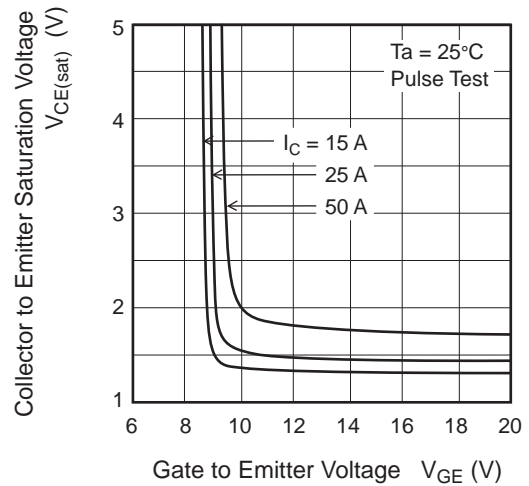
Typical Output Characteristics



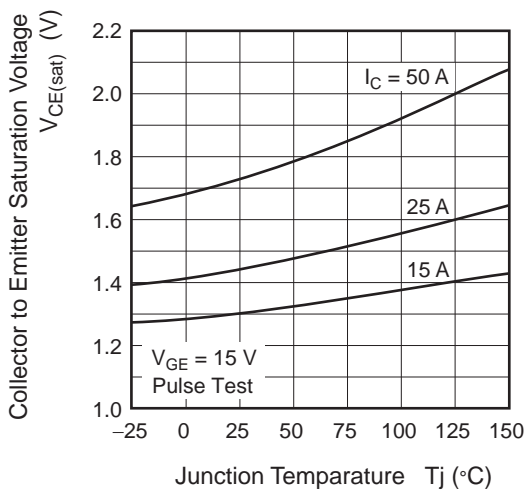
Typical Transfer Characteristics



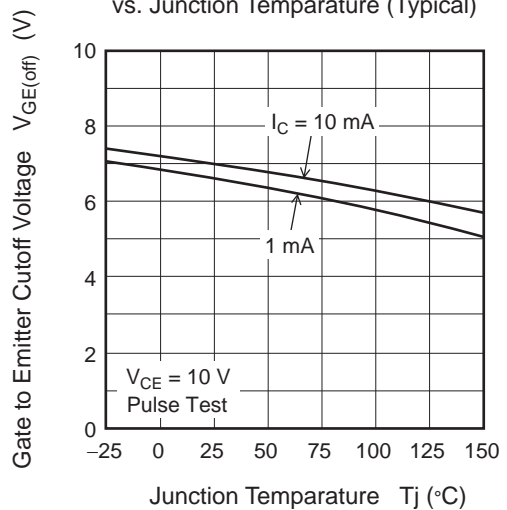
Collector to Emitter Saturation Voltage vs. Gate to Emitter Voltage (Typical)



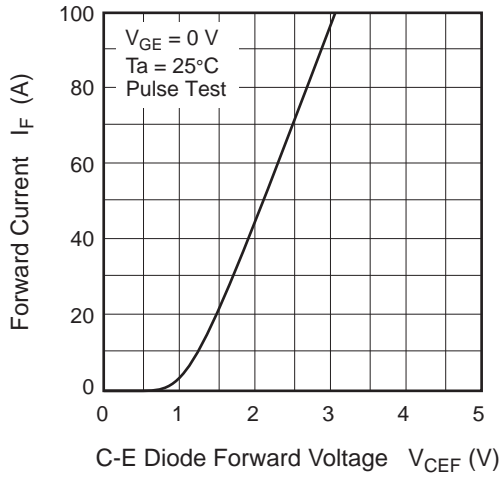
Collector to Emitter Saturation Voltage vs. Junction Temperature (Typical)



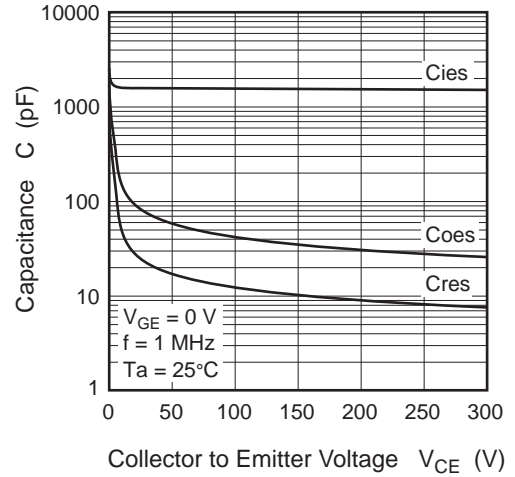
Gate to Emitter Cutoff Voltage vs. Junction Temperature (Typical)



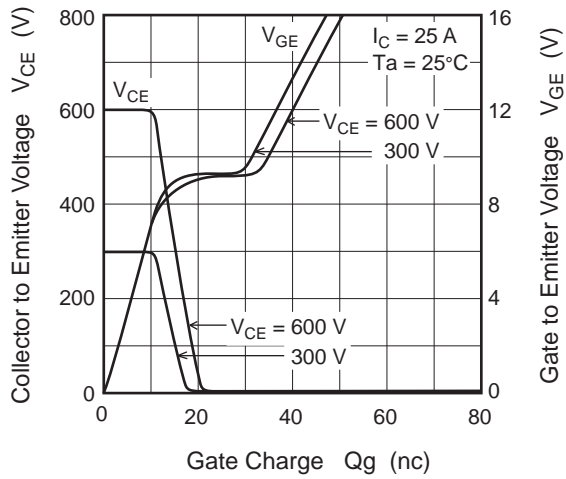
Forward Current vs. Forward Voltage (Typical)



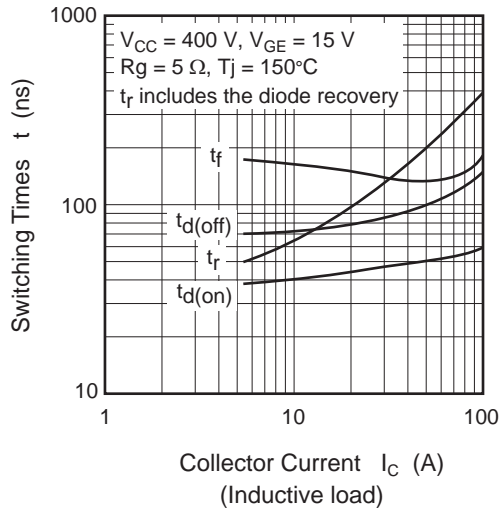
Typical Capacitance vs. Collector to Emitter Voltage



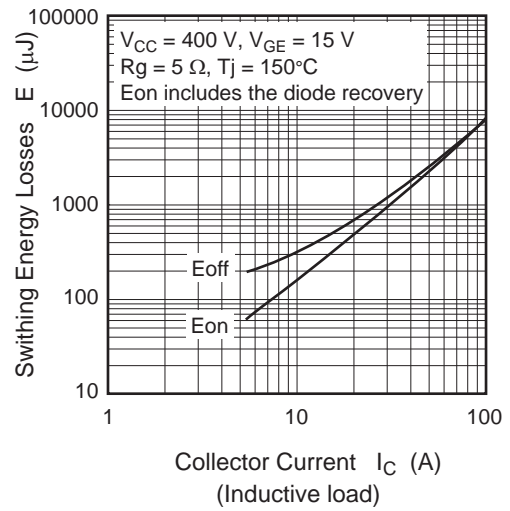
Dynamic Input Characteristics (Typical)



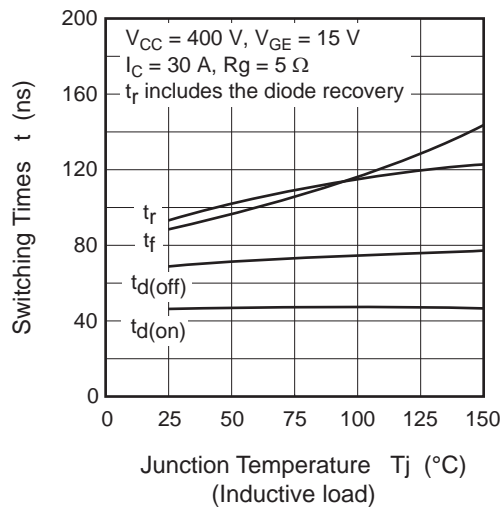
Switching Characteristics (Typical) (1)



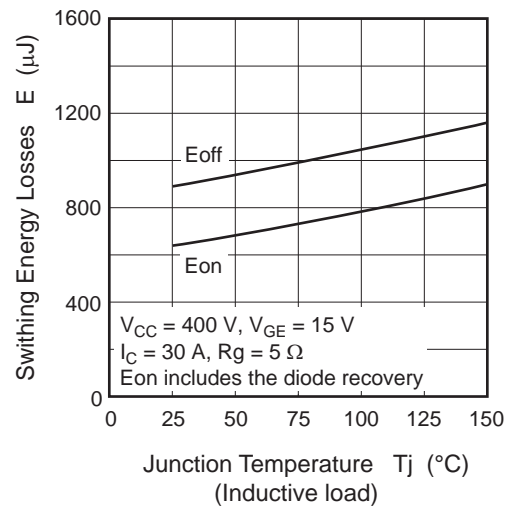
Switching Characteristics (Typical) (2)

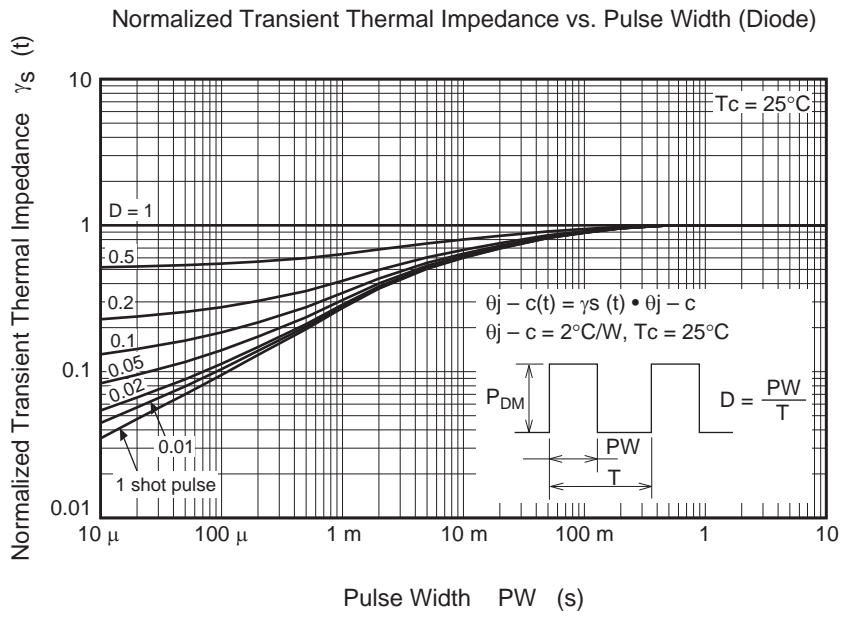
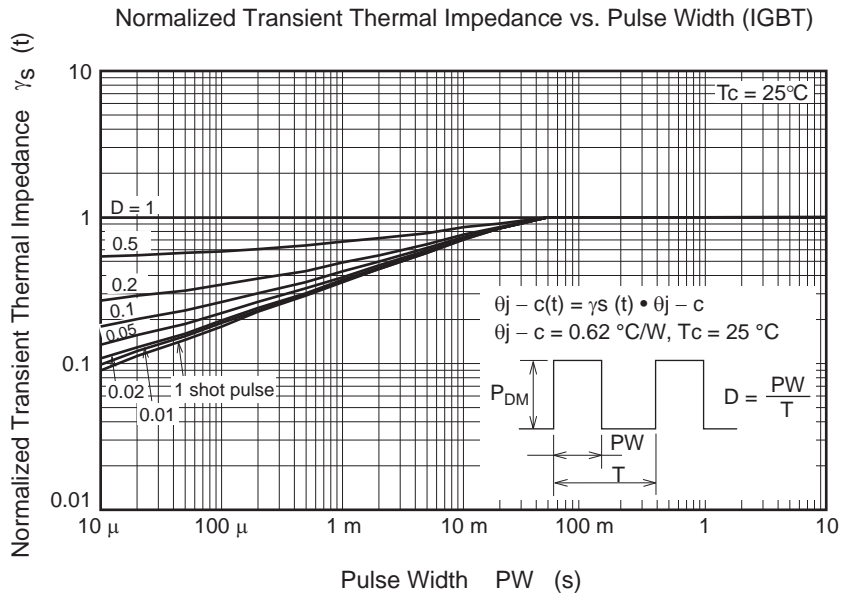


Switching Characteristics (Typical) (3)

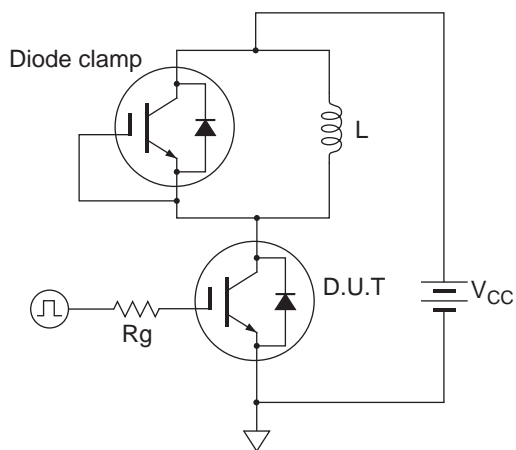


Switching Characteristics (Typical) (4)

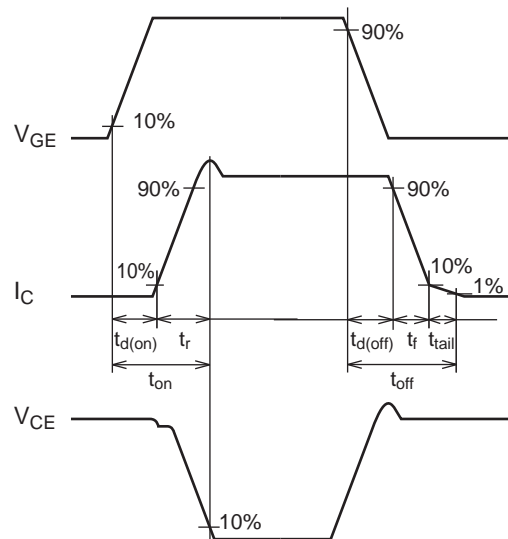




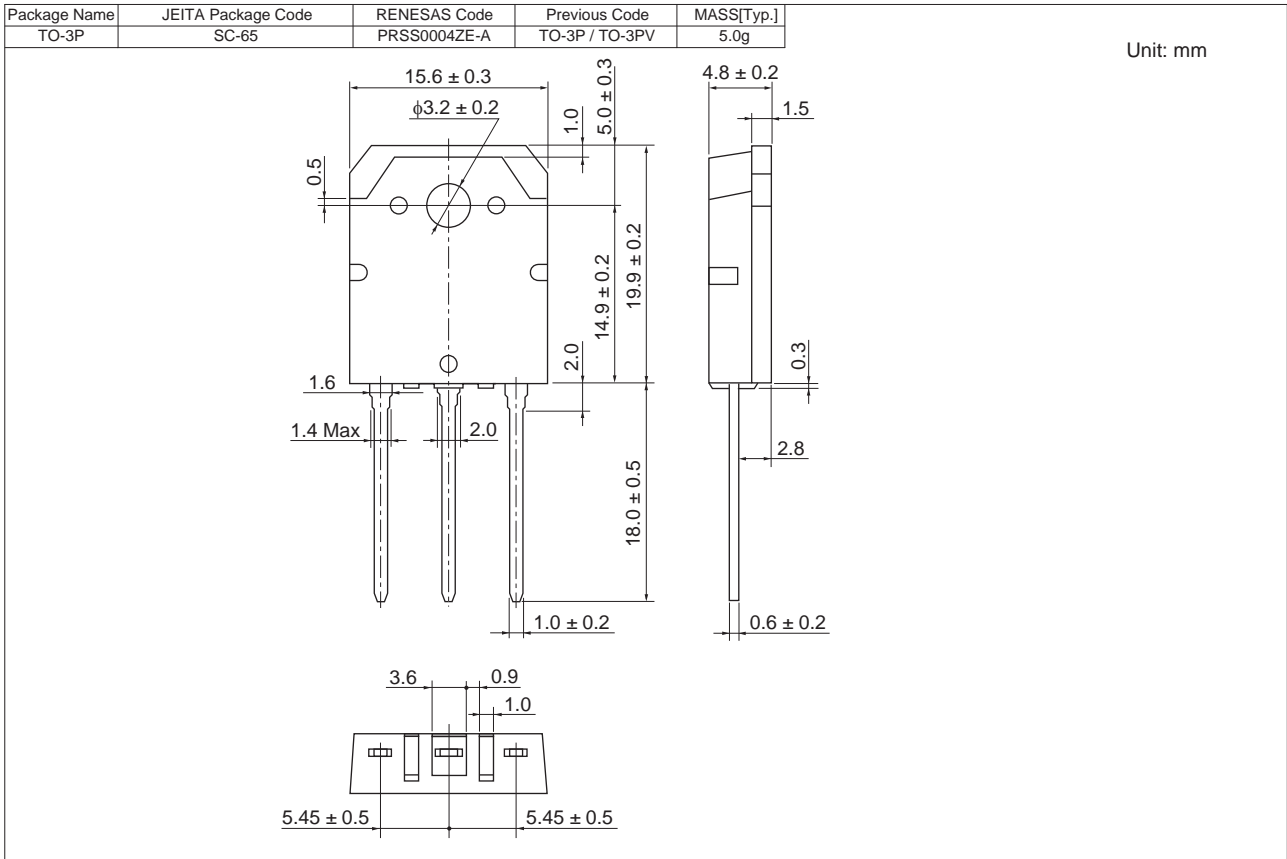
Switching Time Test Circuit



Waveform



Package Dimensions



Ordering Information

| Orderable Part Number | Quantity | Shipping Container |
|-----------------------|----------|--------------------|
| RJH60F0DPK-00-T0      | 360 pcs  | Box (Tube)         |

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