

# RJP30E3DPK-M0

Silicon N Channel IGBT  
High Speed Power Switching

R07DS0352EJ0200

Rev.2.00

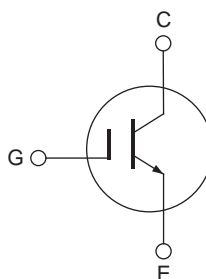
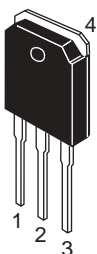
Apr 15, 2011

## Features

- Trench gate technology (G5H series)
- Low collector to emitter saturation voltage  $V_{CE(sat)} = 1.6 \text{ V typ}$
- High speed switching  $t_f = 150 \text{ ns typ}$
- Low leak current  $I_{CES} = 1 \mu\text{A max}$

## Outline

RENESAS Package code: PRSS0004ZH-A  
(Package name: TO-3PSG)



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

## Absolute Maximum Ratings

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

| Item                               | Symbol                         | Ratings     | Unit                      |
|------------------------------------|--------------------------------|-------------|---------------------------|
| Collector to Emitter voltage       | $V_{CES}$                      | 360         | V                         |
| Gate to Emitter voltage            | $V_{GES}$                      | $\pm 30$    | V                         |
| Collector current                  | $I_c$                          | 40          | A                         |
| Collector peak current             | $i_{c(peak)}$ <sup>Note1</sup> | 250         | A                         |
| Collector dissipation              | $P_C$ <sup>Note2</sup>         | 60          | W                         |
| Junction to case thermal impedance | $\theta_{j-c}$                 | 2.08        | $^\circ\text{C}/\text{W}$ |
| Junction temperature               | $T_j$                          | 150         | $^\circ\text{C}$          |
| Storage temperature                | $T_{stg}$                      | -55 to +150 | $^\circ\text{C}$          |

Notes: 1.  $PW \leq 10 \mu\text{s}$ , duty cycle  $\leq 1\%$   
2.  $T_c = 25^\circ\text{C}$

## Electrical Characteristics

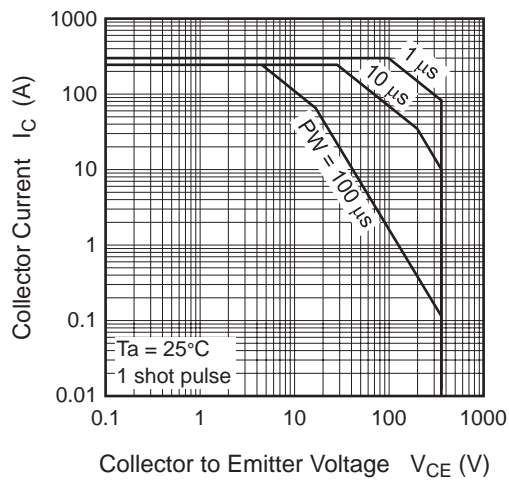
(Ta = 25°C)

| Item                                    | Symbol        | Min | Typ  | Max       | Unit    | Test Conditions   |
|---|---------------|-----|------|-----------|---------|---|
| Zero gate voltage collector current     | $I_{CES}$     | —   | —    | 1         | $\mu A$ | $V_{CE} = 360 V, V_{GE} = 0$  |
| Gate to emitter leak current            | $I_{GES}$     | —   | —    | $\pm 100$ | nA      | $V_{GE} = \pm 30 V, V_{CE} = 0$   |
| Gate to emitter cutoff voltage          | $V_{GE(off)}$ | 2.5 | —    | 5         | V       | $V_{CE} = 10 V, I_C = 1 mA$   |
| Collector to emitter saturation voltage | $V_{CE(sat)}$ | —   | 1.6  | 2.1       | V       | $I_C = 40 A, V_{GE} = 15 V$ <sup>Note3</sup>                            |
| Input capacitance                       | $C_{ies}$     | —   | 1700 | —         | pF      | $V_{CE} = 25 V$<br>$V_{GE} = 0$<br>$f = 1 MHz$                          |
| Output capacitance                      | $C_{oes}$     | —   | 85   | —         | pF      |   |
| Reveres transfer capacitance            | $C_{res}$     | —   | 40   | —         | pF      |   |
| Total gate charge                       | $Q_g$         | —   | 52   | —         | nC      | $V_{GE} = 15 V$<br>$V_{CE} = 150 V$<br>$I_C = 40 A$                     |
| Gate to emitter charge                  | $Q_{ge}$      | —   | 9    | —         | nC      |   |
| Gate to collector charge                | $Q_{gc}$      | —   | 15   | —         | nC      |   |
| Switching time                          | $t_{d(on)}$   | —   | 0.04 | —         | $\mu s$ | $I_C = 40 A$<br>$R_L = 4 \Omega$<br>$V_{GE} = 15 V$<br>$R_G = 5 \Omega$ |
|   | $t_r$         | —   | 0.12 | —         | $\mu s$ |   |
|   | $t_{d(off)}$  | —   | 0.09 | —         | $\mu s$ |   |
|   | $t_f$         | —   | 0.15 | —         | $\mu s$ |   |

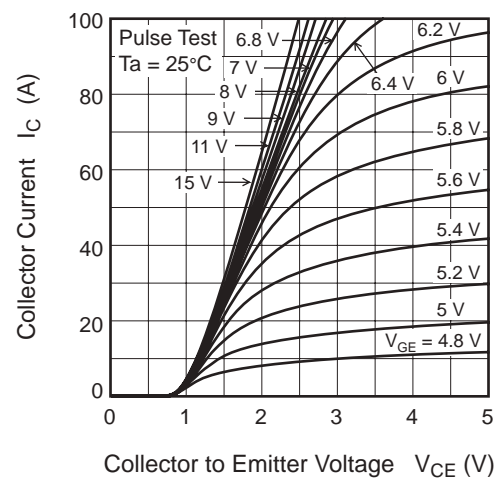
Notes: 3. Pulse test.

## Main Characteristics

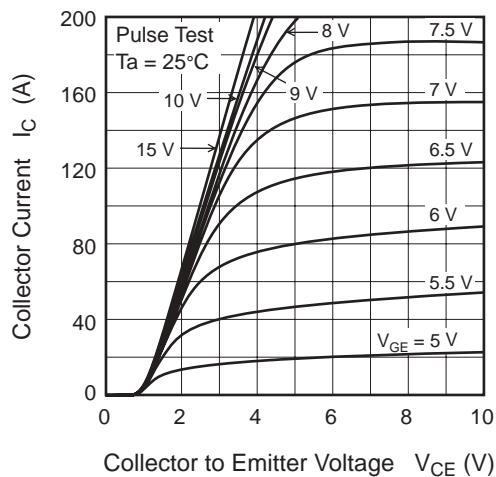
Maximum Safe Operation Area



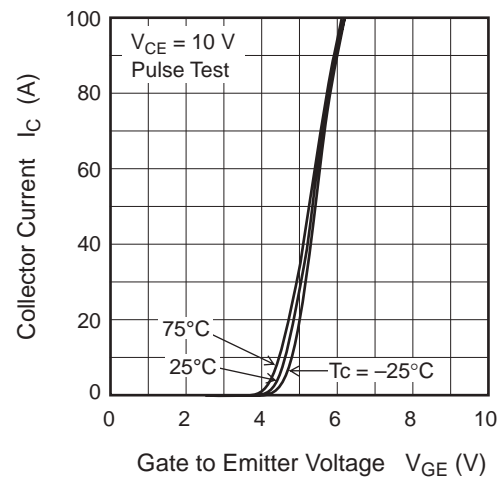
Typical Output Characteristics (1)



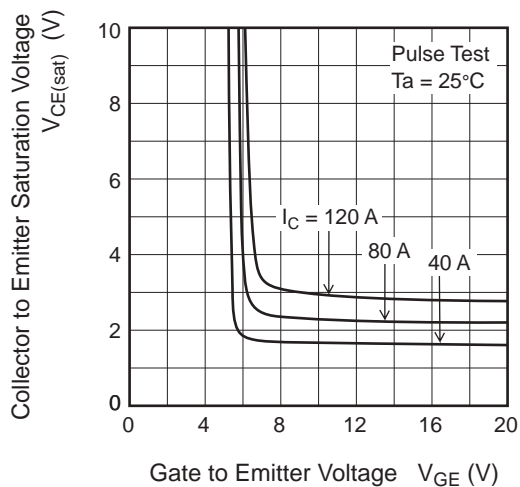
Typical Output Characteristics (2)



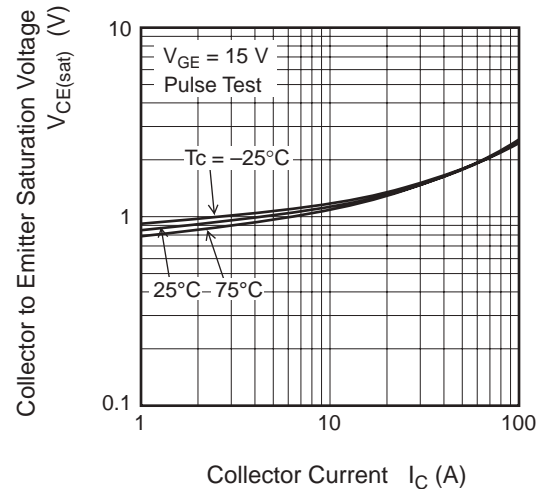
Typical Transfer Characteristics

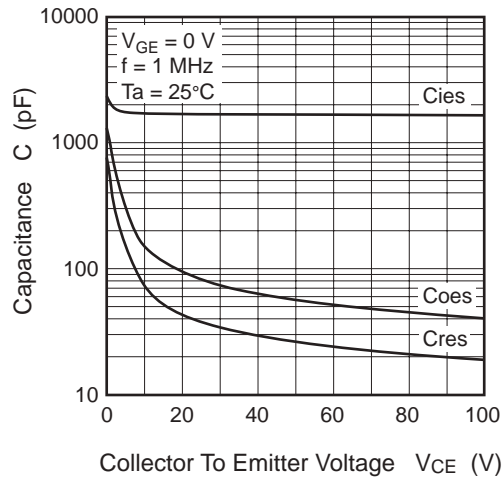


Collector to Emitter Saturation Voltage vs. Gate to Emitter Voltage (Typical)

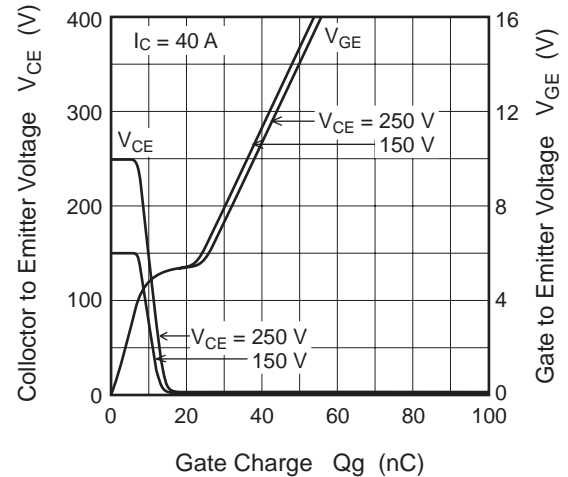


Collector to Emitter Saturation Voltage vs. Collector Current (Typical)

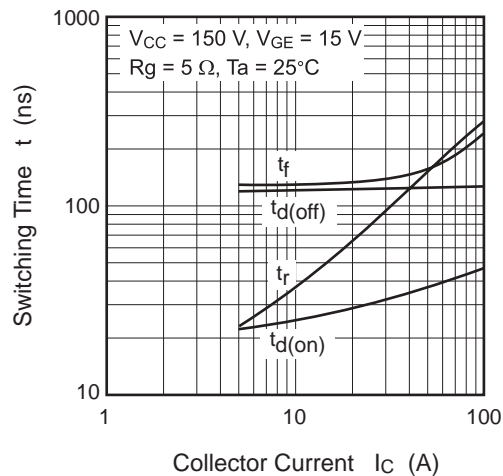


Typical Capacitance vs.  
Collector To Emitter Voltage

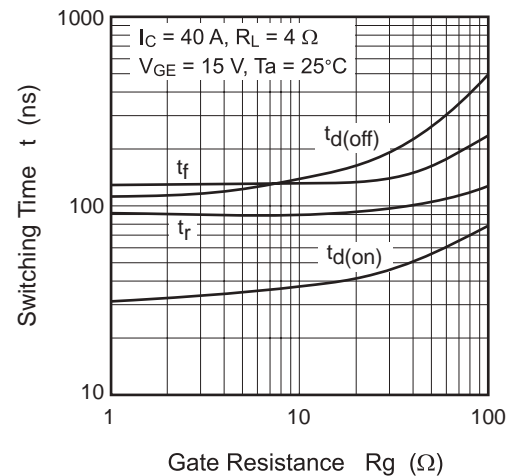
Dynamic Input Characteristics (Typical)



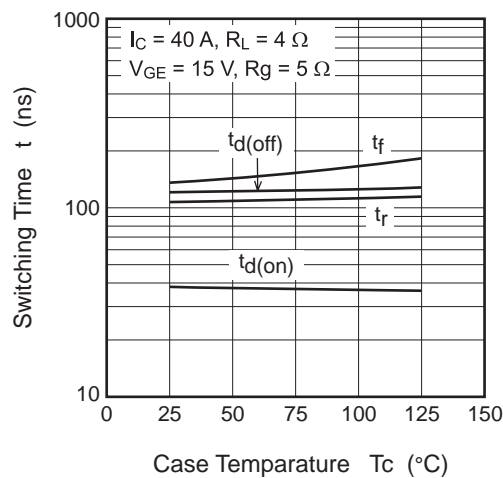
Switching Characteristics (Typical) (1)



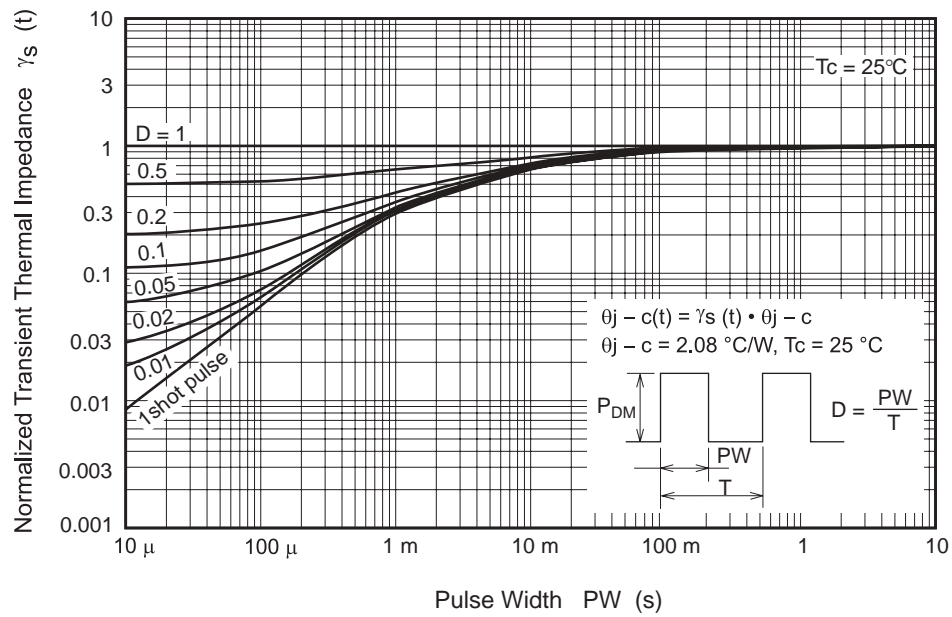
Switching Characteristics (Typical) (2)



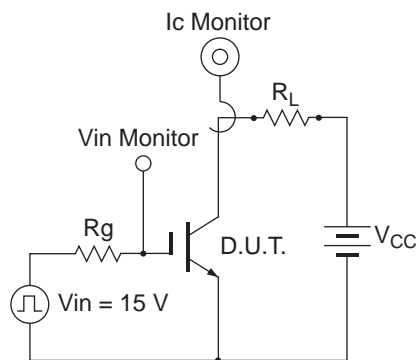
Switching Characteristics (Typical) (3)



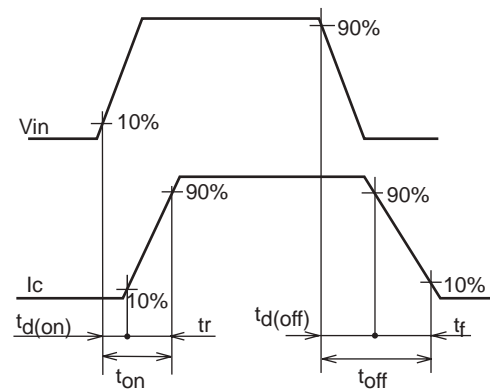
Normalized Transient Thermal Impedance vs. Pulse Width



Switching Time Test Circuit



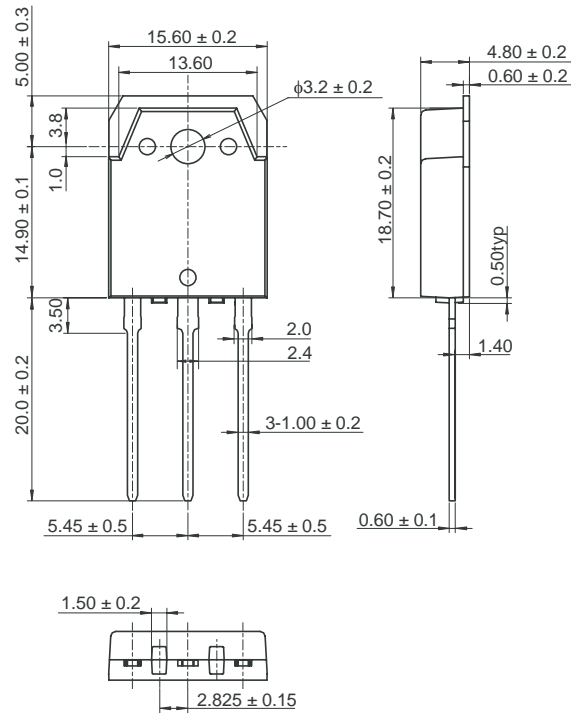
Waveform



## Package Dimension

| Package Name | JEITA Package Code | RENESAS Code | Previous Code    | MASS[Typ.] |
|--------------|--------------------|--------------|------------------|------------|
| TO-3PSG      | —                  | PRSS0004ZH-A | TO-3PSG/TO-3PSGV | 3.7g       |

Unit: mm



## Ordering Information

| Orderable Part Number | Quantity | Shipping Container |
|-----------------------|----------|--------------------|
| RJP30E3DPK-M0-T0      | 360 pcs  | Box (Tube)         |

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