

RJP65T43DPM

650V - 20A - IGBT
High Speed Switching

R07DS1201EJ0200
Rev.2.00
Dec.01.2020

Features

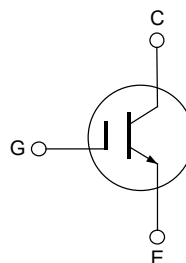
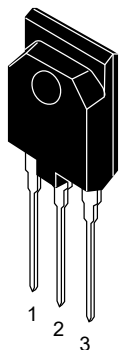
- Trench gate and thin wafer technology (G7H series)
- Isolated package
- Low collector to emitter saturation voltage
 $V_{CE(sat)} = 1.8 \text{ V typ. (at } I_C = 20 \text{ A, } V_{GE} = 15 \text{ V, } T_a = 25 \text{ }^\circ\text{C)}$
- High speed switching
 $t_f = 28 \text{ ns typ. (at } V_{CC} = 400 \text{ V, } V_{GE} = 15 \text{ V, } I_C = 20 \text{ A, } R_g = 10 \text{ } \Omega, T_a = 25 \text{ }^\circ\text{C)}$
- Operation frequency ($20 \text{ kHz} \leq f \leq 100 \text{ kHz}$)
- Not guarantee short circuit withstand time
- Applications: PFC
- Quality grade: Standard

Key Performance

| Type | V_{CES} | I_C | $V_{CE(sat)}$, $T_C=25^\circ\text{C}$ | T_J |
|-------------|-----------|-------|--|--------|
| RJP65T43DPM | 650 V | 20 A | 1.8 V | 175 °C |

Outline

RENESAS Package code: PRSS0003ZA-A
(Package name: TO-3PFM)



1. Gate
2. Collector
3. Emitter

Absolute Maximum Ratings

(T_c = 25 °C)

| Item | | Symbol | Ratings | Unit |
|------------------------------|-------------------------|------------------------------|-------------|------|
| Collector to emitter voltage | | V _{CES} | 650 | V |
| Gate to emitter voltage | | V _{GES} | ±30 | V |
| Collector current | T _c = 25 °C | I _C Notes1 | 40 | A |
| | T _c = 100 °C | I _C Notes1 | 20 | A |
| Collector peak current | | i _c (peak) Notes1 | 150 | A |
| Collector dissipation | | P _C | 68.8 | W |
| Junction temperature | | T _J Notes2 | 175 | °C |
| Storage temperature | | T _{stg} | –55 to +150 | °C |

Note: Continuous heavy condition (e.g. high temperature/voltage/current or high variation of temperature) may affect a reliability even if it is within the absolute maximum ratings. Please consider derating condition for appropriate reliability in reference Renesas Semiconductor Reliability Handbook (Recommendation for Handling and Usage of Semiconductor Devices) and individual reliability data.

- Notes: 1. Pulse width limited by safe operating area.
 2. Please use this device in the thermal conditions which the junction temperature does not exceed 175 °C.
 Renesas IGBT Application Note is disclosed about reliability test and application condition up to 175 °C.

Thermal Resistance Characteristics

(T_c = 25 °C)

| Item | Symbol | Max. Value Notes3 | Unit |
|-------------------------------------|----------------------|-------------------|------|
| Junction to case thermal resistance | R _{th(j-c)} | 2.18 | °C/W |

Notes: 3. Designed target value on Renesas measurement condition. (Not tested)

Electrical Characteristics

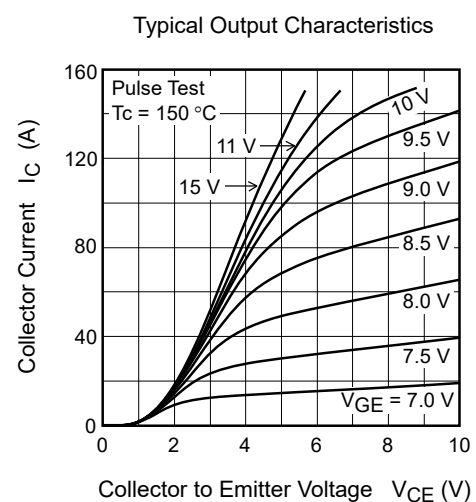
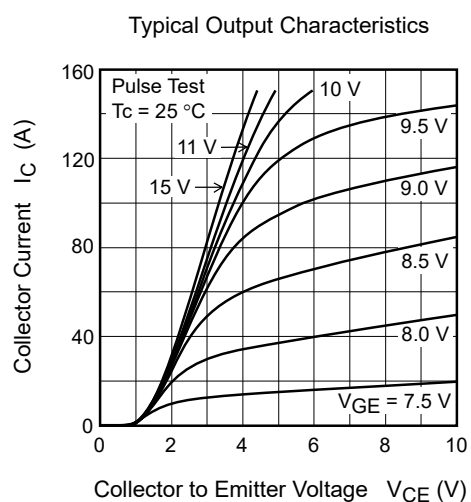
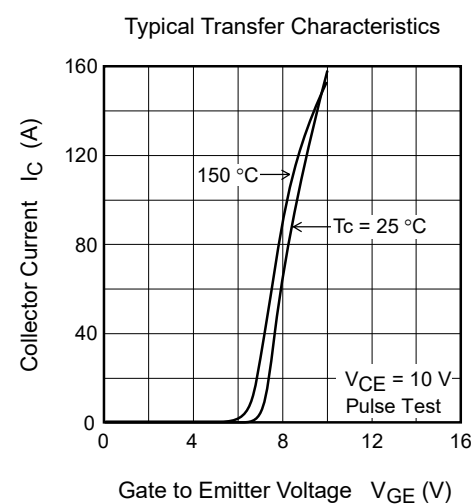
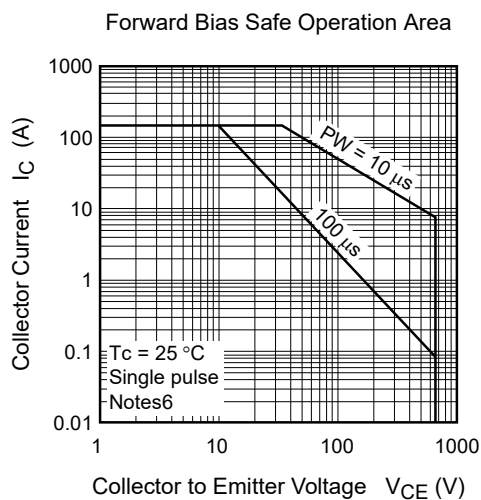
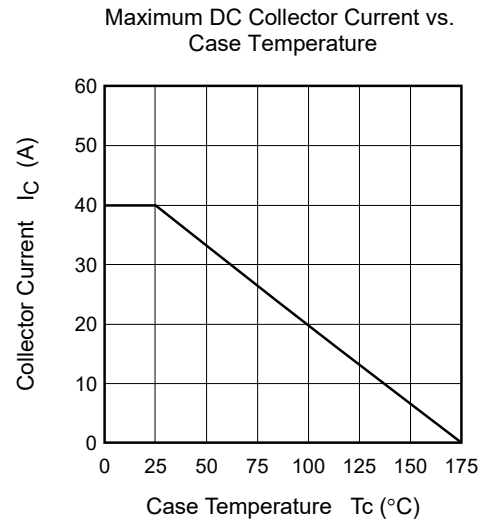
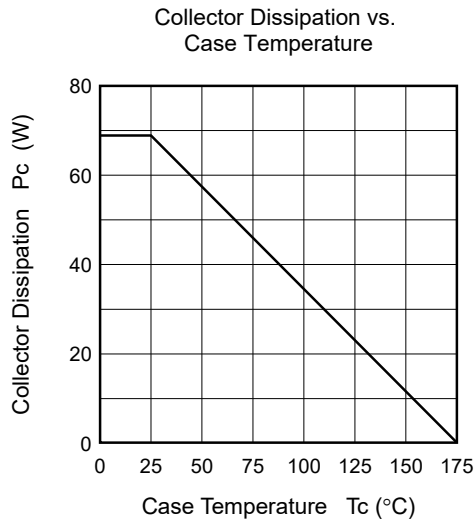
(T_C = 25 °C)

| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|---|----------------------|-----|------|-----|------|--|
| Collector to emitter leakage current | I _{CES} | — | — | 1 | μA | V _{CE} = 650 V, V _{GE} = 0 V |
| Gate to emitter leakage current | I _{GES} | — | — | ±1 | μA | V _{GE} = ±30 V, V _{CE} = 0 V |
| Gate to emitter threshold voltage | V _{GE(th)} | 4.0 | — | 7.0 | V | V _{CE} = 10V, I _C = 0.67 mA |
| Collector to emitter saturation voltage | V _{CE(sat)} | — | 1.8 | 2.4 | V | I _C = 20 A, V _{GE} = 15V ^{Notes4} |
| Input capacitance | C _{ies} | — | 1320 | — | pF | V _{CE} = 25 V V _{GE} = 0 V f = 1 MHz |
| Output capacitance | C _{oes} | — | 37 | — | pF | |
| Reveres transfer capacitance | C _{res} | — | 26 | — | pF | |
| Total gate charge | Q _g | — | 70 | — | nC | V _{GE} = 15 V V _{CE} = 400 V I _C = 20 A |
| Gate to emitter charge | Q _{ge} | — | 8 | — | nC | |
| Gate to collector charge | Q _{gc} | — | 31 | — | nC | |
| Turn-on delay time | t _{d(on)} | — | 30 | — | Ns | V _{CC} = 400 V V _{GE} = 15 V I _C = 20 A R _g = 10 Ω T _C = 25 °C Inductive load ^{Notes5} |
| Rise time | t _r | — | 20 | — | ns | |
| Turn-off delay time | t _{d(off)} | — | 107 | — | ns | |
| Fall time | t _f | — | 28 | — | ns | |
| Turn-on loss energy | E _{on} | — | 0.17 | — | mJ | |
| Turn-off loss energy | E _{off} | — | 0.11 | — | mJ | |
| Total switching energy | E _{total} | — | 0.28 | — | mJ | |
| Turn-on delay time | t _{d(on)} | — | 31 | — | Ns | V _{CC} = 400 V V _{GE} = 15 V I _C = 20 A R _g = 10 Ω T _C = 150 °C Inductive load ^{Notes5} |
| Rise time | t _r | — | 20 | — | ns | |
| Turn-off delay time | t _{d(off)} | — | 114 | — | ns | |
| Fall time | t _f | — | 51 | — | ns | |
| Turn-on loss energy | E _{on} | — | 0.25 | — | mJ | |
| Turn-off loss energy | E _{off} | — | 0.24 | — | mJ | |
| Total switching energy | E _{total} | — | 0.49 | — | mJ | |

Notes: 4. Pulse test

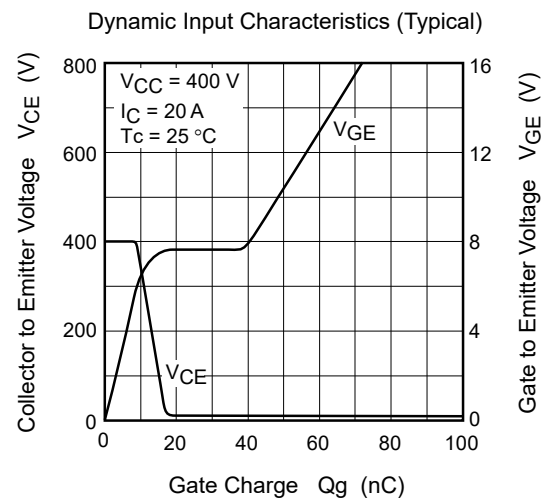
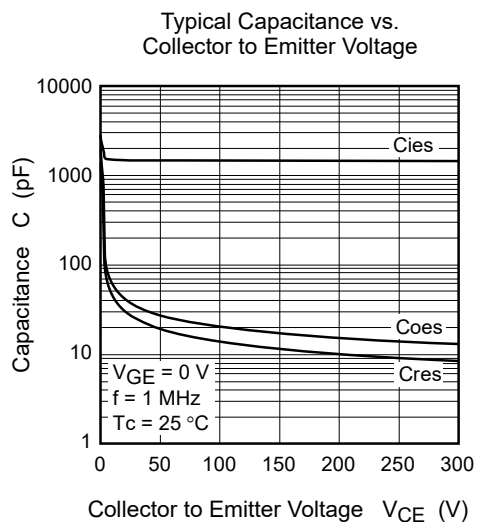
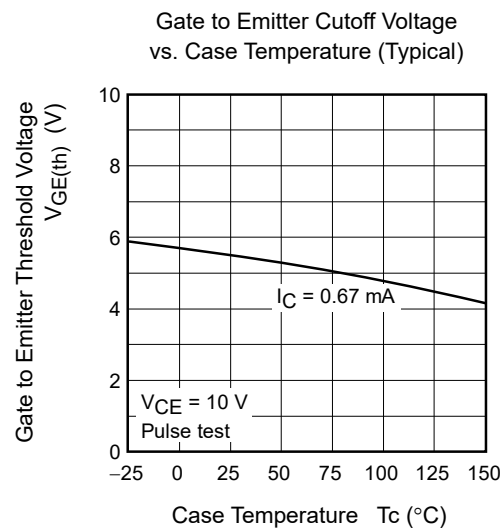
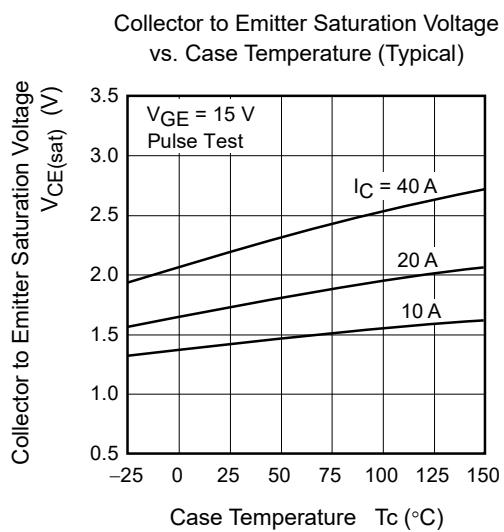
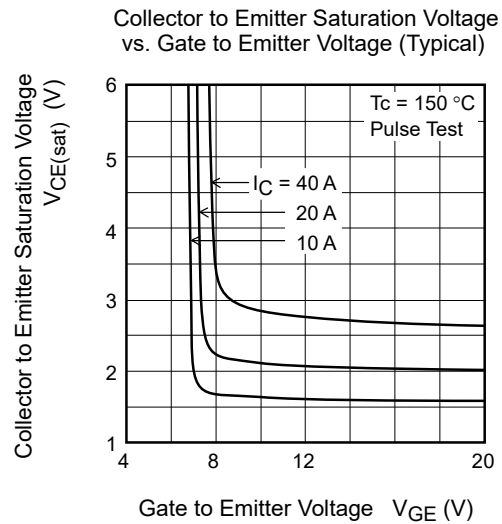
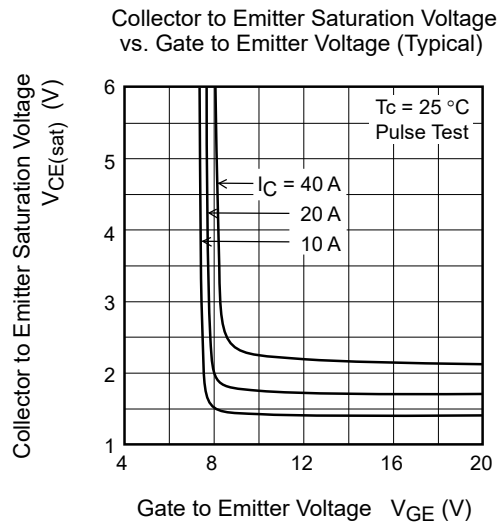
5. Switching time test circuit and waveform are shown below.

Main Characteristics

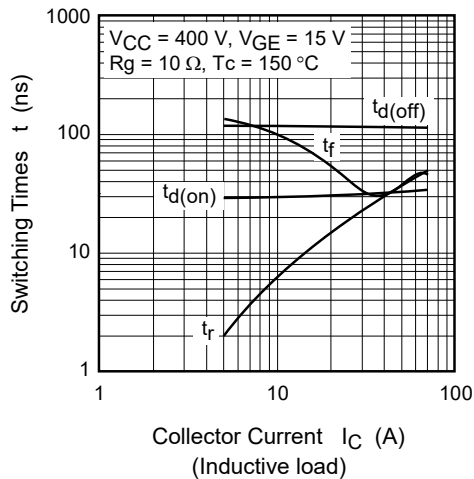


Notes: 6. Designed target value on Renesas measurement condition. (Not tested)

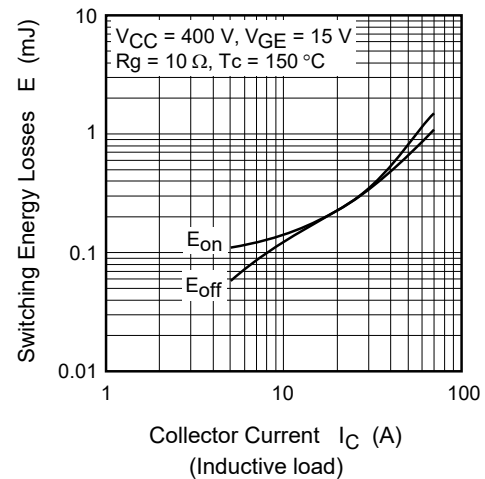
Renesas recommends that operating conditions are designed according to a document "Power MOS FET · IGBT Attention of Handling Semiconductor Devices".



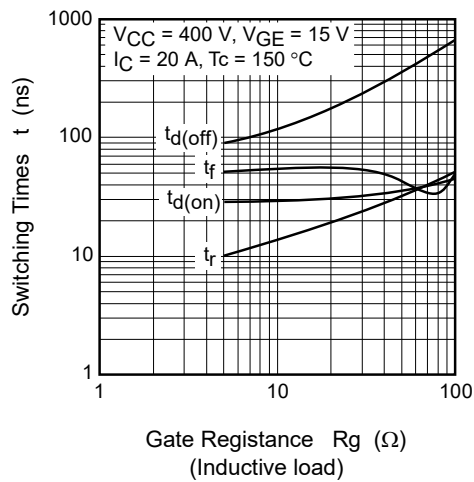
Switching Characteristics (Typical) (1)



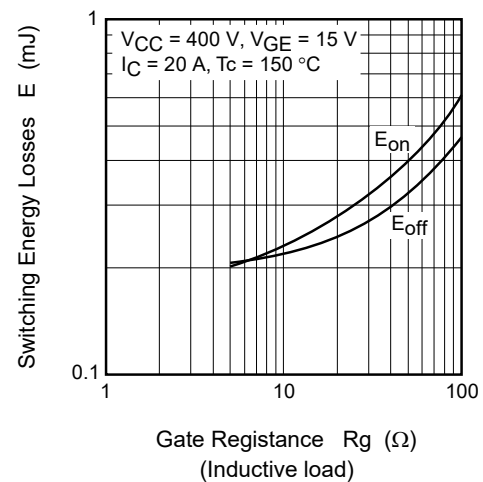
Switching Characteristics (Typical) (2)



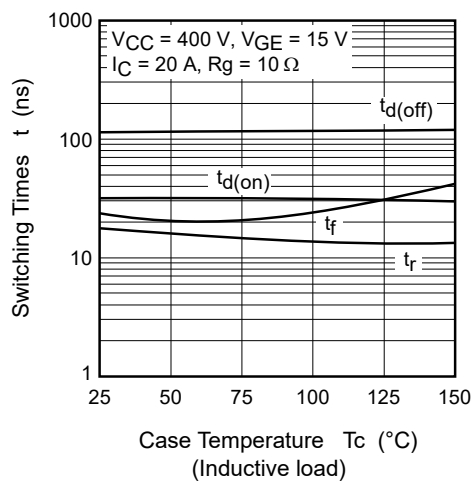
Switching Characteristics (Typical) (3)



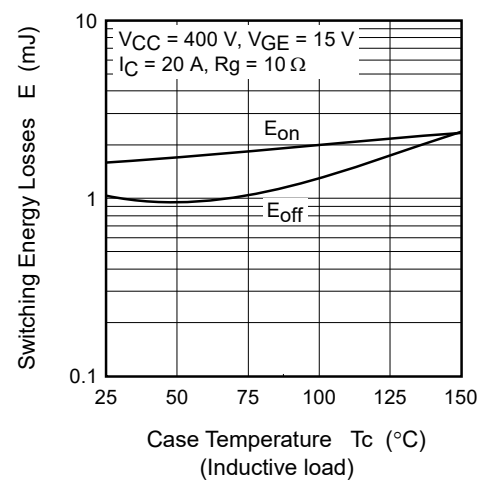
Switching Characteristics (Typical) (4)

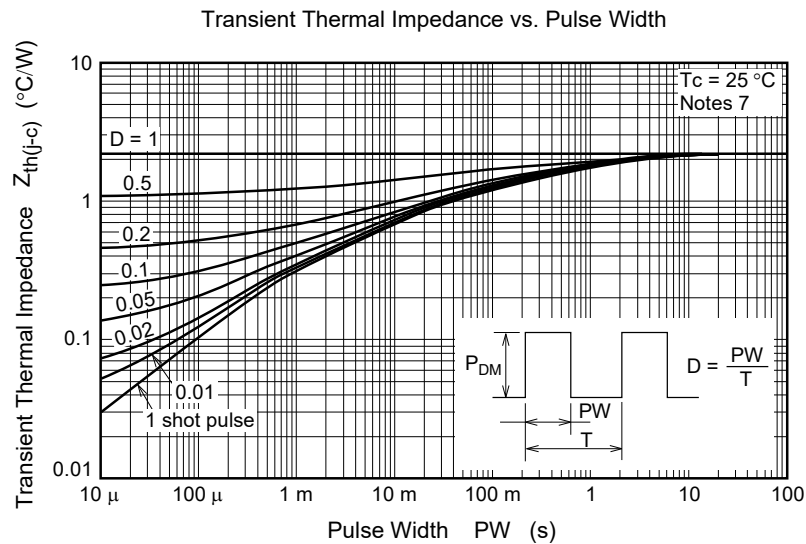


Switching Characteristics (Typical) (5)

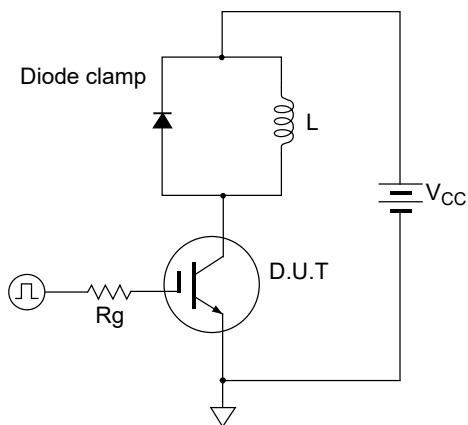


Switching Characteristics (Typical) (6)

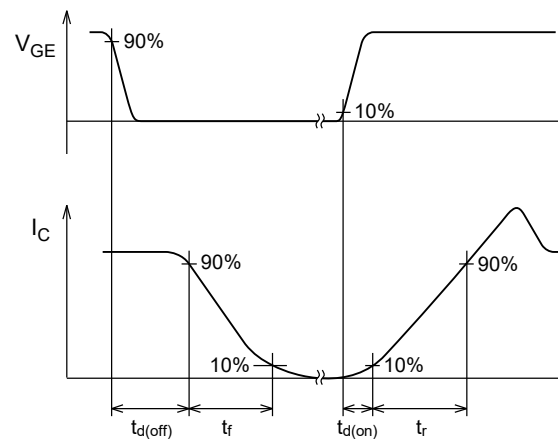




Switching Time Test Circuit



Waveform

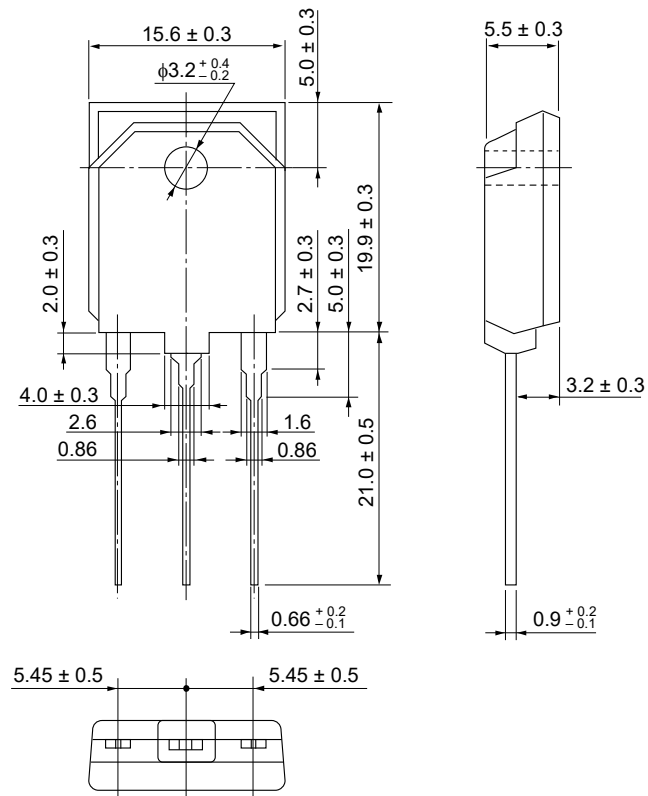


Notes: 7. Designed target value on Renesas measurement condition. (Not tested)

Package Dimensions

| Package Name | JEITA Package Code | RENESAS Code | Previous Code | MASS[Typ.] |
|--------------|--------------------|--------------|--------------------|------------|
| TO-3PFM | SC-93 | PRSS0003ZA-A | TO-3PFM / TO-3PFMV | 5.2g |

Unit: mm



Ordering Information

| Orderable Part No. | Quantity | Shipping Container |
|--------------------|----------|--------------------|
| RJP65T43DPM-00#T1 | 360 pcs | Box (Tube) |

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