RJP65T43DPM

650V - 20A - IGBT
High Speed Switching

R07DS1201EJ0200
Rev.2.00
Dec.01.2020

Features

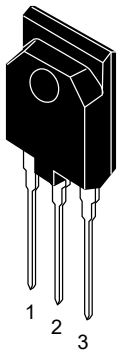
- Trench gate and thin wafer technology (G7H series)
- Isolated package
- Low collector to emitter saturation voltage
  $V_{CE(sat)}$ = 1.8 V typ. (at I_C = 20 A, V_{GE} = 15 V, Ta = 25 °C)
- High speed switching
  t_f = 28 ns typ. (at V_{CC} = 400 V, V_{GE} = 15 V, I_C = 20 A, R_g = 10 Ω, Ta = 25 °C)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

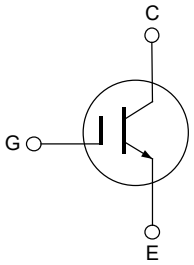
Key Performance

Type	V_{CES}	I_C	$V_{CE(sat)}$, T_C=25°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

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Absolute Maximum Ratings

(Tc = 25 °C)

Item		Symbol	Ratings	Unit
Collector to emitter voltage		V_{CES}	650	V
Gate to emitter voltage		V_{GES}	±30	V
Collector current	Tc = 25 °C	I_C Notes1	40	A
	Tc = 100 °C	I_C Notes1	20	A
Collector peak current		ic(peak) Notes1	150	A
Collector dissipation		P_C	68.8	W
Junction temperature		Tj Notes2	175	°C
Storage temperature		Tstg	–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

(Tc = 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)

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Electrical Characteristics

(Tc = 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	Cies	—	1320	—	pF	V_{CE} = 25 V V_{GE} = 0 V f = 1 MHz
Output capacitance	Coes	—	37	—	pF	
Reveres transfer capacitance	Cres	—	26	—	pF	
Total gate charge	Qg	—	70	—	nC	V_{GE} = 15 V V_{CE} = 400 V I_C = 20 A
Gate to emitter charge	Qge	—	8	—	nC	
Gate to collector charge	Qgc	—	31	—	nC	
Turn-on delay time	$t_{d(on)}$	—	30	—	Ns	V_{CC} = 400 V V_{GE} = 15 V I_C = 20 A Rg = 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 Rg = 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	

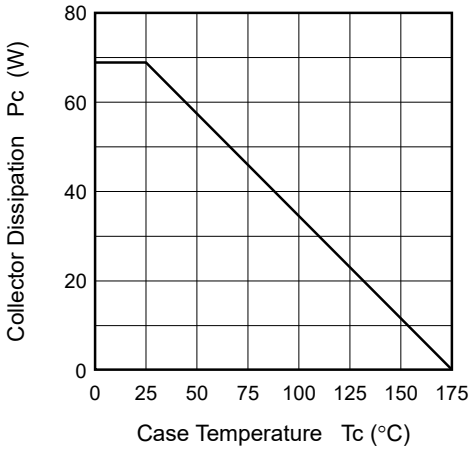
Notes: 4. Pulse test

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

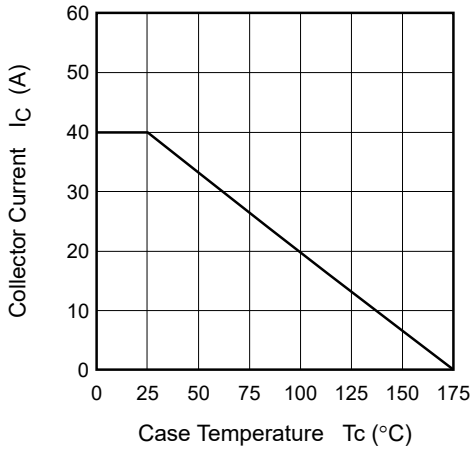
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Main Characteristics

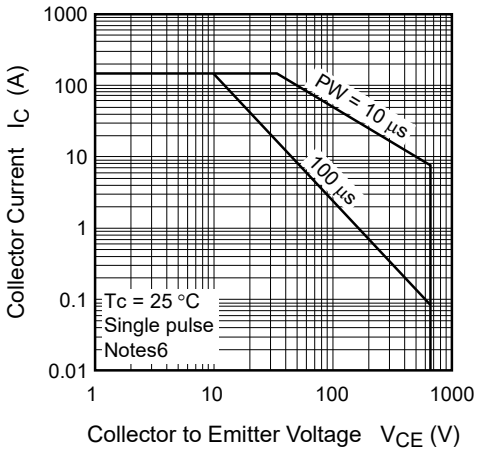
Collector Dissipation vs. Case Temperature



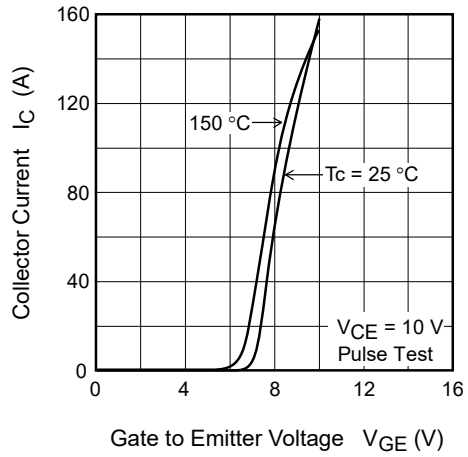
Maximum DC Collector Current vs. Case Temperature



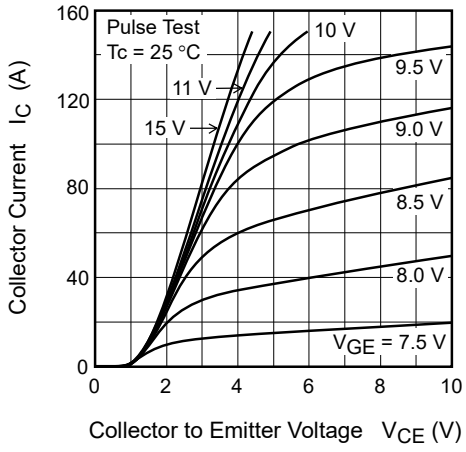
Forward Bias Safe Operation Area



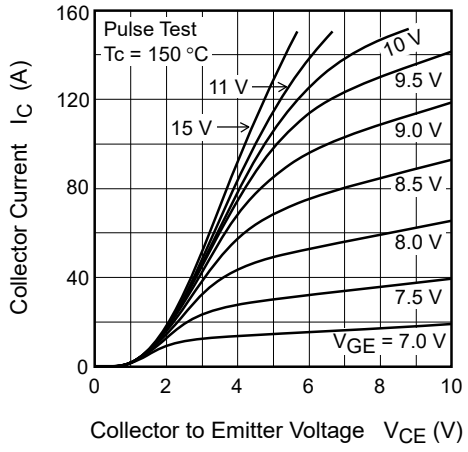
Typical Transfer Characteristics



Typical Output Characteristics



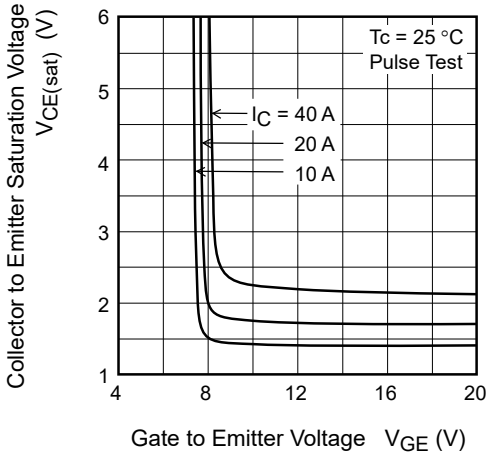
Typical Output Characteristics



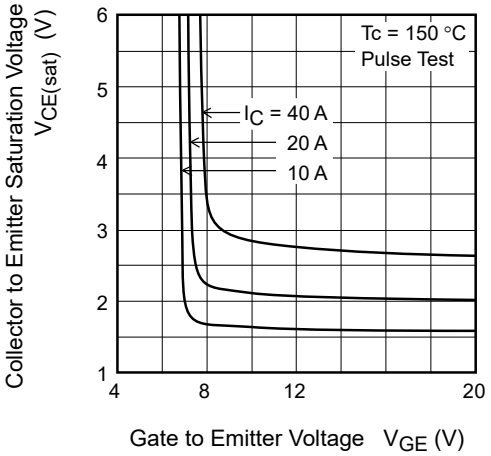
Notes: 6. Designed target value on Renesas measurement condition. (Not tested)
Renesas recommends that operating conditions are designed according to a document “Power MOS FET・IGBT Attention of Handling Semiconductor Devices”.

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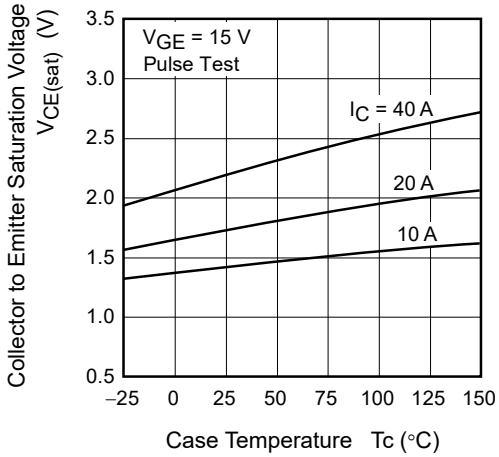
Collector to Emitter Saturation Voltage vs. Gate to Emitter Voltage (Typical)



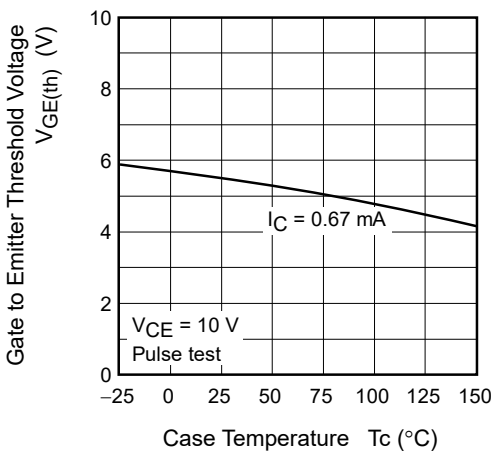
Collector to Emitter Saturation Voltage vs. Gate to Emitter Voltage (Typical)



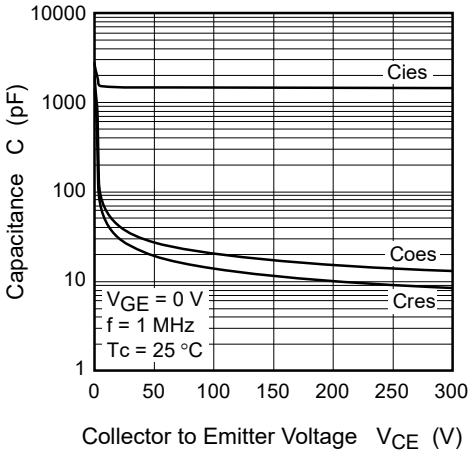
Collector to Emitter Saturation Voltage vs. Case Temperature (Typical)



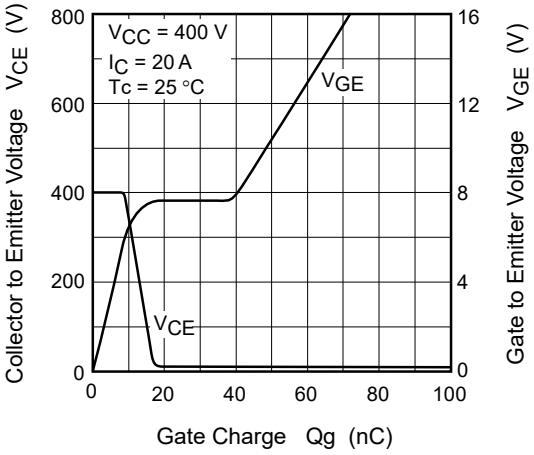
Gate to Emitter Cutoff Voltage vs. Case Temperature (Typical)



Typical Capacitance vs. Collector to Emitter Voltage

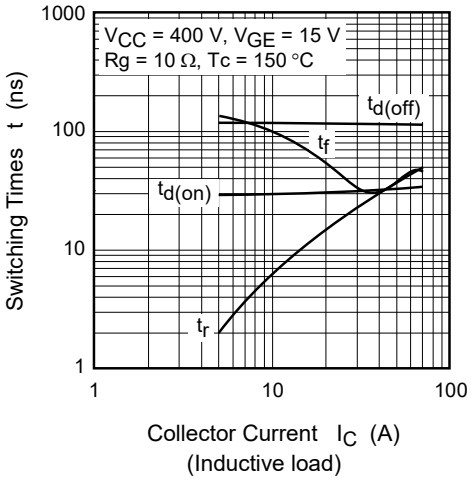


Dynamic Input Characteristics (Typical)

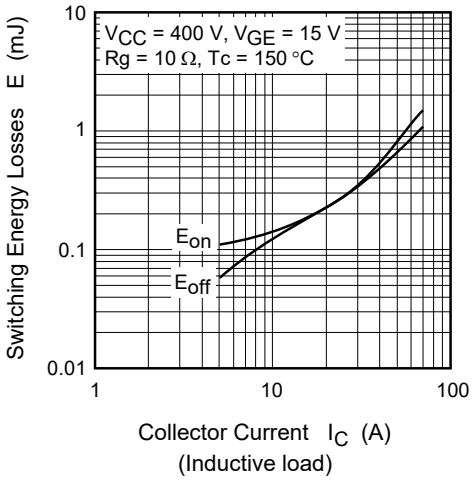


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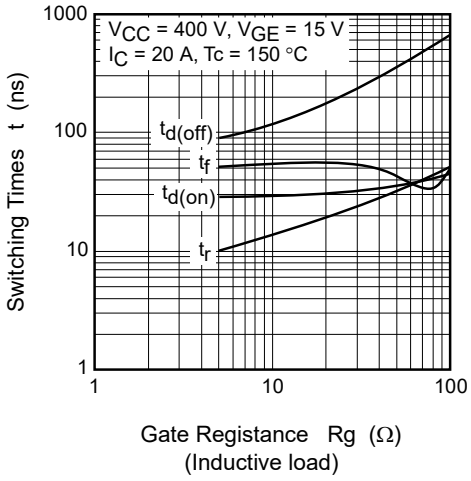
Switching Characteristics (Typical) (1)



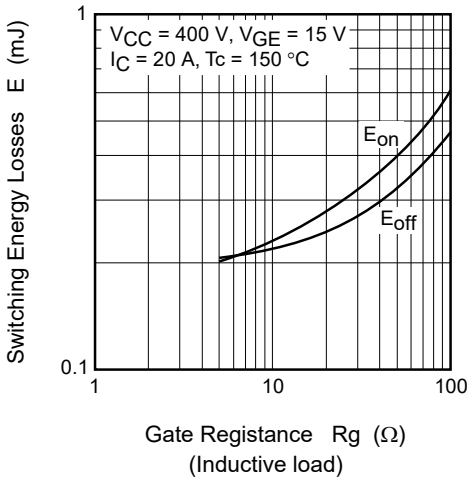
Switching Characteristics (Typical) (2)



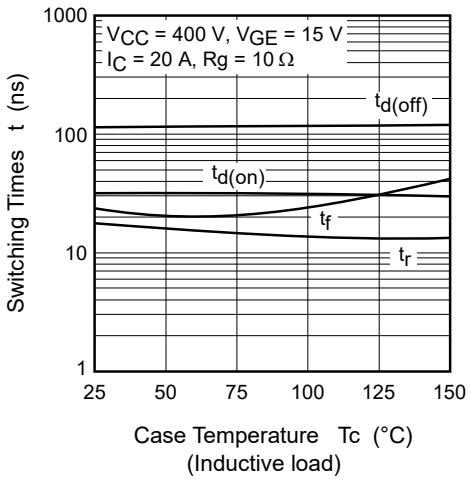
Switching Characteristics (Typical) (3)



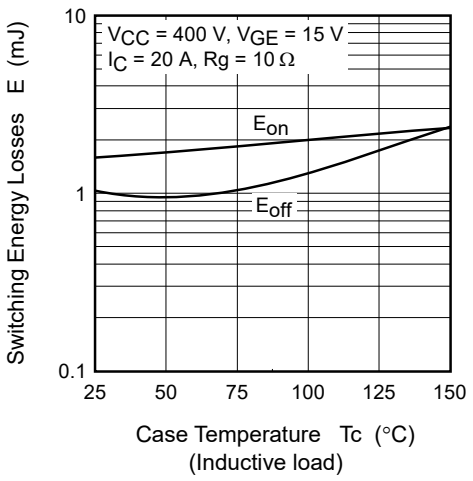
Switching Characteristics (Typical) (4)



Switching Characteristics (Typical) (5)

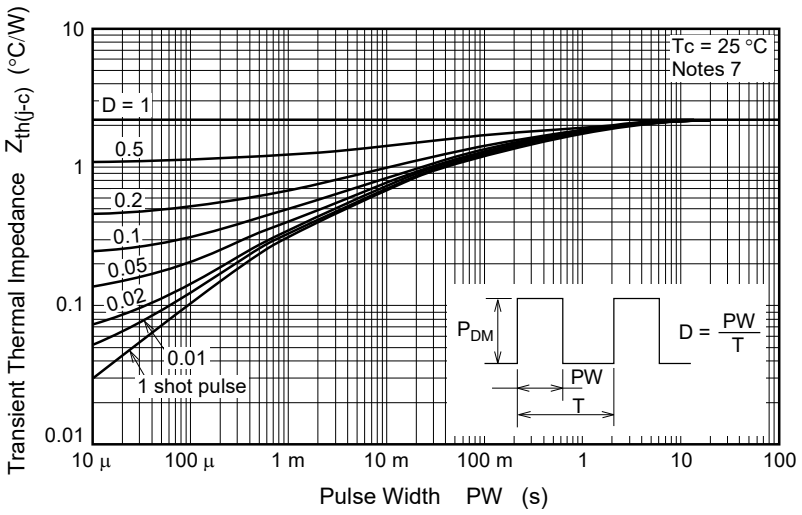


Switching Characteristics (Typical) (6)

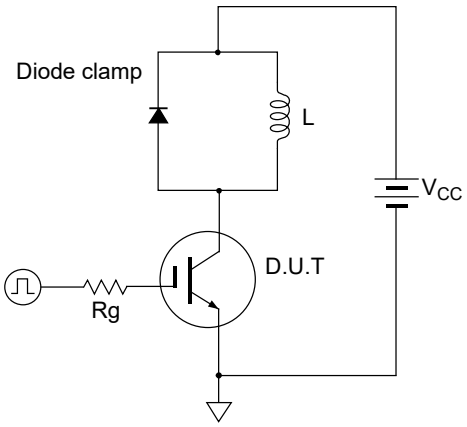


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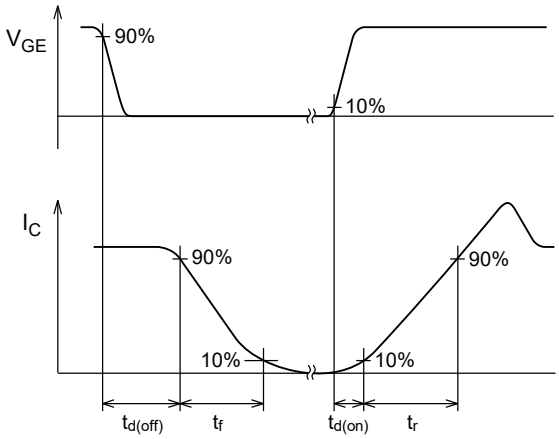
Transient Thermal Impedance vs. Pulse Width



Switching Time Test Circuit



Waveform



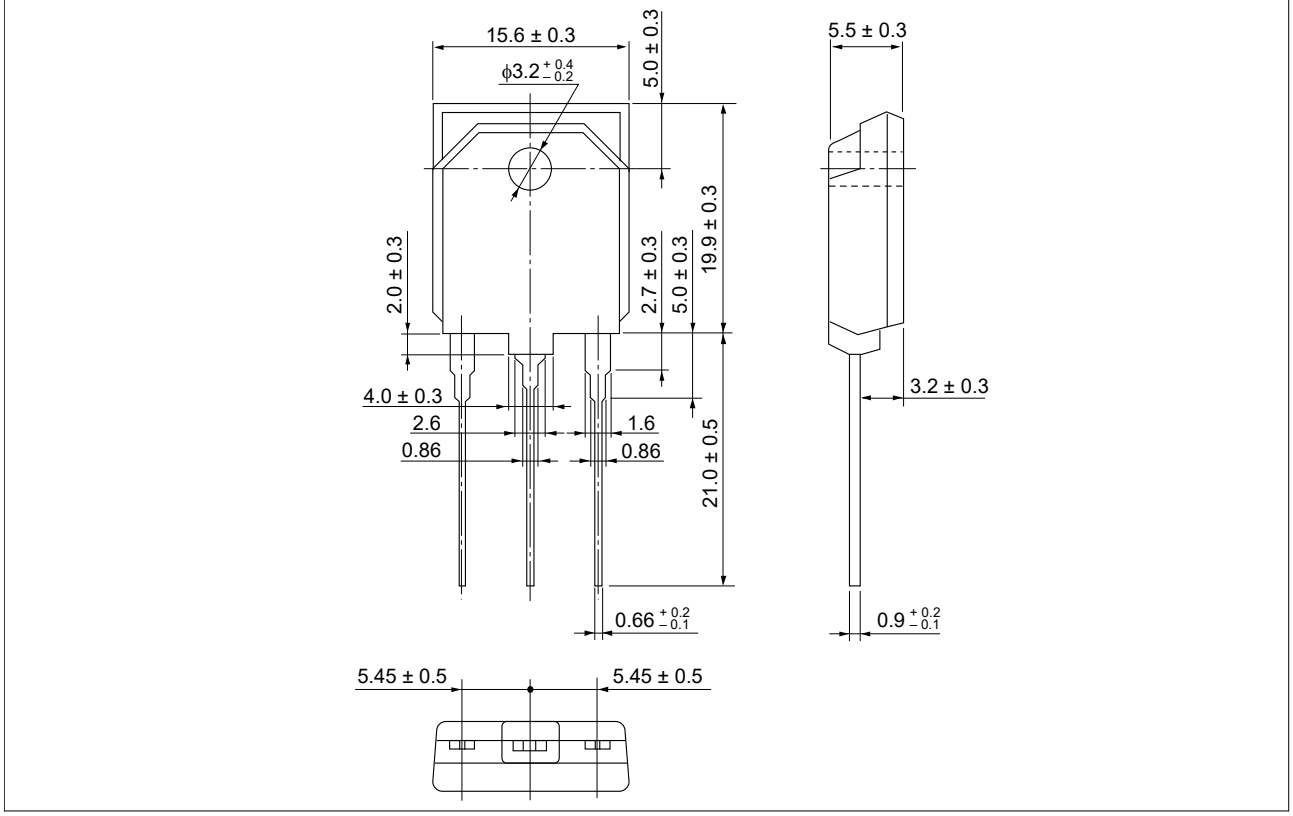
Notes: 7. Designed target value on Renesas measurement condition. (Not tested)

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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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Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
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