To our customers,

# Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation



Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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# 2SC5700

## Silicon NPN Epitaxial
## VHF/UHF wide band amplifier

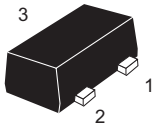
REJ03G0751-0100
(Previous ADE-208-1435)
Rev.1.00
Aug.10.2005

### Features

- High power gain low noise figure at low power operation:
  $|S_{21}|^2$ = 16 dB typ, NF = 1.0 dB typ ($V_{CE}$ = 1 V, $I_C$ = 5 mA, f = 900 MHz)

### Outline

RENESAS Package code: PUSF0003ZA-A
(Package name: MFPAK®)




1. Emitter
2. Base
3. Collector

Note: Marking is "WB–".

*MFPAK is a trademark of Renesas Technology Corp.



### Absolute Maximum Ratings

(Ta = 25°C)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Collector to base voltage | $V_{CBO}$ | 15 | V |
| Collector to emitter voltage | $V_{CEO}$ | 4 | V |
| Emitter to base voltage | $V_{EBO}$ | 1.5 | V |
| Collector current | $I_C$ | 50 | mA |
| Collector power dissipation | Pc | 80 | mW |
| Junction temperature | Tj | 150 | °C |
| Storage temperature | Tstg | –55 to +150 | °C |

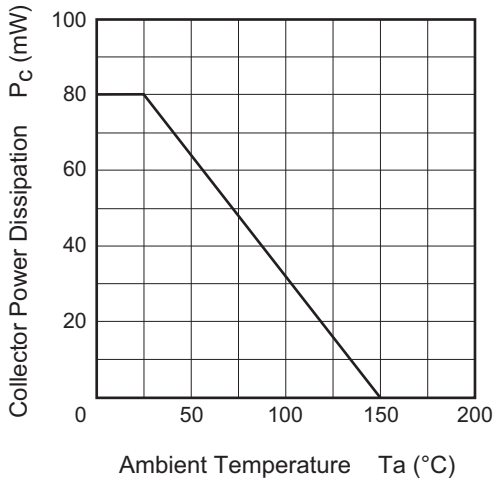
## Electrical Characteristics

(Ta = 25°C)

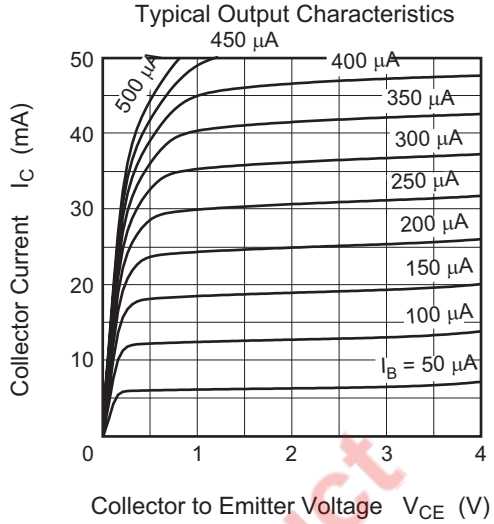
| Item | Symbol | Min | Typ | Max | Unit | Test conditions |
|---|---|---|---|---|---|---|
| Collector to base breakdown voltage | $V_{(BR)CBO}$ | 15 | — | — | V | $I_C$ = 10 µA, $I_E$ = 0 |
| Collector cutoff current | $I_{CBO}$ | — | — | 0.1 | µA | $V_{CB}$ = 15 V, $I_E$ = 0 |
| Collector cutoff current | $I_{CEO}$ | — | — | 1 | µA | $V_{CE}$ = 4 V, $R_{BE}$ = ∞ |
| Emitter cutoff current | $I_{EBO}$ | — | — | 200 | nA | $V_{EB}$ = 0.8 V, $I_C$ = 0 |
| DC current transfer ratio | $h_{FE}$ | 100 | 130 | 170 | | $V_{CE}$ = 1 V, $I_C$ = 5 mA |
| Collector output capacitance | $C_{ob}$ | — | 0.4 | 0.7 | pF | $V_{CB}$ = 1 V, $I_E$ = 0, f = 1 MHz |
| Gain bandwidth product | $f_T$ | 10 | 12 | — | GHz | $V_{CE}$ = 1V, $I_C$ = 5 mA |
| Forward transmission coefficient | $\|S_{21}\|^2$ | 13 | 16 | — | dB | $V_{CE}$ = 1 V, $I_C$ = 5 mA, f = 900 MHz |
| Noise figure | NF | — | 1.0 | 1.7 | dB | $V_{CE}$ = 1 V, $I_C$ = 5 mA, f = 900 MHz, $Z_S$ = $Z_L$ = 50 Ω |

## Main Characteristics

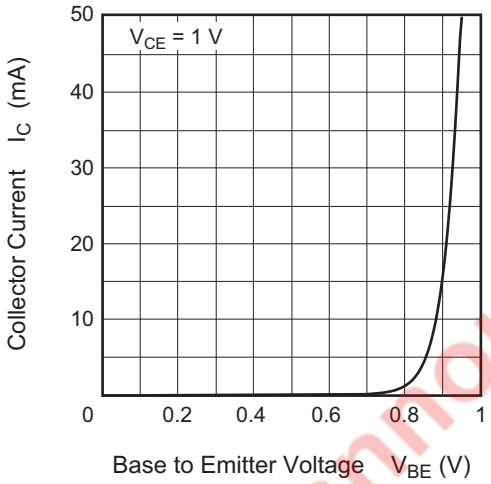
Collector Power Dissipation Curve



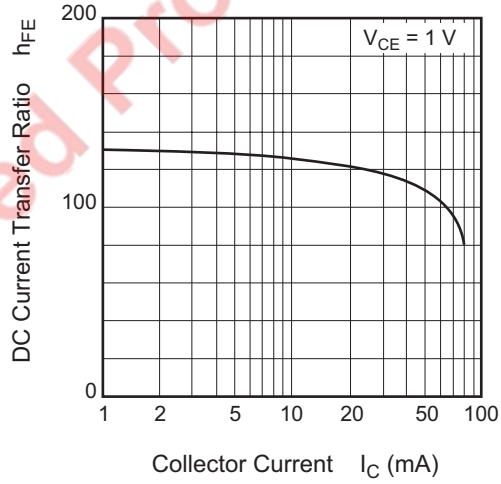

Typical Output Characteristics



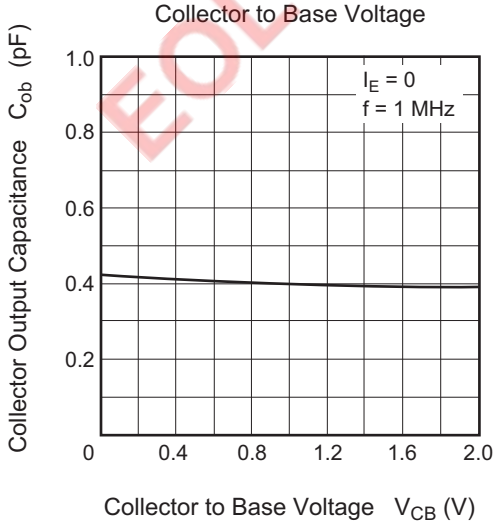

Typical Transfer Characteristics



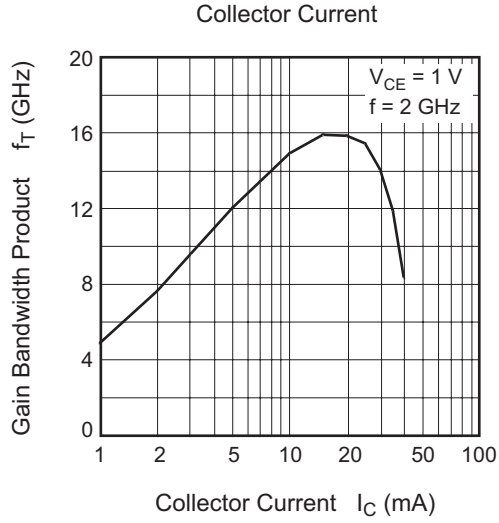

DC Current Transfer Ratio vs. Collector Current



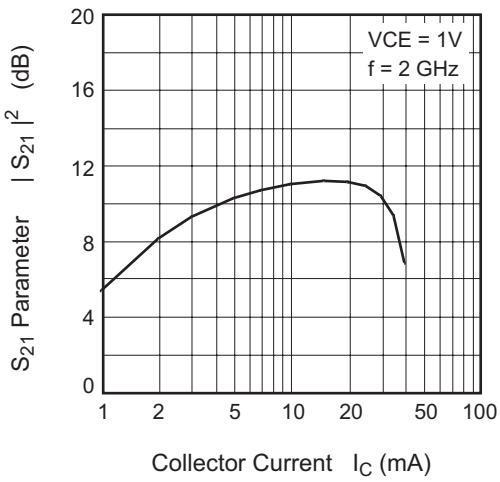

Collector Output Capacitance vs. Collector to Base Voltage



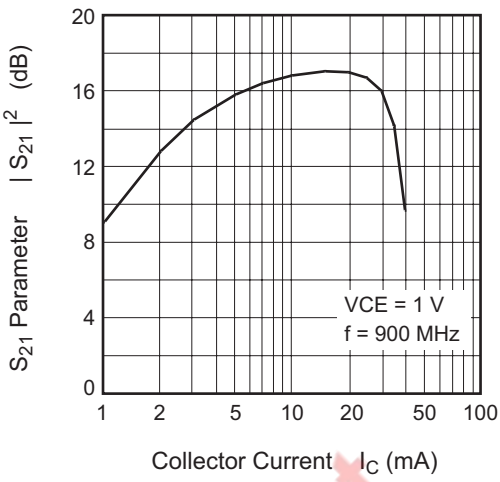

Gain Bandwidth Product vs. Collector Current



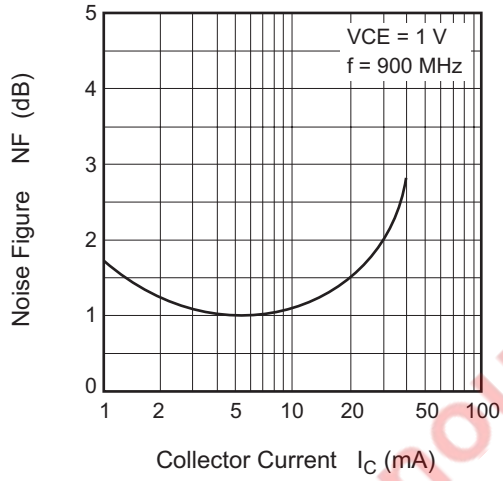
$S_{21}$ Parameter vs. Collector Current



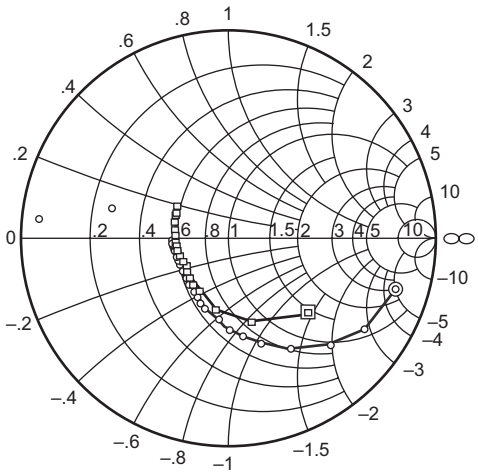

$S_{21}$ Parameter vs. Collector Current




Noise Figure vs. Collector Current



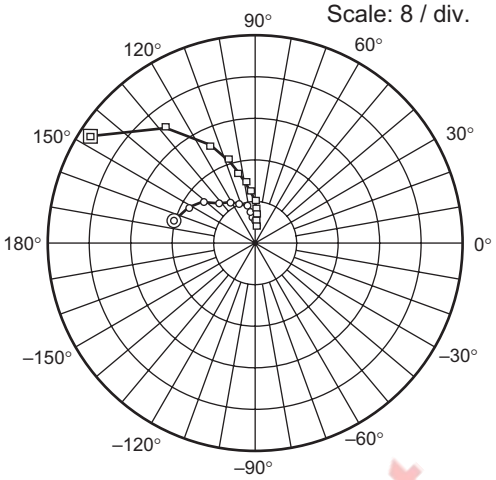
$S_{11}$ Parameter vs. Frequency




Condition: $V_{CE}$ = 1 V , $Z_O$ = 50 Ω
100 to 2000 MHz (100 MHz Step)
( $I_C$ = 5 mA)
( $I_C$ = 20 mA)

$S_{21}$ Parameter vs. Frequency

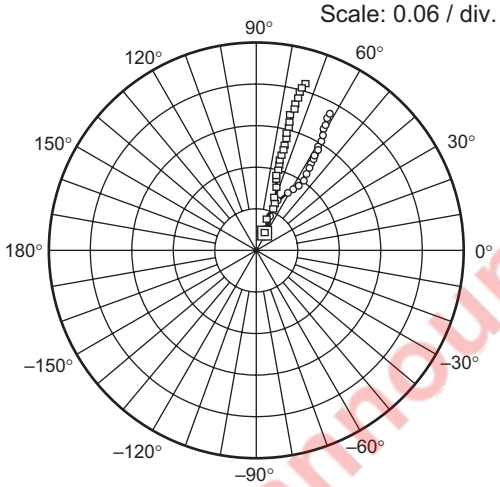
Scale: 8 / div.




Condition: $V_{CE}$ = 1 V , $Z_O$ = 50 Ω
100 to 2000 MHz (100 MHz Step)
( $I_C$ = 5 mA)
( $I_C$ = 20 mA)

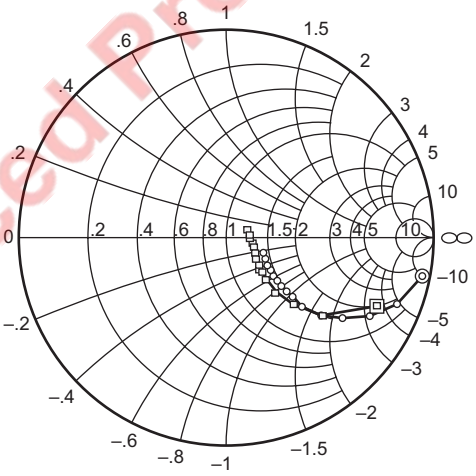
$S_{12}$ Parameter vs. Frequency

Scale: 0.06 / div.




Condition: $V_{CE}$ = 1 V , $Z_O$ = 50 Ω
100 to 2000 MHz (100 MHz Step)
( $I_C$ = 5 mA)
( $I_C$ = 20 mA)

$S_{22}$ Parameter vs. Frequency




Condition: $V_{CE}$ = 1 V , $Z_O$ = 50 Ω
100 to 2000 MHz (100 MHz Step)
( $I_C$ = 5 mA)
( $I_C$ = 20 mA)

## Sparameter

($V_{CE}$ = 1V, $I_C$ = 5mA, Zo = 50Ω)

| f (MHz) | S11 | | S21 | | S12 | | S22 | |
|---|---|---|---|---|---|---|---|---|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100 | 0.855 | –16.3 | 15.67 | 165.4 | 0.018 | 81.2 | 0.962 | –10.7 |
| 200 | 0.784 | –32.7 | 14.42 | 152.1 | 0.035 | 72.2 | 0.889 | –20.9 |
| 300 | 0.703 | –48.4 | 12.92 | 140.6 | 0.048 | 65.3 | 0.791 | –28.9 |
| 400 | 0.616 | –60.4 | 11.41 | 131.2 | 0.059 | 61.2 | 0.698 | –34.6 |
| 500 | 0.540 | –72.1 | 10.09 | 123.5 | 0.067 | 58.6 | 0.618 | –38.2 |
| 600 | 0.475 | –81.4 | 8.94 | 117.2 | 0.074 | 57.3 | 0.549 | –40.7 |
| 700 | 0.428 | –90.3 | 8.00 | 112.3 | 0.080 | 56.6 | 0.492 | –42.1 |
| 800 | 0.385 | –99.1 | 7.23 | 108.2 | 0.085 | 56.1 | 0.445 | –42.5 |
| 900 | 0.348 | –106.5 | 6.54 | 104.2 | 0.091 | 56.3 | 0.404 | –42.7 |
| 1000 | 0.320 | –113.6 | 6.00 | 100.9 | 0.096 | 57.3 | 0.373 | –42.0 |
| 1100 | 0.297 | –121.6 | 5.51 | 98.2 | 0.101 | 57.4 | 0.344 | –41.6 |
| 1200 | 0.283 | –128.8 | 5.14 | 95.4 | 0.106 | 57.8 | 0.321 | –40.7 |
| 1300 | 0.271 | –134.6 | 4.80 | 93.1 | 0.111 | 58.7 | 0.298 | –39.1 |
| 1400 | 0.262 | –142.4 | 4.47 | 90.8 | 0.117 | 59.2 | 0.283 | –37.5 |
| 1500 | 0.254 | –149.0 | 4.23 | 89.0 | 0.122 | 60.0 | 0.263 | –36.3 |
| 1600 | 0.246 | –155.3 | 3.99 | 87.0 | 0.128 | 60.5 | 0.252 | –34.6 |
| 1700 | 0.248 | –160.8 | 3.79 | 85.3 | 0.134 | 61.1 | 0.238 | –33.0 |
| 1800 | 0.249 | –167.3 | 3.59 | 83.7 | 0.140 | 61.5 | 0.226 | –31.3 |
| 1900 | 0.253 | –172.0 | 3.44 | 81.9 | 0.145 | 62.1 | 0.215 | –29.6 |
| 2000 | 0.253 | –177.5 | 3.29 | 80.5 | 0.151 | 62.7 | 0.204 | –27.2 |

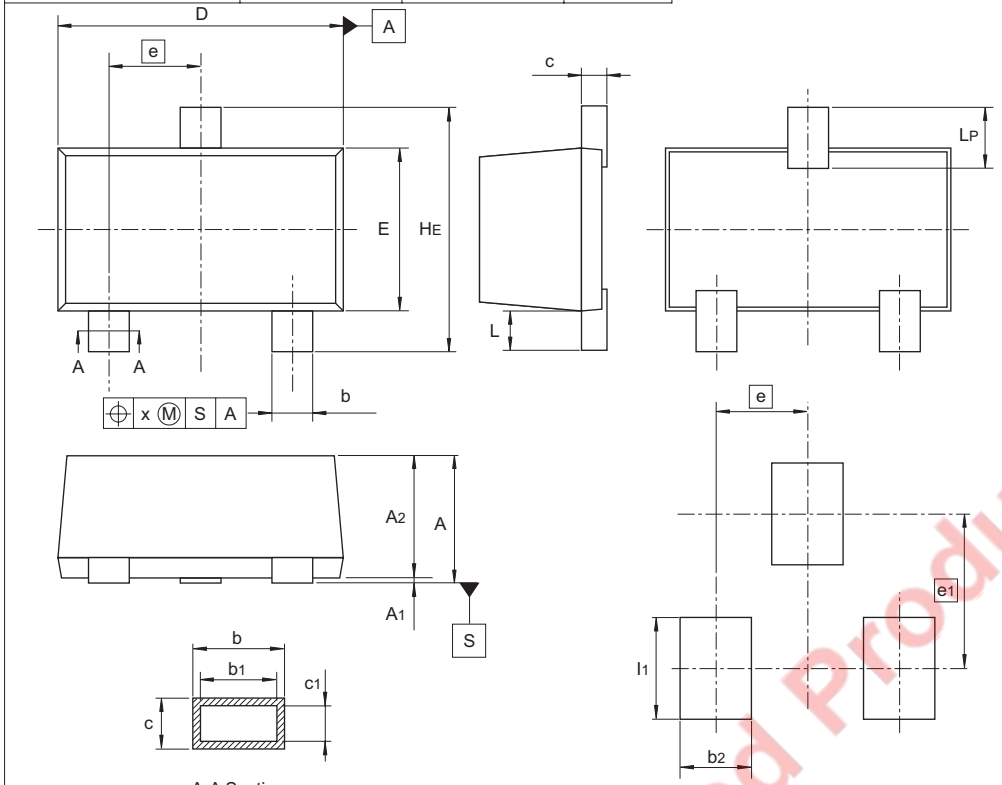
## Sparameter

($V_{CE}$ = 1V, $I_C$ = 20mA, Zo = 50Ω)

| f (MHz) | S11 | | S21 | | S12 | | S22 | |
|---|---|---|---|---|---|---|---|---|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100 | 0.526 | –43.0 | 37.91 | 148.3 | 0.015 | 75.0 | 0.817 | –25.2 |
| 200 | 0.406 | –76.6 | 27.98 | 127.5 | 0.025 | 67.3 | 0.605 | –40.0 |
| 300 | 0.334 | –100.0 | 20.76 | 115.3 | 0.033 | 66.9 | 0.453 | –45.9 |
| 400 | 0.284 | –116.6 | 16.30 | 108.1 | 0.040 | 68.0 | 0.360 | –47.1 |
| 500 | 0.263 | –131.4 | 13.33 | 103.0 | 0.047 | 69.8 | 0.300 | –46.2 |
| 600 | 0.243 | –143.4 | 11.24 | 99.2 | 0.055 | 71.1 | 0.257 | –44.4 |
| 700 | 0.242 | –152.6 | 9.74 | 96.3 | 0.063 | 72.0 | 0.226 | –41.4 |
| 800 | 0.236 | –159.6 | 8.57 | 93.6 | 0.071 | 72.7 | 0.203 | –38.2 |
| 900 | 0.230 | –167.8 | 7.62 | 91.4 | 0.078 | 73.5 | 0.184 | –34.3 |
| 1000 | 0.239 | –173.4 | 6.91 | 89.4 | 0.086 | 74.1 | 0.170 | –30.5 |
| 1100 | 0.240 | –179.4 | 6.31 | 87.7 | 0.094 | 73.9 | 0.160 | –26.8 |
| 1200 | 0.247 | 175.6 | 5.82 | 85.9 | 0.102 | 74.1 | 0.150 | –22.6 |
| 1300 | 0.246 | 172.4 | 5.38 | 84.4 | 0.110 | 74.4 | 0.143 | –18.1 |
| 1400 | 0.255 | 167.4 | 5.02 | 82.9 | 0.117 | 74.3 | 0.138 | –14.0 |
| 1500 | 0.257 | 163.8 | 4.71 | 81.3 | 0.126 | 74.2 | 0.133 | –9.6 |
| 1600 | 0.265 | 160.2 | 4.45 | 80.1 | 0.134 | 74.4 | 0.130 | –5.3 |
| 1700 | 0.268 | 158.7 | 4.19 | 78.9 | 0.142 | 74.2 | 0.128 | –1.2 |
| 1800 | 0.282 | 154.1 | 3.97 | 77.6 | 0.149 | 73.9 | 0.125 | 2.5 |
| 1900 | 0.283 | 152.7 | 3.80 | 76.4 | 0.157 | 74.1 | 0.123 | 7.1 |
| 2000 | 0.300 | 150.3 | 3.63 | 75.4 | 0.165 | 73.7 | 0.123 | 11.8 |

## Package Dimensions

| JEITA Package Code | RENESAS Code | Package Name | MASS[Typ.] |
|---|---|---|---|
| SC-89 Modified | PUSF0003ZA-A | MFPAK / MFPAKV | 0.0016g |




| Reference Symbol | Dimension in Millimeters | | |
|---|---|---|---|
| | Min | Nom | Max |
| A | 0.55 | — | 0.6 |
| $A_1$ | 0 | — | 0.01 |
| $A_2$ | 0.55 | — | 0.59 |
| b | 0.15 | 0.22 | 0.3 |
| $b_1$ | — | 0.2 | — |
| c | 0.1 | 0.13 | 0.15 |
| $c_1$ | — | 0.11 | — |
| D | 1.35 | 1.4 | 1.45 |
| E | 0.7 | 0.8 | 0.9 |
| e | — | 0.45 | — |
| $H_E$ | 1.15 | 1.2 | 1.25 |
| L | 0.1 | 0.2 | 0.3 |
| $L_P$ | 0.15 | — | 0.45 |
| x | — | — | 0.05 |
| $b_2$ | — | — | 0.35 |
| $e_1$ | — | 0.75 | — |
| $l_1$ | — | — | 0.5 |



## Ordering Information

| Part Name | Quantity | Shipping Container |
|---|---|---|
| 2SC5700WB-TR-E | 9000 | ϕ 178 mm Reel, 8 mm Emboss Taping |

Note: For some grades, production may be terminated. Please contact the Renesas sales office to check the state of production before ordering the product.

Renesas Technology Corp. Sales Strategic Planning Div. Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan



## RENESAS SALES OFFICES

http://www.renesas.com

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Colophon .3.0