

## 2SC5772

Silicon NPN Epitaxial  
VHF/UHF wide band amplifier

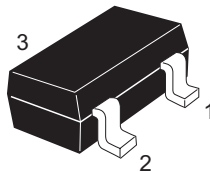
REJ03G0755-0200  
(Previous ADE-208-1390)  
Preliminary  
Rev.2.00  
Aug.10.2005

### Features

- High gain bandwidth product  
 $f_T = 9 \text{ GHz typ.}$
- High power gain and low noise figure ;  
 $PG = 13 \text{ dB typ.}, NF = 1.1 \text{ dB typ. at } f = 900 \text{ MHz}$

### Outline

RENESAS Package code: PLSP0003ZB-A  
(Package name: MPAK)



1. Emitter
2. Base
3. Collector

Note: Marking is "FR-".

### Absolute Maximum Ratings

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

| Item                         | Symbol    | Ratings     | Unit             |
|------------------------------|-----------|-------------|------------------|
| Collector to base voltage    | $V_{CBO}$ | 15          | V                |
| Collector to emitter voltage | $V_{CEO}$ | 9           | V                |
| Emitter to base voltage      | $V_{EBO}$ | 1.5         | V                |
| Collector current            | $I_C$     | 75          | mA               |
| Collector power dissipation  | $P_C$     | 700*        | mW               |
| Junction temperature         | $T_j$     | 150         | $^\circ\text{C}$ |
| Storage temperature          | $T_{stg}$ | -55 to +150 | $^\circ\text{C}$ |

\* When using aluminum ceramic board (25 x 60 x 0.7 mm)

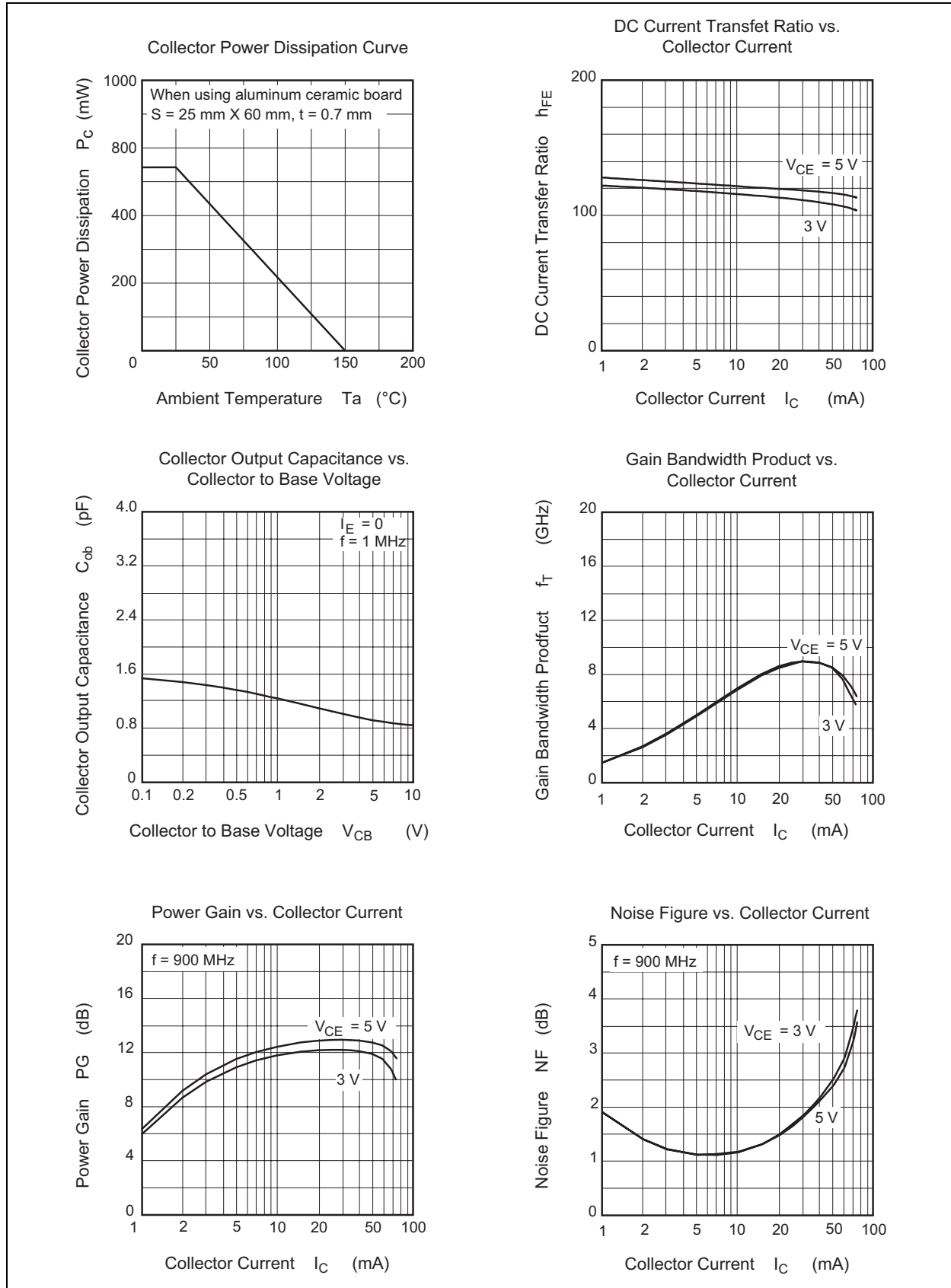
This data sheet contains tentative specification for new product development. It may partially be subject to change without notice.

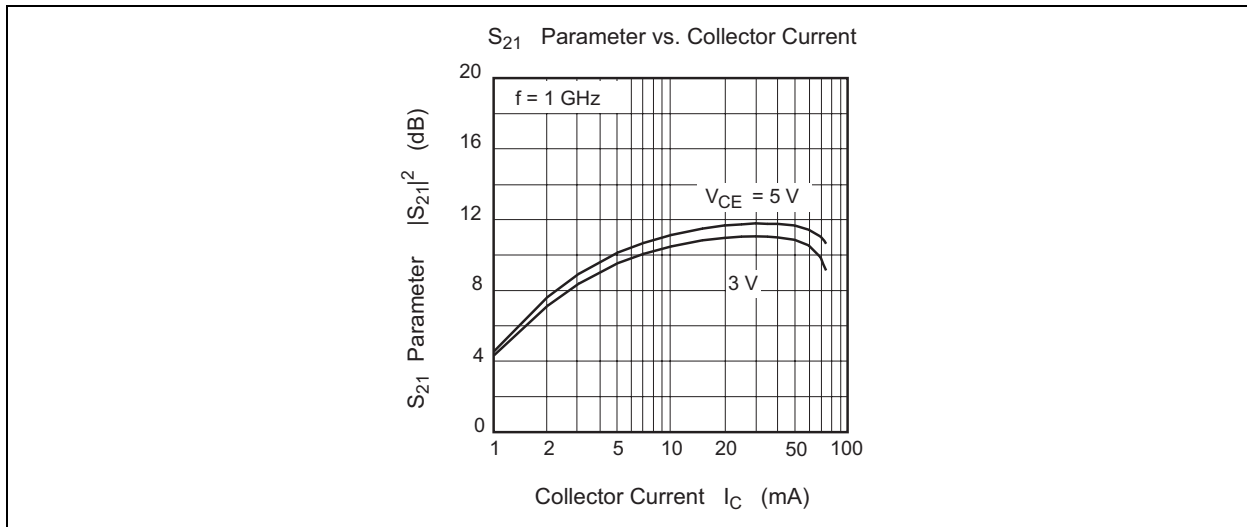
## Electrical Characteristics

(Ta = 25°C)

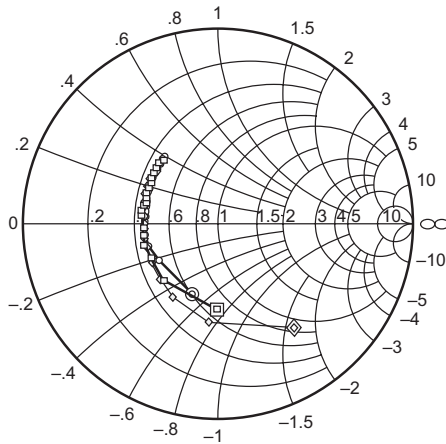
| Item                                | Symbol        | Min | Typ  | Max | Unit    | Test Conditions                              |
|-------------------------------------|---------------|-----|------|-----|---------|--|
| Collector to base breakdown voltage | $V_{(BR)CBO}$ | 15  | —    | —   | V       | $I_C = 10 \mu A, I_E = 0$                    |
| Collector cutoff current            | $I_{CBO}$     | —   | —    | 1   | $\mu A$ | $V_{CB} = 12 V, I_E = 0$                     |
| Collector cutoff current            | $I_{CEO}$     | —   | —    | 1   | mA      | $V_{CE} = 9 V, R_{BE} = \infty$              |
| Emitter cutoff current              | $I_{EBO}$     | —   | —    | 10  | $\mu A$ | $V_{EB} = 1.5 V, I_C = 0$                    |
| DC current transfer ratio           | $h_{FE}$      | 80  | 120  | 160 |         | $V_{CE} = 5 V, I_C = 20 mA$                  |
| Collector output capacitance        | Cob           | —   | 0.9  | 1.5 | pF      | $V_{CB} = 5 V, I_E = 0$<br>$f = 1 MHz$       |
| Reverse transfer capacitance        | Cre           | —   | 0.7  | —   | pF      | $V_{CB} = 5 V, I_E = 0$<br>$f = 1 MHz$       |
| Gain bandwidth product              | $f_T$         | 6   | 9    | —   | GHz     | $V_{CE} = 5 V, I_C = 20 mA$<br>$f = 1 GHz$   |
| S <sub>21</sub> parameter           | $ S_{21} ^2$  | —   | 11.8 | —   | dB      | $V_{CE} = 5 V, I_C = 20 mA$<br>$f = 1 GHz$   |
| Power gain                          | PG            | 9.5 | 13   | —   | dB      | $V_{CE} = 5 V, I_C = 20 mA$<br>$f = 900 MHz$ |
| Noise figure                        | NF            | —   | 1.1  | 1.9 | dB      | $V_{CE} = 5 V, I_C = 5 mA$<br>$f = 900 MHz$  |

Main Characteristics



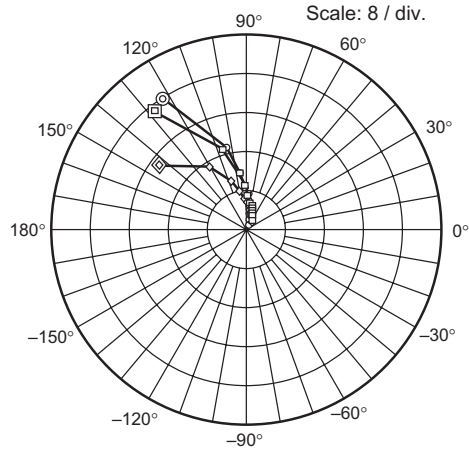


S11 Parameter vs. Frequency



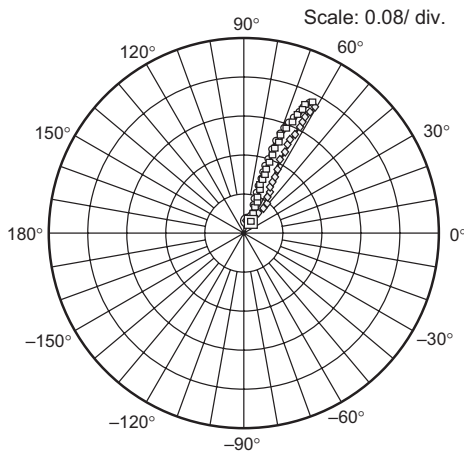
Condition: VCE = 3 V, ZO = 50 Ω  
 100 to 2000 MHz (100 MHz Step)  
 ○ ( IC = 50 mA)  
 □ ( IC = 30 mA)  
 ◇ ( IC = 10 mA)

S21 Parameter vs. Frequency



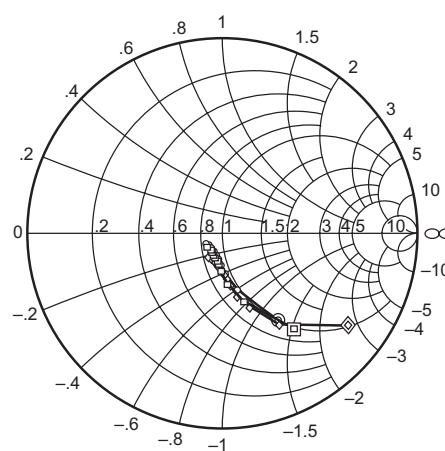
Condition: VCE = 3 V, ZO = 50 Ω  
 100 to 2000 MHz (100 MHz Step)  
 ○ ( IC = 50 mA)  
 □ ( IC = 30 mA)  
 ◇ ( IC = 10 mA)

S12 Parameter vs. Frequency



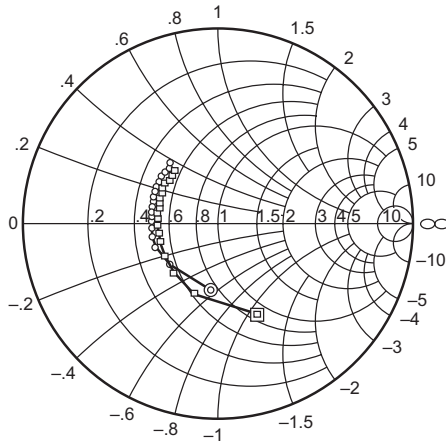
Condition: VCE = 3 V, ZO = 50 Ω  
 100 to 2000 MHz (100 MHz Step)  
 ○ ( IC = 50 mA)  
 □ ( IC = 30 mA)  
 ◇ ( IC = 10 mA)

S22 Parameter vs. Frequency



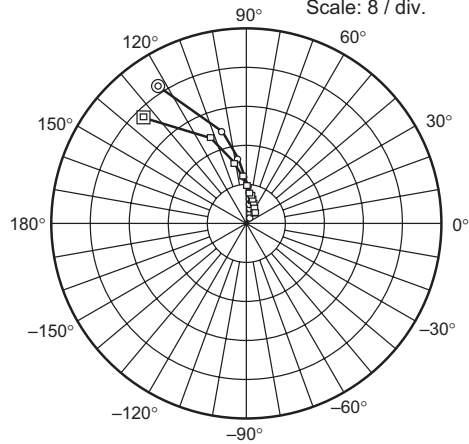
Condition: VCE = 3 V, ZO = 50 Ω  
 100 to 2000 MHz (100 MHz Step)  
 ○ ( IC = 50 mA)  
 □ ( IC = 30 mA)  
 ◇ ( IC = 10 mA)

S11 Parameter vs. Frequency



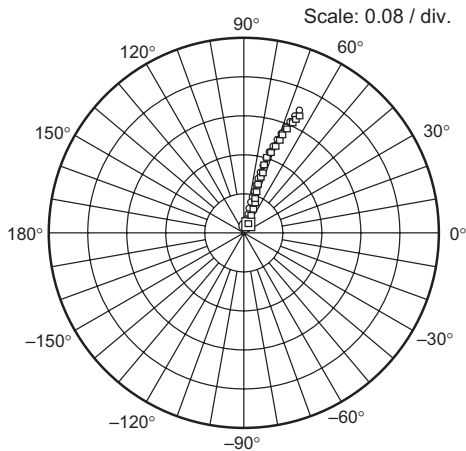
Condition: VCE = 5 V, ZO = 50 Ω  
 100 to 2000 MHz (100 MHz Step)  
 ○—○ ( IC = 50 mA)  
 □—□ ( IC = 20 mA)

S21 Parameter vs. Frequency



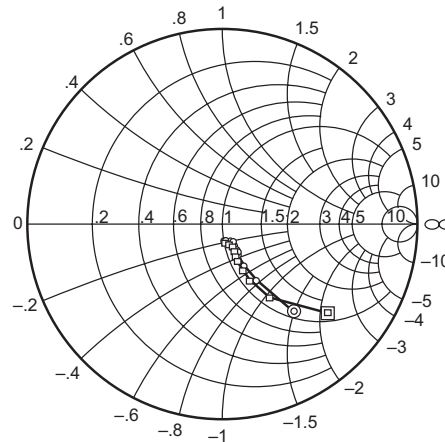
Condition: VCE = 5 V, ZO = 50 Ω  
 100 to 2000 MHz (100 MHz Step)  
 ○—○ ( IC = 50 mA)  
 □—□ ( IC = 20 mA)

S12 Parameter vs. Frequency



Condition: VCE = 5 V, ZO = 50 Ω  
 100 to 2000 MHz (100 MHz Step)  
 ○—○ ( IC = 50 mA)  
 □—□ ( IC = 20 mA)

S22 Parameter vs. Frequency



Condition: VCE = 5 V, ZO = 50 Ω  
 100 to 2000 MHz (100 MHz Step)  
 ○—○ ( IC = 50 mA)  
 □—□ ( IC = 20 mA)

## Sparameter

 $(V_{CE} = 3V, I_C = 10mA, Z_o = 50\Omega)$ 

| f (MHz) | S11   |        | S21   |       | S12   |      | S22   |        |
|---------|-------|--------|-------|-------|-------|------|-------|--------|
|         | MAG   | ANG    | MAG   | ANG   | MAG   | ANG  | MAG   | ANG    |
| 100     | 0.651 | -53.8  | 21.22 | 142.8 | 0.035 | 65.6 | 0.802 | -35.5  |
| 200     | 0.502 | -93.8  | 14.62 | 120.0 | 0.054 | 56.9 | 0.554 | -56.2  |
| 300     | 0.431 | -119.6 | 10.48 | 107.6 | 0.067 | 56.0 | 0.401 | -66.9  |
| 400     | 0.396 | -136.4 | 8.09  | 99.8  | 0.079 | 56.9 | 0.317 | -72.8  |
| 500     | 0.381 | -149.9 | 6.57  | 94.2  | 0.091 | 58.9 | 0.263 | -77.2  |
| 600     | 0.364 | -158.7 | 5.54  | 89.7  | 0.103 | 60.3 | 0.227 | -80.4  |
| 700     | 0.365 | -167.2 | 4.78  | 85.9  | 0.116 | 61.6 | 0.201 | -83.3  |
| 800     | 0.364 | -174.6 | 4.22  | 82.5  | 0.128 | 62.5 | 0.183 | -85.6  |
| 900     | 0.362 | 179.5  | 3.75  | 79.3  | 0.141 | 63.1 | 0.168 | -88.3  |
| 1000    | 0.362 | 173.4  | 3.41  | 76.4  | 0.154 | 63.6 | 0.158 | -90.2  |
| 1100    | 0.366 | 168.8  | 3.12  | 73.9  | 0.167 | 63.7 | 0.150 | -92.7  |
| 1200    | 0.366 | 164.6  | 2.89  | 71.2  | 0.179 | 63.8 | 0.144 | -95.0  |
| 1300    | 0.373 | 160.3  | 2.69  | 68.8  | 0.192 | 63.6 | 0.138 | -97.0  |
| 1400    | 0.372 | 155.8  | 2.51  | 66.4  | 0.205 | 63.4 | 0.135 | -99.0  |
| 1500    | 0.379 | 152.6  | 2.37  | 64.3  | 0.217 | 63.2 | 0.133 | -101.7 |
| 1600    | 0.382 | 149.1  | 2.24  | 62.0  | 0.231 | 62.8 | 0.131 | -103.7 |
| 1700    | 0.386 | 145.0  | 2.14  | 60.1  | 0.243 | 62.5 | 0.130 | -106.0 |
| 1800    | 0.393 | 142.2  | 2.03  | 58.0  | 0.254 | 61.8 | 0.129 | -108.2 |
| 1900    | 0.390 | 139.2  | 1.94  | 55.9  | 0.268 | 61.6 | 0.129 | -110.5 |
| 2000    | 0.400 | 135.4  | 1.87  | 54.0  | 0.278 | 60.7 | 0.129 | -112.1 |

$(V_{CE} = 3V, I_C = 30mA, Z_o = 50\Omega)$ 

| f (MHz) | S11   |        | S21   |       | S12   |      | S22   |        |
|---------|-------|--------|-------|-------|-------|------|-------|--------|
|         | MAG   | ANG    | MAG   | ANG   | MAG   | ANG  | MAG   | ANG    |
| 100     | 0.419 | -90.2  | 30.42 | 127.3 | 0.026 | 63.9 | 0.608 | -53.5  |
| 200     | 0.366 | -132.9 | 17.49 | 107.6 | 0.040 | 64.4 | 0.357 | -74.3  |
| 300     | 0.358 | -151.9 | 11.80 | 98.6  | 0.055 | 67.0 | 0.247 | -85.0  |
| 400     | 0.355 | -163.8 | 8.88  | 93.1  | 0.070 | 69.5 | 0.193 | -91.9  |
| 500     | 0.354 | -173.3 | 7.14  | 89.0  | 0.085 | 70.6 | 0.162 | -98.0  |
| 600     | 0.356 | -178.8 | 5.97  | 85.5  | 0.100 | 71.5 | 0.141 | -102.8 |
| 700     | 0.356 | 174.3  | 5.13  | 82.4  | 0.115 | 71.5 | 0.127 | -107.4 |
| 800     | 0.364 | 169.5  | 4.51  | 79.6  | 0.130 | 71.4 | 0.117 | -111.3 |
| 900     | 0.361 | 165.9  | 4.01  | 77.0  | 0.146 | 71.0 | 0.111 | -114.9 |
| 1000    | 0.359 | 160.6  | 3.64  | 74.6  | 0.160 | 70.6 | 0.105 | -118.5 |
| 1100    | 0.367 | 157.8  | 3.33  | 72.2  | 0.176 | 70.0 | 0.103 | -121.5 |
| 1200    | 0.370 | 153.6  | 3.07  | 70.2  | 0.190 | 69.4 | 0.101 | -124.5 |
| 1300    | 0.368 | 150.1  | 2.86  | 67.7  | 0.204 | 68.3 | 0.099 | -127.0 |
| 1400    | 0.376 | 146.5  | 2.67  | 65.9  | 0.218 | 68.0 | 0.099 | -129.3 |
| 1500    | 0.382 | 144.2  | 2.52  | 63.9  | 0.232 | 67.2 | 0.098 | -131.8 |
| 1600    | 0.387 | 141.0  | 2.38  | 61.8  | 0.247 | 66.4 | 0.099 | -133.9 |
| 1700    | 0.388 | 137.3  | 2.27  | 59.9  | 0.260 | 65.6 | 0.100 | -135.8 |
| 1800    | 0.393 | 134.9  | 2.15  | 58.0  | 0.274 | 64.6 | 0.100 | -138.0 |
| 1900    | 0.394 | 132.8  | 2.07  | 56.3  | 0.288 | 63.8 | 0.102 | -139.9 |
| 2000    | 0.393 | 129.3  | 1.98  | 54.5  | 0.298 | 62.6 | 0.103 | -140.6 |



$(V_{CE} = 3V, I_C = 50mA, Z_o = 50\Omega)$ 

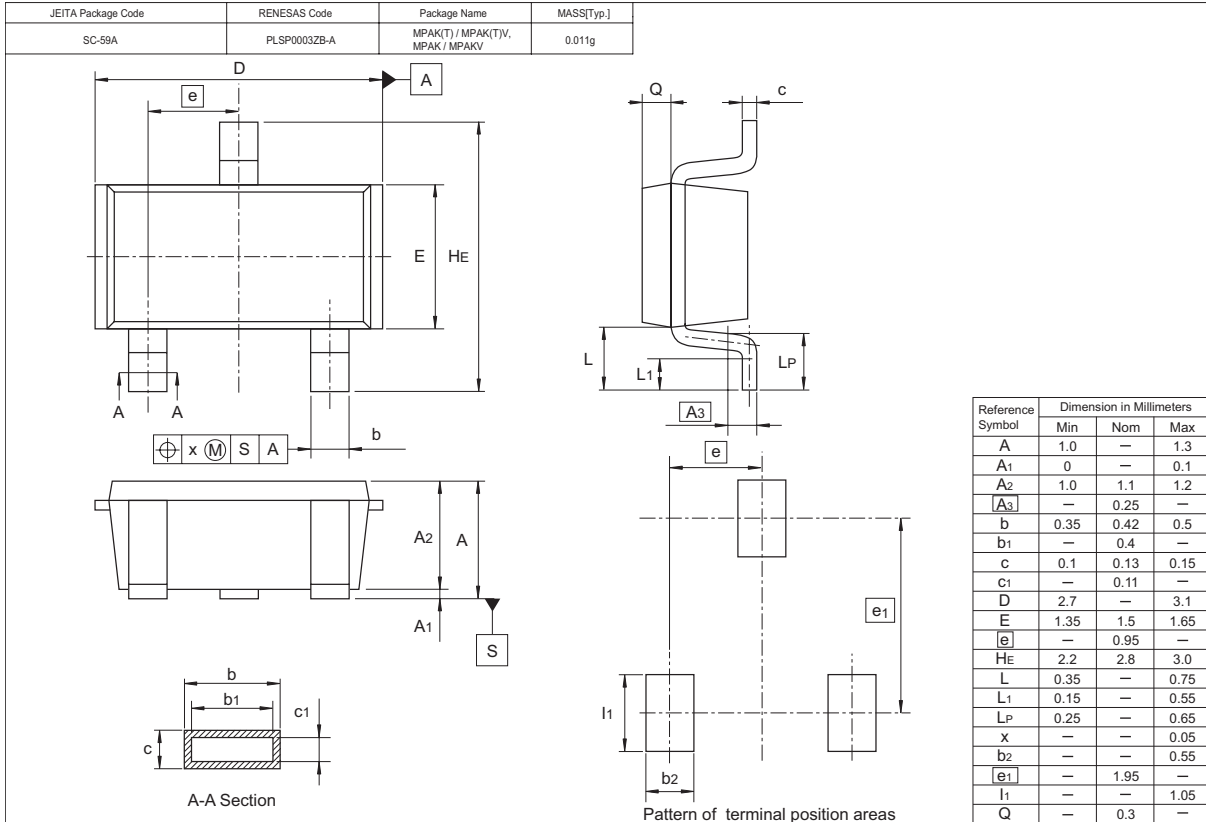
| f (MHz) | S11   |        | S21   |       | S12   |      | S22   |        |
|---------|-------|--------|-------|-------|-------|------|-------|--------|
|         | MAG   | ANG    | MAG   | ANG   | MAG   | ANG  | MAG   | ANG    |
| 100     | 0.365 | -111.0 | 31.77 | 122.3 | 0.023 | 65.4 | 0.530 | -58.5  |
| 200     | 0.363 | -147.7 | 17.40 | 104.2 | 0.037 | 68.1 | 0.299 | -77.7  |
| 300     | 0.370 | -162.8 | 11.60 | 96.2  | 0.052 | 71.0 | 0.207 | -87.5  |
| 400     | 0.368 | -172.3 | 8.71  | 91.0  | 0.068 | 72.8 | 0.163 | -94.0  |
| 500     | 0.374 | -179.4 | 6.97  | 87.3  | 0.083 | 73.4 | 0.137 | -99.7  |
| 600     | 0.375 | 174.9  | 5.84  | 84.0  | 0.099 | 73.8 | 0.121 | -104.7 |
| 700     | 0.378 | 170.4  | 5.02  | 81.2  | 0.114 | 73.6 | 0.110 | -108.8 |
| 800     | 0.383 | 165.8  | 4.41  | 78.4  | 0.129 | 73.4 | 0.103 | -112.5 |
| 900     | 0.381 | 161.7  | 3.91  | 76.0  | 0.146 | 72.7 | 0.099 | -116.4 |
| 1000    | 0.384 | 157.4  | 3.55  | 73.3  | 0.161 | 72.4 | 0.095 | -119.2 |
| 1100    | 0.389 | 153.7  | 3.25  | 71.2  | 0.177 | 71.6 | 0.093 | -122.6 |
| 1200    | 0.394 | 150.4  | 3.00  | 69.0  | 0.190 | 70.7 | 0.092 | -125.1 |
| 1300    | 0.395 | 147.3  | 2.80  | 66.7  | 0.204 | 69.7 | 0.091 | -127.8 |
| 1400    | 0.398 | 144.1  | 2.61  | 64.8  | 0.219 | 69.2 | 0.092 | -129.7 |
| 1500    | 0.407 | 141.7  | 2.46  | 62.9  | 0.233 | 68.2 | 0.092 | -132.2 |
| 1600    | 0.410 | 139.0  | 2.33  | 60.8  | 0.248 | 67.4 | 0.093 | -134.0 |
| 1700    | 0.407 | 135.2  | 2.21  | 59.0  | 0.262 | 66.5 | 0.095 | -135.9 |
| 1800    | 0.414 | 133.5  | 2.10  | 57.2  | 0.275 | 65.5 | 0.096 | -137.7 |
| 1900    | 0.412 | 130.3  | 2.02  | 55.0  | 0.289 | 64.8 | 0.098 | -139.5 |
| 2000    | 0.423 | 127.6  | 1.93  | 53.1  | 0.300 | 63.6 | 0.099 | -140.4 |

| f (MHz) | S11   |        | S21   |       | S12   |      | S22   |       |
|---------|-------|--------|-------|-------|-------|------|-------|-------|
|         | MAG   | ANG    | MAG   | ANG   | MAG   | ANG  | MAG   | ANG   |
| 100     | 0.505 | -66.9  | 29.11 | 134.6 | 0.026 | 65.8 | 0.707 | -40.5 |
| 200     | 0.381 | -108.9 | 18.04 | 112.9 | 0.040 | 62.3 | 0.448 | -57.3 |
| 300     | 0.337 | -132.7 | 12.44 | 102.5 | 0.053 | 64.6 | 0.318 | -63.3 |
| 400     | 0.320 | -148.4 | 9.46  | 96.2  | 0.065 | 66.7 | 0.252 | -65.8 |
| 500     | 0.311 | -161.0 | 7.63  | 91.6  | 0.079 | 68.2 | 0.211 | -67.2 |
| 600     | 0.305 | -168.4 | 6.40  | 87.7  | 0.092 | 69.2 | 0.184 | -67.9 |
| 700     | 0.308 | -176.8 | 5.51  | 84.5  | 0.105 | 69.7 | 0.165 | -68.5 |
| 800     | 0.306 | 177.7  | 4.84  | 81.4  | 0.119 | 70.1 | 0.152 | -69.2 |
| 900     | 0.311 | 172.1  | 4.30  | 78.8  | 0.133 | 70.0 | 0.142 | -70.5 |
| 1000    | 0.309 | 166.8  | 3.90  | 76.1  | 0.145 | 69.8 | 0.134 | -71.1 |
| 1100    | 0.313 | 163.3  | 3.57  | 73.7  | 0.159 | 69.5 | 0.128 | -72.7 |
| 1200    | 0.321 | 158.2  | 3.29  | 71.4  | 0.172 | 69.0 | 0.124 | -74.2 |
| 1300    | 0.318 | 154.7  | 3.06  | 69.1  | 0.184 | 68.3 | 0.119 | -75.5 |
| 1400    | 0.323 | 150.1  | 2.86  | 67.2  | 0.198 | 67.9 | 0.117 | -77.2 |
| 1500    | 0.333 | 147.6  | 2.69  | 65.1  | 0.210 | 67.3 | 0.114 | -79.1 |
| 1600    | 0.338 | 145.0  | 2.53  | 63.0  | 0.223 | 66.6 | 0.113 | -80.9 |
| 1700    | 0.338 | 139.3  | 2.41  | 61.0  | 0.236 | 66.1 | 0.113 | -83.2 |
| 1800    | 0.344 | 136.8  | 2.29  | 59.1  | 0.248 | 65.1 | 0.111 | -85.5 |
| 1900    | 0.344 | 134.7  | 2.19  | 57.3  | 0.260 | 64.5 | 0.110 | -88.0 |
| 2000    | 0.351 | 131.2  | 2.10  | 55.5  | 0.271 | 63.4 | 0.110 | -89.6 |

$(V_{CE} = 5V, I_C = 50mA, Z_o = 50\Omega)$ 

| f (MHz) | S11   |        | S21   |       | S12   |      | S22   |       |
|---------|-------|--------|-------|-------|-------|------|-------|-------|
|         | MAG   | ANG    | MAG   | ANG   | MAG   | ANG  | MAG   | ANG   |
| 100     | 0.360 | -99.4  | 34.20 | 124.3 | 0.020 | 66.9 | 0.567 | -48.7 |
| 200     | 0.329 | -139.8 | 19.03 | 105.6 | 0.034 | 68.2 | 0.330 | -60.7 |
| 300     | 0.323 | -157.8 | 12.76 | 97.1  | 0.047 | 71.6 | 0.233 | -63.2 |
| 400     | 0.323 | -168.1 | 9.58  | 92.1  | 0.061 | 73.6 | 0.186 | -63.4 |
| 500     | 0.326 | -176.6 | 7.69  | 88.2  | 0.075 | 74.1 | 0.160 | -63.3 |
| 600     | 0.328 | 177.5  | 6.42  | 85.0  | 0.089 | 74.6 | 0.142 | -63.4 |
| 700     | 0.326 | 172.1  | 5.51  | 82.0  | 0.103 | 74.4 | 0.131 | -63.6 |
| 800     | 0.332 | 166.9  | 4.85  | 79.2  | 0.117 | 74.1 | 0.122 | -63.9 |
| 900     | 0.335 | 163.3  | 4.30  | 76.9  | 0.131 | 73.6 | 0.116 | -65.2 |
| 1000    | 0.336 | 159.3  | 3.90  | 74.3  | 0.145 | 73.3 | 0.112 | -65.9 |
| 1100    | 0.338 | 155.0  | 3.56  | 72.2  | 0.158 | 72.4 | 0.108 | -67.9 |
| 1200    | 0.349 | 151.7  | 3.28  | 69.9  | 0.172 | 72.0 | 0.106 | -69.5 |
| 1300    | 0.347 | 148.8  | 3.05  | 67.9  | 0.185 | 71.0 | 0.103 | -70.9 |
| 1400    | 0.350 | 144.3  | 2.85  | 65.9  | 0.198 | 70.4 | 0.102 | -73.3 |
| 1500    | 0.360 | 142.0  | 2.67  | 64.0  | 0.210 | 69.7 | 0.101 | -75.5 |
| 1600    | 0.362 | 139.2  | 2.52  | 62.1  | 0.224 | 68.7 | 0.101 | -77.7 |
| 1700    | 0.361 | 135.3  | 2.40  | 60.1  | 0.237 | 67.9 | 0.101 | -80.0 |
| 1800    | 0.373 | 133.4  | 2.28  | 58.1  | 0.249 | 66.9 | 0.101 | -82.5 |
| 1900    | 0.366 | 130.6  | 2.19  | 56.3  | 0.262 | 66.2 | 0.101 | -85.5 |
| 2000    | 0.383 | 127.4  | 2.10  | 54.6  | 0.272 | 65.2 | 0.102 | -87.1 |

### Package Dimensions



### Ordering Information

| Part Name      | Quantity | Shipping Container                |
|----------------|----------|-----------------------------------|
| 2SC5772FR-TL-E | 3000     | 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

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