



# 2SC5245A

## RF Transistor

10V, 30mA,  $f_T=8\text{GHz}$ , NPN Single MCP

ON Semiconductor®

<http://onsemi.com>

### Features

- Low-noise :  $NF=0.9\text{dB}$  typ ( $f=1\text{GHz}$ )  
:  $NF=1.4\text{dB}$  typ ( $f=1.5\text{GHz}$ )
- High gain :  $|S_{21e}|^2=10\text{dB}$  typ ( $f=1.5\text{GHz}$ )
- High cut-off frequency :  $f_T=8\text{GHz}$  typ
- Low-voltage, low-current operation ( $V_{CE}=1\text{V}$ ,  $I_C=1\text{mA}$ )  
:  $f_T=3.5\text{GHz}$  typ  
:  $|S_{21e}|^2=5.5\text{dB}$  typ ( $f=1.5\text{GHz}$ )

### Specifications

**Absolute Maximum Ratings** at  $T_a=25^\circ\text{C}$

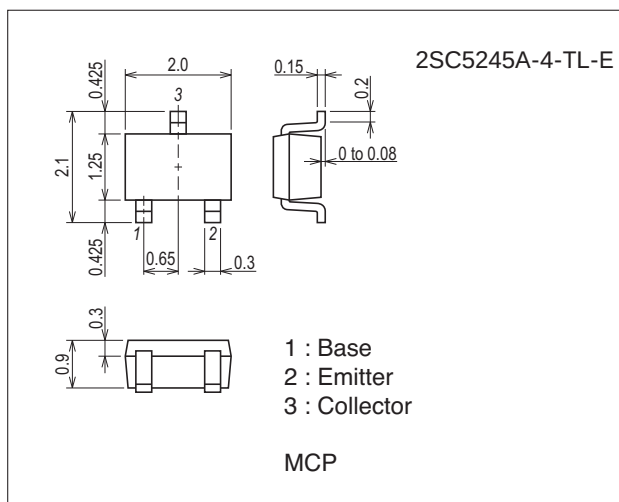
| Parameter                    | Symbol    | Conditions | Ratings     | Unit             |
|------------------------------|-----------|------------|-------------|------------------|
| Collector-to-Base Voltage    | $V_{CBO}$ |            | 20          | V                |
| Collector-to-Emitter Voltage | $V_{CEO}$ |            | 10          | V                |
| Emitter-to-Base Voltage      | $V_{EBO}$ |            | 1.5         | V                |
| Collector Current            | $I_C$     |            | 30          | mA               |
| Collector Dissipation        | $P_C$     |            | 150         | mW               |
| Junction Temperature         | $T_j$     |            | 150         | $^\circ\text{C}$ |
| Storage Temperature          | $T_{stg}$ |            | -55 to +150 | $^\circ\text{C}$ |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

### Package Dimensions

unit : mm (typ)

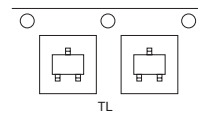
7023A-009



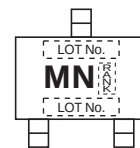
### Product & Package Information

- Package : MCP
- JEITA, JEDEC : SC-70, SOT-323
- Minimum Packing Quantity : 3,000 pcs./reel

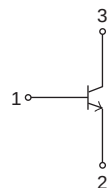
### Packing Type: TL



### Marking



### Electrical Connection



2SC5245A

Electrical Characteristics at Ta=25°C

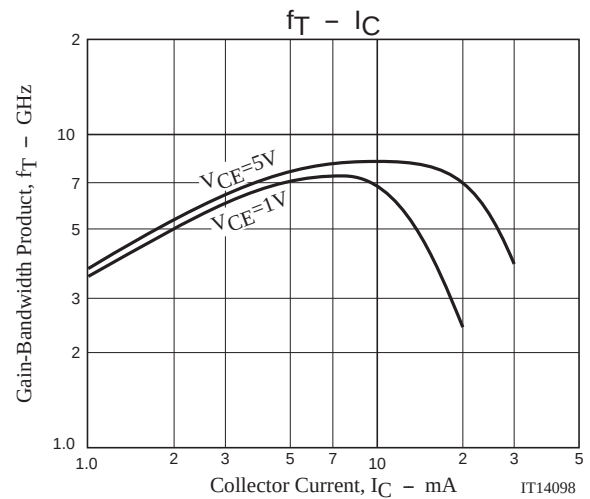
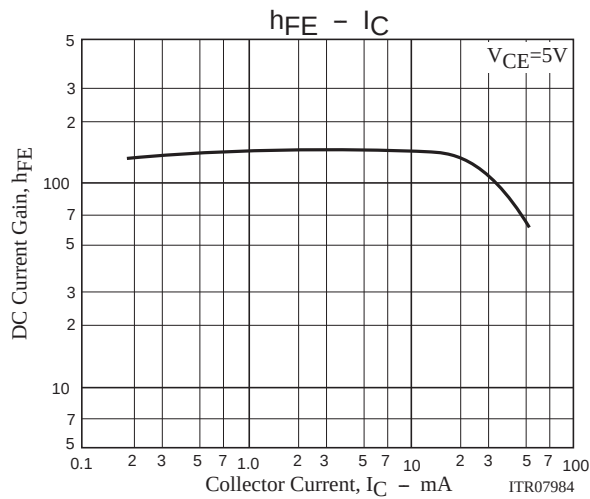
| Parameter                    | Symbol                                       | Conditions                                          | Ratings |      |      | Unit |
|------------------------------|----------------------------------------------|-----------------------------------------------------|---------|------|------|------|
|                              |                                              |                                                     | min     | typ  | max  |      |
| Collector Cutoff Current     | ICBO                                         | V <sub>CB</sub> =10V, I <sub>E</sub> =0A            |         |      | 1.0  | μA   |
| Emitter Cutoff Current       | IEBO                                         | V <sub>EB</sub> =1V, I <sub>C</sub> =0A             |         |      | 10   | μA   |
| DC Current Gain              | h <sub>FE</sub>                              | V <sub>CE</sub> =5V, I <sub>C</sub> =10mA           | 60*     |      | 270* |      |
| Gain-Bandwidth Product       | f <sub>T1</sub>                              | V <sub>CE</sub> =5V, I <sub>C</sub> =10mA           | 5       | 8    |      | GHz  |
|                              | f <sub>T2</sub>                              | V <sub>CE</sub> =1V, I <sub>C</sub> =1mA            |         | 3.5  |      | GHz  |
| Output Capacitance           | Cob                                          | V <sub>CB</sub> =10V, f=1MHz                        |         | 0.45 | 0.7  | pF   |
| Reverse Transfer Capacitance | Cre                                          |                                                     |         | 0.30 |      | pF   |
| Forward Transfer Gain        | S <sub>21e</sub>   <sup>2</sup> <sub>1</sub> | V <sub>CE</sub> =5V, I <sub>C</sub> =10mA, f=1.5GHz | 8       | 10   |      | dB   |
|                              | S <sub>21e</sub>   <sup>2</sup> <sub>2</sub> | V <sub>CE</sub> =1V, I <sub>C</sub> =1mA, f=1.5GHz  |         | 5.5  |      | dB   |
| Noise Figure                 | NF1                                          | V <sub>CE</sub> =5V, I <sub>C</sub> =5mA, f=1.5GHz  |         | 1.4  | 3.0  | dB   |
|                              | NF2                                          | V <sub>CE</sub> =2V, I <sub>C</sub> =3mA, f=1GHz    |         | 0.9  |      | dB   |

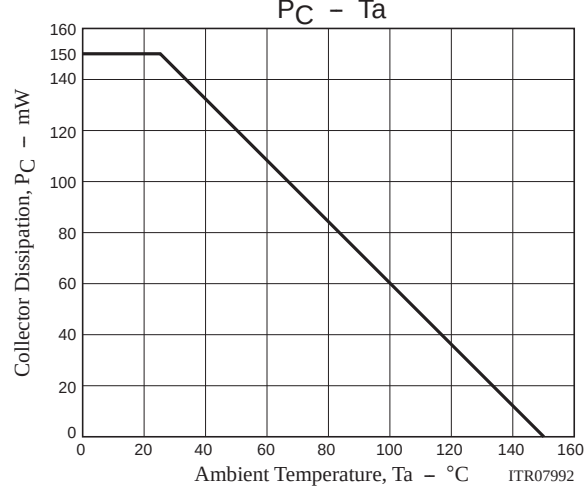
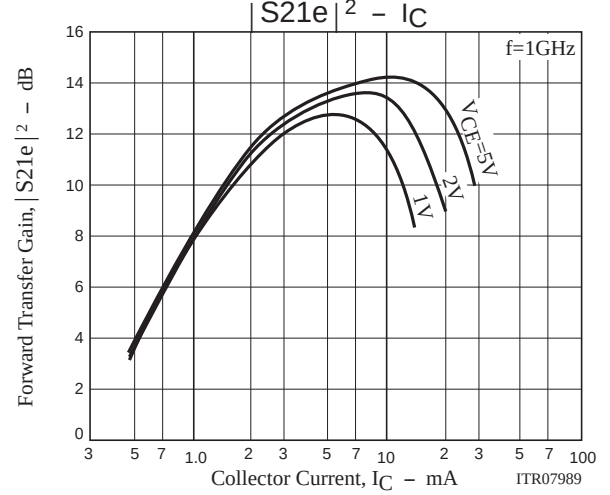
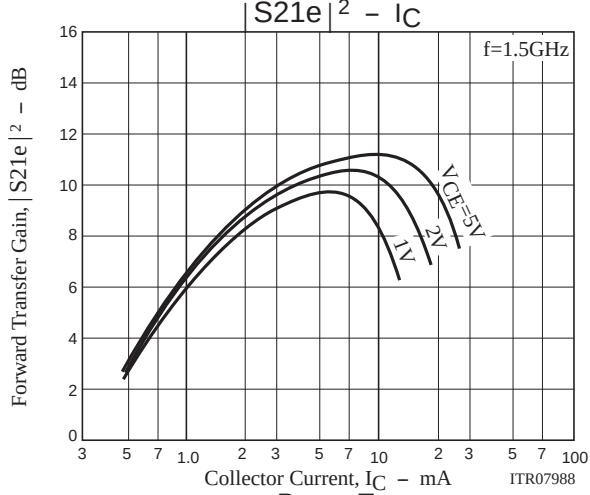
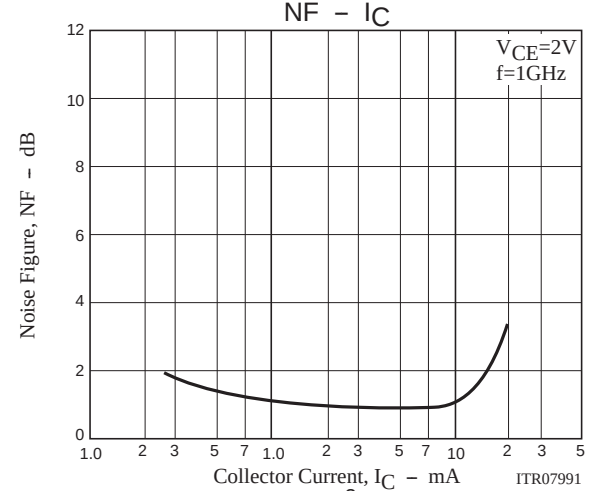
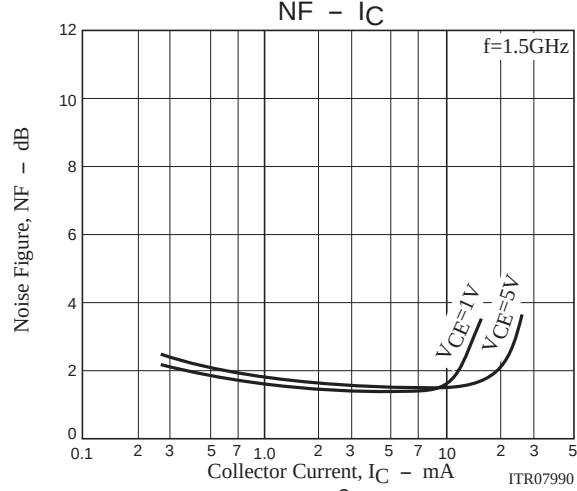
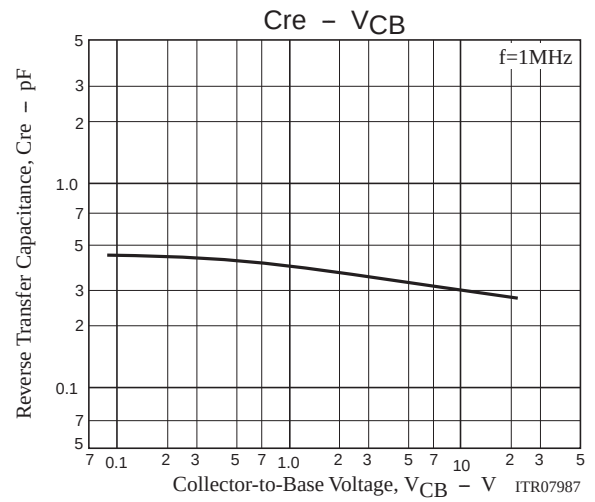
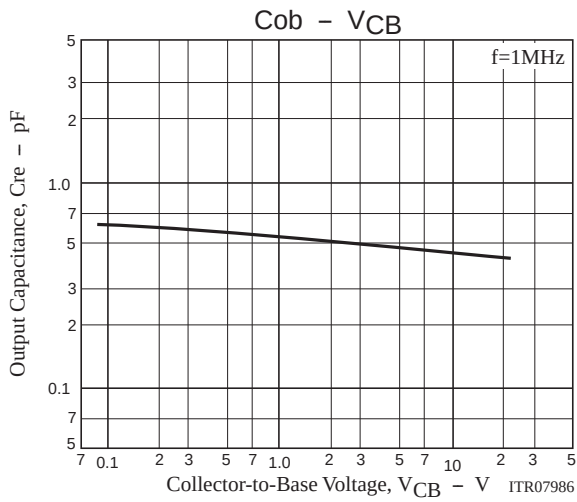
\* : The 2SC5245A is classified by 10mA h<sub>FE</sub> as follows :

|                 |           |           |            |
|-----------------|-----------|-----------|------------|
| Rank            | 3         | 4         | 5          |
| h <sub>FE</sub> | 60 to 120 | 90 to 180 | 135 to 270 |

Ordering Information

|                 |         |                |         |
|-----------------|---------|----------------|---------|
| Device          | Package | Shipping       | memo    |
| 2SC5245A-4-TL-E | MCP     | 3,000pcs./reel | Pb Free |

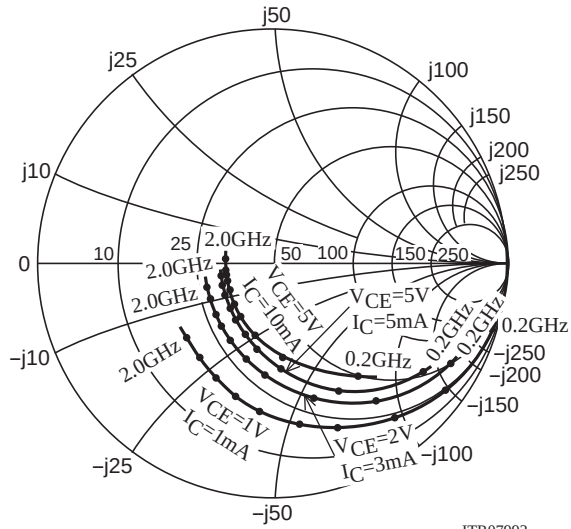




## 2SC5245A

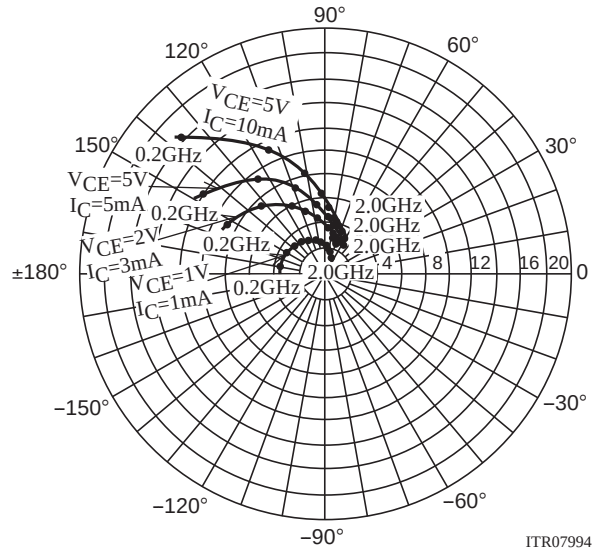
S11e

f=200MHz to 2000MHz(200MHz Step)



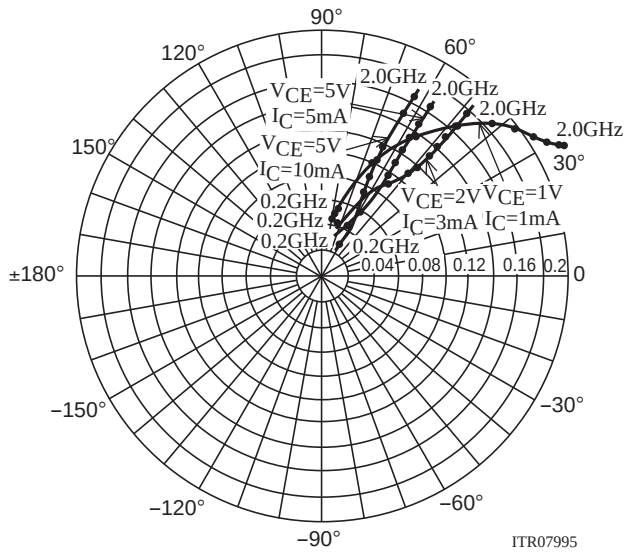
S21e

f=200MHz to 2000MHz(200MHz Step)



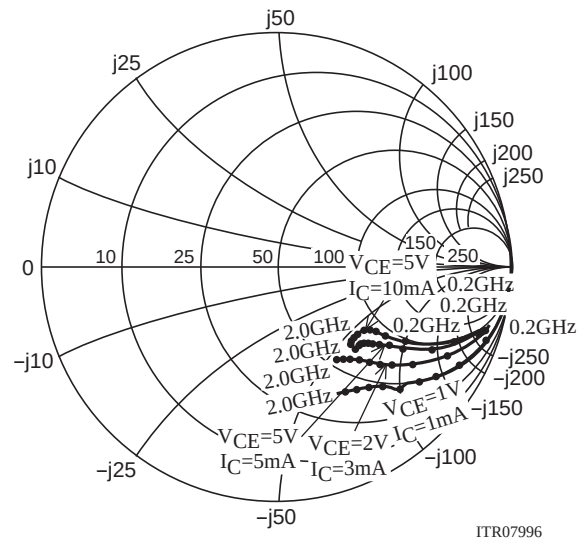
S12e

f=200MHz to 2000MHz(200MHz Step)



S22e

f=200MHz to 2000MHz(200MHz Step)



## 2SC5245A

### S Parameters (Common emitter)

$V_{CE}=5V$ ,  $I_C=5mA$ ,  $Z_O=50\Omega$

| Freq(MHz) | S11   | $\angle S11$ | S21    | $\angle S21$ | S12   | $\angle S12$ | S22   | $\angle S22$ |
|-----------|-------|--------------|--------|--------------|-------|--------------|-------|--------------|
| 200       | 0.763 | -37.5        | 11.926 | 146.9        | 0.036 | 70.7         | 0.892 | -19.1        |
| 400       | 0.590 | -65.4        | 9.202  | 124.3        | 0.058 | 60.9         | 0.740 | -29.1        |
| 600       | 0.456 | -85.5        | 7.173  | 109.4        | 0.073 | 57.4         | 0.631 | -33.7        |
| 800       | 0.374 | -102.0       | 5.743  | 98.7         | 0.086 | 56.7         | 0.566 | -35.8        |
| 1000      | 0.323 | -115.0       | 4.785  | 90.5         | 0.098 | 56.7         | 0.528 | -37.2        |
| 1200      | 0.288 | -127.5       | 4.105  | 83.6         | 0.110 | 57.2         | 0.505 | -38.4        |
| 1400      | 0.264 | -137.7       | 3.599  | 77.5         | 0.123 | 57.7         | 0.488 | -39.6        |
| 1600      | 0.248 | -147.4       | 3.213  | 71.3         | 0.136 | 57.6         | 0.476 | -41.2        |
| 1800      | 0.239 | -156.9       | 2.905  | 66.4         | 0.150 | 57.6         | 0.466 | -43.3        |
| 2000      | 0.235 | -165.7       | 2.651  | 61.3         | 0.165 | 57.2         | 0.462 | -45.4        |

$V_{CE}=5V$ ,  $I_C=10mA$ ,  $Z_O=50\Omega$

| Freq(MHz) | S11   | $\angle S11$ | S21    | $\angle S21$ | S12   | $\angle S12$ | S22   | $\angle S22$ |
|-----------|-------|--------------|--------|--------------|-------|--------------|-------|--------------|
| 200       | 0.605 | -52.6        | 16.354 | 136.2        | 0.031 | 67.5         | 0.804 | -23.9        |
| 400       | 0.417 | -84.6        | 11.011 | 113.3        | 0.048 | 62.4         | 0.622 | -30.5        |
| 600       | 0.319 | -106.3       | 8.026  | 100.5        | 0.062 | 62.2         | 0.533 | -32.0        |
| 800       | 0.266 | -124.6       | 6.250  | 91.3         | 0.076 | 63.4         | 0.491 | -32.4        |
| 1000      | 0.238 | -136.5       | 5.115  | 84.7         | 0.090 | 64.3         | 0.469 | -33.2        |
| 1200      | 0.225 | -148.9       | 4.336  | 78.8         | 0.104 | 64.4         | 0.458 | -34.6        |
| 1400      | 0.215 | -158.3       | 3.813  | 73.4         | 0.119 | 64.5         | 0.449 | -35.8        |
| 1600      | 0.213 | -167.3       | 3.365  | 68.1         | 0.135 | 63.8         | 0.443 | -37.7        |
| 1800      | 0.212 | -175.6       | 3.030  | 63.5         | 0.150 | 63.1         | 0.436 | -39.6        |
| 2000      | 0.216 | -177.5       | 2.754  | 58.9         | 0.166 | 62.5         | 0.438 | -41.9        |

$V_{CE}=2V$ ,  $I_C=3mA$ ,  $Z_O=50\Omega$

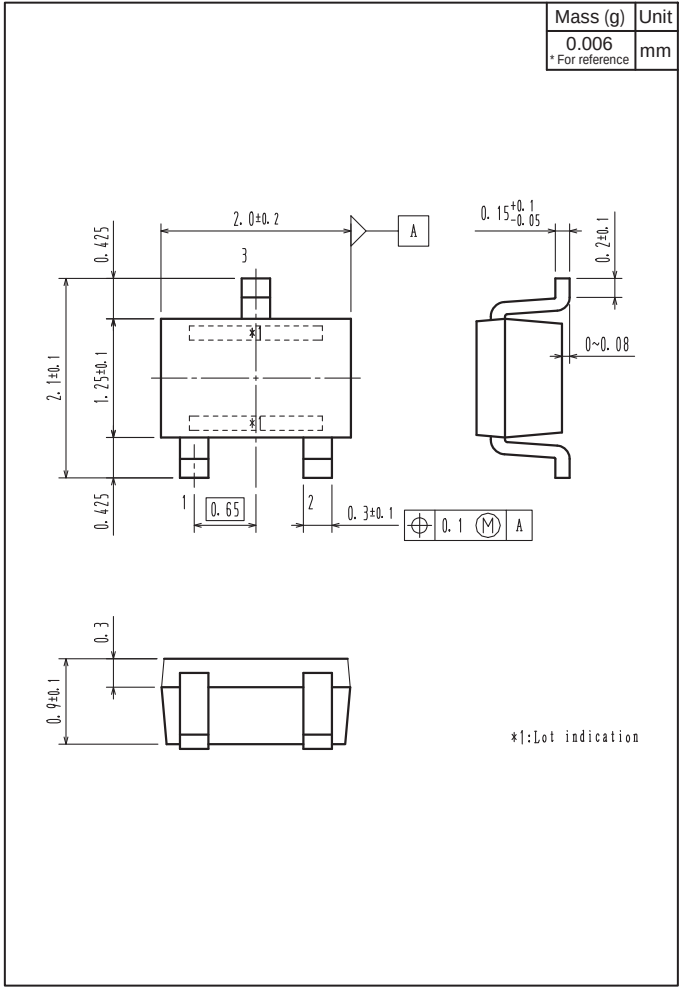
| Freq(MHz) | S11   | $\angle S11$ | S21   | $\angle S21$ | S12   | $\angle S12$ | S22   | $\angle S22$ |
|-----------|-------|--------------|-------|--------------|-------|--------------|-------|--------------|
| 200       | 0.842 | -30.7        | 8.491 | 153.0        | 0.044 | 72.5         | 0.931 | -17.1        |
| 400       | 0.704 | -56.3        | 7.161 | 131.9        | 0.075 | 60.9         | 0.808 | -28.8        |
| 600       | 0.579 | -76.1        | 5.879 | 116.3        | 0.095 | 54.1         | 0.696 | -36.2        |
| 800       | 0.480 | -93.1        | 4.882 | 104.2        | 0.109 | 51.0         | 0.615 | -40.6        |
| 1000      | 0.417 | -106.3       | 4.154 | 95.0         | 0.121 | 49.3         | 0.564 | -43.5        |
| 1200      | 0.376 | -119.6       | 3.597 | 87.1         | 0.132 | 48.7         | 0.526 | -45.8        |
| 1400      | 0.343 | -130.2       | 3.212 | 80.2         | 0.143 | 48.6         | 0.496 | -47.5        |
| 1600      | 0.319 | -140.5       | 2.875 | 73.4         | 0.154 | 48.7         | 0.475 | -49.6        |
| 1800      | 0.303 | -150.0       | 2.604 | 67.7         | 0.166 | 48.6         | 0.461 | -51.6        |
| 2000      | 0.298 | -160.0       | 2.383 | 62.1         | 0.179 | 48.9         | 0.451 | -52.9        |

$V_{CE}=1V$ ,  $I_C=1mA$ ,  $Z_O=50\Omega$

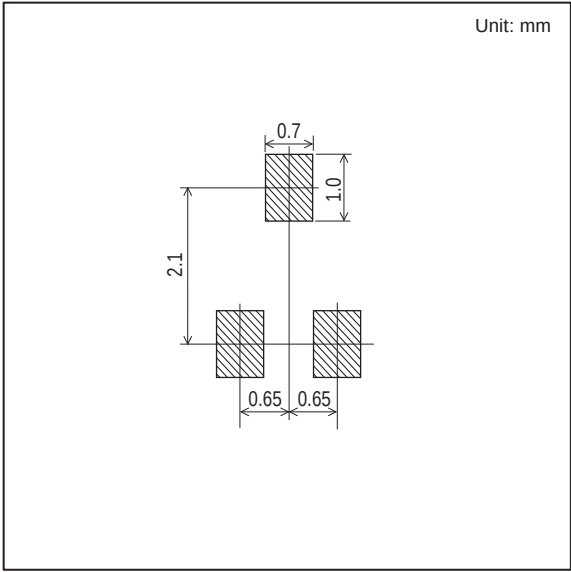
| Freq(MHz) | S11   | $\angle S11$ | S21   | $\angle S21$ | S12   | $\angle S12$ | S22   | $\angle S22$ |
|-----------|-------|--------------|-------|--------------|-------|--------------|-------|--------------|
| 200       | 0.945 | -18.9        | 3.296 | 162.5        | 0.054 | 77.2         | 0.980 | -11.0        |
| 400       | 0.884 | -37.3        | 3.206 | 145.9        | 0.102 | 65.9         | 0.934 | -20.5        |
| 600       | 0.810 | -53.6        | 2.942 | 131.2        | 0.139 | 56.3         | 0.870 | -29.0        |
| 800       | 0.728 | -69.4        | 2.711 | 117.8        | 0.166 | 48.6         | 0.811 | -35.5        |
| 1000      | 0.667 | -82.5        | 2.449 | 107.0        | 0.187 | 42.5         | 0.763 | -40.9        |
| 1200      | 0.605 | -95.8        | 2.252 | 96.9         | 0.199 | 37.3         | 0.715 | -45.7        |
| 1400      | 0.561 | -106.1       | 2.061 | 88.1         | 0.207 | 33.5         | 0.673 | -49.4        |
| 1600      | 0.518 | -117.2       | 1.909 | 79.5         | 0.212 | 30.6         | 0.638 | -53.4        |
| 1800      | 0.492 | -127.5       | 1.766 | 72.2         | 0.215 | 28.6         | 0.611 | -56.5        |
| 2000      | 0.465 | -137.9       | 1.658 | 65.2         | 0.217 | 27.6         | 0.592 | -59.9        |



Outline Drawing  
2SC5245A-4-TL-E



Land Pattern Example



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