

# NSVF5490SK

## RF Transistor for Low Noise Amplifier

20 V, 30 mA,  $f_T = 8$  GHz typ. RF Transistor

This RF transistor is designed for RF amplifier applications. SSFP package is contribute to down size of application because it is small surface mount package. This RF transistor is AEC-Q101 qualified and PPAP capable for automotive applications.

### Features

- Low-noise Use:  $NF = 0.9$  dB typ. ( $f = 1$  GHz)
- High Cut-off Frequency:  $f_T = 8$  GHz typ. ( $V_{CE} = 5$  V)
- High Gain:  $|S_{21e}|^2 = 10$  dB typ. ( $f = 1.5$  GHz)
- Low-voltage, Low-current Operation ( $V_{CE} = 1$  V,  $I_C = 1$  mA)  
 $f_T = 3.5$  GHz typ.  
 $|S_{21e}|^2 = 5.5$  dB typ. ( $f = 1.5$  GHz)
- SSFP Package is Pin-compatible with SOT-623
- AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### Typical Applications

- RF Amplifier for RKE
- RF Amplifier for ADAS
- RF Amplifier for Remote Engine Starter



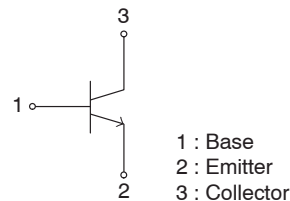
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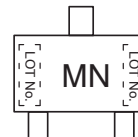


SOT-623 / SSFP  
CASE 631AC

### ELECTRICAL CONNECTION NPN



### MARKING DIAGRAM



MN = Specific Device Code

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

# NSVF5490SK

## SPECIFICATIONS

### ABSOLUTE MAXIMUM RATINGS at $T_a = 25^\circ\text{C}$

| Parameter                                  | Symbol         | Value       | 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                      | $P_C$          | 100         | mW               |
| Operating Junction and Storage Temperature | $T_j, T_{stg}$ | -55 to +150 | $^\circ\text{C}$ |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### ELECTRICAL CHARACTERISTICS at $T_a = 25^\circ\text{C}$

| Parameter                    | Symbol          | Conditions                                                    | Value |      |     | Unit          |
|------------------------------|-----------------|---------------------------------------------------------------|-------|------|-----|---------------|
|                              |                 |                                                               | Min   | Typ  | Max |               |
| Collector Cutoff Current     | $I_{CBO}$       | $V_{CB} = 10\text{ V}, I_E = 0\text{ A}$                      |       |      | 1.0 | $\mu\text{A}$ |
| Emitter Cutoff Current       | $I_{EBO}$       | $V_{EB} = 1\text{ V}, I_C = 0\text{ A}$                       |       |      | 10  | $\mu\text{A}$ |
| DC Current Gain              | $h_{FE}$        | $V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$                     | 90    |      | 200 |               |
| Gain-Bandwidth Product       | $f_{T1}$        | $V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$                     | 5     | 8    |     | GHz           |
|                              | $f_{T2}$        | $V_{CE} = 1\text{ V}, I_C = 1\text{ mA}$                      |       | 3.5  |     | GHz           |
| Output Capacitance           | $C_{ob}$        | $V_{CB} = 10\text{ V}, f = 1\text{ MHz}$                      |       | 0.45 | 0.7 | pF            |
| Reverse Transfer Capacitance | $C_{re}$        |                                                               |       | 0.3  |     | pF            |
| Forward Transfer Gain        | $ S_{21e} ^2_1$ | $V_{CE} = 5\text{ V}, I_C = 10\text{ mA}, f = 1.5\text{ GHz}$ | 8     | 10   |     | dB            |
|                              | $ S_{21e} ^2_2$ | $V_{CE} = 1\text{ V}, I_C = 1\text{ mA}, f = 1.5\text{ GHz}$  |       | 5.5  |     | dB            |
| Noise Figure                 | NF1             | $V_{CE} = 5\text{ V}, I_C = 5\text{ mA}, f = 1.5\text{ GHz}$  |       | 1.4  | 3.0 | dB            |
|                              | NF2             | $V_{CE} = 2\text{ V}, I_C = 3\text{ mA}, f = 1\text{ GHz}$    |       | 0.9  |     | dB            |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

1. Pay attention to handling since it is liable to be affected by static electricity due to the high-frequency process adopted.

TYPICAL CHARACTERISTICS

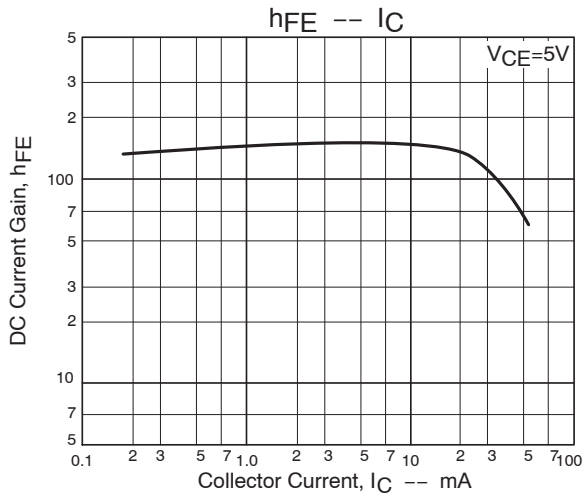


Figure 1.

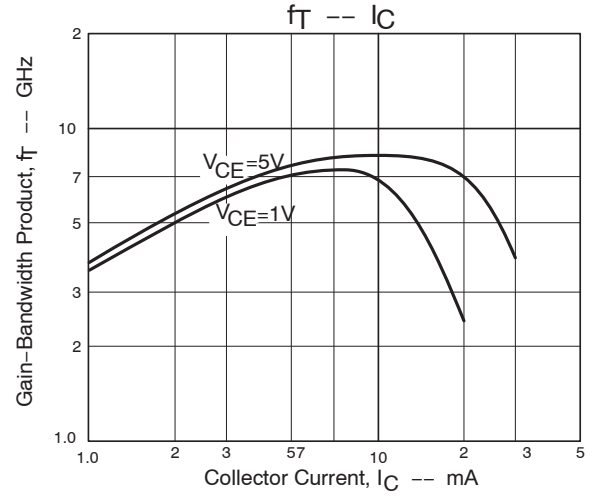


Figure 2.

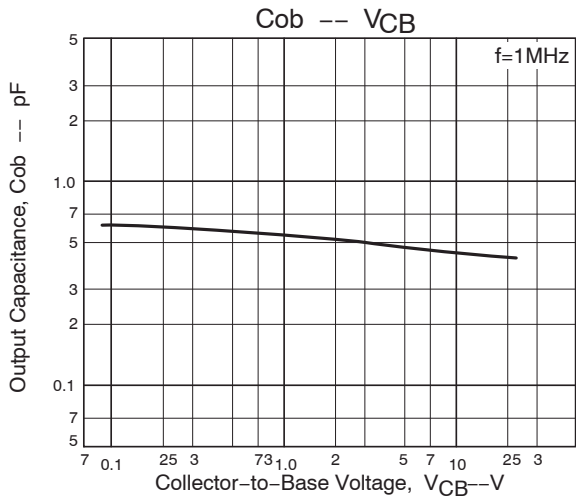


Figure 3.

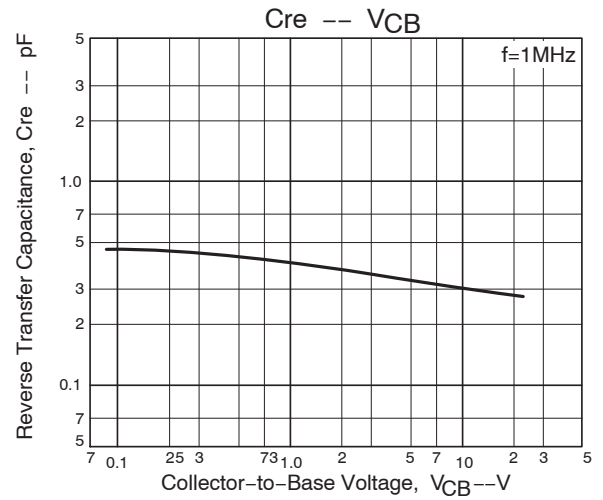


Figure 4.

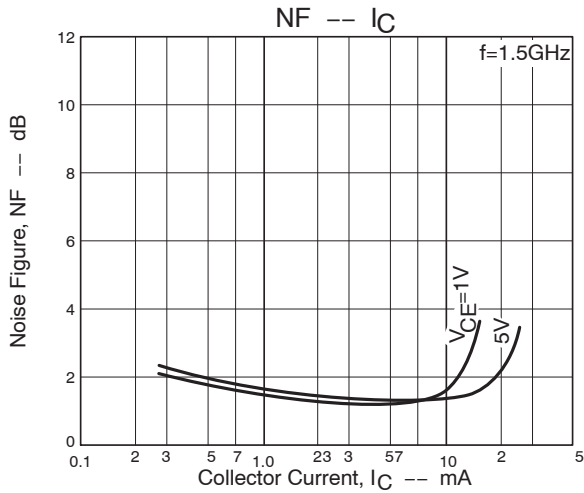


Figure 5.

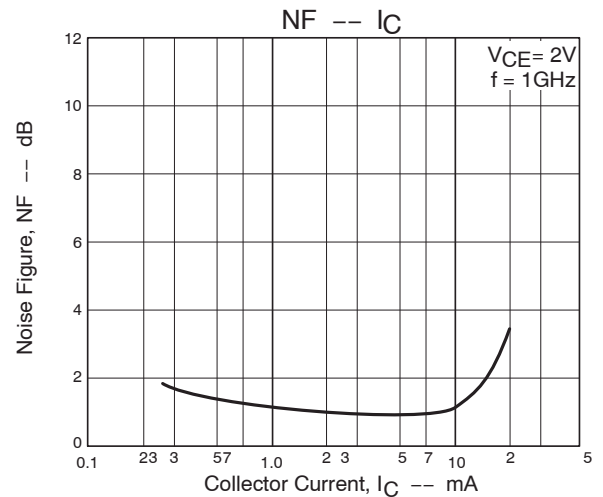


Figure 6.

TYPICAL CHARACTERISTICS

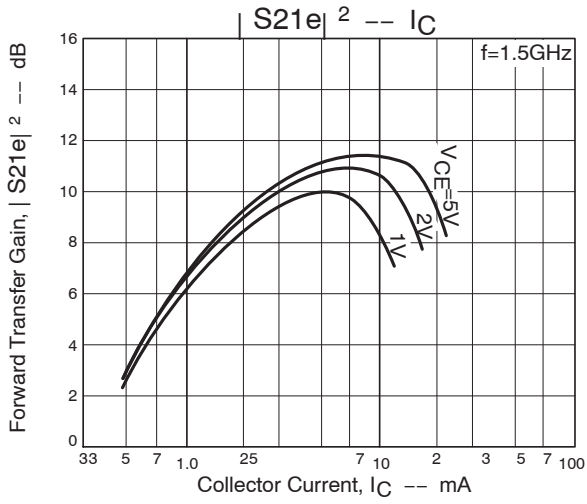


Figure 7.

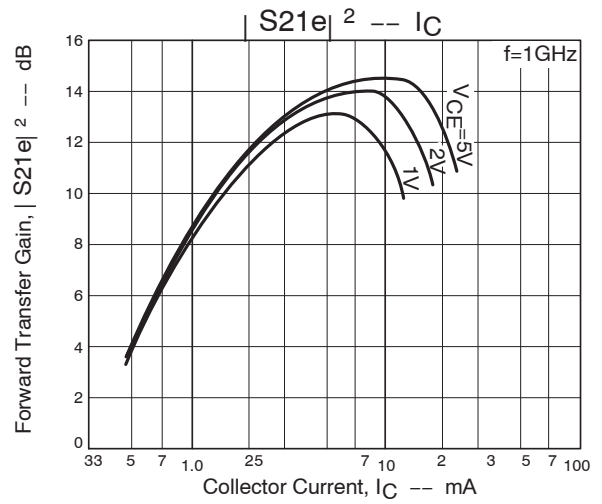


Figure 8.

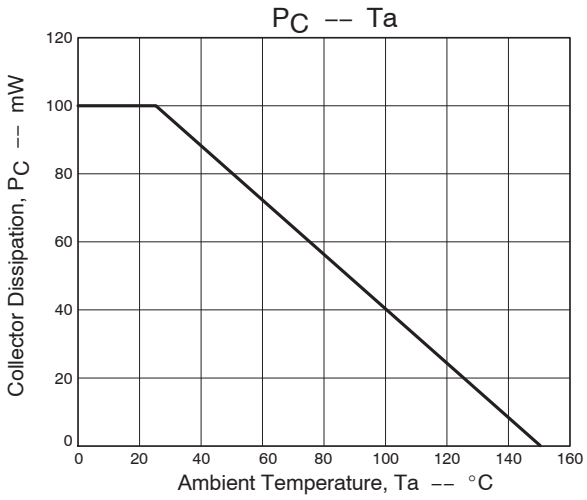


Figure 9.

S PARAMETERS (COMMON EMITTER)

| Freq (MHz)                                                 | S11   | $\angle S11$ | S21    | $\angle S21$ | S12   | $\angle S12$ | S22   | $\angle S22$ |
|------------------------------------------------------------|-------|--------------|--------|--------------|-------|--------------|-------|--------------|
| $V_{CE} = 5\text{ V}, I_C = 5\text{ mA}, Z_O = 50\ \Omega$ |       |              |        |              |       |              |       |              |
| 200                                                        | 0.782 | -37.1        | 12.043 | 148.4        | 0.038 | 69.7         | 0.889 | -19.5        |
| 400                                                        | 0.623 | -65.4        | 9.431  | 126.6        | 0.057 | 60.8         | 0.758 | -28.3        |
| 600                                                        | 0.502 | -85.6        | 7.415  | 112.2        | 0.072 | 56.5         | 0.646 | -33.3        |
| 800                                                        | 0.420 | -102.4       | 6.000  | 101.5        | 0.083 | 55.2         | 0.577 | -35.9        |
| 1000                                                       | 0.369 | -114.7       | 5.025  | 93.6         | 0.094 | 55.1         | 0.538 | -37.6        |
| 1200                                                       | 0.339 | -127.2       | 4.323  | 86.7         | 0.105 | 55.6         | 0.513 | -38.7        |
| 1400                                                       | 0.311 | -137.2       | 3.785  | 80.6         | 0.115 | 55.6         | 0.490 | -39.7        |
| 1600                                                       | 0.296 | -144.9       | 3.391  | 75.3         | 0.127 | 56.7         | 0.480 | -41.3        |
| 1800                                                       | 0.285 | -156.5       | 3.018  | 70.1         | 0.139 | 56.4         | 0.466 | -43.5        |
| 2000                                                       | 0.277 | -164.2       | 2.767  | 65.7         | 0.150 | 56.7         | 0.460 | -45.5        |

# NSVF5490SK

## S PARAMETERS (COMMON EMITTER)

| Freq (MHz) | S11 | ∠S11 | S21 | ∠S21 | S12 | ∠S12 | S22 | ∠S22 |
|------------|-----|------|-----|------|-----|------|-----|------|
|------------|-----|------|-----|------|-----|------|-----|------|

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

|      |       |        |        |       |       |      |       |       |
|------|-------|--------|--------|-------|-------|------|-------|-------|
| 200  | 0.641 | -52.7  | 16.527 | 137.8 | 0.031 | 67.4 | 0.820 | -22.9 |
| 400  | 0.468 | -85.4  | 11.299 | 115.7 | 0.048 | 60.5 | 0.643 | -30.2 |
| 600  | 0.377 | -106.6 | 8.303  | 103.1 | 0.060 | 60.0 | 0.549 | -32.2 |
| 800  | 0.321 | -124.1 | 6.502  | 94.0  | 0.072 | 60.9 | 0.499 | -33.2 |
| 1000 | 0.293 | -136.1 | 5.342  | 87.4  | 0.084 | 61.9 | 0.477 | -33.9 |
| 1200 | 0.280 | -146.7 | 4.546  | 81.4  | 0.097 | 62.7 | 0.462 | -35.0 |
| 1400 | 0.266 | -156.6 | 3.947  | 76.4  | 0.108 | 63.0 | 0.449 | -36.2 |
| 1600 | 0.263 | -163.2 | 3.527  | 71.4  | 0.123 | 63.7 | 0.444 | -37.8 |
| 1800 | 0.263 | -173.5 | 3.121  | 67.0  | 0.136 | 62.8 | 0.435 | -39.9 |
| 2000 | 0.264 | -179.8 | 2.864  | 62.8  | 0.150 | 62.4 | 0.434 | -42.4 |

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

|      |       |        |       |       |       |      |       |       |
|------|-------|--------|-------|-------|-------|------|-------|-------|
| 200  | 0.851 | -30.4  | 8.644 | 154.1 | 0.042 | 73.0 | 0.937 | -16.4 |
| 400  | 0.724 | -55.7  | 7.310 | 133.8 | 0.073 | 61.3 | 0.820 | -27.9 |
| 600  | 0.612 | -76.1  | 6.083 | 118.6 | 0.093 | 54.2 | 0.709 | -35.7 |
| 800  | 0.521 | -93.0  | 5.085 | 106.9 | 0.107 | 50.4 | 0.628 | -40.4 |
| 1000 | 0.461 | -106.1 | 4.343 | 98.1  | 0.118 | 48.3 | 0.572 | -43.7 |
| 1200 | 0.423 | -118.6 | 3.806 | 90.0  | 0.128 | 47.5 | 0.536 | -45.8 |
| 1400 | 0.382 | -129.4 | 3.349 | 83.3  | 0.137 | 46.9 | 0.506 | -47.3 |
| 1600 | 0.366 | -138.0 | 3.036 | 77.5  | 0.147 | 47.4 | 0.485 | -49.5 |
| 1800 | 0.341 | -148.8 | 2.685 | 71.7  | 0.157 | 47.2 | 0.463 | -51.9 |
| 2000 | 0.333 | -157.7 | 2.479 | 66.7  | 0.167 | 47.6 | 0.453 | -54.1 |

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

|      |       |        |       |       |       |      |       |       |
|------|-------|--------|-------|-------|-------|------|-------|-------|
| 200  | 0.945 | -18.7  | 3.431 | 162.9 | 0.053 | 78.1 | 0.982 | -10.3 |
| 400  | 0.892 | -36.9  | 3.263 | 147.1 | 0.099 | 66.9 | 0.939 | -19.7 |
| 600  | 0.826 | -52.9  | 3.004 | 133.2 | 0.136 | 57.5 | 0.879 | -27.7 |
| 800  | 0.754 | -67.9  | 2.765 | 120.4 | 0.164 | 49.7 | 0.815 | -34.8 |
| 1000 | 0.691 | -81.1  | 2.539 | 109.9 | 0.184 | 43.4 | 0.758 | -40.0 |
| 1200 | 0.639 | -94.3  | 2.366 | 99.8  | 0.199 | 38.4 | 0.727 | -44.3 |
| 1400 | 0.589 | -104.9 | 2.143 | 91.2  | 0.207 | 34.1 | 0.683 | -47.8 |
| 1600 | 0.558 | -114.1 | 1.969 | 83.6  | 0.213 | 31.7 | 0.653 | -51.4 |
| 1800 | 0.522 | -124.4 | 1.797 | 76.2  | 0.218 | 28.7 | 0.621 | -54.9 |
| 2000 | 0.490 | -134.9 | 1.701 | 69.7  | 0.219 | 27.0 | 0.601 | -58.1 |

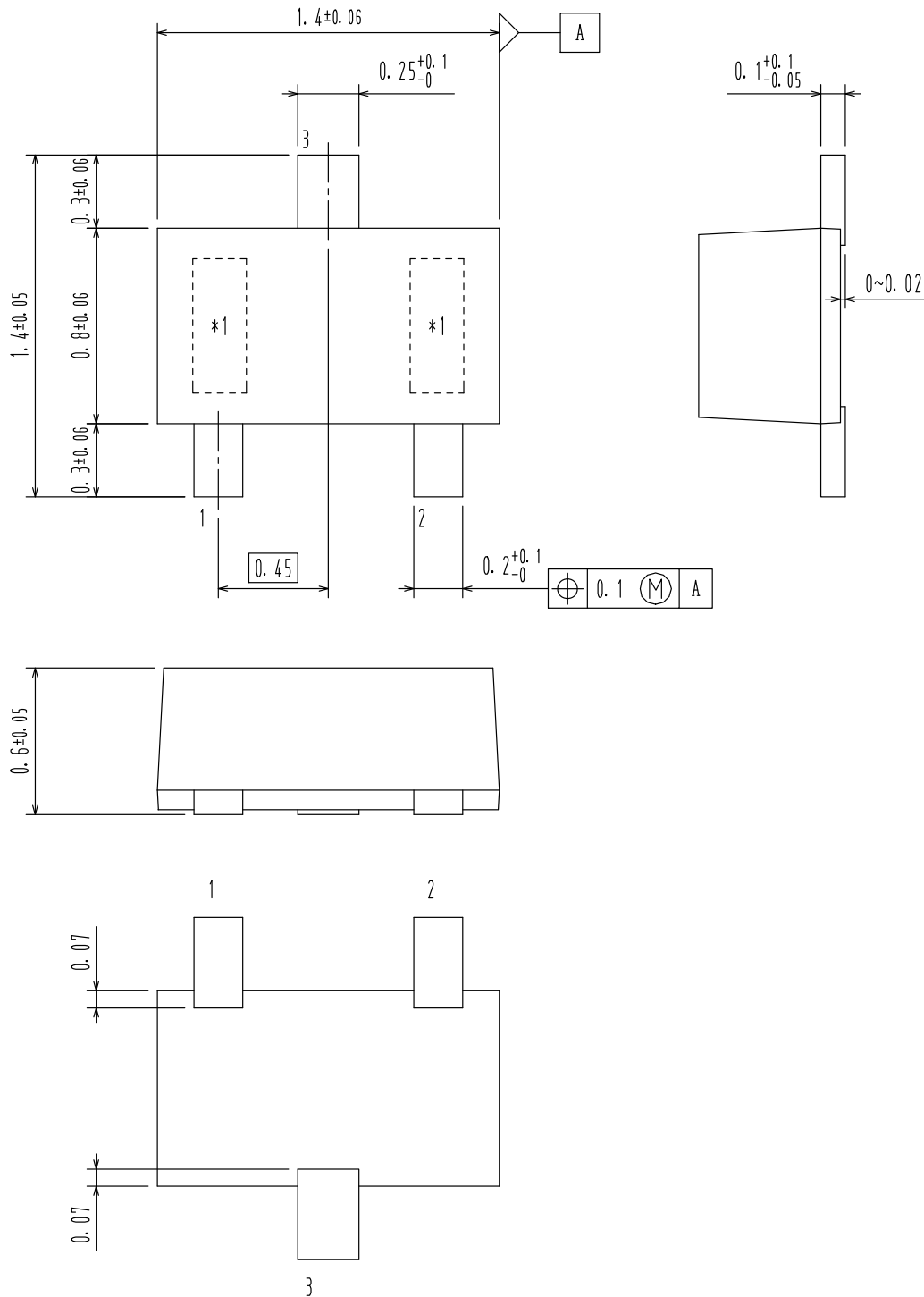
## ORDERING INFORMATION

| Device        | Marking | Package                                    | Shipping†           |
|---------------|---------|--------------------------------------------|---------------------|
| NSVF5490SKT3G | MN      | SOT-623 / SSFP<br>(Pb-Free / Halogen Free) | 8,000 / Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D

**SOT-623 / SSFP**  
**CASE 631AC**  
**ISSUE O**

DATE 29 FEB 2012



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|-------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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