

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



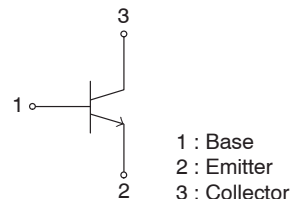
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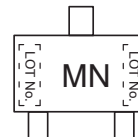


SOT-623 / SSFP
CASE 631AC

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 Ta = 25°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 | °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 Ta = 25°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 | μA |
| Emitter Cutoff Current | I_{EBO} | $V_{EB} = 1\text{ V}, I_C = 0\text{ A}$ | | | 10 | μA |
| 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

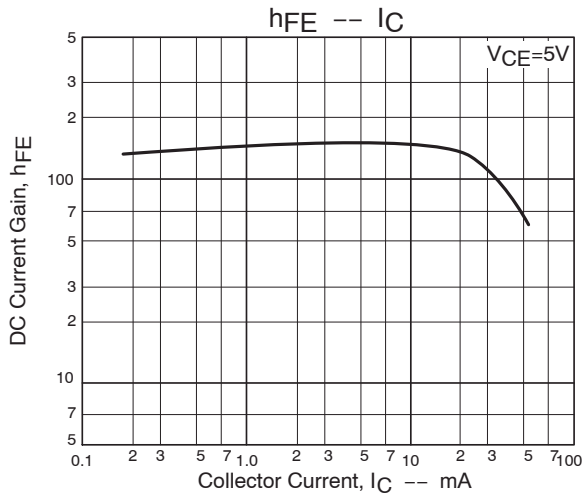


Figure 1.

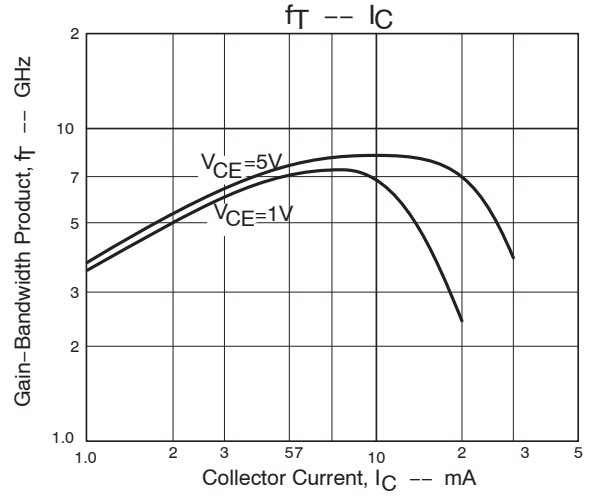


Figure 2.

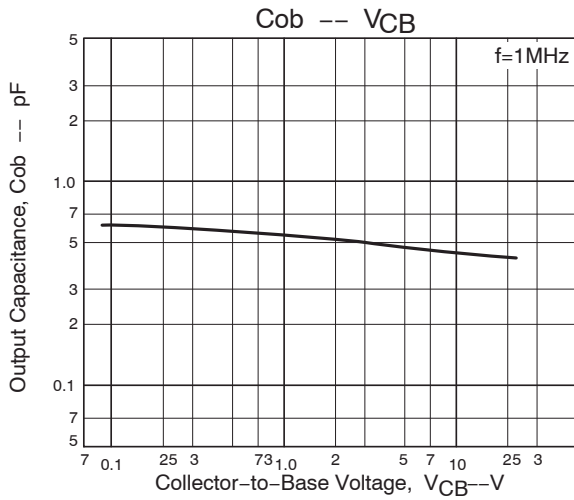


Figure 3.

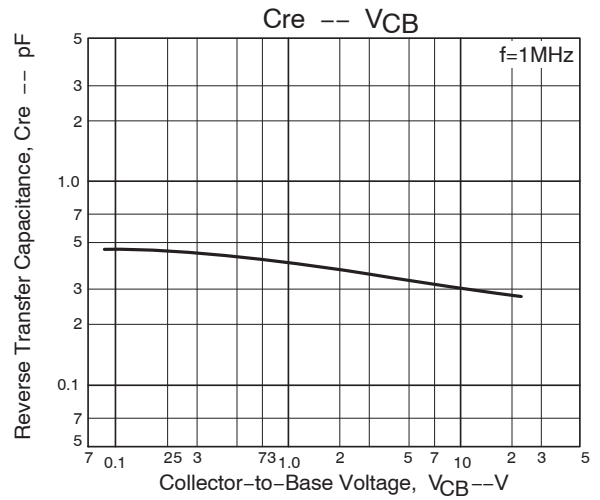


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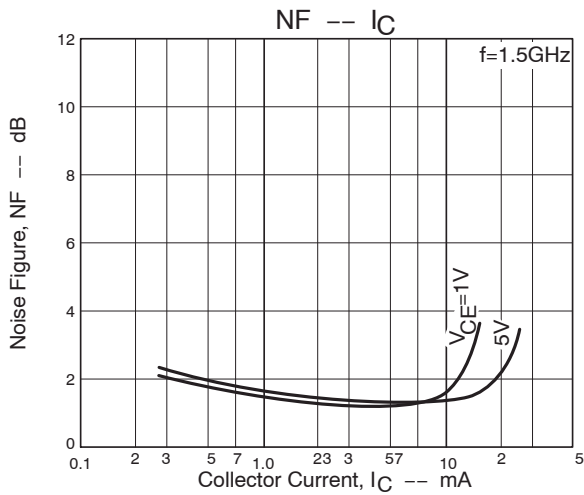


Figure 5.

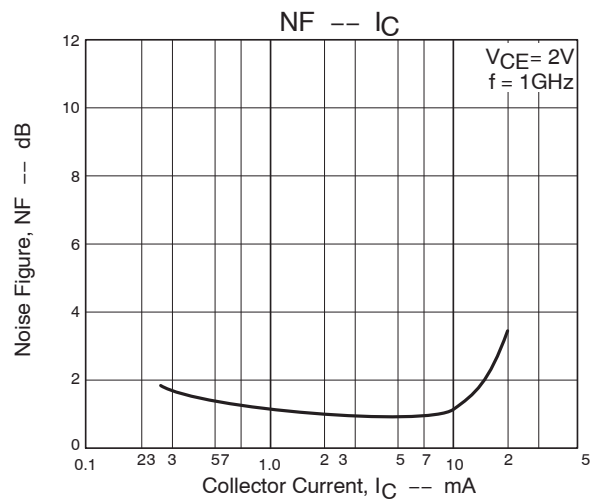


Figure 6.

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TYPICAL CHARACTERISTICS

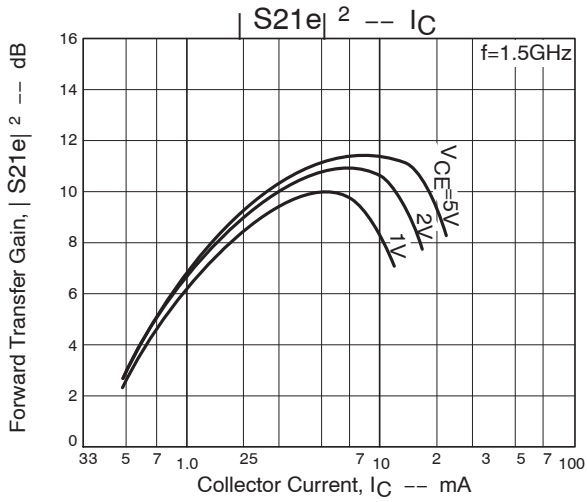


Figure 7.

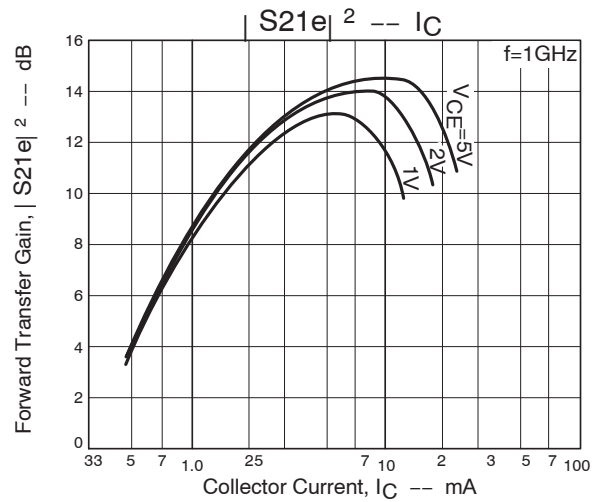


Figure 8.

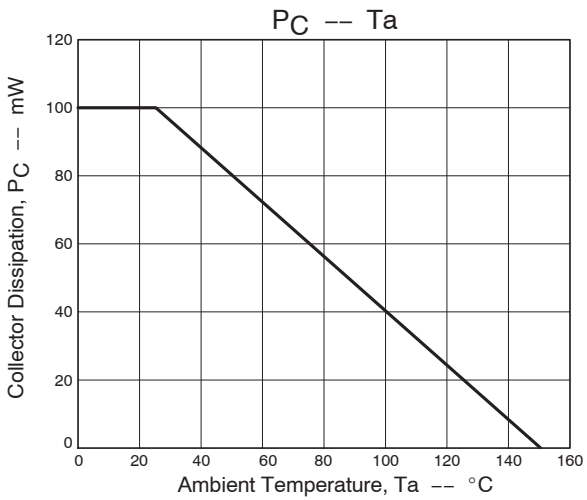


Figure 9.

S PARAMETERS (COMMON EMITTER)

| Freq (MHz) | $ S_{11} $ | $\angle S_{11}$ | $ S_{21} $ | $\angle S_{21}$ | $ S_{12} $ | $\angle S_{12}$ | $ S_{22} $ | $\angle S_{22}$ |
|--|------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|
| $V_{CE} = 5\text{ V}, I_C = 5\text{ mA}, Z_0 = 50\ \Omega$ | | | | | | | | |
| 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

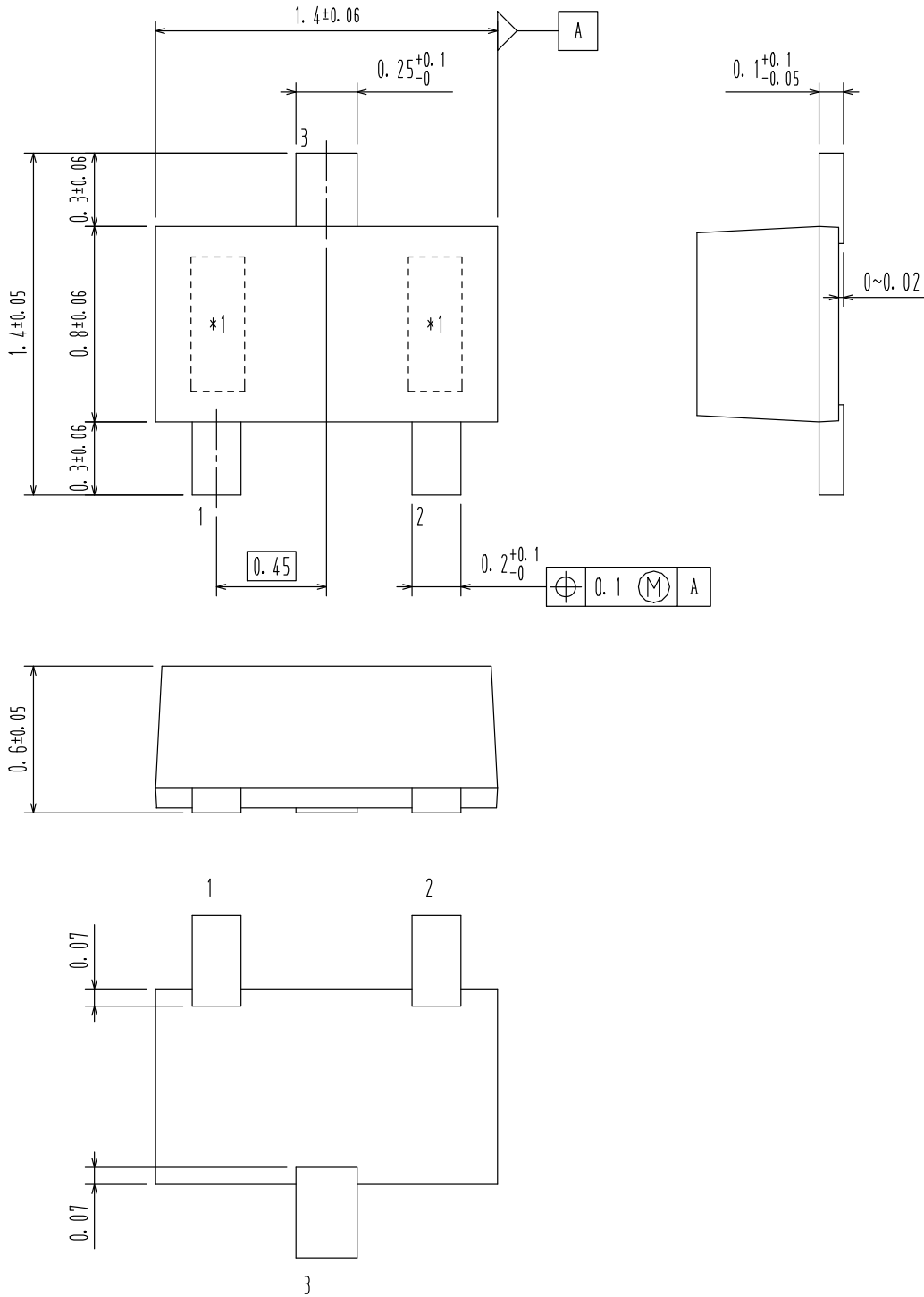
| Device | Marking | Package | Shipping† |
|---------------|---------|--|---------------------|
| NSVF5490SKT3G | MN | SOT-623 / SSFP (Pb-Free / Halogen Free) | 8,000 / Tape & Reel |

†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

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

SOT-623 / SSFP
CASE 631AC
ISSUE O

DATE 29 FEB 2012



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