

NEC

N-CHANNEL GaAs MES FET

NE650R279A

0.2 W L, S-BAND POWER GaAs MES FET

DESCRIPTION

The NE650R279A is a 0.2 W GaAs MES FET designed for middle power transmitter applications for mobile communication handset and base station systems. It is capable of delivering 0.2 watt of output power (CW) with high linear gain, high efficiency, excellent distortion and is suitable as a driver amplifier for our NE6500379A etc.

Reliability and performance uniformity are assured by NEC's stringent quality and control procedures.

FEATURES

- High Output Power : $P_{O(1\text{ dB})} = +23\text{ dBm typ.}$
- High Linear Gain : 16 dB typ.
- High Power Added Efficiency: $45\% \text{ typ. @ } V_{DS} = 6\text{ V, } I_{Dset} = 50\text{ mA, } f = 1.9\text{ GHz}$

ORDERING INFORMATION (PLAN)

| Part Number | Package | Supplying Form |
|---------------|---------|-------------------------------|
| NE650R279A-T1 | 79A | 12 mm tape width, 1 kpcs/reel |

Remark To order evaluation samples, please contact your local NEC sales office.
(Part number for sample order: NE650R279A)

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

Operation in excess of any one of these parameters may result in permanent damage.

| Parameter | Symbol | Ratings | Unit |
|-------------------------|-----------|-------------|------------------|
| Drain to Source Voltage | V_{DS} | 15 | V |
| Gate to Source Voltage | V_{GSO} | -7 | V |
| Drain Current | I_D | 0.3 | A |
| Gate Forward Current | I_{GF} | 8 | mA |
| Gate Reverse Current | I_{GR} | 8 | mA |
| Total Power Dissipation | P_T | 2.1 | W |
| Channel Temperature | T_{ch} | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -65 to +150 | $^\circ\text{C}$ |

Caution Please handle this device at static-free workstation, because this is an electrostatic sensitive device.

The information in this document is subject to change without notice.

RECOMMENDED OPERATING LIMITS

| Characteristics | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|-------------------------|----------|-----------------|------|------|------|------|
| Drain to Source Voltage | V_{DS} | | | 6.0 | 6.0 | V |
| Gain Compression | Gcomp | | | | 3.0 | dB |
| Channel Temperature | T_{ch} | | | | +125 | °C |

ELECTRICAL CHARACTERISTICS

($T_A = 25^\circ\text{C}$, Unless otherwise specified, using NEC standard test fixture.)

| Characteristics | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|---|--------------|---|------|------|------|------|
| Saturated Drain Current | I_{DSS} | $V_{DS} = 2.5\text{ V}$, $V_{GS} = 0\text{ V}$ | | 150 | | mA |
| Pinch-off Voltage | V_P | $V_{DS} = 2.5\text{ V}$, $I_D = 1\text{ mA}$ | -2.5 | | -0.5 | V |
| Gate to Drain Break Down Voltage | BV_{gd} | $I_{gd} = 1\text{ mA}$ | 13 | | | V |
| Thermal Resistance | R_{th} | Channel to Case | | 40 | 60 | °C/W |
| Output Power at 1 dB Gain Compression Point | P_O (1 dB) | $f = 1.9\text{ GHz}$, $V_{DS} = 6.0\text{ V}$ $R_g = 30\ \Omega$ $I_{Dset} = 50\text{ mA}$ (RF OFF) Note 2 | | 23.0 | | dBm |
| Drain Current | I_D | | | 72 | | mA |
| Power Added Efficiency | η_{add} | | | 45 | | % |
| Linear Gain ^{Note 1} | G_L | | 15.0 | 16.0 | | dB |

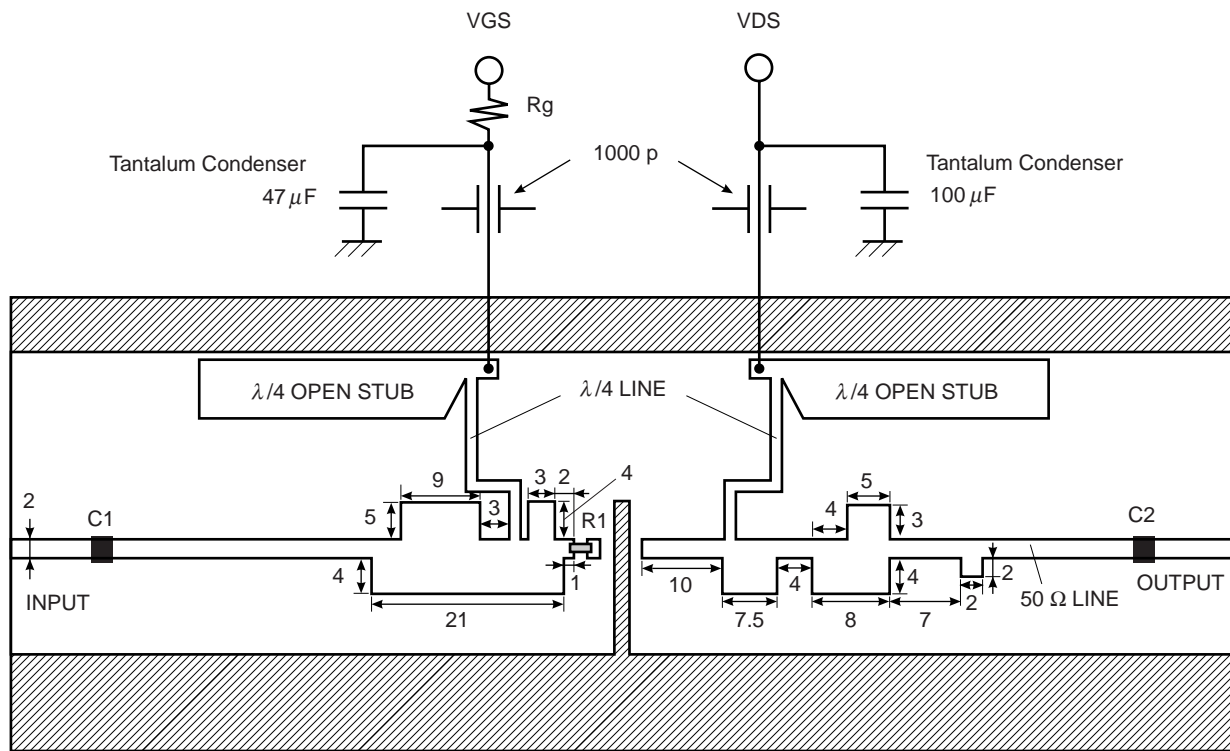
Notes 1. Pin = 0 dBm

2. DC performance is 100% testing. RF performance is testing several samples per wafer.
 Wafer rejection criteria for standard devices is 1 reject for several samples.

NE650R279A S-PARAMETERS TEST CONDITIONS: $V_{DS} = 6.0\text{ V}$, $I_{Dset} = 50\text{ mA}$ (Preliminary Data)

| freq. (MHz) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | |
|-------------|-----------------|-------------|-----------------|-------------|-----------------|-------------|-----------------|-------------|
| | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) | MAG. | ANG. (deg.) |
| 1400 | 0.865 | -103.4 | 5.788 | 133.2 | 0.070 | 53.2 | 0.403 | -73.5 |
| 1500 | 0.861 | -108.0 | 5.593 | 131.9 | 0.072 | 51.5 | 0.397 | -76.7 |
| 1600 | 0.850 | -112.1 | 5.439 | 130.8 | 0.073 | 51.1 | 0.392 | -79.2 |
| 1700 | 0.839 | -116.0 | 5.182 | 129.1 | 0.075 | 50.9 | 0.387 | -82.1 |
| 1800 | 0.833 | -120.5 | 5.026 | 129.1 | 0.078 | 50.6 | 0.382 | -84.9 |
| 1900 | 0.827 | -124.9 | 4.992 | 128.4 | 0.081 | 49.2 | 0.376 | -87.5 |
| 2000 | 0.817 | -129.4 | 4.888 | 125.6 | 0.082 | 47.2 | 0.368 | -90.2 |
| 2100 | 0.809 | -133.1 | 4.739 | 124.9 | 0.082 | 45.8 | 0.360 | -93.0 |
| 2200 | 0.806 | -137.7 | 4.628 | 123.6 | 0.081 | 45.6 | 0.349 | -95.7 |
| 2300 | 0.795 | -143.0 | 4.518 | 121.8 | 0.081 | 46.2 | 0.336 | -98.5 |
| 2400 | 0.789 | -148.3 | 4.403 | 119.9 | 0.083 | 46.5 | 0.325 | -101.6 |
| 2500 | 0.781 | -153.4 | 4.383 | 118.2 | 0.086 | 46.0 | 0.311 | -104.9 |
| 2600 | 0.778 | -157.5 | 4.348 | 116.6 | 0.087 | 44.3 | 0.300 | -107.6 |
| 2700 | 0.779 | -162.9 | 4.065 | 115.8 | 0.087 | 42.7 | 0.288 | -110.5 |
| 2800 | 0.778 | -167.0 | 3.910 | 113.8 | 0.085 | 42.2 | 0.276 | -113.5 |
| 2900 | 0.778 | -172.1 | 3.763 | 113.1 | 0.084 | 42.1 | 0.264 | -117.3 |
| 3000 | 0.781 | -176.7 | 3.632 | 112.8 | 0.083 | 41.4 | 0.256 | -121.0 |

APPLICATION CIRCUIT EXAMPLE (Unit: mm)



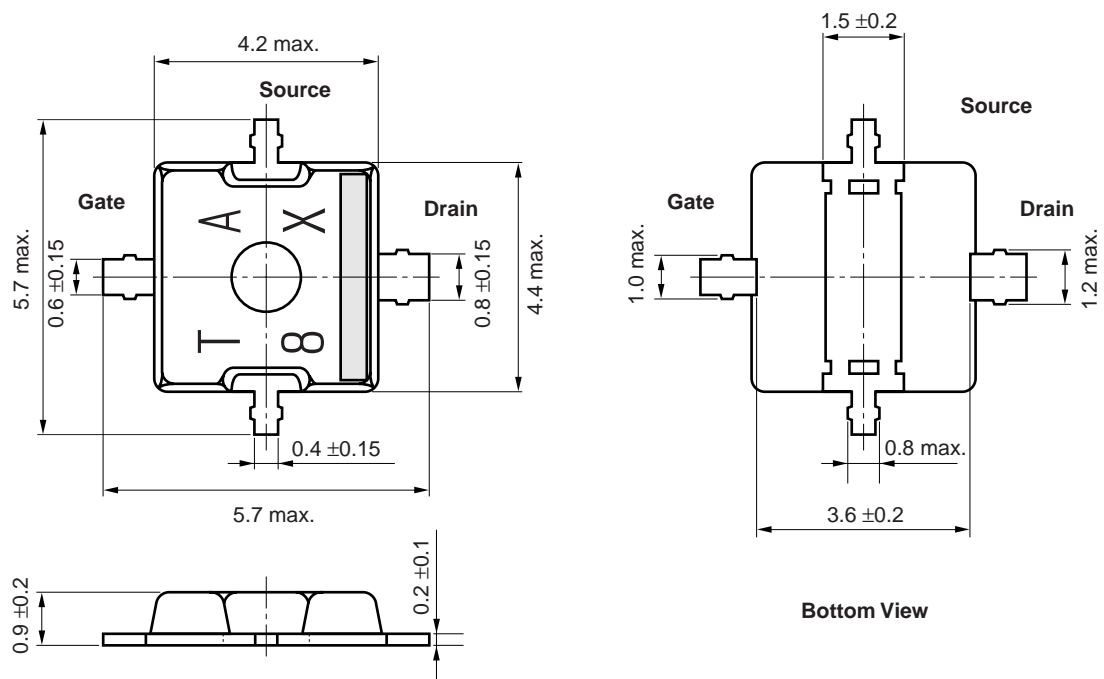
$f = 1.9 \text{ GHz}$
 $V_{DS} = 6 \text{ V}$
 $I_{Dset} = 50 \text{ mA (RF OFF)}$

$C1 = 30 \text{ pF}$ $R1 = 5.1 \Omega$
 $C2 = 30 \text{ pF}$ $R_g = 30 \Omega$

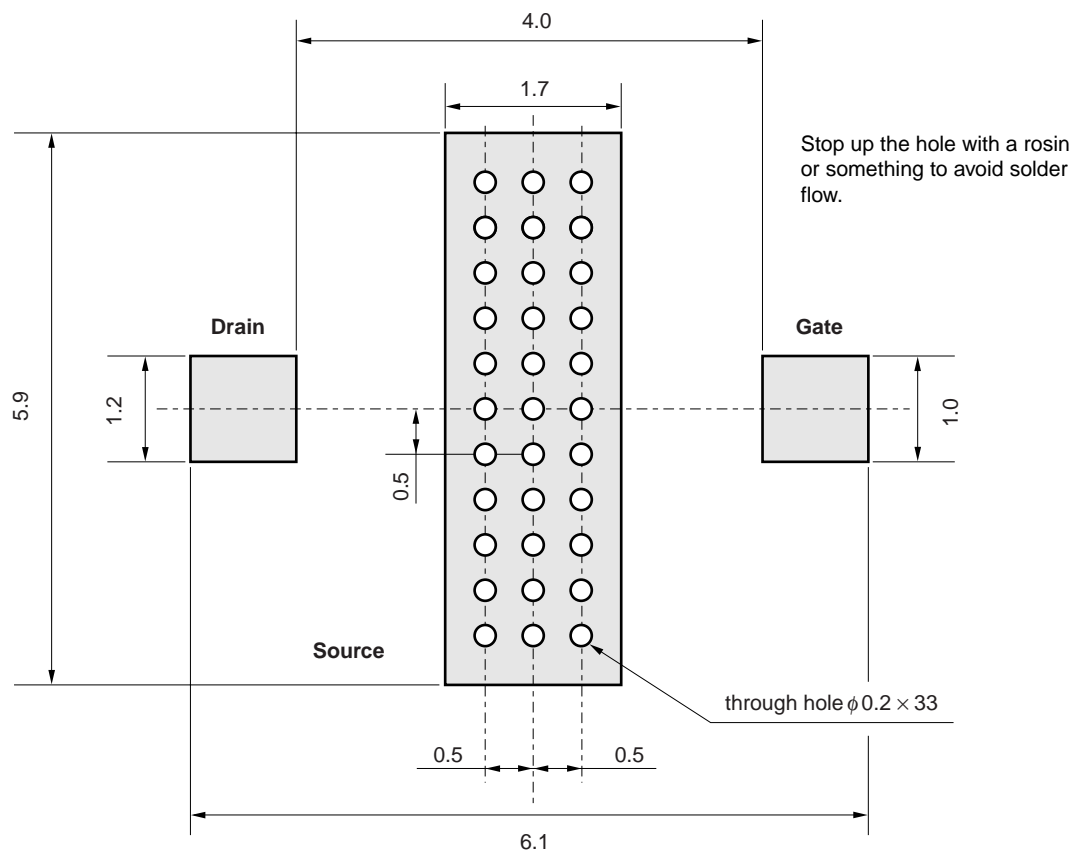
 GND

Substrate: Teflon glass ($\epsilon_r = 2.6$)
 $t = 0.8 \text{ mm}$

79A Package Dimensions (Unit: mm)



79A Package Recommended P.C.B. Layout (Unit: mm)



RECOMMENDED SOLDERING CONDITIONS

This product should be soldered under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your NEC sales representative.

| Soldering Method | Soldering Conditions | Recommended Condition Symbol |
|------------------|--|------------------------------|
| Infrared Reflow | Package peak temperature: 235°C or below Time: 30 seconds or less (at 210°C) Count: 2, Exposure limit ^{Note} : None | IR35-00-2 |
| Partial Heating | Pin temperature: 260°C Time: 5 seconds or less (per pin row) Exposure limit ^{Note} : None | — |

Note After opening the dry pack, keep it in a place below 25°C and 65% RH for the allowable storage period.

Caution Do not use different soldering methods together (except for partial heating).

[MEMO]

Caution

The Great Care must be taken in dealing with the devices in this guide.

The reason is that the material of the devices is GaAs (Gallium Arsenide), which is designated as harmful substance according to the law concerned.

Keep the law concerned and so on, especially in case of removal.

The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

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NEC devices are classified into the following three quality grades:

"Standard", "Special", and "Specific". The Specific quality grade applies only to devices developed based on a customer designated "quality assurance program" for a specific application. The recommended applications of a device depend on its quality grade, as indicated below. Customers must check the quality grade of each device before using it in a particular application.

Standard: Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots

Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

The quality grade of NEC devices is "Standard" unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact an NEC sales representative in advance.

Anti-radioactive design is not implemented in this product.