

0.4 W L, S-BAND POWER GaAs MES FET

DESCRIPTION

The NE650R479A is a 0.4 W GaAs MES FET designed for middle power transmitter applications for mobile communication handset and base station systems. It is capable of delivering 0.4 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 : $P_{O(1\text{ dB})} = +26\text{ dBm typ.}$
- High Linear Gain : 14 dB typ.
- High Power Added Efficiency: $45\% \text{ typ. @ } V_{DS} = 6\text{ V, } I_{Dset} = 100\text{ mA, } f = 1.9\text{ GHz}$

ORDERING INFORMATION (PLAN)

Part Number	Package	Supplying Form
NE650R479A-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: NE650R479A)

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	0.6	A
Gate Forward Current	I_{GF}	12	mA
Gate Reverse Current	I_{GR}	12	mA
Total Power Dissipation	P_T	2.5	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 OPERATION 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}	$V_{DS} = 2.5\text{ V}, V_{GS} = 0\text{ V}$		0.35		A
Pinch-off Voltage	V_P	$V_{DS} = 2.5\text{ V}, I_D = 2\text{ mA}$	-2.5		-0.5	V
Gate to Drain Break Down Voltage	BV_{gd}	$I_{gd} = 2\text{ mA}$	13			V
Thermal Resistance	R_{th}	Channel to Case		30	50	°C/W
Output Power at 1 dB Gain Compression Point	$P_{O(1\text{ dB})}$	$f = 1.9\text{ GHz}, V_{DS} = 6.0\text{ V}$ $R_g = 30\ \Omega$		26.0		dBm
Drain Current	I_D	$I_{Dset} = 100\text{ mA (RF OFF)}$		140		mA
Power Added Efficiency	η_{add}	Note 2		45		%
Linear Gain ^{Note 1}	G_L		13.0	14.0		dB

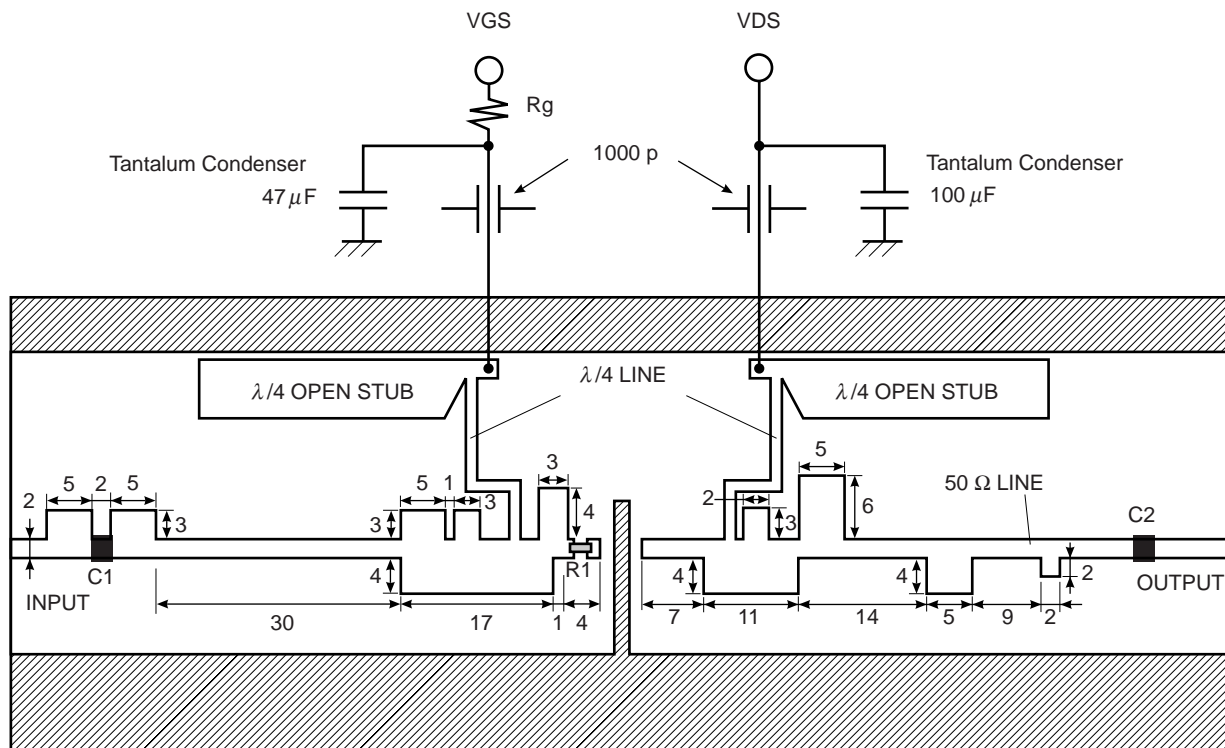
Notes 1. Pin = 0 dBm

- 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.

NE650R479A S-PARAMETERS TEST CONDITIONS: $V_{DS} = 6.0\text{ V}$, $I_{Dset} = 100\text{ mA}$ (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	0.850	-129.3	5.286	120.2	0.062	42.6	0.293	-132.5
1500	0.849	-134.0	5.066	119.1	0.063	41.6	0.294	-136.0
1600	0.840	-137.0	4.837	118.4	0.063	41.5	0.294	-138.1
1700	0.837	-141.4	4.634	116.8	0.065	41.5	0.299	-140.6
1800	0.833	-145.9	4.519	115.0	0.067	40.9	0.298	-143.4
1900	0.826	-150.0	4.404	114.3	0.068	39.4	0.296	-146.1
2000	0.817	-153.3	4.159	112.7	0.068	37.8	0.299	-149.2
2100	0.817	-157.9	4.073	111.3	0.067	37.4	0.296	-152.8
2200	0.808	-161.5	3.926	109.9	0.066	37.9	0.294	-155.6
2300	0.810	-167.1	3.795	108.1	0.066	38.8	0.290	-160.2
2400	0.810	-171.9	3.687	105.3	0.067	39.1	0.289	-164.1
2500	0.805	-176.6	3.545	104.0	0.069	38.3	0.286	-168.7
2600	0.806	179.1	3.306	102.6	0.069	36.5	0.285	-171.9
2700	0.806	175.8	3.216	102.0	0.067	35.7	0.285	-175.5
2800	0.809	172.0	3.129	101.9	0.066	35.8	0.286	-179.3
2900	0.816	167.8	3.023	101.4	0.065	36.3	0.291	176.6
3000	0.817	164.2	2.956	101.3	0.063	35.9	0.298	172.4

APPLICATION CIRCUIT EXAMPLE (Unit: mm)



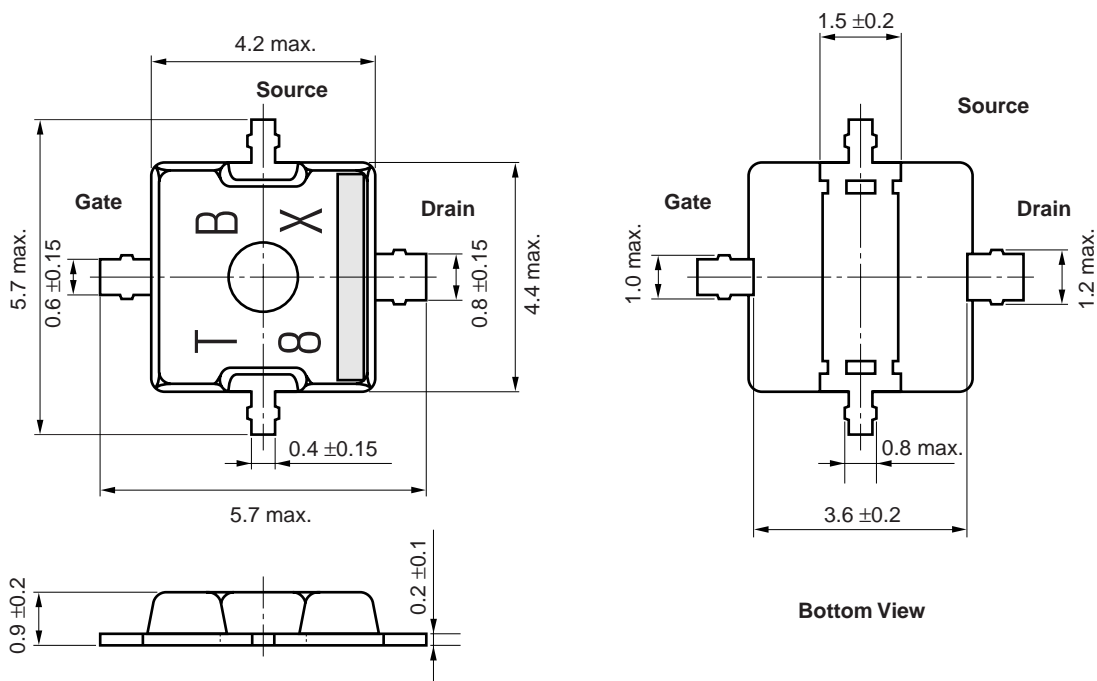
 GND

$f = 1.9 \text{ GHz}$
 $V_{DS} = 6 \text{ V}$
 $I_{Dset} = 100 \text{ mA (RF OFF)}$

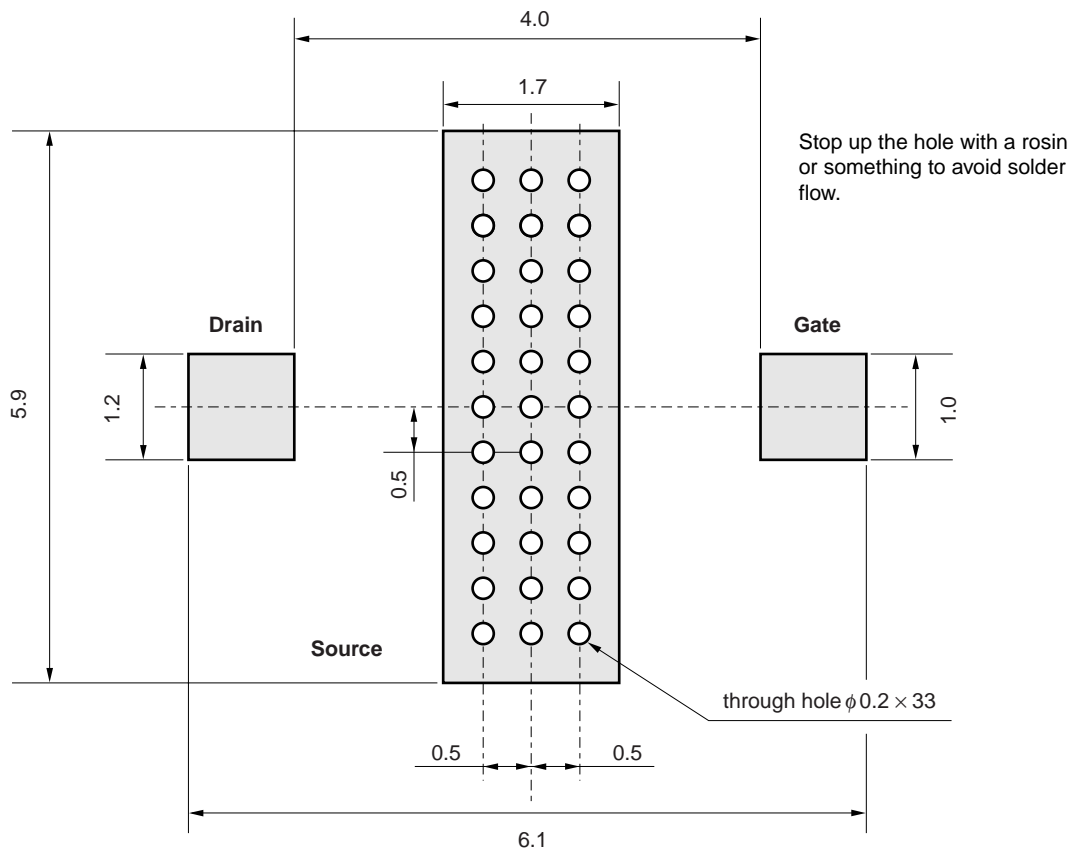
$C1 = 30 \text{ pF}$ $R1 = 5.1 \Omega$
 $C2 = 30 \text{ pF}$ $R_g = 30 \Omega$

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.

No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Corporation. NEC Corporation assumes no responsibility for any errors which may appear in this document.

NEC Corporation does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from use of a device described herein or any other liability arising from use of such device. No license, either express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Corporation or others.

While NEC Corporation has been making continuous effort to enhance the reliability of its semiconductor devices, the possibility of defects cannot be eliminated entirely. To minimize risks of damage or injury to persons or property arising from a defect in an NEC semiconductor device, customers must incorporate sufficient safety measures in its design, such as redundancy, fire-containment, and anti-failure features.

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.