

# SILICON POWER MOS FET NE552R479A

## 3.0 V OPERATION SILICON RF POWER LDMOS FET FOR 2.45 GHz 0.4 W TRANSMISSION AMPLIFIERS

### DESCRIPTION

The NE552R479A is an N-channel silicon power laterally diffused MOS FET specially designed as the transmission power amplifier for 3.0 V WLL products. Dies are manufactured using our NEWMOS2 technology (our WSi gate laterally diffused MOS FET) and housed in a surface mount package. This device can deliver 26.0 dBm output power with 45% power added efficiency at 2.45 GHz under the 3.0 V supply voltage.

### FEATURES

- High output power :  $P_{out} = 26.0$  dBm TYP. ( $V_{DS} = 3.0$  V,  $I_{Dset} = 200$  mA,  $f = 2.45$  GHz,  $P_{in} = 19$  dBm)
- High power added efficiency :  $\eta_{add} = 45\%$  TYP. ( $V_{DS} = 3.0$  V,  $I_{Dset} = 200$  mA,  $f = 2.45$  GHz,  $P_{in} = 19$  dBm)
- High linear gain :  $G_L = 11$  dB TYP. ( $V_{DS} = 3.0$  V,  $I_{Dset} = 200$  mA,  $f = 2.45$  GHz,  $P_{in} = 10$  dBm)
- Surface mount package :  $5.7 \times 5.7 \times 1.1$  mm MAX.
- ★ • Single supply :  $V_{DS} = 2.8$  to  $6.0$  V

### APPLICATIONS

- Digital cellular phones : 3.0 V GSM1900 Pre Driver
- Analog cellular phones : 2.8 V AMPS Handsets
- Bluetooth™ applications : 3.0 V Class 1 Devices
- Others : 3.0 V Two-Way Pagers

### ORDERING INFORMATION

Part Number	Package	Marking	Supplying Form
NE552R479A-T1	79A	AW	<ul style="list-style-type: none"> <li>• 12 mm wide embossed taping</li> <li>• Gate pin face the perforation side of the tape</li> <li>• Qty 1 kpcs/reel</li> </ul>
NE552R479A-T1A			<ul style="list-style-type: none"> <li>• 12 mm wide embossed taping</li> <li>• Gate pin face the perforation side of the tape</li> <li>• Qty 5 kpcs/reel</li> </ul>

**Remark** To order evaluation samples, contact your nearby sales office.

Part number for sample order: NE552R479A

**Caution** Observe precautions when handling because these devices are sensitive to electrostatic discharge.

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.  
Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

# ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = +25°C)

Parameter	Symbol	Ratings	Unit
Drain to Source Voltage	V <sub>DS</sub>	15.0	V
Gate to Source Voltage	V <sub>GS</sub>	5.0	V
Drain Current	I <sub>D</sub>	300	mA
Drain Current (Pulse Test)	I <sub>D</sub> <sup>Note</sup>	600	mA
Total Power Dissipation	P <sub>tot</sub>	10	W
Channel Temperature	T <sub>ch</sub>	125	°C
Storage Temperature	T <sub>stg</sub>	–55 to +125	°C

**Note** Duty Cycle 50%, T<sub>on</sub> ≤ 1 s

# RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
★ Drain to Source Voltage	V <sub>DS</sub>		2.8	3.0	6.0	V
Gate to Source Voltage	V <sub>GS</sub>		0	2.0	3.0	V
Drain Current	I <sub>D</sub>	Duty Cycle 50%, T <sub>on</sub> ≤ 1 s	–	200	500	mA
Input Power	P <sub>in</sub>	f = 2.45 GHz, V <sub>DS</sub> = 3.0 V	18	19	25	dBm

# ELECTRICAL CHARACTERISTICS

(T<sub>A</sub> = +25°C, unless otherwise specified, using NEC standard test fixture)

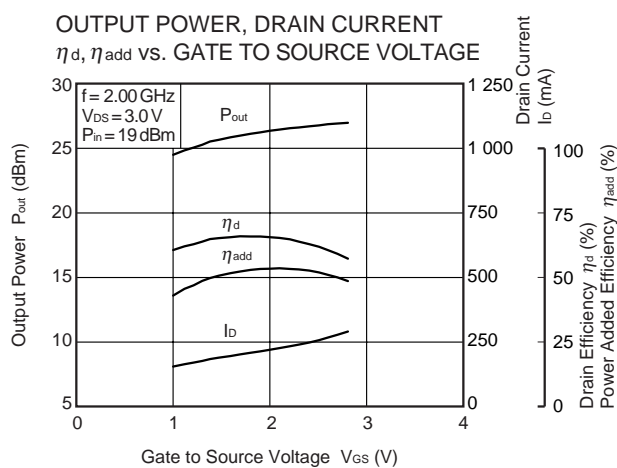
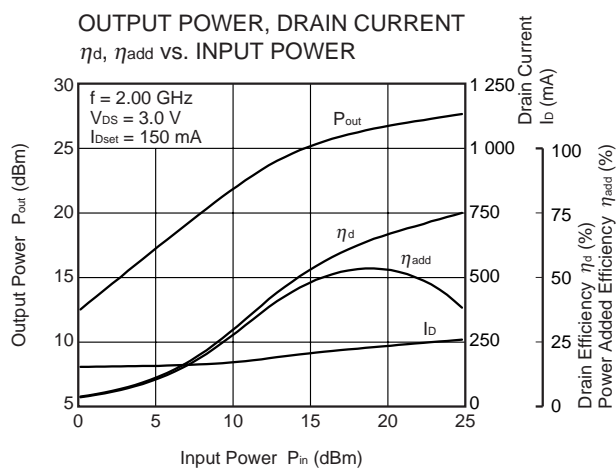
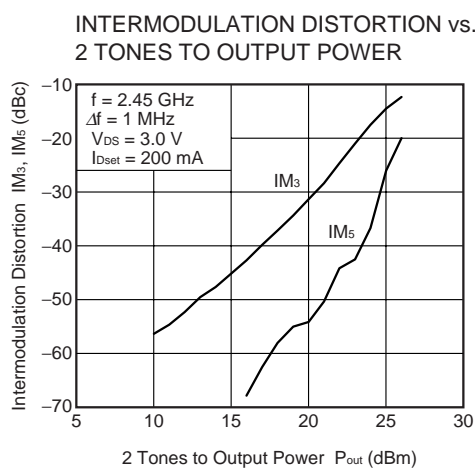
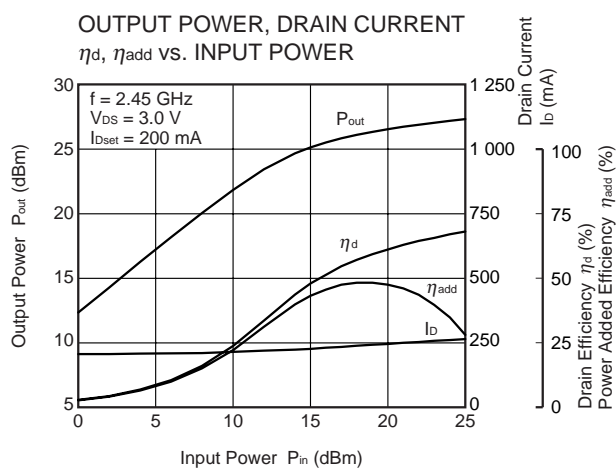
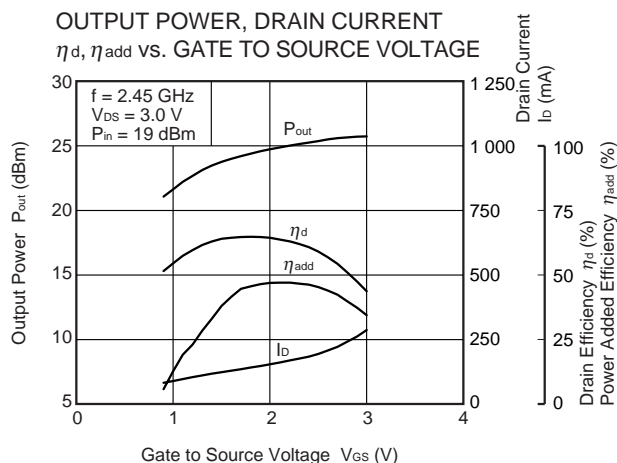
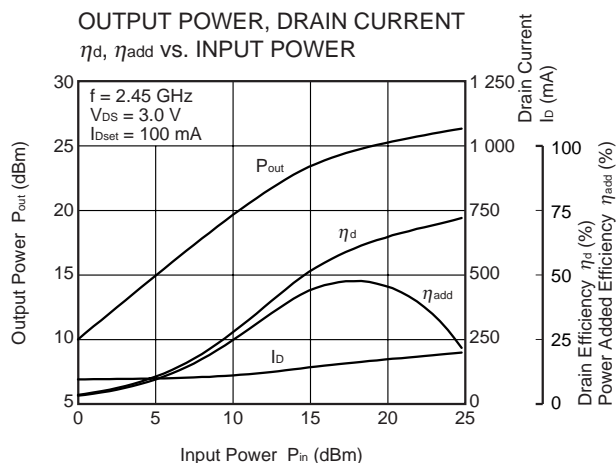
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Gate to Source Leak Current	I <sub>GSS</sub>	V <sub>GS</sub> = 5.0 V	–	–	100	nA
Drain to Source Leakage Current (Zero Gate Voltage Drain Current)	I <sub>DSS</sub>	V <sub>DS</sub> = 6.0 V	–	–	100	nA
Gate Threshold Voltage	V <sub>th</sub>	V <sub>DS</sub> = 3.5 V, I <sub>D</sub> = 1 mA	1.0	1.4	1.9	V
Thermal Resistance	R <sub>th</sub>	Channel to Case	–	–	10	°C/W
Transconductance	G <sub>m</sub>	V <sub>DS</sub> = 3.5 V, I <sub>D</sub> = 100 mA	–	0.4	–	S
Drain to Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>DSS</sub> = 10 μA	15	18	–	V
Output Power	P <sub>out</sub>	f = 2.45 GHz, V <sub>DS</sub> = 3.0 V, P <sub>in</sub> = 19 dBm, I <sub>Dset</sub> = 200 mA (RF OFF), <b>Note1</b>	24.0	26.0	–	dBm
Drain Current	I <sub>D</sub>		–	230	–	mA
Power Added Efficiency	η <sub>add</sub>		35	45	–	%
Linear Gain <sup>Note2</sup>	G <sub>L</sub>		–	11	–	dB

**Notes** 1. 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.

2. P<sub>in</sub> = 10 dBm

**TYPICAL CHARACTERISTICS (T<sub>A</sub> = +25°C)**



**Remark** The graphs indicate nominal characteristics.

**S-PARAMETERS**

S-parameters/Noise parameters are provided on the NEC Compound Semiconductor Devices Web site in a form (S2P) that enables direct import to a microwave circuit simulator without keyboard input.

Click here to download S-parameters.

[RF and Microwave] → [Device Parameters]

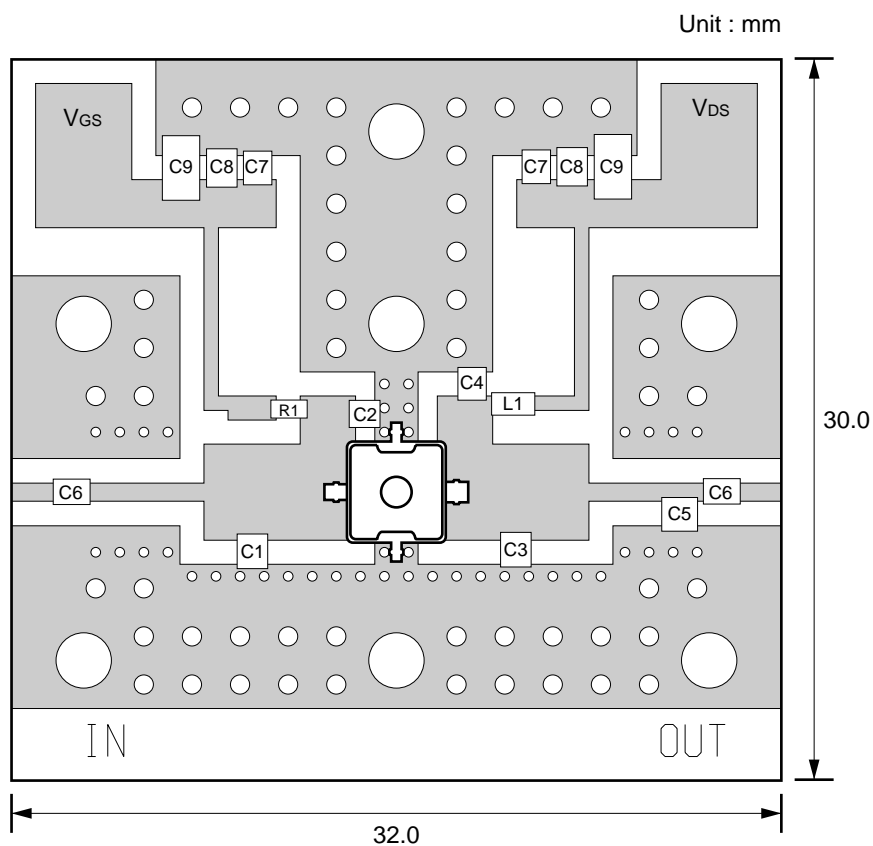
URL <http://www.csd-nec.com/>

**LARGE SIGNAL IMPEDANCE ( $V_{ds} = 3.0$  V,  $I_D = 200$  mA,  $f = 2.45$  GHz,  $P_{out} = 400$  mW)**

f (GHz)	$Z_{in}$ ( $\Omega$ )	$Z_{OL}$ ( $\Omega$ ) <sup>Note</sup>
2.45	2.96 -j7.78	3.36 -j8.42

**Note**  $Z_{OL}$  is the conjugate of optimum load impedance at given voltage, idling current, input power and frequency.

★ EVALUATION BOARD FOR 2.45 GHz



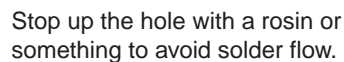
Symbol	Value	Comment
C1	2.0 pF	
C2	1.4 pF	
C3	2.2 pF	
C4	0.8 pF	
C5	0.5 pF	
C6	10 pF	
C7	1 000 pF	
C8	0.22 $\mu$ F	
C9	3.3 $\mu$ F - 16V	
R1	1 000 $\Omega$	
L1	22 nH	
Circuit Board	t = 0.4 mm, $\epsilon$ r = 4.5	R4775

★

**79A (UNIT: mm)**



### 79A PACKAGE RECOMMENDED P.C.B. LAYOUT (UNIT: mm)



# RECOMMENDED SOLDERING CONDITIONS

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

Soldering Method	Soldering Conditions	Condition Symbol
Infrared Reflow	Peak temperature (package surface temperature) : 260°C or below Time at peak temperature : 10 seconds or less Time at temperature of 220°C or higher : 60 seconds or less Preheating time at 120 to 180°C : 120±30 seconds Maximum number of reflow processes : 3 times Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below	IR260
VPS	Peak temperature (package surface temperature) : 215°C or below Time at temperature of 200°C or higher : 25 to 40 seconds Preheating time at 120 to 150°C : 30 to 60 seconds Maximum number of reflow processes : 3 times Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below	VP215
Wave Soldering	Peak temperature (molten solder temperature) : 260°C or below Time at peak temperature : 10 seconds or less Preheating temperature (package surface temperature) : 120°C or below Maximum number of flow processes : 1 time Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below	WS260
Partial Heating	Peak temperature (pin temperature) : 350°C or below Soldering time (per pin of device) : 3 seconds or less Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below	HS350-P3

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

Bluetooth is a trademark owned by Bluetooth SIG, Inc., U.S.A.

- **The information in this document is current as of July, 2003. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC's data sheets or data books, etc., for the most up-to-date specifications of NEC semiconductor products. Not all products and/or types are available in every country. Please check with an NEC sales representative for availability and additional information.**
- No part of this document may be copied or reproduced in any form or by any means without prior written consent of NEC. NEC assumes no responsibility for any errors that may appear in this document.
- NEC does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from the use of NEC semiconductor products listed in this document or any other liability arising from the use of such products. No license, express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC or others.
- Descriptions of circuits, software and other related information in this document are provided for illustrative purposes in semiconductor product operation and application examples. The incorporation of these circuits, software and information in the design of customer's equipment shall be done under the full responsibility of customer. NEC assumes no responsibility for any losses incurred by customers or third parties arising from the use of these circuits, software and information.
- While NEC endeavours to enhance the quality, reliability and safety of NEC semiconductor products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. To minimize risks of damage to property or injury (including death) to persons arising from defects in NEC semiconductor products, customers must incorporate sufficient safety measures in their design, such as redundancy, fire-containment, and anti-failure features.
- NEC semiconductor products are classified into the following three quality grades:  
 "Standard", "Special" and "Specific". The "Specific" quality grade applies only to semiconductor products developed based on a customer-designated "quality assurance program" for a specific application. The recommended applications of a semiconductor product depend on its quality grade, as indicated below. Customers must check the quality grade of each semiconductor product 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": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc.  
 The quality grade of NEC semiconductor products is "Standard" unless otherwise expressly specified in NEC's data sheets or data books, etc. If customers wish to use NEC semiconductor products in applications not intended by NEC, they must contact an NEC sales representative in advance to determine NEC's willingness to support a given application.  
 (Note)  
 (1) "NEC" as used in this statement means NEC Corporation, NEC Compound Semiconductor Devices, Ltd. and also includes its majority-owned subsidiaries.  
 (2) "NEC semiconductor products" means any semiconductor product developed or manufactured by or for NEC (as defined above).

M8E 00.4-0110

---

► For further information, please contact

**NEC Compound Semiconductor Devices, Ltd.** <http://www.csd-nec.com/>

E-mail: [salesinfo@csd-nec.com](mailto:salesinfo@csd-nec.com) (sales and general)

[techinfo@csd-nec.com](mailto:techinfo@csd-nec.com) (technical)

5th Sales Group, Sales Division TEL: +81-44-435-1588 FAX: +81-44-435-1579

**NEC Compound Semiconductor Devices Hong Kong Limited**

E-mail: [ncsd-hk@elhk.nec.com.hk](mailto:ncsd-hk@elhk.nec.com.hk) (sales, technical and general)

Hong Kong Head Office TEL: +852-3107-7303 FAX: +852-3107-7309

Taipei Branch Office TEL: +886-2-8712-0478 FAX: +886-2-2545-3859

Korea Branch Office TEL: +82-2-558-2120 FAX: +82-2-558-5209

**NEC Electronics (Europe) GmbH** <http://www.ee.nec.de/>

TEL: +49-211-6503-01 FAX: +49-211-6503-487

**California Eastern Laboratories, Inc.** <http://www.cel.com/>

TEL: +1-408-988-3500 FAX: +1-408-988-0279