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# SILICON POWER MOS FET

# NE5520279A

## 3.2 V OPERATION SILICON RF POWER LDMOS FET FOR 1.8 GHz 1.6 W TRANSMISSION AMPLIFIERS

### DESCRIPTION

The NE5520279A is an N-channel silicon power laterally diffused MOS FET specially designed as the transmission power amplifier for 3.2 V DCS1800 handsets. 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 32.0 dBm output power with 45% power added efficiency at 1.8 GHz under the 3.2 V supply voltage.

### FEATURES

- High output power :  $P_{out} = 32.0$  dBm TYP. ( $V_{DS} = 3.2$  V,  $I_{Dset} = 700$  mA,  $f = 1.8$  GHz,  $P_{in} = 25$  dBm)
- High power added efficiency :  $\eta_{add} = 45\%$  TYP. ( $V_{DS} = 3.2$  V,  $I_{Dset} = 700$  mA,  $f = 1.8$  GHz,  $P_{in} = 25$  dBm)
- High linear gain :  $G_L = 10$  dB TYP. ( $V_{DS} = 3.2$  V,  $I_{Dset} = 700$  mA,  $f = 1.8$  GHz,  $P_{in} = 5$  dBm)
- Surface mount package :  $5.7 \times 5.7 \times 1.1$  mm MAX.
- Single supply :  $V_{DS} = 2.8$  to  $6.0$  V

### APPLICATION

- Digital cellular phones : 3.2 V DCS1800 Handsets

### ORDERING INFORMATION

Part Number	Package	Marking	Supplying Form
NE5520279A-T1	79A	A2	• 12 mm wide embossed taping • Gate pin face the perforation side of the tape • Qty 1 kpcs/reel
NE5520279A-T1A			• 12 mm wide embossed taping • Gate pin face the perforation side of the tape • Qty 5 kpcs/reel

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

Part number for sample order: NE5520279A-A

**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.

**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>	0.6	A
Drain Current (Pulse Test)	I <sub>D</sub> <sup>Note</sup>	1.2	A
Total Power Dissipation	P <sub>tot</sub>	12.5	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	-	800	1 000	mA
Input Power	P <sub>in</sub>	f = 1.8 GHz, V <sub>DS</sub> = 3.2 V	24	25	30	dBm

**ELECTRICAL CHARACTERISTICS**

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

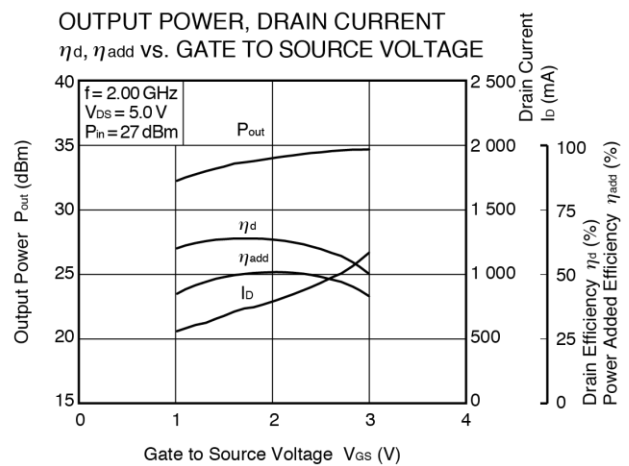
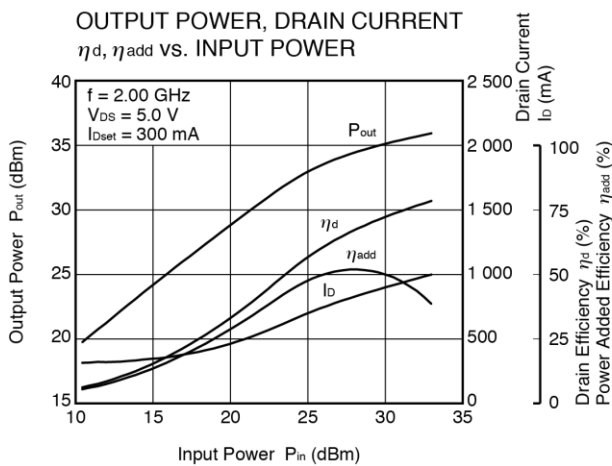
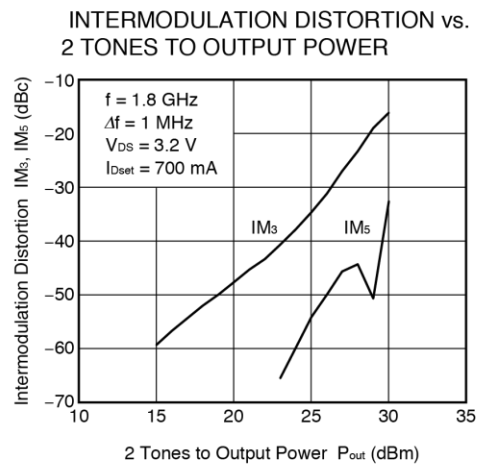
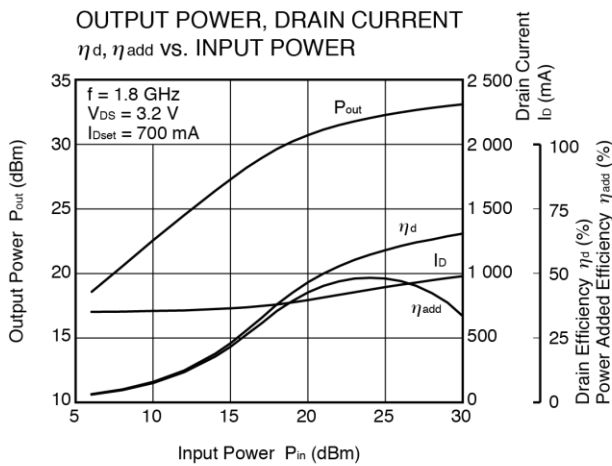
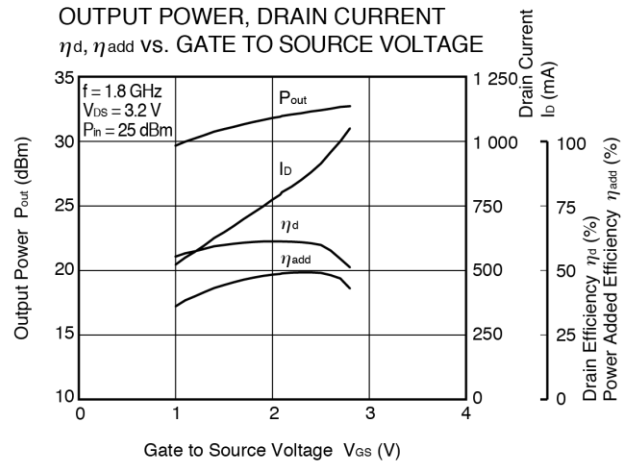
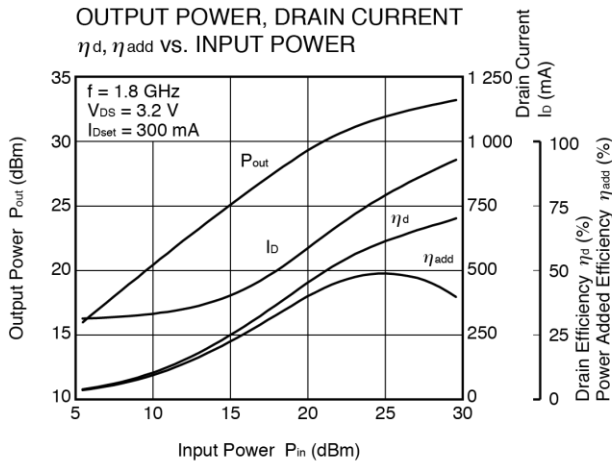
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Gate to Source Leak Current	I <sub>GSS</sub>	V <sub>GS</sub> = 5.0 V	-	-	100	nA
Drain to Source Leakage Current (Zero Gate Voltage Drain Current)	I <sub>DSS</sub>	V <sub>DS</sub> = 6.0 V	-	-	100	nA
Gate Threshold Voltage	V <sub>th</sub>	V <sub>DS</sub> = 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	-	-	8	°C/W
Transconductance	G <sub>m</sub>	V <sub>DS</sub> = 3.2 V, I <sub>D</sub> = 700 mA	-	1.3	-	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 = 1.8 GHz, V <sub>DS</sub> = 3.2 V,	30.5	32.0	-	dBm
Drain Current	I <sub>D</sub>	P <sub>in</sub> = 25 dBm,	-	800	-	mA
Power Added Efficiency	η <sub>add</sub>	I <sub>Dset</sub> = 700 mA (RF OFF), <b>Note1</b>	40	45	-	%
Linear Gain <sup>Note2</sup>	G <sub>L</sub>		-	10	-	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> = 5 dBm

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



**Remark** The graphs indicate nominal characteristics.

**S-PARAMETERS**

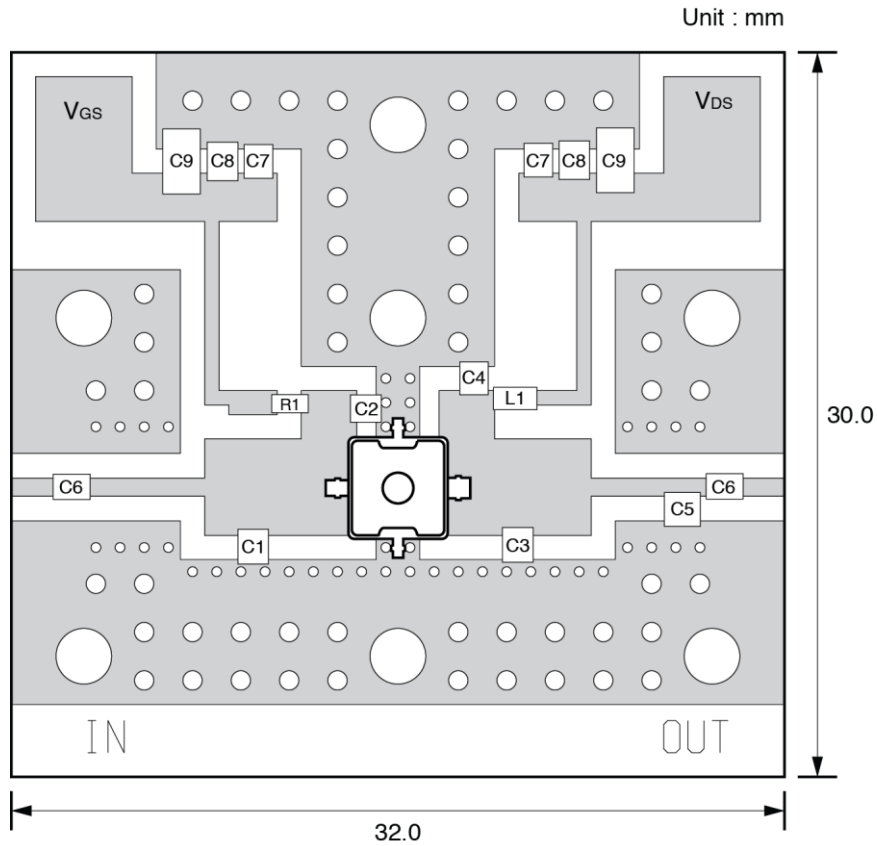
- S-parameters and noise parameters are provided on our Web site in a format (S2P) that enables the direct import of the parameters to microwave circuit simulators without the need for keyboard inputs.
- Click here to download S-parameters.
- [RF and Microwave] ® [Device Parameters]
- URL <http://www.necel.com/microwave/en/>

**LARGE SIGNAL IMPEDANCE ( $V_{DS} = 3.2\text{ V}$ ,  $I_D = 700\text{ mA}$ ,  $f = 1.8\text{ GHz}$ )**

f (GHz)	$Z_{in}$ ( $\Omega$ )	$Z_{OL}$ ( $\Omega$ ) <sup>Note</sup>
1.8	1.77 -j6.71	1.25 -j5.73

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

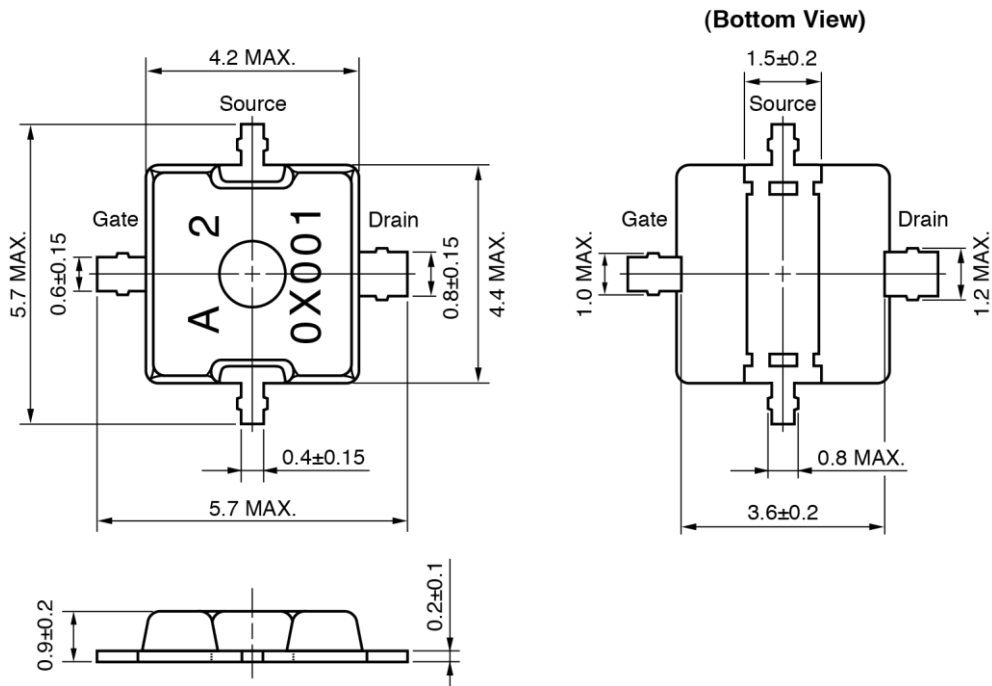
**EVALUATION BOARD FOR 1.8 GHz**



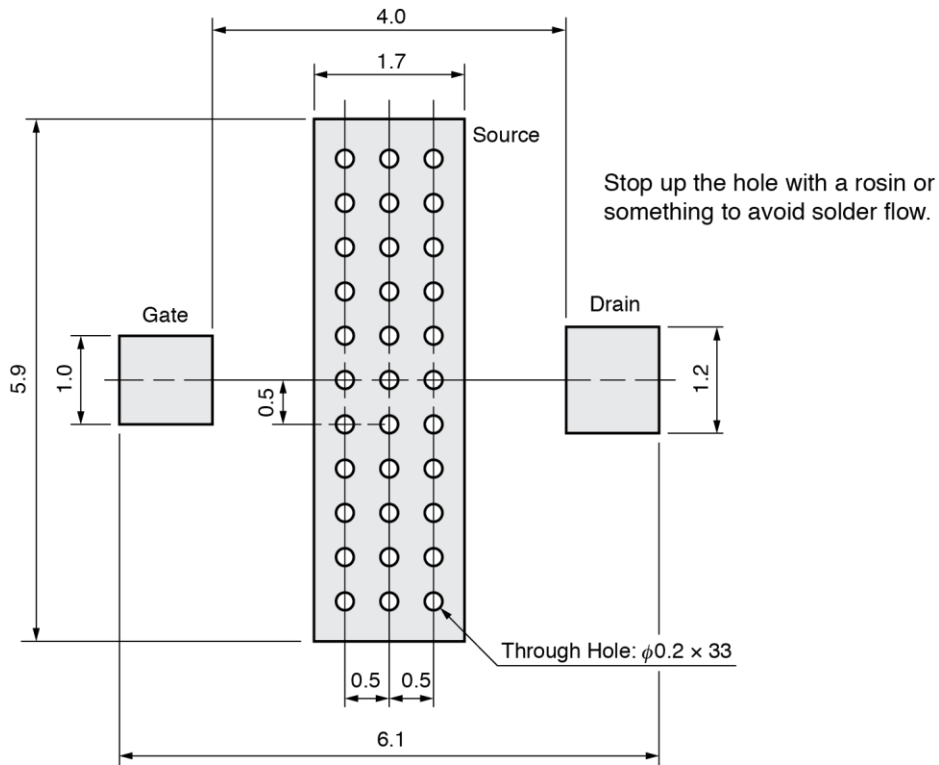
Symbol	Value	Comment
C1, C3	4.7 pF	
C2	2.4 pF	
C4	2.2 pF	
C5	0.8 pF	
C6	10 pF	
C7	1 000 pF	
C8	0.22 $\mu$ F	
C9	3.3 $\mu$ F - 16V	
R1	1 000 $\Omega$	
L1	22 nH	
Circuit Board	t = 0.4 mm, $\epsilon$ r = 4.5	R4775

PACKAGE DIMENSIONS

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).**