

NEC

3.5 V OPERATION SILICON RF POWER MOSFET FOR 1.9 GHz TRANSMISSION AMPLIFIERS

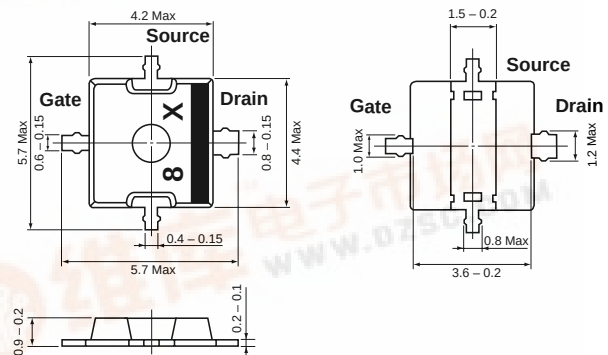
NE5510179A

FEATURES

- **HIGH OUTPUT POWER:** 29.5 dBm TYP
 $V_{DS} = 3.5\text{ V}$, $I_{DQ} = 200\text{ mA}$, $f = 1.9\text{ GHz}$, $P_{IN} = 22\text{ dBm}$
- **HIGH LINEAR GAIN:** 11 dB TYP
 $V_{DS} = 3.5\text{ V}$, $I_{DQ} = 200\text{ mA}$, $f = 1.9\text{ GHz}$, $P_{IN} = 5\text{ dBm}$
- **HIGH POWER ADDED EFFICIENCY:** 50% TYP
 $V_{DS} = 3.5\text{ V}$, $I_{DQ} = 200\text{ mA}$, $f = 1.9\text{ GHz}$, $P_{IN} = 22\text{ dBm}$
- **SINGLE SUPPLY:** 2.8 to 6.0 V
- **SURFACE MOUNT PACKAGE:** 5.7x5.7x1.1 mm MAX

OUTLINE DIMENSIONS (Units in mm)

PACKAGE OUTLINE 79A



DESCRIPTION

The NE5510179A is an N-Channel silicon power MOSFET specially designed as the transmission driver amplifier for 3.5 V GSM1800 and GSM 1900 handsets. Dies are manufactured using NEC's NEWMOS technology (NEC's $0.6\text{ }\mu\text{m}$ WSi gate lateral MOSFET) and housed in a surface mount package. This device can deliver 29.5 dBm output power with 50% power added efficiency at 1.9 GHz under the 3.5 V supply voltage, or can deliver 29 dBm output power at 2.8 V by varying the gate voltage as a power control function.

APPLICATIONS

- **DIGITAL CELLULAR PHONES:**
3.5 V GSM 1800/GSM 1900 Class 1 Handsets
- **OTHERS:**
1.6 - 2.0 GHz TDMA Applications

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

PART NUMBER PACKAGE OUTLINE			NE5510179A 79A			TEST CONDITIONS
SYMBOLS	CHARACTERISTICS	UNITS	MIN	TYP	MAX	
I_{GSS}	Gate-to-Source Leakage Current	nA			100	$V_{GSS} = 6.0\text{ V}$
I_{DSS}	Drain-to-Source Leakage Current	nA			100	$V_{DSS} = 8.5\text{ V}$
V_{TH}	Gate Threshold Voltage	V	1.0	1.35	2.0	$V_{DS} = 3.5\text{ V}$, $I_{DS} = 1\text{ mA}$
gm	Transconductance	S		0.82		$V_{DS} = 3.5\text{ V}$, $I_{DS1} = 300\text{ mA}$, $I_{DS2} = 500\text{ mA}$
RDS (ON)	Drain-to-Source On Resistance			0.5		$V_{GS} = 6.0\text{ V}$, $V_{DS} = 0.5\text{ V}$
BVDSS	Drain-to-Source Breakdown Voltage	V	20	24		$I_{DSS} = 10\text{ A}$

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ABSOLUTE MAXIMUM RATINGS¹ (T_A = 25 °C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V _{DS}	Drain Supply Voltage	V	8.5
V _{GS}	Gate Supply Voltage	V	6
I _D	Drain Current (continuous)		A0.5
I _D	Drain Current (Pulse Test) ²	A	1.0
P _{IN}	Input Power ³	dBm	27
P _T	Total Power Dissipation	W	1.6
T _{CH}	Channel Temperature	°C	125
T _{STG}	Storage Temperature	°C	-55 to +125

- Note:
1. Operation in excess of any one of these parameters may result in permanent damage.
 2. Duty Cycle 50%, Ton = 1ms.
 3. Freq = 1.9 GHz, V_{DS} = 3.5 V.

RECOMMENDED OPERATING CONDITIONS

SYMBOLS	PARAMETERS	UNITS	TYP	MAX
V _{DS}	Drain to Supply Voltage	V	3.5	6.0
V _{GS}	Gate Supply Voltage	V	2.0	2.5
I _{DS}	Drain Current (Pulse Test) ¹	A	–	0.5
P _{IN}	Input Power ²	dBm	22	23
freq	Operating Frequency Range	GHz	–	2.0
T _{OP}	Operating Temperature	°C	25	85

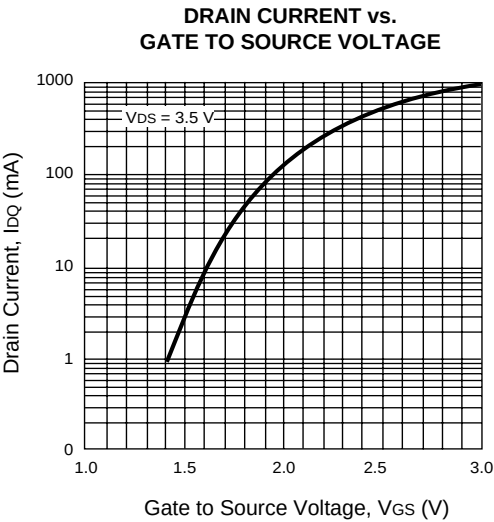
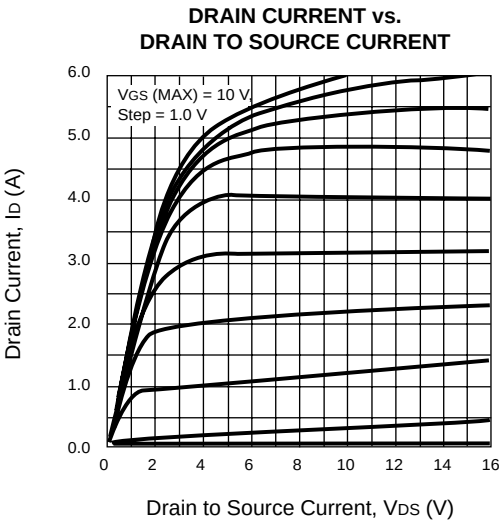
- Note:
1. Duty Cycle 50%, Ton = 1ms.
 2. Freq = 1.9 GHz, V_{DS} = 3.5 V.

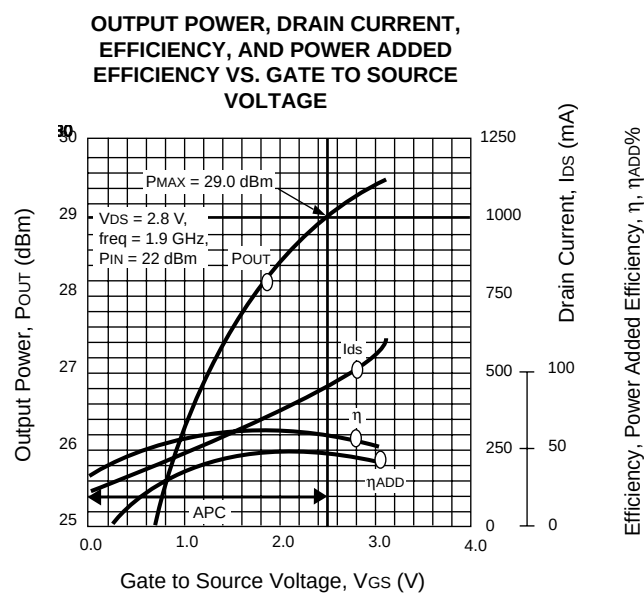
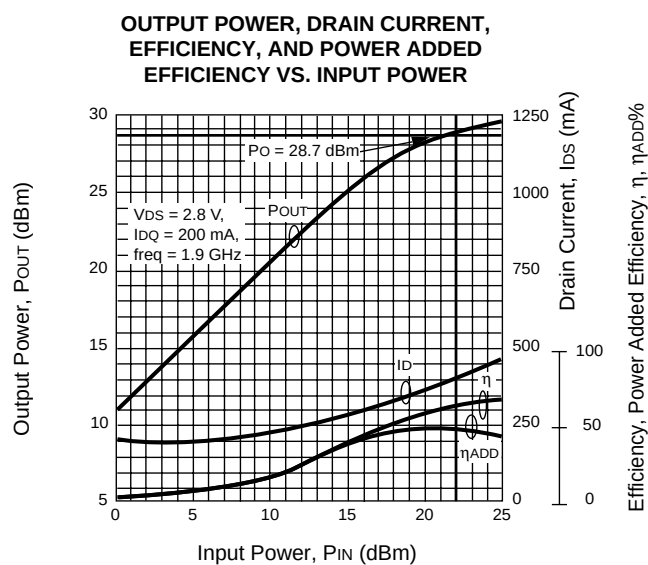
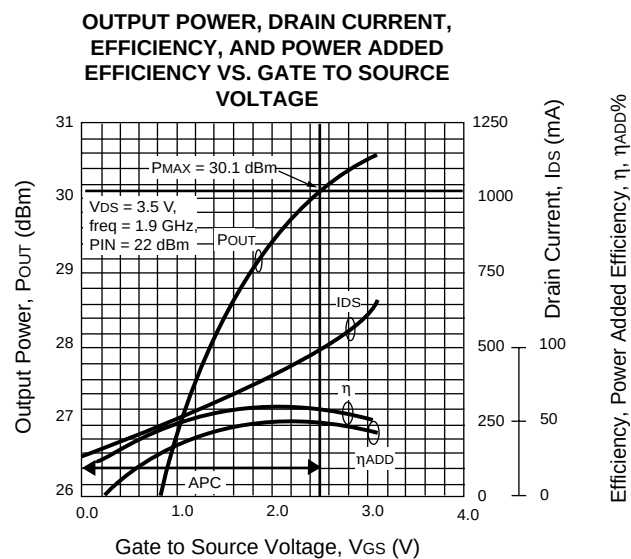
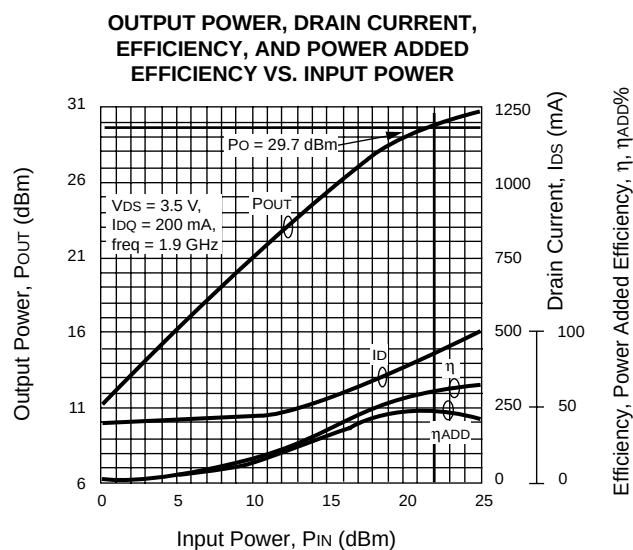
ORDERING INFORMATION¹

PART NUMBER	QTY
NE5510179A-T1	1 K/Reel

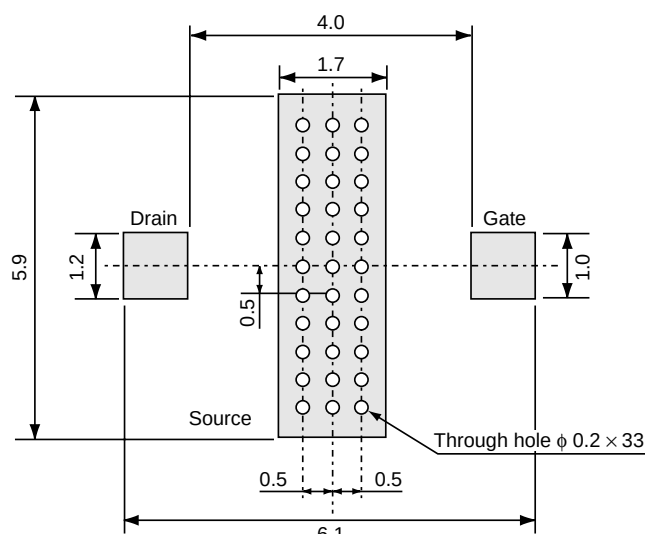
- Note:
1. Embossed tape 12 mm wide. Gate pin face to perforations side of the tape.

TYPICAL PERFORMANCE CURVES (T_A = 25°C)





P.C.B. LAYOUT¹ (Units in mm)



Note:

1. Use rosin or other material to prevent solder from penetrating through-holes.

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TYPICAL SCATTERING PARAMETERS¹ (T_A = 25°C)

Note:

1. This file and many other s-parameter files can be downloaded from www.cel.com

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V_{DS} = 3.5 V, I_{DS} = 200 mA

FREQUENCY		S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG ¹
GHz		MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		(dB)
0.10		0.83	-121.10	13.84	111.30	0.03	23.50	0.65	-154.00	-0.13	26.50
0.20		0.80	-148.10	7.49	93.60	0.03	6.70	0.71	-164.80	-0.12	23.60
0.30		0.80	-158.20	4.96	84.60	0.03	-2.60	0.74	-168.50	-0.04	21.80
0.40		0.81	-163.40	3.67	77.10	0.03	-8.30	0.75	-170.50	0.07	20.60
0.50		0.82	-166.80	2.90	71.20	0.03	-13.30	0.77	-171.60	0.10	19.60
0.60		0.82	-169.40	2.32	66.20	0.02	-17.20	0.79	-172.70	0.24	19.00
0.70		0.83	-171.40	1.96	61.70	0.02	-18.30	0.80	-173.40	0.34	18.60
0.80		0.85	-173.40	1.63	57.30	0.02	-22.70	0.81	-174.60	0.38	18.00
0.90		0.85	-175.00	1.43	52.60	0.02	-24.60	0.83	-175.50	0.50	17.80
1.00		0.86	-176.70	1.23	50.30	0.02	-24.60	0.84	-176.70	0.59	17.30
1.10		0.87	-178.40	1.10	46.20	0.02	-29.30	0.85	-177.50	0.61	17.20
1.20		0.88	180.00	0.96	44.30	0.01	-27.90	0.86	-178.90	0.83	17.00
1.30		0.88	178.00	0.86	39.90	0.01	-28.10	0.87	179.80	0.90	16.80
1.40		0.89	176.50	0.78	38.10	0.01	-29.10	0.88	178.40	0.91	16.60
1.50		0.89	174.90	0.71	34.20	0.01	-31.70	0.88	177.60	0.89	16.20
1.60		0.90	172.90	0.65	33.30	0.01	-35.20	0.89	175.80	1.27	13.50
1.70		0.90	170.90	0.57	29.90	0.01	-28.20	0.89	174.70	1.75	11.40
1.80		0.91	169.30	0.54	27.10	0.01	-23.90	0.90	172.50	1.66	12.20
1.90		0.90	167.00	0.49	24.40	0.01	-23.00	0.90	171.20	2.29	10.50
2.00		0.91	165.10	0.47	23.80	0.01	-15.10	0.91	169.50	1.98	11.10
2.10		0.91	162.20	0.42	20.50	0.00	-3.70	0.90	167.80	4.25	8.60
2.20		0.91	160.80	0.39	19.10	0.00	-4.10	0.91	166.00	4.63	8.50
2.30		0.92	158.30	0.35	15.20	0.00	6.00	0.92	163.50	4.77	7.90
2.40		0.91	156.10	0.35	13.40	0.00	13.90	0.92	162.00	3.34	8.30
2.50		0.91	153.50	0.31	13.00	0.00	15.10	0.92	160.60	5.26	7.00
2.60		0.92	151.50	0.30	12.20	0.00	31.80	0.92	157.90	4.70	6.60
2.70		0.91	149.10	0.26	9.50	0.00	45.00	0.91	155.70	5.87	5.00
2.80		0.92	147.10	0.27	4.80	0.01	48.10	0.94	153.50	2.45	7.60
2.90		0.92	145.00	0.24	6.40	0.00	62.00	0.92	152.40	4.02	5.30
3.00		0.92	142.90	0.24	4.80	0.01	57.70	0.93	150.20	2.75	6.60

Note:

1. Gain Calculation:

$$\text{MAG} = \frac{|S_{21}|}{|S_{12}|} \left(K - \sqrt{K^2 - 1} \right). \text{ When } K \leq 1, \text{ MAG is undefined and MSG values are used. } \text{MSG} = \frac{|S_{21}|}{|S_{12}|}, K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2 |S_{12} S_{21}|}, \Delta = S_{11} S_{22} - S_{21} S_{12}$$

MAG = Maximum Available Gain

MSG = Maximum Stable Gain