

NE5550779A

R09DS0040EJ0300

Rev.3.00

Mar 12, 2013

Silicon Power LDMOS FET

FEATURES

- High Output Power : $P_{out} = 38.5$ dBm TYP. ($V_{DS} = 7.5$ V, $I_{Dset} = 140$ mA, $f = 460$ MHz, $P_{in} = 25$ dBm)
- High power added efficiency : $\eta_{add} = 66\%$ TYP. ($V_{DS} = 7.5$ V, $I_{Dset} = 140$ mA, $f = 460$ MHz, $P_{in} = 25$ dBm)
- High Linear gain : $G_L = 22.0$ dB TYP. ($V_{DS} = 7.5$ V, $I_{Dset} = 140$ mA, $f = 460$ MHz, $P_{in} = 10$ dBm)
- High ESD tolerance
- Suitable for VHF to UHF-BAND Class-AB power amplifier.

APPLICATIONS

- 150 MHz Band Radio System
- 460 MHz Band Radio System
- 900 MHz Band Radio System

ORDERING INFORMATION

Part Number	Order Number	Package	Marking	Supplying Form
NE5550779A	NE5550779A-A	79A (Pb-Free)	W8	<ul style="list-style-type: none"> • 12 mm wide embossed taping • Gate pin faces the perforation side of the tape
NE5550779A-T1	NE5550779A-T1-A			<ul style="list-style-type: none"> • 12 mm wide embossed taping • Gate pin faces the perforation side of the tape • Qty 1 kpcs/reel
NE5550779A-T1A	NE5550779A-T1A-A			<ul style="list-style-type: none"> • 12 mm wide embossed taping • Gate pin faces the perforation side of the tape • Qty 5 kpcs/reel

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

Part number for sample order: NE5550779A

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

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

Parameter	Symbol	Ratings	Unit
Drain to Source Voltage	V_{DS}	30	V
Gate to Source Voltage	V_{GS}	6.0	V
Drain Current	I_{DS}	2.1	A
Drain Current (50% Duty Pulsed)	$I_{DS-pulse}$	4.2	A
Total Power Dissipation ^{Note}	P_{tot}	17.8	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

Note: Value at $T_C = 25^\circ\text{C}$

CAUTION

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

The mark <R> shows major revised points.

The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

RECOMMENDED OPERATING RANGE ($T_A = 25^\circ\text{C}$)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Drain to Source Voltage	V_{DS}		–	7.5	9.0	V
Gate to Source Voltage	V_{GS}		1.65	2.20	2.85	V
Drain Current	I_{DS}		–	1.4	–	A
Input Power	P_{in}	$f = 460 \text{ MHz}, V_{DS} = 7.5 \text{ V}$	–	25	30	dBm

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
DC Characteristics						
Gate to Source Leakage Current	I_{GSS}	$V_{GS} = 6.0 \text{ V}$	–	–	100	nA
Drain to Source Leakage Current (Zero Gate Voltage Drain Current)	I_{DSS}	$V_{DS} = 25 \text{ V}$	–	–	10	μA
Gate Threshold Voltage	V_{th}	$V_{DS} = 7.5 \text{ V}, I_{DS} = 1.0 \text{ mA}$	1.15	1.65	2.25	V
Drain to Source Breakdown Voltage	BV_{DSS}	$I_{DS} = 10 \mu\text{A}$	25	38	–	V
Transconductance	G_m	$V_{DS} = 7.5 \text{ V}, I_{DS} = 490 \pm 70 \text{ mA}$	1.26	1.54	2.03	S
Thermal Resistance	R_{th}	Channel to Case	–	7.0	–	$^\circ\text{C/W}$
RF Characteristics						
Output Power	P_{out}	$f = 460 \text{ MHz}, V_{DS} = 7.5 \text{ V},$ $P_{in} = 25 \text{ dBm},$ $I_{Dset} = 140 \text{ mA (RF OFF)}$	37.0	38.5	–	dBm
Drain Current	I_{DS}		–	1.38	–	A
Power Drain Efficiency	η_d		–	68	–	%
Power Added Efficiency	η_{add}		–	66	–	%
Linear Gain	$G_L^{\text{Note 1}}$		–	22.0	–	dB
Load VSWR Tolerance	Note 2	$f = 460 \text{ MHz}, V_{DS} = 9.0 \text{ V},$ $P_{in} = 25 \text{ dBm},$ $I_{Dset} = 140 \text{ mA (RF OFF)}$ Load VSWR=20:1(All Phase)	No Destroy			
Output Power	P_{out}	$f = 157 \text{ MHz}, V_{DS} = 7.5 \text{ V},$ $P_{in} = 23 \text{ dBm},$ $I_{Dset} = 140 \text{ mA (RF OFF)}$	–	38.5	–	dBm
Drain Current	I_{DS}		–	1.36	–	A
Power Drain Efficiency	η_d		–	69	–	%
Power Added Efficiency	η_{add}		–	67	–	%
Linear Gain	$G_L^{\text{Note 3}}$		–	24.0	–	dB
Output Power	P_{out}	$f = 900 \text{ MHz}, V_{DS} = 7.5 \text{ V},$ $P_{in} = 27 \text{ dBm},$ $I_{Dset} = 140 \text{ mA (RF OFF)}$	–	37.4	–	dBm
Drain Current	I_{DS}		–	1.26	–	A
Power Drain Efficiency	η_d		–	58	–	%
Power Added Efficiency	η_{add}		–	53	–	%
Linear Gain	$G_L^{\text{Note 4}}$		–	17.0	–	dB

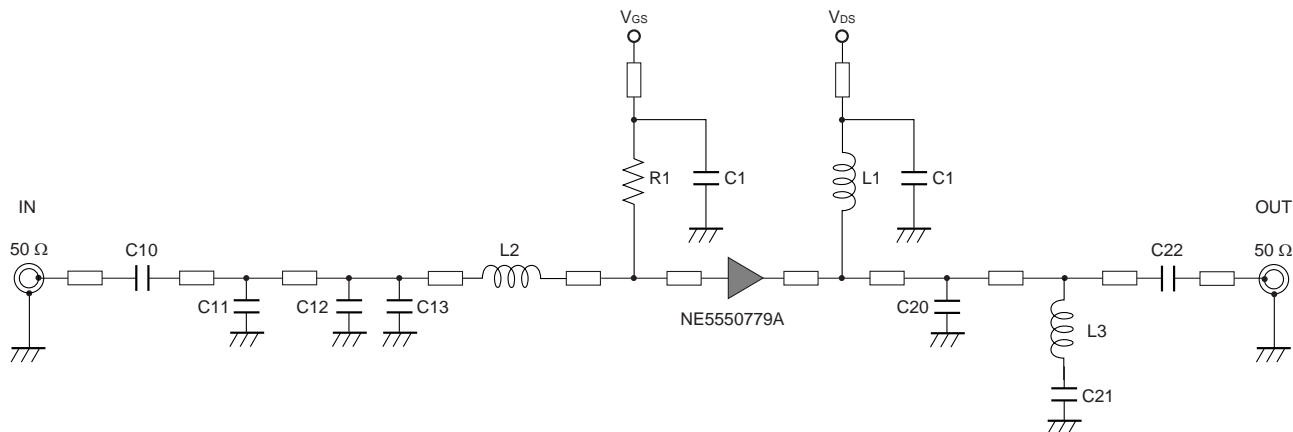
Notes: 1. $P_{in} = 10 \text{ dBm}$

2. These characteristics values are measurement using measurement tools especially by RENESAS.

3. $P_{in} = 5 \text{ dBm}$ 4. $P_{in} = 10 \text{ dBm}$ **Remark** DC performance is 100% testing. RF performance is testing several samples per wafer.

A wafer rejection criterion for standard devices is 1 reject for several samples.

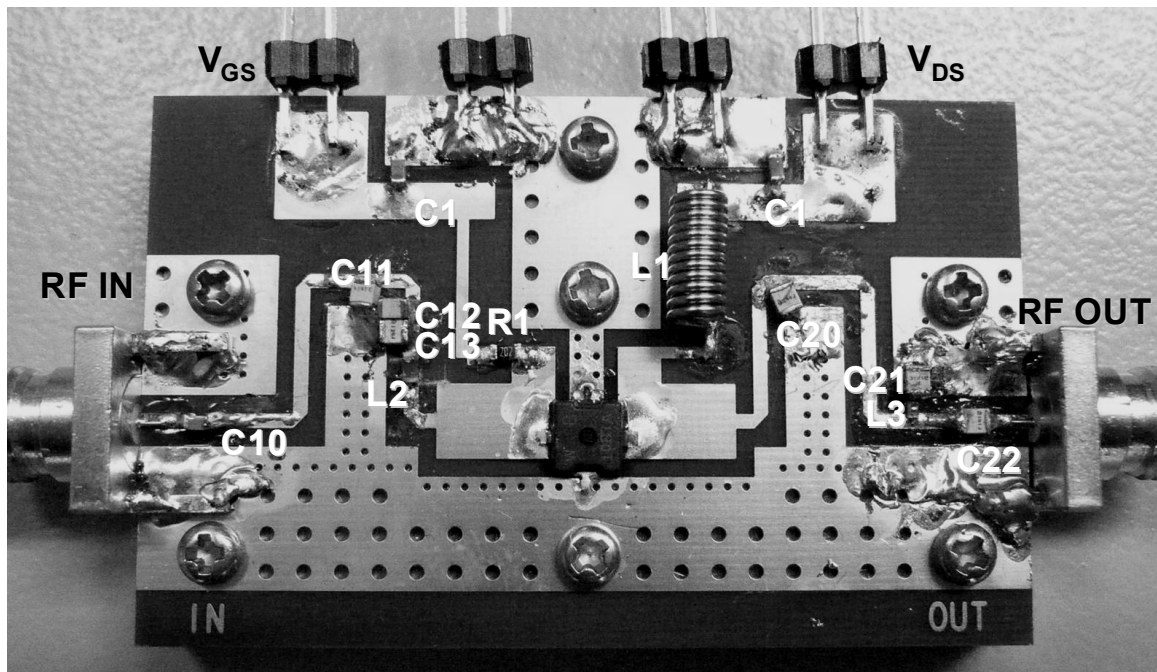
TEST CIRCUIT SCHEMATIC FOR 460 MHz



COMPONENTS OF TEST CIRCUIT FOR MEASURING ELECTRICAL CHARACTERISTICS

Symbol	Value	Type	Maker
C1	1 μ F	GRM188B31C105KA92	Murata
C10	27 pF	GRM1882C1H270JA01	Murata
C11	2.7 pF	ATC100A2R7JW	American Technical Ceramics
C12	12 pF	ATC100A120BW	American Technical Ceramics
C13	12 pF	ATC100A120BW	American Technical Ceramics
C20	24 pF	ATC100A240JW	American Technical Ceramics
C21	6.8 pF	ATC100A6R8BW	American Technical Ceramics
C22	100 pF	ATC100A101JW	American Technical Ceramics
R1	2 k Ω	1/10 W Chip Resistor RK73B1JTTD202J	KOA
L1	114 nH	ϕ 0.5 mm, ϕ D = 3 mm, 10 Turns	Ohesangyou
L2	4.7 nH	LQW18AN4R7NG00	Murata
L3	3.0 nH	LQP15MN3N0B02	Murata
<R> PCB	-	R1766, t = 0.4 mm, ϵ r = 4.5, size = 30 \times 48 mm	Panasonic
SMA Connector	-	WAKA 01K0790-20	WAKA

COMPONENT LAYOUT OF TEST CIRCUIT FOR 460 MHz

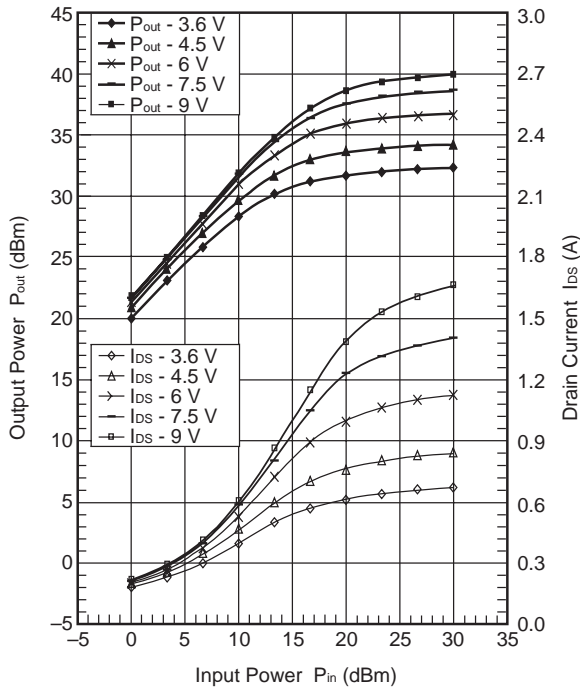


TYPICAL CHARACTERISTICS 1 (T_A = 25°C)

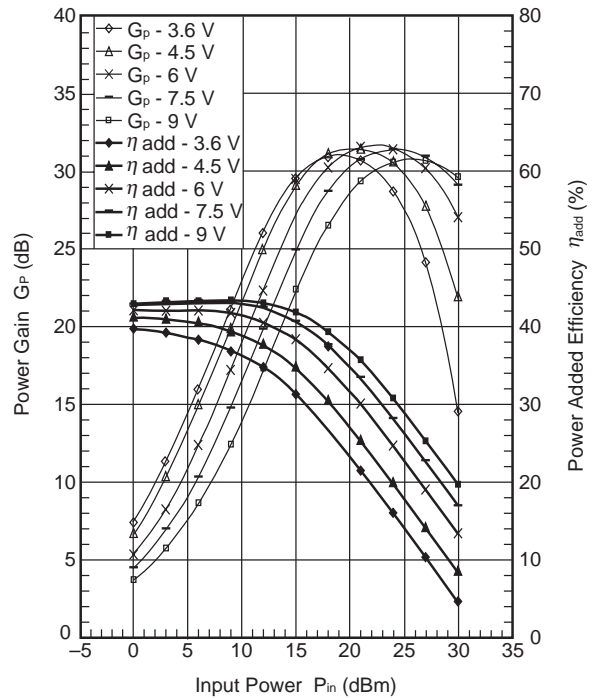
R: f = 460MHz, V_{DS} = 3.6/4.5/6/7.5/9 V, I_{Dset} = 140 mA, P_{in} = 0 to 30 dBm

IM: f₁ = 460MHz, f₂ = 461 MHz, V_{DS} = 3.6/4.5/6/7.5/9 V, I_{Dset} = 140mA, P_{out} (2 tone) = 12 to 37 dBm

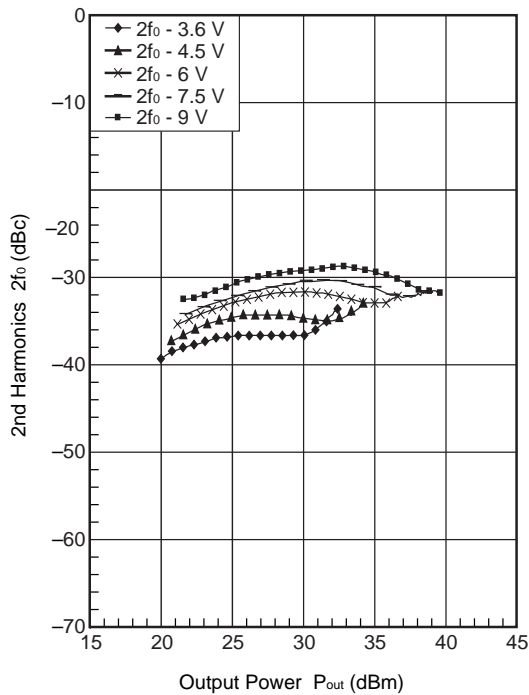
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER



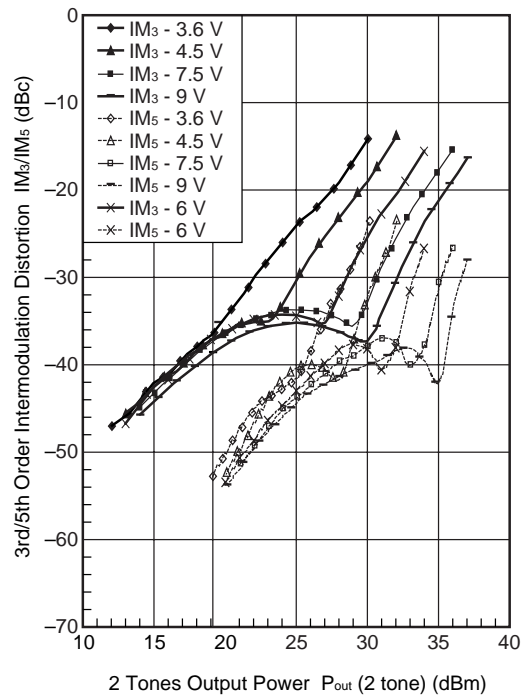
POWER GAIN, POWER ADDED EFFICIENCY vs. INPUT POWER



2f₀ vs. OUTPUT POWER

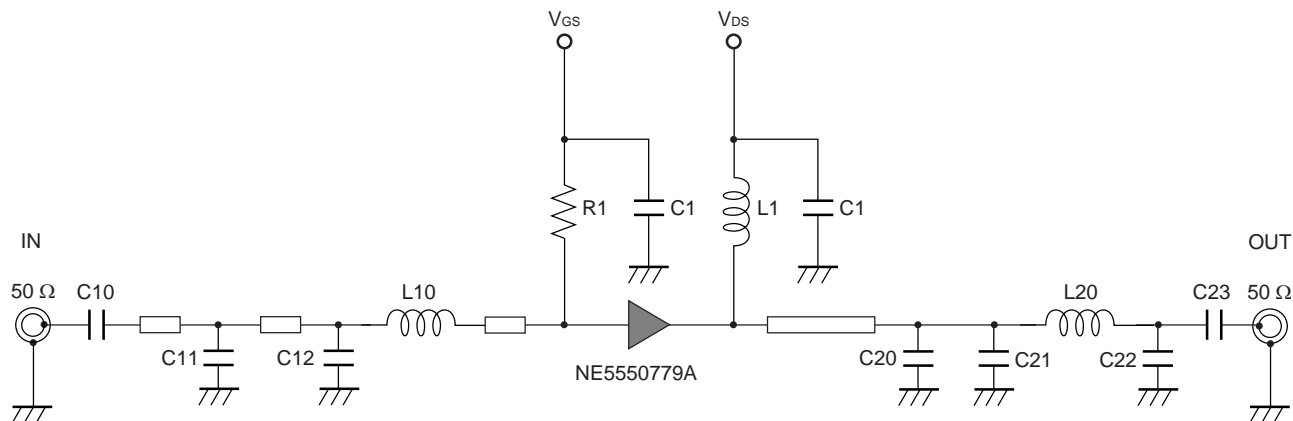


IM₃/IM₅ vs. 2 TONES OUTPUT POWER



Remark The graphs indicate nominal characteristics.

TEST CIRCUIT SCHEMATIC FOR 157 MHz

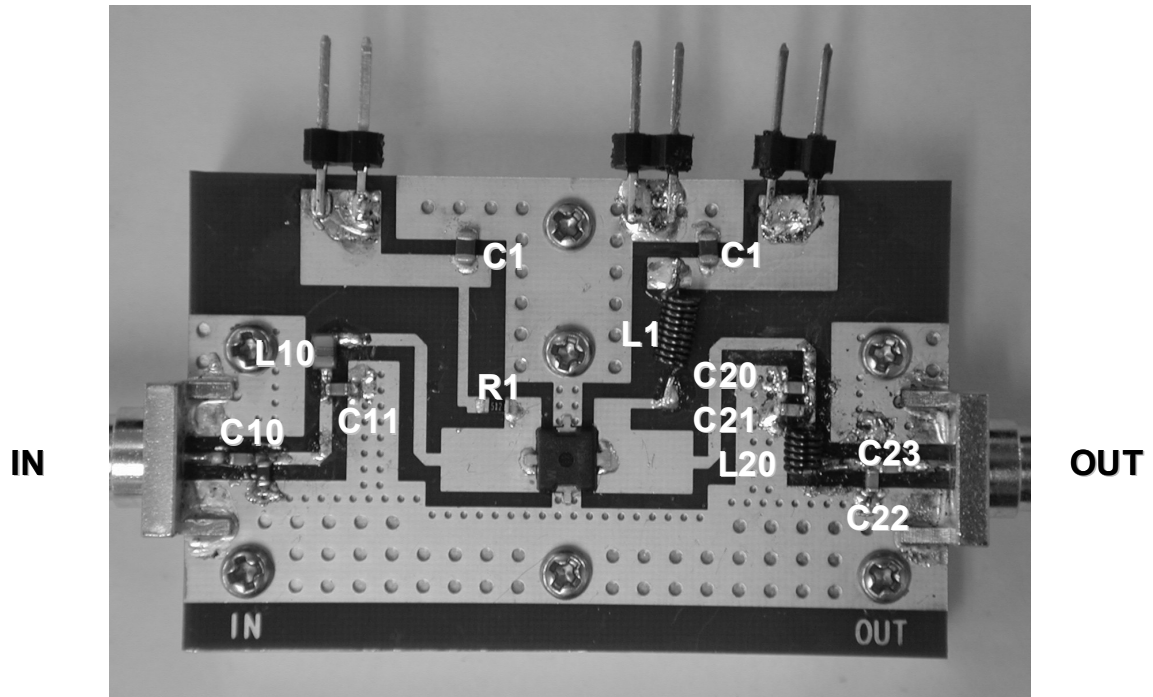


COMPONENTS OF TEST CIRCUIT FOR MEASURING ELECTRICAL CHARACTERISTICS

Symbol	Value	Type	Maker
C1	1 μ F	GRM31MB11E105KA01	Murata
C10	100 pF	GQM1882C1H101JB01	Murata
C11	5.6 pF	GQM1882C2A5R6DB01	Murata
C12	39 pF	GQM1882C1H390JB01	Murata
C20	22 pF	GRM1882C1H220JA01	Murata
C21	68 pF	GQM1882C1H680JB01	Murata
C22	15 pF	GQM1882C1H150JA01	Murata
C23	100 pF	GQM1882C1H101JB01	Murata
R1	5.1 k Ω	1/10 W Chip Resistor MCR03J103	ROAM
L1	74.7 nH	ϕ 0.4 mm, ϕ D = 2 mm, 10 Turns	Ohesangyou
L10	27 nH	LLQ2012-F27N	Toko
L20	29.8 nH	ϕ 0.4 mm, ϕ D = 2 mm, 5 Turns	Ohesangyou
PCB	–	R1766, t = 0.4 mm, ϵ = 4.5, size = 30 \times 48 mm	Panasonic
SMA Connector	–	WAKA 01K0790-20	WAKA

<R>

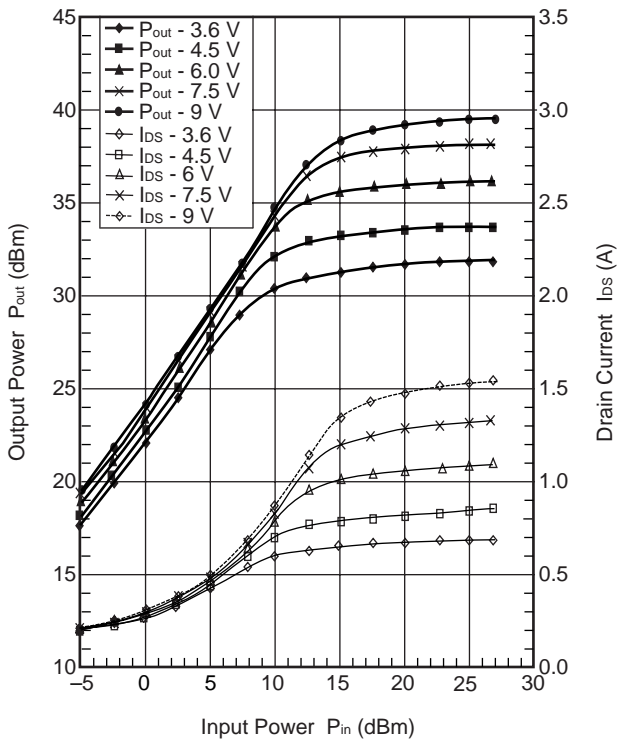
COMPONENT LAYOUT OF TEST CIRCUIT FOR 157 MHz



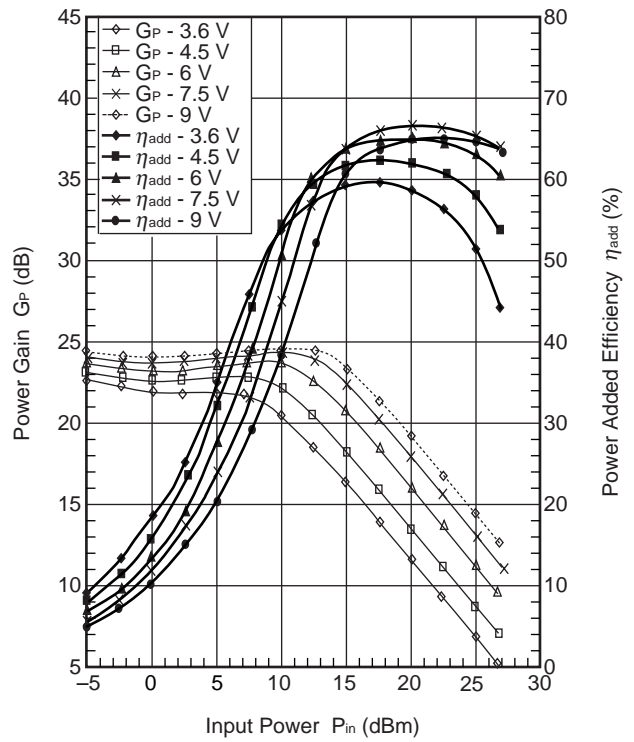
TYPICAL CHARACTERISTICS 2 (T_A = 25°C)

RF: f = 157 MHz, V_{DS} = 3.6/4.5/6/7.5/9 V, I_{Dset} = 40 mA, P_{in} = -10 to 20 dBm

OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER

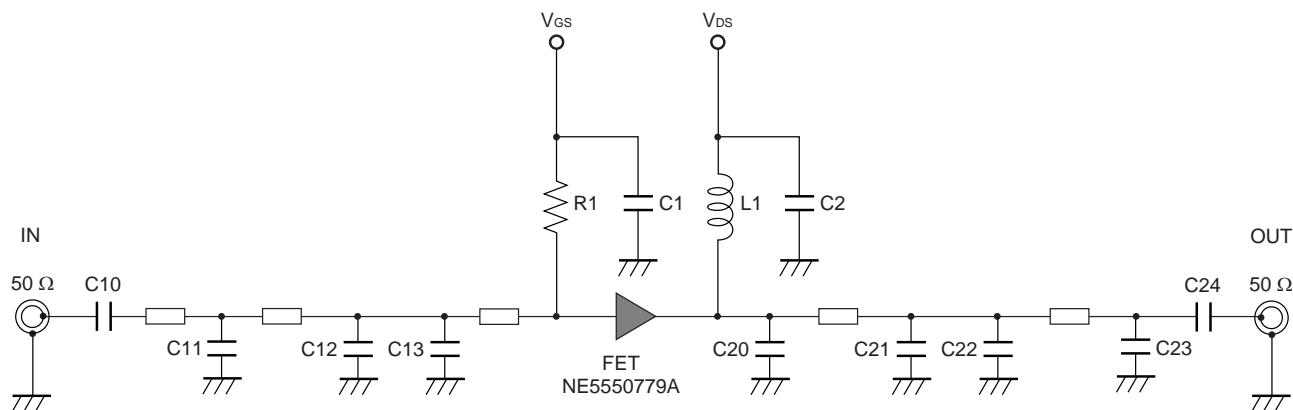


POWER GAIN, POWER ADDED EFFICIENCY vs. INPUT POWER



Remark The graphs indicate nominal characteristics.

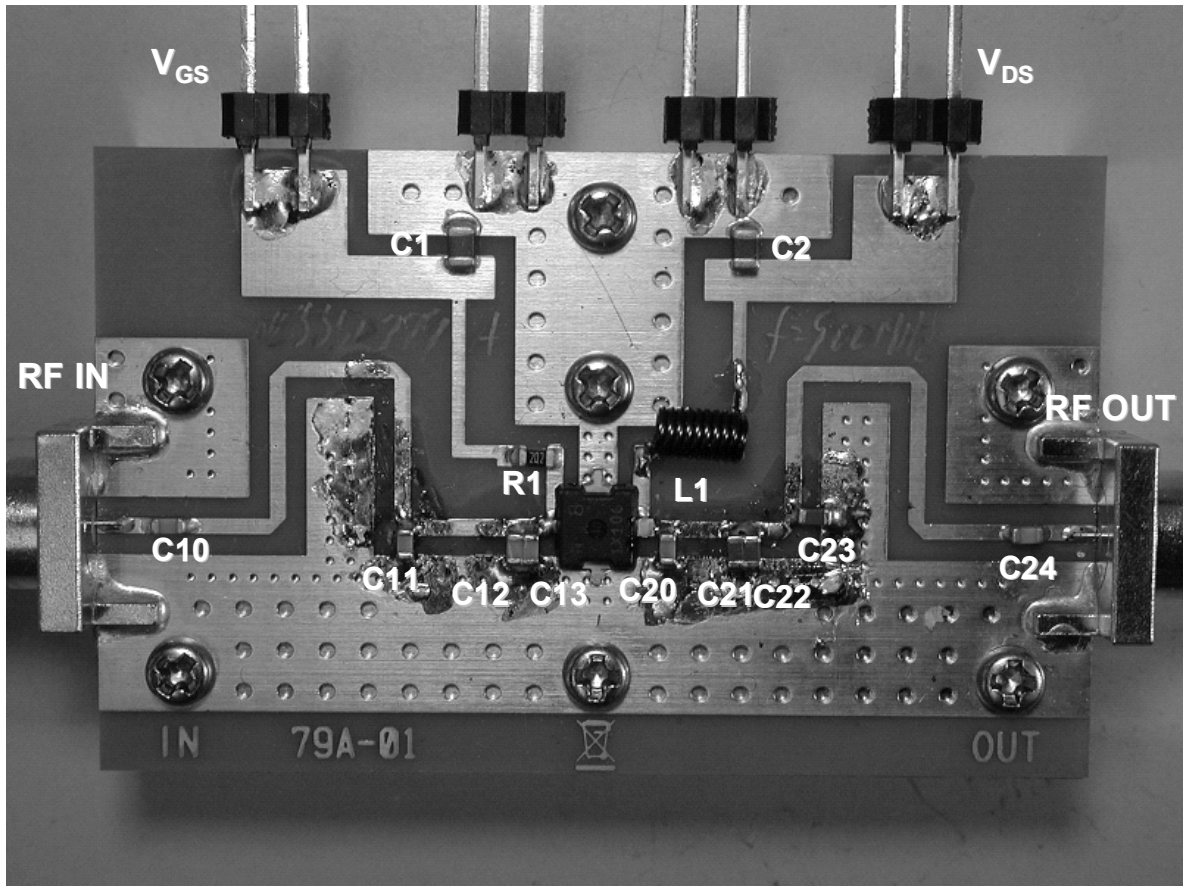
TEST CIRCUIT SCHEMATIC FOR 900 MHz



COMPONENTS OF TEST CIRCUIT FOR MEASURING ELECTRICAL CHARACTERISTICS

Symbol	Value	Type	Maker
C10	27 pF	GQM1882C1H270JB01	Murata
C11	6.8 pF	GQM1882C2A6R8DB01	Murata
C12	15 pF	GQM1882C1H150JB01	Murata
C13	18 pF	GQM1882C1H180JB01	Murata
C20	8.2 pF	GQM1882C1H8R2DB01	Murata
C21	3.9 pF	GQM1883C2A3R9CB01	Murata
C22	1.5 pF	GQM1884C2A1R5CB01	Murata
C23	8.2 pF	GQM1882C1H8R2DB01	Murata
C24	100 pF	GQM1882C1H101JB01	Murata
C1	1 μ F	GRM21BB31H105KA2L	Murata
C2	1 μ F	GRM21BB31H105KA2L	Murata
L1	74.7 nH	D20-74N7	Ohesangyou
R1	20 k Ω	MCR03J203	Rohm
<R> PCB	–	R1766, t = 0.8 mm, ϵ = 4.8, size = 30 × 40 mm	Panasonic
SMA Connector	–	WAKA 01K0790-20	WAKA

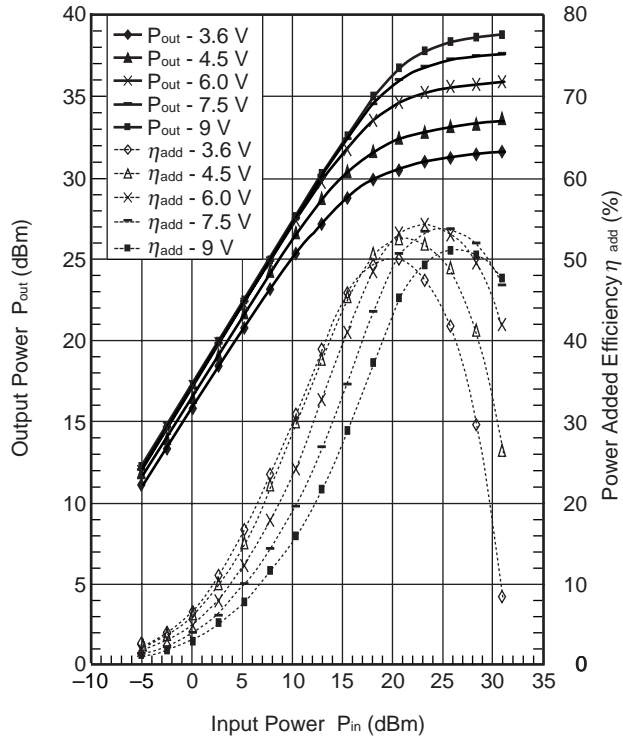
COMPONENT LAYOUT OF TEST CIRCUIT FOR 900 MHz



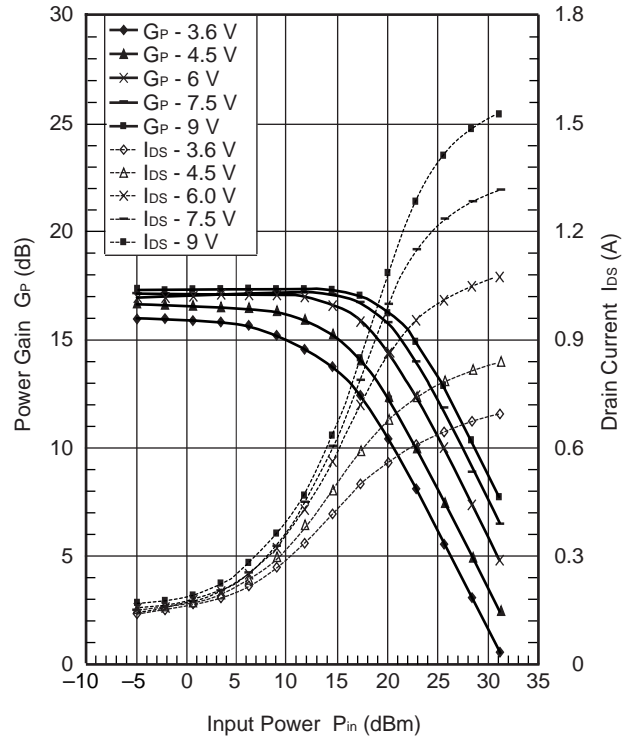
TYPICAL CHARACTERISTICS 3 ($T_A = 25^\circ\text{C}$)

RF: $f = 900\text{ MHz}$, $V_{DS} = 3.6/4.5/6/7.5/9\text{ V}$, $I_{Dset} = 40\text{ mA}$, $P_{in} = -5\text{ to }30\text{ dBm}$

OUTPUT POWER, POWER ADDED EFFICIENCY vs. INPUT POWER



POWER GAIN, DRAIN CURRENT vs. INPUT POWER



Remark The graphs indicate nominal characteristics.

S-PARAMETERS

S-parameters and noise parameters are provided on our web site in a form (S2P) that enables direct import of the parameters to microwave circuit simulators without the need for keyboard inputs.

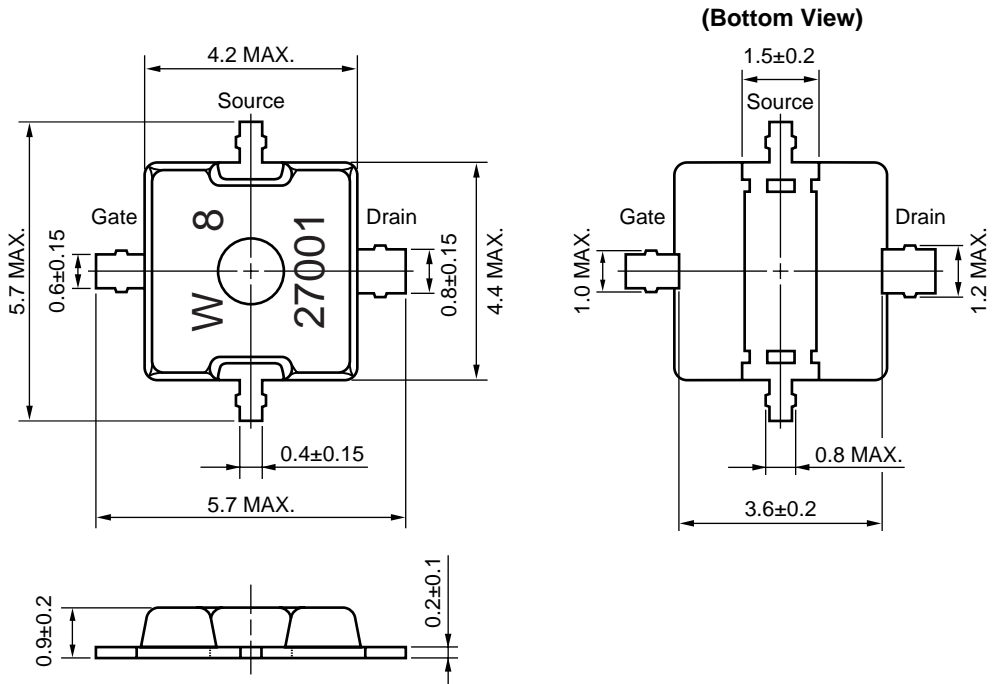
Click here to download S-parameters.

[Products] → [RF Devices] → [Device Parameters]

URL <http://www.renesas.com/products/microwave/>

PACKAGE DIMENSIONS

79A (UNIT: mm)



Revision History**NE5550779A Data Sheet**

Rev.	Date	Description	
		Page	Summary
1.00	Apr 26, 2012	–	First edition issued
2.00	Jul 04, 2012	p.2	Modification of ELECTRICAL CHARACTERISTICS
		p.6	Modification of COMPONENTS OF TEST CIRCUIT FOR MEASURING ELECTRICAL CHARACTERISTICS
3.00	Mar 12, 2013	P3	Modification of COMPONENTS OF TEST CIRCUIT FOR MEASURING ELECTRICAL CHARACTERISTICS
		P6	Modification of COMPONENTS OF TEST CIRCUIT FOR MEASURING ELECTRICAL CHARACTERISTICS
		P9	Modification of COMPONENTS OF TEST CIRCUIT FOR MEASURING ELECTRICAL CHARACTERISTICS

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