NE5550979A

Silicon Power LDMOS FET

R09DS0031EJ0300
Rev.3.00
Mar 12, 2013

FEATURES

- High Output Power : P_{out} = 39.5 dBm TYP. (V_{DS} = 7.5 V, I_{Dset} = 200 mA, f = 460 MHz, P_{in} = 25 dBm)
- High power added efficiency : η_{add} = 66% TYP. (V_{DS} = 7.5 V, I_{Dset} = 200 mA, f = 460 MHz, P_{in} = 25 dBm)
- High Linear gain : G_L = 22 dB TYP. (V_{DS} = 7.5 V, I_{Dset} = 200 mA, f = 460 MHz, P_{in} = 10 dBm)
- High ESD tolerance : ESD tolerance > 8 kV (IEC61000-4-2, Contact discharge)
- 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
NE5550979A	NE5550979A-A	79A (Pb Free)	W6	• 12 mm wide embossed taping • Gate pin faces the perforation side of the tape
NE5550979A-T1	NE5550979A-T1-A			• 12 mm wide embossed taping • Gate pin faces the perforation side of the tape • Qty 1 kpcs/reel
NE5550979A-T1A	NE5550979A-T1A-A			• 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: NE5550979A

ABSOLUTE MAXIMUM RATINGS (T_A = 25°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}	3.0	A
Total Power Dissipation Note	P_{tot}	25	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C

Note: Value at T_C = 25°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°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}		–	1.7	–	A
Input Power	P_{in}	f = 460 MHz, V_{DS} = 7.5 V	–	25	30	dBm

ELECTRICAL CHARACTERISTICS (T_A = 25°C, unless otherwise specified)

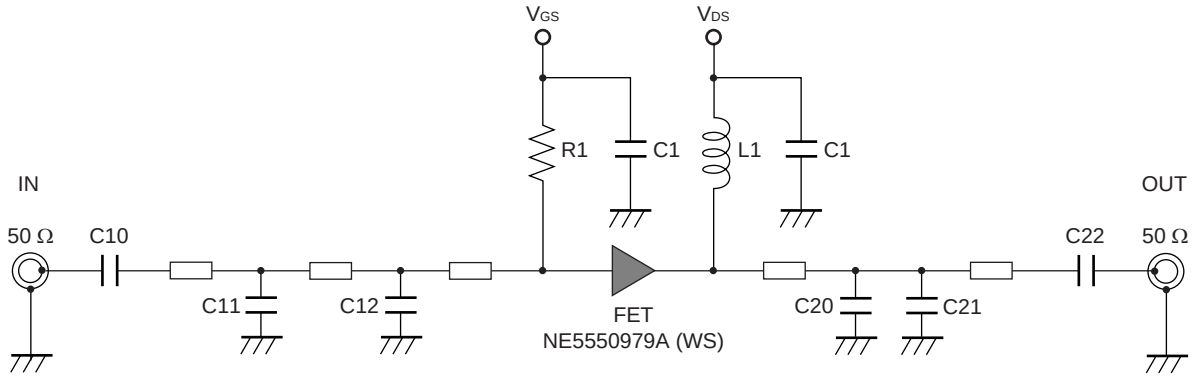
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
DC Characteristics						
Gate to Source Leakage Current	I_{GSS}	V_{GS} = 6.0 V	–	–	100	nA
Drain to Source Leakage Current (Zero Gate Voltage Drain Current)	I_{DSS}	V_{DS} = 25 V	–	–	10	μA
Gate Threshold Voltage	V_{th}	V_{DS} = 7.5 V, I_{DS} = 1.0 mA	1.15	1.65	2.25	V
Drain to Source Breakdown Voltage	BV_{DSS}	I_{DS} = 10 μA	25	37	–	V
Transconductance	G_m	V_{DS} = 7.5 V, I_{DS} = 700±100 mA	1.8	2.2	2.9	S
Thermal Resistance	R_{th}	Channel to Case	–	5.0	–	°C/W
RF Characteristics						
Output Power	P_{out}	f = 460 MHz, V_{DS} = 7.5 V,	38.5	39.5	–	dBm
Drain Current	I_{DS}	P_{in} = 25 dBm,	–	1.70	–	A
Power Drain Efficiency	η_d	I_{Dset} = 200 mA (RF OFF)	–	68	–	%
Power Added Efficiency	η_{add}		–	66	–	%
Linear Gain	G_L Note 1		–	22.0	–	dB
Output Power	P_{out}	f = 157 MHz, V_{DS} = 7.5 V,	–	39.6	–	dBm
Drain Current	I_{DS}	P_{in} = 23 dBm,	–	1.60	–	A
Power Drain Efficiency	η_d	I_{Dset} = 200 mA (RF OFF)	–	75	–	%
Power Added Efficiency	η_{add}		–	73	–	%
Linear Gain	G_L Note 2		–	25.0	–	dB
Output Power	P_{out}	f = 900 MHz, V_{DS} = 7.5 V,	–	38.6	–	dBm
Drain Current	I_{DS}	P_{in} = 27 dBm,	–	1.76	–	A
Power Drain Efficiency	η_d	I_{Dset} = 200 mA (RF OFF)	–	55	–	%
Power Added Efficiency	η_{add}		–	52	–	%
Linear Gain	G_L Note 1		–	16.0	–	dB

Note 1 : P_{in} = 10 dBm

Note 2 : P_{in} = 5 dBm

Remark 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.

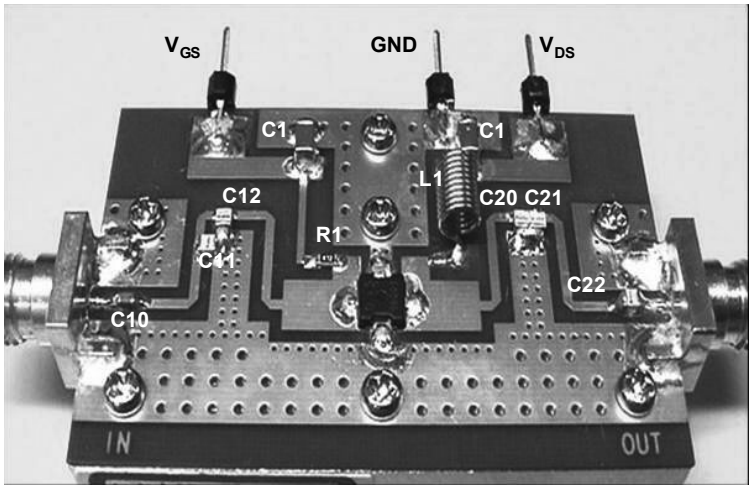
TEST CIRCUIT SCHEMATIC FOR 460 MHz



COMPONENTS OF TEST CIRCUIT FOR MEASURING ELECTRICAL CHARACTERISTICS

Symbol	Value	Type	Maker
C1	1 μF	GRM31CR72A105KA01B	Murata
C10	100 pF	GRM1882C1H101JA01	Murata
C11	24 pF	ATC100A240JW	American Technical Ceramics
C12	2.4 pF	ATC100A2R4BW	American Technical Ceramics
C20	27 pF	ATC100A270JW	American Technical Ceramics
C21	1.8 pF	ATC100A1R8BW	American Technical Ceramics
C22	100 pF	ATC100A101JW	American Technical Ceramics
R1	4.7 kΩ	1/10 W Chip Resistor SSM_RG1608PB472	SSM
L1	123 nH	ϕ0.5 mm, ϕD = 3 mm, 10 Turns	Ohesangyou
<R> PCB	–	R1766, t = 0.4 mm, εr = 4.5, size = 30 × 48 mm	Panasonic
SMA Connecter	–	WAKA 01K0790-20	WAKA

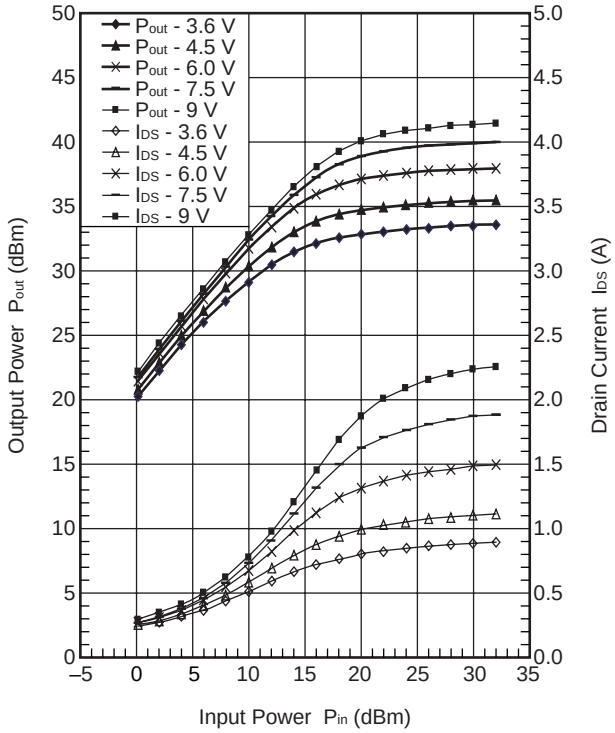
COMPONENT LAYOUT OF TEST CIRCUIT FOR 460 MHz



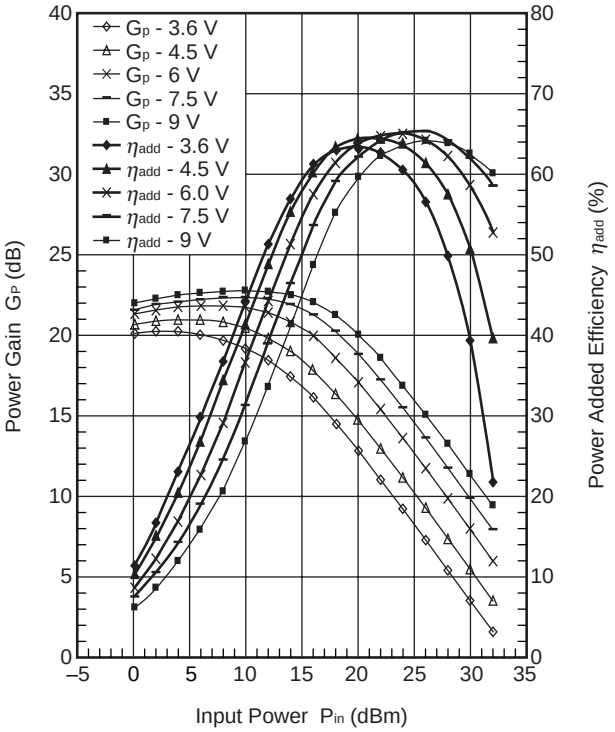
TYPICAL CHARACTERISTICS 1 (T_A = 25°C)

R: f = 460MHz, V_{DS} = 3.6/4.5/6/7.5/8.4/9 V, I_{Dset} = 200 mA, P_{in} = 0 to 32 dBm
IM: f1 = 460MHz, f2 = 461 MHz, V_{DS} = 3.6/4.5/6/7.5/8.4/9 V, I_{Dset} = 200mA, P_{out} (2 tone) = 12 to 38 dBm

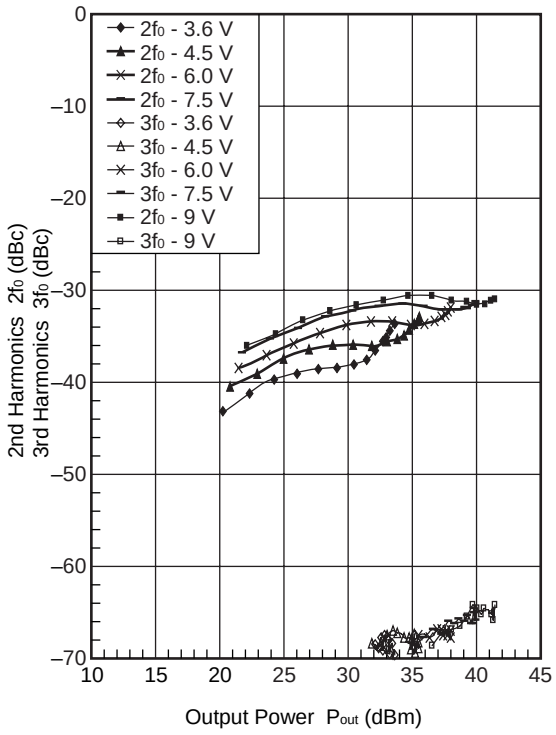
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER



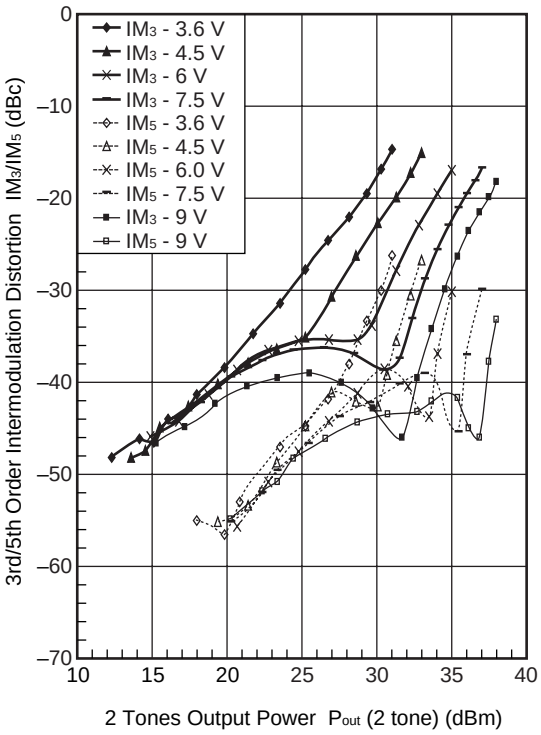
POWER GAIN, POWER ADDED EFFICIENCY vs. INPUT POWER



2f0, 3f0 vs. OUTPUT POWER

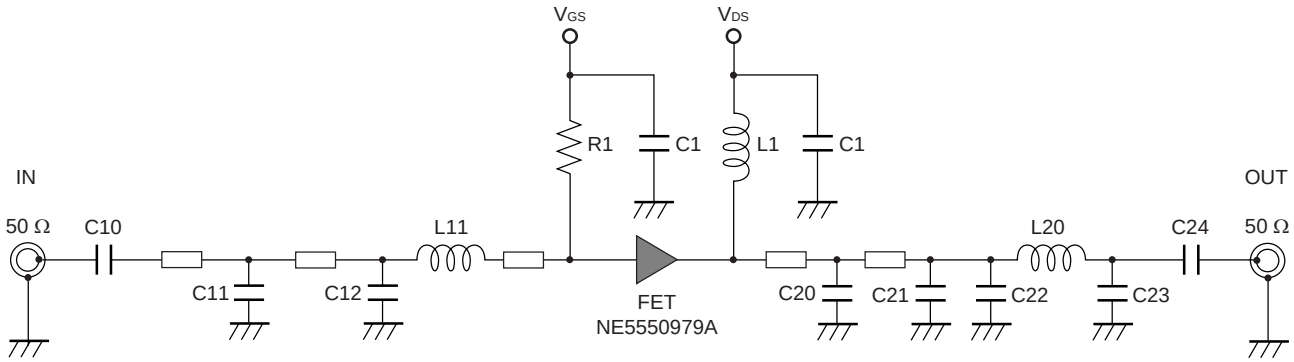


IM3/IM5 vs. 2 TONES OUTPUT POWER



Remark The graphs indicate nominal characteristics.

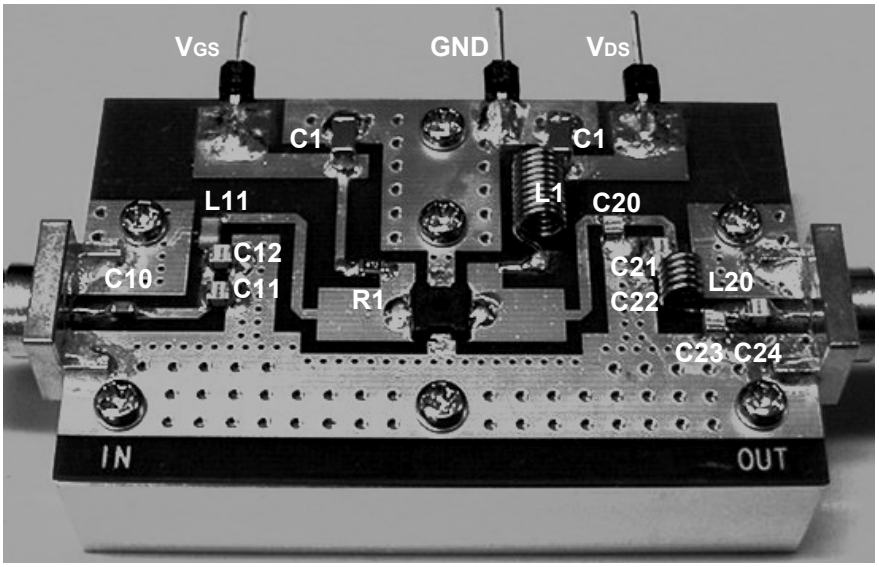
<R> TEST CIRCUIT SCHEMATIC FOR 157 MHz



<R> COMPONENTS OF TEST CIRCUIT FOR MEASURING ELECTRICAL CHARACTERISTICS

Symbol	Value	Type	Maker
C1	1 μF	GRM31CR72A105KA01B	Murata
C10	100 pF	GRM1882C1H101JA01	Murata
C11	4.7 pF	ATC100A4R7CT	American Technical Ceramics
C12	39 pF	ATC100A390JT	American Technical Ceramics
C20	2.0 pF	ATC100A2R0CT	American Technical Ceramics
C21	22 pF	ATC100A220JT	American Technical Ceramics
C22	68 pF	ATC100A680JT	American Technical Ceramics
C23	12 pF	ATC100A120JT	American Technical Ceramics
C24	100 pF	ATC100A101JT	American Technical Ceramics
R1	4.7 kΩ	1/10 W Chip Resistor SSM_RG1608PB472	SSM
L1	123 nH	ϕ0.5 mm, ϕD = 3 mm, 10 Turns	Ohesangyou
L11	27 nH	LLQ2012-F27N	TOKO
L20	35 nH	ϕ0.5 mm, ϕD = 2.4 mm, 5 Turns	Ohesangyou
PCB	–	R1766, t = 0.4 mm, εr = 4.5, size = 30 × 48 mm	Panasonic
SMA Connecter	–	WAKA 01K0790-20	WAKA

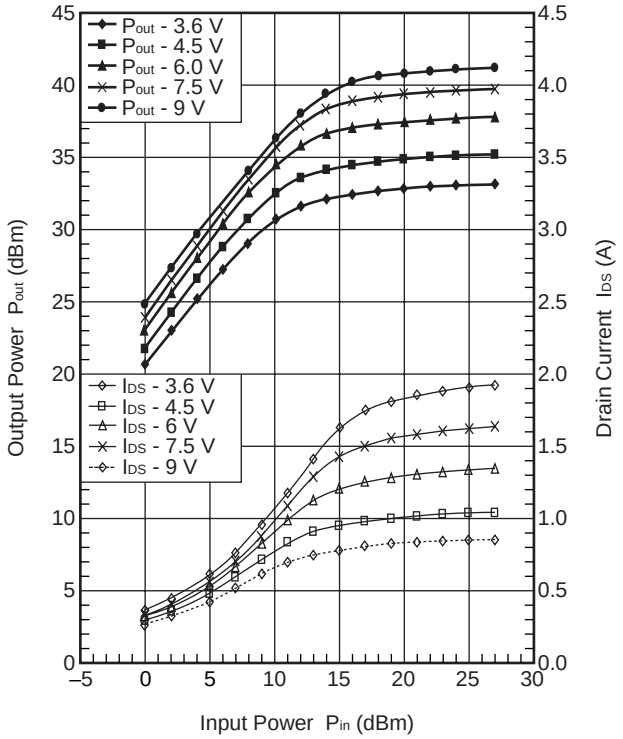
COMPONENT LAYOUT OF TEST CIRCUIT FOR 157 MHz



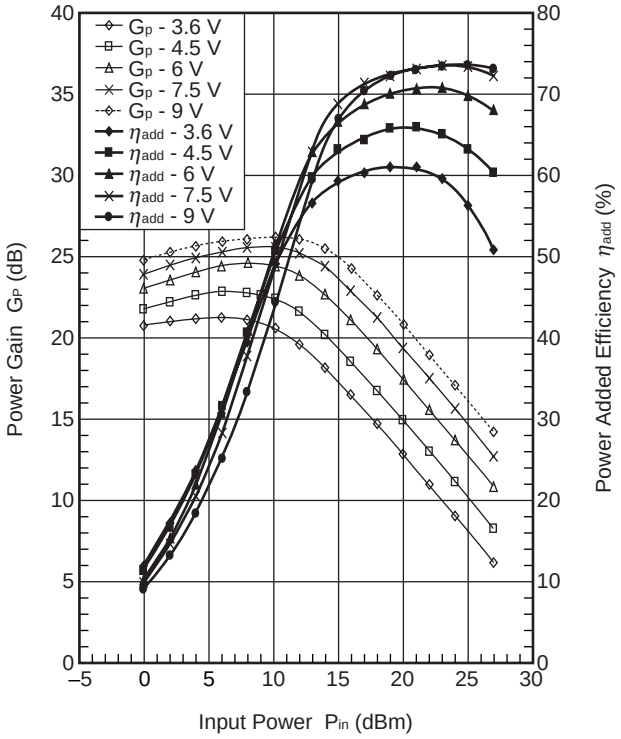
TYPICAL CHARACTERISTICS 2 (T_A = 25°C)

R: f = 157 MHz, V_{DS} = 3.6/4.5/6/7.5/9 V, I_{Dset} = 200 mA, P_{in} = 0 to 27 dBm

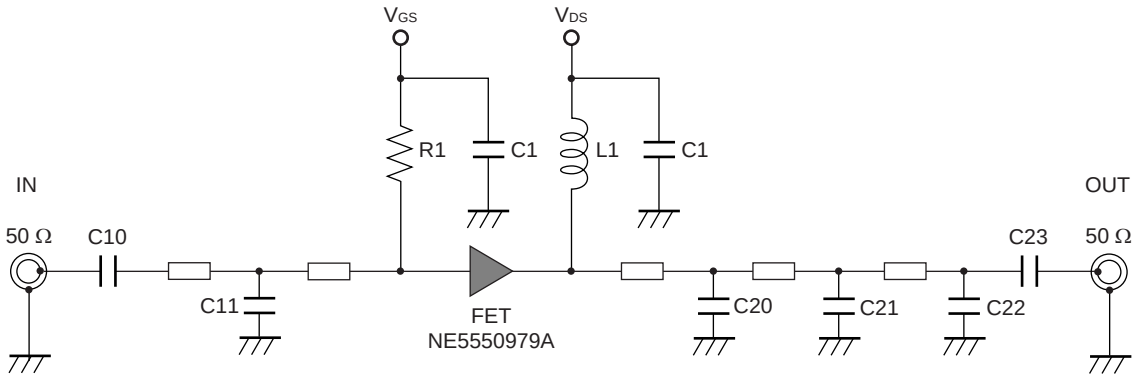
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER



POWER GAIN, POWER ADDED EFFICIENCY vs. INPUT POWER



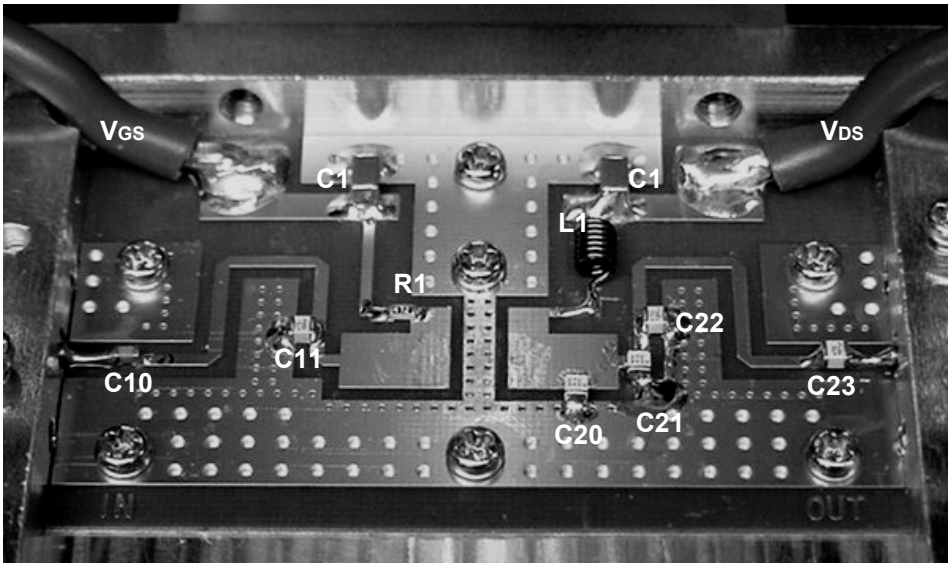
TEST CIRCUIT SCHEMATIC FOR 900 MHz



<R> **COMPONENTS OF TEST CIRCUIT FOR MEASURING ELECTRICAL CHARACTERISTICS**

Symbol	Value	Type	Maker
C1	1 μF	GRM31CR72A105KA01B	Murata
C10	100 pF	GRM1882C1H101JA01	Murata
C11	15 pF	ATC100A150JW	American Technical Ceramics
C20	3.3 pF	ATC100A3R3BW	American Technical Ceramics
C21	3.3 pF	ATC100A3R3BW	American Technical Ceramics
C22	12 pF	ATC100A120JT	American Technical Ceramics
C23	100 pF	ATC100A101JT	American Technical Ceramics
R1	4.7 kΩ	1/10 W Chip Resistor SSM_RG1608PB472	SSM
L1	123 nH	ϕ0.5 mm, ϕD = 3 mm, 10 Turns	Ohesangyou
PCB	–	R1766, t = 0.4 mm, εr = 4.5, size = 30 × 48 mm	Panasonic
SMA Connecter	–	WAKA 01K0790-20	WAKA

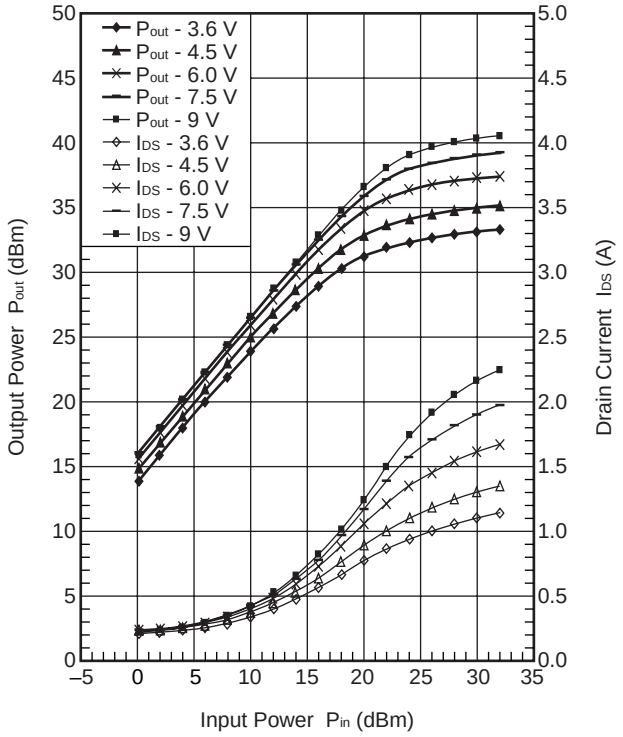
COMPONENT LAYOUT OF TEST CIRCUIT FOR 900 MHz



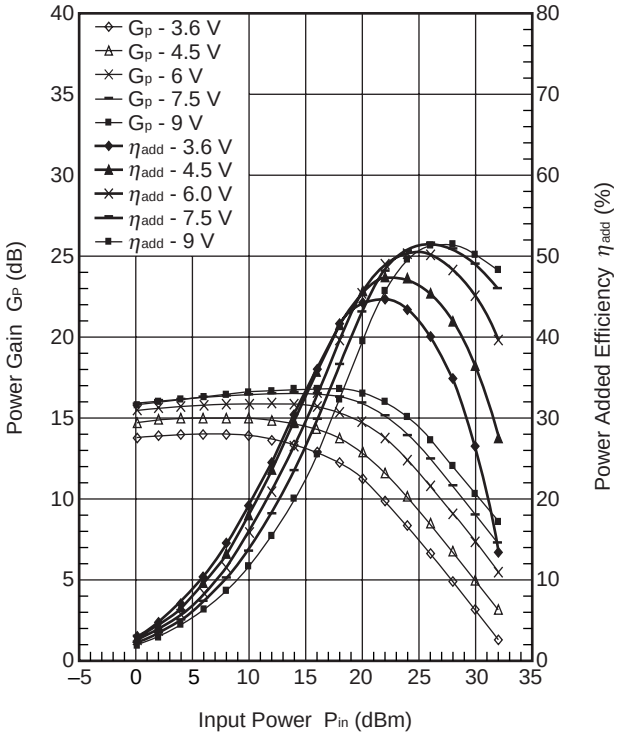
TYPICAL CHARACTERISTICS 3 (T_A = 25°C)

RF: f = 900 MHz V_{DS} = 3.6/4.5/6/7.5/9 V, I_{Dset} = 200 mA, P_{in} = 0 to 32 dBm

OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER



POWER GAIN, POWER ADDED EFFICIENCY vs. INPUT POWER



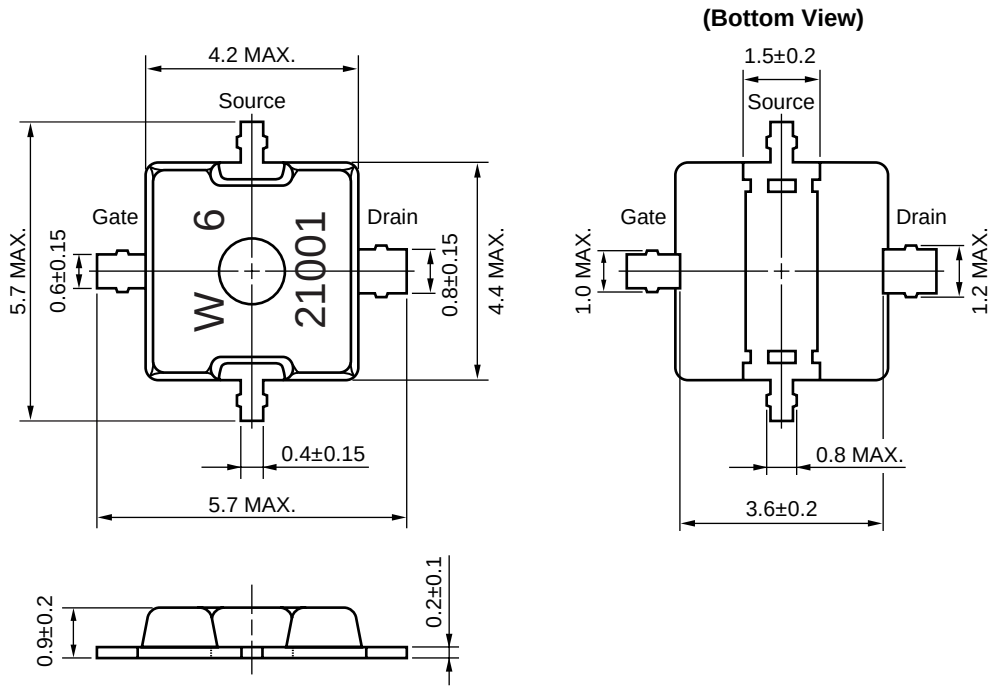
Remark The graphs indicate nominal characteristics.

S-PARAMETERS

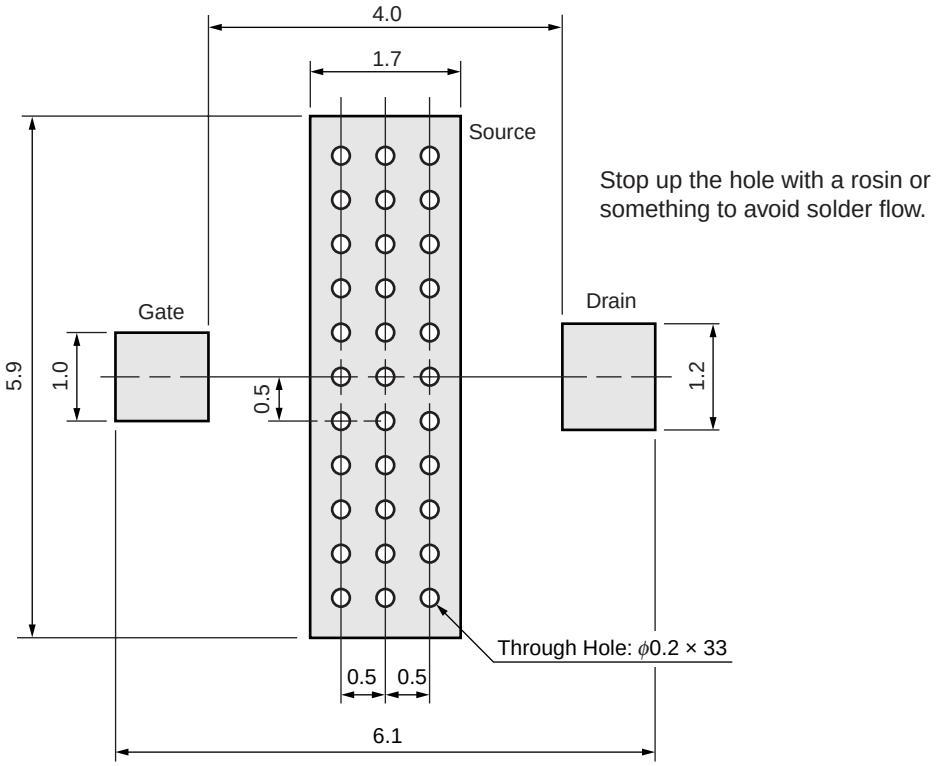
S-parameters and noise parameters are provided on our web site in a form (S2P) that enables direct import of the parameters to microwave circuit simulators without the need for keyboard inputs.
Click here to download S-parameters.
[Products] → [RF Devices] → [Device Parameters]
URL http://www.renesas.com/products/microwave/

PACKAGE DIMENSIONS

79A (UNIT: mm)



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
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 (terminal temperature) : 350°C or below Soldering time (per side of device) : 3 seconds or less Maximum chlorine content of rosin flux (% mass) : 0.2% (Wt.) or below	HS350

CAUTION

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

Revision History	NE5550979A Data Sheet

Rev.	Date	Description	
		Page	Summary
1.00	Nov 25, 2011	–	First edition issued
2.00	Jul 04, 2012	p.1	Modification of ORDERING INFORMATION
		p.5	Addition of TEST CIRCUIT SCHEMATIC FOR 157 MHz
		p.6	Addition of COMPONENT LAYOUT OF TEST CIRCUIT FOR 157 MHz
		p.7	Addition of TEST CIRCUIT SCHEMATIC FOR 900 MHz
		p.8	Addition of COMPONENT LAYOUT OF TEST CIRCUIT FOR 900 MHz
		p.9	Modification of S-PARAMETERS
3.00	Mar 12, 2013	P3	Modification of COMPONENTS OF TEST CIRCUIT FOR MEASURING ELECTRICAL CHARACTERISTICS
		P5	Modification of TEST CIRCUIT SCHEMATIC FOR 157 MHz
			Modification of COMPONENTS OF TEST CIRCUIT FOR MEASURING ELECTRICAL CHARACTERISTICS
		P7	Modification of COMPONENTS OF TEST CIRCUIT FOR MEASURING ELECTRICAL CHARACTERISTICS

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RENESAS

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[Colophon 2.2]