NE5550779A

Silicon Power LDMOS FET

R09DS0040EJ0300
Rev.3.00
Mar 12, 2013

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 : η_{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	• 12 mm wide embossed taping • Gate pin faces the perforation side of the tape
NE5550779A-T1	NE5550779A-T1-A			• 12 mm wide embossed taping • Gate pin faces the perforation side of the tape • Qty 1 kpcs/reel
NE5550779A-T1A	NE5550779A-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: NE5550779A

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}	2.1	A
Drain Current (50% Duty Pulsed)	$I_{DS\text{-}pulse}$	4.2	A
Total Power Dissipation Note	P_{tot}	17.8	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.

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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}		–	1.4	–	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	38	–	V
Transconductance	G_m	V_{DS} = 7.5 V, I_{DS} = 490±70 mA	1.26	1.54	2.03	S
Thermal Resistance	R_{th}	Channel to Case	–	7.0	–	°C/W
RF Characteristics						
Output Power	P_{out}	f = 460 MHz, V_{DS} = 7.5 V,	37.0	38.5	–	dBm
Drain Current	I_{DS}	P_{in} = 25 dBm,	–	1.38	–	A
Power Drain Efficiency	η_d	I_{Dset} = 140 mA (RF OFF)	–	68	–	%
Power Added Efficiency	η_{add}		–	66	–	%
Linear Gain	G_L Note 1		–	22.0	–	dB
Load VSWR Tolerance	Note 2	f = 460 MHz, V_{DS} = 9.0 V, P_{in} = 25 dBm, I_{Dset} = 140 mA (RF OFF) Load VSWR=20:1(All Phase)	No Destroy			
Output Power	P_{out}	f = 157 MHz, V_{DS} = 7.5 V,	–	38.5	–	dBm
Drain Current	I_{DS}	P_{in} = 23 dBm,	–	1.36	–	A
Power Drain Efficiency	η_d	I_{Dset} = 140 mA (RF OFF)	–	69	–	%
Power Added Efficiency	η_{add}		–	67	–	%
Linear Gain	G_L Note 3		–	24.0	–	dB
Output Power	P_{out}	f = 900 MHz, V_{DS} = 7.5 V,	–	37.4	–	dBm
Drain Current	I_{DS}	P_{in} = 27 dBm,	–	1.26	–	A
Power Drain Efficiency	η_d	I_{Dset} = 140 mA (RF OFF)	–	58	–	%
Power Added Efficiency	η_{add}		–	53	–	%
Linear Gain	G_L Note 4		–	17.0	–	dB

Notes: 1. P_{in} = 10 dBm
2. These characteristics values are measurement using measurement tools especially by RENESAS.
3. P_{in} = 5 dBm
4. P_{in} = 10 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.

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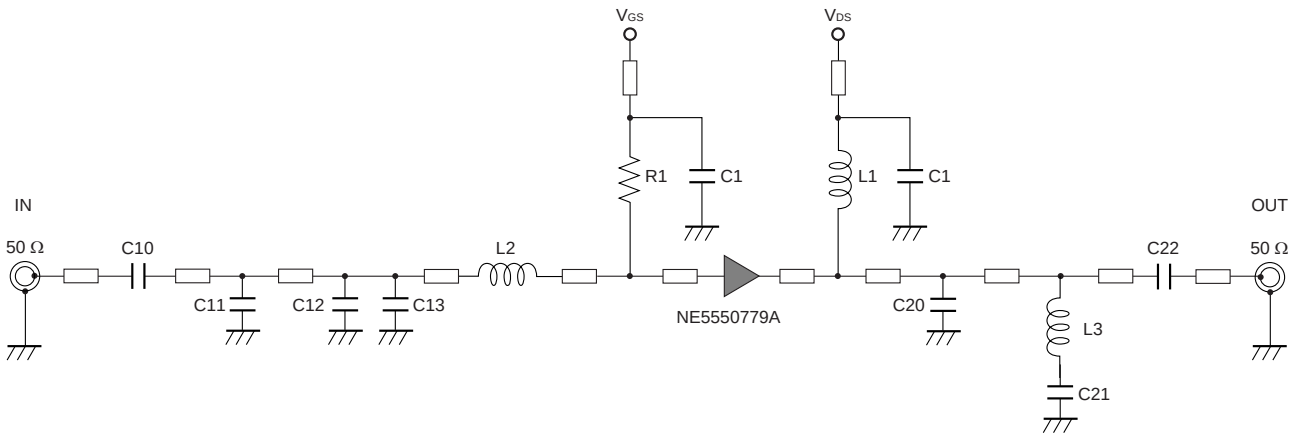
TEST CIRCUIT SCHEMATIC FOR 460 MHz



COMPONENTS OF TEST CIRCUIT FOR MEASURING ELECTRICAL CHARACTERISTICS

Symbol	Value	Type	Maker
C1	1 μF	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 kΩ	1/10 W Chip Resistor RK73B1JTTD202J	KOA
L1	114 nH	ϕ0.5 mm, ϕD = 3 mm, 10 Turns	Ohesangyou
L2	4.7 nH	LQW18AN4R7NG00	Murata
L3	3.0 nH	LQP15MN3N0B02	Murata
<R> PCB	–	R1766, t = 0.4 mm, εr = 4.5, size = 30 × 48 mm	Panasonic
SMA Connecter	–	WAKA 01K0790-20	WAKA

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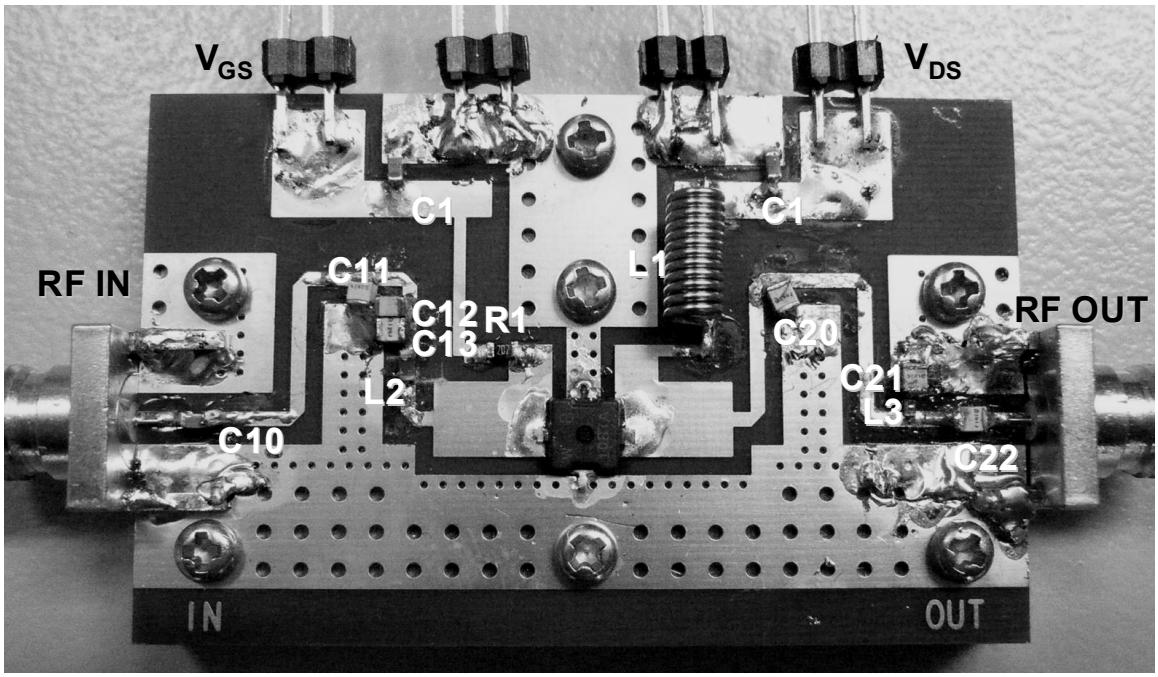
COMPONENT LAYOUT OF TEST CIRCUIT FOR 460 MHz



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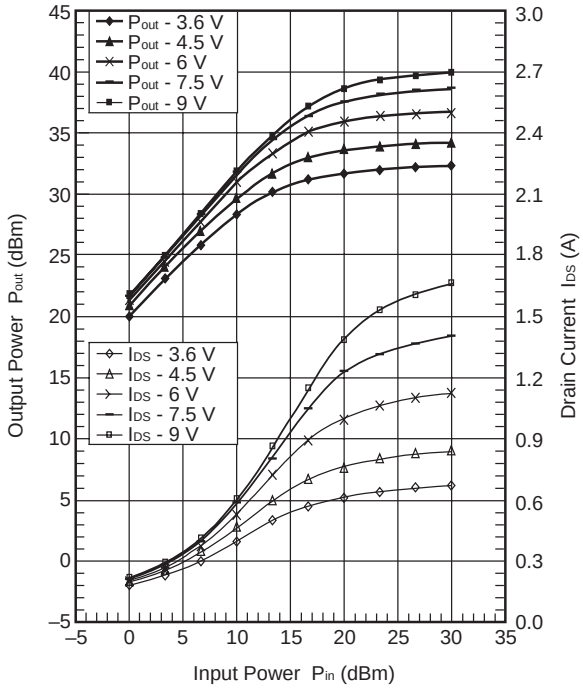
TYPICAL CHARACTERISTICS 1 (T_A = 25°C)

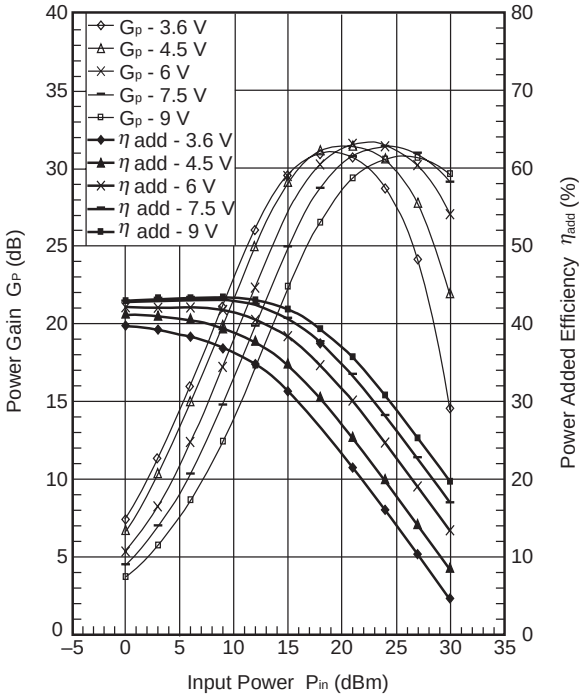
R: **f = 460MHz, V_{DS} = 3.6/4.5/6/7.5/9 V, I_{Dset} = 140 mA, P_{in} = 0 to 30 dBm**

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**

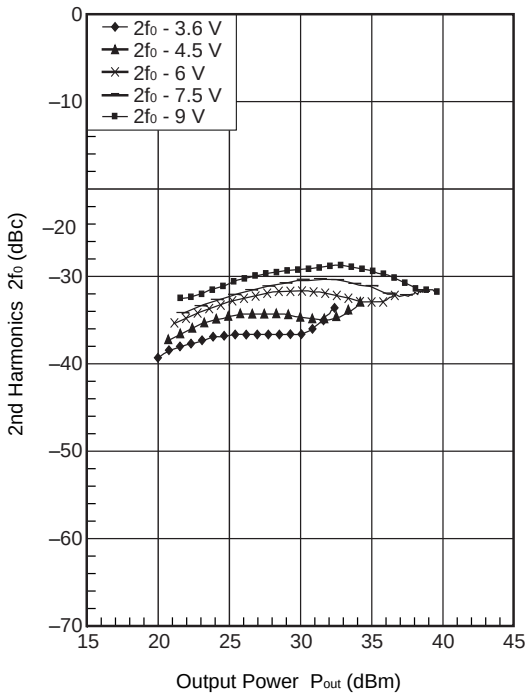
OUTPUT POWER, DRAIN CURRENT vs. INPUT POWER



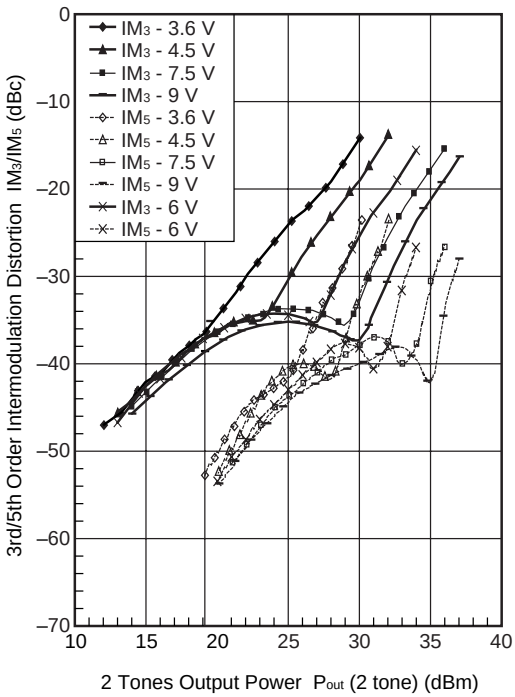
POWER GAIN, POWER ADDED EFFICIENCY vs. INPUT POWER



2f0 vs. OUTPUT POWER



IM3/IM5 vs. 2 TONES OUTPUT POWER



Remark The graphs indicate nominal characteristics.

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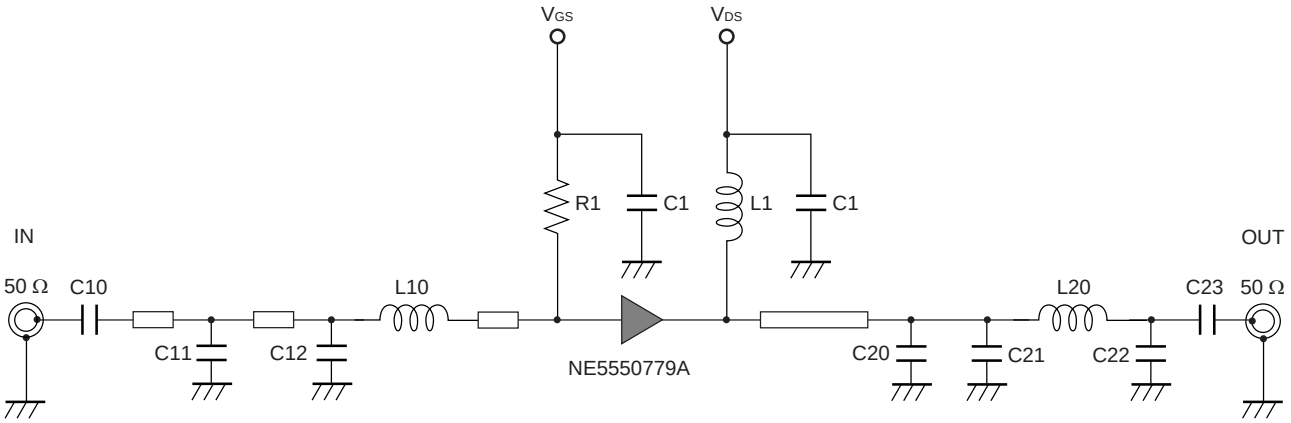
TEST CIRCUIT SCHEMATIC FOR 157 MHz



COMPONENTS OF TEST CIRCUIT FOR MEASURING ELECTRICAL CHARACTERISTICS

Symbol	Value	Type	Maker
C1	1 μF	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 kΩ	1/10 W Chip Resistor MCR03J103	ROAM
L1	74.7 nH	ϕ0.4 mm, ϕD = 2 mm, 10 Turns	Ohesangyou
L10	27 nH	LLQ2012-F27N	Toko
L20	29.8 nH	ϕ0.4 mm, ϕD = 2 mm, 5 Turns	Ohesangyou
<R> PCB	–	R1766, t = 0.4 mm, εr = 4.5, size = 30 × 48 mm	Panasonic
SMA Connecter	–	WAKA 01K0790-20	WAKA

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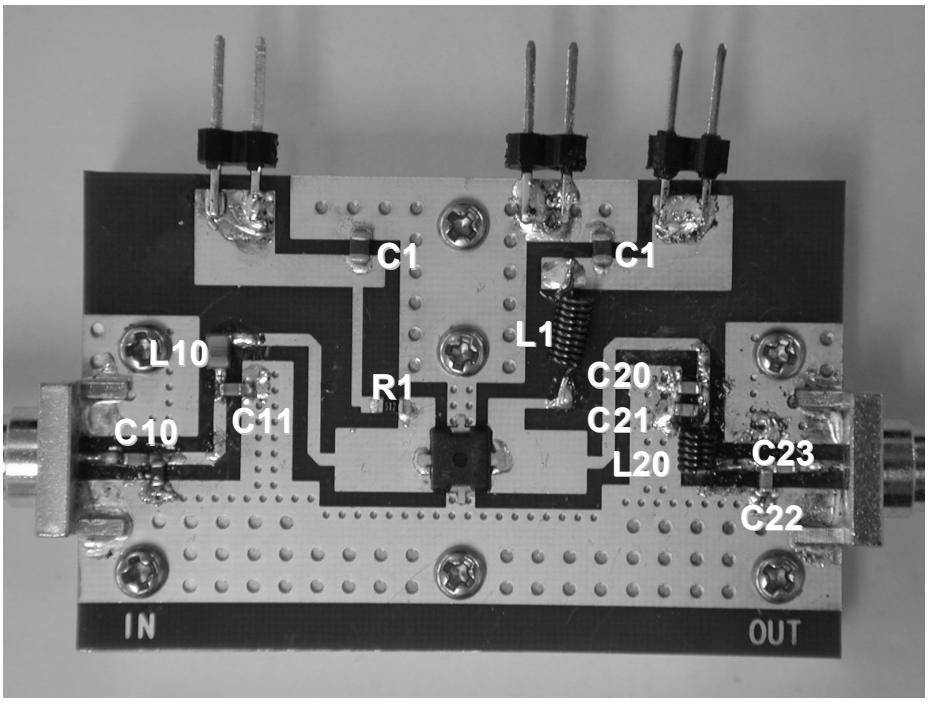
COMPONENT LAYOUT OF TEST CIRCUIT FOR 157 MHz

IN



OUT

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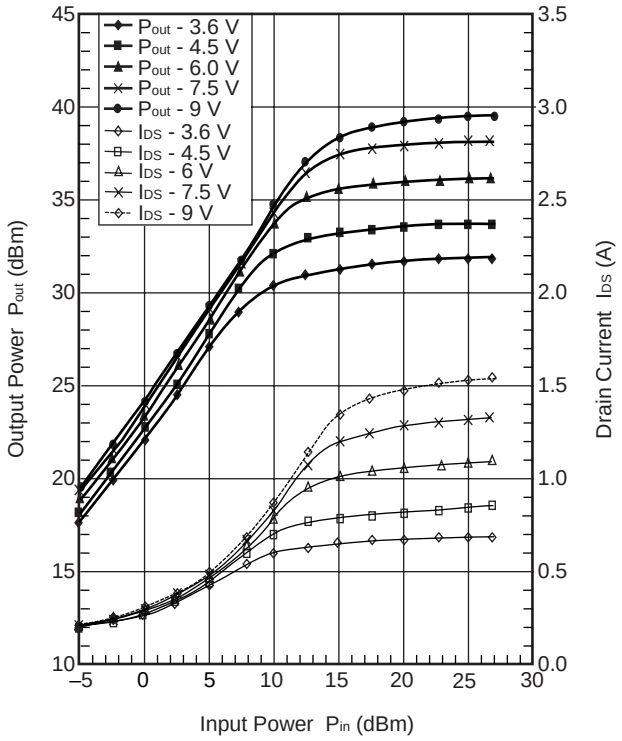
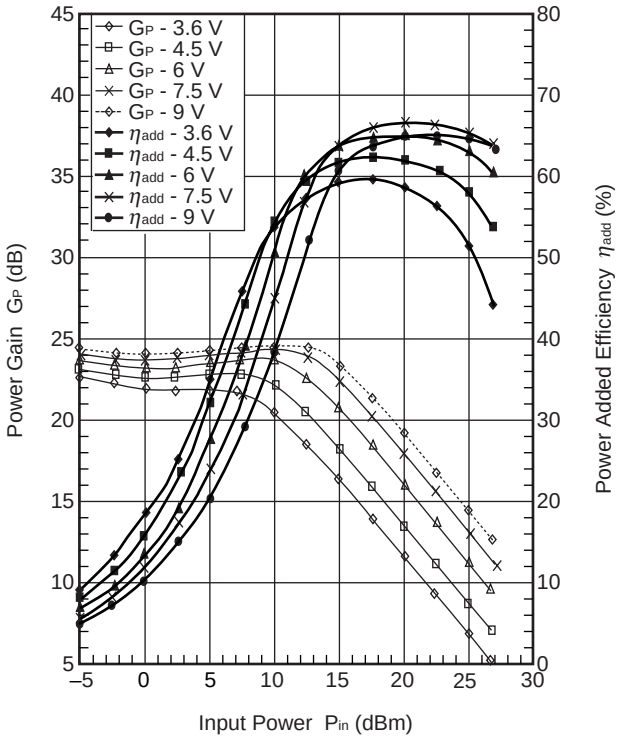
TYPICAL CHARACTERISTICS 2 (T_A = 25°C)

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.

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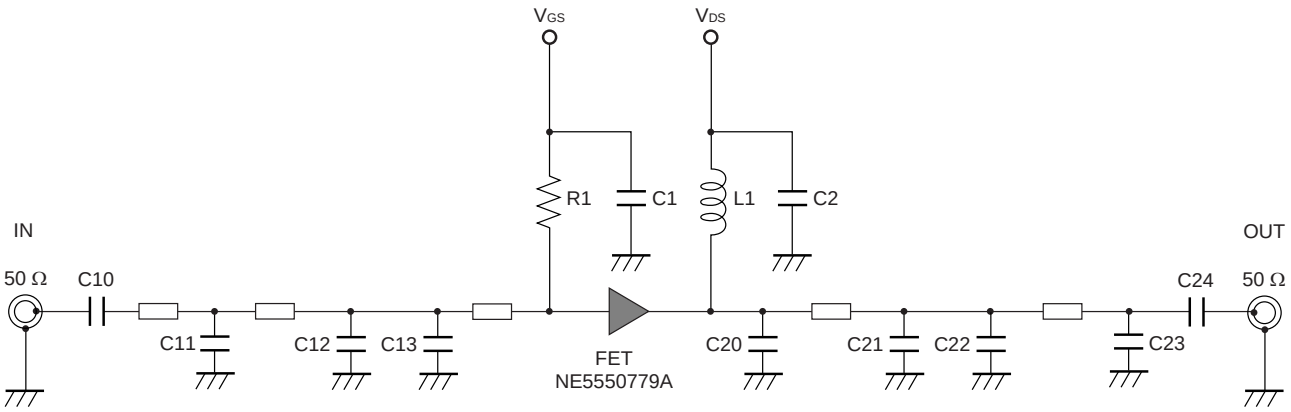
TEST CIRCUIT SCHEMATIC FOR 900 MHz



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 μF	GRM21BB31H105KA2L	Murata
C2	1 μF	GRM21BB31H105KA2L	Murata
L1	74.7 nH	D20-74N7	Ohesangyou
R1	20 kΩ	MCR03J203	Rohm
<R> PCB	–	R1766, t = 0.8 mm, εr = 4.8, size = 30 × 40 mm	Panasonic
SMA Connecter	–	WAKA 01K0790-20	WAKA

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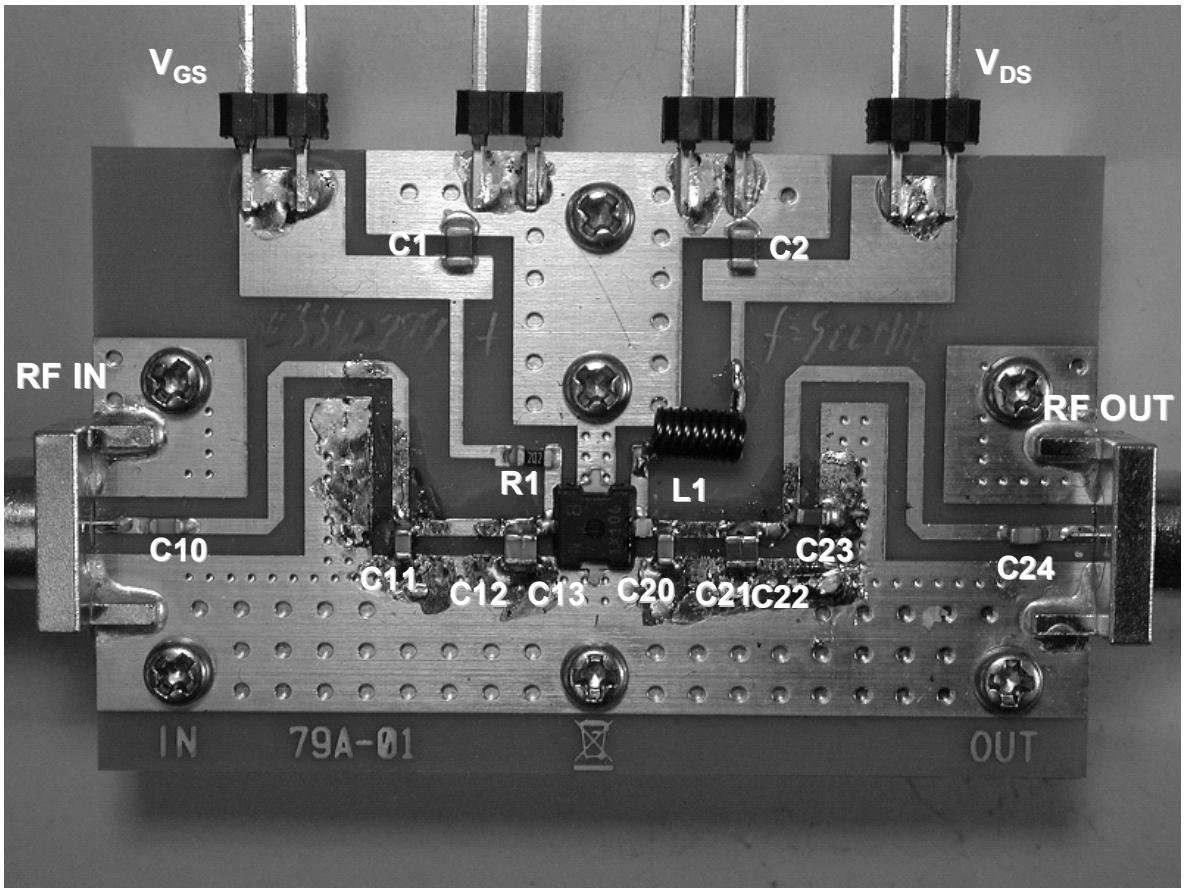
COMPONENT LAYOUT OF TEST CIRCUIT FOR 900 MHz



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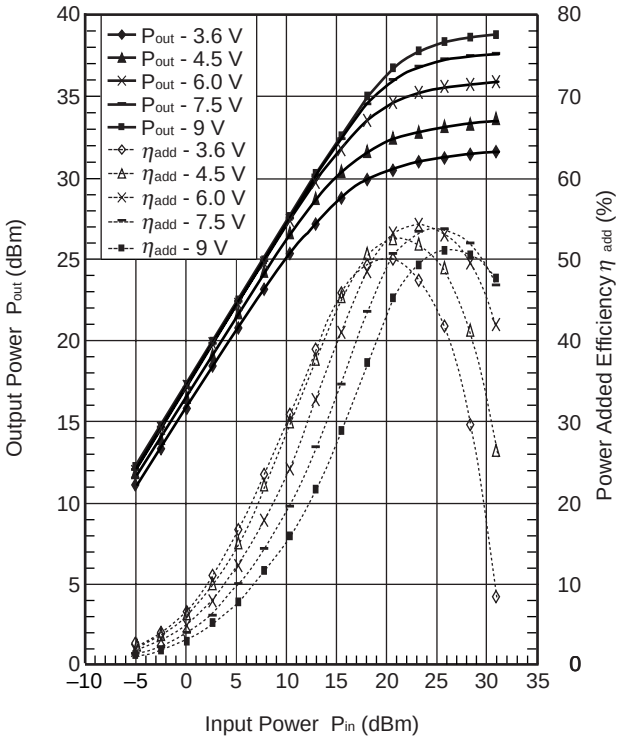
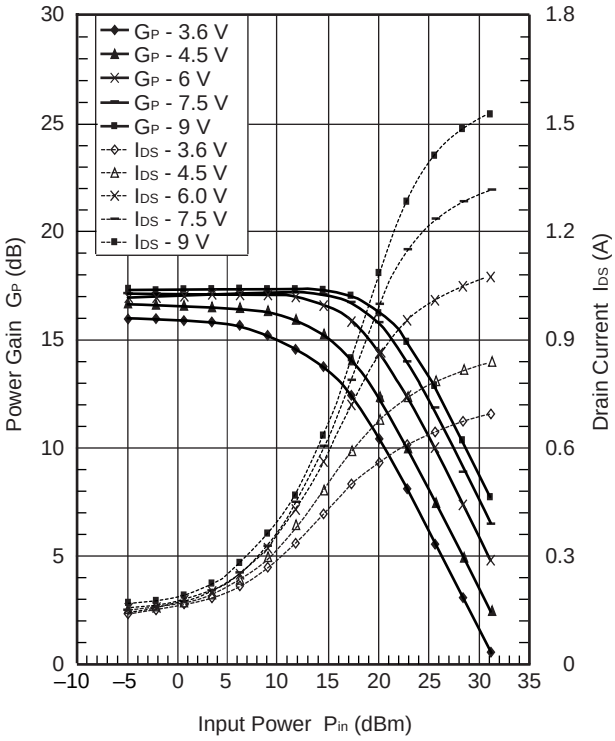
TYPICAL CHARACTERISTICS 3 (T_A = 25°C)

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

OUTPUT POWER, POWER ADDED EFFICIENCY vs. INPUT POWER



POWER GAIN, DRAIN CURRENT vs. INPUT POWER



Remark The graphs indicate nominal characteristics.

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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/

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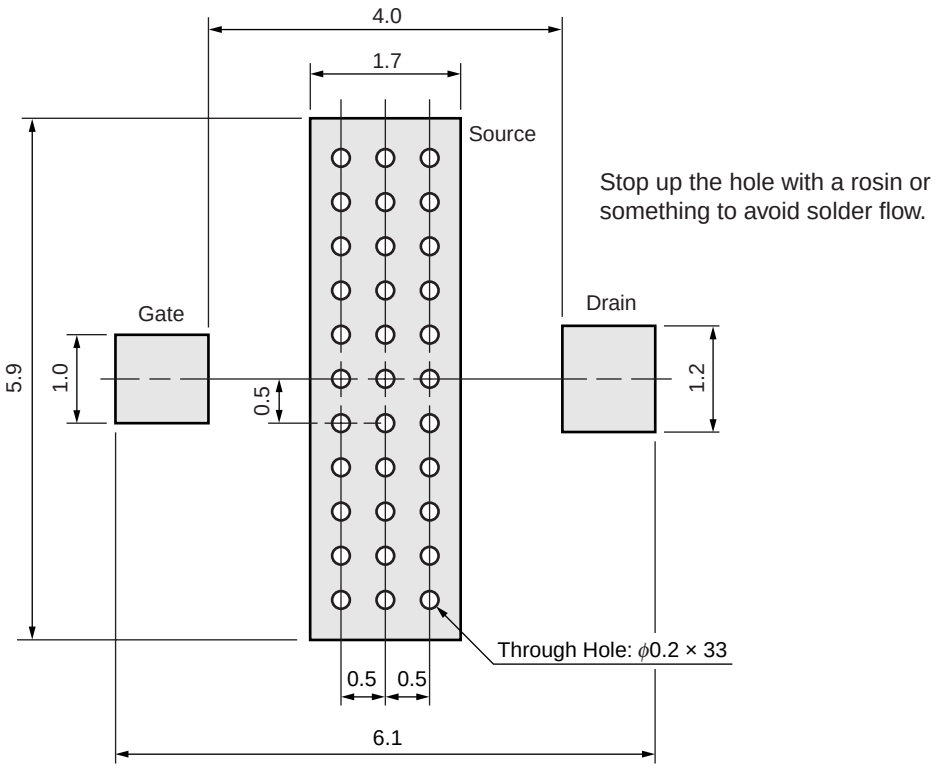
MOUNTING LAYOUT PAD DIMENSIONS

79A (UNIT: mm)



Remark The mounting pad layout in this document is for reference only.
When designing PCB, please consider workability of mounting, solder joint reliability, prevention of solder bridge and so on, in order to optimize the design.

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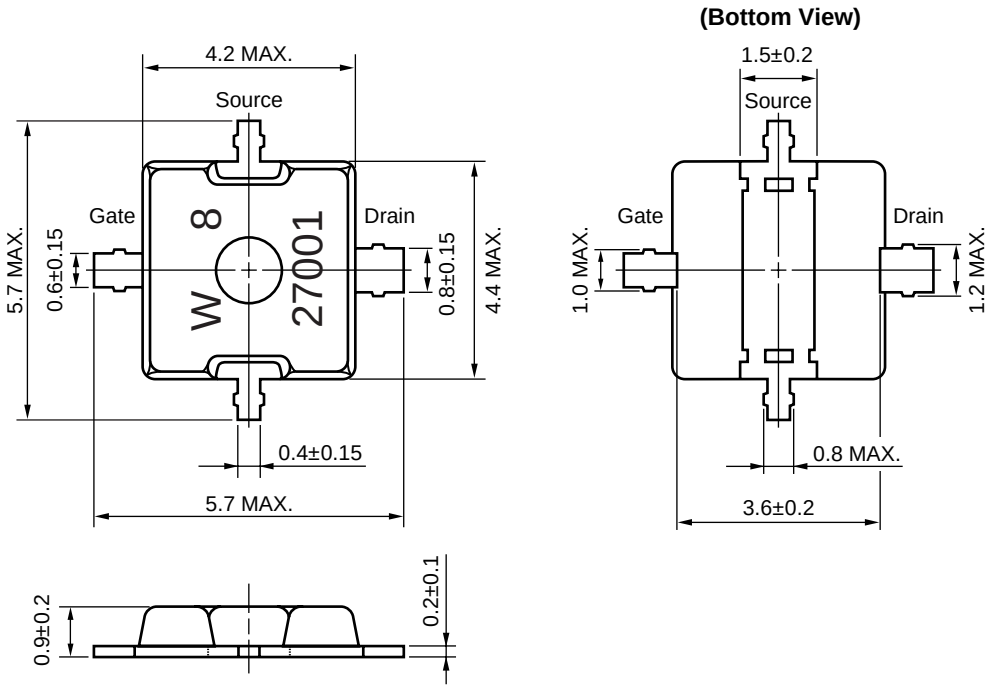
PACKAGE DIMENSIONS

79A (UNIT: mm)



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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).

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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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RENESAS

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[Colophon 2.2]

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