

To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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(Note 2) “Renesas Electronics product(s)” means any product developed or manufactured by or for Renesas Electronics.

HETERO JUNCTION FIELD EFFECT TRANSISTOR
NE3515S02

**X to Ku-BAND SUPER LOW NOISE AMPLIFIER
 N-CHANNEL HJ-FET**

FEATURES

- Super low noise figure, high associated gain and middle output power
 $NF = 0.3 \text{ dB TYP.}$, $G_a = 12.5 \text{ dB TYP.}$ @ $f = 12 \text{ GHz}$, $V_{DS} = 2 \text{ V}$, $I_D = 10 \text{ mA}$
 $P_{O(1dB)} = +14 \text{ dBm TYP.}$ @ $f = 12 \text{ GHz}$, $V_{DS} = 3 \text{ V}$, $I_D = 25 \text{ mA set (Non-RF)}$
- Micro-X plastic (S02) package

APPLICATIONS

- X to Ku-band local buffer amplifier, PA driver amplifier, low noise amplifier, mixer
- DBS LNB, VSAT
- Other X to Ku-band communication systems

ORDERING INFORMATION

Part Number	Order Number	Package	Quantity	Marking	Supplying Form
NE3515S02-T1C	NE3515S02-T1C-A	S02 (Pb-Free)	2 kpcs/reel	G	<ul style="list-style-type: none"> • 8 mm wide embossed taping • Pin 4 (Gate) faces the perforation side of the tape
NE3515S02-T1D	NE3515S02-T1D-A		10 kpcs/reel		

Remark To order evaluation samples, contact your nearby sales office.
 Part number for sample order: NE3515S02

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

Parameter	Symbol	Ratings	Unit
Drain to Source Voltage	V _{DS}	4	V
Gate to Source Voltage	V _{GS}	-3	V
Drain Current	I _D	I _{DSS}	mA
Gate Current	I _G	100	μA
Total Power Dissipation	P _{tot} ^{Note}	165	mW
Channel Temperature	T _{ch}	+125	°C
Storage Temperature	T _{stg}	-65 to +125	°C

Note Mounted on 1.08 cm² × 1.0 mm (t) glass epoxy PCB

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

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 Not all products and/or types are available in every country. Please check with an NEC Electronics sales representative for availability and additional information.

RECOMMENDED OPERATING CONDITIONS (T_A = +25°C)

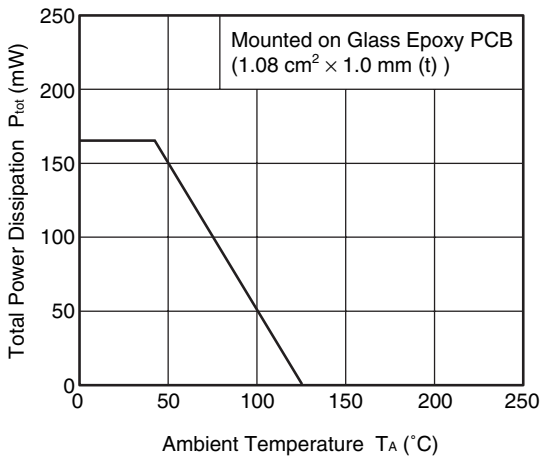
Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Drain to Source Voltage	V _{DS}	1	2	3	V
Drain Current	I _D	5	10	25	mA
Input Power	P _{in}	–	–	0	dBm

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

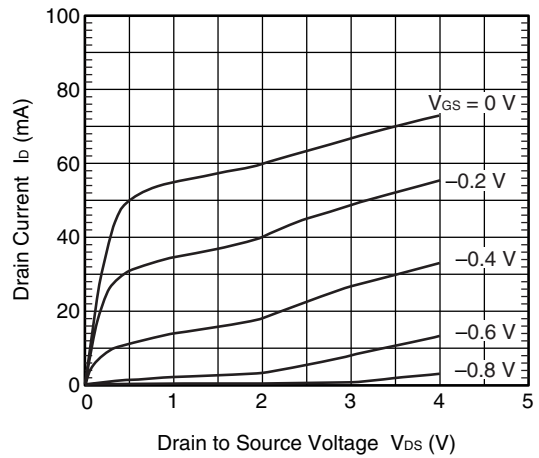
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Gate to Source Leak Current	I _{GSO}	V _{GS} = –3 V	–	0.5	10	μA
Saturated Drain Current	I _{DSS}	V _{DS} = 2 V, V _{GS} = 0 V	32	60	88	mA
Gate to Source Cutoff Voltage	V _{GS(off)}	V _{DS} = 2 V, I _D = 100 μA	–0.2	–0.8	–1.4	V
Transconductance	g _m	V _{DS} = 2 V, I _D = 10 mA	45	70	–	mS
Noise Figure	NF	V _{DS} = 2 V, I _D = 10 mA, f = 12 GHz	–	0.3	0.5	dB
Associated Gain	G _a		11	12.5	–	dB
Gain 1 dB Compression Output Power	P _{O(1 dB)}	V _{DS} = 3 V, I _D = 25 mA set (Non-RF), f = 12 GHz	–	+14	–	dBm

TYPICAL CHARACTERISTICS (TA = +25°C, unless otherwise specified)

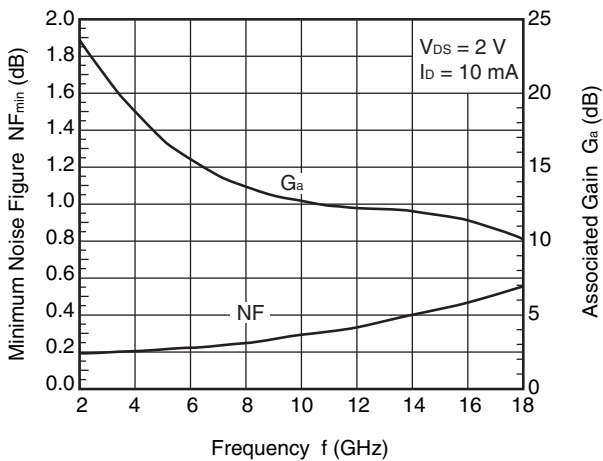
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



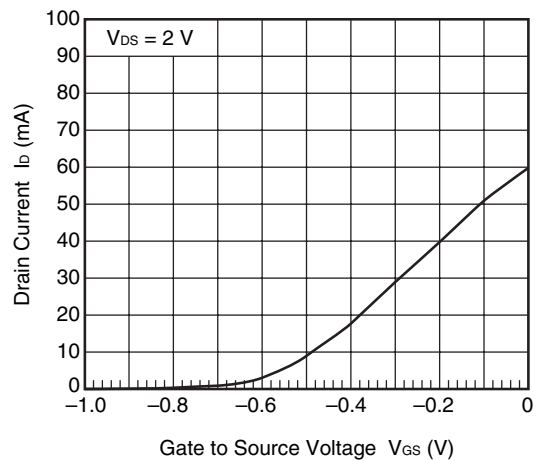
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



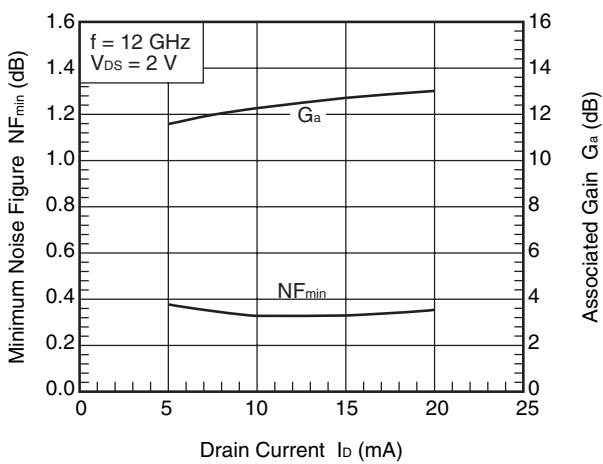
MINIMUM NOISE FIGURE, ASSOCIATED GAIN vs. FREQUENCY



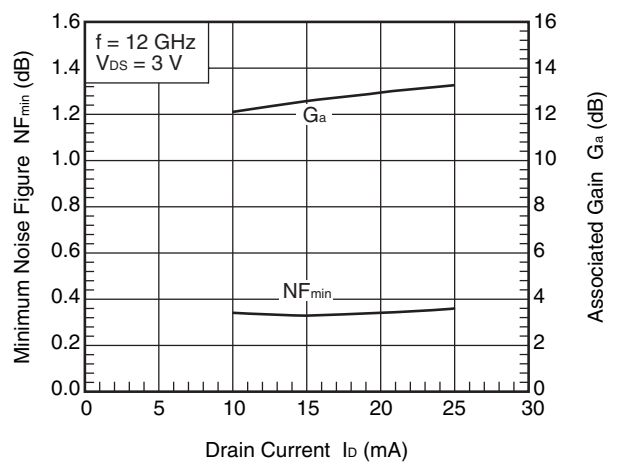
DRAIN CURRENT vs. GATE TO SOURCE VOLTAGE



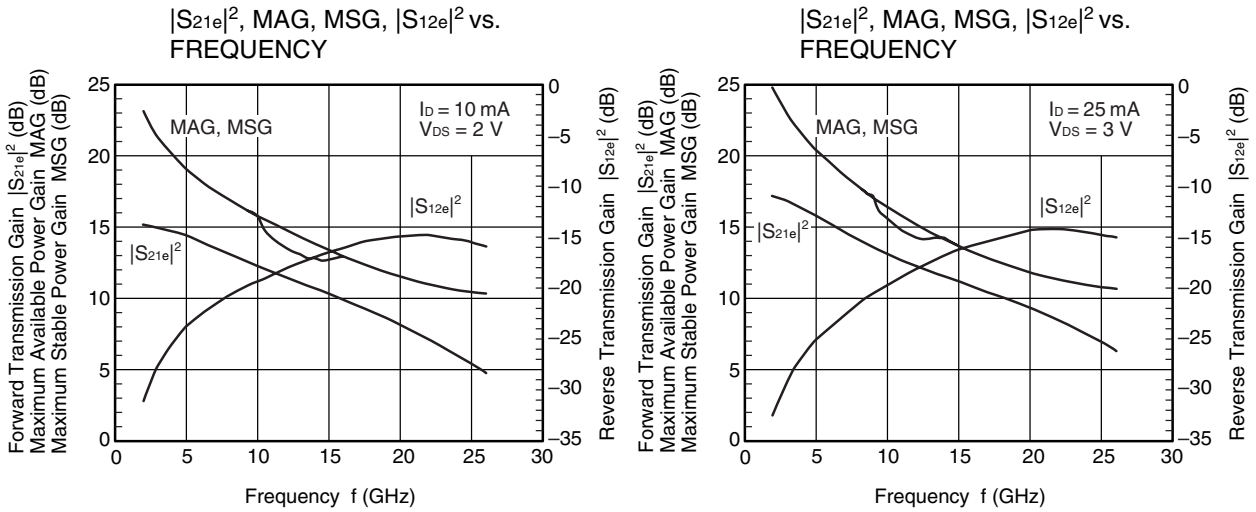
MINIMUM NOISE FIGURE, ASSOCIATED GAIN vs. DRAIN CURRENT



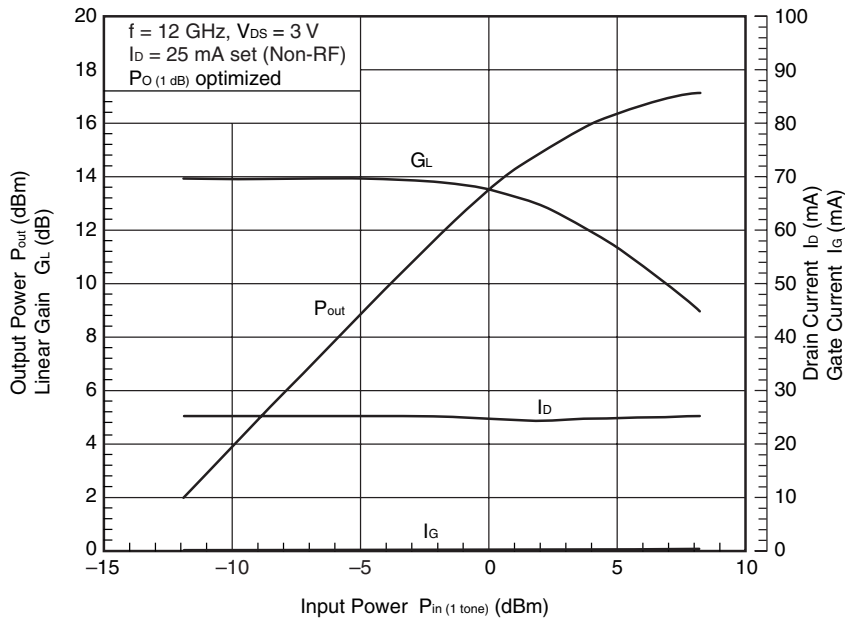
MINIMUM NOISE FIGURE, ASSOCIATED GAIN vs. DRAIN CURRENT



Remark The graphs indicate nominal characteristics.



OUTPUT POWER, LINEAR GAIN, DRAIN CURRENT
GATE CURRENT vs. INPUT POWER



Remark The graphs indicate nominal characteristics.

S-PARAMETERS

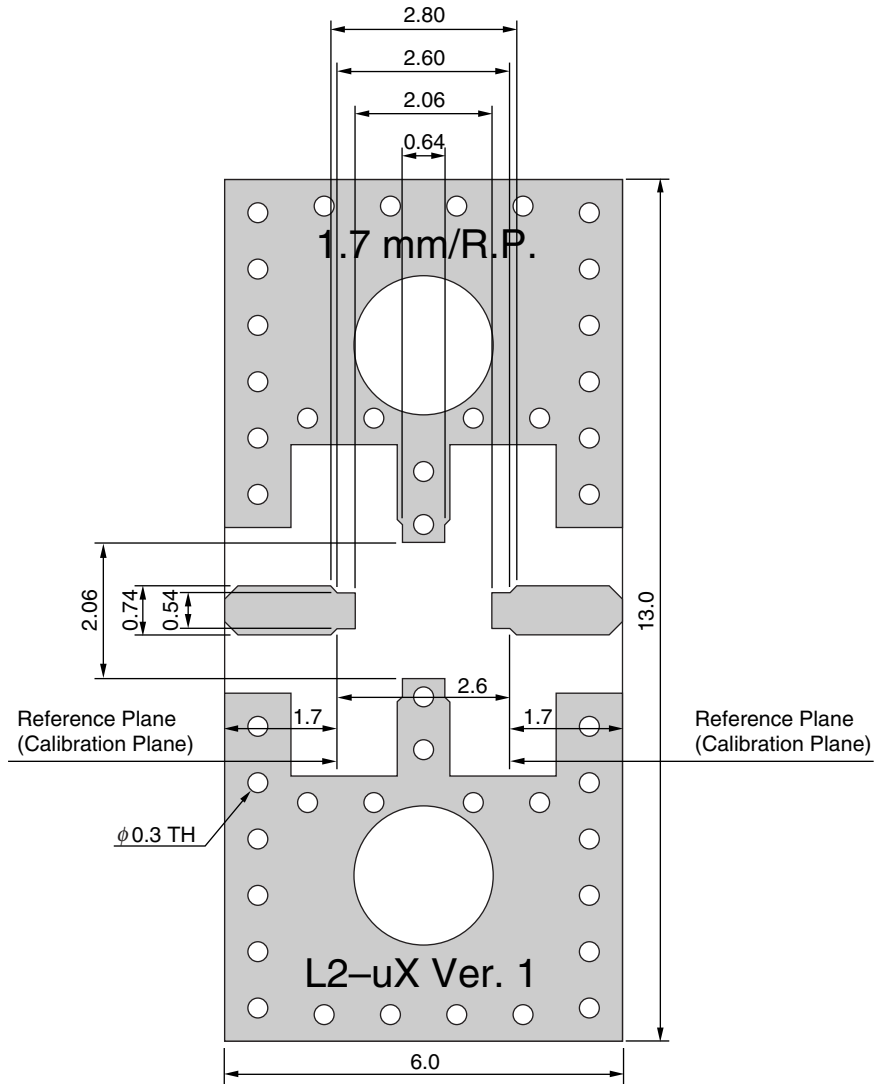
S-parameters and noise parameters are provided on our Web site in a format (S2P) that enables the direct import of the parameters to microwave circuit simulators without the need for keyboard inputs.

Click here to download S-parameters.

[RF and Microwave] → [Device Parameters]

URL <http://www.necel.com/microwave/en/>

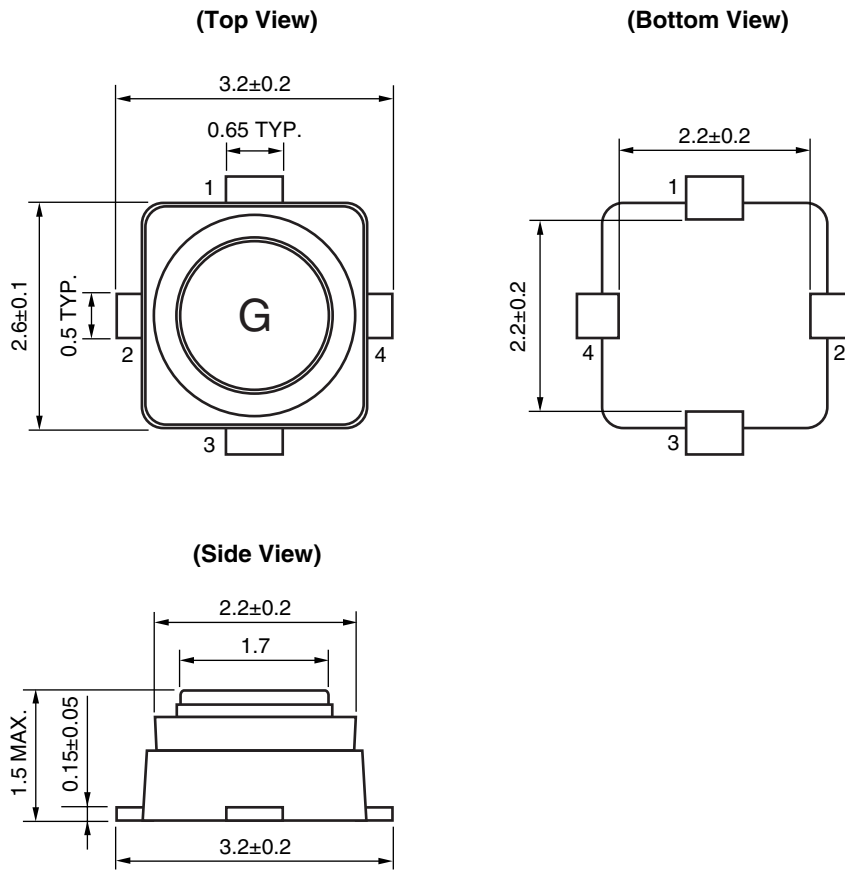
RF MEASURING LAYOUT PATTERN (REFERENCE ONLY) (UNIT: mm)



RT/duroid 5880/ROGERS
t = 0.254 mm
εr = 2.20
tan delta = 0.0009 @10 GHz

PACKAGE DIMENSIONS

S02 (UNIT: mm)



PIN CONNECTIONS

- 1. Source
- 2. Drain
- 3. Source
- 4. Gate

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
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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"Standard": Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots.

"Special": Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support).

"Specific": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc.

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