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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RENESAS

DATA SHEET

HETERO JUNCTION FIELD EFFECT TRANSISTOR

NE3503M04

C TO Ku BAND SUPER LOW NOISE AND HIGH-GAIN AMPLIFIER N-CHANNEL HJ-FET

FEATURES

- Super low noise figure and high associated gain

<R> NF = 0.45 dB TYP., G_a = 12.0 dB TYP. @ V_{DS} = 2 V, I_D = 10 mA, f = 12 GHz

- Flat-lead 4-pin thin-type super minimold (M04) package
- Gate width: W_g = 160 μm

APPLICATIONS

- DBS LNB gain-stage, Mix-stage
- Low noise amplifier for microwave communication system

ORDERING INFORMATION

Part Number	Order Number	Package	Quantity	Marking	Supplying Form
NE3503M04	NE3503M04-A	Flat-lead 4-pin thin-type super minimold (M04) (Pb-Free)	50 pcs (Non reel)	V75	• 8 mm wide embossed taping • Pin 1 (Source), Pin 2 (Drain) face the perforation side of the tape
NE3503M04-T2	NE3503M04-T2-A		3 kpcs/reel		
NE3503M04-T2B	NE3503M04-T2B-A		15 kpcs/reel		

Remark To order evaluation samples, contact your nearby sales office.
Part number for sample order: NE3503M04

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

Parameter	Symbol	Ratings	Unit
Drain to Source Voltage	V_{DS}	4.0	V
Gate to Source Voltage	V_{GS}	−3.0	V
Drain Current	I_D	I_{DSS}	mA
Gate Current	I_G	80	μA
Total Power Dissipation	P_{tot}	125	mW
Channel Temperature	T_{ch}	+125	°C
Storage Temperature	T_{stg}	−65 to +125	°C

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

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Date Published January 2009 NS
Printed in Japan

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 CONDITIONS (T_A = +25°C)

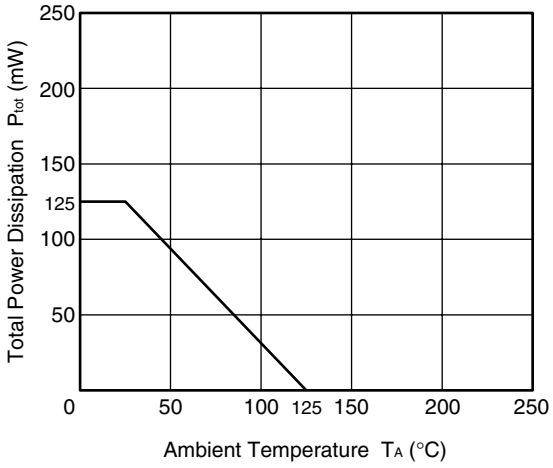
	Parameter	Symbol	MIN.	TYP.	MAX.	Unit
<R>	Drain to Source Voltage	V_{DS}	1	2	3	V
<R>	Drain Current	I_D	5	10	15	mA
	Input Power	P_{in}	–	–	0	dBm

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

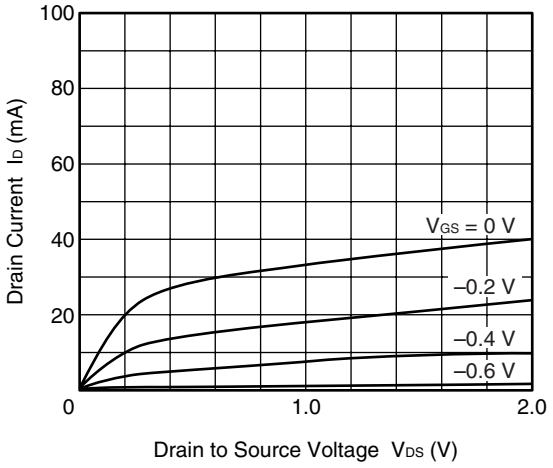
	Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
	Gate to Source Leak Current	I_{GSO}	V_{GS} = –3.0 V	–	0.5	10	μA
<R>	Saturated Drain Current	I_{DSS}	V_{DS} = 2 V, V_{GS} = 0 V	25	40	70	mA
<R>	Gate to Source Cutoff Voltage	$V_{GS (off)}$	V_{DS} = 2 V, I_D = 100 μA	–0.2	–0.7	–1.5	V
	Transconductance	g_m	V_{DS} = 2 V, I_D = 10 mA	40	55	–	mS
<R>	Noise Figure	NF	V_{DS} = 2 V, I_D = 10 mA, f = 12 GHz	–	0.45	0.65	dB
<R>	Associated Gain	G_a		11.0	12.0	–	dB

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

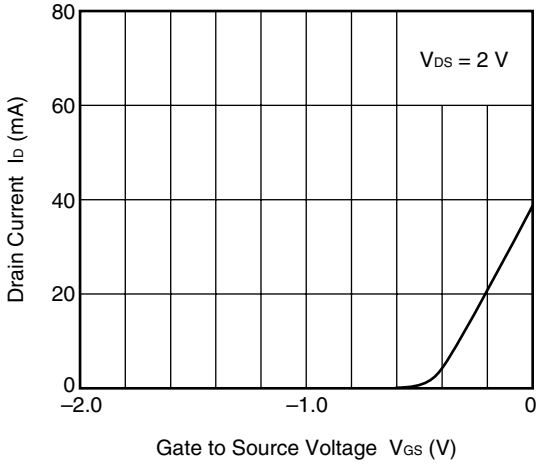
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



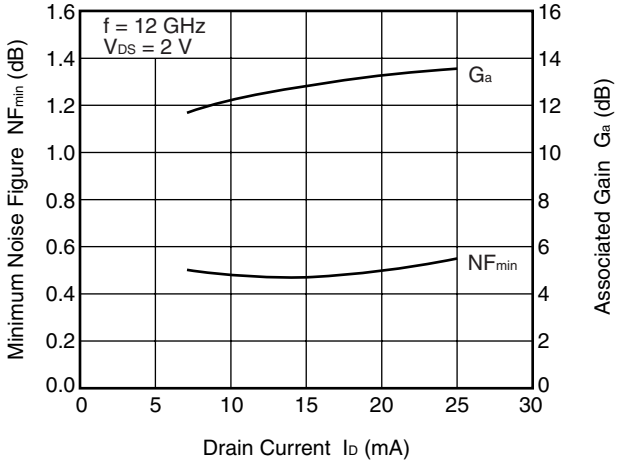
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



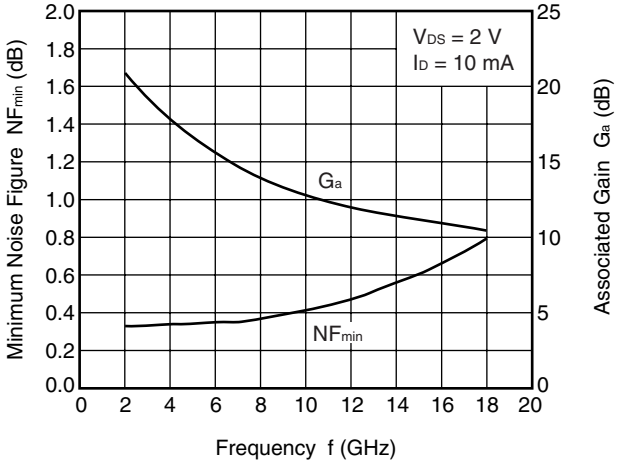
DRAIN CURRENT vs. GATE TO SOURCE VOLTAGE



MINIMUM NOISE FIGURE, ASSOCIATED GAIN vs. DRAIN CURRENT



MINIMUM NOISE FIGURE, ASSOCIATED GAIN vs. FREQUENCY



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.

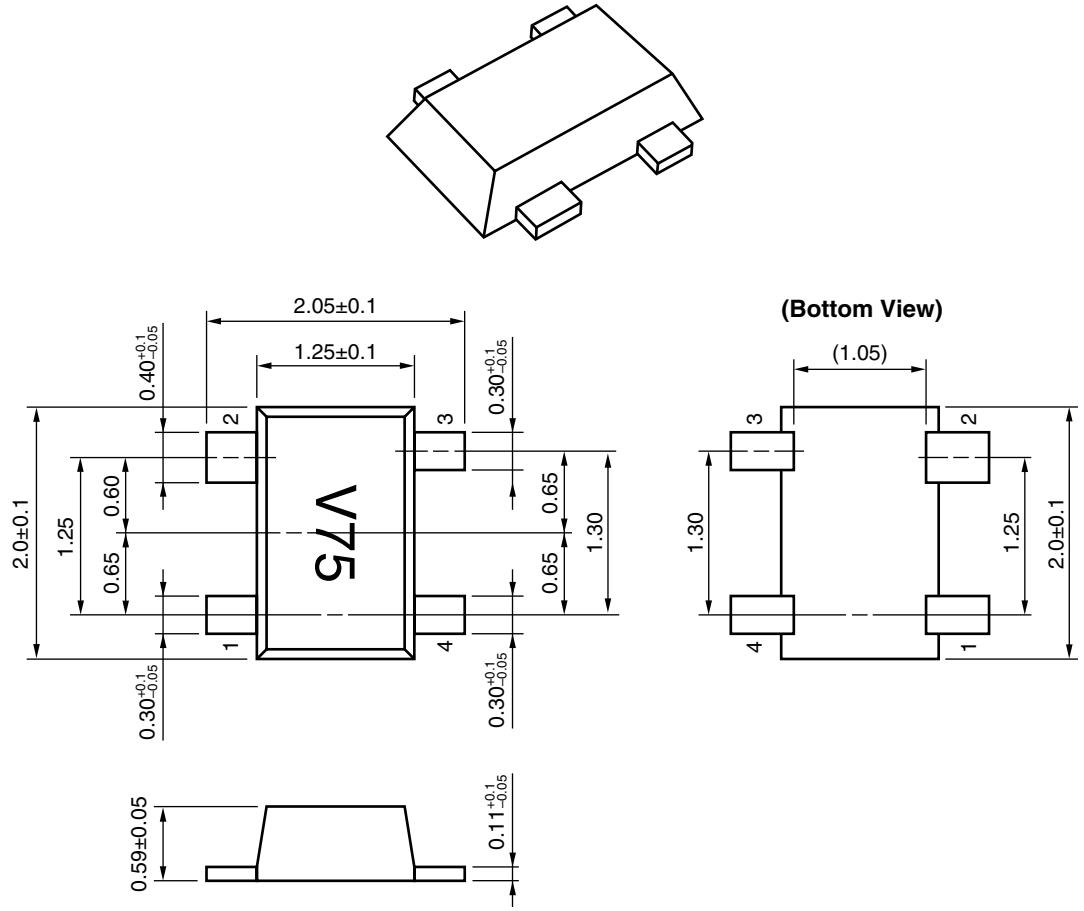
Click here to download S-parameters.

[RF and Microwave] → [Device Parameters]

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

PACKAGE DIMENSIONS

FLAT-LEAD 4-PIN THIN-TYPE SUPER MINIMOLD (M04) (UNIT: mm)



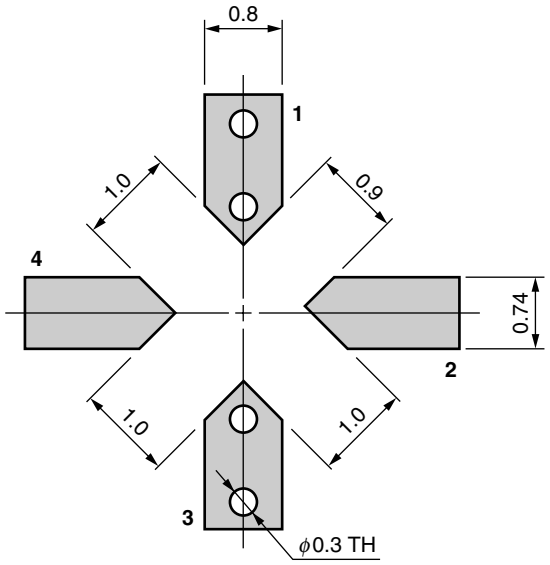
PIN CONNECTIONS

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

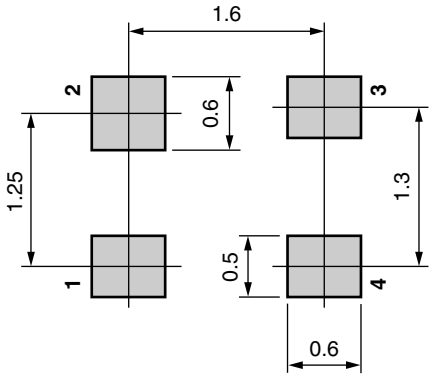
MOUNTING PAD DIMENSIONS

FLAT-LEAD 4-PIN THIN-TYPE SUPER MINIMOLD (M04) (UNIT: mm)

–Reference 1–



–Reference 2–



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) Time at peak temperature Time at temperature of 220°C or higher Preheating time at 120 to 180°C Maximum number of reflow processes Maximum chlorine content of rosin flux (% mass)	: 260°C or below : 10 seconds or less : 60 seconds or less : 120±30 seconds : 3 times : 0.2%(Wt.) or below	IR260
Partial Heating	Peak temperature (pin temperature) Soldering time (per side of device) Maximum chlorine content of rosin flux (% mass)	: 350°C or below : 3 seconds or less : 0.2%(Wt.) or below	HS350

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

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M8E 02. 11-1

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