

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
NE3510M04

L TO S BAND LOW NOISE AMPLIFIER
 N-CHANNEL HJ-FET

FEATURES

- Low noise figure and high associated gain
 NF = 0.45 dB TYP., $G_a = 16$ dB TYP. @ $f = 4$ GHz, $V_{DS} = 2$ V, $I_D = 15$ mA
 NF = 0.35 dB TYP., $G_a = 19$ dB TYP. @ $f = 2$ GHz, $V_{DS} = 2$ V, $I_D = 10$ mA (Reference only)
- Flat-lead 4-pin thin-type super minimold (M04) package

APPLICATIONS

- Satellite radio (SDARS, DMB, etc.) antenna LNA
- Low noise amplifier for microwave communication system

ORDERING INFORMATION

Part Number	Order Number	Package	Quantity	Marking	Supplying Form
NE3510M04	NE3510M04-A	Flat-lead 4-pin thin-type super minimold (M04) (Pb-Free)	50 pcs (Non reel)	V81	<ul style="list-style-type: none"> • 8 mm wide embossed taping • Pin 1 (Source), Pin 2 (Drain) face the perforation side of the tape
NE3510M04-T2	NE3510M04-T2-A		3 kpcs/reel		
NE3510M04-T2B	NE3510M04-T2B-A		15 kpcs/reel		

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Remark To order evaluation samples, contact your nearby sales office.
 Part number for sample order: NE3510M04

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	140	μA
Total Power Dissipation	P_{tot}^{Note}	125	mW
Channel Temperature	T_{ch}	+150	°C
Storage Temperature	T_{stg}	-65 to +150	°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.

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.
 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)

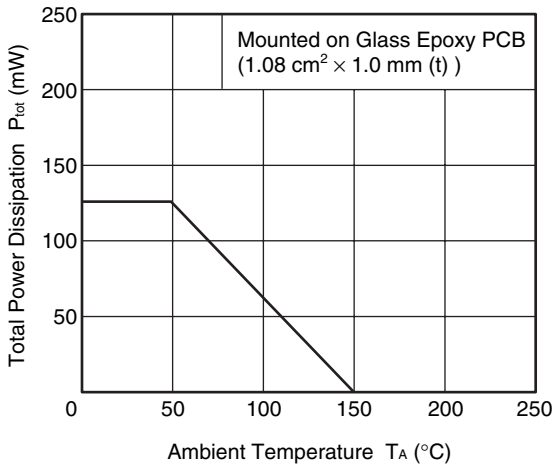
Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Drain to Source Voltage	V _{DS}	–	2	3	V
Drain Current	I _D	–	15	30	mA
Input Power	P _{in}	–	–	0	dBm

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

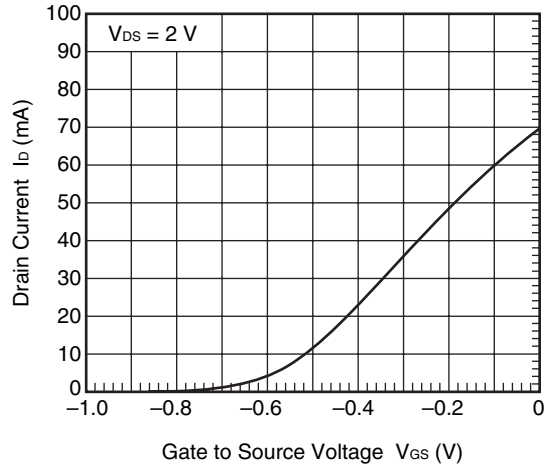
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Gate to Source Leak Current	I _{GSO}	V _{GS} = –3 V	–	0.5	10	μA
Saturated Drain Current	I _{DSS}	V _{DS} = 2 V, V _{GS} = 0 V	42	70	97	mA
Gate to Source Cutoff Voltage	V _{GS(off)}	V _{DS} = 2 V, I _D = 100 μA	–0.35	–0.7	–1.10	V
Transconductance	g _m	V _{DS} = 2 V, I _D = 15 mA	70	–	–	mS
Noise Figure	NF	V _{DS} = 2 V, I _D = 15 mA, f = 4 GHz	–	0.45	0.65	dB
Associated Gain	G _a		14.5	16	–	dB
Gain 1 dB Compression Output Power	P _{O(1 dB)}	V _{DS} = 2 V, I _D = 15 mA (Non-RF), f = 4 GHz	–	+11	–	dBm

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

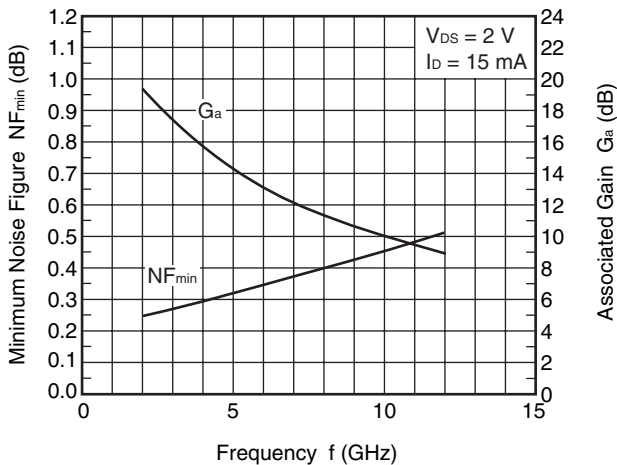
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



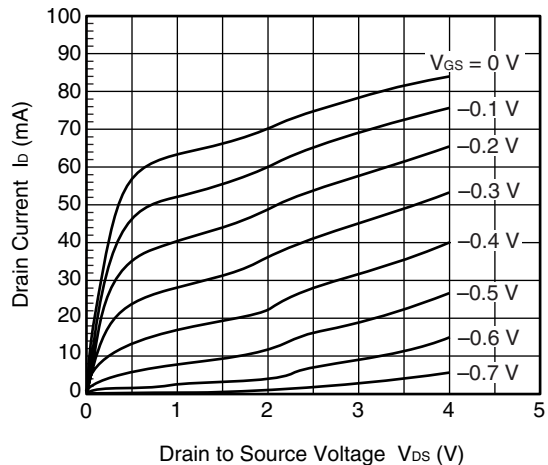
DRAIN CURRENT vs. GATE TO SOURCE VOLTAGE



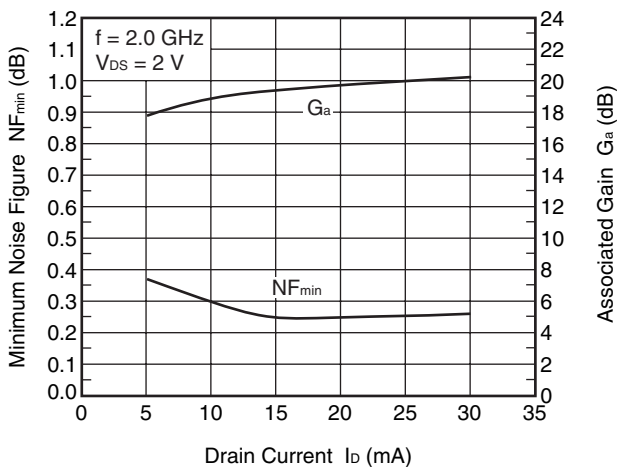
MINIMUM NOISE FIGURE, ASSOCIATED GAIN vs. FREQUENCY



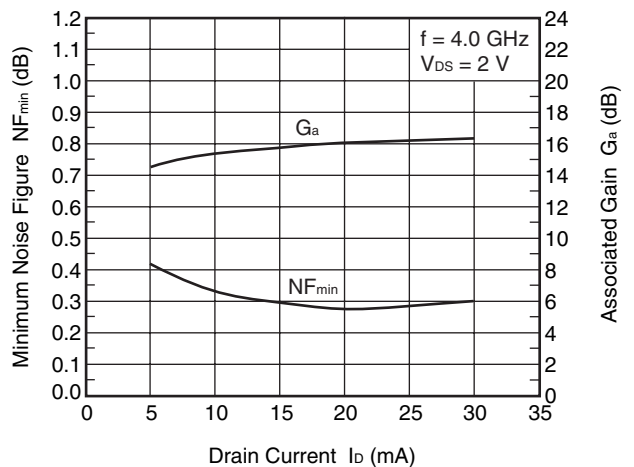
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



MINIMUM NOISE FIGURE, ASSOCIATED GAIN vs. DRAIN CURRENT

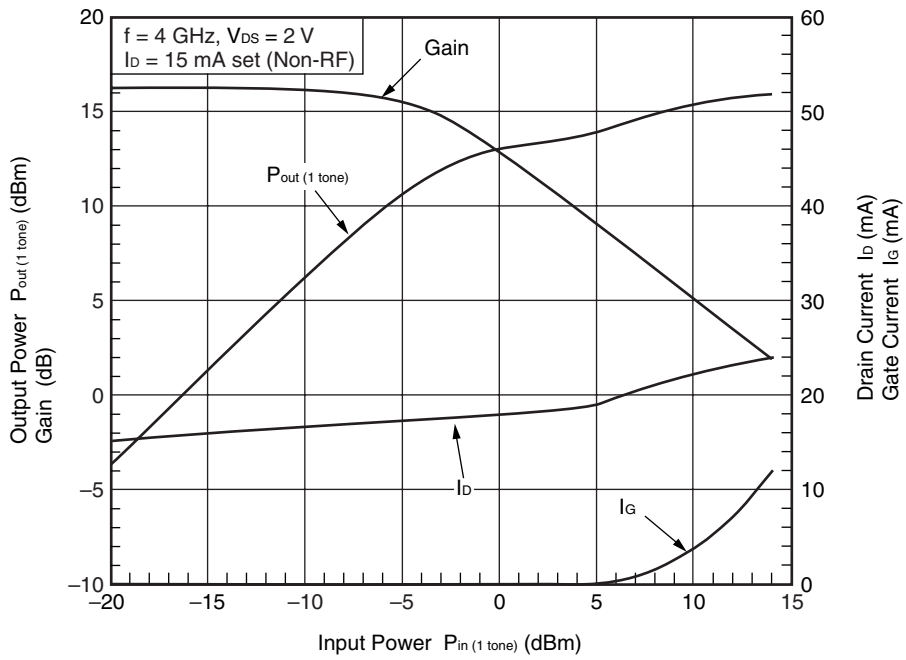


MINIMUM NOISE FIGURE, ASSOCIATED GAIN vs. DRAIN CURRENT

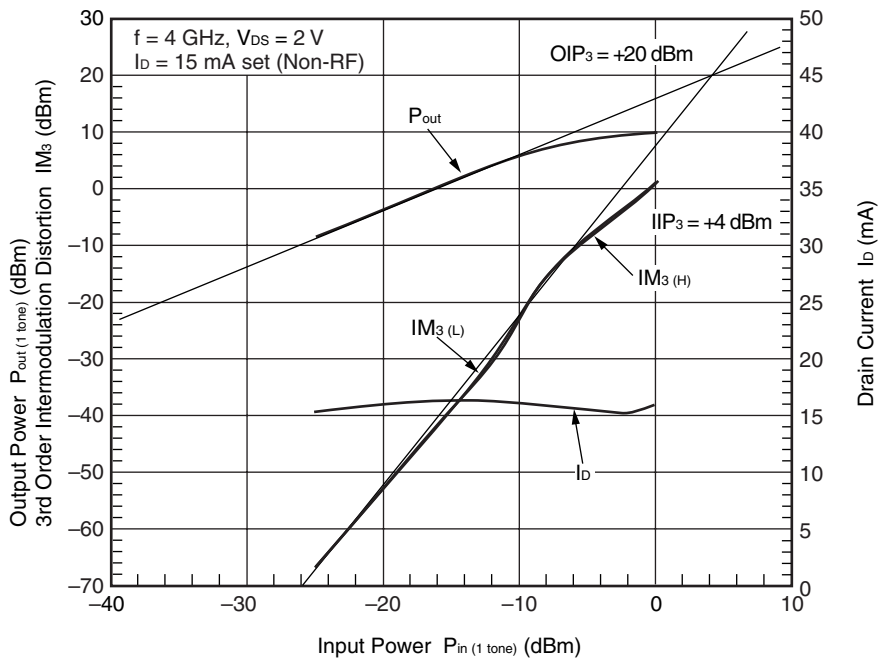


Remark The graphs indicate nominal characteristics.

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



OUTPUT POWER, IM3, 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 format (S2P) that enables the direct import of the parameters to microwave circuit simulators without the need for keyboard inputs.

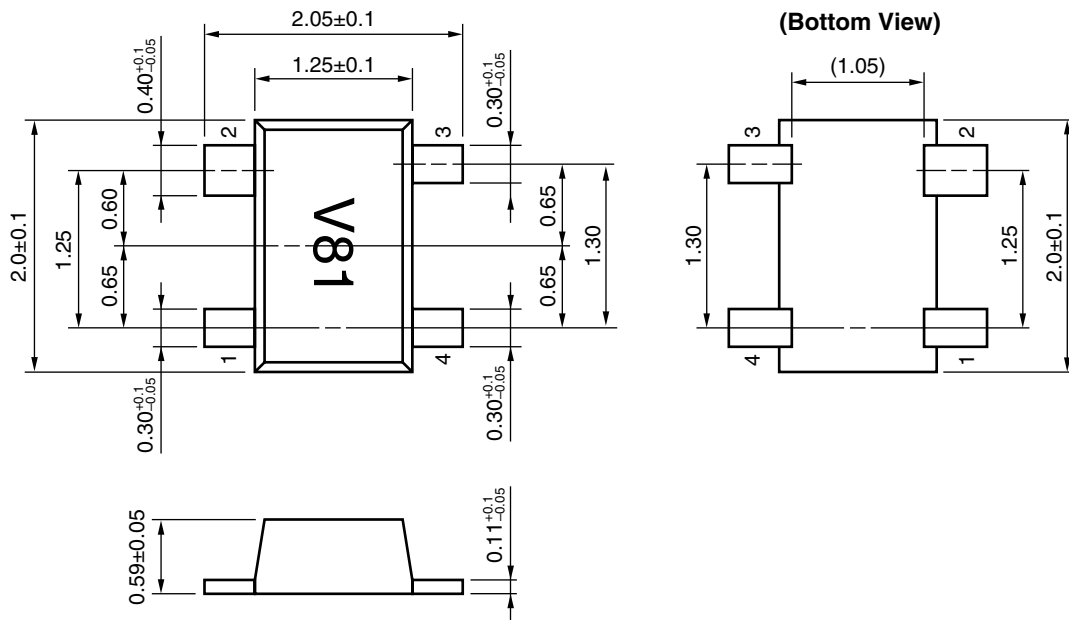
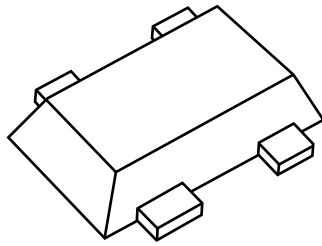
Click here to download S-parameters.

[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)

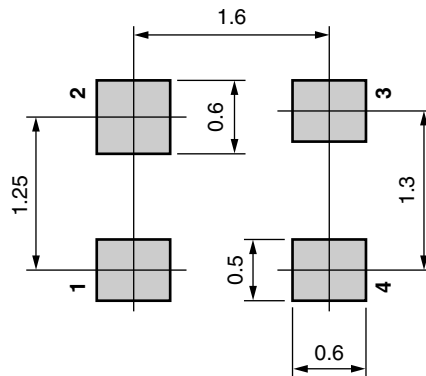


PIN CONNECTIONS

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

MOUNTING PAD DIMENSIONS (REFERENCE ONLY)

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

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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