

To our customers,

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## Old Company Name in Catalogs and Other Documents

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On April 1<sup>st</sup>, 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 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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

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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:  $W_g = 160$   $\mu$ m

**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	<ul style="list-style-type: none"> <li>• 8 mm wide embossed taping</li> <li>• Pin 1 (Source), Pin 2 (Drain) face the perforation side of the tape</li> </ul>
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<sub>A</sub> = +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	$\mu$ A
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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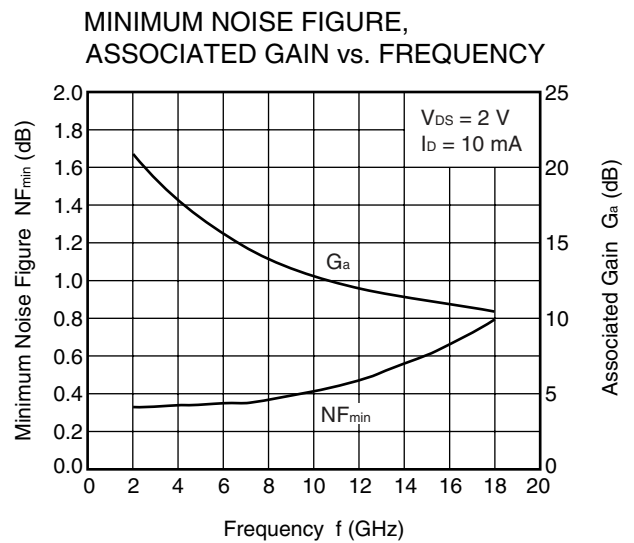
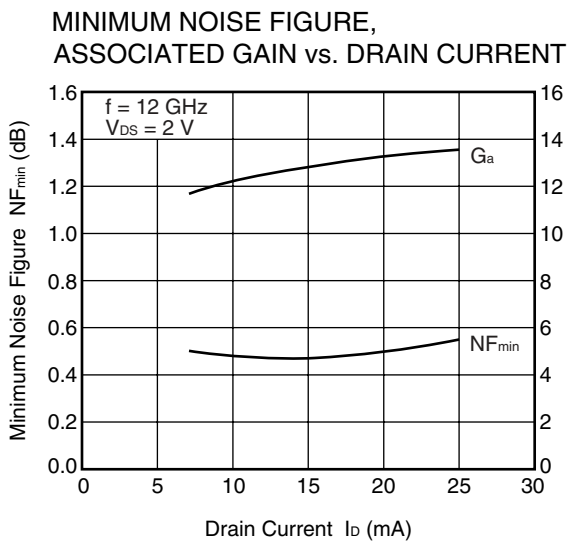
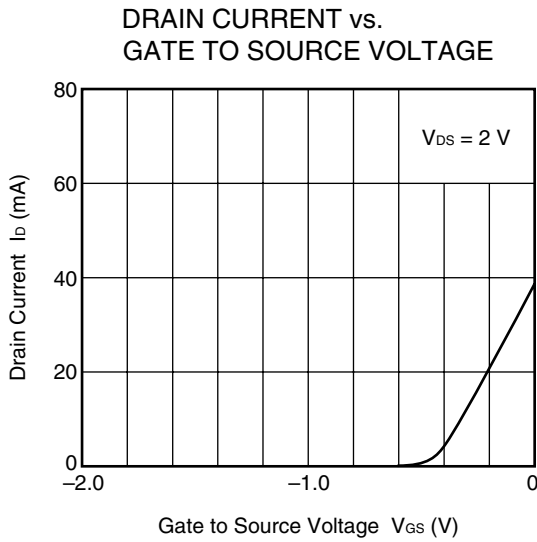
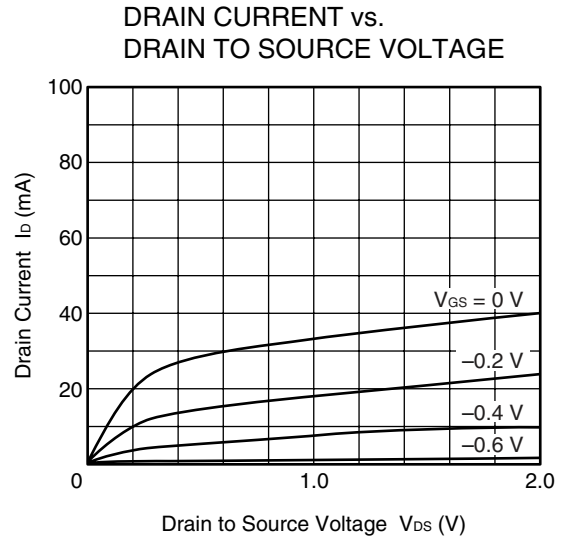
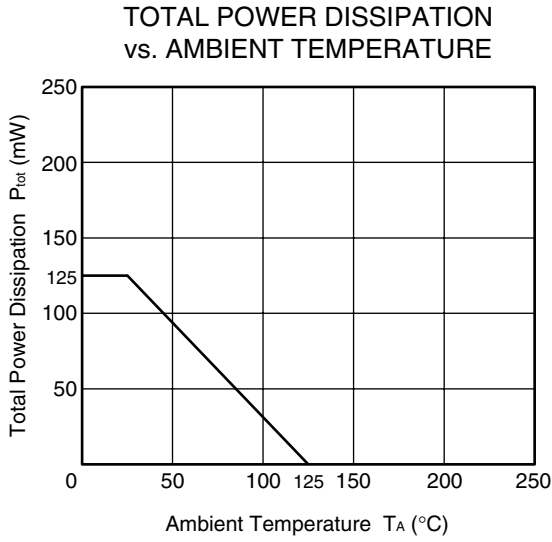
**RECOMMENDED OPERATING CONDITIONS (T<sub>A</sub> = +25°C)**

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
<R> Drain to Source Voltage	V <sub>DS</sub>	1	2	3	V
<R> Drain Current	I <sub>D</sub>	5	10	15	mA
Input Power	P <sub>in</sub>	–	–	0	dBm

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = +25°C, unless otherwise specified)**

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
<R> Gate to Source Leak Current	I <sub>GSO</sub>	V <sub>GS</sub> = –3.0 V	–	0.5	10	μA
<R> Saturated Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 2 V, V <sub>GS</sub> = 0 V	25	40	70	mA
<R> Gate to Source Cutoff Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 2 V, I <sub>D</sub> = 100 μA	–0.2	–0.7	–1.5	V
<R> Transconductance	g <sub>m</sub>	V <sub>DS</sub> = 2 V, I <sub>D</sub> = 10 mA	40	55	–	mS
<R> Noise Figure	NF	V <sub>DS</sub> = 2 V, I <sub>D</sub> = 10 mA, f = 12 GHz	–	0.45	0.65	dB
<R> Associated Gain	G <sub>a</sub>		11.0	12.0	–	dB

**TYPICAL CHARACTERISTICS (T<sub>A</sub> = +25°C, unless otherwise specified)**



**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.

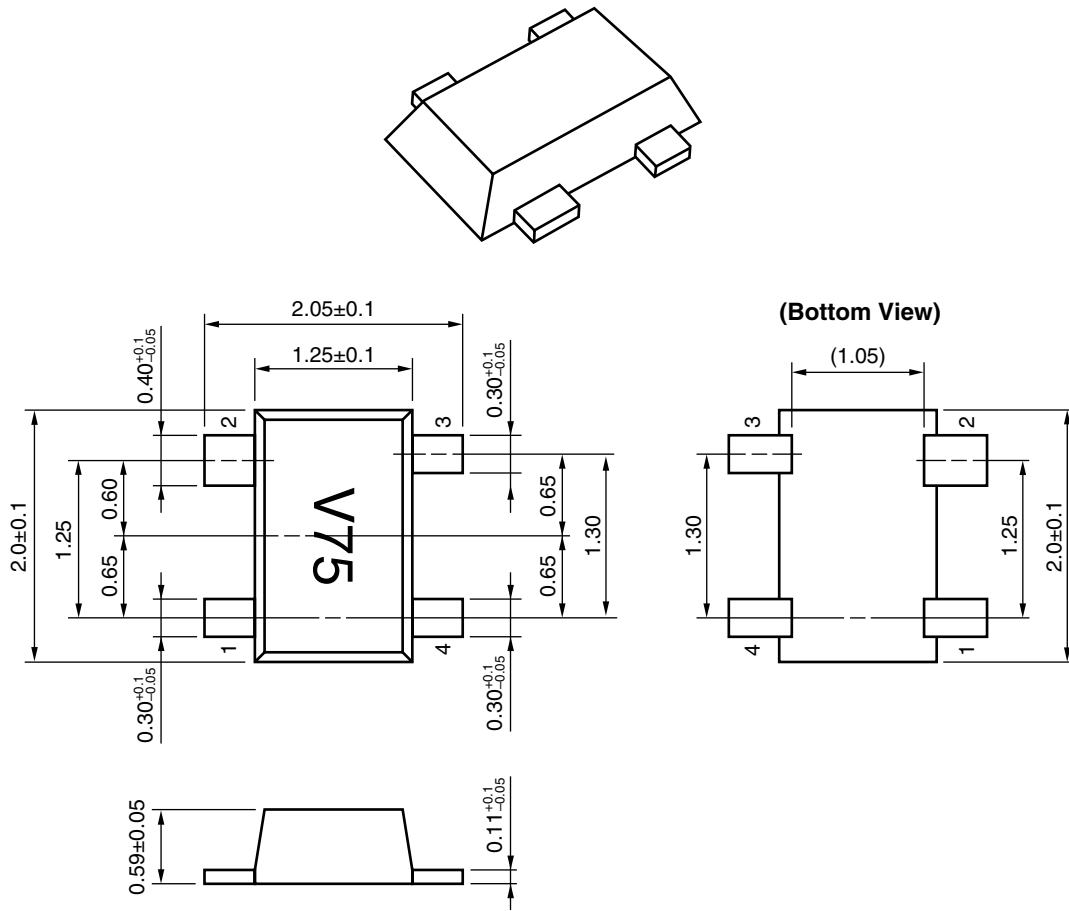
Click here to download S-parameters.

[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)



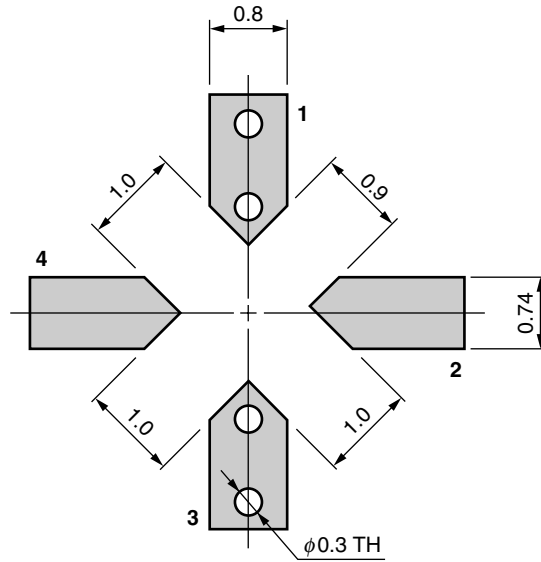
PIN CONNECTIONS

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

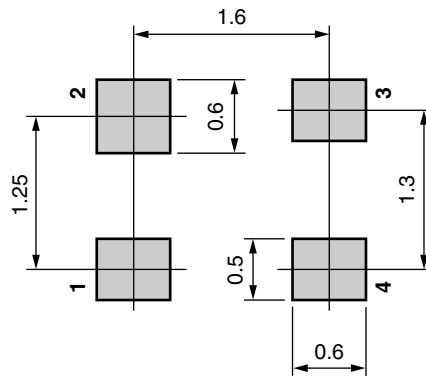
MOUNTING PAD DIMENSIONS

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)	: 260°C or below	IR260
	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 (pin temperature)	: 350°C or below	HS350
	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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"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).

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