

## DATA SHEET

# NEC

# 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  
NF = 0.55 dB TYP.,  $G_a = 11.5$  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:  $W_g = 160 \mu\text{m}$

### APPLICATIONS

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

### ORDERING INFORMATION

Part Number	Quantity	Marking	Supplying Form
NE3503M04	50 pcs (Non reel)	V75	• 8 mm wide embossed taping
NE3503M04-T2	3 kpcs/reel		• Pin 1 (Source), Pin 2 (Drain) face the perforation side of the tape

**Remark** To order evaluation samples, contact your nearby sales office.

Part number for sample order: NE3503M04

### ABSOLUTE MAXIMUM RATINGS ( $T_A = +25^\circ\text{C}$ )

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	$\mu\text{A}$
Total Power Dissipation	$P_{tot}$	125	mW
Channel Temperature	$T_{ch}$	+125	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-65 to +125	$^\circ\text{C}$

**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 devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

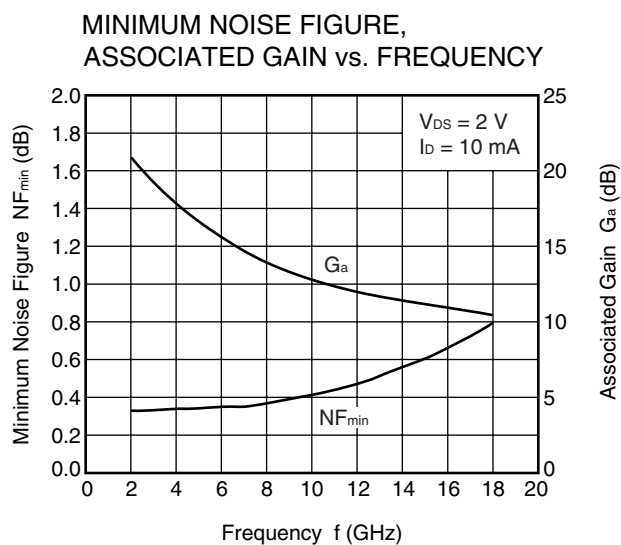
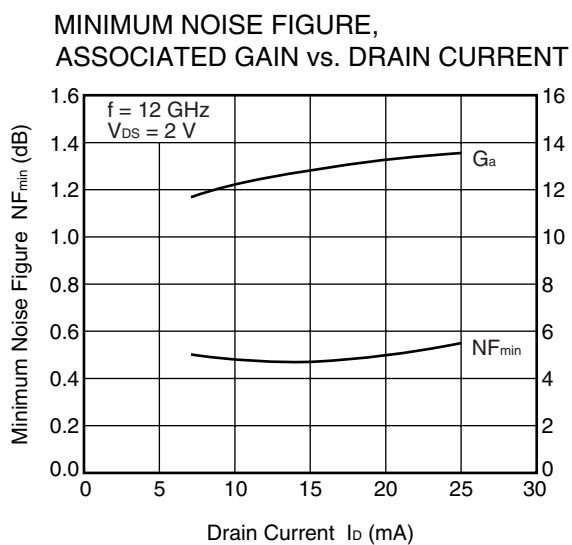
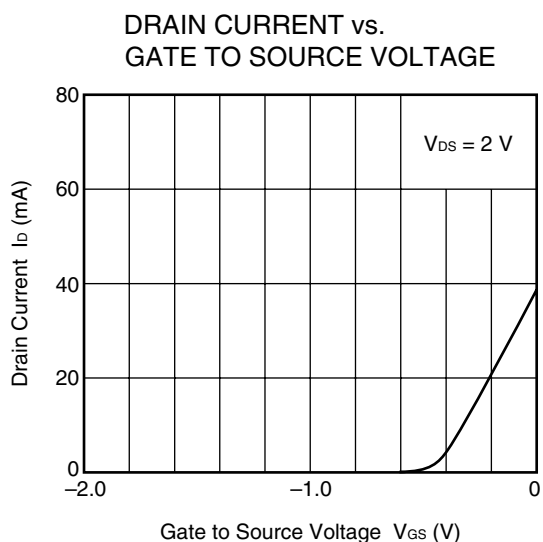
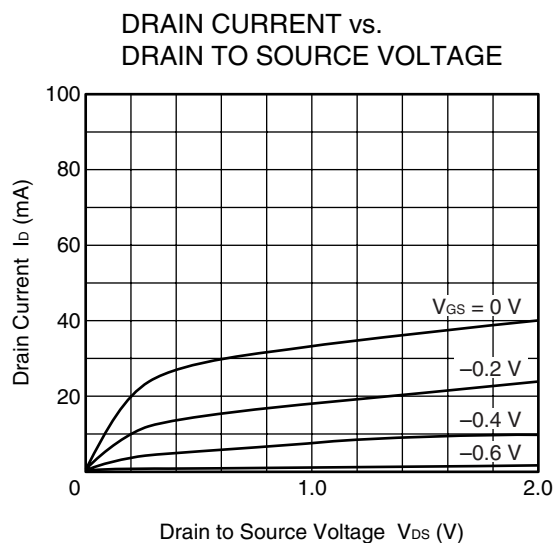
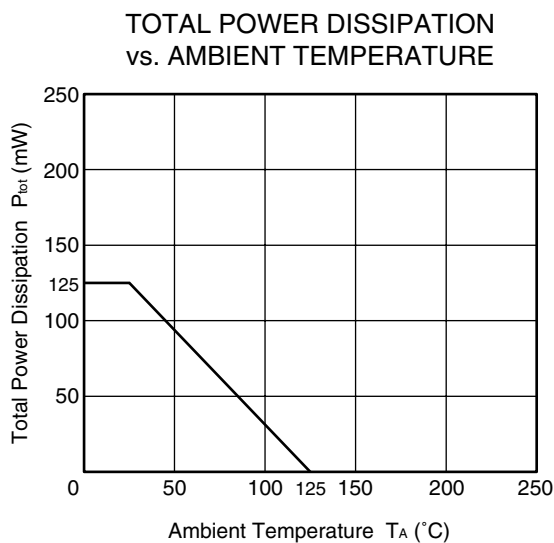
**RECOMMENDED OPERATING CONDITIONS ( $T_A = +25^\circ\text{C}$ )**

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

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

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Gate to Source Leak Current	$I_{GSO}$	$V_{GS} = -3.0\text{ V}$	–	0.5	10	$\mu\text{A}$
Saturated Drain Current	$I_{DSS}$	$V_{DS} = 2\text{ V}, V_{GS} = 0\text{ V}$	15	40	70	mA
Gate to Source Cutoff Voltage	$V_{GS(off)}$	$V_{DS} = 2\text{ V}, I_D = 100\text{ }\mu\text{A}$	–0.2	–0.7	–2.0	V
Transconductance	$g_m$	$V_{DS} = 2\text{ V}, I_D = 10\text{ mA}$	40	55	–	mS
Noise Figure	NF	$V_{DS} = 2\text{ V}, I_D = 10\text{ mA}, f = 12\text{ GHz}$	–	0.55	0.75	dB
Associated Gain	$G_a$		10.5	11.5	–	dB

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



**Remark** The graphs indicate nominal characteristics.

**S-PARAMETERS**

S-parameters/Noise parameters are provided on the NEC Compound Semiconductor Devices Web site in a form (S2P) that enables direct import to a microwave circuit simulator without keyboard input.

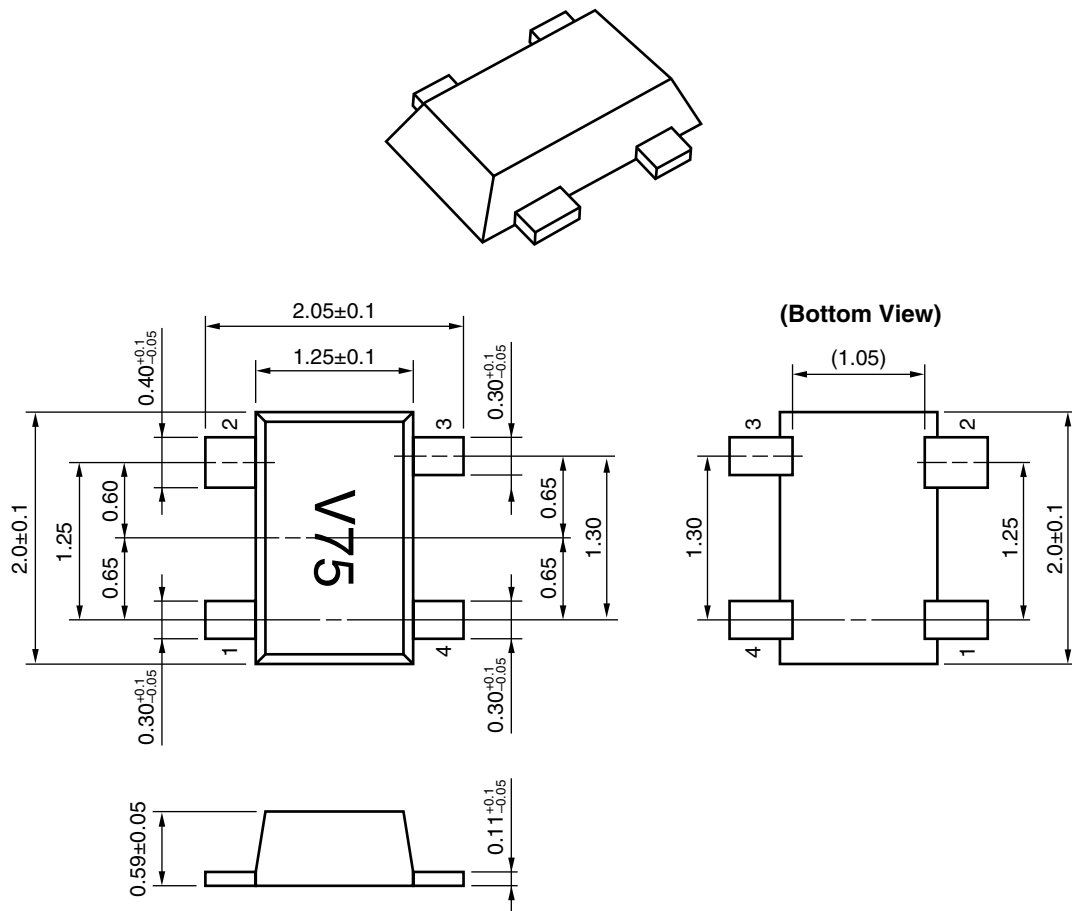
Click here to download S-parameters.

[RF and Microwave] → [Device Parameters]

URL <http://www.ncsd.necel.com/>

# PACKAGE DIMENSIONS

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



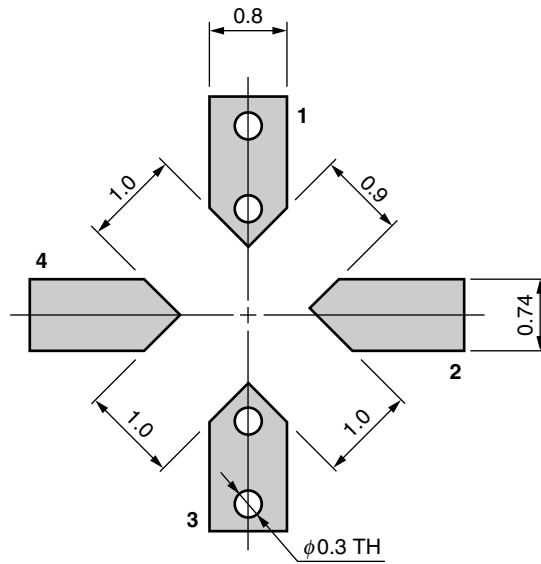
## PIN CONNECTIONS

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

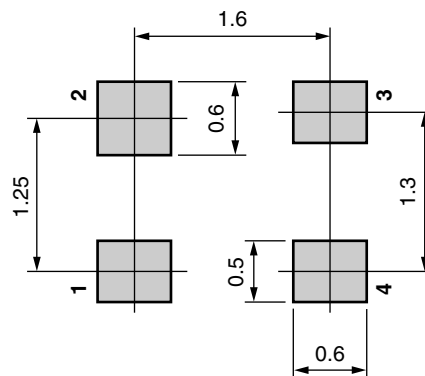
MOUNTING PAD DIMENSIONS

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

- **The information in this document is current as of January, 2004. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC's data sheets or data books, etc., for the most up-to-date specifications of NEC semiconductor products. Not all products and/or types are available in every country. Please check with an NEC sales representative for availability and additional information.**
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M8E 00.4-0110



<b>Caution</b>	GaAs Products	<p>This product uses gallium arsenide (GaAs). GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points.</p> <ul style="list-style-type: none"> <li>• Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below.</li> </ul> <ol style="list-style-type: none"> <li>1. Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials.</li> <li>2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal.</li> </ol> <ul style="list-style-type: none"> <li>• Do not burn, destroy, cut, crush, or chemically dissolve the product.</li> <li>• Do not lick the product or in any way allow it to enter the mouth.</li> </ul>
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► For further information, please contact

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