

# NE3521M04

N-Channel GaAs HJ-FET, K Band Low Noise and High-Gain

## FEATURES

• Low noise figure and high associated gain:

NF = 0.85 dB TYP., Ga = 11 dB TYP. @  $V_{DS}$  = 2 V,  $I_D$  = 10 mA, f = 20 GHz

NF = 0.9 dB TYP., Ga = 10.5 dB TYP.  $@V_{DS} = 2 V$ ,  $I_D = 6mA$ , f = 20 GHz (Reference Value)

• Flat-lead 4-pin thin-type super minimold (M04) package

## **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
NE3521M04-T2	NE3521M04-T2-A	Flat-lead 4-pin	3 kpcs/reel	V86	<ul> <li>Embossed tape 8 mm wide</li> </ul>
		thin-type super minimold (M04)			• Pin 1 (Source), Pin 2 (Drain) face the perforation side of the
NE3521M04-T2B	NE3521M04-T2B-A	(Pb-Free)	15 kpcs/reel		tape

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

Part number for sample order: NE3521M04

## ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = +25°C, unless otherwise specified)

Parameter	Symbol	Ratings	Unit
Drain to Source Voltage	V <sub>DS</sub>	4.0	V
Gate to Source Voltage	V <sub>GS</sub>	-3.0	V
Drain Current	I <sub>D</sub>	I <sub>DSS</sub>	mA
Gate Current	l <sub>G</sub>	80	μA
Total Power Dissipation Note	P <sub>tot</sub>	125	mW
Channel Temperature	T <sub>ch</sub>	+125	°C
Storage Temperature	T <sub>stg</sub>	–65 to +125	°C

Note: Mounted on 1.08  $\text{cm}^2 \times 1.0 \text{ mm}$  (t) glass epoxy PWB

### CAUTION

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

**RECOMMENDED OPERATING RANGE (T<sub>A</sub> = +25°C, unless otherwise specified)** 

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

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

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Gate to Source Leak Current	I <sub>GSO</sub>	$V_{GS} = -3.0 V$	_	0.5	10	μA
Saturated Drain Current	I <sub>DSS</sub>	$V_{DS} = 2 V, V_{GS} = 0 V$	25	45	70	mA
Gate to Source Cut-off Voltage	V <sub>GS (off)</sub>	V <sub>DS</sub> = 2 V, I <sub>D</sub> = 100 <i>µ</i> A	-0.2	-0.7	-1.3	V
Transconductance	gm	V <sub>DS</sub> = 2 V, I <sub>D</sub> = 10 mA	50	_	-	mS
Noise Figure	NF	V <sub>DS</sub> = 2 V, I <sub>D</sub> = 10 mA, f = 20 GHz	-	0.85	1.2	dB
Associated Gain	Ga		9	11	-	dB

# **STANDARD CHARACTERISTICS FOR REFERENCE** $(T_A = +25^{\circ}C, unless otherwise specified)$

Parameter	Symbol	Test Conditions	Reference Value	Unit
Noise Figure	NF	$V_{DS}$ = 2 V, $I_{D}$ = 6 mA, f = 20 GHz	0.9	dB
Associated Gain	Ga		10.5	dB





DRAIN CURRENT vs.

-0.40

DRAIN CURRENT

2.0

-0.20

VGS = 0 V

-0.1 V

-0.2 V

-0.3 V

-0.4 V -0.5 V

3.0

4.0

0.00

-0.60

1.0







## **S-PARAMETERS**

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

Click here to download S-parameters.

 $[\mathsf{Products}] \to [\mathsf{RF} \ \mathsf{Devices}] \to [\mathsf{Device} \ \mathsf{Parameters}]$ 

URL http://www.renesas.com/products/microwave/



## PACKAGE DIMENSIONS

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





(Bottom View)



#### **PIN CONNECTIONS**

- 1. Source
- Drain
   Source
- 4. Gate

## MOUNTING PAD DIMENSIONS

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

## -Reference 1-



-Reference 2-



**Device Direction** 



**Remark** The mounting pad layout in this document is for reference only.



## **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 (package surface 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).



Caution GaAs Products	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.
	<ul> <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> <li>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> </ol>
	<ol><li>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>
	Do not burn, destroy, cut, crush, or chemically dissolve the product.
	<ul> <li>Do not lick the product or in any way allow it to enter the mouth.</li> </ul>



Revision	History
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## NE3521M04 Data Sheet

		Description	
Rev.	Date	Page	Summary
1.00	Mar 19, 2013	-	First edition issued

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