NEC

GaAs MES FET
NE72118

C to X BAND AMPLIFIER
C to X BAND OSC
N-CHANNEL GaAs MES FET

FEATURES

- High Power Gain: Gs = 5.5 dB TYP. @f = 12 GHz
- Gate Length: Lg = 0.8 μm (recessed gate)
- Gate Width: Wg = 330 μm
- 4 pins super mini mold
- Tape & reel packaging only available

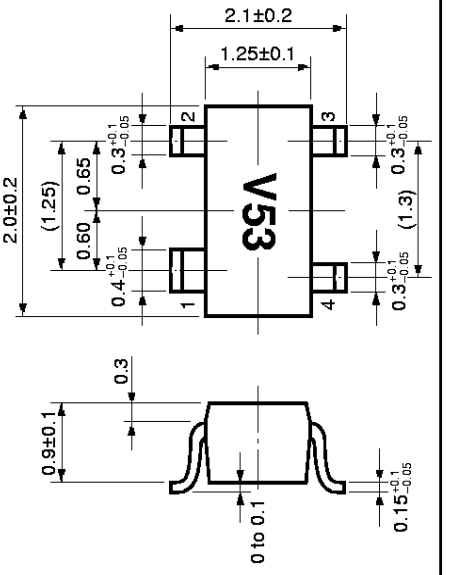
ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKING STYLE
NE72118-T1	3 Kpcs/Reel.	Embossed tape 8 mm wide. Pin 3 (Source), Pin 4 (Drain) face to perforation side of the tape.
NE72118-T2	3 Kpcs/Reel.	Embossed tape 8 mm wide. Pin 1 (Source), Pin 2 (Gate) face to perforation side of the tape.

* Please contact with responsible NEC person, if you require evaluation sample. Unit sample quantity shall be 50 pcs. (Part No.: NE72118)

PACKAGE DIMENSIONS

in millimeters



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

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

Drain to Source Voltage	V_{DS}	5.0	V
Gate to Source Voltage	V_{GS}	−6.0	V
Gate to Drain Voltage	V_{GD}	−6.0	V
Drain Current	I_D	I_{DSS}	mA
Total Power Dissipation	P_{tot}	250	mW
Channel Temperature	T_{ch}	125	°C
Storage Temperature	T_{stg}	−65 to +125	°C

The information in this document is subject to change without notice.

Document No. P12253EJ2V0DS00 (2nd edition)
Date Published March 1997 N
Printed in Japan

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

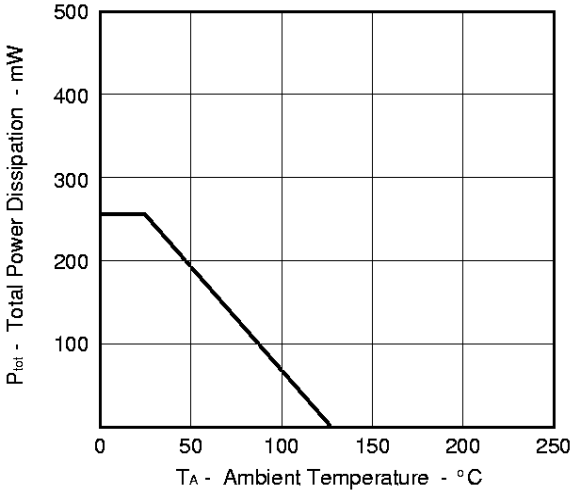
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Gate to Source Leak Current	I_{GSO}		1.0	10	μA	V_{GS} = −5 V
Saturated Drain Current	I_{DSS}	30	60	100	mA	V_{DS} = 3 V, V_{GS} = 0 V
Gate to Source Cut off Voltage	$V_{GS(off)}$	−0.5	−2.0	−4.0	V	V_{DS} = 3 V, I_D = 100 μA
Transconductance	gm	20	40		mS	V_{DS} = 3 V, I_D = 30 mA
Phase Noise	PN		−110		dBc/Hz	V_{DS} = 3 V, I_D = 30 mA f = 11 GHz 100 kHz offset
			−85		dBc/Hz	V_{DS} = 3 V, I_D = 30 mA f = 11 GHz 10 kHz offset
Power Gain	Gs		5.5		dB	V_{DS} = 3 V, I_D = 30 mA f = 12 GHz
Output Power at 1 dB Gain Compression point	Po (1 dB)		13.5		dBm	V_{DS} = 3 V, I_D = 30 mA f = 12 GHz

I_{DSS} CLASSIFICATION

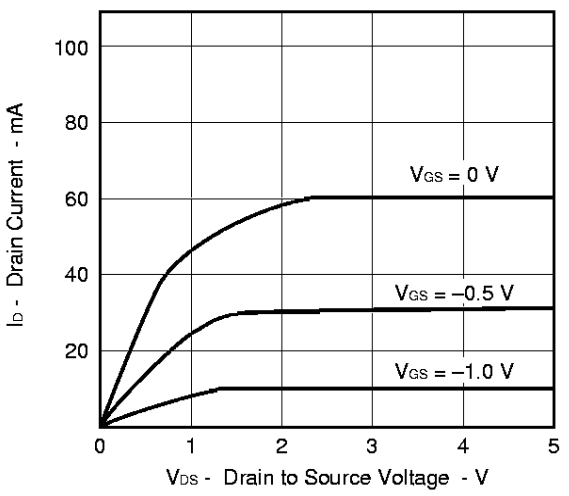
Rank	I_{DSS} (mA)	MARKING
53	30 to 100	V53
54	55 to 100	V54
55	30 to 65	V55

TYPICAL CHARACTERISTICS (T_A = 25 °C)

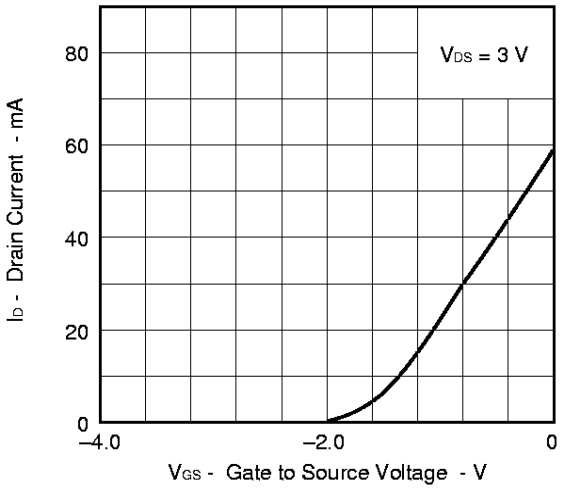
TOTAL POWER DISSIPATION vs.
AMBIENT TEMPERATURE



DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



DRAIN CURRENT vs.
GATE TO SOURCE VOLTAGE



S-PARAMETER

MAG. AND ANG.

V_{DS} = 3 V, I_D = 10 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
2000	.922	−46.8	2.257	134.5	.067	58.5	.667	−27.5
3000	.864	−66.8	2.171	116.4	.089	47.7	.627	−39.0
4000	.784	−89.8	2.125	97.4	.104	37.0	.591	−49.5
5000	.709	−116.1	2.049	77.5	.110	25.3	.545	−58.9
6000	.658	−140.5	1.927	58.5	.107	17.8	.481	−68.0
7000	.623	−164.0	1.780	40.2	.101	13.2	.416	−80.0
8000	.597	171.4	1.639	23.3	.095	12.7	.358	−92.8
9000	.613	146.3	1.545	6.5	.100	16.8	.323	−109.6
10000	.677	125.6	1.450	−12.0	.117	16.3	.284	−137.3
11000	.749	107.4	1.297	−31.1	.136	10.0	.251	−178.5
12000	.797	90.8	1.117	−48.8	.147	1.6	.295	138.4
13000	.839	78.4	.959	−65.1	.159	−8.4	.395	107.9
14000	.877	65.7	.811	−82.3	.164	−20.8	.499	85.8
15000	.909	51.9	.636	−99.1	.157	−33.1	.577	68.3
16000	.934	43.9	.483	−111.1	.145	−42.7	.643	54.4
17000	.928	40.2	.376	−118.6	.136	−49.3	.733	44.4
18000	.920	31.7	.306	−125.6	.126	−55.8	.795	39.5

AMP. PARAMETER

V_{DS} = 3 V, I_D = 10 mA

FREQUENCY MHz	GUmax dB	GAmax dB	$\|S_{21}\|^2$ dB	$\|S_{12}\|^2$ dB	K	Delay ns	Mason's U dB	G1 dB	G2 dB
2000	17.86		7.07	−23.49	.38	.064	20.787	8.24	2.55
3000	14.86		6.73	−21.05	.50	.050	19.443	5.96	2.17
4000	12.57		6.55	−19.62	.65	.053	18.058	4.15	1.87
5000	10.79		6.23	−19.14	.83	.055	15.937	3.03	1.53
6000	9.31	10.84	5.70	−19.42	1.08	.053	14.113	2.47	1.14
7000	7.97	8.79	5.01	−19.89	1.38	.051	12.135	2.13	.82
8000	6.80	7.42	4.29	−20.44	1.72	.047	10.166	1.91	.59
9000	6.30	7.03	3.78	−20.03	1.70	.047	9.776	2.05	.48
10000	6.25	7.31	3.23	−18.62	1.37	.051	10.424	2.66	.36
11000	6.11	7.58	2.26	−17.30	1.13	.053	10.310	3.57	.28
12000	5.73	7.19	.96	−16.63	1.07	.049	8.722	4.37	.40
13000	5.67		−.36	−15.96	.95	.045	8.001	5.29	.74
14000	5.79		−1.81	−15.68	.83	.048	7.689	6.36	1.25
15000	5.42		−3.93	−16.07	.79	.047	6.575	7.60	1.76
16000	4.97		−6.32	−16.75	.75	.033	5.777	8.97	2.32
17000	3.43		−8.49	−17.35	.86	.021	3.808	8.58	3.35
18000	2.18		−10.29	−18.02	.97	.019	2.340	8.12	4.35

S-PARAMETER

MAG. AND ANG.

V_{DS} = 3 V, I_D = 20 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
2000	.907	−49.0	2.672	133.0	.061	58.3	.637	−27.5
3000	.838	−69.9	2.534	114.7	.081	48.6	.594	−38.8
4000	.752	−93.4	2.437	95.8	.093	38.1	.561	−48.8
5000	.675	−120.3	2.318	76.0	.098	29.5	.521	−57.4
6000	.627	−144.7	2.155	57.5	.096	24.3	.459	−65.3
7000	.591	−168.0	1.972	39.6	.095	21.6	.394	−76.3
8000	.570	167.6	1.803	23.2	.093	22.7	.337	−88.8
9000	.592	143.3	1.695	7.0	.104	24.6	.307	−104.8
10000	.666	123.6	1.594	−11.0	.125	22.4	.269	−132.2
11000	.742	105.8	1.429	−29.9	.144	13.7	.226	−173.8
12000	.794	89.6	1.239	−47.1	.157	4.7	.260	139.7
13000	.838	77.7	1.073	−63.6	.168	−5.6	.365	107.7
14000	.880	65.3	.913	−81.1	.173	−18.0	.476	85.9
15000	.914	51.1	.723	−98.1	.166	−31.7	.552	69.2
16000	.939	43.3	.552	−110.5	.153	−40.2	.617	55.1
17000	.935	39.5	.431	−118.9	.141	−48.1	.707	44.5
18000	.920	30.8	.350	−124.9	.134	−57.2	.788	39.6

AMP. PARAMETER

V_{DS} = 3 V, I_D = 20 mA

FREQUENCY MHz	GUmax dB	GAmax dB	$\|S_{21}\|^2$ dB	$\|S_{12}\|^2$ dB	K	Delay ns	Mason's U dB	G1 dB	G2 dB
2000	18.30		8.54	–24.33	.43	.066	21.197	7.50	2.26
3000	15.23		8.08	–21.88	.56	.051	20.047	5.26	1.89
4000	13.00		7.74	–20.59	.72	.053	18.259	3.62	1.64
5000	11.31		7.30	–20.15	.91	.055	17.087	2.64	1.37
6000	9.86	11.13	6.67	–20.33	1.15	.052	15.173	2.16	1.03
7000	8.50	9.29	5.90	–20.45	1.43	.050	12.982	1.87	.73
8000	7.35	7.97	5.12	–20.68	1.72	.046	10.881	1.71	.52
9000	6.89	7.66	4.58	–19.67	1.58	.045	10.644	1.88	.43
10000	6.93	8.19	4.05	–18.06	1.23	.050	11.553	2.55	.33
11000	6.80	8.85	3.10	–16.81	1.03	.052	11.430	3.48	.23
12000	6.49		1.86	–16.10	.98	.048	9.746	4.32	.30
13000	6.50		.61	–15.51	.89	.046	8.869	5.27	.62
14000	6.78		–.79	–15.25	.77	.049	8.507	6.45	1.12
15000	6.60		–2.82	–15.57	.71	.047	7.889	7.84	1.58
16000	6.17		–5.16	–16.30	.68	.034	6.643	9.25	2.08
17000	4.73		–7.30	–17.01	.76	.023	4.987	9.02	3.01
18000	3.20		–9.13	–17.44	.86	.017	3.626	8.12	4.21

S-PARAMETER

MAG. AND ANG.

V_{DS} = 3 V, I_D = 30 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
2000	.900	−50.1	2.906	132.3	.058	58.4	.640	−27.1
3000	.826	−71.2	2.733	114.0	.074	49.0	.596	−38.2
4000	.734	−94.9	2.611	95.2	.086	39.8	.563	−47.6
5000	.657	−121.9	2.466	75.7	.088	32.6	.524	−55.7
6000	.609	−146.2	2.286	57.4	.089	28.1	.468	−63.2
7000	.577	−169.5	2.084	39.8	.089	27.6	.407	−74.0
8000	.558	166.5	1.899	23.7	.091	30.1	.354	−85.7
9000	.581	142.6	1.789	7.8	.104	31.9	.323	−101.4
10000	.659	123.3	1.688	−10.0	.130	27.7	.285	−127.2
11000	.739	105.9	1.522	−28.8	.152	18.4	.238	−167.1
12000	.794	89.9	1.324	−46.2	.164	8.5	.260	145.9
13000	.840	77.8	1.150	−62.6	.177	−2.9	.359	112.2
14000	.888	65.3	.983	−80.4	.183	−16.4	.469	89.2
15000	.923	51.2	.781	−97.6	.175	−29.8	.549	71.6
16000	.944	43.3	.596	−110.4	.157	−39.7	.621	56.4
17000	.941	39.4	.465	−119.0	.147	−47.1	.712	45.5
18000	.922	30.8	.374	−125.9	.136	−54.5	.787	40.0

AMP. PARAMETER

V_{DS} = 3 V, I_D = 30 mA

FREQUENCY MHz	GUmax dB	GAmax dB	$\|S_{21}\|^2$ dB	$\|S_{12}\|^2$ dB	K	Delay ns	Mason's U dB	G1 dB	G2 dB
2000	18.76		9.27	−24.80	.44	.066	21.824	7.21	2.29
3000	15.62		8.73	−22.58	.59	.051	20.429	4.98	1.91
4000	13.35		8.33	−21.27	.76	.052	18.846	3.36	1.66
5000	11.69		7.84	−21.06	.96	.054	17.616	2.46	1.39
6000	10.27	11.46	7.18	−21.00	1.19	.051	15.786	2.01	1.07
7000	8.92	9.76	6.38	−20.98	1.44	.049	13.691	1.76	.79
8000	7.77	8.46	5.57	−20.83	1.66	.045	11.556	1.62	.58
9000	7.32	8.17	5.05	−19.67	1.50	.044	11.175	1.79	.48
10000	7.39	9.05	4.55	−17.71	1.12	.050	12.450	2.47	.37
11000	7.33		3.65	−16.34	.93	.052	12.431	3.43	.25
12000	7.06		2.43	−15.69	.89	.048	10.536	4.32	.30
13000	7.14		1.22	−15.03	.80	.046	9.718	5.32	.60
14000	7.67		−.15	−14.76	.68	.049	9.802	6.74	1.08
15000	7.68		−2.14	−15.14	.62	.048	9.075	8.27	1.56
16000	7.28		−4.49	−16.06	.60	.036	7.935	9.66	2.11
17000	5.80		−6.66	−16.65	.67	.024	6.011	9.39	3.07
18000	3.89		−8.55	−17.34	.82	.019	3.912	8.25	4.19

S-PARAMETER

MAG. AND ANG.

V_{DS} = 3 V, I_D = 40 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
2000	.894	−50.6	3.050	132.1	.053	59.6	.660	−26.6
3000	.817	−72.0	2.858	113.7	.068	49.2	.615	−37.0
4000	.725	−95.7	2.716	95.0	.078	41.5	.582	−46.0
5000	.647	−122.6	2.556	75.8	.080	33.7	.546	−53.7
6000	.600	−146.6	2.368	57.7	.079	34.1	.495	−61.2
7000	.569	−170.0	2.156	40.2	.082	34.0	.440	−71.7
8000	.550	166.1	1.968	24.2	.086	37.9	.394	−82.9
9000	.571	142.5	1.855	8.7	.104	40.5	.366	−97.4
10000	.653	123.9	1.760	−9.0	.134	35.6	.329	−121.7
11000	.737	106.6	1.602	−27.9	.159	24.5	.279	−158.0
12000	.799	90.5	1.398	−45.5	.176	13.2	.282	157.2
13000	.846	78.3	1.215	−62.3	.188	1.8	.368	120.6
14000	.895	65.9	1.045	−80.3	.195	−12.7	.477	95.3
15000	.931	51.6	.827	−98.1	.186	−26.9	.562	75.6
16000	.956	43.6	.630	−111.4	.169	−38.4	.635	59.3
17000	.949	39.4	.487	−120.5	.158	−47.0	.724	47.5
18000	.932	30.6	.386	−127.2	.144	−53.2	.792	41.7

AMP. PARAMETER

V_{DS} = 3 V, I_D = 40 mA

FREQUENCY MHz	GUmax dB	GAmax dB	$\|S_{21}\|^2$ dB	$\|S_{12}\|^2$ dB	K	Delay ns	Mason's U dB	G1 dB	G2 dB
2000	19.16		9.69	–25.51	.44	.067	23.057	6.99	2.48
3000	15.97		9.12	–23.33	.61	.051	20.581	4.78	2.07
4000	13.72		8.68	–22.19	.79	.052	19.425	3.24	1.80
5000	12.04	14.83	8.15	–21.92	1.00	.053	17.691	2.36	1.54
6000	10.65	11.83	7.49	–22.06	1.24	.050	16.421	1.94	1.22
7000	9.30	10.21	6.67	–21.73	1.45	.048	14.244	1.70	.93
8000	8.18	8.96	5.88	–21.34	1.63	.044	12.045	1.56	.73
9000	7.70	8.73	5.37	–19.70	1.41	.043	11.643	1.72	.62
10000	7.83	10.81	4.91	–17.44	1.00	.049	13.058	2.42	.50
11000	7.85		4.09	–15.98	.82	.053	13.349	3.41	.35
12000	7.69		2.91	–15.08	.76	.049	11.658	4.42	.36
13000	7.79		1.69	–14.50	.71	.047	10.225	5.46	.63
14000	8.52		.38	–14.19	.59	.050	10.481	7.01	1.12
15000	8.73		–1.65	–14.59	.53	.049	9.765	8.73	1.65
16000	8.84		–4.02	–15.44	.48	.037	9.669	10.61	2.24
17000	6.97		–6.25	–16.05	.53	.025	7.553	10.00	3.22
18000	4.84		–8.27	–16.84	.69	.019	4.828	8.83	4.28

RECOMMENDED SOLDERING CONDITIONS

The following conditions (see table below) must be met when soldering this product.

Please consult with our sales offices in case other soldering process is used, or in case soldering is done under different conditions.

<TYPES OF SURFACE MOUNT DEVICE>

For more details, refer to our document "SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL" (C10535E).

Soldering process	Soldering conditions	Symbol
VPS	Package peak temperature: 215 °C, Time: 40 seconds MAX. (200 °C MIN.), Number of times: 2, Number of days: not limited*	VP15-00-2
Wave soldering	Soldering bath temperature: 260 °C MAX., Time: 10 seconds MAX., Number of times: 1, Number of days: not limited*	WS60-00-1
Infrared ray reflow	Peak package's surface temperature: 230 °C or below, Reflow time: 30 seconds or below (210 °C or higher), Number of reflow process: 2, Exposure limit*: None	IR30-00-2
Partial heating method	Terminal temperature: 230 °C or below, Flow time: 10 seconds or below, Exposure limit*: None	

* Exposure limit before soldering after dry-pack package is opened.
Storage conditions: 25 °C and relative humidity at 65 % or less.

Note Do not apply more than a single process at once, except for "Partial heating method".

PRECAUTION **Avoid high static voltage and electric fields, because this device is MES FET with GaAs shottky barrier gate.**

[MEMO]

[MEMO]

[MEMO]

Caution

The Great Care must be taken in dealing with the devices in this guide.
The reason is that the material of the devices is GaAs (Gallium Arsenide), which is designated as harmful substance according to the law concerned.
Keep the law concerned and so on, especially in case of removal.

M4 96.5