

C TO X BAND AMPLIFIER C TO X BAND OSC N-CHANNEL GaAs MESFET

NE72118

FEATURES

- **HIGH POWER GAIN:**
Gs = 5.5 dB TYP at f = 12 GHz
- **GATE LENGTH:** Lg = 0.8 μm (recessed gate)
- **GATE WIDTH:** Wg = 330 μm
- **4 PINS SUPER MINI MOLD**
- **TAPE & REEL PACKAGING**

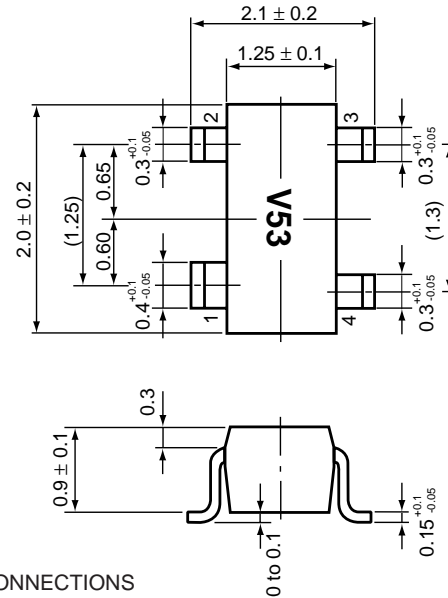
DESCRIPTION

The NE72118 is a high performance gallium arsenide metal semiconductor field effect transistor (MESFET), housed in a low cost plastic surface mount package (SOT 23 style). This device's low phase noise and high fT make it an excellent choice for oscillator applications on a digital LNB (Low Noise Block).

NEC's stringent quality assurance and test procedures ensure the highest reliability performance.

PACKAGE DIMENSIONS (Units in mm)

PACKAGE OUTLINE 18



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

ELECTRICAL CHARACTERISTICS (TA = 25°C)

PART NUMBER PACKAGE OUTLINE			NE72118 18		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
IGSO	Gate to Source Leak Current at VGS = -5 V	μA		1.0	10
IDSS	Saturated Drain Current at VDS = 3 V, VGS = 0 V	μA	30	60	100
VGS (OFF)	Gate to Source Cut off Voltage at VDS = 3 V, ID = 100 μA	V	-0.5	-2.0	-4.0
gm	Transconductance at VDS = 3 V, ID = 30 mA	mS	20	40	
PN	Phase Noise at VDS=3 V, ID=30mA, f=11GHz, 100KHz offset	dBc/Hz		-110	
	Phase Noise at VDS=3 V, ID=30mA, f=11GHz, 10KHz offset	dBc/Hz		-85	
Gs	Power Gain at VDS = 3 V, ID = 30 mA, f = 12 GHz	dB		5.5	
Po (1dB)	Output Power at 1 dB Gain Compression Point at VCE = 3 V, ID = 30 mA, f = 12 GHz	dBm		13.5	

ABSOLUTE MAXIMUM RATINGS¹ (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V _{DS}	Drain to Source Voltage	V	5.0
V _{GS}	Gate to Source Voltage	V	-6.0
V _{GD}	Gate to Drain Voltage	V	-6.0
I _D	Drain Current	mA	IDSS
P _{TOT}	Total Power Dissipation	mW	250
T _{CH}	Channel Temperature	°C	125
T _{STG}	Storage Temperature	°C	-65 to +125

Notes:

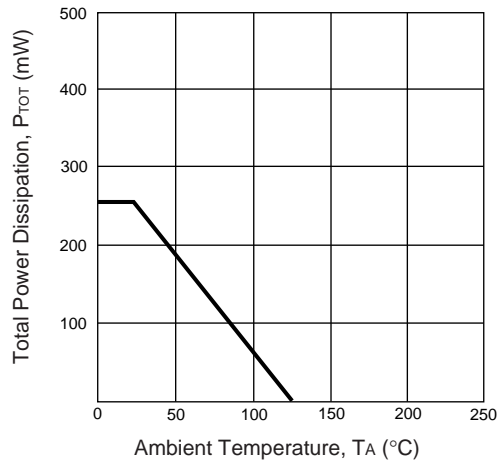
1. Operation in excess of any one of these parameters may result in permanent damage.

ORDERING INFORMATION

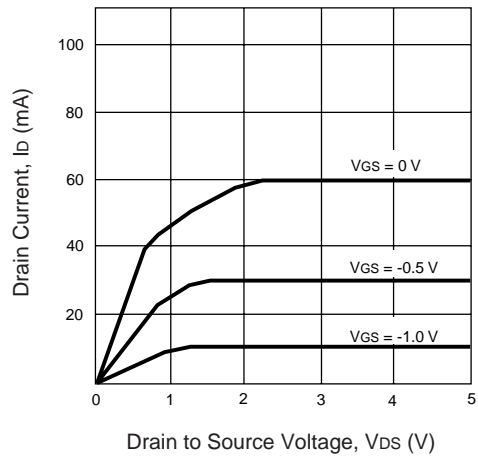
PART NUMBER	QUANTITY
NE72118-T1	3K/Reel
NE72118-T2	3K/Reel

TYPICAL PERFORMANCE CURVES (T_A = 25°C)

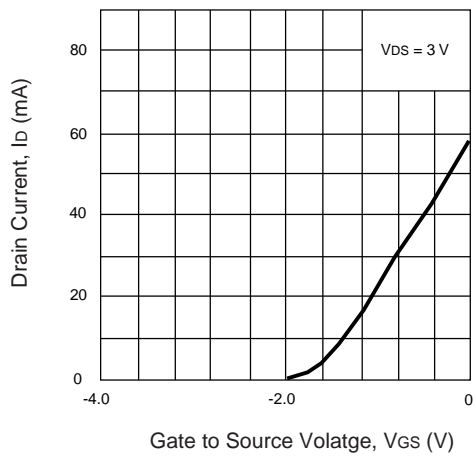
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



DRAIN CURRENT vs. GATE TO SOURCE VOLTAGE



TYPICAL SCATTERING PARAMETERS ($T_A = 25^\circ\text{C}$)**V_{DS} = 3 V, I_D = 10 mA**

FREQUENCY (MHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG ¹ (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
2000	0.922	-46.8	2.257	134.5	0.067	58.5	0.667	-27.5	0.38	17.86
3000	0.864	-66.8	2.171	116.4	0.089	47.7	0.627	-39.0	0.50	14.86
4000	0.784	-89.8	2.125	97.4	0.104	37.0	0.591	-49.5	0.65	12.57
5000	0.709	-116.1	2.049	77.5	0.110	25.3	0.545	-58.9	0.83	10.79
6000	0.658	-140.5	1.927	58.5	0.107	17.8	0.481	-68.0	1.08	10.84
7000	0.623	-164.0	1.780	40.2	0.101	13.2	0.416	-80.0	1.38	8.79
8000	0.597	171.4	1.639	23.3	0.095	12.7	0.358	-92.8	1.72	7.42
9000	0.613	146.3	1.545	6.5	0.100	16.8	0.323	-109.6	1.70	7.03
10000	0.677	125.6	1.450	-12.0	0.117	16.3	0.284	-137.3	1.37	7.31
11000	0.749	107.4	1.297	-31.1	0.136	10.0	0.251	-178.5	1.13	7.58
12000	0.797	90.8	1.117	-48.8	0.147	1.6	0.295	138.4	1.07	7.19
13000	0.839	78.4	0.959	-65.1	0.159	-8.4	0.395	107.9	0.95	5.67
14000	0.877	65.7	0.811	-82.3	0.164	-20.8	0.499	85.8	0.83	5.79
15000	0.909	51.9	0.636	-99.1	0.157	-33.1	0.577	68.3	0.79	5.42
16000	0.934	43.9	0.483	-111.1	0.145	-42.7	0.643	54.4	0.75	4.97
17000	0.928	40.2	0.376	-118.6	0.136	-49.3	0.733	44.4	0.86	3.43
18000	0.920	31.7	0.306	-125.6	0.126	-55.8	0.795	39.5	0.97	2.18

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

FREQUENCY (MHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG ¹ (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
2000	0.907	-49.0	2.672	133.0	0.061	58.3	0.637	-27.5	0.43	18.30
3000	0.838	-69.9	2.534	114.7	0.081	48.6	0.594	-38.8	0.56	15.23
4000	0.752	-93.4	2.437	95.8	0.093	38.1	0.561	-48.8	0.72	13.00
5000	0.675	-120.3	2.318	76.0	0.098	29.5	0.521	-57.4	0.91	11.31
6000	0.627	-144.7	2.155	57.5	0.096	24.3	0.459	-65.3	1.15	11.13
7000	0.591	-168.0	1.972	39.6	0.095	21.6	0.394	-76.3	1.43	9.29
8000	0.570	167.6	1.803	23.2	0.093	22.7	0.337	-88.8	1.72	7.97
9000	0.592	143.3	1.695	7.0	0.104	24.6	0.307	-104.8	1.58	7.66
10000	0.666	123.6	1.594	-11.0	0.125	22.4	0.269	-132.2	1.23	8.19
11000	0.742	105.8	1.429	-29.9	0.144	13.7	0.226	-173.8	1.03	8.85
12000	0.794	89.6	1.239	-47.1	0.157	4.7	0.260	139.7	0.98	6.49
13000	0.838	77.7	1.073	-63.6	0.168	-5.6	0.365	107.7	0.89	6.50
14000	0.880	65.3	0.913	-81.1	0.173	-18.0	0.476	85.9	0.77	6.78
15000	0.914	51.1	0.723	-98.1	0.166	-31.7	0.552	69.2	0.71	6.60
16000	0.939	43.3	0.552	-110.5	0.153	-40.2	0.617	55.1	0.68	6.17
17000	0.935	39.5	0.431	-118.9	0.141	-48.1	0.707	44.5	0.76	4.73
18000	0.920	30.8	0.350	-124.9	0.134	-57.2	0.788	39.6	0.86	3.20

TYPICAL SCATTERING PARAMETERS (T_A = 25°C)V_{DS} = 3 V, I_D = 30 mA

FREQUENCY (MHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG ¹ (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
2000	0.900	-50.1	2.906	132.3	0.058	58.4	0.640	-27.1	0.44	18.76
3000	0.826	-71.2	2.733	114.0	0.074	49.0	0.596	-38.2	0.59	15.62
4000	0.734	-94.9	2.611	95.2	0.086	39.8	0.563	-47.6	0.76	13.35
5000	0.657	-121.9	2.466	75.7	0.088	32.6	0.524	-55.7	0.96	11.69
6000	0.609	-146.2	2.286	57.4	0.089	28.1	0.468	-63.2	1.19	11.46
7000	0.577	-169.5	2.084	39.8	0.089	27.6	0.407	-74.0	1.44	9.76
8000	0.558	166.5	1.899	23.7	0.091	30.1	0.354	-85.7	1.66	8.46
9000	0.581	142.6	1.789	7.8	0.104	31.9	0.323	-101.4	1.50	8.17
10000	0.659	123.3	1.688	-10.0	0.130	27.7	0.285	-127.2	1.12	9.05
11000	0.739	105.9	1.522	-28.8	0.152	18.4	0.238	-167.1	0.93	7.33
12000	0.794	89.9	1.324	-46.2	0.164	8.5	0.260	145.9	0.89	7.06
13000	0.840	77.8	1.150	-62.6	0.177	-2.9	0.359	112.2	0.80	7.14
14000	0.888	65.3	0.983	-80.4	0.183	-16.4	0.469	89.2	0.68	7.67
15000	0.923	51.2	0.781	-97.6	0.175	-29.8	0.549	71.6	0.62	7.68
16000	0.944	43.3	0.596	-110.4	0.157	-39.7	0.621	56.4	0.60	7.28
17000	0.941	39.4	0.465	-119.0	0.147	-47.1	0.712	45.5	0.67	5.80
18000	0.922	30.8	0.374	-125.9	0.136	-54.5	0.787	40.0	0.82	3.89

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

FREQUENCY (MHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG ¹ (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
2000	0.894	-50.6	3.050	132.1	0.053	59.6	0.660	-26.6	0.44	19.16
3000	0.817	-72.0	2.858	113.7	0.068	49.2	0.615	-37.0	0.61	15.97
4000	0.725	-95.7	2.716	95.0	0.078	41.5	0.582	-46.0	0.79	13.72
5000	0.647	-122.6	2.556	75.8	0.080	33.7	0.546	-53.7	1.00	14.83
6000	0.600	-146.6	2.368	57.7	0.079	34.1	0.495	-61.2	1.24	11.83
7000	0.569	-170.0	2.156	40.2	0.082	34.0	0.440	-71.7	1.45	10.21
8000	0.550	166.1	1.968	24.2	0.086	37.9	0.394	-82.9	1.63	8.96
9000	0.571	142.5	1.855	8.7	0.104	40.5	0.366	-97.4	1.41	8.73
10000	0.653	123.9	1.760	-9.0	0.134	35.6	0.329	-121.7	1.00	10.81
11000	0.737	106.6	1.602	-27.9	0.159	24.5	0.279	-158.0	0.82	7.85
12000	0.799	90.5	1.398	-45.5	0.176	13.2	0.282	157.2	0.76	7.69
13000	0.846	78.3	1.215	-62.3	0.188	1.8	0.368	120.6	0.71	7.79
14000	0.895	65.9	1.045	-80.3	0.195	-12.7	0.477	95.3	0.59	8.52
15000	0.931	51.6	0.827	-98.1	0.186	-26.9	0.562	75.6	0.53	8.73
16000	0.956	43.6	0.630	-111.4	0.169	-38.4	0.635	59.3	0.48	8.84
17000	0.949	39.4	0.487	-120.5	0.158	-47.0	0.724	47.5	0.53	6.97
18000	0.932	30.6	0.386	-127.2	0.144	-53.2	0.792	41.7	0.69	4.84

Note:

1. Gain Calculation:

$$\text{MAG} = \frac{|S_{21}|}{|S_{12}|} \left(K \pm \sqrt{K^2 - 1} \right). \text{ When } K \leq 1, \text{ MAG is undefined and MSG values are used. } \text{MSG} = \frac{|S_{21}|}{|S_{12}|}, K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2 |S_{12}| |S_{21}|}, \Delta = S_{11} S_{22} - S_{21} S_{12}$$

EXCLUSIVE NORTH AMERICAN AGENT FOR **NEC** RF, MICROWAVE & OPTOELECTRONIC SEMICONDUCTORS

CEL CALIFORNIA EASTERN LABORATORIES • Headquarters • 4590 Patrick Henry Drive • Santa Clara, CA 95054-1817 • (408) 988-3500 • Telex 34-6393 • FAX (408) 988-0279
24-Hour Fax-On-Demand: 800-390-3232 (U.S. and Canada only) • Internet: <http://WWW.CEL.COM>

DATA SUBJECT TO CHANGE WITHOUT NOTICE



PRINTED IN USA ON RECYCLED PAPER -6/97