

# NEC

## GENERAL PURPOSE DUAL-GATE GaAs MESFET

### NE25118

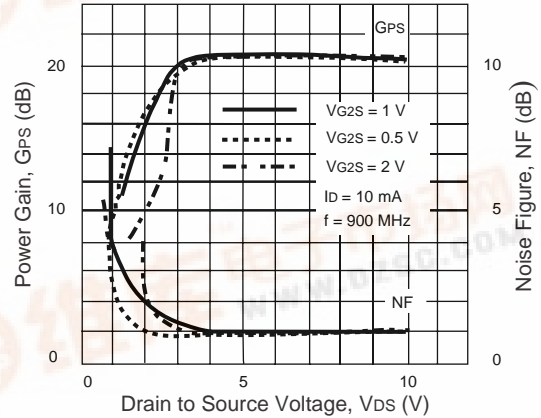
### FEATURES

- SUITABLE FOR USE AS RF AMPLIFIER IN UHF TUNER
- LOW  $C_{RSS}$ : 0.02 pF (TYP)
- HIGH POWER GAIN: 20 dB (TYP) AT 900 MHz
- LOW NF: 1.1 dB TYP AT 900 MHz
- $L_{G1} = 1.0 \mu\text{m}$ ,  $L_{G2} = 1.5 \mu\text{m}$ ,  $W_G = 400 \mu\text{m}$
- ION IMPLANTATION
- AVAILABLE IN TAPE & REEL OR BULK
- LOW PACKAGE HEIGHT: 1.0 mm MAX

### DESCRIPTION

The NE25118 is a dual gate GaAs FET designed to provide flexibility in its application as a mixer, AGC amplifier, or low noise amplifier. As an example, by shorting the second gate to the source, higher gain can be realized than with single gate MESFETs. This device is available in a 4 pin super mini-mold package, (SOT-343 type). Maximum package height of 1.0 mm makes the NE25118 an ideal device for PCMCIA card applications.

POWER GAIN AND NOISE FIGURE  
vs.  
DRAIN TO SOURCE VOLTAGE



### ELECTRICAL CHARACTERISTICS (TA = 25°C)

PART NUMBER PACKAGE OUTLINE			NE25118 18		
SYMBOL	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
NF	Noise Figure at $V_{DS} = 5 \text{ V}$ , $V_{G2S} = 1 \text{ V}$ , $I_D = 10 \text{ mA}$ , $f = 900 \text{ MHz}$	dB		1.1	2.5
GPS	Power Gain at $V_{DS} = 5 \text{ V}$ , $V_{G2S} = 1 \text{ V}$ , $I_D = 10 \text{ mA}$ , $f = 900 \text{ MHz}$	dB	16	20	
BVDSX	Drain to Source Breakdown Voltage at $V_{G1S} = -4 \text{ V}$ , $V_{G2S} = 0$ , $I_D = 10 \mu\text{A}$	V	13		
IDSS	Saturated Drain Current at $V_{DS} = 5 \text{ V}$ , $V_{G2S} = 0 \text{ V}$ , $V_{G1S} = 0 \text{ V}$	mA	5	20	40
VG1S (OFF)	Gate 1 to Source Cutoff Voltage at $V_{DS} = 5 \text{ V}$ , $V_{G2S} = 0 \text{ V}$ , $I_D = 100 \mu\text{A}$	V	-3.5		
VG2S (OFF)	Gate 2 to Source Cutoff Voltage at $V_{DS} = 5 \text{ V}$ , $V_{G1S} = 0 \text{ V}$ , $I_D = 100 \mu\text{A}$	V	-3.5		
IG1SS	Gate 1 Reverse Current at $V_{DS} = 0$ , $V_{G1S} = -4 \text{ V}$ , $V_{G2S} = 0$	$\mu\text{A}$			10
IG2SS	Gate 2 Reverse Current at $V_{DS} = 0$ , $V_{G2S} = -4 \text{ V}$ , $V_{G1S} = 0$	$\mu\text{A}$			10
YFS	Forward Transfer Admittance at $V_{DS} = 5 \text{ V}$ , $V_{G2S} = 1 \text{ V}$ , $I_D = 10 \text{ mA}$ , $f = 1.0 \text{ kHz}$	mS	18	25	35
Ciss	Input Capacitance at $V_{DS} = 5 \text{ V}$ , $V_{G2S} = 1 \text{ V}$ , $I_D = 10 \text{ mA}$ , $f = 1 \text{ MHz}$	pF	0.5	1.0	1.5
CRSS	Reverse Transfer Capacitance at $V_{DS} = 5 \text{ V}$ , $V_{G2S} = 1 \text{ V}$ , $I_D = 10 \text{ mA}$ , $f = 1 \text{ MHz}$	pF		0.02	0.03



**ABSOLUTE MAXIMUM RATINGS<sup>1</sup>** (TA = 25°C)

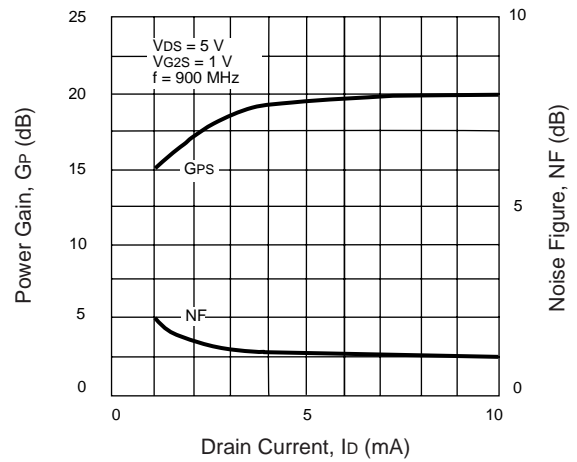
SYMBOLS	PARAMETERS	UNITS	RATINGS
V <sub>DS</sub>	Drain to Source Voltage	V	13
V <sub>G1S</sub>	Gate 1 to Source Voltage	V	-4.5
V <sub>G2S</sub>	Gate 2 to Source Voltage	V	-4.5
I <sub>D</sub>	Drain Current	mA	I <sub>DSS</sub>
P <sub>T</sub>	Total Power Dissipation	mW	120
T <sub>CH</sub>	Channel Temperature	°C	125
T <sub>STG</sub>	Storage Temperature	°C	-55 to +125

Note:

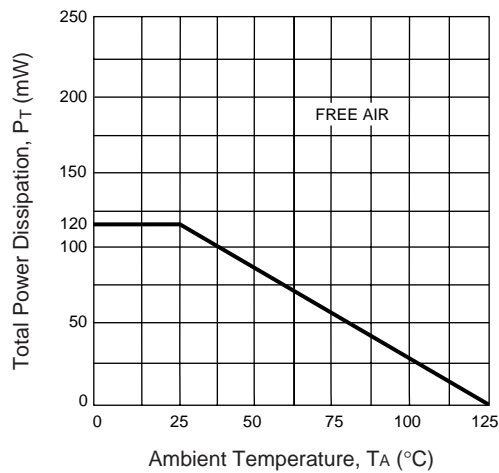
1. Operation in excess of anyone of these parameters may result in permanent damage.

**TYPICAL PERFORMANCE CURVES** (TA = 25 °C)

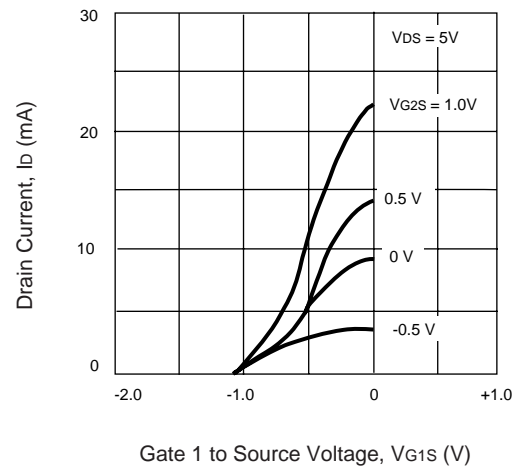
**POWER GAIN AND NOISE FIGURE vs. DRAIN CURRENT**



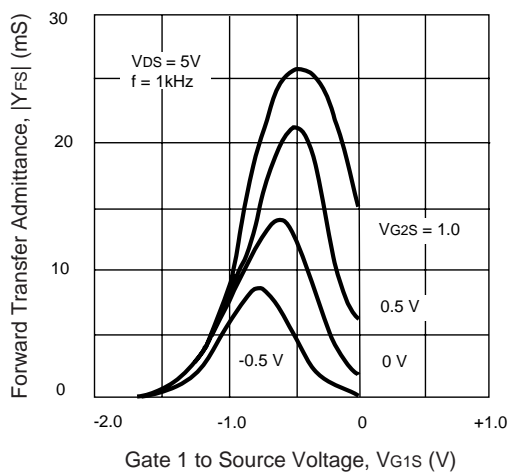
**TOTAL POWER DISSIPATION VS. AMBIENT TEMPERATURE**



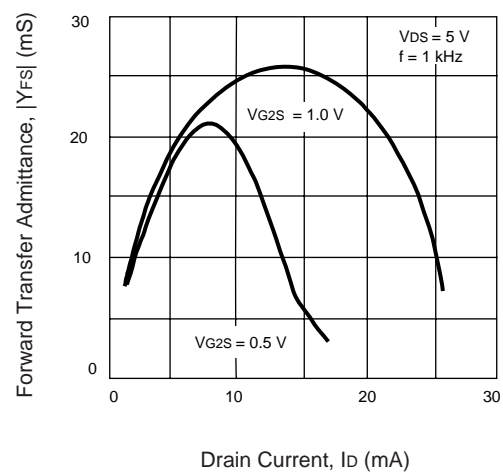
**DRAIN CURRENT vs. GATE 1 TO SOURCE VOLTAGE**



**FORWARD TRANSFER ADMITTANCE vs. GATE 1 TO SOURCE VOLTAGE**

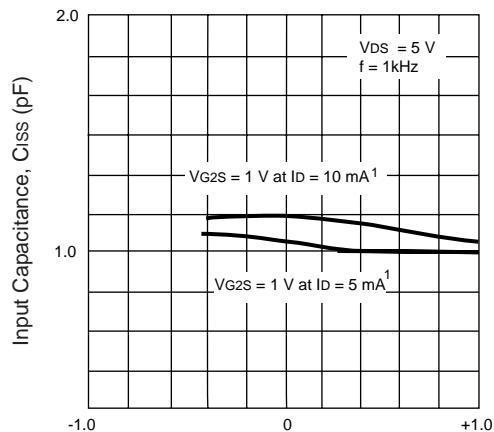


**FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT**



**TYPICAL PERFORMANCE CURVES** (TA = 25°C)

**INPUT CAPACITANCE vs. GATE 2 TO SOURCE VOLTAGE**

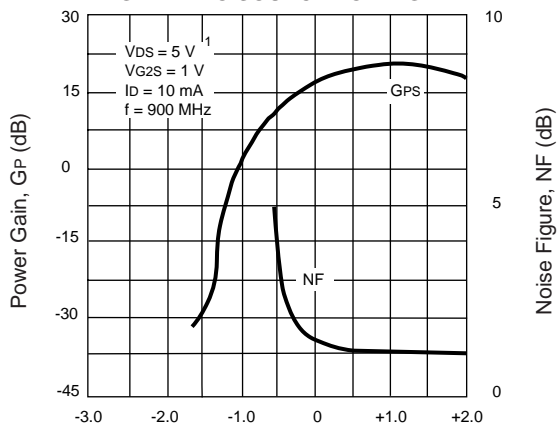


Gate 2 to Source Voltage, VG2S (V)

Note:

- Initial bias conditions. VG1S set to obtain specified drain current.

**POWER GAIN AND NOISE FIGURE vs. GATE 2 TO SOURCE VOLTAGE**



Gate 2 to Source Voltage, VG2S (V)

Note:

- Initial bias conditions. VG1S set to obtain specified drain current.

**NE25118**

**VDS = 5 V, VG2S = 1 V, ID = 10 mA**

FREQUENCY (MHZ)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.999	-3.3	2.359	177.2	0.006	-122.3	0.969	-1.3
200	1.000	-7.2	2.389	169.3	0.004	123.0	0.981	-2.9
300	0.998	-9.3	2.313	164.4	0.000	-145.0	0.979	-3.3
400	0.974	-13.4	2.233	160.0	0.004	79.2	0.967	5.6
500	1.005	-15.7	2.420	158.4	0.007	29.7	0.999	-5.8
600	0.942	-19.1	2.300	150.0	0.003	65.0	0.958	-7.7
700	0.968	-22.2	2.332	145.5	0.004	45.5	0.997	-8.5
800	0.920	-25.2	2.229	141.5	0.008	80.1	0.957	-9.4
900	0.952	-28.9	2.447	136.8	0.004	8.3	0.999	-12.5
1000	0.898	-29.4	2.303	131.1	0.001	50.9	0.968	-11.1
1100	0.915	-35.1	2.348	125.8	0.004	71.4	0.984	-14.8
1200	0.879	-35.2	2.367	123.5	0.000	91.1	0.989	-13.0

Note:

- Gain Calculations:

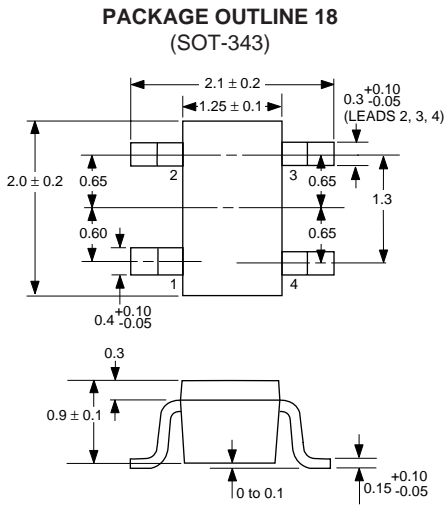
$$MAG = \frac{|S_{21}|}{|S_{12}|} (K \pm \sqrt{K^2 - 1})$$

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

MAG = Maximum Available Gain, MSG = Maximum Stable Gain

# NE25118

## OUTLINE DIMENSIONS (Units in mm)



## ORDERING INFORMATION

PART NUMBER	AVAILABILITY
NE25118	Bulk up to 3K
NE25118-T1	3K/Reel

### PIN CONNECTIONS

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

Note: All dimensions are typical unless otherwise specified.