NEC

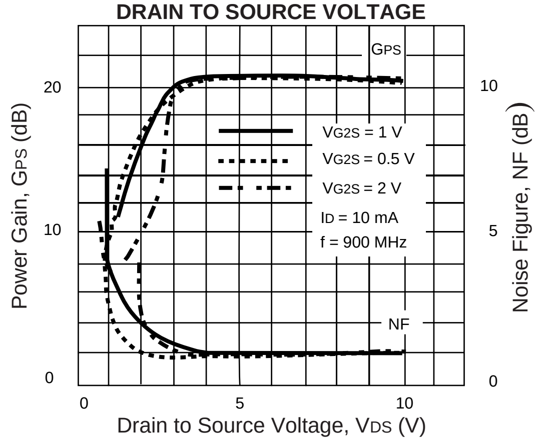
GENERAL PURPOSE DUAL-GATE GaAS MESFET

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 µm, L_{G2} = 1.5 µm, W_G = 400 µm**
- **ION IMPLANTATION**
- **AVAILABLE IN TAPE & REEL OR BULK**
- **LOW PACKAGE HEIGHT:** 1.0 mm MAX

POWER GAIN AND NOISE FIGURE vs. DRAIN TO SOURCE VOLTAGE



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.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

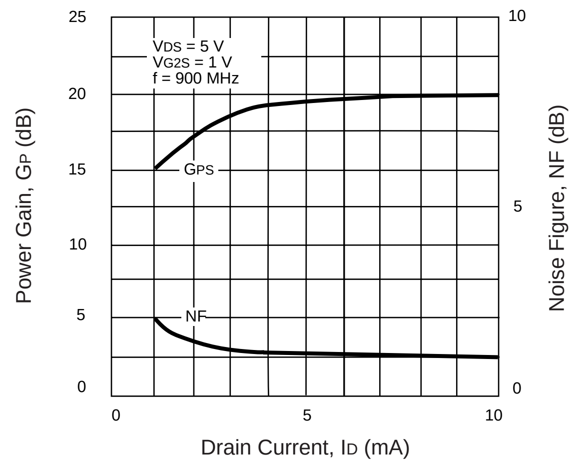
PART NUMBER PACKAGE OUTLINE			NE25118 18		
SYMBOL	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
NF	Noise Figure at V_{DS} = 5 V, V_{G2S} = 1 V, I_D = 10 mA, f = 900 MHz	dB		1.1	2.5
G_{PS}	Power Gain at V_{DS} = 5 V, V_{G2S} = 1 V, I_D = 10 mA, f = 900 MHz	dB	16	20	
BV_{DSX}	Drain to Source Breakdown Voltage at V_{G1S} = -4 V, V_{G2S} = 0, I_D = 10 µA	V	13		
I_{DSS}	Saturated Drain Current at V_{DS} = 5 V, V_{G2S} = 0 V, V_{G1S} = 0 V	mA	5	20	40
$V_{G1S\ (OFF)}$	Gate 1 to Source Cutoff Voltage at V_{DS} = 5 V, V_{G2S} = 0 V, I_D = 100 µA	V	-3.5		
$V_{G2S\ (OFF)}$	Gate 2 to Source Cutoff Voltage at V_{DS} = 5 V, V_{G1S} = 0 V, I_D = 100 µA	V	-3.5		
I_{G1SS}	Gate 1 Reverse Current at V_{DS} = 0, V_{G1S} = -4V, V_{G2S} = 0	µA			10
I_{G2SS}	Gate 2 Reverse Current at V_{DS} = 0, V_{G2S} = -4V, V_{G1S} = 0	µA			10
$\lvert Y_{FS} \rvert$	Forward Transfer Admittance at V_{DS} = 5 V, V_{G2S} = 1 V, I_D = 10 mA, f = 1.0 kHz	mS	18	25	35
C_{ISS}	Input Capacitance at V_{DS} = 5 V, V_{G2S} = 1 V, I_D = 10 mA, f = 1 MHz	pF	0.5	1.0	1.5
C_{RSS}	Reverse Transfer Capacitance at V_{DS} = 5 V, V_{G2S} = 1 V, I_D = 10 mA, f = 1 MHz	pF		0.02	0.03

ABSOLUTE MAXIMUM RATINGS[1] (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V_{DS}	Drain to Source Voltage	V	13
V_{G1S}	Gate 1 to Source Voltage	V	-4.5
V_{G2S}	Gate 2 to Source Voltage	V	-4.5
I_D	Drain Current	mA	I_{DSS}
P_T	Total Power Dissipation	mW	120
T_{CH}	Channel Temperature	°C	125
T_{STG}	Storage Temperature	°C	-55 to +125

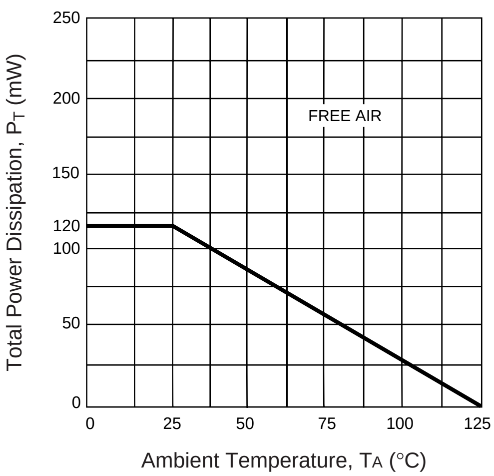
Note:
1. Operation in excess of anyone of these parameters may result in
permanent damage.

POWER GAIN AND NOISE FIGURE vs. DRAIN CURRENT

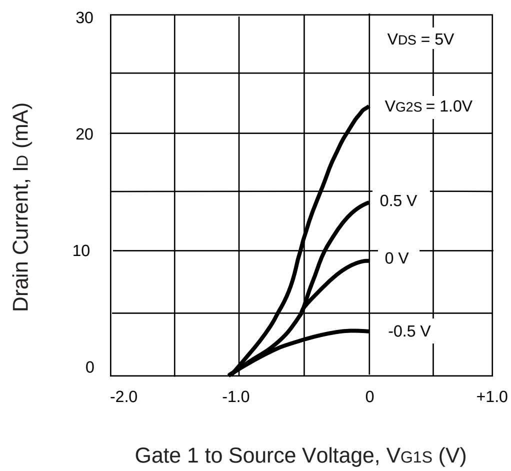


TYPICAL PERFORMANCE CURVES (T_A = 25 °C)

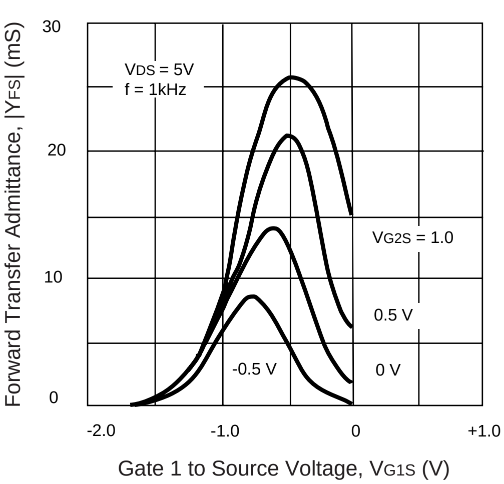
TOTAL POWER DISSIPATION VS. AMBIENT TEMPERATURE



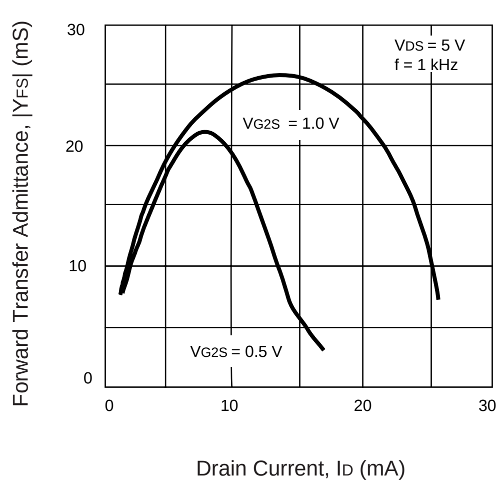
DRAIN CURRENT vs. GATE 1 TO SOURCE VOLTAGE



FORWARD TRANSFER ADMITTANCE vs. GATE 1 TO SOURCE VOLTAGE

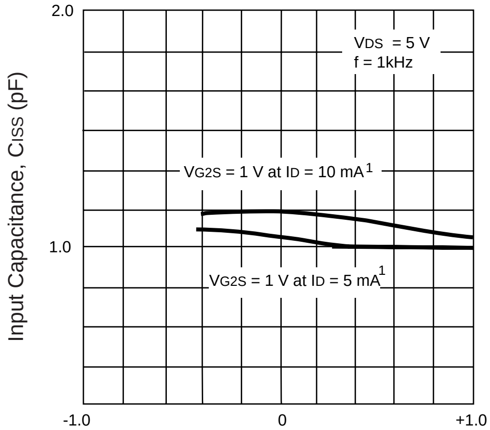


FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



TYPICAL PERFORMANCE CURVES (T_A = 25°C)

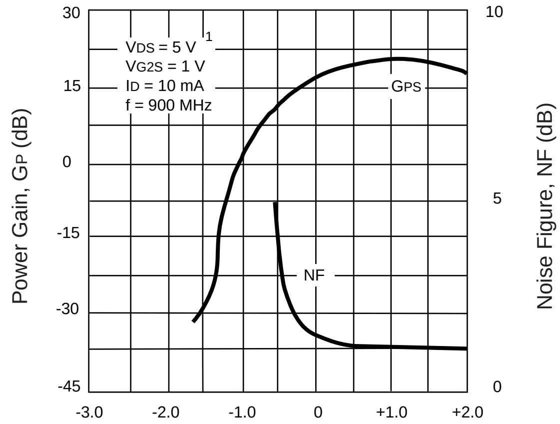
INPUT CAPACITANCE vs.
GATE 2 TO SOURCE VOLTAGE



Gate 2 to Source Voltage, V_{G2S} (V)

Note:
1. Initial bias conditions. V_{G1S} set to obtain specified drain current.

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



Gate 2 to Source Voltage, V_{G2S} (V)

Note:
1. Initial bias conditions. V_{G1S} set to obtain specified drain current.

NE25118
V_{DS} = 5 V, V_{G2S} = 1 V, I_D = 10 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
(MHz)	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

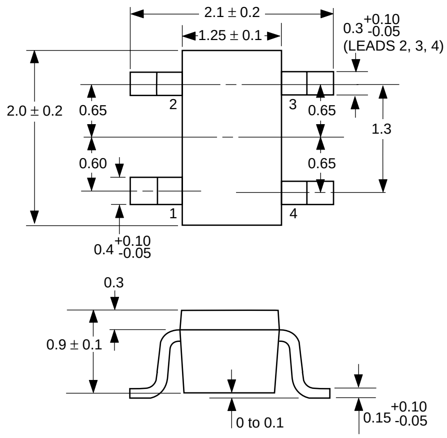
Note:
1. Gain Calculations:

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

OUTLINE DIMENSIONS (Units in mm)

PACKAGE OUTLINE 18
(SOT-343)



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

Note: All dimensions are typical unless otherwise specified.

ORDERING INFORMATION

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