

FEATURES

- **HIGH POWER GAIN:**
Gs = 5.0 dB TYP at f = 12 GHz
- **LOW PHASE NOISE:**
-110 dBc/Hz TYP at 100 KHz offset at f = 11 GHz
- **GATE LENGTH:** LG = 0.8 μ m (recessed gate)
- **GATE WIDTH:** WG = 400 μ m
- **4 PIN SUPER MINI MOLD:** (SOT-343)
- **TAPE & REEL PACKAGING**

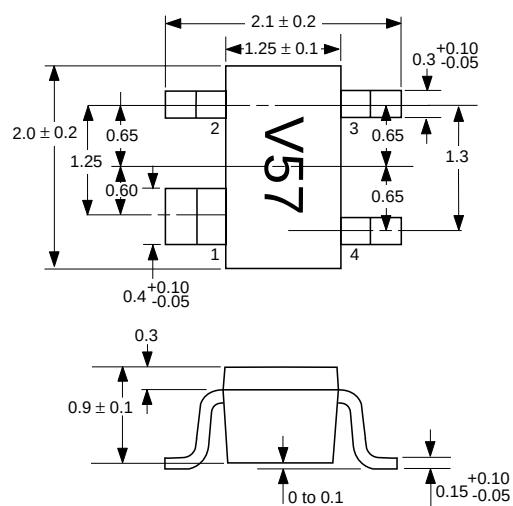
DESCRIPTION

The NE72218 is a low cost GaAs MESFET suitable for both amplifier and oscillator applications through X-band. The device features a 0.8 micron recessed gate, triple epitaxial technology and is fabricated using ion implantation for improved RF and DC performance, reliability and uniformity. The NE72218 is housed in a 4 pin super mini mold package, making it ideal for high density design.

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			NE72218 18		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
GS	Power Gain at VDS = 3 V, ID = 30 mA, f = 12 GHz	dB		5.0	
P1dB	Output Power at 1 dB Gain Compression Point at VDS = 3 V, ID = 30 mA, f = 12 GHz	dBm		15.0	
PN	Phase Noise at VDS = 3 V, ID = 30 mA, f = 11 GHz, 100 KHz offset	dBc/Hz		-110	
	Phase Noise at VDS = 3 V, ID = 30 mA, f = 11 GHz, 10 KHz offset	dBc/Hz		-90	
gm	Transconductance at VDS = 3 V, ID = 30 mA	mS	20	45	
IDSS	Saturated Drain Current at VDS = 3 V, VGS = 0 V	mA	30	60	120
VGS (OFF)	Gate to Source Cut Off Voltage at VDS = 3 V, ID = 100 μ A	V	-0.5	-2.0	-4.0
IGSO	Gate to Source Leakage Current at VGS = -5 V	μ A		1.0	10

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	-5.0
V _{GD}	Gate to Drain Voltage	V	-5.0
I _D	Drain Current	I _{DSS}	mA
T _{CH}	Channel Temperature	°C	125
T _{STG}	Storage Temperature	°C	-65 to +125
P _T	Total Power Dissipation	mW	250

Notes:

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

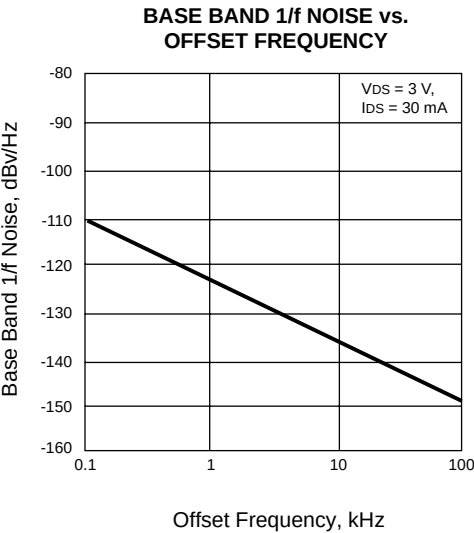
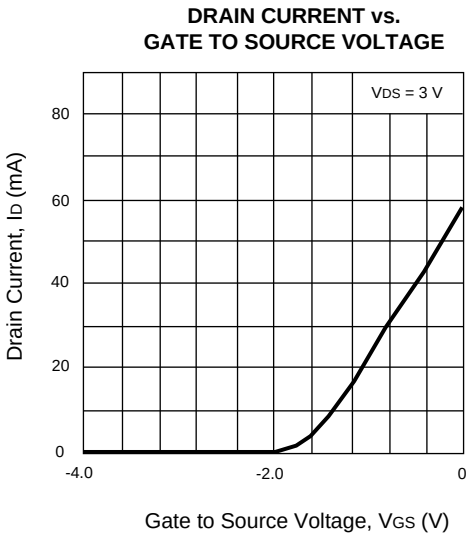
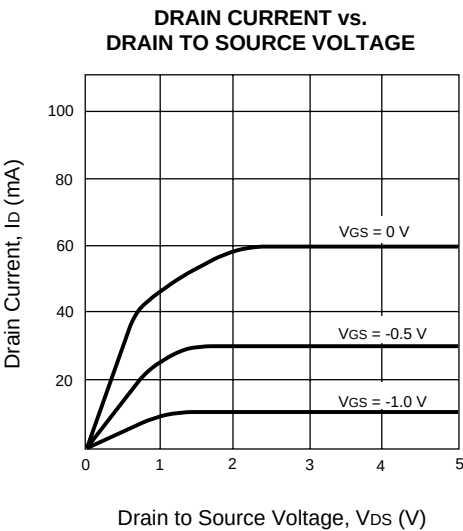
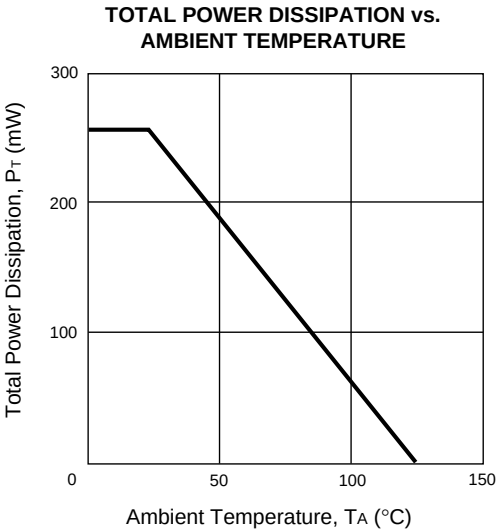
ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKAGE STYLE
NE72218	Bulk	8-mm wide embossed tape, pin 3 (Source), pin 4 (Drain) face perforated side of tape.
NE72218-T1	3 Kpcs/Reel	8-mm wide embossed tape, pin 1 (Source), pin 2 (Gate) face perforated side of tape.

IDSS CLASSIFICATION

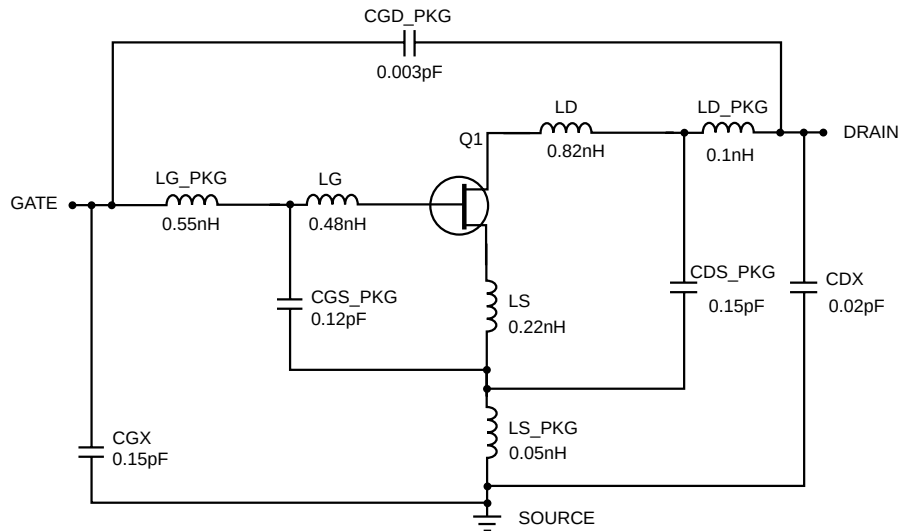
RANK	I _{DSS} (mA)	MARKING
57	30 to 120	V57
58	65 to 120	V58
59	30 to 75	V59

TYPICAL PERFORMANCE CURVES (T_A = 25°C)



NE72218 NONLINEAR MODEL

SCHEMATIC



FET NONLINEAR MODEL PARAMETERS ⁽¹⁾

Parameters	Q1	Parameters	Q1
VTO	-1.34	RG	10
VTOSC	0	RD	4
ALPHA	2.5	RS	4
BETA	0.04	RGMET	0
GAMMA	0.07	KF	2e-10
GAMMADC	0.03	AF	1.5
Q	2	TNOM	27
DELTA	0.3	XTI	3
VBI	1	EG	1.43
IS	1e-14	VTOTC	0
N	1.3	BETATCE	0
RIS	0	FFE	1
RID	0		
TAU	4e-12		
CDS	0.27e-12		
RDB	5000		
CBS	1e-10		
CGSO	0.85e-12		
CGDO	0.055e-12		
DELTA1	0.3		
DELTA2	0.3		
FC	0.5		
VBR	Infinity		

UNITS

Parameter	Units
time	seconds
capacitance	farads
inductance	henries
resistance	ohms
voltage	volts
current	amps

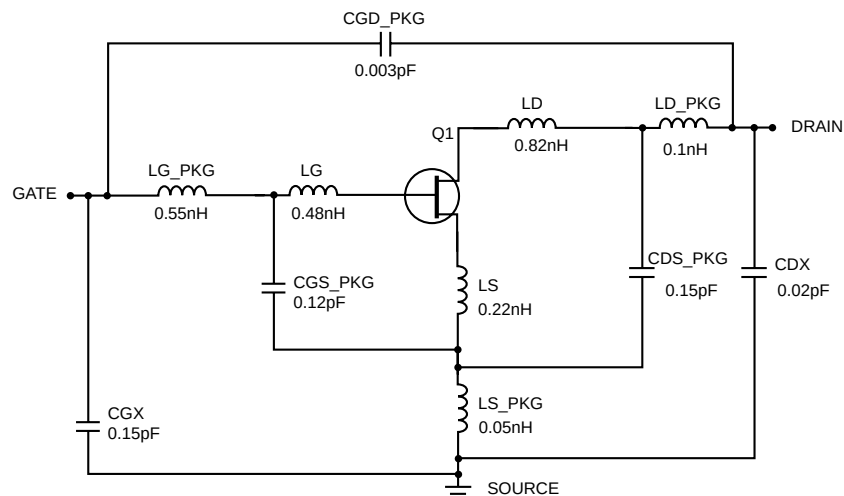
MODEL RANGE

Frequency: 0.5 to 18 GHz
 Bias: $V_{DS} = 2\text{ V to }4\text{ V}$, $I_D = 10\text{ mA to }40\text{ mA}$
 $I_{DSS} = 55\text{ mA @ }V_{GS} = 0, V_{DS} = 3\text{ V}$
 Power: $V_{DS} = 3\text{ V}$, $I_D = 30\text{ mA}$, 4 GHz
 Date: 4/98

(1) Series IV Libra TOM Model

NE72218 (RANK 58) NONLINEAR MODEL

SCHEMATIC

FET NONLINEAR MODEL PARAMETERS ⁽¹⁾

Parameters	Q1	Parameters	Q1
VTO	-1.8065	RG	10
VTOSC	0	RD	4
ALPHA	2.5	RS	4
BETA	0.0396	RGMET	0
GAMMA	0.072	KF	2e-10
GAMMADC	0.03	AF	1.5
Q	1.8	TNOM	27
DELTA	0.3	XTI	3
VBI	1	EG	1.43
IS	1e-14	VTOTC	0
N	1.3	BETATCE	0
RIS	0	FFE	1
RID	0		
TAU	4e-12		
CDS	0.27e-12		
RDB	5000		
CBS	1e-10		
CGSO	0.85e-12		
CGDO	0.055e-12		
DELTA1	0.3		
DELTA2	0.3		
FC	0.5		
VBR	Infinity		

UNITS

Parameter	Units
time	seconds
capacitance	farads
inductance	henries
resistance	ohms
voltage	volts
current	amps

MODEL RANGE

Frequency: 0.5 to 18 GHz

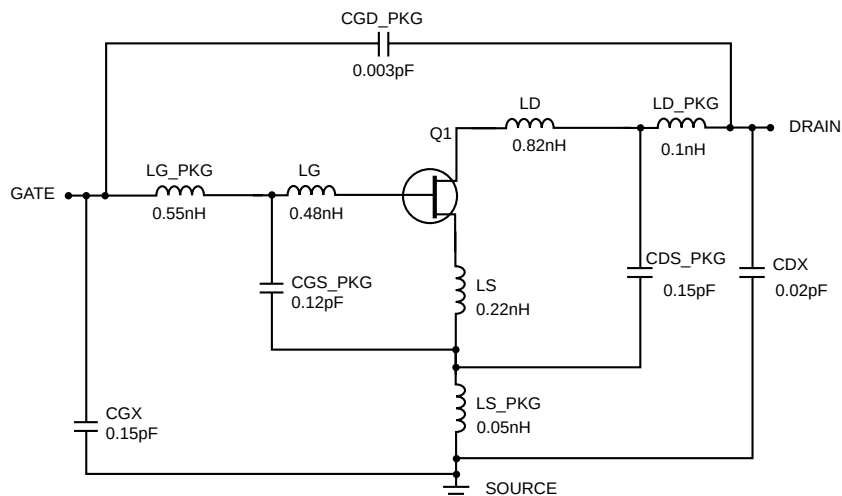
Bias: $V_{DS} = 2\text{ V to }4\text{ V}$, $I_D = 10\text{ mA to }40\text{ mA}$ $I_{DSS} = 82\text{ mA @ }V_{GS} = 0, V_{DS} = 3\text{ V}$

Date: 4/98

(1) Series IV Libra TOM Model

NE72218 (RANK 59) NONLINEAR MODEL

SCHEMATIC



FET NONLINEAR MODEL PARAMETERS ⁽¹⁾

Parameters	Q1	Parameters	Q1
VTO	-1.34	RG	10
VTOSC	0	RD	4
ALPHA	2.5	RS	4
BETA	0.04	RGMET	0
GAMMA	0.07	KF	2e-10
GAMMADC	0.03	AF	1.5
Q	2	TNOM	27
DELTA	0.3	XTI	3
VBI	1	EG	1.43
IS	1e-14	VTOTC	0
N	1.3	BETATCE	0
RIS	0	FFE	1
RID	0		
TAU	4e-12		
CDS	0.27e-12		
RDB	5000		
CBS	1e-10		
CGSO	0.85e-12		
CGDO	0.055e-12		
DELTA1	0.3		
DELTA2	0.3		
FC	0.5		
VBR	Infinity		

UNITS

Parameter	Units
time	seconds
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resistance	ohms
voltage	volts
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MODEL RANGE

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 $I_{DSS} = 55\text{ mA @ }V_{GS} = 0, V_{DS} = 3\text{ V}$
 Power: $V_{DS} = 3\text{ V}$, $I_D = 30\text{ mA}$, 4 GHz
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