

NEC

GaAs HJ-FET L TO S BAND LOW NOISE AMPLIFIER (New Plastic Package)

NE34018

FEATURES

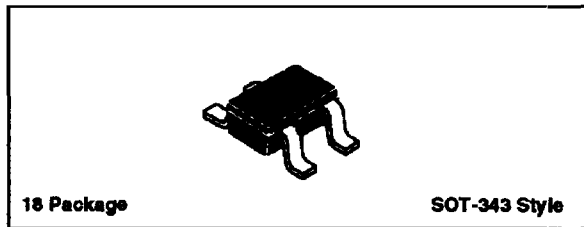
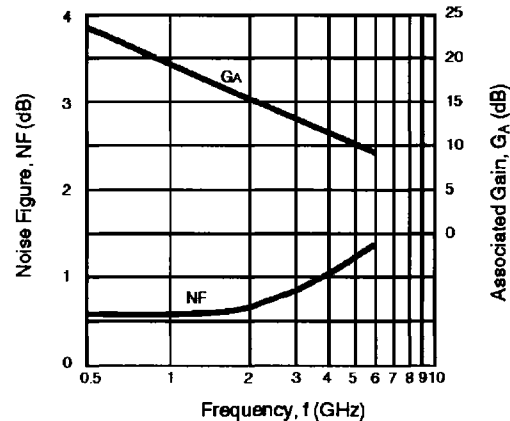
- **LOW COST MINIATURE PLASTIC PACKAGE (SOT-343)**
- **LOW NOISE FIGURE:**
0.6 dB typical at 2 GHz
- **HIGH ASSOCIATED GAIN:**
16.0 dB typical at 2 GHz
- **LG = 0.6 μm, WG = 400 μm**
- **TAPE & REEL PACKAGING**

DESCRIPTION

The NE34018 is a low cost gallium arsenide Hetero-Junction FET housed in a miniature (SOT-343) plastic surface mount package. The device is fabricated using ion implantation for improved RF and DC performance, reliability, and uniformity. Its low noise figure, high gain, small size and weight make it an ideal low noise amplifier transistor in the 1-3 GHz frequency range. The NE34018 is suitable for GPS, PCS, WLAN, MMDS, and other commercial applications.

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

NOISE FIGURE & ASSOCIATED GAIN vs. FREQUENCY
V_{CE} = 3 V, I_D = 20 mA



ELECTRICAL CHARACTERISTICS (T_A = 25°C)

PART NUMBER PACKAGE OUTLINE			NE34018 18		
SYMBOL	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
NF	Noise Figure at V _{DS} = 2 V, I _D = 5 mA, f = 2 GHz	dB		0.6	1.0
GA	Associated Gain at V _{DS} = 2 V, I _D = 5 mA, f = 2 GHz	dB	14.0	16.0	
P _{1dB}	Output Power at 1 dB Gain Compression Point, f = 2 GHz V _{DS} = 2 V, I _{DS} = 10 mA V _{DS} = 3 V, I _{DS} = 30 mA	dBm		12	
		dBm		16.5	
G _{1dB}	Gain at P _{1dB} , f = 2 GHz V _{DS} = 2 V, I _{DS} = 10 mA V _{DS} = 3 V, I _{DS} = 30 mA	dB		17.0	
		dB		17.5	
O/P I _{p3}	Output I _{p3} at f = 2 GHz, Δf = 1 MHz V _{DS} = 2 V, I _{DS} = 10 mA V _{DS} = 2 V, I _{DS} = 30 mA	dBm		23	
		dBm		32	
I _{DSS}	Saturated Drain Current at V _{DS} = 2 V, V _{GS} = 0 V	mA	30	80	120
V _P	Pinch Off Voltage at V _{DS} = 2 V, I _D = 100 μA	V	-2.0	-0.8	-0.2
g _m	Transconductance at V _{DS} = 2 V, I _D = 5 mA	mS	30		
I _{GSO}	Gate to Source Leakage Current at V _{GS} = -3 V	μA		0.5	10
R _{TH(CH-A)}	Thermal Resistance (Channel to Ambient)	°C/W		833	

Note:

1. Typical values of noise figures and associated gain are those obtained when 50% of the devices from a large number of lots were individually measured in a circuit with the input individually tuned to obtain the minimum value. Maximum values are criteria established on the production line as a "go-no-go" screening test with the fixture tuned for the "generic" type but not for each specimen.

CAELSO18

ABSOLUTE MAXIMUM RATINGS¹ (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V _{DS}	Drain to Source Voltage	V	5
V _{GDO}	Gate to Drain Voltage	V	-3
V _{GSO}	Gate to Source Voltage	V	-3
I _{DS}	Drain Current	mA	I _{DSS}
T _{CH}	Channel Temperature	°C	125
T _{STG}	Storage Temperature	°C	-65 to +125
P _T	Total Power Dissipation	mW	125

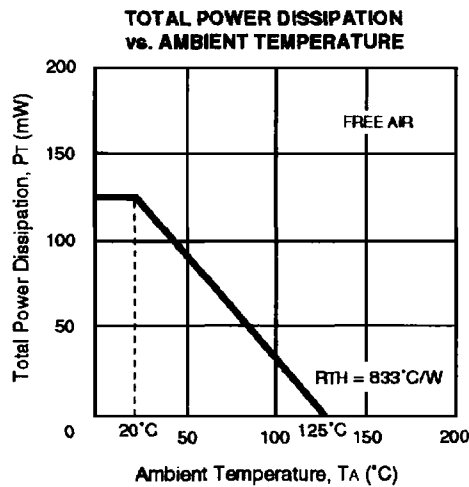
Note:

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

TYPICAL NOISE PARAMETERS (T_A = 25°C)

FREQ. (MHz)	NF _{OPT} (dB)	G _A (dB)	Γ _{OPT}		R _n /50
			MAG	ANG	
V_{CE} = 2 V, I_C = 10 mA					
900	.56	20.5	.76	30	.45
2000	.63	16.3	.61	41	.28
2500	.68	14.1	.49	51	.18
3000	.70	13.6	.39	49	.16
3500	.76	12.3	.28	71	.12
4000	.82	11.6	.20	80	.10
V_{CE} = 2 V, I_C = 30 mA					
2000	.60	17.0	.56	39	.23
2500	.70	15.3	.43	46	.15
3000	.76	14.2	.32	50	.26
V_{CE} = 3 V, I_C = 20 mA					
900	.56	20.2	.74	26	1.54
2000	.62	16.8	.62	42	.43
2500	.66	14.9	.56	50	.31
3000	.70	14.0	.45	65	.24
3500	.80	13.2	.36	76	.14
4000	.84	12.8	.29	85	.10
4500	.90	11.0	.20	98	.08

TYPICAL PERFORMANCE CURVES (T_A = 25°C)



TYPICAL SCATTERING PARAMETERS (T_A = 25°C)

V_{DS} = 2 V, I_{DS} = 5 mA

FREQUENCY (MHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG ¹ (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
100	0.999	-3.6	4.707	176.3	0.006	64.1	0.807	-1.3	0.36	28.9
200	0.995	-7.4	4.730	173.1	0.011	87.5	0.806	-3.0	0.05	26.4
300	0.993	-11.1	4.746	170.3	0.016	82.5	0.803	-4.5	0.09	24.7
400	0.987	-14.9	4.743	166.7	0.021	81.7	0.799	-5.9	0.11	23.5
500	0.980	-18.7	4.766	163.4	0.026	80.1	0.793	-7.2	0.13	22.6
700	0.960	-26.1	4.712	156.8	0.036	75.2	0.779	-10.2	0.20	21.1
1000	0.920	-37.3	4.637	147.1	0.050	69.4	0.752	-14.6	0.28	19.7
1500	0.833	-55.6	4.394	131.2	0.069	61.6	0.699	-21.8	0.41	18.0
2000	0.734	-72.4	3.995	116.7	0.085	54.7	0.646	-28.4	0.55	16.7
2500	0.643	-87.7	3.616	104.3	0.095	50.2	0.618	-33.3	0.66	15.8
3000	0.568	-100.9	3.275	93.9	0.103	46.6	0.588	-35.3	0.79	15.0
3500	0.496	-113.5	2.992	84.2	0.111	45.0	0.562	-35.2	0.91	14.3
4000	0.430	-126.2	2.775	75.4	0.118	44.2	0.532	-34.1	1.02	12.9
4500	0.366	-140.1	2.599	66.9	0.127	44.7	0.499	-33.1	1.11	11.1
5000	0.305	-157.6	2.440	58.4	0.139	45.9	0.459	-33.4	1.17	10.0
5500	0.265	-179.1	2.313	49.8	0.154	46.8	0.416	-36.0	1.18	9.2
6000	0.253	158.0	2.196	41.4	0.177	48.6	0.374	-40.8	1.15	8.6
6500	0.255	141.3	2.055	33.6	0.219	51.7	0.349	-48.2	1.05	8.4

TYPICAL SCATTERING PARAMETERS (T_A = 25°C)V_{ds} = 2 V, I_{ds} = 10 mA

FREQUENCY (MHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG ¹ (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
100	0.999	-4.2	6.805	176.0	0.005	74.0	0.733	-1.6	0.21	31.1
200	0.993	-8.3	6.802	172.1	0.010	88.8	0.731	-3.4	0.05	28.2
300	0.989	-12.6	6.793	168.6	0.015	80.4	0.728	-5.0	0.14	26.6
400	0.980	-16.8	6.761	164.6	0.020	80.7	0.722	-6.5	0.15	25.3
500	0.969	-21.0	6.733	160.8	0.025	80.2	0.715	-8.1	0.17	24.4
700	0.940	-29.3	6.592	153.4	0.034	75.5	0.698	-11.2	0.25	22.9
1000	0.884	-41.5	6.333	142.6	0.046	70.0	0.665	-15.7	0.36	21.4
1500	0.770	-60.6	5.742	125.7	0.063	63.0	0.606	-22.5	0.52	19.6
2000	0.654	-77.5	5.040	111.2	0.077	58.0	0.553	-28.5	0.67	18.1
2500	0.554	-92.2	4.434	99.2	0.089	55.1	0.530	-32.4	0.79	17.0
3000	0.478	-104.2	3.916	89.2	0.098	52.3	0.509	-33.6	0.90	16.0
3500	0.408	-115.4	3.504	80.1	0.108	51.2	0.491	-32.6	0.99	15.1
4000	0.346	-126.4	3.195	71.8	0.119	50.7	0.471	-30.5	1.06	12.8
4500	0.288	-138.9	2.948	64.1	0.132	49.9	0.446	-28.9	1.11	11.5
5000	0.234	-155.8	2.733	56.5	0.148	49.7	0.413	-28.8	1.14	10.4
5500	0.201	-177.7	2.563	48.6	0.167	49.1	0.373	-31.5	1.13	9.6
6000	0.195	158.5	2.414	41.1	0.191	49.0	0.329	-36.2	1.11	9.0
6500	0.203	143.4	2.246	34.3	0.232	49.8	0.303	-43.5	1.04	8.7

V_{ds} = 2 V, I_{ds} = 30 mA

FREQUENCY (MHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG ¹ (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
100	0.997	-4.8	9.745	175.4	0.004	85.6	0.627	-1.7	0.09	33.8
200	0.989	-9.7	9.691	170.5	0.009	86.8	0.626	-3.4	0.12	30.6
300	0.981	-14.7	9.630	166.2	0.013	82.9	0.622	-5.0	0.17	28.7
400	0.967	-19.6	9.512	161.6	0.017	82.9	0.616	-6.4	0.20	27.5
500	0.950	-24.3	9.381	157.1	0.021	81.0	0.608	-7.9	0.25	26.5
700	0.906	-33.5	9.023	148.5	0.029	76.7	0.590	-10.8	0.36	25.0
1000	0.828	-46.7	8.385	136.6	0.040	72.6	0.557	-14.6	0.49	23.2
1500	0.687	-66.0	7.215	119.3	0.055	68.2	0.504	-19.9	0.68	21.2
2000	0.560	-82.2	6.097	105.1	0.068	64.4	0.462	-24.6	0.83	19.5
2500	0.458	-95.9	5.224	93.8	0.081	61.8	0.454	-27.8	0.92	18.1
3000	0.385	-106.1	4.516	84.5	0.094	60.1	0.447	-28.3	0.99	16.8
3500	0.321	-115.2	3.975	76.1	0.107	58.3	0.441	-26.7	1.05	14.4
4000	0.267	-124.0	3.572	68.6	0.121	56.7	0.434	-24.2	1.08	13.0
4500	0.218	-134.1	3.258	61.6	0.136	55.3	0.420	-22.6	1.10	11.9
5000	0.171	-149.4	2.991	54.9	0.154	53.8	0.394	-22.4	1.11	10.9
5500	0.142	-172.4	2.785	47.8	0.174	51.8	0.357	-25.3	1.10	10.1
6000	0.140	161.7	2.609	41.3	0.200	50.4	0.313	-29.9	1.08	9.5
6500	0.151	148.1	2.418	35.5	0.239	50.1	0.286	-37.1	1.03	9.1

V_{ds} = 3 V, I_{ds} = 10 mA

FREQUENCY (MHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG ¹ (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
100	0.998	-4.0	6.810	176.0	0.004	54.7	0.763	-1.5	0.46	32.2
200	0.994	-8.3	6.808	172.1	0.010	88.0	0.761	-3.1	0.05	28.5
300	0.989	-12.5	6.801	168.7	0.014	83.7	0.757	-4.7	0.10	26.8
400	0.980	-16.6	6.769	164.7	0.018	82.7	0.752	-6.1	0.13	25.7
500	0.969	-20.8	6.746	161.0	0.023	80.2	0.745	-7.4	0.17	24.7
700	0.940	-28.9	6.604	153.6	0.031	75.4	0.728	-10.4	0.26	23.3
1000	0.885	-41.0	6.353	142.9	0.043	70.6	0.697	-14.5	0.35	21.7
1500	0.772	-59.9	5.768	126.1	0.058	63.9	0.640	-20.8	0.52	20.0
2000	0.657	-76.5	5.071	111.6	0.071	58.6	0.589	-26.3	0.67	18.5
2500	0.556	-91.0	4.464	99.6	0.081	55.8	0.567	-30.0	0.79	17.4
3000	0.479	-102.9	3.941	89.6	0.090	54.0	0.548	-31.2	0.90	16.4
3500	0.408	-113.9	3.524	80.6	0.099	52.9	0.531	-30.2	1.00	15.2
4000	0.344	-124.5	3.211	72.4	0.110	52.6	0.513	-28.3	1.07	13.0
4500	0.285	-136.3	2.963	64.8	0.121	52.9	0.492	-26.8	1.12	11.7
5000	0.228	-152.2	2.749	57.4	0.136	53.3	0.463	-26.5	1.15	10.7
5500	0.190	-173.2	2.584	49.7	0.154	53.2	0.426	-28.8	1.14	9.9
6000	0.180	163.4	2.442	42.5	0.178	53.9	0.390	-32.9	1.10	9.4
6500	0.183	148.9	2.282	36.0	0.220	55.5	0.370	-39.4	1.02	9.3

TYPICAL SCATTERING PARAMETERS (T_A = 25 °C)

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

FREQUENCY (MHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAG ¹ (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
100	0.998	-4.8	9.813	175.4	0.004	63.0	0.677	-1.5	0.33	34.1
200	0.990	-9.7	9.773	170.5	0.007	87.7	0.675	-3.1	0.10	31.2
300	0.982	-14.6	9.705	166.2	0.012	83.4	0.671	-4.6	0.16	28.9
400	0.967	-19.4	9.592	161.6	0.016	82.8	0.665	-6.0	0.20	27.9
500	0.950	-24.2	9.456	157.2	0.020	80.4	0.657	-7.3	0.25	26.8
700	0.905	-33.3	9.093	148.6	0.027	76.5	0.638	-10.0	0.36	25.3
1000	0.827	-46.3	8.455	136.8	0.036	72.5	0.606	-13.5	0.49	23.7
1500	0.685	-65.4	7.273	119.4	0.050	68.0	0.554	-18.4	0.68	21.6
2000	0.560	-81.4	6.146	105.3	0.063	65.0	0.512	-22.7	0.83	19.9
2500	0.458	-94.9	5.262	94.0	0.074	63.2	0.503	-25.6	0.92	18.5
3000	0.384	-105.0	4.543	84.7	0.084	61.7	0.498	-26.1	1.00	16.9
3500	0.319	-113.9	3.994	76.4	0.097	60.5	0.494	-24.9	1.06	14.7
4000	0.263	-122.0	3.588	69.0	0.110	59.8	0.487	-22.7	1.09	13.3
4500	0.212	-131.3	3.271	62.2	0.124	58.6	0.476	-21.3	1.11	12.2
5000	0.163	-145.2	3.007	55.7	0.140	57.8	0.454	-21.1	1.11	11.3
5500	0.130	-166.7	2.806	48.9	0.159	56.6	0.422	-23.4	1.10	10.5
6000	0.122	168.0	2.638	42.6	0.185	55.9	0.385	-27.5	1.07	10.3
6500	0.130	156.1	2.460	37.1	0.226	56.3	0.366	-33.9	1.00	10.0

Note:

1. Gain Calculations:

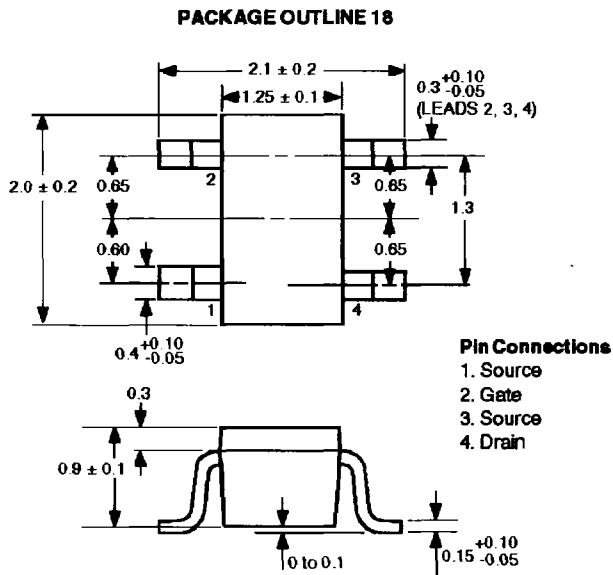
$$MAG = \frac{|S_{21}|}{|S_{12}|} (K \pm \sqrt{K^2 - 1})$$

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)



ORDERING INFORMATION

PART NUMBER	QTY	loss RANGE (mA)	MARKING
NE34018	Bulk up to 3 K	30-120	V63 or V64
NE34018-TI-63	3 K/Reel	30-65	V63
NE34018-TI-64	3 K/Reel	60-120	V64

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