

DESCRIPTION

The MGFC1412 and MGF1412 are low noise GaAs FETs with a N-channel Schottky gate and are designed for use in low noise amplifiers. The MGF1412 features a hermetically sealed metal-ceramic package which adduces minimum parasitic losses, and has a configuration suitable for microstrip circuits.

FEATURES

- Low noise figure $NF_{min} = 0.8$ dB (TYP) @ $f = 4$ GHz
- High associated gain $G_S = 13$ dB (TYP) @ $f = 4$ GHz
- High reliability and stability

APPLICATION

- Low noise amplifiers and oscillators

ABSOLUTE MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

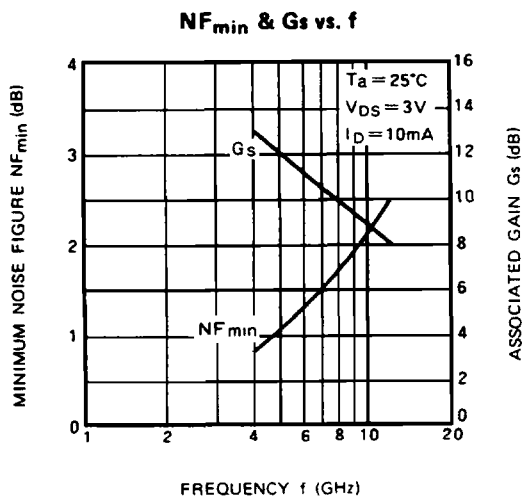
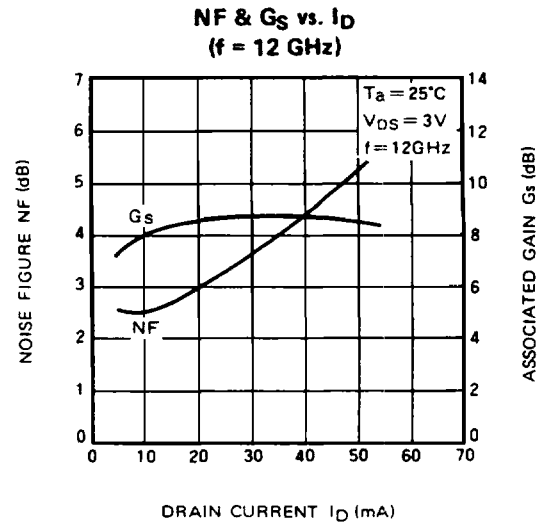
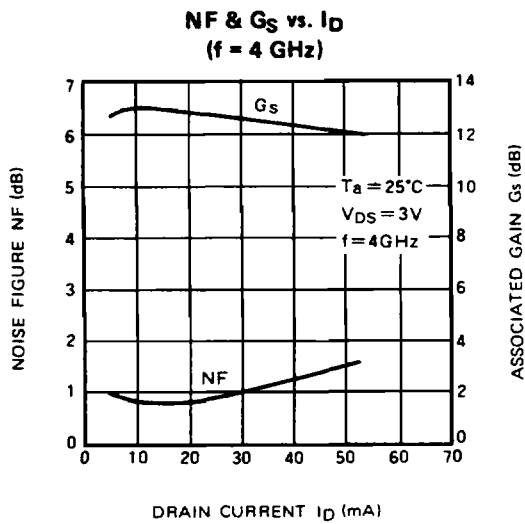
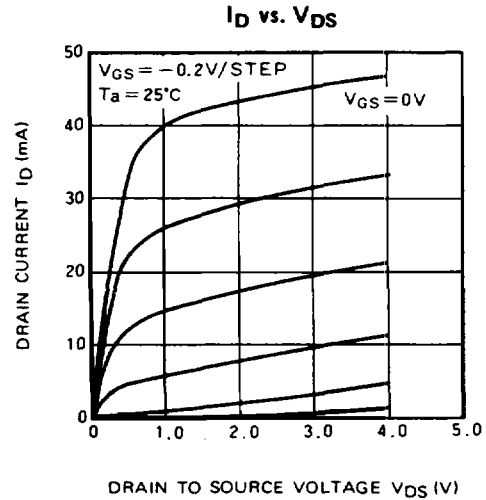
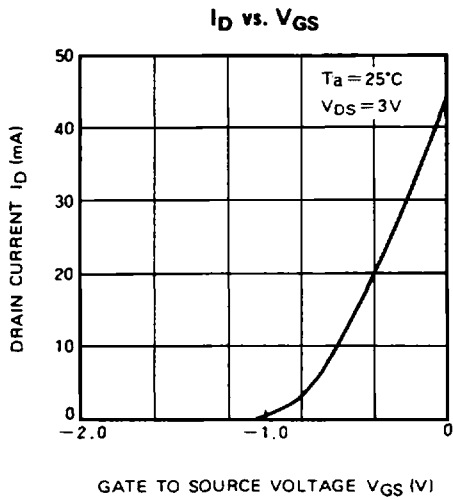
SYMBOL	PARAMETER	TYPE	RATINGS	UNIT
V_{GDO}	Gate to drain voltage		-6	V
V_{GSO}	Gate to source voltage		-6	V
I_D	Drain current		100	mA
P_T	Total power dissipation	MGFC1412	550	mW
		MGF1412	360	
T_{ch}	Channel temperature		175	$^\circ\text{C}$
T_{stg}	Storage temperature		-55 ~ +150	$^\circ\text{C}$
R_{TH}	Thermal resistance	MGFC1412	158	$^\circ\text{C/W}$
		MGF1412	416	

ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

SYMBOL	PARAMETER	TEST CONDITIONS	TYPE	LIMITS			UNIT	
				MIN	TYP	MAX		
$V_{(BR)GDO}$	Gate to drain breakdown voltage	$I_G = -100 \mu A$		-6			V	
$V_{(BR)GSO}$	Gate to source breakdown voltage	$I_G = -100 \mu A$		-6			V	
I_{GSS}	Gate to source leakage current	$V_{GS} = -3V, V_{DS} = 0V$				10	μA	
I_{DSS}	Saturated drain current	$V_{GS} = 0V, V_{DS} = 3V$		30	60	100	mA	
$V_{GS(off)}$	Gate to source cut-off voltage	$V_{DS} = 3V, I_D = 100 \mu A$		-0.3		-3.5	V	
g_m	Transconductance	$V_{DS} = 3V, I_D = 10 \text{ mA}$		25	45		mS	
NF_{min}	Minimum noise figure	$V_{DS} = 3V, I_D = 10 \text{ mA}$	$f = 8 \text{ GHz}$	MGFC1412			1.1	dB
			$f = 12 \text{ GHz}$				3.5	
			$f = 4 \text{ GHz}$	MGF1412		0.8	1.0	
			$f = 8 \text{ GHz}$			1.7		
			$f = 12 \text{ GHz}$			2.5		
G_s	Associated gain	$V_{DS} = 3V, I_D = 10 \text{ mA}$	$f = 8 \text{ GHz}$	MGFC1412	11			dB
			$f = 12 \text{ GHz}$		6			
			$f = 4 \text{ GHz}$	MGF1412	11	13		
			$f = 8 \text{ GHz}$			10		
			$f = 12 \text{ GHz}$			8		
P_{1dB}	Output power at 1dB gain compression	$V_{DS} = 3V, I_D = 10 \text{ mA}$	$f = 4 \text{ GHz}$			+14		dBm

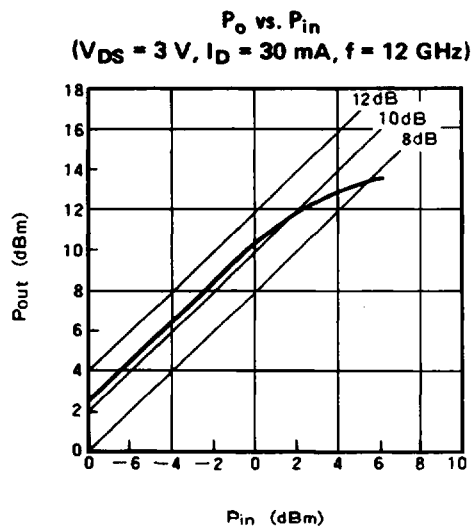
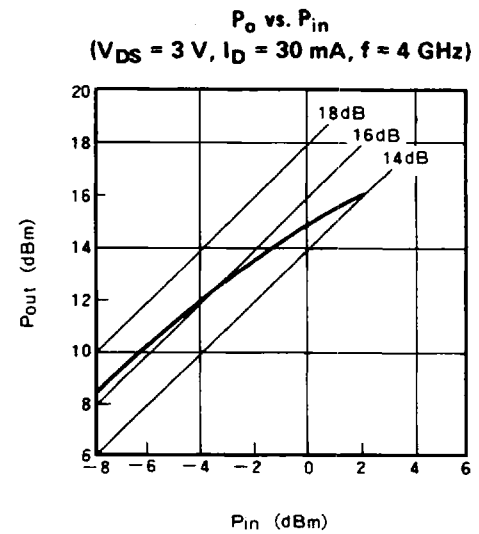
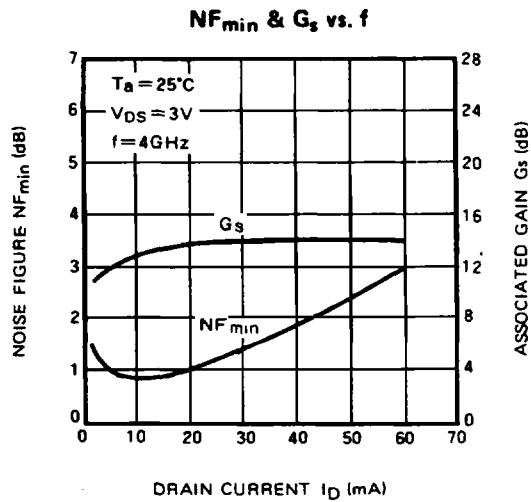
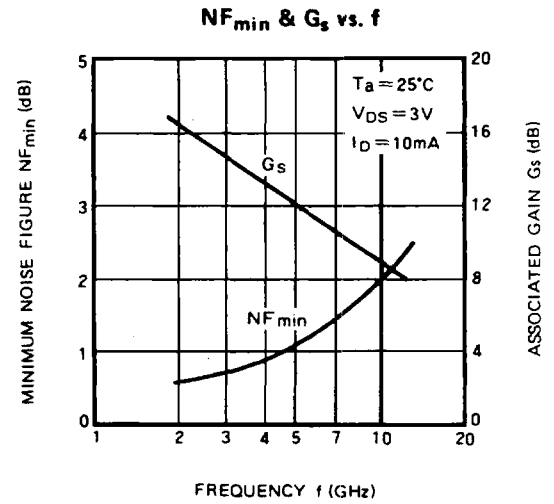
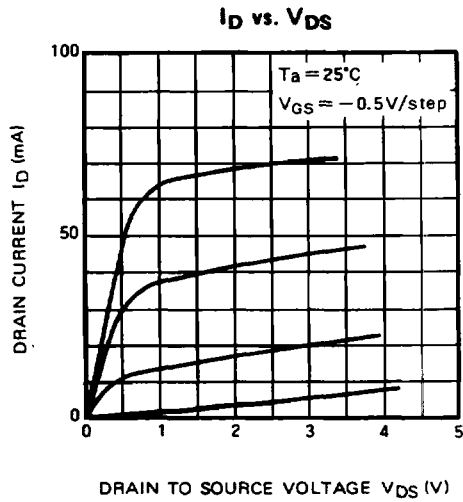
TYPICAL CHARACTERISTICS

MGFC1412



TYPICAL CHARACTERISTICS

MGF1412



MGFC1412 S PARAMETERS ($T_a = 25^\circ\text{C}$, $V_{DS} = 3\text{V}$, $I_D = 10\text{mA}$)

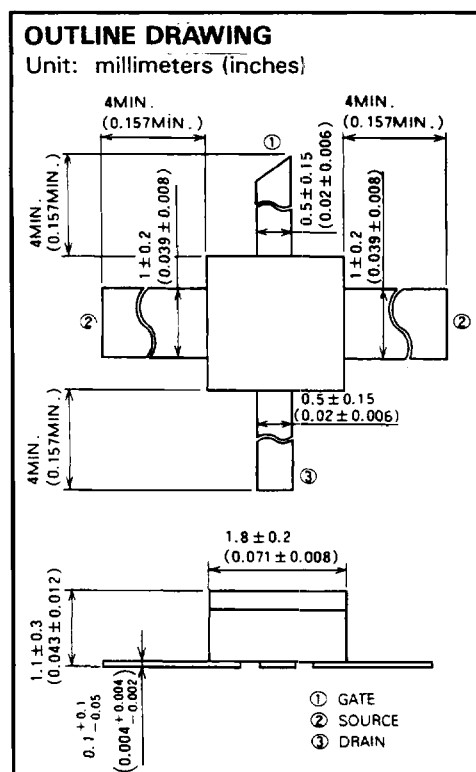
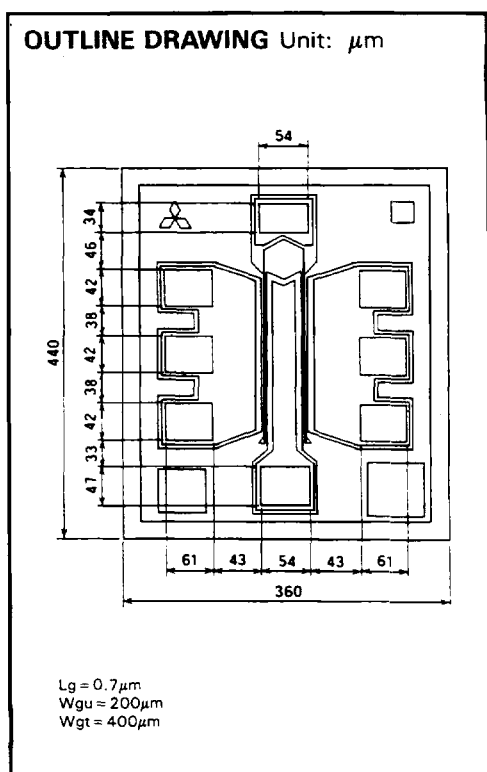
f (GHz)	S ₁₁		S ₁₂		S ₂₁		S ₂₂	
	Magn.	Angle(deg.)	Magn.	Angle(deg.)	Magn.	Angle(deg.)	Magn.	Angle(deg.)
1	0.985	− 27.0	0.023	73.3	4.365	157.3	0.659	− 15.1
2	0.939	− 53.1	0.042	58.4	4.126	135.3	0.637	− 29.0
3	0.864	− 76.6	0.056	43.6	3.780	115.9	0.610	− 41.9
4	0.795	− 98.7	0.064	33.7	3.432	98.2	0.585	− 54.2
5	0.727	−119.2	0.067	24.5	3.115	82.3	0.546	− 65.3
6	0.680	−138.1	0.068	16.3	2.858	66.3	0.518	− 73.3
7	0.649	−156.5	0.068	10.4	2.639	49.8	0.507	− 79.8
8	0.631	−174.6	0.068	6.4	2.466	34.2	0.503	− 88.2
9	0.610	169.3	0.068	3.3	2.291	21.8	0.501	− 97.2
10	0.597	152.4	0.068	2.0	2.138	9.7	0.498	−105.8
11	0.596	133.6	0.069	0	2.007	− 3.8	0.493	−114.3
12	0.596	113.4	0.072	− 2.9	1.908	−18.0	0.486	−123.6

MGF1412 S PARAMETERS ($T_a = 25^\circ\text{C}$, $V_{DS} = 3\text{V}$, $I_D = 10\text{mA}$)

f (GHz)	S ₁₁		S ₁₂		S ₂₁		S ₂₂	
	Magn.	Angle (deg.)	Magn.	Angle (deg.)	Magn.	Angle (deg.)	Magn.	Angle (deg.)
0.5	0.992	− 14.5	0.014	80.6	3.694	167.0	0.741	− 10.0
1.0	0.972	− 28.0	0.026	70.5	3.589	155.5	0.729	− 19.8
1.5	0.953	− 42.3	0.038	60.1	3.479	144.1	0.716	− 28.0
2.0	0.933	− 53.9	0.049	51.2	3.330	133.3	0.704	− 36.3
2.5	0.912	− 64.7	0.063	43.6	3.177	123.0	0.695	− 43.9
3.0	0.891	− 73.6	0.068	35.9	3.020	112.1	0.687	− 50.5
3.5	0.868	− 83.9	0.071	29.0	2.851	102.7	0.680	− 57.2
4.0	0.851	− 92.5	0.074	22.0	2.692	93.5	0.676	− 64.0
4.5	0.830	−101.3	0.077	15.4	2.526	85.6	0.671	− 70.5
5.0	0.813	−109.0	0.080	9.0	2.396	77.3	0.669	− 76.0
5.5	0.802	−116.6	0.081	3.1	2.259	69.4	0.670	− 81.2
6.0	0.785	−123.8	0.081	− 2.5	2.138	62.0	0.671	− 86.2
6.5	0.776	−130.1	0.082	− 7.2	2.035	55.5	0.675	− 91.0
7.0	0.766	−136.0	0.082	−12.0	1.945	47.3	0.678	− 95.1
7.5	0.754	−141.9	0.082	−16.1	1.875	40.1	0.696	− 99.2
8.0	0.743	−147.3	0.081	−20.4	1.820	33.5	0.687	−103.0
8.5	0.731	−153.3	0.081	−24.3	1.758	26.5	0.689	−106.2
9.0	0.716	−159.2	0.080	−28.1	1.708	20.0	0.692	−109.5
9.5	0.702	−166.0	0.080	−31.0	1.660	14.9	0.692	−112.9
10.0	0.688	−172.3	0.080	−33.8	1.622	9.0	0.699	−116.0
10.5	0.672	−179.1	0.079	−36.0	1.579	4.5	0.693	−119.8
11.0	0.653	−174.5	0.079	−38.2	1.548	− 0.6	0.695	−123.0
11.5	0.635	168.0	0.079	−40.7	1.519	− 6.0	0.692	−126.0
12.0	0.615	160.1	0.079	−43.8	1.488	−11.7	0.692	−128.1

MGF1412 NOISE PARAMETERS ($V_{DS} = 3\text{V}$, $I_D = 10\text{mA}$)

Freq. (GHz)	Γ_{opt}		R _n (Ω)	NF _{min} (dB)
	Magn.	Angle (deg.)		
4	0.649	61.5	28.0	0.81
8	0.437	138.1	32.0	1.73
12	0.414	− 168.1	15.0	2.52



ORDERING INFORMATION

Part Number	Grade	Test at	Noise Figure	Notes
MGFC1412-T01	A	12GHz, sample	3.0	
MGFC1412-T02	B	12GHz, sample	3.0	
MGFC1412-T03	C	12GHz, sample	3.0	
MGF1412-11-08	Industrial	4GHz, sample	0.8	
MGF1412-11-09	Industrial	4GHz, sample	0.9	
MGF1412-11-10	Industrial	4GHz, sample	1.0	