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MITSUBISHI SEMICONDUCTOR <GaAs FET>

MGF4910E Series

SUPER LOW NOISE InGaAs HEMT

DESCRIPTION

The MGF4910E series super-low-noise HEMT (High Electron Mobility Transistor) is designed for use in X to K band amplifiers. The hermetically sealed metal-ceramic package assures minimum parasitic losses, and has a configuration suitable for microstrip circuits.

The MGF4910E Series is mounted in the super 12 tape, and is electrically equivalent to MGF4310E Series.

FEATURES

- Low noise figure @f=12GHz
 MGF4914E: NFmin. = 1.00dB (MAX)
 MGF4918E: NFmin. = 0.60dB (MAX)
 MGF4919E: NFmin. = 0.50dB (MAX)
- High associated gain Gs=9.5dB(MIN) @f= 12GHz

APPLICATION

X to K band super-low-noise amplifiers.

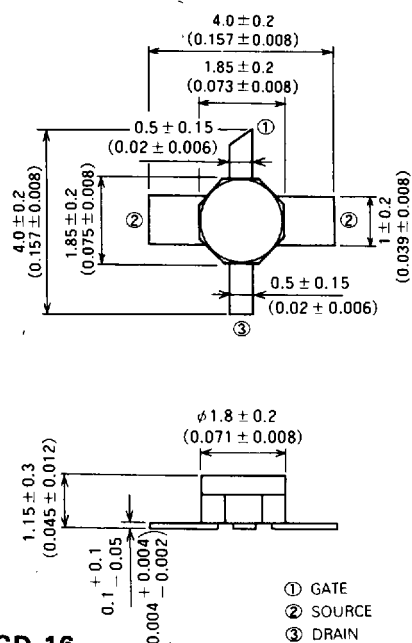
QUALITY GRADE

- GG

RECOMMENDED BIAS CONDITIONS

- V_{DS}=2V I_D=10mA
- Refer to Bias Procedure

OUTLINE DRAWING Unit: millimeters (inches)



ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

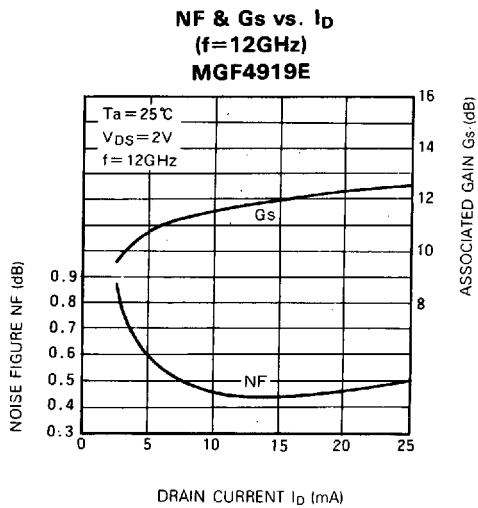
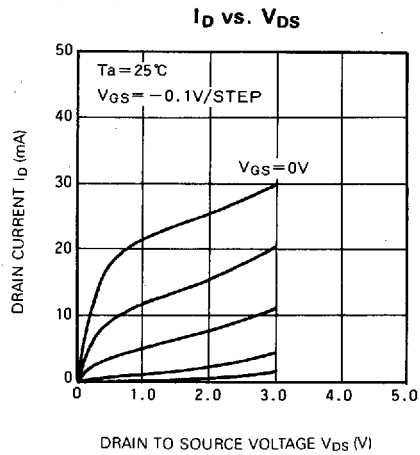
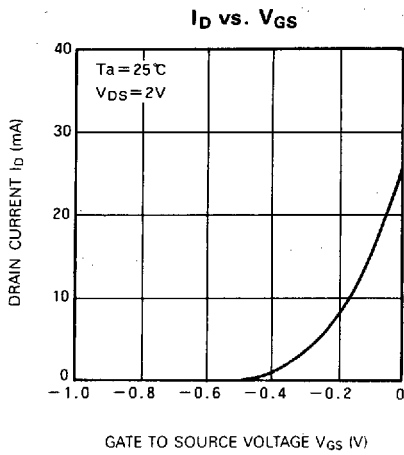
Symbol	Parameter	Rating	Unit
V _{GDO}	Gate to drain voltage	-4	V
V _{GSO}	Gate to source voltage	-4	V
I _D	Drain current	60	mA
P _T	Total power dissipation	50	mW
T _{ch}	Channel temperature	125	°C
T _{stg}	Storage temperature	-65 ~ +125	°C

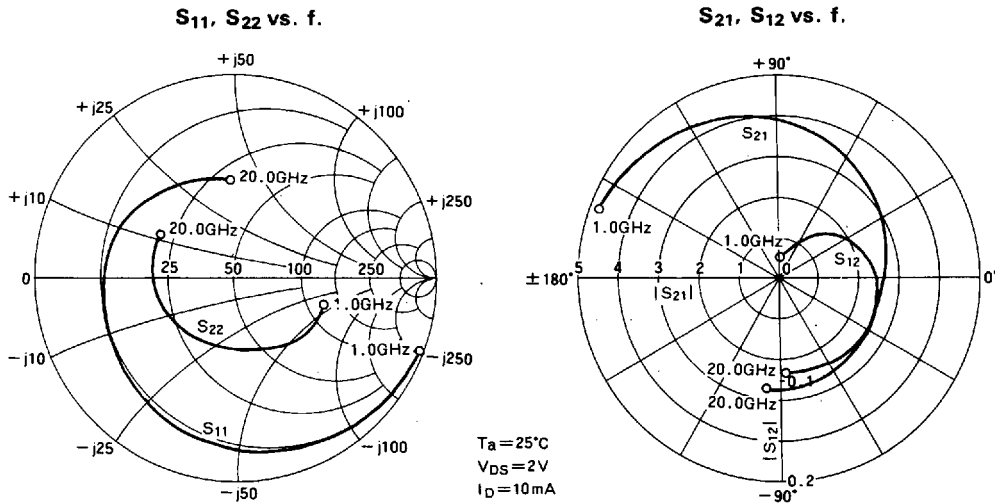
ELECTRICAL CHARACTERISTICS (Ta=25°C)

Symbol	Parameter	Test conditions	Limits			Unit	
			Min	Typ	Max		
V _{(BR)GDO}	Gate to drain breakdown voltage	I _G = -100μA	-3	—	—	V	
V _{(BR)GSO}	Gate to source breakdown voltage	I _G = -100μA	-3	—	—	V	
I _{GSS}	Gate to source leakage current	V _{GS} = -2V, V _{DS} = 0V	—	—	50	μA	
I _{DSS}	Saturated drain current	V _{GS} = 0V, V _{DS} = 2V	10	20	60	mA	
V _{GS(off)}	Gate to source cut-off voltage	V _{DS} = 2V, I _D = 500μA	-0.1	—	-1.5	V	
g _m	Transconductance	V _{DS} = 2V, I _D = 10mA	40	60	—	mS	
G _s	Associated gain		9.5	11.5	—	dB	
NF _{min}	Minimum noise figure	V _{DS} = 2V, I _D = 10mA, f = 12GHz	MGF4914E	—	0.80	1.00	dB
			MGF4918E	—	0.55	0.60	dB
			MGF4919E	—	0.45	0.50	dB
R _{th(ch-a)}	Thermal Resistance	*1 ΔV _f method	—	—	625	°C/W	

*1: Channel to ambient

TYPICAL CHARACTERISTICS (Ta=25°C)





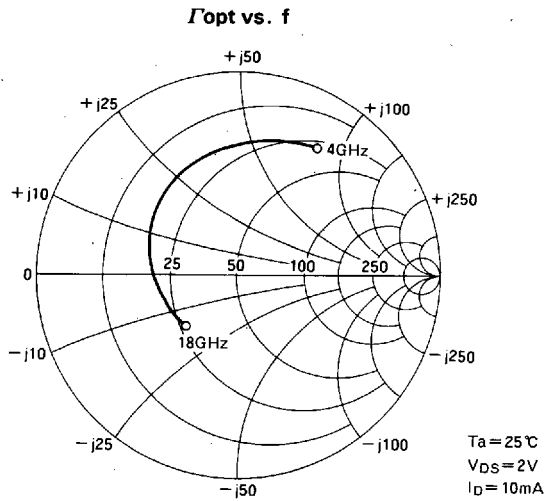
S PARAMETERS ($T_a = 25^\circ\text{C}$, $V_{DS} = 2\text{V}$, $I_D = 10\text{mA}$)

Freq. (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MSG/MAG (dB)
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.		
1.0	0.979	-24.6	4.894	156.5	0.028	71.0	0.493	-21.2	0.156	22.4
2.0	0.946	-41.3	4.662	141.4	0.040	60.0	0.464	-34.0	0.263	20.7
3.0	0.913	-58.1	4.431	126.3	0.052	49.0	0.435	-46.9	0.338	19.3
4.0	0.880	-74.8	4.199	111.2	0.064	38.0	0.406	-59.7	0.400	18.2
5.0	0.840	-92.5	3.949	95.5	0.074	29.2	0.388	-74.9	0.450	17.3
6.0	0.801	-110.2	3.700	79.7	0.084	20.3	0.371	-90.0	0.503	16.4
7.0	0.772	-121.1	3.474	69.3	0.089	13.5	0.361	-99.4	0.570	15.9
8.0	0.743	-132.0	3.248	58.8	0.094	6.6	0.351	-108.7	0.642	15.4
9.0	0.717	-145.1	3.072	45.9	0.096	-0.3	0.355	-120.5	0.699	15.1
10.0	0.692	-158.1	2.896	33.0	0.098	-7.2	0.359	-132.3	0.762	14.7
11.0	0.673	-170.6	2.765	20.1	0.098	-16.4	0.368	-141.8	0.828	14.5
12.0	0.655	177.0	2.634	7.1	0.098	-25.6	0.378	-151.3	0.900	14.3
13.0	0.644	170.7	2.556	0.2	0.098	-28.8	0.378	-157.3	0.952	14.2
14.0	0.632	164.4	2.477	-6.8	0.097	-31.9	0.378	-163.3	1.008	13.5
15.0	0.621	154.4	2.431	-18.9	0.098	-39.7	0.401	-170.3	1.024	13.0
16.0	0.609	144.4	2.385	-31.0	0.098	-47.4	0.424	-177.2	1.040	12.6
17.0	0.584	132.3	2.391	-45.0	0.102	-59.4	0.426	175.1	1.070	12.1
18.0	0.558	120.2	2.398	-59.0	0.107	-71.3	0.428	167.3	1.097	11.6
19.0	0.515	107.3	2.385	-73.4	0.109	-84.5	0.425	158.6	1.196	10.7
20.0	0.472	94.3	2.372	-87.8	0.110	-97.6	0.421	149.9	1.287	10.1

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NOISE PARAMETERS



f (GHz)	Γ_{opt}		R _n (Ω)	NF _{min} (dB)			G _s (dB)
	Magn.	Angle (deg.)		MGF4914E	MGF4918E	MGF4919E	
4	0.75	58	12.5	0.41	0.29	0.27	16.5
8	0.59	120	4.5	0.62	0.43	0.40	12.8
12	0.47	160	1.7	0.90	0.55	0.45	11.5
14	0.42	179	1.5	1.03	0.63	0.56	10.0
18	0.37	-136	1.4	1.29	0.80	0.69	7.4