DESCRIPTION

The MGF0904A and MGF0905A GaAs FETs with N-channel Schottky gates, are designed for use in UHF through S-band amplifiers.

MGFC0904/MGF0904AFEATURES

- High output power
  P_O = 600mW (TYP) @ f = 1.65 GHz,
  P_{IN} = 30mW
- High power gain
  G_P = 13.0dB (TYP) @ f = 1.65 GHz,
  P_{IN} = 30mW
- High power added efficiency
  η_{add} = 40% (TYP) @ f = 1.65 GHz,
  P_{IN} = 30mW

MGFC0905/MGF0905A FEATURES

- High output power
  P_O = 2.5W (TYP) @ f = 0.9 GHz,
  P_{IN} = 200mW
  P_O = 2.5W (TYP) @ f = 1.65 GHz,
  P_{IN} = 400mW
- High power gain
  G_P = 11dB (TYP) @ f = 0.9 GHz,
  P_{IN} = 200mW
  G_P = 8dB (TYP) @ f = 1.65 GHz,
  P_{IN} = 400mW
- High power added efficiency
  η_{add} = 45% (TYP) @ f = 0.9 GHz,
  P_{IN} = 200mW
  η_{add} = 40% (TYP) @ f = 1.65 GHz,
  P_{IN} = 400mW

ABSOLUTE MAXIMUM RATINGS (T_a = 25°C)

Symbol	Parameter	Type	Ratings	Unit
V_{GSO}	Gate to source voltage		–17	V
V_{GDO}	Gate to drain voltage		–17	V
I_D	Drain current	MGFC0904 MGF0904A	800	mA
		MGFC0905 MGF0905A	3200	
I_{GR}	Reverse gate current	MGFC0904 MGF0904A	–2.5	mA
		MGFC0905 MGF0905A	–10	
I_{GF}	Forward gate current	MGFC0904 MGF0904A	5.4	mA
		MGFC0905 MGF0905A	21.5	
P_T	Total power dissipation	MGFC0904 MGF0904A	3.75	W
		MGFC0905 MGF0905A	12	
T_{ch}	Channel temperature		175	°C
T_{stg}	Storage temperature		–65 ~ +175	°C
$R_{th(ch-c)}$	Thermal resistance (channel to case)	MGF0904A	40	°C/W
		MGF0905A	12.5	

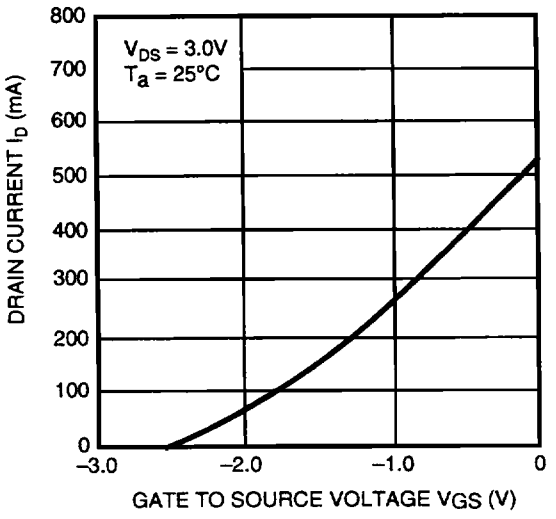
ELECTRICAL CHARACTERISTICS (T_a = 25°C)

SYMBOL	PARAMETER	TEST CONDITIONS	TYPE	LIMITS			UNIT
				MIN	TYP	MAX	
I_{DSS}	Saturated drain current	V_{DS} = –3V, V_{GS} = 0V	MGFC0904 MGF0904A	400	550	800	mA
			MGFC0905 MGF0905A	1600	2400	3200	
$V_{GS(off)}$	Gate to source cut-off voltage	V_{DS} = 3V, I_D = 2.5mA		–1	–3	–5	V
g_m	Transconductance	V_{DS} = 3V, I_D = 300mA	MGFC0904 MGF0904A	120	200	—	mS
		V_{DS} = 3V, I_D = 1.2mA	MGFC0905 MGF0905A	500	800	—	
P_O	Output power	V_{DS} = 8V, I_D = 200mA , f = 1.65GHz, P_{IN} = 15dBm	MGFC0904 MGF0904A	26	28	—	dBm
		V_{DS} = 8V, I_D = 800mA , f = 1.65GHz, P_{IN} = 26dBm	MGFC0905 MGF0905A	33	34	—	
η_{add}	Power added efficiency	V_{DS} = 8V, I_D = 200mA , f = 1.65GHz, P_{IN} = 15dBm	MGFC0904 MGF0904A	—	40	—	%
		V_{DS} = 8V, I_D = 800mA , f = 1.65GHz, P_{IN} = 26dBm	MGFC0905 MGF0905A	—	40	—	

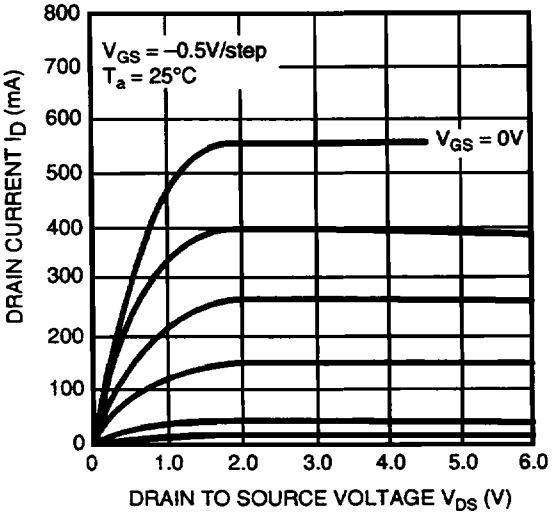
TYPICAL CHARACTERISTICS

MGFC0904 /MGF0904A

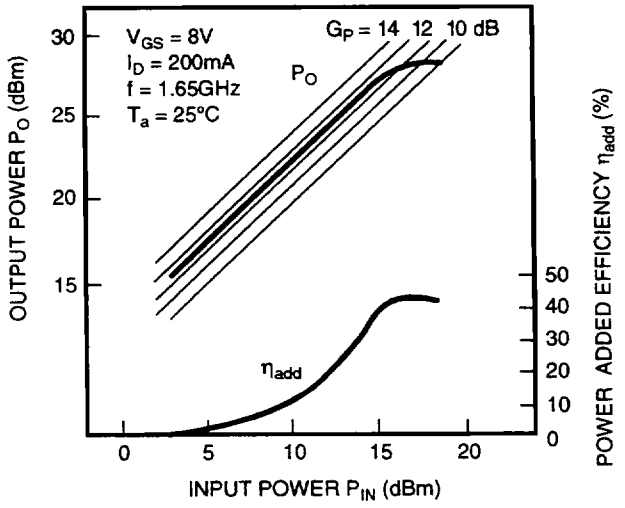
I_D vs. V_{GS}



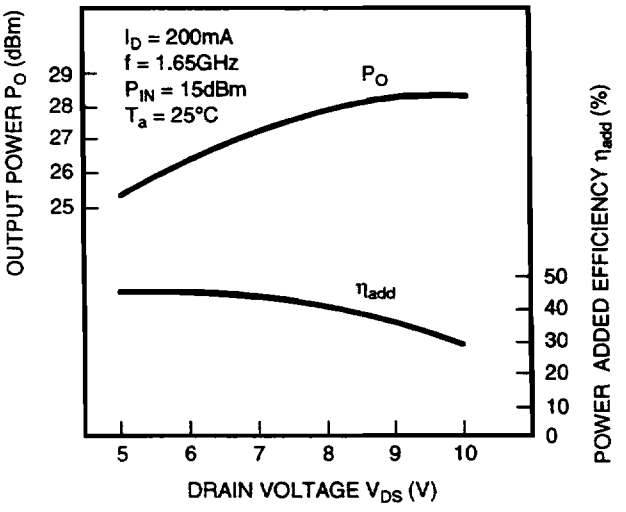
I_D vs. V_{DS}



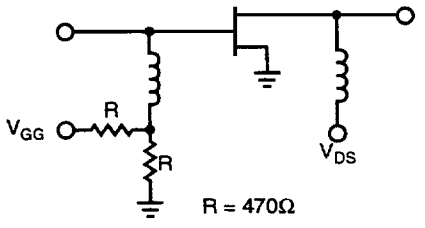
P_O, η_{add} vs. P_{IN}



P_O, η_{add} vs. V_{DS}



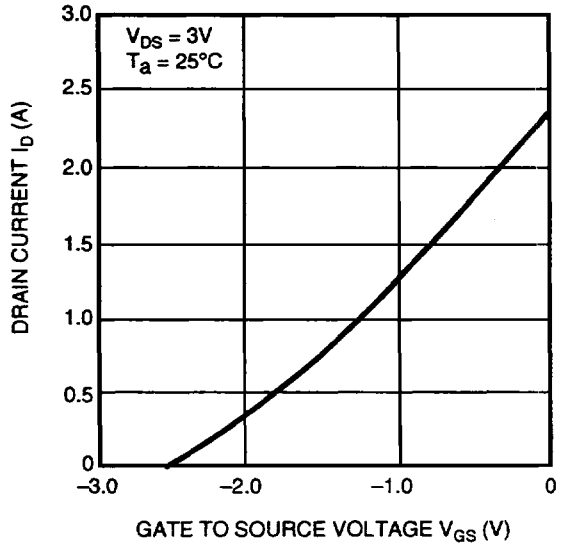
BIAS CIRCUIT



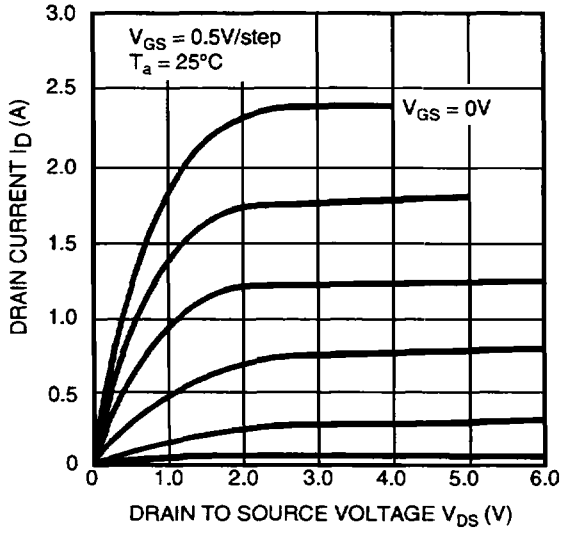
TYPICAL CHARACTERISTICS

MGFC0905 /MGF0905A

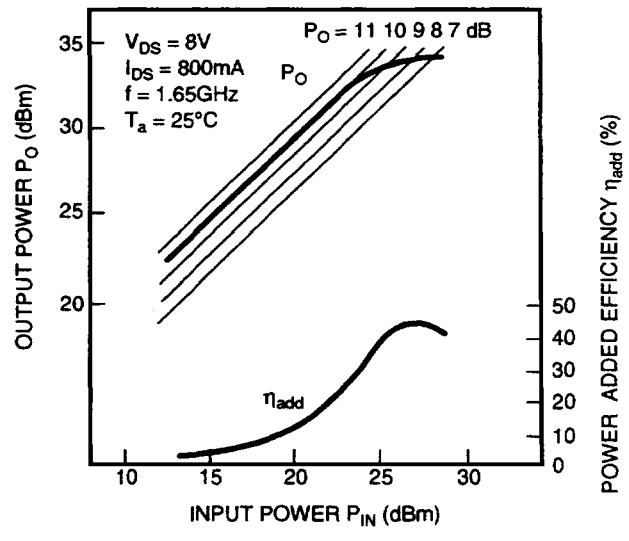
I_D vs. V_{GS}



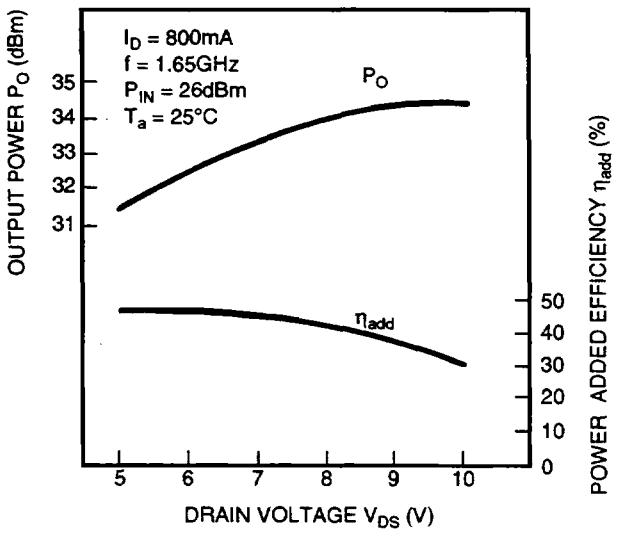
I_D vs. V_{GS}



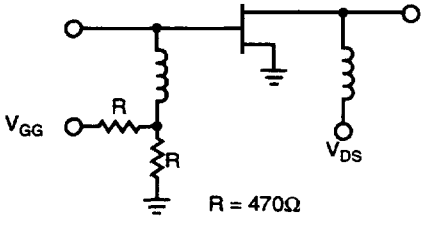
P_O, η_{add} vs. P_{IN}



P_O, η_{add} vs. V_{DS}



BIAS CIRCUIT



MGFC0904 S PARAMETERS (T_a = 25°C, V_{DS} = 8V, I_D = 200mA)

f (GHz)	S_{11}		S_{12}		S_{21}		S_{22}	
	Magn.	Angle (deg)	Magn.	Angle (deg)	Magn.	Angle (deg)	Magn.	Angle (deg)
0.005	0.999	–0.9	0.0005	85.6	8.693	179.8	0.020	23.62
0.010	0.999	–1.8	0.0010	90.2	8.729	179.1	0.024	14.84
0.020	1.000	–3.6	0.0021	88.2	8.760	177.8	0.029	1.51
0.030	1.002	–5.5	0.0031	87.9	8.782	176.3	0.031	–8.44
0.040	1.001	–7.4	0.0041	85.8	8.784	174.8	0.033	–17.12
0.050	0.999	–9.3	0.0052	84.9	8.766	173.4	0.035	–25.06
0.100	0.995	–18.5	0.0103	80.3	8.704	166.8	0.048	–54.50
0.150	0.988	–27.7	0.0153	75.5	8.582	160.1	0.062	–72.40
0.200	0.975	–36.5	0.0200	70.8	8.414	153.7	0.075	–85.60
0.250	0.962	–45.2	0.0246	66.6	8.233	147.4	0.090	–96.34
0.300	0.948	–53.8	0.0287	62.0	8.012	141.3	0.104	–105.23
0.350	0.931	–61.9	0.0327	58.0	7.772	135.5	0.116	–113.10
0.400	0.915	–69.9	0.0364	54.0	7.533	129.8	0.128	–120.32
0.450	0.898	–77.6	0.0397	50.2	7.270	124.3	0.140	–126.75
0.500	0.882	–85.0	0.0428	46.7	7.015	119.1	0.149	–132.32
0.550	0.866	–92.1	0.0456	43.3	6.765	114.0	0.158	–137.92
0.600	0.851	–99.0	0.0482	40.0	6.514	109.2	0.167	–143.01
0.650	0.838	–105.6	0.0506	37.0	6.265	104.6	0.174	–147.75
0.700	0.824	–111.9	0.0528	34.1	6.037	100.1	0.181	–152.22
0.750	0.812	–118.1	0.0549	31.4	5.806	95.7	0.188	–156.73
0.800	0.801	–124.0	0.0568	28.7	5.600	91.5	0.193	–160.54
0.850	0.789	–129.6	0.0586	26.2	5.399	87.5	0.198	–164.54
0.900	0.779	–135.1	0.0603	23.8	5.205	83.5	0.203	–168.34
0.950	0.770	–140.5	0.0619	21.5	5.017	79.7	0.207	–171.72
1.000	0.763	–145.6	0.0634	19.2	4.842	75.9	0.212	–175.17
1.050	0.756	–150.6	0.0648	17.1	4.686	72.3	0.215	–178.56
1.100	0.749	–155.4	0.0663	14.9	4.530	68.7	0.219	178.37
1.150	0.743	–160.2	0.0675	12.9	4.382	65.3	0.222	175.30
1.200	0.738	–164.7	0.0689	10.8	4.239	61.9	0.226	172.25
1.250	0.733	–169.1	0.0701	8.9	4.102	58.5	0.228	169.35
1.300	0.729	–173.4	0.0714	7.0	3.979	55.2	0.232	166.58
1.350	0.724	–177.6	0.0725	5.2	3.862	52.0	0.235	163.69
1.400	0.721	178.3	0.0735	3.2	3.748	48.9	0.238	160.98
1.450	0.717	174.4	0.0748	1.4	3.641	45.8	0.240	158.42
1.500	0.714	170.5	0.0760	–0.4	3.529	42.7	0.243	155.73
1.550	0.712	166.6	0.0770	–2.0	3.434	39.6	0.245	153.18
1.600	0.710	163.0	0.0780	–3.6	3.346	36.5	0.247	150.65
1.650	0.708	159.3	0.0790	–5.4	3.261	33.6	0.250	148.17
1.700	0.706	155.8	0.0800	–7.1	3.175	30.8	0.252	145.68
1.750	0.705	152.3	0.0813	–8.8	3.088	28.0	0.255	143.28
1.800	0.704	148.9	0.0825	–10.4	3.009	24.9	0.257	140.93
1.850	0.702	145.5	0.0834	–11.9	2.938	22.1	0.259	138.53
1.900	0.702	142.3	0.0843	–13.6	2.874	19.3	0.262	136.29
1.950	0.701	139.0	0.0854	–15.2	2.809	16.6	0.264	133.98
2.000	0.700	135.8	0.0866	–16.9	2.740	13.9	0.266	131.76
2.050	0.700	132.7	0.0877	–18.4	2.673	11.1	0.268	129.50
2.100	0.700	129.6	0.0888	–19.9	2.617	8.3	0.270	127.33
2.150	0.698	126.6	0.0898	–21.5	2.564	5.6	0.272	125.14
2.200	0.699	123.6	0.0908	–23.1	2.510	3.1	0.274	123.01
2.250	0.699	120.7	0.0921	–24.8	2.456	0.5	0.276	120.88
2.300	0.698	117.8	0.0933	–26.3	2.402	–2.1	0.278	118.74

MGF0904A S PARAMETERS (T_a = 25°C, V_{DS} = 8V, I_D = 200mA)

f (GHz)	S_{11}		S_{12}		S_{21}		S_{22}		K	MSG/MAG (dB)
	Magn.	Angle (deg)	Magn.	Angle (deg)	Magn.	Angle (deg)	Magn.	Angle (deg)		
0.50	0.851	–99.0	0.055	31.0	6.855	116.0	0.338	–149.0	0.277	21.0
1.00	0.801	–138.0	0.064	22.5	4.265	89.0	0.368	–162.0	0.521	18.2
1.50	0.788	–161.5	0.072	13.0	3.192	71.0	0.390	–173.3	0.655	16.5
2.00	0.740	–177.0	0.079	4.0	2.544	52.0	0.409	–178.0	0.847	15.1
2.50	0.713	176.5	0.085	–7.0	2.180	30.0	0.411	177.0	0.940	14.1
3.00	0.670	171.5	0.091	–18.0	2.040	9.0	0.402	172.0	1.070	11.9

MGFC0905 S PARAMETERS (T_a = 25°C, V_{DS} = 8V, I_D = 500mA)

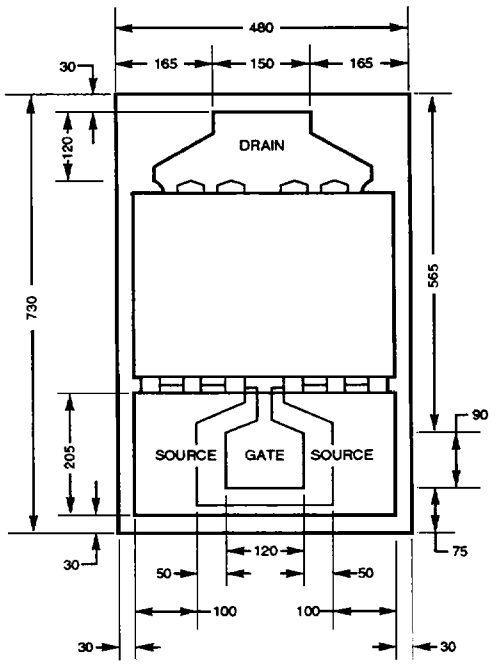
f (GHz)	S_{11}		S_{12}		S_{21}		S_{22}	
	Magn.	Angle (deg)	Magn.	Angle (deg)	Magn.	Angle (deg)	Magn.	Angle (deg)
0.005	0.940	–4.2	0.0015	39.0	13.085	178.6	0.616	179.52
0.010	0.939	–8.2	0.0022	56.5	13.113	176.0	0.614	179.97
0.020	0.938	–16.1	0.0039	66.1	13.045	171.3	0.614	–179.58
0.030	0.937	–24.0	0.0057	68.4	12.917	166.7	0.616	–179.21
0.040	0.933	–31.7	0.0074	68.7	12.700	162.3	0.619	–178.89
0.050	0.930	–39.2	0.0090	67.8	12.405	158.2	0.623	–178.63
0.100	0.916	–71.9	0.0159	59.9	10.785	140.2	0.651	–178.73
0.150	0.899	–96.5	0.0207	53.5	9.060	126.4	0.676	179.64
0.200	0.886	–114.7	0.0243	49.3	7.632	116.1	0.691	177.44
0.250	0.880	–128.6	0.0272	46.5	6.513	107.9	0.701	175.17
0.300	0.874	–139.3	0.0298	44.6	5.641	101.3	0.709	172.87
0.350	0.871	–147.9	0.0322	43.1	4.959	95.8	0.714	170.66
0.400	0.868	–155.3	0.0346	41.8	4.413	90.9	0.717	168.52
0.450	0.866	–161.5	0.0369	40.7	3.868	86.6	0.720	166.42
0.500	0.864	–166.8	0.0392	39.6	3.607	82.7	0.721	164.42
0.550	0.863	–171.7	0.0415	38.5	3.304	78.9	0.723	162.41
0.600	0.863	–176.1	0.0437	37.3	3.049	75.5	0.724	160.38
0.650	0.862	180.0	0.0459	36.1	2.825	72.2	0.726	158.46
0.700	0.861	176.1	0.0481	34.9	2.636	69.1	0.726	156.53
0.750	0.861	172.5	0.0504	33.8	2.466	66.1	0.727	154.58
0.800	0.861	169.3	0.0526	32.5	2.323	63.1	0.727	152.68
0.850	0.860	166.1	0.0548	31.2	2.194	60.2	0.727	150.80
0.900	0.860	163.1	0.0570	29.9	2.078	57.5	0.728	148.89
0.950	0.860	160.1	0.0592	28.5	1.973	54.8	0.728	147.00
1.000	0.860	157.3	0.0615	27.1	1.879	52.1	0.728	145.15
1.050	0.860	154.5	0.0636	25.8	1.797	49.4	0.728	143.26
1.100	0.859	151.9	0.0656	24.3	1.723	46.8	0.728	141.41
1.150	0.860	149.2	0.0678	22.8	1.653	44.3	0.728	139.53
1.200	0.860	146.6	0.0700	21.3	1.588	41.7	0.728	137.68
1.250	0.859	144.2	0.0722	19.9	1.527	39.2	0.729	135.84
1.300	0.859	141.7	0.0744	18.5	1.473	36.5	0.728	134.01
1.350	0.858	139.3	0.0764	16.9	1.424	34.0	0.728	132.14
1.400	0.859	136.9	0.0784	15.4	1.379	31.7	0.729	130.29
1.450	0.858	134.6	0.0807	13.7	1.335	29.3	0.728	128.48
1.500	0.858	132.4	0.0829	12.2	1.289	26.9	0.728	126.62
1.550	0.858	130.0	0.0852	10.8	1.253	24.5	0.728	124.76
1.600	0.858	127.8	0.0872	9.3	1.221	21.9	0.728	122.98
1.650	0.856	125.6	0.0890	7.7	1.189	19.6	0.727	121.12
1.700	0.857	123.3	0.0912	6.0	1.160	17.4	0.728	119.29
1.750	0.858	121.2	0.0936	4.3	1.127	15.2	0.728	117.45
1.800	0.856	119.0	0.0960	2.8	1.097	12.7	0.728	115.65
1.850	0.855	116.8	0.0978	1.4	1.072	10.2	0.727	113.81
1.900	0.857	114.8	0.0998	–0.2	1.051	7.9	0.728	112.00
1.950	0.856	112.6	0.1019	–2.0	1.031	5.9	0.72 7	110.23
2.000	0.855	110.5	0.1042	–3.7	1.005	3.6	0.727	108.40
2.050	0.856	108.4	0.1066	–5.3	0.982	1.3	0.727	106.58
2.100	0.855	106.4	0.1087	–6.7	0.964	–1.2	0.726	104.75
2.150	0.854	104.3	0.1106	–8.4	0.947	–3.4	0.725	102.97
2.200	0.854	102.3	0.1125	–10.1	0.930	–5.5	0.725	101.18
2.250	0.853	100.3	0.1149	–11.9	0.912	–7.6	0.725	99.33
2.300	0.852	98.2	0.1174	–13.6	0.893	–9.9	0.724	97.56

MGF0905A S PARAMETERS (T_a = 25°C, V_{DS} = 8V, I_D = 500mA)

f (GHz)	S_{11}		S_{12}		S_{21}		S_{22}		K	MSG/MAG (dB)
	Magn.	Angle (deg)	Magn.	Angle (deg)	Magn.	Angle (deg)	Magn.	Angle (deg)		
0.50	0.861	–155.5	0.022	25.0	3.895	96.0	0.731	–179.0	0.806	22.5
1.00	0.887	–170.5	0.025	33.0	1.999	78.0	0.753	175.5	1.133	16.8
1.50	0.894	177.0	0.033	33.0	1.485	68.0	0.747	172.5	1.175	14.0
2.00	0.887	173.0	0.039	29.0	1.205	58.0	0.743	169.5	1.205	12.2
2.50	0.877	169.0	0.047	24.0	1.000	48.5	0.738	166.5	1.221	10.4
3.00	0.864	165.0	0.054	18.0	0.795	35.0	0.723	164.0	1.365	8.1

MGFC0904 OUTLINE DRAWING

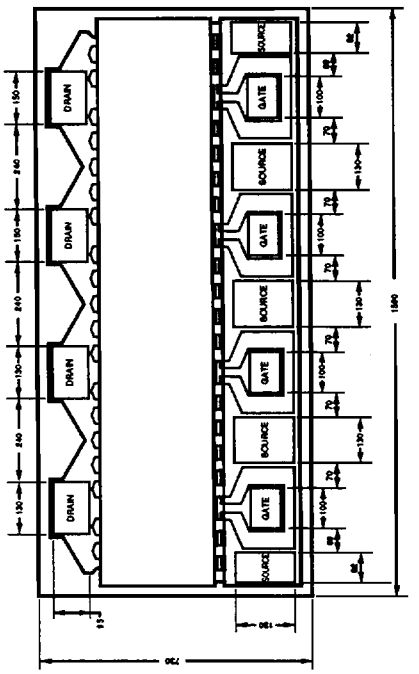
Units: mm (inches)



CHIP THICKNESS: 125 ± 20μm

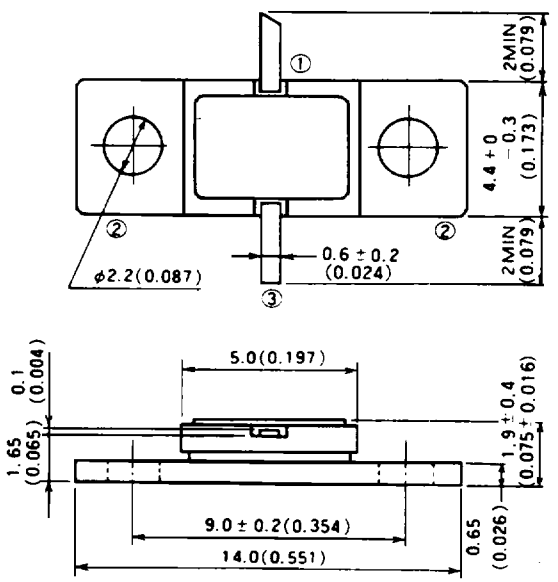
MGFC0905 OUTLINE DRAWING

Units: mm



MGF0904A/MGF0905A OUTLINE DRAWING

Units: mm



1 GATE
2 SOURCE
3 DRAIN

ORDERING INFORMATION

Part Number	Grade	Tested at	P_{1dB} (dBm)	Notes
MGFC0904-03	C		26	Die
MGF0904A-01	General	1.65 GHz, 100% RF	26	Package
MGFC0905-03	C		33	Die
MGF0905A-01	General	1.65 GHz, 100% RF	33	Package