

DESCRIPTION

The MGFC2400 series GaAs FETs are N-channel Schottky gate devices designed for high frequency, medium and high power applications.

These FETs feature source island via-hole structures and air bridge connection of gates and drains to minimize parasitics and enhance high frequency operation, as well as plated heat sinks to improve thermal dissipation characteristics.

These devices have output power ranging from 250mW* (–2407) to 1.6W* (–2445).

The MGF2400 series devices feature hermetically sealed, metal-ceramic flanged packages.

*Typical data at 12GHz

MGFC2407 FEATURES

- High output power
 $P_{1dB} = 250 \text{ mW (TYP) @ 12 GHz}$
- High power gain
 $G_{LP} = 8 \text{ dB (TYP) @ 12 GHz}$
- High power added efficiency
 $\eta_{add} = 30\% \text{ (TYP) @ 12GHz, } P_{1dB}$
- Source island via-hole construction for reduced parasitics

MGF2407 APPLICATIONS

- Medium power amplifiers and oscillators

MGF2407A FEATURES

- High output power
 $P_{1dB} = 24.5 \text{ dBm (TYP) @ 14.5 GHz}$
- High power gain
 $G_{LP} = 8 \text{ dB (TYP) @ 14.5 GHz}$
- High power added efficiency
 $\eta_{add} = 30\% \text{ (TYP) @ 14.5 GHz, } P_{1dB}$

MGF2407A APPLICATIONS

- S to Ku band power amplifiers

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

Symbol	Parameter	Type	Ratings	Unit
V_{GSO}	Gate to source voltage		–15	V
V_{GDO}	Gate to drain voltage		–15	V
I_D	Drain current	MGFC2407	250	mA
		MGF2407A	200	
I_{GR}	Reverse gate current		–0.6	mA
I_{GF}	Forward gate current		2.5	mA
P_T	Total power dissipation		1.5	W
T_{ch}	Channel temperature		175	$^\circ\text{C}$
T_{stg}	Storage temperature	MGFC2407	–55 ~ + 175	$^\circ\text{C}$
		MGF2407A	–65 ~ + 175	
R_{th}	Thermal resistance	MGFC2407	60	$^\circ\text{C/W}$
		MGF2407A	100	

ELECTRICAL CHARACTERISTICS ($P_{OUT} = 200\text{mW}$) ($T_a = 25^\circ\text{C}$)

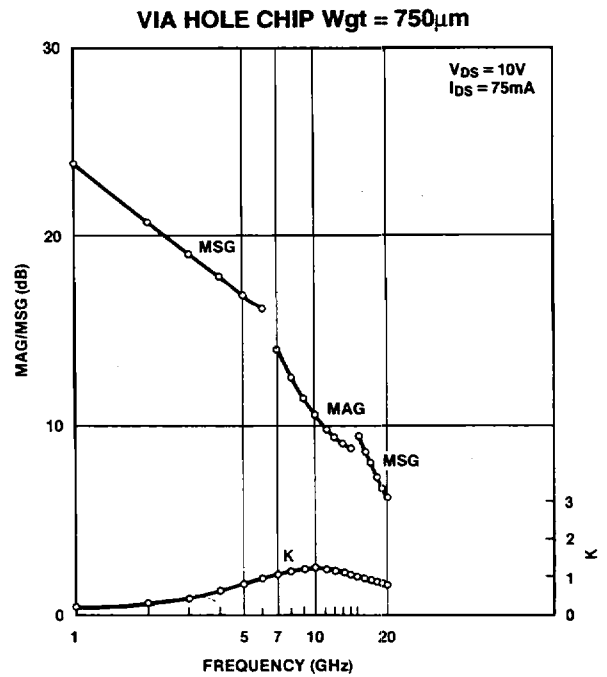
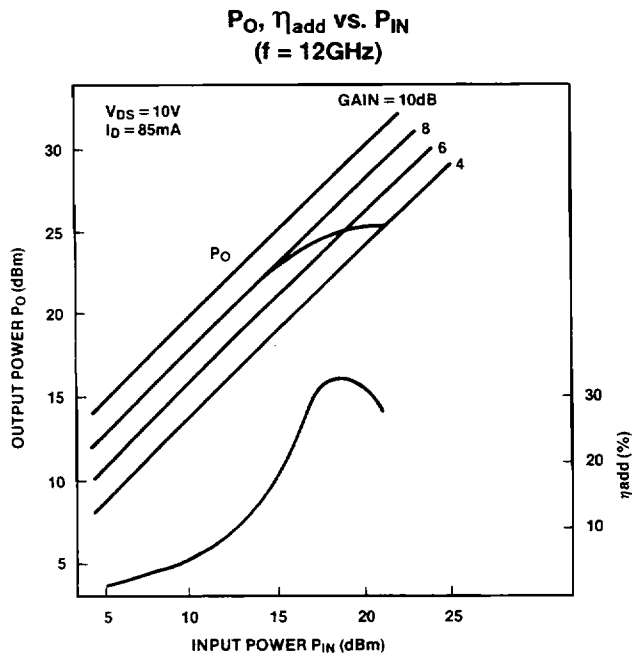
SYMBOL	PARAMETER	CONDITIONS	TYPE	LIMITS			UNIT
				MIN	TYP	MAX	
I_{DSS}	Saturated drain current	$V_{DS} = 3\text{V}, V_{GS} = 0\text{V}$	MGFC2407	130	180	250	mA
			MGF2407A	100	150	200	
$V_{GS(off)}$	Gate to source cut-off voltage	$V_{DS} = 3\text{V}, I_D = 1\text{mA}$	MGFC2407	-2	-3	-5	V
		$V_{DS} = 3\text{V}, I_D = 0.5\text{mA}$	MGF2407A	-1	-2.5	-4	
g_m	Transconductance	$V_{DS} = 3\text{V}, I_D = 85\text{mA}$	MGFC2407	60	80		mS
		$V_{DS} = 0\text{V}, I_D = 75\text{mA}$	MGF2407A	50	65		
P_{1dB}	Output power at 1 dB gain compression	$V_{DS} = 10\text{V}, I_D = 0.5 I_{DSS}, f = 12\text{ GHz}$	MGFC2407	200	250		mW
		$V_{DS} = 10\text{V}, I_D = 0.5 I_{DSS}, f = 14.5\text{ GHz}, R_g = 110\Omega$	MGF2407A	23.0	24.15		
G_{LP}	Linear power gain	$V_{DS} = 10\text{V}, I_D = 0.5 I_{DSS}, f = 12\text{ GHz}$	MGFC2407	7	8		dB
		$V_{DS} = 10\text{V}, I_D = 0.5 I_{DSS}, f = 14.5\text{ GHz}, R_g = 110\Omega$	MGF2407A	7.0	8.0		
η_{add}	Power added efficiency at P_{1dB}	$V_{DS} = 10\text{V}, I_D = 0.5 I_{DSS}, f = 12\text{ GHz}$	MGFC2407		30		%
		$V_{DS} = 10\text{V}, I_D = 0.5 I_{DSS}, f = 14.5\text{ GHz}, R_g = 110\Omega$	MGF2407A		30		

ELECTRICAL CHARACTERISTICS ($P_{OUT} = 160\text{mW}$) ($T_a = 25^\circ\text{C}$)

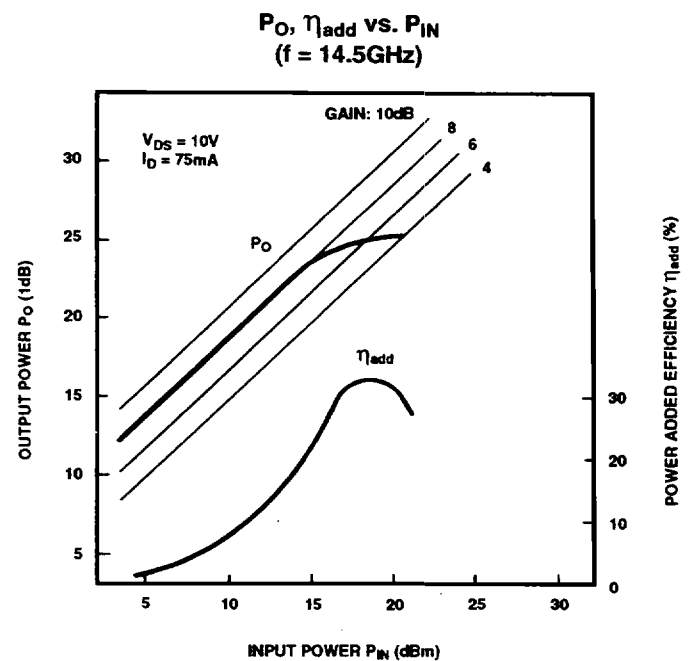
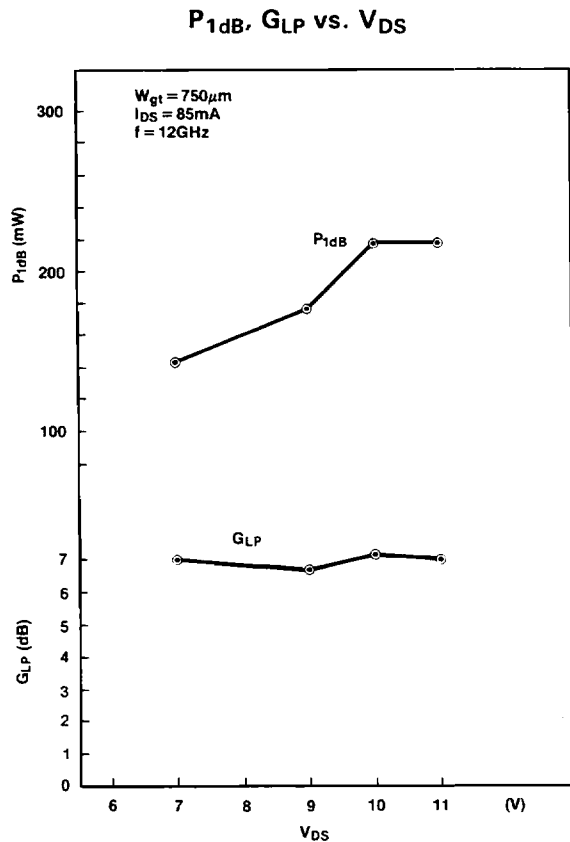
SYMBOL	PARAMETER	CONDITIONS	TYPE	LIMITS			UNIT
				MIN	TYP	MAX	
I_{DSS}	Saturated drain current	$V_{DS} = 3\text{V}, V_{GS} = 0\text{V}$	MGF2407A	—	150	300	mA
$V_{GS(off)}$	Gate to source cut-off voltage	$V_{DS} = 3\text{V}, I_D = 0.5\text{mA}$	MGF2407A	—	-2.5	-5.0	V
g_m	Transconductance	$V_{DS} = 0\text{V}, I_D = 75\text{mA}$	MGF2407A	—	65	—	mS
P_{1dB}	Output power at 1 dB gain compression	$V_{DS} = 10\text{V}, I_D = 75\text{mA}, f = 14.5\text{ GHz}, R_g = 140\Omega$	MGF2407A	22.0	24.5	—	dBm
G_{LP}	Linear power gain	$V_{DS} = 10\text{V}, I_D = 75\text{mA}, f = 14.5\text{ GHz}, R_g = 140\Omega$	MGF2407A	5.0	7.0	—	dB
η_{add}	Power added efficiency at P_{1dB}	$V_{DS} = 10\text{V}, I_D = 75\text{mA}, f = 14.5\text{ GHz}, R_g = 140\Omega$	MGF2407A	—	25	—	%

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

MGFC2407



MGF2407A



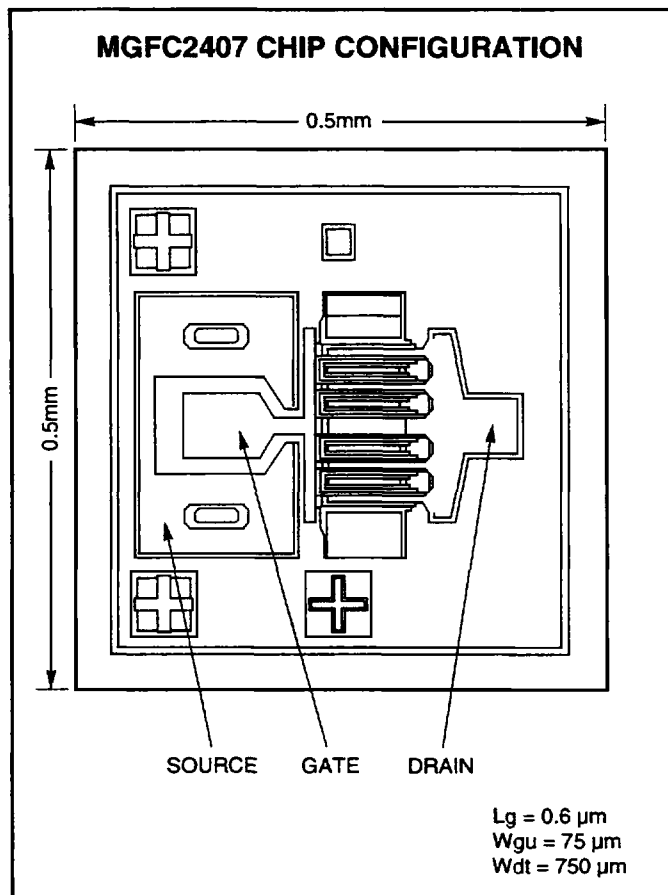
MGFC2407 VIA-HOLE CHIP S PARAMATERS ($V_{DS} = 10V$, $I_{DS} = 75mA$)

FREQUENCY (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	MAXIMUM GAIN	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.		AVAILABLE	STABLE
1	0.987	-24	3.871	160	0.016	78	0.521	-11	0.156		23.71
2	0.955	-46	3.625	141	0.031	67	0.496	-21	0.312		20.74
3	0.916	-66	3.307	124	0.041	58	0.464	-31	0.470		19.04
4	0.878	-83	2.983	109	0.049	51	0.428	-40	0.629		17.86
5	0.848	-97	2.687	95	0.054	47	0.390	-50	0.784		16.96
6	0.824	-110	2.428	83	0.058	44	0.353	-61	0.931		16.21
7	0.807	-120	2.206	71	0.062	43	0.318	-73	1.059	14.04	
8	0.796	-130	2.015	60	0.066	43	0.286	-89	1.158	12.46	
9	0.790	-138	1.847	49	0.071	43	0.262	-107	1.217	11.36	
10	0.787	-145	1.698	39	0.077	44	0.251	-128	1.235	10.52	
11	0.786	-152	1.562	29	0.085	44	0.260	-151	1.217	9.85	
12	0.788	-158	1.435	20	0.094	43	0.288	-172	1.173	9.34	
13	0.790	-164	1.315	11	0.103	41	0.331	170	1.115	8.98	
14	0.793	-169	1.202	2	0.114	39	0.384	154	1.052	8.84	
15	0.796	-175	1.094	-7	0.124	36	0.441	141	0.991		9.45
16	0.798	-180	0.992	-15	0.134	32	0.499	130	0.934		8.69
17	0.799	175	0.897	-22	0.144	28	0.553	121	0.885		7.95
18	0.798	171	0.809	-29	0.152	24	0.604	112	0.845		7.25
19	0.797	166	0.729	-35	0.160	20	0.650	105	0.812		6.58
20	0.795	162	0.656	-41	0.167	16	0.691	98	0.788		5.94

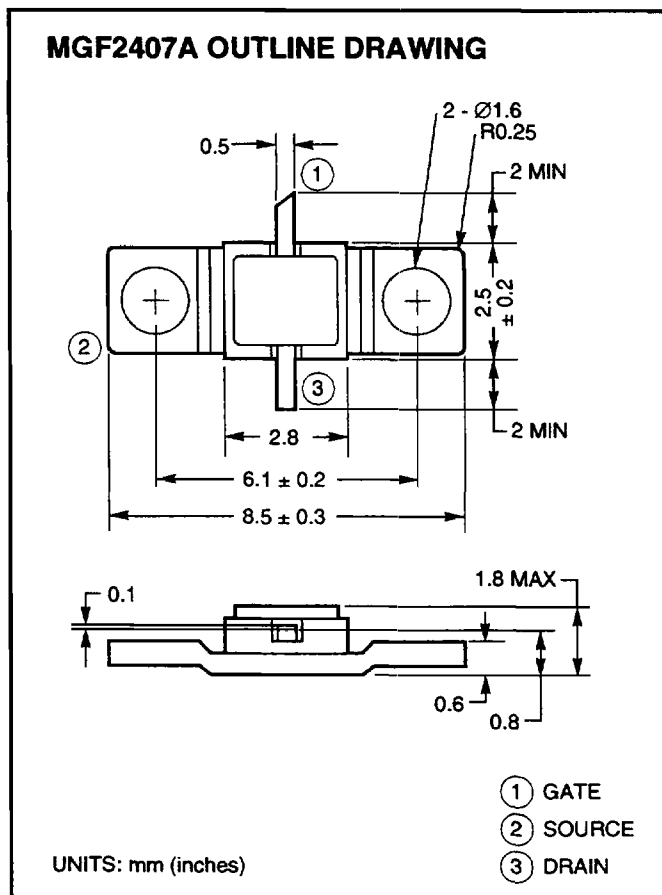
MGF2407A S PARAMATERS ($V_{DS} = 10V$, $I_D = 90mA$)

f (GHz)	S Parameters (TYP.)								K	MSG/MAG
	S ₁₁		S ₁₂		S ₂₁		S ₂₂			
	Magn.	Angle (deg.)	Magn.	Angle (deg.)	Magn.	Angle (deg.)	Magn.	Angle (deg.)		
4	0.968	-112.5	0.024	- 6.0	1.766	81.5	0.713	- 70.5	0.380	18.7
6	0.929	-135.5	0.028	- 6.0	1.279	48.5	0.758	- 93.5	0.813	16.6
8	0.891	-157.5	0.033	- 17.0	1.147	26.0	0.777	-116.0	0.948	15.4
10	0.833	-180.0	0.041	- 30.5	1.111	- 5.0	0.782	-139.0	1.176	11.8
12	0.719	158.0	0.050	- 50.0	1.080	- 36.0	0.793	-164.5	1.583	8.9
14	0.469	133.5	0.059	- 82.0	1.030	- 85.0	0.818	168.0	2.276	6.1
16	0.172	-165.5	0.073	-123.0	0.967	-153.0	0.911	144.5	1.245	8.2

MGFC2407 CHIP CONFIGURATION



MGF2407A OUTLINE DRAWING



ORDERING INFORMATION

Part Number	Grade	Tested at	P_{1dB} (mW)	Notes
MGFC2407-T02	B	12 GHz, sample	200	
MGFC2407-T03	C	12 GHz, sample	200	
MGF2407A-11	Industrial	14.5 GHz, 100% RF	200	
MGF2407A-02	Industrial	14.5 GHz, 100% RF	160	