MITSUBISHI SEMICONDUCTOR <GaAs FET>

MGFC42V3742A

PRELIMINARY

Notice: This is not a final specification.
Some parametric limits are subject to change.

3.7~4.2GHz BAND 16W INTERNALLY MATCHED GaAs FET

DESCRIPTION

The MGFC42V3742A is an internally impedance-matched GaAs power FET especially designed for use in 3.7 ~ 4.2 GHz band amplifiers. The hermetically sealed metal-ceramic package guarantees high reliability.

FEATURES

- Class A operation
- Internally matched to 50Ω system
- High output power
  P_{1dB} = 18W (TYP) @ 3.7 ~ 4.2 GHz
- High power gain
  G_{LP} = 10 dB (TYP) @ 3.7 ~ 4.2 GHz
- High power added efficiency
  η_{add} = 34% (TYP) @ 3.7 ~ 4.2 GHz, P_{1dB}
- Hermetically sealed metal-ceramic package
- Low distortion (Item: −51)
  IM3 = −45dBc (TYP) @Po = 31(dBm) S.C.L.
- Low thermal resistance $R_{th(ch-c)} \leqq 1.6$ (°C/W)

APPLICATION

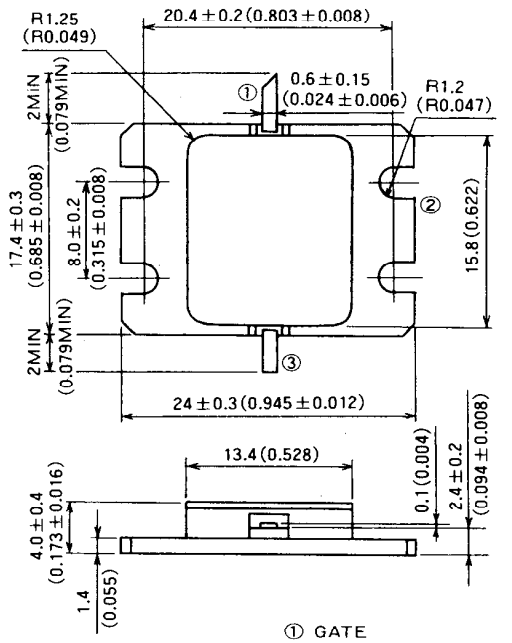
Item-01: 3.7~4.2 GHz band power amplifiers.
Itcm-51: Digital radio communication.

QUALITY GRADE

- IG

OUTLINE DRAWING

Unit: millimeters (inches)



GF-18

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Symbol	Parameter	Ratings	Unit
V_{GDO}	Gate to drain voltage	−15	V
V_{GSO}	Gate to source voltage	−15	V
I_D	Drain current	12	A
I_{GR}	Reverse gate current	−40	mA
I_{GF}	Forward gate current	+84	mA
P_T	Total power dissipation *1	93.7	W
Tch	Channel temperature	175	°C
Tstg	Storage temperature	−65 ~ +175	°C

*1: T_C = 25°C

RECOMMENDED BIAS CONDITIONS

- V_{DS} = 10V
- I_D = 4.5A
- Rg = 25Ω
- Refer to Bias Procedure

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{DSS}	Saturated drain current	V_{DS} = 3V, V_{GS} = 0V	—	9	12	A
g_m	Transconductance	V_{DS} = 3V, I_D = 4.4A	—	4	—	S
$V_{GS(off)}$	Gate to source cut-off voltage	V_{DS} = 3V, I_D = 80mA	−2	−3	−4	V
P_{1dB}	Output power at 1dB gain compression	V_{DS} = 10V, $I_D \fallingdotseq$ 4.5A, f = 3.7~4.2GHz	41.5	42.5	—	dBm
G_{LP}	Linear power gain		9	10	—	dB
I_D	Drain current		—	4.5	—	A
η_{add}	Power added efficiency		—	34	—	%
IM_3	3rd order IM distortion *1		−42	−45	—	dBc
$R_{th(ch-c)}$	Thermal resistance *2	ΔV_f method	—	—	1.6	°C/W

*1: Item-51, 2-tone test Po = 31dBm Single Carrier Level f = 4.2GHz Δf = 10MHz, *2: Channel to case

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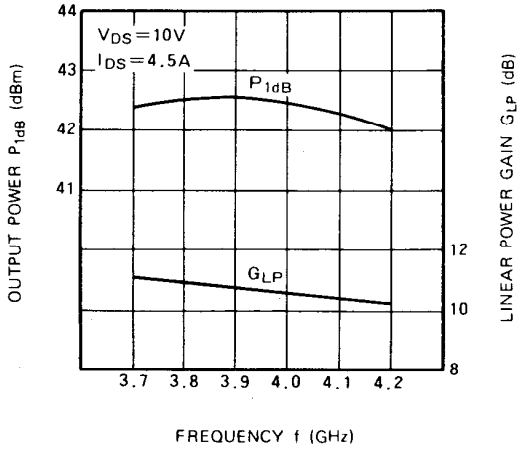
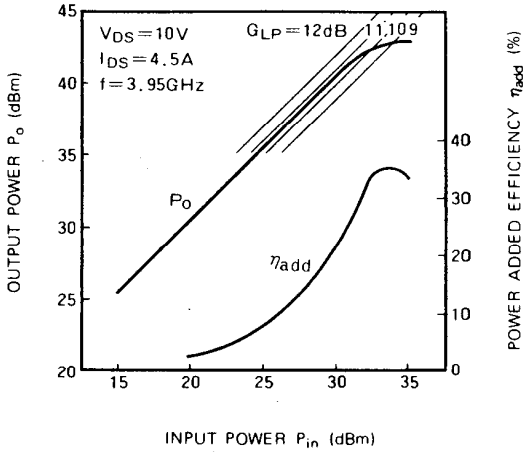
TYPICAL CHARACTERISTICS (T_a=25°C)

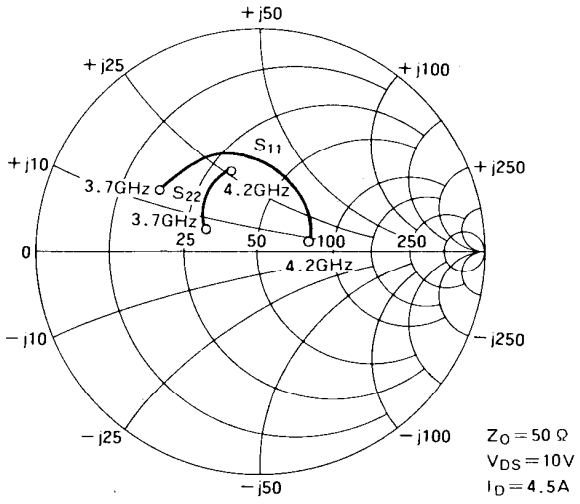
P_{1dB}, G_{LP} vs. f



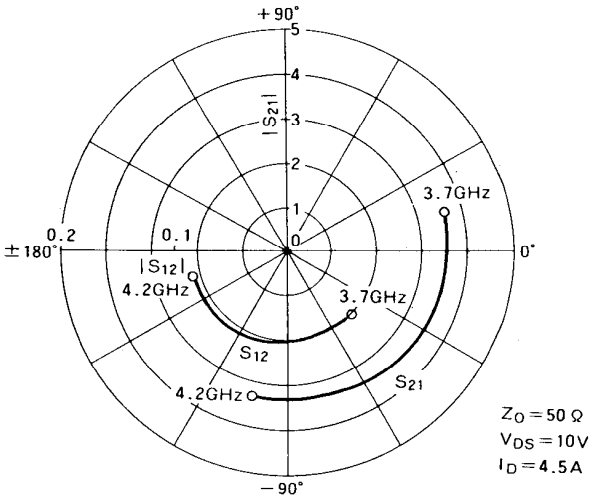
P_o, η_{add} vs. P_{in}



S_{11}, S_{22} vs. f



S_{21}, S_{12} vs. f



S PARAMETERS (T_a=25°C, V_{DS}=10V, I_{DS}=4.5A)

f (GHz)	S Parameters (TYP.)							
	S_{11}		S_{21}		S_{12}		S_{22}	
	Magn.	Angle (deg.)	Magn.	Angle (deg.)	Magn.	Angle (deg.)	Magn.	Angle (deg.)
3.7	0.51	149	3.65	13	0.080	48	0.26	159
3.8	0.49	129	3.55	−9	0.080	72	0.32	148
3.9	0.47	110	3.50	−34	0.083	97	0.34	138
4.0	0.41	90	3.48	−54	0.086	117	0.37	129
4.1	0.33	54	3.39	−77	0.084	139	0.38	119
4.2	0.24	11	3.31	−103	0.086	163	0.38	108

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