

PRELIMINARY

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

MITSUBISHI SEMICONDUCTOR <GaAs FET>

MGFC42V3742A

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
 $P_{1dB} = 18\text{ W (TYP) @ } 3.7 \sim 4.2\text{ GHz}$
- High power gain
 $G_{LP} = 10\text{ dB (TYP) @ } 3.7 \sim 4.2\text{ GHz}$
- High power added efficiency
 $\eta_{add} = 34\% \text{ (TYP) @ } 3.7 \sim 4.2\text{ GHz, } P_{1dB}$
- Hermetically sealed metal-ceramic package
- Low distortion [Item: -51]
 $IM3 = -45\text{ dBc (TYP) @ } P_o = 31\text{ (dBm) S.C.L.}$
- Low thermal resistance $R_{th(ch-c)} \leq 1.6 (^{\circ}\text{C/W})$

APPLICATION

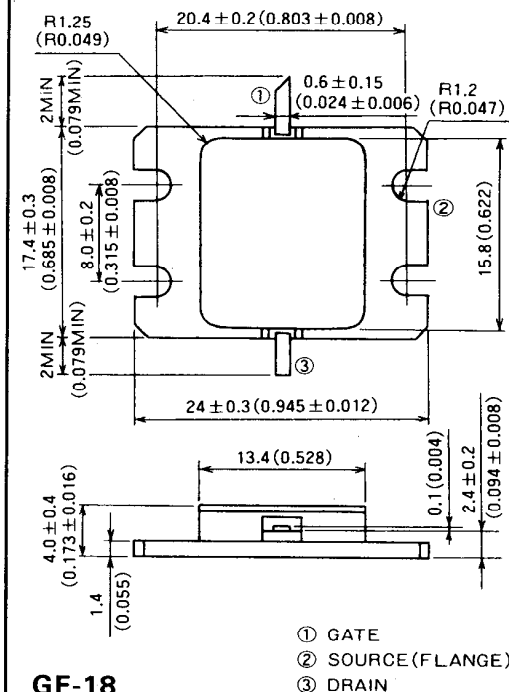
Item-01: 3.7~4.2 GHz band power amplifiers.
Item-51: Digital radio communication.

QUALITY GRADE

- IG

OUTLINE DRAWING

Unit: millimeters (inches)



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

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
T_{ch}	Channel temperature	175	$^{\circ}\text{C}$
T_{stg}	Storage temperature	-65 ~ +175	$^{\circ}\text{C}$

*1: $T_c = 25^{\circ}\text{C}$

RECOMMENDED BIAS CONDITIONS

- $V_{DS} = 10\text{ V}$
- $I_D = 4.5\text{ A}$
- $R_g = 25\Omega$
- Refer to Bias Procedure

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

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{DSS}	Saturated drain current	$V_{DS} = 3\text{ V, } V_{GS} = 0\text{ V}$	—	9	12	A
g_m	Transconductance	$V_{DS} = 3\text{ V, } I_D = 4.4\text{ A}$	—	4	—	S
$V_{GS(off)}$	Gate to source cut-off voltage	$V_{DS} = 3\text{ V, } I_D = 80\text{ mA}$	-2	-3	-4	V
P_{1dB}	Output power at 1dB gain compression	$V_{DS} = 10\text{ V, } I_D = 4.5\text{ A, } f = 3.7 \sim 4.2\text{ GHz}$	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	$^{\circ}\text{C/W}$

*1: Item-51, 2-tone test $P_o = 31\text{ dBm}$ Single Carrier Level $f = 4.2\text{ GHz}$ $\Delta f = 10\text{ MHz}$, *2: Channel to case

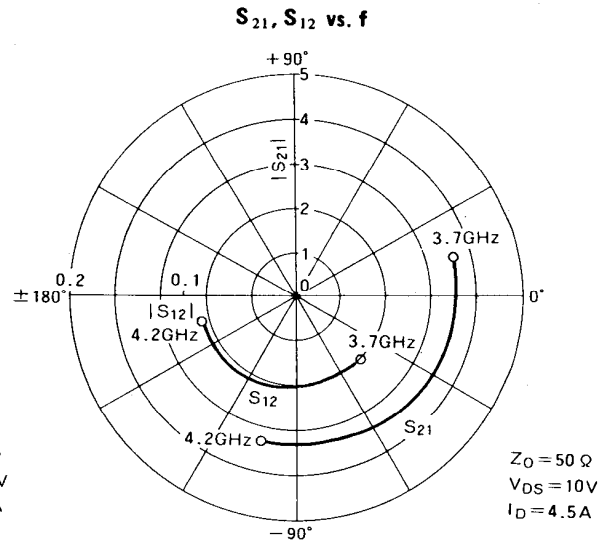
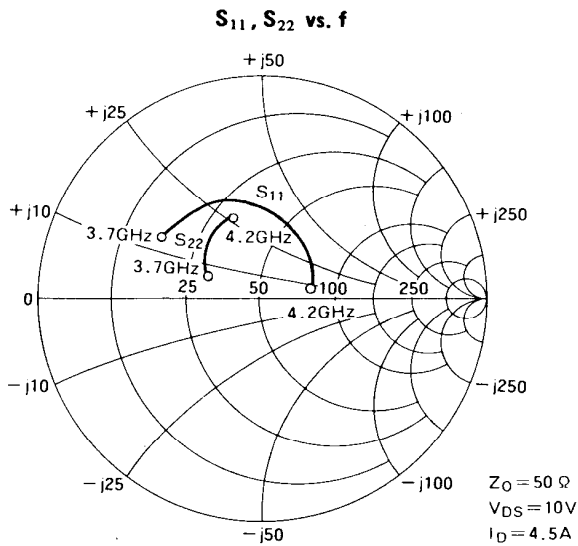
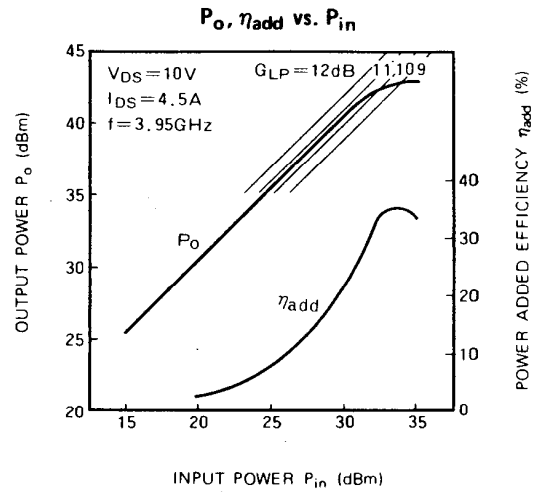
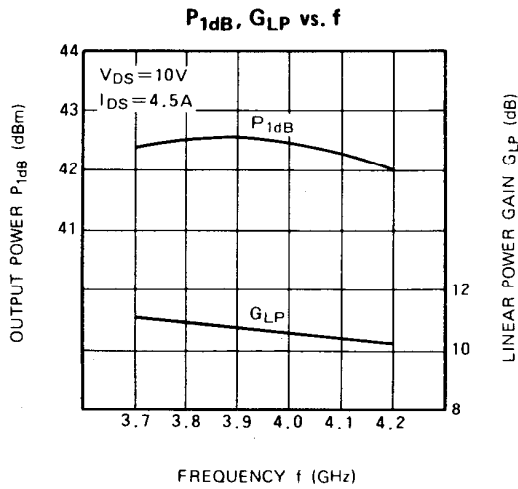
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TYPICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)



S PARAMETERS ($T_a = 25^\circ\text{C}$, $V_{DS} = 10V$, $I_{DS} = 4.5A$)

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