

PRELIMINARY

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

MITSUBISHI SEMICONDUCTOR <GaAs FET>

MGFC40V7785A

7.7~8.5GHz BAND 10W INTERNALLY MATCHED GaAs FET

DESCRIPTION

The MGFC40V7785A is an internally impedance-matched GaAs power FET especially designed for use in 7.7~8.5 GHz band amplifiers. The hermetically sealed metal-ceramic package guarantees high reliability.

FEATURES

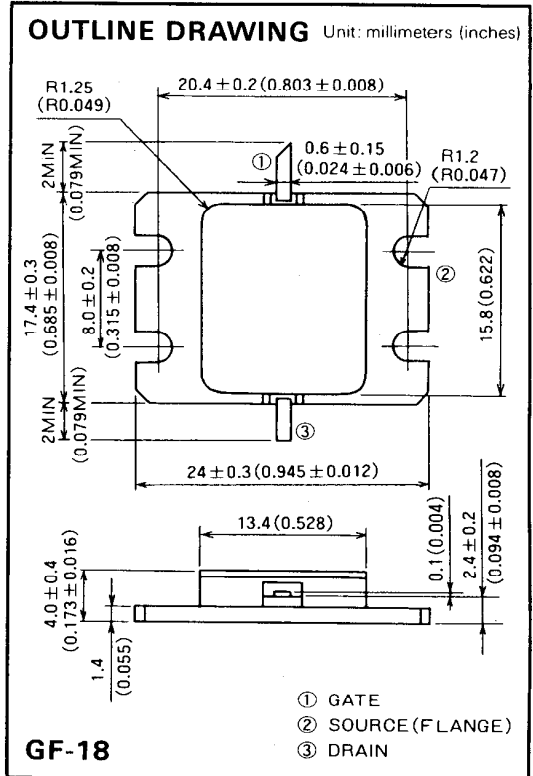
- Class A operation
- Internally matched to 50Ω system
- High output power
 $P_{1dB} = 10W$ (TYP) @ 7.7~8.5 GHz
- High power gain
 $G_{LP} = 7$ dB (TYP) @ 7.7~8.5GHz
- High power added efficiency
 $\eta_{add} = 25\%$ (TYP) @ 7.7~8.5GHz, P_{1dB}
- Hermetically sealed metal-ceramic package
- Low distortion [Item: -51]
 $IM_3 = -45$ dBc (TYP) @ $P_o = 29$ (dBm) S.C.L.
- Low thermal resistance $R_{th(ch-c)} \leq 2.8^\circ C/W$

APPLICATION

- Item-01: 7.7~8.5GHz band power amplifier
- Item-51: Digital radio communication

QUALITY GRADE

- IG



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

Symbol	Parameter	Ratings	Unit
V_{GDO}	Gate to drain voltage	-15	V
V_{GSO}	Gate to source voltage	-15	V
I_D	Drain current	6	A
I_{GR}	Reverse gate current	-20	mA
I_{GF}	Forward gate current	42	mA
P_T	Total power dissipation *1	53.5	W
T_{ch}	Channel temperature	175	$^\circ C$
T_{stg}	Storage temperature	-65 ~ +175	$^\circ C$

*1: $T_c = 25^\circ C$

RECOMMENDED BIAS CONDITIONS

- $V_{DS} = 10V$
- $I_D = 2.4A$
- $R_g = 50 \Omega$
- Refer to Bias Procedure

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

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{DSS}	Saturated drain current	$V_{DS} = 3V, V_{GS} = 0V$	—	4.5	6	A
g_m	Transconductance	$V_{DS} = 3V, I_D = 2.2A$	—	2	—	S
$V_{GS(off)}$	Gate to source cut-off voltage	$V_{DS} = 3V, I_D = 40mA$	-2	-3	-4	V
P_{1dB}	Output power at 1dB gain compression	$V_{DS} = 10V, I_D = 2.4A, f = 7.7 \sim 8.5GHz$	39.0	40.0	—	dBm
G_{LP}	Linear power gain		6	7	—	dB
I_D	Drain current		—	3.0	—	A
η_{add}	Power added efficiency		—	25	—	%
IM_3	3rd order IM distortion *1		-42	-45	—	dBc
$R_{th(ch-c)}$	Thermal resistance *2		ΔV_f method	—	—	2.8

*1: Item-51, 2-tone test $P_o = 29$ dBm Single Carrier Level $f = 8.5GHz$ $\Delta f = 10$ MHz. *2: Channel to case

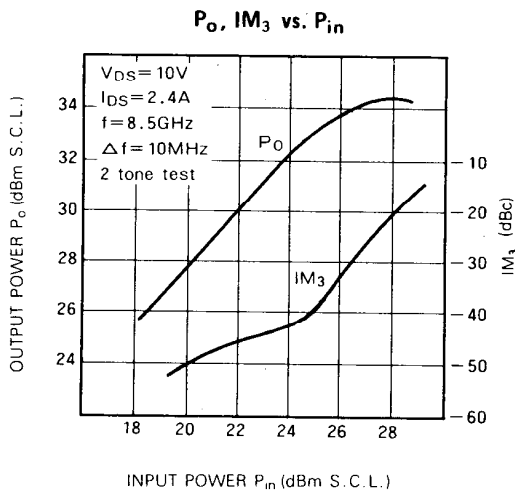
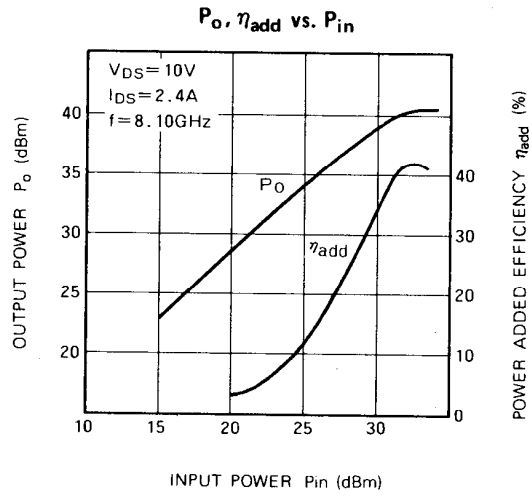
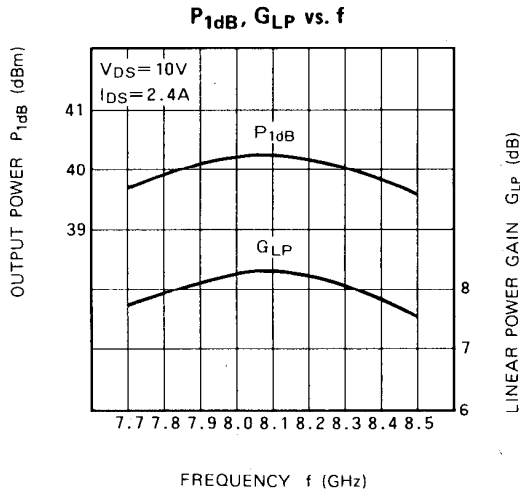
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TYPICAL CHARACTERISTICS (Ta=25°C)



S PARAMETERS (Ta=25°C, VDS=10V, IDS=2.4A)

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.)
7.7	0.50	40	2.13	154	0.072	105	0.42	-17
7.8	0.46	31	2.20	140	0.076	93	0.37	-27
7.9	0.41	19	2.25	127	0.082	78	0.30	-39
8.0	0.34	6	2.28	113	0.085	63	0.22	-52
8.1	0.25	-13	2.29	99	0.084	48	0.15	-73
8.2	0.17	-42	2.32	83	0.087	33	0.10	-116
8.3	0.12	-104	2.32	66	0.090	16	0.11	167
8.4	0.18	-162	2.25	49	0.089	0	0.15	124
8.5	0.31	168	2.20	31	0.085	-19	0.20	96