

**PRELIMINARY**

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

MITSUBISHI SEMICONDUCTOR <GaAs FET>

**MGFC40V7177B**

**7.1~7.7GHz BAND 10W INTERNALLY MATCHED GaAs FET**

## DESCRIPTION

The MGFC40V7177B is an internally impedance-matched GaAs power FET especially designed for use in 7.1~7.7 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) @ 7.1~7.7 GHz
- High power gain  
 $G_{LP} = 9$  dB (TYP) @ 7.1~7.7GHz
- High power added efficiency  
 $\eta_{add} = 28\%$  (TYP) @ 7.1~7.7 GHz,  $P_{1dB}$
- Hermetically sealed metal-ceramic package
- Low distortion [Item: -51]  
 $IM_3 = -45$  dBc (TYP) @  $P_o = 28$  (dBm) S.C.L.
- Low thermal resistance  $R_{th} \leq 2.8^\circ C/W$

## APPLICATION

Item-01: 7.1~7.7 GHz band power amplifier

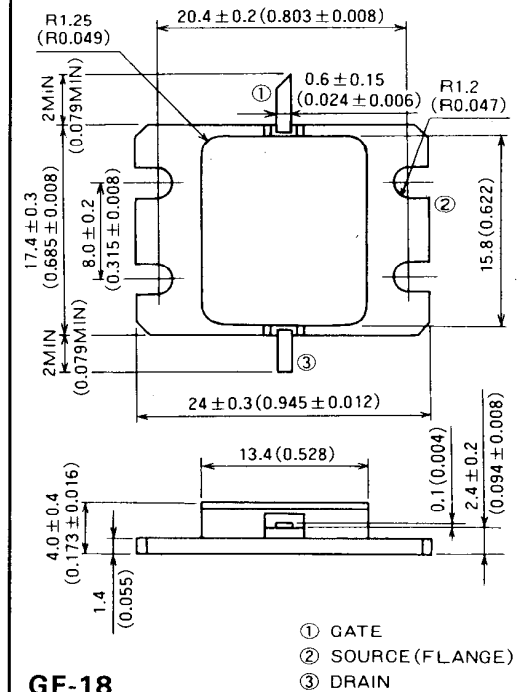
Item-51: Digital radio communication

## QUALITY GRADE

- IG

## OUTLINE DRAWING

Unit: millimeters (inches)



## 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        | °C   |
| $T_{stg}$ | Storage temperature        | -65 ~ +175 | °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   | -4.5 | V    |
| $P_{1dB}$      | Output power at 1dB gain compression | $V_{DS} = 10V, I_D = 2.4A, f = 7.1 \sim 7.7GHz$ | 38.0   | 40.0 | —    | dBm  |
| $G_{LP}$       | Linear power gain                    |                                                 | 8      | 9    | —    | dB   |
| $I_D$          | Drain current                        |                                                 | —      | 3.0  | —    | A    |
| $\eta_{add}$   | Power added efficiency               |                                                 | —      | 28   | —    | %    |
| $IM_3$         | 3rd order IM distortion *1           |                                                 | -42    | -45  | —    | dBc  |
| $R_{th(ch-c)}$ | Thermal resistance *2                | $\Delta V_f$ method                             | —      | —    | 2.8  | °C/W |

\*1: Item-51, 2-tone test  $P_o = 28$  dBm Single Carrier Level  $f = 7.7GHz$   $\Delta f = 10$  MHz.

\*2: Channel to case

NOV. '97

# PRELIMINARY

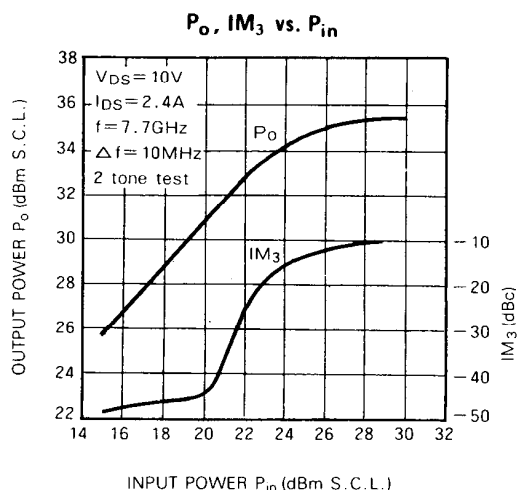
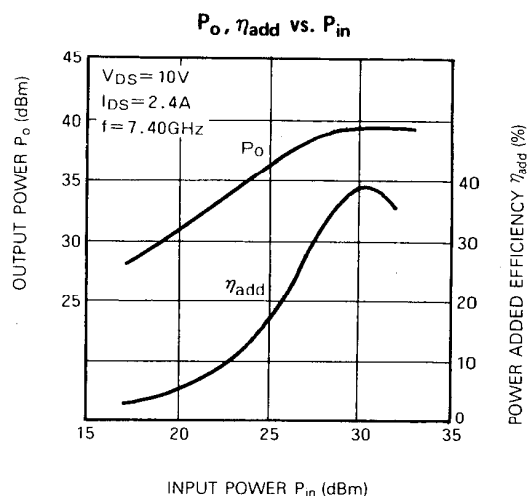
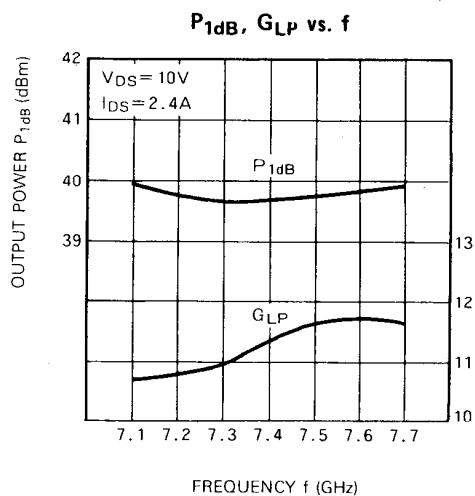
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### 7.1~7.7GHz BAND 10W INTERNALLY MATCHED GaAs FET

#### TYPICAL CHARACTERISTICS (Ta=25°C)



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

| f<br>(GHz) | S Parameters (TYP.) |              |          |              |          |              |          |              |
|------------|---------------------|--------------|----------|--------------|----------|--------------|----------|--------------|
|            | $S_{11}$            |              | $S_{21}$ |              | $S_{12}$ |              | $S_{22}$ |              |
|            | Magn.               | Angle (deg.) | Magn.    | Angle (deg.) | Magn.    | Angle (deg.) | Magn.    | Angle (deg.) |
| 7.1        | 0.66                | 49           | 2.96     | 131          | 0.094    | 72           | 0.36     | -86          |
| 7.2        | 0.63                | 32           | 3.04     | 115          | 0.099    | 59           | 0.30     | -106         |
| 7.3        | 0.63                | 14           | 3.10     | 99           | 0.107    | 39           | 0.23     | -128         |
| 7.4        | 0.61                | -4           | 3.13     | 82           | 0.112    | 23           | 0.19     | -155         |
| 7.5        | 0.55                | -18          | 3.14     | 66           | 0.107    | 7            | 0.18     | 173          |
| 7.6        | 0.52                | -36          | 3.16     | 49           | 0.113    | -7           | 0.19     | 133          |
| 7.7        | 0.45                | -51          | 3.20     | 31           | 0.114    | -26          | 0.21     | 98           |