

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

# MGFC39V7177A

## 7.1~7.7GHz BAND 8W INTERNALLY MATCHED GaAs FET

### DESCRIPTION

The MGFC39V7177A 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  
 $P_{1dB} = 8W$  (TYP) @ 7.1~7.7 GHz
- High power gain  
 $G_{LP} = 8$  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.

### APPLICATION

Item-01: 7.1~7.7 GHz 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              | 7.5        | A    |
| $I_{GR}$  | Reverse gate current       | -20        | mA   |
| $I_{GF}$  | Forward gate current       | 42         | mA   |
| $P_T$     | Total power dissipation *1 | 42.8       | W    |
| $T_{ch}$  | Channel temperature        | 175        | °C   |
| $T_{stg}$ | Storage temperature        | -65 ~ +175 | °C   |

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

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

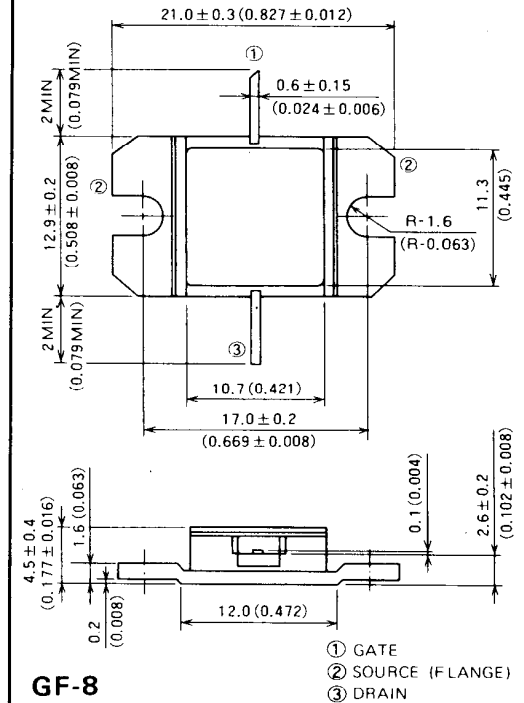
| Symbol         | Parameter                            | Test conditions                                 | Limits |     |      | Unit |
|----------------|--------------------------------------|-------------------------------------------------|--------|-----|------|------|
|                |                                      |                                                 | Min    | Typ | Max  |      |
| $I_{DSS}$      | Saturated drain current              | $V_{DS} = 3V, V_{GS} = 0V$                      | —      | —   | 7.5  | A    |
| $g_m$          | Transconductance                     | $V_{DS} = 3V, I_D = 2.2A$                       | —      | 2   | —    | S    |
| $V_{GS(off)}$  | Gate to source cut-off voltage       | $V_{DS} = 3V, I_D = 20mA$                       | —      | —   | -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     | 39  | —    | dBm  |
| $G_{LP}$       | Linear power gain                    |                                                 | 7      | 8   | —    | dB   |
| $I_D$          | Drain current                        |                                                 | —      | —   | 3.0  | A    |
| $\eta_{add}$   | Power added efficiency               |                                                 | —      | 28  | —    | %    |
| $IM_3$         | 3rd order IM distortion *1           |                                                 | -42    | -45 | —    | dBc  |
| $R_{th(ch-o)}$ | Thermal resistance *2                | $\Delta V_f$ method                             | —      | —   | 3.5  | °C/W |

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

\*2: Channel to case

### OUTLINE DRAWING

Unit: millimeters (inches)



### RECOMMENDED BIAS CONDITIONS

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

**PRELIMINARY**

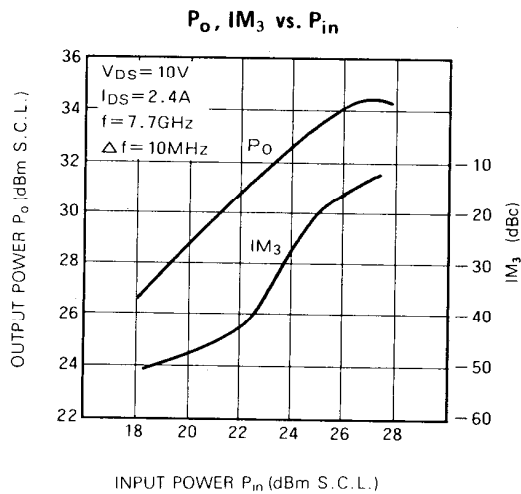
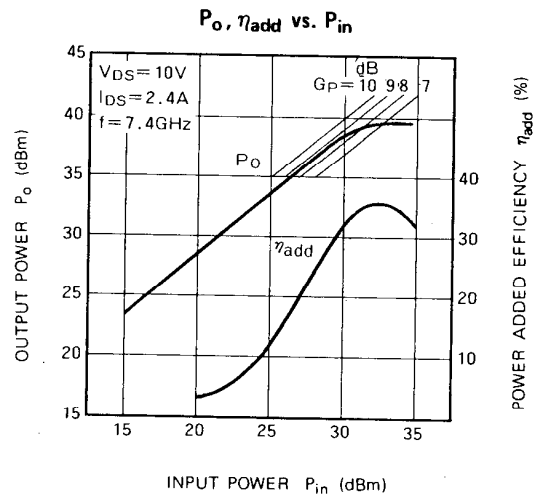
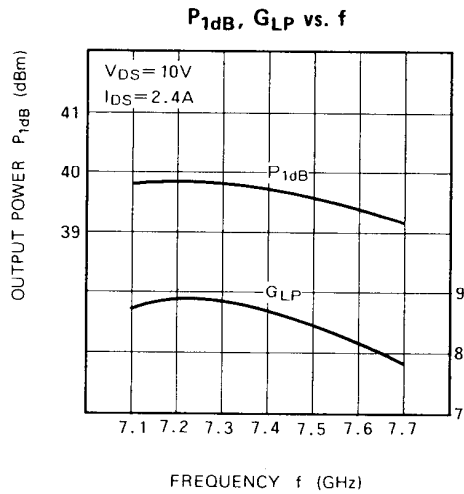
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MITSUBISHI SEMICONDUCTOR <GaAs FET>

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



**S PARAMETERS** ( $T_a = 25^\circ\text{C}$ ,  $V_{DS} = 10\text{V}$ ,  $I_{DS} = 2.4\text{A}$ )

| 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        | 0.43                | 53           | 2.69     | -71          | 0.056    | -103         | 0.35     | -91          |
| 7.2        | 0.39                | 35           | 2.74     | -86          | 0.061    | -119         | 0.30     | -103         |
| 7.3        | 0.35                | 16           | 2.71     | -101         | 0.064    | -133         | 0.25     | -119         |
| 7.4        | 0.26                | -9           | 2.68     | -118         | 0.067    | -150         | 0.21     | -137         |
| 7.5        | 0.22                | -46          | 2.65     | -134         | 0.070    | -167         | 0.19     | -157         |
| 7.6        | 0.21                | -106         | 2.55     | -153         | 0.071    | 175          | 0.16     | -177         |
| 7.7        | 0.30                | -150         | 2.49     | -171         | 0.068    | 158          | 0.16     | 167          |