## DESCRIPTION

The MGFC36VXXXX products are internally impedance matched devices for use in C-band power amplifier applications.

This family of devices uses high performance source island via-hole GaAs die which offer excellent electrical and thermal resistance characteristics.

These devices are available screened for $IM_3$ performance by specifying '–51' as the part number suffix. (See ordering information at the back of this product data sheet.)

## FEATURES

- Class A operation
- Internally matched to 50Ω
- High output power
- High linearity
- High power gain
- High power added efficiency
- Hermetically sealed metal-ceramic package

## FREQUENCIES

| TYPE | FREQUENCY |
|---|---|
| MGFC36V3742 | 3.7 – 4.2 GHz |
| MGFC36V4450 | 4.4 – 5.0 GHz |
| MGFC36V5258 | 5.2 – 5.8 GHz |
| MGFC36V5964 | 5.9 – 6.4 GHz |
| MGFC36V6471 | 6.4 – 7.1 GHz |
| MGFC36V7177 | 7.1 – 7.7 GHz |
| MGFC36V7785 | 7.7 – 8.5 GHz |

## ABSOLUTE MAXIMUM RATINGS ($T_a$ = 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 | 2.8 | A |
| $I_{GR}$ | Gate current (reverse) | –10 | mA |
| $I_{GF}$ | Gate current (forward) | +21 | mA |
| $P_T$ | Total power dissipation*1 | 25 | W |
| $T_{ch}$ | Channel temperature | 175 | °C |
| $T_{stg}$ | Storage temperature | –65 ~ +175 | °C |
| $R_{th\ (ch-a)}$ | Thermal resistance*2 | 6 | °C/W |

*1. $T_C$ = 25°C
*2. Channel to case

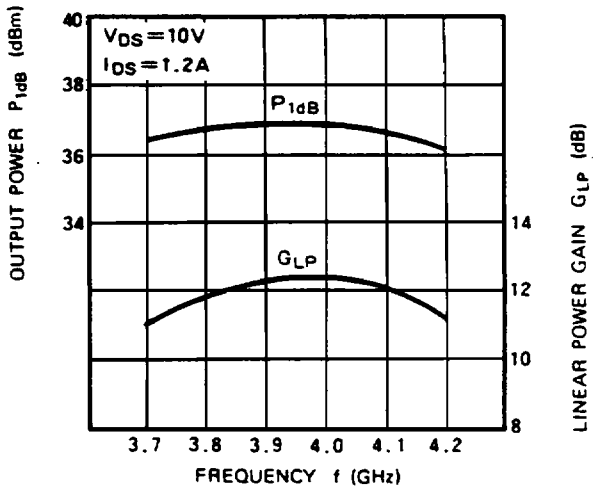
## ELECTRICAL CHARACTERISTICS ($T_a$ = 25°C)

| SYMBOL | PARAMETER | TEST CONDITIONS | | TYPE | LIMITS | | | UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | | | MIN | TYP | MAX | |
| $I_{DSS}$ | Saturated drain current | $V_{DS}$ = 3V, $V_{GS}$ = 0V | | | — | 2.0 | 2.8 | A |
| $g_m$ | Transconductance | $V_{DS}$ = 3V, $V_{GS}$ = 0/–1V | | | — | 1.0 | — | 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, $I_{DS}$ = 1.2A | | | 35 | 36 | — | dBm |
| $IM_3$ | Third order intermodulation distortion | $V_{DS}$ = 10V, $I_{DS}$ = 1.2A<br>2 tones, +25dBm S.C.L; ΔF = 10MHz | | "–51" selection | | –45 | –42 | dBc |
| $G_{LP}$ | Linear power gain | $V_{DS}$ = 10V<br>$I_D$ = 1.2A | f = 3.7 ~ 4.2 GHz | MGFC36V3742 | 10 | 11 | — | dB |
| | | | f = 4.4 ~ 5.0 GHz | MGFC36V4450 | 9 | 10 | — | |
| | | | f = 5.2 ~ 5.8 GHz | MGFC36V5258 | 9 | 10 | — | |
| | | | f = 5.9 ~ 6.4 GHz | MGFC36V5964 | 9 | 10 | — | |
| | | | f = 6.4 ~ 7.1 GHz | MGFC36V6471 | 8 | 9 | — | |
| | | | f = 7.1 ~ 7.7 GHz | MGFC36V7177 | 8 | 9 | — | |
| | | | f = 7.7 ~ 8.5 GHz | MGFC36V7785 | 7 | 8 | — | |
| $\eta_{add}$ | Power added efficiency | | f = 3.7 ~ 4.2 GHz | MGFC36V3742 | — | 33 | — | % |
| | | | f = 4.4 ~ 5.0 GHz | MGFC36V4450 | — | 32 | — | |
| | | | f = 5.2 ~ 5.8 GHz | MGFC36V5258 | — | 32 | — | |
| | | | f = 5.9 ~ 6.4 GHz | MGFC36V5964 | — | 32 | — | |
| | | | f = 6.4 ~ 7.1 GHz | MGFC36V6471 | — | 30 | — | |
| | | | f = 7.1 ~ 7.7 GHz | MGFC36V7177 | — | 30 | — | |
| | | | f = 7.7 ~8.5 GHz | MGFC36V7785 | — | 29 | — | |
| $R_g$ | Gate resistance | | | | — | 100 | — | Ω |

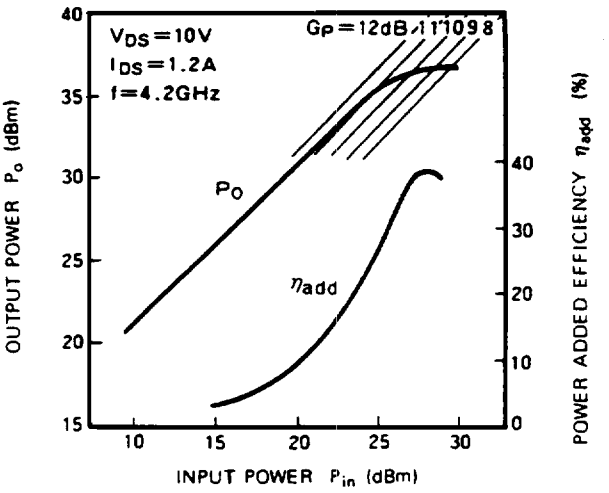
## TYPICAL CHARACTERISTICS ($T_a = 25°C$)

### MGFC36V3742

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

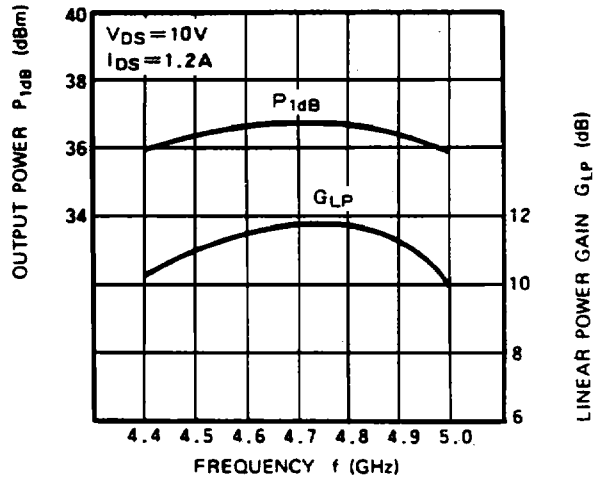



$P_O$, $\eta_{add}$ vs. $P_{IN}$

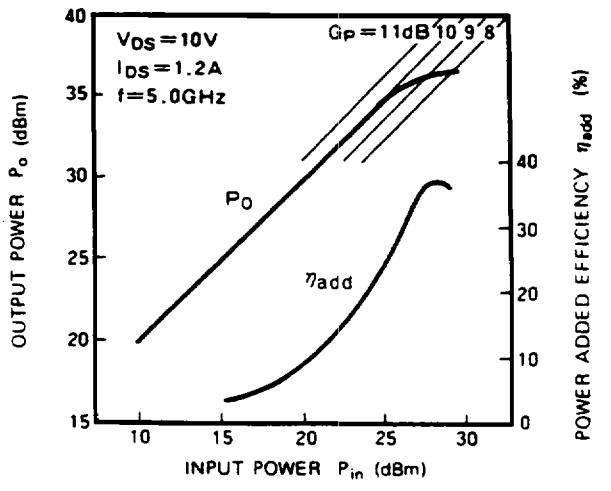



### MGFC36V4450

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

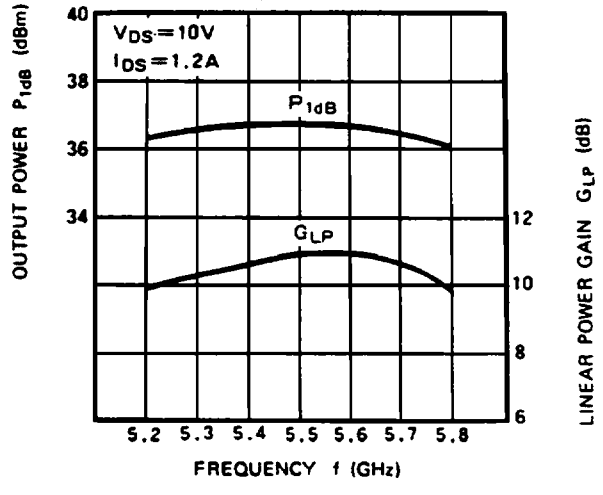



$P_O$, $\eta_{add}$ vs. $P_{IN}$

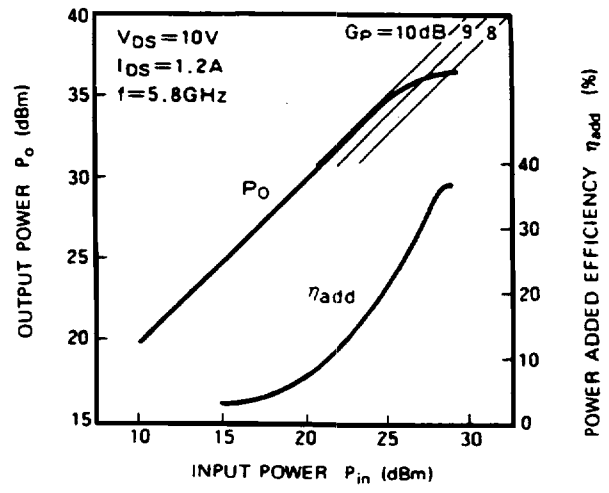



### MGFC36V5258

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



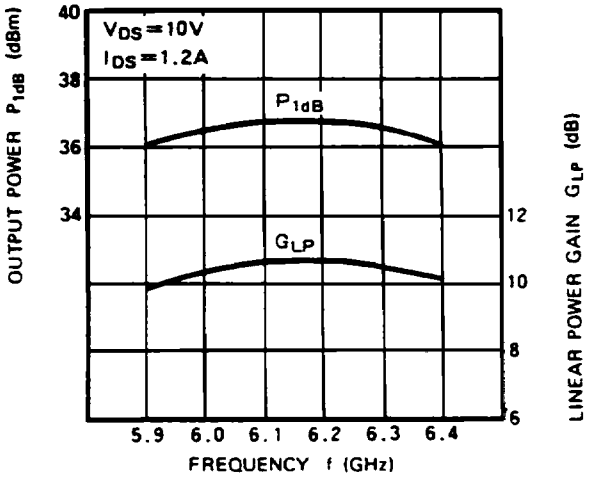

$P_O$, $\eta_{add}$ vs. $P_{IN}$



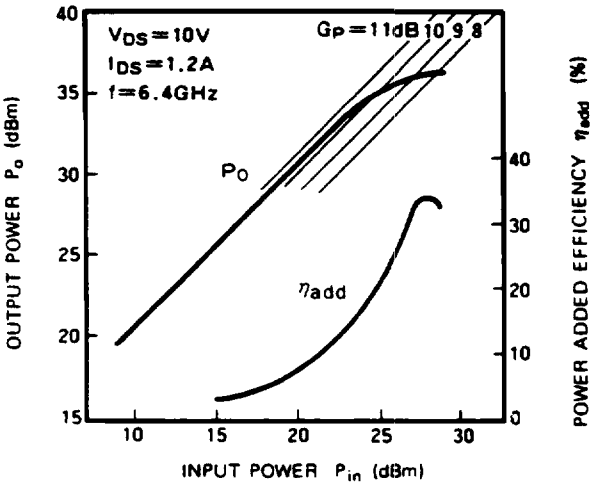
## TYPICAL CHARACTERISTICS ($T_a = 25°C$)

### MGFC36V5964

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

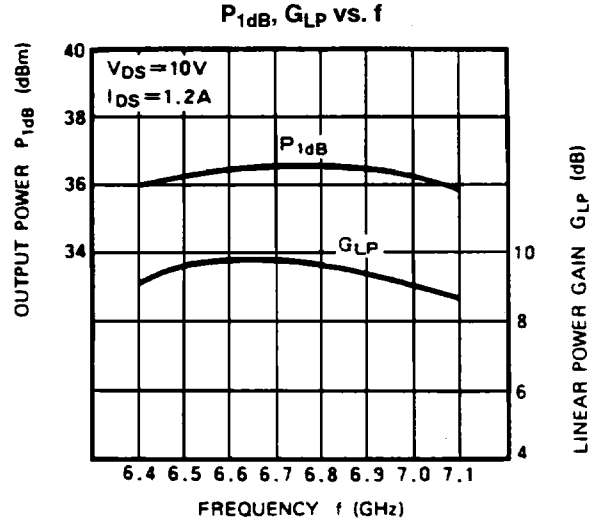



$P_O$, $\eta_{add}$ vs. $P_{IN}$

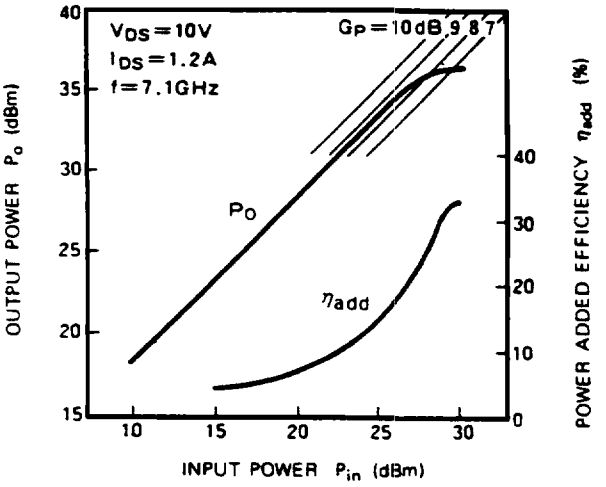



### MGFC36V6471

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

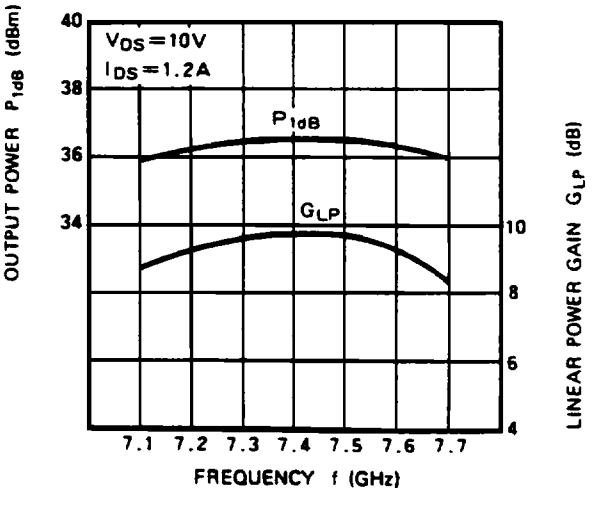



$P_O$, $\eta_{add}$ vs. $P_{IN}$

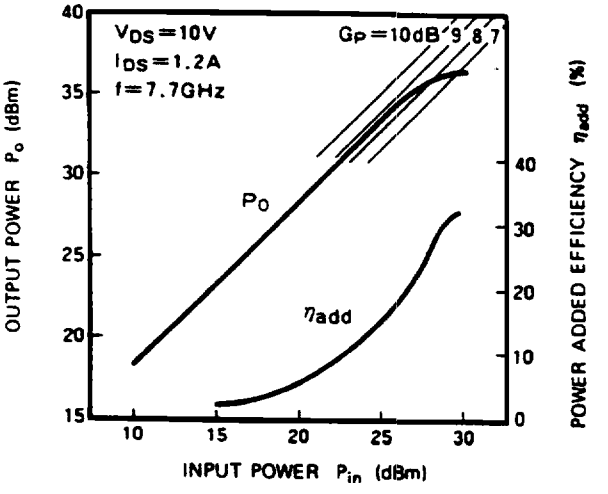



### MGFC36V7177

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



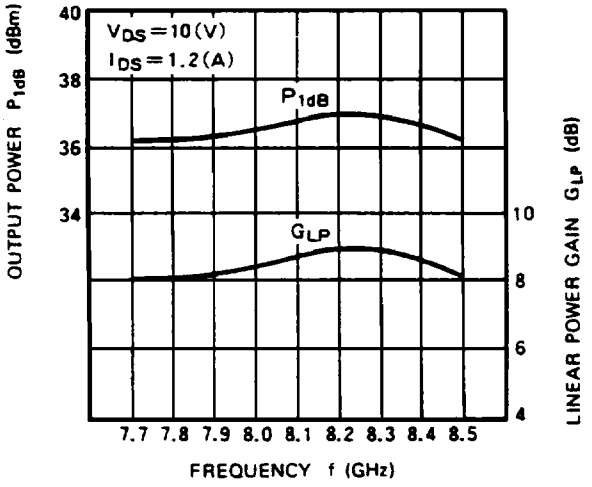

$P_O$, $\eta_{add}$ vs. $P_{IN}$



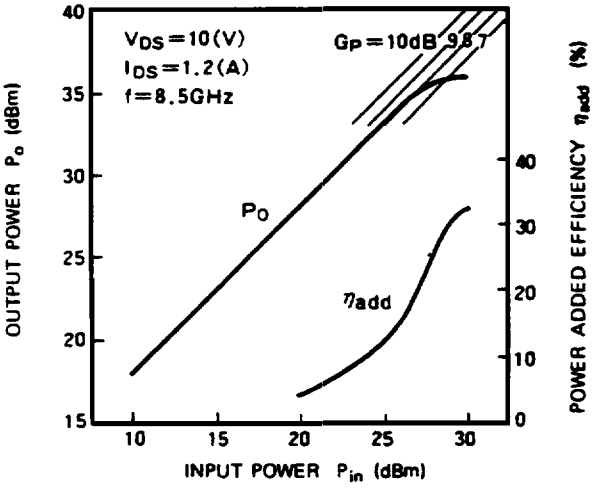
## TYPICAL CHARACTERISTICS ($T_a = 25°C$)

### MGFC36V7785

$P_{1dB}$, $\eta_{add}$ vs. f

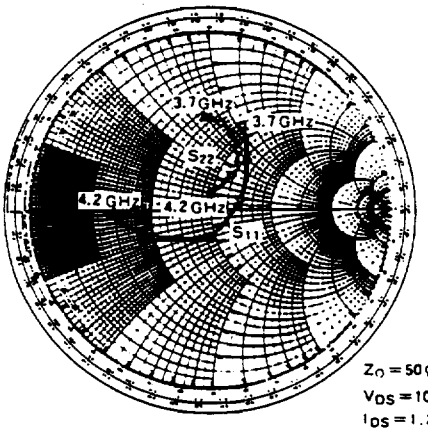



$P_o$, $\eta_{add}$ vs. $P_{in}$

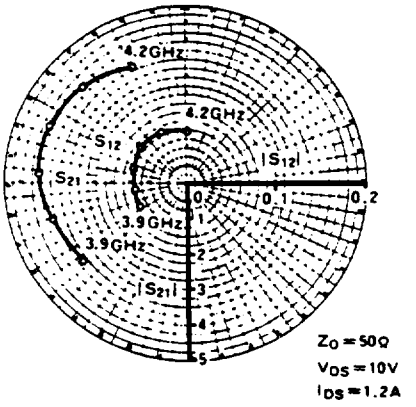



### MGFC36V3742

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




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

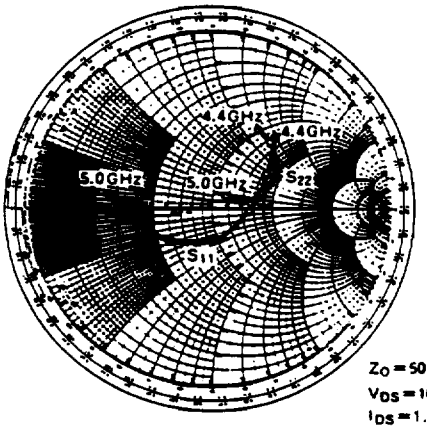



## S PARAMETERS ($T_a = 25°C$, $V_{DS} = 10V$, $I_{DS} = 1.2A$)

| f (GHz) | S Parameters (TYP.) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | $S_{11}$ | | $S_{12}$ | | $S_{21}$ | | $S_{22}$ | |
| | Magn. | Angle (deg.) | Magn. | Angle (deg.) | Magn. | Angle (deg.) | Magn. | Angle (deg.) |
| 3.7 | 0.51 | 69 | 0.058 | −151 | 3.60 | −143 | 0.53 | 92 |
| 3.8 | 0.36 | 54 | 0.058 | −172 | 3.85 | −164 | 0.50 | 83 |
| 3.9 | 0.17 | 20 | 0.060 | 165 | 4.04 | 178 | 0.46 | 74 |
| 4.0 | 0.15 | −92 | 0.062 | 140 | 4.06 | 157 | 0.38 | 64 |
| 4.1 | 0.35 | −155 | 0.061 | 114 | 3.98 | 136 | 0.24 | 58 |
| 4.2 | 0.58 | −177 | 0.059 | 89 | 3.63 | 114 | 0.11 | 85 |

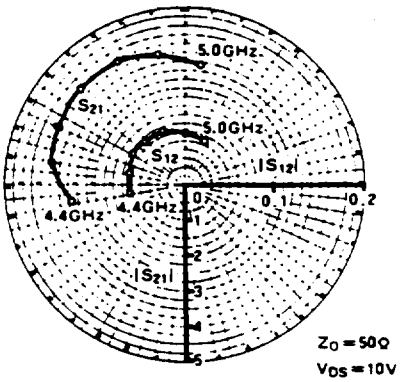
## MGFC36V4450

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




$Z_O = 50\Omega$
$V_{DS} = 10V$
$I_{DS} = 1.2A$

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



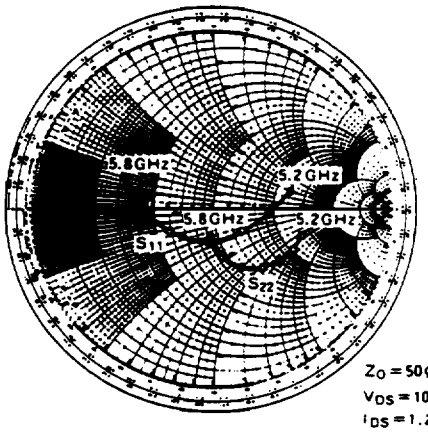

$Z_O = 50\Omega$
$V_{DS} = 10V$
$I_{DS} = 1.2A$

**S PARAMETERS** ($T_a = 25°C$, $V_{DS} = 10V$, $I_{DS} = 1.2A$)

| f (GHz) | S Parameters (TYP.) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | $S_{11}$ | | $S_{12}$ | | $S_{21}$ | | $S_{22}$ | |
| | Magn. | Angle (deg.) | Magn. | Angle (deg.) | Magn. | Angle (deg.) | Magn. | Angle (deg.) |
| 4.4 | 0.53 | 49 | 0.061 | −171 | 3.19 | −171 | 0.52 | 59 |
| 4.5 | 0.32 | 32 | 0.061 | 170 | 3.71 | 171 | 0.50 | 49 |
| 4.6 | 0.19 | −2 | 0.063 | 151 | 3.80 | 155 | 0.45 | 38 |
| 4.7 | 0.17 | −88 | 0.064 | 132 | 3.89 | 137 | 0.39 | 28 |
| 4.8 | 0.31 | −142 | 0.064 | 111 | 3.85 | 118 | 0.28 | 19 |
| 4.9 | 0.45 | −171 | 0.059 | 89 | 3.73 | 101 | 0.17 | 15 |
| 5.0 | 0.59 | 173 | 0.056 | 66 | 3.40 | 82 | 0.11 | 42 |

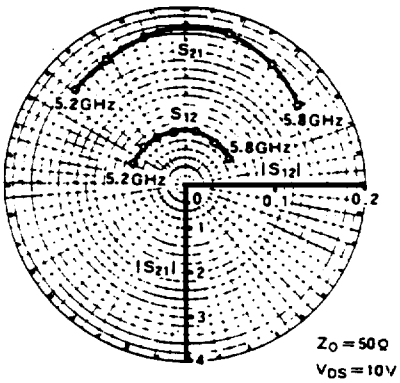
## MGFC36V5258

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




$Z_O = 50\Omega$
$V_{DS} = 10V$
$I_{DS} = 1.2A$

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



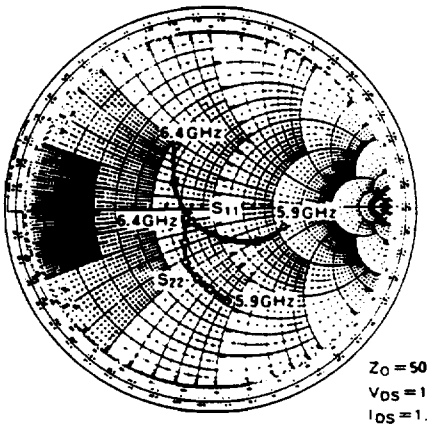

$Z_O = 50\Omega$
$V_{DS} = 10V$
$I_{DS} = 1.2A$

**S PARAMETERS** ($T_a = 25°C$, $V_{DS} = 10V$, $I_{DS} = 1.2A$)

| f (GHz) | S Parameters (TYP.) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | $S_{11}$ | | $S_{12}$ | | $S_{21}$ | | $S_{22}$ | |
| | Magn. | Angle (deg.) | Magn. | Angle (deg.) | Magn. | Angle (deg.) | Magn. | Angle (deg.) |
| 5.2 | 0.43 | 13 | 0.062 | 156 | 3.27 | 138 | 0.51 | −17 |
| 5.3 | 0.30 | −3 | 0.062 | 138 | 3.30 | 122 | 0.48 | −28 |
| 5.4 | 0.19 | −41 | 0.062 | 120 | 3.45 | 105 | 0.46 | −39 |
| 5.5 | 0.18 | −99 | 0.060 | 102 | 3.61 | 89 | 0.41 | −51 |
| 5.6 | 0.28 | −152 | 0.061 | 78 | 3.61 | 73 | 0.34 | −66 |
| 5.7 | 0.39 | 179 | 0.059 | 56 | 3.45 | 55 | 0.26 | −80 |
| 5.8 | 0.51 | 161 | 0.058 | 32 | 3.19 | 36 | 0.17 | −98 |

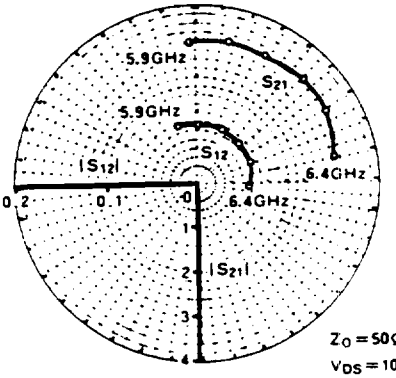
## MGFC36V5964

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




$Z_O = 50\Omega$
$V_{DS} = 10V$
$I_{DS} = 1.2A$

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



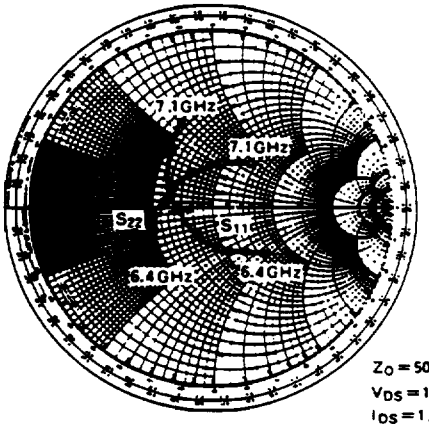

$Z_O = 50\Omega$
$V_{DS} = 10V$
$I_{DS} = 1.2A$

**S PARAMETERS** ($T_a = 25°C$, $V_{DS} = 10V$, $I_{DS} = 1.2A$)

| f (GHz) | S Parameters (TYP.) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | $S_{11}$ | | $S_{12}$ | | $S_{21}$ | | $S_{22}$ | |
| | Magn. | Angle (deg.) | Magn. | Angle (deg.) | Magn. | Angle (deg.) | Magn. | Angle (deg.) |
| 5.9 | 0.41 | −16 | 0.068 | 110 | 3.20 | 93 | 0.52 | −83 |
| 6.0 | 0.26 | −39 | 0.068 | 88 | 3.31 | 76 | 0.46 | −94 |
| 6.1 | 0.19 | −73 | 0.067 | 65 | 3.30 | 61 | 0.42 | −104 |
| 6.2 | 0.16 | −151 | 0.066 | 44 | 3.35 | 44 | 0.34 | −118 |
| 6.3 | 0.25 | 146 | 0.063 | 21 | 3.30 | 29 | 0.25 | −130 |
| 6.4 | 0.40 | 118 | 0.059 | −2 | 3.16 | 12 | 0.16 | −159 |

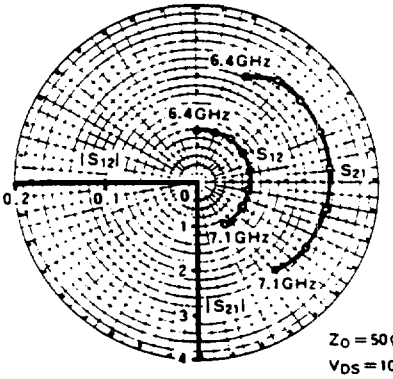
## MGFC36V6471

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




$Z_O = 50\Omega$
$V_{DS} = 10V$
$I_{DS} = 1.2A$

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



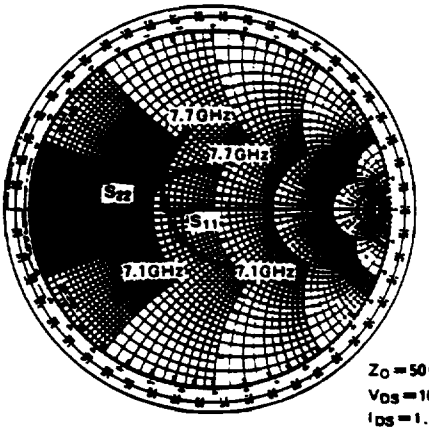

$Z_O = 50\Omega$
$V_{DS} = 10V$
$I_{DS} = 1.2A$

**S PARAMETERS** ($T_a = 25°C$, $V_{DS} = 10V$, $I_{DS} = 1.2A$)

| f (GHz) | S Parameters (TYP.) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | $S_{11}$ | | $S_{12}$ | | $S_{21}$ | | $S_{22}$ | |
| | Magn. | Angle (deg.) | Magn. | Angle (deg.) | Magn. | Angle (deg.) | Magn. | Angle (deg.) |
| 6.4 | 0.38 | −41 | 0.058 | 87 | 2.70 | 64 | 0.42 | −135 |
| 6.5 | 0.31 | −55 | 0.060 | 69 | 2.99 | 51 | 0.38 | −146 |
| 6.6 | 0.23 | −81 | 0.064 | 52 | 3.05 | 38 | 0.34 | −158 |
| 6.7 | 0.17 | −119 | 0.064 | 34 | 3.00 | 22 | 0.29 | −179 |
| 6.8 | 0.19 | −174 | 0.062 | 13 | 3.05 | 6 | 0.25 | 151 |
| 6.9 | 0.26 | 153 | 0.060 | −9 | 2.95 | −11 | 0.23 | 117 |
| 7.0 | 0.39 | 124 | 0.059 | −30 | 2.85 | −31 | 0.26 | 78 |
| 7.1 | 0.52 | 108 | 0.056 | −52 | 2.60 | −48 | 0.33 | 49 |

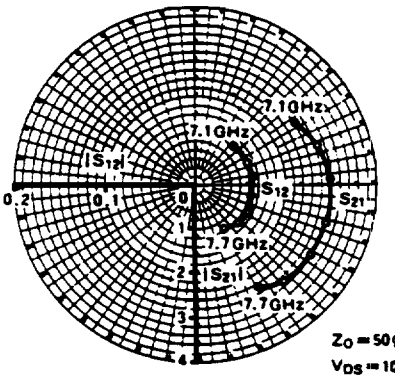
## MGFC36V7177

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




$Z_O = 50\Omega$
$V_{DS} = 10V$
$I_{DS} = 1.2A$

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



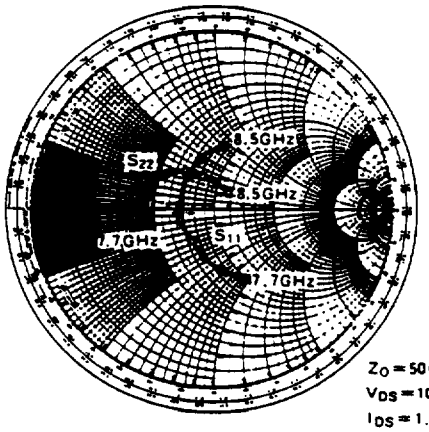

$Z_O = 50\Omega$
$V_{DS} = 10V$
$I_{DS} = 1.2A$

**S PARAMETERS** ($T_a = 25°C$, $V_{DS} = 10V$, $I_{DS} = 1.2A$)

| f (GHz) | S Parameters (TYP.) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | $S_{11}$ | | $S_{12}$ | | $S_{21}$ | | $S_{22}$ | |
| | Magn. | Angle (deg.) | Magn. | Angle (deg.) | Magn. | Angle (deg.) | Magn. | Angle (deg.) |
| 7.1 | 0.34 | −77 | 0.061 | 42 | 2.65 | 32 | 0.46 | −145 |
| 7.2 | 0.28 | −105 | 0.062 | 24 | 2.87 | 17 | 0.41 | −161 |
| 7.3 | 0.25 | −133 | 0.064 | 8 | 3.02 | 2 | 0.38 | 178 |
| 7.4 | 0.27 | 180 | 0.064 | −11 | 3.06 | −16 | 0.33 | 159 |
| 7.5 | 0.33 | 148 | 0.066 | −28 | 3.00 | −32 | 0.28 | 135 |
| 7.6 | 0.38 | 126 | 0.062 | −43 | 2.90 | −47 | 0.24 | 114 |
| 7.7 | 0.46 | 109 | 0.059 | −58 | 2.66 | −59 | 0.22 | 93 |

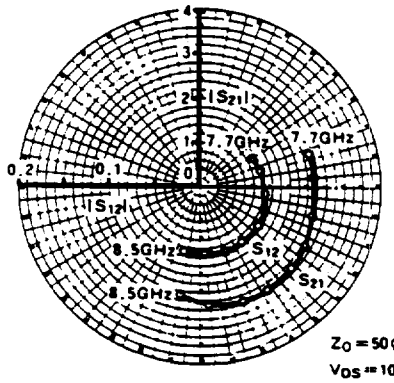
## MGFC36V7785

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




$Z_O = 50\Omega$
$V_{DS} = 10V$
$I_{DS} = 1.2A$

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



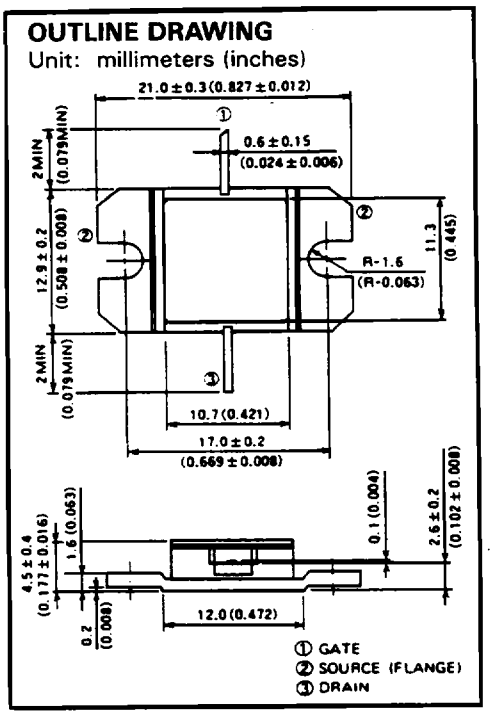

$Z_O = 50\Omega$
$V_{DS} = 10V$
$I_{DS} = 1.2A$

**S PARAMETERS** ($T_a = 25°C$, $V_{DS} = 10V$, $I_{DS} = 1.2A$)

| f (GHz) | S Parameters (TYP.) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | $S_{11}$ | | $S_{12}$ | | $S_{21}$ | | $S_{22}$ | |
| | Magn. | Angle (deg.) | Magn. | Angle (deg.) | Magn. | Angle (deg.) | Magn. | Angle (deg.) |
| 7.7 | 0.43 | −65 | 0.066 | 30 | 2.51 | 17 | 0.48 | −170 |
| 7.8 | 0.36 | −80 | 0.068 | 14 | 2.53 | 5 | 0.44 | −180 |
| 7.9 | 0.27 | −103 | 0.070 | −6 | 2.54 | −15 | 0.41 | 165 |
| 8.0 | 0.21 | −120 | 0.073 | −21 | 2.62 | −30 | 0.36 | 155 |
| 8.1 | 0.20 | −159 | 0.076 | −34 | 2.69 | −43 | 0.33 | 140 |
| 8.2 | 0.18 | 170 | 0.076 | −53 | 2.75 | −57 | 0.27 | 125 |
| 8.3 | 0.24 | 126 | 0.080 | −70 | 2.77 | −71 | 0.21 | 107 |
| 8.4 | 0.30 | 101 | 0.076 | −88 | 2.68 | −86 | 0.16 | 81 |
| 8.5 | 0.37 | 80 | 0.076 | −104 | 2.51 | −100 | 0.13 | 50 |

## OUTLINE DRAWING

Unit: millimeters (inches)




## ORDERING INFORMATION

| Part Number | Grade | Tested at | $P_{1dB}$* (TYP) | $IM_3$* (MAX) |
|---|---|---|---|---|
| MGFC36V3742-01 | Industrial | 3.7 – 4.2 GHz | 36 dBm | — |
| MGFC36V3742-51 | Industrial | 3.7 – 4.2 GHz | 36 dBm | –42 dBc |
| MGFC36V4450-01 | Industrial | 4.4 – 5.0 GHz | 36 dBm | — |
| MGFC36V4450-51 | Industrial | 4.4 – 5.0 GHz | 36 dBm | –42 dBc |
| MGFC36V5258-01 | Industrial | 5.2 – 5.8GHz | 36 dBm | — |
| MGFC36V5258-51 | Industrial | 5.2 – 5.8GHz | 36 dBm | –42 dBc |
| MGFC36V5964-01 | Industrial | 5.9 – 6.4 GHz | 36 dBm | — |
| MGFC36V5964-51 | Industrial | 5.9 – 6.4 GHz | 36 dBm | –42 dBc |
| MGFC36V6471-01 | Industrial | 6.4 – 7.1 GHz | 36 dBm | — |
| MGFC36V6471-51 | Industrial | 6.4 – 7.1 GHz | 36 dBm | –42 dBc |
| MGFC36V7177-01 | Industrial | 7.1 – 7.7 GHz | 36 dBm | — |
| MGFC36V7177-51 | Industrial | 7.1 – 7.7 GHz | 36 dBm | –42 dBc |
| MGFC36V7785-01 | Industrial | 7.7 – 8.5 GHz | 36 dBm | — |
| MGFC36V7785-51 | Industrial | 7.7 – 8.5 GHz | 36 dBm | –42 dBc |

*Test condition specified in 'Electrical Characteristics' section.