# MGFK41A4045

## 14.0-14.5GHz BAND 12.5W INTERNALLY MATCHED GaAs FET

## DESCRIPTION

The MGFK41A4045 is an internally impedance matched GaAs power FET especially designed for use in 14.0-14.5 GHz band amplifiers. The hermetically sealed metal-ceramic package guarantees high reliability.

## FEATURES

- Internally impedance matched
- High output power
  P1dB = 41.0dBm(TYP.) @f=14.0-14.5GHz
- High linear power gain
  GLP = 7.0dB(TYP) @f=14.0-14.5GHz

## APPLICATION

- For use in 14.0-14.5GHz band amplifiers

## QUALITY GRADE

- IG

## RECOMMENDED BIAS CONDITIONS

VDS = 10 (V)
ID =3.0 (A)
RG=50 (ohm)

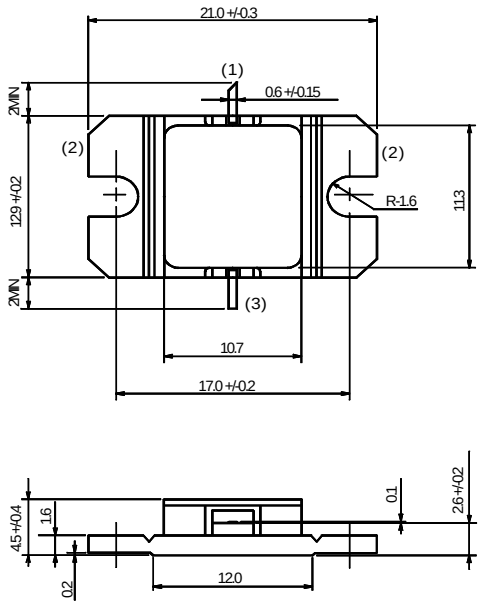
## ABSOLUTE MAXIMUM RATINGS (Ta=25deg.C)

| Symbol | Parameter | Ratings | Unit |
|---|---|---|---|
| VGDO | Gate to drain voltage | -15 | V |
| VGSO | Gate to source voltage | -10 | V |
| ID | Drain current | 11 | A |
| IGR | Reverse gate current | -36 | mA |
| IGF | Forward gate current | 72 | mA |
| PT *1 | Total power dissipation | 68.2 | W |
| Tch | Channel temperature | 175 | deg.C |
| Tstg | Storage temperature | -65 / +175 | deg.C |

*1 : Tc=25deg.C

OUTLINE

OUTLINE DRAWING Unit : millimeters




GF-8

(1) GATE
(2) SOURCE (FLANGE)
(3) DRAIN

< Keep safety first in your circuit designs! >

Mitsubishi Electric Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them.Trouble with semiconductors may lead to personal injury, fire or property damage. Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (1)placement of substitutive, auxiliary circuits, (2)use of non-flammable material or (3)prevention against any malfunction or mishap.

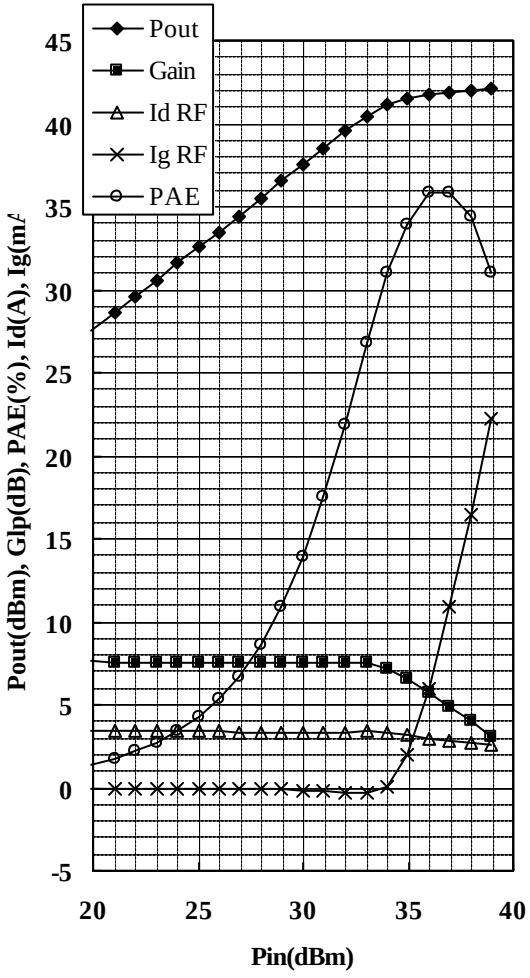
## ELECTRICAL CHARACTERISTICS (Ta=25deg.C)

| Symbol | Parameter | Test conditions | Limits | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| IDSS | Saturated drain current | VDS=3V,VG=0V | -- | 8.0 | -- | A |
| gm | Transconductance | VDS=0V,ID=3.0A | -- | 4 | -- | S |
| VGS(off) | Gate to source cut-off voltage | VDS=3V,ID=42mA | -1.0 | -1.5 | -4.0 | V |
| P1dB | Output power at 1dB gain compression | VDS=10V, ID(RF off)=3.0A, f=14.0 - 14.5GHz | 40 | 41 | -- | dBm |
| GLP | Linear power gain | | 6.0 | 7.0 | -- | dB |
| P.A.E. | Power added efficiency | | -- | 25 | -- | % |
| Rth (Ch-C) | Thermal resistance | Channel to Case | -- | 1.8 | 2.2 | deg.C/W |

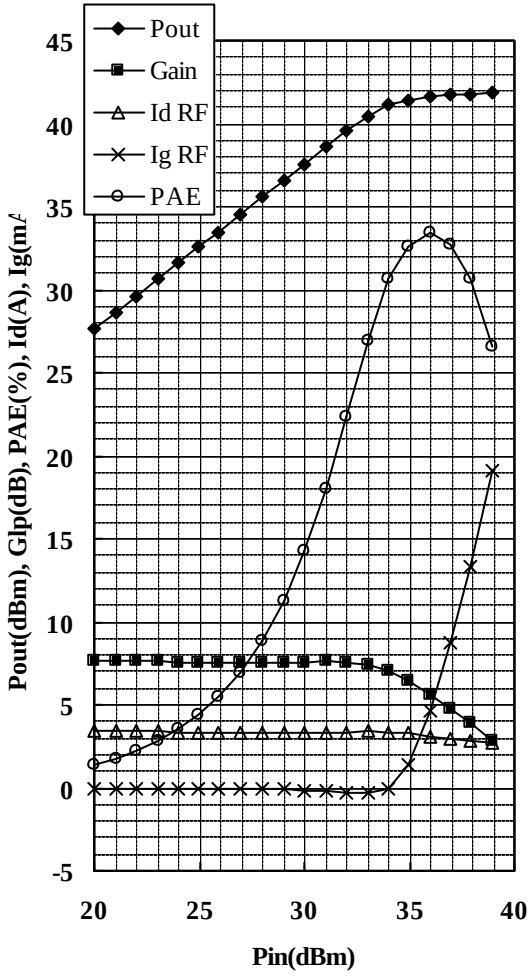
**MITSUBISHI ELECTRIC**

OUTPUT POWER & POWER ADDED EFFICIENCY & GAIN vs. INPUT POWER
TEST CONDITIONS : Vds(Rfoff)=10V,Ids(RFoff)=3.0A,Rg=50ohm

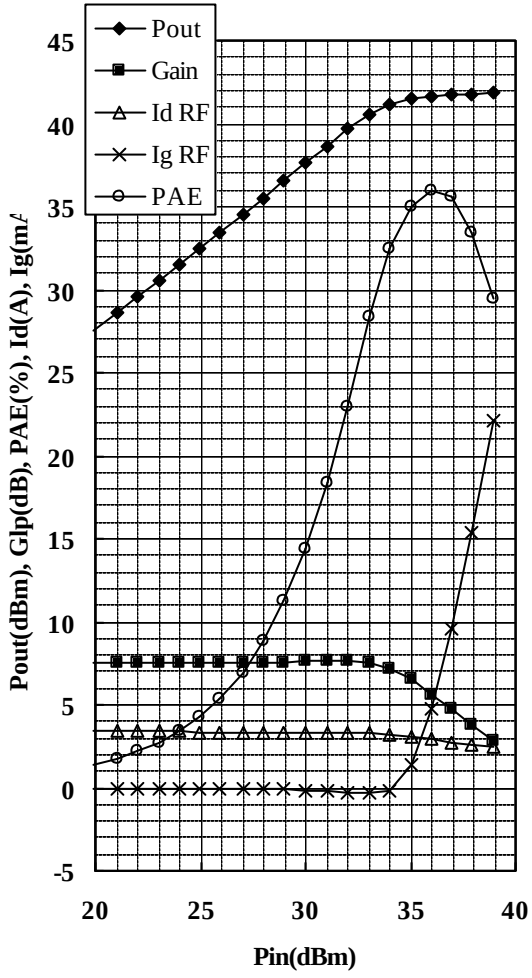
**Freqency=14.0GHz**




**Freqency=14.2GHz**

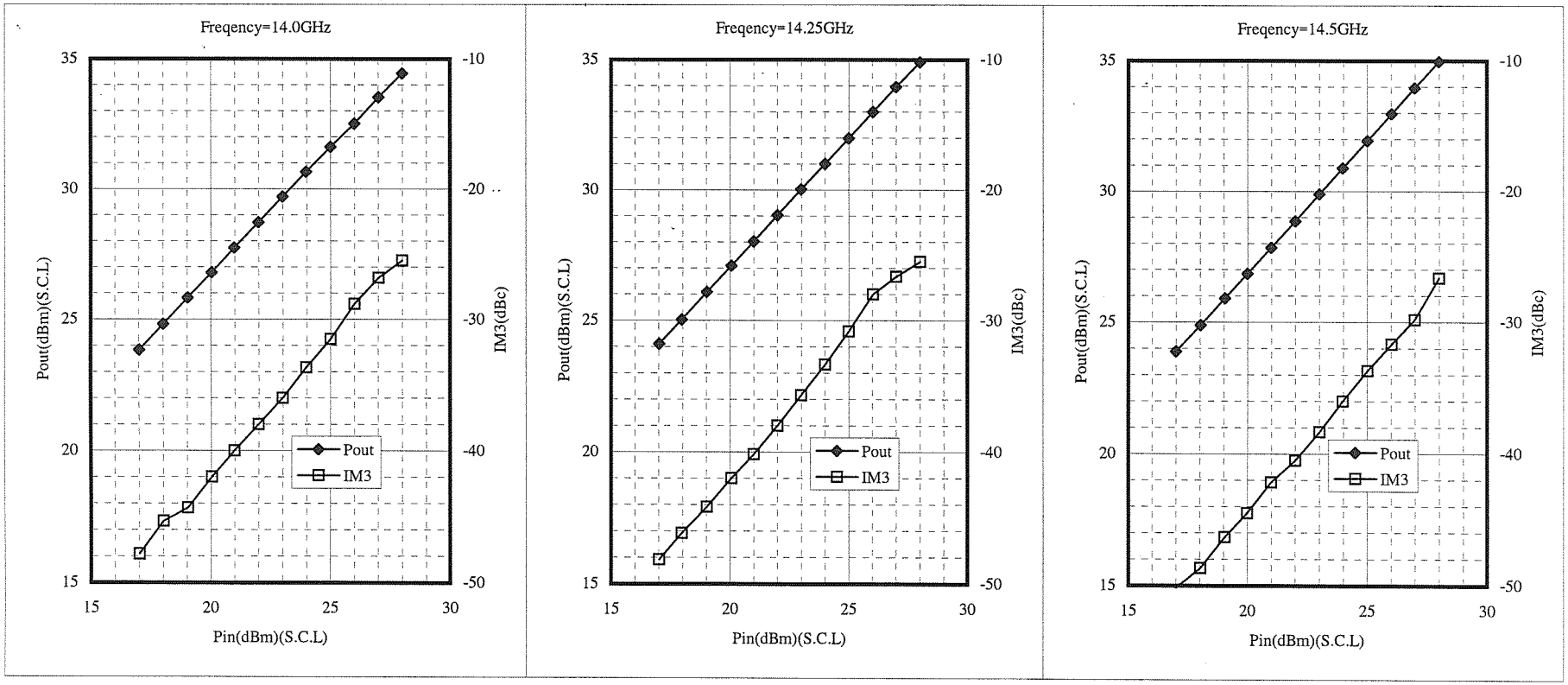



**Freqency=14.5GHz**

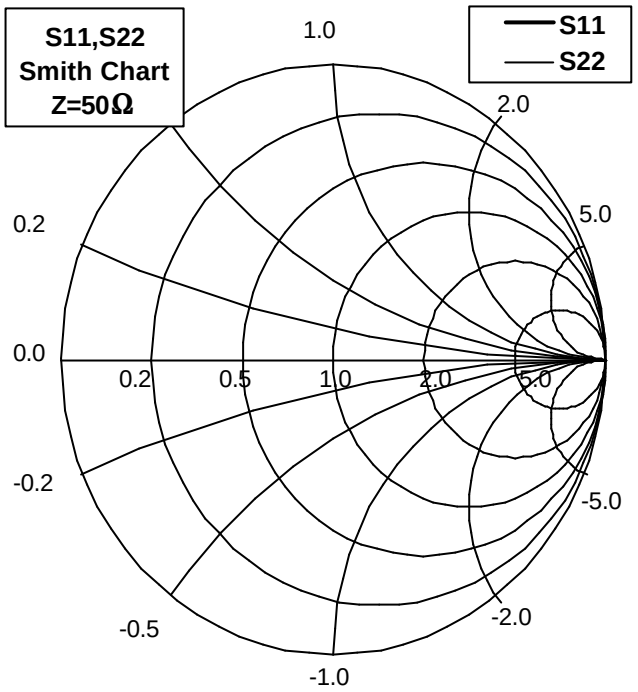


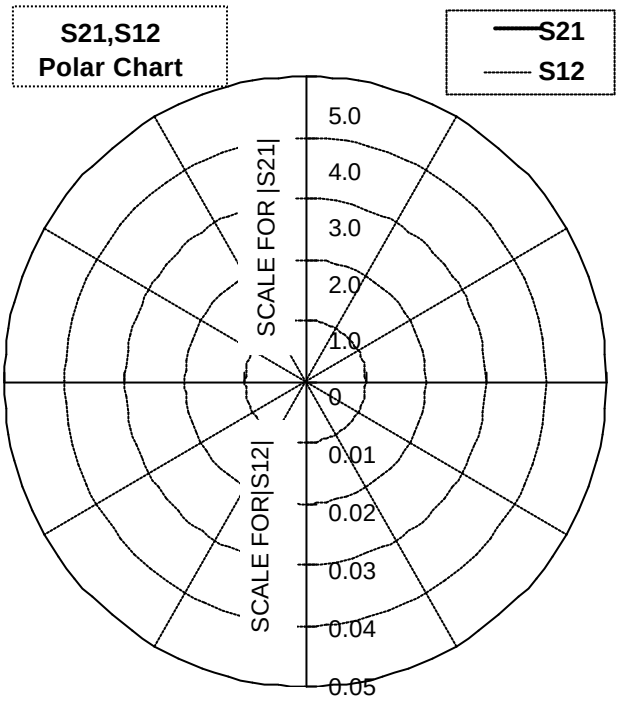
## IM3 vs. OUTPUT POWER

TEST CONDITIONS Vds(Rfoff)=10V,Ids(RFoff)=3.0A,Rg=50ohm
2-tone test , Δf=10MHz



TEST CONDITIONS : f=14.0-14.5GHz,VDS=10V,ID=3.0A




S PARAMETERS (Ta=25deg.C,VDS=10V,ID=3.0A)

| f | S Parameters (TYP.) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | S11 | | S21 | | S12 | | S22 | |
| (GHz) | Mag. | Ang(deg.) | Mag. | Ang(deg.) | Mag. | Ang(deg.) | Mag. | Ang(deg.) |
| 13.00 | 0.738 | -103.4 | 1.278 | 34.7 | 0.057 | 14.1 | 0.668 | -81.0 |
| 13.10 | 0.716 | -109.9 | 1.349 | 26.6 | 0.060 | 7.6 | 0.649 | -87.3 |
| 13.20 | 0.693 | -116.7 | 1.427 | 18.2 | 0.064 | 0.8 | 0.628 | -93.7 |
| 13.30 | 0.665 | -123.8 | 1.517 | 9.1 | 0.068 | -6.4 | 0.609 | -101.0 |
| 13.40 | 0.633 | -132.2 | 1.607 | -0.1 | 0.074 | -13.6 | 0.588 | -109.0 |
| 13.50 | 0.593 | -140.9 | 1.705 | -10.3 | 0.081 | -22.2 | 0.559 | -118.7 |
| 13.60 | 0.546 | -151.8 | 1.809 | -23.6 | 0.087 | -33.8 | 0.521 | -131.2 |
| 13.70 | 0.493 | -162.0 | 1.896 | -34.7 | 0.095 | -42.9 | 0.482 | -141.7 |
| 13.80 | 0.434 | -172.4 | 1.976 | -46.0 | 0.102 | -53.5 | 0.434 | -153.0 |
| 13.90 | 0.369 | 175.1 | 2.059 | -58.0 | 0.109 | -63.7 | 0.383 | -167.1 |
| 14.00 | 0.303 | 161.4 | 2.132 | -70.3 | 0.118 | -75.4 | 0.324 | 177.1 |
| 14.10 | 0.238 | 144.2 | 2.192 | -83.2 | 0.122 | -88.5 | 0.266 | 159.0 |
| 14.20 | 0.176 | 120.7 | 2.241 | -96.3 | 0.127 | -100.8 | 0.215 | 135.8 |
| 14.30 | 0.118 | 83.1 | 2.268 | -110.1 | 0.131 | -113.0 | 0.176 | 104.0 |
| 14.40 | 0.106 | 28.9 | 2.263 | -124.6 | 0.130 | -126.2 | 0.166 | 64.0 |
| 14.50 | 0.156 | -12.7 | 2.217 | -138.9 | 0.130 | -138.3 | 0.179 | 28.6 |
| 14.60 | 0.225 | -38.3 | 2.134 | -153.0 | 0.126 | -151.4 | 0.216 | 0.6 |
| 14.70 | 0.281 | -57.4 | 2.018 | -167.1 | 0.121 | -163.3 | 0.266 | -17.8 |
| 14.80 | 0.335 | -72.0 | 1.885 | 179.9 | 0.113 | -173.9 | 0.318 | -32.7 |
| 14.90 | 0.381 | -86.1 | 1.750 | 166.9 | 0.105 | 176.0 | 0.353 | -46.8 |
| 15.00 | 0.413 | -98.3 | 1.616 | 154.8 | 0.098 | 166.5 | 0.368 | -59.2 |