

### Low Distortion Internally Matched Power GaAs FETs (X, Ku-Band)

#### Features

- Low intermodulation distortion
  - $IM_3 = -45$  dBc at  $P_o = 29.0$  dBm,
  - Single carrier level
- High power
  - $P_{1dB} = 40.5$  dBm at 14.0 GHz to 14.5 GHz
- High gain
  - $G_{1dB} = 5.0$  dB at 14.0 GHz to 14.5 GHz
- Broad band internally matched
- Hermetically sealed package

#### RF Performance Specifications ( $T_a = 25^\circ C$ )

| Characteristics                       | Symbol          | Condition                                 | Unit       | Min. | Typ. | Max       |
|---------------------------------------|-----------------|---|------------|------|------|-----------|
| Output Power at 1dB Compression Point | $P_{1dB}$       | $V_{DS} = 9V$<br>$f = 14.0 \sim 14.5$ GHz | dBm        | 40.0 | 40.5 | –         |
| Power Gain at 1dB Compression Point   | $G_{1dB}$       |   | dB         | 4.0  | 5.0  | –         |
| Drain Current                         | $I_{DS1}$       |   | A          | –    | 4.0  | 5.0       |
| Gain Flatness                         | $\Delta G$      |   | dB         | –    | –    | $\pm 0.8$ |
| Power Added Efficiency                | $\eta_{add}$    |   | %          | –    | 20   | –         |
| 3rd Order Intermodulation Distortion  | $IM_3$          | Note 1                                    | dBc        | -42  | -45  | –         |
| Drain Current                         | $I_{DS2}$       |   | A          | –    | 4.0  | 5.0       |
| Channel-Temperature Rise              | $\Delta T_{ch}$ | $V_{DS} \times I_{DS} \times R_{th(c-c)}$ | $^\circ C$ | –    | –    | 90        |

#### Electrical Characteristics ( $T_a = 25^\circ C$ )

| Characteristic                | Symbol        | Condition                         | Unit         | Min. | Typ. | Max  |
|-------------------------------|---------------|-----------------------------------|--------------|------|------|------|
| Trans-conductance             | gm            | $V_{DS} = 3V$<br>$I_{DS} = 4.8A$  | mS           | –    | 2800 | –    |
| Pinch-off Voltage             | $V_{GSoff}$   | $V_{DS} = 3V$<br>$I_{DS} = 145mA$ | V            | -2   | -3.5 | -5   |
| Saturated Drain Current       | $I_{DSS}$     | $V_{DS} = 3V$<br>$V_{GS} = 0V$    | A            | –    | 10.0 | 11.5 |
| Gate-Source Breakdown Voltage | $V_{GSO}$     | $I_{GS} = -145\mu A$              | V            | -5   | –    | –    |
| Thermal Resistance            | $R_{th(c-c)}$ | Channel to case                   | $^\circ C/W$ | –    | 2.0  | 2.5  |

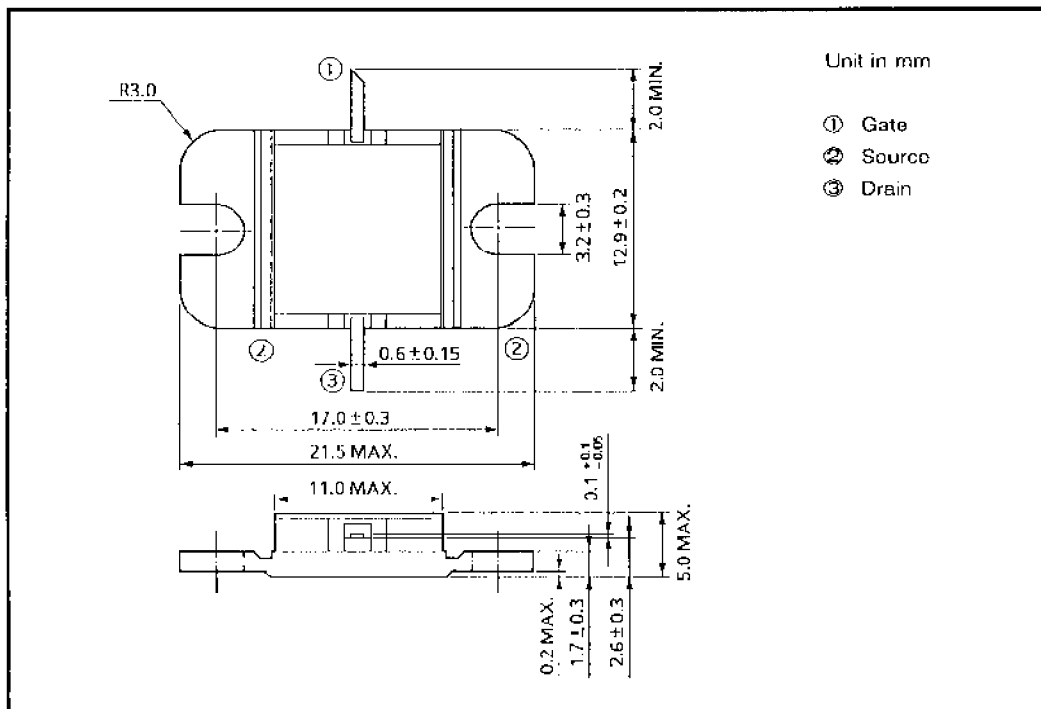
Note 1: 2 Tone Test Pout = 29 dBm Single Carrier Level.

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**Absolute Maximum Ratings (Ta = 25° C)**

| Characteristic                                  | Symbol           | Unit | Rating  |
|---|------------------|------|---------|
| Drain-Source Voltage                            | $V_{DS}$         | V    | 15      |
| Gate-Source Voltage                             | $V_{GS}$         | V    | -5      |
| Drain Current                                   | $I_{DS}$         | A    | 11.5    |
| Total Power Dissipation (T <sub>c</sub> = 25°C) | P <sub>T</sub>   | W    | 60      |
| Channel Temperature                             | T <sub>ch</sub>  | °C   | 175     |
| Storage Temperature                             | T <sub>stg</sub> | °C   | -65~175 |

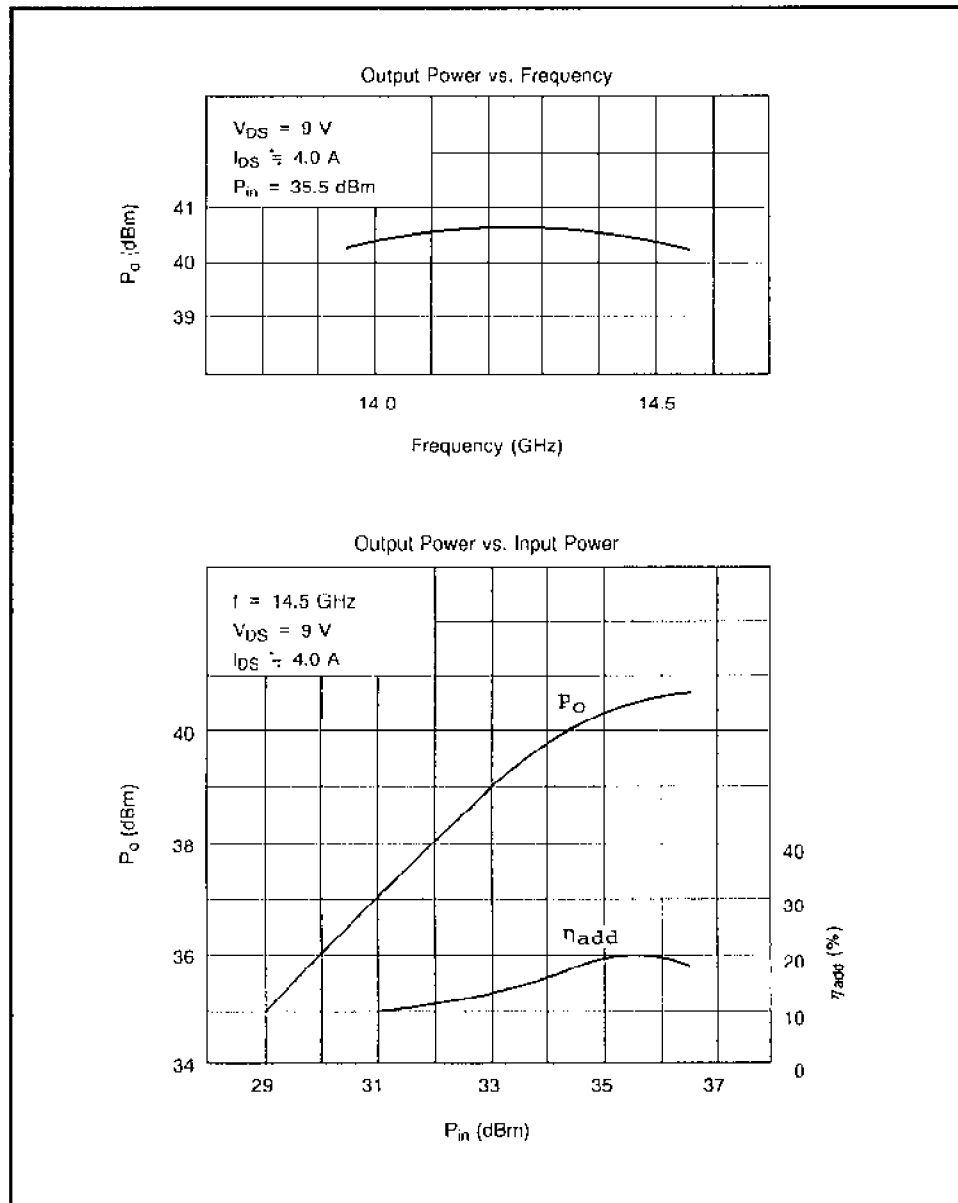
**Package Outline (2-11C1B)**



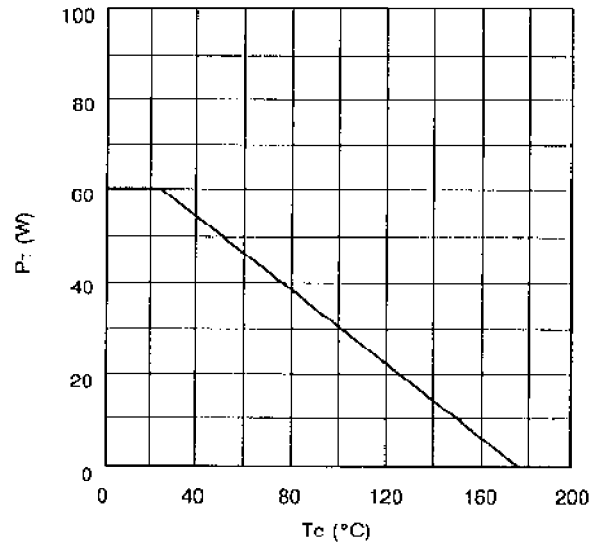
**Handling Precautions for Packaged Type**

Soldering iron should be grounded and the operating time should not exceed 10 seconds at 260°C.

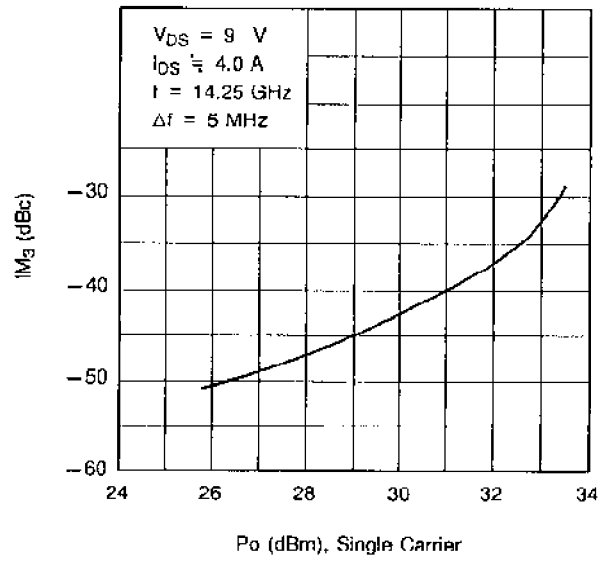
RF Performances



Power Dissipation vs. Case Temperature

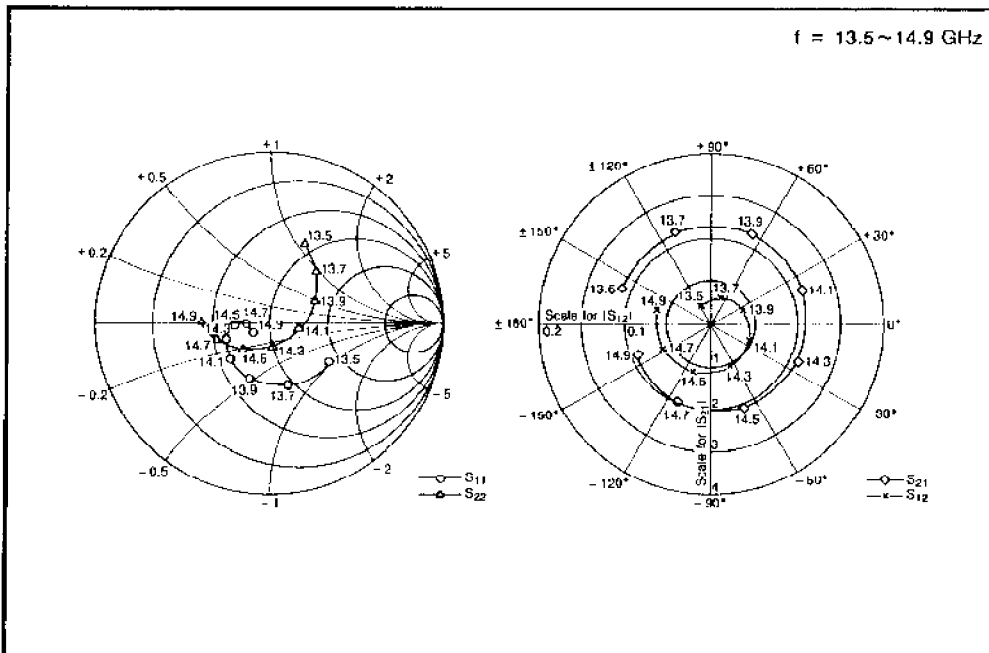


$IM_3$  vs. Output Power Characteristics



TIM1414-10L S-Parameters  
(MAGN. and ANGLES)

$V_{DS} = 9\text{ V}$ ,  $I_{DS} = 4.0\text{ A}$



| FREQUENCY<br>(MHz) | $S_{11}$ |      | $S_{21}$ |      | $S_{12}$ |      | $S_{22}$ |      |
|--------------------|----------|------|----------|------|----------|------|----------|------|
|                    | MAG      | ANG  | MAG      | ANG  | MAG      | ANG  | MAG      | ANG  |
| 13.50              | 0.48     | -30  | 2.12     | 159  | 0.039    | 118  | 0.43     | 70   |
| 13.60              | 0.46     | -48  | 2.16     | 136  | 0.046    | 95   | 0.39     | 59   |
| 13.70              | 0.44     | -65  | 2.16     | 113  | 0.052    | 71   | 0.33     | 48   |
| 13.80              | 0.43     | -80  | 2.16     | 91   | 0.059    | 48   | 0.28     | 34   |
| 13.90              | 0.42     | -94  | 2.13     | 68   | 0.066    | 26   | 0.23     | 17   |
| 14.00              | 0.41     | -106 | 2.10     | 46   | 0.073    | 4    | 0.19     | -7   |
| 14.10              | 0.40     | -118 | 2.08     | 25   | 0.079    | -18  | 0.17     | -38  |
| 14.20              | 0.39     | -128 | 2.06     | 3    | 0.086    | -39  | 0.18     | -70  |
| 14.30              | 0.38     | -139 | 2.01     | -19  | 0.091    | -61  | 0.22     | -95  |
| 14.40              | 0.36     | -147 | 1.97     | -40  | 0.097    | -82  | 0.27     | -114 |
| 14.50              | 0.35     | -155 | 1.93     | -62  | 0.101    | -103 | 0.32     | -129 |
| 14.60              | 0.33     | -161 | 1.88     | -83  | 0.105    | -124 | 0.37     | -140 |
| 14.70              | 0.32     | -166 | 1.83     | -104 | 0.108    | -144 | 0.41     | -150 |
| 14.80              | 0.30     | -171 | 1.79     | -125 | 0.112    | -165 | 0.45     | -158 |
| 14.90              | 0.28     | -174 | 1.75     | -146 | 0.114    | 175  | 0.48     | -166 |