



TC3139

REV.2\_04/12/2004

## 2.3 - 2.5 GHz 1W MMIC

### FEATURES

- P<sub>1</sub> dB: 30 dBm
- Small Signal Gain: 26 dB
- Power Added Efficiency: 32 %
- IP3: 40 dBm
- Matched to 50  $\Omega$  operation
- Bias condition: 400 mA @ 7 V

### PHOTO ENLARGEMENT



### DESCRIPTION

The TC3139 is a 2 stage PHEMT MMIC power amplifier. It is designed for use in low cost, high volume, 2.3 –2.5 GHz band applications. The MMIC provides a typical gain of 26 dB and P1dB power of more than 30 dBm. Typical bias condition is 7V at 400 mA. The MMIC is packaged in a low-cost surface-mountable plastic package. The input and output matching of the MMIC require minimum external components.

### APPLICATIONS

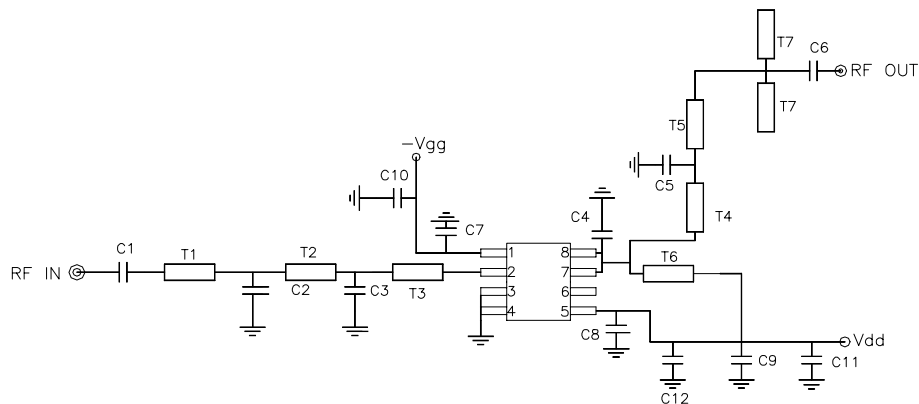
- Wireless Internet Access
- Wireless Local Loop
- Two way radio

### ELECTRICAL SPECIFICATIONS (Ta = 25 °C)

| SYMBOL            | DESCRIPTION                             | MIN  | TYP  | MAX   | UNITS |
|-------------------|-----------------------------------------|------|------|-------|-------|
| FREQ              | Frequency Range                         | 2.3  |      | 2.5   | GHz   |
| SSG               | Small Signal Gain                       | 25   | 26   |       | dB    |
| GOF               | Small Signal Gain Flatness              |      | ±0.5 | ±0.75 |       |
| P <sub>1</sub> dB | Output Power at 1 dB Gain Compression   | 29   | 30   |       | dBm   |
| P <sub>3</sub> dB | Output Power at 3 dB Gain Compression   | 30   | 31   |       | dBm   |
| IP3               | Third Order Intercept Point             | 38   | 40   |       | dBm   |
| VSWR, IN          | Input VSWR                              |      | 2:1  |       |       |
| VDD               | Supply Voltage                          |      | 7    |       | Volt  |
| Vg                | Gate Voltage                            | -0.6 | -1.0 | -1.5  | Volt  |
| IDD               | Current Supply Without RF               |      | 400  |       | mA    |
| IDP <sub>1</sub>  | Current Supply @ Pout=P <sub>1</sub> dB |      | 450  |       | mA    |
| $\eta_a$          | Power Added Efficiency                  |      | 32   |       | %     |

## TEST CIRCUITS

### Evaluation Board Schematic



## EVALUATION BOARD

DXF file of the PCB can be  
downloaded from our web-site at

[www.transcominc.com.tw](http://www.transcominc.com.tw)

PCB Material: FR4

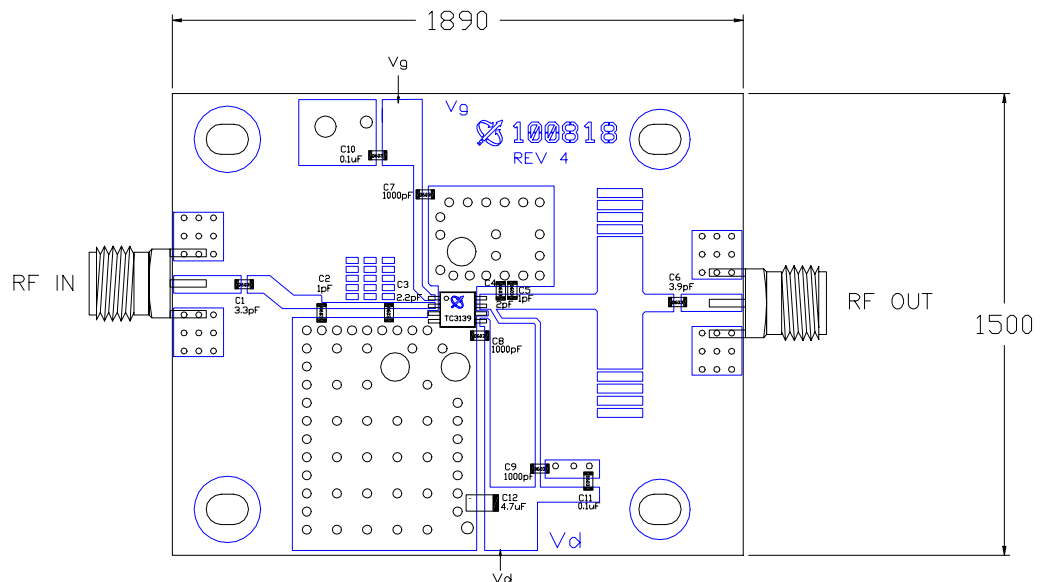
ER = 4.6

Thickness = 32 mil

Unit: mil

### Application Notes:

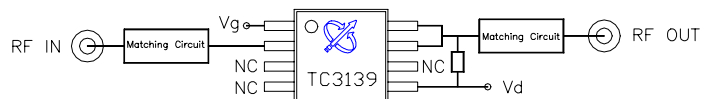
For better heat sinking and  
grounding, it's recommended to have  
the via holes beneath TC3139 filled  
with solder and have two screws  
besides TC3139 installed on the PCB area.



### Evaluation Board Parts List

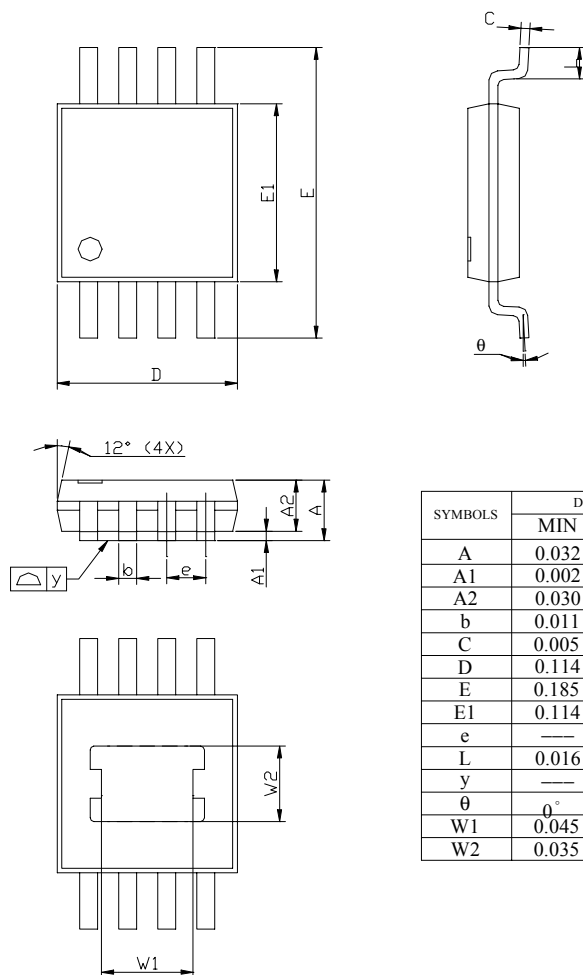
| Part Type | Reference Designator | Description         | Manufacturer | Part Number     |
|-----------|----------------------|---------------------|--------------|-----------------|
| Capacitor | C1                   | 3.3 pF 0603         | Murata       | GRM39C0G3R3C50V |
| Capacitor | C2, C5               | 1 pF 0603           | Murata       | GRM39C0G101C50V |
| Capacitor | C3                   | 2.2 pF 0603         | Murata       | GRM39C0G2R2C50V |
| Capacitor | C4                   | 2 pF 0603           | Murata       | GRM39C0G020C50V |
| Capacitor | C6                   | 3.9 pF 0603         | Murata       | GRM39C0G3R9C50V |
| Capacitor | C7~9                 | 1000 pF 0603        | Murata       | GRM39C0G102J50V |
| Capacitor | C10, C11             | 0.1 uF 0603         | Murata       | GRM39Y5V104Z25V |
| Capacitor | C12                  | 4.7uF Tantalum Cap. |              |                 |

### CONNECTION DIAGRAM AND PIN DESCRIPTIONS



| Pin #  | Name           | Description     |
|--------|----------------|-----------------|
| 2      | RF IN          | RF input        |
| 5      | V <sub>d</sub> | MMIC drain bias |
| 1      | V <sub>g</sub> | MMIC gate bias  |
| 7, 8   | RF OUT         | RF output       |
| Others | NC             | No Connection   |

**PHYSICAL DIMENSIONS (Unit: inches)**



| SYMBOLS | DIMENSIONS IN INCHES |        |       |
|---------|----------------------|--------|-------|
|         | MIN                  | NOM    | MAX   |
| A       | 0.032                | 0.0375 | 0.043 |
| A1      | 0.002                | 0.0035 | 0.005 |
| A2      | 0.030                | 0.034  | 0.038 |
| b       | 0.011                | 0.012  | 0.015 |
| C       | 0.005                | 0.006  | 0.009 |
| D       | 0.114                | 0.118  | 0.122 |
| E       | 0.185                | 0.193  | 0.201 |
| E1      | 0.114                | 0.118  | 0.122 |
| e       | —                    | 0.026  | —     |
| L       | 0.016                | 0.021  | 0.026 |
| y       | —                    | —      | 0.004 |
| θ       | 0°                   | —      | 6°    |
| W1      | 0.045                | —      | 0.075 |
| W2      | 0.035                | —      | 0.065 |