

2.4 GHz 1W MMIC

FEATURES

- P_{-1} dB: 30 dBm
- Small Signal Gain: 28 dB
- Power Added Efficiency: 32 %
- IP3: 39 dBm
- Bias Condition: 400 mA @ 7 V

PHOTO ENLARGEMENT



DESCRIPTION

The TC3131 is a 2 stage PHEMT MMIC power amplifier. It is designed for use in low cost and high volume 2.4-2.5 GHz ISM band applications. The MMIC provides a typical gain of 26 dB and saturation power of more than 30 dBm. Typical bias condition is 7V at 400 mA. The MMIC is packaged in a standard SO-8 power package. The copper based carrier of the package allows direct soldering of the device to the PCB for proper heat sinking. The input and output matching of the MMIC require external components.

ELECTRICAL SPECIFICATIONS (Ta = 25 °C)

| SYMBOL | DESCRIPTION | MIN | TYP | MAX | UNITS |
|--------------------------|--|------|------|-----|-------|
| FREQ | Frequency Range | 2.4 | | 2.5 | GHz |
| SSG | Small Signal Gain | 26 | 28 | | dB |
| P₋₁ dB | Output Power at 1 dB Gain Compression | 29 | 30 | | dBm |
| P₃ dB | Output Power at 3 dB Gain Compression | 30 | 31 | | dBm |
| IP3 | Third Order Intercept Point | 37 | 39 | | dBm |
| VSWR, IN | Input VSWR | | 2:1 | | - |
| VDD | Supply Voltage | | 7 | | Volt |
| Vg | Gate Voltage | -0.8 | -1.5 | -2 | Volt |
| IDD | Current Supply Without RF | | 400 | | mA |
| IDP₋₁ | Current Supply @ Pout = P ₋₁ dB | | 460 | | mA |
| η_a | Power Added Efficiency | | 32 | | % |

Absolute Maximum Ratings

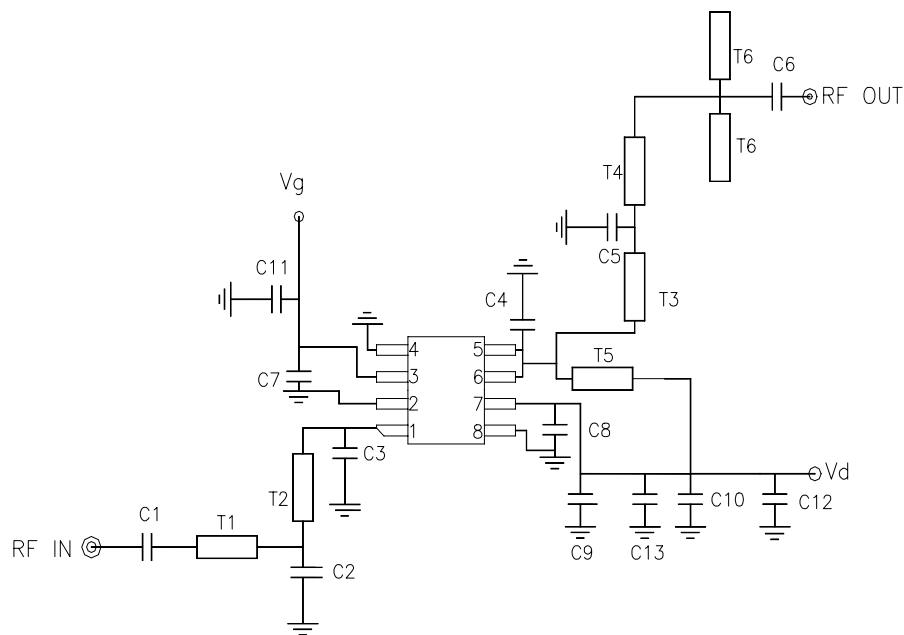
| Symbol | Parameter/Conditions | Min. | Max. | Units |
|-----------|-------------------------------|------|------|-------|
| V_{dd} | Drain-Source Voltage | | 12 | Volts |
| I_{dd} | Total Drain Current | | 1500 | mA |
| P_{in} | RF Input Power | | 8 | dBm |
| P_t | Power Dissipation | | 6 | W |
| T_{ch} | Operating Channel Temperature | | 175 | °C |
| T_{STG} | Storage Temperature | -65 | 175 | °C |

Note:

1. This GaAs MMIC is susceptible to damage from Electrostatic Discharge. Proper precautions should be used when handling these devices.
2. Specifications subject to change without notice.

TEST CIRCUITS

Evaluation Board Schematic



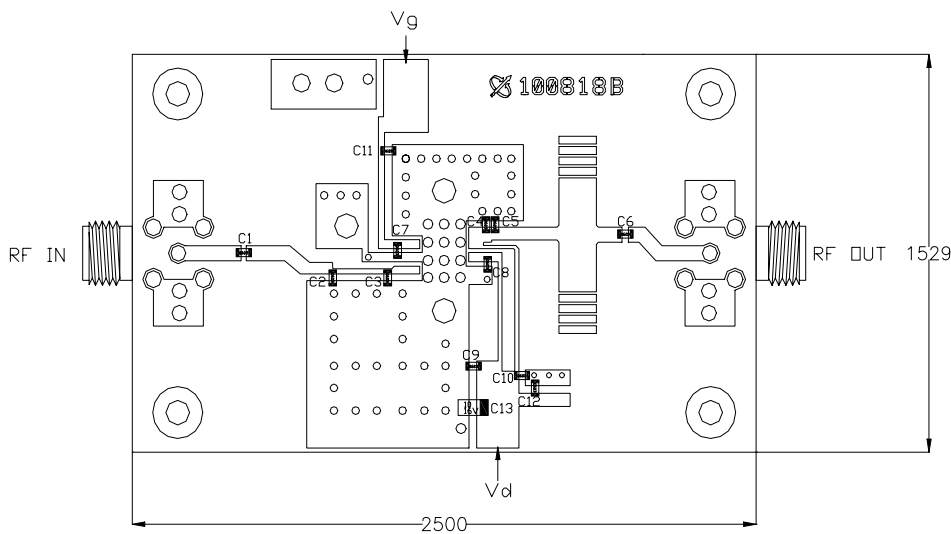
EVALUATION BOARD

PCB Material: FR4
ER = 4.6
Thickness = 31 mil
Unit: mil

* DXF file of the PCB can be downloaded from our web-site at www.transcominc.com.tw

* Application Notes:

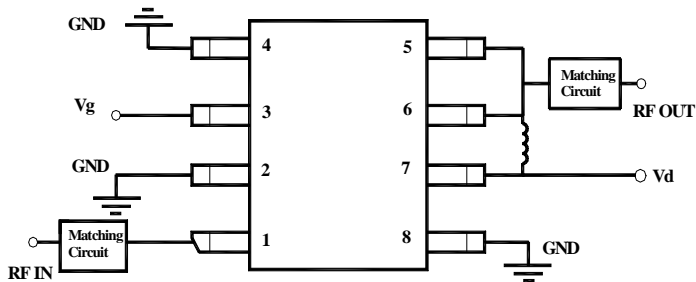
For better heat sinking and grounding, it's recommended to have the via holes beneath TC3131 filled with solder and have two screws installed on required heat sink plate besides TC3131 on the PCB area.



Evaluation Board Parts List

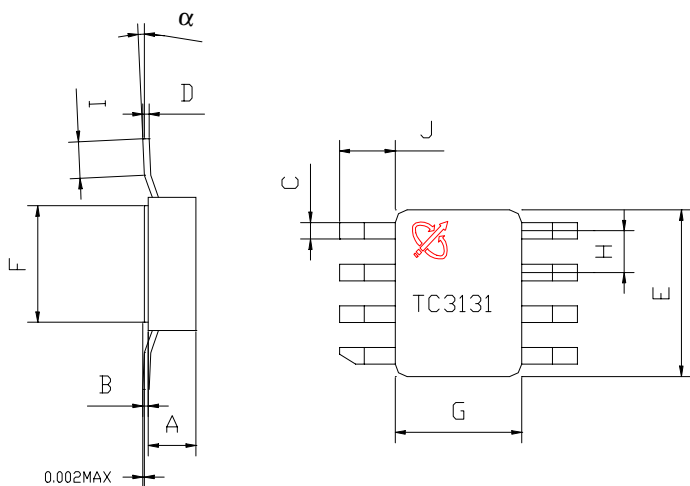
| Part Type | Reference Designator | Description | Manufacturer | Part Number |
|-----------|----------------------|---------------------|--------------|-----------------|
| Capacitor | C1 | 3.3 pF 0603 | Murata | GRM39C0G3R3C50V |
| Capacitor | C2, C5 | 0.75 pF 0603 | Murata | GRM39C0GR75C50V |
| Capacitor | C3 | 1.8 pF 0603 | Murata | GRM39C0G1R8C50V |
| Capacitor | C4 | 2 pF 0603 | Murata | GRM39C0G020C50V |
| Capacitor | C6 | 3.9 pF 0603 | Murata | GRM39C0G3R9C50V |
| Capacitor | C7~10 | 1000 pF 0603 | Murata | GRM39C0G102J50V |
| Capacitor | C11, C12 | 0.1 uF 0603 | Murata | GRM39Y5V104Z25V |
| Capacitor | C13 | 4.7uF Tantalum Cap. | | |

CONNECTION DIAGRAM AND PIN DESCRIPTIONS



| Pin # | Name | Description |
|---------|----------------|--|
| 1 | RF IN | RF input (internally DC blocked) |
| 2, 4, 8 | GND | Ground |
| 3 | V _g | FET gate bias |
| 5, 6 | RF OUT | RF output and V _{d2} External matching circuit required |
| 7 | V _d | Input stage drain bias |

PHYSICAL DIMENSIONS (Unit: inch)



| DIMENSION | MINIMUM | NOMINAL | MAXIMUM |
|-----------|---------|---------|---------|
| A | 0.083 | 0.086 | 0.089 |
| B | 0.007 | 0.008 | 0.009 |
| C | 0.017 | 0.020 | 0.023 |
| D | 0.007 | 0.008 | 0.009 |
| E | 0.195 | 0.200 | 0.205 |
| F | 0.135 | 0.140 | 0.145 |
| G | 0.155 | 0.160 | 0.165 |
| H | | 0.050 | |
| I | 0.020 | | 0.040 |
| J | 0.055 | 0.065 | 0.075 |
| α | 0° | | 7° |