### 0.5W Single-Bias and Prematched GaAs Power PHEMTs using SMT package

## FEATURES

- Prematched for $5 \sim 10 \mathrm{GHz}$
- 0.5W Typical Output Power at $5 \sim 10 \mathrm{GHz}$
- 7dB Typical Linear Power Gain at 10 GHz
- High Linearity: IP3 $=37 \mathrm{dBm}$ Typical at $5 \sim 10 \mathrm{GHz}$
- High Power Added Efficiency: Nominal PAE of $30 \%$ at $5 \sim 10 \mathrm{GHz}$
- Breakdown Voltage: $\mathrm{BV}_{\mathrm{DGO}} \geq 15 \mathrm{~V}$
- $\mathrm{Wg}=1.2 \mathrm{~mm}$
- 100 \% DC Tested
- Suitable for High Reliability Application
- Lost Cost SMT Ceramic Package


## PHOTO ENLARGEMENT



## DESCRIPTION

The TC3943 is a Single-bias and prematched GaAs PHEMT. It is designed for use in low cost, high volume, and $5 \sim 10 \mathrm{GHz} 0.5 \mathrm{~W}$ amplifiers. It provides a typical gain of 7 dB and P 1 dB of 27 dBm at 10 GHz . The single positive drain bias is 8 V and the typical drain-source current is 150 mA . The device is packaged in copper based ceramic 10 pins SMT packages. The copper based carrier of the package allows direct soldering of the device to the PCB.

ELECTRICAL SPECIFICATIONS ( $\mathrm{T}_{\mathrm{A}}=\mathbf{2 5}^{\circ} \mathrm{C}$ )

| Symbol | CONDITIONS | MIN | TYP | MAX |
| :---: | :--- | :---: | :---: | :---: |
| UNIT |  |  |  |  |
| $\mathrm{P}_{1 \mathrm{~dB}}$ | Output Power at 1 dB Gain Compression Point, $f=10 \mathrm{GHz} \mathrm{V}_{\mathrm{DS}}=8 \mathrm{~V}$ | 26 | 27 |  |
| $\mathrm{G}_{\mathrm{L}}$ | Linear Power Gain, $f=10 \mathrm{GHz} \mathrm{V}_{\mathrm{DS}}=8 \mathrm{~V}$ | 6 | 7 | dBm |
| IP 3 | Intercept Point of the $3^{\text {rd }}$-order Intermodulation, $f=10 \mathrm{GHz} \mathrm{V}_{\mathrm{DS}}=8 \mathrm{~V}, * \mathrm{P}_{\mathrm{SCL}}=14 \mathrm{dBm}$ |  | dB |  |
| PAE | Power Added Efficiency at 1 dB Compression Power, $f=10 \mathrm{GHz}$ |  | 37 | dBm |
| $\mathrm{I}_{\mathrm{DS}}$ | Drain-Source Current at $\mathrm{V}_{\mathrm{DS}}=8 \mathrm{~V}$ |  |  | $\%$ |
| $\mathrm{BV}_{\mathrm{DGO}}$ | Drain-Gate Breakdown Voltage at $\mathrm{I}_{\mathrm{DGO}}=0.6 \mathrm{~mA}$ | 15 | 18 | mA |

Note: ${ }^{*} \mathbf{P}_{\text {SCL }}$ : Output Power of Single Carrier Level.

ABSOLUTE MAXIMUM RATINGS ( $\mathrm{T}_{\mathrm{A}}=25^{\circ} \mathrm{C}$ )

| Symbol | Parameter | Rating |
| :---: | :--- | :---: |
| $\mathrm{V}_{\mathrm{DS}}$ | Drain-Source Voltage | 10 V |
| $\mathrm{P}_{\mathrm{in}}$ | RF Input Power, CW | 26 dBm |
| $\mathrm{P}_{\mathrm{T}}$ | Continuous Dissipation | 1.9 W |
| $\mathrm{~T}_{\mathrm{CH}}$ | Channel Temperature | $175^{\circ} \mathrm{C}$ |
| $\mathrm{T}_{\mathrm{STG}}$ | Storage Temperature | $-65^{\circ} \mathrm{C}$ to $+175^{\circ} \mathrm{C}$ |

## RECOMMANDED OPERATING CONDITION

| Symbol | Parameter | Rating |
| :---: | :---: | :---: |
| $\mathrm{V}_{\mathrm{DS}}$ | Drain to Source Voltage | 8 V |

## HANDLING PRECAUTIONS:

The user must operate in a clean, dry environment. Electrostatic Discharge (ESD) precautions should be observed at all stages of storage, handling, assembly, and testing. The static discharge must be less than 300 V .

## EVALUATION BOARD

PCB Material: RO4003
$\mathrm{ER}=3.38$
Thickness $=20 \mathrm{mil}$
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 TC3943 filled with solder and have two screws besides TC3943 installed on the PCB area.


## Evaluation Board Parts List

| Part Type | Qt'y | Reference <br> Designator | Description | Manufacturer | Part Number |
| :---: | :---: | :---: | :---: | :---: | :--- |
| Capacitor | 1 | C 1 | $(0603) 1.2 \mathrm{pF} \pm 5 \%$ | Murata | GRM39COG1R2C50V |
| Capacitor | 1 | C 2 | $(0805) 1.2 \mathrm{pF} \pm 0.1 \mathrm{pF}$ | ATC | ATC 600F 1R2BT (1.2pF $\pm 0.1 \mathrm{pF} 250 \mathrm{WVDC)}$ |
| Capacitor | 1 | C 3 | $(0603) 1000 \mathrm{pF} \pm 10 \%$ | Murata | GRM39X7R102K50V |
| Capacitor | 1 | C 4 | $(0603) 0.1 \mu \mathrm{~F} \pm 20 \%$ | Murata | GRM39Y5V104Z25V |
| Capacitor | 1 | C 5 | $(0603) 10 \mu \mathrm{~F} \pm 20 \%$ | Murata | GRM42-6Y5V106Z25V (GRM31CF5E106ZA01L) |

