



# 4W,4.4-6.0GHz 28V Plastic RF LDMOS Transistor

**ITEH58004C6**

## Description

The ITEH58004C6 is a 4-watt, highly rugged, LDMOS transistor, designed for any general applications at frequencies 4.4 to 6GHz, in 10\*6mm QFN plastic package, supporting surface mounted on PCB through high density grounding vias.



- Typical 5.7-5.9GHz Class AB RF Performance (On Innogrator fixture with device soldered).

| Freq (GHz) | Pulse CW Signal <sup>(1)</sup> |          |              | P <sub>avg</sub> =24.5dBm WCDMA Signal <sup>(2)</sup> |                    |                          |
|------------|--------------------------------|----------|--------------|---|--------------------|--------------------------|
|            | Gain P1dB (dB)                 | P3dB (W) | Eff@P3dB (%) | Gp (dB)   | η <sub>D</sub> (%) | ACPR <sub>5M</sub> (dBc) |
| 5.7        | 10.2                           | 4.56     | 46           | 11.26   | 11.80              | -42.45                   |
| 5.8        | 10.3                           | 4.72     | 48           | 11.38   | 12.60              | -42,80                   |
| 5.9        | 10.8                           | 4.40     | 46           | 11.50   | 12.10              | -43.37                   |

- 5.3-5.9GHz etc application data upon request

## Features

- High Efficiency and Linear Gain Operations
- Integrated ESD Protection
- Excellent thermal stability, low HCI drift
- Large Positive and Negative Gate/Source Voltage Range for Improved Class C Operation
- Pb-free, RoHS-compliant

## Suitable Applications

- C band power amplifier
- 5G cellular power amplifier within 4.4-5GHz
- 5.8G WIFI AP
- 5.8G ISM

**Table 1. Maximum Ratings**

| Rating                         | Symbol           | Value       | Unit |
|--------------------------------|------------------|-------------|------|
| Drain--Source Voltage          | V <sub>DSS</sub> | +65         | Vdc  |
| Gate--Source Voltage           | V <sub>GS</sub>  | -10 to +10  | Vdc  |
| Operating Voltage              | V <sub>DD</sub>  | +28         | Vdc  |
| Storage Temperature Range      | T <sub>stg</sub> | -65 to +150 | °C   |
| Case Operating Temperature     | T <sub>c</sub>   | +150        | °C   |
| Operating Junction Temperature | T <sub>j</sub>   | +225        | °C   |

**Table 2. Thermal Characteristics**

| Characteristic  | Symbol           | Value | Unit |
|---|------------------|-------|------|
| Thermal Resistance, Junction to Case<br>T <sub>c</sub> = 85°C, T <sub>j</sub> =200°C, DC test | R <sub>θJC</sub> | 8.2   | °C/W |

**Table 3. ESD Protection Characteristics**

| Test Methodology                    | Class   |
|-------------------------------------|---------|
| Human Body Model (per JESD22--A114) | Class 2 |



**Table 4. Electrical Characteristics** (TA = 25 °C unless otherwise noted)

| Characteristic  | Symbol               | Min | Typ  | Max | Unit |
|---|----------------------|-----|------|-----|------|
| <b>DC Characteristics</b>   |                      |     |      |     |      |
| Drain-Source Voltage<br>V <sub>GS</sub> =0, I <sub>DS</sub> =100uA                                    | V <sub>(BR)DSS</sub> |     | 65   |     | V    |
| Zero Gate Voltage Drain Leakage Current<br>(V <sub>DS</sub> = 28V, V <sub>GS</sub> = 0 V)             | I <sub>DSS</sub>     | —   | —    | 1   | μA   |
| Gate--Source Leakage Current<br>(V <sub>GS</sub> = 11 V, V <sub>DS</sub> = 0 V)                       | I <sub>GSS</sub>     | —   | —    | 1   | μA   |
| Gate Threshold Voltage<br>(V <sub>DS</sub> = 28V, I <sub>D</sub> = 600 μA)                            | V <sub>GS(th)</sub>  | —   | 2    | —   | V    |
| Gate Quiescent Voltage<br>(V <sub>DD</sub> = 28V, I <sub>D</sub> = 40mA, Measured in Functional Test) | V <sub>GS(Q)</sub>   | —   | 2.84 | —   | V    |

**Load Mismatch (In Innogrations Test Fixture, 50 ohm system):** V<sub>DD</sub> = 28Vdc, I<sub>DQ</sub> = 40mA, f = 5800 MHz

|                                       |                       |
|---------------------------------------|-----------------------|
| VSWR 10:1 at 4W pulse CW Output Power | No Device Degradation |
|---------------------------------------|-----------------------|

**Figure 1: Pin Definition (Top View)**



| Pin No.                          | Symbol     | Description       |
|----------------------------------|------------|-------------------|
| 8,9,10,11                        | Vgs/RF In  | Vgs and RF input  |
| 32,33,34,35                      | Vds/RF out | Vds and RF output |
| 2,5,7,12,13,18,20,23,25,30,31,36 | GND        | DC/RF Ground      |
| Others                           | NC         | No connection     |
| Package Base                     | GND        | DC/RF Ground.     |

**Reference Circuit of Test Fixture Assembly Diagram  
5700-5900MHz RO4350B 20mils**

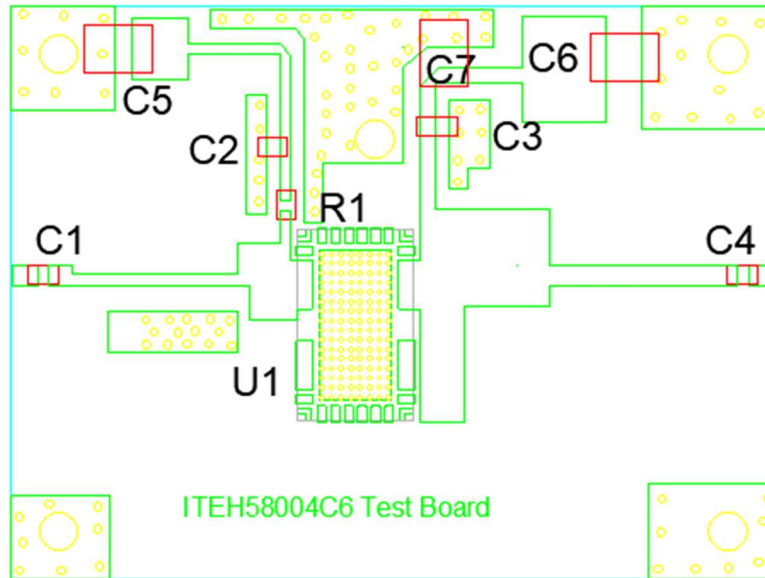


Figure 2. Test Circuit Component Layout

Table 5. Test Circuit Component Designations and Values

| Part        | Quantity | Description            | Part Number           | Manufacture  |
|-------------|----------|------------------------|-----------------------|--------------|
| C1,C2,C3,C4 | 4        | 3.9pF High Q Capacitor | 251SHS3R9BSE          | TEMEX        |
| C5,C6,C7    | 3        | 10uF MLCC              | GRM32EC72A106M<br>E05 | Murata       |
| R1          | 1        | 10 Ω Power Resistor    | ESR03EZPF100          | ROHM         |
| U1          | 1        | 4W LDMOS Transistor    | ITEH58004C6           | Innogrations |



### TYPICAL CHARACTERISTICS

Figure 3. Power Gain and Drain Efficiency as function of Power Out at different bias conditions

(Left:  $I_{dq}=5\text{mA}$ ; Right:  $I_{dq}=40\text{mA}$ )

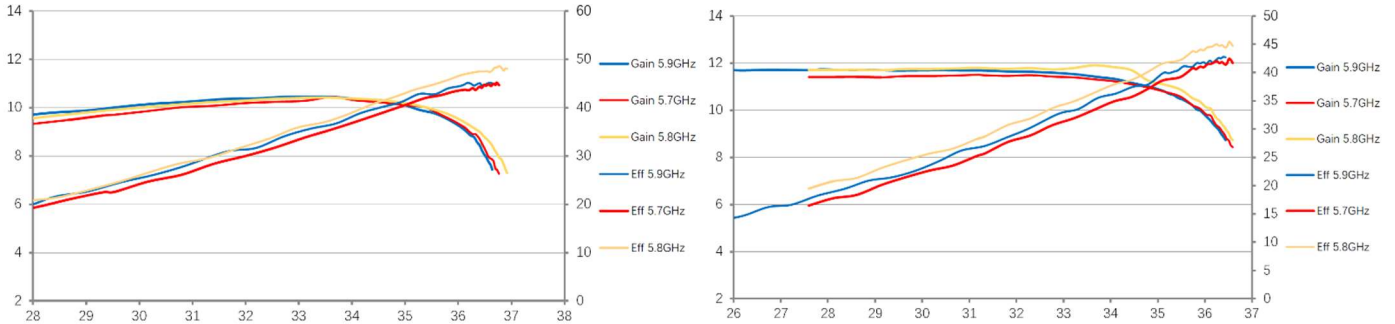


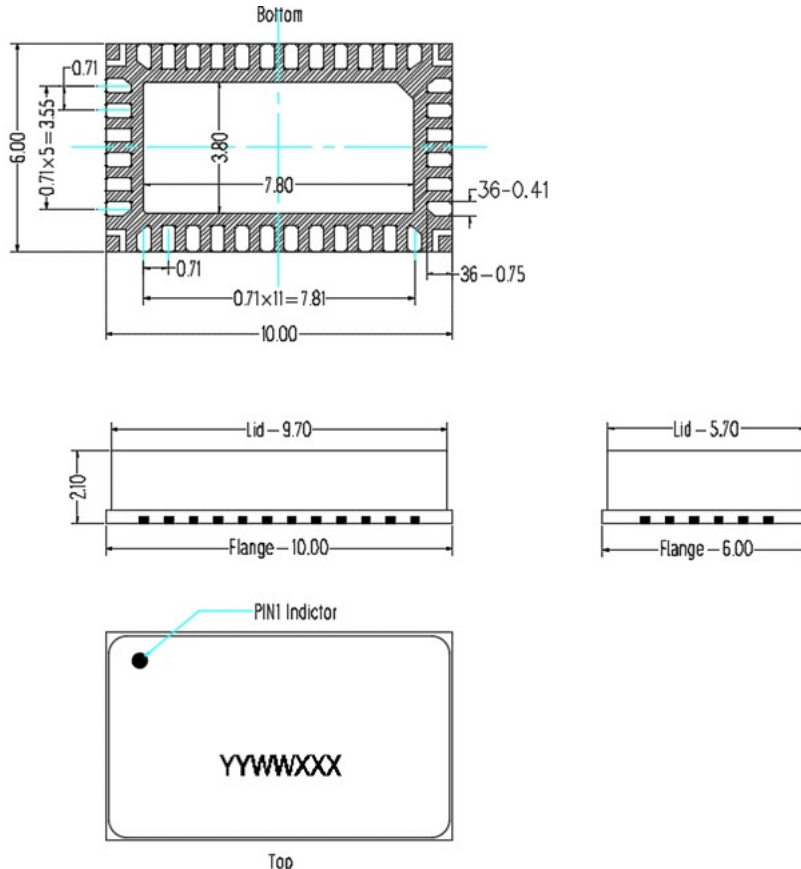
Figure 4. Network analyzer output S11/S21





### Package Dimensions

#### 10\*6 Plastic Package



Notes:

- 1. All dimensions are in mm;
- 2. The tolerances unless specified are ±0.2mm.

### Revision history

Table 7. Document revision history

| Date      | Revision | Datasheet Status         |
|-----------|----------|--------------------------|
| 2022/7/27 | Rev 1.0  | Preliminary Datasheet    |
| 2022/12/9 | Rev 1.1  | Update on Pin Definition |

#### Application data based on LWH-22-22

#### Disclaimers

Specifications are subject to change without notice. Innogrations believes the information contained within this data sheet to be accurate and reliable. However, no responsibility is assumed by Innogrations for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of Innogrations. Innogrations makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose. "Typical" parameters are the average values expected by Innogrations in large quantities and are provided for information purposes only. These values can and do vary in different applications and actual performance can vary over time. All operating parameters should be validated by customer's technical experts for each application. Innogrations products are not designed, intended or authorized for use as components in applications intended for surgical implant into the body or to support or sustain life, in applications in which the failure of the Innogrations product could result in personal injury or death or in applications for planning, construction, maintenance or direct operation of a nuclear facility. For any concerns or questions related to terms or conditions, pls check with Innogrations and authorized distributors

Copyright © by Innogrations (Suzhou) Co.,Ltd.