



# 12W,28V Plastic RF LDMOS Transistor

**ITEH38012C6**

## Description

The ITEH38012C6 is a 12-watt, highly rugged, LDMOS transistor, designed for any general applications at frequencies up to 3.8GHz, in 10\*6mm QFN plastic package, supporting surface mounted on PCB through high density grounding vias.

**It is part of low power general purpose plastic LDMOS with pin to pin compatibility.**

• Typical 3.4-3.6GHz Class AB RF Performance (On Innogrator fixture with device soldered).

VDS=28V, IDQ=70mA

Pulsed CW: 100 us width, 20% duty cycle.

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff (%)	P1dB Gain (dB)	P3dB (dBm)	P3dB (W)	P3dB Eff (%)
3400	41.84	15.3	49.7	15.6	42.62	18.3	51.4
3500	41.44	13.9	50.9	16	42.35	17.2	53.1
3600	40.9	12.3	49.6	15.48	41.93	15.6	52.2



WCDMA 1 carrier at different back off: (PAR=10.8db @0.01% probability)

Freq (MHz)	Pout (dBm)	CCDF (dB)	ACPR (dBc)	Gain (dB)	Efficiency (%)
3400	32	9.71	-39.7	16.6	19.8
3500	32	9.34	-39.7	17.0	21.4
3600	32	9.07	-40.7	16.6	22.3
3400	29	10.59	-42.9	16.4	13.6
3500	29	10.42	-44.3	16.9	14.6
3600	29	10.17	-47.0	16.5	15.1
3400	27	10.84	-45.3	16.3	10.5
3500	27	10.65	-46.3	16.8	11.0
3600	27	10.41	-49.6	16.4	11.4

## 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

- Broadcast and Industrial, Scientific and Medical applications in the frequency range from HF to 3.8GHz
- All 4G/5G cellular application below 3.8GHz

**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	$T_c$	+150	°C
Operating Junction Temperature	$T_j$	+225	°C

**Table 2. Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case $T_c=85^\circ\text{C}, T_j=200^\circ\text{C}, \text{DC test}$	$R_{\theta JC}$	1.8	°C/W

**Table 3. ESD Protection Characteristics**

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

**Table 4. Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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**DC Characteristics**

Drain-Source Voltage $V_{GS}=0, I_{DS}=100\mu\text{A}$	$V_{(BR)DSS}$		65		V
Zero Gate Voltage Drain Leakage Current $(V_{DS} = 28\text{V}, V_{GS} = 0\text{V})$	$I_{DSS}$	—	—	1	$\mu\text{A}$
Gate--Source Leakage Current $(V_{GS} = 11\text{V}, V_{DS} = 0\text{V})$	$I_{GSS}$	—	—	1	$\mu\text{A}$
Gate Threshold Voltage $(V_{DS} = 28\text{V}, I_D = 600\mu\text{A})$	$V_{GS(th)}$	—	2	—	V
Gate Quiescent Voltage $(V_{DD} = 28\text{V}, I_D = 70\text{mA}, \text{Measured in Functional Test})$	$V_{GS(Q)}$	—	2.7	—	V

**Load Mismatch (In Innogrations Test Fixture, 50 ohm system):**  $V_{DD} = 28\text{Vdc}, I_{DQ} = 100\text{mA}, f = 3600\text{MHz}$

VSWR 10:1 at 12W pulse CW Output Power	No Device Degradation
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**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  
3400-3600MHz RO4350B 20mils**

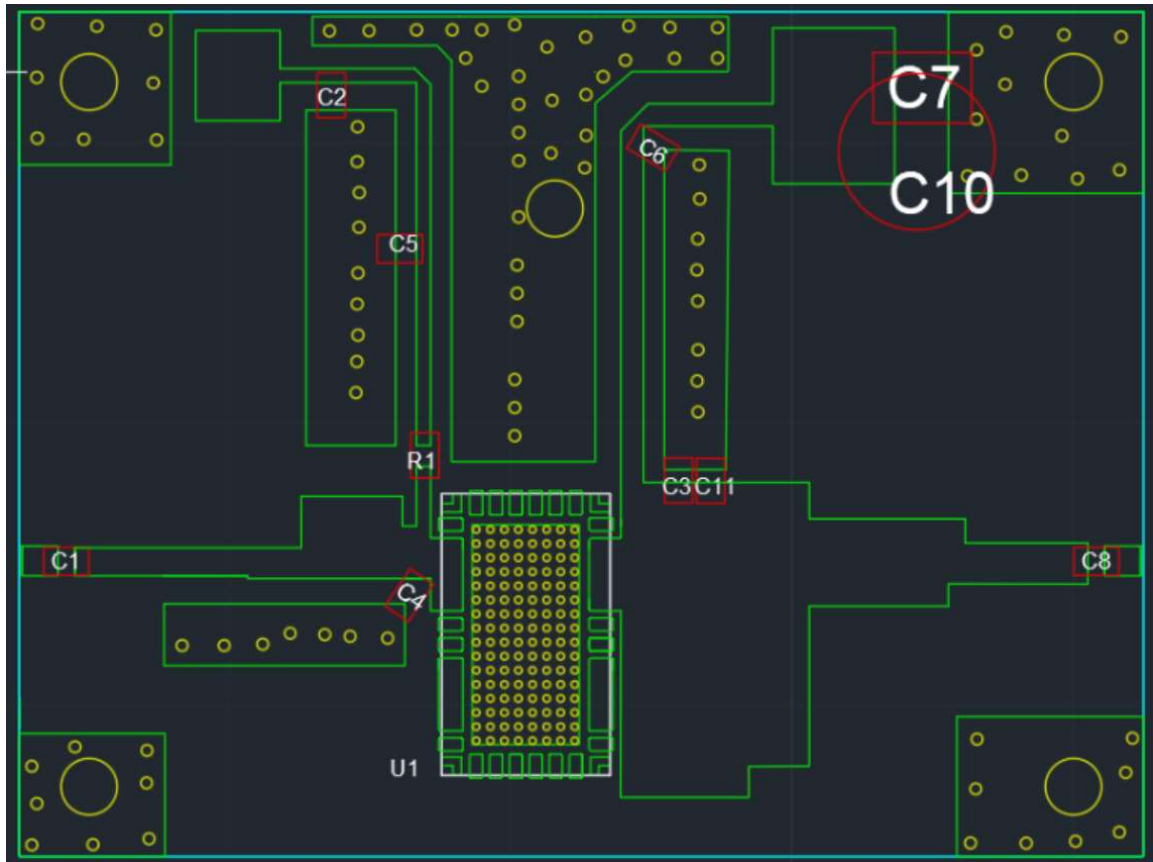


Figure 2. Test Circuit Component Layout

Table 5. Test Circuit Component Designations and Values

BOM		
C2,C7	10uF/63V	1210
C1,C8,C5,C6	8.2pF	0603
R1	10 ohm	0603
C4	0.5pF	0805
C3, C11	0.2pF	0603
C10	470uF	

## TYPICAL CHARACTERISTICS

Figure 3. Power Gain and Drain Efficiency as function of Power Out

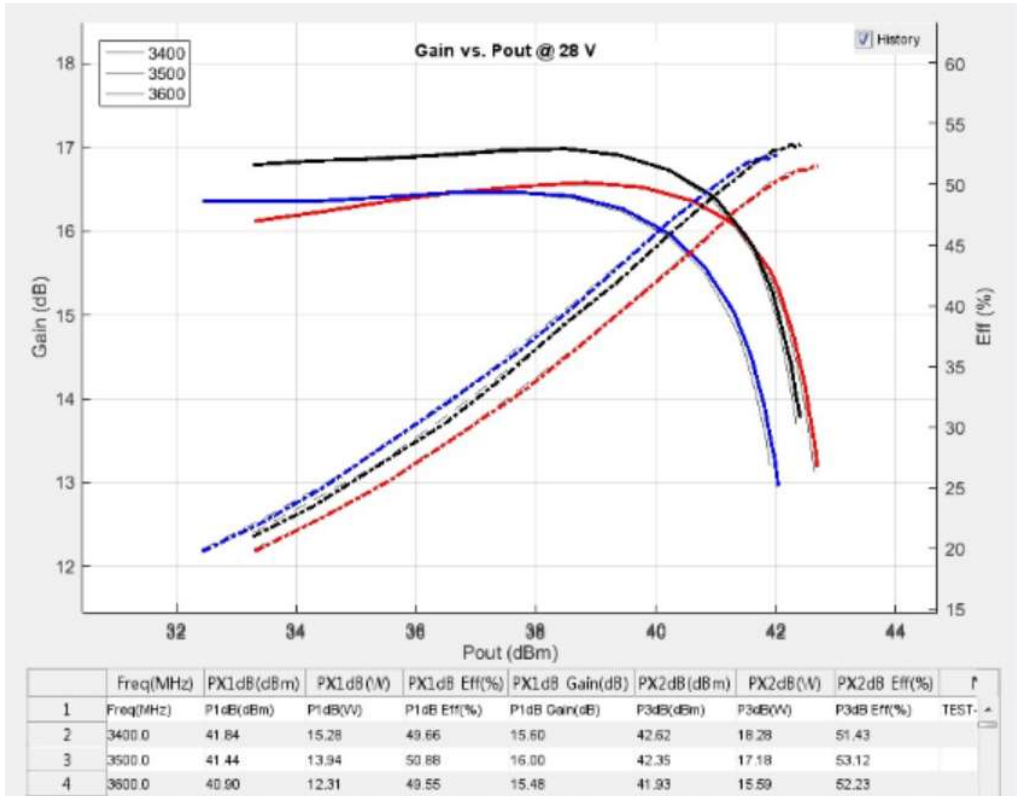
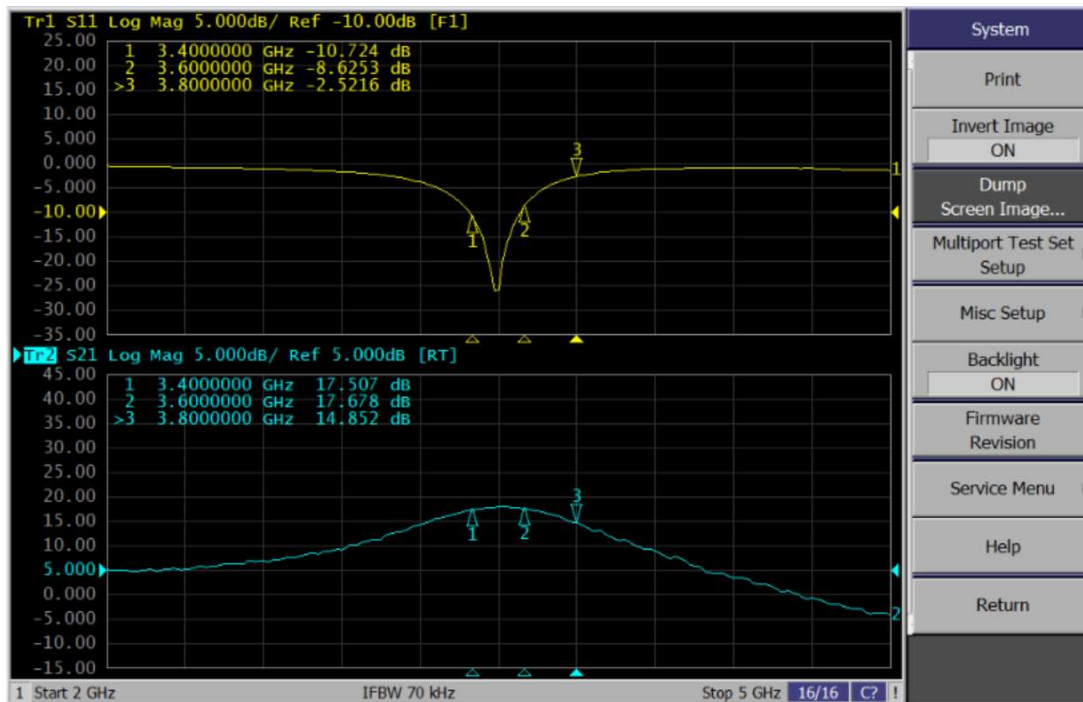


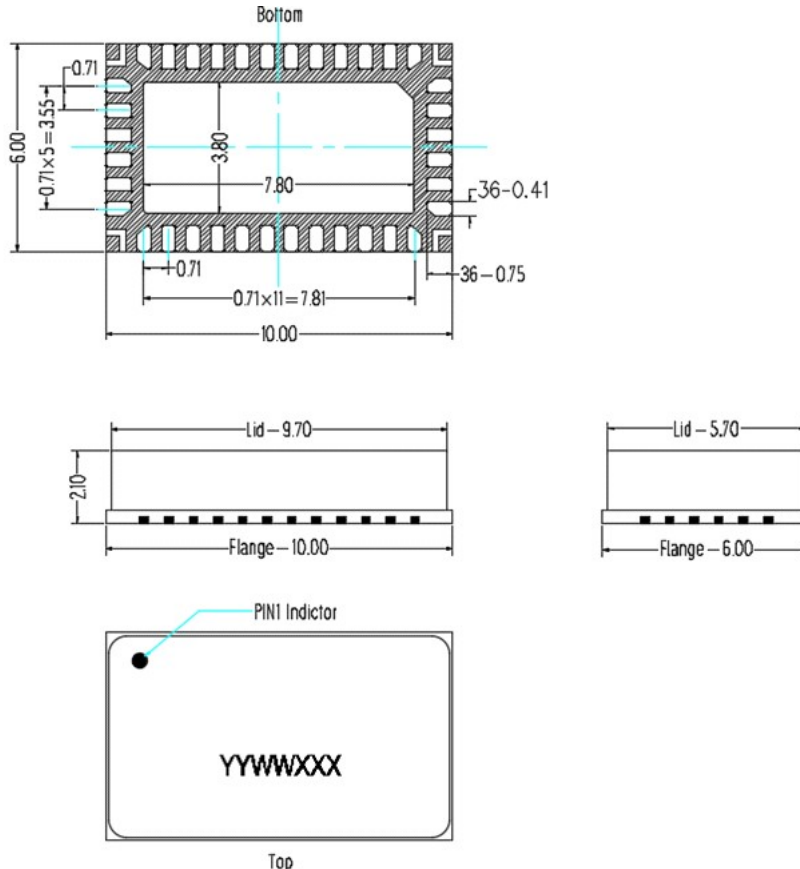
Figure 4. Network analyzer output S11/S21





## Package Dimensions

### 10\*6 Plastic Package



#### Notes:

1. All dimensions are in mm;
2. The tolerances unless specified are  $\pm 0.2$ mm.

## Revision history

Table 7. Document revision history

Date	Revision	Datasheet Status
2022/2/19	Rev 1.0	Preliminary Datasheet
2022/12/9	Rev 1.1	Update on pin definition

### Application data based on ZXY-22-06

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