



4W,28V Plastic RF LDMOS Transistor

ITEH40004P3



Description

The ITEH40004P3 is a 4-watt, highly rugged, LDMOS transistor, designed for any general applications at frequencies up to 4GHz, in 6*5mm DFN plastic package, supporting surface mounted on PCB through high density grounding vias.

- Typical 3.3-3.6GHz CW Class AB RF Performance (On Innegration fixture with device soldered).

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff (%)	P1dB Gain (dB)	P3dB (dBm)	P3dB (W)	P3dB Eff (%)
3300	37.06	5.08	42.66	13.26	37.89	6.15	45.15
3450	37.20	5.25	46.49	14.11	37.90	6.16	47.53
3600	36.63	4.60	39.97	13.51	37.57	5.72	42.86

- Typical 2.4-2.5GHz CW Class AB RF Performance (On Innegration fixture with device soldered).

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff (%)	P1dB Gain (dB)	P3dB (dBm)	P3dB (W)	P3dB Eff (%)
2400	37.44	5.5	60.2	17.56	38.08	6.4	61.7
2450	36.98	5.0	60.7	17.8	37.77	6.0	62.3
2500	36.48	4.5	59.4	17.07	37.45	5.6	60.9

- Typical 1.75-1.85GHz CW Class AB RF Performance (On Innegration fixture with device soldered).

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff (%)	P1dB Gain (dB)	P3dB (dBm)	P3dB (W)	P3dB Eff (%)
1750	37.13	5.2	57.4	20.08	37.88	6.1	58.9
1800	36.77	4.8	57.9	20.12	37.7	5.9	59.8
1850	36.89	4.9	58.9	18.96	37.72	5.9	60.5

- Typical 1.33-1.47GHz CW Class AB RF Performance (On Innegration fixture with device soldered).

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff (%)	P1dB Gain (dB)	P3dB (dBm)	P3dB (W)	P3dB Eff (%)
1330	37.52	5.7	57.2	20	38.35	6.9	59.8
1400	37.48	5.6	58.9	19.94	38.43	7.0	62.0
1470	37.37	5.5	58.6	19.15	38.38	6.9	62.2

- Typical 2.18-2.37GHz CW Class AB RF Performance (On Innegration fixture with device soldered).

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff (%)	P1dB Gain (dB)	P3dB (dBm)	P3dB (W)	P3dB Eff (%)
2180	37.41	5.5	53.9	17.73	38.26	6.7	57.1
2370	36.89	4.9	53.7	17.19	37.94	6.2	56.6

- Typical 700-960MHz CW Class AB RF Performance (On Innegration fixture with device soldered).

Freq (MHz)	P1dB (dBm)	P1dB (W)	P1dB Eff (%)	P1dB Gain (dB)	P3dB (dBm)	P3dB (W)	P3dB Eff (%)
700	37.96	6.26	57.43	19.04	38.61	7.26	60.28
850	37.91	6.17	62.00	20.04	38.70	7.42	65.55
960	37.75	5.96	56.38	18.64	38.71	7.43	61.13



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 GHz
- All 4G/5G cellular application below 3.8GHz

Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain--Source Voltage	V_{DS}	+65	Vdc
Gate--Source Voltage	V_{GS}	-10 to +10	Vdc
Operating Voltage	V_{DD}	+28	Vdc
Storage Temperature Range	T_{stg}	-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 $T_c = 85^\circ\text{C}$, $P_{out} = 4\text{W}$ 3.4GHz	$R_{\theta JC}$	5	°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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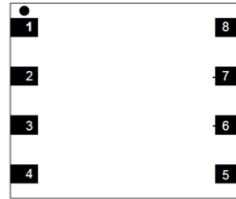
DC Characteristics

Drain-Source Voltage $V_{GS} = 0$, $I_{DS} = 100\mu\text{A}$	$V_{(BR)DS}$		65		V
Zero Gate Voltage Drain Leakage Current ($V_{DS} = 28\text{V}$, $V_{GS} = 0\text{V}$)	I_{DSS}	—	—	1	μA
Gate--Source Leakage Current ($V_{GS} = 11\text{V}$, $V_{DS} = 0\text{V}$)	I_{GSS}	—	—	1	μA
Gate Threshold Voltage ($V_{DS} = 28\text{V}$, $I_D = 600\mu\text{A}$)	$V_{GS(th)}$	—	2	—	V
Gate Quiescent Voltage ($V_{DD} = 28\text{V}$, $I_D = 40\text{mA}$, Measured in Functional Test)	$V_{GS(Q)}$	—	2.7	—	V

Load Mismatch (In Innegration Test Fixture, 50 ohm system): $V_{DD} = 28\text{Vdc}$, $I_{DQ} = 40\text{mA}$, $f = 1800\text{MHz}$

VSWR 10:1 at 4W pulse CW Output Power	No Device Degradation
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Pin Configuration and Description(Top view)



Pin No.	Symbol	Description
1,2,3,4	RF IN/VGS	Gate Bias/RF Input
5,6, 7,8	RF OUT /VDS	RF Output, Drain Bias
Backside metal	GND	DC/RF Ground. Must be soldered to EVB ground plane over array of vias for thermal and RF performance. Solder voids under Pkg Base will result in excessive junction temperatures causing permanent damage.

2400-2500MHz

Reference Circuit of Test Fixture Assembly Diagram

RO4350B 20mils

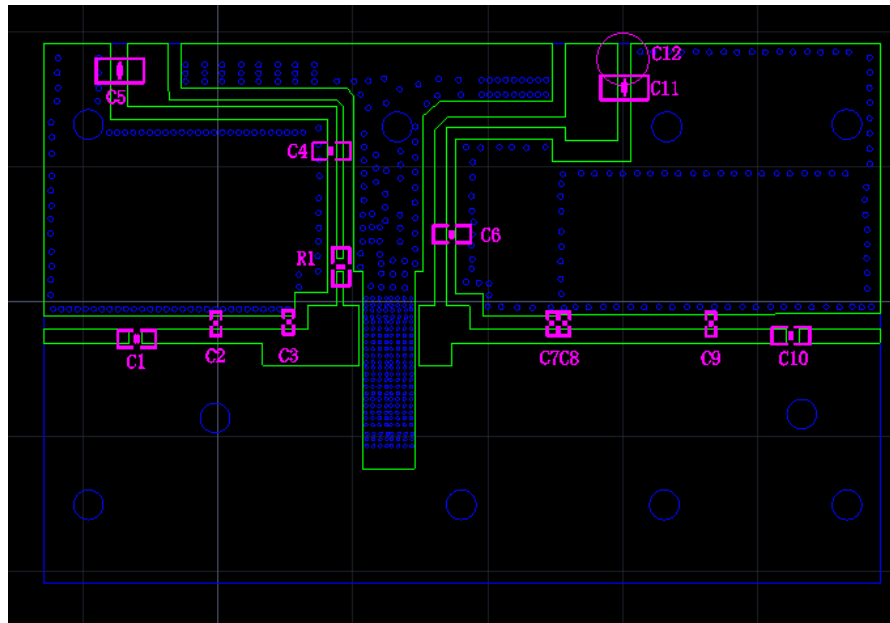


Figure 2. Test Circuit Component Layout

Table 4. Test Circuit Component Designations and Values

Component	Value	Footprint	Quantity
C5,C11	10uF/63V	1210	2
R1	10 ohm	0603	1
C1,C4,C6,C10	12pF	0603	4
C2,C7	0.5pF	0603	2
C3	3pF	0603	1
C8	1.6 pF	0603	1
C9	0.2pF	0603	1
C12	470uF		1
U1	ITEH40004P3	P3	1

TYPICAL CHARACTERISTICS

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

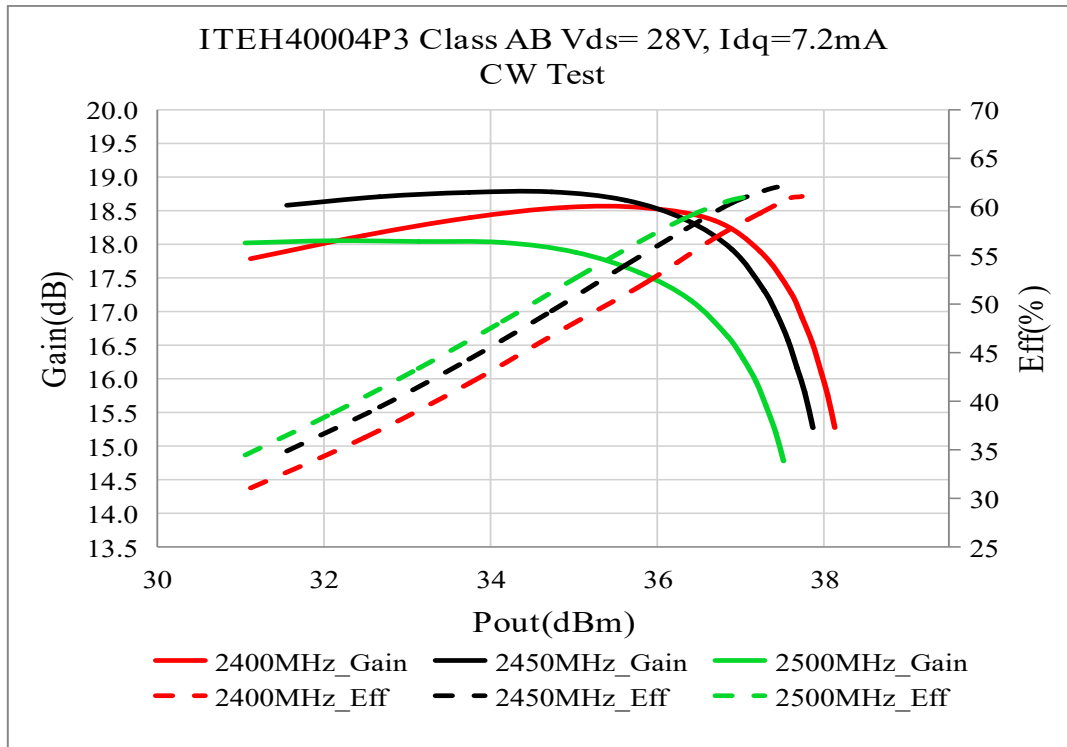
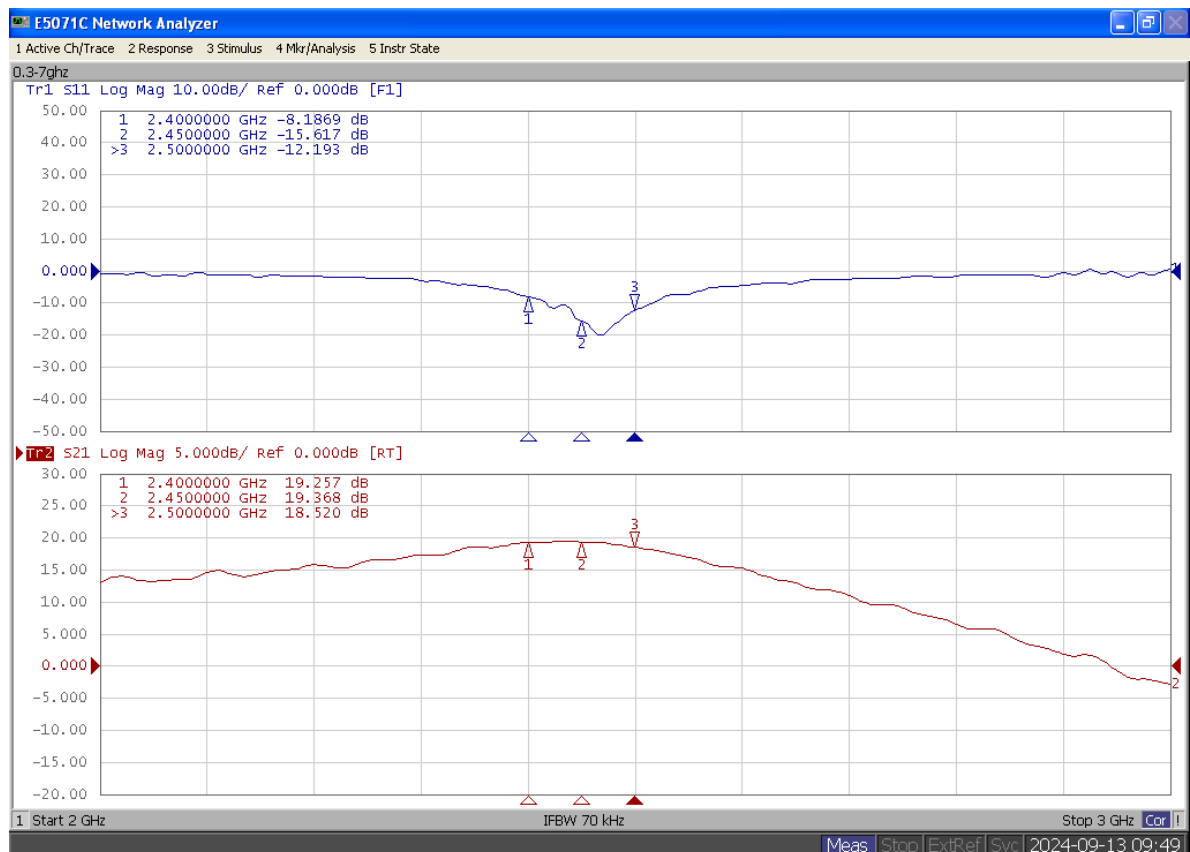


Figure 4. Network analyzer output S11/S21



1750-1850MHz
Reference Circuit of Test Fixture Assembly Diagram
RO4350B 20mils

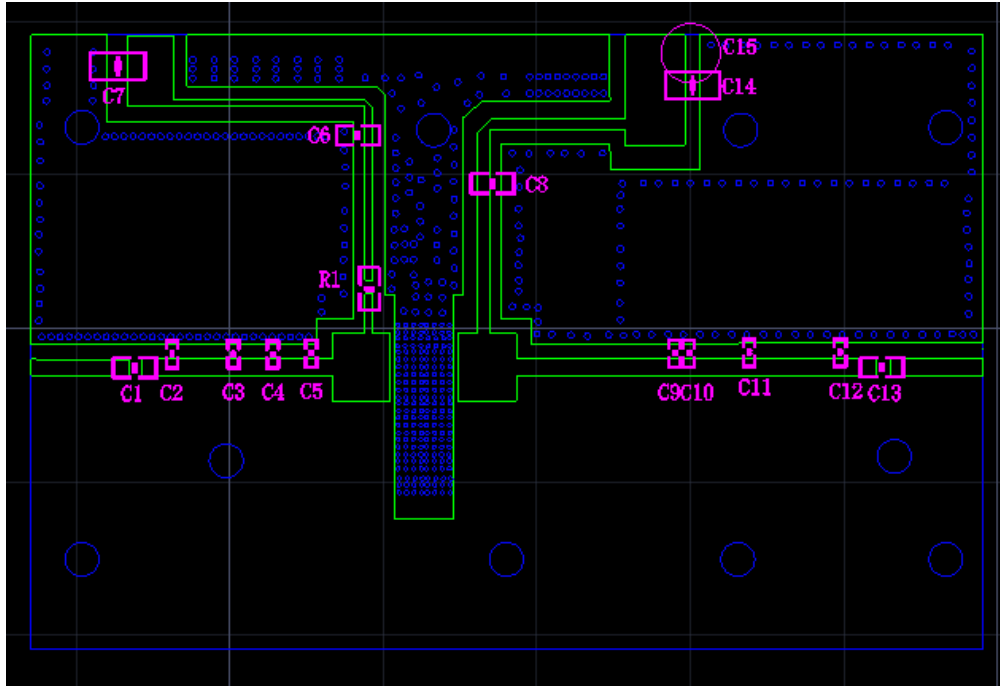


Figure 5. Test Circuit Component Layout

Table 5. Test Circuit Component Designations and Values

Component	Value	Footprint	Quantity
C7,C14	10uF/63V	1210	2
R1	10 ohm	0603	1
C1,C6,C8,C13	20pF	0603	4
C2	2pF	0603	1
C3,C12	0.3pF	0603	2
C4,C5	3.3 pF	0603	2
C9	0.5pF	0603	1
C10	1.1pF	0603	1
C11	0.4pF	0603	1
C15	470uF		1
U1	ITEH40004P3	P3	1

TYPICAL CHARACTERISTICS

Figure 6. Power Gain and Drain Efficiency as function of Power Out

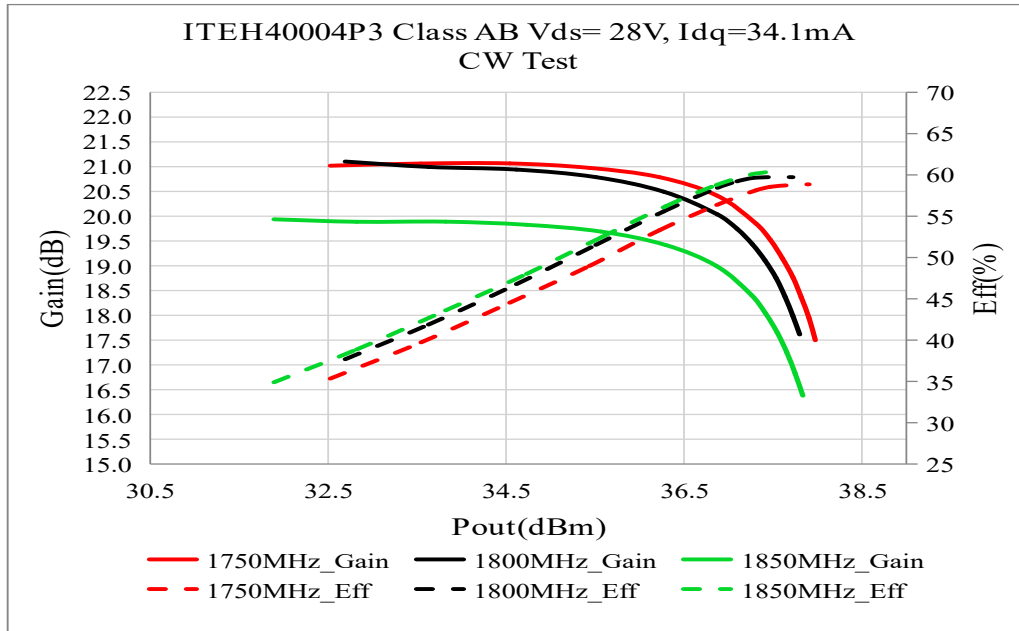


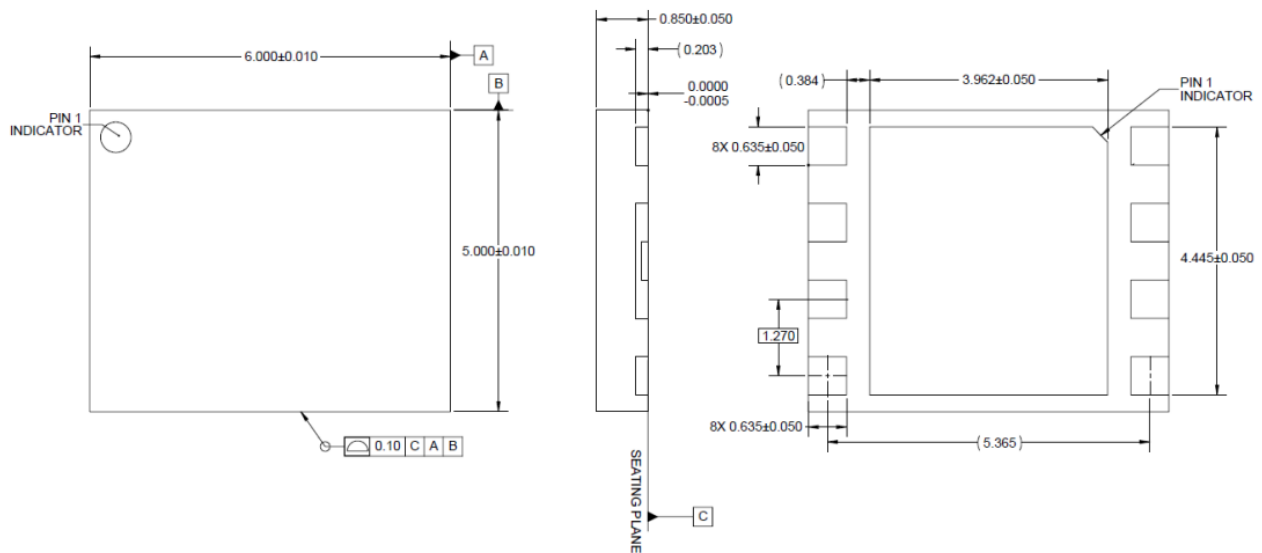
Figure 7. Network analyzer output S11/S21





Package

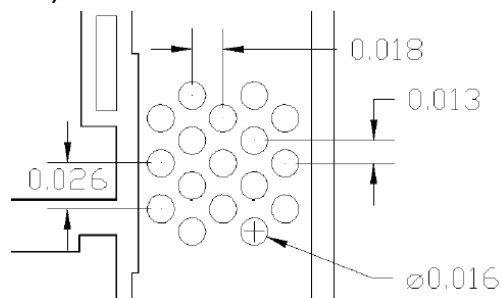
6*5 DFN Package



Notes:

1. All dimensions are in mm. Otherwise noted, the tolerance is ± 0.1 mm.
2. Package leads are gold plated.
3. Part is mold encapsulated.

Recommended vias layout: (all in inches)





Revision history

Table 7. Document revision history

Date	Revision	Datasheet Status
2024/9/13	Rev 1.0	Preliminary Datasheet
2025/6/9	Rev 1.1	Add more application results
2025/6/27	Rev 1.2	Add 3.3-3.6G,700-960M data on 1 st page

Application data based on LBG-24-37/25-23 HZH-25-01/05

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