



40W,28V Plastic RF LDMOS Transistor

ITEH22040C6

Description

The ITEH22040C6 is a 40-watt, highly rugged, LDMOS transistor, designed for any general applications at frequencies 0.7 to 2.2GHz, in 10*6mm QFN plastic package, supporting surface mounted on PCB through high density grounding vias.

It can be tuned to meet up to 36dBm WCDMA or LTE ACLR without DPD needed purely by back off operation.

- Typical 1.8GHz Class AB RF Performance (On Innegration fixture with device soldered).

VDS=28V, IDQ=335mA

Freq (MHz)	Pout (dBm)	CCDF (dB)	ACPR (dBc)	Gain (dB)	Efficiency (%)
1805	35	10.37	-47.3	19.16	14.6
1840	35	10.26	-47.2	19.45	15.8
1880	35	10.03	-46.0	19.58	16.9

- Typical 2.1GHz Class AB RF Performance (On Innegration fixture with device soldered).

VDS=28V, IDQ=280mA

Freq (MHz)	Pout (dBm)	CCDF (dB)	ACPR (dBc)	Gain (dB)	Efficiency (%)
2110	36	10.2	-49.33	17.03	16.44
2140	36	10.1	-50.47	16.85	17.79
2170	36	10.0	-49.15	16.82	19.19

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

- L, S band power amplifier
- All 4G/5G cellular application within 0.7 to 2.2GHz

Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain--Source Voltage	V _{DSS}	+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
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Thermal Resistance, Junction to Case $T_C = 85^\circ\text{C}$, $T_J = 200^\circ\text{C}$, DC test	$R_{\theta JC}$	0.5	$^\circ\text{C/W}$
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Table 3. ESD Protection Characteristics

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

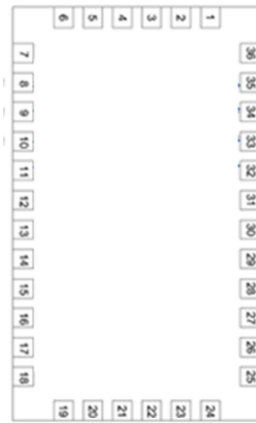
Table 4. Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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	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 ($V_{DD} = 28\text{V}$, $I_D = 350\text{mA}$, Measured in Functional Test)	$V_{GS(Q)}$	—	2.7	—	V

Load Mismatch (In Innegration Test Fixture, 50 ohm system): $V_{DD} = 28\text{Vdc}$, $I_{DQ} = 350\text{mA}$, $f = 2200\text{MHz}$

VSWR 10:1 at 20W pulse CW Output Power	No Device Degradation
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Figure 1: Pin Definition (Top View)



Pin No.	Symbol	Description
8,9,10,11,14,15,16,17	Vgs/RF In	Vgs and RF input
26,27,28,29,32,33,34,35	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.

1.8GHz application board

Reference Circuit of Test Fixture Assembly Diagram 20mils RO4350B

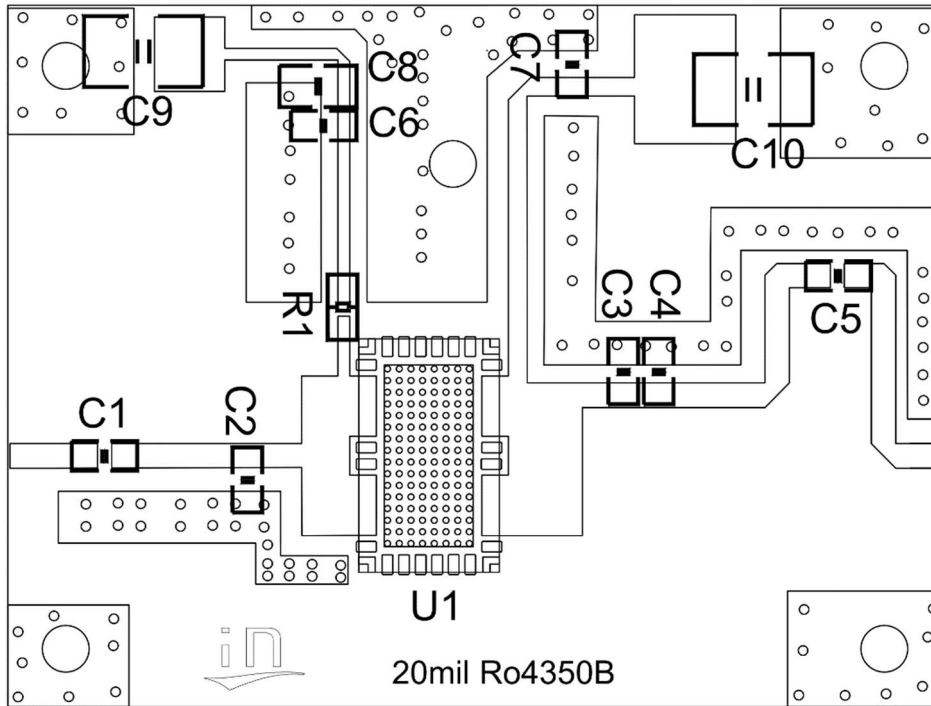


Figure 2. Test Circuit Component Layout

Table 5. Test Circuit Component Designations and Values

Reference	Footprint	Value	Quantity
C1	0603	3.3pF/250V	1
C2	0603	5.1pF/250V	1
C3	0603	4.3pF/250V	1
C4	0603	1.8pF/250V	1
C5, C6, C7	0603	20pF/250V	3
C8	0805	10uF/16V	1
C9, C10	1210	10uF/100V	2
R1	0603	10ohm	1
U1	C6	ITEH22040C6	1

TYPICAL CHARACTERISTICS

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

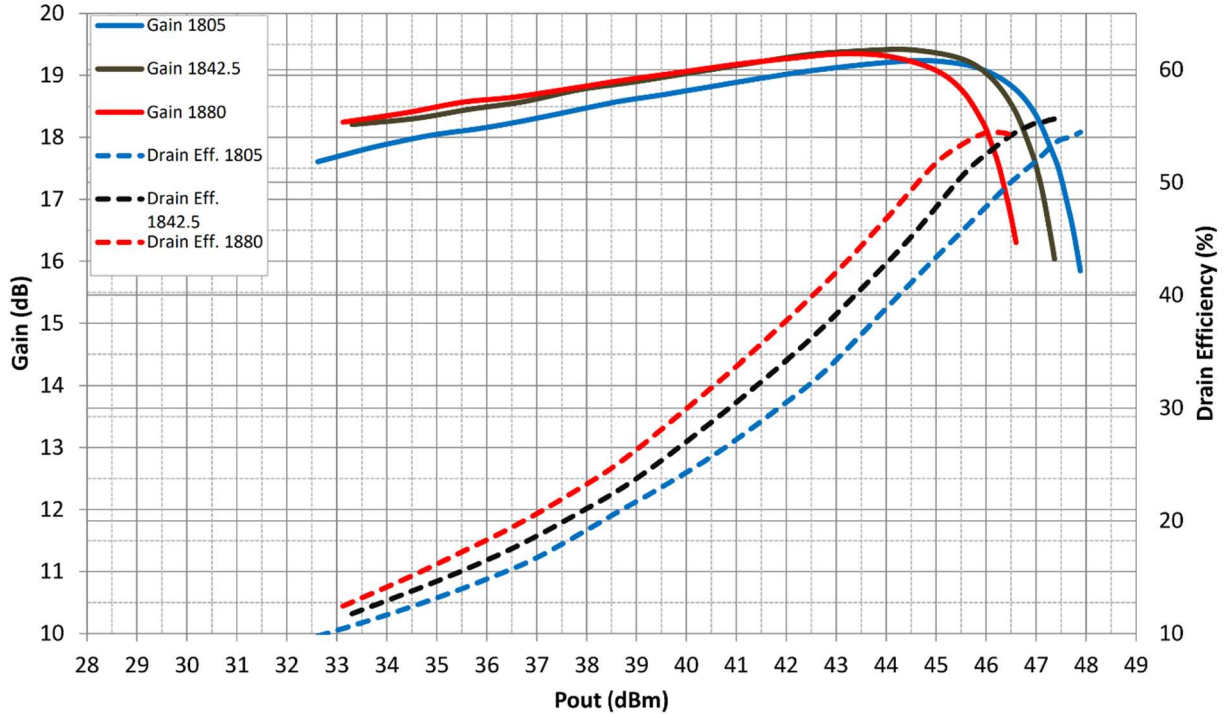
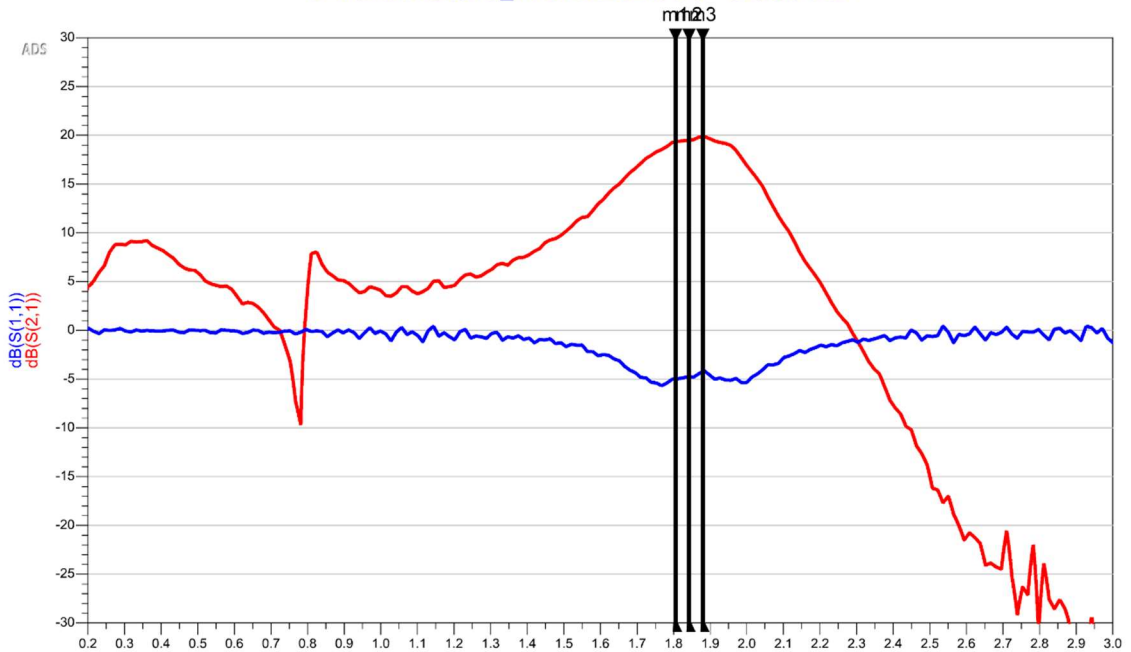


Figure 4. Network analyzer output S11/S21

m1 freq=1.805 GHz dB(S(2,1))=19.340 dB(S(1,1))=-4.987	m2 freq=1.842 GHz dB(S(2,1))=19.465 dB(S(1,1))=-4.749	m3 freq=1.880 GHz dB(S(2,1))=19.853 dB(S(1,1))=-4.212
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S-Parameters_ITEH22040C6 Class AB



2.1GHz application board

Reference Circuit of Test Fixture Assembly Diagram 20mils RO4350B

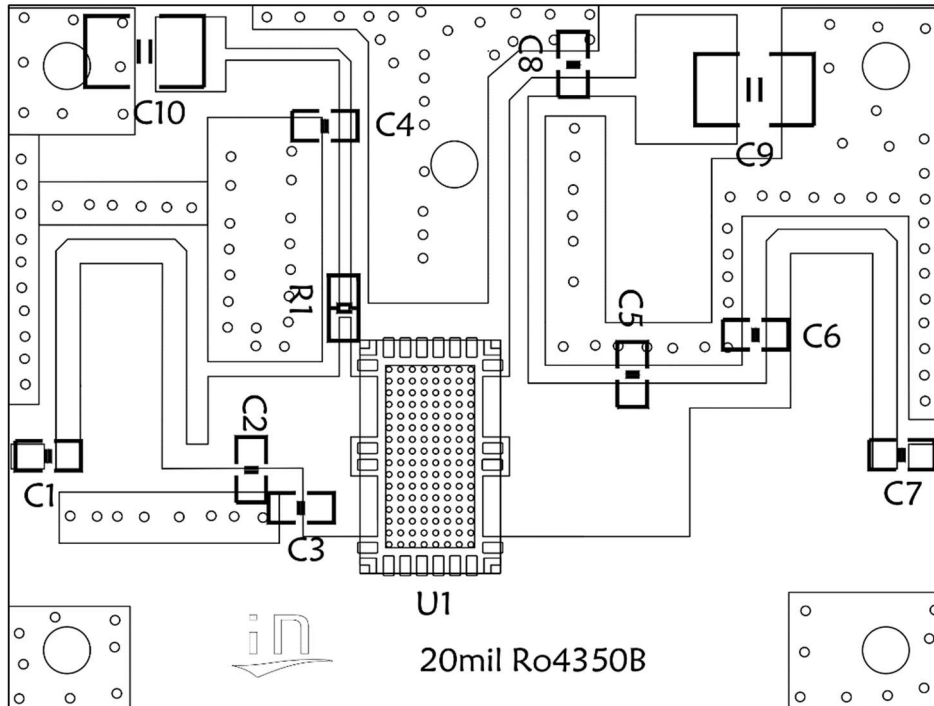


Figure 2. Test Circuit Component Layout

Table 5. Test Circuit Component Designations and Values

Reference	Footprint	Value	Quantity
C1, C4, C7, C8	0603	20pF/250V	4
C2	0603	3.0pF/250V	1
C3	0603	3.6pF/250V	1
C5	0603	4.7pF/250V	1
C6	0603	1.2pF/250V	1
C9, C10	1210	10uF/100V	2
R1	0603	10ohm	1
U1	C6	ITEH22040C6	1



TYPICAL CHARACTERISTICS

Figure 5. Power Gain and Drain Efficiency as function of Power Output

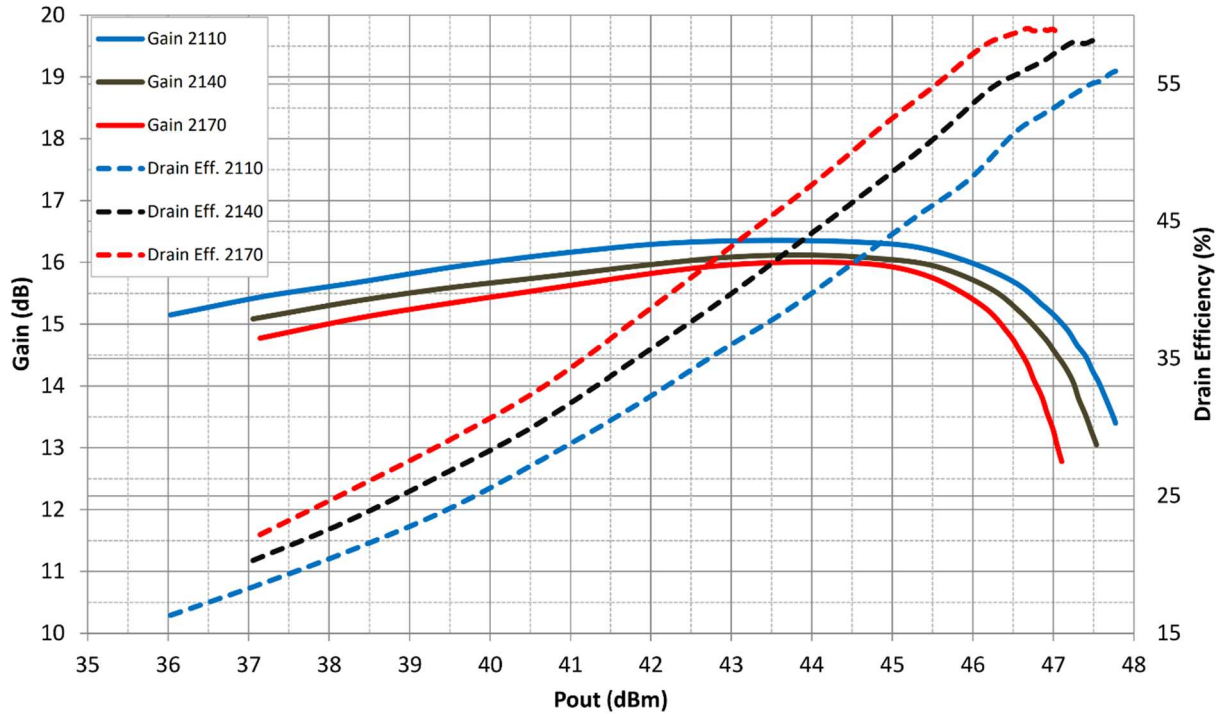
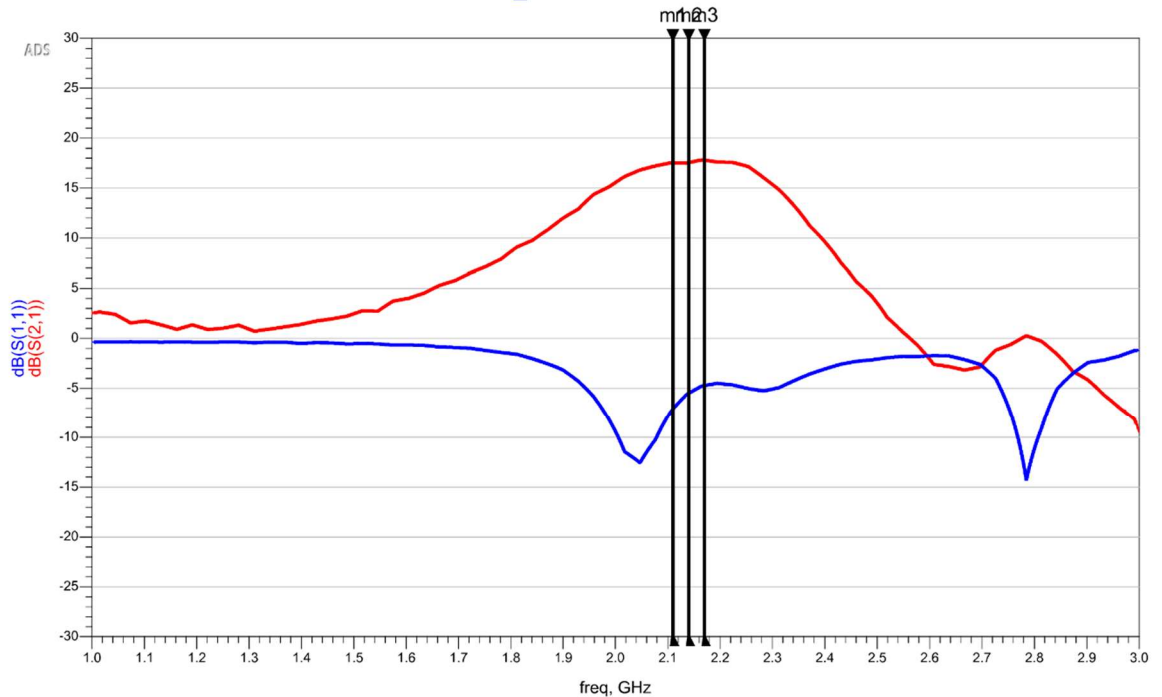


Figure 6. Network analyzer output S11/S21

m1 freq=2.110 GHz dB(S(2,1))=17.521 dB(S(1,1))=-7.101	m2 freq=2.140 GHz dB(S(2,1))=17.541 dB(S(1,1))=-5.521	m3 freq=2.170 GHz dB(S(2,1))=17.792 dB(S(1,1))=-4.736
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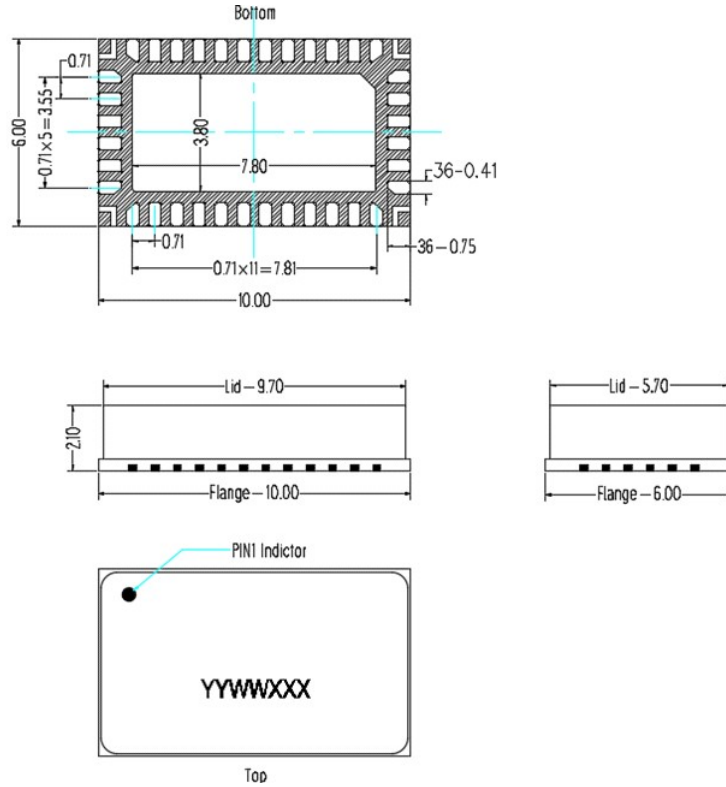
S-Parameters_ITEH22040C6 Class AB





Package Dimensions

10*6 Plastic Package



Notes:

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

Revision history

Table 7. Document revision history

Date	Revision	Datasheet Status
2022/11/11	Rev 1.0	Preliminary Datasheet
2022/12/9	Rev 1.1	Update on Pin Definition
2023/4/3	Rev 1.2	Update on 1.8GHz/2.1GHz application layout
2023/4/28	Rev 1.3	Update 2.1GHz application data up to 36dBm

Application data based on ZXY-22-38&39/ZBB-23-11/12/17

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