UM10565

User Manual for OM7828/BGA6130/Kit

Rev. 1 — 11 September 2012 **User manual**

Document information

Info	Content
Keywords	BGA6130, OM7828, evaluation kit, ISM-434, ISM-915, medium-power amplifier.
Abstract	This user manual describes the BGA6130 customer evaluation kit.

Revision history

Rev	Date	Description
1	2012-09-11	Initial document

Contact information

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1. Introduction

The OM7828/BGA6130/Kit customer evaluation kit enables the user to evaluate the performance of the BGA6130 medium-power amplifier. Please refer to the Data Sheet for information about the BGA6130 performance.

2. Contents of Customer Evaluation Kit

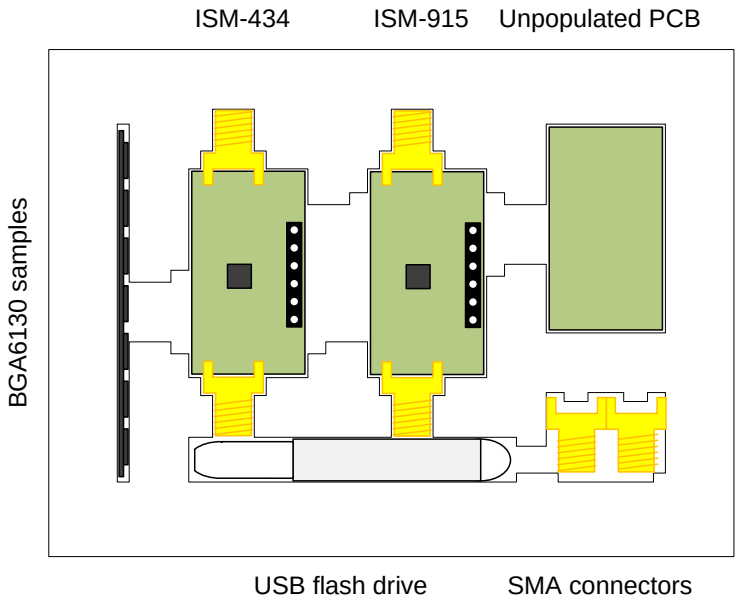

Fig 1. Content of OM7828 customer evaluation kit.

The evaluation kit contains the following items:

- RF board matched for ISM 434 MHz
- RF board matched for ISM 915 MHz
- Unpopulated PCB
- 2 SMA connectors
- BGA6130 samples
- USB flash drive containing:
    - User manual OM7828/BGA6130/Kit,
    - Device models,
    - Gerber files,
    - Data Sheet BGA6130
- ESD safe casing

3. Unpopulated PCB

The kit provides one unpopulated printed-circuit board, two connectors and BGA6130 samples which allows the customer to implement matching and biasing circuitry according to the schematic as depicted in Fig 2 or customer specific applications. In 0 the dimensions of the components are listed that can be placed. In 0 data is provided that is needed for transmission line configuration.

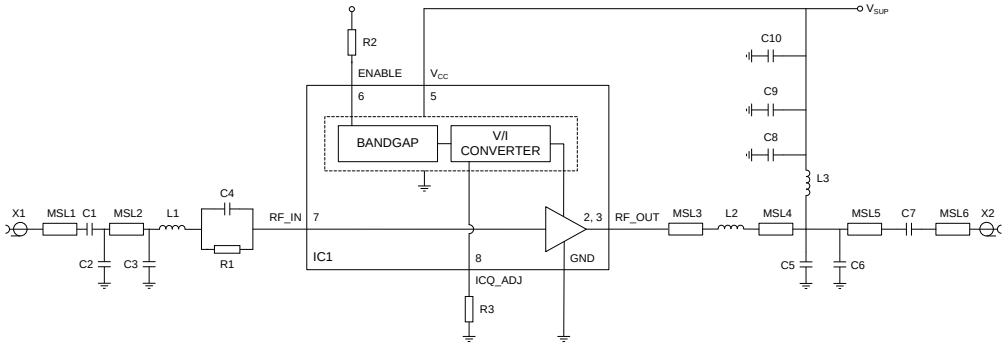

Fig 2. Schematic that can be implemented on the unpopulated printed-circuit board.

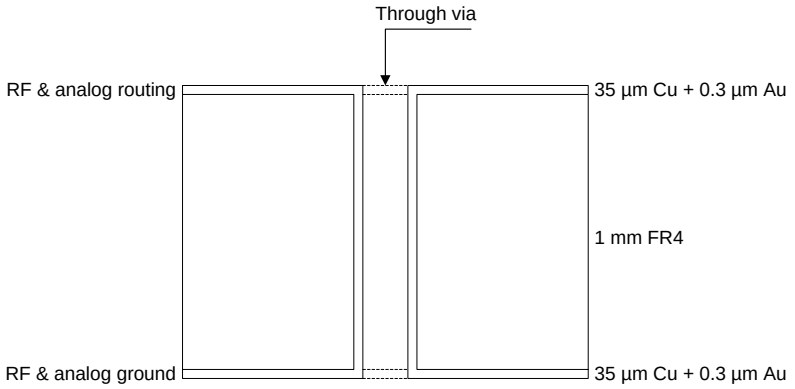

Fig 3. Stack of printed circuit board.

Table 1. Dimensions of surface mounted devices.

Component	Dimensions	Remarks
C1, C3, C5 … C9	0306	Not included.
C2	0204	Not included.
C10	1206	Not included.
R1, R2	0204	Not included.
R3	0603	Not included.

Table 2. Relevant data for transmission line configuration.

Parameter	Value	Description
ε_r	4.6	Dielectric constant FR4 RF layer
h	1.0 mm	RF layer height
t	35 µm	Copper thickness

4. BGA6130 samples

Several BGA6130 qualification samples are included. These samples are qualification grade.

5. USB flash drive

Check website for latest updates, new application notes

6. ISM-434 and ISM-915 RF boards

The performance of the ISM-434 application and the ISM-915 application are described in the BGA6130 datasheet. This section describes how to evaluate the provided boards.

6.1 Interfaces

The interfaces are defined in Fig 4. RF input is located at the top side; RF output at the bottom sited; ground, enable and supply should be provided through the molex connector on the right hand side.

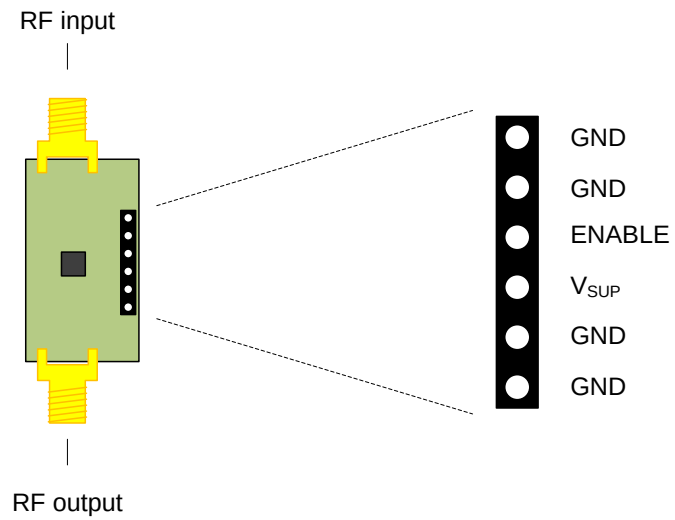

Fig 4. Connecting the evaluation board, top view.

6.2 Powering up

To power the BGA7130 evaluation board connect a GND molex pin to ground, the V_{SUP}

molex pin to 3.6 V and the ENABLE molex pin also to a 3.6 V power supply.

It is good practice to avoid connecting the ENABLE pin to 3.6 V before V_{SUP} is connected to 3.6 V. If the voltage on pin ENABLE is higher than the voltage on pin V_{SUP} it might cause a current to flow through the ESD protection circuitry of the ENABLE pin. On the boards provided a current limiting resistor R2 has been placed, without it the ESD circuitry might be destroyed.

6.3 Powering down

Setting the pin ENABLE to a logic LOW (GND) will disable the device.

6.4 Evaluating the RF boards

6.4.1 S-parameters and output compression point

Both S-parameters and the output compression $P_{L(1dB)}$ point are measured with a network analyzer (NWA) as depicted in Fig 5.

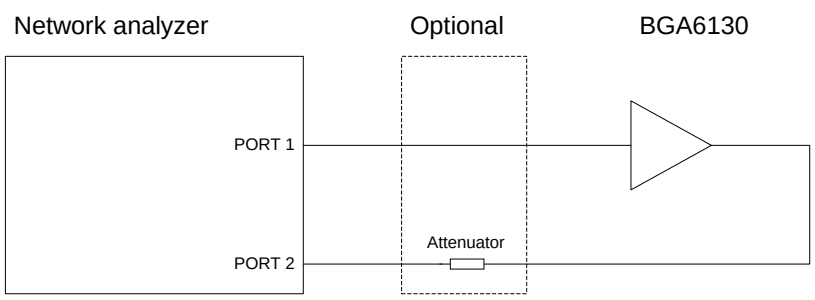

Fig 5. S-parameter and output compression power set-up

The $P_{L(1dB)}$ is measured by sweeping the input power, and observe where the S_{21} of the device has compressed 1 dB compared to the linear gain. For this measurement an input power calibration with a power head has to be performed, in order to accurately measure the input power. The output power of the device is calculated by

$$P_L\ (dBm) = P_{in}\ (dBm) + S_{21}\ (dB).$$

In order to prevent that output signal drives the receiver of the NWA into compression an attenuator can be inserted at the input of the NWA.

In order to maintain small signal conditions for the S-parameter measurements, an input power of –20 dBm is applied.

6.4.2 Output third order intercept point

The output third-order intercept point $IP3_O$ is a figure of merit for linearity (see Fig 6). The set-up (see Fig 7) is configured to achieve an accurate measurement of the $IP3_O$. After the signal generators, a low pass filter (LPF) and isolator is applied, before combining the two signals. This configuration gives best isolation between the generators, hence IMD3

levels of the input signal < -80 dBc can be measured.

Please refer to the Data Sheet for power levels and tone spacing.

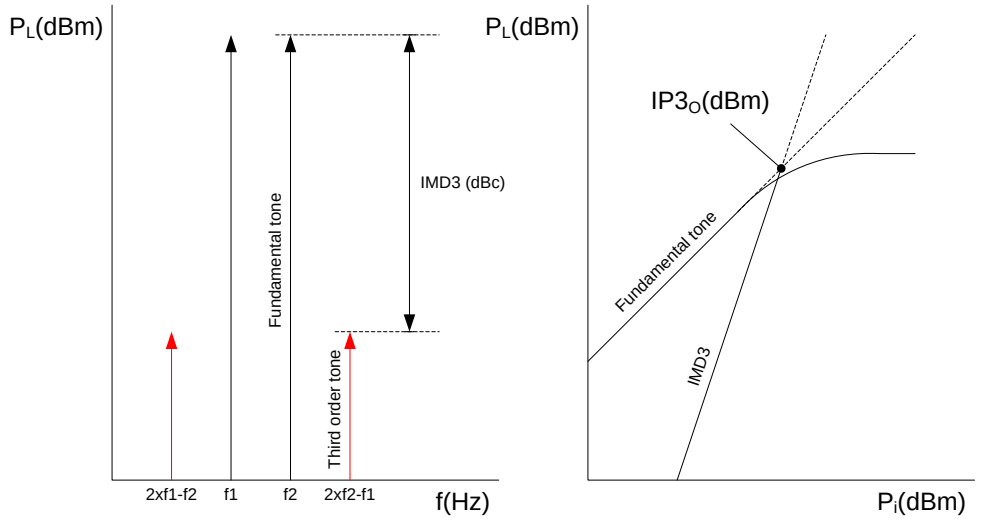

Fig 6. Output third order intercept point definition.

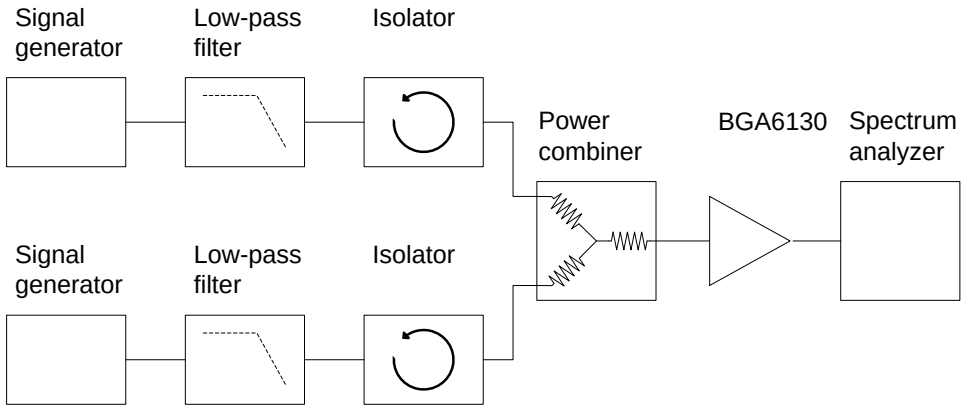

Fig 7. Output third-order intercept point measurement set-up.

6.4.3 Noise

The Noise Figure (NF) is measured with a calibrated noise source with a specified Excess Noise Ratio (ENR), and with a spectrum analyzer with a noise measurement option. The system is calibrated with this noise source, in order to measure accurate noise figures (see Fig 8).

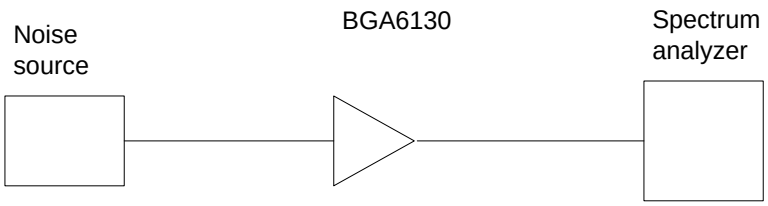

Fig 8. Noise figure measurement set-up.

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8. Contents

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