AR191060

CLL3H0914L(S)-700, 1200 to 1400 MHz

AMPLEON

v1.0 — 24 July 2019

Application Report

Document information	
Status	Company Public
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Abstract	Measurement results of a Class AB design for the 1200 to 1400 MHz band with the CLL3H0914L(S)-700

1. Revision History

Table 1: Report revisions

Revision	Date	Description	Author
1.0	24 July 2019	Initial document	Ali Ilker Isik

2. Contents

3. List of figures

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5. General description

This report presents the measurement results of the Class AB demo AR191060. The device, CLL3H0914L(S)-700, used is a 3rd generation Gallium Nitride(GaN) transistor with >700W output power level in SOT502 ACC package. The presented demo is tuned for the frequency band 1200 to 1400 MHz1200 to 1400 MHz.

The PCB has been designed with Rogers RO4350B, h=0.51mm (20 mils), ε_R = 3.75 and 70µm double sided copper. Supply voltage (drain-source) is 50V. Gate bias voltage is connected to the Vg terminals on the input board. To set the drain quiescent current, slowly decrease V_{GS} until the I_{DQ} becomes 800mA.

6. Measurement Conditions

The efficiencies presented are based on the currents of the drain feeds only.
I.e. the biasing currents for the gate circuitry has not been included.

A Pulsed - CW test signal is used with a Pulse width = 100µs and Duty cycle = 10%

The biasing is as follows:

V_{DD} = 50V

I_D = 800 mA (Typical V_{GS} = -2.8V)

Table 2: Bias Procedure

Bias Turn-On Procedure	Bias Turn-Off Procedure
1. Set V_{GS} to -5 V.	1. Turn-off RF signal.
2. Apply +50 V to V_D.	2. Turn-off V_D.
3. Slowly adjust V_{GS} until I_D is set to 800 mA	3. Wait for drain capacitance discharging.
4. Turn-on RF signal.	4. Turn-off V_{GS}.

7. Performance Details – Pulsed CW

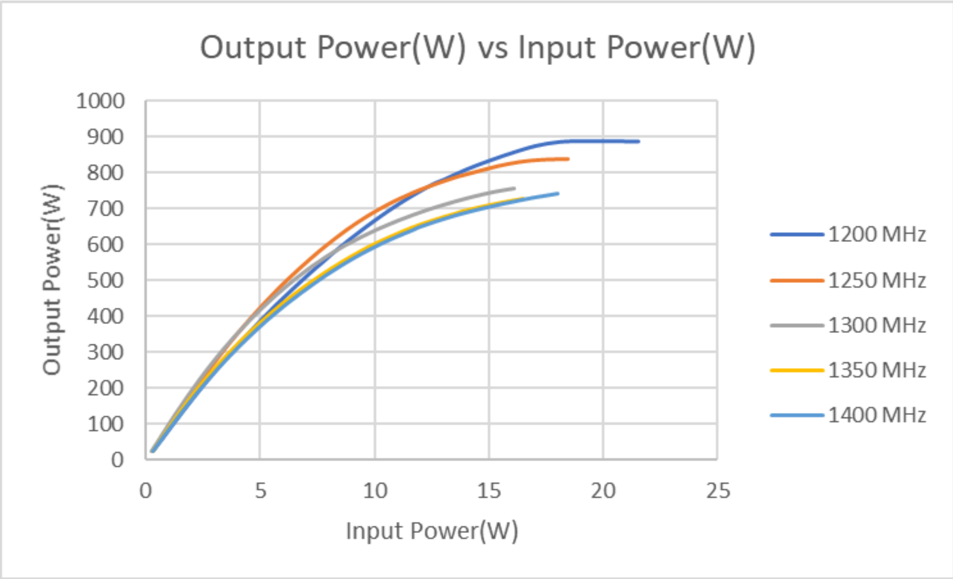

Figure 1 Output Power vs Input Power under pulsed conditions

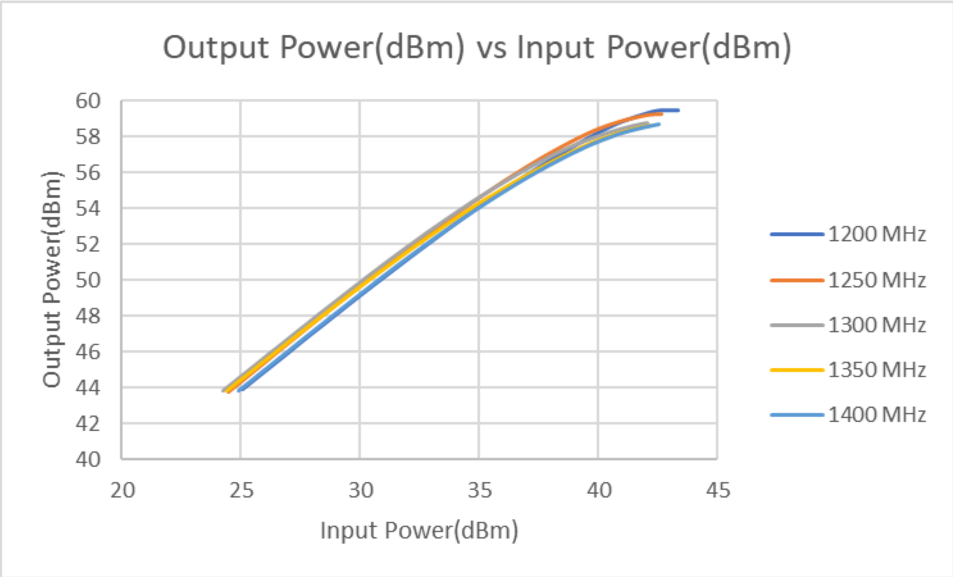

Figure 2 Output Power vs Input Power under pulsed conditions

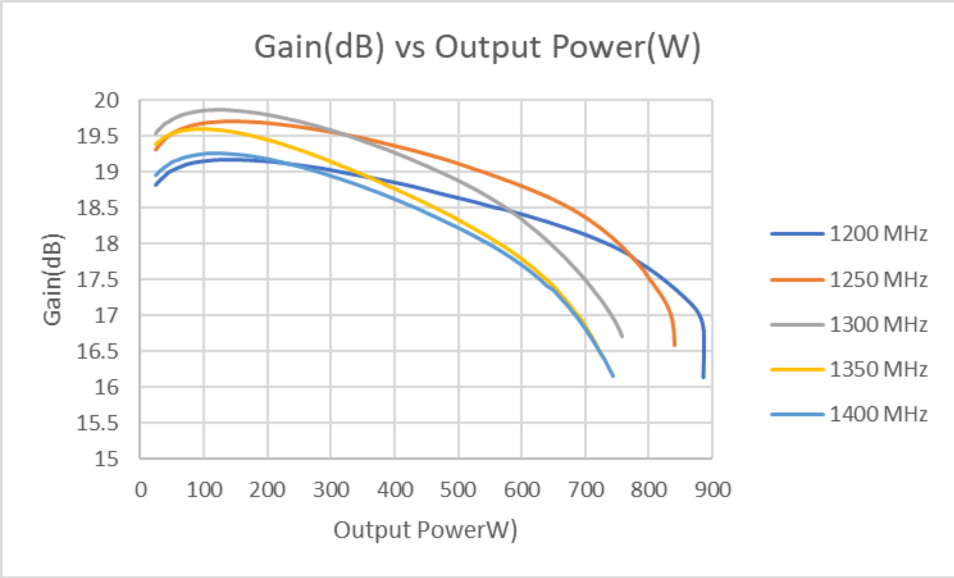

Figure 3 Gain vs Output Power under pulsed conditions

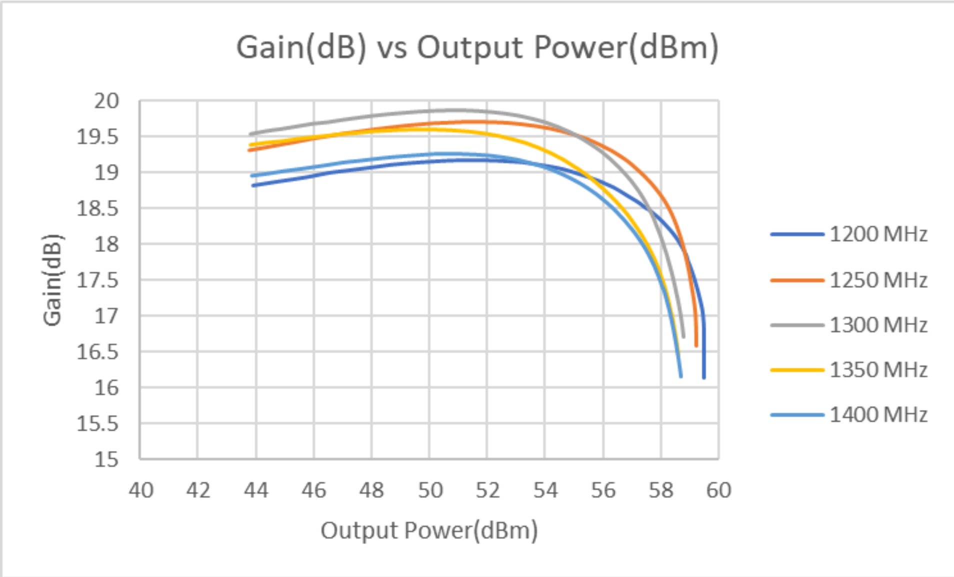

Figure 4 Gain vs Output Power under pulsed conditions

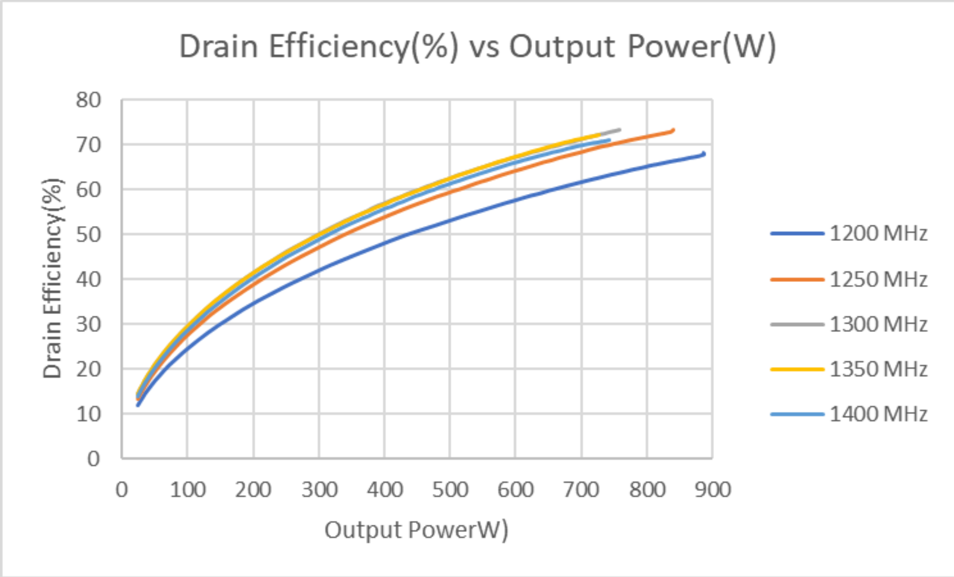

Figure 5 Drain Efficiency vs Output Power under pulsed conditions

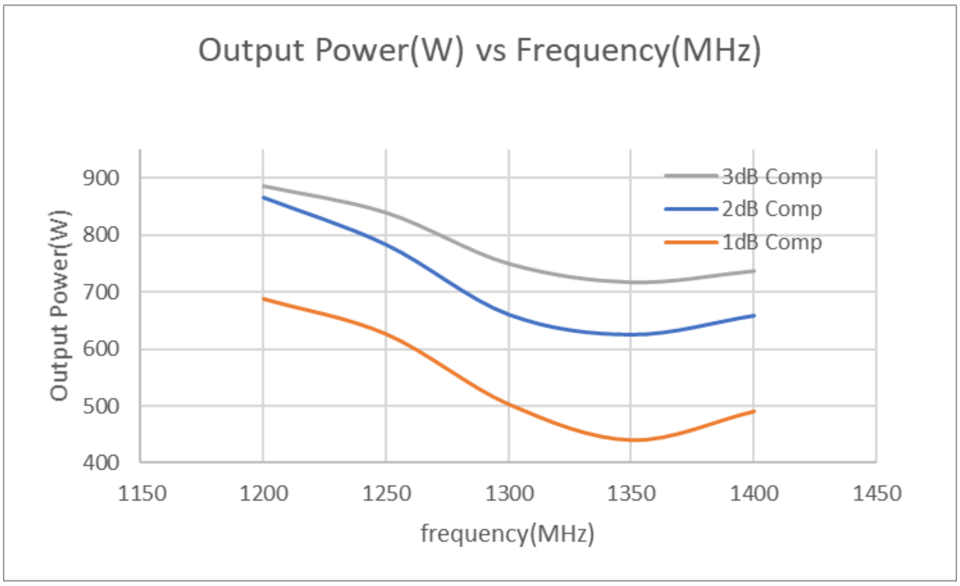

Figure 6 Output Power vs frequency under pulsed conditions

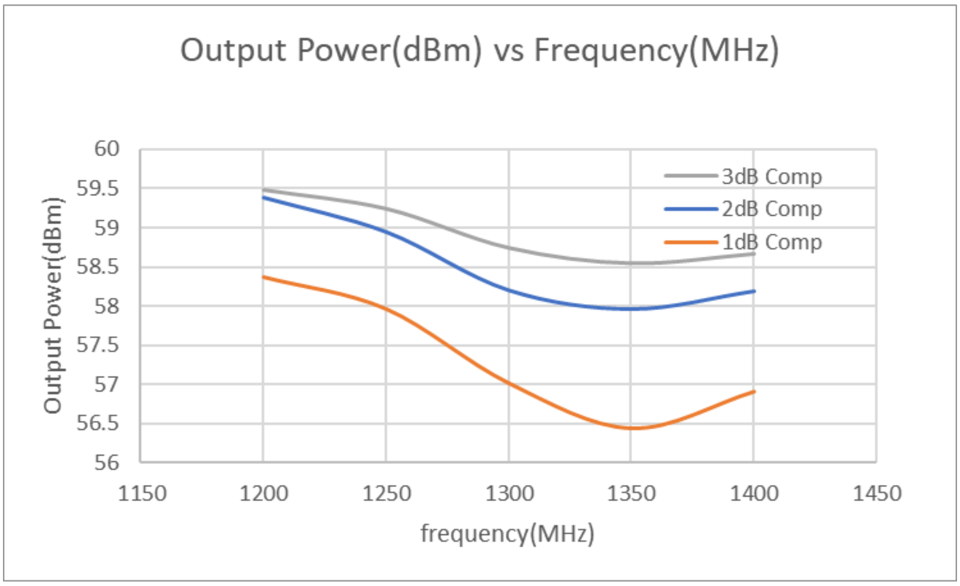

Figure 7 Output Power vs frequency under pulsed conditions

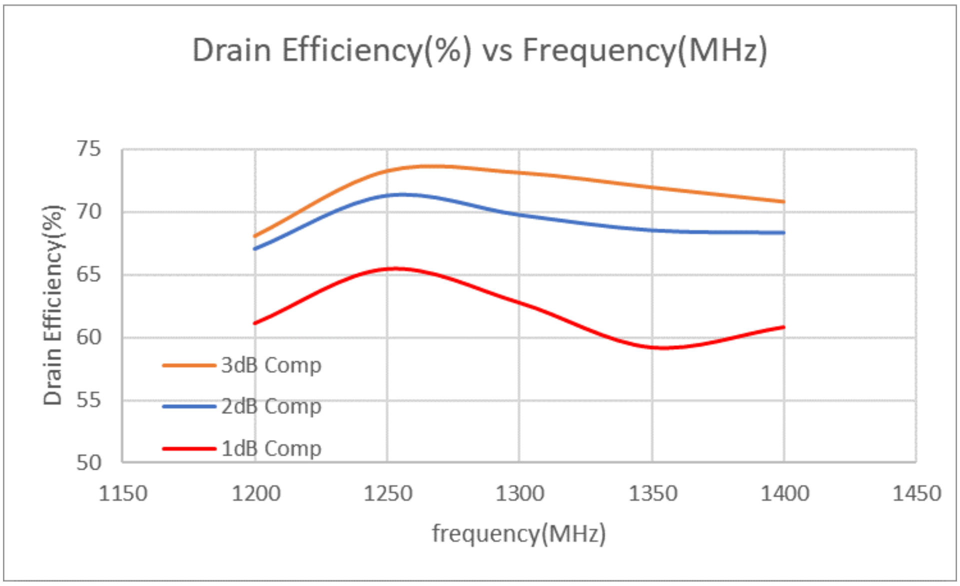

Figure 8 Drain Efficiency as a function of frequency

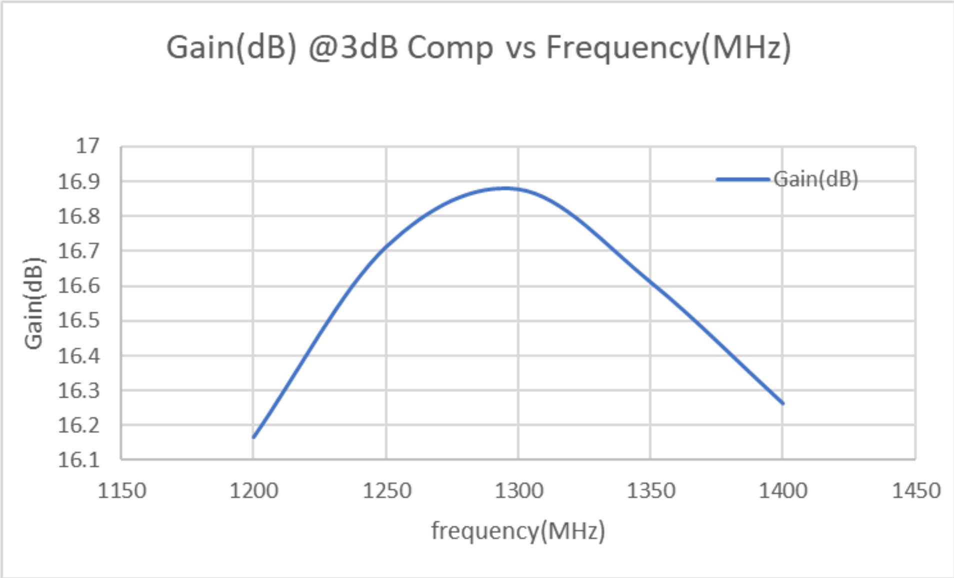

Figure 9 Power Gain as a function of frequency at 3dB Compression

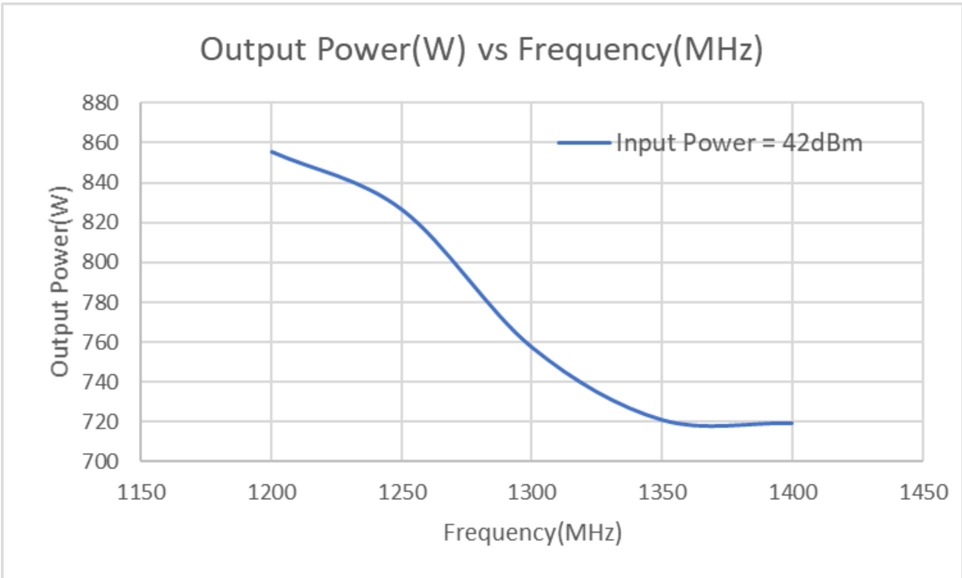

Figure 10 Output Power at 42 dBm Input Power as a function of Frequency

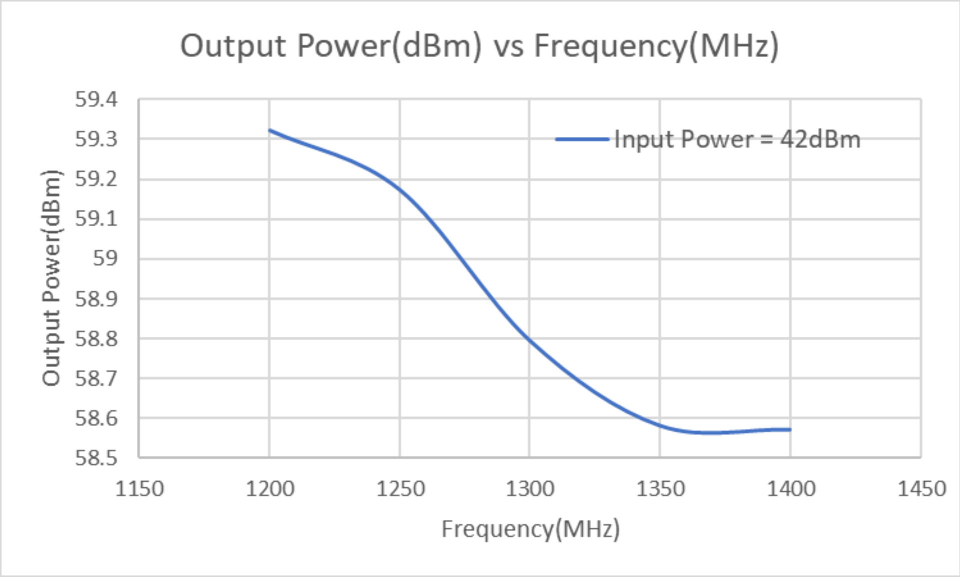

Figure 11 Output Power at 42 dBm Input Power as a function of Frequency

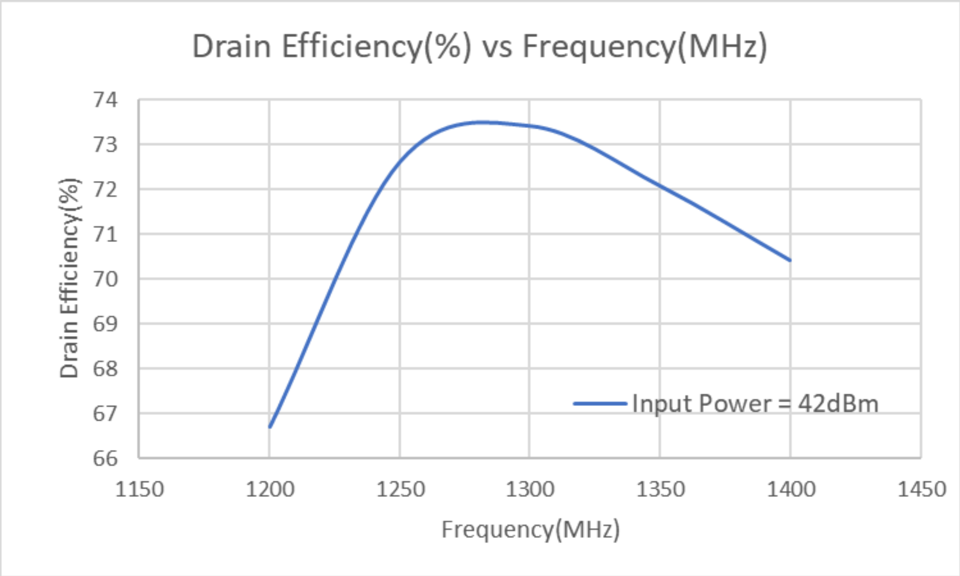

Figure 12 Drain Efficiency at 42 dBm Input Power as a function of Frequency

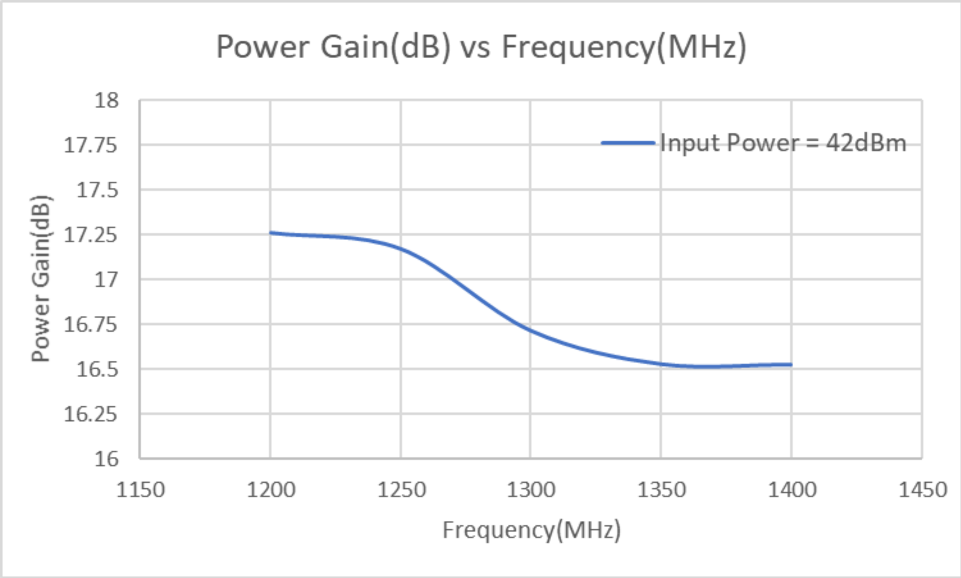

Figure 13 Power Gain at 42 dBm Input Power as a function of Frequency

8. Hardware

8.1 Board Image

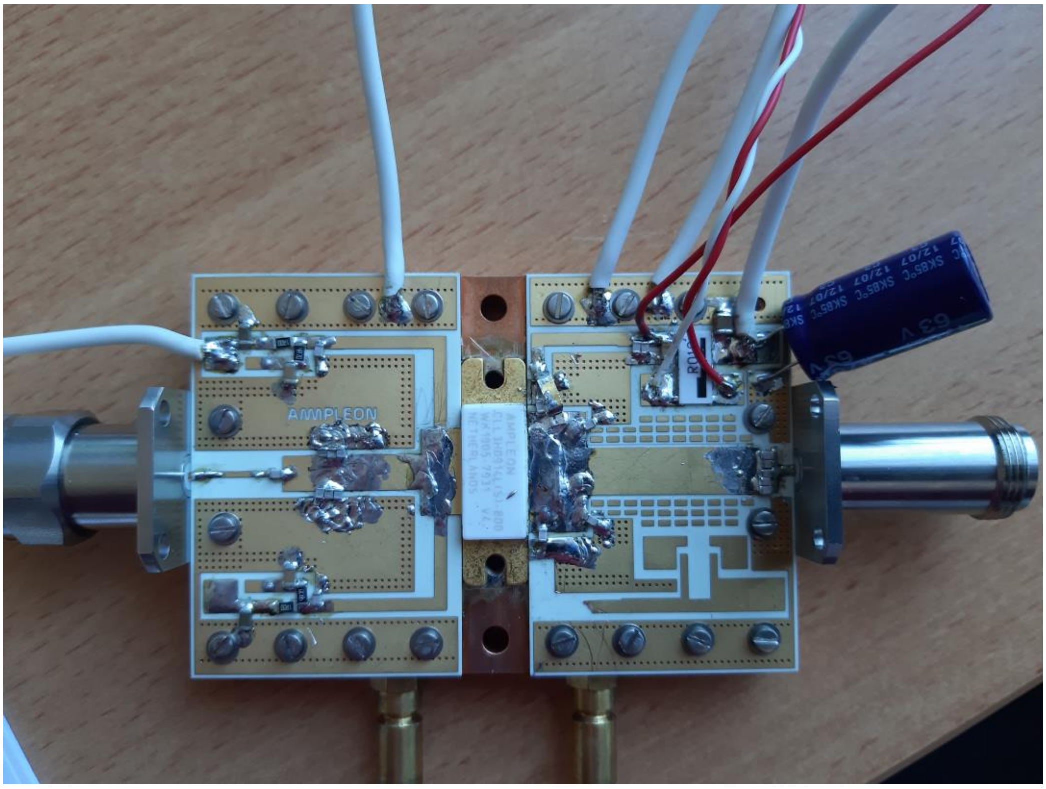

Figure 14 Application board photo (zoomed)

8.2 Board Layout

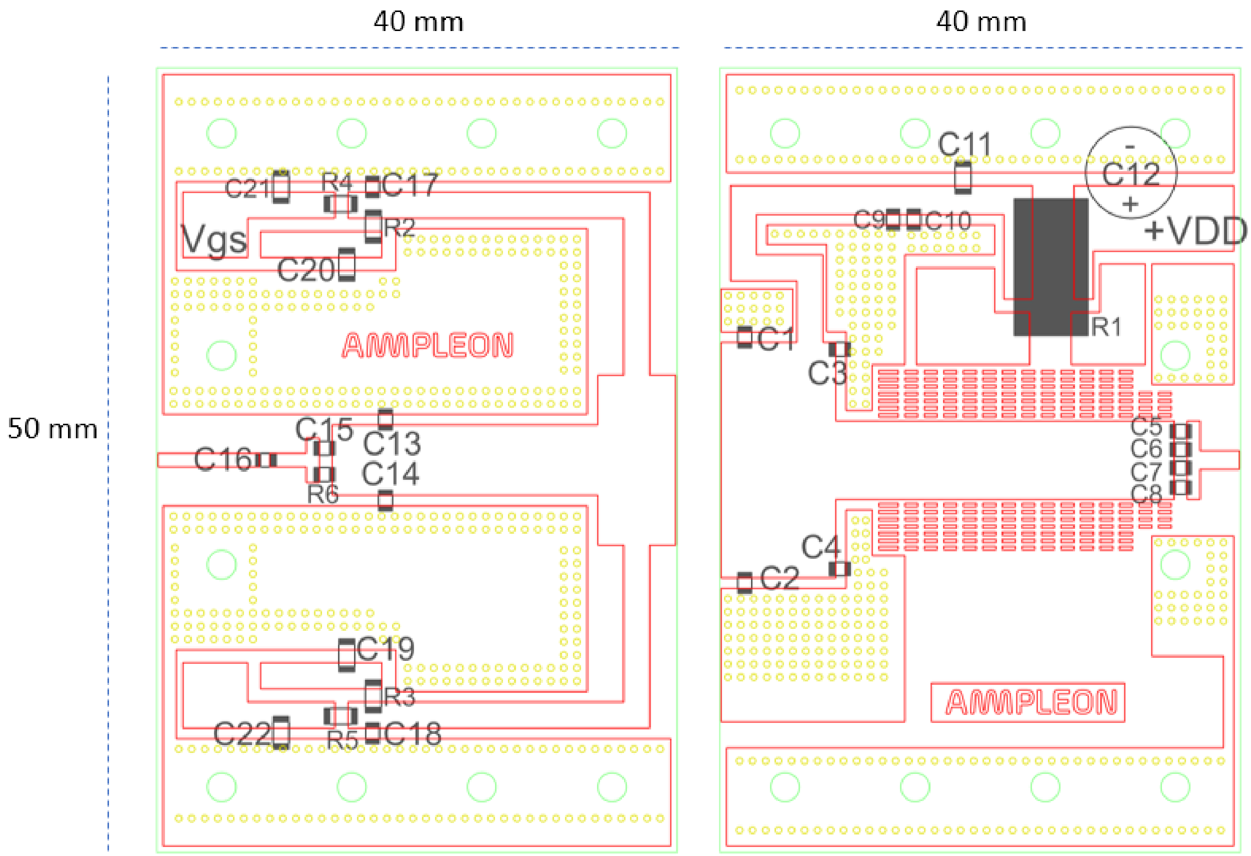

Figure 15 Layout of Application board together with circuit components.

8.3 Bill of materials

Table 3: Bill of Materials

Description	Value	Manufacturer
C1, C2	9.1 pF	ATC 100A
C3, C4	5.1 pF	ATC 100A
C5, C6, C7, C8, C9, C10, C16	100 pF	ATC 100A
C11	4.7 uF	Murata GRM42256X7S475K100H530, 100V SMD
C12	470 uF	63V Electrolytic capacitor
C13, C14	1.2 pF	ATC 100A
C15	24 pF	ATC 100A
C17, C18	72 pF	ATC 100A
C19, C20	10n nF	Murata C1206C104K1RAC, 50V
C21, C22	4.7 uF	TDK 4.7uF
R1	10 mOhm	Shunt Resistor / 5W
R2, R3	8.2 Ω	1206 SMD Resistor
R4, R5	4.7 Ω	1206 SMD Resistor
R6	82 Ohm	0603 SMD Resistor

8.4 Board material

Table 4: Board specifications

Parameter	Value
Manufacturer	Rogers
Type	RO4350B
Thickness	20mil, 0.51mm
Layers	2, top/bottom. Bottom all copper, 70um metal thickness

8.5 Device markings

Table 5: Device specifics

Parameter	Value
Manufacturer	Ampleon
Device	CLL3H0914L(S)-700
Marking	CLL3H0914L(S)-700
Comments	Engineering sample

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