

# AR202113

CLF3H0060-30 500-2700MHz

V1.0 — 18 November 2021

AMPLEON

Application Report

## Document information

Info	Content
Status	General Publication
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Abstract	Measurement results of the CLF3H0060-30 GaN Device Measured at 50V over 500-2700MHz

## 1 Revision History

Table 1. Report revisions

Revision No.	Date	Description	Author
1.0	20201103	Initial document	Bill Goumas
2.0	20211118	Changed to General Publication	Bill Goumas

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## 5 General Description

This report presents the measurements of CLF3H0060-30 GaN device in board AR202113. The board has been tested over 500-2700 MHz at 50V.



## 8 Summary

Goal is for a Broadband circuit that will cover 500-2700MHz. The 500-2500MHz Gen1 demo was the starting point.

A couple minor modifications were made to the output network. The DC feed was modified to clean up a small signal gain peak near 50MHz. Performance rolls off slightly at 2.7GHz. A new PC board and layout is in process with a minor addition to eliminate the roll-off at 2.7GHz.

The next version will be tested down to 28V and with other signals.

**Table 2. RF Performance Vdd=50V, Idq=100mA, CW**

Symbol	Parameter	Range	Unit
Freq.	Frequency Range	500-2600	MHz
P1dB	Power at 1dB Gain Compression	>41	dBm
P2dB	Power at 2dB Gain Compression	>44	dBm
Eff.@25W	Efficiency	>44	%
Eff.@30W	Efficiency	>47	%
G <sub>min.</sub> @25W	Minimum Gain	15.2	dB
G <sub>flatness@25W</sub>	Gain flatness	+/- 0.5	dB

Note: Data at 2.7GHz not included, next pass should eliminate roll-off

9 Performance Details

9.1 Small Signal Results

Vdd=50V, Idq=100mA

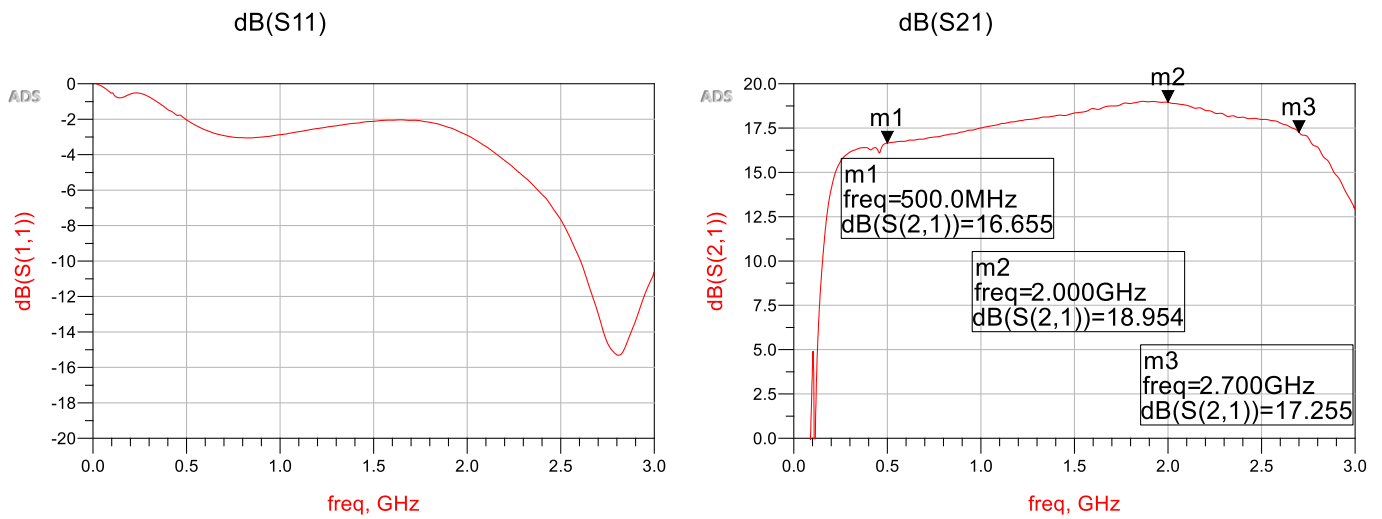
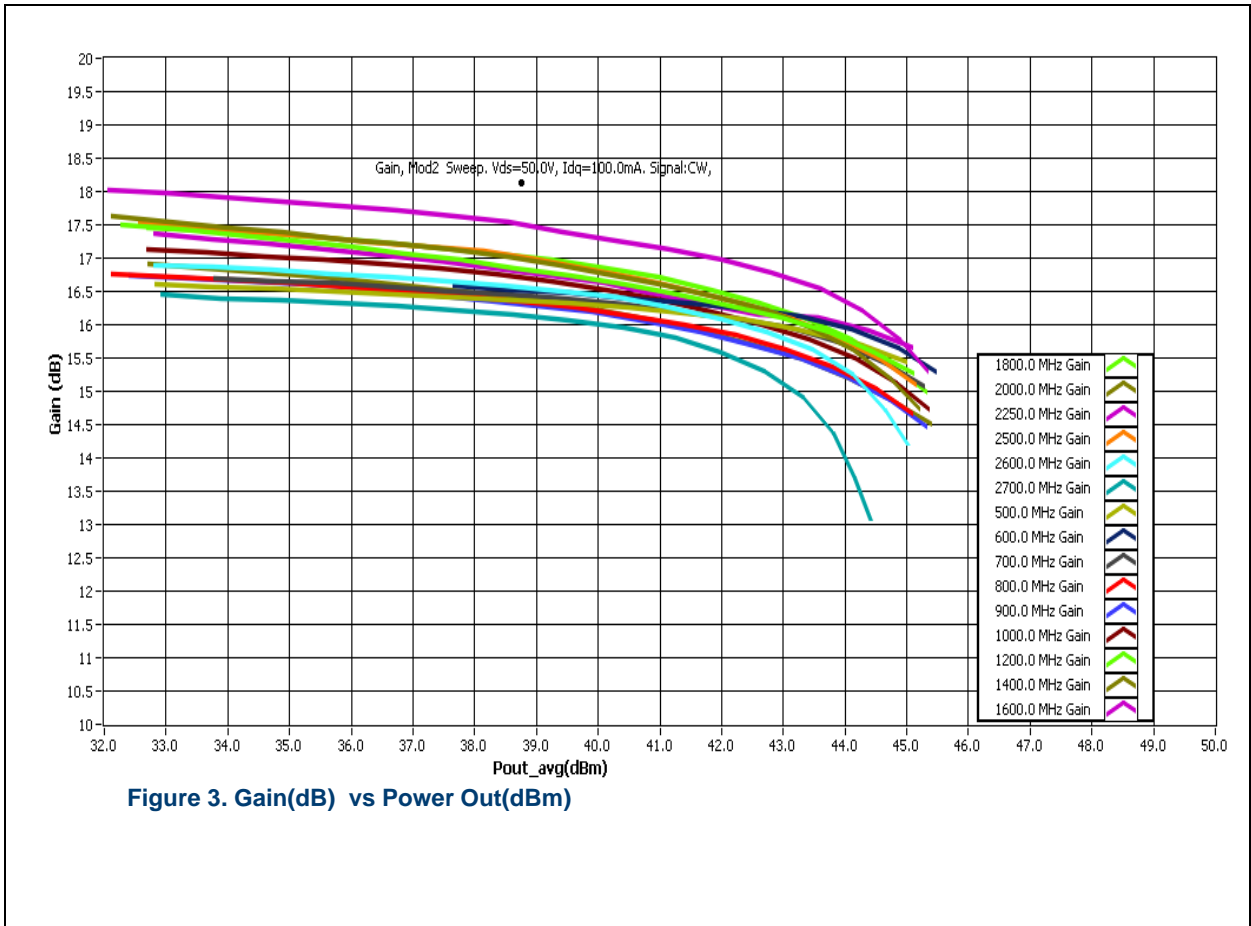


Figure 2. Small Signal Data, Vdd=50V, Idq=100mA

## 9.2 CW Gain vs Pout

Vdd=50V, Idq=100mA



## 9.3 CW Efficiency vs Pout

Vdd=50, Idq=100mA

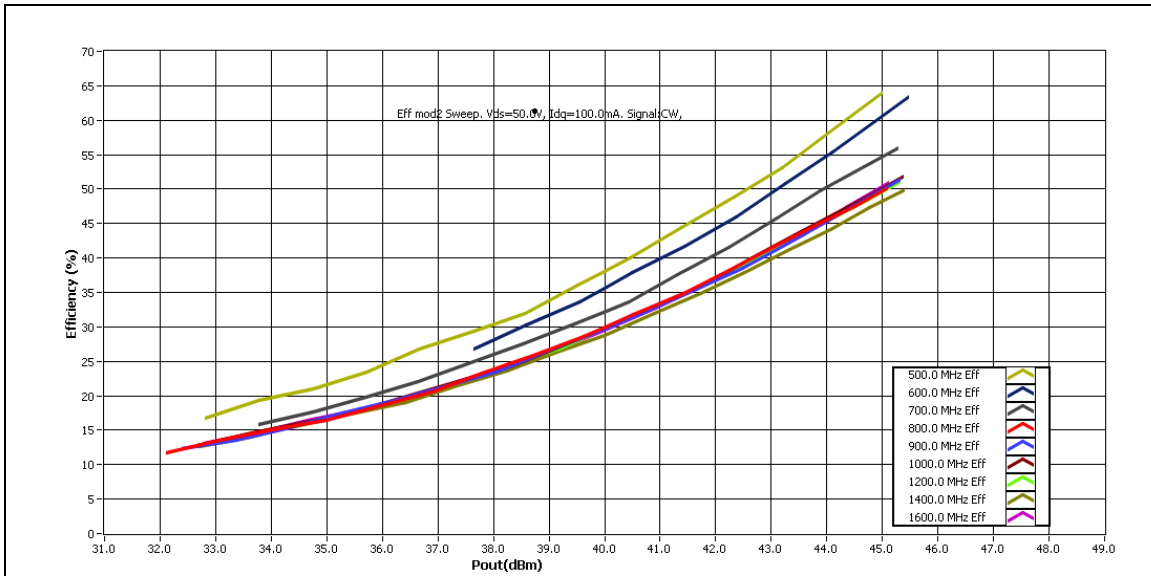


Figure 4. EFF(%) vs Power Out(dBm)

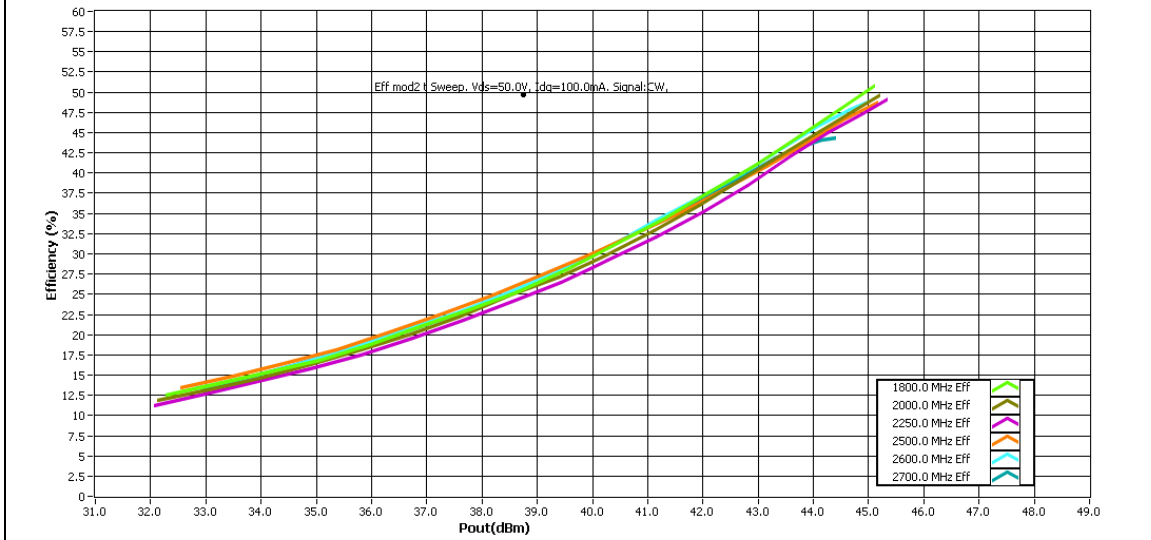


Figure 5. Eff(%) vs Power Output



9.4 Gain, Efficiency vs Frequency at Fixed Power Output

Vdd=50V, Idq=100mA, Gain(red), Eff(black) vs Frequency, Power Out=25W



Figure 6. Gain(dB), Eff(%) vs Frequency(MHz)

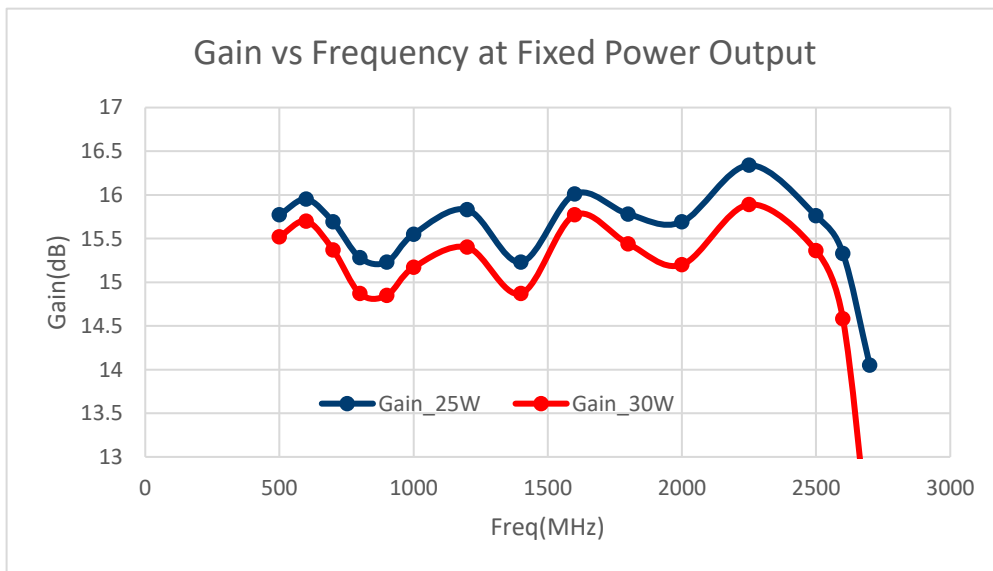
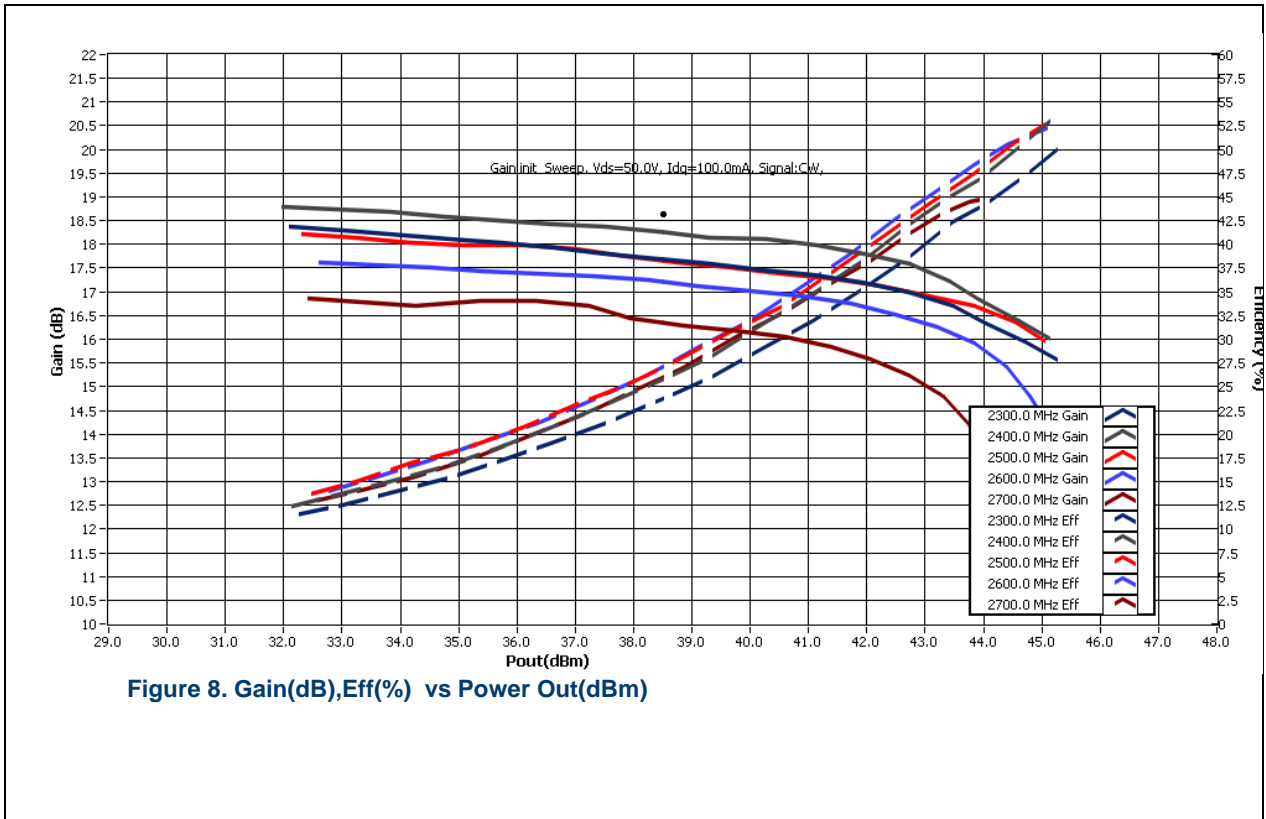


Figure 7. Gain(dB) vs Frequency(MHz)

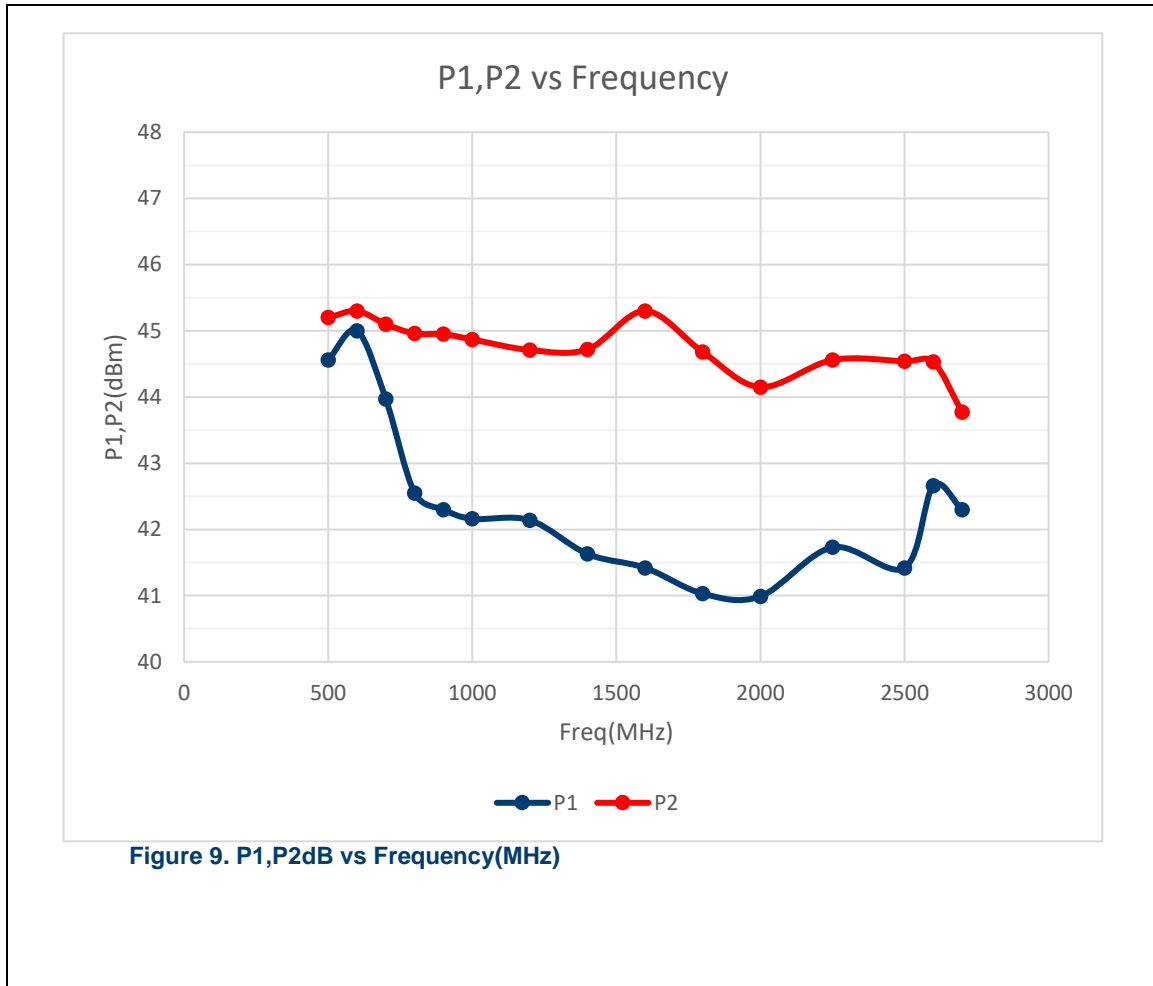
## 9.5 CW Gain, Efficiency vs Pout, High Frequency Detail

Vdd=50V, Idq=100mA



9.6 P1, P2dB vs Frequency

Vdd=50V, Idq=100mA



## 10 Hardware

### 10.1 Board photograph

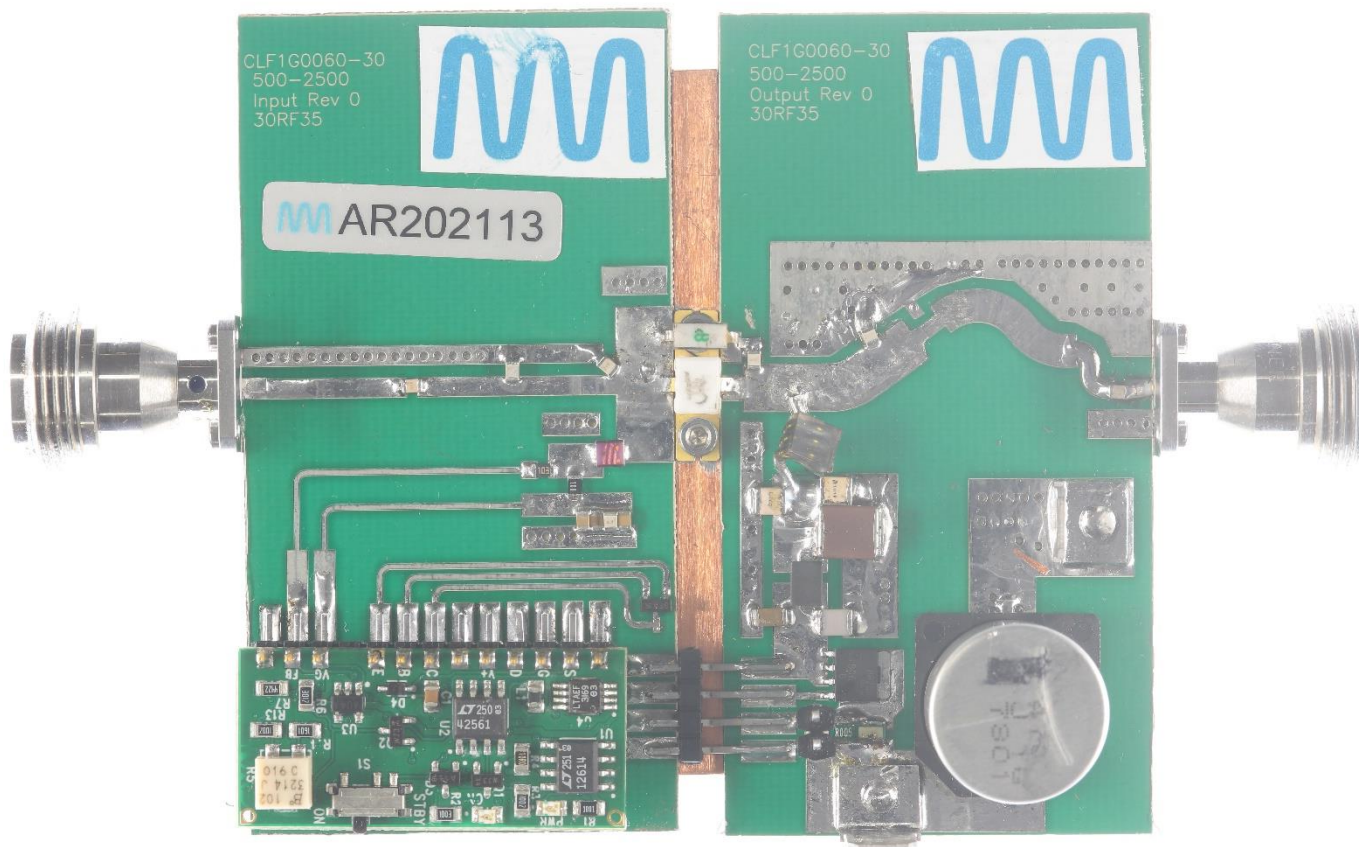


Figure 10. Board Photograph

## 10.2 PCB layout

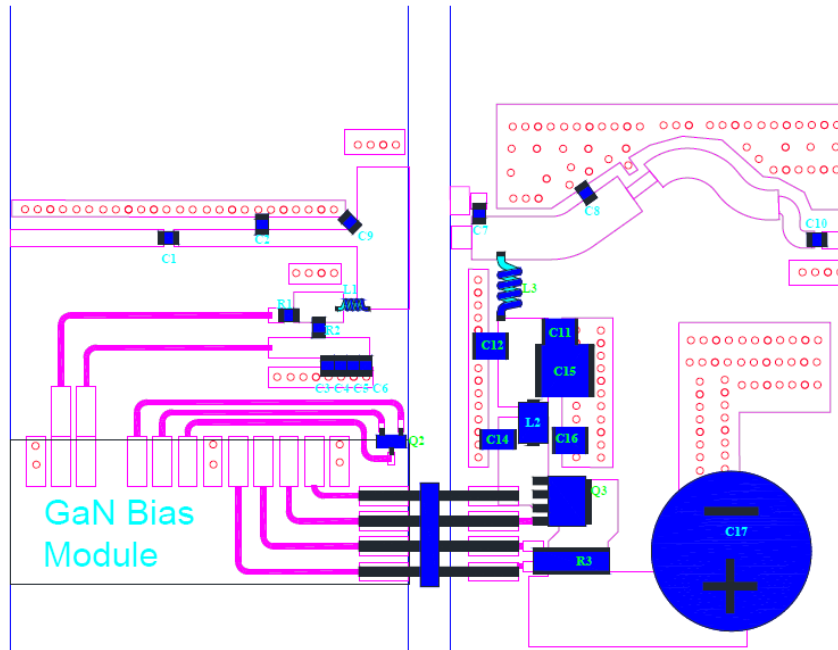


Figure 11.PCB Layout

## 10.3 Bill of materials

Table 3. BOM

Designator	Description	Manufacturer	Part#
PCB Input	30 mil thk. RF35	Avanti Circuits	CLF1G3060-30 500-2500 Input Rev0
PCB Ouput	30 mil thk. RF35	Avanti Circuits	CLF1G3060-30 500-2500 Output Rev0
Q1	30W GaN	Ampleon	CLF3H0060-30
Q2	PNP 45V 100mA GP	NXP BC857B	BC857B
Q3	Transistor, N-ch MOS 80V 80A	NXP	BSMN8R2-80YS
U1	GaN bias module	Ampleon	CA-330-11
R1	10kΩ 0805	Vishay Dale	
R2	10Ω 0805	Vishay Dale	
R3	0.005 Ω 1% 100ppm MF	Susumu	RL7520WT-R005-F
R4	20Ω 0805	Vishay Dale	
C1	8.2pF	ATC or Passive Plus	600F or 0805N
C2	0.8pF	ATC or Passive Plus	600F or 0805N
C3	100nF Capacitor, 50V 10% X7R	0805 Generic	
C4	10nF Capacitor, 50V 10% X7R	0805 Generic	
C5	22pF Capacitor, 100V 5% NPO	0805 Generic	
C6	1nF Capacitor, 100V 5% NPO	0805 Generic	
C7	10pF	ATC or Passive Plus	600F or 0805N
C8	1.1pF	ATC or Passive Plus	600F or 0805N
C9	0.5pF	ATC or Passive Plus	600F or 0805N
C10	22pF	ATC or Passive Plus	600F or 0805N
C11	100pF	ATC or Passive Plus	100B or 1111N
C12	1000pF	ATC or Passive Plus	100B or 1111N
C14	1uF Capacitor, 100V 10% X7R	1206 Generic	
C16	10nF Capacitor, 200V 5% NPO	1210 Generic	
C15	10uF Capacitor, 100V 10% X7S	TDK	C5750X7S2A106M
C17	470uF, 63V Electrolytic	Panasonic	PCE3667CT-ND
L2 Ferrite bead	5A Fair Rite 2743019447		
L3 Inductor	air core 12nH	Coilcraft	Gx3094

## 10.4 PCB materials

Table 4. Board Specifications

Parameter	Value
Manufacturer	Taconic
Type	RF35
Thickness	30 mils, 1oz. copper
Layers	2, top/bottom. Bottom all copper

## 10.5 Device markings

Table 5. Device Specifications

Parameter	Value
Manufacturer	Ampleon
Device	CLF3H0060-30
Date Code	M2018

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