AR192177

BLF984P, 30-520 MHz

V3.0 — 22 April 2022

AMPLEON

Application Report

Document information

Info	Content
Status	General Publication
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Abstract	Measurement results of the BLF984P Gen 9 LDMOS Device in Board #AR192177 tuned for the 30-520 MHz band at 28V

1 Revision History

Table 1. Report revisions

Revision No.	Date	Description	Author
1.0	20191212	Initial document	Bill Goumas
2.0	20200601	Revised Summary section	Bill Goumas
3.0	20220422	Changed to General Publication	Bill Goumas

2 Contents

3 List of Figures

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5 General Description

This report presents the measurement results of the Class AB Demo board AR192177 using the BLF984P. The demo achieves ~100W across 30-520MHz under CW conditions.

Gain is 19-20dB and Efficiency is 47-60% at Pout=80W

6 Biasing

6.1 Bias Details

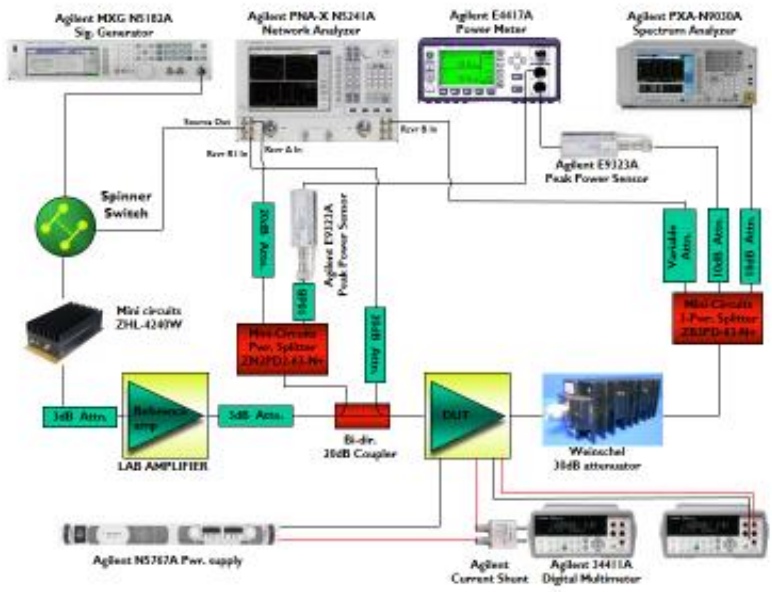
The efficiencies presented include the bias current from the biasing board. The current from the biasing board is ~25mA.

VDD =28

VGS= ~2.1 V, leading to an IDQ =300mA.

7 Test Bench Set Up

Figure 1.Test Bench Equipment set up



8 Summary

The demo achieves ~100W across 30-520MHz under CW conditions. Compression is <1.5dB at Pout=80W and Vdd=28V.

Gain is 19-20dB and Efficiency is 47-60% at Pout=80W

IR scans in section 10 show that the feedback resistor temperatures are <60°C but require 10W axial resistors. 30W surface mount resistors will be used in any further versions of this demo.

9 Performance Details

9.1 Small Signal Results

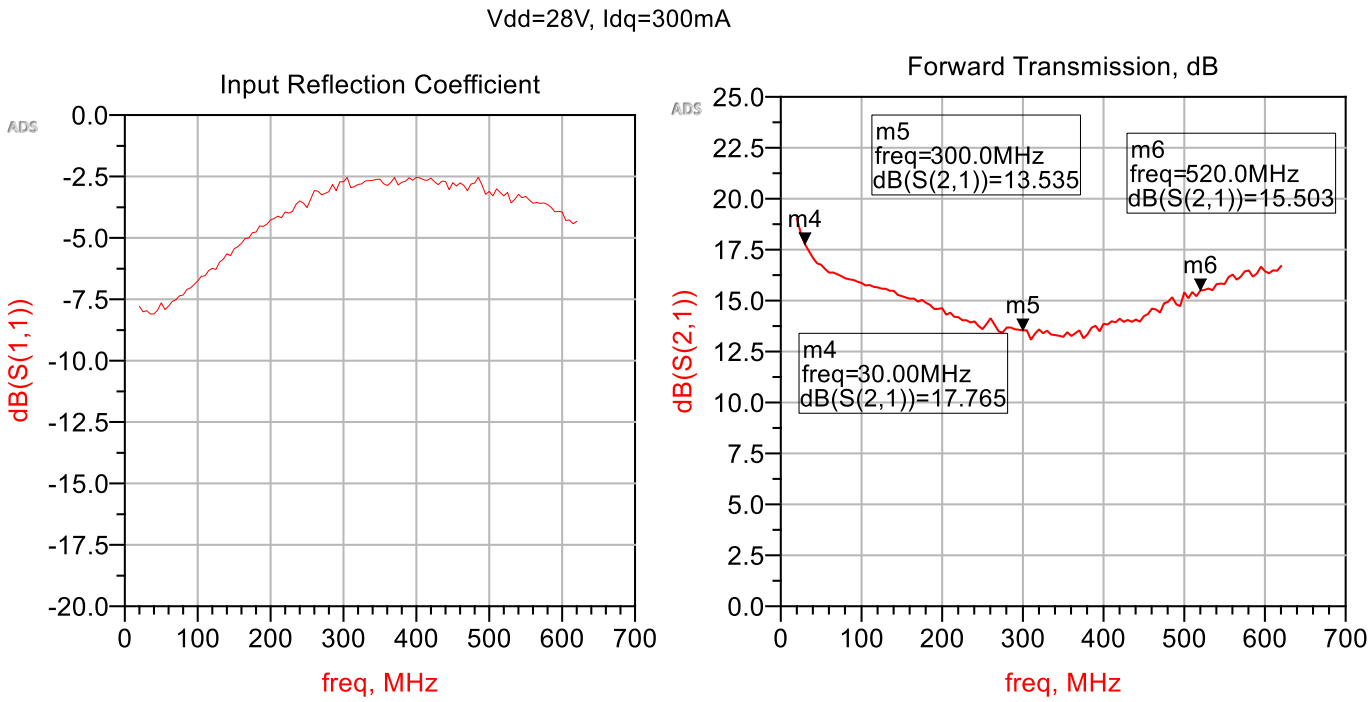


Figure 2. Small SIgnal Data, Vdd=28V, Idq=300mA, Pin=10dBm

9.2 Pulse Gain and Efficiency Sweeps

Vdd=28V, Idq=300mA, 10% Duty Cycle, 100usec PW

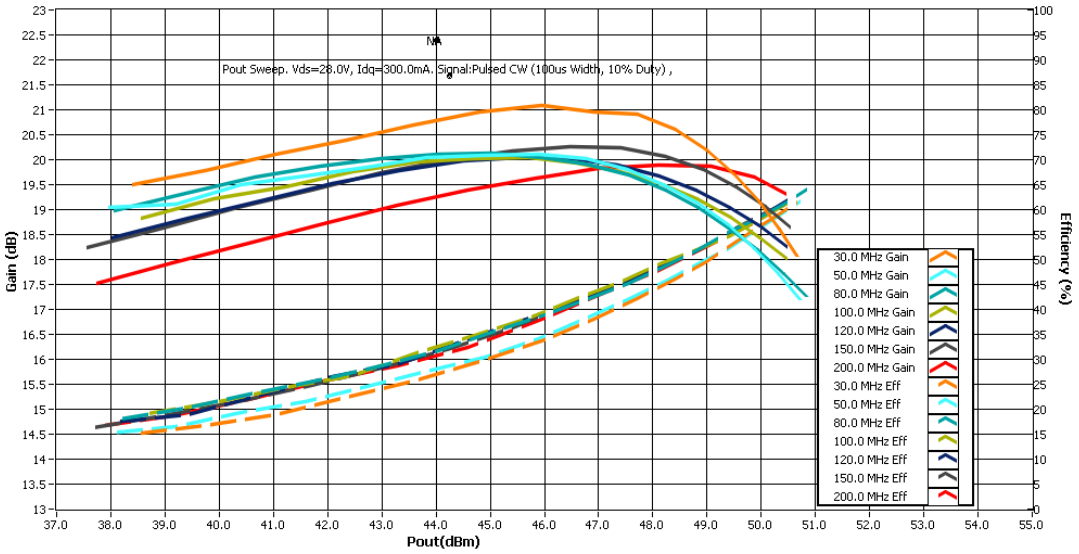


Figure 3. Gain(dB), Eff(%) vs Power Out(dBm)

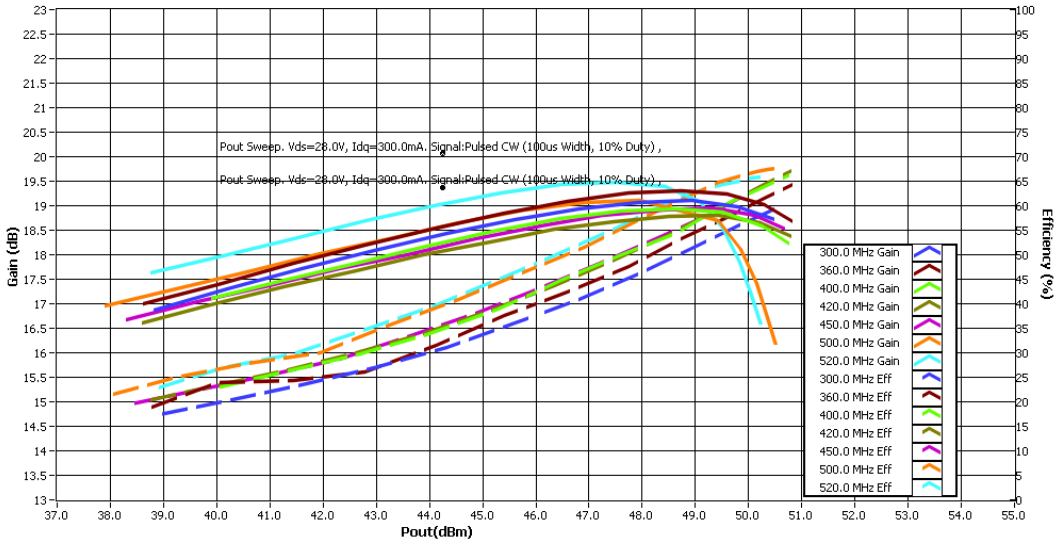


Figure 4. Gain(dB), Eff(%) vs Power Out(dBm)

9.3 CW Gain and Efficiency Sweeps

Vdd=28V, Idq=300mA,

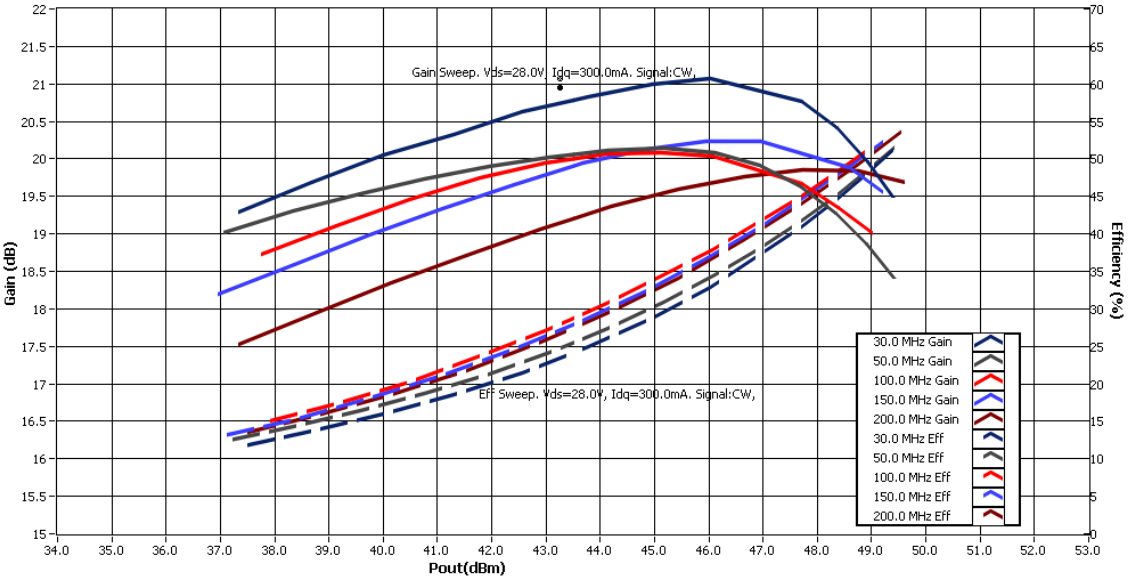


Figure 5. Gain(dB), Eff(%) vs Power Out(dBm)

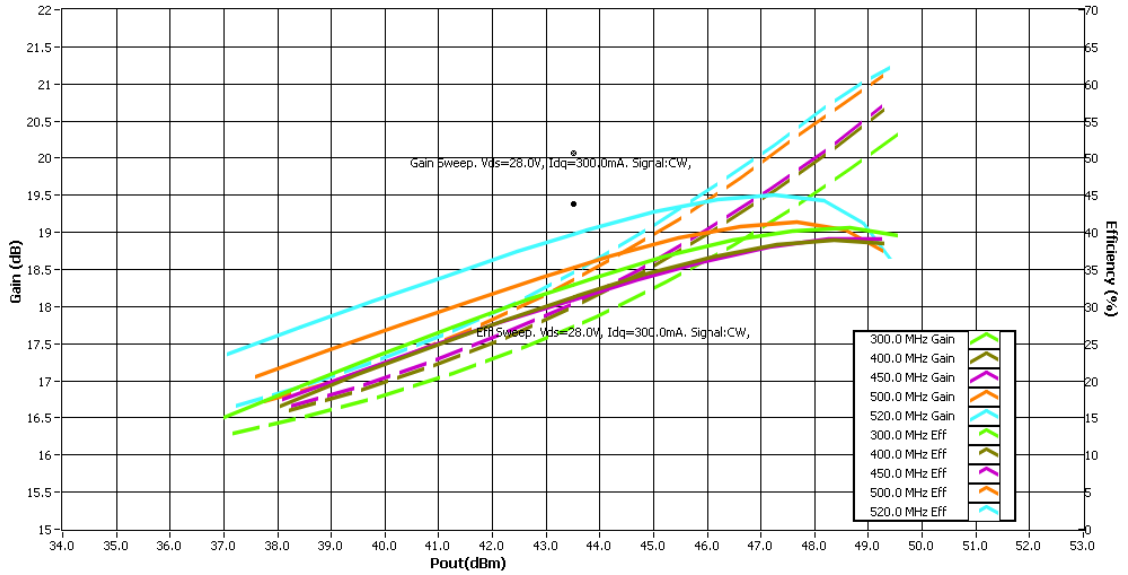


Figure 6. Gain(dB), Eff(%) vs Power Out(dBm)

9.4 P1dB and Compression at Pout=80W

Vdd=28V, Idq=300mA, CW

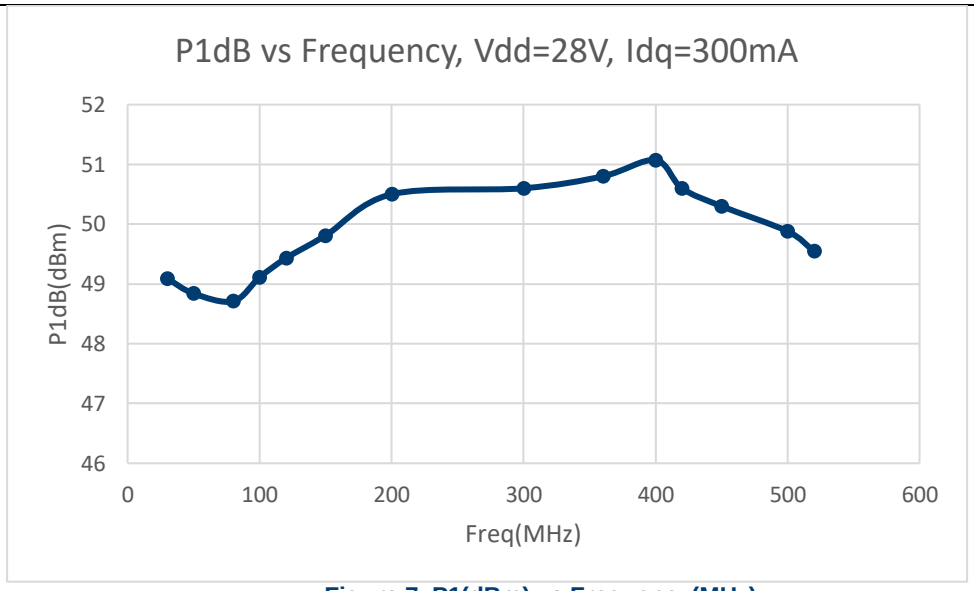


Figure 7. P1(dBm) vs Frequency(MHz)

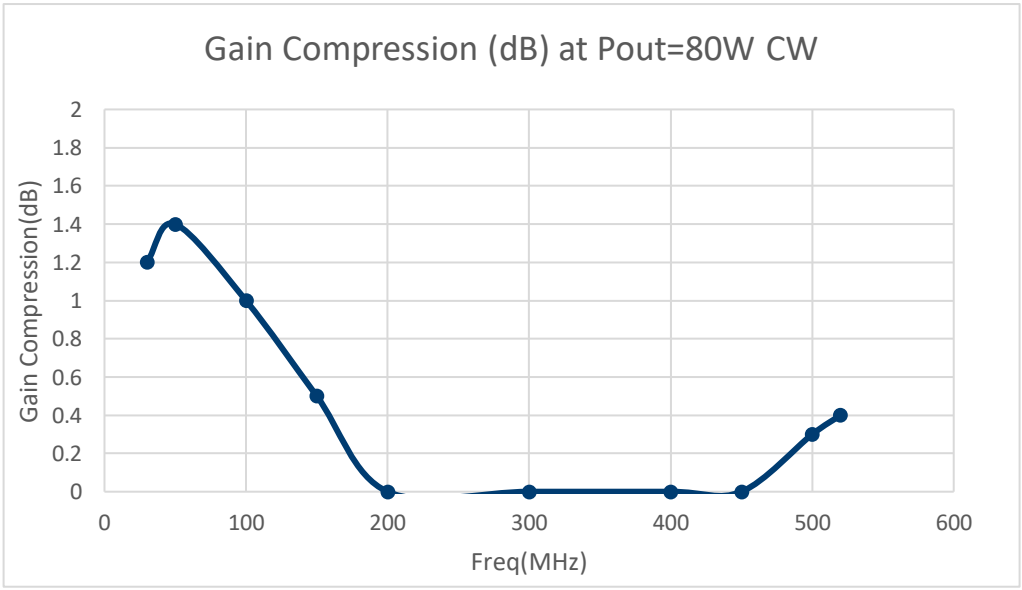


Figure 8. Gain Compression vs Frequency

9.5 Gain, Efficiency vs Frequency at Fixed Power Output

Vdd=28V, Idq=300mA

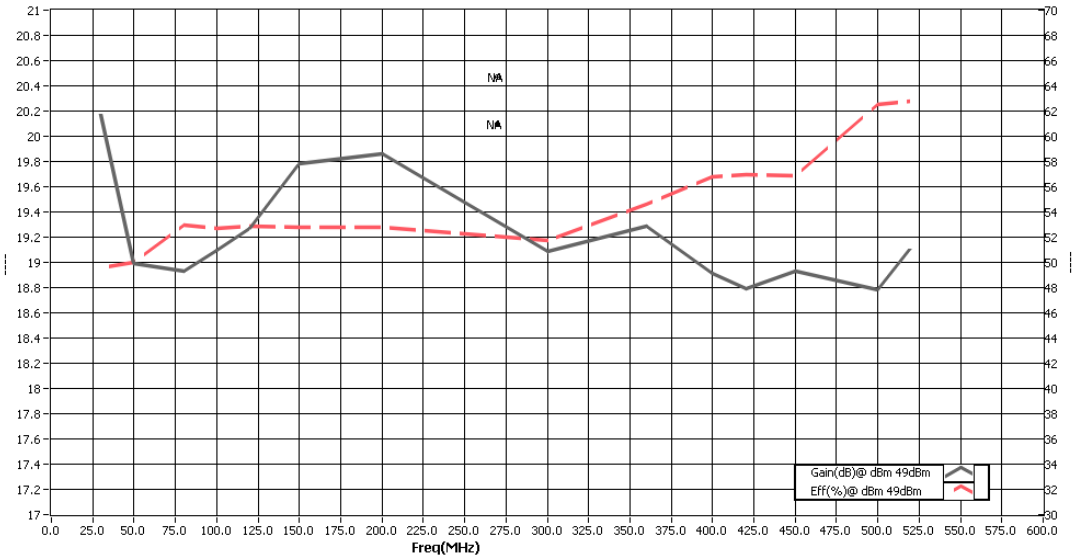


Figure 9. Gain(dB), Eff(%) vs Frequency(MHz) at Pout=80W, 10% Duty Cycle

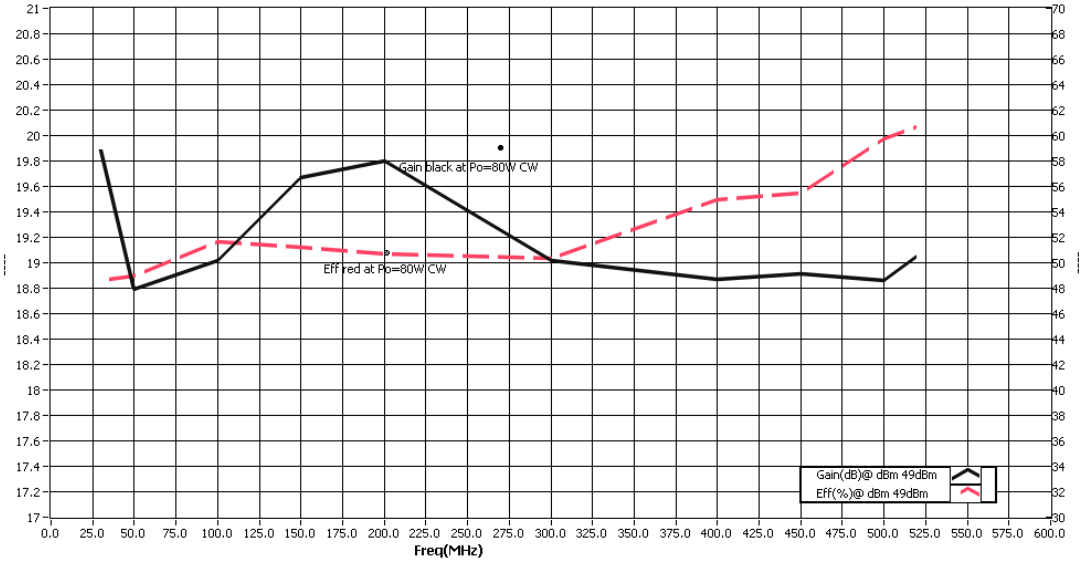


Figure 10. Gain(dB), Eff(%) vs Frequency(MHz) at Pout=80W CW

10 IR Scans

10.1 IR Scan Results

Vdd=28V, Idq=300mA, Frequency=520MHz, Pout=80W CW

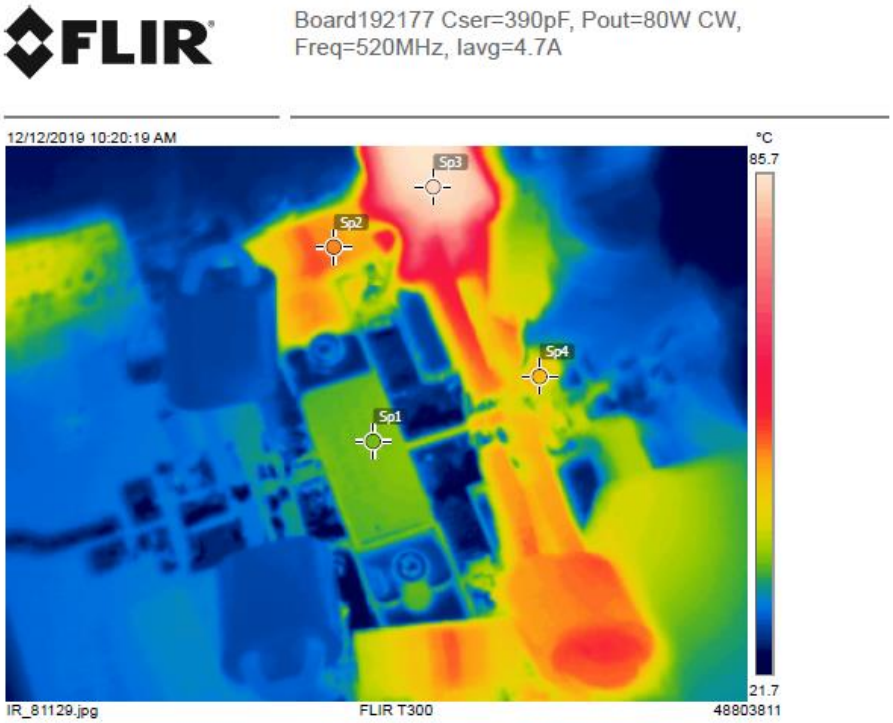


Figure 11. IR Scan at Pout=80W , Frequency=520MHz

11 Hardware

11.1 Board photograph

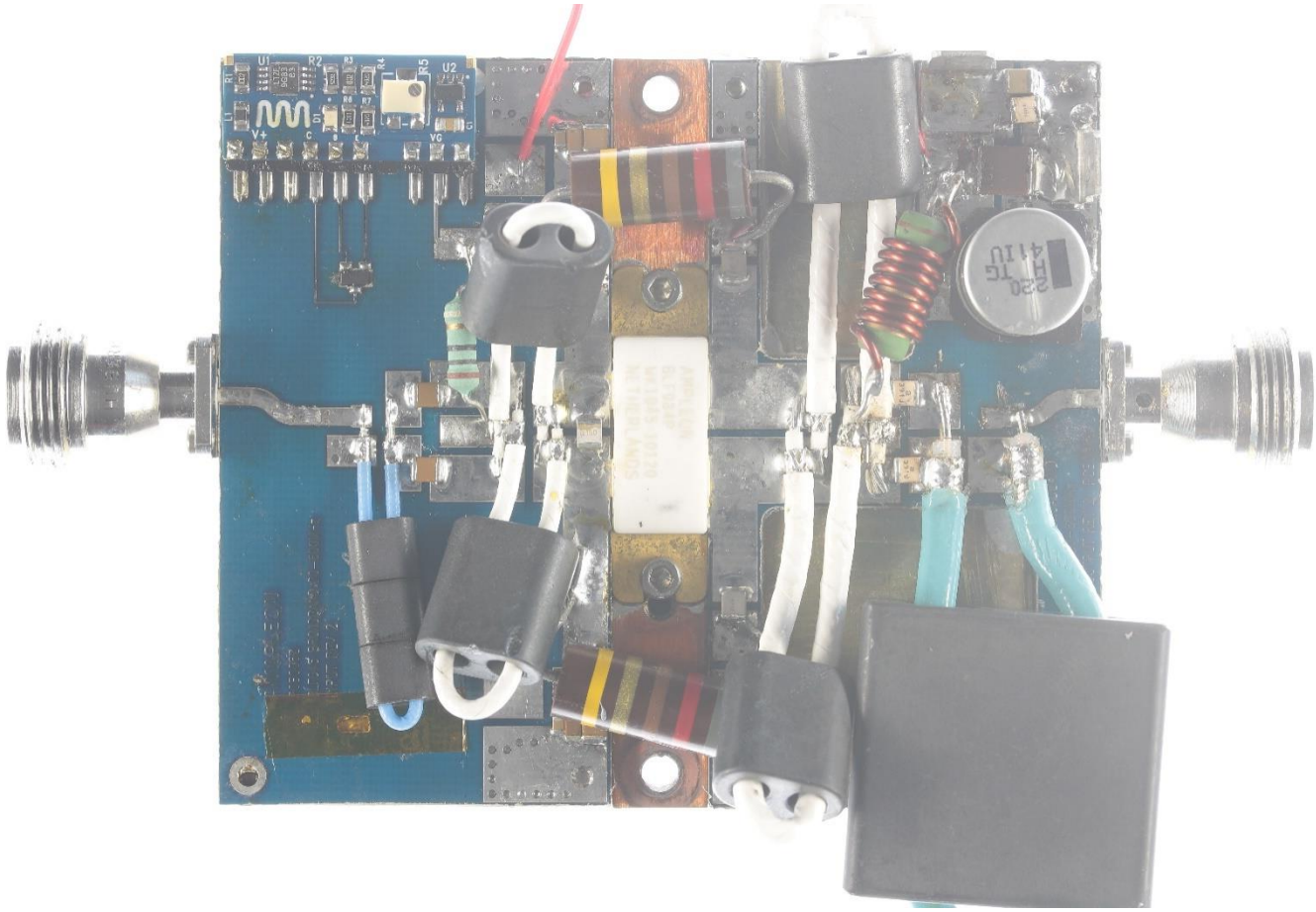


Figure 12. Board Photograph

11.2 PCB layout

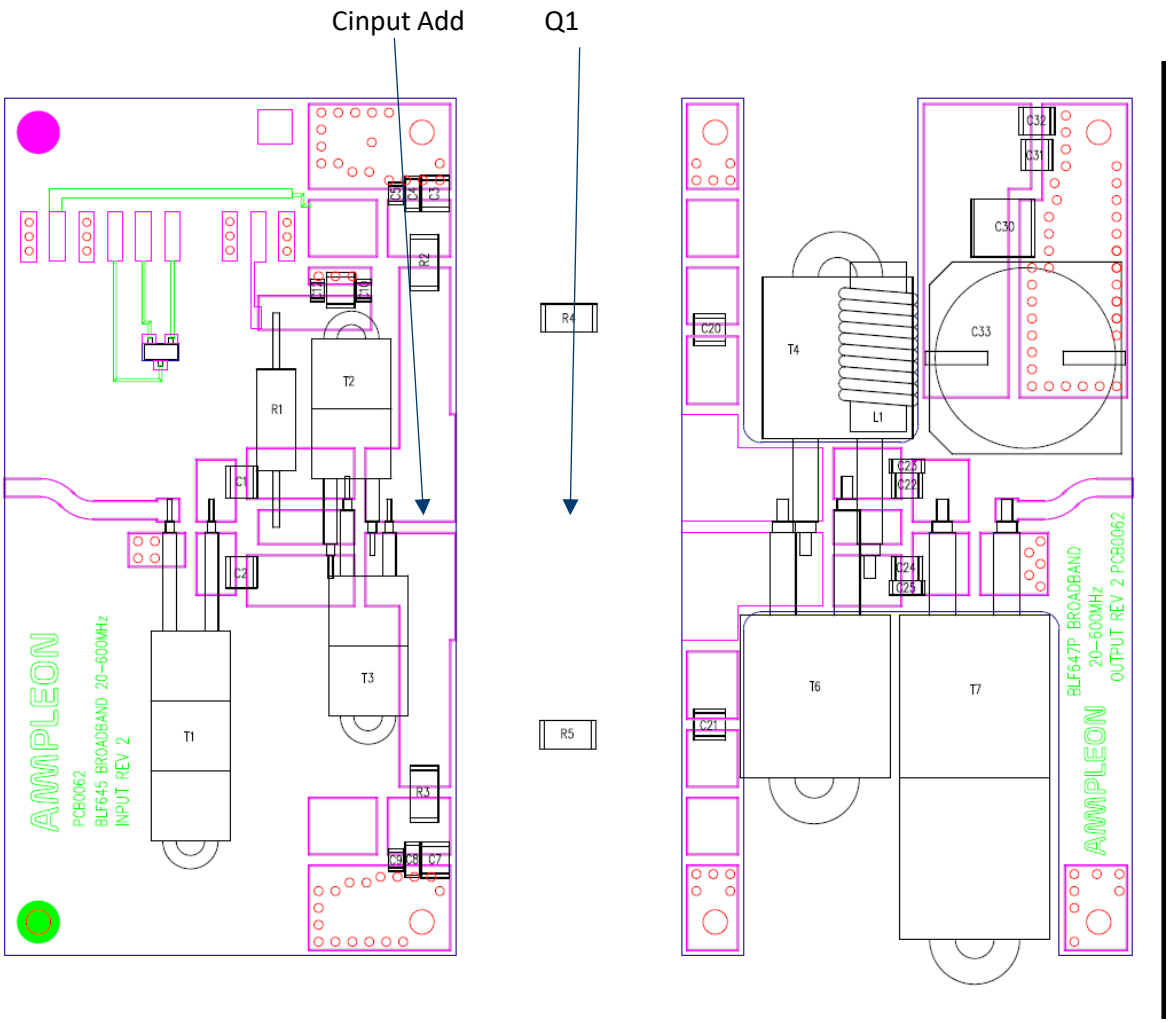


Figure 13.PCB Layout Board #AR192177

11.3 Bill of materials

Table 2. BOM

Designator	Description	Manufacturer	Part#
PCB Input PCB	Input PCB, 30mil thk. RF35	Avanti Circuits	PCB00062 Input Rev2
PCB Output PCB	Output PCB, 30 mil thk. RF35	Avanti Circuits	PCB00062 Output Rev2
A1	LDMOS bias module	Ampleon	CA-330-11
Q1	RF Transistor	Ampleon	BLF984P
Q2	2N2222 NPN Transistor	Fairchild	MMBT2222
R1	10Ω 0.5W5%	Generic	
R2, R3	20 Ω 5%	IMS	NADC-2010WA20R0J
R4,R5	10W 820Ω Axial or 750Ω Flange	Generic or Caddock	Generic or MP915-750-1%
R6	10 Ω 3W	Generic	
L1	8 turn 18AWG wrapped onto R6	Internal	
C5, C9, C12	100nF, 50V 10% X7R, 0805	Generic	
C1,C2,C3, C7, C11,C31	4.7nF,100V 5% NPO, 1210	Generic	
C4,C8,C10	10uF,100V 10% X7R, 1206	Generic	
C32	100nF,100V 10% X7R, 1210	Generic	
C30	10uF, 100V 10% X7S, 2220	TDK	C5750X7S2A106M
C20,C21,C22,C24	510pF, 500V 5%	Passive Plus or ATC	1111N or 100B
C22,C24 C23,C25	390pF, 500V 5% DNP	Passive Plus or ATC	1111N or 100B
C33	220uF, 50V, alum electrolytic	Generic	
Cadd input	15pF, 5%	Passive Plus or ATC	1111N or 100B
T1	1:1 Input Balun	Micro Coax	55mm PE-P047 50 ohm coax + (3)
		Fair-Rite	Fair-Rite 2861002402 cores
T2, T3	4:1 input transformer	Micro Coax	60mm 070AG-25 25 ohm coax
		Fair-Rite	+1 Fair-Rite 2861000202 core each
T4, T6	4:1 output transformer	Micro Coax	3.5” UT-0C-18 18 ohm coax
			+1 Fair-Rite 2861000202 core each
T7	1:1 output balun w 1 core	Micro Coax	4.1” UT-141 50 ohm coax
		Fair-Rite	with one BN-61-002 core

11.4 PCB materials

Table 3. Board Specifications

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

11.5 Device markings

Table 4. Device Specifications

Parameter	Value
Manufacturer	Ampleon
Device	BLF984P
Date Code	M1919

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