

# AR192143

BLP15H9S100, 360-450 MHz

V1.0 — 24 September 2019

**AMPLEON**

Application Report

## Document information

Info	Content
Status	Company Public
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Abstract	Measurement results of the BLP15H9S100 Gen 9 LDMOS Device in Board #AR1924 tuned for the 360-450 MHz band at 50V

## 1 Revision History

Table 1. Report revisions

Revision No.	Date	Description	Author
1.0	20190923	Initial document	Bill Goumas

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## 5 General Description

This report presents the measurement results of the Class AB Demo board AR192143 using the BLP15H9S100. This demo is characterized over 360-450MHz. Customer requirement was 380-430MHz.

## 6 Biasing

### 6.1 Bias Details

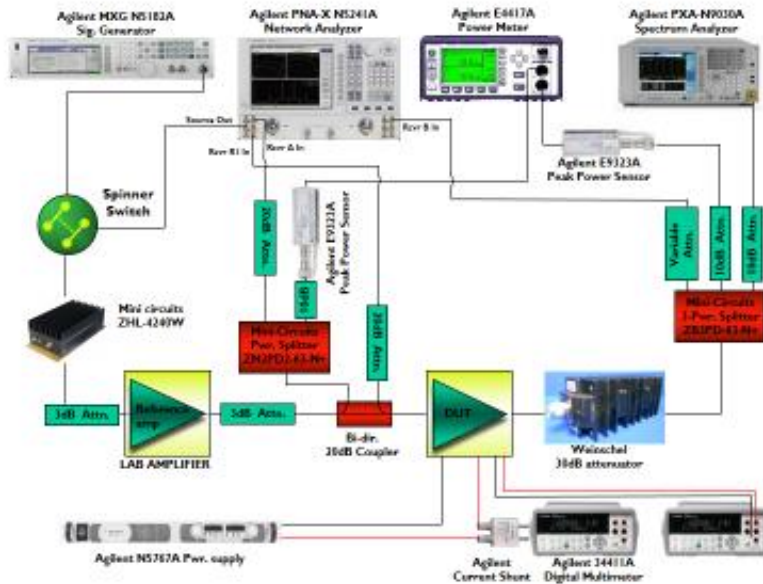
The efficiencies presented include the bias current from the biasing board. The current from the biasing board is ~25mA.

VDD =50

VGS= ~2.3 V, leading to an IDQ =300mA.

## 7 Test Bench Set Up

Figure 1. Test Bench Equipment set up



## 8 Summary

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The demo achieves ~100W across 360-450MHz under CW conditions. Compression is ~0.5-1dB at Pout=100W.

Gain is 17-18dB and Efficiency is 50-60% at Pout=100W

IR Scans show all components < 90°C at Pout =100W CW.

9 Performance Details

9.1 Small Signal Results

Vdd=50V, Idq=500mA

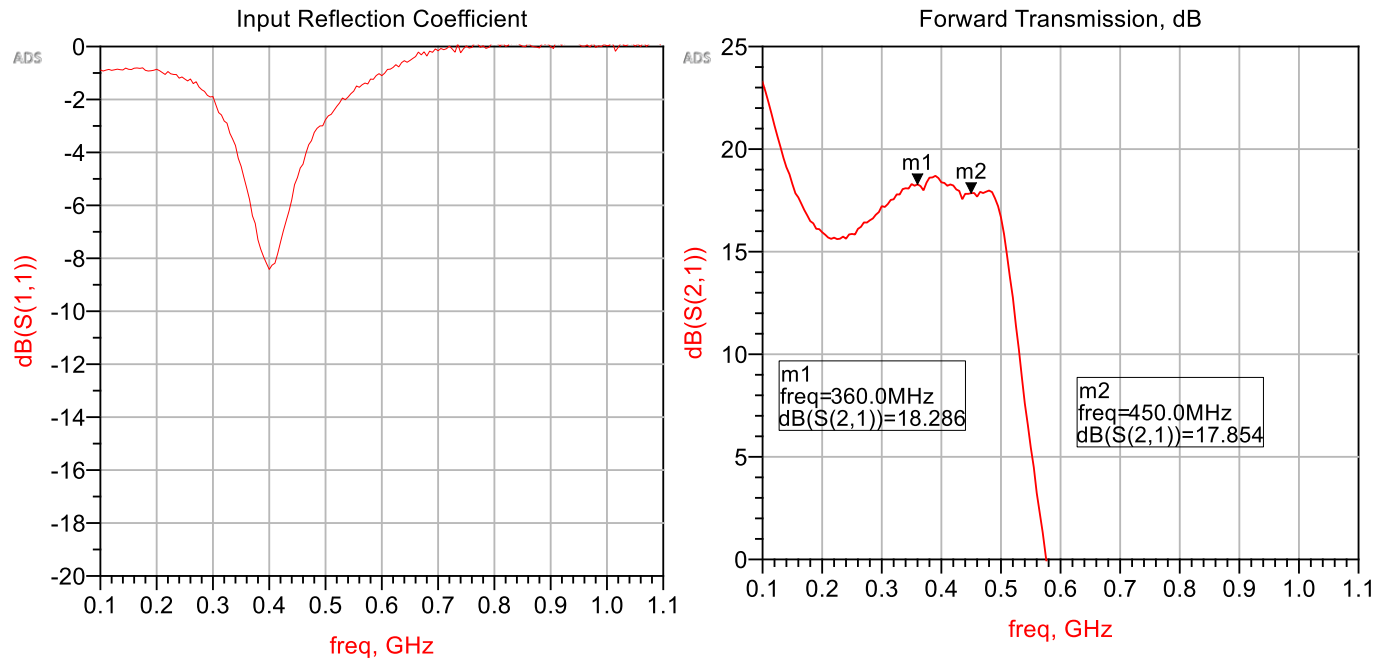
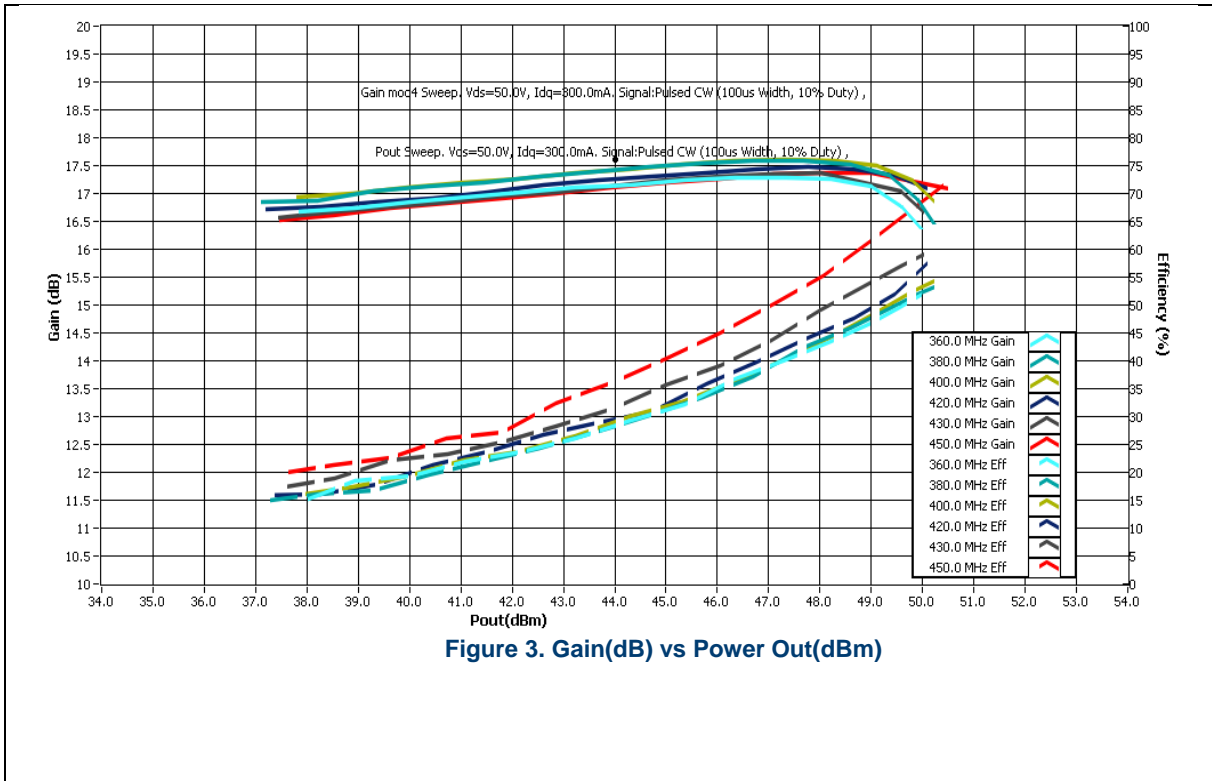


Figure 2. Small Signal Data, Vdd=50V, Idq=500mA, Pin=10dBm

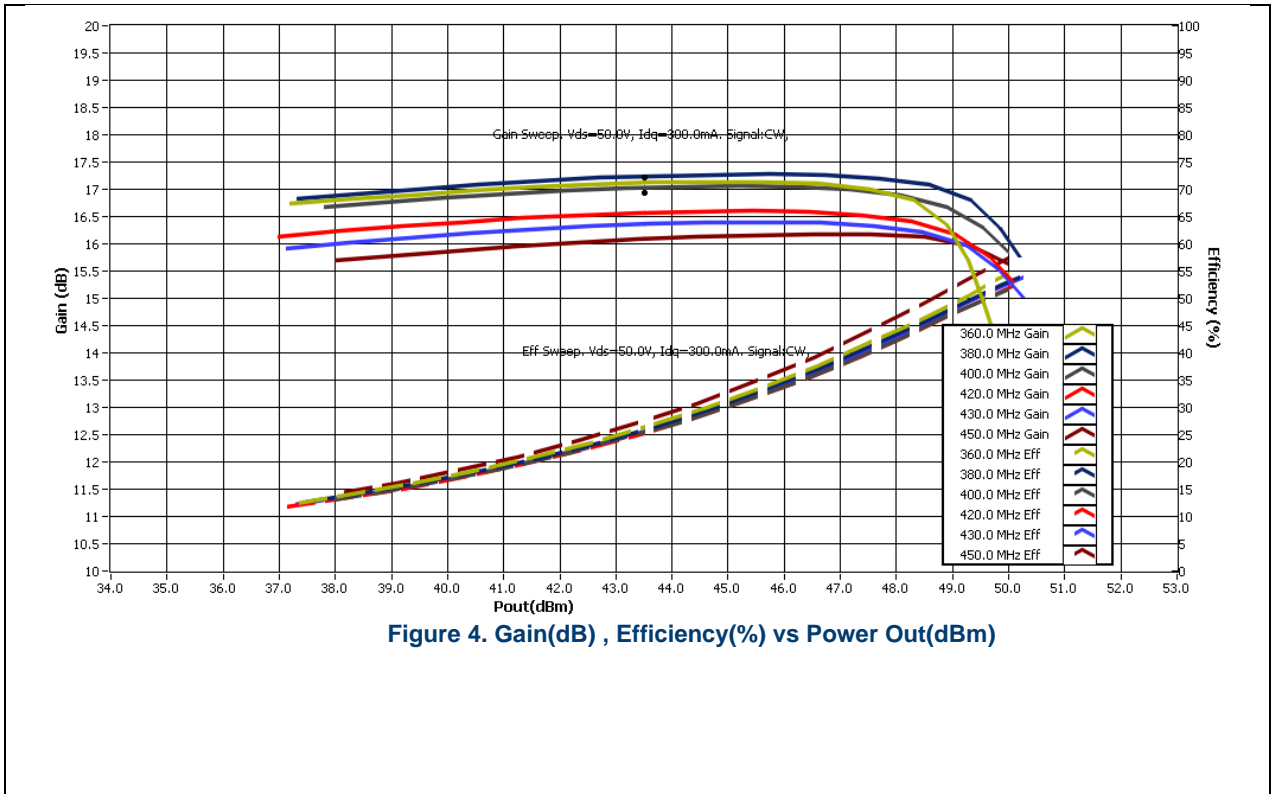
## 9.2 Pulse Gain and Efficiency Sweeps

Vdd=50V, Idq=300mA, 10% Duty Cycle, 100usec PW



## 9.3 CW Gain and Efficiency Sweeps

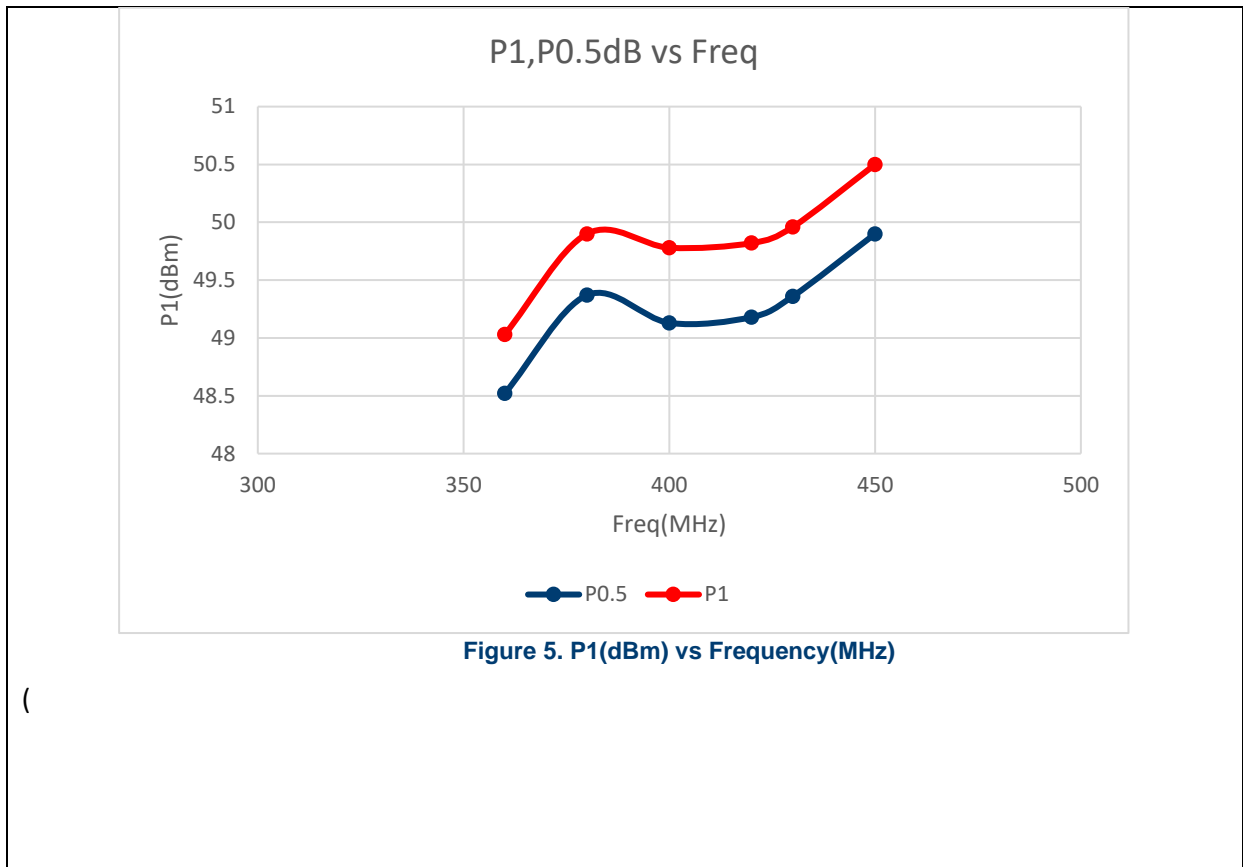
V<sub>dd</sub>=50V, I<sub>dq</sub>=300mA,





## 9.4 P1dB

Vdd=50V, Idq=300mA, CW



## 9.5 Gain, Efficiency vs Frequency at Fixed Power Output

Vdd=50V, Idq=300mA Pout=100W, L3=A04T

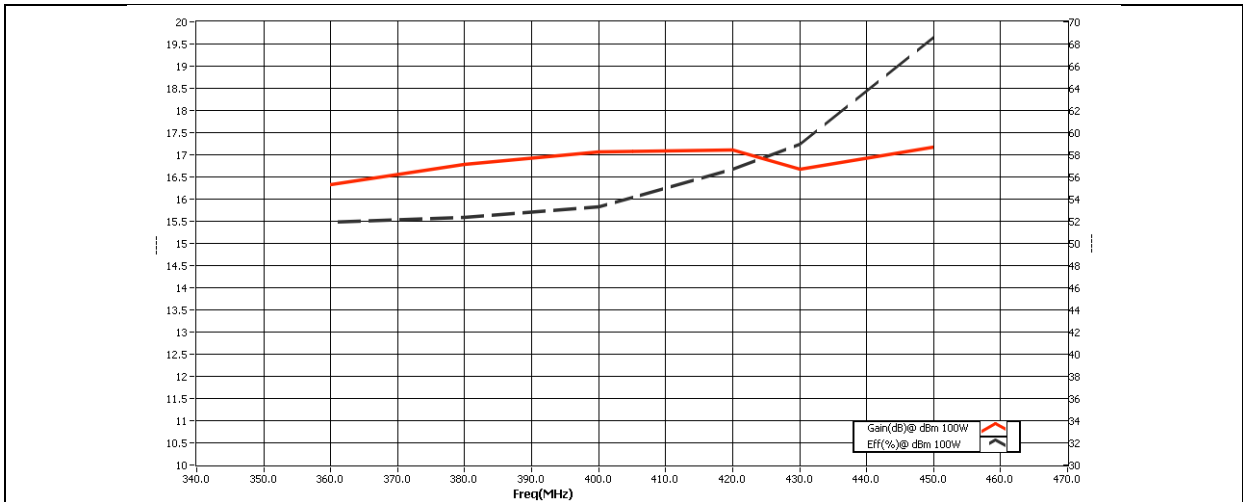


Figure 6. Gain(dB), Eff(%) vs Frequency(MHz) at Pout=100W, 10% Duty Cycle

Pout=100W, Final Modifications-L3=GA3094, 50% Duty

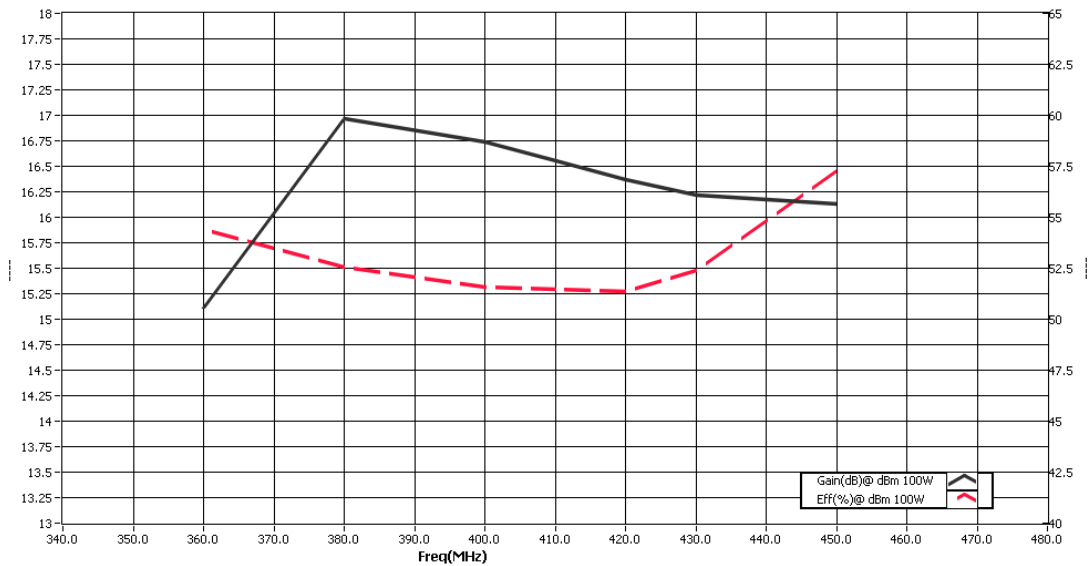
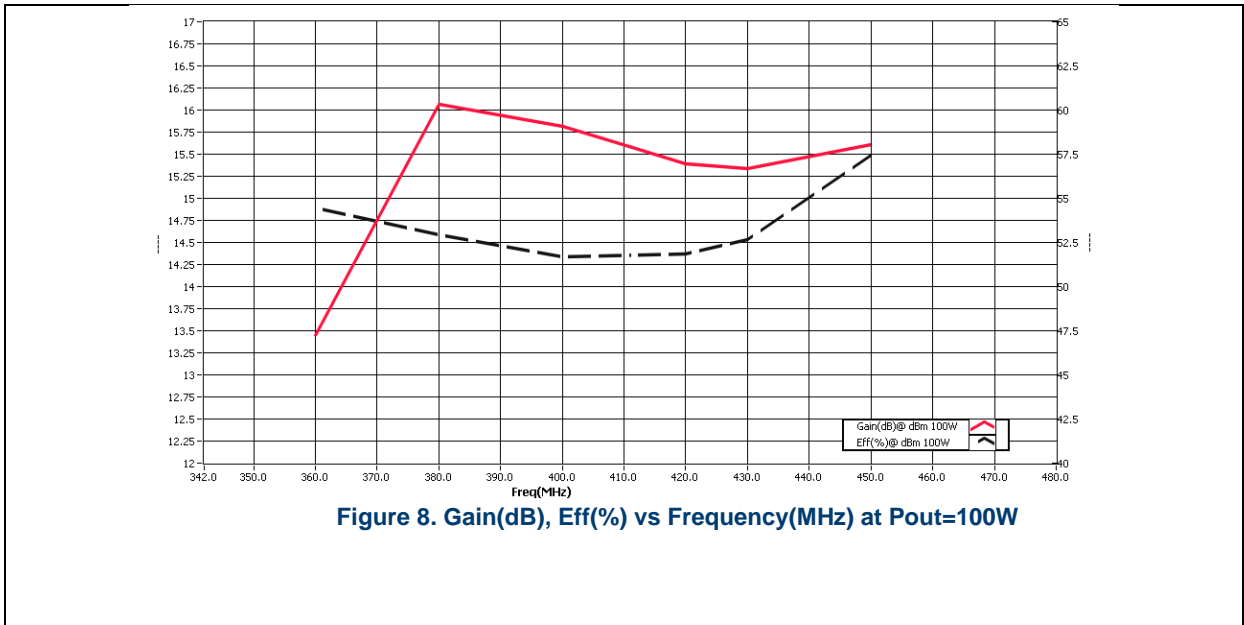


Figure 7. Gain(dB), Eff(%) vs Frequency(MHz) at Pout=100W, 50% Duty Cycle

9.6 Gain, Efficiency vs Frequency at Fixed Power Output

Vdd=50V, Idq=300mA Final Mods, CW Pout=100W



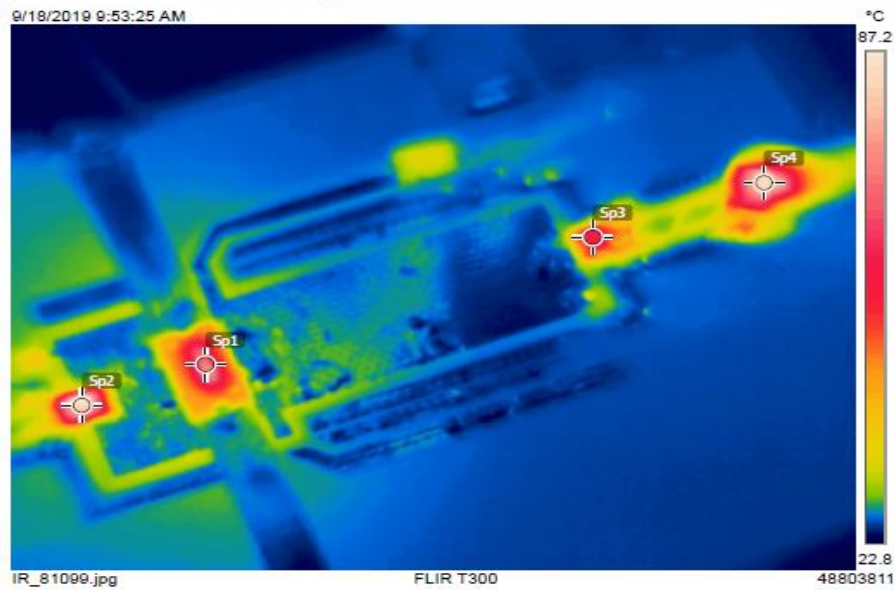
## 10 IR Scans

### 10.1 IR Scan Results

Vdd=50V, Idq=300mA, Frequency=430MHz, Pout=100W



Board 192143\_Mod6. Pout=100W, CW,  
I=3.8, freq=430MHz



#### Measurements

Sp1	74.3 °C
Sp2	85.4 °C
Sp3	62.4 °C
Sp4	86.3 °C

#### Parameters

Emissivity	0.95
Ref. temp.	20 °C

**Figure 9. IR Scan at Pout=10W , Frequency=430MHz**

The 2<sup>nd</sup> Matching Coil L3 is the hottest component on the board.

Temperature of this Coil range from 80-92°C over the 360-450MHz range

## 11 Hardware

### 11.1 Board photograph

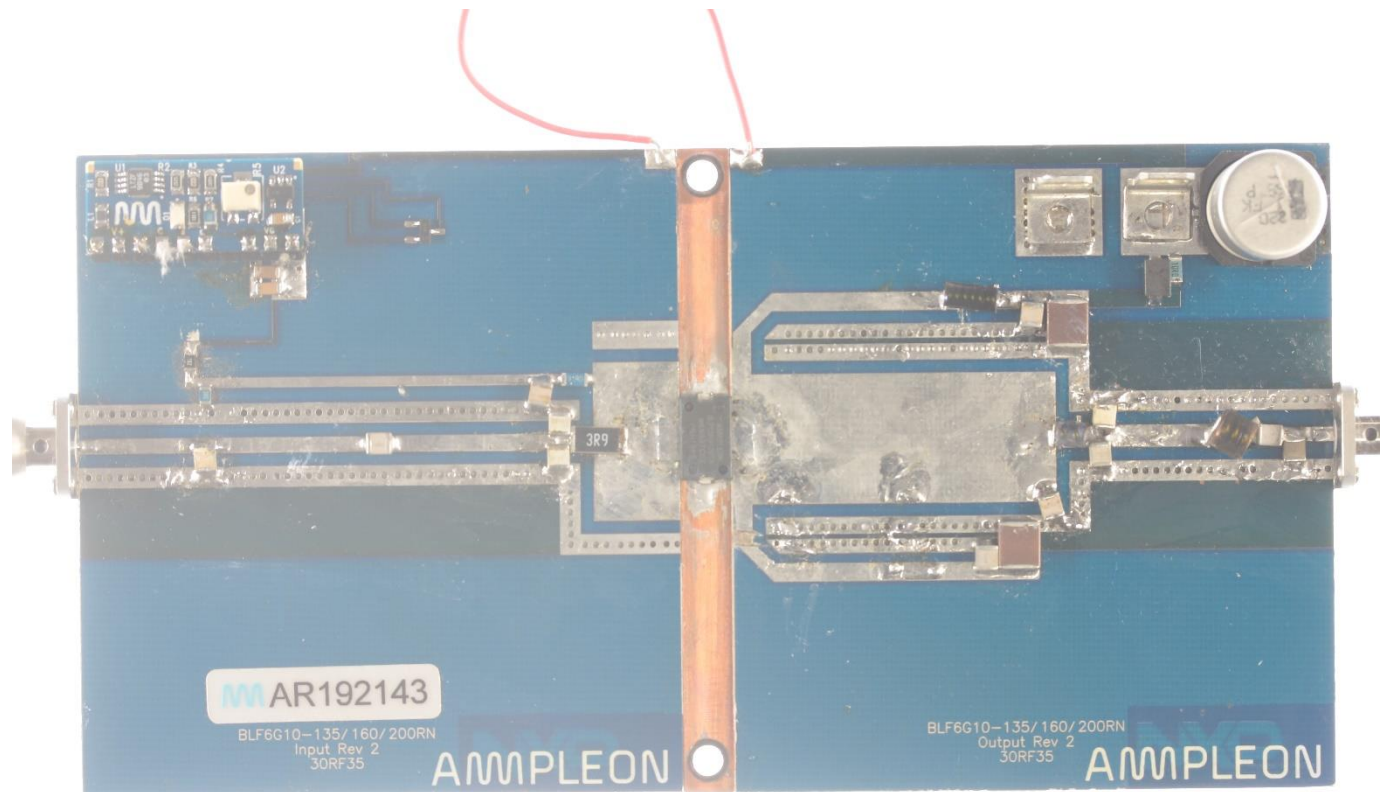


Figure 10. Board Photographs

## 11.2 PCB layout

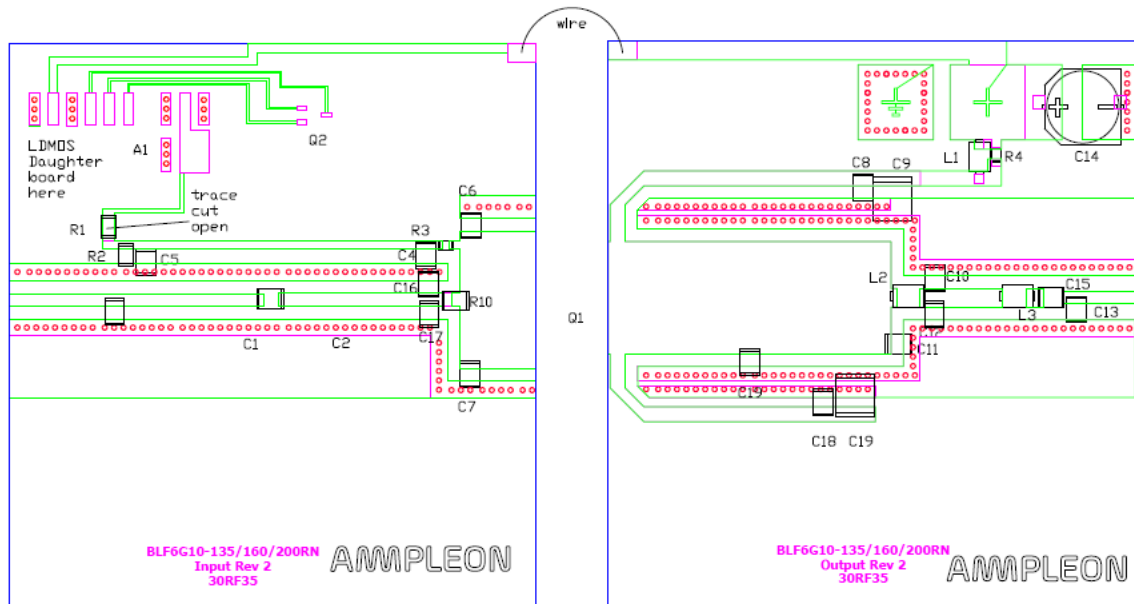


Figure 11.PCB Layout Board #AR192143

## 11.3 Bill of materials

Table 2. BOM

Component	Description	Value	Remarks
PCB Input	Taconic RF35-TC		Er = 3.5, 30 mils thick, 1oz BLF6G10-135/160/200RN Input Rev2
PCB Output	Taconic RF35-TC		Er = 3.5, 30 mils thick, 1oz BLF6G10-135/160/200RN Output Rev2
Q1	Transistor,100W 1000MHz LDMOS		BLP15H9S100
Q2	Transistor, NPN 45V 100mA GP		NXP BC847
C1,C5,C8, C15,C18	Capacitor	100pF	ATC800B orPassive Plus 1111N series
C2	Capacitor	15pF	ATC800B orPassive Plus 1111N series
C3	Capacitor	130pF	ATC800B orPassive Plus 1111N series
C4	Capacitor	100pF	ATC800B orPassive Plus 1111N series
C6, C7	Capacitor	DNP	ATC800B orPassive Plus 1111N series
C9	Capacitor, 100V 10% X7S, 22	10uF	TDK C5750X7S2A106M
C12	Capacitor	12pF	ATC800B orPassive Plus 1111N series
C11	Capacitor	5.6pF	ATC800B orPassive Plus 1111N series
C13	Capacitor	10pF	ATC800B orPassive Plus 1111N series
C14	Capacitor, 63V 20%, alum elc	220uF	Panasonic EEV-FK1J221Q
C16	Capacitor	27pF	ATC800B orPassive Plus 1111N series
C10,C17	Capacitor	12pF	ATC800B orPassive Plus 1111N series
L1	Ferrite Bead		Fair Rite, 2743019447
L2	Inductor 8nH	8nH	Coilcraft A03
L3	Inductor 12nH	12nH	Coilcraft GA3094
R1	Resistor, 0805 size	11K Ohms	Generic
R2	Resistor, 0805 size	20K Ohms	Generic
R3	Resistor, 1210 size	91 Ohms	Generic
R4	Resistor, 1206 size	10 Ohms	Generic
R10	Resistor, 2010 size	3.9 Ohms	Generic

## 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	BLP15H9S100
Date Code	M1919



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