# AR192143

## BLP15H9S100, 360-450 MHz

AMPLEON

V1.0 — 24 September 2019

Application Report

**Document information**

| Info | Content |
|---|---|
| Status | Ampleon Internal |
| Author(s) | Bill Goumas |
| 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 |

# 2 Contents

# 3 List of Figures



# 4 List of Tables



# 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

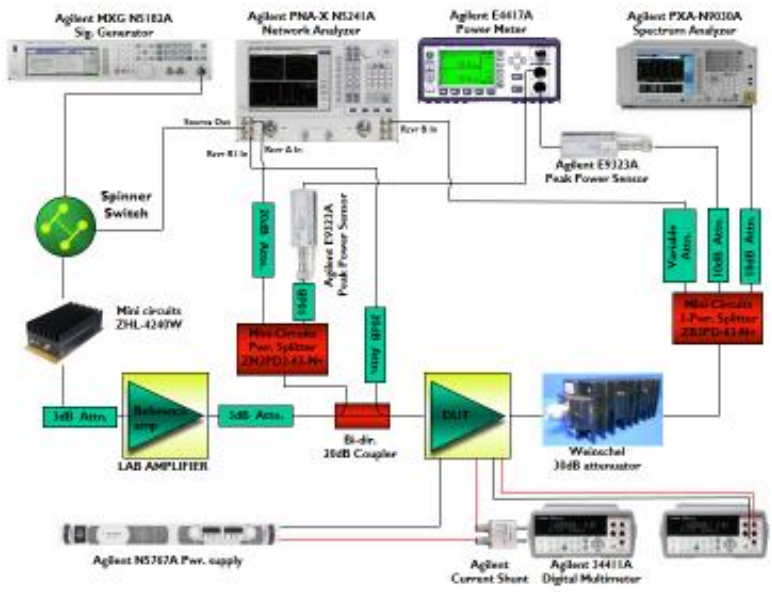
The efficiencies presented include the bias current from the biasing board. The current from the biasing board is ~25mA.

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

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

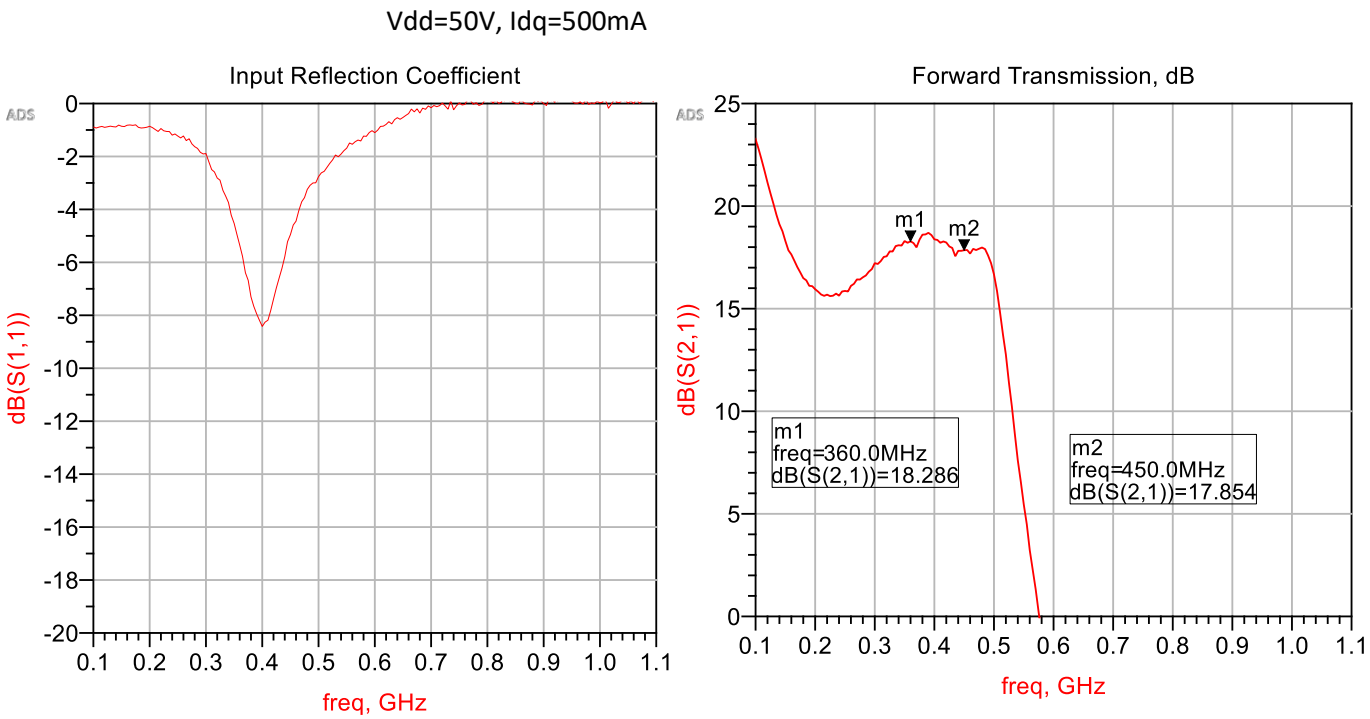



**Figure 2. Small SIgnal Data, Vdd=50V, Idq=500mA, Pin=10dBm**

## 9.2 Pulse Gain and Efficiency Sweeps

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

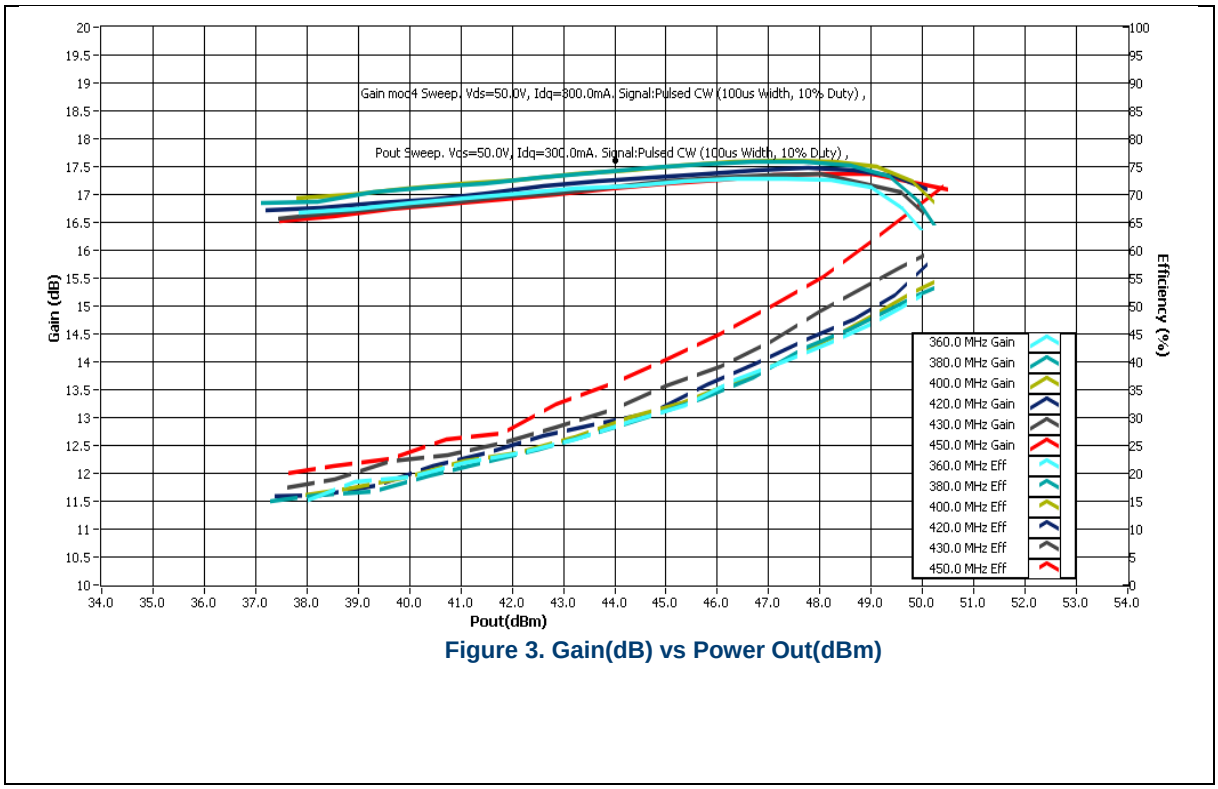



**Figure 3. Gain(dB) vs Power Out(dBm)**

## 9.3 CW Gain and Efficiency Sweeps

Vdd=50V, Idq=300mA,

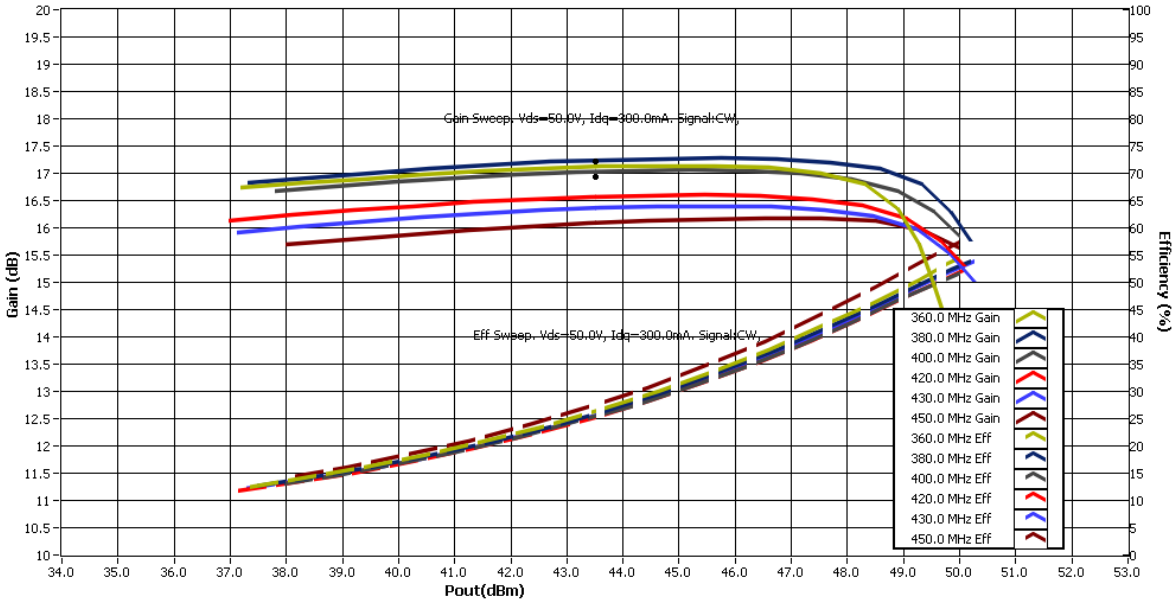



**Figure 4. Gain(dB) , Efficiency(%) vs Power Out(dBm)**

## 9.4 P1dB

Vdd=50V, Idq=300mA, CW

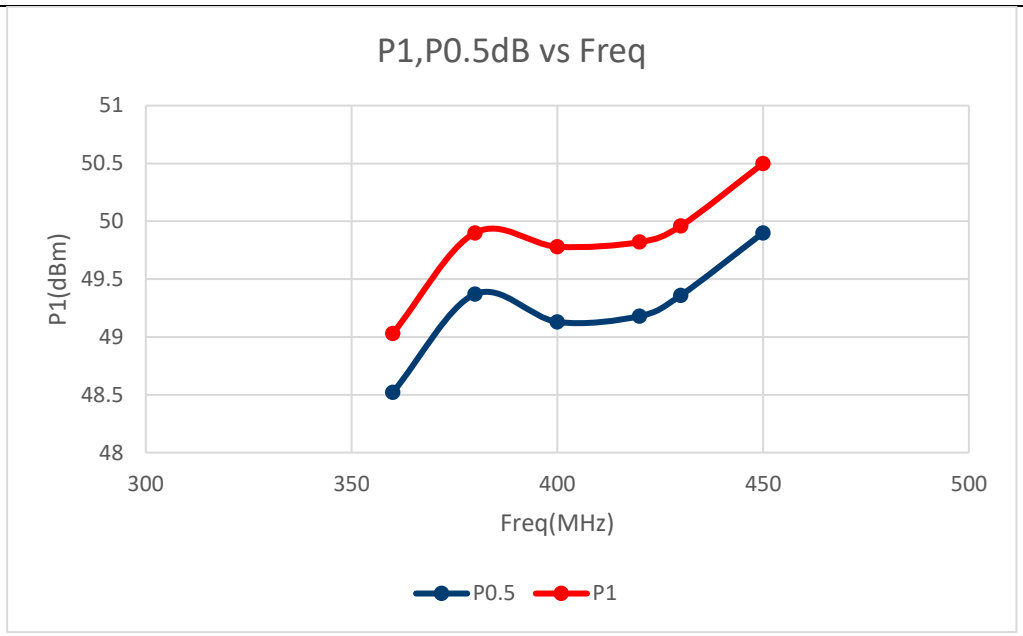



**Figure 5. P1(dBm) vs Frequency(MHz)**

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

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

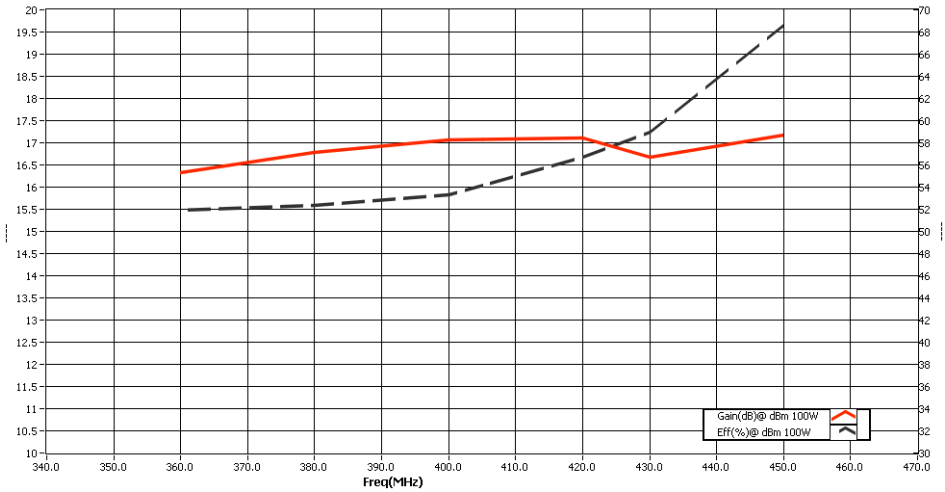


**Figure 6. Gain(dB), Eff(%) vs Frequency(MHz) at Pout=100W, 10% Duty Cycle**

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

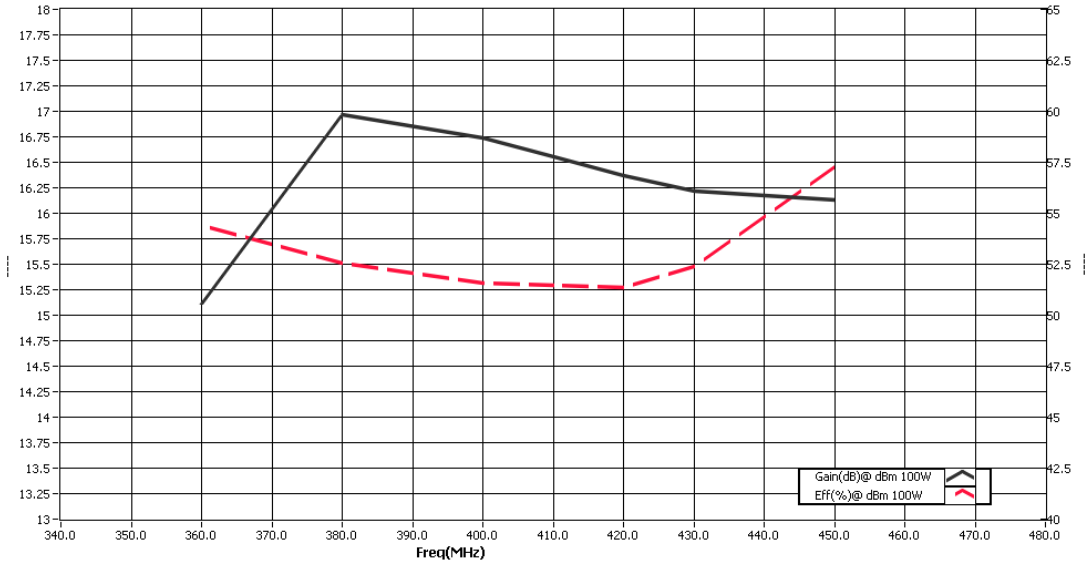


**Figure 7. Gain(dB), Eff(%) vs Frequency(MHz) at Pout=100W, 50% Duty Cycle**

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

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

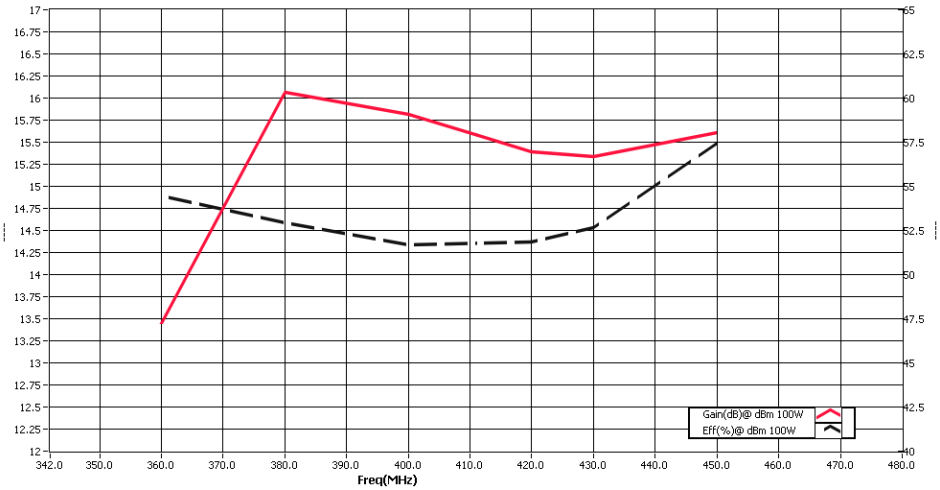


**Figure 8. Gain(dB), Eff(%) vs Frequency(MHz) at Pout=100W**

# 10 IR Scans

## 10.1 IR Scan Results

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


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

The 2nd 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

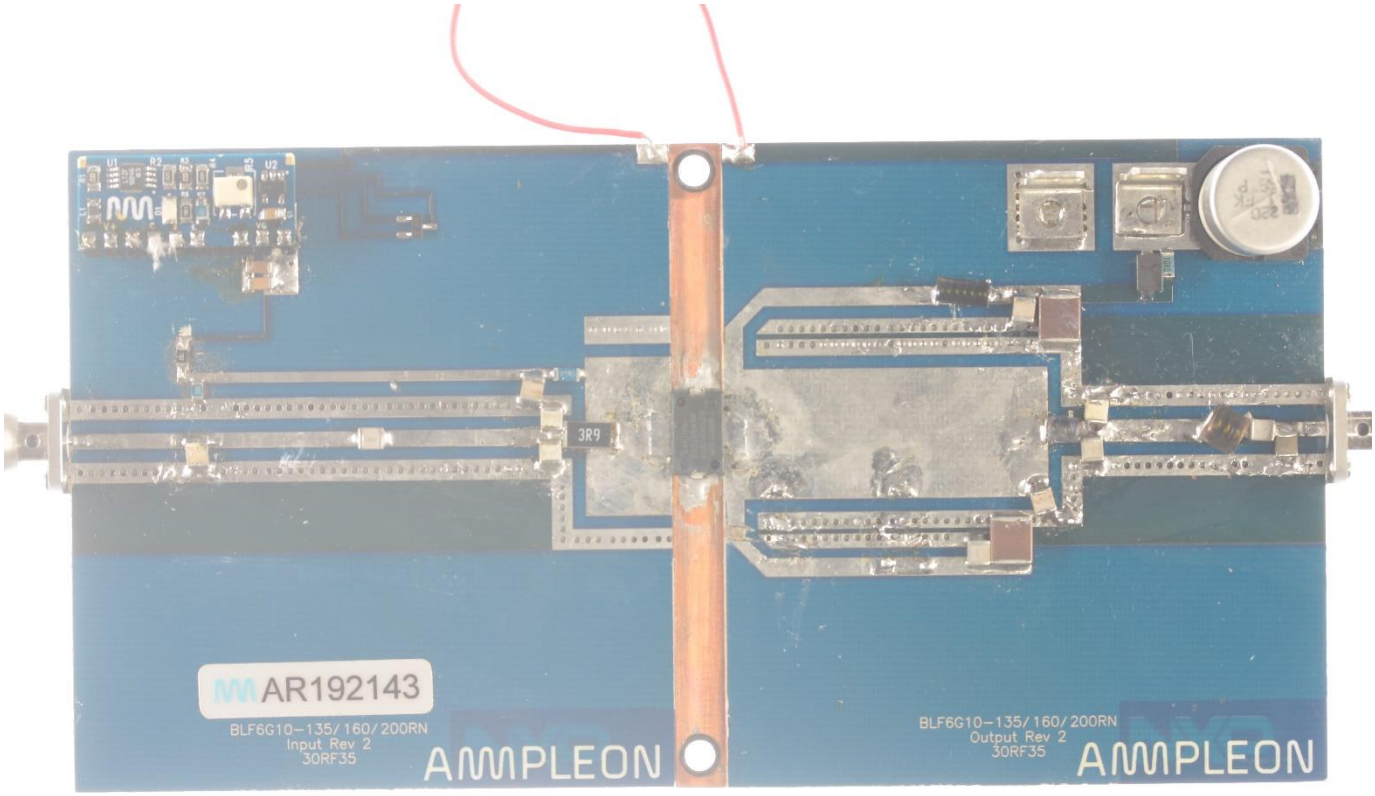


**Figure 10. Board Photographs**

## 11.2 PCB layout

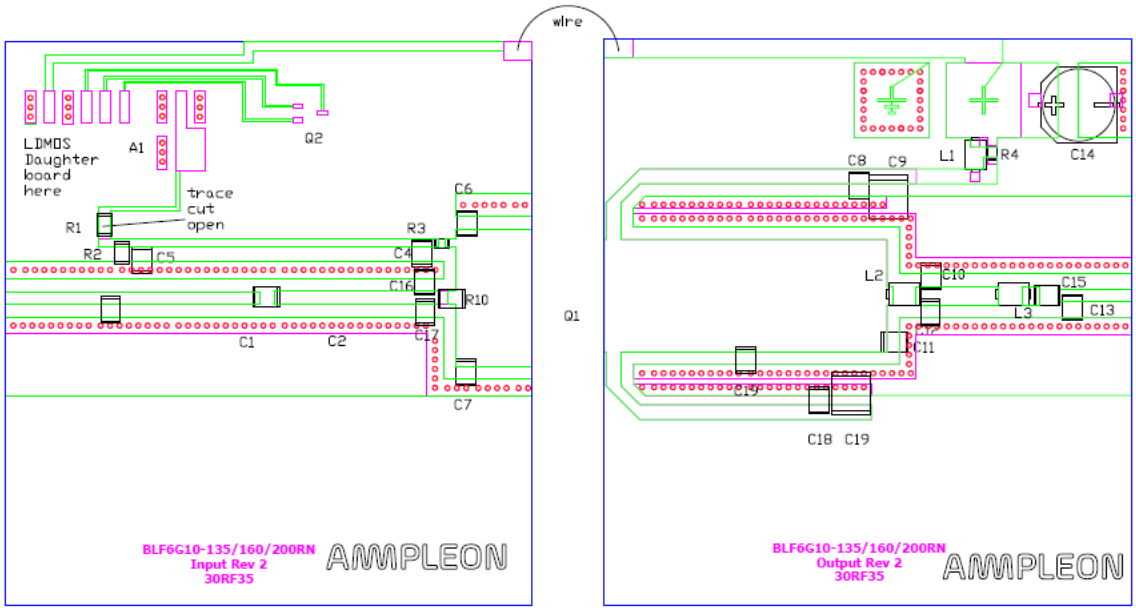


**Figure 11.PCB Layout Board #AR192143**

## 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 el | 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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