AR192151

BLP15H9S10, 380-450 MHz

AMPLEON

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Application Report

Document information

Info	Content
Status	General Publication
Author(s)	Bill Goumas
Abstract	Measurement results of BLP15H9S10 LDMOS device in board #AR192151 tested over 380-450 MHz at 24-32V

1 Revision History

Table 1. Report revisions

Revision No.	Date	Description	Author
1.0	20190802	Initial document	Bill Goumas
2.0	20220422	General Publication	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 AR192151. The device used is a BLP15H9S10 which is a Gen9 10W LDMOS device in an overmolded plastic package.

Customer Requirements are 380-430MHz, but board was optimized and tested over 360-450MHz for future use.

All Two tone IM Data is with 100kHz tone spacing,

PC trace near Drain DC connection ripped off the board, so this unit is kept for reference. Board layout was updated to eliminate this issue and add bias board.

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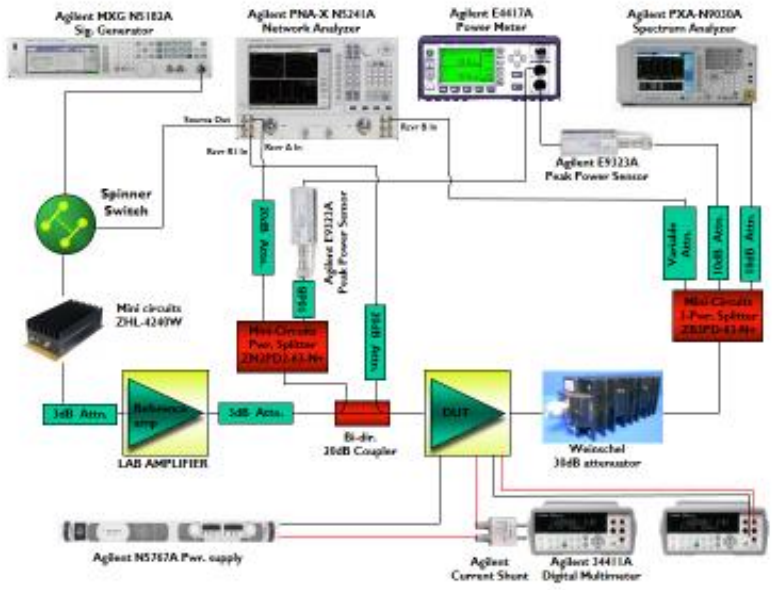
6 Biasing

6.1 Bias Details

For Vdd =50 , Vgs~2.0-2.2 V for Idq =45-125mA.

7 Test Bench Set Up

Figure 1.Test Bench Equipment set up



8 Summary

Table 2. RF Performance Summary, Vdd=50V

Symbol	Parameter	Range	Unit
Freq.	Frequency Range	360-450	MHz
P1dB	Power at 1dB Compression	38-39	dBm
P3dB	Power at 3dB Compression	39-40	dBm
Eff at Pout=10W	Efficiency at Pout=10W	50-57	%
Gain	Gain at Pout=10W	17-19	dB

Table 3. RF Performance Summary, Vdd=40V

Symbol	Parameter	Range	Unit
Freq.	Frequency Range	360-450	MHz
P1dB	Power at 1dB Compression	37-38	dBm
Gain	Gain at Pout=5W	18-21	dB

9 Performance Details

9.1 Small Signal Results

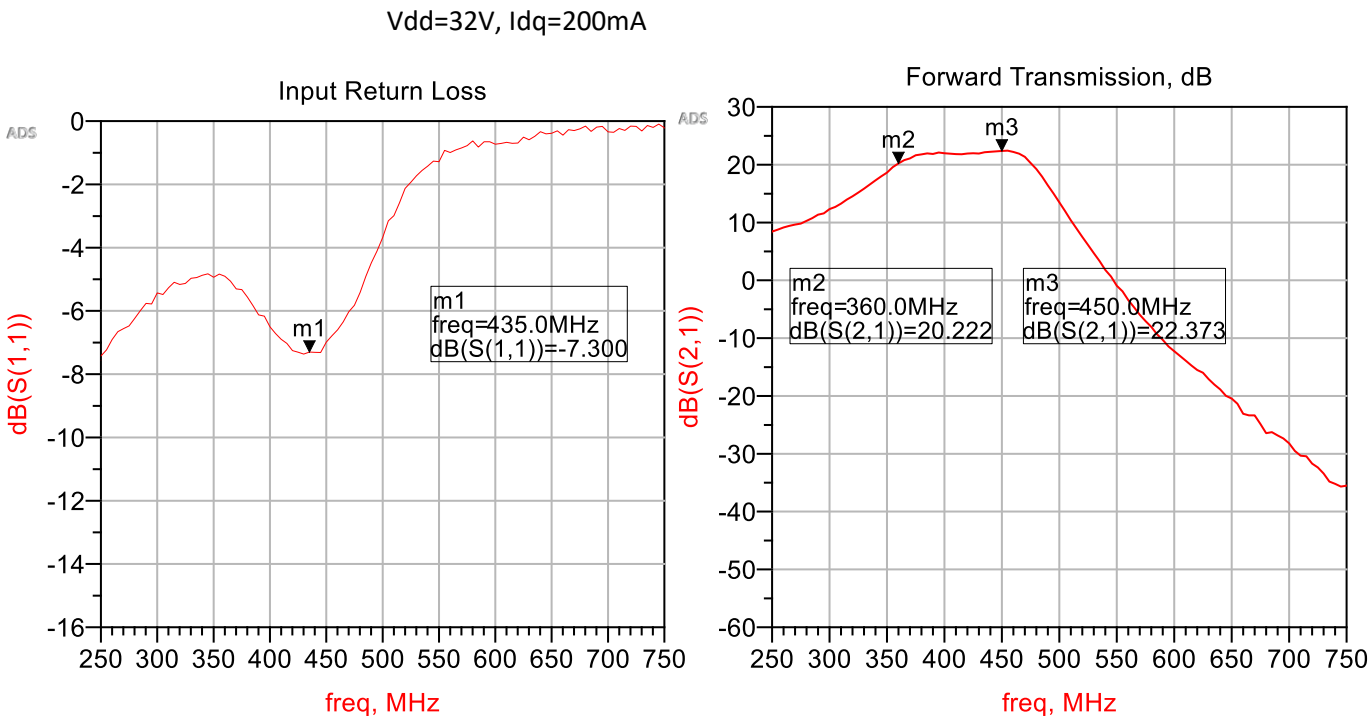


Figure 2. Small SIgnal Data, Sweep Vdd=50V, Idq=75mA, Pin=10dBm

9.2 Pulse Characteristics

Vdd=50V, Idq=75mA, 10% Duty Cycle,PW=100usec

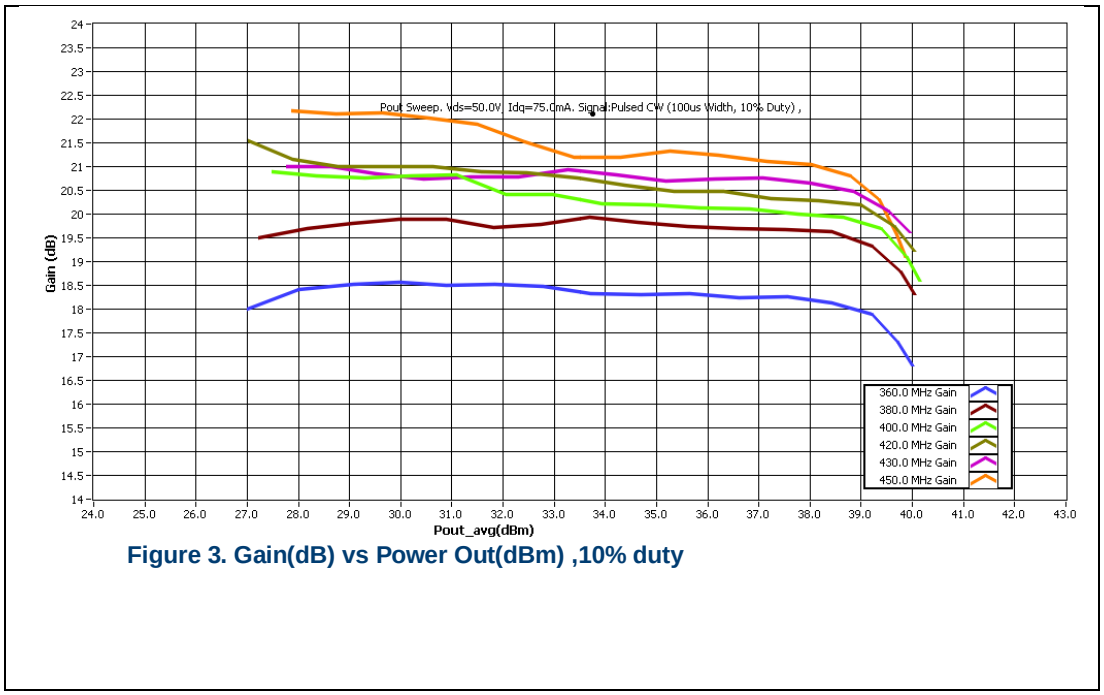


Figure 3. Gain(dB) vs Power Out(dBm) ,10% duty

9.3 CW Performance

Vdd=50V, Idq=75mA

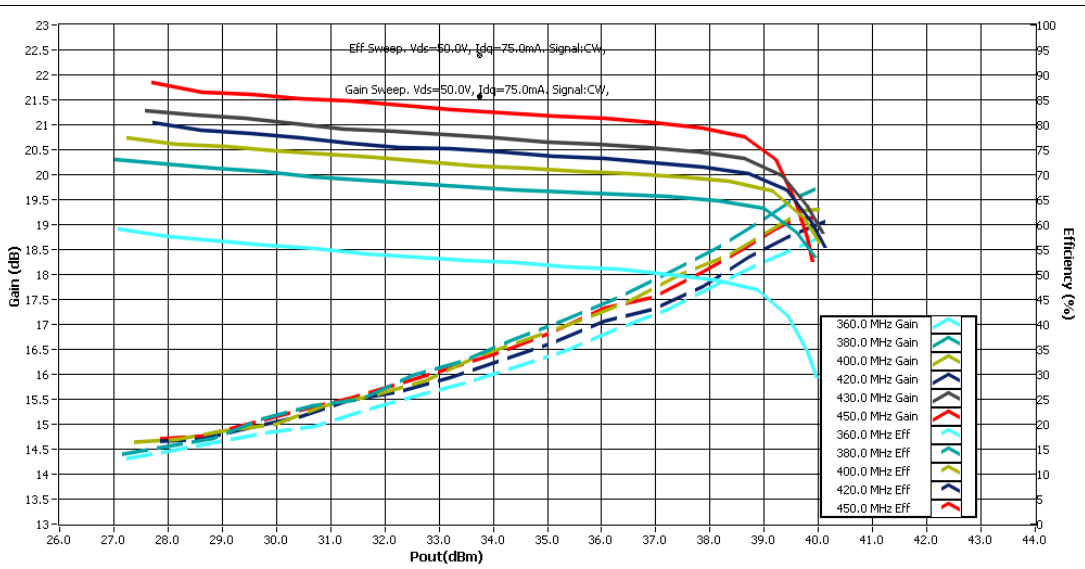


Figure 4. Gain(dB), Eff(%) vs Power Out(dBm)

Vdd=40V, Idq=75mA

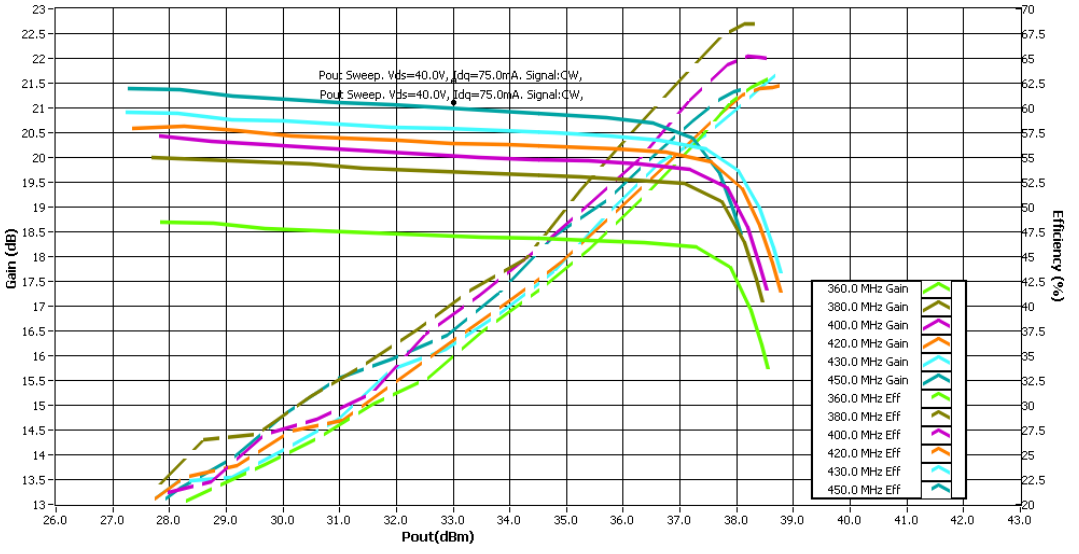


Figure 5. Gain(dB), Eff(%) vs Power Out(dBm)

9.4 IM Data

Vdd=50V, Idq=75mA

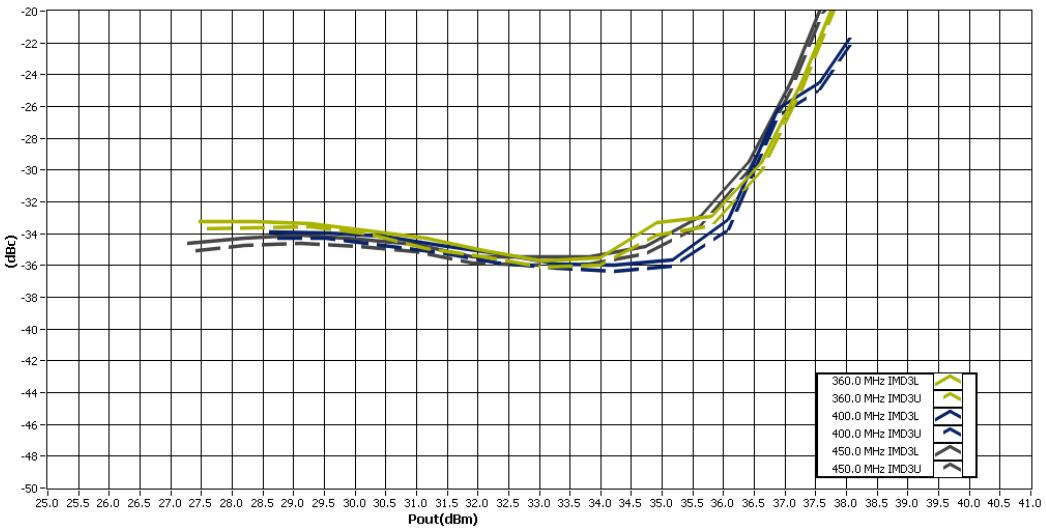


Figure 6. IMD3(dBc) vs Po(dBm) average

IMD5 vs Frequency, Vdd=50V, Idq=75mA

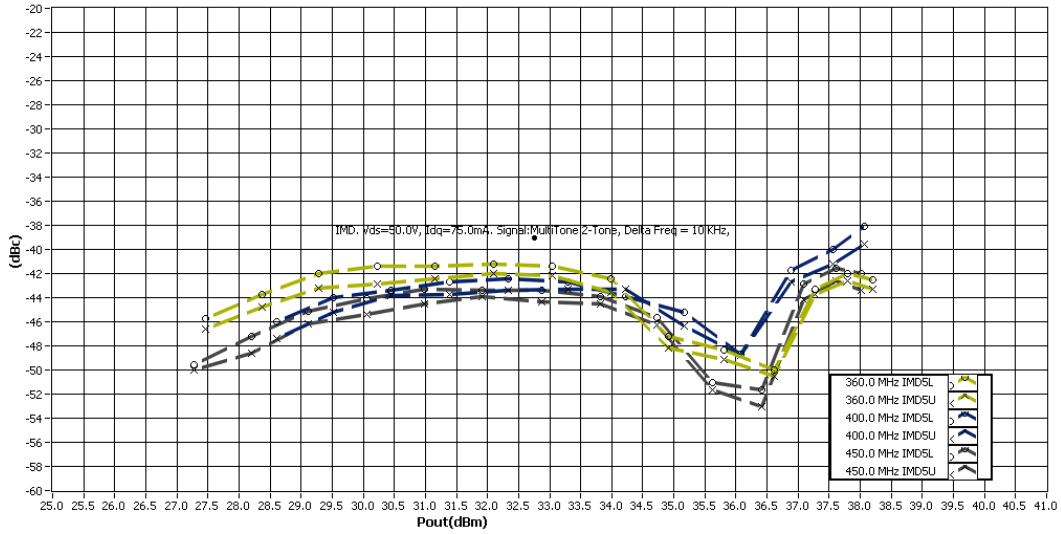


Figure 7. IMD5(dBc) vs Po average

9.5 IMD Data, Sweep Idq, Frequency=400MHz

Vdd=50V, Sweep Idq=45mA(green).75mA(black),125mA (purple)

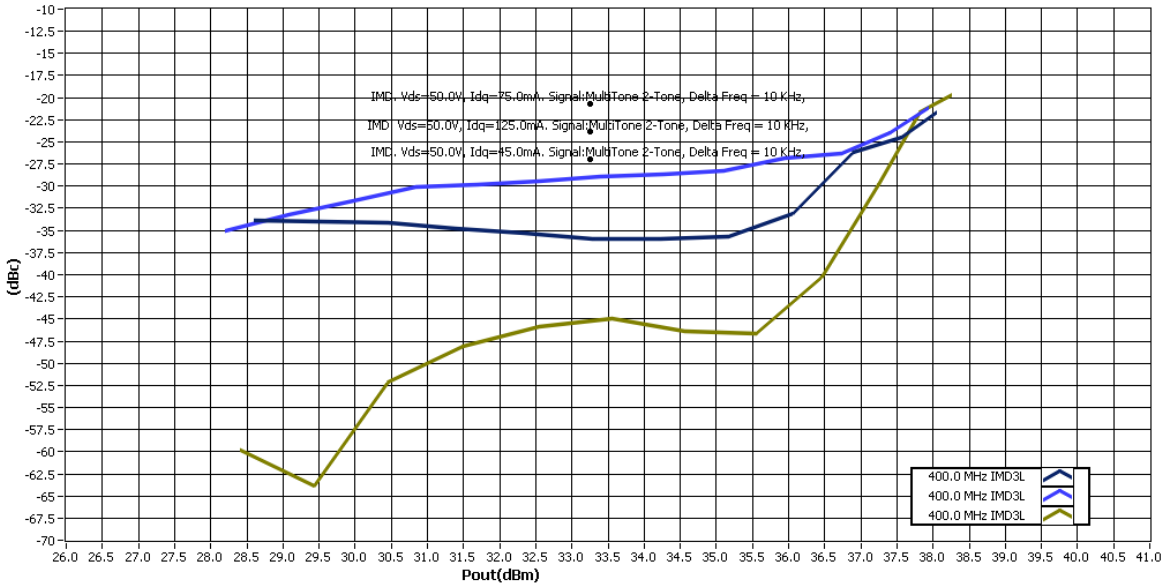


Figure 8. Worst case IM3,IM5 vs Po avg(dBm), Freq=400MHz

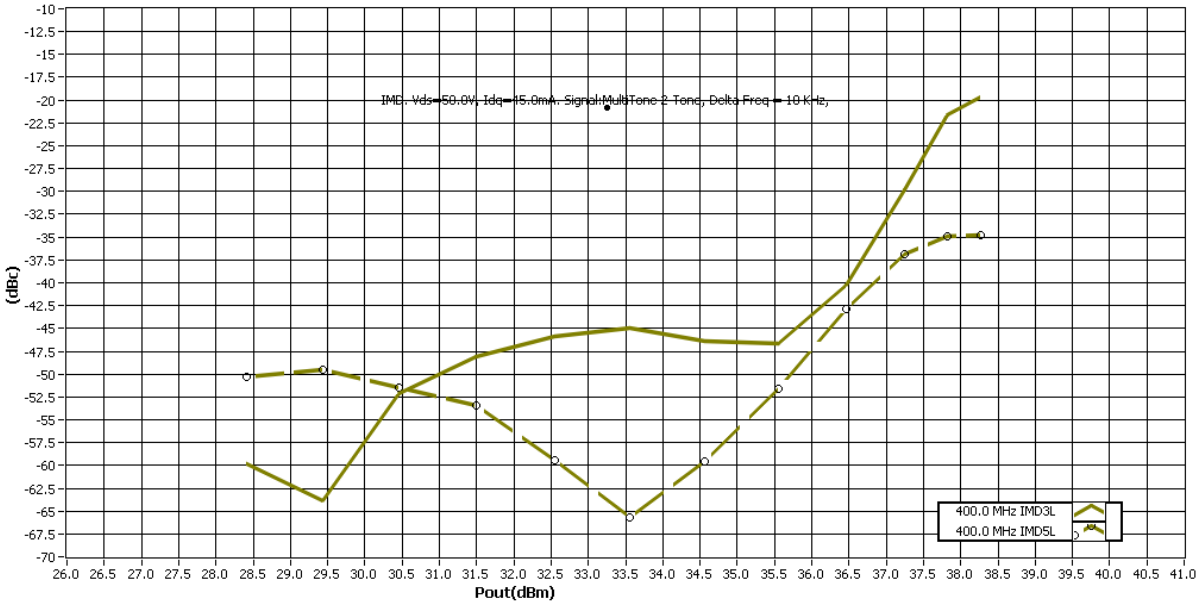


Figure 9. IMD3, IMD5 vs Po avg(dBm),Freq=400MHz, Idq=45mA

9.6 IMD3 vs Pout Average and Frequency, Sweep Idq

Vdd=50V,Idq=45mA

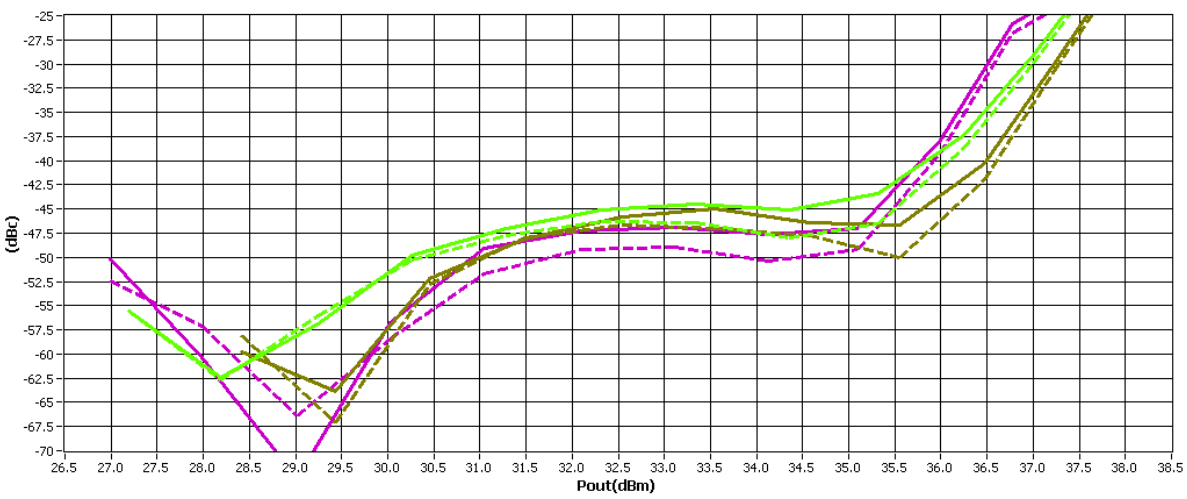


Figure 10. IMD3 vs Po average, Idq=45mA

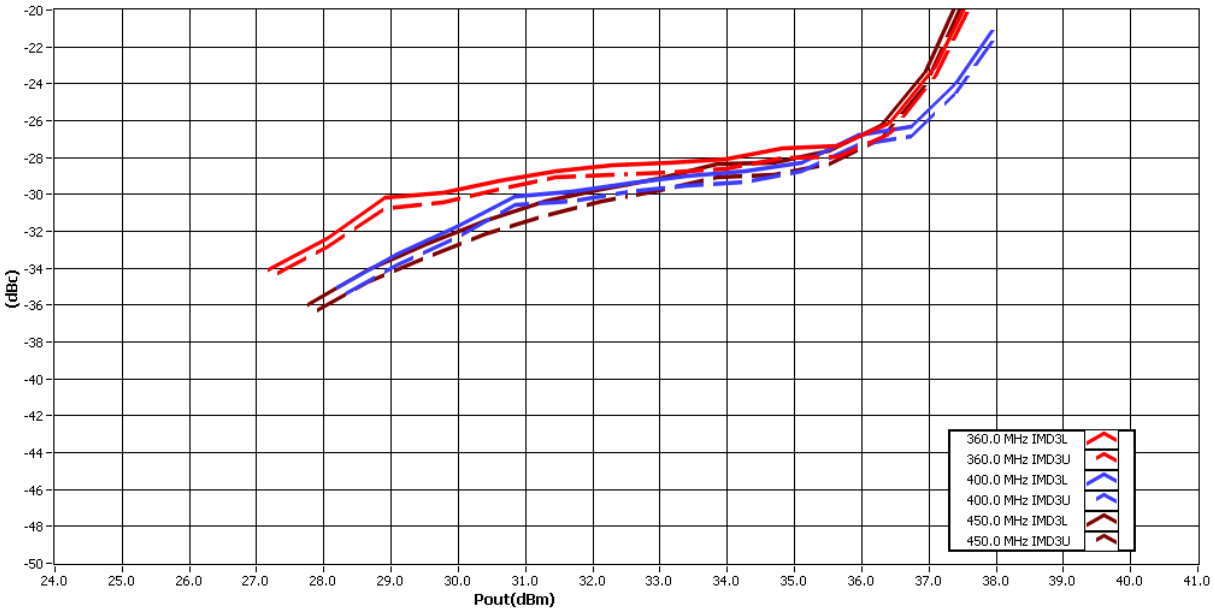


Figure 11. IMD3 vs Po avg, aidq=125mA

9.7 IMD5 vs Pout Average and Frequency, Sweep Idq

Vdd=50V

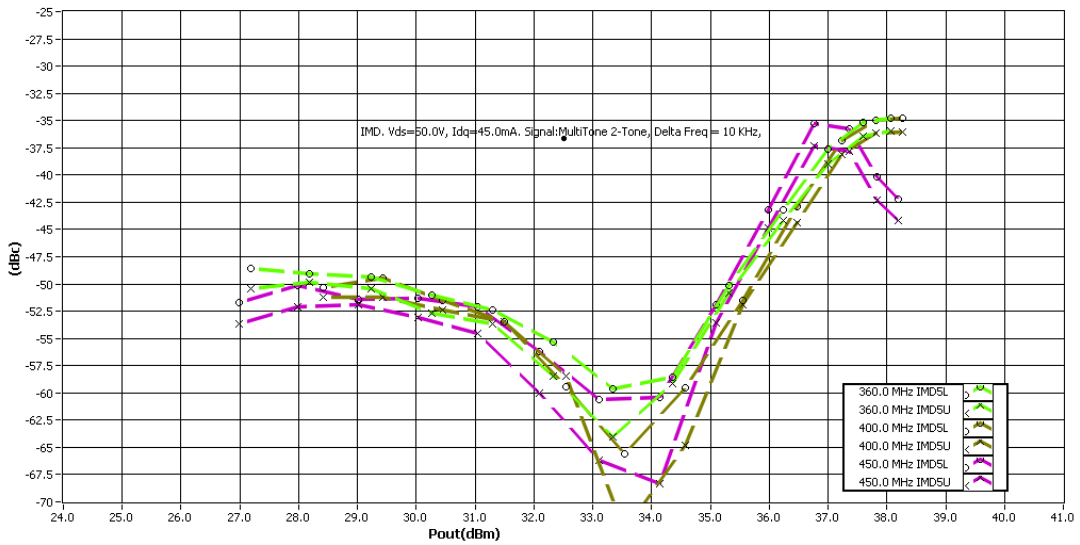


Figure 12. IMD5 vs Po average, Idq=45mA

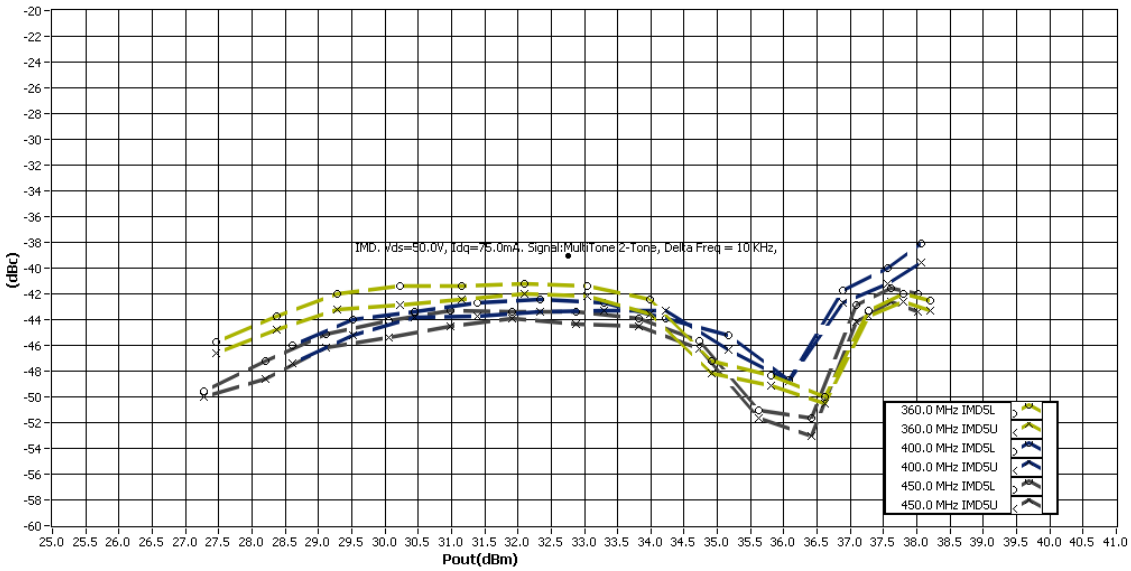


Figure 13. IMD5 vs Po avg, Idq=75mA

9.8 CW Performance at Fixed Power Output

Gain(dB) (Solid line),Eff(%) (Dashed line) at Pout=5W and 10W

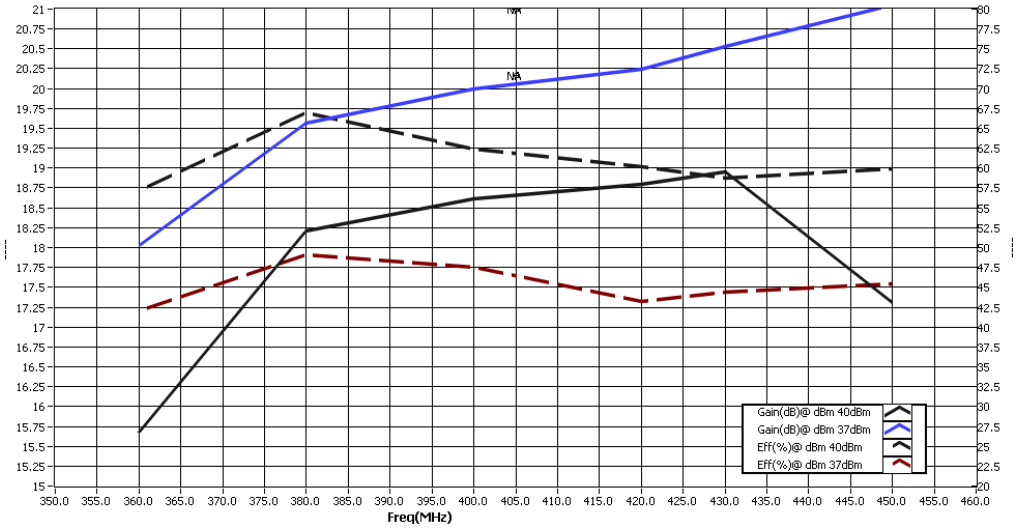


Figure 14. Gain, Eff vs Freq, Po=5W and 10W

P1dB vs Freq, Vdd=40V=red,Vd=50=blk

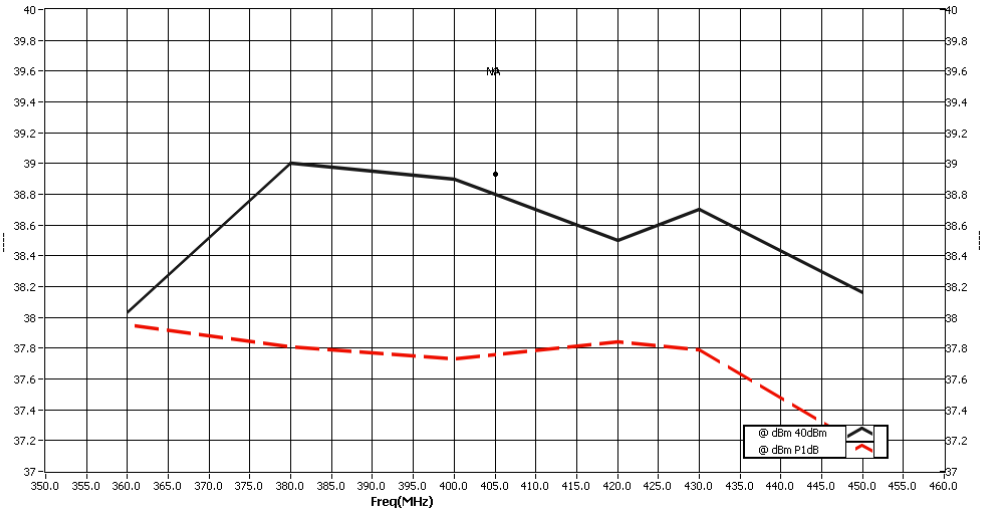


Figure 15. P1dB vs Freq,

10 Hardware

10.1 Board photograph

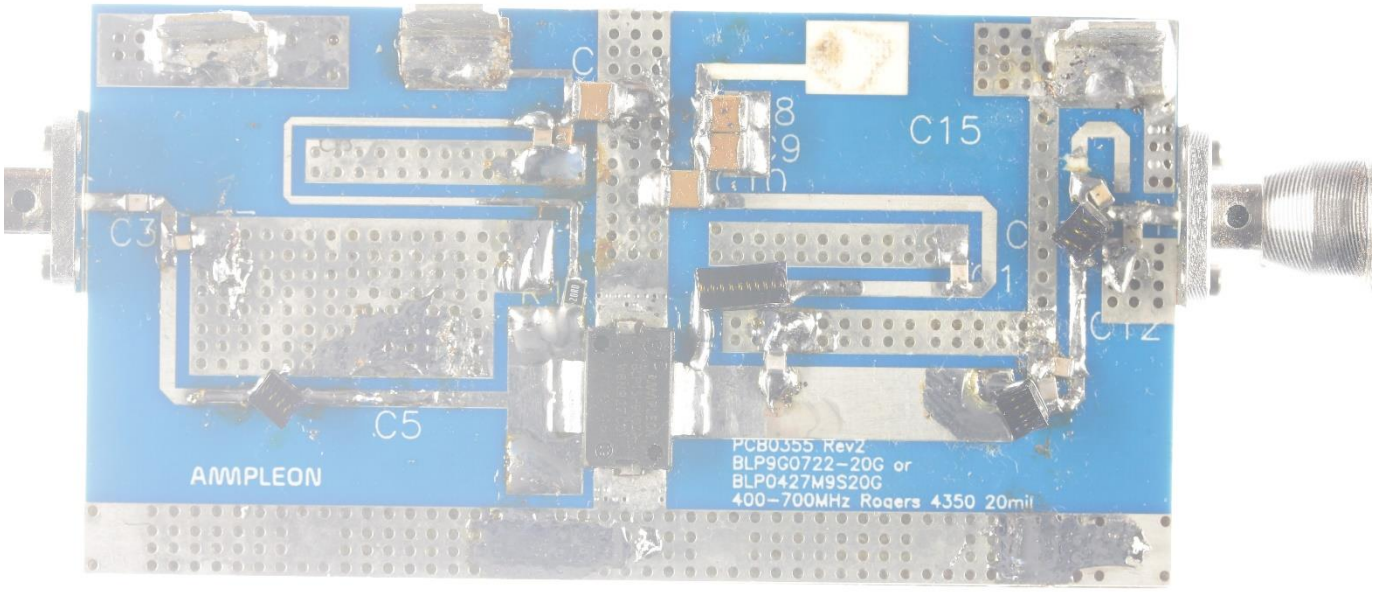


Figure 16. Board Photograph

10.2 PCB layout

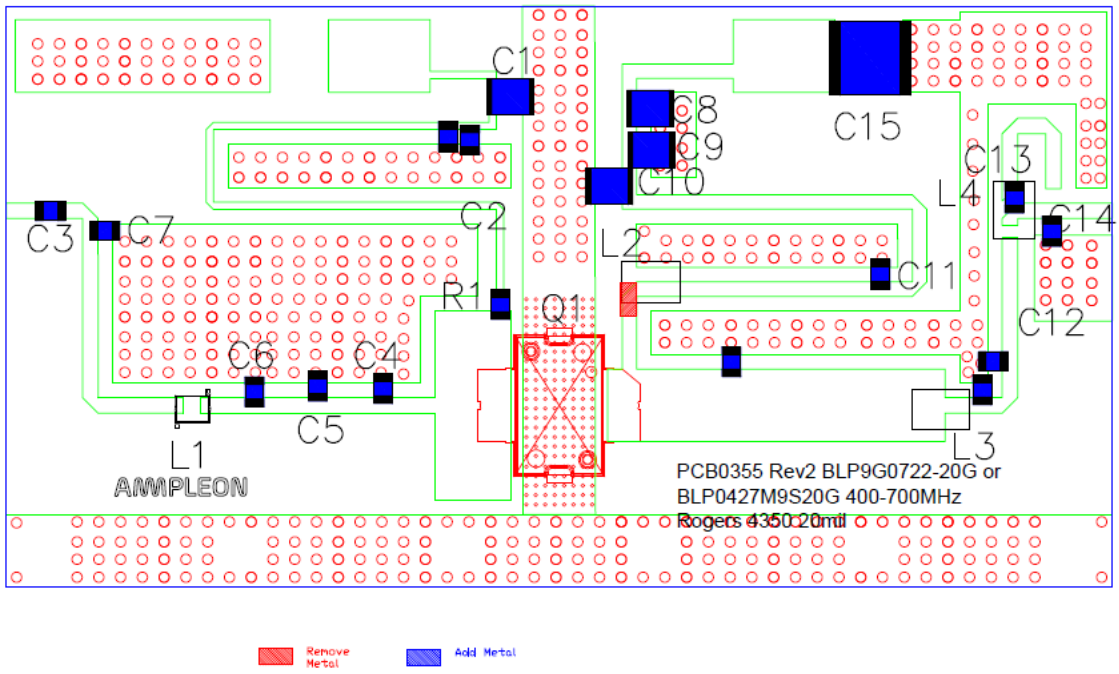


Figure 17.PCB Layout

10.3 Bill of materials

Table 4. BOM

Designator	Description	Manufacturer	Part#
PCB	20 mil thk. Rogers 4350	Avanti Circuits	PCB0355 Rev 2
Q1	RF Transistor 10W 50V LDMOS	Ampleon	BLP15H9S10
R1	20 Ω	Generic	1206
C1,C8	1uF, ceramic, 50V, ±10%	Murata	GRM31CR71H105K
C2,C10	0.01uF,100V,X7R,1206	Murata	GRM319R72A103KA01D
C2A,C9	0.1uF 100V,X7R	Murata	GRM319R72A104KA01D
C3,C11,C13	120pF	ATC	600F
C4	DNP	ATC	600F
C5	DNP	ATC	600F
C7	1.5pF	ATC	600F
C12	24pF	ATC	600F
C12A	12pF	ATC	600F
C14	15pF	ATC	600F
C15	100uF, 50 V electrolytic SMT	Panasonic	
Cadd	2.2pF	ATC	600F
L1	12nH	Coilcraft	0908SQ-12
L2	43nH	Coilcraft	B10T
L3	12.5nH	Coilcraft	A04T
L4	8nH	Coilcraft	A03T

10.4 PCB materials

Table 5. Board Specifications

Parameter	Value
Manufacturer	Rogers
Type	4350
Thickness	20 mils, 1oz. copper
Layers	2, top/bottom. Bottom all copper

10.5 Device markings

Table 6. Device Specifications

Parameter	Value
Manufacturer	Ampleon
Device	BLP15H9S10
Date Code	M1915

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