Document information

Info	Content
Status	General Publication
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Abstract	Measurement results of the BLP15H9S10G LDMOS Device in Board #AR222005 tuned for 2-30MHz at 50V

1 Revision History

Table 1. Report revisions

Revision No.	Date	Description	Author
1.0	20180608	Initial document	Tyler Ware

2 Contents

3 List of Figures

4 List of Tables

5 General Description

This report presents the measurement results Demo Board AR222005 using the BLP15H9S10G. The demo achieves ≥ 40dBm CW at 2-30MHz.

6 Biasing

6.1 Bias Details

VDD =50V
IDQ =50mA

7 Test Bench Set Up

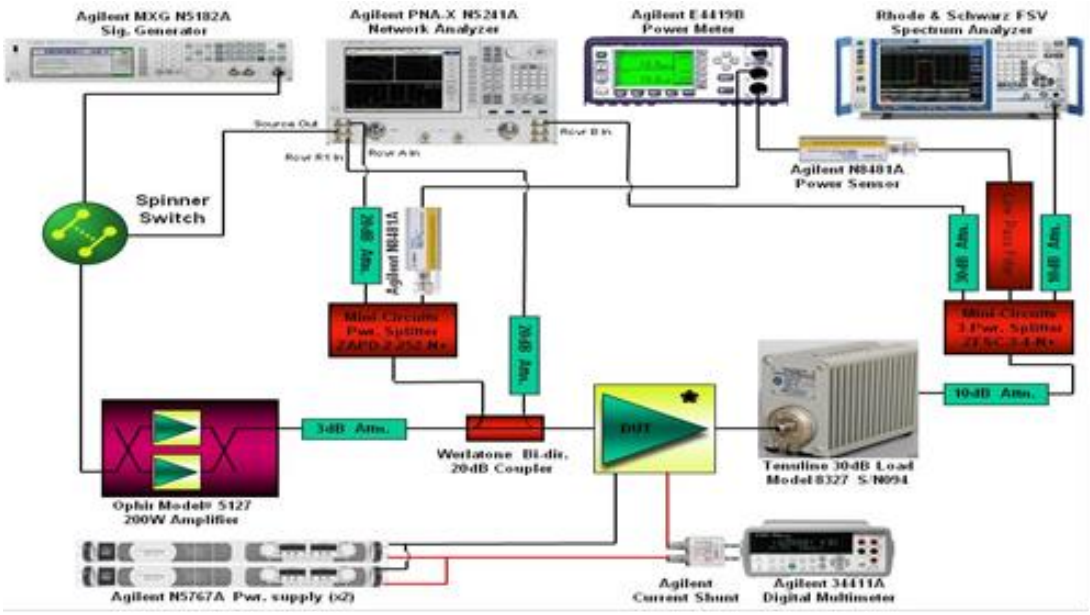

Figure 1.Test Bench Equipment set up

Demo was screwed down to a liquid cold plate with external cooling fan for testing

8 Performance Summary

Table 2. RF Performance, Frequency = 2-30MHz, Signal: CW

Parameter	Measurement	Unit
Specified frequency	15	MHz
Drain voltage	50	V
Quiescent drain current	50	mA
P3dB	11.64	W
Efficiency at P3dB	54.02	%
Gain at P3dB	19.32	dB

The BLP15H9S10G is a 10W LDMOS driver transistor for broadcast and industrial applications. The excellent ruggedness of this device makes it ideal for digital and analog transmitter applications in the frequency range from HF to 2 GHz.

AR222005_BLP15H9S10G_50_2-30MHz CW DriveUpData				
Freq(MHz)	P1.0dB	Pout(W)	P1dB Gain (dB)	P1dB Eff(%)
2	38.61	7.26	22.05	38.31
3	38.94	7.83	22.16	42.24
5	39.28	8.47	22.14	45.27
7.5	39.52	8.95	22.03	47.59
10	39.67	9.27	21.85	47.47
15	39.71	9.35	21.33	49.54
20	39.51	8.93	20.71	52.02
25	39.83	9.62	19.89	53.12
30	39.99	9.98	19.35	53.59
Freq(MHz)	P2.0dB	Pout(W)	P2dB Gain (dB)	P2dB Eff(%)
2	39.32	8.55	21.06	42.24
3	39.66	9.25	21.16	44.81
5	40.01	10.02	21.14	47.60
7.5	40.25	10.59	21.03	48.64
10	40.35	10.84	20.84	51.59
15	40.29	10.69	20.32	55.27
20	39.99	9.98	19.70	50.75
25	40.29	10.69	18.91	52.79
30	40.44	11.07	18.35	55.68
Freq(MHz)	P3.0dB	Pout(W)	P3dB Gain (dB)	P3dB Eff(%)
2	40.05	10.12	20.04	43.98
3	40.12	10.28	20.16	45.63
5	40.47	11.14	20.13	50.09
7.5	40.69	11.72	20.04	51.75
10	40.75	11.89	19.86	54.36
15	40.66	11.64	19.32	54.02
20	40.30	10.72	18.71	52.26
25	40.55	11.35	17.92	54.74
30	40.68	11.69	17.33	56.89

9 Performance Details

9.1 Small Signal Results

Vdd=50V, Idq=50mA, Pin=10dBm

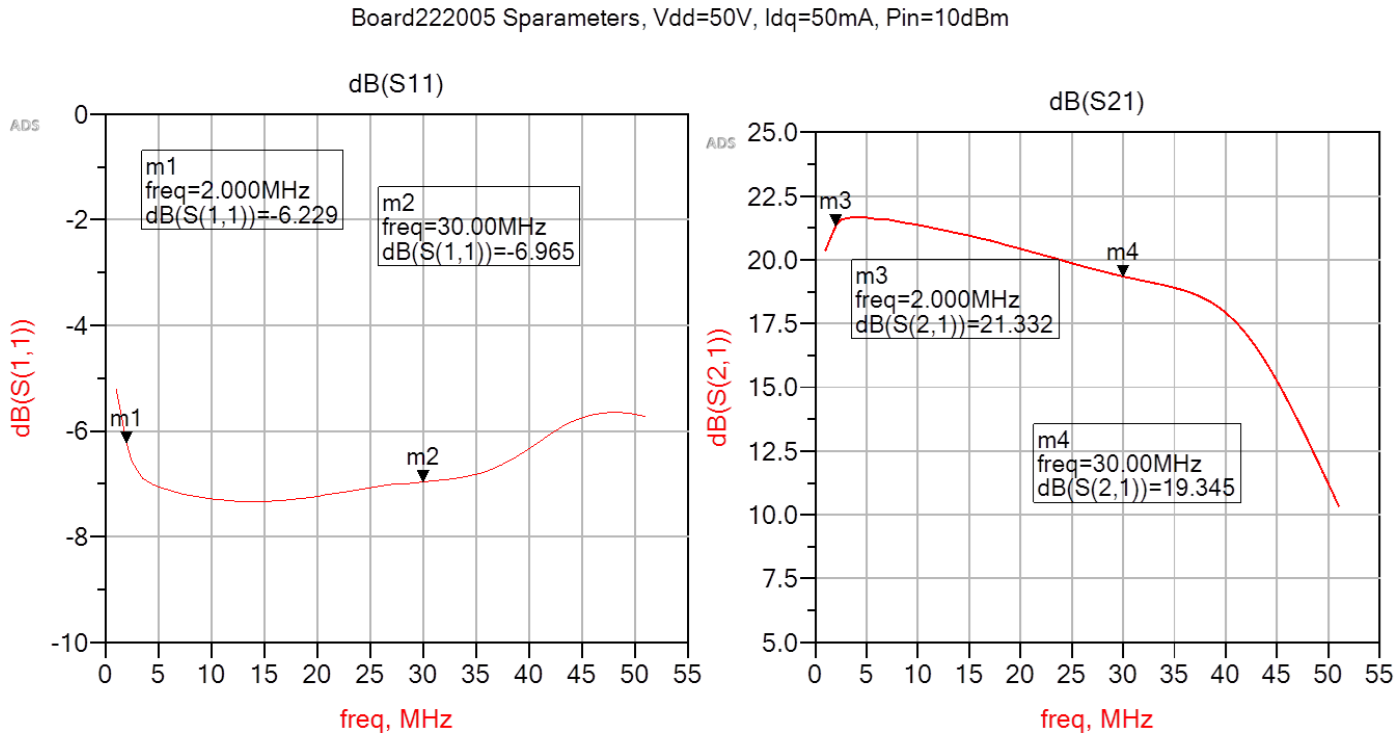

Figure 2. Small Signal results, Vdd=50V, Idq=50mA, Pin=10dBm

9.2 CW Gain

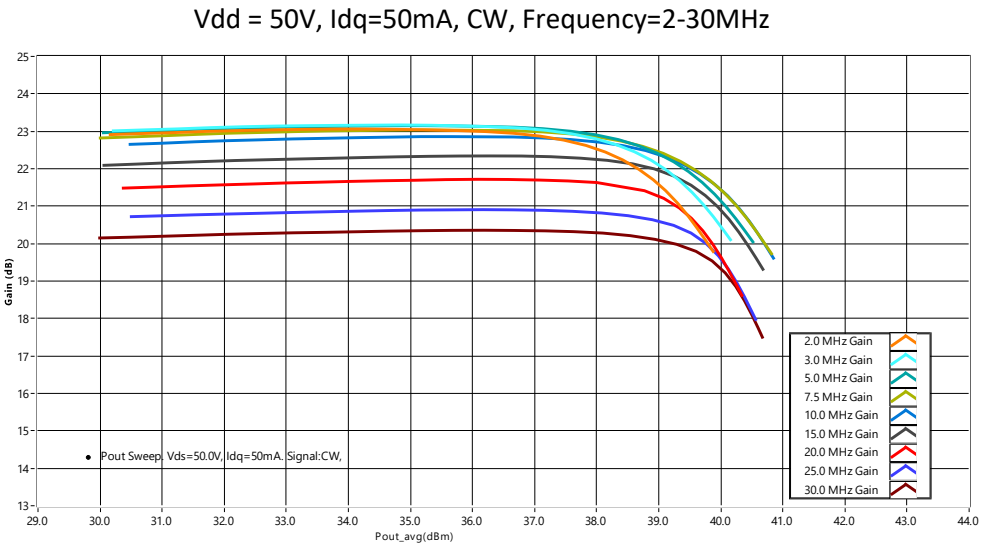

Figure 3. CW Gain (dB) vs Power Out(dBm)

9.3 CW Efficiency

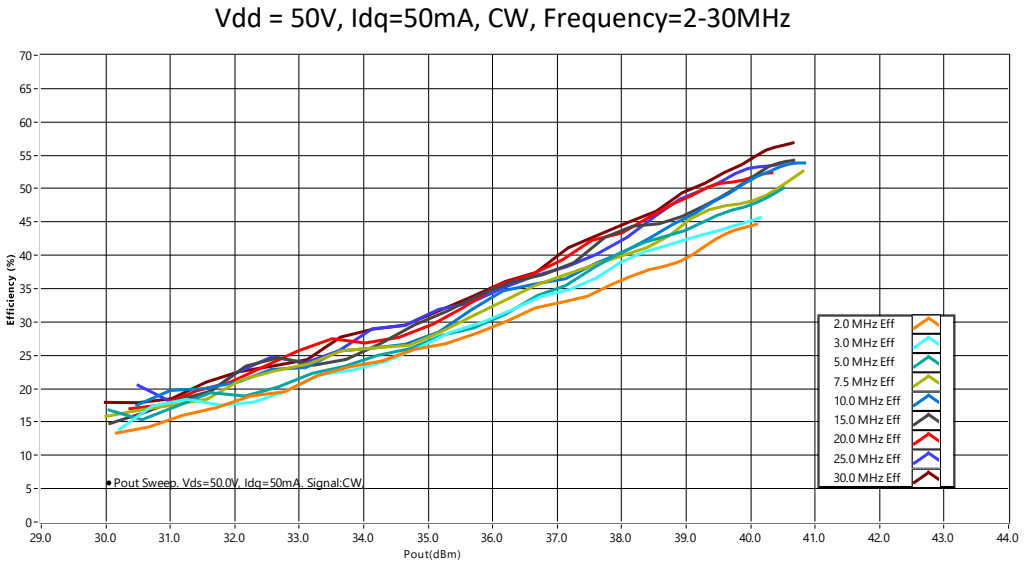

Figure 4. CW Efficiency(%) vs Power Out(dBm)

10 Fixed Power Out Results

10.1 Output Power vs Frequency at P1dB

Vdd = 50V, Idq=50mA, CW, Frequency=2-30MHz, **Pout=P1dB**

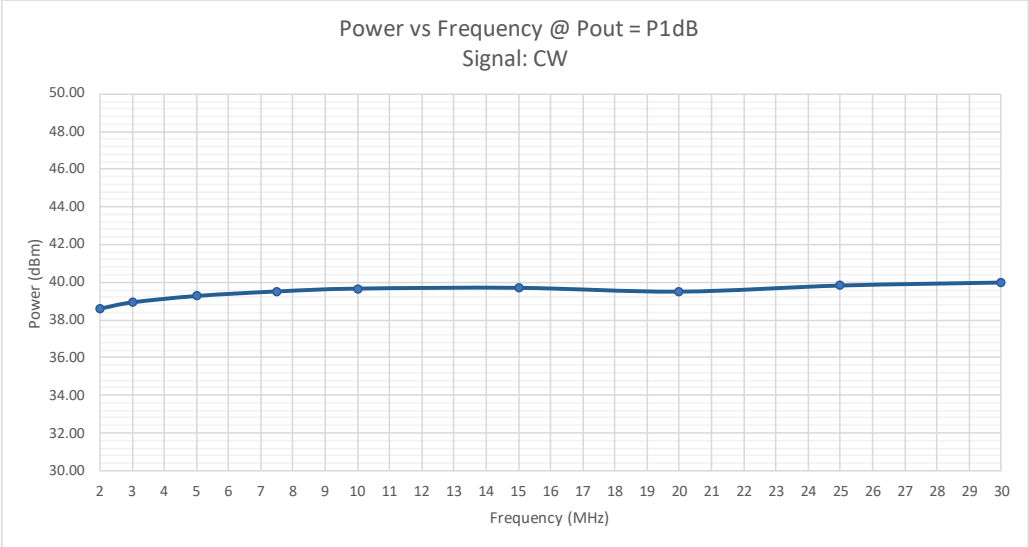

Figure 5. Output Power vs Frequency at Pout=P1dB

10.2 Output Power vs Frequency at P3dB

Vdd = 50V, Idq=50mA, CW, Frequency=2-30MHz, **Pout=P3dB**

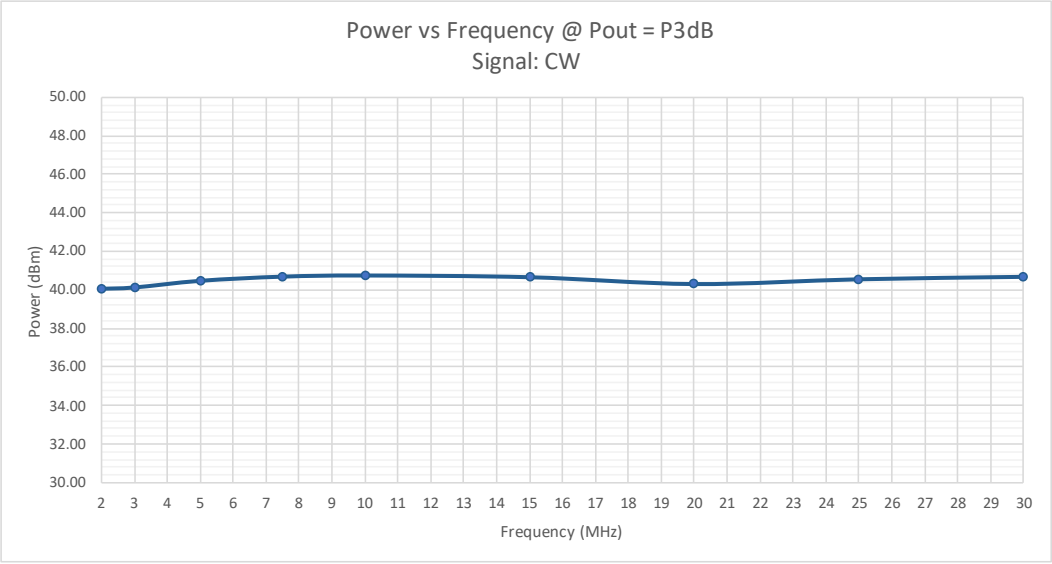

Figure 6. Output Power vs Frequency at Pout=P3dB

10.3 Gain vs Frequency at P3dB

Vdd = 50V, Idq=50mA, CW, Frequency=2-30MHz, **Pout=P3dB**

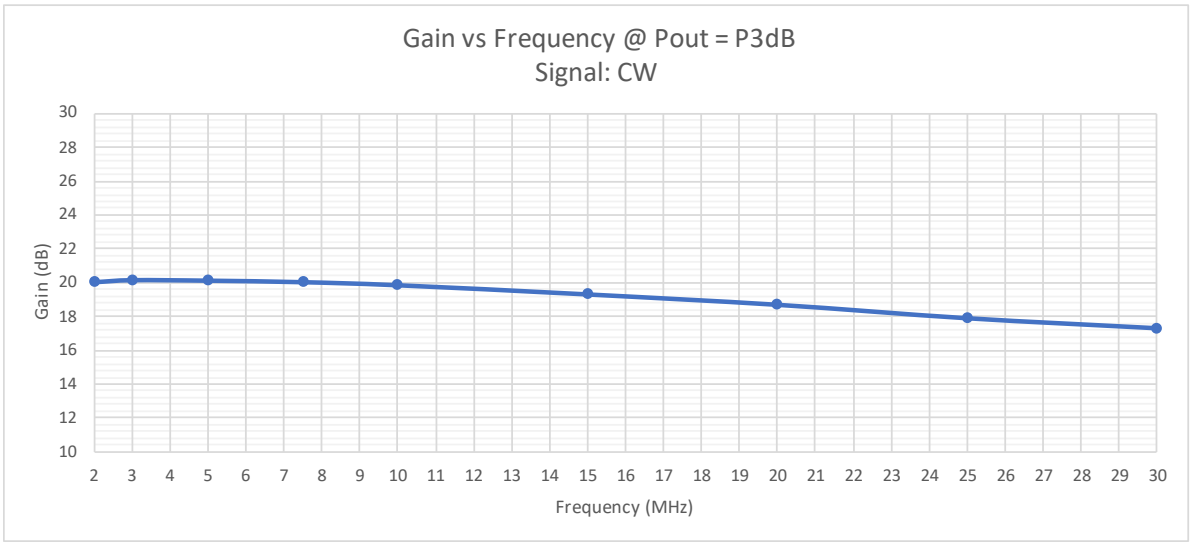

Figure 7. Gain(dB) vs Frequency(MHz) at P3dB

10.4 Efficiency vs Frequency at P3dB

Vdd = 50V, Idq=50mA, CW, Frequency=2-30MHz, **Pout=P3dB**

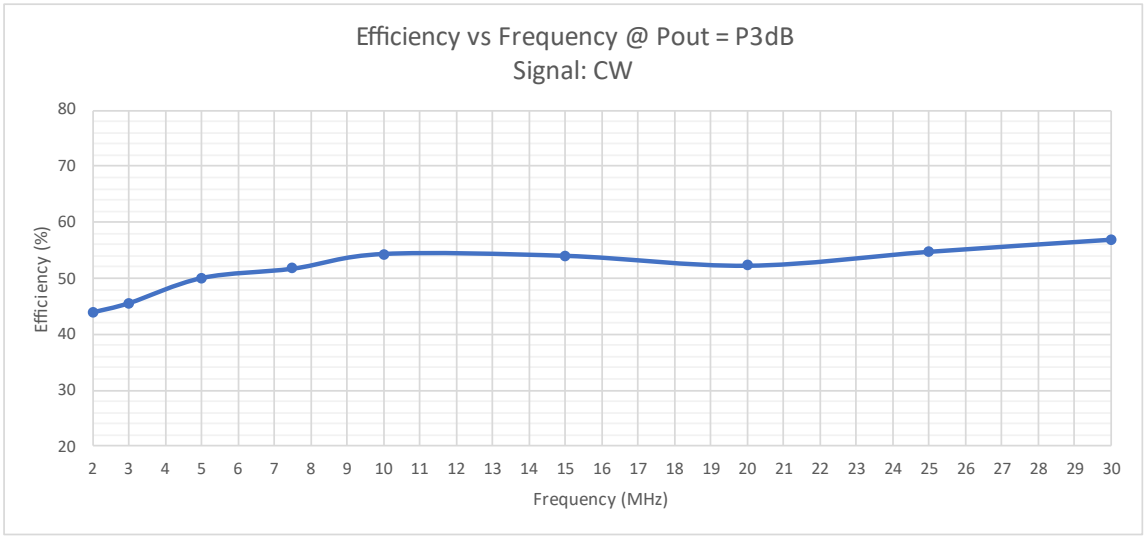

Figure 8. Efficiency(%) vs Frequency(MHz) at P3dB

11 Swept Voltage Results

11.1 Gain(dB) vs Output Power (dBm), Sweep Vdd

Vdd varied **50V**, **45V**, **40V**, **35V**, **30V**, and **28V**; Idq=50mA, Frequency=15MHz, CW, Pout=P3dB

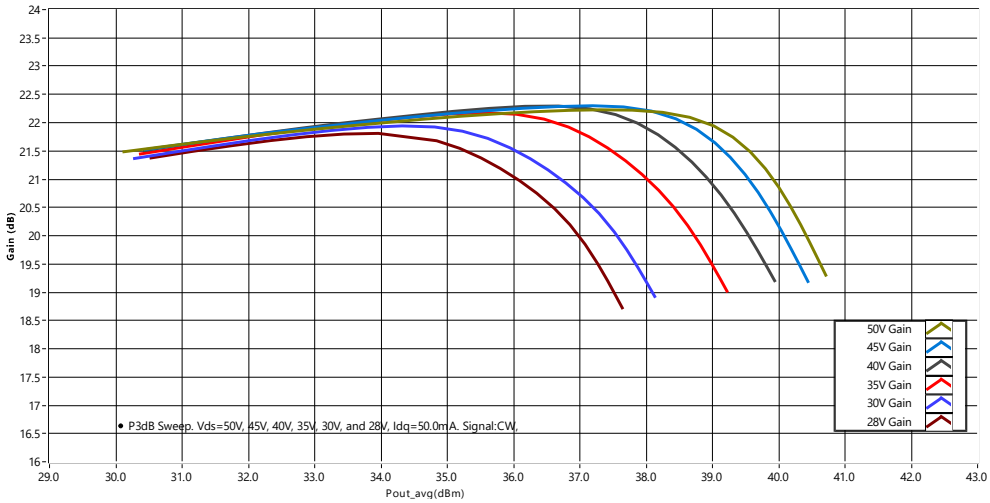

Figure 9. (Swept Voltage) Gain(dB) as a function of Output Power (dBm)

11.2 Efficiency(%) vs Output Power (dBm), Sweep Vdd

Vdd varied **50V**, **45V**, **40V**, **35V**, **30V**, and **28V**; Idq=50mA, Frequency=15MHz, CW, Pout=P3dB

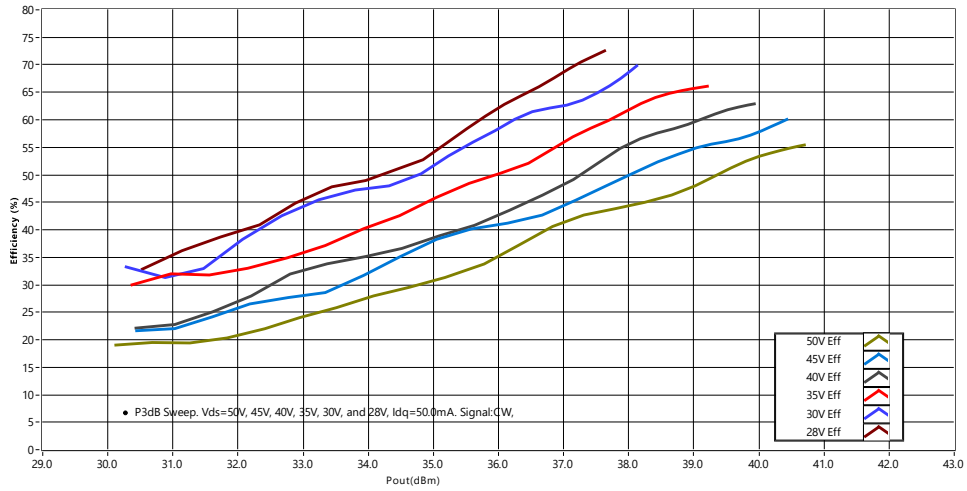

Figure 10. (Swept Voltage) Drain Efficiency(%) as a function of Output Power (dBm)

12 IMD Results

12.1 IMD3 Results

Vdd = 50V, Idq=50mA, Signal: 2-Tone 10kHz Spacing, Frequency=2-30MHz, **Pout=30-39dBm**

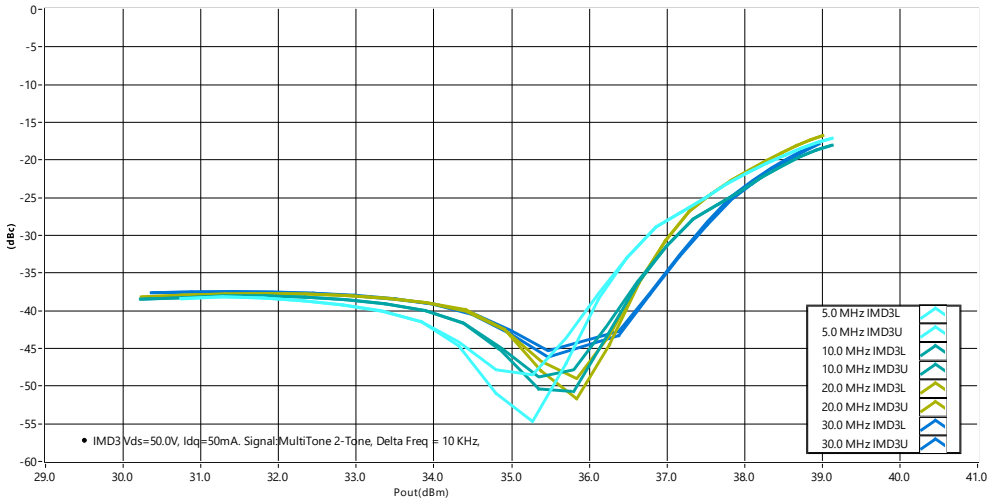

Figure 11. IMD3 Results

12.2 IMD5 Results

Vdd = 50V, Idq=50mA, Signal: 2-Tone 10kHz Spacing, Frequency=2-30MHz, **Pout=30-39dBm**

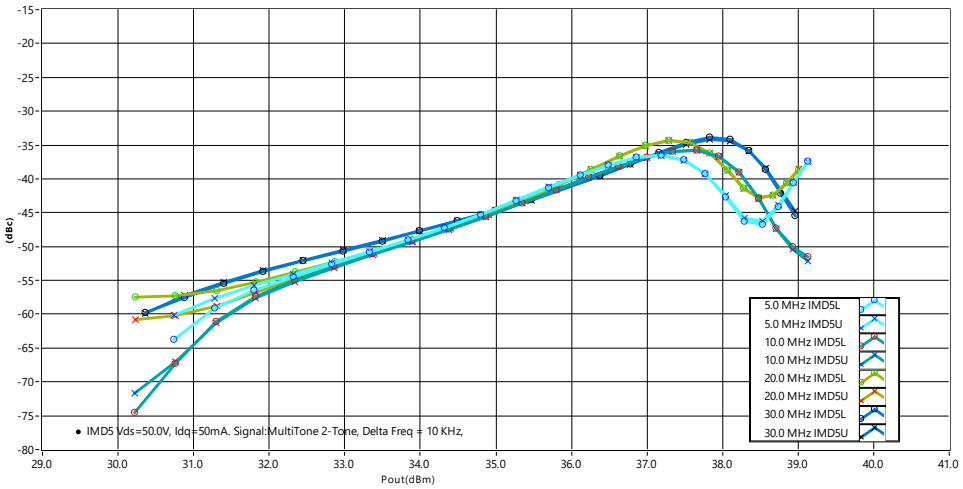

Figure 12. IMD5 Results

13 Hardware

13.1 Board photograph

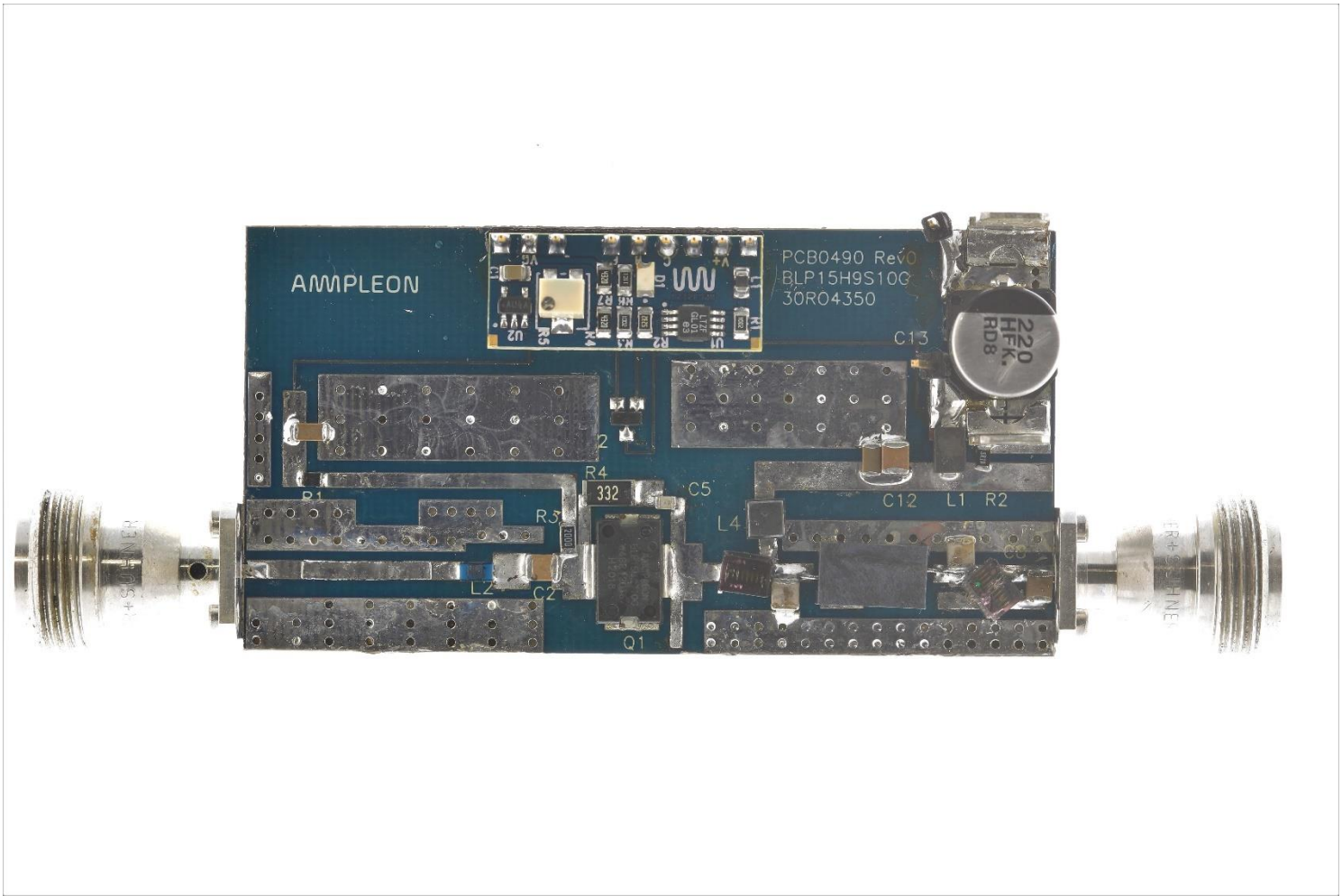

Figure 13. Board Photograph

13.2 PCB layout

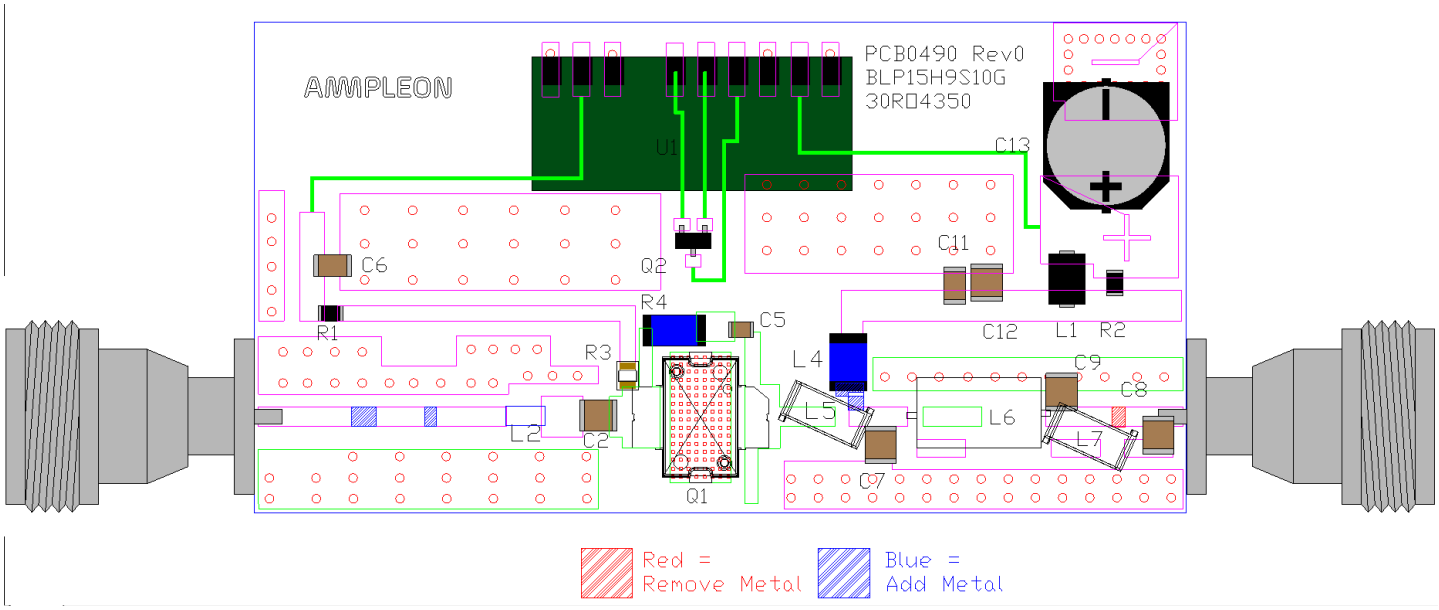

Figure 14. PCB Layout Board #AR222005

13.3 Bill of materials

Table 3. BOM

Designator	Description	Manufacturer	Part Number
PCB0490Rev0	30milRF35, 1oz	Avanti	PCB0490Rev0
U1	LDMOS Bias Module	Ampleon	CA-330-11
Q1	LDMOS Transistor	Ampleon	BLP15H9S10G
Q2	2N2222 NPN transistor	Fairchild	MMBT2222
L1	FerroxCube bead	FairRite	2743019447
L2	100nH	Coilcraft	1206CS-101X_L
L4	10uH	Coilcraft	1008PS-103KL
L5	100nH	Coilcraft	1812SMS-R10JL
L6	380nH	Coilcraft	132-17SM_L
L7	150nH	Coilcraft	1812SMS-R15JL
R1	5.1Ω	Vishay Dale	CRCW08055R1FKEA
R2	9.1Ω	Vishay Dale	CRCW08059R09FKEA
R3	200Ω	Vishay Dale	CRCW1206432RFKEA
R4	3.3KΩ	Generic	2010 3/4W
C2,C8	.1uF 250V	Murata	GRM32DR72E104KW01L
C5	100pF	Passive Plus	0805N
C7	82pF	Passive Plus	1111N
C9	100pF	Passive Plus	1111N
C6,C11	1uF	Murata	GRM31MR71H105K88L
C12	10uF	Murata	GRM32ER7YA106K88L
C13	220uF, 50 V electrolytic	Panasonic	PCE3474CT-ND

13.4 PCB materials

Table 4. Board Specifications

Parameter	Value
Manufacturer	Rogers
Type	4350B
Thickness	30 mils, 1oz. copper
Layers	2, top/bottom. Bottom all copper

13.5 Device markings

Table 5. Device Specifications

Parameter	Value
Manufacturer	Ampleon
Device	BLP15H9S10G
Date Code	W4GR43D187 H2018

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