Document information

Info	Content
Status	Company Public
Author(s)	Tyler Ware
Abstract	Measurement results of the BLP05H9S500P LDMOS Device in Board #AR212045 tuned for 430-450MHz at 50V

1 Revision History

Table 1. Report revisions

Revision No.	Date	Description	Author
1.0	20210416	Initial document	Tyler Ware

2 Contents

3 List of Figures

4 List of Tables

5 General Description

This report presents the measurement results of Demo Board AR212045 using the BLP05H9S500P. The demo achieves 57dBm Pulsed CW at 430-450MHz (Device not pushed to full P3dB compression). The Pulse Droop Results in Section 13 of this report shows stable pulse with added external capacitance in the drain feed.

6 Biasing

6.1 Bias Details

Vdd = 50V
Idq = 100mA

7 Test Bench Set Up

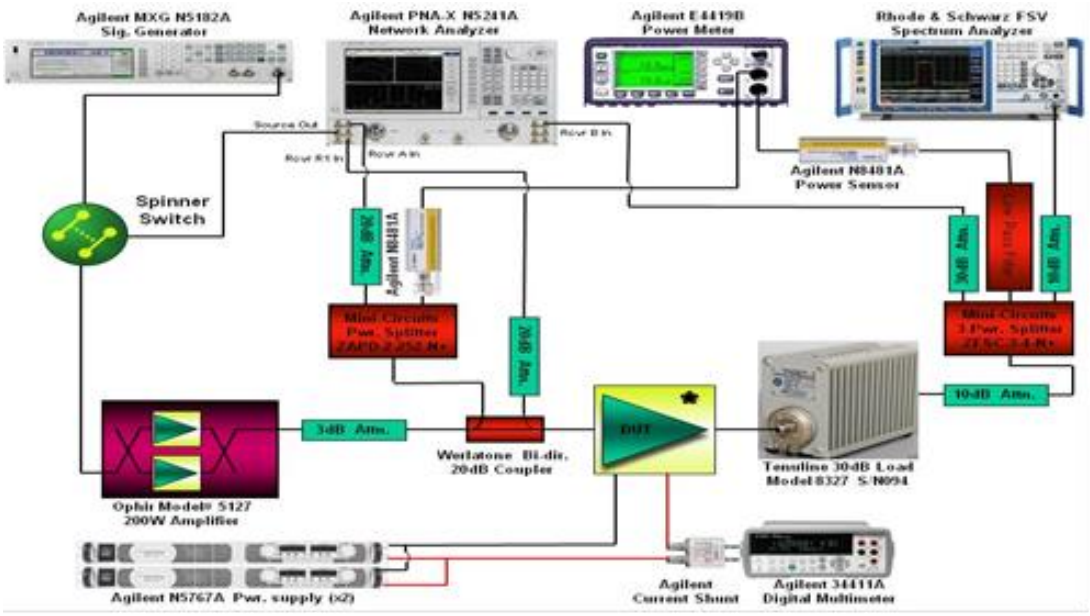

Figure 1.Test Bench Equipment set up

8 Performance Summary

Table 2. RF Performance, Frequency = 430-450MHz, Pulsed CW

Parameter	Measurement	Unit
Specified frequency range	440	MHz
Drain voltage	50	V
Quiescent drain current	100	mA
Average Efficiency at 57dBm	72.2	%
Average Gain at 57dBm	25.42	dB
Average Gain Flatness at 57dBm	+/- 3	dB

The BLP05H9S50P is a 500W LDMOS power transistor for various applications such as ISM, RF plasma lighting and defrosting at frequencies from 423MHz to 443MHz.

AR212045_BLP05H9S500P_50_Pulse10%100uS_DriveupData 041521				
Freq(MHz)	P1.0dB	Pout(W)	P1dB Gain (dB)	P1dB Eff(%)
430	57.35	543.25	25.14	71.11
440	56.63	460.26	25.93	71.39
450	55.99	397.19	24.91	73.42
	P2.0dB	Pout(W)	P2dB Gain(dB)	P2dB Eff(%)
430	57.82	605.34	24.15	72.09
440	57.21	526.02	24.93	72.36
450	56.47	443.61	23.92	71.28
AR212045_BLP05H9S500P_50_Pulse10%100uS_Fixed Power Out 041521				
Freq(MHz)	Fixed Pout(dBm)	Pout(W)	Gain (dB)	Eff(%)
430	57.00	501.19	25.52	69.83
440	57.00	501.19	25.42	72.20
450	57.00	501.19	22.52	71.05

9 Performance Details

9.1 Small Signal Results

Vdd=50V
Idq=500mA
Pin=10dBm

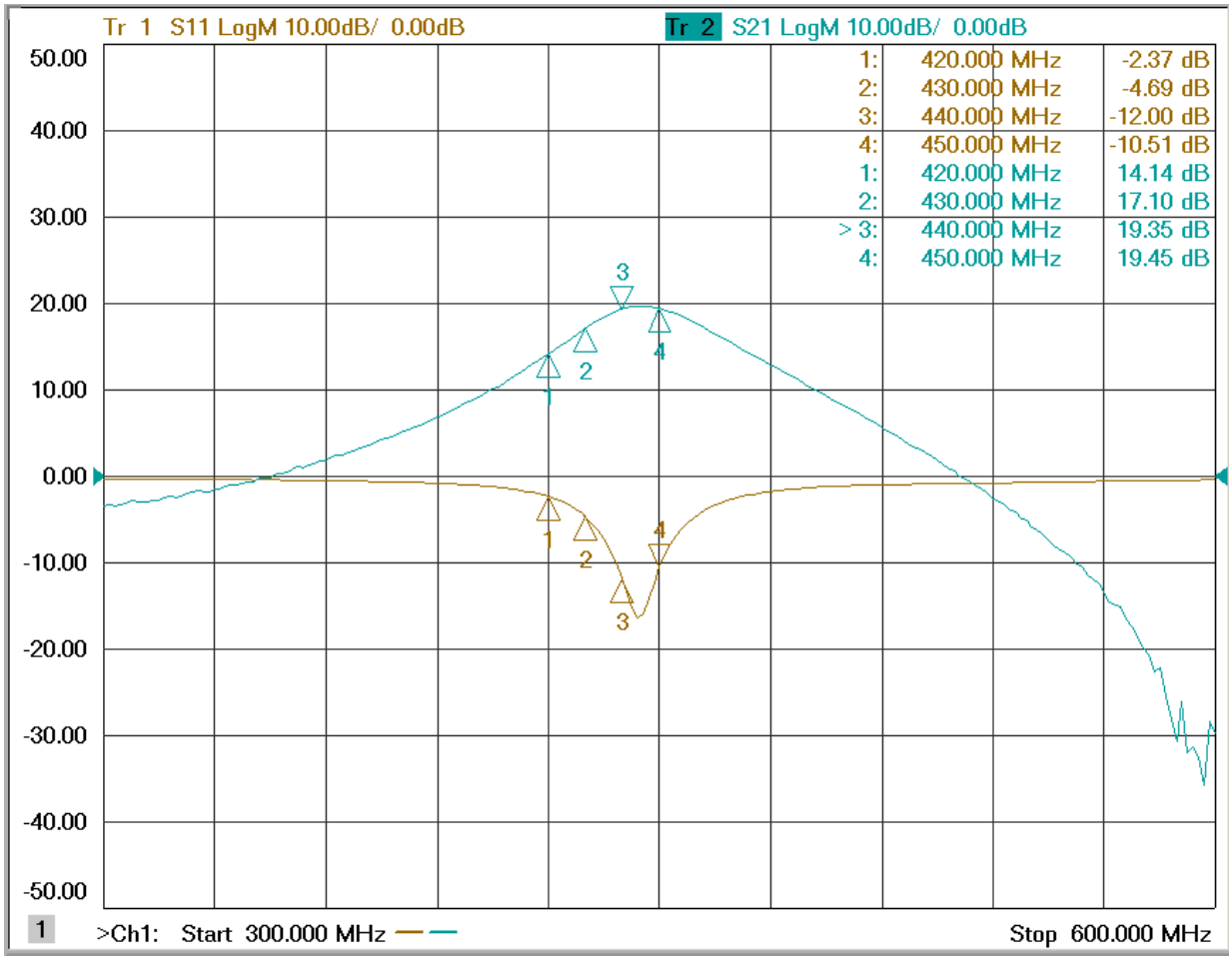

Figure 2. Small Signal results, Vdd=50V, Idq=500mA, Pin=10dBm

9.2 Pulse Gain Sweeps

Vdd = 50V, Idq=100mA, Frequency=430-450MHz, Pulse 10%100uS, Pout=58dBm

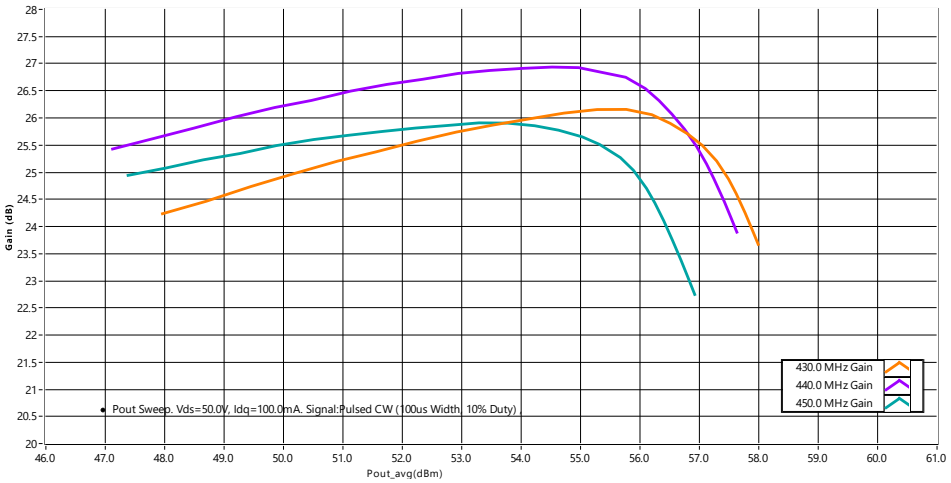

Figure 3. Pulse Gain(dB) vs Power Out(dBm)

9.3 Pulse Efficiency Sweeps

Vdd = 50V, Idq=100mA, Frequency=430-450MHz, Pulse 10%100uS, Pout=58dBm

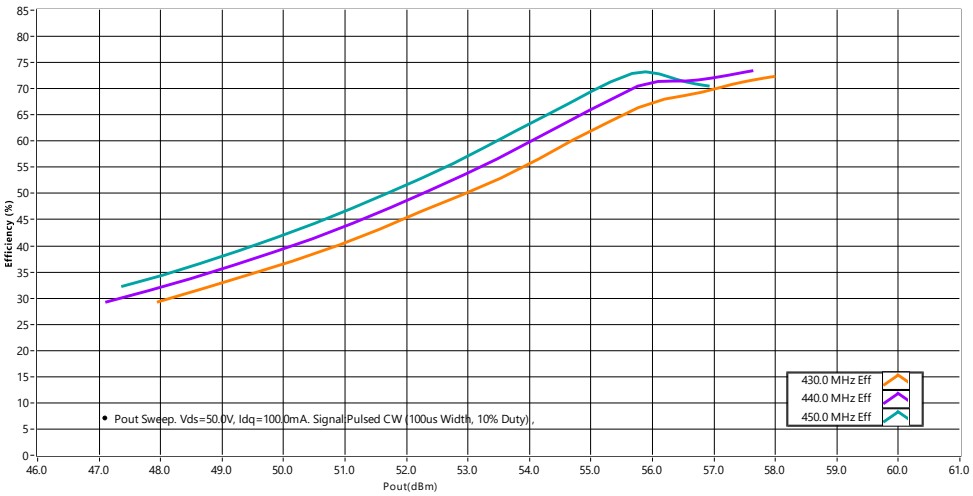

Figure 4. Pulse Efficiency(%) vs Power Out(dBm)

10 Fixed Power Out Results

10.1 Gain v Frequency at 57dBm

Vdd = 50V, Idq=100mA, Frequency=430-450MHz, Pulse 10%100uS, **Pout=57dBm**

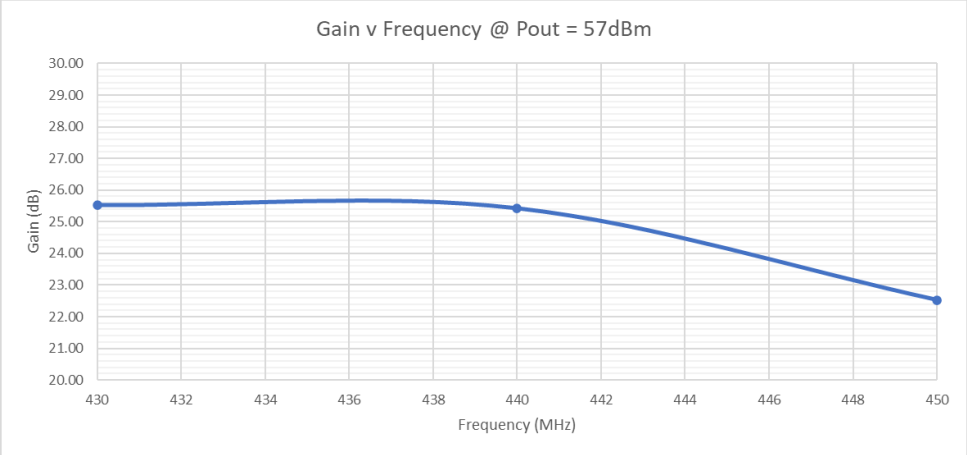

Figure 5. Gain(dB) vs Power Out(dBm) at 57dBm

10.2 Efficiency v Frequency at 57dBm

Vdd = 50V, Idq=100mA, Frequency=430-450MHz, Pulse 10%100uS, **Pout=57dBm**

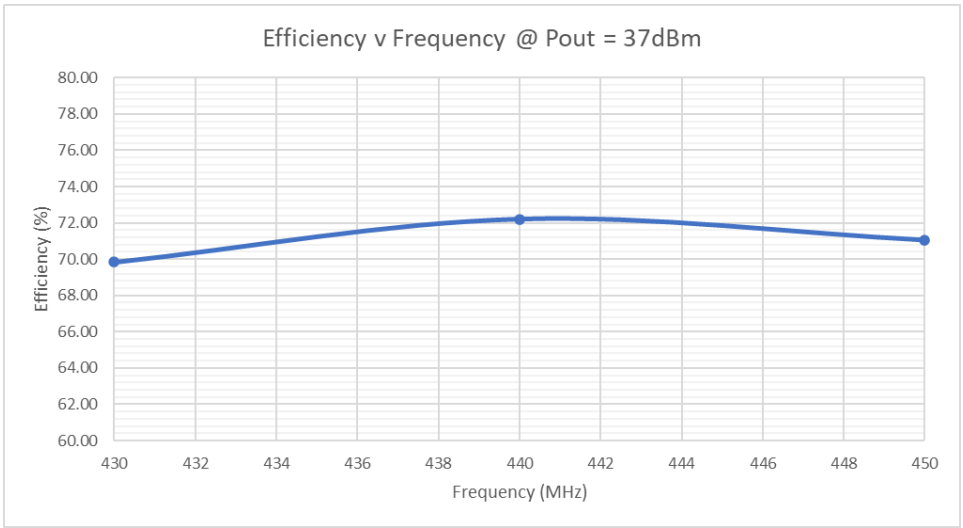

Figure 6. Efficiency(%) vs Power Out(dBm) at 57dBm

11 Swept Voltage Results

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

Vdd=**50V**, **45V**, and **40V**, Idq = 100mA, Frequency=440MHz, Pulse 10%100uS, Pout Sweep to 57dBm

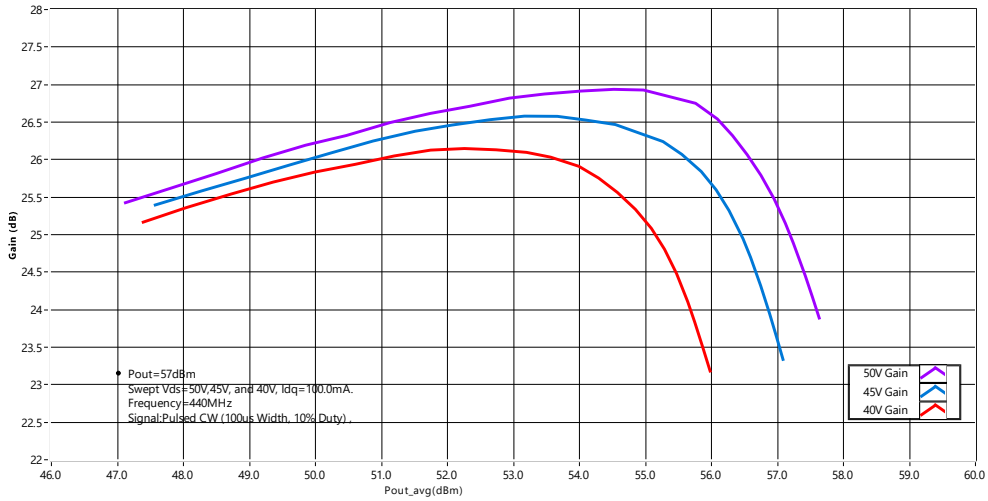

Figure 7. (Swept Voltage) Gain(dB) as a function of Output Power (dBm)

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

Vdd=**50V**, **45V**, and **40V**, Idq = 100mA, Frequency=440MHz, Pulse 10%100uS, Pout Sweep to 57dBm

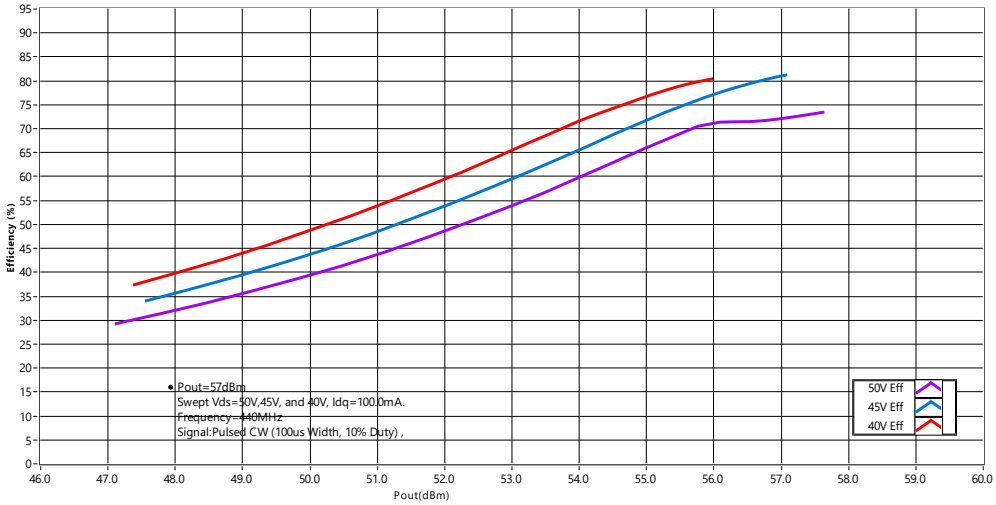

Figure 8. (Swept Voltage) Drain Efficiency(%) as a function of Output Power (dBm)

12 Swept Bias Results

12.1 Gain (dB) vs Output Power (dBm), Sweep Idq

Vdd = 50V, Idq=**50mA**, **75mA**, and **100mA**, Frequency=440MHz, Pulse 10%100uS, Pout Sweep to 57dBm

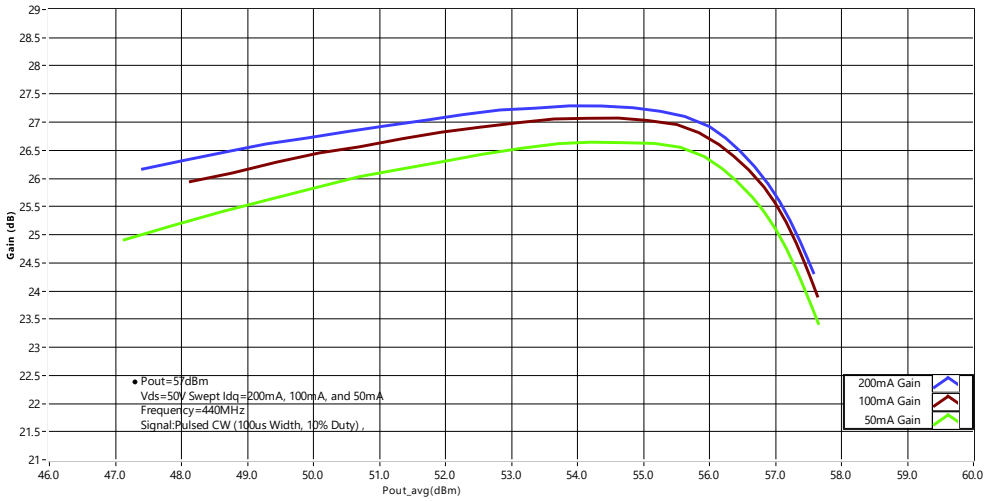

Figure 9. (Swept Bias) Gain(dB) as a function of Output Power (dBm)

12.2 Efficiency (%) vs Output Power (dBm), Sweep Idq

Vdd = 50V, Idq=**50mA**, **75mA**, and **100mA**, Frequency=440MHz, Pulse 10%100uS, Pout Sweep to 57dBm

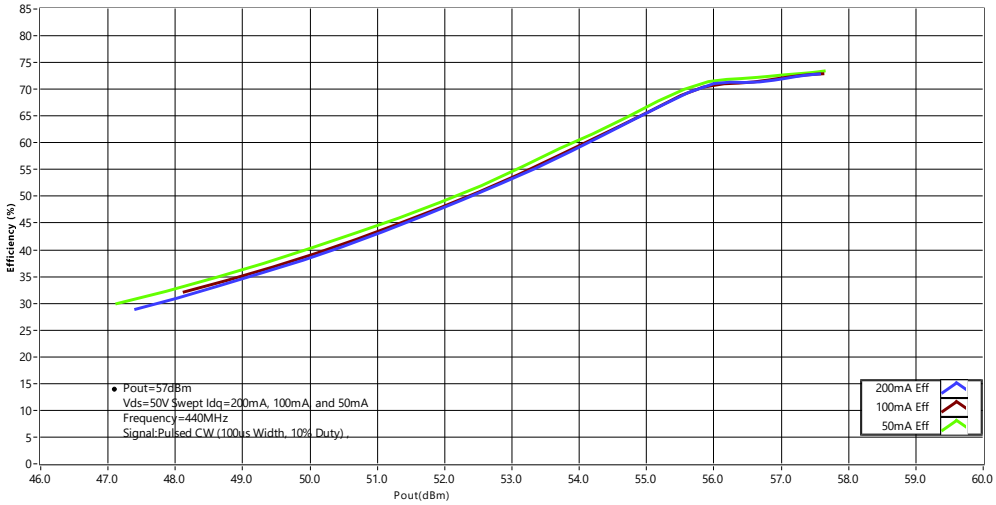

Figure 10. (Swept Bias) Drain Efficiency(%) as a function of Output Power (dBm)

13 Pulse Droop Results

13.1 Pulse Droop at 100W

Vdd = 50V, Idq=100mA, Frequency=440MHz, Pulse10%100uS, 10%-90%, Pout=50dBm

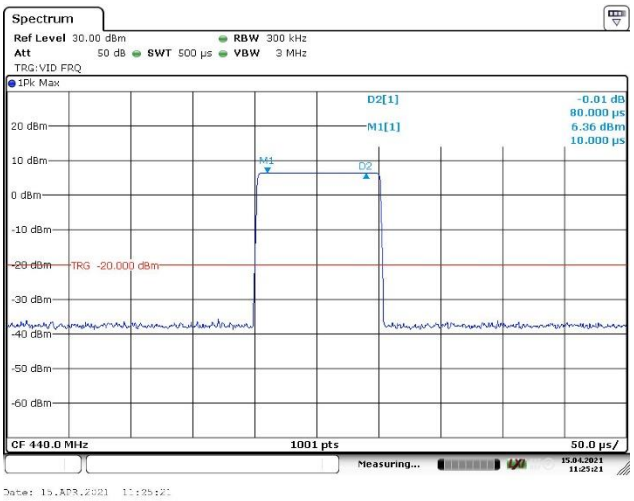

Figure 11. Pulse droop at 100W

13.2 Pulse Droop at 500W

Vdd = 50V, Idq=100mA, Frequency=440MHz, Pulse10%100uS, 10%-90%, Pout=57dBm

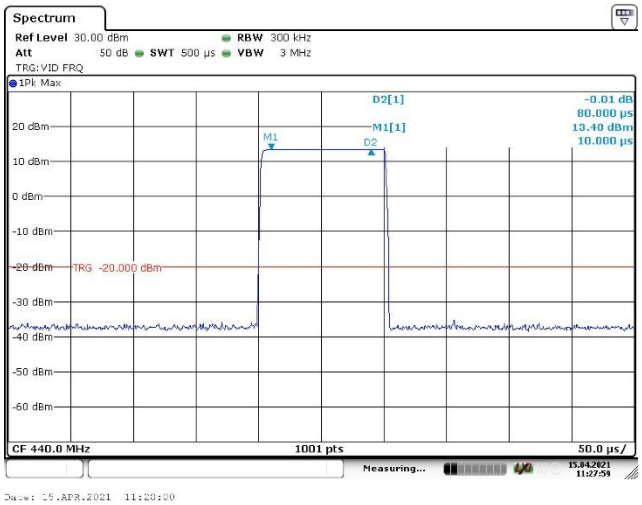

Figure 12. Pulse Droop at 500W

14 Hardware

14.1 Board photograph

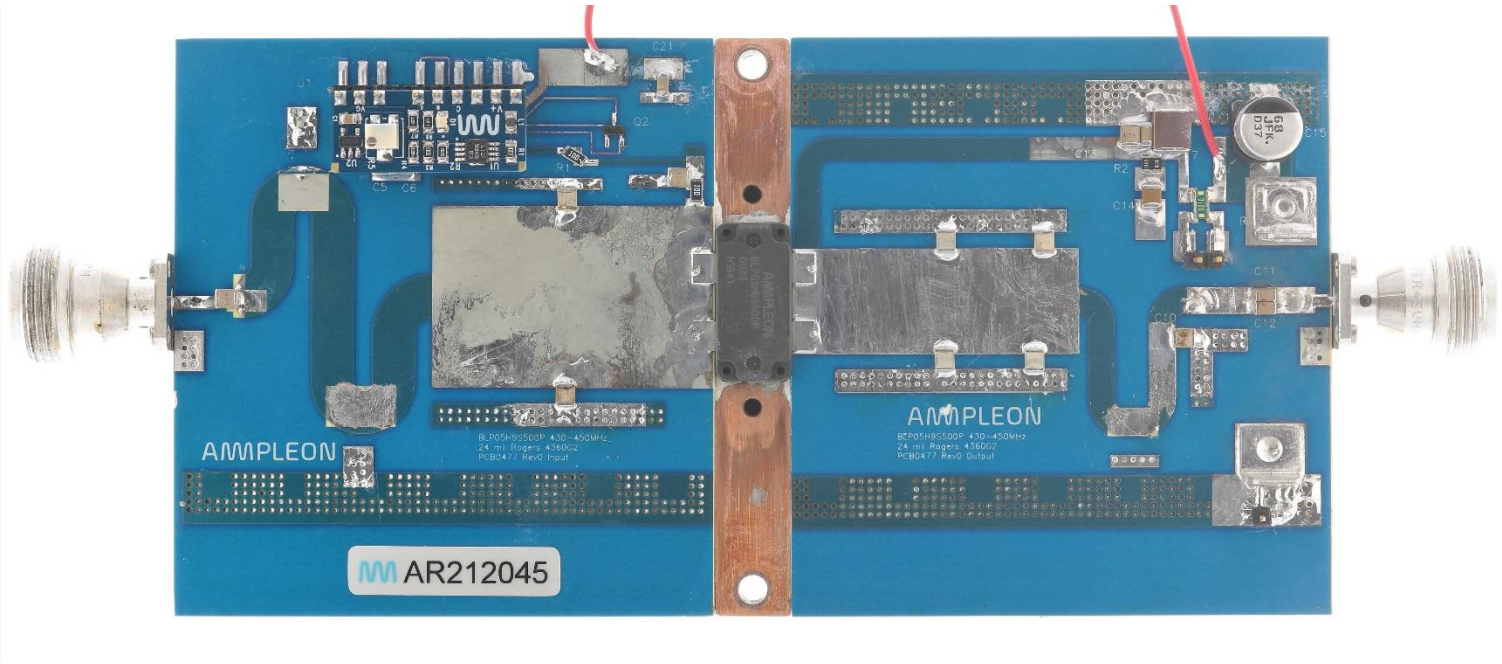

Figure 13. Board Photograph

14.2 PCB layout

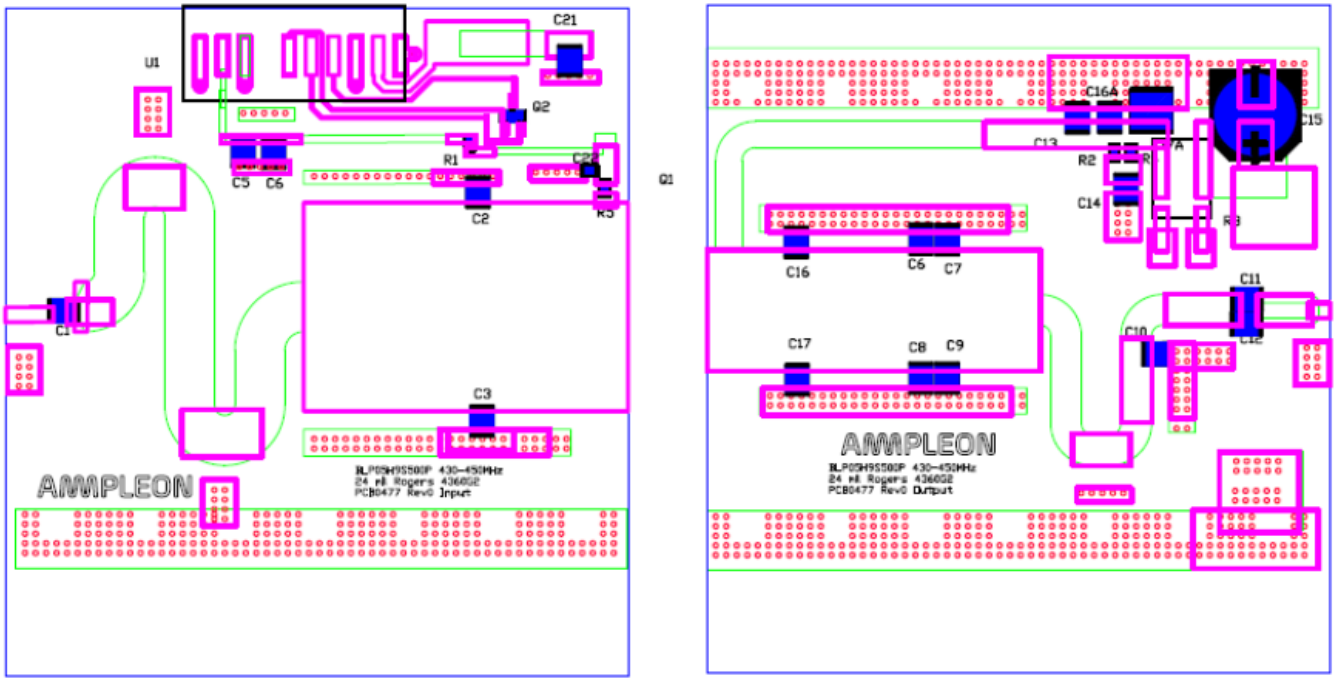

Figure 14.PCB Layout Board #AR212045

14.3 Bill of materials

Table 3. BOM

Designator	Description	Manufacturer	Part#
PCB Input	24 mil thk. Rogers 4360G2	Avanti Circuits	PCB0477 Input Rev 0
PCB Output	24 mil thk. Rogers 4360G2	Avanti Circuits	PCB0477 Output Rev 0
Q1	RF Transistor 500W 50V LDMOS	Ampleon	BLP05H9S500P
Q2	2N2222 NPN Transistor	Fairchild	MMBT2222
U1	LDMOS bias module	Ampleon	CA-330-11
R1	10 Ω	Generic	1206
R2,R4	9.1 Ω	Generic	1206
R3	0.01 Ω	Vishay Dale	RL3720WT-R010-G
R5	10 Ω	Generic	1206
C1,C11,C12,C13,C22	270pF	ATC	800B
C2, C3	75pF	ATC	800B
C4	0.01uF,100V,X7R,1206	Murata	GRM319R72A103KA01D
C5,C14	4.7uF, 100V	TDK	C3225X7S2A475K200AE
C6, C8	18pF	ATC	800B
C7,C9	DNP	ATC	800B
C10	12pF	ATC	800B
C15	68uF, 63 V electrolytic SMT	Panasonic	EEE-FK1J680UP
C17A	10uF, 100V 10% X7S, 2220	TDK	C5750X7S2A106M
C16,C17	10pF	ATC	800B
C16A,C21	0.1uF 100V,X7R	Murata	GRM319R72A104KA01D

14.4 PCB materials

Table 4. Board Specifications

Parameter	Value
Manufacturer	Rogers
Type	4360G2
Thickness	24 mils, 1oz. copper
Layers	2, top/bottom. Bottom all copper

14.5 Device markings

Table 5. Device Specifications

Parameter	Value
Manufacturer	Ampleon
Device	BLP05H9S500P
Date Code	0023 H1941

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