AR202046

BLP15H9S30 50V 1025-1150MHz

V5.0 — 04-27-2022

Application Report

Document information

Info	Content
Status	General Publication
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Keywords	BLP15H9S30 50V Class AB 1025-1150MHz
Abstract	Measurement results of a Class AB design for the 1025-1150MHz band with BLP15H9S30.

1 Revision History

Table 1. Report revisions

Revision No.	Date	Description	Author
1.0	06-03-2020	Initial version.	Hannah Chalas
2.0	06-16-2020	Update report	Hannah Chalas
3.0	07-06-2020	Update Po graph	Hannah Chalas
4.0	02-18-2021	Change Status Ampleon Internal	Hannah Chalas
5.0	04-27-2022	Change Status General Publication	Hannah Chalas

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5 General Description

This report presents the measurement results of the Class AB demo board AR202046. The device used is a 30W, 9th generation LDMOS in a SOT1482-1 overmolded plastic package, BLP15H9S30. The presented demo is optimized for the frequency band 1025-1150MHz.

6 Biasing & Pinout

The efficiencies presented are based on the current of the drain feed.

Parameter		At board connector
V_{DD}	=	50V
I_{DQ}*	=	75mA

* gate bias is adjusted via the pot on the bias module.

7 Performance Indicators

Table 2. Typical performance at 1025-1150MHz .

Parameter	Condition	Unit	Pulsed-CW[1]
VDD		V	50
Normalized AM-PM[2]	Max, @P3dB	°	-4.5
P1dB[3]	GMAX-1dB	dBm	46.4 – 46.6
P3dB[3]	GMAX-3dB	dBm	47.2 - 47.4
POUT of operation[4]	Po	dBm	***44.77***
GAIN	@Po	dB	17.3 - 17.7
Drain Efficiency	@Po	%	48.5 – 50.3

Table 3. Device specifics

Parameter	Value
Manufacturer	AMPLEON
Device	BLP15H9S30
Marking	AMPLEON BLP15H930TA W6N92M201 rNH1902
Package	SOT1482-1

[1] *MXG CW Pulse sweep with 100µs Pulse Width, 10% Duty Cycle*
[2] *PCW Pulse sweep with 20µs Pulse Width, 10% Duty Cycle*
[3] *Pout at 1 and 3dB gain compression relative to the maximum gain in the power sweep*
[4] *Demonstrator is expected to operate at the Po average power level*

8 Performance Details

8.1 Network Analyzer Frequency Sweep — Gain, IRL, and Group Delay

Table 4. PNA-X Pulsed Results

Freq (MHz)	IRL (dB)	Gain (dB)	Group Delay (ns)
1025	-6.8	16.7	2.4
1087.5	-8.3	17.0	2.5
1150	-16.2	17.0	3.2

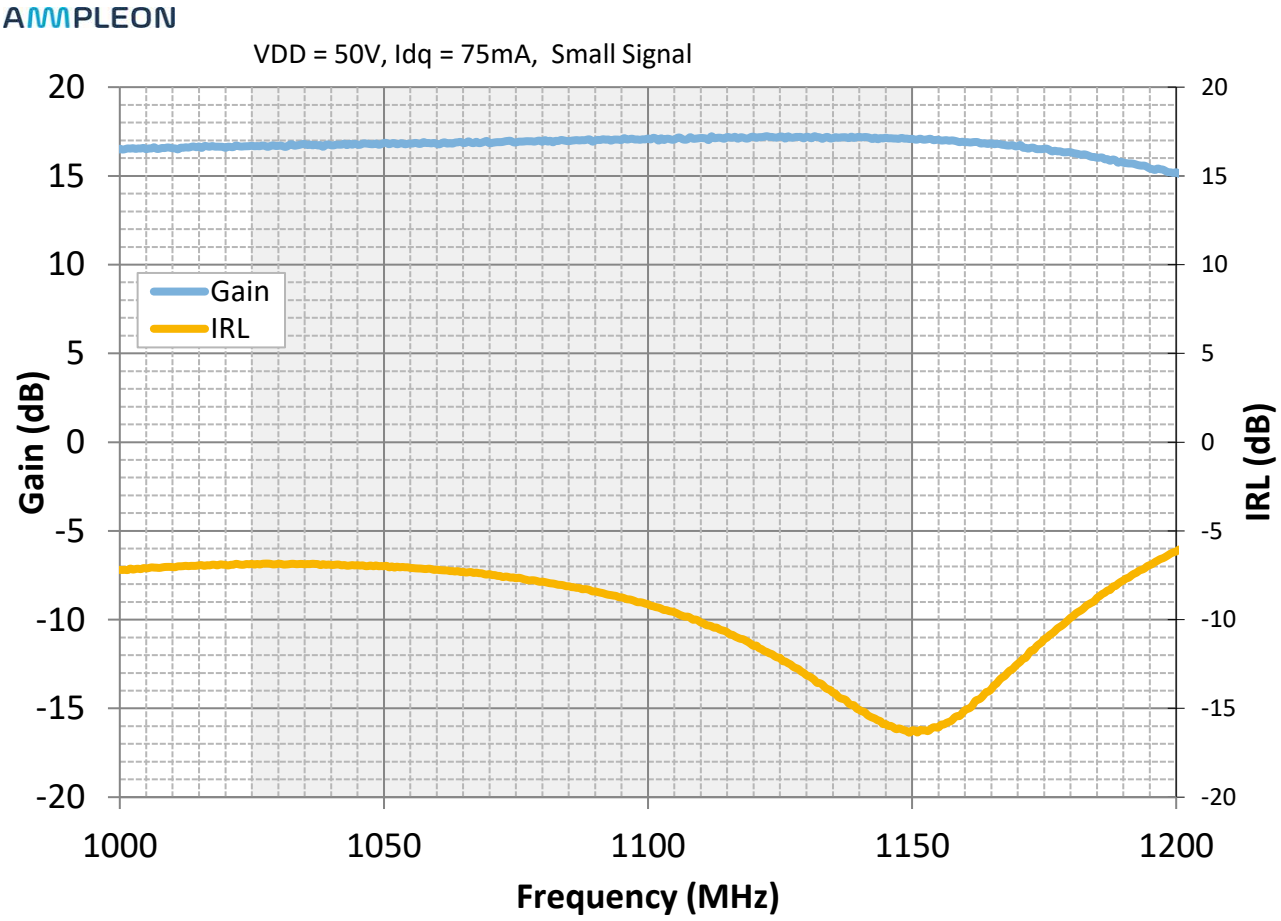

Figure 1. Gain & IRL vs Frequency

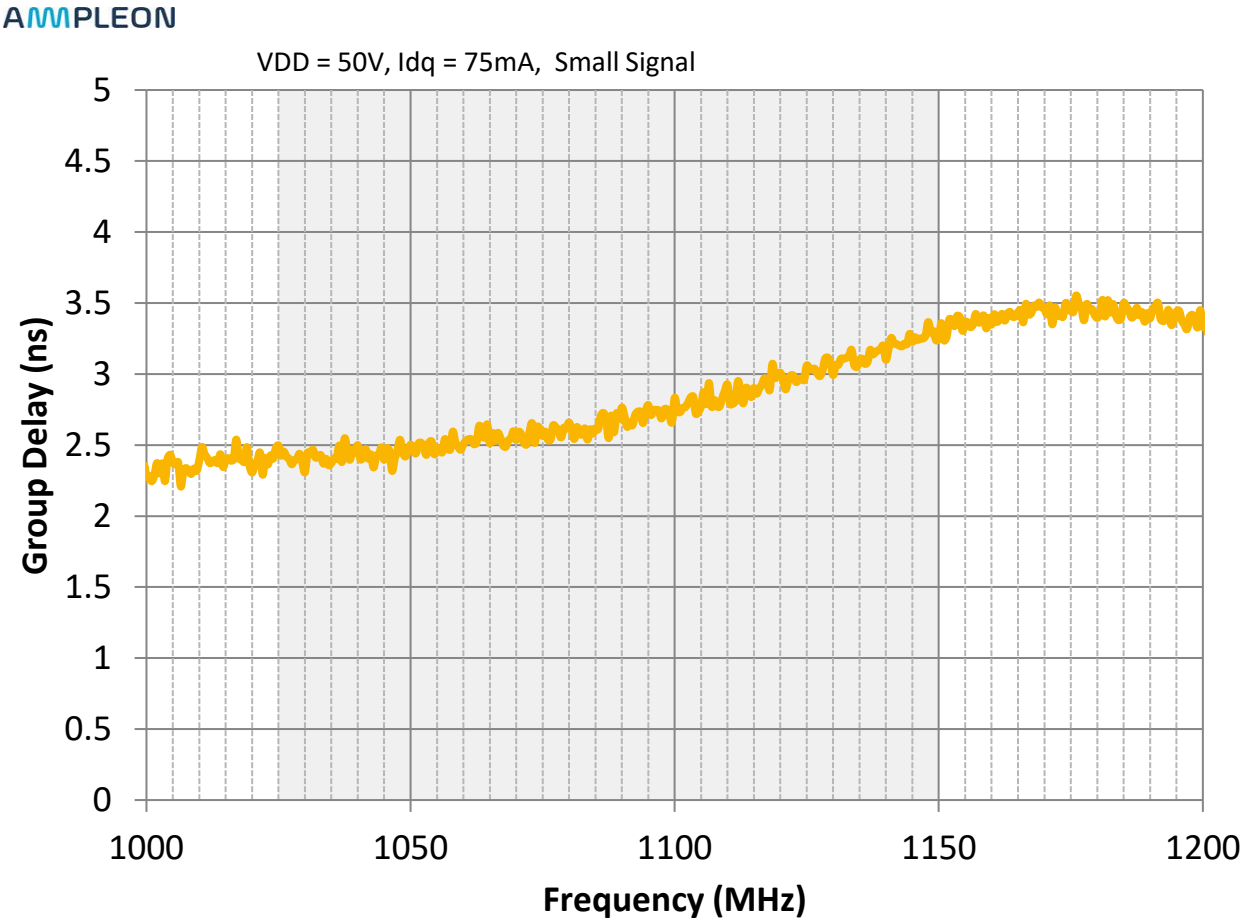

Figure 2. Group Delay vs Frequency

8.2 Network Analyzer Power Sweep — Pulsed (20µs Pulse Width, 10% DC)

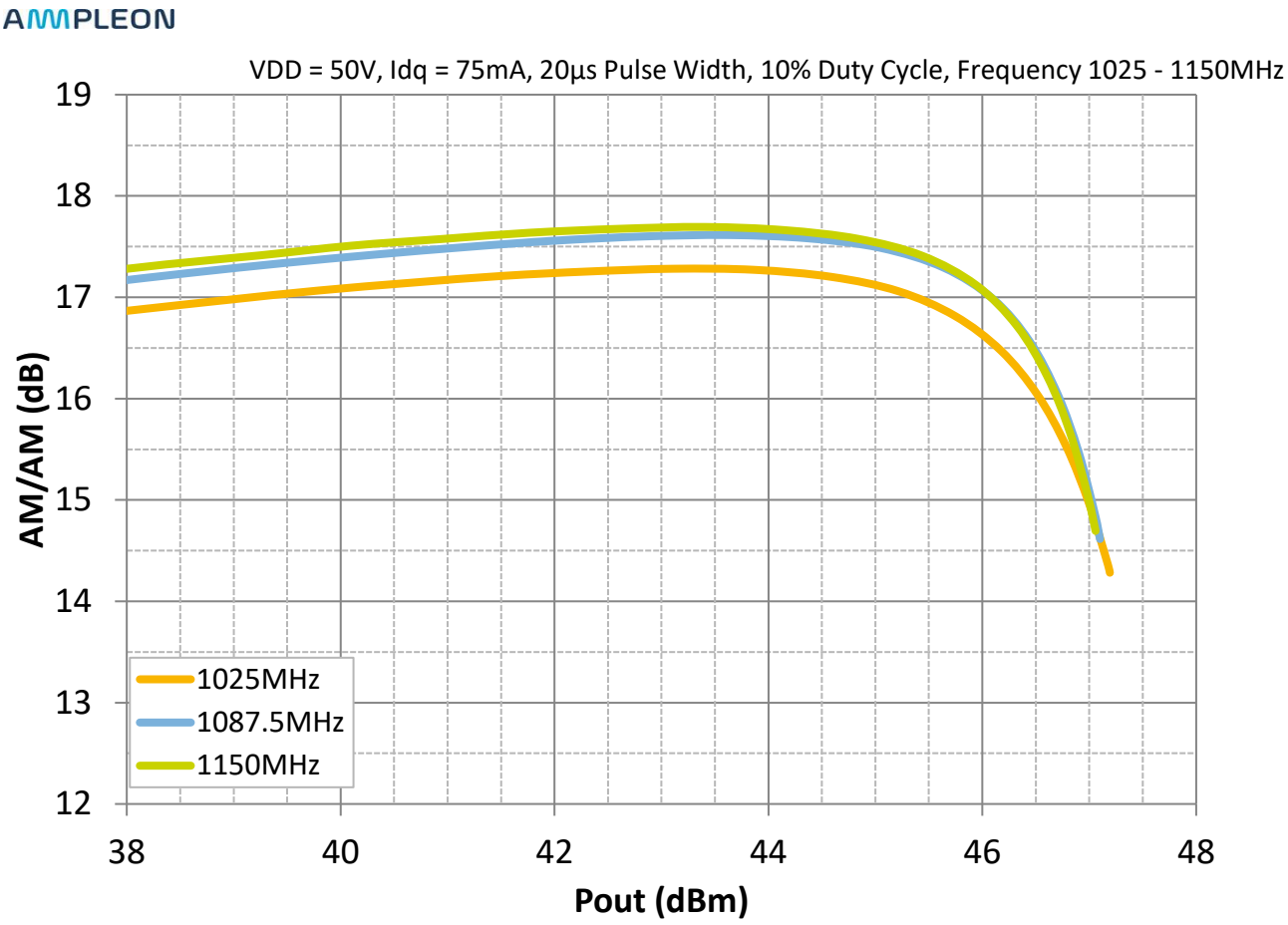

Figure 3. AM/AM

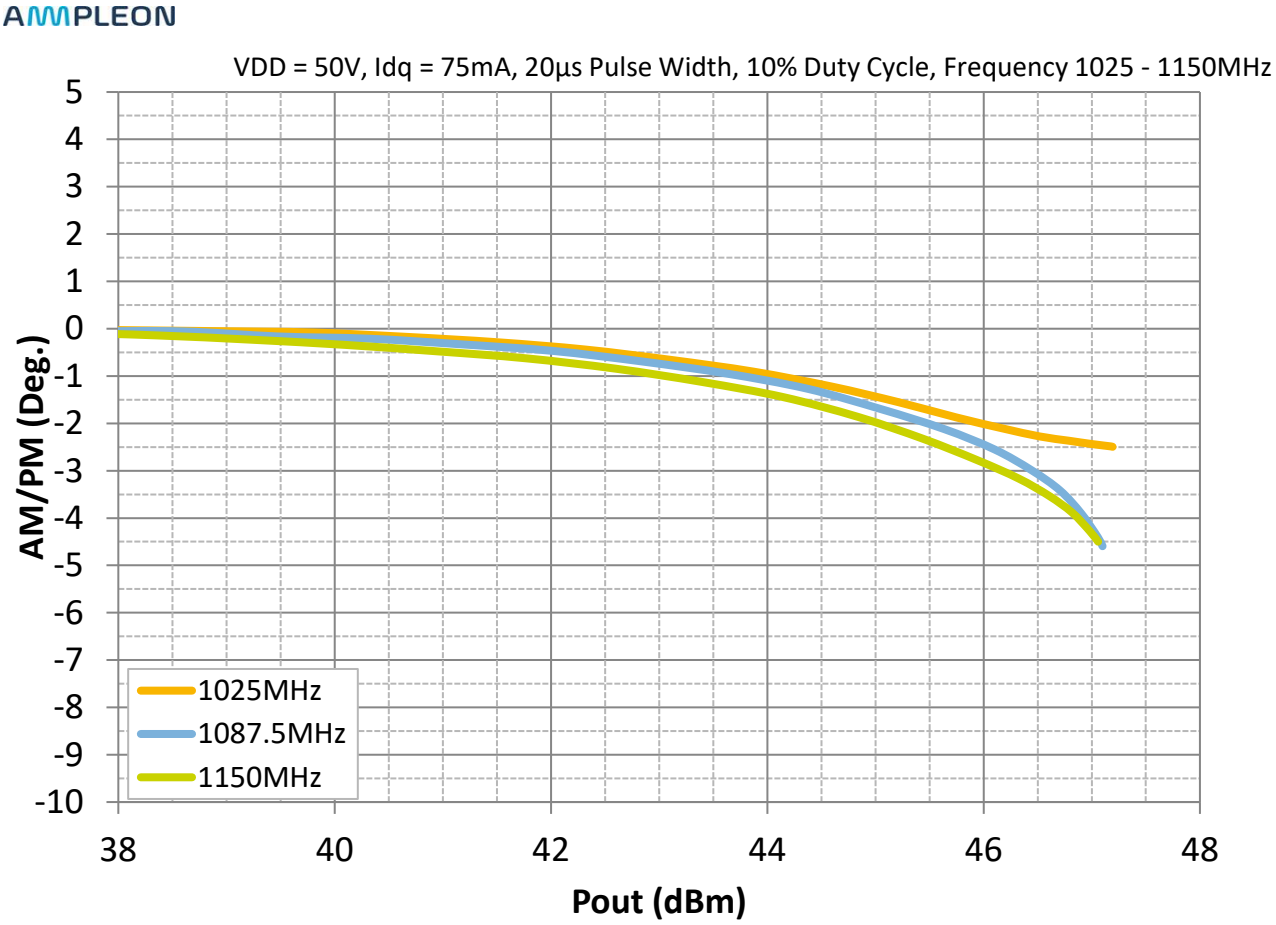

Figure 4. AM/PM

8.3 Pulsed Power Sweep - 100µs Pulse Width, 10% Duty Cycle

Table 5. MXG Pulsed Results

Freq (MHz)	Pout (dBm)	Pout (W)	Gain (dB)	Eff (%)	P1dB (dBm)	P3dB (dBm)	Eff@P3dB (%)
1025.0	44.8	30.0	17.3	48.5	46.5	47.4	62.1
1087.5	44.8	30.0	17.6	50.3	46.6	47.3	63.1
1150.0	44.8	30.0	17.7	49.3	46.4	47.2	60.8

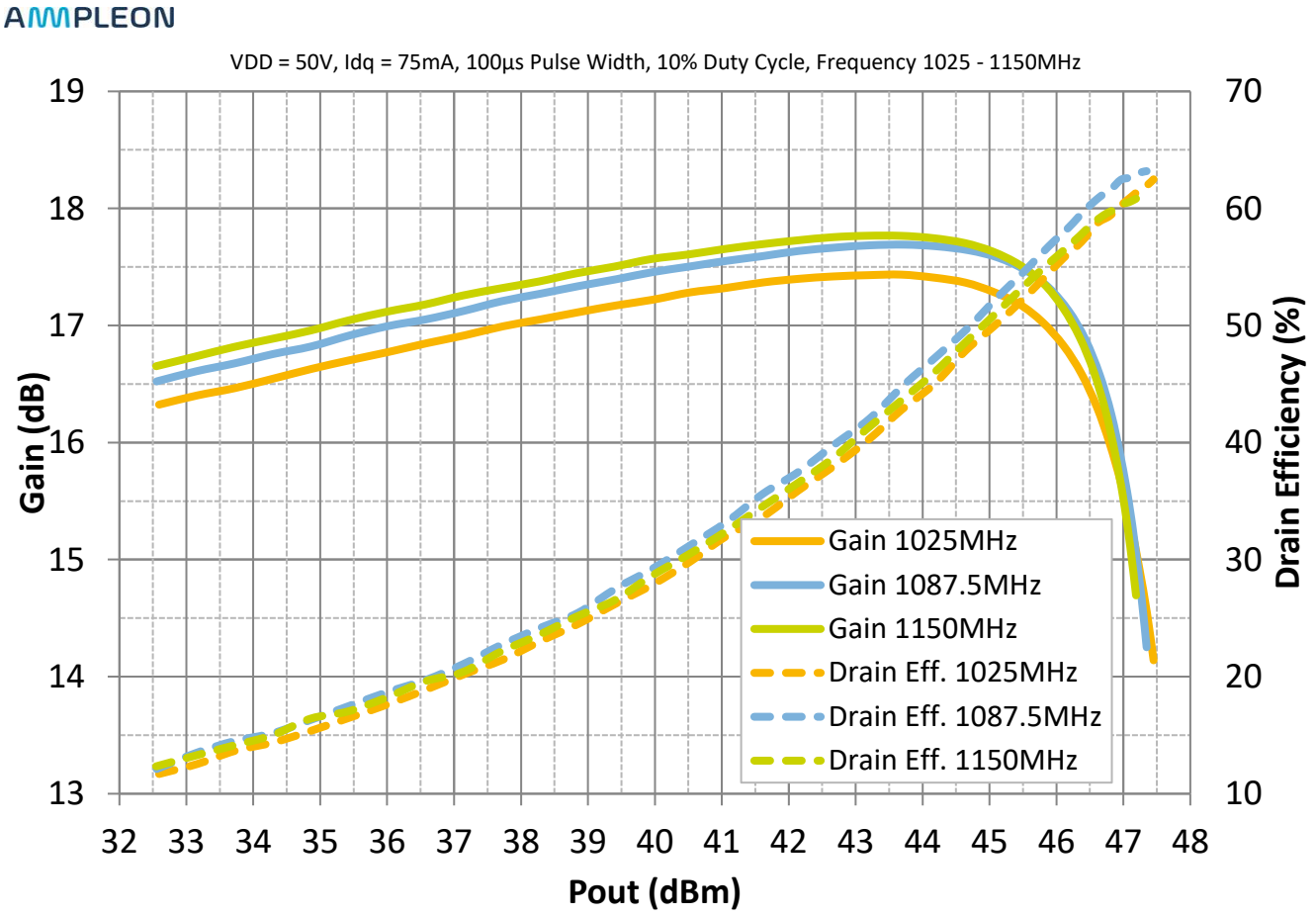

Figure 5. Pulsed Gain and Drain Efficiency vs Output Power

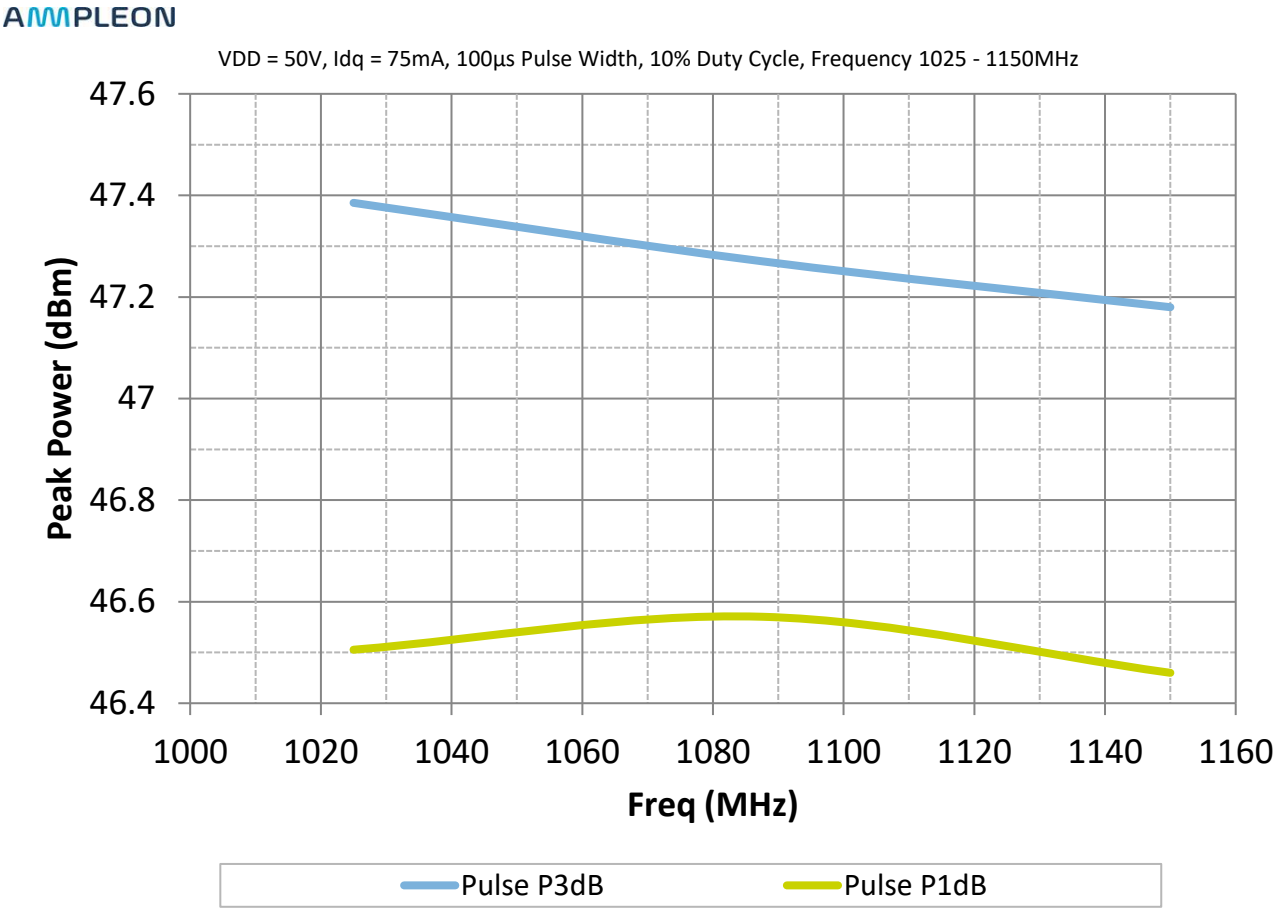

Figure 6. Pulsed Output compression point vs Frequency

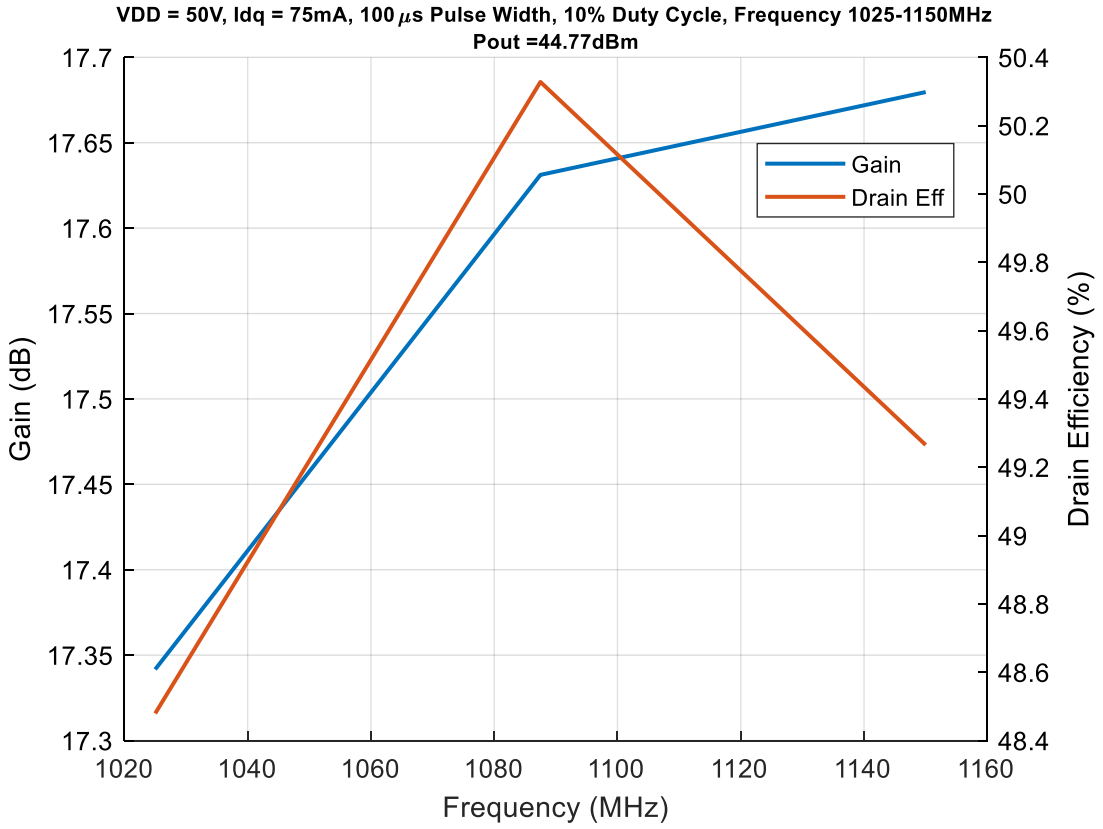

Figure 7. Pulsed Gain and Drain Efficiency vs Frequency at fixed Pout

8.4 CW Power Sweep

Table 6. MXG CW Results

Freq (MHz)	Pout (dBm)	Pout (W)	Gain (dB)	Eff (%)	P1dB (dBm)	P3dB (dBm)	Eff@P3dB (%)
1025.0	44.8	30.0	16.4	48.8	45.4	46.5	57.4
1087.5	44.8	30.0	16.8	50.9	45.7	46.5	59.0
1150.0	44.8	30.0	16.7	49.6	45.4	46.3	56.1

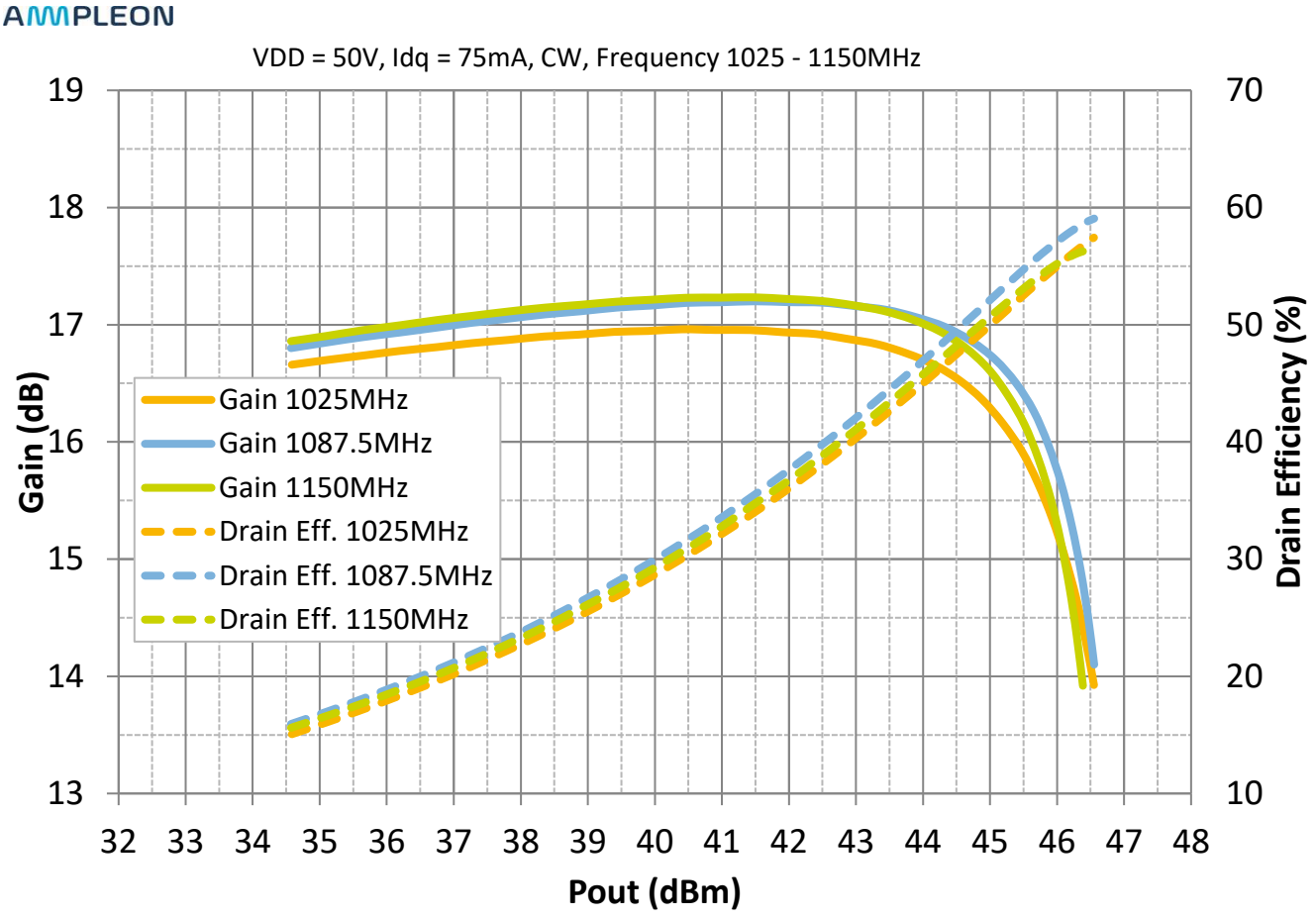

Figure 8. CW Gain and Drain Efficiency vs Output Power

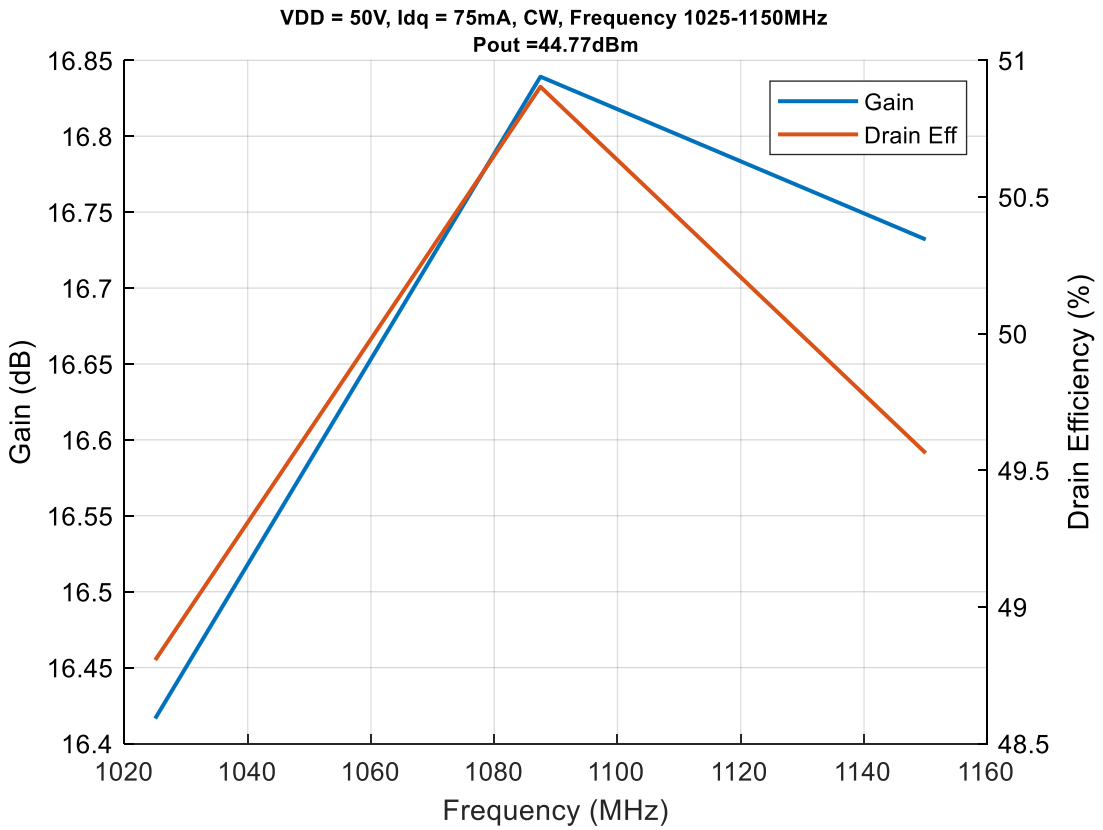

Figure 9. CW Gain and Drain Efficiency vs Frequency at fixed Pout

9 Hardware

9.1 Board photograph

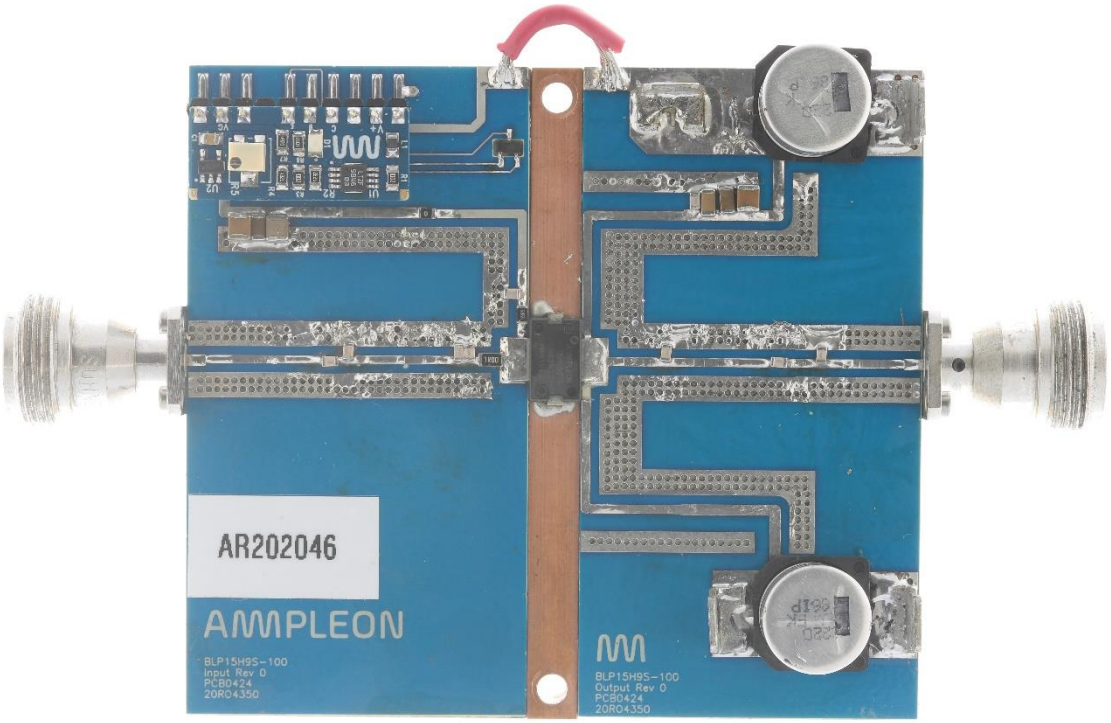

Figure 10. Demo board top view

9.2 PCB layout

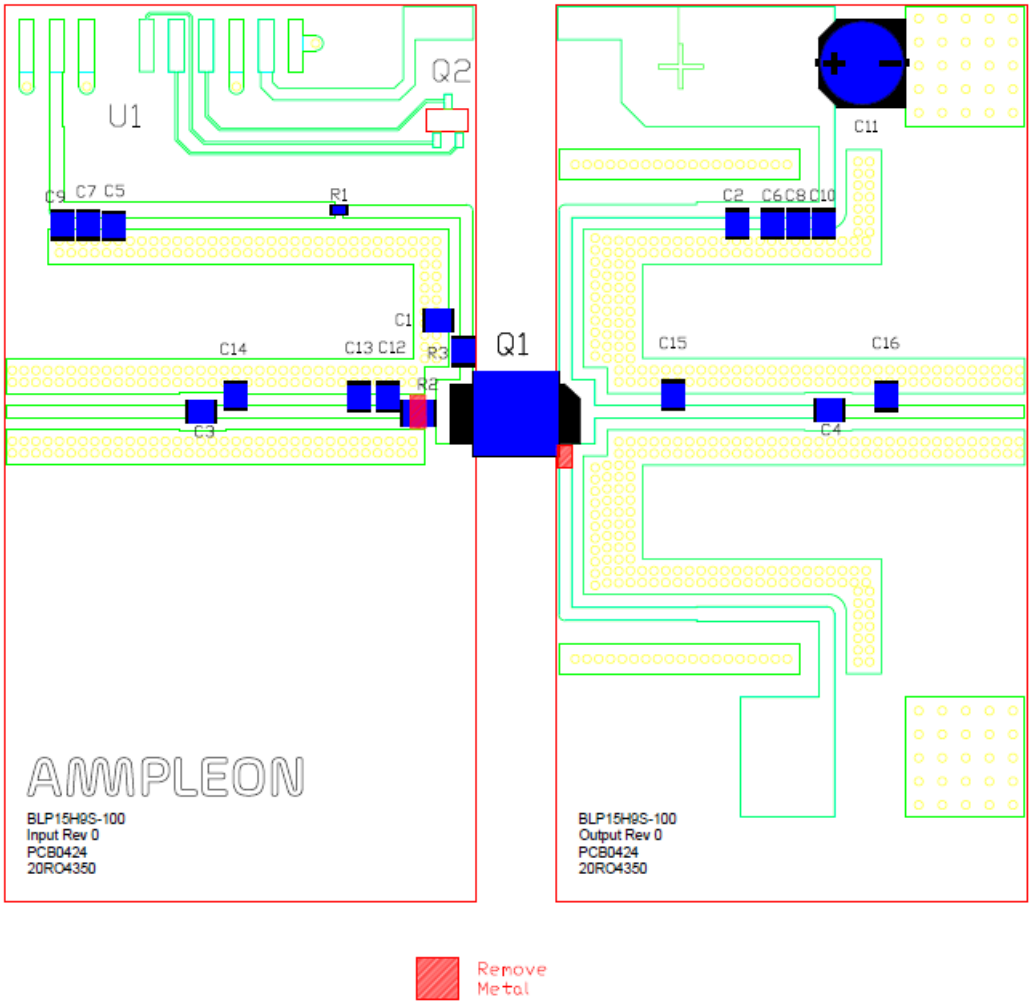

Figure 11. PCB layout and assembly

9.3 Bill of materials

Table 7. Bill of materials

Designator	Description	Manufacturer	Part #
Input Board	20mil RO4350B 1oz	Avanti	PCB0424 Input Rev 0
Output Board	20mil RO4350B 1oz	Avanti	PCB0424 Output Rev 0
Q1	LDMOS, Class AB 30W	Ampleon	BLP15H9S-30
Q2	2N2222 NPN Transistor	Fairchild	MMBT2222
U1	LDMOS bias module	Ampleon	CA-330-11
C1, C2, C3, C4	39pF, 0805, 250V, C0G, 2%	Murata	GQM2195
C5	0.01uF,100V,X7R,1206	Murata	GRM319R72A103KA01D
C6	100nF, 0805, 100V, X7R, 10%	Murata	GRM21BR72A104KAC4L
C7, C8	1uF, ceramic, 50V, 10%	Murata	GRM31CR71H105K
C9, C10	10uF	Murata	GRM55DR61H106KA88L
C11	220uF	Panasonic	63V, Electrolytic capacitor
C12	10pF, 0805, 250V, C0G, 1%	Murata	GQM2195
C13	8pF, 0805, 250V, C0G, 0.1pF	Murata	GQM2195
C14	6.2pF, 0805, 250V, C0G, 0.1pF	Murata	GQM2195
C15	10pF, 0805, 250V, C0G, 1%	Murata	GQM2195
C16	3.6pF, 0805, 250V, C0G, 0.1pF	Murata	GQM2195
R1	0 Ohm	Generic	0805
R2	1.0 Ohm	Generic	1206
R3	50 Ohm	Generic	0805

9.4 PCB materials

Table 8. Board specifications

Parameter	Value
Manufacturer	Rogers
Type	RO4350
Thickness	20mil
Layers	2, top/bottom. Bottom all copper, 1oz copper both sides

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