

AR202051

BLP15H9S30 50V 750-950MHz

V5.0 — 04-27-2022

AMPLEON

Application Report

Document information

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Abstract	Measurement results of a Class AB design for the 750-950MHz 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	06-19-2020	Update report	Hannah Chalas
3.0	07-06-2020	Update report	Hannah Chalas
4.0	09-09-2020	Status Internal	Hannah Chalas
5.0	04-24-2022	Status General Publication	Hannah Chalas

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5 General Description

This report presents the measurement results of the Class AB demo board AR202051. 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 750-950MHz.

6 Biasing & Pinout

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

Parameter	At board connector
V_{DD}	= 50V
I_{DQ}^*	= 95mA

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

7 Performance Indicators

Table 2. Typical performance at 750-950MHz

Parameter	Condition	Unit	Pulsed-CW ¹
VDD		V	50
P1dB ²	GMAX-1dB	dBm	46.41-46.59
P3dB ²	GMAX-3dB	dBm	47.20-46.35
POUT of operation ³	Po	dBm	35
GAIN	@Po	dB	19.21-20.22
Drain Efficiency	@Po	%	16.30-19.49

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 Pout at 1 and 3dB gain compression relative to the maximum gain in the power sweep

³ 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)
750	-6.2	19.0	3.1
775	-10.0	19.1	2.8
800	-13.1	19.8	3.1
825	-11.6	19.8	3.1
850	-9.0	19.6	2.9
875	-8.0	19.1	2.8
900	-8.8	19.1	3.1
925	-11.5	19.2	3.7
950	-9.2	18.7	4.4

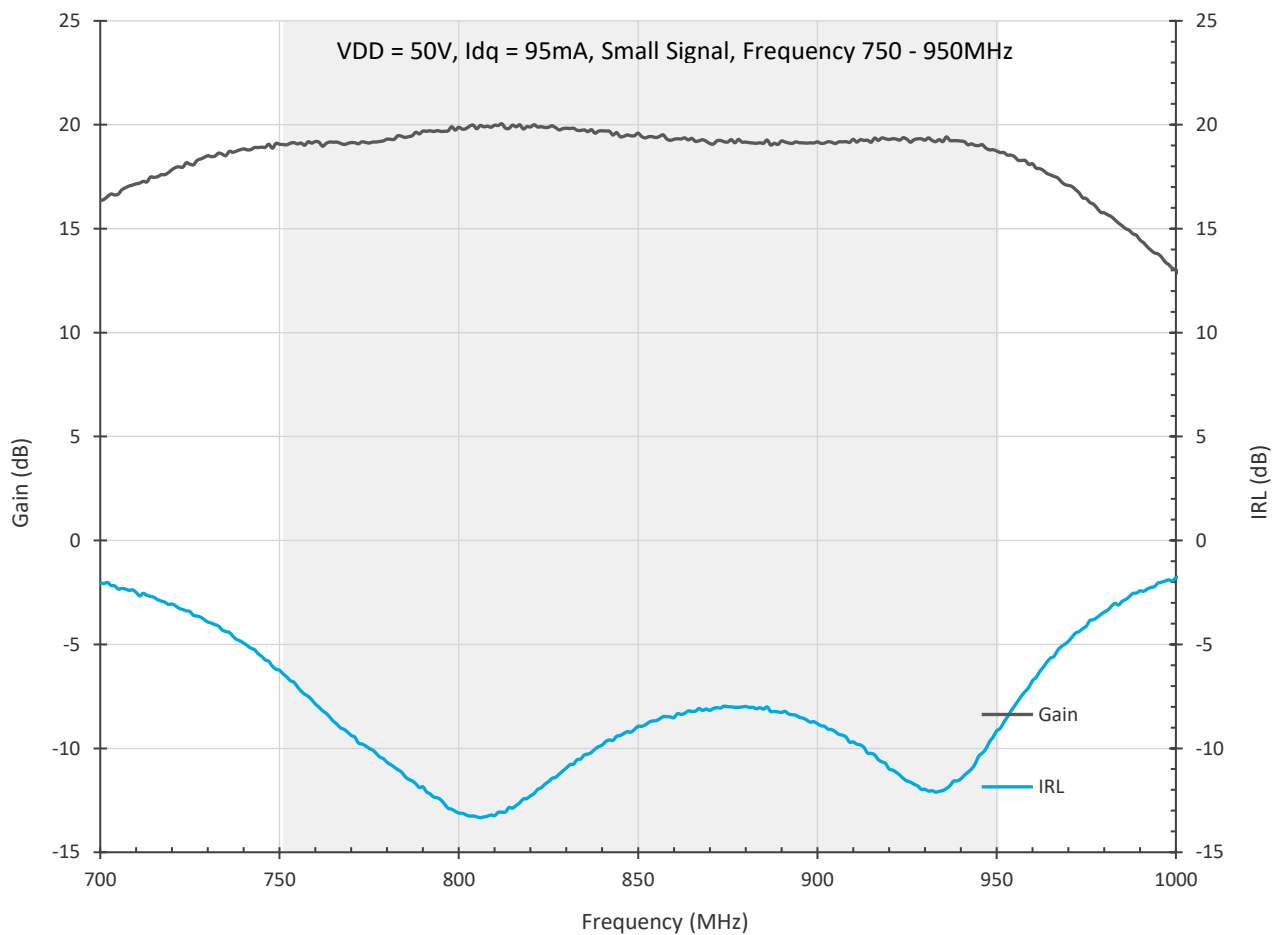


Figure 1. Gain & IRL vs Frequency

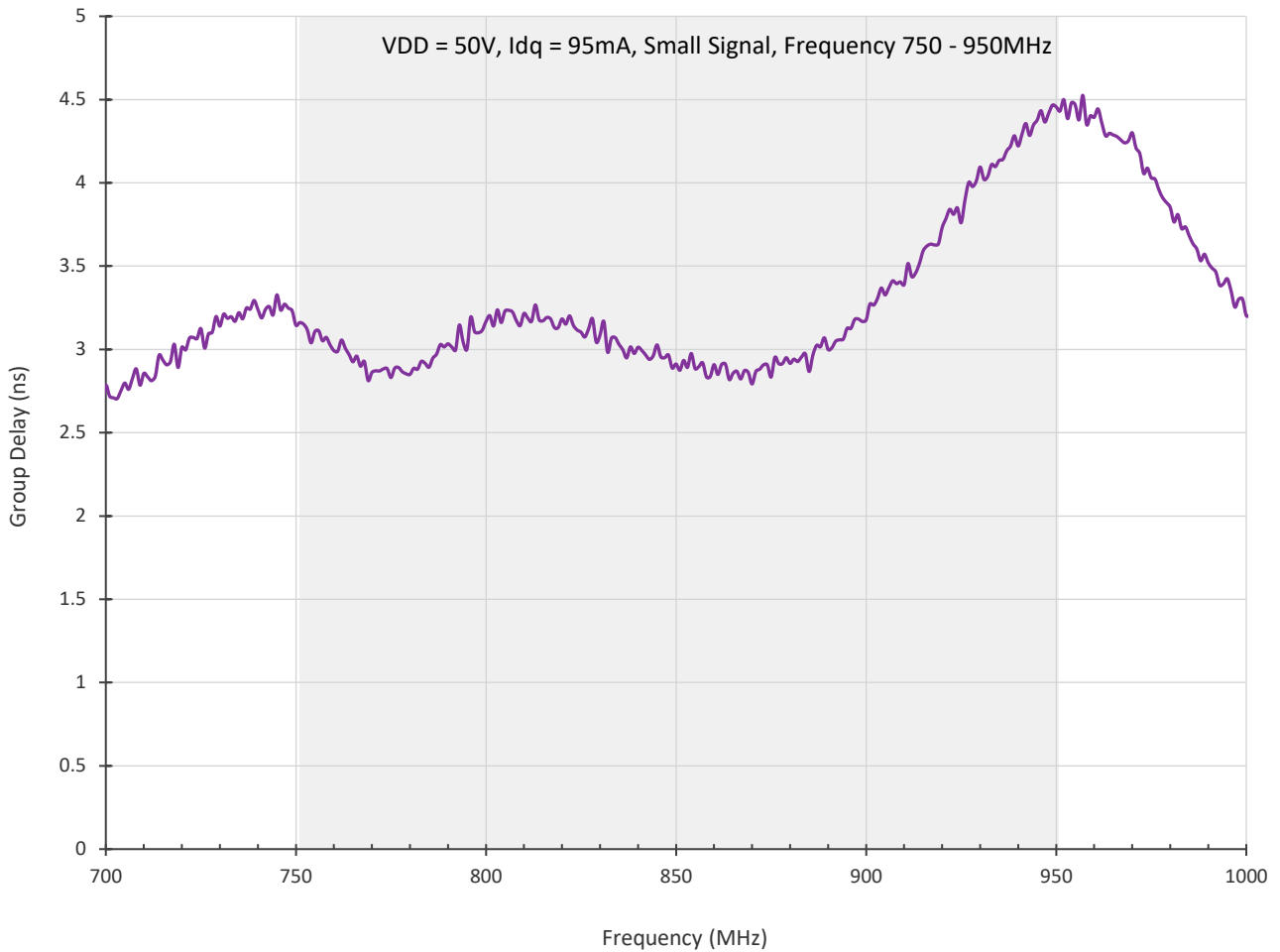


Figure 2. Group Delay vs Frequency

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

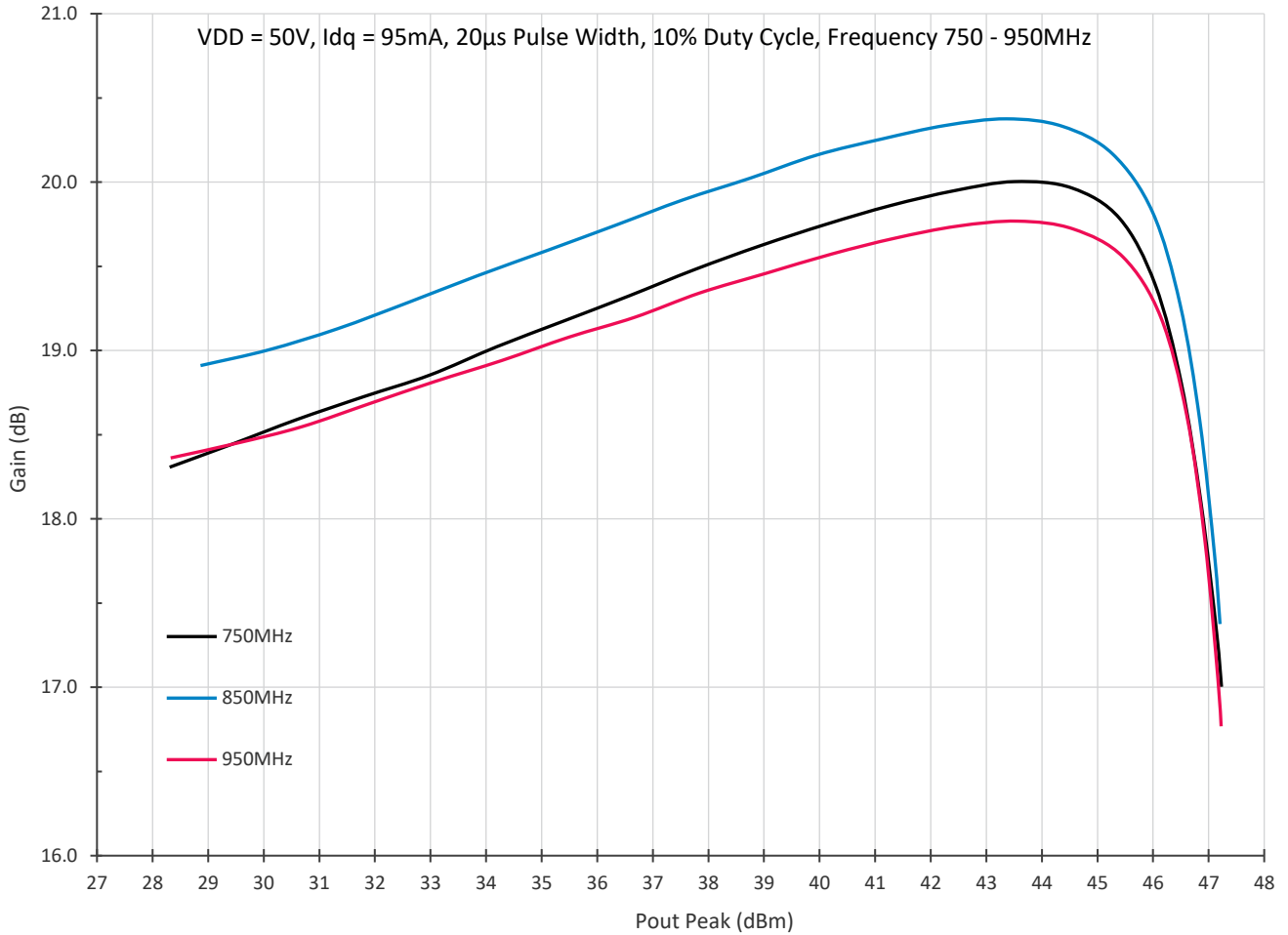


Figure 3. AM/AM

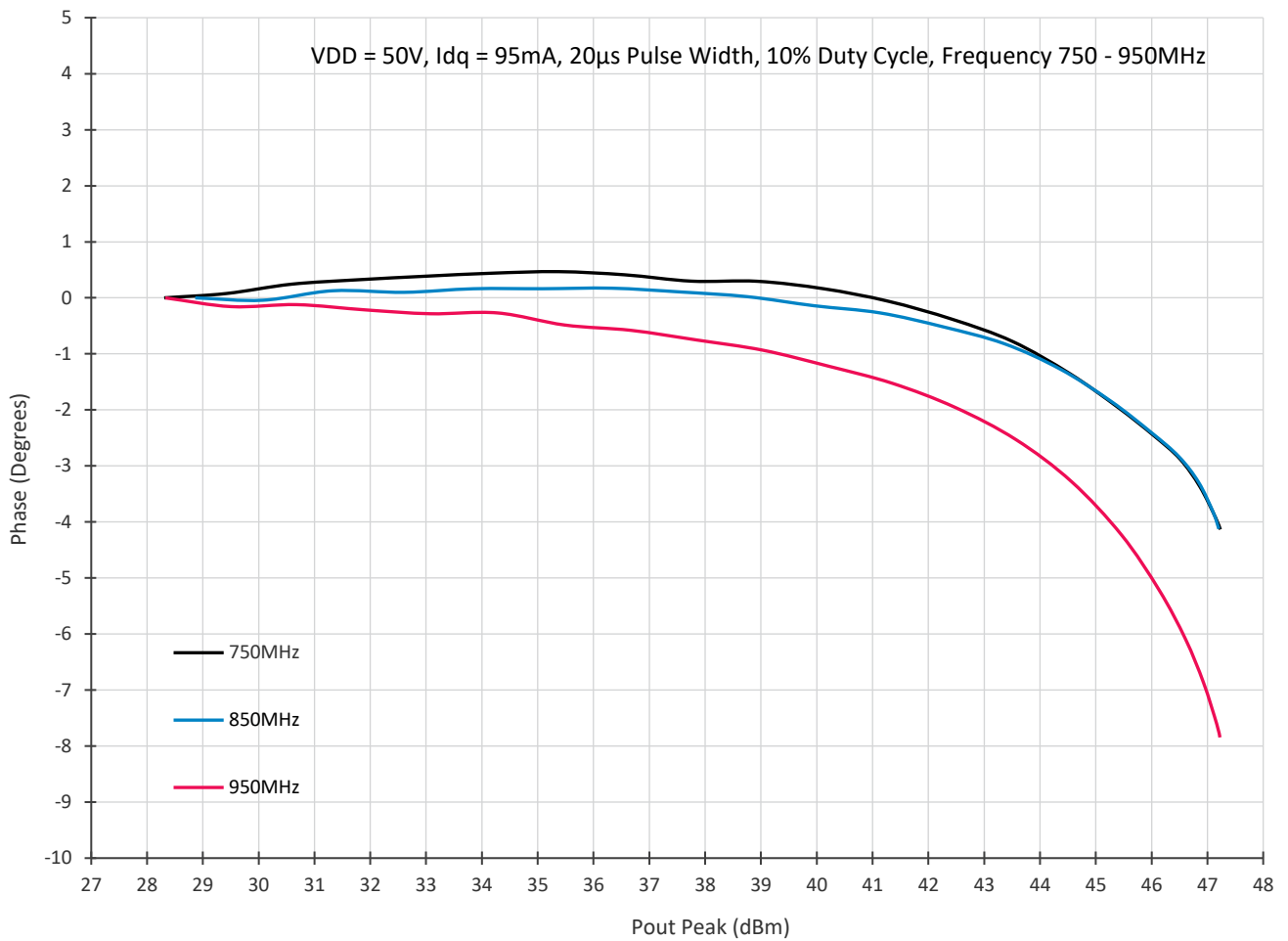


Figure 4. AM/PM

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 (%)
750	35.0	3.16	19.42	17.66	46.41	47.26	66.70
775	35.0	3.16	19.50	17.77	46.42	47.24	65.59
800	35.0	3.16	20.13	17.73	46.40	47.21	64.76
825	35.0	3.16	20.22	16.42	46.45	47.26	63.63
850	35.0	3.16	19.84	16.30	46.46	47.26	63.46
875	35.0	3.16	19.53	16.27	46.50	47.26	63.91
900	35.0	3.16	19.48	17.31	46.47	47.20	65.46
925	35.0	3.16	19.66	18.41	46.50	47.24	67.94
950	35.0	3.16	19.21	19.49	46.59	47.35	72.19

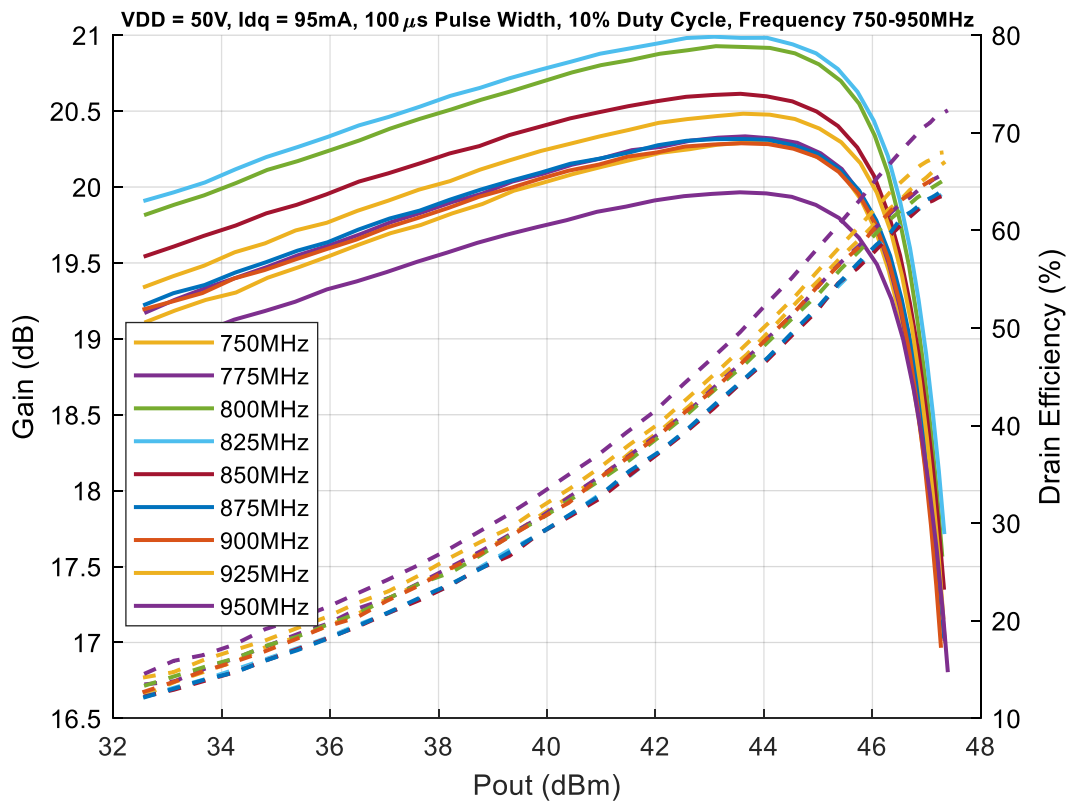


Figure 5. Pulsed Gain and Drain Efficiency vs Output Power

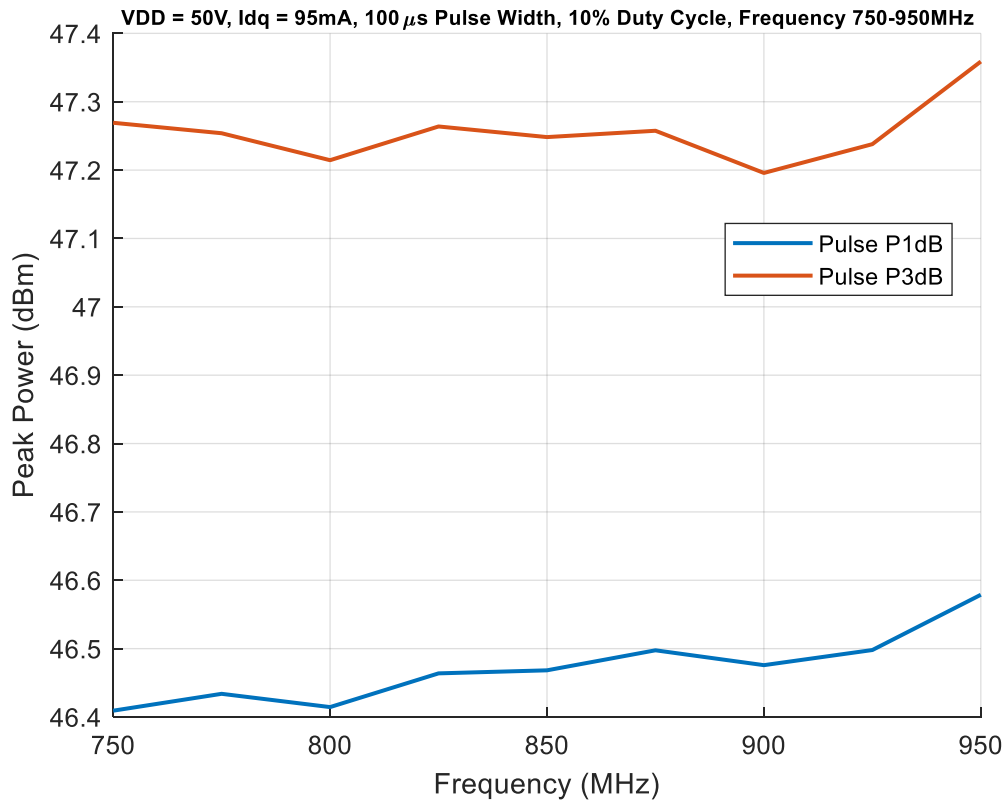


Figure 6. Pulsed Output compression point vs Frequency

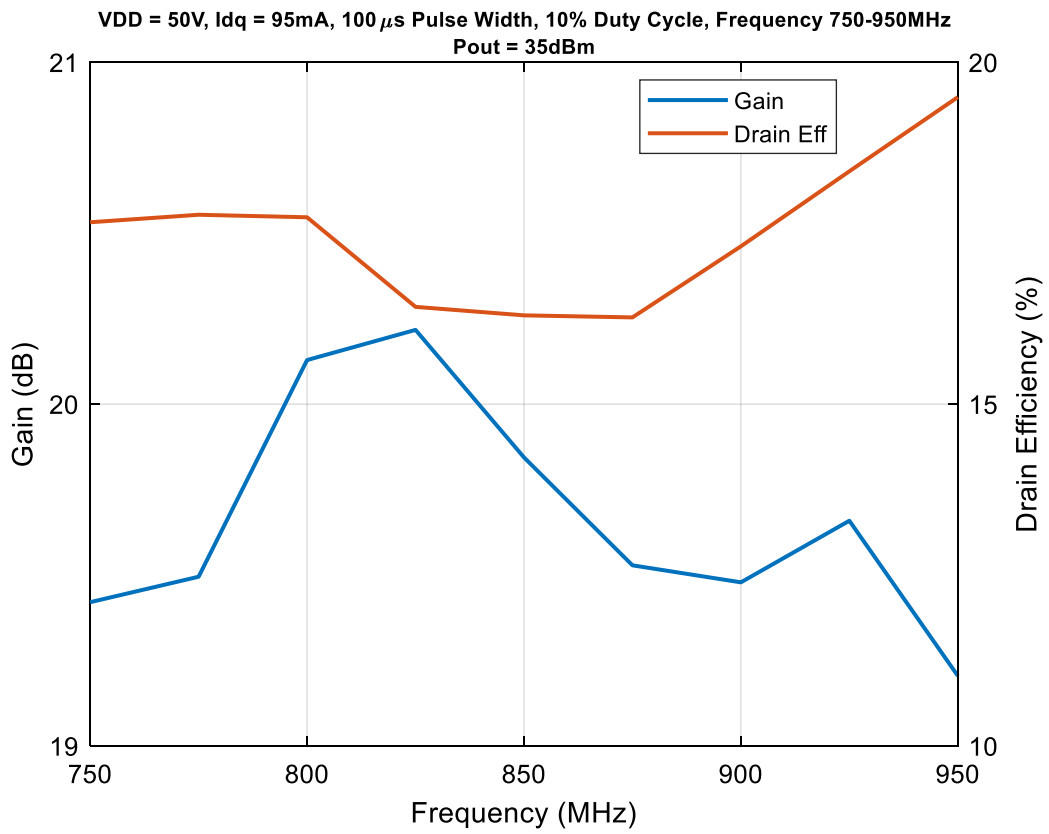


Figure 7. Pulsed Gain and Drain Efficiency vs Frequency at fixed Pout

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 (%)
750	35.00	3.16	19.48	17.53	45.87	46.73	63.38
775	35.00	3.16	19.50	17.37	45.81	46.66	61.98
800	35.00	3.16	20.11	17.16	45.75	46.59	60.91
825	35.00	3.16	20.24	16.94	45.71	46.61	60.64
850	35.00	3.16	19.81	16.94	45.68	46.57	60.17
875	35.00	3.16	19.48	17.04	45.74	46.59	60.63
900	35.00	3.16	19.56	17.19	45.84	46.69	62.17
925	35.00	3.16	19.73	17.63	45.98	46.80	64.55
950	35.00	3.16	19.26	18.19	46.19	47.02	68.91

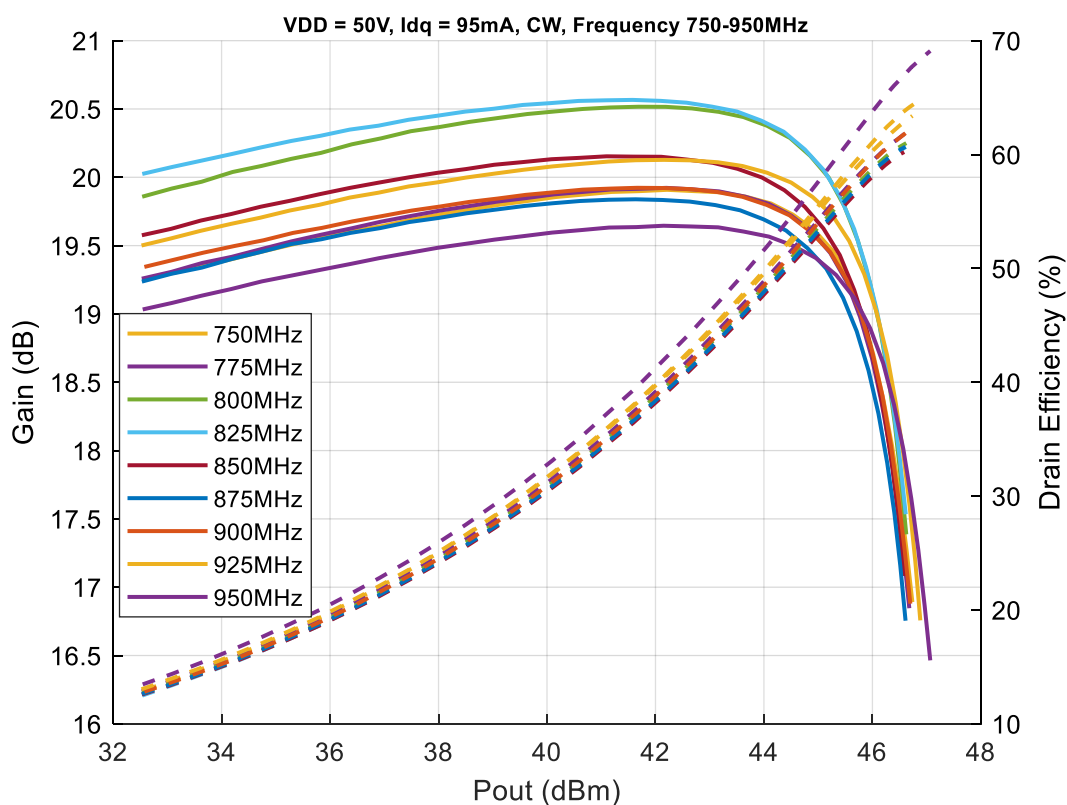


Figure 8. CW Gain and Drain Efficiency vs Output Power

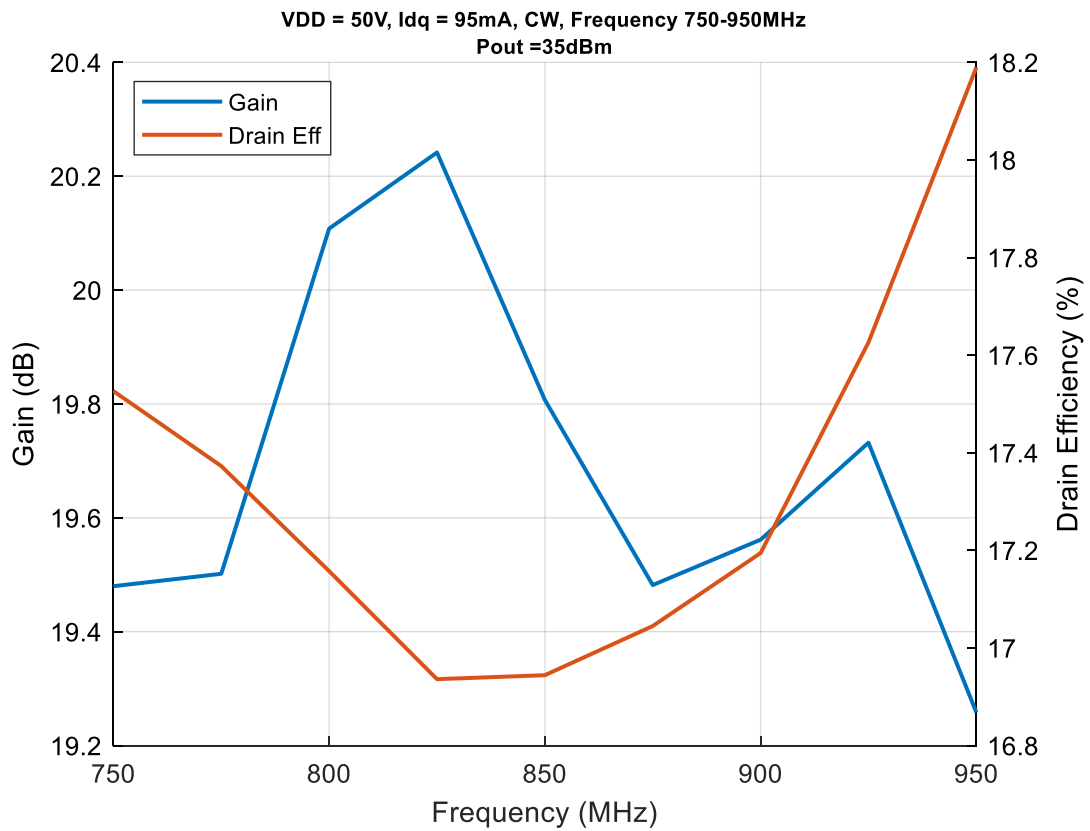


Figure 9. CW Gain and Drain Efficiency vs Frequency at fixed Pout

9 Hardware

9.1 Board photograph

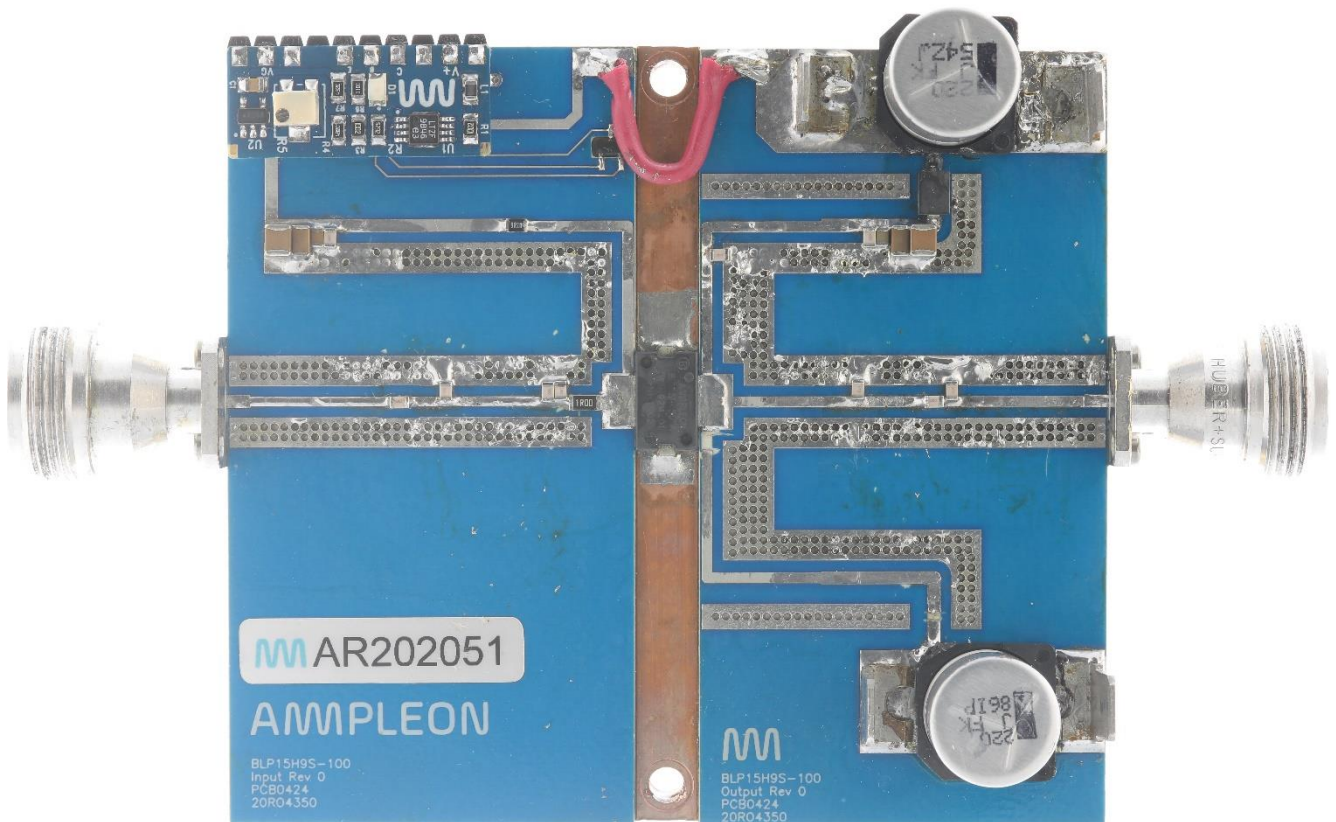
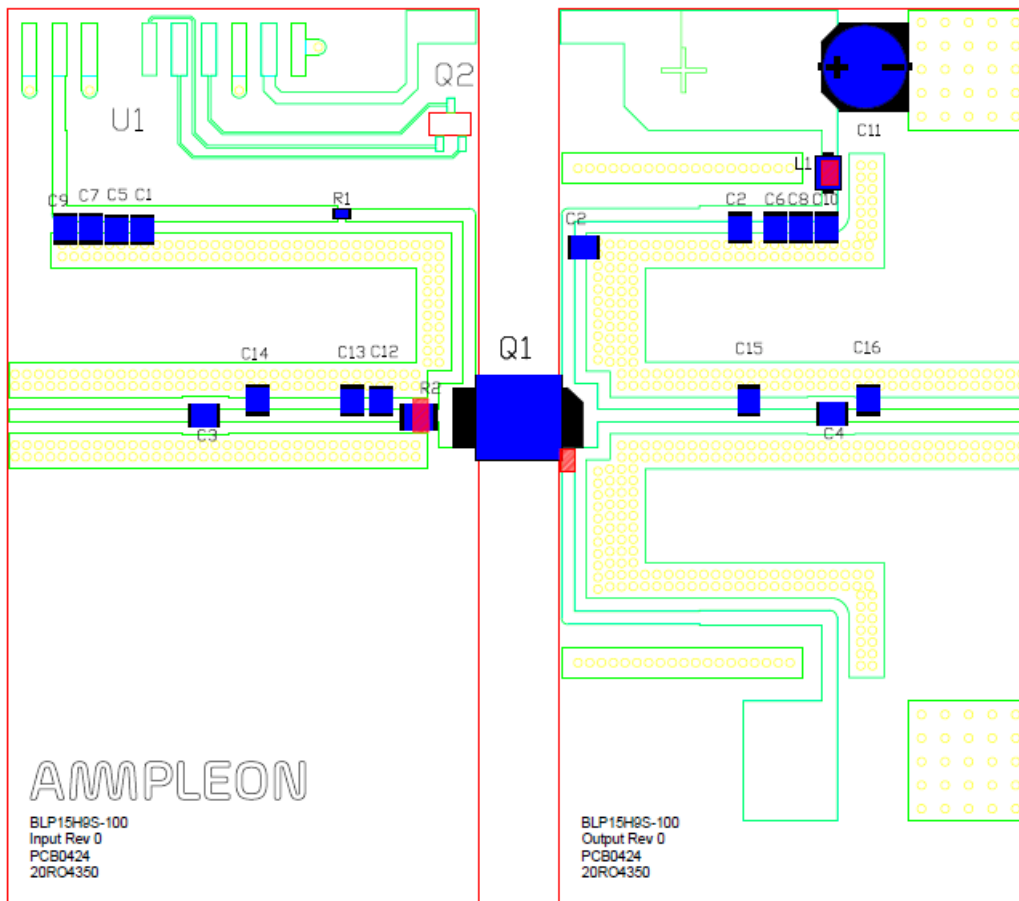


Figure 10. Demo board top view

9.2 PCB layout



 Remove Metal

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
L1	Ferroxcube Bead	Fair Rite	Bead 2743019447
C1, C2, C3, C4	68pF, 0805, 250V, C0G, 2%	Murata	GQM2195C2E680GB12
C5, C6	0.01uF, 0805, 100V, X7R, 10%	Murata	GRM21BR72A103KAC4L
C7, C8	1uF, 1206, 100V, X7R, 10%	Murata	GRM31CR72A105KA01L
C9, C10	10uF	Murata	GRM55DR61H106KA88L
C11	220uF	Panasonic	63V, Electrolytic capacitor
C12	20pF, 0805, 250V, C0G, 2%	Murata	GQM2195
C13	18pF, 0805, 250V, C0G, 1%	Murata	GQM2195
C14	12pF, 0805, 250V, C0G, 1%	Murata	GQM2195
C15	1.2pF, 0805, 250V, C0G, 0.1pF	Murata	GQM2195
C16	3.0pF, 0805, 250V, C0G, 0.1pF	Murata	GQM2195
R1	9.1 Ohm	Generic	0805
R2	1.0 Ohm	Generic	1206

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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