AR192191

BLP15H9S100 50V 1700-1850MHz

V1.0 — 01-17-2019

Application Report

Document information

Info	Content
Status	Public Disclosure Under NDA
Author(s)	Hannah Chalas
Keywords	BLP15H9S100 50V Class AB 1700-1850MHz
Abstract	Measurement results of a Class AB design for the 1700-1850MHz band with BLP15H9S100.

1 Revision History

Table 1. Report revisions

Revision No.	Date	Description	Author
1.0	01-17-2019	Initial version.	Hannah Chalas

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 AR192191. The device used is a 100W, 9th generation LDMOS in a SOT1482-1 overmolded plastic package, BLP15H9S100. The presented demo is optimized for the frequency band 1700-1850MHz.

6 Biasing & Pinout

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

Parameter		At board connector
V_{DD}	=	50V
I_{DQ}	=	170mA

7 Performance Indicators

Table 2. Typical performance at *center* frequency

Parameter	Condition	Unit	Pulsed-CW	1cWCDMA[1]
VDD		V	50	50
Normalized AM-PM[2]	Max, @P3dB	°	-3.4	—
PAR input signal[3]	CCDF=0.01%	dB	—	10
P1dB[3,4]	GMAX-1dB	dBm	50.6	—
P3dB[3,4]	GMAX-3dB	dBm	51.5	—
PPEAK[5]	PAR-3dB	dBm	—	51.3
POUT of operation[6]	Po	dBm	***50***	—
GAIN	@Po	dB	16.1	—
Drain Efficiency	@Po	%	48.7	—
ACPR(L/U), 3.84MHz, ±5MHz	@Po	dBc	—	—

Table 3. Device specifics

Parameter	Value
Manufacturer	AMPLEON
Device	BLP15H9S100
Marking	AMPLEON BLP15H9S100TA W6N927C02 NH1916
Package	SOT1482-1

[1] *Unclipped*
[2] *PCW Pulse sweep with 20µs Pulse Width, 10% Duty Cycle*
[3] *MXG CW Pulse sweep with 100µs Pulse Width, 10% Duty Cycle*
[4] *Pout at 1 and 3dB gain compression relative to the maximum gain in the power sweep*
[5] *When output PAR of modulated signal is compressed by 3dB*
[6] *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 CW

Freq (MHz)	IRL (dB)	Gain (dB)	Group Delay (ns)
1700	-4.7	13.0	3.2
1775	-4.6	13.6	3.2
1850	-12.2	14.5	6.6

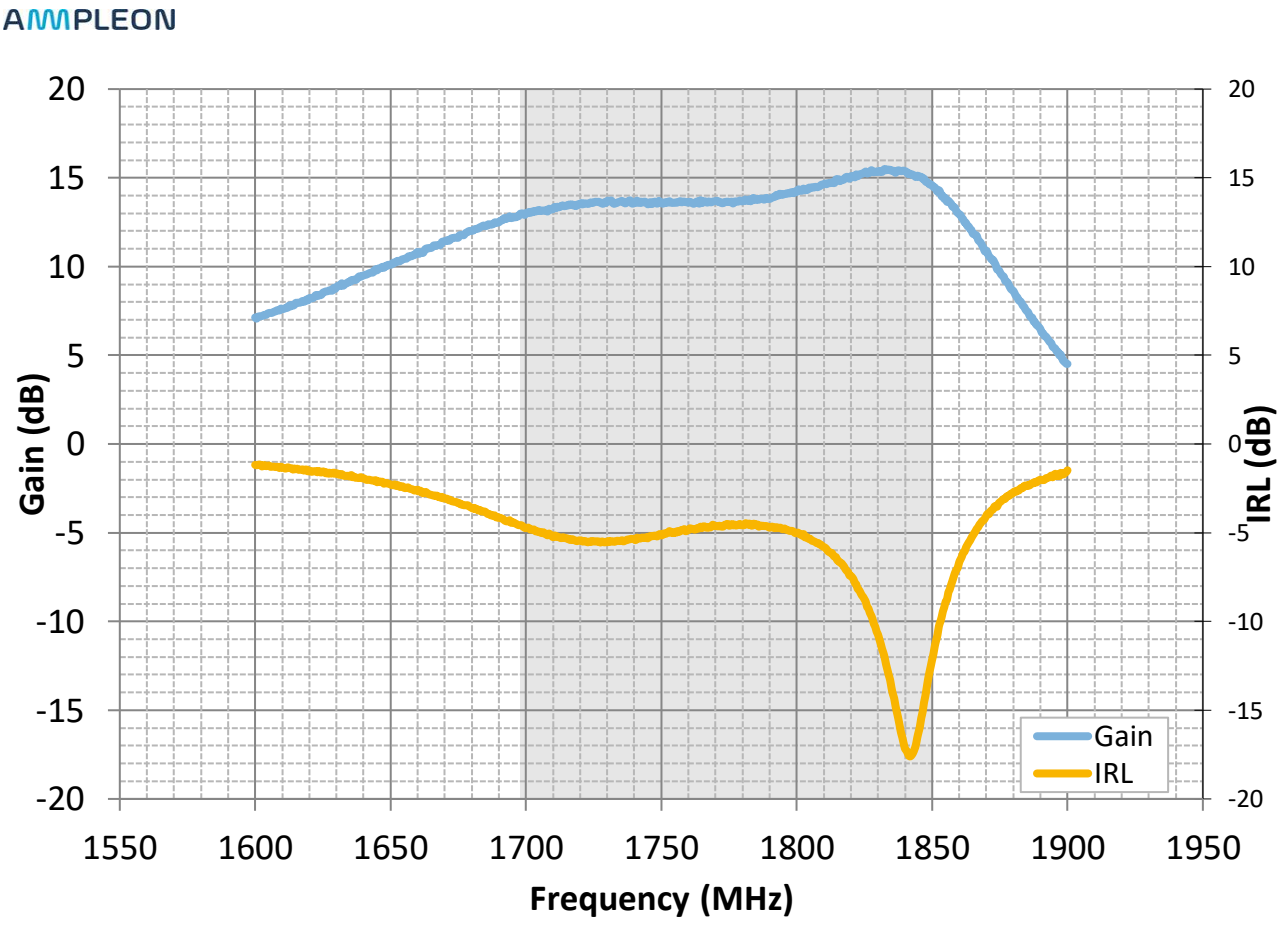

Figure 1. Gain & IRL vs Frequency

AMPLEON

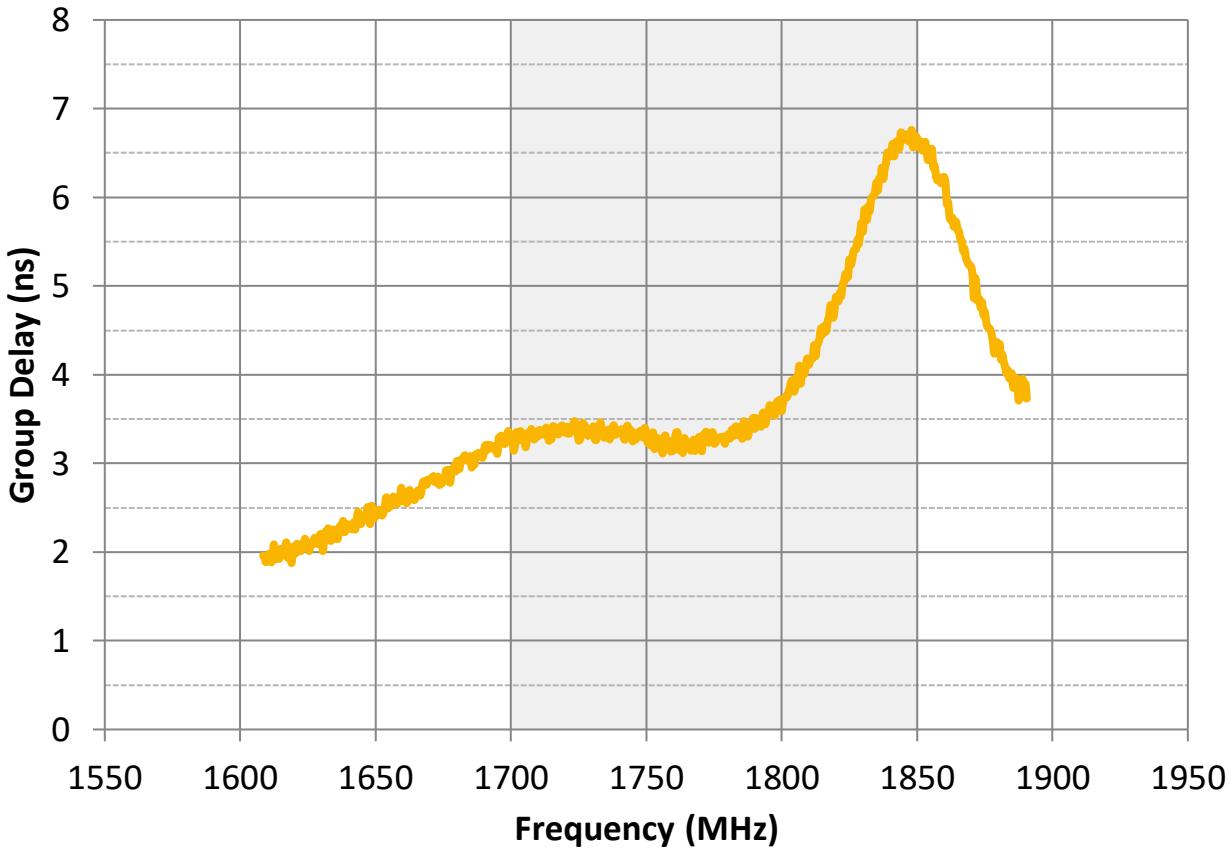

Figure 2. Group Delay vs Frequency

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

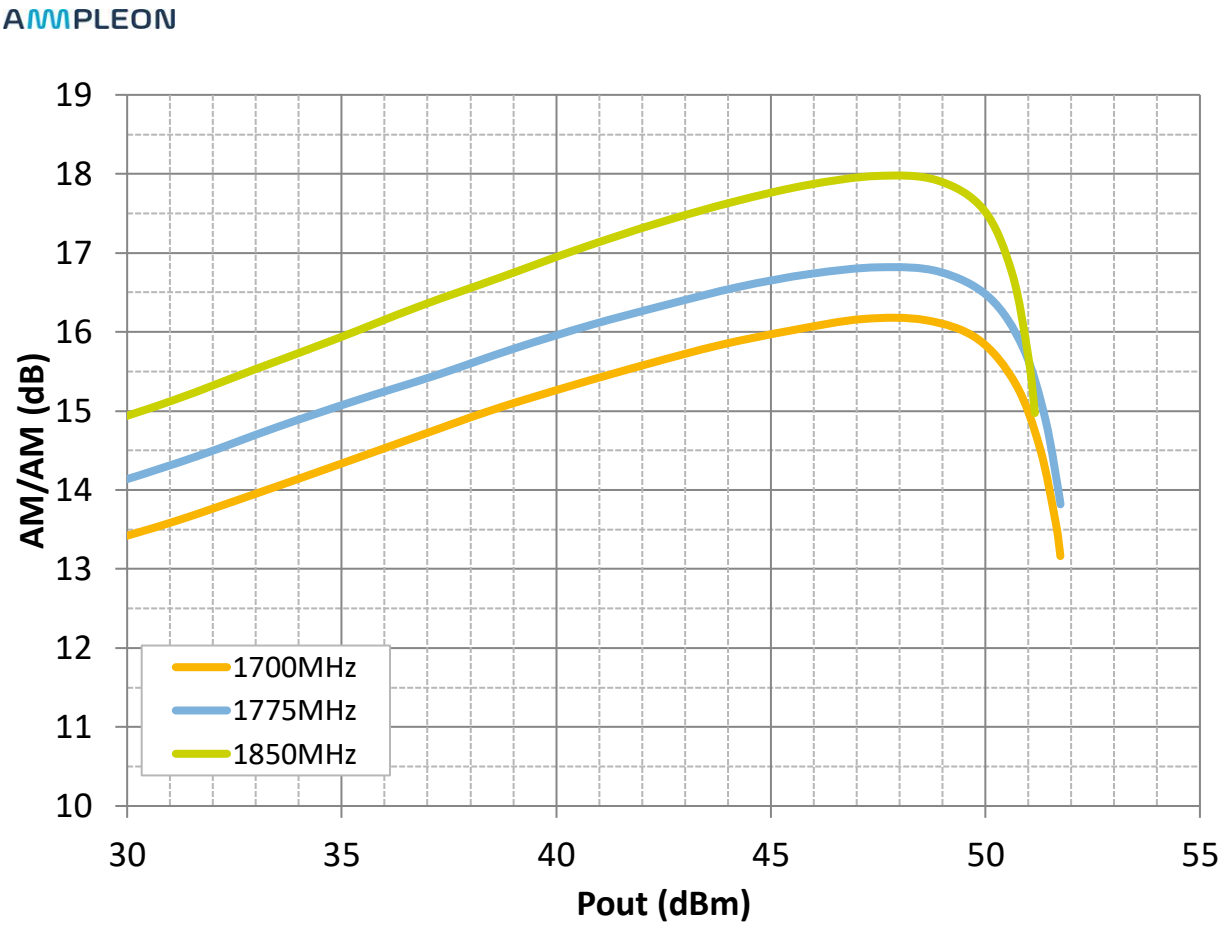

Figure 3. AM/AM

AMPLEON

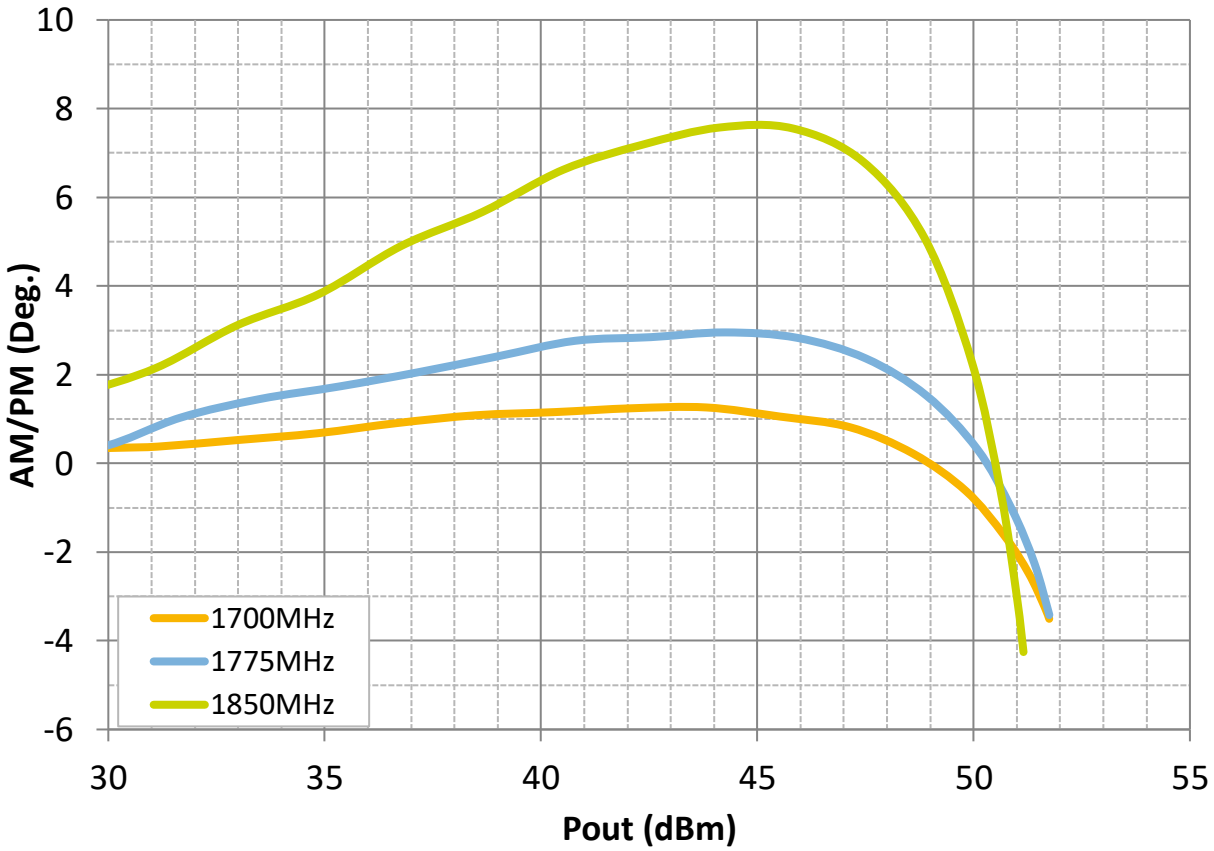

Figure 4. AM/PM

8.3 Power Sweep — Pulsed CW (100µs Pulse Width, 10% Duty Cycle)

Table 5. MXG Pulsed CW

Freq (MHz)	Pout (dBm)	Pout (W)	Gain (dB)	Eff (%)	P1dB (dBm)	P3dB (dBm)	P3dB(WCDMA10) (dBm)
1700	50.00	100.00	15.87	47.60	50.69	51.64	51.36
1775	50.00	100.00	16.14	48.78	50.64	51.59	51.31
1850	50.00	100.00	17.33	53.67	50.39	51.13	51.04

AMPLEON

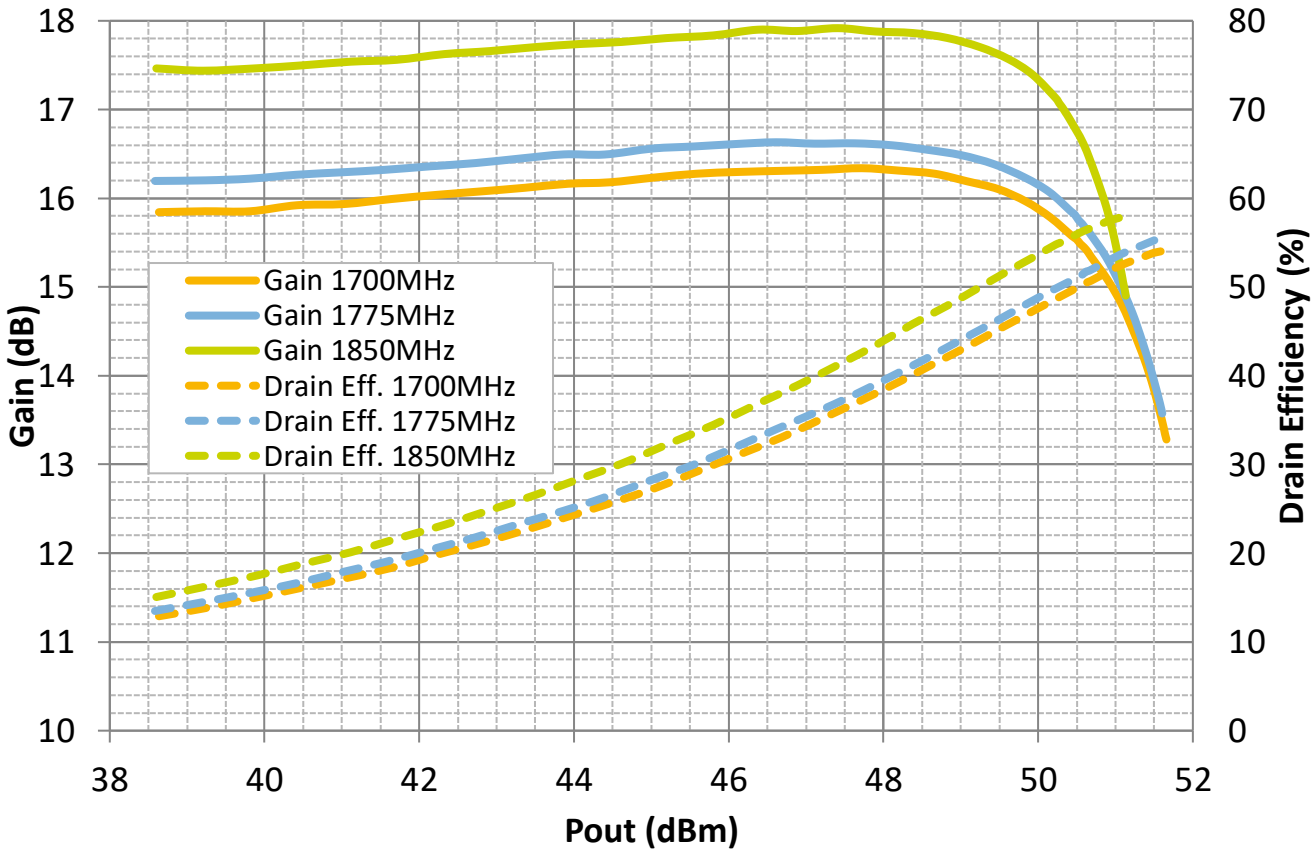

Figure 5. Gain and Drain Efficiency vs Output Power

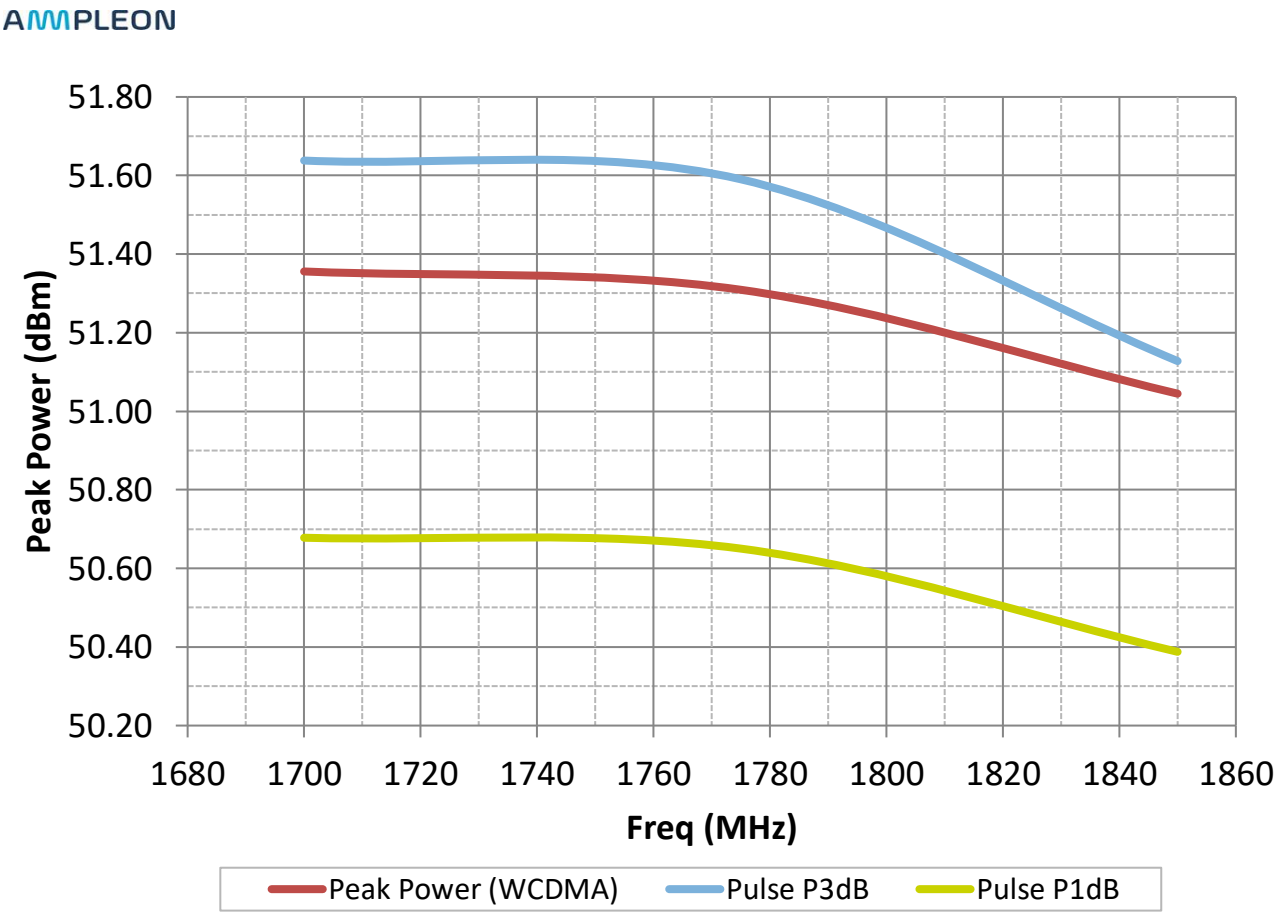

Figure 6. Output compression point vs Frequency

8.4 Power Sweep — CW

Table 6. MXG CW

Freq (MHz)	Pout (dBm)	Pout (W)	Gain (dB)	Eff (%)	P1dB (dBm)	P3dB (dBm)
1700	50.00	100.00	--	--	48.74	49.74
1775	50.00	100.00	12.56	47.07	48.91	49.93
1850	50.00	100.00	14.15	52.30	49.16	50.08

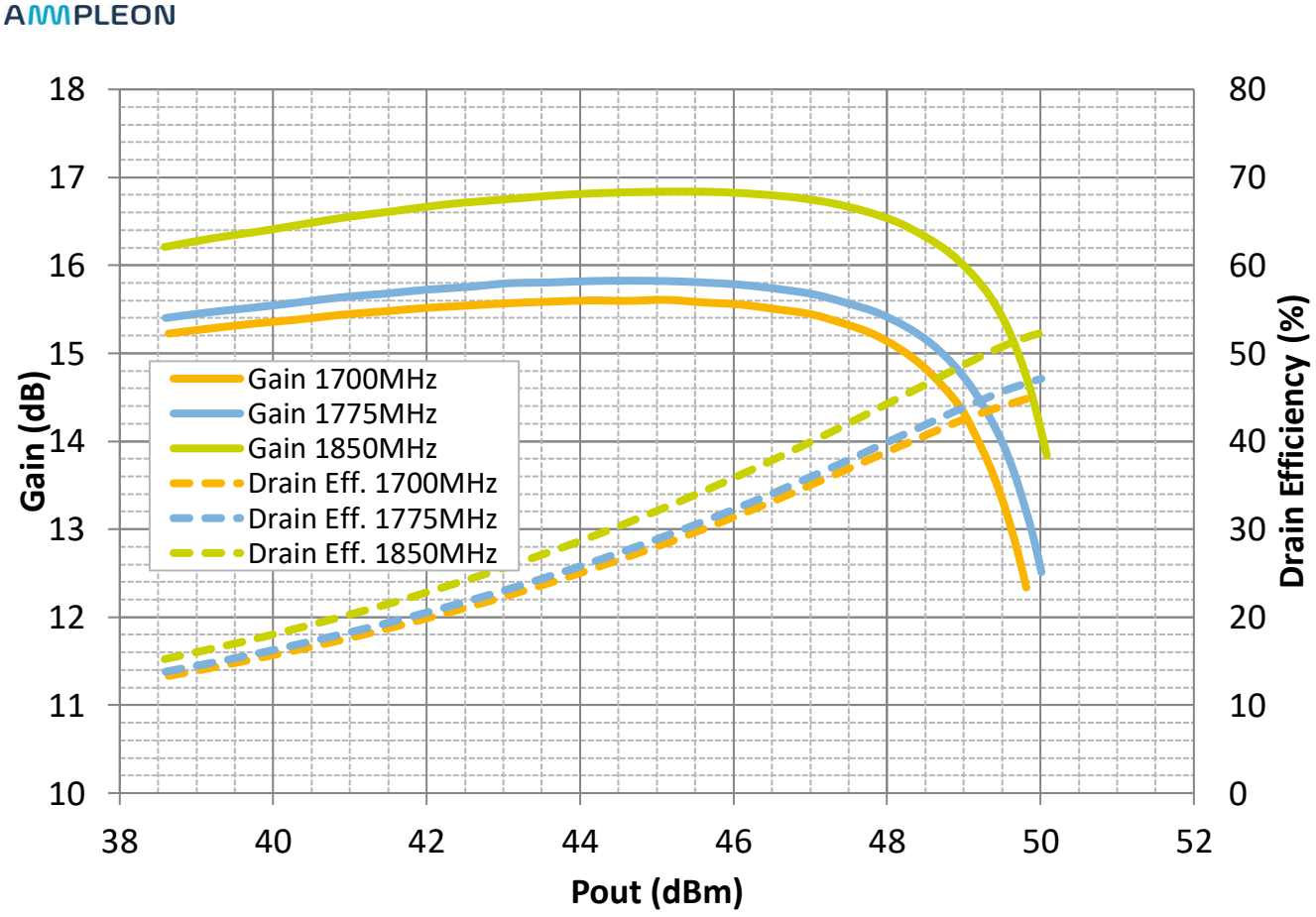

Figure 7. Gain and Drain Efficiency vs CW Output Power

9 Hardware

9.1 Board photograph

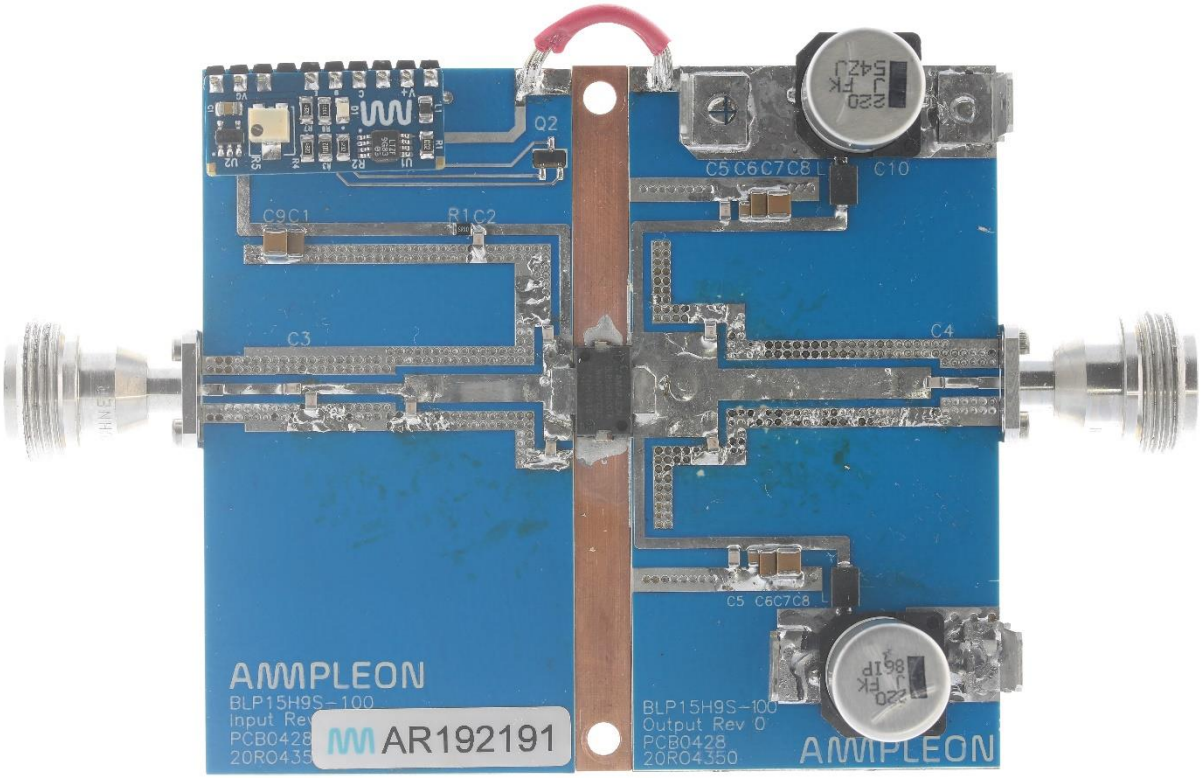

Figure 8. Demo board top view

9.2 PCB layout

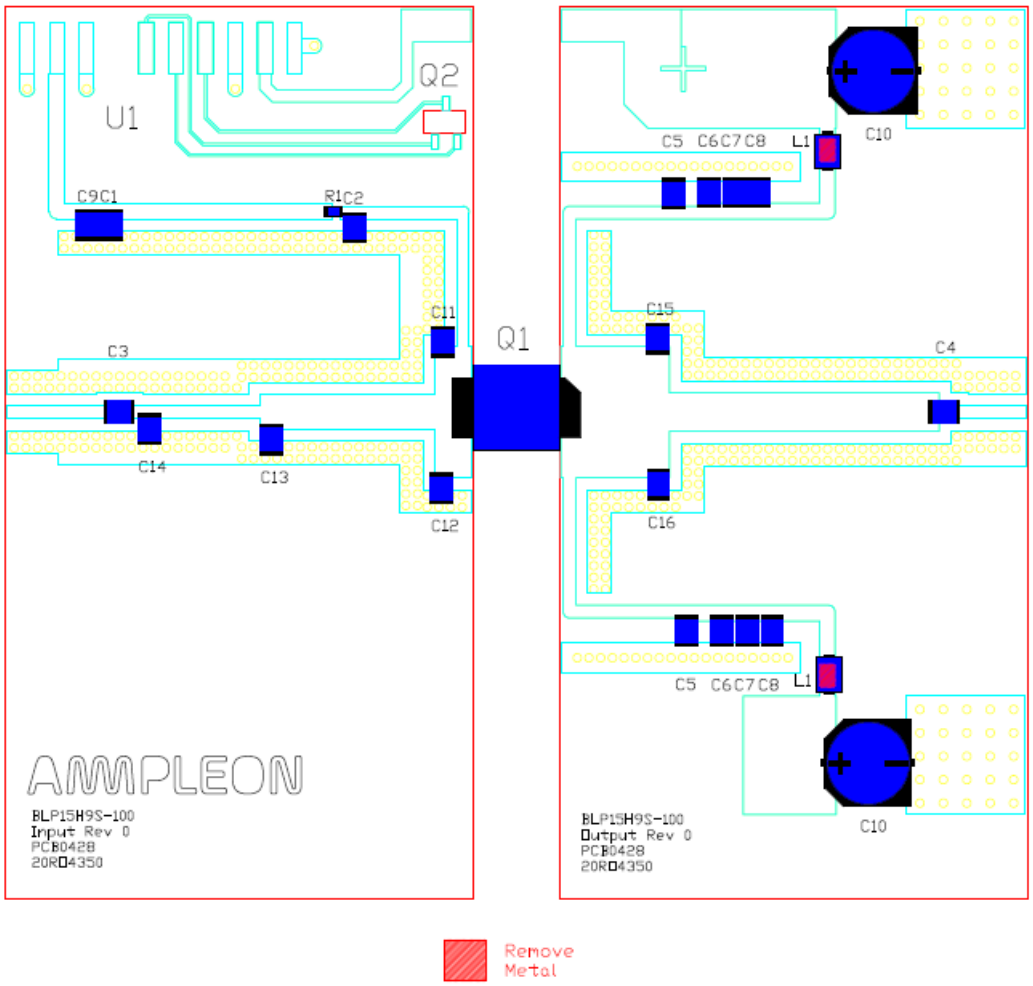

Figure 9. PCB layout and assembly

9.3 Bill of materials

Table 7. Bill of materials

Designator	Description	Manufacturer	Part #
Input Board	20mil RO4350B 1oz	Avanti	PCB0428 Input Rev 0
Output Board	20mil RO4350B 1oz	Avanti	PCB0428 Output Rev 0
Q1	LDMOS, Class AB 100W	Ampleon	BLP15H9S-100
Q2	2N2222 NPN Transistor	Fairchild	MMBT2222
U1	LDMOS bias module	Ampleon	CA-330-11
L1	Ferroxcube Bead	Fair Rite	Bead 2743019447
C1, C7	1uF, 1206, 100V, X7R, 10%	Murata	GRM31CR72A105KA01L
C2,C3,C4,C5	18pF, 0805, 250V, C0G, 2%	Murata	GQM2195C2E180GB12
C6	100nF, 0805, 100V, X7R, 10%	Murata	GRM21BR72A104KAC4L
C8, C9	10uF	Murata	GRM55DR61H106KA88L
C10	220uF	Panasonic	63V, Electrolytic capacitor
C11	5.1pF, 0805, 250V, +/- 0.1pF	Murata	GQM2195C2E5R1BB15
C12	5.6pF, 0805, 250V, +/- 0.1pF	Murata	GQM2195C2E5R6BB15
C13	5.0pF, 0805, 250V, +/- 0.1pF	Murata	GQM2195C2E5R0BB15
C14	3.9pF, 0805, 250V, +/- 0.1pF	Murata	GQM2195C2E3R9BB15
C15, C16	4.3pF, 0805, 250V, +/- 0.1pF	Murata	GQM2195C2E4R3BB15
R1	9.1 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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