AR201054

BLP9LA25SG, 740-800MHz

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AMPLEON

Application Report

Document information	
Status	Public
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Abstract	Measurement results of a Class AB design for the 740-800MHz band with the BLP9LA25SG

1. Revision History

Table 1: Report revisions

Revision	Date	Description	Author
0.1	20200323	Initial document	Tom Brinkman
1.0	20200407	Final	Tom Brinkman

2. Contents

3. List of figures

4. List of tables

5. General description

This report presents the measurement results of the Class AB demo AR201054. The device used is a 25W, 9th generation LDMOS, the BLP9LA25SG. The presented demo is tuned for the frequency 740-800MHz.

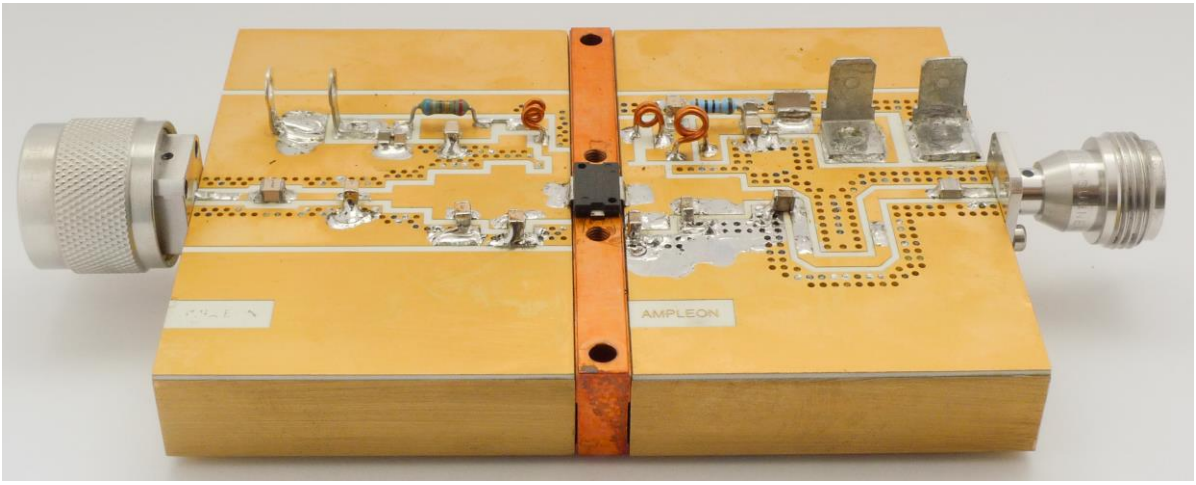

Figure 1 Demo Front view

6. Biasing

The efficiencies presented are based on the currents of the drain feeds only.
I.e. the biasing currents for the gate circuitry has not been included.

Unless otherwise stated, the biasing is as follows:

V_{DD} = 13.5V

V_{GS} = 2.2V, leading to an I_{DQ} = 400mA

7. Performance Indication 740-800MHz

Table 2: Performance indication, sampled at 740-800MHz

Parameter	Condition	Unit	CW
V_{DD}		V	13.5
S11 at connector		dB	< -11
P_{1dB}[1]	G_{MAX}-1dB	W	> 31
P_{3dB}[1]	G_{MAX}-3dB	W	-
P_{OUT} of operation	***P_o***[2]	W	***28.2***
Gain	**@P_o**	dB	>17
Drain Efficiency	**@P_o**	%	>55
Drain Efficiency	**@ 3dB comp.**	%	>67

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

[2] *Demonstrator is expected to operate at the P_o average power level*

8. Performance Details

8.1 CW signal Power sweeps

Table 3: CW Performance

Freq [MHz]	MaxGain [dB]	P1dB [W]*	P3dB [W]*	Eff@P3dB [%]*
740.00	18.1	33.87	46.6	67.0
750.00	18.1	33.70	46.5	68.2
760.00	18.0	33.38	46.5	69.1
770.00	18.0	32.87	46.3	69.9
780.00	17.9	32.30	46.2	70.6
790.00	17.8	31.57	46.1	71.2
800.00	17.7	30.65	45.9	71.6

Table 4: CW Performance at Pout = 28.2Watts

Freq [MHz]	Gain [dB]@	Eff [%]@	Compr [dB]@	IRL [dB]@
740.00	17.6	55.4	-0.48	12.2
750.00	17.6	56.7	-0.49	12.0
760.00	17.6	57.9	-0.50	11.6
770.00	17.5	59.2	-0.53	11.4
780.00	17.3	60.4	-0.57	11.5
790.00	17.2	61.7	-0.62	12.2
800.00	17.0	63.0	-0.69	13.2

8.1.1 Gain and efficiency (3 dB sweep) 740-800 MHz

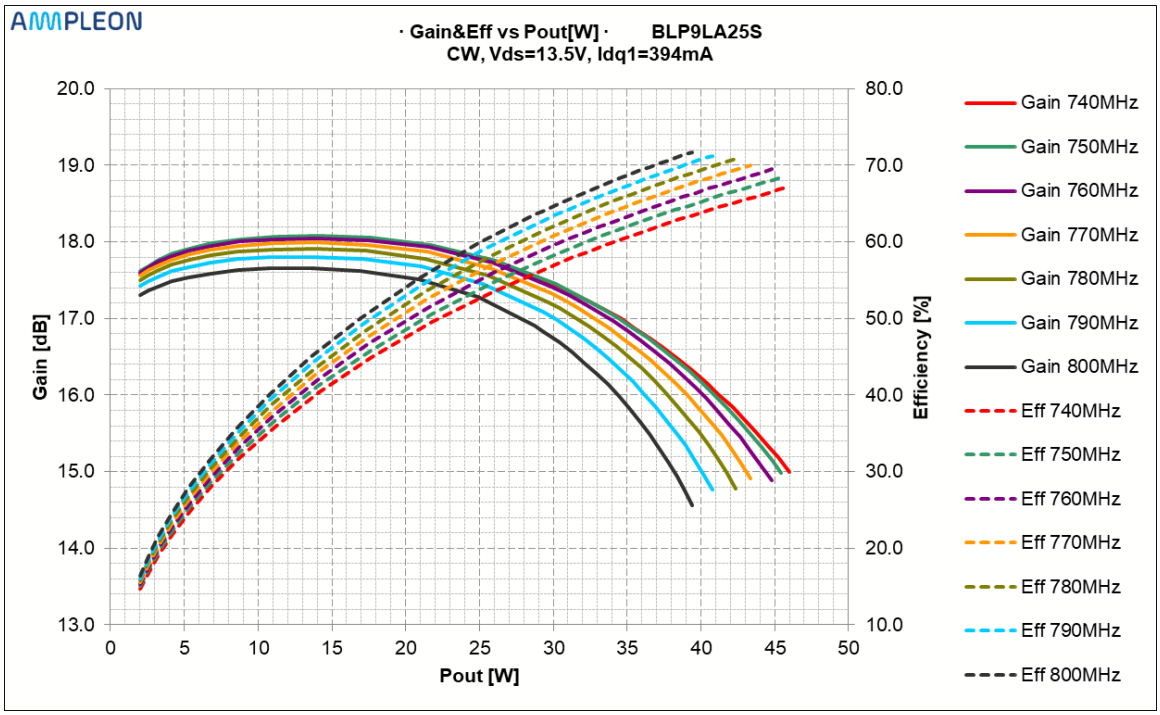

Figure 2 BLP9LA25S_PS_CW_200403_1311 Gain&Eff vs Pout[W]

8.2 CW Signal performance over 730-810 MHz

8.2.1 1dB compressed power

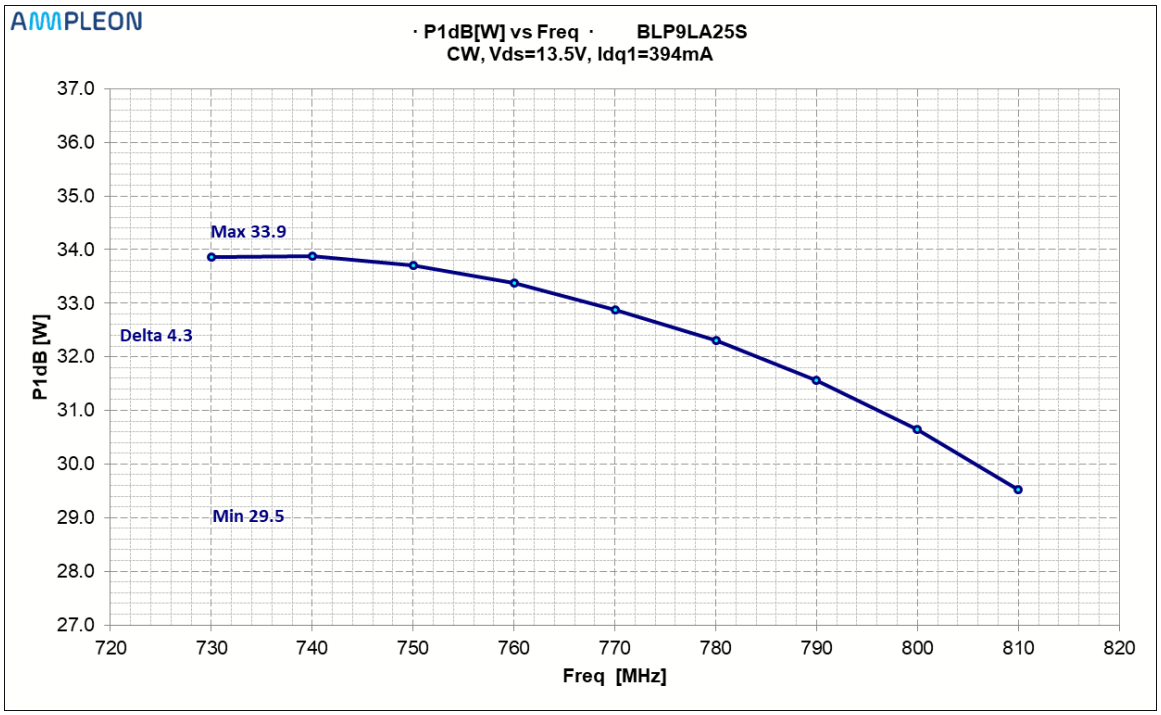

Figure 3 BLP9LA25S_PS_CW_200403_1311 P1dB[W] vs Freq

8.2.2 3dB compressed power

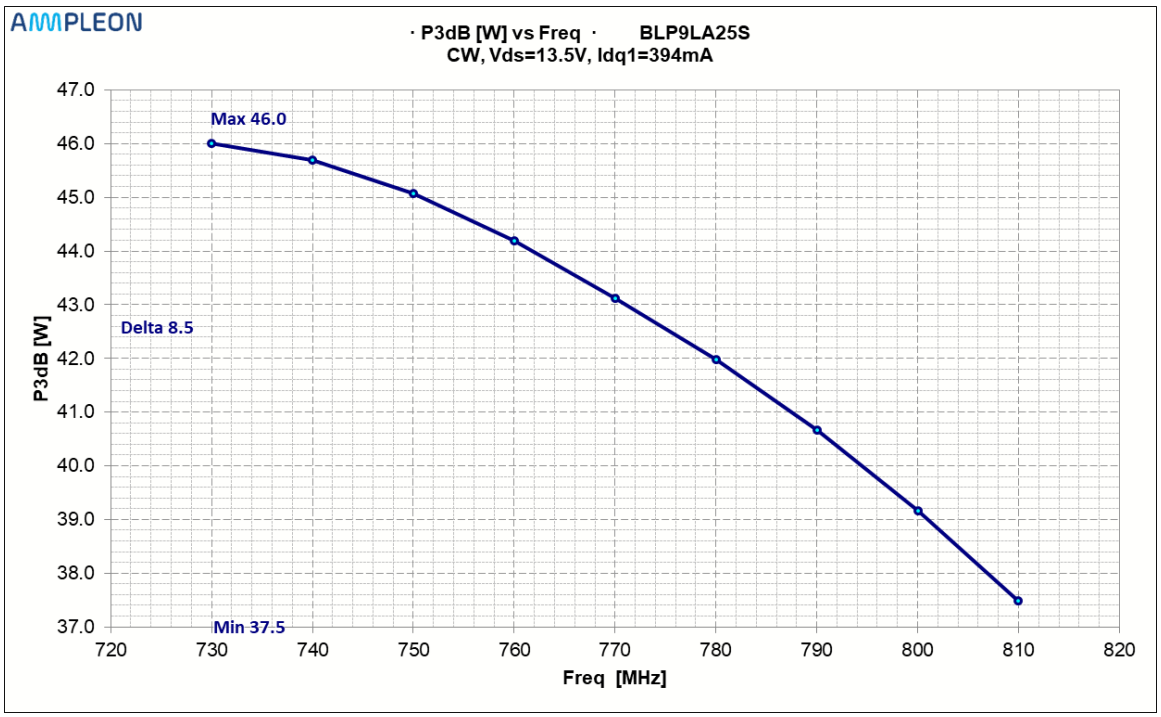

Figure 4 BLP9LA25S_PS_CW_200403_1311 P3dB[W] vs Freq

8.2.3 Gain

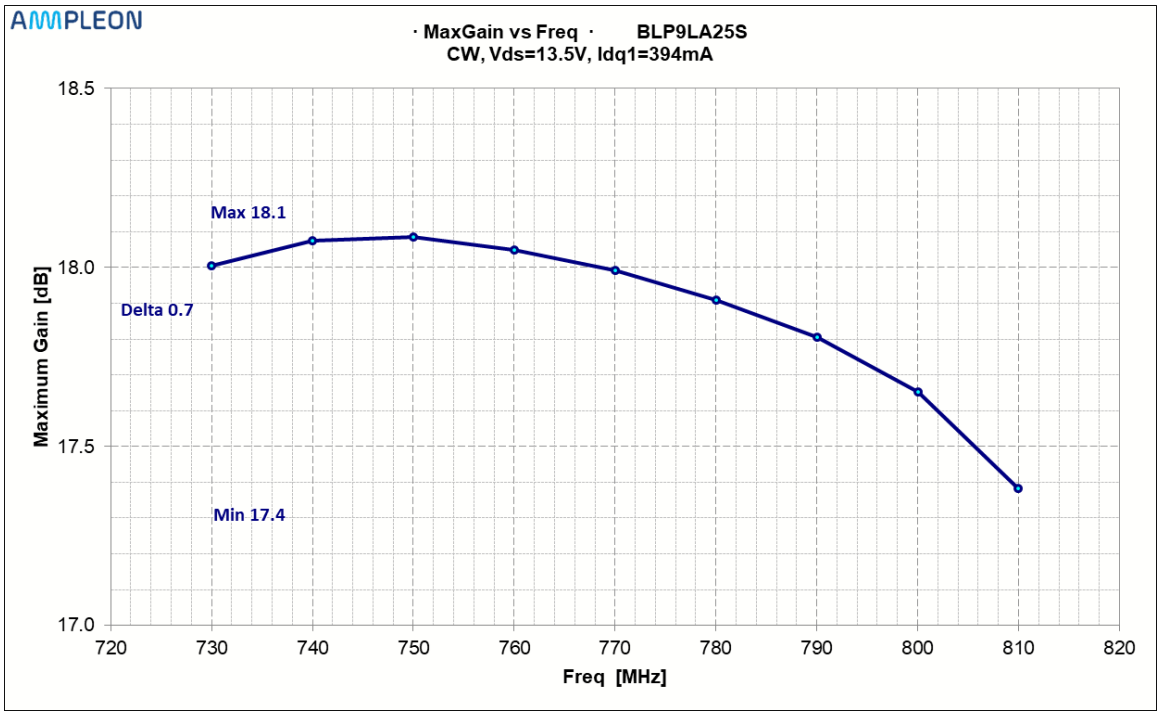

Figure 5 BLP9LA25S_PS_CW_200403_1311 MaxGain vs Freq

8.2.4 Efficiency

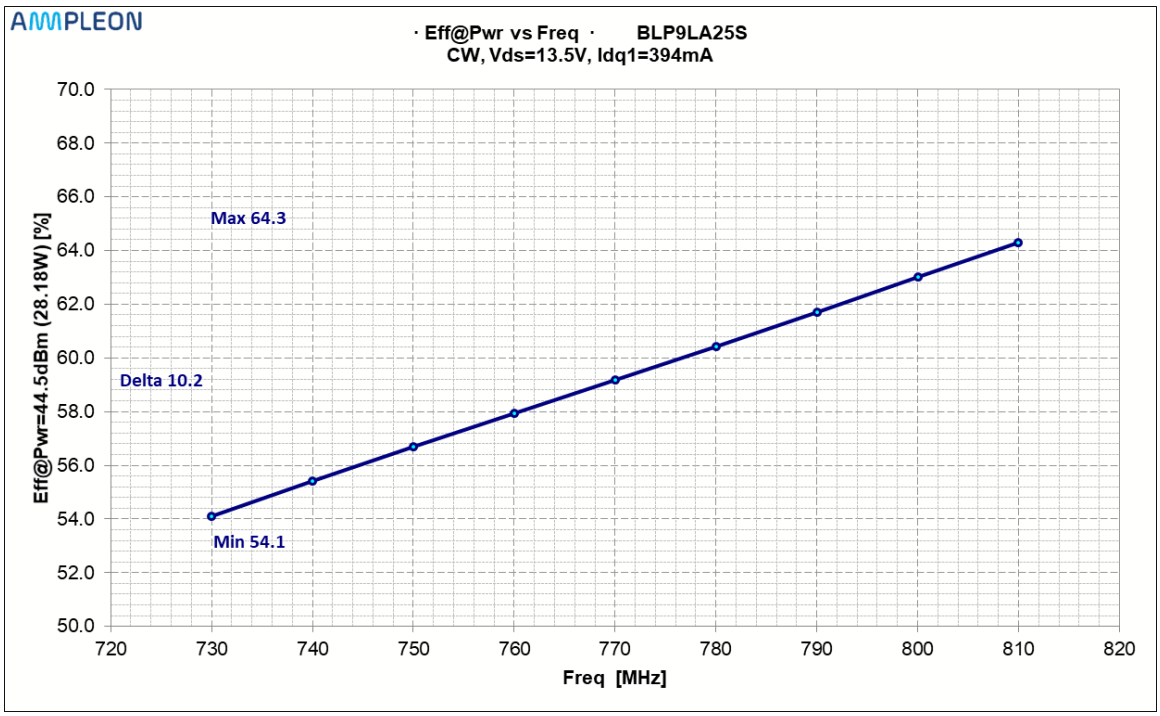

Figure 6 BLP9LA25S_PS_CW_200403_1311 Eff (28.2W) vs Freq

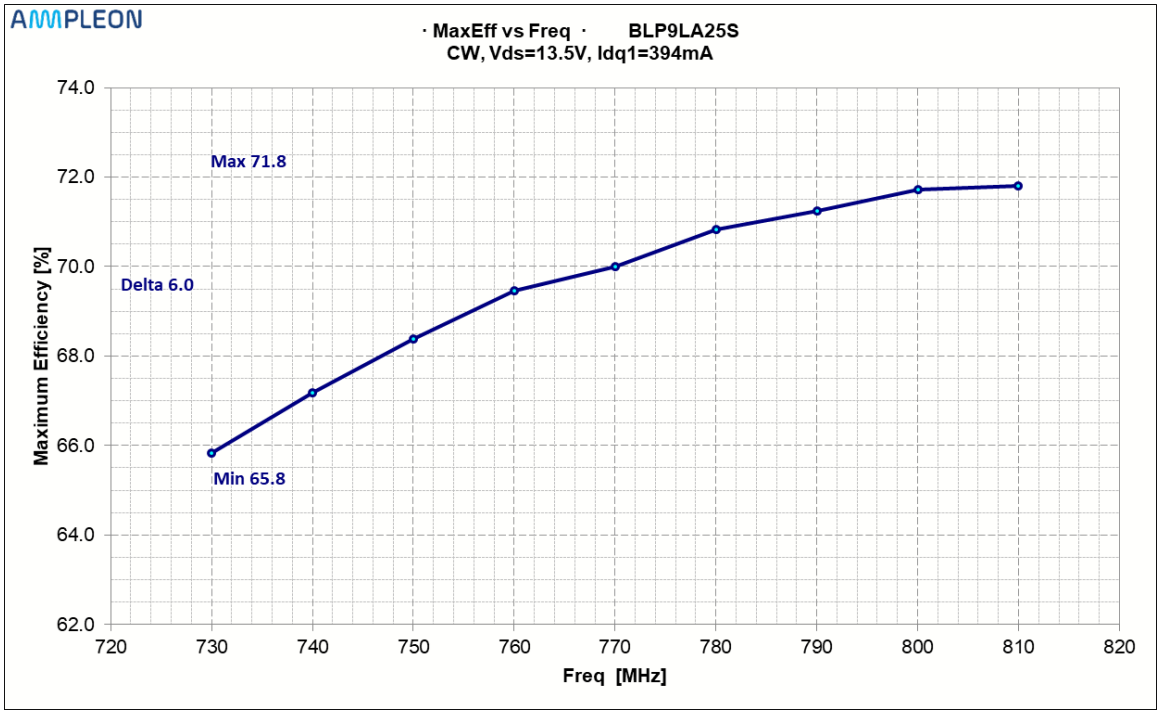

Figure 7 BLP9LA25S_PS_CW_200403_1311 Eff (P3dB) vs Freq

8.2.5 Return loss

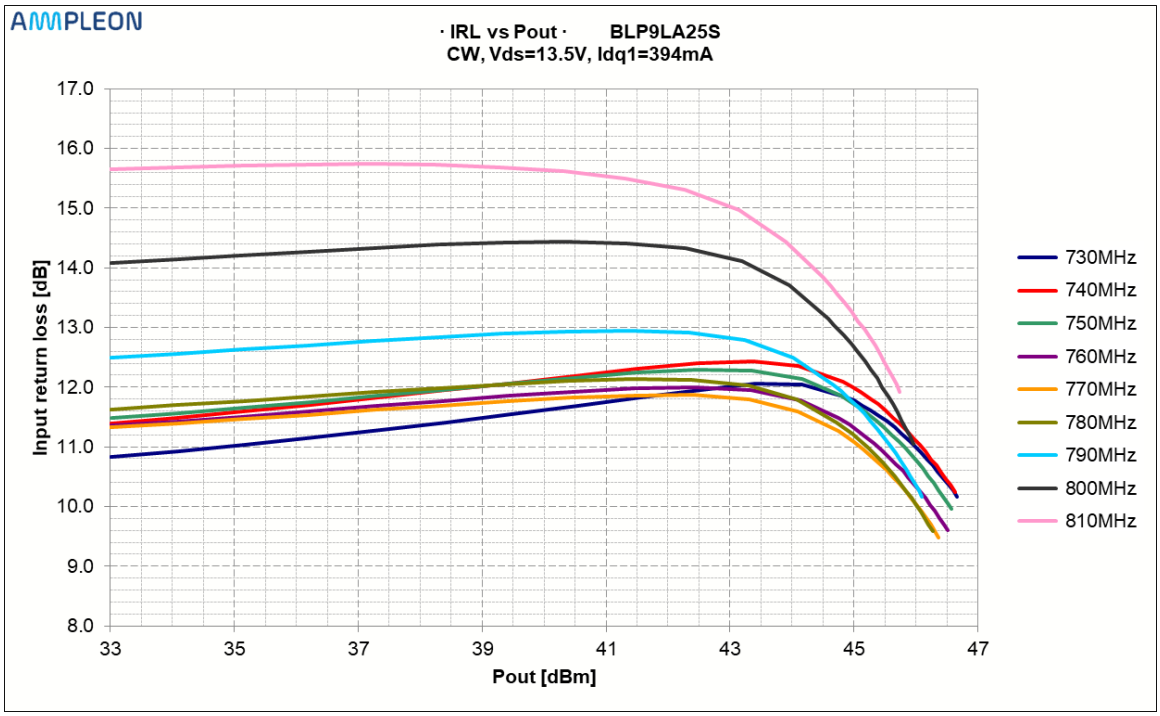

Figure 8 BLP9LA25S_PS_CW_200403_1311 IRL vs Pout

8.3 Two Carrier signal Intermodulation 740-800 MHz

8.3.1 Gain and efficiency power sweep (two carrier)

Up to 0.5dB Gain compression with two carrier separation of 100kHz.

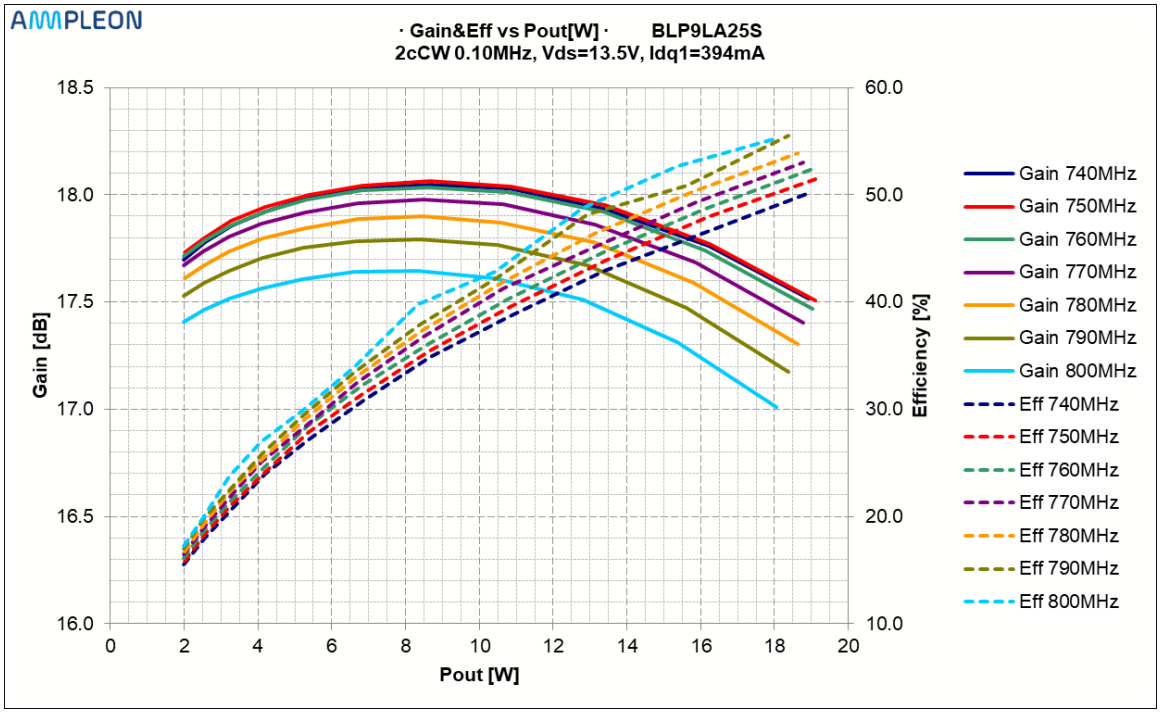

Figure 9 BLP9LA25S_PS_CW_200403_1348 Two carrier Gain&Eff vs Pout[W]

8.3.2 IMD3 & IMD5 (max)

Up to 0.5dB Gain compression with two carrier separation of 100kHz.

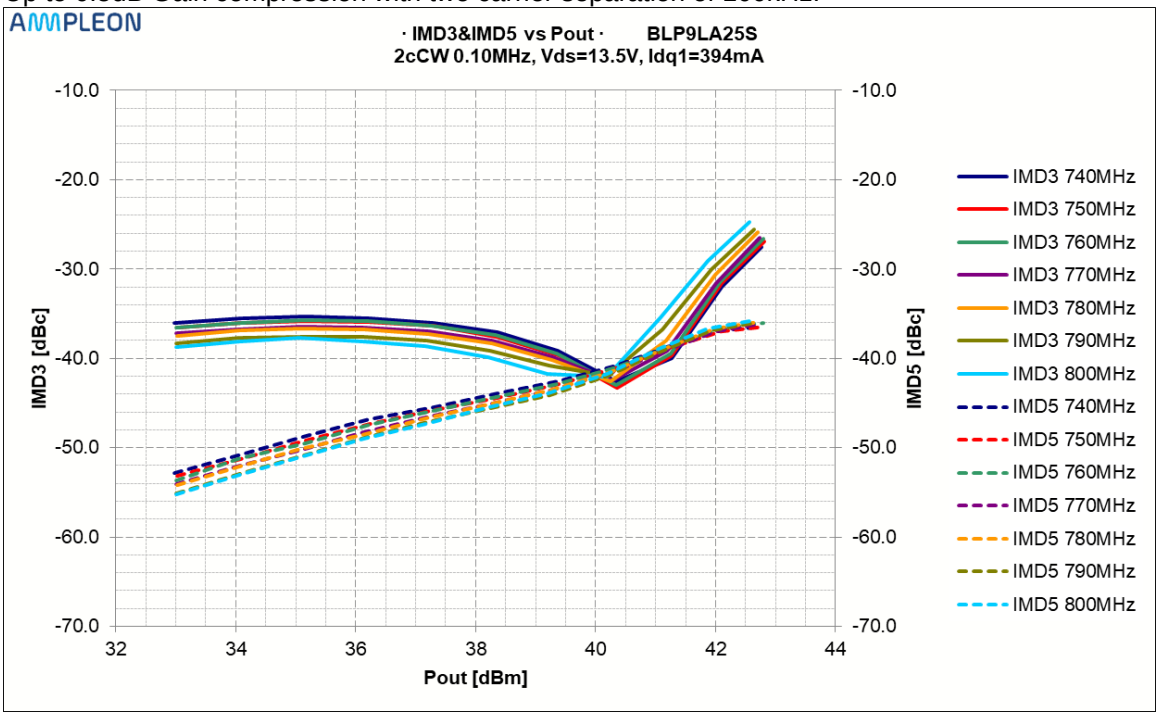

Figure 10 BLP9LA25S_PS_CW_200403_1348 Two carrier IMD3&IMD5 vs Pout[W]

9. Hardware

9.1 Mechanical drawing

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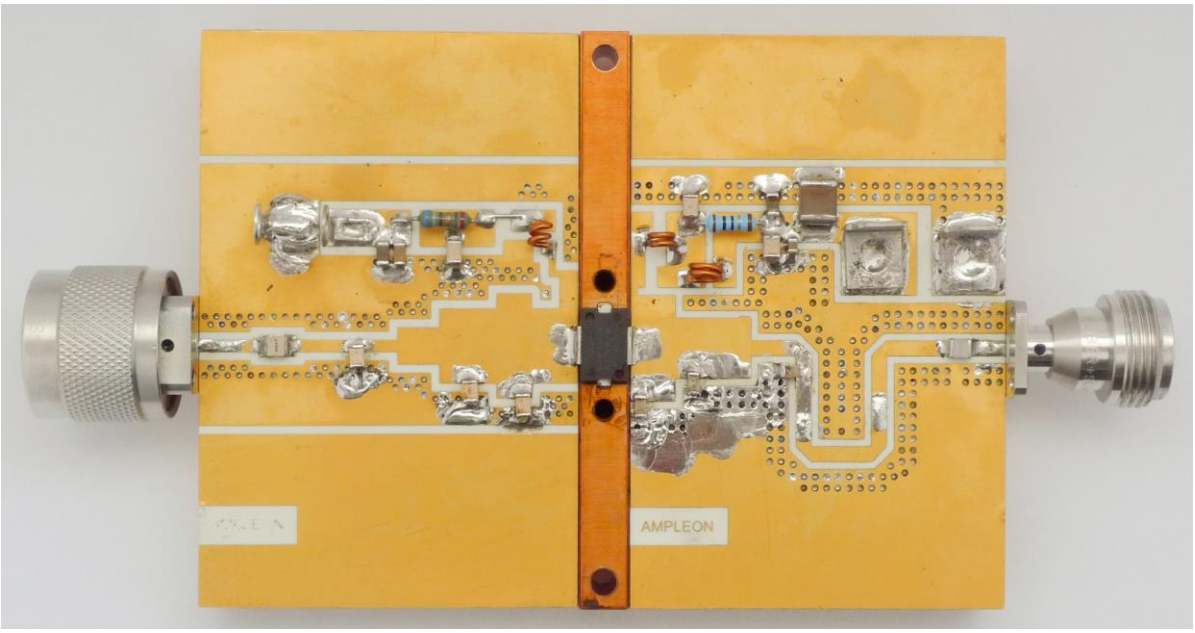
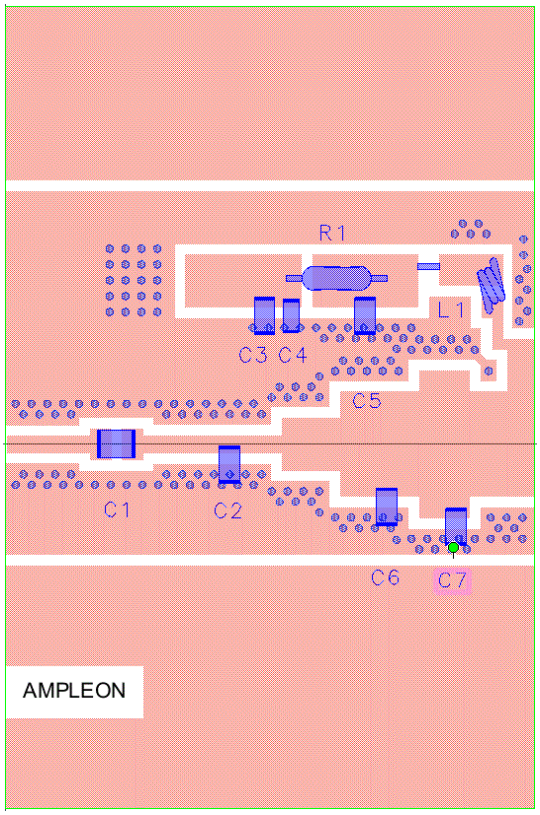
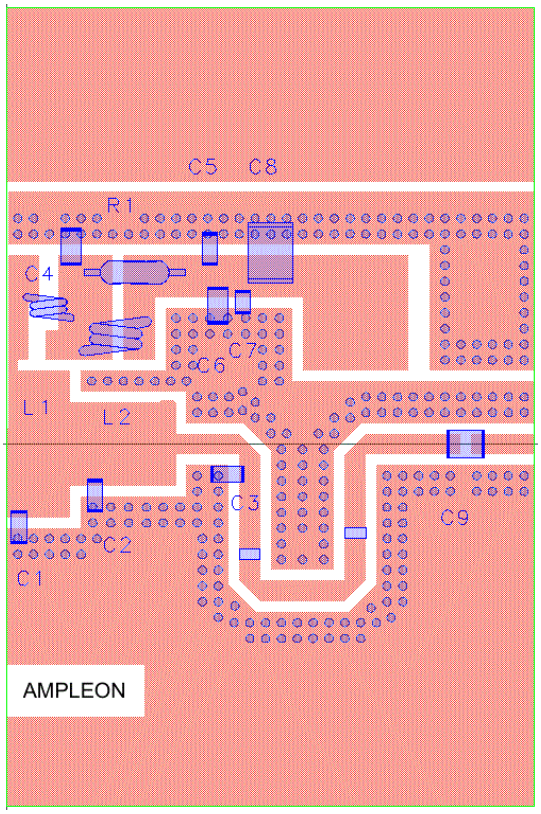
9.2 Board Image



9.3 Board layout

9.3.1 Input & Output





9.4 Bill of materials

9.4.1 Input & Output

Table 5: Bill of Materials input board

Description	Identifier	Value	Manufacturer	Specification
Capacitor	C1	47 pF	ATC	ATC100B
Capacitor	C2	10 pF	ATC	ATC100B
Capacitor	C3	1 uF / 25V	MURATA	GRM31MR71E105KA01L
Capacitor	C4	100 nF	KEMET	C1206C104K1RAC
Capacitor	C5	220 pF	ATC	ATC100B
Capacitor	C6	8.2 pF	ATC	ATC100B
Capacitor	C7	24 pF	ATC	ATC100B
Inductor	L1	~5 nH	wire wound	WD=0.8 mm; N=2; D=1.5 mm; L=3 mm
Resistor	R1	68 Ohm		0.6 Watt

Table 6: Bill of Materials output board

Description	Identifier	Value	Manufacturer	Specification
Capacitor	C1	16 pF	ATC	ATC800B
Capacitor	C2	15 pF	ATC	ATC800B
Capacitor	C3	8.2 pF	ATC	ATC800B
Capacitor	C4	100 pF	ATC	ATC100B
Capacitor	C5	100 nF	KEMET	C1206C104K1RAC
Capacitor	C6	1 nF	ATC	ATC100B
Capacitor	C7	1 uF / 50V	MURATA	GRM32RR71H105KA01LATC100B
Capacitor	C8	10 uF / 50V		50V
Capacitor	C9	82 pF	ATC	ATC800B
Inductor	L1	~9 nH	wire wound	WD=0.8 mm; N=2; D=2 mm; L=2 mm
Inductor	L2	~15 nH	wire wound	WD=0.8 mm; N=2; D=3 mm; L=2 mm
Resistor	R1	10 Ohm		0.6 Watt

9.5 Board material

Table 7: Board specifications

Parameter	Value
Manufacturer	Rogers
Type	RO4350B
Thickness	30mil, 0.762mm>
Layers	Top layer: “cond” ; bottom layer: “cond2”
Layer thickness	35um

9.6 Device markings

Table 8: Device specifics

Parameter	Value
Manufacturer	Ampleon
Device	BLP9LA25SG
Marking	BLP9LA25SG
Comments	Engineering sample

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