AR201178

BLP15H9S10G, 325-352MHz

V1.0 — 2021 Jan 26

AMPLEON
Application Report

Document information	
Status	Public
Author(s)	Tom Brinkman
Abstract	Measurement results of a Class AB design for the 325-352MHz band with the BLP15H9S10G

1. Revision History

Table 1: Report revisions

Revision	Date	Description	Author
0.1	20210114	Initial document	Tom Brinkman
1.0	20210126	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 AR201178. The device used is a 10W, 9th generation LDMOS, the BLP15H9S10G. The presented demo is tuned for the frequency range: 325-352MHz.

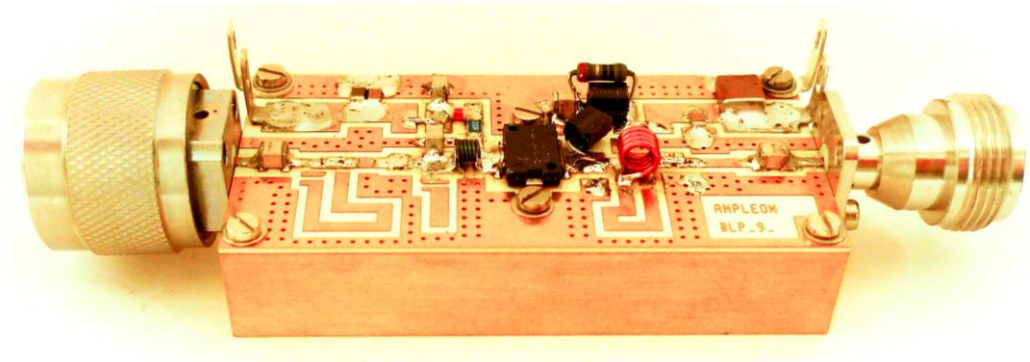

Figure 1 Demo Front view

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} = 50V

V_{GS} = 2.29V, leading to an I_{DQ} = 50mA

7. Performance Indication 325-352MHz

Table 2: Performance indication, sampled at 325-352MHz

Parameter	Condition	Unit	CW
V_{DD}		V	50
S11 at connector		dB	-2.8
P_{1dB}[1]	G_{MAX}-1dB	W	8
P_{3dB}[1]	G_{MAX}-3dB	W	9.8
P_{OUT} of operation	***P_o***[2]	W	***10***
Gain	**@P_o**	dB	>24
Drain Efficiency	**@P_o**	%	>71
Drain Efficiency	**@ 3dB comp.**	dB	>75

[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

Swept to 2.95dB compression.

Freq [MHz]	MaxGain [dB]	MaxEff [%]	P1dB [W]*
312.50	27.2	74.5	10.48
325.00	29.0	76.1	9.72
337.50	29.4	76.1	8.89
352.00	27.6	75.4	8.03
362.50	25.5	73.9	7.48
50.0	3.929	2.260	2.999

Table 4: CW Performance at Pout = 9 Watts

Freq [MHz]	Gain [dB]@	Eff [%]@	Compr [dB]@	IRL [dB]@	H2 [dBc]@	H3 [dBc]@
312.50	26.9	65.5	-0.30	2.0	-18.7	-43.2
325.00	28.5	69.1	-0.53	3.5	-20.5	-43.0
337.50	28.3	72.0	-1.09	4.4	-22.6	-41.2
352.00	25.6	73.7	-1.99	2.8	-25.7	-38.9
362.50	22.7	73.5	-2.78	1.8	-28.0	-37.6
50.0	5.726	8.225	2.482	2.571	9.291	5.582

8.1.1 Gain and efficiency (3dB sweep) 312.5-362.5 MHz

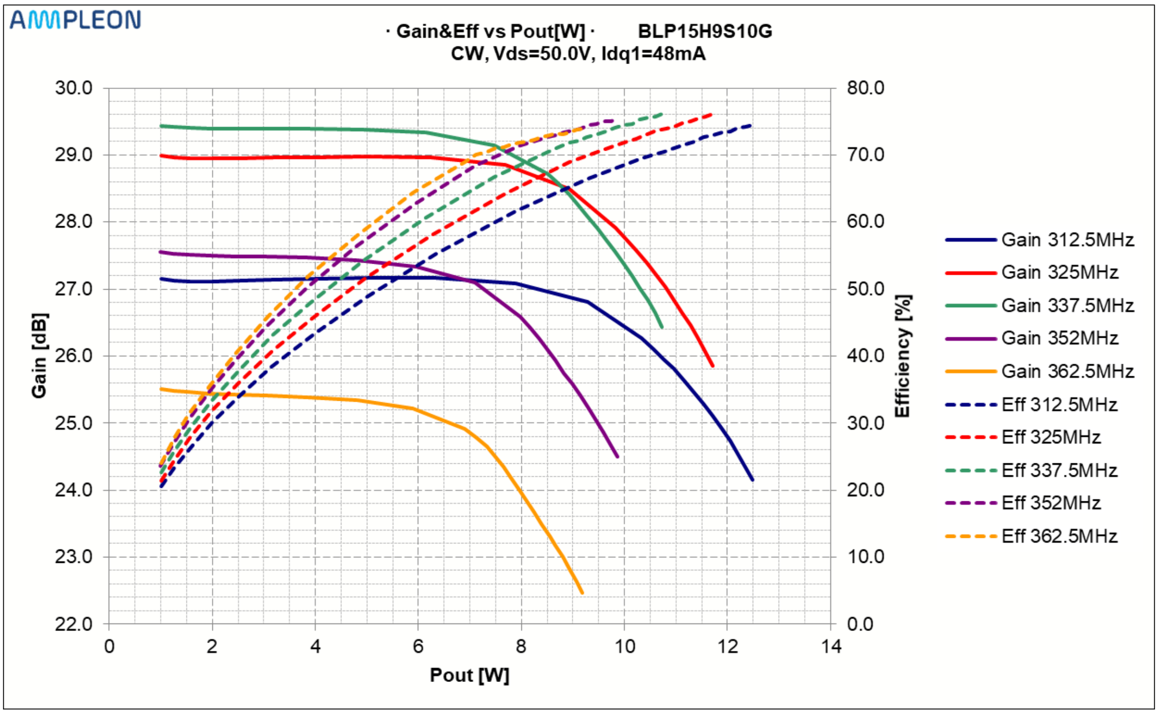

Figure 2 BLP15H9S10G_PS_CW_210114_1649 Gain&Eff vs Pout[W]

8.2 CW Signal performance over 325-352 MHz

8.2.1 3dB compressed power

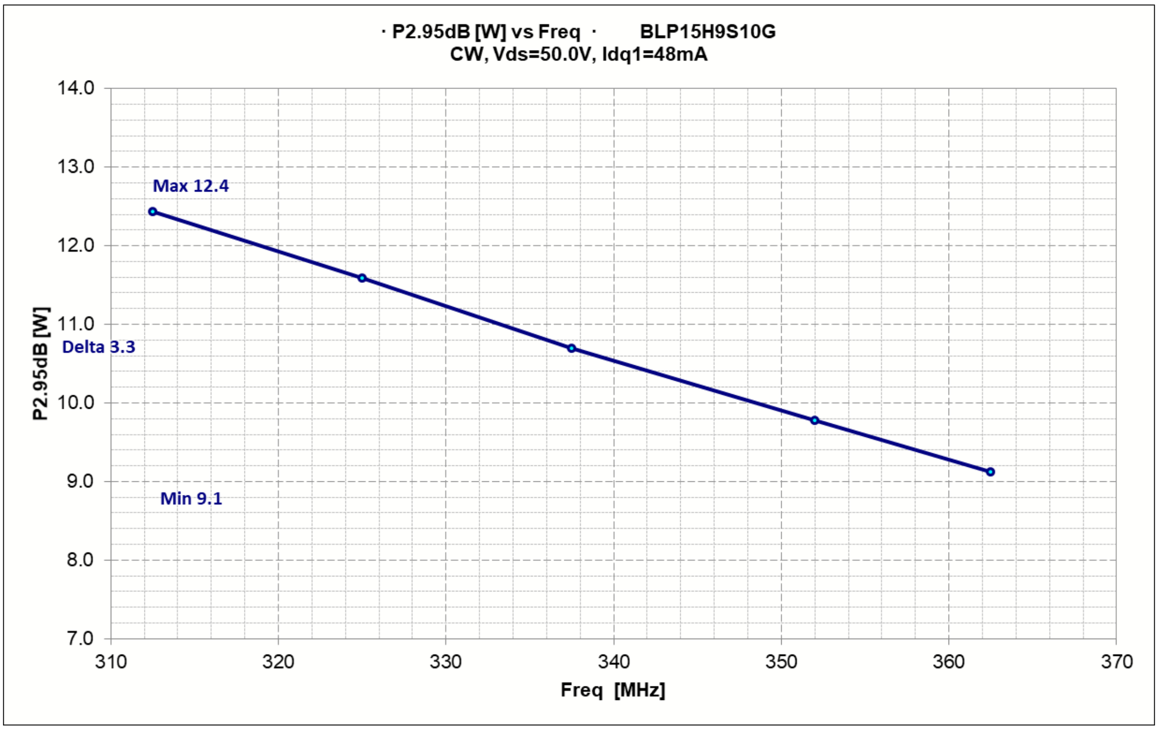

Figure 3 BLP15H9S10G_PS_CW_210114_1649 P3dB[W] vs Freq

8.2.2 Gain

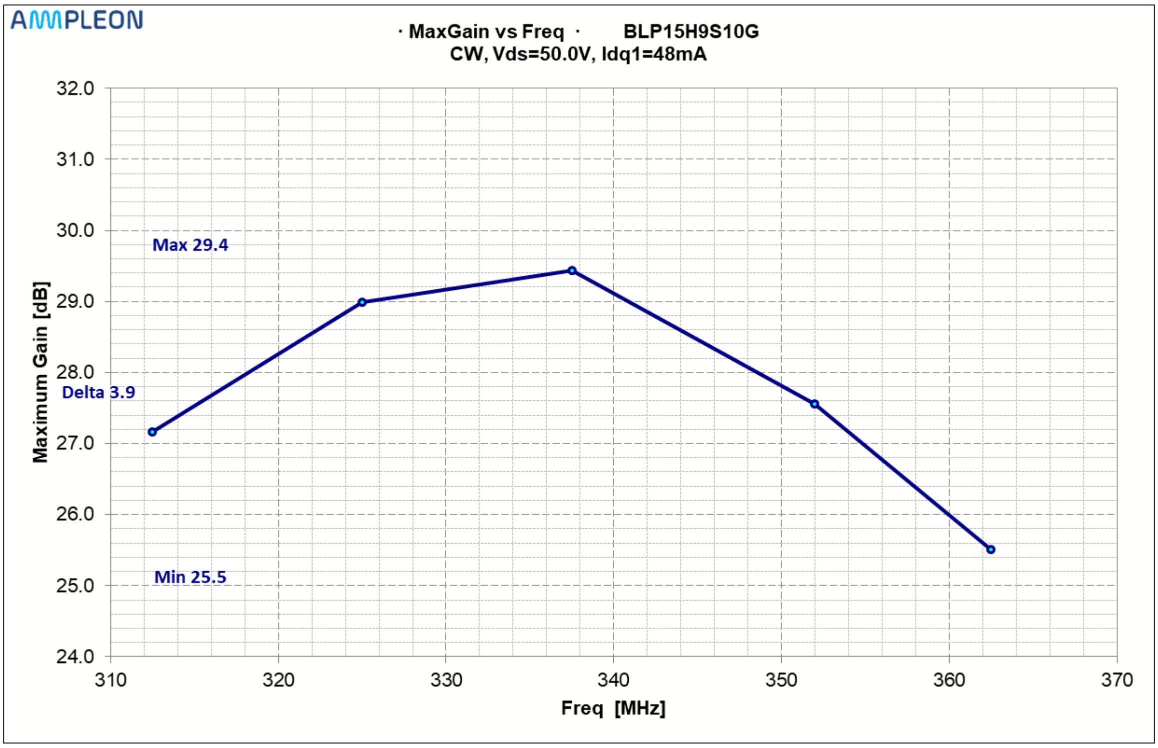

Figure 4 BLP15H9S10G_PS_CW_210114_1649 MaxGain vs Freq

8.2.3 Efficiency

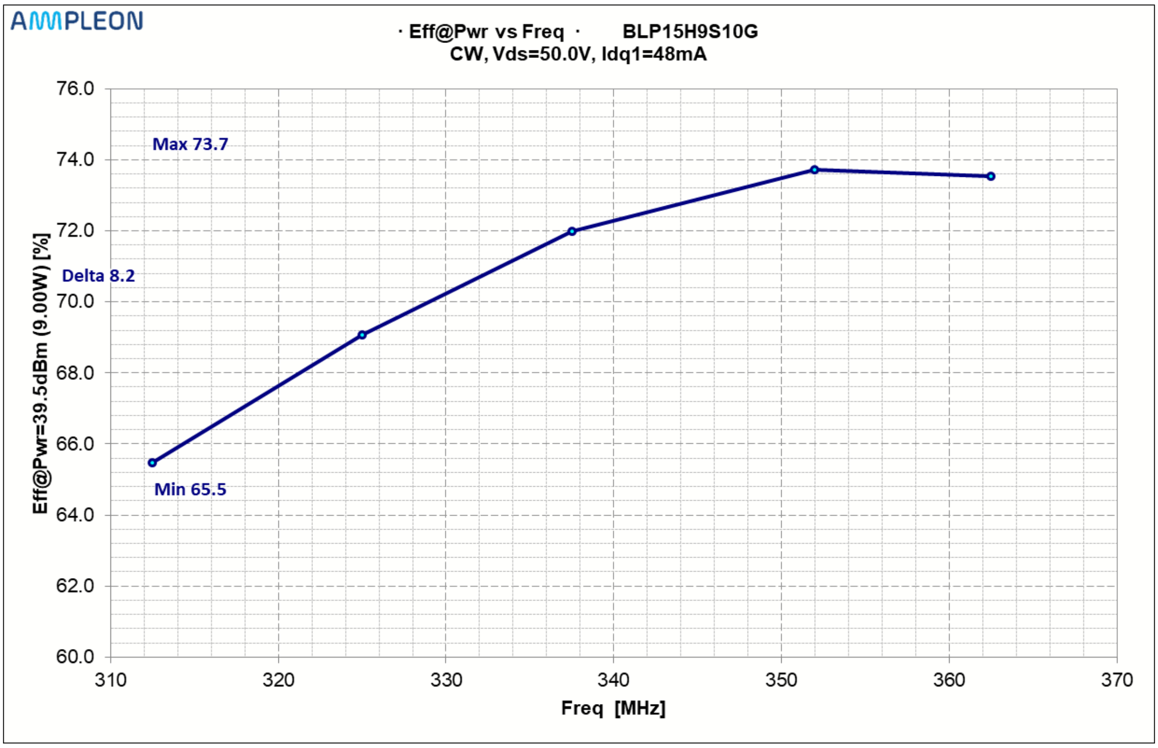

Figure 5 BLP15H9S10G_PS_CW_210114_1649 Eff (25W) vs Freq

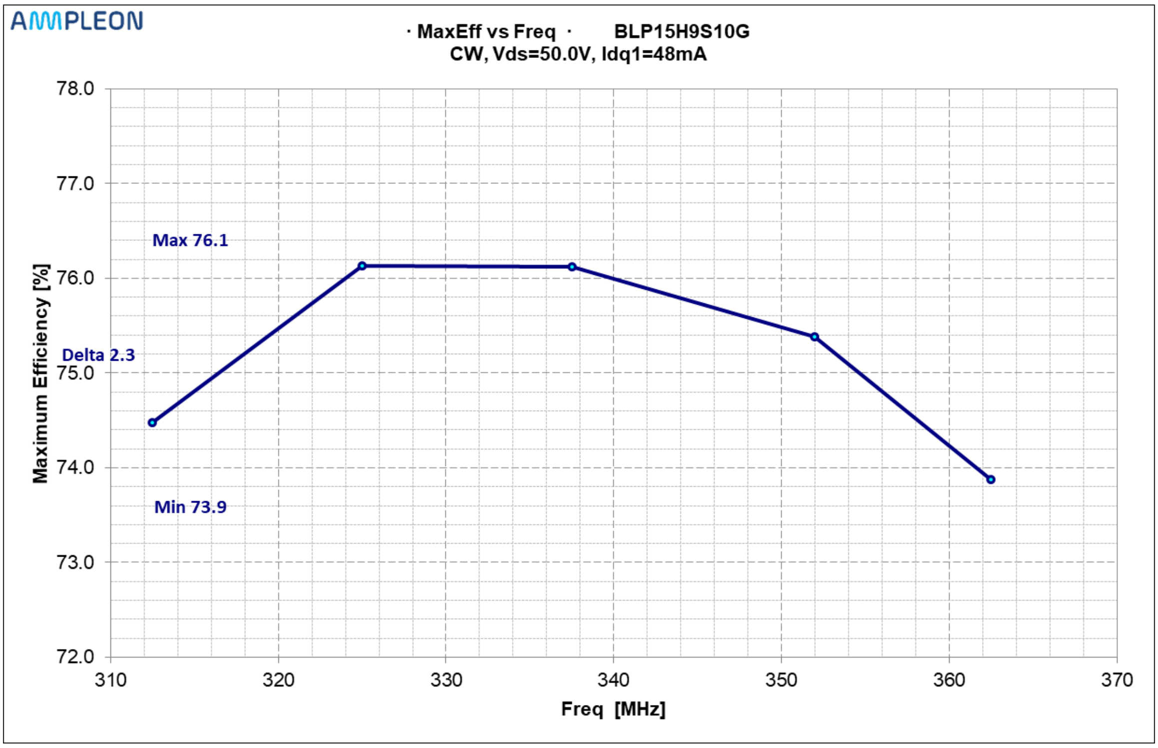

Figure 6 BLP15H9S10G_PS_CW_210114_1649 Eff (P3dB) vs Freq

8.2.4 Return loss

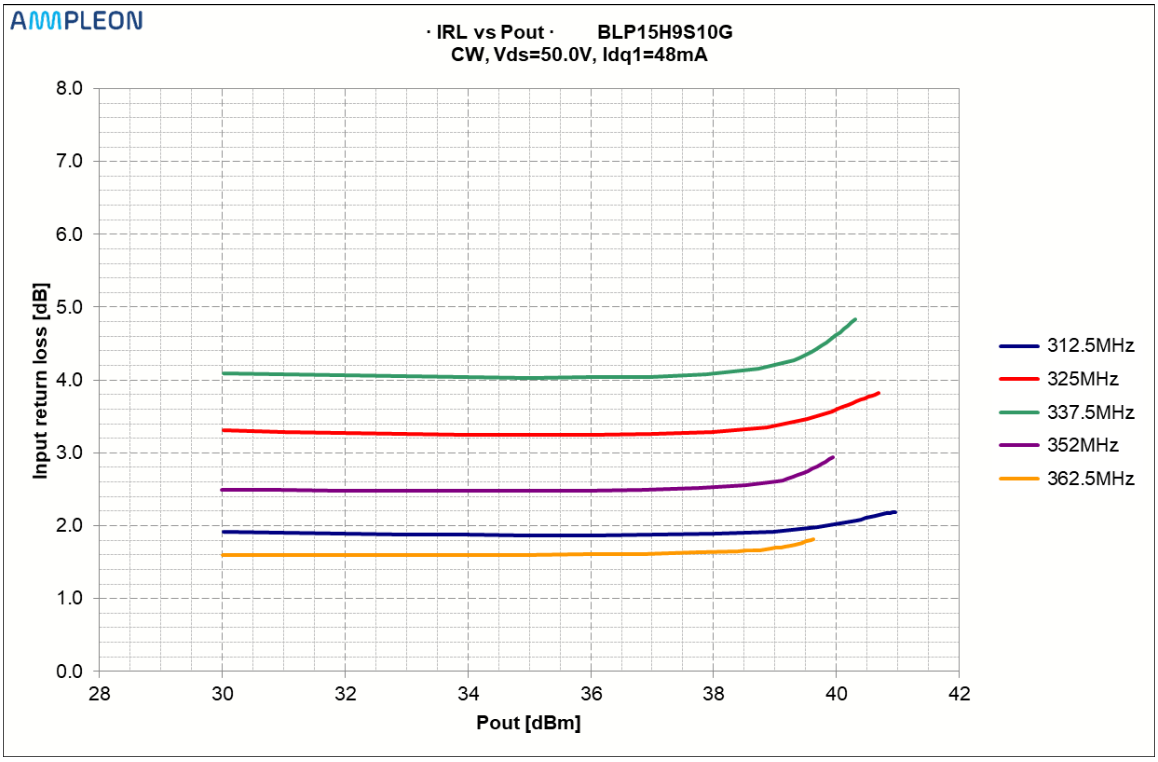

Figure 7 BLP15H9S10G_PS_CW_210114_1649 IRL vs Pout

8.3 Harmonics

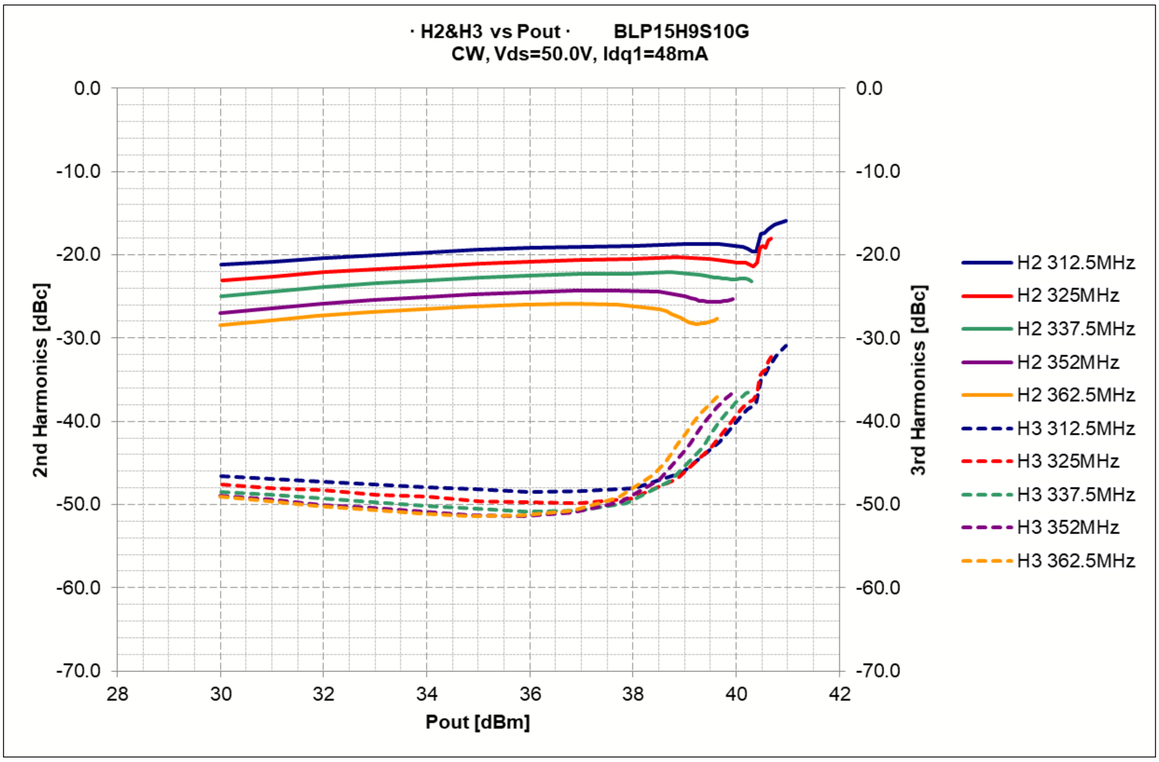

Figure 8 BLP15H9S10G_PS_CW_210114_1649 Harmonics

9. Hardware

9.1 Mechanical drawing

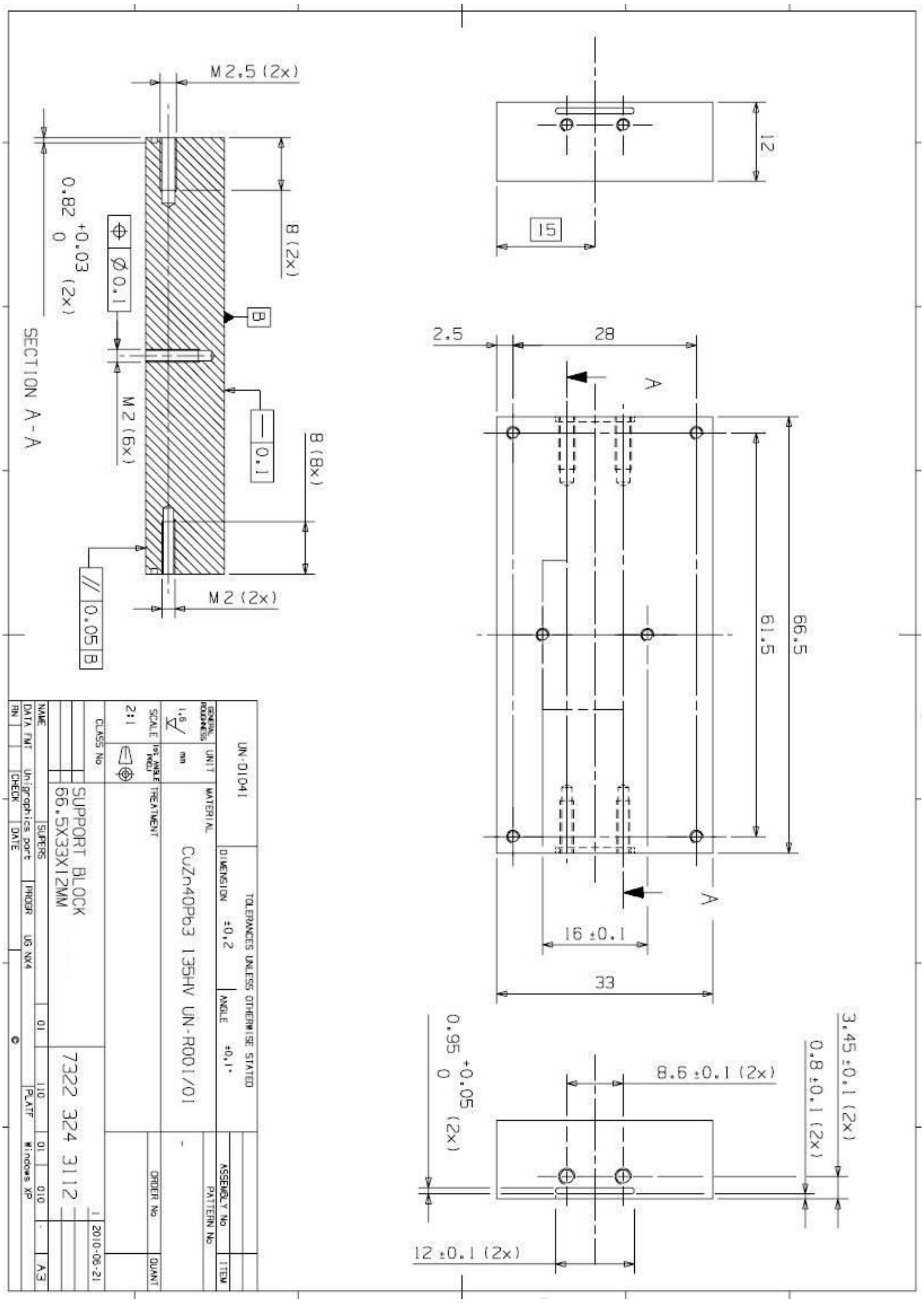

Figure 9 Support block Mechanical drawing

9.2 Board Image

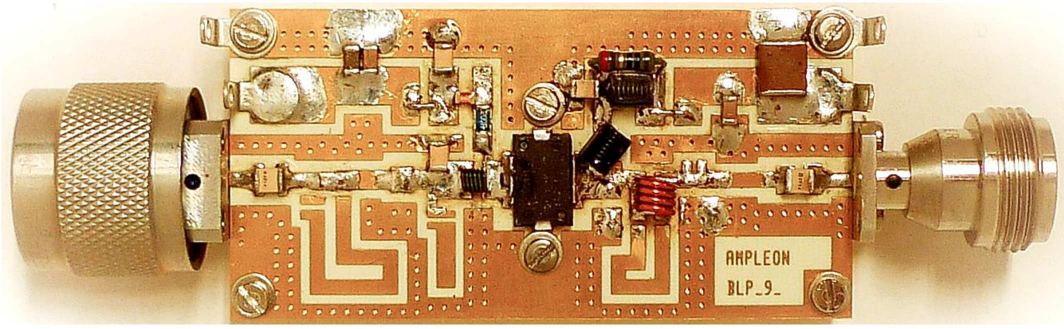

Figure 10 Demo Top View

9.3 Board layout

9.3.1 Input & Output

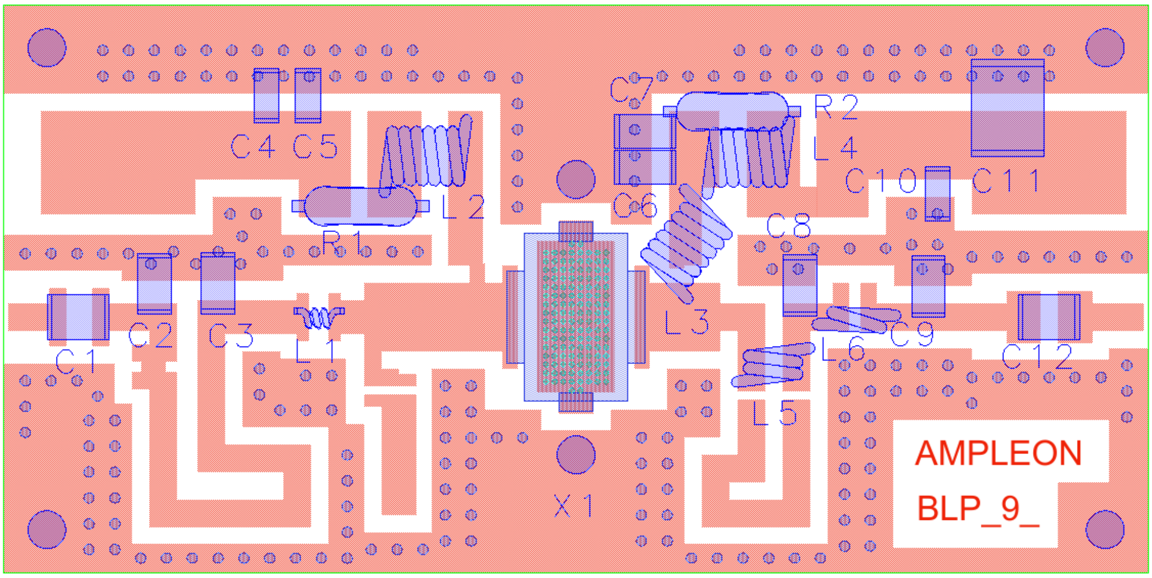

Figure 11 Demo PCB component placement

9.4 Bill of materials

9.4.1 Input & Output

Table 5: Bill of Materials input

Description	Identifier	Value	Manufacturer	Specification
Capacitor	C1	220 pF	ATC	ATC100B
Capacitor	C2	1 uF / 25V	MURATA	GRM31MR71E105KA01L
Capacitor	C3	100 nF / 50V	KEMET	C1206C104K1RAC
Capacitor	C4	15 pF	ATC	ATC100B
Capacitor	C5	180 pF	ATC	ATC100B
Inductor	L1	220 nH	Epcos	0805B3221-J
Inductor	L2	39 nH	Coilcraft	1111SQ39
Resistor	R1	200 Ohm		

Table 6: Bill of Materials output

Description	Identifier	Value	Manufacturer	Specification
Capacitor	C6	180 pF	ATC	ATC100B
Capacitor	C7	100 nF / 100V	MURATA	GRM188R72A104KA35D
Capacitor	C8	4.7 uF / 100V	TDK	C5750X7R2A475KT/A
Capacitor	C9	270 pF	ATC	ATC100B
Inductor	L3, L4	100 nH	Coilcraft	1812SMS-R10
Inductor	L5	~39 nH	wire wound	WD=0.8 mm; N=4; D=2.8 mm; L=3.5 mm
Resistor	R2	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	BLP15H9S10G
Marking	
Comments	Engineering sample

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