

AR221078

BLP0427M9S20G, 1600-1700MHz

V1.0 — 2022 Sep 21

AMPLEON

Application Report

Document information

Status	Public
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Abstract	Measurement results of a Class AB design for the 1600-1700MHz band with the BLP0427M9S20G
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1. Revision History

Table 1: Report revisions

Revision	Date	Description	Author
0.1	20220921	Initial document	Tom Brinkman
1.0	20220921	Final	Tom Brinkman

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5. General description

This report presents the measurement results of the Class AB demo AR221078. The device used is a 20W, 9th generation LDMOS, the BLP0427M9S20G. The presented demo is tuned for maximum output power over the frequency range: 1600-1700MHz.

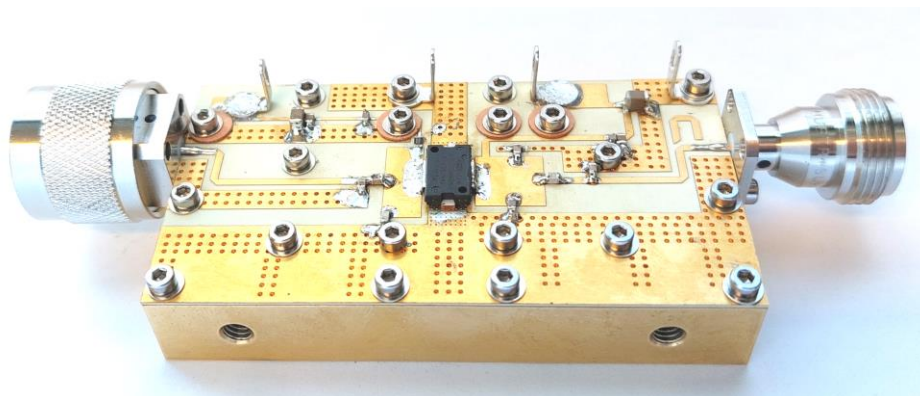


Figure 1 Demo Front view

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:

$$\begin{aligned} V_{DD} &= 28V \\ V_{GS} &= 2.15V, \text{ leading to an } I_{DQ} = 178mA \end{aligned}$$

7. Performance Indication 1626.5-1675MHz

Table 2: Performance indication, sampled at 1626.5-1675MHz

Parameter	Condition	Unit	CW
V_{DD}		V	28
S11 at connector		dB	-11
P_{1dB}^1	$G_{MAX}-1dB$	dBm	44.3
P_{3dB}^1	$G_{MAX}-3dB$	dBm	45.1
P_{OUT} of operation	P_o^2	dBm	44.77
Gain	@ P_o	dB	>16.4
Drain Efficiency	@ P_o	%	>56.1
Drain Efficiency	@ 3dB comp.	dB	>57.2

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 3dB compression.

Freq [MHz]	MaxGain [dB]	P1dB [dBm]*	Eff@P1dB [%]*	P3dB [dBm]*	Eff@P3dB [%]*
1600.00	18.4	44.8	61.6	45.5	64.0
1626.50	18.7	44.6	59.7	45.4	62.0
1659.00	18.5	44.4	56.1	45.2	58.8
1675.00	18.1	44.3	54.3	45.1	57.2
1700.00	17.4	44.2	51.3	45.1	54.8
100.0	1.324	0.674	10.344	0.430	9.205

Table 4: CW Performance at Pout = 30 Watts

Freq [MHz]	Gain [dB]@	Eff [%]@	Compr [dB]@	IRL [dB]@
1600.00	17.5	61.3	-0.89	10.0
1626.50	17.5	60.2	-1.22	14.4
1659.00	16.8	57.6	-1.66	13.8
1675.00	16.4	56.1	-1.80	11.2
1700.00	15.4	53.7	-1.98	8.0
100.0	2.113	7.541	1.092	6.397

8.1.1 Gain and efficiency (3dB sweep) 1600-1700 MHz

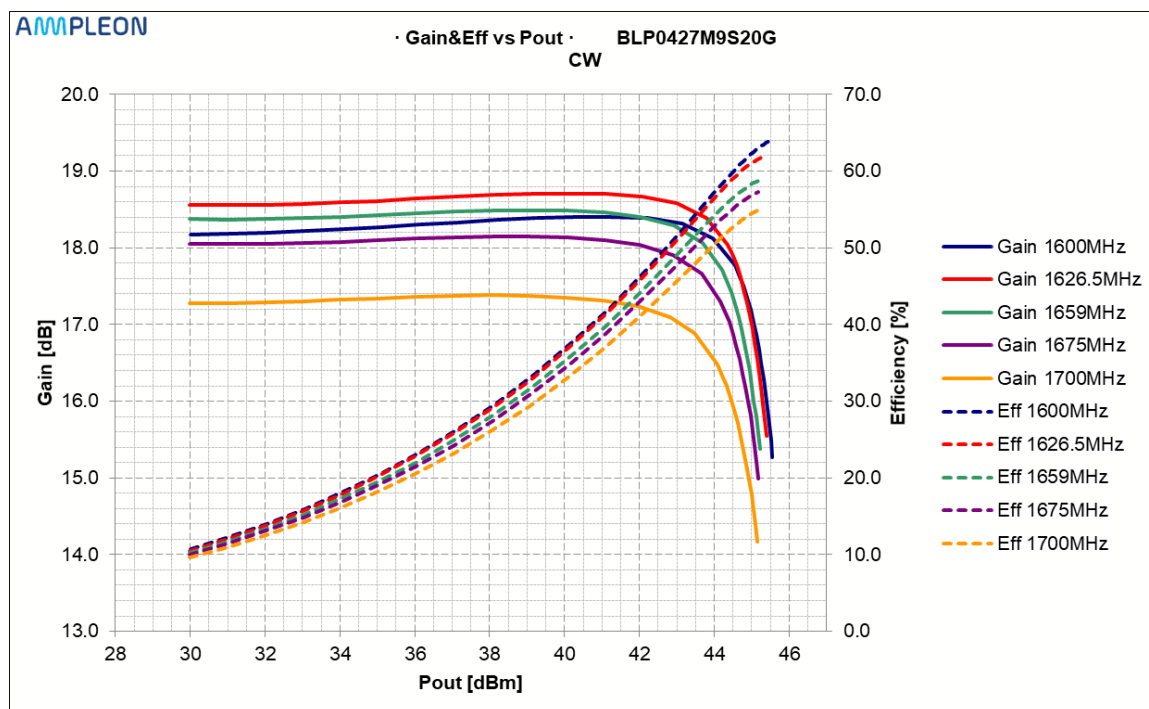


Figure 2 BLP0427M9S20G_PS_CW_20220921_1457 Gain&Eff vs Pout[dBm]

8.2 CW Signal performance over 1600-1700 MHz

8.2.1 3dB compressed power

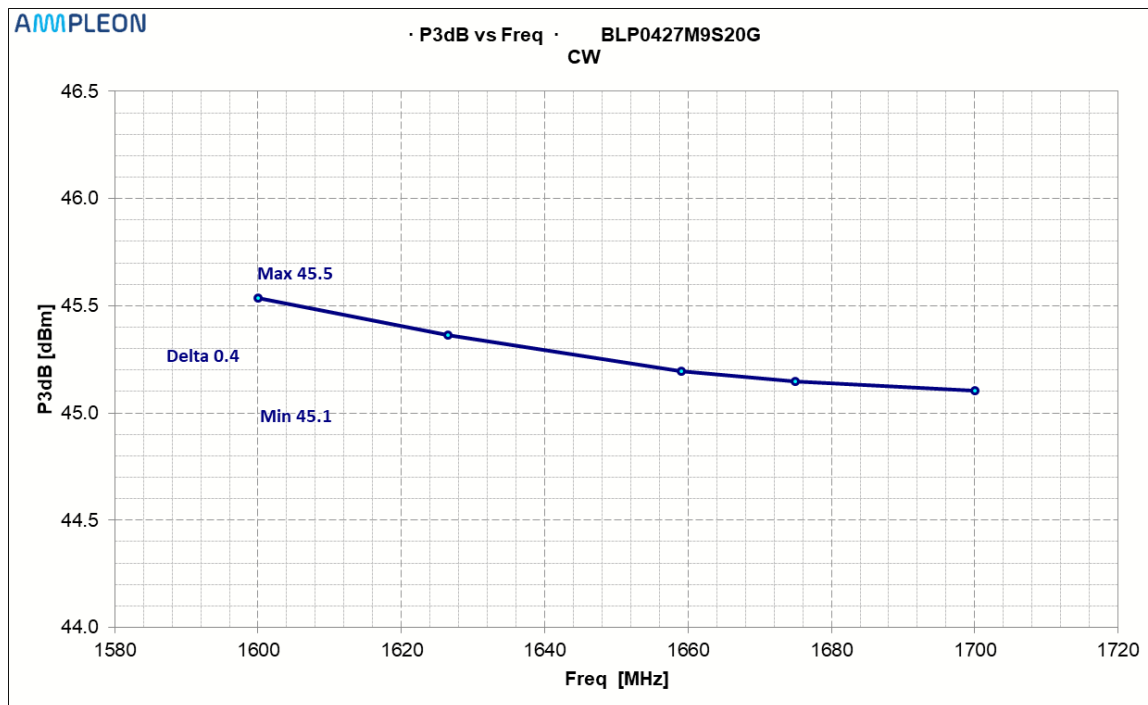


Figure 3 BLP0427M9S20G_PS_CW_220921_1457 P3dB[dBm] vs Freq

8.2.2 Gain

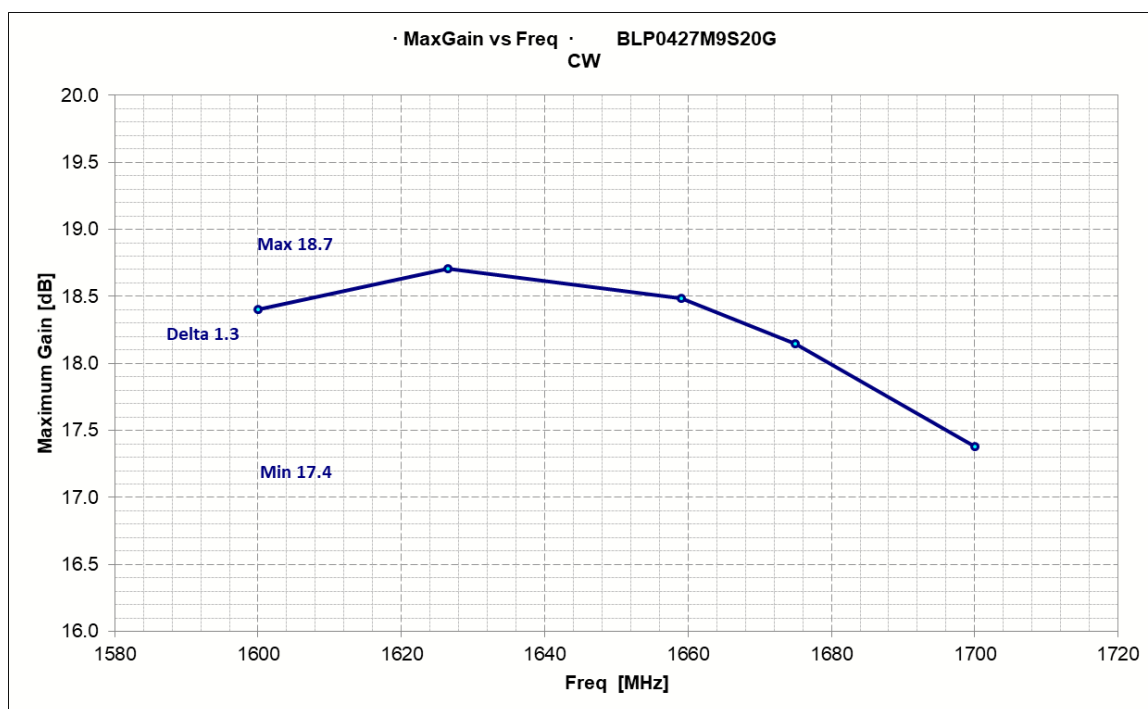


Figure 4 BLP0427M9S20G_PS_CW_220921_1457 MaxGain vs Freq

8.2.3 Efficiency

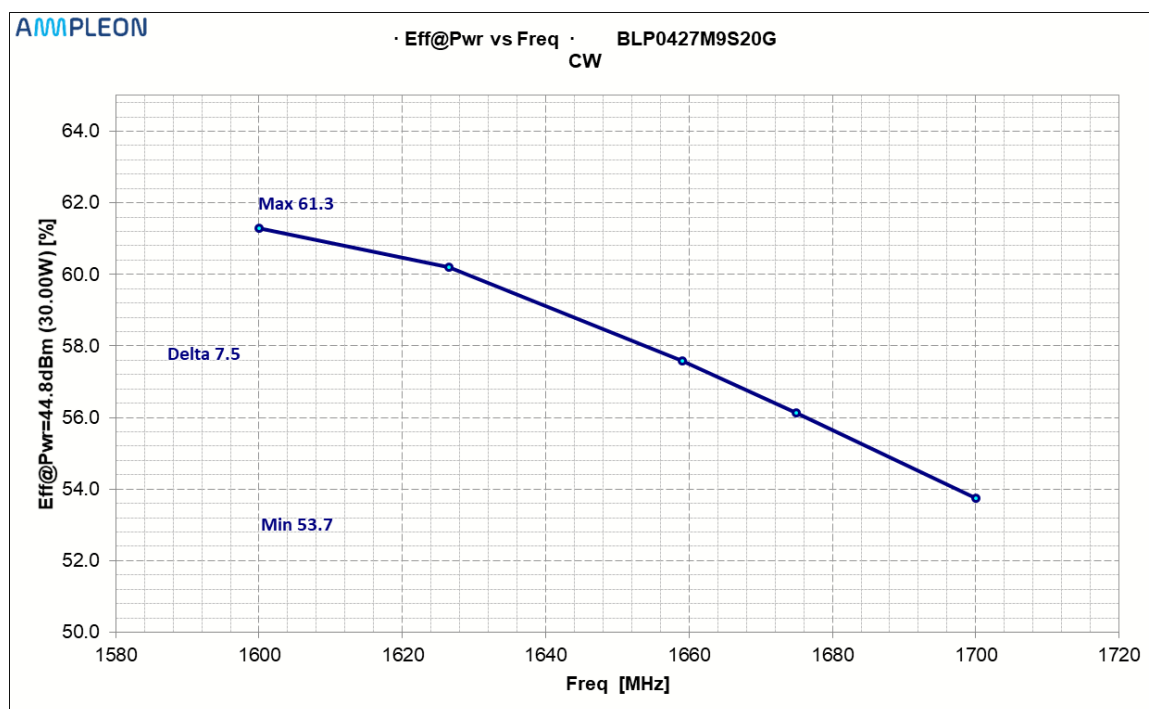


Figure 5 BLP0427M9S20G_PS_CW_220921_1457 Eff (30W) vs Freq

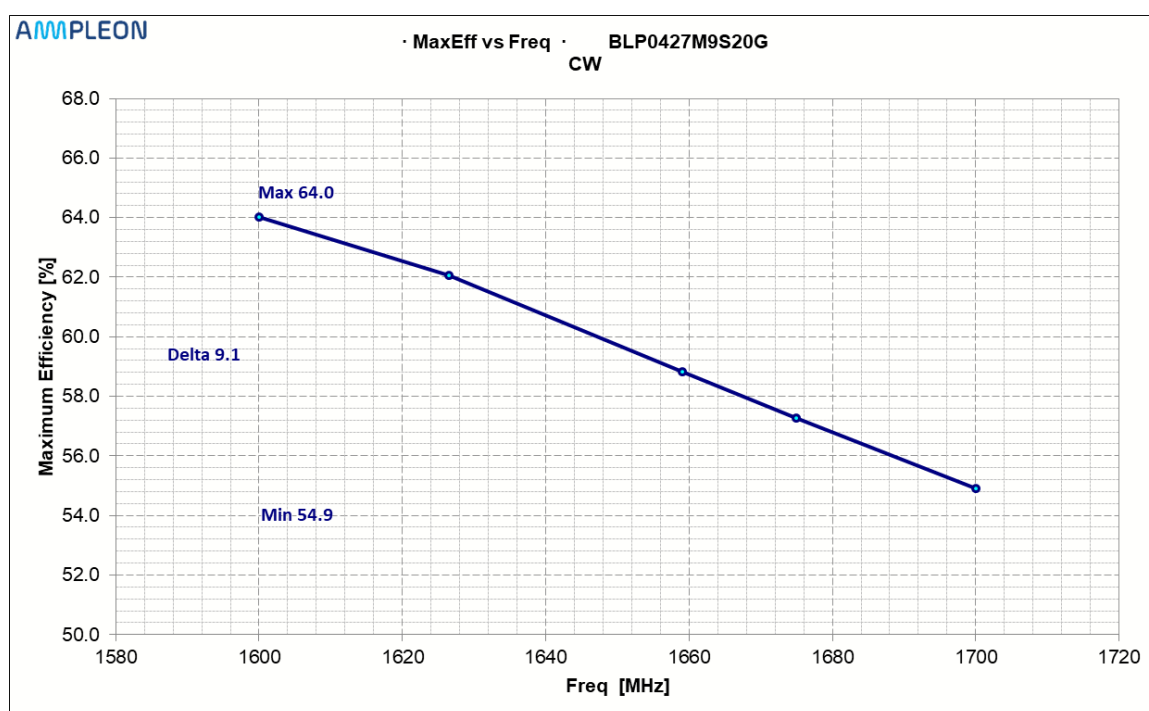


Figure 6 BLP0427M9S20G_PS_CW_220921_1457 Eff (P3dB) vs Freq

8.2.4 Return loss

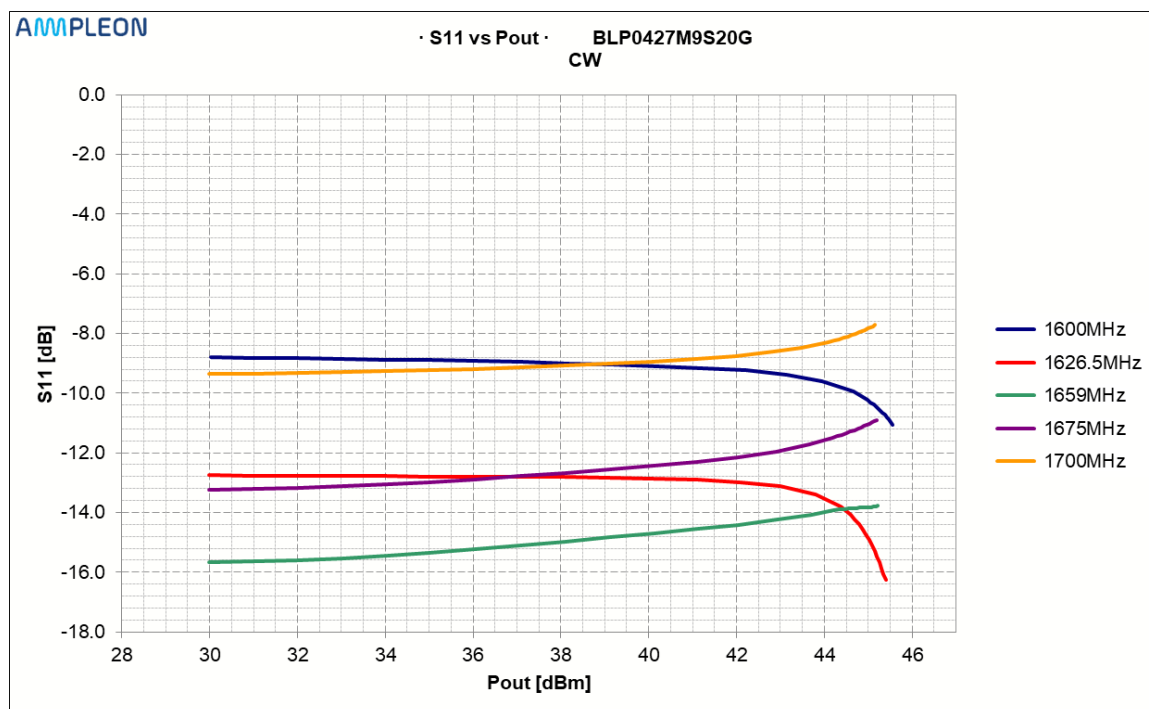


Figure 7 BLP0427M9S20G_PS_CW_220921_1457 IRL vs Freq

9. Hardware

9.1 Board Image

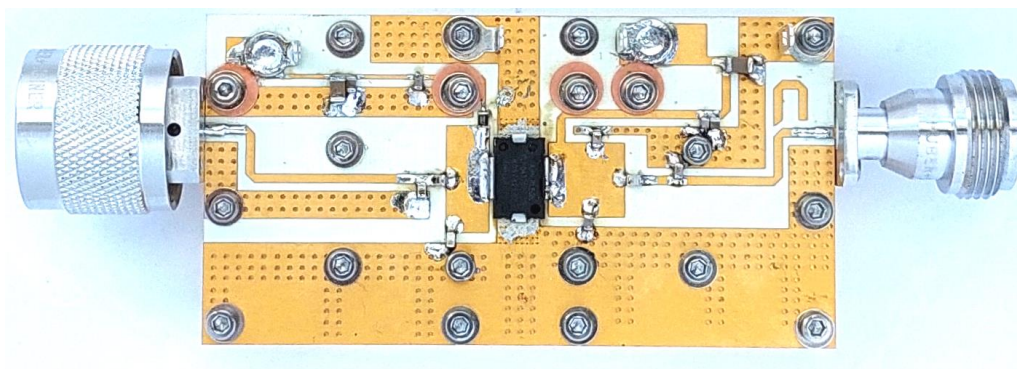


Figure 8 Demo

Top View

9.2 Board layout

9.2.1 Input & Output

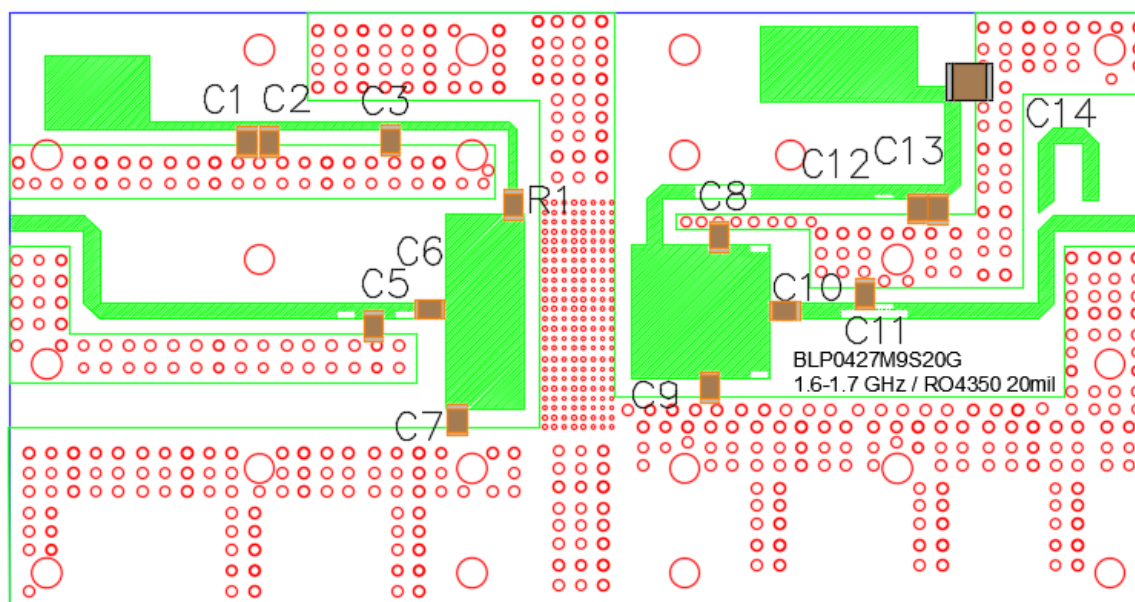


Figure 9 Demo PCB component placement

9.3 Bill of materials

9.3.1 Input & Output

Table 5: Bill of Materials

Description	Identifier	Value	Manufacturer	Specification
Capacitor	C1, C14	1 uF / 50V	MURATA	GRM32RR71H105KA01L
Capacitor	C2, C13	100 nF / 50V	MURATA	GRM21BR71H104KA01L
Capacitor	C3, C12	12 pF	ATC	ATC600F (C1)
Capacitor	C5	3.0 pF	ATC	ATC600F (M0)
Capacitor	C6	6.8 pF	ATC	ATC600F (W0)
Capacitor	C7	2.4 pF	ATC	ATC600F (K0)
Capacitor	C8	4.7 pF	ATC	ATC600F (S0)
Capacitor	C9	5.1 pF	ATC	ATC600F (T0)
Capacitor	C10	18 pF	ATC	ATC600F (G1)
Capacitor	C11	3.9 pF	ATC	ATC600F (Q0)
Resistor	R1	200 Ohm		

9.4 Board material

Table 6: Board specifications

Parameter	Value
Manufacturer	Rogers
Type	Rogers RO4350B / Taconic RF35
Thickness	20mil, 0.508mm>
Layers	Top layer: "cond" ; bottom layer: "cond2"
Layer thickness	35um

9.5 Device markings

Table 7: Device specifics

Parameter	Value
Manufacturer	Ampleon
Device	BLP0427M9S20G
Marking	
Comments	Engineering sample

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