

AR211056

BLF978P, 500 MHz

v1.0 – March 26, 2021

AMPLEON

Application Report

Document information

Status v1.0

Abstract Measurement results of a class AB design for the BLF978P in a demo optimized for 500 MHz.

1. Revision History

Table 1 – Report revisions

Revision	Date	Description	Author
1.0	2021.03.26	Initial document	

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5. General description

This report presents the measurement results of a demoboard designed for 500 MHz using the BLF978P. During the assembly the PCBs have been screwed down while the transistor has been soldered.

The dedicated demo-circuit is matched to 50 Ω at input and output.

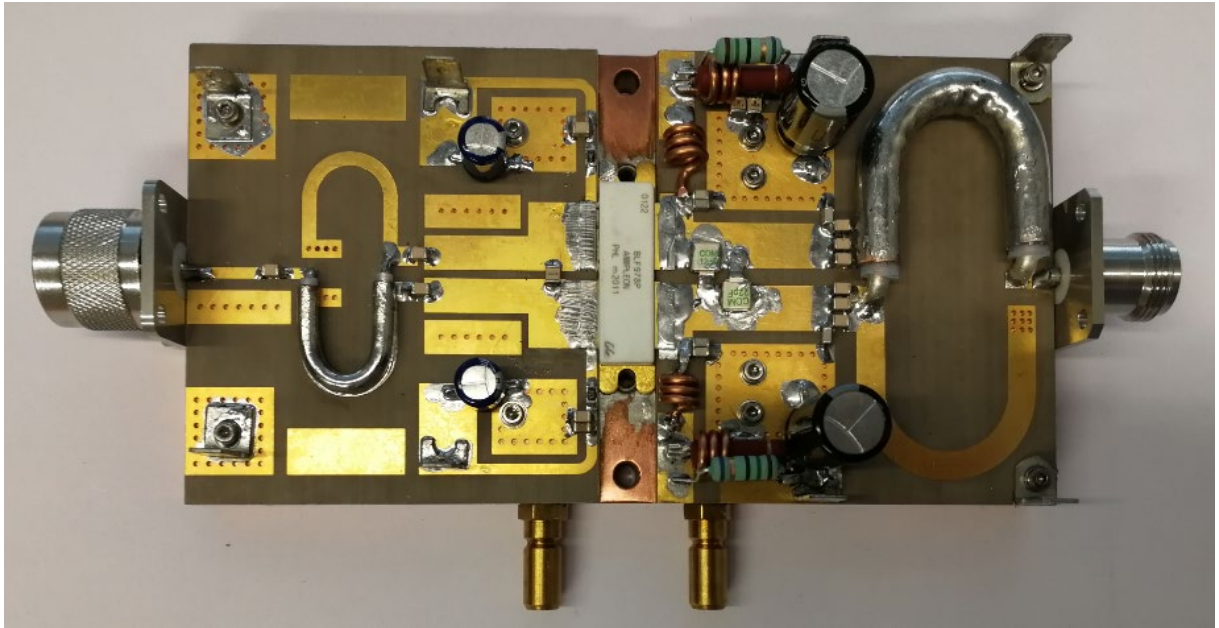


Figure 1 – Demo front view

Table 2 – Test circuit information

Parameter	Description	Unit
Input Laminate Type	Taconic RF35	
Output Laminate Type	Taconic RF35	
Df	0.0018 @ 1.9 GHz	
Dk	3.5	
Laminate thickness	0.762	mm
Copper thickness Input PCB	1 oz	
Copper thickness Output PCB	2 oz	
Overall dimensions	152.3 x 80.2	mm
Cooling type	Indirect water cooling	
Device Package	SOT539	

6. CW RF characteristics

Table 3 – Performance indication

Test signal: CW; RF performance at $V_{DS}=50V$; Total $I_{Dq}=20mA$; $T_{amb}=21^{\circ}C$; $T_{cooling\ water}=25^{\circ}C$

Symbol	Parameter	Conditions	Typical	Unit
f	Frequency		500	MHz
V_{DS}	Drain-source voltage		50	V
V_{GS}	Gate-source voltage	$I_{Dq} = 10mA \times \text{section}$	1.65	V
G_p	Power gain	$P_{1dBcp} = 993.9W$	22.1	dB
η_D	Drain efficiency	$P_{1dBcp} = 993.9W$	70.4	%

7. Performance Details

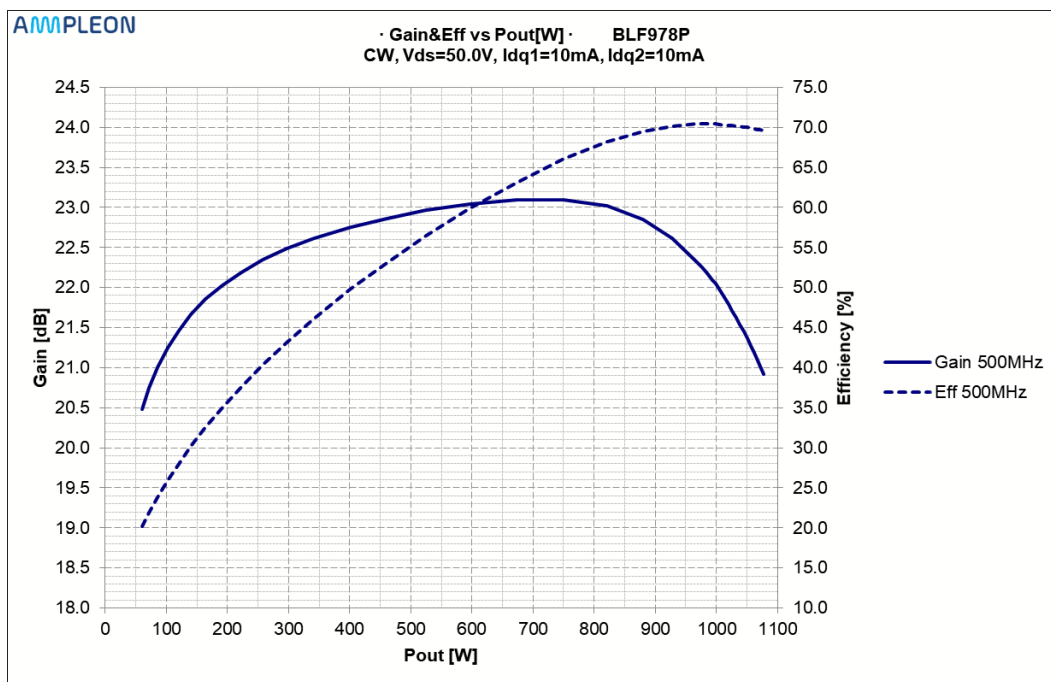


Figure 2 – Demoboard CW performance

Table 4 – RF Performance overview

Freq [MHz]	Gmax [dB]	Pout@Gmax [W]	P1dB [W]	P2dB [W]	Effmax [%]	Pout@Effmax [W]	Eff P1dB [%]	Eff P2dB [%]
500	23.09	672.96	993.93	1067.10	70.48	967.25	70.41	69.75

8. User Guide

8.1 Biasing

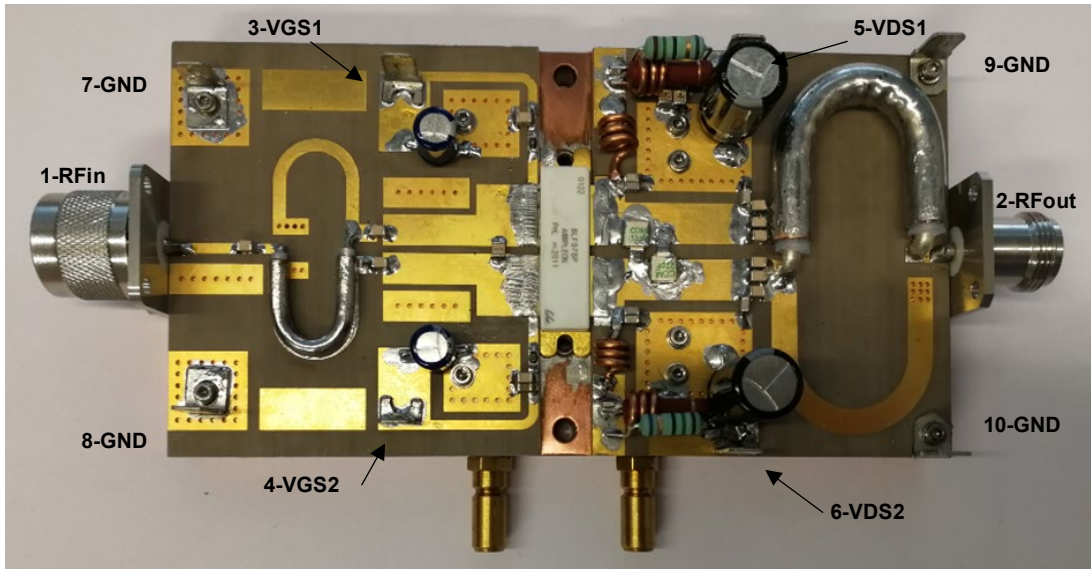


Figure 3 – Demoboard pin configuration

Table 5 – Pin description

Symbol	Pin	Description
RF _{IN}	1	RF input
RF _{OUT}	2	RF output
V _{GS1}	3	Gate-source voltage – Section 1
V _{GS2}	4	Gate-source voltage – Section 2
V _{DS1}	5	Drain-source voltage – Section 1
V _{DS2}	6	Drain-source voltage – Section 2
GND	7, 8	Negative supply terminal for V _{GS}
GND	9, 10	Negative supply terminal for V _{DS}

8.2 Bill of Materials

Table 6 – Bill of Materials

Part	Description	Value	Part number /Remark
C1,C8,C9	Multilayer ceramic chip capacitor	100pF	ATC100B soldered on the side
C2,C3	Multilayer ceramic chip capacitor	56 pF	ATC100B soldered on the side
C4	Multilayer ceramic chip capacitor	51 pF	ATC100B
C5,C6	Electrolytic Capacitor	100 uF, 63V	
C7,C10	Multilayer ceramic chip capacitor	100nF	Murata X7R
C11,C14	Multilayer ceramic chip capacitor	100pF	ATC100B
C12,C15	Multilayer ceramic chip capacitor	1nF	ATC100B
C13,C16	Electrolytic Capacitor	470uF, 63V	
C17	SMT Clad RF Capacitors	22pF	CDE MIN02
C18	SMT Clad RF Capacitors	12pF	CDE MIN02
C19,C20,C21,C22,C23,C24	Multilayer ceramic chip capacitor	15pF	ATC100B soldered on the side
C25, C26	Multilayer ceramic chip capacitor	7.5 pF	ATC800B soldered on the side
C28, C29	Multilayer ceramic chip capacitor	6.2 pF	ATC800B soldered on the side
C27, C30	Multilayer ceramic chip capacitor	6.8 pF	ATC800B soldered on the side
L2,L3	Inductor	3 turns, 1.5mm, 4mm diameter, close wound	
L1,L4	Inductor	3 turns, 1.5mm, 5mm diameter, close wound, parallel to R4 and R5	
R1,R2	Chip Resistor	47Ω	SMD 1206
R3,R6	Resistor	15Ω	3W
R4,R5	Resistor	10Ω	3W
Balun B1	Semirigid Zc=25	UT-090C-25	
Balun B2	Semirigid Zc=25	UT-300C-25	
Input PCB	Taconic RF35	H=0.762mm, Cu=2x35um	Er=3.48
Output PCB	Taconic RF35	H=0.762mm, Cu=2x70um	Er=3.48

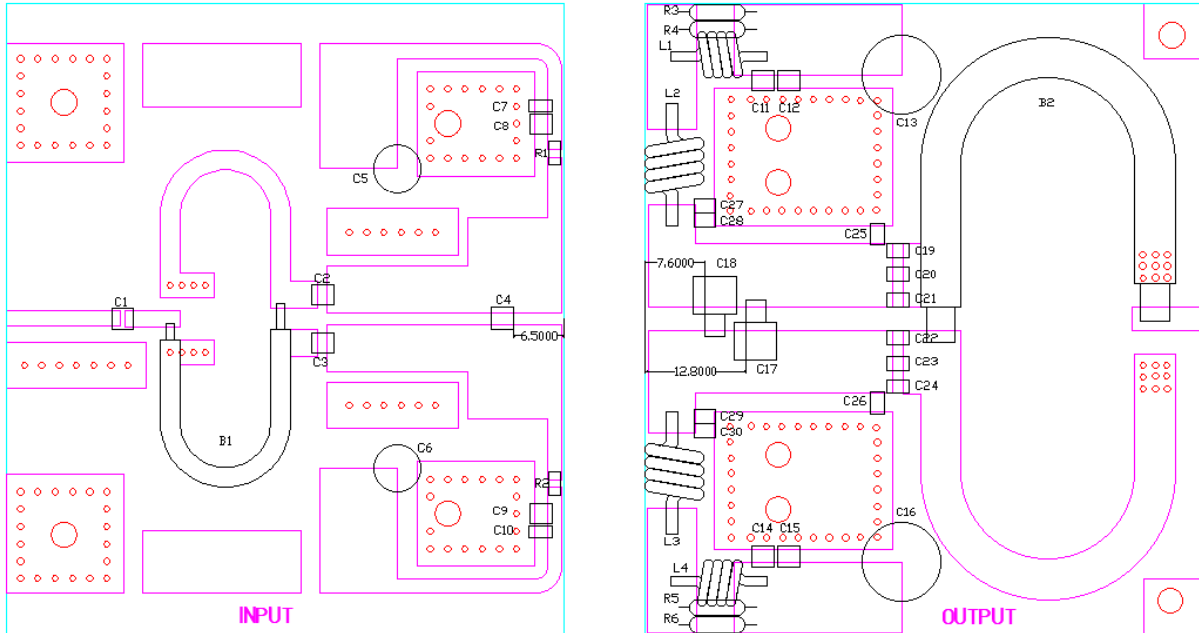


Figure 4 – Component mapping

8.3 Demoboard cooling

For operation of this demo board water cooling should be applied. Water temperature should be kept at 25 degC.

8.4 Device markings

Table 7 – Module specifics

Parameter	Value
Manufacturer	Ampleon
Device	BLF978P
Comments	Engineering sample

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