AR194004

BLF989, 470-494MHz

V2.0---19 April 2019

Document information	
Status	Public
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Abstract	This demo designed for DVB-T digital TV transmitter application with BLF989, this circuit works at 470-494MHz, it can output 200W with <-41dBc delta maker(+/- 4.2MHz), and the efficiency is ~55%.

1. Revision History

Table 1:   *Report revisions*

Revision	Date	Description	Author
1.0	20190419	Initial document	Rock Qiu

2. Contents

3. List of figures

4. List of tables

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Application Measurement Report   **V1.0 —19 April 2019**   **3 of 13**

General description

This report presents the measurement results of the demo AR194004. The device is BLF989 LDMOS in a push-pull package, which can handle 40:1 VSWR.

This demo is tuned for the frequency 470-494MHz, which can output 200W UHF digital TV signal with <-41dBc shoulder, the efficiency is about 55%.

The layout is attached in the pdf report, and the layout can cover 470-700MHz, only need change BOM of capacitors according to different bands.

5. Biasing

The biasing is as follows:

V_{DS} = 50V

Idq(main way) = 600mA

Vgs(Peak way) = 0.5V

6. Performance Indication

Table 2: *Performance indication*

Parameter	Condition	Unit	Pulsed(100us 10%)
V_{DD}		V	50
S11 at input		dB	-20
P_{1dB}	G_{MAX}-1dB	W	500
Peak power		W	950
P_{OUT} of operation	P_o	W	200
Gain	@P_o	dB	19.5
Drain Efficiency	@P_o	%	55

7. Performance Details

7.1 Return loss at input side

Figure 1   return loss

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Application Measurement Report   **V1.0 —19 April 2019**   **5 of 13**
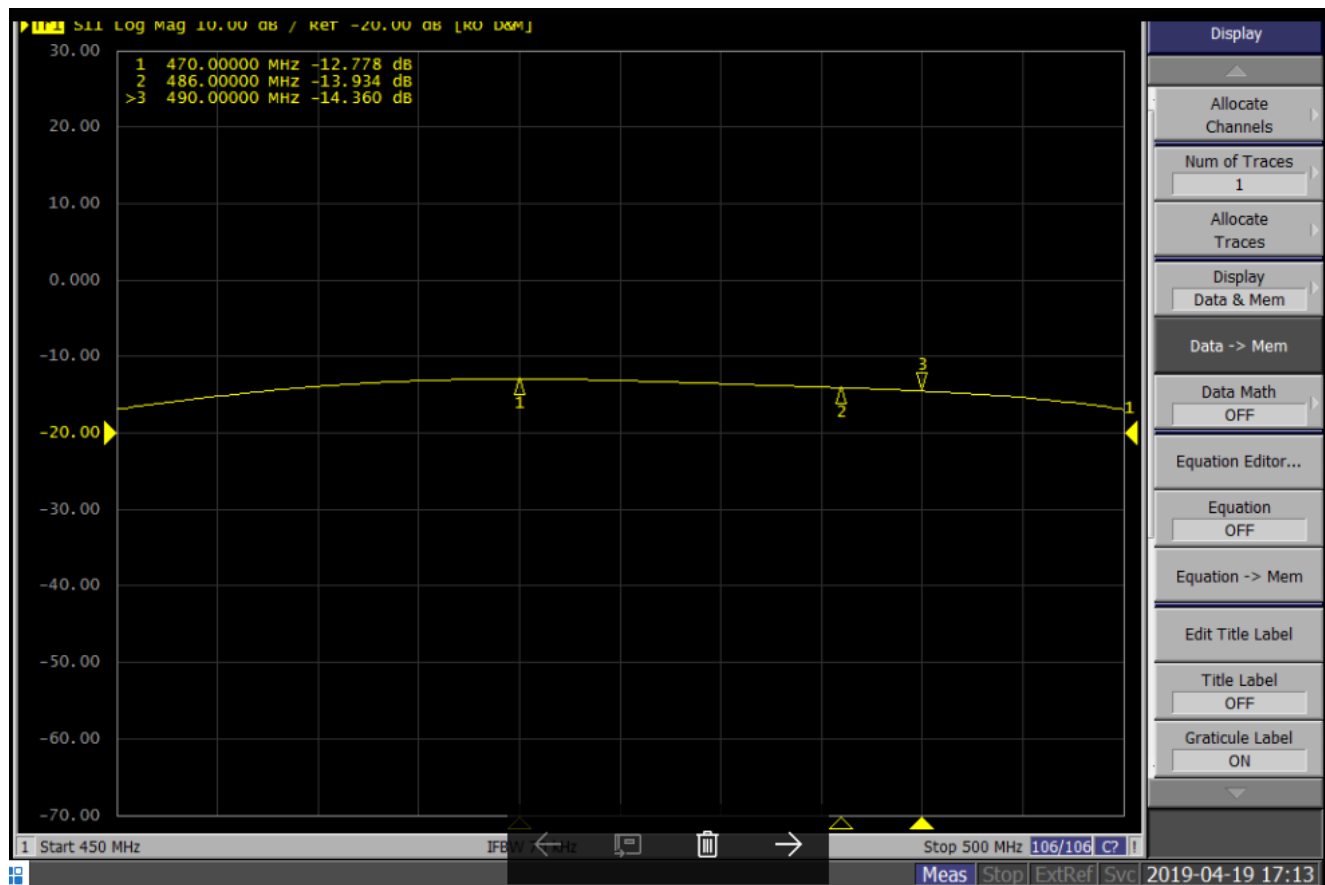
7.2 Test data:

7.2.1 Gain/Efficiency vs Pout（tested with 600mA+0.5V bias）, this data is Doherty P3dB, the actual peak power is higher for Doherty.

Freq(MHz)	P1dB (dBm)	P1dB (W)	P3dB (dBm)	P3dB (W)
474	57.81	604.39	59.34	858.17
482	57.61	577.15	59.34	859.86
490	54.56	286.06	59.01	796.12
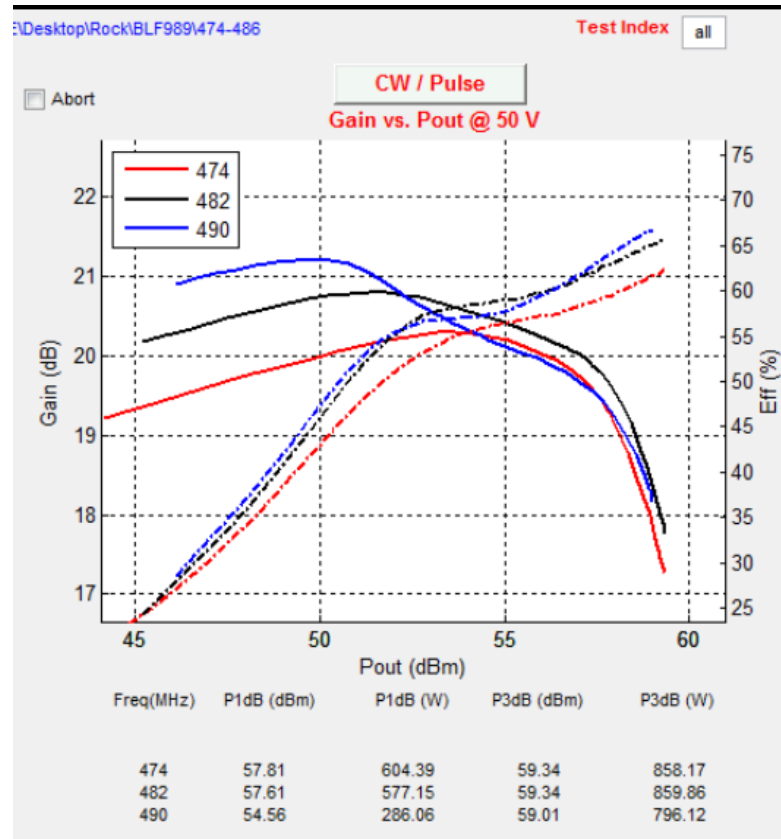
Figure 2   doherty efficiency vs Pout

7.2.2   Peak power(tested with 2X600mA bias)

Figure 3   peak power

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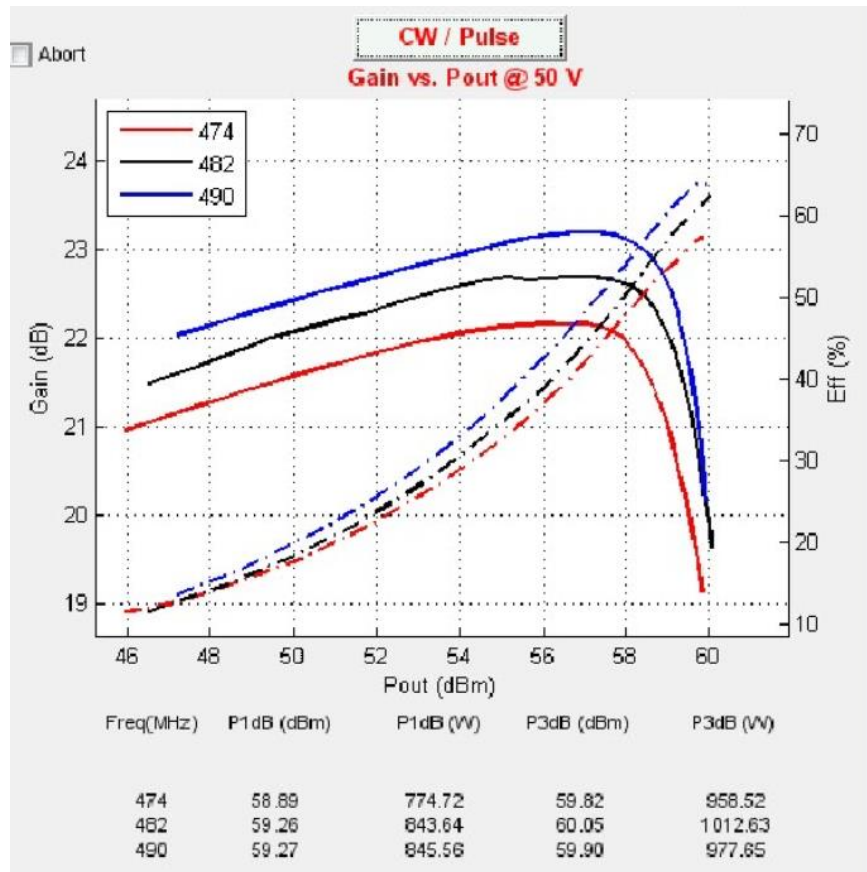**Application Measurement Report**   **V1.0 —19 April 2019**   **7 of 13**

7.2.3   Linearity test (200W and 180W output, spectrum analyzer setup: RBW=100KHz VBW=100KHz) 600mA+0.5V Bias, the bias condition can be changed according to the requirements.

Because the Pout will decrease after DPD, so set the initial Pout is about 225W before DPD, then we can get 200W after DPD.

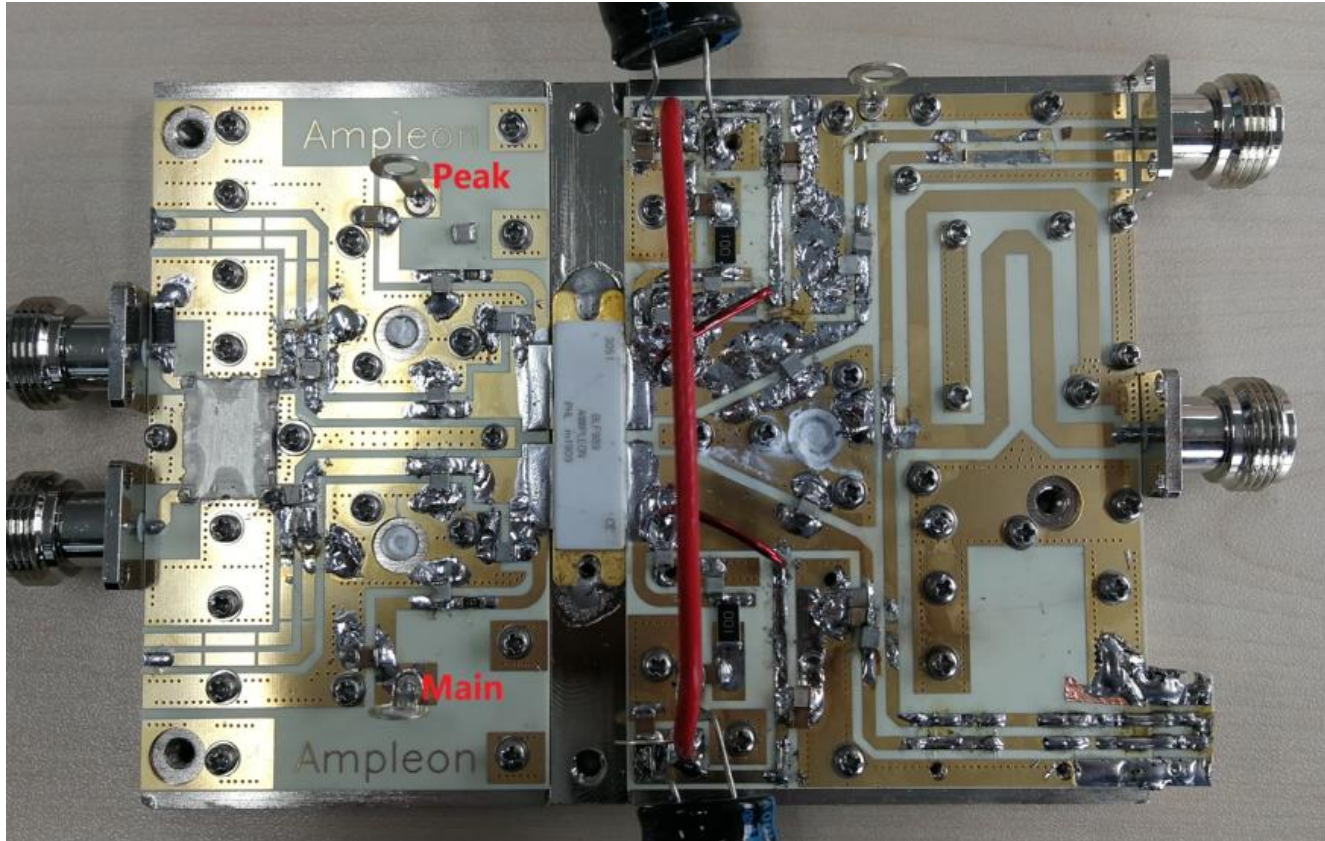| central frequency(MHz)	output(W)	input(W)	Gain(dB)	current(A)	efficiency	delta maker	delta maker
474	200	2.4	19.21	7.76	51.55%	-41.6	-41.2
482	200	2.22	19.55	7.32	54.64%	-41.7	-41.4
490	200	2.21	19.57	7.05	56.74%	-41.2	-41.1

Figure 4   test with DPD 200W

central frequency(MHz)	output(W)	input(W)	Gain(dB)	current(A)	efficiency	delta maker	delta maker
474	180	2.19	19.15	7.12	50.56%	-43.3	-42.8
482	180	1.94	19.67	6.7	53.73%	-43.5	-42.4
490	180	1.93	19.70	6.53	55.13%	-42.5	-42.1

Figure 5   test with DPD 180W

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Application Measurement Report   **V1.0 —19 April 2019**   **8 of 13**

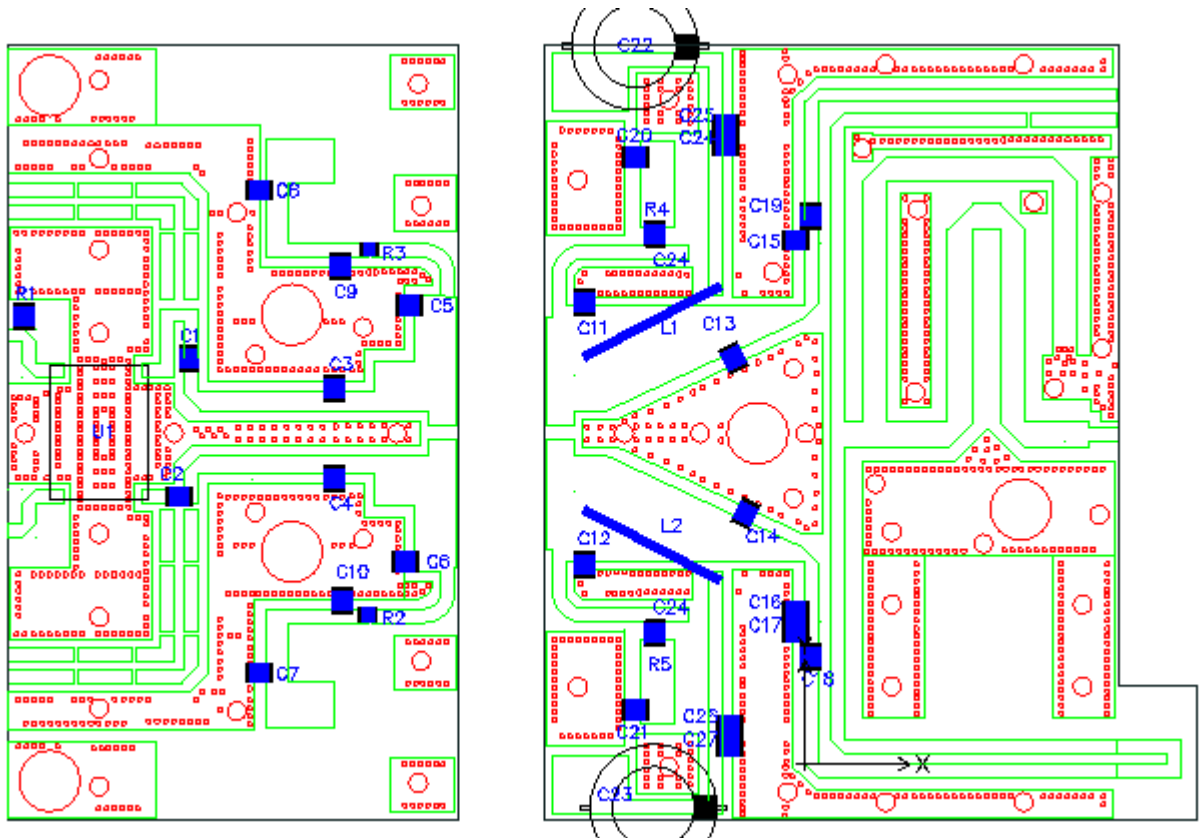## 8. Hardware

8.1 Board Image

8.2 Copper Layout and components mapping(dxf layout is attached in the PDF report, it can work at 470-700MHz, only need change capacitors according to different bands)

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Application Measurement Report

V1.0 —19 April 2019

10 of 13

8.3 Bill of materials

Table 3: *Bill of Materials*

Quantity	Description	Part Number	Manufacturer
R1	50 ohm load		
R2, R3	1/4W 10ohm Resistor	0805	Murata
R4, R5	1W 10ohm Resistor	2512	
C1,C2	10P	800B	ATC
C9,C10,C18,C19,C24,C26	100P	800B	ATC
C3,C4	33P	800B	ATC
C5,C6	43P	800B	ATC
C11	15P	800B	ATC
C12	18P	800B	ATC
C13	24P	800B	ATC
C14	20P	800B	ATC
C15	12P	800B	ATC
C16	1.8P	800B	ATC
C17	12P	800B	ATC
C22,C23	470 uF 63V Electrolytic Capacitor	MCRH63V477M13X26-RH	MULTICOMP
C7,C8,C20,C21,C25,C27	10uF	100V	Murata
PCB	RO4350B 30mil		Rogers
U1	1F1304-3		ANAREN
L1,L2	1.36mm wire	Length 19mm, height 9mm	

8.4 Board material

Table 4:　*Board specifications*

Parameter	Value
Manufacturer	Rogers
Type	RO4350B
Thickness	30mil, 0.762mm
Layers	2, top/bottom. Bottom all copper

8.5 Device markings

Table 5:　*Device specifics*

Parameter	Value
Manufacturer	Ampleon
Device	*BLF989*

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