

# AR133101

BLF188XR 2-30 MHz 1000 W power amplifier

Rev. 1.0---March 10 2013

Application lab report

## Document information

Info	Content
<b>Author</b>	Rock Qiu
<b>Keywords</b>	BLF188XR, broadband, CW
<b>Abstract</b>	This test report describes a broadband amplifier that works more than 1000 W from 2 to 30 MHz, >1300W from 4MHz to 30MHz; using the BLF188XR LDMOS transistor.

**Revision history**

<b>Rev.</b>	<b>Date</b>	<b>Description</b>
1.0	20130310	Initial version

## 1. Introduction

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This report describes a broadband amplifier based on Ampleon's BLF188XR, which works more than 1300 W from 4 to 30 MHz, >1000W from 2-30MHz.

### Summary

The RF performance may be summarised as follows:

**Table 1. Summary of RF performance**

Specified frequency range	2 to 30 MHz
Drain voltage	50 V
Quiescent drain current	200 mA typ
Peak CW power	≥ 1300 W(4-30MHz)
Efficiency at CW Peak power(1415W)	81.4% (13.56 MHz)
3dB compression power	1270W(27.12MHz)
Power Gain at P3dB	29.1dB(27.12MHz)
I drain at P3dB	31.6A (27.12MHz)

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## 2. RF performance

### 2.1 Network Analyzer Sweep

The plot below shows return loss as a function of frequency. The network analyzer is using a swept CW signal at 0dBm of input power.

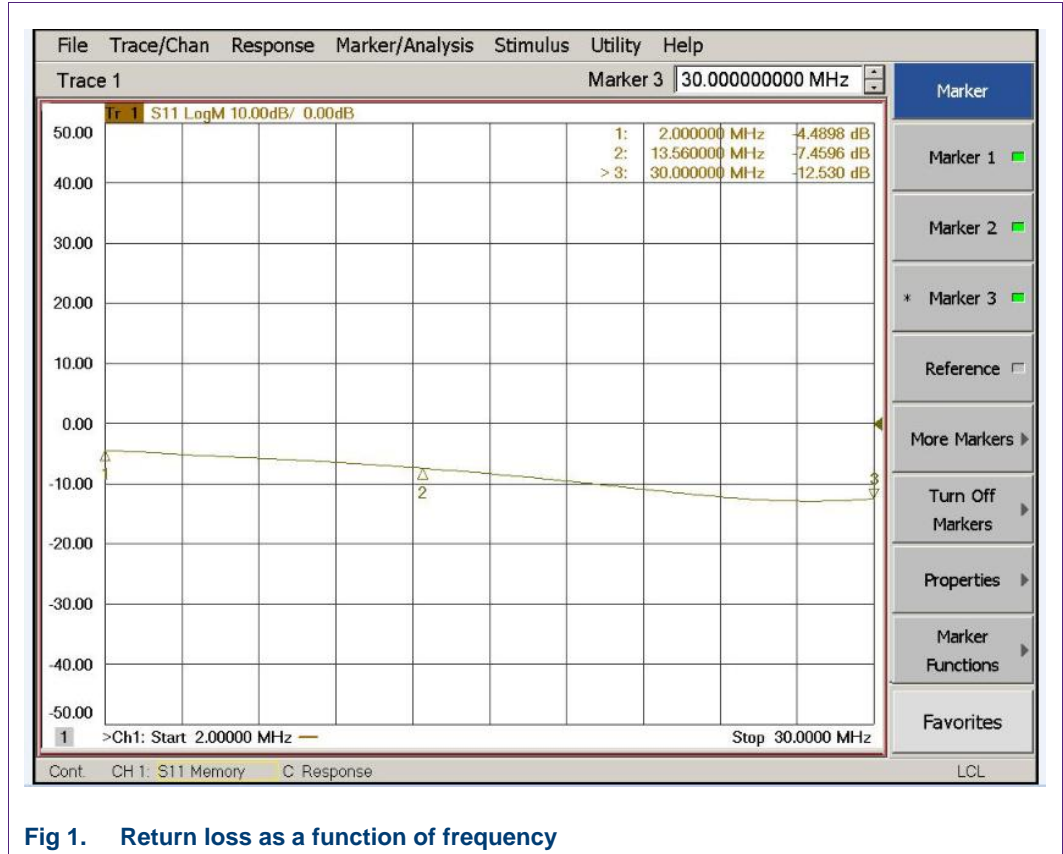
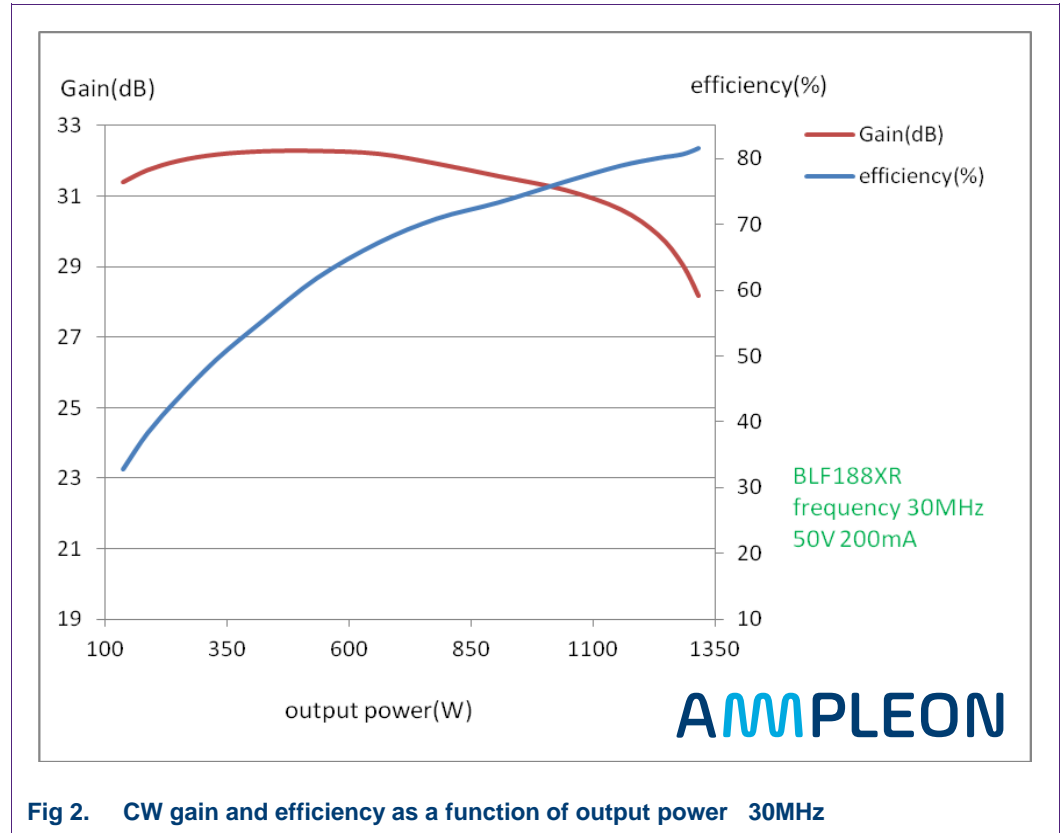


Fig 1. Return loss as a function of frequency

**2.2 CW Gain and Efficiency as a Function of Output Power**

The plot below shows gain and efficiency as a function of output power. The bias point is 50V and 200mA. The signal is a CW signal at 30MHz, 27.12MHz, 13.56MHz, 4MHz, 2MHz.



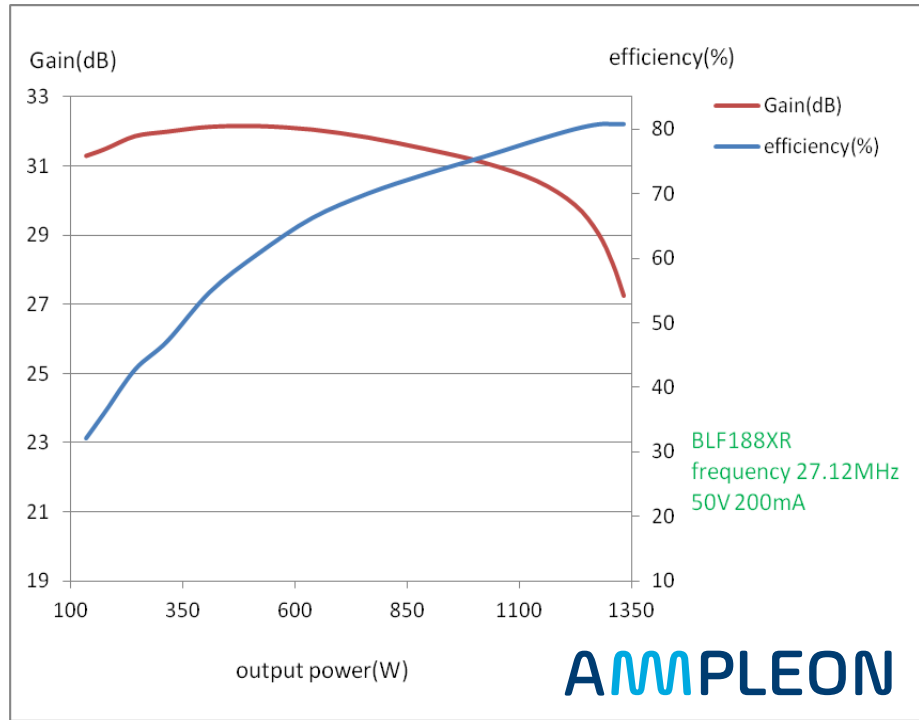


Fig 3. CW gain and efficiency as a function of output power 27.12MHz

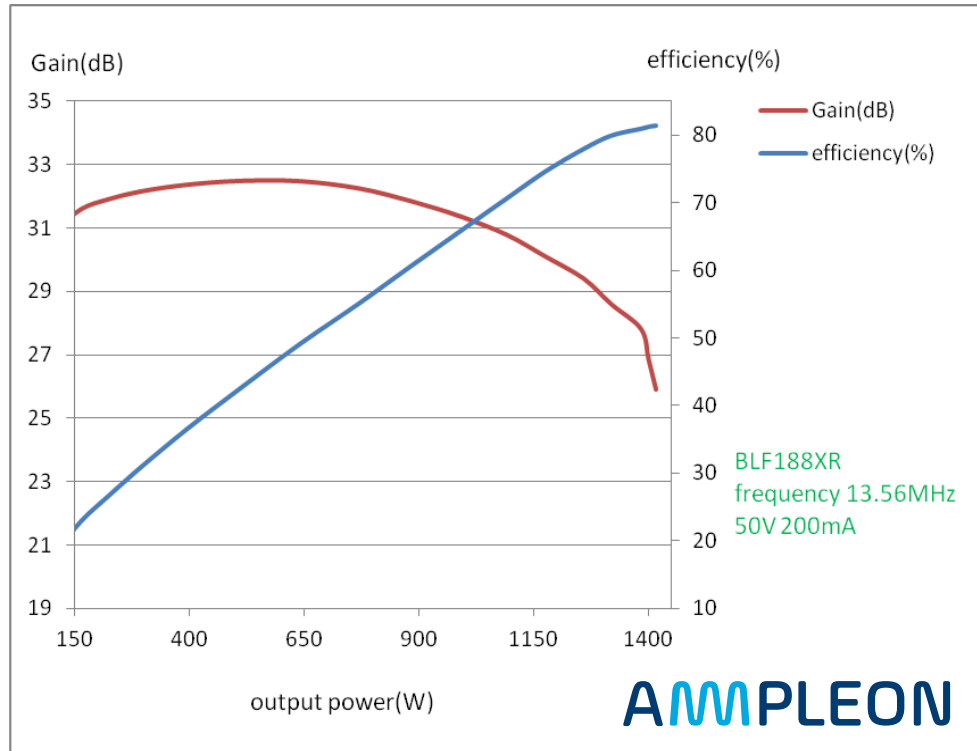


Fig 4. CW gain and efficiency as a function of output power 13.56M

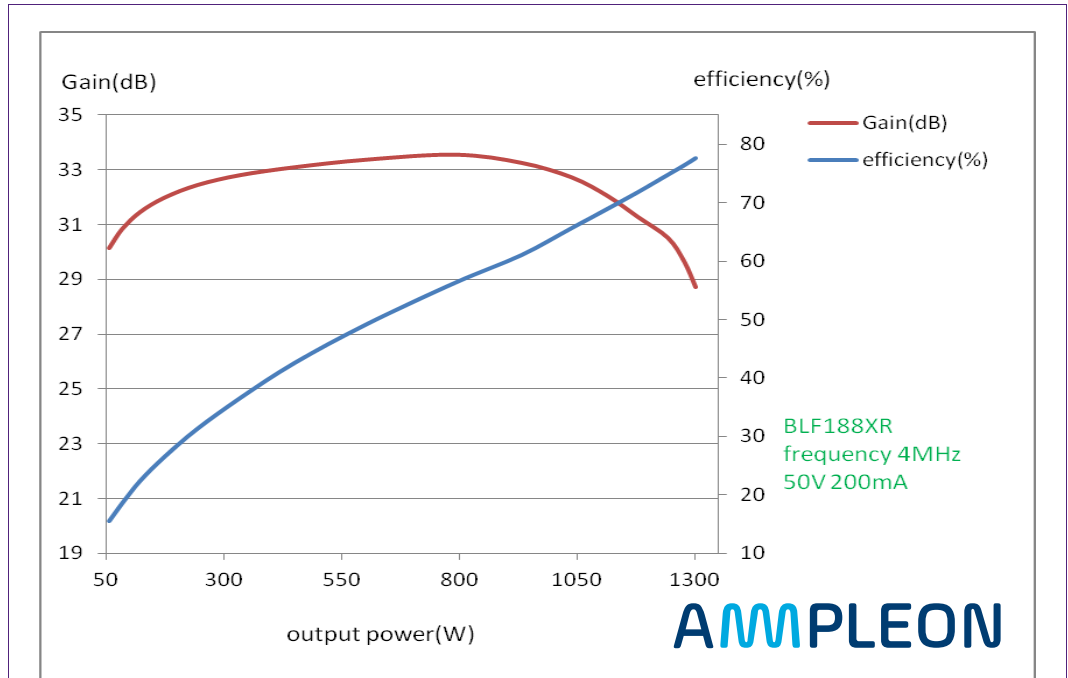


Fig 5. CW gain and efficiency as a function of output power 4MHz

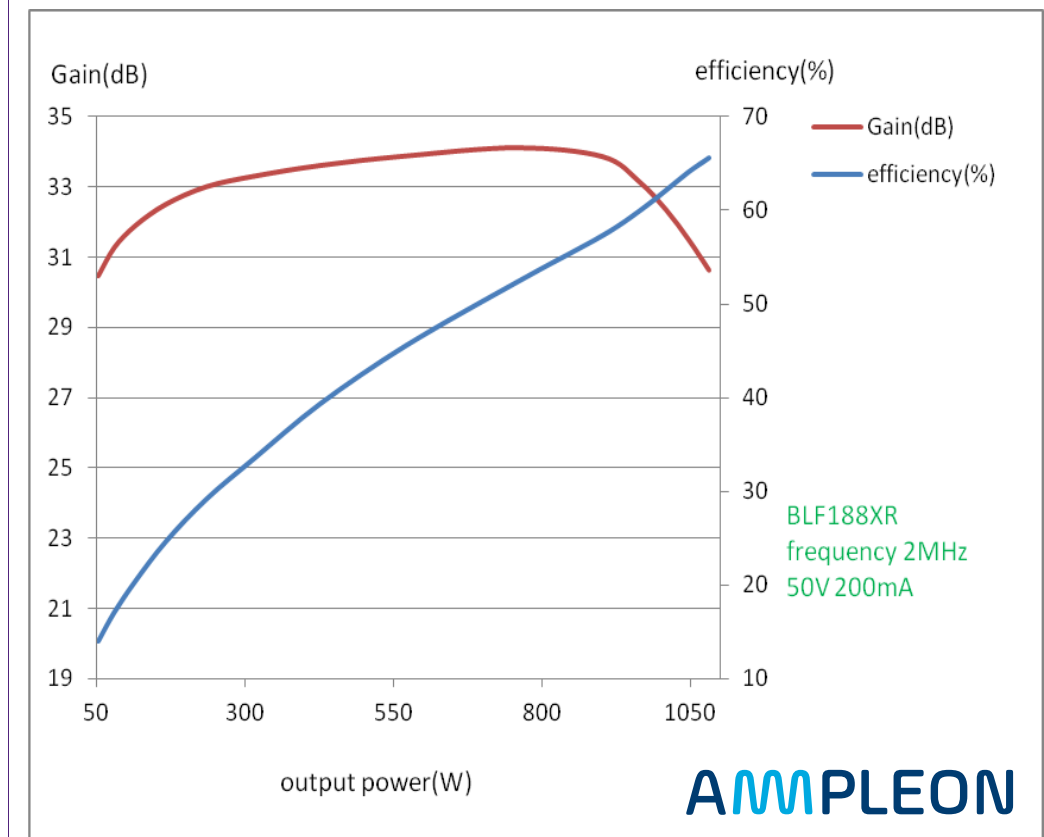


Fig 6. CW gain and efficiency as a function of output power

### 2.3 Harmonics

The plot below shows harmonics while the device output power is being swept from low power to 1400W at 13.56MHz. Max hold is being used on the spectrum analyzer to catch the peak of all the signals. The spectrum is monitored through the circuit, and after the 50 ohm load.

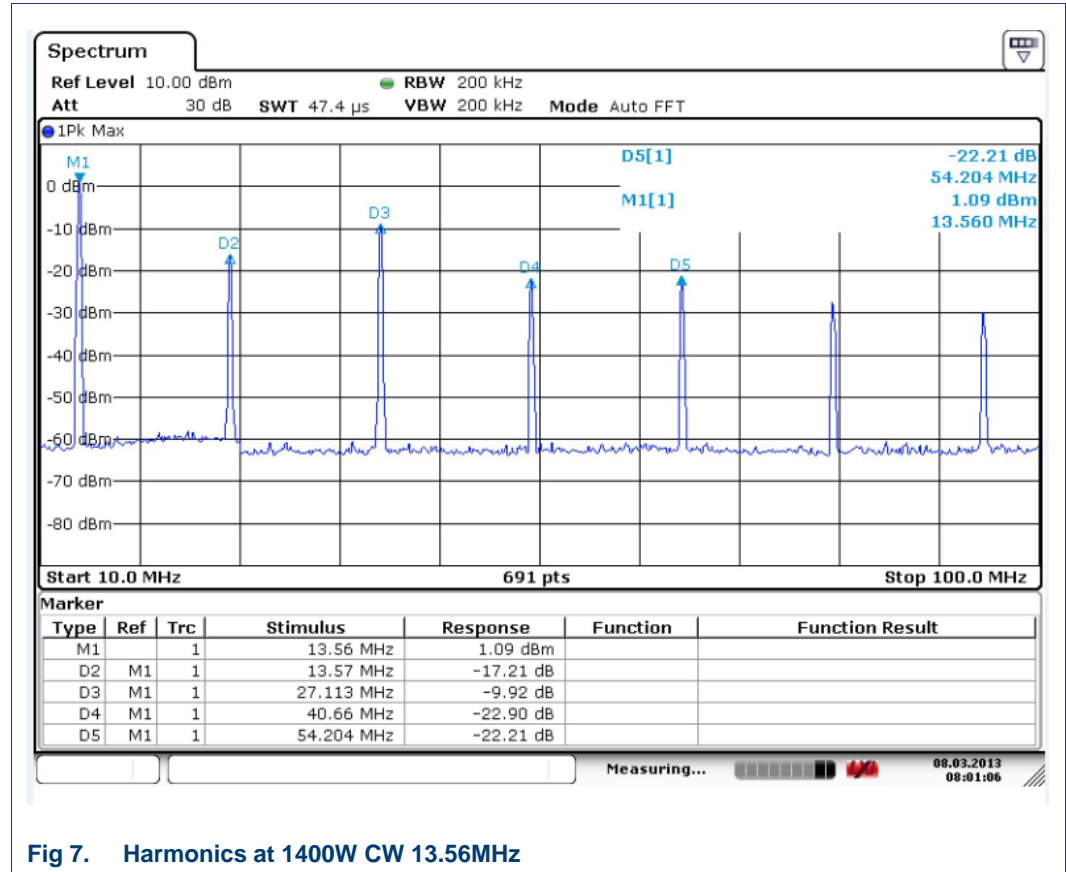
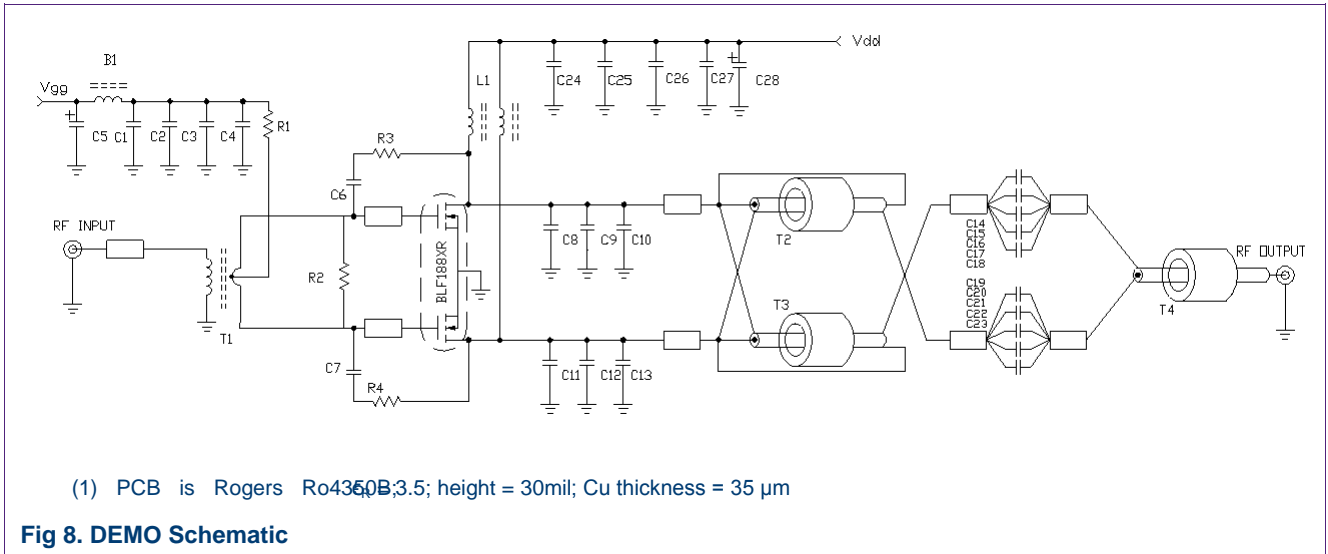


Fig 7. Harmonics at 1400W CW 13.56MHz



### 3. Circuits information



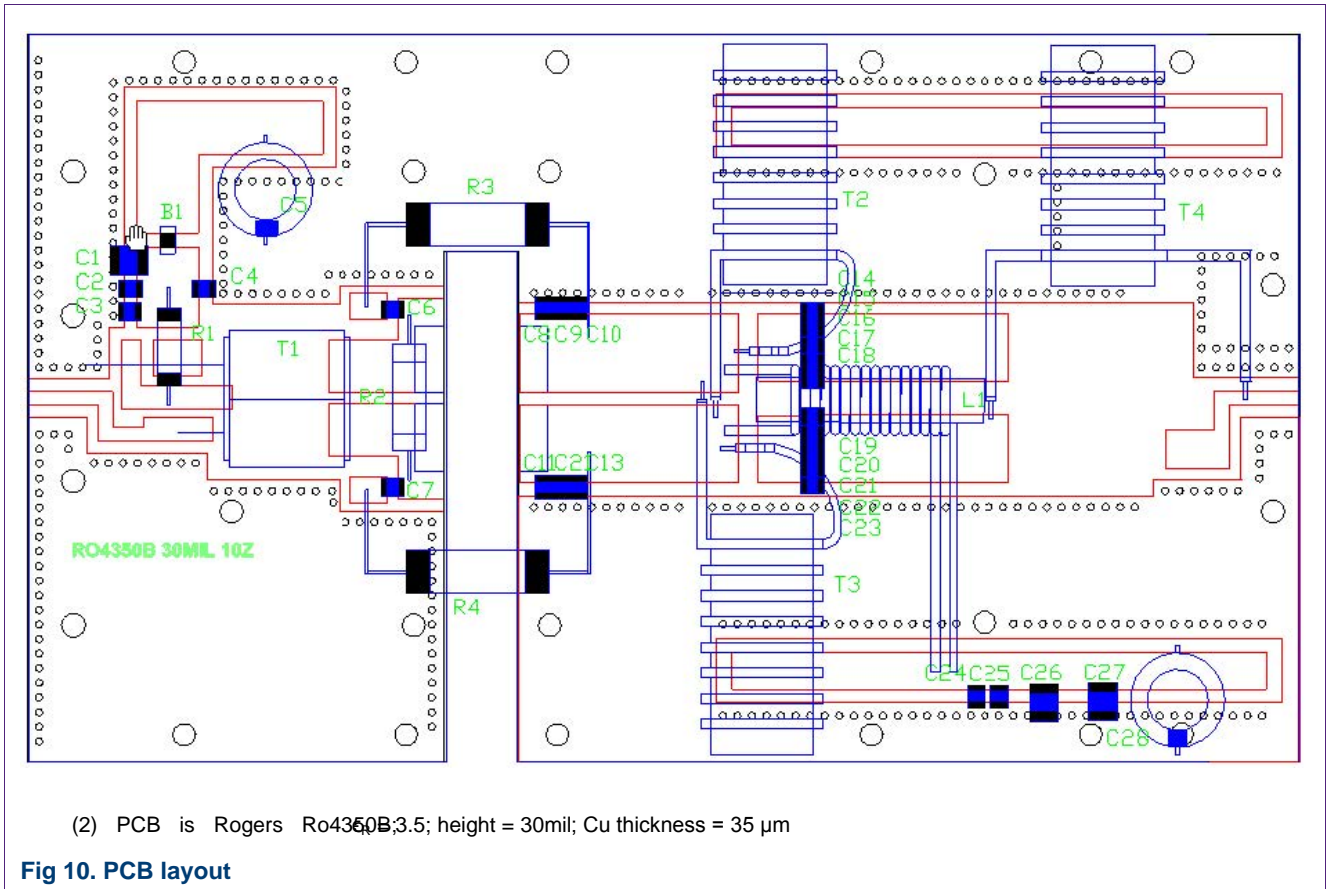


Table 2. Bill of materials

Quantity	Description	Part Number	Manufacturer
B1	SM Bead (47 ohm@100MHz)	2743019447	Fair-Rite
R1	20ohm 1W Resistor leaded		
R2	50ohm 5W Resistor leaded		
R3,R4	100ohm 5W Resistor leaded		
C1,C26,C27	10uF	C5750X7R1H106M	TDK
C2,C3,C6,C7,C24,C25, C14-C23	10nF	C3225C0G2E103J	TDK
C4	0.1uF 50V Ceramic Capacitor	CDR33BX104AKYS	Kemet
C5,C28	470 uF 63V Electrolytic Capacitor	MCRH63V477M13X 26-RH	MULTICOM P
C8-C13	180P	800B	ATC
L1	Handwound 10 turn 18AWG on ferrite rod	NXO-200	Handwound
T1	4:1 Impedance Ratio 43 material		Handwound
T2	Handwound 6 turn 25ohm cable on ferrite rod	NXO-200	Handwound
T3	Handwound 6 turn 25ohm cable on ferrite rod	NXO-200	Handwound
T4	Handwound 6 turn 50ohm cable on ferrite rod	NXO-200	Handwound
ferrite cores: T1,T2,T3,T4			
vendor	Material type	dimension type	
Beijing Seven Star Flight Electronic Co., Ltd.(BSSF)	NXO-200	H37x23x15	
ferrite core: L1,L2			
vendor	Material type	dimension type	
Beijing Seven Star Flight Electronic Co., Ltd.(BSSF)	NXO-200	H37x23x15	
cables: T2,T3,T4			
25ohm cable	Whitmor/wirenetics	141-25	
50ohm cable	Whitmor/wirenetics	141-50	

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