

μ PG2250T5N-EVSAW24-A

Evaluation Board

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- Insertion Loss of Murata's Low-pass Filter of LFL182G45TC3B746
- Circuit Schematic and Assembly Drawing

Circuit Description:

This evaluation board provides a quick and convenient means of evaluating the performance of the NEC uPG2250T5N power amplifier in combination of a Murata 2.4GHz low pass filter, LFL182G45TC3B746. The circuit board demonstrates that the combination of the PA and filter delivers about 24dBm power at 2.4GHz ISM band with conducted harmonic levels well below the regulatory requirements per FCC15.247 ruling.

The circuit schematic and assembly drawing are on the last two pages of this document.

The matching and bias circuits for the uPG2250T5N of this circuit board are based on those used in the CEL's evaluation board, uPG2250T5N-EVAL-A, with some changes in the output matching network. For more information on the PA circuit design, refer to the Evaluation Board Document of uPG2250T5N-EVAL-A which is available on CEL's website: www.cel.com under uPG2250T5N. The changes in the output matching are mainly for reducing the second harmonic level. The output power at the fundamental frequency of this circuit board is slightly lower than that of the original PA circuit. Test result shows that if L4 is removed and C6 changes to 1pF the output power can be increased by a fraction of dB while the conducted second harmonic at 4.8GHz is slightly higher than the FCC spec. Since radiated power is measured in actual compliance testing, the antenna used for the end product may provide additional harmonic rejection. Therefore if the output power is critically important, some experiments might be needed to determine the optimal output matching circuit to achieve highest in-band output power while the harmonics still meet the regulatory requirements.

A typical insertion loss of the Murata filter is shown on the next page. It can be seen the second harmonic of $f_0=2.4\text{GHz}$ could be the highest for fundamental frequencies within the 2.4GHz ISM band (2.4-2.483GHz) because the PA has the highest harmonic component at $2f_0$ while the filter has least rejection at 4.8GHz.

The PCB is FR4 four layer board. The top and bottom dielectric layers are 8mils thick. The total board thickness is 62mils. The dielectric constant of FR4 is 4.3.

Typical Performance Data

Test conditions:

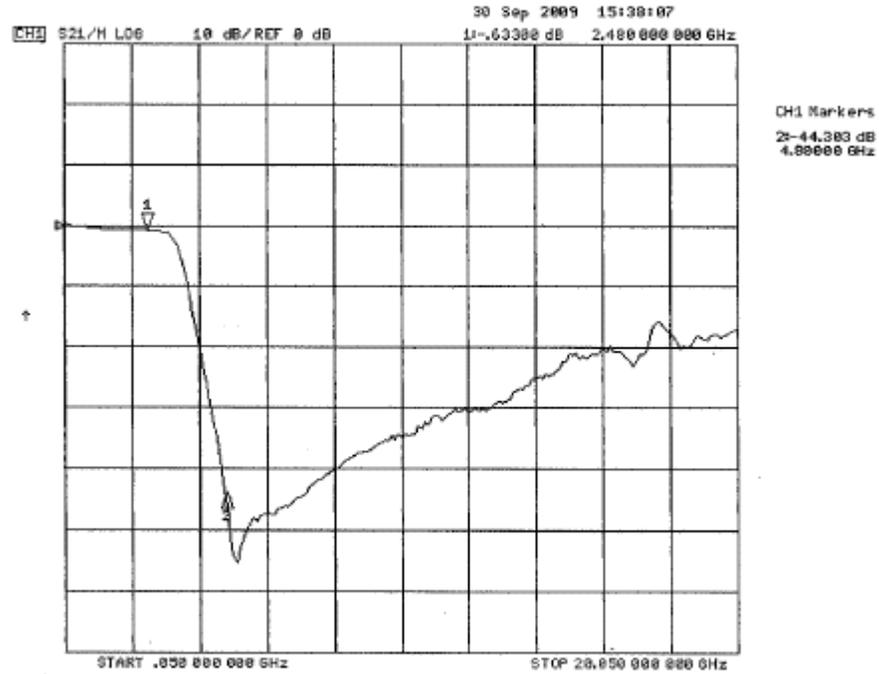
F=2.45GHz, Vdd=3V, Vcont=1.8V, Pin=-5dBm

Output power: 24dBm;

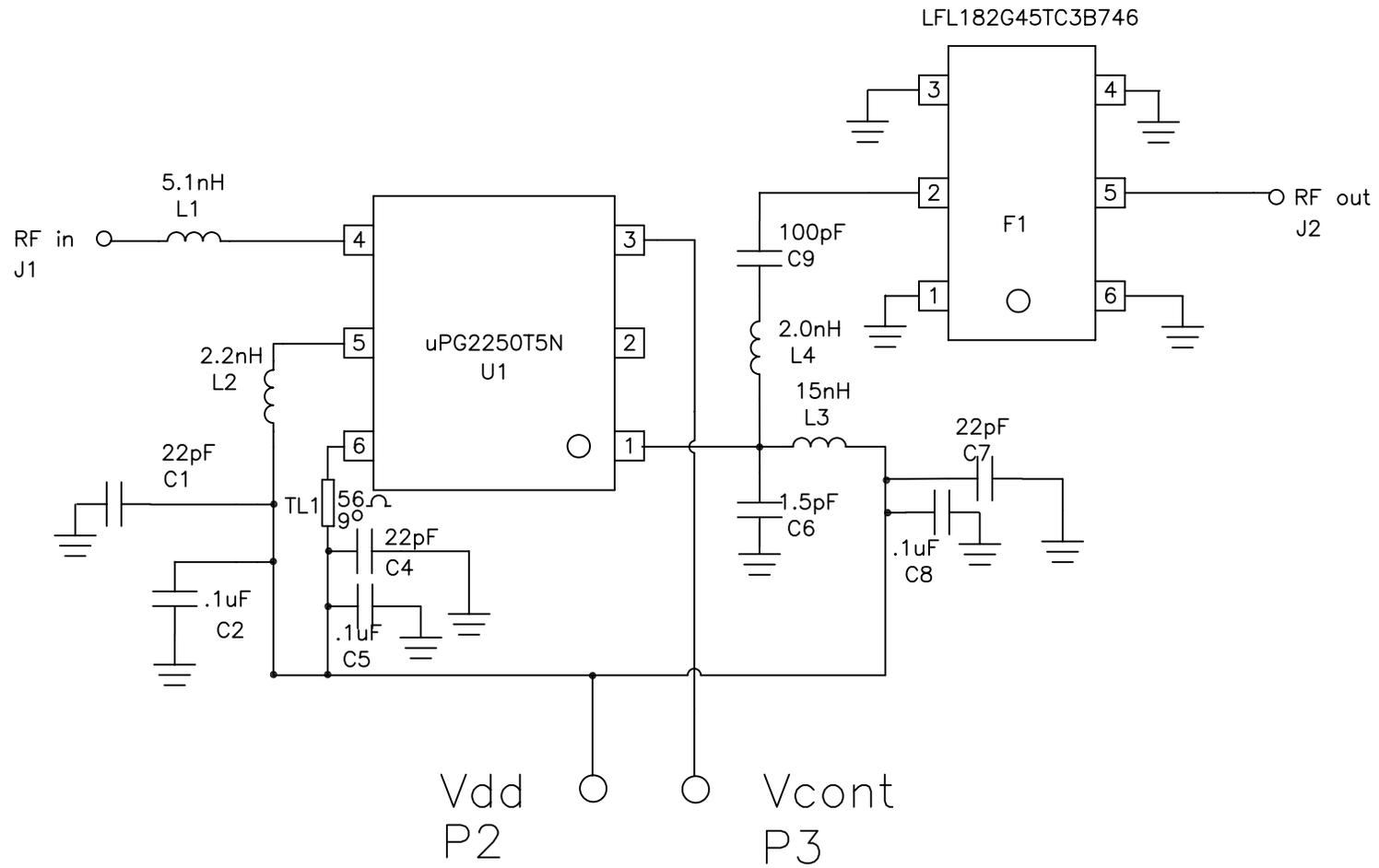
Supply current: 220mA;

Harmonic levels: < -50dBm.

Typical Insertion Loss of Murata's LFL182G45TC3B746



REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



QTY	PART NUMBER OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL/SPECIFICATION	ITEM NO.
1	LQG15HS15NS02	L3	0402 15nH IND +/-0.3nH MURATA	14
1	LQG15HS2N0S02	L4	0402 2.0nH IND +/-0.3nH MURATA	13
1	LQG15HS2N2S02	L2	0402 2.2nH IND +/-0.3nH MURATA	12
1	LQG15HS5N1S02	L1	0402 5.1nH IND +/-0.3nH MURATA	11
1	GRM1555C1H101JZ01B	C9	0402 100pF CAP +/-5% MURATA	10
1	GRM1555C1H1R5CZ01B	C6	0402 1.5pF CAP +/-0.25pF MURATA	9
3	GRM155R71E104KA01D	C2, C5, C8	0402 0.1uF CAP MURATA	8
3	GRM1555C1H220JZ01B	C1, C4, C7	0402 22pF CAP +/-5% MURATA	7
1	LFL182G45TC3B746	F1	MURATA 2.4GHZ LOW PASS FILTER	6
3	2340-6111 TG	P1, P2, P3	PIN HEADER 3M	5
2	142-0711-821	J1, J2	SMA FEMALE CONNECTOR E.F.JOHNSON	4
1	uPG2250T5N	U1	NEC GaAs IC uPG2250T5N	3
1	CL-101998	DRAWING	COMPONENT LAYOUT DRAWING	2
1	N/A	PCB	PCB MANUFACTURED BY NETWORK PCB	1

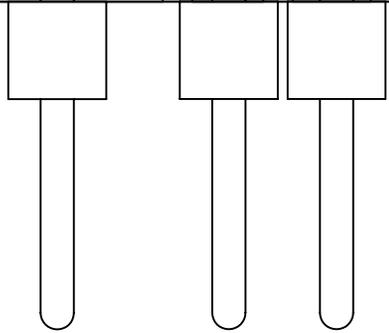
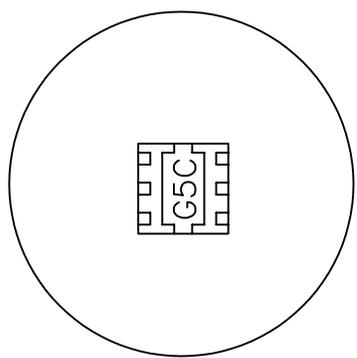
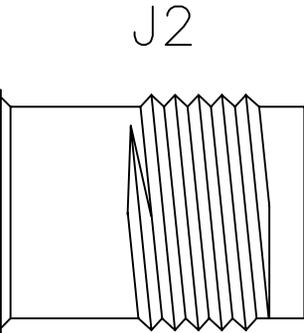
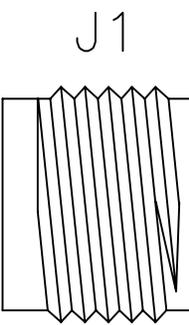
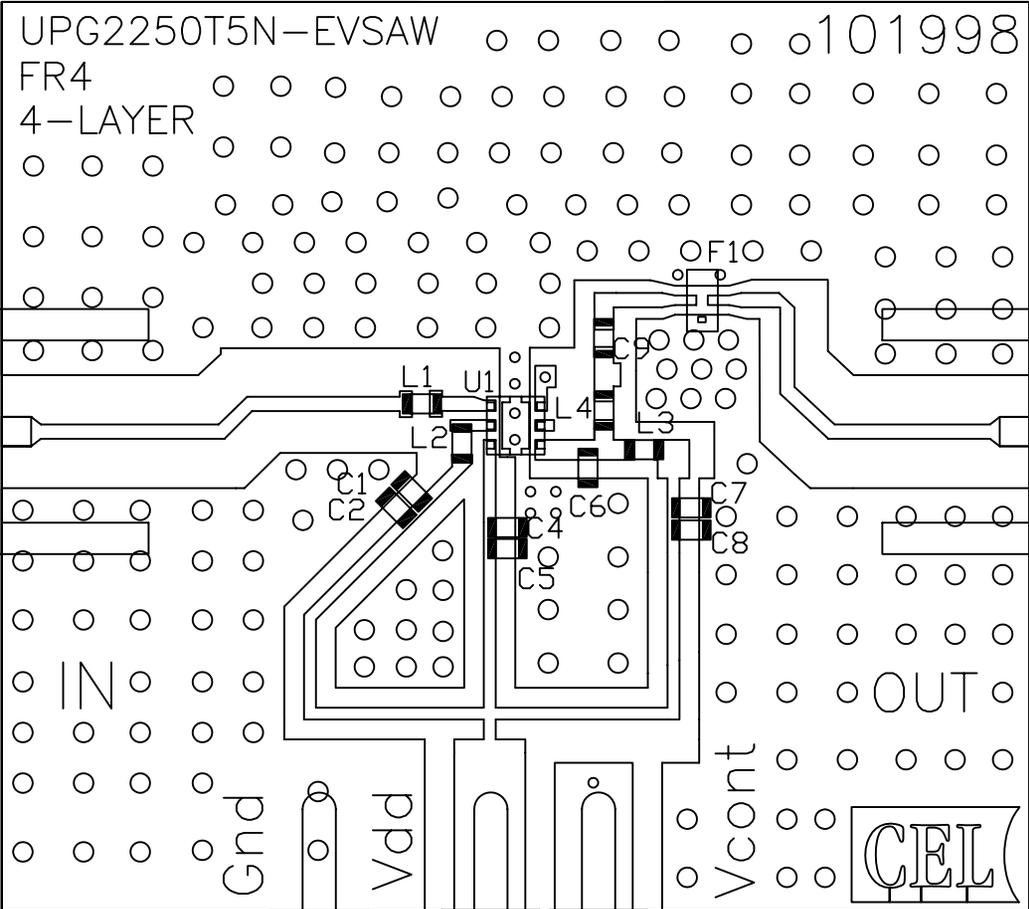
APPROVALS		CEL CALIFORNIA EASTERN LABS 4590 PATRICK HENRY DR. SANTA CLARA CA. 95054	
DRAWN	M DONG	9/21/09	TITLE:
DESIGNED			UPG2250T5N-EVSAW SCHEMATIC AND BOM
CHECKED			
PROJECT ENGINEER		SIZE	FSCM NO.
QUALITY		C	
		DWG NO.	AD101998
		SCALE	RELEASE DATE
		SHEET	OF

PARTS LIST

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REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



APPROVALS		CEL CALIFORNIA EASTERN LABS 4590 PATRICK HENRY DR. SANTA CLARA CA. 95054		
DRAWN M DONG	9/21/09	TITLE: UPG2250T5N-EVSAW ASSEMBLY DRAWING		
DESIGNED				
CHECKED				
PROJECT ENGINEER		SIZE C	FSCM NO.	DWG NO. AD101998
QUALITY		SCALE	RELEASE DATE	SHEET OF

P1

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