APPLICATION NOTE

OM5804 Receiver demoboard for 155/622/1250 Mbps

AN98082

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Abstract

A demoboard for 3 types of transimpedance amplifiers/limiting amplifier combinations is described. The transimpedance amplifiers/limiting amplifiers are TZA3033/TZA3034 (155 Mbps), TZA3023/TZA3024 (622 Mbps) and TZA3043/TZA3044 (1250 Mbps). The type number of the board is OM5804. Application information includes schematics and layouts.

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APPLICATION NOTE

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Introduction

This apnote is a short description of the OM5804 demoboard.

The OM5804 demoboard can be used to demonstrate the functionality of 3 different IC combinations:

TABLE 1 Supported ICs for demoboard OM5804

Datarate [Mbps]	IC type number Transimpedance amplifier	IC type number Limiting amplifier
155	TZA3033	TZA3034
622	TZA3023	TZA3024
1250	TZA3043	TZA3044

The apnote consists of the following sections:

1. Getting started (block diagram, test possibilities and test results)
2. General (used acronyms, PCB cross section)
3. Schematics
4. Bill of materials
5. Layouts

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1. Getting started

1.1 Block diagram

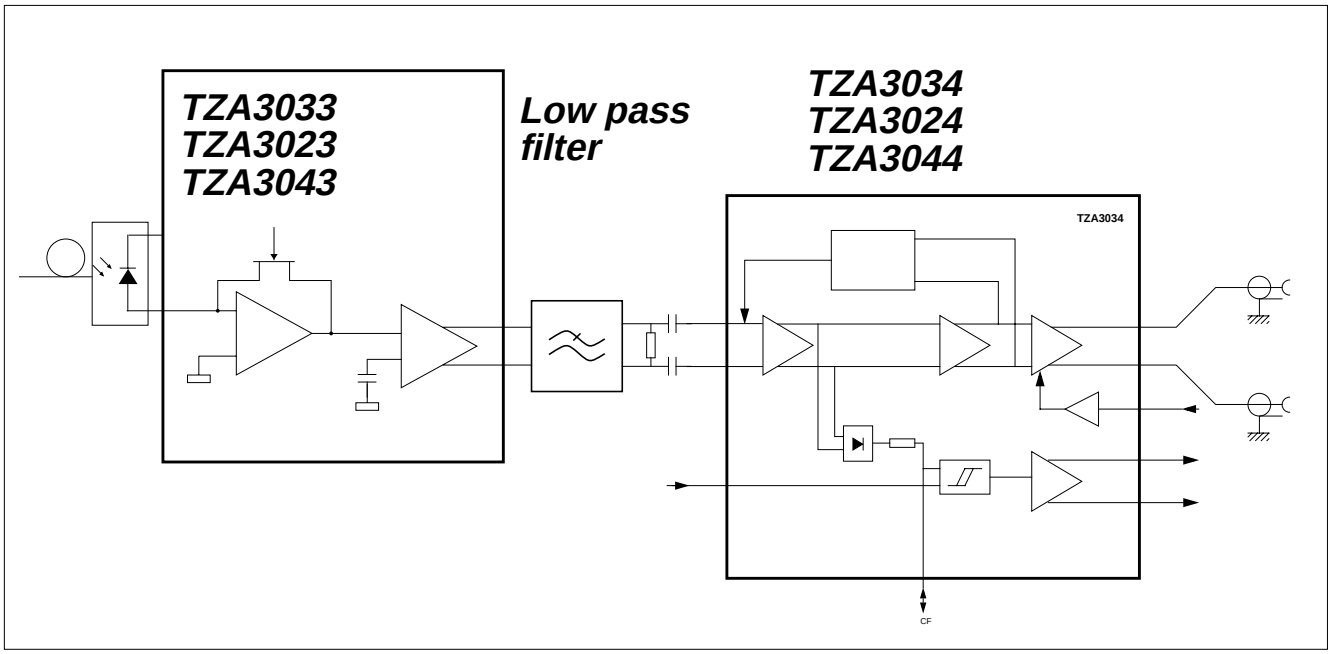


Fig.1 Block diagram of OM5804.

1.2 Which IC type?

The OM5804 demoboard can be used to demonstrate the functionality of 3 different IC combinations, which combination is depending on the preferred bitrate. A list of IC types is given below

TABLE 2 Supported ICs for demoboard OM5804

Datarate [Mbps]	TIA IC type number	LIM IC type number
155	TZA3033	TZA3034
622	TZA3023	TZA3024
1250	TZA3043	TZA3044

1.3 Lowpass filter

The values of the filter depend on the datarate. The schematic of the filter is shown below.

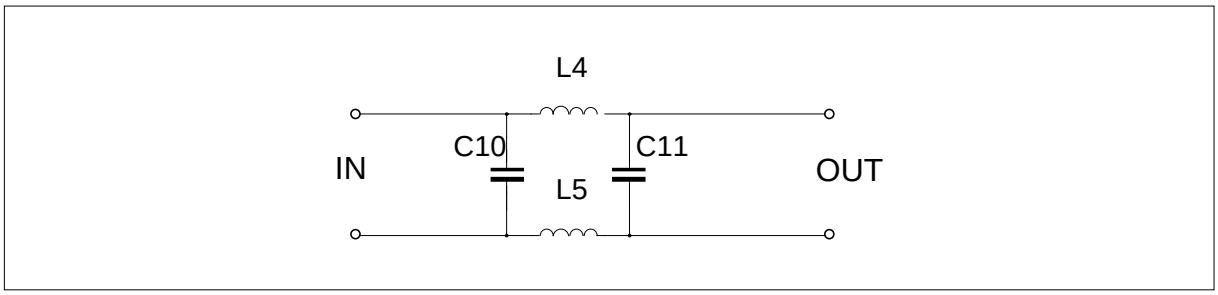


Fig.2 Lowpass filter.

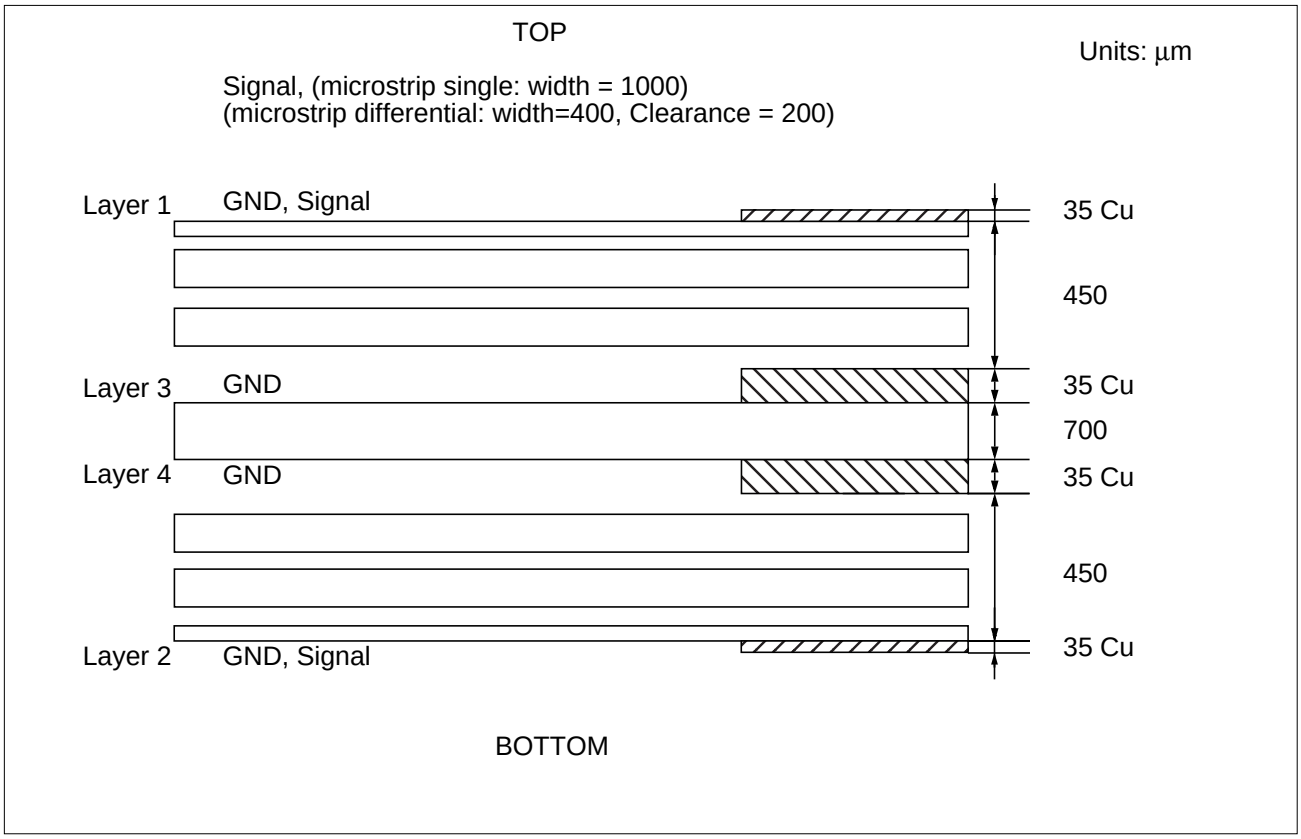
An indication of the values are given in the table below. The components should have low parasitic effects, or relative to the cut off frequency, high self resonance frequency.

TABLE 3 Calculated values for different types of filters.

Impedance [ohm]	50			50			50		
Bitrate [Mb/s]	155,52			622,08			1250,00		
Cutoff freq [MHz]	101,09			404,35			812,50		
	C10	L4,L5	C11	C10	L4,L5	C11	C10	L4,L5	C11
	[pF]	[nH]	[pF]	[pF]	[nH]	[pF]	[pF]	[nH]	[pF]
Maximum Flat Delay	5,31	38,20	34,69	1,33	9,55	8,67	0,66	4,75	4,32
Linear Phase	8,71	40,22	38,18	2,18	10,05	9,54	1,08	5,00	4,75
Gaussion	4,13	32,15	35,05	1,03	8,04	8,76	0,51	4,00	4,36
Advised values	5,6	39	33	1.2	10	8,2	0,68	4,7	4,7

2. General remarks

2.1 Cross section of multilayer PCB



2.2 Optical components

The board has been made adaptable for DIL and coax types optical components.

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3. Schematics

3.1 Overview

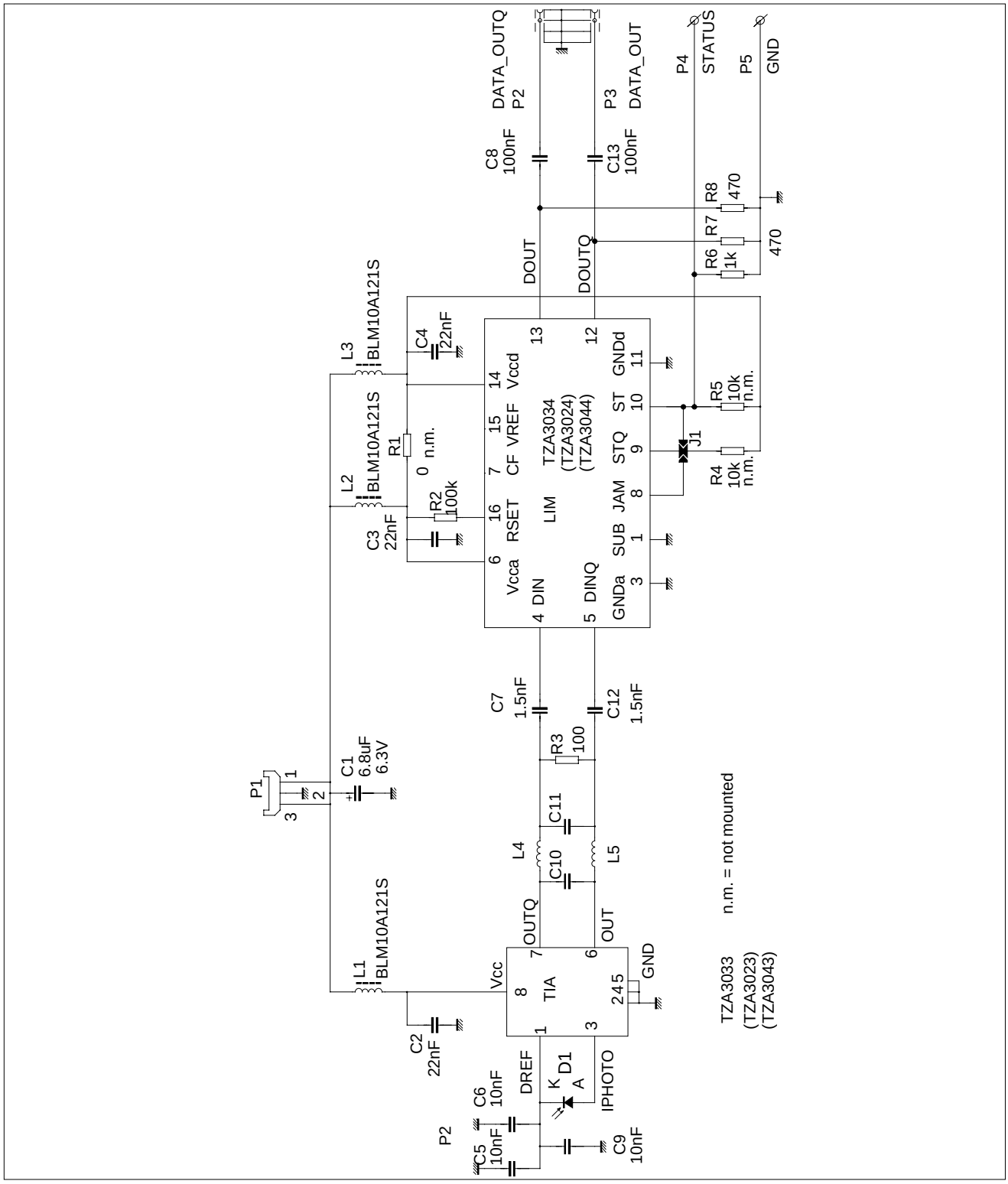

Fig.3 Schematics of OM5804

3.2 Description

Photodetector D1 is biased via the on-chip resistor/capacitor circuit of the transimpedance amplifier. External capacitors C5, C6 and C9 have been placed to give locally decoupling for different detector packages.

Either C5 or C6 or C9 needs to be mounted. Mount it as close as possible near the cathode of the used detector. See the layouts section for details.

The supply of the board is done via lowpass filters L1, C2 (transimpedance amplifier), L2, C3 (analog part of the limiter) and L3, C4 (output stage of the limiter). For both the inductors and the capacitors are low Q components used.

C1 is the central decoupling capacitor. All supply tracks are united at this component.

The noise filter consists of C10, L4, L5 and C11. The values are depending on the used datarate.

The filter is terminated differentially with 100 ohm. This to adapt it to the output of the transimpedance amplifier and to limit the signal strength at the input of the limiter.

C7 and C12 are low Q DC blocking capacitors, to enable the internal offset control of the limiter.

R2 is the threshold programming resistor.

R4 and R5 are biasing resistors for the status outputs of the limiter.

The JAM input can be enabled by connecting it to pin 9 via jumper J1.

The STatus can be read out on pins P4 ‘STATUS’.

The PECL output buffers are biased via 2 470 ohm resistors R6 and R7.

The PECL outputs are AC coupled to the SMA connectors via C5 and C9, which are low Q coupling capacitors.

4. Bill of materials

TABLE 4 Bill of materials, sorted after reference number.

	Partnumber	Value	Series	Vendor	Geom
	8222-411-47761	BOARDPR47761		PS-SLE	BOARD
C1	B45196E1685M9	6.8uF-20%-6.3V	B45196	SIEMENS	B45_b
C7			microwave	PHILIPS	C0603
C8			microwave	PHILIPS	C0603
C3	2222-787-16641	22nF-10%-16V	X7R	PHILIPS	C0402
C24	2222-787-16641	22nF-10%-16V	X7R	PHILIPS	C0402
C4	2222-787-16641	22nF-10%-16V	X7R	PHILIPS	C0402
C5	2222-787-16636	10nF-10%-16V	X7R	PHILIPS	C0402
C6	2222-787-16636	10nF-10%-16V	X7R	PHILIPS	C0402
C9	2222-787-16636	10nF-10%-16V	X7R	PHILIPS	C0402
C7	2222-587-16616	1.5nF-10%-50V	X7R	PHILIPS	C0402
C12	2222-587-16616	1.5nF-10%-50V	X7R	PHILIPS	C0402
C13	2222-786-16749	100nF-20%-16V	X7R	PHILIPS	C0603
C8	2222-786-16749	100nF-20%-16V	X7R	PHILIPS	C0603
D1	9922-155-07414	InGaAs analog detector		PHILIPS	TO46
IC1	PN-TZA3043	TZA3043		PHILIPS	SOT96
IC2	PN-TZA3044	TZA3044		PHILIPS	SOT109
L1	BLM10A121S	BLM10A121S	CBD	muRata	BLM10
L3	BLM10A121S	BLM10A121S	CBD	muRata	BLM10
L1	BLM10A121S	BLM10A121S	CBD	muRata	BLM10
L3			0603CS	Coilcraft	L0603cs
L2			0603CS	Coilcraft	L0603cs
P1	MKS3733-1-0-303	MKS3730_3p	MKS3730	STOCKO	MKS3730_3p
P2	142-0701-851	SMA_sqr	COAX	Johnson	SMA_sqr
P3	142-0701-851	SMA_sqr	COAX	Johnson	SMA_sqr
P5	2422-034-15068	SOLDER-PIN_small		PHILIPS	S_PIN_small
P4	2422-034-15068	SOLDER-PIN_small		PHILIPS	S_small
R1	2322-702-96001	n.m.	RC21	PHILIPS	R0603
R2	2322-705-70104	100k-5%-0.063W	RC31	PHILIPS	R0402
R3	2322-705-70101	100-5%-0.063W	RC31	PHILIPS	R0402
R4	2322-705-70103	n.m.	RC31	PHILIPS	R0402
R5	2322-705-70103	n.m.	RC31	PHILIPS	R0402
R6	2322-705-70102	1k-5%-0.063W	RC31	PHILIPS	R0402
R7	2322-705-70471	470-5%-0.063W	RC31	PHILIPS	R0402
R8	2322-705-70471	470-5%-0.063W	RC31	PHILIPS	R0402

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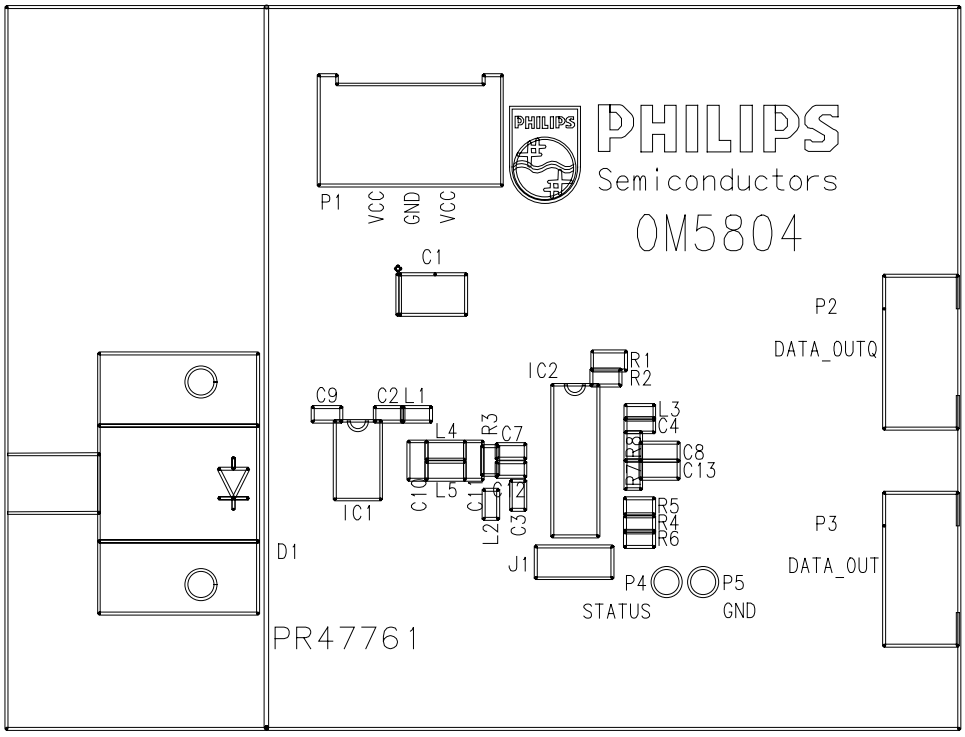
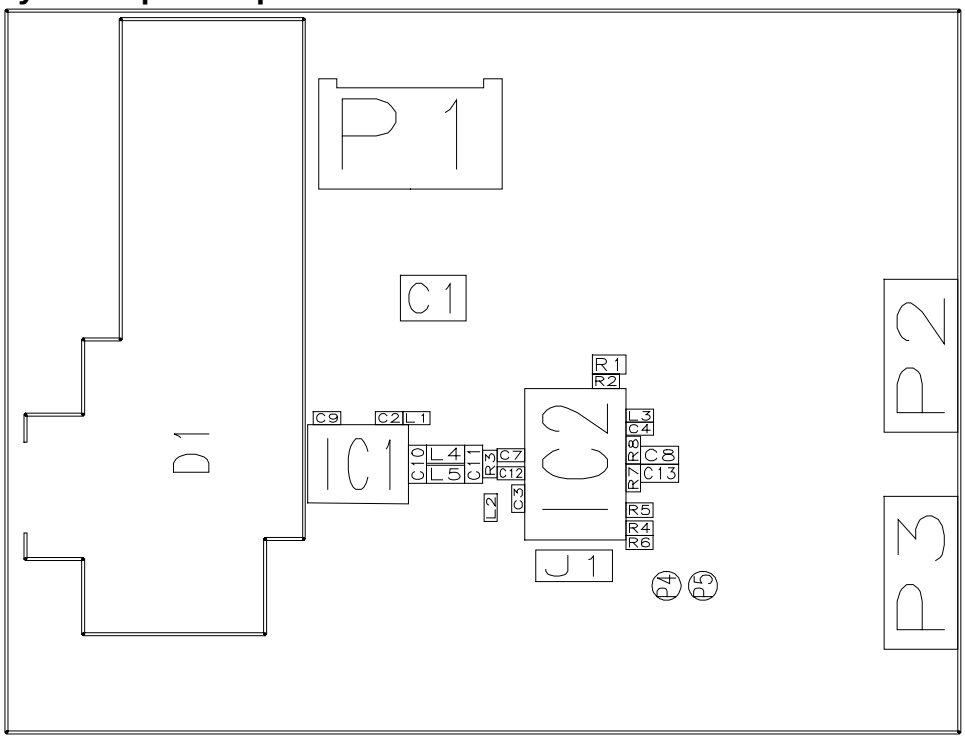
5. Layouts

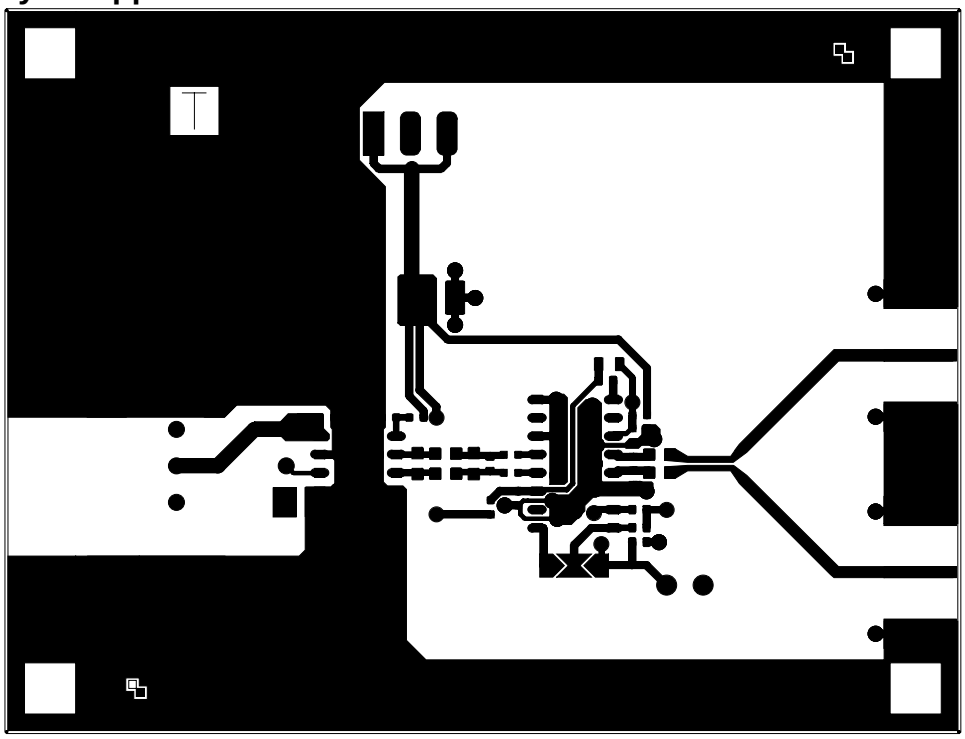
5.1 Silkscreen



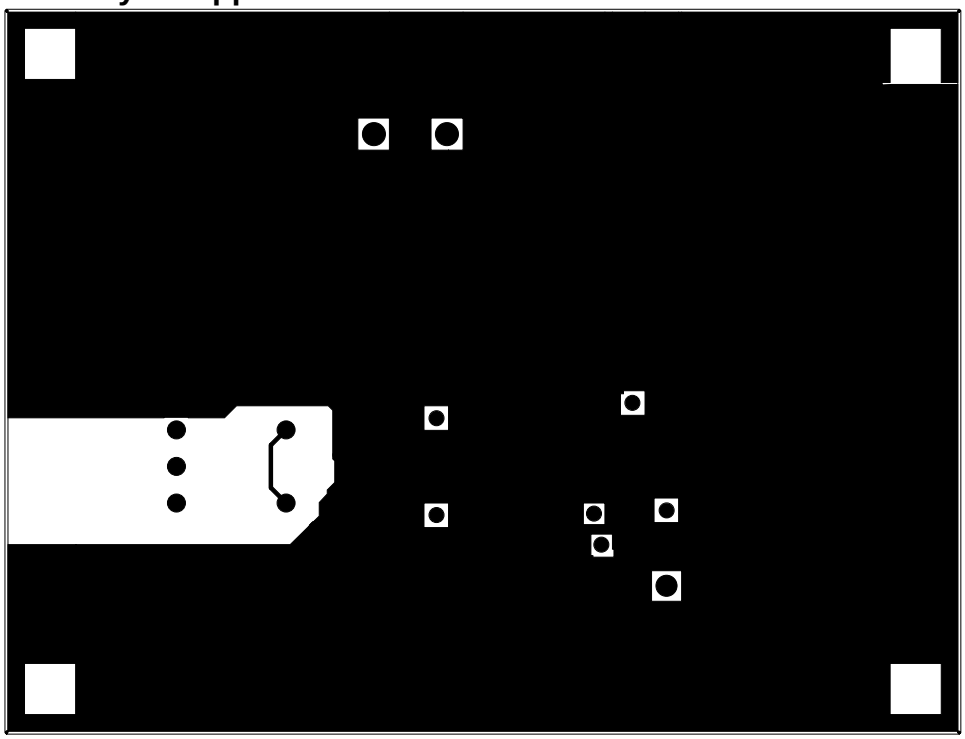
5.2 Top layer component placement



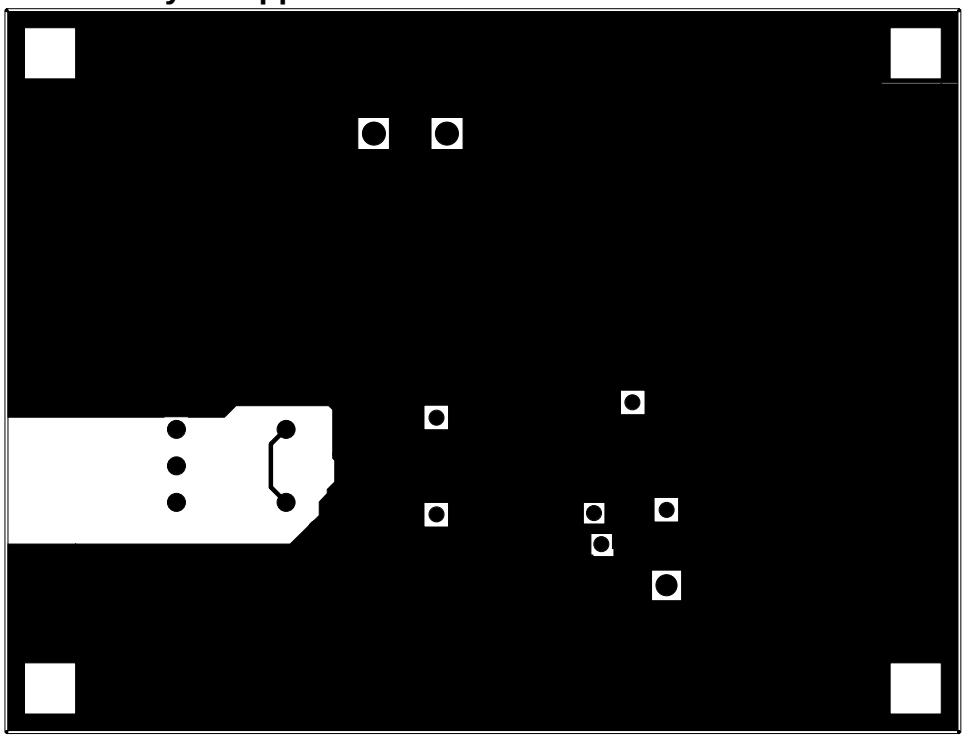
5.3 Top layer copper



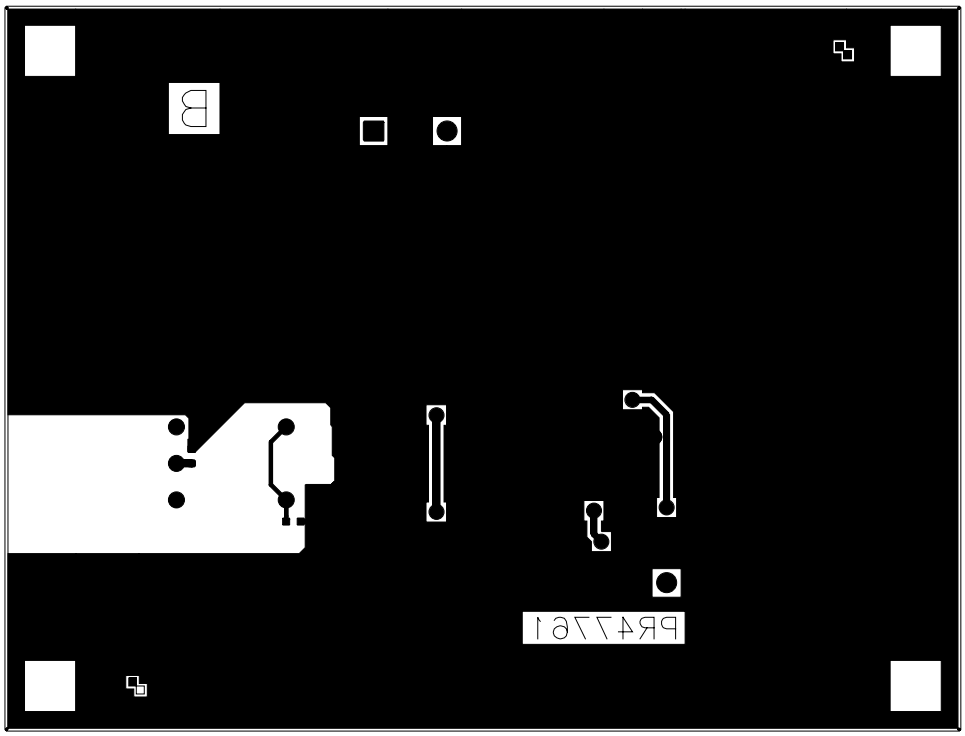
5.4 First inner layer copper



5.5 Second inner layer copper



5.6 Bottom layer copper, topview



5.7 Bottom layer component placement (topview)