APPLICATION NOTE

OM5803 Transimpedance amplifier demoboard for 155/622/1250 Mbps

AN98081

Philips
Semiconductors

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Abstract

A demoboard for 3 types of transimpedance amplifiers is described. The transimpedance amplifiers are TZA3033 (155 Mbps), TZA3023 (622 Mbps) and TZA3043 (1250 Mbps). The type number of the board is OM5803. Application information includes schematics and layouts.

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Introduction

This apnote is a short description of the OM5803 demoboard.

The OM5803 demoboard can be used to demonstrate the functionality of 3 different IC types:

TABLE 1 Supported ICs for demoboard OM5803

Datarate [Mbps]	IC type number
155	TZA3033
622	TZA3023
1250	TZA3043

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

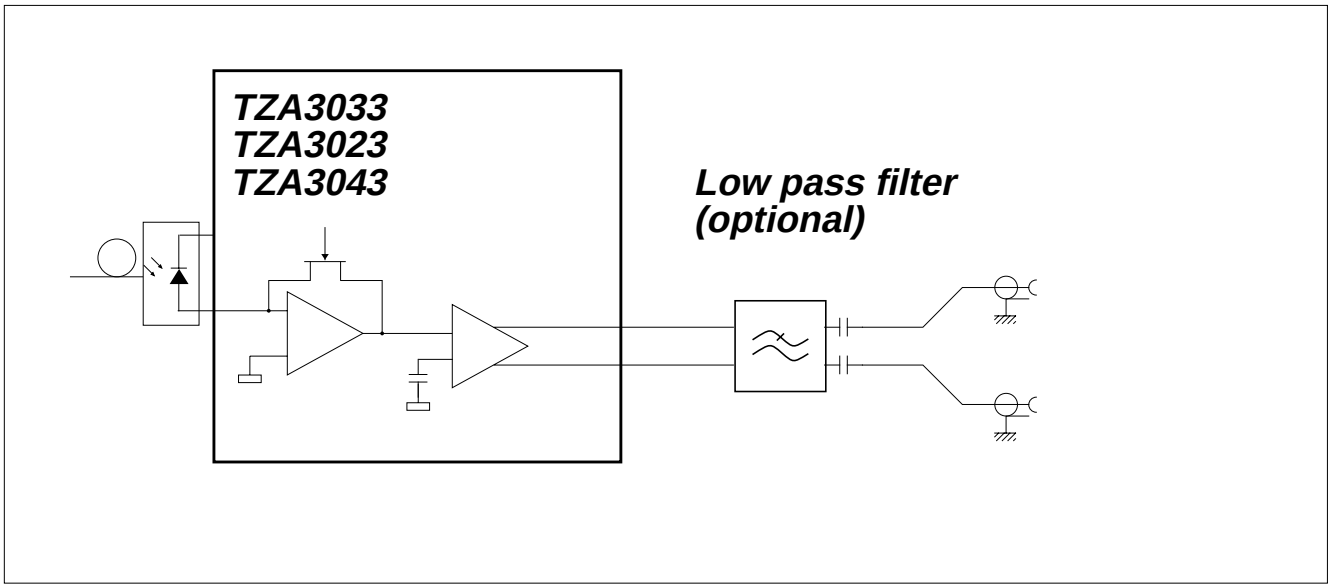


Fig.1 Block diagram of OM5803. The lowpass filter is optional. Standard, no filter is mounted

1.2 Which IC type?

The OM5803 demoboard can be used to demonstrate the functionality of 3 different IC types, which IC is depending on the preferred bitrate. A list of IC types is given below.

TABLE 2 Supported ICs for demoboard OM5803

Datarate [Mbps]	IC type number
155	TZA3033
622	TZA3023
1250	TZA3043

1.3 Lowpass filter

The lowpass filter is standard not mounted. The tracks have been prepared such that a 3rd order filter can be mounted. The schematic of the filter is shown below.

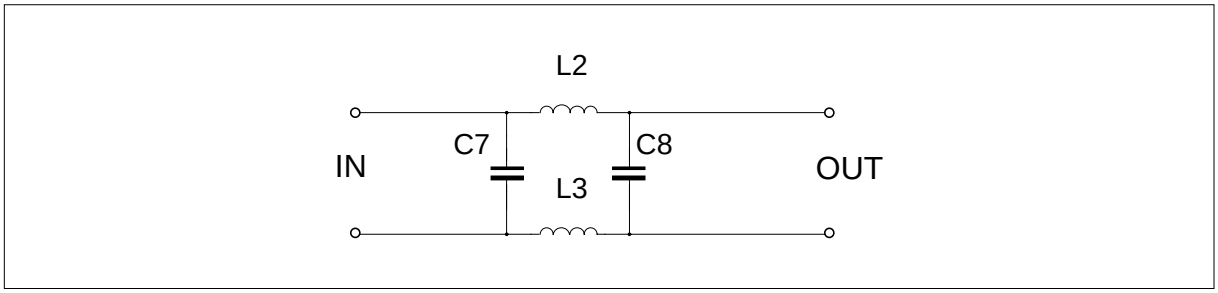


Fig.2 Optional lowpass filter.

The values of the filter depend on the datarate. 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		
	C7	L2,L3	C8	C7	L2,L3	C8	C7	L2,L3	C8
	[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

The tracks have to be cut at the places of the inductors. The place of this cut is shown in the figure below.

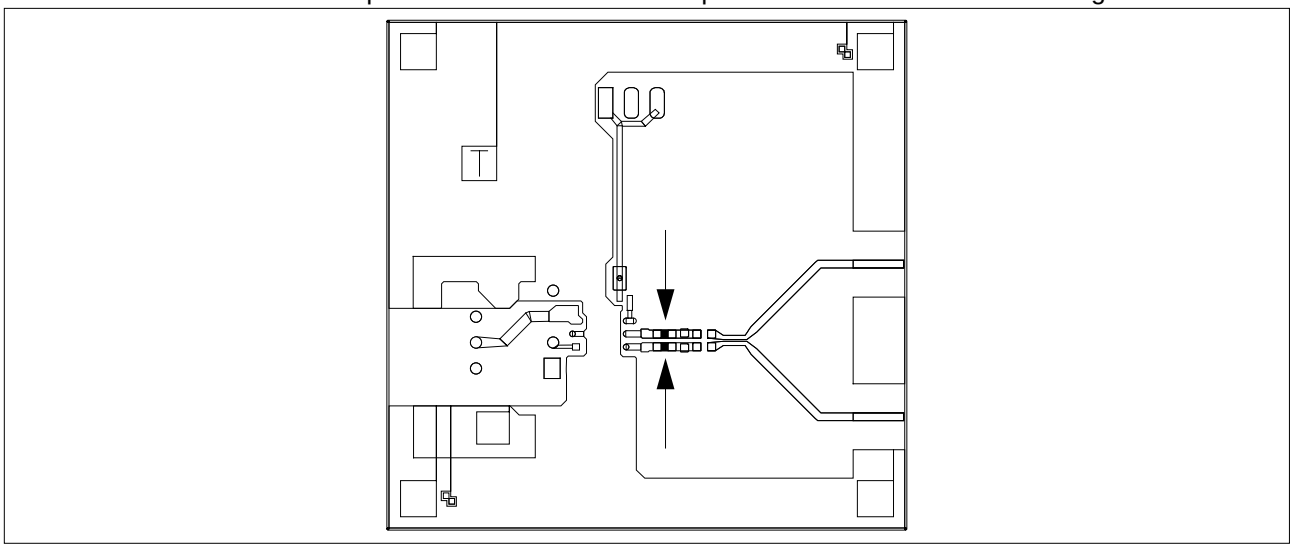
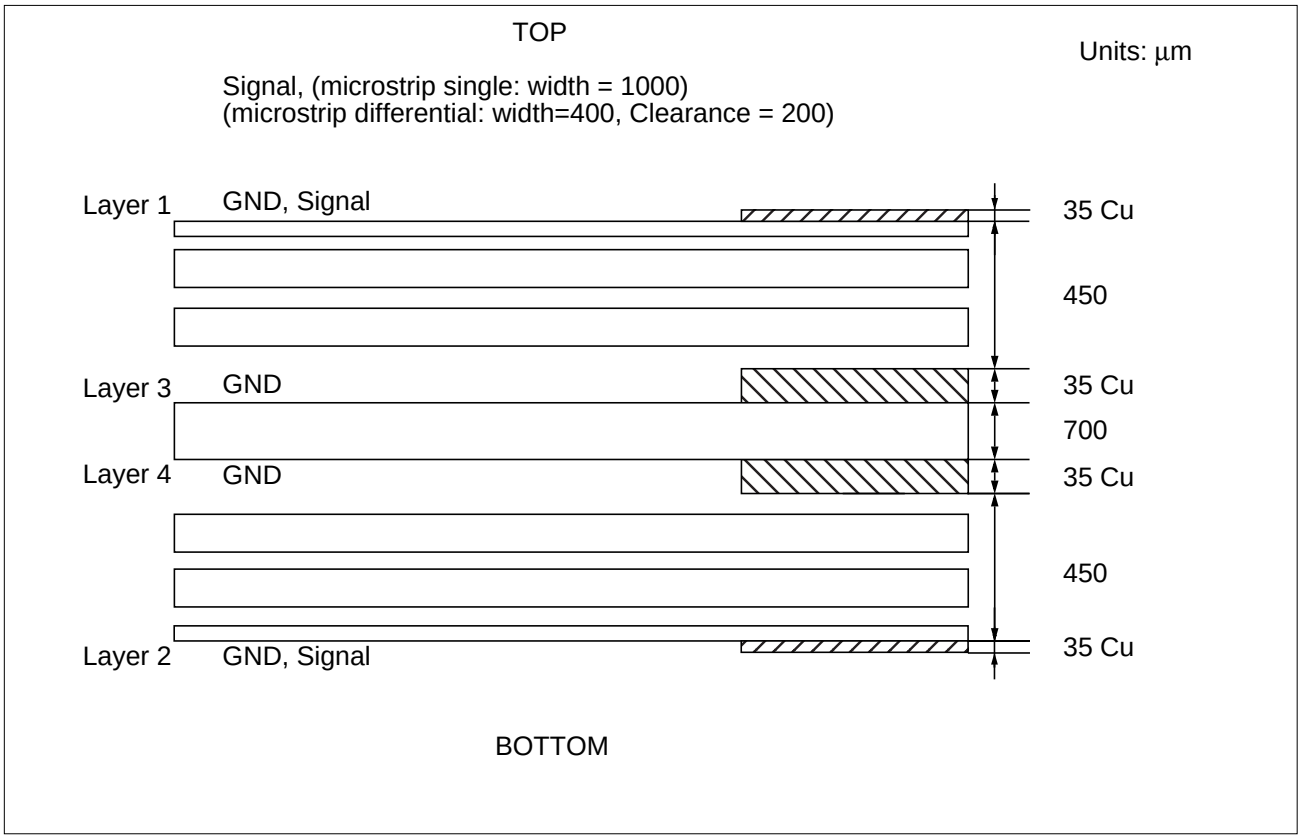


Fig.3 Places to cut the top layer copper to mount a lowpass filer.

2. General remarks

2.1 Cross section of multi layer 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

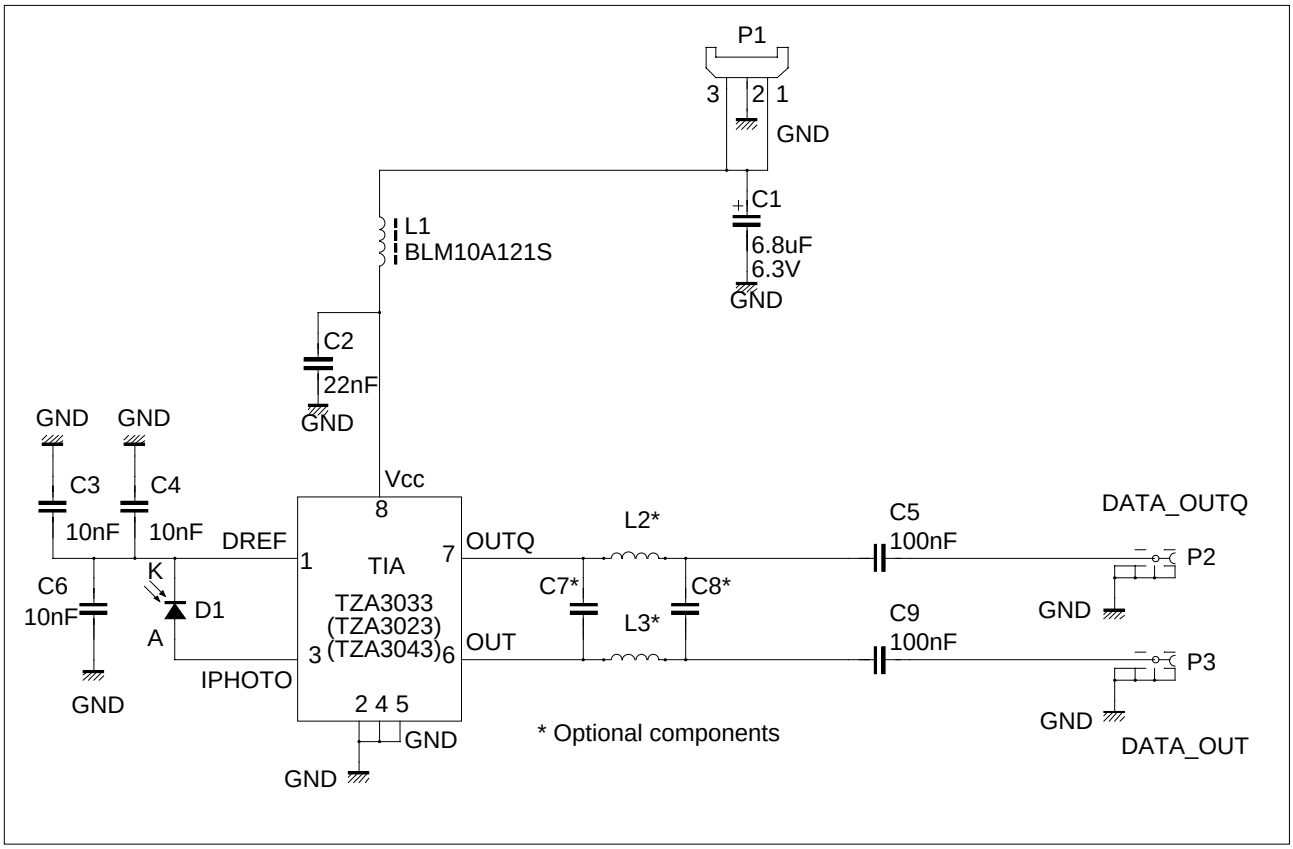

Fig.4 Schematics of the OM5803

3.2 Description

Photodetector D1 is biased via the on-chip resistor/capacitor circuit. External capacitors C3, C4 and C6 have been placed to give locally decoupling for different detector packages.

Either C3 or C4 or C6 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 transimpedance amplifier is decoupled with a lowpass network C1, L1, C2. For both the inductor and the capacitors are low Q components used.

The noise filter (C7, L2, L3 and C8) is laid out as an ‘option’: the tracks under L2 and L3 are connected, and the components are standard not mounted. The values are depending on the used datarate.

C5 and C9 are low Q coupling capacitors.

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4. Bill of materials

TABLE 4 Bill of materials, sorted after reference number.

REF	Partnumber	Value	Series	Vendor	
C1	B45196E1685M9	6.8uF-20%-6.3V	B45196	SIEMENS	B45_b
C2	2222-787-16641	22nF-10%-16V	X7R	PHILIPS	C0402
C6	2222-787-16636	10nF-10%-16V	X7R	PHILIPS	C0402
C4	2222-787-16636	10nF-10%-16V	X7R	PHILIPS	C0402
C6	2222-787-16636	10nF-10%-16V	X7R	PHILIPS	C0402
C5	2222-786-16749	100nF-20%-16V	X7R	PHILIPS	C0603
C9	2222-786-16749	100nF-20%-16V	X7R	PHILIPS	C0603
C7			microwave	PHILIPS	C0603
C8			microwave	PHILIPS	C0603
D1	9922-155-07414	InGaAs anlog detector		PHILIPS	TO46
IC1	PN-TZA3043	TZA3043			SOT96
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

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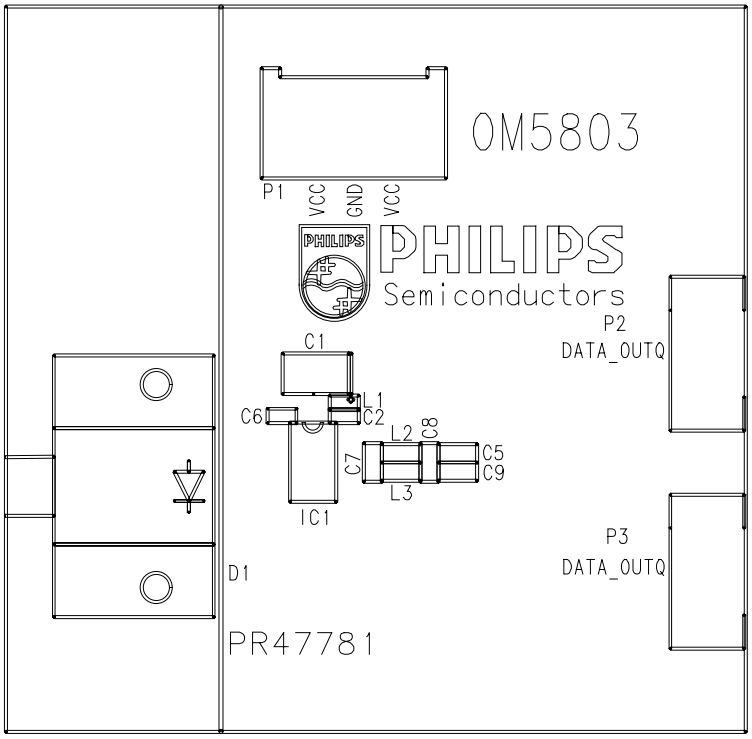
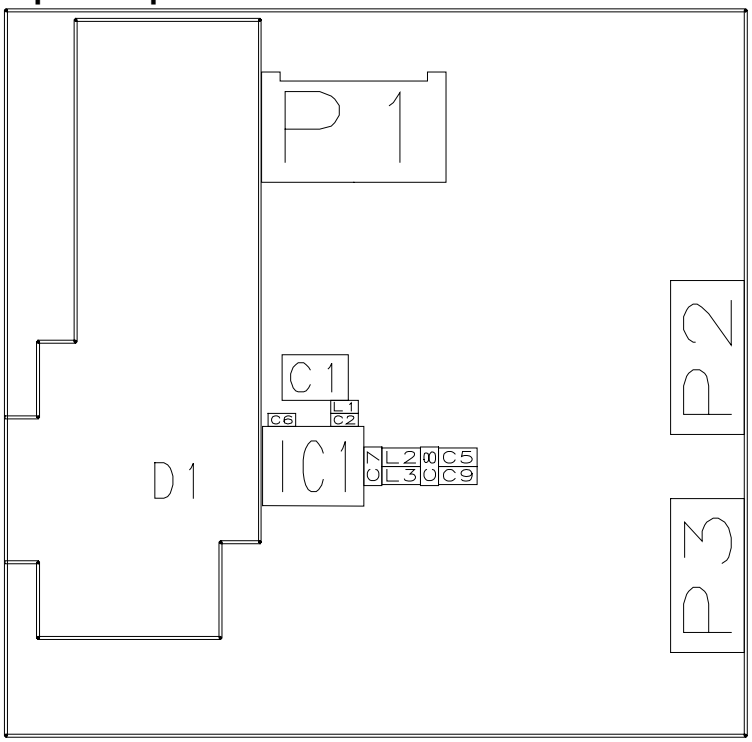
5. Layouts

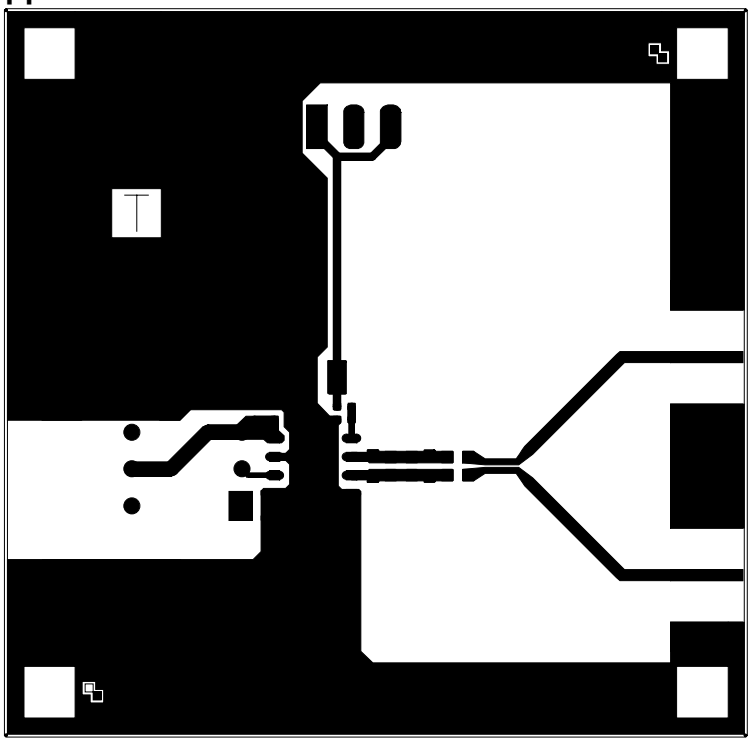
5.1 Silkscreen



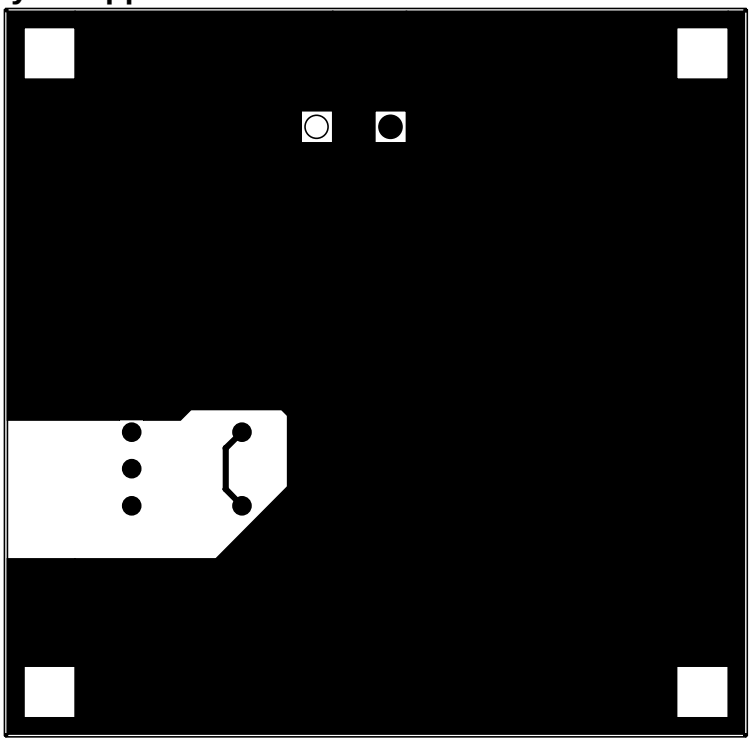
5.2 Top layer component placement



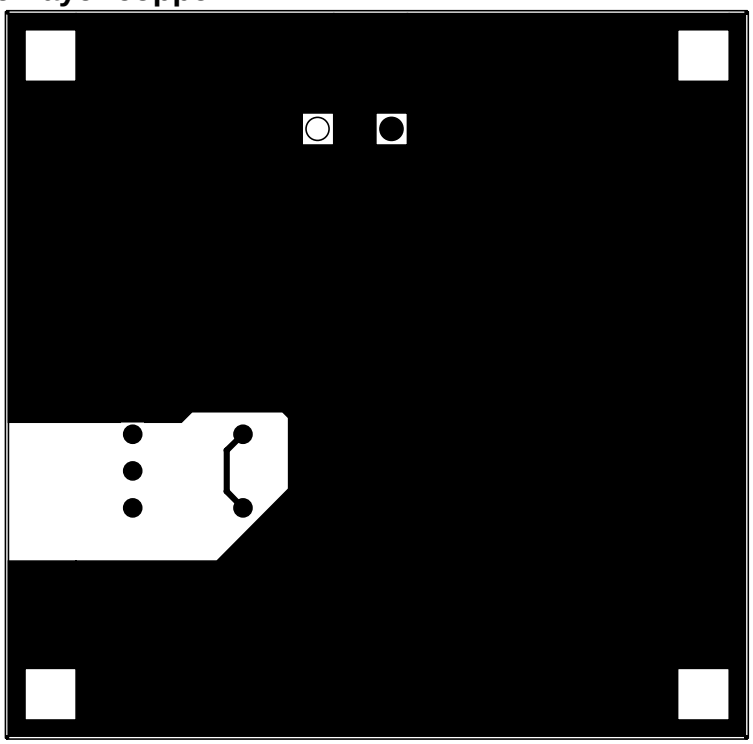
5.3 Top layer copper



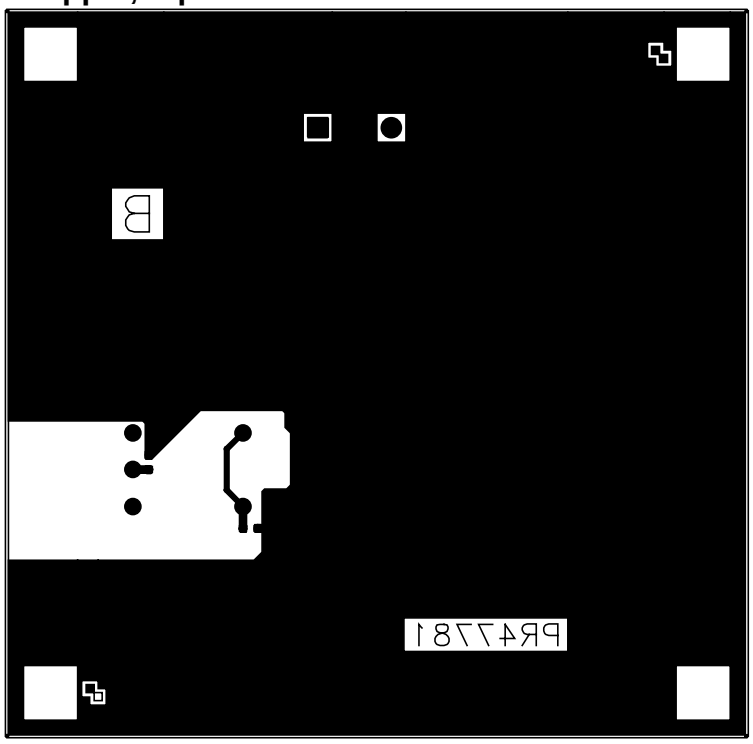
5.4 First inner layer copper



5.5 Second inner layer copper



5.6 Bottom layer copper, topview



5.7 Bottom layer component placement (topview)