Si321xPPQx-EVB

EVALUATION BOARD FOR THE Si3210/15/16 PROSLIC®

Description

This document describes the operation of the Silicon Laboratories ProSLIC® device evaluation platform. The devices supported by this document are the Si3210/15/16 and Si3210M/15M/16M; both Si3201 and discrete interface topologies are included. Schematics and layouts are provided for the various ProSLIC products. The ProSLIC evaluation platform is designed to provide observation of the ProSLIC's functionality. The ProSLIC platform consists of a ProSLIC motherboard, a device-specific daughter card, and the ProSLIC LINC™ software. The ProSLIC LINC software is a Windows®-based program that can run in Microsoft Windows environments.

Equipment requirements:

- PC running Windows NT, 2000, or XP
- 25-pin D male-male cable
- +5 V, 0.5 A power supply
- +3.3 V, 0.5 A power supply (optional)
- +12 V, 0.5 A power supply (Si3210, Si3215, Si3216)

Optional equipment:

- Balanced audio generator and analyzer
  (e.g., Audio Precision System 2 and/or HP TIMS set and/or Wandel and Goltermann PCM-4)
- 8 kHz PCM signal generator and analyzer
  (e.g., Audio Precision System 2 and Audio Precision SIA-2322 and/or Wandel and Goltermann PCM-4)

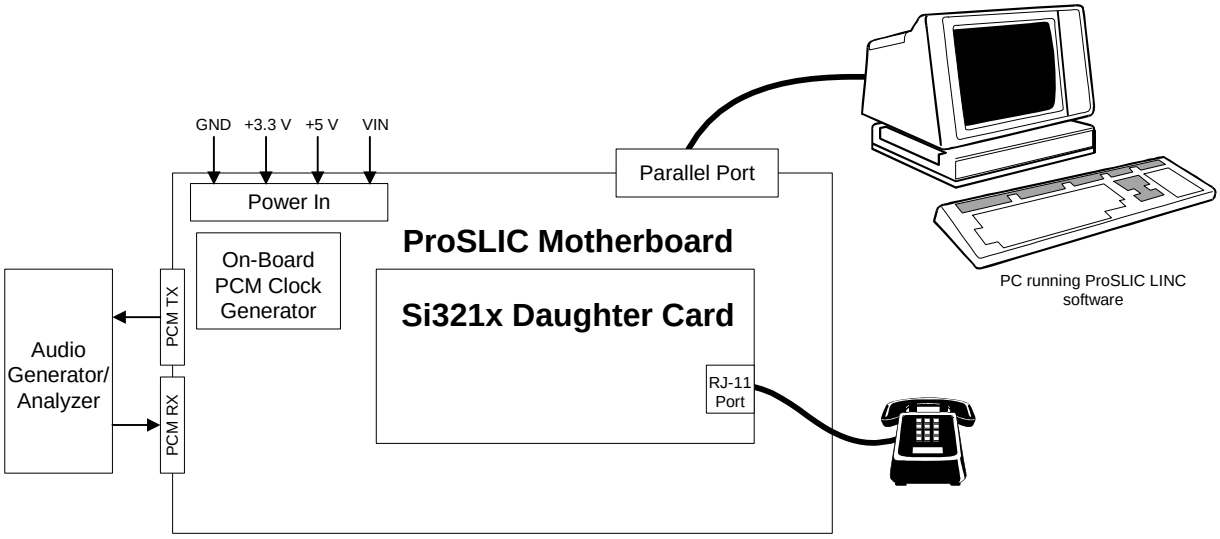
Features

- Silicon Laboratories ProSLIC device
- All components necessary for linecard implementation
- Selectable secondary protection
- Control I/O through standard Parallel Port
- On-board PCLK and FSYNC clock generation for stand-alone operation
- PCM I/O set up for Audio Precision System 2 or Wandel and Goltermann PCM-4
- Full access to PCM highway
- Multiple daughter cards may be stacked for multi-channel evaluation and daisy chain control
- ProSLIC power selection (3.3 or 5 V)

Related Documentation

- ProSLIC LINC™ User Guide

Functional Block Diagram



1. Introduction

The ProSLIC Si321x evaluation platform is a modular system consisting of a generic motherboard and one or more Si321x device-specific daughter cards. Using the EVB hardware and ProSLIC LINC™ software, one can easily configure, control, and monitor Si321x operation. Up to eight Si321x daughter cards may be stacked vertically and accessed using uniquely-assigned timeslots on the common PCM interface and the SPI in daisy-chain mode.

1.1. ProSLIC LINC evaluation software

The ProSLIC LINC software is an executable program that allows control and monitoring of the ProSLIC. It utilizes the primary LPT port of a standard PC to communicate to the ProSLIC's SPI port.

To install the software, insert the Silicon Laboratories ProSLIC CD into the computer. The setup routine can be invoked by running the setup.exe program in the root directory of the CD.

Invoking the ProSLIC LINC is achieved by double clicking the ProSLIC LINC icon. Refer to the ProSLIC LINC User Guide for software operation.

1.2. Si321xPPT-EVB ProSLIC Evaluation Board Description

Si321x EVB daughter cards currently supported by this hardware solution are listed in Table 1 along with supporting hardware schematics and layout references included in this data sheet.

Table 1. Supported Si321x EVB Daughter Cards

EVB Daughter Card Board Description	Schematic Figures	Layout Figures
Si3210/5/6 QFN with Si3201 integrated line interface	1, , 3	4, 5, 6
Si3210/5/6 QFN with discrete line interface	7, , 9	10, 11, 12
Si3210/5/6M QFN with Si3201 integrated line interface	13, 14, 15	16, 17, 18
Si3210/5/6M QFN with discrete line interface	19, 20, 21	22, 23, 24

Motherboard hardware schematics are found in Figures 25, 26, and 27.

All power and signal connections are made to the motherboard as described in Table 2.

Signal requirements for ProSLIC operation are PCLK, FS, and Serial IO. The ProSLIC motherboard has a local oscillator with a programmable logic device to provide the ProSLIC PCLK FS signals. The DIP switch (S2) sets the PCLK frequency and controls the FS enable. See Table 3 for S2 settings. Factory default setting is for a 2.048 MHz PCLK with F5 enabled. JP3 and JP4 select this internal clock source or an external PCM clock source. The ProSLIC motherboard has been designed to directly connect to an Audio Precision SIA-2322 Serial Interface Adapter through the 15 pin d-connectors, P2 and P3 (not installed). See Table 5 for the Audio Precision settings. The ProSLIC evaluation board has also been designed to interface with a Wandel and Goltermann PCM-4 through J8, J9, J10, and J11 (not installed). See Table 6 for PCM-4 settings. A header, J5 (not installed), allows access to the ProSLIC's PCM signals for connection to other PCM testing devices or an actual telephone system PCM bus. TIP and RING of the two wire analog interface is present at the RJ-11 connector, J1.

The ProSLIC evaluation board is voltage-programmable with specific jumper settings. JP1 selects 3 or 5 V ProSLIC operation. JP2 selects 3 or 5 V PCM source level compatibility. These should be placed on the expected setting. Table 4 shows a summary of JP1–4 settings.

Power is connected to the ProSLIC at J3 and J4, and supply connections are summarized in Table 1. The 5 V is always required for the buffers, U2 and U3, to interface to the parallel port. The ProSLIC can be powered from 5 V or 3 V with the placement of a jumper on JP1. The Protection Return connections on J6 are to be connected to an appropriate ground for TIP/RING fault testing. This return is tied to signal ground on board, although it has a dedicated trace for high-current conditions. Serial control of the ProSLIC is achieved by toggling select bits of a standard parallel port. The parallel port connection is available at P1 and J1.

The ProSLIC card can be daisy-chained by simply stacking the cards. Stack up to eight cards by aligning JS1–JS6 and pressing together. The ProSLIC LINC Software allows channel-specific commands by clicking the *Daisy Chain* button.

Table 2. Motherboard Power Connections J2, J3, J4

	Si321x	Si321xM
VBRING	NC	NC
VBHI	NC	NC
VBLO	NC	NC
GND		
GND	GND[1]	GND[1]
GND		
+3 V	+3.3 V[2]	+3.3 V[2]
+5 V	+5 V	+5 V
+VIN	+9 to 12 V[3]	+5 V[3]

Notes:
1. All three GND connection points are electrically connected on the board.
2. +3.3 V is only necessary if that is the desired VDD for operation. Si321x chooses +3.3 V or +5 V based on the SP1 of the motherboard (see schematic).
3. This may be changed based on application-specific circuits. Consult the dc-dc converter spreadsheet for other possible values.

1.3. ProSLIC Evaluation Board Setup

To prepare the ProSLIC evaluation board for use, perform the following steps:

1. Set power supplies to 3.3 V, 5 V, and 12 V.
2. With these supplies off, connect them to J3 and J4 corresponding to the silk screen designators.
3. Connect the PC's parallel port (LPT1) to P1 (or J1) using a 25-pin D male-to-male cable.
4. Select the on-board PCM clock source, or select an external PCM source, and connect an Audio Precision SIA-2322 to P2 and P3 or a Wandel and Goltermann PCM-4 to J8, J9, J10, and J11.
5. TIP/RING connection can be made from the RJ-11 to a phone or telephony test equipment.
6. Invoke the ProSLIC LINC software.
7. Turn the power supplies on and press the ProSLIC evaluation board reset button (S1).
8. Click the "Reinitialize" button in the ProSLIC LINC software panel

The ProSLIC is now ready to perform its linecard function.

Table 3. On-Board PCLK Settings (S2)

S2-1,2,3	S2-4	S2-5	S2-6	S2-7	S2-8
PCLK frequency	Unused	Unused	Unused	Unused	FS enable
0,0,0 = 8.192 MHz 0,0,1 = 4.096 MHz 0,1,0 = 2.048 MHz 0,1,1 = 1.024 MHz 1,x,x = 512 kHz	x	x	x	x	0 = FS disabled 1 = FS enabled
Note: 1 = on.					

Table 4. JP1–4 Settings

Jumper	Function	Jumper Location		Default Factory Setting
		1–2	2–3	
JP1	VDD Level Select	+3 V	+5 V	1–2
JP2	VPCM Level Select	+3 V	+5 V	2–3
JP3	FSYNC Level Select	Internal	External	1–2
JP4	PCLK Source Select	Internal	External	1–2

Table 5. Audio Precision SIA-2322 DIP Switch Setting

Receiver Mode				Transmitter Mode			
00111001	00000010	11111101	01111001	0000001	00000010	11111101	01111001
Note: 256 kHz PCLK and 8 kHz FS.							

Table 6. Wandel and Goltermann PCM-4 Settings

General Configuration	2.14
General Configuration	3.13
General Configuration	4.13
For µ-law Add the Following:	
General Configuration	7.12
General Configuration	7.22

2. Schematics

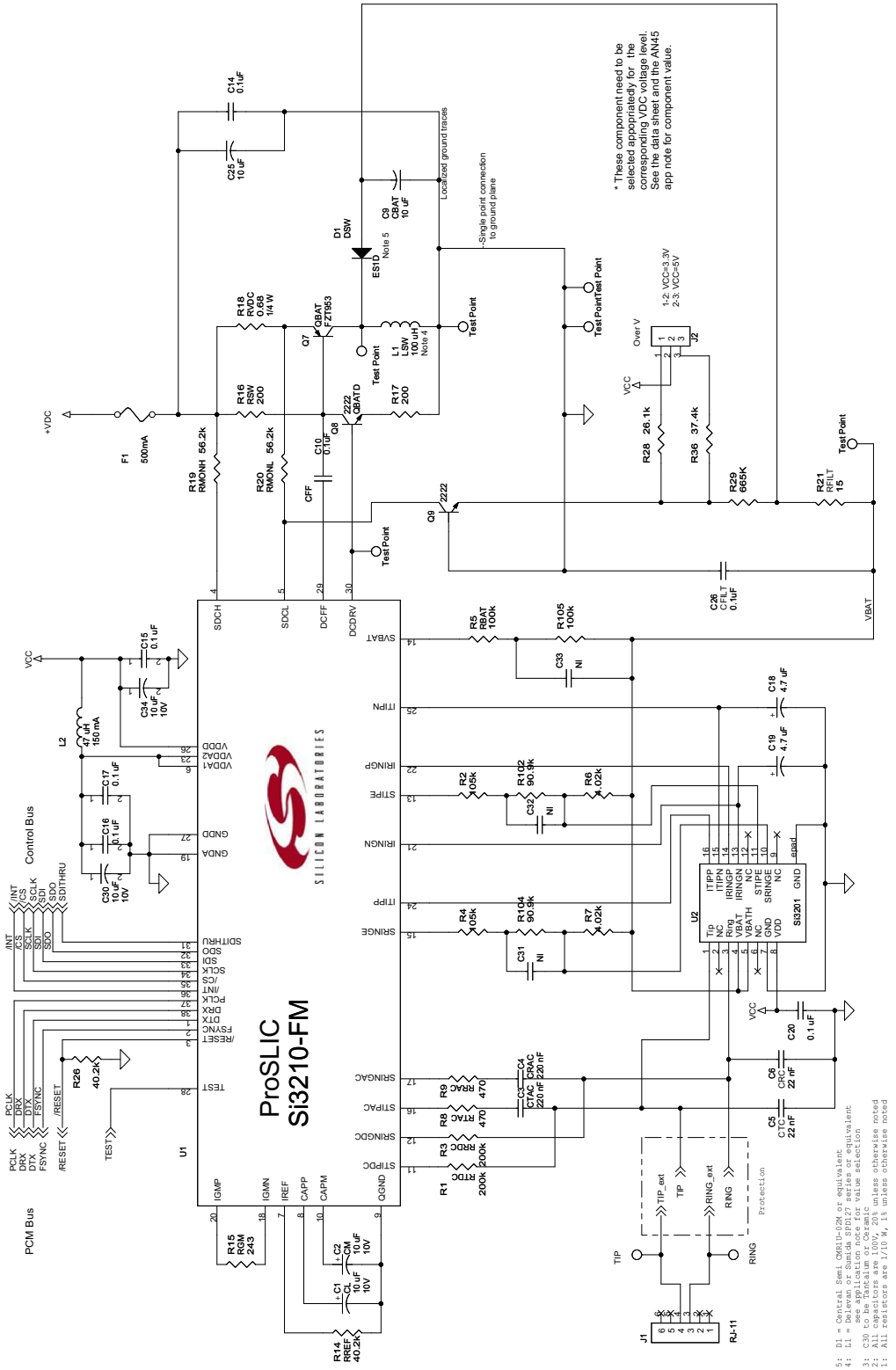


Figure 1. Si321x QFN with Si3201 Schematic (1 of 3)

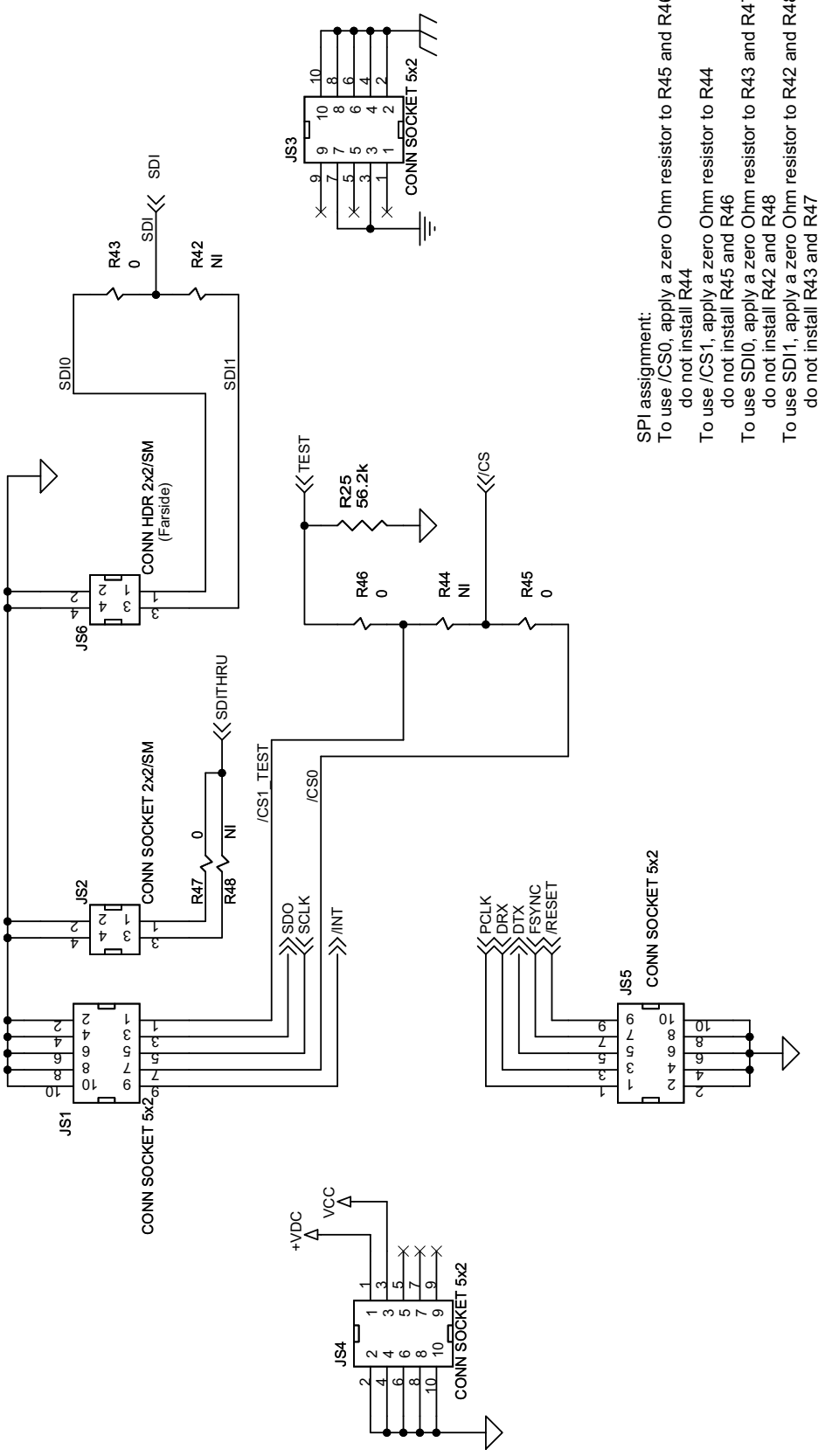


Figure 2. Si321x QFN with Si3201 Schematic (2 of 3)

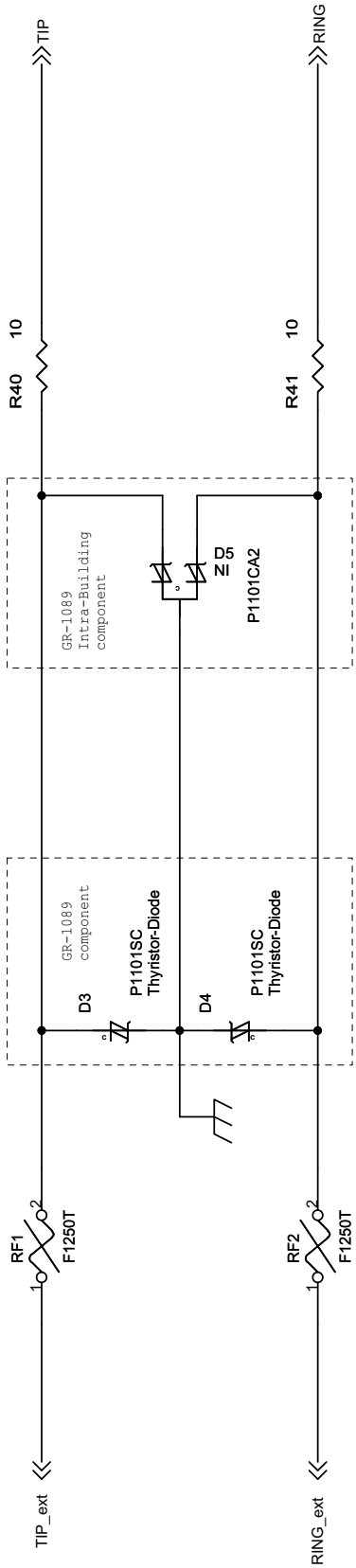


Figure 3. Si321x QFN with Si3201 Schematic (3 of 3)

3. Si321x-FM-DC1 Bill of Materials

Table 7. Si321x-FM-DC1 Bill of Materials

Item	Qty	Ref	Value	Rating	Tol	Dielectric	PCB Footprint	Mfr Part Number	Mfr
1	4	C1,C2, C30,C34	10 µF	10 V	±20%	X7R	1206	C1206X7R100-106MNE	Venkel
2	2	C3,C4	220 nF	100 V	±20%	X7R	1812	18121C224MATA	AVX
3	2	C5,C6	22 nF	100 V	±20%	X7R	1206	12061C223MATA	AVX
4	2	C9,C25	10 µF	100 V	±20%	Elec	C100[6238]6 .3MMR	ECA-2AM100	Pana-sonic
5	3	C10,C14, C26	0.1 µF	100 V	±20%	X7R	1206	12061C104MATA	AVX
6	4	C15,C16, C17,C20	0.1 µF	16 V	±20%	X7R	0603	0603YC104MATA	AVX
7	2	C18,C19	4.7 µF	16 V	±20%	X7R	1206	C1206X7R160-475MNE	Venkel
10	1	D1	ES1D				DO-214	ES1D	Central Semi
11	2	D3,D4	Thyristor-Diode				DO-214	P1101SC	Littelfuse
12	1	F1	500 mA				F1206[60X6 0]	SSQ 500	Bel Fuse Inc.
13	4	JS1,JS3, JS4,JS5	SOCKET 5x2				CONN2X5-SSQ	SSQ-1-05-24-F-D	Samtec
14	1	JS2	SOCKET 2x2/SM				CONN2X2-100-SSM	SSM-102-L-DV-TR	Samtec
15	1	JS6	HDR 2x2/ SM				CONN2X2-100-TSM	TSM-102-02-T-DV	Samtec
16	1	J1	RJ-11				RJ11-6-SMT	555077-2	AMP
17	1	J2	HEADER 3X1				CONN-1X3	2303-6111TN	3M
18	1	L1	100 µH	1.7 A			IND[220X15 0]SPD	SPD127-104	API Delevan
19	1	L2	47 µH	150 mA			IND-NLC3225	NLC322522T-470K	TDK
20	1	Q7	FZT953				SOT-223	FZT953	Zetex
21	2	Q8,Q9	2222				SOT-23	MMBT2222	Motorola
22	2	RF1,RF2	TeleLink				F350[145X1 57]	F1250T	Littelfuse
23	2	R1,R3	200 kΩ	1/10 W	±1%		0805	CR0805-10W-2003FT	Venkel
24	2	R2,R4	105 kΩ	1/10 W	±1%		0805	CR0805-10W-1053FT	Venkel
25	2	R5,R105	100 kΩ	1/10 W	±1%		0805	CR0805-10W-1003FT	Venkel
26	2	R6,R7	4.02 kΩ	1/10 W	±1%		0805	CR0805-10W-4021FT	Venkel

Table 7. Si321x-FM-DC1 Bill of Materials (Continued)

Item	Qty	Ref	Value	Rating	Tol	Dielectric	PCB Footprint	Mfr Part Number	Mfr
27	2	R8,R9	470 Ω (Si3210-FM)	1/10 W	±1%		0805	CR0805-10W-4700FT	Venkel
			4.7 kΩ (Si3215-FM)					CR0805-10W-4701FT	
			4.7 kΩ (Si3216-FM)					CR0805-10W-4701FT	
28	2	R14,R26	40.2 kΩ	1/10 W	±1%		0805	CR0805-10W-4022FT	Venkel
29	1	R15	243 Ω	1/10 W	±1%		0805	CR0805-10W-2430FT	Venkel
30	2	R16,R17	200 Ω	1/10 W	±5%		0805	CR0805-10W-201JT	Venkel
31	1	R18	0.68 Ω	1/4 W	±5%		1206	CR1206-4W-R68JT	Venkel
32	3	R19,R20, R25	56.2 kΩ	1/10 W	±1%		0805	CR0805-10W-5622FT	Venkel
33	1	R21	15 Ω	1/10 W	±1%		0805	CR0805-10W-15R0FT	Venkel
34	1	R28	26.1 kΩ	1/10 W	±1%		0805	CR0805-10W-2612FT	Venkel
35	1	R29	665 kΩ	1/10 W	±1%		0805	CR0805-10W-6653FT	Venkel
36	1	R36	37.4 kΩ	1/10 W	±1%		0805	CR0805-10W-3742FT	Venkel
37	2	R40,R41	10 Ω	1/10 W	±1%		0805	CR0805-10W-10R0FT	Venkel
38	4	R43,R45, R46,R47	0 Ω	1/10 W	±1%		0805	CR0805-10W-0000FT	Venkel
39	2	R102,R104	90.9 kΩ	1/10 W	±1%		0805	CR0805-10W-9092FT	Venkel
40	3	GND, TIP, RING	Test Point					151-205	Mouser
41	1	U1	Si3210-FM				MLF38N5X7 -0.5P	Si3210-FM Rev E	Silabs
			Si3215-FM				MLF38N5X7 -0.5P	Si3215-FM Rev C	
			Si3216-FM				MLF38N5X7 -0.5P	Si3216-FM Rev C	
42	1	U2	Si3201				SOIC16	Si3201-FS Rev E	Silabs
Not Installed Components									
43	3	C31,C32, C33							
44	1	D5	P1101CA2	95 V			DO-214AA-3	P1101CA2	Teccor
45	3	R42,R44, R48							

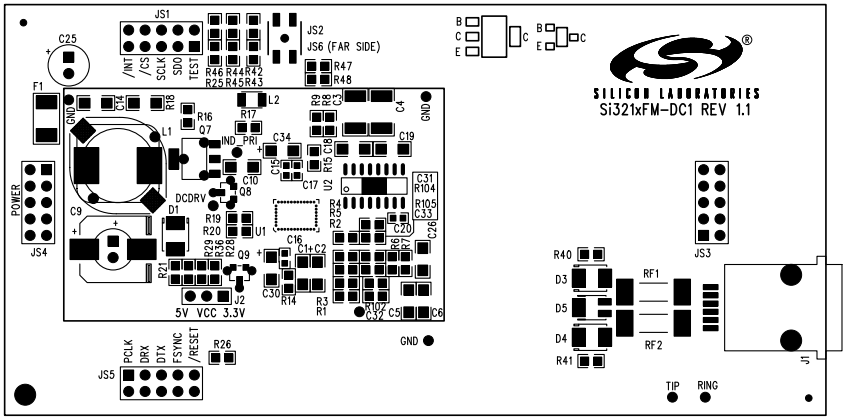


Figure 4. Si321xFM-DC1-EVB with Si3201 Primary Assembly

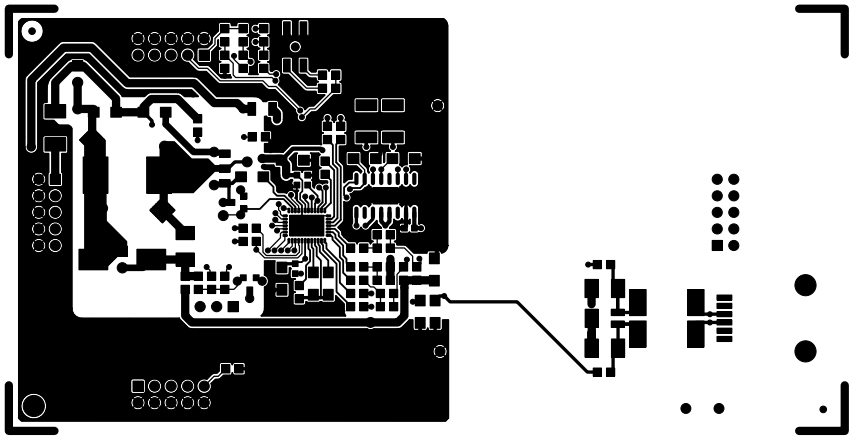


Figure 5. Si321xFM-DC1-EVB with Si3201 Primary Side

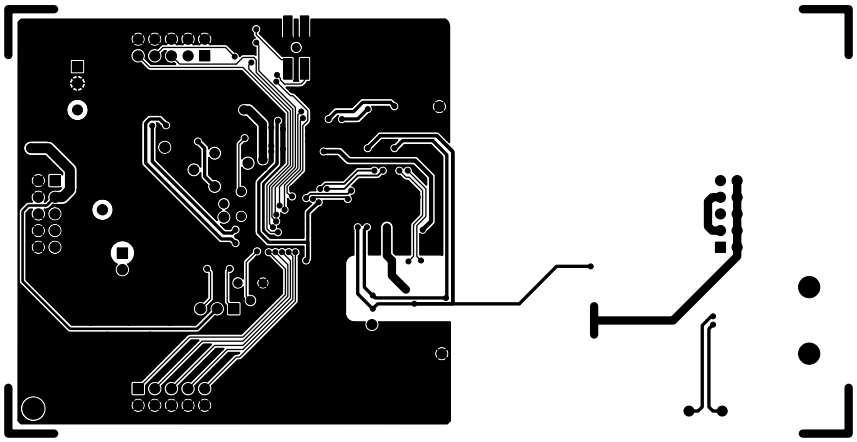


Figure 6. Si321xFM-DC1-EVB with Si3201 Secondary Side

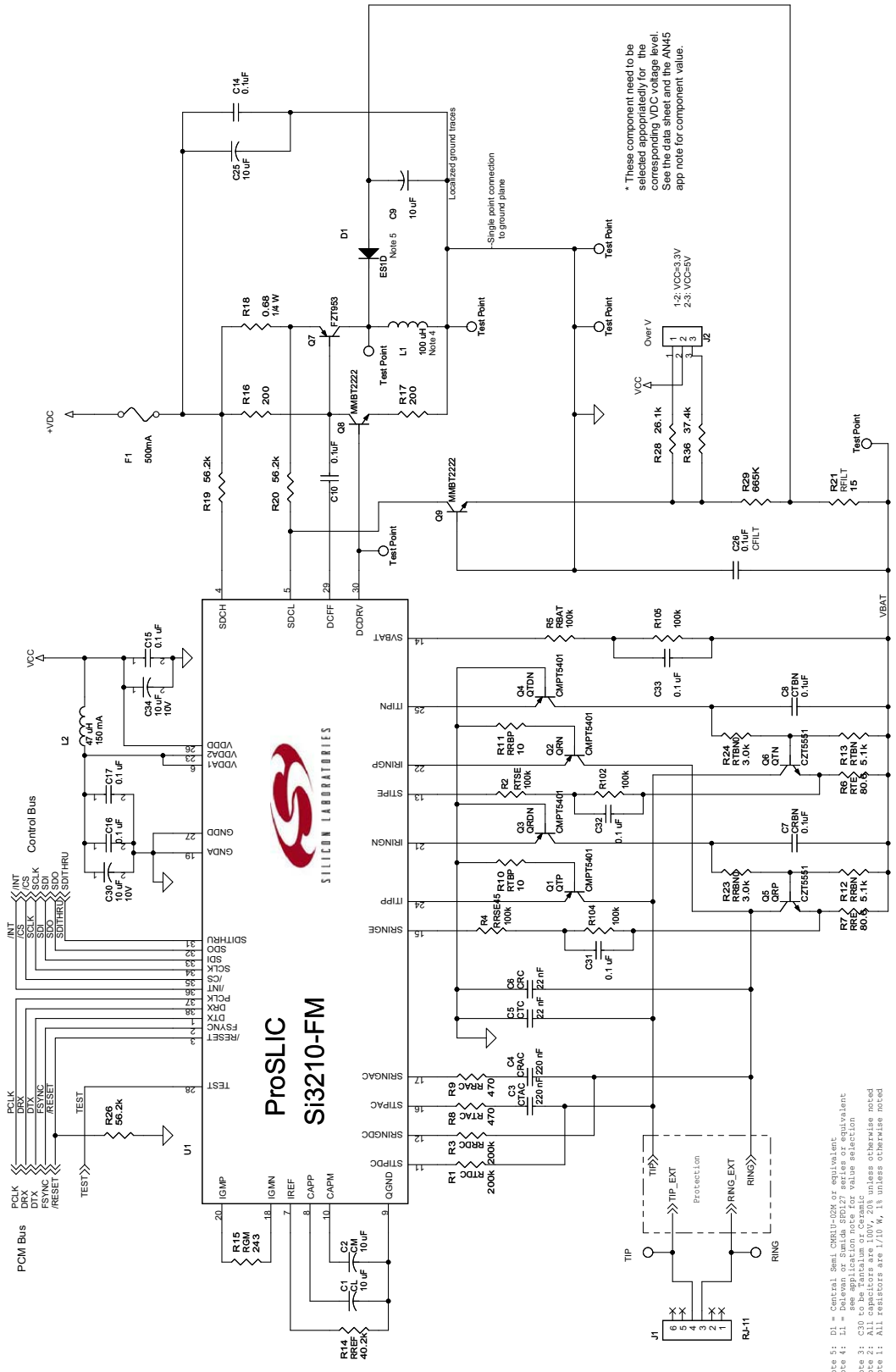


Figure 7. Si321x QFN with Discrete Evaluation Circuit (1 of 3)

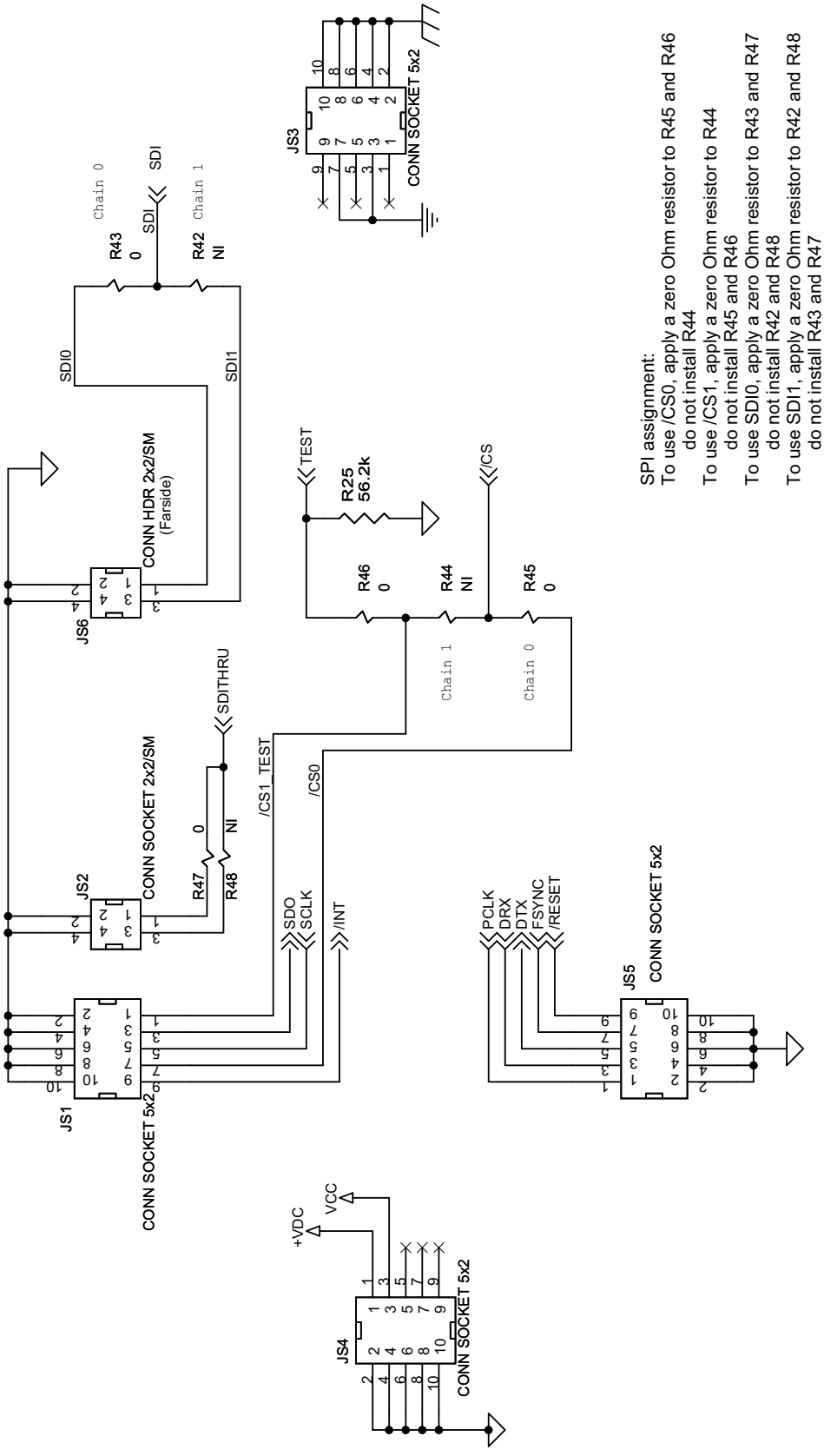


Figure 8. Si321x QFN with Discrete Evaluation Circuit (2 of 3)

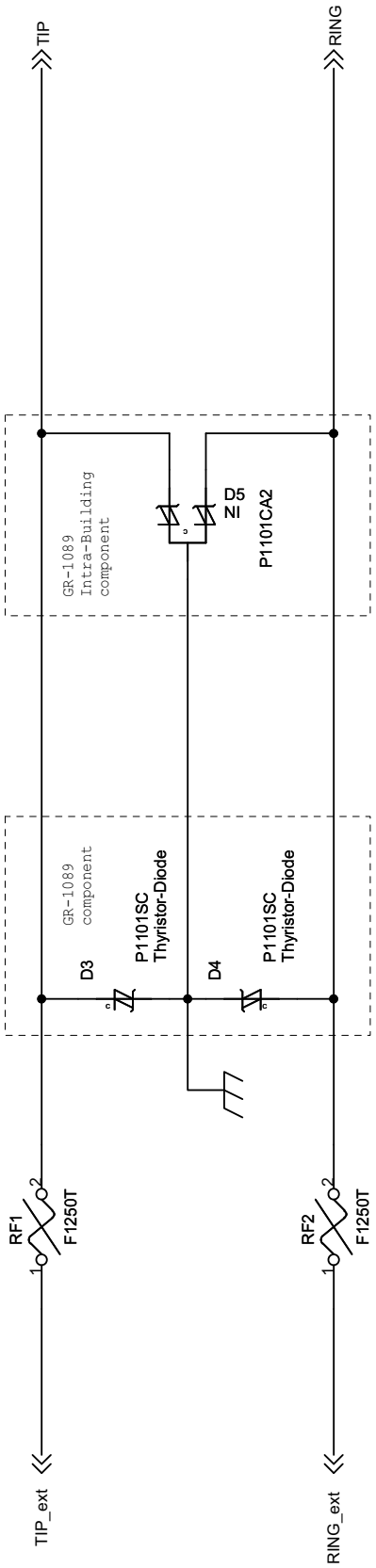


Figure 9. Si321x QFN with Discrete Evaluation Circuit (3 of 3)

4. Si321x-FM-DCX Bill of Materials

Table 8. Si321x-FM-DCX Bill of Materials

Item	Qty	Ref	Value	Rating	Tol	Dielectric	PCB Footprint	Mfr Part Number	Mfr
1	4	C1,C2, C30,C34	10 µF	10 V	±20%	X7R	CC1206	C1206X7R100-106MNE	Venkel
2	2	C3,C4	220 nF	100 V	±20%	X7R	CC1812	C1210X7R101-224MNER	Venkel
3	2	C5,C6	22 nF	100 V	±20%	X7R	CC1206	12061C223MATA	AVX
4	5	C7,C8,C10, C14,C26	0.1 µF	100 V	±20%	X7R	CC1206	12061C104MATA	AVX
5	2	C9,C25	10 µF	100 V	±20%	Elec	C100[6238] 6.3MMR	ECA-2AM100	Pana-sonic
6	3	C15,C16, C17	0.1 µF	16 V	±20%	X7R	CC0603	0603YC104MATA	AVX
7	3	C31,C32, C33	0.1 µF	50 V	±20%	X7R	CC0805	C0805X7R500-104MNER	Venkel
8	1	D1	ES1D				DO-214AA-REV	ES1D	Central Semi
9	2	D3,D4	Thyristor-Diode				DO-214AA-REV	P1101SC	Littelfuse
10	1	F1	500 mA				F2410-SSQ	SSQ 500	Bel Fuse Inc.
11	4	JS1,JS3, JS4,JS5					CONN2X5-SSQ	SSQ-1-05-24-F-D	Samtec
12	1	JS2					CONN2X2-100-SSM	TSM-102-02-T-DV	Samtec
13	1	JS6					CONN2X2-100-TSM	SSM-102-L-DV-TR	Samtec
14	1	J1	RJ-11				RJ11-6-SMT	555077-2	AMP
15	1	J2	HEADER 3X1				CONN-1X3	2303-6111TN	3M
16	1	L1	100 µH	1.7 A			IND[220X150]SPD	SPD127-104	API Delevan
17	1	L2	47 µH	150 mA			IND-NLC3225	NLC322522T-470K	TDK
18	4	Q1,Q2, Q3,Q4	CMPT5401				SOT-23	CMPT5401	Central Semi
19	2	Q5,Q6	CZT5551				SOT-223	CZT5551	Central Semi
20	1	Q7	FZT953				SOT-223	FZT953	Zetex
21	2	Q8,Q9	MMBT2222				SOT-23	MMBT2222	On Semi
22	2	RF1,RF2	F1250T				F350 [145X157]	F1250T	Littelfuse
23	2	R1,R3	200 kΩ	1/10 W	±1%		RC0805	CR0805-10W-2003FT	Venkel

Table 8. Si321x-FM-DCX Bill of Materials (Continued)

Item	Qty	Ref	Value	Rating	Tol	Dielectric	PCB Footprint	Mfr Part Number	Mfr
24	6	R2,R4,R5, R102, R104,R105	100 kΩ	1/10 W	±1%		RC0805	CR0805-10W-1003FT	Venkel
25	2	R6,R7	80.6 Ω	1/4 W	±1%		RC1210	CR1210-4W-80R6FT	Venkel
26	2	R8,R9	470 Ω (Si3210-FM)	1/10 W	±1%		RC0805	CR0805-10W-4700FT	Venkel
			4.7 kΩ (Si3215-FM)					CR0805-10W-4701FT	
			4.7 kΩ (Si3216-FM)					CR0805-10W-4701FT	
27	2	R10,R11	10 Ω	1/10 W	±5%		RC0805	CR0805-10W-100JT	Venkel
28	2	R12,R13	5.1 kΩ	1/10 W	±5%		RC0805	CR0805-10W-512JT	Venkel
29	1	R14	40.2 kΩ	1/10 W	±1%		RC0805	CR0805-10W-4022FT	Venkel
30	1	R15	243 Ω	1/10 W	±1%		RC0805	CR0805-10W-2430FT	Venkel
31	2	R16,R17	200 Ω	1/10 W	±5%		RC0805	CR0805-10W-201JT	Venkel
32	1	R18	0.68 Ω	1/4 W	±5%		RC1206	CR1206-4W-R68JT	Venkel
33	4	R19,R20, R25,R26	56.2 kΩ	1/10 W	±1%		RC0805	CR0805-10W-5622FT	Venkel
34	1	R21	15 Ω	1/10 W	±1%		RC0805	CR0805-10W-15R0FT	Venkel
35	2	R23,R24	3.0 kΩ	1/10 W	±5%		RC0805	CR0805-10W-302JT	Venkel
36	1	R28	26.1 kΩ	1/10 W	±1%		RC0805	CR0805-10W-2612FT	Venkel
37	1	R29	665 kΩ	1/10 W	±1%		RC0805	CR0805-10W-6653FT	Venkel
38	1	R36	37.4 kΩ	1/10 W	±1%		RC0805	CR0805-10W3742FT	Venkel
39	4	R43,R45, R46,R47	0 Ω	1/16 W	±1%		RC0805	CR0805-16W-0000FT	Venkel
40	3	GND, TIP, RING	Test Point					151-205	Mouser
41	1	U1	Si3210-FM				MLF38N 5X7-0.5P	Si3210-FM Rev E	Silabs
			Si3215-FM					Si3215-FM Rev C	
			Si3216-FM					Si3216-FM Rev C	
Not Installed Components									
41	1	D5	NI	95 V			DO-214AA-3	P1101CA2	Teccor
42	3	R42,R44, R48	NI						

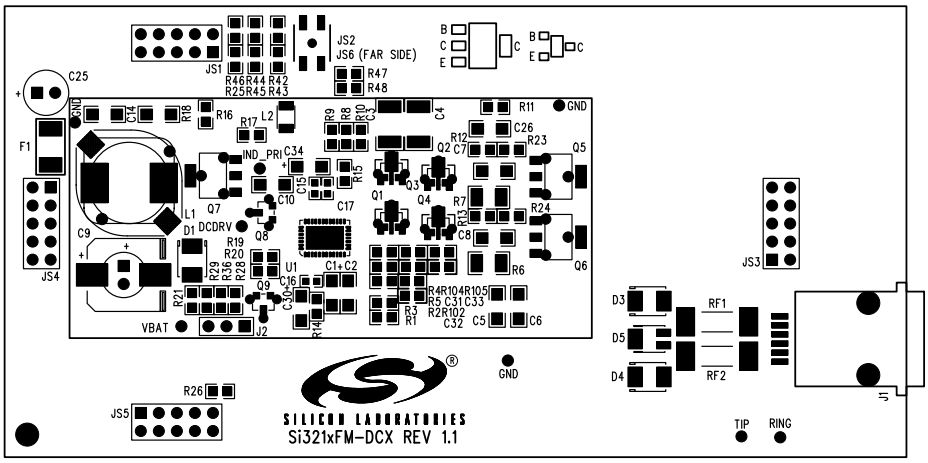


Figure 10. Si321xFM-DCX-EVB with Discretes Primary Assembly

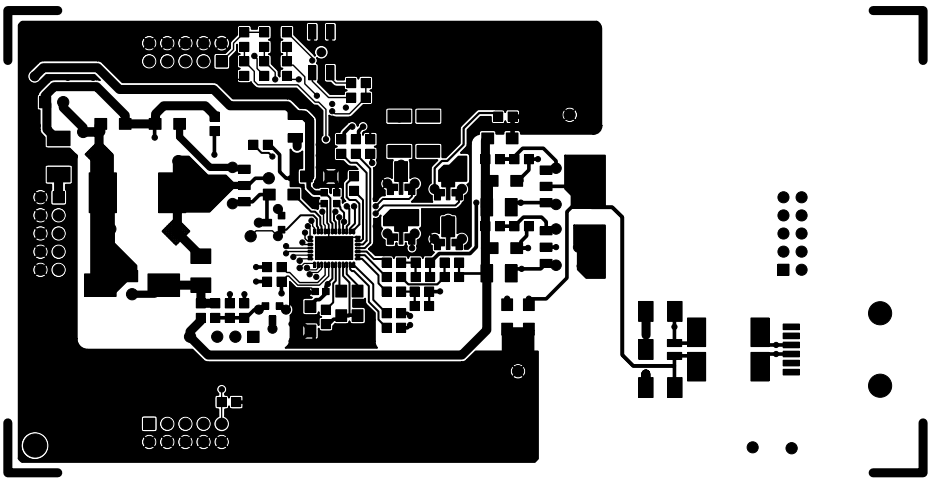


Figure 11. Si321xFM-DCX-EVB with Discretes Primary Side

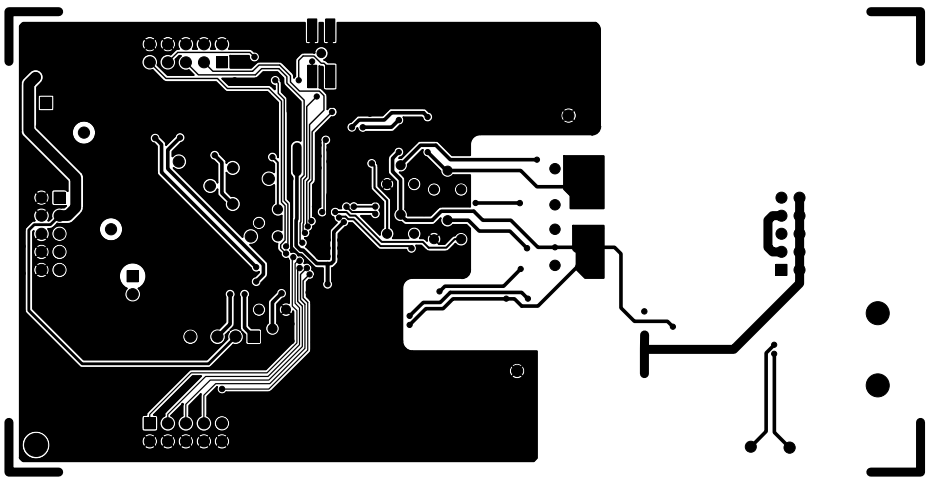


Figure 12. Si321xFM-DCX-EVB with Discretes Secondary Side

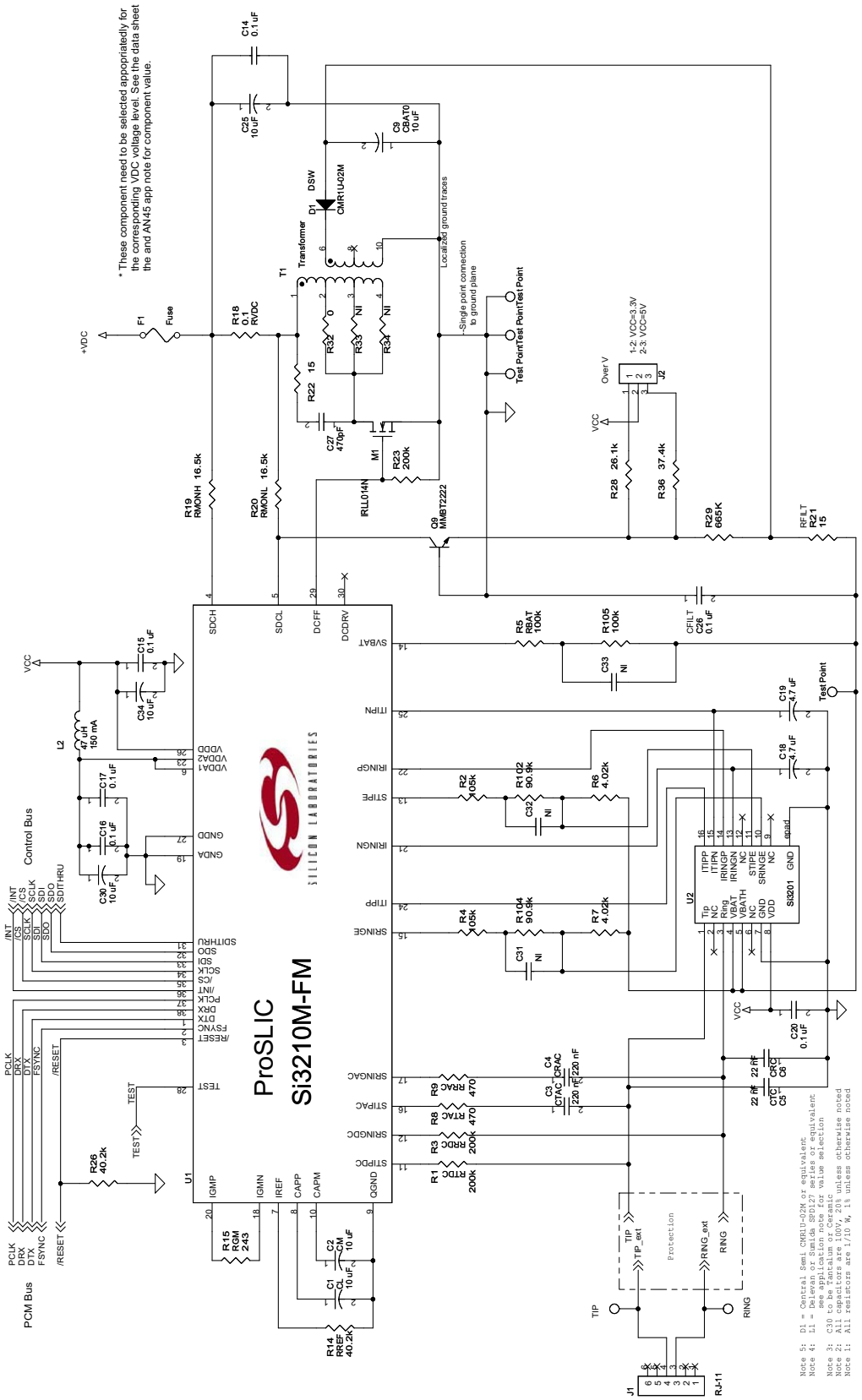


Figure 13. Si321xM QFN with Si3201 Schematic (1 of 3)

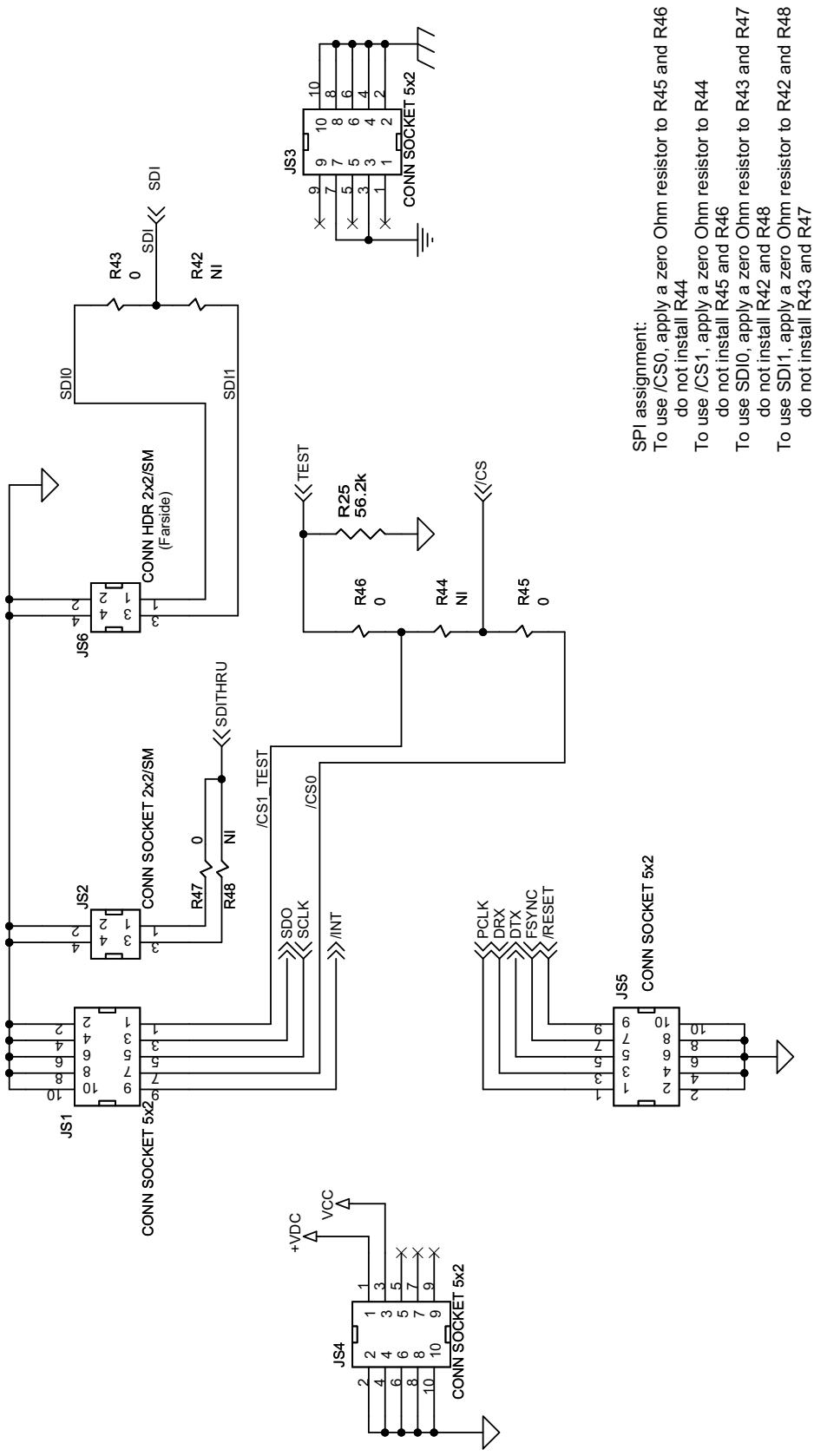


Figure 14. Si321xM QFN with Si3201 Schematic (2 of 3)

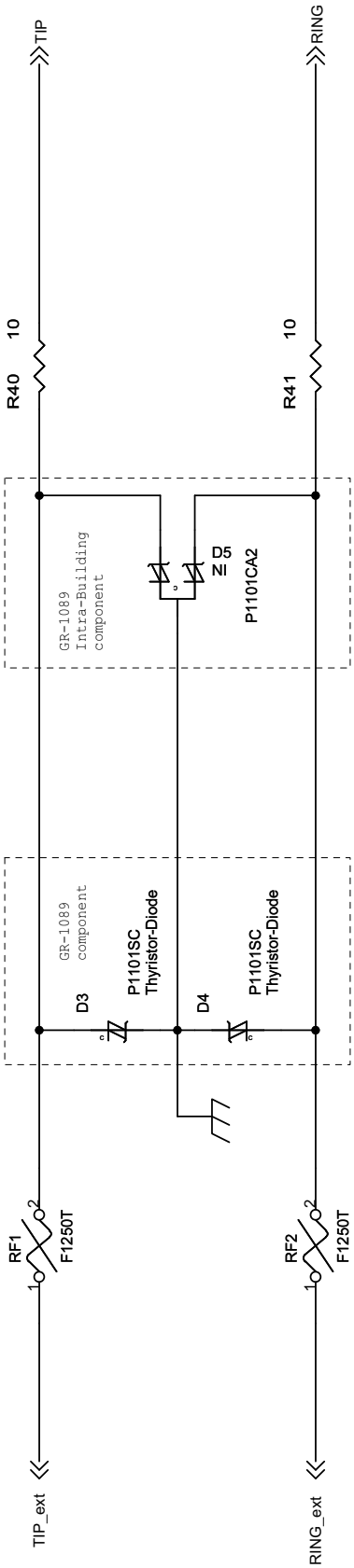


Figure 15. Si321xM QFN with Si3201 Schematic (3 of 3)

5. Si321xM-FM-DC1 Bill of Materials

Table 9. Si321xM-FM-DC1 Bill of Materials

Item	Qty	Ref	Value	Rating	Tol	Dielectric	PCB Footprint	Mfr Part Number	Mfr
1	4	C1,C2, C30,C34	10 µF	10 V	±20%	X7R	CC1206	C1206X7R100-106MNE	Venkel
2	2	C3,C4	220 nF	100 V	±20%	X7R	CC1812	C1210X7R101-224MNER	Venkel
3	2	C5,C6	22 nF	100 V	±20%	X7R	CC1206	12061C223MATA	AVX
4	2	C9,C25	10 µF	100 V	±20%	Elec	C2.5X6.3MM-RAD	ECA-2AM100	Pana-sonic
5	2	C14,C26	0.1 µF	100 V	±20%	X7R	CC1206	12061C104MATA	AVX
6	4	C15,C16, C17,C20	0.1 µF	16 V	±20%	X7R	CC0603	0603YC104MATA	AVX
7	2	C18,C19	4.7 µF	16 V	±20%	X7R	1206	C1206X7R160-475MNE	Venkel
8	1	C27	470 pF	100 V	±20%	X7R	CC1206	12061C470MATA	AVX
9	1	D1	CMR1U-02M				DO-214AA-REV	CMR1U-02M	Central Semi
10	2	D3,D4	Thyristor-Diode				DO-214AA-REV	P1101SC	Littelfuse
11	1	F1	Fuse	0.5 A			F1206[60X60]	R451.500	Littelfuse
12	4	JS1,JS3, JS4,JS5					CONN2X5-SSQ	SSQ-1-05-24-F-D	Samtec
13	1	JS2					CONN2X2-100-SSM	SSM-102-L-DV-TR	Samtec
14	1	JS6					CONN2X2-100-TSM	TSM-102-02-T-DV	Samtec
15	1	J1	RJ-11				RJ11-6-SMT	555077-2	AMP
16	1	J2	HEADER 3X1				CONN-1X3	2303-6111TN	3M
17	1	L2	47 µH	150 mA			IND-NLC3225	NLC322522T-470K	TDK
18	1	M1	IRLL014N				SOT-223	IRLL014N	Intl Rec-tifier
19	1	Q9	MMBT2222				SOT-23	MMBT2222	Motorola
20	2	RF1,RF2	TeleLink				F350[145X157]	F1250T	Littelfuse
21	3	R1,R3, R23	200 kΩ	1/10 W	±1%		RC0805	CR0805-10W-2003FT	Venkel
22	2	R2,R4	105 kΩ	1/10 W	±1%		RC0805	CR0805-10W-1053FT	Venkel
23	2	R5,R105	100 kΩ	1/10 W	±1%		RC0805	CR0805-10W-1003FT	Venkel
24	2	R6,R7	4.02 kΩ	1/10 W	±1%		RC0805	CR0805-10W-4021FT	Venkel

Table 9. Si321xM-FM-DC1 Bill of Materials (Continued)

Item	Qty	Ref	Value	Rating	Tol	Dielectric	PCB Footprint	Mfr Part Number	Mfr
25	2	R8,R9	475 Ω (Si3210M)	1/10 W	±1%		RC0805	CR0805-10W-4750FT	Venkel
			4.7 kΩ (Si3215M)					CR0805-10W-4701FT	
			4.7 kΩ (Si3216M)					CR0805-10W-4701FT	
26	2	R14,R26	40.2 kΩ	1/10 W	±1%		RC0805	CR0805-10W-4022FT	Venkel
27	1	R15	243 Ω	1/10 W	±1%		RC0805	CR0805-10W-2430FT	Venkel
28	1	R18	0.1 Ω	1/4 W	±1%		CC1206	CR1206-4W-R100FT	Venkel
29	2	R19,R20	16.5 kΩ	1/10 W	±1%		RC0805	CR0805-10W-1652FT	Venkel
30	2	R21,R22	15 Ω	1/10 W	±5%		RC0805	CR0805-10W-150JT	Venkel
31	1	R28	26.1 kΩ	1/10 W	±1%		RC0805	CR0805-10W-2612FT	Venkel
32	1	R29	665 kΩ	1/10 W	±1%		RC0805	CR0805-10W-6653FT	Venkel
33	1	R32	0 Ω	1/10 W	±5%		RC0805	CR0805-10W-000JT	Venkel
34	1	R36	37.4 kΩ	1/10 W	±1%		RC0805	CR0805-10W-3742FT	Venkel
35	2	R40,R41	10 Ω	1/10 W	±1%		RC0805	CR0805-10W-10R0FT	Venkel
36	4	R43,R45, R46,R47	0 Ω	1/10 W	±5%		RC0805	CR0805-10W-000JT	Venkel
37	2	R102, R104	90.9 kΩ	1/10 W	±1%		RC0805	CR0805-10W-9092FT	Venkel
38	3	TIP, RING, GND	Test Point					151-205	Mouser
39	1	T1	Transformer				XFMR-CTX01-15275	31353R-02	Midcom
40	1	U1	Si3210M-FM				MLF38N5X7-0.5P	Si3210M-FM Rev E	Silabs
			Si3215M-FM				MLF38N5X7-0.5P	Si3215M-FM Rev C	
			Si3216M-FM				MLF38N5X7-0.5P	Si3216M-FM Rev C	
41	1	U2	Si3201				SO16E	Si3201-FS Rev E	Silabs
Not Installed Components									
42	NI	C31,C32, C33	NI				CC0805		
43	NI	D5	NI	95 V			DO-214AA-3	P1101CA2	Littelfuse
44	NI	R33,R34, R42,R44, R48	NI				RC0805		

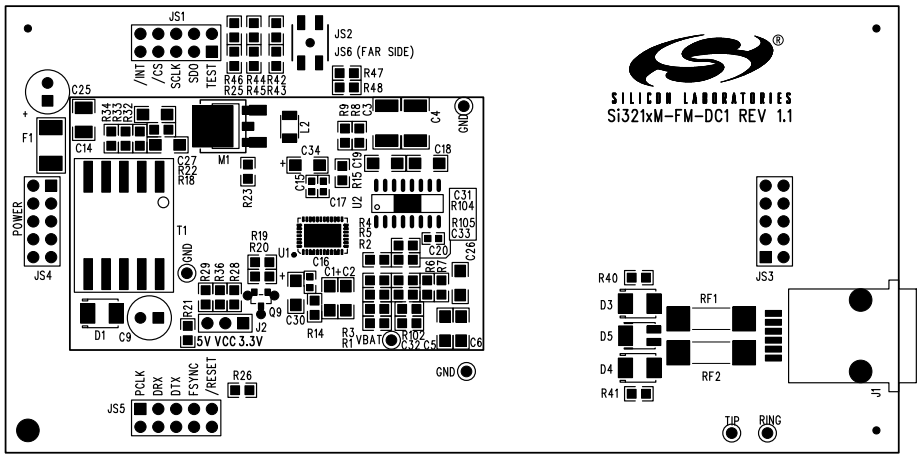


Figure 16. Si321xM-FM-DC1-EVB with Si3201 Primary Assembly

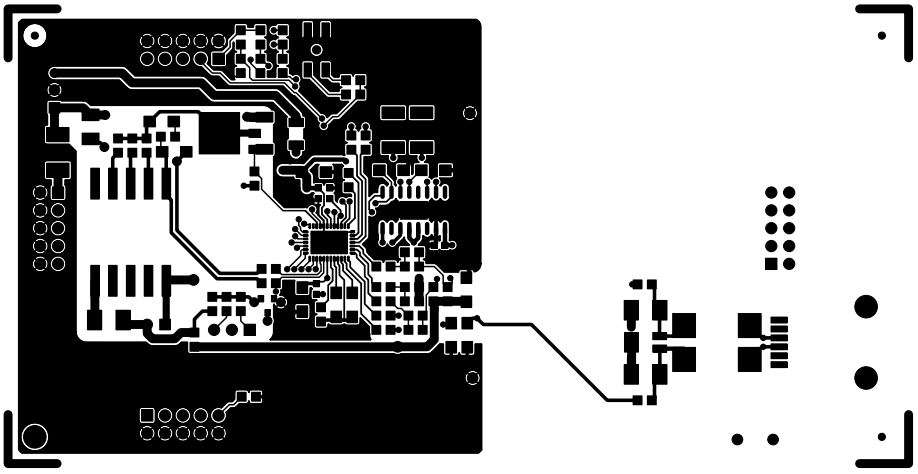


Figure 17. Si321xM-FM-DC1-EVB with Si3201 Primary Side

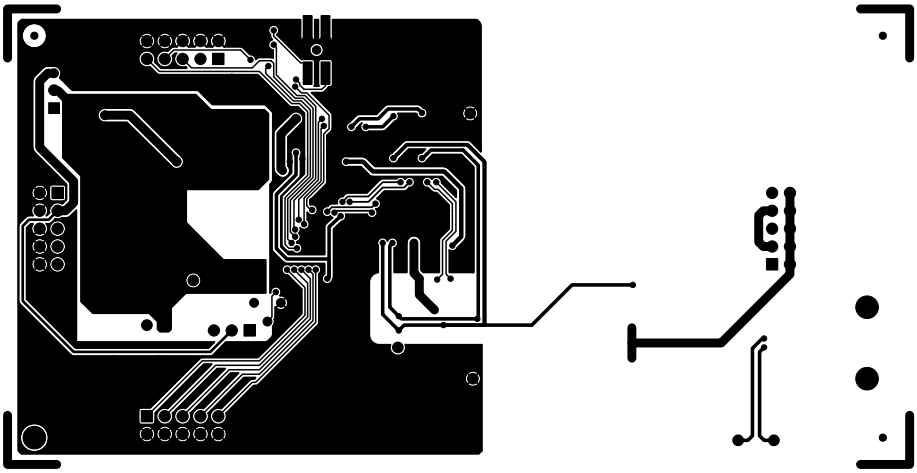


Figure 18. Si321xM-FM-DC1-EVB with Si3201 Secondary Side

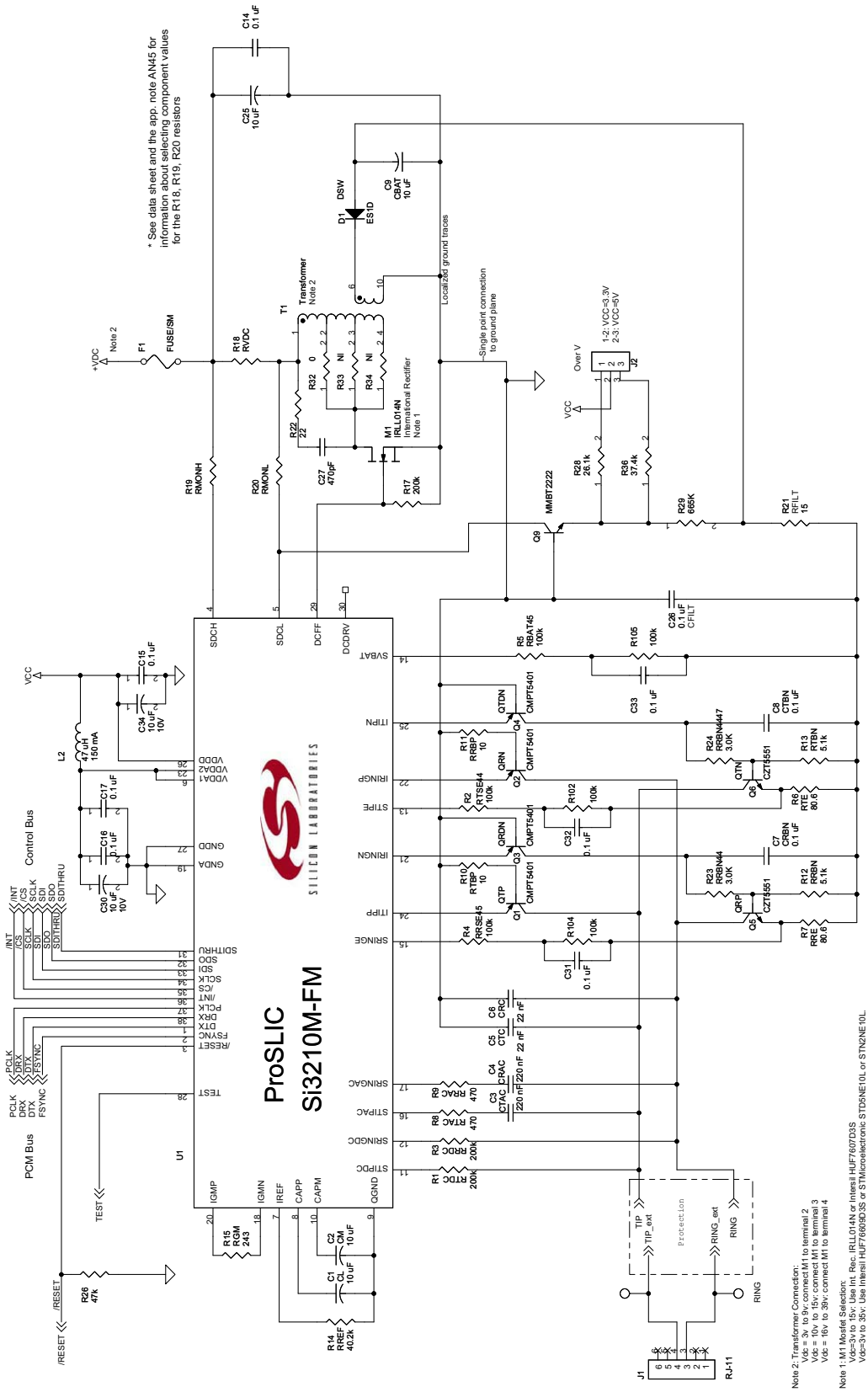


Figure 19. Si321xM QFN with Discrete Evaluation Circuit (1 of 3)

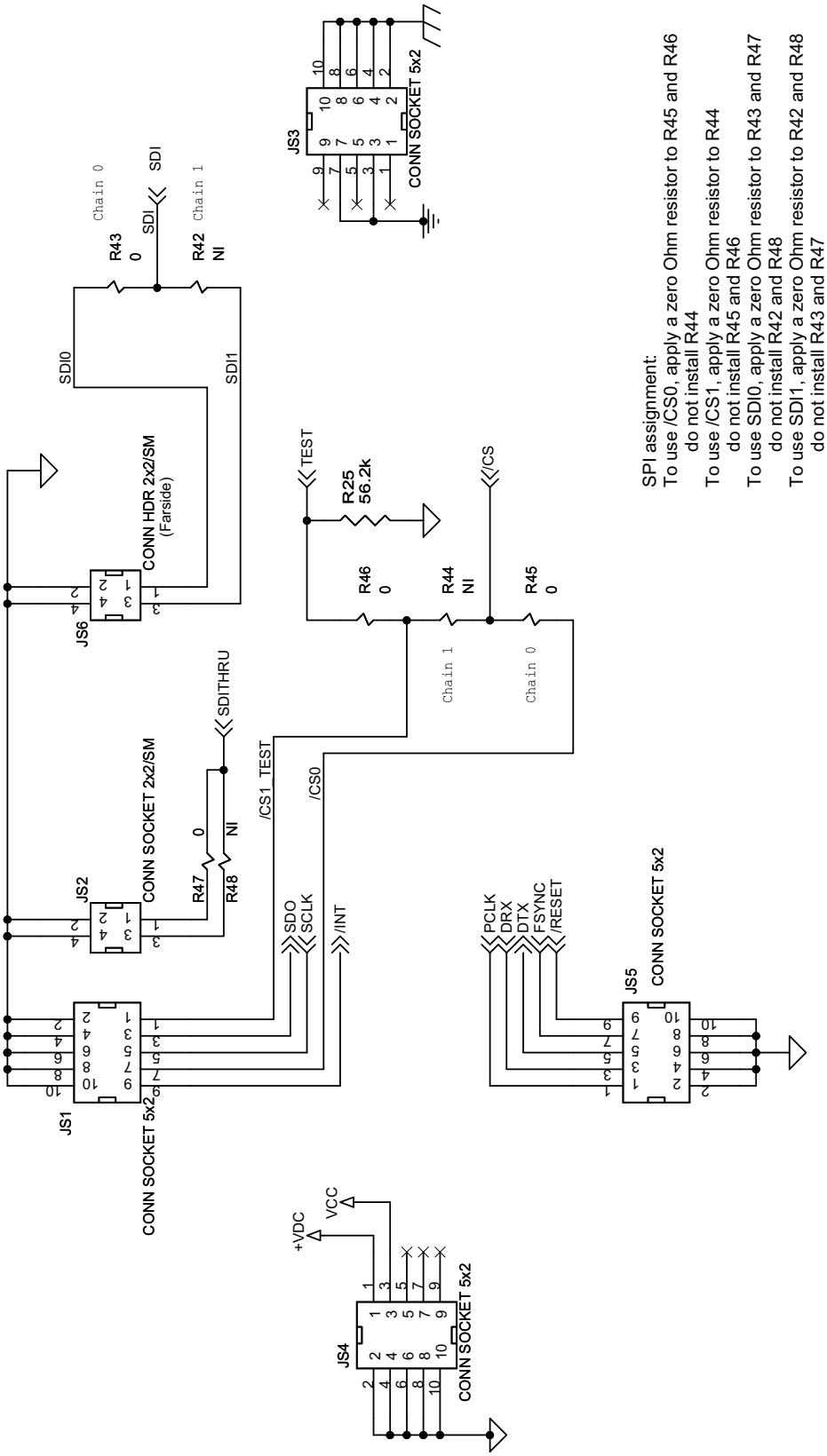


Figure 20. Si321xM QFN with Discrete Evaluation Circuit (2 of 3)

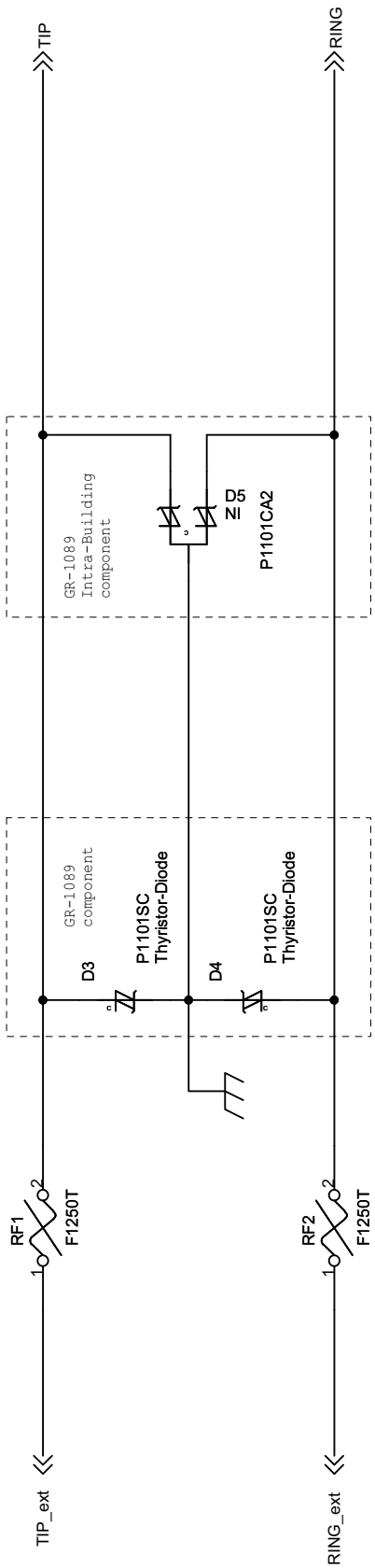


Figure 21. Si321xM QFN with Discrete Evaluation Circuit (3 of 3)

6. Si321xM-FM-DCX Bill of Materials

Table 10. Si321xM-FM-DCX Bill of Materials

Item	Qty	Ref	Value	Rating	Tol	Dielectric	PCB Footprint	Mfr Part Number	Mfr
1	4	C1,C2, C30,C34	10 µF	10 V	±20%	X7R	CC1206	C1206X7R100-106MNE	Venkel
2	2	C3,C4	220 nF	100 V	±20%	X7R	CC1812	C1210X7R101-224MNER	Venkel
3	2	C5,C6	22 nF	100 V	±20%	X7R	CC1206	12061C223MATA	AVX
4	4	C7,C8, C14,C26	0.1 µF	100 V	±20%	X7R	CC1206	12061C104MATA	AVX
5	2	C9,C25	10 µF	100 V	±20%	Elec	C2.5X6.3MM-RAD	ECA-2AM100	Pana-sonic
6	3	C15,C16, C17	0.1 µF	16 V	±20%	X7R	CC0603	0603YC104MATA	AVX
7	1	C27	470 pF	100 V	±20%	X7R	CC1206	12061C471MATA	AVX
8	3	C31,C32, C33	0.1 µF	100 V	±20%	X7R	CC0805	C0805X7R101-104MNER	Venkel
9	1	D1	ES1D				DO-214AA-REV	ES1D	Central Semi
10	2	D3,D4	Thyristor-Diode				DO-214AA-REV	P1101SC	Littelfuse
11	1	F1	FUSE/SM	1.5 A			6.1x1.45	R0451 01.5	Littlefuse
12	4	JS1,JS3, JS4,JS5					CONN2X5-SSQ	SSQ-1-05-24-F-D	Samtec
13	1	JS2					CONN2X2-100-SSM	SSM-102-L-DV-TR	Samtec
14	1	JS6					CONN2X2-100-TSM	TSM-102-02-T-DV	Samtec
15	1	J1	RJ-11				RJ11-6-SMT	555077-2	AMP
16	1	J2	HEADER 3X1				CONN-1X3	2303-6111TN	3M
17	1	L2	47 µH	150 mA			IND-NLC3225	NLC322522T-470K	TDK
18	1	M1	IRLL014N				SOT-223	IRLL014N	Intl Recti-fier
19	4	Q1,Q2, Q3,Q4	CXT5401				SOT89	CXT5401	Central Semi
20	2	Q5,Q6	CZT5551				SOT-223	CZT5551	Central Semi
21	1	Q9	MMBT2222				SOT23-TO92	MMBT2222	On Semi
22	2	RF1,RF2	TeleLink				F350[145X157]	F1250T	Littelfuse
23	3	R1,R3,R17	200 kΩ	1/10 W	±1%		RC0805	CR0805-10W-2003FT	Venkel
24	6	R2,R4,R5, R102,R104, R105	100 kΩ	1/10 W	±1%		RC0805	CR0805-10W-1003FT	Venkel

Table 10. Si321xM-FM-DCX Bill of Materials (Continued)

Item	Qty	Ref	Value	Rating	Tol	Dielectric	PCB Footprint	Mfr Part Number	Mfr
25	2	R6,R7	80.6 Ω	1/4 W	±1%		RC1210	CR1210-4W-80R6FT	Venkel
26	2	R8,R9	470 Ω (Si3210M)	1/10 W	±1%		RC0805	CR0805-10W-4700FT	Venkel
			4.7 kΩ (Si3215M)					CR0805-10W-4701FT	
			4.7 kΩ (Si3216M)					CR0805-10W-4701FT	
27	2	R10,R11	10 Ω	1/10 W	±5%		RC0805	CR0805-10W-100JT	Venkel
28	2	R12,R13	5.1 kΩ	1/10 W	±5%		RC0805	CR0805-10W-512JT	Venkel
29	1	R14	40.2 kΩ	1/10 W	±1%		RC0805	CR0805-10W-4022FT	Venkel
30	1	R15	243 Ω	1/10 W	±1%		RC0805	CR0805-10W-2430FT	Venkel
31	1	R18	0.1 Ω	1/4 W	±1%		CC1206	CR1206-4W-R100FT	Venkel
32	2	R19,R20	16.5 kΩ	1/10 W	±1%		RC0805	CR0805-10W-1652FT	Venkel
33	1	R21	15 Ω	1/10 W	±1%		RC0805	CR0805-10W-15R0FT	Venkel
34	1	R22	22 Ω	1/10 W	±5%		RC0805	CR0805-10W-220JT	Venkel
35	2	R23,R24	3.0 kΩ	1/10 W	±5%		RC0805	CR0805-10W-302JT	Venkel
36	2	R25,R26	47 kΩ	1/10 W	±5%		RC0805	CR0805-10W-473JT	Venkel
37	1	R28	26.1 kΩ	1/10 W	±1%		RC0805	CR0805-10W-2612FT	Venkel
38	1	R29	665 kΩ	1/10 W	±1%		RC0805	CR0805-10W-6653FT	Venkel
39	5	R32,R43, R45,R46, R47	0 Ω	1/16 W	±1%		RC0805	CR0805-16W-0000FT	Venkel
40	1	R36	37.4 kΩ	1/10 W	±1%		RC0805	CR0805-10W-3742FT	Venkel
41	3	TIP, RING, GND	Test Point					151-205	Mouser
42	1	T1	Transformer				XFMR-CTX01-15275	31353R-02	Midcom
43	1	U1	Si3210M-FM				MLF38N5X7-0.5P	Si3210M-FM Rev E	SiLabs
			Si3215M-FM				MLF38N5X7-0.5P	Si3215M-FM Rev C	SiLabs
			Si3216M-FM				MLF38N5X7-0.5P	Si3216M-FM Rev C	SiLabs
Not Installed Components									
44	1	D5	NI	95 V			DO-214AA-3	P1101CA2	Teccor
45	5	R33,R34, R42,R44, R48	NI				RC0805		

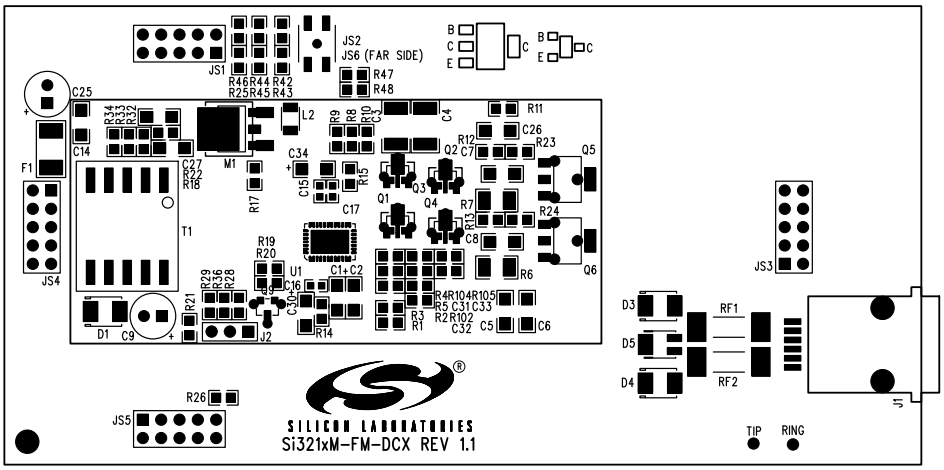


Figure 22. Si321xM-FM-DCX-EVB with Discretes Primary Assembly

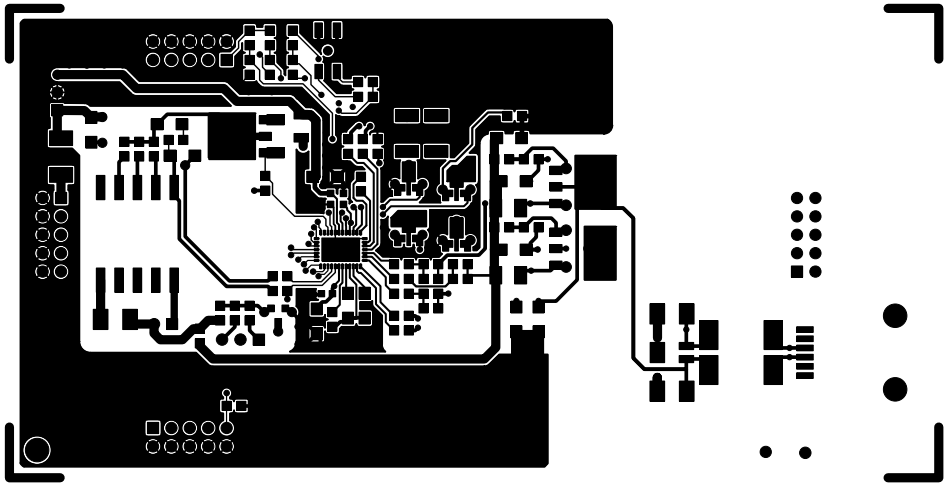


Figure 23. Si321xM-FM-DCX-EVB with Discretes Primary Side

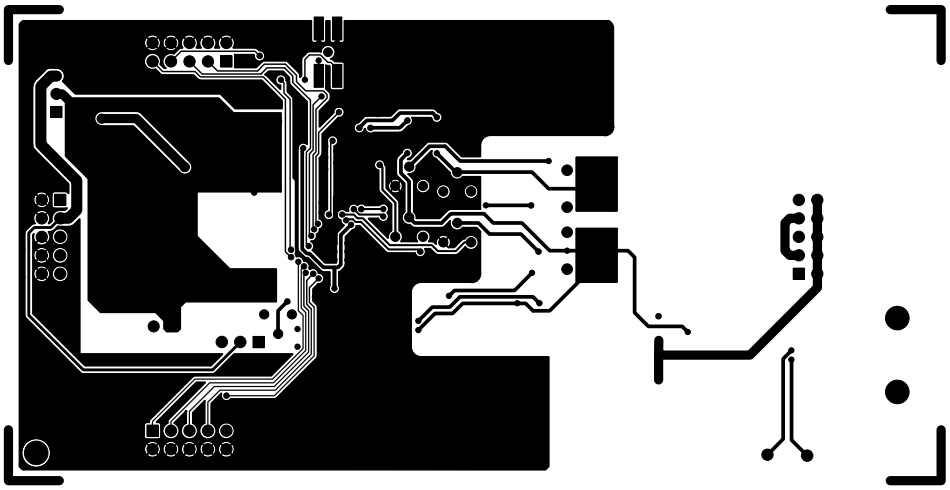


Figure 24. Si321xM-FM-DCI-EVB with Discretes Secondary Side

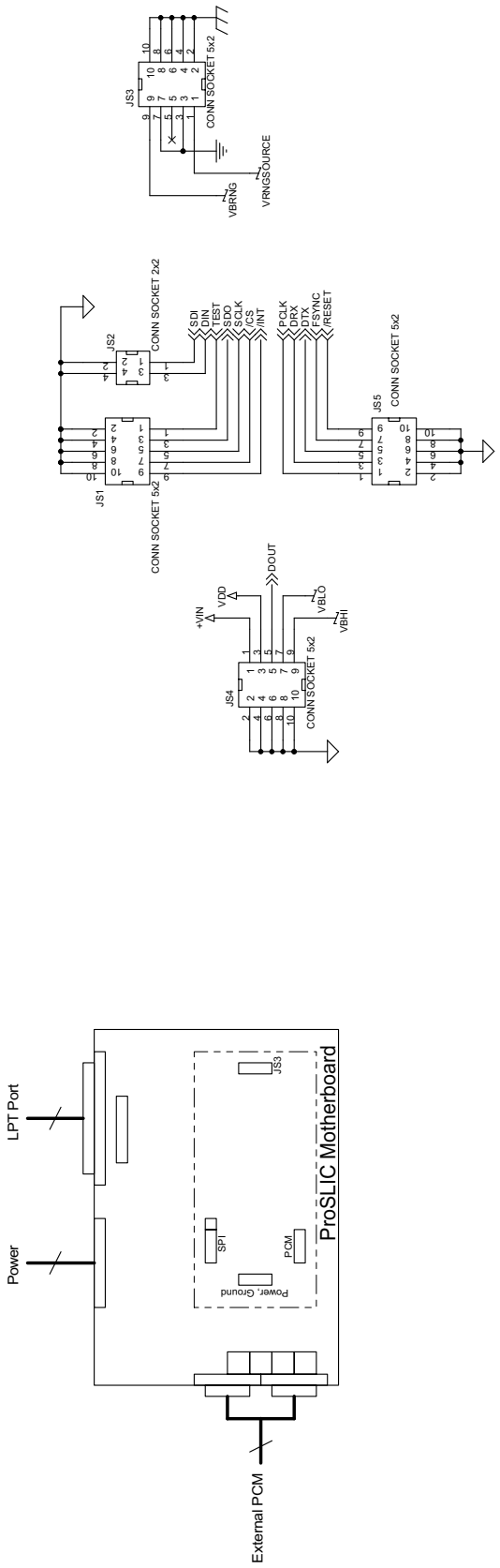


Figure 25. ProSLIC Motherboard (ProSLIC IF)

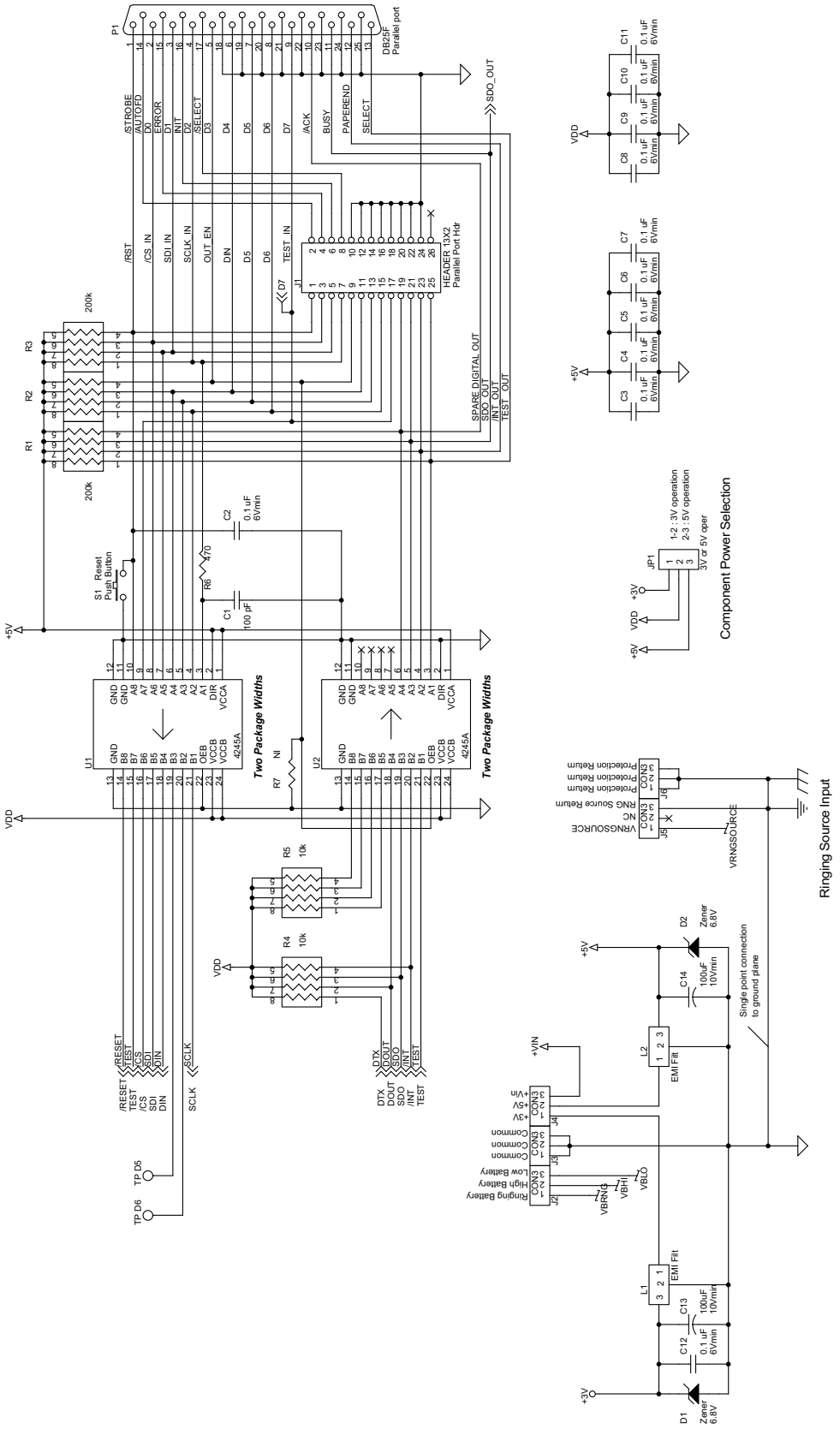


Figure 26. ProSLIC Motherboard (LPT to SPI)

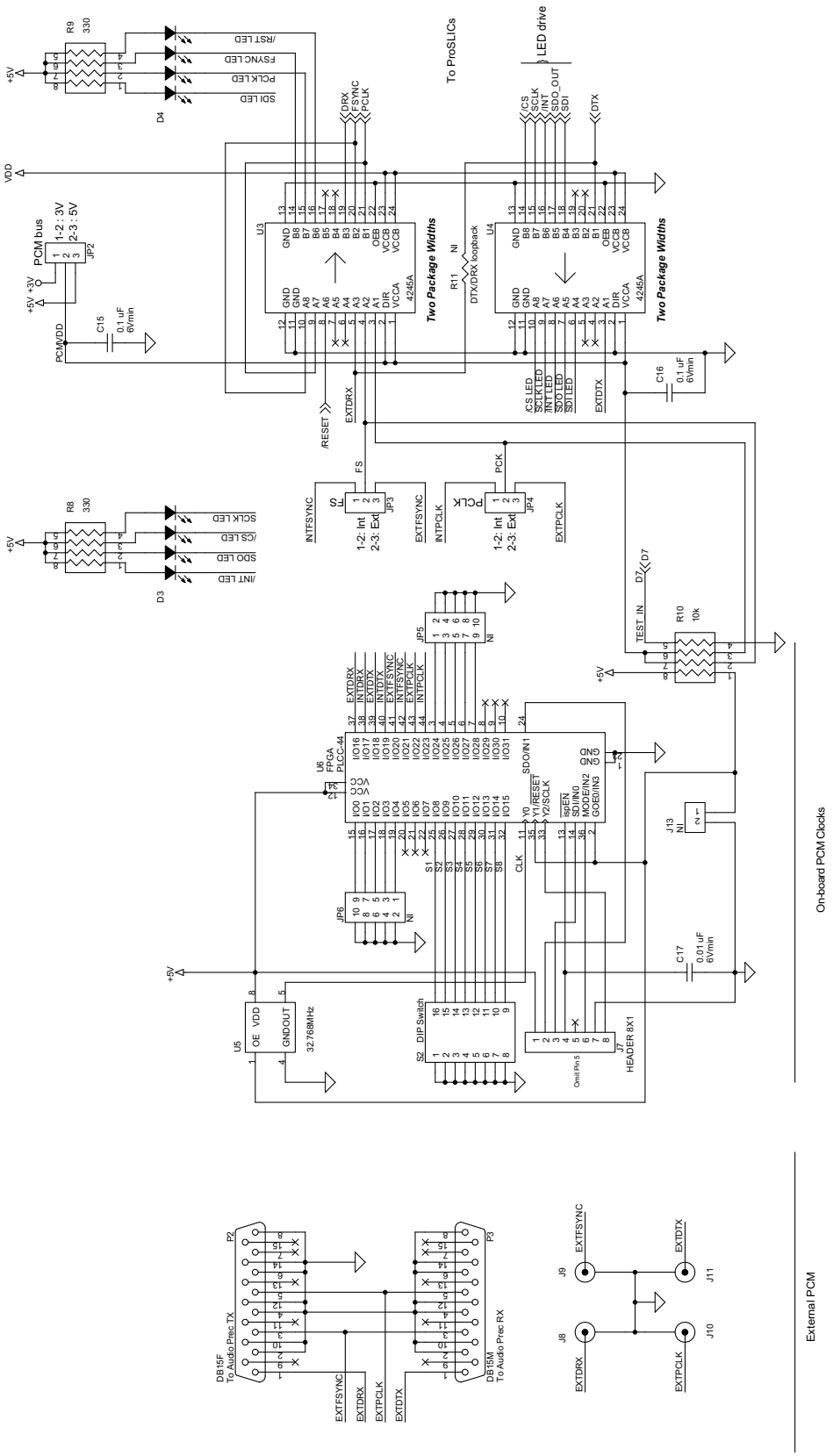


Figure 27. ProSLIC Motherboard (PCM)

7. ProSLIC Motherboard Bill of Materials

Table 11. ProSLIC Motherboard Bill of Materials

Item	NI	Qty	Ref	Value	Rating	Tol	Dielectric	PCB Footprint	Mfr Part Number	Mfr
1		1	C1	100 pF	16 V	±20%	X7R	0402		Venkel
2		13	C2,C3,C4, C5,C6,C7, C8,C9,C10, C11,C12, C15,C16	0.1 µF	6 Vmin	±20%	X7R	0603		Venkel
3		2	C13,C14	100 µF	10 Vmin		Elect	.100in		
4		1	C17	0.01 µF	6 Vmin	±20%	X7R	0603	0603YC103MATA	AVX
5		2	D1,D2	Zener	6.8 V			DO15	P6KE6.8A	Vishay
6		2	D3,D4	LED 4pack					SSF-LXH400ID	Lumex
7		4	JP1,JP2,JP 3, JP4	HEADER 3X1				3x1 100 mil	2303-6111TN	3M
8		4	JS1,JS3, JS4,JS5					5x2 100 mil	SSW-105-01-T-D	Samtec
9		1	JS2					2x2 100 mil	SSW-102-01-T-D	Samtec
10		1	J1	HEADER 13X2				13x2 100 mil	2326-6121TN	3M
11		5	J2,J3,J4, J5,J6	CON3					2SV-03	Thomas & Betts
12		1	J7	HEADER 8X1				8x1 100 mil	2308-6111TN	3M
13		2	L1,L2	EMI Filt				Pana EXC	EXC-EMT103DT	Panasonic
14		1	P1	DB25F				DB25 Female	747846-3	Amp
15		3	R1,R2,R3	220 kΩ				R-Pack	EXB-38V224JV	Panasonic
16		3	R4,R5,R10	10 kΩ				R-Pack	EXB-38V103JV	Panasonic
17		1	R6	470 Ω	1/10 W	±1%		0805	CR0805-10W-4700FT	Venkel
18		2	R8,R9	330 Ω				R-Pack	EXB-38V331JV	Panasonic
19		1	S1	Push Button				DIP-6	101-0161	Mouser
20		1	S2	DIP Switch				DIP-16	SDA08H0KD	C&K
21		4	U1,U2, U3,U4	4245A				TSSOP-24	SN74LVC4245A	TI
22		1	U5	32.768 MHz				SMD and thru-hole	SG-531PH	Epson

Table 11. ProSLIC Motherboard Bill of Materials (Continued)

Item	NI	Qty	Ref	Value	Rating	Tol	Dielectric	PCB Footprint	Mfr Part Number	Mfr
23		1	U6	FPGA				PLCC-44	ISPLSI1016	Lattice
24		4	JP1-+5 V, JP2-+5 V, JP3-NT, JP4-INT	Jumpers					Standard Two Pin, 0.100" Jumpers	
25		6	NA	Screws					#4 Plastic Standoff Screws	
26		6	NA	Standoffs					#4 x 1/2 inch Plastic Standoffs	
Not Installed Components										
27	NI	1	P2					DB15 Female	747845-4	Amp
28	NI	1	P3					DB15 Male	747841-4	Amp
29	NI	2	JP5,JP6							
30	NI	4	J8,J9, J10,J11					BNC	73133	Molex
31	NI	1	J13					2x1 100 mil	2302-6111TN	3M
32	NI	2	R11,R7					805		
33	NI	2	TP D5, TP D6					thru-hole		

8. ProSLIC Motherboard Layouts

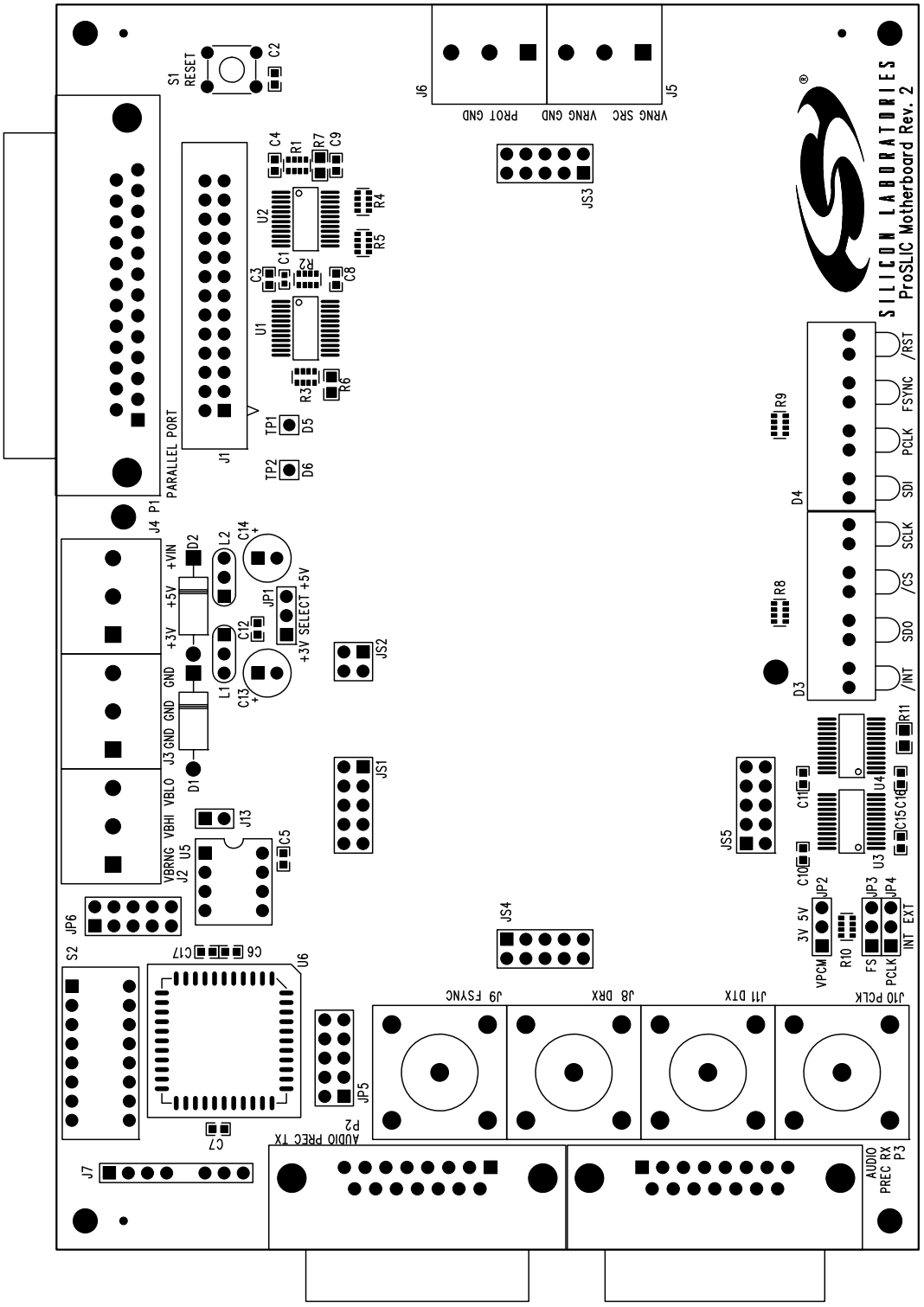


Figure 28. ProSLIC Motherboard Assembly

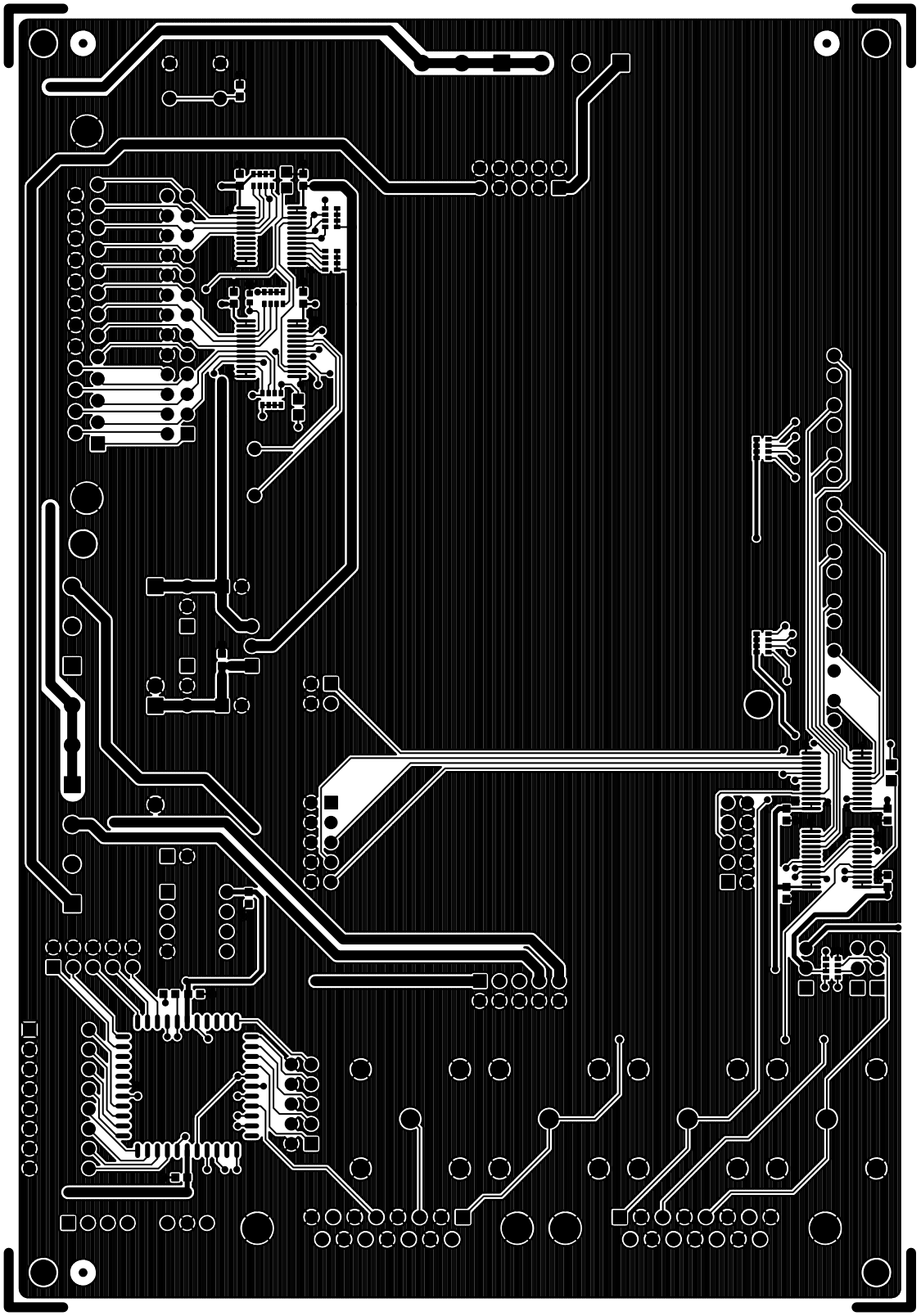


Figure 29. ProSLIC Motherboard Component Side

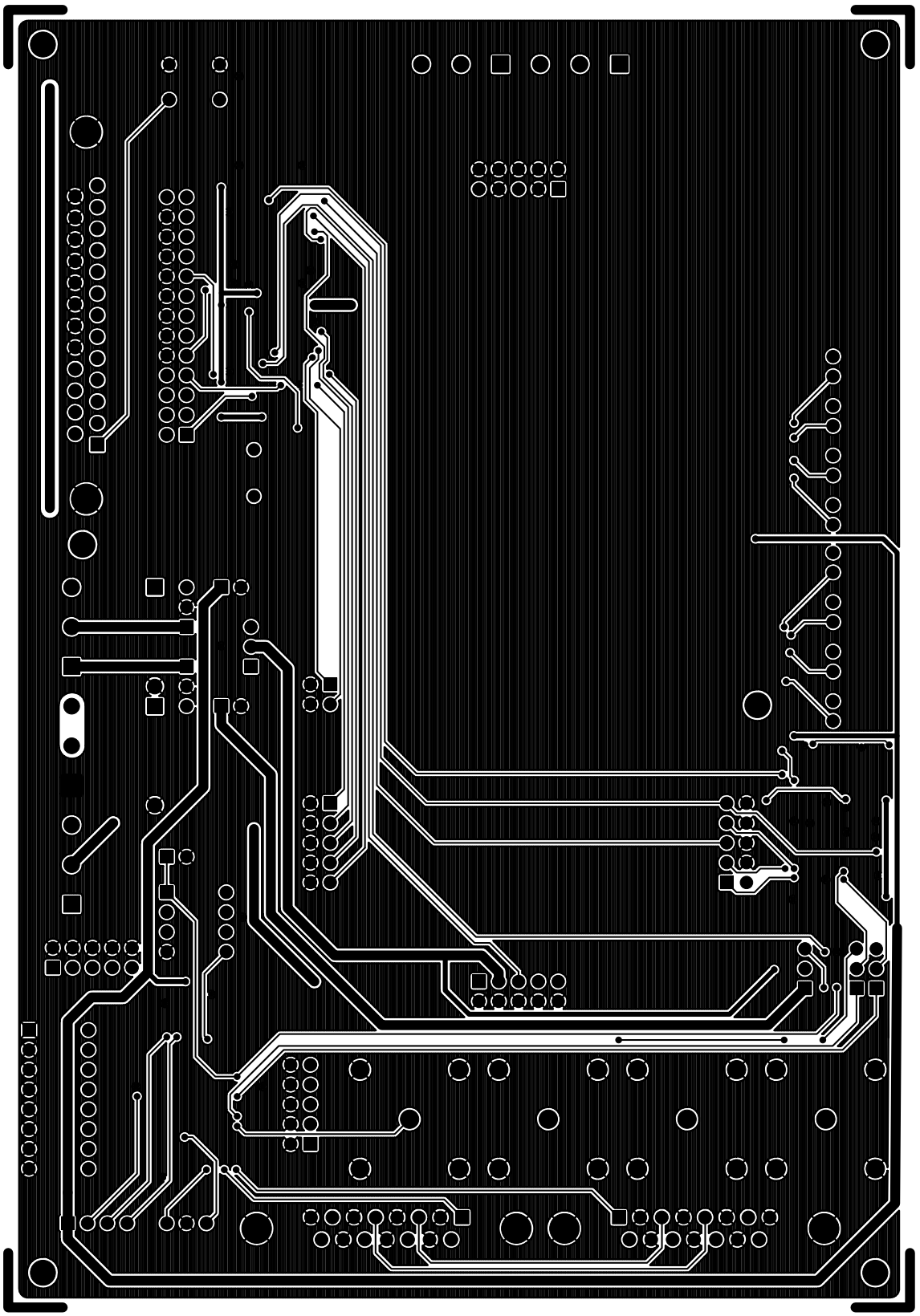


Figure 30. ProSLIC Motherboard Solder Side

9. Ordering Guide

EVB	ProSLIC Device	DC/DC Option	Linefeed Option
Si3210PPQX-EVB	Si3210	BJT/Inductor	Discrete
Si3210PPQ1-EVB	Si3210	BJT/Inductor	Si3201
Si3210MPPQX-EVB	Si3210M	FET/Transformer	Discrete
Si3210MPPQ1-EVB	Si3210M	FET/Transformer	Si3201
Si3215PPQX-EVB	Si3215	BJT/Inductor	Discrete
Si3215PPQ1-EVB	Si3215	BJT/Inductor	Si3201
Si3215MPPQX-EVB	Si3215M	FET/Transformer	Discrete
Si3215MPPQ1-EVB	Si3215M	FET/Transformer	Si3201
Si3216PPQX-EVB	Si3216	BJT/Inductor	Discrete
Si3216PPQ1-EVB	Si3216	BJT/Inductor	Si3201
Si3216MPPQX-EVB	Si3216M	FET/Transformer	Discrete
Si3216MPPQ1-EVB	Si3216M	FET/Transformer	Si3201

DOCUMENT CHANGE LIST

Revision 0.9 to Revision 1.0

- Updated schematics
- Updated layouts

Revision 1.0 to Revision 1.1

- Added QFN schematics and layouts.

Revision 1.1 to Revision 1.2

- Updated to reflect currently-available EVB designs.

NOTES:

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