UG246: Si875x User's Guide

The Si875x isolated MOSFET driver is ideal for driving power switches used in a wide variety of applications, offering longer service life and dramatically higher reliability compared to common SSRs. The Si875x isolated MOSFET driver utilizes Silicon Laboratories' proprietary silicon isolation technology supporting up to 2.5 kVRMS withstand voltage per UL1577 and VDE0884. This technology enables reduced variation with temperature and age, better part-to-part matching, and extremely high reliability. High integration, low propagation delay, small installed size, flexibility, and cost-effectiveness make the Si875x ideal for a wide range of isolated MOSFET gate drive applications. The Si875x evaluation board allows designers to evaluate Silicon Labs' Si875x family of MOSFET drivers. The boards come populated with either the Si8751 (digital input) or Si8752 (LED emulator input) version of the family. The board includes screw terminals for quick evaluation of the device's key parameters and also includes test points on each of the device's pins to accommodate direct connection to the designer's end system. For more ISOdriver information, visit the Silicon Labs website at www.silabs.com/isolation.

KEY FEATURES OR KEY POINTS

- Easy to use
- Supports both dc or ac switching
- Jumper selectable power reduction options
- Jumper to evaluate Miller Clamp function
- Digital input or diode emulation options
  - Si8751-KIT (digital input)
  - Si8752-KIT (diode emulation)

1. Kit Contents

The Si875x Evaluation Kit contains the following items:

- Si875x-based evaluation board shown in the figure below:

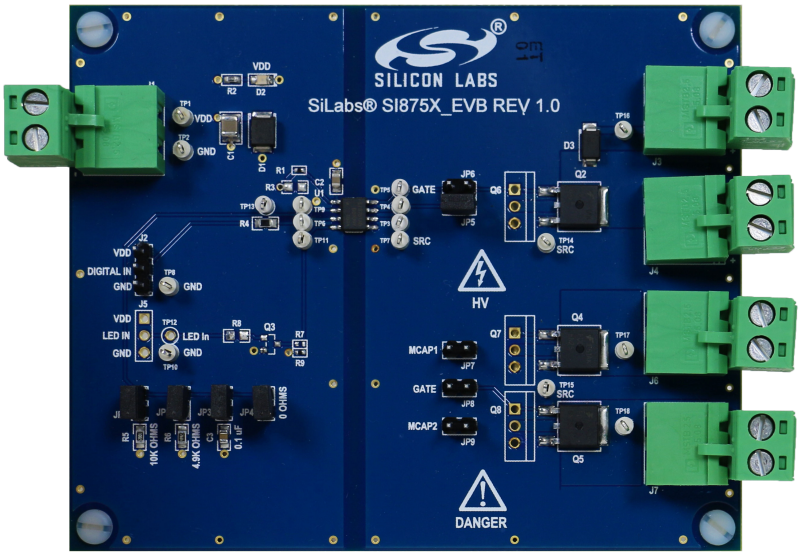


Figure 1.1. Si8751 Evaluation Board

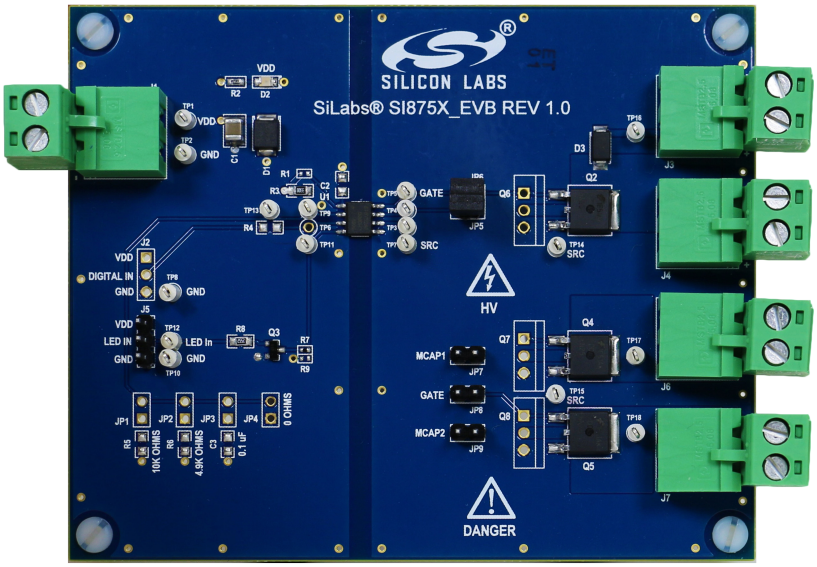


Figure 1.2. Si8752 Evaluation Board

2. EVB Test

To run the test, follow the instructions in the following sections.

2.1 Required Equipment

The following equipment is required to demonstrate the evaluation board:

- 1 digital multimeter
- 1 dc power supply: 0 – 5 V
- 1 dc power supply: 0 – 15 V
- 1 1k – 2k 0.25 W resistor
- Assorted cables and leads as necessary to connect equipment to EVB
- Si875x Evaluation Board (board under test)
- Si827x Evaluation Board User's Guide (this document)

2.2 EVB Test

To run the test, follow the instructions in the following sections.

2.2.1 DC Supply Configuration

1. Set the 5 V supply to output 5 VDC.
2. Turn OFF the supply and connect the positive lead to J1 pin1.
3. Connect the negative lead to J1 pin 2.
4. Set the 15 V supply to output 15 VDC.
5. Turn OFF the supply and connect the positive lead to J3 pin 1.
6. Connect the negative lead to J3 pin 2.
7. Connect the positive lead of the multimeter, and one end of the resistor, to J4 pin 1.
8. Connect the negative lead of the multimeter, and the other end of the resistor, to J4 pin 2.
9. Turn ON the dc power supplies.
10. Ensure that the current draw is less than 25 mA in any of the supplies. If it is larger, this indicates that either the board or Si875x has been damaged or the supply is connected backwards.

2.2.2 Test the Si875x DC Switch

1. Place a shunt between pins 2 and 3 of J2 (Si8751) or J5 (Si8752) and JP6.
2. The multimeter should measure 0 V.
3. Move the shunt from pins 2 and 3 to pins 1 and 2 on J2 (Si8751) or J5 (Si8752).
4. The multimeter should now measure 15 V.
5. Move the shunt back to pins 2 and 3.
6. Turn off the dc supplies.

2.2.3 Test the Si875x AC Switch

1. Move the 15 V supply positive lead to J6 pin1 and the negative lead to J6 pin 2.
2. Move the multimeter positive lead, and the resistor lead, to J7 pin 1 and the negative lead, and the resistor lead, to J7 pin 2.
3. Move the shunt from JP6 to JP8.
4. Turn on the dc supplies. Again, there should be no current draw greater than 25 mA.
5. The multimeter should measure 0 V.
6. Move the shunt on J2 (Si8751) or J5 (Si8752) from pins 2 and 3 to pins 1 and 2.
7. The multimeter should now measure 15 V.

3. Schematics

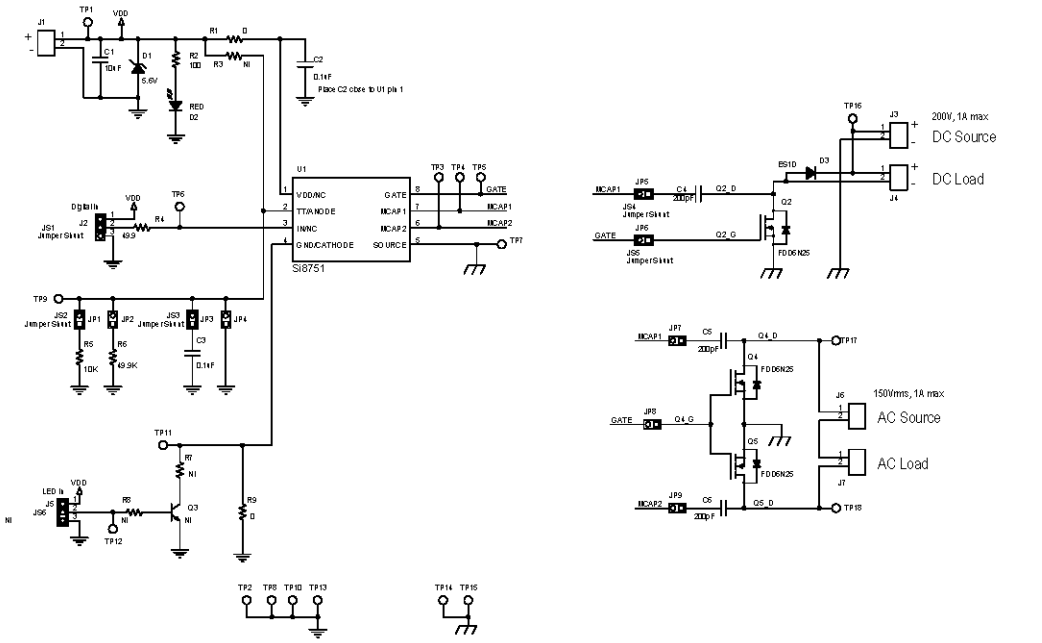


Figure 3.1. Si8751-EVB Schematic

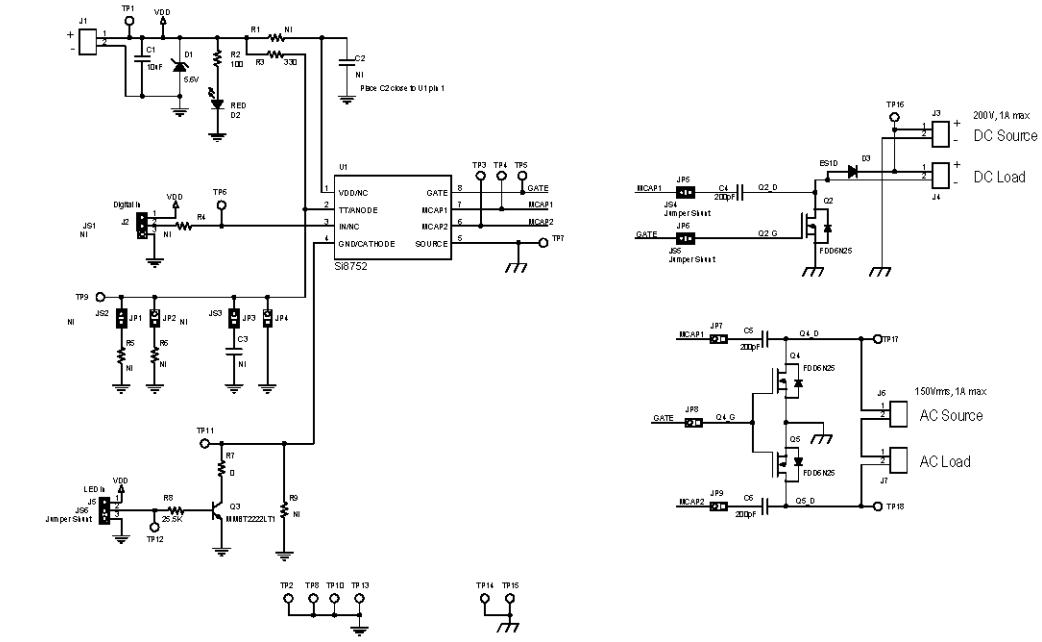


Figure 3.2. Si8752-EVB Schematic

4. Layout

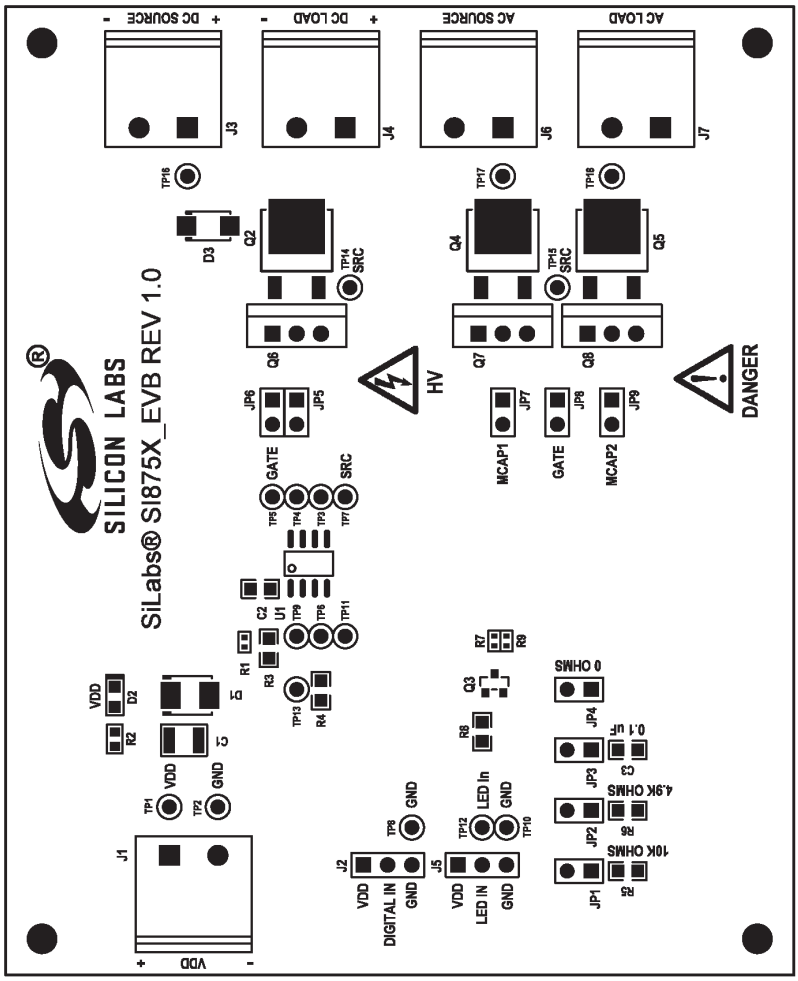


Figure 4.1. Primary Silkscreen

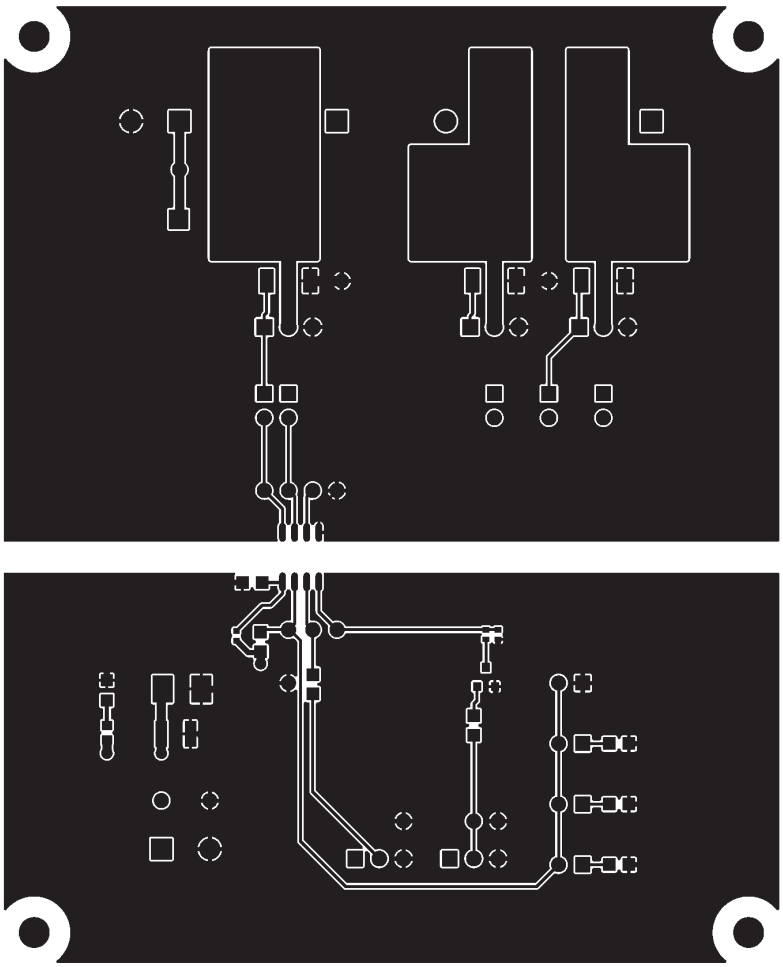


Figure 4.2. Primary Side

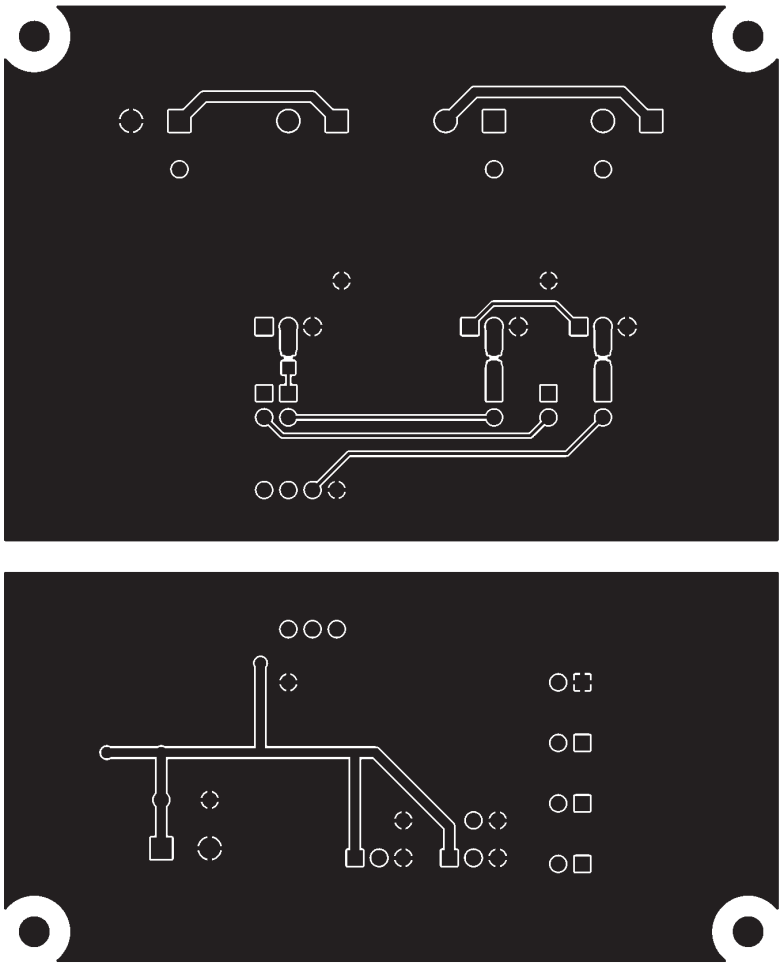


Figure 4.3. Secondary Side



Figure 4.4. Secondary Silkscreen

5. Bill of Materials

Si8751-EVB Bill of Materials

Table 5.1. Si8751-EVB Bill of Materials

Qty	Ref	Value	Type	PCB_Footprint	Manufacturer PN	Manufacturer
1	C1	10uF	X7R	C1210	C1210X7R500-106M	Venkel
2	C2 C3	0.1uF	X7R	C0805	C0805X7R101-104K	Venkel
3	C4 C5 C6	200pF	C0G	C0805	C0805C0G500-201K	Venkel
1	D1	5.6V	Zener	DO-214AA	1SMB5919BT3	On Semi
1	D2	RED	SMT, Chi-pLED	LED-HSMX-C170	HSMZ-C170	Avago Technologies
1	D3	ES1D	Fast	DO-214AC	ES1D	Diodes Inc.
5	J1 J3 J4 J6 J7	CONN TRBLK 2	TERM BLK MALE	CONN-TB-1757242	1757242	PHOENIX CONTACT
1	J2	Header 1x3	Header	CONN-1X3	TSW-103-07-G-S	Samtec
9	JP1 JP2 JP3 JP4 JP5 JP6 JP7 JP8 JP9	JUMPER	Header	CONN1X2	TSW-102-07-T-S	Samtec
5	JP10 JP11 JP12 JP13 JP14	PLUG	TERM BLK		1757019	Phoenix Contact
5	JS1 JS2 JS3 JS4 JS5	Jumper Shunt	Shunt	SHUNT	SNT-100-BK-T	Samtec
1	LB1	OPN: Si8751_EVB	POLYI-MIDE, WHITE	PTL-14-477	LABEL-Si8751_EVB	Silabs
4	MH1 MH2 MH3 MH4	4-40	HDW	MH-125NP|MH-125	NSS-4-4-01	Richco Plastic Co
1	PCB1	Si875x_EVB REV 1.0	BARE PCB	N/A	Si875x_EVB REV 1.0	SiLabs
3	Q2 Q4 Q5	FDD6N25	N-CHNL	DPAK-G2SD	FDD6N25	Fairchild
2	R1 R9	0	ThickFilm	R0402|R0402L	CR0402-16W-000	Venkel
1	R2	100	ThickFilm	R0603|R0603L	CR0603-10W-1000F	Venkel
1	R4	49.9	ThickFilm	R0805	CR0805-10W-49R9F	Venkel
1	R5	10K	ThickFilm	R0805	CR0805-10W-1002F	Venkel
1	R6	49.9K	ThickFilm	R0805	CR0805-10W-4992F	Venkel
4	SO1 SO2 SO3 SO4	STAND-OFF	HDW		1902D	Keystone Electronics

Qty	Ref	Value	Type	PCB_Footprint	Manufacturer PN	Manufacturer
17	TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9 TP10 TP11 TP13 TP14 TP15 TP16 TP17 TP18	WHITE	Loop	TESTPOINT	151-201-RC	Kobiconn
1	U1	Si8751	Isolator	SO8N6.0P1.27	Si8751	SiLabs

Table 5.2. Si8751-EVB Not Installed Components

Qty	Reference	Value	Type	PCB_Footprint	ManufacturerPN	Manufacturer
1	J5	Header 1x3	Header	CONN-1X3	TSW-103-07-G-S	Samtec
1	JS6	Jumper Shunt	Shunt	SHUNT	SNT-100-BK-T	Samtec
1	Q3	MMBT2222LT1	NPN	SOT23-BEC	MMBT2222LT1	On Semi
3	Q6 Q7 Q8	IRG4BC10UDPBF	IGBT	TO-220|TO220-UP	IRG4BC10UDPBF	IR
1	R3	330	ThickFilm	R0805	CR0805-10W-3300F	Venkel
1	R7	0	ThickFilm	R0402|R0402L	CR0402-16W-000	Venkel
1	R8	25.5K	ThickFilm	R0805	CR0805-10W-2552F	Venkel
1	TP12	WHITE	Loop	TESTPOINT	151-201-RC	Kobiconn

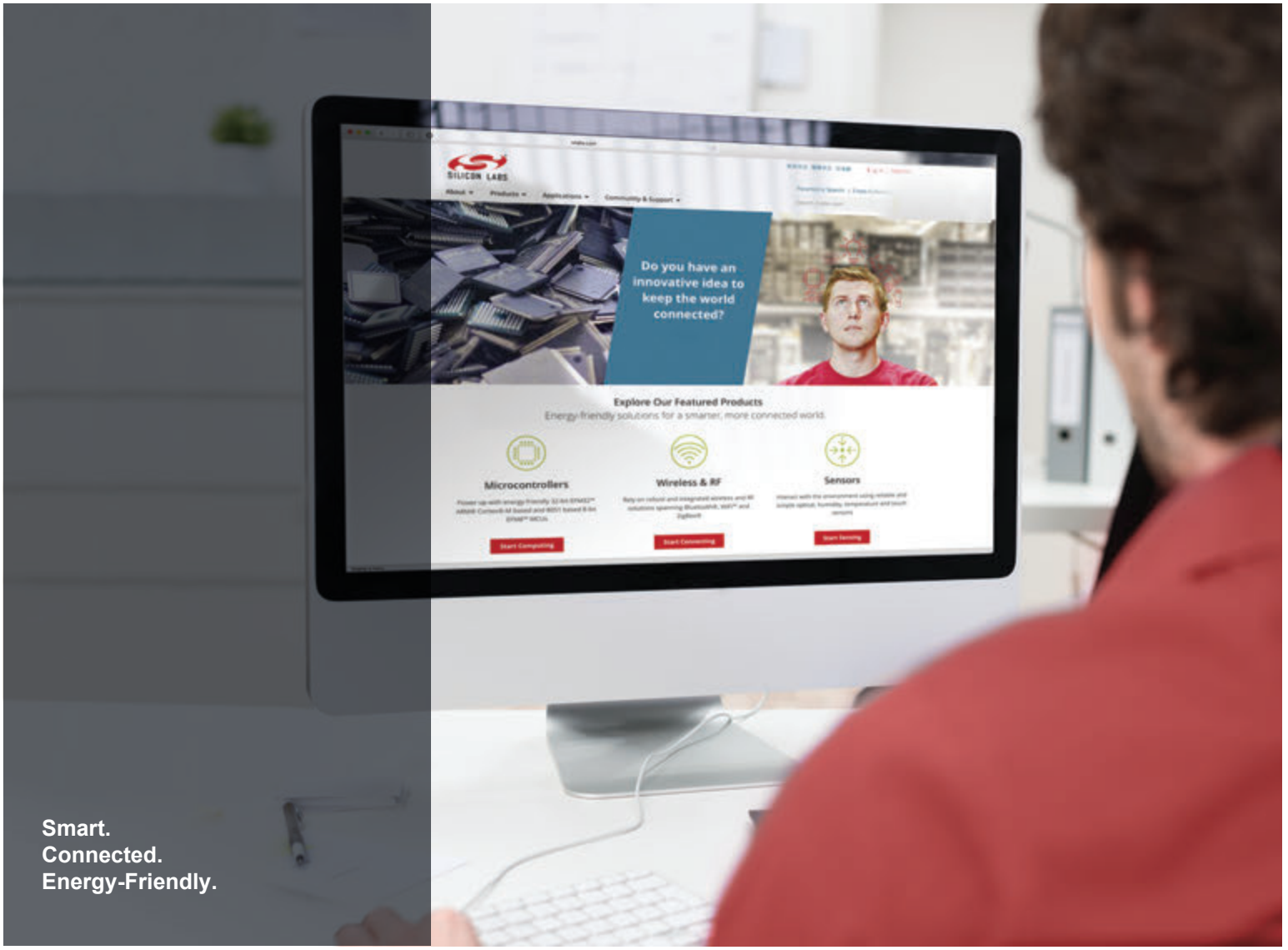
Si8752-EVB Bill of Materials

Table 5.3. Si8752-EVB Bill of Materials

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1	C1	10uF	X7R	C1210	C1210X7R500-106M	Venkel
3	C4 C5 C6	200pF	C0G	C0805	C0805C0G500-201K	Venkel
1	D1	5.6V	Zener	DO-214AA	1SMB5919BT3	On Semi
1	D2	RED	SMT, Chi-pLED	LED-HSMX-C170	HSMZ-C170	Avago Technologies
1	D3	ES1D	Fast	DO-214AC	ES1D	Diodes Inc.
5	J1 J3 J4 J6 J7	CONN TRBLK 2	TERM BLK MALE	CONN-TB-1757242	1757242	PHOENIX CONTACT
1	J5	Header 1x3	Header	CONN-1X3	TSW-103-07-G-S	Samtec
5	JP10 JP11 JP12 JP13 JP14	PLUG	TERM BLK		1757019	Phoenix Contact
5	JP5 JP6 JP7 JP8 JP9	JUMPER	Header	CONN1X2	TSW-102-07-T-S	Samtec
3	JS4 JS5 JS6	Jumper Shunt	Shunt	SHUNT	SNT-100-BK-T	Samtec
1	LB1	OPN: Si8752_EVB	POLYI-MIDE, WHITE	PTL-14-477	LABEL-Si8752_EVB	Silabs
4	MH1 MH2 MH3 MH4	4-40	HDW	MH-125NP|MH-125	NSS-4-4-01	Richco Plastic Co
1	PCB1	Si875x_EVB REV 1.0	BARE PCB	N/A	Si875x_EVB REV 1.0	SiLabs
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1	Q3	MMBT2222LT1	NPN	SOT23-BEC	MMBT2222LT1	On Semi
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4	SO1 SO2 SO3 SO4	STAND-OFF	HDW		1902D	Keystone Electronics
17	TP1 TP2 TP3 TP4 TP5 TP7 TP8 TP9 TP10 TP11 TP12 TP13 TP14 TP15 TP16 TP17 TP18	WHITE	Loop	TESTPOINT	151-201-RC	Kobiconn
1	U1	Si8752	Isolator	SO8N6.0P1.27	Si8752	SiLabs

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4	JP1 JP2 JP3 JP4	JUMPER	Header	CONN1X2	TSW-102-07-T-S	Samtec
3	JS1 JS2 JS3	Jumper Shunt	Shunt	SHUNT	SNT-100-BK-T	Samtec
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2	R1 R9	0	ThickFilm	R0402|R0402L	CR0402-16W-000	Venkel
1	R4	49.9	ThickFilm	R0805	CR0805-10W-49R9F	Venkel
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1	R6	49.9K	ThickFilm	R0805	CR0805-10W-4992F	Venkel
1	TP6	WHITE	Loop	TESTPOINT	151-201-RC	Kobiconn



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