TAS2770YFF Evaluation Module

This user's guide describes the characteristics, operation, and use of the TAS2770YFF-EVM Reference Board. A complete schematic diagram, printed-circuit board layouts, and bill of materials are included in this document.

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1 Export Control Notice

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3 Description

The TAS2770YFF is a mono, digital-input, Class-D audio amplifier optimized for efficiently driving high peak power into small loudspeakers. The Class-D amplifier is capable of delivering 18.3 W of peak power into a 4-Ω load while sustaining 1% THD+N at a battery voltage of 13.8 V. Integrated speaker voltage and current sense provides for real time monitoring of loudspeaker behavior. Up to eight devices can share a common bus through either I2S or TDM + I^2C or Soundwire^{SM} interfaces. Two PDM inputs are provided for low latency playback or sensor aggregation.

The TAS2770YFF-EVM supports evaluation and development with the TAS2770YFF device through the following interfaces:

- USB interface
  - TAS2770YFF control through PurePath™ Console 3 (PPC3) GUI, USB-HID
  - USB-class audio device, compatible with Microsoft® Windows® 7+
- Digital audio AP and PSIA interface through 100-mil headers
- I^2C interface for TAS2770YFF control
- Soundwire^{SM} interface for TAS2770YFF control

4 Specifications

Table 1 lists the reference board specifications.

Table 1. Reference Board Specifications

Amplifier power supply (VBAT)	4.5 to 16 V
EVM power supply	4.5 to 16 V
I/O power supply (IOVDD)	1.65 to 1.95 V
Output power	18.3 W
USB, USB class-audio	Micro-USB B

5 Software

The TAS2770YFF EVM can be easily configured with PPC3 running the TAS2770YFF plug-in.

NOTE: The evaluation driver currently distributed for use with this EVM periodically injects a tone into the data stream. This is intentional behavior for this version of the driver; Texas Instruments is in the process of legal procurement of the full release version of this driver that will resolve this issue. As soon as the full-release version is available it will be provided to the end user.

6 Mono Setup

Use the following instructions to complete the mono setup:

1. Install PPC3 with the TAS2770YFFEVM plug-in.
2. Connect a speaker to J10 on the EVM. Alternatively, J20 and J15 can be used for speaker connections.
3. Attach a power supply to connector J9. There is also an alternate barrel jack connector (J19) adjacent to this connector.
4. Set jumper J13 to select the desired I^2C address for channel 1.
5. Connect the EVM to a Windows® 7 or higher PC with a micro-USB cable (J16).

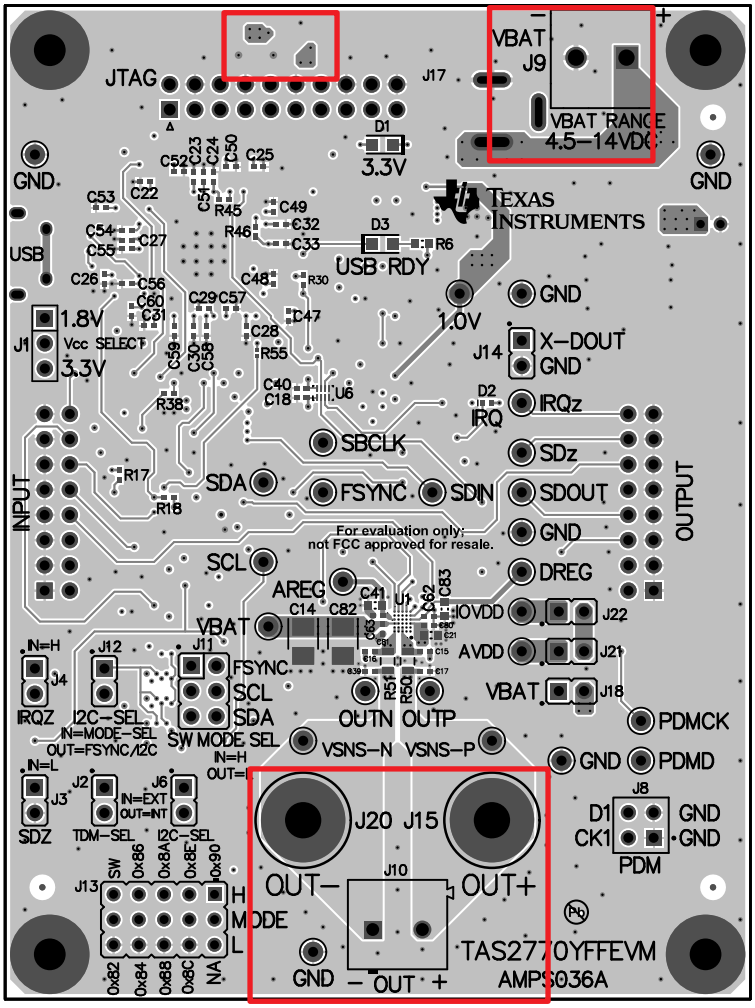

Figure 1. TAS2770YFF-REF1 Stereo Configuration

6. Verify that the EVM is the default playback device by opening the sound dialog from the *Windows Control Panel* as shown in Figure 2.

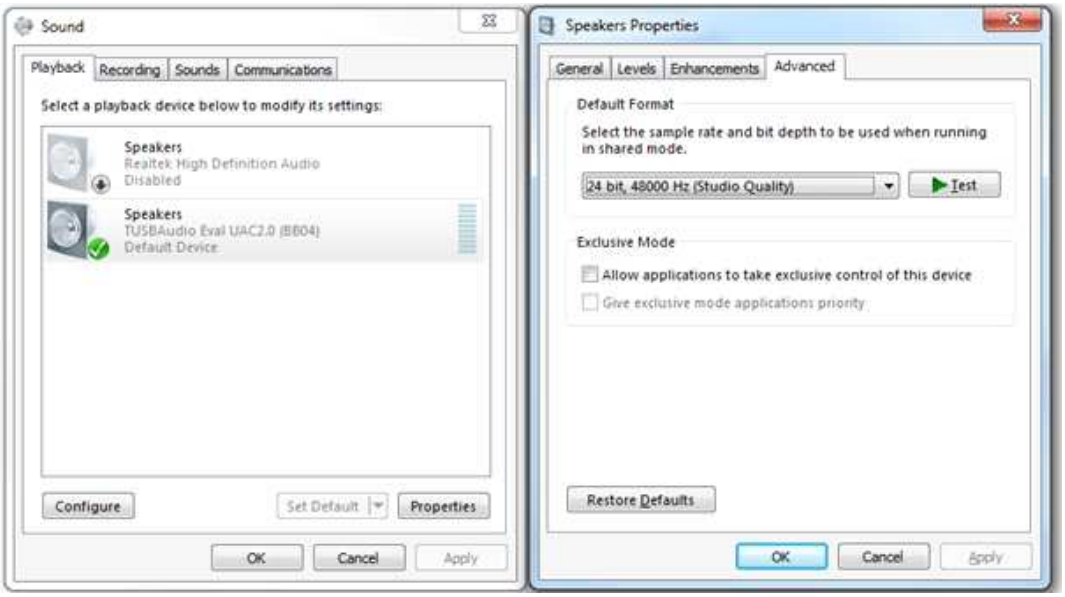

Figure 2. Playback Device Settings

7. Set the sampling rate using the Windows setting by opening Properties → Advanced. The TAS2770YFF-EVM supports 44.1-kHz and 48-kHz sampling rates.
8. Set the bit depth as desired using the Texas Instruments Audio USB Control Panel that is accessible from the system tray shown in Figure 3.
9. Configure the device using PPC3.

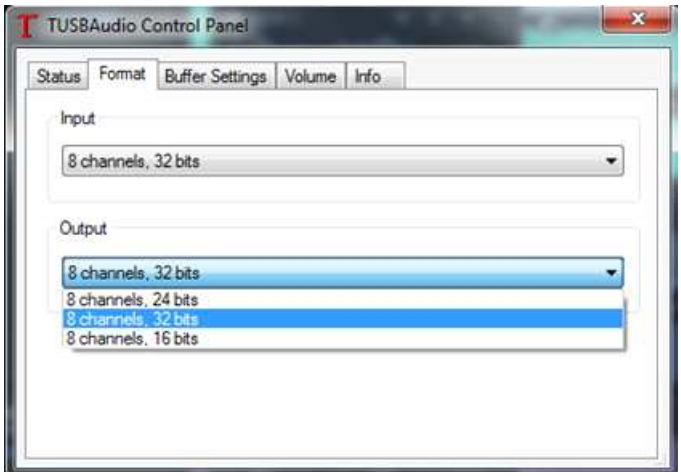

Figure 3. Texas Instruments Audio Control Panel

Refer to Table 2 for default jumper settings.

Table 2. Default Jumper Settings

V Jumper	Setting	Description
J1	3.3 V	Selects I2S or TDM logic level
J2	Remove	Selects TDM input source
J6	Remove	Selects I^2C input source
J13	0x62	Selects I^2C address
J11	Remove	Soundwire address select
J21	Insert	AVDD connect
J22	Insert	IOVDD connect
J18	Insert	VBAT connect
J8	Remove	PDM inputs
J3	Remove	SDZ pulldown
J12	Insert	FSYNC and I^2C Soundwire address enable
J4	Remove	IRQZ pullup
J14	Remove	3.3-V SDOUT

7 Multi-Channel Setup

Use the following instructions to complete the multi-channel setup:

1. Install PPC3 with the TAS2770YFFEVM plug-in.
2. Connect up to eight TAS2770YFF EVMs together using connectors J5 and J7.
3. Attach a power supply to each board.
4. The leftmost board should have jumpers set to match the mono configuration. On all other boards insert a jumper on J2 and J6. PPC3 will recognize 1-, 2-, 4-, or 8-channel setups. See Figure 4 for details.
5. Set Jumper J13 on each board to a unique address.
6. Verify that the EVM is the default playback device by opening the sound dialog from the *Windows Control Panel* as shown in Figure 2.
7. Set the sampling rate using the Windows setting by opening Properties → Advanced. The TAS2770YFF-EVM supports 44.1-kHz and 48-kHz sampling rates.
8. Set the bit depth as desired using the Texas Instruments Audio USB Control Panel that is accessible from the system tray shown in Figure 3.
9. Proceed to configure the device using PPC3.
10. Connect the leftmost EVM to a Windows 7 or later PC with a micro-USB cable (J16).

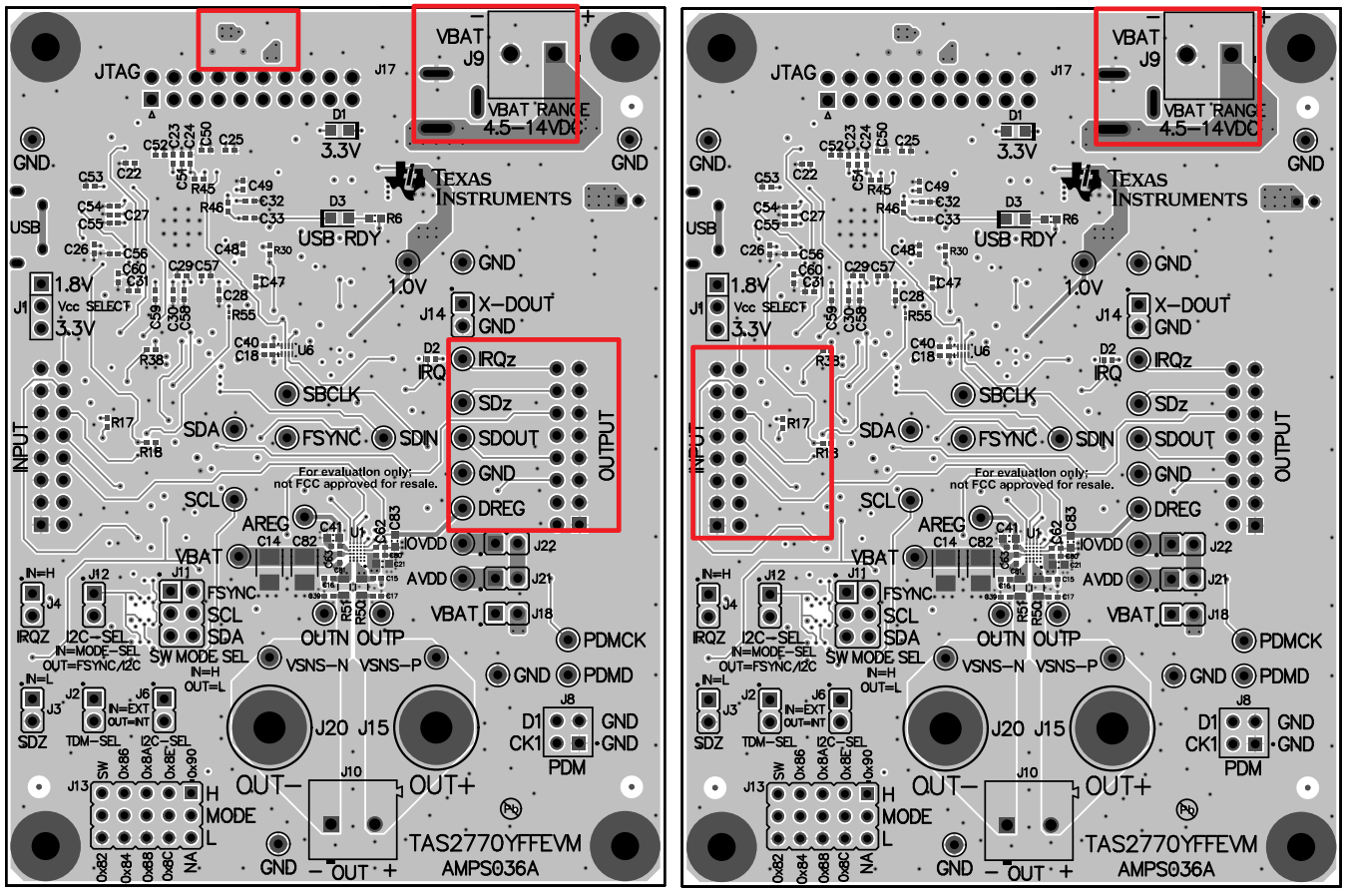

Figure 4. Multi-Channel Setup

8 Digital Audio Interfaces

The various digital audio interfaces on the TAS2770YFF Reference Board can be selected through hardware settings and software settings. Several headers close to the TAS2770YFF device allow access to the following digital audio signals:

- I2S data out (SDOUT) from the TAS2770YFF (for example, current and voltage sense data)
- I2S data in (SDIN) to the TAS2770YFF
- I2S word clock or frame sync (FSYNC)
- I2S bit clock (SBCLK)
- PDM clock (PDMCLK0) – optional input source for TAS2770YFF
- PDM clock (PDMCLK1) – optional input source for TAS2770YFF
- PDM data (PDMD0) – optional input source for TAS2770YFF
- PDM data (PDMD1) – optional input source for TAS2770YFF
- I^2C clock (SCLK)
- I^2C data (SDA)

The TAS2770YFF device can be configured for Soundwire^{SM} mode as well:

- Soundwire^{SM} clock: SBCLK
- Soundwire^{SM} data: SDOUT
- Soundwire^{SM} address: SDA
- Soundwire^{SM} address: FSYNC
- Soundwire^{SM} address: SCL

A jumper inserted in the SW slot of J13 sets the TAS2770YFF to Soundwire^{SM} mode. Also, J12 should be removed to enable use of J11 to set the desired device address in this mode.

The selection between USB (internal) and external inputs is controlled by jumpers J2 and J6. These jumpers set TDM and I^2C, respectively.

8.1 Digital Audio Interface Selection

8.1.1 USB

The TAS2770YFF Reference Board contains an XMOS microcontroller that acts as a USB HID and USB-class audio interface. To select USB, Remove J2 and J6 (see Figure 5).

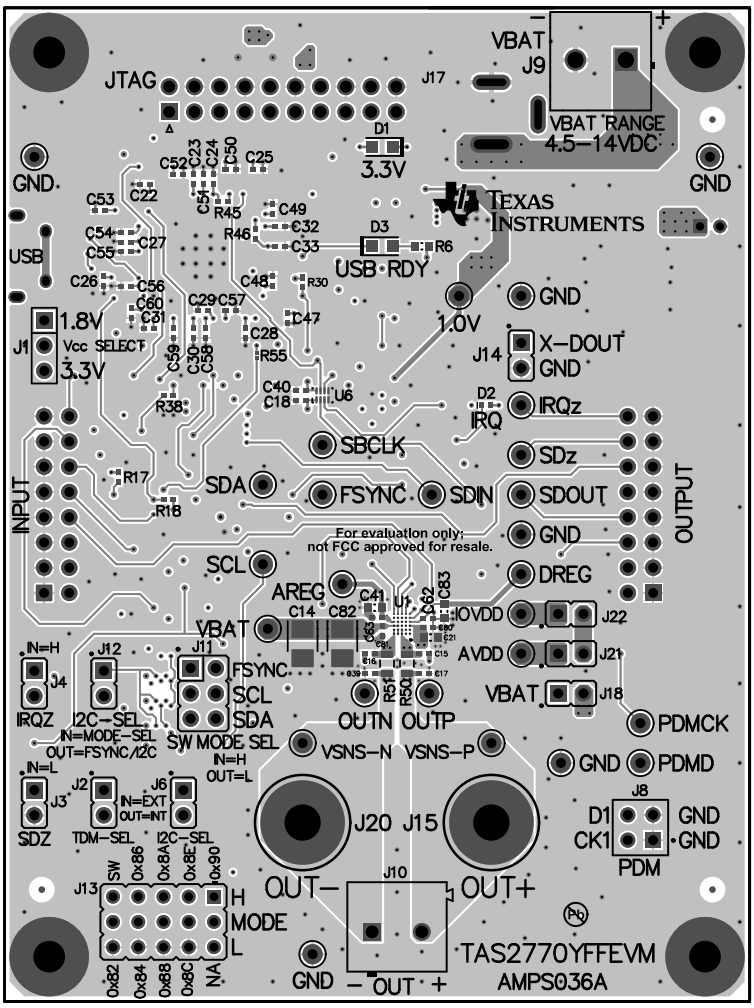

Figure 5. USB Audio Input Configuration

8.1.2 Direct (AP or PSIA)

Insert a jumper on J2 and connect the external digital audio source (for example AP or PSIA) to the external input header pin. The odd numbered pins on this header provide a ground for each signal (shown in Figure 6). The jumper setting for J1 must reflect the logic level of the external source.

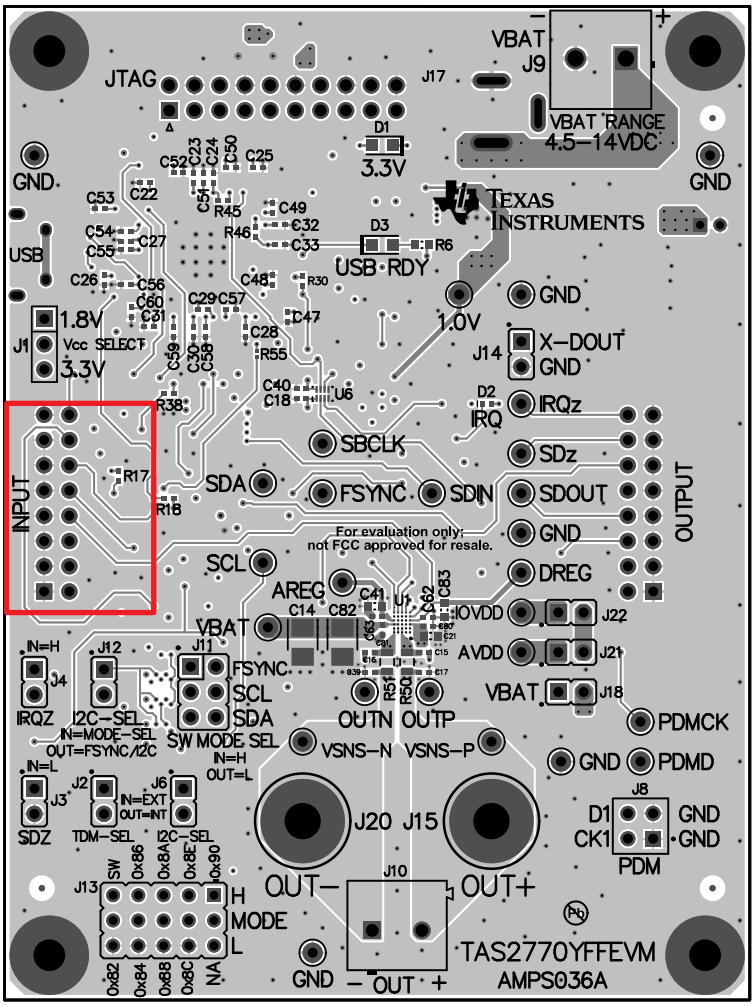

Figure 6. AP or PSIA Input Configuration

9 Hardware Documentation

9.1 TAS2770YFF-EVM Schematics

Figure 7 through Figure 11 show the TAS2770YFF-EVM schematics.

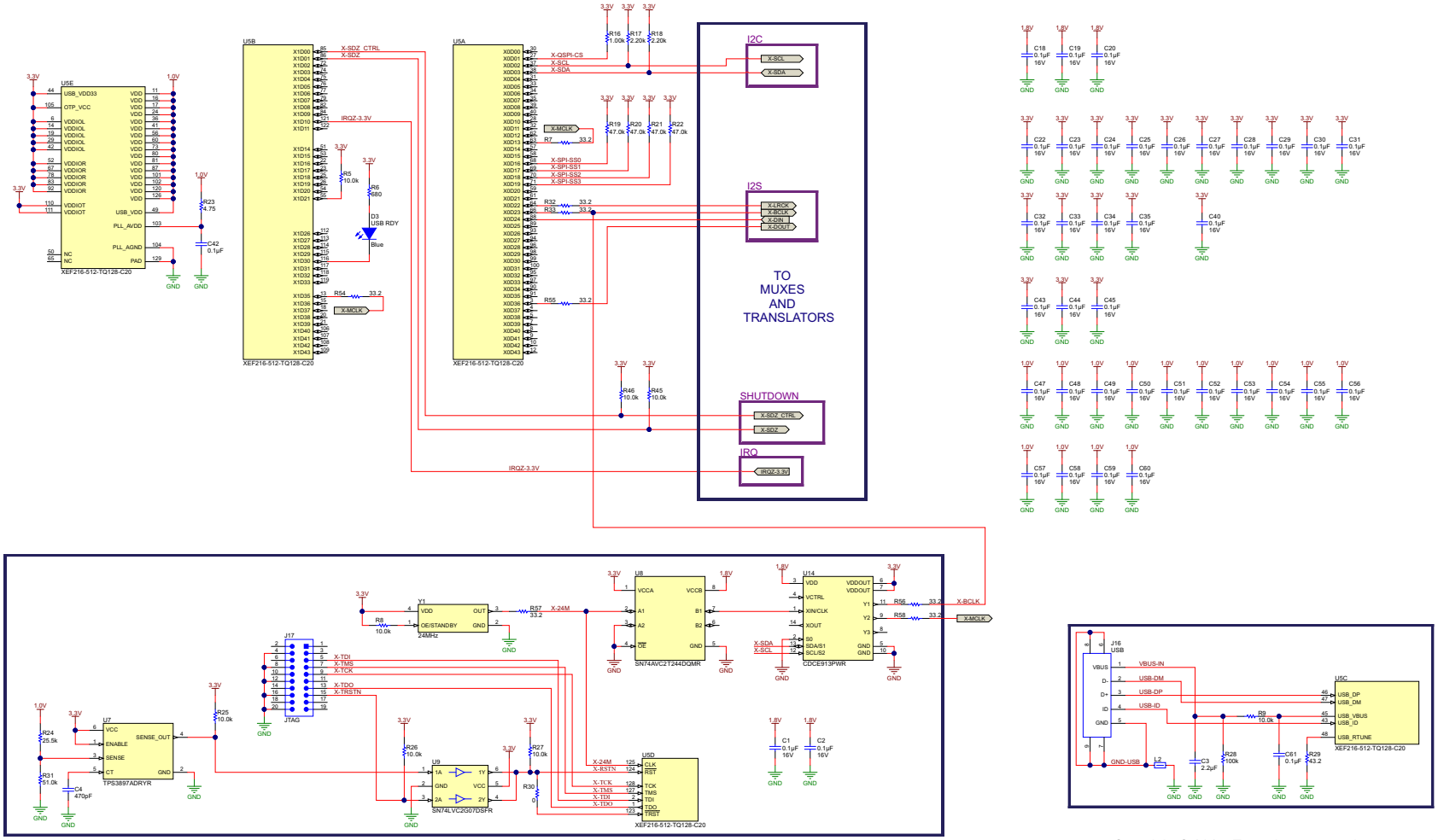

Figure 7. Schematic: XMOS USB Controller

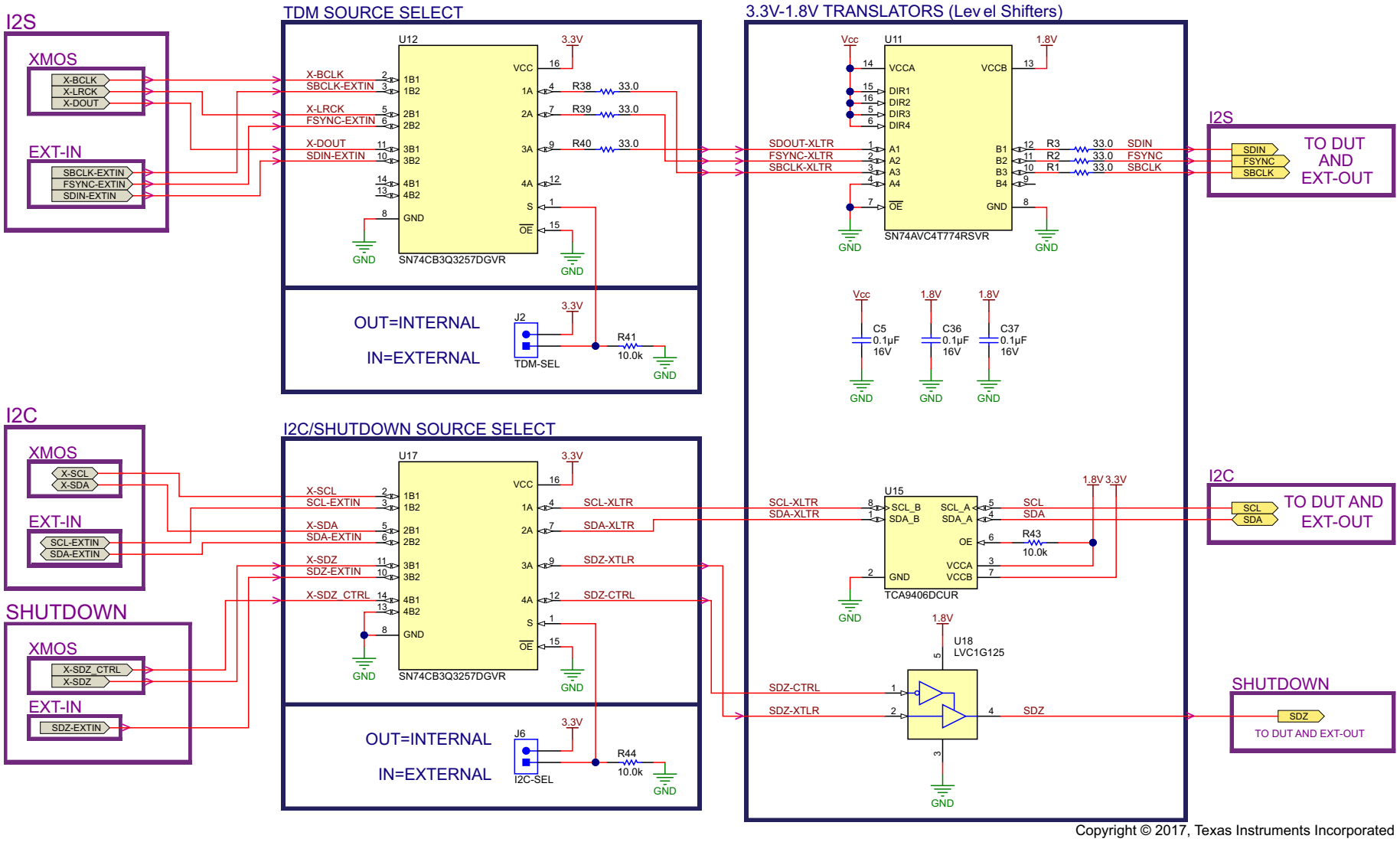

Figure 8. Schematic: Input Multiplexing and Level Shift

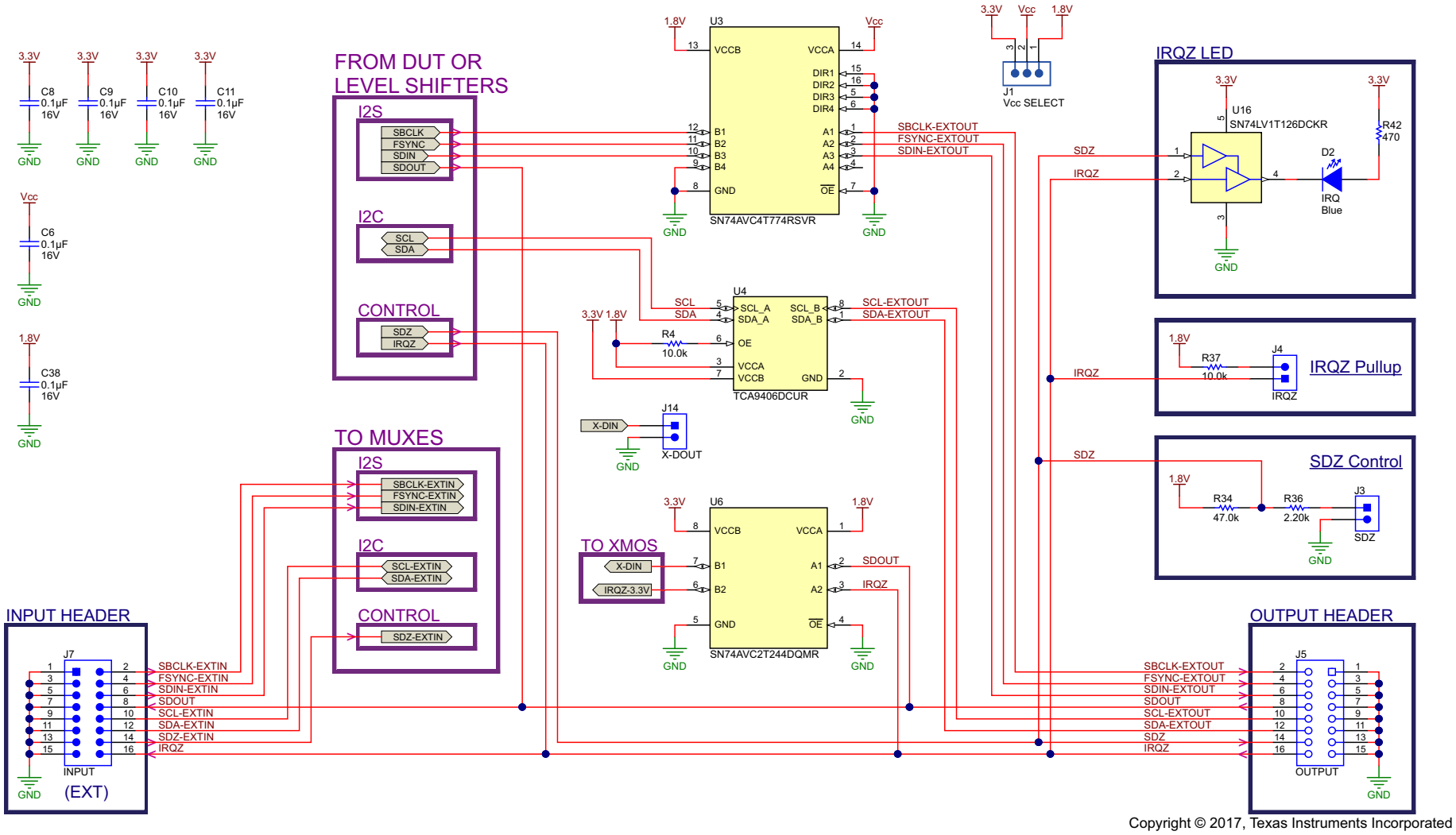

Figure 9. Schematic: External Input and Output Routing

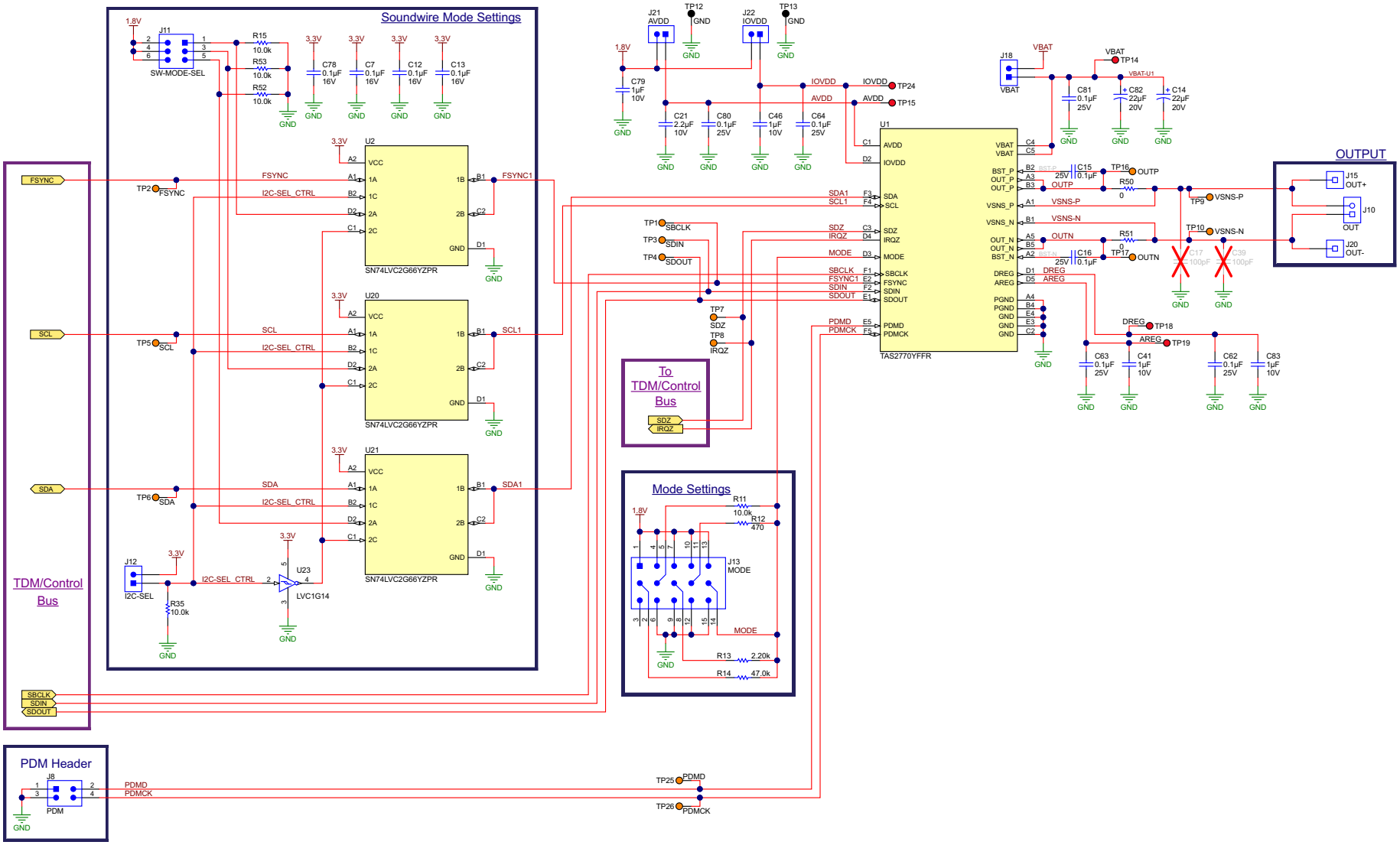

Figure 10. Schematic: TAS2770YFF Channel 1 Control

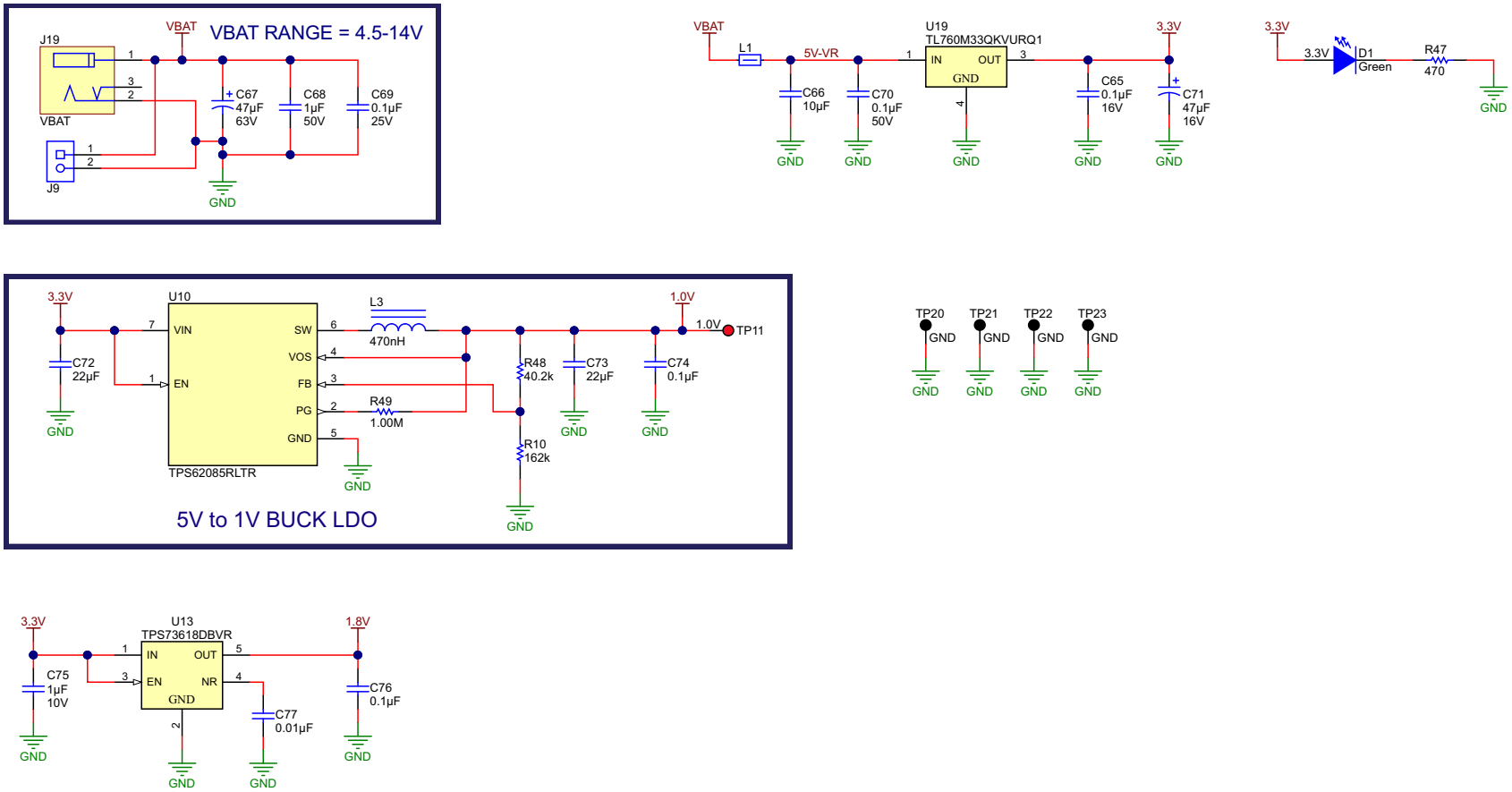

Figure 11. Schematic: Onboard Power

9.2 TAS2770YFF Reference Board Printed Circuit Board Layout

Figure 12 through Figure 19 show the PCB layout images.

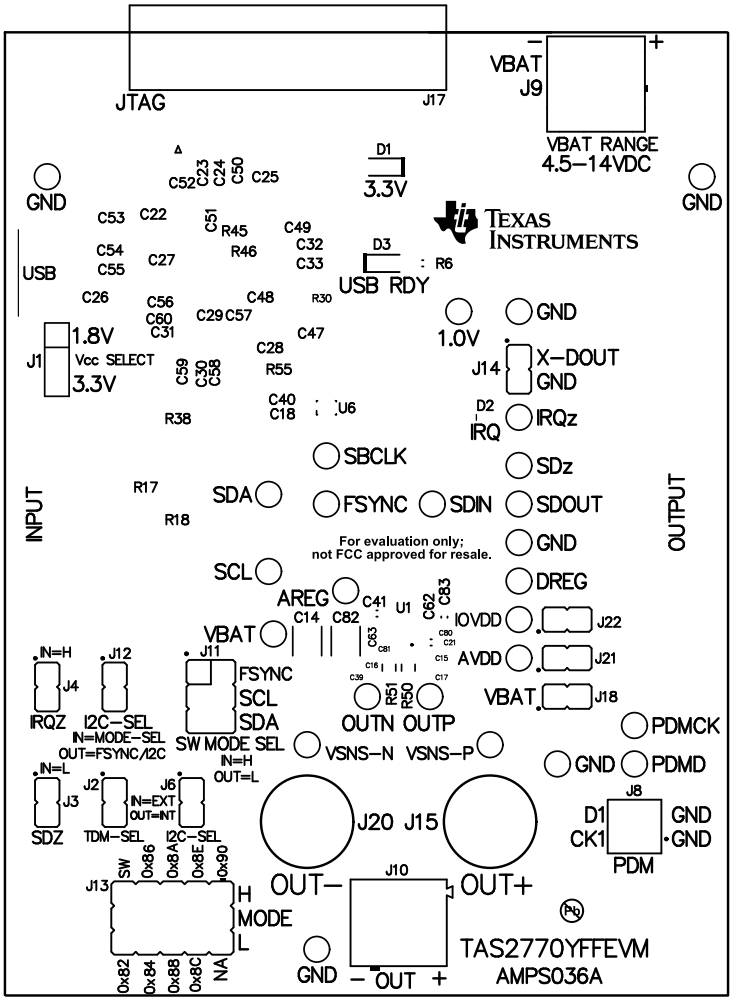

Figure 12. PCB: Top Silkscreen

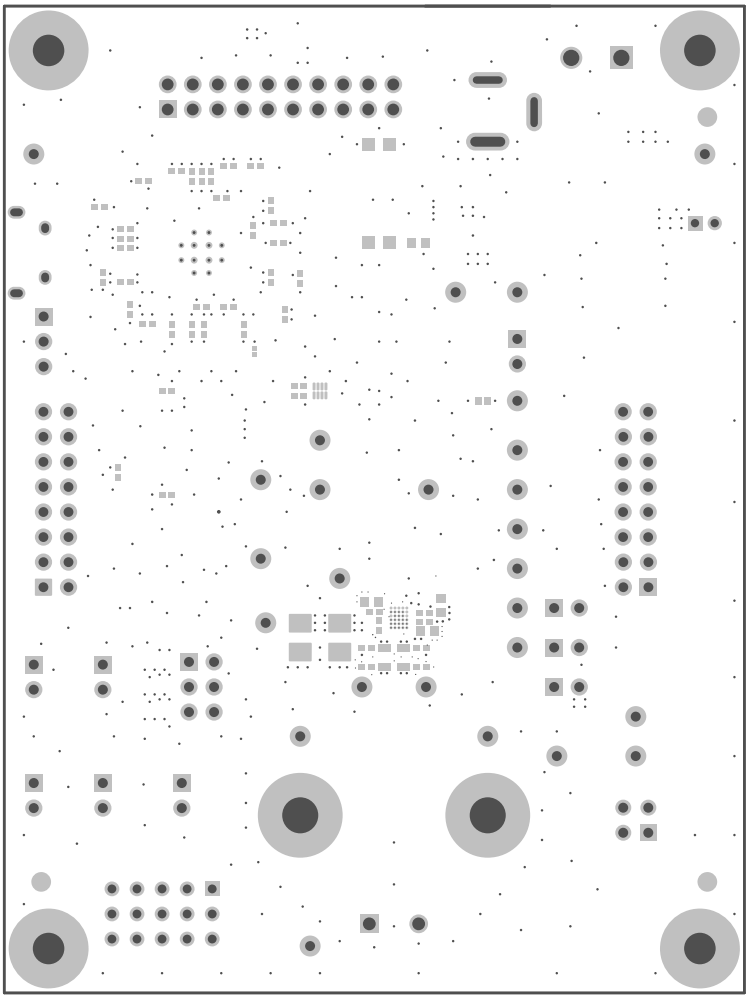

Figure 13. PCB: Top Solder Mask

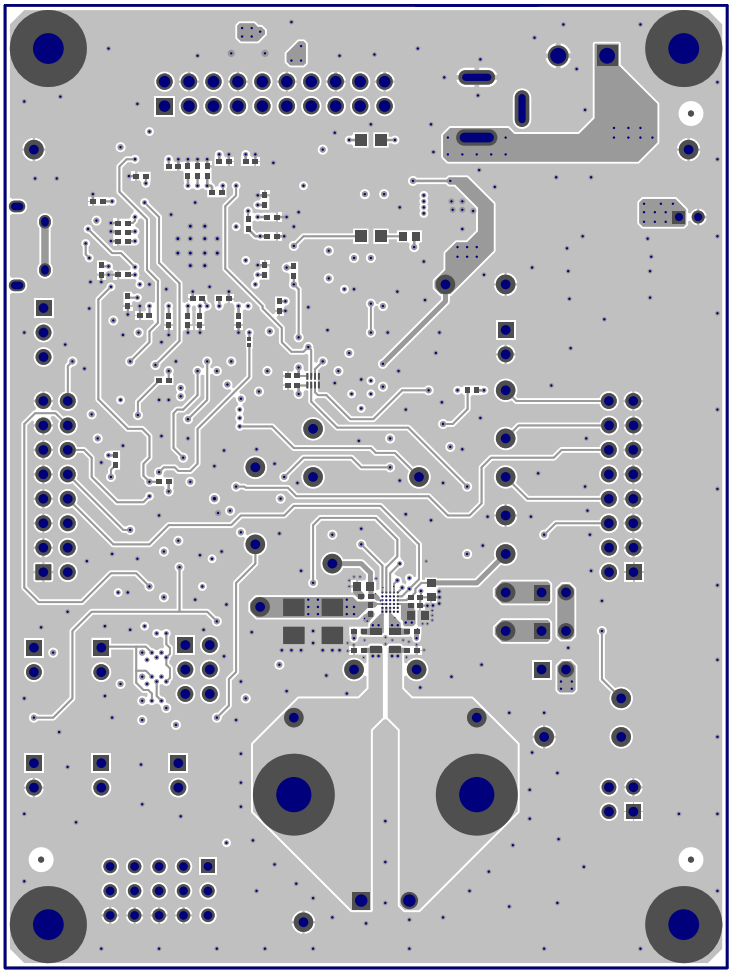

Figure 14. PCB: Top Copper

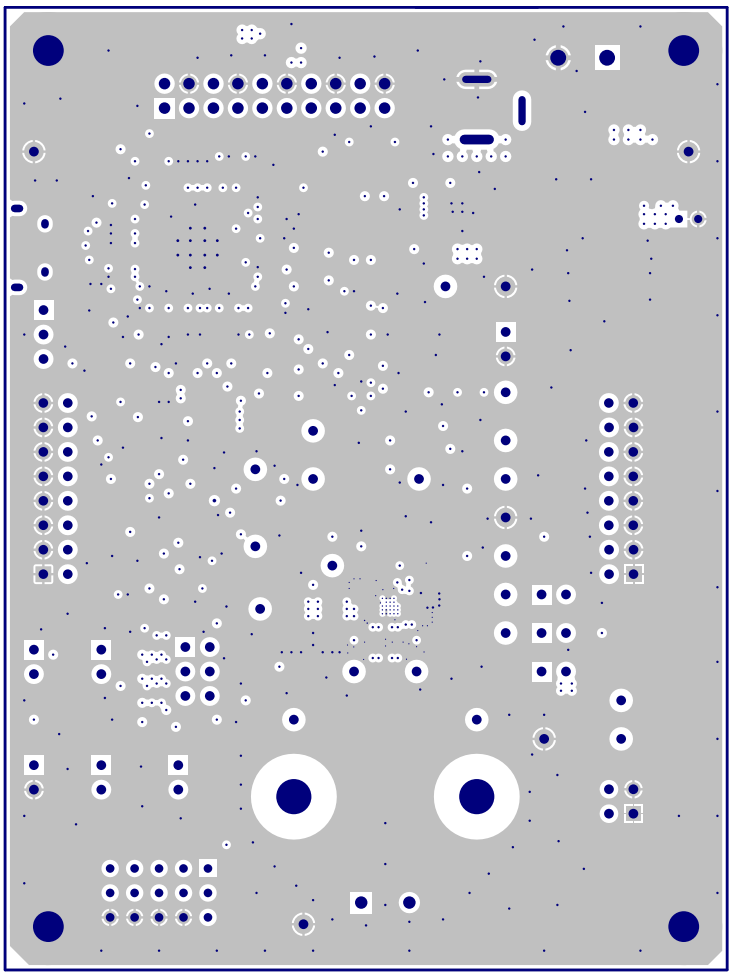

Figure 15. PCB: Copper Layer 2

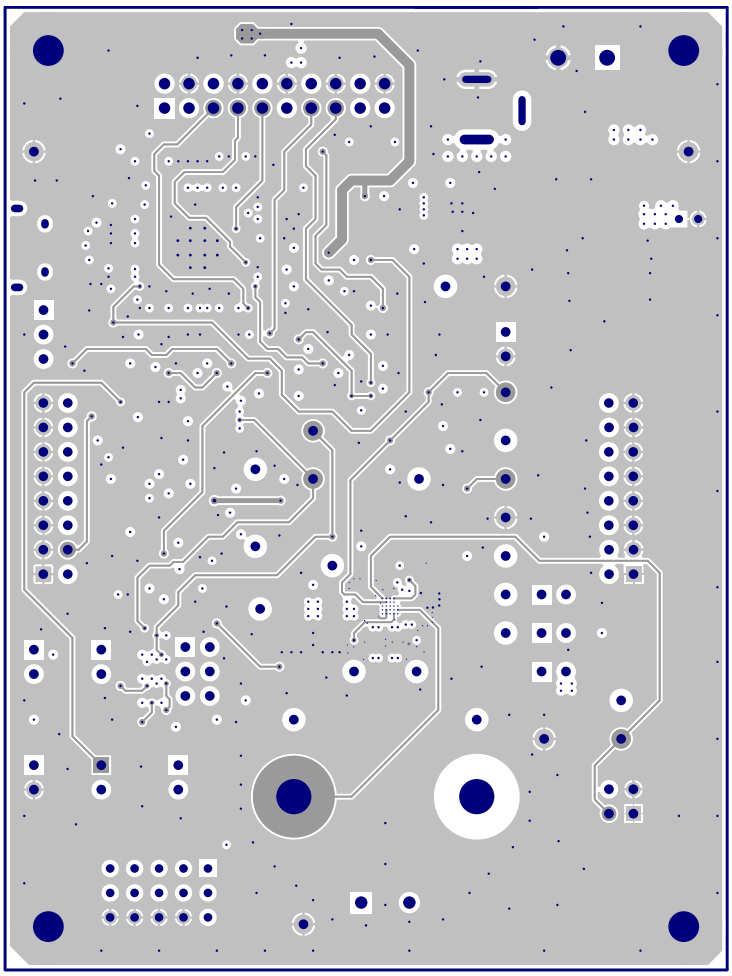

Figure 16. PCB: Copper Layer 3

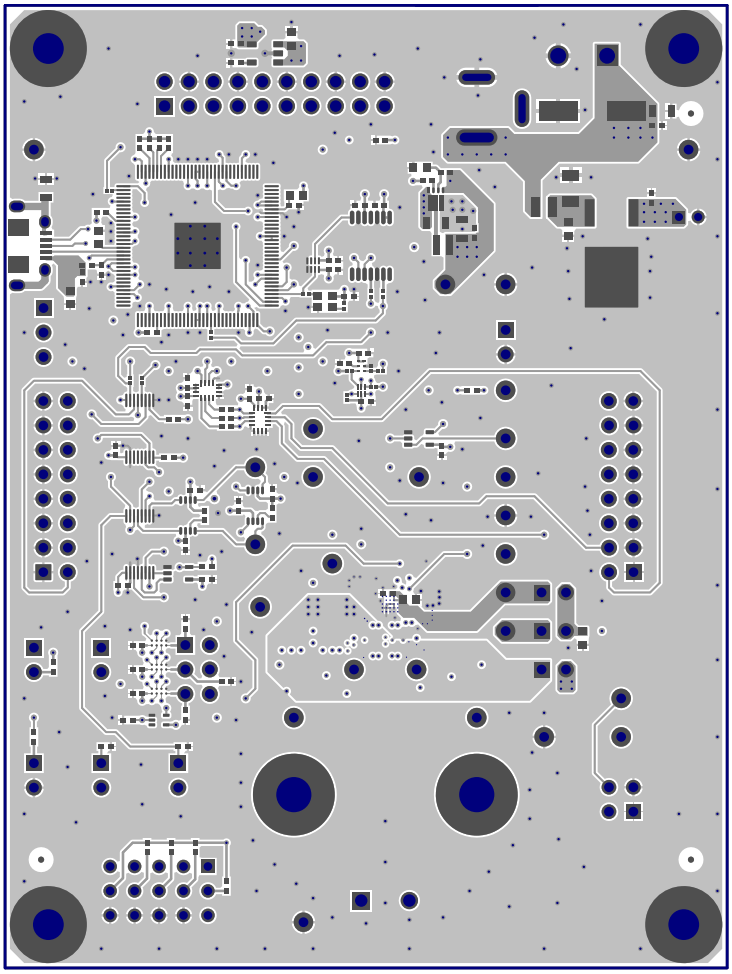

Figure 17. PCB: Bottom Copper

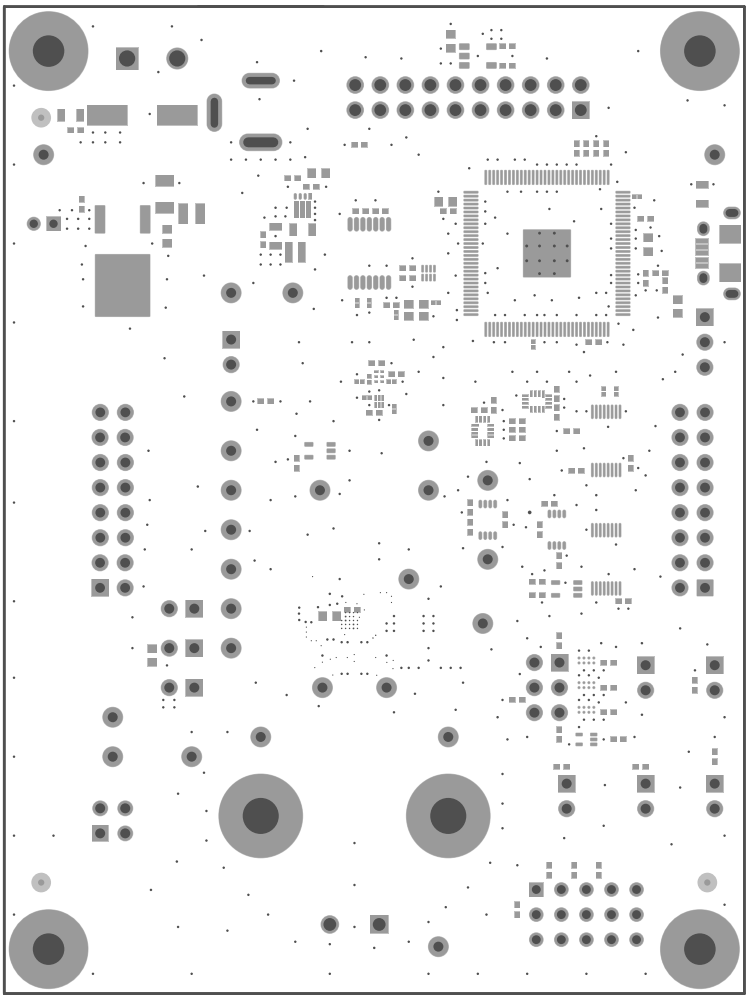

Figure 18. PCB: Bottom Solder Mask

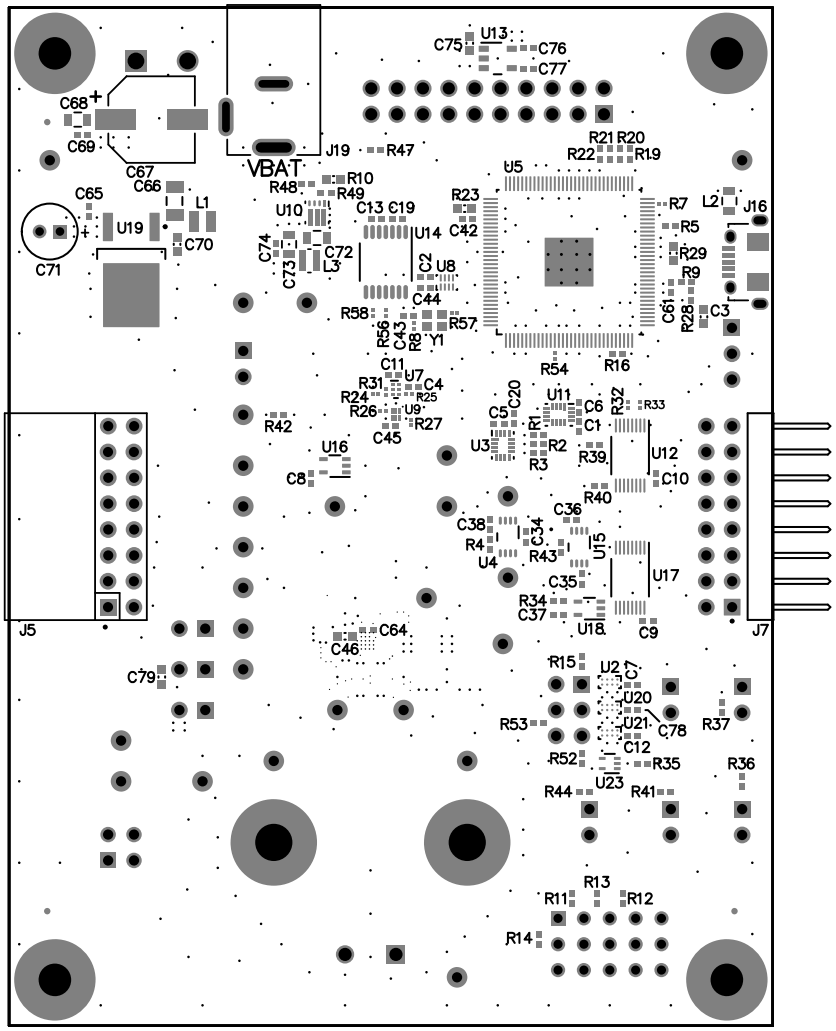

Figure 19. PCB: Bottom Silk Screen

9.3 TAS2770YFF Evaluation Board Bill of Materials

Table 3 displays the EVM BOM.

Table 3. TAS2770YFFEVM Bill of Materials(1)

Designator	QTY	Value	Description	Package Reference	Part Number	Manufacturer	Alternate Part Number	Alternate Manufacturer
!PCB1	1		Printed Circuit Board		AMPS022	Any	-	-
C1, C2, C5, C6, C8, C9, C10, C11, C12, C13, C14, C15, C18, C19, C20, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C40, C43, C44, C45, C47, C48, C49, C50, C51, C52, C53, C54, C55, C56, C57, C58, C59, C60, C78	51	0.1 µF	Capacitor, Ceramic, 0.1µF, 16V, ±10%, X7R, 0402	0402	GRM155R71C104KA88D	Murata		
C3	1	2.2 µF	Capacitor, Ceramic, 2.2 µF, 10 V, ±10%, X7R, 0603	0603	GRM188R71A225KE15D	Murata		
C4	1	470 pF	Capacitor, Ceramic, 470 pF, 25 V, ±5%, C0G/NP0, 0402	0402	GRM1555C1E471JA01D	Murata		
C7	1	1 µF	Capacitor, Ceramic, 1 µF, 25 V,±10%, X5R, 0603	0603	GRM188R61E105KA12D	Murata		
C16, C17, C21, C46, C75, C79	6	1 µF	Capacitor, Ceramic, 1 µF, 10 V, ±10%, X7R, 0603	0603	GRM188R71A105KA61D	Murata		
C39, C62, C63, C64, C69, C80, C81, C84	8	0.1 µF	Capacitor, Ceramic, 0.1 µF, 25 V, ±20%, X7R, 0402	0402	C1005X7R1E104M050BB	TDK		
C42, C61, C65, C74	4	0.1 µF	Capacitor, Ceramic, 0.1 µF, 16 V, ±10%, X7R, 0402	0402	GRM155R71C104KA88D	Murata		
C66	1	10 µF	Capacitor, Ceramic, 10 µF, 35 V, ±10%, X7R, 1206	1206	GMK316AB7106KL	Taiyo Yuden		
C67	1	47 µF	Capacitor, AL, 47 µF, 63 V, ±20%, 0.65 Ω, AEC-Q200 Grade 2, SMD	SMT Radial F	EEE-FK1J470P	Panasonic		
C68	1	1 µF	Capacitor, Ceramic, 1 µF, 50 V, ±10%, X7R, 0805	0805	GRM21BR71H105KA12L	Murata		
C70	1	0.1 µF	Capacitor, Ceramic, 0.1 µF, 50 V, ±10%, X7R, 0603	0603	GCM188R71H104KA57D	Murata		
C71	1	47 µF	Capacitor, AL, 47 µF, 16 V, ±20%, 0.8 Ω, AEC-Q200 Grade 2, TH	D5xL11mm	EEU-FC1C470	Panasonic		
C72, C73	2	22 µF	Capacitor, Ceramic, 22 µF, 10 V, ±20%, X7R, 0805	0805	GRM21BZ71A226ME15L	Murata		
C76	1	0.1 µF	Capacitor, Ceramic, 0.1 µF, 10 V, ±10%, X7R, 0402	0402	GRM155R71A104KA01D	Murata		
C77	1	0.01 µF	Capacitor, Ceramic, 0.01 µF, 6.3 V, ±10%, X7R, 0402	0402	GRM155R70J103KA01D	Murata		
C82, C83	2	22 µF	Capacitor, Tantalum Polymer, 22 µF, 20 V, ±20%, 0.09 Ω, 3528-21 SMD	3528-21	TCJB226M020R0090	AVX		
D1	1	Green	LED, Green, SMD	LED_0805	LTST-C171GKT	Lite-On		
D2	1	Blue	LED, Blue, SMD	Blue LED	SMLP12BC7TT86	Rohm		
D3	1	Blue	LED, Blue, SMD	LED_0805	LTST-C170TBKT	Lite-On		
H1, H2, H3, H4	4		Machine Screw, Round, #4-40 × 1/4, Nylon, Philips panhead	Screw	NY PMS 440 0025 PH	B&F Fastener Supply		
H5, H6, H7, H8	4		Standoff, Hex, 0.5"L #4-40 Nylon	Standoff	1902C	Keystone	-	-
J1	1		Header, 100 mil, 3 × 1, Gold, TH	PBC03SAAN	PBC03SAAN	Sullins Connector Solutions		
J2, J3, J4, J6, J12, J14, J18, J21, J22	9		Header, 100 mil, 2 × 1, Gold, TH	Sullins 100mil, 1x2, 230 mil above insulator	PBC02SAAN	Sullins Connector Solutions		
J5	1		Receptacle, 100mil, 8 × 2, Gold, R/A, TH	SSQ-108-02-G-D-RA	SSQ-108-02-G-D-RA	Samtec		

(1) Unless otherwise noted in the *Alternate Part Number* or *Alternate Manufacturer* columns, all parts may be substituted

Table 3. TAS2770YFFEVM Bill of Materials[(1)] (continued)

Designator	QTY	Value	Description	Package Reference	Part Number	Manufacturer	Alternate Part Number	Alternate Manufacturer
J7	1		Header, 100mil, 8 × 2, Gold, R/A, TH	8x2 R/A Header	TSW-108-08-G-D-RA	Samtec		
J8	1		Header, 100mil, 4 × 2, Tin, TH	Header, 4x2, 100mil, Tin	PEC04DAAN	Sullins Connector Solutions		
J9	1		Terminal Block, 5.08 mm, 2 × 1, TH	Terminal Block, 5.08mm, 2x1, TH	0395443002	Molex		
J10	1		Terminal Block, 5 mm, 2 × 1, Tin, TH	Terminal Block, 5 mm, 2x1, TH	691 101 710 002	Wurth Elektronik		
J11	1		Header, 100 mil, 3 × 2, Gold, TH	Sullins 100mil, 2x3, 230 mil above insulator	PBC03DAAN	Sullins Connector Solutions		
J13	1		Header, 2.54 mm, 5 × 3, Gold, TH	Header, 2.54mm, 5x3, TH	804-10-015-10-002000	Mill-Max		
J15	1		Binding Post, RED, TH	11.4x27.2mm	7006	Keystone		
J16	1		Connector, Receptacle, Micro-USB Type AB, R/A, Bottom Mount SMT	Connector, USB Micro AB	DX4R205JJAR1800	JAE Electronics		
J17	1		Receptacle, 50 mil, 6 × 1, Gold, R/A, TH	6x1 Receptacle	LPPB061NGCN-RC	Sullins Connector Solutions		
J19	1		Power Jack, mini, 2.5 mm OD, R/A, TH	Jack, 14.5x11x9mm	RAPC712X	Switchcraft		
J20	1		Binding Post, BLACK, TH	11.4x27.2mm	7007	Keystone		
L1	1	300 Ω	Ferrite Bead, 300 Ω @ 100 MHz, 3.1 A, 0806	0806	NFZ2MSM301SN10L	Murata		
L2	1	600 Ω	Ferrite Bead, 600 Ω @ 100MHz, 2 A, 0805	0805	MPZ2012S601A	TDK		
L3	1	470 nH	Inductor, Shielded Drum Core, Ferrite, 470 nH, 2 A, 0.059 Ω, SMD	Inductor, 2x1.2x2mm	VLS2012ET-R47N	TDK		
R1, R2, R3, R38, R39, R40	6	33.2	Resistor, 33.2, 1%, 0.063 W, 0402	0402	CRCW040233R2FKED	Vishay-Dale		
R4, R5, R43, R45, R46	5	10 kΩ	Resistor, 10 kΩ, 5%, 0.063 W, 0402	0402	CRCW040210K0JNED	Vishay-Dale		
R6	1	680	Resistor, 680, 1%, 0.1 W, 0603	0603	RC0603FR-07680RL	Yageo America		
R7, R32, R33, R54, R55, R56, R57, R58	8	33.2	Resistor, 33.2, 1%, 0.05 W, 0201	0201	RC0201FR-0733R2L	Yageo America		
R8, R25, R26, R27	4	10 kΩ	Resistor, 10.0 kΩ, 1%, 0.05 W, 0201	0201	CRCW020110K0FKED	Vishay-Dale		
R9	1	10 kΩ	Resistor, 10.0 kΩ, 1%, 0.1 W, 0402	0402	ERJ-2RKF1002X	Panasonic		
R10	1	162 kΩ	Resistor, 162 kΩ, 1%, 0.063 W, 0402	0402	CRCW0402162KFKED	Vishay-Dale		
R11, R15, R35, R37, R52, R53	6	10 kΩ	Resistor, 10 kΩ, 1%, 0.063 W, 0402	0402	CRCW040210K0FKED	Vishay-Dale		
R12	1	470	Resistor, 470, 1%, 0.1 W, AEC-Q200 Grade 0, 0402	0402	ERJ-2RKF4700X	Panasonic		
R13, R17, R18, R36	4	2.2 kΩ	Resistor, 2.2 kΩ, 5%, 0.063 W, 0402	0402	CRCW04022K20JNED	Vishay-Dale		
R14, R19, R20, R21, R22, R34	6	47 kΩ	Resistor, 47 kΩ, 5%, 0.063 W, 0402	0402	CRCW040247K0JNED	Vishay-Dale		
R16	1	1 kΩ	Resistor, 1 kΩ, 5%, 0.063 W, 0402	0402	CRCW04021K00JNED	Vishay-Dale		
R23	1	4.7	Resistor, 4.7, 5%, 0.1 W, 0603	0603	CRCW06034R70JNEA	Vishay-Dale		
R24	1	25.5 k	Resistor, 25.5 kΩ, 1%, 0.05 W, 0201	0201	RC0201FR-0725K5L	Yageo America		
R28	1	100 kΩ	Resistor, 100 kΩ, 5%, 0.063 W, 0402	0402	CRCW0402100KJNED	Vishay-Dale		
R29	1	43.2	Resistor, 43.2, 1%, 0.063 W, 0402	0402	CRCW040243R2FKED	Vishay-Dale		
R30	1	0	Resistor, 0, 5%, 0.063 W, 0402	0402	CRCW04020000Z0ED	Vishay-Dale		
R31	1	51 kΩ	Resistor, 51.0 kΩ, 1%, 0.05 W, 0201	0201	RC0201FR-0751KL	Yageo America		

Table 3. TAS2770YFFEVM Bill of Materials[(1)] (continued)

Designator	QTY	Value	Description	Package Reference	Part Number	Manufacturer	Alternate Part Number	Alternate Manufacturer
R41, R44, R59	3	10 kΩ	Resistor, 10.0 kΩ, 1%, 0.063W, 0402	0402	CRCW040210K0FKED	Vishay-Dale		
R42	1	360	Resistor, 360 Ω, 5%, 0.063W, 0402	0402	CRCW0402360RJNED	Vishay-Dale		
R47	1	360	Resistor, 360, 5%, 0.063 W, 0402	0402	CRCW0402360RJNED	Vishay-Dale		
R48	1	40.2 kΩ	Resistor, 40.2 kΩ, 1%, 0.063 W, 0402	0402	CRCW040240K2FKED	Vishay-Dale		
R49	1	1.00 Meg	Resistor, 1.00 M, 1%, 0.063 W, 0402	0402	CRCW04021M00FKED	Vishay-Dale		
R50, R51	2	0	Resistor, 0, 5%, 0.125 W, 0805	0805	RC0805JR-070RL	Yageo America		
SH1, SH2, SH3, SH4, SH5, SH6, SH7, SH8, SH9, SH10, SH11, SH12	12	1x2	Shunt, 100 mil, Gold plated, Black	Shunt	969102-0000-DA	3M	SNT-100-BK-G	Samtec
TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP16, TP17, TP25, TP26, TP27, TP28	16	Orange	Test Point, Miniature, Orange, TH	Orange Miniature Testpoint	5003	Keystone		
TP11, TP14, TP15, TP18, TP19, TP24	6		Test Point, Miniature, Red, TH	Red Miniature Testpoint	5000	Keystone		
TP12, TP13, TP20, TP21, TP22, TP23	6		Test Point, Miniature, Black, TH	Black Miniature Testpoint	5001	Keystone		
U1	1		TBD Data, VQFN26-RJQ	RJQ00026	TAS2770RJQ	Texas Instruments		Texas Instruments
U2, U20, U21	3		Dual Bilateral Analog Switch, YZP0008ADAD (DSBGA-8)	YZP0008ADAD	SN74LVC2G66YZPR	Texas Instruments		Texas Instruments
U3, U11	2		4-BIT DUAL-SUPPLY BUS TRANSCEIVER WITH CONFIGURABLE VOLTAGE TRANSLATION AND 3-STATE OUTPUTS, RSV0016A (UQFN-16)	RSV0016A	SN74AVC4T774RSVR	Texas Instruments		Texas Instruments
U4, U15	2		TCA9406 Dual Bidirectional 1-MHz I2C-BUS and SMBus Voltage Level-Translator, 1.65 to 3.6 V, -40 to 85 degC, 8-pin US8 (DCU), Green (RoHS & no Sb/Br)	DCU0008A	TCA9406DCUR	Texas Instruments	Equivalent	Texas Instruments
U5	1		IC MCU 512KB RAM, 128TQFP	TQFP-128	XEF216-512-TQ128-C20	XMOS semiconductor		
U6	1		Dual-Bit Dual-Supply Bus Transceiver, DQM0008A (X2SON-8)	DQM0008A	SN74AVC2T244DQMR	Texas Instruments		Texas Instruments
U7	1		Single-Channel, Adjustable Supervisory Circuit in Ultra-Small Package, DRY0006A (USON-6)	DRY0006A	TPS3897ADRYR	Texas Instruments	TPS3897ADRYT	Texas Instruments
U8	1		2-BIT UNDIRECTIONAL VOLTAGE-LEVEL TRANSLATOR, DQM0008A (X2SON-8)	DQM0008A	SN74AVC2T244DQMR	Texas Instruments		Texas Instruments
U9	1		DUAL BUFFER/DRIVER WITH OPEN DRAIN OUTPUTS, DSF0006A	DSF0006A	SN74LVC2G07DSFR	Texas Instruments		Texas Instruments
U10	1		3-A Step-Down Converter with Hiccup Short Circuit Protection in 2x2 QFN Package, RLT0007A	RLT0007A	TPS62085RLTR	Texas Instruments	TPS62085RLTT	Texas Instruments
U12, U17	2		4-Bit 1-of-2 FET Multiplexer/Demultiplexer 2.5-V/3.3-V Low-Voltage High-Bandwidth Bus Switch, DGV0016A	DGV0016A	SN74CB3Q3257DGVR	Texas Instruments		Texas Instruments
U13	1		Single Output Low Noise LDO, 400 mA, Fixed 1.8 V Output, 1.7 to 5.5 V Input, with Reverse Current Protection, 5-pin SOT-23 (DBV), -40 to 85 degC, Green (RoHS & no Sb/Br)	DBV0005A	TPS73618DBVR	Texas Instruments	Equivalent	Texas Instruments
U14	1		Programmable 1-PLL VCXO Clock Synthesizer With 1.8-V, 2.5-V, and 3.3-V Outputs, PW0014A (TSSOP-14)	PW0014A	CDCE913PWR	Texas Instruments	CDCE913PW	Texas Instruments
U16	1		Single Power Supply Single Buffer Gate with 3-State Output CMOS Logic Level Shifter, DCK0005A	DCK0005A	SN74LV1T126DCKR	Texas Instruments		Texas Instruments
U18	1		Single Bus Buffer Gate With 3-State Output, DCK0005A (SOT-5)	DCK0005A	SN74LVC1G125DCKR	Texas Instruments	SN74LVC1G125DCKT	Texas Instruments

Table 3. TAS2770YFFEVM Bill of Materials[(1)] (continued)

Designator	QTY	Value	Description	Package Reference	Part Number	Manufacturer	Alternate Part Number	Alternate Manufacturer
U19	1		Single Output Automotive LDO, 500 mA, Fixed 3.3-V Output, 3.8-V to 26-V Input, 3-pin PFM (KVU), –40 to +125°C, Green (RoHS & no Sb/Br)	KVU0003A	TL760M33QKVURQ1	Texas Instruments	Equivalent	Texas Instruments
U22	1		SINGLE SCHMITT-TRIGGER INVERTER, DRL0005A (SOT-5)	DRL0005A	SN74LVC1G14DRLR	Texas Instruments		Texas Instruments
Y1	1		OSC, 24 MHz, 2.25 V to 3.63 V, SMD	2 mm × 1.6 mm	ASTMLPA-24.000MHZ-EJ-E-T	Abracon Corporation		
C41, C85	0	100 pF	Capacitor, Ceramic, 100 pF, 50 V, ±5%, C0G/NP0, 0402	0402	GRM1555C1H101JA01D	Murata		
FID1, FID2, FID3, FID4, FID5, FID6	0		Fiducial mark. There is nothing to buy or mount.	N/A	N/A	N/A		

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Date	Revision	Description
December 2017	*	Initial Release

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