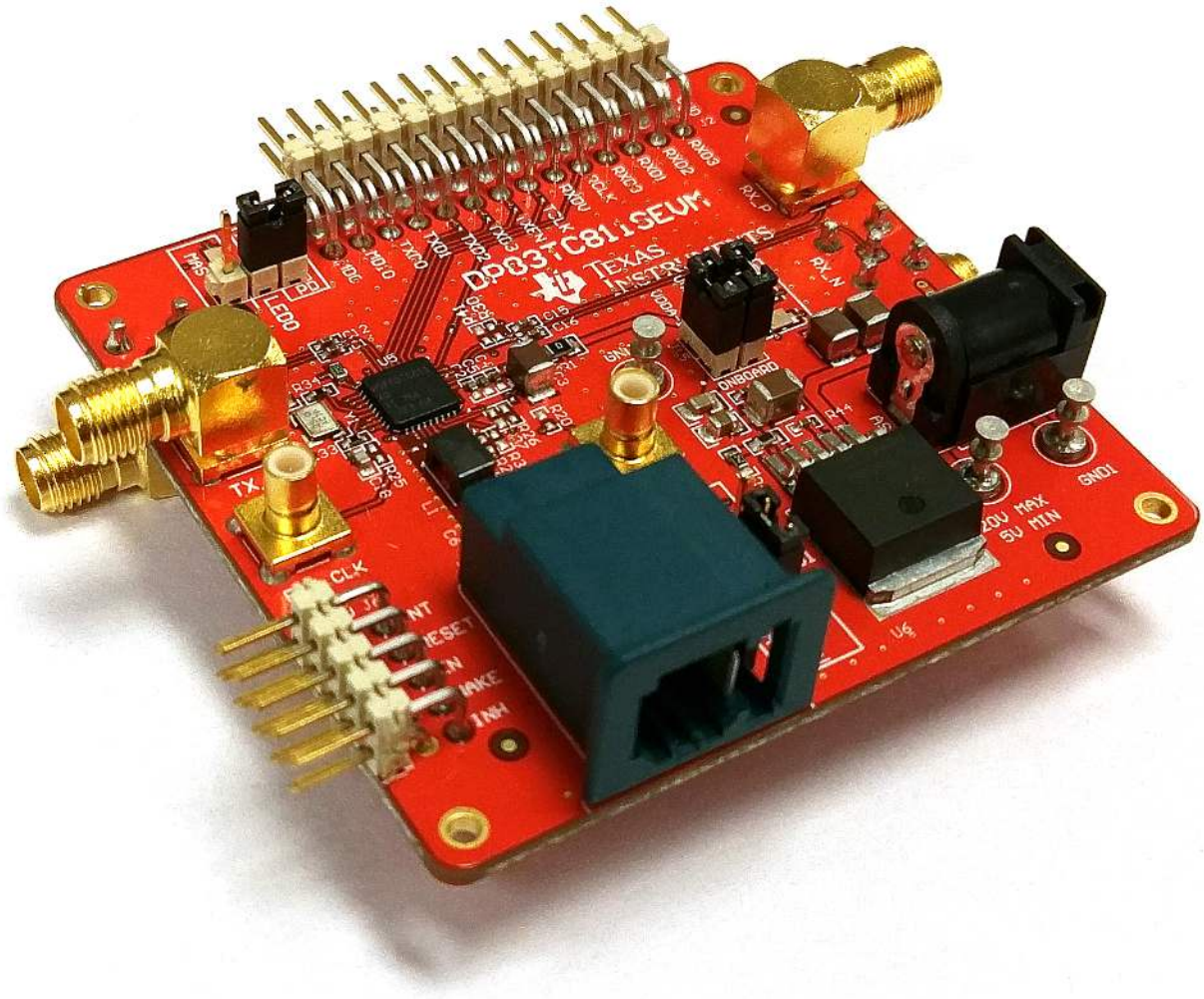
DP83TC811SEVM User's Guide



This User's Guide discusses how to properly operate and configure the DP83TC811SEVM. For best layout practices, schematic files, and Bill of Materials please see the associated support documents.

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Trademarks

1 Definitions

Table 1. Terminology

ACRONYM	DEFINITION
PHY	Physical Layer Transceiver
MAC	Media Access Controller
SMI	Serial Management Interface
MDIO	Management Data I/O
MDC	Management Data Clock
MII	Media Independent Interface
RMII	Reduced Media Independent Interface
RGMII	Reduced Gigabit Media Independent Interface
SGMII	Serial Gigabit Media Independent Interface
VDDA	Analog Core Supply Rail
VDDIO	Digital Supply Rail
PD	Pull-Down
PU	Pull-Up

2 Introduction

The DP83TC811SEVM supports 100Mbps speed and is IEEE 802.3bw compliant. This board supports four MAC interfaces and SMI. The 28 pin header is used for SMI, MII, RMII and RGMII. Additionally, there are four SMA connectors for SGMII operation. This board is compatible with the MSP430 Launchpad for use with the USB-2-MDIO graphical user interface.

2.1 Key Features

- IEEE802.3bw Compliant
- MII, RMII, RGMII and SGMII MAC Interfaces
- Small Footprint Example Layout
- USB-2-MDIO Support Through MSP430 Launchpad
- Onboard LDO
- Autonomous and Managed Mode Operation
- Status LEDs
  - Link
  - Link + Activity
  - Power
- Variable I/O Voltage Range: 1.8-V, 2.5-V and 3.3-V
- 4-Level Bootstraps for Hardware Configuration
- 100BASE-T1 Error Free Data transfer Over 60 Meters
- Certified UNH Platform Supporting all Compliance Test Modes

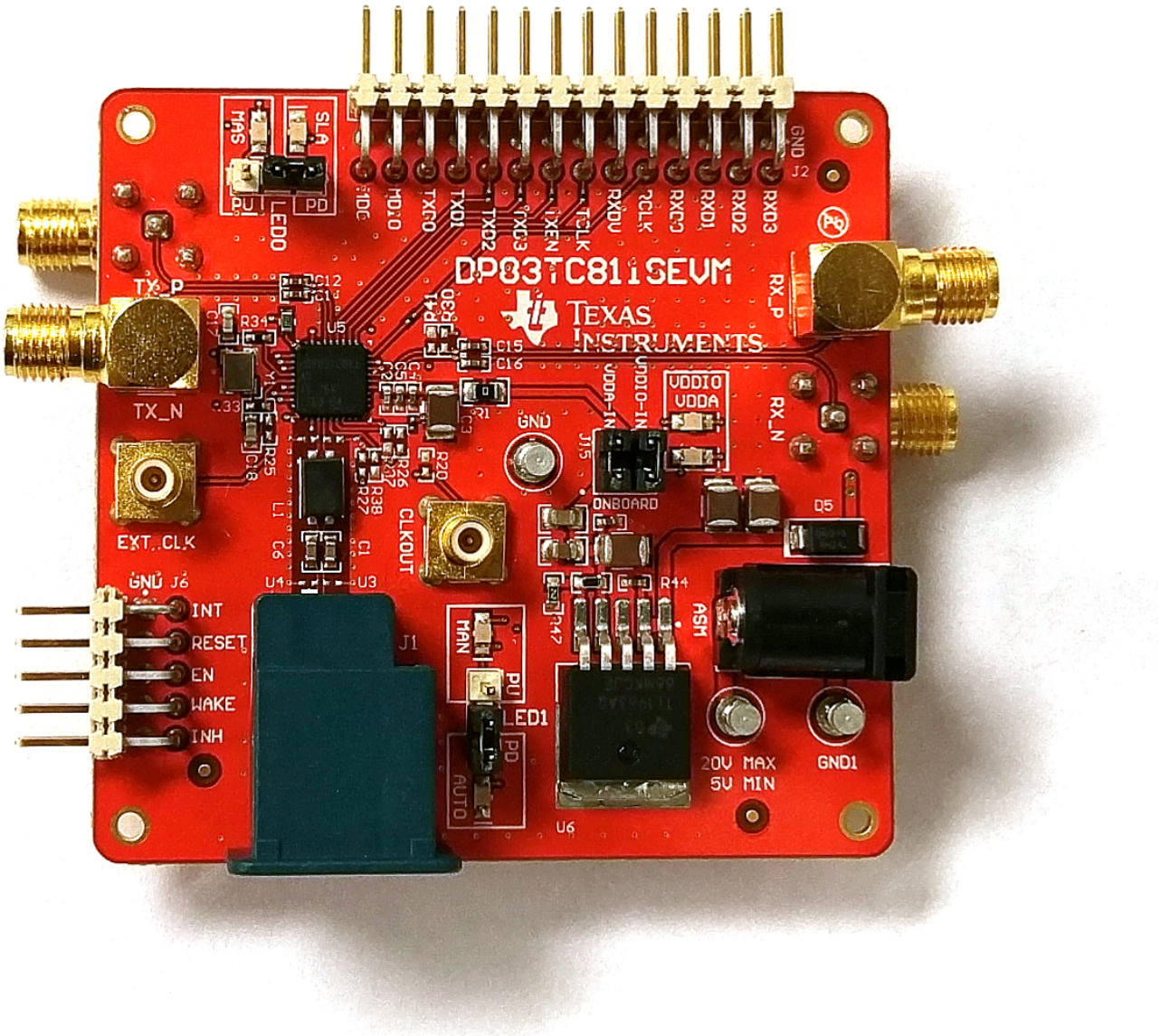


Figure 1. DP83TC811SEVM – Top Side

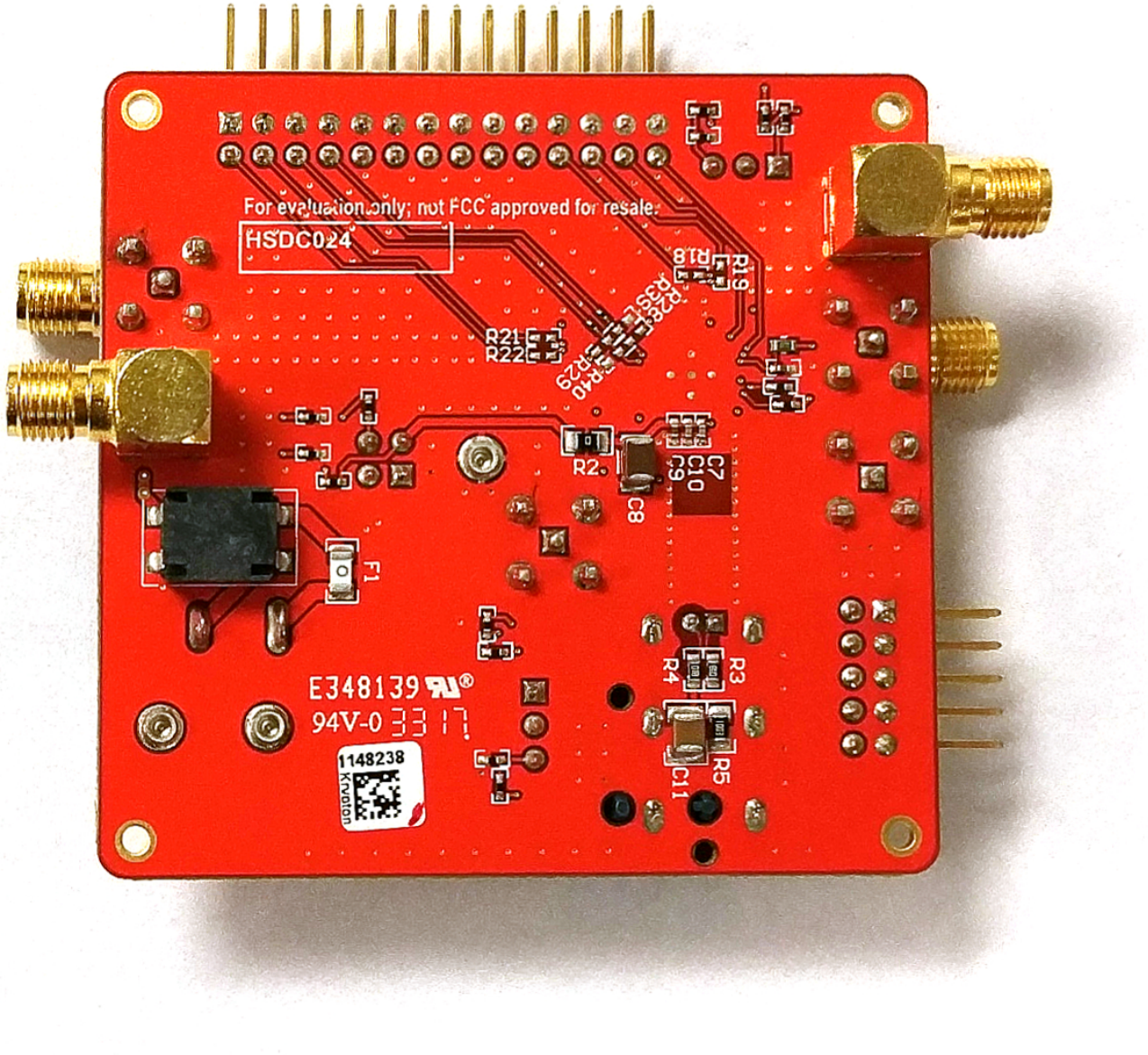


Figure 2. DP83TC811SEVM – Bottom Side

2.2 Operation – Quick Setup

2.2.1 Onboard Power Supply Operation

- EVM can operate from a single DC supply connected to either turret or barrel jack connector
  - Wide Vin: 20-V to 5-V
  - When power is supplied, LED's VDDIO and VDDA will light up

Figure 3. Onboard Power Supply Connection

- Jumper Settings
  - Place shunt across VDDA-IN and ONBOARD on J15 to enable onboard VDDA
  - Place shunt across VDDIO-IN and ONBOARD on J15 to enable onboard VDDIO

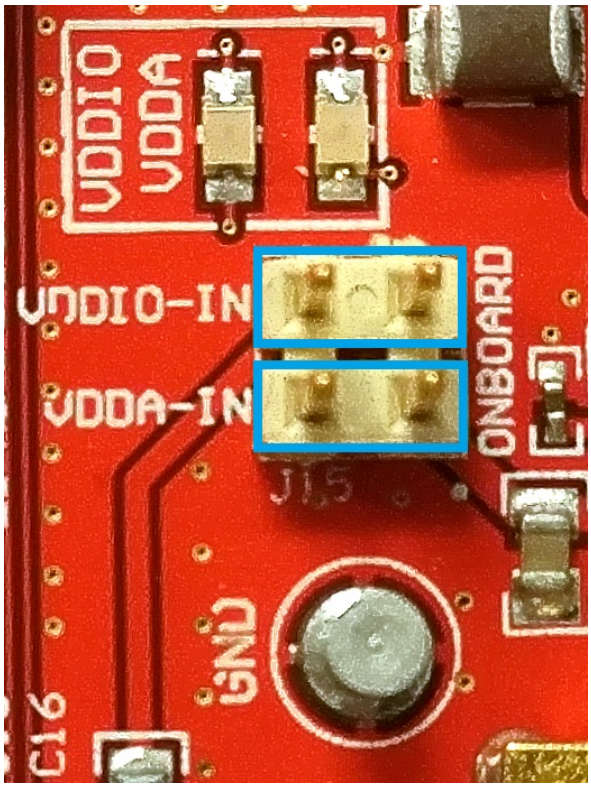


Figure 4. Jumper Placements for Onboard Power

2.2.2 External Power Supply Operation

- Remove all shunts from J15
- Connect 3.3-V to VDDA-IN on J15
- Connect 1.8-V, 2.5-V, or 3.3-V to VDDIO-IN on J15
- Connect ground to GND turret near J15
- When power is supplied, LED's VDDIO and VDDA will light up

2.2.3 xMII Basic Interface Configuration

- By default the PHY is set for 4-wire SGMII operation
- SGMII is accessed using four SMAs
  - SMA (J3) for TX_P
  - SMA (J4) for TX_N
  - SMA (J5) for RX_P
  - SMA (J6) for RX_N

2.2.4 Master and Slave Mode Selection

- Master Mode
  - Place shunt across pins 1 and 2 at LED0
- Slave Mode
  - Place shunt across pins 2 and 3 at LED0

2.2.5 Managed and Autonomous Mode Selection

- Managed Mode
  - Place shunt across pins 1 and 2 at LED1
- Autonomous Mode
  - Place shunt across pins 2 and 3 at LED1

2.2.6 Cable Assembly

- Plug a MatENET cable assembly into the B-type automotive connector (J1)
- Connect the far-end of the automotive cable to a 100BASE-T1 capable PHY

2.2.7 LED Indication

- When link is established with a Link Partner, LED0 and LED1 will light up
  - Shunts must be populated on LED0 and LED1 for LEDs to light up

3 Board Setup Details

3.1 Block Diagram

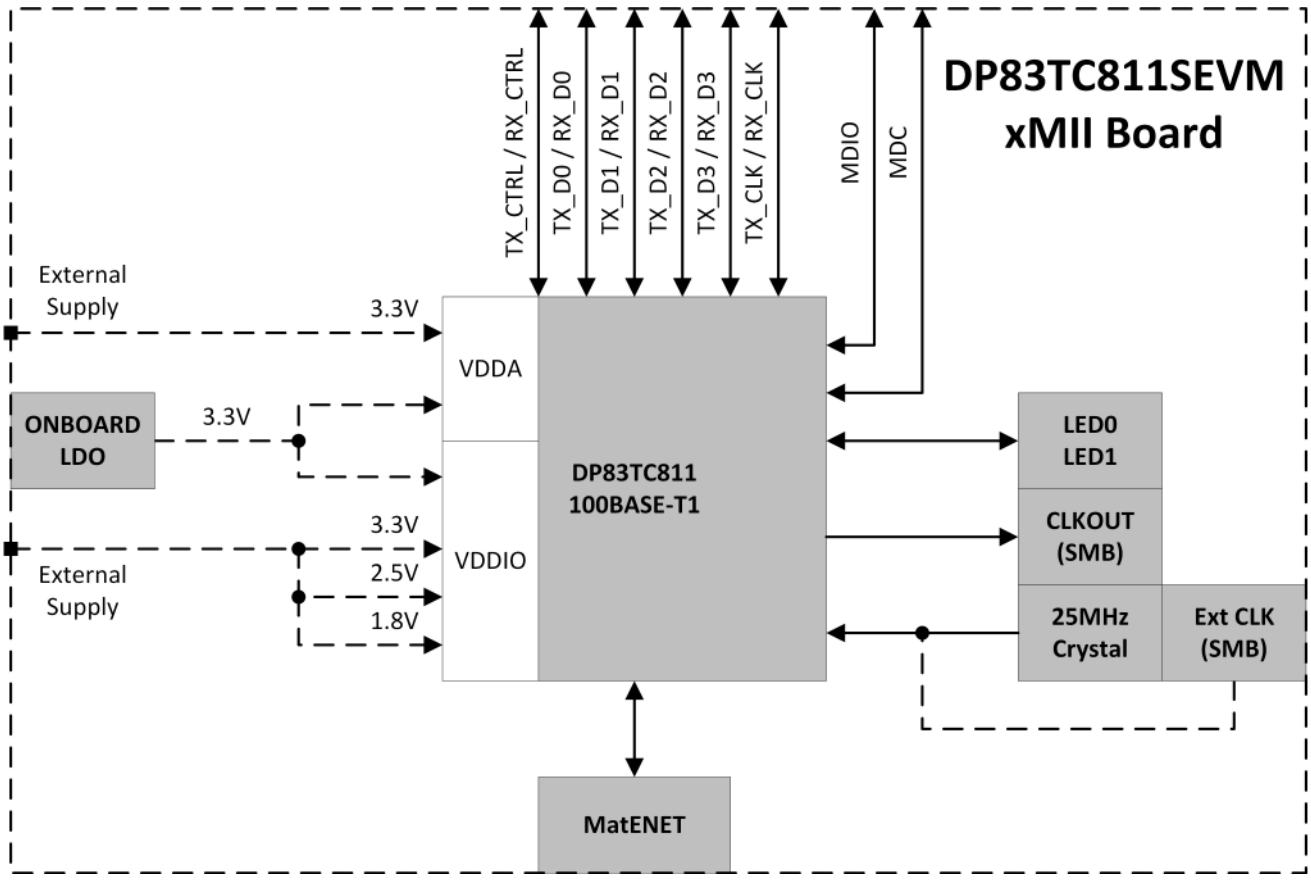


Figure 5. DP83TC811SEVM Block Diagram

3.2 Serial Management Interface

The DP83TC811SEVM supports SMI through J2 using pin 26 for MDIO and 28 for MDC. These pins can be connected to an MSP430 Launchpad, which can be used for USB-2-MDIO control.

Notes:

- DP83TC811 default PHY_ID is 0x0h
- PHY IDs can be changed through bootstrap options found in the datasheet

3.3 Configuration Options

3.3.1 Bootstrap Options

Some DP83TC811 configurations can be done through hardware bootstraps. These bootstrap options can be selected with jumpers or resistor population. Please refer to the data sheets for bootstrap description and function as well as the schematic and layout sections of this User's Guide for resistor locations.

Table 2. Bootstrap Resistor Designation and Suggested Bootstrap Resistor Values

PIN NAME	PIN NUMBER	STRAP MODE	PU RESISTOR (KΩ)	PU RESISTOR DESIGNATION	PD RESISTOR (KΩ)	PD RESISTOR DESIGNATION
RX_D0	26	1	OPEN	R28	OPEN	R39
		2	10.20		2.49	
		3	5.76		2.49	
		4	2.49		OPEN	
RX_D1	25	1	OPEN	R29	OPEN	R40
		2	10.20		2.49	
		3	5.76		2.49	
		4	2.49		OPEN	
RX_D2(RX_P)	24	1	OPEN	R30	OPEN	R41
		2	10.20		2.49	
		3	5.76		2.49	
		4	2.49		OPEN	
RX_ER	14	1	OPEN	R27	OPEN	R38
		2	10.20		2.49	
		3	5.76		2.49	
		4	2.49		OPEN	
RX_DV	15	1	OPEN	R26	OPEN	R37
		2	10.20		2.49	
		3	5.76		2.49	
		4	2.49		OPEN	
LED_0	35	1	OPEN	R23	2.49	R35
		4	2.49		OPEN	
LED_1	6	1	OPEN	R24	2.49	R36
		4	2.49		OPEN	

3.3.2 xMII Interface Configuration

Notes:

- DP83TC811 internal pulls on bootstrap pins are 9-kΩ pull-downs
- Please consider the internal pulls of a connected MAC when selecting needed external resistors for proper bootstrap configuration

3.3.2.1 MII

- From Table 2, set RX_D0 to Strap Mode 4, RX_D1 to Strap Mode 1, and RX_D2 to Strap Mode 1
- Remove the capacitors from C12, C14, C15, and C16
- Populate R18, R19, R21, and R22 with 0-Ω resistors

3.3.2.2 RMII

- Master
  - From Table 2, set RX_D0 to Strap Mode 4, RX_D1 to Strap Mode 4, and RX_D2 to Strap Mode 1
  - Remove the capacitors from C12, C14, C15, and C16
  - Populate R18, R19, R21, and R22 with 0-Ω resistors
- Slave
  - From Table 2, set RX_D0 to Strap Mode 1, RX_D1 to Strap Mode 4, and RX_D2 to Strap Mode 1
  - Remove the capacitors from C12, C14, C15, and C16
  - Populate R18, R19, R21, and R22 with 0-Ω resistors

3.3.2.3 RGMII

- Align
  - From Table 2, set RX_D0 to Strap Mode 1, RX_D1 to Strap Mode 1, and RX_D2 to Strap Mode 4
  - Remove the capacitors from C12, C14, C15, and C16
  - Populate R18, R19, R21, and R22 with 0-Ω resistors
- TX Shift
  - From Table 2, set RX_D0 to Strap Mode 4, RX_D1 to Strap Mode 1, and RX_D2 to Strap Mode 4
  - Remove the capacitors from C12, C14, C15, and C16
  - Populate R18, R19, R21, and R22 with 0-Ω resistors
- RX Shift
  - From Table 2, set RX_D0 to Strap Mode 4, RX_D1 to Strap Mode 4, and RX_D2 to Strap Mode 4
  - Remove the capacitors from C12, C14, C15, and C16
  - Populate R18, R19, R21, and R22 with 0-Ω resistors
- TX and RX Shift
  - From Table 2, set RX_D0 to Strap Mode 1, RX_D1 to Strap Mode 4, and RX_D2 to Strap Mode 4
  - Remove the capacitors from C12, C14, C15, and C16
  - Populate R18, R19, R21, and R22 with 0-Ω resistors

3.3.2.4 SGMII

- From Table 2, set RX_D0 to Strap Mode 1, RX_D1 to Strap Mode 1, and RX_D2 to Strap Mode 1
- Populate C12, C14, C15, and C16 with 0.1-µF capacitors
- Remove the resistors from R18, R19, R21, and R22

3.3.3 Clock Configuration

- Onboard Clock
  - The onboard clock is enabled by default
  - If disabled:
    - Populate Y1, R33, R34, C17, and C18 with their respective values from the schematic
    - Remove R25 if populated
  - By default, a 25-MHz clock output can be viewed using the CLKOUT SMA
- External Clock
  - Remove R33 and R34
  - Populate R25 with a 0-Ω resistor
  - Use the SMA labeled EXT_CLK to input the external clock source
  - By default, a 25-MHz clock output can be viewed using the CLKOUT SMA

3.3.4 Device Control

- Enable
  - DP83TC811 is enabled by default
  - To disable, place shunt across pins 5 and 6 of J6
- Reset
  - Populate shunt across pins 3 and 4 of J6

4 Schematics

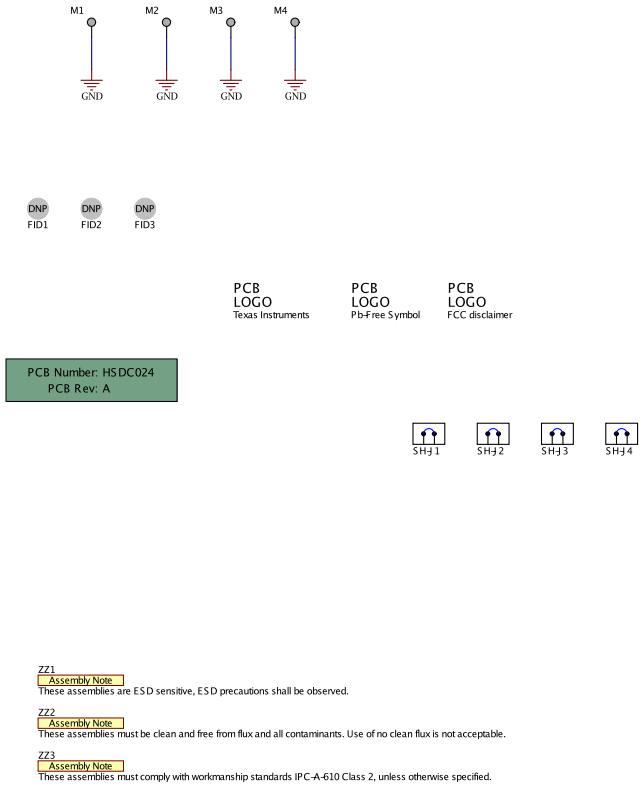


Figure 6. Hardware Schematic

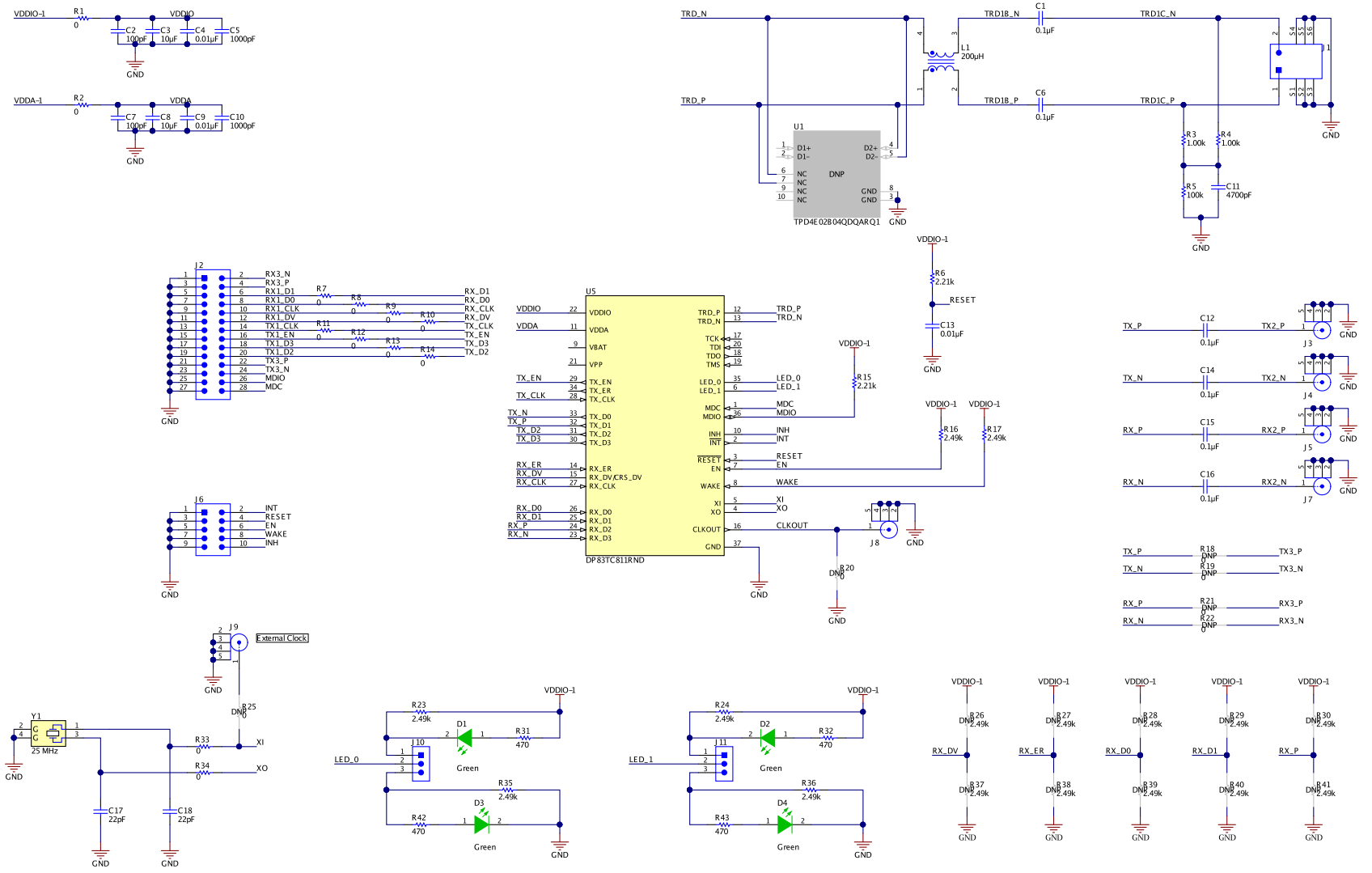


Figure 7. Main Block Schematic

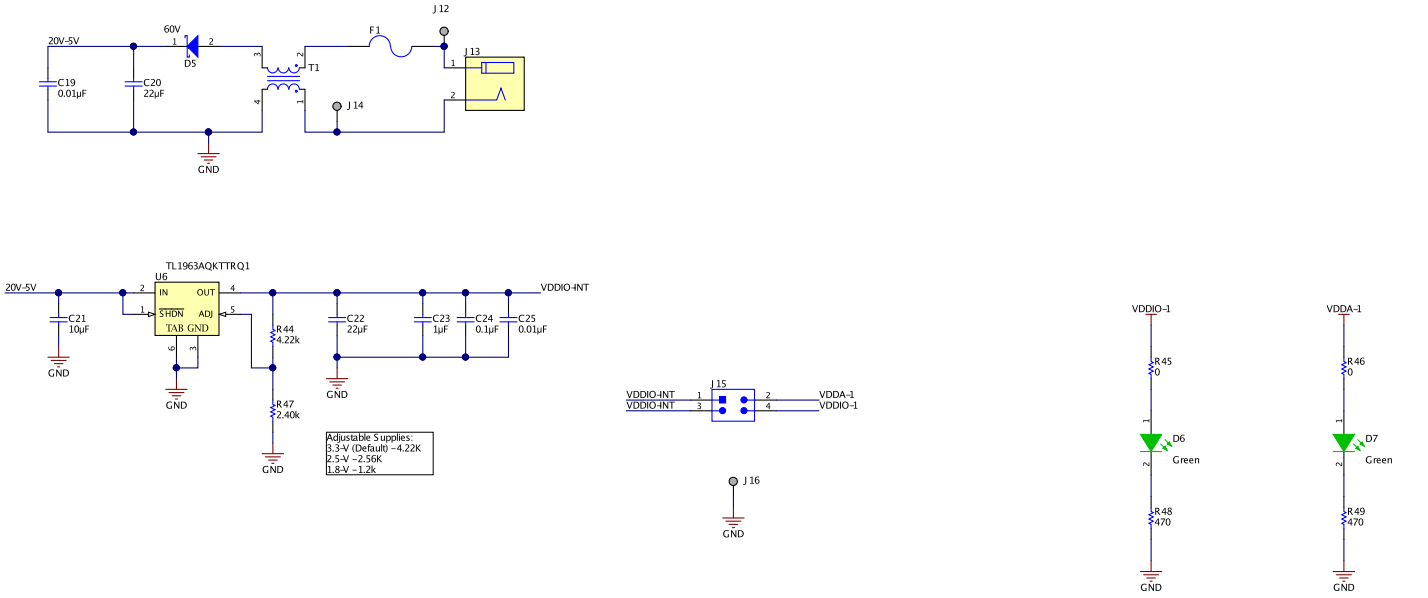
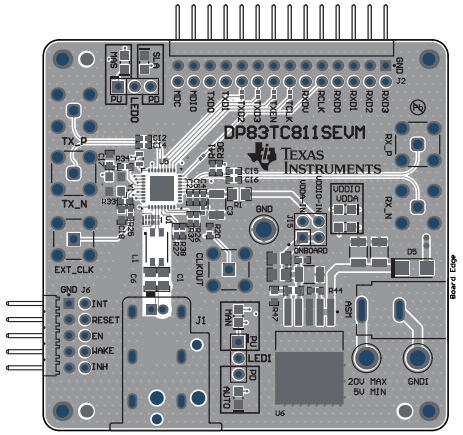


Figure 8. Power Block Schematic

5 Layout



Mechanical Outline

Figure 9. Top Overlay

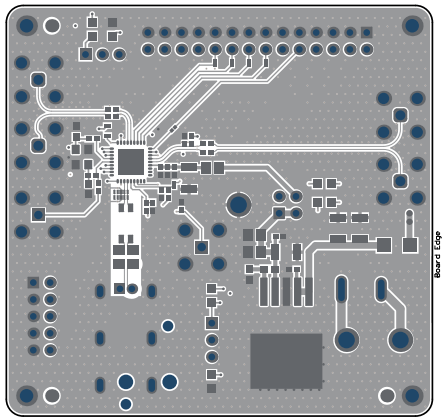


Figure 10. Top Layer

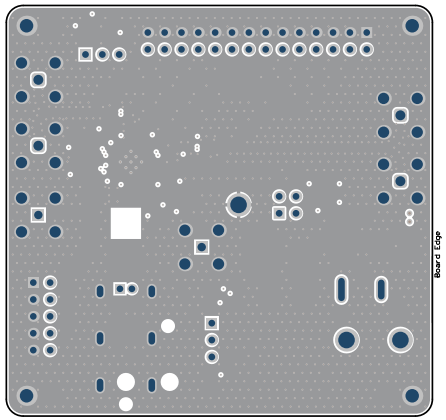


Figure 11. Signal Layer 1

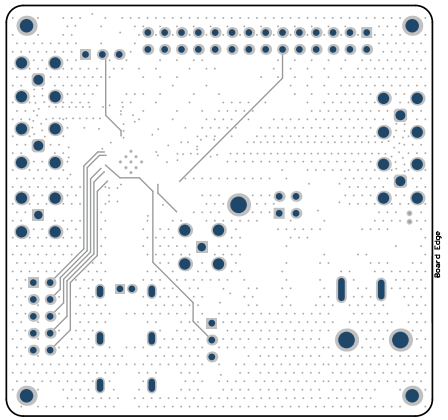


Figure 12. Signal Layer 2

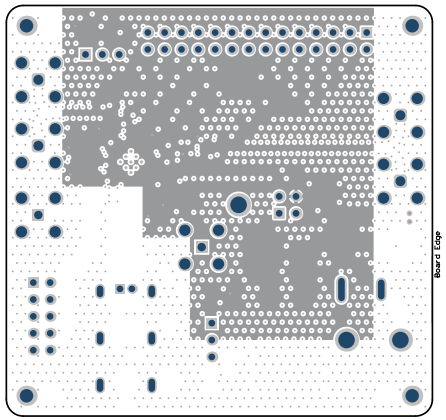


Figure 13. Signal Layer 3

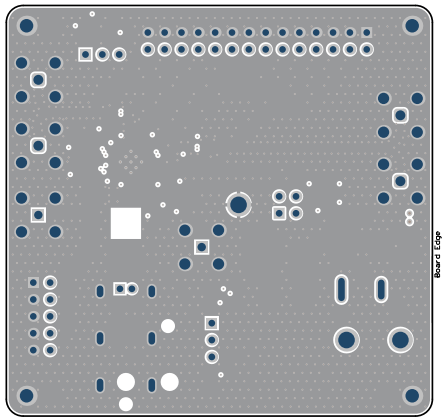


Figure 14. Signal Layer 4

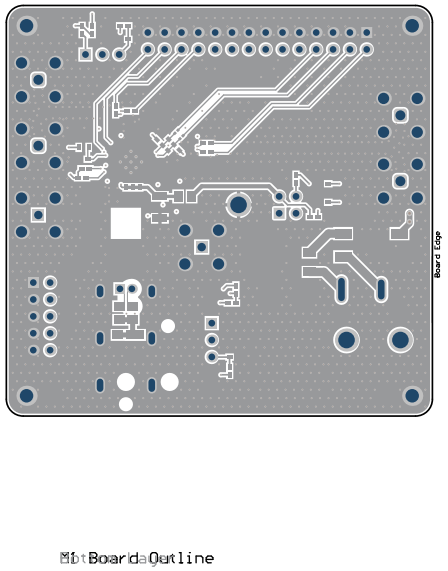


Figure 15. Bottom Layer

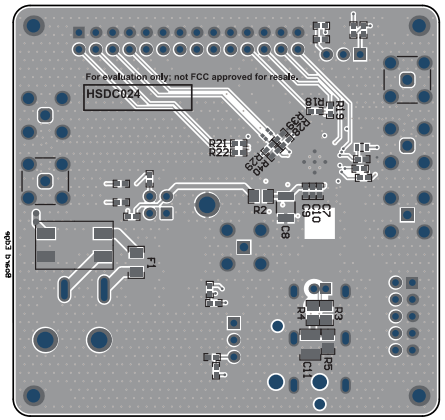


Figure 16. Bottom Overlay

6 Bill of Materials

DESIGNATOR	QTY	VALUE	DESCRIPTION	PART NUMBER	MANUFACTURER
C1, C6	2	0.1uF	CAP, CERM, 0.1 µF, 50 V,+/- 10%, X7R, AEC-Q200 Grade 1, 0805	GCM21BR71H104KA37K	MuRata
C2, C7	2	100pF	CAP, CERM, 100 pF, 50 V, +/- 5%, C0G/NP0, AEC-Q200 Grade 1, 0402	CGA2B2C0G1H101J050BA	TDK
C3, C8, C21	3	10uF	CAP, CERM, 10 µF, 25 V, +/- 20%, X7R, AEC-Q200 Grade 1, 1210	CGA6P1X7R1E106M250AC	TDK
C4, C9, C13, C19, C25	5	0.01uF	CAP, CERM, 0.01 µF, 50 V, +/- 10%, X7R, AEC-Q200 Grade 1, 0402	CGA2B3X7R1H103K050BB	TDK
C5, C10	2	1000pF	CAP, CERM, 1000 pF, 50 V, +/- 5%, C0G/NP0, AEC-Q200 Grade 1, 0402	CGA2B2C0G1H102J050BA	TDK
C11	1	4700pF	CAP, CERM, 4700 pF, 2000 V, +/- 10%, X7R, 1210	C1210C472KGRACTU	Kemet
C12, C14, C15, C16	4	0.1uF	CAP, CERM, 0.1 µF, 16 V,+/- 10%, X7R, AEC-Q200 Grade 1, 0402	C0402C104K4RACAUTO	Kemet
C17, C18	2	22pF	CAP, CERM, 22 pF, 50 V, +/- 5%, C0G/NP0, AEC-Q200 Grade 1, 0603	CGA3E2C0G1H220J080AA	TDK
C20, C22	2	22uF	CAP, CERM, 22 µF, 16 V, +/- 20%, X7R, AEC-Q200 Grade 1, 1210	CGA6P1X7R1C226M250AC	TDK
C23	1	1uF	CAP, CERM, 1 µF, 16 V, +/- 10%, X5R, 0805	GRM216R61C105KA88D	MuRata
C24	1	0.1uF	CAP, CERM, 0.1 µF, 16 V, +/- 10%, X7R, 0805	GRM219R71C104KA01D	MuRata
D1, D2, D3, D4, D6, D7	6	Green	LED, Green, SMD	QTLP630C4TR	Everlight
D5	1	60V	Diode, Schottky, 60 V, 1 A, AEC-Q101, SMA	NRVBA160T3G	ON Semiconductor
F1	1		Fuse, 2.5 A, 32VAC/VDC, SMD	044002.5WR	Littelfuse
J1	1		Header(shrouded), 6 Power, 2 Signal, TH	0-2290024-1	TE Connectivity
J2	1		Header, 100mil, 14x2, Gold, R/A, TH	TSW-114-08-G-D-RA	Samtec
J3, J4, J5, J7	4		JACK, SMA, 50 Ohm, Gold, R/A, TH	901-143-6RFX	Amphenol RF
J6	1		Header, 100mil, 5x2, Gold, R/A, TH	TSW-105-08-G-D-RA	Samtec
J8, J9	2		JACK, SMB 50 Ohm, TH	903-499J-51P2	Amphenol RF
J10, J11	2		Header, 100mil, 3x1, Gold, TH	TSW-103-07-G-S	Samtec
J12, J14, J16	3	Double	Terminal, Turret, TH, Double	1502-2	Keystone
J13	1		Power Jack, 2mm, R/A, TH	PJ-037AH	CUI Inc.
J15	1		Header, 100mil, 2x2, Gold, TH	TSW-102-07-G-D	Samtec
L1	1	200uH	Coupled inductor, 200 µH, 4.5 ohm, AEC-Q200 Grade 2, SMD	DLW43MH201XK2L	MuRata
R1, R2	2	0	RES, 0, 5%, 0.125 W, 0805	ERJ-6GEY0R00V	Panasonic
R3, R4	2	1.00k	RES, 1.00 k, 1%, 0.125 W, 0805	CRCW08051K00FKEA	Vishay-Dale
R5	1	100k	RES, 100 k, 5%, 0.125 W, 0805	CRCW0805100KJNEA	Vishay-Dale
R6, R15	2	2.21k	RES, 2.21 k, 0.1%, 0.1 W, AEC-Q200 Grade 0, 0603	TNPW06032K21BEEA	Vishay-Dale
R7, R8, R9, R10, R11, R12, R13, R14	8	0	RES, 0, 5%, 0.05 W, 0201	CRCW02010000Z0ED	Vishay-Dale
R16, R17, R23, R24, R35, R36	6	2.49k	RES, 2.49 k, 1%, 0.063 W, 0402	CRCW04022K49FKED	Vishay-Dale

DESIGNATOR	QTY	VALUE	DESCRIPTION	PART NUMBER	MANUFACTURER
R31, R32, R42, R43, R48, R49	6	470	RES, 470, 5%, 0.063 W, 0402	CRCW0402470RJNED	Vishay-Dale
R33, R34, R45, R46	4	0	RES, 0, 5%, 0.063 W, 0402	RC0402JR-070RL	Yageo America
R44	1	4.22k	RES, 4.22 k, 1%, 0.1 W, 0603	CRCW06034K22FKEA	Vishay-Dale
R47	1	2.40k	RES, 2.40 k, 0.1%, 0.1 W, AEC-Q200 Grade 0, 0603	ERA-3AEB242V	Panasonic
SH-J1, SH-J2, SH-J3, SH-J4	4		Shunt, 100mil, Gold plated, Black	881545-2	TE Connectivity
T1	1		Common Mode Filter for Power Line	ACM9070-701-2PL	TDK
U5	1		DP83TC811,RND0036A	DP83TC811RND	Texas Instruments
U6	1		Single Output Fast Transient Response LDO, 1.5 A, Adjustable 1.21 to 20 V Output, 2.1 to 20 V Input, 5-pin DDPAK (KTT), -40 to 125 degC, Green (RoHS & no Sb/Br)	TL1963AQKTTRQ1	Texas Instruments
Y1	1		Crystal, 25MHz, 12pF, SMD	ABM8AIG-25.000MHZ-12-2Z-T3	Abracon Corporation
FID1, FID2, FID3	0		Fiducial mark. There is nothing to buy or mount.	N/A	N/A
R18, R19, R20, R21, R22, R25	0	0	RES, 0, 5%, 0.063 W, 0402	RC0402JR-070RL	Yageo America
R26, R27, R28, R29, R30, R37, R38, R39, R40, R41	0	2.49k	RES, 2.49 k, 1%, 0.063 W, 0402	CRCW04022K49FKED	Vishay-Dale
U1	0		Automotive 4-Channel ESD Protection Diode for USB Type-C and HDMI 2.0, DQA0010A (USON-10)	TPD4E02B04QDQARQ1	Texas Instruments

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1. *Delivery:* TI delivers TI evaluation boards, kits, or modules, including any accompanying demonstration software, components, and/or documentation which may be provided together or separately (collectively, an “EVM” or “EVMs”) to the User (“User”) in accordance with the terms set forth herein. User's acceptance of the EVM is expressly subject to the following terms.

   1.1 EVMs are intended solely for product or software developers for use in a research and development setting to facilitate feasibility evaluation, experimentation, or scientific analysis of TI semiconductors products. EVMs have no direct function and are not finished products. EVMs shall not be directly or indirectly assembled as a part or subassembly in any finished product. For clarification, any software or software tools provided with the EVM (“Software”) shall not be subject to the terms and conditions set forth herein but rather shall be subject to the applicable terms that accompany such Software

   1.2 EVMs are not intended for consumer or household use. EVMs may not be sold, sublicensed, leased, rented, loaned, assigned, or otherwise distributed for commercial purposes by Users, in whole or in part, or used in any finished product or production system.

2 *Limited Warranty and Related Remedies/Disclaimers*:

   2.1 These terms do not apply to Software. The warranty, if any, for Software is covered in the applicable Software License Agreement.

   2.2 TI warrants that the TI EVM will conform to TI's published specifications for ninety (90) days after the date TI delivers such EVM to User. Notwithstanding the foregoing, TI shall not be liable for a nonconforming EVM if (a) the nonconformity was caused by neglect, misuse or mistreatment by an entity other than TI, including improper installation or testing, or for any EVMs that have been altered or modified in any way by an entity other than TI, (b) the nonconformity resulted from User's design, specifications or instructions for such EVMs or improper system design, or (c) User has not paid on time. Testing and other quality control techniques are used to the extent TI deems necessary. TI does not test all parameters of each EVM. User's claims against TI under this Section 2 are void if User fails to notify TI of any apparent defects in the EVMs within ten (10) business days after delivery, or of any hidden defects with ten (10) business days after the defect has been detected.

   2.3 TI's sole liability shall be at its option to repair or replace EVMs that fail to conform to the warranty set forth above, or credit User's account for such EVM. TI's liability under this warranty shall be limited to EVMs that are returned during the warranty period to the address designated by TI and that are determined by TI not to conform to such warranty. If TI elects to repair or replace such EVM, TI shall have a reasonable time to repair such EVM or provide replacements. Repaired EVMs shall be warranted for the remainder of the original warranty period. Replaced EVMs shall be warranted for a new full ninety (90) day warranty period.

3 *Regulatory Notices:*

   3.1 *United States*

      3.1.1 *Notice applicable to EVMs not FCC-Approved:*

      FCC NOTICE: This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

      3.1.2 *For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:*

      CAUTION

      This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

      Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

      FCC Interference Statement for Class A EVM devices

      NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

3.2 *Canada*

3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210 or RSS-247*

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSSs. Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

3.3 *Japan*

3.3.1 *Notice for EVMs delivered in Japan:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。
http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page

3.3.2 *Notice for Users of EVMs Considered "Radio Frequency Products" in Japan:* EVMs entering Japan may not be certified by TI as conforming to Technical Regulations of Radio Law of Japan.

If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required to follow the instructions set forth by Radio Law of Japan, which includes, but is not limited to, the instructions below with respect to EVMs (which for the avoidance of doubt are stated strictly for convenience and should be verified by User):

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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1. 電波法施行規則第6条第1項第1号に基づく平成18年3月28日総務省告示第173号で定められた電波暗室等の試験設備でご使用いただく。
2. 実験局の免許を取得後ご使用いただく。
3. 技術基準適合証明を取得後ご使用いただく。

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東京都新宿区西新宿６丁目２４番１号
西新宿三井ビル

3.3.3 *Notice for EVMs for Power Line Communication:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_02.page
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3.4 *European Union*

3.4.1 *For EVMs subject to EU Directive 2014/30/EU (Electromagnetic Compatibility Directive)*:

This is a class A product intended for use in environments other than domestic environments that are connected to a low-voltage power-supply network that supplies buildings used for domestic purposes. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

4 *EVM Use Restrictions and Warnings:*

4.1 EVMS ARE NOT FOR USE IN FUNCTIONAL SAFETY AND/OR SAFETY CRITICAL EVALUATIONS, INCLUDING BUT NOT LIMITED TO EVALUATIONS OF LIFE SUPPORT APPLICATIONS.

4.2 User must read and apply the user guide and other available documentation provided by TI regarding the EVM prior to handling or using the EVM, including without limitation any warning or restriction notices. The notices contain important safety information related to, for example, temperatures and voltages.

4.3 *Safety-Related Warnings and Restrictions:*

4.3.1 User shall operate the EVM within TI's recommended specifications and environmental considerations stated in the user guide, other available documentation provided by TI, and any other applicable requirements and employ reasonable and customary safeguards. Exceeding the specified performance ratings and specifications (including but not limited to input and output voltage, current, power, and environmental ranges) for the EVM may cause personal injury or death, or property damage. If there are questions concerning performance ratings and specifications, User should contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may also result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM user guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative. During normal operation, even with the inputs and outputs kept within the specified allowable ranges, some circuit components may have elevated case temperatures. These components include but are not limited to linear regulators, switching transistors, pass transistors, current sense resistors, and heat sinks, which can be identified using the information in the associated documentation. When working with the EVM, please be aware that the EVM may become very warm.

4.3.2 EVMs are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems. User assumes all responsibility and liability for proper and safe handling and use of the EVM by User or its employees, affiliates, contractors or designees. User assumes all responsibility and liability to ensure that any interfaces (electronic and/or mechanical) between the EVM and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard. User assumes all responsibility and liability for any improper or unsafe handling or use of the EVM by User or its employees, affiliates, contractors or designees.

4.4 User assumes all responsibility and liability to determine whether the EVM is subject to any applicable international, federal, state, or local laws and regulations related to User's handling and use of the EVM and, if applicable, User assumes all responsibility and liability for compliance in all respects with such laws and regulations. User assumes all responsibility and liability for proper disposal and recycling of the EVM consistent with all applicable international, federal, state, and local requirements.

5. *Accuracy of Information:* To the extent TI provides information on the availability and function of EVMs, TI attempts to be as accurate as possible. However, TI does not warrant the accuracy of EVM descriptions, EVM availability or other information on its websites as accurate, complete, reliable, current, or error-free.

6. *Disclaimers:*

   6.1 EXCEPT AS SET FORTH ABOVE, EVMS AND ANY MATERIALS PROVIDED WITH THE EVM (INCLUDING, BUT NOT LIMITED TO, REFERENCE DESIGNS AND THE DESIGN OF THE EVM ITSELF) ARE PROVIDED "AS IS" AND "WITH ALL FAULTS." TI DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, REGARDING SUCH ITEMS, INCLUDING BUT NOT LIMITED TO ANY EPIDEMIC FAILURE WARRANTY OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF ANY THIRD PARTY PATENTS, COPYRIGHTS, TRADE SECRETS OR OTHER INTELLECTUAL PROPERTY RIGHTS.

   6.2 EXCEPT FOR THE LIMITED RIGHT TO USE THE EVM SET FORTH HEREIN, NOTHING IN THESE TERMS SHALL BE CONSTRUED AS GRANTING OR CONFERRING ANY RIGHTS BY LICENSE, PATENT, OR ANY OTHER INDUSTRIAL OR INTELLECTUAL PROPERTY RIGHT OF TI, ITS SUPPLIERS/LICENSORS OR ANY OTHER THIRD PARTY, TO USE THE EVM IN ANY FINISHED END-USER OR READY-TO-USE FINAL PRODUCT, OR FOR ANY INVENTION, DISCOVERY OR IMPROVEMENT, REGARDLESS OF WHEN MADE, CONCEIVED OR ACQUIRED.

7. *USER'S INDEMNITY OBLIGATIONS AND REPRESENTATIONS.* USER WILL DEFEND, INDEMNIFY AND HOLD TI, ITS LICENSORS AND THEIR REPRESENTATIVES HARMLESS FROM AND AGAINST ANY AND ALL CLAIMS, DAMAGES, LOSSES, EXPENSES, COSTS AND LIABILITIES (COLLECTIVELY, "CLAIMS") ARISING OUT OF OR IN CONNECTION WITH ANY HANDLING OR USE OF THE EVM THAT IS NOT IN ACCORDANCE WITH THESE TERMS. THIS OBLIGATION SHALL APPLY WHETHER CLAIMS ARISE UNDER STATUTE, REGULATION, OR THE LAW OF TORT, CONTRACT OR ANY OTHER LEGAL THEORY, AND EVEN IF THE EVM FAILS TO PERFORM AS DESCRIBED OR EXPECTED.

8. *Limitations on Damages and Liability:*

   8.1 *General Limitations*. IN NO EVENT SHALL TI BE LIABLE FOR ANY SPECIAL, COLLATERAL, INDIRECT, PUNITIVE, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES IN CONNECTION WITH OR ARISING OUT OF THESE TERMS OR THE USE OF THE EVMS , REGARDLESS OF WHETHER TI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. EXCLUDED DAMAGES INCLUDE, BUT ARE NOT LIMITED TO, COST OF REMOVAL OR REINSTALLATION, ANCILLARY COSTS TO THE PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES, RETESTING, OUTSIDE COMPUTER TIME, LABOR COSTS, LOSS OF GOODWILL, LOSS OF PROFITS, LOSS OF SAVINGS, LOSS OF USE, LOSS OF DATA, OR BUSINESS INTERRUPTION. NO CLAIM, SUIT OR ACTION SHALL BE BROUGHT AGAINST TI MORE THAN TWELVE (12) MONTHS AFTER THE EVENT THAT GAVE RISE TO THE CAUSE OF ACTION HAS OCCURRED.

   8.2 *Specific Limitations.* IN NO EVENT SHALL TI'S AGGREGATE LIABILITY FROM ANY USE OF AN EVM PROVIDED HEREUNDER, INCLUDING FROM ANY WARRANTY, INDEMITY OR OTHER OBLIGATION ARISING OUT OF OR IN CONNECTION WITH THESE TERMS, , EXCEED THE TOTAL AMOUNT PAID TO TI BY USER FOR THE PARTICULAR EVM(S) AT ISSUE DURING THE PRIOR TWELVE (12) MONTHS WITH RESPECT TO WHICH LOSSES OR DAMAGES ARE CLAIMED. THE EXISTENCE OF MORE THAN ONE CLAIM SHALL NOT ENLARGE OR EXTEND THIS LIMIT.

9. *Return Policy.* Except as otherwise provided, TI does not offer any refunds, returns, or exchanges. Furthermore, no return of EVM(s) will be accepted if the package has been opened and no return of the EVM(s) will be accepted if they are damaged or otherwise not in a resalable condition. If User feels it has been incorrectly charged for the EVM(s) it ordered or that delivery violates the applicable order, User should contact TI. All refunds will be made in full within thirty (30) working days from the return of the components(s), excluding any postage or packaging costs.

10. *Governing Law:* These terms and conditions shall be governed by and interpreted in accordance with the laws of the State of Texas, without reference to conflict-of-laws principles. User agrees that non-exclusive jurisdiction for any dispute arising out of or relating to these terms and conditions lies within courts located in the State of Texas and consents to venue in Dallas County, Texas. Notwithstanding the foregoing, any judgment may be enforced in any United States or foreign court, and TI may seek injunctive relief in any United States or foreign court.

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