

QCIOT30-ISL76683EVZ

Light-to-Digital Output Sensor PMOD™ Board (QCIOT-030)

The QCIOT30-ISL76683EVZ board enables quick prototyping of the [ISL76683](#) Light-to-Digital Output Sensor for a custom system design. The board provides a standard PMOD™ Type 6A (Extended I²C) connection for the on-board sensor to plug into any MCU evaluation kit with a matching connector.

The QCIOT30-ISL76683EVZ features PMOD connectors on both sides of the board to allow additional Type 6/6A boards to be connected in a daisy-chained solution with multiple sensors on the same MCU PMOD connector. Software support present in the Renesas IDE ([e2 studio](#)) provides code generation to connect the sensor and the MCU, thus significantly reducing development time. With its standard connector and software support, the QCIOT30-ISL76683EVZ is ideal for the Renesas [Quick-Connect IoT](#) to rapidly create an IoT system.

Kit Contents

- QCIOT30-ISL76683EVZ PMOD™ board

Features

- Range selects with I²C:
 - Range 1 = 0 lux to 1000 lux
 - Range 2 = 0 lux to 4000 lux
 - Range 3 = 0 lux to 16000 lux
 - Range 4 = 0 lux to 64000 lux
- IR + UV rejection
- AEC-Q100 qualified
- Adjustable sensitivity: up to 65 counts per lux
- User-programmable upper and lower threshold interrupt
- Standardized Type 6A PMOD connector supports Extended I²C interface.
- Dual connectors allow pass-through signals for daisy-chained solutions.
- Software support in e2 studio minimizes development time with one-click code generation

Related Documents

- [ISL76683 Datasheet](#)
- [ISL76683EVAL1Z User Guide](#)
- [Renesas Quick-Connect IoT Manual](#)



Figure 1. QCIOT30-ISL76683EVZ PMOD Board (QCIOT-030)

Contents

1. Functional Description.....	3
2. Operating Environment.....	3
3. Kit Setup.....	4
3.1 Required or Recommended Equipment.....	4
3.2 Required Software Tools	4
3.3 Kit Hardware Connections	5
4. Programming Interface	6
5. Board Design	9
5.1 Application Schematic	9
5.2 Bill of Materials	10
5.3 Board Layout	10
6. Ordering Information.....	11
7. Revision History	11

Figures

Figure 1. QCIOT30-ISL76683EVZ PMOD Board (QCIOT-030)	1
Figure 2. Evaluation Kit Connections using the QCIOT30-ISL76683EVZ and EK-RA6M4.....	3
Figure 3. Evaluation Kit Connections.....	5
Figure 4. Debugging the Board	6
Figure 5. Flashing and Flash Programmer Settings Windows.....	7
Figure 6. Serial Data Output Window	8
Figure 7. Application Schematic.....	9
Figure 8. Silkscreen Top.....	10
Figure 9. Silkscreen Bottom	10
Figure 10. Copper Top Layer	10
Figure 11. Copper Bottom Layer	10
Figure 12. Internal Plane-1 (GND).....	11
Figure 13. Internal Plane-2 (PWR)	11

1. Functional Description

The QCIOT30-ISL76683EVZ functions as a Light-to-Digital Output converter building block to create a custom system solution. Use the board individually or with a combination of other sensors by using the PMOD Type 6A interface. See the Renesas [Quick-Connect IoT](#) web page for a list of available sensors and PMOD boards.

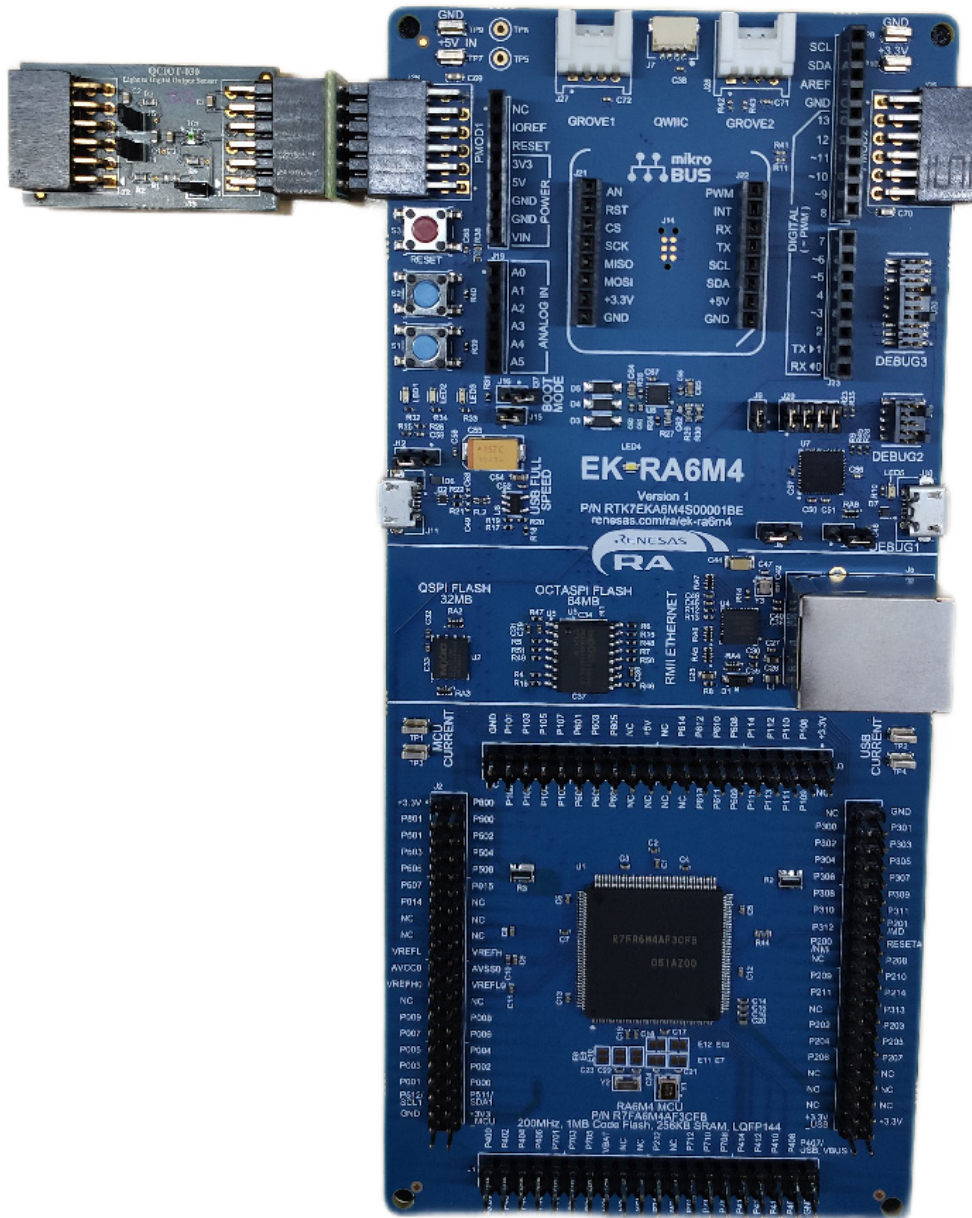


Figure 2. Evaluation Kit Connections using the QCIOT30-ISL76683EVZ and EK-RA6M4

2. Operating Environment

Table 1. Operating Environment Items and Descriptions

Item	Description
Demonstration Board	RTK7EKA6M4S00001BE (EK-RA6M4)
Microcontroller	RA6M4
Operating Frequency	48MHz

Item	Description
Operating Voltage	+3.3V
Integrated Development Environment	e2 Studio 2023-04
C compiler	GCC 10.3.1.20210824
Flexible Software Package (FSP)	v3.3.0
RTOS	N/A
Emulator	On board (J-LINK)
Interposer	Interposer board to convert Type2/3 to Type 6A PMOD standard (US082-INTERPEVZ)
Sensor Board	QCIOT30-ISL76683EVZ PMOD Board

Note: The operation of this software project has been confirmed with the above operating environment.

3. Kit Setup

3.1 Required or Recommended Equipment

Additional lab equipment (sold separately) is required for using the board:

- Any MCU/MPU board that supports Type 6A PMOD
- [US082-INTERPEVZ](#) Interposer board when using one of the Renesas MCU kits shown in Table 2.

Table 2. MCU Evaluation Kits Capable of Supporting a Type 6A PMOD when used with QCIOT30-ISL76683EVZ

RA	RX	Synergy
EK-RA2A1	RX111-Starter-Kit	PK-S5D9
EK-RA4M1	RX231-Starter-Kit	DK-S3A7
EK-RA4W1	RX23W-Starter-Kit	DK-S128
EK-RA6M1	RX23T-Starter-Kit	TB-S1JA
EK-RA6M2	RX24T-Starter-Kit	TB-S3A6
EK-RA6M3	RX24U-Starter-Kit	DK-S7G2
EK-RA6M3G	-	-

Note: This table is not a comprehensive list of supported MCU Kits. See the evaluation kit hardware manual to confirm PMOD pinout.

3.2 Required Software Tools

SST software tool is available by request and includes a raw lux data collecting demo. For more information about creating a customized system solution, visit Renesas [Quick-Connect IoT](#).

Note: Currently, only RZ solution is available. Other MCU software is in development.

3.3 Kit Hardware Connections

To setup the kit, use the following steps and refer to Figure 3.

1. Ensure the MCU evaluation kit being used has a PMOD connector set to Type 6A. For more information, refer to the kit hardware manual.
 - a. If no Type 6A PMOD is available, ensure the MCU evaluation kit can use the PMOD interposer board and insert the board into the MCU connector before adding any sensor boards.
2. Connect the QCIOT-030 board to the Type 6A connector, taking care to align pin 1 on the sensor board and MCU kit.
3. Connect the J3, J4 and J5 jumpers to place 1kΩ pull-up resistors on the IRQ and I²C bus lines.
 - a. Only one set of pull-up resistors should be used on the I²C bus lines. If multiple sensor boards are used, only one board should have the jumpers present.
 - b. MCU kits typically do not have pull-up resistors present on these lines. Ensure to check for them.
4. The sensor is now ready to be used in the system. Follow the MCU kit instructions for connecting and powering up the evaluation kit.

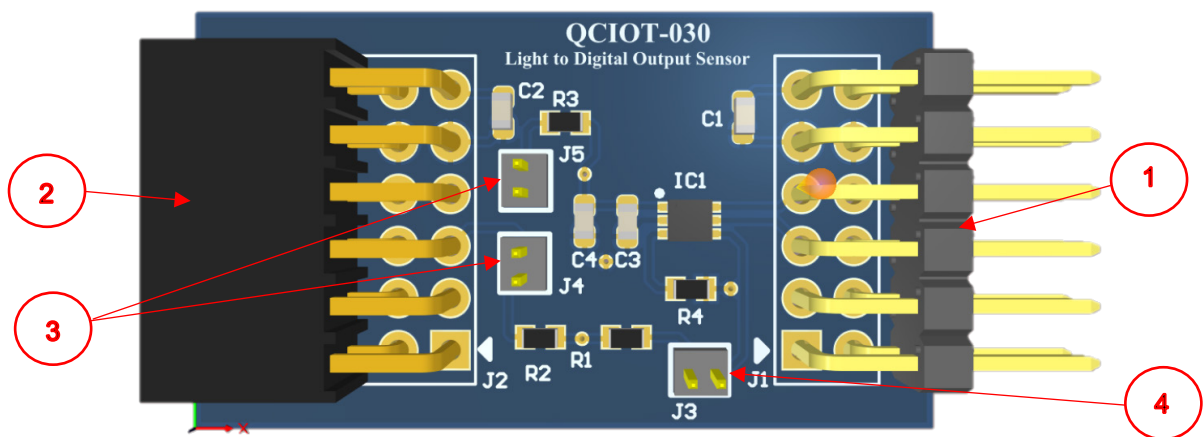


Figure 3. Evaluation Kit Connections

Table 3. Evaluation Kit Connections and Functions

Number	Function
1	Connect to the MCU evaluation kit board
2	Other PMOD connection locations
3	I ² C pull-up BUS
4	IRQ pull-up

4. Programming Interface

Programming of the system is accomplished through the Renesas IDE, e2 studio. See the MCU evaluation kit documentation to setup the initial project in e2 studio. As the project is initialized, adding the ISL76683 sensor to the project only takes a few steps.

1. Project settings, configuration, and source code building:

IDE environment used for code development is e2-studio and Toolchain is Renesas CCRL. Figure 4 shows the steps to debug the board for the first time.

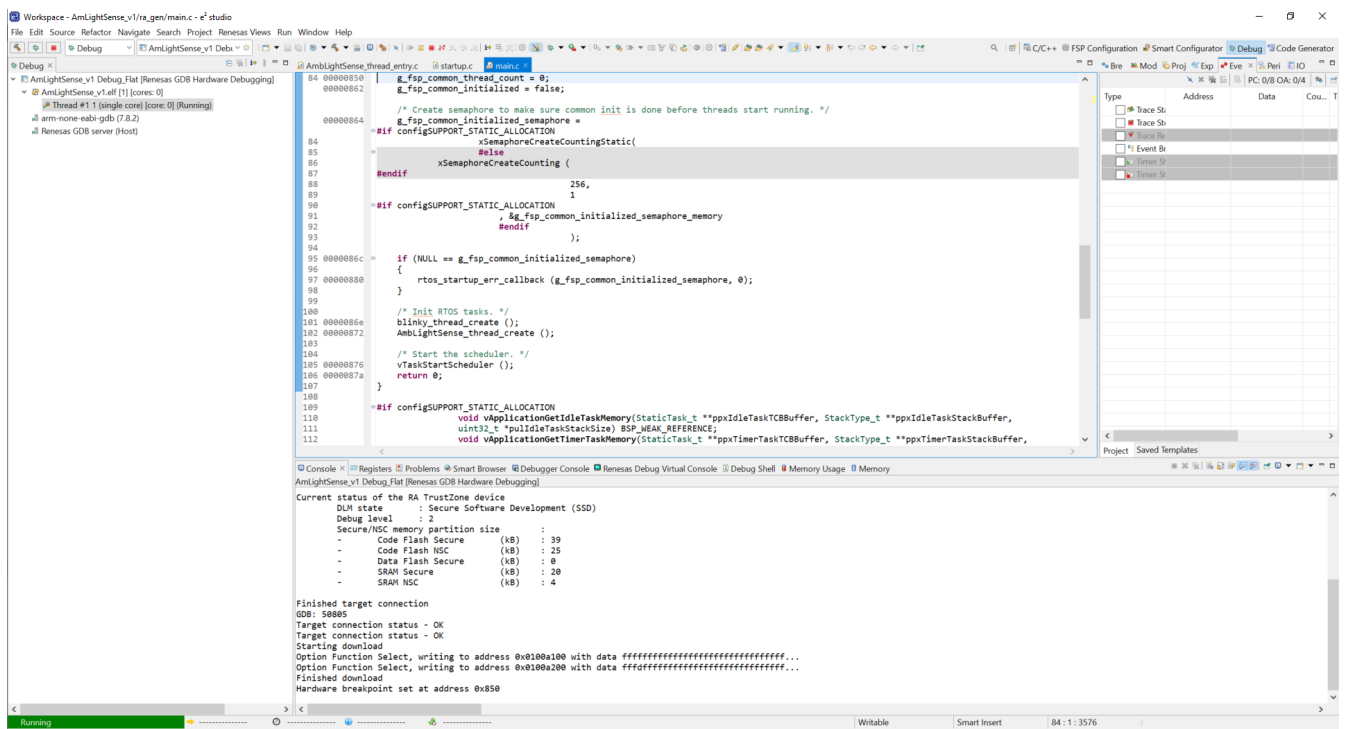
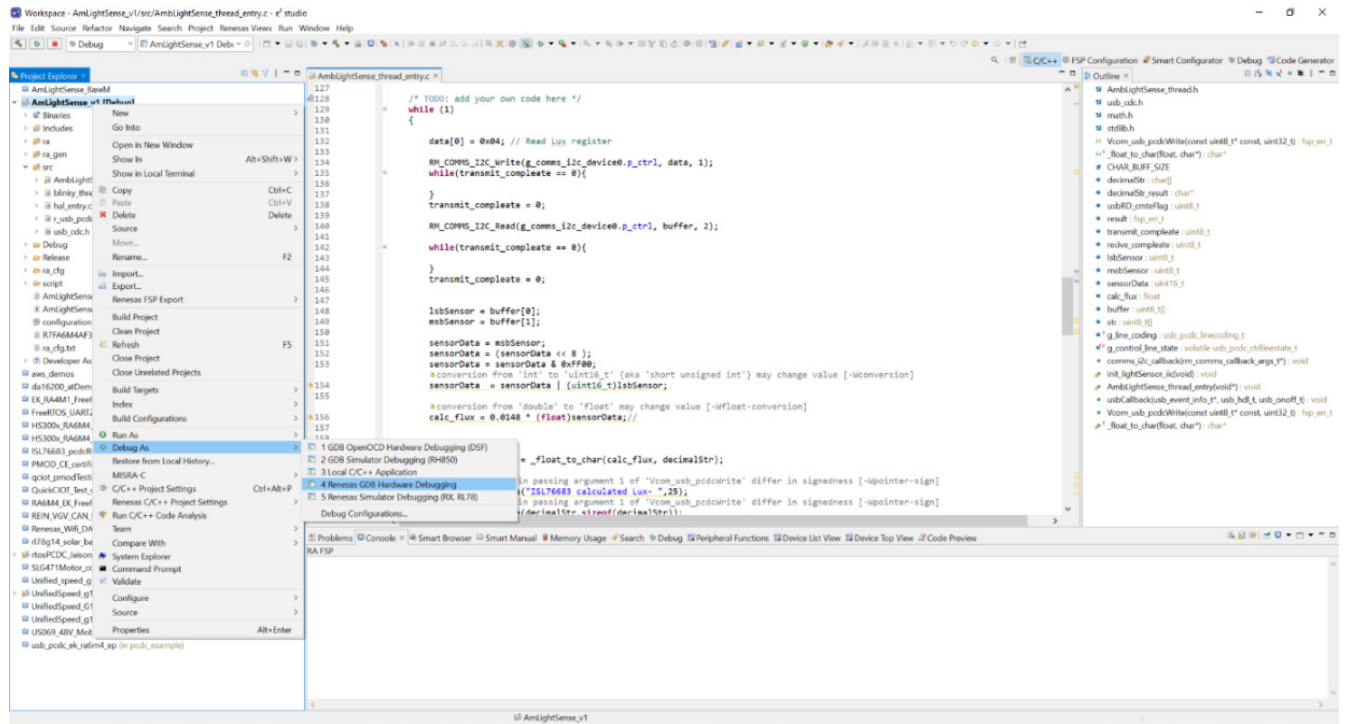


Figure 4. Debugging the Board

2. Flashing and Flash Programmer Settings:

Tool: E2 Emulator Lite, Speed Setting: 9600

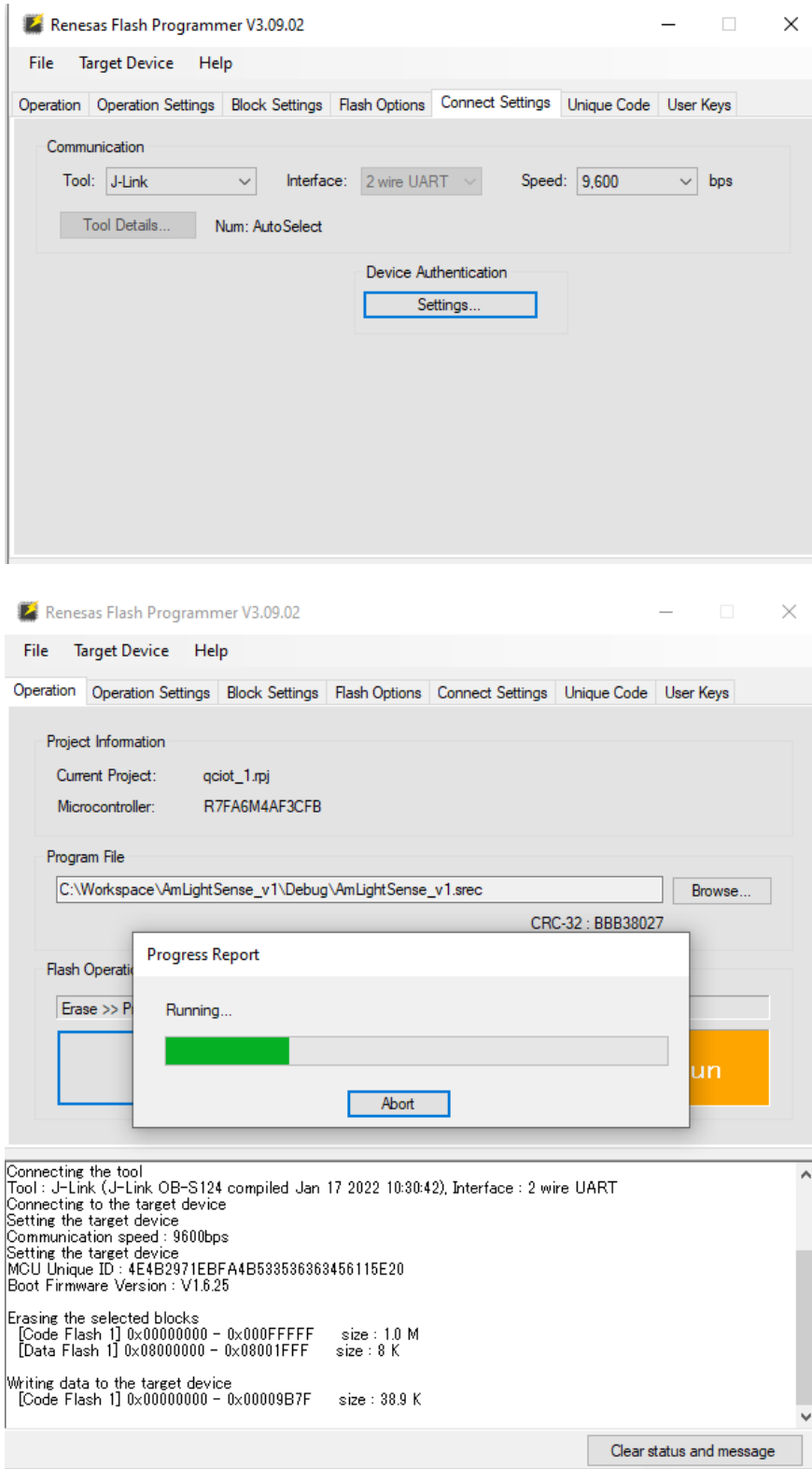


Figure 5. Flashing and Flash Programmer Settings Windows

- 3. After debugging is complete, the lux data can be viewed from the Tera Term VT software window (see Figure 6).

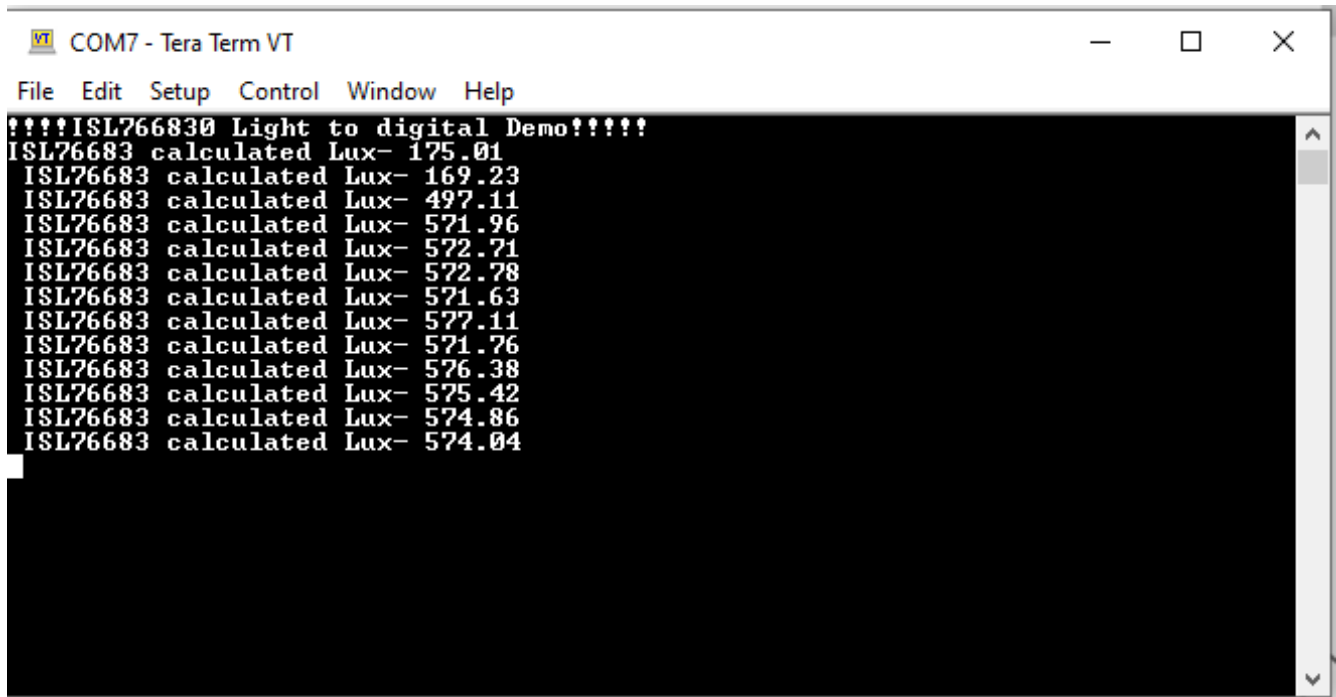


Figure 6. Serial Data Output Window

5. Board Design

5.1 Application Schematic

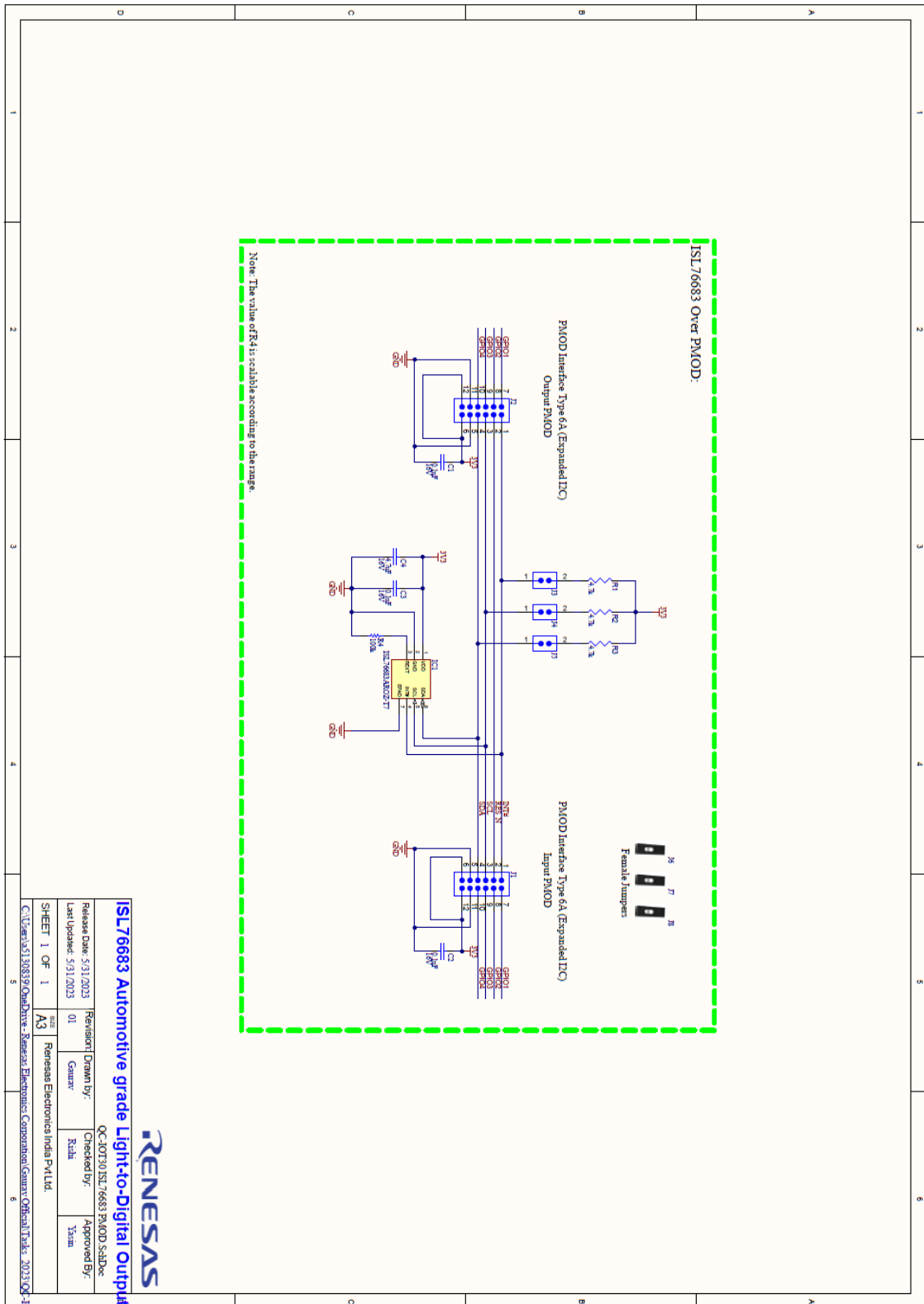


Figure 7. Application Schematic

5.2 Bill of Materials

Qty	Reference Designator	Description	Manufacturer	Manufacturer Part Number
3	C1, C2, C3	0.1µF ±10% 16V Ceramic Capacitor X7R 0603 (1608 Metric)	Würth Elektronik	885012206046
1	C4	4.7µF ±10% 16V Ceramic Capacitor X7R 0603 (1608 Metric)	Würth Elektronik	CC0603KRX5R7BB475
1	IC1	Light-to-Digital Output Sensor with Gain Selection, Interrupt Function, and I ² C Interface	Renesas	ISLISL76683AROZ-T7
1	J1	Connector Header Through Hole, Right Angle 12 position 0.100" (2.54mm)	Würth Elektronik	61301221021
1	J2	12 Position Receptacle Connector 0.100" (2.54mm) Through Hole, Right Angle Gold	Würth Elektronik	613012243121
3	J3, J4, J5	Conn Header Vert 2Pos 1.27mm	Samtec Inc.	FTS-102-01-L-S
3	J6, J7, J8	2 (1 × 2) Position Shunt Connector Black Closed Top, Grip 0.050" (1.27mm) Gold	Harwin Inc.	M50-2000005
3	R1, R2, R3	4.7kOhm ±1% 0.1W, 1/10W Chip Resistor 0603 (1608 Metric) Moisture Resistant Thick Film	YAGEO	RC0603FR-134K7L
1	R4	Chip Resistor, 100kOhm, ±1%, 0.1W, 0603 (1608 Metric)	Yageo	RC0603FR-07100KL

5.3 Board Layout

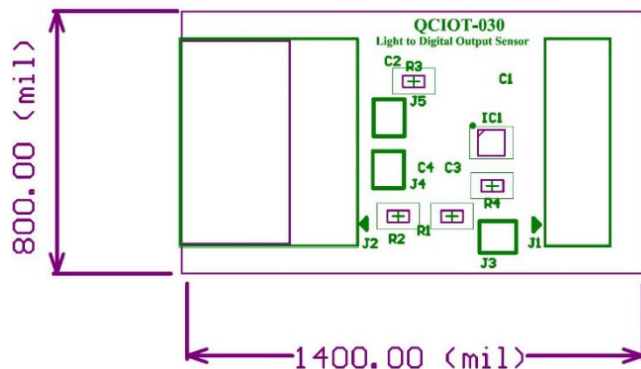


Figure 8. Silkscreen Top

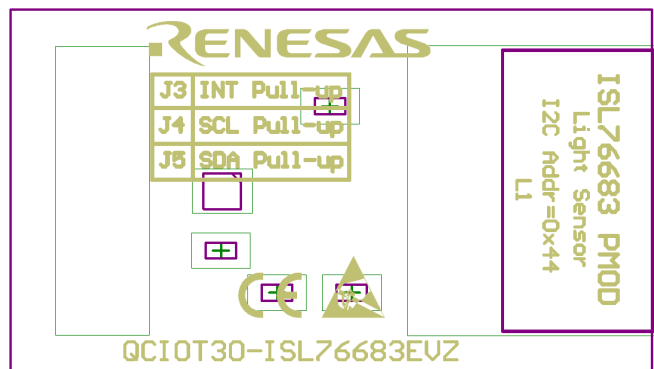


Figure 9. Silkscreen Bottom

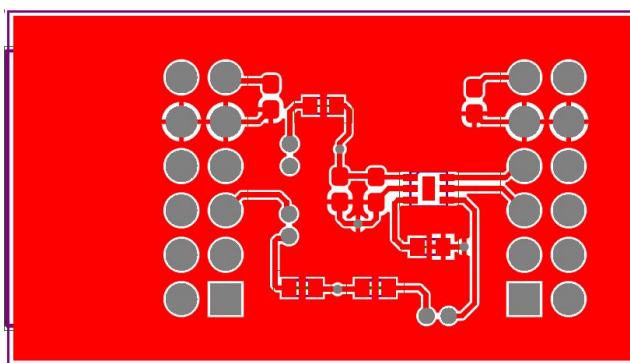


Figure 10. Copper Top Layer

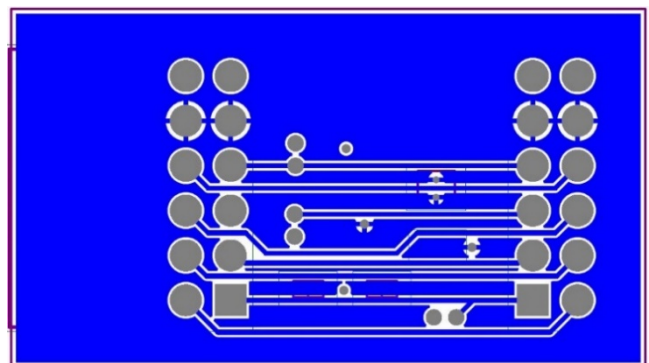


Figure 11. Copper Bottom Layer

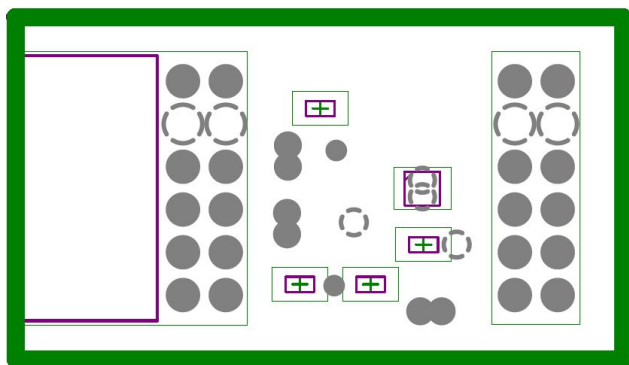


Figure 12. Internal Plane-1 (GND)

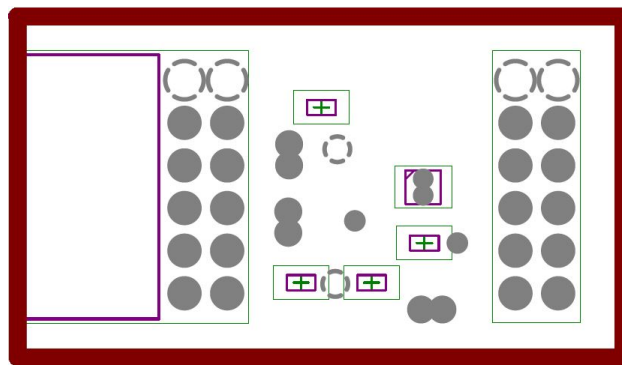


Figure 13. Internal Plane-2 (PWR)

6. Ordering Information

Part Number	Description
QCIOT30-ISL76683EVZ	ISL76683 Automotive-grade Light-to-Digital Output Sensor
US082-INTERPEVZ	PMOD™ Interposer Board to convert Type 2A and 3A to Type 6A PMOD standard

7. Revision History

Revision	Date	Description
1.00	Aug 21, 2024	Initial release.

IMPORTANT NOTICE AND DISCLAIMER

RENESAS ELECTRONICS CORPORATION AND ITS SUBSIDIARIES (“RENESAS”) PROVIDES TECHNICAL SPECIFICATIONS AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT OF THIRD-PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for developers who are designing with Renesas products. You are solely responsible for (1) selecting the appropriate products for your application, (2) designing, validating, and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. Renesas grants you permission to use these resources only to develop an application that uses Renesas products. Other reproduction or use of these resources is strictly prohibited. No license is granted to any other Renesas intellectual property or to any third-party intellectual property. Renesas disclaims responsibility for, and you will fully indemnify Renesas and its representatives against, any claims, damages, costs, losses, or liabilities arising from your use of these resources. Renesas' products are provided only subject to Renesas' Terms and Conditions of Sale or other applicable terms agreed to in writing. No use of any Renesas resources expands or otherwise alters any applicable warranties or warranty disclaimers for these products.

(Disclaimer Rev.1.01 Jan 2024)

Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.

Contact Information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit www.renesas.com/contact-us/.