EVM User's Guide: UCC27735Q1EVM

Using the UCC27735Q1 EVM

1 Description

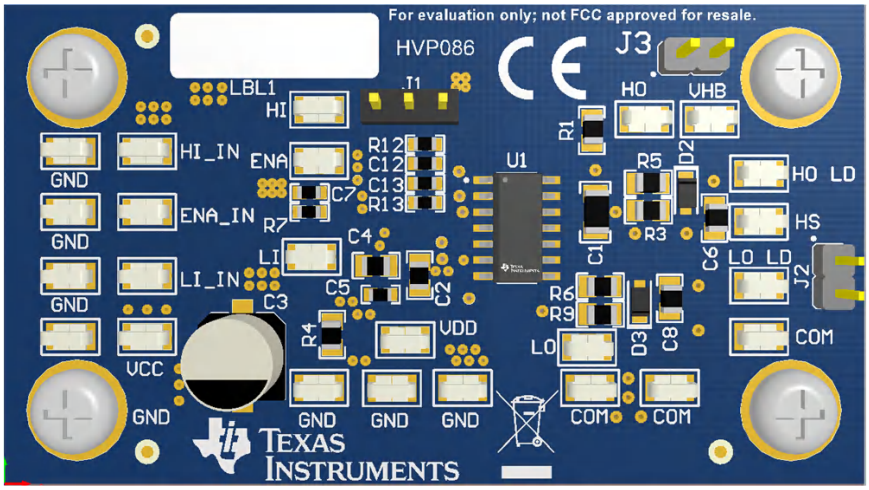
This user's guide describes the characteristics, operation, and use of the UCC27735-Q1 Evaluation Module (EVM). A complete schematic diagram, PCB layouts, and BOM are included in this document.

The EVM is developed in such a way that the UCC27735-Q1 driver performance can be evaluated and compared to data sheet parameters, or externally connected to power devices with provisions for source and sink gate-resistance flexibility. The UCC27735Q1EVM evaluation board uses surface-mount test points allowing connection to LI, HI, VDD, and HB inputs. A variety of other test points are available for probing the UCC27735-Q1. The input bias is configured such that the VHB-VHS high-side bias can be sourced from VCC, or an external additional bias can be added to provide VHB-VHS directly. The high- and low-side driver output returns are separated on HS and GND respectively to allow evaluation of the UCC27735-Q1 HS negative voltage capabilities. For detailed device information, see *UCC2773x Data Sheet* and *UCC2773x-Q1 Data Sheet*.

2 Features

The EVM supports the following features:

- EVM for the low-voltage features of the UCC27735-Q1 gate driver
- 10V to 21V V_{CC} power supply range
- TTL-compatible inputs
- PCB layout optimized for bias supply bypassing cap, gate-drive resistance selection
- Capacitive load, external gate drive resistor and diode for gate drive network evaluation
- Allows quick verification of most of the data sheet parameters
- Test points allow probing all the key pins of the UCC27735-Q1



UCC27735Q1EVM Hardware Board

3 Evaluation Module Overview

3.1 Introduction

The UCC27735Q1EVM is designed to primarily evaluate the UCC27735-Q1 performance. This driver is a 700V (HB absolute maximum), half-bridge driver with 3.5A peak source and 4A peak sink current for driving two N-Channel MOSFETs or IGBT's. The same board can be used to evaluate other pin-to-pin compatible parts in the supported package. The UCC27735-Q1 has low propagation delays (32ns typical) and low propagation delay matching (5ns to 6ns) between the high- and low-side rising and falling edges of the driver outputs for reliable timing of the gate-drive signals. The UCC27735-Q1 HI, LI, and EN inputs can tolerate signals as high as 21V regardless of the V_{DD} voltage which enhances device robustness. The UCC27735-Q1 has split ground with VSS referenced to the control input signals and COM is the low side driver return. The VSS and COM pins can tolerate +5V to –5V between the ground reference pins. Also, the driver LI, HI and EN inputs can operate with –5V with respect to VSS.

The UCC27735-Q1 driver includes an enable function which enables the driver outputs when pulled high, and disables the driver outputs when low. The UCC27735-Q1 also includes an interlock feature which sets both LO and HO driver outputs low when both LI and HI inputs are high at the same time. This prevents turning on the high-side and low-side MOSFETs at the same time enhancing robustness of the power train design.

3.2 Kit Contents

The EVM kit includes:

- UCC27735Q1EVM

3.3 Specifications

Refer to the UCC2773x Data Sheet and UCC2773x-Q1 Data Sheet for the full range of recommended operating specifications and design guidelines for driving loads.

CAUTION

The UCC27735Q1EVM is designed for low-voltage evaluation only, and is not certified for evaluation with voltages beyond the absolute maximums listed in the electrical specifications. Do **not** evaluate high-voltage parameters with this board.

3.4 Device Information

The UCC27735-Q1 is a 700V half-bridge gate driver with 3.5A source and 4A sink current capability, targeted to drive power MOSFETs or IGBTs. The device comprises of one ground-referenced channel (LO) and one floating channel (HO) which is designed to drive half-bridge configured MOSFET's and IGBT's operating with boostrap supplies. The device features robust drive with excellent noise and transient immunity including large negative voltage tolerance on its inputs, high dV/dt tolerance, and wide negative transient safe operating area (NTSOA) on the switch node (HS).

The device accepts a wide range of bias supply input from 10V to 21V and offers UVLO protection for both the VDD and HB bias supply pins. The UCC27735-Q1 is available in an SOIC package and is rated to operate from –40°C to 150°C.

4 Hardware

4.1 Definitions

This procedure details how to configure the UCC27735Q1EVM evaluation board. Within this test procedure, the following naming conventions are applied. Refer to the UCC27735Q1EVM *Bench Setup Diagram and Configuration*, Figure 5-1, for details.

DMM: Digital multimeter

EVM: Evaluation module

4.2 Equipment

4.2.1 Power Supply

DC power supply with voltage and current capability above 20V and 1A, for example: Agilent E3634A

4.2.2 Function Generator

Two-channel function generator with 10MHz or greater bandwidth, for example: Tektronics AFG3252

4.2.3 DMM

DMM with voltage and current capability above 25V and 1A, for example: Fluke 187

4.2.4 Oscilloscope

Four channel oscilloscope with 500MHz or greater bandwidth, for example DPO 7054

4.3 Connection Descriptions

Table 4-1 details the connection descriptions.

Table 4-1. Connection Descriptions

Pins	Description
VCC	V_{CC} positive input bias supply test point. Powers IC VDD pin, use 10V to 21V range.
VDD	V_{DD} positive input bias of UCC27735-Q1 IC
GND	Multiple test points. V_{CC} negative input, HI_IN,LI_IN, and ENA_IN negative inputs, and ground at UCC27735-Q1 IC
HI_IN	High-side input to EVM
HI	High-side input pin, HI
LI_IN	Low-side input to EVM
LI	Low-side input pin, LI
ENA_IN	Enable input to EVM. Connect to GND to disable driver.
ENA	Enable input pin, EN/NC
VHB	HB pin voltage
HO LD	High-side output at capacitive load
HO	High-side output pin
HS	High-side driver return pin. Usually connected to high-side MOSFET source.
LO LD	Low-side output at capacitive load
LO	Low-side output pin
COM	Low-side driver return pin. Usually connected to low-side MOSFET source.

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5 Implementation Results

5.1 Evaluation Setup

5.1.1 DC Power Supply Settings

- DC power supply #1
  - Voltage setting: 15V
  - Current limit: 0.05A

5.1.2 Digital Multi-Meter Settings

- DMM #1
  - DC current measurement, auto-range. Expected current is within 1mA to 15mA.

5.1.3 Two-Channel Function Generator Settings

Table 5-1 displays the two-channel function generator settings.

Table 5-1. Two-Channel Function Generator Settings

	Mode	Frequency	Width	Delay	High	Low	Output Impedance
Channel A	Pulse	100 kHz	2.5µs	0us	5V	0V	High Z
Channel B			2.5µs	5µs			

The UCC27735-Q1 interlock function will result in HO and LO in the low state if HI and LI are high at the same time.

5.1.4 Oscilloscope Settings

Table 5-2 details the oscilloscope settings.

Table 5-2. Oscilloscope Settings

	Bandwidth	Coupling	Termination	Scale Settings	Inverting
Channel A	500MHz or above	DC	1MΩ or automatic	10× or automatic	OFF
Channel B					

5.1.5 Bench Setup Diagram

The bench setup diagram includes the function generator and oscilloscope connections.

Use the following connection procedure, refer to Figure 5-1.

- First, make sure the output of the function generator and power supplies are disabled before connection.
- Apply function generator channel-A on HI_IN-GND.
- Apply function generator channel-B on LI_IN-GND.
- Ensure shunt is installed on J1 pins 1-2 to connect EN to VDD.
- Ensure shunt is installed on J2 pins 1-2 to connect HS to GND.
- Power supply #1: apply positive lead to current input of DMM #1 and current output of DMM #1 to test point VCC; apply negative lead to test point GND.
- Apply oscilloscope channel-1 probes on HO LD-HS, minimizing the loop area as much as possible. Note the scope ground is connected to HS test point.
- Apply oscilloscope channel-2 probes on LO LD-GND, minimizing the loop area as much as possible.

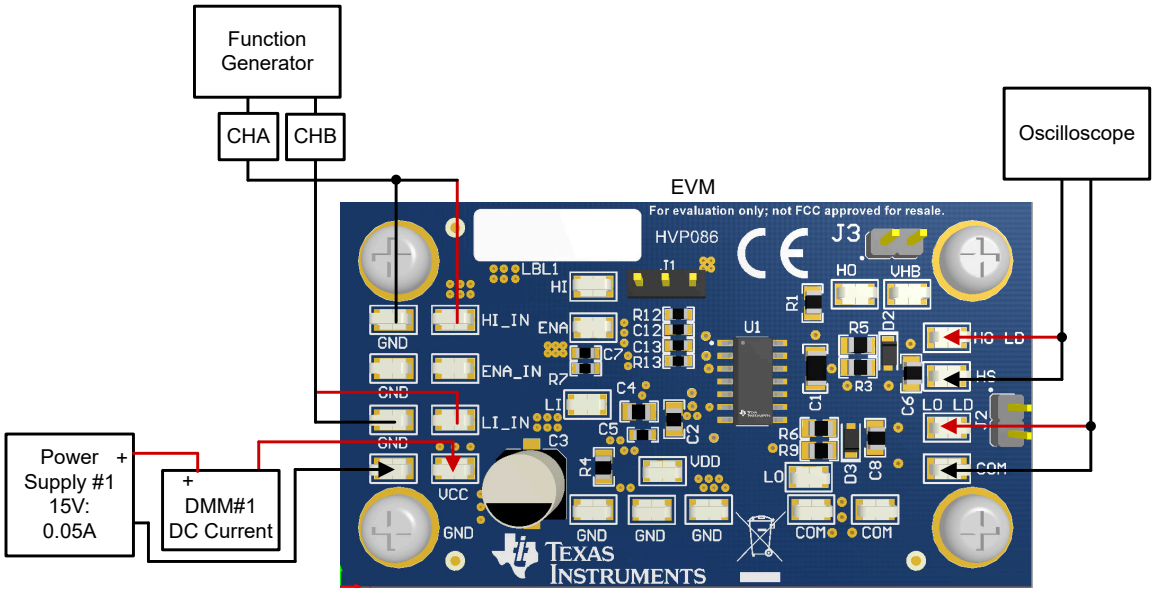

Figure 5-1. Bench Setup Diagram and Configuration

5.2 External Bootstrap Diode

The UCC27735Q1EVM has an external bootstrap diode included and a 2.2Ω series resistor (R2).

As a general guideline TI recommends making provisions for resistance in series with the bootstrap diode. A value of 2.2Ω to 10Ω is recommended.

5.3 Power Up and Power Down Procedure

5.3.1 Power Up

1. Before beginning the power up test procedure, verify the connections with Figure 5-1.
2. Enable supply #1, if the current on DMM1 is more than 0.20mA and less than 0.71mA, everything is set correctly.
3. Enable function generator outputs channel-A and channel-B.
4. The following conditions should be present:
   a. Stable pulse output on channel-1 and channel-2 in the oscilloscope, refer to Figure 5-2
   b. Frequency measurement should be 100kHz, ±5kHz or equal to the programmed function generator frequency
   c. DMM #1 should display around 3.5mA, ±1mA with the default load capacitance of 1.0nF. For more information about operating current, refer to *UCC2773x Data Sheet* and *UCC2773x-Q1 Data Sheet*.
5. Connect ENA_IN test point to GND test point with Jumper J1. The pulse outputs on channel-1 and channel-2 will cease operation and the voltage level should be near ground.

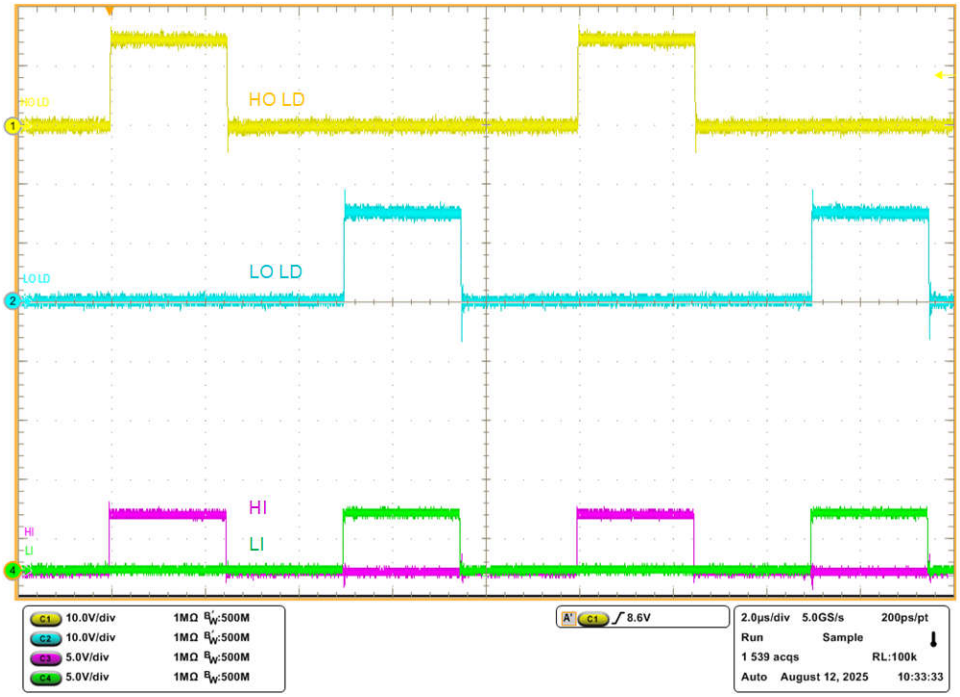

Figure 5-2. Example Input and Output Waveforms (Green and Magenta are PWM Inputs, Yellow and Blue are Driver Outputs)

5.3.2 Power Down

Use the following steps to power down the EVM:

1. Disable function generator
2. Disable power supply #1
3. Disconnect cables and probes

5.4 Typical Performance Waveforms (C_L = 1000pF)

5.4.1 Propagation Delays

The waveforms below illustrate the HI input and HO output on the top traces, and the LI input and LO output on the bottom traces in each plot.

To evaluate propagation delays and rising and falling details, it is recommended to have scope probe connections with short ground leads, see Figure 5-3 and Figure 5-4.

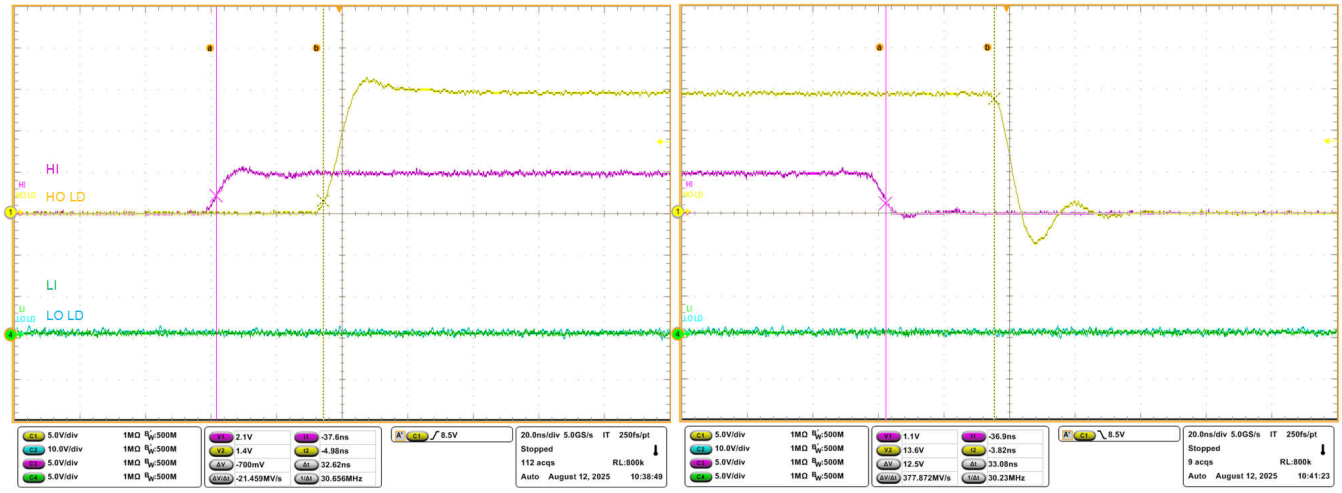

Figure 5-3. HI and HO Propagation Delay Waveforms (Green and Magenta are PWM Inputs, Yellow and Blue are Driver Outputs)

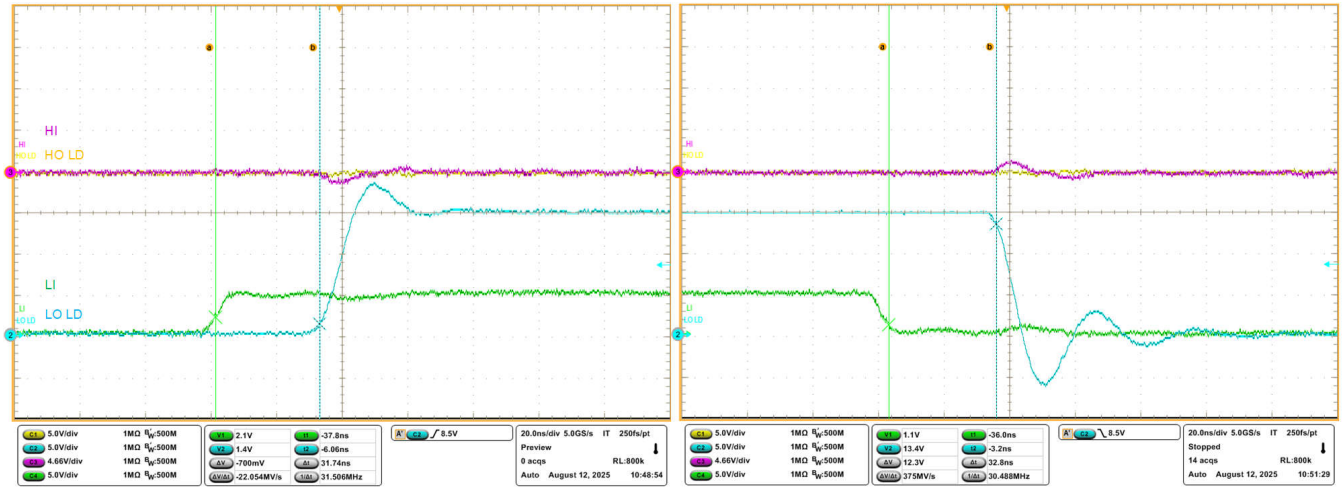

Figure 5-4. LI and LO Propagation Delay Waveforms (Green and Magenta are PWM Inputs, Yellow and Blue are Driver Outputs)

6 Hardware Design Files

6.1 Schematic

Figure 6-1 shows the UCC27735Q1EVM schematic diagram.

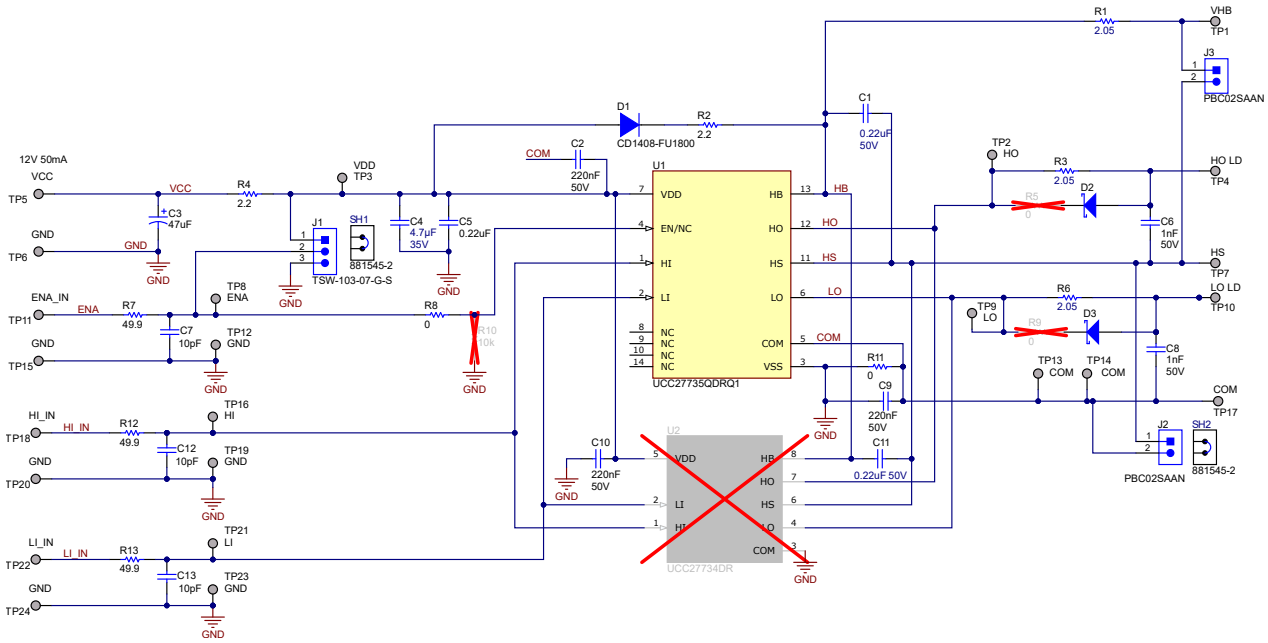

Figure 6-1. UCC27735Q1EVM Schematic

6.2 PCB Layouts

The PCB layout information for UCC27735Q1EVM is shown in Figure 6-2 through Figure 6-5.

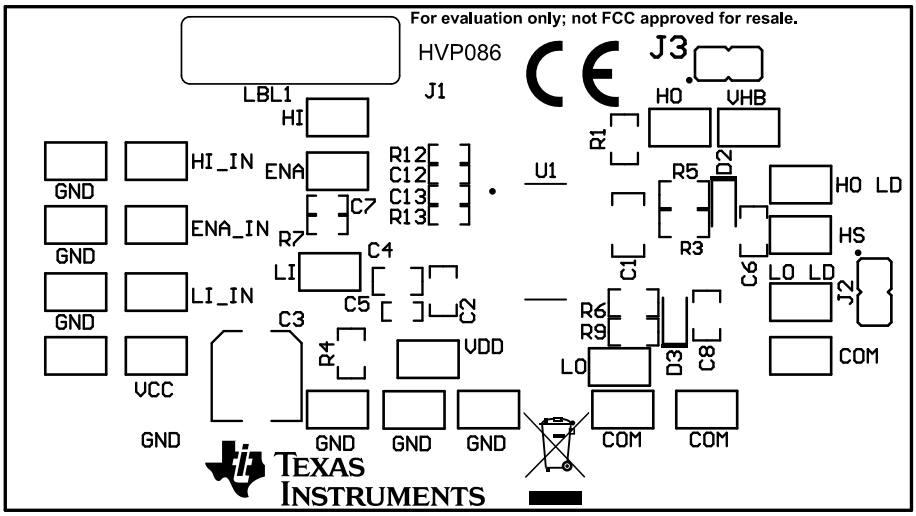

Figure 6-2. Top Overlay

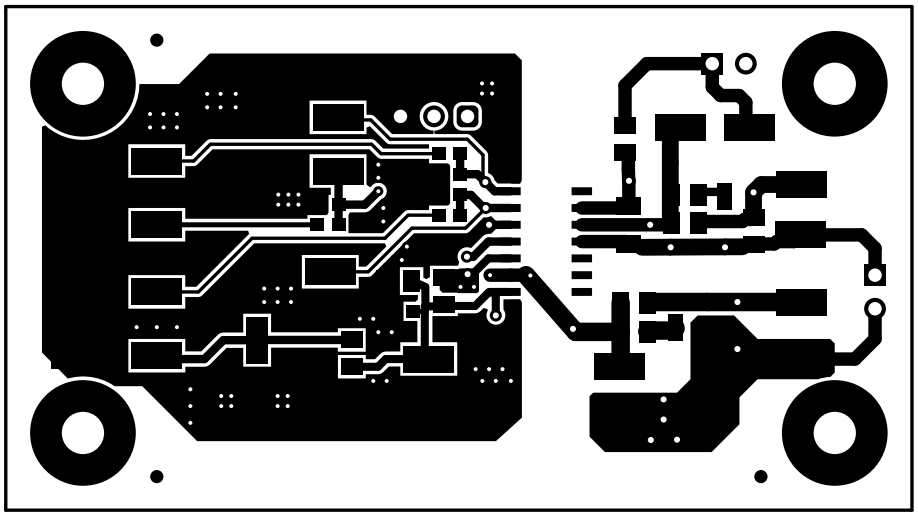

Figure 6-3. Top Layer

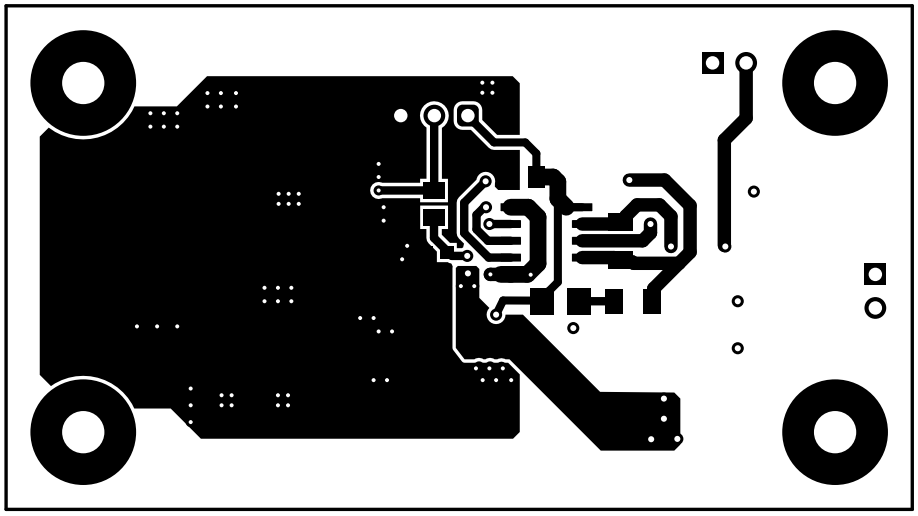

Figure 6-4. Bottom Layer

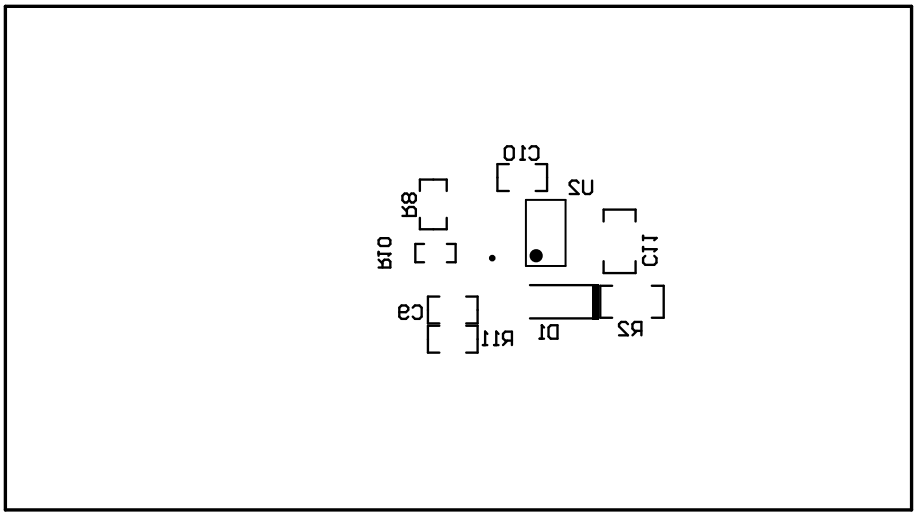

Figure 6-5. Bottom Overlay

6.3 Bill of Materials (BOM)

Table 6-1 lists the UCC27735Q1EVM list of materials.

Table 6-1. UCC27735Q1EVM Bill of Materials

Item	Designator	QTY	Value	Part Number	Manufacturer	Description	Package Reference
1	C1, C11	2	0.22uF	GRM319R71H224KA01D	Murata	CAP, CERM, 0.22 µF, 50 V, ±10%, X7R, 1206	1206
2	C2, C9, C10	3	0.22uF	C0805C224K5RACTU	Kemet	CAP, CERM, 0.22 µF, 50 V,±10%, X7R, 0805	0805
3	C3	1	47uF	UUD1H470MCL1GS	Nichicon	CAP, AL, 47 µF, 50 V,±20%, 0.68 ohm, SMD	6.3x7.7
4	C4	1	4.7uF	C2012X7R1V475M125AC	TDK	CAP, CERM, 4.7 uF, 35 V, +/- 20%, X7R, 0805	0805
5	C5	1	0.22uF	C1608X7R1H224K080AB	TDK	CAP, CERM, 0.22 uF, 50 V, ±10%, X7R, 0603	0603
6	C6, C8	2	1000pF	C0805C102J5RACTU	Kemet	CAP, CERM, 1000 pF, 50 V, +/- 5%, X7R, 0805	0805
7	C7, C12, C13	3	10pF	C0603C100J5GACTU	Kemet	CAP, CERM, 10 pF, 50 V, +/- 5%, C0G/NP0, 0603	0603
8	D1	1	800V	CD1408-FU1800	Bourns	Diode, Ultrafast, 800 V, 1 A, 1408 Diode	1408 Diode
9	D2, D3	2	30V	MSS1P3L-M3/89A	Vishay-Semiconductor	Diode, Schottky, 30 V, 1 A, AEC-Q101, MicroSMP	MicroSMP
10	H1, H2, H3, H4	4		NY PMS 440 0025 PH	B&F Fastener Supply	Machine Screw, Round, #4-40 x 1/4, Nylon, Philips panhead	Screw
11	H5, H6, H7, H8	4		1902C	Keystone	Standoff, Hex, 0.5"L #4-40 Nylon	Standoff
12	J1	1		TSW-103-07-G-S	Samtec	Header, 100mil, 3x1, Gold, TH	3x1 Header
13	J2, J3	2		PBC02SAAN	Sullins Connector Solutions	Header, 100mil, 2x1, Gold, TH	2x1 header
14	R1, R3, R6	3	2.05	CRCW08052R05FKEA	Vishay-Dale	RES, 2.05, 1%, 0.125 W, AEC-Q200 Grade 0, 0805	0805
15	R2	1	2.2	CRM1206-JW-2R2ELF	Bourns	RES, 2.2, 5%, 0.5 W, 1206	1206
16	R4	1	2.2	CRCW08052R20JNEA	Vishay-Dale	RES, 2.2, 5%, 0.125 W, AEQ-Q200 Grade 0 0805	0805
17	R7, R12, R13	3	49.9	CRCW060349R9FKEA	Vishay-Dale	RES, 49.9, 1%, 0.1 W, AEC-Q200 Grade 0, 0603	0603
18	R8, R11	2	0	MCR10EZPJ000	Rohm	RES, 0, 5%, 0.125 W, 0805	0805
19	SH1, SH2	2		881545-2	TE Connectivity	Shunt, 100mil, Gold plated, Black	Shunt 2 pos. 100 mil
20	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP14, TP15, TP16, TP17, TP18, TP19, TP20, TP21, TP22, TP23, TP24	24		5019	Keystone	Test Point, Miniature, SMT	Test Point, Miniature, SMT
14	U1	1		UCC27735QDRQ1	Texas Instruments	UCC2773X High-Speed, 700V Half-Bridge Gate Driver with 3.5A, 4A Drive Strength and up to 200V/ns Noise Immunity	SOIC14

7 Additional Information

7.1 Trademarks

All trademarks are the property of their respective owners.

STANDARD TERMS FOR EVALUATION MODULES

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.

WARNING

Evaluation Kits 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 shall operate the Evaluation Kit within TI’s recommended guidelines and any applicable legal or environmental requirements as well as reasonable and customary safeguards. Failure to set up and/or operate the Evaluation Kit within TI’s recommended guidelines may result in personal injury or death or property damage. Proper set up entails following TI’s instructions for electrical ratings of interface circuits such as input, output and electrical loads.

NOTE:

EXPOSURE TO ELECTROSTATIC DISCHARGE (ESD) MAY CAUSE DEGREDATION OR FAILURE OF THE EVALUATION KIT; TI RECOMMENDS STORAGE OF THE EVALUATION KIT IN A PROTECTIVE ESD BAG.

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。

https://www.ti.com/ja-jp/legal/notice-for-evaluation-kits-delivered-in-japan.html

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。

なお、本製品は、上記の「ご使用にあたっての注意」を譲渡先、移転先に通知しない限り、譲渡、移転できないものとします。

上記を遵守頂けない場合は、電波法の罰則が適用される可能性があることをご留意ください。 日本テキサス・インスツルメンツ株式会社

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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

電力線搬送波通信についての開発キットをお使いになる際の注意事項については、次のところをご覧ください。https://www.ti.com/ja-jp/legal/notice-for-evaluation-kits-for-power-line-communication.html

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.

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