

EVM User's Guide: UCC21231AEVM-108

UCC21231AEVM-108 Evaluation Module

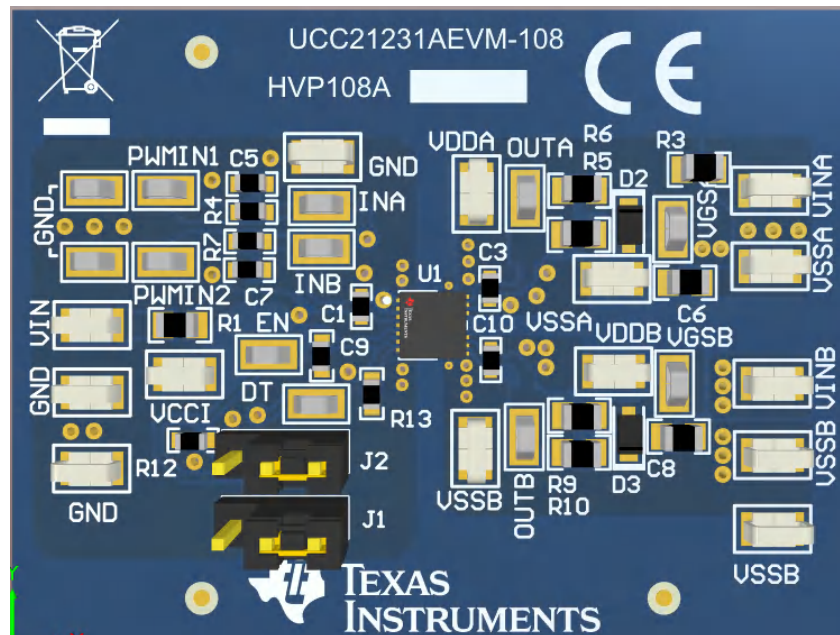


Description

The UCC21231AEVM-108 is a two copper layer PCB containing multiple test points and jumpers to fully evaluate the functionality of the UCC21231A gate driver. The EVM features PWM input control, bootstrapped high side power supply, options to use bench top power supply, configurable dead time options, and EN and DIS pin jumpers. The layout has been optimized to minimize gate loop area for each channel and placement of bypass capacitors allow for clean and sharp signal reading with minimal noise interference.

Features

- Universal dual low-side, dual high-side or half-bridge driver
- Common-mode transient immunity (CMTI) greater than 125V/ns
- Variety of test points to help evaluate all of the gate driver functions
- Selectable dead time modes: overlap, interlock, programmable



PCB (Top View)

1 Evaluation Module Overview

1.1 Introduction

The UCC21231AEVM-108 evaluation module is designed for evaluating TI's UCC21231A gate driver. The UCC21231A is a 1.6kVrms isolated dual-channel gate driver with 4A source and 6A sink peak current for driving Si MOSFETs, IGBTs and WBG devices such as SiC and GaN transistors. This user's guide provides a complete EVM schematic diagram, printed circuit board layout, bill of materials, test setup, and feature descriptions for the UCC21231A. TI recommends that users read the data sheet ([SLUSF46](#)) thoroughly before switching the part in the EVM covered by this user's guide.

1.2 Kit Contents

- UCC21231AEVM-108 two layer PCB

1.3 Specification

UCC21231AEVM-108 primary function is to evaluate the UCC21231A dual channel gate driver. Multiple test points enable monitoring of the different input and outputs of the gate driver for thorough performance evaluation. The gate driver output can be configured to drive a capacitive loads for low voltage testing.

1.4 Device Information

The UCC21231A is an isolated dual channel gate driver family with programmable dead time and wide temperature range. The device is designed with 4A peak source and 6A peak sink current to drive power MOSFET, SiC, and IGBT transistors.

The UCC21231A can be configured as two low-side drivers, two high-side drivers, or a half-bridge driver. The input side is isolated from the two output drivers by a 1.6kVRMS isolation barrier, with a minimum of 125V/ns common-mode transient immunity (CMTI).

Protection features include: resistor programmable dead time, disable feature to shut down both outputs simultaneously, and integrated de-glitch filter that rejects input transients shorter than 5ns. All supplies have UVLO protection.

With all these advanced features, the UCC21231A device enables high efficiency, high power density, and robustness in a wide variety of power applications.

2 Hardware

2.1 Power Requirements

Table 2-1. UCC21231AEVM-108 Electrical Specifications

	Description	Min	Typ	Max	Units
VIN	Enable for UCC21231A VCCI	3.3	5	5.5	V
VDDB VDDA	UCC21231A output bias supply voltage	6.5		25	V
Fs	Switching frequency	0		500	KHz
Tj	Operating junction temperature	-40		150	°C

2.2 Header Information

Table 2-2. Headers Description

Header Marker	Description
J1	Gate driver enable/disable
J2	Dead time setting

2.3 Jumper Information

Table 2-3. Jumper Configurations

Header	Jumper Settings	Default
J1	EN/DIS-VCCI EN/DIS-GND	EN/DIS-VCC1: connects VCC1 to UCC21551 EN pin, enabling gate driver
J2	DT-VCCI DT-GND Unconnected	DT-VCCI: enables gate driver output overlap

2.4 Test Points

Table 2-4. Test Point Description

Test Point	Test Point Board Marker	Description
TP1	VIN	Input voltage for VCCI
TP2	GND	Input side ground
TP3	VINA	Input voltage for VDDA
TP4	INA	Channel A input
TP5	PWMIN1	Input signal for INA
TP6	VSSA	Output side channel A ground
TP7	GND	Input side ground
TP8	OUTA	Channel A output
TP9	VGSA	Channel A capacitive load
TP10	VCCI	Input side VCCI supply
TP11	VDDA	Output side channel A supply
TP12	INB	Channel B input
TP13	PWMIN2	Input signal for INB
TP14	VSSA	Output side channel A ground
TP15	EN	Input side EN input
TP16	VDDB	Output side channel B supply
TP17	OUTB	Channel B output
TP18	GND	Input side ground

Table 2-4. Test Point Description (continued)

Test Point	Test Point Board Marker	Description
TP19	DT	Dead time pin
TP20	VGSB	Channel B capacitive load
TP21	VSSB	Output side channel B ground
TP22	GND	Input side ground
TP23	GND	Input side ground
TP24	VINB	Input voltage for VDDB
TP25	VSSB	Output side channel B ground
TP26	VSSB	Output side channel B ground

3 Hardware Design Files

3.1 Schematics

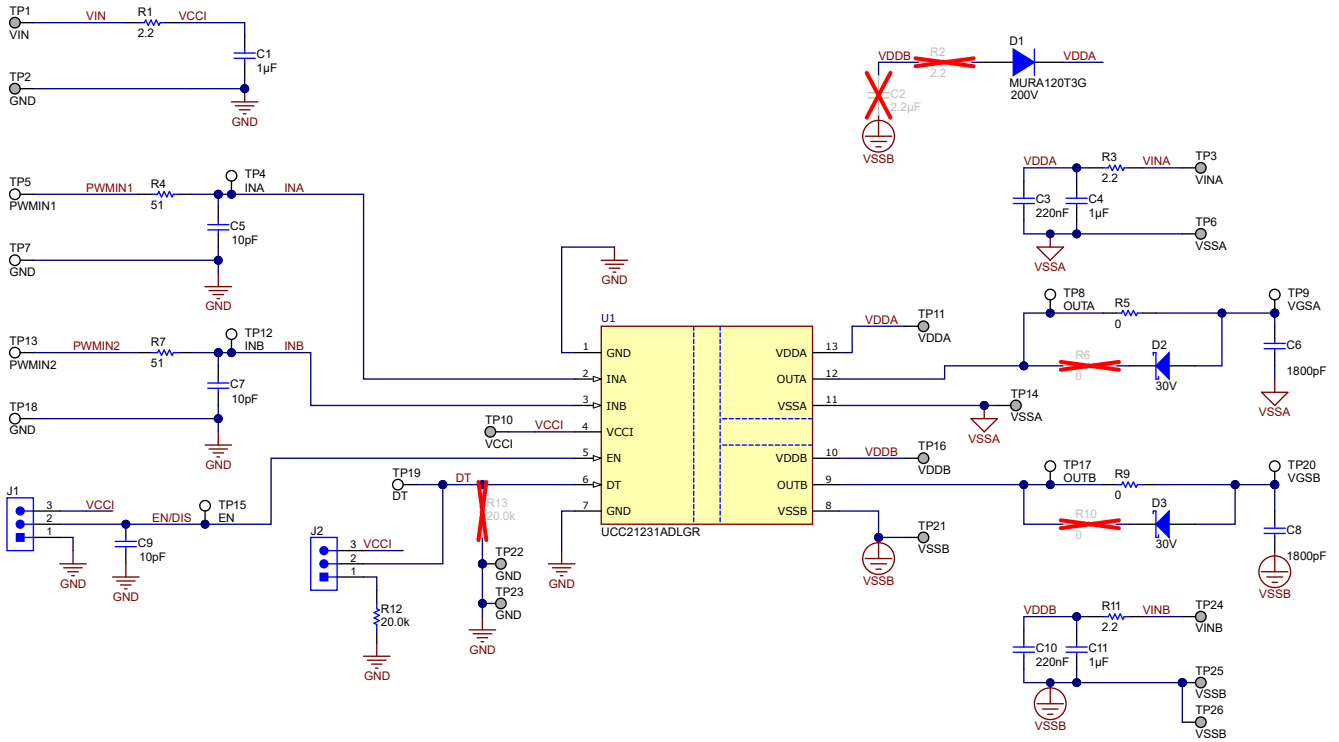


Figure 3-1. UCC21231AEVM-108 Schematic

3.2 PCB Layouts

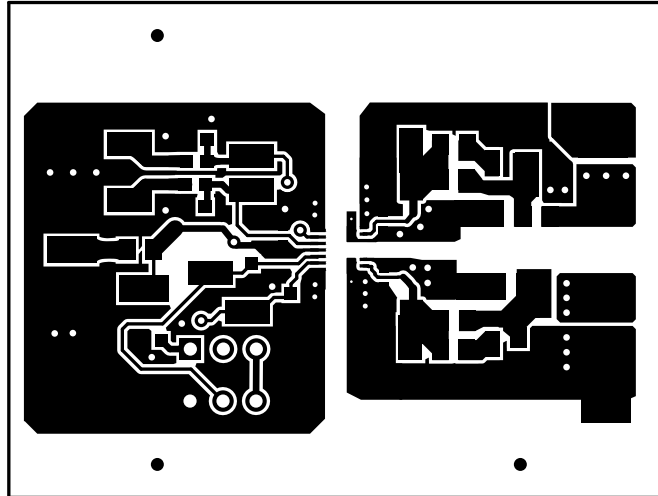


Figure 3-2. PCB Top Layer

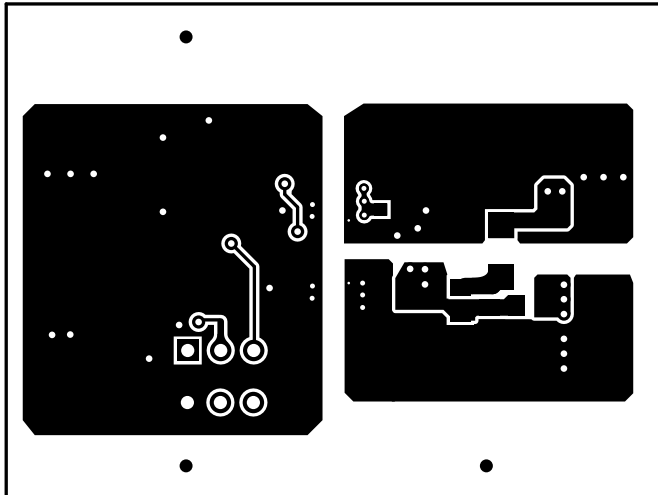


Figure 3-3. PCB Bottom Layer

3.3 Bill of Materials (BOM)

Table 3-1 lists the bill of materials for UCC21231AEVM-108.

Table 3-1. Bill of Materials

Designator	Qty	Description	Part Number	Manufacturer
C1, C4, C11	3	CAP, CERM, 1uF, 50V, +/- 10%, X7R, 0603	UMK107AB7105KA-T	Taiyo Yuden
C3, C10	2	CAP, CERM, 0.22uF, 50V, +/- 10%, X7R, 0603	GRM188R71H224KAC4D	MuRata
C5, C7, C9	3	CAP, CERM, 10pF, 50V, +/- 5%, C0G/NP0, 0603	CGA3E2NP01H100D080AA	TDK
C6, C8	2	CAP, CERM, 1800pF, 100V, +/- 5%, C0G/NP0, 0805	GRM2165C2A182JA01D	MuRata
D1	1	Diode, Ultrafast, 200V, 1A, SMA	MURA120T3G	ON Semiconductor
D2, D3	2	Diode, Schottky, 30V, 1A, AEC-Q101, MicroSMP	MSS1P3L-M3/89A	Vishay-Semiconductor
H1, H2, H3, H4	4	Bumpon, Hemisphere, 0.44 X 0.20, Clear	SJ-5303 (CLEAR)	3M
J1, J2	2	Header, 100mil, 3x1, Gold, TH	PBC03SAAN	Sullins Connector Solutions
R1, R3, R11	3	RES, 2.2, 5%, 0.125 W, 0805	RC0805JR-072R2L	Yageo America
R4, R7	2	RES, 51, 5%, 0.1 W, AEC-Q200 Grade 0, 0603	CRCW060351R0JNEA	Vishay-Dale
R5, R9	2	RES, 0, 5%, 0.125 W, AEC-Q200 Grade 0, 0805	CRCW08050000Z0EA	Vishay-Dale
R12	1	RES, 20.0 k, 1%, 0.1 W, 0603	RC0603FR-0720KL	Yageo
SH-J1, SH-J2	2	Shunt, 100mil, Gold plated, Black	SNT-100-BK-G	Samtec
TP1, TP2, TP3, TP6, TP10, TP11, TP14, TP16, TP21, TP22, TP23, TP24, TP25, TP26	14	Test Point, Miniature, SMT	5019	Keystone
TP4, TP5, TP7, TP8, TP9, TP12, TP13, TP15, TP17, TP18, TP19, TP20	12	Test Point, Miniature, SMT	5015	Keystone
U1	1	4A Source, 6A Sink, High-Speed, Dual-Channel Isolated Gate Driver, WSON13	UCC21231ADLGR	Texas Instruments
C2	0	CAP, CERM, 2.2uF, 50V, +/- 10%, X7R, 0805	UMK212BB7225KG-T	Taiyo Yuden
FID1, FID2, FID3, FID4, FID5, FID6	0	Fiducial mark. There is nothing to buy or mount.	N/A	N/A
R2	0	RES, 2.2, 5%, 0.125 W, 0805	RC0805JR-072R2L	Yageo America
R6, R10	0	RES, 0, 5%, 0.125 W, AEC-Q200 Grade 0, 0805	CRCW08050000Z0EA	Vishay-Dale
R13	0	RES, 20.0 k, 1%, 0.1 W, 0603	RC0603FR-0720KL	Yageo

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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.

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- 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.

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(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.

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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.

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