DS90LV011-12AEVM User's Guide

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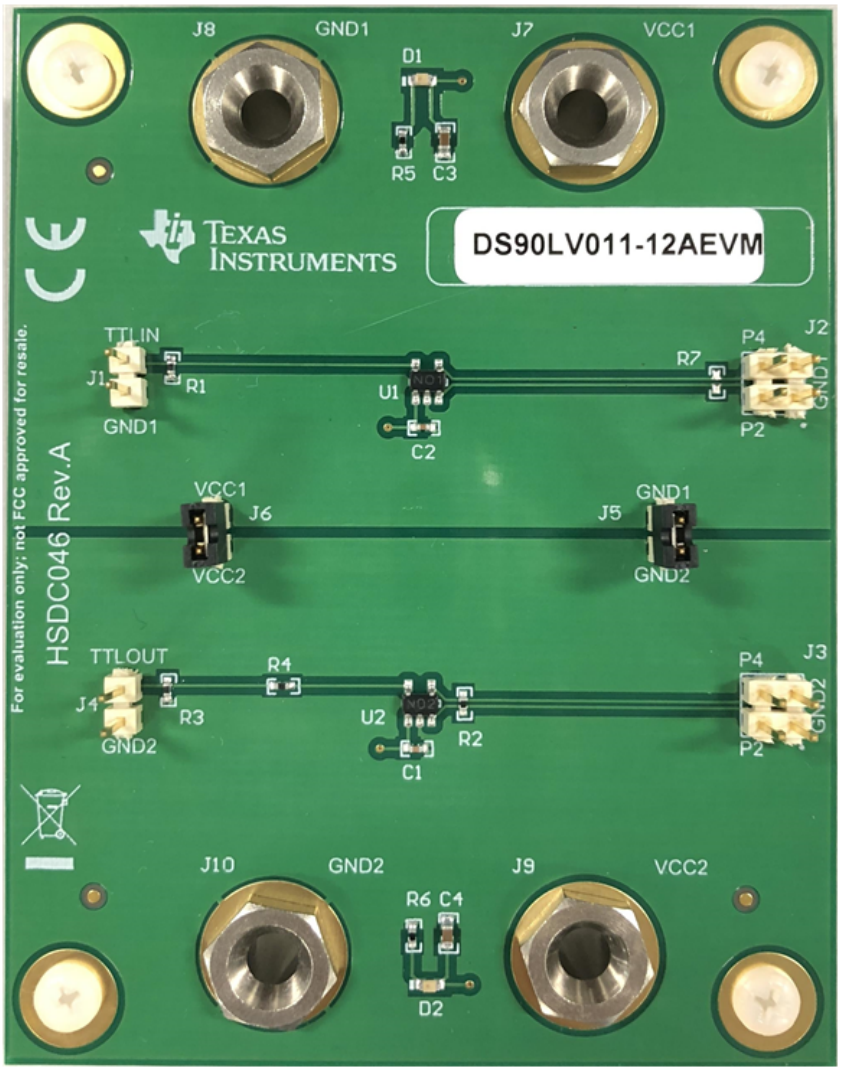
Trademarks

1 Introduction

The DS90LV011-12AEVM is an evaluation module designed for performance and functional evaluation of the Texas Instruments DS90LV011A 3-V LVDS Single High Speed Differential Line Driver and DS90LV012A 3-V LVDS Single High Speed Differential Line Receiver. With this kit, users can evaluate the output waveform characteristics and signal integrity supported by the DS90LV011A and DS90LV012A. Header pins allow access to the DS90LV011A and DS90LV012A inputs and outputs and also facilitate connection to lab equipment or user systems for performance evaluation.



1.1 Features

DS90LV011A:

- Conforms to TIA/EIA-644-A Standard
- >400 Mbps (200 MHz) Switching Rates
- 700 ps (100 ps Typical) Maximum Differential Skew
- 1.5 ns Maximum Propagation Delay
- Single 3.3 V Power Supply

DS90LV012A:

- Compatible with ANSI TIA/EIA-644-A Standard
- >400 Mbps (200 MHz) switching rates
- 100 ps differential skew (typical)
- 3.5 ns maximum propagation delay
- Single 3.3 V Power Supply

1.2 Applications

- Wireless/Telecom Infrastructure
- Medical/Health
- Multi-Function Printers
- Factory Automation and Control
- EPOS/ECR/Cash Drawer
- Board to Board Communication

2 Ordering Information

EVM ID	Device ID	Device Package
DS90LV011-12AEVM	DS90LV011A, DS90LV012A	SOT-23

3 Setup

The DS90LV011A is a LVDS Single High Speed Differential Line Driver, and the DS90LV012A is a LVDS Single High Speed Differential Line Receiver. When operating the DS90LV011-12AEVM, jumper setting definitions can be referenced in Table 1, while signal input and output connection descriptions can be found in Figure 1. When using the DS90LV011A and DS90LV012A together, the typical configuration is to connect the DS90LV011A outputs (J2) such that they drive the inputs of the DS90LV012A (J3). The setup configuration is shown in Figure 2

Table 1. Description of Jumper Settings

Component	Name	Comments
J5		Shunt for GND1 and GND2
J6		Shunt for VCC1 and VCC2
J7	GND1	GND for DS90LV011A
J8	VCC1	3.3 V power supply for DS90LV011A
J9	VCC2	3.3 V power supply for DS90LV012A
J10	GND2	GND for DS90LV012A

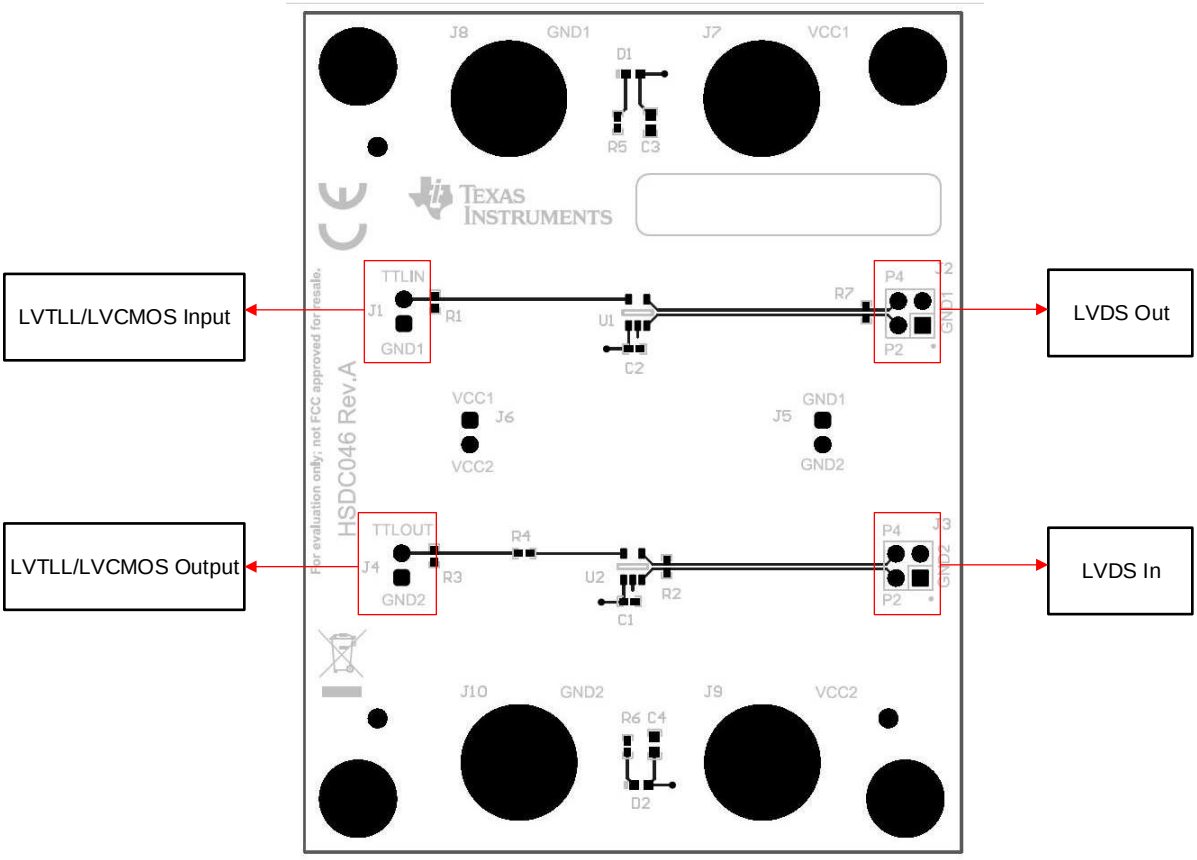


Figure 1. DS90LV011-12AEVM Input and Output Diagram

3.1 Hardware Description and Setup

3.1.1 Termination Resistor

By factory default, the DS90LV011-12AEVM comes with populated termination resistors R2 on the DS90LV012A inputs and unpopulated termination resistors R7 on the DS90LV011A outputs.

In order to measure LVDS signals properly, a 100 Ω termination resistor must be present across each differential pair at the point of measurement. However, if multiple 100 Ω termination resistors are placed across a differential pair between the transmitter and receiver, the signal becomes double terminated. Double termination should be avoided, since this reduces the output amplitude and noise margin.

Populate R7 with 100 Ω termination resistors

- if the DS90LV011A output is measured by a high-impedance differential probe.
- if the DS90LV011A output interfaces with an external load that does **not** have an appropriate 100 Ω differential termination.

Remove R7 (or keep R7 unpopulated)

- if the DS90LV011A output interfaces with a DS90LV012A input by connecting J4 to J1.
- if the DS90LV011A output interfaces with an external load that has an appropriate 100 Ω differential termination.

3.1.2 Hardware Setup

DS90LV011-12AEVM can be powered using a single power supply or two separate power supplies.

When using a single power supply, J5 and J6 should be connected with jumpers. When using two separate power supplies, J5 and J6 should be left open.

1. Connect a 3.3 V DC power supply (30 mA max) to the EVM. The LEDs D1 and D2 should turn on to specify that the board is powered.
2. Apply a high-speed 3.3 V LVTTL/LVCMOS signal to the DS90LV011A inputs on header J1.
3. The DS90LV011A LVDS output signals can be measured differentially on an oscilloscope by applying a Tektronix P6247 probe or equivalent differential probe at header J4 to measure the differential signal across the 100 Ω termination resistors R7, when R7 is populated. The expected output waveform is a ±350 mV LVDS signal.
4. Apply a high-speed ±350 mV (700 mV_{pp} differential) LVDS signal to the DS90LV012A inputs on header J3. If desired, LVDS output from DS90LV011A can be connected to LVDS input of DS90LV012A. If this is done, make sure R7 is not populated to avoid double-termination.
5. The DS90LV012A LVTTL/LVCMOS output signals can be measured on an oscilloscope by applying a Tektronix P6247 probe or equivalent differential probe at header J4.

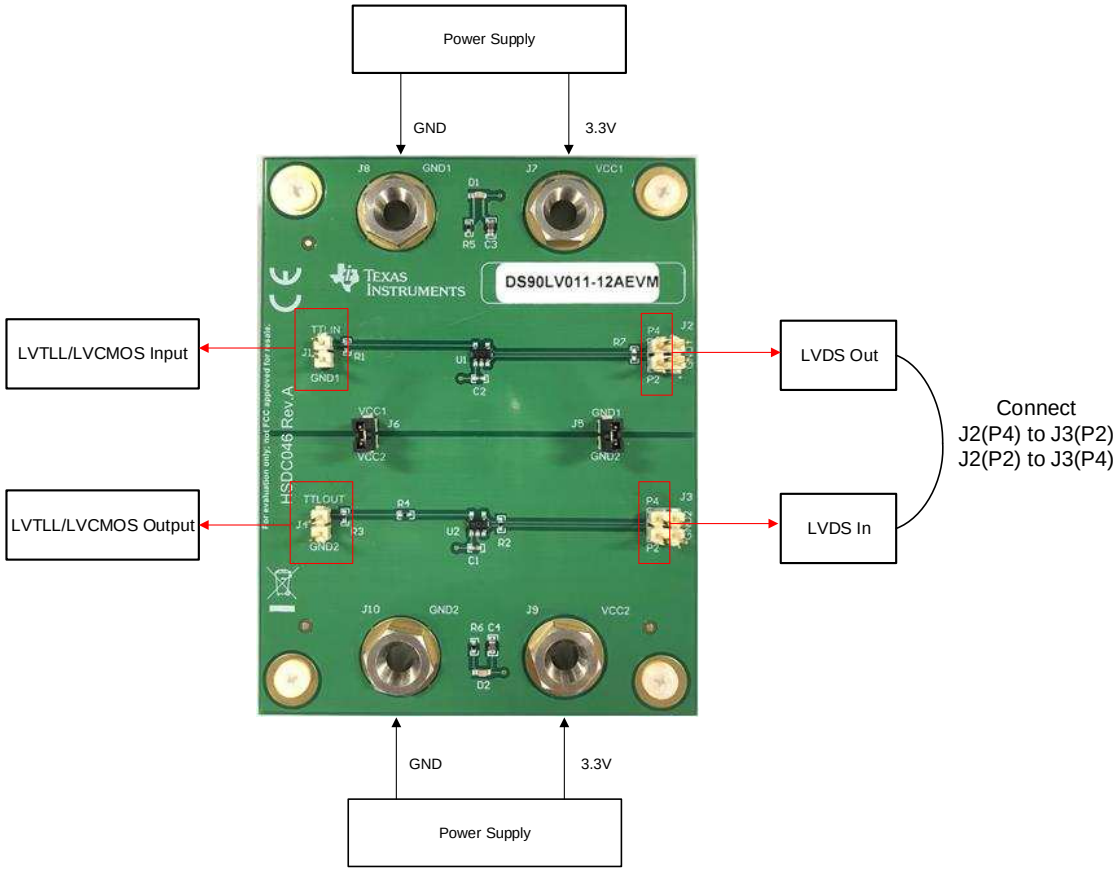


Figure 2. DS90LV011-12AEVM Setup Configuration

3.2 DS90LV011-12AEVM Performance Plots

The following plots show typical waveforms measured on the DS90LV011-12AEVM inputs and outputs using the hardware setup in Figure 2. For these measurements, the following parameters were used:

- Operating Frequency: 200 MHz (400 Mbps)
- DS90LV011A Input: 3.3 V LVCMOS square wave to J1
- DS90LV012A Input: LVDS signal to LVDS IN± from DS90LV011A output LVDS OUT1±. 100 Ω termination resistor R7 not populated
- DS90LV012A Output: Measured at TTLOUT

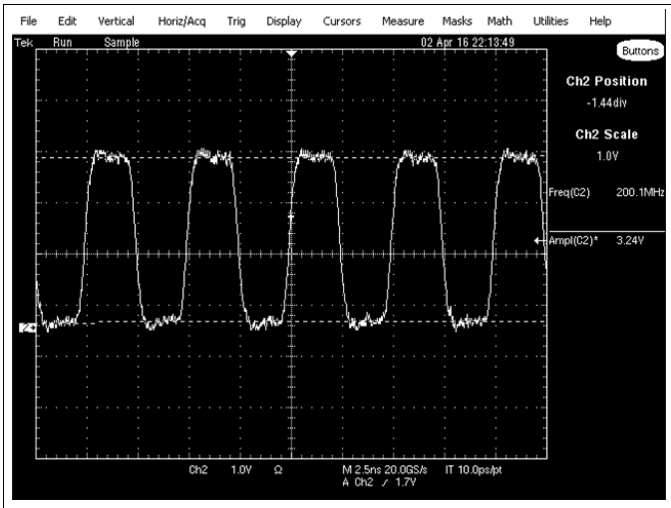


Figure 3. DS90LV011A 3.3 V LVCMOS Input

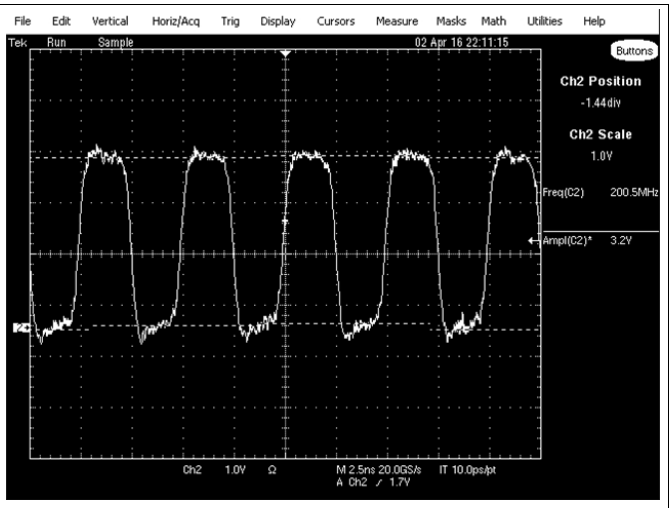


Figure 4. DS90LV012A LVCMOS Output

4 Board Layout

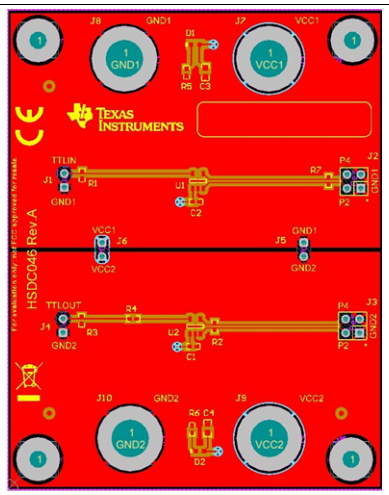


Figure 5. DS90LV011-12AEVM Top Layer

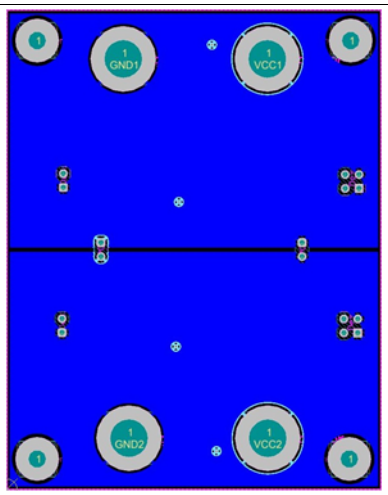
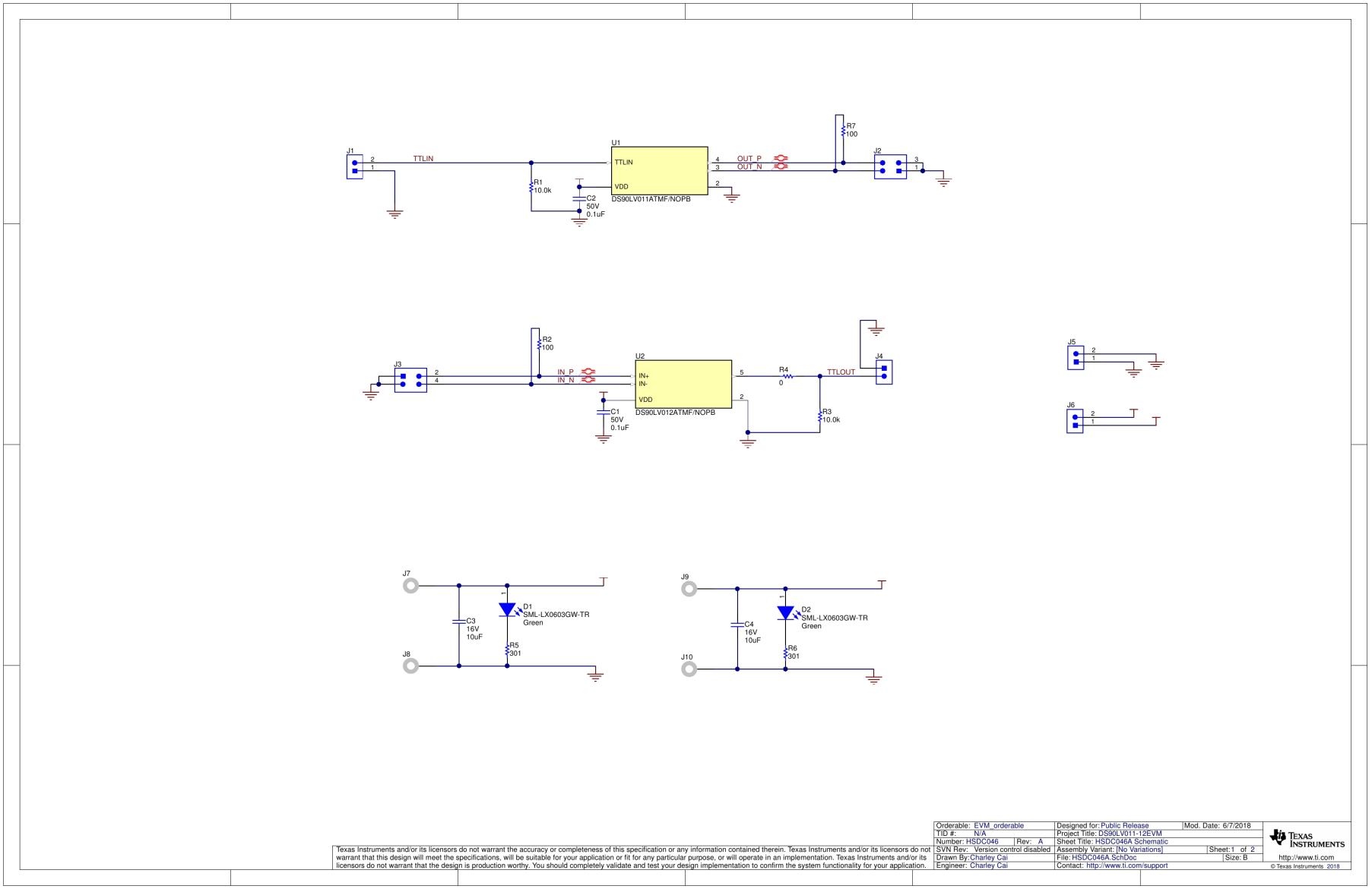


Figure 6. DS90LV011-12AEVM Bottom Layer

5 Schematic



6 Bill of Materials

Table 2. Bill of Materials

Designator	Quantity	Value	Description	Package Reference	Part Number	Manufacturer
!PCB	1		Printed Circuit Board		HSDC046	Any
C1, C2	2	0.1uF	CAP, CERM, 0.1 uF, 50 V, +/- 10%, X7R, 0402	0402	C1005X7R1H104K050BB	TDK
C3, C4	2	10uF	CAP, CERM, 10 uF, 16 V, +/- 20%, X5R, 0603	0603	EMK107BBJ106MA-T	Taiyo Yuden
D1, D2	2	Green	LED, Green, SMD	LED, GREEN, 0603	SML-LX0603GW-TR	Lumex
H1, H2, H3, H4	4		Machine Screw, Round, #4-40 x 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, J4, J5, J6	4		Header, 100mil, 2x1, Gold, TH	2x1 Header	TSW-102-07-G-S	Samtec
J2, J3	2		Header, 100mil, 2x2, Gold, TH	2x2 Header	TSW-102-07-G-D	Samtec
J7, J8, J9, J10	4		Standard Banana Jack, Uninsulated	Pomona_3267	3267	Pomona Electronics
LBL1	1			PCB Label 1.25 x 0.250 inch	THT-13-457-10	Brady
R1, R3	2	10.0k	RES, 10.0 k, 1%, 0.063 W, 0402	0402	RC0402FR-0710KL	Yageo America
R2	1	100	RES, 100, 1%, 0.063 W, 0402	0402	RC0402FR-07100RL	Yageo America
R4	1	0	RES, 0, 5%, 0.1 W, AEC-Q200 Grade 0, 0402	0402	ERJ-2GE0R00X	Panasonic
R5, R6	2	301	RES, 301, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW0402301RFKED	Vishay-Dale
SH-J1, SH-J2	2	1x2	Shunt, 100mil, Gold plated, Black	Shunt	SNT-100-BK-G	Samtec
U1	1		Single High Speed Differential Driver, 5-pin SOT-23, Pb-Free	DBV0005A	DS90LV011ATMF/NOPB	Texas Instruments
U2	1		3V LVDS Single CMOS Differential Line Receiver, 5-pin SOT-23, Pb-Free	DBV0005A	DS90LV012ATMF/NOPB	Texas Instruments
FID1, FID2, FID3	0		Fiducial mark. There is nothing to buy or mount.	N/A	N/A	N/A
R7	0	100	RES, 100, 1%, 0.063 W, 0402	0402	RC0402FR-07100RL	Yageo America

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

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      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.

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      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.

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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

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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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