LP8557EVM User Guide

1 Introduction

The LP8557EVM evaluation kit is ready to be used with a power source and a PWM input. The boost switching frequency and the maximum led current are set by resistors R3 and R4.

2 LP8557EVM Startup

The LP8557EVM requires a power source and Pulse Width Modulated (PWM) input. See Figure 1 for the connector descriptions and the location of the PWM input on the left side of the board.

1. Connect the LED board to the LP8557 evaluation board. Set jumpers for 6 LEDs per string as shown in Figure 3.
2. Connect external power and ground to the board. Suggest 3.6V to VIN. VDD is not required if P2 is in place.
3. Connect Ground to GND jack.
4. Connect a pulse generator or PWM source to the PWM input. R2 is a 10 KΩ resistor to ground on this input.
5. Set pulse stream to 30 kHz frequency, 50% duty cycle, 3V input high level.
6. Turn on power supply.
7. Enable pulse stream output.
   The LEDs will light at 50% brightness if a 50% duty cycle is used. The brightness will vary with the positive duty cycle of the PWM input signal.

3 Changing Boost Frequency and PWM Frequency on the LP8557EVM

The LP8557EVM is configured to operate at 500 kHz boost switching frequency and 9.8 kHz PWM frequency by the resistor R3 equal to zero ohms. This resistor can be changed to a value from Table 4 of the LP8557 datasheet which is presented here.

Table 1. Setting Boost Switching and PWM Dimming Frequencies with an External Resistor

RFSET [Ω] (Tolerance)	f_{SW} (kHz)	f_{PWM} (kHz)
470k - 1M (±5%)	500	4.9
300k, 330k (±5%)	500	9.8
200k (±5%)	500	24.6
147k, 150k, 154k, 158k (±1%)	500	19.5
121k (±1%)	500	24.4
100k (±1%)	500	29.3
86.6k (±1%)	500	34.2
75.0k (±1%)	500	39.1
63.4k (±1%)	1000	4.9
52.3k, 53.6k (±1%)	1000	9.8
44.2k, 45.3k (±1%)	1000	24.6
39.2k (±1%)	1000	19.5
34.0k (±1%)	1000	24.4
30.1k (±1%)	1000	29.3

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Table 1. Setting Boost Switching and PWM Dimming Frequencies with an External Resistor (continued)

RFSET [Ω] (Tolerance)	f_{SW} (kHz)	f_{PWM} (kHz)
26.1k (±1%)	1000	34.2
23.2k (±1%)	1000	39.1
0 (grounded)	500	9.8

4 Changing Maximum Current on the LP8557EVM

The LP8557EVM is configured to operate at a maximum current of 20 milliamps as set by resistor R4 equal to zero ohms. This resistor can be changed to a value from Table 6 of the LP8557 datasheet which is presented here.

Table 2. Setting Full-Scale LED Current and Boost Compensation with an External Resistor

RISET [Ω0 (Tolerance)	Boost Compensation Option	ILED (mA)
470k - 1M (±5%)	1	5
300k, 330k (±5%)	1	10
200k (±5%)	1	13
147k, 150k, 154k, 158k (±1%)	1	15
121k (±1%)	1	18
100k (±1%)	1	20
86.6k (±1%)	1	23
75.0k (±1%)	1	25
63.4k (±1%)	0	5
52.3k, 53.6k (±1%)	0	10
44.2k, 45.3k (±1%)	0	13
39.2k (±1%)	0	15
34.0k (±1%)	0	18
30.1k (±1%)	0	20
26.1k (±1%)	0	23
23.2k (±1%)	0	25
0 (grounded)	1	20

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5 EVM Description

The LP8557EVM kit includes the main evaluation board and an LED loadboard.

5.1 Main EVM Board

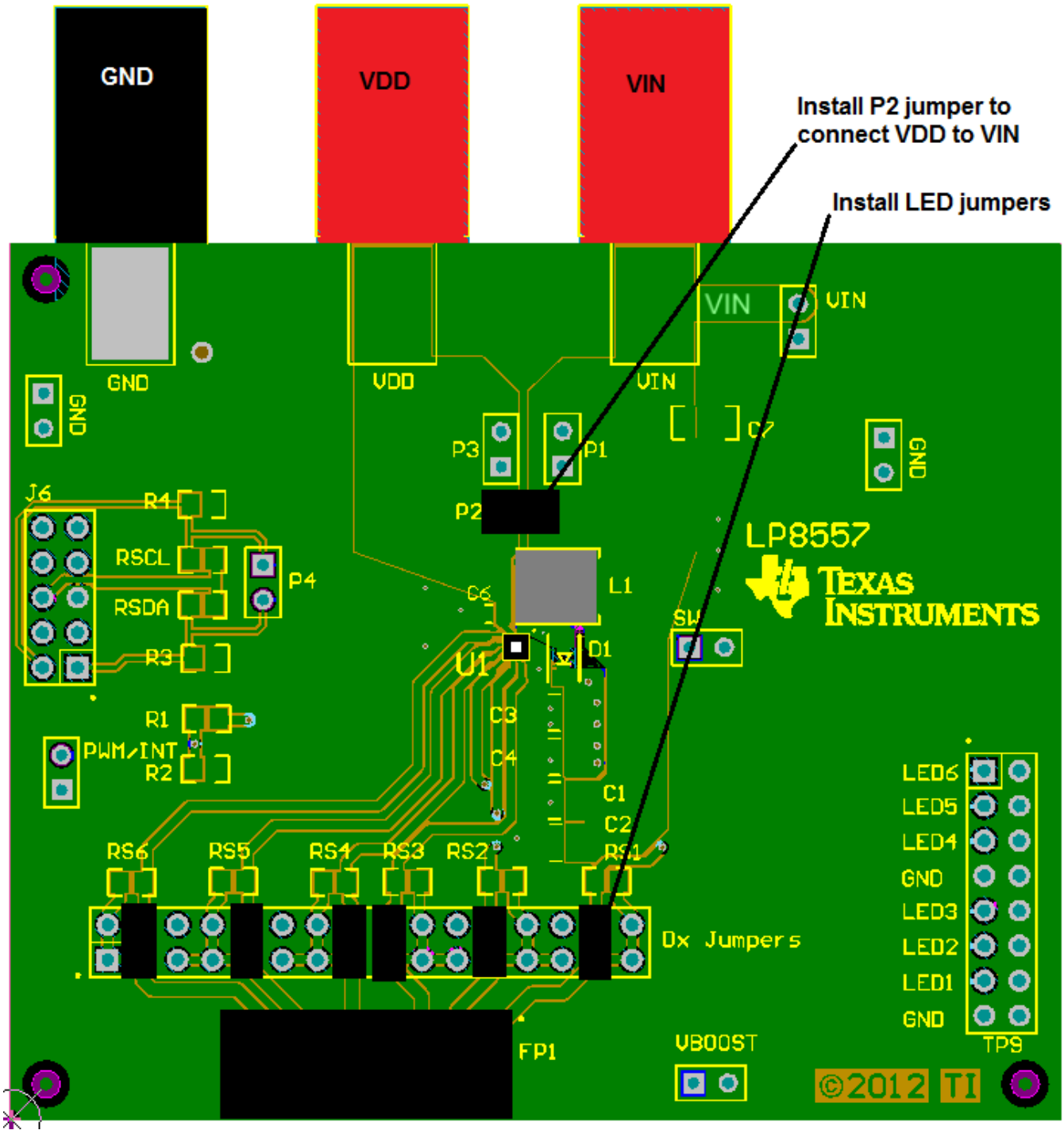


Figure 1. LP8557 EVM Main Board

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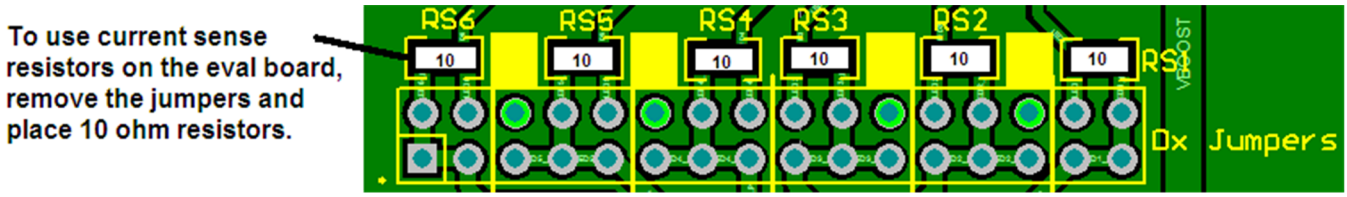


Figure 2. Current Sense Resistors

5.2 LED Loadboard

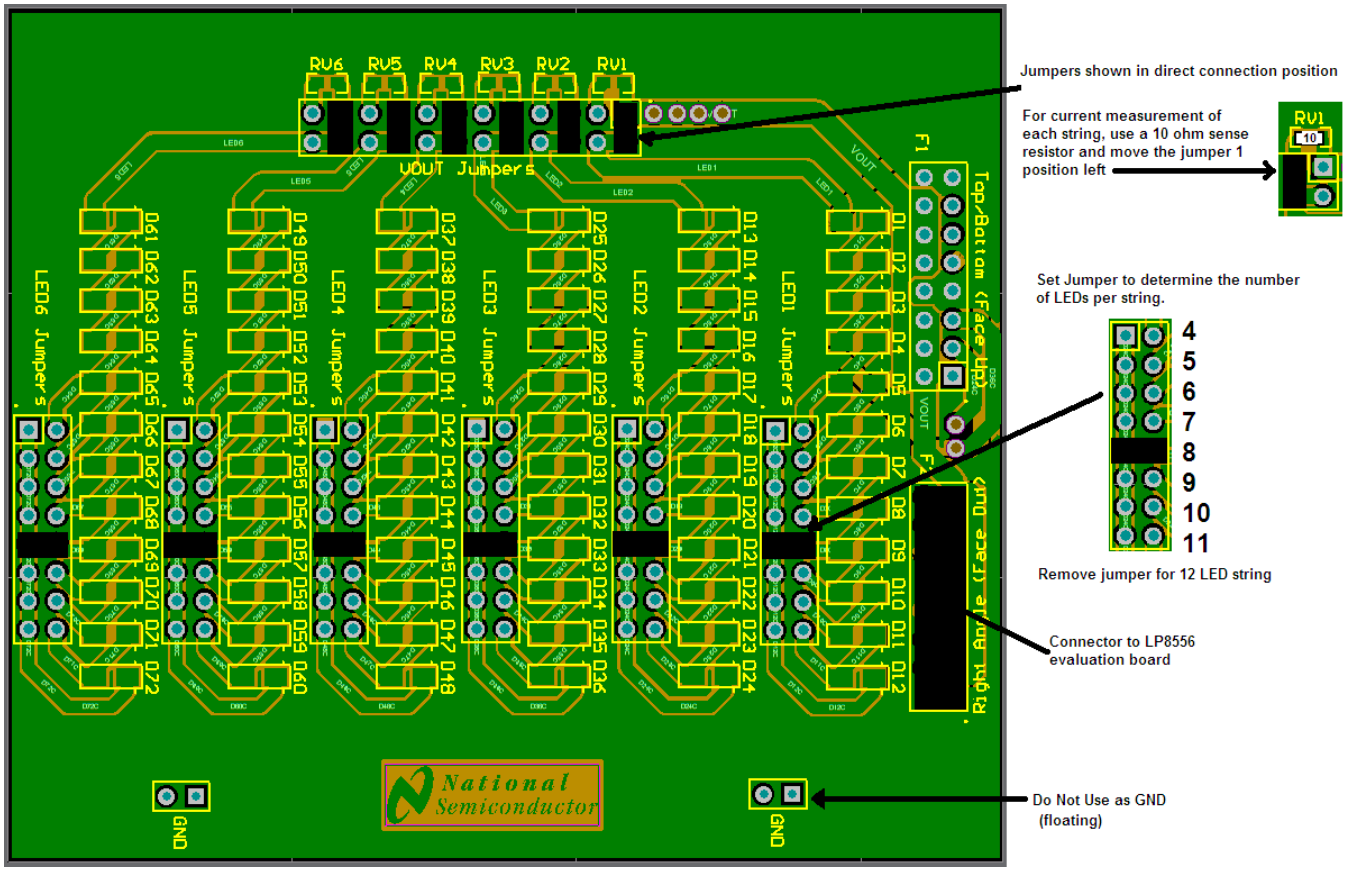


Figure 3. LED Loadboard

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5.3 Kit Assembly

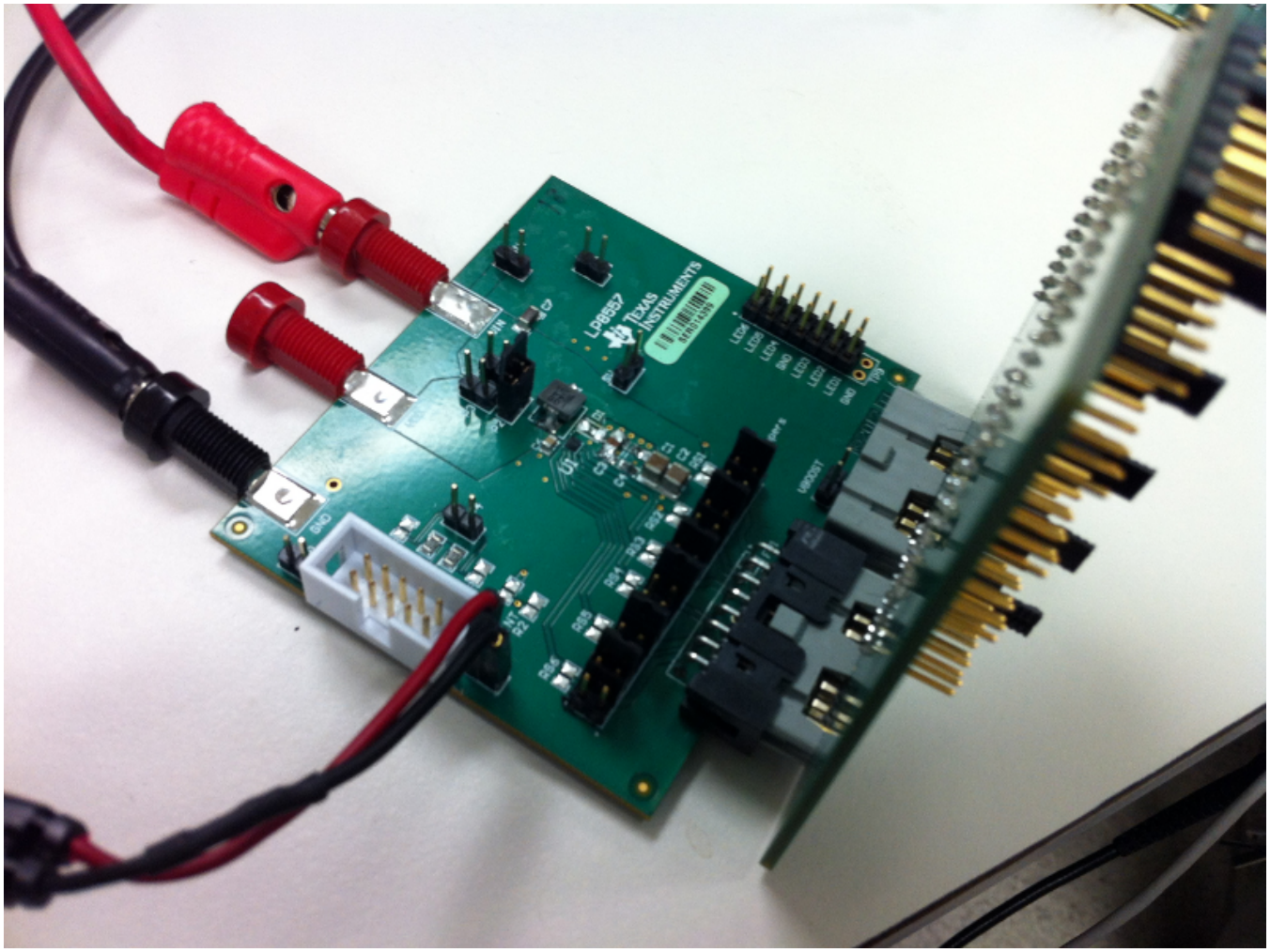


Figure 4. Kit Assembly

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6 Main EVM Schematic

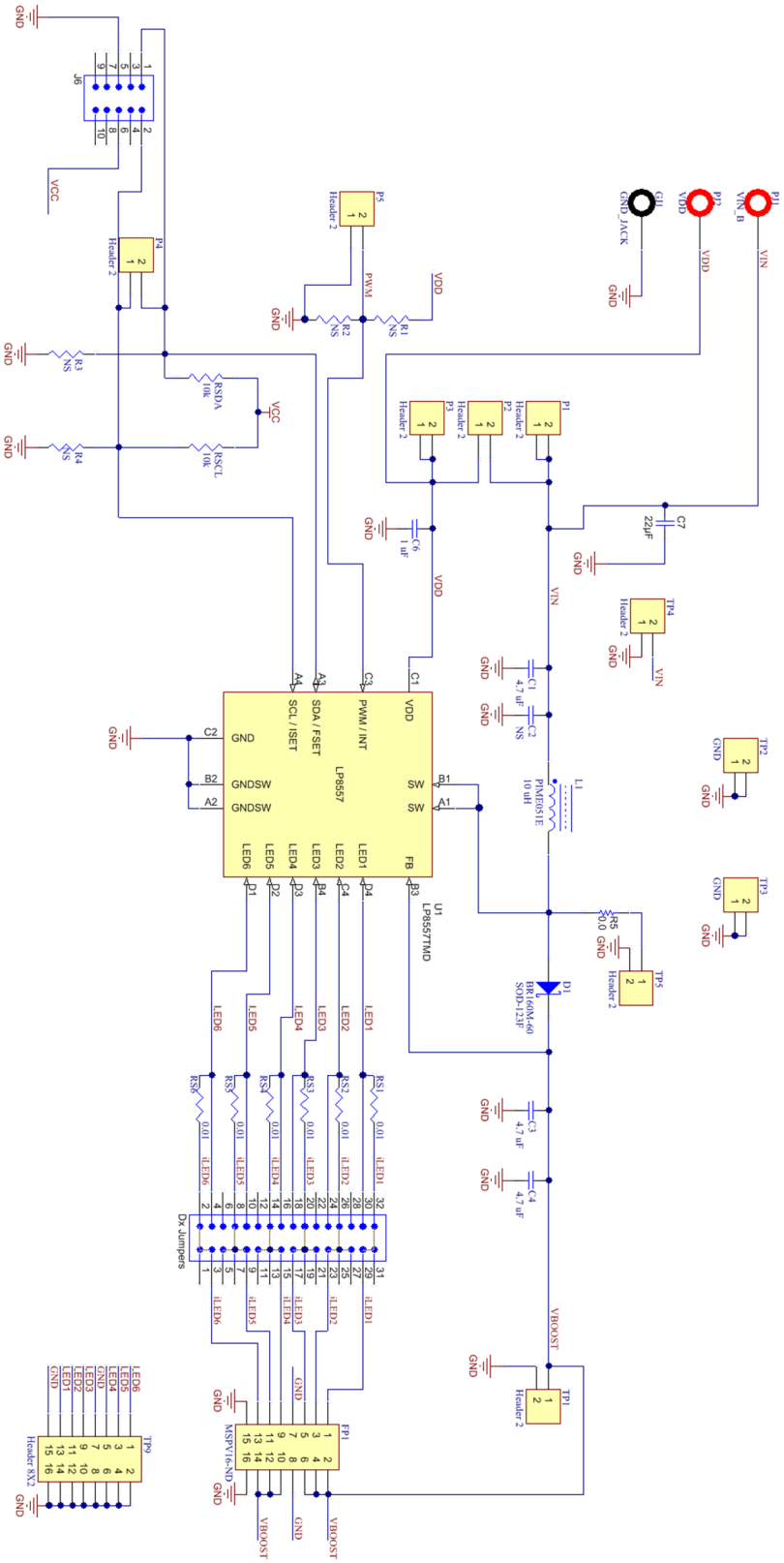


Figure 5. LP8557 EVM Schematic

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As noted in the EVM User's Guide and/or EVM itself, this EVM and/or accompanying hardware may or may not be subject to the Federal Communications Commission (FCC) and Industry Canada (IC) rules.

For EVMs **not** subject to the above rules, this evaluation board/kit/module is intended for use for ENGINEERING DEVELOPMENT, DEMONSTRATION OR EVALUATION PURPOSES ONLY and is not considered by TI to be a finished end product fit for general consumer use. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC or ICES-003 rules, which are designed to provide reasonable protection against radio frequency interference. Operation of the equipment may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

General Statement for EVMs including a radio

User Power/Frequency Use Obligations: This radio is intended for development/professional use only in legally allocated frequency and power limits. Any use of radio frequencies and/or power availability of this EVM and its development application(s) must comply with local laws governing radio spectrum allocation and power limits for this evaluation module. It is the user's sole responsibility to only operate this radio in legally acceptable frequency space and within legally mandated power limitations. Any exceptions to this are strictly prohibited and unauthorized by Texas Instruments unless user has obtained appropriate experimental/development licenses from local regulatory authorities, which is responsibility of user including its acceptable authorization.

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

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

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.

For EVMs annotated as IC – INDUSTRY CANADA Compliant

This Class A or B digital apparatus complies with Canadian ICES-003.

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

Concerning EVMs including radio transmitters

This device complies with Industry Canada licence-exempt RSS standard(s). 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.

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.

Cet appareil numérique de la classe A ou B est conforme à la norme NMB-003 du Canada.

Les changements ou les modifications pas expressément approuvés par la partie responsable de la conformité ont pu vider l'autorité de l'utilisateur pour actionner l'équipement.

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.

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.

【Important Notice for Users of EVMs for RF Products in Japan】

This development kit is NOT certified as Confirming to Technical Regulations of Radio Law of Japan

If you use this product in Japan, you are required by Radio Law of Japan to follow the instructions below with respect to this product:

1. Use this product 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 this product only after you obtained the license of Test Radio Station as provided in Radio Law of Japan with respect to this product, or
3. Use of this product only after you obtained the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to this product. Also, please do not transfer this product, unless you give the same notice above to the transferee. Please note that if you could not follow the instructions above, you will be subject to penalties of Radio Law of Japan.

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