Using the NexFET-EVM-762

User's Guide

Literature Number: SLUU935
May 2012

CSD96370 Power Stage Test Board

1 Introduction

This User's Guide describes the features of the NexFET-EVM-762. The CSD96370 Schematic, Layout and List of Materials are provided as well as setup and getting started instructions. Test data shows expected results.

2 Description

The EVM is four independent power stage channels connected one at a time to a synchronous buck regulator. This gives a side by side comparison of power stage efficiency between CSD96370, combination L6743B and CSD86350Q5D, combination L6743B and CSD16323Q3,and the generic TDA21211.

TDA21211 device is customer supplied if testing with this device.

2.1 Applications

- Server
- Telecom
- General Purpose

2.2 Features

- **Input:** 3 V_{DC} to 20 V_{DC}
- **V_{OUT}:** 0.8 V, 1.0 V, 1.2 V, 1.3 V, 1.4 V, 1.5 V, 2.5 V, 3.3 V
- **I_{OUT}:** 25 A Maximum
- **Frequency:** 300 kHz, 400 kHz, 500 kHz, 600 kHz, 750 kHz, 900 kHz, 1 MHz, 1.2 MHz
- **Controller:** LM2737 Synchronous Buck Regulator
- **Power Stage:** Separate Jumper Enable/Channel
- **Regulator:** Separate Jumper Enable
- **Test Points:** Set for Efficiency Measurements

3 Block Diagram

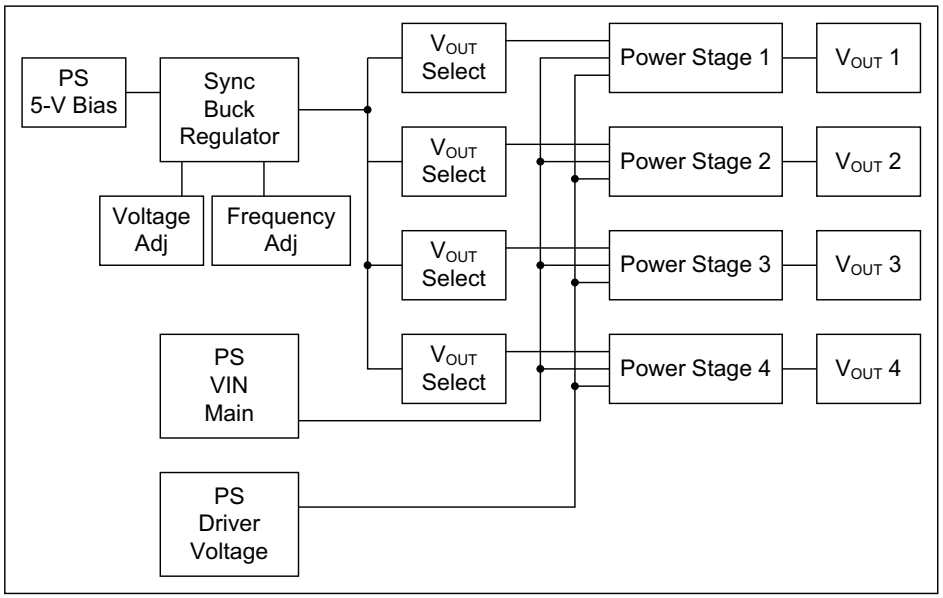

Figure 1. NexFET-EVM-762 Block Diagram

4 Schematic

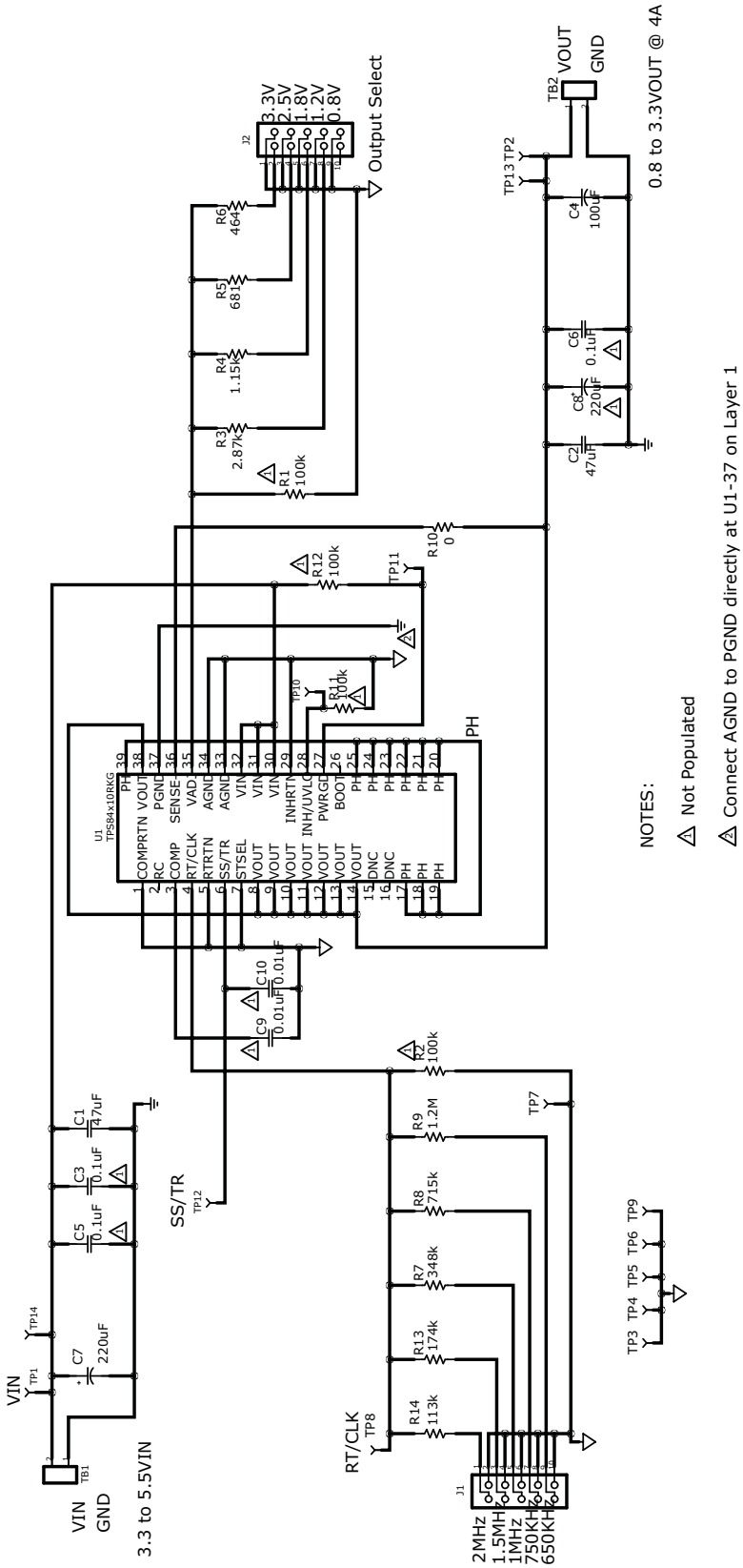

Figure 2. Schematic

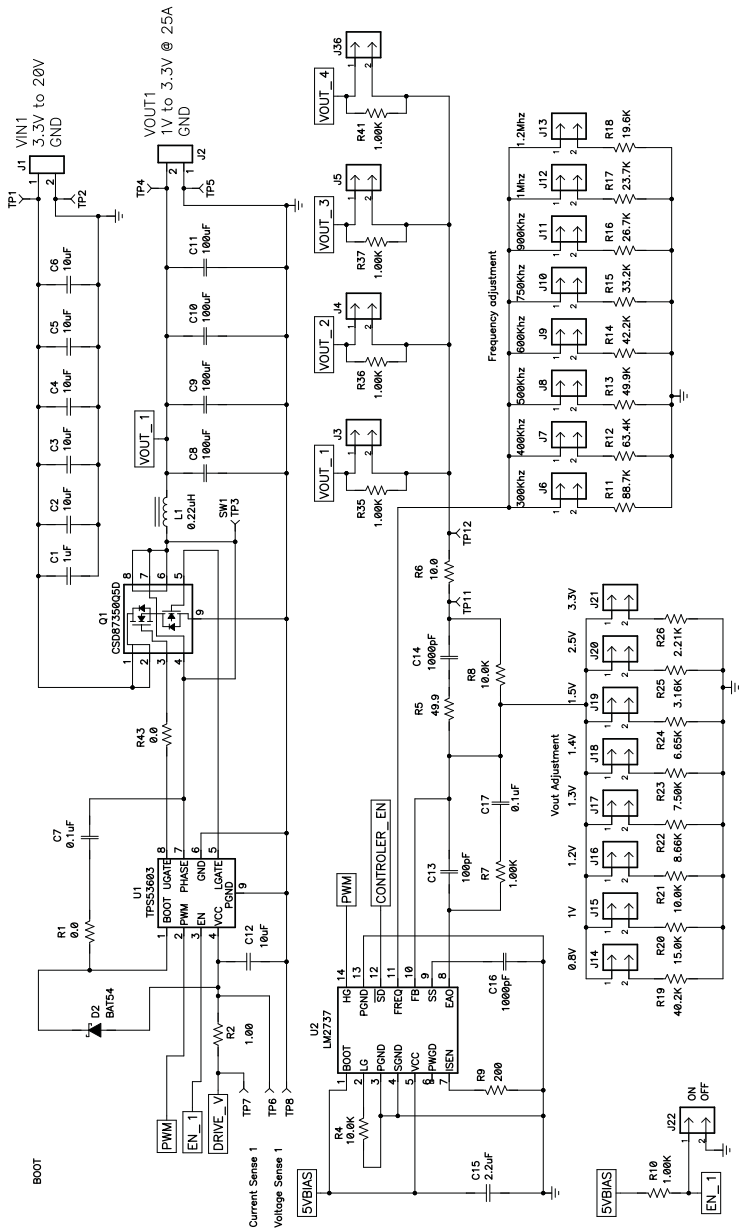

Figure 3. Schematic

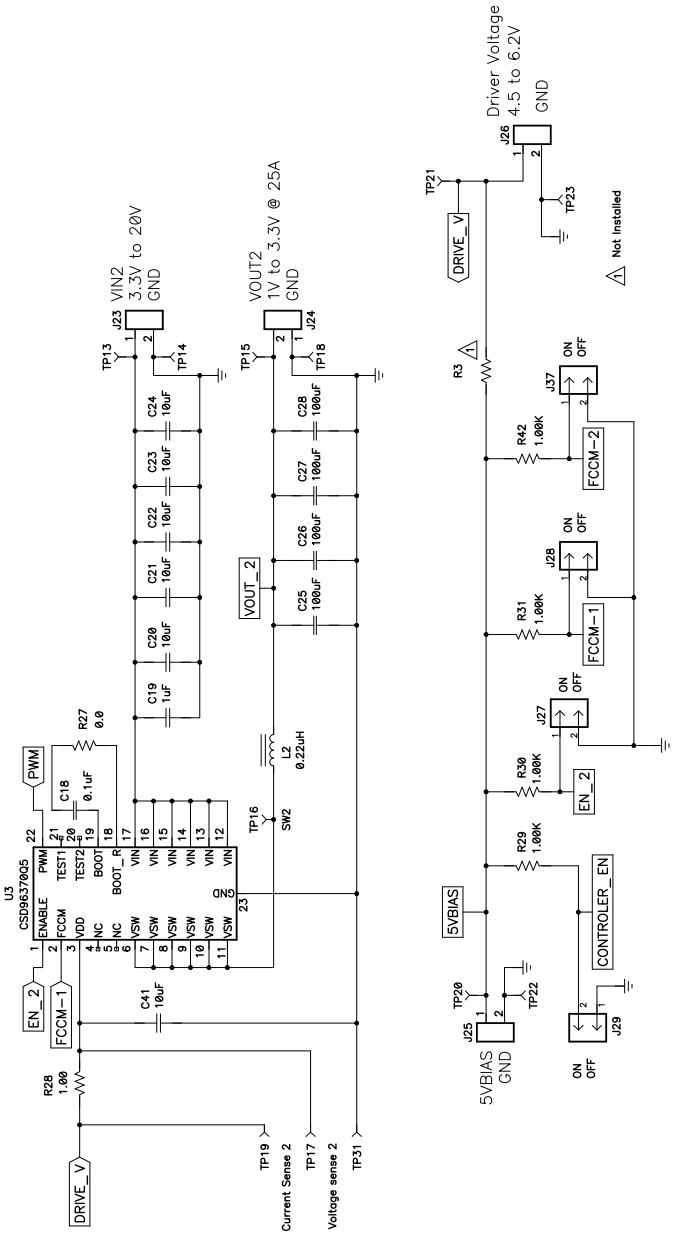

Figure 4. Schematic

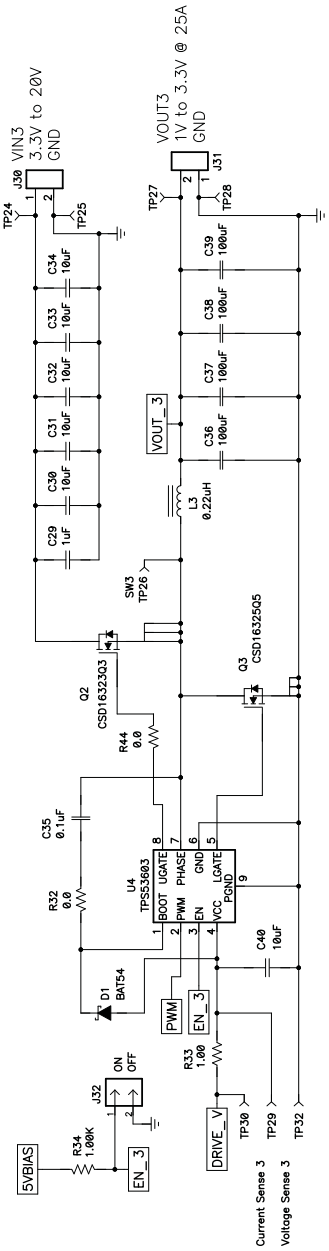

Figure 5. Schematic

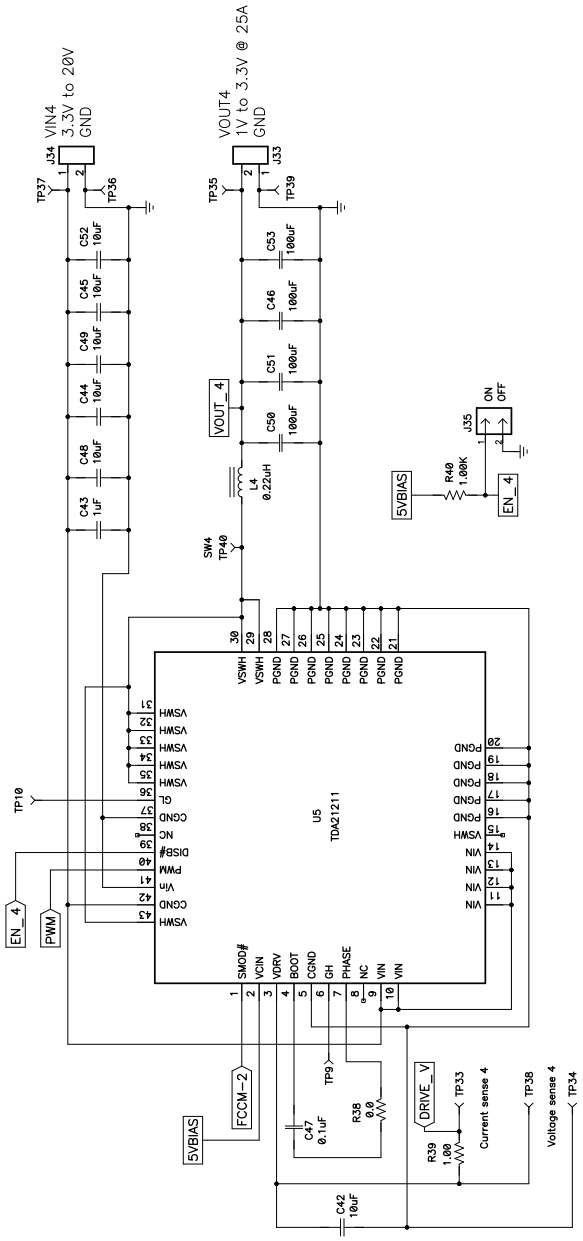

Figure 6. Schematic

5 Test Points

Test points are on board to assist with circuit measurements.

Table 1. NexFET-EVM-762 Test Points

TEST POINTS	SIGNAL NAME
TP1	VIN1
TP2	VIN1 GND
TP3	SW1
TP4	VOUT1
TP5	VOUT1 GND
TP6	VOLTAGE SENSE
TP7	CURRENT SENSE
TP8	SENSE GND
TP9	TDA21211 CH PIN
TP10	TDA21211 CL PIN
TP11	REGULATOR LOOP
TP12	REGULATOR LOOP
TP13	VIN2
TP14	VIN2 GND
TP15	VOUT2
TP16	CURRENT SENSE2
TP17	VOLTAGE SENSE2
TP18	VOUT2 GND
TP19	DRIVE_V
TP20	5V_BIAS
TP21	DRIVE_V
TP22	5V_BIAS GND
TP23	DRIVER VOLTAGE GND
TP24	VIN3
TP25	VIN3 GND
TP26	SW3
TP27	VOUT3
TP28	VOUT3 GND
TP29	VOLTAGE SENSE3
TP30	CURRENT SENSE3
TP31	SENSE2 GND
TP32	SENSE3 GND
TP33	DRIVE_V4
TP34	VOLTAGE SENSE4
TP35	VOUT4
TP36	VIN4 GND
TP37	VIN4
TP38	VOLTAGE SENSE4
TP39	VOUT4 GND
TP40	SW4

6 Connectors

Table 2. NexFET-EVM-762 Connectors

CONNECTOR NUMBER	FUNCTION
J1	VIN1
J2	VOUT1
J23	VIN2
J24	VOUT2
J25	5VBIAS
J26	DRIVER VOLTAGE
J30	VIN3
J31	VOUT3
J33	VOUT4
J34	VIN4

7 Jumpers

Table 3. NexFET-EVM-762 Jumpers

JUMPER	NAME	INITIAL CONFIGURATION
J3	VOUT_1	Remove
J4	VOUT_2	Install
J5	VOUT_3	Remove
J6	300 kHz	Remove
J7	400 kHz	Remove
J8	500 kHz	Remove
J9	600 kHz	Remove
J10	750 kHz	Install
J11	900 kHz	Remove
J12	1.0 MHz	Remove
J13	1.2 MHz	Remove
J14	0.8 V	Remove
J15	1.0 V	Remove
J16	1.2 V	Remove
J17	1.3 V	Remove
J18	1.4 V	Remove
J19	1.5 V	Remove
J20	2.5 V	Remove
J21	3.3 V	Install
J22	EN_1	Install
J27	EN_2	Remove
J28	FCCM-1	Install
J29	CONTROLLER_EN	Remove
J32	EN_3	Install
J35	EN_4	Install
J36	VOUT_4	Remove
J37	FCCM-2	Install

8 Switches

- None

9 Indicators

- None

10 Getting Started

10.1 Equipment

- Three Power Supplies (Table 4)
- Load
- Scope and Probes
- DVM

10.2 Equipment Setup

- Three output channels can be checked; VOUT1, VOUT2, and VOUT3. TA21211 not installed in channel VOUT4. The component is user supplied if this testing is desired.
- Remove the EN jumper in the channel under test. Enable only one channel at a time. See Table 3, Jumper Table.
- Connect the channel under test to the VIN power supply and install that channels VOUT jumper.
- The controller enable jumper, J29, is removed to enable the controller. The controller should be disabled when changing the frequency select jumper or the output voltage jumper when the power supplies are on.

11 Input Supply

Set the voltage and current limit for each power supply as listed in Table 4. Turn off the power supplies when set up. Connect the power supplies to the EVM; see Table 2 and board screen for connector and polarity information.

Table 4. Initial Input Power Connections

SUPPLY	RATING	+CONNECT	-CONNECT
Bias	5 V at 1 A	J25-1	J25-2
Driver	5 V at 1 A	J26-1	26-2
VIN	12 V at 5 A	J23-1	J23-2

12 Test Channel 2

Connect the load to VOUT2 at J24-2 positive and J24-1 negative. Connect the scope to VOUT2, positive at TP15 and negative at TP18. Turn on the power supplies and check the output voltage 3.3 V.

13 Test Data

Test Conditions:

- V_{IN} = 12 V
- V_{OUT} = 1.2 V
- V_{DD} = 5 V
- F_{SW} = 500 kHz
- L = 200 nH
- I_{OUT} = 0 A to 25 A
- T_A = 25°C, no airflow
- Driver Device
  - TPS53603
- Devices Under Test
  - CSD96370Q5M
  - CSD87350Q5M
  - CSD16323Q3 and CSD16325Q5

14 Performance Curves

14.1 CSD96370

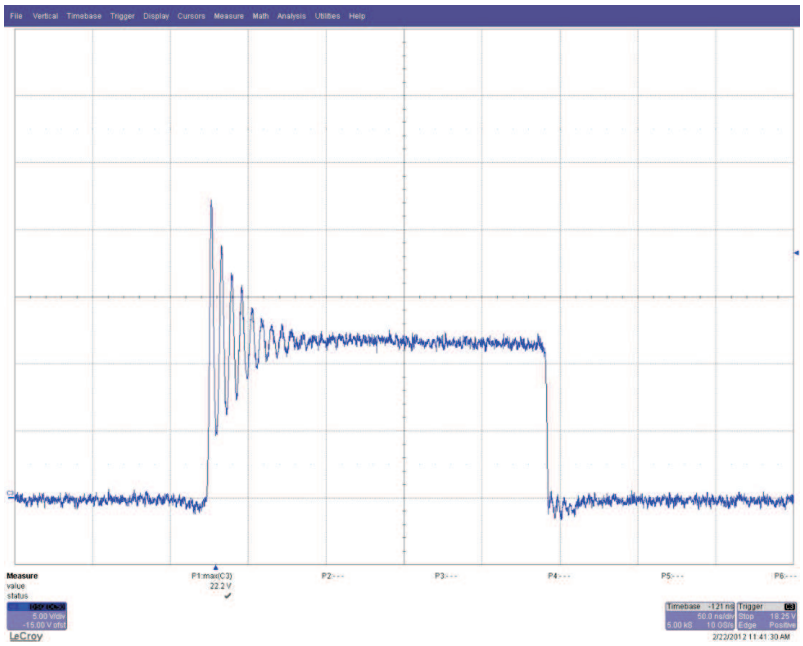

Figure 7. CSD96370 (CH2: V_{SW}, 5 V/div Timescale:50 ns/div)

14.2 CSD87350

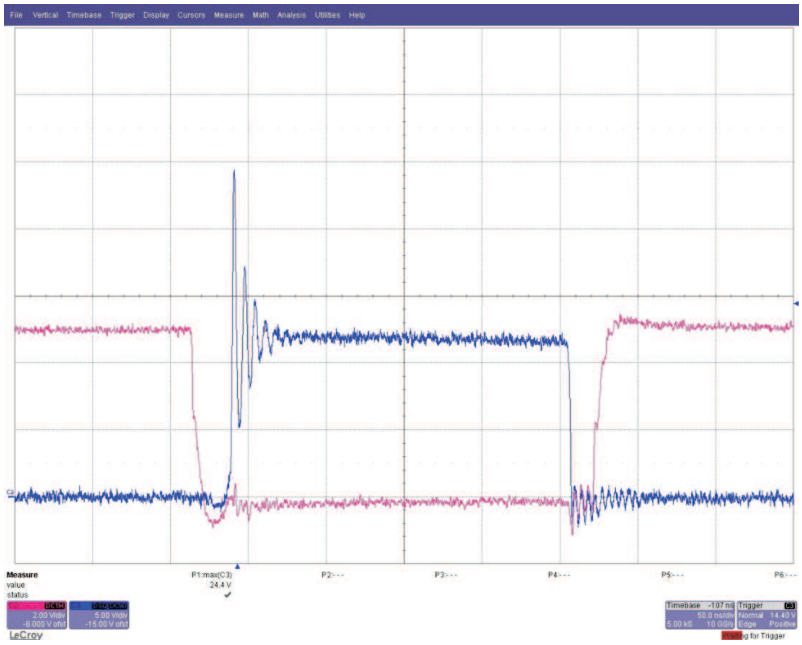

Figure 8. CSD87350 (CH2: V_{SW}, 5 V/div CH3: LS V_{GS}, 2 V/div Timescale: 50 ns/div)

14.3 CSD16323Q3 and CSD16325Q5

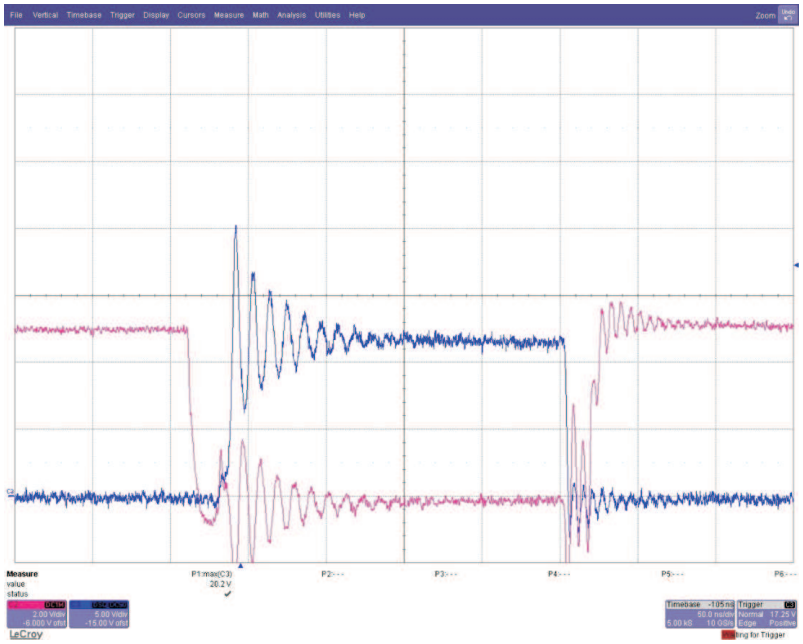

Figure 9. CSD16323Q3 and CSD16325Q5 (CH2: V_{SW}, 5 V/div CH3: LS V_{GS}, 2 V/div Timescale: 50 ns/div)

14.4 CSD16323Q3 and CSD16325Q5

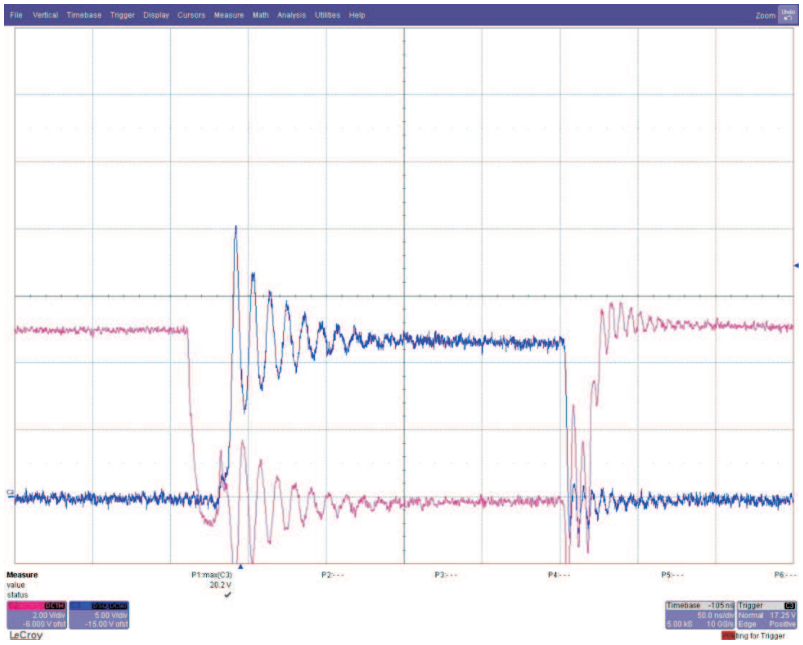

Figure 10. CSD16323Q3 and CSD16325Q5 (CH2: V_{SW}, 5 V/div CH3: LS V_{GS}, 2 V/div Timescale: 50 ns/div)

14.5 Efficiency

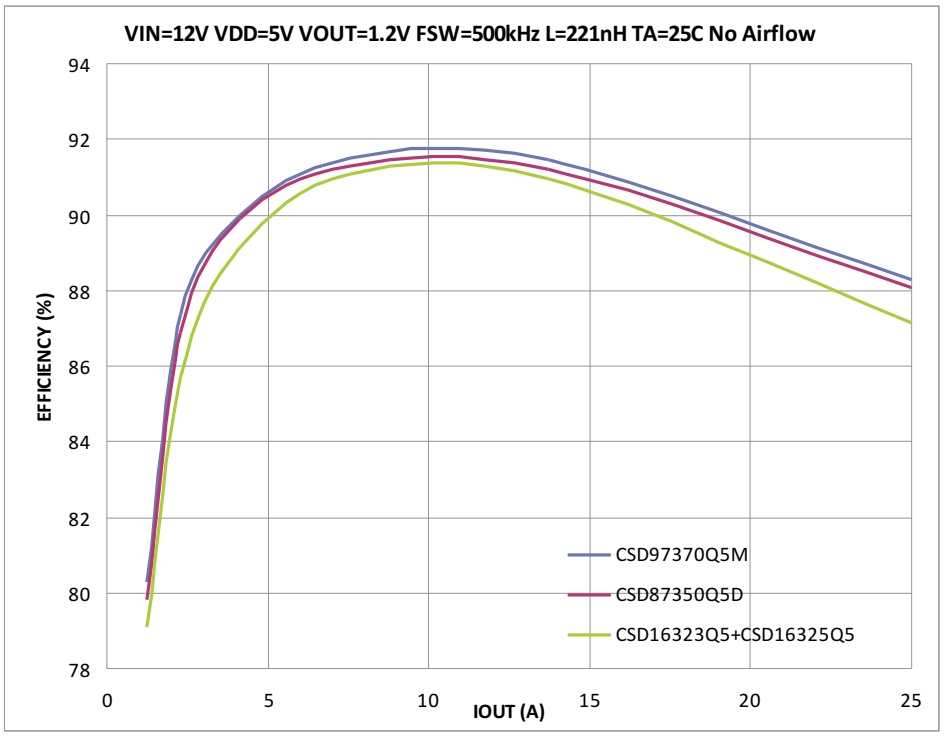

Figure 11. Efficiency

14.6 Power Loss

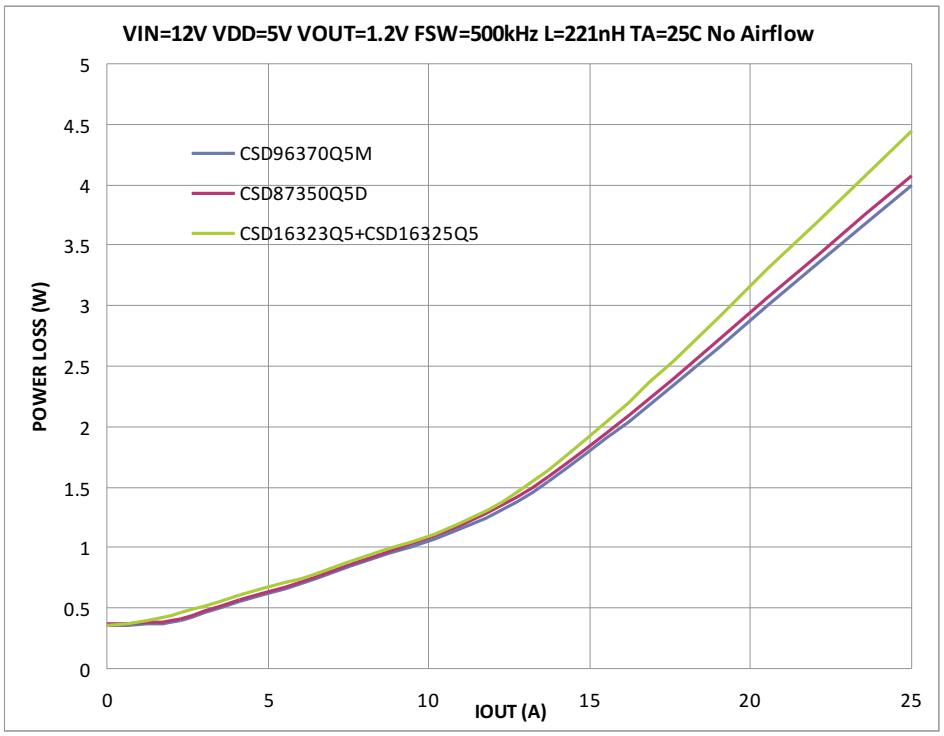

Figure 12. Power Loss

15 PCB Layout

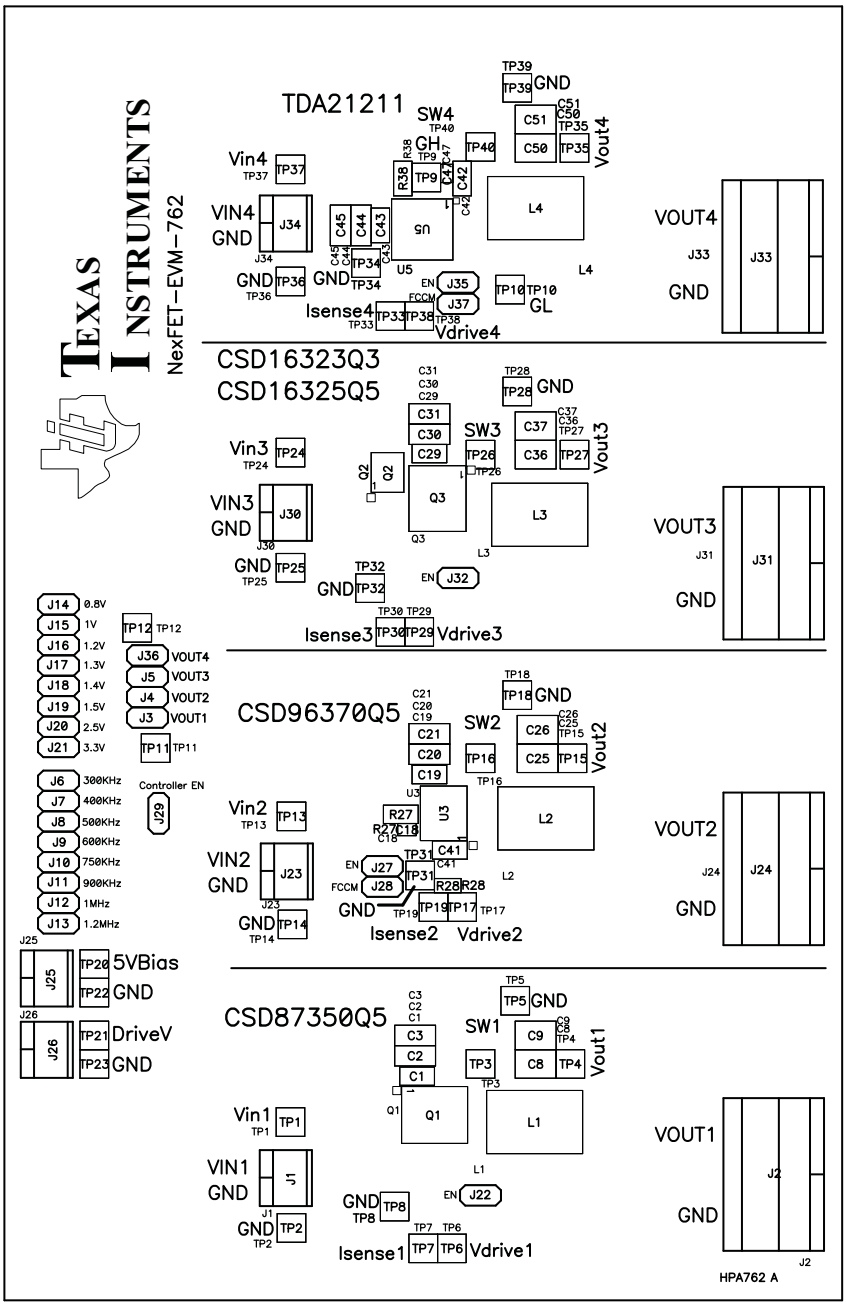

Figure 13. NexFET-EVM-762 Board Layout

16 List of Materials

Table 5. NexFET-EVM-762 List of Materials

COUNT	REF DES	DESCRIPTION	PART NUMBER	MFR
4	C1, C19, C29, C43	Capacitor, ceramic, 50 V, X7R, 10%, 1 µF, 0805	Std	Std
4	C12, C40, C41, C42	Capacitor, ceramic, 10 V, X5R, 20%, 10 µF, 0805	Std	Std
1	C13	Capacitor, ceramic, 25 V, C0G, 5%, 100 pF, 0402	Std	Std
2	C14, C16	Capacitor, ceramic, 25 V, X7R, 10%, 1000 pF, 0402	Std	Std
1	C15	Capacitor, ceramic, 16 V, X5R, 20%, 2.2 µF, 0603	Std	Std
1	C17	Capacitor, ceramic, 25 V, COG, 5%, 0.1 µF, 0402	Std	Std
20	C2, C3, C4, C5, C6, C20, C21, C22, C23, C24, C30, C31, C32, C33, C34, C44, C45, C48, C49, C52	Capacitor, ceramic, 25 V, X5R, 20%, 10 µF, 1206	Std	Std
4	C7, C18, C35, C47	Capacitor, ceramic, 16 V, X7R, 10%, 0.1 µF, 0402	Std	Std
16	C8, C9, C10, C11, C25, C26, C27, C28, C36, C37, C38, C39, C46, C50, C51, C53	Capacitor, ceramic, 6.3 V, X5R, 20%, 100 µF, 1210	Std	Std
2	D1, D2	Diode, Schottky, 200 mA, 30 V, SOT23	BAT54-TP	MicroCommercial
6	J1, J23, J25, J26, J30, J34	Terminal block, 2 pin, 6 A, 3.5 mm, 0.27 inch x 0.25 inch	ED555/2DS	OST
4	J2, J24, J31, J33	Terminal block, 2 pin, 32 A, 9.5 mm, 0.75 inch x 0.49 inch	OSTT7022150	OST
27	J3, J4, J5, J6, J7, J8, J9, J10, J11, J12, J13, J14, J15, J16, J17, J18, J19, J20, J21, J22, J27, J28, J29, J32, J35, J36, J37	Header, 2 pin, 100-mil spacing, 0.100 inch x 2 inch	PTC02SAAN	Sullins
4	L1, L2, L3, L4	Inductor, dual, 0.2 µH, 700 mΩ, 0.22 µH, 0.400 inch x 0.276 inch	PA0511-221	Pulse
1	Q1	MOSFET, dual N-Channel, 25 V, SON-8, QFN-8 power	CSD87350Q5D	Texas Instruments
1	Q2	MOSFET, N-Channel, 25 V, 60 A, 4.4 mΩ, QFN, 3.3 mm x 3.3 mm	CSD16323Q3	TI
1	Q3	MOSFET, N-Channel, 25 V, 100 A, 1.7 mΩ, QFN-8 power	CSD16325Q5	TI
4	R1, R27, R32, R38	Resistor, chip, 1/10 W, 5%, 0 Ω, 0805	Std	Std
1	R11	Resistor, chip, 1/16 W, 1%, 88.7 kΩ, 0402	Std	Std
1	R12	Resistor, chip, 1/16 W, 1%, 63.4 kΩ, 0402	Std	Std
1	R13	Resistor, chip, 1/16 W, 1%, 49.9 kΩ, 0402	Std	Std
1	R14	Resistor, chip, 1/16 W, 1%, 42.2 kΩ, 0402	Std	Std
1	R15	Resistor, chip, 1/16 W, 1%, 33.2 kΩ, 0402	Std	Std
1	R16	Resistor, chip, 1/16 W, 1%, 26.7 kΩ, 0402	Std	Std
1	R17	Resistor, chip, 1/16 W, 1%, 23.7 kΩ, 0402	Std	Std
1	R18	Resistor, chip, 1/16 W, 1%, 19.6 kΩ, 0402	Std	Std
1	R19	Resistor, chip, 1/16 W, 1%, 40.2 kΩ, 0402	Std	Std
4	R2, R28, R33, R39	Resistor, power metal strip, ± 1%, 1, 0603	RP1608S-1R0-F	Susumu
1	R20	Resistor, chip, 1/16 W, 1%, 15.0 kΩ, 0402	Std	Std
1	R22	Resistor, chip, 1/16 W, 1%, 8.66 kΩ, 0402	Std	Std
1	R23	Resistor, chip, 1/16 W, 1%, 7.50 kΩ, 0402	Std	Std
1	R24	Resistor, chip, 1/16 W, 1%, 6.65 kΩ, 0402	Std	Std
1	R25	Resistor, chip, 1/16 W, 1%, 3.16 kΩ, 0402	Std	Std

Table 5. NexFET-EVM-762 List of Materials (continued)

COUNT	REF DES	DESCRIPTION	PART NUMBER	MFR
1	R26	Resistor, chip, 1/16 W, 1%, 2.21 kΩ, 0402	Std	Std
0	R3	Resistor, chip, 1W, 5%, open, 2512	Std	Std
3	R4, R8, R21	Resistor, chip, 1/16 W, 1%, 10.0 kΩ, 0402	Std	Std
2	R43, R44	Resistor, chip, 1/16 W, 5%, 0 Ω, 0402	Std	Std
1	R5	Resistor, chip, 1/16 W, 1%, 49.9 Ω, 0402	Std	Std
1	R6	Resistor, chip, 1/16 W, 1%, 10 Ω, 0402	Std	Std
12	R7, R10, R29, R30, R31, R34, R35, R36, R37, R40, R41, R42	Resistor, chip, 1/16 W, 1%, 1.00 kΩ, 0402	Std	Std
1	R9	Resistor, chip, 1/16 W, 1%, 200 Ω, 0402	Std	Std
28	TP1, TP3, TP4, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP15, TP16, TP17, TP19, TP20, TP21, TP24, TP26, TP27, TP29, TP30, TP32, TP33, TP35, TP37, TP38, TP40,	Test point, red, thru hole color keyed, 0.100 inch x 0.100 inch	5000	Keystone
12	TP2, TP5, TP14, TP18, TP22, TP23, TP25, TP28, TP31, TP34, TP36, TP39	Test point, black, thru hole color keyed, 0.100 inch x 0.100 inch	5001	Keystone
2	U1, U4	High current MOSFET driver, QFN	TPS53603DRG	TI
1	U2	N-Channel FET Synchronous Buck Regulator Controller, TSSOP	LM2737	TI
1	U3	Power Stage, QFN-22 6 mm x 5 mm	CSD96370Q5M	TI
1	U5	High-Performance DrMOS, QFN, 6 inch x 6 inch	TDA21211	Infineon
1	PCB	PCB, FR4, 0.062 inch, Oz Cu all layers, 6.0 inch x 4.0 inch	Any	Any
8	--	Shunt, 100 mil, black, 0.100	929950-00	3M
6	--	Bumpon, cylindrical, 0.375 inch x 0.250 inch	SJ61A3	3M

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EVM Warnings and Restrictions

It is important to operate this EVM within the input voltage range of 3 VDC to 20 VDC and the output voltage range of 0.8 VDC to 3.3 VDC.

Exceeding the specified input range may cause unexpected operation and/or irreversible damage to the EVM. If there are questions concerning the input range, please contact a TI field representative prior to connecting the input power.

Applying loads outside of the specified output range may result in unintended operation and/or possible permanent damage to the EVM. Please consult the EVM User's 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, some circuit components may have case temperatures greater than 65°C. The EVM is designed to operate properly with certain components above 65°C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265

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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 this Product 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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EVALUATION BOARD/KIT/MODULE (EVM)
WARNINGS, RESTRICTIONS AND DISCLAIMERS

For Feasibility Evaluation Only, in Laboratory/Development Environments. Unless otherwise indicated, this EVM is not a finished electrical equipment and not intended for consumer use. It is intended solely for use for preliminary feasibility evaluation in laboratory/development environments by technically qualified electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems and subsystems. It should not be used as all or part of a finished end product.

Your Sole Responsibility and Risk. You acknowledge, represent and agree that:

1. You have unique knowledge concerning Federal, State and local regulatory requirements (including but not limited to Food and Drug Administration regulations, if applicable) which relate to your products and which relate to your use (and/or that of your employees, affiliates, contractors or designees) of the EVM for evaluation, testing and other purposes.
2. You have full and exclusive responsibility to assure the safety and compliance of your products with all such laws and other applicable regulatory requirements, and also to assure the safety of any activities to be conducted by you and/or your employees, affiliates, contractors or designees, using the EVM. Further, you are responsible to assure 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.
3. You will employ reasonable safeguards to ensure that your use of the EVM will not result in any property damage, injury or death, even if the EVM should fail to perform as described or expected.
4. You will take care of proper disposal and recycling of the EVM's electronic components and packing materials.

Certain Instructions. It is important to operate this EVM within TI's recommended specifications and environmental considerations per the user guidelines. Exceeding the specified EVM ratings (including but not limited to input and output voltage, current, power, and environmental ranges) may cause property damage, personal injury or death. If there are questions concerning these ratings please 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 result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM User's 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, some circuit components may have case temperatures greater than 60°C as long as the input and output are maintained at a normal ambient operating temperature. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors which can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during normal operation, please be aware that these devices may be very warm to the touch. As with all electronic evaluation tools, only qualified personnel knowledgeable in electronic measurement and diagnostics normally found in development environments should use these EVMs.

Agreement to Defend, Indemnify and Hold Harmless. You agree to defend, indemnify and hold TI, its licensors and their representatives harmless from and against any and all claims, damages, losses, expenses, costs and liabilities (collectively, "Claims") arising out of or in connection with any use of the EVM that is not in accordance with the terms of the agreement. This obligation shall apply whether Claims arise under law of tort or contract or any other legal theory, and even if the EVM fails to perform as described or expected.

Safety-Critical or Life-Critical Applications. If you intend to evaluate the components for possible use in safety critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, such as devices which are classified as FDA Class III or similar classification, then you must specifically notify TI of such intent and enter into a separate Assurance and Indemnity Agreement.

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