

User's Guide

TPS65265 Buck Converter Evaluation Module User's Guide



ABSTRACT

This document presents the information required to operate the TPS65265 PMIC as well as the support documentation including schematic, printed-circuit board (PCB) layout, hardware setup, and bill of materials.

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Trademarks

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1 Background

The TPS65265 PMIC is a triple 5-A/3-A/2-A output current, synchronous step-down (buck) converter with an operational range of 4.5 to 17 V. The feedback voltage reference for each buck is 0.6 V. Each buck is independent with dedicated enable and loop compensation. The TPS65265 supports PSM mode and FCC mode.

As there are many possible options to set the converters, [Table 1-1](#) presents the performance specification summary for the EVM.

Table 1-1. Summary of Performance

Test Conditions	Performance
$V_{IN} = 4.5$ to 17 V	Buck1, 1.2 V, up to 5 A
$f_{sw} = 610$ kHz	Buck2, 1.5 V, up to 3 A
(25°C ambient)	Buck3, 1.8 V, up to 2 A

The evaluation module is designed to provide access to the features of the TPS65265. Some modifications can be made to this module to test performance at different input and output voltages, current and switching frequency. Please contact the TI Field Applications Group for advice on these matters.

2 Schematic

Figure 2-1 illustrates the TPS65265EVM-705 EVM schematic.

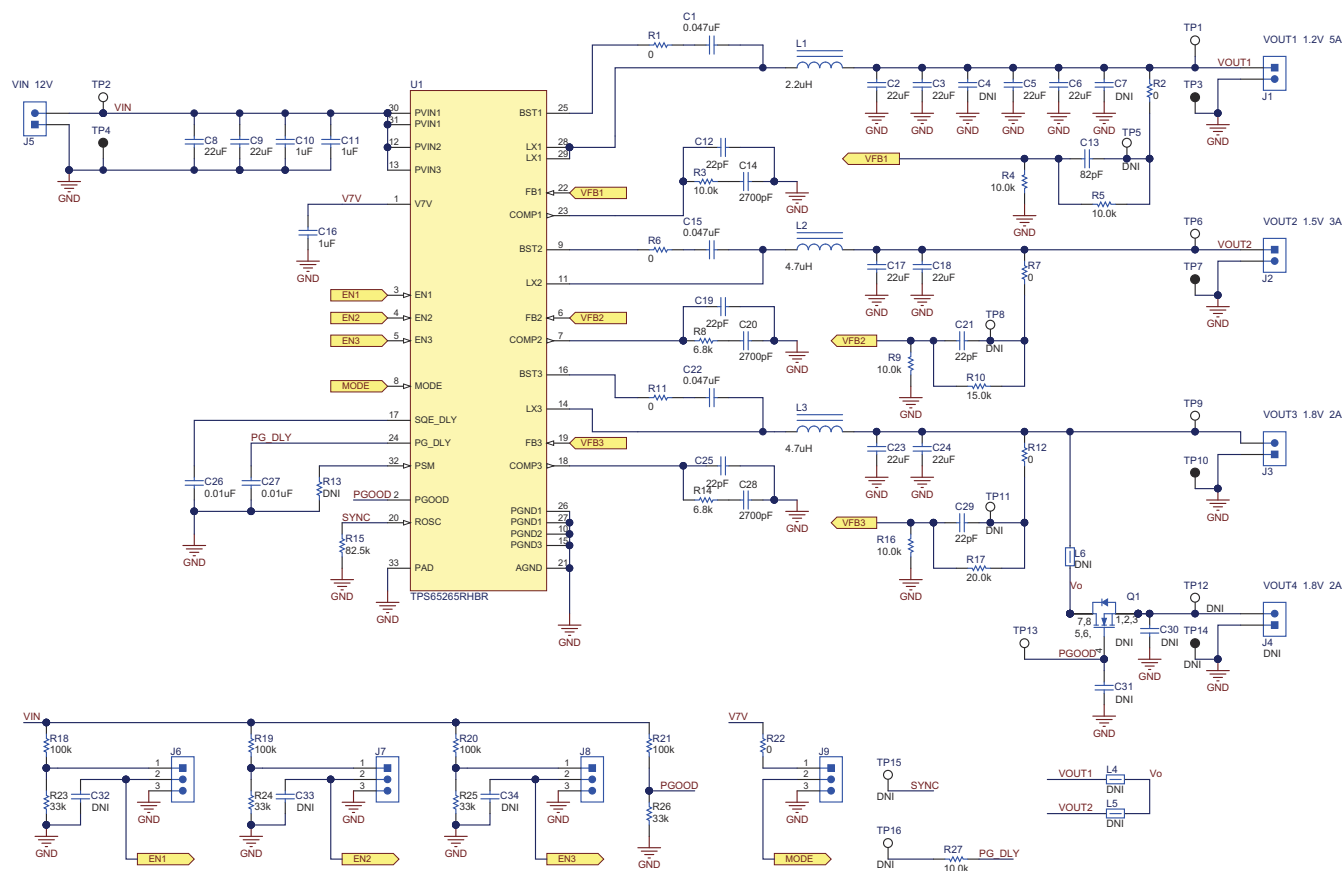


Figure 2-1. TPS65265EVM-705 Schematic

3 Board Layout

Figure 3-1 through Figure 3-5 illustrate the TPS65265EVM-705 PCB layout.

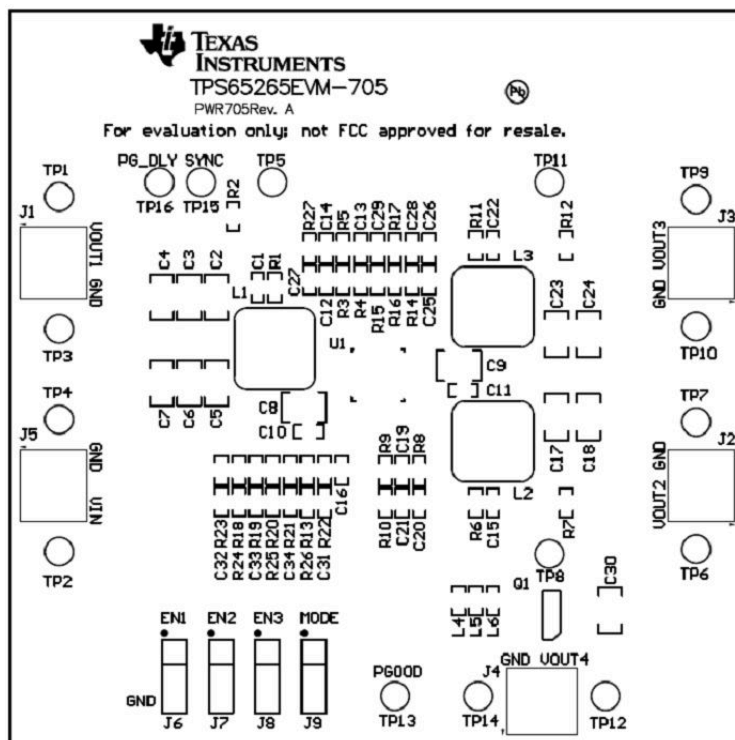


Figure 3-1. Component Placement (Top Layer)

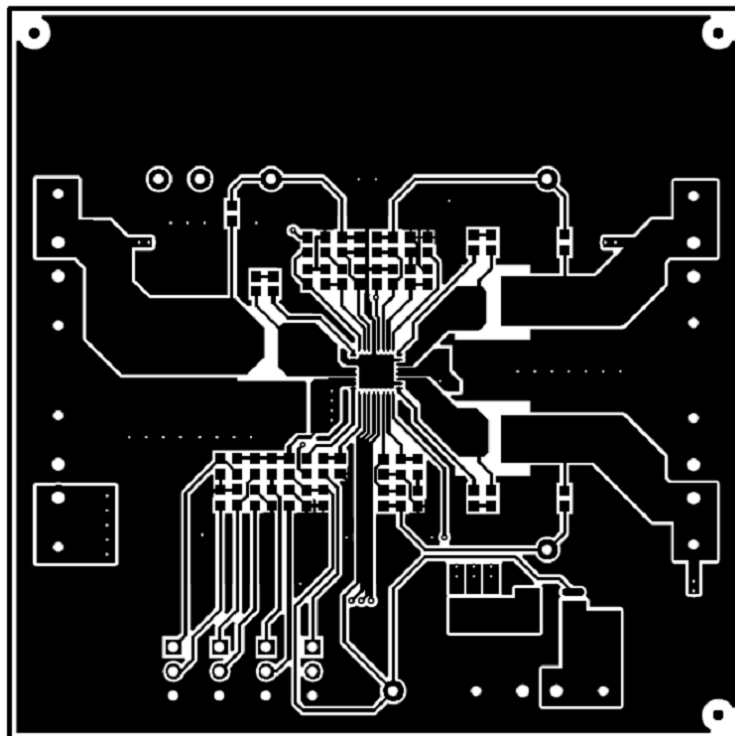


Figure 3-2. Board Layout (Top Layer)

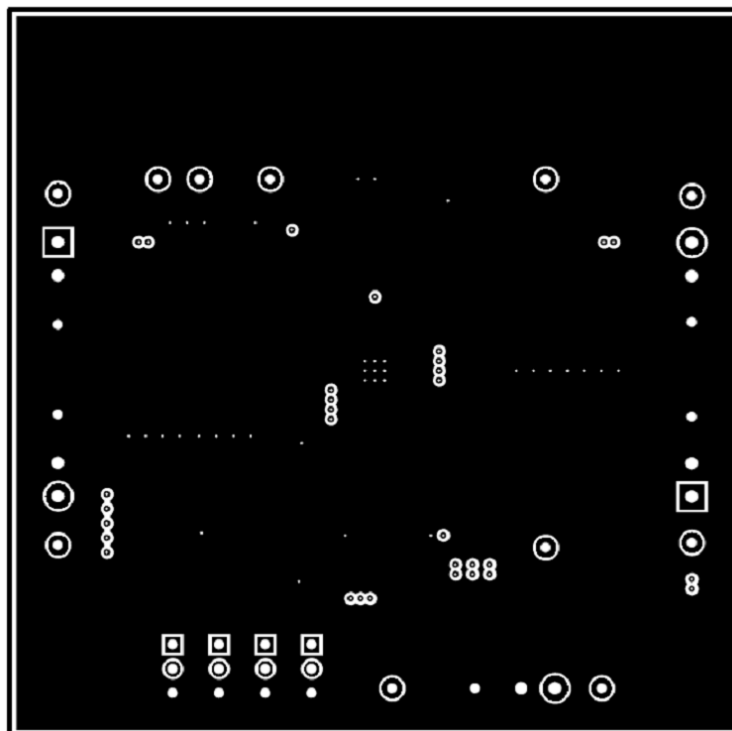


Figure 3-3. Board Layout (Second Layer)

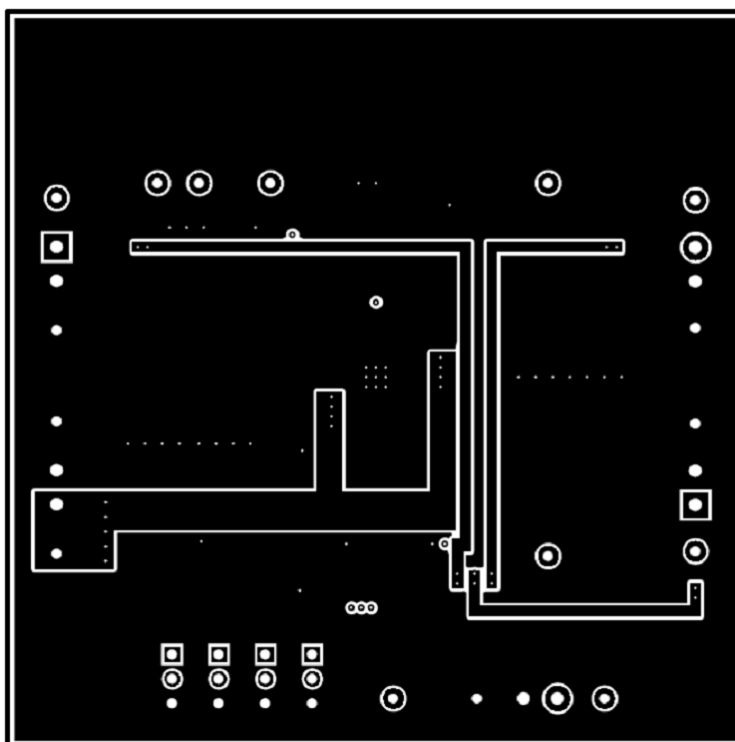


Figure 3-4. Board Layout (Third Layer)

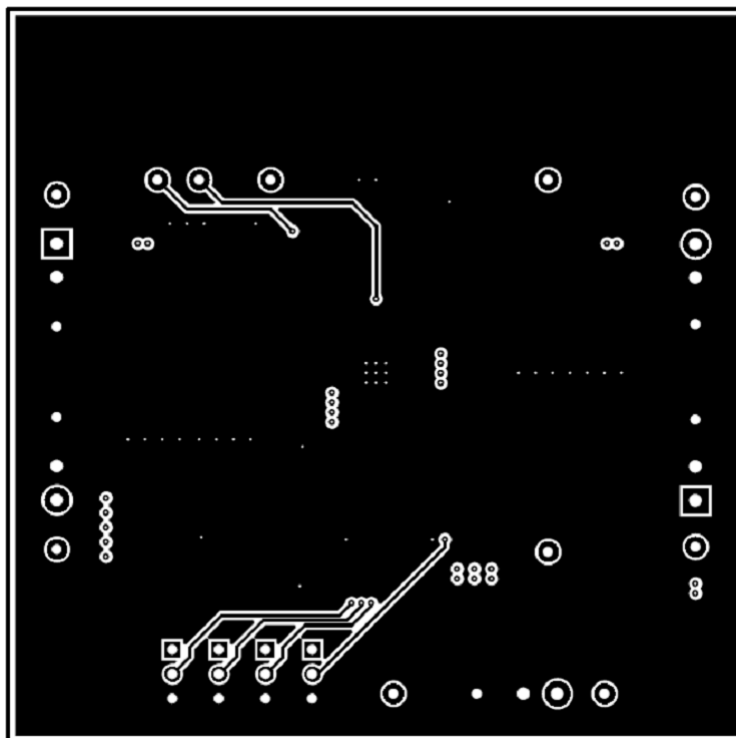


Figure 3-5. Board Layout (Bottom Layer)

4 Bench Test Setup Conditions

4.1 Header Description and Jumper Placement

Figure 4-1 shows the jumper and pin placement on the TPS65265EVM-705 board.

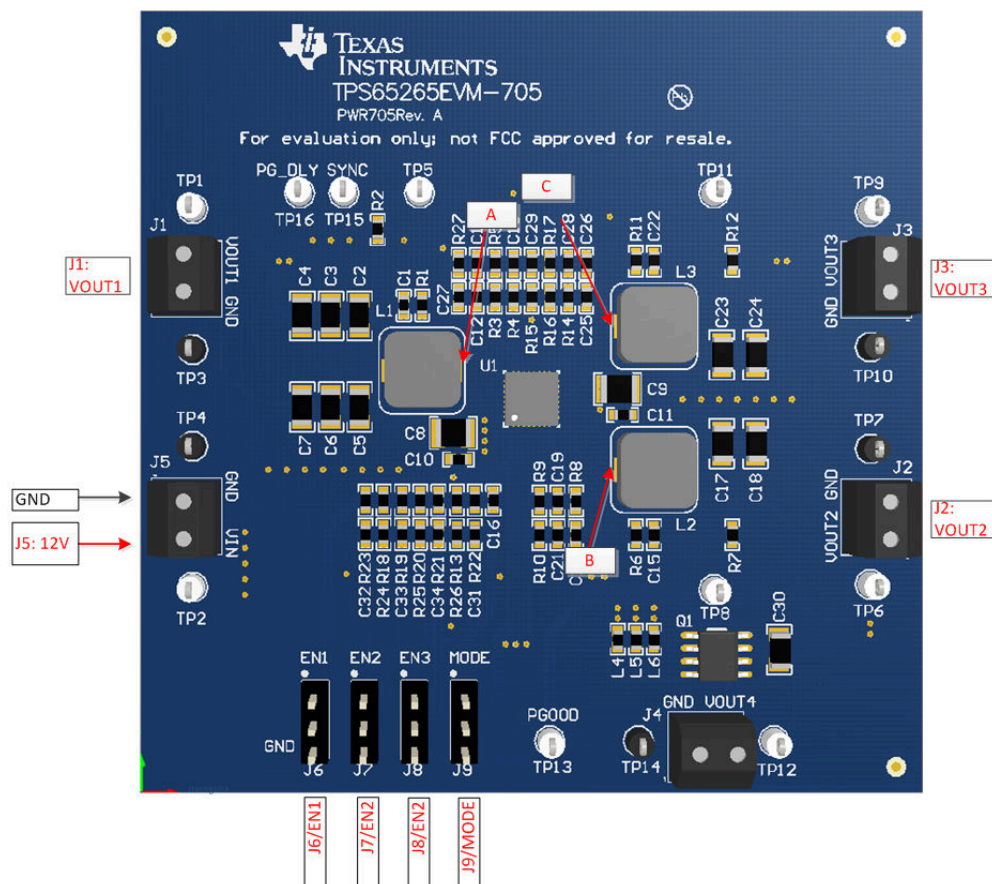


Figure 4-1. TPS65265EVM-705 Header Description and Jumper Placement

Test points:

1. LX of VOUT1
2. LX of VOUT2
3. LX of VOUT3

VOUT1, VOUT2, VOUT3, VIN, PGOOD, PG_DLY, SYNC

Table 4-1. Input/Output Connection

#	Function	Description
J1	Buck1 Connector	Output of Buck1
J2	Buck2 Connector	Output of Buck2
J3	Buck3 Connector	Output of Buck3
J5	VIN Connector	Apply power supply to this connector

Table 4-2. Jumpers

#	Function	Placement	Comment
J6	Buck1 enable (EN1)	Connect EN1 to GND to disable VOUT1 Connect EN1 to HIGH or leave open to enable VOUT1	
J7	Buck2 enable (EN2)	Connect EN2 to GND to disable VOUT2 Connect EN2 to HIGH or leave open to enable VOUT2	

Table 4-2. Jumpers (continued)

#	Function	Placement	Comment
J8	Buck3 enable (EN3)	Connect EN3 to GND to disable VOUT3 Connect EN3 to HIGH or leave open to enable VOUT3	
J9	MODE	Power sequencing mode control pin. Connect MODE pin to GND or HIGH, set the power sequence with pre-defined power up and power down sequence. Leave open to set power up and down with dedicated enable pin.	

5 Power-Up Procedure

Power-up with dedicated enable pin:

1. Apply 4.5 V–17 V to J5
2. Toggle J6 , J7, or J8 to enable VOUT1, VOUT2, and VOUT3, respectively
3. Apply loads to the output connectors

Six bucks power sequence schemes with the pre-defined power up and power down sequence, shown in [Table 5-1](#).

1. Connect J9 to GND or high
2. Connect J6 to High(or Low), J7 to High(or Low)
3. Apply 4.5 V–18 V to J5
4. Toggle J8 to enable VOUT1, VOUT2, and VOUT3 (power up sequence shown in [Table 5-1](#))
5. Apply loads to the output connectors

Table 5-1. Power Sequencing

Mode	EN1	EN2	EN3	Start Sequencing	Shutdown Sequencing
Low	High	High	Used to start/stop bucks in sequence	buck1→buck2→buck3	Buck3→buck2→buck1
Low	Low	High		Buck2→buck1→buck3	Buck3→buck1→buck2
Low	High	Low		Buck2→buck3→buck1	Buck1→buck3→buck2
High	High	High		Buck1→buck3→buck2	Buck2→buck3→buck1
High	Low	High		Buck3→buck1→buck2	Buck2→buck1→buck3
High	High	Low		Buck3→buck2→buck1	Buck1→buck2→buck3
High/Low	Low	Low	Reserved	Reserved	Reserved

6 Bill of Materials

Table 6-1 lists the TPS65265EVM-705 BOM.

Table 6-1. TPS65265EVM-705 Bill of Materials

#	Value	Qty	Designator	Footprint	Manufacturer	Manufacturer Part Number	Description
1	47nF	3	C8, C9, C17	0603	Generic		CAP 47nF 50V CERAMIC X7R 0603
2	10nF	1	C7	0603	Generic		CAP 10nF 50V CERAMIC X7R 0603
3	3.3nF	1	C4	0603	Generic		CAP 3.3nF 50V CERAMIC X7R 0603
4	22uF	4	C10, C11, C12, C18	1206	Generic		CAP 22uF 16V CERAMIC X5R 1206
5	22pF	3	C2, C3, C5	0603	Generic		CAP 22pF 16V CERAMIC X7R 0603
6	82pF	1	C1	0603	Generic		CAP 82pF 50V CERAMIC X7R 0603
7	4.7uF	2	C19, C20	0603	Generic		CAP 4.7uF 50V CERAMIC X7R 0603
8	10uF	3	C13, C14, C15	1206	Generic		CAP 10uF 16V CERAMIC X5R 1206
9	1uF	3	C6, C16, C21	0603	Generic		CAP 1uF 50V CERAMIC X7R 0603
10	4.99K	1	R52	0603	Generic		RES 4.99k OHM 1/10W 1% 0603 SMD
11	36.5K	1	R51	0603	Generic		RES 36.5k OHM 1/10W 1% 0603 SMD
12	10K	1	R42	0603	Generic		RES 10k OHM 1/10W 1% 0603 SMD
13	31.6K	1	R41	0603	Generic		RES 31.6k OHM 1/10W 1% 0603 SMD
14	8.67K	1	R32	0603	Generic		RES 8.67k OHM 1/10W 1% 0603 SMD
15	19.6K	1	R22	0603	Generic		RES 19.6k OHM 1/10W 1% 0603 SMD
16	39K	2	R21, R31	0603	Generic		RES 39k OHM 1/10W 1% 0603 SMD
17	51K	1	R10	0603	Generic		RES 51k OHM 1/10W 1% 0603 SMD
18	100K	2	R8, R9	0603	Generic		RES 100k OHM 1/10W 1% 0603 SMD
19	0	6	R2, R3, R4, R5, R6, R7	0603	Generic		RES 0k OHM 1/10W 1% 0603 SMD
20	20K	3	R1, R11, R12	0603	Generic		RES 20k OHM 1/10W 1% 0603 SMD
21	4.7uH	3	L1, L2, L3	IND_744311470	Würth Electronics Inc	744311470	SMT power inductor
22 ⁽¹⁾	HEADER 3 PIN	6	JP1, JP2, JP3, JP4, JP5, JP6	JMP0.3	Mil-Max	800-10-064-10-001000	Three Pin Header, Break SIPs into groups of 3
23	ED500/2 DS	8	J1, J2, J3, J4, J5, J6, J7, J8	TB_2X5.0MM	OnShore Technology Inc	ED500/2DS	Terminal Block, 2-pin, 15-A, 5.0mm
24	Test Point White	9	TP1, TP2, TP3, TP4, TP5, TP6, TP8, TP9	TP	Keystone	5002	TEST POINT PC MINI .040"D WHITE
25	Test Point Black	6	TP10, TP11, TP12, TP13, TP14, TP15	TP	Keystone	5001	TEST POINT PC MINI .040"D BLACK
26		6					Jumper, 2.54mm, open top, Applied on item 22
27 ⁽²⁾		4			3M	SJ-5303 (CLEAR)	BUMPON HEMISPHERE .44X.20 CLEAR
28		1	U1	RHB	Texas Instruments	TPS65262RHBR	

(1) Item 22: split into 3 pins

(2) Install item 27 on bottom at corners

7 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision * (December 2015) to Revision A (May 2021)	Page
• Updated user's guide title.....	2
• Updated the numbering format for tables, figures, and cross-references throughout the document.	2

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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.

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.

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