TPS62743EVM-689 Evaluation Module

This user's guide describes the characteristics, operation, and use of the Texas Instruments TPS62743 evaluation module (EVM). This EVM is designed to help the user easily evaluate and test the operation and functionality of the TPS62743. The EVM converts a 2.0-V to 5.5-V input voltage to a regulated output voltage that is set between 1.2 V and 3.3 V at up to 300 mA. The TPS62743 has an ultra-low quiescent current of 360 nA. This user's guide includes setup instructions for the hardware, a printed-circuit board layout for the EVM, a schematic diagram, a bill of materials, and test results for the EVM.

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1 Introduction

The TPS62743 is a 300-mA, synchronous, step-down converter in a tiny 1.6 x 0.9-mm, 8-ball DSBGA package. The output voltage is fixed inside the device by the connection of the three VSELx pins.

1.1 Background

The TPS62743EVM-689 uses the TPS62743 device. The EVM operates with full-rated performance with an input voltage between 2.0 V and 5.5 V.

2 Setup

This section describes how to properly use the TPS62743EVM-689.

2.1 Input/Output Connector Descriptions

J1, Pin 1&2 – VIN,	Positive input connection from the input supply for the EVM.
J1, Pin 3&4 – S+/S–	Input voltage sense connections. Measure the input voltage at this point.
J1, Pin 5&6 – GND	Return connection from the input supply for the EVM.
J2, Pin 1&2 – VOUT	Output voltage connection.
J2, Pin 3&4 – S+/S–	Output voltage sense connections. Measure the output voltage at this point.
J2, Pin 5&6 – GND	Output return connection.
J3 – SW/GND	Switch node measurement connection
JP1 – EN	EN pin input jumper. Place the supplied jumper across ON and EN to turn on the IC. Place the jumper across OFF and EN to turn off the IC.
JP2 – VHIGH	HIGH Level Selection Jumper. The setting high level can be chosen from either VIN or VOUT
JP3 through JP5 – VSELx	These four inputs set the output voltage. By connecting each pin high or low, the output voltage is programmed per Table 1. Do not leave any jumper open for proper operation.

Table 1 provides the output voltage settings for the TPS62743EVM-689. A 0 refers to logic low, while 1 refers to logic high.

Table 1. Output Voltage Settings

VOUT	VSEL 3	VSEL 2	VSEL 1
1.2	0	0	0
1.5	0	0	1
2.8	0	1	0
2.1	0	1	1
2.5	1	0	0
2.8	1	0	1
3.0	1	1	0
3.3	1	1	1

2.2 Operation

To operate the EVM, set jumpers JP1 through JP5 to the desired positions per Section 2.1. Connect the input supply to J1 and connect the load to J2.

3 Common Efficiency Measurement Errors with Ultra-Low Iq Devices

Efficiency is a common measurement for a power supply. With an ultra-low quiescent current device, such as the TPS62743, measurement errors can have a large impact on the measured efficiency, especially at very low load currents (< 100 µA).

3.1 Efficiency Measurement Setup

To accurately measure the efficiency of the TPS62743EVM-689, use the setup described in SLVA236 Figure 6. The 'Additional Input Capacitor' referred to in that application report is not needed as C5 is already included on the TPS62743EVM-689. Any additional input capacitance is not recommended as it incurs increased leakage on the input which lowers the measured efficiency.

When measuring efficiency through the setup in SLVA236, special care must be taken to remove the current consumed by the measurement instruments from the efficiency calculations. Such measurement instruments typically include the input voltage and output voltage multimeters as well as the input power supply's remote sense lines (if it has this capability). The current into these points affects the measured efficiency at very light loads. Two possible methods to overcome this are: measuring the current into these points (measure the current into the multimeters and/or remote sense lines) and then subtracting this current from the efficiency calculation or simply removing these instruments from the test setup. At very light load currents, it is typically best to remove the remote sense lines of the input power supply and then measure the current into the input and output voltage multimeters to get the most accurate efficiency measurement.

3.2 Pullup and Pulldown Resistors

In addition to the input capacitor and remote sense lines noted in Section 3.1, any pullup or pulldown resistors can draw significant current and affect the measured efficiency. For example, if the VSEL2 pin were pulled up to the input voltage with a 1-MΩ resistor and the pin were tied low through JP4, this would draw an extra 3.6 µA from the input source at a 3.6-V input voltage. This would greatly affect the efficiency at very light loads. For this reason, no pullup or pulldown resistors have been used on the TPS62743EVM-689. The final application circuit should ensure that all digital inputs to the TPS62743 are terminated either high or low and not left floating, per the device data sheet.

4 Board Layout

This section provides the TPS62743EVM-689 board layout and illustrations. The gerbers are available on the EVM product page: TPS62743EVM-689.

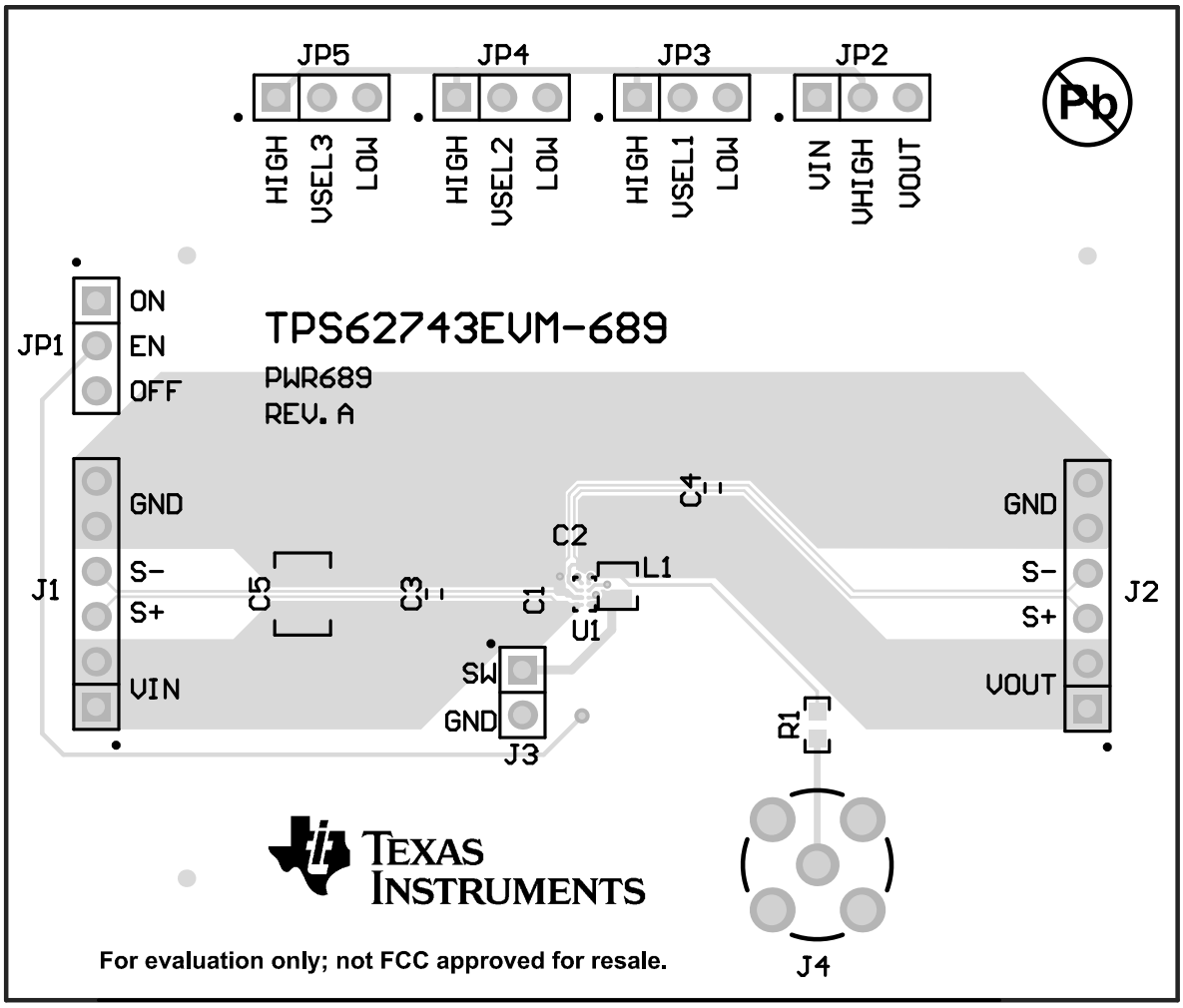

Figure 1. Assembly Layer

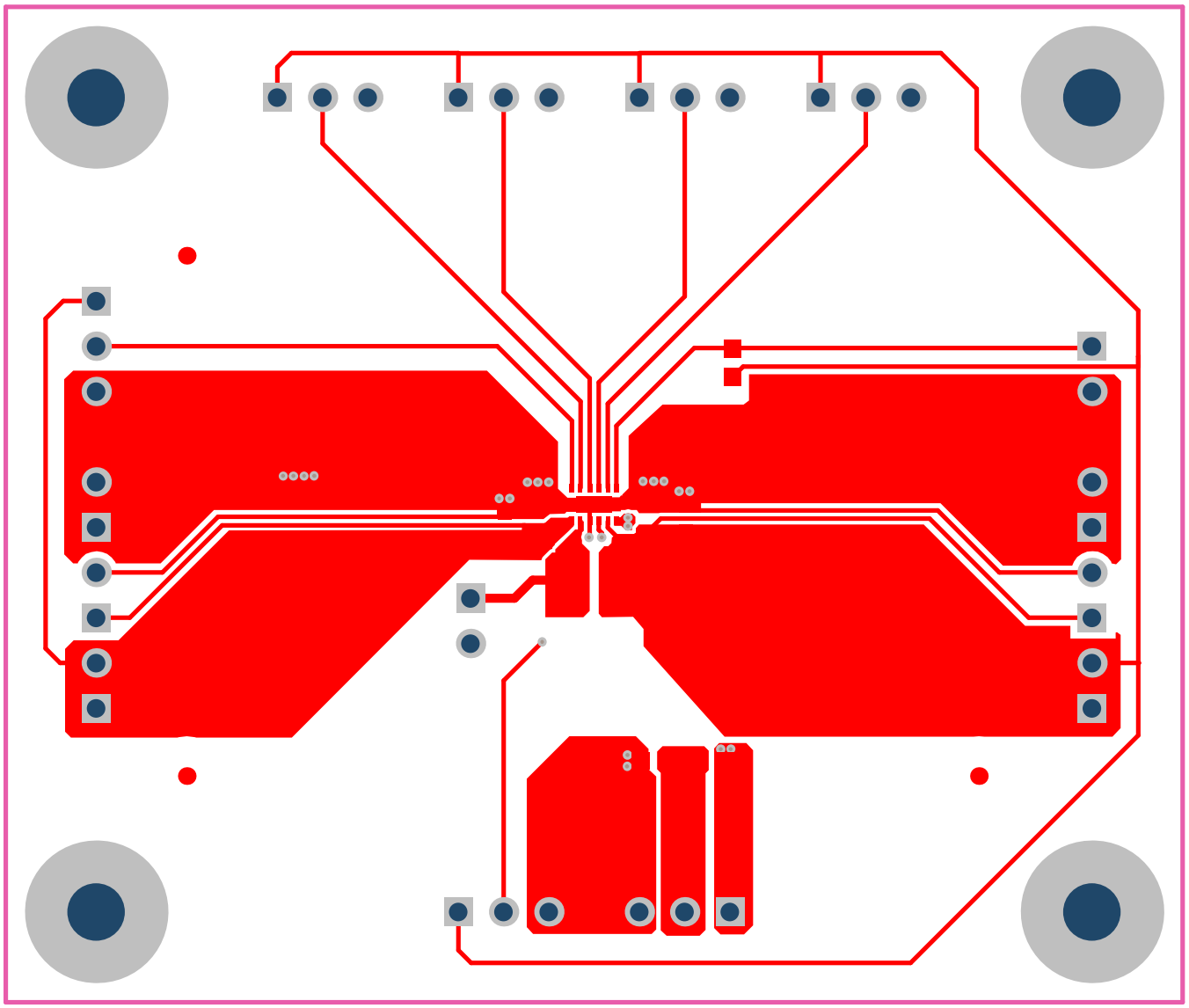

Figure 2. Top Layer

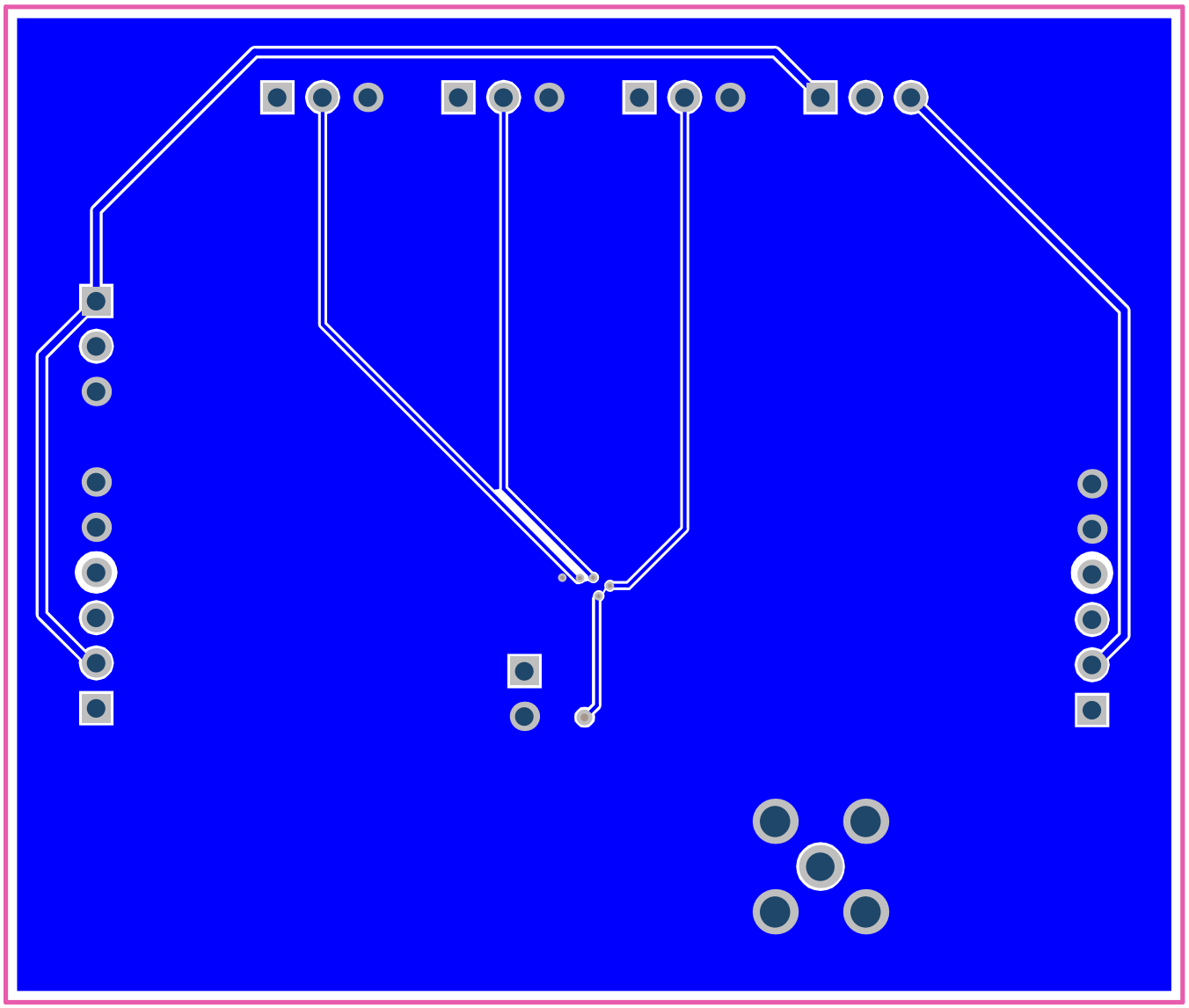

Figure 3. Bottom Layer

5 Schematic and Bill of Materials

This section provides the TPS62743EVM-689 schematic and bill of materials.

5.1 Schematic

Figure 4 illustrates the TPS62743EVM-689 schematic.

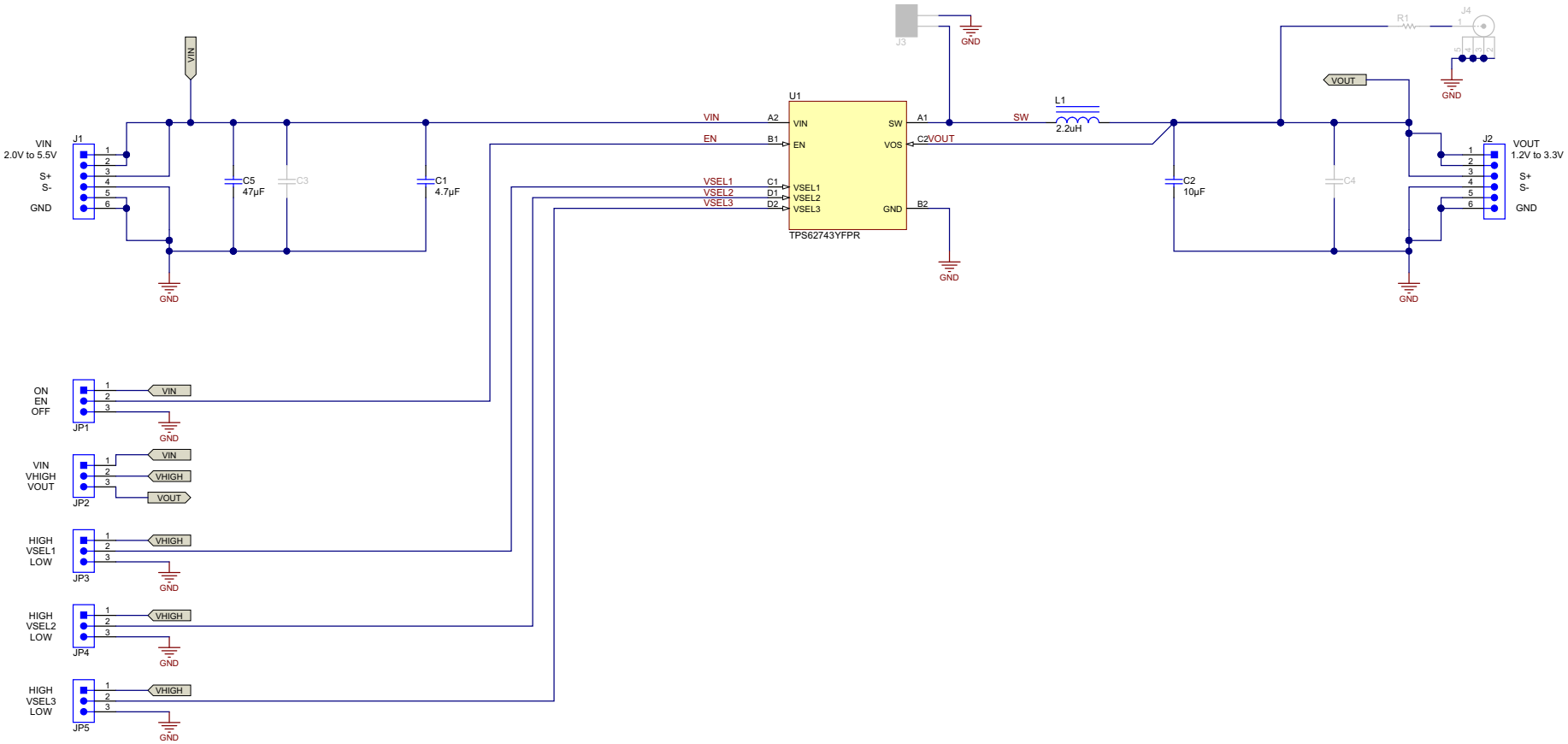

Figure 4. TPS62743EVM-689 Schematic

5.2 Bill of Materials

Table 2 lists the TPS62743EVM-689 bill of materials.

Table 2. TPS62743EVM-689 Bill of Materials

Count	RefDes	Value	Description	Size	Part Number	MFR
1	C1	4.7µF	Capacitor, Ceramic, X5R, 6.3V, 20%	0402	GRM155R61C475ME15	Murata
1	C2	10µF	Capacitor, Ceramic, X5R, 6.3V, 20%	0402	GRM155R60J106ME11	Murata
2	C3, C4	not populated		0603		
1	C5	47µF	Capacitor, Ceramic, X5R, 6.3V, 20%	2016	GRM32ER61C476ME15L	Murata
1	L1	2.2µH	Inductor, SMT, 0.7A, 230-mΩ	0805	1285AS-H-2R2M	Toko
1	U1	TPS62743	IC, 360 nA I_Q Step Down Converter	1.6mm x 0.9mm 8-Ball DSBGA	TPS62743YFP	TI

Revision History

Changes from Original (June 2015) to A Revision **Page**

- Changed first two rows of *RefDes* and *Value* columns in the bill of materials. 9

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

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- *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.*
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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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