LM10692 Evaluation Module User's Guide

The LM10692 LLP36 Evaluation Board allows the user to test all the different features of the LM10692. It is designed to interface with a Graphical User Interface (GUI) on a PC through a USB port. A microcontroller is embedded on the board to provide the USB link to I2C communication to the LM10692 and to register the different flags and switches from/to the IC. It also provides input and output voltage sensing for quick monitoring and diagnosis on the GUI.

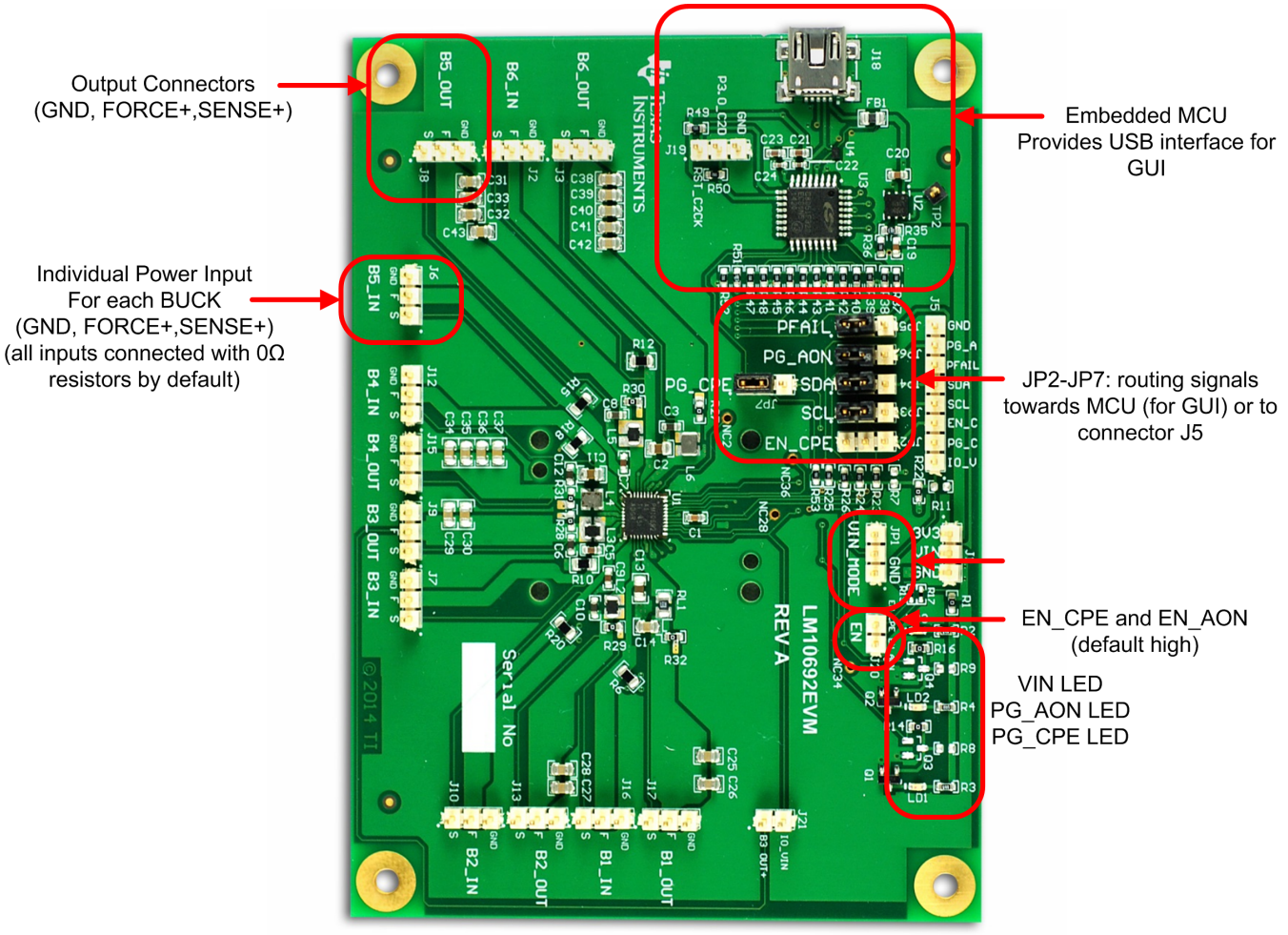

Figure 1. LM10692 Evaluation Board

1 Quick Power-Up Procedure

- Connect jumper to JP2-JP7 on position 2-3 (between the center and the bottom of the connector)
- Connect USB connector (if using the GUI or communicating through I2C)
- Set external power supply to 3.3V, 3A.
- Connect the positive supply terminal to the center pin of J1. Alternatively, The F pin of any VIN B# connector (J2,J6,J12,J7,J10 or J16) can be used
- Connect the negative supply terminal to of the GND pin of any VIN B# connector

Remark: Alternatively, the basic power-up function can be verified by connecting a jumper between pin1 and pin2 of TP1. This will feed 3.3V power from the USB port (via an LDO) into the IC. The USB connection as well as the LDO are limited in their current handling capabilities hence this is not recommended if the buck outputs of the LM10692 are to be loaded.

Remark: The USB connection is not necessary to power up the LM10692 EVM. If the Graphical User Interface is not needed, the USB connector can be left disconnected.

1.1 Power Inputs to the LM10692

- Each power connector (VIN B# and BUCK#) has three pins: “F” for the positive power terminal, “GND” for the negative power terminal and “S” for the positive sense terminal in the case of a 4-wire power supply or load. If present, the negative sense terminal of the power supply connects to the “GND” connector as well.
- By default, all VINs are connected together with 0Ω resistors (R6,R10,R12,R15,R18, R20). If needed, these resistors can be disconnected to decouple the supply of each BUCK.
- IO_VIN is supplied from VIN by default through R22 (0Ω). IO_VIN can also be powered by BUCK3 output (1.8V default) by unsoldering R22 and connecting a jumper on J21. It can also be supplied through VIO pin on J5 (pin1) (R22 needs to be unsoldered also for this option).
- **Important: Do not connect IO_VIN to more than one power rail at the same time**.

1.2 VIN_MODE Connector

The VIN_MODE pin controls the behavior of BUCK1 (bypass mode or buck mode). By default it is left floating which results in BUCK1 in bypass mode. A jumper can be connected on JP1 which will force VIN_MODE to GND. If doing so, an inductor **must be connected** across the terminals of L1. By default, a 0Ω (typically 10mΩ in practice) resistor is soldered at this location.

1.3 Enables

The board has connector to the EN_CPE pin and the EN_AON pin of the LM10692. EN_AON is pulled-up through a 100kΩ resistor to VIN and EN_CPE is pulled up through a 100kΩ resistor to VIN_IO.

EN_CPE can also be connected to J5 or to the MCU through JP7. The GUI then provides the user with a toggle switch.

1.4 PG LEDs

The board has three LED indicators which show the following signals:

- LD1: PG_CPE
- LD2: PG_AON
- LD3: VIN (simple connection to VIN through a 511Ω resistor)

2 GUI

The following screen capture shows the main screen of the GUI.

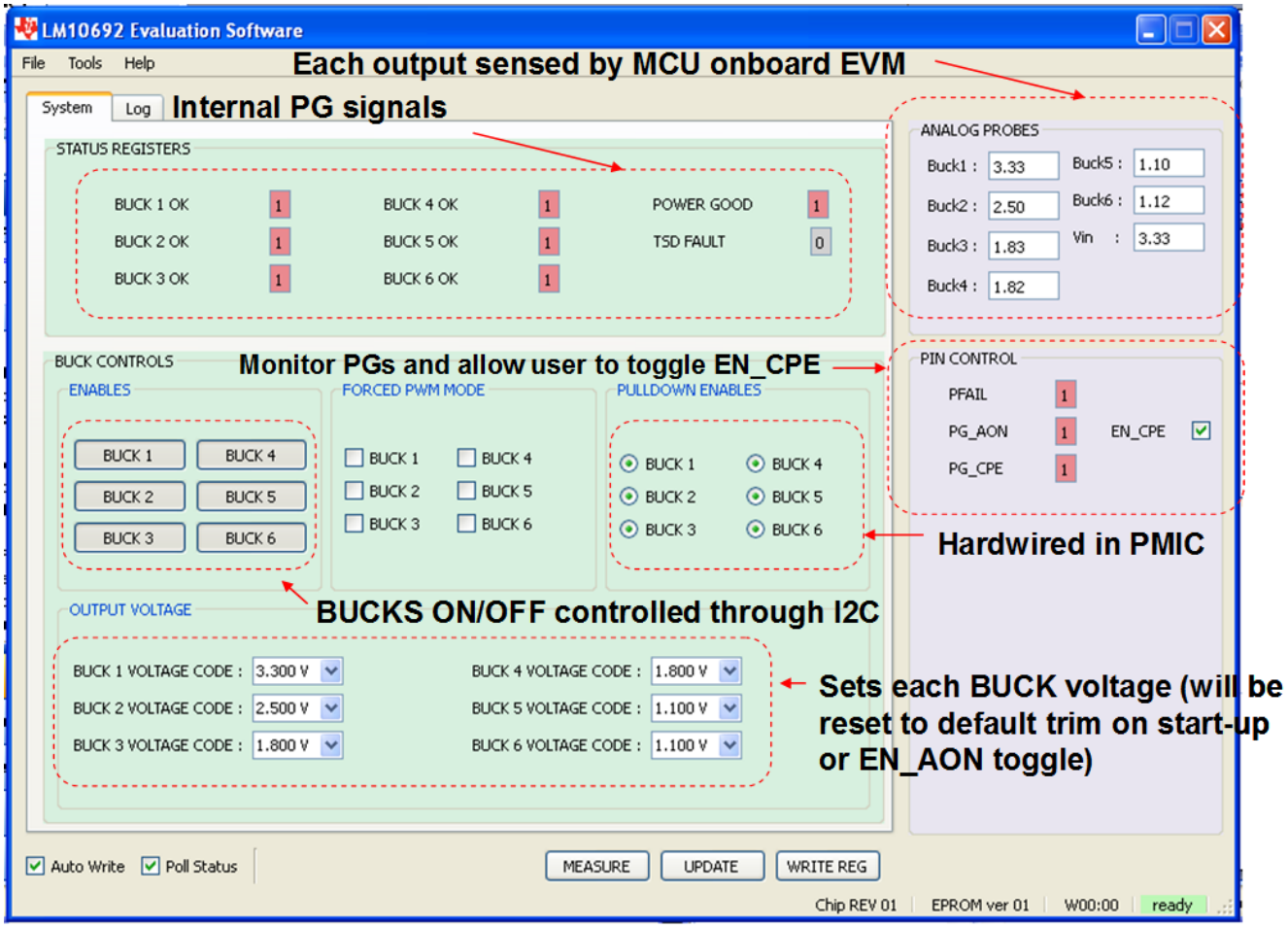

Figure 2. LM10692 Evaluation GUI main screen

When the USB cable is connected, the MCU embedded on the EVM gets powered and the indicator on the bottom right turns green and reads "ready" indicating that communication is established with the MCU.

The GUI includes the following features:

- Ability to control each output voltage through I2C
- Ability to enable and disable any BUCK through I2C Note that BUCK1 is internally tied to BUCK6 and that it will shutdown if BUCK6 is turned OFF. Similarly BUCK4 will shutdown if BUCK1 is down
- Monitoring of the PFAIL, PG_AON and PG_CPE signals through sensing by MCU (on the PCB, JP5,JP6 and JP7 need to carry a jumper between pin2&3 for this function to work)
- Monitoring of the individual internal PG flags of each BUCK through I2C polling (on the PCB, JP3 and JP4 need to carry a jumper between pin 2&3 for this function to work)
- Monitoring of the actual output voltages through sensing by MCU
- Ability to pull the EN_CPE line high or low (on the PCB, JP2 needs to carry a jumper between pin 2&3 for this function to work)
- Ability to read and write data to I2C directly (on the PCB, JP3 and JP4 need to carry a jumper between pin 2&3 for this function to work)

3 Schematics

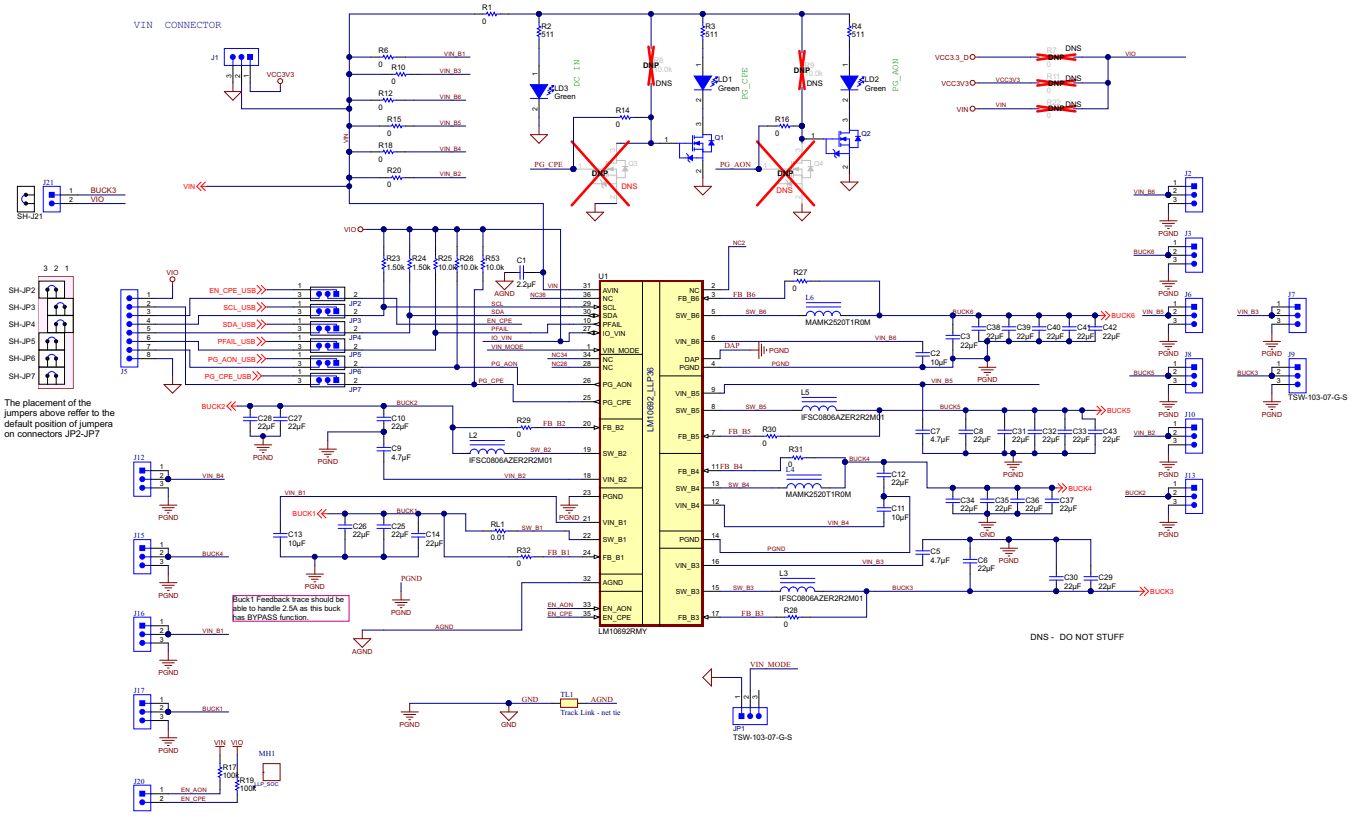

Figure 3. Board Schematic (1/2)

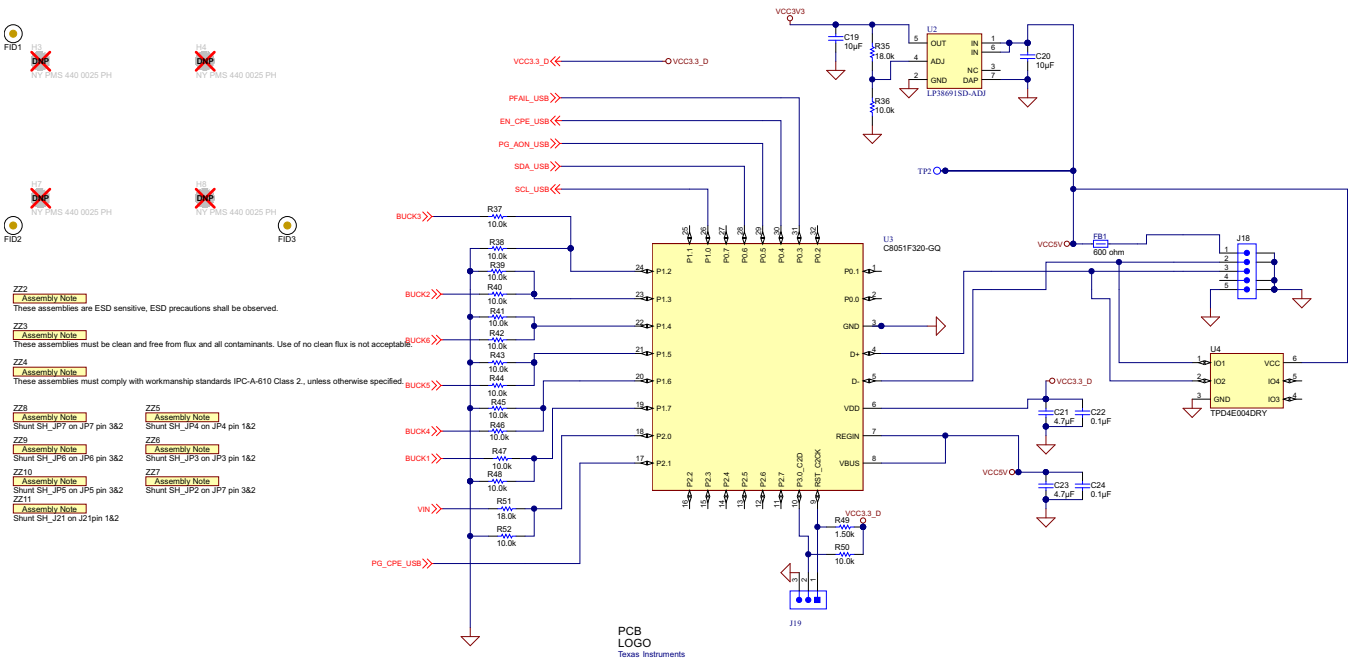

Figure 4. Board Schematic (2/2)

4 Bill of Materials

Designator	Quantity	Value	Description	Package Reference	PartNumber	Manufacturer
C1	1	2.2uF	CAP, CERM, 2.2uF, 10V, +/-10%, X6S, 0603	603	GRM188C81A225KE34D	MuRata
C2, C11, C13	3	10uF	CAP, CERM, 10uF, 6.3V, +/-20%, X5R, 0805	805	GRM21BR60J106ME19L	MuRata
C3, C6, C8, C10, C12	5	22uF	CAP, CERM, 22uF, 4V, +/-20%, X5R, 0603	603	GRM188R60G226MEA0L	MuRata
C5, C7, C9, C21, C23	5	4.7uF	CAP, CERM, 4.7uF, 6.3V, +/-10%, X5R, 0603	603	GRM188R60J475KE19D	MuRata
C14, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43	20	22uF	CAP, CERM, 22uF, 6.3V, +/-20%, X5R, 0805	805	GRM21BR60J226ME39L	MuRata
C19, C20	2	10uF	CAP, CERM, 10uF, 10V, +/-20%, X5R, 0603	603	GRM188R61A106ME69	MuRata
C22, C24	2	0.1uF	CAP CER 0.1UF 10V 10% X5R 0402	402	CC0402KRX5R6BB104	YAGAO
FB1	1		FERRITE BEAD 600 OHM 2.0A 080		742792040	Wurth
H3, H4, H7, H8	4		screw, Round, #4-40 x 1/4, Nylon, Philips panhead	Screw	NY PMS 440 0025 PH	B and F Fastener Supply
J1, J2, J3, J6, J7, J8, J9, J10, J12, J13, J15, J16, J17, J19, JP1, JP2, JP3, JP4, JP5, JP6, JP7	21		Header, TH, 100mil, 3x1, Gold plated, 230 mil above insulator	3x1 Header	TSW-103-07-G-S	Samtec
J5	1		Header, TH, 100mil, 8x1, Gold plated, 230 mil above insulator	8x1 Header	TSW-108-07-G-S	Samtec, Inc.
J18	1		Connector, Receptacle, Mini-USB Type B, R/A, Top Mount SMT	USB Mini Type B	1734035-2	TE Connectivity
J20, J21	2		Header, TH, 100mil, 2x1, Gold plated, 230 mil above insulator	2x1 Header	TSW-102-07-G-S	Samtec
L2, L3, L5	3		Inductor, Shielded, Ferrite, 2.2uH, 1.3A, 0.236 ohm, SMD		IFSC0806AZER2R2M01	Vishay
L4, L6	2	1uH	Inductor, Wirewound, Ferrite, 1uH, 2.7A, 0.059 ohm, SMD	2.5x1x2mm	MAMK2520T1R0M	Taiyo Yuden
LD1, LD2, LD3	3	Green	LED, Green, SMD	LED, GREEN, 0603	SML-LX0603GW-TR	Lumex
MH1	1					
Q1, Q2	2	25V	MOSFET, N-CH, 25V, 0.68A, SOT-23	SOT-23	FDV303N	Fairchild Semiconductor
R1, R14, R16, R22, R27, R28, R29, R30, R31, R32	10	0	RES, 0 ohm, 5%, 0.1W, 0603	603	MCR03EZPJ000	Rohm
R2, R3, R4	3	511	RES, 511 ohm, 1%, 0.1W, 0603	603	CRCW0603511RFKEA	Vishay-Dale
R6, R10, R12, R15, R18, R20	6	0	RES, 0 ohm, 5%, 0.125W, 0805	805	MCR10EZHJ000	Rohm
R17, R19	2	100k	RES, 100k ohm, 1%, 0.063W, 0402	402	CRCW0402100KFKED	Vishay-Dale
R23, R24, R49	3	1.50k	RES, 1.50k ohm, 1%, 0.1W, 0603	603	CRCW06031K50FKEA	Vishay-Dale

Designator	Quantity	Value	Description	Package Reference	PartNumber	Manufacturer
R25, R26, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R50, R52, R53	18	10.0k	RES, 10.0k ohm, 1%, 0.1W, 0603	603	CRCW060310K0FKEA	Vishay-Dale
R35, R51	2	18.0k	RES, 18.0k ohm, 1%, 0.1W, 0603	603	RC0603FR-0718KL	Yageo America
RL1	1	0.01	RES, 0.01 ohm, 1%, 0.25W, 0805	805	WSL0805R0100FEA18	Vishay-Dale
TP2	1		CONN HEADER VERT .100 1POS 15AU		87224-1	TE Connectivity
U1	1		LM10692RMY, RMY0036A	RMY0036A	LM10692RMY	Texas Instruments
U2	1		500mA Low Dropout CMOS Linear Regulators with Adjustable Output Stable with Ceramic Output Capacitors, 6-pin LLP, Pb-Free	SDE06A	LP38691SD-ADJ/NOPB	Texas Instruments
U3	1		IC 8051 MCU 16K FLASH, 32LQFP	LQFP-32	C8051F320-GQ	Silicon Laboratories
U4	1		4-CHANNEL ESD-PROTECTION ARRAY FOR HIGH-SPEED DATA INTERFACES, DRY006A	DRY0006A	TPD4E004DRY	Texas Instruments
Q3, Q4	0	25V	MOSFET, N-CH, 25V, 0.68A, SOT-23	SOT-23	FDV303N	Fairchild Semiconductor
R7, R11	0	0	RES, 0 ohm, 5%, 0.1W, 0603	603	MCR03EZPJ000	Rohm
R8, R9	0	10.0k	RES, 10.0k ohm, 1%, 0.1W, 0603	603	CRCW060310K0FKEA	Vishay-Dale

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      3.1.2 *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.

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FCC Interference Statement for Class B EVM devices

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- *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.*

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3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210*

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Concernant les EVMs avec antennes détachables

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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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