

Wireless Module F1CS43752_HP

(VWLM-1)

User manual

F1CS43752_HP User Manual

The F1CS43752_HP is a Wi-Fi/BT combo module based on the industry-standard Mini PCIe module half-size format. This embedded module is optimized for WLAN/Bluetooth enabled handheld mobile devices.

WLAN, BT

The F1CS43752_HP is a dual-band (2.4GHz and 5GHz) Wi-Fi 2X2 and supports 802.11 a/b/g/n/ac Wi-Fi standard.

Support BT v5.3 and Bluetooth class 1 or class 2 TX operation.(BDR, LE1Mbps)

And it has two signal path.

- ANT1 : WLAN, BT shared
- ANT2 : WLAN

Interface

The F1CS43752_HP is designed in PCIe mini card format.

The WLAN host interface is PCIe v3.0 compliant and runs at Gen1 speeds.

Host controller interface (HCI) using a high-speed UART interface and PCM for audio data.

Please refer to the datasheet for detailed interface pin information.

Power

The F1CS43752_HP is powered by an external 3.3V from PCIe HOST.

1. KEY FEATURES

- 1) WLAN - IEEE Std 802.11a/b/g/n/ac
- 2) 2x2 MIMO
- 3) Bluetooth – Bluetooth specification Version 5.3
- 4) WLAN Channel Bandwidths : 20MHz at 2.4GHz, 20MHz / 40MHz / 80MHz at 5GHz
- 5) Concurrent WLAN+BT reception in the 2.4GHz band.
- 6) One antenna configuration with WLAN and Bluetooth coexistence support
- 7) Built-in reference clock : 37.4MHz Crystal
- 8) Built-in 32.768kHz Low-Power Oscillator
- 9) Interface
 - WLAN : PCIe
 - BT : UART / PCM
- 10) Operating temperature range (-10°C ~ +50°C)
- 11) Supply voltage Range (3.3V from Mini PCIe slot)
- 12) Mini PCIe Module Format
- 13) Size : 26.8 x 30 x 4.6mm

2. Specification

Model Name	F1CS43752_HP
Product Description	2T2R 802.11 a/b/g/n/ac Wi-Fi + BT 5.3 Module
Dimension	26.8 x 30 x 4.6mm
Wi-Fi Interface	PCIe v3.0 compliant and runs at Gen2 speeds
BT Interface	UART / PCM
Operating temperature	-10 to +50°C
Storage temperature	-40 to -125°C

3. Module Installation Instructions

3.1. Safety and Caution Statements

- 1) **No user modification:** Do not change hardware, firmware, RF parameters, or region settings of the module. Any change may invalidate Radio Law conformity.
- 2) **Co-location limits:** This module is permitted to operate simultaneously with other transmitters or antennas.
- 3) **RF exposure:** Maintain a minimum separation distance of 20 cm from persons. Hand-held or body-worn use is not covered by this guide and requires a separate MPE evaluation.

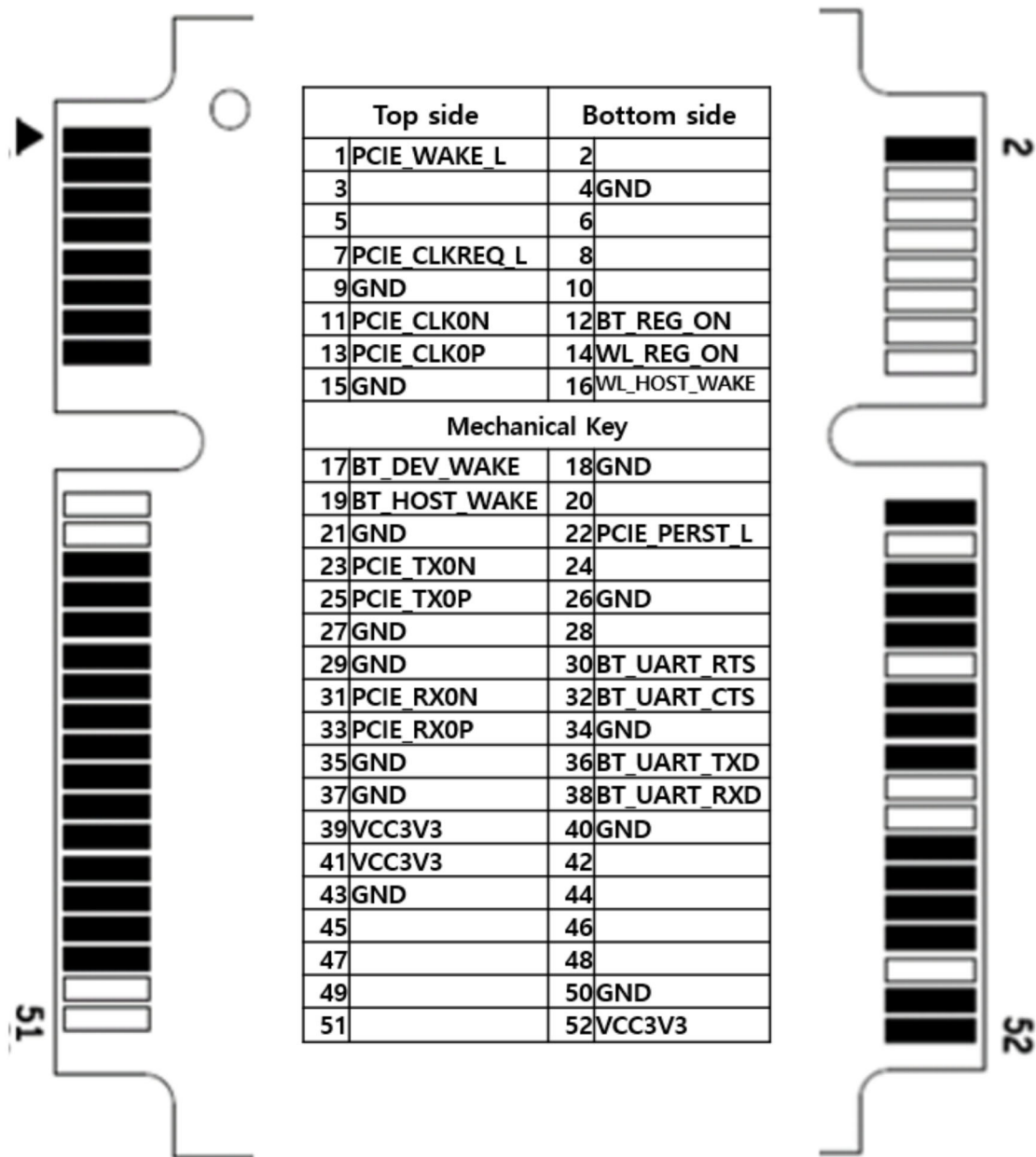
3.2. Mechanical Integration Requirements

- 1) **Grounding/shielding:** Connect module GND to the host main GND with low impedance; a star-ground topology is recommended for RF paths.
- 2) **Placement:** Need to confirm whether the product supports a PCIe slot.

3.3. Electrical Integration

- 1) **Power:** The F1CS43752_HP is powered by an external 3.3V from PCIe HOST.

4. Pin Definition



Top side		Bottom side	
1	PCIE_WAKE_L	2	
3		4	GND
5		6	
7	PCIE_CLKREQ_L	8	
9	GND	10	
11	PCIE_CLK0N	12	BT_REG_ON
13	PCIE_CLK0P	14	WL_REG_ON
15	GND	16	WL_HOST_WAKE
Mechanical Key			
17	BT_DEV_WAKE	18	GND
19	BT_HOST_WAKE	20	
21	GND	22	PCIE_PERST_L
23	PCIE_TX0N	24	
25	PCIE_TX0P	26	GND
27	GND	28	
29	GND	30	BT_UART_RTS
31	PCIE_RX0N	32	BT_UART_CTS
33	PCIE_RX0P	34	GND
35	GND	36	BT_UART_TXD
37	GND	38	BT_UART_RXD
39	VCC3V3	40	GND
41	VCC3V3	42	
43	GND	44	
45		46	
47		48	
49		50	GND
51		52	VCC3V3

Device Terminal Descriptions

The symbols shown under Type indicate pin directions (I/O = bidirectional, I =input, O = output) and the internal pull-up/pull-down characteristics (PU = weak internal pull-up resistor and PD = weak internal pull-down resistor),

Pin	Pin Name	Pin Type	Description
1	PCIE_WAKE_L	O(OD)	PCIe management event output
2	NC	-	Not connect
3	NC	-	Not connect
4	GND	-	Ground connections
5	NC	-	Not connect
6	NC	-	Not connect
7	PCIE_CLKREQ_L	O(OD)	PCIe clock request signal output
8	NC	-	Not connect
9	GND	-	Ground connections
10	NC	-	Not connect
11	PCIE_CLK0N	I	PCIe differential clock input
12	BT_REG_ON	I(PD)	Low asserting reset for Bluetooth core
13	PCIE_CLK0P	I	PCIe differential clock input
14	WL_REG_ON	I(PD)	Low asserting reset for WiFi core
15	GND	-	Ground connections
16	WL_HOST_WAKE	O(PD)	WLAN to wake-up HOST
17	BT_DEV_WAKE	I(PU)	HOST wake-up Bluetooth device
18	GND	-	Ground connections
19	BT_HOST_WAKE	O(PU)	HOST wake-up Bluetooth device

20	NC	-	Not connect
21	GND	-	Ground connections
22	PCIE_PERST_L	I(PD)	PCIE system reset
23	PCIE_TX0N	O	Transmitter differential pair (×1 lane)
24	NC	-	Not connect
25	PCIE_TX0P	O	Transmitter differential pair (×1 lane)
26	GND	-	Ground connections
27	GND	-	Ground connections
28	NC	-	Not connect
29	GND	-	Ground connections
30	BT_UART_RTS_N	O(PU)	UART request-to-send. Active-low request-to-send signal for the HCI UART interface.
31	PCIE_RX0N	I	Receiver differential pair (×1 lane)
32	BT_UART_CTS_N	I(PU)	UART clear-to-send. Active-low clear-to-send signal for the HCI UART interface.
33	PCIE_RX0P	I	Receiver differential pair (×1 lane)
34	GND	-	Ground connections
35	GND	-	Ground connections
36	BT_UART_TXD	O(PU)	UART serial output. Serial data output for the HCI UART interface.
37	GND	-	Ground connections
38	BT_UART_RXD	I(PU)	UART serial input. Serial data input for the HCI UART interface.

39	VCC3V3	P	3.3V supply input from Mini PCIe slot
40	GND	-	Ground connections
41	VCC3V3	P	3.3V supply input from Mini PCIe slot
42	NC	-	Not connect
43	GND	-	Ground connections
44	NC	-	Not connect
45	NC	-	Not connect
46	NC	-	Not connect
47	NC	-	Not connect
48	NC	-	Not connect
49	NC	-	Not connect
50	GND	-	Ground connections
51	NC	-	Not connect
52	VCC3V3	P	3.3V supply input from Mini PCIe slot

FCC Compliance Statement

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.

FCC Interference Statement

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 correct the interference by one 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 which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

2.4 GHz band IEEE 802.11n operation of this product in the USA is firmware-limited to channels 1 through 11.

Industry Canada Statement

This device complies with RSS-247 of the Industry Canada 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. Ce dispositif est conforme à la norme CNR-247 d'Industrie Canada applicable aux appareils radio exempts de licence. Son fonctionnement est sujet aux deux conditions suivantes: (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

Industry Canada Radiation Exposure Statement

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

Déclaration d'exposition aux radiations

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

End Product Labeling

The module is labeled with its own FCC ID & IC Number. If the FCC ID& IC Number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following:

"Contains FCC ID: **PFR-F1CS43752HP**"

"Contains IC Number : **11233A-F1CS43752HP**"

Information on test modes and additional testing requirements

a) The modular transmitter has been fully tested by the module grantee on the required number of channels, modulation types and modes, it should not be necessary for the host installer to retest all the available transmitter modes or settings. It is recommended that the host product manufacturer installing the modular transmitter, perform some investigative measurements to confirm that the resulting composite system does not exceed the spurious emissions limits or band edge limits (e.g., where a different antenna may be causing additional emissions).

b) The testing should check for emissions that may occur due to the intermixing of emissions with the other transmitter, digital circuitry, or due to physical properties of the host product (enclosure).

This investigation is especially important when integrating multiple modular transmitters where the certification is based on testing each of them in a standalone configuration. It is important to note that host product manufacturers should not assume that because the modular transmitter is certified that they do not have any responsibility for final product compliance.

Additional testing, Part 15 subpart B disclaimer

The final host/module combination need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device. The host integrator installing this module into their product must ensure that the final composite product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation and should refer to guidance in KDB 996369.

This appliance and its antenna must not be co-located or operation in conjunction with any other antenna or transmitter.

- OEM integrators must ensure that its product is electrically identical to the device, FCC ID:

PFR-F1CS43752HP reference designs . Any modifications to module reference designs may invalidate regulatory approvals in relation to the product, or may necessitate notifications to the relevant regulatory authorities.

- OEM integrators are responsible for regression testing to accommodate changes to designs, new antennas, and host and submit for C2PC filings.

- Colocation with other transmitter modules will be addressed through filings for those co-located transmitters when necessary or that colocation of other transmitters will be according to applicable KDB guidelines including those for RF exposure

- Appropriate labels must be affixed to the product that complies with applicable regulations in all respects. The regulatory label on the final system must include the statement:

"Contains FCC ID: **PFR-F1CS43752HP**".

"Contains IC Number : **11233A-F1CS43752HP**"

1. The module is limited to OEM installation ONLY.

2. OEM integrators are responsible for ensuring that the end-user has no manual instructions to remove or install module.

3. The module is limited to installation in mobile or fixed applications, according to Part 2.1091(b).

4. Separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and different antenna configurations.

The module is labeled with its own FCC ID. If the FCC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following:

"Contains FCC ID: **PFR-F1CS43752HP**"

"Contains IC Number : **11233A-F1CS43752HP**"

LE-LAN devices are restricted to indoor operation, including the use inside of trains, only in the band 5150-5250 MHz. However, original equipment manufacturer (OEM) devices, which are installed in vehicles by vehicle manufacturers, are permitted.

The devices certified under this section are not permitted to be used on airplanes.

Antennas Statement

This radio transmitter (identify the device by certification number or model number if Category II) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain 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.

Le present emetteur radio (identifier le dispositif par son numero de certification ou son numero de modele s'il fait partie du materiel de categorie II) a ete approuve par Industrie Canada pour fonctionner avec les types d'antenne enumeres ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est superieur au gain maximal indique, sont strictement interdits pour l'exploitation de l'emetteur.

Antenna List

No.	Model	Type	Gain[dBi]	Impedance
1	Viewworks2016-01 Dual BandPCB Antenna (1832-6104-01A)	PCB Antenna	2.4 GHz : 2.13 dBi 5.15~5.25 GHz : 0.699 dBi 5.725~5.85 GHz : 1.889 dBi	50

The modular transmitter must comply with the antenna and transmission system requirements of §§15.203, 15.204(b) and 15.204(c). The antenna must either be employ a “unique” antenna coupler (at all connections between the module and the antenna, including the cable).