Life Fitness SMARTconnect RF Module Manual

FCC ID of this product is as follows:
FCC ID: LM6-LFSCRF

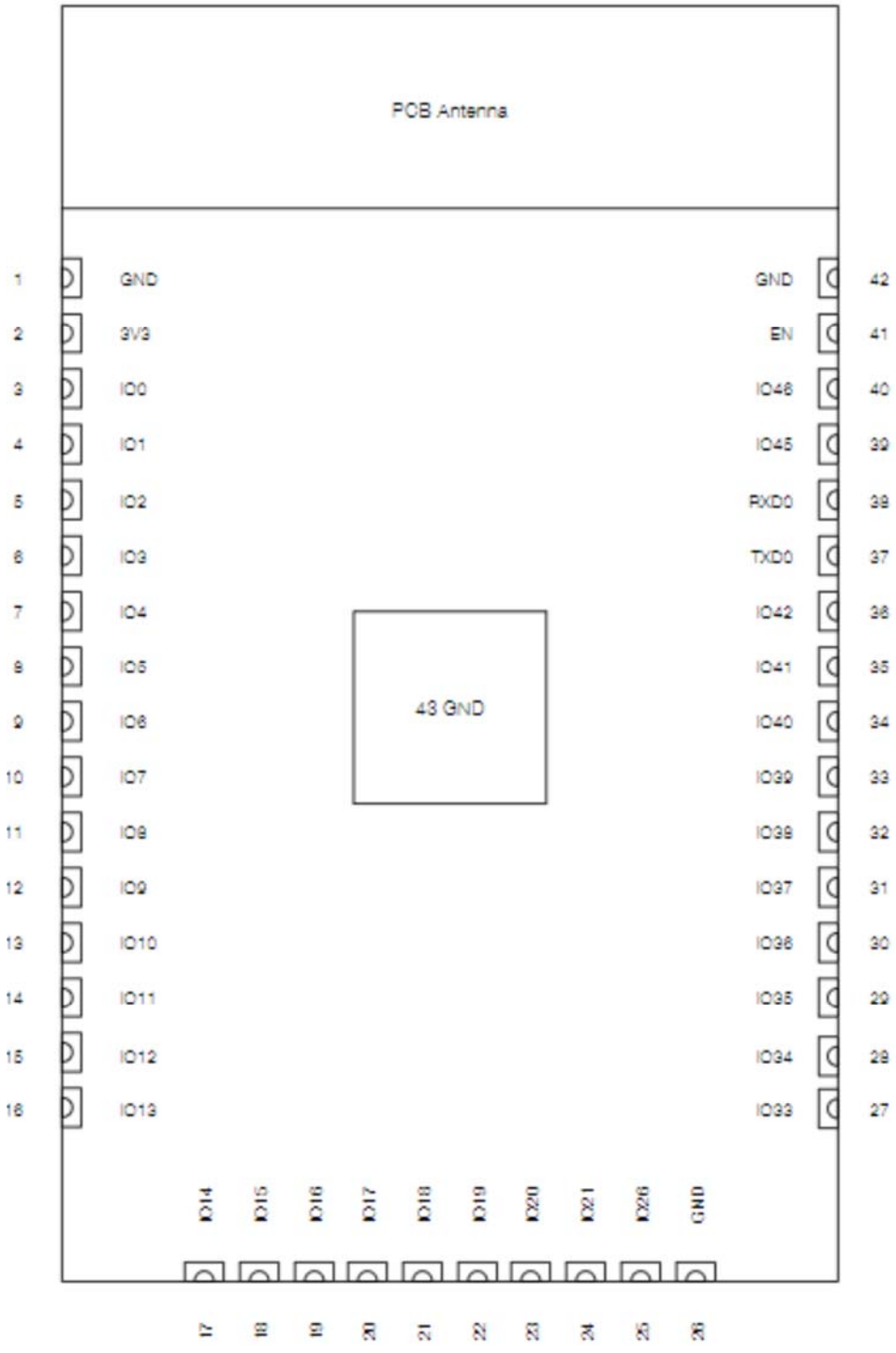
IC Number of this product is as follows:
IC: 23315-LFSCRF

1. Description / Theory of Operation

LFSCRF is a powerful, generic Wi-Fi MCU module that has a rich set of peripherals. This module is an ideal choice for a wide variety of application scenarios relating to Internet of Things (IoT), wearable electronics and smart home.

LFSCRF integrates a rich set of peripherals, ranging from SPI, I²S, UART, I²C,LED PWM, ADC, DAC, touch sensor, temperature sensor, as well as up to 43 GPIOs. It also includes a full-speed USB On-The-Go (OTG) interface to enable USB communication.

2. Pin Layout


PCB Antenna
1 GND
2 3V3
3 IO0
4 IO1
5 IO2
6 IO3
7 IO4
8 IO5
9 IO6
10 IO7
11 IO8
12 IO9
13 IO10
14 IO11
15 IO12
16 IO13
GND 42
EN 41
IO46 40
IO45 39
RXD0 38
TXD0 37
IO42 36
IO41 35
IO40 34
IO39 33
IO38 32
IO37 31
IO36 30
IO35 29
IO34 28
IO33 27
43 GND
IO14
IO15
IO16
IO17
IO18
IO19
IO20
IO21
IO26
GND
17
18
19
20
21
22
23
24
25
26

3. Pin Definitions

Name	No.	Type	Function
GND	1	P	Ground
3V3	2	P	Power supply
IO0	3	I/O/T	RTC_GPIO0, GPIO0
IO1	4	I/O/T	RTC_GPIO1, GPIO1, TOUCH1, ADC1_CH0
IO2	5	I/O/T	RTC_GPIO2, GPIO2, TOUCH2, ADC1_CH1
IO3	6	I/O/T	RTC_GPIO3, GPIO3, TOUCH3, ADC1_CH2
IO4	7	I/O/T	RTC_GPIO4, GPIO4, TOUCH4, ADC1_CH3
IO5	8	I/O/T	RTC_GPIO5, GPIO5, TOUCH5, ADC1_CH4
IO6	9	I/O/T	RTC_GPIO6, GPIO6, TOUCH6, ADC1_CH5
IO7	10	I/O/T	RTC_GPIO7, GPIO7, TOUCH7, ADC1_CH6
IO8	11	I/O/T	RTC_GPIO8, GPIO8, TOUCH8, ADC1_CH7
IO9	12	I/O/T	RTC_GPIO9, GPIO9, TOUCH9, ADC1_CH8, FSPIHD
IO10	13	I/O/T	RTC_GPIO10, GPIO10, TOUCH10, ADC1_CH9, FSPICS0, FSPIIO4
IO11	14	I/O/T	RTC_GPIO11, GPIO11, TOUCH11, ADC2_CH0, FSPID, FSPIIO5
IO12	15	I/O/T	RTC_GPIO12, GPIO12, TOUCH12, ADC2_CH1, FSPICLK, FSPIIO6
IO13	16	I/O/T	RTC_GPIO13, GPIO13, TOUCH13, ADC2_CH2, FSPIQ, FSPIIO7
IO14	17	I/O/T	RTC_GPIO14, GPIO14, TOUCH14, ADC2_CH3, FSPIWP, FSPIDQS
IO15	18	I/O/T	RTC_GPIO15, GPIO15, U0RTS, ADC2_CH4, XTAL_32K_P
IO16	19	I/O/T	RTC_GPIO16, GPIO16, U0CTS, ADC2_CH5, XTAL_32K_N
IO17	20	I/O/T	RTC_GPIO17, GPIO17, U1TXD, ADC2_CH6, DAC_1
IO18	21	I/O/T	RTC_GPIO18, GPIO18, U1RXD, ADC2_CH7, DAC_2, CLK_OUT3
IO19	22	I/O/T	RTC_GPIO19, GPIO19, U1RTS, ADC2_CH8, CLK_OUT2, USB_D-
IO20	23	I/O/T	RTC_GPIO20, GPIO20, U1CTS, ADC2_CH9, CLK_OUT1, USB_D+
IO21	24	I/O/T	RTC_GPIO21, GPIO21
IO26	25	I/O/T	SPICS1, GPIO26
GND	26	P	Ground
IO33	27	I/O/T	SPIIO4, GPIO33, FSPIHD
IO34	28	I/O/T	SPIIO5, GPIO34, FSPICS0
IO35	29	I/O/T	SPIIO6, GPIO35, FSPID
IO36	30	I/O/T	SPIIO7, GPIO36, FSPICLK
IO37	31	I/O/T	SPIDQS, GPIO37, FSPIQ
IO38	32	I/O/T	GPIO38, FSPIWP
IO39	33	I/O/T	MTCK, GPIO39, CLK_OUT3
IO40	34	I/O/T	MTDO, GPIO40, CLK_OUT2
IO41	35	I/O/T	MTDI, GPIO41, CLK_OUT1
IO42	36	I/O/T	MTMS, GPIO42
TXD0	37	I/O/T	U0TXD, GPIO43, CLK_OUT1
RXD0	38	I/O/T	U0RXD, GPIO44, CLK_OUT2
IO45	39	I/O/T	GPIO45
IO46	40	I	GPIO46
EN	41	I	High: on, enables the chip. Low: off, the chip powers off. Note: Do not leave the EN pin floating.

4. Power Ratings

Table 4: Absolute Maximum Ratings

Symbol	Parameter	Min	Max	Unit
VDD33	Power supply voltage	–0.3	3.6	V
T_{STORE}	Storage temperature	–40	150	°C

5. Operating Condition

Symbol	Parameter	Min	Typ	Max	Unit
VDD33	Power supply voltage	3.0	3.3	3.6	V
I_{VDD}	Current delivered by external power supply	0.5	—	—	A
T	Operating temperature	–40	—	85	°C
Humidity	Humidity condition	—	85	—	%RH

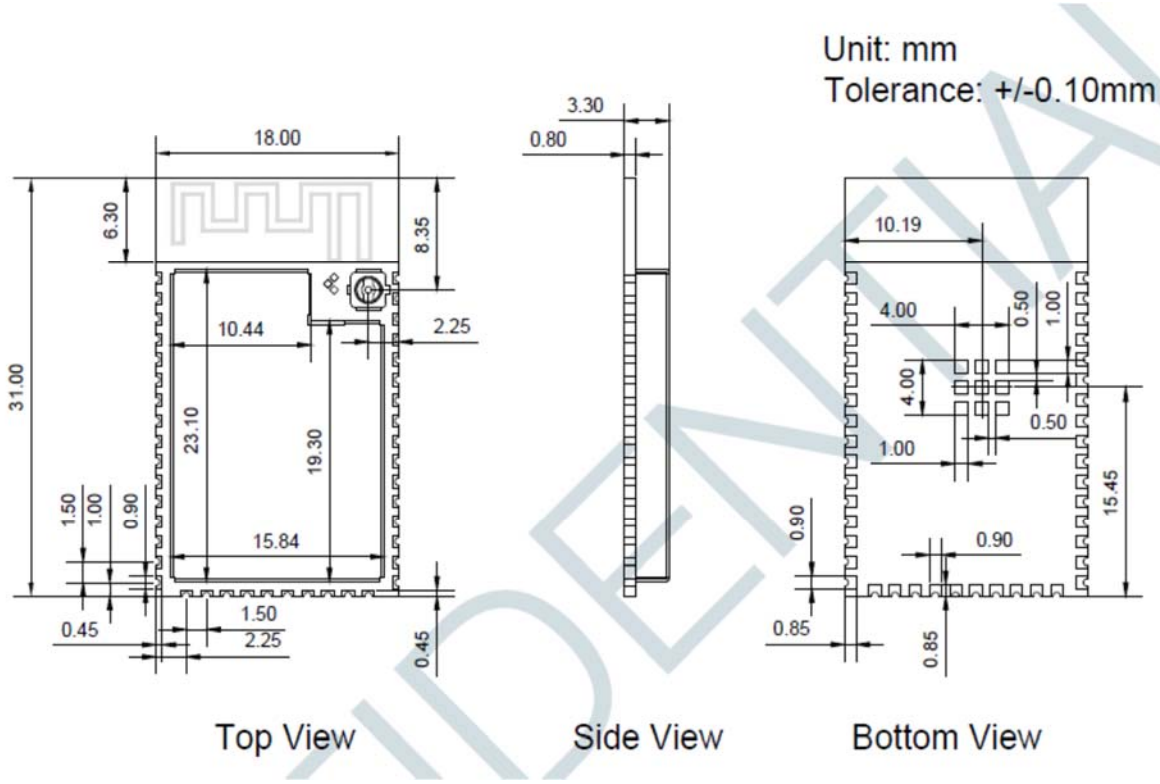
6. DC Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
C_{IN}	Pin capacitance	—	2	—	pF
V_{IH}	High-level input voltage	0.75 × VDD	—	VDD + 0.3	V
V_{IL}	Low-level input voltage	–0.3	—	0.25 × VDD	V
I_{IH}	High-level input current	—	—	50	nA
I_{IL}	Low-level input current	—	—	50	nA
V_{OH}	High-level output voltage	0.8 × VDD	—	—	V
V_{OL}	Low-level output voltage	—	—	0.1 × VDD	V
I_{OH}	High-level source current (VDD = 3.3 V, V_{OH} >= 2.64 V, PAD_DRIVER = 3)	—	40	—	mA
I_{OL}	Low-level sink current (VDD = 3.3 V, V_{OL} = 0.495 V, PAD_DRIVER = 3)	—	28	—	mA
R_{PU}	Pull-up resistor	—	45	—	kΩ
R_{PD}	Pull-down resistor	—	45	—	kΩ
V_{IH_nRST}	Chip reset release voltage	0.75 × VDD	—	VDD + 0.3	V
V_{IL_nRST}	Chip reset voltage	–0.3	—	0.25 × VDD	V

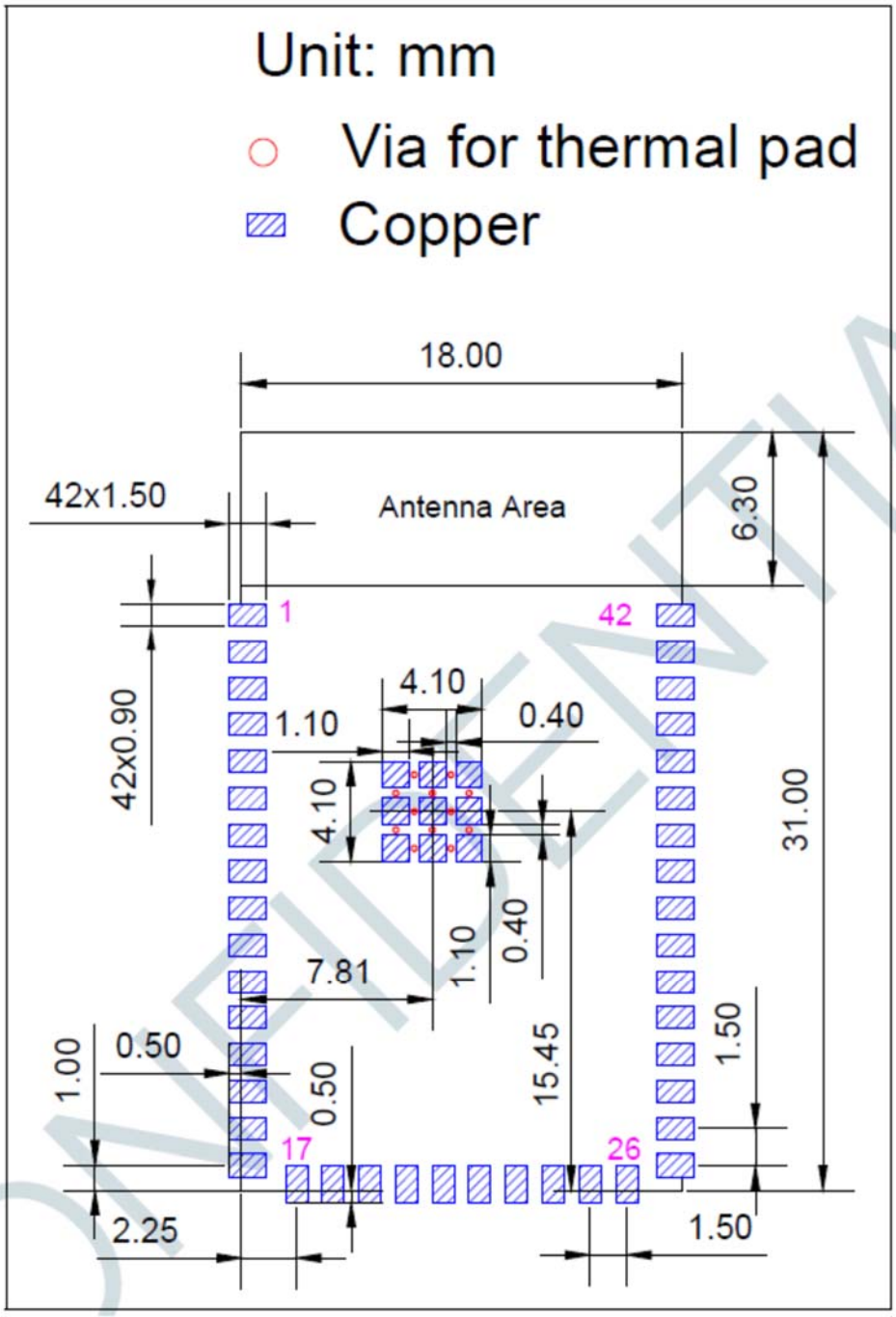
7. WiFi RF Standards

Name		Description
Operating frequency range ^{note1}		2412 ~ 2462 MHz
Wi-Fi wireless standard		IEEE 802.11b/g/n
Data rate	20 MHz	11b: 1, 2, 5.5 and 11 Mbps 11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 11n: MCS0-7, 72.2 Mbps (Max)
	40 MHz	11n: MCS0-7, 150 Mbps (Max)
Antenna type		PCB antenna

8. Physical Dimensions



9. PCB Land Pattern



10. Compliance Statements & Guidelines

FCC Statements

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.

Cet appareil est conforme à la section 15 des réglementations de la FCC. Le fonctionnement de l'appareil est sujetaux deux conditions suivantes :

1) cet appareil ne doit pas provoquer d'interférences néfastes, et

2) cet appareil doit tolérer les interférences reçues, y compris celles qui risquent de provoquer un

fonctionnement indésirable.

Note: This product 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 product 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 product 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.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance.

FCC Modular Usage Notes

Note 1: Any modifications made to the module will void the Grant of Certification, this module is limited to OEM installation only and must not be sold to end-users, end-user shall have no manual instructions to remove or install the device, only software or operating procedure shall be placed in the end-user operating manual of final products.

Note 2: Additional testing and certification may be necessary when multiple modules are used.

Note 3: The module may be operated only with the integral chip antenna with which it is authorized.

Note 4: The FCC ID label on the final system must be labeled with “Contains FCC ID: LM6-LFSCRF” or “Contains transmitter module FCC ID:LM6-LFSCRF”.

Note 5: This modular transmitter is only FCC authorized for the specific rule parts listed on its grant. The host product manufacturer is responsible to any other FCC rules that apply to the host not covered by the modular.

ISED Statements

This device complies with Innovation, Science and Economic Development Canada’s license-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.

Le présent appareil est conforme aux CNR d’Innovation, Sciences et Développement Èconomique Canada applicables aux appareils radioexempts 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.

Under Innovation, Science and Economic Development Canada’s regulations, this radio transmitter may only operate using the integral antenna under which it was approved.

Conformément à la réglementation d’Innovation, Sciences et Développement Èconomique Canada, le present émetteur radio peut fonctionner avec une antenne fonctionner qu’en utilisant l’antenne intégrée sous laquelle il a été approuvé.

ISED Modular Usage Statement

NOTE 1: When the ISED certification 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. This exterior label can use the wording ”Contains transmitter module IC: 23315-LFSCRF” or “Contains IC: 23315-LFSCRF”.

NOTE 1: Lorsque le numéro de certification ISED n'est pas visible lorsque le module est installé dans un autre appareil, l'extérieur de l'appareil dans lequel le module est installé doit également afficher une étiquette faisant référence au module inclus. Cette étiquette extérieure peut être libellée Contient le module émetteur IC: 23315-LFSCRF ou Contient IC: 23315-LFSCRF.