resideo

RTF004N1AL59UA

Table of Contents

Glossary of Terms

Terms	Description
BLE	Bluetooth Low Energy
UART	Universal Asynchronous Receiver Transmitter
SPI	Serial Peripheral Interface
ADC	Analog-to-Digital Converter
RF	Radio Frequency
AIO	Analog Input / Output
GPIO	General Purpose Input / Output
I2C	Inter-Integrated Circuit

1 **RTF004N1AL59UA**

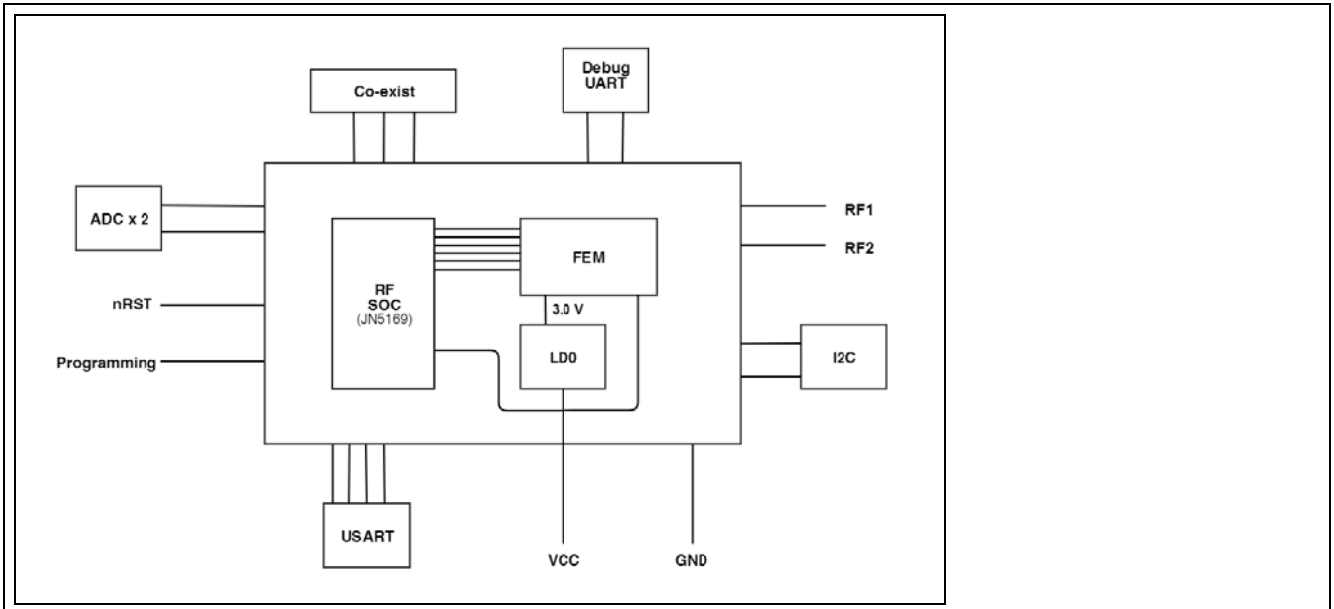|	
1.1.1 Description	RTF004N1AL59UA module is a highly integrated a 2.4 GHz(2405MHz~2480MHz) wireless module, two-way micro-controller based radio transceiver which integrates into the security family of sensors. It has rich peripherals and high link budget to communication. RTF004N1AL59UA complies with IEEE802.15.4 and integrates 3 wires Co-exist, 1x IIC,2x ADC, 4wires USART, 2wires UART, making it a complete RF6 solution.
1.1.2 Module	
1.1.3 Feature	• Support RF6 protocol (base on 802.15.4) • 1km open field range @20dBm • 128/256-bit AES Encryption • RF signal strength health check • Low-power consumption • Built-in 32bit RISC processor • Host interface: UART • Other interfaces: 2 ADC, 4 wires USART, Debug UART. 1x I2C, Programing, 3 wires Co-exist, INT • Maximum transmit power: 20dBm @ 2.4GHz • Receive sensitivity: -101dBm @ 256kbps 2.4GHz • Compact form factor: 12x15x2.5 mm (L x W x H) • RoHS compliant
1.1.4 Certification (planning)	Regulatory certificates: FCC, CE
1.1.5 Operational	• Operating voltage range: 2V~3.6V • Storage temperature range: -40 °C to +85 °C • Working frequency range 2400MHz~2480MHz

1.1.6 Typical Applications	• Smart Grid and Automatic Meter Reading
	
	    – Water, Gas, and Electricity Meters
	
	    – Heat Cost Allocators
	
	    – Gateways
	
	• Wireless Sensor Networks
	
	    – Long-Range Sensor Applications
	
	• Industrial
	
	    – Asset Tracking and Management
	
	    – Factory Automation
	
	    – Remote Display
	
	• Wireless Healthcare Applications
	• Energy Harvesting Applications
	• Electronic Shelf Label (ESL)
	• Home and Building Automation
	
	    – Wireless Alarms and Security Systems
	
	    – Locks
	
	    – Lightning Control
	
	    – Motion Detectors
	
	    – Connected Appliances
	
	    – HVAC
	
	    – Garage Door Opener

2 Module Function Block(JN5169)

2.1.1 VCC	2~3.6V
2.1.2 JTAG debug	Tied together Jtag and USART1
2.1.3 Uart debug	Need have Uart for FCT/Debug 　•TXD 　•RXD
2.1.4 Co-ext signals	AP mode: If need work with WiFi or other 2.4Ghz wireless module, need use 3 co-ext singles to align time slot Notes They are share with SPI flash pins
2.1.5 FEM VCC1	Need reserve FEM VCC1 debug,　keep it float
2.1.6 Programming	For FW update usage Notes They are share with SPI flash pins
2.1.7 Reset	There is a pull-up resistor inside
2.1.8 I2C	I2C_SDA and I2C_SCL need 4.7K pull-up resistor

3 Electrical Characteristic(JN5169)

Stresses above those listed under "Absolute Maximum Ratings' may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operation listings of this specification is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

3.1.1 Basic conditions

Parameter	Min.	Typ.	Max.	Units
Input Voltage (Vbat)	0	—	3.6	V
Operating Temperature	-40	—	85	°C

3.1.2 DC Characteristic

Parameter	Min.	Typ.	Max.	Units
I/O current sink/source capability	—	10	—	mA
Supply voltage	2	—	3.6	V

3.1.3 ADC Characteristic

Parameter	Description	Min.	Typ.	Max.	Units
Resolution	200kHz Clock	—	—	12	Bits

4 Mechanical characteristic(JN5169)

Module	Specification	Description
	Dimensions	12X15X2.5 mm(L x W x H)

5 Pin Diagram and Description(JN5169)
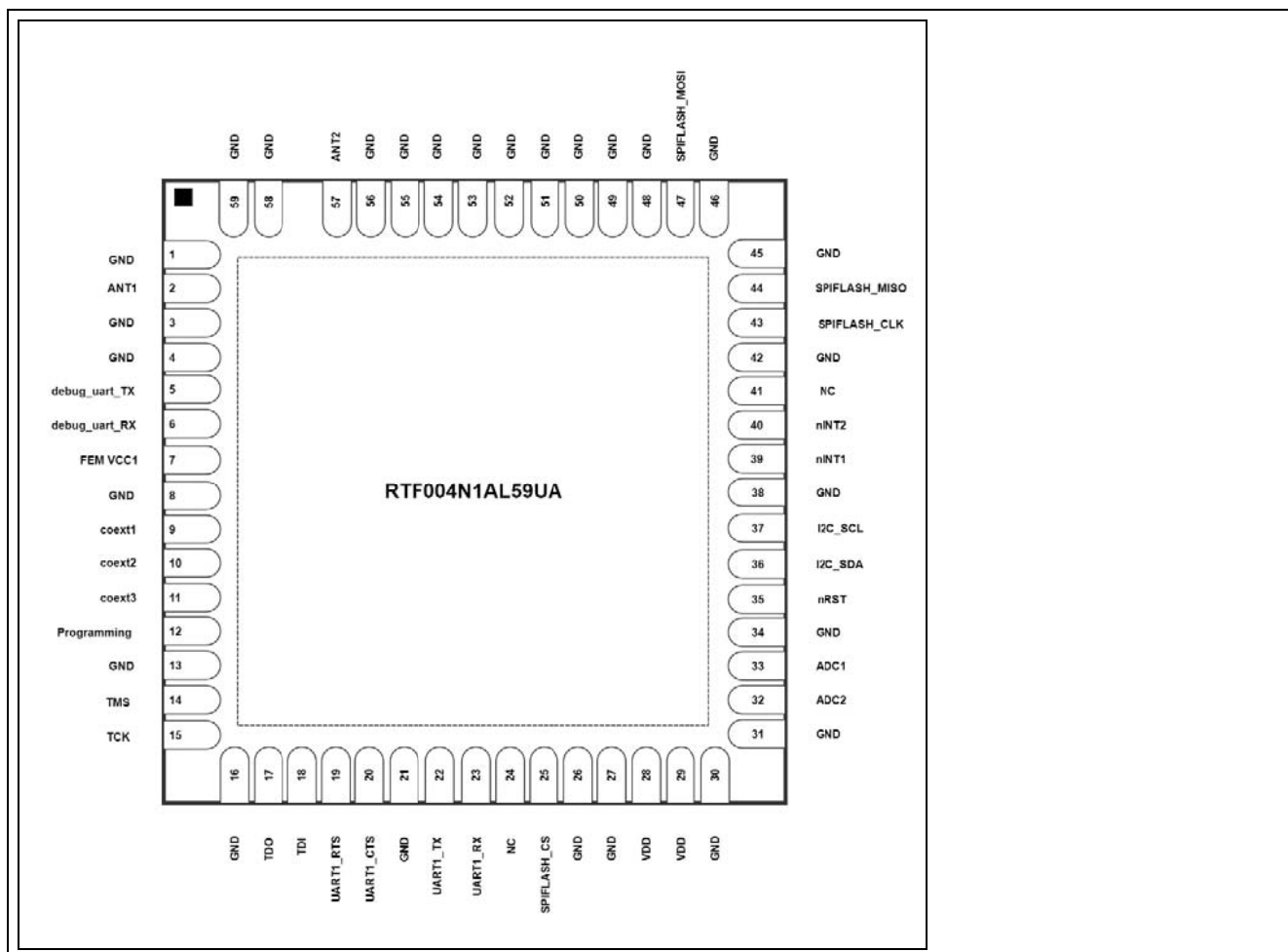
RTF004N1AL59UA Pin Number	RTF004N1AL59UA Pin Name	Description	JN5169 Chip Pin Number	JN5169 Pin Name	Comments for JN5169
1	GND	Ground			
2	ANT1	RF signal antenna 1			
3	GND	Ground			
4	GND	Ground			
5	debug_uart_TX	debug port	38	DIO14	

6	debug_uart_RX	debug port	40	DIO15	
7	FEM VCC1	Keep float			
8	GND	Ground			
9	coext1	co-exist pin with WiFi&BLE	23	DIO18	share with SPI flash
10	coext2	co-exist pin with WiFi&BLE	24	DIO19	share with SPI flash
11	coext3	co-exist pin with WiFi&BLE	20	DIO0	share with SPI flash
12	Programming	when low power up, enter into UART prgram mode	22	DIO1	share with SPI flash
13	GND	Ground			
14	NC	No connect			
15	NC	No connect			
16	GND	Ground			
17	NC	No connect			
18	NC	No connect			
19	UART1_RTS	UART1 request to send output	27	DIO5	
20	UART1_CTS	UART1 clear to send input	26	DIO4	
21	GND	Ground			
22	UART1_TX	UART1 Transmit Data output	28	DIO6	
23	UART1_RX	UART1 Receive Data input	29	DIO7	
24	NC	No connect			
25	SPIFLASH_CS	SPI-bus master select output/slave input	24	DIO19	share with coexistence

26	GND	Ground			
27	GND	Ground			
28	VDD	Power input			
29	VDD	Power input			
30	GND	Ground			
31	GND	Ground			
32	ADC2	ADC input	11	ADC2	
33	ADC1	ADC input	15	ADC1	
34	GND	Ground			
35	nRST	reset input	3	nRST	
36	I2C_SDA	Serial DatA	2	DIO17	
37	I2C_SCL	Serial CLock	1	DIO16	
38	GND	Ground			
39	nINT1	Interrupt for SPI communicate	31	DIO8	
40	nINT2	Interrupt for SPI communicate	34	DIO11	
41	NC	No connect			
42	GND	Ground			
43	SPIFLASH_CLK	SPI-bus master clock output	20	DIO0	share with coexistence
44	SPIFLASH_MISO	SPI-bus slave Master In Slave Out output	22	DIO1	share with coexistence
45	GND	Ground			
46	GND	Ground	23	DIO18	share with coexistence
47	SPIFLASH_MOSI	SPI-bus slave Master Out Slave In input			
48	GND	Ground			

49	GND	Ground			
50	GND	Ground			
51	GND	Ground			
52	GND	Ground			
53	GND	Ground			
54	GND	Ground			
55	GND	Ground			
56	GND	Ground			
57	ANT2	RF signal antenna 2			
58	GND	Ground			
59	GND	Ground			

Antennas

Current design use external antenna, SATIMO company antenna PN is SD2450, dipole type antenna, the nominal dipole impedance is 50ohm with return loss value better than -15dB at the labeled center frequency and better than -10dB return loss in a bandwidth of 10%. For the more information, please see antenna test report.

See following for microstrip layouts, use 50ohm microstrip connect to RF connectors,
Connectors part number:

Molex: 73412-0110,
I-PEX CO LTD: 20279-001E-03
AMPHENOL CORP :   A-1JB

Layer Stackup 63th

L1(SIGNAL_1)	1.8mil	COPPER
	3.8mil	PP
L2(PLANE_1)	1.2mil	COPPER
	47mil	CORE
L3(PLANE_2)	1.2mil	COPPER
	3.0mil	PP
L4(SIGNAL_2)	1.8mil	COPPER

IMPEDANCE REQUIREMENT 63th

1. Single ended trace impedance(CPW)

Layer	W (mil)	Single ended trace impedance and tolerance(ohm)
L1/L3	6	50 +/-10%

W, width of line
S, space of line
D, space of line to GND

clearance: 26mil

trace width:6mil
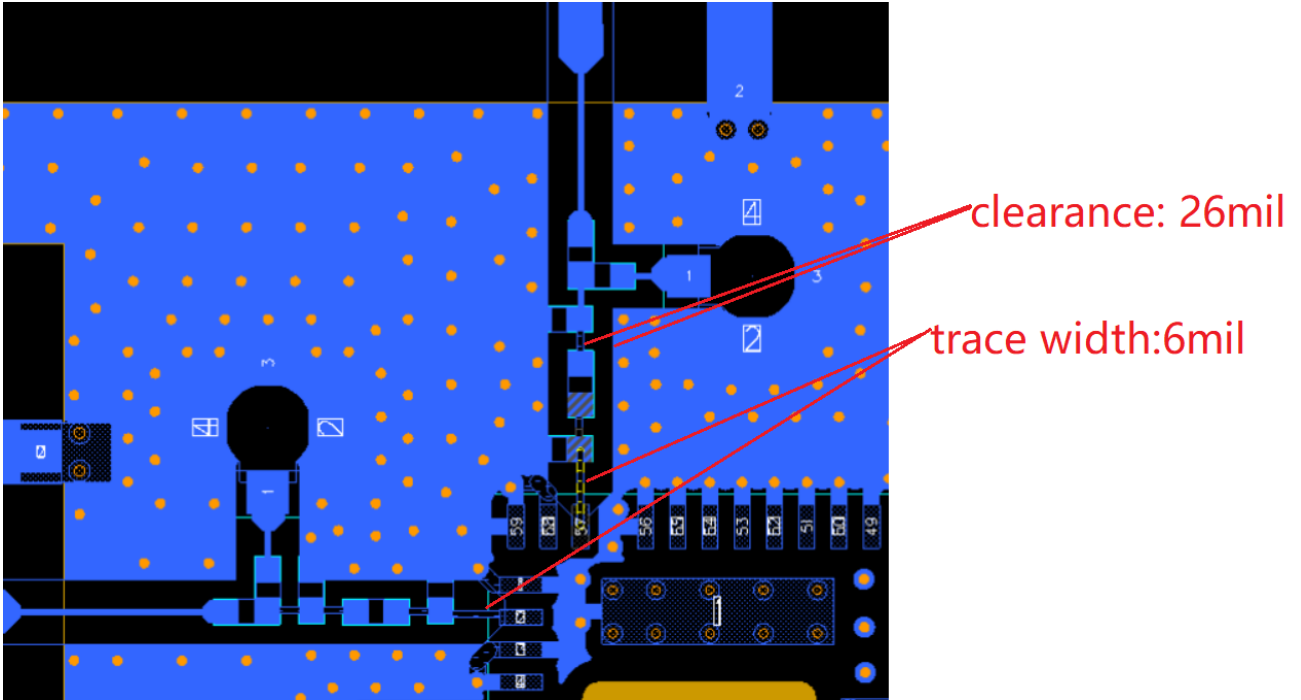
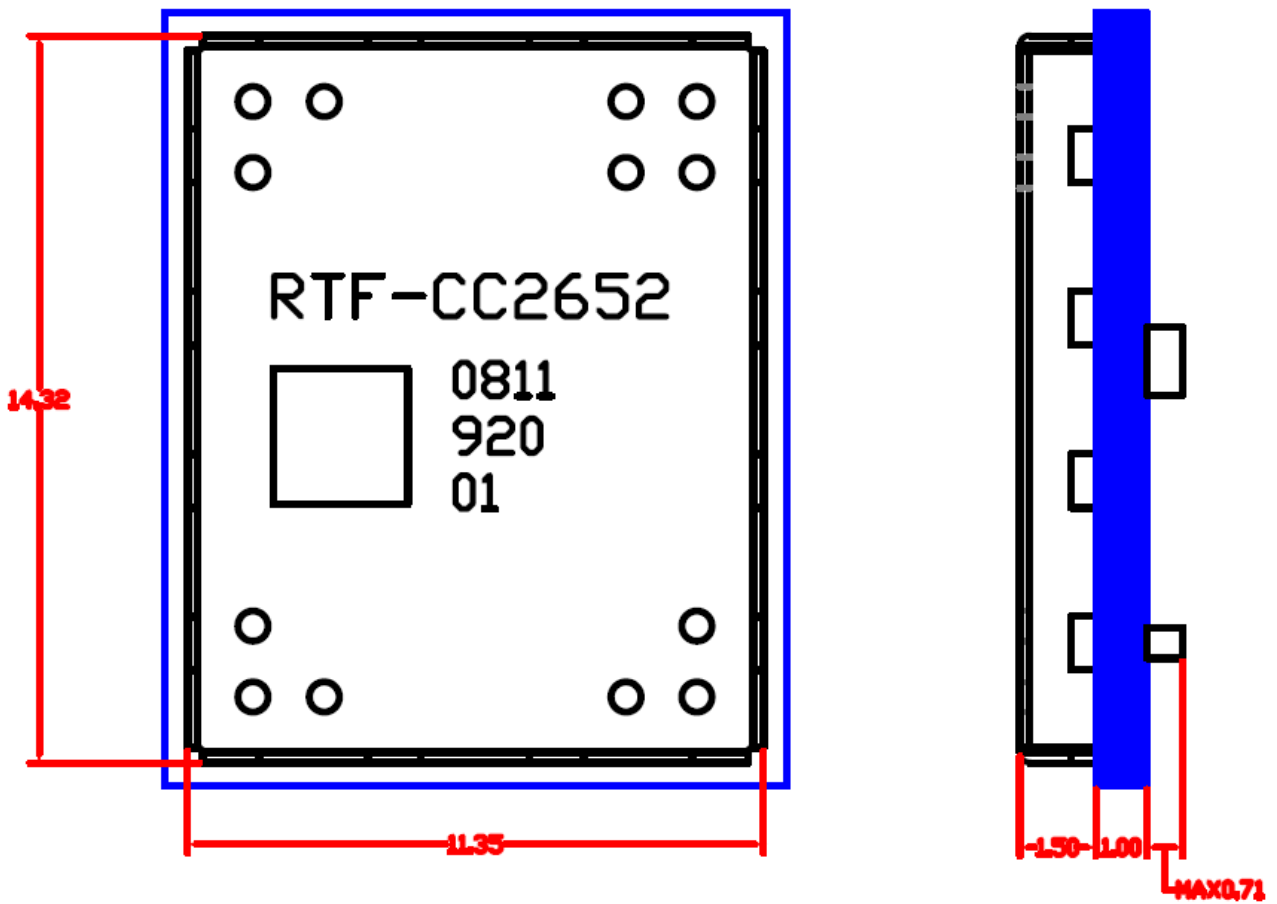# 6 Mechanical characteristic

Table 3-1shows the weight anddimensions.Figure 3-2 shows thephysical dimensions for the RTF004N1AL59UAmodule.

Table3-2: Mechanical characteristic

Specification	Description
Dimensions	12x15x2.5 mm

Figure 3-1: RTF004N1AL59UAModule Dimensions

UNIT: mm
Tolerance: 0.05mm

FCC Certification Requirements.

According to the definition of mobile and fixed device is described in Part 2.1091(b), this device is a mobile device.

And the following conditions must be met:

1. This Modular Approval is limited to OEM installation for mobile and fixed applications only. The antenna installation and operating configurations of this transmitter, including any applicable source-based time- averaging duty factor, antenna gain and cable loss must satisfy MPE categorical Exclusion Requirements of 2.1091.

2. The EUT is a mobile device; maintain at least a 20 cm separation between the EUT and the user's body and must not transmit simultaneously with any other antenna or transmitter.

3.A label with the following statements must be attached to the host end product: This device contains FCC ID: CFSRTF004N1.

4.To comply with FCC regulations limiting both maximum RF output power and human exposure to RF radiation, maximum antenna gain (including cable loss) must not exceed:

❏ Zigbee(Tx: 2405MHz~2480MHz): <2.15 dBi

5. This module must not transmit simultaneously with any other antenna or transmitter

6. The host end product must include a user manual that clearly defines operating requirements and conditions that must be observed to ensure compliance with current FCC RF exposure guidelines.
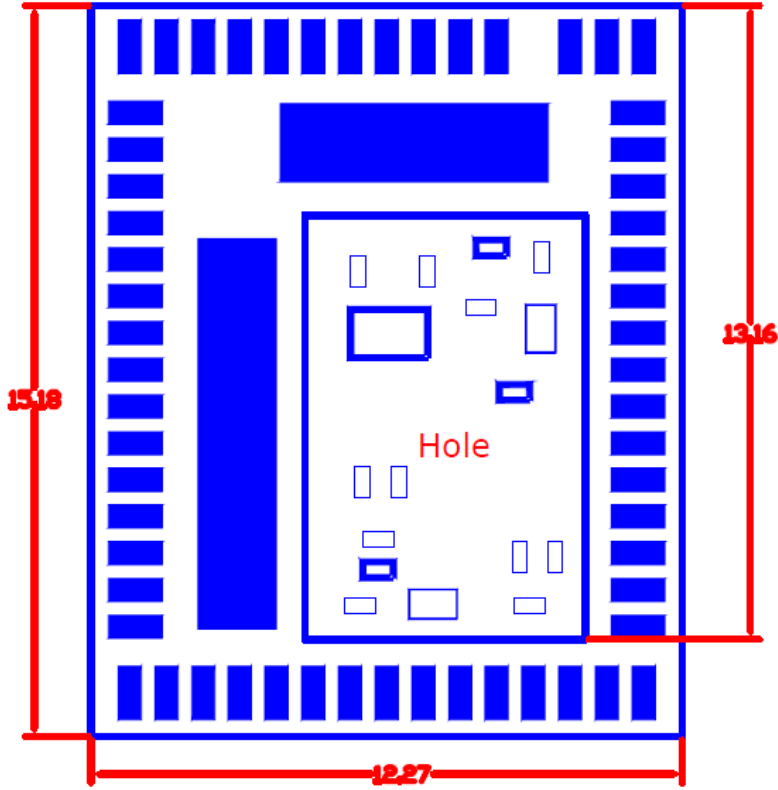
For portable devices, in addition to the conditions 3 through 6 described above, a separate approval is required to satisfy the SAR requirements of FCC Part 2.1093

If the device is used for other equipment that separate approval is required for all other operating configurations, including portable configurations with respect to 2.1093 and different antenna configurations.

For this device, OEM integrators must be provided with labeling instructions of finished products. Please refer to KDB784748 D01 v07, section 8. Page 6/7 last two paragraphs:

A certified modular has the option to use a permanently affixed label, or an electronic label. For a permanently affixed label, the module must be labeled with an FCC ID - Section 2.926 (see 2.2 Certification (labeling requirements) above). The OEM manual must provide clear instructions explaining to the OEM the labeling requirements, options and OEM user manual instructions that are required (see next paragraph).

For a host using a certified modular with a standard fixed label, if (1) the module's FCC ID is not visible when installed in the host, or (2) if the host is marketed so that end users do not have straightforward commonly used methods for access to remove the module so that the FCC ID of the module is visible; then an additional permanent label referring to the enclosed module:"Contains Transmitter Module FCC ID: CFSRTF004N1" or "Contains FCC ID: CFSRTF004N1" must be used. The host OEM user manual must also contain clear instructions on how end users can find and/or access the module and the FCC ID.

Back View

7 Revision History

Revision A (September 2019)
This is the initial release of this document

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15.19:
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.

15.21:
The user manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
(SAMPLE)
NOTE: THE GRANTEE IS NOT RESPONSIBLE FOR ANY CHANGES OR
MODIFICATIONS NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR
COMPLIANCE. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO
OPERATE THE EQUIPMENT.