

Specifications / User Manual

24GHz Sensor Module **Model No. NJR4267F3C1**

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Microwave Business Division

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Nisshinbo Micro Devices Inc.

Microwave Business Division

Title:

Specifications of NJR4267C for Radio Certification

Reference No.:

PDS-R4267C

Rev.:

00-01E

Sheet:

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4. Special care is required in designing devices, machinery or equipment, which demand high levels of reliability. This is particularly important when designing critical components or systems whose foreseeable failure can result in situations that could adversely affect health or safety. In designing such critical devices, equipment or machinery, careful consideration should be given to, amongst other things, their safety design, fail-safe design, back-up and redundancy systems, and diffusion design.

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5. The products listed in the catalog and specification sheets may not be appropriate for use in certain equipment where reliability is critical or where the products may be subjected to extreme conditions. You must consult our sales office or sales representatives before using the products in any of the following types of equipment.

- * Aerospace Equipment
- * Equipment Used in the Deep Sea
- * Power Generator Control Equipment (nuclear, steam, hydraulic)
- * Life Maintenance Medical Equipment
- * Fire Alarm/Intruder Detector
- * Vehicle Control Equipment (automobile, airplane, railroad, ship, etc.)
- * Various Safety Equipment

This sensor module is NOT intended to be used in motor vehicles nor aircraft.

Additional considerations are required for use in such environments.

You (i.e. Host integrator of this module) must consult detail our sales office or sales representatives beforehand.

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7. The product specifications and descriptions listed in the catalog and specification sheets are subject to change at any time, without notice.

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As the product is a transmitter module to be incorporated in a host, the module complies with the following FCC rules and ISSED Standard.

For FCC, NJR4267F3C1: See the section 15.245.

For ISSED, NJR4267F3C1: See RSS-210 Annex F, F.1

Further information regarding module integration, refer to the KDB Publication 996369 D01 to D03 for details. This guidance is available on the following web site.

<https://apps.fcc.gov/oetcf/kdb/index.cfm>

◆FCC Statement (For United States of America)
Appendix)
FCC Statements of 2ACUJR4267F3C1

Grant holder of the Transmitter module:

Nissinbo Micro Devices Inc.

1-1, Fukuoka 2-Chome Fujimino-City

Saitama Prefecture 356-8510 Japan

Tel: +81-49-278-1271, Fax: +81-49-278-1234

Caution:

DC power supply for each module should be conformed to the electrical specifications

as described in this section. A host in which a module is integrated should provide stable DC power through suitable regulator circuit to the module.

* Above Specifications are subject to change without notice.

Changes or modifications to the device not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment(s).

The equipment complies with radio frequency exposure limits set forth by the FCC for an uncontrolled environment. This equipment must be installed and operated with a minimum distance of 5cm between the device and the user or bystanders. The device must not be co-located or operating in conjunction with any other antenna or transmitter.

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Integration Instructions for host product manufacturers:

Additional testing requirement by a host product
(Part 15 Subpart B Disclaimer) (*)

The module transmitter is only FCC authorized for the specific rule parts listed on the grant. A host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification.

The final host product requires **Part 15 Subpart B compliance testing** with the modular transmitter installed.

(*) See the KDB 996369 D03 for details.

Manual and Product Labeling information to the End User:

End user manual must include all required regulatory information and/or warning as show in this manual.

OEM Integrator must indicate as described below with the outside of a host product such as label when the module is installed in the host product.

"Contains FCC ID: 2ACUJR4267F3C1" (to use NJR4267F3C1)

* Above Specifications are subject to change without notice.

The following statement from FCC §15.19(a)(3) is required on the label of the host equipment.

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.

OEM Integrator may be sure that the End user manual may not contain any information about the way to install or remove the modules from the host product.

The following statement from FCC §15.105(a) or (b) is required in the user manual of the host equipment. Sample statement for a Class B digital device is the following;

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 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.

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- Consult the dealer or an experienced radio/TV technician for help.

The following statement is required in the user manual of the host equipment.

Changes or modifications to the device not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment(s).

◆ RF Exposure Consideration for host product (For FCC: United States of America)

A host product must also comply with radio frequency exposure limits set forth by the FCC for an uncontrolled environment.

The host product needs to operate with a minimum separation distance of 5cm between the transmitter module and user and/or bystanders.

Co-location of the module with the other transmitters that operate simultaneously are required to be evaluated using the FCC multi-transmitter procedures.

This transmitter module can only be used in a host for the conditions that it was granted for.

To be used in any other way than granted, it requires additional evaluation, testing and Class 2 permissive change application by the grantee.

* Above Specifications are subject to change without notice.

◆ISED Statement (For Canada)

Note:

This device complies with Innovation, Science and Economic Development Canada's license-exempt RSSs.

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.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

- (1) L'appareil ne doit pas produire de brouillage.
- (2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

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Manual and Product Labeling information to The End User:

The end user manual shall include all required regulatory information/warning as show in this manual.

And when this module is installed in the host product, you must include a as described below in the label of the host product.

"Contains IC: 22589-R4267F3C1" (to use NJR4267F3C1)

Informations sur le manuel et l'étiquetage du produit destinées à l'utilisateur final:

Le manuel de l'utilisateur final doit inclure toutes les informations / avertissements réglementaires requis, comme indiqué dans ce manuel.

Et lorsque ce module est installé dans le produit hôte, vous devez inclure un comme décrit ci-dessous dans l'étiquette du produit hôte.

" Contient IC: 22589-R4267F3C1" (pour utiliser NJR4267F3C1)

* Above Specifications are subject to change without notice.

◆ RF Exposure Statement (For ISED : Canada)

This equipment complies with radio frequency exposure limits set forth by Industry Canada for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 9 cm between the device and the user or bystanders. This device must not be co-located or operating in conjunction with any other antenna or transmitter.

Cet équipement est conforme aux limites d'exposition aux radiofréquences définies par Industrie Canada pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 9 cm de distance entre le dispositif et l'utilisateur ou des tiers. Ce dispositif ne doit pas être utilisé à proxi

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Scope

This module is a sensor for detecting the human movement using a radio-wave in the 24 GHz band.

Table 1 List of Product Models

Model No.	RF Frequency	Antenna Type	Region / Regulations
NJR4267F3C1	24.075~24.175GHz	4x2 type (Angle: 42°/28°, Distance: 55m)	Japan / Ordinance Regulating Radio Equipment Article 49-14-11 USA / FCC Part 15.245 Canada / ISED RSS-210 (Issue 10): 2019+Amendment 1:2020

Main Structure

- Integrated antenna structure, the patch antenna is integrated on the module PCB.
- All of electric parts except interface connector are covered with metal cap.

Operation Overview

- 3.8~5.8 V input operation, LDO integrated.
- Implemented an internal MCU for RF frequency tuning of RF transceiver IC and intermittent operation.
- Internal MCU controls ON/OFF of input voltage of RF transceiver IC which is output from integrated LDO, and this is for intermittent operation.
- There are 10 frequency channels.
- The module operates in CW or intermittent.
- The intermittent rate is selectable at 1kHz/2kHz. And RF ON time is 4us.
- Internal MCU supplies the tuning voltage to RF transceiver IC and the RF frequency is controlled by tuning voltage.
- Monitors the output of the temperature sensor built into the RF transceiver IC, and if a temperature change above a certain level is detected, frequency adjustment is performed using AFC (frequency calibration)

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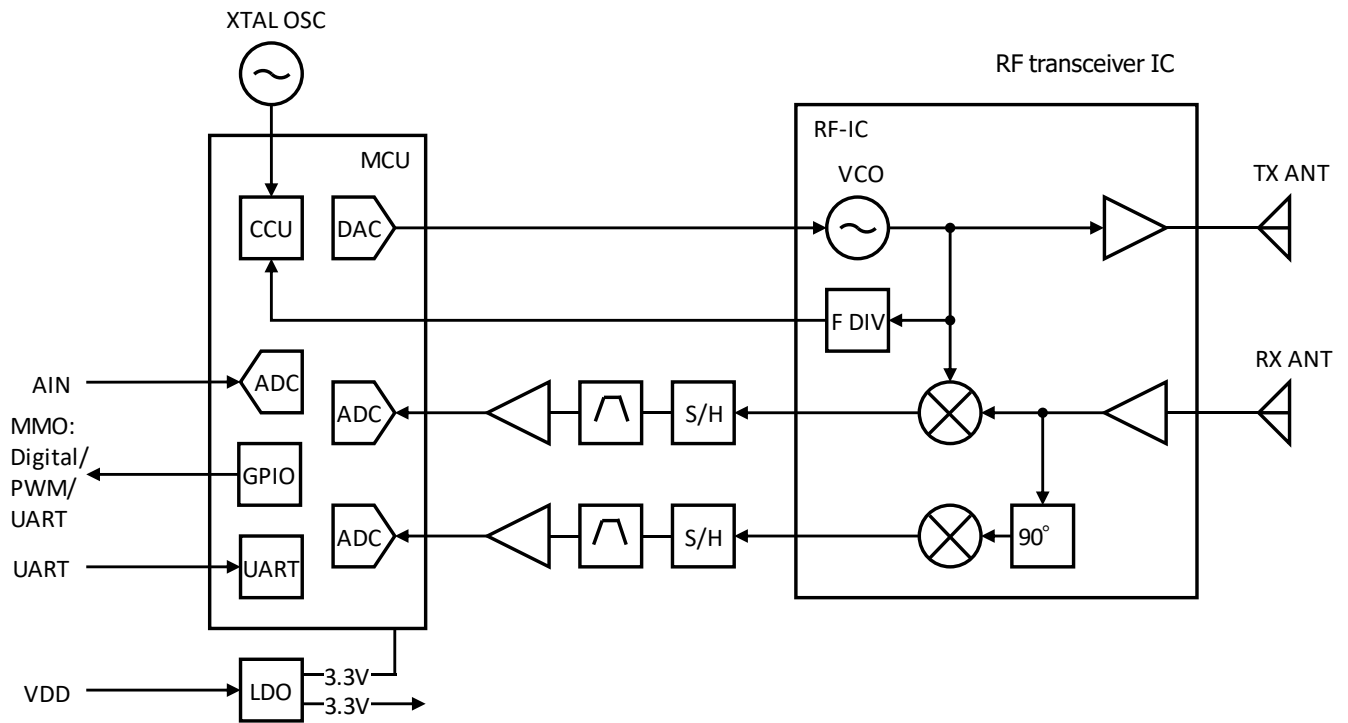


Fig.1 Functional Block Diagram

* Above Specifications are subject to change without notice.

1. Electrical Specifications

Common measurement conditions Ta= +25 °C

Table 2 Electrical Characteristics 1

Items	Specs			Unit	Remarks
	Min	Typ	Max		
Supply Voltage	3.8	5	5.8	V	
Consumption current (at power supply voltage 5.0V)					
Peak Current	—	75	90	mA	
Average current during normal operation (at digital output/UART output)					
Sampling rate 1kHz	—	1.5	1.8	mA	
Sampling rate 2kHz	—	2.6	3.1	mA	
Sampling rate 4kHz	—	52.5	63.0	mA	
Sampling rate 8kHz	—	53.2	63.9	mA	
Sampling rate 16kHz	—	54.6	65.6	mA	
Average current during normal operation (at PWM output)					
Sampling rate 1kHz	—	6.5	7.8	mA	
Sampling rate 2kHz	—	7.0	8.4	mA	
Sampling rate 4kHz	—	52.7	63.3	mA	
Sampling rate 8kHz	—	53.5	64.2	mA	
Sampling rate 16kHz	—	55.0	66.0	mA	
Current during sleep mode	—	560	728	uA	
Current during deep sleep mode	—	220	280	uA	

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Table 3 Electrical Characteristics 2

Items	Specs			Unit	Remarks
	Min	Typ	Max		
Input / Output Pin Characteristics					
AIN pin (AIN: Pin2)					
Input voltage range	0	—	3.3	V	
Connected device impedance	0	—	15	kΩ	
Multi-mode output pin (MMO: Pin3)					
High level output voltage	2	—	3.5	V	At 10mA source current
High level output voltage	2.8	3.3	3.5	V	At 0mA source current
Low level output voltage	0	—	1.3	V	At 10mA sink current
Low level output voltage	0	0	0.4	V	At 0mA sink current
Source current	0	—	10	mA	
Sink current	0	—	10	mA	
UART RX pin (UART RX: Pin4)					
High level input voltage range	2.31	3.3	5.5	V	
Low level input voltage range	-0.1	0	0.99	V	

* Above Specifications are subject to change without notice.

Table 4 Electrical Characteristics 3

Items	Specs			Unit	Remarks
	Min	Typ	Max		
RF Circuit Specifications					
Transmission Frequency					
NJR4267F3C1	24.075	—	24.175	GHz	Common to all antenna types
Output Power (Antenna Input Power)	2.2	4.4	6.6	mW	
E.I.R.P. (reference value)					
NJR4267F3C1	17.00	20.00	21.77	dBm	
Second harmonic level	—	—	-30	dBm	
Antenna Characteristics					
NJR4267F3C1					
H-plane half width	—	42	—	deg.	
V plane half width	—	28	—	deg.	
Antenna gain	—	13.57	—	dBi	

* Above Specifications are subject to change without notice.

Table 5 Transmission channel list

Channel	NJR4267F3C1 transmission frequency [GHz]
CH0	24.089
CH1	24.097
CH2	24.105
CH3	24.113
CH4	24.121
CH5	24.129
CH6	24.137
CH7	24.145
CH8	24.153
CH9	24.161

RF Timing Diagram

The timing diagram of RF transmission and reception during intermittent operation is shown below.

Ftx stands for intermittent rate. The intermittent rate is automatically determined from the sampling rate. When intermittent operation is disabled (CW operation), intermittent operation is not performed, so RF transmission/reception is always performed.

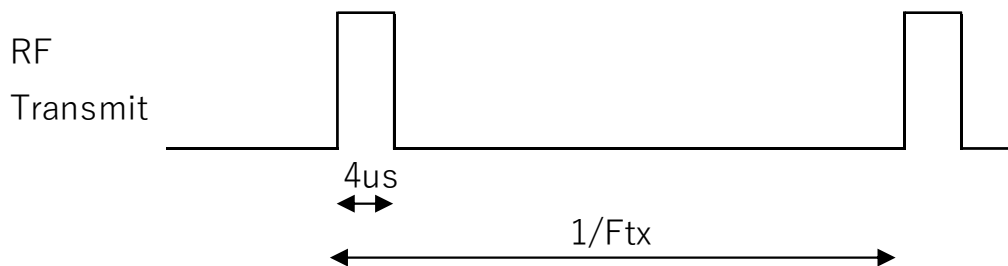


Fig.2 RF timing diagram

* Above Specifications are subject to change without notice.

2. Environmental Specifications

Table 6 Environmental Performance

Item	Specification
Operating temperature	-30 ~ +85°C
Storage temperature	-40 ~ +85°C
Humidity	0 ~ 95%RH @+30°C
Vibration	49.03m/s ² (5G) Conditions: 30-50Hz, 10 minutes, XYZ axis
Shock	196.13m/s ² (20G) Half sine, 11 msec, XYZ direction, 3 times

* Above Specifications are subject to change without notice.

3. Drawing

3.1. Outline

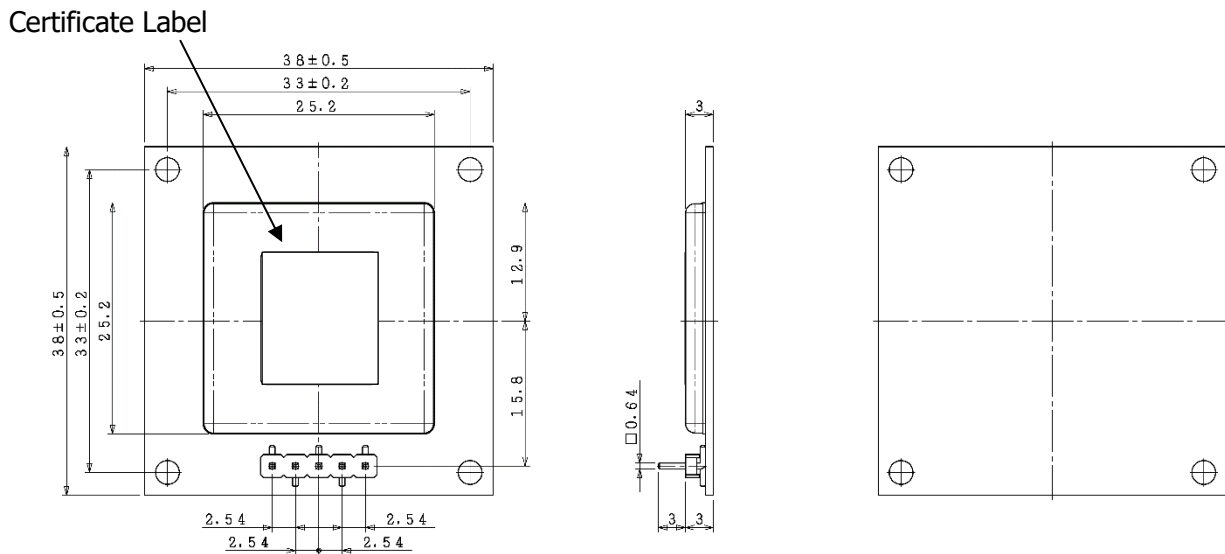


Fig. 3 NJR4267F3C1 Outline drawing

3.2. Interface

Connector: 2.54mm pitch Pin-Header

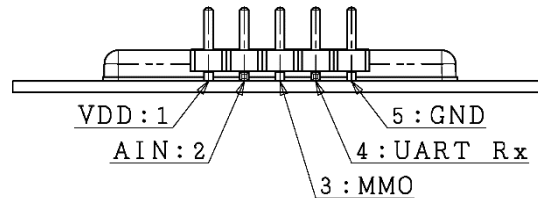


Fig. 5 Pinout Diagram

Table 7 Pinout

#	NAME	I/O	FUNCTION
1	VDD	—	Power supply
2	AIN	I	Analog input sensitivity setting
3	MMO	O	Multimode output
4	UART RX	I	UART reception (5V tolerant)
5	GND	—	GND

* Above Specifications are subject to change without notice.

3.3. Label Drawing

- NJR4267F3C1



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