



RM-RF10TP-1278

LoRa Transmittance Module Specification

V1.5

This specification contains products

Plug-in	Stamp pane
RM-RF10TP-1278(PI)	RM-RF10TP-1278(SP)

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I. Product overview

1.1 Product Profile

The LoRa transmission module is a wireless transparent transmission module based on SX1278 chip. It adopts LoRa spread spectrum modulation frequency hopping technology, has high efficiency receiving sensitivity and super anti-interference performance, and its communication distance. The receiving sensitivity is much higher than the current FSK、GFSK modulation. This module can support 433~509 MHz frequency band, the default use of global license-free ISM 433MHz frequency band.

1.2 Physical drawing

Figure 1: plug-in RM-RF10TP-1278(PI) physical diagram



1.3 Basic characteristics

- ◆ Advanced LoRa modulation is supported, which has the advantages of long-range anti-interference;
- ◆ The communication distance can reach 3 km, the transmission distance is better than the traditional GFSK and so on;
- ◆ Support for air wake-up (ultra-low power consumption), suitable for battery applications;
- ◆ 500 mW; maximum transmit power
- ◆ (b) Support global licensing ISM 433MHz frequency bands;

- ◆ Supports data transmission rates K bps 0.1~22;
- ◆ Support 3~5.2 V power supply, more than 3.3 power supply can ensure the best performance;
- ◆ Industrial standard design, support -40~+85℃ long time use;
- ◆ SMA-K interface, easy to connect coaxial cable or external antenna.

II. Hardware features

2.1 Wireless communication features

Table 1: Wireless communication features

Project	Minimum	Typical values	Maximum	Unit	Remarks
Working frequency	433.049	433	433.049	MHz	
Receiving sensitivity		-139	-139	dBm	
Air rate		1.8		Kbps	Rate customization 0.1~22 Kbps
Stable transmission interval	0.3		2	S	the stable sending interval depends on the byte length. 1Bbyte: 0.30s;1 Bbyte: 0.32s;0 20Bbyte: 0.40s;40Bbyte: 0.54s; 80Bbyte: 0.80s;160Bbyte: 1.40s; 200Bbyte: 1.70s;248Bbyte: 2.00s.

2.2 Working parameters

Table 2: Working parameters

Main parameters	Note	Remarks
Communication distance	m 3000	air rate 1.8 Kbps, antenna gain 3 dbi
Single frame size	248Byte	A single transmission of data more than 248 Byte will automatically discard the latter data.
Modulation mode	LoRa™	Global licensing ISM 433MHz frequency band.
Communication interface	UART Serial	TTL level, default baud rate 9600, data bit 8, stop bit 1.

Antenna format	SMA antenna	by default use dbi 3 gain antenna.
Number of channels	1	433.049MHz
Working life	20 years	

2.3 Electrical characteristics

Table 3: Electrical characteristics

Project	Minimum	Typical values	Maximum	Unit	Remarks
Working voltage	3	5	5.2	V	
Emission current		100		mA	Instantaneous power consumption
Receiving Current		16		mA	
Working temperature	-40		+85	°C	

2.4 Suggested module connections

Table 4: Recommended Module Connectivity Table

Module pin	Pin direction	Remarks
MD0	Input	And AUX cooperation, determine the module of the three working modes.dangling defaults to high level (M D0=1).
AUX	Input	And MD0 cooperation, determine the module of the three working modes.dangling defaults to high level (AUX=1).
RXD	Input	TTL serial port input, connect to MCU TXD output pin.
TXD	Output	TTL serial port output, connect to MCU RXD input pin.
GND	Input	Module grounding.
VCC	Input	Module supply pin, voltage range:3~5.2 V DC.

III. Module function description

3.1 Module Mode

Module mode	Pin configuration	Remarks
Upgrade mode	M D0=0, AUXM D0=0	The MD0 foot is low level, the AUX foot is low level, and the module enters firmware upgrade mode after 1 s. In this mode, the module can be upgraded by serial port and configuration tool software.
Configuration mode	M D0=1, AUXM D0=0	The MD0 foot is high level (suspended), the AUX foot is low level, and the module enters the configuration mode after 1 s. In this mode, the module can be configured by serial port.
Transmission mode	M D0=1, AUXM D0=1	The MD0 foot is high level (suspended), the AUX foot is high level (suspended), the module enters the transmission mode; all the data received from the RXD foot will be encapsulated and sent by wireless broadcast. All received legitimate wireless packets are unpacked and sent to MCU. via TXD pins

3.2 Communication mode

3.2.1 point to multi-mode

Data can be sent to the specified channel.

Figure: Point-to-Model



Example:

Module A: Sending Module, Address:4369(0x11 0x11), channel:05(0x05);

Module B: Receiving Module, Address:8738(0x22 0x22), channel:30(0x1E);

Module C: Receiving Module, Address:13107(0x33 0x33), channel:30(0x1E);

Module D: Receiving Module, Address:17476(0x44 0x44), channel:31(0x1F);

Data sent: 00x12x34 0x56 0x78 0x90;

If you need to send data to all modules with channel 30, the serial port needs to send data to the module A as follows:

[0xFF 0xFF 0x1E 00x12x34 0x56 0x78 0x90]

- ◆ [0xFF 0xFF]: point-to-multimode;
- ◆ [0x1E]: Channels requiring data reception;
- ◆ [00x12x34 0x56 0x78 0x90]: Data to be sent;

The actual data sent A the module is:[00x68xFF 0xFF 0x1E 0x05 00x12x34 0x56 0x78 0x90 0x2D 0x16];

The actual data received B the module are:[00x68xFF 0xFF 0x1E 0x05 00x12x34 0x56 0x78 0x90 0x2D 0x16];

The actual data received C the module are:[00x68xFF 0xFF 0x1E 0x05 00x12x34 0x56 0x78 0x90 0x2D 0x16];

The module B,C sends data to serial port:[0x12 x34 0x56 0x78 0x90];

Module D can not receive data.

3.2.2 point-to-point pattern

You can send data to the module with the specified address.

Figure: Point-to-point pattern



Example:

Module A: Sending Module, Address:4369(0x11 0x11), channel:05(0x05);

Module B: Receiving Module, Address:8738(0x22x22), channel:30(0x1E);

Module C: Receiving Module, Address:13107(0x33 0x33), channel:30(0x1E);

Module D: Receiving Module, Address:17476(0x44 0x44), channel:31(0x1F);

Data sent: 00x12x34 0x56 0x78 0x90;

Now need to send data to module B separately, then serial port needs to send data to module A as follows:

[00x220x22x1E 00x12x34 0x56 0x78 0x90];

◆ [00x22x22]: point-to-point mode, module B address;

◆ [0x1E]: Module B channel;

◆ [00x12x34 0x56 0x78 0x90]: Data to be sent.

The actual data sent A the module is:[00x680x220x22x1E 0x05 00x12x34 0x56 0x78 0x90 0x73 0x16];

The actual data received B the module are:[00x680x220x22x1E 0x05 00x12x34 0x56 0x78 0x90 0x73 0x16];

The actual data received C the module are:[00x680x220x22x1E 0x05 00x12x34 0x56 0x78 0x90 0x73 0x16];

The module B sends data to serial port:[00x12x34 0x56 0x78 0x90];

Module C do not send data to serial port;

Module D can not receive data.

IV. Data communication

4.1 Transparent data

When the module is in the transmission mode, the data transmission can be realized through the module serial port.

Serial Communication Frame Structure: Send

Name of name	Target address	Channel	Data domain
Symbol	Target	Channel	Data
bytes	2	1	Maximum 248
Value			

- ◆ Target address: address number of Target: data target, Hex code 2 bytes.
When the target address is 0xFF 0xFF, it is a point-to-multimode; if the target address is not 0xFF 0xFF, it is a point-to-point mode.
- ◆ Channel: Channel: data target communication 1 channel,
- ◆ Data domain: Data: transparent data, Hex code, maximum length of 248 bytes.

Serial Communication Frame Structure: Receiving

Name of name	Data domain
Symbol	Data
bytes	Maximum 248
Value	

- ◆ Data domain: Data: transparent data, Hex code, maximum length of 248 bytes.

4.2 Configuration data (AT instruction set)

When the module is in configuration mode, the module can be configured through the module serial port.

4.2.1 instruction brief

Note 1: AT instructions are uppercase, all end with enter, newline character: [\r\n]

Note 2: module in upgrade mode, only AT+UPDATE instructions, other instructions do not do processing and return.

Note 3: module in the configuration function, received AT instruction error or parameter error, return ERROR error message.

Note 4: under the operation of AT instruction, the baud rate of fixed serial port is 96001 bit stop

bit, no check bit.

Instruction description	Instruction format	Examples of instructions	Example Description
Response of test modules	AT sent Return: OK	AT sent Return: OK	Send a response test instruction to the module, The module responded: OK: module working normally
Type of equipment	AT+MD0EL? sent Return:+MD0EL: <Type> OK	AT+MD0EL? sent Return:+MD0EL: RZ-LORA-V1.1 OK	Send to moduleType of equipmentInstructions, The module responded: Type: Module Type OK: query success
Get firmware version number	AT+CGMR? sent Return:+VERSION: <Ver.> OK	AT+CGMR? sent Return:+VERSION: 109 OK	Send to moduleGet firmware version numberInstructions, The module responded: Ver: firmware version:1.09 OK: query success
Turn off echo	AT+NORESP sent Return: No return	AT+NORESP sent Return: No return	Send to moduleCancel echo instructions, The module will not respond
Open echo	AT+RESP sent Return: OK	AT+RESP sent Return: OK	Send to moduleTurn off the echo command, The module responded: OK: echo open
Query whether the device is in firmware upgrade mode	AT+UPDATE sent Return: OK	AT+UPDATE sent Return: OK	Send a query to the modules the device in firmware upgrade modeInstructions, The module responded: OK: in upgrade mode
Module reset (restart)	AT+RESET sent Return: OK	AT+RESET sent Return: OK	Send module reset (restart) instructions to the module, The module responded: OK: reset successfully
Restoration of factory settings	AT+DEFAULT sent Return: OK	AT+DEFAULT sent Return: OK	Send recovery factory setup instructions to the module, The module responded: OK: recovery success
Query device address	AT+ADDR? sent Return:+ADDR: <Addr> OK	AT+ADDR? sent Return:+ADDR: B1,B2 OK	Send to moduleQuery device addressInstructions, The module responded: Addr: address:45490 OK: query success
Configuration Device Address	AT+ADDR=<Addr> sent Return: OK	AT+ADDR=B1,B2 sent Return: OK	Send the device address setting instruction to the module and set the address to: Addr: address:45490 The module responded: OK: set up successfully
Query wireless rates and	AT+WLRATE? sent Return:	AT+WLRATE? sent Return:+WLRATE(0,7)	Send to moduleQuery wireless rates and channelsInstructions,

channels	+WLRATE (<Channel>,<Channel>Speed) OK	OK	The module responded: Channel: channel:0(433 MHz) Speed:7(1.8 Kbps)
Configure wireless rates and channels	Sending: AT+WLRATE=<Channel>,<Speed> Return: OK	Delivery: AT+WLRATE=0,7 Return: OK	Send to moduleConfigure wireless rates and channelsInstruction, willWireless Rate and Channel SettingsTo: Channel: channel:0(433 MHz) Speed:7(1.8 Kbps) The module responded: OK: set up successfully

4.2.2 Instruction Parameter Description

Address: Addr: module address number, Hex code 2 bytes.

Set address:0000~65535:[0x00 0x00]~[0xFF 0xFF];

Among them [0x00 0x01] is factory default address ,[0xFF 0xFF] is broadcast default address, do not recommend equipment use;

Rate: Speed: module communication air rate, Hex code 1 byte.

The following is the rate versus configuration value:

***Note:[0x07]: 1.8Kbps is the most stable rate to be tested under various long-term conditions and is not recommended for modification.**

Wireless rate	0.1 Kbps	0.14 Kbps	0.21 Kbps	0.3 Kbps	0.45 Kbps	0.6 Kbps
Configuration values	0x00	0x01	0x02	0x03	0x04	0x05
Wireless rate	0.9 Kbps	1.8 Kbps	3.5 Kbps	7.0 Kbps		
Configuration values	0x06	0x07	0x08	0x09		

Channel: Channel: module communication channel, Hex code 1 byte.

Set channels to:0~80:[0x00]~[0x80];

The different channel modules will automatically use different communication frequencies:433 MHz~509 MHz;

Device type: Type: current device type, Ascii code.

Device type: RM-RF10TP-1278: lora transmission module.

Firmware version: Ver: firmware version of the current device, BCD code 2 bytes.

Example: firmware version:[00x01x09]: Represents the current firmware version 1.09

4.2.3 module factory default parameters

Project	Parameters	Value	Unit	Note
Module	00 01	1		

address				
Air rate	07	1.8	Kbps	
Communication channel	00	0		433MHz communication frequency
Serial port baud rate	-	9600		TTL level, data bit 8, stop bit 1.
Transmission power	-	20	dBm	Fixed value
Receiving sensitivity	-	-139	dBm	Fixed value

4.3 Configuration data (Hex instruction)

When the module is in configuration mode, the module can be configured through the module serial port.

4.3.1 frame structure

Name of name	Baotou	Command code	Data domain	Package tail
Symbol	Head	Cmd	Data	End
bytes	1	1	Change	1
Value	0x68			0x16

- ◆ Baotou: Head: data frame header, fixed to 0x68, Hex code 1 byte.
- ◆ Command code: Cmd: used to identify command content. Hex code ,1 byte.
- ◆ Data domain: Data: configuration command contains relevant data, Hex code, maximum length of 251 bytes.
- ◆ Package tail: End: data frame package tail, fixed to 0x 16, Hex code 1 byte.

4.3.2 instruction brief

Instruction description	Instruction format	Examples of instructions	Example Description
Module Response Test	Send:68 01 16 Return:68 22<Addr><Speed><Channel>16	Send:68 01 16 Return:68 22 12 34 07 00 16	Send the response test instruction to the module, the module reply is: Addr: address:4660 Speed: rate:07(1.8 Kbps) Channel: channel:00(433 MHz)
Restoration of factory settings	Send:68 02 16 Return:68 22 00 01 03 00 16	Send:68 02 16 Return:68 22 00 01 07 00 16	Send the recovery factory instruction to the module, the module will reset all parameters and reply. The default parameters of the module are: Addr: address:0001

			Speed: rate:07(1.8 Kbps) Channel: channel:00(433 MHz)
Module Reset	Send:68 03 16 Return:68 22<Addr><Speed><Channel>16	Send:68 03 16 Return:68 22 12 34 07 00 16	Send module reset instruction to module, module will restart, and reply. The module responded: Addr: address:4660 Speed: rate:07(1.8 Kbps) Channel: channel:00(433 MHz)
Turn off echo	Send:68 04 00 16 Return: No return	Send:68 04 00 16 Return: No return	Send to moduleTurn off the echo command , The module will not make any reply.
Open echo	Send:68 04 01 16 Return:68 22<Addr><Speed><Channel>16	Send:68 04 01 16 Return:68 22 12 34 07 00 16	Send open to moduleEcho command , The module returns to the latest parameters: Addr: address:4660 Speed: rate:07(1.8 Kbps) Channel: channel:00(433 MHz)
Read device information	Send:68 11 16 Return:68 12<Type><Ver.>16	Send:68 11 16 Return:68 12 01 02 01 09 16	Send instructions to the module to read device information, The module responded: Type: equipment type:0102 Ver.: firmware version:1.09
Setting device parameters	Send:68 21<Addr><Speed><Channel>16 Return:68 22<Addr><Speed><Channel>16	Send:68 21 12 34 07 00 16 Return:68 22 12 34 07 00 16	Send the set device parameter instruction to the module and set the parameter to: Addr: address:4660 Speed: rate:07(1.8 Kbps) Channel: channel:00(433 MHz) The module returns to the latest parameters: Addr: address:4660 Speed: rate:07(1.8 Kbps) Channel: channel:00(433 MHz)

4.3.3 Instruction Parameter Description

Address: Addr: module address number, Hex code 2 bytes.

Set address:0000~65535:[0x00 0x00]~[0xFF 0xFF];

Among them [0x00 0x01] is factory default address ,[0xFF 0xFF] is broadcast default address,
do not recommend equipment use;

Rate: Speed: module communication air rate, Hex code 1 byte.

The following is the rate versus configuration value:

***Note:[0x07]: 1.8Kbps is the most stable rate to be tested under various long-term conditions
and is not recommended for modification.**

Wireless rate	0.1 Kbps	0.14 Kbps	0.21 Kbps	0.3 Kbps	0.45 Kbps	0.6 Kbps
Configuration values	0x00	0x01	0x02	0x03	0x04	0x05
Wireless rate	0.9 Kbps	1.8 Kbps	3.5 Kbps	7.0 Kbps		
Configuration values	0x06	0x07	0x08	0x09		

Channel: Channel: module communication channel, Hex code 1 byte.

Set channels to:0~80:[0x00]~[0x80];

The different channel modules will automatically use different communication frequencies:433.049MHz

Device type: Type: the type of the current device, Hex code 2 bytes.

Equipment Type 1:[00x01 0x02]: lora Transmission module.

Firmware version: Ver.: firmware version of the current device, BCD code 2 bytes.

Example: firmware version:[00x01 0x09]: Represents the current firmware version 1.09

4.3.4 module response test (0x01)

Name of name	Baotou	Command code	Data domain	Package tail
Symbol	Head	Cmd	Data	End
bytes	1	1	0	1
Value	0x68	0x01		0x16

Module received in configuration mode:[0x68 0x01 0x16] Returns device parameter information [0x22]command frame.

4.3.5 restore factory settings (0x02)

Name of name	Baotou	Command code	Data domain	Package tail
Symbol	Head	Cmd	Data	End
bytes	1	1	0	1
Value	0x68	0x02		0x16

Module received in configuration mode:[0x68 0x02 0x16] command frame, all parameters are reset to factory status and the recovered device parameter information [0x22], is returned.

Note: factory default equipment parameter information is:

- ◆ Device address:[0x00 0x01]: 1;
- ◆ Wireless rate:[0x07]: 1.8Kbps;
- ◆ Channel:[0x00]: 0 channel 433 MHz communication band.

4.3.6 module reset (0x03)

Name of name	Baotou	Command code	Data domain	Package tail
Symbol	Head	Cmd	Data	End
bytes	1	1	0	1
Value	0x68	0x03		0x16

Module received in configuration mode:[0x68 0x03 0x16] command frame is automatically

restarted and the device parameter information [0x22]. is returned after the restart is successful.

4.3.7 echo control (0x04)

Name of name	Baotou	Command code	Data domain	Package tail
Symbol	Head	Cmd	Data	End
bytes	1	1	0	1
Value	0x68	0x04		0x16

Data domain (Data)

Name of name	Echo type
Symbol	Type
bytes	1

- ◆ Type of echo: Type: need to set the flag bit to open or close the echo, HEX code 1 byte;
Device type 1:[0x00]: turn off the echo, will no longer reply to the settings command, but directly effective.;
- Device type 2:[0x01]: Turn on the echo and will reply to all setup commands;

4.3.8 read device information (0x11)

Name of name	Baotou	Command code	Data domain	Package tail
Symbol	Head	Cmd	Data	End
bytes	1	1	0	1
Value	0x68	x11 0		0x16

Module received in configuration mode:[0x68 0x11 0x16] ,Returns device information [0x12],after command frame.

4.3.9 equipment information (0x12)

Name of name	Baotou	Command code	Data domain	Package tail
Symbol	Head	Cmd	Data	End
bytes	1	1	4	1
Value	0x68	0x12		0x16

Data domain (Data)

Name of name	Type of equipment	Firmware version
Symbol	Type	Ver.
bytes	2	2

- ◆ Device type: Type: current device type, BCD code 2 bytes;
Equipment Type 1:[0x01 0x02]: plug-in version single chip lora transmission module;
Equipment type 2:[0x01 0x03]: single chip lora transmission module;
- ◆ Firmware version: Ver.: firmware version of the current device, BCD code 2 bytes.
Example: firmware version:[00x01 0x07]: Represents current firmware version 1.07

Set device parameters 4.3.1 0(0x21)

Name of name	Baotou	Command code	Data domain	Package tail
Symbol	Head	Cmd	Data	End
bytes	1	1	4	1
Value	0x68	0x21		0x16

Module received in configuration mode:[0x68 00x21 0xXX 0xXX 0xXX 0xXX 0x16] command frame, save what needs to be set and return the device's latest parameter information [0x22].

Data domain (Data)

Name of name	Device address	Wireless rate	Channel
Symbol	Addr	Speed	Channel
bytes	2	1	1

- ◆ Device address: Addr: to set the device new address, Hex code 2 bytes;
Note: Address:0000~65535:[0x00 0x00]~[0xFF 0xFF];
Among them [0x00 0x01] is factory default address ,[0xFF 0xFF] is broadcast default address, do not recommend equipment use;
- ◆ Wireless rate: Speed: wireless rate to be set, Hex code 1 byte;
Note: The following is a correlation between rate and configuration values:
***Note:[0x07]: 1.8Kbps is the most stable rate to be tested under various long-term conditions and is not recommended for modification.**

Wireless rate	0.1 Kbps	0.14 Kbps	0.21 Kbps	0.3 Kbps	0.45 Kbps	0.6 Kbps
Configuration values	0x00	0x01	0x02	0x03	0x04	0x05
Wireless rate	0.9 Kbps	1.8 Kbps	3.5 Kbps	7.0 Kbps		
Configuration values	0x06	0x07	0x08	0x09		

- ◆ Channel: Channel: wireless channel to be set, Hex code 1 byte.
Note: A total of 81 channels can be configured ,433 MHz~509 MHz;

4.3.1 1 device parameters (0x22)

Name of name	Baotou	Command code	Data domain	Package tail
Symbol	Head	Cmd	Data	End
bytes	1	1	4	1
Value	0x68	0x22		0x16

Data domain (Data)

Name of name	Device address	Wireless rate	Channel
Symbol	Addr	Speed	Channel
bytes	2	1	1

- ◆ Device address: Addr: device current address, Hex code 2 bytes;
- ◆ Wireless rate: Speed: device current wireless rate, Hex code 1 byte;
Note: The following is a correlation between rate and configuration values:
***Note:[0x07]: 1.8Kbps is the most stable rate to be tested under various long-term conditions**

and is not recommended for modification.

Wireless rate	0.1 Kbps	0.14 Kbps	0.21 Kbps	0.3 Kbps	0.45 Kbps	0.6 Kbps
Configuration values	0x00	0x01	0x02	0x03	0x04	0x05
Wireless rate	0.9 Kbps	1.8 Kbps	3.5 Kbps	7.0 Kbps		
Configuration values	0x06	0x07	0x08	0x09		

◆ Channel: Channel: device's current wireless channel, Hex code 1 byte.

IV. Versioning

Date	Version	Modification record	Modifier
20201225	V1.0	Create specifications	Jasin Wu
20210104	V1.1	Add: Configuration data (Hex instruction)	Jasin Wu
20210222	V1.2	New: AT instruction set brief description, instruction parameter description; Hex instruction set brief description, instruction parameter description.	Jasin Wu
20210225	V1.3	1. Delete:4.1.2 LoRa communications; 2. Delete:4.3.2 instruction brief on [module switching success] content; 3. Delete:4.3.7 Switch mode successfully (0x04); 4. Update: physical maps; 5. Update: point-to-point diagram, point-to-multigraph.	Jasin Wu
20210301	V1.4	1. Delete:" sleep time "configuration and query, fixed to long detection mode; 2. update: device type: RM-RF10TP-1278.	Jasin Wu
20210409	V1.5	1. Add:4.2 Configuration data (AT instruction set): Close echo: AT+NORESP; Open echo: AT+RESP. 2. Add:4.3 Configuration data (Hex instruction): 4.3.7 echo control (0x04): Close echo:0x68 0x04 0x00 0x16; Open echo:0x68 0x04 0x01 0x16. 3. Update: physical diagram.	Jasin Wu

FCC 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.

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

NOTE: 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.
- Consult the dealer or an experienced radio/TV technician for help important announcement

Important Note:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

The final end product must be labeled in a visible area with the following"

Contains FCC ID: **2AZV8RM-RF10TP-1278** "

Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

**Integration instructions for host product manufacturers according to KDB 996369 D03
OEM****Manual v01****2.2 List of applicable FCC rules**

CFR 47 FCC PART 15 SUBPART C has been investigated. It is applicable to the modular transmitter

2.3 Specific operational use conditions

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

2.4 Limited module procedures

Not applicable

2.5 Trace antenna designs

Not applicable

2.6 RF exposure considerations

The EUT application the FCC part 15.231 rules, No need to evaluate RF exposure.

2.7 Antennas

This radio transmitter **2AZV8RM-RF10TP-1278** has been approved by Federal Communications Commission to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Model	Type	Peak Gain(dBi)
400-500MHz	External antenna	3.0 dBi

2.8 Label and compliance information

The final end product must be labeled in a visible area with the following "Contains FCC ID: 2AZV8RM-RF10TP-1278".

2.9 Information on test modes and additional testing requirements

Host manufacturer which install this modular with limit modular approval should perform the test of radiated emission and spurious emission according to FCC part 15C:15.231 and 15.209 requirement, only if the test result comply with FCC part 15.231 and 15.209 requirement, then the host can be sold legally.

2.10 Additional testing, Part 15 Subpart B disclaimer

Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B.