

Company Name \_\_\_\_\_

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**NEW** UPDATE

# Delivery specification

TN18301(E)

IC CARD READER UNIT

Revision 1.01

Receipt stamp



〈Publisher〉 TOPPAN FORMS CO., LTD.  
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		Approver	Reviewer	Author

\*『MIFARE』 is a trademark of NXP Semiconductors N.V.

\*『FeliCa』 is a trademark of Sony Corporation.

## Revision History

No	Date	Changes	Reason
	2018/ 5/xx	New	
	2018/ 6/ 22	Rev 1.01	P3. Change FCC ID to TN18301E
			Figure 9-1 Change FCC ID to TN18301 E
			P16. Add 10.3 Radio Act and 10.3.1 FCC

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# 1. Overview

This reader/writer has the following features.

- (1) Three high-level interfaces are installed.
  - It has a USB interface. It can also operate with USB bus power.
  - It has a UART interface.
  - It has a I2C interface.
- (2) Radio law compliance
  - We have obtained type approval based on the japan radio wave law.
  - We have obtained FCC certification under the US Radio Law.
  - It conforms to CE self-declaration based on EU Radio Law.
- (3) VCCI Class B conformity
  - It conforms to VCCI Class B information technology equipment.
- (4) Compliant with USB compliance
  - It conforms to USB 2.0 device interface (Full speed) .
- (5) Compatible with various contactless IC cards.
  - The reader/writer complies with the following communication method.
    - JIS X 6319-4
    - ISO/IEC 14443 Type A(MIFARE)/Type B
    - ISO/IEC 15693
    - ISO/IEC 18092
    - ISO/IEC 21481

## 2. Basic Specifications

### 2.1. Reader/Writer Basic Specification

The basic specifications of this reader/writer are as follows.

**Table 2-1 Basic specification list of reader/writer**

item		specification
Name		IC card reader unit
Model number		TN18301(E)
Upper interface① (For USB) <sup>1</sup>	Power supply	USB bus power (DC+5V/250mA or less)
	Communication method	USB 2.0 Full Speed device interface
	Communication speed	12Mbps
	USB connector	USB Mini B connector (female)
Upper interface② (For UART) <sup>1</sup>	Power supply	DC+5V/250mA or less
	Communication method	Asynchronous type (full duplex)
	Communication speed	~115.2kbps ( host selection )
	Start bit	1bit
	Data bit	8bit
	Stop bit	1bit
	Parity bit	なし
	Character transmission	LSB first
	UART connector	JST SM05B-SRSS-TB(LF)(SN)
Upper interface ③ (For I2C) <sup>1</sup>	Power supply	DC+5V/250mA or less
	Communication method	I2C version 2.1 compliance interface
	Communication speed	100kbps/400kbps ( host selection )
	Address	7bit/10bit ( host selection )
	I2C connector	JST SM07B-SRSS-TB(LF)(SN)

<sup>1</sup> Upper interface USB, UART and I2C can not be connected at the same time.

item		specification
Wireless interface	Radio law classification	Refer to the list in the next page.
	Carrier frequency	13.56MHz
	Data transfer rate <sup>2</sup>	JIS X 6319-4 : 211.875kbps / 423.750kbps ISO/IEC 14443 : 105.9375kbps ISO15693 : 26.48kbps ISO/IEC18092 : 3Kbps
	Communication distance <sup>3</sup>	【FeliCa】Standard card : about 40mm 【FeliCa】Transportation card : about 30mm 【MIFARE】Standard 1K : about 40mm 【eLWISSE】 : about 15mm 【I-Code SLI】 : about 50mm
User interface	Status LED	Single color (green) LED × 1
Operating environment	Operating temperature range	-20 ~ +60℃
	Operating humidity range	30 ~ 90%RH (without condensation)
Storage environment	Storage temperature range	-20 ~ +60℃
	Storage humidity range	30 ~ 90%RH (without condensation)
Outline(module)	Size	69.5mm×48mm×5mm
	Weight	10g

<sup>2</sup> The communication target card and device must correspond to the data transfer speed.

<sup>3</sup> Communication distance is a reader/writer module alone, and it is numerical value in an ideal environment at room temperature/free space.

## Compliance with each radio wave law

item	specification
Japan	Inductive read/write communication equipment type specification. Model name: TN18301 (E) specified number: No. AC- 17165
FCC	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 ID:ORKTN18301E
CE	
VCCI	VCCI Class B conformity (filing number : 2017061830 )
Environmental response	According to CompanyName like green procurement standards survey.



## 3. Interface

### 3.1. Connector specification (USB)

---

Connector specification (USB) of the reader/writer.

**Table 3-1 Connector specification (USB)**

item	model name	manufacture	remarks
connector	UX60SC-MB-5ST	Hirose	

The model number above is a typical example

and it may be replaced with other equivalent products without prior notice.

**Table 3-2 Facing Socket Specification (USB)**

item	model name	manufacture	remarks
connector	USB mini B (male)	unspecified	

### 3.2. Pin assignment (USB)

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Pin assignment (USB) of the reader/writer.

**Table 3-3 Pin assignment (USB)**

pin number	Signal name	type	remarks
1	VBUS	POWER	Power supply input (+5V)
2	D-	I/O	USB D-
3	D+	I/O	USB D+
4	(ID)	NC	Not connect anything
5	GND	GND	Ground

### 3.3. Connector specification (UART)

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Connector specification (UART) of the reader/writer.

**Table 3-4 Connector specification (UART)**

item	model name	manufacture	remarks
connector	SM05B-SRSS-TB(LF)(SN)	JST	P=1.0(Gold plate)

The model number above is a typical example

and it may be replaced with other equivalent products without prior notice.

**Table 3-5 Facing Socket Specification (UART)**

item	model name	manufacture	remarks
socket	SHR-05V-S-B	JST	
contact	SSH-003T-P0.2-H	JST	AWG32~28 (Gold plate)

### 3.4. Pin assignment (UART)

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Pin assignment (UART) of the reader/writer.

**Table 3-6 Pin assignment (UART)**

pin number	Signal name	type	remarks
1	VCC	POWER	Power supply input (+5V)
2	VCCIO	IN	TX,RX signal "H"level ( Shared use Chipselect)
3	RX	IN	Serial receive signal
4	TX	OUT	Serial transmission signal
5	GND	GND	Ground

### 3.5. Connector specification (I2C)

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Connector specification (I2C) of the reader/writer.

**Table 3-7 Connector specification (I2C)**

item	Model name	manufacture	remarks
connector	SM07B-SRSS-TB(LF)(SN)	JST	P=1.0 (Gold plate)

The model number above is a typical example

and it may be replaced with other equivalent products without prior notice.

**Table 3-8 Facing Socket Specification (I2C)**

item	Model name	manufacture	remarks
Socket	SHR-07V-S-B	JST	
contact	SSH-003T-P0.2-H	JST	AWG32~28 (Gold plate)

### 3.6. Pin assignment (I2C)

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Pin assignment (I2C) of the reader/writer.

**Table 3-9 Pin assignment (I2C)**

pin number	Signal name	type	remarks
1	VCC5	IN	Power supply input (+5V)
2	VCC33	POWER	Power supply input (+3.3V , Shared use chipSelect)
3	GND	GND	Ground
4	IRQ	OUT	Interrupt signal
5	SDA	I/O	Serial transmission signal
6	SCL	IN	Serial receive signal
7	-	NC	Not connect anything

## 4. 4. Electrical characteristics

Electrical characteristics of the reader/writer.

### 4.1. Absolute Maximum Ratings

**Table 4-1 Absolute maximum ratings**

項目		記号	最大定格	単位
USB	Power supply voltage	VBUS	5.5	V
	USB D+	D+	3.6	V
	USB D-	D-	3.6	V
UART	Power supply voltage	VCC	5.5	V
	UART transmission / reception voltage	VCCIO	5.5	V
	UART reception voltage	RX	5.5	V
I2C	Power supply voltage	VCC5	5.5	V
	Power supply voltage	VCC33	4.1	V
	I2C transmission /reception voltage	SDA	4.1	V
	I2C clock input voltage	SCL	4.1	V

### 4.2. Operating environment

**Table 4-2 Operating environment**

item		symbol	Min	Max	unit
Operating temperature range		Top	-20	+60	°C
Operating humidity rage (without condensation)		RHop	30	90	%
USB	Recommended operating voltage	VBUS	4.75	5.25	V
UART	Recommended operating voltage	VCC	4.75	5.25	V
		VCCIO	3.0	5.0	V

I2C	Recommended operating voltage	VCC5	4.75	5.25	V
		VCC33	3.0	3.6	V

### 4.3. Input characteristics

Table 4-3 Input characteristics

signal name	item	symbol	Min	Max	unit
USB (D+,D-)	Input LOW voltage	$V_{IL}$	-	0.8	V
	Input HIGH voltage	$V_{IH}$	2.0	-	V
signal name	item	symbol	Min	Max	unit
UART (RX)	Input LOW voltage	$V_{IL}$	-	0.8	V
	Input HIGH voltage	$V_{IH}$	2.0	-	V
signal name	item	symbol	Min	Max	unit
I2C (SCL)	Input LOW voltage	$V_{IL}$	-	0.8	V
	Input HIGH voltage	$V_{IH}$	2.0	-	V

### 4.4. Output characteristics

Table 4-4 Output characteristics

signal name	item	symbol	Min	Max	unit
USB (D+,D-)	Output LOW voltage	$V_{OL}$	0	0.3	V
	Output HIGH voltage	$V_{OH}$	2.8	3.6	V

Signal name	condition	item	symbol	Min	Max	unit
UART (TX)	3.0V ≤ VCCIO < 4.5V output current : 5mA(max)	Output LOW voltage	$V_{OL}$	-	0.4	V
		Output HIGH	$V_{OH}$	2.4	-	V

		voltage				
	4.5V $\leq$ VCCIO<5.0V output current : 5mA(max)	Output LOW voltage	V <sub>OL</sub>	-	0.55	V
		Output HIGH voltage	V <sub>OH</sub>	3.8	-	V

signal name	item	symbol	Min	Max	unit
I2C (SDA,IRQ)	Output LOW voltage	V <sub>OL</sub>	-	0.25	V
	Output HIGH voltage	V <sub>OH</sub>	2.75	3.6	V

## 4.5. Current consumption

Table 4-5 Current consumption

	item	symbol	Typ	Max	unit
USB	Supply current	I <sub>VBIS</sub>	120	250	mA
	USB standby current	I <sub>USB-STBY</sub>	2.2	2.5	mA
	USB standby mode [Wakeup By Card mode]	I <sub>USB-wubc</sub>	0.05	0.4	mA
UART	Supply current	I <sub>VCC</sub>	150	250	mA
	VCCIO	I <sub>VCCIO</sub>	5	10	mA
I2C	Supply current	I <sub>VCC33</sub>	150	250	mA
	VCC5	I <sub>VCC5</sub>	180	250	mA

## 5. Function

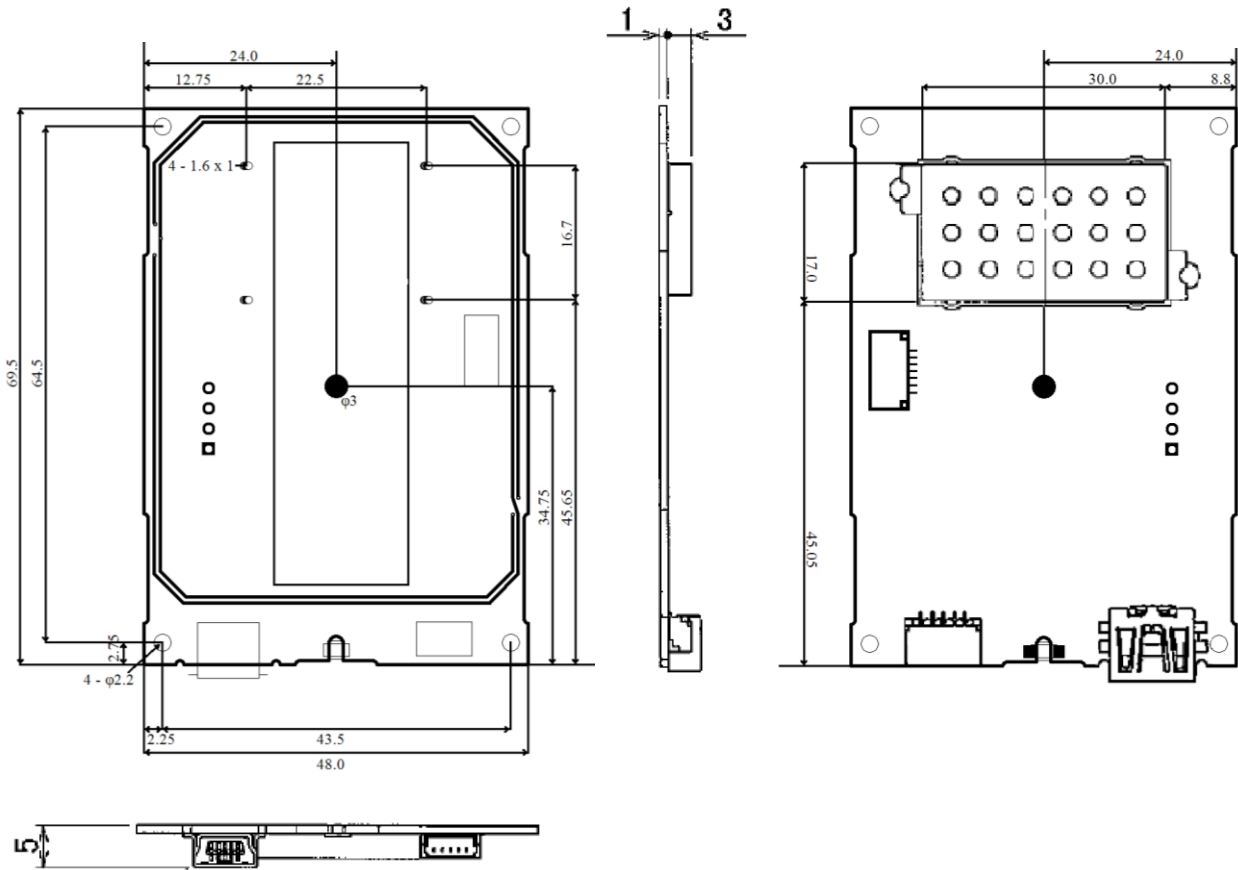
Please refer to the attached document below.

- TN18301 product specification
- TN18301 command reference
- TN18301 user's guide

## 6. Outline

### 6.1. Reader/Writer module

external dimensions of the reader/writer module.



[unit : mm]

Figure 6-1 outline dimensions of reader/writer

## 7. Part names

Part name and function of reader/writer module.

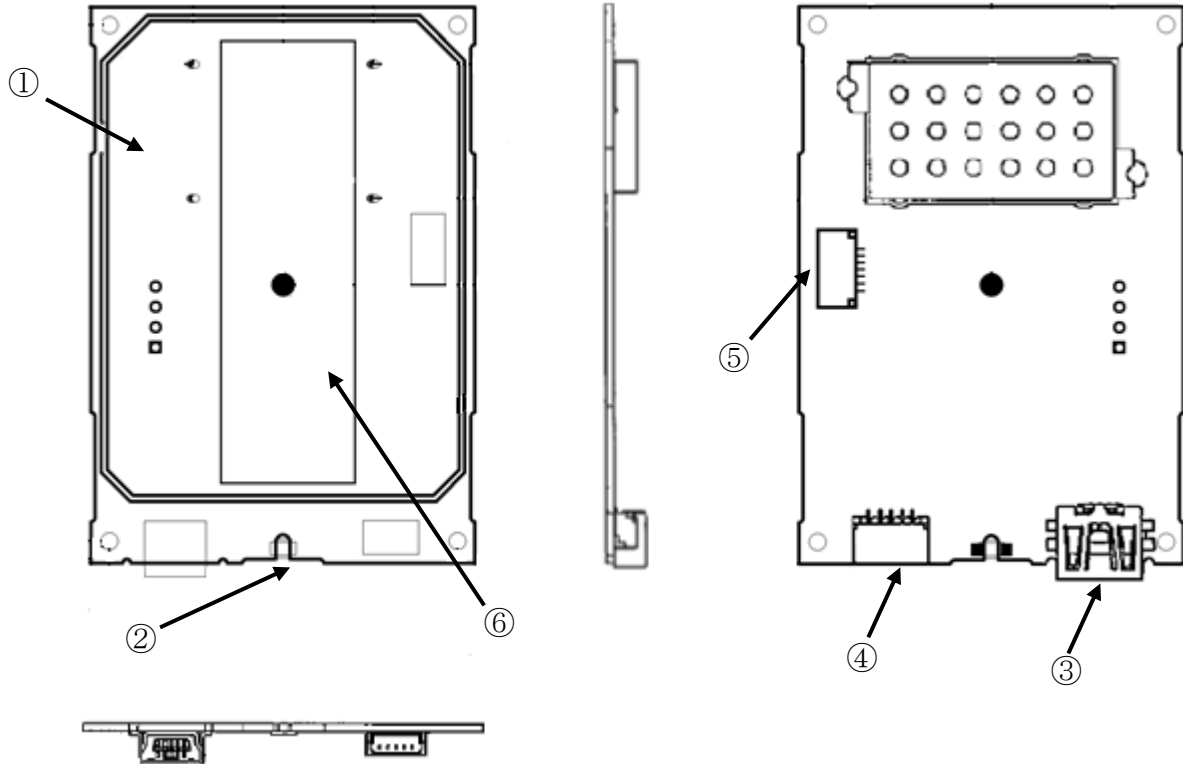


Figure 7-1 part names

Table 7-1 Names and Functions

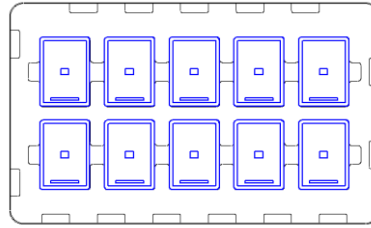
no.	part names	function
①	Hold over part	It is the holding part of the communication target card/mobile terminal.
②	Power monitor LED	The status of the reader/writer is indicated by the green LED.
③	USB interface connector	Connect the reader/writer to the host device with USB.
④	UART interface connector	Connect the reader/writer to the host device with UART.
⑤	I2C interface connector	Connect the reader/writer to the host device with I2C.
⑥	Production name plate	Specifications and manufacturing information of the reader-writer, and displays the authentication content.



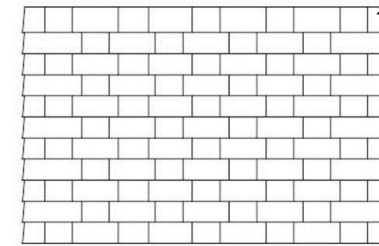
# 8. Packing specification

packing specification of the reader/writer.

Number of trays 10 x 10 trays



Ten steps are stacked while inverting the tray, Place an empty tray in the top row (total 11 steps)



Empty tray ( At the top )



Place the stacked trays in an antistatic bag, Tie the mouth of the bag twice.

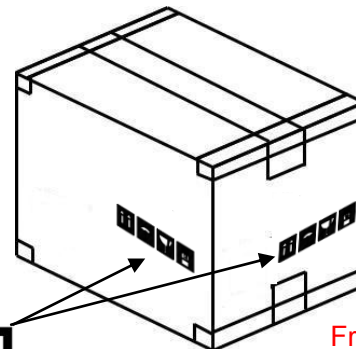


antistatic bag

outline : 420x260x240H  
Number of units accumulated :  
100 units / box



The product placed in the antistatic bag is placed in the packing box Put it in place with packing tape.



Caution mark (printing)  
Four sides of the packing box



No reverse charge prohibition  
Water prohibition  
Warning notice  
Number of product steps

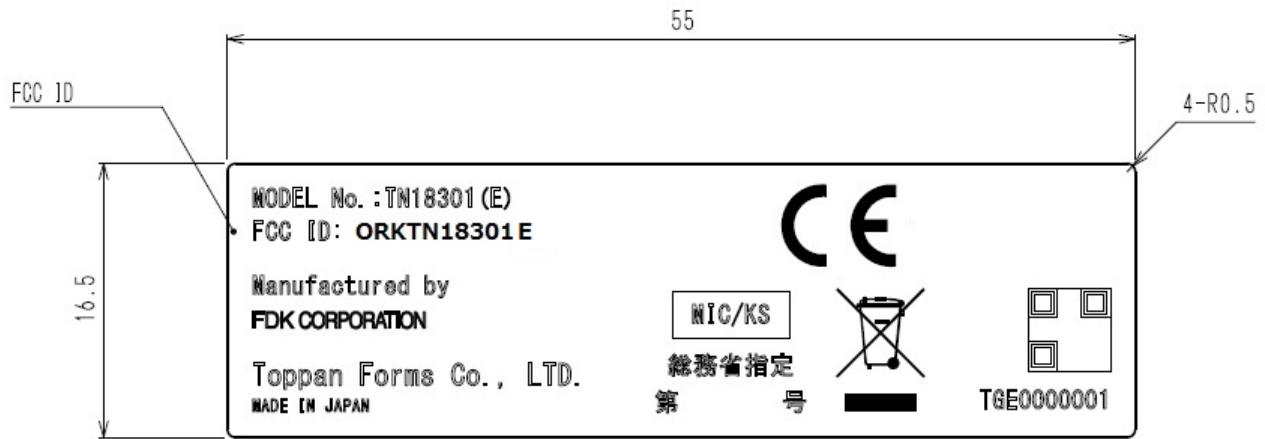
**Fractional packing**  
In the case of fraction packaging, packing box Insert the empty tray.

**Figure 8-1 Packing specification**

## 9. Label specification (Reconditioning in progress)

### 9.1. Product nameplate specification (module)

Specification of the nameplate of the product.



※ Since FCC ID is displayed, FCC mark is not included.

Figure 9-1 Product nameplate specification (module)



## 10. Notes

### 10.1. handling

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- This product is inductive type read / write communication equipment which was designated by the Ministry of Internal Affairs and Communications.  
Adding changes to this product will be punished as it will violate radio laws.
- Please handle carefully so as not to apply static electricity to this product.
- Do not apply excessive voltage or noise to each terminal of this product

### 10.2. Installation environment

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- Please verify this product in the final installation environment.
- Communication characteristics may be affected if the source of electromagnetic noise that interferes within the induced magnetic field generated by this product or an object that blocks or reflects radio waves is placed.  
If there is a problem with operation, improvement of the installation environment is required.
- When other reader / writers are installed at close range, mutual communication characteristics may be affected. If there is a problem with operation, please increase the interval between each other.
- Please verify thoroughly when installing this product in places where extreme vibrations, shocks, dropping and high temperature / high humidity environment are concerned.
- Because this product is a radio equipment using radio waves, it may affect the medical equipment at installation location and operation.
- If you connect via a USB hub, it may not be recognized correctly or the communication distance may decrease.
- If you use the USB extension cable, it may not be recognized correctly or the communication distance may decrease.

### 10.3. Radio Act

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#### 10.3.1. FCC

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

Please notice that if the FCC identification 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 wording such as the following: "Contains FCC ID: ORKTN18301E" any similar wording that expresses the same meaning may be used.

Note: The OEM integrator is responsible for ensuring that the host product which is installed and operating with the module is in compliant with Part 15B unintentional Radiator requirements, please note that For a Class B digital device or peripheral, the instructions furnished the user manual of the end-user product shall include the following or similar statement, placed in a prominent location in the text of the host product manual:

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.

The module is limited to installation in mobile application; A separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and difference antenna configurations.

## 11. Disclaimer

- This product is designed to be used for general electronic equipment (computer, personal equipment, office equipment, industrial equipment, home appliances, etc.). It is not supposed to be used in equipment (nuclear power control equipment, aerospace equipment, medical equipment, etc.) that requires special high quality and reliability, and that malfunction or malfunction can threaten human lives. We can not guarantee the use in such applications by our company. It will be done at your own risk.
- This product can not be used for applied products for which manufacture, use and sale are prohibited by domestic and foreign laws, regulations and orders.  
We will not take any responsibility for any defects, breakdowns, damage or the like caused by such modifications or deliberately and erroneously using this product.

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