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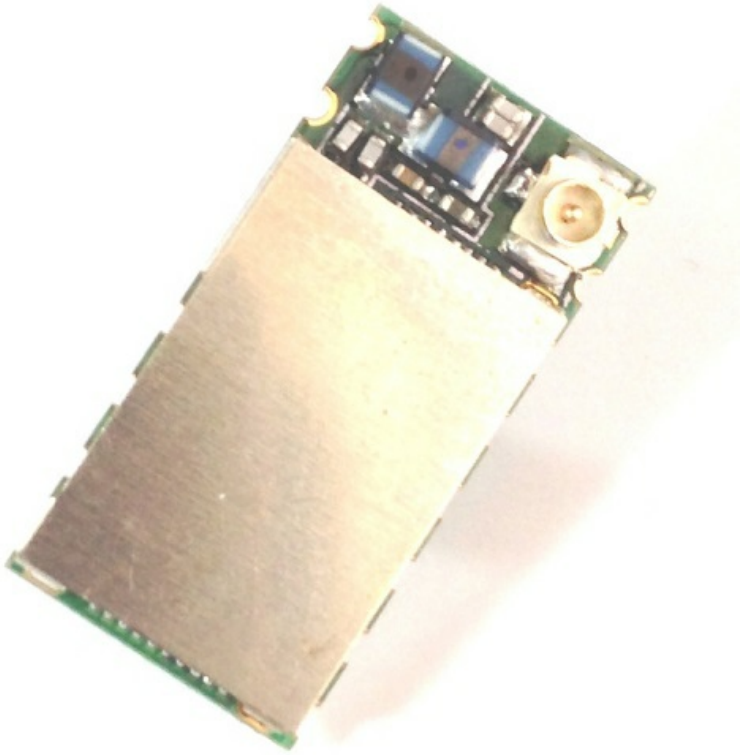
TSC TM-007 Mini RFID and NFC Module



Copyright

TM-007 Mini

Multiprotocol Fully

Integrated 13.56MHz

RFID & NFC Module

Datasheet

TM-007 Mini

10mm x20mm x 1.8mm

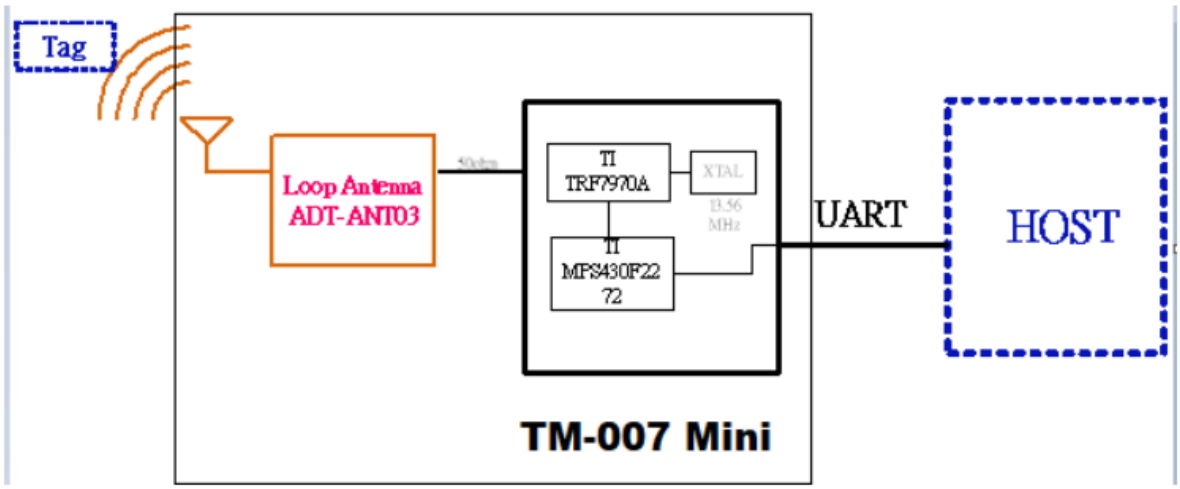
PRODUCT DESCRIPTION

The TM-007 Mini is a RFID/NFC module for integration into Table, Notebook, PDA, label printers, handheld devices and in general any fixed or mobile short and mdedium range device requiring RFID/NFC technology. TSC-005 supports Near Field Communivstion Standards NFCIP-1 (IOS/IEC 18092) and NFCIP-2 (ISO/IEC 21481) which defines the delection of any of the four possible communication modes (Proximity reader/writer, ISO 14443A/B or Felica and Vicinty reader/writer –ISO15693. TSC-005, its simplified UART interface, low power consumption and superior performance, make ot easy to integrate any device with NFC technology.

FEATURES

- Support NFCIP-1, NFCIP-2, Reader/Writer
- Muklti protocol HF RFID Tag support including: ISO15693, ISO14443A, ISO14443B and FeliCa®.
- 200 mW maximum output power
- Standard 50 ohm antenna output port
- Host interface: UART.
- Bard rate: 115200bps, 8, N, 1

BLOCK DIAGRAM



SPECIFICATION

Item	Min.	Typical	Max.	Unit	Condition
Operation Voltage	2.7	5	5.5	V	VDD
VSS		0		V	
VOH	VCC_M-0.25		VCC_M	V	I(OHmax) = -1.5 mA (see Note 1)
	VCC_M-0.6		VCC_M	V	I(OHmax) = -6 mA (see Note 2)
VOL	VSS		VSS+0.25	V	I(OLmax) = 1.5 mA (see Note 1)
	VSS		VSS+0.6	V	I(OLmax) = 6 mA (see Note 2)
RF Output Power			200	mW	
RF Transmit Peak Current		250		mA	

Baud Rate		115200		bps	8,N,1
RF Frequency Range	13.553	13.56	13.567	MHz	
Operating Temperature	0	25	70	˚C	
Storage Temperature	-25		85		
Weight		3.6		g	

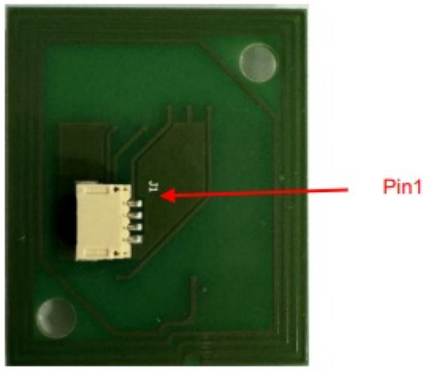
NOTES:

1. The maximum total current, IOHmax and IOLmax, for all outputs combined, should not exceed ±12 mA to hold the maximum voltage drop specified.
2. The maximum total current, IOHmax and IOLmax, for all outputs combined, should not exceed ±48 mA to hold the maximum voltage drop specified

ANTENNA SPECIFICATION

Item	Min.	Typical	Max.	Unit	Condition
Frequency		13.56		MHz	
Impedance		50		ohm	
MAX Power			200	mW	
Electrical Type					Loop Antenna

PIN DESCRIPTION

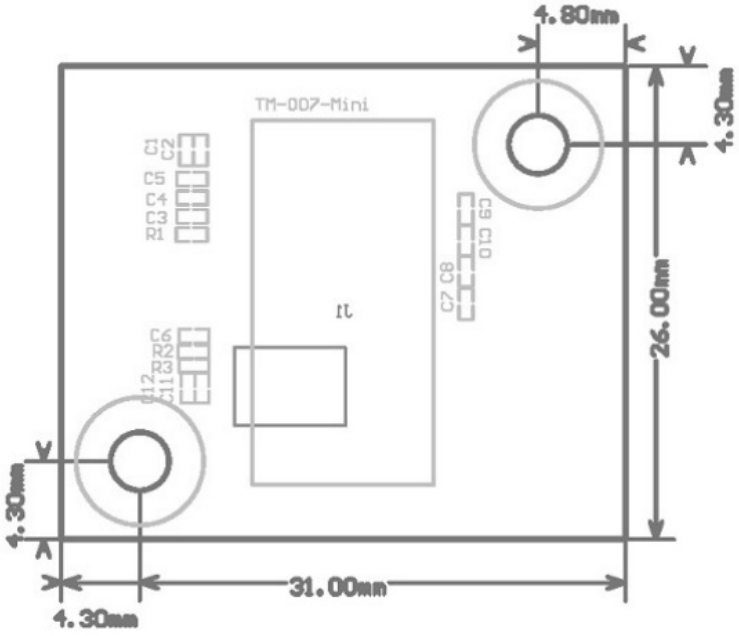


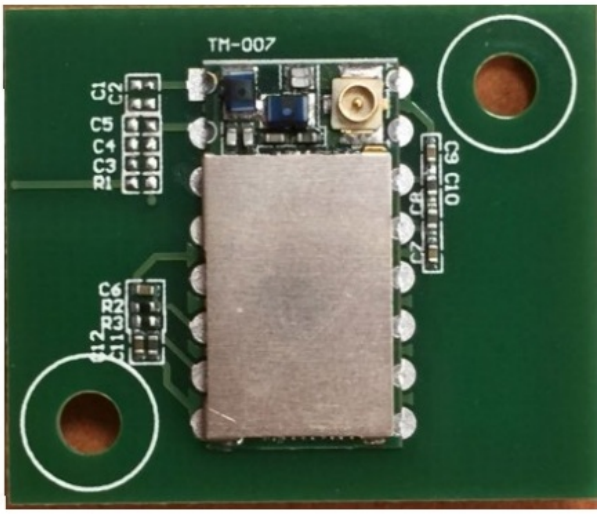
J1 Connector

Pin	Name	I/O	Condition
1	VCC	PWR	Serial data input
2	TXD	O	Transmit data
3	RXD	I	Receive data
4	GND	PWR	Ground

DIMENSIONS

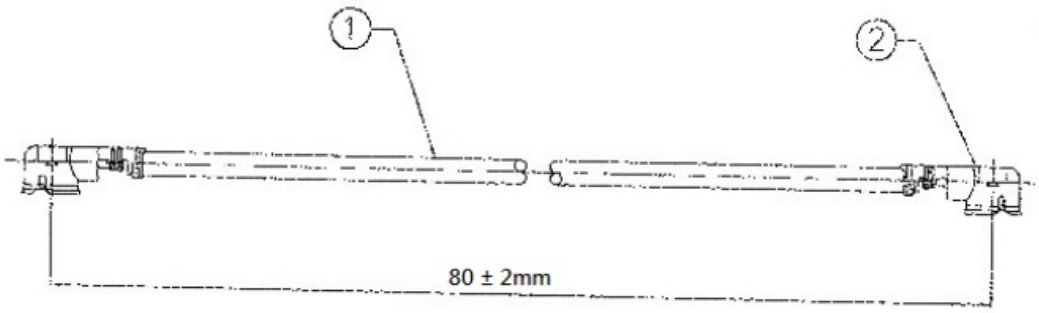
TM-007 Mini module : 10mm x 20mm x 1.888mm





Cable Length: 80mm

Cable Length: 80mm



ITEM	Description	P/N	Color	Q'ty
1	Cable ø1.13	1302213002	Gray	1
2	I-PEX 20278-113	636131902	Gold	2

Antenna : 50mm x 12mm x 1.85mm

FCC

This module has been tested and found to comply with the following requirements for Modular Approval.
Part 15.225 Operation within the band 13.110–14.010 MHz (NFC) (KDB 996369 D03 section 2.2 List of applicable FCC rules)

RF exposure considerations

This equipment complies with FCC mobile radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a

minimum distance of 20cm between the radiator & your body. A separate SAR/Power Density evaluation is required to confirm compliance with relevant FCC portable RF exposure rules.

Antennas

This radio transmitter has been approved by the FCC and ISED to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Radio	Antenna Type	Freq. (MHz)
NFC	PCB Loop antenna	13.56

(KDB 996369 D03 section 2.7 Antennas)

Summarize the specific operational use conditions

The module is tested for standalone mobile RF exposure use condition. Any other usage conditions such as co-location with other transmitter(s) will need a separate reassessment through a class II permissive change application or new certification.

Limited module procedures

Not applicable, this device is a single modular approval and meets FCC 47 CFR 15.212 requirement.

Trace antenna designs

Not applicable. This module has its own antenna, and does not need a host’s printed board micro strip trace antenna, etc.

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.

OEM/Host manufacturer responsibilities

OEM/Host manufacturers are ultimately responsible for the compliance of the Host and Module. The final product must be reassessed against all the essential requirements of the FCC rule, such as FCC Part 15 Subpart B, before it can be placed on the US market. This includes reassessing the transmitter module for compliance with the Radio and EMF essential requirements of the FCC rules. This module must not be incorporated into any other device or system without retesting for compliance as multi-radio and combined equipment.

Required End Product Labeling

Any device incorporating this module must display an external, visible, permanently affixed label with the FCC ID and the ISED certification number preceded by the term as follows.

- “ Contains FCC ID: VTV-TM007MINI”
- “ Contains IC: 10524A-TM007MINI ”
- « Contient IC : 10524A-TM007MINI »

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 that integrates this module. The end user manual shall include all required regulatory information/warnings as shown in User manual.
(KDB 996369 D03 section 2.8 Label and compliance information)

Test Modes (FCC)

This deviceuses various test mode programs for test set up which operate separate from production firmware. Host integrators should contact the grantee for assistance with test modes needed for module/host compliance test requirements.
(KDB 996369 D03 section 2.9 Information on test modes and additional testing requirements)

Additional testing, Part 15 Subpart B disclaimer (FCC)

The modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC

transmitter rules) listed on the grant, and that the 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 still requires Part 15 Subpart B compliance testing with the modular transmitter installed.
(KDB 996369 D03 section 2.10 Additional testing, Part 15 Subpart B disclaimer)

Note EMI Considerations

Note that a host manufacture is recommended to use KDB996369 D04 Module Integration Guide recommending as “best practice” RF design engineering testing and evaluation in case non-linear interactions generateadditional non-compliant limits due to module placement to host components or properties.
For standalone mode, reference the guidance in KDB996369 D04 Module Integration Guide and for simultaneous mode; see KDB996369 D02 Module Q&A Question 12, which permits the host manufacturer to confirm compliance.
(KDB 996369 D03 section 2.11 Note EMI Considerations)

How to make changes

Only Grantees are permitted to make permissive changes,if the module will be used differently than granted conditions, please contact us to ensure modifications will not affect compliance.
(KDB 996369 D03 section 2.12 How to make changes)

FCC

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.

Federal Communications Commission (FCC) Statement

15.105(b)

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.

15.21

You are cautioned that changes or modifications not expressly approved by the part responsible for compliance could void the user’s authority to operate the equipment.

FCC RF Radiation Exposure Statement:

1. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. For portable operation, this device has been tested and meets FCC RF exposure guidelines. When used with an accessory that contains metal may not ensure compliance with FCC RF exposure guidelines.

ISED

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada’s licence-exempt RSS(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.

Radiation Exposure Statement:

This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with greater than 20cm between the radiator & your body.

This device is intended only for OEM integrators under the following conditions: (For module device use)

1. The antenna must be installed and operated with greater than 20cm between the antenna and users, and
2. The transmitter module may not be co-located with any other transmitter or antenna. As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

IMPORTANT NOTE: In the event that these conditions cannot be met (for example certain laptop configurations or colocation with another transmitter), then the Canada authorization is no longer considered valid and the IC 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 Canada authorization.

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

Frequently Asked Questions

- **Q: What should I do if I cannot meet the specified operational use conditions?**

A: If you cannot meet the specified operational use conditions, such as co-location with other transmitters, a separate reassessment through a class II permissive change application or new certification may be required.

- **Q: Is the device compliant with FCC regulations?**
  A: Yes, this device complies with FCC mobile radiation exposure limits for an uncontrolled environment. Ensure compliance with relevant FCC portable RF exposure rules.

Documents / Resources

	TSC TM-007 Mini RFID and NFC Module [pdf] User Manual TM-007, TM-007 Mini RFID and NFC Module, Mini RFID and NFC Module, RFID and NFC Module, NFC Module

References

- User Manual

TSC

Mini RFID and NFC Module, NFC Module, RFID and NFC Module, TM-007, TM-007 Mini RFID and NFC Module, TSC

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