

TC643

User manual

HBC

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User manual

Transceiver module TC643



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2 Information about the module

2.1 Intended use

The TC643 is a transceiver for data transfer with fast transmit-receive switchover. The frequency range is 460.6500 to 461.5625 MHz, according to the hardware version for USA. This module is not sold separately, but is used for systems of HBC-radiomatic GmbH exclusively.

2.2 Shielding provision of the RF part

The RF component has been designed in this way to comply with the requirements for modular transmitters and to avoid easy access to the RF components. Efficient shielding of RF part is achieved by means of metal shielding. The metal shielding is soldered up with the circuit board.

2.3 Common installation guidelines

- Align module with connector and insert it with care.
- Affix module with fixing screw.
- Check proper installation.

2.4 Specific installation instructions

For details about the installation of the module in a specific host appropriate “Instructions for modular transceiver installation” are supplied by HBC-radiomatic GmbH. Please refer to the document appropriate for the host to be assembled with the transmitter module.

2.5 FCC notes for the module

2.5.1 Applied rules

The TC643 transceiver module complies with the requirements of 47 CFR Part 90, §90.217. It uses frequencies of the Industrial/Business Radio Pool and **is subject to licensing**.

2.5.2 Modification of equipment

Changes or modifications made to this equipment not expressly approved by HBC-radiomatic GmbH may void the FCC authorization to operate this equipment.

2.5.3 Dedicated antennas

The TC643 transceiver module may only be used with antennas certified with the module or antennas of the same type with antenna gain not exceeding the certified values for this type.

The list of antennas to be used with the TC643 transceiver module is shown below.

Internal antennas:

HBC part number	Antenna type	Frequency range	Gain [dBi]	Connector type	HBC-radiomatic datasheet
AA080004	$\lambda/4$ - antenna	405 – 480 MHz	2.15	MMCX male	x
AB047010	$\lambda/4$ - antenna	405 – 480 MHz	2.15	MMCX male	x
AB158010	short dipole antenna	405 – 480 MHz	2.15	MMCX male	x

External antennas:

HBC part number	Antenna type	Frequency range	Gain [dBi]	Connector type	Manufacturer datasheet
012-01-00007	shortened half-wave antenna	440 – 470 MHz	6.15	BNC male	x
AA020002	whip antenna	400 – 460 MHz	2.15	BNC male	x
AA020031	$\lambda/4$ whip antenna	410 – 470 MHz	2.15	Mini-Crimp	x
AA050002	omnidirectional antenna	406 – 470 MHz	2	N female	x
AA060007	$\lambda/4$ mobile whip antenna	430 – 470 MHz	2.15	Mini-Crimp	x
AA060015	dual frequency whip antenna	380 – 470 MHz 800 – 960 MHz	2.15	Mini-Crimp	x
AA060018	whip antenna	450 – 470 MHz	6.15	Mini-Crimp	x
AA060021	$\lambda/4$ mobile whip antenna	406 – 470 MHz	2.15	Mini-Crimp	x

2.5.4 RF exposure information

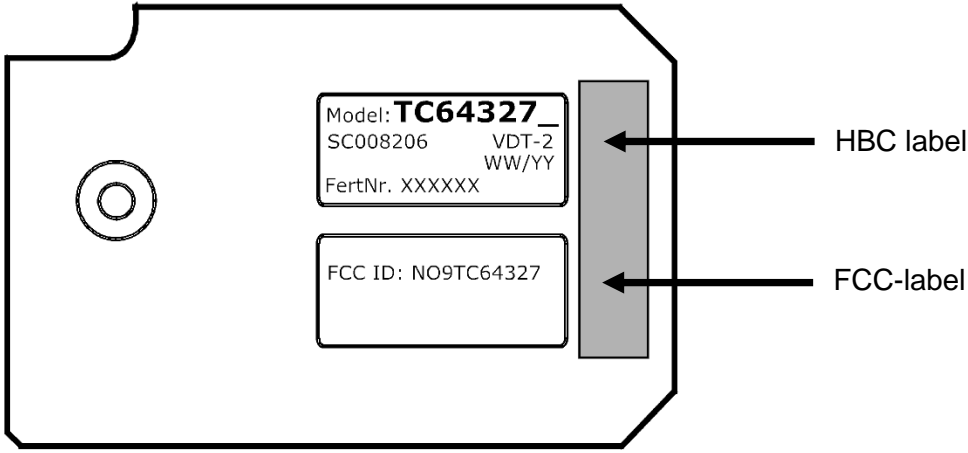
The TC643 transceiver module complies with the RF exposure standalone SAR test exclusion requirements for portable devices with a test separation distance of 6 mm, i. e. a minimum separation distance of at least 6 mm between the radiating part and the user or nearby persons has to be assured.

For simultaneous transmission appropriate RF exposure evaluations have to be performed.

Portable exposure host platform evaluation procedures can be applied only if all transmitters in the host devices support portable exposure conditions. Transmitters and modules approved for use in the portable exposure host platform may be used for standalone operations in mobile exposure host platforms, without further equipment approval, only when the same identical transmitter and antenna required for portable device exposure conditions are used.



2.6 Labelling of the module



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2.7 Technical data

Technical Specification	
Common data	
Module code	TC64327_
Antenna	MMCX socket
Number of RF channels	16
Frequency range	460.6500 – 461.5625 MHz
Channel spacing	12.5 kHz
Deviation	±2.5 kHz
Frequency stability	±2.5 ppm or less (-30 °C ...+85 °C)
Operating temperature range	-30 °C ... +80 °C
Modulation	9k12F2D
Switch-over time (RX – TX)	< 1 ms
Dimensions	(49 x 34 x 19) mm
Weight	26 g



Transmitter specific data				
Parameter	Min.	Typ.	Max.	Unit
Supply voltage	3.3	4.2	4.6	V
Parameter	Min.	Typ.	Max.	Unit
Conducted output power	-	< 14	-	dBm
Adjacent channel power (25 kHz)	-	< -37	-	dBm
Spurious emission (80 MHz to 1 GHz)	-	< -37	-	dBm
Spurious emission (47 MHz to 74 MHz)	-	< -57	-	dBm
Spurious emission (87.5 MHz to 118 MHz)	-	< -57	-	dBm
Spurious emission (174 MHz to 230 MHz)	-	< -57	-	dBm
Spurious emission (470 MHz to 862 MHz)	-	< -57	-	dBm
Spurious emission (> 1 GHz)	-	< -50	-	dBm
Supply current	110	115	120	mA
Receiver specific data				
Parameter	Min.	Typ.	Max.	Unit
Supply voltage	3.3	4.2	4.6	V
Sensitivity @ 20 dB S/N and 8 kHz bandwidth	-107	-108	-111	dBm
Adjacent channel selectivity (12.5 kHz)	37	38	40	dB
Spurious radiation (all)	-	< -57	-	dBm
Blocking (±2 MHz)	85	86	87	dB
Blocking (±10 MHz)	95	96	97	dB
Supply current	50	55	60	mA

3 Information for the end device

3.1 Integration of the module

As the TC643 transceiver module can be mounted in various hosts subject to different authorization procedures only the most typical combinations are covered by this user manual. If the host device is subject to other authorization procedures than described below the appropriate requirements of these authorization procedures apply.

For details about the installation of the module in a specific host appropriate “Instructions for modular transceiver installation” are supplied by HBC-radiomatic GmbH. Please refer to the document appropriate for the host to be assembled with the module. This document also contains information about labelling and notices to the user.

3.2 Safety Instructions

In customer related documents of the end product like instruction manuals, installation guides etc. appropriate safety instructions have to be included. The supplier of the complete system is responsible for these safety instructions.



3.3 FCC notes for all host devices

The information in this section applies to all hosts irrespective of the authorization procedure applicable to the host.

The integrator is responsible for the final compliance of the end product including this certified transmitter module. Section §15.101 of 47 CFR Part 15 gives guidance in terms of applicable equipment authorization procedures of different end devices. Typically compliance to subpart 15 B (§15.107 and 15.109) Class A or B (spurious emissions up to 5th harmonic of the maximum of the highest frequency generated or used and the fundamental frequency of the module) including verification of the subpart 15 C compliance (field strength of fundamental and out-of-band emissions up to 10th harmonic of the fundamental frequency of the module) of the transmitter parameters apply. For details about the frequency range of radiated measurements see section §15.33.

As the module is used for systems of HBC-radiomatic GmbH exclusively, two different authorization procedures for the end device are intended to be applied:

- Verification (see section 3.4)
- Certification (see section 3.5)

3.3.1 Modification of equipment

The instruction manual of the host shall include the following statement:

Changes or modifications made to this equipment not expressly approved by the party responsible for compliance may void the FCC authorization to operate this equipment.

3.3.2 Special accessories

Where special accessories such as shielded cables and/or special connectors are required to comply with the emission limits, the instruction manual shall include appropriate instructions on the first page of the text describing the installation of the device.

3.3.3 RF exposure evaluation

The TC643 transceiver module complies with the RF exposure standalone SAR test exclusion requirements for portable devices with a test separation distance of 6 mm, i. e. a minimum

separation distance of at least 6 mm between the radiating part and the user or nearby persons has to be assured.

For simultaneous transmission (e. g. if more than one module is assembled) appropriate RF exposure evaluations have to be performed.

3.3.4 Simultaneous transmission

When the host product supports simultaneous-transmission operations the host manufacturer needs to check if there are additional RF exposure filing requirements due to the simultaneous transmissions. When additional application filing for RF exposure compliance demonstration is not required (e. g. if the TC643 transceiver module in combination with all simultaneously operating transmitters complies with the RF exposure simultaneous transmission SAR test exclusion requirements), the host manufacturer may do his own evaluation without any filing, using reasonable engineering judgment and testing for confirming compliance with out-of-band, restricted band, and spurious emission requirements in the simultaneous-transmission operating modes.

If additional filing is required please contact the person at HBC-radiomatic GmbH responsible for certification of the TC643 transceiver module.

3.3.5 RF exposure statement

After having performed an RF exposure evaluation including a check for simultaneous transmission, if applicable, the instruction manual of the host shall include the appropriate statement as noted below:

a) For portable host devices:

This device complies with the RF exposure SAR test exclusion requirements for portable devices if a minimum separation distance of 6 mm to its antennas and radiating structures is kept. In addition, the device shall be used in such a manner that the potential for human contact during normal operation is minimized.

b) For mobile or fixed host devices:

This device complies with the RF exposure requirements for mobile or fixed host devices. However, the device shall be used in such a manner that the potential for human contact during normal operation is minimized.

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3.3.6 Labelling

The host device shall bear the following statement in a conspicuous location on the device:

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.**

If the FCC identification number is not visible when the TC643 transceiver module is installed inside the host, then the outside of the device into which the module is installed must also display a label referring to the enclosed module:

Contains FCC ID: NO9TC64327

3.4 FCC notes for a host subject to verification

For a host device assembled with the TC643 transceiver module and subject to 47 CFR Part 15 verification of class A digital devices, the following statements have to be included in the user manual and the host device has to be labelled as noted below. If the host device is subject to other authorization procedures or parts the appropriate requirements of these authorization procedures or parts apply.

3.4.1 Modification of equipment

See section 3.3.1.



3.4.2 Information to the user

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

3.4.3 Special accessories

See section 3.3.2.

3.4.4 RF exposure evaluation

See section 3.3.3.

3.4.5 Simultaneous transmission

See section 3.3.4.

3.4.6 Labelling

See section 3.3.6.

3.5 FCC notes for a host subject to certification

If the host additionally has radio parts inside for its own it is subject to certification. For a host device assembled with the TC643 transceiver module and subject to 47 CFR Part 15 certification, the following statements have to be included in the user manual and the host device

has to be labelled as noted below. If the host device is subject to other authorization procedures or parts the appropriate requirements of these authorization procedures or parts apply.

3.5.1 Modification of equipment

See section 3.3.1.

3.5.2 Special accessories

See section 3.3.2.

3.5.3 RF exposure evaluation

See section 3.3.3.

3.5.4 Simultaneous transmission

See section 3.3.4.

3.5.5 Labelling

In addition to the labelling requirements as described in section 3.3.6, the host device must also be labelled with the FCC Identifier (FCC ID) of its own certification:

FCC ID XZZYYNNNNN