



User manual

Transceiver module TC241



Table of Contents

FCC notes

IC notes

Intended use

Shielding provision of the RF part

Installation guidelines

Technical data

Antenna

Labelling

Manufacturer:

HBC-radiomatic GmbH • Haller Straße 45 – 53 • 74564 Crailsheim • Germany • Tel. +49 7951 393-0 • info@radiomatic.com.

HBC.radiomatic GmbH is not liable for any misprints or errors! – Specifications and design subject to change without notice.

® *radiomatic* and *radiobus* are registered German trademarks.

© 26 / 2012, HBC-radiomatic GmbH, 74564 Crailsheim, Germany

No part of this document may be reproduced in any manner whatsoever without the expressed written permission of HBC-radiomatic GmbH.

FC FCC notes

Part 15.21 Statement

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

Part 15.105 Statement

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 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.

RF Exposure Statement

Radiofrequency radiation exposure information

The radiated output power of the device is far below the FCC radio frequency exposure limits. Nevertheless, the device shall be used in such a manner that the potential for human contact during normal operation is minimized.

The modular approved transmitter complies with the RF Exposure requirements for fixed or mobile installations / categorised host devices where a minimum separation distance of at least 20 cm between the radiating part and any human body can be assured under normal operating conditions.



IC notes

RSS-GEN – User Manual Statements (English/French)

Licence exempt

This device complies with Part 15 of the FCC Rules and Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

1. this device may not cause interference, and
2. this device must accept any interference received, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie 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, et
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.



Note:

The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network, protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The Department does not guarantee the equipment will operate to the user's satisfaction. Repairs to certified equipment should be coordinated by a representative designated by the supplier. Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together.

This precaution may be particularly important in rural areas.



Note:

Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate. This product meets the applicable Industry Canada technical specifications.

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.

Intended use

The TC241 is a SHF transceiver for data transfer with fast transmit-receive switchover. The frequency range is 2402 – 2480 MHz, according to the hardware version for USA. This module is not sold separately, but is exclusively used for own HBC systems.

Shielding provision of the RF part

The RF component has been designed in this way that the user cannot have easy access. Efficient shielding of RF part is achieved by means of metal shielding. The metal shielding is soldered up with the circuit board.

Installation guidelines

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

Technical data

Technical Specification	
Common data	
Module code	TC241
Country identity	---
Label	CE, FCC, IC, GOST-R, ARIB
Antenna	MMCX socket
Number of RF channels	79
Frequency range	2402 – 2480 MHz
Channel spacing	1 MHz
Operating temperature range	-30 °C ... +80 °C
Modulation	GFSK, $\pi/4$ DQPSK, 8DPSK
Dimensions	(40 x 30 x 12) mm (TC20) (40 x 30 x 16) mm (TC38)
Weight	8 g



Transmitter specific data (@ 25 °C)				
Parameter	Min.	Typ.	Max.	Unit
Supply voltage	3.3	4.2	4.6	V
Parameter	Min.	Typ.	Max.	Unit
Power (ERP)	-	< 18	-	dBm
TX – output spectrum 20 dB bandwidth	-	900	-	kHz
Adjacent Channel Power $F = F_o + 2$ MHz	-	-	-20	dBm
Adjacent Channel Power $F = F_o + 3$ MHz	-	-	-40	dBm
Adjacent Channel Power $F = F_o > 3$ MHz	-	-	-40	dBm
Initial carrier frequency tolerance	-20	-	20	kHz
Out of band spurious emissions 0.030 – 1.000 GHz	-36	-	-	dBm
Out of band spurious emissions 1.000 – 12.750 GHz	-30	-	-	dBm
Out of band spurious emissions 1.800 – 5.100 GHz	-47	-	-	dBm
Out of band spurious emissions 5.100 – 5.300 GHz	-47	-	-	dBm
Supply current	15	45	76	mA
Receiver specific data (@ 25 °C)				
Parameter	Min.	Typ.	Max.	Unit
Supply voltage	3.3	4.2	4.6	V
Sensitivity (0.1% BER)	-	-90	-	dBm
Adjacent channel selectivity at 0.1% BER / $F = f_o + 1$ MHz	-	0	-	dB
Adjacent channel selectivity at 0.1% BER / $F = f_o - 1$ MHz	-	0	-	dB
Adjacent channel selectivity at 0.1% BER / $F = f_o + 2$ MHz	-	-20	-	dB
Adjacent channel selectivity at 0.1% BER / $F = f_o - 2$ MHz	-	-30	-	dB
Adjacent channel selectivity at 0.1% BER / $F = f_o - 3$ MHz	-	-40	-	dB
Adjacent channel selectivity at 0.1% BER / $F = f_o + 5$ MHz	-	-40	-	dB
Maximum input level (0.1% BER)	-20	-	-	dBm
Blocking 0.030 – 2.000 GHz	-10	-	-	dBm
Blocking 2.000 – 2.400 GHz	-27	-	-	dBm
Blocking 2.500 – 3.000 GHz	-27	-	-	dBm
Blocking 3.000 – 12.750 GHz	-10	-	-	dBm
Supply current	15	-	18	mA

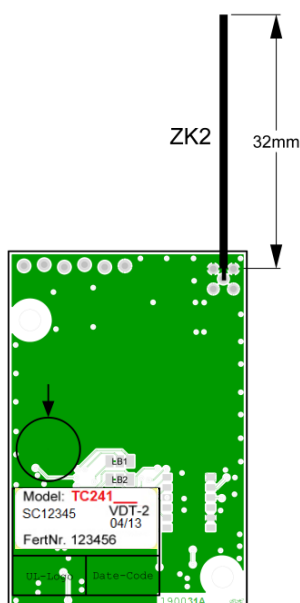
Antenna

The antenna is an omnidirectional straight dipole which has a gain of 2,14 dBi and an impedance of 50 Ω and is supplied with the module.

Other antennas with less gain are possible to use as well, e.g. a directly mounted $\lambda/4$ -antenna with a length of 32 mm.

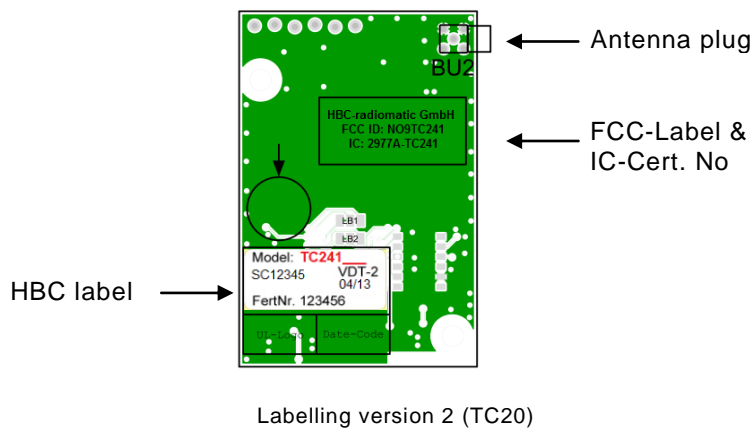
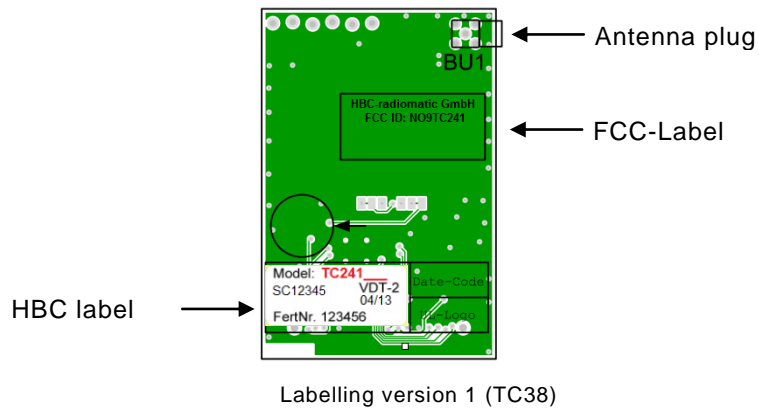
The module should be used in “mobile” hosts with a distance of 20 cm from the user to the antenna only.

The following picture shows the directly mounted $\lambda/4$ -antenna on the TC241-Module instead of the omnidirectional straight dipole, which has more gain:



TC20-version of TC241 with $\lambda/4$ -antenna

Labelling



**Contains FCC ID: NO9TC241
IC: 2977A-TC241**

Labelling for installing the module in another device



The end product (host) with the module built inside must be marked as follows:

Contains Transmitter Module FCC ID: NO9TC241 / IC: 2977A-TC241

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.

Module transmetteur ID IC: 2977A-TC241.

Son fonctionnement est soumis aux deux conditions suivantes: (1) cet appareil ne doit pas causer d'interférences nuisibles et (2) appareil doit accepter toute interference recue, y compris les interferences qui peuvent perturber le fonctionnement.

The following regulatory statements shall be printed in the user manual for the end product.

This device complies with FCC/IC radiation exposure limits set forth for an uncontrolled environment and should be installed/operated with minimum distance 20 cm between the radiator & your body.

FCC Information:

Changes or modifications to the equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. This equipment has been tested and found to comply with the limits for Class B digital device, pursuant to 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. 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 system off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the end product and receiver.
3. Connect the end product into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio TV technician for help.

Industry Canada Information:

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.

NOTICE: The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network, protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The Department does not guarantee the equipment will operate to the user's satisfaction. Repairs to certified equipment should be coordinated by a representative designated by the supplier. Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together.

This precaution may be particularly important in rural areas.

NOTE: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate. This product meets the applicable Industry Canada technical specifications.

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.
