Wireless System TX-Module
H3805－B
Model EP

Integration and Operation Manual

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Safety Instructions

RADIO TRANSMITTER PRODUCT ！

This product emission Radio-Frequency energy. Be carefully to integrate your system.
Make sure to be taken to cautions and specifications in this manual, especially operation environment for best performance. Must not exceed supply voltage limit, or may be damaged permanently. This Product conforms to world-wide ISM-standard radio-regulations, so you may operate according to your local regulations. ISM-band device operate in shared frequency with others, so Interference can't be ruled out.

SAFETY PRECAUTIONS!

Do not attempt to operate the equipment before studying the instruction manual and the accompanying safety instructions. Failure to do so may result in serious injuries.
Make sure that Safety Instructions is always accompanied the equipment!
This products are intended for professional use!
Do not place or use the equipment where it con be exposed to moisture, extreme electromagnetic fields, or in areas with flammable gases or dust!
Do not expose the equipment to rapid temperature changes in humidity conditions as this could lead to water condensation in the unit.
Equipment must only be serviced by authorized and competent service personnel!
Any modification will break the modular certification and require the module to be re-certified.

FINAL DISPOSAL

This equipment contains electrical and electronic components that could be harmful to the environment.
Follow local requirements for separate disposal of waste, for instance WEEE directive for electrical and electronic equipment on the European market, when the product's life has ended.

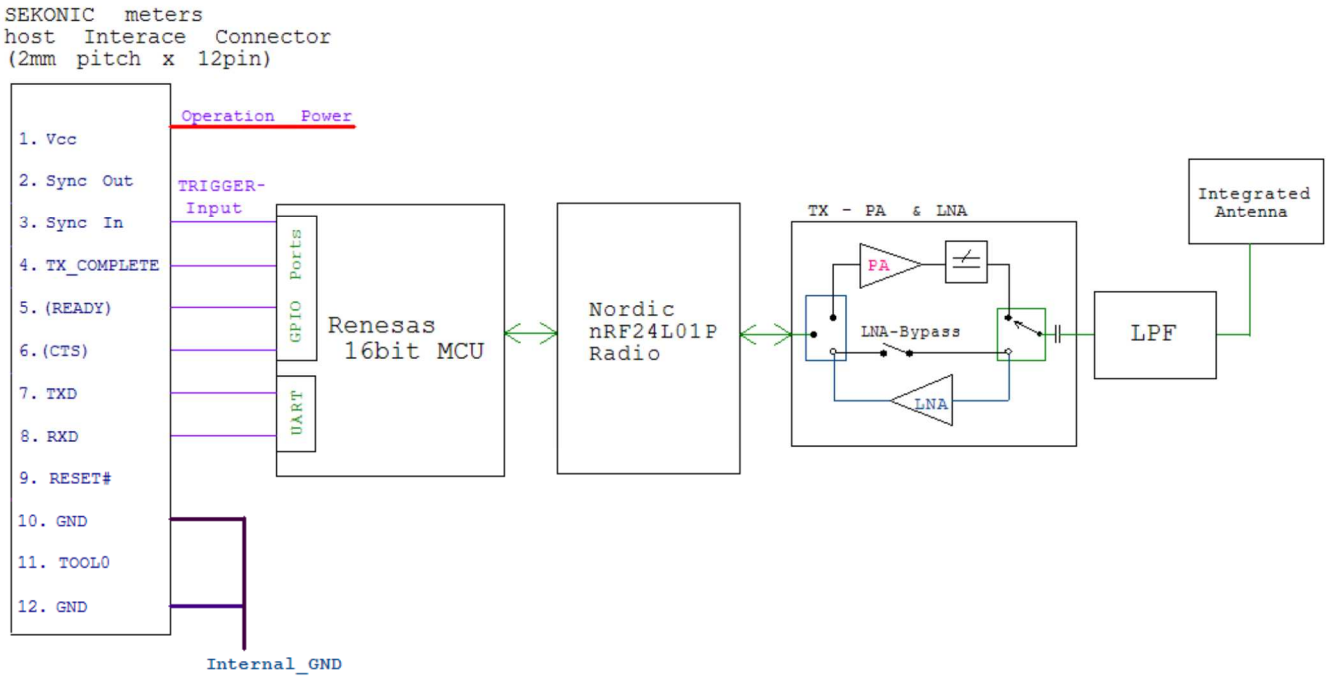
Introduction

WS TX-Module is wireless transmit function module, using 2.4GHz ISM-band.
It is originally designed to integration with SEKONIC Exposure-meter/Color-meter products, can remote-control for professional photography lighting equipment.
Radio control range performance is up to over 50m, in open-space.
WS TX-Module 'Model EP' is compatible with "elinchrom EL-SKYPORT wireless system" and "Phottix TTL flash, Strato II Receiver etc." ,under agreement of SEKONIC-elinchrom-phottix collaboration.

Chapter 1 General Description

WS TX-Module Model EP is using Nordic high performance RF-Transceiver chip with +10dBm power amp, and controller core (MCU) is a 16-bit renesas microprocessor, with integrated (on-board pattern) Antenna, and function-feature set is compatible both EL-SKYPORT system and Phottix system.
But you can not use both feature-set simultaneously, use one-feature set selected by host using 'mode-set command'. Since 'Elinchrom Skyport' and 'Phottix' has no air-interface compatibility.
Host Interface is a 3V-UART communication and simple TRIGGER-SW input.

System Diagram



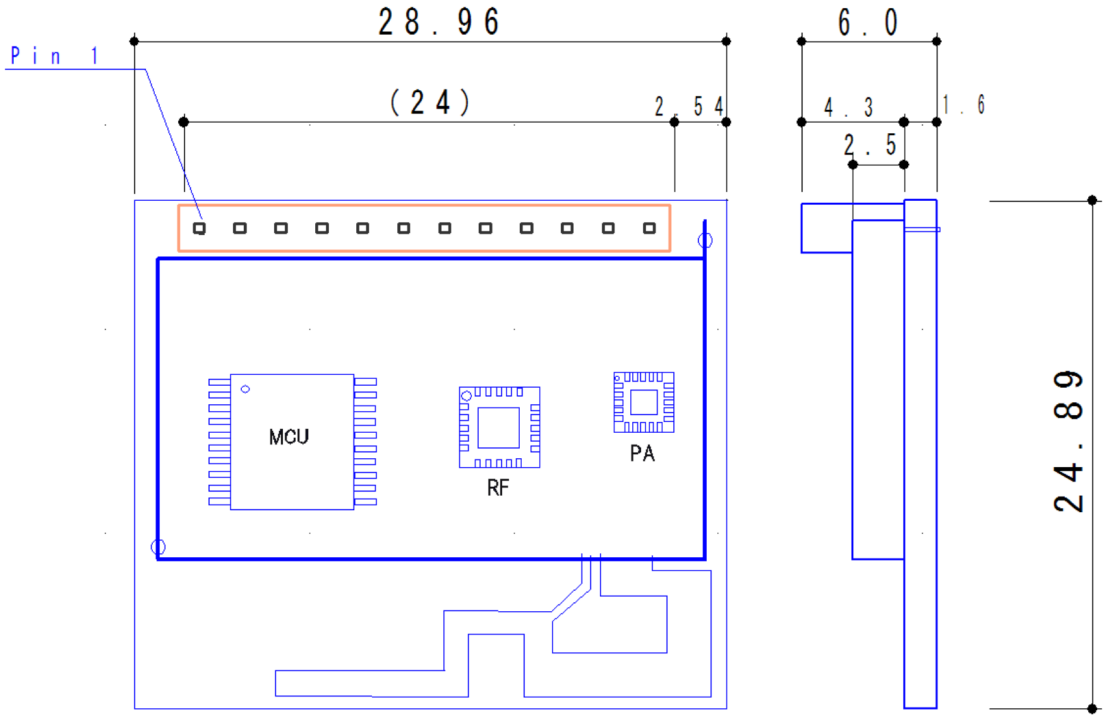
Chapter 2 Hardware Description

Dimensions

29 x 25 x 6 mm +/- 0.5mm [Width,Length,Height]
Weight : approx. 8g

Product Image

Mechanical Drawing



Chapter 3 Electrical Characteristics

3.1 HOST Interface

J1 2.0mm pitch/12pin

Pin	Function	
1	Vcc	DC Power
2	(SYNC_OUT)	Connected to GND Internally
3	SYNC_IN	TRIGGER Input (Active L)
4	TX_Complete	Status Output (Active L)
5	READY	Status Output (Active L)
6	CTS	Status Output (Active L)
7	TXD	UART TxD (Output)
8	RXD	UART RxD (Input)
9	RESET	RESET INPUT (Active L)
10	GND	
11	(reserved)	Keep open (not to connect)
12	GND	

Interface Description

The interface to the host-system is implemented as a 12 pin male connector. Connector part is JC HSW2W-S12G, recommended matching pin-header is IK210W39-S12G-H1.5 (or compatible 2.00mm pith, 3.9mm-height square-pin type header pin.)

UART Serial Interface

The UART is using pins 7,8. Signal level is 3V-CMOS level, these signals can directly connect to host MCU. If you wish to connect to RS232 line, must use a TTL(CMOS) level converter (like a FTDI converter dongle).

Serial characteristics : 38400, 8, N, 1 (no flow control) [firmware for L-478 Installation]

Connecting the module to an RS232 line without a level converter may cause permanent damage to the module.

For available command list and control session sequences, please refer to the Control Command Spec documentation.

RESET Interface

RESET Interface forces control MCU to hardware-reset (active low, minimum 10uS).
The following conditions also reset on the module (MCU).

- Power on reset
- Low voltage (Brown Out) detected from internal MCU supervisory function.
- Reset by Software (command)

3.2 Operating Conditions

Parameter	Min	Max	Unit
DC Supply	2.7	3.3	V
Current		0.1	A
Temperature		65	℃
Humidity		95	% RH

Chapter 4 Radio Characteristics

Parameter	Min	Typ.	Max	Unit
Frequency Range	2402		2478	MHz
Channel Step		1.0		MHz
Frequency Stability	-96		+96	kHz
Transmit Power	7	8.5	10	dBm
Antenna(Integrated) Gain		0		dBi

The module have two operation features, one is compatible to "elinchrom system"(Elichrom-mode), another is compatible to "Phottix system" (Phottix-mode). Both feature sets are commonly based on, Nordic ShockBurst Protocol, but difference in air-interface detail, defined by each system independently.

Eg. System channel number to Physical Frequency mapping.
Channel /Logical grouping..
Transmit Data Rate
Air-frame data structure (Command bit assign and data-length, etc.).

Air-interface Definitions (and differences) are as follows.

Parameter	Elichrom Mode	Phottix Mode	Unit
Modulation	GFSK		
Frequency Channel	1 : 2456 11:2444 2 : 2458 12:2439 3 : 2460 13:2434 4 : 2462 14:2429 5 : 2469 15:2424 6 : 2471 16:2419 7 : 2473 17:2414 8 : 2475 18:2410 9 : 2478 19:2407 10:2449 20:2404	1 : 2464 2 : 2464 3 : 2464 4 : 2464	MHz
Data Rate	Speed : 1000 Normal : 250	1000	Kbps
Grouping	4 group + All (Group bit cannot be combined.)	4 group bit (Any combination of bits can be assigned.)	

The modules default operation mode is Elinchrom-mode, and may selectable to Phottix-mode by host, using mode-set command.

More detail information of operation mode, please refer to command reference documentation.

Chapter 5　Internal mechanism

Boot-up

This module is originally intended to integration for SEKONIC L-478 exposure meter product.
As of nature, if the module is cold-started (or hardware reset), the module firmware initialize internal resources. After complete initialize, send boot-up message to host on UART interface. Boot-Up message contains Module ID, hardware and firmware revision code and serial number.

Idle-state

After boot-up state, the module enter to idle-state.
In idle state, the module firmware wait a command from host or TRIGGER signal. If no host command/TRIGGER Input for 10mS-duration, the module firmware go into Sleep State (HALT State).

Sleep-state

In the Sleep state, the module control-MCU is in HALT State.
So the module firmware cannot run until an interruption is occur. (TRIGGER or UART)

TRIGGER-Operation

The module can get TRIGGER Input signal from host in any state, include HALT state.
TRIGGER Input (SYNC-IN) signal can acknowledged, minimum 10uS duration low-level.
After TRIGGER Input is acknowledged, module firmware send a radio packet, 'RF-Trigger-Command'.
'RF-Trigger Command' frame, defined by target feature set(air-interface), is to trigger Strobo-flash(s).

TRIGGER Input is must not allowed continuously low state.　To be lesser to 1mS-Low.
If no other input-low after process-complete, the module firmware go into idle state.

Command-Operation

The module can get UART Command from host in any state, include HALT state.
The module firmware validate the received command, and process the command.
　eg.　Send a command on radio/ status report/ RF-mode control (change)

If no other command after process one command, the module firmware go into idle state.

Send a radio packet state

In send a radio packet state, the module send a packet-frame, frame content is defined by feature set.
After complete send-operation, the module enters idle state.

Chapter 6 Integration (Installation)

WS TX-Module is originally designed for installation to SEKONIC L-478 series exposure-meter. However, you can integrate (install) the module to any device, but appropriate care shall be need.

Mechanical Integration

You must consider host-side space and dimensions against to the module (mechanical) dimensions and Host interface connector height to be fit. Also, the module has integrated Antenna, so you need to keep instructions bellow, to perform the radio performance.

Space or Clearance :

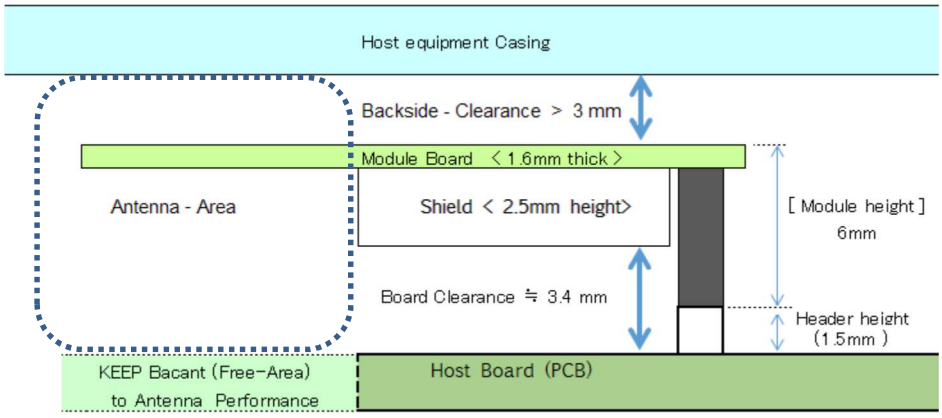
Back-side - The module needs at least 3mm back-side clearance. This clearance need to keep the antenna performance, or the antenna – gain will be degrade.
(ie. Radio communication distance will be shortened.)

Host-Side - The modules Host-side has an RF-Shield which protects circuit/electronic parts I inside the shield.

Antenna area/or space

For best to Radio performance, keep in mind to Antenna Area will be needed, Metal-Plate (or structure) may shadow the module antenna, cause some shield like effect. And, Host board must be free space (or no part-mounted).

[Installation space requirement]



Electrical Integration

Host side Connector : suitable pin-header to the module connector, 2.0mm pitch/ 0.5mm-sq. pin.
The minimum connections needed for operation are:

PIN	Function	Comment
1	Vcc	Operation Power source
3	Trig	Active Low (In)
4	TX Complete	Active Low (Out)
10,12	GND	Ground

Full functional connections are:

PIN	Function	Comment
1	Vcc	Operation Power source
3	Trig	Active Low (In)
4	TX Complete	Active Low (Out)
7	TXD	Command Serial out
8	RXD	Command Serial in
9	RESET	Active Low
11	(Reserved)	(No connect.)
10,12	GND	Ground

Chapter 7 Radio Certification

World-wide Usage of Radio Spectrum Regulation

WS-TX-Module Model EP operates on the license-free 2.4GHz ISM Band (Short Range Devices).

This band may be used in most part of the world. Regional restrictions may apply in most countries/region.

NOTE!

Refer to national regulations for the region where the WS-TX-Module shall be operated and make sure that they are followed.

Europe

WS-TX-Module Model EP has been tested to R&TTE Directive assessed radio module, that is CE marked and has been manufactured and tested with intention of being integrated into a final product.

The module has been tested to R&TTE Directive 1999/5/EC Essential Requirements for Health and Safety(Article(3.1(a)),and Radio(Article3.2) .

Harmonized standards applied:

Air Interface of the radio systems pursuant to article 3(2)

EN 300 440 v1.6.1(2010 08)

Safety requirements concerning human exposure to electromagnetic compatibility according to article 3(1)a:

EN 62479

The manufacturer must maintain a copy of the module documentation and ensure the final product does not exceed the specified power ratings, antenna specifications, and/or installation requirements as specified in the user manual. All test reports are available, please contact our sales stuff.

The “CE” marking must be affixed to a visible location on the OEM product. The CE mark shall consist of the initials “CE” taking to following form:

- If the CE marking is reduced or enlarged, the proportions given the above graduated drawing must be respected.
- The CE marking must have a height of at least 5mm except where this is not possible on account of the nature of the apparatus.
- The CE marking must be affixed visibly, legibly, and indelibly.

More detailed information about CE marking requirements you can find at “DERECTIVE 1999/5/EC OF THE EUROPEAN PARLIAMENT AND THE COUNCIL” on March 1999 at section 12.

Once approved and CE marked, the system may be sold and used EU/EEC countries without the need to have country-specific approval tests.

United States and Canada

FCC and Industry Canada

Compliance Statement (Part 15.19)

This device complies with Part 15 of FCC rules and RSS-210 of industry Canada.
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.

Warning (Part15.21)

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

RF exposure compliance

1) To comply with FCC/IC RF exposure compliance requirements, a separation distance of al least 20 cm must be maintained between the antenna of this device and all persons.
2) This transmitter must not be co-located or operation in conjunction with any other antenna or transmitter.

Requirement to end product

This module must be integrated only by OEM integrators under the following conditions.

(1) OEM integrator has to be aware not provide information to the users regarding how to install or remove this module in the Users Manual of the end product which integrate this module.
Installation by end users is strictly prohibited.

(2) Antenna
OEM Integrator shall use this module without any modifications including antenna.
OEM Integrator must make sure that 20cm minimum separation is maintained between users and the antenna.

(3) Co-location
This module must not be co-located in conjunction with any other antenna or transmitter. The module integrator shall obtain FCC approval for the end product, if the module is used for co-location operation.

(4) Markings
To satisfy FCC/IC exterior labeling requirements, the following text must be places on the exterior of the end product.

Contains Module FCC ID: 2AGF8-TXMEPA, IC:20931-TXMEPA

Any similar wording that expresses the same meaning may be used.

If Host device in which is integrated this module, has a built-in display screen, OEM integrator can use e-label on the host display (Electronic labeling) instead to physical labeling.
Since this module not have a secure electronic exchange interface to host with authentication, host manufacturer can display the FCC ID information on host by factory-encoding the FCC ID of the module. Factory encoding must be secure and locked by the manufacturer and not alterable by any third parties. The Programmed information must display the above statement-string or equivalent.

(Contains FCC ID.....)
For detailed information, please consult us or see FCC website.(http://www.fcc.gov/oet/info/rules/)

(5) Caution to user for modification

The following caution is expressed on the user's instruction manual.

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

(6) Compliance statement to FCC

The following statement is expressed on the user's instruction 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.

Ce dispositive est conforme aux norms RSS-210 d'Industrie Canada.
L'utilisation de ce dipositive est autorisée seulement aux conditions suivantes;

1) il ne doit pas produire de brouillage at
2) l'ulitisateur de dispositive duit être prêt à accepter tout brouillage radioélectrique recu, même si ce brouillage est susceptible de compromettre le fonctionnement du dispositig.

The term 'IC' before the certification/registration number only signifies that the Industry Canada technical specifications were met.

Les lettres 'IC' n'ont aucune autre signification ni aucun autre but que d'identifier ce qui suit comme le numero de certification/'d'enregistrement d'Industrie Canada.

> Le présent appareil est conforme aux CNR d'Indus-trie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux con-ditions 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.

HOKUBU Communication & Industrial
Transmitter
MODEL : Model EP
PRODUCT NO:H3805-B
FCC ID : 2AGF8-TXMEPA
IC: 20931-TXMEPA
Made in JAPAN

Change History

Revision	Date	Description / Changes ,	Page(s)
1.0	2015.12.15	Initial release.	Total 13

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