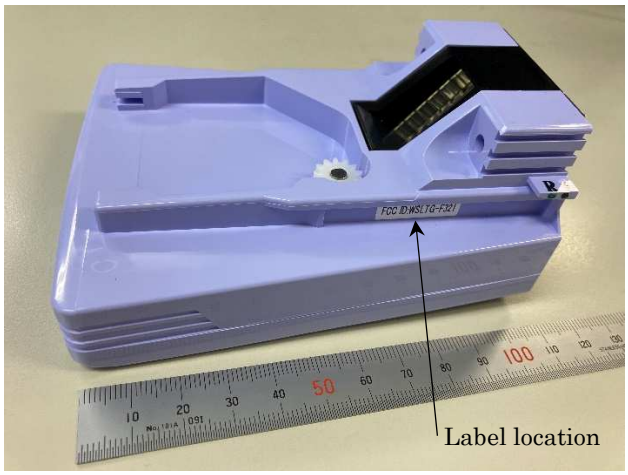
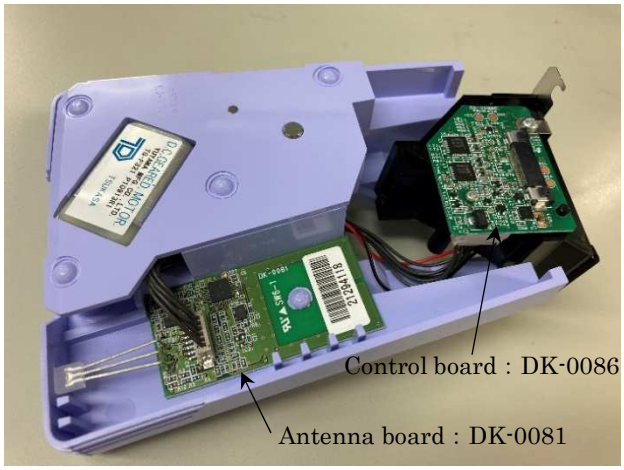
User Manual

TABLET CASSETTE BASE
MODEL TG-F321

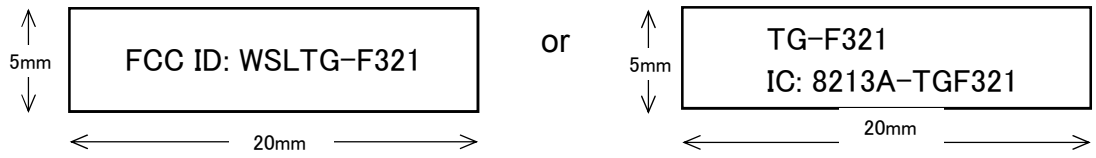
The purpose of this document is to provide an overview of the Tablet Cassette Base (TG-F321) and how to use it.
This document also explains the correct way to integrate the TG-F321 into the final product and includes instructions to avoid unexpected problems.
The TG-F321 consists of an antenna board (DK-0081) with antenna layout and RFID reader/writer IC, etc., and a control board (DK-0086) with microcontroller, etc. for interfacing the host system and the antenna board. It complies with FCC Part 15C, RSS-210 Issue 10 and RSS-Gen Issue 5.





TG-F321 : Width 93, Depth 113, Height 51 (mm)

Wireless Certification Label（Character height: approx. 2mm）



TABLET CASSETTE BASE (TG-F321)

1 Description

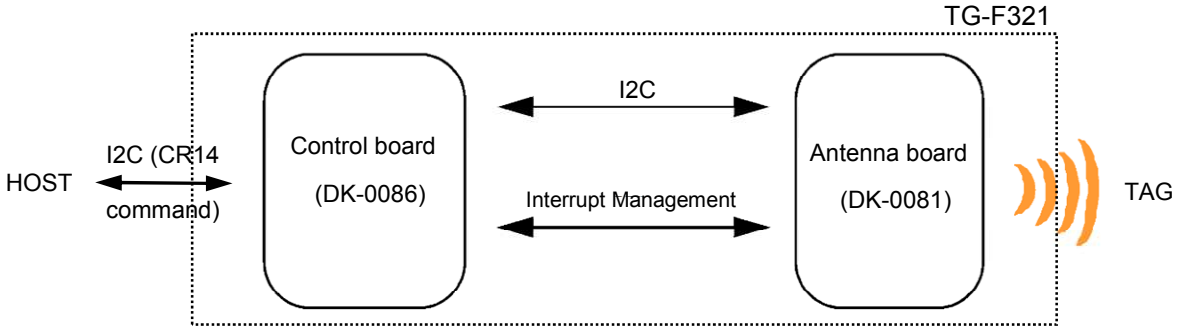
The TG-F321 is an integrated transceiver IC for contactless applications.

The TG-F321 manages the frame coding and decoding in Reader mode for standard applications.

The TG-F321 embeds the Analog Front End for 13.56 MHz Air Interface.

The TG-F321 supports ISO/IEC 14443 B protocols.

Figure 1. TG-F321 application overview



2 Commands

2.1 Command format

Fields <Cmd>, <RespCode> and <Len> are always 1 byte long.

<Data> can be from 0 to 255 bytes.

- Direction: HOST to TG-F321

<CMD><Len><Data>

- Direction: TG-F321 to HOST

<RespCode><Len><Data>

Note: EchoCode is an exception as it has only one byte (0x55).

2.2 List of commands

Table 1 lists the command set available for standard use.

Table 1. List of commands

Code	Command	Description
01	IDN	Requests short information about TG-F321 and its firmware version.
02	Protocol Select	Select communication protocol and specify some protocol-related parameters.
04	SendRecv	Sends data using previously selected protocol and receives the tag response.
07	Idle	Switches the TG-F321 into TagDetect or Hibernate state and specifies under which condition to exit from these states.
08	RdReg	Reads wakeup flags.
0A	BaudRate	Sets UART baud rate.
55	EchoCode	Performs a serial interface echo.
Other codes		ST Reserved

3 Power management and operating modes

3.1 Operating modes

The TG-F321 has 2 operating modes: Idle and Active. In Active mode, the TG-F321 communicates actively with a tag or an external MCU. Idle mode includes two low consumption states: Hibernate and Tag Detector.The TG-F321 can switch from one mode to another.

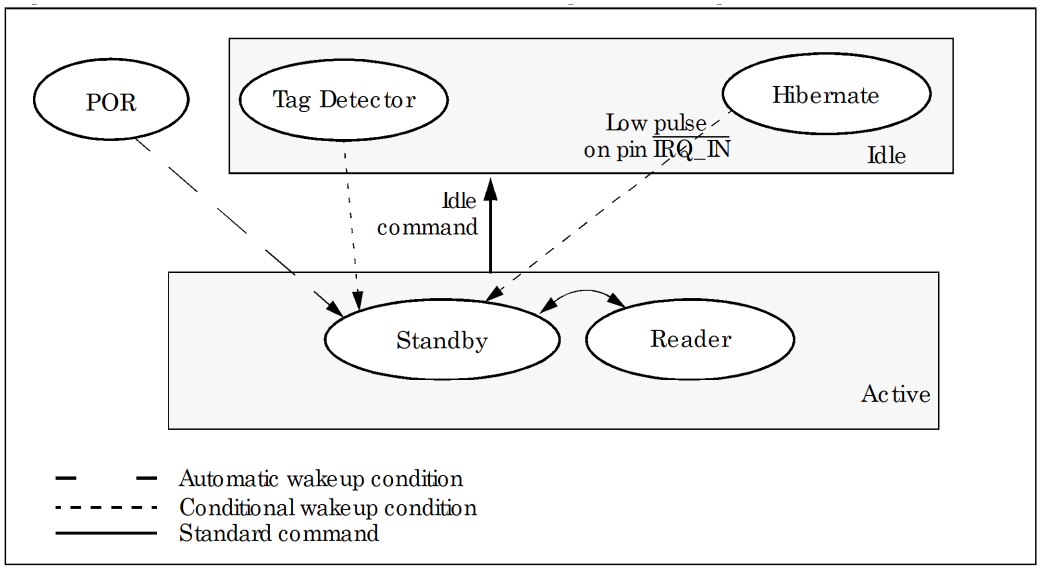
Table 2. Operating modes

Mode	State	Description
Idle	Hibernate	Lowest power consumption. TG-F321 has to be waken-up in order to communicate. Low level on $\overline{\text{IRQ\_IN}}$ pin is the only wakeup source.
	Tag Detector	Low power consumption, Tag detection. Wakeup source is configurable: – Timer – $\overline{\text{IRQ\_IN}}$ pin – $\overline{\text{SPI\_SS}}$ pin – Tag detector LFO (low-frequency oscillator) is running in this state.
Active	Standby or Reader	Main communication mode. HFO (high-frequency oscillator) is running, TG-F321 is able to decode and execute commands from external MCU. It can switch the reader ON and OFF and communicate with a tag or an external MCU.

Hibernate and Tag-Detector states can only be activated by a command from the external MCU. As soon as Application environmentany of these states are activated, the TG-F321 can no longer communicate with the external MCU. It can only be woken up.

The behavior of the TG-F321 in 'Tag-Detector' state is defined by the Idle command.

Figure 2. TG-F321 initialization and operating state change



4 Electrical characteristics (Analog Front End Section)

4.1 Absolute maximum ratings

Table 3. Absolute maximum ratings

Symbol	Parameter	Value	Unit
VCC_5V	Supply voltage (Main)	6 (Typ.5V)	V
VCC_12V	Supply voltage (Motor driver)	18 (Typ.12V)	V
T_A	Ambient operating temperature	-20 to +50	℃
T_{STG}	Storage temperature	-30 to +60	℃
V_{ESD}	Electrostatic discharge voltage according to JESD22-A114, Human Body Model	2000	V
P_{TOT} (1)	Total power dissipation per package	1	W

1. Depending on the thermal resistance of package.

Note: Stresses listed above may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of the specification is not implied.
Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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.This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.
FCC RF Exposure requirements:
This device and its antenna(s) must not be co-located or operation in conjunction with any other antenna or transmitter.

15.19(a):

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.

U.S. Responsible Party:	TianHeng Consulting, LLC 392 Andover Street Wilmington, MA 01887, United States
Contact Person:	Hualing Dong Phone: +1-617- 997-4010 Email: info@tianhengconsulting.com
Product Name:	Tablet cassette base
Model Number(s):	TG-F321

Industry Canada Statement:

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.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation,
Sciences et Développement économique 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;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.