User Manual
Temperature Monitoring System

Model name : MT110H

seers

Table of Contents

1. Product Introduction

1.1. Intend of Use

MT110H is a system for measuring body temperature by detecting infrared ray emission of the forehead using infrared sensors. MT110H is used to measure, but is not limited to, patients with suspected abnormalities in body temperature.

- Product name : Temperature Monitoring System
- Model name : MT110H
- Manufacturer : Seers Technology Co., Ltd.

1.2. Intended purpose of the device

Intended Use
The MT110H is used to measure the body temperature by detecting infrared ray emission.
Indication for use
No limitation

1.3. Intended Patient population

No limitation for age, weight, health, nationality, and patient state.

1.4. Intended part of the body or type of tissue applied to or interacted with

1) Intended part of the body : forehead / armpit / wrist
2) Type of tissue : Skin

1.5. Intended user profile

1) Education
   - Minimum : Patient with at least 10 years education* can use the product alone, and Patient without at least 10 years education (ex, child, etc.) or Patient who need help (ex, senior) can use it under the care of their parents or guardian
   * education : fundamental education such like early childhood, elementary school, etc.
   - Maximum : No maximum

2) Knowledge
  - Minimum : It is necessary to understand the numerical values and the overall description in Korean or English manual.
  - Maximum : No maximum

3) Language understanding
 - Be able to understand the numerical values and general technical information presented in the user manual written in Korean or English

4) Experience
 - No special experience needed and no maximum

5) Permissible impairment
 - Mild reading vision impairment or vision corrected to log MAR 0.2(6/10 or 20/32)
 - Impaired by 40% resulting in 60% of normal hearing at 50Hz to 2kHz

6) Others
 - At least the temperature graph must be confirmed

1.6. Use Environment
  1) Environment
   - General : Home, Hospital environment, Indoor, Outdoor
   - Physical
    (1) Temperature : 15 ~ 40℃
    (2) Relative Humidity : 15-93%
    (3) Atmospheric pressure : 700-1060hPa

  2) Frequency of use
   - 24hours per a day (continuously)

  3) Mobility
   - hand-held equipment

1.7. Operating principle

MT110H measures body temperature. That automatically detects infrared radiation of the skin by the infrared sensor.

1.8. Explanation of Symbols

Symbol	Explanation
⋏	Manufacture
	Date of manufacturer
UDI	Unique Device Identifier
LOT	Batch code
SN	Serial number
	Keep dry
	Temperature limit
	Humidity limit
	Atmospheric pressure limit
	Refer to User Manual
⚠	Caution
	Type BF Applied Part
IP22	Protection against external dust 12.5 mm in diameter. Protection against water drops falling in a range of 15 degrees from vertical.
FC	Federal Communications Commission

$((\text{\textapprox}))$	Non-ionizing radiation
⌧	WEEE mark

2. Medical Safety

Before using the infrared thermometer MT110H please read the various safety warnings in this [Medical safety]. Safety warning alerts you with symbols and letters about the dangers that may injure the operator or the patient or MT110H.

This manual classifies the categories of possible hazards into the following three classes.

🚫	**Contraindication** Ignoring this indication and handled the product incorrectly, can create an imminent risk of death or serious injury to the user.
⚠️	**Warning** Ignoring this indication and handled the product incorrectly, may result in death or serious injury to the user.
⚠️	**Caution** Ignoring this indication and handling the product incorrectly can result in personal injury or property damage.

🚫 **Contraindication**

- Keep out of reach of children under 12 years.
- Use this product only for its intended purpose, and do not use it for any purpose other than its intended use. For children, carefully follow the safety precautions.

⚠ Warning

- Do not put this product in water or other liquids.
- Keep this thermometer away from extreme temperatures (below -25℃ or above 70℃) or humidity (above 95% non-condensing relative humidity). If the thermometer was stored at a place that is hotter or colder than the environment that is going to be used, store it in the same environment to be measured for about 10 minutes before measuring the body temperature.
- Do not use the thermometer if there are any signs of damage to the core module or infrared sensor. If damaged, do not attempt to repair the product. Do not insert sharp objects into the surface of the body temperature measuring part.
- This thermometer is made of high quality precision parts. Be careful not to drop the thermometer or give a severe impact. Do not bend over the Core Module.
- This thermometer is a general household medical device. Measuring body temperature with this product cannot substitute the treatment or consultation of a specialist or pediatrician. If there is an abnormality in the measured body temperature, be sure to visit a specialist or pediatrician.
- Please be aware that children may be choked by swallowing the small parts. Please keep the device away from reach of infant or child.

⚠ Caution

- Elevated body temperature can be a sign of serious illness in elderly people, people with weakened bodies, adults with poor immune systems, newborns, and infants. If these people have elevated body temperature, please consult a specialist.
  - -Newborn babies and infants under 3 months (If the body temperature is over 37.5℃, consult a doctor immediately)
  - Elderly patients over 60 (some patients may be insensitive to

fever or have no symptoms)

- Diabetes or immunodeficiency patients (e.g. HIV positive, taking chemotherapy, chronic steroid therapy or splenectomy)
- Lying patients (e.g. home care patients, stroke patients, chronic disease patients, patients recovering after surgery)

- Do not use this thermometer for premature babies.
- Do not use this thermometer to determine hypothermia. Do not let children measure body temperature without parental supervision.
- If you have symptoms such as irritable symptoms, vomiting, diarrhea, dehydration, loss of appetite and behavior, seizures, muscle pain, chills, stiff neck, or urination pain, seek medical attention even if you have no fever.
- People with no fever and normal body temperature may need to be examined. People who are taking antibiotics, painkillers, or antipyretics should not assess the severity of the disease by body temperature alone.
- Do not modify the thermometer without manufacturer's approval.
- If the person who will measure the body temperature comes indoor from outside, or the thermometer was stored at a place that the temperature environment is different, please use the thermometer after 30minutes.
- If a person is struggling when measuring body temperature, measure the body temperature after calming because if the distance between the skin and the sensor is not constant, it may cause measurement error.
- Do not allow infants and toddlers to suck the thermometer by mouth or touch it with wet hands.
- Body temperature sensors should always be kept clean and undamaged.
- Since it may affect the deterioration of the product earlier than the expected service life, it is recommended to manage it in a place where humidity and temperature do not rise, and where there is no adverse effect from direct sunlight or dust.
- If each component (Core module, main body) with deteriorated performance is used, an error may occur in the diagnosis, and

treatment timing may be missed if necessary. To avoid deterioration of the performance of each component, read the instruction manual thoroughly as recommended by the manufacturer before use.

- Since pets, pests and/or children touch, bite, and suck, problems such as damage and/or deterioration of the product may occur, so it is recommended to keep them out of access.

3. Components and Installation

3.1. Core Module
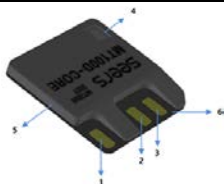
< Core Module>

Label	Name	Description
1	Antenna terminal	Terminal for external antenna connection
2	Power -	External power input terminal(Ground)
3	Power +	External power input terminal(DC 3.0V)
4	Infrared sensor	Infrared sensor for body temperature measurement
5	EMC Molding	EMC (Epoxy Molding Compound) Molding to protect circuit parts
6	PCBA	PCB with circuit parts mounted and fixing the molding part

3.2. Main body

Display GUI icon			
motiCARE™ +Temp	--.-	▣	🔽
GUI 1	GUI 2	GUI 3	GUI 4
▲✦ ⬢	°C °F	🕸 📱	☁ 🗄
GUI 5	GUI 6	GUI 7	GUI 8
Err	Hi Lo	🔂	⫶⫶ 🔋
GUI 9	GUI 10	GUI 11	GUI 12

번호		명칭	설명
1	SW1	Power ON/OFF and measurement mode change button	
2		SW2	Light ON/OFF and temperature unit(℃↔℉) change button
3		Display	Display the measured temperature
		GUI 1	Initial boot image
GUI 2			Waiting screen after the power is on
GUI 3			Core module is not inserted or recognized.
GUI 4			Display when the core module is removed during operation
GUI 5			Measurement mode(body temperature, objects, ambient)
GUI 6			Temperature unit(℃↔℉)
GUI 7			Peripheral connect trying UI(BT) / Peripheral connect success UI(Mobile)
GUI 8			DFU enter FW download mode UI
GUI 9			Failed to measure the temperature
GUI 10			Display when the specified temperature range is exceeded (High, Low) Ex) The temperature of the object to be measured is too high or too low
GUI 11			Need to replace the battery
GUI 12			Battery status. level 1~4 UI

3.3. Component

Main body	Core Module	Manual
	Battery	

Main body	MT110H

11

battery	3V lithium battery (CR2032)
Core Module	MT100D-CORE
Manual	User manual

3.4. How to install MT110H

  1) Insert Core module to the back of the main body. (Check the direction of the Core module and insert it direction correctly).

  2) How to insert Core Module
  - Open the cover of the main body.
  - Insert the core module with the terminal part facing down.
  - Close the cover so that the core module does not come off.

  ⚠ If the Core Module is not inserted properly, the product may be damaged.

3.5. Precautions before use

  1) Before operating this product, please read the user manual.
  2) Confirm that there are no problems with using the product according to the product precautions.
  3) This device can be used for everyday activities as well as during sleep. However, you should stop using and remove the device if;
- Bath or swim
- Aircraft boarding
- Taking MRI, CT, X-ray

4. How to use MT110H

* Operator is patients generally. If the patient needs help, parents or guardian can be the operator.

4.1. How to use

1) ON / OFF

(A) ON

Insert the Core Module and battery to the main body, and press the button(SW1) for about 3 seconds. Then power is turned on.

(B)OFF

Don't input for 1 minute, or press the button(SW1) for about 3 seconds. Then power is turned off.

2) Insert

(1) Core Module

- Open the cover of the main body.
- Insert the core module with the terminal part facing down.
- Close the cover so that the core module does not come off.
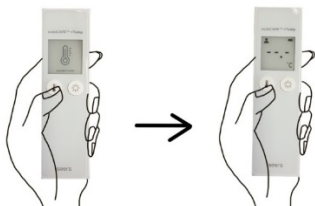
(2) battery

- Open the cover of the main body.
- Insert the battery with the positive poles part facing up.
- Close the cover so that the battery does not come off.

3) Measuring

 1) Body Temperature

 (1) Turn on the thermometer and wait until three dashes (-.--℃)
 indicating that the temperature is ready to be taken are displayed on the
 screen.

 (2) When the basic screen appears, put the thermometer close to the
 human body and press the SW1($\textcircled{\textbf{!}}$) button.


 (3) Don't move until the body temperature measurement is completed.
 (4) Check the body temperature on the screen surface.

 (5) If the power is turned on and there is no input for a minute, the
 power is automatically turned off.
 (6) If you want to illuminate the screen, press SW2($\textcircled{\ast}$) while the power is
 on, and the auxiliary lighting is turned on for 10 seconds (reduced
 brightness after 5 seconds).
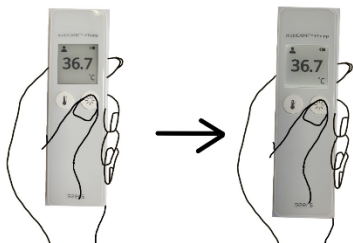
(7) If SW1(🌡) is pressed for about 3 seconds, the power is turned off.

(8) When SW2(❄) is pressed while SW1(🌡) is pressed, the temperature unit is changed, and the measured value is displayed based on the changed temperature unit from the subsequent measurement.
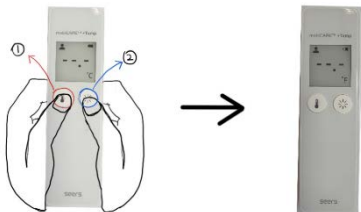
(9) If the remaining battery is insufficient when the power is turned on by pressing the SW1(🌡) button, the low battery screen(GUI 11) is displayed and the power is turned off after about 5 seconds.

(10) When power is turned on by pressing the SW1 button without the Core Module inserted, the Core Module non-insert screen(GUI 3) is displayed and the power is turned off after about 15 seconds.

(11) When the Core Module is disconnected while the power is on, the Core Module removal screen(GUI 4) is displayed and the power is turned off after about 15 seconds.


2) Objects/Ambient

(This function is independent of the performance of the medical device)

(1) Turn on the thermometer and wait until three dashes (-.--℃) indicating that the temperature is ready to be taken are displayed on the screen.

(2) Power is on, and if SW1( ) is pressed while SW2( ) is pressed, a cube-shaped icon(GUI 5) appears on the screen and becomes an object measuring mode.

(3) If you repeat (2) in the object measurement mode, a diamond-shaped icon(GUI 5) appears on the screen and becomes a spatial measuring mode.
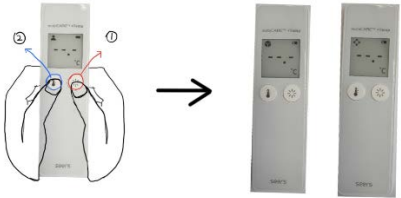
(4) Set the measuring mode according to the desired measurement, and when three dashes (-.--°C) indicate that they are ready to take the temperature on the screen, bring the infrared sensor close to the object or ambient to be measured and press the SW1( ) button.

(5) Don't move until the body temperature measurement is completed.

(6) Check the temperature on the screen surface.

16
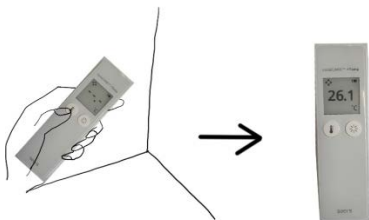
(7) If the power is turned on and there is no input for a minute, the power is automatically turned off.

3) Temperature data transmitted/measured to the gateway may be transmitted to a separate gateway using the BLE function in the thermometer.

4.2. Maintenance and Storage
1) As the Core Module is the reusable component, keep the Core Module in a case that protects the product.
2) Remove the discharged battery and insert a new battery before measurement begins.
3) After use, wipe the device with a soft, dry cloth.
4) Using the equipment for a long period of time may cause a malfunction due to dust or debris.
5) If the device is not to be used for a long time, remove the Core Module from the main body and store it.

4.3 User notification
If a problem occurs while using the product, check the following carefully and take the necessary action.
If the same problem occurs again, please contact the place of purchase or Seers Technology Co., Ltd

Problem	Cause	Solution
If it doesn't work even if you press the power button for more than 3 seconds	Battery status	Replace the battery and use it.
If the temperature is not measured	Check the Infrared sensor part	Check if there is a foreign object on the infrared sensor.

4.4 Specifications

Model	MT110H	
Size	Main Body : 138mm x 40mm x 9.0mm(Height)	
	Core Module : 16mm x 15mm x 1.6mm(Height)	
Weight	Main Body : 51.75g (without battery)	
	Core Module : 3.02g	
Battery life time	Within 30 days (depends on measurement period)	
Expected service life of Core Module	2 years	
Protection against electric shock	Internal power supply equipment, BF type	
Supply voltage (main body)	3V d.c. (Coin Battery)	
Communication	Data communication	Bluetooth 5.1 (within 10m distance)
Performance	Measurement range	34.0℃ ~ 43.0℃
	Resolution	0.1℃
	Accuracy	36.0-39.0℃ : ±0.2℃
		34.0-35.9℃ : ±0.3℃
		39.1-43.0℃ : ±0.3℃
Software	Device Firmware	V 1.0.0
	MAIN Processor	BLE chip
	Bluetooth	5.1
Operating Environment		Operation	Storage/Transport
	Temperature	15 ~ 40℃	-25 ~ 70℃

	15 ~ 93%R.H	10 ~ 95%R.H
Humidity	(Non-condensing)	(Non-condensing)
Atmospheric pressure	700 ~ 1060 hPa	700 ~ 1060 hPa

5. Labels and Packaging

5.1. Labels

5.1.1. Core Module Label

TOP

BOTTOM LABEL

(1) LASER MARKING

A	B	C	D	E	F	GHIJ
Type identification code		Production year in 2 digits		Production month in 2 digits		Production year & Production week in 4 digits

- AB : 2-digit Name of identification (MT2011 → MT)
- CD : 2-digit production year (2021 → 21)
- EF : 2-digit production month (January → 01, December → 12)
- GHIJ : Production year in 2 digits & Production week in 2 digits
  ex) 2027 : 2020 year & 27 week

(2) LABEL Barcode format (BOTTOM)

KLMNOP
Device code

- KLMNOP : Convert the last 5 digits of the Mac Address to a decimal number and use the last 6 digits as the device number.

5.1.2. Gift Box label

(1) MT110H

mobiCARE™ +Temp

Model Name	MT110H
Supply Voltage	⎓ 3V (Lithium coin battery)
Classification of Applied Parts	Internally powered, Body Floating (BF)

Date of Manufacture

2021.08.20

SN C000403

LOT MH2108

(01)
(10) MH2108
(21) C000403

CAUTION - Electric shock
"To avoid electrical shock, do not disassemble the device"

Please read the user's manual carefully before use

IP22

+70°C / -25°C

95% / 10%

106 kPa / 70 kPa

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MADE IN KOREA

ST-T2201-GL-US, Rev.0

※ The barcode label on the gift box is the same as the barcode on the product label

6.   Manufacturer's Responsibility

The manufacturer and seller of the device is responsible only in the following cases for the normal operation and safety of the product.

1) When the user received maintenance and repair service of a person entrusted with qualifications by the manufacturer

2) When the device is normally used according to the user manual

3) In the case where the device is not damaged, lost, or broken due to the user's negligence

4) If you need to exchange or repair the product, please contact the purchase place.

7.   Manufacture Information

	Seers Technology Co., Ltd.
	291-13, Dongbu-daero, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, Korea
	Tel) +82-31-8023-9811
	Fax) +82-31-8023-9812

8. Declaration of Conformity

8.1. Electromagnetic Compatibility

It has been independently tested and it manufactured in compliance with the following EMC standard IEC 60601-1-2:2014

Guidance and manufacturer' declaration – electromagnetic emissions

The MT110H is intended for use in the electromagnetic environment specified below. The customer or the user of the MT110H should assure that it is used in such an environment

Emissions test	Compliance	Electromagnetic environment-guidance
RF emissions CISPR 11	Group 1	The MT110H uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The MT110H is suitable for use in all establishments domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	-	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	-	

Guidance and manufacturer' declaration – electromagnetic immunity

The MT110H is intended for use in the electromagnetic environment specified below. The customer or the user of the MT110H should assure that it is used in such an environment

Immunity test	IEC60601 test level	Compliance level	Electromagnetic environment-

			guidance
Electrostatic discharge (ESD) IEC 610 00-4-2	±8 kV contact ±2, 4, 8, 15 kV air	±8 kV contact ±2, 4, 8, 15 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines	-	Mains power quality should be that of a typical commercial or hospital environment
Surge IEC61000-4-5	±1 kV line(s) to line(s) ±2 kV line(s) to earth	-	Mains power quality should be that of a typical commercial or hospital environment
Voltage dips, short interruptions and voltage variations on power supply lines IEC6100-4-11	<5% UT (>95%dip in UT) for 0.5 cycle 40% UT (60% dip in UT) for 5 cycles 70% UT (30% dip in UT) for 25 cycles <5% UT (>95% dip in UT) for 5 seconds	-	Mains power quality should be that of a typical commercial or hospital environment If the user of the mobiCARE-mobiCARE-MC200M series requires continued operation during power mains interruptions, it is recommended that the mobiCARE-MC200M series be powered from an

			uninterruptible power supplied or a battery
Power frequency (50/60Hz) Magnetic field IEC61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment

Note UT is the a.c. mains voltage prior to the application of the test level

Guidance and manufacturer' declaration – electromagnetic immunity

The MT110H is intended for use in the electromagnetic environment specified below. The customer or the user of the MT110H should assure that it is used in such an environment

Immunity test	IEC60601 test level	Compliance level	Electromagnetic environment-guidance
Conductive RF IEC61000-4-6	3Vrms 150kHz to 80MHz	-	Portable and mobile RF communications equipment should be no closer to any part of the MT110H Including cables, than the recommended distances calculated from the equation applicable to the frequency of the transmitter
Radiated RF IEC61000-4-3	10V/m 80MHz to 2,700MHz	10V/m	Recommended separation distance $d = [\frac{3,5}{V_1}]\sqrt{P}$

			$d = [\frac{3,5}{E_1}]\sqrt{P}$ 80 MHz to 800 MHz
			$d = [\frac{7}{E_1}]\sqrt{P}$ 800 MHz to 2,5 GHz
			Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres(m). Field strengths from fixed RF transmitters, as determined by an electromagnetic surveya should be less than the compliance level in each frequency rangeb Interference may occur in the vicinity of equipment marked with the following symbol: $(((\cdot)))$

Note 1 At 80MHz and 800MHz the higher frequency range applies.
Note 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

a Field strengths from fixed transmitted, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment in the location due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the MT110H is used exceeds the applicable RF compliance level above, the MT110H should be observed to verify normal operation. If abnormal performance is

observed, additional measures may be necessary, such as reorienting or relocating MT110H

b Over the frequency range 150kHz to 80MHz, field strengths should be less than 3V/m.

Recommended separation distances between portable and mobile communication equipment and the MT110H

MT110H is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the MT110H can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communication equipment (transmitters) and MT110H as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter (m)		
	150kHz to 80MHz $d = [\frac{3.5}{V_1}]\sqrt{P}$	80MHz to 800MHz $d = [\frac{3.5}{E_1}]\sqrt{P}$	800MHz to 2.5GHz $d = [\frac{7}{E_1}]\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1.0	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitter rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power of the transmitter in watts (W) according to the transmitter manufacturer.

Note 1. At 80MHz and 800MHz the higher frequency range applies.

Note 2. These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

9. FCC Warning

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.

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.

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

This device complies with RF exposure requirement.

Seers Technology

ST-T2200-UM-US

MANUFACTURER	Seers Technology Co., Ltd.
	291-13, Dongbu-daero, Jinwi-myeon,
	Pyeongtaek-si, Gyeonggi-do, South of
	Korea