



## testo 549 - testo 550 . Digital manifold

Instruction manual



---

# 1 Contents

<b>1</b>	<b>Contents .....</b>	<b>3</b>
<b>2</b>	<b>Safety and the environment.....</b>	<b>4</b>
	2.1. About this document.....	4
	2.2. Ensure safety.....	4
	2.3. Protecting the environment.....	5
<b>3</b>	<b>Specifications .....</b>	<b>5</b>
	3.1. Use .....	5
	3.2. Technical data .....	6
<b>4</b>	<b>Product description.....</b>	<b>9</b>
	4.1. Overview.....	9
<b>5</b>	<b>First steps .....</b>	<b>10</b>
<b>6</b>	<b>Using the product.....</b>	<b>12</b>
	6.1. Preparing for measurement.....	12
	6.1.1. Switching the instrument on.....	12
	6.1.2. Connecting the temperature sensor.....	12
	6.1.3. Switching Bluetooth® on and off (testo 550).....	14
	6.1.4. Selecting the measuring mode.....	15
	6.2. Performing the measurement .....	16
<b>7</b>	<b>Maintaining the product.....</b>	<b>17</b>
<b>8</b>	<b>Tips and assistance.....</b>	<b>19</b>
	8.1. Questions and answers .....	19
	8.2. Measurement parameters .....	19
	8.3. Error reports .....	20
	8.4. Accessories and spare parts .....	20
<b>9</b>	<b>Declarations .....</b>	<b>21</b>



## 2 Safety and the environment

### 2.1. About this document

#### Use

- > Please read this documentation through carefully and familiarize yourself with the product before putting it to use. Pay particular attention to the safety instructions and warning advice in order to prevent injuries and damage to the products.
- > Keep this document to hand so that you can refer to it when necessary.
- > Hand this documentation on to any subsequent users of the product.

#### Symbols and writing standards

Representation	Explanation
	Warning advice, risk level according to the signal word: <b>Warning!</b> Serious physical injury may occur. <b>Caution!</b> Slight physical injury or damage to the equipment may occur. > Implement the specified precautionary measures.
	Note: Basic or further information.
<b>Menu</b>	Elements of the instrument, the instrument display or the program interface.
<b>[OK]</b>	Control keys of the instrument or buttons of the program interface.

### 2.2. Ensure safety

- > Do not operate the instrument if there are signs of damage at the housing, mains unit or feed lines.
- > Do not perform contact measurements on non-insulated, live parts.
- > Do not store the product together with solvents. Do not use any desiccants.

- > Carry out only the maintenance and repair work on this instrument that is described in the documentation. Follow the prescribed steps exactly. Use only original spare parts from Testo.
- > Dangers may also arise from the systems being measured or the measuring environment: Note the safety regulations valid in your area when performing the measurements.
- > If the measuring instrument falls or another comparable mechanical load occurs, the pipe sections of the refrigerant hoses may break. The valve positioners may also be damaged, whereby further damage to the interior of the measuring instrument may occur that cannot be identified from the outside. The refrigerant hoses must therefore be replaced with new, undamaged refrigerant hoses every time the measuring instrument falls or following any other comparable mechanical load. Send the measuring instrument to Testo Customer Service for a technical check for your own safety.
- > Make sure that your refrigeration system is properly earthed, as otherwise the measuring instrument might get damaged.

## **2.3. Protecting the environment**

- > Dispose of faulty rechargeable batteries/spent batteries in accordance with the valid legal specifications.
- > At the end of its useful life, send the product to the separate collection for electric and electronic devices (observe local regulations) or return the product to Testo for disposal.
- > Refrigerant gases can harm the environment. Please note the applicable environmental regulations.

# **3 Specifications**

## **3.1. Use**

testo 549 and testo 550 are digital manifolds for maintenance and service work on refrigeration systems and heat pumps. They may only be used by qualified authorized personnel.

The functions of the testo 549 and testo 550 mean they can replace mechanical manifolds, thermometers and pressure/temperature charts. Pressures and temperatures can be applied, adapted, tested and monitored.

testo 549 and testo 550 are compatible with most non-corrosive refrigerants, water and glycol. testo 549 and testo 550 are not compatible with refrigerants containing ammonia.

The instruments must not be used in explosive environments!

## 3.2. Technical data

Characteristic	Values
Parameters	Pressure: kPa / MPa / bar / psi Temperature: °C/°F/K
Sensor	Pressure: 2 x pressure sensor, temperature: 2 x NTC
Meas. cycle	0,5 s
Measurement channels	Quantity: 4
Interfaces	Pressure connections: 3 x 7/16" UNF NTC measurement
Measuring ranges	HP/LP pressure measuring range: -100 to 6000 kPa / -0.1 to 6 Mpa / -1 to 60 bar (rel) / -14.7 to 870 psi Temperature measuring range: -50 to +150 °C / -58 to 302°F Vacuum measuring range (rel): -1 to 0 bar / -14.7 to 0 psi
Overload	65 bar, 6500 kPa, 6,5 Mpa, 940 psi
Resolution	Pressure resolution: 0.01 bar/0.1 psi/ 1 kPa/0.001 MPa Temperature resolution: 0.1 °C/0.1 °F
Accuracy (nominal temperature 22 °C/71.6 °F)	Pressure: ±0,5 % of full scale (±1 digit) Temperature (-40...150°C): ±0.5 °C (±1 digit) /0,9°F (±1 Digit)
No. of refrigerants	60

Characteristic	Values		
Selectable refrigerants in the instrument	R114	R407C	R444B
	R12	R407F	R448A
	R123	R407H	R449A
	R1233zd	R408A	R450A
	R1234yf	R409A	R452A
	R1234ze	R410A	R452B
	R124	R414B	R453a
	R125	R416A	R454A
	R13	R420A	R454B
	R134a	R421A	R454C
	R22	R421B	R455A
	R23	R422B	R458A
	R290	R422C	R500
	R32	R422D	R502
	R401A	R424A	R503
	R401B	R427A	R507
	R402A	R434A	R513A
	R402B	R437A	R600a
	R404A	R438A	R718 (H <sub>2</sub> O)
	R407A	R442A	R744 (CO <sub>2</sub> )
Refrigerants that can be updated via testo Service (only testo 549)	R11	R227	R417A
	FX80	R236fa	R417B
	I12A	R245fa	R417C
	R1150	R401C	R422A
	R1270	R406A	R426A
	R13B1	R407B	R508A
	R14	R407D	R508B
	R142B	R41	R600
	R152a	R411A	RIS89
	R161	R412A	SP22
	R170	R413A	

Characteristic	Values		
Refrigerants that can be updated via testo Service (only testo 550)	R11	R227	R417A
	FX80	R236fa	R417B
	I12A	R245fa	R417C
	R1150	R401C	R422A
	R1270	R406A	R426A
	R13B1	R407B	R508A
	R14	R407D	R508B
	R142B	R41	R600
	R152a	R411A	RIS89
	R161	R412A	SP22
	R170	R413A	
Measurable media	Measurable media: All media that are stored in the testo 549 and testo 550 Not measurable: Ammonia (R717) and other refrigerants which contain ammonia		
Ambient conditions	Operating temperature: -20 to 50 °C/ -4 to 122 °F Storage temperature: -20 to 60 °C/ -4 to 140 °F		
Housing	Material: ABS/PA/TPU Dimensions: 265 x 135 x 75 mm Weight: approx. 1000 g (without batteries)		
IP class	42		
Power supply	Current source: Rechargeable batteries/batteries 4x 1.5 V, type AA/mignon/LR6 Battery life: approx. 250h (display light off, Bluetooth off)		
Display	Type: Illuminated LCD Response time: 0.5 s		
Directives, standards and tests	EU Directive: 2014/30/EU  <b>i</b> You can find the EU declaration of conformity on the Testo homepage <a href="http://www.testo.com">www.testo.com</a> under the product-specific downloads.		



## 4 Product description

### 4.1. Overview

#### Display and control elements




- 1 Mini-DIN probe socket for NTC temperature probe, with socket cover
- 2 Foldable suspension device (on rear)
- 3 Display. Instrument status icons:

Icon	Significance
	Battery capacity
	Bluetooth®, (see Switching Bluetooth® on and off (testo 550), page 14)
	Select measuring mode (see Selecting the measuring mode, page 15)

- 4 Battery compartment. It is not possible to charge rechargeable batteries in the instrument!

## 5 Control keys:

Key	Function
[Set]	Set units
[R, ►, ■]	Select refrigerant/ Start/stop / Tightness test
[Mode]	Switching measuring mode
[Min/Max/Mean]	Display min./max./mean values
[▲]	Up key: Change display view
[P=0]	Pressure zeroing
Esc	Switches to the measurement/home view
[▼]	Down key: Change display view
	Switching the instrument on/off Switch the display illumination on/off.

- 6 Sight glass for refrigerant flow
- 7 2 x valve positioner
- 8 3 x hose parkers for refrigerant hoses
- 9 3 x connections 7/16" UNF, brass  
Left/right: Low pressure/high pressure, for refrigerant hoses with quick connect fitting, passage can be locked via valve positioner. Centre: for refrigerant bottles, for example, with sealing cap.
- 10 On the back below the battery compartment cover, mini-USB connection for firmware update.

## 5 First steps

### Inserting batteries/rechargeable batteries

1. Fold out the suspension device and open the battery compartment (clip lock).
2. Insert batteries (included in delivery) or rechargeable batteries (4x 1.5 V, type AA/Mignon/LR6) in the battery compartment. Observe the polarity!
3. Close the battery compartment.
  - After inserting the batteries, the instrument switches on automatically and goes into the settings menu.



When not in use for long period: Remove batteries/rechargeable batteries.

---




### Performing settings

1. Press **[Set]** repeatedly,
  2. Press **[▲]** or **[▼]** to select the unit/parameter.
- The settings will be accepted once the last selection has been made.

### Key functions

Representation	Explanation
<b>[▲]</b> or <b>[▼]</b>	Change parameter, select unit
<b>[Set]</b>	Select units/parameters

### Adjustable parameters

Representation	Explanation
<b>°C, °F</b>	Set temperature unit.
<b>bar, kPa, MPa, psi</b>	Set unit of pressure.
<b>Pabs, Prel</b> or <b>psig</b>	Depending on the selected unit of pressure: Switch between absolute and relative pressure display.
<b>14.7 psi</b> <b>1.013 bar</b> <b>(Pamb)</b>	Set current absolute pressure
 /  / 	Select measuring mode
<b>AUTO OFF</b>	Automatic switch-off time, instrument switches off after 30 minutes if no temperature probe is connected and there is no pressure apart from ambient pressure.
<b>T<sub>fac</sub></b>	Temperature compensation factor, icon is shown on the display if the function is disabled.

- Settings will be applied following the final selection.

### Operating valve positioner

The digital manifold acts like a conventional two-way manifold with regard to the refrigerant path: The passages are opened by opening the valves. The adjacent pressure is measured with valves closed as well as with them open.

- > Open valve: Turn valve positioner anticlockwise.
- > Close valve: Turn valve positioner clockwise.



**⚠ WARNING**

Valve positioner tightened too tightly.

- Damage to the PTFE seal (1).
- Mechanical deformation of the valve piston (2) leading to the PTFE seal (1) falling out.
- Damage to the thread of the threaded spindle (3) and the valve screw (4).
- Broken valve knob (5).

Tighten the valve positioner only hand-tight. Do not use any tools to tighten the valve positioner.

## 6 Using the product

### 6.1. Preparing for measurement

#### 6.1.1. Switching the instrument on

- > Press **[⏻]**.

##### **Zeroing the pressure sensors**

Zero the pressure sensors before every measurement.

- ✓ There must be ambient pressure at all connections. >
- > Press for 3 seconds key **[P=0]** and execute zeroing.

#### 6.1.2. Connecting the temperature sensor



Sensors must be connected before the measuring instrument is switched on, so that they are recognised by the instrument.

---

### Surface temperature sensor

An NTC temperature sensor (accessory) must be connected for measuring the pipe temperature and for automatic calculation of superheating and subcooling.

### Deactivating the surface compensation factor for insertion and air temperature sensor

A surface compensation factor has been set in the measuring instrument to reduce the measuring errors in the main field of applications. This reduces measuring errors when using surface temperature sensors.

If the measuring instrument testo 550 is used in combination with insertion or air temperature sensors (accessories), this factor must be deactivated:

1. Press **[Set]** repeatedly until **T<sub>fac</sub>** is displayed.
  2. Press **[▲]** or **[▼]** to set **T<sub>fac</sub>** to Off.
  3. Press **[Set]** to continue through the settings menu until the measurement/home view is displayed.
- **T<sub>fac</sub>** is shown on the display if **T<sub>fac</sub>** is disabled.

### Connecting the refrigerant hoses



Before each measurement check whether the refrigerant hoses are in flawless condition.

- ✓ The valve actuators are closed.
1. Connect the refrigerant hoses for low-pressure side (blue) and high-pressure side (red) to the measuring instrument.
  2. Connect the refrigerant hoses to the system.



#### WARNING

The measuring instrument dropping down or any other comparable mechanical load can cause breakage of the pipe pieces in the refrigerant hoses. The valve actuators may also suffer damage, which in turn could result in further damage inside the measuring instrument, which may not be detectable from outside.

- > For your own safety you should return the measuring instrument to the Testo Service for technical inspection.
- > You should therefore always replace the refrigerant hoses with new ones after the measuring instrument has dropped down or after any comparable mechanical loading.

**Setting the refrigerant**

1. Press [R, ►, ■].
  - This opens the refrigerant menu and the currently selected refrigerant flashes.
2. Setting the refrigerant:

**Key functions**

Representation	Explanation
[▲] or [▼]	Changing the refrigerant
[R, ►, ■]	Confirm the setting and exit the refrigerant menu.

**Available refrigerants**

Representation	Explanation
R...	Refrigerant number of refrigerant acc. to ISO 817
---	no refrigerant selected.

**Example: Setting refrigerant R401B**

1. Press [▲] or [▼] several times, until R401B flashes.
2. Press [R, ►, ■] to confirm the setting.

**Quitting the refrigerant selection**

- > Press [R, ►, ■] or automatically after 30 s, if no other key has been pressed.

**6.1.3. Switching Bluetooth® on and off (testo 550)**

---



In order to be able to establish a connection via Bluetooth, you need a tablet or smartphone with the Testo app **Refrigeration** already installed on it.






You can get the App for iOS instruments in the App Store or for Android instruments in the Play Store.

Information about compatibility can be found in the relevant app store.

---




1. Press **[▲]** and **[▼]** simultaneously and hold down for 3 seconds.
- Once the Bluetooth icon is shown on the display, Bluetooth is switched on.

Display	Explanation
 flashes	There is no Bluetooth connection, or a potential connection is being searched for.
 is permanently displayed	There is a Bluetooth connection.
 is not displayed	Bluetooth is disabled.

2. Press **[▲]** and **[▼]** simultaneously and hold down for 3 seconds.
- Once the Bluetooth icon is no longer shown on the display, Bluetooth is switched off.

### 6.1.4. Selecting the measuring mode

1. Press **[Set]** several times.
2. Select function with **[▲]** or **[▼]**.
3. Save setting: press **[Set]**.
- Measuring mode is displayed.

Display	Mode	Function
	Refrigeration system	Normal functionality of the digital manifold
	Heat pump	Normal functionality of the digital manifold
	Automatic mode	<p>If the automatic mode is activated, the testo 549 und testo 550 digital manifold automatically changes the display of the high and low pressure. This automatic change occurs when the pressure on the low-pressure side is 1 bar higher than the pressure on the high-pressure side. During the change, <b>Load</b> (2 s) is shown in the display.</p> <p>This mode is especially suited to air conditioning systems which cool and heat.</p>

## 6.2. Performing the measurement

### WARNING

**Risk of injury caused by refrigerant that is at high pressure, hot, cold, or poisonous!**

- > Wear safety goggles and protective gloves.
- > Before pressurizing the measuring instrument: Always fasten the measuring instrument at the suspension device in order to prevent it from falling (risk of breakage)
- > Check if the refrigerant hoses are intact and connected correctly before each measurement. Do not use a tool to connect the hoses. Only tighten the hoses by hand (max. torque 5.0 Nm/3.7 ft\*lb).
- > Maintain permissible measuring range (0 to 60 bar). Pay particular attention with systems with refrigerant R744, as these are often operated with higher pressures.

### Measuring

1. Pressurize the measuring instrument.
2. Read off readings.



With zeotropic refrigerants, the evaporation temperature  $t_{\text{o/Ev}}$  is displayed after the complete evaporation/the condensation temperature  $t_{\text{c/Co}}$  is displayed after the complete condensation.

The measured temperature must be assigned to the superheating or the subcooling side ( $t_{\text{oh}} \leftrightarrow t_{\text{cu}}$ ). Depending on this assignment,  $t_{\text{oh}}/T1$  or  $\Delta t_{\text{oh}}/SH$  or  $t_{\text{cu}}/T2$  or  $\Delta t_{\text{cu}}/SC$  is shown depending on the selected display.

- Reading and display illumination flash:
  - 1 bar before reaching the critical pressure of the refrigerant,
  - upon exceeding the max. permissible pressure of 60 bar.

### Key functions

- > **[▲]** or **[▼]**: Change the reading display.

Possible display combinations:

<b>Evaporation pressure</b> <b>Refrigerant evaporation</b> <b>temperature <math>t_{\text{o/Ev}}</math></b>	<b>Condensation pressure</b> <b>Refrigerant condensation</b> <b>temperature <math>t_{\text{c/Co}}</math></b>
--	--



or (only with connected temperature probe)

<b>Evaporation pressure</b> <b>Measured temperature</b> $t_{oh}/T1$	<b>Condensation pressure</b> <b>Measured temperature</b> $t_{cu}/T2$
--	---

or (only with connected temperature probe)

<b>Evaporation pressure</b> <b>Superheating</b> $\Delta t_{oh}/SH.$	<b>Condensation pressure</b> <b>Subcooling</b> $\Delta t_{cu}/SC$
--	--

With two connected NTC probes,  $\Delta t$  is also shown.

- > **[Mean/Min/Max]**: Record readings, display min./max. readings, mean values (since switching on).

### Tightness test/pressure drop test



Systems can be tested for tightness with the temperature-compensated tightness test. The system pressure and the ambient temperature are measured over a defined period for this. A temperature probe can be connected that measures the ambient temperature for this (recommendation: NTC air probe, art. no. 0613 1712). Information about the temperature-compensated differential pressure and about the temperature at the beginning/end of the test exists as a result. If no temperature probe is connected, the tightness test can be performed without temperature compensation.

1. Press **[Mode]** (leakage test view).
  - Leakage test view is opened. **ΔP** is displayed.
2. Start the leakage test: Press **[R, ►, ■]**.
3. End the leakage test: Press **[R, ►, ■]**.
  - Result is displayed.
4. Confirm message: Press **[Mode]**.

## 7 Maintaining the product

### Cleaning the instrument



Do not use any aggressive cleaning agents or solvents! Mild household cleaning agents and soap suds may be used.

- > If the housing of the instrument is dirty, clean it with a damp cloth.

### **Keeping connections clean**

- > Keep screw connections clean and free of grease and other deposits, clean with a moist cloth as required.

### **Removing oil residues**

- > Carefully blow out oil residues in valve block using compressed air.

### **Ensuring the measuring accuracy**

Testo Customer Service would be glad to further assist you if you so wish.

- > Check instrument regularly for leaks (recommended: annually). Keep to the permissible pressure range!
- > Calibrate instrument regularly (recommended: annually).

### **Changing batteries/rechargeable batteries**


- ✓ Instrument is switched off.



1. Fold out the suspension device, loosen the clip and remove the cover of the battery compartment.
2. Remove empty batteries/rechargeable batteries and insert new batteries/rechargeable batteries (4x 1.5 V, type AA, Mignon, LR6) in the battery compartment. Observe the polarity!
3. Set on and close cover of the battery compartment (clip must engage).
4. Switch the instrument on.

## 8 Tips and assistance

### 8.1. Questions and answers

Question	Possible causes/solution
 flashes	Batteries are almost empty. > Change batteries.
The instrument switches off automatically.	Residual capacity of the batteries is too low. > Change batteries.
uuuu lights up instead of the parameter display	The permissible measuring range has been undershot. > Keep to the permitted measuring range.
oooo lights up instead of the parameter display	The permissible measuring range has been exceeded. > Keep to the permitted measuring range.

### 8.2. Measurement parameters

Name		Description
bar, °C	psi, °F	
$\Delta$ toh	SH	Superheating, evaporation pressure
$\Delta$ tcu	SC	Subcooling, condensation pressure
to	Ev	Refrigerant evaporation temperature
tc	Co	Refrigerant condensation temperature
toh	T1	Measured temperature, evaporation
tcu	T2	Measured temperature, condensation

### 8.3. Error reports

Question	Possible causes/solution
---- lights up instead of the temperature value display (T1/T2 or toh/tcu)	Sensor or cable faulty > Please contact your dealer or Testo Customer Service
---- lights up instead of the display of the value for superheating/subcooling (SH/SC or $\Delta$ toh/ $\Delta$ tcu)	- There is no superheating/subcooling. - No theoretical condensation or evaporation temperature can be calculated based on the pressure measured.
<b>EEP FAIL</b> displayed	Electronics faulty > Please contact your dealer or Testo Customer Service

### 8.4. Accessories and spare parts

Description	Article no.
Clamp probe for temperature measurement at pipes (1,5m cable length)	0613 5505
Clamp probe for temperature measurement at pipes (5m cable length)	0613 5506
Pipe wrap probe with Velcro tape for pipe diameters of up to max. 75 mm, Tmax. +75 °C, NTC	0613 4611
Watertight NTC surface probe	0613 1912
Precise, robust NTC air probe	0613 1712
Transport case for measuring instrument, probe and hoses	0516 0012

For a complete list of all accessories and spare parts, please refer to the product catalogues and brochures or look up our website at: [www.testo.com](http://www.testo.com)


If you have any questions, please contact your dealer or Testo Customer Service. The contact details can be found on the back of this document or on the Internet at [www.testo.com/service-contact](http://www.testo.com/service-contact).

## 9 Declarations

Product	Testo 550
Mat.-No.	0560 1550
Date	09.02.2018

**i** The use of the wireless module is subject to the regulations and stipulations of the respective country of use, and the module may only be used in countries for which a country certification has been granted. The user and every owner has the obligation to adhere to these regulations and prerequisites for use, and acknowledges that the re-sale, export, import etc. in particular in countries without wireless permits, is his responsibility.

Country	Comments	
Australia		E 1561
Brazil	 <p>03226-16-04701</p> <p>Este equipamento opera em caráter secundário, isto é, não tem direito a proteção contra interferência prejudicial, mesmo de estações do mesmo tipo, e não pode causar interferência a sistemas operando em caráter primário.</p>	
Canada	<p>Product IC ID: 12231A-05631550</p> <p>see IC Warnings</p>	
Europe + EFTA	 <hr/>  The EU Declaration of Conformity can be found on the homepage <a href="http://www.testo.com">www.testo.com</a> under the product <hr/> <p><b>EU countries:</b>          Belgium (BE), Bulgaria (BG), Denmark (DK), Germany (DE), Estonia (EE), Finland (FI), France (FR), Greece (GR), Ireland (IE), Italy (IT), Latvia (LV), Lithuania (LT), Luxembourg (LU), Malta (MT), Netherlands (NL), Austria (AT), Poland (PL), Portugal (PT), Romania (RO), Sweden (SE), Slovakia (SK), Slovenia (SI), Spain (ES), Czech Republic (CZ), Hungary (HU), United Kingdom (GB), Republic of Cyprus (CY).</p> <p><b>EFTA countries:</b>          Iceland, Liechtenstein, Norway, Switzerland</p>	
Hongkong	Authorized	
Japan	  201-150148 <p>see Japan Information</p>	

Korea	 MSIP-CMM-Toi-550 see KCC Warning																
Russia	Authorized																
South Africa	ICASA: TA-2016/1203																
Turkey	Authorized																
USA	Product FCC ID: 2ACVD056001550 FCC Warnings																
<b>Bluetooth SIG Listing</b>	<table border="1"> <thead> <tr> <th data-bbox="417 584 624 608">Feature</th> <th data-bbox="624 584 822 608">Values</th> </tr> </thead> <tbody> <tr> <td data-bbox="417 608 624 632">Bluetooth Range</td> <td data-bbox="624 608 822 632">&lt; 20 m (free field)</td> </tr> <tr> <td data-bbox="417 632 624 735">Bluetooth type</td> <td data-bbox="624 632 822 735">L Series BLE module (08 May 2013) based on TI CC254X chip</td> </tr> <tr> <td data-bbox="417 735 624 783">Qualified Design ID</td> <td data-bbox="624 735 822 783">B016552</td> </tr> <tr> <td data-bbox="417 783 624 831">Bluetooth radio class</td> <td data-bbox="624 783 822 831">Class 3</td> </tr> <tr> <td data-bbox="417 831 624 911">Bluetooth company</td> <td data-bbox="624 831 822 911">LSD Science &amp; Technology Co., Ltd</td> </tr> <tr> <td data-bbox="417 911 624 935">RF Band</td> <td data-bbox="624 911 822 935">2402-2480MHz</td> </tr> <tr> <td data-bbox="417 935 624 959">Output power</td> <td data-bbox="624 935 822 959">0 dBm</td> </tr> </tbody> </table>	Feature	Values	Bluetooth Range	< 20 m (free field)	Bluetooth type	L Series BLE module (08 May 2013) based on TI CC254X chip	Qualified Design ID	B016552	Bluetooth radio class	Class 3	Bluetooth company	LSD Science & Technology Co., Ltd	RF Band	2402-2480MHz	Output power	0 dBm
Feature	Values																
Bluetooth Range	< 20 m (free field)																
Bluetooth type	L Series BLE module (08 May 2013) based on TI CC254X chip																
Qualified Design ID	B016552																
Bluetooth radio class	Class 3																
Bluetooth company	LSD Science & Technology Co., Ltd																
RF Band	2402-2480MHz																
Output power	0 dBm																

### IC Warnings

This instrument complies with Part 15C of the FCC Rules and Industry Canada RSS-210 (revision 8). Commissioning is subject to the following two conditions:

- (1) This instrument must not cause any harmful interference and
- (2) this instrument must be able to cope with interference, even if this has undesirable effects on operation.

Cet appareil satisfait à la partie 15C des directives FCC et au standard Industrie Canada RSS-210 (révision 8). Sa mise en service est soumise aux deux conditions suivantes :

- (1) cet appareil ne doit causer aucune interférence dangereuse et
- (2) cet appareil doit supporter toute interférence, y compris des interférences qui provoquerait des opérations indésirables.

### FCC Warnings

Information from the FCC (Federal Communications Commission)

### **For your own safety**

Shielded cables should be used for a composite interface. This is to ensure continued protection against radio frequency interference.

### **FCC warning statement**

This equipment has been tested and found to comply with the limits for a Class C 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.

### **Caution**

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. Shielded interface cable must be used in order to comply with the emission limits.

### **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.

### **KCC Warning**

해당 무선 설비는 운용 중 전파혼신 가능성이 있음

### **Japan Information**

当該機器には電波法に基づく、技術基準適合証明等を受けた特定無線設備を装着している。





