



testo 557 · Digital manifold

Instruction manual



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2 Safety and the environment

2.1. About this document

Use

- > Please read this documentation 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 product.
- > 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: Warning! Serious physical injury may occur. Caution! Slight physical injury or damage to the equipment may occur. > Implement the specified precautionary measures.
i	Note: Basic or further information.
1. ... 2. ...	Action: more steps, the sequence must be followed.
> ...	Action: a step or an optional step.
- ...	Result of an action.
Menu	Elements of the instrument, the instrument display or the program interface.
[OK]	Control keys of the instrument or buttons of the program interface.
... ...	Functions/paths within a menu.
"..."	Example entries

2.2. Ensure safety

- > Do not operate the instrument if there are signs of damage at the housing, mains unit or hoses.
- > 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 refrigeration 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.
- > Electrostatic charging can destroy the device. Integrate all the components (system, manifold's valve block, refrigerant bottle etc.) into the potential equalisation (earthing). Please see the safety instructions for the system and the refrigerant used.

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

The testo 557 is a digital manifold for maintenance and service work on refrigeration systems and heat pumps. The device is only to be used by qualified expert personnel.

With its functions the testo 557 replaces mechanical manifolds, thermometers and pressure/temperature charts. Pressures and temperatures can be applied, adapted, tested and monitored.

The testo 557 is compatible with most of the non-corrosive refrigerants, water and glycol. The testo 557 is not compatible with ammoniac refrigerants.

This product must not be used in explosive environments!

3.2. Technical data

Feature	Values
Measurement parameters	Pressure: psi/ kPa/MPa/bar Temperature: °F/°C/K Vacuum: micron / inHg / inH ₂ O / hPa / mbar/ mTorr /Torr / Pa
Sensing element	Pressure: 2 x pressure sensors Temperature: 2 x NTC Vacuum: via external probe
Measuring cycle	0,5s
Interfaces	Pressure connections: 3 x 7/16" UNF, 1x 5/8" UNF NTC measurement External vacuum probe
Measurement ranges	Pressure measurement range HP/LP: -14.7...870 psi / -100...6000 kPa / -0.1...6 MPa / -1...60 bar (rel) Temperature measurement range: -58...302 °F / -50...+150 °C Measurement range vacuum: 0 ... 20.000 Mikron
Overload	940 psi, 65 bar, 6500 kPa, 6.5 MPa

Feature	Values
Resolution	Resolution pressure: 0.1 psi / 0.01 bar / 1 kPa / 0.001 MPa Resolution temperature: 0.1 °F / 0.1 °C / 0.1 K Vacuum resolution: 1 Mikron (from 0 to 1000 Mikron) 10 Mikron (from 1000 to 2000 Mikron) 100 Mikron (from 2000 to 5000 Mikron) 500 Mikron (from 5000 to 10000 Mikron) 5000 Mikron (from 10000 to 20.000 Mikron)
Accuracy (nominal temperature 71.6 °F / 22 °C)	Pressure: $\pm 0.5\%$ of final value (± 1 digit) Temperature (-40...302 °F/-40...+150 °C): $\pm 0.9^\circ\text{F}$ (± 1 digit), $\pm 0.5^\circ\text{C}$ (± 1 digit) Vacuum: $\pm(10 \text{ Mikron} + 10\% \text{ v. Mw.})$ (100 ... 1.000 Mikron)
No. of refrigerants	60

Feature	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 (H2O)
	R407A	R442A	R744 (CO2)
Refrigerants that can be updated via APP	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	

Feature	Values
Measurable media	Measurable media: all media that is stored in the testo 557. Not measurable: ammonia (R717) and other refrigerants which contain ammonia
Ambient conditions	Operating temperature: -4...122°F / -20...50°C -10 ... 50°C / 14 ... 122 °F (Vacuum) Storage temperature: -4...140°F / -20...60°C Humidity in area of use: 10... 90%rF
Housing	Material: ABS / PA / TPE Dimensions approx. 280 x 135 x 75 mm Weight: approx. 1200 g (without batteries)
IP-class	42
Power supply	Current source: Rechargeable batteries / batteries 4 x 1.5V type AA / Mignon / LR6 Battery lifetime: approx. 250 h (Bluetooth off, vacuum probe not connected)
Display	Type: Illuminated LCD Response time: 0.5 s
Directives, standards and tests	EU Directive: 2014/30/EU i You can find the EU declaration of conformity on the Testo homepage www.testo.com under the product-specific downloads.

4 Product description

4.1. Overview

Display and control elements




- 1 Front connection for external vacuum probe
- 2 Sensor socket Mini-DIN for NTC-temperature sensor, with socket cover
- 3 Suspension attachment, foldable (backside).
- 4 Display. Instrument status icons:

Icon	Meaning
	Battery status
	Bluetooth®
	Select measuring mode

- 5 Battery compartment. The rechargeable batteries cannot be charged inside the instrument!

6 Control keys:

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

7 Inspection glass for refrigerant flow.

8 4 x valve stem shutoff

9 4 x hose holders for refrigerant hoses

10 Connection 1/4" SAE, brass.

High pressure, for refrigerant hoses with quick release screw fitting, passage for valve actuator lockable.

11 Connection 3/8" SAE, brass, for vacuum pump

12 Connection 1/4" SAE, brass, for e.g. refrigerant cylinders, with screw cap.

13 Connection 1/4" SAE, brass.

Low pressure for refrigerant hoses with quick release screw fitting, passage for valve actuator lockable.

14 Mini-USB connection for firmware update, inside the battery compartment.

5 First steps

Inserting batteries/rechargeable batteries

1. Fold out the hanging hook and open the battery compartment by squeezing the 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: Take out the batteries / rechargeable batteries.




Performing settings

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

Key functions

Key Functions	Description
[▲] or [▼]	Change parameters and select units
[Set]	Confirm units / parameters

Adjustable parameters

Representation	Explanation
°C, °F	Set unit for temperature.
bar, kPa, MPa, psi	Set unit for pressure.
Pabs, Prel or psig	Depending on the chosen unit for pressure: Change between absolute and relative pressure displays.
micron, inHg, Pa, hPa, mTorr, Torr, inH2O, mbar	Set pressure unit for vacuum.
 /  / 	Select the measuring mode

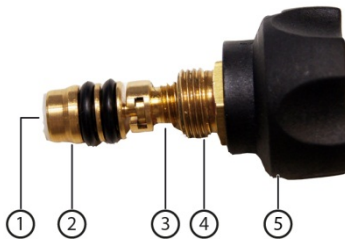
Representation	Explanation
AUTO OFF	Automatic switch-off time, instrument switches off after 30 minutes if no temperature probe is connected and there is no pressure apart from ambient pressure.
T_{fac}	Temperature compensation factor, icon is shown on the display if the function is disabled.

Operating the valve stem shutoffs

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 counterclockwise.

> 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 manifold

6.1. Preparing for measurement

6.1.1. Switching the instrument on

> Press .

Zeroing the pressure sensors

Zero the pressure sensors before every measurement.

✓ All connections must be pressureless (ambient pressure).

> Press for 2 seconds key **[P=0]** and execute zeroing.

6.1.2. Connecting the temperature sensor

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.

1. Press **[Set]** repeatedly until **T_{fac}** is displayed.
2. Press **[▲]** or **[▼]** to set **T_{fac}** to Off.
3. Press **[Set]** to continue through the settings menu until the measurement/home view is displayed.
 - **T_{fac}** is shown on the display if **T_{fac}** 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. Connecting the vacuum probe

- > Open the front cover of the connector and connect up the vacuum probe.
- The instrument automatically switches to the vacuum measurement mode.

6.1.4. Switching Bluetooth® on and off

i 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	Description
✧ 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.

6.1.5. Choosing the measuring mode

1. Press **[Set]** several times
2. Press **[▲]** or **[▼]** to select the function.
3. Saving settings: Press **[Set]**.
 - The measuring mode is displayed.

Display	Mode	Function
	Refrigeration system	Normal function of the digital manifold
	Heat pump	Normal function of the digital manifold
	Automatic mode	When automatic mode is activated the digital manifold testo 557 automatically reverse the display of high and low pressure. This automatic reversal occurs when the pressure in the low pressure side is 1 bar higher than the pressure in the high pressure side. This switching over is indicated by ---- flashing in the display. This mode is particularly suitable for air conditioning systems that provide cooling and heating.

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 applying pressure to the measuring instrument: Always fasten the measuring instrument on the suspension attachment to prevent it from falling down (danger of breakage)
- > Before each measurement check the refrigerant hoses for flawless condition and correct connection. Do not use any tools to connect the hoses, tighten hoses only hand-tight (max. torque 5.0 Nm / 3.7 ft*lb).
- > Comply with the permissible measuring range (-14.7...870 psi / -1...60 bar). Pay particular attention in systems with refrigerant R744, since these are frequently operated with higher pressures.

Measuring

✓ The actions described in the chapter “Preparing for measurement” have been performed.

1. Apply pressure to the measuring instrument.
2. Read the measuring values.

i With zeotropic refrigerants, the evaporation temperature t_o/Ev is displayed after the complete evaporation / the condensation temperature t_c/Co is displayed after complete condensation.

The measured temperature must be assigned to the superheating or subcooling side ($t_{oh} <-> t_{cu}$). Dependent on this assignment, the display will show $t_{oh}/T1$ resp. $\Delta t_{oh}/SH$ or $t_{cu}/T2$ resp. $\Delta t_{cu}/SC$, depending on the selected display.

- Reading and display illumination are flashing.
 - The critical pressure of the refrigerant is within 15 psi (1 bar) of the highest pressure (and temperature) where the refrigerant can still condense.
 - The maximum permissible pressure of 870 psi (60 bar) is exceeded.

Key functions

> Press [**▲**] or [**▼**] to change the reading in the display.

Possible display combinations:

Evaporation pressure Refrigerant evaporation temperature t_o/Ev	Condensation pressure Refrigerant condensation temperature t_c/Co
---	---

or (only with inserted temperature sensor)

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

or (only with inserted temperature sensor)

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



With both NTC temperature probes connected, Δt is also shown.

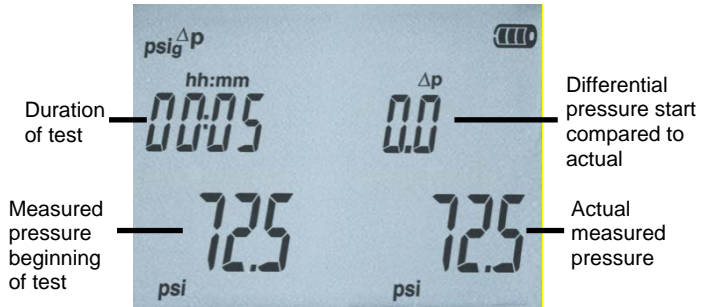
- > Press **[Mean/Min/Max]**: to display min. / max. readings and mean values.

Leak test / pressure drop test



The temperature compensated leak test can be used to check the leak tightness of systems. For this purpose both the system pressure and the ambient temperature are measured over a defined period of time. For this purpose a temperature sensor to measure the ambient temperature may be connected (recommendation: Deactivate the surface compensation factor (see page 14) and use NTC air sensors Art.-No. 0613 1712). This provides information about the temperature compensated differential pressure and about the temperature at the beginning/end of the test as a result. If no temperature sensor is connected, you may also perform the leak test without temperature compensation.

- ✓ The actions described in the chapter “Preparing for measurement” have been performed.
1. Press **[Mode]**
 - The leak test view is opened. **ΔP** is displayed.
 2. Start the leak test: Press **[R, ►, ■]**.
 3. End the leak test: Press **[R, ►, ■]**.
 - The result is displayed.
 4. Confirm the message: Press **[Mode]**.
 - Main menu display.



Evacuation / vacuum display

5. Connect Vakuum probe

Vacuum measurement

- ✓ The vacuum probe is plugged into the front connection of the manifold and connected to the system.
1. **[Mode]** 2 x press.
 - The vacuum measurement menu appears. If ambient pressure is applied to the vacuum probe, then **oooo** is shown on the display.
 2. Start the vacuum pump.
 - Once the measuring range 0 to 20,000 microns is reached, the current vacuum value is shown on the instrument display. The instrument also displays the current ambient temperature, the water evaporation temperature, which corresponds to the vacuum reading, and the delta between these two temperatures.
 3. To leave vacuum mode, remove the vacuum probe from the testo 557 or switch to the standard measurement view using the **[Mode]** button.

7 Maintaining the product

Cleaning the instrument

i 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 hook, loosen the clip and remove the cover of the battery compartment.
2. Remove discharged 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.

Cleaning the vacuum probe



Contaminants such as oil may impair the accuracy of the vacuum sensor.

CAUTION

Carrying out cleaning with the probe connected may result in damage to the probe!

- > Remove the vacuum probe from the testo 557!

CAUTION


Damage to the sensor due to sharp objects!

- > Do not insert any sharp objects into the probe!

1. Remove the vacuum probe from the testo 557.
2. Put a few drops of rubbing alcohol into the sensor opening.
3. Seal the opening by placing your finger on it and shake the vacuum probe briefly.
4. Remove all the alcohol from the probe.
5. Repeat this process at least twice.
6. Leave the probe to dry for at least 1 hour. To dry the sensor faster, you can connect the probe directly to a vacuum pump and draw vacuum.

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	
Δ toh	SH	Superheating, evaporation pressure
Δ tcu	SC	Subcooling, condensation pressure
t _o	Ev	Refrigerant evaporation temperature
t _c	Co	Refrigerant condensation temperature
t _{oh}	T1	Measured temperature, evaporation
t _{cu}	T2	Measured temperature, condensation

8.3. Error reports

Question	Possible causes/solution
---- lights up instead of the temperature display (T1/T2 or toh/tcu)	Sensor or cable faulty > Please contact your dealer or Testo Customer Service
---- lights up instead of the display for superheating / subcooling (SH/SC or Δ oh/ Δ tcu)	- No actual superheating / subcooling. - No theoretical condensation or evaporation temperature can be calculated based on the pressure measured.
Display EPP FAIL	Eeprom defective > Please contact your dealer or Testo Customer Service
Display BT ERR	No BT module connected or BT module defective. > Please contact your dealer or Testo Customer Service
Display ERR 1-5	Vac-Probe defect > Please contact your dealer or Testo Customer Service

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.

8.4. Accessories and spare parts

Description	Article no.
Clamp probe for temperature measurement at pipes (1,5m)	0613 5505
Clamp probe for temperature measurement at pipes (5m)	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
External vacuum probe	Please contact Testo Service.






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

9 Declarations

Product	Testo 557
Mat.-No.	0560 1557
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>03238-16-04701</p> <p>Este equipamento opera em caráter secundário, isto é, não tem direito a proteção contra interferência prejudicial,</p>	

Country	Comments
	mesmo de estações do mesmo tipo, e não pode causar interferência a sistemas operando em caráter primário.
Canada	Product IC: 12231A-05631557 see IC Warnings
Europe + EFTA	  The EU Declaration of Conformity can be found on the testo homepage www.testo.com specific downloads. <p>EU countries: 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>EFTA countries: Iceland, Liechtenstein, Norway, Switzerland</p>
Hongkong	Authorized
Japan	  201-150183 see Japan Information
Korea	 MSIP-CMM-Toi-557 see KCC Warning
Russia	Authorized
Turkey	Authorized
South Africa	ICASA: TA-2016/1202

Country	Comments																
USA	Product FCC ID: 2ACVD056001557 FCC Warnings																
Bluetooth SIG Listing	<table border="1"> <thead> <tr> <th>Feature</th> <th>Values</th> </tr> </thead> <tbody> <tr> <td>Bluetooth Range</td> <td>< 20 m (free field)</td> </tr> <tr> <td>Bluetooth type</td> <td>L Series BLE module (08 May 2013) based on TI CC254X chip</td> </tr> <tr> <td>Qualified Design ID</td> <td>B016552</td> </tr> <tr> <td>Bluetooth radio class</td> <td>Class 3</td> </tr> <tr> <td>Bluetooth company</td> <td>LSD Science & Technology Co., Ltd</td> </tr> <tr> <td>RF Band</td> <td>2402-2480MHz</td> </tr> <tr> <td>Output power</td> <td>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
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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。



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