ECE TYPE-APPROVAL CERTIFICATE

E24

Communication Concerning: Approval granted
~~Approval extended~~
~~Approval refused~~
~~Approval withdrawn~~
~~Production definitively discontinued~~

Of a type of electrical/electronic sub-assembly with regard to Regulation No.10.

Approval No: ***E24*10R06/02*5386*00***

Reason for extension: ***-N/A***

1. Make (trade name of manufacturer): ***N/A***

2. Type and general commercial description: ***TC02+RP03+E22, Tire Pressure Monitoring System***

   Variant(s): ***TC02+RP03+E74U, TC02+RP03+E74, TC02+RP03+SR, TM508T22+RP03+E22, TM508T22+RP03+E74U, M508T22+RP03+E74, TM508T22+RP03+SR, TC11+RP03+E22, TC11+RP03+E74U, TC11+RP03+E74, TC11+RP03+SR, RP03U6+RP03+E22, RP03U6+RP03+E74U, RP03U6+RP03+E74, RP03U6+RP03+SR***

3. Means of identification of type, if marked on the ~~vehicle~~/ component/~~separate technical unit~~: ***Letters and digits***

3.1 Location of that marking: ***Laser engraving on the surface***

4. Category of vehicle: ***N/A***

5. Name and address of manufacturer:

6. In the case of components and separate technical units, location and method of affixing of the approval mark: ***N/A***

7. Address(es) of assembly plant(s):

NSAI, 1 Swift Square, Northwood, Santry, Dublin 9, Ireland. Telephone: (+353+1) 807 3800, Facsimile: 01-807 3844

Approval No: ***E24*10R06/02*5386*00***

8.	Additional information (where applicable):	***See appendix below***
9.	Technical service responsible for carrying out the tests:	***Optival Test ve Belgelendirme A.Ş Alikahya Fatih Mah. Sakıp Sabancı Bulv. No:71 Kocaeli / Turkey***
10.	Date of test report:	***10.04.2023***
11.	Number of test report:	***OPH-T-12536-00 Rev01***
12.	Remarks (if any):	***See Appendix below***
13.	Place:	***Dublin***
14.	Date:	***20th April, 2023***
15.	Signature:	

16. The index to the information package lodged with the approval authority, which may be obtained on Request, is attached.

NSAI, 1 Swift Square, Northwood, Santry, Dublin 9, Ireland. Telephone: (+353+1) 807 3800, Facsimile: 01-807 3844

Approval No: ***E24*10R06/02*5386*00***

Appendix

To type-approval communication concerning the type approval
of an electrical/electronic sub-assembly under Regulation No.10.

1.	Additional information	
1.1.	Electrical system rated voltage:	***24V DC, negative ground***
1.2.	This ESA can be used on any vehicle type with the following restrictions:	***See manufacturer's specifications.***
1.2.1	Installation conditions, if any:	***See manufacturer's specifications.***
1.3.	This ESA can only be used on the following vehicle types:	***N/A***
1.3.1	Installation conditions, if any:	***N/A***
1.4.	The specific test method(s) used and the frequency ranges covered to determine immunity were:	***Bulk Current Injection Method:*** *Frequency: (20 – 400 MHz)* ***Absorber Chamber Test:*** *Frequency: (400 – 2000 MHz)*
1.5.	Laboratory accredited to ISO 17025 and recognized by the Approval Authority responsible for carrying out the tests:	***Optival Test ve Belgelendirme A.Ş***
2.	Remarks:	***N/A***

Appendix to type-approval communication concerning the
type approval of a vehicle under Regulation No.10.

1.	Additional information	
2.	Special devices for the purpose of Annex 4 to this Regulation:	***N/A***
3.	Electrical system rated voltage:	***N/A***
4.	Type of bodywork:	***N/A***
5.	List of electronic systems installed in the tested vehicle(s) not limited to the items in the information document:	***N/A***
5.1	Vehicle equipped with 24 GHz short-range radar equipment (yes/no):	***N/A***
6.	Laboratory accredited to ISO 17025 and recognized by the Approval Authority responsible for carrying out the tests:	***N/A***
7.	Remarks:	***N/A***

NSAI, 1 Swift Square, Northwood, Santry, Dublin 9, Ireland. Telephone: (+353+1) 807 3800, Facsimile: 01-807 3844

Approval No: ***E24*10R06/02*5386*00***

Index to the Information Package

Date of issue:	***20th April, 2023***
Date of latest amendment:	***N/A***
Reason for extension/revision:	***N/A***

1. Additional conditions, and advisory notes on legal alternatives.

2. Test report(s)

- numbers(s):	***OPH-T-12536-00 Rev01***
- date of issue:	***10.04.2023***
- date of latest amendment:	***N/A***

3. Information document

- number(s):	***TC02+RP03+E22-R10-00***
- date of issue:	***07.04.2023***
- date of latest amendment:	***N/A***
Documentation:	***28pages***

NSAI, 1 Swift Square, Northwood, Santry, Dublin 9, Ireland. Telephone: (+353+1) 807 3800, Facsimile: 01-807 3844

Approval No: ***E24*10R06/02*5386*00***

Appendix: **Additional conditions, and advisory notes on legal alternatives**

A: Additional conditions:

1. The attached technical report, with any of its attachments, forms part of this Type Approval certificate.
2. Each device from series production shall be to the measurements specified in the attached drawings, and shall be manufactured only from the materials specified in the Approval documents.
3. Changes in the type are permitted only with the explicit permission of NSAI. Breaches of this requirement will lead to a withdrawal of the Type Approval, and in addition may be subject to criminal prosecution.
4. At regular intervals, any tests or associated checks prescribed by the applicable legislation to verify continued conformity with the approved type shall be carried out. The manufacturer shall demonstrate compliance with this by submitting to NSAI evidence of adequate arrangements and documented control plans for each type approved.
5. Any set of samples or test pieces showing evidence of non-conformity shall give rise to further sampling and testing and all steps shall be taken to restore conformity of production.
6. This Type Approval will expire when it is surrendered by the holder, or withdrawn by NSAI, or when the approved type no longer conforms to legal requirements. The recall of the Type Approval can be issued by NSAI when the conditions required for the issuing or continuation of the Type Approval are no longer current, or when the Approval holder is in breach of the duties attached to the Type Approval, or when it is established that the approved type no longer meets the requirements of traffic safety.
7. Changes in the company name, address or manufacturing site, as well as in any of the sales or other agents specified in the issuing of the approval must immediately be notified to NSAI.
8. The duties imposed by the issuing of this certificate are not transferable. The legal protection of third parties is not affected by this certificate.
9. When the manufacture or sale of the system, component or separate technical unit has not been started within one year of the date of issue of this certificate, then NSAI is to be informed. This requirement also applies when the manufacture or sale has been halted for more than one year, or when it ought to have been halted for more than one year. The initial commencement of manufacture or sale, or the resumption of manufacture or sale, shall then be notified to NSAI within one month of commencement or resumption.

B: Legal Options:

Any objection to the requirements set out in this certificate shall be made within one month of the date of issue. The objection shall be made, in writing, to NSAI in Dublin.

NSAI, 1 Swift Square, Northwood, Santry, Dublin 9, Ireland. Telephone: (+353+1) 807 3800, Facsimile: 01-807 3844

TECHNICAL REPORT

OPH-T-12536-00 Rev01 Dated 10.04.2023

Applicant	:	
Regulatory act	:	UN ECE R-10
		Electromagnetic Compatibility
		Supplement 2 to the 06 series of amendments
Type	:	TC02+RP03+E22

Application for:

	Vehicle
	System
X	Component
	Separate technical unit

Information regarding approval status:

X	First approval application
	Application for extension from
	Test report only

0. INDEX

1. ATTACHMENTS

1.1	Manufacturer's information document	No:	TC02+RP03+E22-R10-00
		Date:	07.04.2023

2. GENERAL INFORMATION

2.1	Make (trade name of manufacturer)	:	N/A
2.2	Type	:	TC02+RP03+E22
2.2.1	Variants	:	See Information Document 2.1
2.3	Commercial name(s)	:	Tire Pressure Monitoring System
2.4	Means of identification of type, if marked on the component	:	Letters and digits
2.4.1	Location of that marking	:	Laser engraving on the surface
2.5	Category of vehicle	:	N/A
2.6	Company name and address of manufacturer	:	
2.7	Name(s) and address(es) of assembly plant(s)	:	
2.8	Name and address of the manufacturer's representative (if any)	:	N/A
2.9	Location of approval mark	:	Laser engraving on the surface

Date	:	07.04.2023
Location	:	Guangzhou LCS Compliance Testing Laboratory Ltd.
Test expert	:	Andy Yang

3. REASONS FOR EXTENSION

N/A

4. TEST EQUIPMENT AND CONDITION

4.1. Equipment name		**ID Number**
Peak/Quasi-peak detector	:	R&S ESCI EMI Test Receiver, SN: 100849
Average detector	:	R&S ESCI EMI Test Receiver, SN: 100849
Antennas	:	Biconical: SCHW ARZBACK SN: 9124-803 Log-periodic: SCHWARZBACK SN: 9118A570 Log-periodic: SCHWARZBACK SN: 9128D029 Horn: R&S SN: 100685
50µH Line Impedance Stabilization Network (LISN) (AC) or HVAN (DC)	:	SCHWARZBACK MESS - ELEKTRONIK, Type: NNBM 8124, SN: 8124-963 SCHWARZBACK MESS - ELEKTRONIK, Type: NNBM 8124, SN: 8124-956
Measuring instrument	:	R&S ESCI EMI Test Receiver, SN: 100849
Stimulation and monitoring system	:	R&S ESCI EMI Test Receiver, SN: 100849 EMTEST, Type: CWS500N1, SN.: V1150111216
RF signal generator and amplifier	:	R&S Signal generator, Type: SMB100A-B106, SN.: 105643
Injection probe	:	FCC, Type: F-140, SN.: 141550
Oscilloscope or equivalent	:	Tektronix, Type: DPO4054B, SN.: C011183
Voltage probe	:	Tektronix, Type: TPP0500
Pulse generator	:	3ctest, Type: JDS200, SN.: ES0701521

4.2. Ambient conditions

Testing area	[X]	ALSE
	[ ]	OATS

<u>For OATS testing:</u>

Temperature	:	23 ℃
Humidity	:	51 RH%

5. IDENTIFICATION OF TEST SAMPLE

Product code	:	N/A
Function of the ESA	:	Tire Pressure Monitoring System
Regarded as immunity related?	:	Yes
Primary material(s) of the body	:	Plastic
Electrical system voltage and ground	:	24V DC, negative ground
Provides coupling system for REESS?	:	no

6. REQUIREMENTS AND TEST RESULTS

6.1. GENERAL

Annex	Title	Result
7	Radiated broadband electromagnetic emissions from ESAs	**In conformity**
8	Narrowband electromagnetic emissions from ESAs	**In conformity**
9	Immunity of ESAs to electromagnetic radiation	**In conformity**
10	Immunity to and emission of transients of ESAs	**In conformity**
17	Emission of harmonics generated on AC power lines from an ESA	**Not applicable**
18	Emission of voltage changes, voltage fluctuations and flicker on AC power lines from an ESA	**Not applicable**
19	Emission of radiofrequency conducted disturbances on AC or DC power lines from an ESA	**Not applicable**
20	Emission of radiofrequency conducted disturbances on network and telecommunication access from an ESA	**Not applicable**
21	Immunity of an ESA to Electrical Fast Transient/Burst disturbances conducted along AC and DC power lines	**Not applicable**
22	Immunity of ESAs to surges conducted along AC and DC power lines	**Not applicable**

6.2. DETAILS

[6.1.2.][7.1.2.] Before testing the Technical Service has to prepare a test plan in conjunction with the manufacturer, which contains at least mode of operation, stimulated function(s), monitored function(s), pass/fail criterion (criteria) and intended emissions.

In conformity

Worst case selection	:	ESA with the maximum rated power
Normal operating condition(s)	:	Working in test voltage 24 DC
Failure criteria for immunity tests	:	Unintended operation or degradation of performance

Annex 7
Radiated broadband electromagnetic emissions from ESAs

Type of detector : ~~peak /~~ quasi peak

Testing configuration details / reference line for testing : The side of the connection points located

[2.]ESA state during tests

[2.1.] The ESA under test shall be in normal operation mode, preferably in maximum load. **In conformity**

ESAs involved in "REESS charging mode coupled to the power grid" shall be in charging mode. The state of charge (SOC) of the traction battery shall be kept between 20% and 80% of the maximum SOC during the whole frequency range measurement (this may lead to split the measurement in different sub-bands with the need to discharge the vehicle's traction battery before starting the next sub-bands) **Not applicable**

If the test is not performed with a REESS the ESA should be tested at rated current. If the current consumption can be adjusted, then the current shall be set to at least 80% of its nominal value. **Not applicable**

[3.1.] For ESA other than involved in "REESS charging mode coupled to the power grid" the test shall be performed according to the ALSE method described in Paragraph 6.4. of CISPR 25. **In conformity**

[3.2.] For ESAs in configuration "REESS charging mode coupled to the power grid" the test arrangement shall be according to Figure 2 of the appendix to Annex 7. **Not applicable**

[3.3.] As an alternative to an absorber lined shielded enclosure (ALSE) an open area test site (OATS), which complies with the requirements of CISPR 16-1-4 may be used (see Appendix to this Annex). **Not applicable**

[4.3.] The measurements shall be performed with a spectrum analyser or a scanning receiver with below parameters. **In conformity**

Measurement device:

☐ Spectrum analyser

☒ Scanning receiver

Spectrum Analyser Parameters

Frequency range MHz	Peak detector		Quasi-peak detector		Average detector	
	RBW at -3dB	Scan time	RBW at -6dB	Scan time	RBW at -3dB	Scan time
30 to 1,000	100/120kHz	100ms/MHz	120kHz	20s/MHz	100/120kHz	100ms/MHz

Note: If a spectrum analyser is used for peak measurements, the video bandwidth shall be at least three times the resolution bandwidth (RBW).

Scanning Receiver Parameters

Frequency range MHz	Peak detector			Quasi-peak detector			Average detector		
	BW at -6dB	Step size[(a)]	Dwell time	BW at -6dB	Step size[(a)]	Dwell time	BW at -6dB	Step size[(a)]	Dwell time
30 to 1,000	120Hz	50kHz	5ms	120Hz	50kHz	1s	120kHz	50kHz	5ms

(a) For purely broadband disturbances, the maximum frequency step size may be increased up to a value not greater than the bandwidth value.

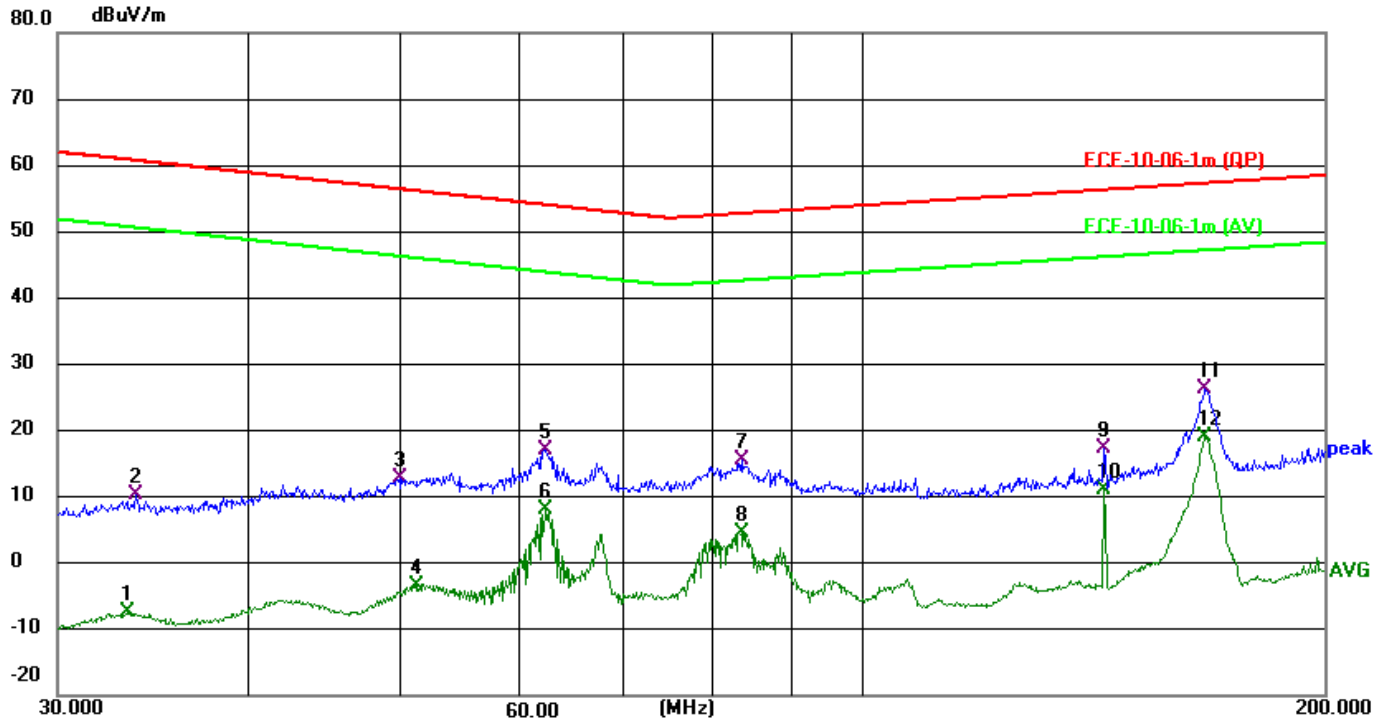
Note: For emissions generated by brush commutator motors without an electronic control unit, the maximum step size may be increased up to five times the bandwidth.

[4.5.] Readings

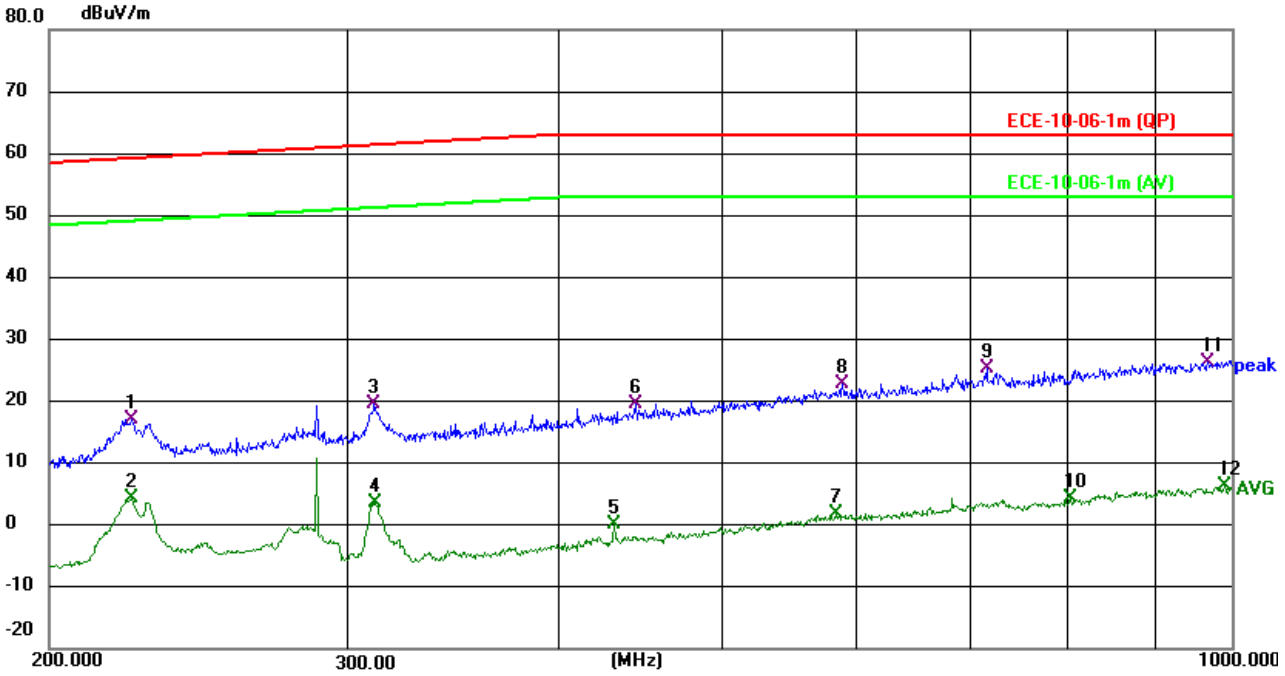
12V System

ESA in configuration other than "REESS in charging mode coupled to the power grid"

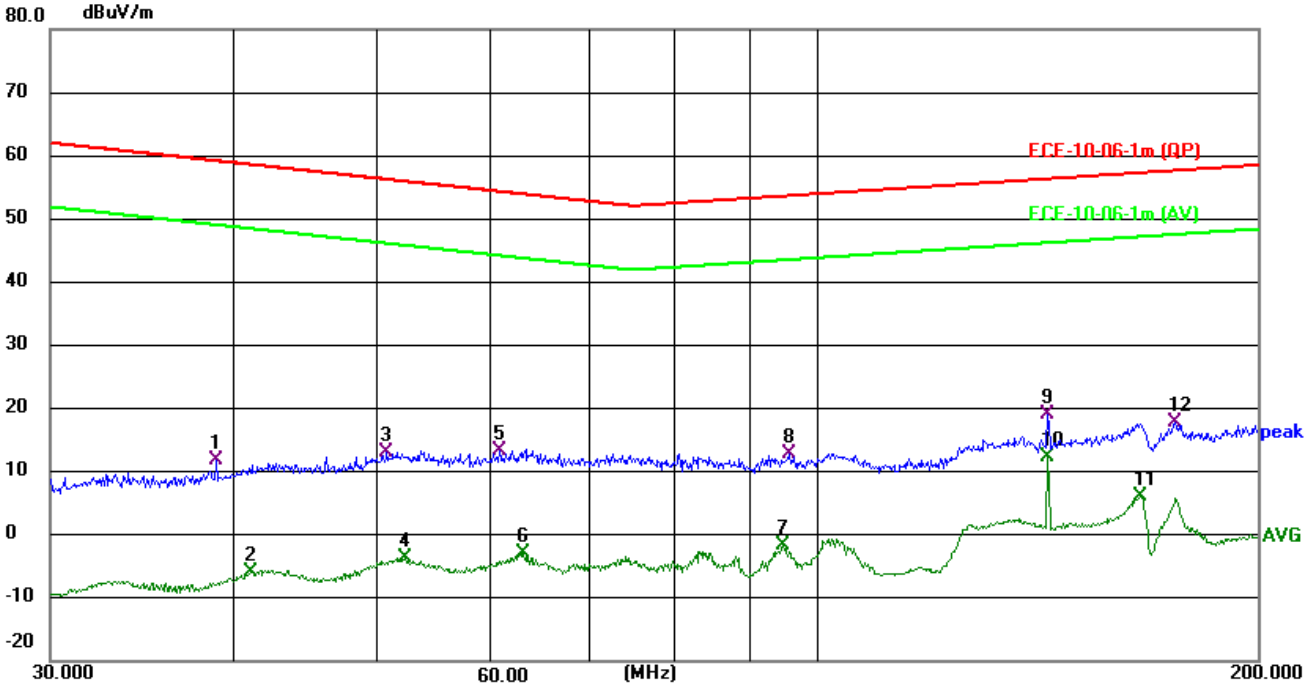
Frequency bands	Frequency	Polarization	Testing configuration	Characteristic reading	Limit
MHz	*MHz*	*H: horizontal V: vertical*	*define the reference line for testing (Correct Factor) dB µV/m*	*dB µV/m*	*dB µV/m*
30-34	Refer to Graph 1, 2,3 and 4 for measurement results				
34-45					
45-60					
60-80					
80-100					
100-130					
130-170					
170-225					
225-300					
300-400					
400-525					
525-700					
700-850					
850-1000					



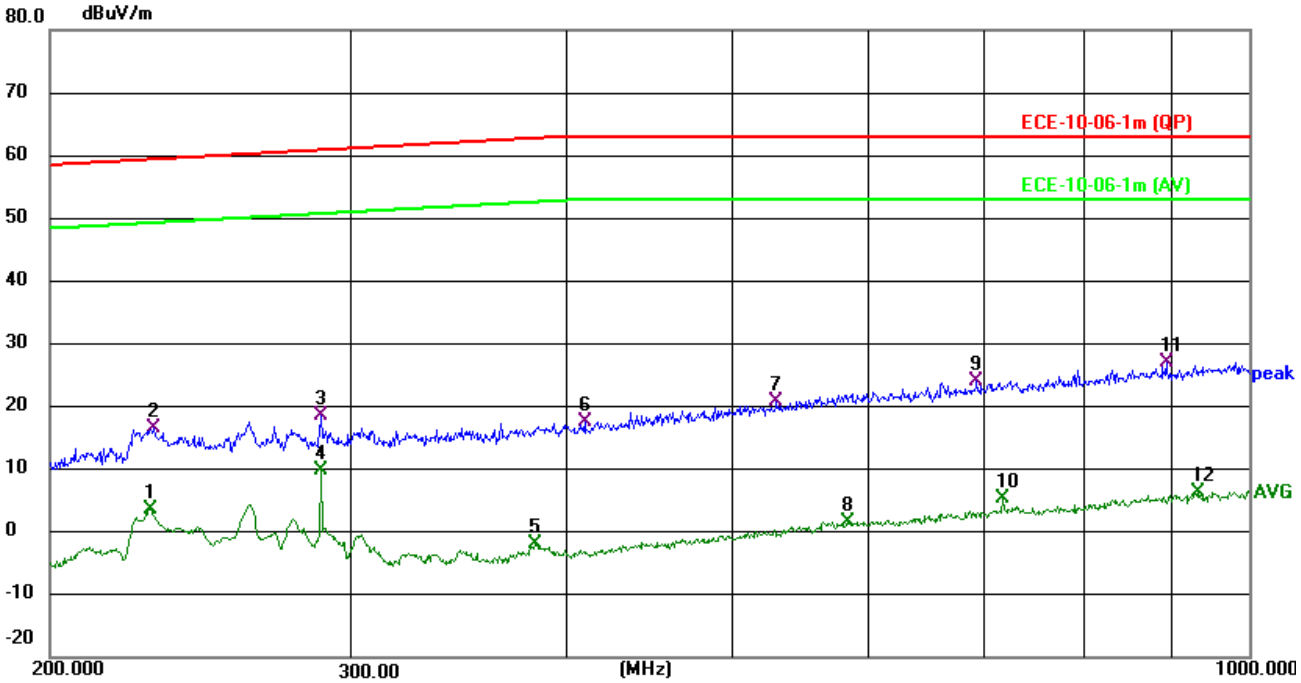
Graph 1: Radiated broadband EM (blue) and radiated narrowband EM (green), polarization: horizontal



Graph 2: Radiated broadband EM (blue) and radiated narrowband EM (green), polarization: horizontal



Graph 3: Radiated broadband EM (blue) and radiated narrowband EM (green), polarization: vertical



Graph 4: Radiated broadband EM (blue) and radiated narrowband EM (green), polarization: vertical

ESA in configuration "REESS in charging mode coupled to the power grid" N/A

Annex 8
Radiated narrowband electromagnetic emissions from ESA(s)

Type of detector : average

Testing configuration details / reference line for testing : The side of the device where connection points are located

[2.] ESA state during tests
The ESA under test shall be in normal operation mode, preferably in maximum load. **In conformity**

Operating condition : Working in test voltage 24 DC

[3.1.] The test shall be performed according to ALSE method described in Paragraph 6.4. of CISPR 25. **In conformity**

[3.2.] As an alternative to an absorber lined shielded enclosure (ALSE) an open area test site (OATS) which complies with the requirements of CISPR 16-1-4 may be used (see Figure 1 of the Appendix to Annex 7). **Not applicable**

[4.3.] The measurements shall be performed with a spectrum analyser or a scanning receiver with the parameters given below: **In conformity**

Measurement device:

☐ Spectrum analyser

☒ Scanning receiver

Spectrum Analyser Parameters

Frequency range MHz	Peak detector		Quasi-peak detector		Average detector	
	RBW at -3dB	Scan time	RBW at -6dB	Scan time	RBW at -3dB	Scan time
30 to 1,000	100/120kHz	100ms/MHz	120kHz	20s/MHz	100/120kHz	100ms/MHz

Note: If a spectrum analyser is used for peak measurements, the video bandwidth shall be at least three times the resolution bandwidth (RBW).

Scanning Receiver Parameters

Frequency range MHz	Peak detector			Quasi-peak detector			Average detector		
	BW at -6dB	Step size[(a)]	Dwell time	BW at -6dB	Step size[(a)]	Dwell time	BW at -6dB	Step size[(a)]	Dwell time
30 to 1,000	120Hz	50kHz	5ms	120Hz	50kHz	1s	120kHz	50kHz	5ms

(a) For purely broadband disturbances, the maximum frequency step size may be increased up to a value not greater than the bandwidth value.

Note: For emissions generated by brush commutator motors without an electronic control unit, the maximum step size may be increased up to five times the bandwidth.

[3.5.] Readings

12 V System

Frequency bands	Frequency	Polarization	Testing configuration	Characteristic reading	Limit
MHz	*MHz*	*H: horizontal V: vertical*	*define the reference line for testing (Correct Factor) dB µV/m*	*dB µV/m*	*dB µV/m*
30-34	Refer to Graph 1, 2, 3 and 4 for measurement results				
34-45					
45-60					
60-80					
80-100					
100-130					
130-170					
170-225					
225-300					
300-400					
400-525					
525-700					
700-850					
850-1000					

Annex 9
Immunity of ESA(s) to electromagnetic radiation

[1.2.1.] Test methods used

X	Absorber chamber test according ISO 11452-2 *Frequency Range: 400~2000MHz*
	TEM cell testing according ISO 11452-3
X	Bulk current injection testing according ISO 11452-4 *Frequency Range: 20~400MHz*
	Stripline testing according ISO 11452-5
	800mm stripline according Paragraph 4.5. of Annex 9

ESAs in configuration "REESS charging mode coupled to the power grid" shall comply with the requirements of the combination of the Absorber chamber test according to ISO 11452-2 and Bulk current injection testing according to ISO 11452-4 at the manufacturer's discretion provided that these results in the full frequency range specified in Paragraph 3.1. of this Annex being covered.	**Not applicable**
[2.] ESA state during tests	
[2.2.] The ESA under test shall be switched on and must be stimulated to be in normal operation condition. It shall be arranged as defined in this Annex unless individual test methods dictate otherwise.	**In conformity**
ESAs involved in "REESS charging mode coupled to the power grid" shall be in charging mode. The state of charge (SOC) of the traction battery shall be kept between 20% and 80% of the maximum SOC during the whole frequency range measurement (this may lead to split the measurement in different sub-bands with the need to discharge the vehicle's traction battery before starting the next sub-bands). If the test is not performed with a REESS the ESA should be tested at rated current. If the current consumption can be adjusted, then the current shall be set to at least 20% of its nominal value.	**Not applicable**
[2.5.] If the ESA under test consists of more than one unit, the interconnecting cables should ideally be the wiring harnesses as intended for use in the vehicle. If these are not available, the length between the electronic control unit and the AN shall be as defined in the standard.	**In conformity**
All cables in the wiring harness should be terminated as realistically as possible and preferably with real loads and actuators.	**In conformity**
[3.1.] The test signal modulation shall be: (a) AM (amplitude modulation), with 1kHz modulation and 80% modulation depth in the 20 to 800MHz frequency range, and (b) PM (pulse modulation), t on 577µs, period 4,600µs in the 800 to 2,000MHz frequency range. Frequency step size and dwell time shall be chosen according to ISO 11452-1.	**In conformity**
[6.8.2.2. of general part] The ESA representative of its type shall be considered as complying with immunity requirements if, during the tests performed in accordance with Annex 9, there shall be no degradation of performance of "immunity related functions".	**In conformity**

Annex 10
Immunity to and emission of transients of ESAs

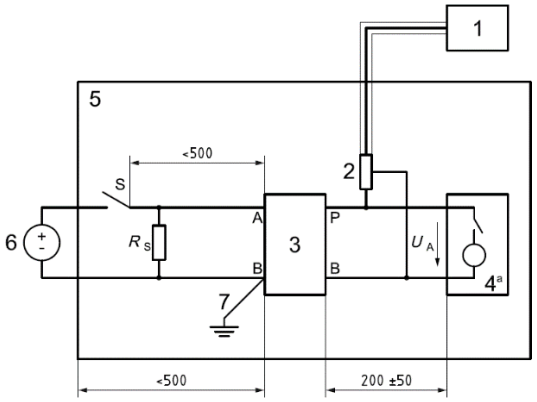
[4.2. of ISO 7637-2]The ambient temperature during the test shall be 23 ±5ºC. **In conformity**

[6.7. of general part] Emission of Transient Conducted Disturbances Generated by ESAs

[6.10.5. of general part]ESAs that are not switched, contain no switches or do not include inductive loads need not be tested for transient conducted emission and shall be deemed to comply with Paragraph 6.7. **Not applicable**

[4.3.1. of ISO 7637-2]The sampling rate and trigger level shall be selected to capture a waveform displaying the complete duration of the transient, and with sufficient resolution to display the highest positive and negative portions of the transient. **In conformity**

[4.3.2. of ISO 7637-2] Test set-up for slow pulses shall be in line with the figure below. **In conformity**

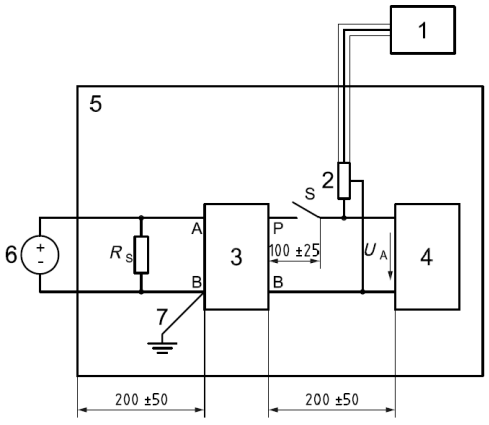


Key
1 oscilloscope or equivalent
2 voltage probe
3 artificial network
4 DUT (source of transient)
5 ground plane
6 power supply
7 ground connection; length <100 mm
R_S shunt resistance, as specified in 5.2
S switch, as specified in 5.3
U_A supply voltage

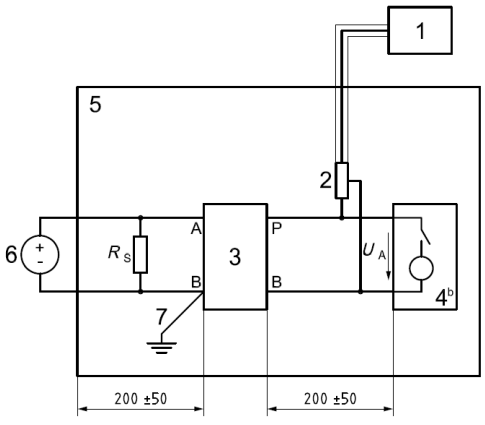
NOTE For A, B, and P, see Figure 3.

[a] Optionally with internal switch driving inductive load.
[b] With internal load and switch.

[4.3.3. of ISO 7637-2] Test set-up for fast pulses shall be in line with the related figure below. **In conformity**



Transient emission test set-up to measure fast pulses (ns to µs range) for DUT without internal switch



Transient emission test set-up to measure fast pulses (ns to µs range) for DUT with internal switch

[6.7.1. of general part] Measurement results for positive and negative, 12V and/or 24V system(s), slow and fast pulses shall be less than the limit values. **In conformity**

	12 V system			24 V system		
	Slow pulse	**Fast pulse**	**Limit**	**Slow pulse**	**Fast pulse**	**Limit**
Positive(OFF to ON)	N/A	N/A	N/A	27.21	28.80	+75 V
Negative(On to OFF)	N/A	N/A	N/A	-0.04	-1.80	-100 V

[6.9. of general part] Immunity of ESAs to Transient Disturbances

[2.] Test pulses 1, 2a, 2b, 3a, 3b and 4 shall be applied.
Refer to ISO 7637-2 for pulses 1, 2a, 2b, 3a and 3b; refer to ISO 16750-2 for pulse 4. **In conformity**

[4.4. of ISO 7637-2] Test set-up shall be in line with ISO 7637-2. **In conformity**

Supply voltage (U_A), shall be measured at the output of the pulse generator and shall 13,5 ± 0,5V for nominal 12 V system and 27 ± 1 V for nominal 24 V system. **In conformity**

Test pulse	**Immunity level**	**Functional status of the systems**			
		Related to immunity related functions		**Not related to immunity related functions**	
		Observation	**Criteria**	**Observation**	**Criteria**
1	III	C	C	N/A	D
2a	III	A	B	N/A	D
2b	III	C	C	N/A	D
3a	III	A	A	N/A	D
3b	III	A	A	N/A	D
4	III	C	C	N/A	D

Annex 17 – Emission of harmonics generated on AC power lines from an ESA **N/A**

Annex 18 – Emission of voltage changes, voltage fluctuations and flicker on AC power lines from an ESA **N/A**

Annex 19 – Emission of radiofrequency conducted disturbances on AC or DC power lines from an ESA **N/A**

Annex 20 – Emission of radiofrequency conducted disturbances on network and telecommunication access from an ESA **N/A**

Annex 21 – Immunity of an ESA to Electrical Fast Transient/Burst disturbances conducted along AC and DC power lines **N/A**

Annex 22 – Immunity of ESAs to Surges conducted along AC and DC power lines **N/A**

7. CONCLUSION AND STATEMENT OF CONFORMITY

The manufacturer's information document mentioned in item 1.1. and the electrical/electronic sub-assembly meet the requirements of UN ECE Regulation no. 10.

Remarks: Variants of this product are identical in circuitry design, control unit, PCB layout, electronic components used and internal wiring. Only differences are cover structure and color, which do not have an effect on the EMC related attributes. Because of this there is no technical concern to cover all the variants covered by the manufacturer's information document.

Optival Test ve Belgelendirme A.Ş. is affirmed by National Standards Authority of Ireland (NSAI) with technical service number 113.

Authorized expert
Hüseyin Anıl Kolukırık

Content check by
Tuğçe Ekin

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Revision reasons:

Revision No. 01 Means of identification of type updated. Functional status criteria in Annex 10 test result table updated.

[redacted]	Type: TC02+RP03+E22 Information Document No.: TC02+RP03+E22 -R10-00
	Date: 2023-4-7
	Pages 1 of 28

APPLICATION FOR APPROVAL PURSUANT

TO THE ECE REGULATION No. 10.06

RELATING TO ELECTROMAGNETIC COMPATIBILITY OF AN ESA

[redacted]

Type: TC02+RP03+E22

Date: 2023-4-7

Signature of a responsible person:

Confirmation

We declare hereby that the specimen ESA submitted for this approval test has been manufactured

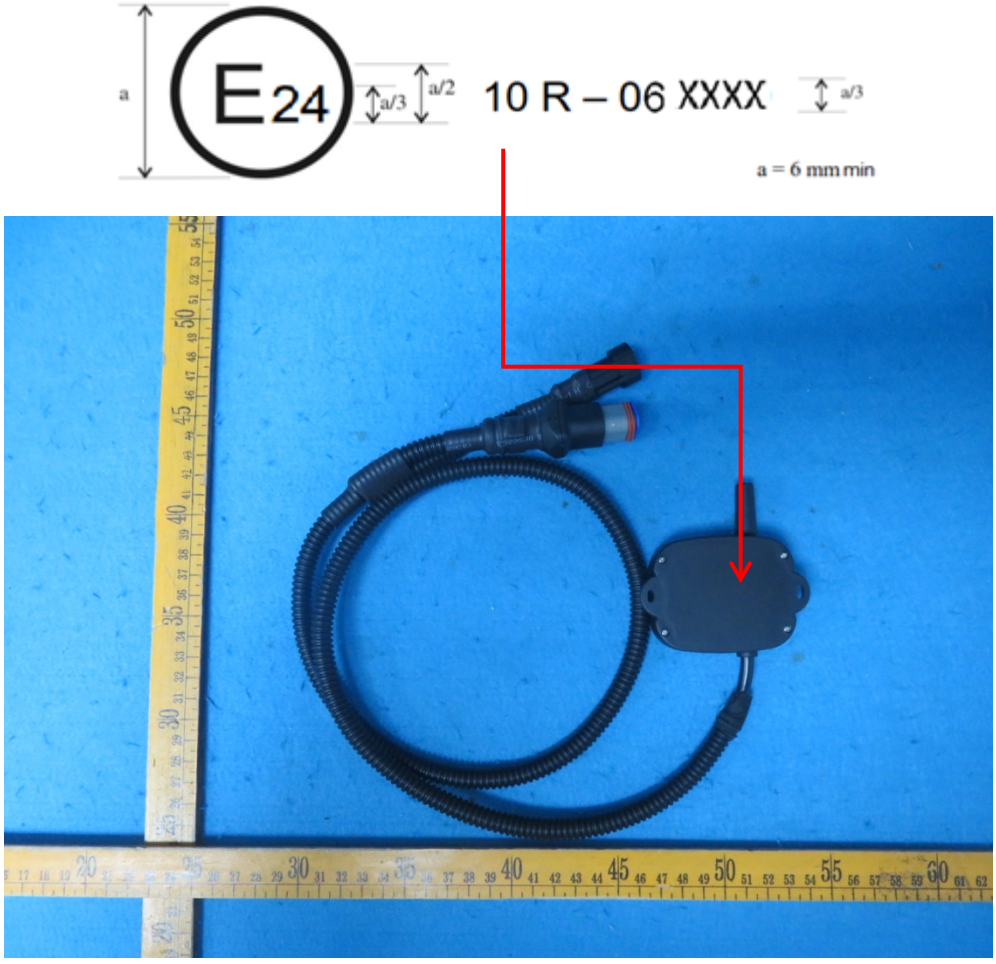
and assembled on conditions of ordinary mass production and that they are compatible with enclosed documentation.

Date: 2023-4-7

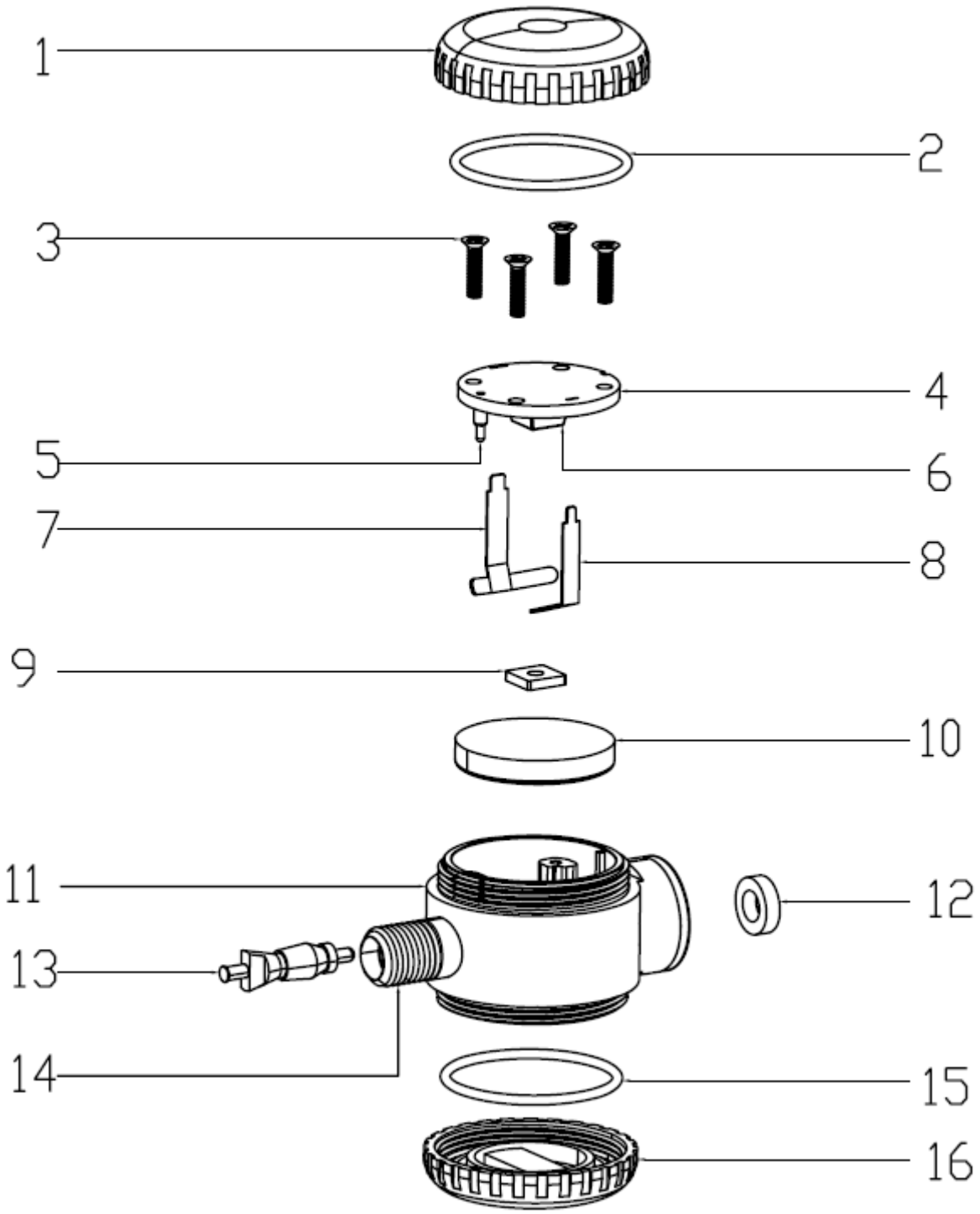
Signature of a responsible person:

1	Make (trade name of manufacturer):	N/A
2	Type:	TC02+RP03+E22
2.1	Variants (if applicable) :	TC02+RP03+E74U, TC02+RP03+E74, TC02+RP03+SR, TM508T22+RP03+E22, TM508T22+RP03+E74U, TM508T22+RP03+E74, TM508T22+RP03+SR, TC11+RP03+E22, TC11+RP03+E74U, TC11+RP03+E74, TC11+RP03+SR, RP03U6+RP03+E22, RP03U6+RP03+E74U, RP03U6+RP03+E74, RP03U6+RP03+SR
3.	Statement for model difference :	Only different in shape and model number for marketing.
4.	Name and address of manufacturer:	
4.1	Name and address of manufacturer's authorized representative:	N/A
5.	Production plant(s) address(es):	
6.	Position of the approval mark:	Laser engraving on the surface
7.	Electrical system rated voltage:	24V DC
8.	This ESA shall be approved as a:	Component

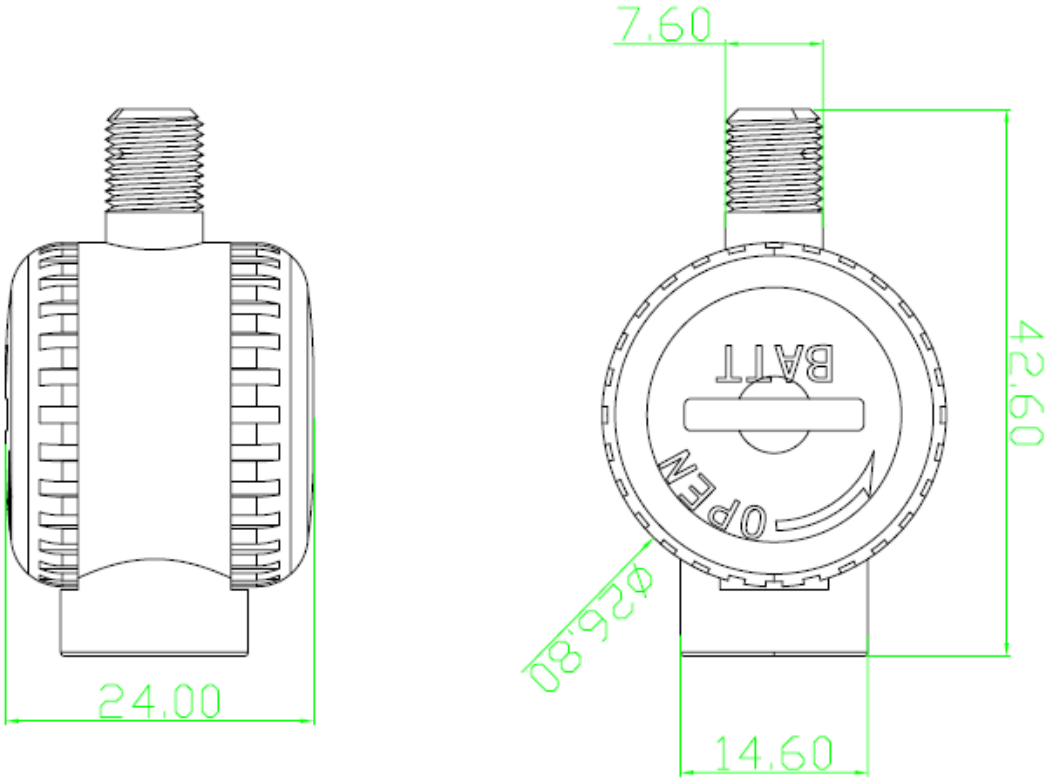
APPENDIX	No.1	Drawing of Location of Approval Mark



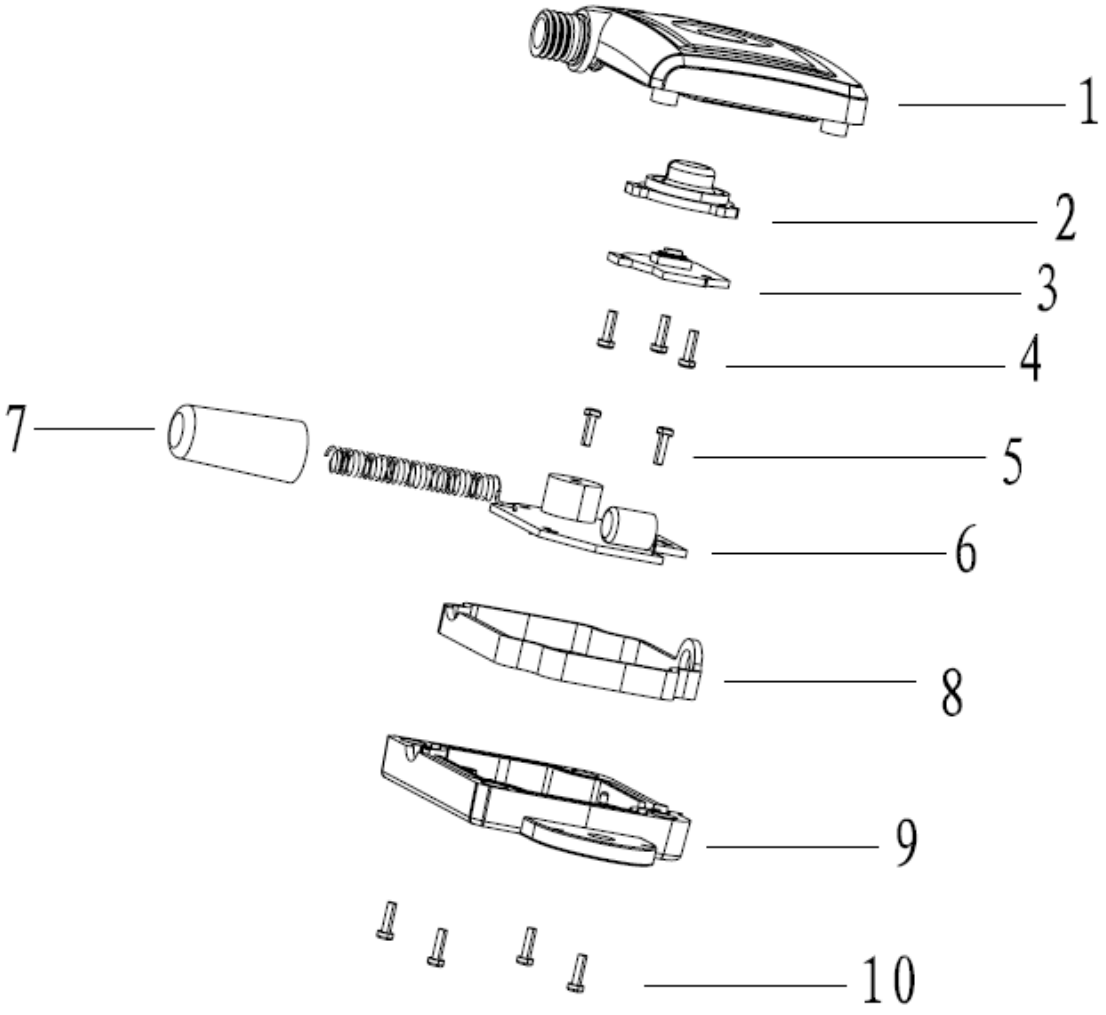
APPENDIX	No.2	Drawing of assembly



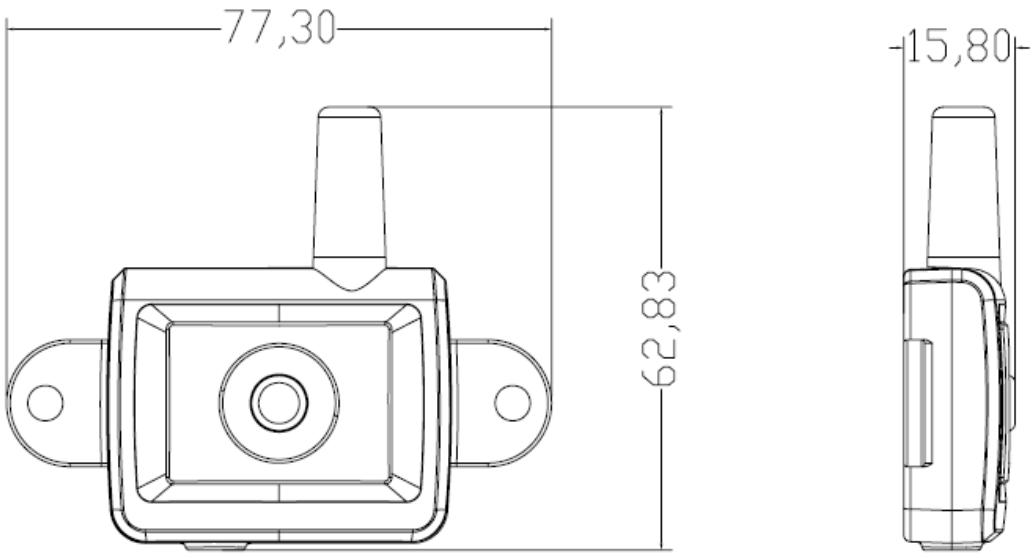
APPENDIX	No.2	Drawing of assembly



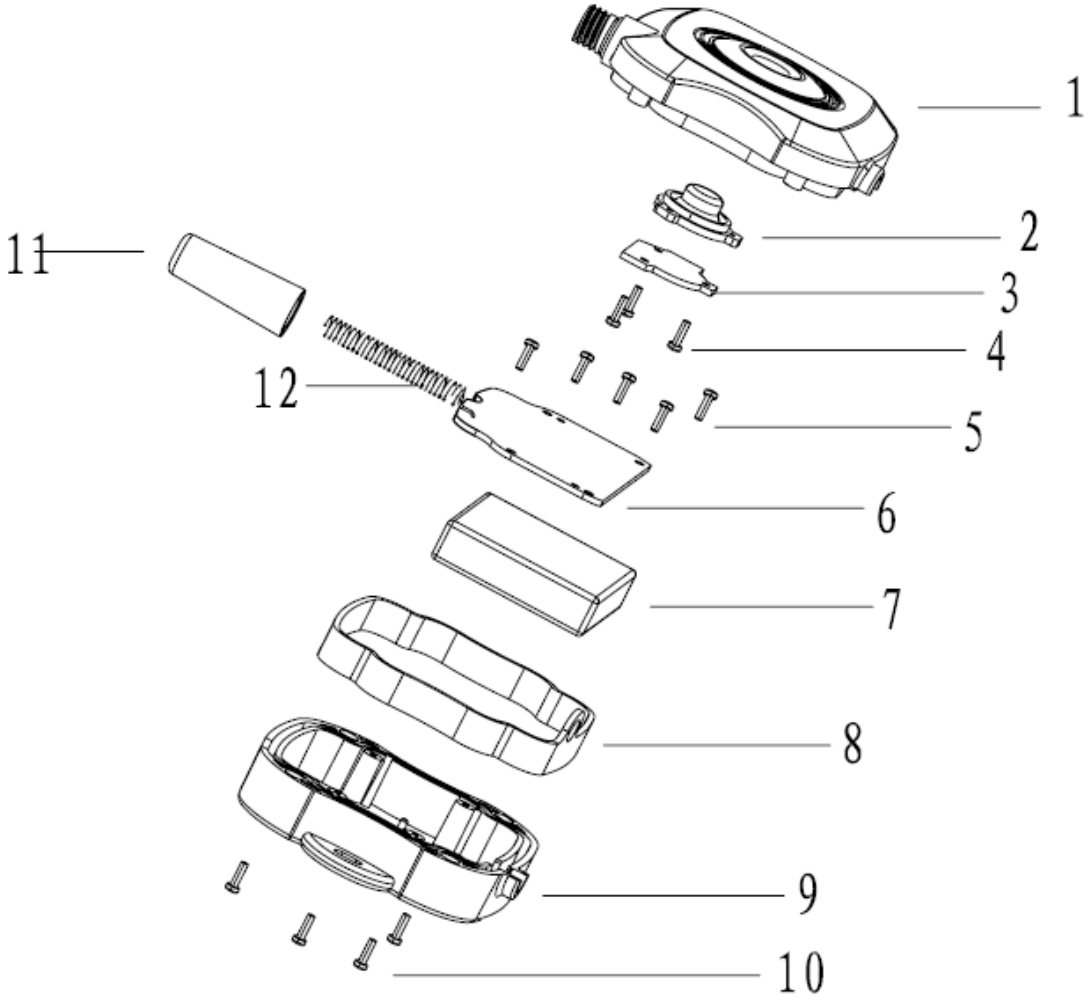
APPENDIX	No.2	Drawing of assembly



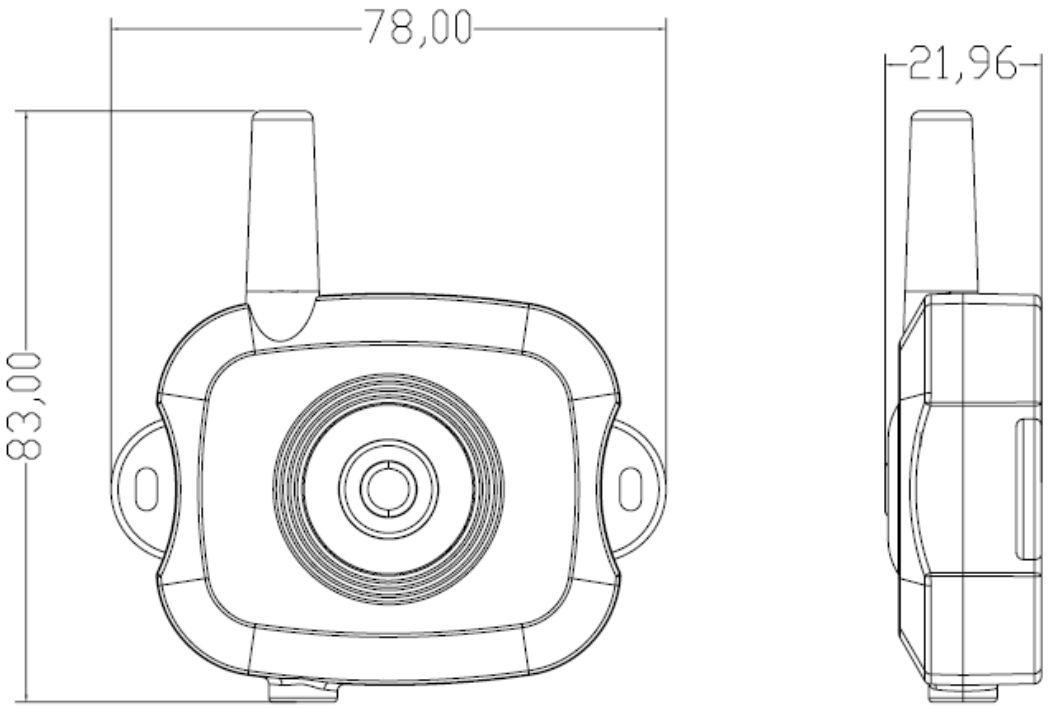
APPENDIX	No.2	Drawing of assembly



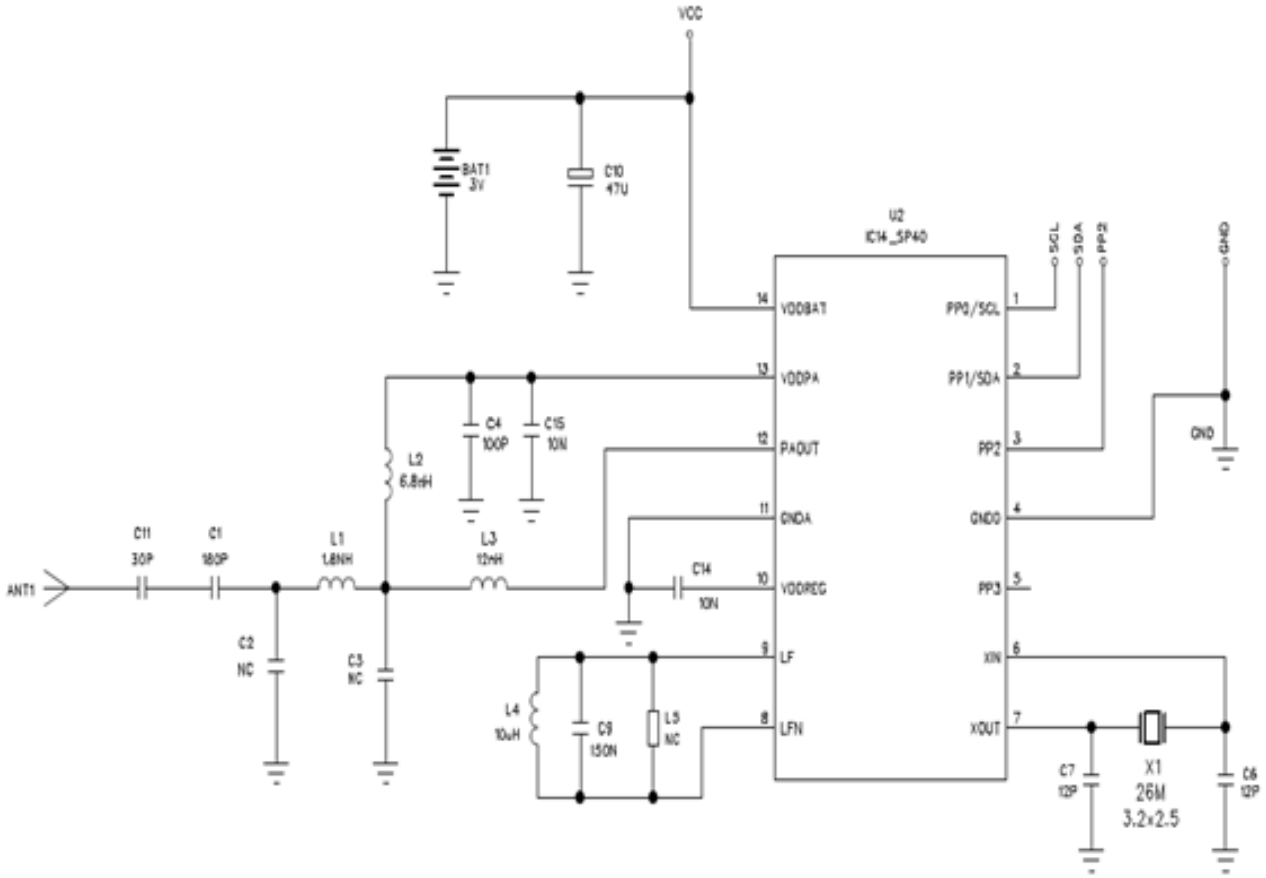
APPENDIX	No.2	Drawing of assembly



APPENDIX	No.2	Drawing of assembly



APPENDIX	No.3	Circuit Diagram



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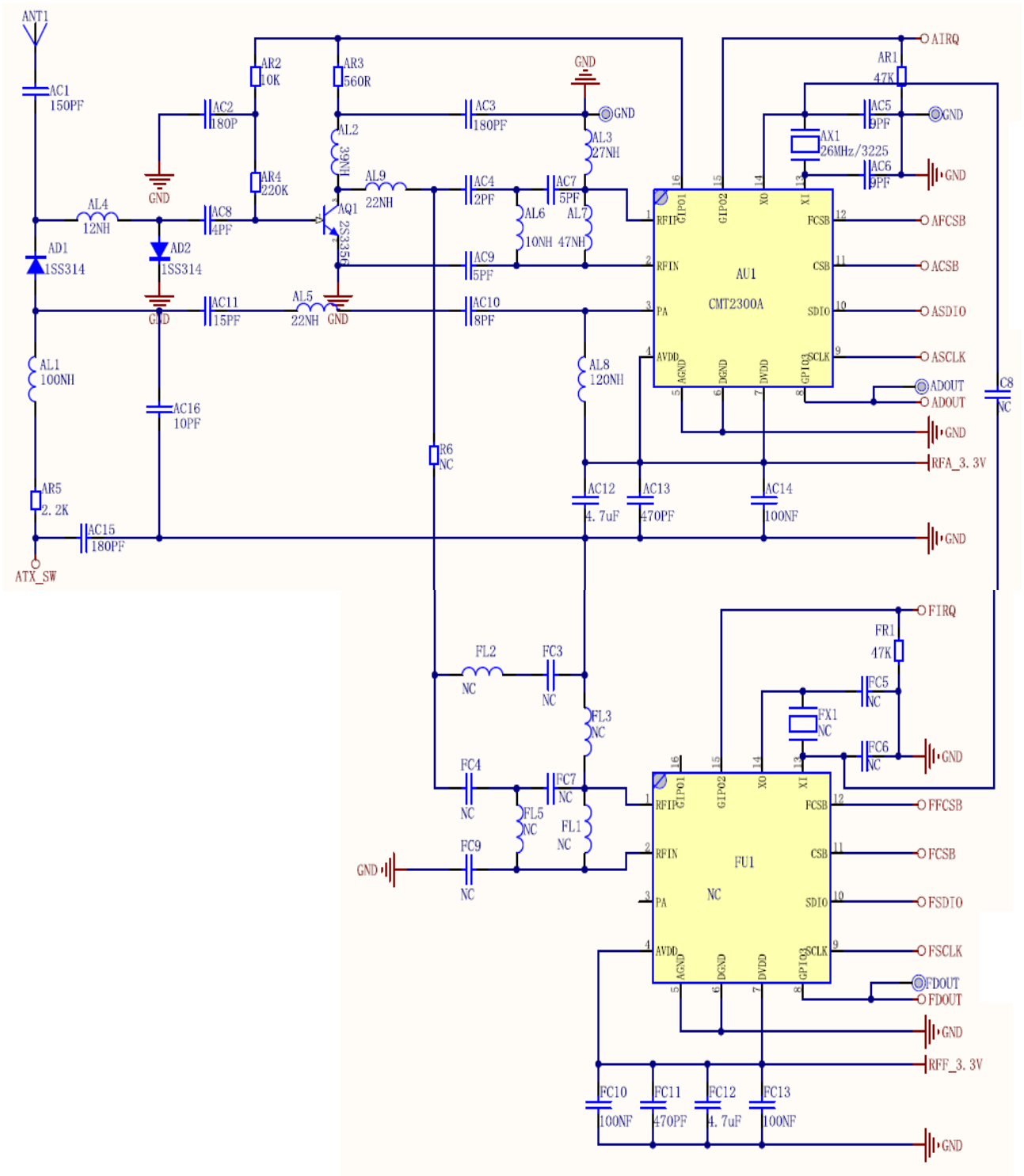
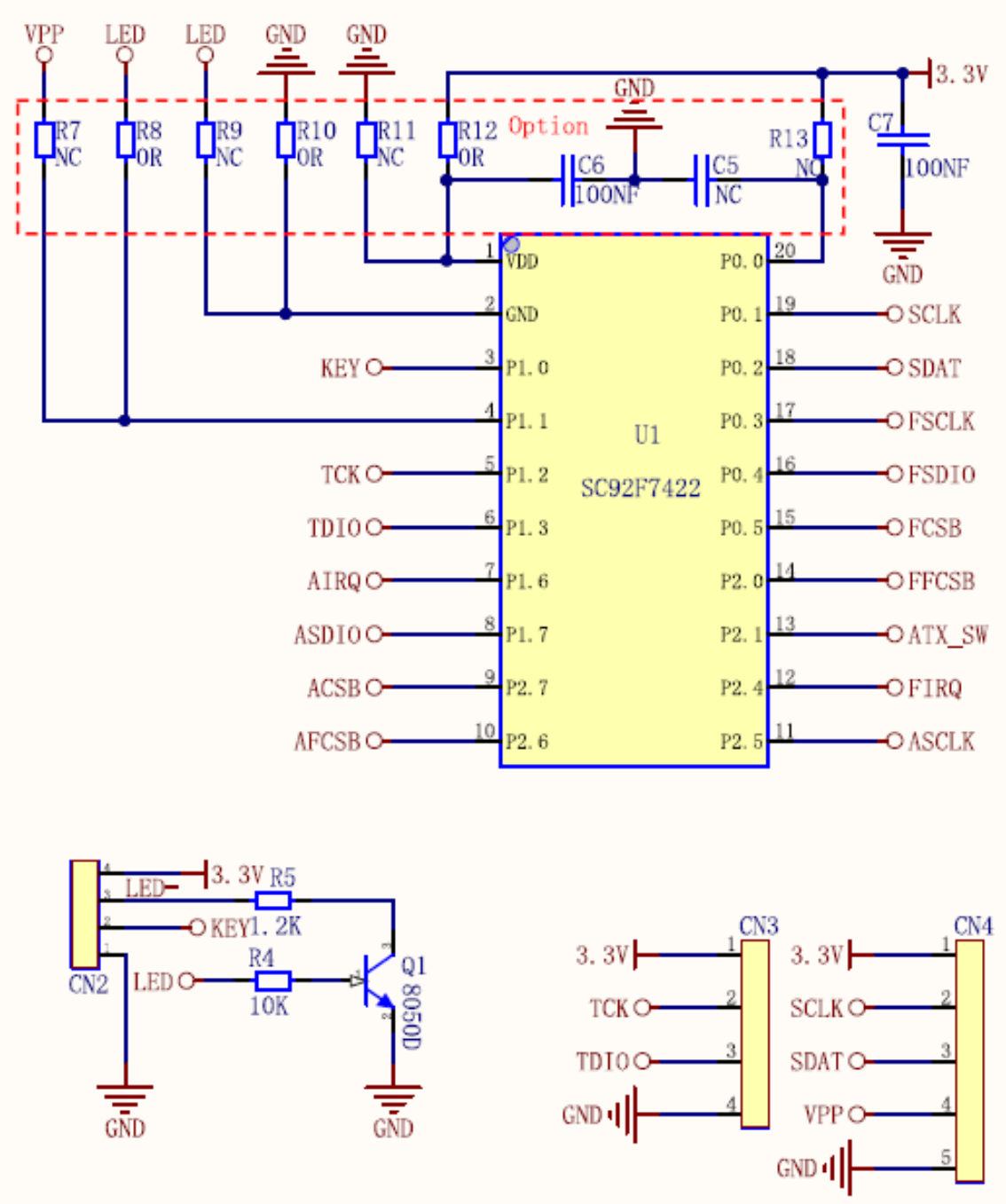
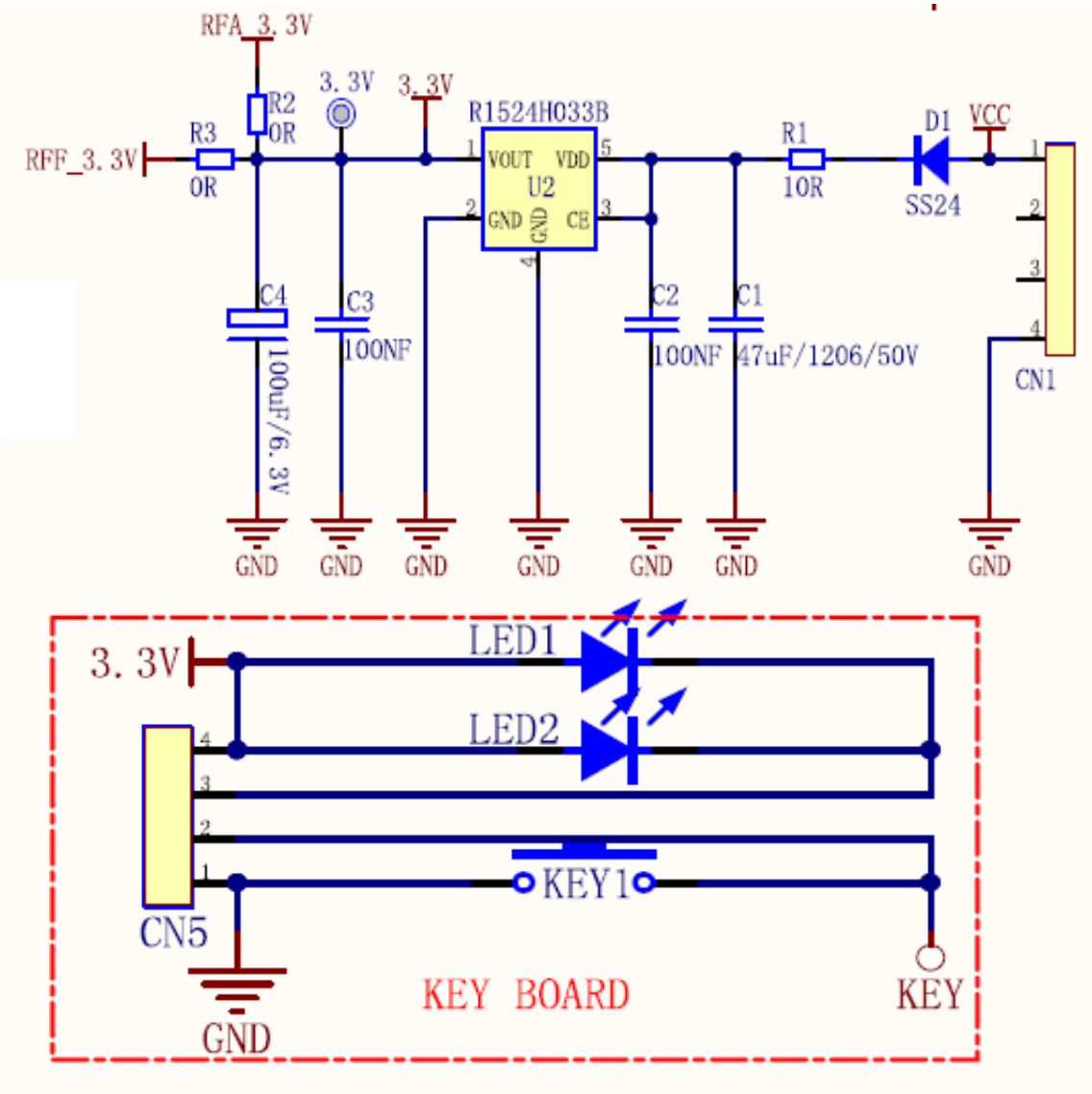


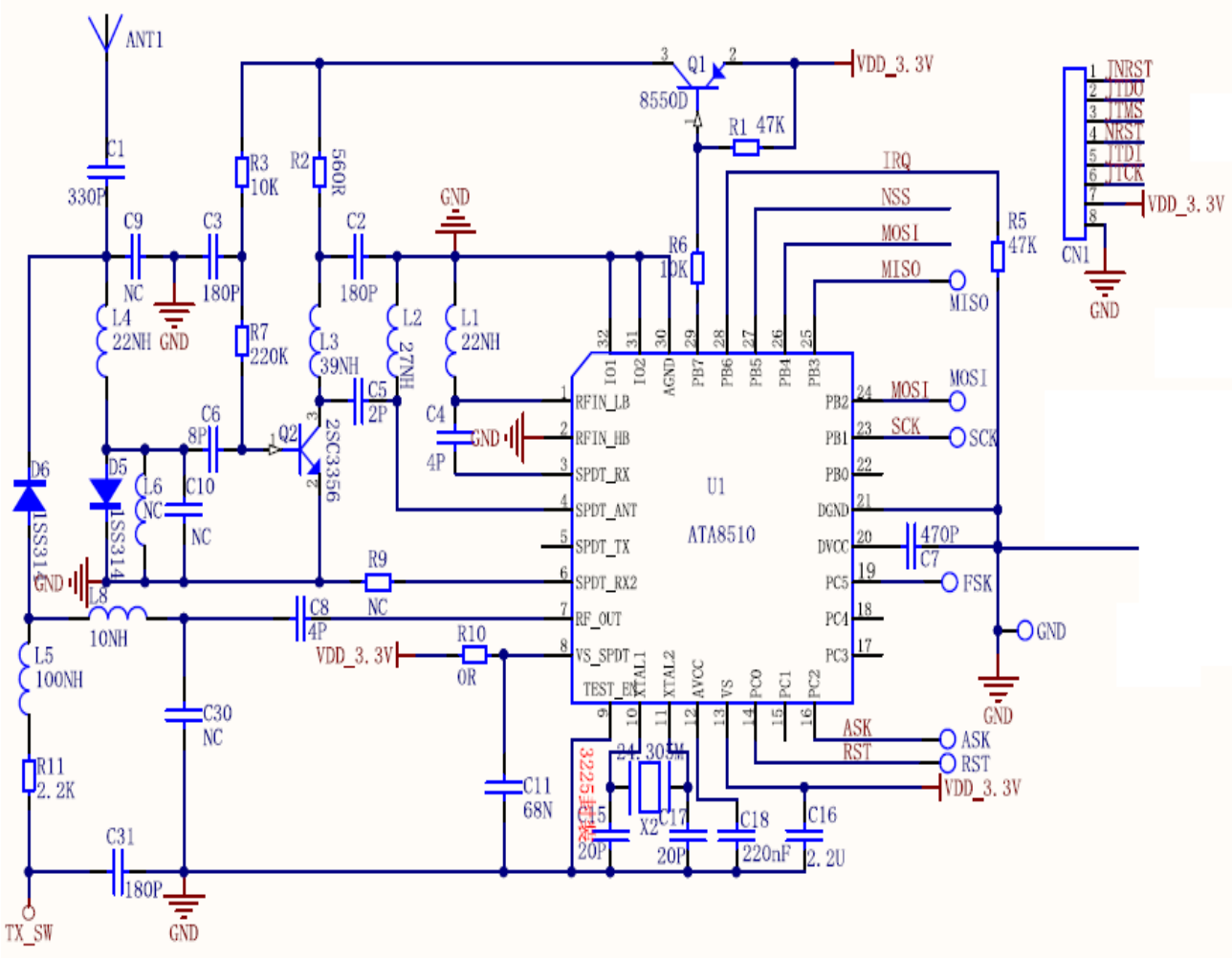
APPENDIX	No.3	Circuit Diagram



APPENDIX	No.3	Circuit Diagram



APPENDIX	No.3	Circuit Diagram



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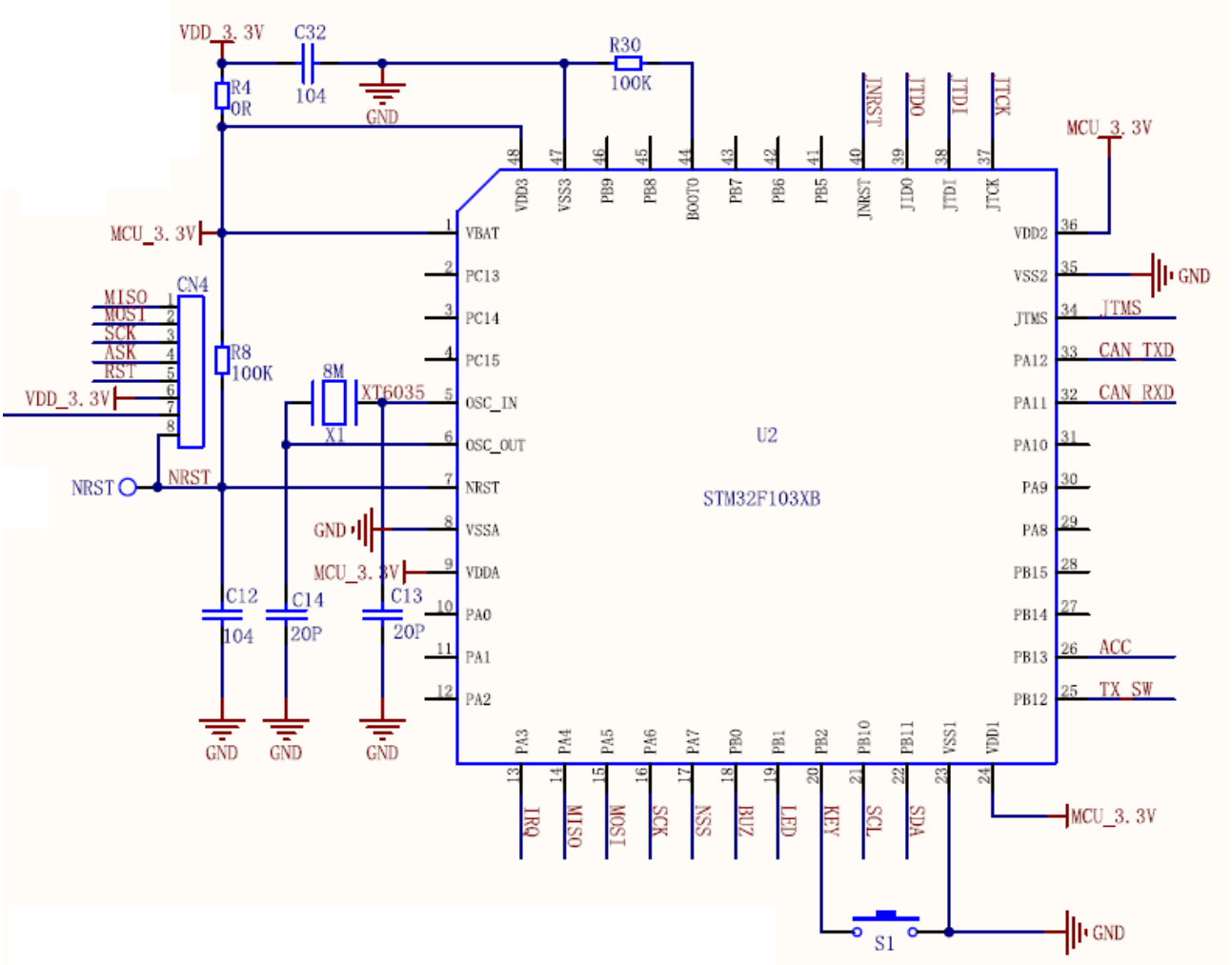
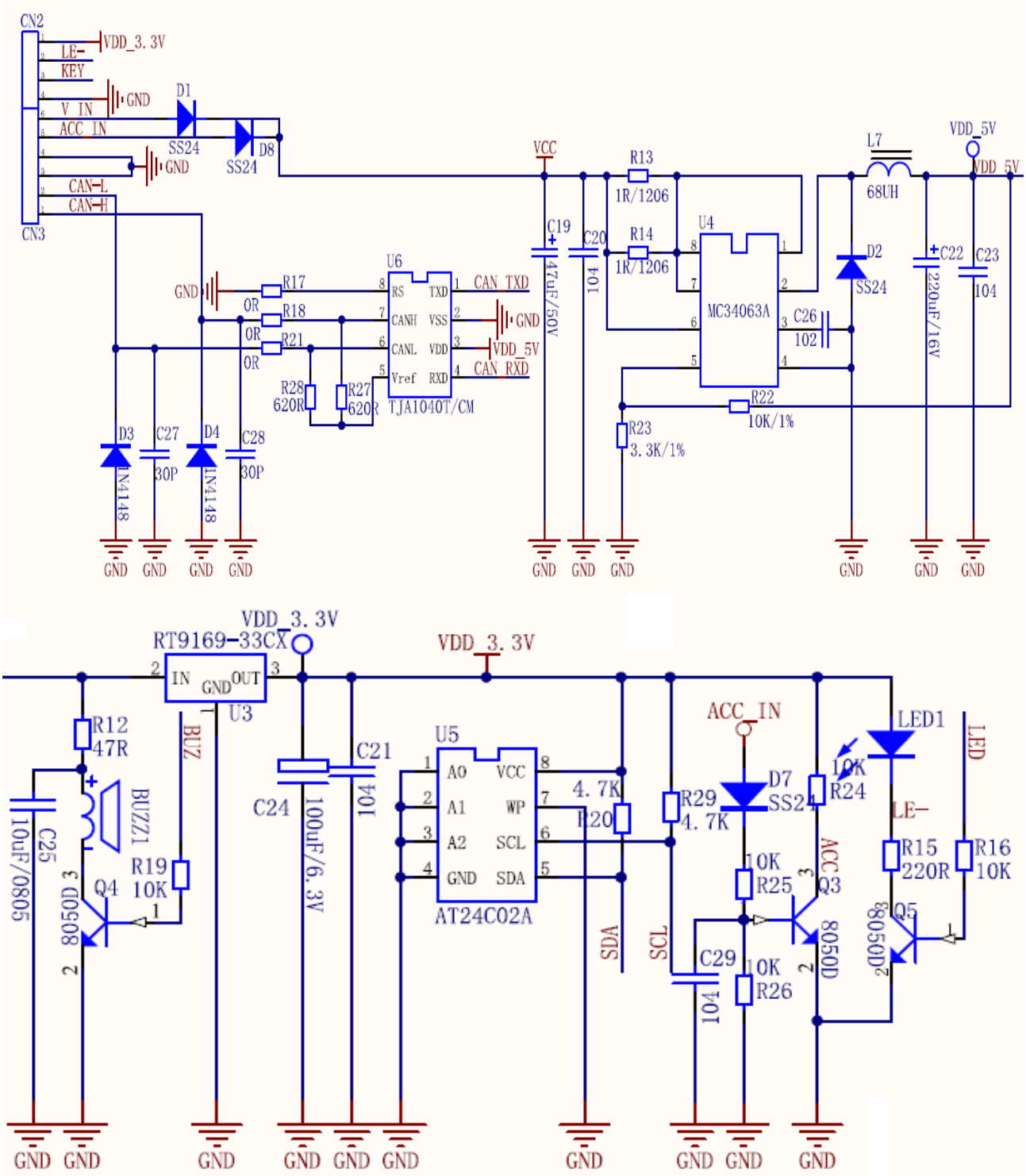
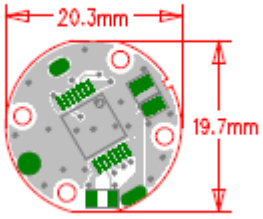


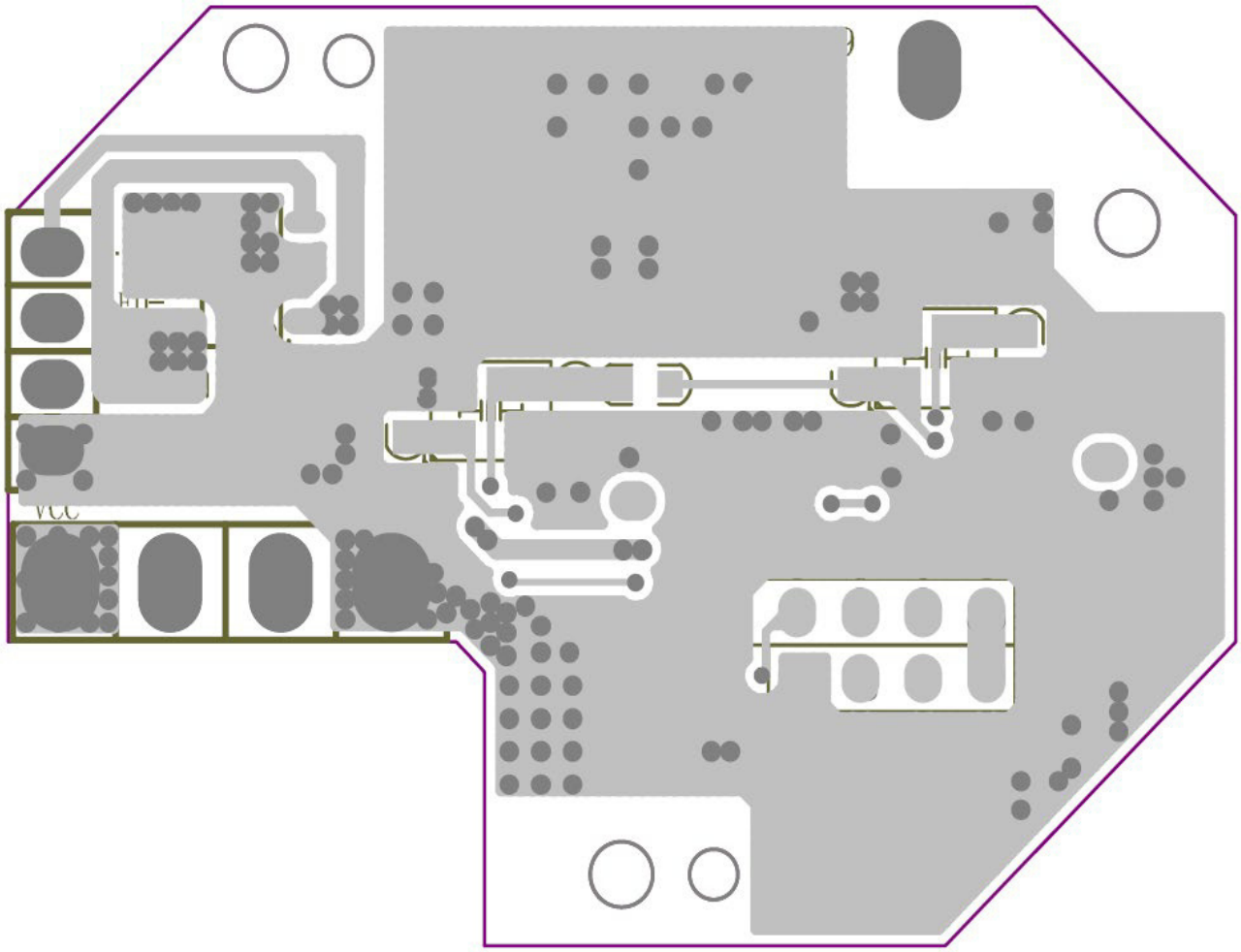
APPENDIX	No.3	Circuit Diagram



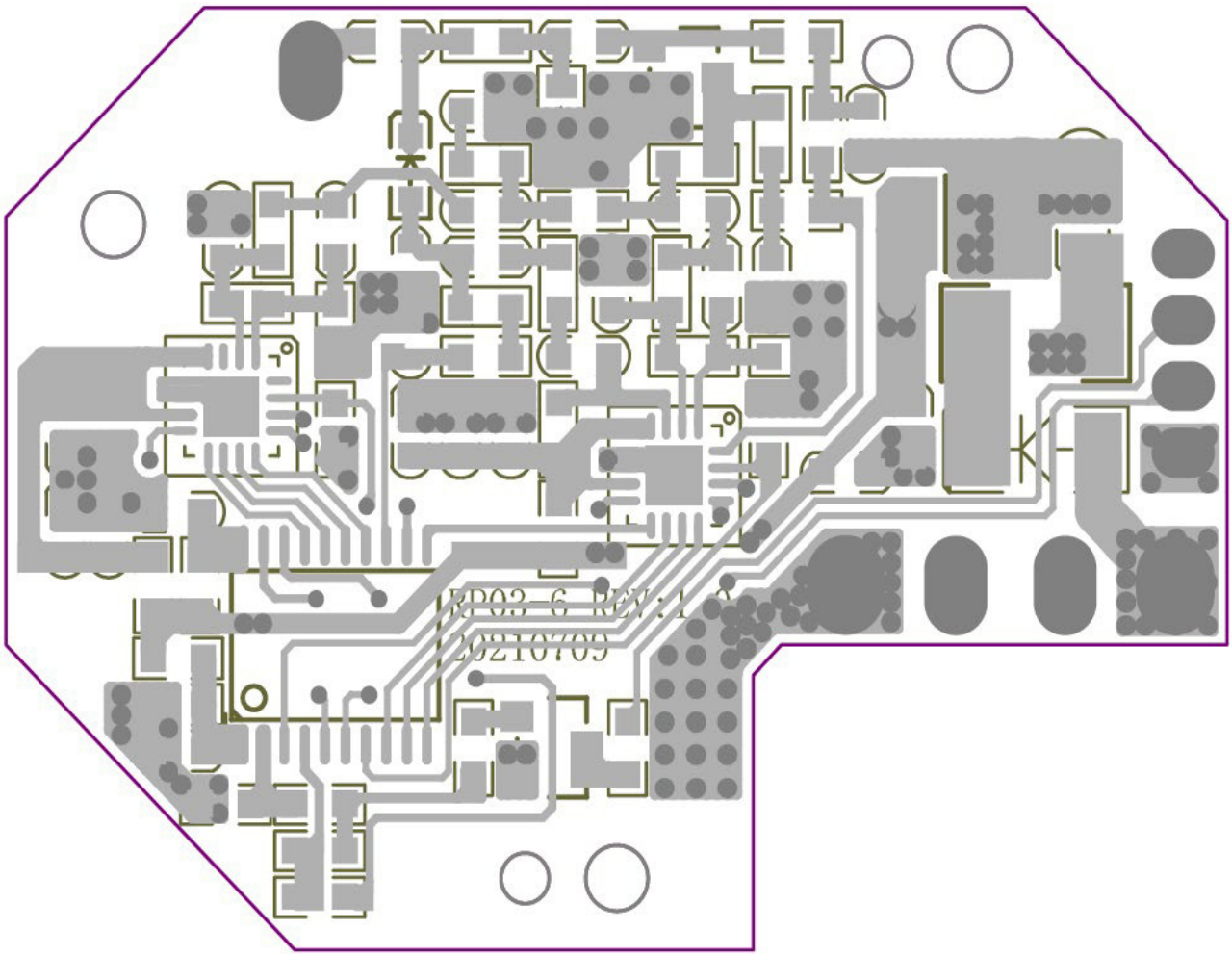
APPENDIX	No.4	PCB Layout



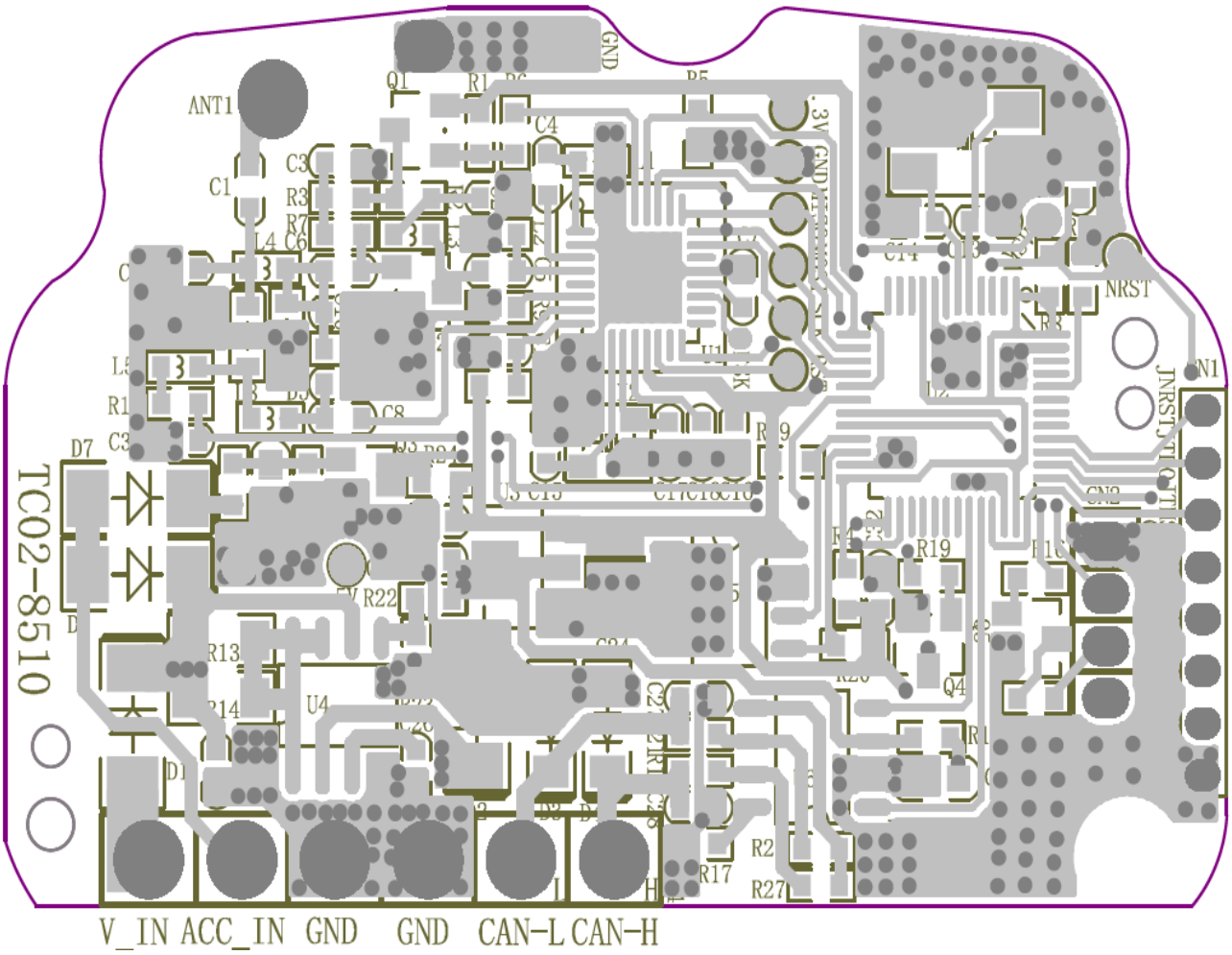
APPENDIX	No.4	PCB Layout



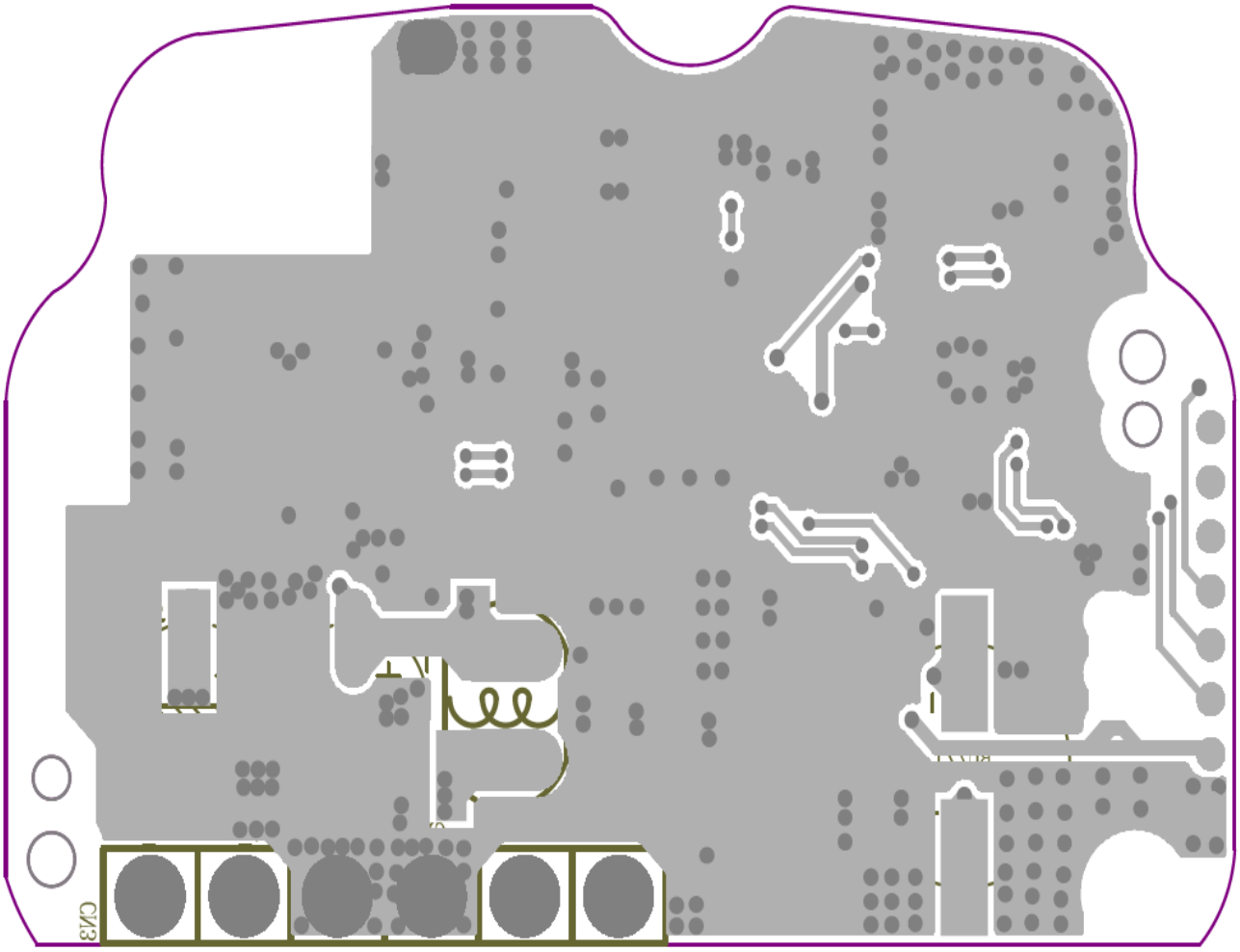
APPENDIX	No.4	PCB Layout



APPENDIX	No.4	PCB Layout



APPENDIX	No.4	PCB Layout



List of main component					
Bill of material					
Items	Description	Value	Position	Quantity	units
1	PCB	E22-SP40 double-side 20.3×20.3×1.6 REV:1.0	/	1	PC
2	IC	SP400-11-11 Package PG-DSOSP-14-8-X (burn software before SMT)	U2	1	PC
3	Capacitor	0603 30PF 50V ±5%	C11	1	PC
4	Capacitor	0603 12PF 50V ±5%	C6 C7	2	PC
5	Capacitor	0603 180PF 50V ±5%	C1	1	PC
6	Capacitor	0603 100PF 50V ±10%	C4	1	PC
7	Capacitor	0603 10NF 50V ±10%	C15	1	PC
8	Capacitor	0603 100NF 50V ±10% TDK	C14	1	PCS
9	Tantalum capacitor	47uF 6.3V ±10% SMT A Type	C10	1	PC
10	Crystal oscillator	26MHZ ±10ppm 9PF 3.2×2.5	X1	1	PC
11	Inductor	6.8NH 0603 +-5%	L2	1	PC
12	Inductor	0603 12NH ±5%	L3	1	PC
13	Inductor	1.8NH 0603 +-5%	L1	1	PC
14	Inductor	0603 150NF 50V ±10%	C9	1	PC
15	Inductor	1206 10UH ±5%	L4	1	PC
16	Pogopin	external dia. 6.5×2 Gold-plated copper	ANT1	1	PC
17	Battery	CR2032 3.0V 220mAh Φ20×3.2mm	BATT	1	PC
18	Battery plate	+ External dia. 15.6×0.3 Nickel-plated phosphorous copper	/	1	PC
19	Battery plate	- External dia. 15.7×0.3 Nickel-plated phosphorous copper	/	1	PC
20	PCB	RP03-6 PCB double-side 38.9×28.4×1.2mm REV：1.0	/	1	PC
21	IC	IC 7422X	U1	1	PC
22	Regulator IC	R1524HO33B-T1-KE SOT-89-5	U2	1	PC
23	IC	CMT2300A QFN16(3X3)	AU1	1	PC
24	Triode	NPN 8050D/ SOT-23 (β=150~300) "Y" printed	Q1	1	PC
25	Triode	NPN 2SC3356 R25 SOT-23 NEC β=125-250 Ic:100mA	AQ1	1	PC
26	Diode	SS24 DO-214AA Iav:2A Vf:0.5V	D1	1	PC
27	Diode	1SS314 0805 TOSHIBA 1-1E1A If:100mA	AD1 AD2	2	PCS

28	Capacitor	0603 2PF 50V ±5%	AC4	1	PC
29	Capacitor	0603 4PF 50V ±5%	AC8	1	PC
30	Capacitor	0603 5PF 50V ±5%	AC7 AC9	2	PCS
31	Capacitor	0603 8PF 50V ±5%	AC10	1	PC
32	Capacitor	0603 9PF 50V ±5%	AC5 AC6	2	PCS
33	Capacitor	0603 10PF 50V ±5%	AC16	1	PC
34	Capacitor	0603 15PF 50V ±5%	AC11	1	PC
35	Capacitor	0603 180PF 50V ±10%	AC2 AC3 AC15	3	PCS
36	Capacitor	0603 150PF 50V ±10%	AC1	1	PC
37	Capacitor	0603 470PF 50V ±10%	AC13 FC11	2	PC
38	Capacitor	0603 4.7uF 50V +80-20%	AC12 FC12	2	PC
39	Capacitor	0603 100NF 50V +80-20%	C2 C3 C6 C7 AC14 FC10 FC13	7	PCS
40	Capacitor	1206 47uF 50V ±10%	C1	1	PC
41	Tantalum capacitor	100uF 6.3V ±20% SMT A Type KEMET	C4	1	PC
42	Resistor	0603 0Ω ±5%	R2 R3 R8 R10 R12	5	PCS
43	Resistor	2010 10Ω 3/4W ±5%	R1	1	PC
44	Resistor	0603 560Ω ±5%	AR3	1	PCS
45	Resistor	0603 1.2KΩ ±5%	R5	1	PC
46	Resistor	0603 2.2KΩ ±5%	AR5	1	PC
47	Resistor	0603 10KΩ ±5%	R4 AR2	2	PCS
48	Resistor	0603 47KΩ ±5%	AR1 FR1	2	PCS
49	Resistor	0603 220KΩ ±5%	AR4	1	PC
50	Inductor	0603 22NH ±5%	AL5 AL9	2	PCS
51	Inductor	27NH / 0603 +-5%	AL3	1	PC
52	Inductor	0603 10NH ±5%	AL6	1	PC
53	Inductor	0603 12NH ±5%	AL4	1	PC
54	Inductor	39NH/ 0603 +-5%	AL2	1	PC
55	Inductor	47NH/ 0603 +-5%	AL7	1	PC
56	Inductor	100NH / 0603 +-5%	AL1	1	PC
57	Inductor	120NH 0603 +-5%	AL8	1	PC
58	Crystal oscillator	26MHZ ±10ppm 9PF 3.2×2.5	AX1	1	PC
59	Antenna	RP02 Antenna Frequency: 433.92MHZ	/	1	PC
60	Row wire	4P Soft row wire Length 50mm Spacing 2.0mm 2-end tin-plated 3.0mm	/	1	PC

61	Diode	Illuminating diode 0805 Red Regular brightness	LED1 LED2	2	PCS
62	PCB	RP02 button PCB 21.5×18.5×1.2mm REV：2.0	PCB1	1	PC
63	Switch	Tact switch HT-1163S 6×3.7×2.5mm Red button Black basement	SW1	1	PC
64	Back cover	RP03 Back cover Material: PA66+30%GF (nylon) Wire hole dia. 6MM	/	1	PC
65	Antenna cap	RP03 Antenna cap Material: PA66+30%GF (nylon)	/	1	PC
66	Front cover	RP03 Front cover Material: PA66+30%GF (nylon) With button hole	/	1	PC
67	Sealing ring	RP03 Sealing ring 50A Silicon 45.8*36*4.7	/	1	PC
68	Sealing ring	RP03 Antenna sealing ring 7×5×1mm Black Silicon 70A	/	1	PC
69	Button	RP02 Silicon button	/	1	PC
70	Screw	Screw PA M2×9(screw head included) Black tin-plated steel	/	4	PCS
71	Screw	Screw KB M1.4×5(screw head included) Black tin-plated steel	/	6	PCS
72	Sticker	QC PASS Sticker ϕ12×0.1mm Silver background Black characters PET	/	1	PC
73	Power cable	RP03 Power cable L=1.5M 2 Wires Red+Black 2A Fuse Water-proof fuse OD6.5 Wire dia. 2.0	/	1	PC
74	Screw	Screw BA M4×10(screw head included) Stainless steel	accessory	2	PCS
75	PCB	TC02-8510 PCB double-side 52.5×34.5×1.2mm REV：3.0	PCB	1	PC
76	IC	ATA8510-GHQW QFN32 (burn software before SMT)	U1	1	PC
77	IC	STM32F103C8T6 (burn software before SMT)	U2	1	PC
78	IC	Regulator IC RT9169-33CX SOT-89 3.3V Imax=100mA "633P" printed	U3	1	PC
79	IC	Regulator IC MC34063A SO/MSOP	U4	1	PC
80	IC	AT24C02C-SSHM-T SOP-8 ATMEL	U5	1	PC
81	IC	TC06 IC TJA1040T/CM NXP SOP8	U6	1	PC
82	Diode	SS24 DO-214AA Iav:2A Vf:0.5V	D1 D2 D7 D8	4	PCS
83	Diode	1N4148 1206 Io:150mA Vf:0.5V	D3 D4	2	PCS
84	Diode	1SS314 0805 TOSHIBA 1-1E1A If:100mA	D5 D6	2	PCS

85	Triode	PNP 8550D SOT-23 β=150-300	Q1	1	PC
86	Triode	NPN 2SC3356 R25 SOT-23 NEC β=125-250 Ic:100mA	Q2	1	PC
87	Triode	NPN 8050D/ SOT-23 (β=150~300) "Y" printed	Q3 Q4 Q5	3	PCS
88	Capacitor	0603 2PF 50V ±5%	C5	1	PC
89	Capacitor	0603 4PF 50V ±5%	C4 C8	2	PCS
90	Capacitor	0603 8PF 50V ±5%	C6	1	PC
91	Capacitor	0603 20PF 50V ±5%	C13 C14 C15 C17	4	PCS
92	Capacitor	0603 30PF 50V ±5%	C27 C28	2	PCS
93	Capacitor	0603 180PF 50V ±10%	C2 C3 C31	3	PCS
94	Capacitor	0603 330PF 50V ±10%	C1	1	PC
95	Capacitor	0603 470PF 50V ±10%	C7	1	PC
96	Capacitor	0603 1NF 50V ±10%	C26	1	PC
97	Capacitor	0603 68NF 50V +80-20%	C11	1	PC
98	Capacitor	0603 100NF 50V +80-20%	C12 C20 C21 C23 C32	5	PCS
99	Capacitor	0603 220NF 50V +80-20%	C18	1	PC
100	Capacitor	0603 2.2uF 50V +80-20%	C16	1	PC
101	Capacitor	0805 10uF 10V ±10%	C25	1	PC
102	Capacitor	Electrolytic capacitor 47uF 50V ±10% SMT	C19	1	PC
103	Tantalum capacitor	100uF 6.3V ±20% SMT A Type KEMET	C24	1	PC
104	Capacitor	Electrolytic capacitor 220uF 16V ±10% 6×7mm	C22	1	PC
105	Resistor	0603 0Ω ±5%	R4 R10 R17 R18 R21	5	PCS
106	Resistor	1206 1Ω ±5%	R13 R14	2	PCS
107	Resistor	0603 47Ω ±5%	R12	1	PC
108	Resistor	0603 220Ω ±5%	R15	1	PC
109	Resistor	0603 560Ω ±5%	R2	1	PC
110	Resistor	0603 620Ω ±5%	R27 R28	2	PCS
111	Resistor	0603 2.2KΩ ±5%	R11	1	PC
112	Resistor	Precision resistor 0603 3.3KΩ ±1%	R23	1	PC
113	Resistor	Precision resistor 0603 10KΩ ±1%	R22	1	PC
114	Resistor	0603 10KΩ ±5%	R3 R6 R16 R19 R24 R25 R26	7	PCS
115	Resistor	0603 47KΩ ±5%	R1 R5	2	PCS
116	Resistor	0603 100KΩ ±5%	R8 R30	2	PC

117	Resistor	0603 220KΩ ±5%	R7	1	PC
118	Inductor	0603 22NH ±5%	L1 L4	2	PCS
119	Inductor	27NH / 0603 +-5%	L2	1	PC
120	Inductor	39NH/ 0603 +-5%	L3	1	PC
121	Inductor	2.2mH CD54 ±20% YS54-222M	L7	1	PC
122	Inductor	100NH / 0603 +-5%	L5	1	PC
123	Crystal oscillator	8MHz ±10ppm 12PF 6×3.5 4 Connectors Industrial grade ROHS Resistance≤38Ω	X1	1	PC
124	Crystal oscillator	24.305MHz ±10ppm 8PF 3.2×2.5mm 4 Connectors	X2	1	PC
125	Buzzer	Passive buzzer 1.5V 2.7KHZ ϕ9×4.5(H)mm Big gap between film and casing	BUZZ1	1	PC
126	Resistor	0603 4.7KΩ ±5%	R20 R29	2	PCS
127	Inductor	10NH / 0603 +-5%	L8	1	PC
128	Capacitor	0805 1uF 50V +80-20%	C29	1	PC
129	Antenna	RP02 Antenna Frequency: 433.92MHZ	ANT1	1	PC
130	Row wire	4P Soft row wire Length 50mm Spacing 2.0mm 2-End tin-plated 3.0mm	CN2	1	PC
131	Diode	Illuminating diode 0805 Red Regular brightness	LED1 LED2	2	PCS
132	PCB	RP02 Button PCB 21.5×18.5×1.2mm REV：2.0	PCB1	1	PC
133	Switch	Tact switch HT-1163S 6×3.7×2.5mm Red button Black basement	SW1	1	PC
134	Front cover	RP04-A Front cover Material: PA66+30%Gf	/	1	PC
135	Back cover	RP04-A Back cover Material: PA66+30%Gf	/	1	PC
136	Antenna cap	RP04-A Antenna cap Material: PA66+30%Gf	/	1	PC
137	Button	RP02 Silicon button	/	1	PC
138	Sealing ring	RP04-A Sealing ring Black silicon 58.7*51.7*6.8 50 by durometer	/	1	PC
139	Sealing ring	RP03 Antenna sealing ring 7×5×1mm Black Silicon 70A	/	1	PC
140	Screw	KB M1.4×5(screw head included） Black tin-plated steel	/	3	PCS
141	Screw	1.7×6mm PA Nickel-plated steel	/	4	PCS

APPENDIX	No.6	EUT Photos