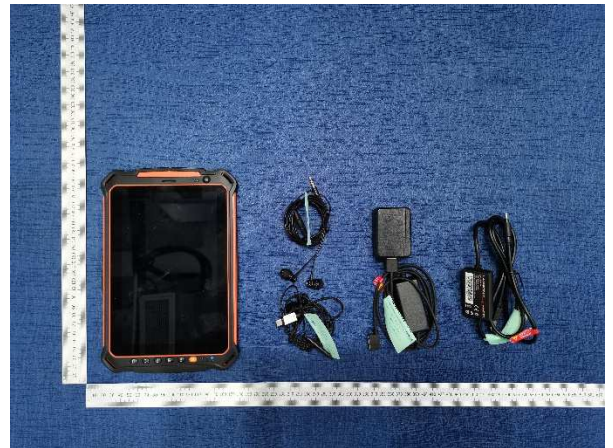


Prüfbericht-Nr.: Test report no.:	60374756 006	Auftrags-Nr.: Order no.:	168264720	Seite 1 von 27 Page 1 of 27																								
Kunden-Referenz-Nr.: Client reference no.:	N/A	Auftragsdatum: Order date:	2020-05-13																									
Auftraggeber: Client:	i.safe MOBILE GmbH i_Park Tauberfranken 10, 97922 Lauda-Koenigshofen, Germany																											
Prüfgegenstand: Test item:	Rugged tablet computer																											
Bezeichnung / Typ-Nr.: Identification / Type no.:	M93A01																											
Auftrags-Inhalt: Order content:	Test Report																											
Prüfgrundlage: Test specification:	47 CFR FCC Part 22 47 CFR FCC Part 24 47 CFR FCC Part 27 47 CFR FCC Part 90 47 CFR FCC Part 2 RSS-130 Issue 2 RSS-132 Issue 3 RSS-133 Issue 6 RSS-139 Issue 3 RSS-140 Issue 1 RSS-195 Issue 2 RSS-199 Issue 3 RSS-Gen Issue 5																											
Wareneingangsdatum: Date of sample receipt:	2020-05-13																											
Prüfmuster-Nr.: Test sample no:	A002024323-004 A002024323-005																											
Prüfzeitraum: Testing period:	2020-05-24 – 2020-07-25																											
Ort der Prüfung: Place of testing:	TÜV Rheinland (Shenzhen) Co., Ltd.																											
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (Shenzhen) Co., Ltd.																											
Prüfergebnis*: Test result*:	Pass																											
geprüft von: tested by: Lin Lin		genehmigt von: authorized by: Winnie Hou																										
Datum: Date: 2020-10-09		Ausstellungsdatum: Issue date: 2020-10-09																										
Stellung / Position: Senior Project Manager		Stellung / Position: Technical Certifier																										
Sonstiges / Other: FCC ID: 2AACZ-M93A01 IC: 11122A-M93A01 HVIN: M93A01																												
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:		Prüfmuster vollständig und unbeschädigt Test item complete and undamaged																										
<table border="0"> <tr> <td>* Legende:</td> <td>1 = sehr gut</td> <td>2 = gut</td> <td>3 = befriedigend</td> <td>4 = ausreichend</td> <td>5 = mangelhaft</td> </tr> <tr> <td></td> <td>P(ass) = entspricht o.g. Prüfgrundlage(n)</td> <td>F(ail) = entspricht nicht o.g. Prüfgrundlage(n)</td> <td>N/A = nicht anwendbar</td> <td>N/T = nicht getestet</td> <td></td> </tr> <tr> <td>* Legend:</td> <td>1 = very good</td> <td>2 = good</td> <td>3 = satisfactory</td> <td>4 = sufficient</td> <td>5 = poor</td> </tr> <tr> <td></td> <td>P(ass) = passed a.m. test specification(s)</td> <td>F(ail) = failed a.m. test specification(s)</td> <td>N/A = not applicable</td> <td>N/T = not tested</td> <td></td> </tr> </table>					* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft		P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet		* Legend:	1 = very good	2 = good	3 = satisfactory	4 = sufficient	5 = poor		P(ass) = passed a.m. test specification(s)	F(ail) = failed a.m. test specification(s)	N/A = not applicable	N/T = not tested	
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	P(ass) = passed a.m. test specification(s)	F(ail) = failed a.m. test specification(s)	N/A = not applicable	N/T = not tested																								
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>																												



Test Summary

5.1.1 RF POWER OUTPUT

RESULT: Pass

5.1.2 MODULATION CHARACTERISTICS

RESULT: Pass

5.1.3 OCCUPIED BANDWIDTH AND 26DB BANDWIDTH

RESULT: Pass

5.1.4 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

RESULT: Pass

5.1.5 SPURIOUS EMISSIONS AT ANTENNA TERMINALS – BAND EDGE

RESULT: Pass

5.1.6 FIELD STRENGTH OF SPURIOUS RADIATION

RESULT: Pass

5.1.7 FREQUENCY STABILITY

RESULT: Pass

5.1.8 PEAK TO AVERAGE RATIO

RESULT: Pass

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1. GENERAL REMARKS

1.1 COMPLEMENTARY MATERIALS

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Test Results of GSM operation

Appendix B: Test Results of WCDMA operation

Appendix C: Test Results of LTE Band 2 operation

Appendix D: Test Results of LTE Band 4 operation

Appendix E: Test Results of LTE Band 5 operation

Appendix F: Test Results of LTE Band 7 operation

Appendix G: Test Results of LTE Band 12 operation

Appendix H: Test Results of LTE Band 13 operation

Appendix I: Test Results of LTE Band 14 operation

Appendix J: Test Results of LTE Band 17 operation

Appendix K: Test Results of LTE Band 25 operation

Appendix L: Test Results of LTE Band 26 Lower Band operation

Appendix M: Test Results of LTE Band 26 Upper Band operation

Appendix N: Test Results of LTE Band 30 operation

Appendix O: Test Results of LTE Band 38 operation

Appendix P: Test Results of LTE Band 40 operation

Appendix Q: Test Results of LTE Band 41 operation

Appendix R: Test Results of LTE Band 66

Appendix S: Test Results of LTE CA (CA_5B, CA_41C)

Appendix T: Test Results of Field Strength of Spurious Radiation

1.2 TEST STANDARD(S)

Applied Rules:	47 CFR FCC Part 22	RSS-130 Issue 2
	47 CFR FCC Part 24	RSS-132 Issue 3
	47 CFR FCC Part 27	RSS-133 Issue 6
	47 CFR FCC Part 90	RSS-139 Issue 3
	47 CFR FCC Part 2	RSS-140 Issue 1
		RSS-195 Issue 2
Test Method:	KDB 971168 D01	RSS-199 Issue 3
	ANSI C63.26	

2. TEST SITES

2.1 TEST FACILITIES

TÜV Rheinland (Shenzhen) Co., Ltd.

(FCC Registration No.: 694916 & IC Registration Number: 25069)

Address: No. 362 Huanguan Road Middle, Longhua District, Shenzhen 518110, P.R. China

2.2 LIST OF TEST AND MEASUREMENT INSTRUMENTS

Table 1: List of Test and Measurement Equipment

Description	Manufacturer	Model	Serial No.	Calibrated until (DD.MM.YYYY)
Radio Spectrum Testing				
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	166305	20.09.2020
Signal Analyzer	Rohde & Schwarz	FSV 40	101475	20.09.2020
Vector Signal Generator	Rohde & Schwarz	SMBV100A	263466	20.09.2020
Signal Generator	Rohde & Schwarz	SMB100A	181041	17.12.2020
High Speed Power Supply	KEITHLEY	2303	4080052	17.12.2020
RF Control Unit	Tonscend	JS0806-1	19H8060192	N/A
Field Strength of Spurious Radiation				
Signal Generator	Rohde & Schwarz	SMB100A	180840	20.08.2020
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	165339	20.08.2020
Signal Analyzer	Rohde & Schwarz	FSV 40	101440	21.08.2020
System Controller Interface	Rohde & Schwarz	SCI-100	S10010036	N/A
Filterbank	Rohde & Schwarz	GSM	100811	21.08.2020
OSP	Rohde & Schwarz	OSP 120	102041	N/A
OSP	Rohde & Schwarz	OSP 150	101385	17.12.2020
Pre-amplifier	Rohde & Schwarz	SCU08F1	08320030	20.08.2020
Amplifier	Rohde & Schwarz	SCU-18F	180079	20.08.2020
Amplifier	Rohde & Schwarz	SCU40A	100450	20.09.2020
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	192	02.09.2020
Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218719	02.09.2020
Wideband Ridged Horn Antenna (12-18 GHz)	Steatite	QMS-00208	18312	02.09.2020
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19066	02.09.2020
Biconical Broadband Antenna (30 MHz - 1 GHz)	Schwarzbeck	VUBA 9117	357	02.09.2020

Double Ridged Broadband Horn Antenna (1 – 18 GHz)	Schwarzbeck	BBHA 9120 D	01760	02.09.2020
Broadband Horn Antenna (15 – 40 GHz)	Schwarzbeck	BBHA 9170	00862	02.09.2020
Test software	Rohde & Schwarz	EMC32 (V10.40.00)	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NW9P2	N/A
3m Fully Anechoic Chamber	Albatross	FAC-3m	APC17151-FAC	06.07.2021

2.3 Traceability

All measurement equipment calibrations are traceable to NIST or where calibration is performed outside the United States, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) file for certification follow-up purposes.

2.6 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. facility located at No. 362 Huanguan Road Middle, Longhua District, Shenzhen 518110, P.R. China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3. GENERAL PRODUCT INFORMATION

3.1 GENERAL DESCRIPTION

The EUT is a tablet which supports Bluetooth, 2.4G Wi-Fi 802.11 b/g/n, 5G Wi-Fi 802.11a/n/ac, NFC and GSM/WCDMA/LTE wireless technology. This report is for GSM, WCDMA and LTE.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 RATING AND SYSTEM DETAILS

Table 2: Rating of EUT

General Information of EUT	Description
Product Name	IS930.1
Model	M93A01
Trade Mark	i.safe MOBILE
FCC ID	2AACZ-M93A01
IC	11122A-M93A01
HVIN	M93A01
Hardware Version:	V1.0
Software Version:	IS930_ROW_ ? 1.0.0.0.0_1_20200414
Antenna:	Integral
Operating Voltage:	DC 5V@2A input via power adapter DC 3.7V Battery
Operating Temperature Range:	-10°C ~ +55°C

Table 3: Technical Specification of EUT

Characteristic	Description
Modulation:	GMSK, 8PSK, QPSK, 16QAM
Operational Frequency Band(s):	GSM850/ PCS1900 WCDMA850/1700/1900 LTE Band 2/4/5/7/12/13/14/17/25/26/30/38/40/41/66/CA_5B/ CA_41C
Nominal RF Output Power:	GSM 850: 33 dBm ± 2dB PCS 1900: 30 dBm ± 2dB WCDMA: 23 dBm ± 2dB LTE: 23 dBm ± 2dB for Band 38/40/41 LTE: 22 dBm ± 1.5dB for Band 7 LTE: 22.5 dBm ± 1.5dB for Band 2/4/5/12/13/14/17/25/26/30/66
Power Class:	Class 3
Modulation Type:	GMSK, 8PSK, QPSK, 16QAM
Antenna Type:	Integral
Extreme Voltage:	DC 3.3 ~ 4.1V
Extreme Temperature:	-30°C ~ +55°C

Table 4: Operating Frequency Range and Channel Bandwidth of EUT

Characteristics	Description	
Radio System Type	☒ GSM ☒ UMTS ☒ LTE	
Supported Frequency Range	GSM850/ WCDMA850	Transmission (TX): 824 to 849 MHz
		Receiving (RX): 869 to 894 MHz
	PCS1900/ WCDMA1900	Transmission (TX): 1850 to 1910 MHz
		Receiving (RX): 1930 to 1990 MHz
	WCDMA1700	Transmission (TX): 1710 to 1755 MHz
		Receiving (RX): 2110 to 2155 MHz
	LTE BAND2	Transmission (TX): 1850 to 1910 MHz
		Receiving (RX): 1930 to 1990 MHz
	LTE BAND4	Transmission (TX): 1710 to 1755 MHz
		Receiving (RX): 2110 to 2155 MHz
	LTE BAND5	Transmission (TX): 824 to 849 MHz
		Receiving (RX): 869 to 894 MHz
	LTE BAND7	Transmission (TX): 2500 to 2570 MHz
		Receiving (RX): 2620 to 2690 MHz
	LTE BAND12	Transmission (TX): 699 to 716 MHz
		Receiving (RX): 729 to 746 MHz
	LTE BAND13	Transmission (TX): 777 to 787 MHz
		Receiving (RX): 746 to 756 MHz
	LTE BAND14	Transmission (TX): 788 to 798 MHz
		Receiving (RX): 758 to 768 MHz
	LTE BAND17	Transmission (TX): 704 to 716 MHz
		Receiving (RX): 734 to 746 MHz
	LTE BAND25	Transmission (TX): 1850 to 1915 MHz
		Receiving (RX): 1930 to 1995 MHz
	LTE band 26(814 to 824 MHz) only apply for FCC.	Transmission (TX): 814 to 824MHz
		Receiving (RX): 859 to 869 MHz

	LTE band 26 (824 to 849 MHz)	Transmission (TX): 824 to 849 MHz
		Receiving (RX): 869 to 894 MHz
	LTE BAND38	Transmission (TX): 2570 to 2620 MHz
		Receiving (RX): 2570 to 2620 MHz
	LTE Band 41	Transmission (TX): 2496 to 2690 MHz
		Receiving (RX): 2496 to 2690 MHz
	LTE Band 30, LTE Band 40	Transmission (TX): 2305 to 2315 MHz
		Receiving (RX): 2305 to 2315 MHz
	LTE Band 30, LTE Band 40	Transmission (TX): 2350 to 2360 MHz
		Receiving (RX): 2350 to 2360 MHz
	LTE Band 66	Transmission (TX): 1710 to 1780 MHz
		Receiving (RX): 2110 to 2175 MHz
	CA_Band_CA_5B	Transmission (TX): 824 to 849 MHz
		Receiving (RX): 869 to 894 MHz
	CA_Band_CA_41C	Transmission (TX): 2496 to 2690 MHz
		Receiving (RX): 2496 to 2690 MHz
Antenna	Description	Isotropic Antenna
	Type	☒ Integral (permanent fixed antenna, which may be built-in, designed as an indispensable part of EUT) ☐ Dedicated (removable antenna supplied with EUT, designed as an indispensable part of EUT)
	Smart Antenna(for uplink)	☐ MIMO ☒ Non MIMO
	Gain Remark	GSM850/WCDMA B5/FDD B5/26: 0.6dbi PCS1900/WCDMA 2/4/ LTE B2/4/66/25/39: 0.5dbi LTE B12/13/14/17:-0.4dbi LTE B30/40: 0.3dbi LTE B38/41/7: 0.6dbi When the EUT is put into service, the practical maximum antenna gain should NOT exceed the value as described above.
Supported Channel Bandwidth	GSM system:	☒ 200 kHz
	UMTS system:	☒ 5 MHz

LTE band 2	☒ 1.4MHz, ☒ 3MHz, ☒ 5MHz, ☒ 10MHz, ☒ 15MHz, ☒ 20MHz
LTE band 4	☒ 1.4MHz, ☒ 3MHz, ☒ 5MHz, ☒ 10MHz, ☒ 15MHz, ☒ 20MHz
LTE band 5	☒ 1.4MHz, ☒ 3MHz, ☒ 5MHz, ☒ 10MHz
LTE band 7	☒ 5MHz, ☒ 10MHz, ☒ 15MHz, ☒ 20MHz
LTE band 12	☒ 1.4MHz, ☒ 3MHz, ☒ 5MHz, ☒ 10MHz
LTE band 13	☒ 5MHz, ☒ 10MHz
LTE band 14	☒ 5MHz, ☒ 10MHz
LTE band 17	☒ 5MHz, ☒ 10MHz
LTE band 25	☒ 1.4MHz, ☒ 3MHz, ☒ 5MHz, ☒ 10MHz
LTE BAND26(814 to 824 MHz) only apply for FCC	☒ 1.4MHz, ☒ 3MHz, ☒ 5MHz, ☒ 10MHz
LTE band26(824 to 849 MHz)	☒ 1.4MHz, ☒ 3MHz, ☒ 5MHz, ☒ 10MHz, ☒ 15MHz
LTE band 30	☒ 5MHz, ☒ 10MHz
LTE band 38	☒ 5MHz, ☒ 10MHz, ☒ 15MHz, ☒ 20MHz
LTE band 40	☒ 5MHz, ☒ 10MHz
LTE band 41	☒ 5MHz, ☒ 10MHz, ☒ 15MHz, ☒ 20MHz
LTE band 66	☒ 5MHz, ☒ 10MHz, ☒ 15MHz, ☒ 20MHz

3.3 INDEPENDENT OPERATION MODES

The basic operation modes are:

- A. On, communication link established, Transmitting
 - i. Low channel
 - ii. Middle channel
 - iii. High channel
- B. On, communication link established, Receiving
- C. Idle
- D. Off

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3.4 NOISE GENERATING AND NOISE SUPPRESSING PARTS

Refer to the Circuit Diagram.

3.5 SUBMITTED DOCUMENTS

- | | |
|---|--|
| ☒ User Manual | ☒ Rating Label |
| ☒ Circuit Diagram | ☒ PCB Layout |
| ☒ Block Diagram | ☒ Photo Document |
| ☒ Schematics | ☒ Parts List |
| ☐ Model Difference Letter | |

4. TEST SET-UP AND OPERATION MODES

4.1 PRINCIPLE OF CONFIGURATION SELECTION

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 TEST OPERATION AND TEST SOFTWARE

Test operation refers to test setup in chapter 5. All testing were performed according to the procedure in KDB 971168 D01 and ANSI C63.26.

Table 5: List of Frequencies and Configuration under Test

Refer to Appendix A to Appendix T.

Table 6: Test Environments

Environment Parameter	Selected Values During Tests		
	Temperature (°C)	Voltage (V) DC	Relative Humidity (%)
Normal (NTNV)	24	3.7	51%
HTHV	55 °C	4.1	---
LTHV	-30 °C	4.1	---
HTLV	55 °C	3.3	---
LTLV	-30 °C	3.3	---

4.3 SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT

Table 7: Cables used during test

Port	Quantity	Length (m)	Connector	Type of Cable
--	--	--	--	--

Table 8: Auxiliary Equipment used during test

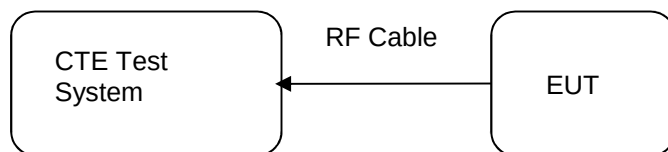
Name	Model	Manufacturer	S/N
--	--	--	--

4.4 COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE

The test sample, which has been tested, contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Equipment Configuration for Transmitter Conducted Measurement



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5. TEST RESULTS

5.1 ESSENTIAL REQUIREMENTS

5.1.1 RF POWER OUTPUT

RESULT:
Pass

Test standard	:	47 CFR FCC Part 22 47 CFR FCC Part 24 47 CFR FCC Part 27 47 CFR FCC Part 90 47 CFR FCC Part 2	RSS-130 Issue 2 RSS-132 Issue 3 RSS-133 Issue 6 RSS-139 Issue 3 RSS-140 Issue 1 RSS-195 Issue 2 RSS-199 Issue 3 RSS-Gen Issue 5
Limits	:	Operating band PCS 1900 / WDM 1900 WCDMA 1700 GSM 850 / WCDMA 850 LTE Band 2/7/25/38/41 LTE Band 12/13 Band 14 Band 17 Band 26 L_Band Band 5/26 U_Band LTE Band 30/40 Band 4/66	FCC Limit EIRP 2 watts EIRP 1 watts ERP 7 watts EIRP 2 watts ERP 3 watts ERP 3 watts ERP 3 watts < 100 watts ERP 7 watts EIRP 0.25 watts EIRP 1 watts ISED Limit EIRP 2 watts EIRP 1 watts ERP 11.5 watts EIRP 2 watts ERP 3 watts ERP 3 watts ERP 3 watts N/A ERP 11.5 watts EIRP 0.25 watts /5MHz EIRP 1 watts
Test procedure	:	Clause 5.2.4.2 of ANSI C63.26	
Kind of test site	:	Shielding Room	

TEST SETUP

Date of testing	:	05.24.2020 – 07.25.2020
Input voltage	:	DC 3.7V
Test environment	:	☒ Normal test conditions ☐ Extreme test conditions
Operation mode	:	A.1
Ambient temperature	:	23 °C
Relative humidity	:	50%
Atmospheric pressure	:	101.0 kPa

$$\text{ERP or EIRP} = P_{\text{Meas}} + G_{\text{T}}$$

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where

ERP or EIRP: effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas} , e.g. dBm)

P_{Meas} : measured transmitter output power, in dBm

G_T : gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

Refer to attached Appendix A to Appendix T for details of test results.

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5.1.2 MODULATION CHARACTERISTICS
RESULT:
Pass

Test standard	:	47 CFR FCC Part 22 47 CFR FCC Part 24 47 CFR FCC Part 27 47 CFR FCC Part 90 47 CFR FCC Part 2	RSS-130 Issue 2 RSS-132 Issue 3 RSS-133 Issue 6 RSS-139 Issue 3 RSS-140 Issue 1 RSS-195 Issue 2 RSS-199 Issue 3 RSS-Gen Issue 5
Limits	:	"Other types of equipment", the use of higher order modulations such as OFDM or LTE or other modulation are acceptable for use	
Test procedure	:	Clause 5.2.3 of ANSI C63.26	
Kind of test site	:	Shielding Room	

TEST SETUP

Date of testing	:	05.24.2020 – 07.25.2020
Input voltage	:	DC 3.7V
Test environment	:	☒ Normal test conditions ☐ Extreme test conditions
Operation mode	:	A.1
Ambient temperature	:	24 °C
Relative humidity	:	50%
Atmospheric pressure	:	101.0 kPa

Note:

The device implement digital modulation such as QPSK and 16QAM, hence the EUT is deemed to comply with this requirement without additional testing.

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5.1.3 OCCUPIED BANDWIDTH AND 26DB BANDWIDTH
RESULT:
Pass

Test standard	:	47 CFR FCC Part 22 47 CFR FCC Part 24 47 CFR FCC Part 27 47 CFR FCC Part 90 47 CFR FCC Part 2	RSS-130 Issue 2 RSS-132 Issue 3 RSS-133 Issue 6 RSS-139 Issue 3 RSS-140 Issue 1 RSS-195 Issue 2 RSS-199 Issue 3 RSS-Gen Issue 5
Test requirement	:	Section 2.1049 of 47 CFR FCC Part 2 Clause 6.7 of RSS-Gen	
Limits	:	No limit	
Test procedure	:	Section 5.4.3 of ANSI C63.26 ☒ Conducted measurements ☐ Radiated measurements	
Kind of test site	:	Shielding Room	

TEST SETUP

Date of testing	:	05.24.2020 – 07.25.2020
Input voltage	:	DC 3.7V
Test environment	:	☒ Normal test conditions ☐ Extreme test conditions
Operation mode	:	A.1
Ambient temperature	:	24 °C
Relative humidity	:	50%
Atmospheric pressure	:	101.0 kPa

Refer to attached Appendix A to Appendix T for details of test results.

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5.1.4 SPURIOUS EMISSIONS AT ANTENNA TERMINALS
RESULT:
Pass

Test standard	:	47 CFR FCC Part 22 47 CFR FCC Part 24 47 CFR FCC Part 27 47 CFR FCC Part 90 47 CFR FCC Part 2	RSS-130 Issue 2 RSS-132 Issue 3 RSS-133 Issue 6 RSS-139 Issue 3 RSS-140 Issue 1 RSS-195 Issue 2 RSS-199 Issue 3 RSS-Gen Issue 5
Limits	:	Operating band GSM/WCDMA/LTE Refer to below details Section 22.917(a) of 47 CFR FCC Part 22 & Section 5.5 of RSS-132 Issue 3 Section 24.238(a) of 47 CFR FCC Part 24 & Section 6.5 of RSS-133 Issue 6 "the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10log(P) dB" Section 27.53(c)/(g)/(h)/(m) of 47 CFR FCC Part 27 & Section 4.7.1 of RSS-130 Issue 2 & Section 6.6 of RSS-139 Issue 3 "the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log ₁₀ (P) dB" Section 5.6.2 of RSS-195 Issue 2 Section 4.5 (b) of RSS-199 Issue 3 Section 90.691(a) of 47 CFR FCC Part 90 "for any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log ₁₀ (P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz" Section 90.543(a) of 47 CFR FCC Part 90 & Section 4.4 (b) of RSS-140 Issue 1 On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, attenuation by at least 43 + 10 log(P) dB.	FCC Limit < - 13 dBm /1MHz ISED Limit < - 13 dBm /1MHz
Test procedure	:	Clause 5.7.4 of ANSI C63.26	
Kind of test site	:	Shielding Room	

TEST SETUP

Date of testing	:	05.24.2020 – 07.25.2020
Input voltage	:	DC 3.7V
Test environment	:	☒ Normal test conditions ☐ Extreme test conditions
Operation mode	:	A.1
Ambient temperature	:	24 °C
Relative humidity	:	51%
Atmospheric pressure	:	101.0 kPa

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The limit calculation:

$$\text{Limit} = P_{\text{Meas}} \text{ (dBm)} - [43 + 10 \log(P_{\text{Meas}})] = -13 \text{ dBm}$$

Refer to attached Appendix A to Appendix T for details of test results.

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5.1.5 SPURIOUS EMISSIONS AT ANTENNA TERMINALS – BAND EDGE
RESULT:
Pass

Test standard	:	47 CFR FCC Part 22 47 CFR FCC Part 24 47 CFR FCC Part 27 47 CFR FCC Part 90 47 CFR FCC Part 2	RSS-130 Issue 2 RSS-132 Issue 3 RSS-133 Issue 6 RSS-140 Issue 1 RSS-139 Issue 3 RSS-195 Issue 2 RSS-199 Issue 3 RSS-Gen Issue 5
Limits	:	Operating band GSM/WCDMA/LTE LTE Band 12/13/17 Refer to below details	FCC Limit < - 13 dBm /1%EBW < - 13 dBm /30kHz ISED Limit < - 13 dBm / 1%OBW < - 13 dBm /30kHz
Limits	:	Section 22.917(a) of 47 CFR FCC Part 22 & Section 5.5 of RSS-132 Issue 3 Section 24.238(a) of 47 CFR FCC Part 24 & Section 6.5 of RSS-133 Issue 6 “The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43+10\log(P)$ dB” Section 27.53(c)/(g)/(h)/(m) of 47 CFR FCC Part 27& Section 4.7.1 of RSS-130 Issue 2 & Section 6.6 of RSS-139 Issue 3 “the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB” Section 4.7.2 of RSS-130 Issue 2 The unwanted emissions in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed, the power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least: $65 + 10 \log_{10} p$ (watts), dB, for mobile and portable equipment Section 5.6.2 of RSS-195 Issue 2 Section 4.5 (b) of RSS-199 Issue 3 Section 90.691(a) of 47 CFR FCC Part 90 “for any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116 \log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz” Section 90.543(a) of 47 CFR FCC Part 90 & Section 4.4 (a) of RSS-140 Issue 1 On all frequencies between 769-775 MHz and 799-805 MHz, attenuation by a factor not less than $65 + 10 \log(P)$ dB in a 6.25kHz band segment	
Test procedure	:	Clause 5.7.3 of ANSI C63.26	
Kind of test site	:	Shielding Room	

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Date of testing	:	05.24.2020 – 07.25.2020
Input voltage	:	DC 3.7V
Test environment	:	☒ Normal test conditions ☐ Extreme test conditions
Operation mode	:	A.1
Ambient temperature	:	24 °C
Relative humidity	:	51%
Atmospheric pressure	:	101.0 kPa

The limit calculation:

 $\text{Limit} = P_{\text{Meas}} \text{ (dBm)} - [43 + 10\log(P_{\text{Meas}})] = -13 \text{ dBm}$ $\text{Limit} = P_{\text{Meas}} \text{ (dBm)} - [50 + 10\log(P_{\text{Meas}})] = -20 \text{ dBm}$ $\text{Limit} = P_{\text{Meas}} \text{ (dBm)} - [65 + 10\log(P_{\text{Meas}})] = -35 \text{ dBm}$

Refer to attached Appendix A to Appendix T for details of test results.

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5.1.6 FIELD STRENGTH OF SPURIOUS RADIATION
RESULT:
Pass

Test standard	:	47 CFR FCC Part 22 47 CFR FCC Part 24 47 CFR FCC Part 27 47 CFR FCC Part 90 47 CFR FCC Part 2	RSS-130 Issue 2 RSS-132 Issue 3 RSS-133 Issue 6 RSS-140 Issue 1 RSS-139 Issue 3 RSS-195 Issue 2 RSS-199 Issue 3 RSS-Gen Issue 5
Limits	:	Operating band GSM/WCDMA/LTE	FCC Limit < - 13 dBm /1MHz Refer to below details ISED Limit < - 13 dBm /1MHz
Limits	:	Section 22.917(a) of 47 CFR FCC Part 22 & Section 5.5 of RSS-132 Issue 3 Section 24.238(a) of 47 CFR FCC Part 24 & Section 6.5 of RSS-133 Issue 6 "The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10log(P) dB" Section 27.53(c)/(g)/(h)/(m) of 47 CFR FCC Part 27 & Section 4.7.1 of RSS-130 Issue 2 & Section 6.6 of RSS-139 Issue 3 "the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log ₁₀ (P) dB" Section 5.6.2 of RSS-195 Issue 2 Section 4.5 (b) of RSS-199 Issue 3 Section 90.691(a) 90.543(e) of 47 CFR FCC Part 90 "for any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log ₁₀ (P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz" Section 90.543(a) of 47 CFR FCC Part 90 & Section 4.4 (a) of RSS-140 Issue 1 On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, attenuation by at least 43 + 10 log(P) dB On all frequencies between 769-775 MHz and 799-805 MHz, attenuation by a factor not less than 65 + 10 log(P) dB in a 6.25kHz band segment	
Test procedure	:	Clause 5.5 of ANSI C63.26	
Kind of test site	:	3m Semi Anechoic Room	

TEST SETUP

Date of testing	:	05.24.2020 – 07.25.2020
Input voltage	:	DC 3.7V
Test environment	:	☒ Normal test conditions ☐ Extreme test conditions
Operation mode	:	A.1
Ambient temperature	:	23 °C
Relative humidity	:	48%

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Atmospheric pressure : 101.0 kPa

The limit calculation:

$$\text{Limit} = \text{PMeas (dBm)} - [43 + 10 \log(\text{PMeas})] = -13 \text{ dBm}$$

Sweep the whole frequency band through the range from 9 kHz to the 10th harmonic of the carrier, the emissions below the noise floor will not be recorded in this report. The measurement is performed for all operational modes and both antenna polarization, only the data of the worst mode is recorded in this report.

Refer to attached Appendix K for details of test results.

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5.1.7 FREQUENCY STABILITY
RESULT:
Pass

Test standard	:	47 CFR FCC Part 22	RSS-130 Issue 2
		47 CFR FCC Part 24	RSS-132 Issue 3
		47 CFR FCC Part 27	RSS-133 Issue 6
		47 CFR FCC Part 90	RSS-139 Issue 3
		47 CFR FCC Part 2	RSS-140 Issue 1
			RSS-195 Issue 2
			RSS-199 Issue 3
			RSS-Gen Issue 5
Limits	:	2.5 ppm and within the authorized frequency block	
Test procedure	:	Clause 5.6.3 of ANSI C63.26	
Kind of test site	:	Shielding Room	

TEST SETUP

Date of testing	:	05.24.2020 – 07.25.2020
Input voltage	:	DC 3.7V
Test environment	:	☒ Normal test conditions
		☒ Extreme test conditions
Operation mode	:	A.1
Ambient temperature	:	24 °C
Relative humidity	:	51%
Atmospheric pressure	:	101.0 kPa

Refer to attached Appendix A to Appendix T for details of test results.

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5.1.8 PEAK TO AVERAGE RATIO
RESULT:
Pass

Test standard	:	47 CFR FCC Part 22	RSS-130 Issue 2
		47 CFR FCC Part 24	RSS-132 Issue 3
		47 CFR FCC Part 27	RSS-133 Issue 6
		47 CFR FCC Part 90	RSS-140 Issue 1
		47 CFR FCC Part 2	RSS-139 Issue 3
			RSS-195 Issue 2
			RSS-199 Issue 3
			RSS-Gen Issue 5
Limits	:	Section 22.913(d) of 47 CFR FCC Part 22	
		Section 24.232(d) of 47 CFR FCC Part 24	
		Section 27.50(d) of 47 CFR FCC Part 27	
		"The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB"	
Limits	:	PAR < 13 dB	
Test procedure	:	Clause 5.2.6 of ANSI C63.26	
Kind of test site	:	Shielding Room	

TEST SETUP

Date of testing	:	05.24.2020 – 07.25.2020
Input voltage	:	DC 3.7V
Test environment	:	☒ Normal test conditions ☐ Extreme test conditions
Operation mode	:	A.1
Ambient temperature	:	24 °C
Relative humidity	:	51%
Atmospheric pressure	:	101.0 kPa

Refer to attached Appendix A to Appendix T for details of test results.

6. SYSTEM MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

Table 7: System Measurement Uncertainty

Items		Extended Uncertainty
RE	Radiated emission 9 kHz - 30 MHz	±3.97 dB
	Radiated emission 30 MHz - 1 GHz	±4.30 dB
Remark: 95% Confidence Levels, K=2.		

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