


Prüfbericht-Nr.: <i>Test report no.:</i>	NN22S1RQ 001	Auftrags-Nr.: <i>Order no.:</i>	168347600	Seite 1 von 20 <i>Page 1 of 20</i>
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2021-11-08	
Auftraggeber: <i>Client:</i>	Autel New Energy Co.,Ltd. Room 101, Building 1, Rainbow Technology Building, No.36, Gaoxin Sixth Road(N), Nanshan District, Shenzhen Guangdong, P.R. China			
Prüfgegenstand: <i>Test item:</i>	MaxiCharger DC Fast			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	EF060A3001,EF060C3001,EF080A3001,EF080C3001,EF100A3001 ,EF100C3001,E F120A3001,EF120C3001 (Trademark: AUTEL)			
Auftrags-Inhalt: <i>Order content:</i>	RED approval			
Prüfgrundlage: <i>Test specification:</i>	<div style="display: flex; justify-content: space-between;"> <div> EN 301 511 V12.5.1 EN 301 908-1 V15.1.1 EN 301 908-2 V13.1.1 EN 301 908-13 V13.1.1 EN 301 893 V2.1.1 EN 300 328 V2.2.2 EN 300 440 V2.1.1 EN 300 330 V2.1.1 EN 61851-23:2014 </div> <div> EN 301 489-1 V2.2.3 EN 301 489-3 V2.1.1 EN 301 489-17 V3.2.4 EN 301 489-52 V1.2.1 EN IEC 61000-6-1: 2019 EN 61000-6-3: 2007+A1 EN IEC 61851-21-2: 2021 EN IEC 61851-1:2019 EN 61851-24:2014 </div> </div>			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2022-05-24			
Prüfmuster-Nr.: <i>Test sample no.:</i>	A00168347600-001/002			
Prüfzeitraum: <i>Testing period:</i>	2022-05-24 – 2022-06-27			
Ort der Prüfung: <i>Place of testing:</i>	Shenzhen STS Test Services Co., Ltd.			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: <i>tested by:</i>	genehmigt von: <i>authorized by:</i>			
Datum: <i>Date:</i> 2022-07-05	Ausstellungsdatum: <i>Issue date:</i> 2022-07-05			
Stellung / Position: Senior Project Manager	Stellung / Position: Reviewer			
Sonstiges / Other: This report is GSM for Article 3.2 Radio Spectrum and Article 3.1a Health requirements only. Refer to TÜV Rheinland report NN22S1RQ 002, NN22S1RQ 003, NN22S1RQ 004, NN22S1RQ 005, NN22S1RQ 006, NN22S1RQ 007, NN22S1RQ 008, NN22S1RQ 009, NN22S1RQ 010 for details of Article 3.2 Radio Spectrum and Article 3.1b EMC requirements. Refer to TÜV Rheinland report CN22PWPZ 001 for details of Article 3.1a Electrical Safety requirement				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
<div style="display: flex; justify-content: space-between;"> <div> * Legende: 1 = sehr gut 2 = gut 3 = befriedigend P(ass) = entspricht o.g. Prüfgrundlage(n) * Legend: 1 = very good 2 = good 3 = satisfactory P(ass) = passed a.m. test specification(s) </div> <div> 4 = ausreichend 5 = mangelhaft N/A = nicht anwendbar N/T = nicht getestet 4 = sufficient 5 = poor N/A = not applicable N/T = not tested </div> </div>				
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>				

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1. General Remarks

1.1 Test Standards

Test standards	Version	Test standards description
ETSI EN 301 511	V12.5.1	Global System for Mobile communications (GSM); Mobile Stations (MS) equipment; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU
ETSI EN 301 908-1	V15.1.1	IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 1: Introduction and common requirements Release 15
ETSI EN 301 908-2	V13.1.1	IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 2: CDMA Direct Spread (UTRA FDD) User Equipment (UE)
ETSI EN 301 908-13	V13.1.1	IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 13: Evolved Universal Terrestrial Radio Access (E-UTRA) User Equipment (UE)
Reference standards	Version	Test standards description
ETSI TS 151 010-1	V12.8.0	Digital cellular telecommunications system (Phase 2+); Mobile Station (MS) conformance specification; Part 1: Conformance specification (3GPP TS 51.010-1 version 12.8.0 Release 12)
ETSI TS 134 121-1	V12.1.0	Universal Mobile Telecommunications System (UMTS); User Equipment (UE) conformance specification; Radio transmission and reception (FDD); Part 1: Conformance specification (3GPP TS 34.121-1 version 12.1.0 Release 12)
ETSI TS 136 521-1	V15.2.0	LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Conformance testing (3GPP TS 36.521-1 version 15.2.0 Release 15)

1.2 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendixes:
Appendix A: GSM900 Test data;
Appendix B: GSM1800 Test data

2. Test Sites

2.1 Test Facilities

SHENZHEN STS TEST SERVICES CO., LTD

A 1/F, Building B, Zhuoke Science Park, No.190 Chongqing Road, HepingShequ,
Fuyong Sub-District, Bao'an District, Shenzhen, Guang Dong, China
CNAS Registration No.: L7649

The tests at the test sites have been conducted under the supervision of a TÜV engineer.

2.2 List of Test and Measurement Instruments

Table 1: List of Radio Test and Measurement Equipment

Radio Spectrum Testing				
Equipment	Manufacturer	Model	Serial No.	Cal. until
Bilog Antenna	TESEQ	CBL6111D	34678	2022.10.11
Horn Antenna	SCHWARZBECK	BBHA 9120D	02014	2023.10.10
Pre-Amplifier (0.1M-3GHz)	EM	EM330	060665	2022.10.07
Pre-Amplifier (1G-18GHz)	SKET	LNPA-01018G-45	SK2018080901	2022.09.29
Signal Analyzer	R&S	FSV 40-N	101823	2022.09.29
Universal Radio communication tester	R&S	CMU200	119907	2022.09.28
Wireless Communications Test Set	R&S	CMW 500	131428	2023.02.28
Temperature & Humidity	SW-108	SuWei	N/A	2023.03.01
Turn table	EM	SC100_1	60531	N/A
Antenna mast	EM	SC100	N/A	N/A
AC Power Source	APC	KDF-11010G	F214050035	N.C.R
Unwanted Emission Testing				
Equipment	Manufacturer	Model	Serial No.	Cal. until
Signal Generator	Agilent	N5182A	MY46240556	2022.09.29
Signal Analyzer	Keysight	N9020A	MY52440124	2023.02.28
Universal Radio communication tester	R&S	CMU200	111058	2022.09.28
Wireless Communications Test Set	R&S	CMW 500	131428	2023.02.28
Temperature & Humidity	SW-108	SuWei	N/A	2023.03.01
Temperature & Humidity test chamber	Safety test	AG80L	171200018	2023.02.28
Programmable power supply	Agilent	E3642A	MY40002025	2022.10.07
Attenuator	HP	8494B	DC-18G	2023.03.01
AC Power Source	APC	KDF-11010G	F214050035	N.C.R

2.3 Uncertainty of Measurement

The value of the measurement uncertainty of each parameter is listed as below:

Table 2: Measurement Uncertainty, Radio

No.	Item	Uncertainty
1	RF output power, conducted	±0.87dB
2	Unwanted Emissions, conducted	±2.895dB
3	All emissions, radiated below 1GHz	±2.54dB
4	All emissions, radiated 1GHz-18GHz	±3.22dB
5	All emissions, radiated>18G	±3.81dB

3. General Product Information

3.1 Product Function and Intended Use

The product is MaxiCharger DC Fast used for electric vehicle's DC charging, which supports LTE, WCDMA, GSM , WIFI , Bluetooth and RFID (13.56MHz) wireless technologies.

According to the client's declaration, The models (EF060A3001,EF060C3001,EF080A3001, EF080C3001,EF100A3001 ,EF100C3001,EF120A3001) are the same as the original ones EF120C3001 in circuit design, layout only difference in software.

As consideration of interaction effect between wireless module with others circuit, the majority of radiated spurious emissions come from wireless module, hence we use the main circuit components to performed radiation Spurious Emission.

For details refer to user manual and circuit diagram.

3.2 Ratings and System Details

Table 3: Technical Specification

Characteristics	Description	
Type of Product	MaxiCharger DC Fast	
Model	EF060A3001,EF060C3001,EF080A3001,EF080C3001,EF100A3001 ,EF100C3001,EF120A3001,EF120C3001	
Operating Voltage	AC 400V ± 10%, 50/60Hz (three-phase)	
Testing Voltage	DC 12V	
Antenna	Combo Antenna	
Antenna Gain	3.38dBi	
HW Version	N/A	
SW Version	N/A	
Operation Temperature	-30°C to 75°C	
GSM Operation Band	<input checked="" type="checkbox"/> E-GSM900: Uplink:880-915MHz,Downlink:925-960MHz <input checked="" type="checkbox"/> DCS1800: Uplink:1710-1785MHz,Downlink:1805-1880MHz	
GSM Specification		
Characteristics	Description	
Downlink Frequency (as UE Receiver)	E-GSM900	925 MHz ~ 960 MHz
	DCS1800	1805 MHz ~ 1880 MHz
Uplink Frequency (as UE Transmitter)	E-GSM900	880 MHz ~ 915 MHz
	DCS1800	1710 MHz ~ 1785 MHz
GPRS Class	GPRS Multi-slot class [12]	
Type of Modulation	GMSK(GPRS)	
Channel separation	200 kHz	
TX and RX Antenna Ports	1 * TRX, 1 * RX-only	
UE Power Class for GSM	E-GSM900	Class 4
	DCS1800	Class 1

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3.3 Independent Operation Modes

The basic operation modes are:
A. GPRS

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Application Form	- Rating Label
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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.

Emissions: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

Note: The main consideration of radiation spurious emission is wireless module. Due to EUT is too large and heavy, we use the main circuit components to performed radiation Spurious Emission. For other parts, please refer to EMC test reports of EN IEC 61851 & EN 301489.

4.2 Test Environments

Table 4: Test environments

Environment Parameter	Values During Tests		
	Temperature	Voltage	Relative Humidity
NTNV	25°C±2°C	12Vdc	Ambient
LTUV	-30 °C	10.8Vdc	---
LTHV	-30 °C	13.2Vdc	---
HTLV	75 °C	10.8Vdc	---
HTHV	75 °C	13.2Vdc	---

4.3 Test Frequency

4.3.1 Test Frequency of GSM

GSM	Transmitter / Receiver	Frequencies under Test		
		Lowest range (L)	Middle range (M)	Highest range (H)
GSM900 (ARFCN)	Transmitter	NO. 975 880.2 MHz	NO.37 897.4 MHz	NO.124 914.8 MHz
	Receiver	NO.975 925.2 MHz	NO.37 897.4 MHz	NO.124 959.8 MHz
DCS1800 (ARFCN)	Transmitter	NO. 512 1710.2 MHz	NO.700 1747.8 MHz	NO.885 1784.8 MHz
	Receiver	NO.512 1805.2 MHz	NO.700 1747.8 MHz	NO.885 1879.8 MHz

4.4 Special Accessories and Auxiliary Equipment

Table 5: List of Accessories and Auxiliary Equipment

Assistant equipment	Manufacturer	Model	Serial No.
N/A	N/A	N/A	N/A

4.5 Countermeasures to Achieve ERM Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF). No additional measures were employed to achieve compliance.

5. Test Condition and Test Frequency for GSM/WCDMA/LTE

5.1 Test Condition and Test Frequency of GSM

Test Item	Test Conditions	
Transmitter - Frequency error and phase error	Test Environment	Normal (TN/VN), Vibrated, TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	L, M, H
Transmitter - Frequency error under multipath and interference conditions	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	L, M, H
Transmitter output power and burst timing	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	L, M, H
Transmitter - Output RF spectrum	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	L, M, H
Frequency error and phase error in GPRS multislot configuration	Test Environment	Normal (TN/VN), Vibrated, TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	L, M, H
Transmitter output power in GPRS multislot configuration	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	L, M, H
Output RF spectrum in GPRS multislot configuration	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	L, M, H
Conducted spurious emissions - MS allocated a channel	Test Environment	Normal (TN/VN) , TN/VL, TN/VH,
	Test Frequency	M
Conducted spurious emissions - MS in idle mode	Test Environment	Normal (TN/VN) , TN/VL, TN/VH,
	Test Frequency	M
Radiated spurious emissions - MS allocated a channel	Test Environment	Normal (TN/VN) , TN/VL, TN/VH
	Test Frequency	M
Radiated spurious emissions - MS in idle mode	Test Environment	Normal (TN/VN) , TN/VL, TN/VH
	Test Frequency	M
Frequency error and Modulation accuracy in EGPRS Configuration	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	L, M, H
Frequency error under multipath and interference conditions in EGPRS Configuration	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	L, M, H
EGPRS Transmitter output power	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	L, M, H
Output RF spectrum in EGPRS configuration	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	L, M, H
Blocking and spurious response in EGPRS configuration	Test Environment	Normal (TN/VN)
	Test Frequency	M
Intermodulation rejection – control channels	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	L,M,H
Intermodulation rejection – EGPRS	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	L,M,H
AM suppression - control channels	Test Environment	Normal (TN/VN)
	Test Frequency	M
AM suppression - packet channels	Test Environment	Normal (TN/VN)
	Test Frequency	M
Adjacent channel rejection - control channels	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	M
Adjacent channel rejection – EGPRS	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	M
Minimum Input level for Reference Performance - GPRS	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	M
Minimum Input level for Reference Performance -E GPRS	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	M

5.2 Test Condition and Test Frequency of WCDMA

Test Item	Test Conditions	
Transmitter Maximum Output Power	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	L, M, H
Transmitter minimum output power	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	L, M, H
Transmitter spectrum emission mask	Test Environment	Normal (TN/VN)
	Test Frequency	L, M, H
Transmitter adjacent channel leakage power ratio (ACLR)	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	L, M, H
Transmitter spurious emissions	Test Environment	Normal (TN/VN)
	Test Frequency	L, M, H
Receiver spurious emissions	Test Environment	Normal (TN/VN)
	Test Frequency	L, M, H
Receiver adjacent channel selectivity (ACS)	Test Environment	Normal (TN/VN)
	Test Frequency	M
Receiver blocking characteristics	Test Environment	Normal (TN/VN)
	Test Frequency	M
Receiver spurious response	Test Environment	Normal (TN/VN)
	Test Frequency	M
Receiver Intermodulation characteristics	Test Environment	Normal (TN/VN)
	Test Frequency	M
Out of-synchronization handling of output power	Test Environment	Normal (TN/VN)
	Test Frequency	M
Receiver Reference Sensitivity Level	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	L, M, H
Control and Monitoring Functions(UE)	Test Environment	Normal (TN/VN)
	Test Frequency	WCDMA Bands I/VIII
Radiated Spurious Emissions (UE)	Test Environment	Normal (TN/VN)
	Test Frequency	L, M, H

5.3 Test Condition and Test Frequency of LTE

Test Item	Test Conditions	
Transmitter maximum output power for Single Carrier	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	L, M, H
	Channel Bandwidth (If supported)	Lowest, 5 MHz, Highest
	Uplink/Downlink Configuration	as specified in ETSI TS 136 521-1 Table 6.2.2.4.1-1
Transmitter minimum output power for Single Carrier	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	L, M, H
	Channel Bandwidth (If supported)	Lowest, 5 MHz, Highest
	Uplink/Downlink Configuration	as specified in ETSI TS 136 521-1 Table 6.3.2.4.1-1
Transmitter spectrum emission mask for Single Carrier	Test Environment	Normal (TN/VN)
	Test Frequency	L, M, H
	Channel Bandwidth (If supported)	Lowest, 5 MHz, 10 MHz, Highest.
	Uplink/Downlink Configuration	as specified in ETSI TS 136 521-1 Table 6.6.2.1.4.1-1
Transmitter adjacent channel leakage power ratio for Single Carrier	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	L, M, H
	Channel Bandwidth (If supported)	Lowest, 5 MHz, 10 MHz, Highest
	Uplink/Downlink Configuration	as specified in ETSI TS 136 521-1 Table 6.6.2.3.4.1-1
Transmitter spurious emissions for Single Carrier	Test Environment	Normal (TN/VN)
	Test Frequency	L, M, H
	Channel Bandwidth (If supported)	Lowest, 5 MHz, Highest.
	Uplink/Downlink Configuration	as specified in ETSI TS 136 521-1 Table 6.6.3.1.4.1-1
Receiver Spurious Emissions for Single Carrier	Test Environment	Normal (TN/VN)
	Test Frequency	L, M, H
	Channel Bandwidth	Highest
	Uplink/Downlink Configuration	as specified in ETSI TS 136 521-1 Table 7.9.4.1-1
Receiver Adjacent Channel Selectivity (ACS) for Single Carrier	Test Environment	Normal (TN/VN)
	Test Frequency	M
	Channel Bandwidth	Lowest, 5 MHz, Highest.
	Uplink/Downlink Configuration	as specified in ETSI TS 136 521-1 Table 7.5.4.1-1
In-band Blocking Characteristics for Single Carrier	Test Environment	Normal (TN/VN)
	Test Frequency	M
	Channel Bandwidth	Lowest, 5 MHz, Highest
	Uplink/Downlink Configuration	as specified in ETSI TS 136 521-1 Table 7.6.1.4.1-1
Out-band Blocking Characteristics for Single Carrier	Test Environment	Normal (TN/VN)
	Test Frequency	H
	Channel Bandwidth	Lowest, 5MHz, Highest
	Uplink/Downlink Configuration	as specified in ETSI TS 136 521-1 Table 7.6.2.4.1-1
Narrow band Blocking Characteristics for Single Carrier	Test Environment	Normal (TN/VN)
	Test Frequency	M
	Channel Bandwidth	Lowest, 5 MHz, Highest
	Uplink/Downlink Configuration	as specified in ETSI TS 136 521-1 Table 7.6.3.4.1-1
Receiver Spurious Response for Single Carrier	Test Environment	Normal (TN/VN)
	Test Frequency	H
	Channel Bandwidth	Lowest, 5MHz, Highest
	Uplink/Downlink Configuration	as specified in ETSI TS 136 521-1 Table 7.6.2.4.1-1
Receiver Intermodulation Characteristics for Single Carrier	Test Environment	Normal (TN/VN)
	Test Frequency	M
	Channel Bandwidth	Lowest, 5 MHz, Highest.
	Uplink/Downlink	as specified in ETSI TS 136 521-1 Table

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Test Item	Test Conditions	
Receiver Reference Sensitivity Level for Single Carrier	Configuration	7.8.1.4.1-1
	Test Environment	Normal (TN/VN), TL/VL, TL/VH, TH/VL, TH/VH
	Test Frequency	L, M, H
	Channel Bandwidth	Lowest, 5 MHz, Highest.
	Uplink/Downlink Configuration	as specified in ETSI TS 136 521-1 Table 7.3.4.1-1
Control and Monitoring Functions(UE)	Test Environment	Normal (TN/VN)
	Test Configurations	LTE Bands 1/3/7/8/20/28/38/40
Radiated Spurious Emissions for Single Carrier	Test Environment	Normal (TN/VN)
	Test Frequency	L, M, H
	Channel Bandwidth	Lowest, 5 MHz, Highest.
	Uplink/Downlink Configuration	Traffic Mode:1 RB Idle Mode: 0 RB

6. Test Results

6.1 Radio Test Requirement & Test Suites of GSM

Test Items	Test Requirements	Test Method	Test Results
Transmitter - Frequency error and phase error	EN 301 511 clause 4.2.1; TS 151 010-1 clauses 13.1.1 and 13.1.2	EN 301 511 clause 5.3.1; TS 151 010-1 clause 13.1.5	N/A
Transmitter - Frequency error under multipath and interference conditions	EN 301 511 clause 4.2.2; TS 151 010-1 clauses 13.2.1 and 13.2.2	EN 301 511 clause 5.3.2; TS 151 010-1 clause 13.2.5	N/A
Frequency error and phase error in GPRS multislot configuration	EN 301 511 clause 4.2.4; TS 151 010-1 clauses 13.16.1.1 and 13.16.1.2	EN 301 511 clause 5.3.4; TS 151 010-1 clause 13.16.1.5	PASS
Transmitter output power and burst timing	EN 301 511 clause 4.2.5; TS 151 010-1 clauses 13.3.1 and 13.3.2	EN 301 511 clause 5.3.5; TS 151 010-1 clause 13.3.5	N/A
Transmitter - Output RF spectrum	EN 301 511 clause 4.2.6; TS 151 010-1 clauses 13.4.1 and 13.4.2	EN 301 511 clause 5.3.6; TS 151 010-1 clause 13.4.5	N/A
Transmitter output power in GPRS multislot configuration	EN 301 511 clause 4.2.10; TS 151 010-1 clauses 13.16.2.1 and 13.16.2.2	EN 301 511 clause 5.3.10; TS 151 010-1 clause 13.16.2.5	PASS
Output RF spectrum in GPRS multislot configuration	EN 301 511 clause 4.2.11; TS 151 010-1 clauses 13.16.3.1 and 13.16.3.2	EN 301 511 clause 5.3.11; TS 151 010-1 clause 13.16.3.5	PASS
Conducted spurious emissions - MS allocated a channel	EN 301 511 clause 4.2.12; TS 151 010-1 clauses 12.1.1.1 and 12.1.1.2	EN 301 511 clause 5.3.12; TS 151 010-1 clause 12.1.1.5	PASS
Conducted spurious emissions - MS in idle mode	EN 301 511 clause 4.2.13; TS 151 010-1 clauses 12.1.2.1 and 12.1.2.2	EN 301 511 clause 5.3.13; TS 151 010-1 clause 12.1.2.5	PASS
Radiated spurious emissions - MS allocated a channel	EN 301 511 clause 4.2.16; TS 151 010-1 clauses 12.2.1.1 and 12.2.1.2	EN 301 511 clause 5.3.16; TS 151 010-1 clause 12.2.1.5	PASS
Radiated spurious emissions - MS in idle mode	EN 301 511 clause 4.2.17; TS 151 010-1 clauses 12.2.2.1 and 12.2.2.2	EN 301 511 clause 5.3.17; TS 151 010-1 clause 12.2.2.5	PASS
Frequency error and Modulation accuracy in EGPRS Configuration	EN 301 511 clause 4.2.26; TS 151 010-1 clauses 13.17.1.1 and 13.17.1.2	EN 301 511 clause 5.3.26; TS 151 010-1 clause 13.17.1.5	N/A
Frequency error under multipath and interference conditions in EGPRS Configuration	EN 301 511 clause 4.2.27; TS 151 010-1 clauses 13.17.2.1 and 13.17.2.2	EN 301 511 clause 5.3.27; TS 151 010-1 clause 13.17.2.5	N/A
EGPRS Transmitter output power	EN 301 511 clause 4.2.28; TS 151 010-1 clauses 13.17.3.1 and 13.17.3.2	EN 301 511 clause 5.3.28; TS 151 010-1 clause 13.17.3.5	N/A
Output RF spectrum in EGPRS configuration	EN 301 511 clause 4.2.29; TS 151 010-1 clauses 13.17.4.1 and 13.17.4.2	EN 301 511 clause 5.3.29; TS 151 010-1 clause 13.17.4.5	N/A
Blocking and spurious response in EGPRS configuration	EN 301 511 clause 4.2.30; TS 151 010-1 clauses 14.18.5.1 and 14.18.5.2	EN 301 511 clause 5.3.30; TS 151 010-1 clause 13.18.5.5	N/A
Intermodulation rejection - control channels	EN 301 511 clause 4.2.33; TS 151 010-1 clauses 14.6.2	EN 301 511 clause 5.3.33; TS 151 010-1 clause 14.6.1.5	N/A
Intermodulation rejection – EGPRS	EN 301 511 clause 4.2.34; TS 151 010-1 clauses 14.18.4	EN 301 511 clause 5.3.34; TS 151 010-1 clause 14.18.4.5	N/A
AM suppression - control channels	EN 301 511 clause 4.2.36; TS 151 010-1 clauses 14.8.1	EN 301 511 clause 5.3.36; TS 151 010-1 clause 14.8.2.5	N/A
AM suppression - packet channels	EN 301 511 clause 4.2.37; TS 151 010-1 clauses 14.8.3	EN 301 511 clause 5.3.37; TS 151 010-1 clause 14.8.3.5	N/A
Adjacent channel rejection - control channels	EN 301 511 clause 4.2.39; TS 151 010-1 clauses 14.5.2	EN 301 511 clause 5.3.39; TS 151 010-1 clause 14.5.2.5	N/A
Adjacent channel rejection – EGPRS	EN 301 511 clause 4.2.40; TS 151 010-1 clauses 14.18.3	EN 301 511 clause 5.3.40; TS 151 010-1 clause 14.18.3.5	N/A

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Minimum Input level for Reference Performance - GPRS	EN 301 511 clause 4.2.44; TS 151 010-1 clauses 14.16.1	EN 301 511 clause 5.3.44; TS 151 010-1 clause 14.16.1.5	PASS
Minimum Input level for Reference Performance -EGPRS	EN 301 511 clause 4.2.45; TS 151 010-1 clauses 14.18.1	EN 301 511 clause 5.3.45; TS 151 010-1 clause 14.18.1.5	N/A

7. Safety Human Exposure

7.1 Human Exposure to Electromagnetic Fields 0Hz-300GHz

7.1.1 Electromagnetic Fields

RESULT:
Pass
Test Specification

Test standard : EN IEC 62311: 2020
Limit : 61.00 V/m, 5 A/m

Assumed used distance from EUT to Human, 20 cm separation distance warning is required. In this section, the power density at 20 cm location is calculated to examine if it is lower than the limit.

a) Stand-alone

The electric field strength:

$$E = \sqrt{30PG_{(\theta,\phi)}} / r$$

Antenna gain(G): 0 dBi for RFID
-0.5 dBi for BR & EDR & BLE
1.52 dBi for Wi-Fi a/b/g/n/ac
3.38 dBi for GSM & WCDMA & LTE

Reference electromagnetic field strength (E): 61 V/m for Wi-Fi b/g/n

Distance from EUT to Human (r): 0.20 m

Input power to antenna (P): refer to below table

Table 6: Test Result of Max. Measured E Field Strength

Test Mode	Maximum Output Power (dBm)	Maximum Output Power (mW)	E Field Strength (V/m)	E Field Strength Limit (V/m)	Result
RFID	-37.96	0.00016	0.01	28.00	Pass
BR & EDR	7.54	5.7	2.07	61.00	Pass
BLE	9.43	8.8	2.57	61.00	Pass
2.4GHz Wi-Fi	18.02	63.4	6.90	61.00	Pass
5GHz Wi-Fi B1	16.56	45.3	5.83	61.00	Pass
5GHz Wi-Fi B2	16.56	45.3	5.83	61.00	Pass
5GHz Wi-Fi B3	17.41	55.1	6.43	61.00	Pass
5GHz Wi-Fi B4	11.83	15.2	3.38	61.00	Pass

RF Function	Max AVG Power (dBm)	Ant Gain (dBi)	Duty cycle Factor (dB)	Max AVG EIRP (dBm)	Max AVG EIRP (mW)	Result (W/m ²)	Limit (W/m ²)
GSM 900	32.9	3.38	-6.02	30.26	1061.55	2.1130	4.574
GSM 1800	29.77	3.38	-3.01	30.14	1032.69	2.0555	8.924
WCDMA 2100	21.22	3.38	0.00	24.60	288.40	0.5741	9.887
WCDMA 900	22.76	3.38	0.00	26.14	411.15	0.8184	4.563
LTE Band 1	23.23	3.38	0.00	26.61	458.14	0.9119	9.8875
LTE Band 3	23.55	3.38	0.00	26.93	493.17	0.9816	8.9215
LTE Band 7	23.58	3.38	0.00	26.96	496.59	0.9884	10
LTE Band 8	23.83	3.38	0.00	27.21	526.02	1.0470	4.5715
LTE Band 20	24.05	3.38	0.00	27.43	553.35	1.1014	4.2975
LTE Band 28	23.95	3.38	0.00	27.33	540.75	1.0763	3.7325
LTE Band 38	23.31	3.38	-1.99	24.70	295.40	0.5880	10
LTE Band 40	22.21	3.38	-1.99	23.60	229.30	0.4564	10

b) Simultaneous Transmission

The product has multiple transmitters, the Simultaneous Transmission possibilities are listing below:

Simultaneous Tx Combination	Configuration
1	Wi-Fi 802.11 a/b/g/n/ac+RFID GSM900/1800 WCDMA Band 1/8 LTE Band 1/3/7/8/20/28/38/40

The Simultaneous Transmission expected exposure in electric field strength on a given point can be made with the following equation:

Exposure field strengths can be compared to the reference levels on an rss basis:

$$\sum_{i=100 \text{ kHz}}^{1 \text{ MHz}} \left(\frac{E_i}{c} \right)^2 + \sum_{i>1 \text{ MHz}}^{300 \text{ GHz}} \left(\frac{E_i}{E_{L,i}} \right)^2 \leq 1$$

and

$$\sum_{i=100 \text{ kHz}}^{1 \text{ MHz}} \left(\frac{H_i}{d} \right)^2 + \sum_{i>1 \text{ MHz}}^{300 \text{ GHz}} \left(\frac{H_i}{H_{L,i}} \right)^2 \leq 1$$

where