

	FCC PART 22/24 TEST REPORT
	FCC Part 22H / Part 24E
Report Reference No	:: LCS211129059AEE
FCC ID.	
Date of Issue	:: March 09, 2022
Testing Laboratory Name	: Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
Applicant's name	: ComNav Technology Ltd.
Address	: Building 2, No.618 Chengliu Middle Rd. Malu town, Shanghai, China
Test specification	
Standard	FCC Part 22H: Cellular Radiotelephone Service FCC Part 24E: Broadband PCS
Stanuaru	FCC Part 24E: Broadband PCS
Test Report Form No	:: LCSEMC-1.0
0	: Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	:: Dated 2011-03
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Test item description	:: GNSS Receiver
Trade Mark	SinoGNSS
Test Model	: N6
Ratings	: Please Refer to Page 6
Hardware version	:: V2.1
Software version	:: V1.3.7
Frequency	: UMTS Band II/ V
Result	

Compiled by:

Ray Yang/ Administrator

Supervised by:

Approved by:

Jin Wang

Jin Wang/ Technique principal

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Scan code to check authenticity



TEST REPORT

Test Report No. :	LCS211129059AEE	March 09, 2022
Test Report No. :	LC5211129059AEL	Date of issue

EUT	: GNSS Receiver
Test Model	: N6
Applicant	: ComNav Technology Ltd.
Address	: Building 2, No.618 Chengliu Middle Rd. Malu town, Shanghai, China
Telephone	: /
Fax	: /
Manufacturer	: ComNav Technology Ltd.
Address	: Building 2, No.618 Chengliu Middle Rd. Malu town, Shanghai, China
Telephone	: /
Fax	: /
Factory	: ComNav Technology Ltd.
Address	: Building 2, No.618 Chengliu Middle Rd. Malu town, Shanghai, China
Telephone	: /
Fax	: /

Test Result:

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



Revison History

Revision	Issue Date	Revision Content	Revised By
000	March 09, 2022	Initial Issue	



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1 <u>TEST STANDARDS</u>

The tests were performed according to following standards:

FCC Part 22H: Cellular Radiotelephone Service.

FCC Part 24E: Broadband PCS.

<u>TIA-603-E March 2016</u>: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards. <u>47 CFR FCC Part 15 Subpart B</u>: Unintentional Radiators.

FCC Part 2: Frequency Allocations And Radio Treaty Matters; General Rules And Regulations.

ANSI C63.4:2014: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

FCC KDB971168 D01 Power Meas License Digital Systems v03r01



SUMMARY 2

2.1 **General Remarks**

Date of receipt of test sample	:	December 13, 2021
Date of Test	:	December 13, 2021 ~ March 08, 2022
Date of Report	:	March 09, 2022

2.2 **Product Description**

The ComNav Technology Ltd.'s Model: N6 or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

EUT	: GNSS Receiver
Test Model	: N6
Power Supply	: Input: 7.2V 3300mAh Supplied by 2*Li-ion batteries
Hardware Version	: V2.1
Software Version	: V1.3.7
Bluetooth	:
Frequency Range	: 2402MHz ~ 2480MHz
Channel Number	: 79 channels for Bluetooth V4.2(DSS)
Channel Spacing	40 channels for Bluetooth V4.2 (DTS)1MHz for Bluetooth V4.2 (DSS)
Modulation Type	2MHz for Bluetooth V4.2 (DTS) : GFSK, π/4-DQPSK, 8-DPSK for Bluetooth V4.2(DSS)
	GFSK for Bluetooth V4.2 (DTS)
Bluetooth Version	: V4.2
Antenna Description	: PIFA Antenna, 1.0dBi (max.)
WIFI(2.4G Band)	:
Frequency Range	: 2412MHz ~ 2462MHz
Channel Spacing	: 5MHz
Channel Number	: 11 Channels for 20MHz bandwidth (2412 \sim 2462MHz)
Modulation Type	7 Channels for 40MHz bandwidth (2422~2452MHz): IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK)
	IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Description	: PIFA Antenna, 1.0dBi (max.)
2G	:
Support Band	: \square GSM 900 (EU-Band) \square DCS 1800 (EU-Band)
Release Version	☐GSM 850 (U.SBand) ☐PCS 1900 (U.SBand) : R11
GPRS Class	: Class 12
EGPRS Class	: Class 12
Type Of Modulation	: GMSK for GSM/GPRS; 8PSK for EGPRS
Antenna Description	: PIFA Antenna 2.29dBi (max.) For GSM 850 1.59dBi (max.) For PCS 1900

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3G	:
Support Band	 : ⊠WCDMA Band II (U.SBand) ⊠WCDMA Band V (U.SBand) □WCDMA Band IV (U.SBand) ⊠WCDMA Band I (EU-Band) ⊠WCDMA Band VIII (EU-Band)
Release Version	: R11
Type Of Modulation	: WCDMA: QPSK; HSDPA/HSUPA: QPSK
Antenna Description	: PIFA Antenna 1.59dBi (max.) For WCDMA Band II 2.29dBi (max.) For WCDMA Band V
LTE	:
Support Band	 ∴ E-UTRA Band 2(U.SBand) ☆ E-UTRA Band 4(U.SBand) ☆ E-UTRA Band 5(U.SBand) ☆ E-UTRA Band 25(U.SBand) ☆ E-UTRA Band 26(U.SBand) ☆ E-UTRA Band 41(U.SBand)
LTE Release Version	: R11
Type Of Modulation	: QPSK/16QAM
Antenna Description	 PIFA Antenna 1.59dBi (max.) For E-UTRA Band 2 2.0dBi (max.) For E-UTRA Band 4 2.29dBi (max.) For E-UTRA Band 5 1.59dBi (max.) For E-UTRA Band 25 2.53dBi (max.) For E-UTRA Band 26 3.0dBi (max.) For E-UTRA Band 41
Power Class	: Class 3
PMR	
Operating Frequency	: $410 \sim 470 MHz$
Channel Separation	: 12.5KHz & 25KHz
Modulation Type	: GMSK
Emission Designator	: 8K25G1D for GMSK Modulation at 12.5KHz Channel Separation 16K4G1D for GMSK Modulation at 25KHz Channel Separation
Antenna Type	: SMA Antenna
Antenna Gain	: 5.0dBi (max.) for PMR
GPS function	: Support and only RX
Extreme temp. Tolerance	$: -30^{\circ}C \text{ to } +50^{\circ}C$
Extreme vol. Limits	: 6.12VDC to 8.28VDC (nominal: 7.2VDC)



2.3 **Equipment under Test**

Power supply system utilised

Power supply voltage	:	0	120V / 60 Hz	0	115V / 60Hz
		0	12 V DC	0	24 V DC
		•	Other (specified in blank below	v) 7	7.2 V DC

Test frequency list

Test Mode	TV/DV	RF Channel				
Test Mode	Test Mode TX/RX		Middle (M)	High (H)		
	ТХ	Channel 4132	Channel 4182	Channel 4233		
WCDMA Band V	IΛ	826.4 MHz	836.4 MHz	846.6 MHz		
WCDWA Dalid V	RX	Channel 4357	Channel 4407	Channel 4458		
	КЛ	871.4 MHz	881.4 MHz	891.6 MHz		
Test Mode TX/RX		RF Channel				
Test Wide	$1\Lambda/\Lambda\Lambda$	Low(L)	Middle (M)	High (H)		
	TX	Channel 9262	Channel 9400	Channel 9538		
WCDMA Band II	1	1852.4 MHz	1880.0 MHz	1907.6 MHz		
W CDIVIA Dalla II	RX	Channel 9662	Channel 9800	Channel 9938		
	ŇΛ	1932.4 MHz	1960.0 MHz	1987.6 MHz		

2.4 Short description of the Equipment under Test (EUT)

General Description 2.4.1

GNSS Receiver is subscriber equipment in the BT/BLE/2.4G WIFI/GSM/WCDMA/LTE/PMR system. GSM/GPRS/EGPRS frequency band is Band II//V. The HSPA/UMTS frequency band is Band II/V. LTE frequency band is band 2/4/5/25/26/41. The HSPA/UMTS frequency band II and Band V test data included in this report. The GNSS Receiver implements such functions as RF signal receiving/transmitting, GSM/GPRS/EGPRS/ HSPA/UMTS/LTE protocol processing, video MMS service and etc. Externally it provides SIM card interface.

2.5 Internal Identification of AE used during the test

AE ID*	Description
AE1	Rechargeable Li-Polymer Battery
AE2	Switching Adapter

Normal Accessory setting 2.6

N/A



2.7 EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- - supplied by the manufacturer
- \circ supplied by the lab

0	Power Cable	Length (m) :	/
		Shield :	/
		Detachable :	/
0	Multimeter	Manufacturer :	/
		Model No. :	/

2.8 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2ACHBN6 filing to comply with FCC Part 22H, Part 24E Rules.

2.9 Modifications

No modifications were implemented to meet testing criteria.

2.10 General Test Conditions/Configurations

2.10.1 Test Modes

NOTE: The test mode(s) are selected according to relevant radio technology specifications.

Test Mode	Test Modes Description
UMTS/TM1	WCDMA system, QPSK, 16QAM modulation
UMTS/TM2	HSDPA system, QPSK, 16QAM modulation
UMTS/TM3	HSUPA system, QPSK, 16QAM modulation

Note: As WCDMA, HSDPA and HSUPA with the same emission designator, test result recorded in this report at the worst case UMTS/TM1 only after exploratory scan.

2.10.2 Test Environment

Environment Parameter	Environment Parameter Selected Values During Tests				
Relative Humidity	Ambient				
Temperature	TN	Ambient			
	VL	DC 6.12V			
Voltage	VN	DC 7.2V			
	VH	DC 8.28V			

NOTE: VL=lower extreme test voltage VN=nominal voltage VH=upper extreme test voltage TN=normal temperature

TEST ENVIRONMENT

3.1 Address of the test laboratory

Shenzhen LCS Compliance Testing Laboratory Ltd

101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

The sites are constructed in conformance with the requirements of ANSI C63.4 (2014) and CISPR Publication 32.

3.2 **Test Facility**

The test facility is recognized, certified, or accredited by the following organizations:

NVLAP Accreditation Code is 600167-0.

FCC Designation Number is CN5024.

CAB identifier is CN0071.

CNAS Registration Number is L4595.

Test Firm Registration Number: 254912.

3.3 **Environmental conditions**

During the measurement the environmental conditions were within the listed ranges:

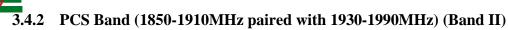
Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar
	0

(1) expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

3.4 **Test Description**

Cellular Band (824-849MHz paired with 869-894MHz) (Band V) 3.4.1

Test Item	FCC Rule No.	Requirements	Verdict
Effective(Isotropic) Radiated Output Power	§2.1046, §22.913	FCC: ERP \leq 7W.	Pass
Modulation Characteristics	§2.1047	Digital modulation	N/A
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Pass
Band Edges Compliance	§2.1051, §22.917	≤-13dBm/1%*EBW, in 1MHz bands immediately outside and adjacent to The frequency block.	Pass
Spurious Emission at Antenna Terminals	§2.1051, §22.917	\leq -13dBm/100kHz, from 9kHz to 10 th harmonics but outside authorized operating frequency ranges.	Pass
Field Strength of Spurious Radiation	§2.1053, §22.917	\leq -13dBm/100kHz.	Pass
Frequency Stability	§2.1055, §22.355	$\leq \pm 2.5$ ppm.	Pass
Peak-Average Ratio	§24.232	≤13dB	Pass
NOTE 1: For the verdict	, the "N/A" de	enotes "not applicable", the "N/T" de notes "not tes	sted".



Test Item	FCC Rule No.	Requirements	Verdict
Effective(Isotropic) Radiated Output Power	§2.1046, §24.232	$EIRP \le 2W$	Pass
Peak-Average Ratio	§2.1046, §24.232	≤13dB	Pass
Modulation Characteristics	§2.1047	Digital modulation	N/A
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Pass
Band Edges Compliance	§2.1051, §24.238	\leq -13dBm/1%*EBW, In 1MHz bands immediately outside and adjacent to The frequency block.	Pass
Spurious Emission at Antenna Terminals	\$2.1051, \$24.238	≤-13dBm/1MHz, from 9kHz to10 th harmonics but outside authorized operating frequency ranges.	Pass
Field Strength of Spurious Radiation	\$2.1053, \$24.238	\leq -13dBm/1MHz.	Pass
Frequency Stability	§2.1055, §24.235	≤ ±2.5ppm.	Pass
NOTE 1: For the verdict, the "N/A	" denotes "not applicat	ble", the "N/T" de notes "not tested".	



3.5 Equipments Used during the Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Power Meter	R&S	NRVS	100444	2021-06-21	2022-06-20
2	Power Sensor	R&S	NRV-Z81	100458	2021-06-21	2022-06-20
3	Power Sensor	R&S NRV-Z81 100458 R&S NRV-Z32 10057		10057	2021-06-21	2022-06-20
4	LTE Test Software	Tonscend	JS1120-1	N/A	N/A	N/A
5	RF Control Unit	Tonscend	JS0806	158060009	2021-11-25	2022-11-24
6	MXA Signal Analyzer	Agilent	N9020A	MY51250905	2021-11-16	2022-11-15
7	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	103818	2021-06-21	2022-06-20
8	DC Power Supply	Agilent	E3642A	N/A	2021-11-25	2022-11-24
9	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
10	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2021-06-21	2022-06-20
11	Positioning Controller	MF	MF7082	MF78020803	2021-06-21	2022-06-20
12	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2021-07-25	2024-07-24
13	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2021-07-25	2024-07-24
14	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2021-07-01	2024-06-30
15	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2020-09-20	2023-09-19
16	Broadband Preamplifier	SCHWARZBECK	BBV9745	9719-025	2021-06-21	2022-06-20
17	EMI Test Receiver	R&S	ESR 7	101181	2021-06-21	2022-06-20
18	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2021-11-16	2022-11-15
19	Broadband Preamplifier	/	BP-01M18G	P190501	2021-06-21	2022-06-20
20	6dB Attenuator	/	100W/6dB	1172040	2021-06-21	2022-06-20
21	3dB Attenuator	/	2N-3dB	/	2021-11-16	2022-11-15
22	Temperature & Humidity Chamber	GUANGZHOU GOGNWEN	GDS-100	70932	2021-10-07	2022-10-06
23	EMI Test Software	Farad	EZ	N/A	N/A	N/A



3.6 Measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to ETSI TR 100 028 " Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics" and is documented in the Shenzhen LCS Compliance Testing Laboratory Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen LCS Compliance Testing Laboratory Ltd. is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	3.10 dB	(1)
Radiated Emission	1~18GHz	3.80 dB	(1)
Radiated Emission	18-40GHz	3.90 dB	(1)
Conducted Disturbance	0.15~30MHz	1.63 dB	(1)
Conducted Power	9KHz~18GHz	0.61 dB	(1)
Spurious RF Conducted Emission	9KHz~40GHz	1.22 dB	(1)
Band Edge Compliance of RF Emission	9KHz~40GHz	1.22 dB	(1)
Occuiped Bandwidth	9KHz~40GHz	-	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.



4 TEST CONDITIONS AND RESULTS

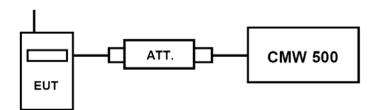
4.1 Output Power

TEST APPLICABLE

During the process of testing, the EUT was controlled via R&S WIDEBAND RADIO COMMUNICATION TESTER (CMW 500) to ensure max power transmission and proper modulation. This result contains output power and EIRP measurements for the EUT. In all cases, output power is within the specified limits.

4.1.1. Conducted Output Power

TEST CONFIGURATION



TEST PROCEDURE

Conducted Power Measurement:

- a) Place the EUT on a bench and set it in transmitting mode.
- b) Connect a low loss RF cable from the antenna port to a CMW 500 by an Att.
- c) EUT Communicate with CMW 500 then selects a channel for testing.
- d) Add a correction factor to the display CMW 500, and then test.

TEST RESULTS

	band	WCDM	IA Band II resu	lt (dBm)	WCDMA Band V result (dBm)			
Item	Uallu	Chan	nel/Frequency(MHz)	Channel	Channel/Frequency(MHz)		
nem	sub-test	9262/	9400/	9538/	4132/	4182/	4233/	
	sub-test	1852.4	1880	1907.6	826.4	836.4	846.6	
RMC	12.2kbps RMC	23.18	23.35	23.35	23.03	23.30	23.30	
	Sub –Test 1	22.54	22.77	22.63	22.61	22.69	22.54	
HSDPA	Sub –Test 2	22.55	22.56	22.70	22.45	22.69	22.52	
пзрра	Sub –Test 3	22.55	22.45	22.57	22.47	22.81	22.64	
	Sub –Test 4	22.44	22.54	22.41	22.42	22.66	22.64	
	Sub –Test 1	22.45	22.55	22.38	22.58	22.61	22.39	
	Sub –Test 2	22.52	22.65	22.52	22.34	22.65	22.64	
HSUPA	Sub –Test 3	22.46	22.57	22.33	22.61	22.72	22.50	
	Sub –Test 4	22.52	22.32	22.49	22.52	22.43	22.33	
	Sub –Test 5	21.40	21.56	21.67	23.26	23.43	23.54	



4.1.1 Radiated Output Power

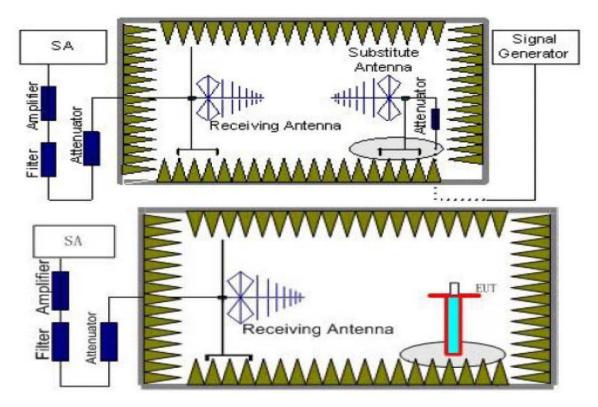
TEST DESCRIPTION

This is the test for the maximum radiated power from the EUT.

Rule Part 24.232(c) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(e) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

Rule Part 22.913(a) specifies "The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts."

TEST CONFIGURATION



TEST PROCEDURE

- EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A
 receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of
 receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360°
 and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in
 three channels (High, Middle, Low) were measured with peak detector.
- 2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The logperiodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
- 3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=10MHz, VBW=10MHz, And the maximum value of the receiver should be recorded as (P_r).
- 4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
- 5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (P_{cl}) ,the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test.

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The measurement results are obtained as described below:

 $Power(EIRP) = P_{Mea} + P_{Ag} - P_{cl} + G_a$

- 6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
- 7. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

TEST LIMIT

According to 22.913(a)(5), 24.232(c)the ERP(EIRP) should be not exceeding following table limits:

	Burst Average EIRP
UMTS Band II	FCC: ≤33.01dBm (2W)
	Burst Average ERP
UMTS Band V	FCC: ≤38.45dBm (7W)

TEST RESULTS

Remark:

- 1. We were tested all Configuration refer 3GPP TS134 121.
- 2. $EIRP = P_{Mea}(dBm) P_{cl}(dB) + P_{Ag}(dB) + G_a(dBi)$
- 3. ERP = EIRP 2.15 dBi as EIRP by subtracting the gain of the dipole.
- 4. Margin = Emission Level Limit
- 5. We tested the worst-case records for H and V directions, and only the worst-case records for V direction were recorded in the report.

UMTS/TM1/UMTS Band II

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain (dB)	P _{Ag} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1852.4	-16.77	4.03	8.38	35.51	23.09	33.01	-9.92	V
1880.0	-16.59	4.08	8.33	35.56	23.22	33.01	-9.79	V
1907.6	-17.50	4.14	8.26	35.63	22.25	33.01	-10.76	V

UMTS/TM1/UMTS Band V

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain (dB)	Correction (dB)	P _{Ag} (dB)	Burst Average ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
826.4	-13.51	3.45	8.45	2.15	33.79	23.13	38.45	-15.32	V
836.4	-13.38	3.49	8.45	2.15	33.85	23.28	38.45	-15.17	V
846.6	-13.62	3.55	8.36	2.15	33.88	22.92	38.45	-15.53	V

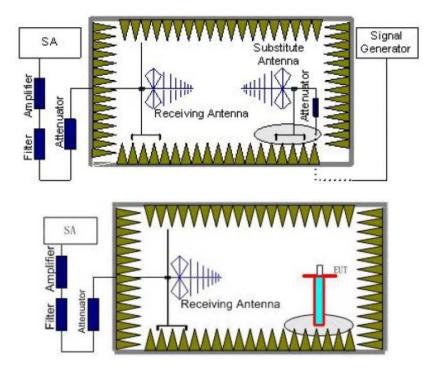


4.2 Radiated Spurious Emssion

TEST APPLICABLE

According to the TIA-603-E:2016 and FCC Part 2.1033 test method, The Receiver or Spectrum was scanned from lowest frequency generated within the equipment to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set as outlined in Part 24.238, Part 22.917, The spectrum is scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of WCDMA Band II and WCDMA Band V.

TEST CONFIGURATION



TEST PROCEDURE

- EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A
 receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of
 receiving antenna is 1.50 m. Detected emissions were maximized at each frequency by rotating the EUT through 360°
 and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in
 three channels (High, Middle, Low) were measured with peak detector.
- 2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The logperiodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
- 3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, And the maximum value of the receiver should be recorded as (P_r) .
- 4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
- 5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (P_{cl}), the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test. The measurement results are obtained as described below:

 $Power(EIRP) = P_{Mea} + P_{Ag} - P_{cl} + G_{a}$



- This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
- 7. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi.
- 8. In order to make sure test results more clearly, we set frequency range and sweep time for difference frequency range as follows table:

Working Frequency	Subrange (GHz)	RBW	VBW	Sweep time (s)
	0.00009~0.15	1KHz	3KHz	30
	0.00015~0.03	10KHz	30KHz	10
	0.03~1	100KHz	300KHz	10
UMTS/TM1/ WCDMA Band V	1~2	1 MHz	3 MHz	2
WCDWA Dallu V	2~5	1 MHz	3 MHz	3
	5~8	1 MHz	3 MHz	3
	8~10	1 MHz	3 MHz	3
	0.00009~0.15	1KHz	3KHz	30
	0.00015~0.03	10KHz	30KHz	10
	0.03~1	100KHz	300KHz	10
	1~2	1 MHz	3 MHz	2
UMTS/TM1/	2~5	1 MHz	3 MHz	3
WCDMA Band II	5~8	1 MHz	3 MHz	3
	8~11	1 MHz	3 MHz	3
	11~14	1 MHz	3 MHz	3
	14~18	1 MHz	3 MHz	3
	18~20	1 MHz	3 MHz	2

TEST LIMITS

According to 24.238, 22.917, specify that 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 $43 + 10 \log(P) dB$.

The specification that emissions shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P) dB$, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

Frequency	Channel	Frequency Range	Verdict
UMTS/TM1/ WCDMA	Low	9KHz - 10GHz	PASS
Band V	Middle	9KHz - 10GHz	PASS
Balla V	High	9KHz - 10GHz	PASS
	Low	9KHz - 20GHz	PASS
UMTS/TM1/ WCDMA Band II	Middle	9KHz - 20GHz	PASS
Dand II	High	9KHz - 20GHz	PASS

TEST RESULTS

Remark:

- 1. We were tested all Configuration refer 3GPP TS134 121.
- 2. $EIRP = P_{Mea}(dBm) P_{cl}(dB) + P_{Ag}(dB) + G_a(dBi)$
- 3. ERP = EIRP 2.15 dBi as EIRP by subtracting the gain of the dipole.
- 4. Margin = EIRP Limit



Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3704.8	-39.83	5.26	3.00	9.88	-35.21	-13.00	-22.21	Н
5557.2	-45.54	6.11	3.00	11.36	-40.29	-13.00	-27.29	Н
3704.8	-45.14	5.26	3.00	9.88	-40.52	-13.00	-27.52	V
5557.2	-48.55	6.11	3.00	11.36	-43.30	-13.00	-30.30	V

UMTS/TM1/ WCDMA Band II _ Low Channel

UMTS/TM1/ WCDMA Band II _ Middle Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3760.0	-37.79	5.32	3.00	10.03	-33.08	-13.00	-20.08	Н
5640.0	-43.42	6.19	3.00	11.41	-38.20	-13.00	-25.20	Н
3760.0	-43.65	5.32	3.00	10.03	-38.94	-13.00	-25.94	V
5640.0	-47.87	6.19	3.00	11.41	-42.65	-13.00	-29.65	V

UMTS/TM1/ WCDMA Band II _ High Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3815.2	-43.12	5.36	3.00	9.62	-38.86	-13.00	-25.86	Н
5722.8	-51.55	6.24	3.00	11.46	-46.33	-13.00	-33.33	Н
3815.2	-46.37	5.36	3.00	9.62	-42.11	-13.00	-29.11	V
5722.8	-53.32	6.24	3.00	11.46	-48.10	-13.00	-35.10	V

UMTS/TM1/ WCDMA Band V _ Low Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1652.8	-47.91	3.86	3.00	8.56	-43.21	-13.00	-30.21	Н
2479.2	-49.40	4.29	3.00	6.98	-46.71	-13.00	-33.71	Н
1652.8	-44.26	3.86	3.00	8.56	-39.56	-13.00	-26.56	V
2479.2	-44.37	4.29	3.00	6.98	-41.68	-13.00	-28.68	V

UMTS/TM1/ WCDMA Band V _ Middle Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1672.8	-49.08	3.9	3.00	8.58	-44.40	-13.00	-31.40	Н
2509.2	-50.82	4.32	3.00	6.8	-48.34	-13.00	-35.34	Н
1672.8	-45.12	3.9	3.00	8.58	-40.44	-13.00	-27.44	V
2509.2	-45.27	4.32	3.00	6.8	-42.79	-13.00	-29.79	V

UMTS/TM1/ WCDMA Band V _ High Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1693.2	-51.93	3.91	3.00	9.06	-46.78	-13.00	-33.78	Н
2539.8	-54.58	4.32	3.00	6.65	-52.25	-13.00	-39.25	Н
1693.2	-49.67	3.91	3.00	9.06	-44.52	-13.00	-31.52	V
2539.8	-51.41	4.32	3.00	6.65	-49.08	-13.00	-36.08	V

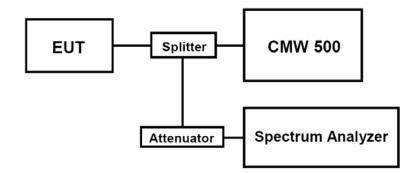


4.3 **Occupied Bandwidth and Emission Bandwith**

TEST APPLICABLE

Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. The table below lists the measured 99% Bandwidth and -26dBc Bandwidth.

TEST CONFIGURATION



TEST PROCEDURE

- 1. The EUT was set up for the max output power with pseudo random data modulation;
- 2. The Occupied bandwidth and Emission Bandwidth were measured with Aglient Spectrum Analyzer N9020A (peak);
- 3. Set RBW=100KHz,VBW=300KHz,Span=10MHz,SWT=Auto;
- Set SPA Max hold and View, Set 99% Occupied Bandwidth/ Set -26dBc Occupied Bandwidth 4.
- These measurements were done at 3 frequencies for WCDMA band II/V. (low, middle and high of operational 5. frequency range).

TEST RESULTS

Test Mode	Channel	Frequency (MHz)	Occupied Bandwidth (99% BW) (MHz)	Emission Bandwidth (-26 dBc BW) (MHz)	Verdict
UMTS/TM1/	9262	1852.4	4.1287	4.718	PASS
WCDMA Band II	9400	1880.0	4.1235	4.693	PASS
	9538	1907.6	4.1059	4.686	PASS
UMTS/TM1/	4132	826.4	4.1324	4.697	PASS
WCDMA Band V	4182	836.4	4.1280	4.697	PASS
	4233	846.6	4.1211	4.698	PASS

Remark:

- *Test results including cable loss;* 1.
- 2. Please refer to following plots;



Occupied Bandwidth a	nd Emission Bandwidth
UMTS/TM1/ WCDMA Band II	UMTS/TM1/ WCDMA Band V
Agitert Spestrum Analyzer - Occupied BW EDITE OF AGI ALIZY/AUTO (00-49.17 OH Jin 17, 2022 # AL 35 50.0 AC Conceror Aug ALIZY/AUTO (00-49.17 OH Jin 17, 2022 Center Freq 1.852400000 GHz Conceror Aug Trig: Free Run AugHeid: 100/100 Frequency	Aginet Spectrum Analyzer - Occupied DW Isote PA.02 ALIONATIO IOC-BR08FM Jp.17, 2022 Frequency R L 26 50.0 AC Center Freq 826.400000 MHz Center Freq 826.400000 MHz Frequency Center Freq 826.400000 MHz Trig: Freq Num ArgHold: 100/100 Frequency
#IFGalicLow #Atten: 40 dB Radio Device: BTS	HFGalsLow #Atten: 40 dB Radio Device: BTS
10 dB/div Ref 30.00 dBm	10 dBldiv Ref 30.00 dBm Log Center Freg
100 1852400000 GHz	10.0 B26.400000 MHz
	10.0 30.0
40.0	600
Center 1.852 GHz Span 10 MHz CF Step #Res BW 100 kHz #VBW 300 kHz #Sweep 100 ms	Center \$26.4 MHz Span 10 MHz CF Step #Res BW 100 kHz #VBW 300 kHz #Sweep 100 ms
Occupied Bandwidth Total Power 32.9 dBm Auto Man 4.1287 MHz	Occupied Bandwidth Total Power 32.9 dBm Auto Man 4.1324 MHz
Transmit Freq Error 4.368 kHz OBW Power 99.00 %	Transmit Freq Error -3.279 kHz OBW Power 99.00 %
x dB Bandwidth 4.718 MHz x dB -26.00 dB	x dB Bandwidth 4.697 MHz x dB -26.00 dB
Channel 9262 / 1852.4 MHz	Channel 4132 / 826.4 MHz
Agilent Spectrum Analyzer - Occupied BW R R 55 500 AC 103/22/01/02 01/22/01/02 102/02/02/04 0n/17, 2022	Agilent Spectrum Analyzer - Occupied BW 20 R.L. 35 50.0. (0255.91.55) 413214010 (0258.00 M Jan 17, 2022
Certiter Freq 1.00000000 0H2 Trig:Free Run AvgHold: 100100 IFGaint.ov #Atten: 40 dB Radio Device: BTS	Center Freq S36.500000 WHZ
Ref Offset 7.35 dB 10 dB/div Ref 30.00 dBm	Ref Offset 6 37 48 10 dBildiv Ref 30.00 dBm Log
200 Center Freq 100 188000000 GHz	200 Center Freq 100 836.60000 MHz
-100	
200 mm man	and the second s
40.0	60.0
Center 1.88 GHz Span 10 MHz Span 10 MHz CF Step #Res BW 100 kHz #Sweep 100 ms	Center 336.6 MHz Span 10 MHz CF Step #Res BW 100 kHz #Sweep 100 ms 1.00000 MHz
Occupied Bandwidth Total Power 32.4 dBm	Occupied Bandwidth Total Power 33.3 dBm
4.1235 MHz Freq Offset Transmit Freq Error 5.092 kHz OBW Power 99.00 % 0Hz	4.1280 MHz Freq Offset Transmit Freq Error -813 Hz OBW Power 99.00 % 0 Hz
x dB Bandwidth 4.693 MHz x dB -26.00 dB	x dB Bandwidth 4.697 MHz x dB -26.00 dB
Channel 9400 / 1880.0 MHz	Channel 4182 / 836.4 MHz
Aglent Spectrum Analyser - Recupied (# # 81 30 50 50 412/14/170 02+42/69/13r12, 2022	Agilent Spectrum Analyzer - Occupied BW
Center Freq 1.907600000 GHz Center Freq: 190760000 GHz Radio Std: None Frequency	0 84. 590 AC 000000000000000000000000000000000000
Ref Offset 7.36 dB 10 dB/div Ref 30.00 dBm	Ref Offset 6.97 dB 10 dB/div Ref 30.00 dBm
Log 200 Center Freq 190760000 GHz	200 Center Freq 2010 845.600000 Mitz
	10.0
200 mm mm N N	NO MARKAN
Center 1.908 GHz Span 10 MHz	Center 846.6 MHz Span 10 MHz
#Res BW 100 kHz #VBW 300 kHz #Sweep 100 ms CPS test 1000000 MHz Occupied Bandwidth Total Power 32.4 dBm Auto Man	#Res BW 100 kHz #VBW 300 kHz #Sweep 100 ms CF Step 100000 MHz Occupied Bandwidth Total Power 33.3 dBm Auto Man
4.1059 MHz Freq Offset Transmit Freq Error -5.552 kHz OBW Power 99.00 % 014z	4.1211 MHz Freq Offset Transmit Freq Error -12.282 kHz OBW Power 99.00 % 0Hz
Transmit Freq Error -5.552 kHz OBW Power 99.00 % 0 Hz x dB Bandwidth 4.686 MHz x dB -26.00 dB 0 Hz	Transmit Freq Error -12.282 kHz OBW Power 99.00 % 0 Hz x dB Bandwidth 4.698 MHz x dB -26.00 dB 0 Hz
NS0	NSO STATUS
Channel 9538 / 1907.6 MHz	Channel 4233 / 846.6 MHz



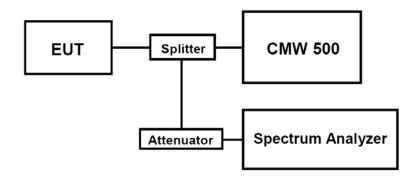
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4.4 Band Edge Compliance

TEST APPLICABLE

During the process of testing, the EUT was controlled via R&S WIDEBAND RADIO COMMUNICATION TESTER (CMW 500) to ensure max power transmission and proper modulation.

TEST CONFIGURATION



TEST PROCEDURE

- 1. The EUT was set up for the max output power with pseudo random data modulation;
- 2. The power was measured with Spectrum Analyzer N9020A;
- 3. Set RBW=100KHz,VBW=300KHz,Span=2MHz,SWT=Auto,Dector: RMS;

These measurements were done at 2 frequencies for WCDMA Band II/V. (low and high of operational frequency range).

TEST RESULTS

		UMTS/TM1/WC	DMA Band II		
Test Mode	Channel	Frequency (MHz)	Band Edg Compliance (dBm)	Limits (dBm)	Verdict
UMTS/TM1/WCDMA	9262	1852.4	<-13dBm	-13dBm	
Band II	9538	1907.6	<-13dBm	-13dBm	PASS
Dallu II	1513	1752.6	<-13dBm	-13dBm	
		UMTS/TM1/WCI	DMA Band V		
Test Mode	Channel	Frequency (MHz)	Band Edg Compliance (dBm)	Limits (dBm)	Verdict
UMTS/TM1/WCDMA	4132	826.4	<-13dBm	-13dBm	PASS
Band V	4233	846.6	<-13dBm	-13dBm	PASS

Remark:

1. Test results including cable loss;

2. Please refer to following plots;



	UMTS	/TM1/V	VCDMA	Band II			U_{\perp}	MTS/1	<i>[M1/W</i>	/CDM	A Ba	nd V		
RL Spectrum Analyzer RL 25 55 enter Freq 1.850 Ref Offset Ref 30.00 9	PNO: Wid IFGain:Los 17.45 dB	g → Trig: Free Run w #Atten: 40 dB	A3243 AvgHold: 1001 N	AUTO 10241-50 FM Jan 17, 2022 15 FMACE 1, 2, 3 4 5 6 tree A AAAAA 00 GETA AAAAAA AKr1 1.850 000 GHz -20.114 dBm	Frequency Auto Tune	Aglent Spectru UI RL Center Fr 10 dB/div	an Analyzer - Swept SA 55 50 AC eq 824.000000 Ref Offset 6.42 dB Ref 30.00 dBm	MHz PHO: Wide → IFGain:Low	Trig: Free Run #Atten: 40 dB	#Avg Type: Avg Hold: 1	00/100 Mkr1	2:59:16 PM Jan 17, TRACE 1 2 3 Type A A A Opt A A A 824.000 N -21.058 d	AAA AHZ Aut	ency to Tu
			_		Center Freq 1.85000000 GHz	20.0							Cent 824.000	
00					Start Freq 1.849000000 GHz	0.00					-		Sta 823.000	art Fi
0		•1 ⁻		-13.00 dBe	Stop Freq 1.851000000 GHz	-10.0			↓ ¹			-131	0 mm Sto 825.000	op F
0		\frown			CF Step 200.000 kHz Auto Man	-30.0	~	\checkmark	\sim				Auto	CF S
10					Freq Offset 0 Hz	-50.0							Free	101
enter 1.850000 GH tes BW 100 kHz	#\	/BW 300 kHz*		Span 2.000 MHz reep 100.0 ms (601 pts)		Center 824 #Res BW			300 kHz*		Sweep 10	Span 2.000 I 0.0 ms (601		
es BW 100 kHz en System Aulyzer - RL 35 55 nter Freq 1.910 Ref Offset	#V Chan Swept 5A 0000000 GHz PNO: Wide FGainLee 17.36 dB		2 / 1852 #Avg Type: RM AvgHold: 1001	reep 100.0 ms (601 pts) status 2.4 MHz 100 000-02-11.94 Jan 17, 2007 100 000-02-11.94 Jan 17, 2007 100 000-02-11.94 Jan 17, 2007 100 000 000 GHz 4.4 Mkr1 1,910 000 GHz	Frequency	#Res BW	100 kHz () () () () () () () () () () () () ()	Chann	el 413		Sweep 100 status 6.4 N 10748070 00 INFRMS 100/100 Mkr1	0.0 ms (601 1Hz, 1Hz, 18425 12 4 4 1849.000 N	2022 4 5 6 A A A 1Hz Aut	
es BW 100 kHz nt Systrum Analyzer : 5 RL 25 55 nter Freq 1.910 Ref Offset aB/div Ref 30.01	#V Chan Swept 5A 0000000 GHz PNO: Wide FGainLee 17.36 dB	nel 926	2 / 1852 #Avg Type: RM AvgHold: 1001	reep 100.0 ms (601 pts) status 2.4 MHz, 100 00242112413m17.2027 150 Track 12.3 + 5.6 150 Track 12.3 + 5.6 150 Track 12.4 + 5.4 + 5.4	Frequency	#Res BW 1 usg Aptent Spectro	100 kHz (um Analyzer - Swept SA 85 900 AC eq 849.000000	Chann MHz PNO: Wide →	el 413	2 / 820 #Avg Type:	Sweep 100 status 6.4 N 10748070 00 INFRMS 100/100 Mkr1	0.0 ms (601 1117 1117 1117 1117 1117 1117 1117 1	2022 4 5 6 A A A 1Hz Aut	to T
es BW 100 kHz erf Spectrum Audyrer 1 R. 2010 Sectrum Audyrer 1 Ref Preg 1.910 dBl/div Ref 30.00	#V Chan Swept 5A 0000000 GHz PNO: Wide FGainLee 17.36 dB	nel 926	2 / 1852 #Avg Type: RM AvgHold: 1001	reep 100.0 ms (601 pts) status 2.4 MHz 100 000-02-11.94 Jan 17, 2007 100 000-02-11.94 Jan 17, 2007 100 000-02-11.94 Jan 17, 2007 100 000 000 GHz 4.4 Mkr1 1,910 000 GHz	Frequency Auto Tune Center Freq	Agtent Spectra Agtent Spectra I RL Center Fr	100 kHz () () () () () () () () () () () () ()	Chann MHz PNO: Wide →	el 413	2 / 820 #Avg Type:	Sweep 100 status 6.4 N 10748070 00 INFRMS 100/100 Mkr1	0.0 ms (601 1Hz, 1Hz, 18425 12 4 4 1849.000 N	2022 45.0 HHz Bm Cent 849.000	er F
es BW 100 kHz	#V Chan Swept 5A 0000000 GHz PNO: Wide FGainLee 17.36 dB	nel 926	2 / 1852 #Avg Type: RM AvgHold: 1001	reep 100.0 ms (601 pts) status 2.4 MHz 100 000-02-11.94 Jan 17, 2007 100 000-02-11.94 Jan 17, 2007 100 000-02-11.94 Jan 17, 2007 100 000 000 GHz 4.4 Mkr1 1,910 000 GHz	Frequency Auto Tune Center Freq 1.91000000 GHz Start Freq	#Res BW Mss Activit System B Center Fr 10 dB/div 000 100	100 kHz () () () () () () () () () () () () ()	Chann MHz PNO: Wide →	el 413	2 / 820 #Avg Type:	Sweep 100 status 6.4 N 10748070 00 INFRMS 100/100 Mkr1	0.0 ms (601 1Hz, 1Hz, 18425 12 4 4 1849.000 N	2002 1 5 5 6 1 5 6 1 1 2 1 1 1 2 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	to Tu ter F 000 M art Fi 000 M
es BW 100 kHz	#V Chan Swept 5A 0000000 GHz PNO: Wide FGainLee 17.36 dB	nel 926	2 / 1852 #Avg Type: RM AvgHold: 1001	Interim 100.0 ms (601 pts) interim 2 2.4 MHz Interim 2 Interim 2 <	Frequency Auto Tune Center Freq 1.91000000 GHz Start Freq 1.90900000 GHz Stop Freq 1.911000000 GHz CF Step 200.000 Hz	#Res BW Mss Agted Spectra It & Conter Fr 10 dB/div 200 100	100 kHz () () () () () () () () () () () () ()	Chann MHz PNO: Wide →	el 413	2 / 820 #Avg Type:	Sweep 100 status 6.4 N 10748070 00 INFRMS 100/100 Mkr1	0.0 ms (601 11 11 12 12 12 12 12 12 12 1	2002 142 142 142 142 142 142 142 14	to Tr ter F 0000 1 art F 0000 1 000 1
es BW 100 kHz	#V Chan Swept 5A 0000000 GHz PNO: Wide FGainLee 17.36 dB	nel 926	2 / 1852 #Avg Type: RM AvgHold: 1001	Interim 100.0 ms (601 pts) interim 2 2.4 MHz Interim 2 Interim 2 <	Frequency Auto Tune Center Freq 1.91000000 GHz Start Freq 1.90900000 GHz Stop Freq 1.911000000 GHz CF Step	#Res BW Miss Activit Spectra 0 0 0 0 0 0 000	100 kHz () () () () () () () () () () () () ()	Chann MHz PNO: Wide →	el 413	2 / 820 #Avg Type:	Sweep 100 status 6.4 N 10748070 00 INFRMS 100/100 Mkr1	0.0 ms (601 11 11 12 12 12 12 12 12 12 1	2000 4.5.6 HIZ Bm Cent 849.000 0.066 Stt 550.000 Cent	to Tu ter F 0000 h art F 0000 h CF S 0000 h

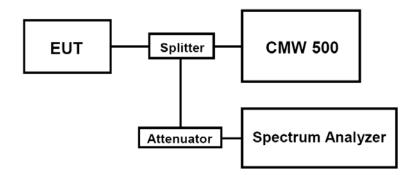
4.5 Spurious Emssion on Antenna Port

TEST APPLICABLE

The following steps outline the procedure used to measure the conducted emissions from the EUT.

- Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of WCDMA band II, this equates to a frequency range of 9 KHz to 19GHz, data taken from 30 MHz to 19 GHz. For WCDMA Band V, this equates to a frequency range of 9 KHz to 9 GHz,data taken from 30 MHz to 9 GHz.
- 2. The sweep time is set automatically by instrument itself. That should be the optimal sweep time for the span and the RBW. If the sweep time is too short, that is sweep is too fast, the sweep result is not accurate; if the sweep time is too long, that is sweep is too low, some frequency components may be lost. The instrument will give an optimal sweep time according the selected span and RBW.
- The procedure to get the conducted spurious emission is as follows: The trace mode is set to MaxHold to get the highest signal at each frequency; Wait 25 seconds; Get the result.
- 4. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

TEST CONFIGURATION



TEST PROCEDURE

- 1. The EUT was set up for the max output power with pseudo random data modulation;
- 2. The power was measured with Spectrum Analyzer N9020A;
- 3. These measurements were done at 3 frequencies for WCDMA band II/V. (low, middle and high of operational frequency range).

TEST LIMIT

Part 24.238, Part 22.917, specify that 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 $43 + 10 \log(P) dB$.

The specification that emissions shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P) dB$, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

TEST RESULTS

Test Mode	Channel	Frequency (MHz)	Spurious RF Conducted Emission (dBm)	Limits (dBm)	Verdict	
UMTS/TM1/WCDMA Band II	9262	1852.4	<-13dBm	-13dBm	PASS	
	9400	1880.0	<-13dBm	-13dBm		
	9538	1907.6	<-13dBm	-13dBm		
UMTS/TM1/WCDMA Band V	4132	826.4	<-13dBm	-13dBm		
	4182	836.4	<-13dBm	-13dBm	PASS	
	4233	846.6	<-13dBm	-13dBm		

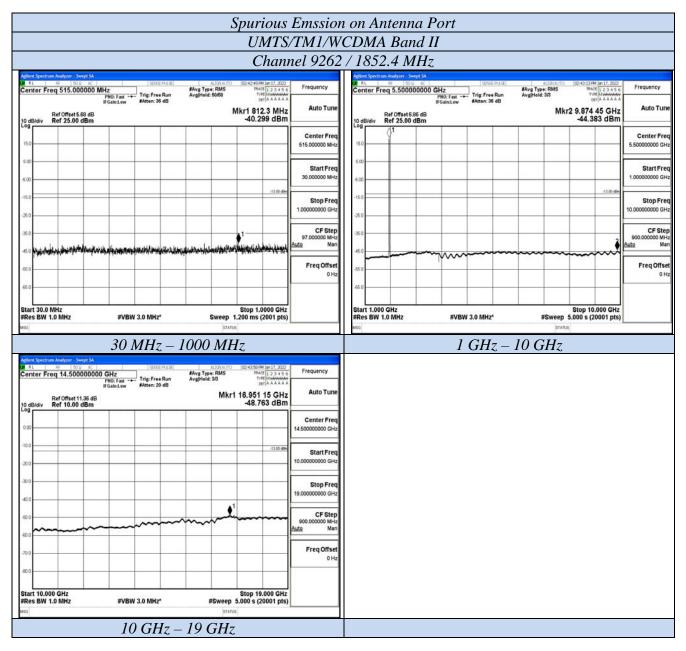
Remark:

1. Test results including cable loss;

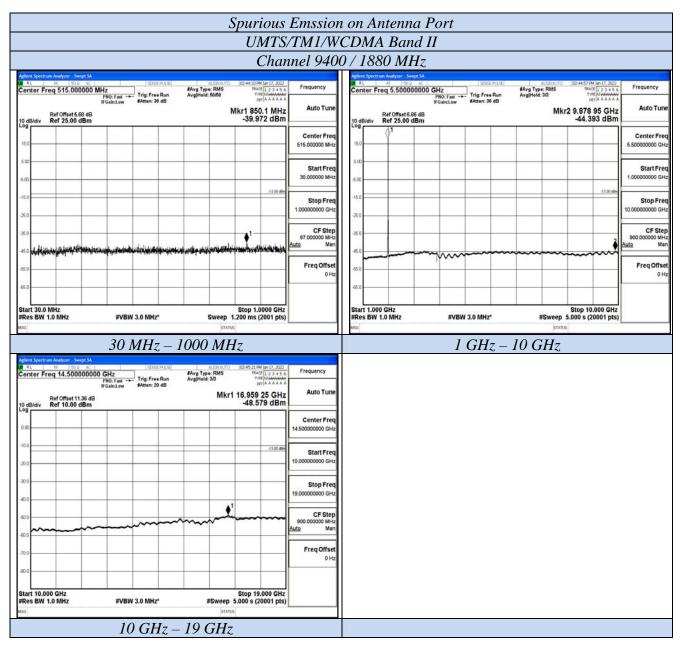
2. Please refer to following plots;

3. Not reorded test plots from 9 KHz to 30 MHz as emission levels 20dB lower than emission limit;





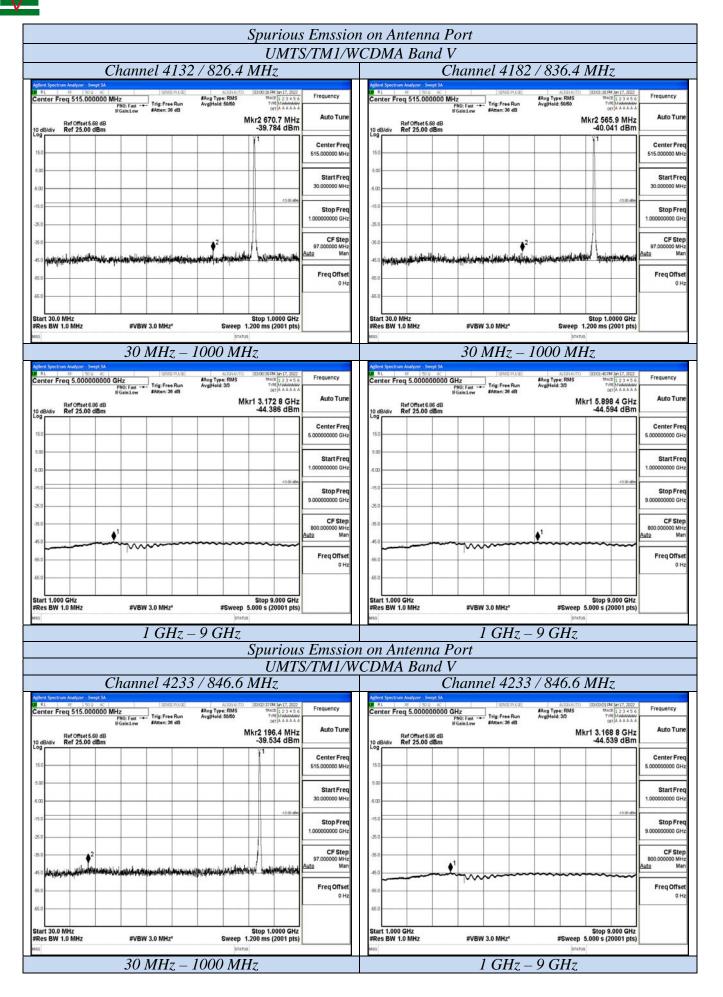






Report No.: LCS211129059AEE

		S	•	Emssion							
				/TM1/W							
			Chan	nel 9538	_						
Agtent Spectrum Analyzer - Swept SA RL RF 50 R AC Center Freq 515.000000	MHz PN0: Fast IFGain:Low Atten: 36 dB	ALIGHAUTO #Avg Type: RMS Avg]Hold: 50/50	02-45:56 PM Jan 17, 2022 TRACE 1 2 3 4 5 6 TVRE MUMMMM DET A A A A A A	Frequency	CO RL	um Analyzer - Swept SA 35 50 Q AC req 5.50000000	00 GHz PNO: Fast -	Trig: Free Run	ALIGHAUTO #Avg Type: RMS Avg Hold: 3/3	02-46-20 PM Jan 17, 2022 TRACE [1 2 3 4 5 6 TVRE [1 2 3 4 A A A DET A A A A A A	Frequency
Ref Offset 5.68 dB	IFGain:Low BAtten: 35 db	м	kr1 828.3 MHz -39.461 dBm	Auto Tune	10 dB/div	Ref Offset 6.86 dB Ref 25.00 dBm	IFGain:Low	#Atten: 36 dB	Mk	r2 9.648 10 GHz -44.305 dBm	Auto Tune
15.0				Center Freq 515.000000 MHz	15.0	\$1					Center Freq 5.50000000 GHz
500				Start Freq 30.000000 MHz	500						Start Fred 1.000000000 GH:
-15.0			-13 00 dBn	Stop Freq 1.00000000 GHz	-15.0					-13 00 dBn	Stop Free 10.000000000 GH:
-35.0	wimiting history		1	CF Step 97.000000 MHz <u>Auto</u> Man	-35.0					↓ ²	CF Step 900.000000 MH Auto Mar
-20	an ideas i de fating da fating da fating an	adamaterika ann inn a		Freq Offset 0 Hz	-55.0						Freq Offse
45.0 Start 30.0 MHz #Res BW 1.0 MHz M50	#VBW 3.0 MHz*	Sweep 1.3	Stop 1.0000 GHz 200 ms (2001 pts)		65.0 Start 1.00 #Res BW	0 GHz 1.0 MHz	#VB	W 3.0 MHz*	#Sweep	Stop 10.000 GHz 5.000 s (20001 pts)	1
Agilerit Spectrum Analyzer - Swept SA GT RL RF 50.0 A.C	30 MHz –	1000 MH	Z (02:46:44 PM Jan 17, 2022				1	GHz –	10 GHz		
Center Freq 14.50000000 Ref Offset 11.36 dB	PN0: Fast Trig: Free Run IFGain:Low #Atten: 20 dB	#Avg Type: RMS Avg Held: 3/3	THACE 1 2 3 4 5 6 TYPE MULTURE DET A A A A A A 16.946 20 GHz	Frequency Auto Tune							
Log dB/div Ref 10.00 dBm			-48.782 dBm	Center Freq 14 50000000 GHz							
-10.0			-13 00 dBm	StartFreq							
-20.0				10.00000000 GHz Stop Freq							
-40.0				19.00000000 GHz							
-50.0 -60.0		- marken		900.000000 MHz <u>Auto</u> Man							
-70.0				Freq Offset 0 Hz							
Start 10.000 GHz #Res BW 1.0 MHz	#VBW 3.0 MH2*		Stop 19.000 GHz .000 s (20001 pts)								
MSG	10 GHz.	– <i>19 GHz</i> ,									



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4.6 Frequency Stability Test

TEST APPLICABLE

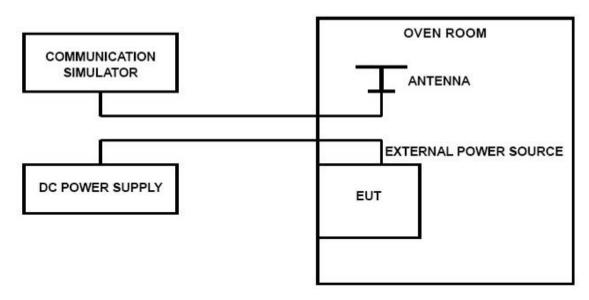
- 1. According to FCC Part 2 Section 2.1055 (a)(1), the frequency stability shall be measured with variation of ambient temperature from -30°C to +50°C centigrade.
- 2. According to FCC Part 2 Section 2.1055 (e)(2), for battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacture.
- 3. Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried voltage equipment and the end voltage point was 3.3V.

TEST PROCEDURE

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S WIDEBAND RADIO COMMUNICATION TESTER (CMW 500).

- 1. Measure the carrier frequency at room temperature;
- 2. Subject the EUT to overnight soak at -30° C;
- With the EUT, powered via nominal voltage, connected to the CMW 500 and in a simulated call on middle channel of WCDMA Band II/V, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming;
- 4. Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 0.5 hours at each temperature, unpowered, before making measurements;
- 5. Remeasure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments remeasuring carrier frequency at each voltage. Pause at nominal voltage for 0.5 hours unpowered, to allow any self-heating to stabilize, before continuing;
- 6. Subject the EUT to overnight soak at $+50^{\circ}$ C;
- 7. With the EUT, powered via nominal voltage, connected to the CMW 500 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming;
- 8. Repeat the above measurements at 10°C increments from +50°C to -30°C. Allow at least 0.5 hours at each temperature, unpowered, before making measurements;
- 9. At all temperature levels hold the temperature to +/-0.5 °C during the measurement procedure;

TEST CONFIGURATION





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FCC ID: 2ACHBN6

TEST LIMITS

For Hand carried battery powered equipment

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.40VDC and 4.30VDC, with a nominal voltage of 3.80DC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of -10 % and +12.5 %. For the purposes of measuring frequency stability these voltage limits are to be used.

For equipment powered by primary supply voltage

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. For this EUT section 2.1055(d)(1) applies. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

TEST RESULTS

UMTS/TM1/WCDMA Band II							
DC Power	Temperature (℃)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict		
6.12	25	-13	-0.007	2.50	PASS		
7.2	25	-21	-0.011	2.50	PASS		
8.24	25	6	0.003	2.50	PASS		
7.2	-30	1	0.001	2.50	PASS		
7.2	-20	-13	-0.007	2.50	PASS		
7.2	-10	4	0.002	2.50	PASS		
7.2	0	-11	-0.006	2.50	PASS		
7.2	10	11	0.006	2.50	PASS		
7.2	20	-29	-0.015	2.50	PASS		
7.2	30	8	0.004	2.50	PASS		
7.2	40	25	0.013	2.50	PASS		
7.2	50	-2	-0.001	2.50	PASS		

UMTS/TM1/WCDMA Band V							
DC Power	Temperature (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict		
6.12	25	11	0.013	2.50	PASS		
7.2	25	-20	-0.024	2.50	PASS		
8.24	25	-10	-0.012	2.50	PASS		
7.2	-30	-15	-0.018	2.50	PASS		
7.2	-20	0	0.000	2.50	PASS		
7.2	-10	-3	-0.004	2.50	PASS		
7.2	0	26	0.031	2.50	PASS		
7.2	10	-28	-0.033	2.50	PASS		
7.2	20	-17	-0.020	2.50	PASS		
7.2	30	-18	-0.022	2.50	PASS		
7.2	40	17	0.020	2.50	PASS		
7.2	50	-12	-0.014	2.50	PASS		

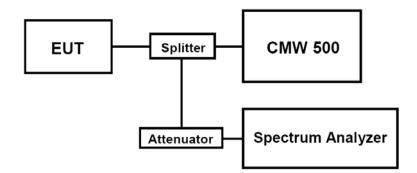


4.7 Peak-to-Average Ratio (PAR)

LIMIT

The Peak-to-Average Ratio (PAR) of the transmission may not exceed 13 dB.

TEST CONFIGURATION



TEST PROCEDURE

- 1. Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;
- 2. Set resolution/measurement bandwidth \geq signal's occupied bandwidth;
- 3. Set the number of counts to a value that stabilizes the measured CCDF curve;
- 4. Set the measurement interval as follows:
 - 1). for continuous transmissions, set to 1 ms,
 - 2). for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
- 5. Record the maximum PAPR level associated with a probability of 0.1%.

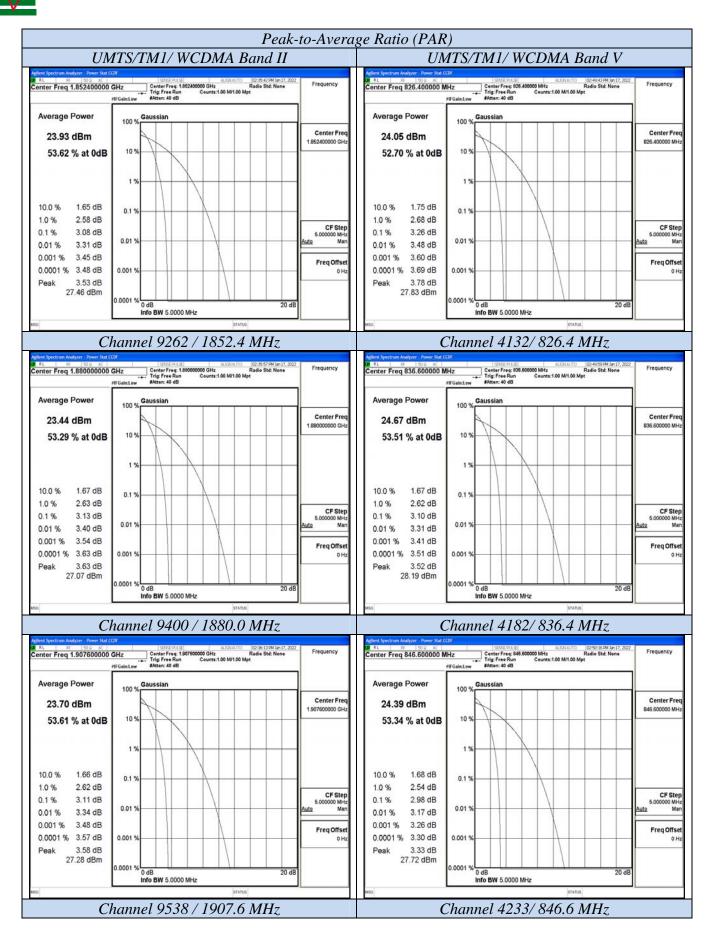
PAPR Value Frequency Limits Test Mode Channel Verdict (MHz) (dB)(dB)9262 1852.4 3.08 13.0 PASS UMTS/TM1/ 9400 1880.0 3.13 13.0 PASS WCDMA Band II 9538 1907.6 PASS 3.11 13.0 4132 826.4 3.26 13.0 PASS UMTS/TM1/ WCDMA Band 4182 836.4 3.1 13.0 PASS V 4233 2.98 PASS 846.6 13.0

TEST RESULTS

Remark:

1. Test results including cable loss;

2. Please refer to following plots;





Test Setup Photos of the EUT

Please refer to separated files for Test Setup Photos of the EUT.

6 External Photos of the EUT

Please refer to separated files for External Photos of the EUT.

7 Internal Photos of the EUT

Please refer to separated files for Internal Photos of the EUT.

.....End of Report.....