FCC TEST REPORT

Product Name:	Module
Trade Mark:	CINTERION
Model No.:	PLS63-W
Report Number:	210811001RFM-1
Test Standards:	FCC 47 CFR Part 27 P
FCC ID:	QIPPLS63-W
Test Result:	PASS
Date of Issue:	August 26, 2021

Prepared for:

THALES DIS AIS Deutschland GmbH
Siemensdamm 50, 13629 Berlin, Germany

Prepared by:

Shenzhen UnionTrust Quality and Technology Co., Ltd.
Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China
TEL: +86-755-2823 0888
FAX: +86-755-2823 0886

Prepared by:	Gavin Xu Project Engineer	Reviewed by:	Henry Lu Team Leader
Approved by:	Kevin Liang Assistant Manager	Date:	August 26, 2021

UnionTrust Laboratories UnionTrust *Certified*

Version

Version No.	Date	Description
V1.0	August 26, 2021	Original

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	THALES DIS AIS Deutschland GmbH
Address of Applicant:	Siemensdamm 50, 13629 Berlin, Germany
Manufacturer:	Thales DIS AIS Deutschland GmbH
Address of Manufacturer:	Werinherstr.81, 81541 Munich, Germany

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Module	
Model No.:	PLS63-W	
Trade Mark:	CINTERION	
DUT Stage:	Production Unit	
EUT Supports Function:	GSM Bands:	GSM850/1900
	UTRA Bands:	Band II/ Band IV/ Band V
	E-UTRA Bands:	FDD Band 2/ Band 4/ Band 5/ Band 7/Band 8/ Band 12/ Band 13/ Band 26/ Band 66
		TDD Band 38/ Band 41
Sample Received Date:	August 10, 2021	
Sample Tested Date:	August 10, 2021 to August 17, 2021	

1.2.2 Description of Accessories

None.

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Support Networks:	LTE	
Type of Modulation:	LTE Band 8:	QPSK, 16QAM
Antenna Type:	External Antenna	
Antenna Gain:	LTE Band 8:	50 ohm terminal (0dBi)
Normal Test Voltage:	3.8 Vdc	
Extreme Test Voltage:	3.2 to 4.5Vdc	
Extreme Test Temperature:	-30 °C to +65 °C	

Summary of Results:								
Bands	BW (MHz)	Modulation	Frequency Range (MHz)	Max RF Output Power (dBm) Conducted (Average)	Max RF Output Power (dBm) ERP/EIRP (Average)	EIRP (W)	99% BW (MHz)	Emission Designator
8	1.4	QPSK	897.5-900.5	24.15	24.15	0.26002	1.1056	1M11G7D
		16QAM		23.05	23.05	0.20184	1.1050	1M11W7D
	3	QPSK	897.5-900.5	24.20	24.20	0.26303	2.7185	2M72G7W
		16QAM		23.28	23.28	0.21281	2.7043	2M70D7W

1.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
Adaptor	N/A	CD139	20359	Applicant
PCB board	N/A	DSB75	--	Applicant
PCB board	N/A	AH8	--	Applicant
50 ohm terminal	N/A	N/A	N/A	UnionTrust

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable	SMA	0.1 Meter	UnionTrust
2	RF Cable	SMA	0.8 Meter	UnionTrust
3	RF Cable	SMA	0.8 Meter	UnionTrust

1.5 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China
Telephone: +86 (0) 755 2823 0888
Fax: +86 (0) 755 2823 0886

1.6 TEST FACILITY

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

CNAS-Lab Code: L9069
The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01
Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories
CAB identifier: CN0032

FCC Accredited Lab.
Designation Number: CN1194
Test Firm Registration Number: 259480

1.7 DEVIATION FROM STANDARDS

None.

1.8 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.10 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9kHz-150kHz	±3.2 dB
2	Conducted emission 150kHz-30MHz	±2.7 dB
3	Radiated spurious emissions 30MHz-1GHz	± 4.9 dB
4	Radiated spurious emissions 1GHz-18GHz	± 4.8 dB
5	Radiated spurious emissions 18GHz-40GHz	± 5.1 dB
6	Occupied Bandwidth	± 1.86 %
7	DC Supply Voltages	± 0.68 %
8	Temperature	± 0.62 °C
9	Humidity	± 3.9 %
10	Conducted spurious emissions	± 2.7 dB
11	DC Supply Voltages	± 0.68 %
12	AC Supply Voltages	± 1.2 %
13	Radio Frequency	± 6.5 x 10^{-8}
14	RF Power, Conducted	± 0.9 dB

2. TEST SUMMARY

FCC 47 CFR Part 27 Test Cases (LTE Band 8)			
Test Item	**Test Requirement**	**Test Method**	**Result**
Equivalent Radiated Power (ERP)	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.1507(a)(3)	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.1507(a)(3)	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note
Peak-to-average ratio	FCC 47 CFR Part 27.1507(d)	KDB 971168 D01v03r01	See Note
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h) FCC 47 CFR Part 27.1506	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note
Band Edge at antenna terminals	FCC 47 CFR Part 27.1509(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 27.1509(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 27.1509(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note

Note:

Difference description:

1) There are hardware differences between PLS63-W and PLS83-W Module. For detailed PCB board and component differences, see the difference statement document

2) The HSPA Category level of PLS63-W is 1, different from PLS83-W Cat 4.

3) The difference is defined by the applicant and the referenced data complies with FCC regulations，and the applicant assumes full responsibility.

Test Plan:

1) According to the difference description, PLS63-W shares the same data from the PLS83-W original report (Report No.: 210809036RFM-1).
2) This report is based on the report of 210809036RFM-1,just update the Field strength of spurious radiation and
3) The FCC ID of PLS83-W is QIPPLS83-W
4) The data of PLS63-W was used for PLS83-W as bellow：

Band	Test Item	Description
LTE Band 8	Equivalent Radiated Power (ERP)	Reuse
	Conducted Output Power	Verification
	Peak-to-average ratio	Reuse
	99%&26dB Bandwidth	Reuse
	Band Edge at antenna terminals	Reuse
	Spurious emissions at antenna terminals	Reuse
	Field strength of spurious radiation	Updated
	Frequency stability	Reuse

3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☒	3m SAC	ETS-LINDGREN	3M	N/A	Jan. 22, 2021	Jan. 21, 2024
☐	Loop Antenna	ETS-Lindgren	6502	00202525	Nov. 14, 2020	Nov. 13, 2021
☒	Receiver	R&S	ESIB26	100114	Nov. 18, 2020	Nov. 17, 2021
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Nov. 14, 2020	Nov. 13, 2021
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	Nov. 14, 2020	Nov.13, 2021
☒	Preamplifier	HP	8447F	2805A02960	Nov. 10, 2020	Nov. 9, 2021
☒	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201541	Apr. 30, 2021	Apr. 29, 2022
☒	Pre-amplifier	ETS-Lindgren	00118385	00201874	Nov. 10, 2020	Nov. 9, 2021
☐	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Nov. 14, 2020	Nov. 13, 2021
☐	Pre-amplifier	ETS-Lindgren	00118384	00202652	Nov. 14, 2020	Nov. 13, 2022
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☒	Test Software	Audix	e3	Software Version: 9.160323		

RF Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☒	Spectrum Analyzer	R&S	FSV40-N	101653	Apr. 22, 2021	Apr. 21, 2022
☒	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Nov. 10, 2020	Nov. 9, 2021
☒	Wideband Radio Communication Tester	R&S	CMW500	120932	Apr. 22, 2021	Apr. 21, 2022
☐	Wideband Radio Communication Tester	R&S	CMW500	119583	Apr. 22, 2021	Apr. 21, 2022
☒	DC Source	KIKUSUI	PWR400L	LK003024	N/A	N/A
☒	Digital multimeter	FLUKE	15B+	30701460WS15	Nov. 12, 2020	Nov. 11, 2021
☒	Temp & Humidity chamber	Votisch	VT4002	58566133290020	Apr. 22, 2021	Apr. 21, 2022

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

Test Environment	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
TN/VN	+15 to +35	3.8	20 to 75
TL/VL	-30	3.2	20 to 75
TH/VL	+65	3.2	20 to 75
TL/VH	-30	4.5	20 to 75
TH/VH	+65	4.5	20 to 75

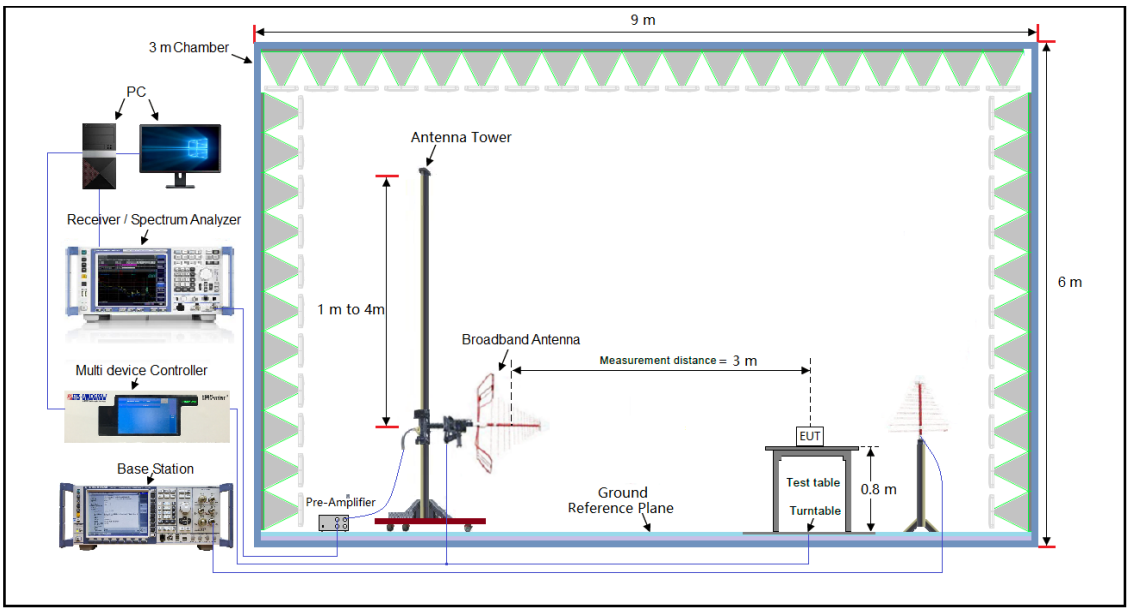
Remark:

1) The EUT just work in such extreme temperature of -30 °C to +65 °C and the extreme voltage of 3.2 V to 4.5 V, so here the EUT is tested in the temperature of -30 °C to +65 °C and the voltage of 3.2 V to 4.5 V.
2) VN: Normal Voltage; TN: Normal Temperature;
   TL: Low Extreme Test Temperature; TH: High Extreme Test Temperature;
   VL: Low Extreme Test Voltage; VH: High Extreme Test Voltage.

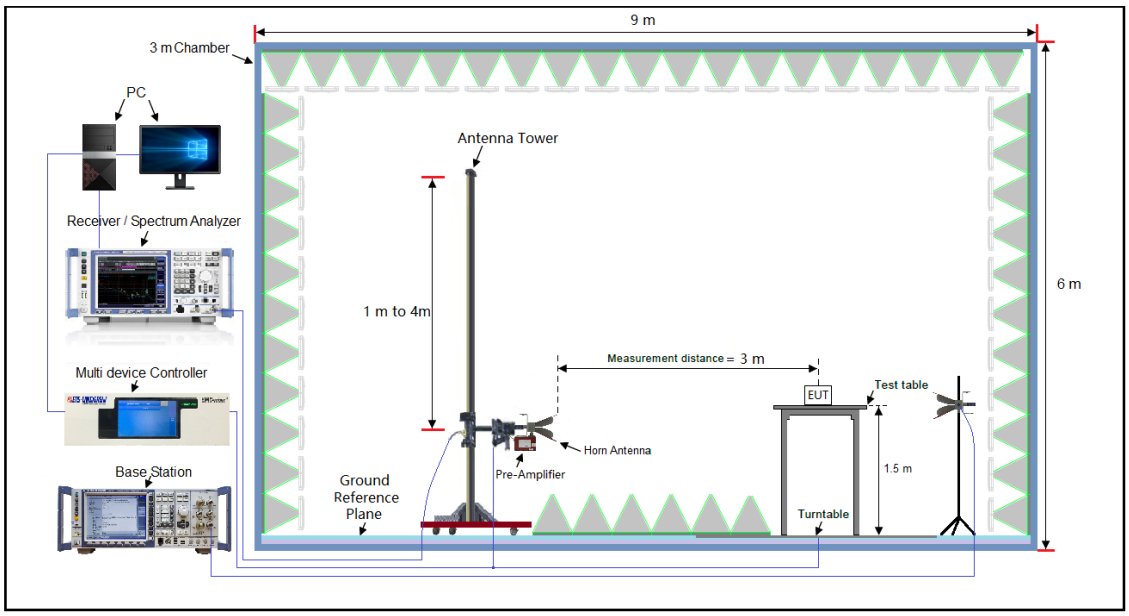
4.2 TEST SETUP

4.2.1 For Radiated Emissions test setup

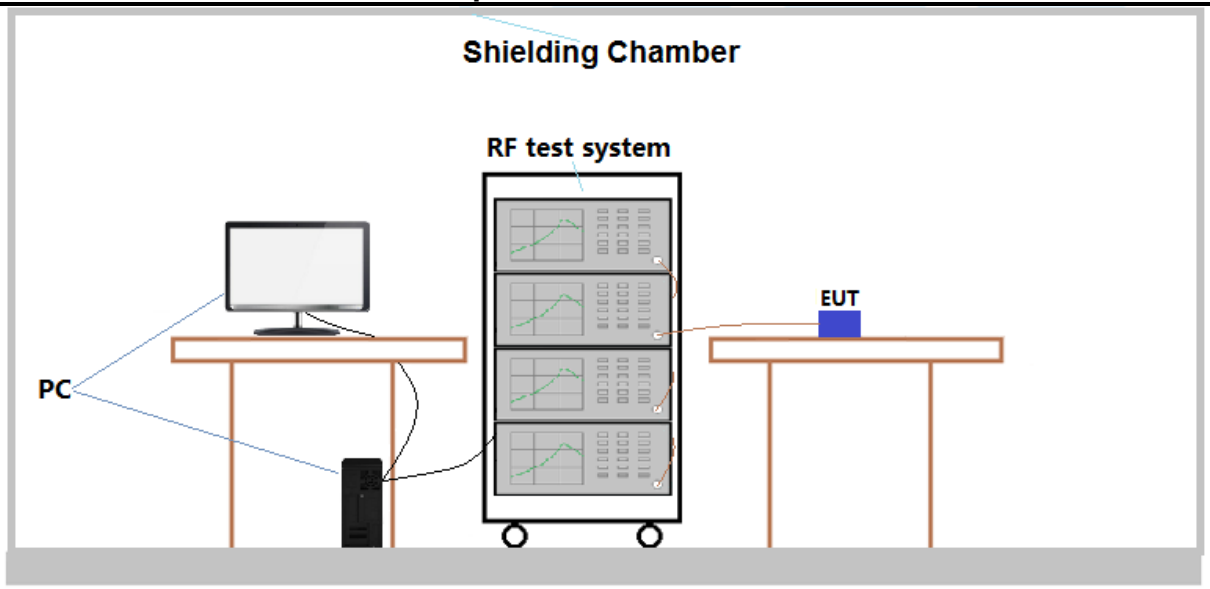
Radiated Emissions 30MHz to 1GHz Test setup



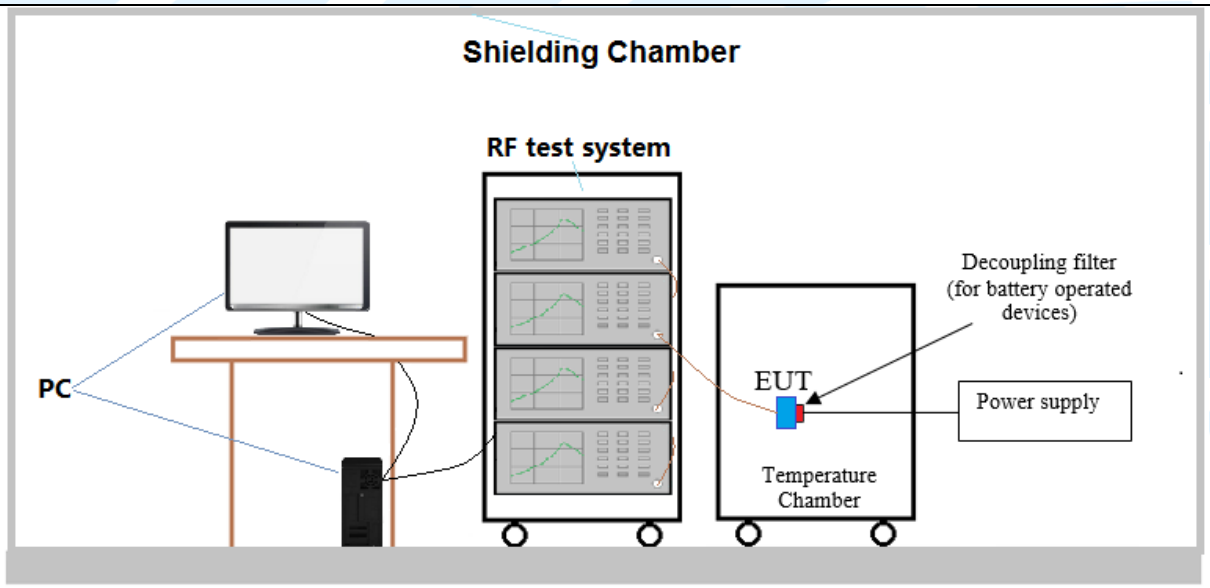
Radiated Emissions Above 1GHz Test setup



4.2.2 For Conducted RF test setup



Normal Environment



Extreme Environment

4.3 TEST CHANNELS

Band	Test Frequency ID	Bandwidth (MHz)	Number [UL]	Frequency of Uplink (MHz)
LTE Band 8 TX: 897.5-900.5MHz	Low Range	1.4	21632	898.2
	Middle Range	1.4/3	21640	899
	High Range	1.4	21648	899.8

4.4 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. Only the worst case data were recorded in this test report.

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, X/Y/Z axis, and antenna ports.
The worst case was found when positioned as the table below.

Band	Mode	Antenna Port	Worst-case axis positioning
LTE Band 8	1TX	Chain 0	Z axis

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000MHz. The resolution is 1 MHz or greater for frequencies above 1000MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

4.5 PRE-SCAN

Pre-scan under all rate at lowest middle and highest channel, find the transmitter power as below.

LTE Band 8

LTE Band 8 Maximum Average Power (dBm)										
Modulation	RB		Test Channel			RB		Test Channel		
	Size	Offset	Low	Mid	High	Size	Offset	Low	Mid	High
	Channel Bandwidth: 1.4 MHz					Channel Bandwidth: 3 MHz				
QPSK	1	0	23.65	24.04	23.60	1	0	/	24.11	/
	1	3	23.85	23.97	23.92	1	8	/	24.20	/
	1	5	23.76	24.15	23.82	1	14	/	23.94	/
	6	0	22.86	22.94	22.66	15	0	/	22.98	/
16QAM	1	0	22.61	23.01	22.86	1	0	/	22.99	/
	1	3	22.98	23.05	22.80	1	8	/	22.98	/
	1	5	22.74	22.91	22.81	1	14	/	23.28	/
	6	0	21.85	21.86	21.58	15	0	/	22.09	/

Verification Data:

LTE Band 8 Maximum Average Power (dBm)										
Modulation	RB		Test Channel			RB		Test Channel		
	Size	Offset	Low	Mid	High	Size	Offset	Low	Mid	High
	Channel Bandwidth: 1.4 MHz					Channel Bandwidth: 3 MHz				
QPSK	1	0	23.63	23.98	23.50	1	0	/	24.09	/
	1	3	23.82	23.86	23.79	1	8	/	24.09	/
	1	5	23.73	24.06	23.76	1	14	/	23.91	/
	6	0	22.78	22.83	22.53	15	0	/	22.90	/
16QAM	1	0	22.55	22.88	22.81	1	0	/	22.93	/
	1	3	22.95	22.94	22.66	1	8	/	22.90	/
	1	5	22.59	22.89	22.80	1	14	/	23.15	/
	6	0	21.83	21.74	21.56	15	0	/	22.05	/

Pre-scan all bandwidth and RB, find worse case mode are chosen to the report, the LTE worse case mode applicability and tested channel detail as below:

Item	Band	Bandwidth(MHz)		Modulation			RB			Test Channel		
		1.4	3	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
ERP/EIRP	8	☒	☒	☒	☒	☐	☒	☐	☐	☒	☒	☒
Conducted output power	8	☒	☒	☒	☒	☐	☒	☒	☒	☒	☒	☒
99%&26dB Bandwidth	8	☒	☒	☒	☒	☐	☐	☐	☒	☒	☒	☒
peak-to-average ratio	8	☒	☒	☒	☒	☐	☒	☐	☒	☒	☒	☒
Band Edge at antenna terminals	8	☒	☒	☒	☒	☐	☒	☐	☒	☒	☒	☒
Spurious emissions at antenna terminals	8	☒	☒	☒	☒	☐	☒	☐	☐	☒	☒	☒
Field strength of spurious radiation	8	☒	☒	☒	☐	☐	☒	☐	☐	☒	☒	☒
Frequency stability	8	☐	☒	☒	☐	☐	☐	☐	☒	☐	☒	☐

Remark:
The mark "☒" means is chosen for testing; The mark "☐" means is not chosen for testing;
The mark "-" means is not supported bandwidth

5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

5.1 REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part 27	Miscellaneous Wireless Communications Services

5.2 ERP

Test Requirement: FCC 47 CFR Part 2.1046(a)
LTE Band 8 : FCC 47 CFR Part 27.1507(a)(3)

Test Method: KDB 971168 D01v03r01 Section 5.6 & ANSI C63.26-2015

Limit:

FCC 47 CFR Part 27.1507(a)(3):
Mobile, control and auxiliary test stations. Mobile, control and auxiliary test stations must not exceed 10 watts ERP.

Test Procedure:

$$\textbf{ERP or EIRP} = P_{Meas} + G_T - L_C$$

where:

ERP or EIRP = effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);

P_{Meas} = measured transmitter output power or PSD, in dBm or dBW;

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

1) L_C = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

Test Setup: Refer to section 4.2.1 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

Test Data: See table below

LTE Band 8

LTE Band 8 Maximum EIRP (dBm)					
Channel	**QPSK; RB:1**	**16QAM; RB:1**	**64QAM; RB:1**	**Limit (dBm)**	**Result**
Channel Bandwidth: 1.4MHz					
Lowest	23.85	22.98	/	40	Pass
Middle	24.15	23.05	/	40	Pass
Highest	23.92	22.86	/	40	Pass
Channel Bandwidth: 3MHz					
Middle	24.20	23.28	/	40	Pass

5.3 CONDUCTED OUTPUT POWER

Test Requirement: FCC 47 CFR Part 2.1046(a)
LTE Band 8: FCC 47 CFR Part 27.1507(a)(3)

Test Method: KDB 971168 D01v03r01 & ANSI C63.26-2015

Limit:

FCC 47 CFR Part 27.1507(a)(3):
Mobile, control and auxiliary test stations. Mobile, control and auxiliary test stations must not exceed 10 watts ERP.

Test Procedure:
The EUT was set up for the maximum power with LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

Test Data: The full result refer to section 4.5 for details.

5.4 PEAK-TO-AVERAGE RATIO

Test Requirement: **LTE Band 8:** FCC 47 CFR Part 27.1507(d)

Test Method: KDB 971168 D01v03r01 Section 5.7

Limit: PAR limit. The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB.

Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer.

a) Set resolution/measurement bandwidth ≥ signal's occupied bandwidth
b) Set the number of counts to a value that stabilizes the measured CCDF curve
c) Record the maximum PAPR level associated with a probability of 0.1 %

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

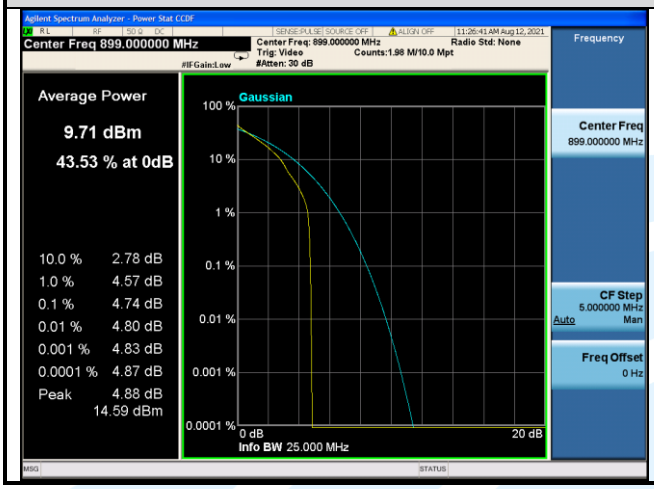
Test Results: Pass

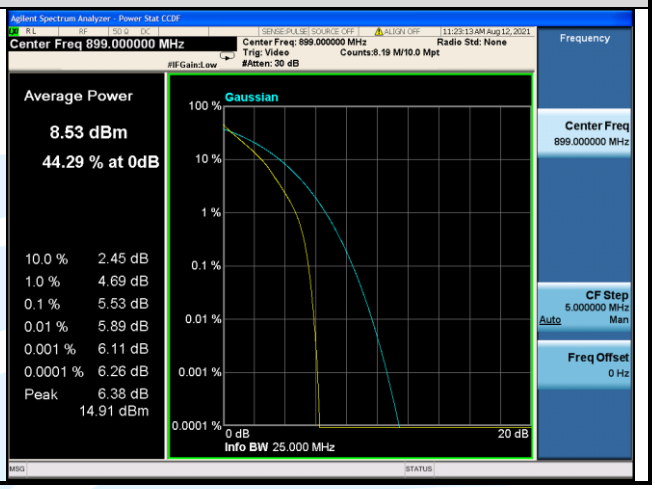
Test Data: See table below

LTE Band 8

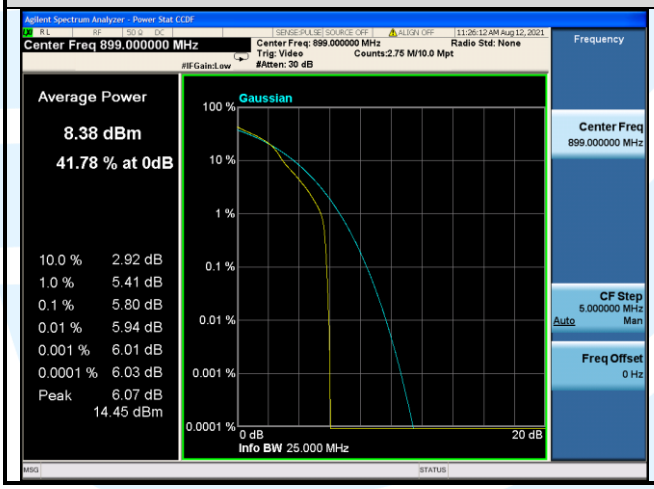
LTE Band 8 Peak-to-average ratio (dB)						
Channel	RB Configuration	Channel Bandwidth: 3 MHz			Limit (dB)	Result
		QPSK	16QAM	64QAM		
Middle	1 RB	4.74	5.80	/	13	Pass
	Full RB	5.53	6.32	/	13	Pass

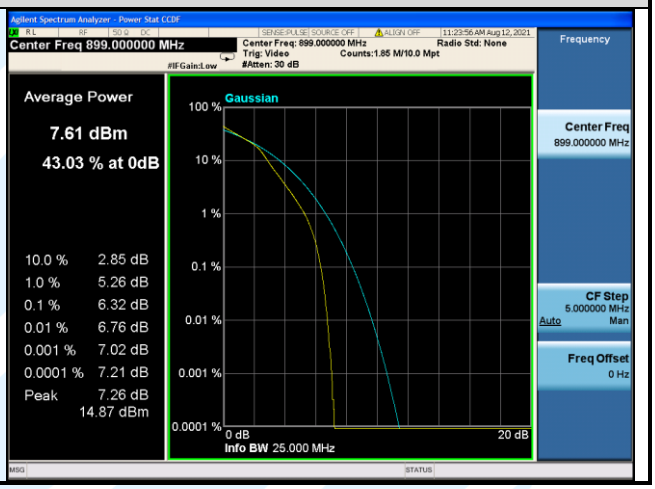
LTE Band 8 / 3 MHz / QPSK	
1 RB	Full RB
Middle Channel	





LTE Band 8 / 3 MHz / 16QAM	
1 RB	Full RB
Middle Channel	





5.5 99%&26DB BANDWIDTH

Test Requirement: FCC 47 CFR Part 2.1049(h)

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01 Section 4

Limit: No Limit, for reporting purposes only.

Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The 99% and -26dB bandwidths was also measured and recorded.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

Test Data: See table below

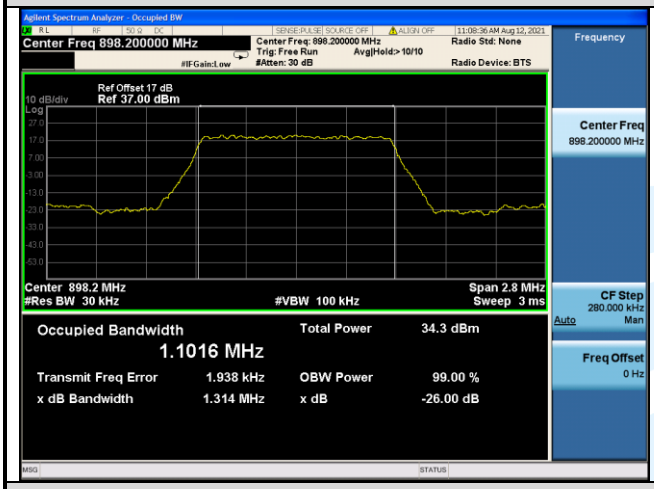
LTE Band 8

LTE Band 8								
Channel	RB Configuration		26 dB BW (MHz)			99% BW (MHz)		
	Size	Offset	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
Channel Bandwidth: 1.4 MHz								
Lowest	6	0	1.314	1.302	/	1.1016	1.0985	/
Middle	6	0	1.306	1.290	/	1.1011	1.1009	/
Highest	6	0	1.282	1.306	/	1.1056	1.1050	/
Channel Bandwidth: 3 MHz								
Middle	15	0	2.999	2.991	/	2.7185	2.7043	/

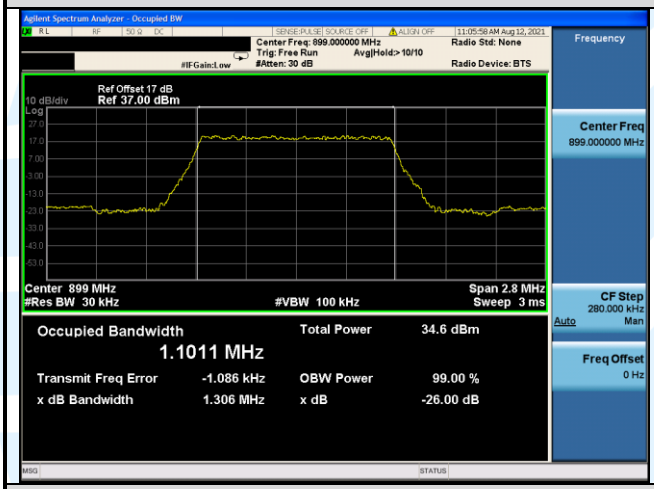
LTE Band 8_ Channel Bandwidth: 1.4 MHz

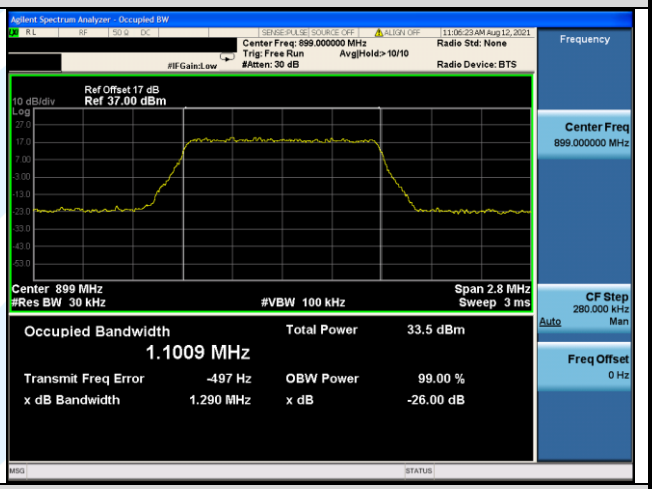
QPSK	16QAM

Lowest Channel

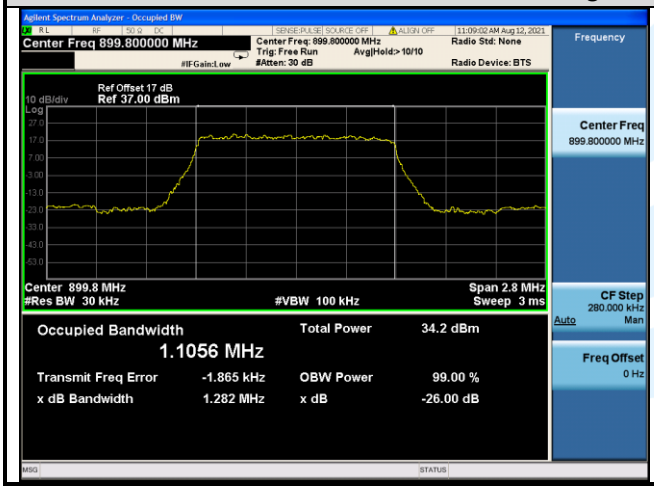


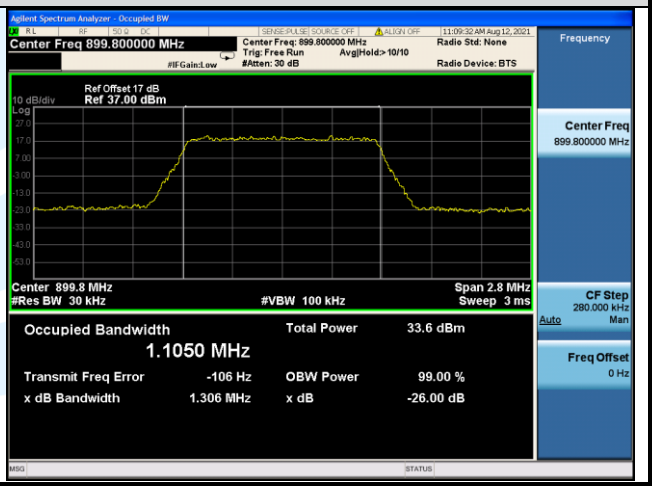
Middle Channel

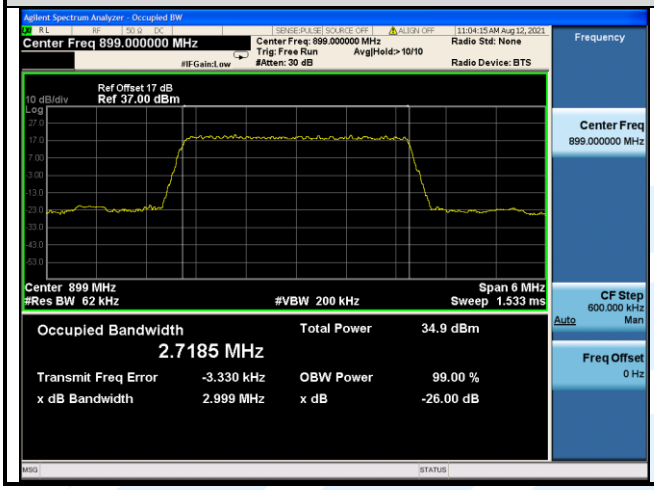
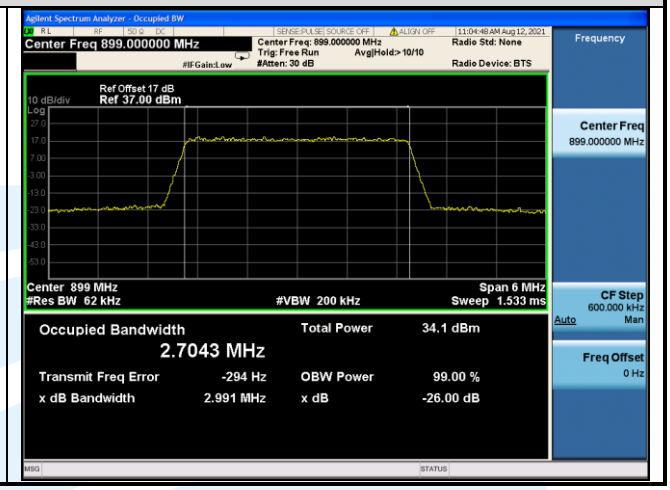




Highest Channel





LTE Band 8_ Channel Bandwidth: 3 MHz	
QPSK	16QAM
Middle Channel	
	

5.6 BAND EDGE AT ANTENNA TERMINALS

Test Requirement: **LTE Band 8:** FCC 47 CFR Part 27.1509(a)

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Limit:

FCC 47 CFR Part 27.1509(a):

The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) in watts by at least the following amounts:
(a) For 900 MHz broadband operations in 897.5-900.5 MHz band by at least 43 + 10 log (P) dB.

Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer.
For each band edge measurement:

1) Set the spectrum analyzer span to include the block edge frequency.
2) Set a marker to point the corresponding band edge frequency in each test case.
3) Set display line at -13 dBm
4) Set resolution bandwidth to at least 1% of emission bandwidth.
5) Set spectrum analyzer with RMS detector.
6) Record the max trace plot into the test report

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

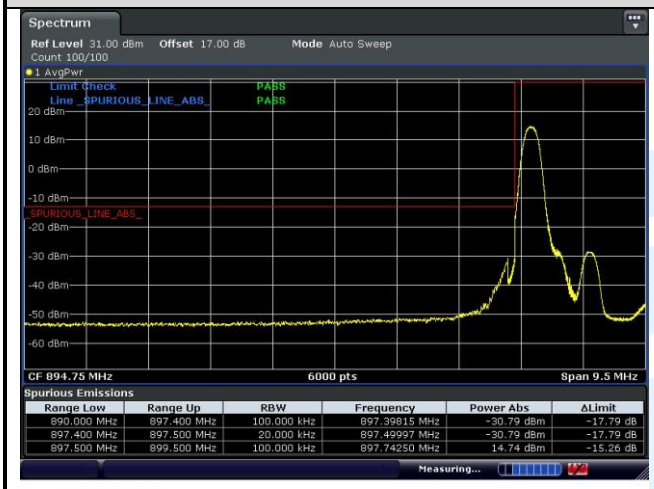
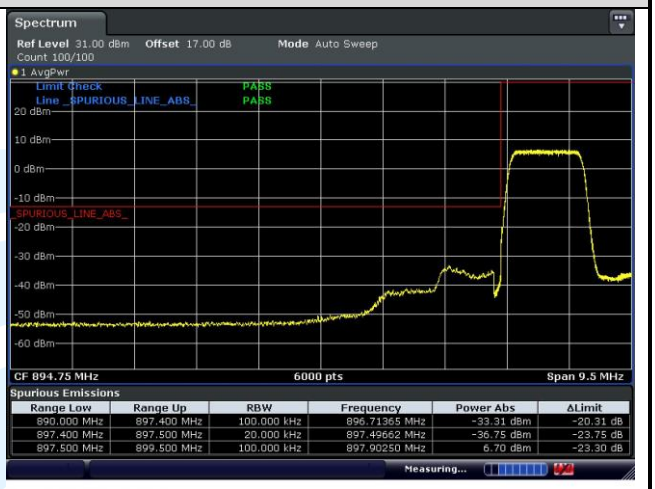
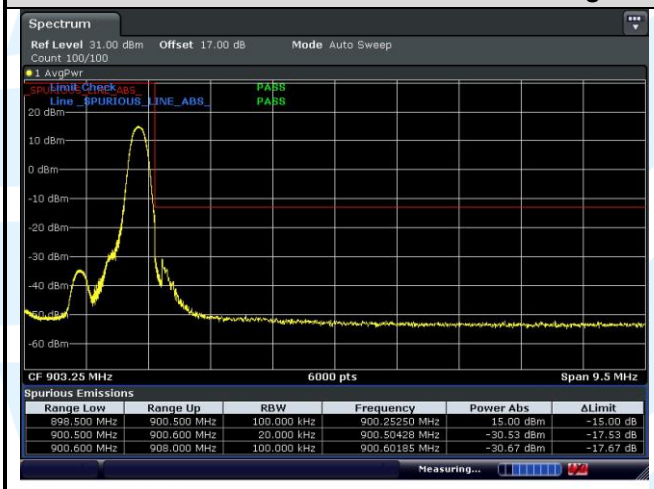
Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

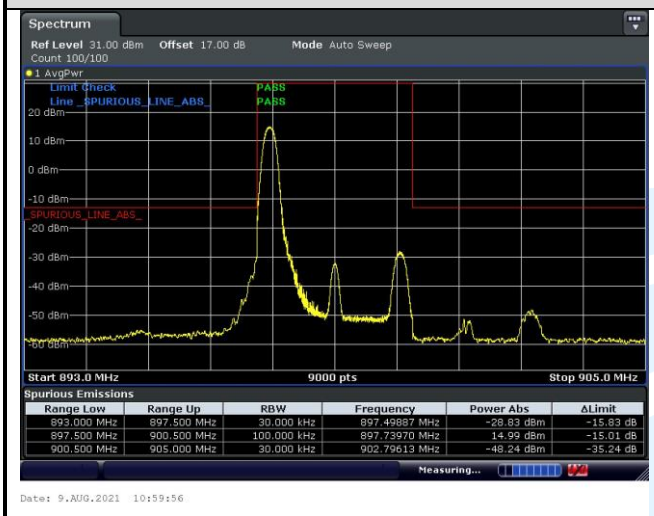
Test Mode: Link mode

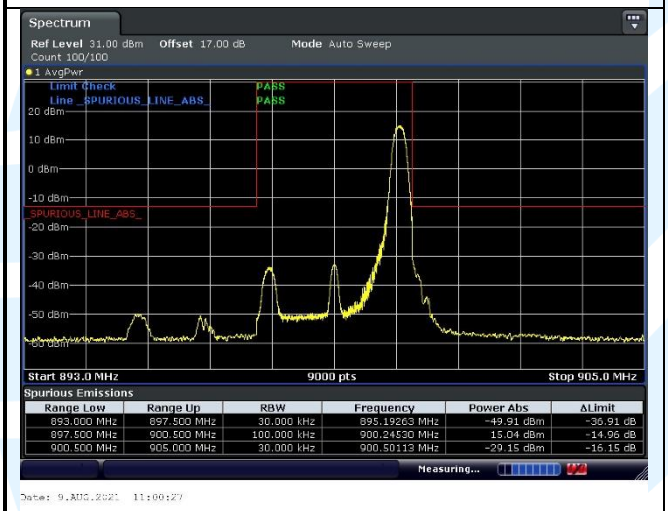
Test Results: Pass

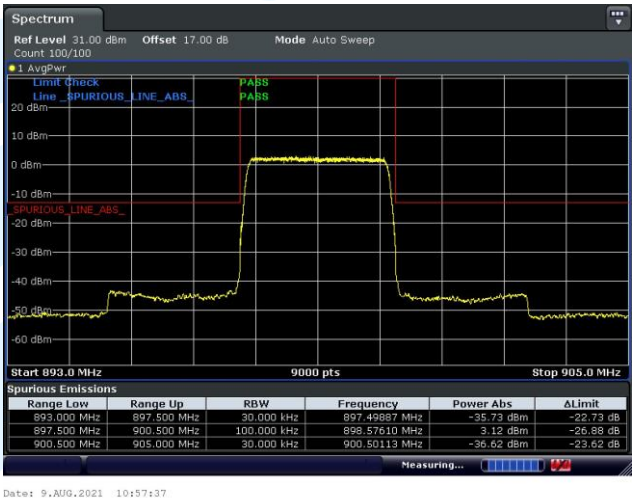
LTE Band 8

LTE Band 8 / 1.4 MHz / QPSK	
1 RB	Full RB
Lowest Channel	
	
Highest Channel	
	

LTE Band 8 / 3 MHz / QPSK	
1 RB	Full RB
Middle Channel	



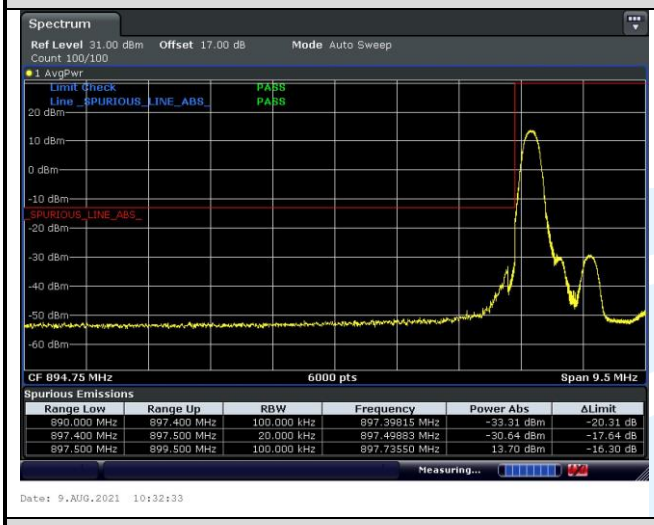


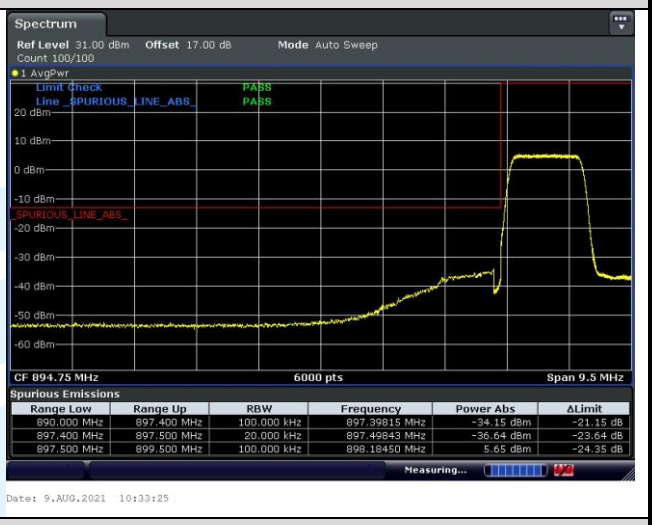


LTE Band 8 / 1.4 MHz / 16QAM

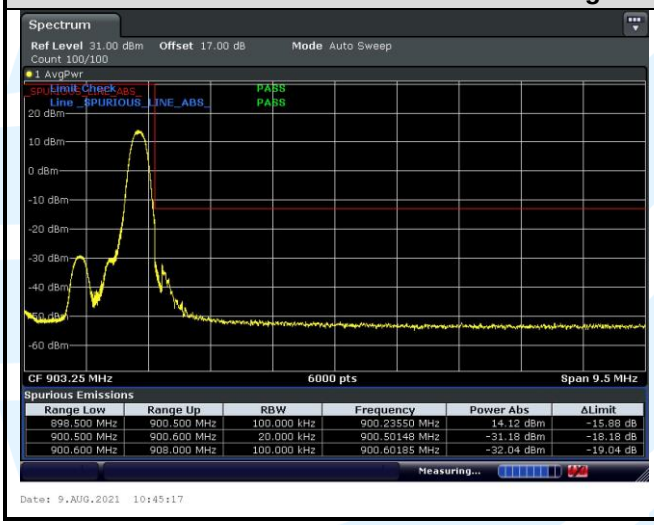
1 RB	Full RB

Lowest Channel

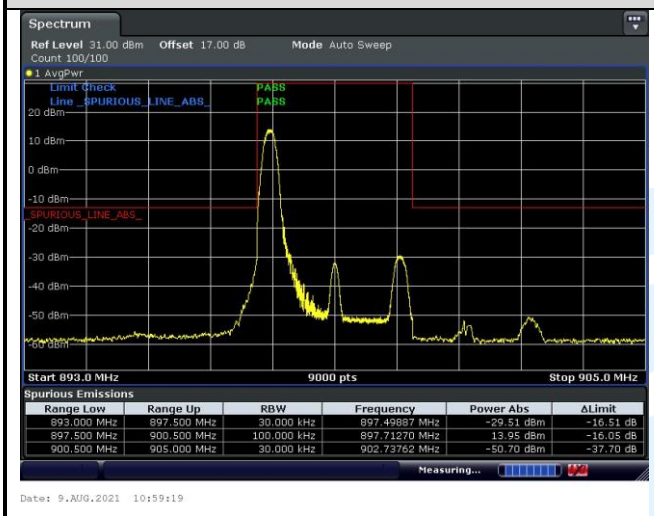


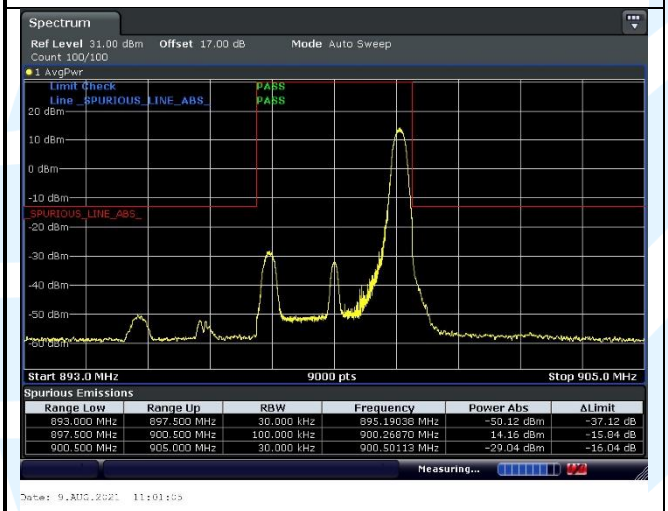


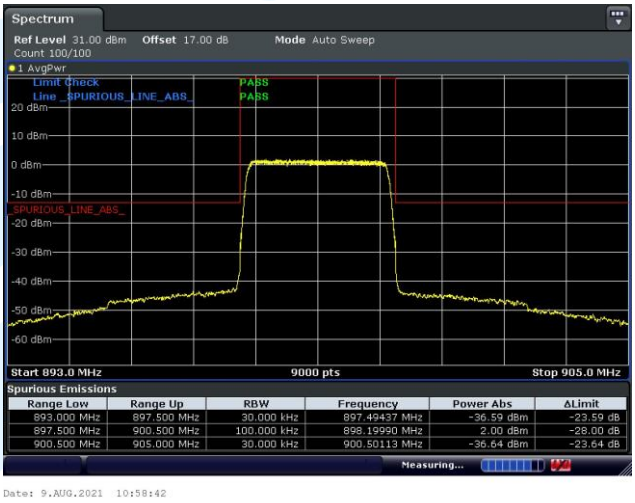
Highest Channel



LTE Band 8 / 3 MHz / 16QAM	
1 RB	Full RB
Middle Channel	







5.7 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Requirement: **LTE Band 8:** FCC 47 CFR Part 27.1509(a)

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Limit:

FCC 47 CFR Part 27.1509(a):

The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) in watts by at least the following amounts:
(a) For 900 MHz broadband operations in 897.5-900.5 MHz band by at least 43 + 10 log (P) dB.

Test Procedure:

The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range. b. Measuring frequency range is from 30 MHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

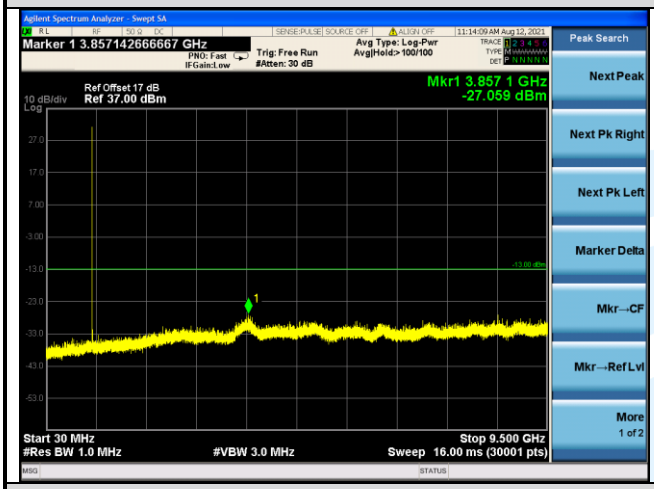
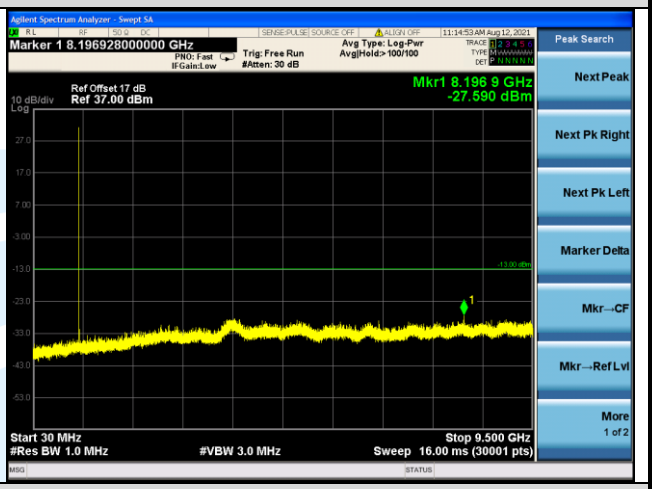
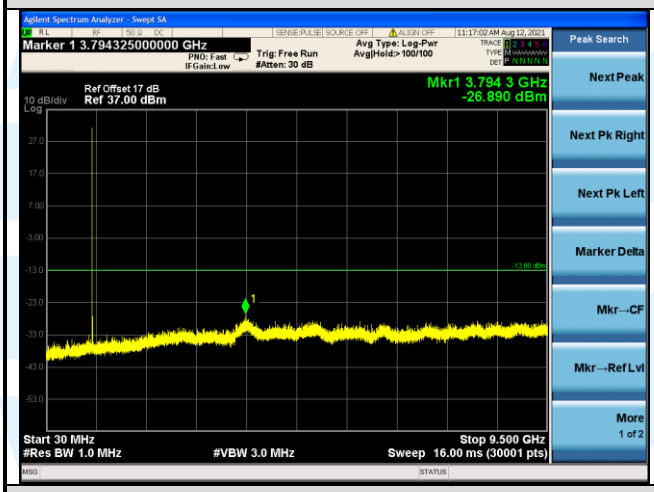
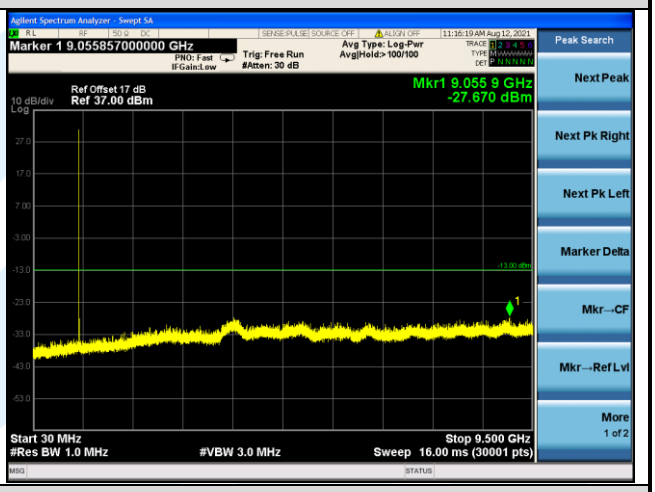
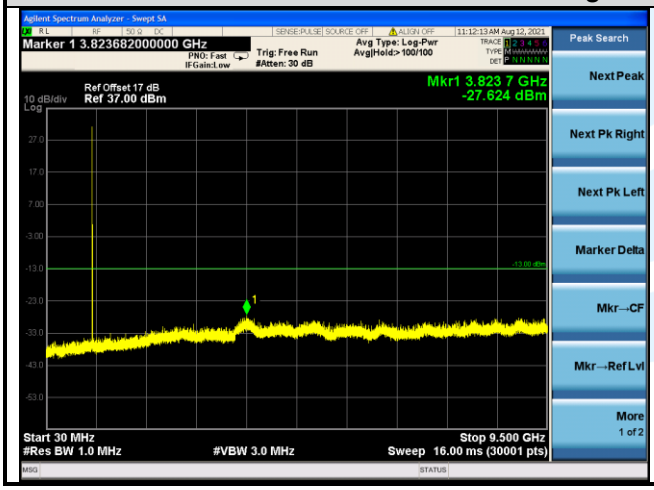
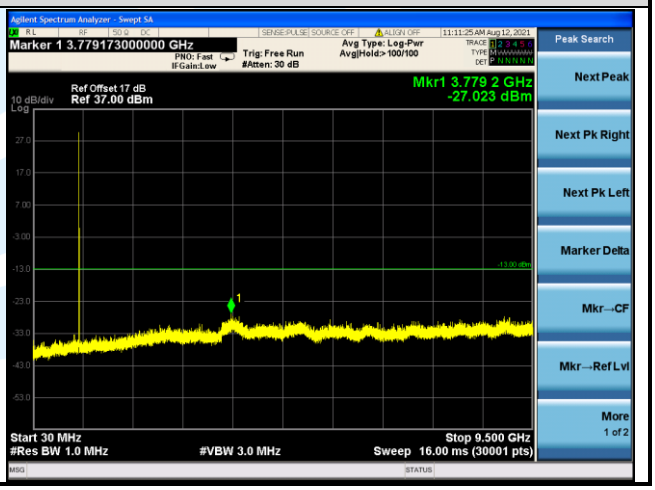
Test Setup: Refer to section 4.2.2 for details.

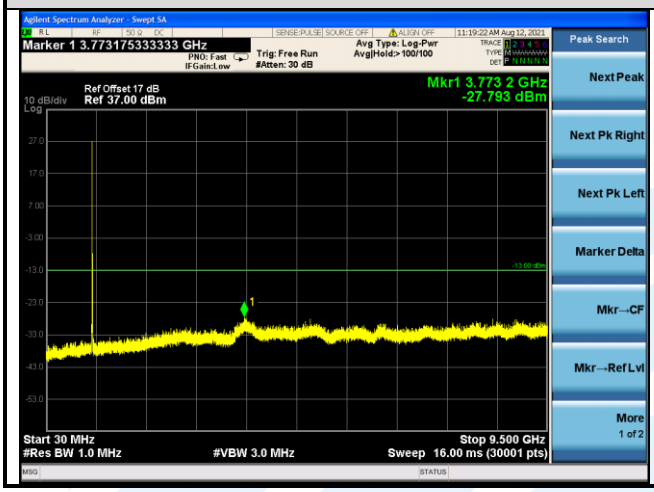
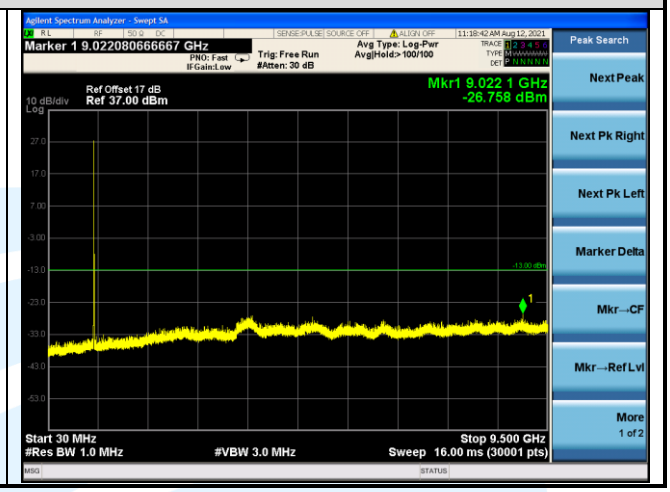
Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

LTE Band 8

LTE Band 8_ Channel Bandwidth: 1.4 MHz	
QPSK	16QAM
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

LTE Band 8_ Channel Bandwidth: 3 MHz	
QPSK	16QAM
Middle Channel	
	

Remark:

1) All the above radiation data, the fundamental frequency is not marked, it may exceed the limit, please ignore it.

5.8 FIELD STRENGTH OF SPURIOUS RADIATION

Test Requirement: **LTE Band 8:** FCC 47 CFR Part 27.1509(a)

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009 MHz-30 MHz	Peak	10 kHz	30 KHz	Peak
30 MHz-1 GHz	Quasi-peak	100 kHz	300 KHz	Peak
Above 1 GHz	Peak	1 MHz	3 MHz	Peak

Limits:

FCC 47 CFR Part 27.1509(a):

The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) in watts by at least the following amounts:

(a) For 900 MHz broadband operations in 897.5-900.5 MHz band by at least 43 + 10 log (P) dB.

Test Setup: Refer to section 4.2.1 for details.

Test Procedures: KDB 971168 D01v03r01 Section 7

Equipment Used: Refer to section 3 for details.

Test Result: Pass

The measurement data as follows:

LTE Band 8

LTE Band 8_ 1.4 MHz_ QPSK							
No.	Frequency (MHz)	SA Reading (dBm)	Correction factor (dB/m)	EIRP Result (dBm)	Limit (dBm)	Margin (dB)	Ant. Pol.
Lowest Channel							
1	488.326	-89.43	36.17	-53.26	-13.00	-40.26	Horizontal
2	693.910	-89.33	40.62	-48.71	-13.00	-35.71	Horizontal
3	932.141	-88.40	43.12	-45.28	-13.00	-32.28	Horizontal
4	1796.400	-67.81	0.94	-66.87	-13.00	-53.87	Horizontal
5	2694.600	-63.68	3.38	-60.30	-13.00	-47.30	Horizontal
6	594.514	-89.38	37.82	-51.56	-13.00	-38.56	Vertical
7	708.694	-89.23	39.57	-49.66	-13.00	-36.66	Vertical
8	952.000	-87.08	42.19	-44.89	-13.00	-31.89	Vertical
9	1796.400	-66.40	0.27	-66.13	-13.00	-53.13	Vertical
10	2694.600	-62.69	2.82	-59.87	-13.00	-46.87	Vertical
Middle Channel							
1	689.051	-89.32	40.52	-48.80	-13.00	-35.80	Horizontal
2	787.475	-89.16	41.17	-47.99	-13.00	-34.99	Horizontal
3	919.132	-87.44	42.77	-44.67	-13.00	-31.67	Horizontal
4	1798.000	-65.63	0.95	-64.68	-13.00	-51.68	Horizontal
5	2697.000	-64.13	3.38	-60.75	-13.00	-47.75	Horizontal
6	471.467	-88.12	36.03	-52.09	-13.00	-39.09	Vertical
7	708.694	-89.79	39.57	-50.22	-13.00	-37.22	Vertical
8	938.714	-88.79	42.24	-46.55	-13.00	-33.55	Vertical
9	1798.000	-65.74	0.29	-65.45	-13.00	-52.45	Vertical
10	2697.000	-63.32	2.83	-60.49	-13.00	-47.49	Vertical
Highest Channel							
1	669.952	-88.82	40.04	-48.78	-13.00	-35.78	Horizontal
2	815.635	-89.02	41.35	-47.67	-13.00	-34.67	Horizontal
3	938.714	-88.43	43.33	-45.10	-13.00	-32.10	Horizontal
4	1799.600	-65.35	0.96	-64.39	-13.00	-51.39	Horizontal
5	2699.400	-66.13	3.40	-62.73	-13.00	-49.73	Horizontal
6	439.473	-90.52	35.25	-55.27	-13.00	-42.27	Vertical
7	573.988	-90.27	38.38	-51.89	-13.00	-38.89	Vertical
8	798.620	-88.66	40.59	-48.07	-13.00	-35.07	Vertical
9	1799.600	-65.53	0.30	-65.23	-13.00	-52.23	Vertical
10	2699.400	-63.50	2.84	-60.66	-13.00	-47.66	Vertical

LTE Band 8_ 3 MHz_ QPSK							
No.	Frequency (MHz)	SA Reading (dBm)	Correction factor (dB/m)	EIRP Result (dBm)	Limit (dBm)	Margin (dB)	Ant. Pol.
Middle Channel							
1	502.247	-87.95	36.35	-51.60	-13.00	-38.60	Horizontal
2	703.731	-89.74	40.67	-49.07	-13.00	-36.07	Horizontal
3	938.714	-88.13	43.33	-44.80	-13.00	-31.80	Horizontal
4	1798.000	-67.07	0.95	-66.12	-13.00	-53.12	Horizontal
5	2697.000	-64.63	3.38	-61.25	-13.00	-48.25	Horizontal
6	569.969	-90.36	38.29	-52.07	-13.00	-39.07	Vertical
7	708.694	-89.59	39.57	-50.02	-13.00	-37.02	Vertical
8	809.924	-88.58	40.87	-47.71	-13.00	-34.71	Vertical
9	1798.000	-65.84	0.29	-65.55	-13.00	-52.55	Vertical
10	2697.000	-64.04	2.83	-61.21	-13.00	-48.21	Vertical

Remark:

1. Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result – Limit

5.9 FREQUENCY STABILITY

Test Requirement: FCC 47 CFR Part 2.1055 &

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Limits:

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Setup: Refer to section 4.2.2 for details.

Test Procedures:

1) Use CMW 500 or CMU 200 with Frequency Error measurement capability.
   a) Temp. = −30° to + 50°C
   b) Voltage =low voltage, 3.2 Vdc, Normal, 3.8 Vdc and High voltage, 4.5 Vdc.
2) Frequency Stability vs Temperature:

The EUT is place inside a temperature chamber. The temperature is set to 20ºC and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50ºC is reached.

3) Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

Equipment Used: Refer to section 3 for details.

Test Result: Pass

LTE Band 8

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Pass/ Fail
LTE Band 8 / 3MHz / Full RB							
QPSK	21640 / 899.0	VL	TN	-0.01	0.0000	N/A	Pass
		VN		-0.51	-0.0003		Pass
		VH		-0.43	-0.0002		Pass
		VN	50	-0.64	-0.0003		Pass
			40	-0.29	-0.0002		Pass
			30	-0.04	0.0000		Pass
			20	-0.37	-0.0002		Pass
			10	-0.23	-0.0001		Pass
			0	-0.16	-0.0001		Pass
			-10	0.19	0.0001		Pass
			-20	0.63	0.0003		Pass
			-30	0.78	0.0004		Pass

APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

*** End of Report ***

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.