

Report No.: FG281920-08C



FCC RADIO TEST REPORT

FCC ID : B94HNI57CPS

Equipment : Notebook Computer

Brand Name : HP

Model Name : **HSN-I57C** : HP Inc. **Applicant**

1501 Page Mill Road, Palo Alto CA 94304 USA

Standard : FCC 47 CFR Part 2, 90(R)

The product was received on Sep. 04, 2023 and testing was performed from Sep. 29, 2023 to Oct. 06, 2023. We, Sporton International Inc. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA-603-E and has been in compliance with the applicable technical standards.

The test results in this partial report apply exclusively to the tested model / sample. Without written approval from Sporton International Inc. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Approved by: Louis Wu

Louis Win

Sporton International Inc. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)

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History of this test report

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Report No.	Version	Description	Issue Date
FG281920-08C	01	Initial issue of report	Oct. 17, 2023
FG281920-08C	02	Revise Product Feature of Equipment Under Test This report is an updated version, replacing the report issued on Oct. 17, 2023.	Oct. 20, 2023

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Summary of Test Result

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Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.2	§2.1046	Conducted Output Power	Reporting only	-
3.2	§90.542 (a)(7)	Effective Radiated Power	Pass	-
-	-	Peak-to-Average Ratio	-	See Note
-	§2.1049	Occupied Bandwidth	-	See Note
-	§2.1053 §90.543 (e)(2)	Conducted Band Edge Measurement	-	See Note
-	§2.1051 §90.210 (n)	Emission Mask	-	See Note
-	- §2.1053 §90.543 (e)(3) Conducted Spurious Emission		-	See Note
-	§2.1055 Frequency Stability - §90.539 (e) Temperature & Voltage		-	See Note
4.2	§2.1053 §90.543 (e)(3) §90.543 (f)	Radiated Spurious Emission	Pass	11.90 dB under the limit at 1577.00 MHz

Note:

- For host device, Radiated Spurious Emission and Effective Radiated Power are verified and complies with the limit in this test report.
- For host device, the Conducted Output Power is no difference after compared to module (Model: FM101-GL)

Conformity Assessment Condition:

- 1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
- 2. The measurement uncertainty please refer to each test result in the section "Measurement Uncertainty".

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Sheng Kuo Report Producer: Lucy Wu

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1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature						
General Specs	WCDMA/LTE, Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n/ac/ax, Wi-Fi 5GHz 802.11a/n/ac/ax, and Wi-Fi 6GHz 802.11ax					
Integrated WLAN Module	Brand Name: Realtek Model Name: RTL8852CE FCC ID: TX2-RTL8852CE					
Integrated WLAN Module	Brand Name: Intel Model Name: AX211NGW FCC ID: PD9AX211NG					
Antenna Type	WWAN: PIFA Antenna WLAN: <main>: PIFA Antenna <aux.>: PIFA Antenna Bluetooth: PIFA Antenna</aux.></main>					

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WWAN Antenna Information							
Antenna 5	Dent manual an	6036B0327801	Peak gain (dBi)	LTE Band 14 : -1.04			
(Notebook Mode)	Part number	(81EABL15.G79)	Туре	PIFA			
Antenna 5	Dort number	6036B0327801	Peak gain (dBi)	LTE Band 14 : 1.78			
(Tablet Mode)	Part number	(81EABL15.G79)	Туре	PIFA			

Remark: The EUT's information above is declared by manufacturer. Please refer to Disclaimer in report summary.

1.2 Modification of EUT

No modifications made to the EUT during the testing.

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1.3 Testing Site

Test Site	Sporton International Inc. EMC & Wireless Communications Laboratory		
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978		
Test Site No.	Sporton Site No.		
Test Site No.	TH03-HY		
Test Engineer	Cotty Hsu		
Temperature (°C)	22.2~23.1		
Relative Humidity (%)	51~56		

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Test Site	Sporton International Inc. Wensan Laboratory			
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855			
Test Site No.	Sporton Site No.			
rest Site No.	03CH21-HY (TAF Code: 3786)			
Test Engineer	Jack Cheng, Ray Lung and Sky Chang			
Temperature (°C)	18~26			
Relative Humidity (%)	50~70			
Remark	The Radiated Spurious Emission test item subcontracted to Sporton International Inc. Wensan Laboratory.			

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC Designation No.: TW1190 and TW3786

1.4 Applied Standards

According to the specifications declared by the manufacturer, the EUT must comply with the requirements of the following standards:

- ANSI C63.26-2015
- FCC 47 CFR Part 2, Part 90(R)
- ANSI / TIA-603-E
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01
- FCC KDB 414788 D01 Radiated Test Site v01r01

Remark:

- 1. All the test items were validated and recorded in accordance with the standards without any modification during the testing.
- **2.** The TAF code is not including all the FCC KDB listed without accreditation.

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2 Test Configuration of Equipment Under Test

2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

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For radiated measurement, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in Tablet Type (three orthogonal axis (X: flat, Y: portrait, Z: landscape)) and Notebook Type, and adjusting the measurement antenna orientation, following C63.26 exploratory test procedures and only the worst case emissions were reported in this report.

Modulation Type	Modulation
А	QPSK
В	16QAM

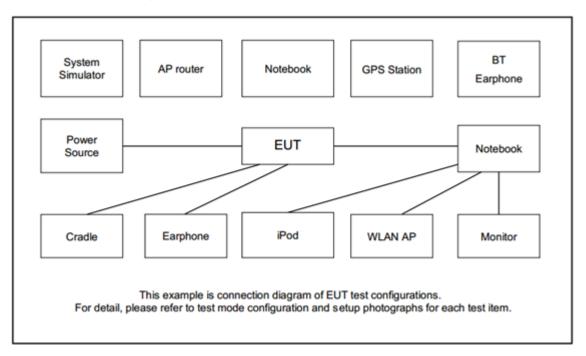
Test Item Modulation Type		Bandwidth	RB Size	Channel
Conducted Power	A, B	All	1, Half, Full	L, M, H
EIRP	A, B	All	1, Half, Full	L, M, H
RSE	А	10 MHz or less	1RB	L, M, H

Remark:

- Evaluated all the transmitter signal and reporting worst-case configuration among all modulation types.
- 2. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst-case emissions are reported.
- 3. During the RSE preliminary test, the standalone mode and charging modes were verified. It is determined that the adapter mode is the worst case for the official test.

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2.2 Connection Diagram of Test System



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2.3 Support Unit used in test configuration and system

Item Equipment		Equipment Brand Name Model No. F		FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8821C	N/A	N/A	Unshielded, 1.8 m
2.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A

2.4 Frequency List of Low/Middle/High Channels

LTE Band 14 Channel and Frequency List								
BW [MHz] Channel/Frequency(MHz) Lowest Middle Highest								
10	Channel	-	23330	-				
10	Frequency	-	793	-				
E	Channel	23305	23330	23355				
5	Frequency	790.5	793	795.5				

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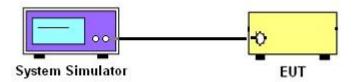
Conducted Test Items 3

3.1 Measuring Instruments

See list of measuring instruments of this test report.

3.1.1 Test Setup

3.1.2 Conducted Output Power



3.1.3 Test Result of Conducted Test

Please refer to Appendix A.

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3.2 Conducted Output Power Measurement and ERP

3.2.1 Description of the Conducted Output Power Measurement and ERP Measurement

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals shall be reported.

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The ERP of mobile transmitters must not exceed 3 Watts for LTE Band 14.

According to KDB 412172 D01 Power Approach,

 $EIRP = P_T + G_T - L_C$, ERP = EIRP - 2.15, where

 P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.2.2 Test Procedures

- 1. The transmitter output port was connected to base station.
- 2. Set EUT at maximum power through base station.
- 3. Select lowest, middle, and highest channels for each band and different modulation.
- 4. Measure and record the power level from the system simulator.

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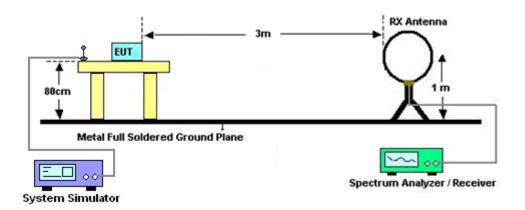
4 Radiated Test Items

4.1 Measuring Instruments

See list of measuring instruments of this test report.

4.1.1 Test Setup

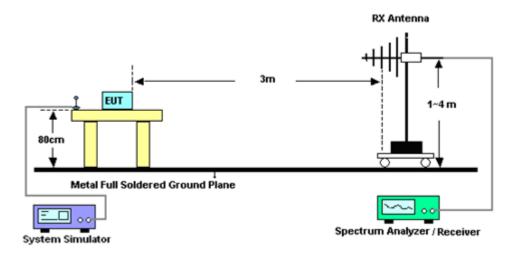
For radiated test below 30MHz



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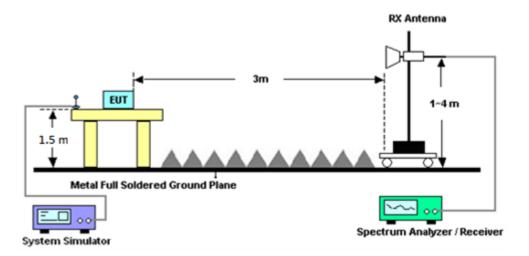
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For radiated test from 30MHz to 1GHz



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For radiated test above 1GHz



4.1.2 Test Result of Radiated Test

Please refer to Appendix B.

Note:

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is adequate comparison measurement of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

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4.2 Radiated Spurious Emission

4.2.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI / TIA-603-E. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

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For operations in the 758-775 MHz and 788-805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.2.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 7 and ANSI C63.26-2015 section 5.5.4 Radiated measurement using the field strength method.

- 1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
- 2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
- 3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
- 4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
- 5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, Sweep = 500ms, Taking the record of maximum spurious emission.
- To convert spectrum reading E(dBuV/m) to EIRP(dBm)
 EIRP(dBm) = Level (dBuV/m) + 20log(d) -104.77, where d is the distance at which filed strength limit is specified in the rules
- 7. Field Strength Level (dBm) = Spectrum Reading (dBm) + Antenna Factor + Cable Loss + Read Level Preamp Factor.
- 8. ERP (dBm) = EIRP (dBm) 2.15
- 9. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
- 10. The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)

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5 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Radio Communication Analyzer	Anritsu	MT8821C	6262025353	LTE FDD/TDD LTE-2CC DLCA/ULCA	Oct. 13, 2022	Sep. 29, 2023~ Oct. 06, 2023	Oct. 12, 2023	Conducted (TH03-HY)
Coupler	Warison	20dB 25W SMA Directional Coupler	#B	1-18GHz	Jan. 06, 2023	Sep. 29, 2023~ Oct. 06, 2023	Jan. 05, 2024	Conducted (TH03-HY)
LOOP Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Sep. 12, 2023	Oct. 05, 2023~ Oct. 06, 2023	Sep. 11, 2024	Radiation (03CH21-HY)
Bilog Antenna	TESEQ	CBL 6111D&00802 N1D01N-06	55606 & 08	30MHz~1GHz	Oct. 22, 2022	Oct. 05, 2023~ Oct. 06, 2023	Oct. 21, 2023	Radiation (03CH21-HY)
Double Ridged Guide Horn Antenna	RFSPIN	DRH18-E	LE2C03A18 EN	1GHz~18GHz	Jul. 12, 2023	Oct. 05, 2023~ Oct. 06, 2023	Jul. 11, 2024	Radiation (03CH21-HY)
Amplifier	SONOMA	310N	421580	30MHz~1GHz	Jul. 15, 2023	Oct. 05, 2023~ Oct. 06, 2023	Jul. 14, 2024	Radiation (03CH21-HY)
Amplifier	EMEC	EM01G18GA	060876	1GHz~18GHz	Sep. 28, 2023	Oct. 05, 2023~ Oct. 06, 2023	Sep. 27, 2024	Radiation (03CH21-HY)
Spectrum Analyzer	Keysight	N9010B	MY62170358	10Hz~44GHz	Aug. 28, 2023	Oct. 05, 2023~ Oct. 06, 2023	Aug. 27, 2024	Radiation (03CH21-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	803951/2	9K~30M	Mar. 07, 2023	Oct. 05, 2023~ Oct. 06, 2023	Mar. 06, 2024	Radiation (03CH21-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	804397/2,80 4612/2,8046 14/2	30MHz~40GHz	Oct. 25, 2022	Oct. 05, 2023~ Oct. 06, 2023	Oct. 24, 2023	Radiation (03CH21-HY)
Hygrometer	TECPEL	DTM-303A	TP211568	N/A	Nov. 17, 2022	Oct. 05, 2023~ Oct. 06, 2023	Nov. 16, 2023	Radiation (03CH21-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Oct. 05, 2023~ Oct. 06, 2023	N/A	Radiation (03CH21-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Oct. 05, 2023~ Oct. 06, 2023	N/A	Radiation (03CH21-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Oct. 05, 2023~ Oct. 06, 2023	N/A	Radiation (03CH21-HY)
Software	Audix	E3 6.2009-8-24	RK-001053	N/A	N/A	Oct. 05, 2023~ Oct. 06, 2023	N/A	Radiation (03CH21-HY)

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6 Measurement Uncertainty

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.06 dB

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Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of	3.31 dB
Confidence of 95% (U = 2Uc(y))	3.31 UB

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Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power & ERP)

LTE Band 14 Maximum Average Power [dBm] (GT - LC = 1.78 dB)									
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	ERP (dBm)	ERP (W)	
10	1	0			24.01				
10	1	25			23.98				
10	1	49			23.90				
10	25	0	QPSK		23.55		23.64	0.2312	
10	25	12			23.52				
10	25	25			23.46				
10	50	0			23.50				
10	1	0		-	23.82	-			
10	1	25			23.71				
10	1	49			23.68				
10	25	0	16-QAM		22.59		23.45	0.2213	
10	25	12			22.50				
10	25	25			22.47				
10	50	0			22.46				
Limit		ERP < 3W			Result		Pa	ISS	

LTE Band 14 Maximum Average Power [dBm] (GT - LC = 1.78 dB)									
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	ERP (dBm)	ERP (W)	
5	1	0		23.84	23.91	23.90		0.2259	
5	1	12		23.82	23.89	23.82			
5	1	24		23.77	23.85	23.78			
5	12	0	QPSK	23.40	23.49	23.39	23.54		
5	12	7		23.38	23.48	23.47			
5	12	13		23.36	23.37	23.29			
5	25	0		23.44	23.45	23.44			
5	1	0		23.75	23.79	23.79		0.2198	
5	1	12		23.61	23.71	23.71			
5	1	24		23.52	23.61	23.61			
5	12	0	16-QAM	22.41	22.49	22.46	23.42		
5	12	7		22.45	22.49	22.44			
5	12	13		22.40	22.46	22.39			
5	25	0		22.30	22.38	22.29			
Limit		ERP < 3W			Result		Pa	ISS	

Appendix B. Test Results of Radiated Test

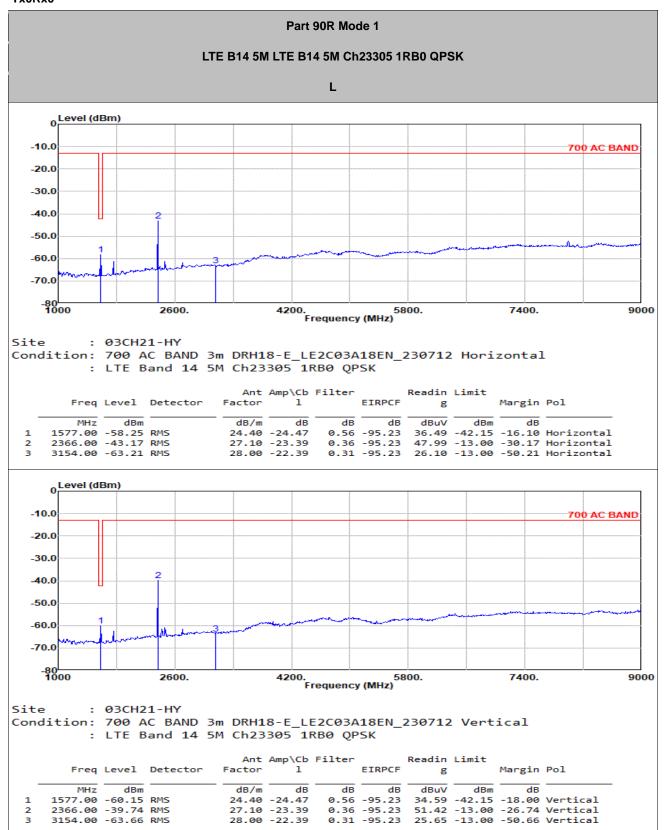
B1. Summary of each worse mode

Part	Mode	Ch	Freq (MHz)	Level (dBm)	Detector	Ant Factor (dB/m)	Amp\Cbl	Filter (dB)	EIRP CF (dB)	Reading (dBuV)	Limit (dBm)	Margin (dB)	Pol	Ant
Part 90R	1	M	1582.000	-54.68	RMS	24.42	-24.46	0.56	-95.23	40.03	-42.15	-12.53	Н	Tx0Rx0
Part 90R	2	М	1577.000	-54.05	RMS	24.40	-24.47	0.56	-95.23	40.69	-42.15	-11.90	Н	Tx0Rx0

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Tx0Rx0

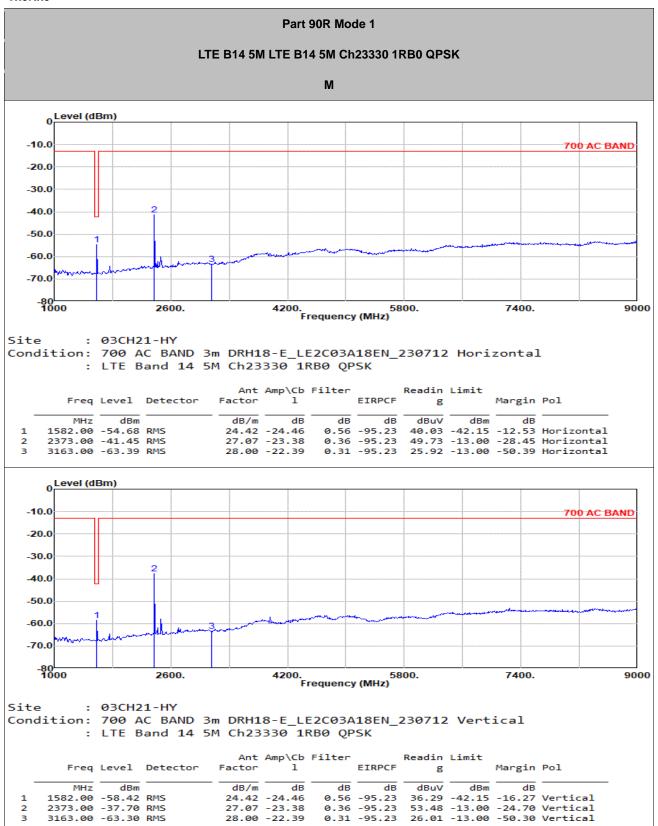


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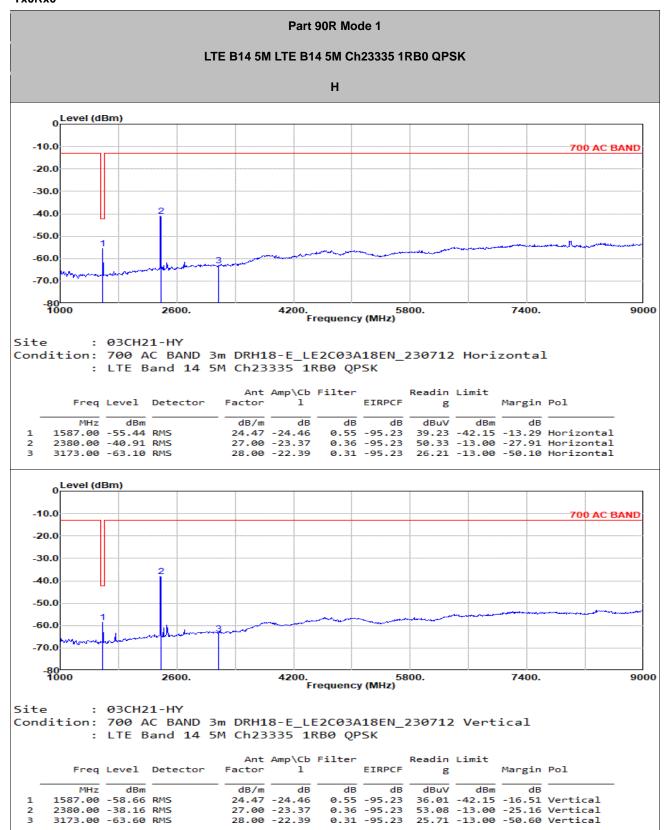
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Tx0Rx0



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Tx0Rx0

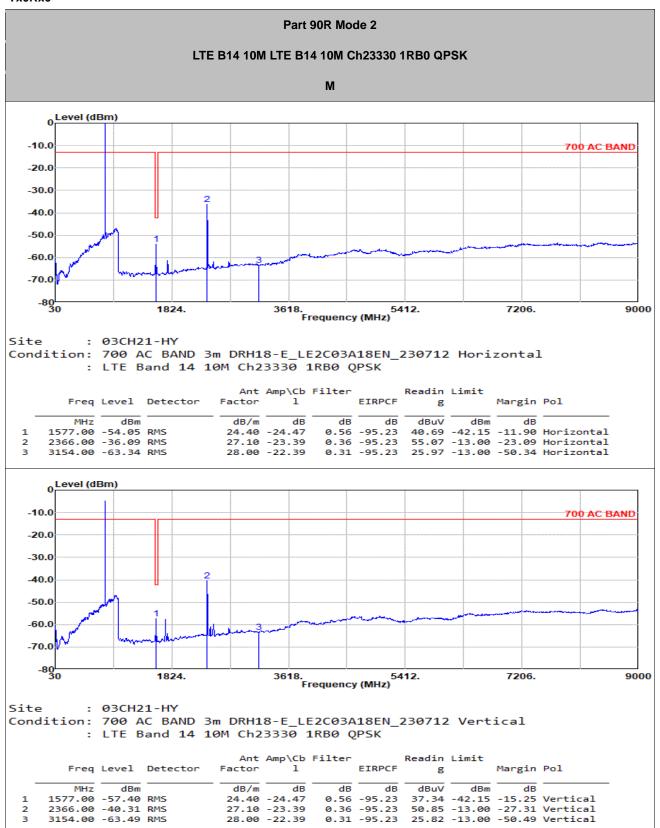


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Tx0Rx0



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