



TEST REPORT

For LTE Cat M1

CHTEW22090081 Report No.::

Report verification:

Project No..... SHT2103098305EW

Applicant: HARDWARIO a.s.

Address....: U Jezu 525/4, 460 01 Liberec, CZECHIA

Product Name: CHESTER

Trade Mark:

Model No.: CHESTER

Listed Model(s):

Standard: ETSI EN 301 908-1 V13.1.1 (2019-11)

ETSI EN 301 908-13 V13.1.1 (2019-11)

Date of receipt of test sample....: Jun. 29, 2022

Date of testing.....: Jun. 30, 2022- Sep. 20, 2022

Sep. 21, 2022 Date of issue....:

PASS Result.....:

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Testing Laboratory Name: Shenzhen Huatongwei International Inspection Co., Ltd.

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The test report merely correspond to the test sample.

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1. TEST STANDARDS AND REPORT VERSION

1.1. Test Standards

The tests were performed according to following standards:

ETSI EN 301 908-1 V13.1.1(2019-11)—IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 1: Introduction and common requirements

ETSI EN 301 908-13 V13.1.1 (2019-11)—IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 13: Evolved Universal Terrestrial Radio Access (E-UTRA) User Equipment (UE)

ETSI TS 136 521-1 V16.6.0 (2020-12)—LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Conformance testing (3GPP TS 36.521-1 version 16.6.0 Release 16)

ETSI TS 136 508 V16.6.0 (2020-11)—LTE; Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); Common test environments for User Equipment (UE) conformance testing (3GPP TS 36.508 version 16.6.0 Release 16)

1.2. Report version information

Revision No.	Date of issue	Description
N/A	2022-09-21	Original

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2. TEST DESCRIPTION

Radio Spectrum Matter (RSM) Part of Transmitter							
Test Item	Test require	Result #1	Test Engineer				
Radiated emissions (UE)	EN 301 908-1 Section 4.2.2	Pass	Pan Xie				
Control and monitoring functions (UE)	EN 301 908-1 Section 4.2.4	Pass*1	N/A				
Transmitter Maximum Output Power	EN 301 908-13 Section 4.2.2	Pass*2	N/A				
Transmitter Spectrum emission mask	EN 301 908-13 Section 4.2.3	Pass*2	N/A				
Transmitter Spurious Emissions	EN 301 908-13 Section 4.2.4	Pass*2	N/A				
Transmitter Minimum Output Power	EN 301 908-13 Section 4.2.5	Pass*2	N/A				
Transmitter Adjacent Channel Leakage Power Ratio	EN 301 908-13 Section 4.2.11	Pass*2	N/A				
Radio Spect	rum Matter (RSM) Part of Receiv	/er					
Test Item	Test require	Result #1	Test Engineer				
Receiver Adjacent Channel Selectivity	EN 301 908-13 Section 4.2.6	Pass*2	N/A				
Receiver Blocking Characteristics	EN 301 908-13 Section 4.2.7	Pass*2	N/A				
Recevier Spurious Response	EN 301 908-13 Section 4.2.8	Pass*2	N/A				
Recevier Intermodulation Characteristics	EN 301 908-13 Section 4.2.9	Pass*2	N/A				
Receiver Spurious Emissions	EN 301 908-13 Section 4.2.10	Pass*2	N/A				
Receiver Reference Sensitivity Level	EN 301 908-13 Section 4.2.12	Pass*2	N/A				

Note:

- 1) #1: The test result does not include measurement uncertainty value
- 2) *1: Refer to the module report which report No. is 64610REM.001A2,
 - *2: Refer to the module report which report No. is 64610REM.001A1,
- 3) This device has installed the certified modular which model number is nRF9160, so these conducted test data directly reference the modular's data.
- 4) In this device, Cat M only use B1,B3,B8,B20.B28,other bands are shielded by software.

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3. **SUMMARY**

3.1. Client Information

Applicant:	HARDWARIO a.s.
Address:	U Jezu 525/4, 460 01 Liberec, CZECHIA
Manufacturer:	HARDWARIO a.s.
Address:	U Jezu 525/4, 460 01 Liberec, CZECHIA

3.2. Product Description

Main unit information:				
Product Name:	CHESTER			
Trade Mark:	-			
Model No.:	CHESTER			
Listed Model(s):	-			
Power supply:	DC 3.6V			
Hardware version:	R3.2			
Software version:	v1.0.0			

3.3. Radio Specification Description

Support LTE type:	⊠ Cat M1					
Commant On a ration a Daniel	⊠ FDD Band 1					
Support Operating Band:			and 28			
Operating Frequency Range:	Please refer to note #2					
Channel bandwidth:	Please refer to note #3					
Maximum RB:	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz
Maximum Rb.	6	6	6	6	6	6
Uplink Modulation type:	⊠ QPSK	⊠ 1	6QAM	☐ 64QAM	2:	56QAM
Downlink Modulation type:	⊠ QPSK	⊠ 1	6QAM	☐ 64QAM	_ 2	56QAM
Power Class:	☐ Class 1	ss 1		⊠ Class 3	□с	lass 4
Antenna type:	PCB antenna	PCB antenna				
Antenna gain #4:	3.5 dBi					

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Note:

O 🛛: means that this feature is supported; 🔲: means that this feature is not supported

O #2: Operating frequency range is as follow:

LTE Band	Uplink frequency	Downlink frequency
FDD Band 1	1920 ~ 1980 MHz	2110 ~ 2170 MHz
FDD Band 3	1710 ~ 1785 MHz	1805 ~ 1880 MHz
FDD Band 8	880 ~ 915 MHz	925 ~ 960 MHz
FDD Band 20	832 ~ 862 MHz	791 ~ 821 MHz
FDD Band 28	703 ~ 748 MHz	758 ~ 803 MHz

O #3: Supported channel bandwidth is as follow:

LTE Band	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz
FDD Band 1	-	-	√	\checkmark	√	√
FDD Band 3	√	√	√	√	√	√
FDD Band 8	√	√	√	√	-	-
FDD Band 20	-	-	√	√	√	√
FDD Band 28	-	√	√	√	√	√

^{√:} means that this feature is supported; -: means that this feature is not supported

O #4: The antenna gain is provided by the applicant, and the applicant should be responsible for its authenticity, HTW lab has not verified the authenticity of its information

3.4. Testing Laboratory Information

Laboratory Name	Shenzhen Huatongwei International Inspection Co., Ltd.
Laboratory Location	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China
	Tel: 86-755-26715499
Connect information:	E-mail: cs@szhtw.com.cn
	http://www.szhtw.com.cn

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4. TEST CONFIGURATION

4.1. Test frequency list

FDD Band 1:	Test Frequency ID	Bandwidth	N _{UL}	Frequency of		Frequency of
		[MHz]		Uplink [MHz		Downlink [MHz]
		5	1802		25	2112.5
	Low Range	10	1805	1925	50	2115
	Low Nalige	15	1807	5 1927.5	75	2117.5
		20	1810	1930	100	2120
	Mid Range	5/10/15/20	1830	1950	300	2140
	Ů	5	1857	5 1977.5	575	2167.5
		10	1855		550	2165
	High Range	15	1852		525	2162.5
		20	1850		500	2160
		20	1000	1970	300	2100
FDD Band 3	Test Frequency ID	Bandwidth [MHz]	N _{UL}	Frequency of Uplink [MHz]	N_{DL}	Frequency of Downlink [MHz]
		1.4	19207	1710.7	1207	1805.7
		3	19215	1711.5	1215	1806.5
		5	19225	1711.5	1225	1807.5
	Low Range					
		10	19250	1715	1250	1810
		15 ^[1]	19275	1717.5	1275	1812.5
		20 ^[۱۱]	19300	1720	1300	1815
	Mid Range	1.4/3/5/10 15 ^[1] /20 ^[1]	19575	1747.5	1575	1842.5
		1.4	19943	1784.3	1943	1879.3
		3	19935	1783.5	1935	1878.5
		5				
	High Range		19925	1782.5	1925	1877.5
	3	10	19900	1780	1900	1875
		15 ^[1]	19875	1777.5	1875	1872.5
		20 [1]	19850	1775	1850	1870
FDD Band 8:	Test Frequency ID	Bandwidth [MHz]	NuL	Frequency of Uplink [MHz]	N _{DL}	Frequency of Downlink [MHz]
		1.4	21457	880.7	3457	925.7
		3	21465	881.5	3465	926.5
	Low Range	5	21475	882.5	3475	
		10 [1]	21500	885	3500	930
	Mid Range	1.4/3/5 10 ^[1]	21625	897.5	3625	
		1.4	24702	014.3	2702	050.3
			21793	914.3	3793	
	High Range	3	21785	913.5	3785	
		5 10 ^[1]	21775	912.5	3775	
	NOTE 1: Bandwidth 1 36.101 [27			910 ecified UE receiver s	3750 ensitivity re	955 quirement (TS
FDD Band 20:	Test Frequency ID Bandwidth NuL Frequency of NpL Frequency of					
55 5ana 20.		[MHz]		Uplink [MHz	1	Downlink [MHz]
		5 10 ^[1]	2417		6175	793.5
			0.100			
	Low Range		2420	837	6200	796
	Low Range	15 ^[1]	2422	837 839.5	6200 6225	796 798.5
		15 ^[1] 20 ^[1]	2422 2425	837 839.5 842	6200 6225 6250	796 798.5 801
	Low Range Mid Range	15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^[1]	2422 2425 2430	837 5 839.5 0 842 0 847	6200 6225 6250 6300	796 798.5 801 806
		15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^[1] 5	2422 2425 2430 2442	837 5 839.5 0 842 0 847 5 859.5	6200 6225 6250 6300 6425	796 798.5 801 806 818.5
	Mid Range	15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^{[1} 5 10 ^[1]	2422 2425 2430 2442 2440	837 839.5 842 847 859.5 859.5 857	6200 6225 6250 6300 6425 6400	796 798.5 801 806
		15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^{[1} 5 10 ^[1] 15 ^[1]	2422 2425 2430 2442	837 839.5 842 847 859.5 859.5 857	6200 6225 6250 6300 6425	796 798.5 801 806 818.5
	Mid Range	15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^{[1} 5 10 ^[1]	2422 2425 2430 2442 2440	837 839.5 842 847 859.5 859.5 857 854.5	6200 6225 6250 6300 6425 6400	796 798.5 801 806 818.5 816
	Mid Range High range NOTE 1: Bandwidth	15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^{[1} 5 10 ^[1] 15 ^[1] 20 ^[1] for which a relaxati	2422 2425 2430 2442 2440 2437 2435 on of the sp	0 837 5 839.5 0 842 0 847 5 859.5 0 857 5 854.5 0 852	6200 6225 6250 6300 6425 6400 6375 6350	796 798.5 801 806 818.5 816 813.5 811
	Mid Range High range NOTE 1: Bandwidth	15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^{[1} 5 10 ^[1] 15 ^[1] 20 ^[1]	2422 2425 2430 2442 2440 2437 2435 on of the sp	0 837 5 839.5 0 842 0 847 5 859.5 0 857 5 854.5 0 852	6200 6225 6250 6300 6425 6400 6375 6350	796 798.5 801 806 818.5 816 813.5 811
FDD Band 28:	Mid Range High range NOTE 1: Bandwidth	15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^{[1} 5 10 ^[1] 15 ^[1] 20 ^[1] for which a relaxati	2422 2425 2430 2442 2440 2437 2435 on of the sp	0 837 5 839.5 0 842 0 847 5 859.5 0 857 5 854.5 0 852	6200 6225 6250 6300 6425 6400 6375 6350	796 798.5 801 806 818.5 816 813.5 811 equirement (TS
FDD Band 28:	Mid Range High range NOTE 1: Bandwidth 36.101 [2	15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^{[1} 5 10 ^[1] 15 ^[1] 20 ^[1] for which a relaxati 7] Clause 7.3) is all Bandwidth [MHz]	2422 2425 2430 2442 2440 2437 2435 on of the spowed.	837 839.5 842 847 859.5 857.5 854.5 850.5 857.5 854.5 859.5 85	6200 6225 6250 6300 6425 6400 6375 6350 sensitivity re	796 798.5 801 806 818.5 816 813.5 811 equirement (TS
FDD Band 28:	Mid Range High range NOTE 1: Bandwidth 36.101 [2	15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^{[1} 5 10 ^[1] 15 ^[1] 20 ^[1] for which a relaxati 7] Clause 7.3) is all Bandwidth [MHz] 3	2422 2425 2430 2442 2440 2437 2435 on of the spowed.	837 839.5 842 847 859.5 854.5 852 ecified UE receiver	6200 6225 6250 6300 6425 6400 6375 6350 sensitivity re	796 798.5 801 806 818.5 816 813.5 811 equirement (TS
FDD Band 28:	Mid Range High range NOTE 1: Bandwidth 36.101 [2	15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^{[1} 5 10 ^[1] 15 ^[1] 20 ^[1] for which a relaxati 7] Clause 7.3) is all Bandwidth [MHz] 3 5	2422 2425 2430 2442 2440 2437 2435 on of the spowed. NuL 27225 27235	837 839.5 842 1	6200 6225 6250 6300 6425 6400 6375 6350 sensitivity re	796 798.5 801 806 818.5 816 813.5 811 equirement (TS Frequency of Downlink [MHz] 759.5 760.5
FDD Band 28:	Mid Range High range NOTE 1: Bandwidth 36.101 [2	15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^{[1} 5 10 ^[1] 15 ^[1] 20 ^[1] for which a relaxati 7] Clause 7.3) is all Bandwidth [MHz] 3 5 10 ^[1]	2422 2425 2430 2442 2440 2437 2435 on of the spowed. Nu. 27225 27235 27260	837 839.5 842 847 859.5 854.5 852 ecified UE receiver Frequency of Uplink [MHz] 704.5 705.5 708	6200 6225 6250 6300 6425 6400 6375 6350 sensitivity re	796 798.5 801 806 818.5 816 813.5 811 equirement (TS
FDD Band 28:	Mid Range High range NOTE 1: Bandwidth 36.101 [2	15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^{[1} 5 10 ^[1] 15 ^[1] 20 ^[1] 15 ^[1] 20 ^[1] for which a relaxati 7] Clause 7.3) is all Bandwidth [MHz] 3 5 10 ^[1] 15 ^[1]	2422 2425 2430 2442 2440 2437 2435 on of the spowed. Nu. 27225 27235 27260 27285	837 839.5 842 0 847 5 847 5 859.5 0 857 5 854.5 0 852 ecified UE receiver	6200 6225 6250 6300 6425 6400 6375 6350 sensitivity re	796 798.5 801 806 818.5 816 813.5 811 equirement (TS Frequency of Downlink [MHz] 759.5 760.5 763 765.5
FDD Band 28:	Mid Range High range NOTE 1: Bandwidth 36.101 [2	15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^{[1} 5 10 ^[1] 15 ^[1] 20 ^[1] for which a relaxati 7 Clause 7.3) is all Bandwidth [MHz] 3 5 10 ^[1] 15 ^[1] 20 ^[1]	2422 2425 2430 2442 2440 2437 2435 on of the spowed. Nu. 27225 27235 27260 27285 27310	837 839.5 842 847 842 847 859.5 857 854.5 850 852 ecified UE receiver Frequency of Uplink [MHz] 704.5 705.5 708 710.5 713	6200 6225 6250 6300 6425 6400 6375 6350 sensitivity re NbL 9225 9235 9260 9285 9310	796 798.5 801 806 818.5 816 813.5 811 equirement (TS Frequency of Downlink [MHz] 759.5 760.5 763 765.5 768
FDD Band 28:	Mid Range High range NOTE 1: Bandwidth 36.101 [2	15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^[1] 5 10 ^[1] 15 ^[1] 20 ^[1] for which a relaxati 7] Clause 7.3) is all Bandwidth [MHz] 3 5 10 ^[1] 15 ^[1] 20 ^[1] 3	2422 2437 2430 2440 2437 2435 on of the spowed. Nu. 27225 27235 27260 27285 27310 27375	837 839.5 842 842 845.5 859.5 857.5 854.5 855.5 855.5 855.5 855.5 855.5 855.5 855.5 708.5 708.5 710.5 713 719.5	6200 6225 6250 6300 6425 6400 6375 6350 sensitivity re NbL 9225 9235 9260 9285 9310	796 798.5 801 806 818.5 816 813.5 811 equirement (TS Frequency of Downlink [MHz] 759.5 760.5 763 765.5 768 774.5
FDD Band 28:	Mid Range High range NOTE 1: Bandwidth 36.101 [2	15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^{[1} 5 10 ^[1] 15 ^[1] 20 ^[1] for which a relaxati 7 Clause 7.3) is all Bandwidth [MHz] 3 5 10 ^[1] 15 ^[1] 20 ^[1]	2422 2425 2430 2442 2440 2437 2435 on of the spowed. Nu. 27225 27235 27260 27285 27310	837 839.5 842 847 842 847 859.5 857 854.5 850 852 ecified UE receiver Frequency of Uplink [MHz] 704.5 705.5 708 710.5 713	6200 6225 6250 6300 6425 6400 6375 6350 sensitivity re NbL 9225 9235 9260 9285 9310	796 798.5 801 806 818.5 816 813.5 811 equirement (TS Frequency of Downlink [MHz] 759.5 760.5 763 765.5 768
FDD Band 28:	Mid Range High range NOTE 1: Bandwidth 36.101 [2	15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^[1] 5 10 ^[1] 15 ^[1] 20 ^[1] for which a relaxati 7] Clause 7.3) is all Bandwidth [MHz] 3 5 10 ^[1] 15 ^[1] 20 ^[1] 3	2422 2437 2430 2440 2437 2435 on of the spowed. Nu. 27225 27235 27260 27285 27310 27375	837 839.5 842 842 845.5 859.5 857.5 854.5 855.5 855.5 855.5 855.5 855.5 855.5 708.5 708.5 708.5 710.5 713 719.5	6200 6225 6250 6300 6425 6400 6375 6350 sensitivity re NbL 9225 9235 9260 9285 9310	796 798.5 801 806 818.5 816 813.5 811 equirement (TS Frequency of Downlink [MHz] 759.5 760.5 763 765.5 768 774.5
FDD Band 28:	Mid Range High range NOTE 1: Bandwidth 36.101 [2 Test Frequency ID Low Range	15 ^[1] 20 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^{[1} 5 10 ^[1] 15 ^[1] 20 ^[1] 15 ^[1] 20 ^[1] for which a relaxati 7] Clause 7.3) is all Bandwidth [MHz] 3 5 10 ^[1] 15 ^[1] 20 ^[1] 3 5	2422 2425 2430 2442 2440 2437 2435 on of the spowed. Nu. 27225 27235 27260 27285 27310 27375 27385	837 839.5 842 847 859.5 854.5 852 ecified UE receiver Frequency of Uplink [MHz] 704.5 705.5 708 710.5 713 719.5 720.5 723	6200 6225 6250 6300 6425 6400 6375 6350 sensitivity re NbL 9225 9235 9260 9285 9310 9375 9385	796 798.5 801 806 818.5 816 813.5 811 equirement (TS Frequency of Downlink [MHz] 759.5 760.5 763 765.5 768 774.5
FDD Band 28:	Mid Range High range NOTE 1: Bandwidth 36.101 [2 Test Frequency ID Low Range	15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^[1] 5 10 ^[1] 15 ^[1] 20 ^[1] for which a relaxati 7] Clause 7.3) is all Bandwidth [MHz] 3 5 10 ^[1] 15 ^[1] 20 ^[1] 3 5 10 ^[1] 15 ^[1] 20 ^[1] 15 ^[1] 15 ^[1] 15 ^[1] 15 ^[1] 15 ^[1]	2422 2425 2430 2442 2440 2437 2435 on of the spowed. Nu. 27225 27235 27260 27285 27310 27375 27385 27310 27375 27385 27410 27435	837 839.5 839.5 842 847 859.5 857 854.5 855 857 85	6200 6225 6250 6300 6425 6400 6375 6350 sensitivity re NpL 9225 9235 9260 9285 9310 9375 9385 9410	796 798.5 801 806 818.5 816 813.5 811 equirement (TS Frequency of Downlink [MHz] 759.5 760.5 763 765.5 768 774.5 775.5 778 780.5
FDD Band 28:	Mid Range High range NOTE 1: Bandwidth 36.101 [2 Test Frequency ID Low Range	15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^[1] 5 10 ^[1] 15 ^[1] 20 ^[1] for which a relaxati 7] Clause 7.3) is all Bandwidth [MHz] 3 5 10 ^[1] 15 ^[1] 20 ^[1] 3 5 10 ^[1] 15 ^[1] 20 ^[1] 15 ^[1] 20 ^[1] 15 ^[1] 20 ^[1] 15 ^[1] 20 ^[1] 15 ^[1]	2422 2430 2442 2440 2447 2435 on of the spowed. Nu. 27225 27235 27260 27285 27310 27375 27375 27310 27410 27435 27460	837 839.5 839.5 842 847 859.5 857.5 854.5 855.5 856.5 857.5 857.5 857.5 708.5 708.5 719.5 720.5 723 725.5 728	6200 6225 6250 6300 6425 6400 6375 6350 sensitivity re NDL 9225 9235 9260 9285 9310 9375 9410 9435 9460	796 798.5 801 806 818.5 816 813.5 811 equirement (TS Frequency of Downlink [MHz] 759.5 760.5 763 765.5 768 774.5 775.5 778 780.5 783
FDD Band 28:	Mid Range High range NOTE 1: Bandwidth 36.101 [2 Test Frequency ID Low Range	15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^{[1} 5 10 ^[1] 15 ^[1] 20 ^[1] 15 ^[1] 20 ^[1] for which a relaxati 7] Clause 7.3) is all Bandwidth [MHz] 3 5 10 ^[1] 15 ^[1] 20 ^[1] 3 5 10 ^[1] 15 ^[1] 20 ^[1] 3 5	2422 2437 2430 2442 2440 2437 2435 on of the spowed. NuL 27225 27235 27260 27285 27360 27375 27385 27410 27435 27436 27435 27460 27645	837 839.5 839.5 842 847 859.5 854.5 854.5 855.5 856.5 857.5 85	6200 6225 6250 6300 6425 6400 6375 6350 sensitivity re NbL 9225 9235 9260 9285 9310 9375 9385 9410 9435 9446 9645	796 798.5 801 806 818.5 816 813.5 811 equirement (TS Frequency of Downlink [MHz] 759.5 760.5 763 765.5 768 774.5 775.5 778 780.5 783 801.5
FDD Band 28:	Mid Range High range NOTE 1: Bandwidth 36.101 [2 Test Frequency ID Low Range Mid Range	15 ^[1] 20 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^{[1} 5 10 ^[1] 15 ^[1] 20 ^[1] 15 ^[1] 20 ^[1] for which a relaxati 7] Clause 7.3) is all Bandwidth [MHz] 3 5 10 ^[1] 15 ^[1] 20 ^[1] 3 5 10 ^[1] 15 ^[1] 20 ^[1] 3 5	2422 2425 2430 2442 2440 2437 2435 on of the spowed. Nu. 27225 27235 27260 27285 27310 27375 27310 27375 27460 27435 27460 27435 27460 27435 27460	837 839 5 842 0 847 6 842 0 847 6 859 5 0 857 6 854 5 0 852 ecified UE receiver	6200 6225 6250 6300 6425 6400 6375 6350 sensitivity re NoL 9225 9235 9260 9285 9310 9375 9385 9410 9435 9460 9645 9635	796 798.5 801 806 818.5 816 813.5 811 equirement (TS Frequency of Downlink [MHz] 759.5 760.5 763 765.5 768 774.5 775.5 778 780.5 783 801.5 800.5
FDD Band 28:	Mid Range High range NOTE 1: Bandwidth 36.101 [2 Test Frequency ID Low Range	15[1] 20[1] 5/10[1]/15[1]/20[1] 5 10[1] 15[1] 20[1] 15[1] 20[1] for which a relaxati 7] Clause 7.3) is all Bandwidth [MHz] 3 5 10[1] 15[1] 20[1] 3 5 10[1] 15[1] 20[1] 3 5 10[1] 15[1] 20[1] 3 5 10[1] 15[1] 20[1] 3 5 10[1]	2422 2425 2430 2442 2440 2437 2435 on of the spowed. Nu. 27225 27235 27260 27285 27310 27375 27385 27410 27435 27460 27435 27460 27645 27645 27645 27640	837 839.5 839.5 842 847 842 859.5 857 854.5 855.5 854.5 855.5 855.5 705.5 708 710.5 713 719.5 720.5 728 745.5 745.5 743	6200 6225 6250 6300 6425 6400 6375 6350 sensitivity re 9225 9235 9260 9285 9310 9375 9385 9410 9435 9460 9645 9645	796 798.5 801 806 818.5 816 813.5 811 equirement (TS Frequency of Downlink [MHz] 759.5 760.5 763 765.5 768 774.5 775.5 778 780.5 783 801.5 800.5 798
FDD Band 28:	Mid Range High range NOTE 1: Bandwidth 36.101 [2 Test Frequency ID Low Range Mid Range	15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^[1] 5 10 ^[1] 15 ^[1] 20 ^[1] 15 ^[1] 20 ^[1] for which a relaxati 7] Clause 7.3) is all Bandwidth [MHz] 3 5 10 ^[1] 15 ^[1] 20 ^[1] 3 5 10 ^[1] 15 ^[1] 20 ^[1] 3 5 10 ^[1] 15 ^[1] 20 ^[1,2] 3 5 10 ^[1] 15 ^[1]	2422 2437 2430 2440 2437 2435 on of the spowed. Nu. 27225 27235 27260 27285 27360 27375 27385 27410 27410 27435 27460 27645 27640 27645 27610 27585	837 839.5 839.5 842 847 859.5 857.5 854.5 855.5 856.5 857.5 857.5 857.5 857.5 708.5 708.5 719.5 720.5 723.5 728.5 746.5 745.5 743.5 740.5 743.5 740.5 743.5 740.5 743.5 740.5 743.5 740.5 743.5 740.5 743.5 740.5 743.5 740.5 743.5 740.5 743.5 740.5 743.5 740.5 74	6200 6225 6250 6300 6425 6400 6375 6350 sensitivity re NDL 9225 9235 9260 9285 9310 9375 9410 9445 9645 9635 9635 9630 9685 9630 9585	796 798.5 801 806 818.5 816 813.5 811 equirement (TS Frequency of Downlink [MHz] 759.5 760.5 763 765.5 768 774.5 775.5 778 780.5 783 801.5 800.5 798 795.5
FDD Band 28:	Mid Range High range NOTE 1: Bandwidth 36.101 [2 Test Frequency ID Low Range Mid Range High Range	15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^{[1} 5 10 ^[1] 15 ^[1] 20 ^[1] 15 ^[1] 20 ^[1] for which a relaxati 7] Clause 7.3) is all Bandwidth [MHz] 3 5 10 ^[1] 15 ^[1] 20 ^[1] 3 5 10 ^[1] 15 ^[1] 20 ^[1] 3 5 10 ^[1] 15 ^[1] 20 ^[1]	2422 2437 2430 2440 2437 2435 on of the spowed. Nu. 27225 27235 27260 27285 27385 27310 27375 27385 27410 27435 27435 2760 27645 27635 27610 27585 27610 27585 27610	837 839.5 839.5 842 842 847 859.5 857.5 854.5 855.5 855.5 855.5 708.5 710.5 713 719.5 720.5 728 746.5 745.5 748.5 745.5 748.5 749.5	6200 6225 6250 6300 6425 6400 6375 6350 sensitivity re NbL 9225 9235 9260 9285 9310 9375 9410 9435 9410 9645 9645 9615 9615 9610 9585 9560	796 798.5 801 806 818.5 816 813.5 811 equirement (TS Frequency of Downlink [MHz] 759.5 760.5 763 765.5 768 774.5 775.5 778 780.5 783 801.5 800.5 793
FDD Band 28:	Mid Range High range NOTE 1: Bandwidth 36.101 [2 Test Frequency ID Low Range Mid Range High Range NOTE 1: Bandwid (TS 36.1) NOTE 2: Mid Range	15 ^[1] 20 ^[1] 5/10 ^[1] /15 ^[1] /20 ^[1] 5 10 ^[1] 15 ^[1] 20 ^[1] 15 ^[1] 20 ^[1] for which a relaxati 7] Clause 7.3) is all Bandwidth [MHz] 3 5 10 ^[1] 15 ^[1] 20 ^[1] 3 5 10 ^[1] 15 ^[1] 20 ^[1,2] 3 5 10 ^[1] 15 ^[1] 20 ^[1,2] 3 15 10 ^[1] 15 ^[1] 20 ^[1,2] 3 15 10 ^[1] 15 ^[1] 20 ^[1] 15 ^[1] 20 ^[1] 20 ^[1] 20 ^[1] 15 ^[1] 20	2422 2437 2430 2440 2437 2435 on of the spowed. Nu. 27225 27235 27260 27285 27310 27375 27385 27460 27435 27460 27645 27635 27610 27585 27560 et is allowed. ed due to ne	837 839.5 839.5 842 842 847 859.5 857.5 854.5 855.5 856.5 857.5 856.5 857.5 857.5 708.5 708.5 719.5 720.5 723.5 725.5 728.5 746.5 745.	6200 6225 6250 6300 6425 6400 6375 6350 sensitivity re NDL 9225 9235 9260 9285 9310 9475 9485 9460 9645 9635 9635 9630 9585 9560 9586 9560 9586 9560 9586 9560 9560	796 798.5 801 806 818.5 816 813.5 811 equirement (TS Frequency of Downlink [MHz] 759.5 760.5 763 765.5 778 778.5 778.5 778.7 780.5 783 801.5 800.5 798 795.5 798 795.5 793 requirement 01 [27].
FDD Band 28:	Mid Range High range NOTE 1: Bandwidth 36.101 [2 Test Frequency ID Low Range Mid Range High Range NOTE 1: Bandwidt (TS 36.1) NOTE 2: Mid Rang NOTE 3: For CA	15[1] 20[1] 5/10[1]/15[1]/20[1] 5 10[1] 15[1] 20[1] 15[1] 20[1] for which a relaxati 7] Clause 7.3) is all Bandwidth [MHz] 3 5 10[1] 15[1] 20[1] 3 5 10[1] 15[1] 20[1] 20[1]	2422 2435 2430 2442 2440 2437 2435 on of the spowed. NuL 27225 27235 27260 27285 27385 27310 27375 27385 27410 27435 27610 27645 27635 27610 27585 27560 ation of the is allowed. ed due to ne A-18A-28A	837 839.5 839.5 842 842 847 859.5 857.5 854.5 852 ecified UE receiver	6200 6225 6300 6425 6400 6375 6350 sensitivity re NbL 9225 9235 9260 9285 9310 9375 9410 9645 9615 9610 9585 9585 9580 9585 9580 9585 9580 9585 9580 9585 9586 9586	796 798.5 801 806 818.5 816 813.5 811 equirement (TS Frequency of Downlink [MHz] 759.5 760.5 763 765.5 768 774.5 775.5 778 780.5 783 801.5 800.5 793 requirement 01 [27]. 3.1.1.28-2.
FDD Band 28:	Mid Range High range NOTE 1: Bandwidth 36.101 [2 Test Frequency ID Low Range Mid Range High Range NOTE 1: Bandwid (TS 36.1) NOTE 2: Mid Range	15[1] 20[1] 5/10[1]/15[1]/20[1] 5 10[1] 15[1] 20[1] 15[1] 20[1] for which a relaxati 7] Clause 7.3) is all Bandwidth [MHz] 3 5 10[1] 15[1] 20[1] 3 5 10[1] 15[1] 20[1] 20[1]	2422 2435 2430 2442 2440 2437 2435 on of the spowed. NuL 27225 27235 27260 27285 27385 27310 27375 27385 27410 27435 27610 27645 27635 27610 27585 27560 ation of the is allowed. ed due to ne A-18A-28A	837 839.5 839.5 842 842 847 859.5 857.5 854.5 852 ecified UE receiver	6200 6225 6300 6425 6400 6375 6350 sensitivity re NbL 9225 9235 9260 9285 9310 9375 9410 9645 9615 9610 9585 9585 9580 9585 9580 9585 9580 9585 9580 9585 9586 9586	796 798.5 801 806 818.5 816 813.5 811 equirement (TS Frequency of Downlink [MHz] 759.5 760.5 763 765.5 768 774.5 775.5 778 780.5 783 801.5 800.5 793 requirement 01 [27]. 3.1.1.28-2.

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4.2. Descriptions of Test mode

The EUT has been tested under typical operating condition.

Test bandwidth is as follow:

Test Item	FDD B1	FDD B3	FDD B8	FDD B20	FDD B28
Radiated emissions (UE)	5MHz 20MHz	1.4MHz 5MHz 20MHz	1.4MHz 5MHz 10MHz	5MHz 20MHz	3MHz 5MHz 20MHz

4.3. Support unit used in test configuration and system

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

Whethe	Whether support unit is used?							
✓	No							
Item	Equipment	Trade Name	Model No.	Other				
1								
2								

4.4. Environmental conditions

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

Duffing the measurement the environmental conditions were within the listed ranges.				
Normal Conditon	V _N =Nominal Voltage	DC 3.60V		
	T _N =Normal Temperature	25 °C		
Extreme Conditon	V _L =Lower Voltage	DC 3.24V		
	T _L =Lower Temperature	-20 °C		
	V _H =Higher Voltage	DC 3.96V		
	T _H =Higher Temperature	40 °C		

4.5. Statement of the measurement uncertainty

Test Items	Measurement Uncertainty		
Radio frequency	<1GHz: 0.022ppm >1GHz: 0.64ppm		
Conducted output power	0.65 dB		
Conducted spurious emission	0.65 dB		
Radiated spurious emission	<1GHz: 2.85dB >1GHz: 3.66dB		

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

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4.6. Equipments used during the test

•	Radiated Spurious Emission							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)	
•	Semi-Anechoic Chamber	Albatross projects	HTWE0122	SAC-3m-01	C11121	2018/09/27	2023/09/26	
•	Spectrum Analyzer	R&S	HTWE0098	FSP40	100597	2022/08/25	2023/08/24	
•	Loop Antenna	R&S	HTWE0170	HFH2-Z2	100020	2021/04/06	2024/04/05	
•	Broadband Horn Antenna	SCHWARZBECK	HTWE0103	BBHA9170	BBHA9170472	2020/04/27	2023/04/26	
•	Ultra-Broadband Antenna	SCHWARZBECK	HTWE0123	VULB9163	538	2021/04/06	2024/04/05	
•	Horn Antenna	SCHWARZBECK	HTWE0126	9120D	1011	2020/04/01	2023/03/31	
•	Pre-amplifier	CD	HTWE0071	PAP-0102	12004	2021/11/05	2022/11/04	
•	Broadband Preamplifier	SCHWARZBECK	HTWE0201	BBV 9718	9718-248	2022/02/28	2023/02/27	
•	RF Connection Cable	HUBER+SUHNER	HTWE0120-01	6m 18GHz S Serisa	N/A	2022/02/25	2023/02/24	
•	RF Connection Cable	HUBER+SUHNER	HTWE0120-02	6m 3GHz RG Serisa	N/A	2022/02/25	2023/02/24	
•	RF Connection Cable	HUBER+SUHNER	HTWE0119-05	6m 3GHz RG Serisa	N/A	2022/02/25	2023/02/24	
•	RF Connection Cable	HUBER+SUHNER	HTWE0120-04	6m 3GHz RG Serisa	N/A	2022/02/25	2023/02/24	
•	EMI Test Software	Audix	N/A	E3	N/A	N/A	N/A	

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5. TEST CONDITIONS AND RESULTS

5.1. ETSI EN301908-1 Requirement

5.1.1. Radiated emissions (UE)

LIMIT

ETSI EN 301 908-1 Sub-clause 4.2.2.2

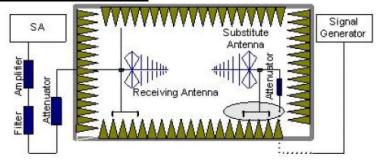
The frequency boundary and reference bandwidths for the detailed transitions of the limits between the requirements for out-of-band emissions and spurious emissions are based on ITU-R Recommendations SM.329-10 [3] and SM.1539-1 [4].

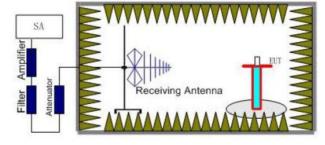
The requirements shown in table 4.2.2.2-1 are only applicable for frequencies in the spurious domain.

Table 4.2.2.2-1: Radiated spurious emissions requirements (UE)

Frequency	Minimum requirement (e.r.p.)/ reference bandwidth idle mode	Minimum requirement (e.r.p.)/ reference bandwidth traffic mode	Applicability			
30 MHz ≤ f < 1 000 MHz	-57 dBm/100 kHz	-36 dBm/100 kHz	All			
1 GHz ≤ f < 12,75 GHz	-47 dBm/1 MHz	-30 dBm/1 MHz	All			
fc - 2,5 × 5 MHz < f < fc + 2,5 × 5 MHz		Not defined	UTRA FDD, UTRA TDD, 3,84 Mcps option, cdma2000, spreading rate 3			
fc - 2,5 \times BW _{Channel} MHz < f < fc + 2,5 \times BW _{Channel} MHz		Not defined	E-UTRA FDD, E-UTRA TDD, Mobile WiMAX, UMB			
fc - 2,5 × 10 MHz < f < fc1 + 2,5 × 10 MHz		Not defined	UTRA TDD, 7,68 Mcps option			
fc - 4 MHz < f < fc + 4 MHz		Not defined	UTRA TDD, 1,28 Mcps option cdma2000, spreading rate 1			
fc - 500 kHz < f < fc + 500 kHz		Not defined	UWC 136, 200 kHz option			
fc - 250 kHz < f < fc + 250 kHz		Not defined	UWC 136, 30 kHz option			
NOTE: fc is the UE transmit centre frequency.						

TEST CONFIGURATION





TEST PROCEDURE

- 1. The test conditions.
- 2. Please refer to ETSI EN301908-1 Sub-clause 5.3.1 for the measurement method.

TEST MODE:

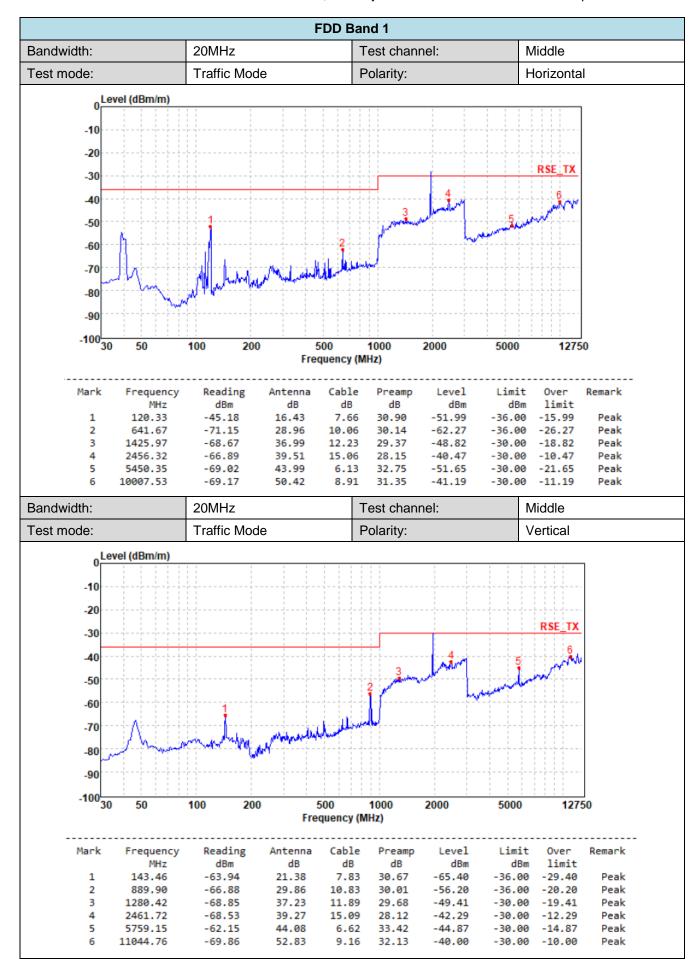
ETSI EN301908-1 Sub-clause 5.3.1

Traffic mode, Idle mode

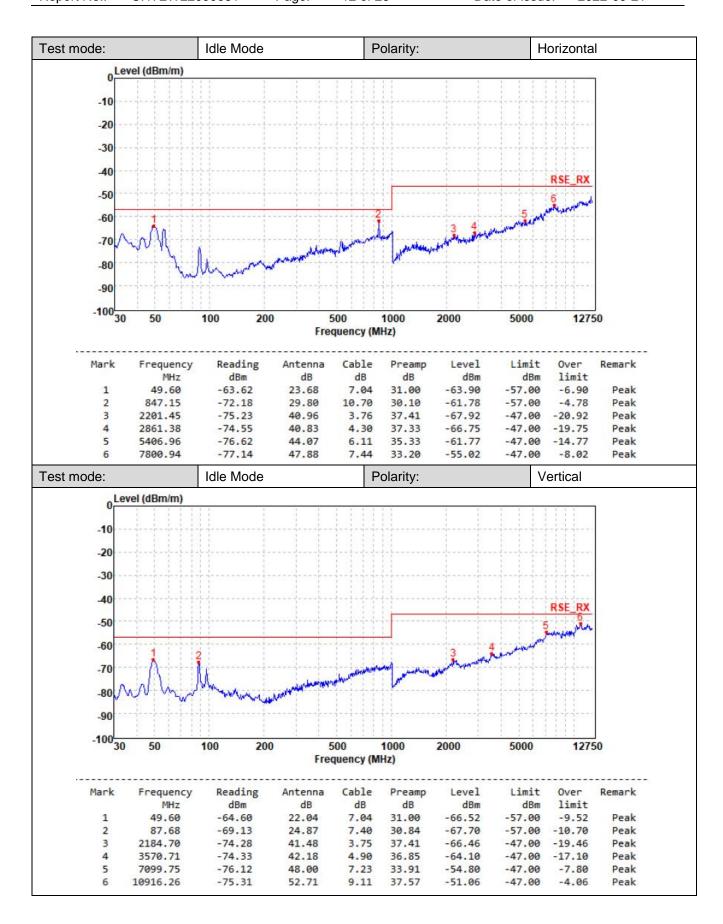
TEST RESULTS

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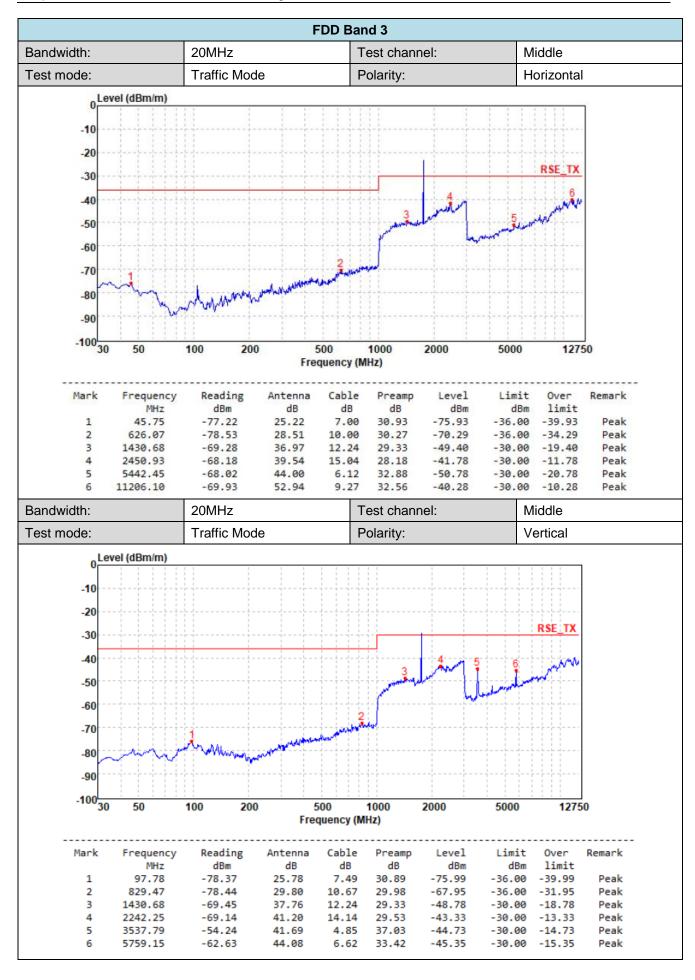
Note: Pre-scan all kinds of bandwidth and channel, but only show the worst test data on the report.



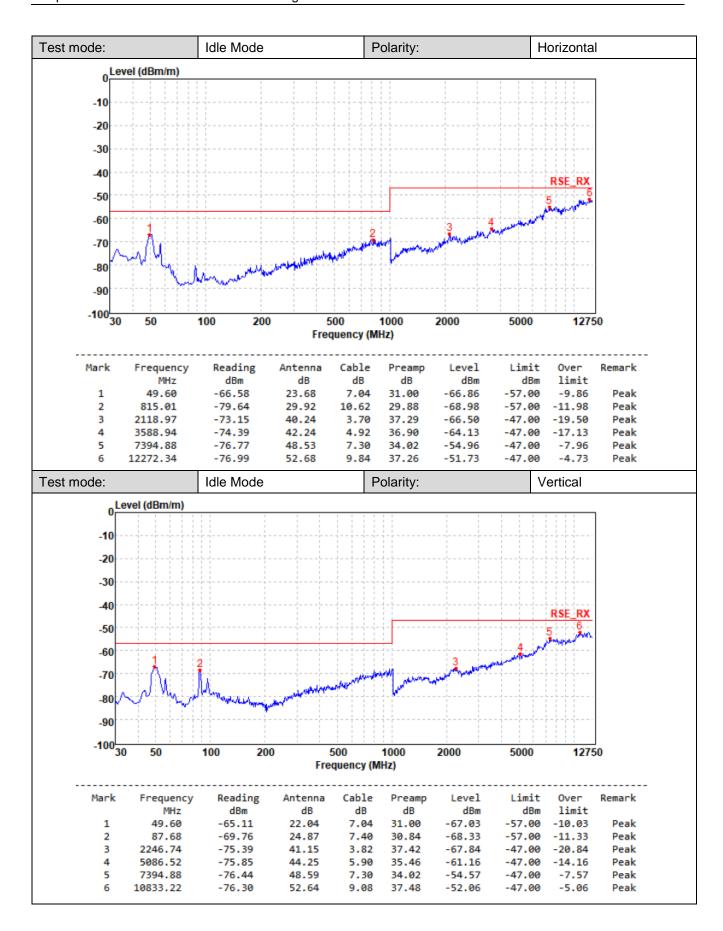
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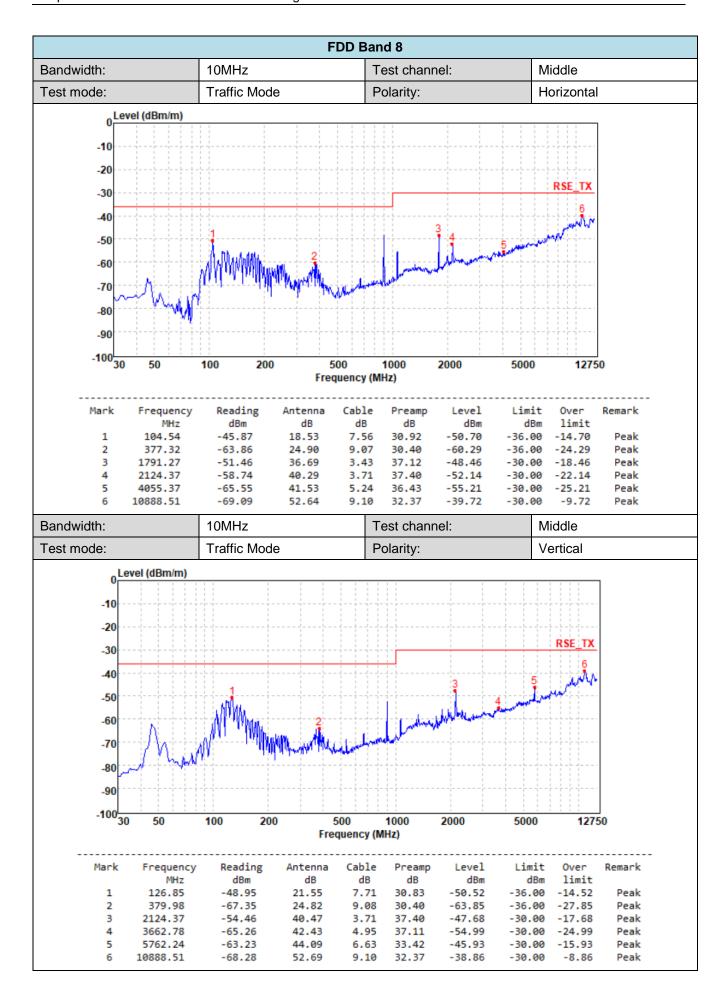
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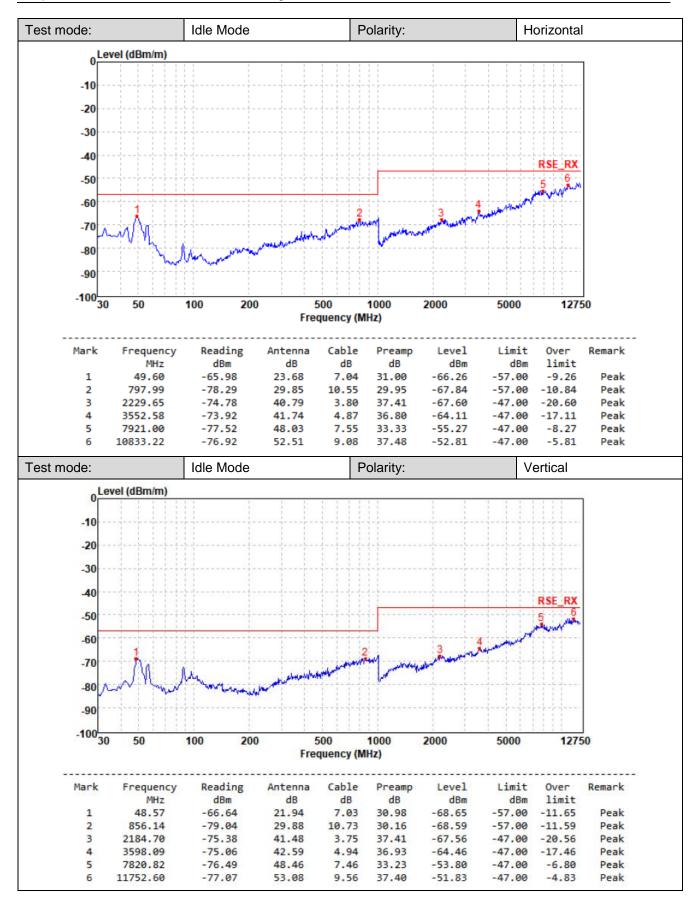
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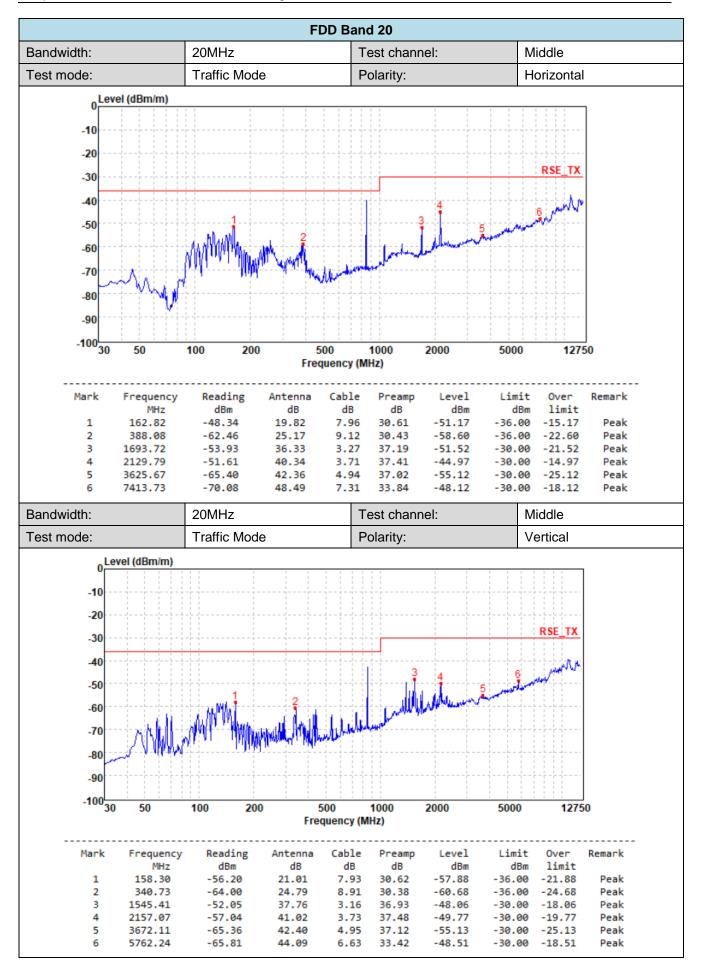
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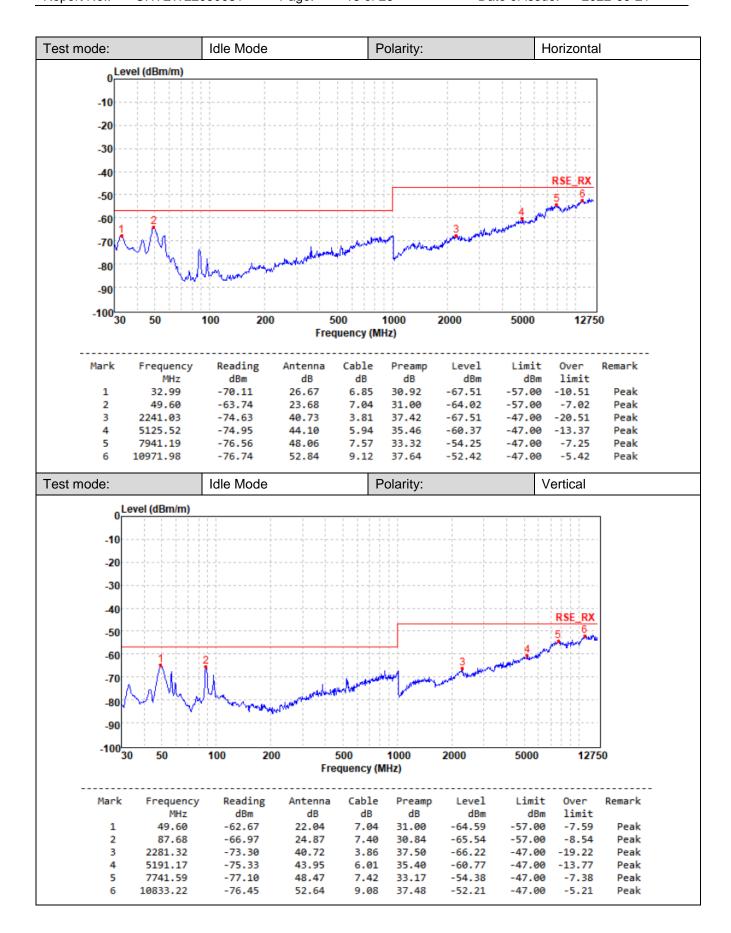
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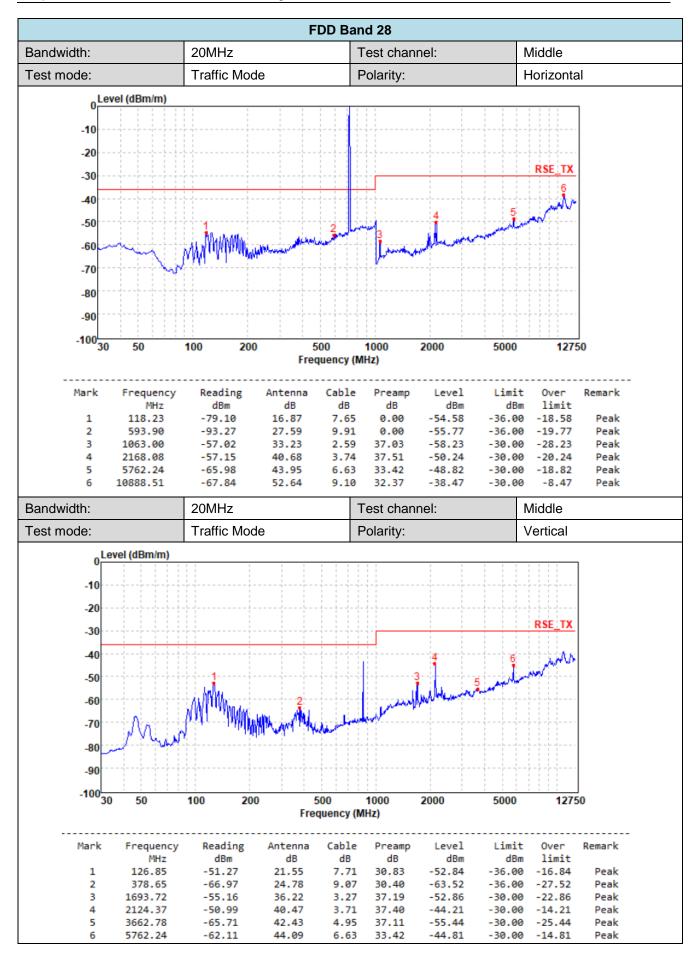
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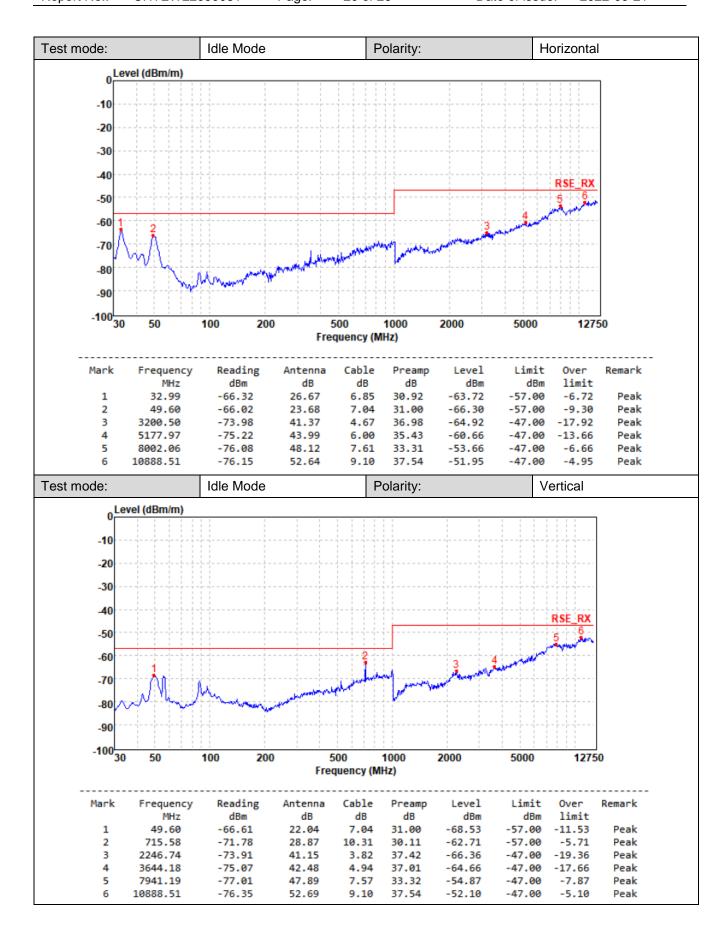
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6. TEST SETUP PHOTOS OF THE EUT

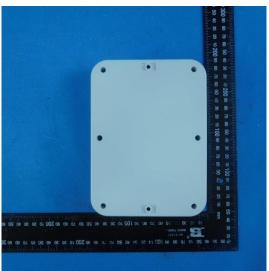


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7. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

EXTERNAL PHOTOS OF THE EUT

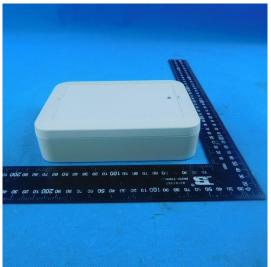






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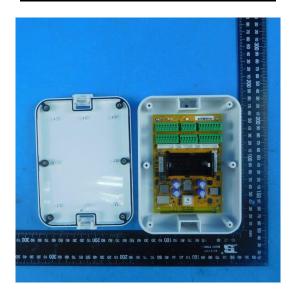




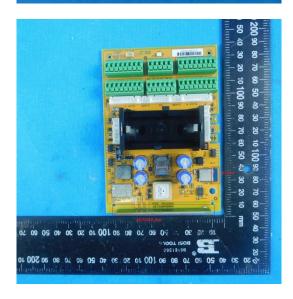


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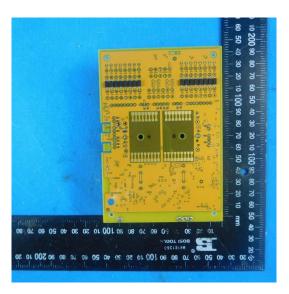
INTERNAL PHOTOS OF THE EUT



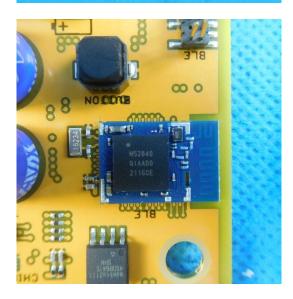




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