FCC CFR47 PART 22 SUBPART H
FCC CFR47 PART 24 SUBPART E
FCC CFR47 PART 27 SUBPART L

WWAN

CERTIFICATION TEST REPORT

FOR

3G wireless modem

MODEL NUMBER : mBFT17(V)-WCDMA

FCC ID: 2AL3AHDJC-1802

REPORT NUMBER: 4788319770-E1V3

ISSUE DATE: MAR 18, 2018

Prepared for
Hyundai J-Comm. Co. Ltd
27, Sagimakgol-ro 105beon-gil, Jungwon-gu, Seongnam-Si,
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ACCREDITED
Testing Laboratory

TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	03/13/18	Initial issue	Hyunsik Yun
V2	03/14/18	Revised missed typo	Hyunsik Yun
V3	04/18/18	Reduced power	Hyunsik Yun

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Hyundai J-Comm. Co. Ltd

EUT DESCRIPTION: 3G wireless modem

MODEL NUMBER: mBFT17(V)-WCDMA

SERIAL NUMBER: 0008

DATE TESTED: DEC 28, 2018 – APR 17, 2018

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 22H, 24E and 27L	Pass

UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Korea, Ltd. By:

SungGil Park
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:

Hyunsik Yun
Laboratory Engineer
UL Korea, Ltd.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with following methods.

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 22.
3. FCC CFR 47 Part 24.
4. FCC CFR 47 Part 27.
5. ANSI TIA-603-E
6. KDB 971168 D01 Power Meas License Digital Systems v03

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do,16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro
☐ Chamber 1
☒ Chamber 2

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4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

EIRP = PSA reading with EUT worst orientation (dBm) + Path loss (dB) – cable loss(between the SG and substitution antenna) + Substitution Antenna Factor (dBi)

ERP = PSA reading with EUT worst orientation (dBm) + Path loss (dB) – cable loss(between the SG and substitution antenna)

(Path loss = Signal generator output – PSA reading with substitution antenna)

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4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	2.32 dB
Radiated Disturbance, Below 1GHz	4.14 dB
Radiated Disturbance, Above 1 GHz	5.97 dB

Uncertainty figures are valid to a confidence level of 95%.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a 3G wireless modem.
This test report addresses the WWAN operational mode.

5.2. MAXIMUM OUTPUT POWER(WCDMA)

The transmitter has a maximum peak conducted and radiated ERP / EIRP output powers as follows:

Note : Conducted output power results were excerpted from RF exposure test report.(4788319770-S1V1 FCC Report SAR)

The transmitter has a maximum conducted and radiated ERP / EIRP output powers as follows:

FCC Part 22/24/27				
Band	Frequency Range	Modulation	Radiated	
	[MHz]		[dBm]	[mW]
Band 5	824~849	REL99	18.90	77.62
		HSDPA	19.39	86.90
		HSUPA		
Band 4	1710~1755	REL99	26.66	463.45
		HSDPA	25.92	390.84
		HSUPA		
Band 2	1850~1910	REL99	22.29	169.43
		HSDPA	21.82	152.05
		HSUPA		

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5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a external antenna for the [List the bands supported] with a maximum peak gain as follow:

Frequency (MHz)	Peak Gain (dBi)
WCDMA Band 5 824 ~ 849 MHz	2.92
WCDMA Band 2 1850 ~ 1910 MHz	4.90
WCDMA Band 4 1710 ~ 1755 MHz	2.71

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5.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

No	Description	Manufacturer	Model	Serial Number	FCC ID
1	Adapter	Hyundai J.Comm Co.,Ltd.	Blue Force Tracker17/V	0024	N/A
2	Multi Path Blue Force Tracker	Hyundai J.Comm Co.,Ltd.	mBFT17(V)	8	2AL3AHDJC-1801

I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	2-PIN	Shielded	1 m	N/A
2	AC Power	2	AC	Shielded	1.1 m	N/A
3	DC & Data	3	Unique	Shielded	0.2 m	N/A

TEST SETUP

The EUT is continuously communicated to the call box during the tests after mounting to the host (model: mBFT17(V)).

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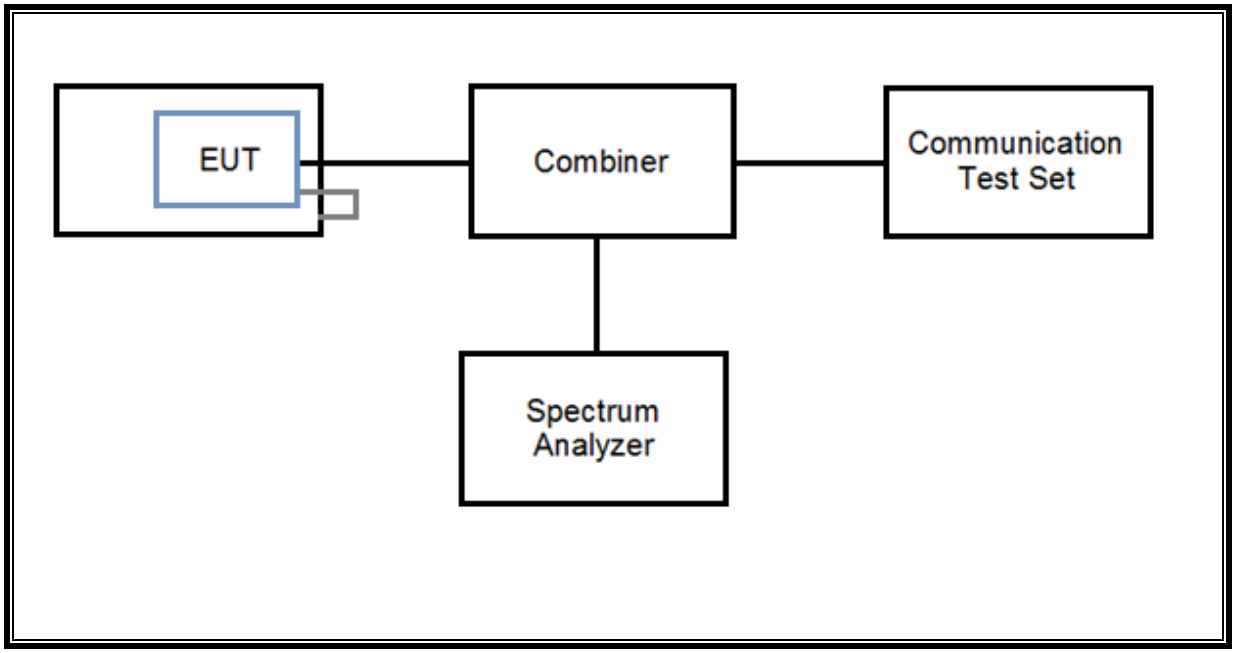
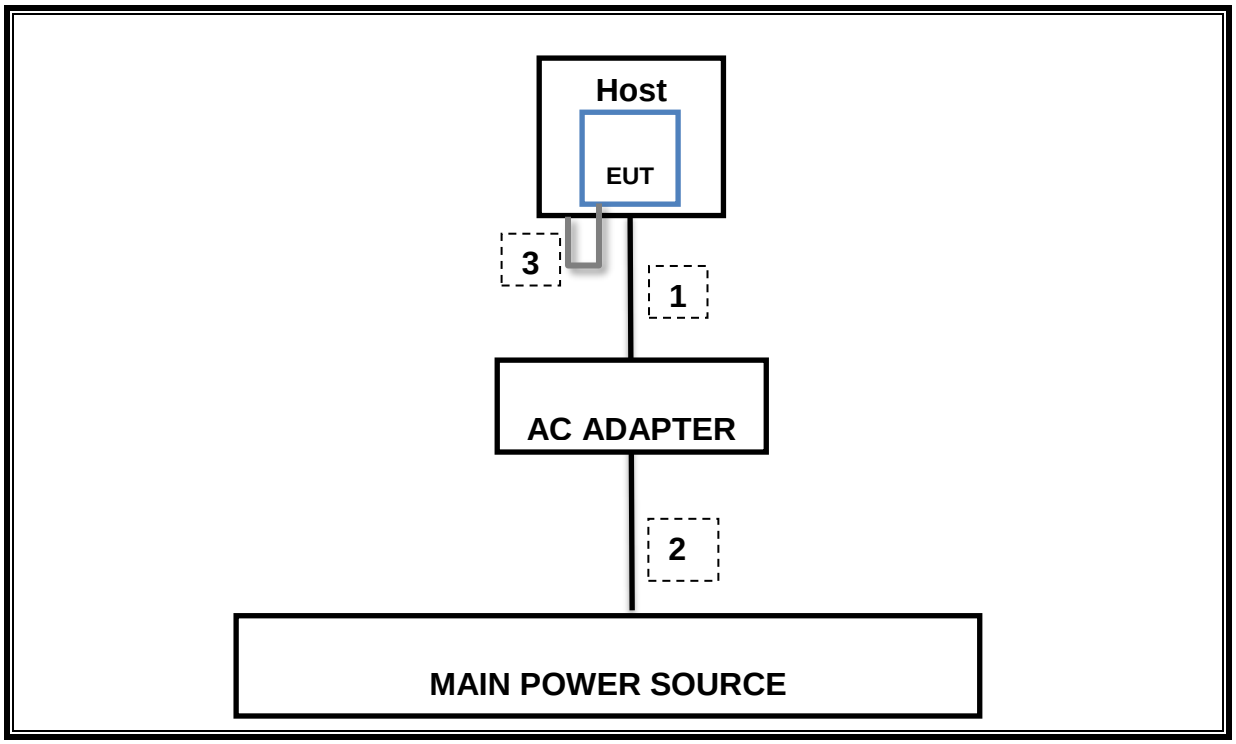
SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



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6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Description	Manufacturer	Model	S/N	Cal Due
Antenna, Tuned Dipole 400~1000 MHz	ETS	3121D DB4	00164753	06-30-19
Antenna, Horn, 40 GHz	ETS	3116C	00166155	12-04-19
Preamplifier	ETS	3116C-PA	00168841	11-13-19
Antenna, Horn, 40 GHz	ETS	3116C	00168645	12-04-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	10-14-18
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	04-14-19
Antenna, Horn, 18 GHz	ETS	3115	00167211	10-14-18
Antenna, Horn, 18 GHz	ETS	3115	00161451	03-10-19
Antenna, Horn, 18 GHz	ETS	3117	00168724	05-31-19
Antenna, Horn, 18 GHz	ETS	3117	00168717	05-31-19
Combiner	WEINSCHEL	1575	2152	08-08-18
Communications Test Set	R&S	CMW500	150312	08-07-18
Communications Test Set	R&S	CMW500	115331	08-07-18
DC Power Supply	Agilent / HP	E3640A	MY54226395	08-07-18
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-09-18
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-07-18
Preamplifier	ETS	3115-PA	00167475	08-09-18
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-08-18
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-08-18
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-08-18
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-08-18
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G005	08-09-18
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G006	08-08-18
High Pass Filter 2.8GHz	Micro-Tronics	HPM50111-02	010	08-09-18
High Pass Filter 2.8GHz	Micro-Tronics	HPM50111-02	011	08-08-18
High Pass Filter 4GHz	Micro-Tronics	HPM50118-02	G001	08-09-18
High Pass Filter 4GHz	Micro-Tronics	HPM50118-02	G002	08-08-18
Attenuator	PASTERNACK	PE7087-10	A009	08-08-18
Temperature Chamber	ESPEC	SH-642	93001109	08-08-18
UL Software				
Description	**Manufacturer**	**Model**	**Version**	
Antenna port test software	UL	CLT	Ver 2.2	

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7. Summary Table

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
2.1049	Occupied Band width (99%)	N/A	Conducted	Pass
22.917(a) 24.238(a) 27.53(g)	Band Edge / Conducted Spurious Emission	-13dBm		Pass
2.1046	Conducted output power	N/A		See the RF exposure test report. (4788319770-S1V2 FCC Report SAR)
22.355 24.235 27.54	Frequency Stability	2.5PPM		Pass
22.913(a)(2)	Effective Radiated Power	38 dBm	Radiated	Pass
24.232(c)	Equivalent Isotropic Radiated Power	33dBm		Pass
27.50(d)(4)		30dBm		Pass
22.917(a) 24.238(a) 27.53(g)	Radiated Spurious Emission	-13dBm		Pass

FCC Rule Part	Frequency Range [MHz]	Output Power [W]	Frequency Tolerance	Emission Designator	Communication Type
WCDMA					
22H	826.4 - 846.6	0.087	2.5 ppm	4M07F9W	WCDMA B5
27L	1712.4 - 1752.6	0.463	2.5 ppm	4M07F9W	WCDMA B4
24E	1852.4 - 1907.6	0.169	2.5 ppm	4M07F9W	WCDMA B2

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8. PEAK TO AVERAGE RATIO

Test Procedure

Per KDB 971168 D01 Power Meas License Digital Systems v03;

The transmitter output was connected to a CMW500 Test Set and configured to operate at maximum power. The PAR were measured on the Spectrum Analyzer.

Test Spec

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

8.1. CONDUCTED PEAK TO AVERAGE RESULT

WCDMA

Band	Channel	f [MHz]	Mode	Ratio [dB]	Limit [dB]
Band 5	4183	836.6	REL99	2.77	13.00
			HSDPA	3.15	
Band 4	1413	1732.6	REL99	2.81	
			HSDPA	3.28	
Band 2	9400	1880.0	REL99	2.78	
			HSDPA	3.38	

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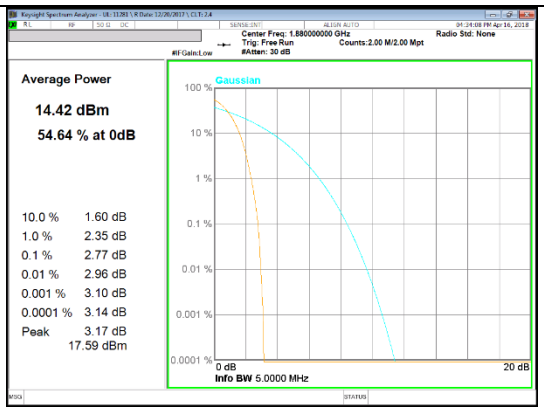
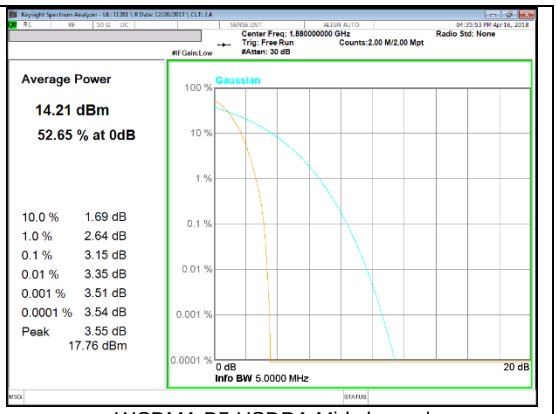
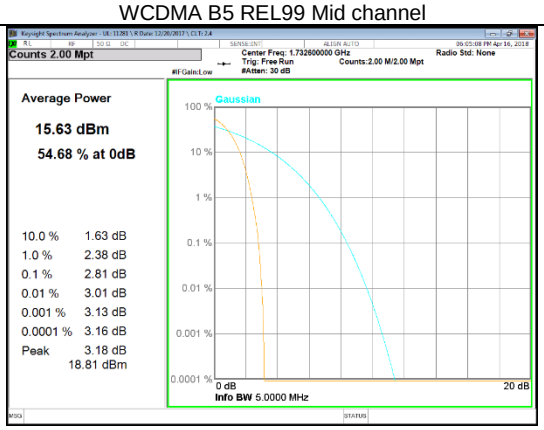
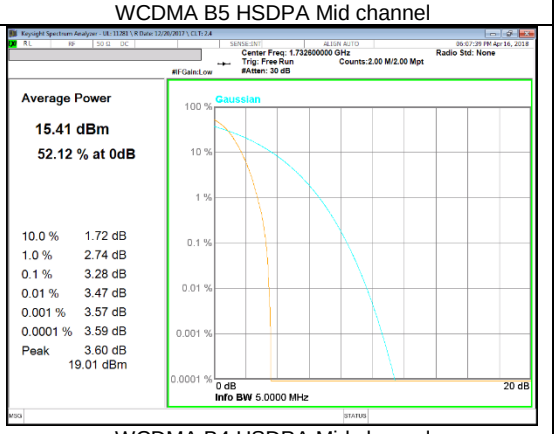
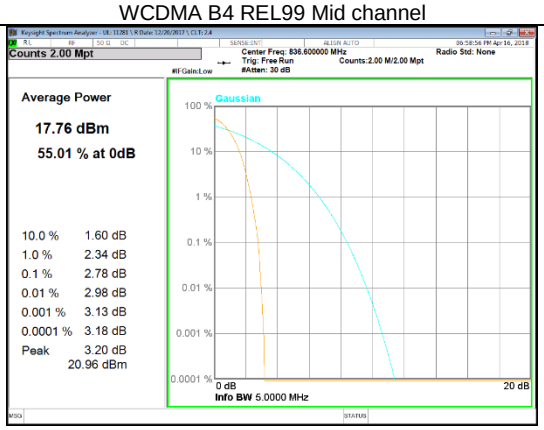
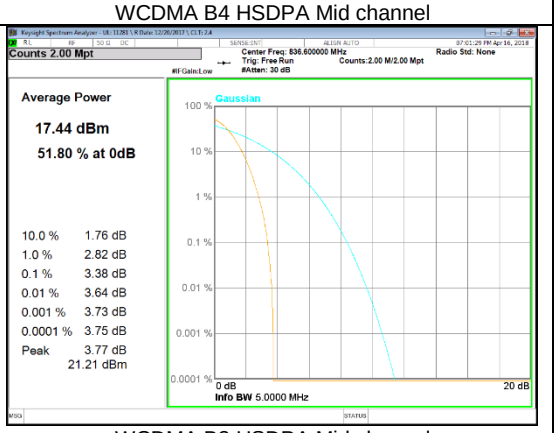
8.2. CONDUCTED PEAK TO AVERAGE PLOTS

WCDMA

WCDMA Band 5	 WCDMA B5 REL99 Mid channel	 WCDMA B5 HSDPA Mid channel
WCDMA Band 4	 WCDMA B4 REL99 Mid channel	 WCDMA B4 HSDPA Mid channel
WCDMA Band 2	 WCDMA B2 REL99 Mid channel	 WCDMA B2 HSDPA Mid channel

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9. LIMITS AND CONDUCTED RESULTS

9.1. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049

LIMITS

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 -26dB bandwidth was also measured and recorded.

(KDB 971168 D01 Power Meas License Digital Systems v03)

9.1.1. OCCUPIED BANDWIDTH RESULTS

WCDMA

Band	Mode	Channel	f [MHz]	99% BW [MHz]	26dB BW [MHz]
Band 5	REL99	4132	826.4	4.0728	4.624
		4183	836.6	4.0673	4.644
		4233	846.6	4.0769	4.649
	HSDPA	4132	826.4	4.0511	4.565
		4183	836.6	4.0498	4.563
		4233	846.6	4.0398	4.558
Band 4	REL99	1312	1712.4	4.0773	4.611
		1413	1732.6	4.0633	4.600
		1513	1752.6	4.0717	4.605
	HSDPA	1312	1712.4	4.0499	4.491
		1413	1732.6	4.0654	4.585
		1513	1752.6	4.0585	4.555
Band 2	REL99	9262	1852.4	4.0728	4.624
		9400	1880.0	4.0673	4.644
		9538	1907.6	4.0769	4.649
	HSDPA	9262	1852.4	4.0511	4.565
		9400	1880.0	4.0498	4.563
		9538	1907.6	4.0398	4.558

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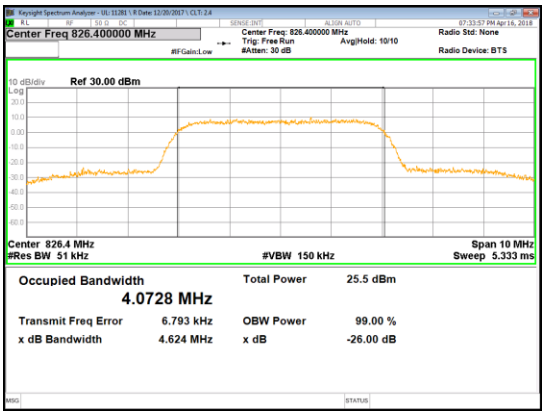
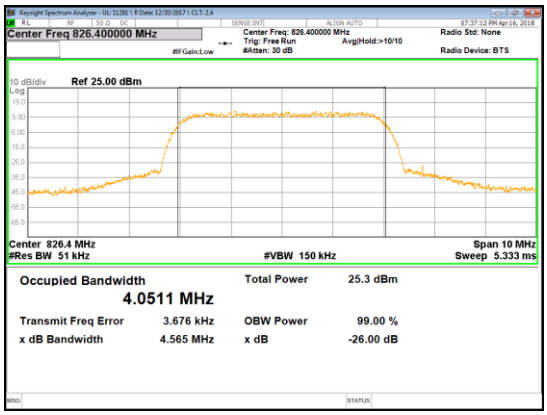
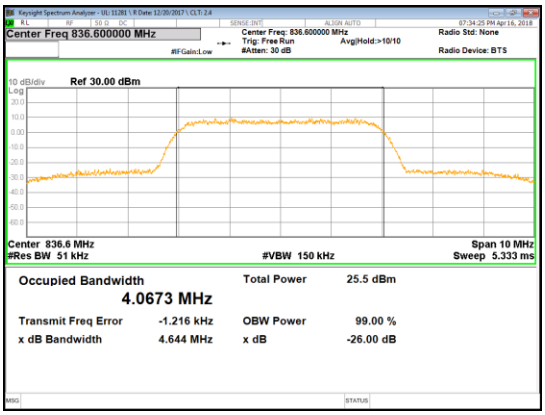
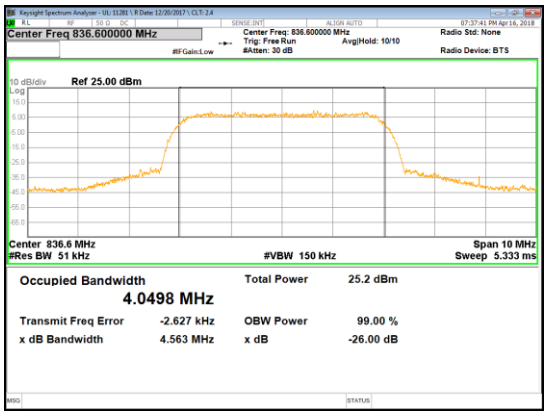
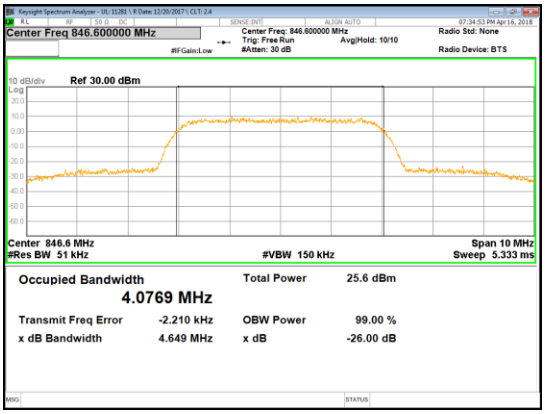
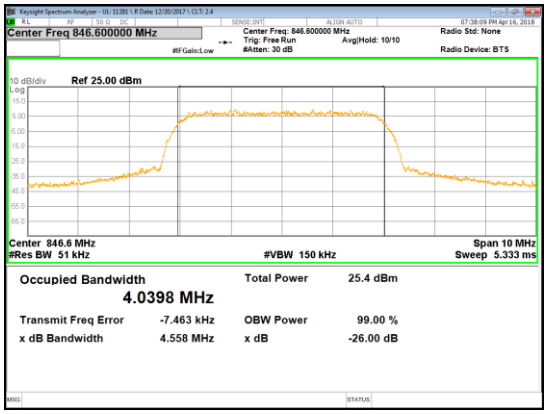
9.1.2. OCCUPIED BANDWIDTH PLOTS

WCDMA Band 5

Band 5	 REL99 Low channel	 HSDPA Low channel
	 REL99 Mid channel	 HSDPA Mid channel
	 REL99 High channel	 HSDPA High channel

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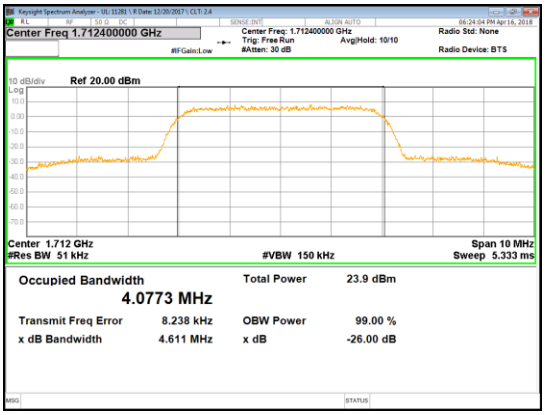
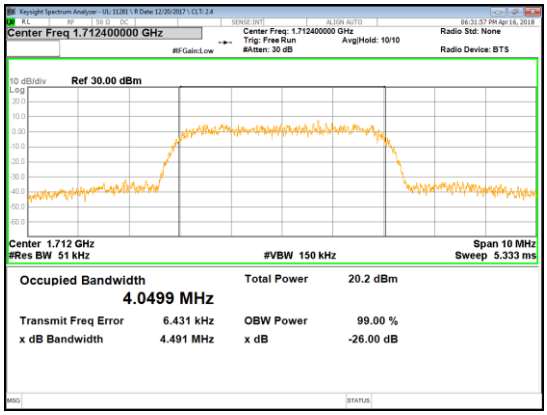
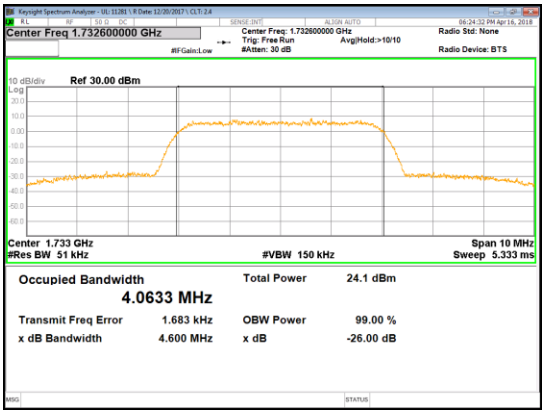
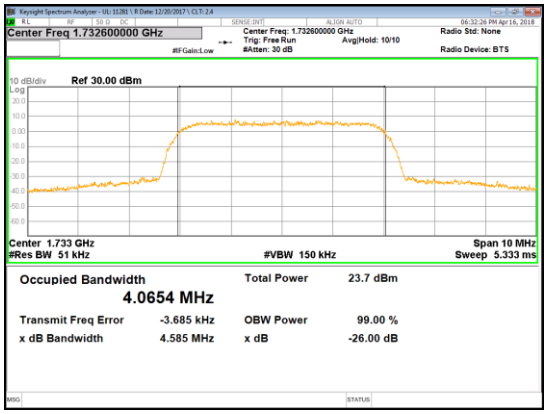
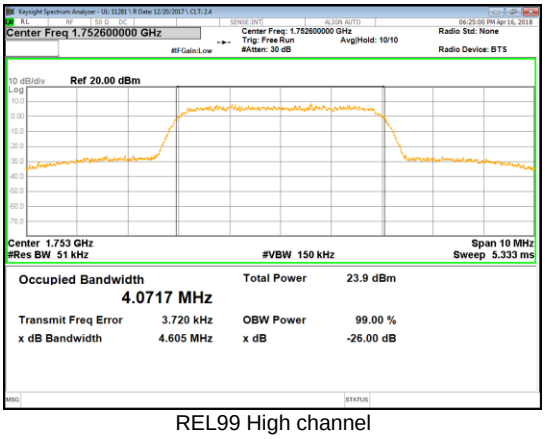
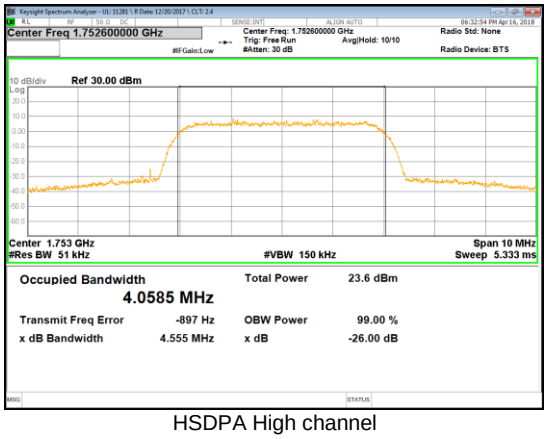
WCDMA Band 4

Band 4	 REL99 Low channel	 HSDPA Low channel
	 REL99 Mid channel	 HSDPA Mid channel
	 REL99 High channel	 HSDPA High channel

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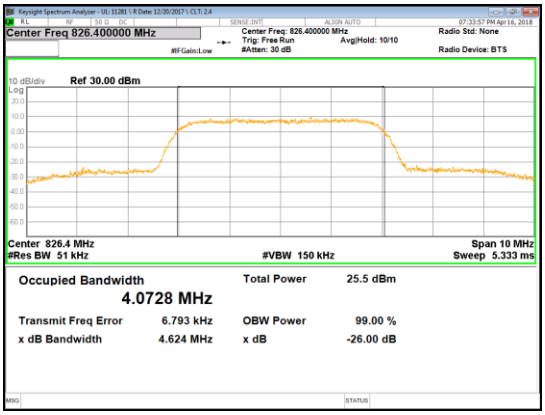
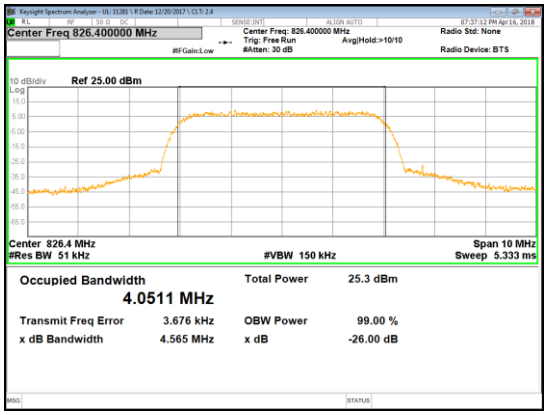
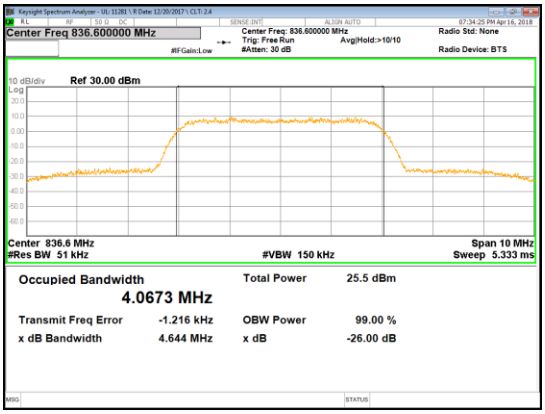
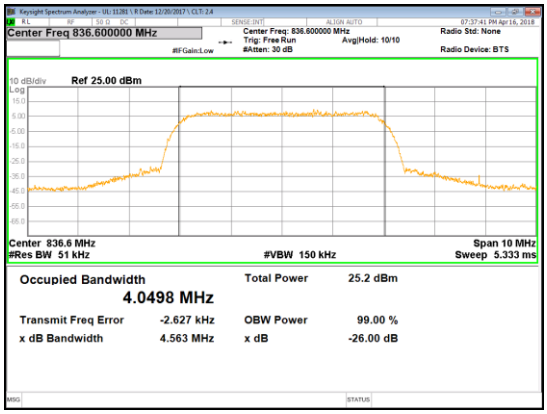
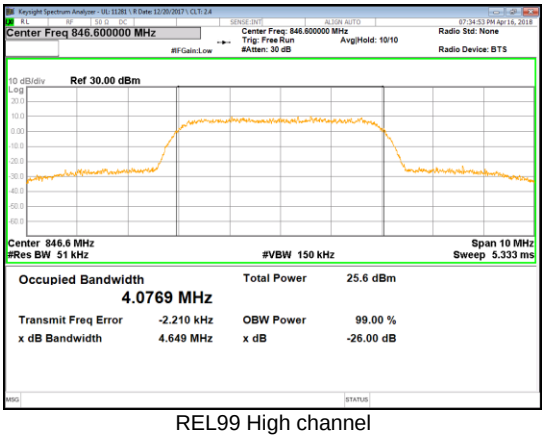
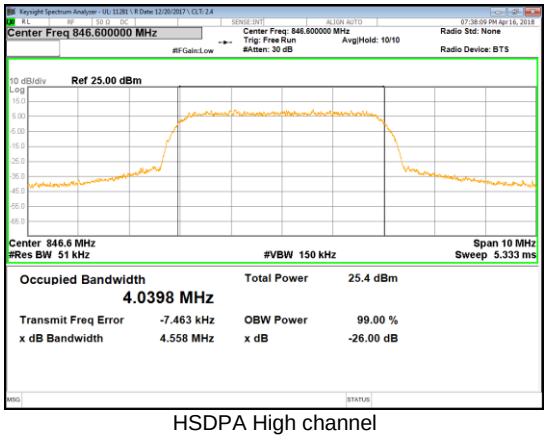
WCDMA Band 2

Band 2	 REL99 Low channel	 HSDPA Low channel
	 REL99 Mid channel	 HSDPA Mid channel
	 REL99 High channel	 HSDPA High channel

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9.2. BAND EDGE EMISSIONS

RULE PART(S)

§22.359, §24.238 and §27. 53 LIMITS

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.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03
The transmitter output was connected to a CMW500 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

WCDMA

a) Set the RBW = 1 ~ 1.5 % of OBW(Typically limited to a minimum RBW of 1% of the OBW)

b) Set VBW ≥ 3 × RBW;

c) Set span ≥ 1.5 times the OBW;

d) Sweep time = Auto;

e) Detector = RMS;

f) Ensure that the number of measurement points ≥ 2*Span/RBW;

g) Trace mode = Average (100);

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RESULTS

WCDMA

Band	Mode	Side	f [MHz]	Level [dBm]	Limit [dBm]
Band 5	REL99	Lower	824.000	-31.079	-13.00
		Upper	849.000	-30.205	
	HSDPA	Lower	824.000	-40.043	
		Upper	849.000	-40.594	
Band 4	REL99	Lower	1710.000	-32.446	
		Upper	1755.000	-34.707	
	HSDPA	Lower	1710.000	-37.658	
		Upper	1755.000	-38.569	
Band 2	REL99	Lower	1850.000	-35.365	
		Upper	1910.000	-36.274	
	HSDPA	Lower	1850.000	-37.585	
		Upper	1910.000	-40.225	

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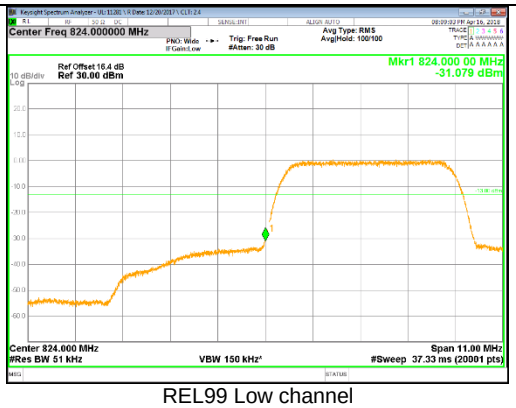
9.2.1. BAND EDGE PLOTS

WCDMA

Band 5



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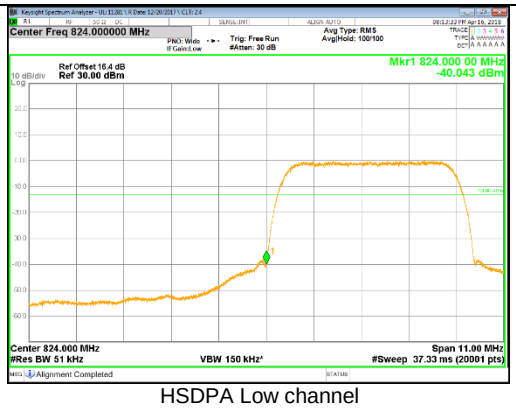

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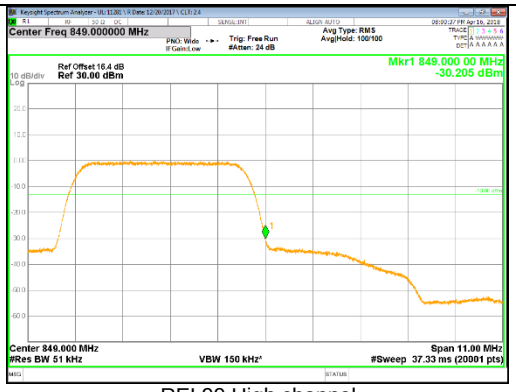

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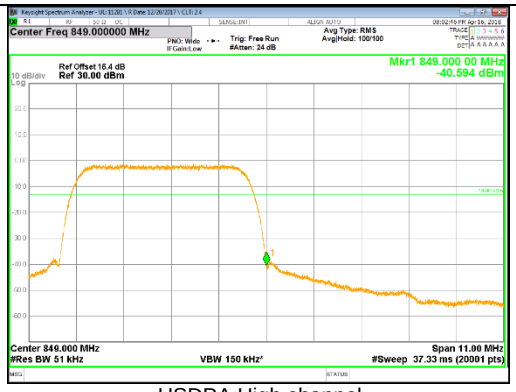
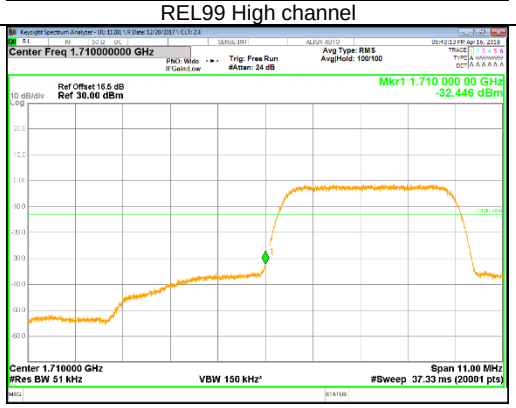


HSDPA High channel

Band 4



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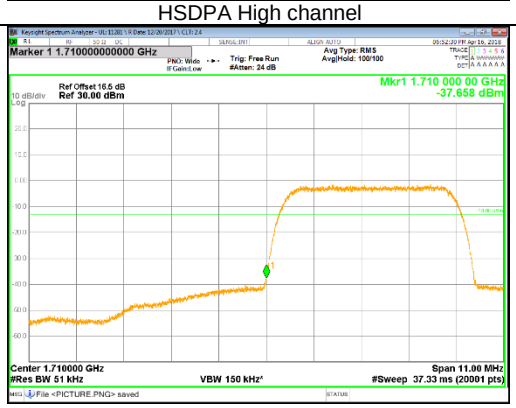

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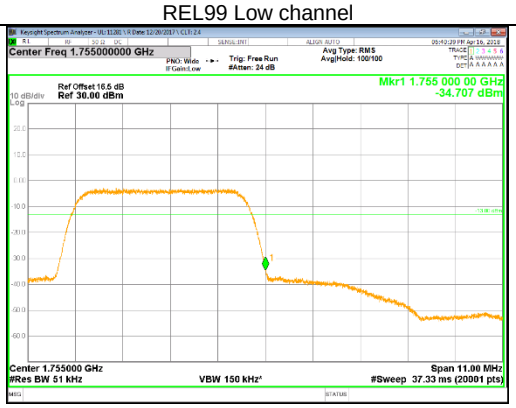

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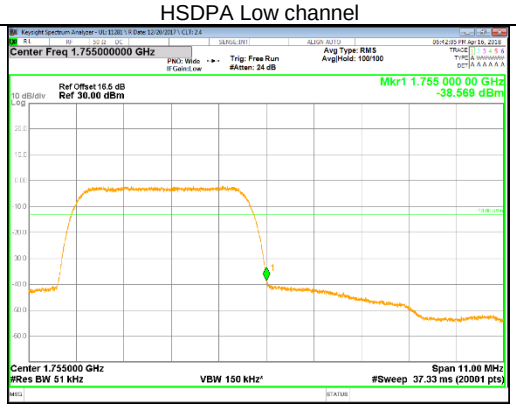

HSDPA High channel

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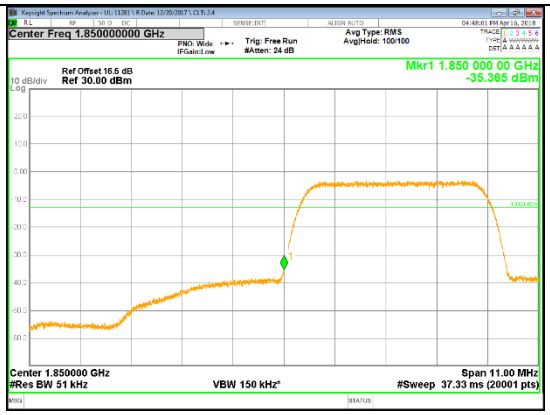
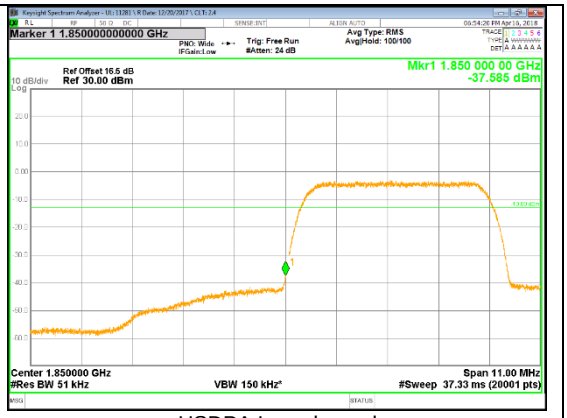
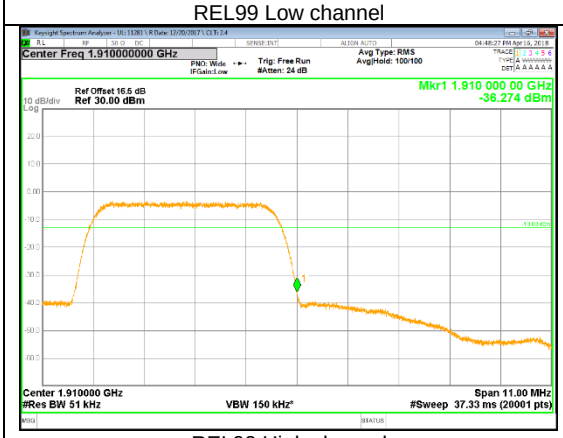
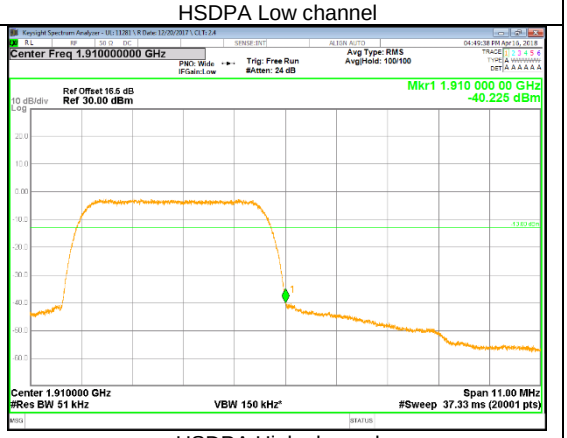
WCDMA

Band 2	 REL99 Low channel	 HSDPA Low channel
	 REL99 High channel	 HSDPA High channel

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10.3 OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §24.238 and §27. 53

LIMITS

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.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03
The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

a) Set the RBW = 100KHz for emission below 1GHz and 1MHz for emissions above 1GHz (Tests were performed 1MHz [Worst case], to sweep 1 time for all frequency range)

b) Set VBW ≥ 3 × RBW;

c) Set span ≥ 1.5 times the OBW;

d) Sweep time = auto couple;

e) Detector = peak;

f) Ensure that the number of measurement points = Max (40001);

g) Trace mode = max hold;

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RESULTS

WCDMA

Band	Mode	f [MHz]	Spurious [dBm]	Limit [dBm]
Band 5	REL99	826.4	-33.27	-13.00
		836.6	-32.94	
		846.6	-33.40	
	HSDPA	826.4	-32.67	
		836.6	-32.05	
		846.6	-33.30	
Band 4	REL99	1712.4	-32.78	
		1732.6	-32.80	
		1752.6	-32.79	
	HSDPA	1712.4	-32.02	
		1732.6	-32.71	
		1752.6	-32.79	
Band 2	REL99	1852.4	-32.40	
		1880.0	-33.11	
		1907.6	-32.11	
	HSDPA	1852.4	-32.70	
		1880.0	-32.65	
		1907.6	-32.06	

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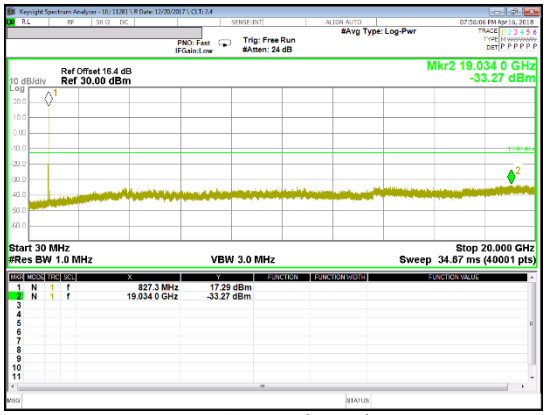
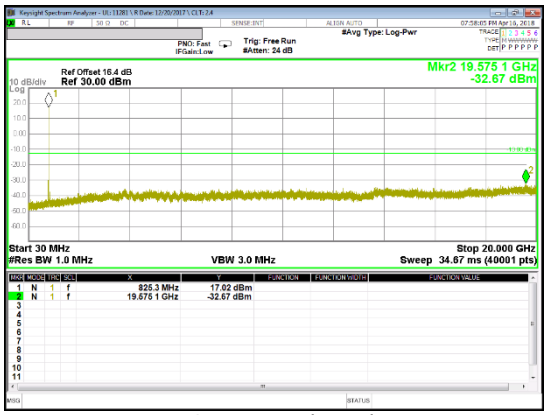
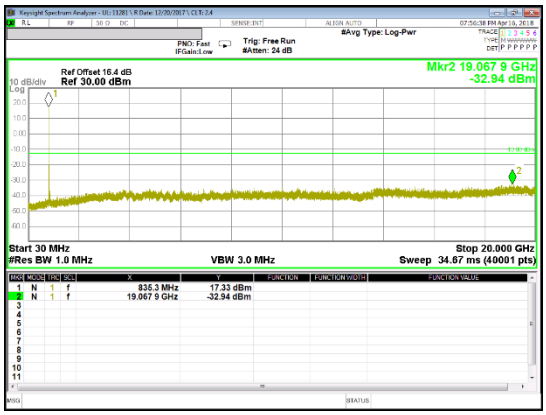
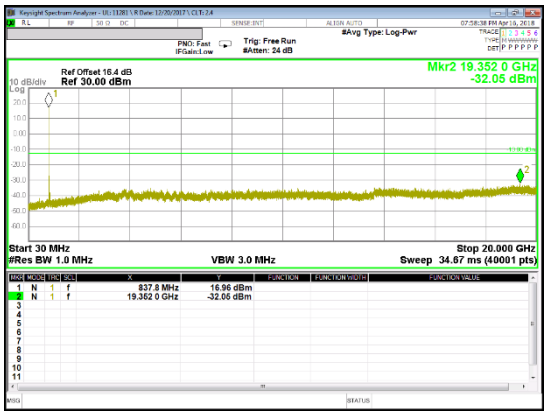
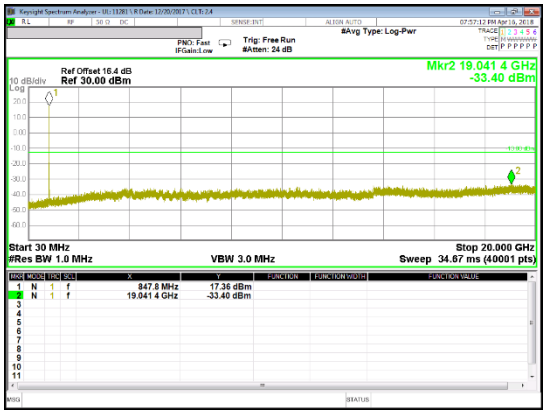
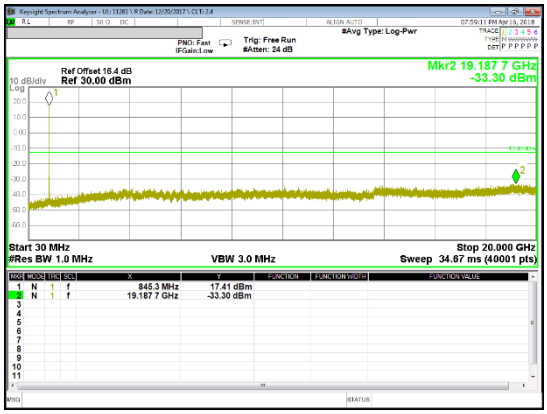
9.2.2. OUT OF BAND EMISSIONS PLOTS

WCDMA Band 5

Band 5	 REL99 Low channel	 HSDPA Low channel
	 REL99 Mid channel	 HSDPA Mid channel
	 REL99 High channel	 HSDPA High channel

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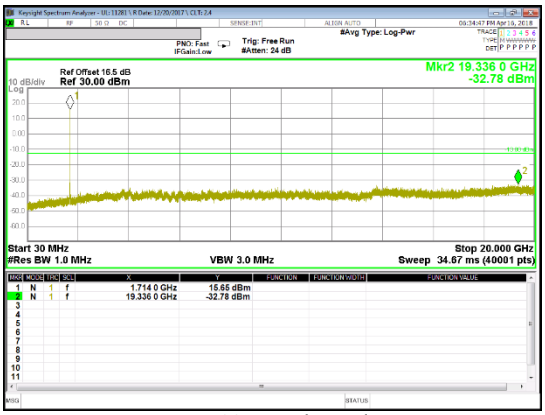
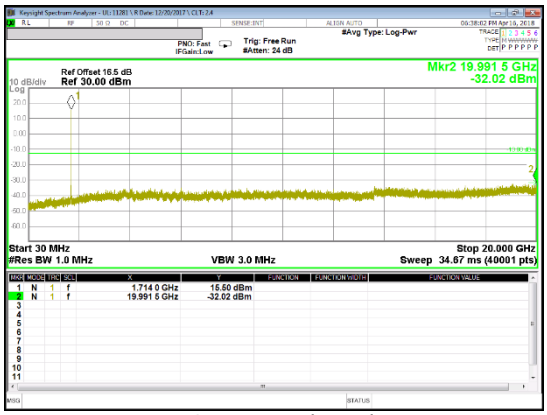
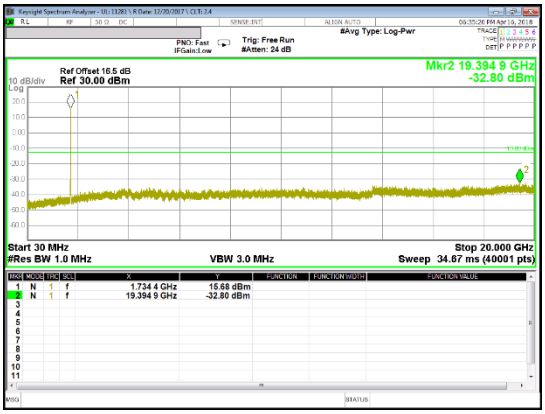
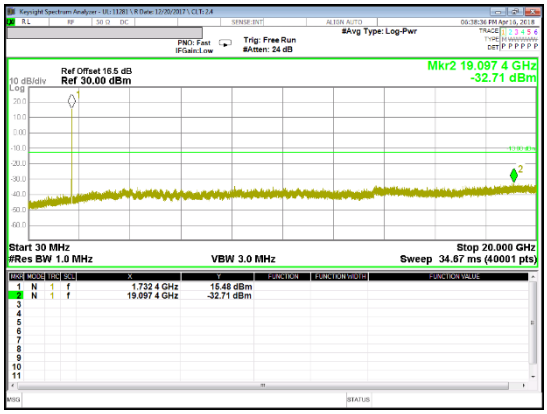
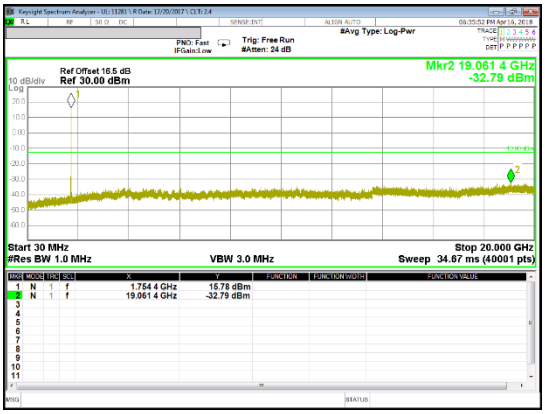
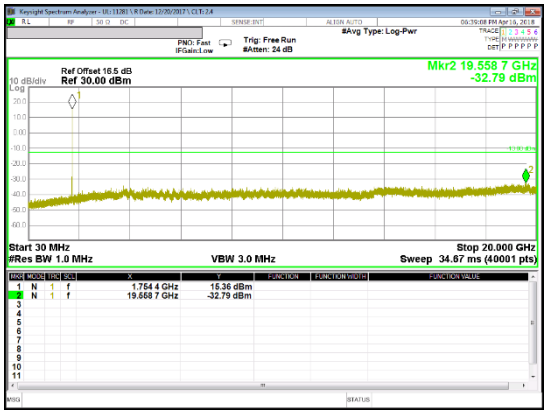
WCDMA Band 4

Band 4	 REL99 Low channel	 HSDPA Low channel
	 REL99 Mid channel	 HSDPA Mid channel
	 REL99 High channel	 HSDPA High channel

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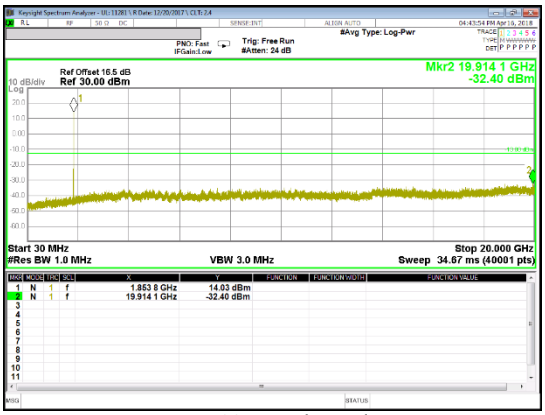
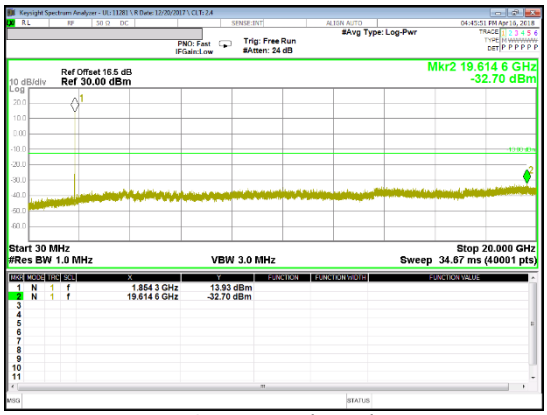
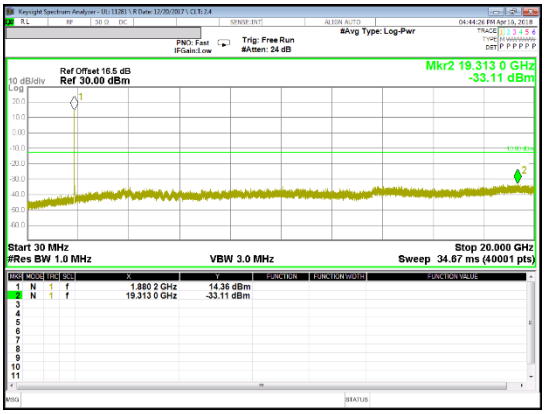
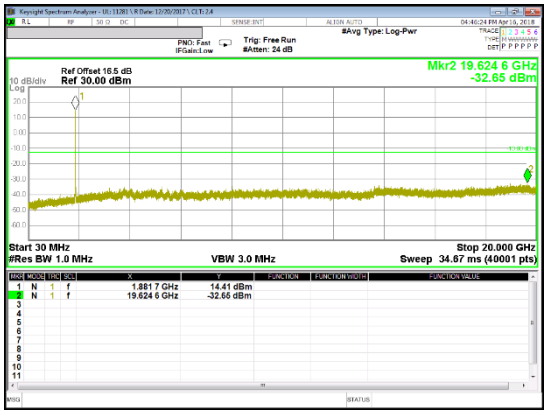
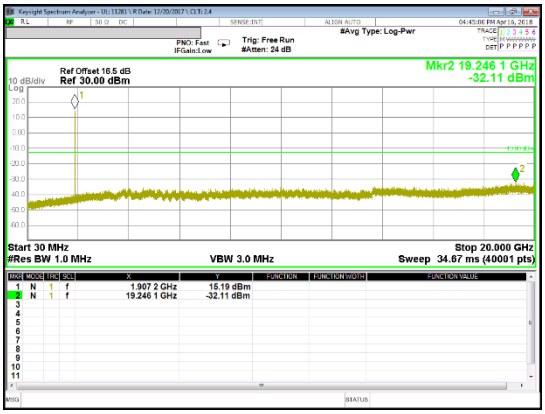
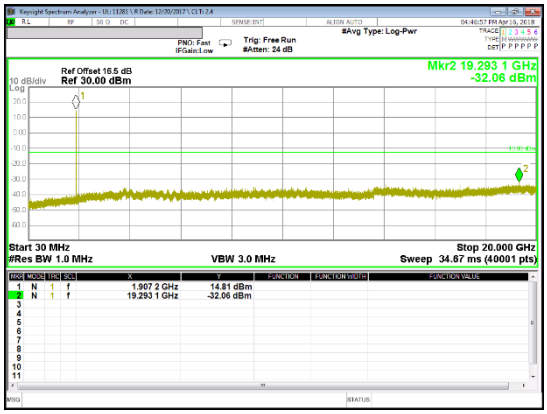
WCDMA Band 2

Band 2	 REL99 Low channel	 HSDPA Low channel
	 REL99 Mid channel	 HSDPA Mid channel
	 REL99 High channel	 HSDPA High channel

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9.3. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355, §24.235 and §27.54

LIMITS

§22.355 - The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations.

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

§27.54 - The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03

RESULTS

See the following pages.

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9.3.1. FREQUENCY STABILITY RESULTS

WCDMA Band 5, Channel 4183, Frequency 836.6 MHz

Reference Frequency: WCDMA Band 5 Mid Channel 836.6 MHz @ 20ºC				
Limit: +- 2.5 ppm = 2091.500 Hz				
Power Supply	**Environment**	**Frequency Deviation Measureed with Time Elapse**		
[Vdc]	**Temperature [*C]**	**[MHz]**	**Delta [ppm]**	**Limit [ppm]**
3.70	50	836.60000799	-0.001	2.5
3.70	40	836.60000693	0.001	2.5
3.70	30	836.60000795	-0.001	2.5
3.70	***20***	836.60000752	***0***	***2.5***
3.70	10	836.60000896	-0.002	2.5
3.70	0	836.60000706	0.001	2.5
3.70	-10	836.60000600	0.002	2.5
3.70	-20	836.60000693	0.001	2.5
3.70	-30	836.60000661	0.001	2.5

Reference Frequency: WCDMA Band 5 Mid Channel 836.6 MHz @ 20ºC				
Limit: +- 2.5 ppm = 2091.500 Hz				
Power Supply	**Environment**	**Frequency Deviation Measureed with Time Elapse**		
[Vdc]	**Temperature [*C]**	**[MHz]**	**Delta [ppm]**	**Limit [ppm]**
3.70	***20***	**836.60000709**	***0***	***2.5***
4.20	20	836.60000784	-0.001	2.5
3.50	20	836.60000614	0.001	2.5

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WCDMA Band 4, Channel 1413, Frequency 1732.6 MHz

Reference Frequency: WCDMA Band 4 Mid Channel 1732.6 MHz @ 20ºC				
Limit: +- 2.5 ppm = 4331.500 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.70	50	1732.60001158	0.001	2.5
3.70	40	1732.60001492	-0.001	2.5
3.70	30	1732.60001294	0.000	2.5
3.70	***20***	1732.60001356	***0***	***2.5***
3.70	10	1732.60001240	0.001	2.5
3.70	0	1732.60001599	-0.001	2.5
3.70	-10	1732.60001167	0.001	2.5
3.70	-20	1732.60001414	0.000	2.5
3.70	-30	1732.60001415	0.000	2.5

Reference Frequency: WCDMA Band 4 Mid Channel 1732.6 MHz @ 20ºC				
Limit: +- 2.5 ppm = 4331.500 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.70	***20***	**1732.60001299**	***0***	***2.5***
4.20	20	1732.60001321	0.000	2.5
3.50	20	1732.60001363	0.000	2.5

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WCDMA Band 2, Channel 9400, Frequency 1880.0 MHz

Reference Frequency: WCDMA Band 2 Mid Channel 1880.0 MHz @ 20ºC				
Limit: +- 2.5 ppm = 4700.000 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.70	50	1879.99998314	0.000	2.5
3.70	40	1879.99998485	0.000	2.5
3.70	30	1879.99998656	-0.001	2.5
3.70	***20***	1879.99998405	***0***	***2.5***
3.70	10	1879.99998385	0.000	2.5
3.70	0	1879.99998325	0.000	2.5
3.70	-10	1879.99998315	0.000	2.5
3.70	-20	1879.99998390	0.000	2.5
3.70	-30	1879.99998505	-0.001	2.5

Reference Frequency: WCDMA Band 2 Mid Channel 1880.0 MHz @ 20ºC				
Limit: +- 2.5 ppm = 4700.000 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
[Vdc]	Temperature [*C]	[MHz]	Delta [ppm]	Limit [ppm]
3.70	***20***	**1879.99998356**	***0***	***2.5***
4.20	20	1879.99998346	0.000	2.5
3.50	20	1879.99998283	0.000	2.5

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10. RADIATED TEST RESULTS

10.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913, §24.232 and §27.50

LIMITS

22.913(a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

24.232(c) - Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

27.50(d) - (4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.(Band 4)

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13dB.

TEST PROCEDURE

ANSI / TIA / EIA 603 E Clause 2.2.17; ESU40 setting reference to 971168 D01 v03

For peak power measurement with a ESU40:

a) Set the RBW ≥ OBW; b) Set VBW ≥ 3 × RBW; c) Set span ≥ 2 x RBW; d) Sweep time = auto couple; e) Detector = peak; f) Ensure that the number of measurement points ≥ span/RBW; g) Trace mode = max hold;

For average power measurement with a ESU40:

a) Set span to at least 1.5 times the OBW; b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz; c) Set VBW ≥ 3 x RBW; d) Set number of points in sweep ≥ 2 × span / RBW; e) Sweep time = auto-couple; f) Detector = RMS (power averaging); g) Use free run trigger If burst duty cycle ≥ 98; h) Use trigger to capture bursts If burst duty cycle < 98; i) Trace average at least 100 traces in power averaging (*i.e.*, RMS) mode. j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function.

TEST RESULTS

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10.1.1. ERP/EIRP Results

WCDMA

Band	Mode	Channel	f [MHz]	ERP / EIRP	
				[dBm]	[mW]
Band 5 *	REL99	4132	826.4	15.50	35.48
		4183	836.6	15.94	39.26
		4233	846.6	14.87	30.69
	HSDPA	4132	826.4	15.03	31.84
		4183	836.6	15.77	37.76
		4233	846.6	14.13	25.88
Band 4	REL99	1312	1712.4	12.05	16.03
		1413	1732.6	12.60	18.2
		1513	1752.6	12.63	18.32
	HSDPA	1312	1712.4	11.24	13.3
		1413	1732.6	12.26	16.83
		1513	1752.6	12.39	17.34
Band 2	REL99	9262	1852.4	12.80	19.05
		9400	1880.0	14.05	25.41
		9538	1907.6	13.38	21.78
	HSDPA	9262	1852.4	12.80	19.05
		9400	1880.0	13.18	20.8
		9538	1907.6	12.90	19.5

* Base on ERP.

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10.1.2. ERP/EIRP DATA

WCDMA Band 5

WCDMA

Band 5
REL99

(ERP)

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: HYUNDAI J-COMM. CO., LTD.
Project #: 4788319772
Date: 2017-01-22 ~ 2018-04-18
Test Engineer: Dexter Yun
Configuration: EUT+Adaptor
Location: Chamber 2
Mode: Rel99 Band 5 Fundamentals

Test Equipment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
826.40	15.68	V	1.0	-1.5	13.26	38.5	-25.2	
826.40	17.92	H	1.0	-1.5	15.50	38.5	-23.0	
Mid Ch								
836.60	15.65	V	1.0	-1.4	13.27	38.5	-25.2	
836.60	18.32	H	1.0	-1.4	15.94	38.5	-22.6	
High Ch								
846.60	14.83	V	1.0	-1.4	12.48	38.5	-26.0	
846.60	17.22	H	1.0	-1.4	14.87	38.5	-23.6	

WCDMA

Band 5
HSDPA

(ERP)

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: HYUNDAI J-COMM. CO., LTD.
Project #: 4788319772
Date: 2017-01-22 ~ 2018-04-18
Test Engineer: Dexter Yun
Configuration: EUT+Adaptor
Location: Chamber 2
Mode: HSDPA Band 5 Fundamentals

Test Equipment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
826.40	15.47	V	1.0	-1.5	13.05	38.5	-25.4	
826.40	17.45	H	1.0	-1.5	15.03	38.5	-23.5	
Mid Ch								
836.60	15.39	V	1.0	-1.4	13.01	38.5	-25.5	
836.60	18.15	H	1.0	-1.4	15.77	38.5	-22.7	
High Ch								
846.60	14.83	V	1.0	-1.4	12.48	38.5	-26.0	
846.60	16.48	H	1.0	-1.4	14.13	38.5	-24.4	

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WCDMA Band 4

WCDMA

Band 4
REL99

(EIRP)

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: HYUNDAI J-COMM. CO., LTD.
Project #: 4788319772
Date: 2017-01-22 ~ 2018-04-18
Test Engineer: Dexter Yun
Configuration: EUT+Adaptor
Location: Chamber 2
Mode: Rel99 Band 4 Fundamentals

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.40	4.97	V	4.3	9.5	10.12	30.0	-19.9	
1712.40	6.90	H	4.3	9.5	12.05	30.0	-18.0	
Mid Ch								
1732.60	4.42	V	4.3	9.5	9.62	30.0	-20.4	
1732.60	7.41	H	4.3	9.5	12.60	30.0	-17.4	
High Ch								
1752.60	6.17	V	4.4	9.6	11.41	30.0	-18.6	
1752.60	7.39	H	4.4	9.6	12.63	30.0	-17.4	

WCDMA

Band 4
HSDPA

(EIRP)

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: HYUNDAI J-COMM. CO., LTD.
Project #: 4788319772
Date: 2017-01-22 ~ 2018-04-18
Test Engineer: Dexter Yun
Configuration: EUT+Adaptor
Location: Chamber 2
Mode: HSDPA Band 4 Fundamentals

Test Equipment:
Receiving: Horn 3117[00168724], and Chamber 2 SMA Cables
Substitution: Horn 3115[00161451], 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1712.40	4.08	V	4.3	9.5	9.23	30.0	-20.8	
1712.40	6.09	H	4.3	9.5	11.24	30.0	-18.8	
Mid Ch								
1732.60	4.04	V	4.3	9.5	9.24	30.0	-20.8	
1732.60	7.07	H	4.3	9.5	12.26	30.0	-17.7	
High Ch								
1752.60	5.24	V	4.4	9.6	10.48	30.0	-19.5	
1752.60	7.15	H	4.4	9.6	12.39	30.0	-17.6	

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WCDMA Band 2

WCDMA

Band 2
REL99

(EIRP)

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: HYUNDAI J-COMM. CO., LTD.
Project #: 4788319772
Date: 2017-01-22 ~ 2018-04-18
Test Engineer: Dexter Yun
Configuration: EUT+Adaptor
Location: Chamber 2
Mode: Rel99 Band 5 Fundamentals

Test Equipment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
826.40	15.68	V	1.0	-1.5	13.26	38.5	-25.2	
826.40	17.92	H	1.0	-1.5	15.50	38.5	-23.0	
Mid Ch								
836.60	15.65	V	1.0	-1.4	13.27	38.5	-25.2	
836.60	18.32	H	1.0	-1.4	15.94	38.5	-22.6	
High Ch								
846.60	14.83	V	1.0	-1.4	12.48	38.5	-26.0	
846.60	17.22	H	1.0	-1.4	14.87	38.5	-23.6	

WCDMA

Band 2
HSDPA

(EIRP)

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: HYUNDAI J-COMM. CO., LTD.
Project #: 4788319772
Date: 2017-01-22 ~ 2018-04-18
Test Engineer: Dexter Yun
Configuration: EUT+Adaptor
Location: Chamber 2
Mode: HSDPA Band 5 Fundamentals

Test Equipment:
Receiving: VULB9163-749, and Chamber 2 SMA Cables
Substitution: Dipole 3121_DB4, 3m N-type Cable

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
826.40	15.47	V	1.0	-1.5	13.05	38.5	-25.4	
826.40	17.45	H	1.0	-1.5	15.03	38.5	-23.5	
Mid Ch								
836.60	15.39	V	1.0	-1.4	13.01	38.5	-25.5	
836.60	18.15	H	1.0	-1.4	15.77	38.5	-22.7	
High Ch								
846.60	14.83	V	1.0	-1.4	12.48	38.5	-26.0	
846.60	16.48	H	1.0	-1.4	14.13	38.5	-24.4	

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10.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917, §24.238 and §27. 53

LIMIT

Part 22.917(a) & Part 24.238(a) 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.

TEST PROCEDURE

ANSI / TIA / EIA 603 E Clause 2.2.12; ESU40 setting reference to 971168 D01 v03

For peak power measurement with a ESU40:

a) Set the RBW = 100 KHz for emission below 1GHz and 1MHz for emissions above 1GHz

b) Set VBW ≥ 3 × RBW;

c) Set span ≥ 1.5 times the OBW;

d) Sweep time = auto couple;

e) Detector = peak (RMS for average measurement);

f) Ensure that the number of measurement points ≥ span/RBW;

g) Trace mode = max hold;

RESULTS

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10.2.1. SPURIOUS RADIATION PLOTS

WCDMA Band 5

WCDMA

Band 5
REL99

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: HYUNDAI J-COMM. CO., LTD.
Project #: 4788319772
Date: 2017-01-22 ~ 2017-01-26
Test Engineer: Dexter Yun
Configuration: EUT+Adaptor
Location: Chamber 2
Mode: Rel99 Band 5 Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 826.4MHz									
1652.80	-10.1	V	3.0	38.2	1.0	-47.3	-13.0	-34.3	
2479.20	-14.5	V	3.0	38.8	1.0	-52.3	-13.0	-39.3	
3305.60	-13.9	V	3.0	39.4	1.0	-52.3	-13.0	-39.3	
1652.80	-9.1	H	3.0	38.2	1.0	-46.3	-13.0	-33.3	
2479.20	-16.0	H	3.0	38.8	1.0	-53.9	-13.0	-40.9	
3305.60	-13.8	H	3.0	39.4	1.0	-52.3	-13.0	-39.3	
Mid Ch, 836.6MHz									
1673.20	-11.2	V	3.0	38.2	1.0	-48.4	-13.0	-35.4	
2509.80	-14.6	V	3.0	38.8	1.0	-52.5	-13.0	-39.5	
3346.40	-14.4	V	3.0	39.5	1.0	-52.9	-13.0	-39.9	
1673.20	-10.9	H	3.0	38.2	1.0	-48.1	-13.0	-35.1	
2509.80	-15.5	H	3.0	38.8	1.0	-53.3	-13.0	-40.3	
3346.40	-14.4	H	3.0	39.5	1.0	-52.8	-13.0	-39.8	
High Ch, 846.6MHz									
1693.20	-8.8	V	3.0	38.2	1.0	-46.0	-13.0	-33.0	
2539.80	-13.7	V	3.0	38.9	1.0	-51.6	-13.0	-38.6	
3386.40	-14.0	V	3.0	39.5	1.0	-52.5	-13.0	-39.5	
1693.20	-10.3	H	3.0	38.2	1.0	-47.5	-13.0	-34.5	
2539.80	-15.1	H	3.0	38.9	1.0	-52.9	-13.0	-39.9	
3386.40	-14.4	H	3.0	39.5	1.0	-52.9	-13.0	-39.9	

Version 1.2.4 updated 8/24/17

WCDMA

Band 5
HSDPA

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: HYUNDAI J-COMM. CO., LTD.
Project #: 4788319772
Date: 2017-01-22 ~ 2017-01-26
Test Engineer: Dexter Yun
Configuration: EUT+Adaptor
Location: Chamber 2
Mode: HSDPA Band 5 Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 826.4MHz									
1652.80	-9.7	V	3.0	38.2	1.0	-47.0	-13.0	-34.0	
2479.20	-14.4	V	3.0	38.8	1.0	-52.2	-13.0	-39.2	
3305.60	-13.7	V	3.0	39.4	1.0	-52.2	-13.0	-39.2	
1652.80	-9.5	H	3.0	38.2	1.0	-46.8	-13.0	-33.8	
2479.20	-15.9	H	3.0	38.8	1.0	-53.7	-13.0	-40.7	
3305.60	-13.9	H	3.0	39.4	1.0	-52.3	-13.0	-39.3	
Mid Ch, 836.6MHz									
1673.20	-11.7	V	3.0	38.2	1.0	-49.0	-13.0	-36.0	
2509.80	-15.4	V	3.0	38.8	1.0	-53.2	-13.0	-40.2	
3346.40	-13.8	V	3.0	39.5	1.0	-52.3	-13.0	-39.3	
1673.20	-9.8	H	3.0	38.2	1.0	-47.1	-13.0	-34.1	
2509.80	-15.2	H	3.0	38.8	1.0	-53.1	-13.0	-40.1	
3346.40	-14.1	H	3.0	39.5	1.0	-52.6	-13.0	-39.6	
High Ch, 846.6MHz									
1693.20	-6.9	V	3.0	38.2	1.0	-44.1	-13.0	-31.1	
2539.80	-15.6	V	3.0	38.9	1.0	-53.5	-13.0	-40.5	
3386.40	-14.0	V	3.0	39.5	1.0	-52.4	-13.0	-39.4	
1693.20	-8.9	H	3.0	38.2	1.0	-46.2	-13.0	-33.2	
2539.80	-15.8	H	3.0	38.9	1.0	-53.6	-13.0	-40.6	
3386.40	-14.1	H	3.0	39.5	1.0	-52.6	-13.0	-39.6	

Version 1.2.4 updated 8/24/17

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WCDMA Band 4

WCDMA

Band 4
REL99

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: HYUNDAI J-COMM. CO., LTD.
Project #: 4788319772
Date: 2017-01-22 ~ 2017-01-26
Test Engineer: Dexter Yun
Configuration: EUT+Adaptor
Location: Chamber 2
Mode: Rel99 Band 4 Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1712.4MHz									
3424.80	-0.1	V	3.0	39.5	1.0	-38.6	-13.0	-25.6	
5137.20	-7.8	V	3.0	39.8	1.0	-46.6	-13.0	-33.6	
6849.60	-5.0	V	3.0	39.7	1.0	-43.7	-13.0	-30.7	
3424.80	4.3	H	3.0	39.5	1.0	-34.2	-13.0	-21.2	
5137.20	-7.9	H	3.0	39.8	1.0	-46.7	-13.0	-33.7	
6849.60	-5.5	H	3.0	39.7	1.0	-44.2	-13.0	-31.2	
Mid Ch, 1732.6MHz									
3465.20	-0.6	V	3.0	39.5	1.0	-39.1	-13.0	-26.1	
5197.80	-8.2	V	3.0	39.8	1.0	-47.0	-13.0	-34.0	
6930.40	-5.2	V	3.0	39.7	1.0	-43.8	-13.0	-30.8	
3465.20	4.6	H	3.0	39.5	1.0	-33.9	-13.0	-20.9	
5197.80	-7.8	H	3.0	39.8	1.0	-46.6	-13.0	-33.6	
6930.40	-4.8	H	3.0	39.7	1.0	-43.5	-13.0	-30.5	
High Ch, 1752.6MHz									
3505.20	-4.9	V	3.0	39.5	1.0	-43.4	-13.0	-30.4	
5257.80	-8.2	V	3.0	39.8	1.0	-47.0	-13.0	-34.0	
7010.40	-5.0	V	3.0	39.6	1.0	-43.6	-13.0	-30.6	
3505.20	3.3	H	3.0	39.5	1.0	-35.2	-13.0	-22.2	
5257.80	-8.5	H	3.0	39.8	1.0	-47.4	-13.0	-34.4	
7010.40	-5.1	H	3.0	39.6	1.0	-43.8	-13.0	-30.8	

Version 1.2.4 updated 8/24/17

WCDMA

Band 4
HSDPA

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: HYUNDAI J-COMM. CO., LTD.
Project #: 4788319772
Date: 2017-01-22 ~ 2017-01-26
Test Engineer: Dexter Yun
Configuration: EUT+Adaptor
Location: Chamber 2
Mode: HSDPA Band 4 Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1712.4MHz									
3424.80	-1.0	V	3.0	39.5	1.0	-39.5	-13.0	-26.5	
5137.20	-3.9	V	3.0	39.8	1.0	-42.7	-13.0	-29.7	
6849.60	-1.7	V	3.0	39.7	1.0	-40.4	-13.0	-27.4	
3424.80	5.2	H	3.0	39.5	1.0	-33.2	-13.0	-20.2	
5137.20	-4.2	H	3.0	39.8	1.0	-43.0	-13.0	-30.0	
6849.60	-1.2	H	3.0	39.7	1.0	-39.9	-13.0	-26.9	
Mid Ch, 1732.6MHz									
3465.20	-4.4	V	3.0	39.5	1.0	-42.9	-13.0	-29.9	
5197.80	-8.0	V	3.0	39.8	1.0	-46.8	-13.0	-33.8	
6930.40	-4.9	V	3.0	39.7	1.0	-43.6	-13.0	-30.6	
3465.20	4.1	H	3.0	39.5	1.0	-34.4	-13.0	-21.4	
5197.80	-7.2	H	3.0	39.8	1.0	-46.0	-13.0	-33.0	
6930.40	-4.7	H	3.0	39.7	1.0	-43.4	-13.0	-30.4	
High Ch, 1752.6MHz									
3505.20	-6.2	V	3.0	39.5	1.0	-44.7	-13.0	-31.7	
5257.80	-8.4	V	3.0	39.8	1.0	-47.2	-13.0	-34.2	
7010.40	-4.5	V	3.0	39.6	1.0	-43.1	-13.0	-30.1	
3505.20	2.9	H	3.0	39.5	1.0	-35.6	-13.0	-22.6	
5257.80	-8.3	H	3.0	39.8	1.0	-47.1	-13.0	-34.1	
7010.40	-4.7	H	3.0	39.6	1.0	-43.4	-13.0	-30.4	

Version 1.2.4 updated 8/24/17

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WCDMA Band 2

WCDMA

Band 2
REL99

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: HYUNDAI J-COMM. CO., LTD.
Project #: 4788319772
Date: 2017-01-22 ~ 2017-01-26
Test Engineer: Dexter Yun
Configuration: EUT+Adaptor
Location: Chamber 2
Mode: Rel99 Band 2 Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1852.4MHz									
3704.80	-9.5	V	3.0	39.7	1.0	-48.2	-13.0	-35.2	
5557.20	-11.2	V	3.0	39.9	1.0	-50.2	-13.0	-37.2	
7409.60	-10.7	V	3.0	39.4	1.0	-49.1	-13.0	-36.1	
3704.80	-13.7	H	3.0	39.7	1.0	-52.4	-13.0	-39.4	
5557.20	-12.3	H	3.0	39.9	1.0	-51.2	-13.0	-38.2	
7409.60	-11.6	H	3.0	39.4	1.0	-50.1	-13.0	-37.1	
Mid Ch, 1880MHz									
3760.00	-10.8	V	3.0	39.7	1.0	-49.5	-13.0	-36.5	
5640.00	-11.0	V	3.0	40.0	1.0	-50.0	-13.0	-37.0	
7520.00	-10.2	V	3.0	39.4	1.0	-48.6	-13.0	-35.6	
3760.00	-11.1	H	3.0	39.7	1.0	-49.8	-13.0	-36.8	
5640.00	-11.9	H	3.0	40.0	1.0	-50.9	-13.0	-37.9	
7520.00	-10.6	H	3.0	39.4	1.0	-49.0	-13.0	-36.0	
High Ch, 1907.6MHz									
3815.20	-11.3	V	3.0	39.7	1.0	-50.0	-13.0	-37.0	
5722.80	-11.4	V	3.0	40.0	1.0	-50.4	-13.0	-37.4	
7630.40	-10.7	V	3.0	39.3	1.0	-49.0	-13.0	-36.0	
3815.20	-13.5	H	3.0	39.7	1.0	-52.2	-13.0	-39.2	
5722.80	-12.2	H	3.0	40.0	1.0	-51.1	-13.0	-38.1	
7630.40	-10.1	H	3.0	39.3	1.0	-48.5	-13.0	-35.5	

Version 1.2.4 updated 8/24/17

WCDMA

Band 2
HSDPA

UL Verification Services, Inc.
Above 1GHz High Frequency Substitution Measurement

Company: HYUNDAI J-COMM. CO., LTD.
Project #: 4788319772
Date: 2017-01-22 ~ 2017-01-26
Test Engineer: Dexter Yun
Configuration: EUT+Adaptor
Location: Chamber 2
Mode: HSDPA Band 2 Harmonics

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1852.4MHz									
3704.80	-10.2	V	3.0	39.7	1.0	-48.9	-13.0	-35.9	
5557.20	-9.5	V	3.0	39.9	1.0	-48.4	-13.0	-35.4	
7409.60	-11.1	V	3.0	39.4	1.0	-49.6	-13.0	-36.6	
3704.80	-11.8	H	3.0	39.7	1.0	-50.4	-13.0	-37.4	
5557.20	-11.8	H	3.0	39.9	1.0	-50.7	-13.0	-37.7	
7409.60	-11.5	H	3.0	39.4	1.0	-49.9	-13.0	-36.9	
Mid Ch, 1880MHz									
3760.00	-11.5	V	3.0	39.7	1.0	-50.2	-13.0	-37.2	
5640.00	-11.3	V	3.0	40.0	1.0	-50.3	-13.0	-37.3	
7520.00	-10.6	V	3.0	39.4	1.0	-49.0	-13.0	-36.0	
3760.00	-13.4	H	3.0	39.7	1.0	-52.1	-13.0	-39.1	
5640.00	-12.1	H	3.0	40.0	1.0	-51.0	-13.0	-38.0	
7520.00	-10.6	H	3.0	39.4	1.0	-49.0	-13.0	-36.0	
High Ch, 1907.6MHz									
3815.20	-12.0	V	3.0	39.7	1.0	-50.7	-13.0	-37.7	
5722.80	-11.8	V	3.0	40.0	1.0	-50.8	-13.0	-37.8	
7630.40	-10.5	V	3.0	39.3	1.0	-48.8	-13.0	-35.8	
3815.20	-13.7	H	3.0	39.7	1.0	-52.4	-13.0	-39.4	
5722.80	-11.8	H	3.0	40.0	1.0	-50.8	-13.0	-37.8	
7630.40	-10.3	H	3.0	39.3	1.0	-48.7	-13.0	-35.7	

Version 1.2.4 updated 8/24/17

END OF REPORT

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