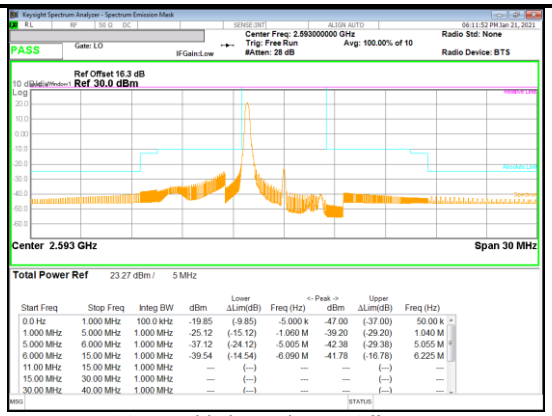
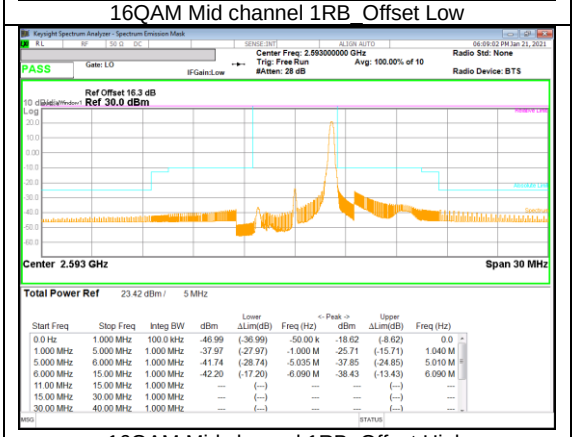
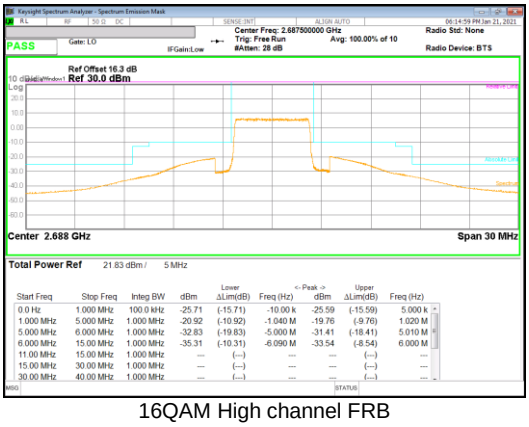
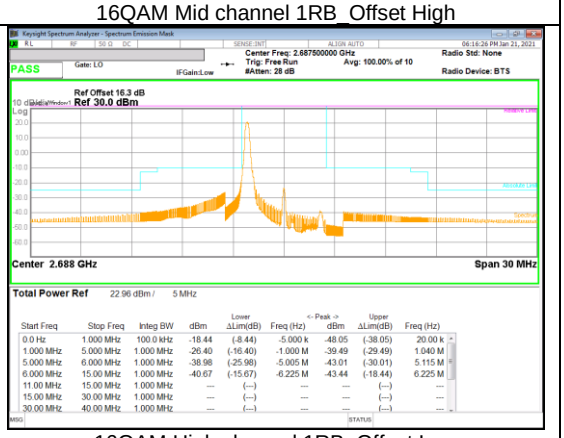
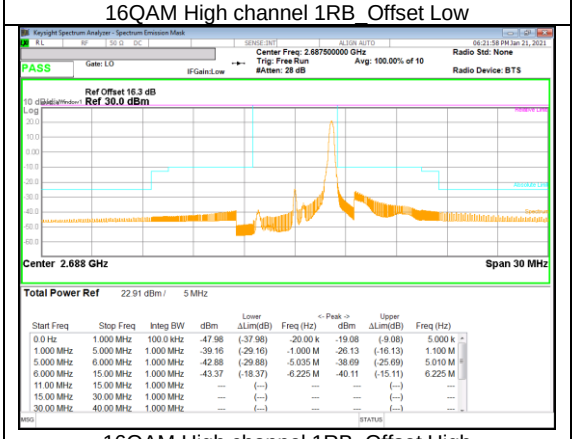
Band 41 5MHz 16QAM	 16QAM Mid channel FRB	 16QAM Mid channel 1RB_Offset Low
		 16QAM Mid channel 1RB_Offset High
	 16QAM High channel FRB	 16QAM High channel 1RB_Offset Low
		 16QAM High channel 1RB_Offset High

9.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §27.53

LIMITS

Part 27.53:

(m) (4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03r01
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 = RMS;

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

g) Trace mode = Average(WCDMA, LTE FDD), Max hold(GSM, LTE TDD);

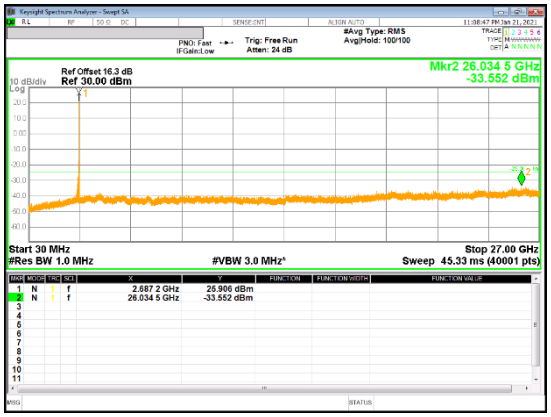
RESULTS

See the following pages.

NOTE : Please refer to section 5.4 for bandwidth and RB setting about LTE bands.

9.3.1. OUT OF BAND EMISSIONS RESULT

LTE Band 41

Band 41 10MHz	 QPSK Low channel	 QPSK Mid channel
	 QPSK High channel	

9.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §27.54

LIMITS

§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 v03r01

RESULTS

See the following pages.

NOTE : Test were performed each lowest or highest frequency on the modulation condition of more wide bandwidth.(Please refer to section 9.1.1 OBW results)

9.4.1. FREQUENCY STABILITY RESULTS

LTE Band 41 (Lowest Frequency:QPSK / Highest Frequency: QPSK)

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	2496.2574	2689.7438		
Extreme (50C)		2496.2574	2689.7439	93.8	0.036
Extreme (40C)		2496.2574	2689.7439	72.0	0.028
Extreme (30C)		2496.2574	2689.7439	54.8	0.021
Extreme (10C)		2496.2574	2689.7439	79.8	0.031
Extreme (0C)		2496.2574	2689.7439	77.7	0.030
Extreme (-10C)		2496.2574	2689.7439	74.8	0.029
Extreme (-20C)		2496.2574	2689.7439	81.6	0.031
Extreme (-30C)		2496.2574	2689.7439	87.0	0.034
20C	15%	2496.2574	2689.7439	82.4	0.032
	-15%	2496.2574	2689.7439	76.0	0.029
	End Point	2496.2574	2689.7439	71.6	0.028

9.5. RADIATED POWER (EIRP)

RULE PART(S)

FCC: §27.50

LIMITS

27.50:

(h) The following power limits shall apply in the BRS and EBS:

(2) Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

TEST PROCEDURE

ANSI / TIA / EIA 603 E Clause 2.2.17; ESU40 setting reference to 971168 D01 v03r01

For radiated output 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 = rms;

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

g) Trace mode = average(LTE);

TEST RESULTS

9.5.1. ERP/EIRP Results

LTE Band 41

Band	BW [MHz]	Mode	RB Size/ RB Offset	f [MHz]	ERP / EIRP	
					[dBm]	[mW]
Band 41	20	QPSK	1/49	2506.0	19.88	97.27
			1/49	2593.0	**20.83**	**121.06**
			1/49	2680.0	19.91	97.95
		16QAM	1/0	2506.0	19.67	92.68
			1/49	2593.0	**20.09**	**102.09**
			1/49	2680.0	19.68	92.90
	15	QPSK	1/0	2503.5	19.88	97.27
			1/37	2593.0	**20.55**	**113.50**
			1/37	2682.5	19.97	99.31
		16QAM	1/37	2503.5	19.89	97.50
			1/37	2593.0	19.96	99.08
			1/37	2682.5	**20.11**	**102.57**
	10	QPSK	1/25	2501.0	19.79	95.28
			1/25	2593.0	**22.05**	**160.32**
			1/25	2685.0	20.23	105.44
		16QAM	1/0	2501.0	19.85	96.61
			1/25	2593.0	**22.61**	**182.39**
			1/25	2685.0	20.02	100.46
	5	QPSK	1/12	2498.5	20.19	104.47
			1/24	2593.0	**20.68**	**116.95**
			1/12	2687.5	20.18	104.23
		16QAM	1/24	2498.5	19.61	91.41
			1/24	2593.0	**20.40**	**109.65**
			1/24	2687.5	20.02	100.46

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9.5.2. ERP/EIRP DATA

LTE Band 41

LTE Band 41 20MHz QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company:	Samsung
Project #:	4789713984
Date:	2021-01-21
Test Engineer:	22943
Configuration:	EUT, X-Position
Location:	Chamber 1
Mode:	LTE_QPSK Band 41 Fundamentals, 20MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-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								
2506.00	14.53	V	5.3	10.2	19.40	33.0	-13.6	
2506.00	15.00	H	5.3	10.2	19.88	33.0	-13.1	
Mid Ch								
2593.00	14.50	V	5.4	10.0	19.16	33.0	-13.8	
2593.00	16.18	H	5.4	10.0	20.83	33.0	-12.2	
High Ch								
2680.00	13.65	V	5.5	10.1	18.22	33.0	-14.8	
2680.00	15.34	H	5.5	10.1	19.91	33.0	-13.1	

LTE Band 41 20MHz 16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company:	Samsung
Project #:	4789713984
Date:	2021-01-21
Test Engineer:	22943
Configuration:	EUT, X-Position
Location:	Chamber 1
Mode:	LTE_16QAM Band 41 Fundamentals, 20MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-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								
2506.00	13.38	V	5.3	10.2	18.25	33.0	-14.7	
2506.00	14.79	H	5.3	10.2	19.67	33.0	-13.3	
Mid Ch								
2593.00	13.83	V	5.4	10.0	18.49	33.0	-14.5	
2593.00	15.44	H	5.4	10.0	20.09	33.0	-12.9	
High Ch								
2680.00	13.54	V	5.5	10.1	18.11	33.0	-14.9	
2680.00	15.11	H	5.5	10.1	19.68	33.0	-13.3	

LTE
Band 41
15MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789713984
Date: 2021-01-21
Test Engineer: 20882
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 41 Fundamentals, 15MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-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								
2503.50	13.59	V	5.3	10.2	18.48	33.0	-14.5	
2503.50	15.00	H	5.3	10.2	19.88	33.0	-13.1	
Mid Ch								
2593.00	14.72	V	5.4	10.0	19.38	33.0	-13.6	
2593.00	15.90	H	5.4	10.0	20.55	33.0	-12.4	
High Ch								
2682.50	13.75	V	5.5	10.1	18.31	33.0	-14.7	
2682.50	15.40	H	5.5	10.1	19.97	33.0	-13.0	

LTE
Band 41
15MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789713984
Date: 2021-01-21
Test Engineer: 20882
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 41 Fundamentals, 15MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-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								
2503.50	13.60	V	5.3	10.2	18.49	33.0	-14.5	
2503.50	15.01	H	5.3	10.2	19.89	33.0	-13.1	
Mid Ch								
2593.00	14.24	V	5.4	10.0	18.90	33.0	-14.1	
2593.00	15.31	H	5.4	10.0	19.96	33.0	-13.0	
High Ch								
2682.50	13.92	V	5.5	10.1	18.48	33.0	-14.5	
2682.50	15.54	H	5.5	10.1	20.11	33.0	-12.9	

LTE
Band 41
10MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789713984
Date: 2021-01-21
Test Engineer: 20882
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 41 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-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								
2501.00	13.88	V	5.3	10.2	18.77	33.0	-14.2	
2501.00	14.91	H	5.3	10.2	19.79	33.0	-13.2	
Mid Ch								
2593.00	16.94	V	5.4	10.0	21.60	33.0	-11.4	
2593.00	17.40	H	5.4	10.0	22.05	33.0	-10.9	
High Ch								
2685.00	14.04	V	5.5	10.1	18.60	33.0	-14.4	
2685.00	15.67	H	5.5	10.1	20.23	33.0	-12.8	

LTE
Band 41
10MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789713984
Date: 2021-01-21
Test Engineer: 20882
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 41 Fundamentals, 10MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-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								
2501.00	13.20	V	5.3	10.2	18.09	33.0	-14.9	
2501.00	14.97	H	5.3	10.2	19.85	33.0	-13.1	
Mid Ch								
2593.00	16.38	V	5.4	10.0	21.04	33.0	-12.0	
2593.00	17.96	H	5.4	10.0	22.61	33.0	-10.4	
High Ch								
2685.00	13.89	V	5.5	10.1	18.45	33.0	-14.5	
2685.00	15.46	H	5.5	10.1	20.02	33.0	-13.0	

LTE
Band 41
5MHz
QPSK

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789713984
Date: 2021-01-21
Test Engineer: 20882
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_QPSK Band 41 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-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								
2498.50	13.88	V	5.3	10.2	18.78	33.0	-14.2	
2498.50	15.29	H	5.3	10.2	20.19	33.0	-12.8	
Mid Ch								
2593.00	14.68	V	5.4	10.0	19.34	33.0	-13.7	
2593.00	16.03	H	5.4	10.0	20.68	33.0	-12.3	
High Ch								
2687.50	14.21	V	5.5	10.1	18.77	33.0	-14.2	
2687.50	15.62	H	5.5	10.1	20.18	33.0	-12.8	

LTE
Band 41
5MHz
16QAM

UL Verification Services, Inc.
High Frequency Substitution Measurement

Company: Samsung
Project #: 4789713984
Date: 2021-01-21
Test Engineer: 20882
Configuration: EUT, X-Position
Location: Chamber 1
Mode: LTE_16QAM Band 41 Fundamentals, 5MHz Bandwidth

Test Equpment:
Receiving: Horn 3117[00168717], and Chamber 1 SMA Cables
Substitution: Horn 3115[00167211], 8.5m SMA-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								
2498.50	13.66	V	5.3	10.2	18.56	33.0	-14.4	
2498.50	14.71	H	5.3	10.2	19.61	33.0	-13.4	
Mid Ch								
2593.00	14.47	V	5.4	10.0	19.13	33.0	-13.9	
2593.00	15.75	H	5.4	10.0	20.40	33.0	-12.6	
High Ch								
2687.50	13.90	V	5.5	10.1	18.46	33.0	-14.5	
2687.50	15.46	H	5.5	10.1	20.02	33.0	-13.0	

9.6. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §27. 53

LIMIT

Part 27.53:
(m) (4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

TEST PROCEDURE

ANSI / TIA / EIA 603 E Clause 2.2.12; ESU40 setting reference to 971168 D01 v03r01
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 = rms;
f) Ensure that the number of measurement points ≥ span/RBW;
g) Trace mode = Max hold(LTE Band41);;

RESULTS

See the following pages.
NOTE : Please refer to section 5.4 for bandwidth and RB setting about LTE bands.

9.6.1. SPURIOUS RADIATION PLOTS

LTE Band 41

LTE

Band 41

10MHz

QPSK

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

Company:	Samsung
Project #:	4789713984
Date:	2021-01-21
Test Engineer:	20882
Configuration:	EUT / AC Adapter / Earphone, X-Position
Location:	Chamber 1
Mode:	LTE_QPSK Band 41 Harmonics, 10MHz Bandwidth
Test Votage:	AC 120 V, 60 Hz

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 2501MHz									
5002.00	-9.4	V	3.0	45.5	1.0	-53.8	-25.0	-28.8	
7503.00	-4.5	V	3.0	44.1	1.0	-47.7	-25.0	-22.7	
10004.00	-11.9	V	3.0	42.2	1.0	-53.2	-25.0	-28.2	
12505.00	-9.9	V	3.0	43.3	1.0	-52.2	-25.0	-27.2	
15006.00	-7.1	V	3.0	45.4	1.0	-51.5	-25.0	-26.5	
5002.00	-8.3	H	3.0	45.5	1.0	-52.8	-25.0	-27.8	
7503.00	-4.0	H	3.0	44.1	1.0	-47.1	-25.0	-22.1	
10004.00	-12.1	H	3.0	42.2	1.0	-53.3	-25.0	-28.3	
12505.00	-9.5	H	3.0	43.3	1.0	-51.8	-25.0	-26.8	
15006.00	-7.6	H	3.0	45.4	1.0	-52.0	-25.0	-27.0	
Mid Ch, 2593MHz									
5186.00	11.9	V	3.0	45.4	1.0	-32.6	-25.0	-7.6	
7779.00	-2.3	V	3.0	44.0	1.0	-45.3	-25.0	-20.3	
10372.00	1.2	V	3.0	42.4	1.0	-40.1	-25.0	-15.1	
12965.00	-3.3	V	3.0	43.7	1.0	-45.9	-25.0	-20.9	
15558.00	-6.4	V	3.0	44.7	1.0	-50.1	-25.0	-25.1	
5186.00	8.7	H	3.0	45.4	1.0	-35.8	-25.0	-10.8	
7779.00	-5.1	H	3.0	44.0	1.0	-48.2	-25.0	-23.2	
10372.00	-5.4	H	3.0	42.4	1.0	-46.8	-25.0	-21.8	
12965.00	-3.1	H	3.0	43.7	1.0	-45.8	-25.0	-20.8	
15558.00	-6.5	H	3.0	44.7	1.0	-50.3	-25.0	-25.3	
High Ch, 2685MHz									
5370.00	13.7	V	3.0	45.4	1.0	-30.7	-25.0	-5.7	
8055.00	-0.8	V	3.0	43.9	1.0	-43.6	-25.0	-18.6	
10740.00	-0.9	V	3.0	42.5	1.0	-42.3	-25.0	-17.3	
13425.00	-3.6	V	3.0	44.1	1.0	-46.7	-25.0	-21.7	
16110.00	-6.1	V	3.0	44.1	1.0	-49.2	-25.0	-24.2	
5370.00	11.5	H	3.0	45.4	1.0	-32.9	-25.0	-7.9	
8055.00	-2.1	H	3.0	43.9	1.0	-44.9	-25.0	-19.9	
10740.00	-7.1	H	3.0	42.5	1.0	-48.6	-25.0	-23.6	
13425.00	-2.6	H	3.0	44.1	1.0	-45.7	-25.0	-20.7	
16110.00	-7.0	H	3.0	44.1	1.0	-50.0	-25.0	-25.0	