

NR Band n77(PC2) (3700 – 3980 MHz)



100MHz



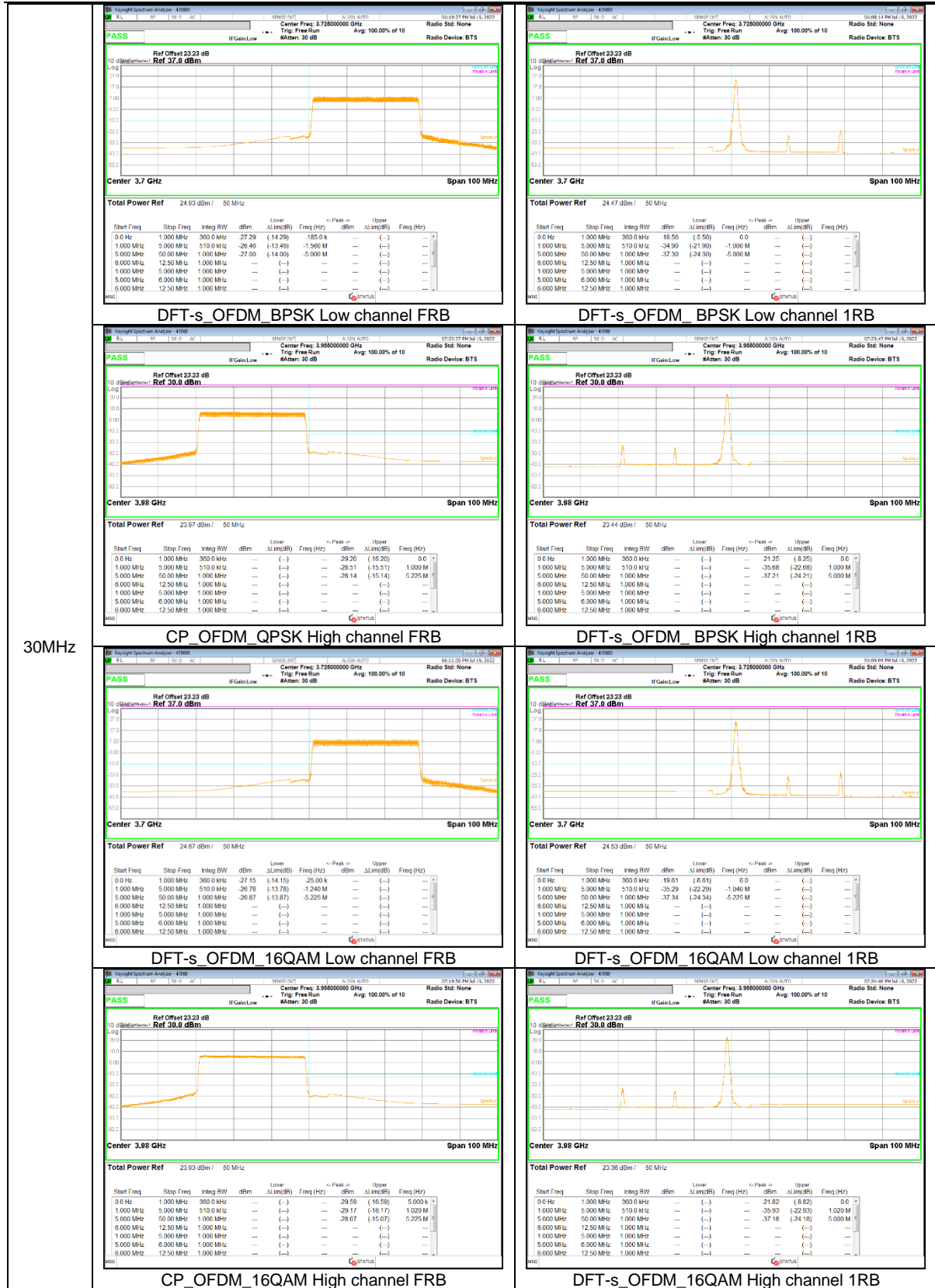
80MHz



60MHz



40MHz



30MHz



20MHz

9.3. OUT OF BAND EMISSIONS

RULE PART

FCC: §27.53

LIMITS

Part 27.53:

(l)(2) For mobile operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz.

(n)(2) For mobile operations in the 3450-3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz

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 $\geq 3 \times$ 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 = Max hold;

NOTE1

5G NR: All Waveforms (CP-OFDM vs DFT-s_OFDM) and modulations ($\pi/2$ BPSK, QPSK, 16QAM, 64QAM, 256QAM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

NOTE2

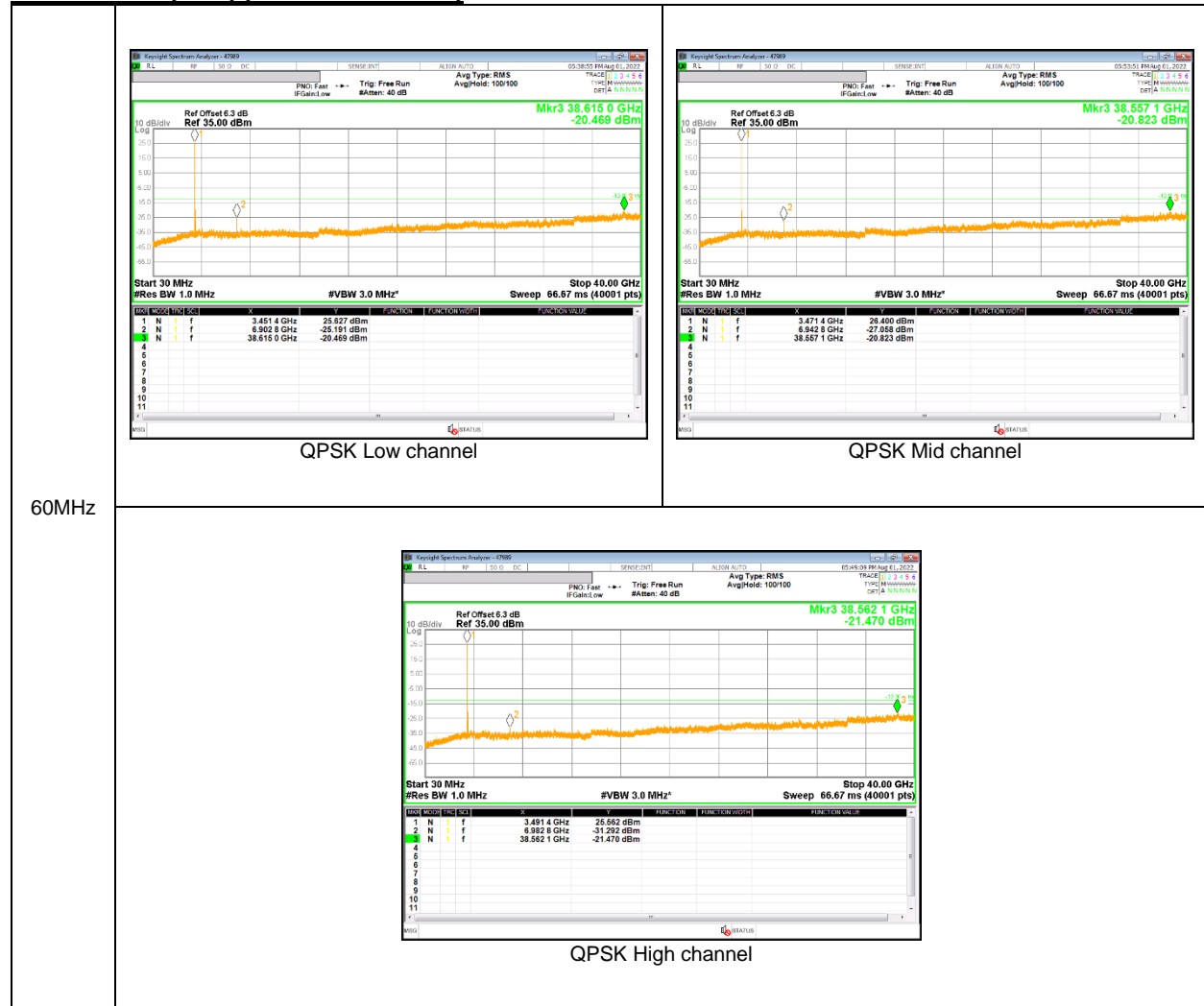
Please refer to section 5.4 for bandwidth and RB setting about 5G NR bands.

RESULTS

See the following pages.

9.3.1. OUT OF BAND EMISSIONS RESULT

NR Band n77(PC2) (3450 – 3550 MHz)



NR Band n77(PC2) (3700 – 3980 MHz)



9.4. FREQUENCY STABILITY

RULE PART

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

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)

RESULTS

See the following pages.

9.4.1. FREQUENCY STABILITY RESULTS

NR Band n77(PC2) (Lowest Frequency: QPSK / Highest Frequency: QPSK)

Limit		3450	3550	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	3450.8825	3549.0890	22.8	0.007
Extreme (50C)		3450.8825	3549.0890		
Extreme (40C)		3450.8825	3549.0890		
Extreme (30C)		3450.8825	3549.0890		
Extreme (10C)		3450.8825	3549.0890		
Extreme (0C)		3450.8825	3549.0890		
Extreme (-10C)		3450.8825	3549.0890		
Extreme (-20C)		3450.8825	3549.0890		
Extreme (-30C)		3450.8825	3549.0890		
20C		15%	3450.8825		
	-15%	3450.8825	3549.0890	24.6	0.007
	End Point	3450.8825	3549.0890	23.7	0.007
Limit		3700	3980	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	3700.8865	3979.1275	22.1	0.006
Extreme (50C)		3700.8865	3979.1275		
Extreme (40C)		3700.8865	3979.1275		
Extreme (30C)		3700.8865	3979.1275		
Extreme (10C)		3700.8865	3979.1275		
Extreme (0C)		3700.8865	3979.1275		
Extreme (-10C)		3700.8865	3979.1275		
Extreme (-20C)		3700.8865	3979.1275		
Extreme (-30C)		3700.8865	3979.1275		
20C		15%	3700.8865		
	-15%	3700.8865	3979.1275	17.7	0.005
	End Point	3700.8865	3979.1275	19.1	0.005

9.5. RADIATED POWER (EIRP)

RULE PART

FCC: §27.50

LIMITS

27.50:

(j)(3) Mobile and portable stations are limited to 1 Watt EIRP. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

(k)(3) Mobile devices are limited to 1Watt (30 dBm) EIRP. Mobile devices operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

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 v03r01

For radiated output power measurement with a ESU40:

- a) Set the RBW \geq OBW;
- b) Set VBW $\geq 3 \times$ RBW;
- c) Set span $\geq 2 \times$ RBW;
- d) Sweep time = auto couple or 1 second;
- e) Detector = rms;
- f) Ensure that the number of measurement points \geq span/RBW;
- g) Trace mode = average;

TEST RESULTS

See the following pages.

9.5.1. EIRP Results

5G NR n77(PC2) (3450 - 3550 MHz)

BW (MHz)	Modulation	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	Limit (dBm)	Delta (dB)	RB
20	QPSK	3460.02	24.22	H	6.32	10.60	28.50	707.95	30.00	-1.50	1/49
		3499.98	24.17	H	6.36	10.65	28.46	701.46	30.00	-1.54	1/1
		3540.00	23.99	H	6.39	10.71	28.31	677.64	30.00	-1.69	1/1
	16-QAM	3460.02	22.95	H	6.32	10.60	27.23	528.45	30.00	-2.77	1/49
		3499.98	23.34	H	6.36	10.65	27.63	579.43	30.00	-2.37	1/1
		3540.00	22.50	H	6.39	10.71	26.82	480.84	30.00	-3.18	1/1
30	QPSK	3465.00	24.26	H	6.32	10.61	28.54	714.50	30.00	-1.46	1/39
		3499.98	24.20	H	6.36	10.65	28.49	706.32	30.00	-1.51	1/1
		3535.02	23.87	H	6.38	10.70	28.20	660.69	30.00	-1.80	1/1
	16-QAM	3465.00	22.39	H	6.32	10.61	26.67	464.52	30.00	-3.33	1/39
		3499.98	22.37	H	6.36	10.65	26.66	463.45	30.00	-3.34	1/1
		3535.02	22.63	H	6.38	10.70	28.96	787.05	30.00	-1.04	1/1
40	QPSK	3407.01	24.29	H	6.33	10.61	28.57	719.45	30.00	-1.43	1/1
		3499.98	24.14	H	6.36	10.65	28.43	696.63	30.00	-1.57	1/1
		3529.98	23.76	H	6.39	10.69	28.06	639.73	30.00	-1.94	1/1
	16-QAM	3407.01	22.15	H	6.33	10.61	26.43	439.54	30.00	-3.57	1/1
		3499.98	22.05	H	6.36	10.65	26.34	430.53	30.00	-3.66	1/1
		3529.98	21.85	H	6.39	10.69	26.15	412.10	30.00	-3.85	1/1
60	QPSK	3480.00	24.70	H	6.34	10.62	28.98	790.68	30.00	-1.02	1/1
		3499.98	24.55	H	6.36	10.65	28.84	765.60	30.00	-1.16	1/1
		3519.99	24.62	H	6.37	10.68	28.92	779.83	30.00	-1.08	1/1
	16-QAM	3480.00	23.49	H	6.34	10.62	27.77	598.41	30.00	-2.23	1/1
		3499.98	23.41	H	6.36	10.65	27.70	588.84	30.00	-2.30	1/1
		3519.99	23.40	H	6.37	10.68	27.70	588.84	30.00	-2.30	1/1
80	QPSK	3490.02	24.39	H	6.35	10.63	28.68	737.90	30.00	-1.32	1/109
		3499.98	24.36	H	6.36	10.65	28.65	732.82	30.00	-1.35	1/109
		3510.00	24.28	H	6.37	10.66	28.57	719.45	30.00	-1.43	1/109
	16-QAM	3490.02	22.09	H	6.35	10.63	26.39	435.51	30.00	-3.61	1/109
		3499.98	22.10	H	6.36	10.65	26.39	435.51	30.00	-3.61	1/109
		3510.00	22.30	H	6.37	10.66	26.59	456.04	30.00	-3.41	1/109
100	QPSK	3499.98	24.22	H	6.36	10.65	28.51	709.58	30.00	-1.49	1/137
	16-QAM	3499.98	22.17	H	6.36	10.65	26.46	442.59	30.00	-3.54	1/1

5G NR n77(PC2) (3450 - 3550 MHz, SRS1)

BW (MHz)	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	Limit (dBm)	Delta (dB)
20	3460.02	18.13	H	6.32	10.60	22.41	174.18	30.00	-7.59
	3499.98	17.89	H	6.36	10.65	22.18	165.20	30.00	-7.82
	3540.00	17.42	H	6.38	10.71	21.75	149.62	30.00	-8.25
30									
40									
60									
80									
100									

5G NR n77(PC2) (3450 - 3550 MHz, SRS2)

BW (MHz)	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	Limit (dBm)	Delta (dB)
20									
30	3465.00	8.80	V	6.32	10.93	13.41	21.93	30.00	-16.59
	3499.98	10.09	V	6.36	10.94	14.67	29.31	30.00	-15.33
	3534.00	9.98	V	6.38	10.96	14.56	28.58	30.00	-15.44
40									
60									
80									
100									

5G NR n77(PC2) (3450 - 3550 MHz, SRS3)

BW (MHz)	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	Limit (dBm)	Delta (dB)
20	3460.02	17.87	H	6.32	10.60	22.15	164.06	30.00	-7.85
	3499.98	17.95	H	6.36	10.65	22.24	167.49	30.00	-7.76
	3540.00	17.92	H	6.38	10.71	22.25	167.88	30.00	-7.75
30									
40									
60									
80									
100									

5G NR n77(PC2) (3700 - 3980 MHz)

BW (MHz)	Modulation	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	Limit (dBm)	Delta (dB)	RB
20	QPSK	3710.01	21.46	H	6.54	10.80	25.72	373.25	30.00	-4.28	1/49
		3840.00	23.25	H	6.65	10.65	27.24	529.66	30.00	-2.76	1/1
		3969.99	21.83	H	6.77	10.62	25.69	370.68	30.00	-4.31	1/49
	16-QAM	3710.01	20.63	H	6.54	10.80	24.89	308.32	30.00	-5.11	1/49
		3840.00	22.65	H	6.65	10.65	26.64	461.32	30.00	-3.36	1/1
		3969.99	20.94	H	6.77	10.62	24.80	302.00	30.00	-5.20	1/49
30	QPSK	3715.02	21.60	H	6.55	10.80	25.85	384.59	30.00	-4.15	1/39
		3840.00	23.16	H	6.65	10.65	27.15	518.80	30.00	-2.85	1/1
		3964.98	24.64	H	6.77	10.62	28.49	706.32	30.00	-1.51	1/76
	16-QAM	3715.02	21.08	H	6.55	10.66	25.20	331.13	30.00	-4.80	1/39
		3840.00	22.57	H	6.65	10.31	26.23	419.76	30.00	-3.77	1/1
		3964.98	24.36	H	6.77	10.22	27.81	603.95	30.00	-2.19	1/76
40	QPSK	3720.02	22.20	H	6.55	10.79	26.44	440.55	30.00	-3.56	1/1
		3840.00	23.35	H	6.65	10.65	27.34	542.00	30.00	-2.66	1/53
		3960.00	24.59	H	6.77	10.62	28.44	698.23	30.00	-1.56	1/104
	16-QAM	3720.02	21.45	H	6.55	10.64	25.44	349.95	30.00	-4.56	1/1
		3840.00	22.64	H	6.65	10.31	26.30	426.58	30.00	-3.70	1/53
		3960.00	24.11	H	6.77	10.22	27.56	570.16	30.00	-2.44	1/104
60	QPSK	3730.02	22.56	H	6.56	10.78	26.77	475.34	30.00	-3.23	1/1
		3840.00	23.66	H	6.65	10.65	27.65	582.10	30.00	-2.35	1/1
		3949.98	25.01	H	6.75	10.62	28.88	772.68	30.00	-1.12	1/81
	16-QAM	3730.02	21.74	H	6.56	10.61	25.78	378.44	30.00	-4.22	1/1
		3840.00	23.06	H	6.65	10.31	26.72	469.89	30.00	-3.28	1/1
		3950.00	24.46	H	6.75	10.22	27.94	622.30	30.00	-2.06	1/81
80	QPSK	3740.01	22.49	H	6.58	10.77	26.68	465.59	30.00	-3.32	1/109
		3840.00	23.79	H	6.65	10.65	27.78	599.79	30.00	-2.22	1/1
		3939.99	24.63	H	6.74	10.62	28.50	707.95	30.00	-1.50	1/215
	16-QAM	3740.01	21.59	H	6.58	10.77	25.78	378.44	30.00	-4.22	1/109
		3840.00	22.98	H	6.65	10.65	26.97	497.74	30.00	-3.03	1/1
		3939.99	24.26	H	6.74	10.62	28.13	650.13	30.00	-1.87	1/215
100	QPSK	3750.00	23.00	H	6.58	10.75	27.17	521.19	30.00	-2.83	1/137
		3840.00	23.68	H	6.65	10.65	27.67	584.79	30.00	-2.33	1/1
		3930.00	24.27	H	6.75	10.62	28.14	651.63	30.00	-1.86	1/1
	16-QAM	3750.00	21.63	H	6.58	10.75	25.80	380.19	30.00	-4.20	1/271
		3840.00	22.28	H	6.65	10.65	26.27	423.64	30.00	-3.73	1/1
		3930.00	23.36	H	6.75	10.62	27.23	528.45	30.00	-2.77	1/1

5G NR n77(PC2) (3700 - 3980 MHz, SRS1)

BW (MHz)	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	Limit (dBm)	Delta (dB)
20	3710.01	16.08	H	6.55	10.80	20.34	108.14	30.00	-9.66
	3840.00	14.00	H	6.65	10.65	17.99	62.95	30.00	-12.01
	3969.99	12.65	H	6.77	10.62	16.51	44.77	30.00	-13.49
30									
40									
60									
80									
100									

5G NR n77(PC2) (3700 - 3980 MHz, SRS2)

BW (MHz)	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	Limit (dBm)	Delta (dB)
20	3710.01	9.72	H	6.55	10.80	13.98	25.00	30.00	-16.02
	3840.00	9.14	H	6.65	10.65	13.13	20.56	30.00	-16.87
	3969.99	9.96	H	6.77	10.62	13.82	24.10	30.00	-16.18
30									
40									
60									
80									
100									

5G NR n77(PC2) (3700 - 3980 MHz, SRS3)

BW (MHz)	f (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	Limit (dBm)	Delta (dB)
20									
30	3715.02	15.91	V	6.55	10.80	20.16	103.75	30.00	-9.84
	3840.00	13.32	V	6.65	10.65	17.31	53.83	30.00	-12.69
	3964.98	12.59	V	6.77	10.62	16.44	44.06	30.00	-13.56
40									
60									
80									
100									

9.6. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART

FCC:, §27. 53

LIMIT

Part 27.53

(l)(2) For mobile operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz. Compliance with this paragraph (l)(2) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be either one percent of the emission bandwidth of the fundamental emission of the transmitter or 350 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(n)(2) For mobile operations in the 3450-3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz. Compliance with this paragraph (n)(2) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed, but limited to a maximum of 200 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

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 $\geq 3 \times$ 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 \geq span/RBW;
- g) Trace mode = Maxhold;

NOTE1

5G NR: All Waveforms (CP-OFDM vs DFT-s_OFDM) and modulations ($\pi/2$ BPSK, QPSK, 16QAM, 64QAM, 256QAM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

NOTE2

Please refer to section 5.4 for bandwidth and RB setting about 5G NR bands.

9.6.1. SPURIOUS RADIATION PLOTS

NR Band n77(PC2) (3450 – 3550 MHz)

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement								
		Company:	Samsung							
		Project #:	4790430333							
		Date:	8/1/2022							
		Test Engineer:	26087							
		Configuration:	EUT / AC Adapter / Earphone, X-Position							
		Location:	Chamber 1							
		Mode:	5G NR_QPSK NR n77 LO Harmonics, 60MHz Bandwidth							
		Test Voltage:	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, 3480MHz										
7460.04	-3.2	V	3.0	44.5	1.0	-46.7	-13.0	-33.7		
11190.06	2.7	V	3.0	43.0	1.0	-39.3	-13.0	-26.3		
14920.08	5.1	V	3.0	45.7	1.0	-39.6	-13.0	-26.6		
7460.04	-3.6	H	3.0	44.5	1.0	-47.2	-13.0	-34.2		
11190.06	2.4	H	3.0	43.0	1.0	-39.6	-13.0	-26.6		
14920.08	5.4	H	3.0	45.7	1.0	-39.3	-13.0	-26.3		
Mid Ch, 3499.98MHz										
6999.96	-3.6	V	3.0	44.8	1.0	-47.3	-13.0	-34.3		
10499.94	2.9	V	3.0	42.7	1.0	-38.9	-13.0	-25.9		
13999.92	4.9	V	3.0	44.9	1.0	-39.0	-13.0	-26.0		
6999.96	-3.6	H	3.0	44.8	1.0	-47.4	-13.0	-34.4		
10499.94	2.6	H	3.0	42.7	1.0	-39.1	-13.0	-26.1		
13999.92	4.8	H	3.0	44.9	1.0	-39.1	-13.0	-26.1		
High Ch, 3519.99MHz										
7039.98	-3.6	V	3.0	44.7	1.0	-47.3	-13.0	-34.3		
10559.97	2.7	V	3.0	42.8	1.0	-39.1	-13.0	-26.1		
14079.96	5.5	V	3.0	45.0	1.0	-38.4	-13.0	-25.4		
7039.98	-3.7	H	3.0	44.7	1.0	-47.5	-13.0	-34.5		
10559.97	2.4	H	3.0	42.8	1.0	-39.4	-13.0	-26.4		
14079.96	5.4	H	3.0	45.0	1.0	-38.6	-13.0	-25.6		

60MHz
QPSK

NR Band n77(PC2) (3450 – 3550 MHz, SRS1)

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company: Samsung Project #: 4790430333 Date: 8/9/2022 Test Engineer: 25770 Configuration: EUT / AC Adapter / Earphone, X-Position Location: Chamber 1 Mode: 5G NR_n77 LO Harmonics, 20MHz Bandwidth Test Voltage: 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, 3460.02MHz									
6920.04	-5.7	V	3.0	44.8	1.0	-49.6	-13.0	-36.6	
10380.06	0.2	V	3.0	42.7	1.0	-41.6	-13.0	-28.6	
13840.08	2.4	V	3.0	44.8	1.0	-41.3	-13.0	-28.3	
6920.00	-5.9	H	3.0	44.8	1.0	-49.7	-13.0	-36.7	
10380.00	0.9	H	3.0	42.7	1.0	-40.8	-13.0	-27.8	
13840.00	2.6	H	3.0	44.8	1.0	-41.2	-13.0	-28.2	
Mid Ch, 3499.98MHz									
6999.96	-6.0	V	3.0	44.8	1.0	-49.8	-13.0	-36.8	
10499.94	-0.1	V	3.0	42.7	1.0	-41.9	-13.0	-28.9	
13999.92	2.5	V	3.0	44.9	1.0	-41.4	-13.0	-28.4	
6999.96	-6.2	H	3.0	44.8	1.0	-50.0	-13.0	-37.0	
10499.94	-0.2	H	3.0	42.7	1.0	-42.0	-13.0	-29.0	
13999.92	2.6	H	3.0	44.9	1.0	-41.3	-13.0	-28.3	
High Ch, 3540MHz									
7078.00	-5.9	V	3.0	44.7	1.0	-49.7	-13.0	-36.7	
10617.00	0.1	V	3.0	42.8	1.0	-41.7	-13.0	-28.7	
14156.00	2.4	V	3.0	45.0	1.0	-41.6	-13.0	-28.6	
7078.00	-6.0	H	3.0	44.7	1.0	-49.7	-13.0	-36.7	
10617.00	0.0	H	3.0	42.8	1.0	-41.8	-13.0	-28.8	
14156.00	2.6	H	3.0	45.0	1.0	-41.5	-13.0	-28.5	

20MHz

NR Band n77(PC2) (3450 – 3550 MHz, SRS2)

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement											
20MHz		Company: Samsung Project #: 4790430333 Date: 8/9/2022 Test Engineer: 26087 Configuration: EUT / AC Adapter / Earphone, X-Position Location: Chamber 2 Mode: 5G NR_n77 LO Harmonics, 30MHz Bandwidth Test Voltage: 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, 3465MHz									
		6930.00	-6.7	V	3.0	43.0	1.0	-48.6	-13.0	-35.6	
		10395.00	-1.0	V	3.0	41.3	1.0	-41.3	-13.0	-28.3	
		13860.00	3.1	V	3.0	43.2	1.0	-39.1	-13.0	-26.1	
		6930.00	-6.6	H	3.0	43.0	1.0	-48.5	-13.0	-35.5	
		10395.00	-0.8	H	3.0	41.3	1.0	-41.1	-13.0	-28.1	
		13860.00	3.2	H	3.0	43.2	1.0	-39.0	-13.0	-26.0	
		Mid Ch, 3499.98MHz									
6999.96	-6.6	V	3.0	42.9	1.0	-48.5	-13.0	-35.5			
10499.94	-0.7	V	3.0	41.3	1.0	-41.0	-13.0	-28.0			
13999.92	3.0	V	3.0	43.3	1.0	-39.3	-13.0	-26.3			
6999.96	-6.4	H	3.0	42.9	1.0	-48.3	-13.0	-35.3			
10499.94	-0.5	H	3.0	41.3	1.0	-40.8	-13.0	-27.8			
13999.92	3.1	H	3.0	43.3	1.0	-39.1	-13.0	-26.1			
High CH, 3535.02 MHz											
7070.04	-6.5	V	3.0	42.9	1.0	-48.4	-13.0	-35.4			
10605.06	-0.4	V	3.0	41.4	1.0	-40.7	-13.0	-27.7			
14140.08	3.6	V	3.0	43.4	1.0	-38.8	-13.0	-25.8			
7070.04	-6.4	H	3.0	42.9	1.0	-48.2	-13.0	-35.2			
10605.06	-0.2	H	3.0	41.4	1.0	-40.5	-13.0	-27.5			
14140.08	3.7	H	3.0	43.4	1.0	-38.7	-13.0	-25.7			

NR Band n77(PC2) (3450 – 3550 MHz, SRS3)

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
		Company: Samsung Project #: 4790430333 Date: 8/9/2022 Test Engineer: 25770 Configuration: EUT / AC Adapter / Earphone, X-Position Location: Chamber 1 Mode: 5G NR_n77 LO Harmonics, 20MHz Bandwidth Test Voltage: 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	
30MHz QPSK	Low Ch, 3460.02MHz										
		6920.04	-5.7	V	3.0	44.8	1.0	-49.6	-13.0	-36.6	
		10380.06	0.2	V	3.0	42.7	1.0	-41.5	-13.0	-28.5	
		13840.08	2.6	V	3.0	44.8	1.0	-41.2	-13.0	-28.2	
		6920.04	-5.9	H	3.0	44.8	1.0	-49.7	-13.0	-36.7	
		10380.06	0.0	H	3.0	42.7	1.0	-41.7	-13.0	-28.7	
		13840.08	2.6	H	3.0	44.8	1.0	-41.2	-13.0	-28.2	
	Mid Ch, 3499.98MHz										
		6999.96	-6.2	V	3.0	44.8	1.0	-49.9	-13.0	-36.9	
		10499.94	-0.3	V	3.0	42.7	1.0	-42.0	-13.0	-29.0	
		13999.92	2.4	V	3.0	44.9	1.0	-41.5	-13.0	-28.5	
		6999.96	-6.3	H	3.0	44.8	1.0	-50.1	-13.0	-37.1	
	10499.94	-0.2	H	3.0	42.7	1.0	-41.9	-13.0	-28.9		
	13999.92	2.6	H	3.0	44.9	1.0	-41.3	-13.0	-28.3		
High Ch, 3540MHz											
	7078.00	-5.9	V	3.0	44.7	1.0	-49.7	-13.0	-36.7		
	10617.00	0.0	V	3.0	42.8	1.0	-41.8	-13.0	-28.8		
	14156.00	2.4	V	3.0	45.0	1.0	-41.6	-13.0	-28.6		
	7078.00	-6.0	H	3.0	44.7	1.0	-49.8	-13.0	-36.8		
	10617.00	0.0	H	3.0	42.8	1.0	-41.8	-13.0	-28.8		
	14156.00	2.5	H	3.0	45.0	1.0	-41.5	-13.0	-28.5		

NR Band n77(PC2)(3700 – 3980 MHz)

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement										
		Company:	Samsung							
		Project #:	4790430333							
		Date:	8/1/2022							
		Test Engineer:	26087							
		Configuration:	EUT / AC Adapter / Earphone, X-Position							
		Location:	Chamber 1							
		Mode:	5G NR_QPSK NR n77 UP Harmonics, 30MHz Bandwidth							
		Test Voltage:	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, 3715.02MHz										
7430.04	-3.8	V	3.0	44.5	1.0	-47.3	-13.0	-34.3		
11145.06	3.0	V	3.0	43.0	1.0	-38.9	-13.0	-25.9		
14860.08	5.5	V	3.0	45.6	1.0	-39.1	-13.0	-26.1		
7430.04	-3.3	H	3.0	44.5	1.0	-46.8	-13.0	-33.8		
11145.06	3.4	H	3.0	43.0	1.0	-38.5	-13.0	-25.5		
14860.08	5.8	H	3.0	45.6	1.0	-38.8	-13.0	-25.8		
Mid Ch, 3840MHz										
7680.00	-3.6	V	3.0	44.4	1.0	-47.0	-13.0	-34.0		
11520.00	3.7	V	3.0	43.1	1.0	-38.4	-13.0	-25.4		
15360.00	5.8	V	3.0	45.0	1.0	-38.2	-13.0	-25.2		
7680.00	-3.7	H	3.0	44.4	1.0	-47.1	-13.0	-34.1		
11520.00	3.4	H	3.0	43.1	1.0	-38.6	-13.0	-25.6		
15360.00	5.7	H	3.0	45.0	1.0	-38.3	-13.0	-25.3		
High Ch, 3964.98MHz										
7929.96	-3.5	V	3.0	44.3	1.0	-46.8	-13.0	-33.8		
11894.94	4.2	V	3.0	43.2	1.0	-37.9	-13.0	-24.9		
15859.92	5.9	V	3.0	43.9	1.0	-37.1	-13.0	-24.1		
7929.96	-3.3	H	3.0	44.3	1.0	-46.6	-13.0	-33.6		
11894.94	3.9	H	3.0	43.2	1.0	-38.3	-13.0	-25.3		
15859.92	5.7	H	3.0	43.9	1.0	-37.3	-13.0	-24.3		

NR Band n77(PC2)(3700 – 3980 MHz, SRS1)

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company: Samsung Project #: 4790430333 Date: 8/9/2022 Test Engineer: 25770 Configuration: EUT / AC Adapter / Earphone, X-Position Location: Chamber 1 Mode: 5G NR_n77 UP Harmonics, 20MHz Bandwidth Test Voltage: 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, 3710.01MHz									
7420.02	-5.8	V	3.0	44.5	1.0	-49.4	-13.0	-36.4	
11130.03	0.7	V	3.0	43.0	1.0	-41.2	-13.0	-28.2	
14840.04	3.2	V	3.0	45.6	1.0	-41.4	-13.0	-28.4	
7420.02	-5.9	H	3.0	44.5	1.0	-49.4	-13.0	-36.4	
11130.03	0.7	H	3.0	43.0	1.0	-41.2	-13.0	-28.2	
14840.04	3.3	H	3.0	45.6	1.0	-41.4	-13.0	-28.4	
Mid Ch, 3840MHz									
7680.00	-5.8	V	3.0	44.4	1.0	-49.2	-13.0	-36.2	
11520.00	1.1	V	3.0	43.1	1.0	-40.9	-13.0	-27.9	
15360.00	3.5	V	3.0	45.0	1.0	-40.5	-13.0	-27.5	
7680.00	-5.9	H	3.0	44.4	1.0	-49.4	-13.0	-36.4	
11520.00	1.3	H	3.0	43.1	1.0	-40.8	-13.0	-27.8	
15360.00	3.6	H	3.0	45.0	1.0	-40.4	-13.0	-27.4	
High Ch, 3969.99MHz									
7939.98	-5.6	V	3.0	44.3	1.0	-48.9	-13.0	-35.9	
11909.97	1.8	V	3.0	43.2	1.0	-40.4	-13.0	-27.4	
15879.96	3.9	V	3.0	43.9	1.0	-39.0	-13.0	-26.0	
7939.98	-5.6	H	3.0	44.3	1.0	-48.8	-13.0	-35.8	
11909.97	2.0	H	3.0	43.2	1.0	-40.2	-13.0	-27.2	
15879.96	4.0	H	3.0	43.9	1.0	-38.9	-13.0	-25.9	

20MHz

NR Band n77(PC2)(3700 – 3980 MHz, SRS2)

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement											
20MHz		Company: Samsung Project #: 4790430333 Date: 8/9/2022 Test Engineer: 25770 Configuration: EUT / AC Adapter / Earphone, X-Position Location: Chamber 1 Mode: 5G NR_n77 UP Harmonics, 20MHz Bandwidth Test Voltage: 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, 3710.01MHz									
		7420.02	-5.7	V	3.0	44.5	1.0	-49.3	-13.0	-36.3	
		11130.03	0.5	V	3.0	43.0	1.0	-41.5	-13.0	-28.5	
		14840.04	3.2	V	3.0	45.6	1.0	-41.4	-13.0	-28.4	
		7420.02	-5.8	H	3.0	44.5	1.0	-49.4	-13.0	-36.4	
		11130.03	0.8	H	3.0	43.0	1.0	-41.2	-13.0	-28.2	
		14840.04	3.3	H	3.0	45.6	1.0	-41.4	-13.0	-28.4	
		Mid Ch, 3840MHz									
7680.00	-5.8	V	3.0	44.4	1.0	-49.2	-13.0	-36.2			
11520.00	1.2	V	3.0	43.1	1.0	-40.9	-13.0	-27.9			
15360.00	3.5	V	3.0	45.0	1.0	-40.5	-13.0	-27.5			
7680.00	-5.8	H	3.0	44.4	1.0	-49.2	-13.0	-36.2			
11520.00	1.5	H	3.0	43.1	1.0	-40.6	-13.0	-27.6			
15360.00	3.6	H	3.0	45.0	1.0	-40.4	-13.0	-27.4			
High Ch, 3969.99MHz											
7939.98	-5.6	V	3.0	44.3	1.0	-48.9	-13.0	-35.9			
11909.97	1.9	V	3.0	43.2	1.0	-40.3	-13.0	-27.3			
15879.96	3.9	V	3.0	43.9	1.0	-39.0	-13.0	-26.0			
7939.98	-5.5	H	3.0	44.3	1.0	-48.8	-13.0	-35.8			
11909.97	2.1	H	3.0	43.2	1.0	-40.1	-13.0	-27.1			
15879.96	3.9	H	3.0	43.9	1.0	-39.0	-13.0	-26.0			

NR Band n77(PC2)(3700 – 3980 MHz, SRS3)

UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement									
Company:		Samsung							
Project #:		4790430333							
Date:		8/9/2022							
Test Engineer:		19568							
Configuration:		EUT / AC Adapter / Earphone, Y-Position							
Location:		Chamber 1							
Mode:		5G NR_n77 UP Harmonics, 30MHz Bandwidth							
Test Voltage:		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, 3715.02MHz									
7430.04	-5.8	V	3.0	44.5	1.0	-49.3	-13.0	-36.3	
11145.06	0.6	V	3.0	43.0	1.0	-41.3	-13.0	-28.3	
14860.08	3.2	V	3.0	45.6	1.0	-41.5	-13.0	-28.5	
7430.04	-5.9	H	3.0	44.5	1.0	-49.4	-13.0	-36.4	
11145.06	0.7	H	3.0	43.0	1.0	-41.3	-13.0	-28.3	
14860.08	3.3	H	3.0	45.6	1.0	-41.4	-13.0	-28.4	
Mid Ch, 3840MHz									
7680.00	-5.9	V	3.0	44.4	1.0	-49.3	-13.0	-36.3	
11520.00	1.2	V	3.0	43.1	1.0	-40.9	-13.0	-27.9	
15360.00	3.4	V	3.0	45.0	1.0	-40.5	-13.0	-27.5	
7680.00	-5.8	H	3.0	44.4	1.0	-49.2	-13.0	-36.2	
11520.00	1.2	H	3.0	43.1	1.0	-40.9	-13.0	-27.9	
15360.00	3.5	H	3.0	45.0	1.0	-40.4	-13.0	-27.4	
High Ch, 3964.98MHz									
7929.96	-5.7	V	3.0	44.3	1.0	-49.0	-13.0	-36.0	
11894.94	1.8	V	3.0	43.2	1.0	-40.4	-13.0	-27.4	
15859.92	3.8	V	3.0	43.9	1.0	-39.1	-13.0	-26.1	
7929.96	-5.7	H	3.0	44.3	1.0	-48.9	-13.0	-35.9	
11894.94	2.0	H	3.0	43.2	1.0	-40.2	-13.0	-27.2	
15859.92	3.9	H	3.0	43.9	1.0	-39.0	-13.0	-26.0	

END OF REPORT