



EMC Technologies (NZ) Ltd
PO Box 68-307, Newton
Auckland 1145
New Zealand
Phone 09 360 0862
Fax 09 360 0861
E-Mail Address: aucklab@ihug.co.nz
Web Site: www.emctech.com.au

TEST REPORT

4RF SR+ SQ215M141 Point to Multi-point Digital Radio

tested to the

Code of Federal Regulations (CFR) 47

Part 90 –Private Land Mobile Services

for

4RF Limited

This Test Report is issued with the authority of:

A handwritten signature in black ink, appearing to read "Andrew Cutler".

Andrew Cutler - General Manager



All tests reported
herein have been
performed in accordance
with the laboratory's
scope of accreditation

Table of Contents

1. COMPLIANCE STATEMENT	3
2. RESULT SUMMARY	3
3. ATTESTATION	4
4. CLIENT INFORMATION	5
5. TEST SAMPLE DESCRIPTION	5
6. TEST RESULTS	7
7. TEST EQUIPMENT USED	37
8. ACCREDITATIONS	37
9. PHOTOGRAPHS	38

1. COMPLIANCE STATEMENT

The **4RF SR+ SQ215M141 Point to Multi-point Digital Radio** complies with the limits defined in 47 CFR Part 90 and 47 CFR Part 2 when tested in accordance with the test methods described in 47 CFR Part 2, ANSI C63.4, 2002 and ANSI / TIA-603-C, 2004.

2. RESULT SUMMARY

The results of testing carried out in March, April, July and August 2014 are summarised below.

Clause	Description	Result
90.203	Certification required	Noted
2.1046	RF power output	Noted
90.259 (a)	Power and antenna height limits	Noted
2.1049	Occupied bandwidth	Noted
2.202	Bandwidths	Noted
90.207	Types of emissions	Complies
90.209	Bandwidth limitations	Complies
90.210	Emission masks	Complies
2.1051	Spurious emissions at antenna terminals	Complies
2.1053	Field strength of spurious radiation	Complies
2.1055	Frequency stability	Noted
90.213	Frequency stability	Complies
1.1310	Radio frequency exposure limits	Complies

3. ATTESTATION

This report describes the tests and measurements performed for the purpose of determining compliance with the specification with the following conditions:

The client selected the test sample.

The report relates only to the sample tested.

This report does not contain corrections or erasures.

Measurement uncertainties with statistical confidence intervals of 95% are shown below test results. Both Class A and Class B uncertainties have been accounted for, as well as influence uncertainties where appropriate.

All compliance statements have been made with respect of the specification limit with no reference to the measurement uncertainty.

In addition this equipment has been tested in accordance with the requirements contained in the appropriate Commission regulations.

To the best of my knowledge, these tests were performed using measurement procedures that are consistent with industry or Commission standards and demonstrate that the equipment complies with the appropriate standards.

I further certify that the necessary measurements were made by EMC Technologies NZ Ltd, 47 MacKelvie Street, Grey Lynn, Auckland, New Zealand.



Andrew Cutler
General Manager
EMC Technologies NZ Ltd

4. CLIENT INFORMATION

Company Name 4RF Limited

Address 26 Glover Street
Ngauranga
Wellington

Country New Zealand

Contact Mr Paul Young

5. TEST SAMPLE DESCRIPTION

Brand Name Aprisa SR+

Model Number SQ215M141

Product Point to Multi Point Digital Radio

Manufacturer 4RF Limited

Manufactured in New Zealand

Designed in New Zealand

Serial Numbers -

FCC ID UIPSQ215M141

The sample tested has the following specifications:

Rated Transmitter Output Power

5.0 Watts (37.0 dBm)

Transmitter FCC frequency range

Part 90: 216 - 217 MHz, 217 - 220 MHz and 220 – 222 MHz

Test frequencies

Channel	Frequency (MHz)	Power (Watts)	Spacing (kHz)
1	216.575	5.0	12.5, 25.0 & 50.0
2	217.575	2.0	12.5, 25.0 & 50.0
3	219.575	2.0	12.5, 25.0 & 50.0
4	221.000	5.0	15.0

Modes of operation

G1D and D1D emissions designators have been applied when the transmitter uses 12.5, 15.0, 25.0 and 50 kHz channel spacing.

G1D emission designator is applied when QPSK modulation is utilised

D1D emission designator is applied when 16QAM and 64QAM modulation is utilised

Power Supply

The equipment is powered using an external DC supply.

Standard Temperature and Humidity

Temperature: +15°C to + 30°C maintained.

Relative Humidity: 20% to 75% observed.

Standard Test Power Source

Nominal Voltage: 13.8 V dc.

Standard Test Voltage: 13.8 V dc.

Extreme Temperature

High Temperature: + 50°C maintained.

Low Temperature: - 30°C maintained.

Extreme Test Voltages

High Voltage: 30.0 Vdc

Low Voltage: 10.0 Vdc

6. TEST RESULTS

RF power output

Measurements were carried out at the RF output terminals of the transmitter using a 30 dB power attenuator and a 50 Ω dummy load.

Measurements were carried out when the transmitter was not being modulated.

Testing was carried out at 5 watts (37 dBm) for the band 216 – 217 MHz.

Frequency (MHz)	Voltage (Vdc)	Rated (dBm)	Measured (dBm)
216.575	10.0	37.0	36.5
216.575	13.8	37.0	36.5
216.575	30.0	37.0	36.5

Testing was carried out at 2 watts (33 dBm) for the band 217 – 220 MHz

Frequency (MHz)	Voltage (Vdc)	Rated (dBm)	Measured (dBm)
217.575	10.0	33.0	32.9
217.575	13.8	33.0	32.9
217.575	30.0	33.0	32.9

Testing was carried out at 5 watts (37 dBm) for the band 220 – 220 MHz.

Frequency (MHz)	Voltage (Vdc)	Rated (dBm)	Measured (dBm)
221.000	10.0	37.0	36.4
221.000	13.8	37.0	36.4
221.000	30.0	37.0	36.4

Limit:

90.259 (a) (4) In the 217-220 MHz band, the maximum transmitter output power is 2 watts.

The maximum antenna height above average terrain (HAAT) is 152 m (500 feet).

Result: Complies

Measurement Uncertainty: ± 0.5 dB

Part 90.207 – Emission types:

The following emission types are used:

- G1D digital data when QPSK modulation is utilised
- D1D digital data when 16QAM or 64QAM modulation is utilised

Part 90.209 – Bandwidth limitations (216 – 217 and 217 – 220 MHz bands):

The authorised bandwidth is taken to be the necessary bandwidth.

Measurements have been made to verify the declared bandwidth.

The occupied bandwidth has been measured and compared against the occupied bandwidth declared by the client.

Measurements have been made of each modulation type using a spectrum analyser operating in peak hold mode and a 30 dB attenuator.

Initially power measurements are made using a resolution bandwidth of 120 kHz.

This level is used as a reference level on the spectrum analyser.

The resolution bandwidth is then changed to 100 Hz and the reference level minus 23 dB (99%) absolute bandwidth points determined.

Nominal Frequency: 217.575 MHz

Emission	Channel (kHz)	Measured (kHz)	Authorised Bandwidth (kHz)
QPSK	12.5	10.750	11.25
16QAM	12.5	10.350	11.25
64QAM	12.5	9.975	11.25
QPSK	25.0	17.750	20.0
16QAM	25.0	17.300	20.0
64QAM	25.0	16.750	20.0
QPSK	50.0	39.000	45.0
16QAM	50.0	39.000	45.0
64QAM	50.0	38.625	45.0

Result: Complies.

Part 90.209 – Bandwidth limitations (220 – 222 MHz band):

The authorised bandwidth is taken to be the necessary bandwidth.

Measurements have been made to verify the declared bandwidth.

The occupied bandwidth has been measured and compared against the occupied bandwidth declared by the client.

90.733 (e) allows three (3) contiguous channels to form channels greater than 5 kHz.

Measurements have been made of each modulation type using a spectrum analyser operating in peak hold mode and a 30 dB attenuator.

Initially power measurements are made using a resolution bandwidth of 120 kHz.

This level is used as a reference level on the spectrum analyser.

The resolution bandwidth is then changed to 100 Hz and the reference level minus 23 dB (99%) absolute bandwidth points determined.

Nominal Frequency: 221.000 MHz

Emission	Channel Spacing (kHz)	Measured (kHz)	Authorised Bandwidth (kHz)
QPSK	15.0	11.750	12.0
16QAM	15.0	11.600	12.0
64QAM	15.0	11.150	12.0

Result: Complies.

Spectrum Masks (216 – 217 and 217 – 220 MHz bands).

Part 90.210 states all equipment operating in other bands equipment designed to operate with a must meet the requirements of Emission Mask B or C, as applicable.

Mask B has been applied as the transmitter has an audio low pass filter.

The transmitter can operate in the band 217-220 MHz using an authorised bandwidth of 11.25 kHz and channel spacing of 12.5 kHz and an authorised bandwidth of 20 kHz and a channel spacing of 25 kHz.

Measurements have been made of each modulation type using a spectrum analyser operating in peak hold mode and a 30 dB attenuator.

Initially power measurements are made using a resolution bandwidth of 120 kHz.

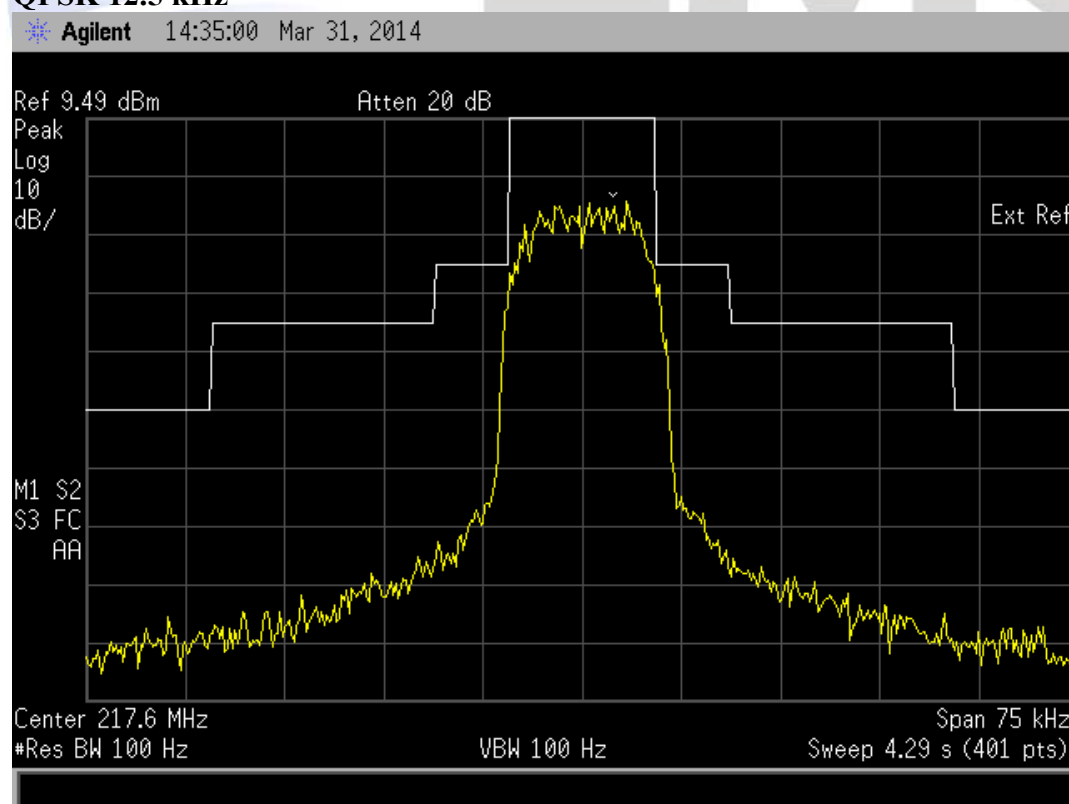
This level is used as a reference level on the spectrum analyser.

The resolution bandwidth is then changed and the reference level minus 23 dB (99%) absolute bandwidth points determined.

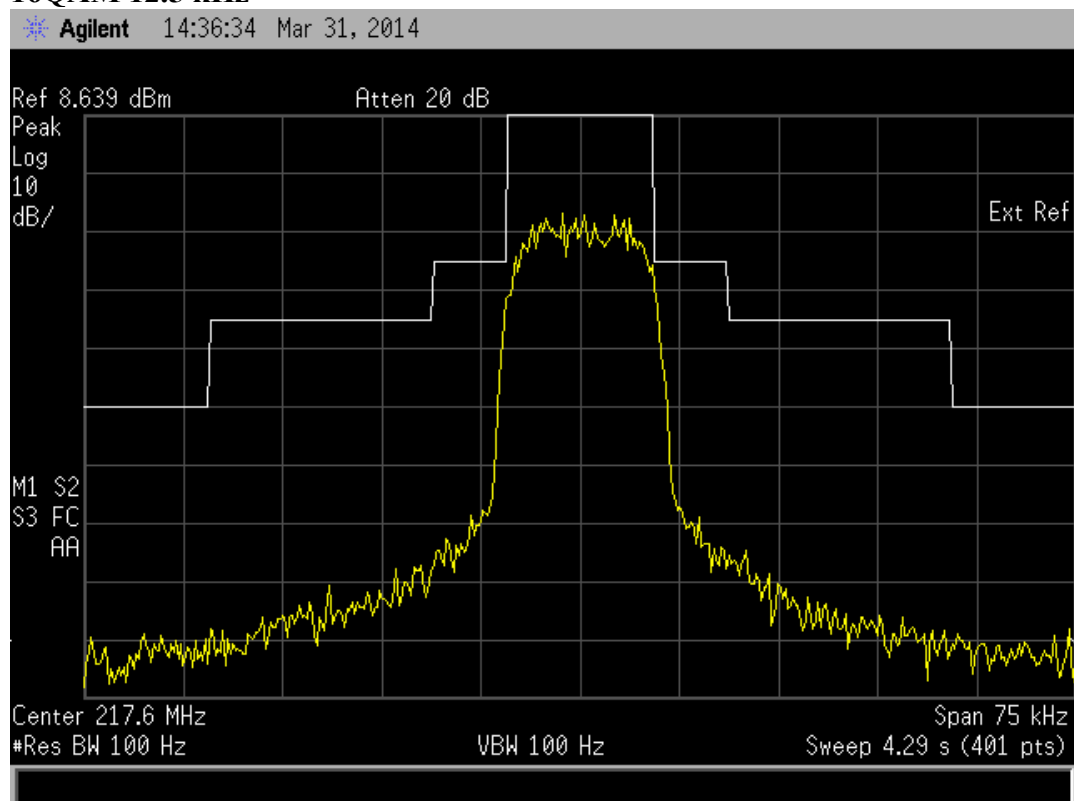
Measurements were made with the spectrum analyser operating in peak hold centred on the allocated frequency.

Nominal Frequency: 217.575 MHz

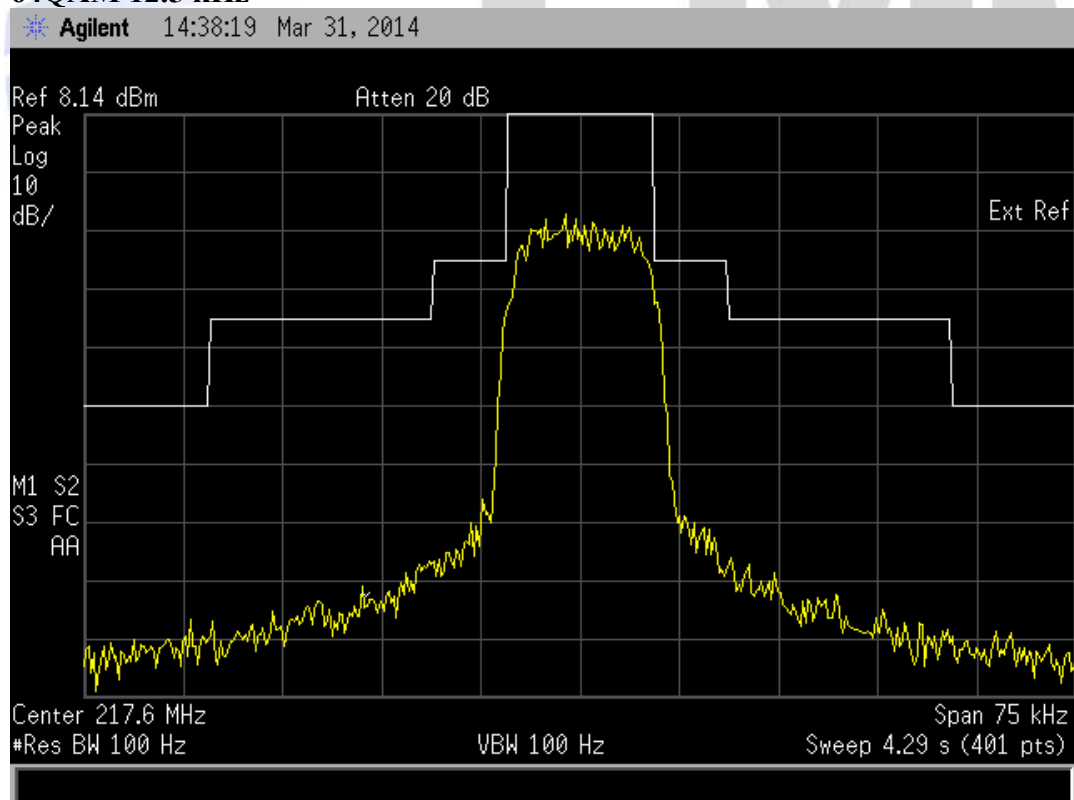
QPSK 12.5 kHz



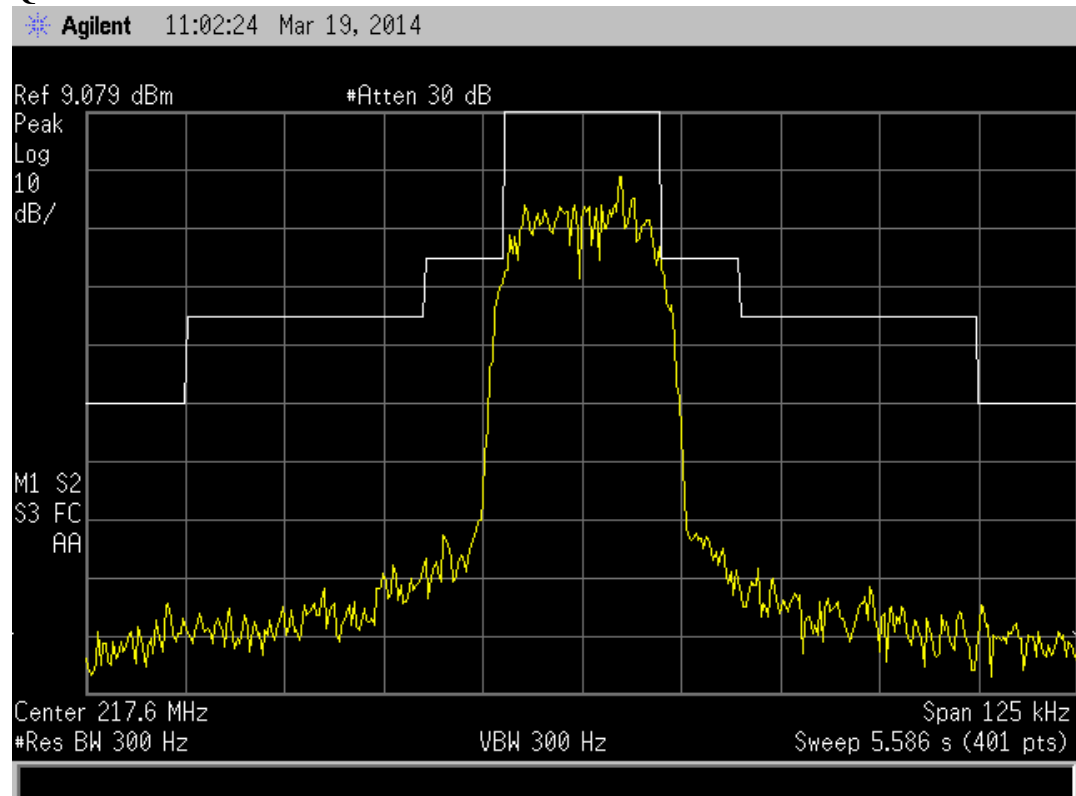
16QAM 12.5 kHz



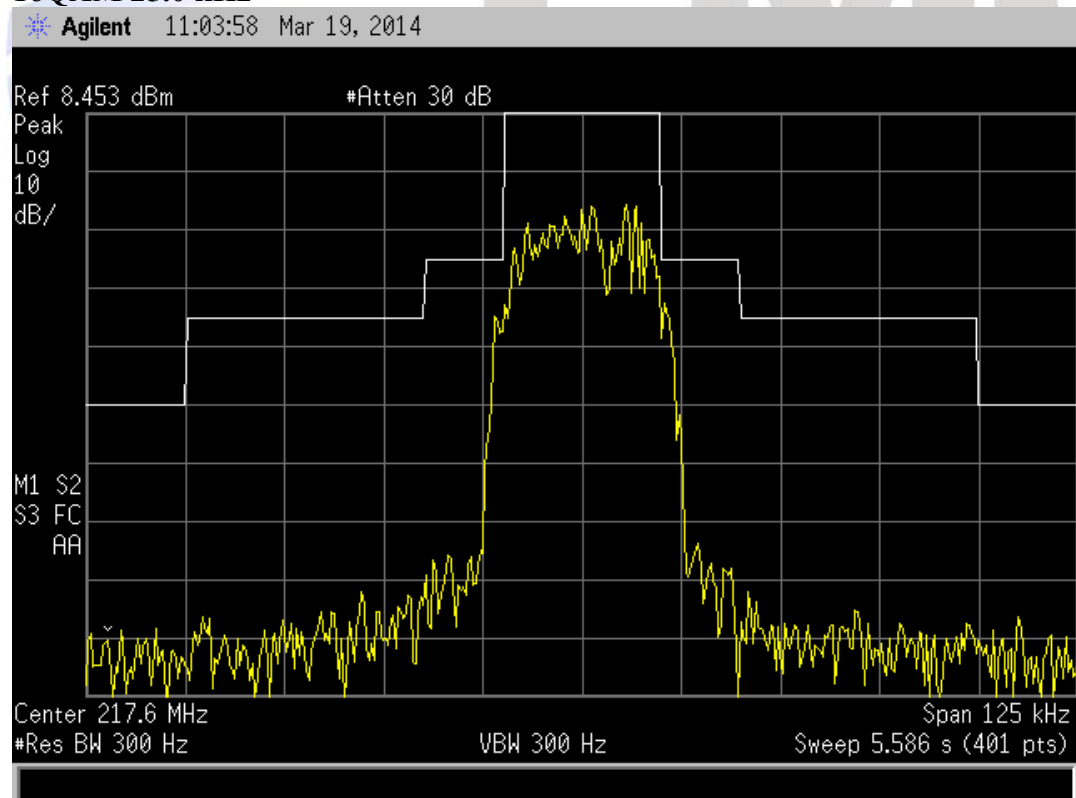
64QAM 12.5 kHz



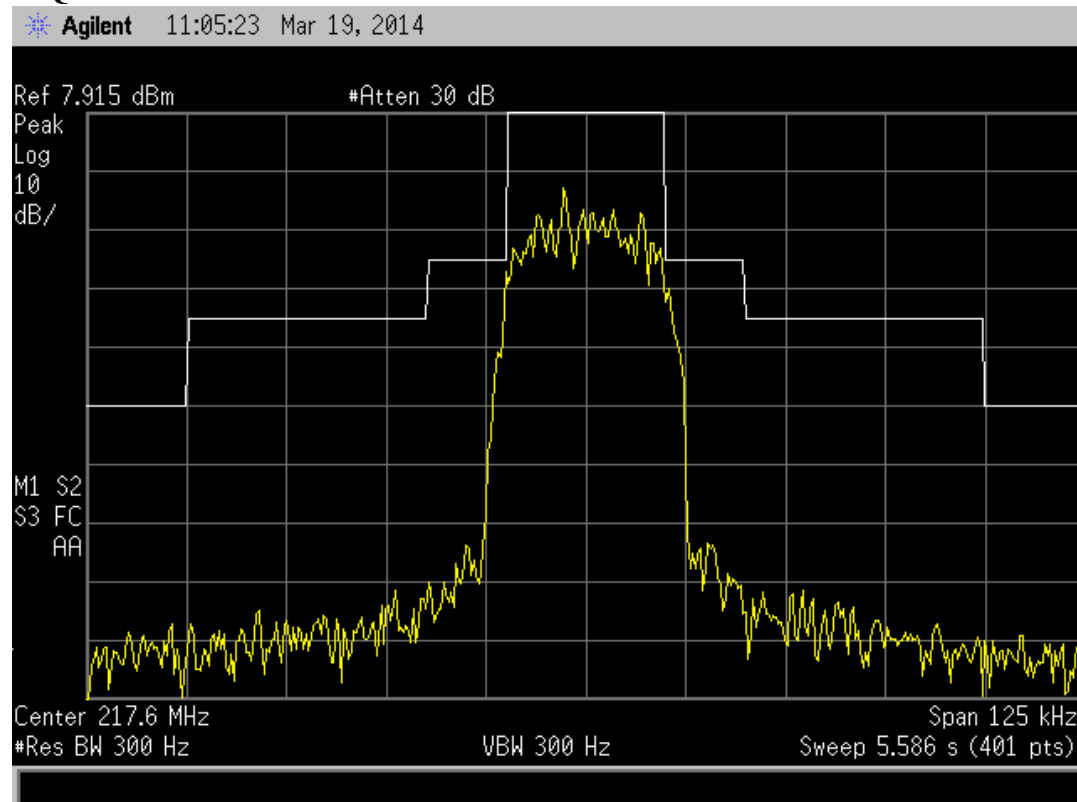
QPSK 25.0 kHz



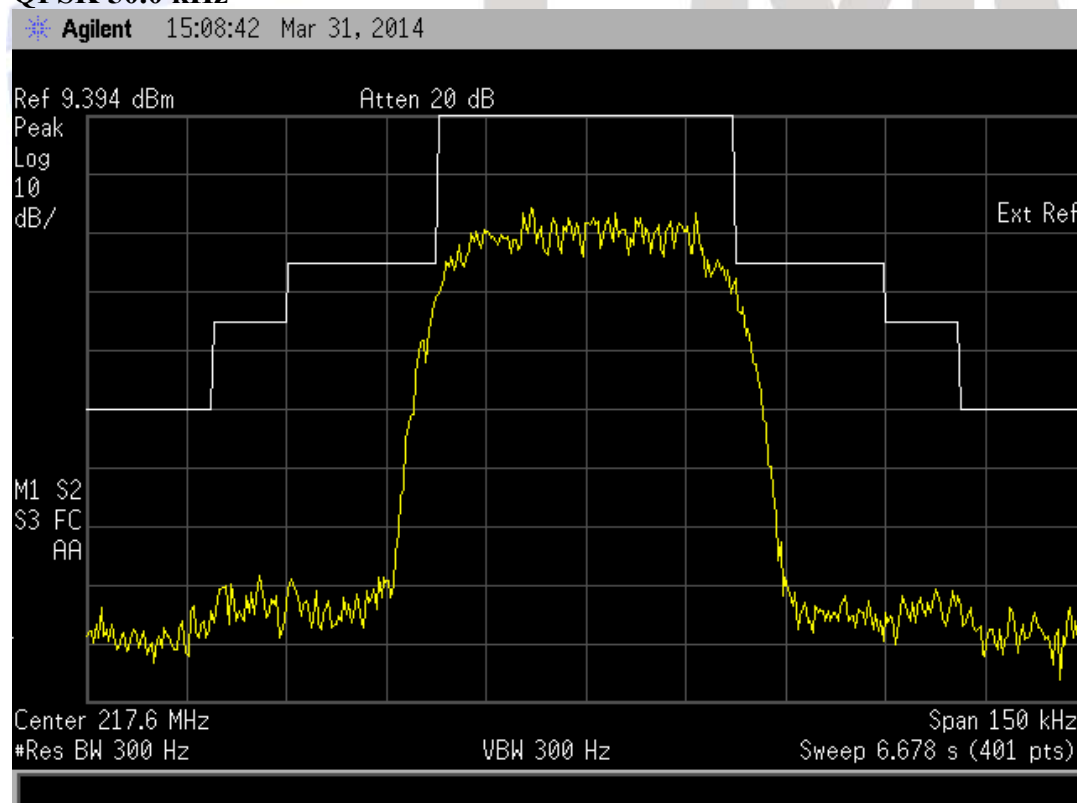
16QAM 25.0 kHz



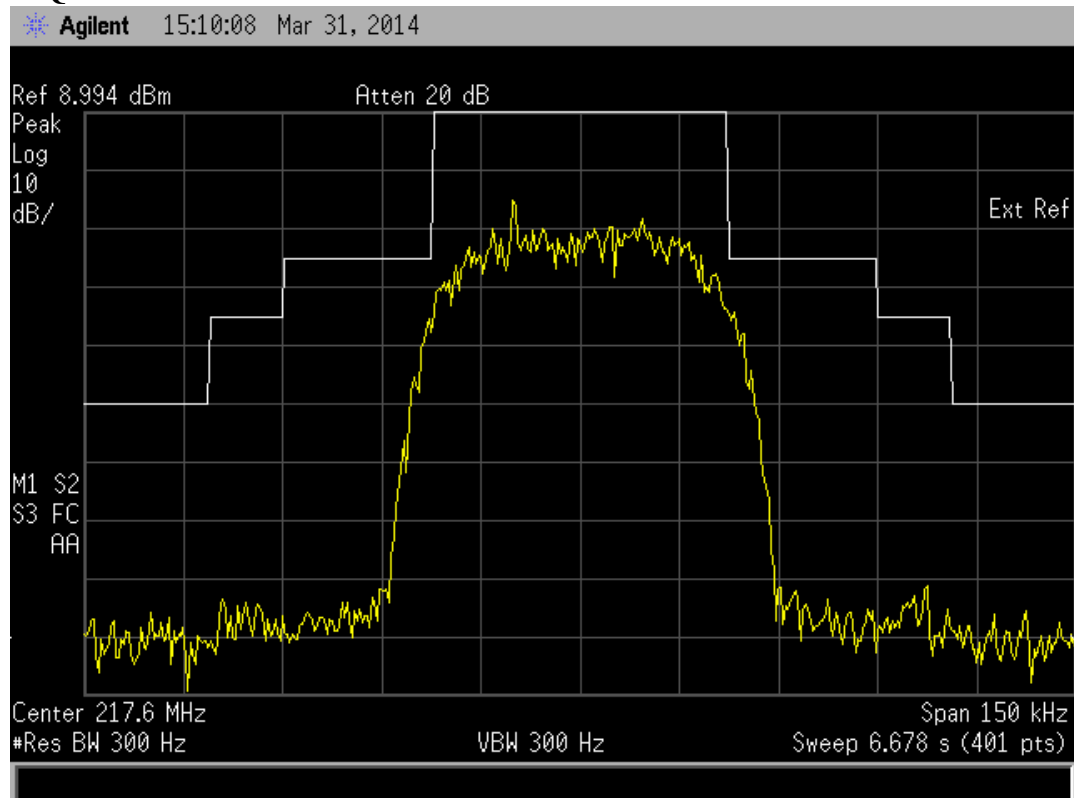
64QAM 25.0 kHz



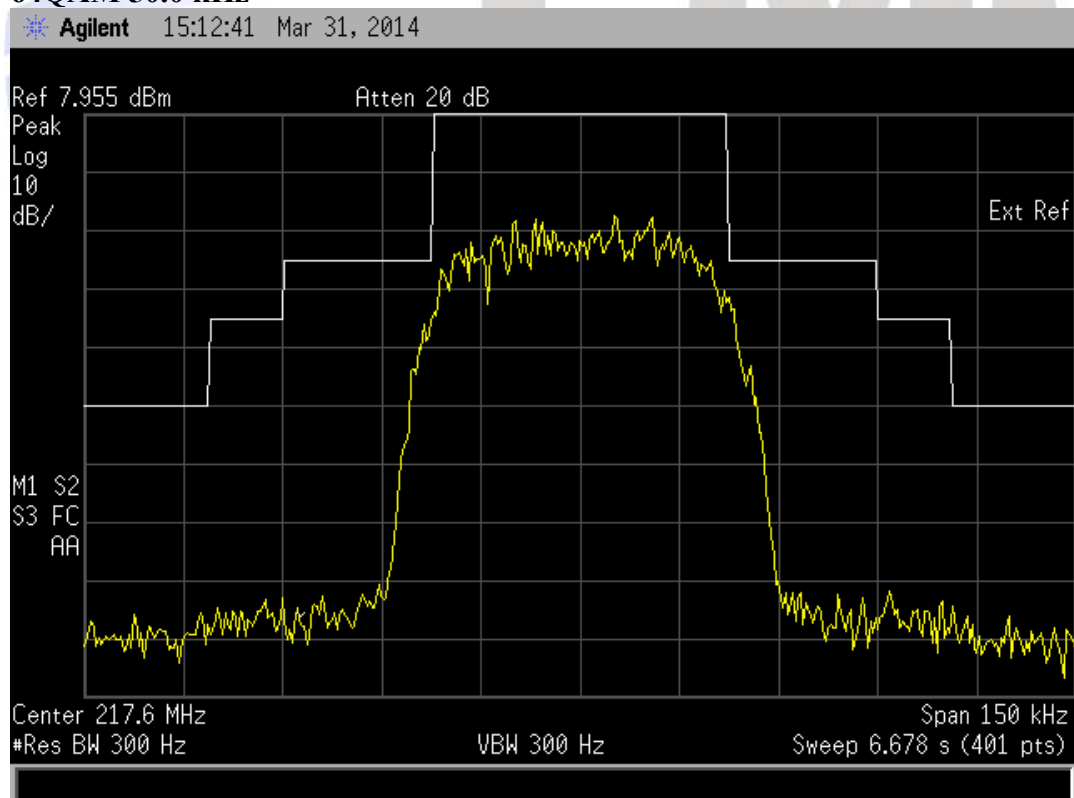
QPSK 50.0 kHz



16QAM 50.0 kHz



64QAM 50.0 kHz



Result: Complies

Spectrum Masks (220 – 222 MHz band).

Part 90.210 states equipment designed to operate in the 220-222 MHz band must meet the requirements of Emission Mask F.

Mask F has been applied as the transmitter has an audio low pass filter.

The transmitter can operate in the band 220-222 MHz using an authorised bandwidth of 4.0 kHz and channel spacing of 5 kHz.

Part 90.733 (e) states: In combining authorized, contiguous channels (including channels derived from multiple authorizations) to form channels wider than 5 kHz, the emission limits in §90.210(f) must be met only at the outermost edges of the contiguous channels.

Transmitters shall be tested to confirm compliance with this requirement with the transmission located as close to the band edges as permitted by the design of the transmitter.

The frequency stability requirements in §90.213 shall apply only to the outermost of the contiguous channels authorized to the licensee.

However, the frequency stability employed for transmissions operating inside the outermost contiguous channels must be such that the emission limits in §90.210(f) are met over the temperature and voltage variations.

Measurements have been made when operating on 221.000 MHz with the supply voltage at 10.0, 13.8 and 30.0 Vdc.

Measurements have been made at ambient temperatures and extreme temperatures of +50.0°C and -30°C.

Measurements have been made of each modulation type using a spectrum analyser operating in peak hold mode and a 30 dB attenuator.

Initially power measurements are made using a resolution bandwidth of 120 kHz.

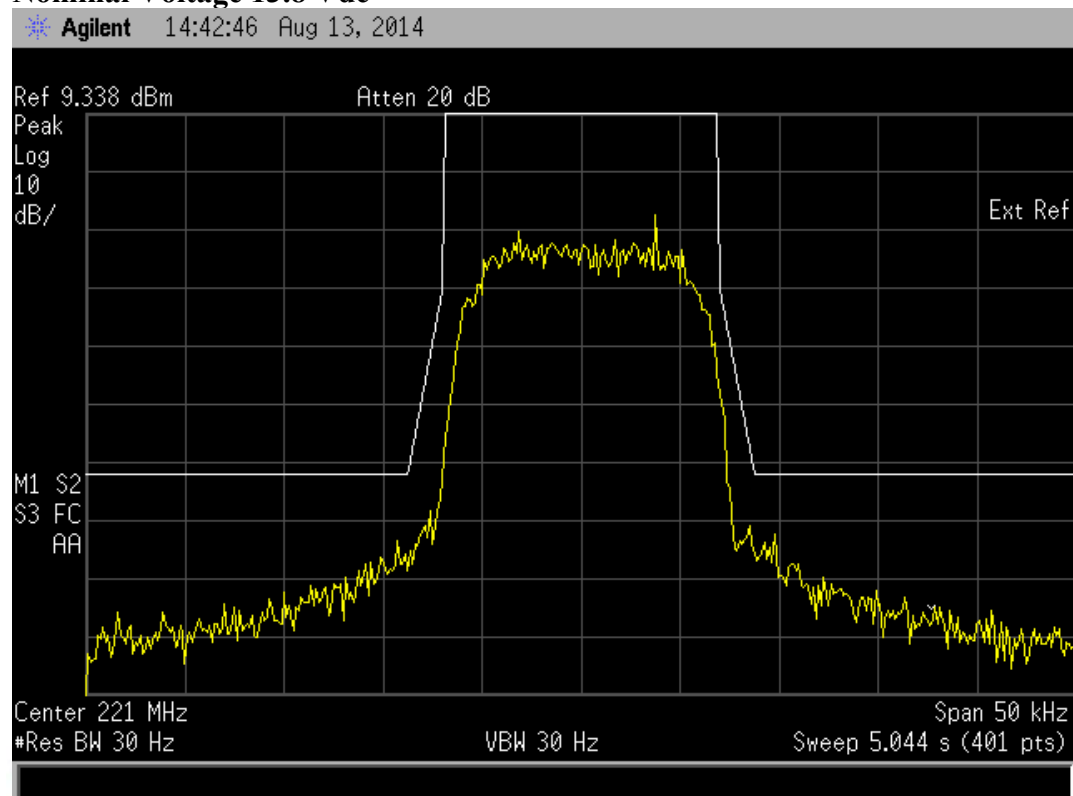
This level is used as a reference level on the spectrum analyser.

Measurements were made with the spectrum analyser operating in peak hold centred on the allocated frequency.

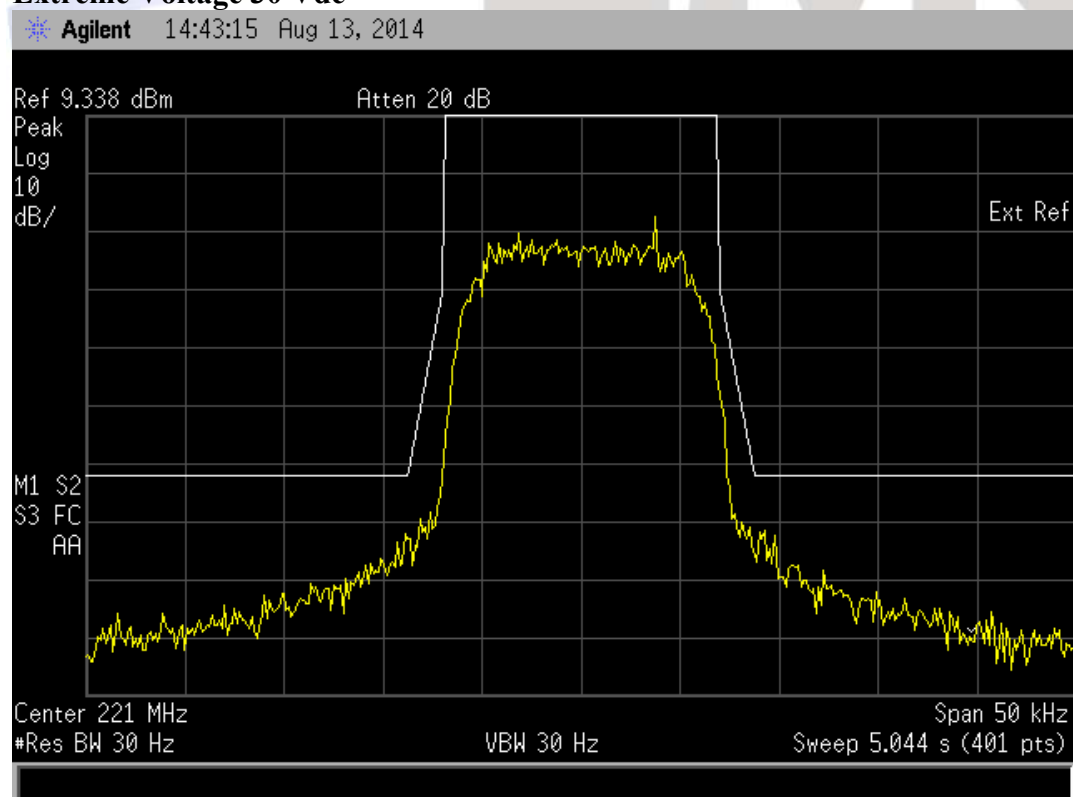
Result: Complies

QPSK at ambient temperature +25°C

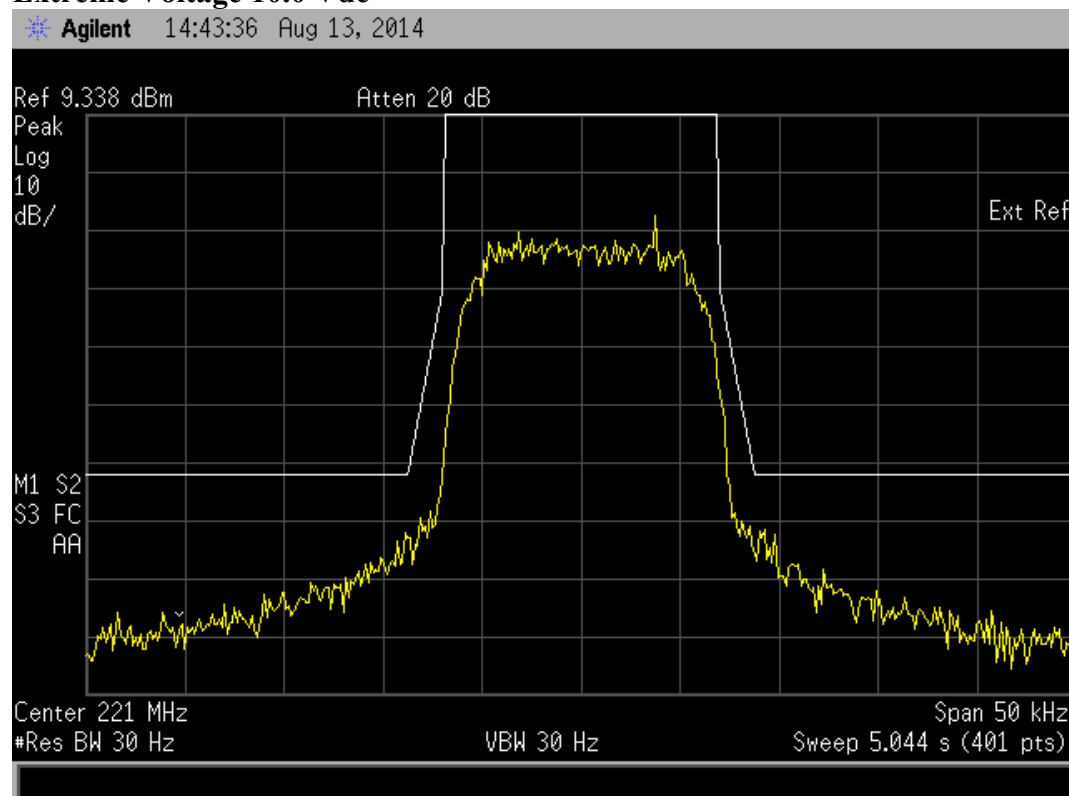
Nominal Voltage 13.8 Vdc



Extreme Voltage 30 Vdc

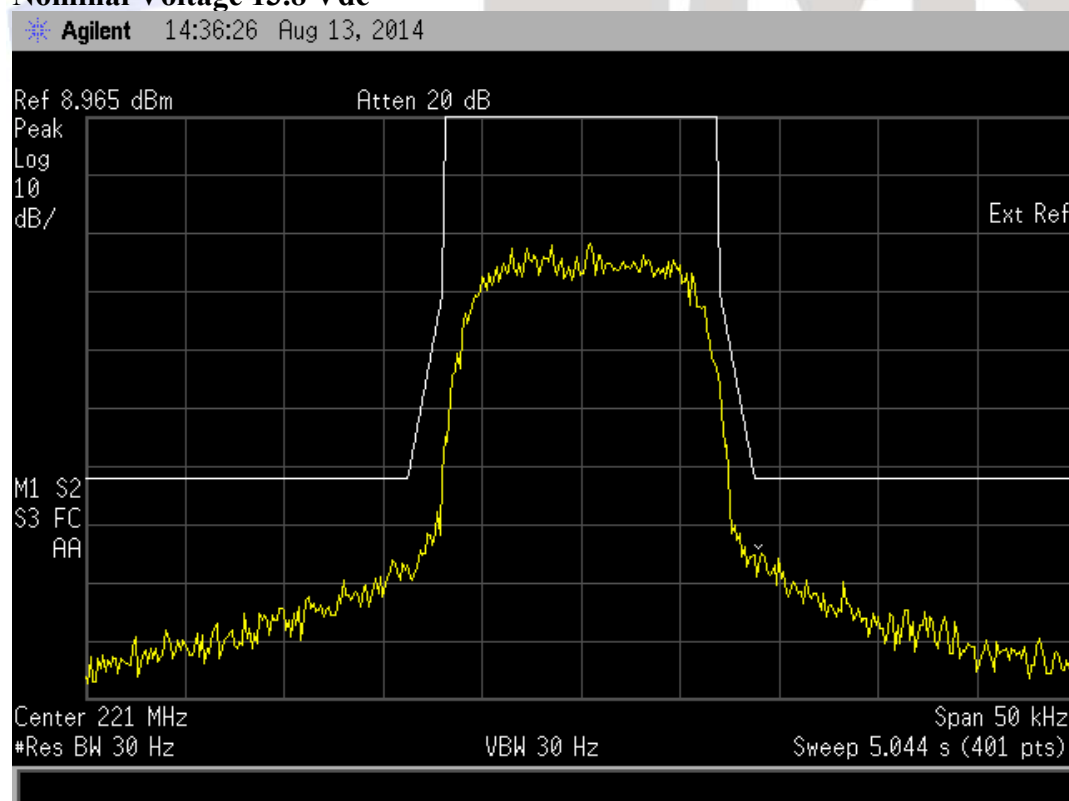


Extreme Voltage 10.0 Vdc

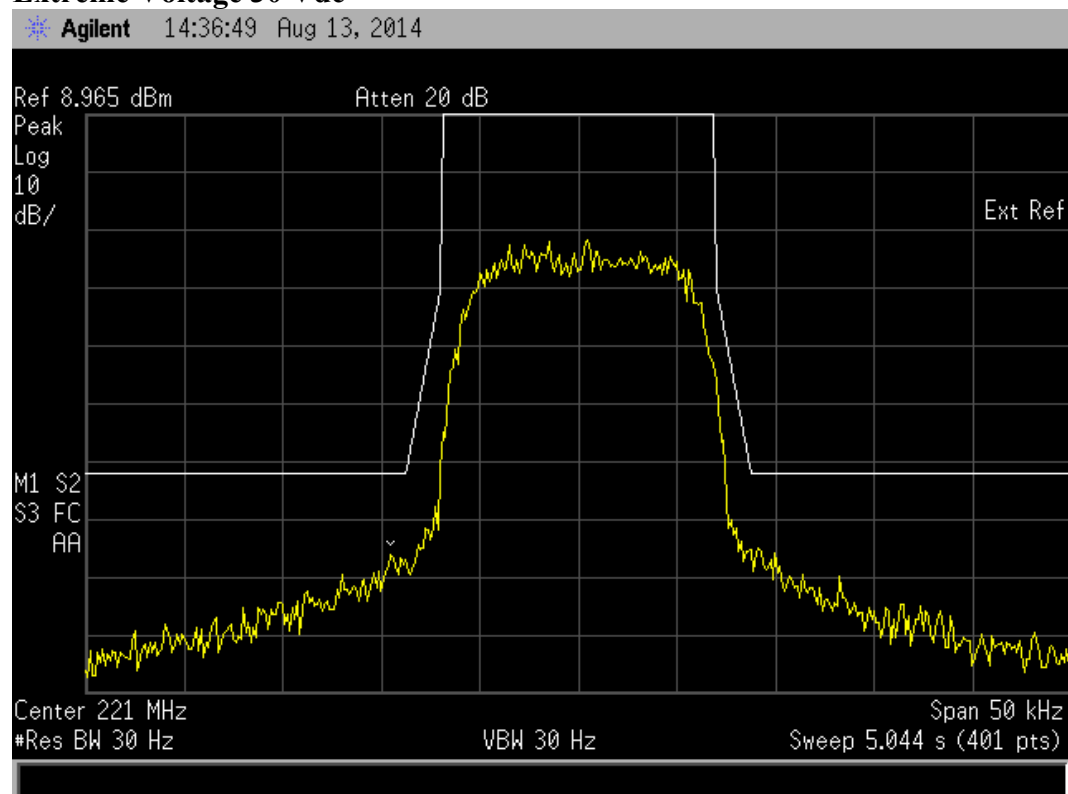


16QAM at ambient temperature +25°C

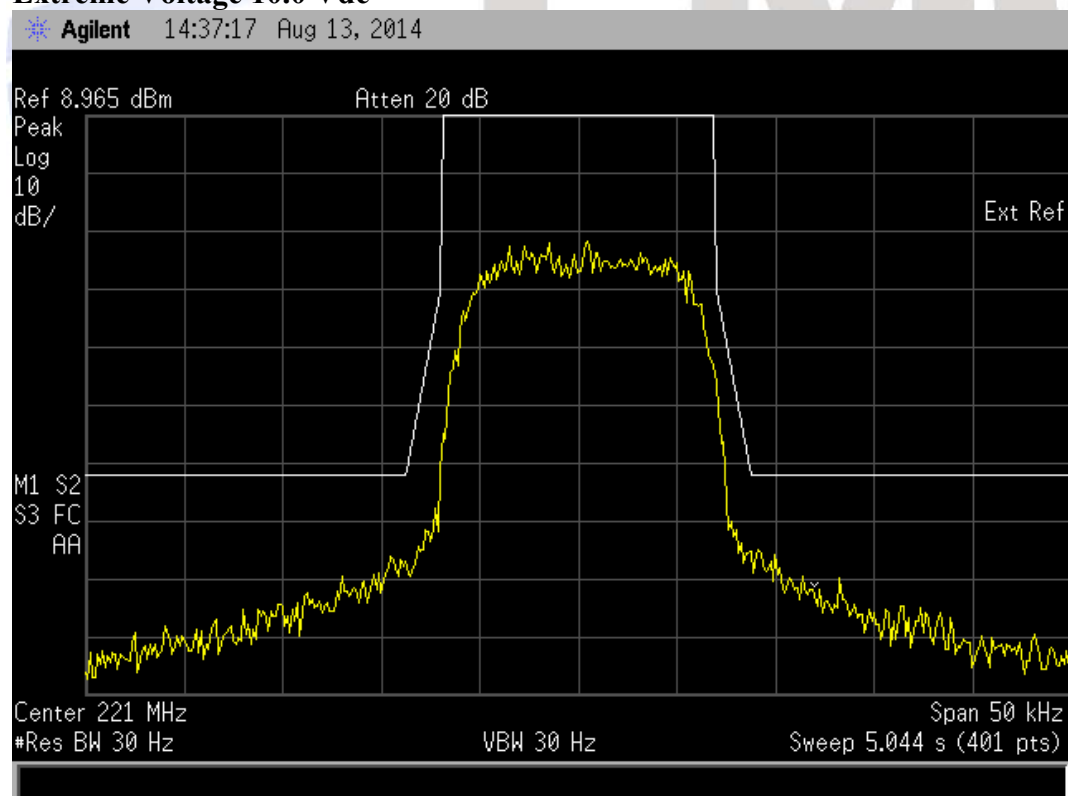
Nominal Voltage 13.8 Vdc



Extreme Voltage 30 Vdc

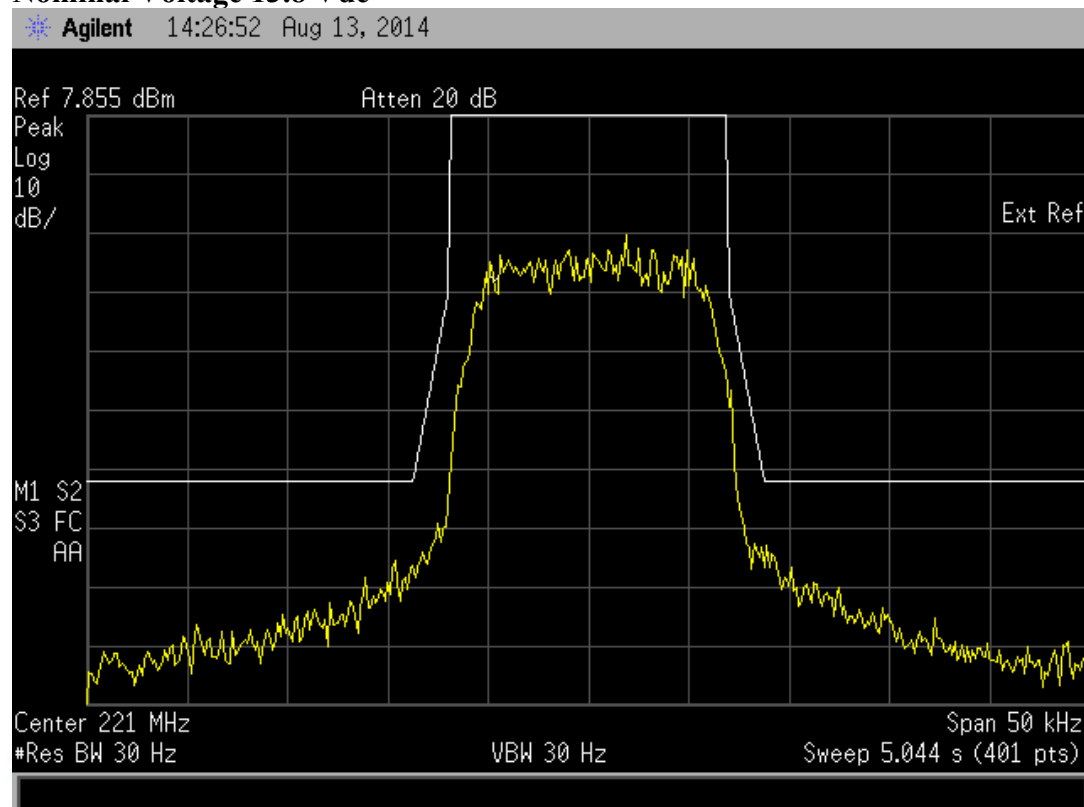


Extreme Voltage 10.0 Vdc

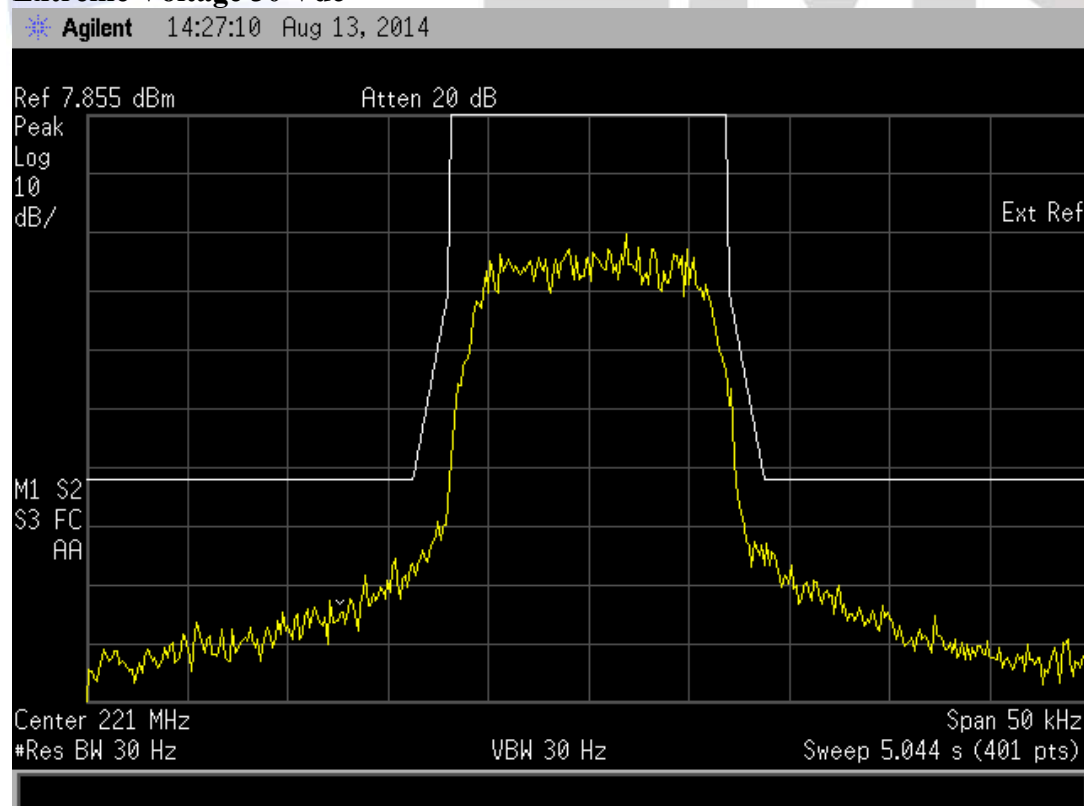


64QAM at ambient temperature +25°C

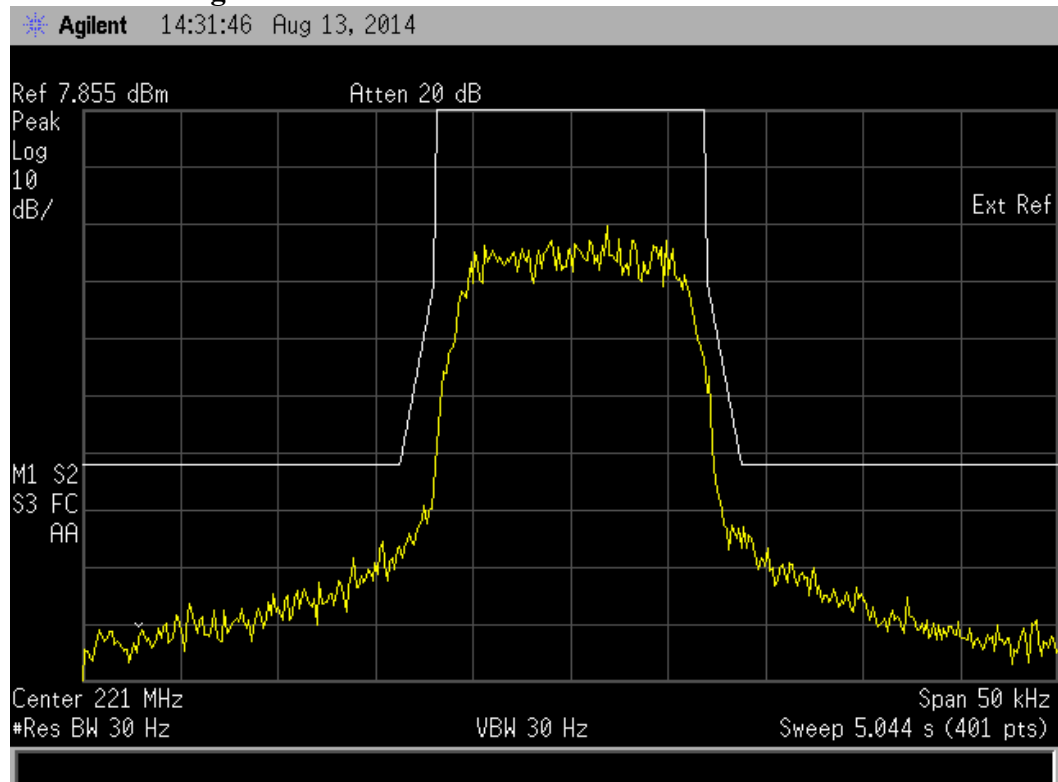
Nominal Voltage 13.8 Vdc



Extreme Voltage 30 Vdc

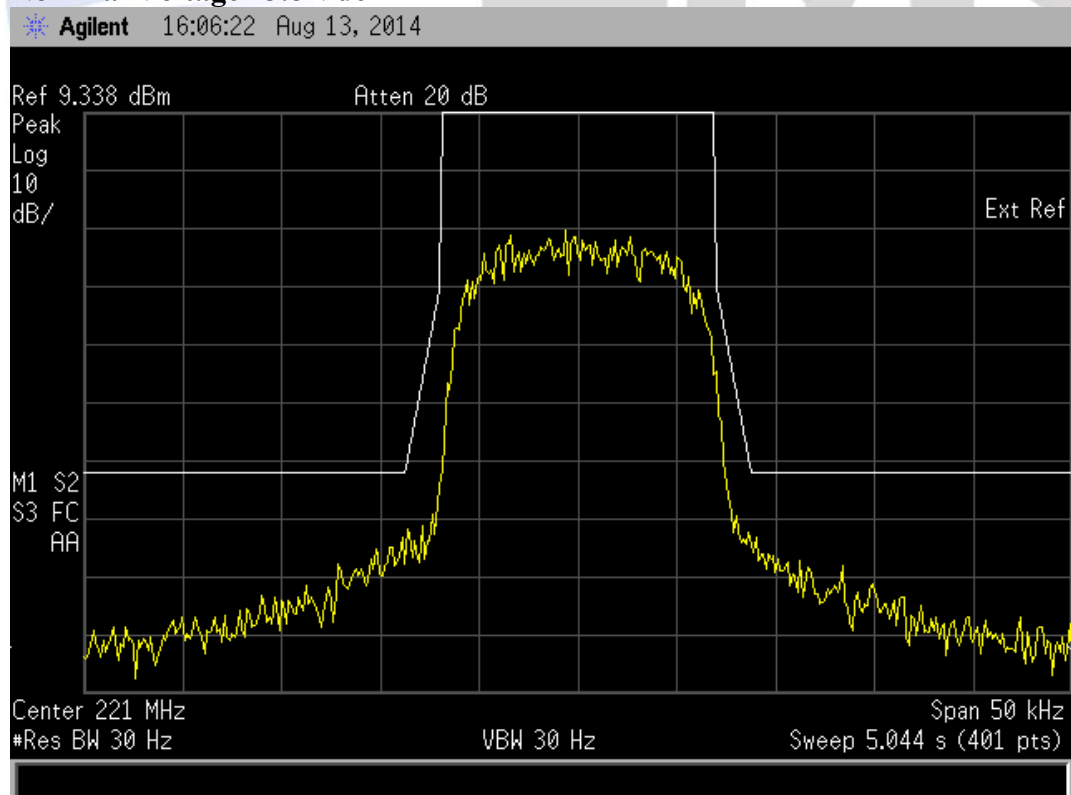


Extreme Voltage 10.0 Vdc

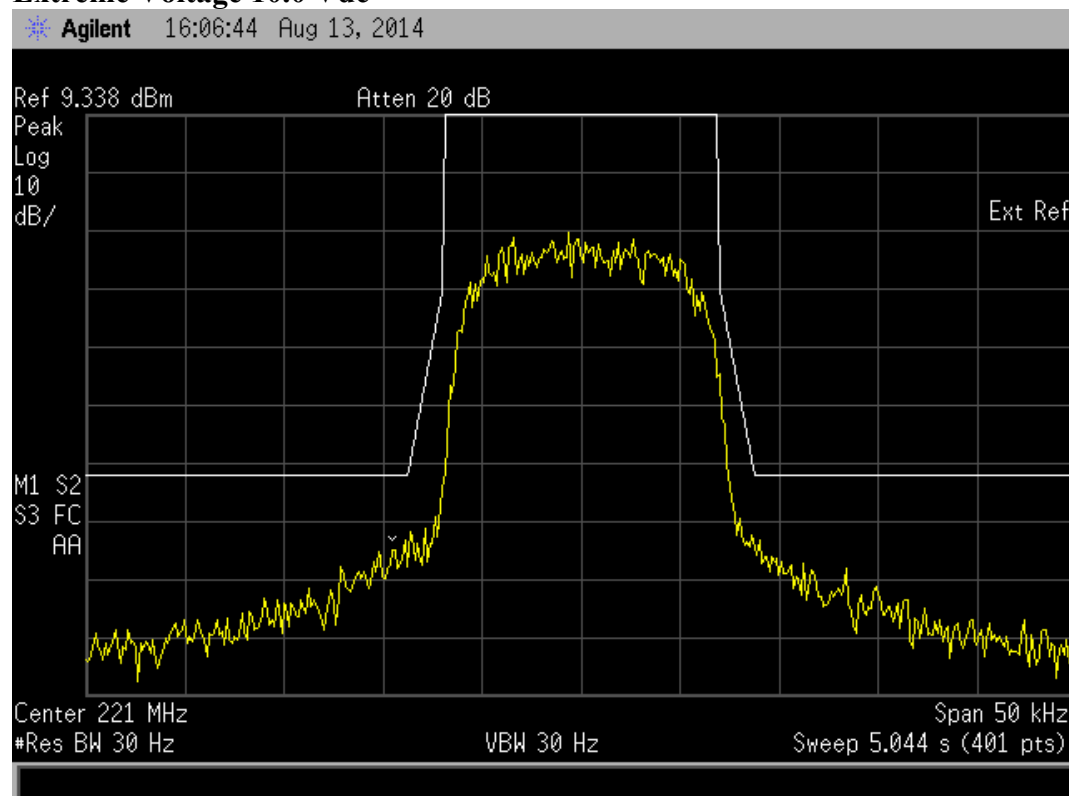


QPSK at extreme temperature +50°C

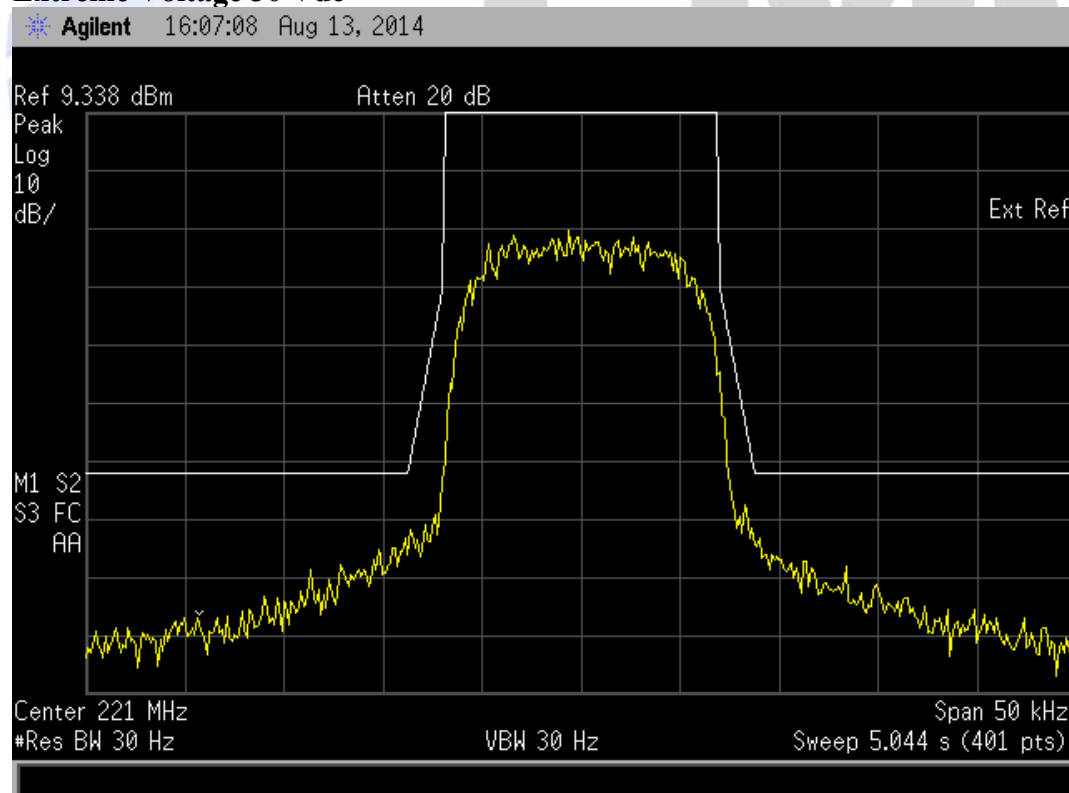
Nominal Voltage 13.8 Vdc



Extreme Voltage 10.0 Vdc

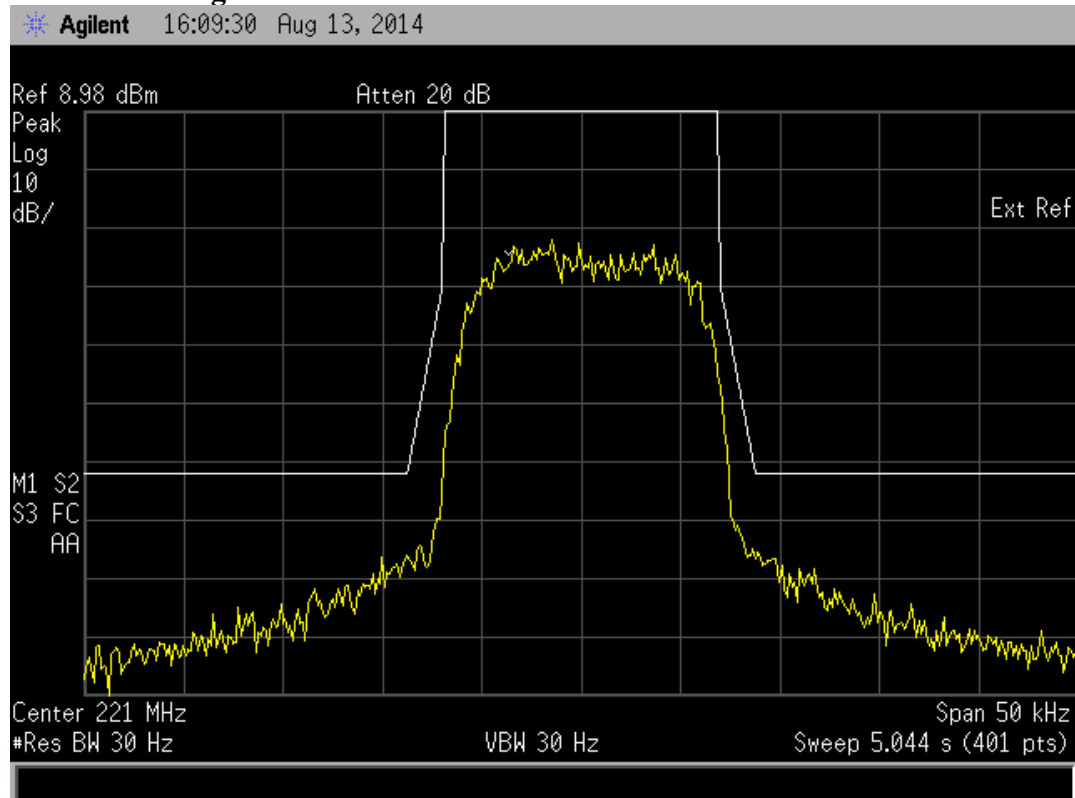


Extreme Voltage 30 Vdc

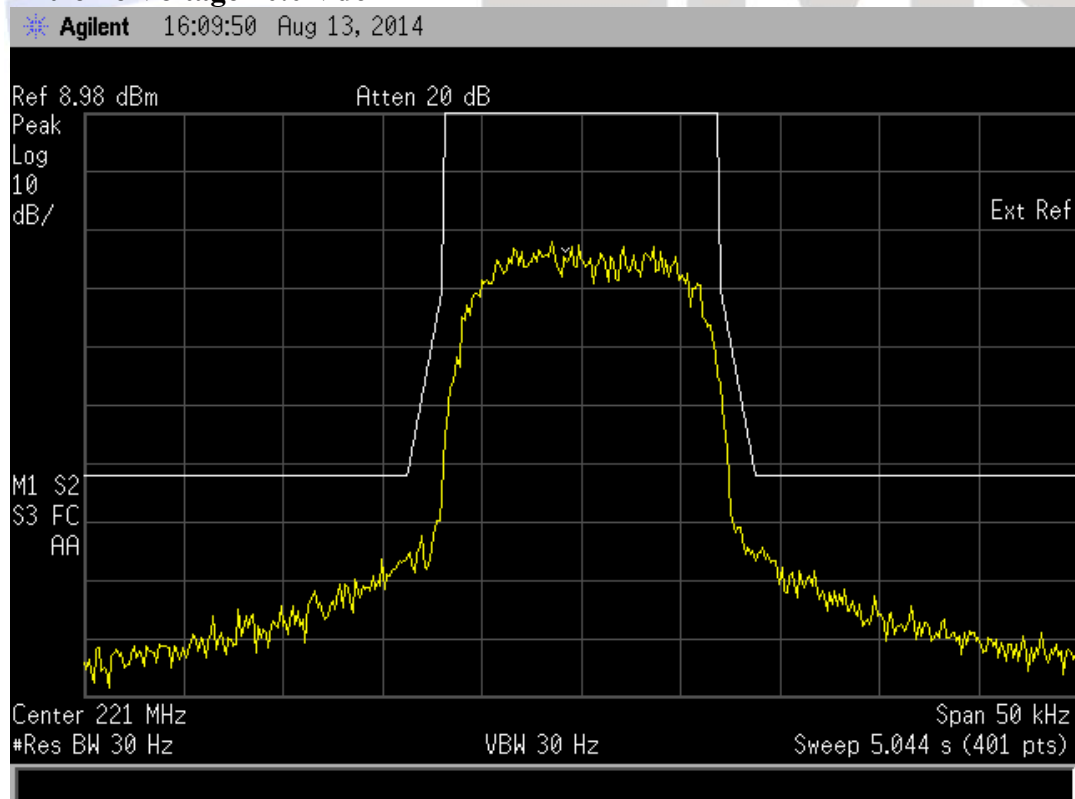


16QAM at extreme temperature +50°C

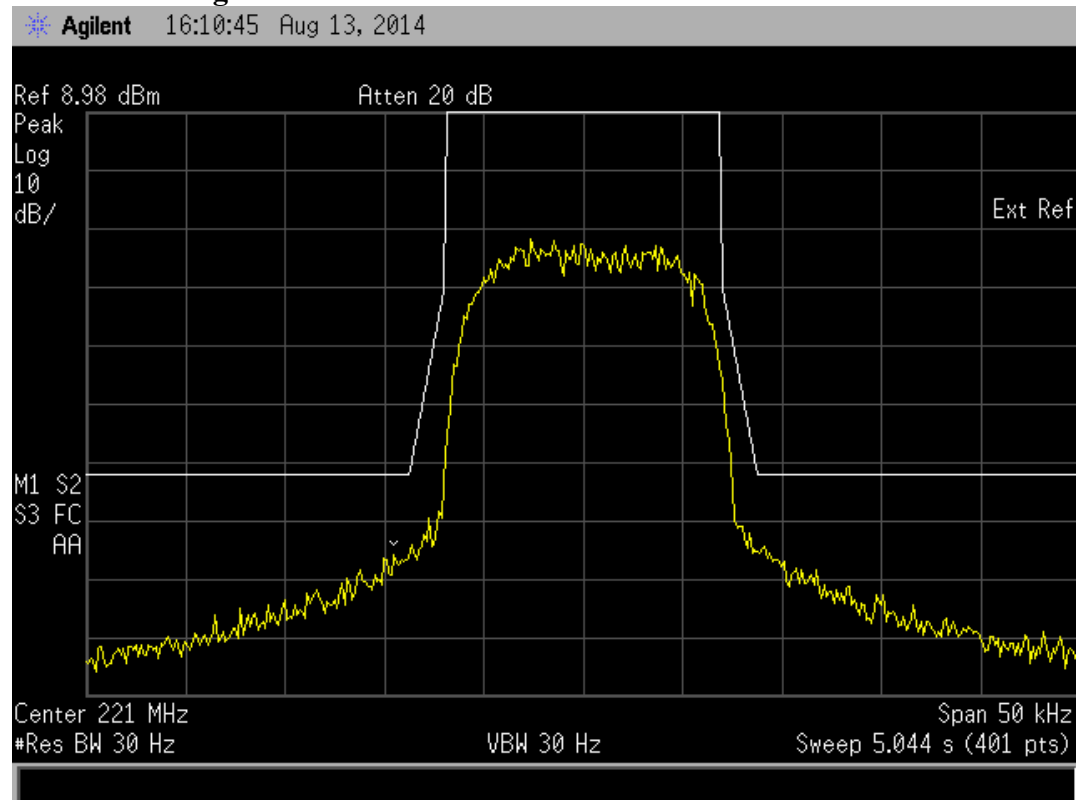
Nominal Voltage 13.8 Vdc



Extreme Voltage 10.0 Vdc

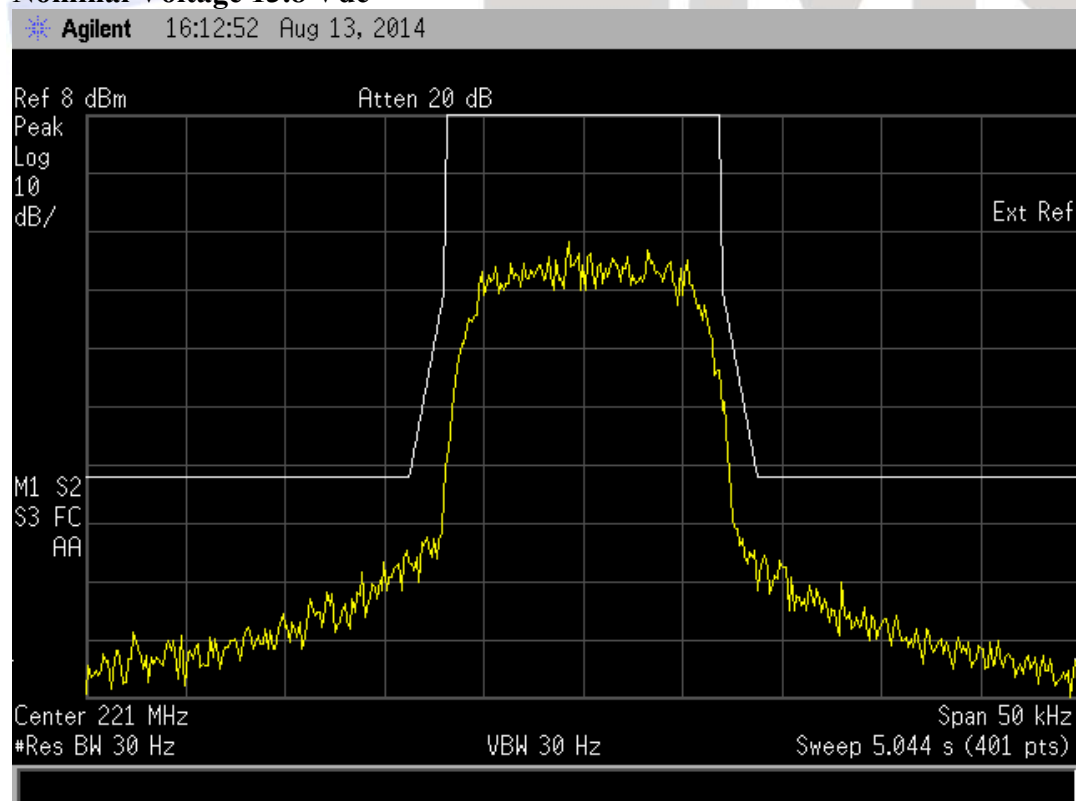


Extreme Voltage 30 Vdc

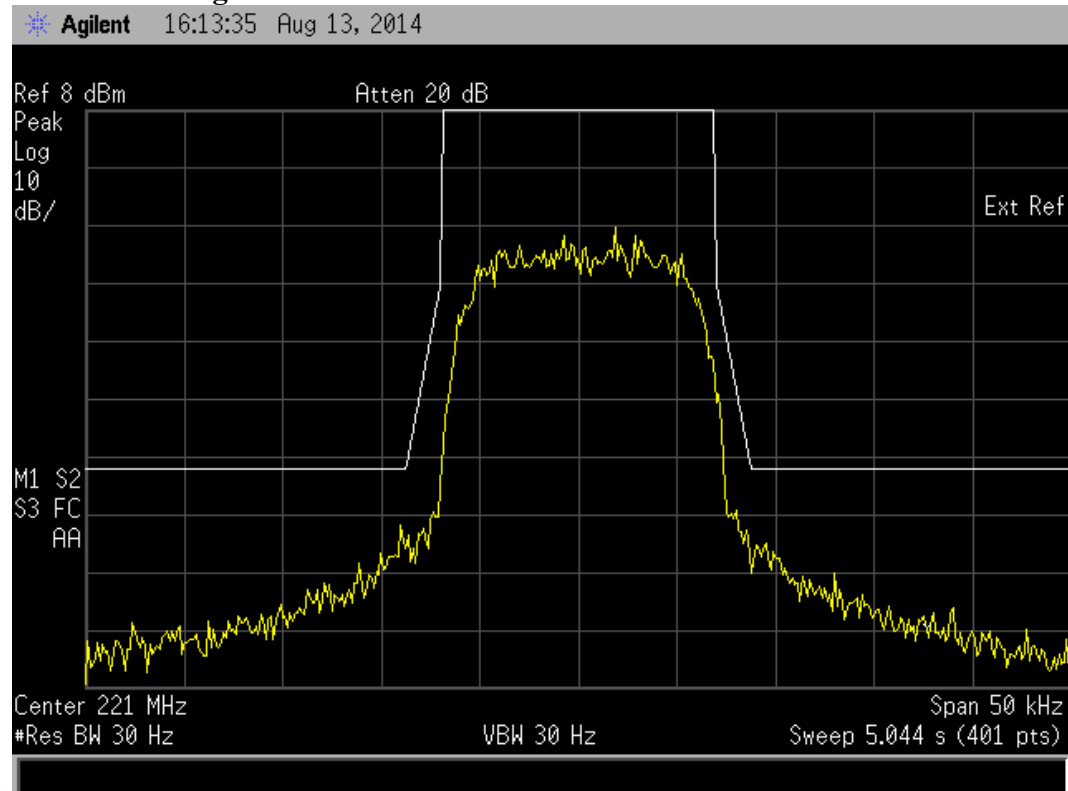


64QAM at extreme temperature +50°C

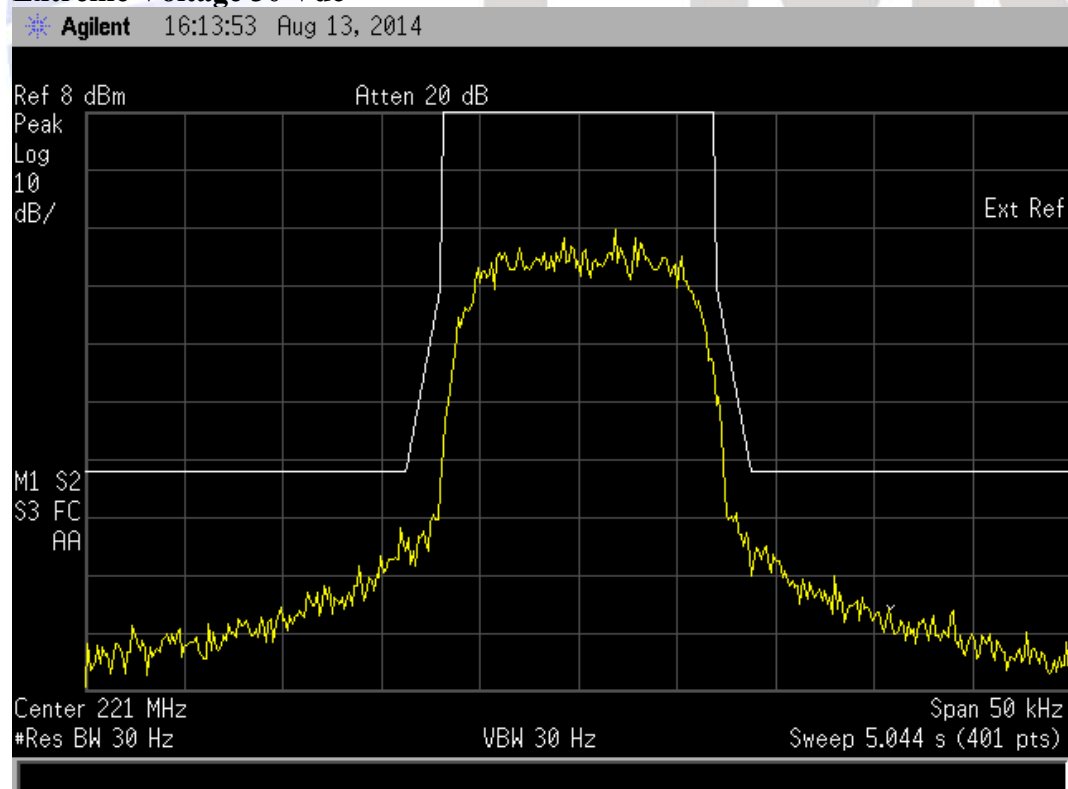
Nominal Voltage 13.8 Vdc



Extreme Voltage 10.0 Vdc

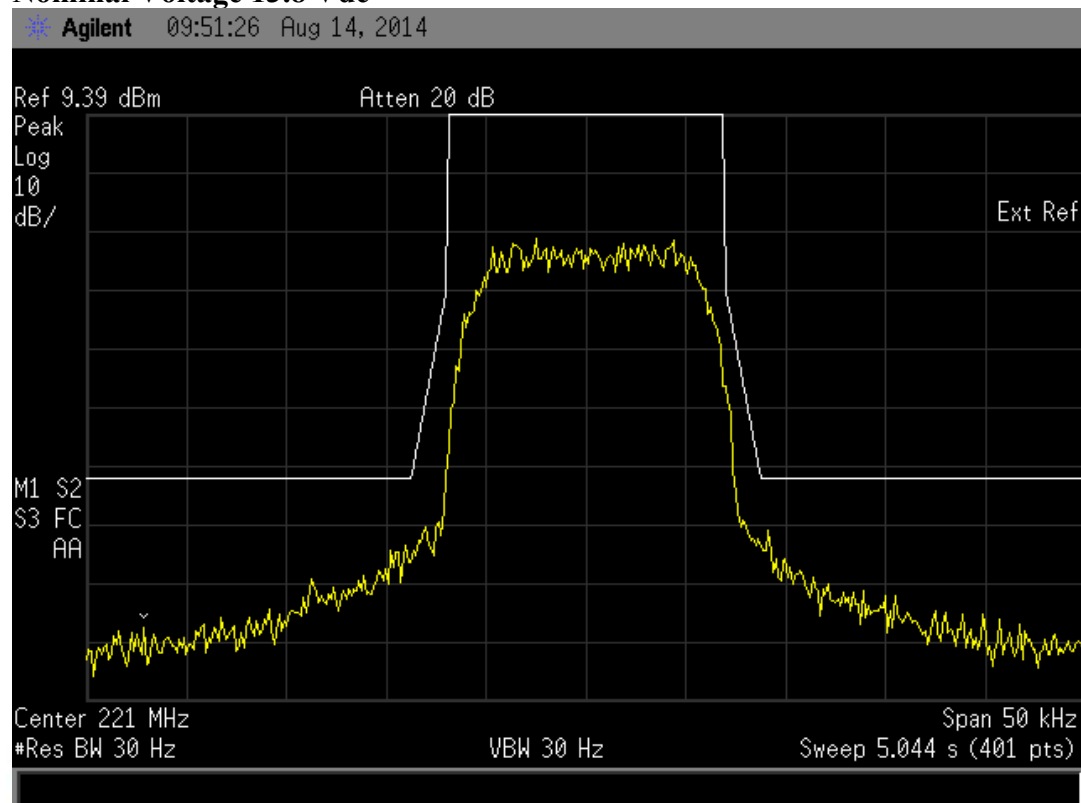


Extreme Voltage 30 Vdc

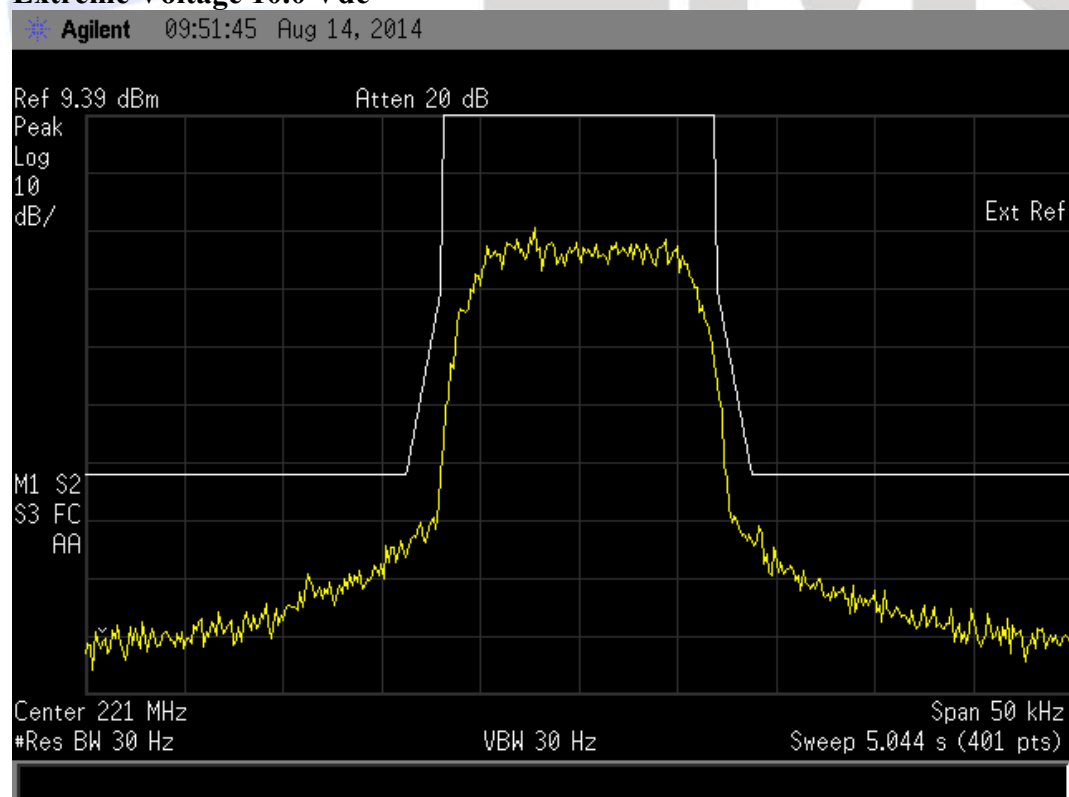


QPSK at extreme temperature -30°C

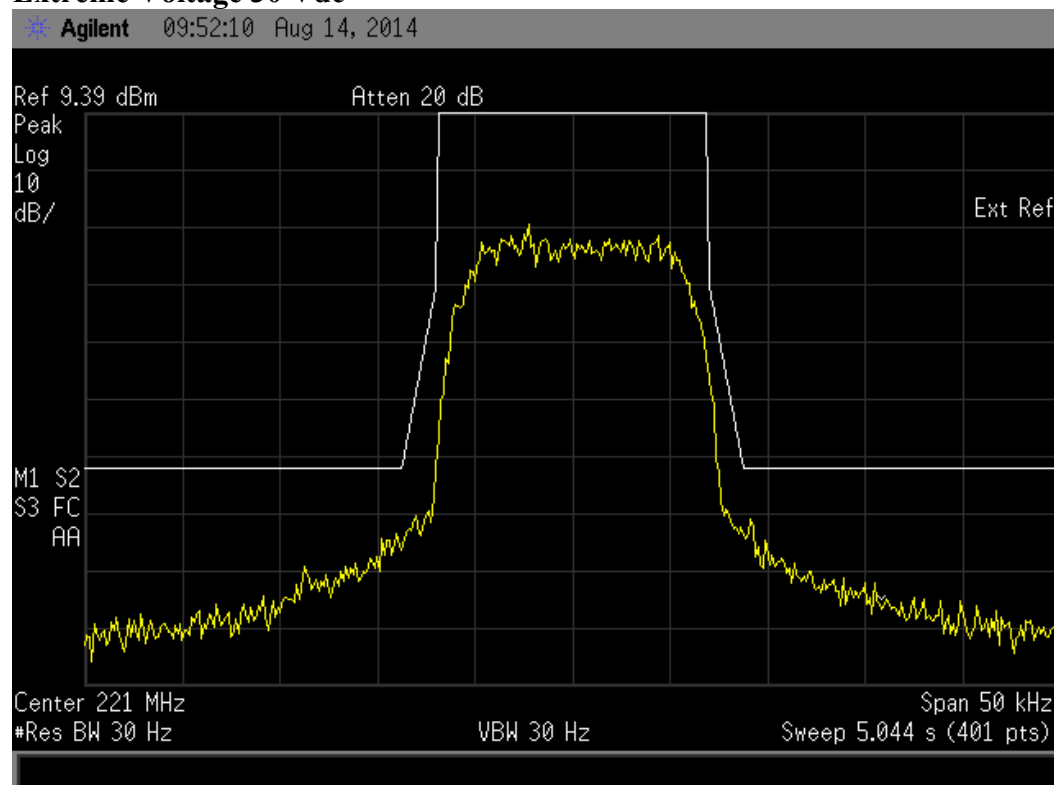
Nominal Voltage 13.8 Vdc



Extreme Voltage 10.0 Vdc

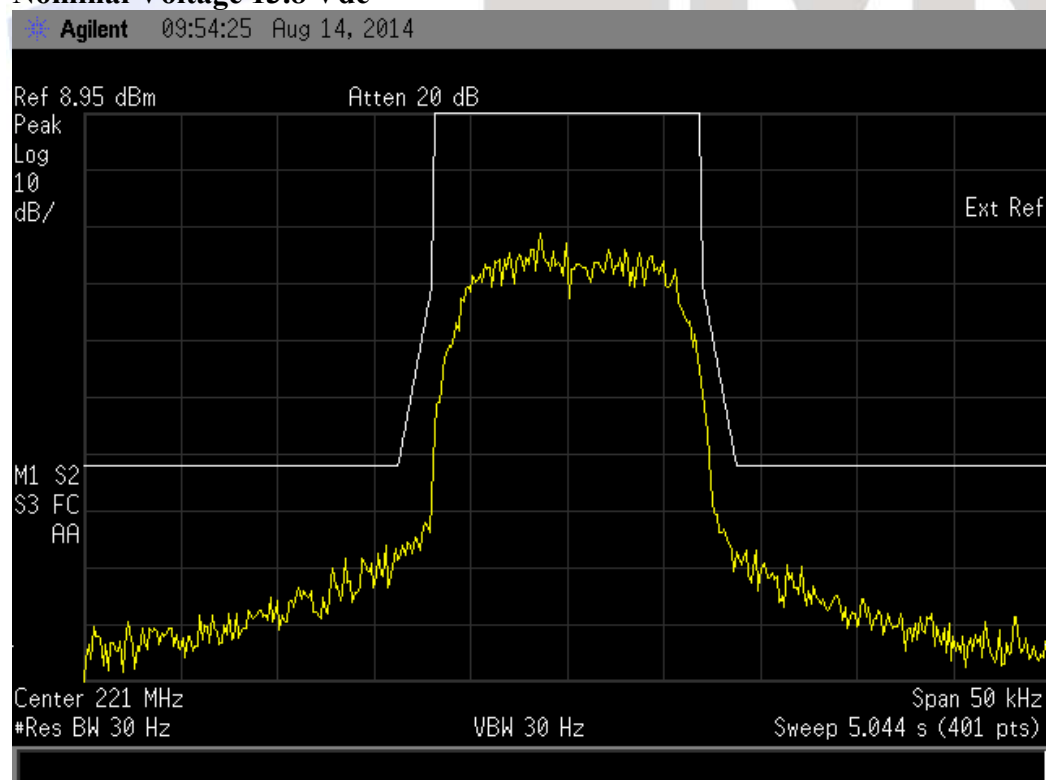


Extreme Voltage 30 Vdc

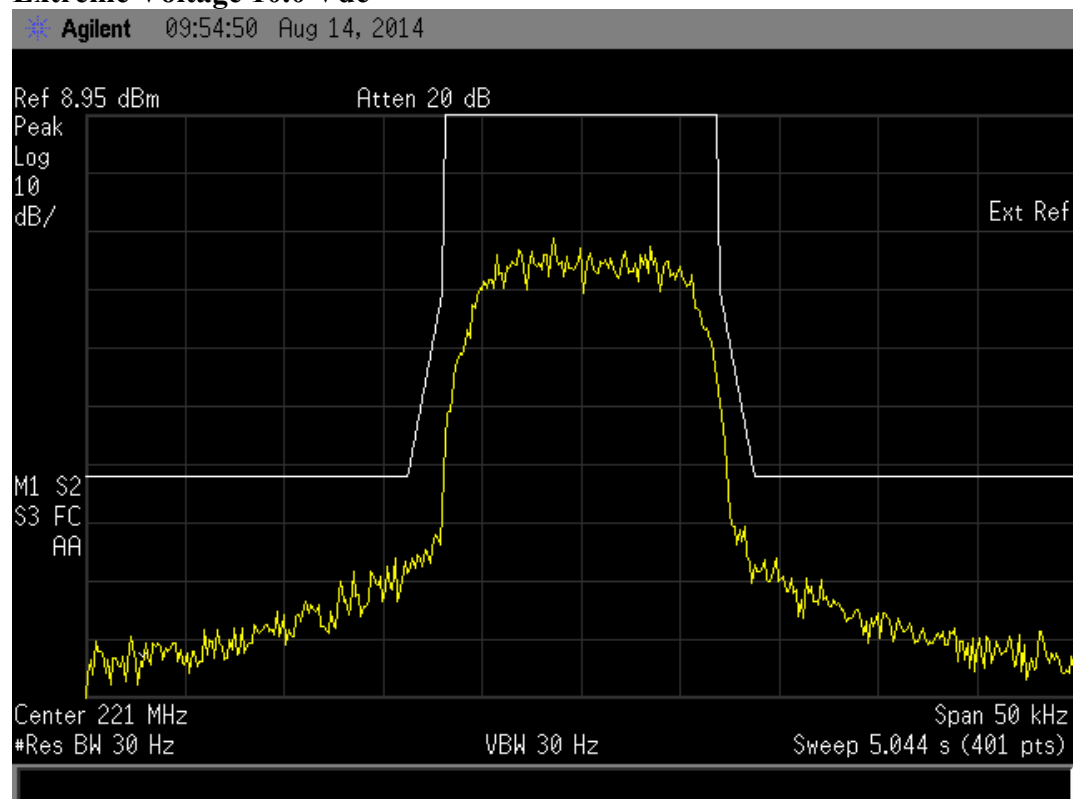


16QAM at extreme temperature -30°C

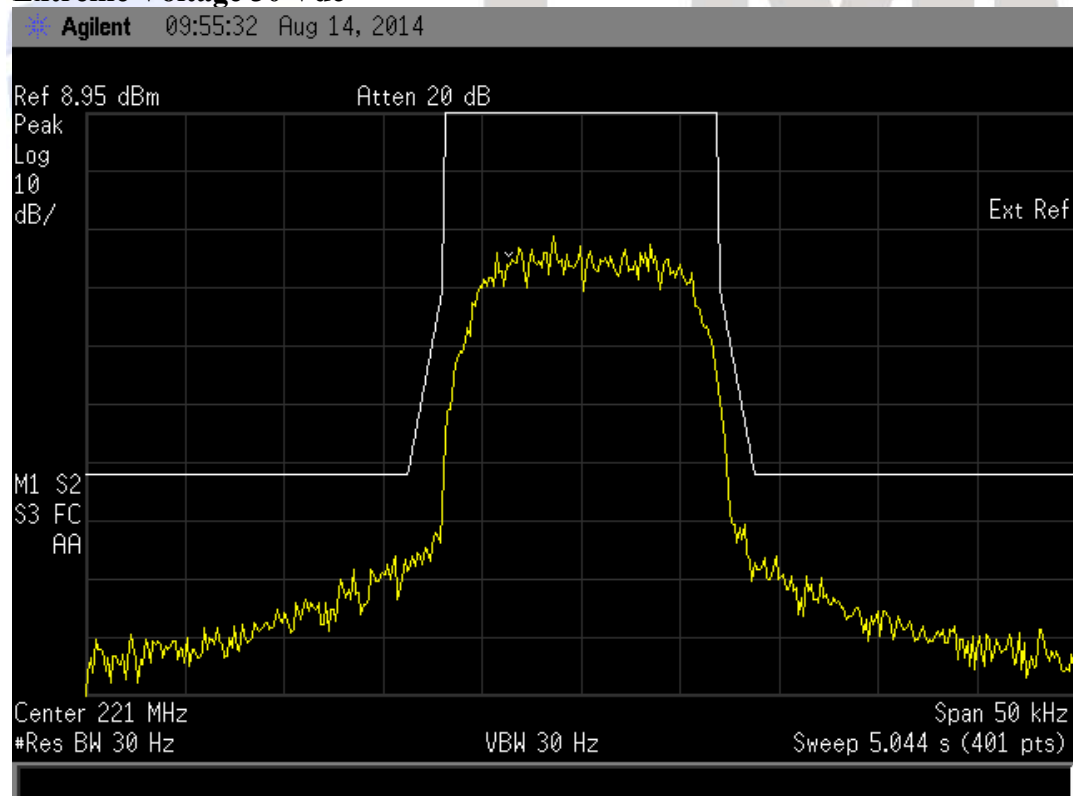
Nominal Voltage 13.8 Vdc



Extreme Voltage 10.0 Vdc

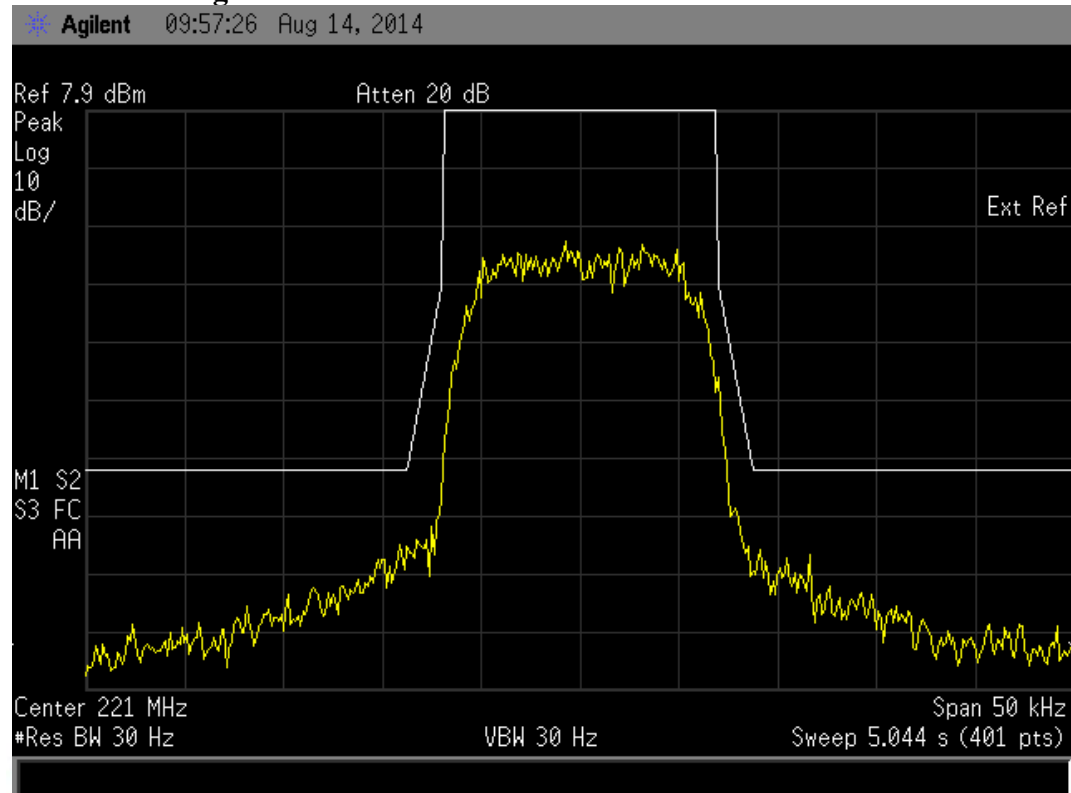


Extreme Voltage 30 Vdc

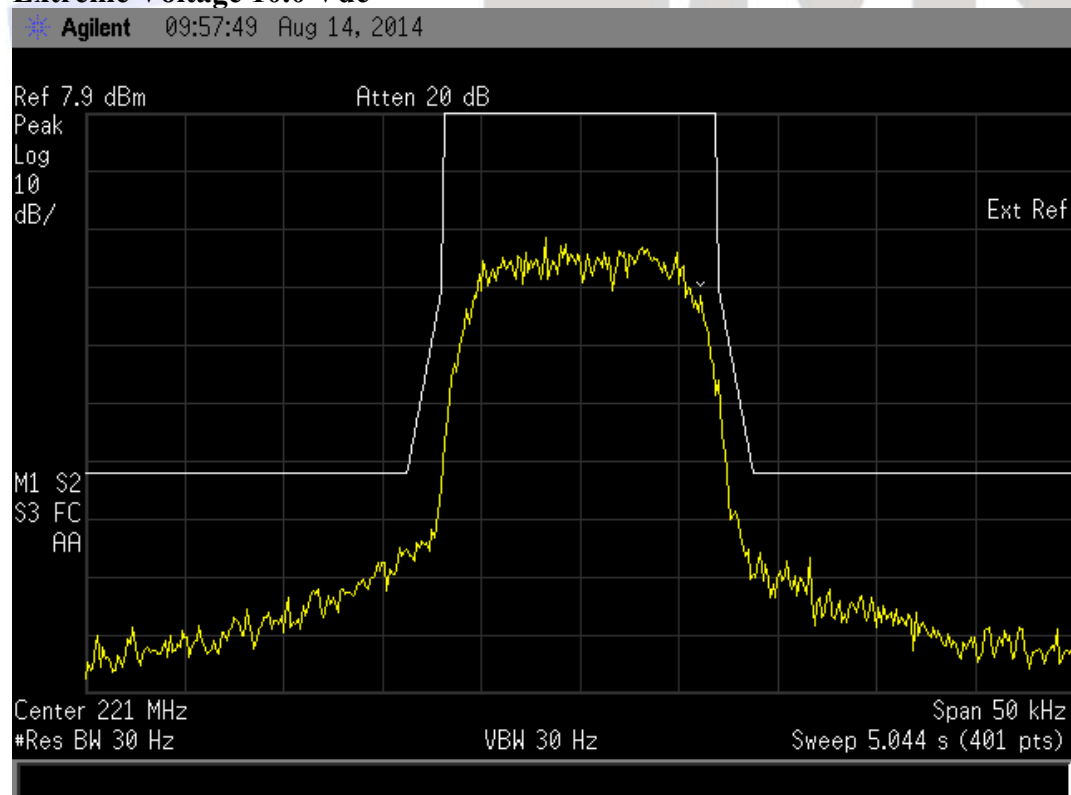


64QAM at extreme temperature -30°C

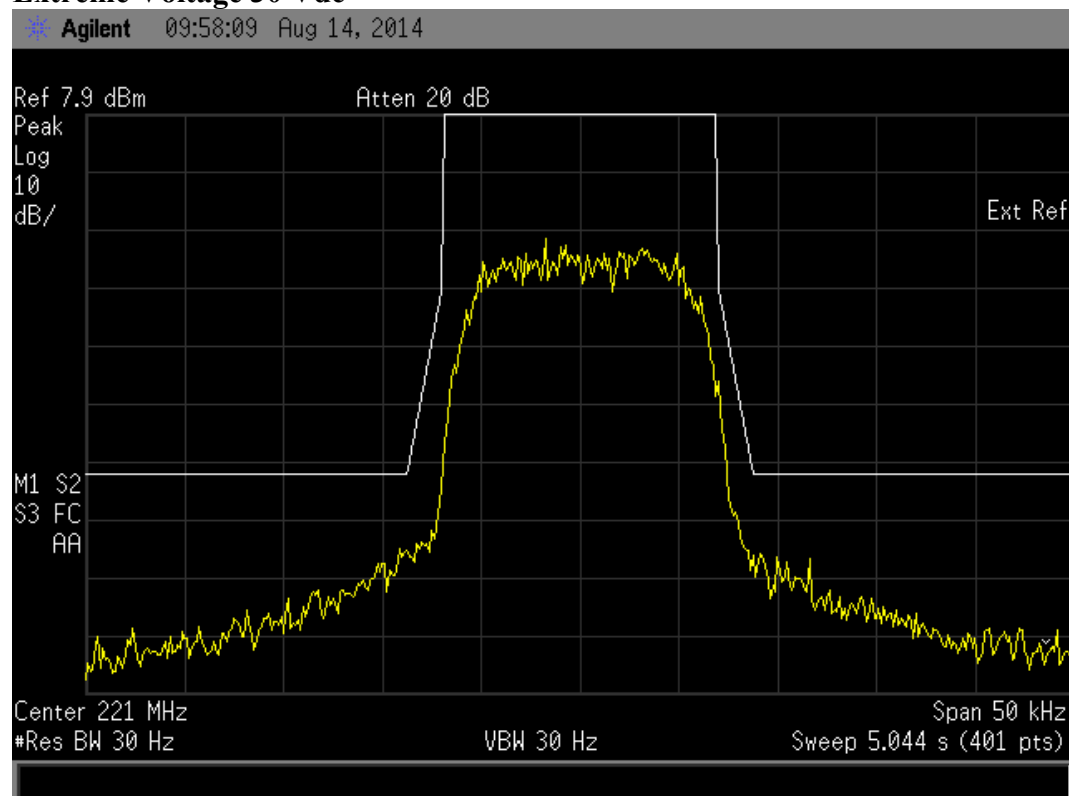
Nominal Voltage 13.8 Vdc



Extreme Voltage 10.0 Vdc



Extreme Voltage 30 Vdc



Transmitter spurious emissions at the antenna terminals (216 – 217 and 217 – 220 MHz bands).

Nominal Frequency: 216.575 MHz

Spurious emission (MHz)	Emission level (dBm)	Limit (dBm)
433.150	-31.1	-13.0
649.725	< -70.0	-13.0
866.300	< -70.0	-13.0
1082.875	< -70.0	-13.0
1299.450	< -70.0	-13.0
1516.025	< -70.0	-13.0
1732.600	< -70.0	-13.0
1949.175	< -70.0	-13.0
2165.750	< -70.0	-13.0

Nominal Frequency: 217.575 MHz

Spurious emission (MHz)	Emission level (dBm)	Limit (dBm)
435.150	-31.4	-13.0
652.725	< -70.0	-13.0
870.300	< -70.0	-13.0
1087.875	< -70.0	-13.0
1305.450	< -70.0	-13.0
1523.025	< -70.0	-13.0
1740.600	< -70.0	-13.0
1958.175	< -70.0	-13.0
2175.750	< -70.0	-13.0

Nominal Frequency: 219.575 MHz

Spurious emission (MHz)	Emission level (dBm)	Limit (dBm)
439.150	-33.6	-13.0
658.725	< -70.0	-13.0
878.300	< -70.0	-13.0
1097.875	< -70.0	-13.0
1317.450	< -70.0	-13.0
1537.025	< -70.0	-13.0
1756.600	< -70.0	-13.0
1976.175	< -70.0	-13.0
2195.750	< -70.0	-13.0

Limit:

Applied mask B, on any frequency removed from the centre of the authorised bandwidth by a displacement frequency of more than 12.5 kHz shall be attenuated by at least $43 + 10 \log (P)$.

A rated power of 2.0 watts (33.0 dBm) and of 5.0 watts (37.0 dBm) gives a limit of -13 dBm.

The spectrum has been investigated up to the 10th harmonic of the transmitter.

Part 2.1051 states that emissions greater than 20 dB below the limit need not be specified.

Part 2.1057 states that the spectrum should be investigated up to the 10th harmonic if the transmitter operates below 10 GHz.

Result: Complies.

Measurement Uncertainty: ± 3.3 dB



Transmitter spurious emissions at the antenna terminals (220 – 222 MHz band)

Nominal Frequency: 221.000 MHz

Spurious emission (MHz)	Emission level (dBm)	Limit (dBm)
442.000	-31.9	-25.0
663.000	< -70.0	-25.0
884.000	< -70.0	-25.0
1105.000	< -70.0	-25.0
1326.000	< -70.0	-25.0
1547.000	< -70.0	-25.0
1768.000	< -70.0	-25.0
1989.000	< -70.0	-25.0
2210.000	< -70.0	-25.0

Limit:

Applied mask F, on any frequency removed from the centre of the authorised bandwidth by a displacement frequency of more than 11.25 kHz shall be attenuated by at least $55 + 10 \log(P)$.

A rated power of 5.0 watts (37.0 dBm) gives a limit of -25 dBm.

The spectrum has been investigated up to the 10th harmonic of the transmitter.

Part 2.1051 states that emissions greater than 20 dB below the limit need not be specified.

Part 2.1057 states that the spectrum should be investigated up to the 10th harmonic if the transmitter operates below 10 GHz.

Result: Complies.

Measurement Uncertainty: ± 3.3 dB

Field strength of the transmitter spurious emissions (216 – 222 MHz)

Nominal Frequency: 216.075 MHz

Frequency (MHz)	Level (dBμV/m)	Level (dBm)	Limit (dBm)	Polarity	Margin (dB)
433.1500	27.8	-69.6	-20.0	Vertical	49.6
433.1500	27.6	-69.8	-20.0	Horizontal	49.8
649.7250	31.8	-65.6	-20.0	Vertical	45.6
649.7250	31.7	-65.7	-20.0	Horizontal	45.7
866.3000	35.4	-62.0	-20.0	Vertical	42.0
866.3000	35.4	-62.0	-20.0	Horizontal	42.0
1082.8750	44.4	-53.0	-20.0	Vertical	33.0
1082.8750	45.2	-52.2	-20.0	Horizontal	32.2
1299.4500	46.7	-50.7	-20.0	Vertical	30.7
1299.4500	47.3	-50.1	-20.0	Horizontal	30.1
1516.0250	49.0	-48.4	-20.0	Vertical	28.4
1516.0250	48.8	-48.6	-20.0	Horizontal	28.6
1732.6000	51.4	-46.0	-20.0	Vertical	26.0
1732.6000	49.6	-47.8	-20.0	Horizontal	27.8
1949.1750	53.6	-43.8	-20.0	Vertical	23.8
1949.1750	53.0	-44.4	-20.0	Horizontal	24.4
2165.7500	55.7	-41.7	-20.0	Vertical	21.7
2165.7500	55.0	-42.4	-20.0	Horizontal	22.4

Nominal Frequency: 217.575 MHz

Frequency (MHz)	Level (dBμV/m)	Level (dBm)	Limit (dBm)	Polarity	Margin (dB)
435.1500	27.8	-69.6	-20.0	Vertical	49.6
435.1500	27.6	-69.8	-20.0	Horizontal	49.8
652.7250	31.8	-65.6	-20.0	Vertical	45.6
652.7250	31.7	-65.7	-20.0	Horizontal	45.7
870.3000	35.4	-62.0	-20.0	Vertical	42.0
870.3000	35.4	-62.0	-20.0	Horizontal	42.0
1087.8750	44.4	-53.0	-20.0	Vertical	33.0
1087.8750	45.2	-52.2	-20.0	Horizontal	32.2
1305.4500	46.7	-50.7	-20.0	Vertical	30.7
1305.4500	47.3	-50.1	-20.0	Horizontal	30.1
1523.0250	49.0	-48.4	-20.0	Vertical	28.4
1523.0250	48.8	-48.6	-20.0	Horizontal	28.6
1740.6000	51.4	-46.0	-20.0	Vertical	26.0
1740.6000	49.6	-47.8	-20.0	Horizontal	27.8
1958.1750	53.6	-43.8	-20.0	Vertical	23.8
1958.1750	53.0	-44.4	-20.0	Horizontal	24.4
2175.7500	55.7	-41.7	-20.0	Vertical	21.7
2175.7500	55.0	-42.4	-20.0	Horizontal	22.4

Nominal Frequency: 219.575 MHz

Frequency (MHz)	Level (dB μ V/m)	Level (dBm)	Limit (dBm)	Polarity	Margin (dB)
439.1500	27.8	-69.6	-20.0	Vertical	49.6
439.1500	27.6	-69.8	-20.0	Horizontal	49.8
658.7250	31.8	-65.6	-20.0	Vertical	45.6
658.7250	31.7	-65.7	-20.0	Horizontal	45.7
878.3000	35.4	-62.0	-20.0	Vertical	42.0
878.3000	35.4	-62.0	-20.0	Horizontal	42.0
1097.8750	44.4	-53.0	-20.0	Vertical	33.0
1097.8750	45.3	-52.1	-20.0	Horizontal	32.1
1317.4500	46.7	-50.7	-20.0	Vertical	30.7
1317.4500	46.9	-50.5	-20.0	Horizontal	30.5
1537.0250	49.0	-48.4	-20.0	Vertical	28.4
1537.0250	48.5	-48.9	-20.0	Horizontal	28.9
1756.6000	51.4	-46.0	-20.0	Vertical	26.0
1756.6000	49.6	-47.8	-20.0	Horizontal	27.8
1976.1750	53.6	-43.8	-20.0	Vertical	23.8
1976.1750	53.0	-44.4	-20.0	Horizontal	24.4
2195.7500	55.7	-41.7	-20.0	Vertical	21.7
2195.7500	55.1	-42.3	-20.0	Horizontal	22.3

In transmit mode the transmitter was tested while transmitting continuously while attached to a dummy load.

Device was tested on an open area test site at a distance of 3 metres.

Testing was carried out at EMC Technologies NZ Ltd Open Area Test Site, which is located at Driving Creek, Orere Point, Auckland. Details of this site have been filed with the Commission, Registration Number: 90838, which was last updated in July 2013

Limit:

All spurious emissions are to be attenuated by at least $50 + 10 \log (P)$.

The rated power of 2 watts (33.0 dBm) and 5.0 watts (37.0 dBm) gives a limit of -20 dBm.

No measurements were made above the 10th harmonic.

Result: Complies.

Measurement Uncertainty: ± 4.1 dB

Frequency Stability (216 – 217 and 217 – 220 MHz band)

Frequency stability measurements were between - 30°C and + 50°C in 10°C increments.

At each temperature the transmitter was given a period of 30 minutes to stabilise.

The transmitter was then turned on and the frequency error measured after a period of 1 minute.

Nominal Frequency: 217.575 MHz

Frequency Error (Hz)

Temperature (°C)	Voltage (10.8 Vdc)	Voltage (13.8 Vdc)	Voltage (15.6 Vdc)
+50	-13.0	-10.0	-12.0
+40	-18.0	-18.0	-19.0
+30	-12.0	-15.0	-15.0
+20	+10.0	+11.0	+13.0
+10	+12.0	+14.0	+14.0
0	+18.0	+18.0	+21.0
-10	-15.0	-15.0	-17.0
-20	-38.0	-38.0	-42.0
-30	-44.0	-48.0	-53.0

Limit:

Part 90.213 states that mobile station transmitters operating between 216 – 220 fixed base stations are required to have a frequency tolerance of 1.0 ppm.

The Part 90 frequency stability requirement has been applied to this transmitter.

This transmitter was tested on 217.575 MHz.

$1.0 \text{ ppm} = 1.0 \times 217.5 \text{ Hz}$.

A worst case error of -53 Hz or 0.24 ppm was observed.

Result: Complies.

Measurement Uncertainty: $\pm 30 \text{ Hz}$.

Exposure of humans to RF fields

As per Section 1.1310 mobile transmitters are required to be operated in a manner that ensures the public is not exposed to RF energy levels in accordance with OST/OET Bulletin Number 65.

Calculations have been made using the General Public Exposure limits.

Minimum safe distances have been calculated below.

$$\text{Power density, mW/cm}^2 = E^2/3770$$

- General Public / Uncontrolled exposure limit will be 0.2 mW/cm² or 27.5 V/m.

The minimum distance from the antenna at which the MPE is met is calculated from the equation relating field strength in V/m, transmit power in watts, transmit antenna gain, transmitter duty cycle and separation distance in metres:

$$E, \text{ V/m} = (\sqrt{30 * P * G * DC}) / d$$

In the band the 216 – 217 MHz a transmitter power (P) of 5 watts was measured on 216.575 MHz

In the band 217 – 220 MHz a transmitter power (P) of 2 watts was measured on 217.575 MHz.

In the band the 220 – 222 MHz a transmitter power (P) of 5 watts was measured on 221.000 MHz

The client has declared a duty (DC) of 100% (1)

General Public / Uncontrolled

216 – 217 MHz band (216.575 MHz) at 5 watts
220 – 222 MHz band (221.000 MHz) at 5 watts

$$d = \sqrt{30 * 5 * 20 * 1} / 27.5$$

$$d = 1.99 \text{ metres or } 199 \text{ cm}$$

217 – 220 MHz (217.575 MHz) at 2 watts

$$d = \sqrt{30 * 2 * 20 * 1} / 27.5$$

$$d = 1.26 \text{ metres or } 126 \text{ cm}$$

Result: Complies if the above safe distance is defined in the user manual for this equipment.

7. TEST EQUIPMENT USED

Instrument	Manufacturer	Model	Serial #	Asset	Cal Due	Interval
Aerial Controller	EMCO	1090	9112-1062	3710	N/a	N/a
Aerial Mast	EMCO	1070-1	9203-1661	3708	N/a	N/a
Turntable	EMCO	1080-1-2.1	9109-1578	3709	N/a	N/a
VHF Balun	Schwarzbeck	VHA9103	-	3603	12/01/2015	1 year
Biconical Antenna	Schwarzbeck	BBA 9106	-	3612	12/01/2015	1 year
Log Periodic	Schwarzbeck	VUSLP 91111	9111-228	3785	12/01/2015	1 year
Horn Antenna	EMCO	3115	9511-4629	E1526	04/06/2017	1 year
Receiver	Rohde & Schwarz	ESIB-40	100171	EMC4003	29/01/2015	1 year
Modulation Analyzer	Rohde & Schwarz	FMA	837807/020	E1552	15/01/2015	1 year
Oscilloscope	Tektronics	745A	B010643	E1569	15/01/2015	1 year
Power Attenuator	Weinschel	49-20-43	GC104	E1308	N/a	N/a
Power Supply	Hewlett Packard	6032A	2743A-02859	E1069	N/a	N/a
Signal Generator	Rohde & Schwarz	SMHU	838923/028	E1493	22/01/2015	1 year
Spectrum Analyzer	Hewlett Packard	E7405A	US39150142	RFS 3776	07/07/2015	1 year
Thermal chamber	Contherm	M180F	86025	E1129	01/01/2015	1 year
Thermometer	DSIR	RT200	035	E1049	01/01/2015	1 year

All test equipment was within calibration at the time of testing.

8. ACCREDITATIONS

Testing was carried out in accordance with EMC Technologies NZ Ltd registration with the Federal Communications Commission as a listed facility, Registration Number: 90838, which was updated in July 2013 and then June 2014.

All testing has been carried out in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to ISO/IEC 17025.

All measurement equipment has been calibrated in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to ISO/IEC 17025.

International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with various accreditation bodies in a number of economies. This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied on request.

9. PHOTOGRAPHS

External photos of the device tested



Labels



Radiated emissions test set up photos



