SPECTRA
ENGINEERING Pty Ltd
ABN 65 057 696 438
High Performance Base Stations and Repeaters

9 TRADE ROAD
MALAGA, 6090 WESTERN
AUSTRALIA.

TEL: +(61-8) 92482755
FAX: +(61-8) 92482756

TEST REPORT

RADIO PERFORMANCE TESTING FOR APPROVAL

MANUFACTURER & APPLICANT:

Spectra Engineering Pty Ltd
9 Trade Road
Malaga, 6090
Western Australia.
TEL: +(61-8) 92482755
FAX: +(61-8) 92482756
WEB: http://www.spectraeng.com.au

TYPE DESIGNATION: MX800-Radio Base Station Transceiver \Repeater

FCC ID OKRMX800A3V

EMISSION DESIGNATORS:

16K0F3E	*(Analogue)*	16K0F3D	*(Data)*
16K0F8D	*(Data 2 Channels)*		
16K0F9W	*(Composite system Data & Analogue)*		
11K0F3E	*(Analogue)*	11K0F3D	*(Data)*
11K0F8D	*(Data 2 Channels)*		
11K0F9W	*(Composite system Data & Analogue)*		

CODE OF FEDERAL REQULATIONS \TEST SPECIFICATIONS:

Parts of 47 CFR 2	(*Frequency Allocations and Radio Treaty Matters; General Rules and Regulations*)
Parts of 47 CFR 22	*(Public mobile services)*
Part of 47 CFR 74	(*Experimental Radio Auxiliary, Special Broadcast and Other Program Distributional Services*)
Parts of 47 CFR 90	(*Private Land Mobile Radio Services)*

TEST METHODS OR GUIDE: ANSI/TIA 603. *(Land Mobile FM or PM Communications Equipment Measurement and Performance Standards)*

RADIO TYPE: MX800 **FREQUENCY BAND:** 39 MHz ~ 47 MHz

NUMBER OF SAMPLES TESTED: **1**

TEST ENGINEER(S):

Anthony Chadd
Research & Development Engineer

APPROVED BY:

AJChadd

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TEST REPORT

Managing Director\Chief Engineer

Gary Jacobs

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DECLARATION OF CONFORMITY

We: **Spectra Engineering Pty Ltd**
9 Trade Rd
Malaga
Western Australia

Declare under our sole responsibility that the following products:

Equipment: Base Station\Repeater, Transmitter and Receiver

Product Family Name	**Models**
MX800	MX800A3A3V

We also hereby certify that all the statements made in this application and attached technical data are true and correct, to the best of our knowledge and belief. Tests have been conducted in strict adherence to the application rules of the commission and under the most accurate measurement standards possible.

We further certify that all the necessary steps have been taken and are in force to assure that the production units of this equipment and bearing this application FCC ID type approval number will continue to comply with the commission's requirements.

To which this declaration relates is in conformity with the following standards:

FCC CFR 47 Parts 2, 22, 74 & 90

Signatory: _____

Name: **Gary Jacobs**

Title: **Managing Director**

Date: **Tuesday, June 01, 2008**

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Product Description:

The MX800 is a compact lightweight standard 19" rack mounting transceiver. It is designed to mount horizontally in a 19" rack frame and occupies 2RU (89mm). The depth of the unit is 330mm and the weight is less than 9kg.

The unit consists of four main sub assemblies an Exciter Module, a Receiver Module, a Power Amplifier Module and a Micro Controller board. These modules are housed in a fully welded steel case.

The MX800 features a high degree of RFI and EMI screening throughout the design and construction. The receiver and exciter (low power transmitter) modules are contained in solid aluminium enclosures, and for additional screening each interface pin in the modules is individually filtered. The PA module is contained in a special compact efficient extrusion for minimum harmonic radiation. This design results in low conducted and radiated emissions and minimal susceptibility to RFI and EMI.

User interface is via the front and rear panels. The rear panel provides access to all connectors and the standard front panel provides 6 LED indicators of the radio status. The local control option front panel has additional speaker, microphone and (optionally) channel select functions. Other variations can accommodate serial and monitor ports, as well as VF line level adjustment on the front panel.

MX800 Technical Manual:

Please see APPENDIX A within this document.

General Description
Theory of Operation/ Technical Description
Tune Up Procedure
Parts Lists
Schematics

Labeling Information

Please see APPENDIX B within this document.

Photographs

Please see APPENDIX C within this document.

Test Methodology

Prepared in accordance with the requirements of FCC Rules and Regulations Part 2 Subpart F, Paragraphs 2.983 through 2.999 and applicable portions of Parts 24, 74, 80 and 90. Interconnecting cables were manipulated as necessary to maximize emissions

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Necessary Bandwidth and Emission Designators

SPECIFICATION: FCC 47 CFR 2.202

The Necessary Bandwidth is the minimum value of the occupied bandwidth sufficient to ensure the transmission of information at the rate and with the quality required for the system employed.

This is calculated using the following formula.

Bn = 2M + 2DK

Where:

Bn = Necessary Bandwidth
M = Maximum modulation frequency
For Data transmission
M = B/2
Where: B = Modulation rate in Baud
D = Peak deviation
K = Constant
For Analogue transmission this is 1
For Data transmission this is typically 1.2

Analogue Voice 12.5 kHz Channel Spacing:

Necessary bandwidth Emission Designator

M = 3kHz
D = 2.5kHz

11K0F3E
F3E represents a FM voice transmission

Bn = 6 + 5 x 1
=11kHz

Analogue Voice 25kHz Channel Spacing:

Necessary bandwidth Emission Designator

M = 3kHz
D = 5kHz

16K0F3E
F3E represents a FM voice transmission

Bn = 6 + 10 x 1
=16kHz

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TEST REPORT

Modifications

No modifications were required to bring the EUT into compliance.

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Test Equipment Use

Table 1 below describes test equipment used to evaluate this product.

Test Equipment Used		
MANUFACTURER	**MODEL**	**EQUIPMENT TYPE**
Hewlett Packard	Hp8920b	Communication Test Set
Aeroflex	IFR2975	Communication Test Set
Hewlett Packard	Hp54600b	100mhz Oscilloscope
Hewlett Packard	Hp8901b	Modulation Analyzer
Hewlett Packard	Hp8644a	Synthesized Signal Generator
Hewlett Packard	Hp8657b	Signal Generator
Hewlett Packard	Hp8562e	Spectrum Analyzer
Lambda	Zup20-20	Power Supply
1m Coax Cable	RG-214	COAX
Narda		Directional Coupler
Narda		RF Attenuator
Minicircuits		RF Splitter 3 Port Combiner
Minicircuits		RF Splitter 4 Port Combiner
Spectra	-	Filter Notch
		Voltmeter

Table 1 TEST EQUIPMENT USED

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TEST REPORT

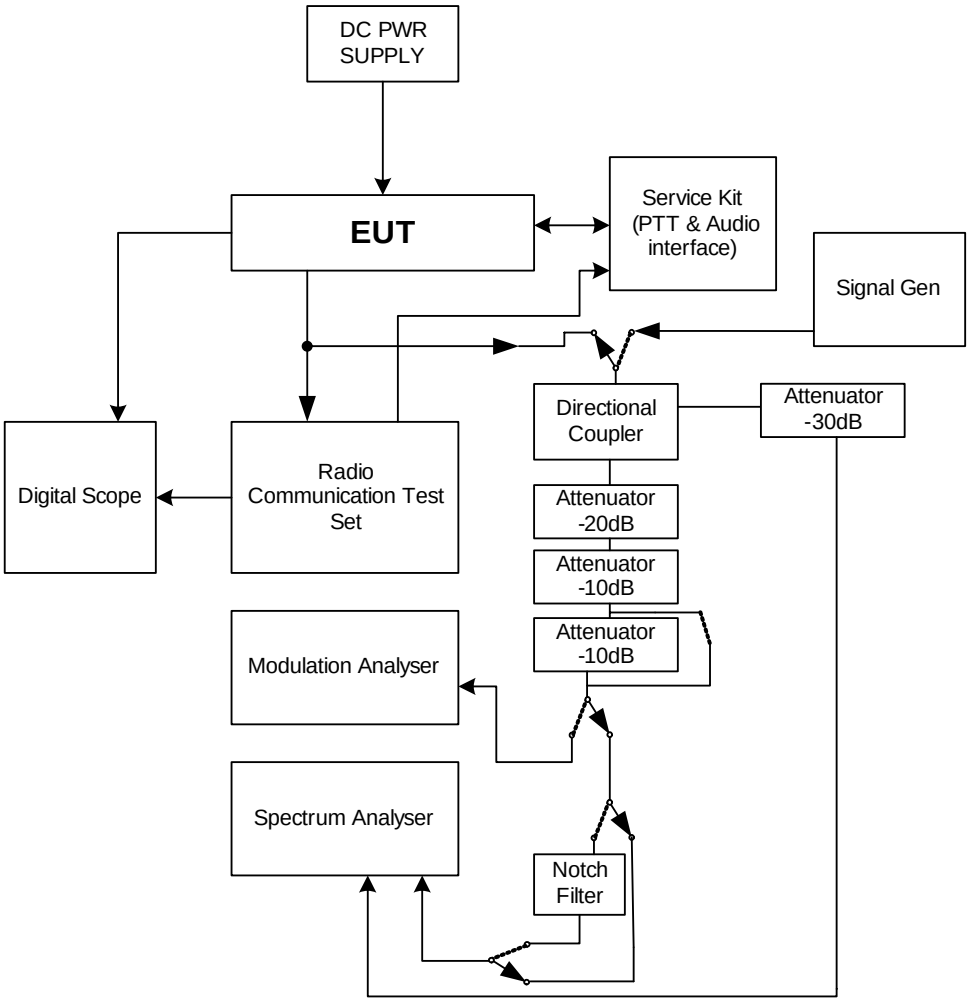

Figure 1 EUT SETUP

Test Frequencies		
(FT)	**(LT)**	**(FT)**
FR_L	**FR_C**	**FR_U**
39.000 MHz	**44.000**	**47.000MHz**

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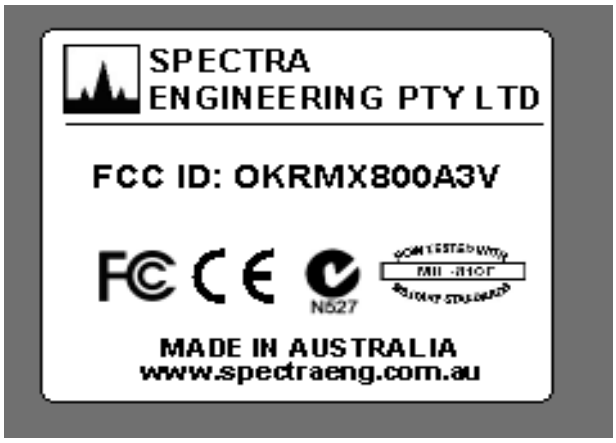
TEST REPORT

Label details:



TYPE APPROVAL LABEL

Location of label on Product :

Label will be located on the right hand side of product.
Please see APPENDIX C within this document.

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TEST REPORT

Transmitter Requirements:

Conducted Carrier Output Power Rating.

SPECIFICATION: FCC 47 CFR 2.1046
Measurement Method Definition Guide EIA-603 clauses 2.2.1

Limits:

FCC 47 CFR 90.205
Shall not exceed by more than 20% the rating for which the equipment has been type accepted by FCC

FCC 47 CFR 74.461
The authorized transmitter power for a remote pickup broadcast station shall be limited to that necessary for satisfactory service and, in any event, shall not be greater than 100 watts

MEASUREMENT PROCEDURE:

1. RF Communication test set (RCTS) is used as a RF load and to measure the output power.
2. Record the output power level measured by the RCTS.
3. Correct the measured level for all losses in the RF path.
4. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band

Measured Results:

RF Power is variable from 1W-100W

Nominal Target Power	FR_L	FR_C	FR_U
1W	30.3	30.13	30.13
50W	46.96	46.97	47
100W	50.00	49.99	50.02

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Carrier Frequency Stability

SPECIFICATION: FCC 47 CFR 2.1055 (a) (1)
FCC 47 CFR 2.1055 (d) (1)

Measurement Method Definition Guide EIA-603 clauses 2.2.2

Limits:

FCC 47 CFR 90.213
FCC 47 CFR 22.355, 74.464

Frequency Range: 25-50MHz

Channel Spacing (kHz)	Base Station Frequency Error (PPM)
20	20

MEASUREMENT PROCEDURE:

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30 C.
3. With the EUT, powered via nominal voltage, connected to the MX800 and a PTT was asserted on all three test channels, measure the carrier frequency.
   These measurements were made within 2 minutes of powering up & PTT the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10 C increments from -30 C to +60 C.
   Allowed at least 1 hour at each temperature, unpowered, before making measurements.
5. Subject the EUT to overnight soak at +50 C.
6. With the EUT, powered via nominal voltage, connected to the MX800 and a PTT was asserted on all three test channels, measure the carrier frequency.
   These measurements were made within 2 minutes of powering up the EUT, to prevent significant self-warming.
7. Repeat the above measurements at 10 C increments from +50 C to -30 C. Allowed at least 1 hour at each temperature, unpowered, before making measurements.
8. At all temperature levels hold the temperature to +/- 0.5 C during the measurement procedure.

9. Re-measured carrier frequency at room temperature with nominal voltage.
   Vary supply voltage from minimum voltage to maximum voltage, in 1Volt increments re-measuring carrier frequency at each voltage.
   Pause at nominal voltage for 1/2 hours unpowered, to allow any self-heating to stabilize, before continuing.

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TEST REPORT

Measured Results:

NOTE: Freq. Error (ppm) = Freq. Error (Hz) / **$FR_{(L,C,U)}$**

FR_L

12.5 kHz & 25 kHz Channel Spacing:

TEMPERATURE (°C)	FREQUENCY ERROR (HZ)	FREQUENCY ERROR (PPM)
-30	57	0.38507009
-20	38	0.256713393
-10	66	0.44587063
0	110	0.743117717
+10	98	0.662050329
+20	43	0.290491471
+30	-109	0.736362101
+40	-140	0.945786185
+50	-7	0.047289309
+60	39	0.263469009

Voltage (VDC)	FREQUENCY ERROR (HZ)	FREQUENCY ERROR (PPM)
11.7	-16	
11.8	-16	
12.8	-16	
13.8	-16	
14.8	-16	
15.8	-16	
15.9	-16	

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TEST REPORT

FRc
12.5 kHz & 25 kHz Channel Spacing:

TEMPERATURE (°C)	FREQUENCY ERROR (HZ)	FREQUENCY ERROR (PPM)
-30	69	0.428571429
-20	47	0.291925466
-10	76	0.472049689
0	127	0.788819876
+10	114	0.708074534
+20	52	0.322981366
+30	-119	0.739130435
+40	-146	0.906832298
+50	-11	0.068322981
+60	39	0.242236025

Voltage (VDC)	FREQUENCY ERROR (HZ)	FREQUENCY ERROR (PPM)
11.7	-15	
11.8	-15	
12.8	-15	
13.8	-15	
14.8	-15	
15.8	-15	
15.9	-15	

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TEST REPORT

FR_U
12.5 kHz & 25kHz Channel Spacing:

TEMPERATURE (°C)	FREQUENCY ERROR (HZ)	FREQUENCY ERROR (PPM)
-30	-80	0.459836183
-20	56	0.321885328
-10	85	0.488575945
0	143	0.821957178
+10	130	0.747233798
+20	60	0.344877138
+30	108	0.620778848
+40	-155	0.890932605
+50	-18	0.103463141
+60	54	0.310389424

Voltage (VDC)	FREQUENCY ERROR (HZ)	FREQUENCY ERROR (PPM)
11.7	-10	
11.8	-10	
12.8	-10	
13.8	-10	
14.8	-10	
15.8	-10	
15.9	-10	

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TEST REPORT

Audio Frequency Response

SPECIFICATION: FCC 47 CFR 2.1047 (a)
Measurement Method Definition Guide EIA-603 clauses 2.2.6

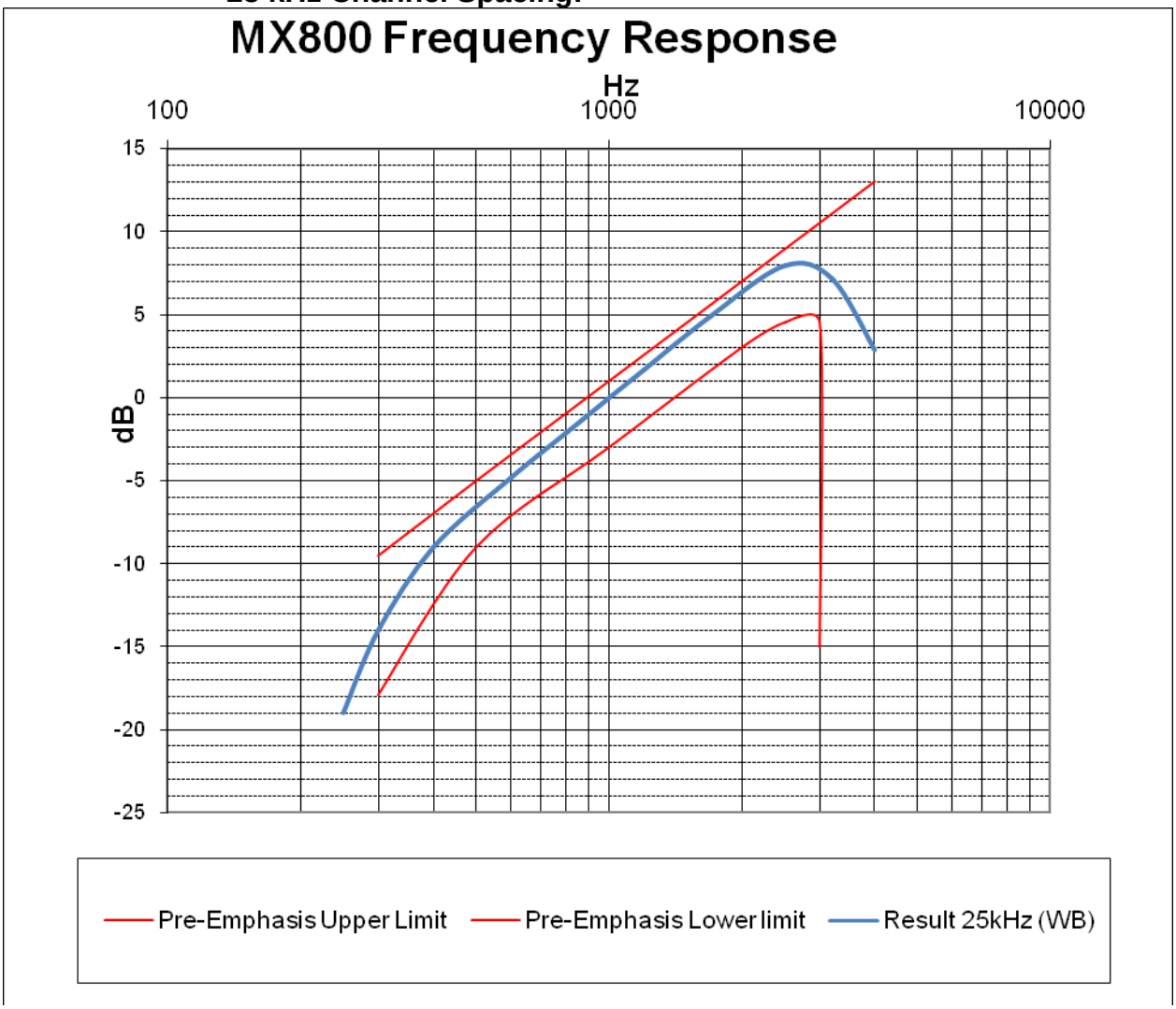
Limits:
EIA-603 Clause 3.2.6 Recommend Standard.

MEASUREMENT PROCEDURE:

1. An audio input tone of 1000Hz was applied with the level set to obtain 20% of maximum deviation. This was used as the 0dB reference point.
2. The AF was varied while the audio level was held constant.
3. The response in dB relative to 1000Hz was measured.

Measured Results:

25 kHz Channel Spacing:



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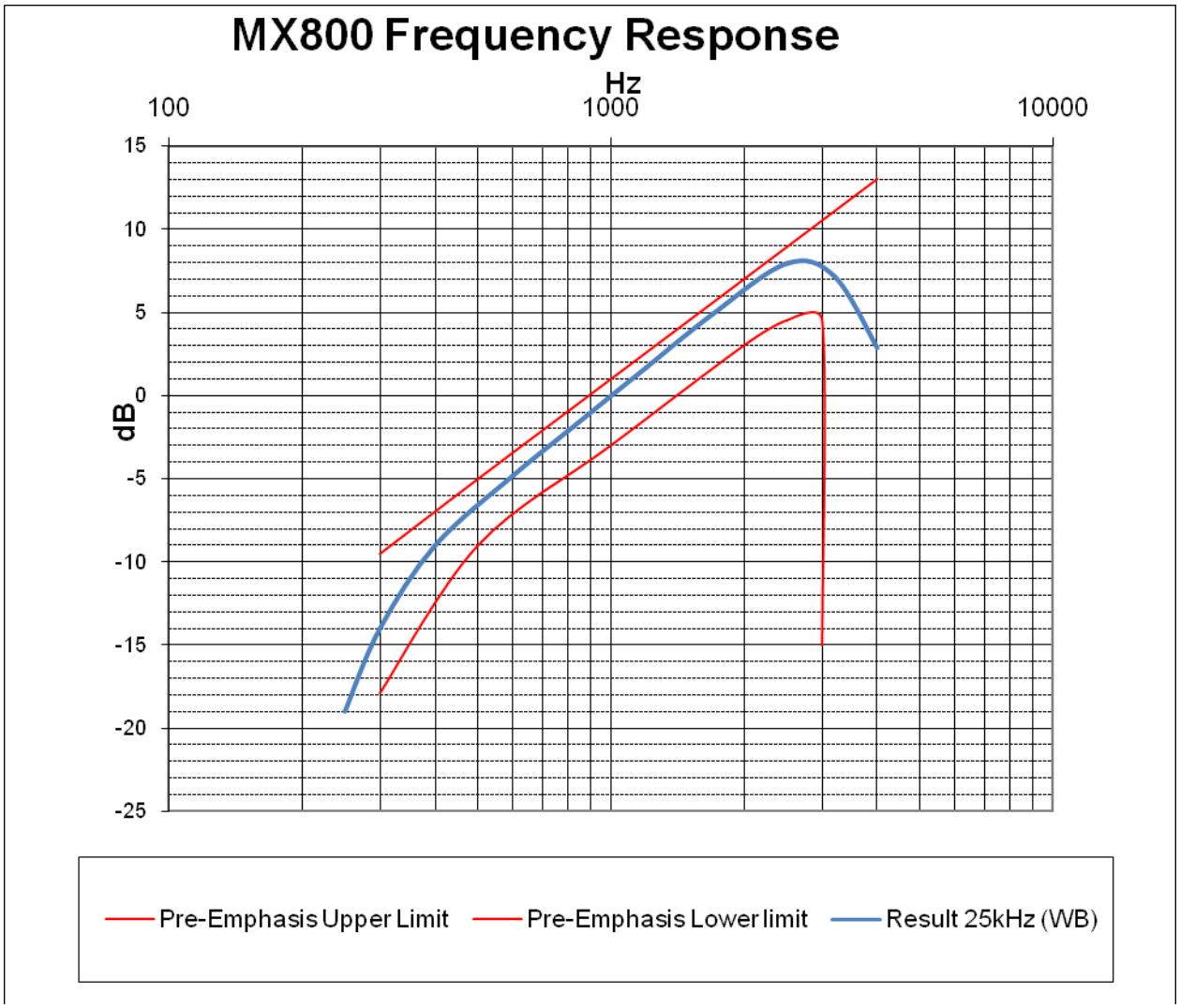
TEST REPORT

20 kHz Channel Spacing:



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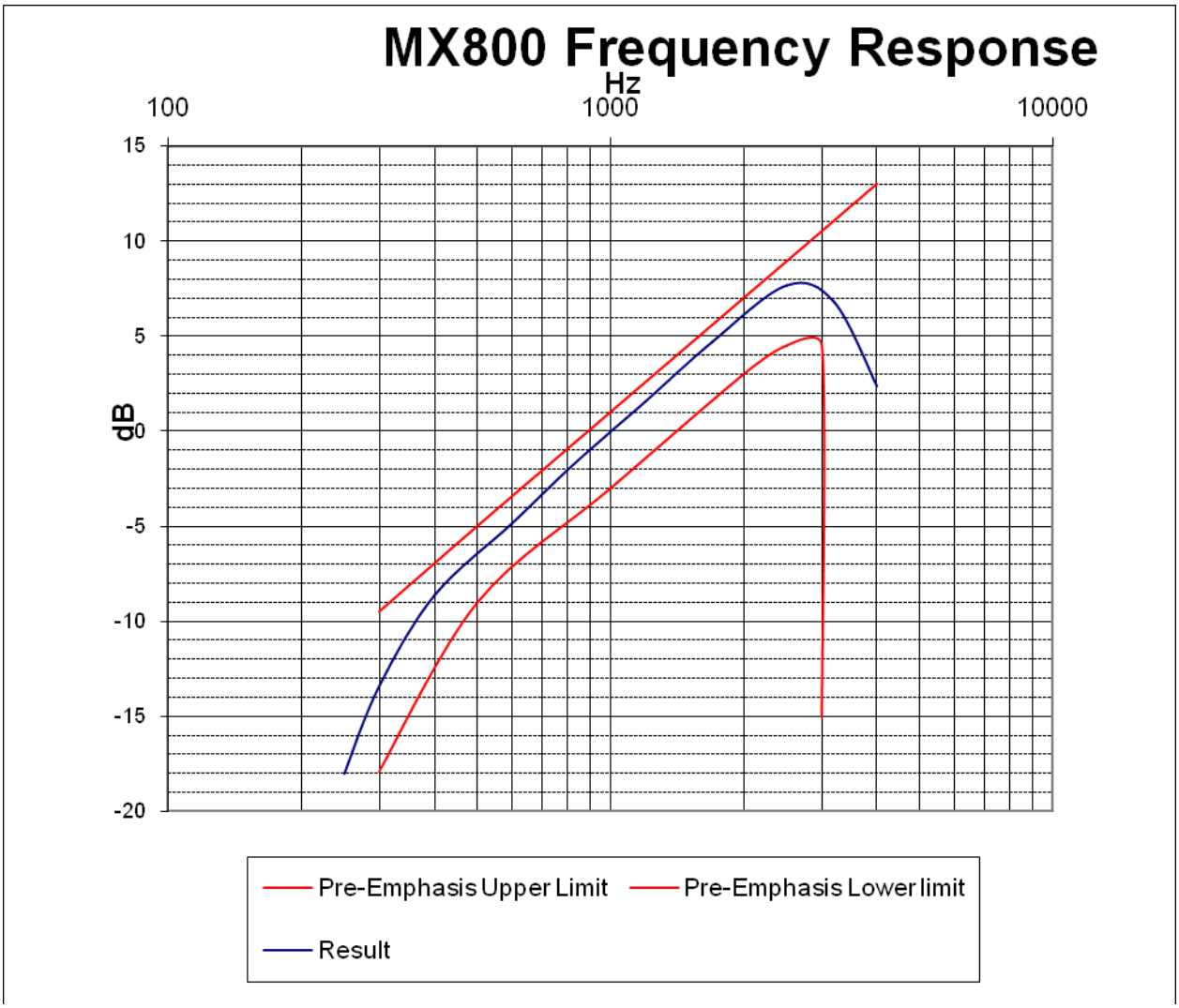
12.5 kHz Channel Spacing:



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Modulation Limiting

SPECIFICATION: FCC 47 CFR 2.1047 (b)
Measurement Method Definition Guide EIA-603 clauses 2.2.3

Limits:

FCC 47 CFR 2.1047 (b)
FCC 47 CFR 74.462
Maximum frequency deviation 5kHz (10kHz frequency depend, see regulation code)

MEASUREMENT PROCEDURE

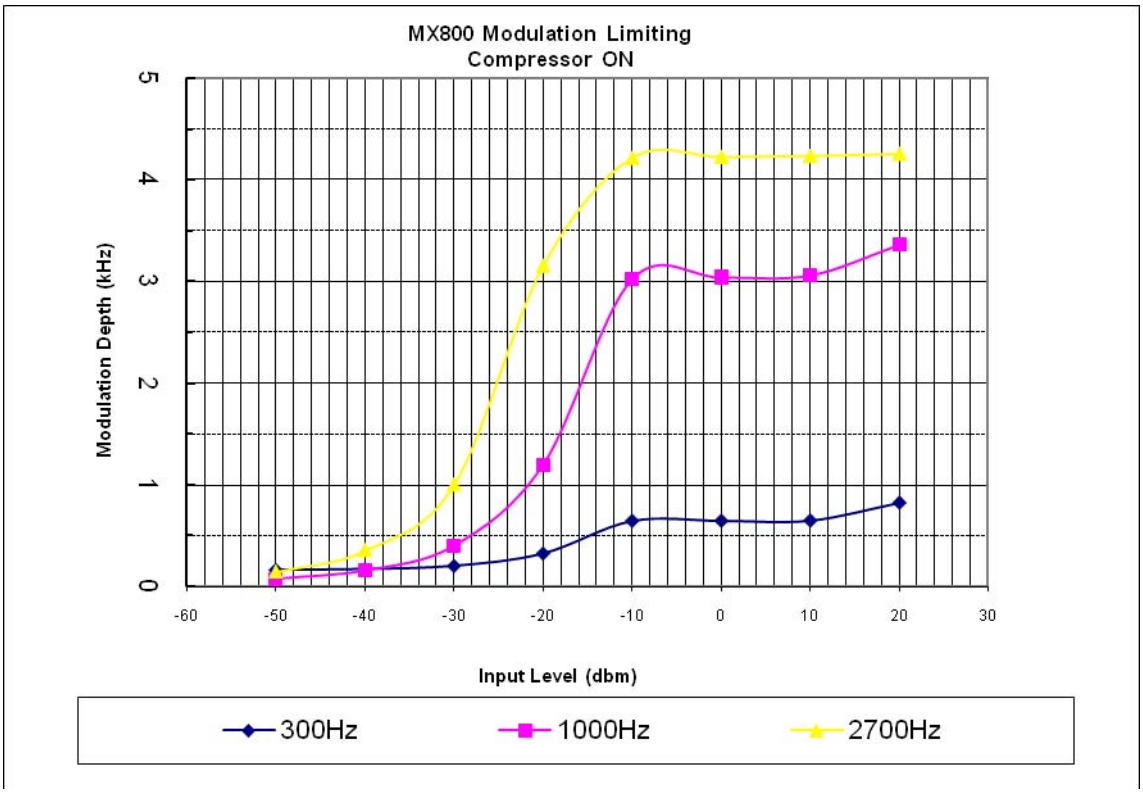
1. The modulation response was measured at three audio frequencies (300Hz, 1000Hz & 2700Hz) while varying the input level.

2. Measurements were made for both Positive and Negative Deviation.

3. The modulation response was measured with a level stepped 20 dB above the level required to obtain 60% deviation at 1000Hz AF.

Measured Results:

25 kHz Channel Spacing:



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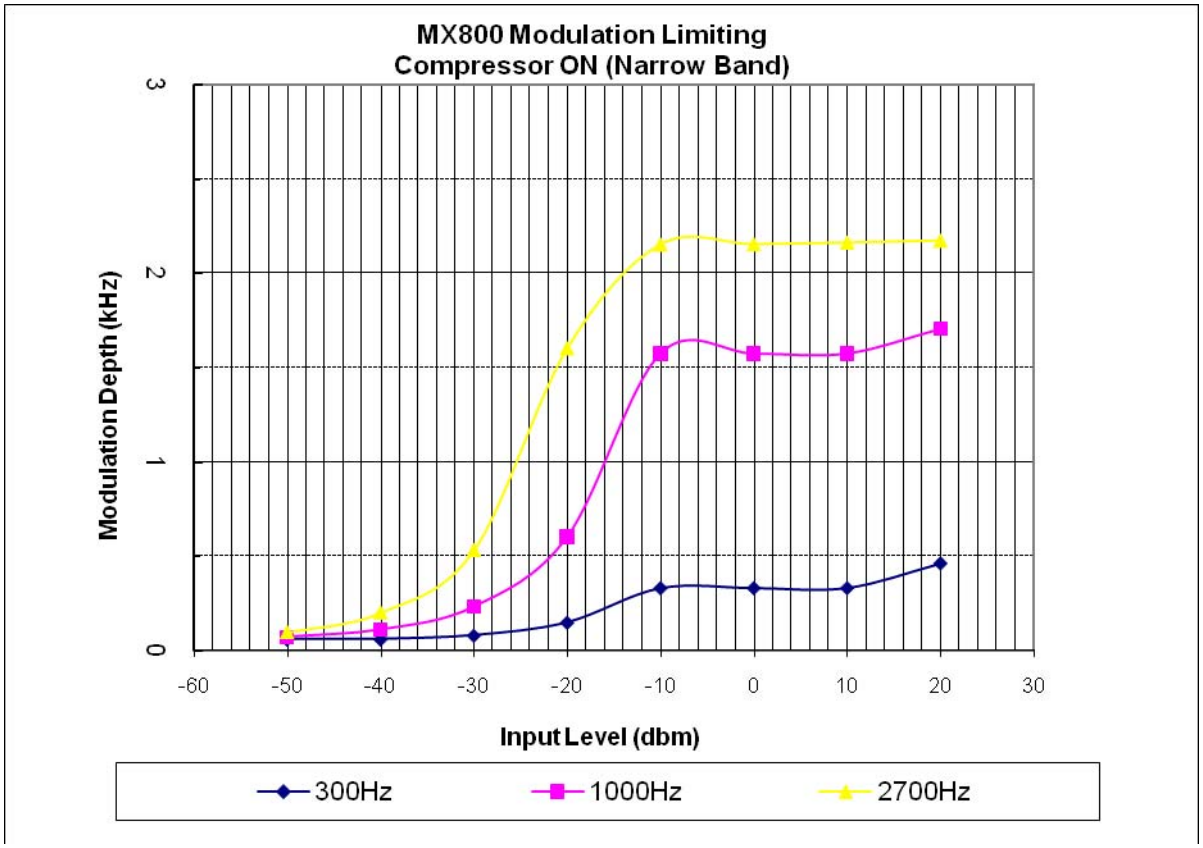
12.5 kHz Channel Spacing:



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TEST REPORT

OCCUPIED BANDWIDTH

SPECIFICATION: FCC 47 CFR 2.1049 (c)
Measurement Method Definition Guide EIA-603 clauses 2.2.11

LIMITS:
FCC 47 CFR 90.210, 74.462, 74.463

Emission Mask B 25.0 kHz Channel Spacing

Displacement Frequency	Attenuation (dB)
10-20kHz	25
20-50kHz	35
>50kHz	43+log10 (Power)

Emission Mask D 12.5 kHz Channel Spacing

Displacement Frequency	Attenuation (dB)
0-5.625kHz	0
5.625 <fd ≤ 12.5kHz	7.27(fd-2.88 kHz)
>12.5 kHz	50+log10 (Power) or 70 whichever is the lesser attenuation

Emission Mask D – Resolution Bandwidth = 100Hz, Video Bandwidth = 1 kHz

MEASUREMENT PROCEDURE:

1. *For Analogue measurement:*

   The EUT was modulated by a 2500Hz tone at an input level 16dB above a level that produced 50% deviation. The input level was established at the frequency of maximum response of the audio modulating circuit.

2. *For Data measurements:*
   The EUT was modulated with an internally generated pseudo random bit sequence at the appropriate Baud rates using the Conformance 1011Hz test pattern .

3. The Occupied Bandwidth was measured on the Spectrum Analyser with the controls set as shown on the following plots.

MEASURED RESULTS:

See the plots on the following pages for Emission Mask **B** 25.0 kHz Channel Spacing & Emission Mask **D** 12.5 kHz Channel Spacing channel spacing

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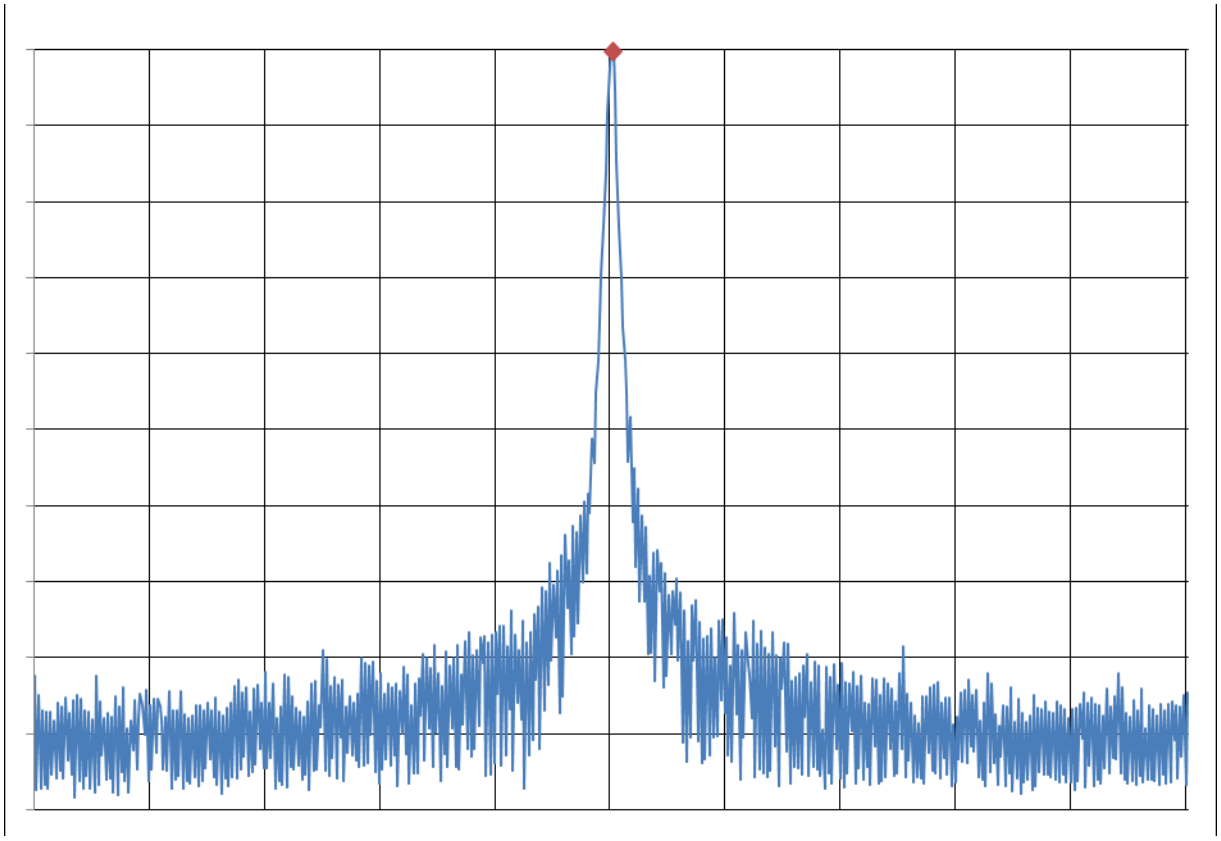
FR_L @ 1W
Emission Mask B 25.0 kHz Channel Spacing:



Reference Un-modulated Measurement

Centre Frequency	39.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	10.000	**dB**
Reference Level	30.300	**dB**
Marker Amplitude	30.300	**dBm**
Scale	10.000	**dB/Div**

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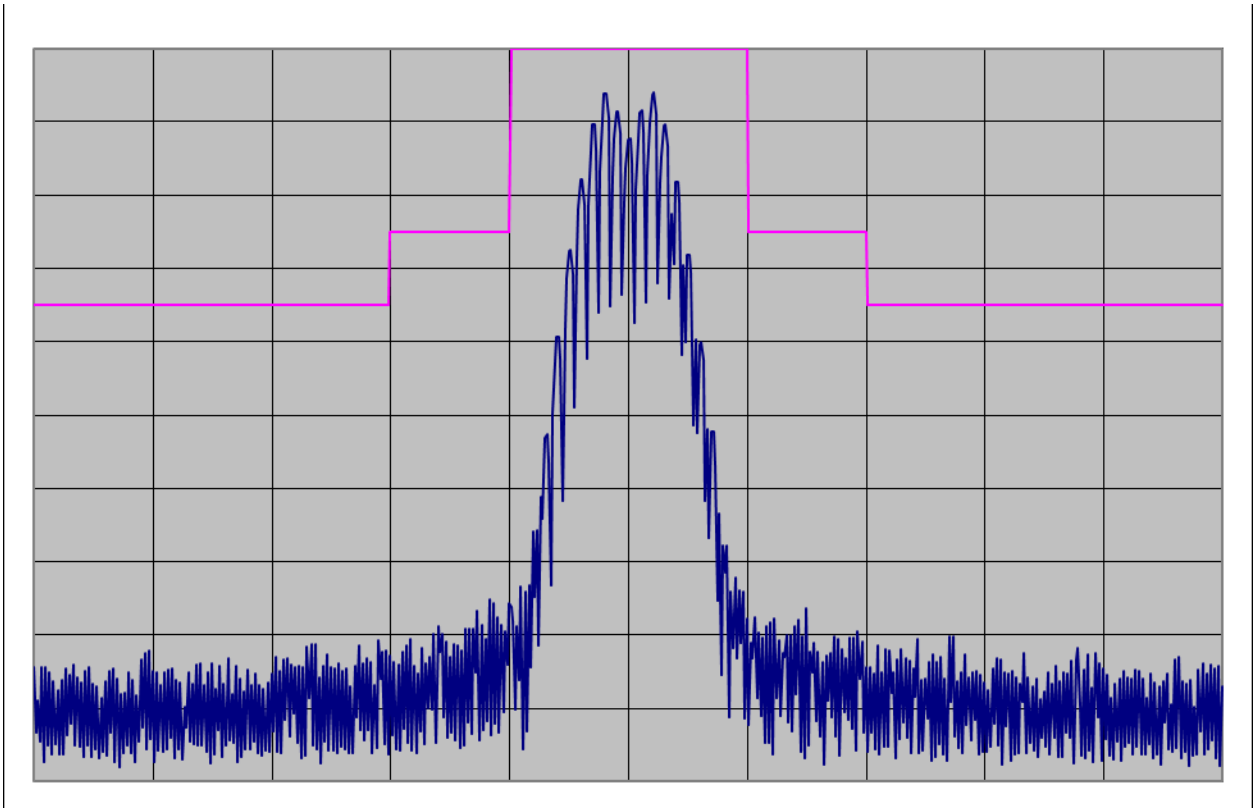
Emission Mask B 25.0 kHz Channel Spacing:



Analogue Measurement

Centre Frequency	39.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	10.000	**dB**
Reference Level	30.300	**dB**
Marker Amplitude		**dBm**
Scale	10.000	**dB/Div**

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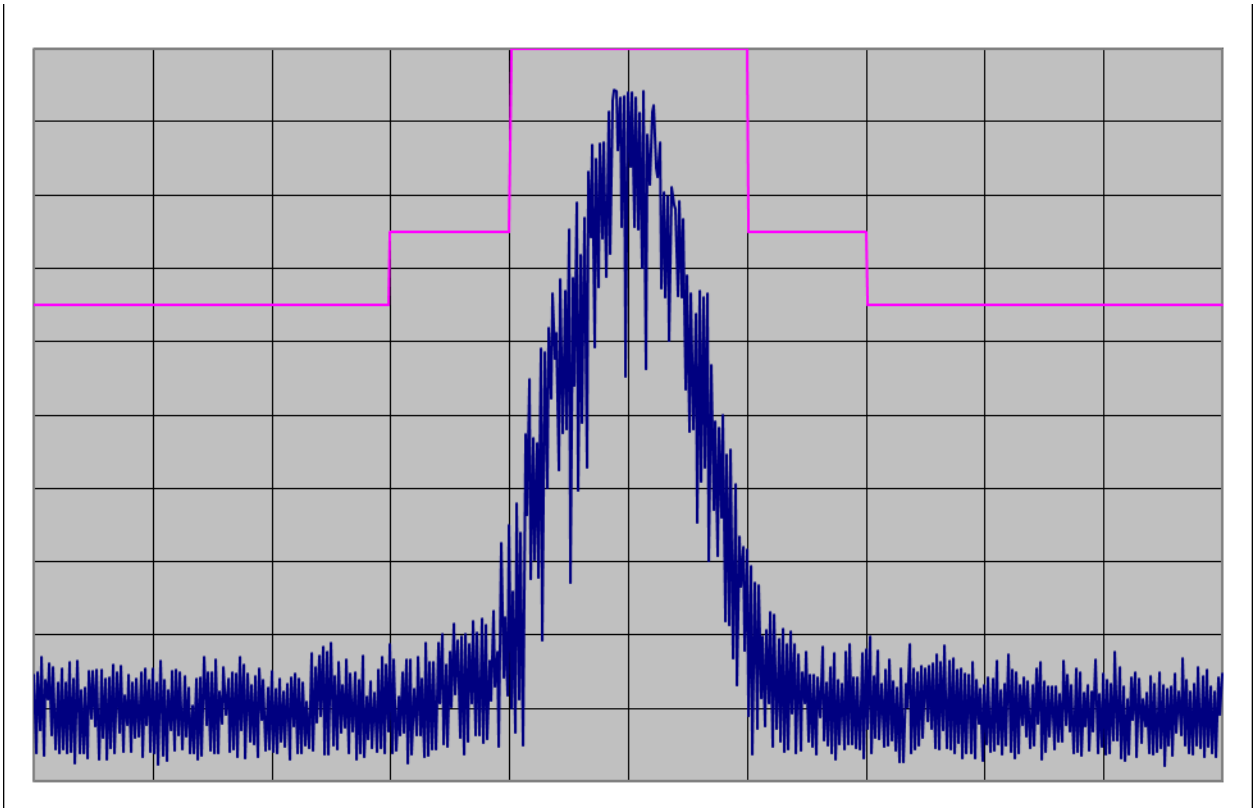
Emission Mask B 25.0 kHz Channel Spacing:



Data measurements

Centre Frequency	39.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	10.000	**dB**
Reference Level	30.300	**dB**
Marker Amplitude		**dBm**
Scale	10.000	**dB/Div**

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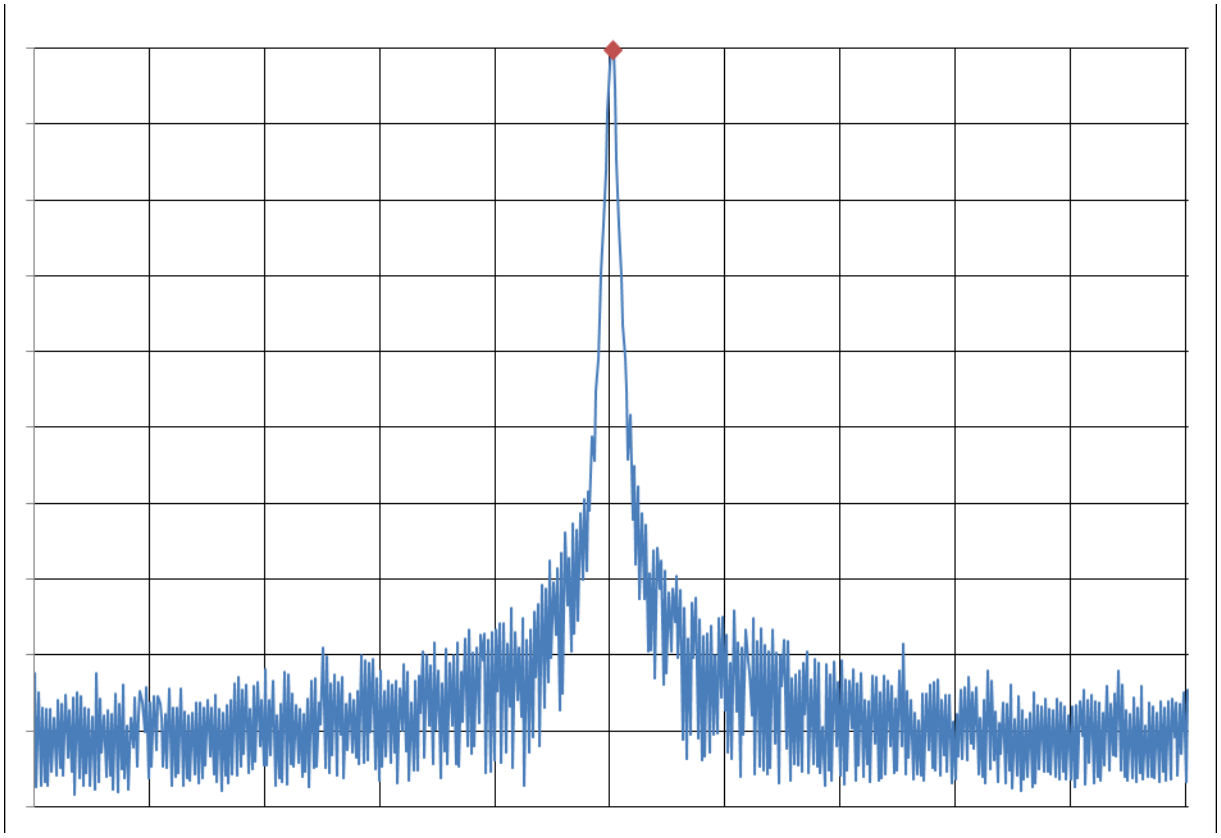
FAX: +(61-8) 92482756

TEST REPORT

FR_L @ 1W
Emission Mask D 12.5 kHz Channel Spacing:



Reference Un-modulated Measurement

Centre Frequency	39.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	10.000	**dB**
Reference Level	30.300	**dB**
Marker Amplitude	30.300	**dBm**
Scale	10.000	**dB/Div**

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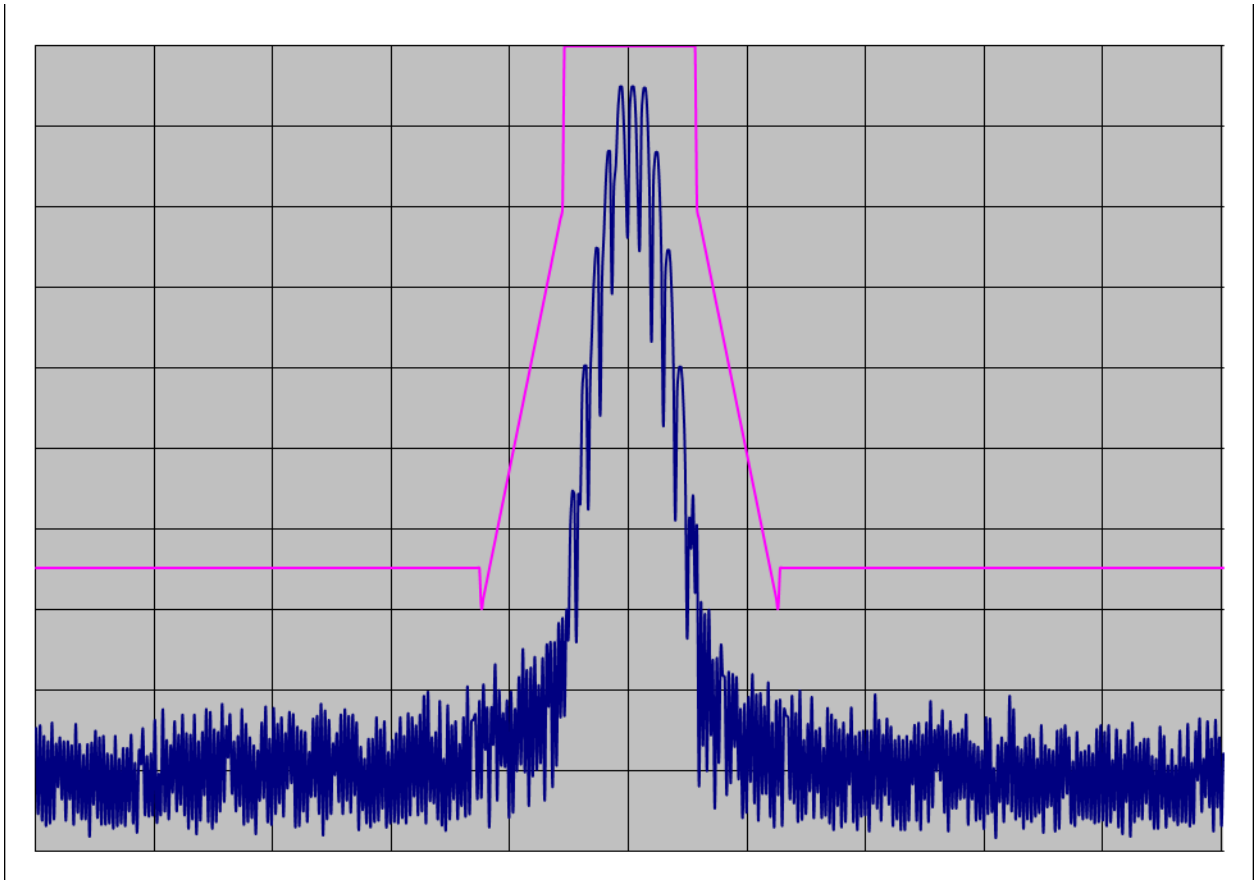
Emission Mask D 12.5 kHz Channel Spacing:



Analogue Measurement

Centre Frequency	39.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	10.000	**dB**
Reference Level	30.300	**dB**
Marker Amplitude		**dBm**
Scale	10.000	**dB/Div**

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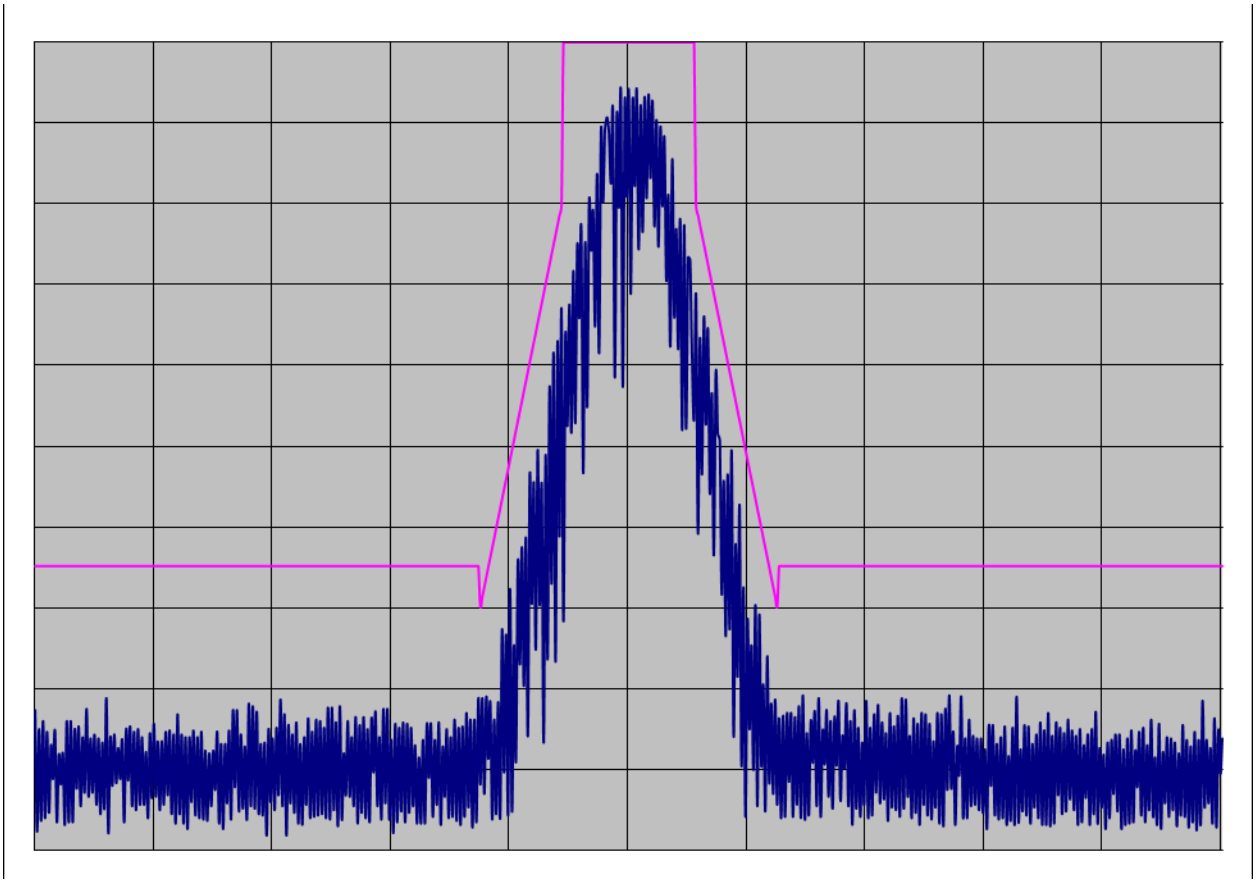
TEST REPORT

Emission Mask D 12.5 kHz Channel Spacing:



Data Measurement

Centre Frequency	39.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	10.000	**dB**
Reference Level	30.300	**dB**
Marker Amplitude		**dBm**
Scale	10.000	**dB/Div**

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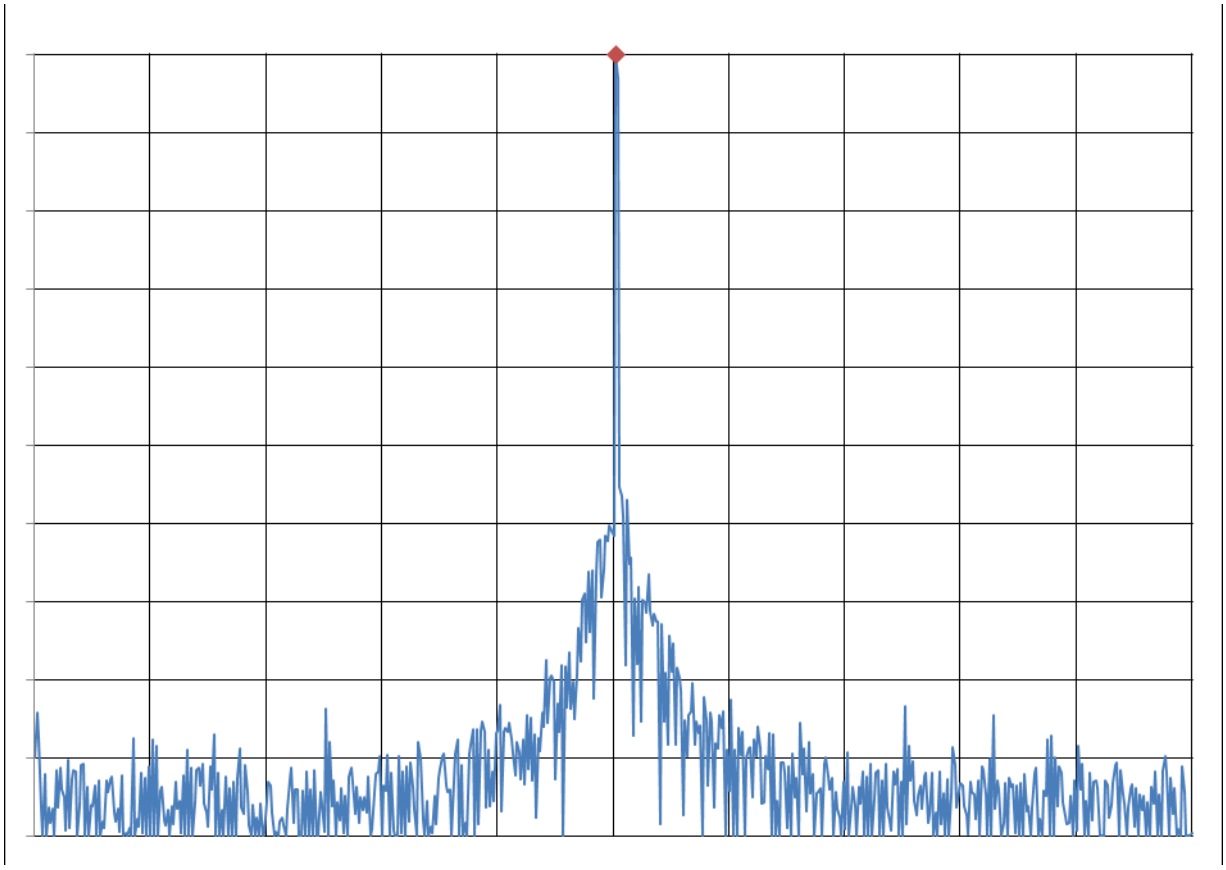
TEST REPORT

FR_L @ 50W
Emission Mask B 25.0 kHz Channel Spacing:



Reference Un-modulated Measurement

Centre Frequency	39.000	**MHz**
Resolution Bandwidth	0.100	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	8.000	**Sec**
Attenuation	20.000	**dB**
Reference Level	46.970	**dB**
Marker Amplitude	46.96	**dBm**
Scale	10.000	**dB/Div**

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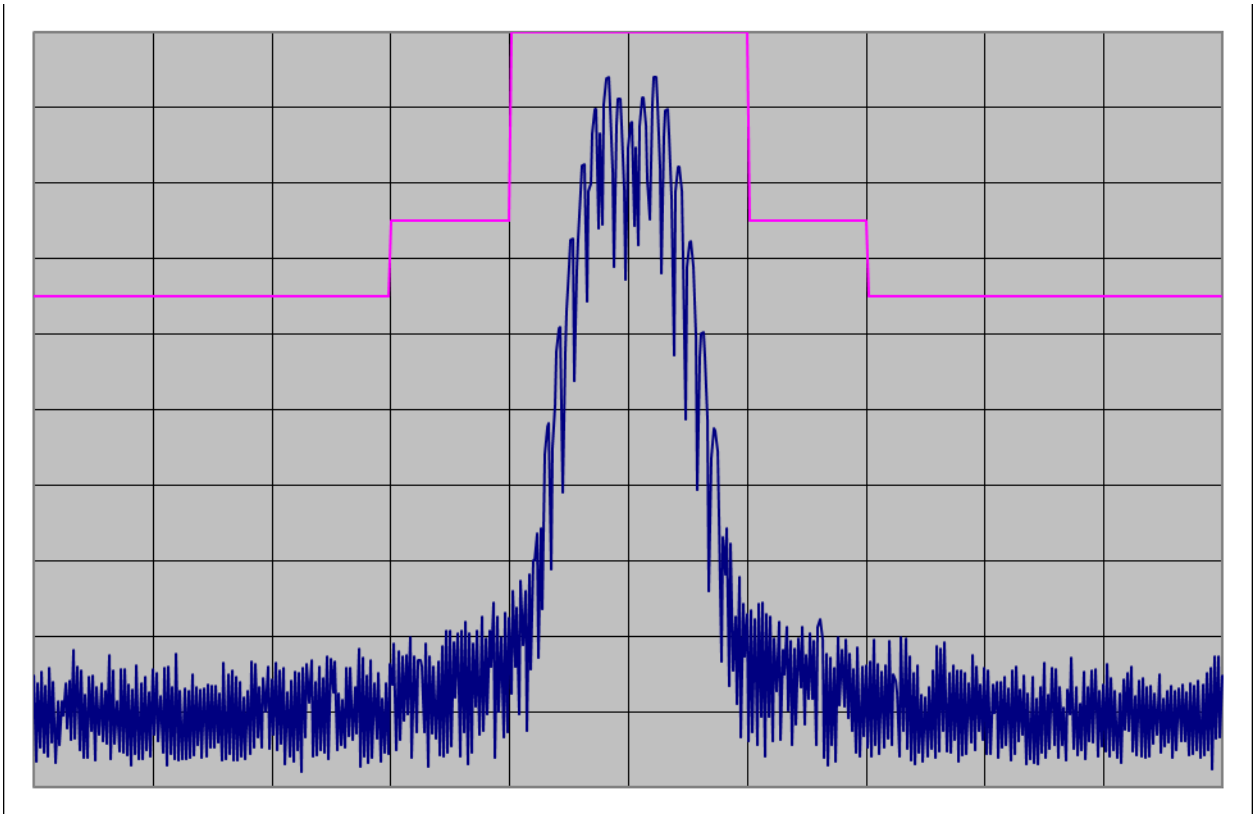
TEST REPORT

Emission Mask B 25.0 kHz Channel Spacing:



Analogue Measurement

Centre Frequency	39.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	3.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	20.000	**dB**
Reference Level	46.930	**dB**
Marker Amplitude		**dB**
Scale	10.000	**dB/Div**

Emission Mask B 25.0 kHz Channel Spacing:

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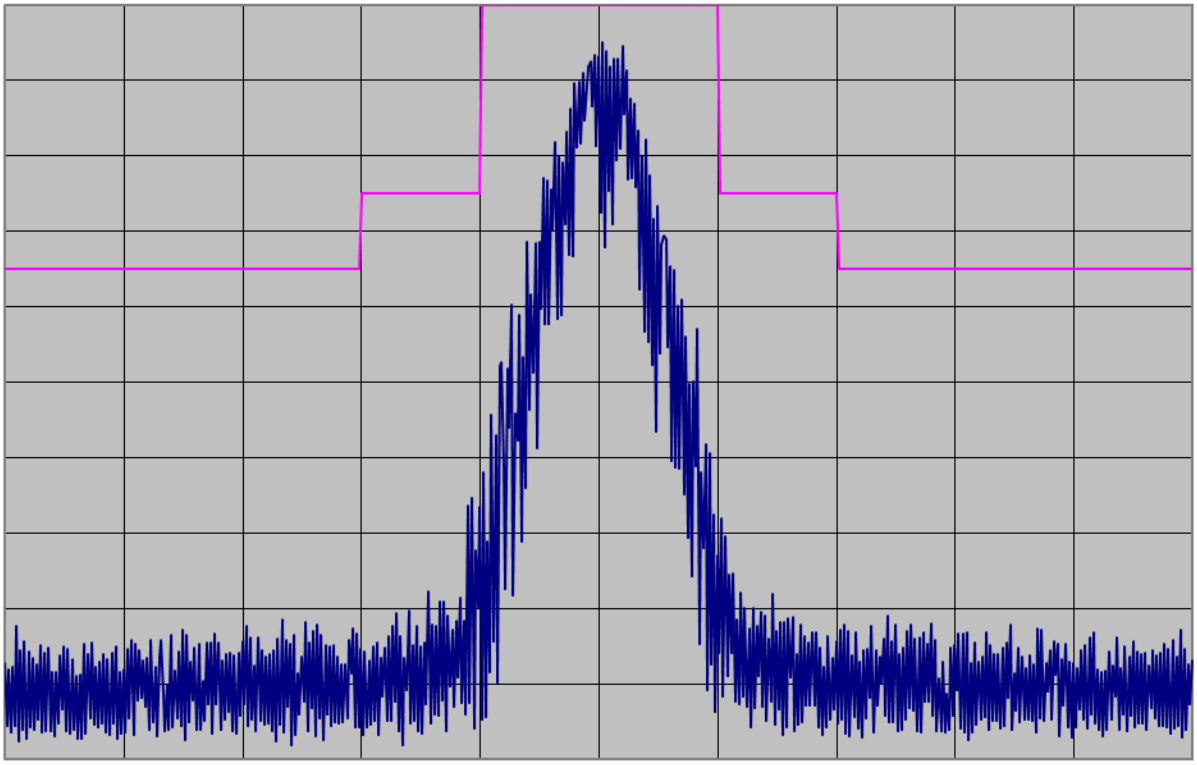
TEST REPORT



Data Measurements

Centre Frequency	39.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	20.000	**dB**
Reference Level	46.970	**dB**
Marker Amplitude		**dB**
Scale	10.000	**dB/Div**

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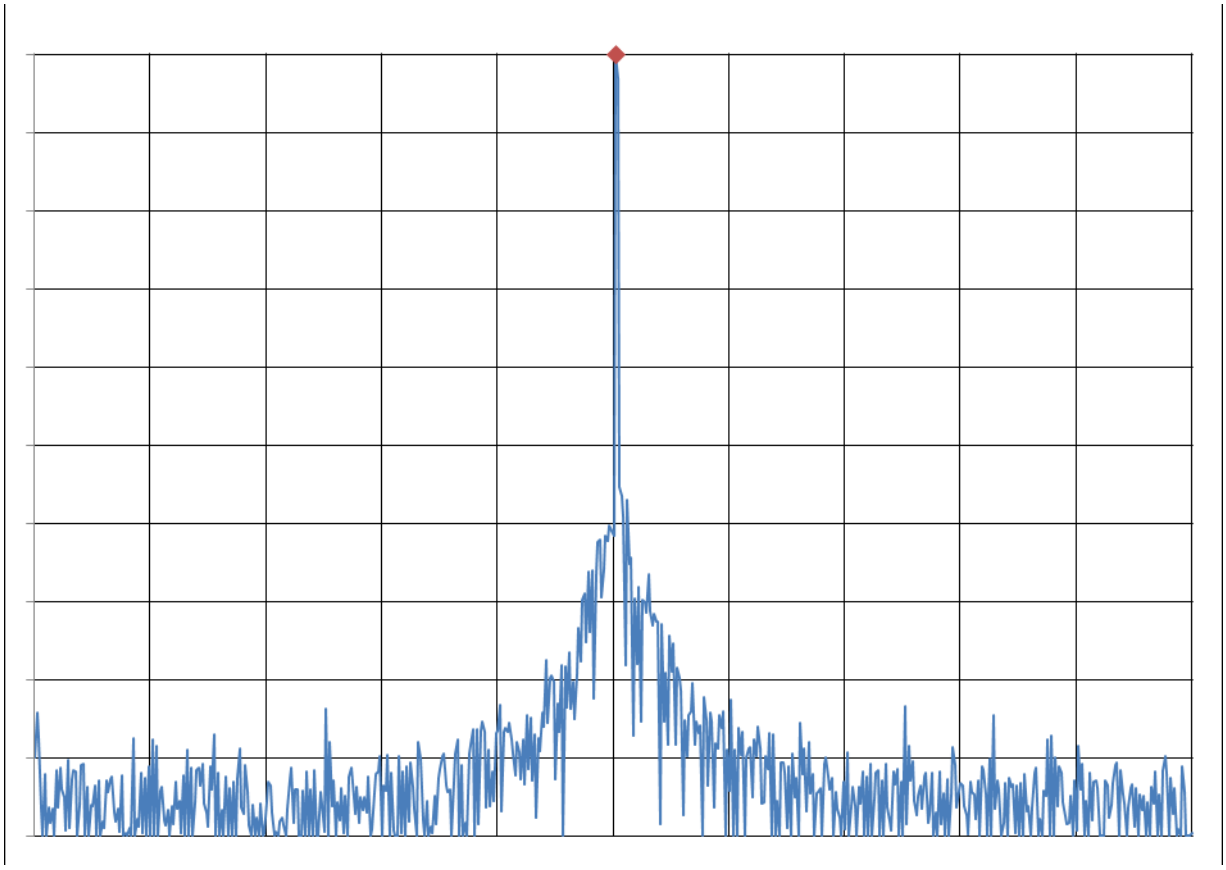
TEST REPORT

FR_L @ 50W
Emission Mask D 12.5 kHz Channel Spacing:



Reference Un-modulated Measurement

Centre Frequency	39.000	**MHz**
Resolution Bandwidth	0.100	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	8.000	**Sec**
Attenuation	20.000	**dB**
Reference Level	46.970	**dB**
Marker Amplitude	46.96	**dBm**
Scale	10.000	**dB/Div**

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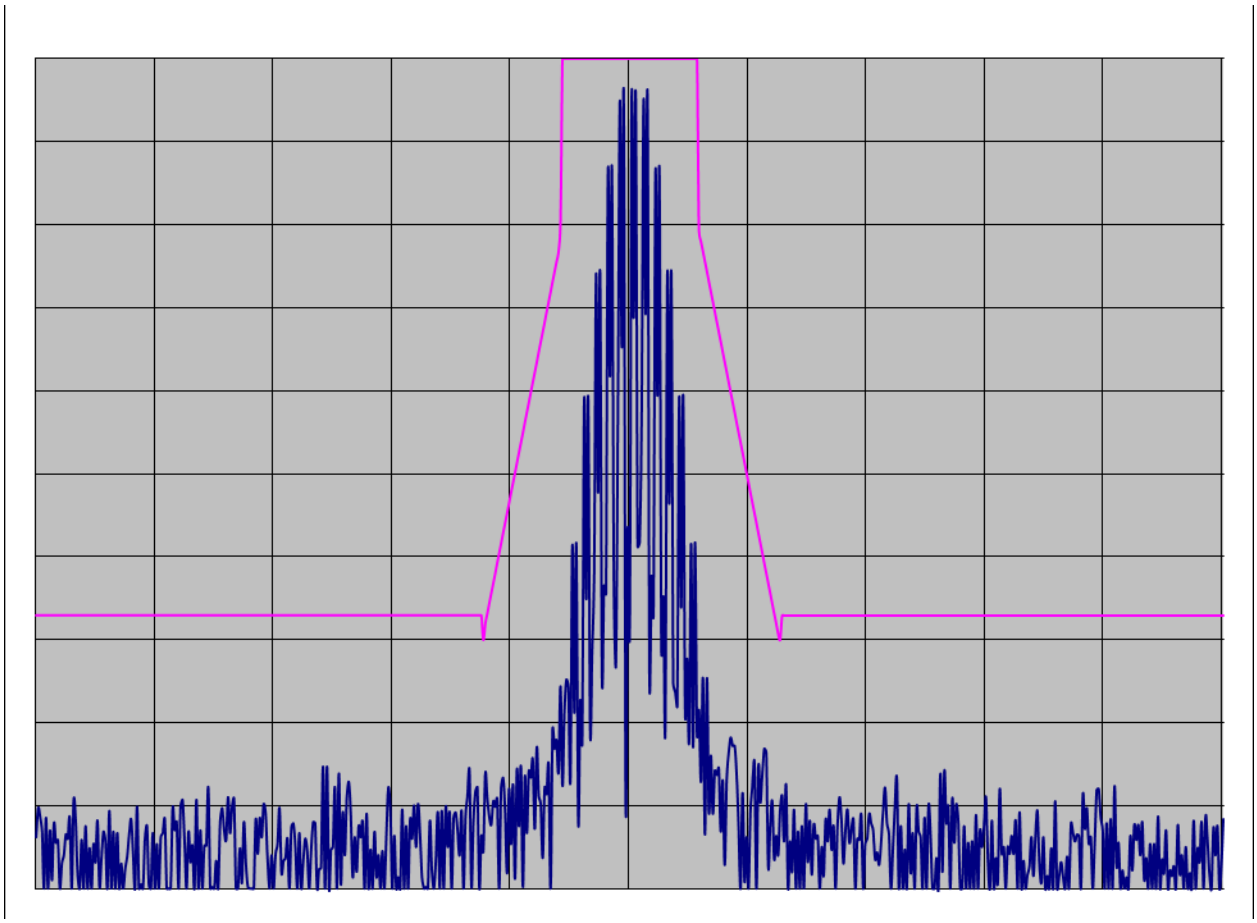
TEST REPORT

Emission Mask D 12.5 kHz Channel Spacing:



Analogue Measurement

Centre Frequency	39.000	**MHz**
Resolution Bandwidth	0.100	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	8.000	**Sec**
Attenuation	20.000	**dB**
Reference Level	46.970	**dB**
Marker Amplitude		**dB**
Scale	10.000	**dB/Div**

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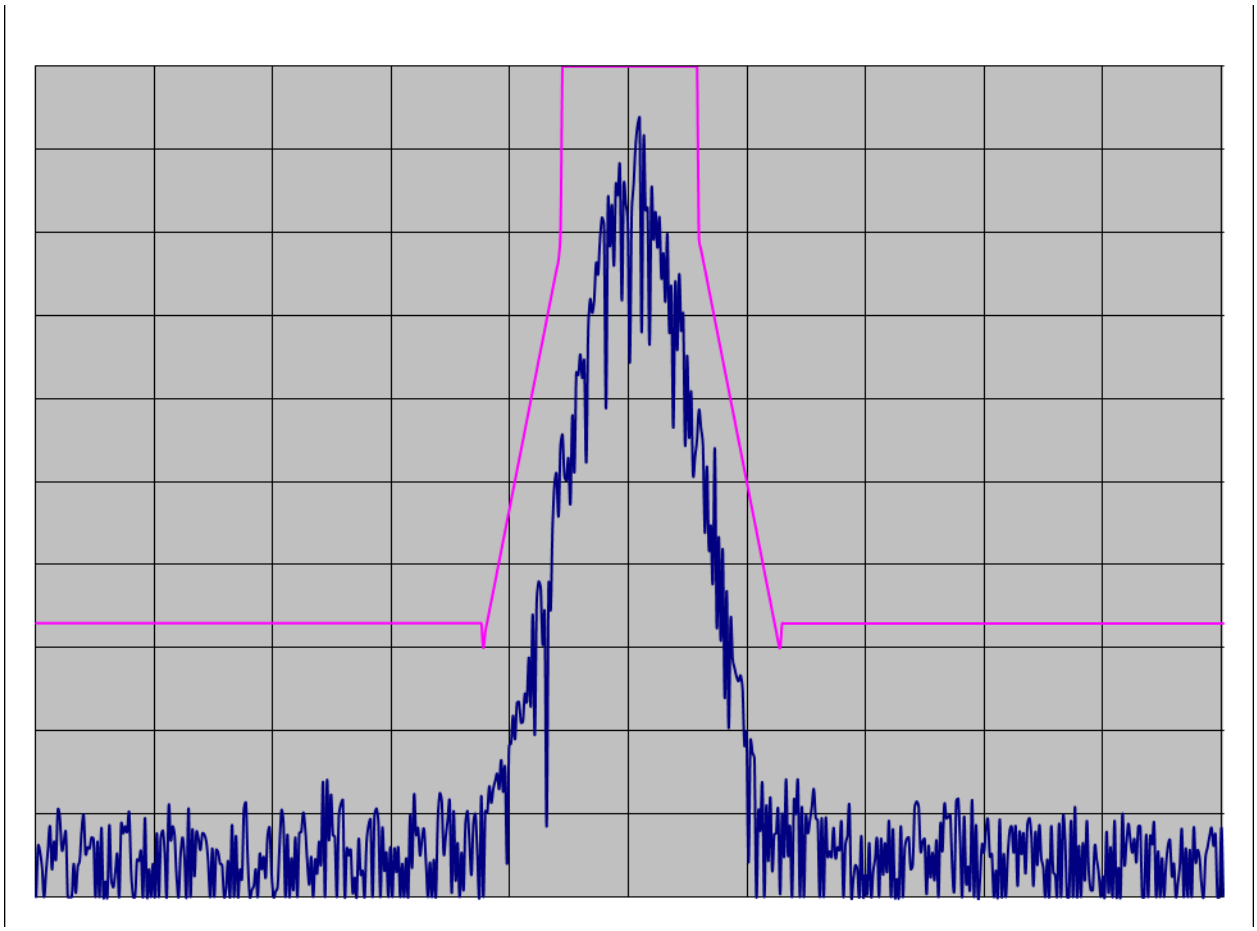
TEST REPORT

Emission Mask D 12.5 kHz Channel Spacing:



Data Measurements

Centre Frequency	39.000	**MHz**
Resolution Bandwidth	0.100	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	8.000	**Sec**
Attenuation	20.000	**dB**
Reference Level	46.970	**dB**
Marker Amplitude		**dB**
Scale	10.000	**dB/Div**

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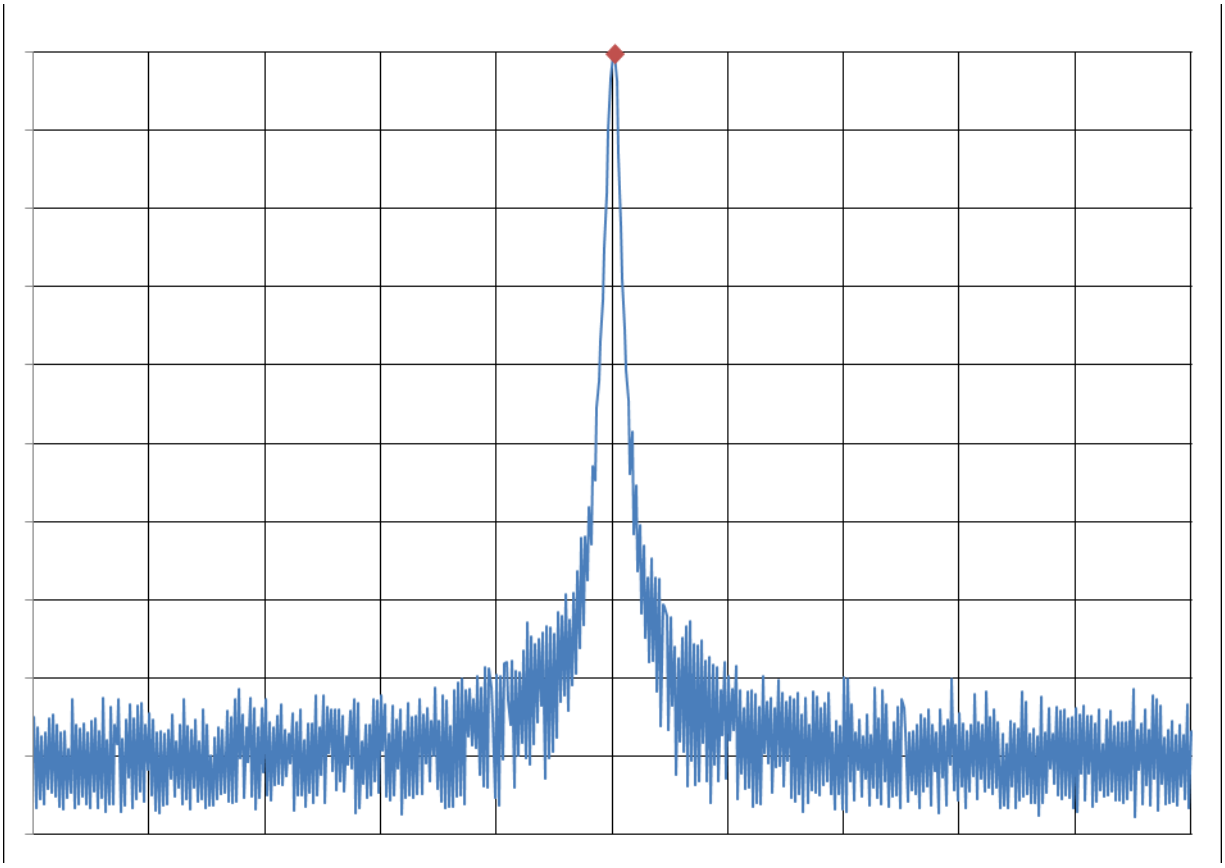
TEST REPORT

FR$_c$ @ 1W
Emission Mask B 25.0 kHz Channel Spacing:



Reference Un-modulated Measurement

Centre Frequency	44.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	10.000	**dB**
Reference Level	30.300	**dB**
Marker Amplitude	30.130	**dBm**
Scale	10.000	**dB/Div**

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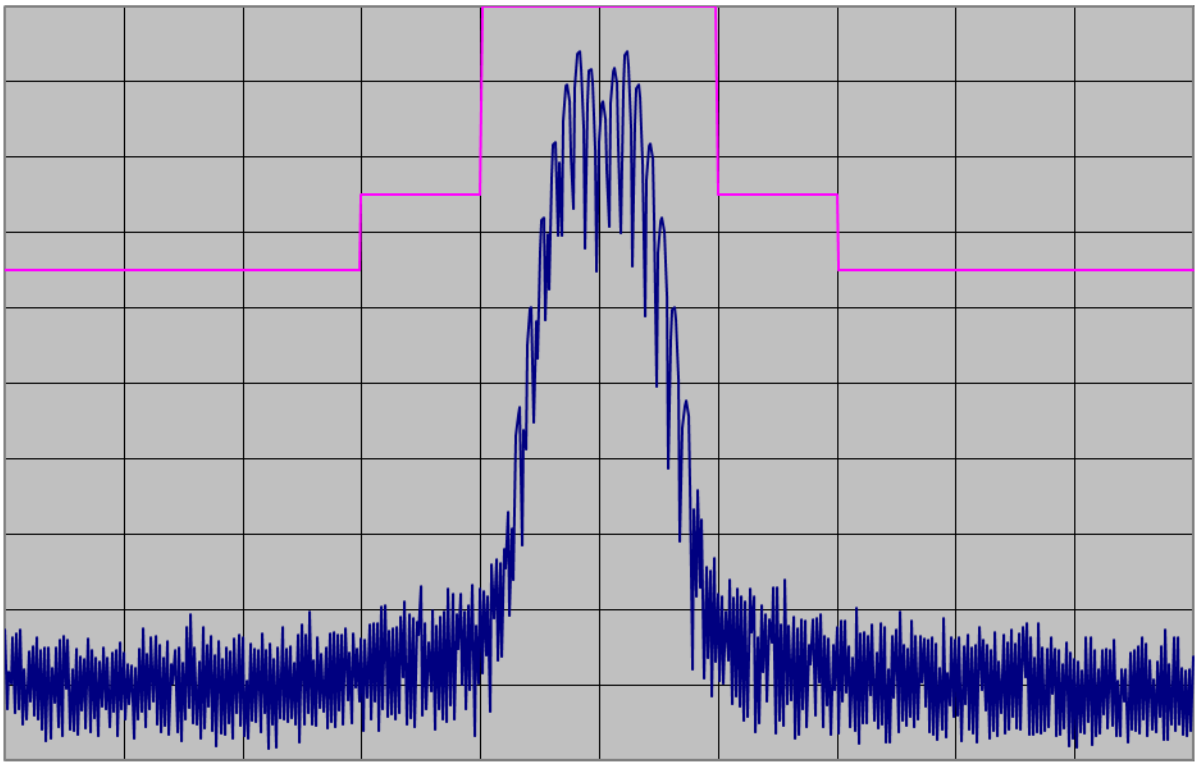
TEST REPORT

Emission Mask B 25.0 kHz Channel Spacing:



Analogue Measurement

Centre Frequency	44.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	10.000	**dB**
Reference Level	30.300	**dB**
Marker Amplitude		**dBm**
Scale	10.000	**dB/Div**

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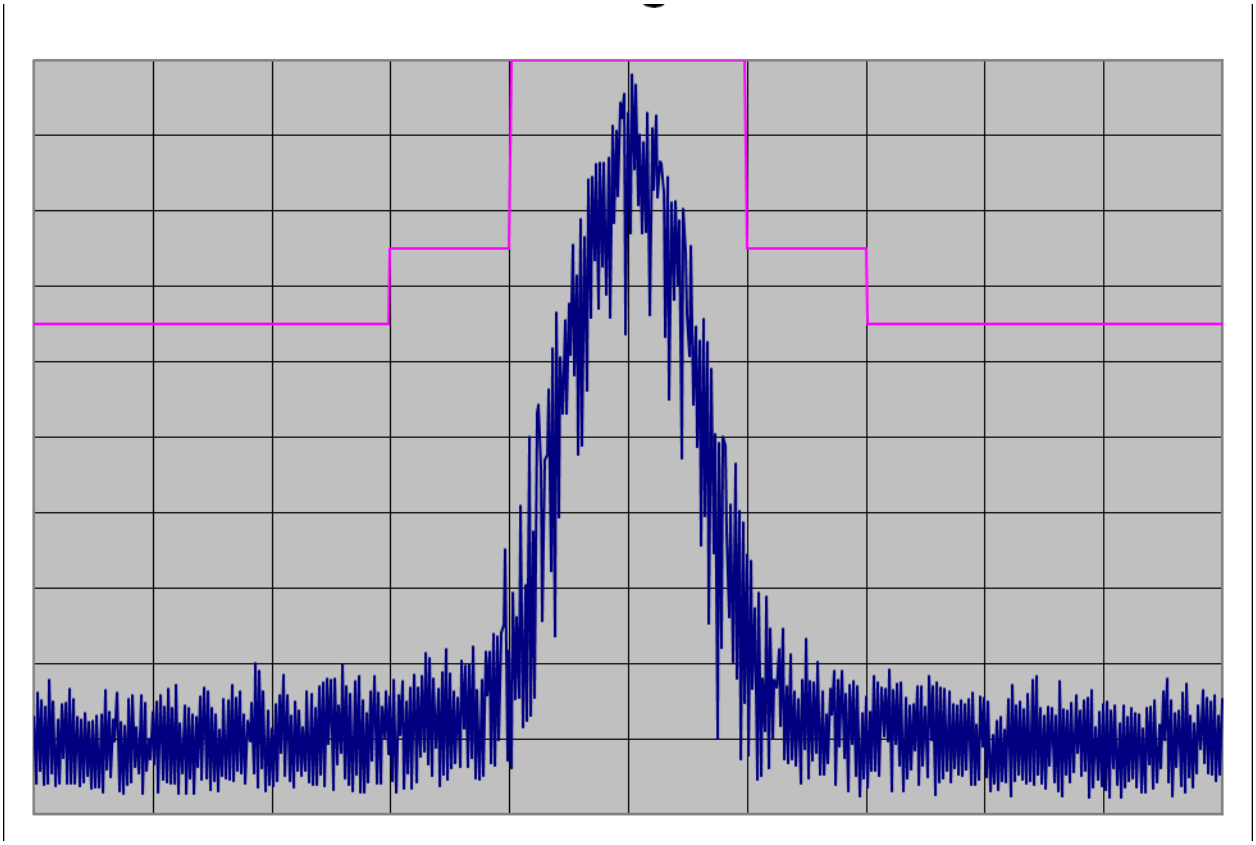
TEST REPORT

Emission Mask B 25.0 kHz Channel Spacing:



Data Measurement

Centre Frequency	44.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	10.000	**dB**
Reference Level	30.300	**dB**
Marker Amplitude		**dBm**
Scale	10.000	**dB/Div**

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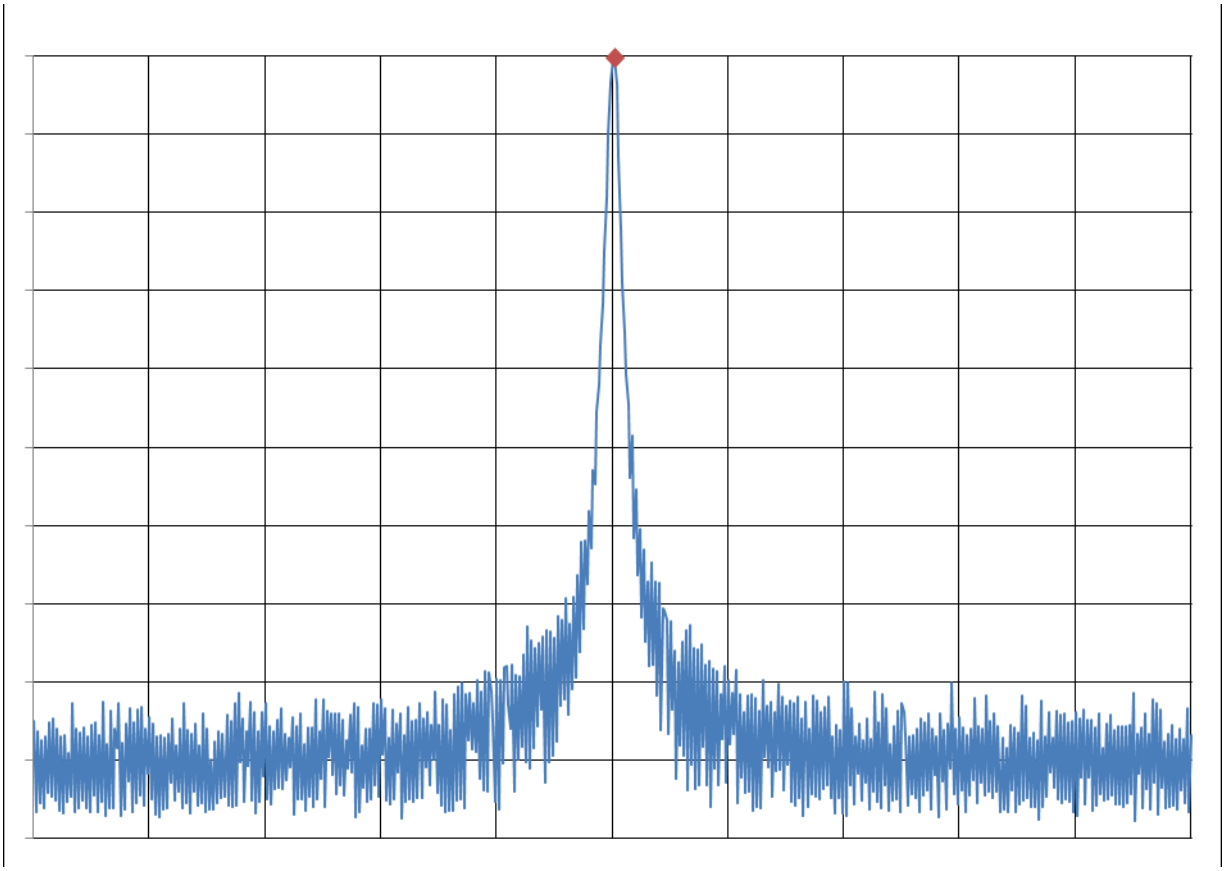
TEST REPORT

FR$_c$ @ 1W
Emission Mask D 12.5 kHz Channel Spacing:



Reference Un-modulated Measurement

Centre Frequency	44.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	10.000	**dB**
Reference Level	30.300	**dB**
Marker Amplitude	30.130	**dBm**
Scale	10.000	**dB/Div**

Emission Mask D 12.5 kHz Channel Spacing:

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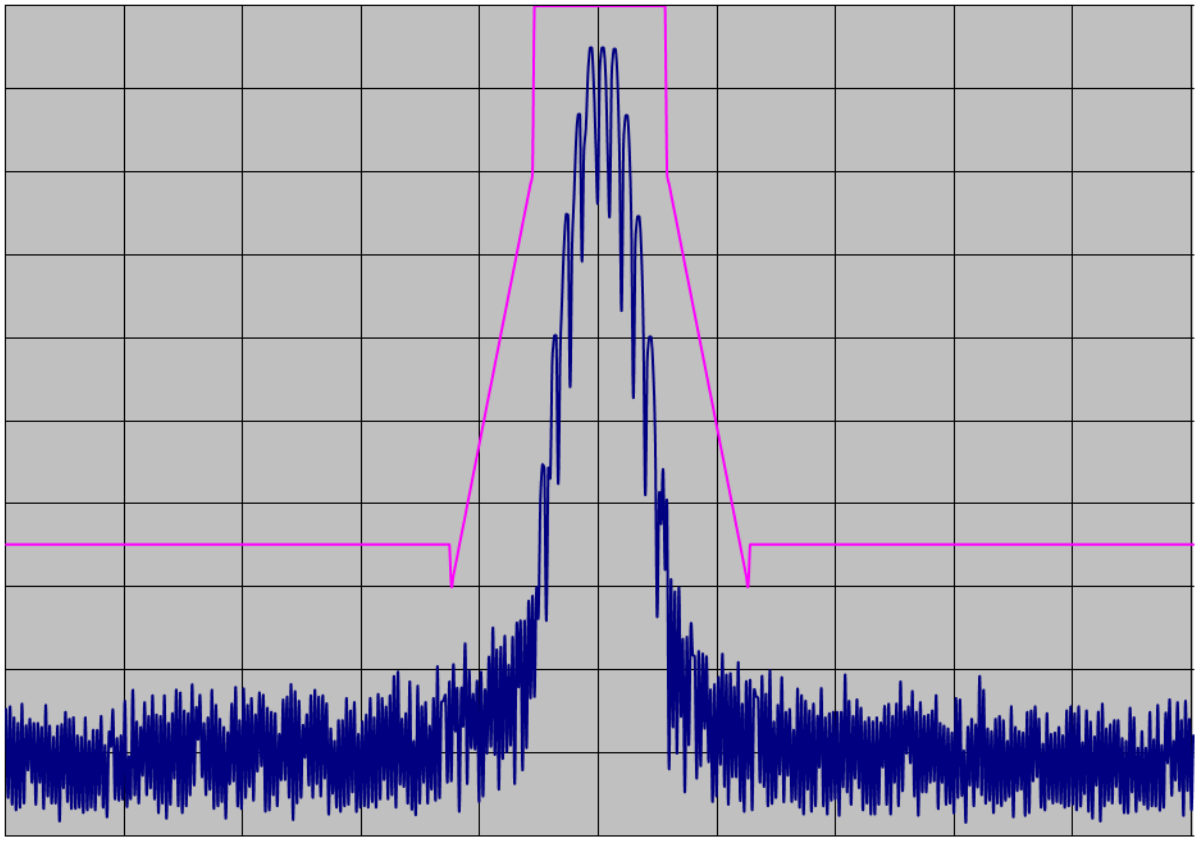
TEST REPORT



Analogue Measurement

Centre Frequency	44.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	10.000	**dB**
Reference Level	30.300	**dB**
Marker Amplitude		**dBm**
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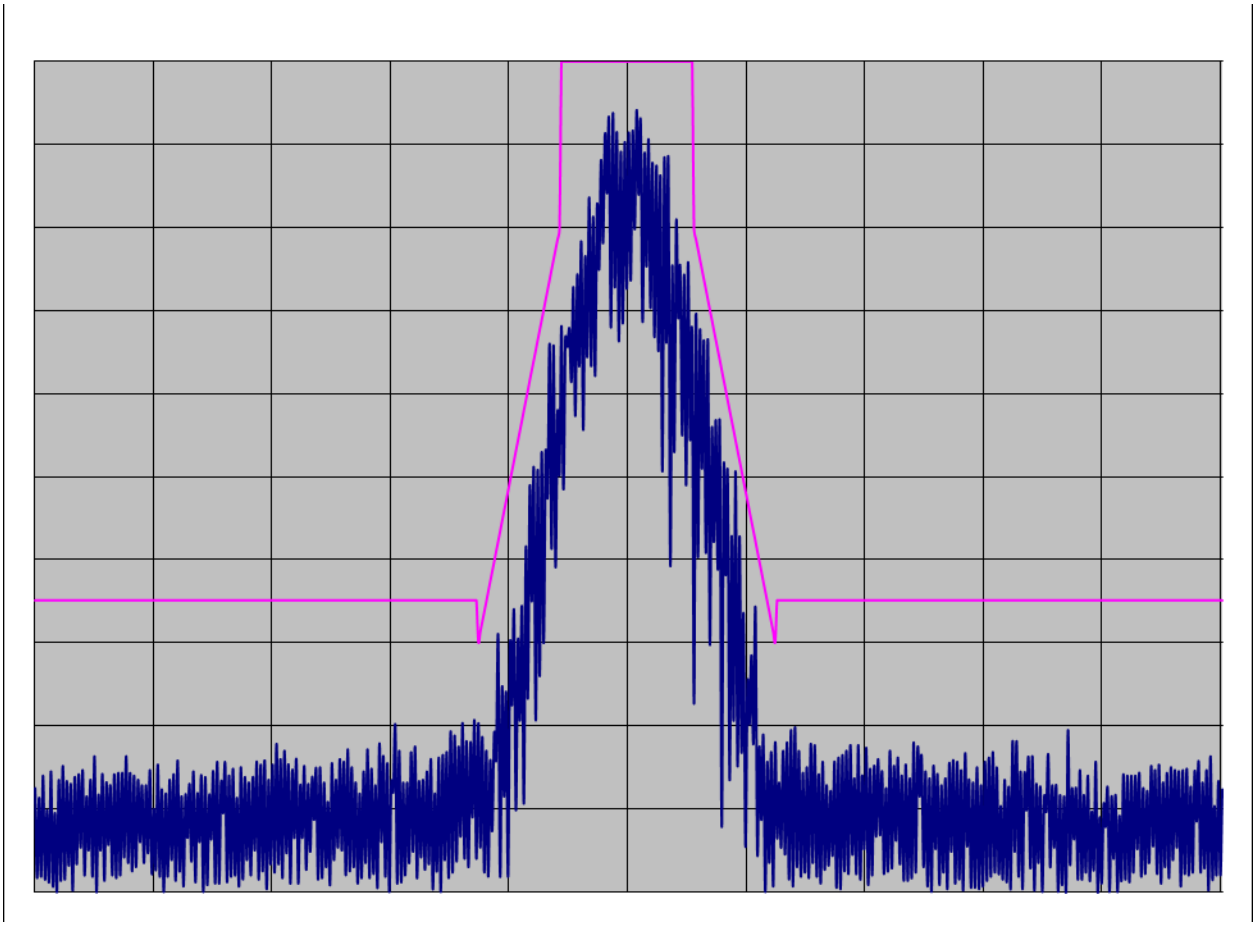
TEST REPORT

Emission Mask D 12.5 kHz Channel Spacing:



Data Measurements

Centre Frequency	44.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	10.000	**dB**
Reference Level	30.300	**dB**
Marker Amplitude		**dBm**
Scale	10.000	**dB/Div**

FRc @ 50W

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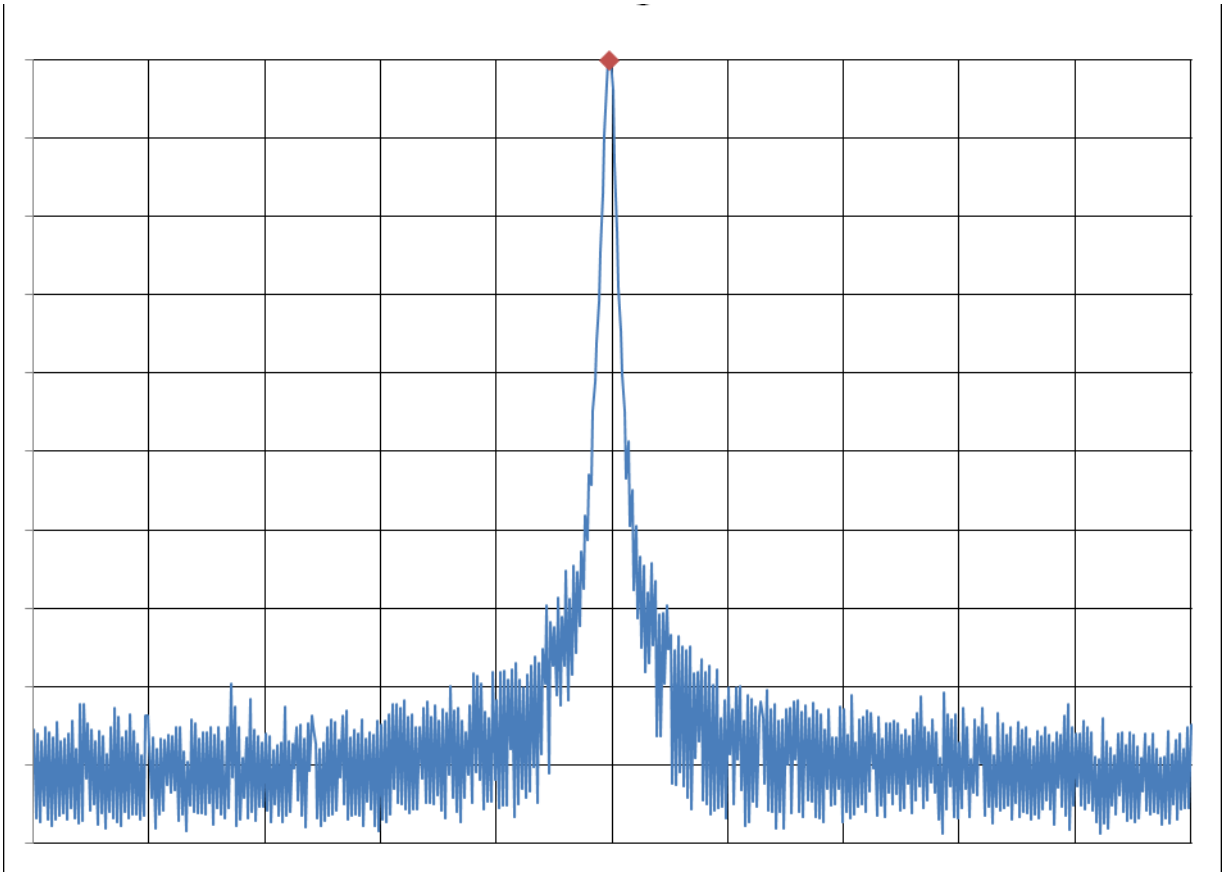
TEST REPORT

Emission Mask B 25.0 kHz Channel Spacing:



Reference Un-modulated Measurement

Centre Frequency	44.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	20.000	**dB**
Reference Level	46.970	**dB**
Marker Amplitude	46.970	**dBm**
Scale	10.000	**dB/Div**

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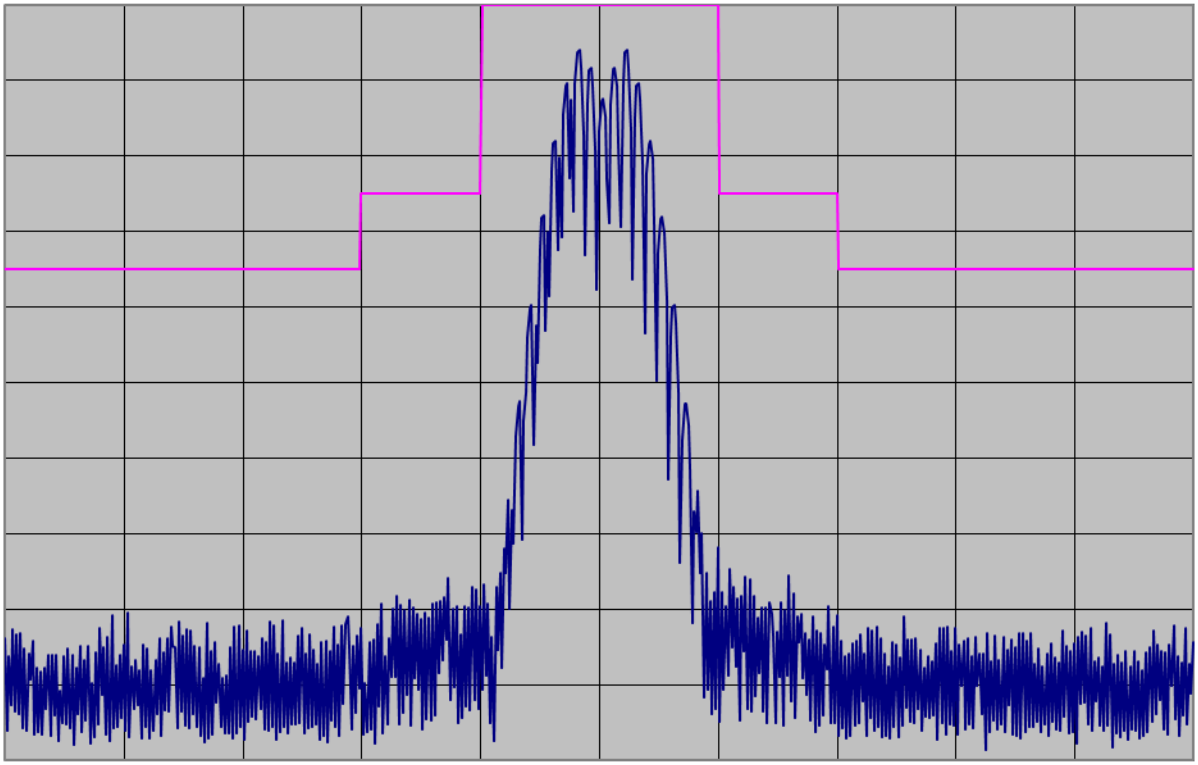
TEST REPORT

Emission Mask B 25.0 kHz Channel Spacing:



Analogue Measurement

Centre Frequency	44.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	20.000	**dB**
Reference Level	46.970	**dB**
Marker Amplitude		**dBm**
Scale	10.000	**dB/Div**

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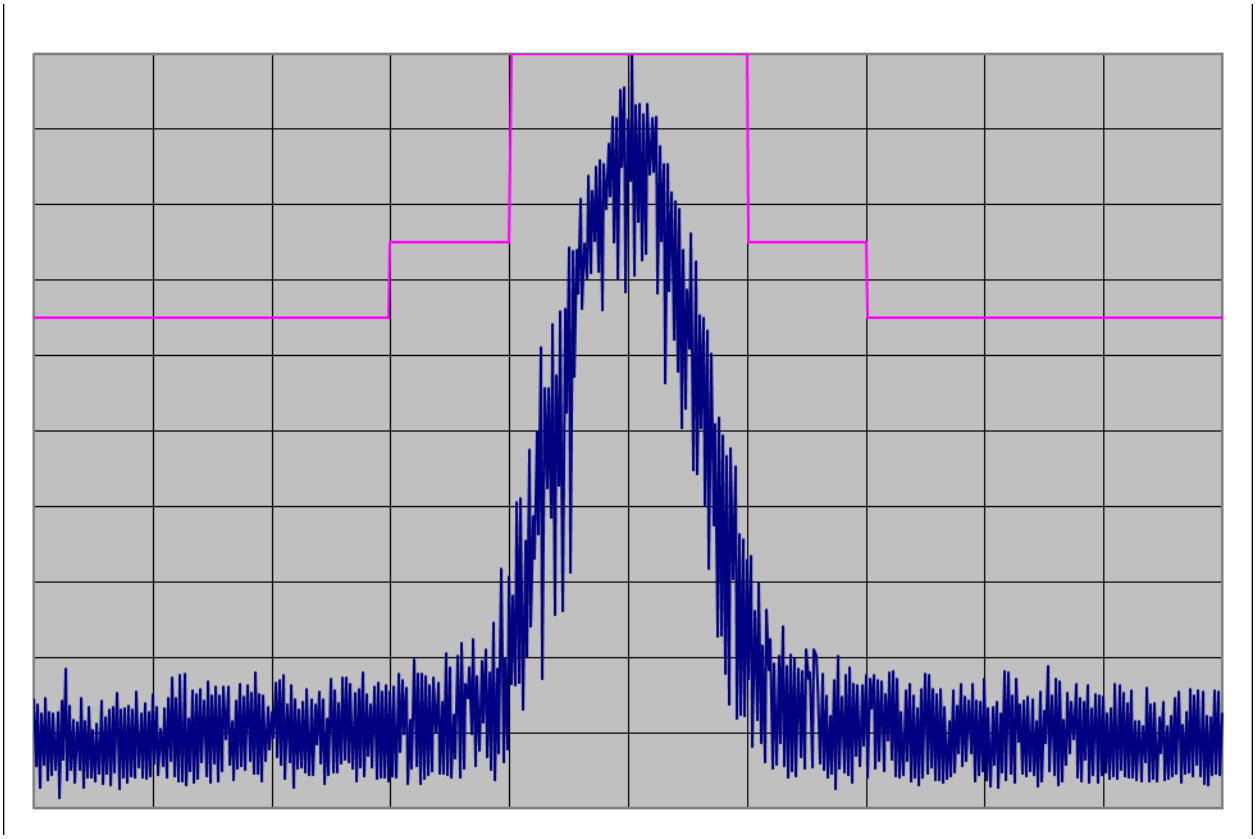
Emission Mask B 25.0 kHz Channel Spacing:



Data Measurements

Centre Frequency	44.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	20.000	**dB**
Reference Level	46.970	**dB**
Marker Amplitude		**dBm**
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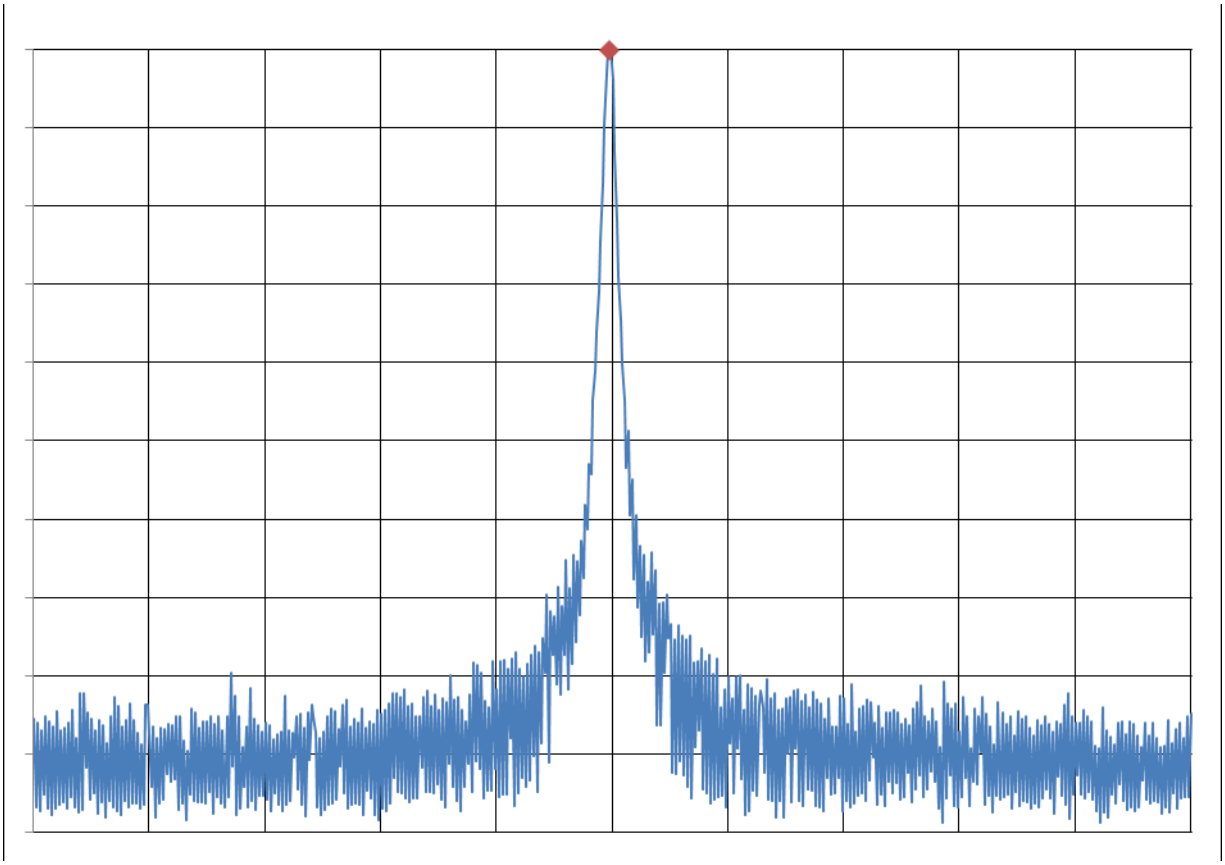
TEST REPORT

FRc @ 50W
Emission Mask D 12.5 kHz Channel Spacing:



Reference Un-modulated Measurement

Centre Frequency	44.001	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	20.000	**dB**
Reference Level	46.970	**dB**
Marker Amplitude	46.970	**dBm**
Scale	10.000	**dB/Div**

Emission Mask D 12.5 kHz Channel Spacing:

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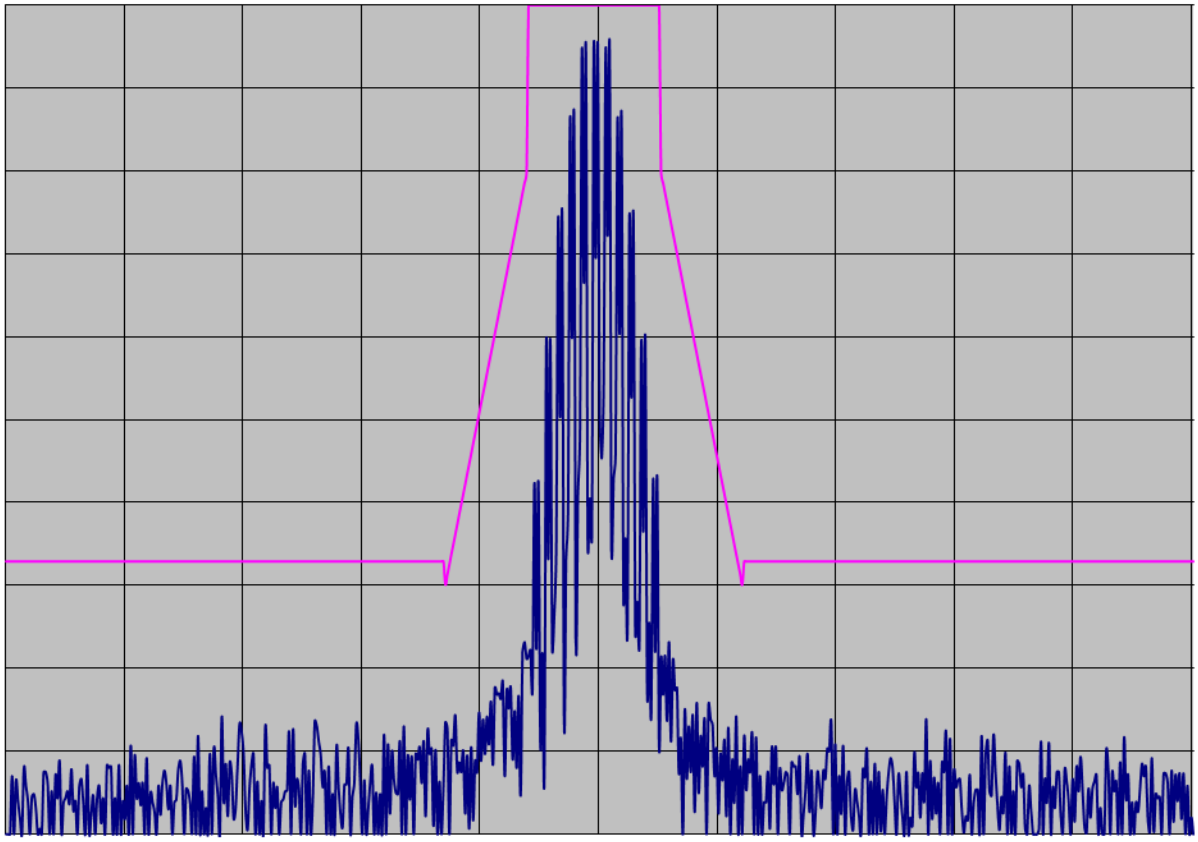
TEST REPORT



Analogue measurement

Centre Frequency	44.001	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	20.000	**dB**
Reference Level	46.970	**dB**
Marker Amplitude		**dBm**
Scale	10.000	**dB/Div**

Emission Mask D 12.5 kHz Channel Spacing:

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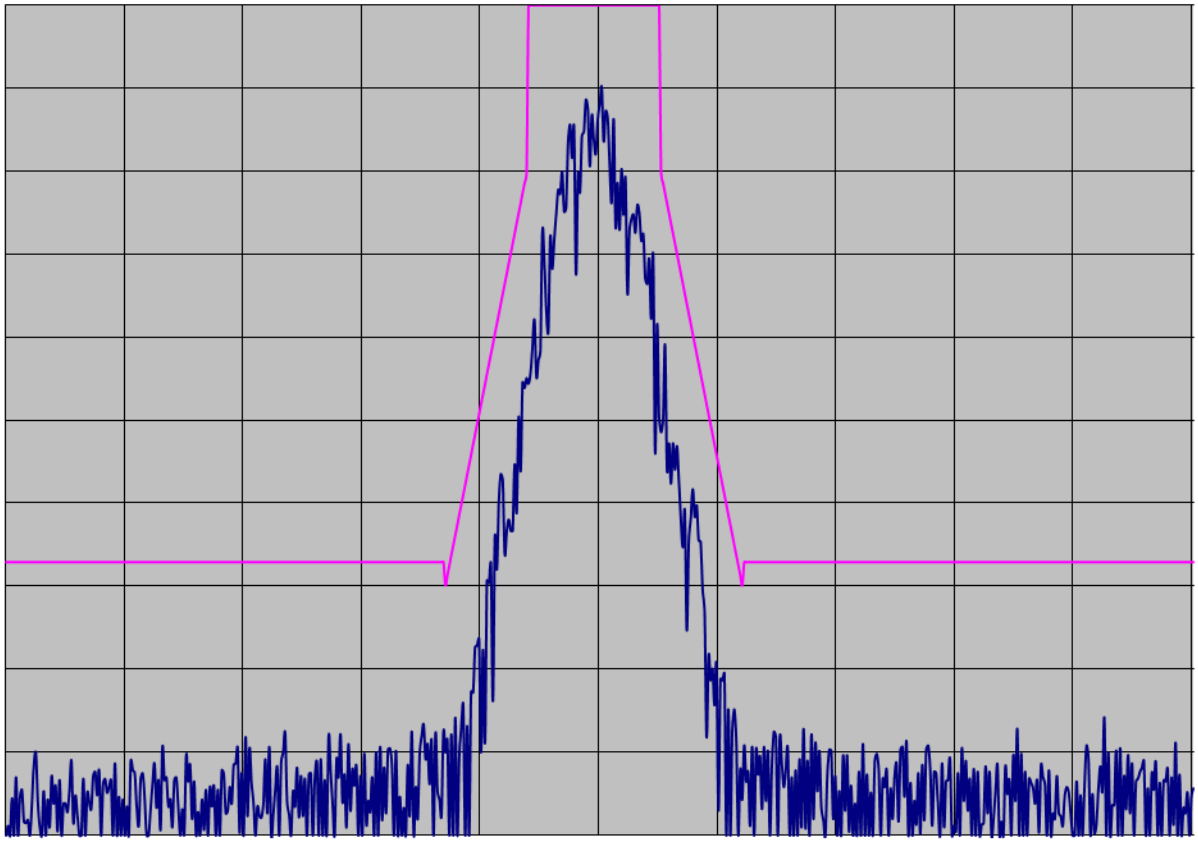
TEST REPORT



Data measurements

Centre Frequency	44.001	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	20.000	**dB**
Reference Level	46.970	**dB**
Marker Amplitude		**dBm**
Scale	10.000	**dB/Div**

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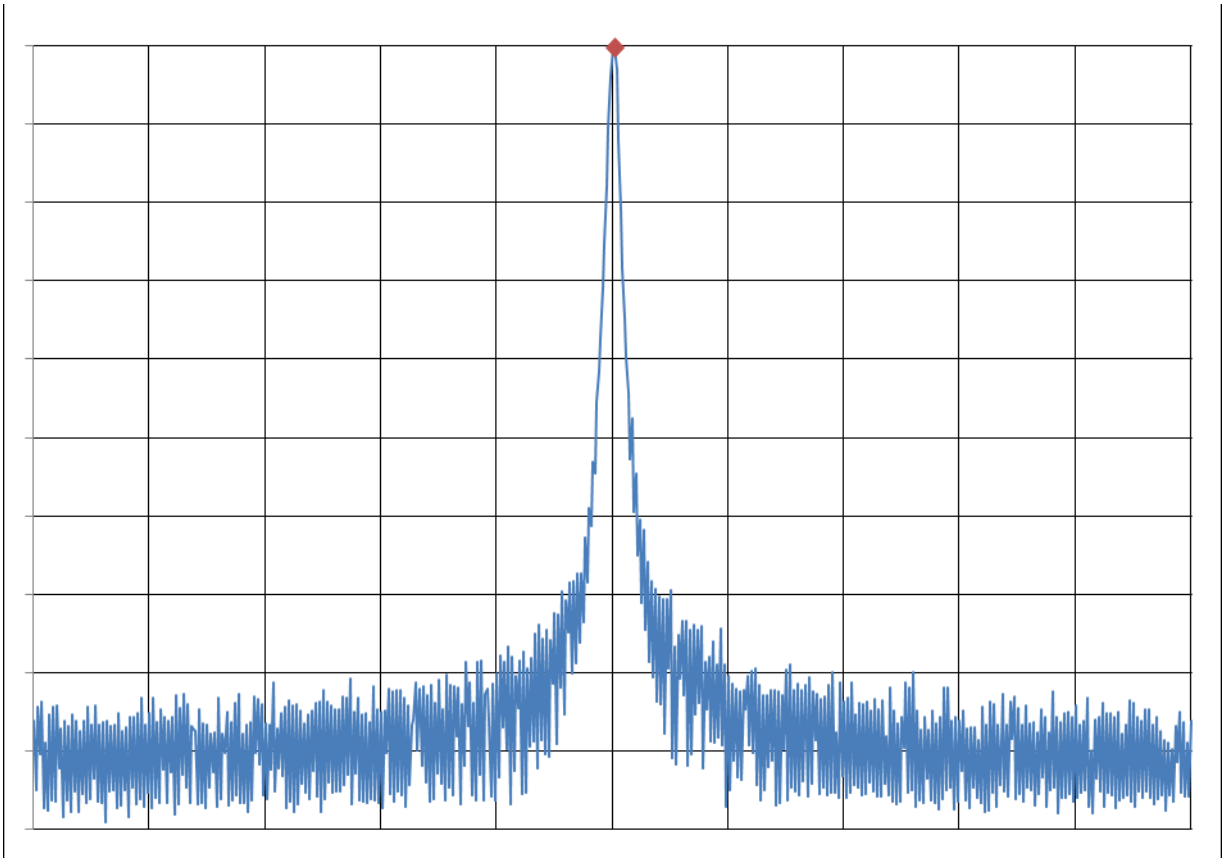
TEST REPORT

FR$_U$ @ 1W
Emission Mask B 25.0 kHz Channel Spacing:



Reference Un-modulated Measurement

Centre Frequency	47.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	10.000	**dB**
Reference Level	30.300	**dB**
Marker Amplitude	30.130	**dBm**
Scale	10.000	**dB/Div**

Emission Mask B 25.0 kHz Channel Spacing:

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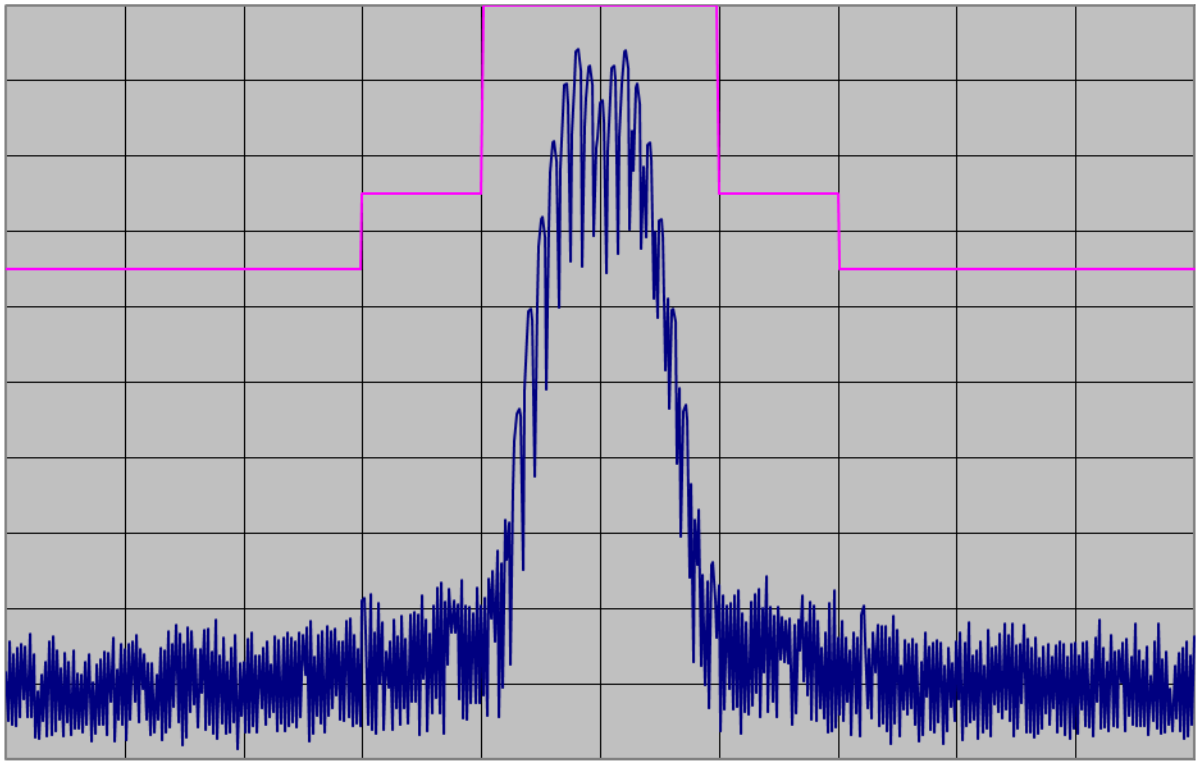
TEST REPORT



Analogue Measurement

Centre Frequency	47.00	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	10.000	**dB**
Reference Level	30.300	**dB**
Marker Amplitude		**dBm**
Scale	10.000	**dB/Div**

Emission Mask B 25.0 kHz Channel Spacing:

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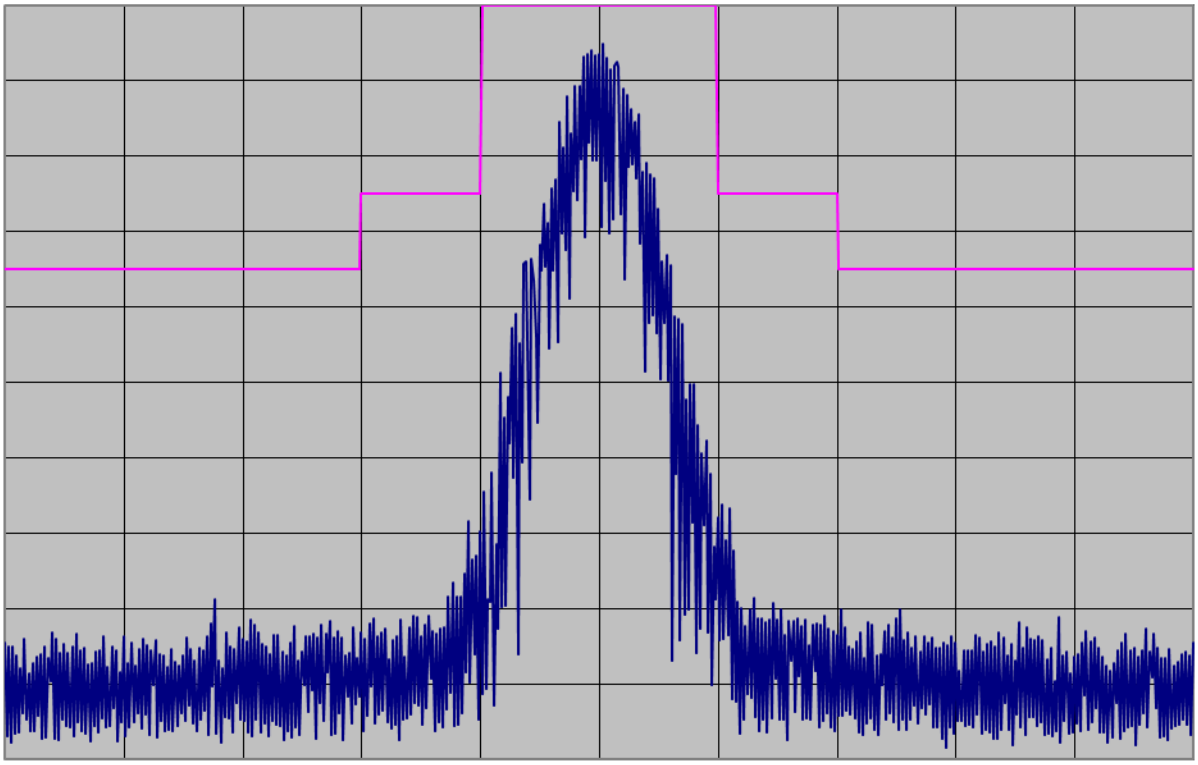

Data measurements

Centre Frequency	47.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	10.000	**dB**
Reference Level	30.300	**dB**
Marker Amplitude		**dBm**
Scale	10.000	**dB/Div**

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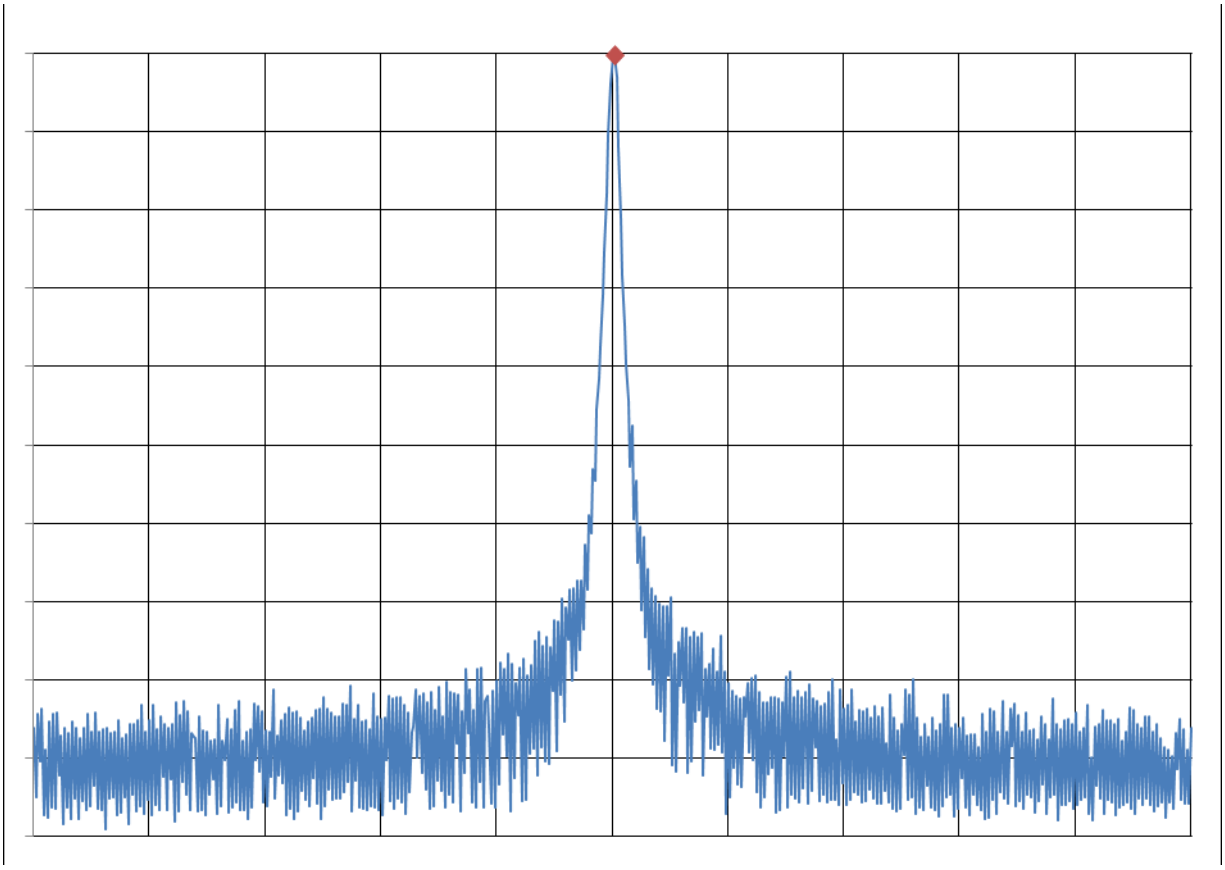
TEST REPORT

FR$_U$ @ 1W
Emission Mask D 12.5 kHz Channel Spacing:



Reference Un-modulated Measurement

Centre Frequency	47.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	10.000	**dB**
Reference Level	30.300	**dB**
Marker Amplitude	30.130	**dBm**
Scale	10.000	**dB/Div**

Emission Mask D 12.5 kHz Channel Spacing:

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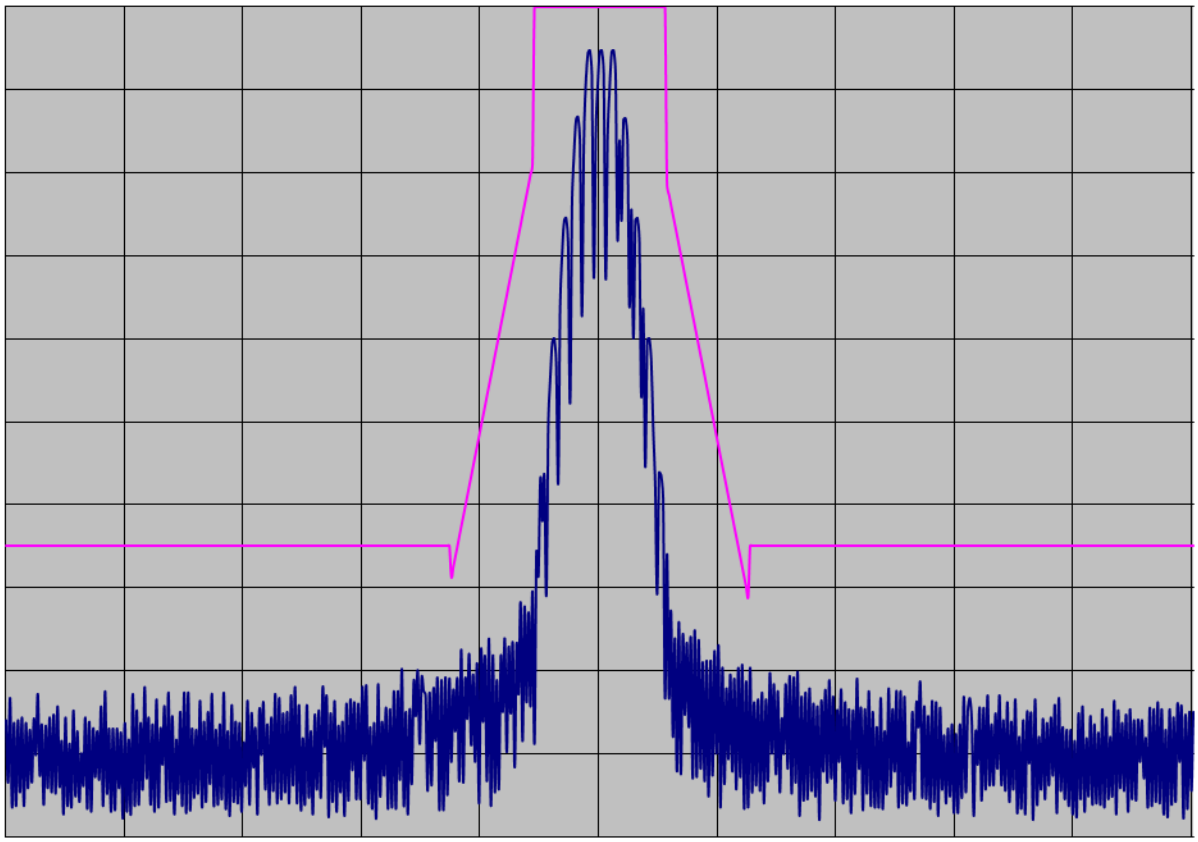
TEST REPORT



Analogue Measurement

Centre Frequency	47.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	10.000	**dB**
Reference Level	30.300	**dB**
Marker Amplitude		**dBm**
Scale	10.000	**dB/Div**

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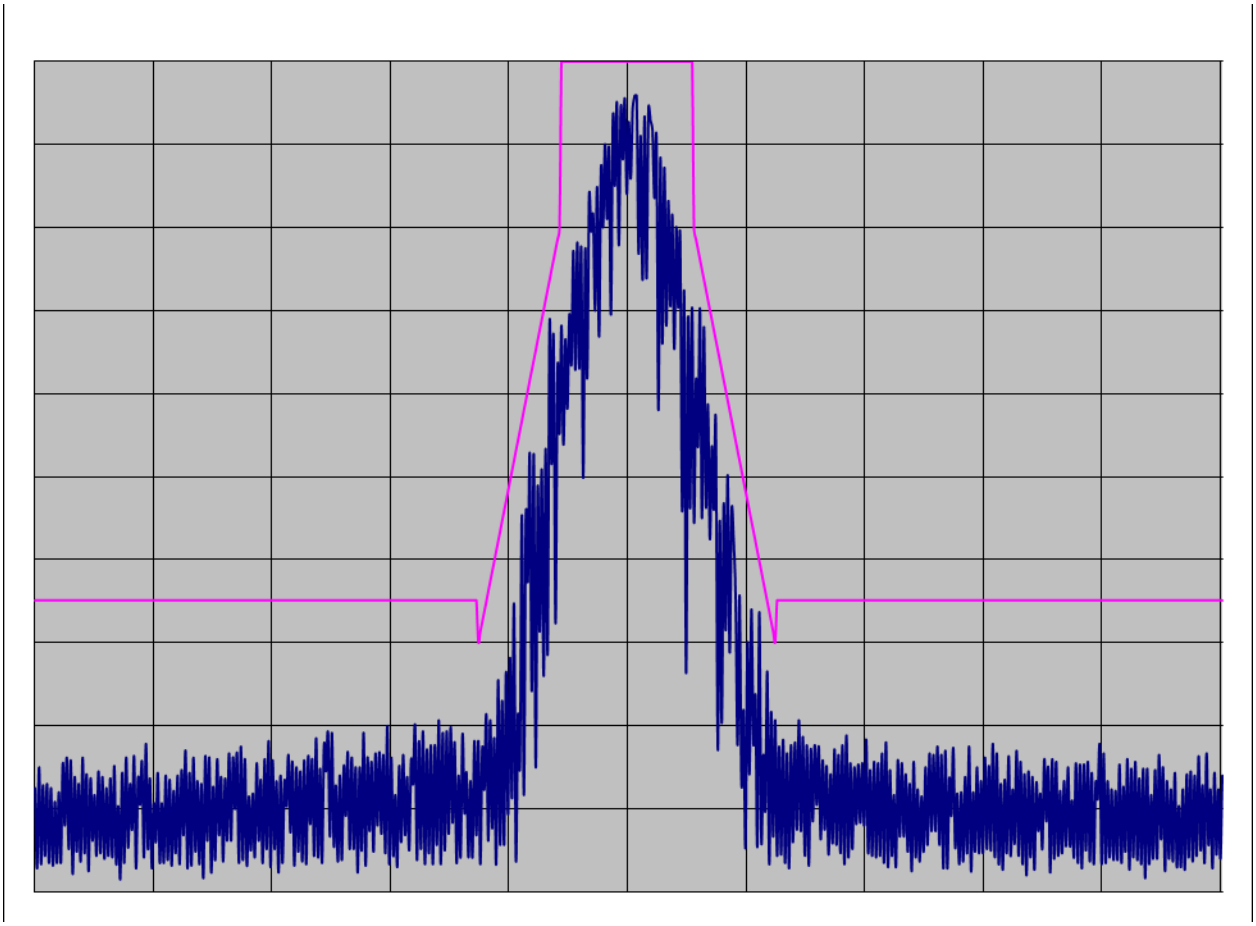
Emission Mask D 12.5 kHz Channel Spacing:



Data Measurements

Centre Frequency	47.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	10.000	**dB**
Reference Level	30.300	**dB**
Marker Amplitude		**dBm**
Scale	10.000	**dB/Div**

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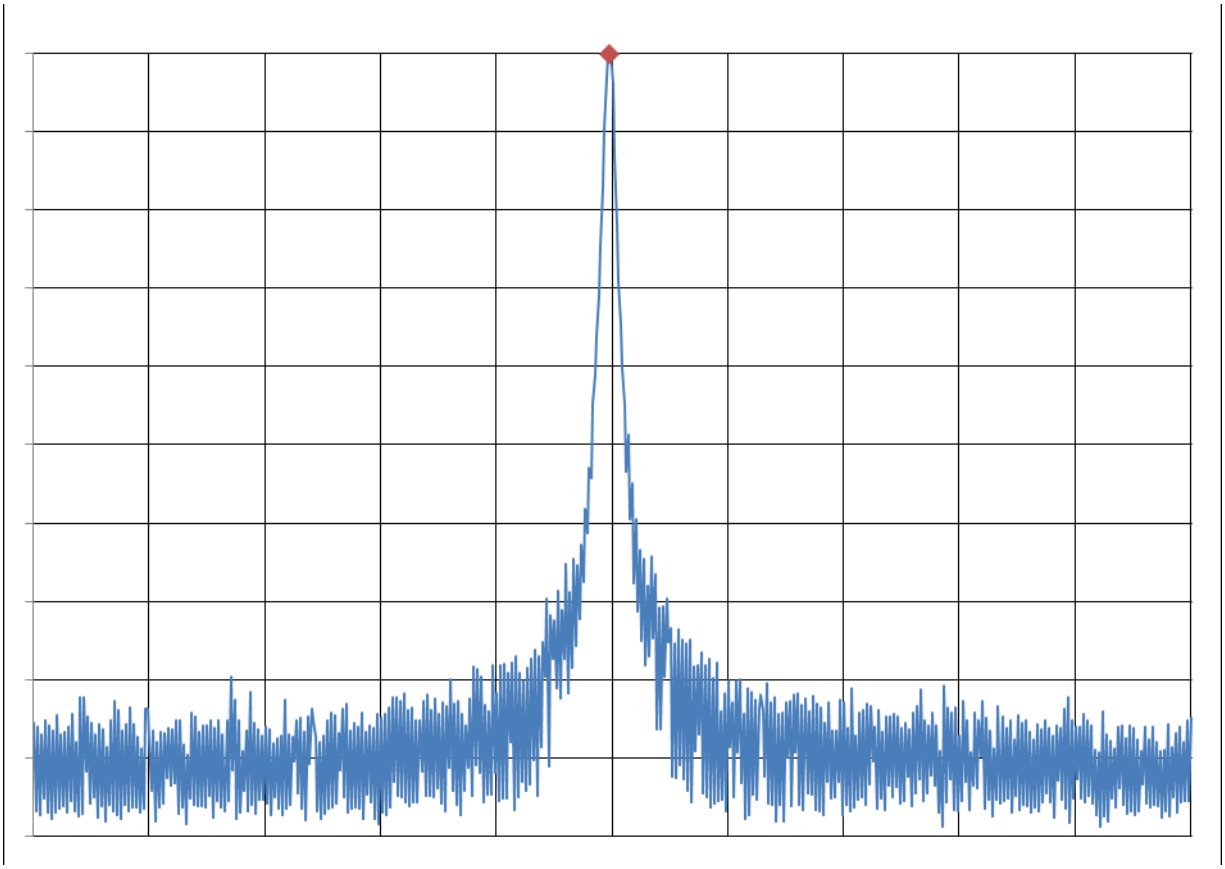
TEST REPORT

FR$_U$ @ 50W
Emission Mask B 25.0 kHz Channel Spacing:



Reference Un-modulated Measurement

Centre Frequency	47.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	20.000	**dB**
Reference Level	46.970	**dB**
Marker Amplitude	46.970	**dBm**
Scale	10.000	**dB/Div**

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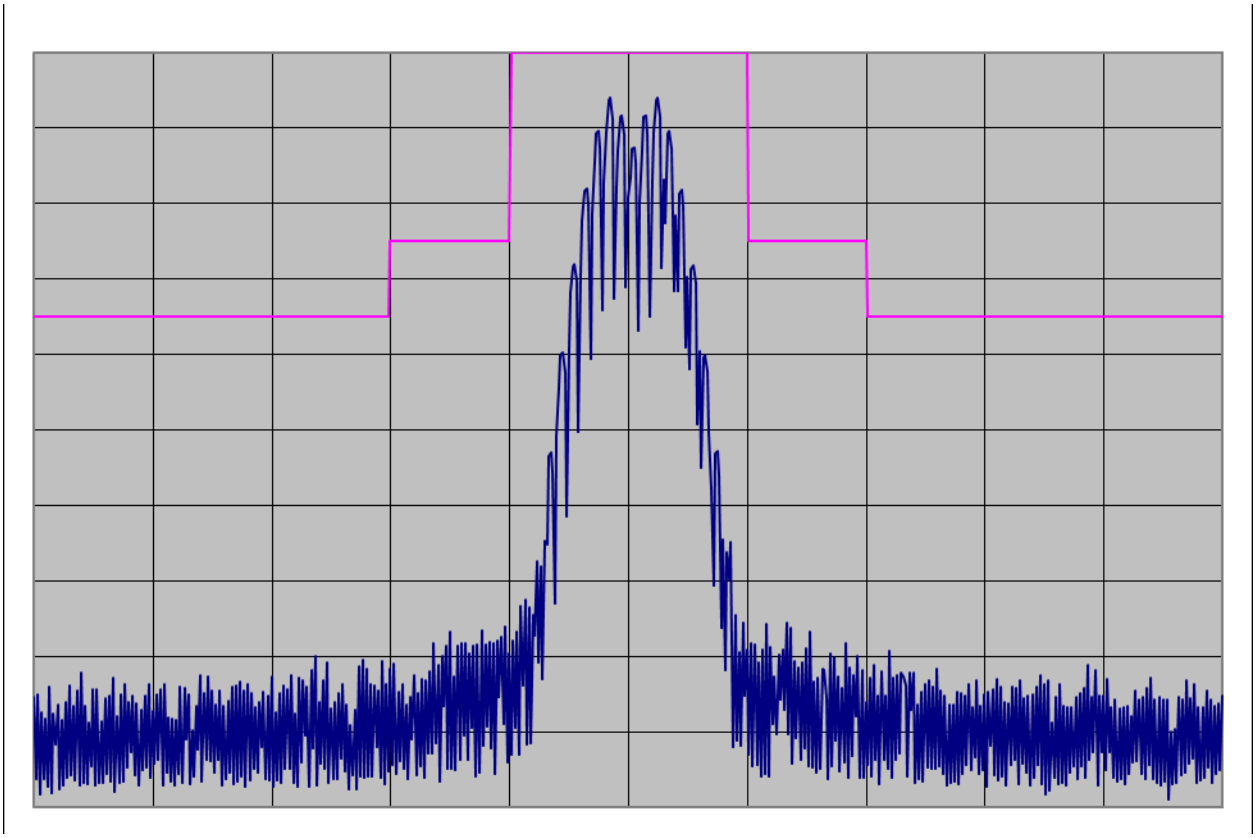
Emission Mask B 25.0 kHz Channel Spacing:



Analogue Measurement

Centre Frequency	47.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	20.000	**dB**
Reference Level	46.970	**dB**
Marker Amplitude		**dBm**
Scale	10.000	**dB/Div**

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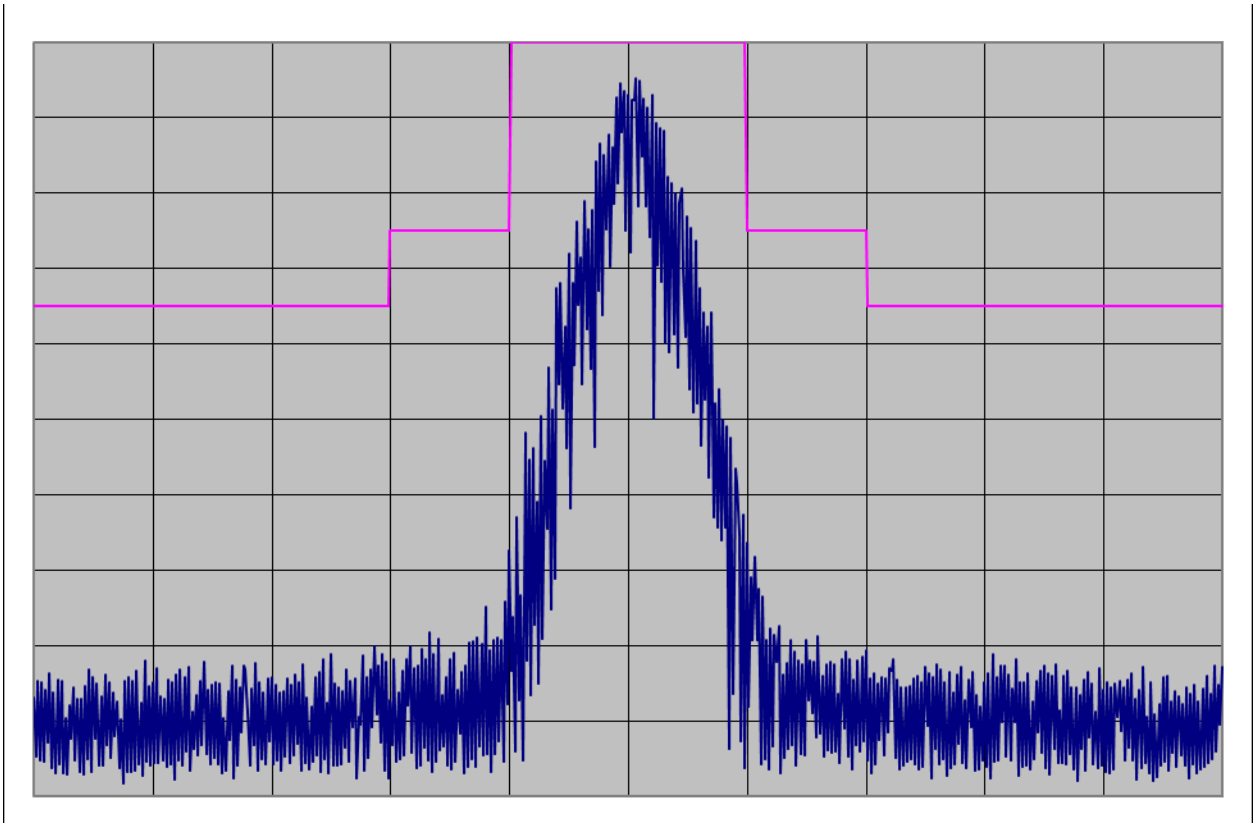
Emission Mask B 25.0 kHz Channel Spacing:



Data Measurements

Centre Frequency	47.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	20.000	**dB**
Reference Level	46.970	**dB**
Marker Amplitude	46.970	**dBm**
Scale	10.000	**dB/Div**

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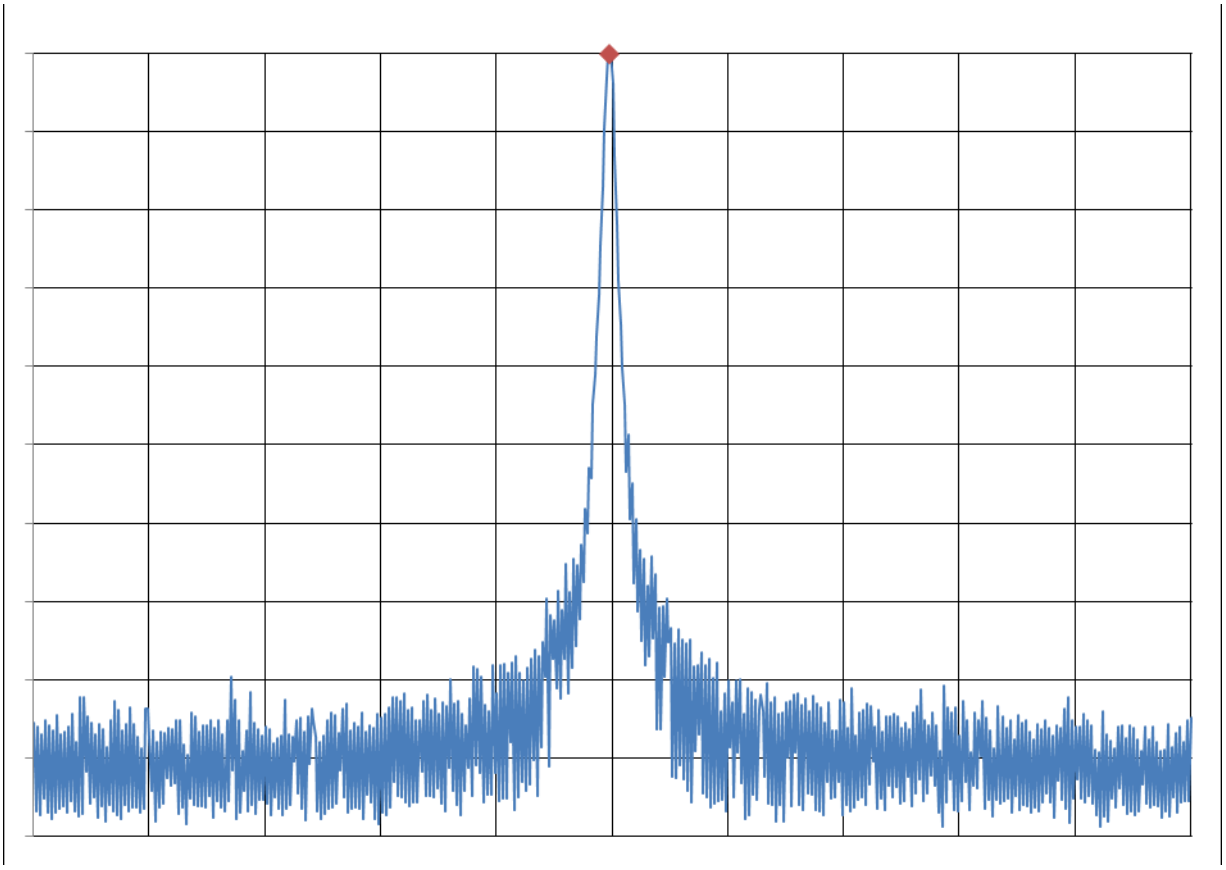
TEST REPORT

FR$_U$ @ 50W
Emission Mask D 12.5 kHz Channel Spacing:



Reference Un-modulated Measurement

Centre Frequency	47.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	20.000	**dB**
Reference Level	46.970	**dB**
Marker Amplitude	46.970	**dBm**
Scale	10.000	**dB/Div**

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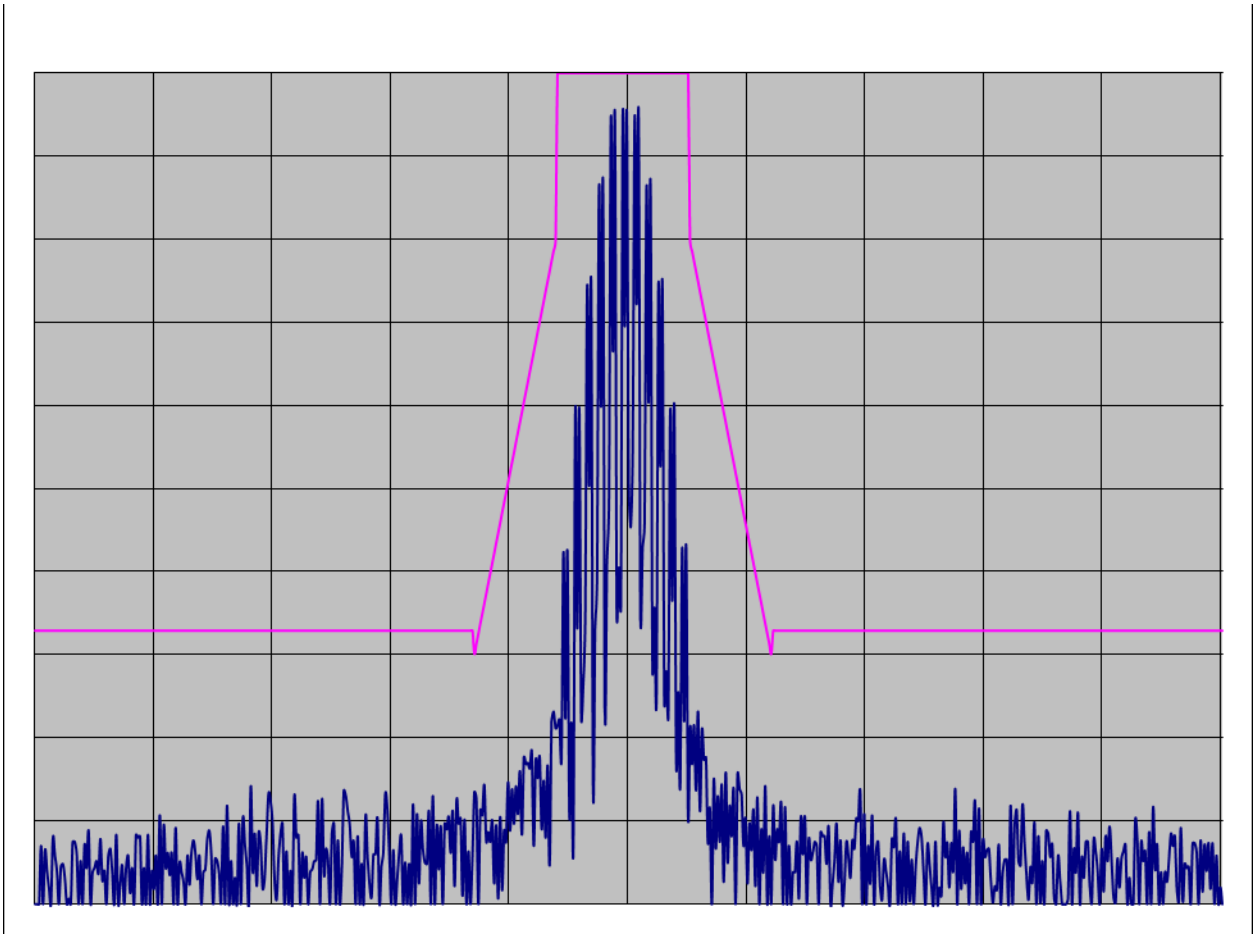
TEST REPORT

Emission Mask D 12.5 kHz Channel Spacing:



Analogue Measurement

Centre Frequency	47.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	20.000	**dB**
Reference Level	46.970	**dB**
Marker Amplitude		**dBm**
Scale	10.000	**dB/Div**

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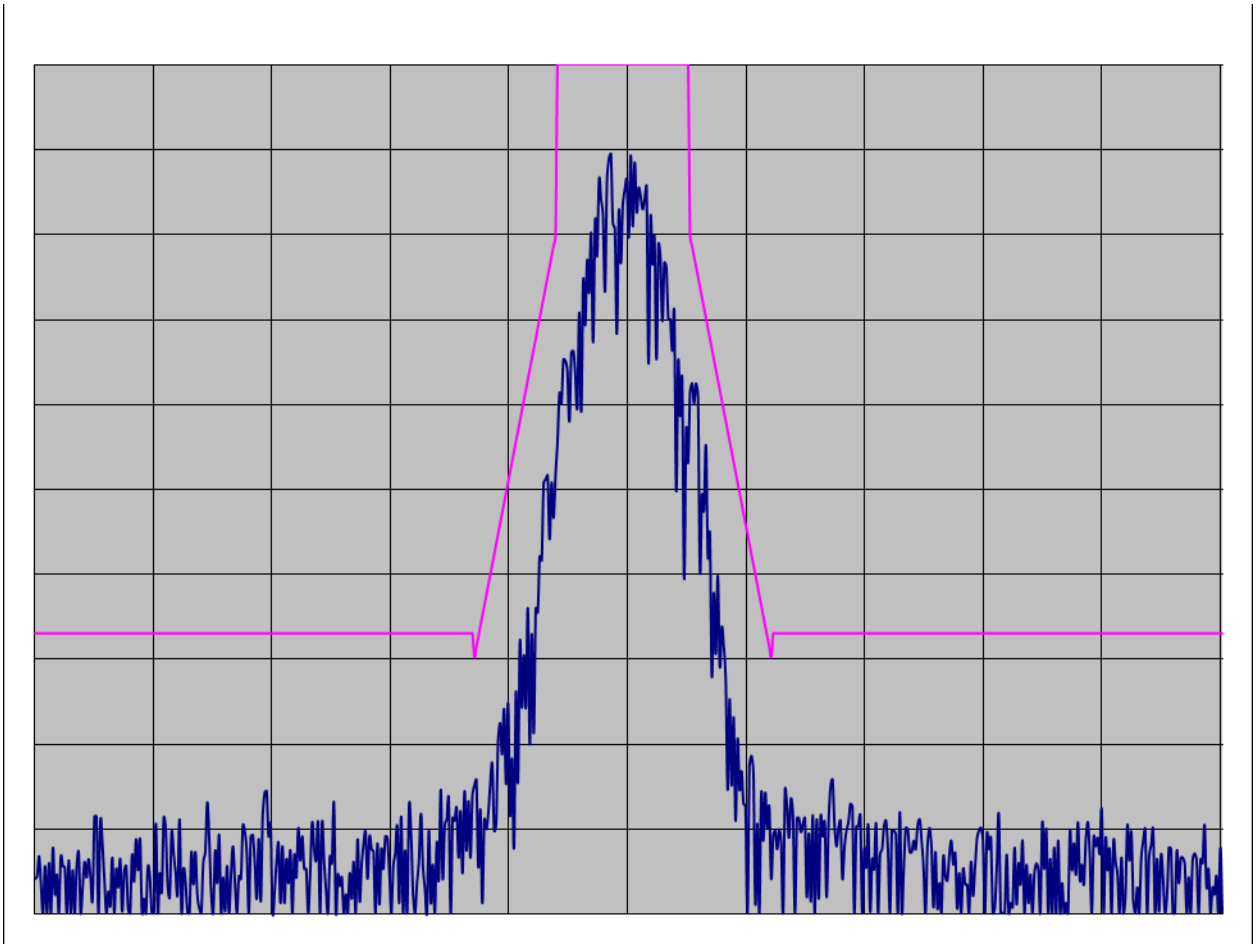
TEST REPORT

Emission Mask D 12.5 kHz Channel Spacing:



Data Measurements

Centre Frequency	47.000	**MHz**
Resolution Bandwidth	0.300	**kHz**
Span	100.000	**kHz**
Video Bandwidth	1.000	**kHz**
Sweep Time	2.800	**Sec**
Attenuation	20.000	**dB**
Reference Level	46.970	**dB**
Marker Amplitude		**dBm**
Scale	10.000	**dB/Div**

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TEST REPORT

SPURIOUS EMISSIONS (CONDUCTED)

SPECIFICATION: FCC 47 CFR 2.1051

Measurement Method Definition Guide EIA-603 clauses 2.2.13

LIMITS:

FCC 47 CFR 90.210
FCC 47 CFR 22.359(a)
FCC 47 CFR 74.462(c)

Emission Mask B 25.0 kHz Channel Spacing		
Carrier Output Power Watts	**12.5 kHz Channel Spacing 43 + 10 Log10 (PWatts)**	
1W	**-13dBm**	**43dBc**
50W	**-13dBm**	**59.99dBc**
100W	**-13dBm**	**63dBc**

Emission Mask D 12.5 kHz Channel Spacing		
Carrier Output Power Watts	**12.5 kHz Channel Spacing 50 + 10 Log10 (PWatts)**	
1W	**-20dBm**	**50dBc**
50W	**-20dBm**	**66.99dBc**
100W	**-20dBm**	**70dBc**

The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be recorded

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TEST REPORT

MEASUREMENT PROCEDURE:

1. Set the spectrum analyzer to measure peak hold with the required settings.
2. Set the signal generator to a known output power and record the path loss in dB (LOSS) for frequencies up to the tenth harmonic of the EUT's carrier frequency. **LOSS** =Generator Output Power (dBm) – Analyzer reading (dBm).
3. Replace the signal generator with the EUT.
4. Adjust the settings of the Radio Communication Test set (RCTS) to set the EUT to its maximum power at the required channel.
5. Set the spectrum analyzer to measure peak hold with the required settings. Offset the spectrum analyzer reference level by the path loss measured above.
6. Measure and record all spurious emissions up to the tenth harmonic of the carrier frequency.
7. Measurements are to be performed with the EUT set to the lower, centre & upper of the frequency band and at low, medium and high power settings.
8. If necessary steps 6 and 7 may be performed with the spectrum analyzer set to average detector.

Measured Results:

Please see the follow pages for results.

The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be recorded

All emission pass greater than 90dBc

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TEST REPORT

12.5 kHz Channel Spacing FR_L @ 100 W Emission Mask D

Emission Frequency (MHz)	Level (dBc)	Level (dBm)

25 kHz Channel Spacing FR_L @ 100 W Emission Mask B

Emission Frequency (MHz)	Level (dBc)	Level (dBm)

Note#
The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be recorded.

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TEST REPORT

12.5 kHz Channel Spacing FR_L @ 50 W Emission Mask D

Emission Frequency (MHz)	Level (dBc)	Level (dBm)

25 kHz Channel Spacing FR_L @ 50 W Emission Mask B

Emission Frequency (MHz)	Level (dBc)	Level (dBm)

Note#
The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be recorded.

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TEST REPORT

12.5 kHz Channel Spacing FR_L @ 1W Emission Mask D

Emission Frequency (MHz)	Level (dBc)	Level (dBm)

25 kHz Channel Spacing FR_L @ 1 W Emission Mask B

Emission Frequency (MHz)	Level (dBc)	Level (dBm)

Note#
The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be recorded.

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TEST REPORT

12.5 kHz Channel Spacing FR_c @ 100 W Emission Mask D

Emission Frequency (MHz)	Level (dBc)	Level (dBm)

25 kHz Channel Spacing FR_c @ 100 W Emission Mask B

Emission Frequency (MHz)	Level (dBc)	Level (dBm)

Note#
The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be recorded.

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TEST REPORT

12.5 kHz Channel Spacing FR_c @ 50 W Emission Mask D

Emission Frequency (MHz)	Level (dBc)	Level (dBm)

25 kHz Channel Spacing FR_c @ 50 W Emission Mask B

Emission Frequency (MHz)	Level (dBc)	Level (dBm)

Note#
The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be recorded.

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TEST REPORT

12.5 kHz Channel Spacing FR_c @ 1W Emission Mask D

Emission Frequency (MHz)	Level (dBc)	Level (dBm)

25 kHz Channel Spacing FR_c @ 1 W Emission Mask B

Emission Frequency (MHz)	Level (dBc)	Level (dBm)

Note#
The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be recorded.

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TEST REPORT

12.5 kHz Channel Spacing FR_U @ 100 W Emission Mask D

Emission Frequency (MHz)	Level (dBc)	Level (dBm)

25 kHz Channel Spacing FR_U @ 100 W Emission Mask B

Emission Frequency (MHz)	Level (dBc)	Level (dBm)

Note#
The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be recorded.

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TEST REPORT

12.5 kHz Channel Spacing FR_u @ 50 W Emission Mask D

Emission Frequency (MHz)	Level (dBc)	Level (dBm)

25 kHz Channel Spacing FR_u @ 50 W Emission Mask B

Emission Frequency (MHz)	Level (dBc)	Level (dBm)

Note#
The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be recorded.

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TEST REPORT

12.5 kHz Channel Spacing FR_U @ 1W Emission Mask D

Emission Frequency (MHz)	Level (dBc)	Level (dBm)

25 kHz Channel Spacing FR_U @ 1 W Emission Mask B

Emission Frequency (MHz)	Level (dBc)	Level (dBm)

Note#
The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be recorded.

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TEST REPORT

Radiated Spurious Emissions

SPECIFICATION: FCC 47 CFR 2.1053
Measurement Method Definition Guide EIA-603 clauses 2.2.12

Limits:

FCC 47 CFR 2.1053
Radiated spurious emissions are required to be 60 dB or more below the mean power of the transmitter.

Please see the attached report in APPENDIX D

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TEST REPORT

Transient Frequency Behavior of Transmitter

SPECIFICATION: FCC 47 CFR 90.214
Measurement Method definition clause 2.2.19

Limits:

FCC 47 CFR 90.214, 74.462

MEASUREMENT PROCEDURE:

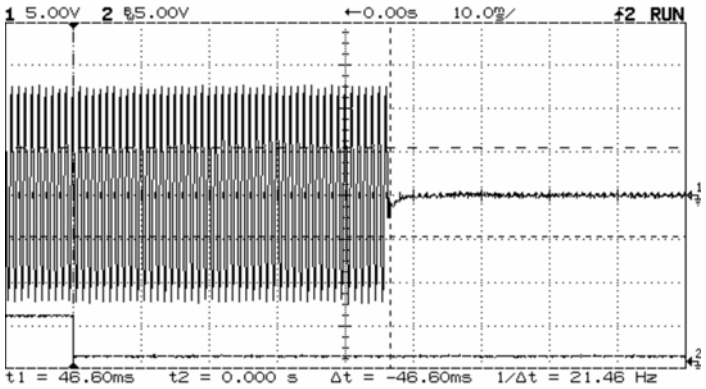
1. Measurements and plots were made following the TIA/EIA603 clause 2.2.19 procedure

Measured Results:

12.5 kHz Channel Spacing
FRL

	30Mhz-300Mhz	300Mhz-512Mhz	512Mhz-1000Mhz	Frequency Spec	Measured Period
T1	**5ms**	**10ms**	**20ms**	**< ±25kHz**	<1Ms
T2	**20ms**	**25ms**	**50ms**	**< ±12.5kHz**	<1Ms
T3	**5ms**	**10ms**	**10ms**	**< ±25kHz**	<1Ms

TX ON



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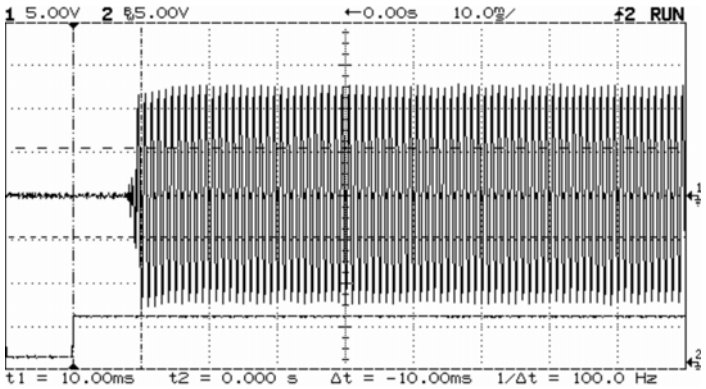

	YES	NO
Confirm that during period's t1 and t3 the frequency difference does not exceed the value of one channel separation.	**Y**	
Confirm that during the period t2 the frequency difference does not exceed half a channel separation.	**Y**	
Confirm that during the period t2 to t3 the frequency difference does not exceed the frequency error limit.	**Y**	

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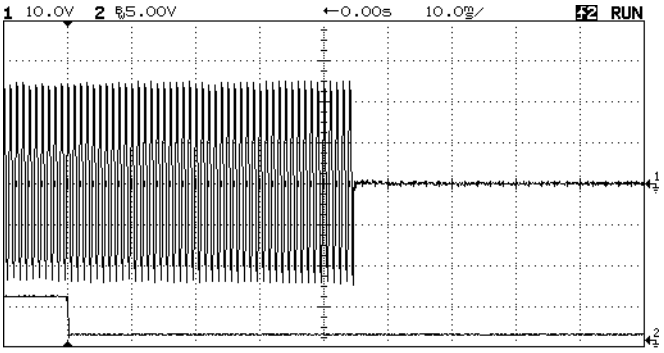
TEST REPORT

25 kHz Channel Spacing
FRL

	30Mhz-300Mhz	300Mhz-512Mhz	512Mhz-1000Mhz	Frequency Spec	Measured Period
T1	**5ms**	**10ms**	**20ms**	**< ±25kHz**	<1Ms
T2	**20ms**	**25ms**	**50ms**	**< ±12.5kHz**	<1Ms
T3	**5ms**	**10ms**	**10ms**	**< ±25kHz**	<1Ms

TX ON



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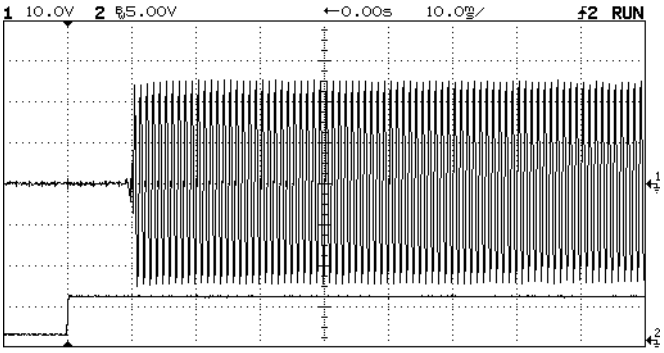

	YES	NO
Confirm that during period's t1 and t3 the frequency difference does not exceed the value of one channel separation.	**Y**	
Confirm that during the period t2 the frequency difference does not exceed half a channel separation.	**Y**	
Confirm that during the period t2 to t3 the frequency difference does not exceed the frequency error limit.	**Y**	

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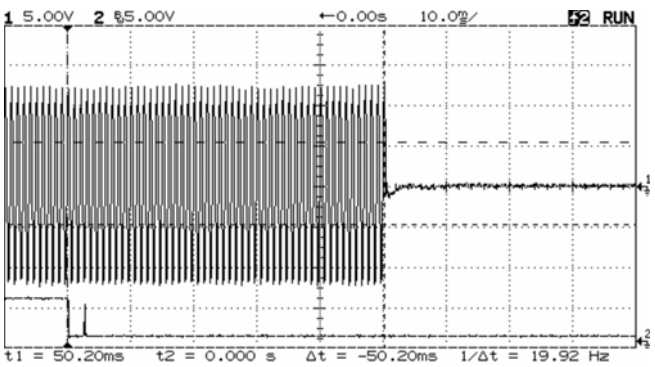
TEST REPORT

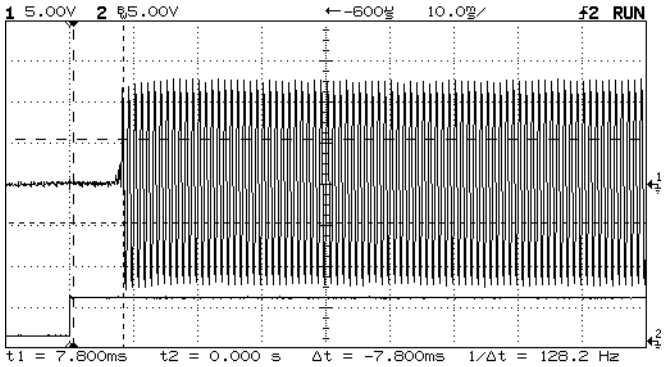
12.5 kHz Channel Spacing
FRc

	30Mhz-300Mhz	300Mhz-512Mhz	512Mhz-1000Mhz	Frequency Spec	Measured Period
T1	**5ms**	**10ms**	**20ms**	**< ±25kHz**	<1Ms
T2	**20ms**	**25ms**	**50ms**	**< ±12.5kHz**	<1Ms
T3	**5ms**	**10ms**	**10ms**	**< ±25kHz**	<1Ms

TX ON



TX OFF



	YES	NO
Confirm that during period's t1 and t3 the frequency difference does not exceed the value of one channel separation.	**Y**	
Confirm that during the period t2 the frequency difference does not exceed half a channel separation.	**Y**	
Confirm that during the period t2 to t3 the frequency difference does not exceed the frequency error limit.	**Y**	

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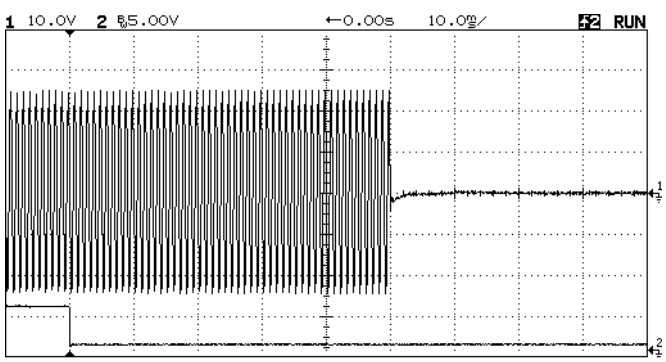
TEST REPORT

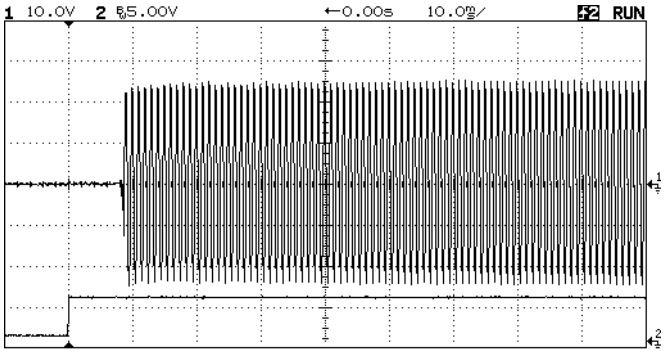
25 kHz Channel Spacing
FRc

	30Mhz-300Mhz	300Mhz-512Mhz	512Mhz-1000Mhz	Frequency Spec	Measured Period
T1	**5ms**	**10ms**	**20ms**	**< ±25kHz**	<1Ms
T2	**20ms**	**25ms**	**50ms**	**< ±12.5kHz**	<1Ms
T3	**5ms**	**10ms**	**10ms**	**< ±25kHz**	<1Ms

TX ON



TX OFF



	YES	NO
Confirm that during period's t_1 and t_3 the frequency difference does not exceed the value of one channel separation.	**Y**	
Confirm that during the period t_2 the frequency difference does not exceed half a channel separation.	**Y**	
Confirm that during the period t_2 to t_3 the frequency difference does not exceed the frequency error limit.	**Y**	

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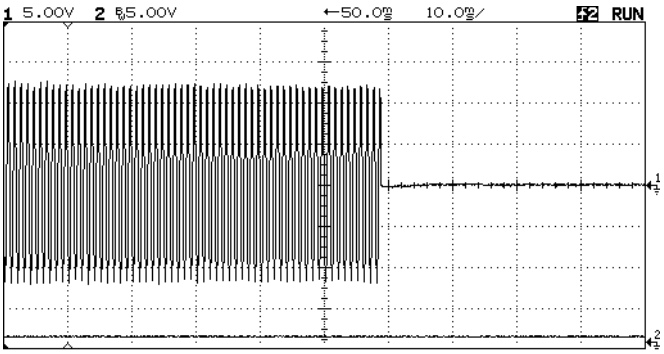
TEST REPORT

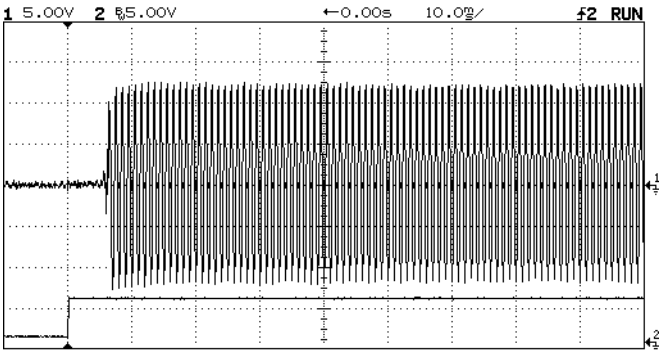
12.5 kHz Channel Spacing
FRU

	30Mhz-300Mhz	300Mhz-512Mhz	512Mhz-1000Mhz	Frequency Spec	Measured Period
T1	**5ms**	**10ms**	**20ms**	**< ±25kHz**	<1Ms
T2	**20ms**	**25ms**	**50ms**	**< ±12.5kHz**	<1Ms
T3	**5ms**	**10ms**	**10ms**	**< ±25kHz**	<1Ms

TX ON



TX OFF



	YES	NO
Confirm that during period's t1 and t3 the frequency difference does not exceed the value of one channel separation.	**Y**	
Confirm that during the period t2 the frequency difference does not exceed half a channel separation.	**Y**	
Confirm that during the period t2 to t3 the frequency difference does not exceed the frequency error limit.	**Y**	

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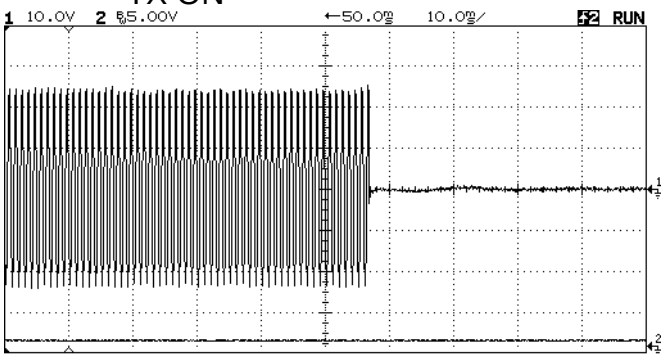
TEST REPORT

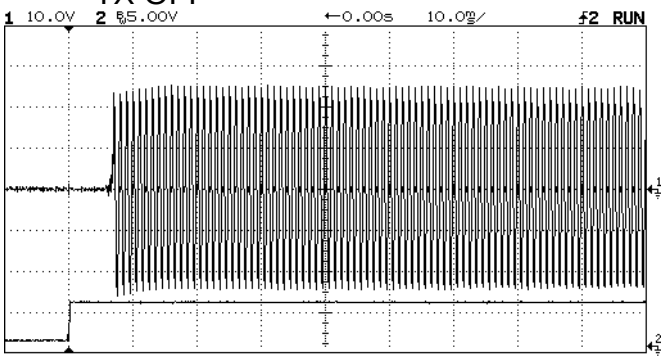
25 kHz Channel Spacing
FRU

	30Mhz-300Mhz	300Mhz-512Mhz	512Mhz-1000Mhz	Frequency Spec	Measured Period
T1	**5ms**	**10ms**	**20ms**	**< ±25kHz**	<1Ms
T2	**20ms**	**25ms**	**50ms**	**< ±12.5kHz**	<1Ms
T3	**5ms**	**10ms**	**10ms**	**< ±25kHz**	<1Ms

TX ON



TX OFF



	YES	NO
Confirm that during period's t_1 and t_3 the frequency difference does not exceed the value of one channel separation.	**Y**	
Confirm that during the period t_2 the frequency difference does not exceed half a channel separation.	**Y**	
Confirm that during the period t_2 to t_3 the frequency difference does not exceed the frequency error limit.	**Y**	