FCC
Test Report
for
802.15.4/ Zigbee module
JN 5139-Z01-M00R

Report Number 02-160A/3280/2/07
Supercedes report number 02-160/3280/2/07
Report Produced by: -

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1. Contents

2. Summary of Test Results

The 802.15.4/ Zigbee module JN 5139-Z01-M00R was tested to the following standards: -

FCC Part 15C (effective date February 7, 2007); Class DTS Intentional Radiator

Any compliance statements are made reliant on: (a) the modes of operation as instructed to us by the Customer based on their specific knowledge of the application and functionality of the EUT.

Title	Reference	Results
1. Conducted Emissions	FCC Part 15C §15.207	NOT APPLICABLE[1]
2. Radiated Emissions	FCC Part 15C §15.205, §15.209 & §15.247(d)	PASSED
3. Modulation Bandwidth	FCC Part 15C §15.215(c), §15.247(a)(2)	PASSED
4. Intentional Radiator Field Strength	FCC Part 15C §15.247(b)	PASSED
5. Power Spectral Density	FCC Part 15C §15.247(e)	PASSED

This report relates to the equipment tested as identified by a unique serial number and at the time it was tested. It does not relate to any other similar equipment and performance of the product before or after the test cannot be guaranteed.

Date of Test: 23rd March 2007

Test Engineer: Daniel Sims — Digitally signed by Daniel Sims DN: CN = Daniel Sims, C = GB, O = RN Electronics Date: 2007.03.26 13:40:53 +01'00'

Approved By: Paul Darragh — Digitally signed by Paul Darragh DN: CN = Paul Darragh, C = GB, OU = RN Electronics Date: 2007.03.26 10:53:18 +01'00'

Customer Representative:

[1] The digital device tested is intended to be powered from 3V dc supply (battery) and intended for modular approval. Any third party device it is incorporated into with a connection to the AC power line will require demonstration of compliance with the limits. Refer to §15.207(c) "Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to AC power lines".

3. Information about Equipment Under Test

Manufacturer of EUT	Jennic Ltd Furnival Street Sheffield S1 4QT
Full name of EUT	802.15.4/ Zigbee module
Model Number of EUT Model Number of alternative sample	JN 5139-Z01-M00R JN 5130-000-M01
Serial Number of EUT Serial Number of alternative sample	0704100031 001
FCC ID (if applicable):	TYOJN5139M0
Date when equipment was received by RN Electronics Limited	9th February 2007
Date of test:	23rd March 2007
Customer order number:	PO 003971
A visual description of EUT is as follows:	A canned IC on small PCB with an integral ceramic antenna / SMA antenna port on alternative sample. For purposes of test mounted on a motherboard with battery / dc voltage input and RS232 communications fly lead.
The main function of the EUT is:	To provide 2.4GHz Zigbee / IEEE 802.15.4 communications.
Antenna:	Integral

Equipment Under Test Information specification:

Height	3.5mm
Width	18mm
Depth	30mm
Weight	0.001kg
Voltage	3V dc
Current required from above voltage source	0.05A
Highest Frequencies used / generated	2480MHz

Description of ancillary equipment connected to the equipment under test, for the purpose of tests, can be found in Section 11.

Any modifications made to the **EUT**, whilst under test, can be found in Section 12.

This report was printed on: 26 March 2007

4. Specifications

The tests were performed by RN Electronics Engineer Daniel Sims who set up the tests, the test equipment, and operated it in accordance with the ***R.N. Electronics Ltd*** procedures manual and FCC Part 15.

4.1 Deviations

NONE

5. Tests, Methods and Results
5.1 Conducted Emissions

NOT APPLICABLE.
The digital device tested is intended to be powered from 3V dc supply (battery) and intended for modular approval. Any third party device it is incorporated into with a connection to the AC power line will require demonstration of compliance with the limits. Refer to §15.207(c) "Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to AC power lines"

5.2 Radiated Emissions

5.2.1 Test Methods

Test Requirements	FCC Part 15C, Reference (15.205 / 15.209)
Test Method:	FCC Part 15C, Reference (15.209)

5.2.1.1 Configuration of EUT

Radiated Emissions testing was performed with the EUT in a test jig provided by the manufacturer. The jig allowed for communications to set the frequency and power level of the device as well as provide the 3V required dc input. This set up also allowed for continuous operation of the transmitter which would normally have a duty cycle <= 1 %.

30MHz to 6.5GHz.
The EUT was placed on a 0.8 metres high turntable. The front edge of the EUT was initially positioned facing the antenna. The EUT was measured at a distance of 3 metres. The EUT was rotated in all three orthogonal planes. Tests were repeated with the EUT transmit frequency channel set to 2405, 2440 and 2480 MHz.
Above 6.5GHz.
The antenna was re-positioned at a distance of 1 metre.

5.2.1.2 Test Procedure

Tests were made in accordance with FCC Part 15 using the measuring equipment noted below.

30MHz to 1GHz measurements were made in a semi-anechoic chamber (pre-scan) with final measurements on an OATS. Test sites ‘M’ and 'OATS' have been listed with the FCC. The equipment was rotated 360° and the antenna scanned 1 – 4 metres in both horizontal and vertical polarisations to record the worst case emissions.
1GHz to 26GHz measurements were made in a semi-anechoic chamber. The equipment was rotated 360° and the antenna positioned level with the EUT in both horizontal an vertical polarisations.
At least 6 signals within 20dB and all signals within 10dB of the limit were investigated.

5.2.2 Test results

Tests were performed using Test Site M**.**

Test Environment:
Temperature: 18-20°C Humidity: 41-46 %

Analyser plots for the Quasi-Peak / Average values as applicable on the middle channel and a table of any signals within 20dB of the limit line on all three channels can be found in Section 6.2 of this report.

These show that the **EUT** has PASSED this test.

5.2.2.1 Test Equipment used

E3, E268, TMS79, N438, E242, E238, E235, TMS82, E1, TMS933
See Section 10 for more details

5.3 Intentional Radiator Field Strength

5.3.1 Test Methods

Test Requirements FCC Part 15C, Reference (15.247(b))

Test Method: FCC Part 15C, Reference (15.247)

5.3.1.1 Configuration of EUT

An alternative sample with a 50ohm coaxial connector instead of the ceramic antenna was checked for maximum conducted power at the antenna port.

5.3.1.2 Test Procedure

Tests were made in accordance with FCC Part 15 using the measuring equipment noted below.

5.3.2 Test results

Tests were performed using Test Site A.
Test Environment:
A Temperature: 22°C Humidity: 31 %

The conducted power from the alternative sample was as shown in the table below:

Frequency (MHz)	Power (W)
2405	0.0017
2440	0.0018
2480	0.0018

Limit 1 Watt.
These results show that the EUT has PASSED this test.

5.3.2.1 Test Equipment used

CO31, CO32
See Section 10 for more details

5.4 Maximum Spectral Power Density

5.4.1 Test Methods

Test Requirements FCC Part 15C, Reference (15.247(e))

Test Method: FCC Part 15C, Reference (15.247)

5.4.1.1 Configuration of EUT

An alternative sample with a 50ohm coaxial connector instead of the ceramic antenna was checked for maximum spectral power density conducted at the antenna port.

5.4.1.2 Test Procedure

Tests were made in accordance with FCC Part 15 using the measuring equipment noted below.

5.4.2 Test results

Tests were performed using Test Site A**.**

Temperature of test Environment: 22°C

The spectral power density from the alternative sample was as shown in the table below:

Frequency (MHz)	Peak Power (dBm/3kHz)
2405	-16.1
2440	-15.9
2480	-15.8

These results show that the **EUT** has PASSED this test.

5.4.2.1 Test Equipment used

TMS6-2, TMS77, CO31, CO32, E5
See Section 10 for more details.

5.5 6dB Bandwidth

5.5.1 Test Methods

Test Requirements FCC Part 15C, Reference (15.247(a))

Test Method: FCC Part 15C, Reference (15.247)

5.5.1.1 Configuration of EUT

The EUT was placed on a 0.8 metres high turntable. The front edge of the EUT was initially positioned facing the antenna. The EUT was measured at a distance of 3 metres.

5.5.1.2 Test Procedure

Tests were made in accordance with FCC Part 15 using the measuring equipment noted below.

Measurements were made in a semi-anechoic chamber.

5.5.2 Test results

Tests were performed using Test Site M .

Temperature of test Environment: 20°C

Analyser plots for the 6dB bandwidth can be found in Section 6.3 of this report.

Frequency (MHz)	6dB Bandwidth (MHz)	Plot Reference
2405	1.45	30
2440	1.41	31
2480	1.43	32

Limit > 500kHz.
These results show that the **EUT** has PASSED this test.

5.5.2.1 Test Equipment used

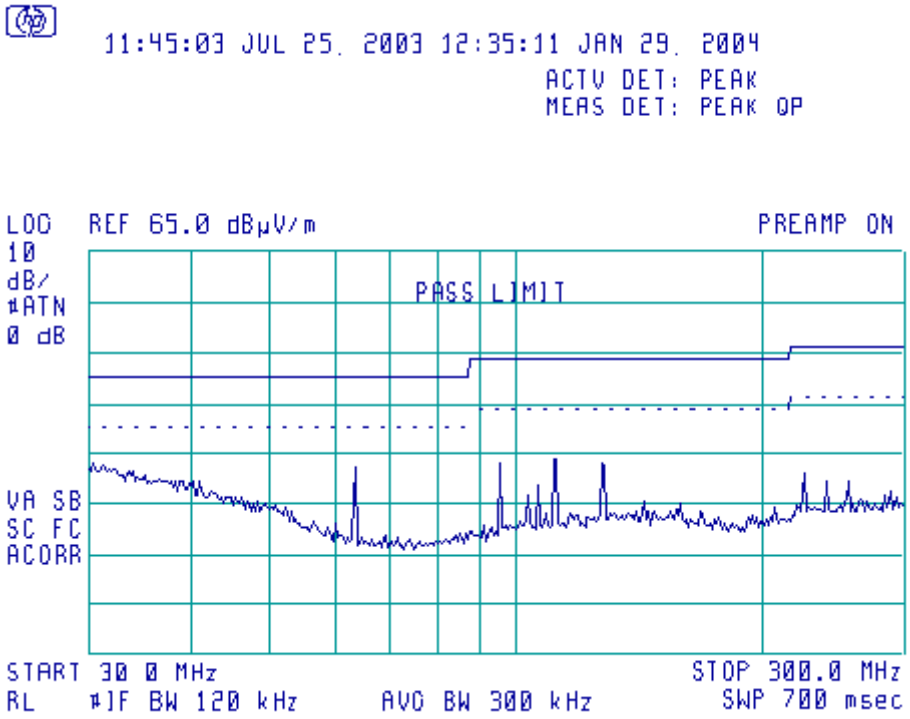
E3, E268
See Section 10 for more details.

6. Plots and Results

6.1 Conducted Emissions

NONE - TEST NOT APPLICABLE

6.2 Radiated Emissions



Quasi-Peak Values of 30 MHz. to 300 MHz.

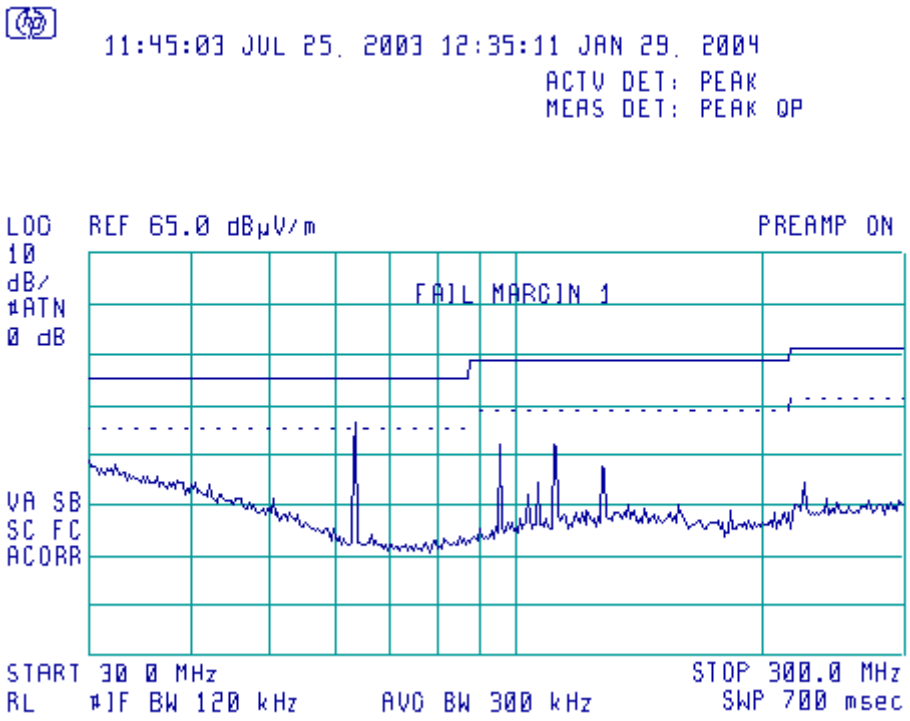
Horizontal Polarisation

The plot shows a swept response of peak values using the quasi-peak limit line

(Any peaks within 20dB of the limit line have been calculated and appear in the table on following page of this report)

EUT Freq (MHz)	Signal	Freq (MHz)	Peak Amp (dBuV/m)	QP Amp (dBuV/m)	15.209 Limit (dBuV/m)	Comments
2405	1	95.9990	25.98	24.65	43.5	
2405	2	128.011	25.36	23.67	43.5	
2440	3	63.9997	23.59	22.35	40.0	
2440	4	111.997	25.62	23.95	43.5	
2440	5	96.0094	25.13	23.74	43.5	
2480	6	63.9973	24.08	22.52	40.0	

Table of signals within 20dB of the limit line for Quasi-Peak Horizontal



Quasi-Peak Values of 30 MHz. to 300 MHz.

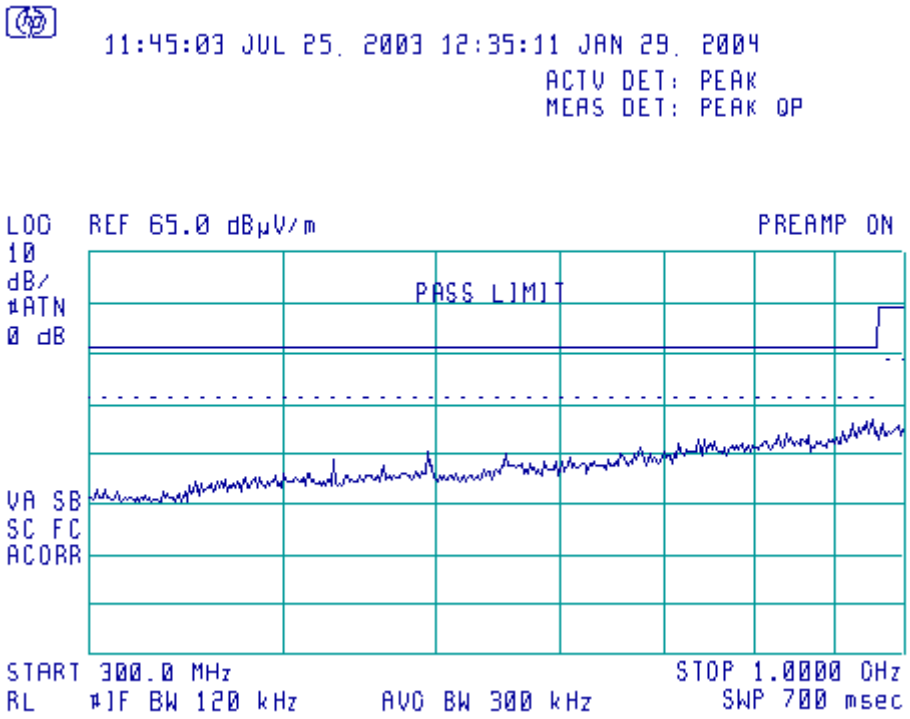
Vertical Polarisation

The plot shows a swept response of peak values using the quasi-peak limit line

(Any peaks within 20dB of the limit line have been calculated and appear in the table on following page of this report)

EUT Freq (MHz)	Signal	Freq (MHz)	Peak Amp (dBuV/m)	QP Amp (dBuV/m)	15.209 QP Limit (dBuV/m)	Comments
2405	1	63.9987	32.42	31.76	40.0	
2405	2	95.9999	25.57	23.96	43.5	
2405	3	112.003	27.33	25.99	43.5	
2405	4	127.999	21.98	19.31	43.5	
2440	5	63.9978	32.34	31.79	40.0	
2440	6	96.0094	28.26	27.13	43.5	
2440	7	111.998	28.35	27.24	43.5	
2440	8	128.002	24.53	22.60	43.5	
2480	9	63.9992	32.98	32.48	40.0	
2480	10	95.9981	26.69	25.43	43.5	
2480	11	112.000	26.60	25.30	43.5	
2480	12	127.999	24.65	22.76	43.5	

Table of signals within 20dB of the limit line for Quasi-peak Vertical



Quasi-Peak Values of 300 MHz. to 1 GHz.

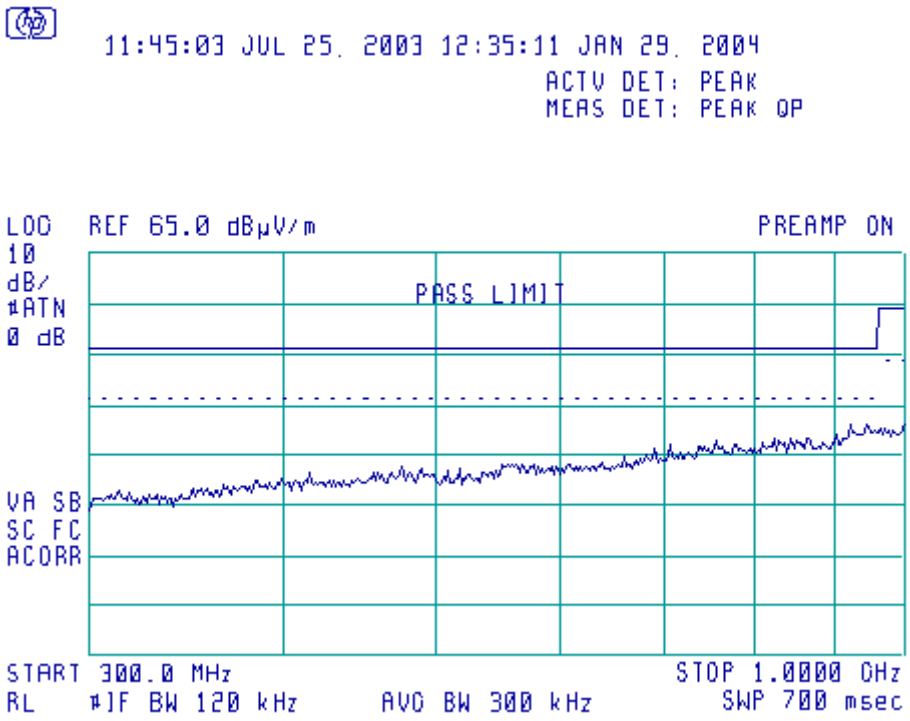
Horizontal Polarisation

The plot shows a swept response of peak values using the quasi-peak limit line

(Any peaks within 20dB of the limit line have been calculated and appear in the table on following page of this report)

NONE

Table of signals within 20dB of the limit line for Quasi-Peak Horizontal



Quasi-Peak Values of 300 MHz. to 1 GHz.

Vertical Polarisation

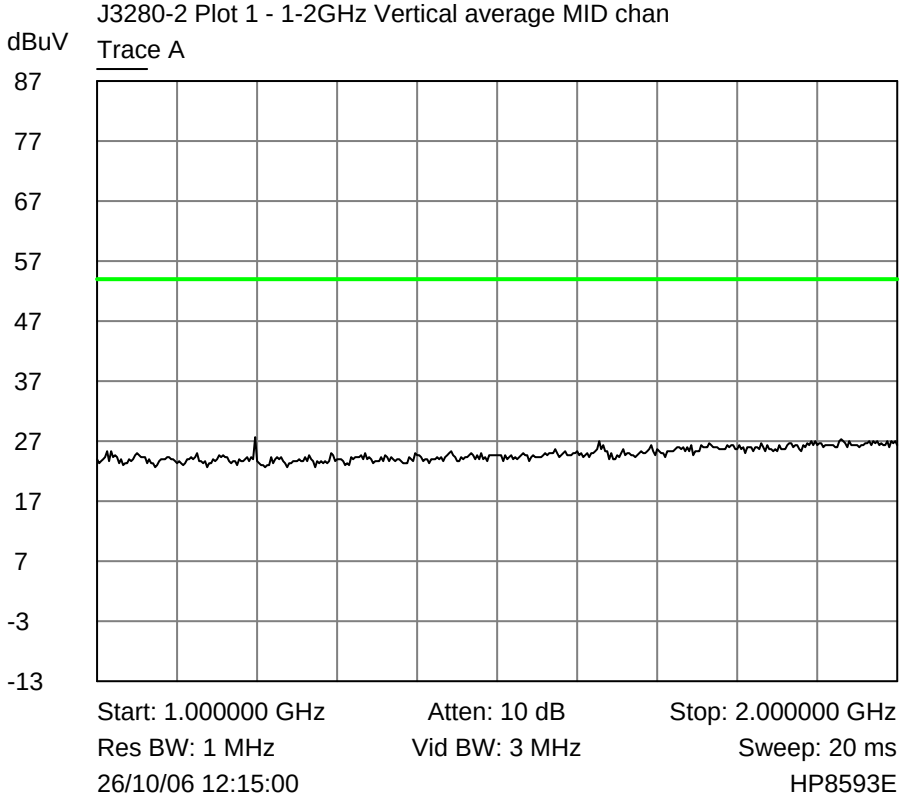
The plot shows a swept response of peak values using the quasi-peak limit line

(Any peaks within 20dB of the limit line have been calculated and appear in the table on following page of this report)

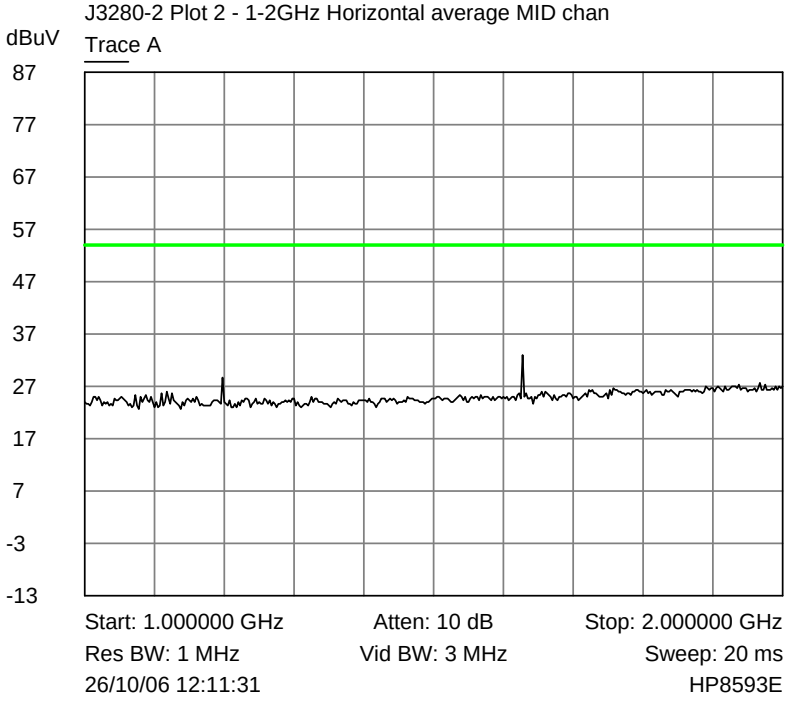
NONE

Table of signals within 20dB of the limit line for Quasi-peak Vertical

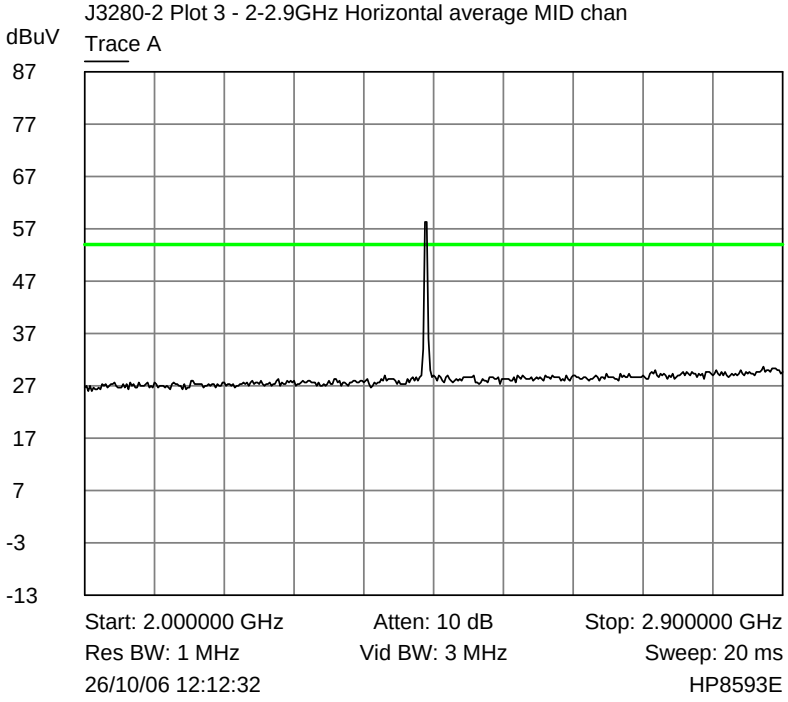
J3280-2 Plot 1 - 1-2GHz Vertical average MID chan



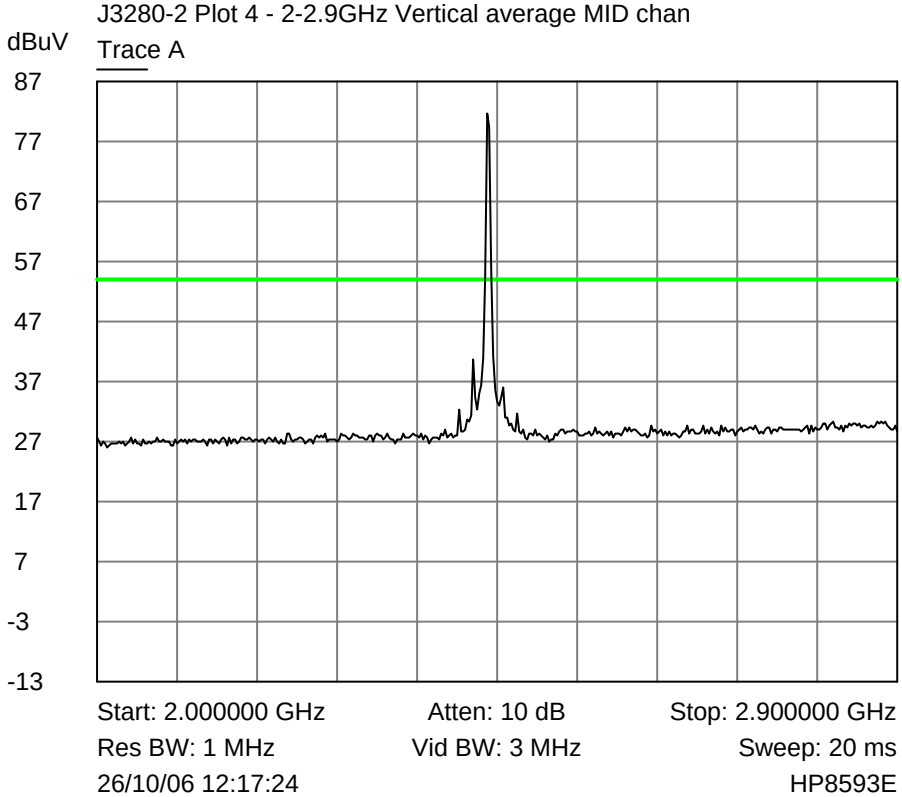
J3280-2 Plot 2 - 1-2GHz Horizontal average MID chan



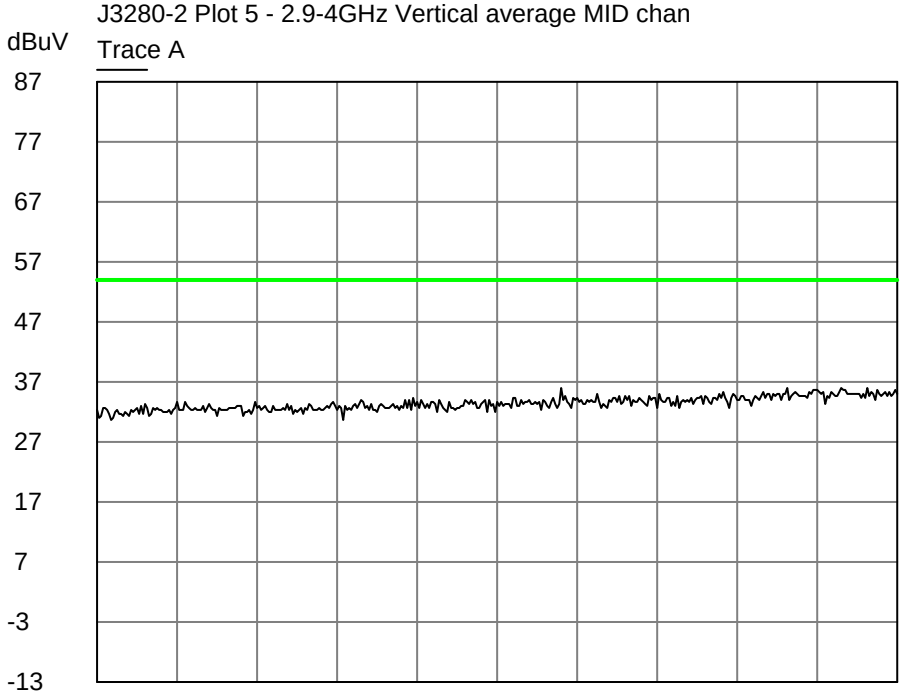
J3280-2 Plot 3 - 2-2.9GHz Horizontal average MID chan



J3280-2 Plot 4 - 2-2.9GHz Vertical average MID chan

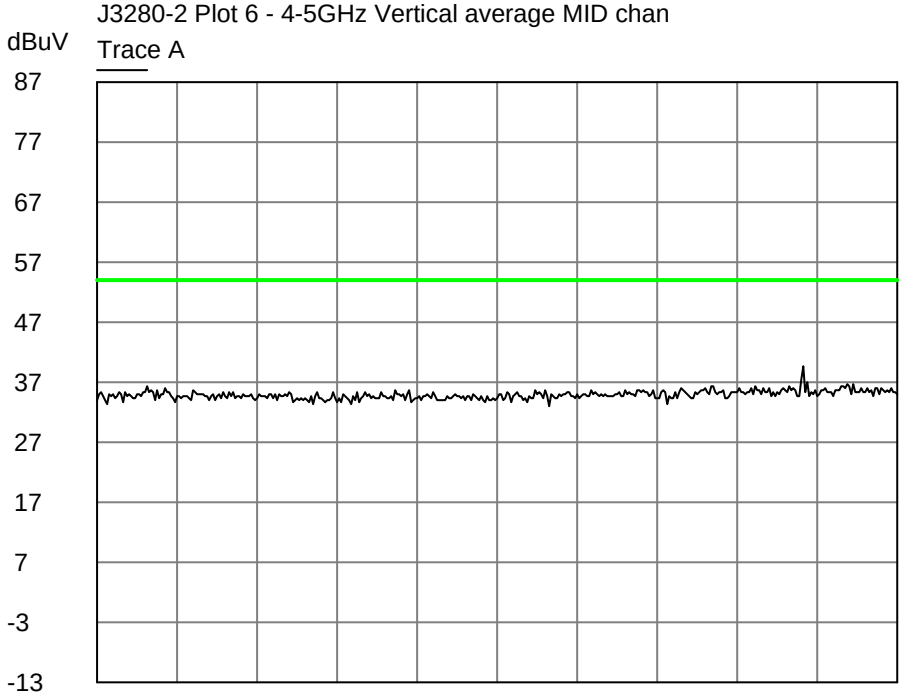


J3280-2 Plot 5 - 2.9-4GHz Vertical average MID chan



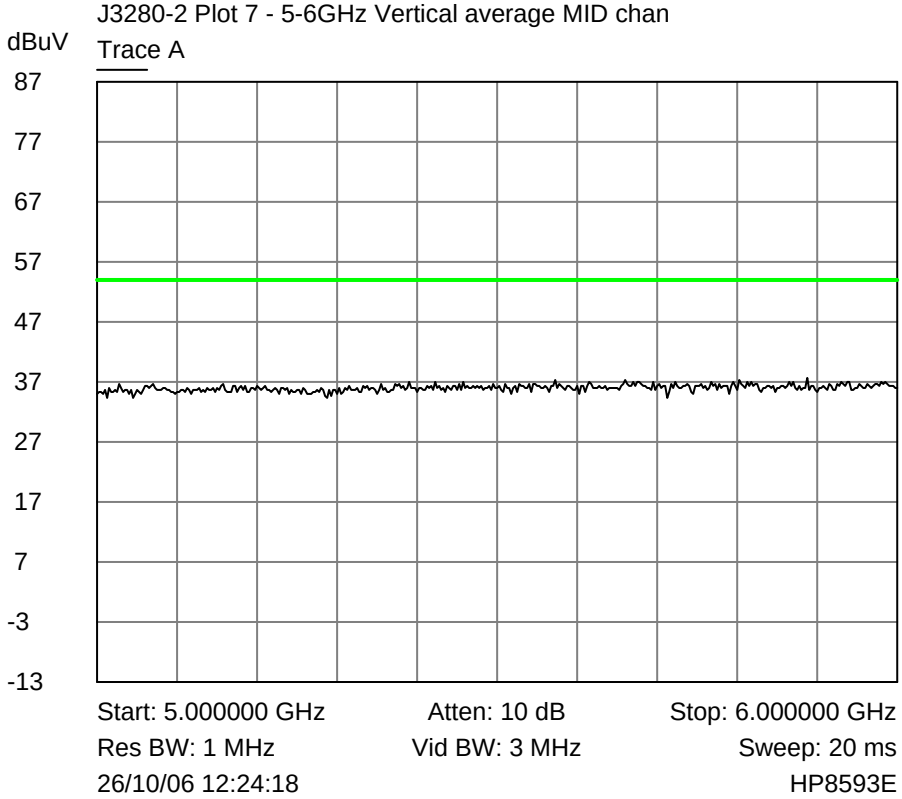
Start: 2.900000 GHz Atten: 10 dB Stop: 4.000000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 22 ms
26/10/06 12:20:25 HP8593E

J3280-2 Plot 6 - 4-5GHz Vertical average MID chan



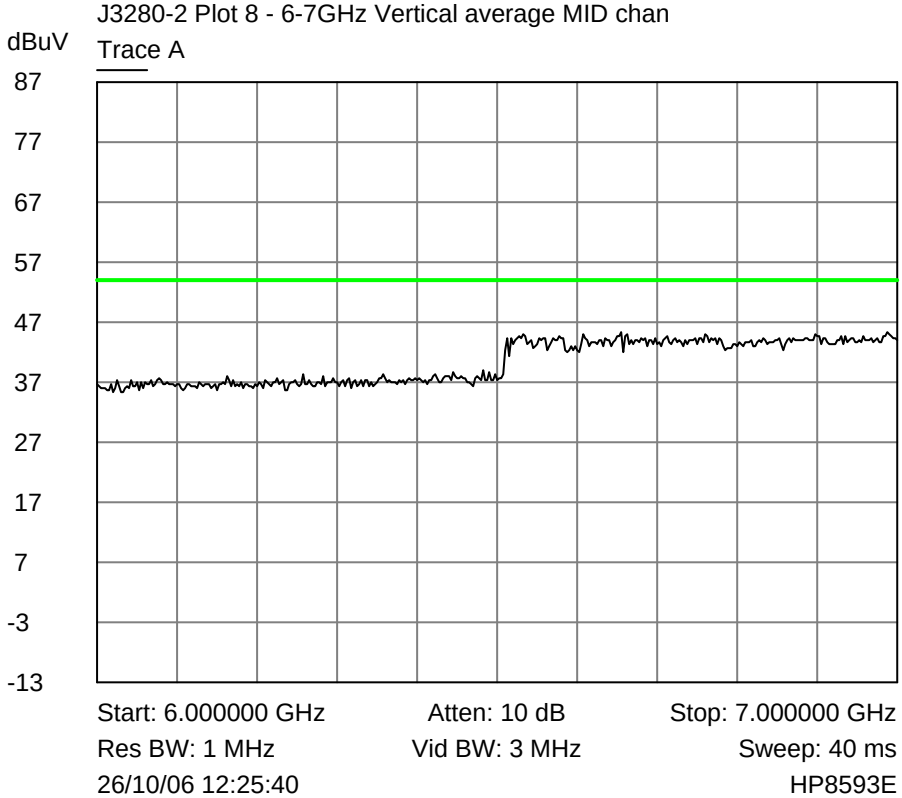
Start: 4.000000 GHz Atten: 10 dB Stop: 5.000000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 20 ms
26/10/06 12:22:13 HP8593E

J3280-2 Plot 7 - 5-6GHz Vertical average MID chan



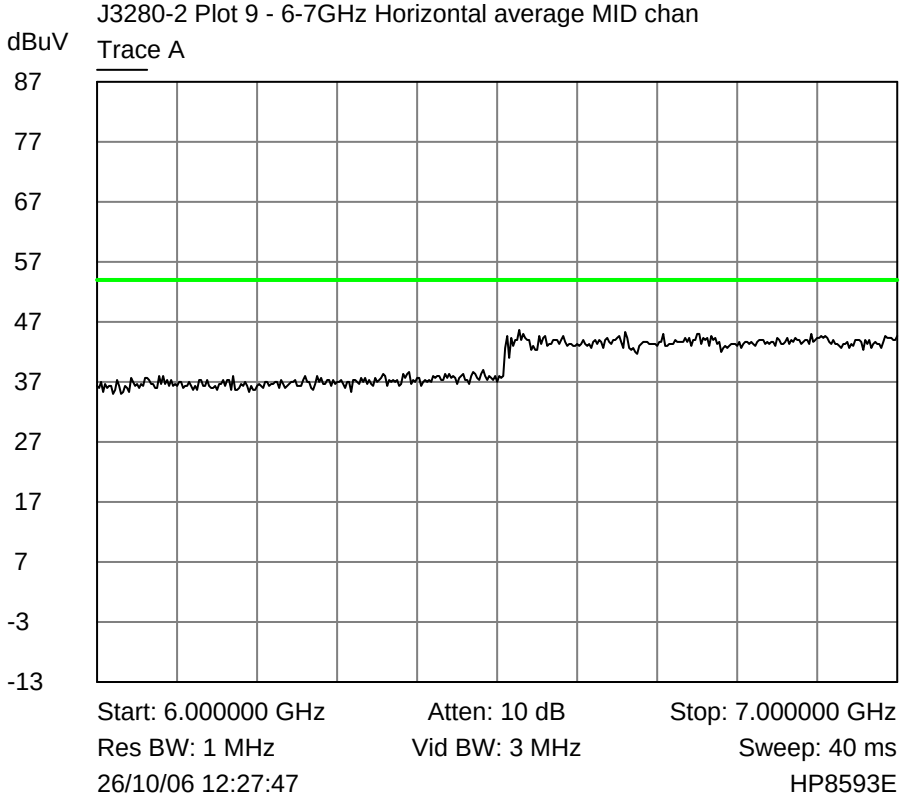
Start: 5.000000 GHz Atten: 10 dB Stop: 6.000000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 20 ms
26/10/06 12:24:18 HP8593E

J3280-2 Plot 8 - 6-7GHz Vertical average MID chan



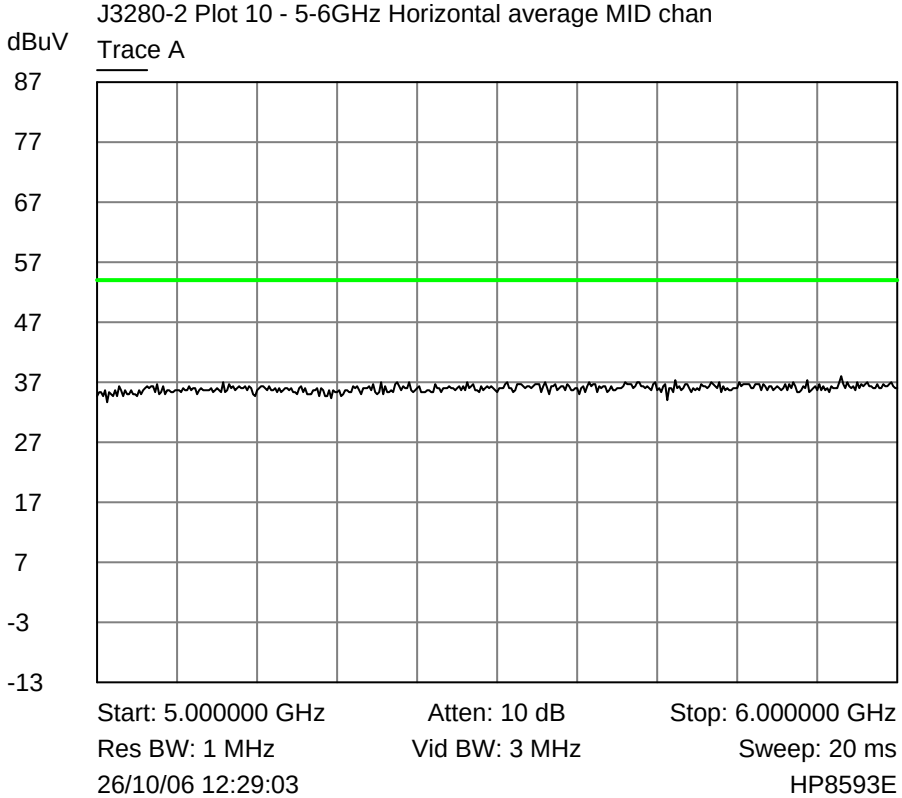
Start: 6.000000 GHz Atten: 10 dB Stop: 7.000000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 40 ms
26/10/06 12:25:40 HP8593E

J3280-2 Plot 9 - 6-7GHz Horizontal average MID chan



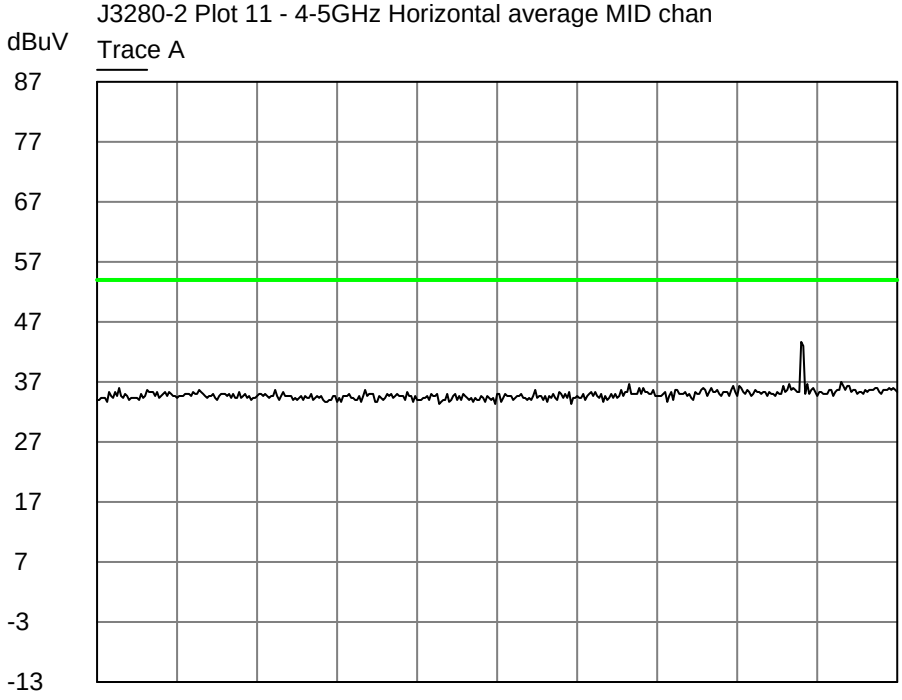
Start: 6.000000 GHz Atten: 10 dB Stop: 7.000000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 40 ms
26/10/06 12:27:47 HP8593E

J3280-2 Plot 10 - 5-6GHz Horizontal average MID chan



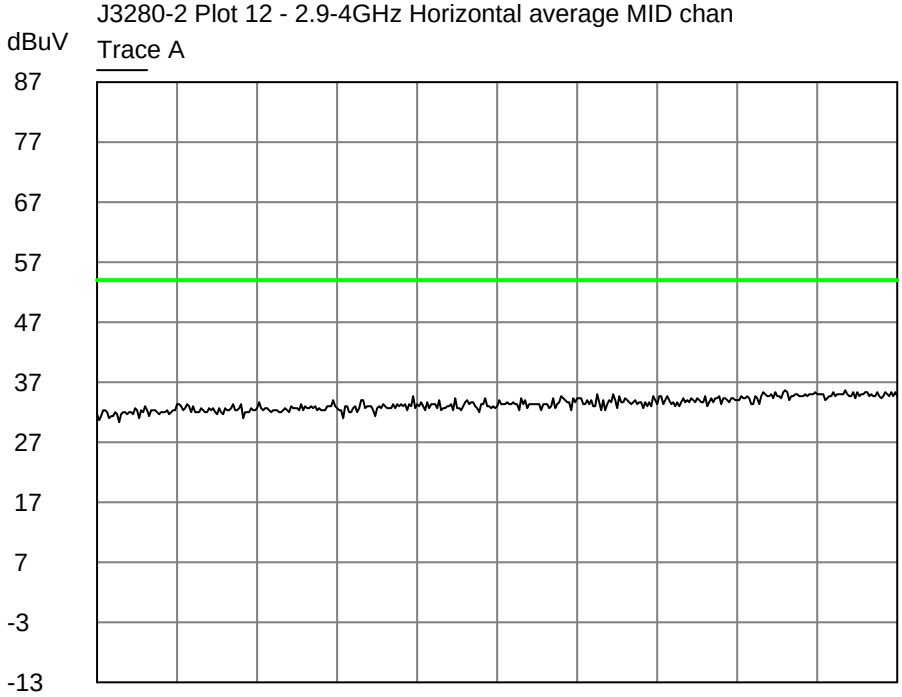
Start: 5.000000 GHz Atten: 10 dB Stop: 6.000000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 20 ms
26/10/06 12:29:03 HP8593E

J3280-2 Plot 11 - 4-5GHz Horizontal average MID chan



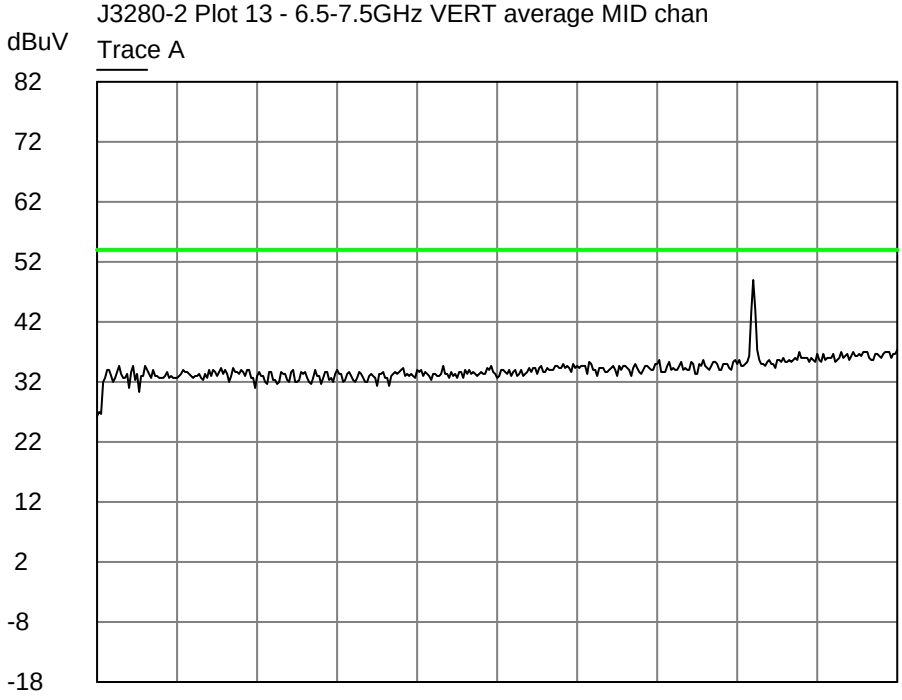
Start: 4.000000 GHz Atten: 10 dB Stop: 5.000000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 20 ms
26/10/06 12:30:16 HP8593E

J3280-2 Plot 12 - 2.9-4GHz Horizontal average MID chan



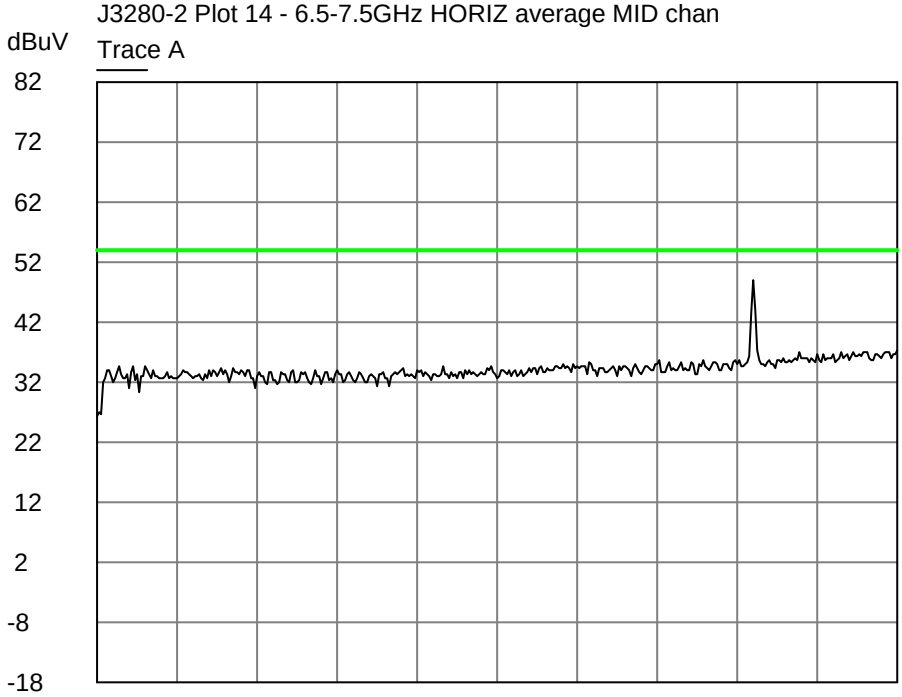
Start: 2.900000 GHz Atten: 10 dB Stop: 4.000000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 22 ms
26/10/06 12:31:36 HP8593E

J3280-2 Plot 13 - 6.5-7.5GHz VERT average MID chan



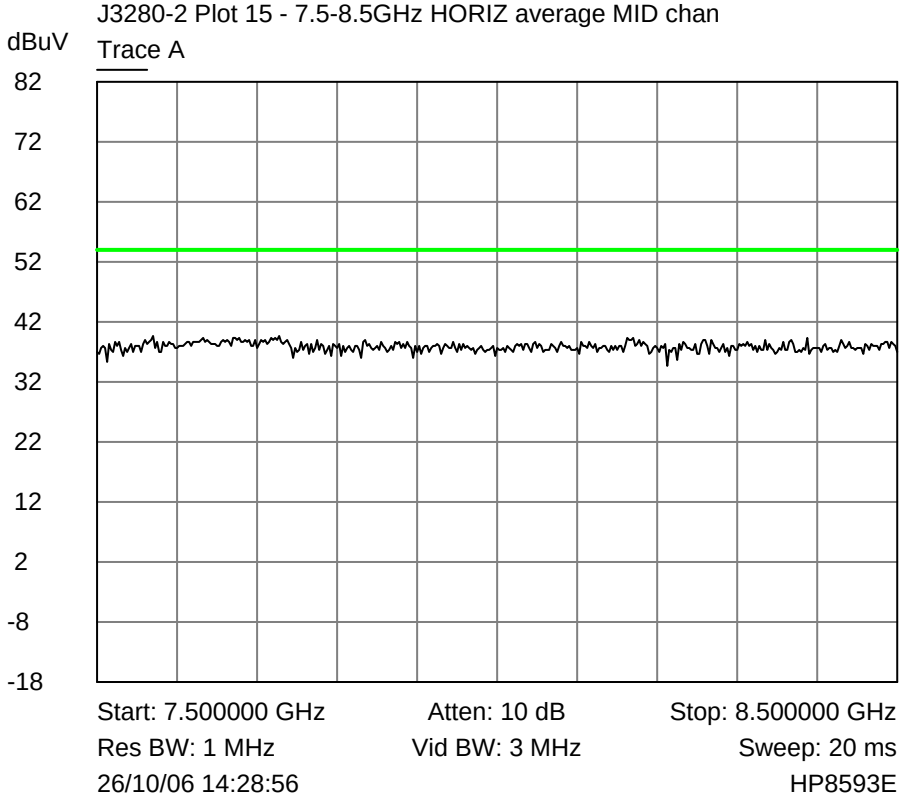
Start: 6.500000 GHz Atten: 10 dB Stop: 7.500000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 40 ms
26/10/06 14:22:10 HP8593E

J3280-2 Plot 14 - 6.5-7.5GHz HORIZ average MID chan

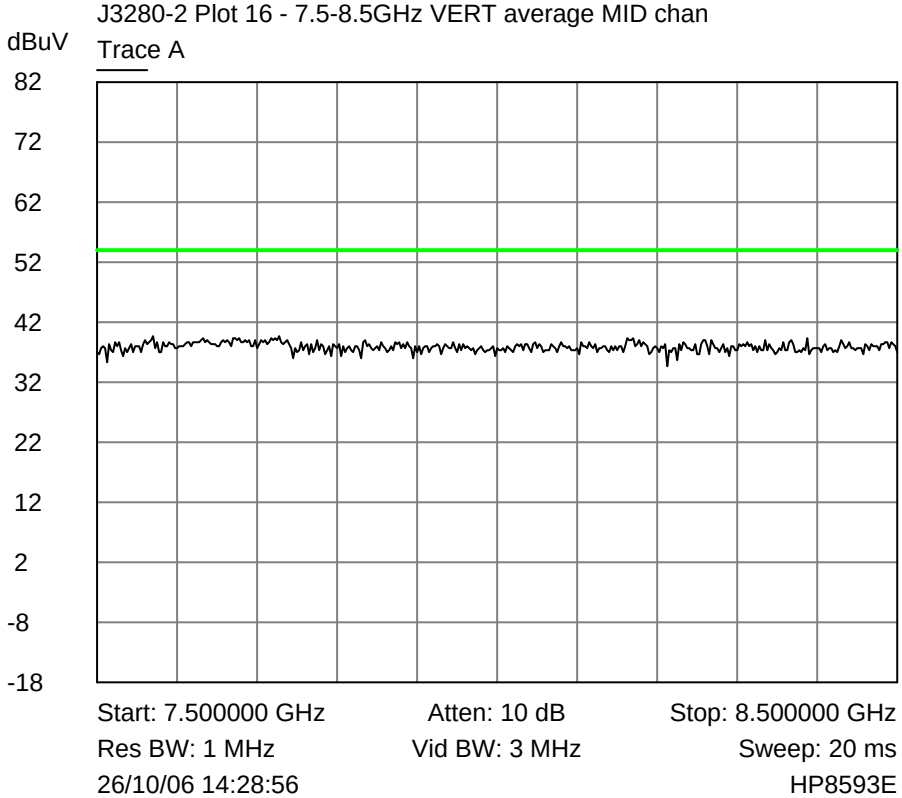


Start: 6.500000 GHz Atten: 10 dB Stop: 7.500000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 40 ms
26/10/06 14:22:10 HP8593E

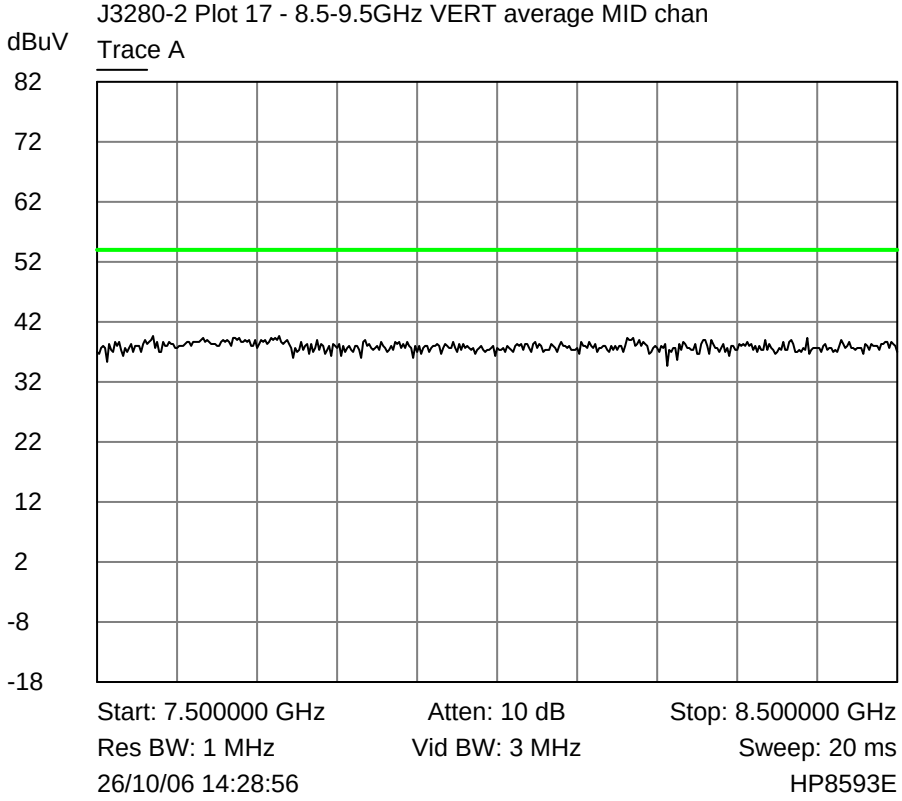
J3280-2 Plot 15 - 7.5-8.5GHz HORIZ average MID chan



J3280-2 Plot 16 - 7.5-8.5GHz VERT average MID chan

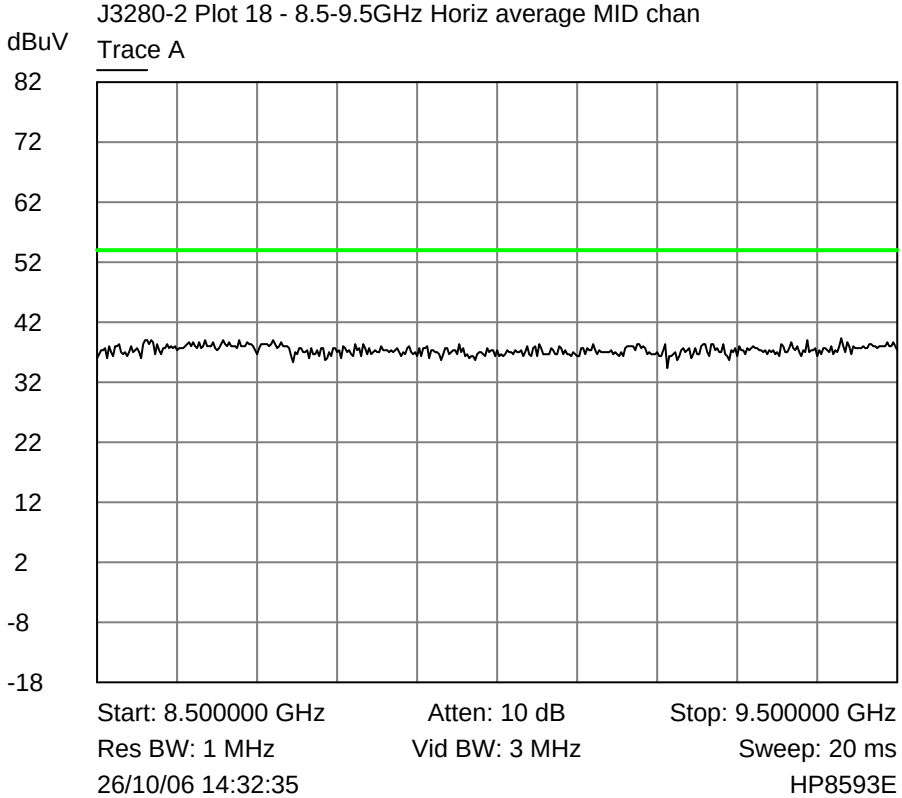


J3280-2 Plot 17 - 8.5-9.5GHz VERT average MID chan



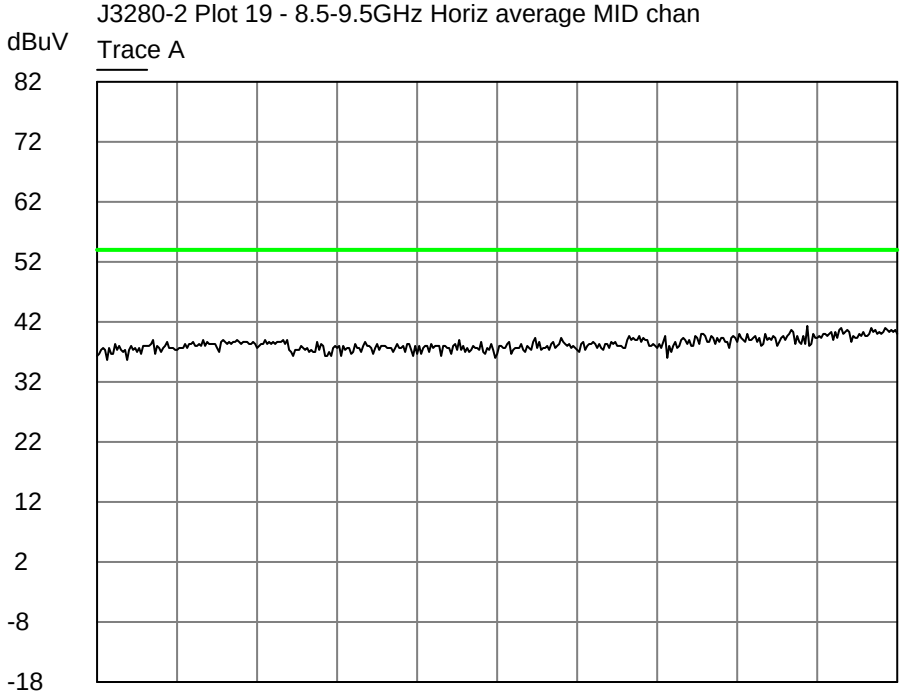
Start: 7.500000 GHz Atten: 10 dB Stop: 8.500000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 20 ms
26/10/06 14:28:56 HP8593E

J3280-2 Plot 18 - 8.5-9.5GHz Horiz average MID chan



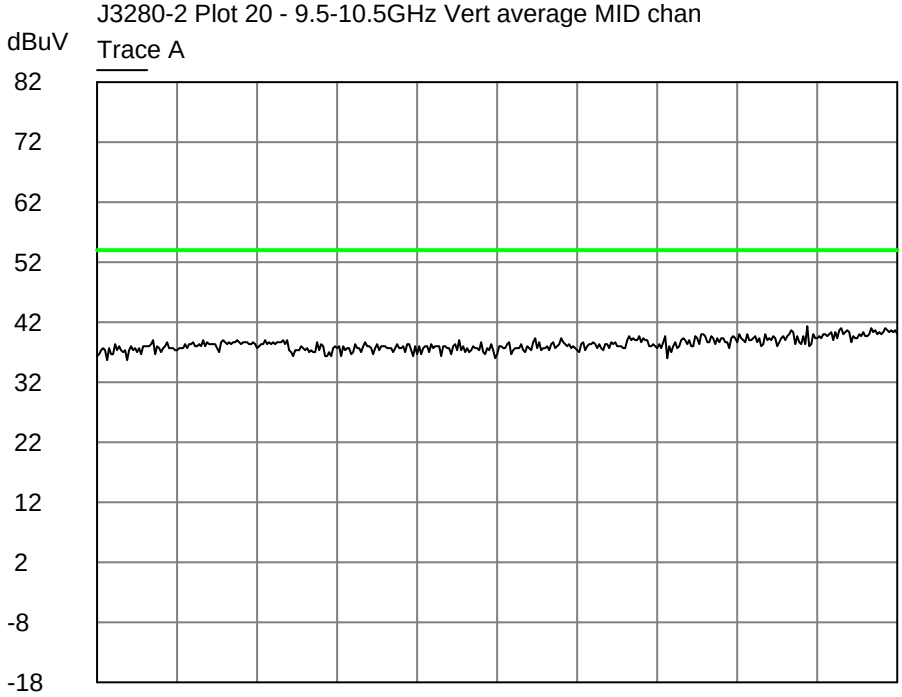
Start: 8.500000 GHz Atten: 10 dB Stop: 9.500000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 20 ms
26/10/06 14:32:35 HP8593E

J3280-2 Plot 19 - 8.5-9.5GHz Horiz average MID chan



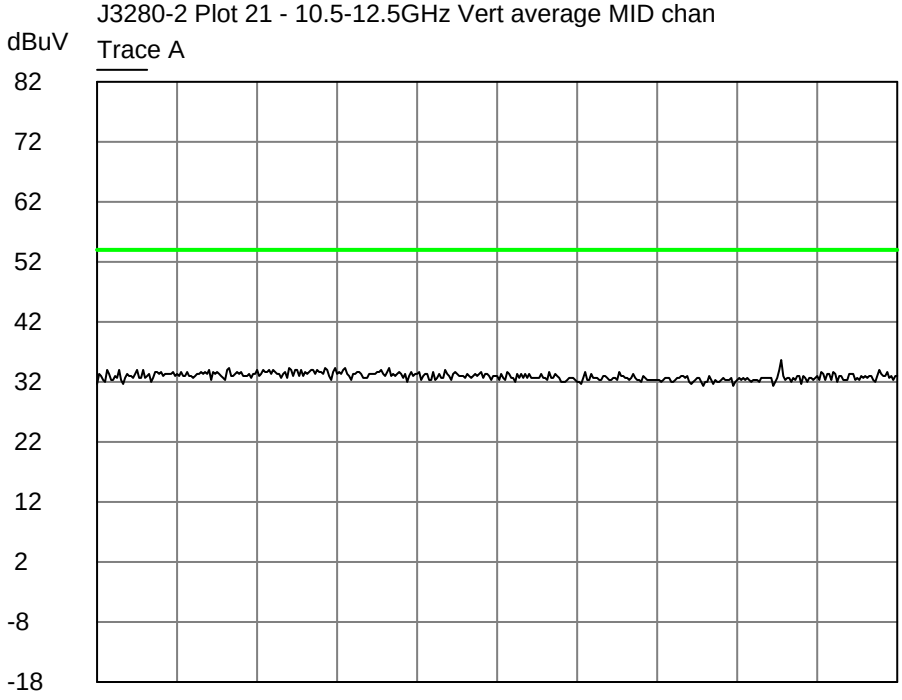
Start: 9.500000 GHz Atten: 10 dB Stop: 10.500000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 20 ms
26/10/06 14:34:32 HP8593E

J3280-2 Plot 20 - 9.5-10.5GHz Vert average MID chan



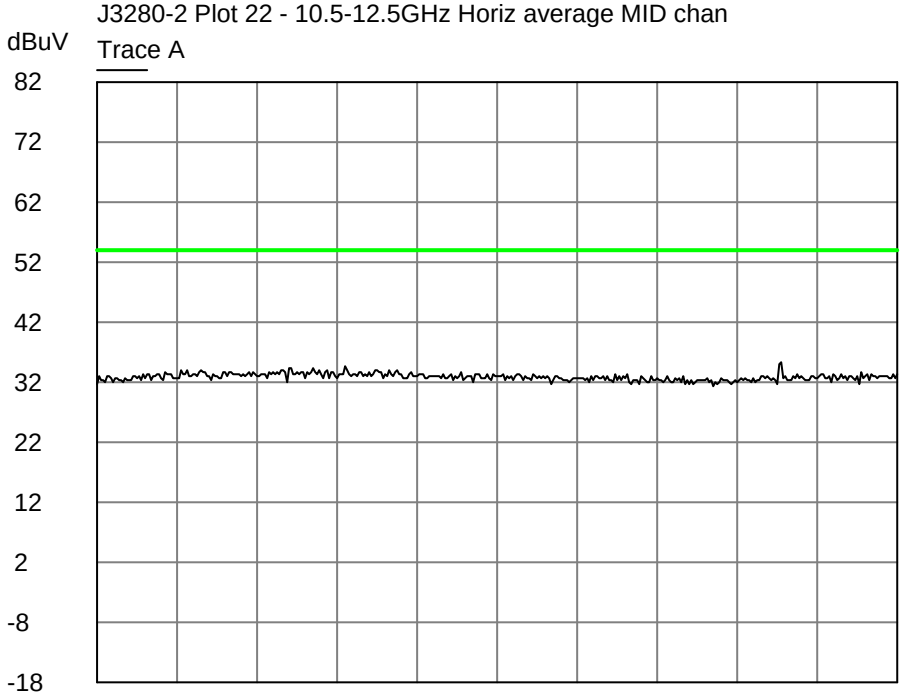
Start: 9.500000 GHz Atten: 10 dB Stop: 10.500000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 20 ms
26/10/06 14:34:32 HP8593E

J3280-2 Plot 21 - 10.5-12.5GHz Vert average MID chan



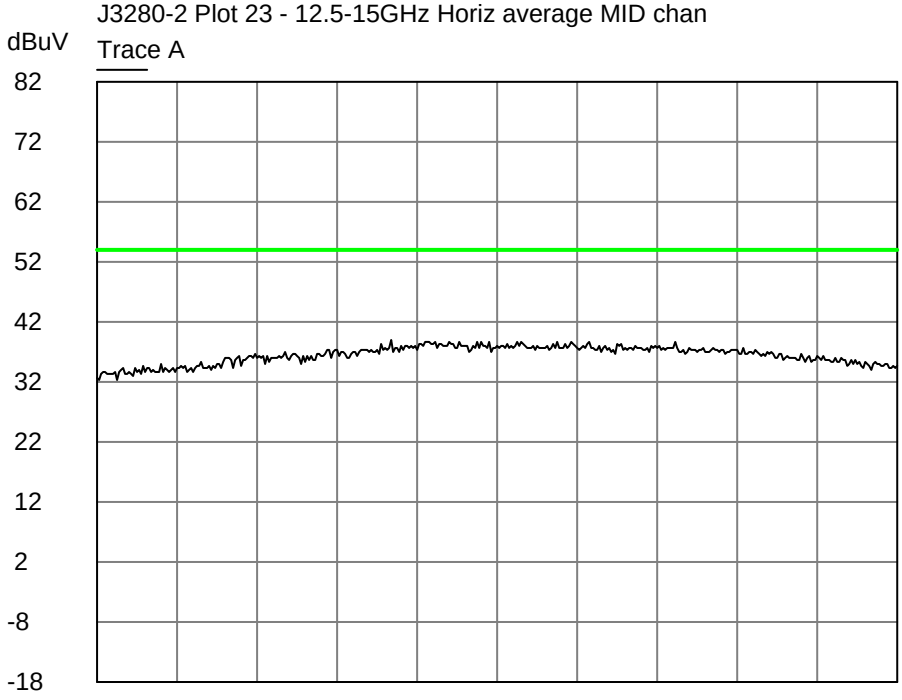
Start: 10.500000 GHz Atten: 0 dB Stop: 12.500000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 40 ms
26/10/06 14:39:05 HP8593E

J3280-2 Plot 22 - 10.5-12.5GHz Horiz average MID chan



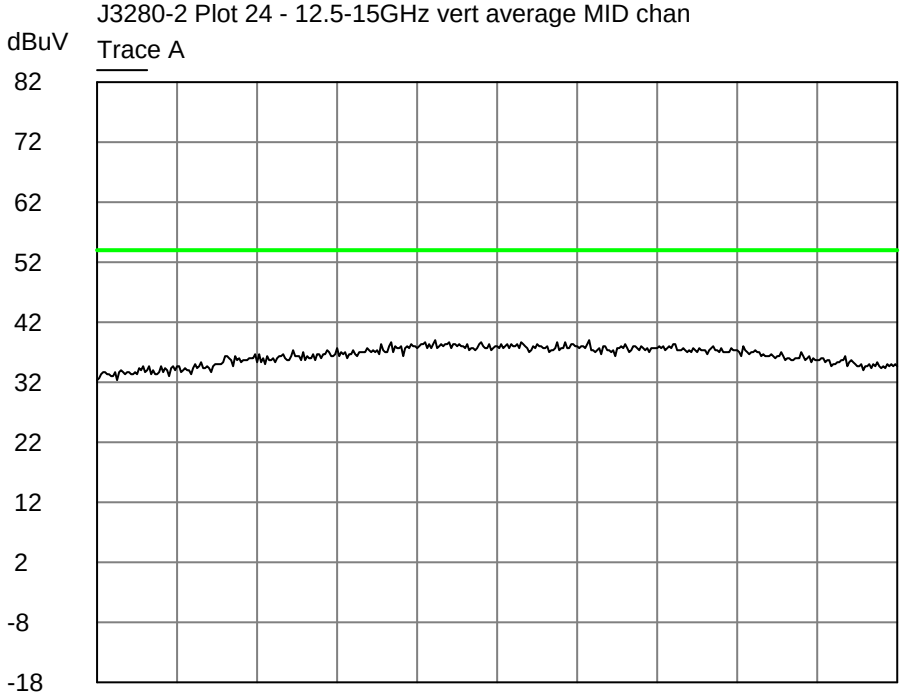
Start: 10.500000 GHz Atten: 0 dB Stop: 12.500000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 40 ms
26/10/06 14:40:51 HP8593E

J3280-2 Plot 23 - 12.5-15GHz Horiz average MID chan



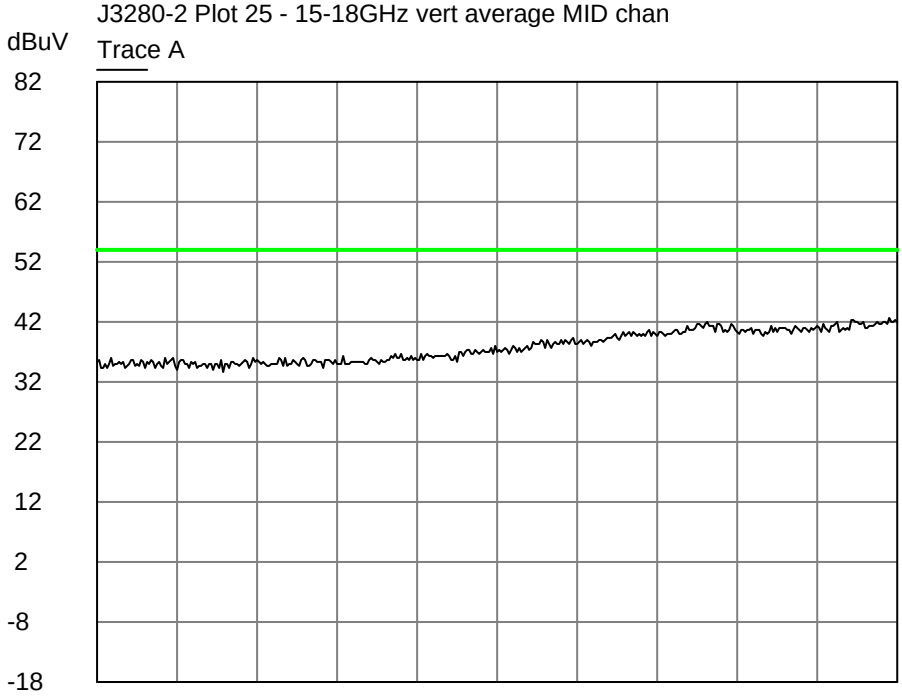
Start: 12.500000 GHz Atten: 0 dB Stop: 15.000000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 62 ms
26/10/06 14:42:41 HP8593E

J3280-2 Plot 24 - 12.5-15GHz vert average MID chan



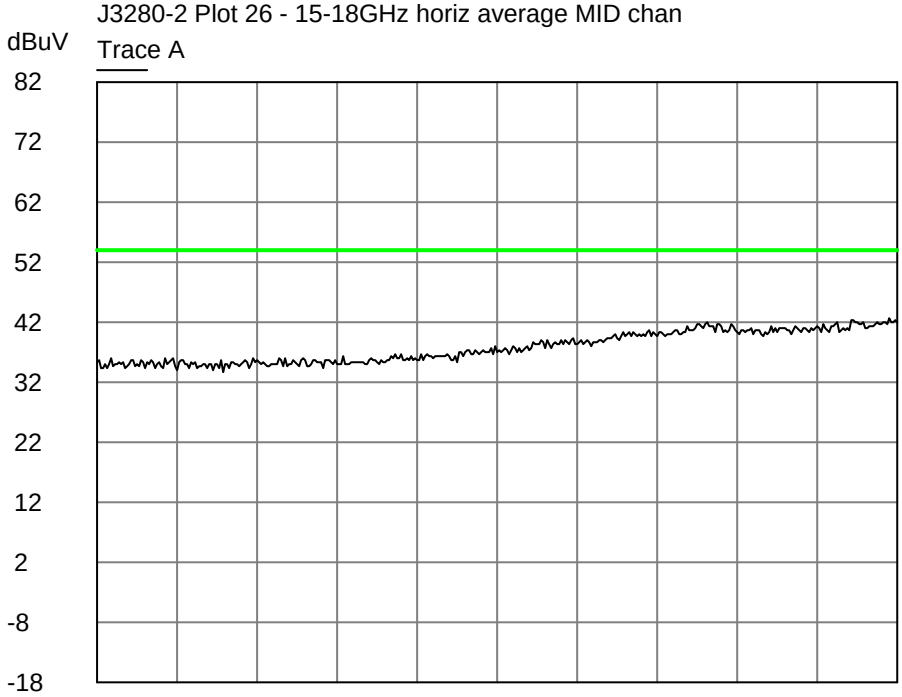
Start: 12.500000 GHz Atten: 0 dB Stop: 15.000000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 62 ms
26/10/06 14:43:06 HP8593E

J3280-2 Plot 25 - 15-18GHz vert average MID chan



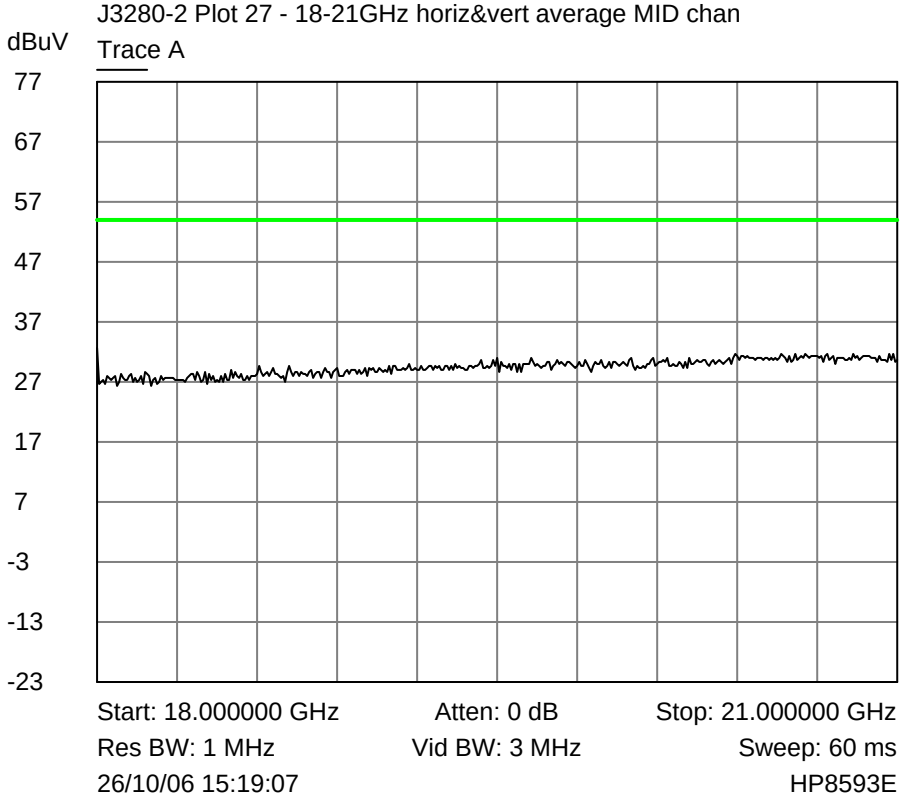
Start: 15.000000 GHz Atten: 0 dB Stop: 18.000000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 60 ms
26/10/06 14:46:11 HP8593E

J3280-2 Plot 26 - 15-18GHz horiz average MID chan



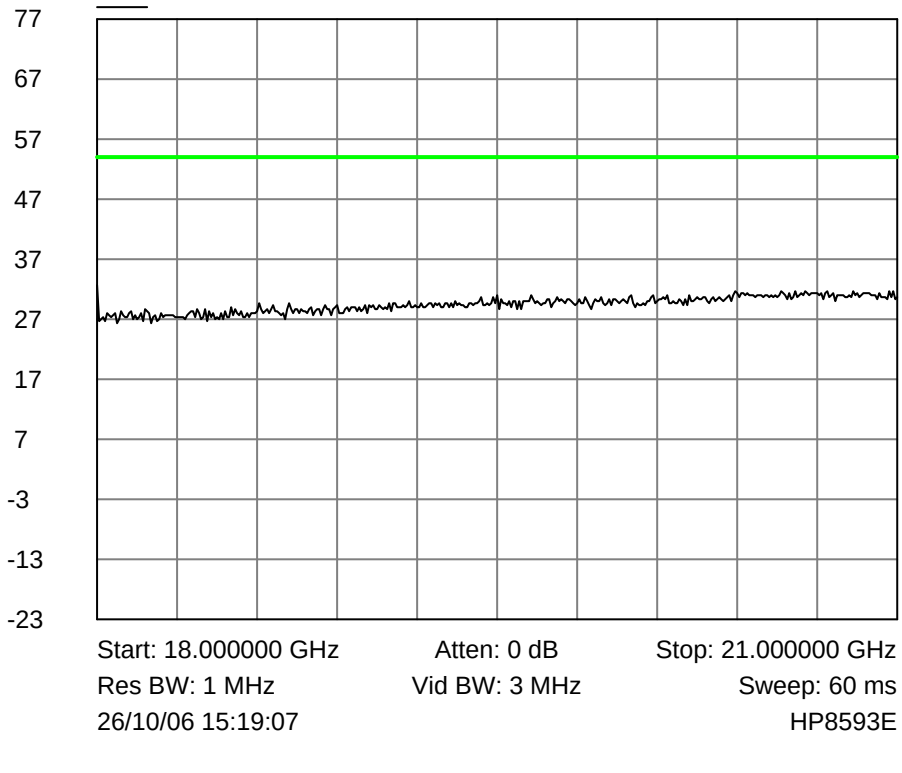
Start: 15.000000 GHz Atten: 0 dB Stop: 18.000000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 60 ms
26/10/06 14:46:11 HP8593E

J3280-2 Plot 27 - 18-21GHz horiz&vert average MID chan



Start: 18.000000 GHz Atten: 0 dB Stop: 21.000000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 60 ms
26/10/06 15:19:07 HP8593E

J3280-2 Plot 28 - 21-25GHz horiz&vert average MID chan



Start: 18.000000 GHz Atten: 0 dB Stop: 21.000000 GHz
Res BW: 1 MHz Vid BW: 3 MHz Sweep: 60 ms
26/10/06 15:19:07 HP8593E

Restricted Band Emissions.

Signal	Freq (MHz)	Polaris-ation	Avg Amp (dBuV/m)	15.209 Avg Limit (dBuV/m)	Comments
1	4810	V	48.0	54.0	Harmonic
2	4810	H	53.0	54.0	Harmonic
3	12025	V	35.0	54.0	Harmonic
4	4880	V	45.1	54.0	Harmonic
5	4880	H	51.0	54.0	Harmonic
6	4960	V	40.0	54.0	Harmonic
7	4960	H	45.3	54.0	Harmonic
8	7440	V	53.5	54.0	Harmonic
9	7440	H	48.5	54.0	Harmonic

100kHz Bandwidth Emissions.

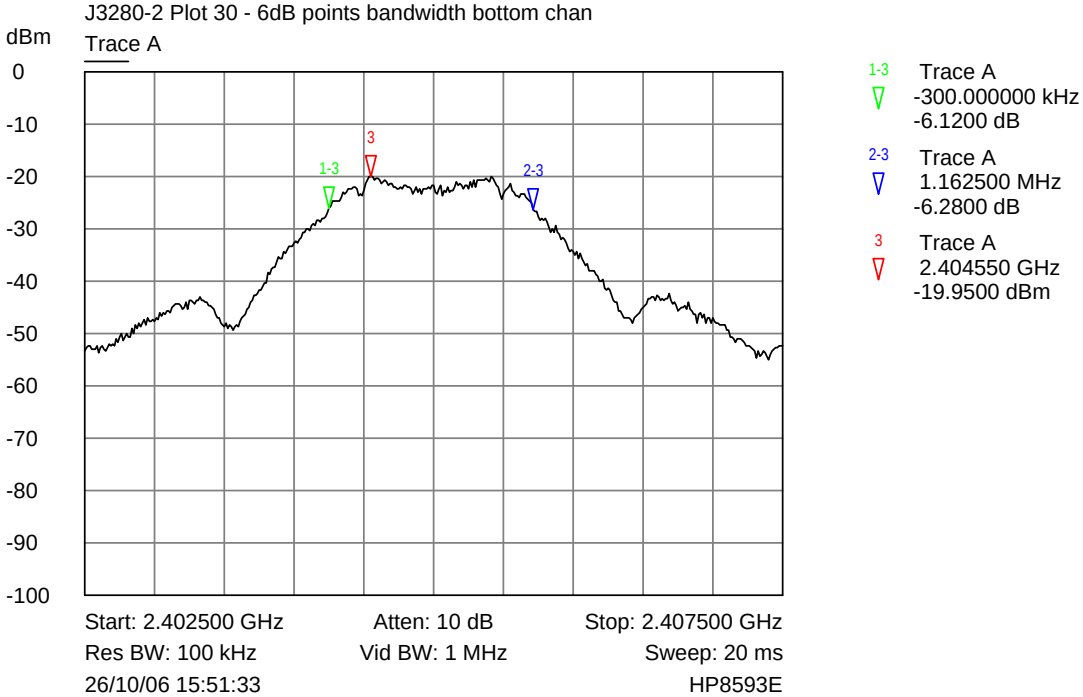
Signal	Freq (MHz)	Polaris-ation	Avg Amp (dBuV/m)	15.247(d) Avg Limit -20dBC (dBuV/m)	Comments
1	2405	V	91.7	-	Fundamental
2	2405	H	91.9	-	Fundamental
3	7215	V	49.5	71.7	Harmonic
4	7215	H	51.5	71.9	Harmonic
5	9620	V	32.0	71.7	Harmonic
6	9620	H	32.0	71.9	Harmonic
7	2440	V	91.6	-	Fundamental
8	2440	H	89.9	-	Fundamental
9	7230	V	50.5	71.6	Harmonic
10	7320	H	45.8	69.9	Harmonic
11	9760	H	32.0	69.9	Harmonic
12	2480	V	93.8	-	Fundamental
13	2480	H	89.2	-	Fundamental

Tables of signals within 20dB of the limit line for 1GHz - 26GHz

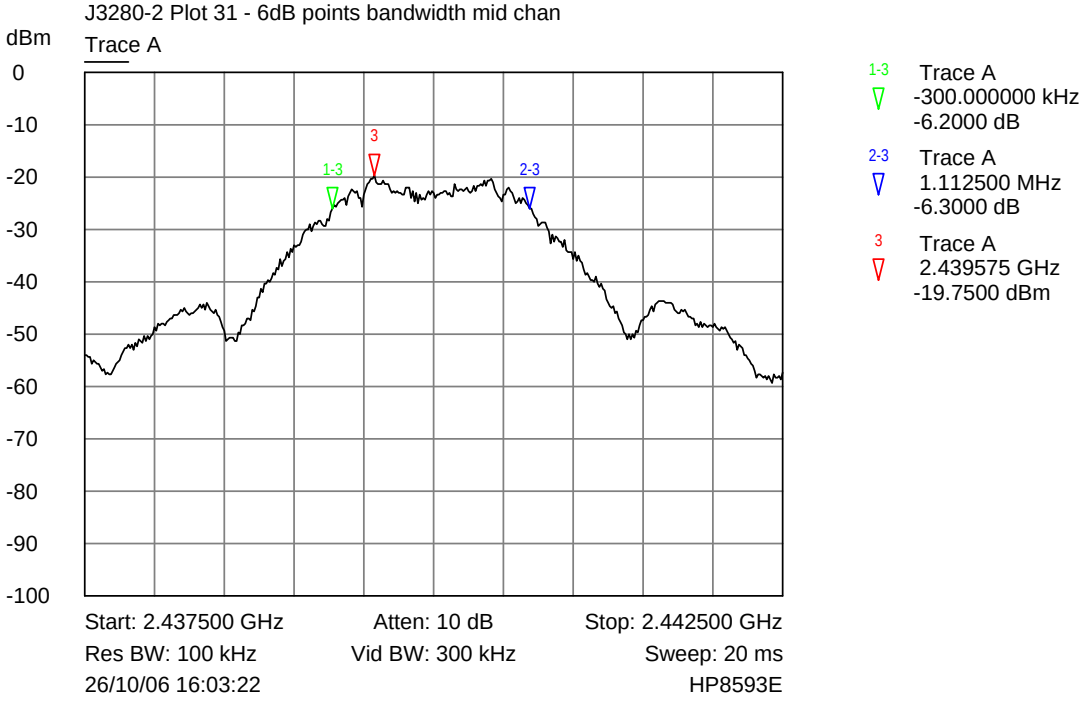
note, the fundamental signal measured was continuously on and in no case were the peak emissions more than 3dB above the average.

6.3 6dB Bandwidth

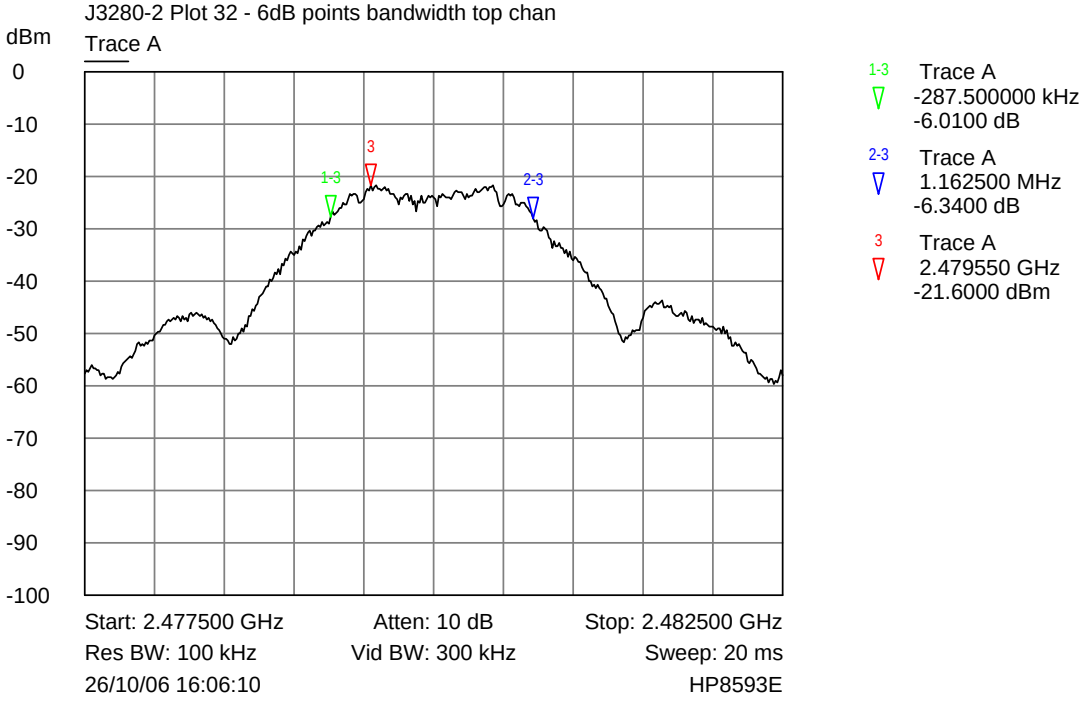
J3280-2 Plot 30 - 6dB points bandwidth bottom chan



J3280-2 Plot 31 - 6dB points bandwidth mid chan



J3280-2 Plot 32 - 6dB points bandwidth top chan



1-3 Trace A
-287.500000 kHz
-6.0100 dB

2-3 Trace A
1.162500 MHz
-6.3400 dB

3 Trace A
2.479550 GHz
-21.6000 dBm

7 Explanatory Notes

7.1 Explanation of FAIL LIMIT 1 Statement

The **FAIL MARGIN 1** statement(s) may appear on the graphical plots when the receiver used to measure your equipment detects a signal that exceeds the dashed line. This does not mean that the **EUT**, has failed the test only that the 10 dB calculation margin set, has been exceeded on a peak measurement.

Following the indication that the margin has been exceeded, measurements are made at the frequency (ies) of the peaks. These peaks have been calculated to either Quasi Peak or Average Peak dependant on the test. A table of results has been printed on the reverse of the page. This table looks similar to the one illustrated below: -

Signal Number	Frequency (MHz)	Peak (dBµV)	PK Delta L 1 (dB)	Avg (dBµV)	Av Delta L 1 (dB)
1	12345.0000	12.9	-2.5	10.2	-5.2

The First column, labelled Signal Number, is a number that the receiver has given to each signal, which has been calculated.

Column Two, labelled Frequency (MHz), is the frequency of the signal received.

Column Three, labelled Peak (dBµV), (can also be labelled, in the case of Quasi Peak, Peak dBµV/m) is the Level that was received at peak amount in dB above 1µV.

Column Four, labelled PK Delta L1 (dB), is the same level as Column three but is given in a level relative to the limit line required.

Column Five, labelled AVG (dBµV), (can also be labelled, in the case of Quasi Peak, QP dBµV/m) when undertaking a Quasi peak test, This is the Average or Quasi peak calculation results given in dBµV or dBµV/m above 1µV.

Column Six, labelled AV Delta L 1 (dB), (can also be labelled, in the case of Quasi Peak, QP Delta L 1 (dB)) is the Average or Quasi Peak calculation relevant to the limit line. The results entered in this column indicate the signal level relative to the compliance limit required. Negative numbers indicate that the product is compliant.

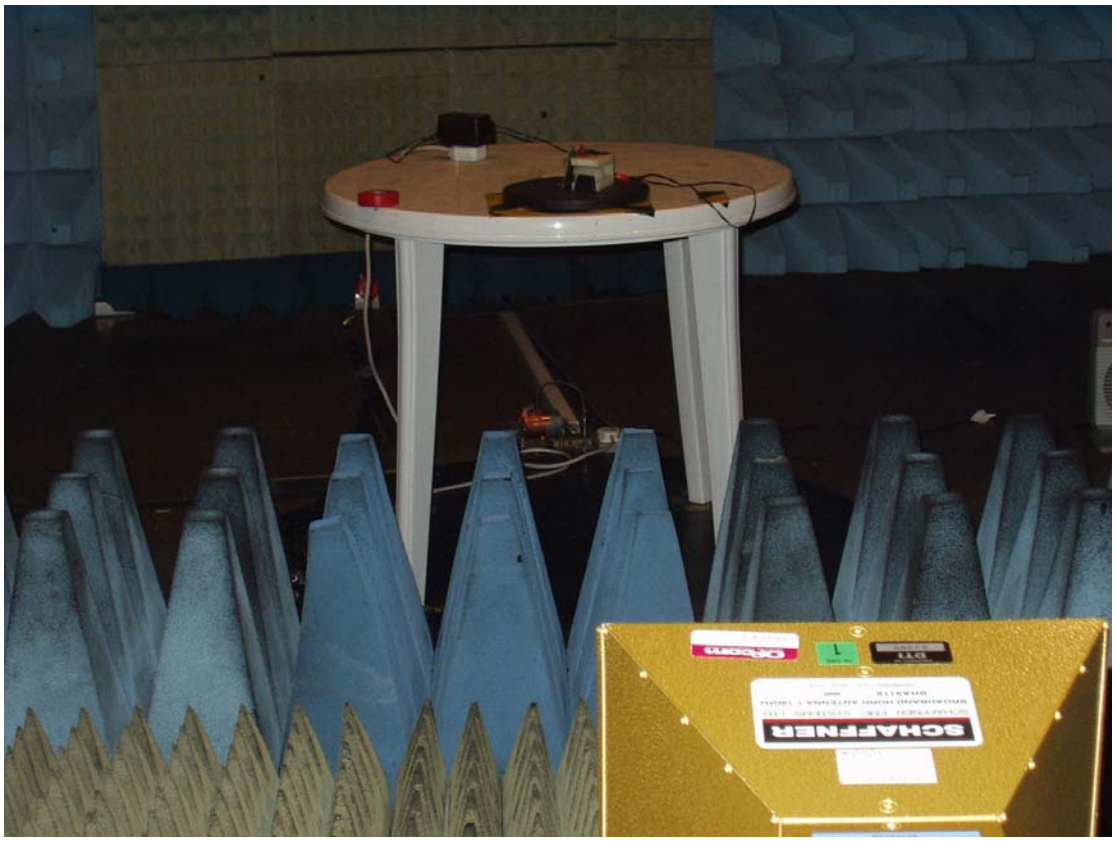
7.2 Explanation of limit line calculations for radiated measurements

The limits given in the test standard are normally expressed as absolute values (e.g. in µV/m at a specified distance), whereas the measured values are expressed as peak, quasi peak or average values in dBµV/m referenced to the measuring instrument inputs. RN Electronics calibrate the test set-up to account for any path losses, antenna gains, etc. so that the value read at the receiver relates directly to the absolute value required, except that it is expressed in dB relative to one microVolt and may need to take account of any alternative measuring distance used. Examples:

(a) limit of 500 µV/m equates to 20.log (500) = 54 dB µV/m.
(b) limit of 300 µV/m at 10m equates to 20.log (300 . 10/3) = 60 dB µV/m at 3m

N.B. The limit lines drawn are the general limits of 15.209, not the specific limits of 15.247 which are less stringent outside of the restricted bands of 15.205.

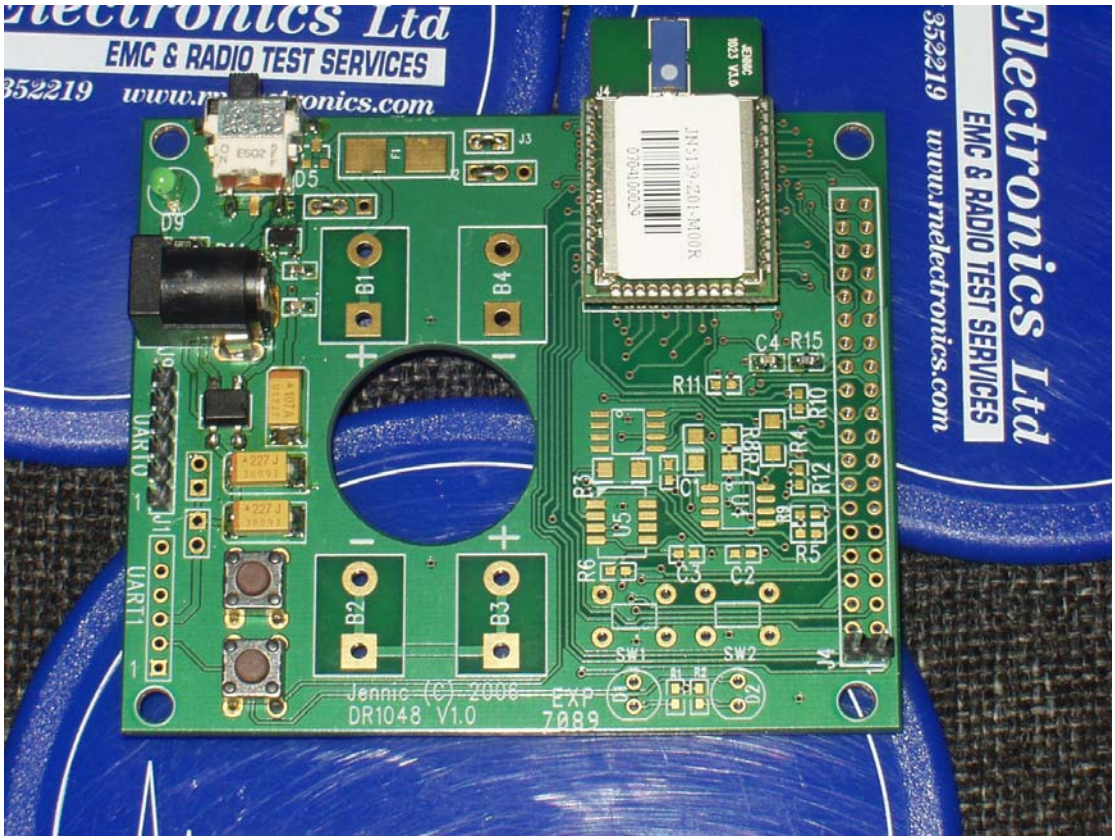
8. Photographs
8.1 Radiated emissions



Photograph of the EUT as viewed from in front of the antenna, site M. EUT is mounted on a test jig on a turntable with test jig power adaptor to rear.

8.2 EUT

8.3 EUT in Test Jig



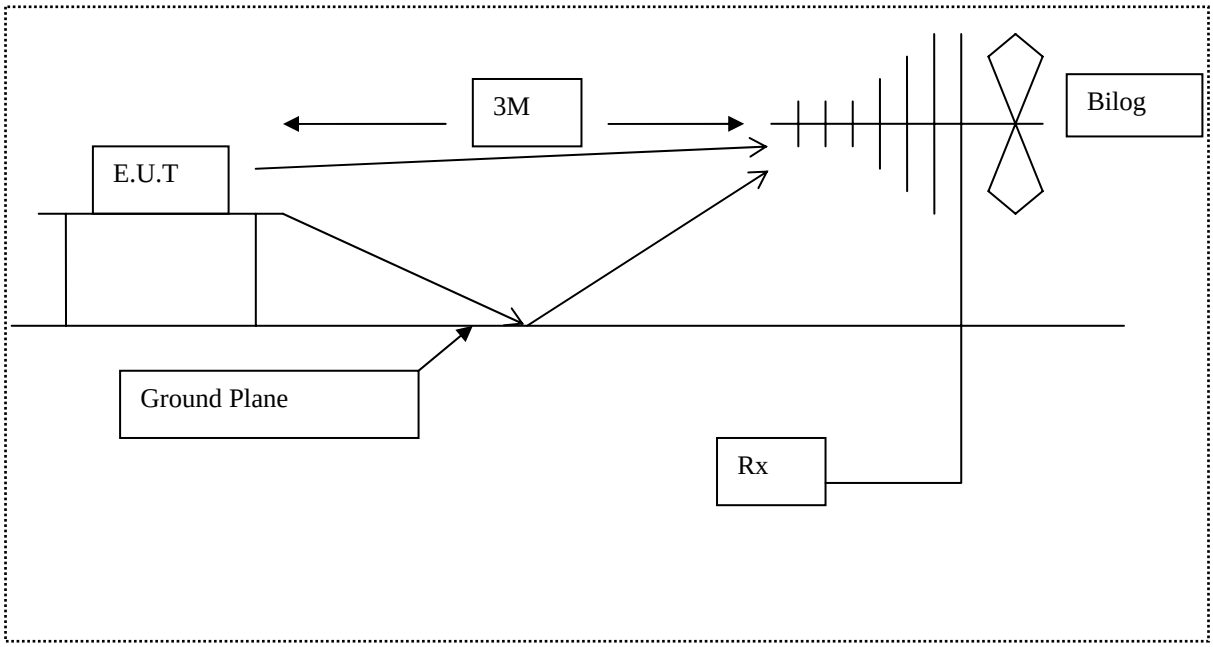


Diagram of the radiated emissions test setup.

9. Signal Leads

Port Name	Cable Type	Location
Antenna port	SMA coax connector.	On alternative sample only.
Serial Comms	RS232 (USB) fly lead	On test jig.
DC input	7V dc fed from ac/dc adaptor to jack	On test jig.
Battery	3V battery clip input (2 of 1.5V AAA)	On test jig / direct to pins of module.

10. Test Equipment Calibration list

The following table lists the test equipment used, last calibration date and calibration interval. All equipment used has been maintained within the calibration requirements of R.N. Electronics Ltd. quality management system.

RNNo	Model	Description	Manufacturer	Last Cal	Interval
C031	437B	Power Meter	Hewlett Packard	Sep-19-06	12 mths
C032	8482A	Power Sensor	Hewlett Packard	Sep-22-06	12 mths
E1	HP8542E	EMI Receiver & RF Filter	Hewlett Packard	Oct-31-06	12 mths
E235	J2 7FV-15000/X6000	12-18 GHz BPF	K&L Microwave Inc.	N/A	N/A
E238	FC5343A	2.7 - 5.0 GHz BPF	IFR	N/A	N/A
E242	22102	Bandpass filter 7.8 - 16 GHz	Merimec	N/A	N/A
E246	8482B	Power Sensor	Hewlett Packard	Nov-07-06	12 mths
E268	BHA 9118	1-18 GHz Horn Antenna	Schaffner	May-26-06	60 mths
E274	437B	Power Meter	Hewlett Packard	Nov-07-06	12 mths
E3	HP8593E	Spectrum Analyser	Hewlett Packard	Sep-20-06	24 mths
E5	HP8447F	Pre-Amplifier	Hewlett Packard	Aug-15-06	12 mths
N438	3513 172 1208	3.9 - 7.5 GHz BPF	MEL	N/A	N/A
TMS6-2	MS2602A	Spectrum Analyser	Anritsu	Jan-25-07	24 mths
TMS77	8673B	Synthesised Signal Generator	Hewlett Packard	Nov-14-05	24 mths
TMS79	460451	Std Gain Horn Antenna 18-26.5 GHz	ETS Systems	Oct-17-06	12 mths
TMS82	8449B	Pre Amplifier 1 - 26 GHz	Agilent	Oct-17-06	12 mths
TMS933	CBL6141A	Bilog Antenna 30MHz - 2GHz	York EMC	Aug-17-06	36 mths

11. Auxiliary equipment

11.1 Auxiliary equipment supplied by Jennic Ltd

Auxiliary equipment used for the purpose of test supplied by the above has been listed below

Manufacturer	Description	Model Number	Serial Number
FRIWO	ac/dc adaptor set to 7.5V	EP 2	805
Jennic	Jig for RS232 comms / dc supply	DR1048 v1.0	-

11.2 Auxiliary equipment supplied by RN Electronics Limited

Auxiliary equipment used for the purpose of test supplied by the above has been listed below

NONE

12. Modifications

In order for the EUT to produce the results shown within this report the following modifications, if any, were implemented.

NONE

13. Compliance information

Products subject to the Declaration of Conformity procedure are required to be supplied with a compliance information statement. A copy of this statement may be included here:

NOT APPLICABLE - Device to be Certified.

RN Electronics
EMC & RADIO TEST SERVICES

Certificate of Test

The equipment noted below has been tested by ***R.N. Electronics Limited*** and conforms with the relevant subpart of FCC part 15.

This certificate relates to the equipment, as identified by unique serial number(s) and further detailed in the referenced report, in the condition(s) at the time it was tested. It does not relate to any other similar equipment and performance of the product before or after the test cannot be guaranteed. Furthermore, this is a certificate of test only and should not be confused with an equipment authorisation.

Equipment:	802.15.4/ Zigbee module
Model Number(s):	JN 5139-Z01-M00R
Unique Serial Number(s):	0704100031
Manufacturer:	Jennic
Customer Purchase Order Number:	PO 003971
R.N. Electronics Limited Report Number:	02-160A/3280/2/07
Test Standards:	FCC Part 15C: effective date February 7th 2007 Class DTS Intentional Radiator
Date tested:	23rd March 2007
For and on behalf of R.N. Electronics Limited	
Signature:	Paul Darragh — Digitally signed by Paul Darragh DN: CN = Paul Darragh, C = GB, OU = RN Electronics Date: 2007.03.26 10:53:06 +01'00'

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