

	Report No: R1938 Issue No: 3	FCC ID : QA6 Convensor-F3	
Test No: T1292		Test Report	Page: 1 of 22



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## REPORT ON ELECTROMAGNETIC COMPATIBILITY TESTS

**Performed at:  
 TWENTY PENCE TEST SITE**

**Twenty Pence Road,  
 Cottenham,  
 Cambridge  
 U.K.  
 CB4 8PS**

on

Conversor Products Ltd

F3-US-Convensor

dated

28th September 2004

### Document History

Issue	Date	Affected page(s)	Description of modifications	Revised by	Approved by
1	29/09/04		Initial release		
2	04/11/04	All	FCC ID corrected	CA	DB
3	09/11/04	22	Add emissions designator	DS	DB

Based on report template:  
 v040722

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	Report No: R1938	FCC ID : QA6 Conversor-F3	
	Issue No: 3		
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Equipment Under Test (EUT):

F3-US-Conversor

Test Commissioned by:

Conversor Products Ltd  
64 Mallusk Road  
Newtownabbey  
Northern Ireland  
BT36 4QE

Representative:

Abol Chizari

Test Started:

3rd September 2004

Test Completed:

27th September 2004

Test Engineer:

Dave Smith

Date of Report:

28th September 2004

Report:

Written by: Dave Smith

Checked by: Derek Barlow

Signature: D. A. Smith

Signature: D. Barlow

Date: 28th September 2004

Date: 29th September 2004

**dB Technology can only report on the specific unit(s) tested at its site. The responsibility for extrapolating this data to a product line lies solely with the manufacturer.**

## Test Standards Applied

CFR 47 : 2004

*Code of Federal Regulations: Pt 2 General Rules and Regulations  
& Part 95 LPRS Transmitters*

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## 1 EUT Details

### 1.1 General

The EUT was wireless microphone used for auditory assistance.

The EUT is intended to be operated under the LPRS rules of CFR 47 part 95G. The EUT utilises the extra band channels listed in part 95.629(c).

The sample tested was set to use the channel with centre frequency 216.025MHz.

The EUT has an integral antenna. In normal use it is powered from an internal battery. The battery can be charged from an external adapter.

Details of the EUT and associated peripherals used during the tests are listed below. Figure 1 shows the interconnections between the EUT and peripherals.

Item	Manufacturer	Model	Description	Serial No:	Notes
	Glentronics	F3-US-Conversor	EUT	Sample 1	

### 1.2 Modifications to EUT and Peripherals

Details of any modifications that were required to achieve compliance are listed below. The modification numbers are referred to in the results sections as appropriate.

Mod No:	Details	Implemented for
0	As submitted. No modifications made.	

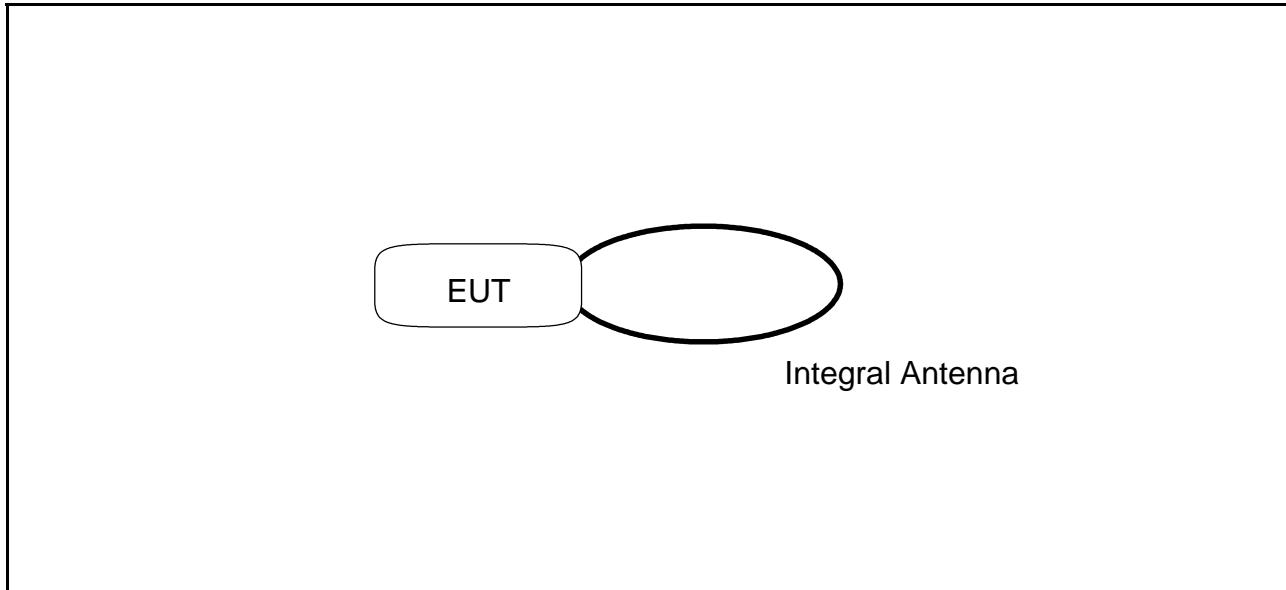
### 1.3 EUT Operating Modes

The EUT was tested in the following operating mode or modes. Generally, operating modes are chosen that will exercise the functions of the EUT as fully as possible and in a manner likely to produce maximum emission levels or susceptibility. Individual test result sheets reference the operating mode of the EUT.

Operating Mode	Details
1	Transmitting.

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**Figure 1 General Arrangement of EUT**



**Photograph 1 General Arrangement of EUT**

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## 2 Test Equipment

The test equipment used during the tests was one or more of the items listed below. Individual test result sheets indicate which items were used.

Ref No:	Manufacturer	Model	Description	Serial Number
R4	Rohde and Schwarz	ESVS10	RF Receiver (20MHz-1GHz)	843744/002
R5	Hewlett Packard	HP 8595E	Spectrum Analyser	3412A00701
R6	Marconi Instruments	2390	Spectrum Analyser	23901010
A5	Chase	CBL6111A	Bilog Antenna (30MHz-1GHz)	1760
A10	EMCO	3121	Dipole Set (30MHz-1GHz)	189
A12	Chase	CBL6111A	Bilog Antenna (30MHz-1GHz)	1012
SG1	Marconi	2022D	RF Signal Generator	119216/050
SG3	Marconi	6200	Microwave Test Set	236425/009
AA1	Hewlett Packard	8903A	Audio Analyser	2126A00817
MM2	Marconi	2305	Modulation Meter	169807/057
EC1	Des. Environmental	BS125-40	Environ. Chamber	A3049
SG10	Quartzlock	2A-XF	Frequency Standard	183

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### 3 Carrier Power - 47CFR part 2.1046 & 95.639(e)

Carrier power was measured using a dipole substitution method on an open area test site.

The EUT was placed on a non-conducting bench at a height of 0.8m above a ground plane. The carrier radiation at a distance of 3m was measured. The EUT was rotated through 360° and the height of the receiving antenna adjusted over a 1m to 4m range in order to obtain a maximum reading. A quasi peak detector was used.

The EUT was then replaced by a reference dipole with the length adjusted according to the frequency of the carrier. The dipole was fed from a signal generator and the maximised field strength at a distance of 3m recorded.

The power from the carrier is obtained using the following:

$$\text{Carrier Power} = \text{SG Pwr} - \text{Cable Att} + \text{Dipole Gain} + \text{EUT reading} - \text{Dipole Reading}$$

Carrier Power:	Power of EUT Carrier (dBm)
SG Pwr:	Output power of signal generator fed into dipole (dBm)
Cable Att:	Attenuation of cable between signal generator and dipole (dB)
Dipole Gain:	Gain of substitution dipole (with respect to ideal dipole) (dBd)
EUT Reading:	Maximised receiver reading measuring radiation from EUT (dBuV)
Dipole Reading:	Maximised receiver reading measuring radiation from dipole (dBuV)

Company: Conversor Products Ltd			Product: F3-US-Conversor										
Date: 17 September 2004			Test Eng: DS										
Ports:													
Test: Carrier Power			using limits of			95.639(e)							
Measuring Receiver: R4:ESVS10			Measuring Antenna: A12:CBL6111A			Signal Generator: SG1:2022D							
Op Mode	Mod State	CF Set	Freq. MHz	Cable Loss						ERP	Limit	Margin	Note
				Sig Gen Level Cable	Rec'vr Level Cable	Ant Pol	Rec'vr Level EUT	Sig Gen Level Sub'n Ant	Rec'vr Level Sub'n Ant	Sub'n Ant Gain			
1	0	2	216.024	100.0	99.7	H	82.1	100.0	72.9	-0.5	1.4	20.0	18.6
1	0	2	216.024	100.0	99.7	V	71.6	100.0	74.4	-0.5	-10.6	20.0	30.6
Results			Minimum Margin			18.6 dB			PASS				
Notes													

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#### 4 Spurious Radiated Emissions - 47CFR part 2.1053 & 95.635(c)(2)

Pre-scans were performed in a semi-anechoic chamber at a distance of 3m. Scans were performed up to 2.9GHz (i.e. above 10th harmonic of carrier). EUT was placed on non-conductive bench 0.8m above the ground plane. The EUT was rotated through 360° with spectrum analyser in peak hold mode.

The limit of section 95.639(c)(2) was applied which specifies -13dBm for spurious emissions more than 35kHz from the carrier. For the purposes of the scans the limit was converted to an equivalent field strength at 3m using:

$$E = ((P 120 \Pi g / 4 \Pi)^{0.5}) / d$$

E = field strength (dBuV/m)

P = limit (W)

g = gain of ideal dipole (1.25)

d = test distance (3m)

This gives a limit of 83.4dBuV/m at a distance of 3m.

Results of screened room scans shown in plots 1 to 3. All emissions were sufficiently below the limit line that it was not considered necessary to maximise on the open area test site.

Test Equipment:	Factor Set 1:	BILOG	RG214	25 m cable
		A5, R5, CBL003, CBL002. A8, R5, CBL043,CBL044.		

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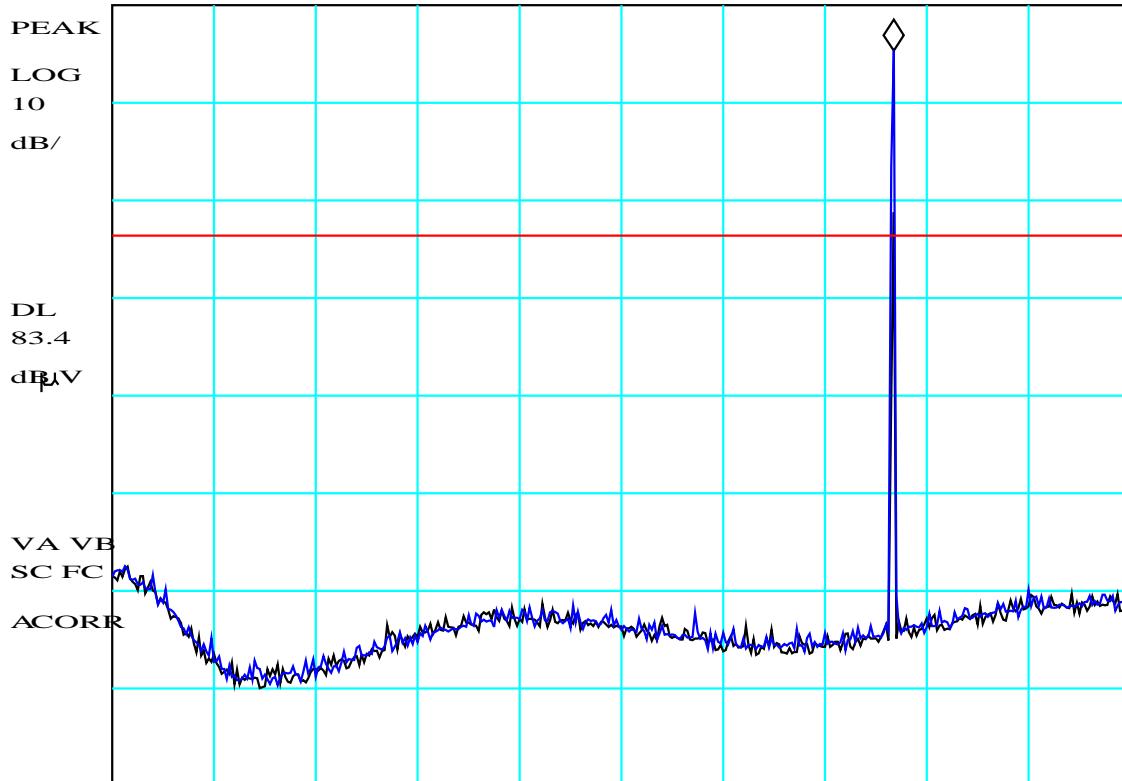
/p

MKR 216.9 MHz

REF 107.0 dB $\mu$ V

#AT 10 dB

102.33 dB $\mu$ V



START 25.0 MHz

#RES BW 120 kHz

VBW 300 kHz

STOP 275.0 MHz

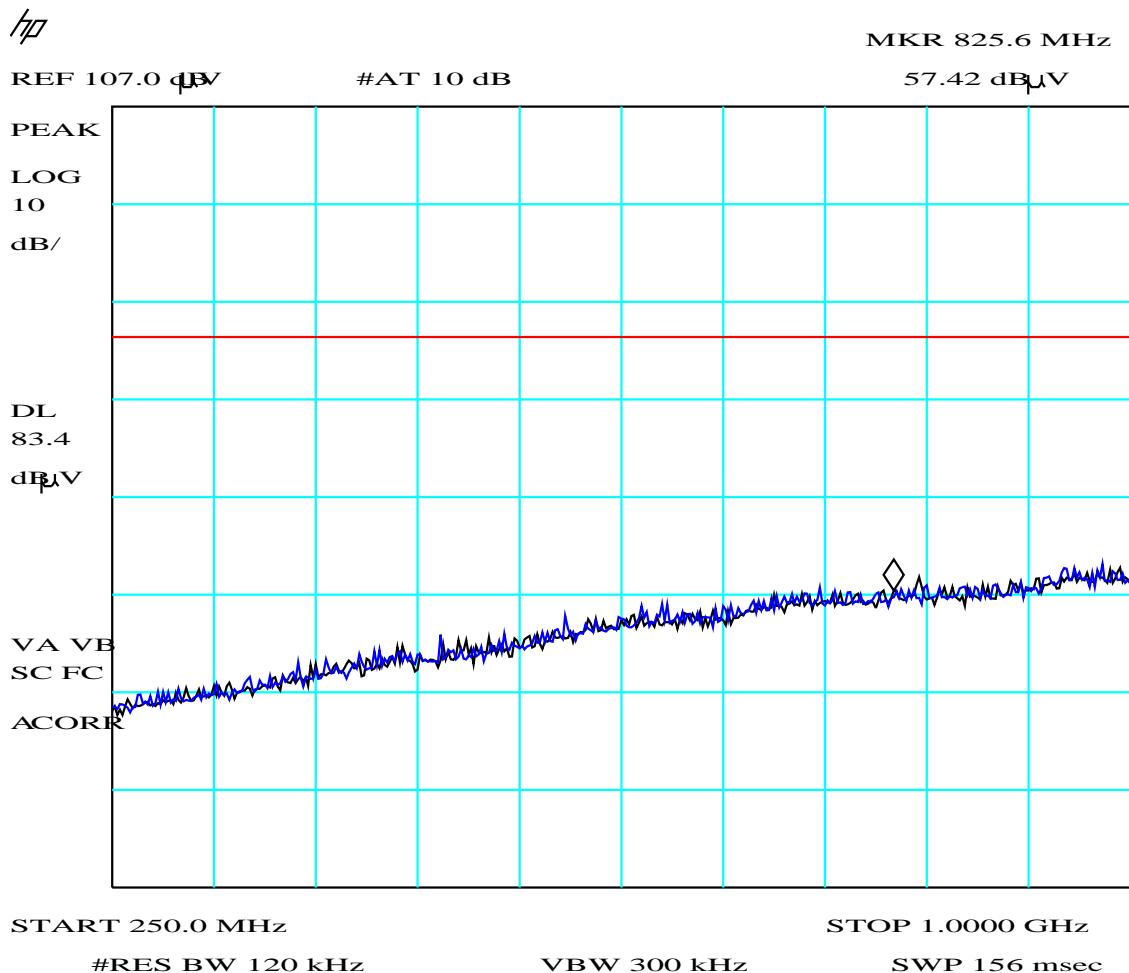
SWP 52.1 msec

### PLOT 1 Radiated Emissions - 25MHz to 275MHz

Company:	Convensor Products Ltd	Product:	F3FCC
Date:	03 Sep 04	Test Engineer:	DS
Test:	FCC95G	Limit:	Spurious
Notes:			
Transmitting			
Polarisation:	V + H	Orientation:	0 - 360°
Distance:	3m	Antenna:	Bilog
Height:	1m	Filename:	H49033C2.plt

### Frequency List (MHz)


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## PLOT 2 Radiated Emissions 250MHz to 1GHz

Company:	Convensor Products Ltd	Product:	F3FCC
Date:	03 Sep 04	Test Engineer:	DS
Test:	FCC95G	Limit:	Spurious
Notes:			
Transmitting			
Polarisation:	V + H	Orientation:	0 - 360°
Distance:	3m	Antenna:	Bilog
Height:	1m	Filename:	H49033CA.plt

### Frequency List (MHz)


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HP

MKR 1.960 GHz

REF 97.0 dB<sub>μ</sub>V

#AT 0 dB

60.78 dB<sub>μ</sub>V

PEAK

LOG

10

DL

83.4

dB<sub>μ</sub>V

VA VB  
SC FC

ACORR

START 1.000 GHz

#RES BW 1.0 MHz

VBW 300 kHz

STOP 2.900 GHz

SWP 38.0 msec

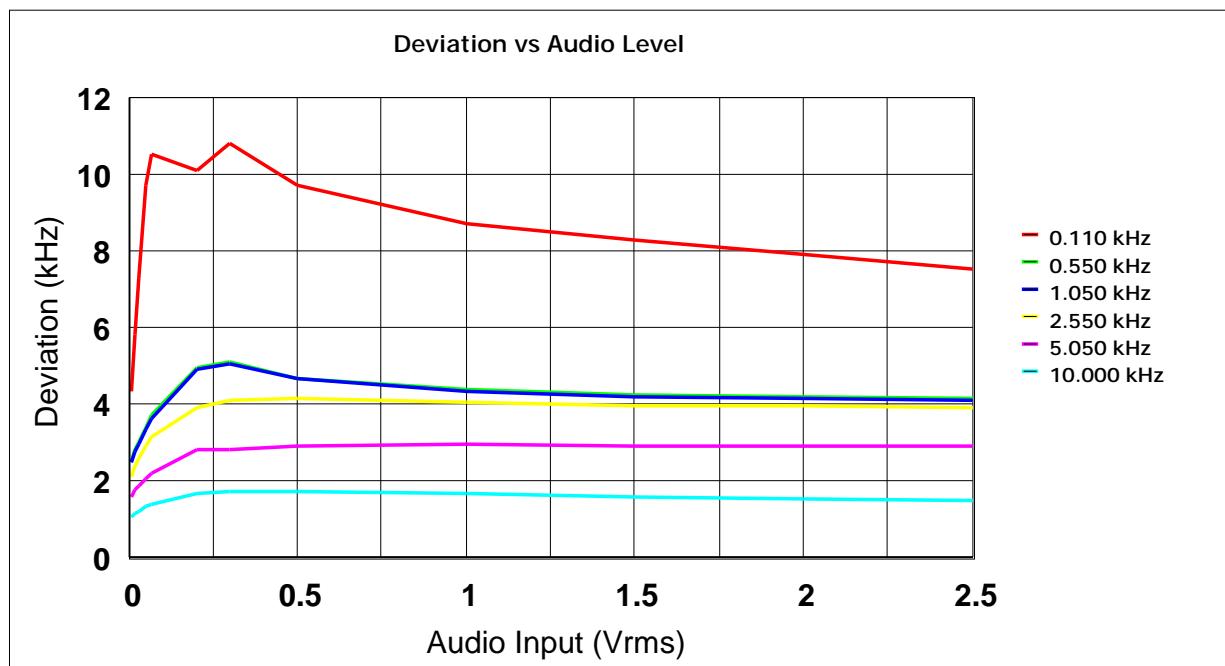
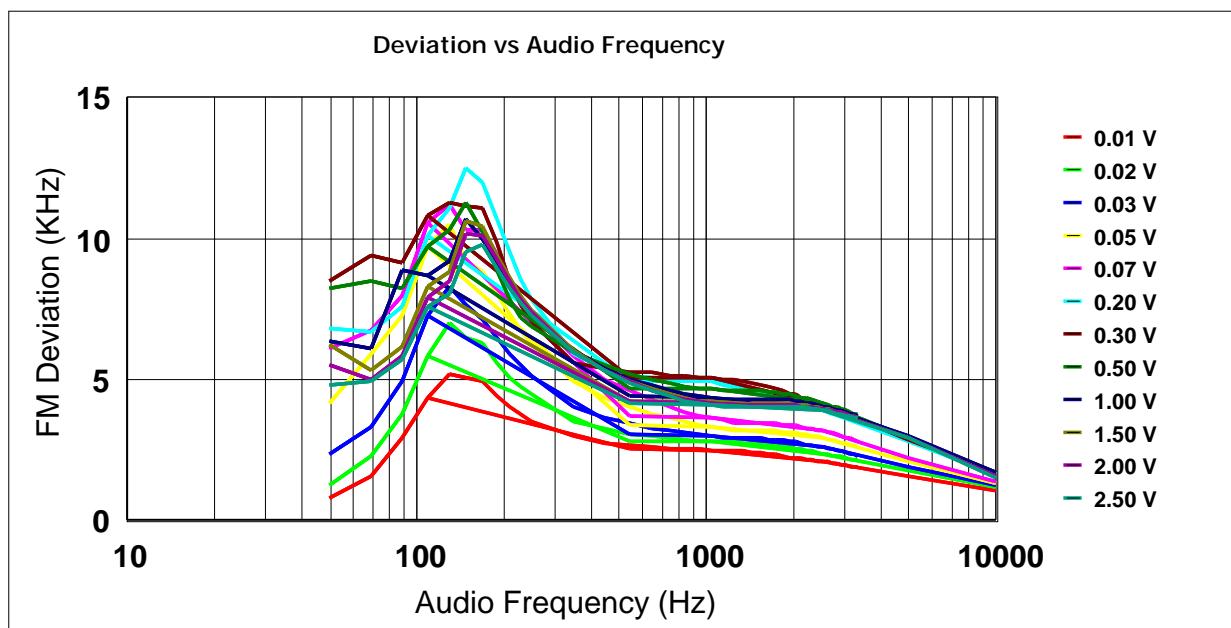
### PLOT 3 Radiated Emissions - 1GHz to 2.9GHz

Company:	Convensor Products Ltd	Product:	F3FCC
Date:	03 Sep 04	Test Engineer:	DS
Test:	FCC95G	Limit:	Spurious
Notes:			
Transmitting			
Polarisation:	V + H	Orientation:	0 - 360°
Distance:	3m	Antenna:	DRG
Height:	1m	Filename:	H49033E3.plt

#### Frequency List (MHz)


## 5 Modulation Characteristics - 47CFR part 2.1047

An audio signal was applied via a temporary connector supplied by the manufacturer. The FM deviation was measured (using a deviation meter) for various audio frequencies and levels. the results are shown in the graphs below.



Equipment: MM2, AA1  
 Date: 20 September 2004  
 Test Engineer: Dave Smith

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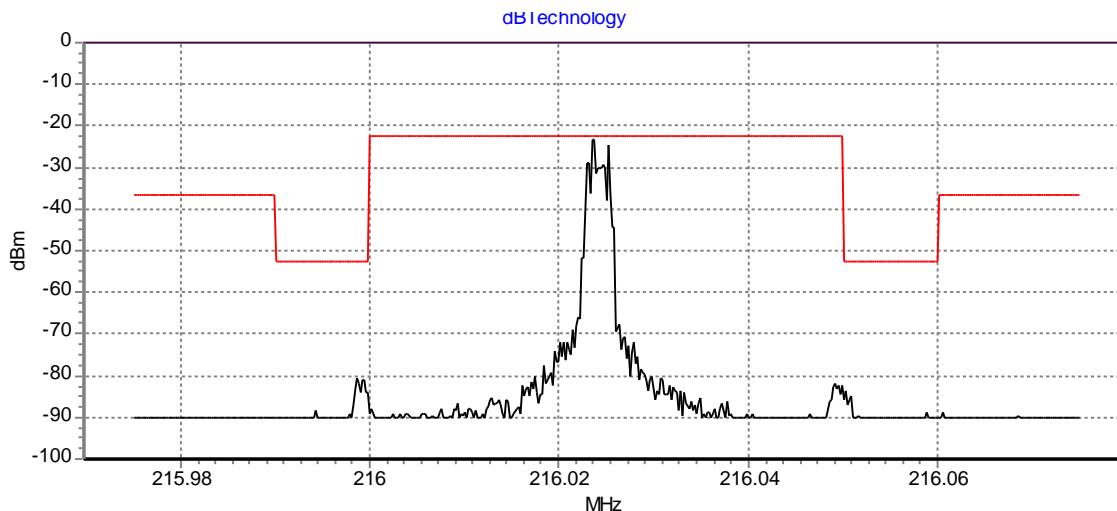
## 6 Occupied Bandwidth - 47CFR part 2.1049 & 95.635(C)(2)

Occupied bandwidth was measured with respect to the mask specified in 47CFR part 95.635(C)(2). A coupling antenna was fixed to the EUT and fed into a spectrum analyser. All measurements are therefore relative to the carrier but absolute values can be determined by comparison with the carrier power measurement made on the open area test site.

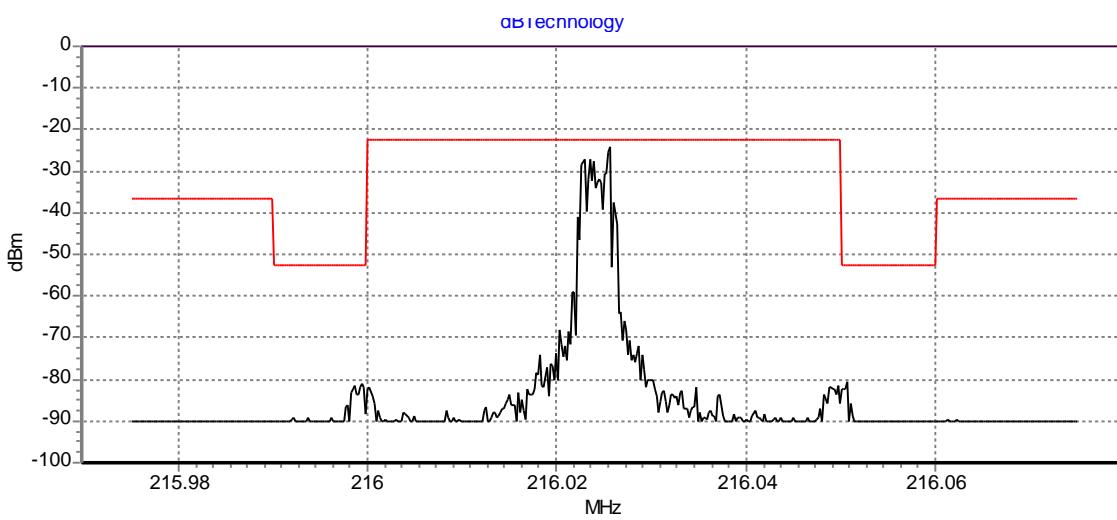
Measurements were made at various audio frequencies and levels. The results are shown in plots 4 to 24 below.

**Equipment:** R6, AA1  
**Date:** 27 September 2004  
**Test Engineer:** Dave Smith

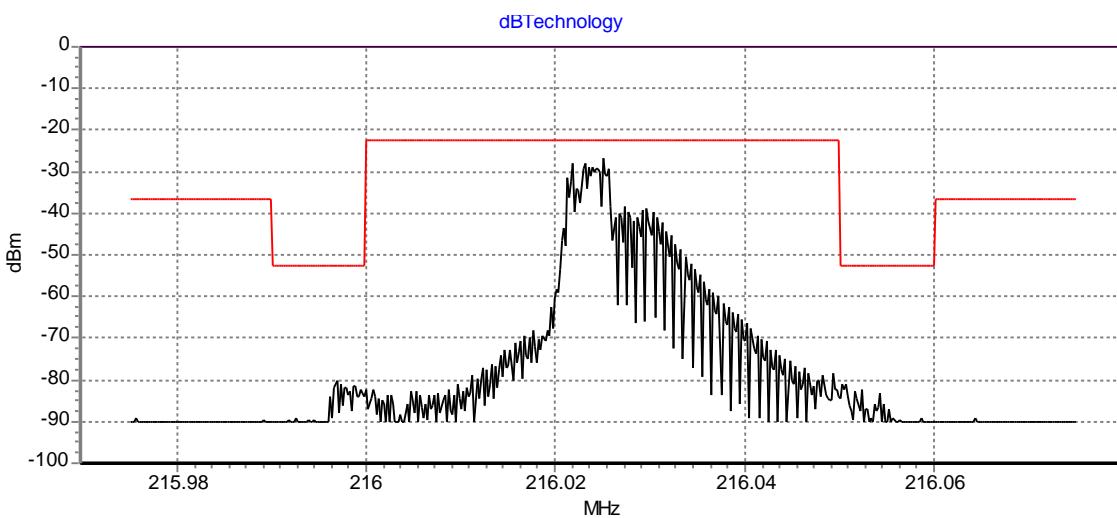
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PLOT 4 Occupied Bandwidth - 100Hz - 10mV



PLOT 5 Occupied Bandwidth - 100Hz - 20mV



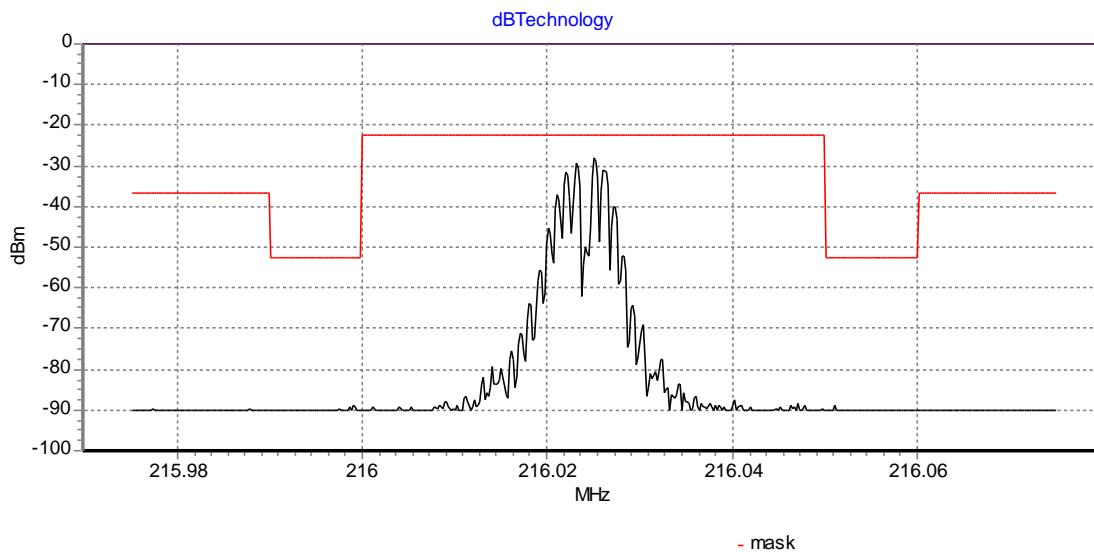
PLOT 6 Occupied Bandwidth - 100Hz - 6V

	Report No: R1938 Issue No: 3
Test No: T1292	

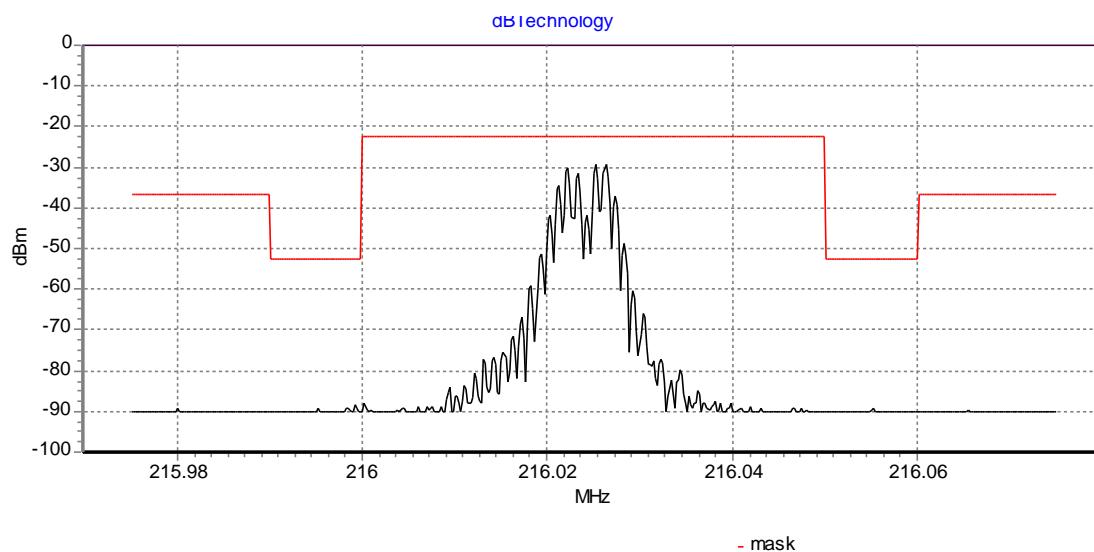
FCC ID : QA6 Convensor-F3

**Test Report**

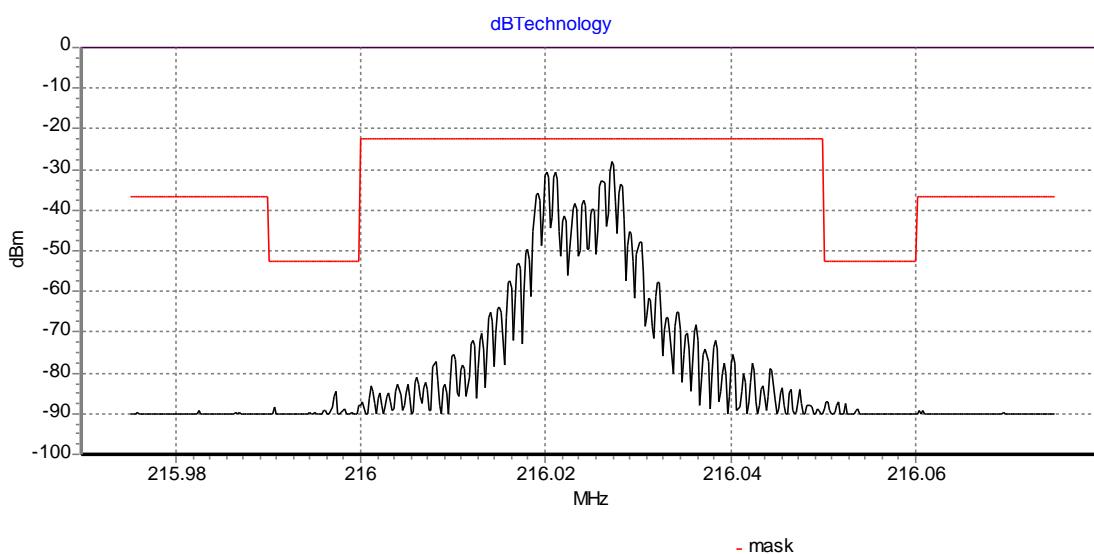
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**PLOT 7 Occupied Bandwidth - 1KHz - 10mV**



**PLOT 8 Occupied Bandwidth - 1KHz - 20mV**



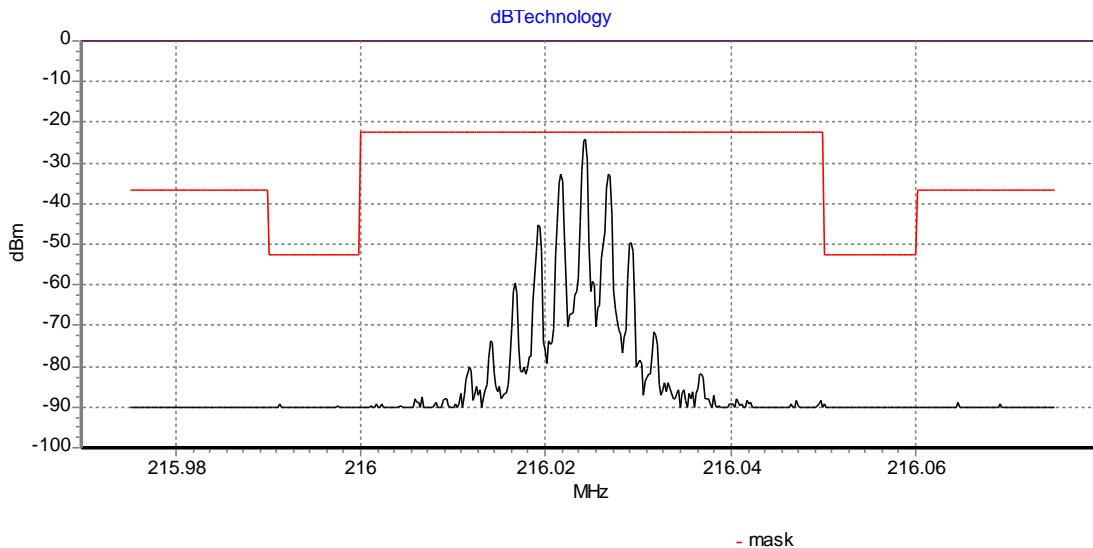
**PLOT 9 Occupied Bandwidth - 1KHz - 6V**

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Test No: T1292	

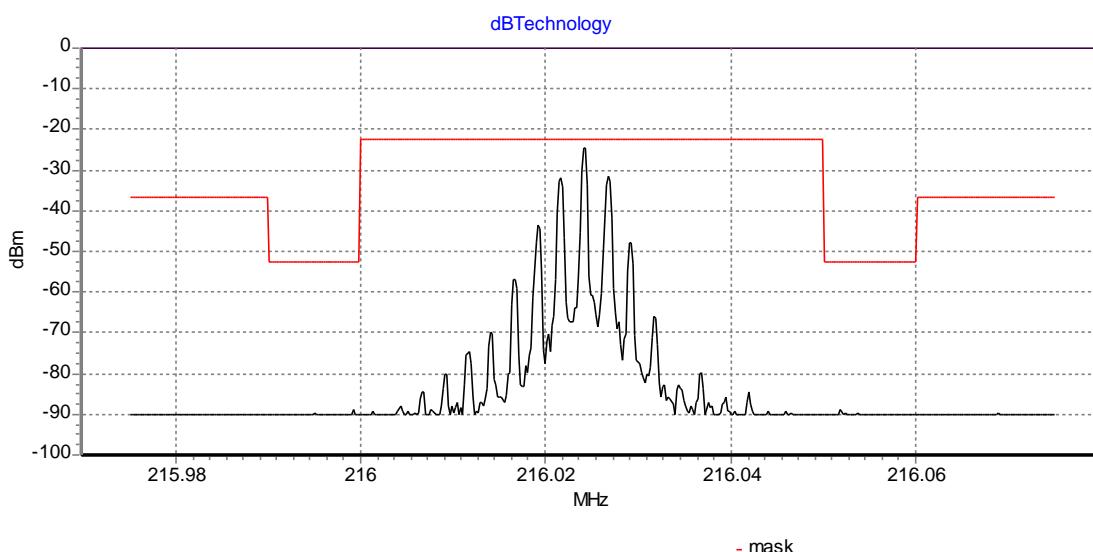
FCC ID : QA6 Convensor-F3

**Test Report**

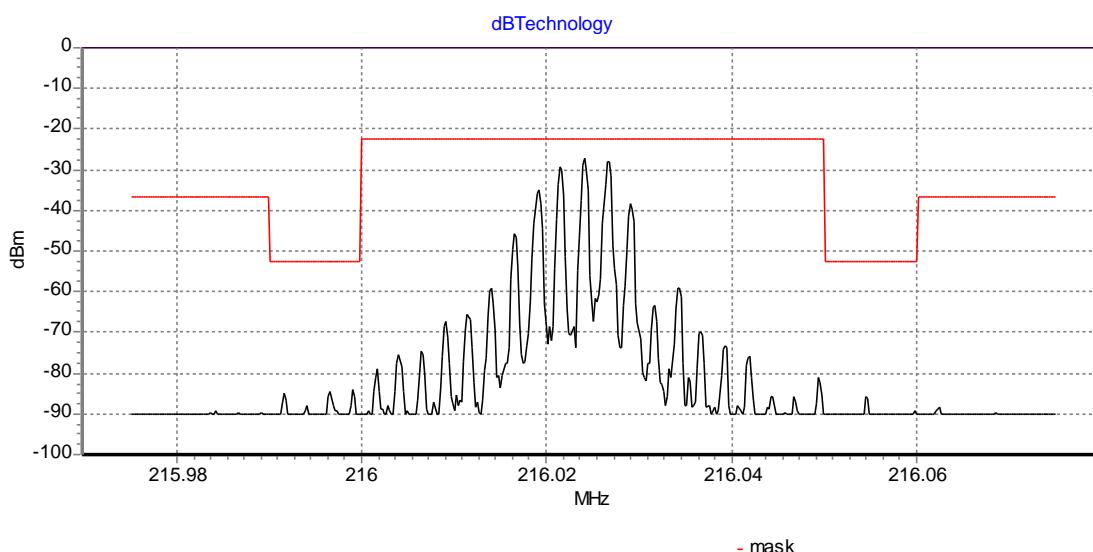
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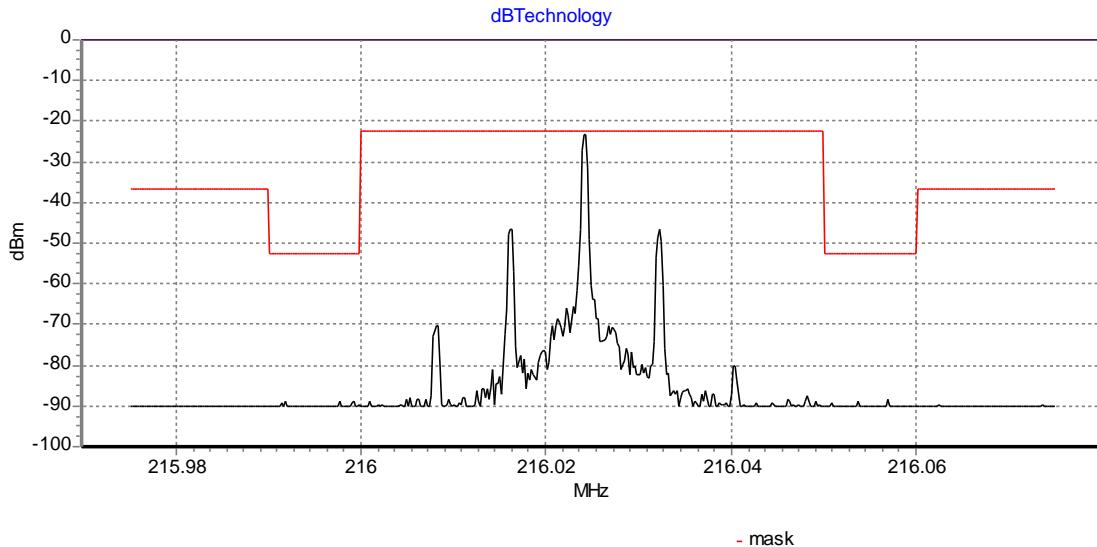
PLOT 10 Occupied Bandwidth - 2.5KHz - 10mV



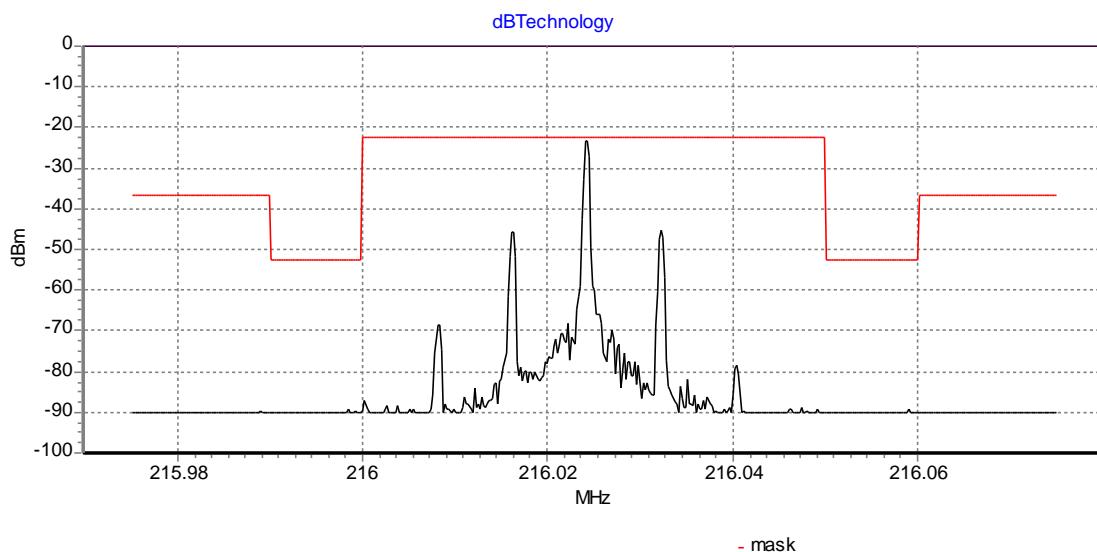
PLOT 11 Occupied Bandwidth - 2.5KHz - 20mV



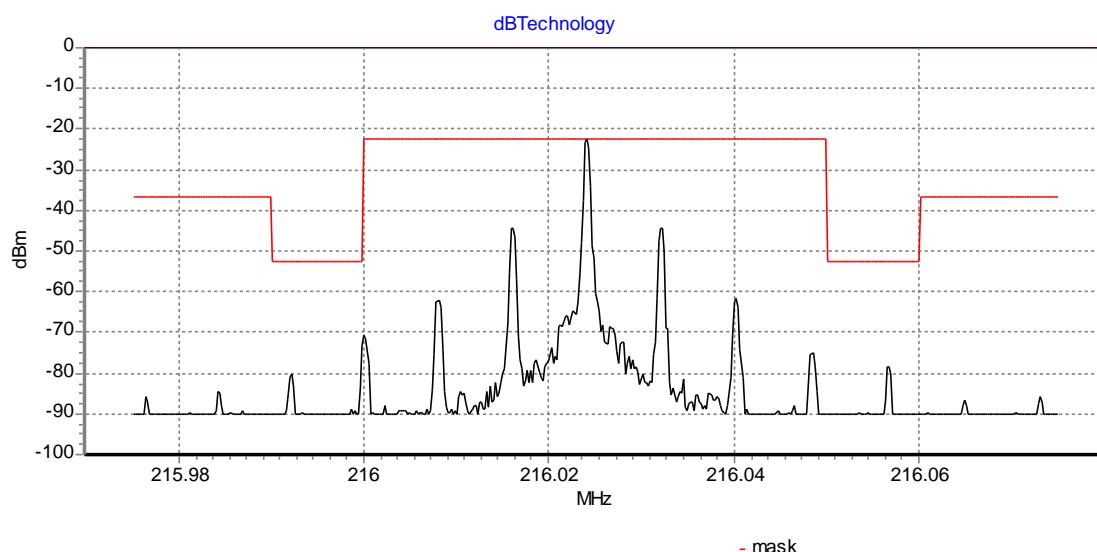
PLOT 12 Occupied Bandwidth - 2.5KHz - 6V



PLOT 13 Occupied Bandwidth - 8KHz - 10mV



PLOT 14 Occupied Bandwidth - 8KHz - 20mV



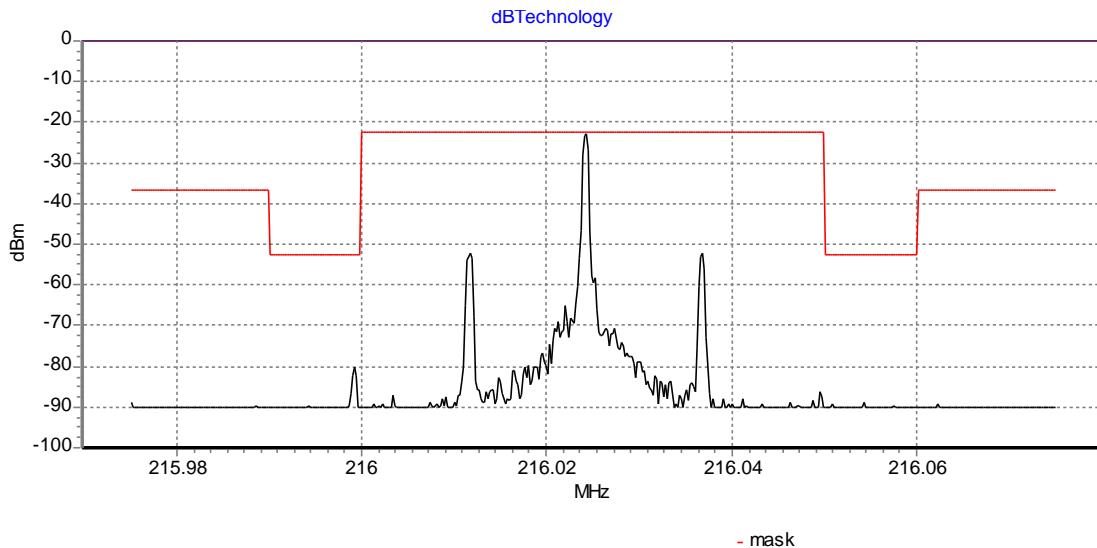
PLOT 15 Occupied Bandwidth - 8KHz - 6V

	Report No: R1938 Issue No: 3
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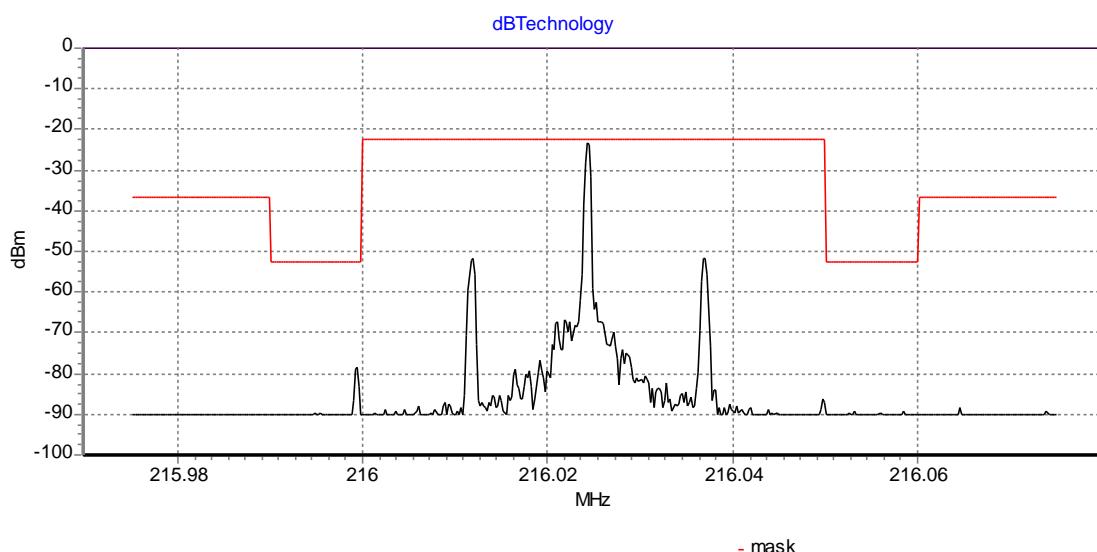
FCC ID : QA6 Convensor-F3

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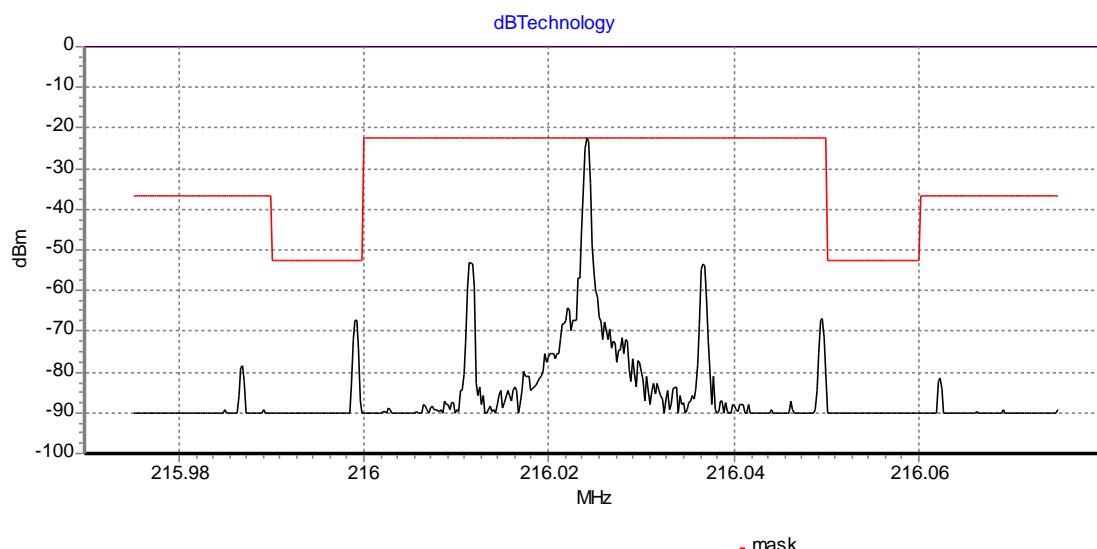
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PLOT 16 Occupied Bandwidth - 12.5KHz - 10mV



PLOT 17 Occupied Bandwidth - 12.5KHz - 20mV



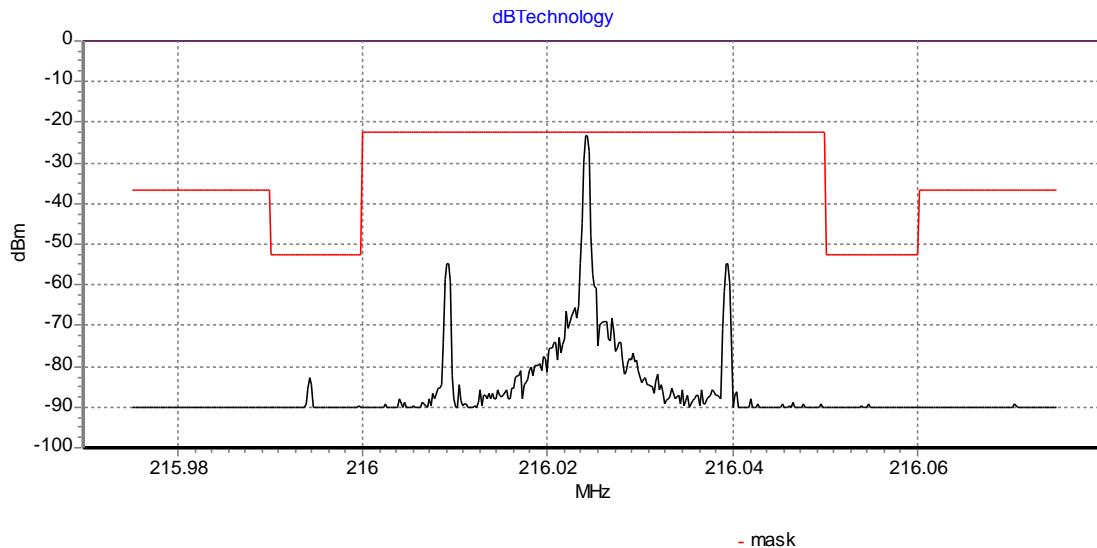
PLOT 18 Occupied Bandwidth - 12.5KHz - 6V

	Report No: R1938 Issue No: 3
Test No: T1292	

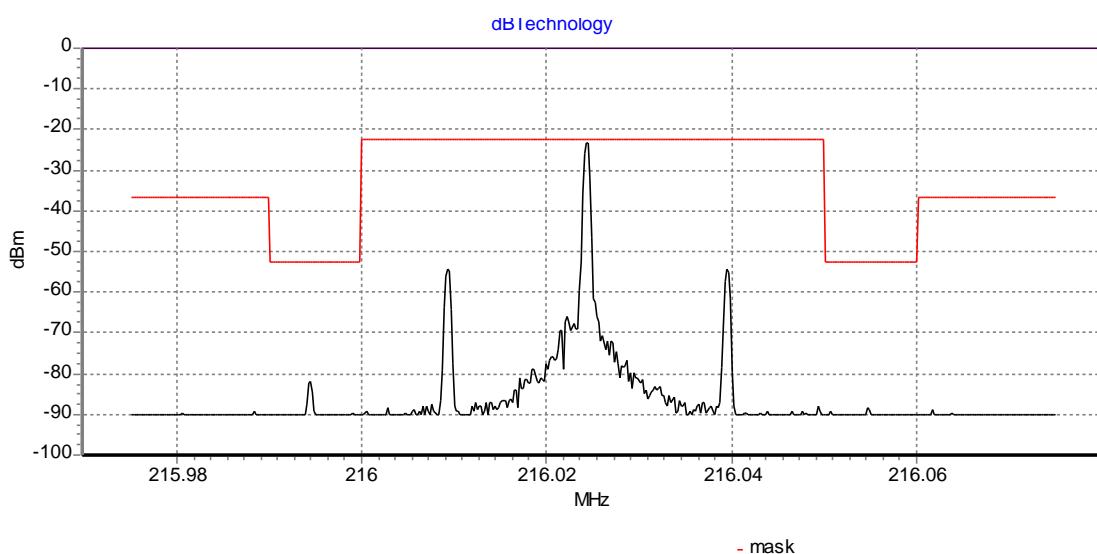
FCC ID : QA6 Convensor-F3

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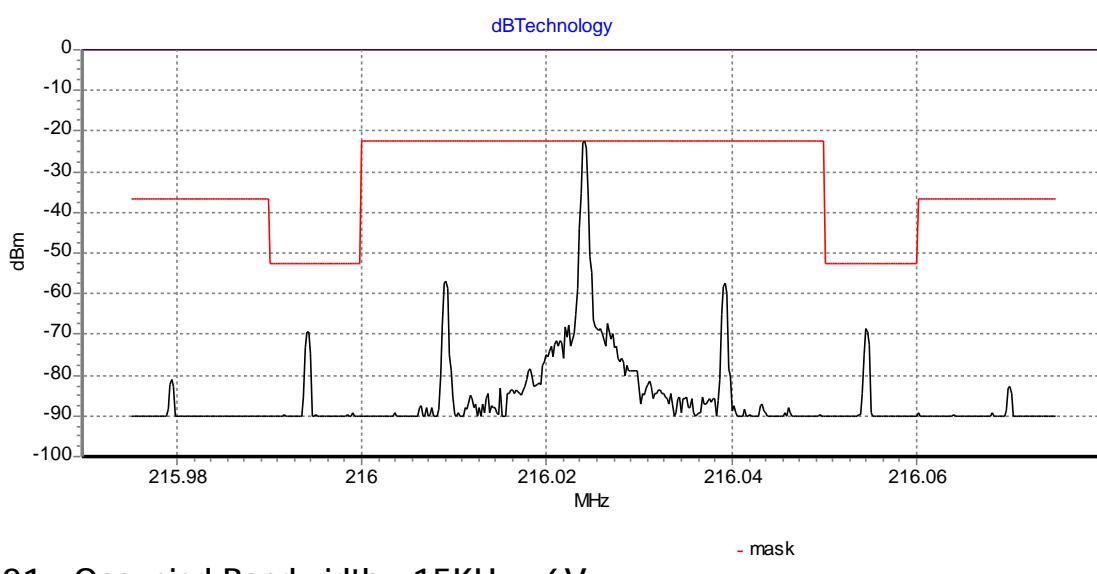
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PLOT 19 Occupied Bandwidth - 15KHz - 10mV



PLOT 20 Occupied Bandwidth - 15KHz - 20mV



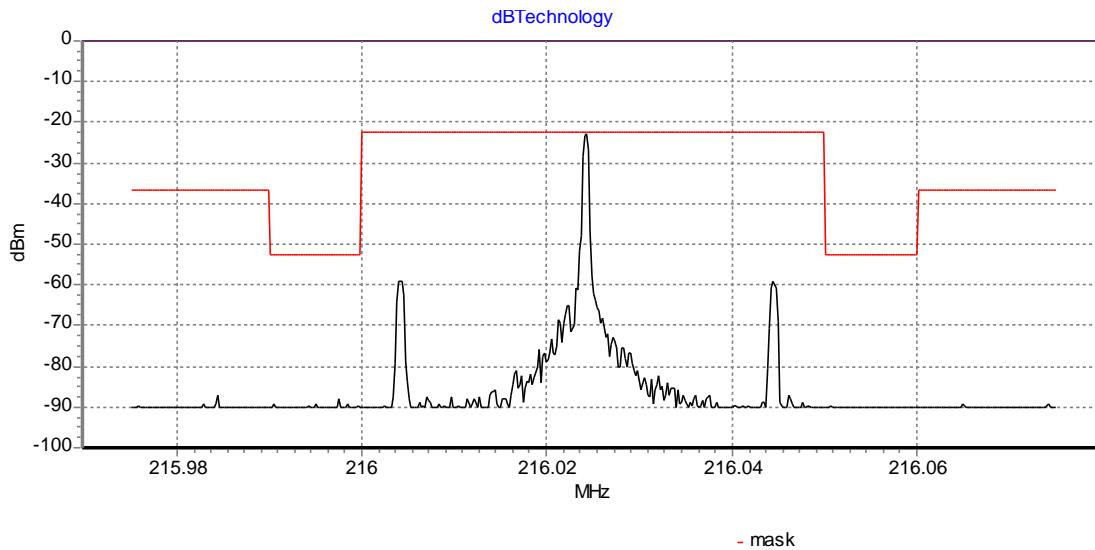
PLOT 21 Occupied Bandwidth - 15KHz - 6V

	Report No: R1938 Issue No: 3
Test No: T1292	

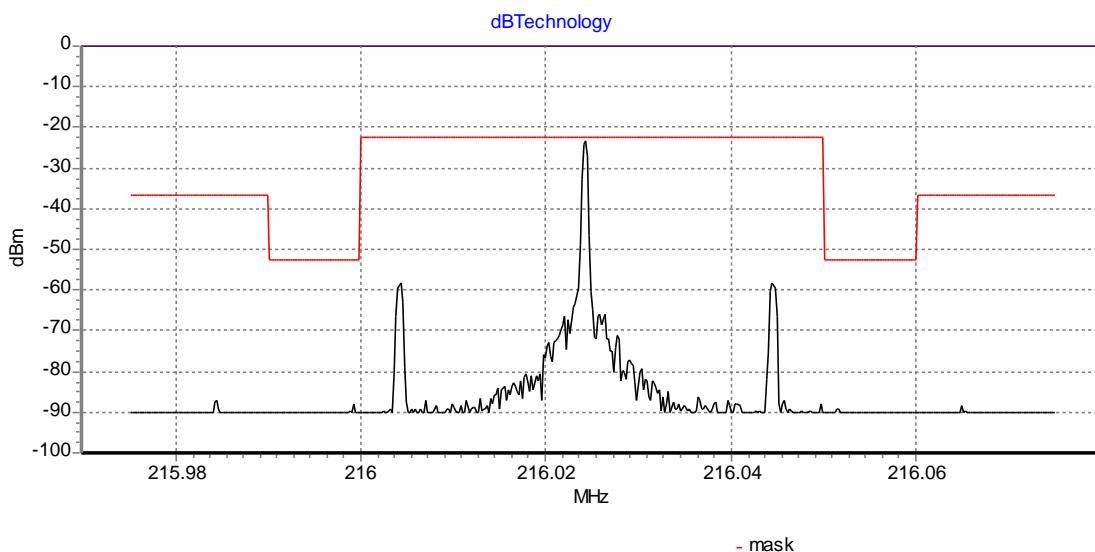
FCC ID : QA6 Convensor-F3

**Test Report**

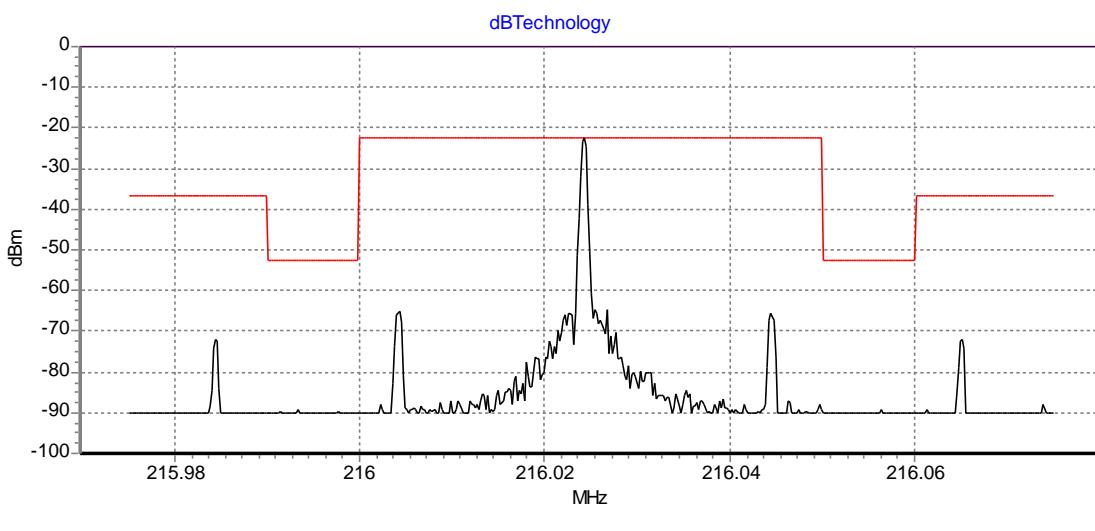
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PLOT 22 Occupied Bandwidth - 20KHz - 10mV



PLOT 23 Occupied Bandwidth - 20KHz - 20mV



PLOT 24 Occupied Bandwidth - 20KHz - 6V

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## 7 Frequency Stability - 47CFR part 2.1055 & 95.629(2)

The temperature of the EUT was varied from -30°C to +50°C. The permitted variation in frequency is 50ppm.

Temperature °C	Frequency MHz	Change ppm	Limit ppm
-30	216.024956	0.54	±50
-20	216.024910	0.33	±50
-10	216.024882	0.20	±50
0	216.024839	0.00	±50
10	216.024838	-0.00	±50
20	216.024824	-0.07	±50
30	216.024736	-0.48	±50
40	216.024658	-0.84	±50
50	216.024901	0.29	±50

The DC voltage of the EUT was varied from 1.1V to 1.73V. The permitted variation in frequency is 50ppm. An LED is used to indicate to the user that the battery is below normal voltage.

Battery Voltage V	Frequency MHz	Change ppm	Limit ppm
1.73	216.025066	1.12	±50
1.5	216.024970	0.68	±50
1.35	216.024824	0.00	±50
1.1	216.025147	1.50	±50

**Equipment:** SG3, SG10, EC1  
**Date:** 27 September 2004  
**Test Engineer:** Dave Smith

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## 8 Necessary Bandwidth - 47CFR part 2.201 and 2.202

Carsons rule for FM audio gives necessary bandwidth as:

$$B_n = 2M + 2D$$

where

M = maximum modulating frequency

D = peak frequency deviation

Based on the manufacturer's specification, M=7kHz and D= 5kHz.

Therefore

$$B_n = 2 * 7\text{kHz} + 2 * 5\text{kHz} = 24\text{kHz}$$

The overall emission designator is:

24K0F3E