EMC Test report
FCC 47 CFR PART 15 B(US)
INCL. ICES-003 (Canada)

TÜVRheinland®

Prüfbericht-Nr.: *Test Report No.*:	**17122201_17122202_FCC**	**Auftrags-Nr.:** *Order No.*:	3001483785	Seite 1 von 19 *Page 1 of 19*
Kunden-Referenz-Nr.: *Client Reference No.*:	4602437	**Auftragsdatum:** *Order date*:	December 22, 2017	
Auftraggeber: *Client*:	Intel Mobile Communications, France SAS, 2600 route des Crêtes, 06560 VALBONNE, FRANCE			
Prüfgegenstand: *Test item*:	Intel WiGig module 11100D2W Intel WiGig module 13110NGW			
Bezeichnung / Typ-Nr.: *Identification / Type No.*:	11100D2W and 13110NGW			
Auftrags-Inhalt: *Order content*:	Tests in accordance with FCC: 47 CFR Part 15 RF Devices. Including FCC15B Test report			
Prüfgrundlage: *Test specification*:	FCC 47 CFR PART 15 B			

Wareneingangsdatum: *Date of receipt*:	January 18, 2018
Prüfmuster-Nr.: *Test sample No.*:	N.a.
Prüfzeitraum: *Testing period*:	January 22 – February 13, 2018
Ort der Prüfung: *Place of testing*:	Leek
Prüflaboratorium: *Testing laboratory*:	TÜV Rheinland Nederland B.V. Leek Laboratory
Prüfergebnis*: *Test result**:	Pass

Geprüft von / *tested by:*

February 13, 2018 A.J.K. Hut, Test engineer

Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*
February 13, 2018	A.J.K. Hut, Test engineer	

Kontrolliert von / reviewed by:

K.F. van der Molen

Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*
	K.F. van der Molen	

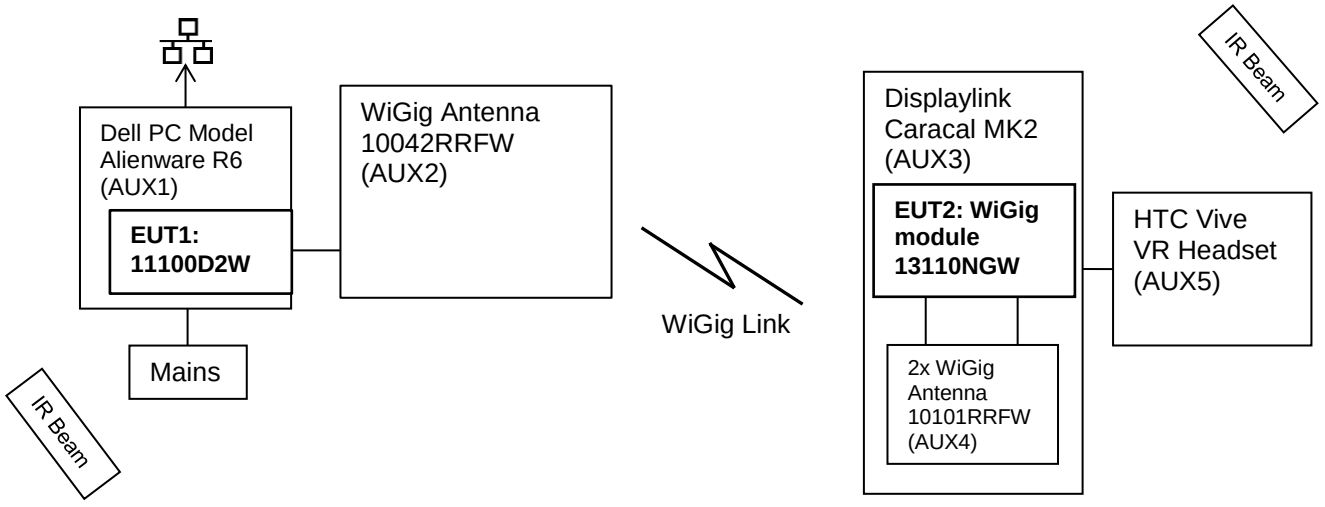
Sonstiges / *Other:* *This testreport is only valid with photoreport 17122201_17122202_Intel_EMC_FCC15b_Photo*

Zustand des Prüfgegenstandes be Anlieferung: *Condition of the test item at delivery:*	Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*

* Legende:	1 = sehr gut P(ass) = entspricht o.g.	2 = gut Prüfgrundlage(n)	3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar	5 = mangelhaft N/T/ = nicht getested
Legend:	*1 = very good* *P(ass) = passed a.m.*	*2 = good* *Test specification(s)*	*3 = satisfactory* *F(ail) a.m. test specification(s)*	*4 = sufficient* *N/A = not applicable*	*5 = poor* *N/T = not tested*

TÜV Rheinland Nederland B.V. · Eiberkamp 10 · 9351 VT Leek · Tel: + 31 88 8887888
Mail: info@nl.tuv.com · Web: www.tuv.com

1	**Produktdetails** *Product details*	Intel Wigig module 11100D2W Intel Wigig module 13110NGW
2	**Maße / Gewicht** *Dimensions / Weight*	N.a..
3	**Bedienelemente** *Operating elements*	PC Dell
4	**Ausstattung / Zubehör** *Equipment / Accessories*	HTC Vive system including 2x IR beamer, Display-link Caracal MK2, PC Dell with software, Antenna 10042RRFW, 2x Antenna 10101RRFW
5	**Verwendete Materialien** *Used materials*	N.a.
6	**Sonstiges** *Other*	None
7	**This report concerns:**	**EMC Verification**



Liste der verwendenten Prüfmittel
List of used test equipment

Prüfmittel Nr. / ID-Nr. *Equipment No. / ID-No.*	**Prüfmittel** *Test equipment*			**Nächste Kalibrierung** *Next calibration*
Conducted emission				
A00726	Rohde & Schwarz	ESCS30	Measurement Receiver	25-10-2018
A01978	Rohde & Schwarz	ESH3-Z2	Impulse Limiter	17-5-2018
A00022	Emco	3725/2	LISN FCC 50 uH / 50 ohm	30-1-2019
A00093	COMTEST	1415	Conducted Reference Source 9kHz-50MHz	29-6-2018
Radiated emission				
A00337	R&S	FSV30	Signal Analyzer/Spectrum Analyzer	21-6-2018
A00338	H&S	Sucotest 18/Sucoflex 102	Cable RF	12-6-2018
A00029	Emco	4610	Gen. field source	30-1-2020
A00235	Siepel	FCC	FCC Test Site Registration nr 786213	3-4-2018
A00313	Comtest	verloopt per: 20-11-2020	Site registration filing Industry Canada	20-5-2020
A00436	Siepel		S-AR	28-9-2020
A00447	Gigalink	APG0500	RF Cable S-AR	27-1-2018
A00466	Teseq	CBL 6111D	Antenne S-AR, BiLog 30MHz-1GHz	11-10-2018
A01982	Rohde & Schwarz	ESR7	EMI Test Receiver 7GHz	6-7-2018
A00009	Emco	3115	Guide ant. 1-18GHz	14-4-2018
A00011	Emco	3116	Guide ant. 18-40GHz	14-4-2018
A00012	Emco	3160-09	Gain horn 18-26.5GHz	14-4-2018
A00209	Emco	3160-09	Gain horn 18-26.5GHz	14-4-2018
A00210	Emco	3160-10	Gain horn 26.5-40GHz	14-4-2018
A00255	EMCS	RFS06S	S-AR Setup Radiated Emission	14-2-2018
A00339	H&S	Sucotest 18/Sucoflex 102	Cable RF S-AR >1G setup	13-6-2018
A00340	H&S	Sucotest 18/Sucoflex 102	Cable RF	12-6-2018
A00341	H&S	Sucotest 18/Sucoflex 102	Cable RF	12-6-2018
A01473	Anritsu	MS2713E	Spectrum Analyzer	25-10-2018

Zusammenfassung der Prüfergebnisse ***Summary of test results***						
Index *Index*	**Prüfung** *Test*	**Anwendbar** *Applicable*	**Prüfergebnis** *Test result*	**Paragraf** *Paragraph*	**Messungen unter Akkreditierung ausgeführt** *under accreditation*	**Kommentar** *Remark*
Page 9	Radiated emission < 1000 MHz	Yes	Pass	1.1	Yes	
Page 13	Radiated emission > 1000 MHz	Yes	Pass	1.2	Yes	(fx = 60GHz)
Page 17	Conducted emission AC port	Yes	Pass	1.3	Yes	Tested on AC port of Dell PC

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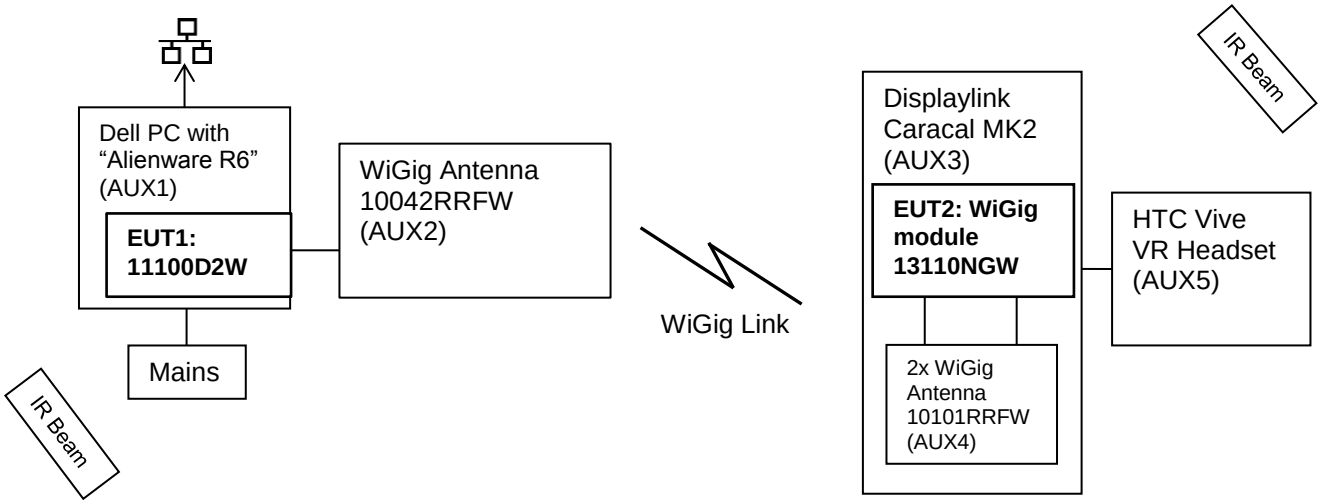
Revisions ***Revisions***			
Revision Revision	**Datum** Date	**Anmerkung** Remark	**Verfasser** Author
01	13.02.2018	First Design	W. Brouwer
Note: Latest revision report will replace all previous reports			

CONDITIONS FOR TESTING

General test configuration

Enter here a short description of the test configuration.	
Test item	2 different WiGig modules
Models	11100D2W and 13110NGW
Manufacturer	Intel Mobile Communications
Voltage input rating	EUT is battery operated
Current input rating	EUT is battery operated
Test software	Intel
Driver version	Intel
Remarks	

List of tested cables					
Number	**Function**	**From**	**To**	**Length**	**Remarks**
1	AC	AUX1	MAINS	<3	



1 Test results Emission according to FCC CRF47 Part 15B

1.1 Enclosure Radiated Emission 30-1000 MHz

1.1.1 Definition

Result of the measurements concerning radiated electromagnetic fields (electric component) emitted by the total set-up of the EUT.

1.1.2 Basic standard

The test is performed according to FCC CRF 47 Part 15B § 15.109

1.1.3 Limit

Frequency (MHz)	Limit (dBµV/m)
30.0 - 88.0	40.0
88.0 – 216.0	43.5
216.0 – 960.0	56.5
> 960.0	59.5

1.1.4 Test procedures

The EUT is measured at a distance of 3 m in a semi-anechoic room. The Measuring receiver is tuned over the frequency range from 30 MHz to Choose max. freq. range At each frequency at which a relevant peak is detected, the peak is re-measured with a Quasi-peak detector, the EUT is rotated and the test antenna is varied in height and Polarity to obtain the maximum field strength. The maximum field strength level is noted on next pages.

1.1.5 Test deviation

There is no deviation with the original standard

1.1.6 Test results

Test conditions			
Ambient temperature (^{0}C)	21.0	Relative humidity (%)	36.0
Air pressure (hPa)	1017	Test location	Leek
Applied Standard(s)	FCC CRF 47 Part 15B § 15.109		
Test engineer	A.J.K. Hut	Test result	Pass
Test date	January 23, 2018	Signature:	

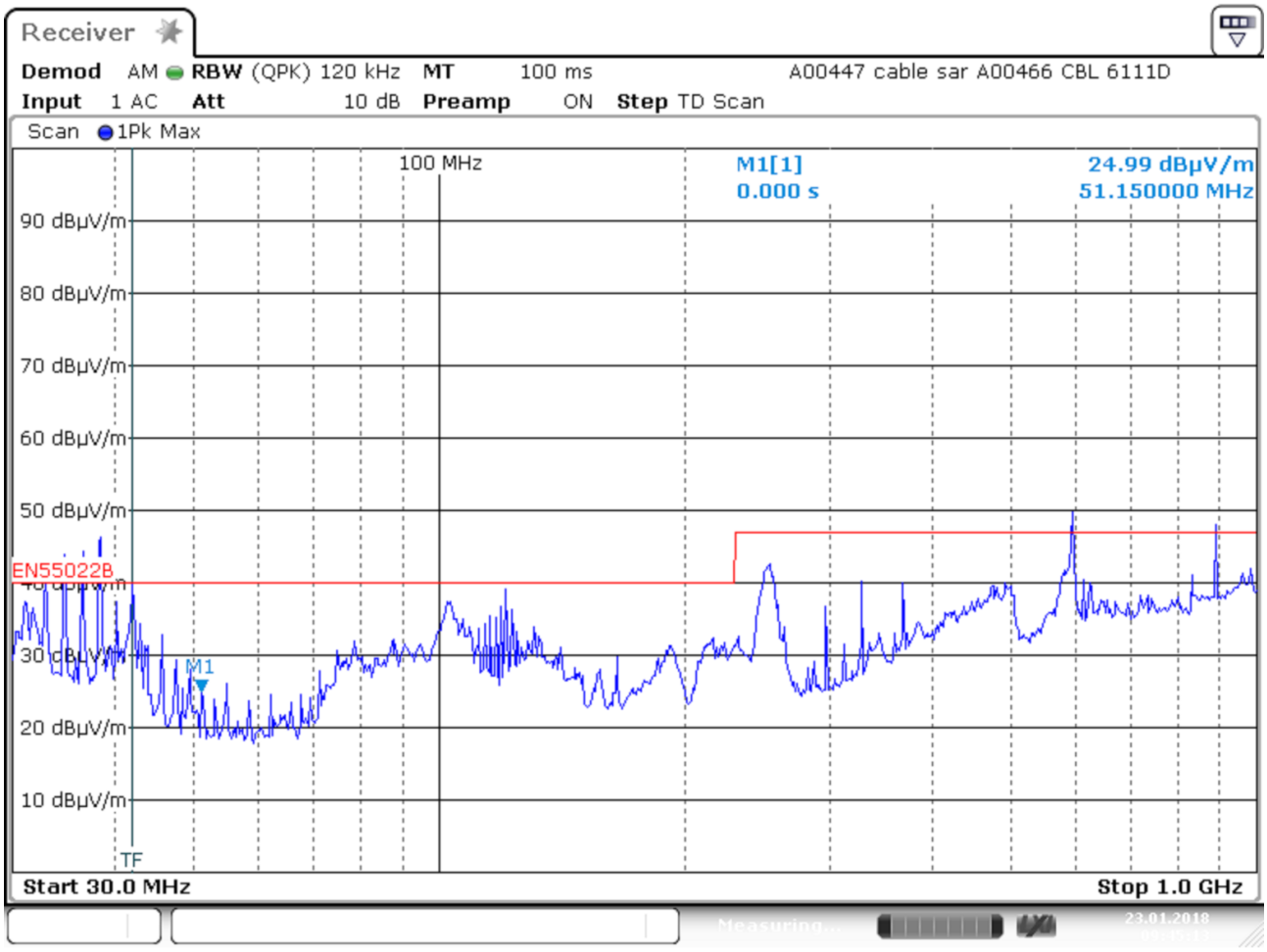
Results and limits						
Frequency (MHz)	**Result (dBµV/m)**	**Antenna polarization**	**Limit (dBµV/m)**	**Margin**	**Height (cm)**	**Angle (deg)**
42.11	36.5	Vertical	40.0	3.5	99.9	347.3
103.27	32.5	Vertical	43.5	11.0	99.7	6.2
119.00	32.0	Vertical	43.5	11.5	100.1	240.7
253.68	28.2	Horizontal	46.0	17.8	144.3	50.9
593.98	41.7	Vertical	46.0	4.3	99.8	0.2
593.98	41.5	Vertical	46.0	4.5	99.7	352.6
890.97	43.1	Horizontal	46.0	2.9	100.1	46.8

Table 1 Results Enclosure Radiated Emission 30.0 – 1000 MHz

Used Equipment

A01982	A00029	A00235	A00313	A00447	A00466	A00255			

1.1.7 Spectrum plot



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Plot 1: Pre-scan plot with peak detector. Radiated emissions from 30 MHz to 1000 MHz.

1.2 Enclosure Radiated emission 1 GHz – 40 GHz (fx = 60GHz)

Results and limits						
Frequency	**Peak Results**			**Average Results**		
(GHz)	**Horizontal (dBµV/m)**	**Vertical (dBµV/m)**	**Limit (dBµV/m)**	**Horizontal (dBµV/m)**	**Vertical (dBµV/m)**	**Limit (dBµV/m)**
1.188	53.5	53.3	74	41.1	42.8	54
1.485	54.1	56.1	74	32.1	38.1	54
1.782	45.2	40.6	74	34.1	46.1	54
2.228	55.9	58.1	74	51.1	45.1	54
2.969	52.1	54.1	74	37.1	49.1	54
8.921	53.1	53.1	74	37.4	37.5	54
11.484	65.4	64.1	74	43.9	37.5	54
17.675	62.1	63.8	74	48.7	48.6	54
21.290	52.2	50.5	74	39.9	40.9	54
24.960	51.0	50.0	74	39.6	40.5	54
29.030	50.1	52.5	74	41.2	40.1	54

Table 2 Results Enclosure Radiated Emission 1000.0 – 40000.0 MHz

Notes:

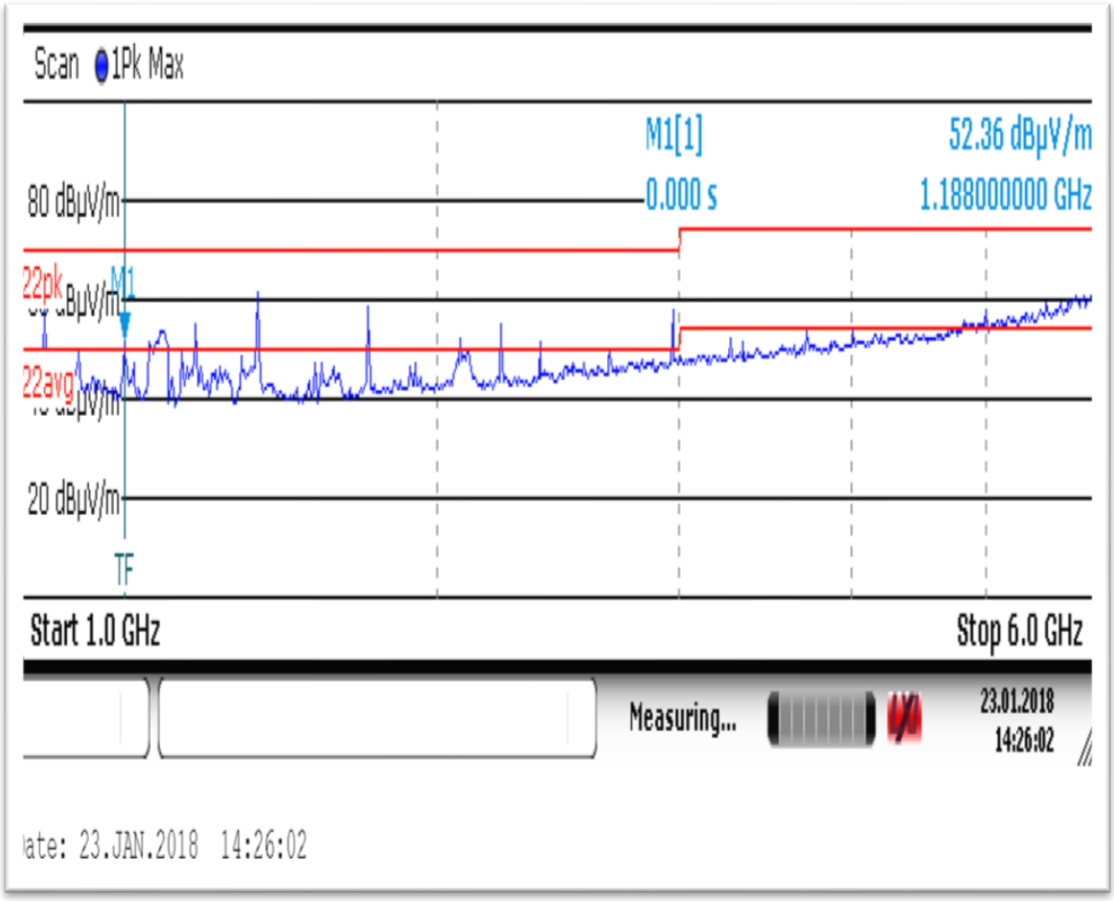
Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.

1. Measurement uncertainty is +/- 5.1 dB
2. The reported field strength values are the worst case values at the indicated frequency. The receiving antenna was varied in horizontal and vertical orientations and also in height (between 1m and 2m).
3. A Peak and Average detector was used with a resolution bandwidth of 1MHz.

Used Equipment

A01982	A00337	A00338	A00235	A00313	A00447	A00008			

1.2.2 Spectrum plot 1- 6 GHz



Plot 2: Pre-scan plot with peak detector. Radiated emissions from 1 GHz – 6 GHz.

1.3 AC Mains Conducted Emission 0.15-30 MHz

1.3.1 Definition

Result of the measurements concerning the disturbance voltage level at the power input port emitted by the total set-up of the EUT.

1.3.2 Basic standard

The test is performed according to FCC CRF 47 Part 15B § 15.107

1.3.3 Limit

Frequency (MHz)	Limit Quasi-peak(dBμV)	Limit Average(dBμV)
0.15 - 0.50	66.0 – 56.0	56.0 – 46.0
0.50 - 5.0	56.0	46.0
5.0 – 30.0	60.0	50.0

1.3.4 Test procedures

The EUT is measured in a screened room and connected to a LISN. The Measuring receiver is tuned over the frequency range from 0.15 MHz to 30 MHz. At each frequency at which a relevant peak is detected, the peak is re-measured with a Quasi-peak and Average detector. The EUT is measured between the Phase lead and reference ground and between the Neutral and reference ground. The maximum level is noted down.

1.3.5 Test deviation

There is no deviation with the original standard

1.3.6 Test results

Test conditions			
Ambient temperature (^{0}C)	23.0	Relative humidity (%)	43.0
Air pressure (hPa)	1010	Test location	Leek
Applied Standard(s)	to FCC CRF 47 Part 15B § 15.107	Tested on Mains of Dell PC	
Test engineer	A.J.K. Hut	Test result	Pass
Test date	January 24, 2018	Signature	

Results and limits Neutral						
Frequency (MHz)	Quasi peak detector			Average detector		
	Result	Limit	Margin	Result	Limit	Margin
2.87	33.7	56.0	22.3	23.3	46.0	22.7
3.11	33.2	56.0	22.8	22.6	46.0	23.5
3.42	40.3	56.0	15.7	26.1	46.0	19.9
3.74	37.0	56.0	19.0	26.2	46.0	19.8
4.66	32.7	56.0	23.3	24.1	46.0	22.0
16.96	38.9	60.0	21.1	30.4	50.0	19.6

Table 3 Results Conducted Emission 0.15 - 30 MHz

Results and limits L1						
Frequency (MHz)	Quasi peak detector			Average detector		
	Result	Limit	Margin	Result	Limit	Margin
2.87	36.6	56.0	19.4	25.0	46.0	21.0
3.11	35.8	56.0	20.2	23.3	46.0	22.7
3.42	40.5	56.0	15.5	25.1	46.0	20.9
3.74	37.7	56.0	18.3	26.0	46.0	20.0
4.66	32.0	56.0	24.1	23.4	46.0	22.6
16.96	38.7	60.0	21.3	30.2	50.0	19.9

Table 4 Results Enclosure Conducted Emission 0.15 - 30 MHz

Notes:

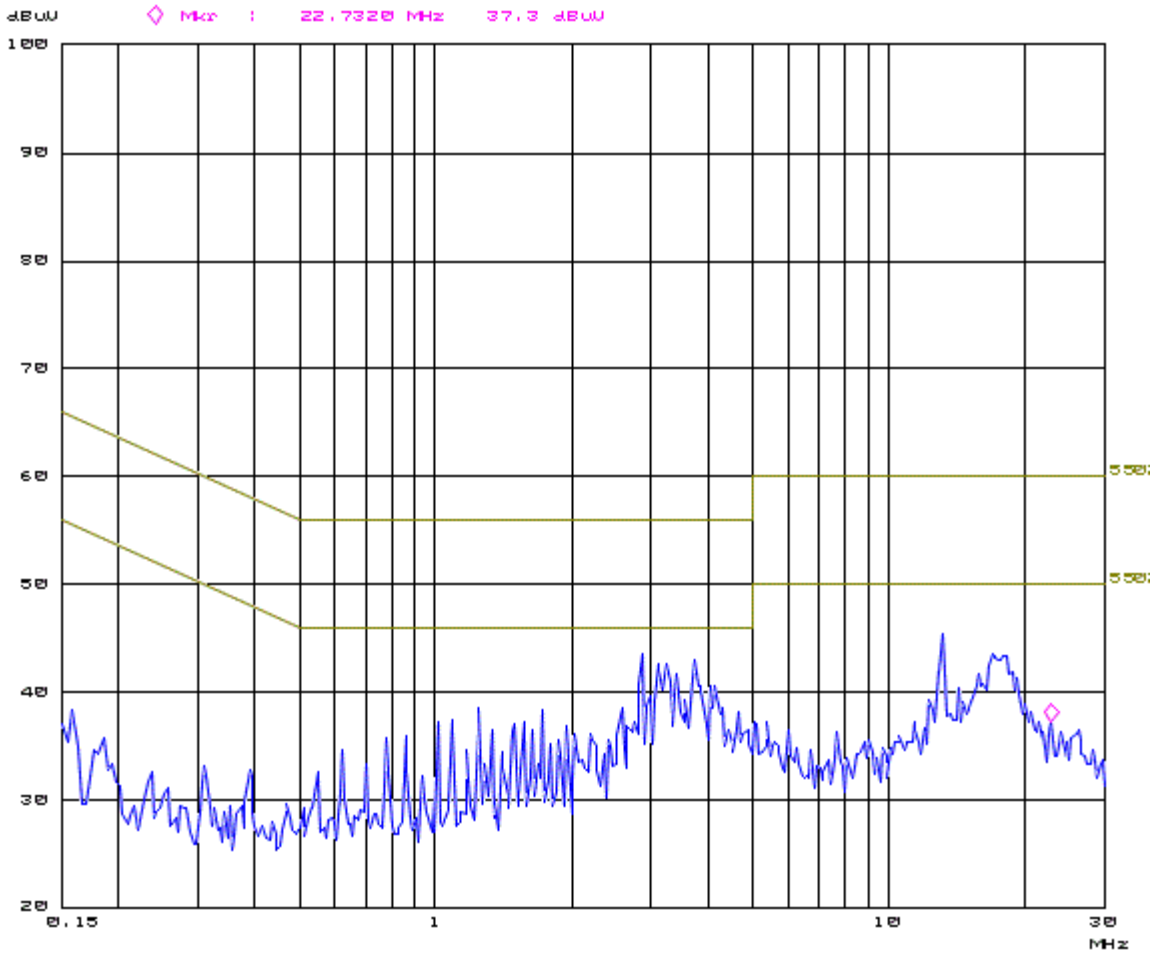
Notes:

1. Measurement uncertainty is ±3.5dB
2. The resolution bandwidth used was 9 kHz.
3. The six highest values relative to the applicable limits were noted.
4. Plot is provided on the next page.

Used Equipment

A00726	A01978	A00022	A00354	A00093					

1.3.7 Spectrum plot



Plot 3: Pre-scan plot with peak detector. Conducted emissions from 0.15 - 30 MHz.

END OF THIS EMC TESTREPORT