FCC Test Firm Designation Number: FR0014
SED Wireless Device Testing Laboratory CAB Number: FR0004

Matériel testé : *Equipment under test*:	**IDENTEC SOLUTIONS / IDS1002 (i-Point X)** *(Trademark / Marketing name or product reference)* **LF communication media (125kHz)**

Client / Demandeur:
Customer / Applicant :
IDENTEC SOLUTIONS AG
Millennium Park 2
A-6890 Lustenau – Austria

Rapport délivré à :
Issued to:
IDENTEC SOLUTIONS AG
Karl-Heinz Feierle
Millennium Park 2
A-6890 Lustenau – Austria

Référence de la proposition : 012019-23396-1
Proposal number:

Numéro d'affaire : 12928
Work number :

Date de l'essai : Du 18 au 20 mai 2020
Date of test: *May 18th to 20th, 2020*

Objectif des essais :
Test purpose:
EMC qualification according to following standards:
- CFR 47, FCC Part 15, Subpart C
- ISED Canada, RSS-Gen Issue 5
Low power transmitter below 1705KHz
Measurement standards:
ANSI C63.10 (2013)

Lieu du test:
Test location:
SMEE, Rue de Taille
38500 VOIRON - France

Test réalisé par : Laurent CHAPUS
Test realized by:

Conclusion :
Conclusion:
L'équipement satisfait aux prescriptions et essais des normes citées en référence.
The appliance complies with requirements and tests of above mentioned standards.

Ed.	Date	Modifications / Pages	Written by : Visa	Approved by: Visa
1	September 7th, 2020	Initial Edition	Laurent CHAPUS *Technical Manager* Signature numérique de Chapus Laurent	Regis ANCEL *General Manager* Signature numérique de Ancel Régis

cofrac ESSAIS
Accréditation
N° 1-6356
Portée disponible sur :
Scope available on :
www.cofrac.fr

Contents

1. Normatives References

FCC qualification according to:		
Standards	**Applied**	**Title**
ANSI C63.10 (2013)	X	American National Standard for Testing Unlicensed Wireless Devices
CFR47, Part 15	X	Telecommunication – Federal Communication Commission – Radio frequency devices, Sections 15.207 / 15.209

ISED Canada qualification according to:		
Standards	**Applied**	**Title**
RSS-Gen (Issue 5/2019)	X	General Requirements and Information for the Certification of Radio Apparatus
RSS-210 (Issue10/2019)	X	Licence-exempt Radio Apparatus: Category I Equipment,

Deviation from standards: None.

2. Test synthesis

TEST	Paragraph number FCC Part 15 IC RSS-210	Spec. FCC Part 15 IC RSS-210	RESULTS (comments)
Conducted emissions test	15.207 (a) RSS-Gen: Issue 5, §8.8	15.207 (a) Table 4, §8.8	**PASS**
Unwanted emissions	15.209 RSS-Gen: Issue 5, §8.9	Measure at 300m 9-490kHz: 2400µV/m/F(kHz) 6.370µA/m/F (kHz) Measure at 30m 0.490-1.705: 24000µV/m/F(kHz) 63.70µA/m/F (kHz) 1.705-30MHz: 30µV/m 0.08µA/m Measure at 3m 30MHz-88MHz : 40 dBµV/m 88MHz-216MHz : 43.5 dBµV/m 216MHz-960MHz : 46.0 dBµV/m Above 960MHz : 54.0 dBµV/m	**PASS**
Occupied Bandwidwth	15.215 (c) RSS-Gen: Issue 5, §6.7	BW at 99%	**PASS**

- **General conclusion:**

Measures and tests performed on the sample of the product *DENTEC SOLUTIONS / IDS1002*, in configuration and description presented in this test report, show compliance with standards FCC CFR 47, PART 15, Subpart C and ISED Canada RSS-Gen.

3. Equipment Under Test (EUT)

Nom / *Identification*	**IDENTEC SOLUTIONS / IDS1002 (i-Point X)** *(Trademark / Marketing name or product reference)*	P/N: 455990 (IDS1002) Sn: 2019PR0172
FCC ID:	OO4-IDS1002	
IC:	IC : 3538A-IDS1002	
Model:	IDS1002	
Alimentation / *Power supply*	15VDC from external power supply	
Auxiliaires / *Auxiliaries*	- Laptop ASUS, model F200M - 15V DC power supply PHOENIX CONTACT UNO-PS/1AC/15DC/30W	

Entrées-Sorties / *Input / Output*

	Câbles pour essai / *Cables for test*	Blindé / *Shielded*	Prévu pour >3m / *Intended for >3m*
RS422 (MASTER+15V)	2m/10m	YES	YES
RS422 (SLAVE)	2m	YES	YES

Mode de fonctionnement / *Running mode*

Equipment running modes are:
The tested sample is able to be set in following modes:
- Transmit a modulated carrier frequency at 125kHz

Version programme interne / *Firmware version*

V101.01

Programme de test / *Test program /*

PC test program "Gen3 Tag Certification tool" V.0.0.29105

Informations supplémentaires / *Additional informations*

Declaration of the applicant:
- Type of technology: LF Marker
- Emission bands: 125kHz
- Equipment intended for use as a fixed station
- Equipment designed for continuous operation
- Antenna type: Integrated 125kHz coil
- Rated output power is set at 100%

Dimensions de l'EST / *Dimensions of EUT*

224mm x 214 x 46

4. Test conditions

Power supply voltage:
Equipment under test: 15V DC
Auxiliaries (AC mains): 230V/50Hz (Radiated emission)
110V/60Hz (Conducted emission)

5. Modifications of the EUT

None.

6. Special accessories

None required for compliance with emission limits.

7. Measurement Uncertainty

Test Description	Expanded uncertainty
Conducted emissions test (150k-30MHz, AC mains)	± 3.5dB
Radiated emission test (9kHz-30MHz, electric field)	± 4.0dB
Radiated emission test (30-300MHz, OATS)	± 5.6dB
Radiated emission test (300-1000MHz, OATS)	± 5.3dB
Radiated emission test (1-40GHz, OATS / FAC)	± 5.6dB
Conducted RF output power at antenna port	± 1.6dB
Radiated RF output power (Peak, Power density)	± 5.6dB
DTS Bandwidth, 99% OBW	±4%
Temperature	± 1°C
Time and duty cycle calculation	±1%
AC and DC voltage	±1%

Note: Expended uncertainty at 95% confidence (k=2)

8. Field Strength Calculation

The field strength (level) is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation is as follow:
FS = RA + AF + CF – AG
Where FS = Field Strength (Level)
RA = Receiver Amplitude (Meter Reading)
AF = Antenna Factor
CF = Cable Factor
AG = Amplifier Gain
Total factor = AF+CF-AG
Margin value = Emission level – Limit value

Example:
RA: 14.0dBµV / AF: 16.5 dBm^{-1} / CF: 3.5dB / AG: 15dB
→ Total factor: $5dBm^{-1}$
→ Field level: 19.0dBµV/m (-21.0dB for margin if limit is 40dBµV/m)

9. Conducted Emission Measurement (150kHz-30MHz)

TEST: Limits for conducted disturbance 150kHz – 30MHz	**Verdict**
Method: The LISN is placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane. This distance was between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment were at least 0,8 m from the AMN. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on lines were made at the output of the LISN. The EUT is 80cm above the ground reference plane and 40cm from the vertical ground plane. The AC power cable is 1m length.	**Pass**

Laboratory Parameters:	Required prior to the test	During the test
Ambient Temperature	20 to 30 °C	25°C ± 2
Relative Humidity	25 to 70 %	45% ± 5
Fully configured sample scanned over the following frequency range	Frequency range on each side of line	Measurement Point
	150kHz to 30MHz	AC input port (110V)

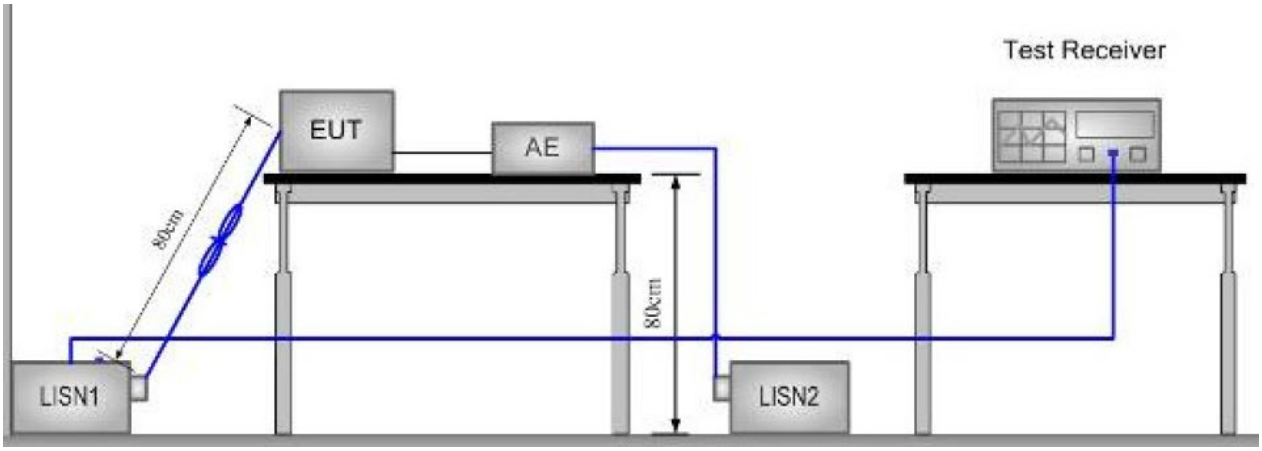
Limits

Frequency (MHz)	Limit dB (µV)			
	Quasi-Peak	Result	Average	Result
0.15 – 0.50	66 \ 56	**PASS**	56 \ 46	**PASS**
0.50 - 5	56	**PASS**	46	**PASS**
5 – 30	60	**PASS**	50	**PASS**

Supplementary information:
Test location: SMEE
Test date: May 20th, 2020. Tested by L. CHAPUS
Power supply voltage: 15V/DC from external power supply (AC mains 110V/60Hz)

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
AC power supply	PACIFIC POWER	AMX-125	ALI-101-002	-	-
Attenuator / limiter	SMEE	ATT#2	ATT-171-010	2019/6	2020/6
Cable RF	Div	1m	CAB-101-021	2020/4	2021/4
Measuring receiver	Rohde&Schwarz	ESRP	REC-151-002	2019/9	2021/9
LISN (50Ω / 50µH) (Meas.)	AFJ	LS16C	RSI-101-001	2019/6	2021/6
LISN (50Ω / 50µH) (Aux.)	AFJ	LS16C	RSI-111-002	2019/6	2021/6
EMC Software	NEXIO	BAT EMC V3.18	SOF-101-001	-	-

Test Setup for conducted emission



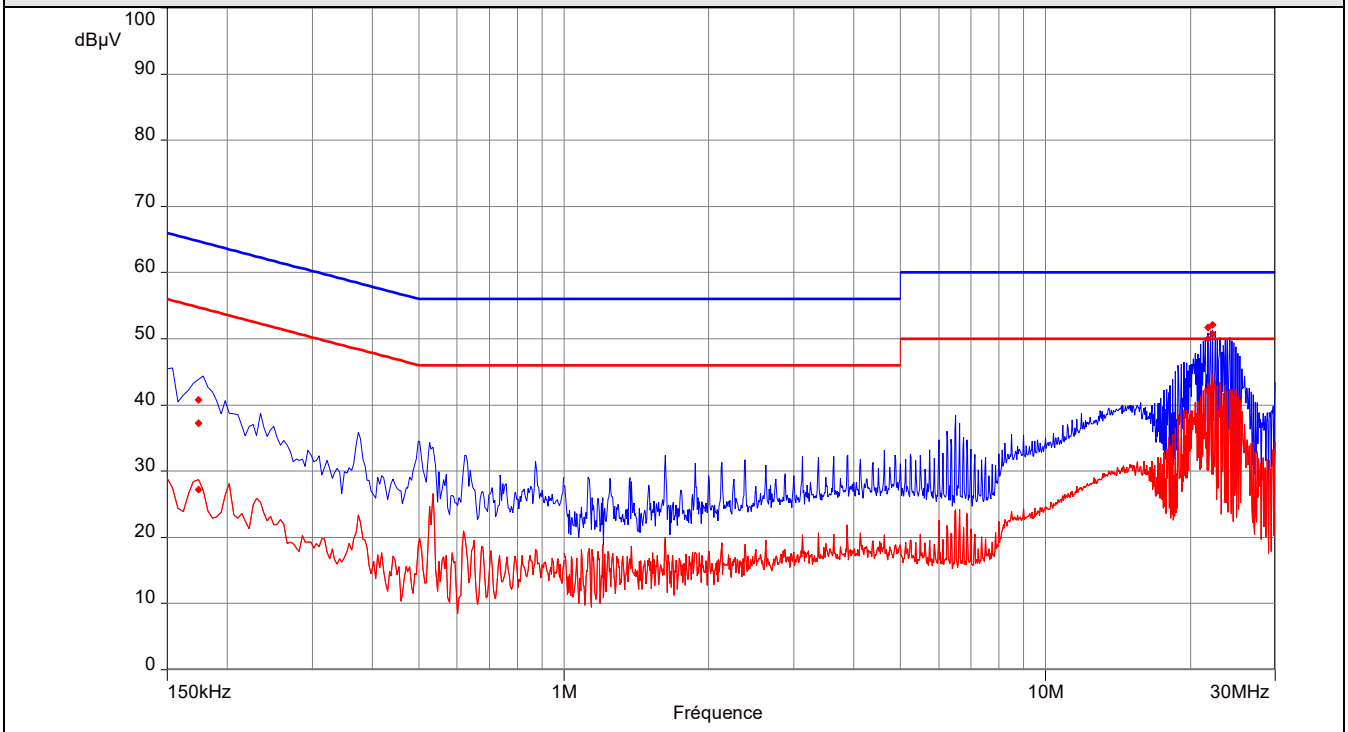
Ground reference plane

Tabulated Results for Mains Terminal Disturbance Voltage on AC port

FREQ	Meas. PK	Mes. QP	LIMIT QP	Margin QP	Mes. AV	LIMIT AV	Margin AV	Line
(MHz)	(dBµV)	(dBµV)	(dBµV)	(dB)	(dBµV)	(dBµV)	(dB)	
0.174	40.77	37.3	64.77	-27.47	27.19	54.77	-27.58	L1
21.752	51.71	50.06	60	-9.94	42.21	50	-7.79	L1
22.252	52.15	50.66	60	-9.34	42.79	50	-7.21	L1
0.178	39.12	32.69	64.58	-31.89	20.27	54.58	-34.31	L1
22	52.06	50.6	60	-9.4	42.66	50	-7.34	N
22.252	51.77	50.35	60	-9.65	42.43	50	-7.57	N

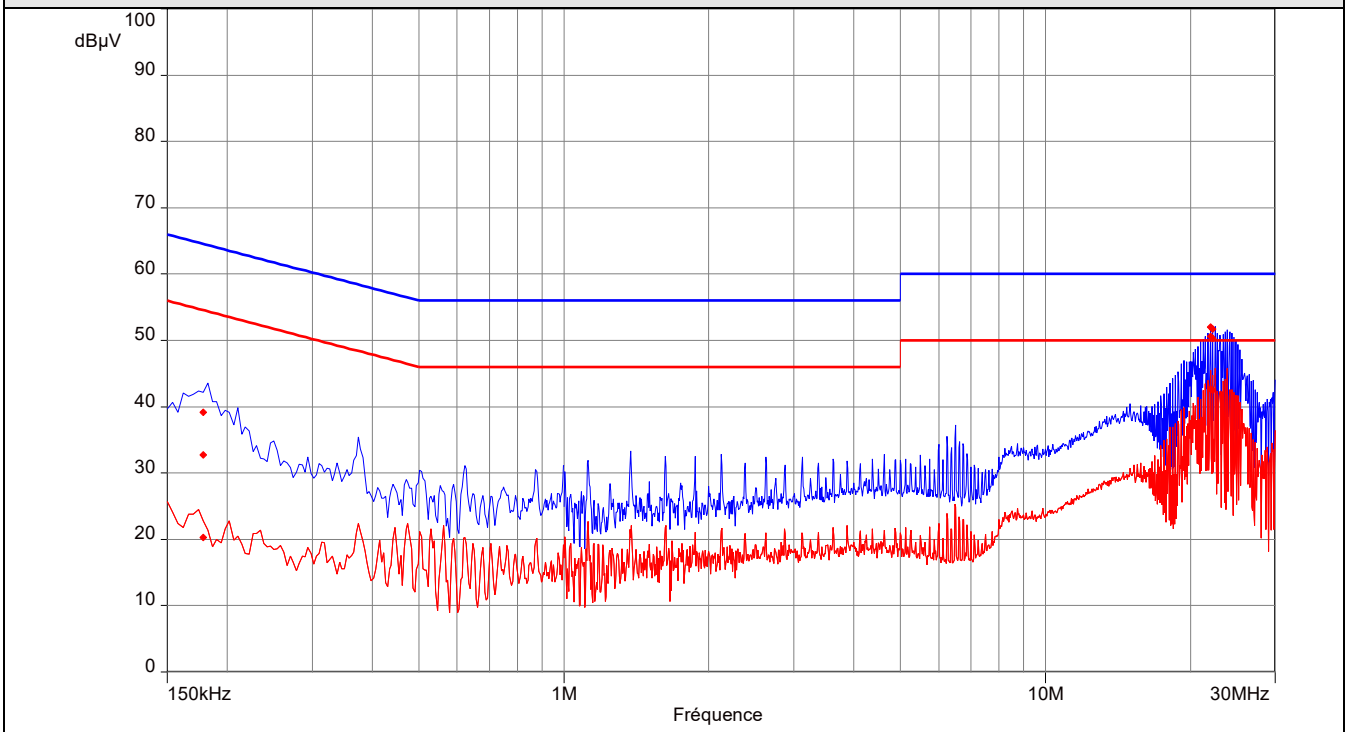
Frequency band investigated:	150kHz-30MHz
RBW:	9kHz
Voltage:	110V/60Hz
Limit:	15.207 / RSS-GEN §8.8
Final measurement detector:	Quasi-Peak and CISPR Average (AV)
RESULT:	PASS
Measured value calculation:	The measured value (level) is calculated by adding the Cable Factor, the Transient suppressor attenuation and LISN attenuation from the receiver amplitude reading. The basic equation is as follow: Meas. = RA + CF + ATT_{TRAN} + ATT_{LISN} Where Meas. = Level (dBµV) RA = Receiver Amplitude CF = Cable Factor ATT_{TRAN} = Transient suppressor attenuation ATT_{LISN} = LISN attenuation Margin value = Emission level – Limit value (A negative margin shows compliance to limit)

Graphical representation of Conducted Disturbance Measurement (Peak and Average detection)
AC port, Line L1



----: Peak | ----: Average

Graphical representation of Conducted Disturbance Measurement (Peak and Average detection)
AC port, Line Neutral



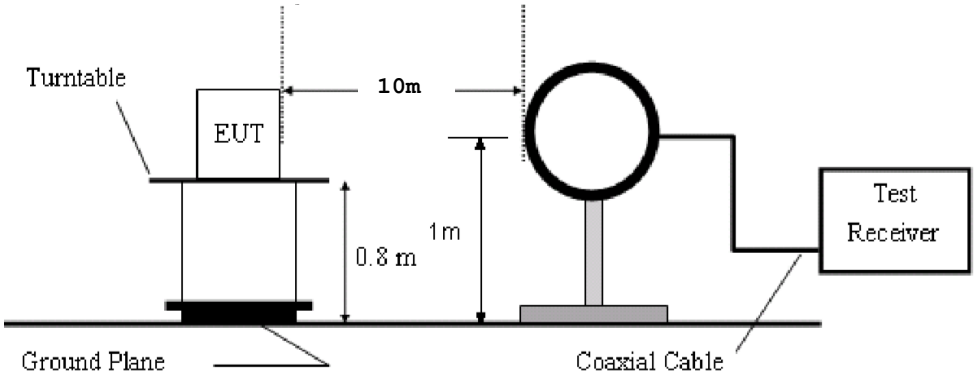
----: Peak | ----: Average

10. Radiated Emission Measurement (9kHz-10GHz)

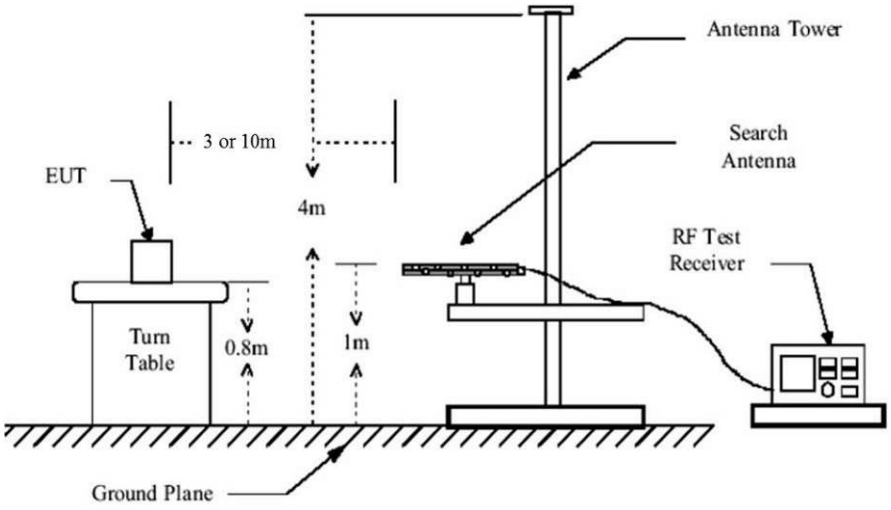
TEST: Radiated Emission Measurement (9kHz-10GHz)			**Verdict**
Method: Measurements were made in a 10 or 3-meter Open Area Test Site that complies to ANSI C63.4/ C63.10 for frequency below 1GHz. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in horizontal and vertical polarities. Final measurements (Peak/Quasi-Peak/Average) were then performed by rotating the EUT 360° and adjusting the receive antenna height. The tested equipment is set to transmit operation with modulations on lowest, middle and highest channel. Three orthogonal axis measurements on EUT are performed to obtain the maximum peak field strength. A pre-scan frequency identification of the EUT has been performed in full anechoic chamber. The measured radiated field of the EUT is performed at 3-meters of distance for frequency 9k-1GHz. Antenna is 1.25m high in front of EUT.			**Pass**
Laboratory Parameters:	Required prior to the test	During the test	
Ambient Temperature	20 to 30 °C	25°C ± 2	
Relative Humidity	30 to 70 %	45% ± 5	
Fully configured sample scanned over the following frequency range	Frequency range on each side of line	Measurement Point	
	9kHz – 30MHz	10 m measurement distance	
	30MHz – 10GHz	3 m measurement distance	
Limits – FCC Part 15.209, 15.225 (d) / RSS-210 §B.6 (d)			
Frequency (MHz)	Limits (dBµV/m)		
	Level / Detector / Distance	Results	
0.009 to 0.090	107.6 – 87.6 / AV / 10m 127.6 – 107.6 / PK / 10m	**Pass**	
0.090 to 0.110	87.6 – 85.9 / QP / 10m	**Pass**	
0.110 to 0.490	85.7 – 72.9 / AV / 10m 105.7 – 92.9 / PK / 10m	**Pass**	
0.490 to 1.705	52.9 – 42.1 / QP / 10m	**Pass**	
1.705 to 30	48.6 / QP / 10m	**Pass**	
30 to 88	40.0 / QP / 3m	**Pass**	
88 to 216	43.5 / QP / 3m	**Pass**	
216 to 960	46.0 / QP / 3m	**Pass**	
960-1000	54.0 / QP / 3m	**Pass**	
Above 1GHz	54.0 / AV / 3m 74.0 / PK / 3m	**Pass**	
Supplementary information: Test location: SMEE Test date: May 18th to 20th, 2020. Tested by L. Chapus			

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Log-periodic antenna	EMCO	3146	ANT-191-019	2019/6	2021/6
Biconnic antenna	COM-POWER	AB- 900	ANT-101-003	2019/6	2021/6
Loop antenna	EMCO	6502	ANT-101-009	2019/8	2021/8
BiConiLog antenna	EMCO	3142B	ANT-101-010	2019/8	2021/8
Horn antenna	ETS-LINDGREN	3115	ANT-141-013	2018/10	2021/10
Spectrum analyzer	Rohde&Schwarz	FSV40	ASP-171-004	2019/8	2021/8
RF cable	Div	OATS/25m	CAB-101-017	2020/4	2021/4
RF cable	Pasternack RF	PE302-120	CAB-131-024	2019/4	2020/6
RF cable	HUBER+SUHNER	RG214U	CAB-141-026	2019/4	2020/6
RF cable	HUBER+SUHNER	RG214U	CAB-141-029	2019/4	2020/6
RF cable	HUBER+SUHNER	SF104	CAB-141-030	2019/4	2020/6
Pre-amplifier	Pasternack RF	PE1524	PRE-101-002	2019/6	2020/6
Anechoic chamber	COMTEST	214263	CAG-141-001	2017/6	2020/6
OATS	Div	10m	SIT-101-001	2017/7	2020/7
Antenna mast	Innco- Systems	MA4000EP	MAT-101-001	-	-
Turntable	Innco- Systems	DS1200S	PLA-101-001	-	-
Turntable	Innco- Systems	CT0800	PLA-141-001	-	-
Measuring Rec	Rohde&Schwarz	ESRP	REC-151-002	2019/9	2021/9
EMC Software	NEXIO	BAT EMC V3.18	SOF-101-001	-	-

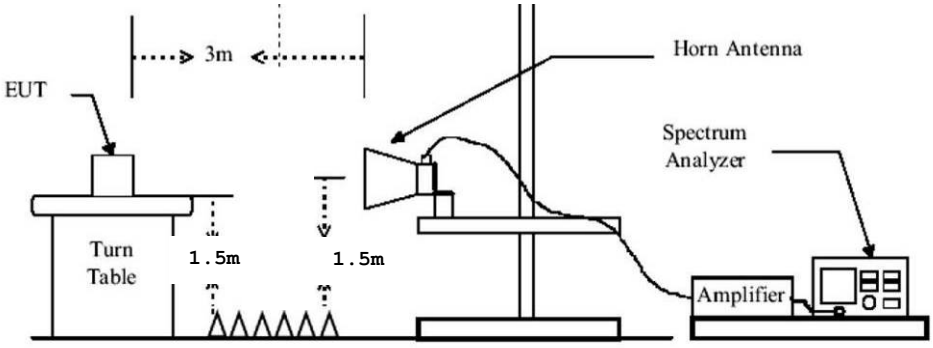
Test Setup for radiated emission



Test setup for 9k-30MHz



Test setup for 30-1000MHz (3m)



Test setup for 1-10GHz

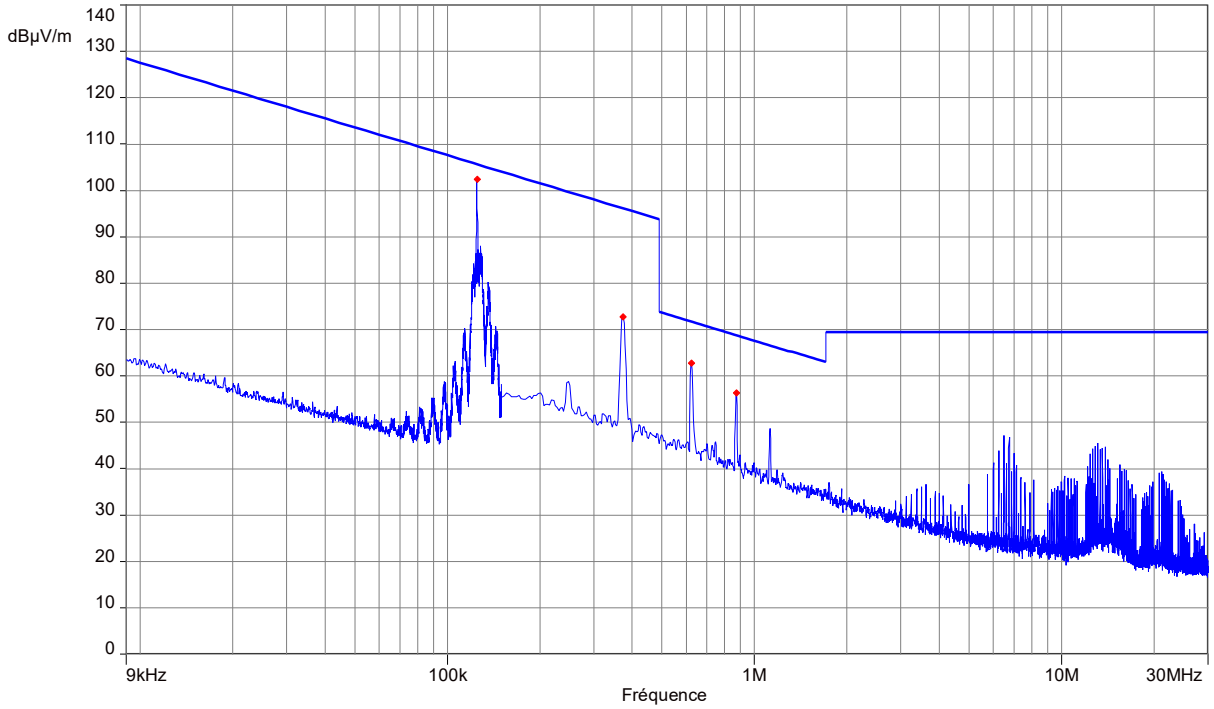
Tabulated Results for Unwanted emissions (9kHz-490kHz)							
FREQ	**RF field @ 300m**	**Limit @ 300m**	**Detector**	**Margin**	**Ant. angle**	**Table angle**	**Correc. Fact. (CF)**
MHz	dBµV/m	dBµV/m	Pk / QP / AV	dB	Degree	Degree	dB
0,125	**12.1***1	25,6	AV	**-13.5**	90	75	10.6
0,125	**29.7***1	45.6	Pk	**-15.9**	90	75	10.6
0.374	**-16.8***1	16.1	AV	**-33.0**	90	55	10.5
0.374	**3.1***1	36.1	Pk	**-32.9**	90	55	10.5
Supplementary information: Frequency list measured on the Open Area Test Site has been created with pre-scan results.							
Frequency band investigated:	9kHz-490kHz						
RBW:	200Hz (9kHz-150kHz) 9kHz (150kHz-30MHz)						
Measurement distance:	10m						
Final measurement detector:	Peak / Quasi-Peak / Average						
Limit:	FCC Part 15.209 / RSS-Gen						
Note:	CF: Correction factor = Antenna factor + Cable loss *1: Measure have been done at 10m distance and corrected according to requirements of 15.209.e / RSS-Gen clause 6.5) (M@300m = M@10m-59.1dB) Loop antenna used and rotated about its axis to maximize any emission.						

Tabulated Results for Unwanted emissions (490kHz-30MHz)							
FREQ	**RF field @ 30m**	**Limit @ 30m**	**Detector**	**Margin**	**Ant. angle**	**Table angle**	**Correc. Fact. (CF)**
MHz	dBµV/m	dBµV/m	Pk / QP	dB	Degree	Degree	dB
0.625	**25.3***1	31.7	QP	**-6.4**	0	65	10.5
0.875	**21.4***1	28.8	QP	**-7.4**	0	75	10.5
Supplementary information: Frequency list measured on the Open Area Test Site has been created with pre-scan results.							
Frequency band investigated:	490kHz-30MHz						
RBW:	9kHz (150kHz-30MHz)						
Measurement distance:	10m						
Final measurement detector:	Quasi-Peak						
Limit:	FCC Part 15.209 / RSS-Gen						
Note:	CF: Correction factor = Antenna factor + Cable loss *1: Measure have been done at 10m distance and corrected according to requirements of 15.209.e) (M@30m = M@10m-19.1dB) Loop antenna used and rotated about its axis to maximize any emission.						

Tabulated Results for Radiated Disturbance (3m measurement on Open Area Test Site, 30MHz-1GHz)										
FREQ	**Meter reading**	**Meter reading**	**Total Factor**	**Field level**	**Field level**	**Pol**	**Antenna height**	**Table angle**	**Limit**	**Margin**
MHz	(QP) dBµV	(Pk) dBµV	dB	(QP) dBµV/m	(Pk) dBµV/m		cm	Degré	(QP) dBµV/m	dB
48.760	29.0	33.4	10.8	39.8	44.2	V	100	124	40	**-0.2**
56.250	29.5	34.0	10.3	39.8	44.3	V	100	129	40	**-0.2**
168.350	21.8	24.0	13.2	35.0	37.2	V	100	180	40	**-5.0**
270.050	24.3	26.6	15.0	39.3	41.6	V	100	100	46	**-6.7**
Supplementary information: Frequency list measured on the Open Area Test Site is created with pre-scan results.										
Frequency band investigated:			30MHz-1GHz							
RBW:			120kHz							
Measurement distance:			3m							
Limit:			FCC Part 15.209 / RSS-Gen §8.9							
Final measurement detector:			Quasi-Peak							
RESULT:			PASS							
Note:										

Tabulated Results for Unwanted emissions (1GHz-10GHz)				
FREQ	**Field level**	**Detector**	**Limit**	**Result**
(MHz)	dBµV/m		(dBµV/m)	
Levels at least 10dB below limits		Pk	74 Pk	**Pass**
Levels at least 10dB below limits		Av	54 Av	**Pass**
RBW	1MHz (CISPR)			
Measurement distance:	3m			
Limit:	FCC Part 15.209 / RSS-Gen §8.9			
Final measurement detector:	Peak / CISPR Average			
RESULT:	PASS			

Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 9kHz-30MHz / 3m / Parallel & Perpendicular antenna position / Transmit mode)



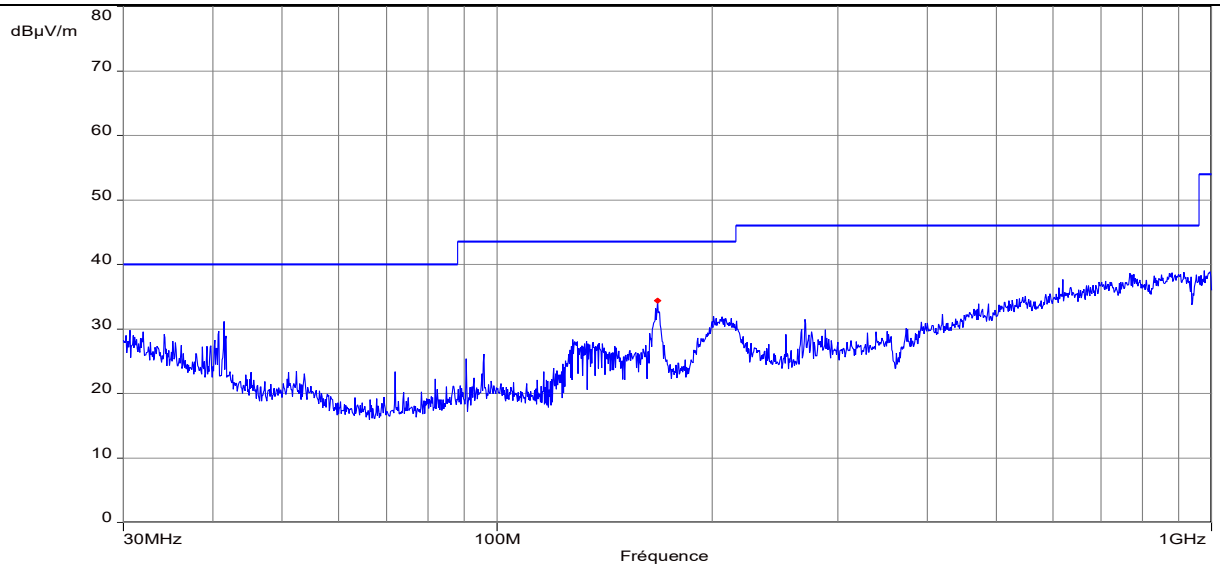
Notes: Pre-scan graph only for identification purpose.

Frequency band investigated:	9kHz-30MHz
Unit :	dBµV/m
RBW :	200Hz (9kHz-150kHz) 9kHz (150kHz-30MHz)
Antenna polarization :	Parallel & Perpendicular to measurement axis
Measurement detector:	Peak

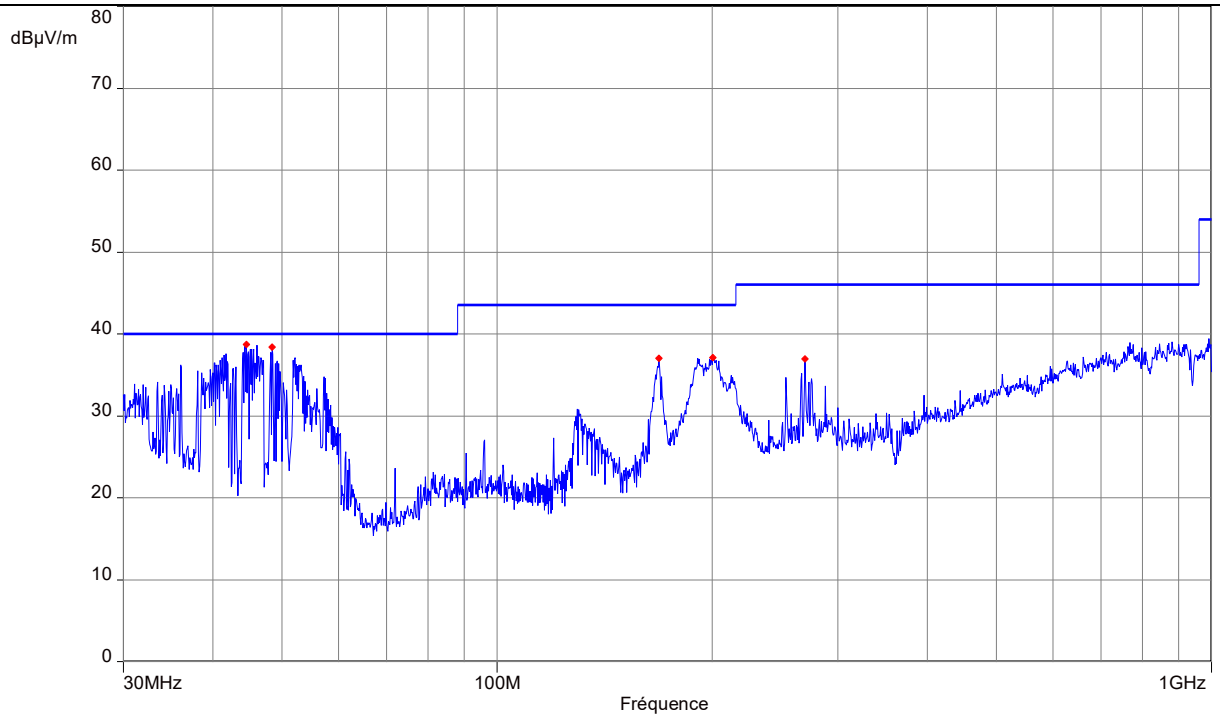
Frequency (MHz)	Peak Level (dBµV/m)	Limit (dBµV/m)	Polarization
0.125031	102.37	105.6	
0.373897	72.79	96.2	
0.624662	62.77	71.7	
0.872442	56.35	68.8	

Graphical representation of Radiated Disturbance Measurement (Anechoic chamber pre-scan, 30MHz-1GHz / 3m)

Horizontal polarization



Vertical polarization



------ : Peak measure / limits | ------ : Average measure / limits

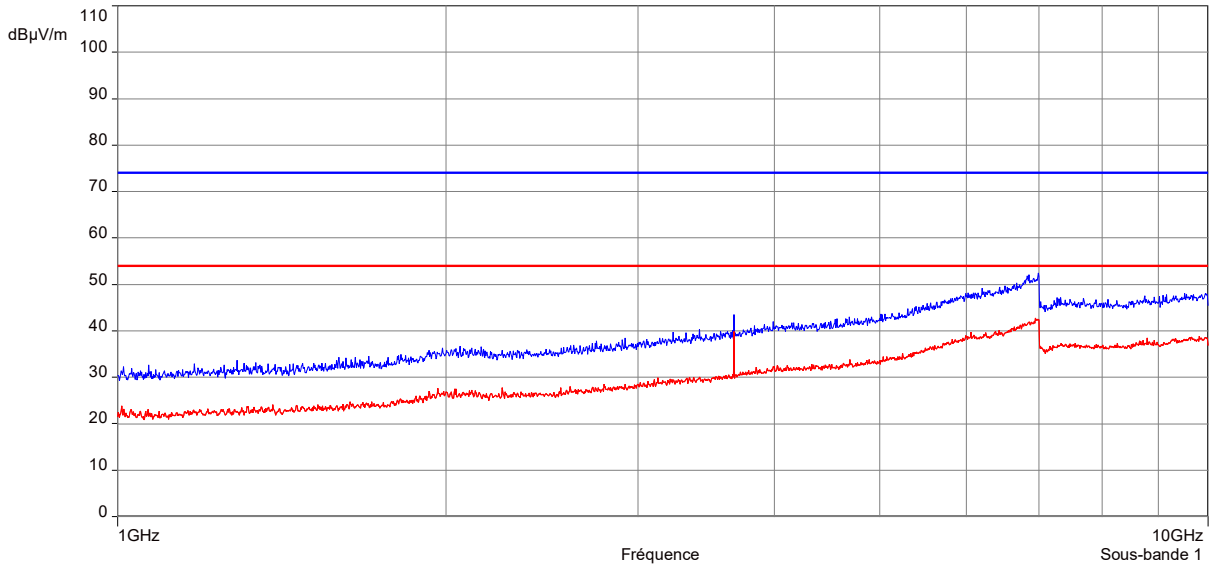
Note: Pre-scan graph only for identification purpose.

Marker List :

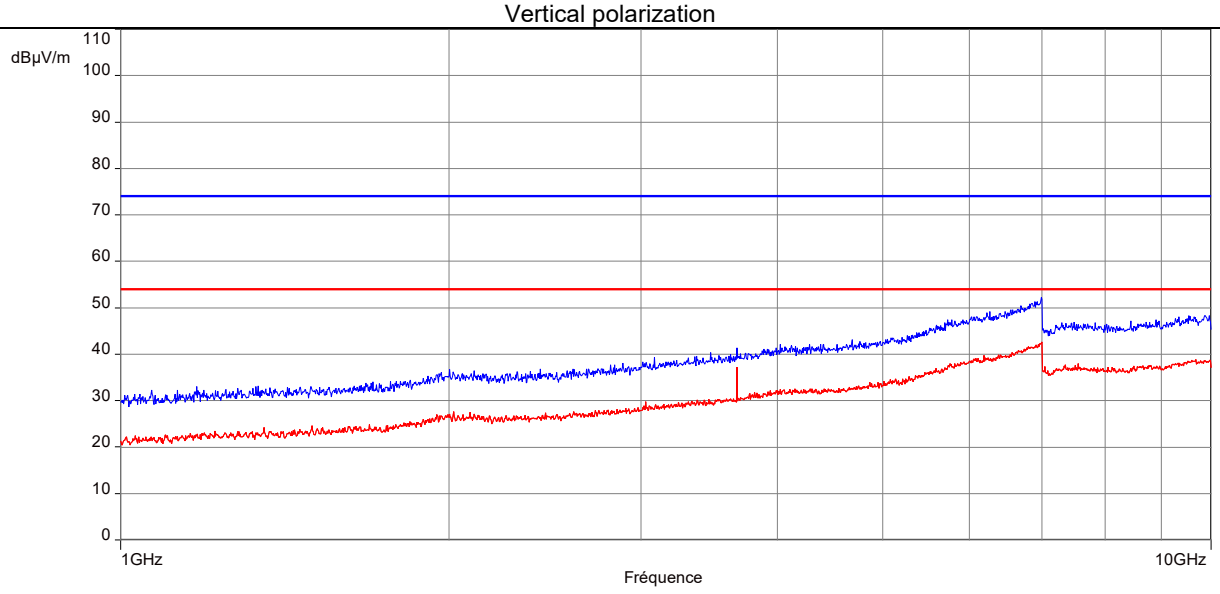
Frequency (MHz)	Peak Level (dBµV/m)	Limit (dBµV/m)	Polarization
44.6111	38.76	40.0	V
48.4912	38.42	40.0	V
168.381	37.07	43.5	V
200.695	37.12	43.5	V
270.052	36.99	46.0	V

Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 1GHz-10GHz / 3m)

Horizontal polarization



Vertical polarization



------ : Peak measure / limit	------ : AVG measure / limit	

Note: Pre-scan graph only for identification purpose.

Marker List :

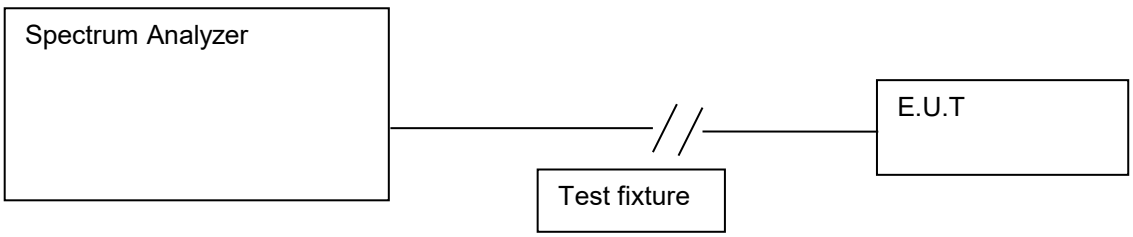
Frequency (MHz)	Peak Level (dBµV/m)	Limit (dBµV/m)	Polarization
None	-	-	-

11. 99% Occupied Bandwidth

TEST: Occupied Bandwidth / 15.215 – RSS-Gen		**Verdict**
Method: The setup is in an anechoic chamber. The spectrum analyzer is connected to the measuring antenna. The RBW is set at 1kHz, with VBW ≥ 3 x RBW. The SPAN is wide enough to capture all products of the modulation process. A MaxHold Peak detector is used. Measures are performed with OBW 99% function of the spectrum analyser.		**Pass**
Laboratory Parameters:	Required prior to the test	During the test
Ambient Temperature	10 to 40 °C	20°C
Relative Humidity	10 to 90 %	55%
Supplementary information: Test location: SMEE Test date: May 18th, 2020. Tested by L. Chapus		

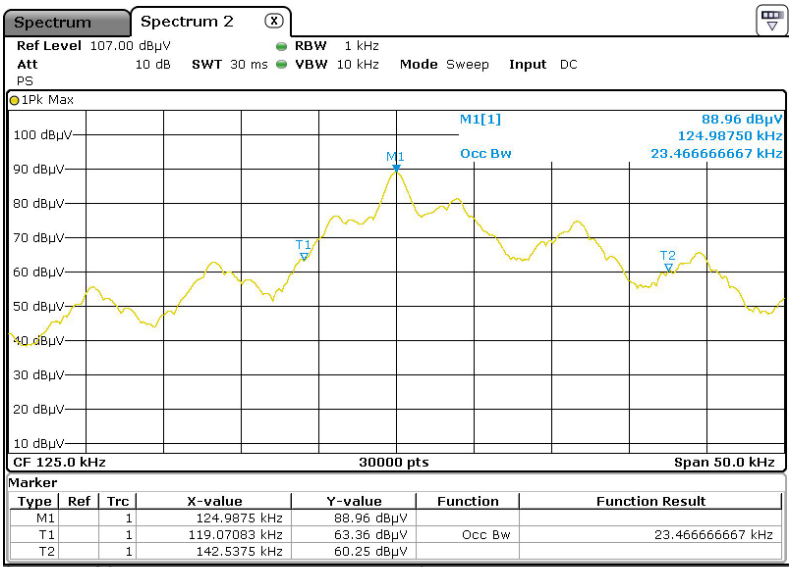
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Measuring Rec.	Rohde&Schwarz	ESRP	REC-151-002	2019/9	2021/9
Loop antenna	EMCO	6502	ANT-101-009	2019/8	2021/8
RF cable	HUBER+SUHNER	RG214U	CAB-141-026	2019/4	2020/6
RF cable	HUBER+SUHNER	RG214U	CAB-141-029	2019/4	2020/6
Anechoic chamber	COMTEST	214263	CAG-141-001	2017/6	2020/6

Test Setup for radiated emission (Test fixture)



Tabulated Results for Occupied Bandwidth (99%)	
Frequency (kHz)	**99% Bandwidth** (kHz)
124.9875	23.466

Graphical representation of Occupied Bandwidth



99% Occupied Bandwidth

Frequency:	125kHz
RBW / VBW:	1kHz / 10kHz
Measurement detector:	Peak