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TEST REPORT

N°121425-642650A

FCC REGISTRATION NUMBER 888863
Industry Canada number 6230B-1

ISSUED TO : **SCHNEIDER ELECTRIC**
BP 660
ZI N°3
16340 L'Isle d'Espagnac – France

SUBJECT : **ELECTROMAGNETIC COMPATIBILITY TESTS ACCORDING TO THE
STANDARD 47 CFR PART 15, SUBPART C, 15.225 and RSS-GEN, RSS-102,
RSS-210**

Apparatus under test

Product : ETHERNET / IP SMART ANTENNA
Trade mark : Telemecanique Sensors
Manufacturer : Schneider Electric
Model : -
Reference : XGCS850C201
Serial number : -

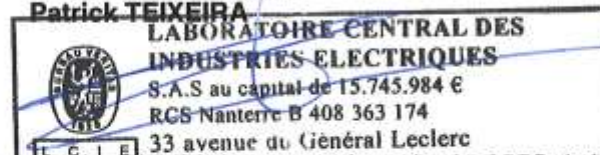
Applicant : **SCHNEIDER ELECTRIC**
FCC ID : **Y7HXGCS85**
IC : **7002C-XGCS85**
Test date : 2013-06-20 & 2013-08-30 & 2013-09-02

Composition of document : 26 pages

Fontenay-Aux-Roses, September 03rd, 2013

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TABLE OF CONTENTS

1 – GENERAL

1.1 – <u>Summary of test results</u>	Page 3
1.2 – <u>References</u>	Page 3
1.3 – <u>Equipment under test specification</u>	Page 5

2 – TEST RESULTS

2.1 – <u>Power line conducted emission test</u>	Page 8
2.2 – <u>Field strength within the 13.110-14.010MHz band</u>	Page 12
2.3 – <u>Field strength outside the 13.110-14.010MHz band</u>	Page 16
2.4 – <u>Frequency tolerance over extreme voltage and temperature condition</u>	Page 23

FCC ID: Y7HXGCS85
IC: 7002C-XGCS85

1 – GENERAL

1.1 – Summary of test results

Radiated emissions are made in open field site located Chemin des Hautes Peines at ECUELLES (77260, FRANCE).
FCC REGISTRATION NUMBER 888863
Industry Canada number 6230B-1

A description of the test facility is on file with the FCC.

47 CFR Part 15 & RSS 210			
Paragraph No.	Name of test	Remarks	Result
§ 15.203	Antenna requirement	Internal antenna	Pass
§ 15.205	Restricted band operation		Pass
§ 15.207 (a) & RSS GEN §7.2.2	Power line conducted limits		Pass
§ 15.209 (a) (b) (c) (d) & table 3 RSS 210	Radiated measurement of spurious emissions		Pass
§15.225 (a) (b) (c) & RSS 210	Field strength within the band 13.110-14.010 MHz		Pass
§15.225 (d) & A2.6 of RSS 210	Field strength outside of the bands 13.110-14.010 MHz		Pass
§15.225 (e) & A.2 of RSS 210	Frequency stability over extreme temperature and voltage conditions		Pass

NA : Not Applicable

Remark:

1.2 – References

Measurements were performed in accordance with the following standards:

47 CFR Part 15 of October, 2012: Code of federal regulations – Telecommunication –Radiofrequency devices

RSS-Gen of December 2010: General Requirements and Information for the Certification of Radiocommunication Equipment

RSS-102 of Mars 2010: Radio Frequency Exposure Compliance of Radiocommunication Apparatus

RSS-210 of December 2010: Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

ANSI C63.4 of December 11, 2003: American national standard for methods of measurement of radio noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz.

CISPR 16-4-2 of November, 2003: International electrotechnical commission - Specification for radio disturbance and immunity measuring apparatus and methods – Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements.



1.3 – test methodology

Radio performance tests procedures given in part 15:

Paragraph 33: frequency range of radiated measurements

Paragraph 35: measurement detector functions and bandwidths

Paragraph 203: antenna requirement

Paragraph 205: restricted bands of operation

Paragraph 207: conducted limits

Paragraph 209: radiated emission limits; general requirements

Paragraph 225: radiated emission limits; general requirements

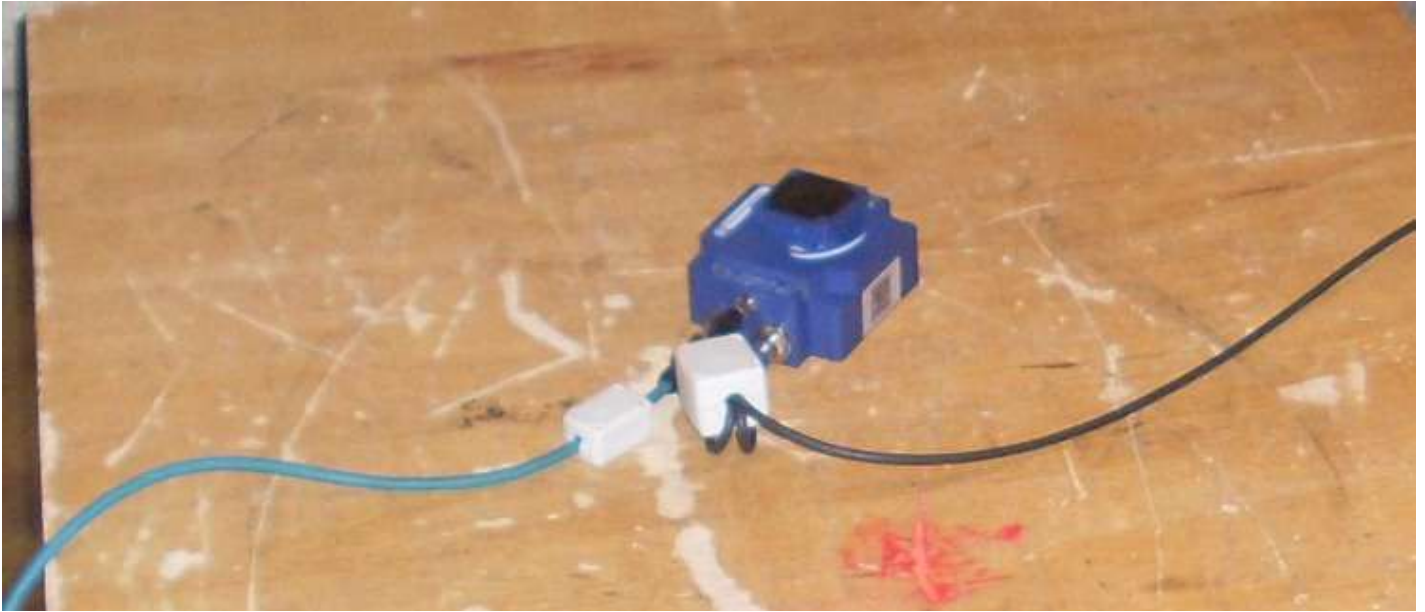
FCC ID: Y7HXGCS85
IC: 7002C-XGCS85**1.3 - Equipment under test specification**1.3.1 – General equipment information

Applicant	: SCHNEIDER ELECTRIC BP 660 ZI N°3 16340 L'Isle d'Espagnac – France
Manufacturer	: SCHNEIDER ELECTRIC BP 660 ZI N°3 16340 L'Isle d'Espagnac – France
Dimensions	: 108 x 80 x 40 mm
Frequency band	: 13.56 MHz
Number of channel	: 1
Channel spacing	: -
User frequency adjustment	: No
User power adjustment	: No
Type of antenna	: Dedicated loop antenna permanently connected on the PCB
Is the operation point to point?	: No
Power supply	: 24 V-dc
Internal frequencies	: Ethernet 25MHz, Switching power supply oscillator (3.3 V) 260KHz, Switching power supply oscillator (2.5 V & 1 V) 1.6MHz, Asic clock oscillator 25MHz, Mico-controller clock 40MHz-crystal, RFID-controller clock 13.56MHz-crystal.
External links	: Port 1 : M8 socket power supply 24 V-dc Port 2 : M12 socket Ethernet port Nr1 Port 3 : M12 socket Ethernet port Nr2

Marking plate

1.3.2 – Description of modifications

- Adding a ferrite reference 74271221 on 24 V-dc power cable
- Adding a ferrite reference 74271131 on Ethernet Cable



1.3.3 – Description of operation

The equipment was configured in the following operation mode:

- Maximum transmission power: Permanently emission at 13.56 MHz with the usual modulation.

FCC ID: Y7HXGCS85
IC: 7002C-XGCS85

1.3.4 – Photographs of the sample



General view of OsiSence XG Range



The Tag



OsiSence XG Range marking plate

1.3.5 – Auxiliary equipment

Laptop computer and the tag



AC/DC converter for conducted emission test



2- TEST RESULTS

2.1 Power line conducted emission test

2.1.1 - General

The product has been tested at 120V/60Hz with AC/DC converter on power line voltage and compared to the FCC part 15 subpart C § 15.207 limits.

The 6 dB resolution bandwidth was 9 kHz from 150 kHz to 30 MHz.

2.1.2 – Test setup

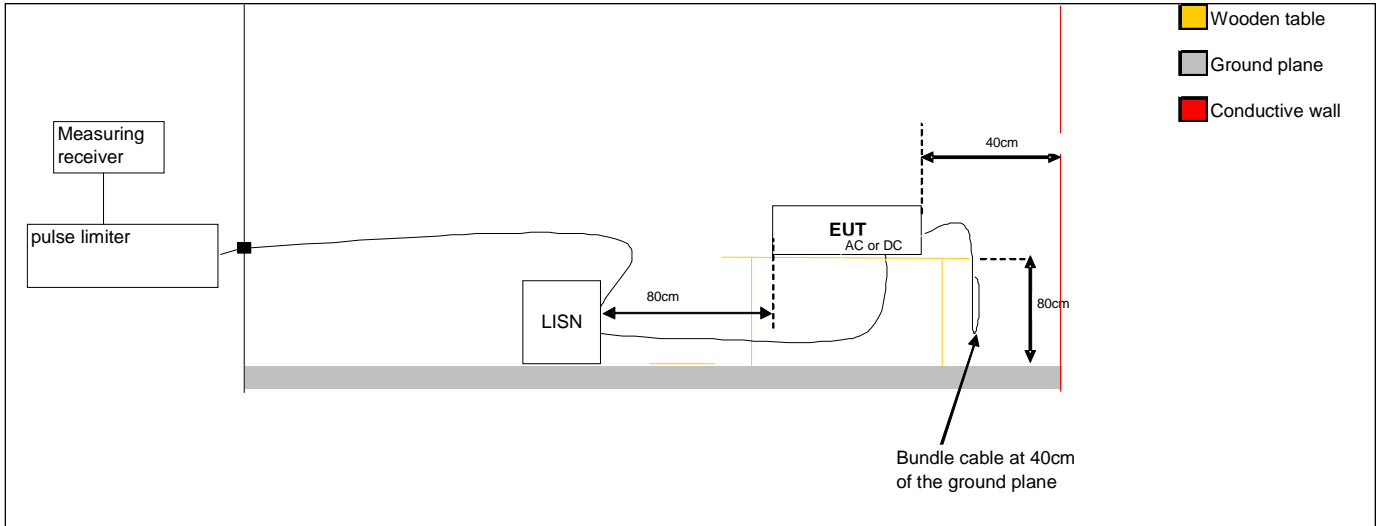
The EUT is placed on a table at 0.8 m height. The cable of the power port has been shorted to 1 meter length. The EUT is powered through the LISN.





FCC ID: Y7HXGCS85
IC: 7002C-XGCS85





2.1.3 – Equipment list

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Receiver	ROHDE & SCHWARZ	ESI40	A2642010	2012/09	2013/09
V ISLN	ROHDE & SCHWARZ	ESH3Z5	C2322003	2012/12	2013/12
Pulse limiter	ROHDE & SCHWARZ	ESH3Z2	A2649005	2012/11	2013/11
Reference ground plan	L.C.I.E.	-	-	-	-

2.1.4 – Uncertainty

The uncertainty values calculated by the laboratory are lower than limit uncertainty values defined by the CISPR 16-4-2. The conformity of the sample is directly established by the applicable limits values.

Kind of measurement	Wide uncertainty laboratory (k=2) ± x	CISPR uncertainty limit ± y
Measurement of conducted disturbances in voltage on the power port	3.57 dB	3.6 dB



FCC ID: Y7HXGCS85
IC: 7002C-XGCS85

2.1.5 – Test results

Conducted measurement on phase line

<u>Frequency</u> (MHz)	<u>Peak</u> <u>measurements</u> (dB μ V)	<u>Quasi-Peak</u> <u>measurements</u> (dB μ V)	<u>Quasi-Peak</u> <u>limits</u> (dB μ V)	<u>Average</u> <u>measurement</u> (dB μ V)	<u>Average limits</u> (dB μ V)
0.205	49.9	-	63.4	35.2	53.4
0.475	44.3	-	56.4	42.5	46.4
1.09	37.7	-	56	36.2	46
1.90	39.4	-	56	37.3	46
2.92	43.2	-	56	31.9	46
3.35	42.7	-	56	39.5	46
13.56 (*)	46.2	-	60	38.3	50

(*): transmitter frequency

Conducted measurement on neutral line

<u>Frequency</u> (MHz)	<u>Peak</u> <u>measurements</u> (dB μ V)	<u>Quasi-Peak</u> <u>measurements</u> (dB μ V)	<u>Quasi-Peak</u> <u>limits</u> (dB μ V)	<u>Average</u> <u>measurement</u> (dB μ V)	<u>Average limits</u> (dB μ V)
0.205	48.2	-	63.4	33.7	53.4
0.475	42.3	-	56.4	41.3	46.4
1.09	36.3	-	56	35.0	46
1.90	38.1	-	56	36.4	46
2.92	42.3	-	56	32.0	46
3.53	43.4	-	56	31.3	46
13.56 (*)	43.5	-	60	35.5	50

(*): transmitter frequency

Remark:

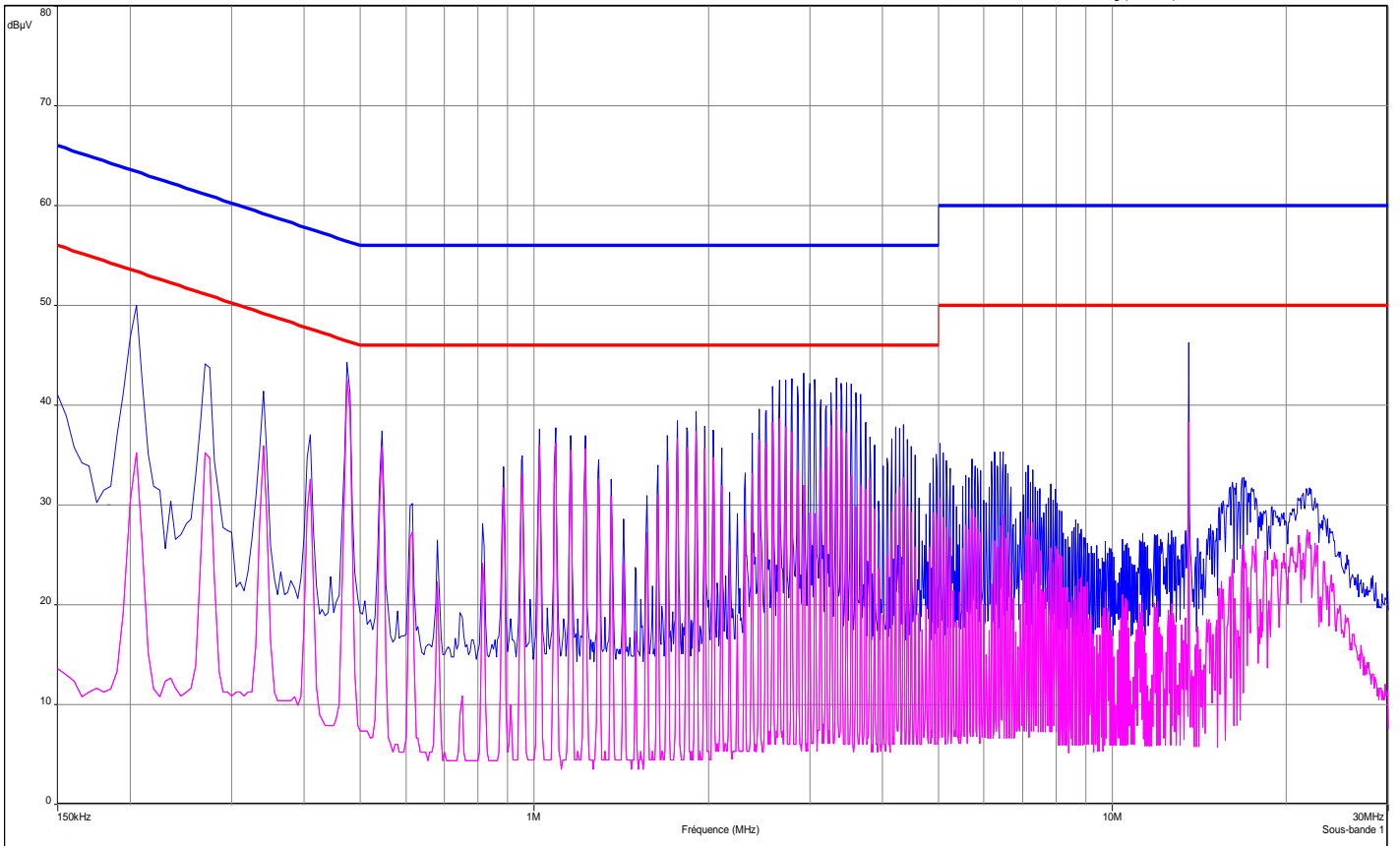
The carrier of the transmitter is at 13.56 MHz



FCC ID: Y7HXGCS85
IC: 7002C-XGCS85

FCC Part15 class B
TELEMECANIQUE SENSORS
ETHERNET / IP SMART ANTENNA
TYPE: XGCS850C201
Phase Line
120V/60Hz

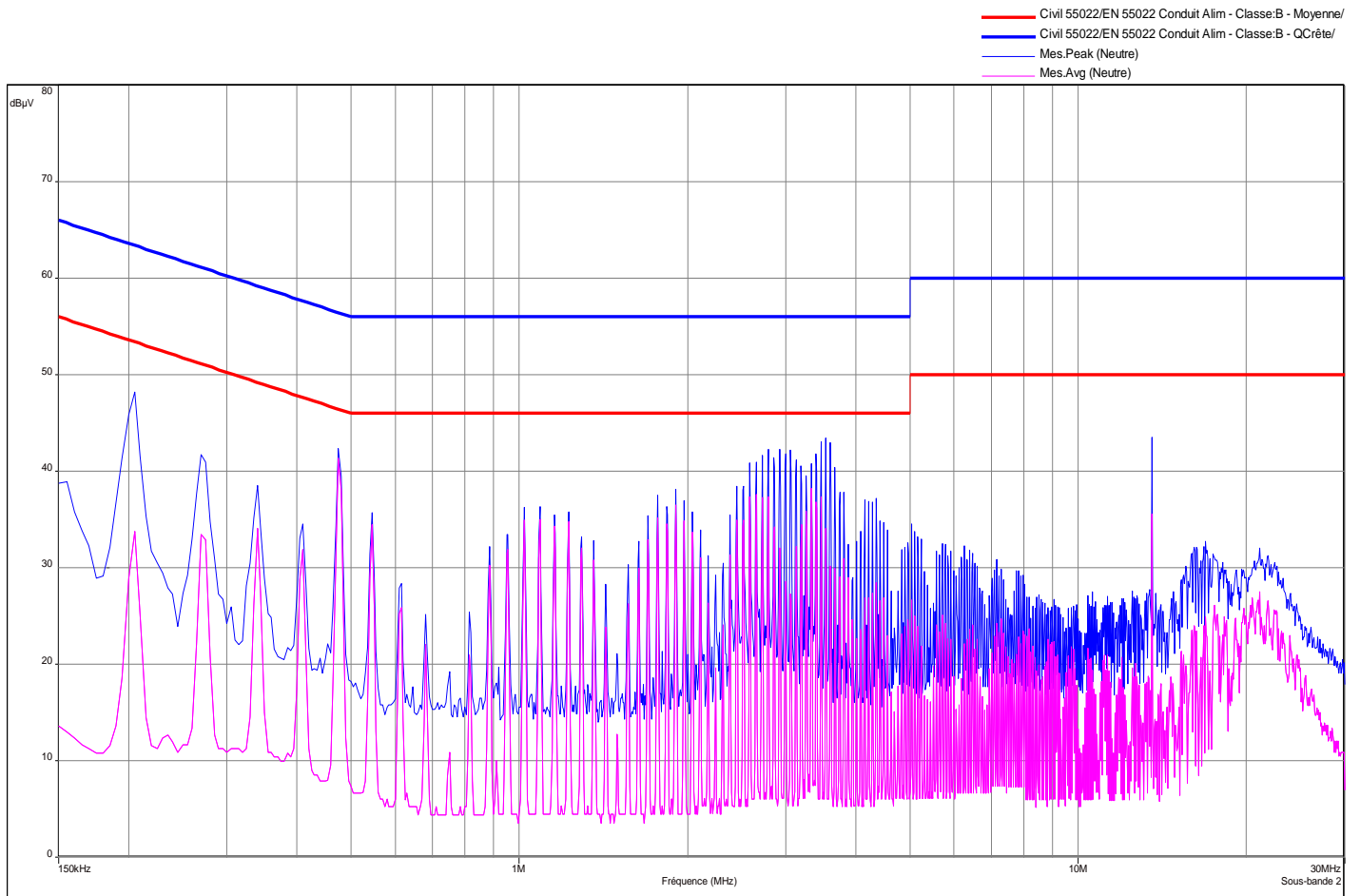
— Civil 55022/EN 55022 Conduit Alim - Classe:B - Moyenne/
— Civil 55022/EN 55022 Conduit Alim - Classe:B - QCrête/
— Mes.Peak (Phase 1)
— Mes.Avg (Phase 1)





FCC ID: Y7HXGCS85
IC: 7002C-XGCS85

FCC Part15 class B
TELEMECANIQUE SENSORS
ETHERNET / IP SMART ANTENNA
TYPE: XGCS850C201
Neutral Line
120V/60Hz



2.2 – Field strength within the band 13.110-14.010MHz

2.2.1 – General

The product has been tested with 24 V-dc power line voltage on charger and compared to the FCC part 15 subpart C §15.225 (a) (b) and (c) limits.

The 6dB resolution bandwidth was :

- 9 KHz from 150 kHz to 30 MHz

2.2.2 – Test setup

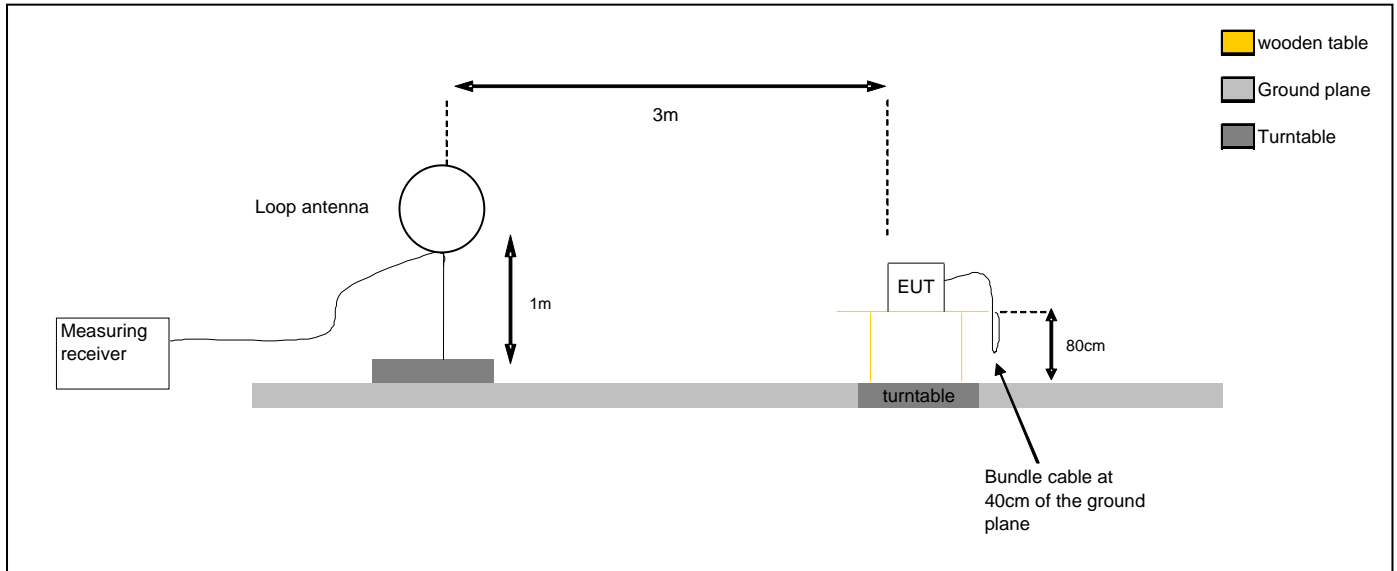
The EUT is placed at 3m distance of the loop antenna on a table 80cm height. The level has been maximised by turning the EUT with the rotating table and with the antenna at 0° and 90° around its vertical and horizontal axes. Antenna height was 1m. Pre scans were performed on the EUT put on its three axes to determine the position with maximum radiation.

The measuring value has been extrapolated to a 30m distance measured level according to § 15.31 (f) (2) by the following formula:

$$E_{30m} = E_d \times \left(\frac{d}{30}\right)^2$$

E_{30m} is the field strength at 30m in $\mu\text{V/m}$
 E_d is the field strength at the measured distance in $\mu\text{V/m}$
 d is the used distance between antenna and EUT in m





2.2.3 – Equipment list

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Receiver	ROHDE & SCHWARZ	ESU 26	A2642018	04/2013	04/2014
Loop antenna	ROHDE & SHWARZ	HFH H2 Z2	C2040007	08/2012	08/2014

2.2.4 – Uncertainty

Kind of measurement	Wide uncertainty laboratory (k=2) ± x	CISPR uncertainty limit ± y
E field measurement	4.75 dB	Not defined



FCC ID: Y7HXGCS85
IC: 7002C-XGCS85

2.2.5 – Test results

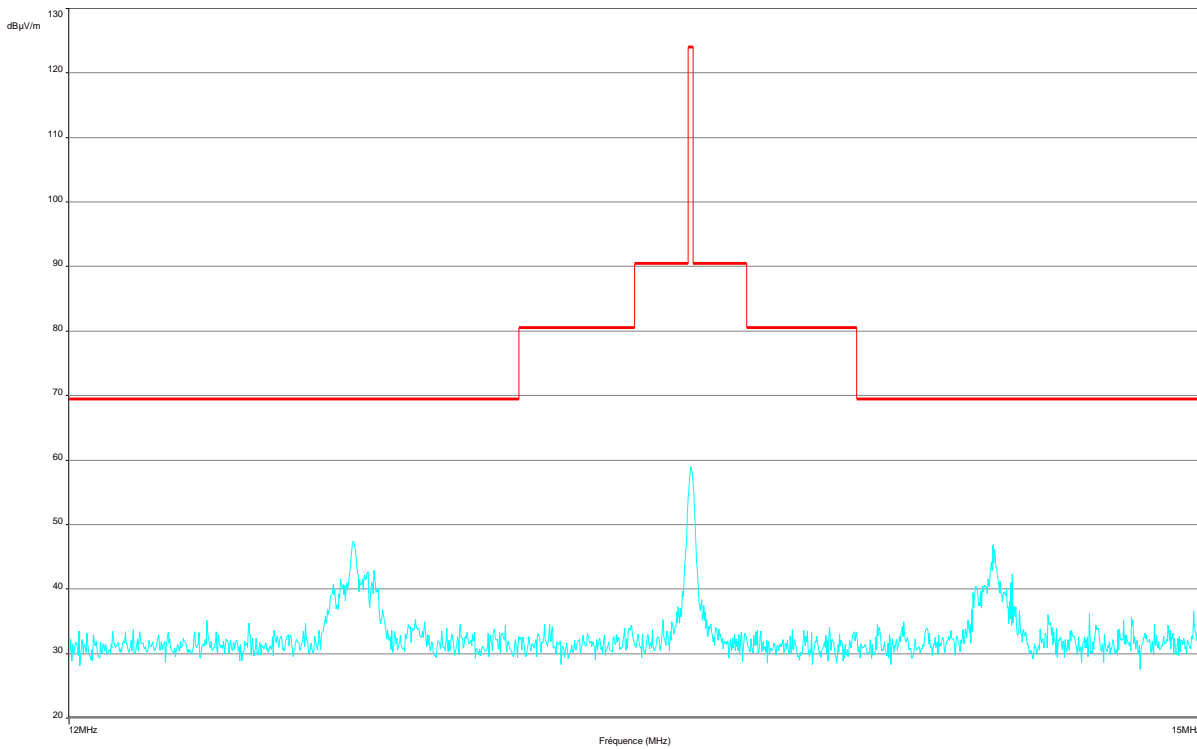
The 30 m measure corrected is M@3m - 40dB

Frequency (MHz)	Maximum Quasi Peak (30m) dBµV/m	Quasi Peak Limit (30m) dBµV/m
13.56	14.9	84.0

2.2.6 – Band-edge compliance

Frequency (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
13.553-13.567	15848	84	30
13.410-13.553 13.567-13.710	334	50.5	30
13.110-13.410 13.710-14.010	106	40.5	30
Outside 13.110-14.010	30	29.5	30

Graph from 12.5 to 14.5 MHz with RBW=10kHz and VBW=30kHz (measurement @ 3m)



2.3 – Field strength outside the 13.110-14010MHz band

2.3.1 – General

The product has been tested with 24 V-dc power line voltage on charger and compared to the FCC part 15 subpart C § 15.209 limits.

The 6dB resolution bandwidth was:

- 200 Hz from 9 kHz to 150 kHz.
- 9 kHz from 150 kHz to 30 MHz.
- 120 kHz from 30 MHz to 1000 MHz.
- 1 MHz from 1 GHz to 18 GHz.

-Frequency range: 9 kHz to 30 MHz

Measuring Distance: **3 m**

Antenna:

- Loop antenna (9 KHz to 30 MHz)

-Frequency range: 30 MHz to 18000 MHz

Measuring Distance: **10 m**

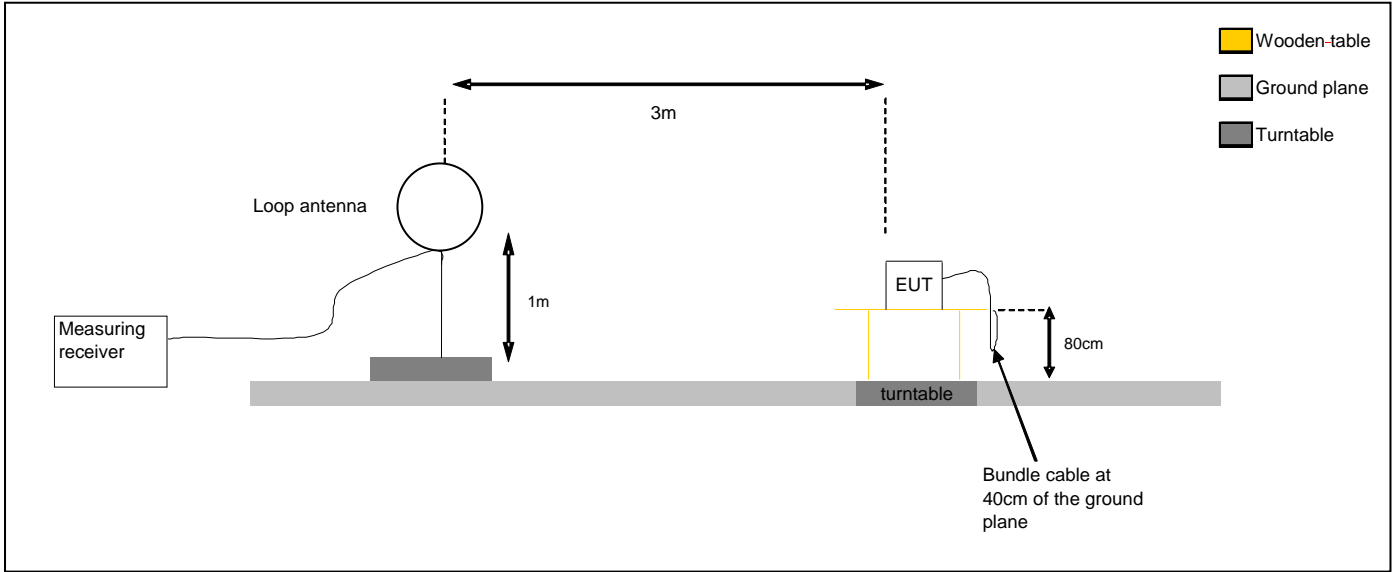
Antenna:

- Bilog (30 MHz to 1000 MHz)
- horn (1000 MHz to 18000 MHz)

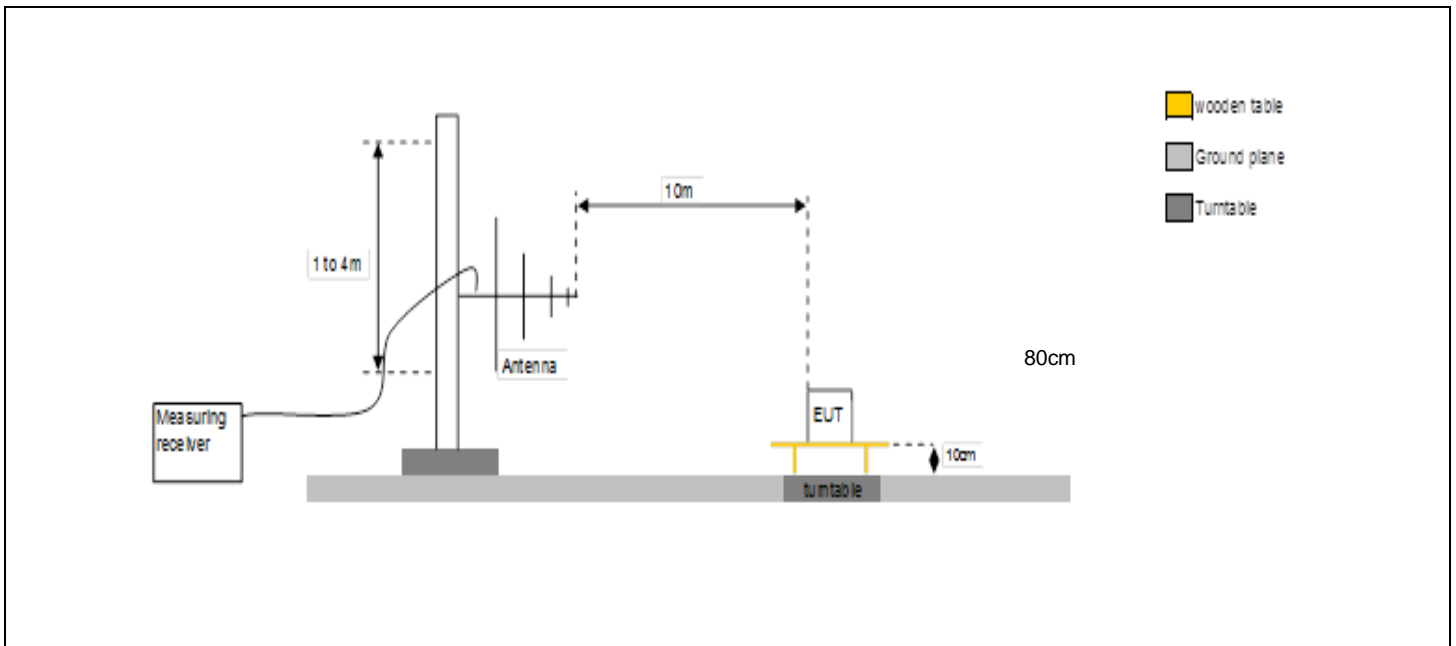


FCC ID: Y7HXGCS85
IC: 7002C-XGCS85

The EUT is placed at 3m distance of the loop antenna (0.009 to 30MHz) on a table 80cm height. The level has been maximised by turning the EUT with the rotating table and with the antenna at 0° and 90° around its vertical and horizontal axes. Antenna height was 1m. Pre scans were performed on the EUT put on its three axes to determine the position with maximum radiation.



The EUT is placed at 10m distance of the Bilog (30 to 1000MHz) or horn (above 1GHz) antenna on a table 80cm height. The level has been maximised by turning the EUT with the rotating table and with the antenna in horizontal and vertical polarity. Antenna height search was performed from 1 to 4m





2.3.2 – Equipment list

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Open area test site	LCIE	-	F2000400	2013 / 04	2014 / 04
Receiver	ROHDE & SCHWARZ	ESU	A2642018	2013 / 04	2014 / 04
Antenne bilog / Bilog antenna	CHASE	CBL 6112A	C2040040	2013 / 04	2014 / 04
Loop antenna	ROHDE & SCHWARZ	HFH H2 Z2	C2040007	08/2012	08/2014

2.3.3 – Uncertainty

The uncertainty values calculated by the laboratory are lower than limit uncertainty values defined by the CISPR 16-4-2. The conformity of the sample is directly established by the applicable limits values.

Kind of measurement	Wide uncertainty laboratory (k=2) ± x	CISPR uncertainty limit ± y
E field measurement within the band 150kHz-30MHz	4.75 dB	Not defined
Measurement of radiated electric field from 30 to 1000MHz in horizontal position on the Ecuelles site (CBL6112 bilog antenna)	4.24	5.2
Measurement of radiated electric field from 30 to 1000MHz in vertical position on the Ecuelles site (CBL6112 bilog antenna)	4.55	5.2

2.3.4 – Test results on transmitter

10 m radiated measurement graph from 30 to 1000 MHz

Frequency (MHz)	Quasi-peak measurements @ 10m (dBµV/m)	Limits @ 10m (dBµV/m)
120.7	25	33
136.8	27.2	33
176.3	25.4	33
230.5	35.3	35.5
250	29.5	35.5
257	30	35.5



FCC ID: Y7HXGCS85
IC: 7002C-XGCS85

2.3.5 – Test results on receiver

The RFID receiver works at the same time as the transmitter. Spurious emissions for transmitter already represents the receive mode.

2.3.6 – Measurements diagrams & tables

3 m radiated measurement from 9 kHz to 30 MHz

Perpendicular antenna from 9 KHz to 30 MHz

Loop antenna measurements

Frequency (MHz)	Level @ 3m (dB μ V/m)	Limit @ 3m (dB μ V/m)
2.38	21.68	69.5
2.414	20.32	69.5
2.446	23.87	69.5
2.516	23.94	69.5
2.586	24.6	69.5
2.62	20.28	69.5
2.652	26.44	69.5
2.722	26.22	69.5
2.788	26.71	69.5
2.854	25.58	69.5
2.994	23.75	69.5
3.13	23.61	69.5
3.166	21.34	69.5
3.196	22.18	69.5
3.3	20.99	69.5
3.368	21.1	69.5
3.406	19.89	69.5
3.438	21.23	69.5
3.506	20.84	69.5
3.642	20.85	69.5
3.706	18.6	69.5
3.95	17.03	69.5
6.578	19	69.5
7.058	22	69.5
7.122	24	69.5
7.324	23	69.5
7.53	22	69.5
7.662	24	69.5
7.734	18	69.5
7.936	16	69.5
8.006	15	69.5
8.074	11.68	69.5
8.954	12.6	69.5



FCC ID: Y7HXGCS85
IC: 7002C-XGCS85

Parallel antenna from 9 KHz to 30 MHz
Loop antenna measurements

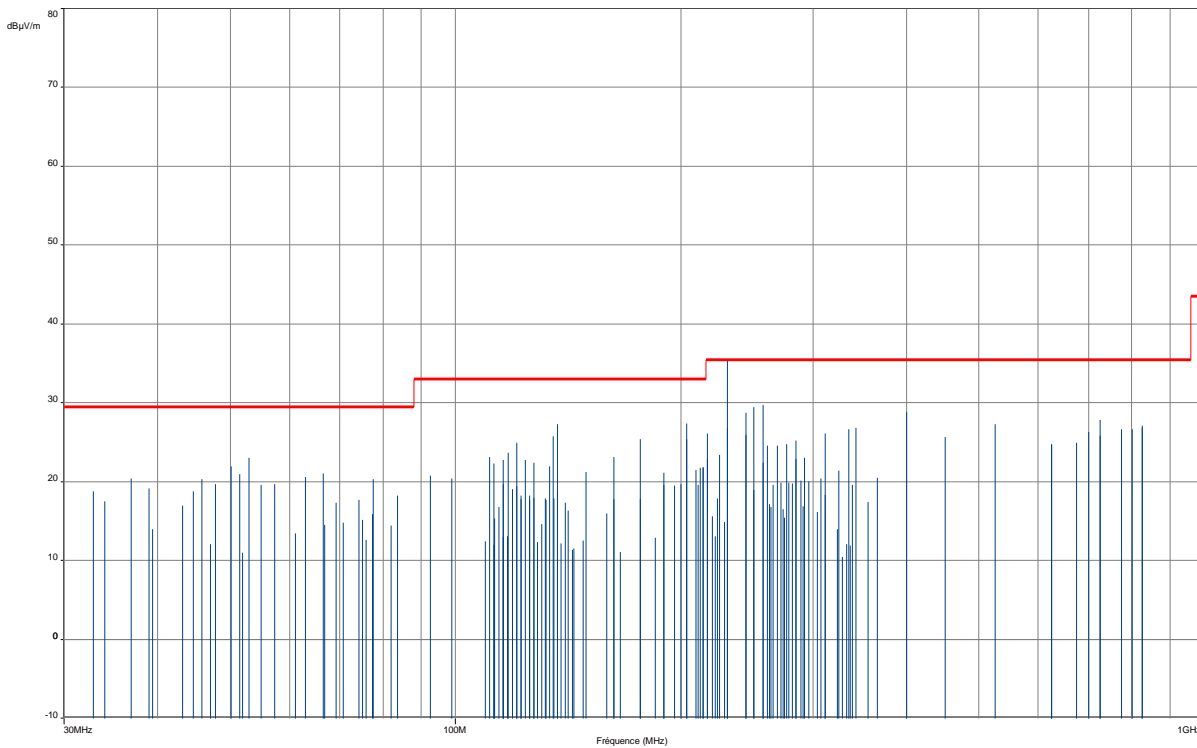
No significant frequency has been observed

10 m radiated measurement graph from 30 to 1000 MHz
Horizontal and vertical antenna from 30 to 1000 MHz

FCC Part15 class B

TELEMECANIQUE SENSORS
ETHERNET / IP SMART ANTENNA
TYPE : XGCS850C201

Quasi Peak measurement



2.4 – Frequency stability over extreme voltage and temperature condition

2.4.1 – General

The product has been powered with DC (24 V-dc) power supply and it was tested inside a climatic chamber and compared to the FCC part 15 subpart C § 15.225 (e) limits.

2.4.2 – Test setup





2.4.3 – Equipment list

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyser	ROHDE & SCHWARZ	FSL	A4060032	2012/12	2013/12
Climatic chamber	SECASI Technologies	SLT34	D1024029	Verify with thermometer before test	Verify with thermometer before test
Thermometer	AOIP	TM 6630	B4041042	2013/07	2014/07
Power Supply	KIKUSUI	PCR500M	A7040079	Verify with multimeter before test	Verify with multimeter before test
Multimeter	KEITHLEY	2000	A1241084	2012/10	2013/10

2.4.4 – Uncertainty

The uncertainty values calculated by the laboratory are lower than limit uncertainty values defined by the CISPR 16-4-2. The conformity of the sample is directly established by the applicable limits values.

Kind of measurement	Wide uncertainty laboratory (k=2) ± x
Frequency stability	±10 ⁻⁷ of frequency



2.4.5 – Test results

The measure result at 3 m is 54.9 dB μ V/m for 13.56 MHz
The 30 m measure corrected is M@3m - 40dB

Frequency MHz	Maximum Quasi Peak (30m) dB μ V/m	Quasi Peak Limit (30m) dB μ V/m
13.56	14.9	84.0

Temperature	Voltage	Frequency (MHz)	Limits
20 °C	27.6	13.5603	Reference
20 °C	24	13.5603	Fmin = 13.5586 - Fmax = 13.5613
20 °C	20.4	13.5603	
- 20 °C	27.6	13.5602	
- 20 °C	24	13.5602	
- 20 °C	20.4	13.5602	
- 30 °C	27.6	13.5601	
- 30 °C	24	13.5601	
- 30 °C	20.4	13.5601	
+ 55 °C	27.6	13.5604	
+ 55 °C	24	13.5604	
+ 55 °C	20.4	13.5604	

