



LCIE

TEST REPORT

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166175 (FAR)
6230B

Standards

47 CFR Part 15.225 (Limited program)
RSS-210, Issue 8 (Limited program)
RSS-Gen, Issue 4 (Limited program)

Issued to

INGENICO
28-32 boulevard de Grenelle
75015 PARIS

Apparatus under test

Trade mark
Manufacturer
Type
Serial number
IC
FCC ID

Payment terminal
INGENICO
INGENICO
ISC250-V4
13345SC00000215
2586D-IS250V4CL
XKB-ISC250V4CL

Test date

2015/10/09

Tests performed by

Laurent DENEUX

Test site

Ecuelles

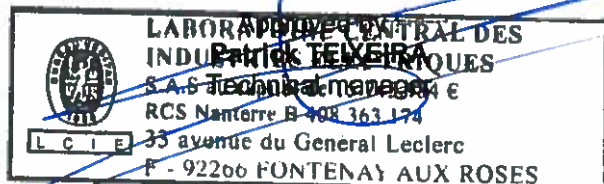
Initial Issue

2015/11/25

Date of issue

2016/02/11

Written by :
Laurent DENEUX
Tests operator



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1. TEST PROGRAM

• References

Standards:

- 47 CFR Part 15C
- RSS-210 Issue 8
- RSS-Gen Issue 4
- CISPR 16-4-2
- ANSI C63.10 (2013)

Standard Section	Test Description	TEST RESULT - Comments
RSS-Gen § 6.6	Occupied Bandwidth	NP(Limited program)
CFR 47 § 15.225 (e) RSS-210 § A2.6	Frequency tolerance	NP(Limited program)
CFR 47 § 15.207 RSS-Gen § 8.8	AC Power Line Conducted Emissions	PASS
CFR 47 § 15.225 (a) (b) (c) RSS-210 § A2.6 (a) (b) (c)	Field strength within the band 13.110-14.010 MHz	NP(Limited program)
CFR 47 § 15.209 (a) CFR 47 § 15.225 (d) RSS-210 § A2.6 (d)	Field strength outside of the bands 13.110-14.010 MHz	PASS (30MHz-1GHz only)
RSS-Gen § 7	Receiver Radiated emissions	NA (Transceiver equipment. Include in Field strength test)

PASS: EUT complies with standard's requirement

FAIL: EUT does not comply with standard's requirement

NA: Not Applicable

NP: Test Not Performed



2. EQUIPMENT DESCRIPTION

2.1. HARDWARE & SOFTWARE IDENTIFICATION

- Equipment under test (EUT):



Photograph of EUT

- Auxiliary equipment (AE) used for testing:



Photograph of AE

- Input/output:
 - Input Power
 - Usb



- **Equipment information:**

- External antenna connector: No
- Frequency band allocated: 13.553MHz to 13.567MHz
- Frequency band used: 13.56MHz
- Modulation: ASK100%
- Number of channel: 1
- Antenna type: Integral
- Stand By mode: No
- Type of power source: External power supply
- Power supply: Vmin: 102V/60Hz
Vnom: 120V/60Hz
Vmax: 138V/60Hz
- Temperature range: Tmin: -30°C (IC) -20°C (FCC)
Tnom: 20°C
Tmax: +50°C

2.2. RUNNING MODE

The EUT is set in the following modes during tests:
-Communication with a tag

2.3. EQUIPEMENT LABELLING



2.4. EQUIPMENT MODIFICATIONS

No equipment modification has been necessary during testing.



3. AC POWER LINE CONDUCTED EMISSIONS

3.1. TEST CONDITIONS

Test performed by : Laurent DENEUX
Date of test : 2015/10/09
Ambient temperature : 22°C
Relative humidity : 49%

3.2. TEST SETUP

The EUT is placed on the ground reference plane, at 80cm from the LISN. The distance between the EUT and the vertical ground plane is 40cm. Auxiliaries are powered by another LISN. The cable has been shorted to 1meter length. The EUT is powered through the LISN. Measurement is made with a receiver in peak mode. This was followed by a Quasi-Peak, i.e. CISPR measurement for any strong signal. If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary. The LISN (measure) is 50Ω / $50\mu\text{H}$. Interconnecting cables and equipment's were moved to position that maximized emission.



Photograph for AC Power Line Conducted Emissions (Front view)



Photograph for AC Power Line Conducted Emissions (Rear view)



3.3. RESULTS

Antenna Connected Neutral Line

<u>Frequency</u> <u>(MHz)</u>	<u>Peak</u> <u>measurements</u> <u>(dBμV)</u>	<u>Quasi-Peak</u> <u>measurements</u> <u>(dBμV)</u>	<u>Quasi-Peak</u> <u>limits</u> <u>(dBμV)</u>	<u>Average</u> <u>measurement</u> <u>(dBμV)</u>	<u>Average limits</u> <u>(dBμV)</u>
0.164	46	-	65.2	32.4	55.2
0.315	46.6	-	59.8	41	49.8
0.543	38	-	56	29	46
0.876	35.5	-	56	27.5	46
8.818	38.5	-	60	31.2	50
13.56	49.5	-	60	48	50

Phase Line

<u>Frequency</u> <u>(MHz)</u>	<u>Peak</u> <u>measurements</u> <u>(dBμV)</u>	<u>Quasi-Peak</u> <u>measurements</u> <u>(dBμV)</u>	<u>Quasi-Peak</u> <u>limits</u> <u>(dBμV)</u>	<u>Average</u> <u>measurement</u> <u>(dBμV)</u>	<u>Average limits</u> <u>(dBμV)</u>
0.154	46.8	-	65.8	30.2	55.8
0.312	46	-	60	40	50
0.589	36	-	56	31.5	46
0.925	37.5	-	56	24	46
8.93	38.2	-	60	29.6	50
13.56	47.4	-	60	46	50

See annex for graphics

Result: **PASS**

Limit:

☐ Power supply Class A

<u>Frequency Bands/frequencies</u>	<u>dBμV quasi-peak</u>	<u>dBμV average</u>
0.15-0.5MHz	79	66
0.5-30 MHz	73	60

☒ Power supply Class B

<u>Frequency Bands/frequencies</u>	<u>dBμV quasi-peak</u>	<u>dBμV average</u>
0.15-0.5MHz	66-56	56-46
0.5-5 MHz	56	46
5-30 MHz	60	50

*Decreases with the logarithm of the frequency



4. FIELD STRENGTH OUTSIDE OF THE BANDS 13.110-14.010 MHz

4.1. TEST CONDITIONS

Test performed by : Laurent DENEUX
Date of test : 2015/10/09
Ambient temperature : 22°C
Relative humidity : 49%

4.2. TEST SETUP

The EUT is placed on an open area test site. Distance between measuring antenna and the EUT is 10m for frequency above 30MHz.

Test is performed in horizontal (H) and vertical (V) polarization with bilog antenna between 30MHz & 1GHz and with a horn antenna above 1GHz. Measurement bandwidth was 120kHz below 1GHz and 1MHz above 1GHz. The level has been maximised by the turntable rotation of 360 degrees range on the 3 axis of EUT. Antenna height search was performed from 1 to 4m.



Photograph for Field strength outside of the bands 13.110-14.010 MHz



4.3. RESULTS

- Characterization on an open test site (30MHz to 1GHz):

Frequency (MHz)	Peak Level (dBμV/m)	QPeak Level (dBμV/m)	Limit @10m (dBμV/m)
37.3	-	26.9	29.5
37.8	-	26	29.5
150.8	-	28.7	33
266.6	-	30.2	35.5
800	-	33.6	35.5
1000	-	33.3	43.5

See annex for graphics

Result: **PASS**

Limit: → 30MHz to 88MHz: 100μV/m (3m) or 29.5dBμV/m (10m) QPeak
88MHz to 216MHz: 150μV/m (3m) or 33dBμV/m (10m) QPeak
216MHz to 960MHz: 200μV/m (3m) or 35.5dBμV/m (10m) QPeak
960MHz to 1000MHz: 500μV/m (3m) or 43.5dBμV/m (10m) QPeak



5. TEST EQUIPMENT LIST

Field strength outside of the bands 13.110-14.010 MHz					
Apparatus	Trade Mark	Type	Registration number	Calibration date	Calibration due
Spectrum analyzer	ROHDE & SCHWARZ	ESU	A2642018	01/2015	01/2016
Bilog antenna	CHASE	CBL6112A	C2040040	03/2015	03/2016
Cable	-	-	A5329418	09/2014	09/2015 (Note 1)
Cable	-	-	A5329442	09/2014	09/2015 (Note 1)
Cable	-	-	A5329542	2015/02	02/2016
Cable	-	-	A5329449	03/2014	09/2016
cable	-	-	A5329368	03/2015	03/2016
cable	-	-	A5329444	09/2014	09/2015 (Note 1)
AC Power Line Conducted Emissions					
Apparatus	Trade Mark	Type	Registration number	Calibration date	Calibration due
EMI Test Receiver	ROHDE & SCHWARZ	ESU	A2642018	2015/01	2016/01
Pulse limiter	RHODE & SCHWARZ	ESH3-Z2	A2649008	2015/02	2016/02
V ISLN	ROHDE & SCHWARZ	ESH3-Z5	C2322003	2015/02	2016/02
Ground plan	LCIE	-	-	-	-
Cable	-	-	A5329417	2014/09	09/2015 (Note 1)

Note 1: In our system quality, the calibration due is more & less 2months.



6. UNCERTAINTIES CHART

Kind of test	Measurement uncertainties (k=2) $\pm x(\text{dB})$ / (Hz)	Limit for uncertainties $\pm y(\text{dB})$
TRANSMITTER REQUIREMENTS		
Radio frequency	$\pm 2.10^{-8}$ Hz	$\pm 1.10^{-7}$ Hz
RF Conducted power	± 0.6 dB	± 1.5 dB
Spurious emissions - Frequency < 1000 MHz - Frequency > 1000 MHz	± 3.9 dB ± 3.1 dB	± 6 dB
Spurious in conduction	± 1.6 dB	± 3 dB
Temperature	$\pm 0.5^{\circ}\text{C}$	$\pm 1^{\circ}\text{C}$
Humidity	± 2.5 %	± 10 %



7. ANNEX (GRAPHS)

AC power line conducted emissions

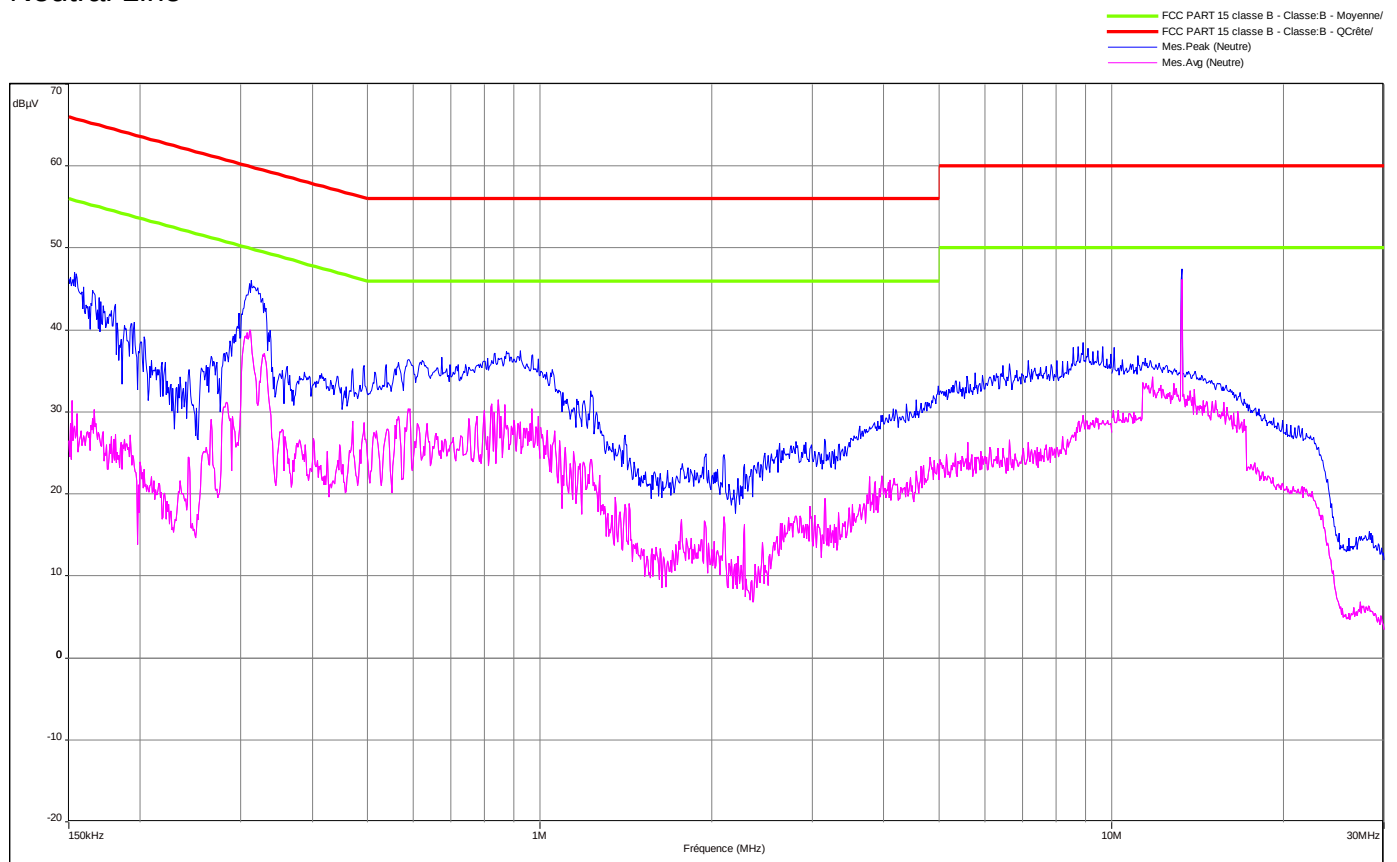
Antenna Connected

Frequency: F_{nom}

Temperature: T_{nom}

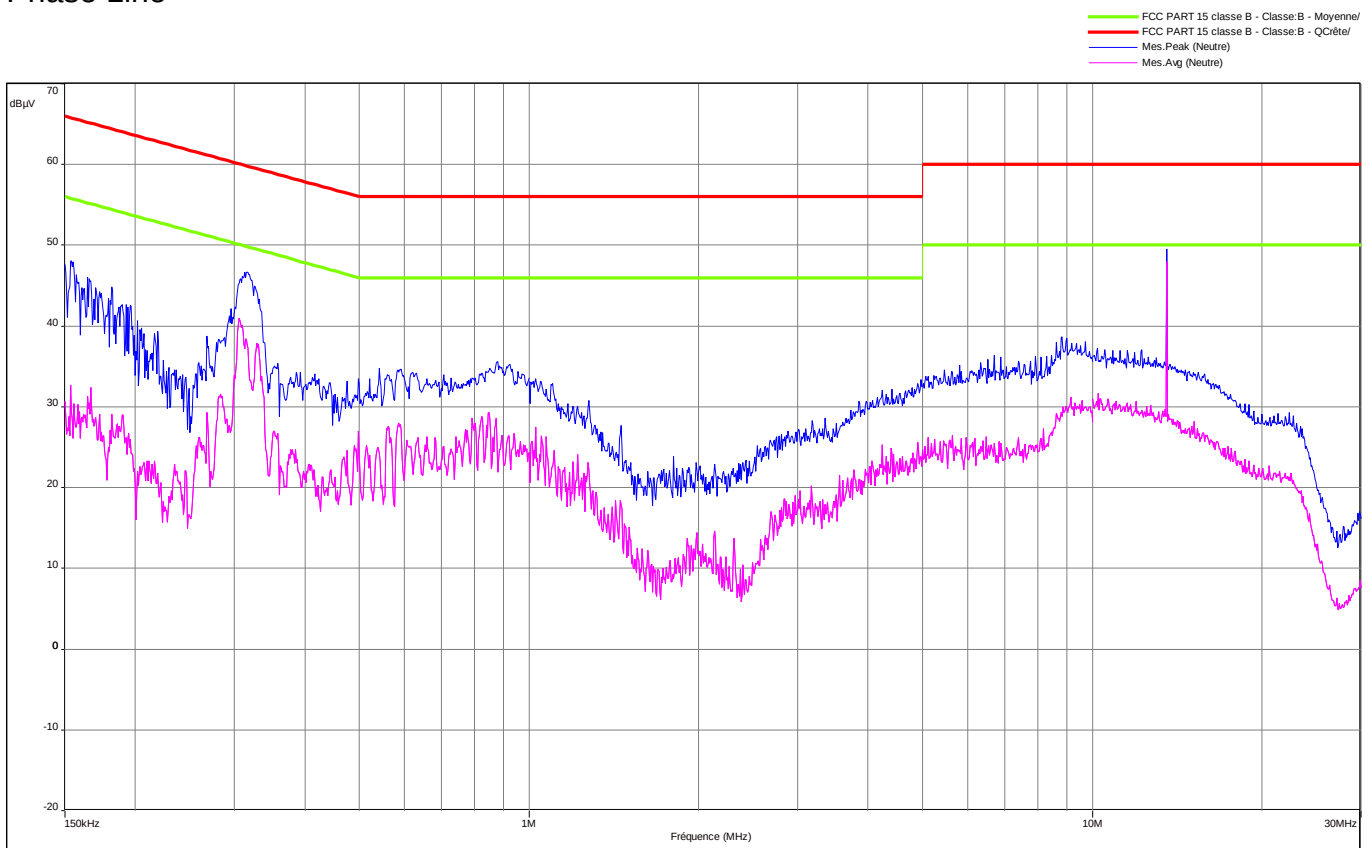
Voltage: V_{nom}

Neutral Line





AC power line conduted emissions
Antenna Connected
Frequency: Fnom
Temperature: Tnom
Voltage: Vnom
Phase Line





Transmitter Radiated Emissions both vertical and horizontal polarization

Frequency: F_{nom}

Temperature: T_{nom}

Voltage: V_{nom}

QPeak

