



LCIE

# TEST REPORT

N°: 139029-680189-D (FILE#871244)

Version : 01

<b>Subject</b>	<b>Electromagnetic compatibility tests according to the standards: FCC CFR 47 Part 15, Subpart B. ANSI C63.4 (2014)</b>
<b>Issued to</b>	<b>INGENICO</b> Rovaltain TGV – Quartier de la Gare, 9 avenue de la gare 26958 – VALENCE CEDEX 9 FRANCE
<b>Apparatus under test</b>	
↪ Product	ICT220
↪ Trade mark	<b>INGENICO</b>
↪ Manufacturer	<b>INGENICO</b>
↪ Model under test	<b>ICT220-11T2025A</b>
↪ Serial number	<b>15267CT24257765</b>
↪ FCCID	<b>XKB-ICT220V3</b>
<b>Conclusion</b>	See page 4
<b>Test date</b>	From November 20 <sup>th</sup> to December 3 <sup>th</sup> , 2015
<b>Test location</b>	MOIRANS
<b>Composition of document</b>	24 pages
<b>Document issued on</b>	December 3 <sup>rd</sup> 2015

**Written by :**  
Gaëtan DESCHAMPS  
**Tests operator**

**Approved by :**  
Anthony MERLIN

**Technical manager**



This document shall not be reproduced, except in full, without the written approval of the LCIE. This document contains results related only to the items tested. It does not imply the conformity of the whole production to the items tested. Unless otherwise specified, the decision of conformity takes into account the uncertainty of measurement. This document doesn't anticipate any certification decision.

**LCIE**

Laboratoire Central des Industries Electriques  
Une société de Bureau Veritas

ZI Centr'alp  
170 rue de Chatagnon  
38430 Moirans FRANCE

Tél : +33 4 76 07 36 36  
contact@lcie.fr  
www.lcie.fr



## PUBLICATION HISTORY

<b>Version</b>	<b>Date</b>	<b>Author</b>	<b>Modification</b>
01	December 3rd 2015	Gaëtan DESCHAMPS	Creation of the document



## SUMMARY

1.	TEST PROGRAM .....	4
2.	EQUIPMENT UNDER TEST: CONFIGURATION (DECLARED BY PROVIDER).....	5
3.	MEASUREMENT OF CONDUCTED EMISSION .....	8
4.	MEASUREMENT OF RADIATED EMISSION (30MHZ-2GHZ).....	10
5.	UNCERTAINTIES CHART .....	15
6.	ANNEX 1 (GRAPHS) .....	17



## 1. TEST PROGRAM

### 1.1. REQUIREMENTS FOR DISTURBANCE EMISSIONS

**Standard:** - FCC Part 15, Subpart B (Digital Devices)  
- ANSI C63.4 (2014)

EMISSION TEST	LIMITS			RESULTS (Comments)
	Frequency	Quasi-peak value	Average value	
Limits for conducted disturbance at mains ports 150kHz-30MHz	150-500kHz	66.0 dB $\mu$ V to 56.0 dB $\mu$ V	56.0 dB $\mu$ V to 46.0 dB $\mu$ V	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
	0.5-5MHz	56.0 dB $\mu$ V	46.0 dB $\mu$ V	
	5-30MHz	60.0 dB $\mu$ V	50.0 dB $\mu$ V	
Radiated emissions 30MHz-1GHz	Frequency	Quasi-peak value @3m		<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
	30MHz-88MHz	40.0 dB $\mu$ V/m		
	88MHz-216MHz	43.5 dB $\mu$ V/m		
	216MHz-960MHz	46.0 dB $\mu$ V/m		
Radiated emissions 1GHz-2GHz* <i>Highest frequency : 387MHz (Declaration of provider)</i>	Frequency	Peak value @3m	Average value @3m	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
	1-2GHz	74.0 dB $\mu$ V/m	54.0 dB $\mu$ V/m	

\*§15.33: The highest internal source of a testing device is defined like more the highest frequency generated or used in the testing device or on which the testing device works or agrees.

- If the highest frequency of the internal sources of the testing device is lower than 108 MHz, measurement must be only performed until 1GHz.
  - If the highest frequency of the internal sources of the testing device ranges between 108 MHz and 500 MHz, measurement must be only performed until 2GHz.
  - If the highest frequency of the internal sources of the testing device ranges between 500 MHz and 1 GHz, measurement must be only performed until 5GHz.
- If the highest frequency of the internal sources of the testing device is above 1 GHz, measurement must be only performed until 5 times the highest frequency or 40 GHz, while taking smallest of both.

## 2. EQUIPMENT UNDER TEST: CONFIGURATION (DECLARED BY PROVIDER)

### 2.1. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

**Equipment under test (EUT):**  
ICT220-11T2025A

Serial Number: 15267CT24257765



Equipment Under Test

#### **Power supply:**

During all the tests, EUT is supplied by  $V_{nom}$ : 110VAC  
For measurement with different voltage, it will be presented in test method.

Name	Type	Rating	Reference / Sn	Comments
Supply1	<input type="checkbox"/> AC <input checked="" type="checkbox"/> DC <input type="checkbox"/> Battery	100-240VAC~50/60Hz 0.6A -> 8VDC 3A	PSM24W-080L6IN-R	Configuration 1 (see EUT configuration §2.2)
Supply2	<input type="checkbox"/> AC <input checked="" type="checkbox"/> DC <input type="checkbox"/> Battery	100-240VAC~50/60Hz 0.9A -> 8VDC 4A	PSM32W-080L6IN-R	Configuration 2 (see EUT configuration §2.2)

#### **Inputs/outputs - Cable:**

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
Supply1	DC	1.5	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-
Supply2	DC	1.5	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-
Access1	1 x USB Host	2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Not used in this test configuration
Access2	1 x USB Slave	2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Not used in this Test configuration
Access3	1 x COM0 to magicbox	2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-
Access4	1 x Ethernet to magic Box	2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-
Access5	1 x Modem Line to magicbox	2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-
Access6	2 x SAM	-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-
Access7	1 x CAM	-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-
Access8	1 x Printer	-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-



### MagicBOX 296105416

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
Supply1	1 x Jack power supply DC to magicbox	1.5	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Supply2	1 x Jack power supply DC to magicbox	1.5	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Access1	1 x Modem Line	2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Access2	1 x RS232	2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Access3	1 x Ethernet	2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

#### Auxiliary equipment used during test:

Type	Reference	Sn	Comments
Laptop LENOVO	8896-2FG	L3-B7463	-
Modem line simulator TELTONE	TLS-5B-02	017652	

## 2.1. EUT CONFIGURATION

Software : Hardtoolbox V0206

#### Configuration 1 and Running mode:

Backlight : **Yes**  
 Imprimante : **Yes** -> Ticket **No**  
 Modem : **Yes** -> Comm test: **No**  
**Cless** : **No**  
 Sam1 : **Yes**  
 Sam2 : **Yes**  
 Cam0 : **Yes**  
 Com0 : **Yes**  
 MMC : **No**  
 USB : **No**  
 Mouse : **No**  
 Swipe: **No**  
 Keyboard : **No**

Test Ethernet between EUT and Laptop: Ping : 192.168.2.2  
 EUTpowered by the supply1 see Hardware identification cf. §2.1.

#### Configuration 2 and Running mode:

Backlight : **Yes**  
 Imprimante : **Yes** -> Ticket **No**  
 Modem : **Yes** -> Com test: **No**  
**Cless** : **No**  
 Sam1 : **Yes**  
 Sam2 : **Yes**  
 Cam0 : **Yes**  
 Com0 : **Yes**  
 MMC : **No**  
 USB : **No**  
 Mouse : **No**  
 Swipe: **No**  
 Keyboard : **No**

Test Ethernet between EUT and Laptop: Ping : 192.168.2.2  
 EUTpowered by the supply2 see Hardware identification cf. §2.1.



## 2.2. EQUIPMENT MODIFICATIONS

None       Modification:

## 2.3. SPECIAL ACCESSORIES

None

## 2.4. FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follow:

$$FS = RA + AF + CF - AG$$

Where      FS = Field Strength  
              RA = Receiver Amplitude  
              AF = Antenna Factor  
              CF = Cable Factor  
              AG = Amplifier Gain

Assume a receiver reading of 52.5dB $\mu$ V is obtained. The antenna factor of 7.4 and a cable factor of 1.1 is added. The amplifier gain of 29dB is subtracted, giving field strength of 32 dB $\mu$ V/m.

$$FS = 52.5 + 7.4 + 1.1 - 29 = 32 \text{ dB}\mu\text{V/m}$$

The 32 dB $\mu$ V/m value can be mathematically converted to its corresponding level in  $\mu$ V/m.

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(32\text{dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m.}$$

### 3. MEASUREMENT OF CONDUCTED EMISSION

#### 3.1. ENVIRONMENTAL CONDITIONS

Date of test : November 20<sup>th</sup>, 2015  
Test performed by : G.Deschamps  
Atmospheric pressure (hPa) : 994  
Relative humidity (%) : 36  
Ambient temperature (°C) : 21

#### 3.2. TEST SETUP

##### **Mains terminals**

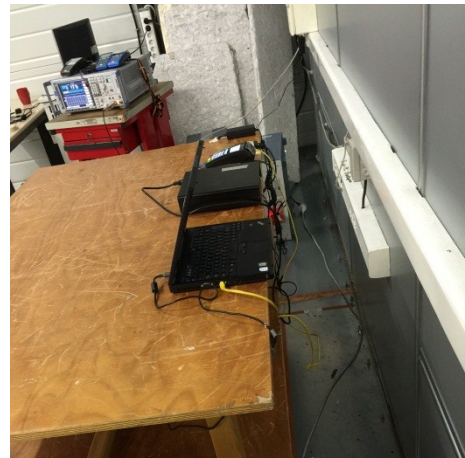
The EUT and auxiliaries are set:

- 80cm above the ground on the non-conducting table (Table-top equipment)
- 10cm above the ground on isolating support (Floor standing equipment)

The distance between the EUT and the LISN is 80cm. The EUT is 40cm away for the vertical ground plane.

The EUT is powered by  $V_{nom}$ .

The EUT is powered through a LISN (measure). Auxiliaries are powered by another LISN.



Test setup

#### 3.3. TEST METHOD

The product has been tested according to ANSI C63.4 and FCC Part 15 subpart B. The product has been tested with 120V/60Hz power line voltage and compared to the FCC Part 15 subpart B. Measurement bandwidth was 9kHz from 150kHz to 30MHz. 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  $50\Omega / 50\mu\text{H}$ . The Peak data are shown on plots in annex 1. Quasi-Peak and Average measurements are detailed in a table with frequencies and levels measured. Interconnecting cables and equipment's were moved to position that maximized emission. A summary of the worst case emissions found in all test configurations and modes is shown on the following page.

Measurements are performed on the phase (L1) and neutral (N) of power line voltage. Graphs are obtained in PEAK detection. Measures are also performed in Quasi-Peak and Average for any strong signal.





### 3.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Cable + self	-	-	A5329578	07/15	07/16
Conducted emission comb generator	BARDET	-	A3169049	-	-
LISN tri-phase ESH2-Z5	RHODE & SCHWARZ	33852.19.53	C2320062	07/15	07/16
LISN	RHODE & SCHWARZ	ENV216	C2320123	02/15	02/16
Load 50Ω - BNC	AEROFLEX	-	A7152071	04/15	04/16
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	04/15	04/16
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	09/15	09/16
Transient limiter	HEWLETT PACKARD	11947A	A4049061	02/15	02/16

### 3.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None                       Divergence:

### 3.6. TEST RESULTS

#### Mains terminals:

#### Supply1 (configuration 1)

Measurements are performed on the phase (L1) and neutral (N) of the power line.

#### Results: (PEAK detection)

Graph identifier	Line	Comments
Emc# 1	Phase	- See annex 1
Emc# 2	Neutral	- See annex 1

#### Supply2 (configuration 2)

Measurements are performed on the phase (L1) and neutral (N) of the power line.

#### Results: (PEAK detection)

Graph identifier	Line	Comments
Emc# 3	Phase	- See annex 1
Emc# 4	Neutral	- See annex 1

### 3.7. CONCLUSION

The sample of the equipment **ICT220-11T2025A**, Sn: **15267CT24257765**, tested in the configuration presented in this test report **satisfies** to requirements of class B limits of the standard FCC Part15B, for conducted emissions.

## 4. MEASUREMENT OF RADIATED EMISSION (30MHz-2GHz)

### 4.1. ENVIRONMENTAL CONDITIONS

Date of test	: November 23 <sup>rd</sup> , 2015	November 24 <sup>th</sup> , 2015
Test performed by	: G.Deschamps	G.Deschamps
Atmospheric pressure (hPa)	: 990	994
Relative humidity (%)	: 38	36
Ambient temperature (°C)	: 22	21

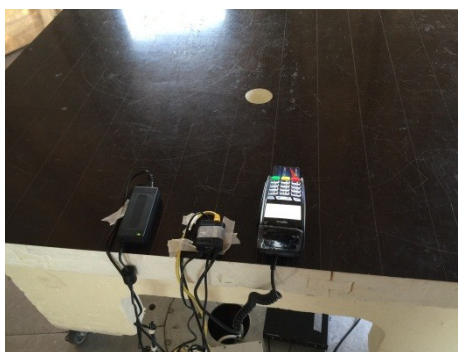
### 4.2. TEST SETUP

The installation of EUT is identical for pre-characterization measures in a 3 meters semi- anechoic chamber and for measures on the 10 meters Open site.

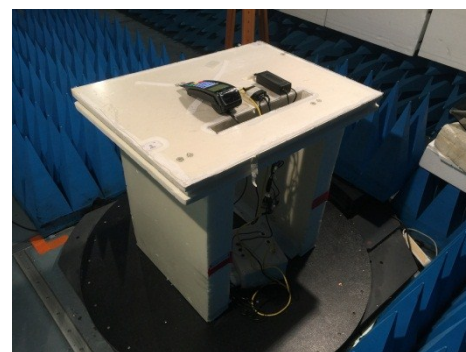
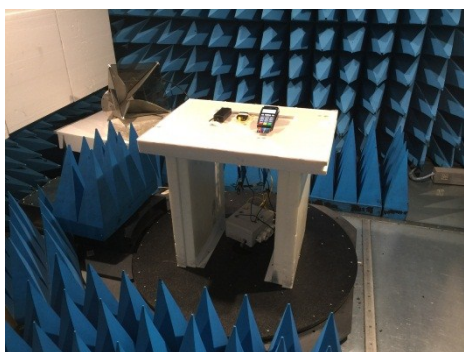
The EUT and auxiliaries are set:

- 80cm above the ground on the non-conducting table (Table-top equipment)
- 10cm above the ground on isolating support (Floor standing equipment)

The EUT is powered by  $V_{nom}$ .



Test setup on OATS



Test setup in anechoic chamber



### 4.3. TEST METHOD

The product has been tested according to ANSI C63.4, FCC part 15 subpart B.

#### Pre-characterisation measurement: (30MHz –2GHz)

A pre-scan of all the setup has been performed in a 3 meters semi-anechoic chamber for frequency from 30MHz to 2GHz. Test is performed in horizontal (H) and vertical (V) polarization during the test for maximized the emission measurement. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on all axis of EUT used in normal configuration.

The pre-characterization graphs are obtained in PEAK detection and PEAK/AVERAGE from 1GHz to 2GHz.

#### Characterization on 10 meters open site from 30MHz to 1GHz:

Radiated Emissions were measured on an open area test site. A description of the facility is on file with the FCC. The product has been tested at a distance of **10 meters** from the antenna and compared to the FCC part 15 subpart B limits. Measurement bandwidth was 120kHz from 30 MHz to 1GHz. Test is performed in horizontal (H) and vertical (V) polarization, during the test for maximized the emission measurement. The height antenna is varied from 1m to 4m. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on all axis of EUT used in normal configuration. A summary of the worst case emissions found in all test configurations and modes is shown. Frequency list has been created with anechoic chamber pre-scan results.

#### Characterization on 3 meters full anechoic chamber from 1GHz to 2GHz:

The product has been tested at a distance of **3 meters** from the antenna and compared to the FCC part 15 subpart B limits. Measurement bandwidth was 1MHz from 1GHz to 2GHz.

Test is performed in horizontal (H) and vertical (V) polarization. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on all axis of EUT used in normal configuration. A summary of the worst case emissions found in all test configurations and modes is shown. The height antenna is

On mast, varied from 1m to 4m

Fixed and centered on the EUT (EUT smaller than the beamwidth of the measurement antenna)

Frequency list has been created with anechoic chamber pre-scan results.



#### 4.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Antenna horn	EMCO	3115	C2042027	09/15	09/16
Cable Measure @3m 18GHz	-	-	A5329038	08/15	08/16
Cable Measure @3m	-	-	A5329206	04/15	04/16
Semi-Anechoic chamber #3	SIEPEL	-	D3044017	04/13	04/16
Radiated emission comb generator	BARDET	-	A3169050	-	-
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060051	11/15	11/16
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078	04/15	04/16
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011	09/15	09/16
Turntable chamber (Cage#3)	ETS Lingren	Model 2165	F2000371	-	-
Table	LCIE	-	F2000461	-	-
Antenna Bi-log	CHASE	CBL6111A	C2040051	04/14	04/16
Cable	SUCOFLEX	106G	A5329061	03/15	03/16
Cable (OATS)	-	-	A5329623	10/15	10/16
HF Radiated emission comb generator	LCIE SUD EST	-	A3169088	-	-
OATS	-	-	F2000409	09/15	09/16
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	04/15	04/16
Turntable / Mast controller (OATS)	ETS Lindgren	Model 2066	F2000372	-	-
Antenna mast (OATS)	ETS Lindgren	2071-2	F2000392	-	-
Turntable (OATS)	ETS Lindgren	Model 2187	F2000403	-	-
Table	MATURO GmbH	-	F2000437	-	-

#### 4.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None       Divergence:

#### 4.6. TEST RESULTS

##### 4.6.1. Pre-characterization at 3 meters [30MHz-1GHz]

See graphs:

See graphs for 30MHz-1GHz:

Graph identifier	Polarization	EUT position	Comments	
Emr# 1	H/V	Axis XY	Configuration 1	See annex 1
Emr# 2	H/V	Axis XY	Configuration 2	See annex 1

##### 4.6.2. Pre-characterization at 3 meters [1GHz-2GHz]

See graphs:

Graph identifier	Polarization	EUT position	Comments	
Emr# 3	H/V	Axis XY	Configuration 1	See annex 1
Emr# 4	H/V	Axis XY	Configuration 2	See annex 1



#### 4.6.3. Characterization on 10 meters open site from 30MHz to 1GHz

##### **Worst case final data result:**

Frequency list has been created with semi-anechoic chamber pre-scan results. Measurements are performed using a QUASI-PEAK detection.

##### **Test results for configuration 1:**

No	Frequency (MHz)	Limit QPeak (dBµV/m)	Measure QPeak (dBµV/m)	Margin QPeak (dB)	Angle Table (°)	Pol. Ant.	Ht. Ant. (cm)	FC (dB)	Remark
1	30.612	40.0	37.2	-2.8	0	V	100	19.5	*
2	37.514	40.0	36.2	-3.8	0	V	100	15.6	*
3	45.266	40.0	28.9	-11.1	0	V	100	11.5	*
4	53.885	40.0	32.2	-7.8	0	V	100	8.7	*
5	71.106	40.0	30.9	-9.1	0	V	100	8.0	*
6	122.888	43.5	30.4	-13.1	0	V	100	13.7	
7	290.320	46.0	29.6	-16.4	220	V	125	16.2	
8	358.040	46.0	31.3	-14.7	100	H	250	18.1	
9	580.640	46.0	35.4	-10.6	75	H	100	23.4	
10	737.320	46.0	41.7	-4.3	0	H	250	25.6	

\*Measure performed at 3m.

##### **Test results for configuration 2:**

No	Frequency (MHz)	Limit QPeak (dBµV/m)	Measure QPeak (dBµV/m)	Margin QPeak (dB)	Angle Table (°)	Pol. Ant.	Ht. Ant. (cm)	FC (dB)	Remark
1	33.247	40.0	38.4	-1.6	0	H	400	18.0	*
2	37.514	40.0	38.1	-1.9	0	V	100	15.6	*
3	47.799	40.0	30.7	-9.3	0	V	100	10.4	*
4	53.885	40.0	31.4	-8.6	0	V	100	8.7	*
5	84.366	40.0	24.5	-15.5	0	H	400	9.4	
6	221.160	46.0	34.0	-12.0	275	V	100	12.9	
7	387.080	46.0	39.8	-6.2	110	H	250	19.2	
8	580.640	46.0	33.9	-12.1	300	H	150	23.4	
9	704.540	46.0	38.1	-7.9	260	H	120	25.0	
10	870.920	46.0	39.5	-6.5	210	V	300	28.3	

\*Measure performed at 3m.

Note: Measure have been done at 10m distance and corrected according to requirements of 15.209.e)  
( $M@3m = M@10m + 10.5dB$ )

#### 4.6.4. Characterization on 3meters anechoic chamber from 1GHz to 2GHz

##### **Worst case final data result:**

The frequency list is created from the results obtained during the pre-characterization in anechoic chamber. Measurements are performed using a PEAK and AVERAGE detection.

##### **Test results for configuration 1 and 2:**

No significant frequency observed, margin PEAK > 20dB and AVERAGE > 10dB (see Annex 1).



#### 4.7. CONCLUSION

The sample of the equipment **ICT220-11T2025A**, Sn: **15267CT24257765**, tested in the configuration presented in this test report **satisfies** to requirements of class B limits of the standard FCC Part15B, for radiated emissions.





## 5. UNCERTAINTIES CHART

Type de mesure / Kind of measurement	Incertitude élargie laboratoire / Wide uncertainty laboratory (k=2) ±x	Incertitude limite du CISPR / CISPR uncertainty limit ±y
Mesure des perturbations conduites en tension sur le réseau d'énergie (triphase) <i>Measurement of conducted disturbances in voltage on the power port ( three phases)</i>	3.51dB	3.6dB
Mesure des perturbations conduites en tension sur le réseau d'énergie (monophasé) <i>Measurement of conducted disturbances in voltage on the power port (single line)</i>	3.51dB	3.6dB
Mesure des perturbations conduites en tension sur le réseau de télécommunication <i>Measurement of conducted disturbances in voltage on the telecommunication port.</i>	3.26dB	A l'étude / Under consideration
Mesure des perturbations discontinues conduites en tension <i>Measurement of discontinuous conducted disturbances in voltage</i>	3.45dB	3.6dB
Mesure des perturbations conduites en courant <i>Measurement of conducted disturbances in current</i>	3.09dB	A l'étude / Under consideration
Mesure du champ électrique rayonné en cage de Faraday semi-anechoïque de 30MHz à 18GHz <i>Measurement of radiated electric field in half-anechoic Faraday room From 30MHz to 18GHz</i>	5.15dB	5.2dB
Mesure du champ électrique rayonné sur le site en espace libre de Moirans 30MHz – 1GHz. <i>Measurement of radiated electric field on the Moirans open area test site 30MHz – 1GHz.</i>	4.54dB	5.2dB
Mesure du champ électrique rayonné IN SITU de 30 à 1000 MHz <i>IN SITU measurement of radiated electric field from 30 to 1000MHz</i>	A l'étude / Under consideration	5.2dB
Mesure de la puissance perturbatrice <i>Measurement of disturbance power</i>	3.32dB	4.5dB
Mesure des harmoniques de courant <i>Measurement of current harmonics</i>	11.11%	/
Mesure du flicker <i>Flicker measurement</i>	9.26%	/
Immunité aux perturbations conduites, induites par les champs électromagnétiques <i>Immunity to conducted disturbance, induced by radio-frequency fields.</i>	2.76dB	/
Immunité aux champs électromagnétiques rayonnés aux fréquences radioélectriques (80MHz-6GHz) <i>Immunity to radiated, radio-frequency, electromagnetic field (80MHz-6GHz)</i>	4.98dB	/
Immunité aux ondes de choc <i>Surge immunity</i>		
Tension crête / Peak voltage	<±10%	/
Durée du front (circuit ouvert) / Front time (open circuit)	<±30%	/
Durée jusqu'à la mi-valeur (circuit ouvert) / Time to half-value (open circuit)	<±20%	/
Courant crête / Peak current	<±10%	/
Durée du front (court-circuit) / Front time (short-circuit)	<±20%	/
Durée jusqu'à la mi-valeur (court-circuit) / Time to half-value (short-circuit)	<±20%	/
Immunité aux transitoires électriques rapides en salves <i>Immunity to electrical fast transient/burst immunity</i>		
Incertitude sous 50 ohms / <i>Uncertainty under 50ohms</i>		
Tension crête / <i>peak voltage</i>	<±10%	/
Temps de montée $t_r$ / <i>rise time <math>t_r</math></i>	<±30%	/
Durée $t_d$ à 50% / <i>Duration <math>t_d</math> to 50%</i>	<±30%	/
Durée de la salve / <i>Burst duration</i>	<±20%	/
Période de la salve / <i>Burst periode</i>	<±20%	/
Fréquence de répétition / <i>Repetition frequency</i>	<±20%	/



L C I E

Type de mesure / Kind of measurement	Incertitude élargie laboratoire / Wide uncertainty laboratory (k=2) ±x	Incertitude limite du CISPR / CISPR uncertainty limit ±y
<b>Incertitude sous 1000 ohms / Uncertainty under 1000ohms</b>		
Tension crête / <i>peak voltage</i>	<±10% - 15%	/
Temps de montée $t_r$ / <i>rise time <math>t_r</math></i>	<±30%	/
Durée $t_d$ à 50% / <i>Duration <math>t_d</math> to 50%</i>	+200% -30%	/
Durée de la salve / <i>Burst duration</i>	<±20%	/
Période de la salve / <i>Burst periode</i>	<±20%	/
Fréquence de répétition / <i>Repetition frequency</i>	<±20%	/
<b>Immunité aux décharges électrostatiques / Immunity to electrostatic discharge immunity</b>		
Tension de sortie / <i>Output voltage</i>	<±5%	/
Crête de courant / <i>Peak current</i>	<±13%	/
Temps de montée $t_r$ / <i>Rise time <math>t_r</math></i>	0.7 – 1ns	/
Intensité à 30ns / <i>Current at 30ns</i>	<±45%	/
Intensité à 60ns / <i>Current at 60ns</i>	<±52%	/
<b>Immunité aux creux de tension et coupures brèves / Immunity to Voltage dips, short interruptions</b>		
Tension de sortie à vide/ <i>Output voltage at no load</i>	<±1.5%	/
Tension de sortie en charge/ <i>Output voltage in load</i>	<±5%	/
Temps de montée et de descente $t_r$ & $t_f$ / <i>Rise and fall time <math>t_r</math> &amp; <math>t_f</math></i>	1-5µs	/
Valeur crête instantanée du sur-dépassement/sous dépassement / <i>Instantaneous peak overshoot/undershoot of the voltage <math>U_t</math></i>	<±5% $U_t$	/
Angle de phase / <i>Phase angle</i>	<±10°	/
<b>Immunité aux champs magnétique à la fréquence du réseau / Power frequency magnetic field immunity</b>		
	±4.42dB	/
<b>Immunité conduite en mode commun de 0Hz à 150kHz / Common mode immunity from 0Hz to 150kHz</b>		
Niveau de test / <i>Test level :1V - 30V</i>	14.5%	/
Niveau de test / <i>Test level :1V - 300V</i>	13.3%	/
<b>Immunité à l'onde oscillatoire amortie lente / Slow damped oscillatory wave immunity</b>		
Temps de montée (tension) / <i>Voltage rise time</i>	<±20%	/
Fréquence d'oscillation (tension) / <i>Voltage oscillation frequencies</i>	<±10%	/
Fréquence de répétition / <i>Repetition rate</i>	<±10%	/
Décroissance Pk5-Pk1 / <i>Decaying Pk5-Pk1</i>	>50%	/
Décroissance Pk10-Pk1 / <i>Decaying Pk10-Pk1</i>	<50%	/
Tension à vide (Pk1) / <i>Open circuit voltage</i>	<±10%	/
Courant de court-circuit (Pk1) / <i>Short-circuit current</i>	<±20%	/
<b>Immunité à l'onde oscillatoire amortie rapide / Fast damped oscillatory wave immunity</b>		
Temps de montée (tension) / <i>Voltage rise time</i>	<±30%	/
Fréquence d'oscillation (tension) / <i>Voltage oscillation frequencies</i>	<±10%	/
Fréquence d'oscillation (courant) / <i>Current oscillation frequencies</i>	<±30%	/
Fréquence de répétition / <i>Repetition rate</i>	<±10%	/
Décroissance Pk5-Pk1 (Circuit ouvert) / <i>Decaying Pk5-Pk1</i>	>50%	/
Décroissance Pk5-Pk1 (Court circuit) / <i>Decaying Pk5-Pk1</i>	>25%	/
Décroissance Pk10-Pk1 (Circuit ouvert) / <i>Decaying Pk10-Pk1</i>	<50%	/
Décroissance Pk10-Pk1 (Court circuit) / <i>Decaying Pk10-Pk1</i>	<25%	/
Durée des salves / <i>Burst duration</i>	<±20%	/
Période des salves / <i>Burst period</i>	<±20%	/
Impédance de sortie / <i>Output impedance</i>	<±20%	/
Tension à vide (Pk1) / <i>Open circuit voltage</i>	<±10%	/
Courant de court-circuit (Pk1) / <i>Short-circuit current</i>	<±20%	/

Les valeurs d'incertitudes calculées du laboratoire étant inférieures aux valeurs d'incertitudes limites établies par le CISPR, la conformité de l'échantillon est établie directement par les niveaux limites applicables. Ce tableau regroupe l'ensemble des incertitudes maximales pour les essais réalisables dans le laboratoire, qu'ils aient été ou non réalisés dans le cadre du présent rapport / The uncertainty values calculated by the laboratory are lower than limit uncertainty values defined by the CISPR. The conformity of the sample is directly established by the applicable limits values. This table includes all uncertainties maximum feasible for testing in the laboratory, whether or not made in this report

Note - L'incertitude de mesure instrumentale est déterminée selon la CISPR 16-4-2. / The instrumentation measurement uncertainty is determined according to CISPR16-4-2



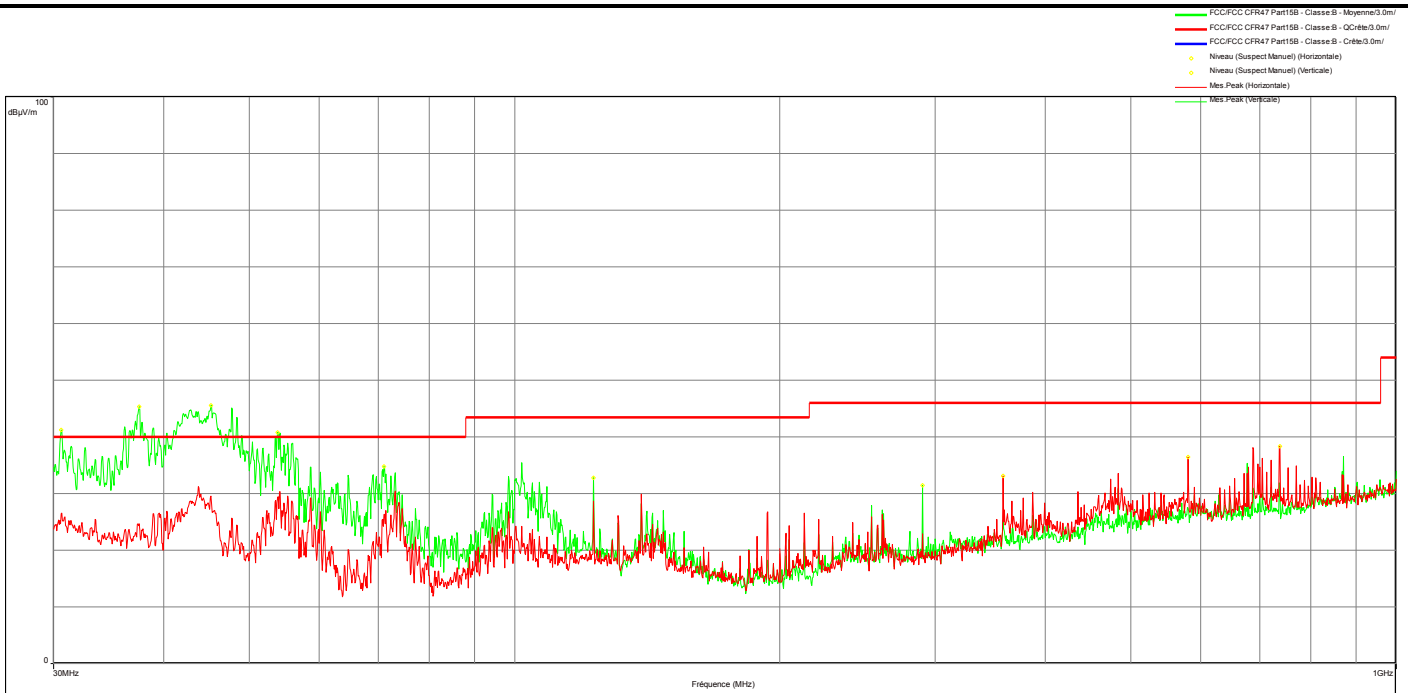


L C I E

## 6. ANNEX 1 (GRAPHS)

### RADIATED EMISSIONS

<b>Graph name:</b>	Emr#1	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15B	(H+V) - Configuration 1 <1GHz
<b>Class:</b>	B	
<b>Frequency range: [30MHz - 1GHz]</b>		
<b>Antenna polarization:</b>	Horizontal & Vertical	<b>RBW :</b> 100kHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 300kHz



### Spurious emissions

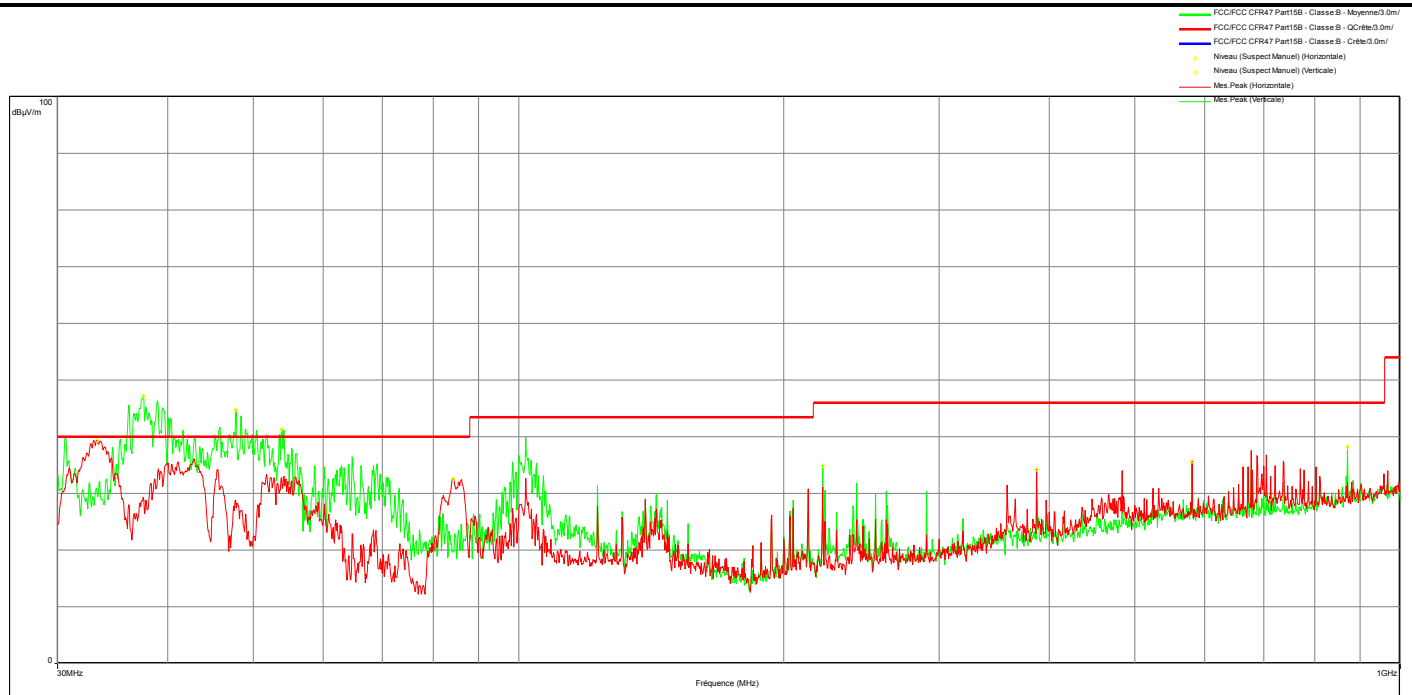
Frequency (MHz)	Peak (dBµV/m)	Polarization
358.04	33.14	Horizontal
580.64	36.49	Horizontal
737.32	38.33	Horizontal
30.612	41.22	Vertical
37.514	45.37	Vertical
45.266	45.53	Vertical
53.885	40.81	Vertical
71.106	34.8	Vertical
122.888	32.82	Vertical
290.32	31.47	Vertical



L C I E

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#2	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15B	(H+V) - Configuration 2 <1GHz
<b>Class:</b>	B	
<b>Frequency range: [30MHz - 1GHz]</b>		
<b>Antenna polarization:</b>	Horizontal & Vertical	<b>RBW :</b> 100kHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 300kHz



**Spurious emissions**

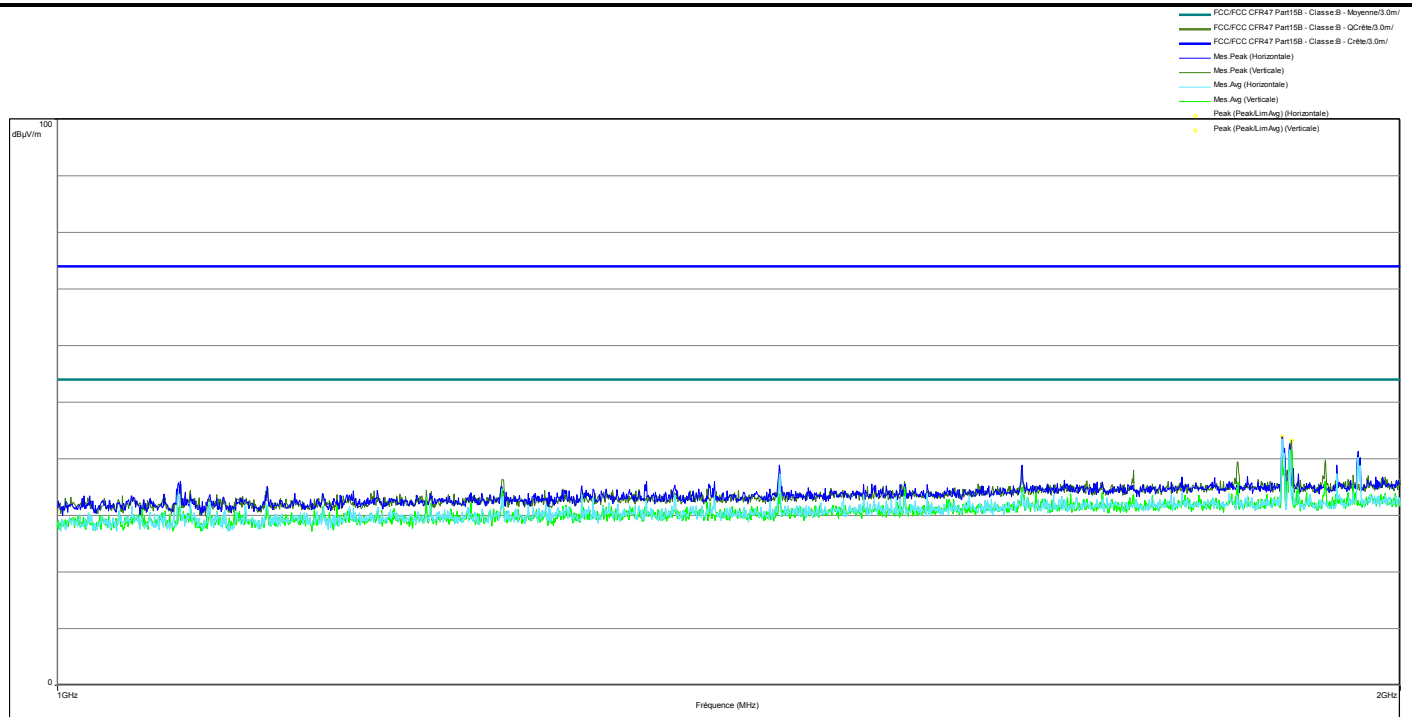
Frequency (MHz)	Peak (dBµV/m)	Polarization
33.247	39.32	Horizontal
84.366	32.59	Horizontal
387.08	34.23	Horizontal
580.64	35.7	Horizontal
37.514	47.2	Vertical
47.799	44.82	Vertical
53.885	41.39	Vertical
221.16	34.93	Vertical
870.92	38.22	Vertical



L C I E

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#3	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15B	(H+V) - Configuration 1 >1GHz
<b>Class:</b>	B	
<b>Frequency range: [1GHz - 2GHz]</b>		
<b>Antenna polarization:</b>	Horizontal & Vertical	<b>RBW :</b> 1MHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 3MHz



**Spurious emissions**

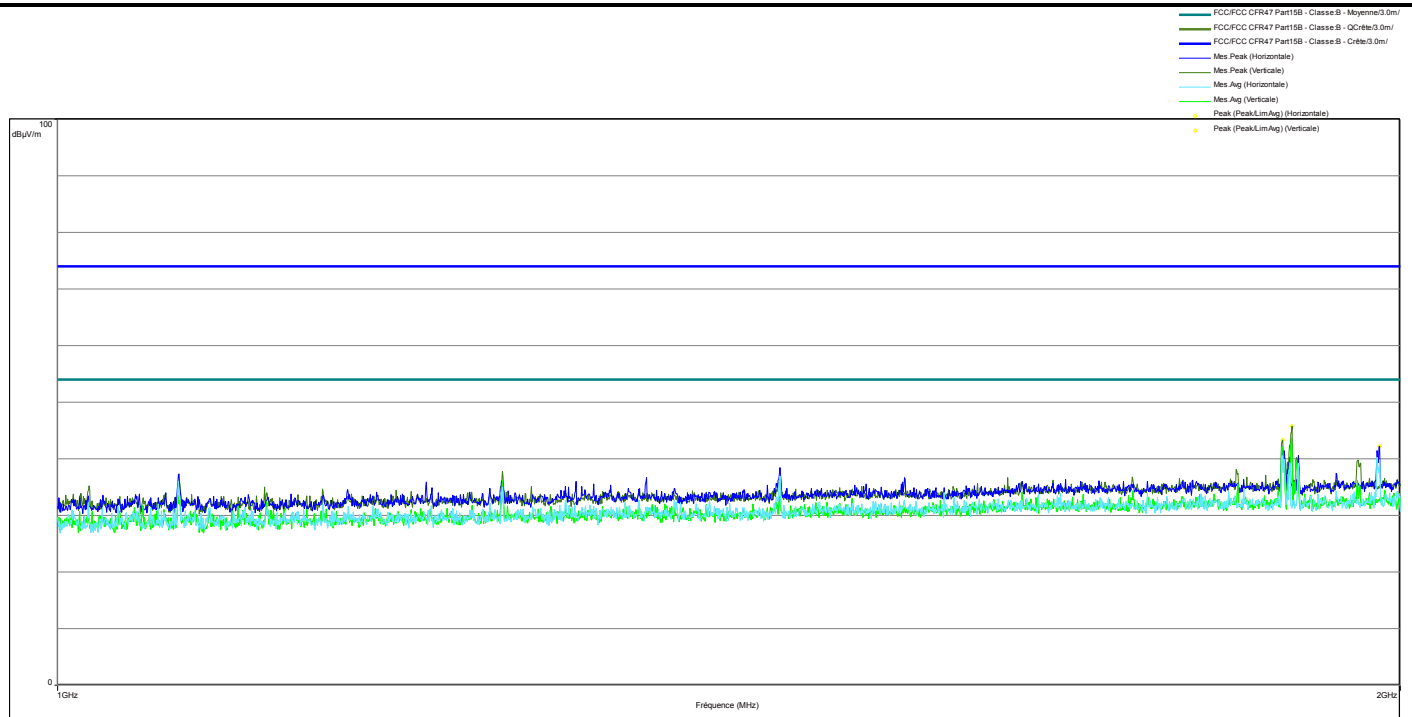
Frequency (MHz)	Peak (dBµV/m)	Polarization
1881.8	43.86	Horizontal
1891	43.19	Vertical



L C I E

**RADIATED EMISSIONS**

<b>Graph name:</b>	Emr#4	<b>Test configuration:</b>
<b>Limit:</b>	FCC CFR47 Part15B	(H+V) - Configuration 2 >1GHz
<b>Class:</b>	B	
<b>Frequency range: [1GHz - 2GHz]</b>		
<b>Antenna polarization:</b>	Horizontal & Vertical	<b>RBW :</b> 1MHz
<b>Azimuth:</b>	0° - 360°	<b>VBW :</b> 3MHz

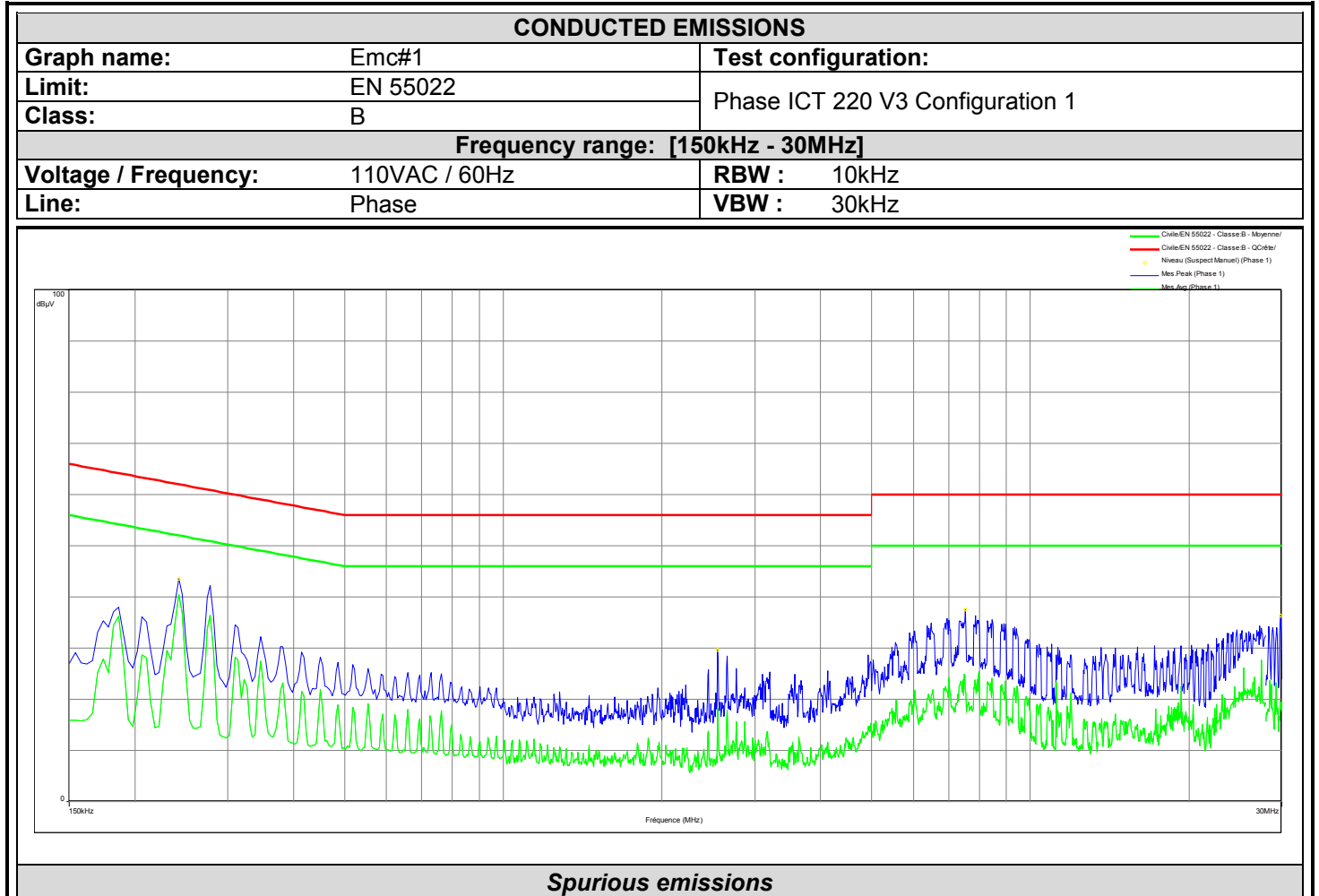


**Spurious emissions**

Frequency (MHz)	Peak (dBµV/m)	Polarization
1978.4	42.23	Horizontal
1882.2	43.39	Vertical
1891.1	45.79	Vertical



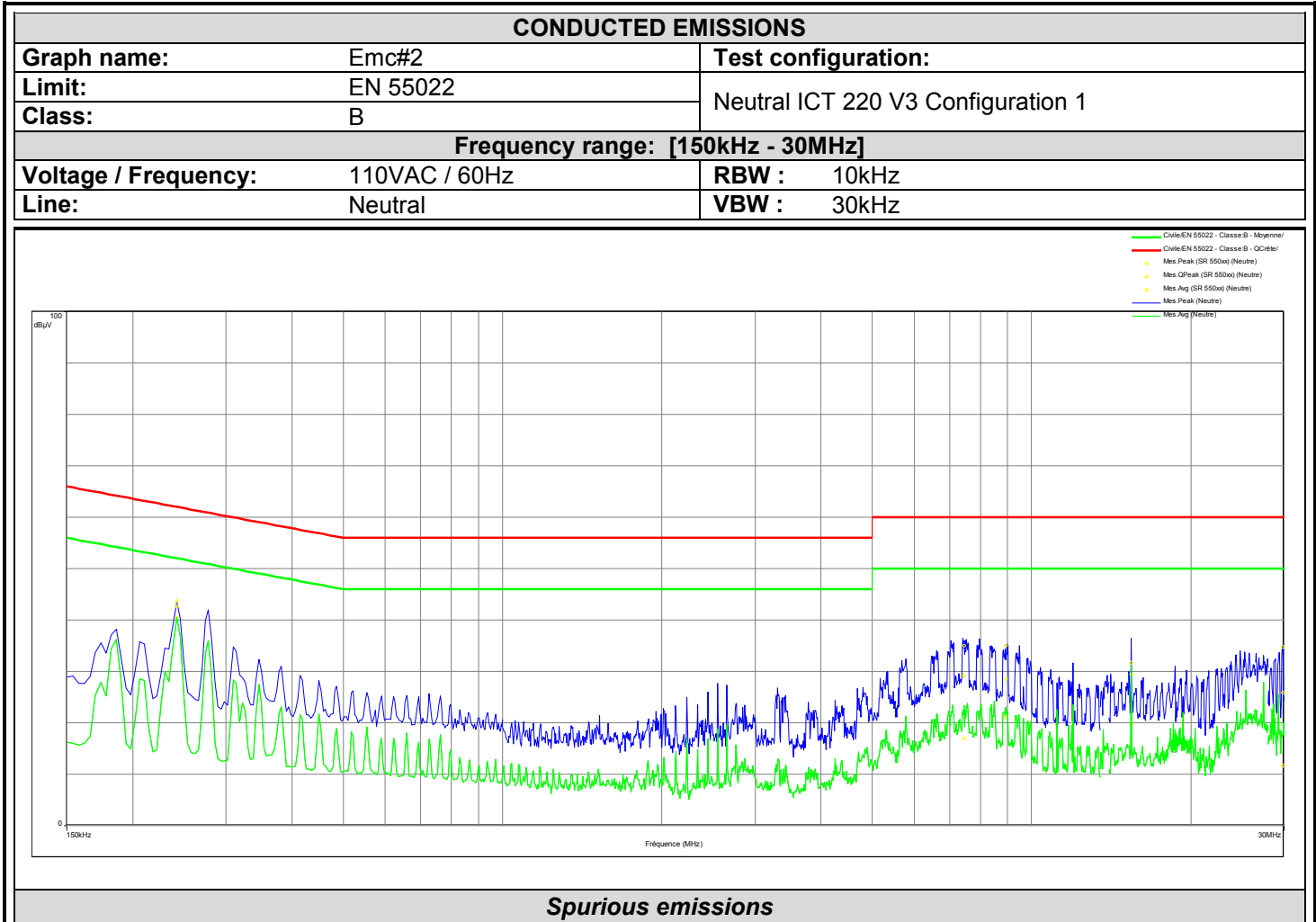
L C I E



Frequency (MHz)	Peak (dBµV)
0.242	43.55
0.242	43.55
0.278	42.26
6.944	35.76
6.956	35.83
7.524	37.55
7.524	37.55
7.872	36.28
8.448	35.6
29.768	35.01
29.868	36.33



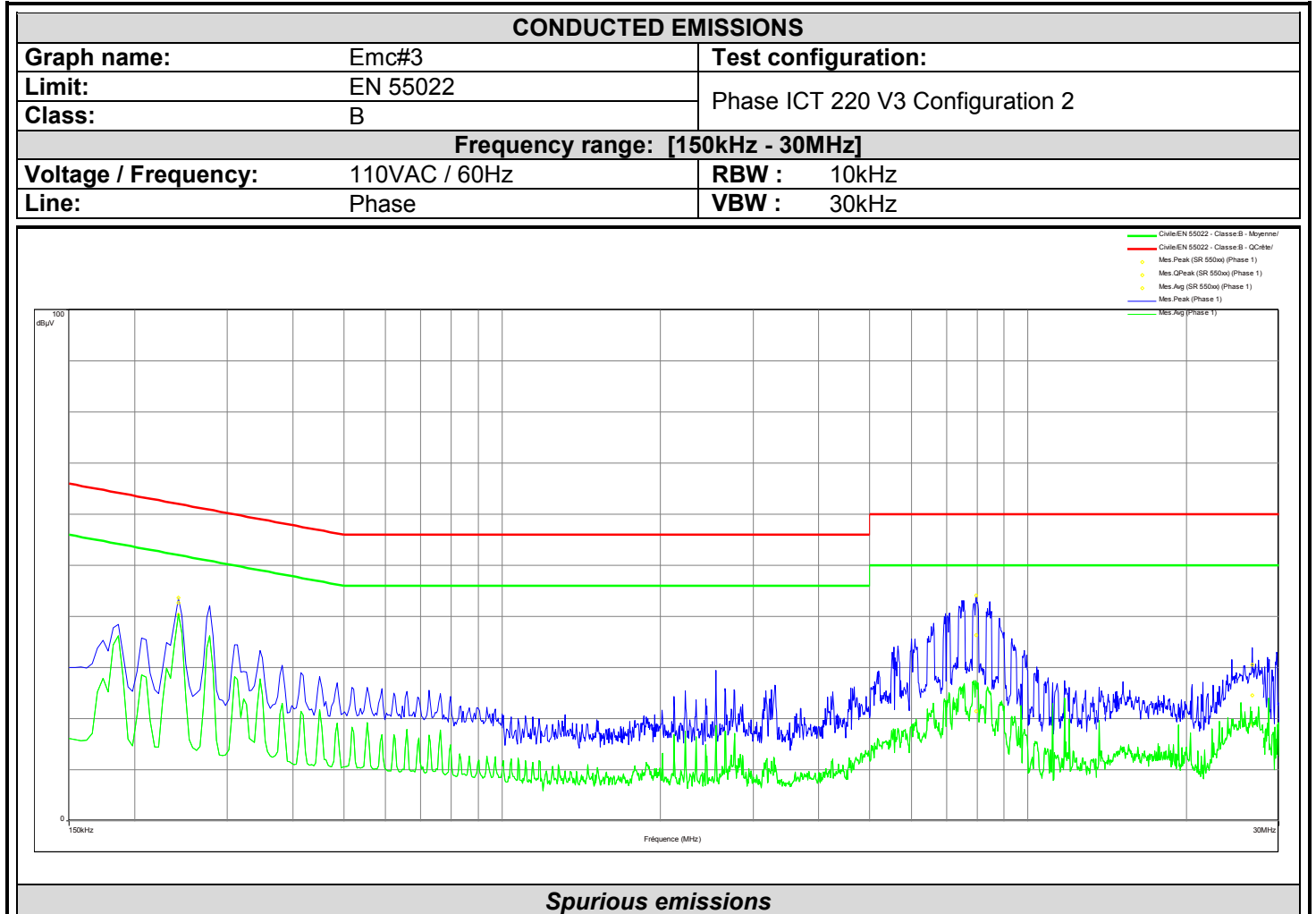
L C I E



Frequency (MHz)	Mes.Peak (dBµV)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)
0.242	43.72	42.72	62.03	-19.3	40.45	52.03	-11.58
7.457	35	29.18	60	-30.82	17.05	50	-32.95
8.927	35.05	28.61	60	-31.39	21.14	50	-28.86
15.436	31.69	29.45	60	-30.55	19.67	50	-30.33
29.837	34.79	25.87	60	-34.13	11.67	50	-38.33



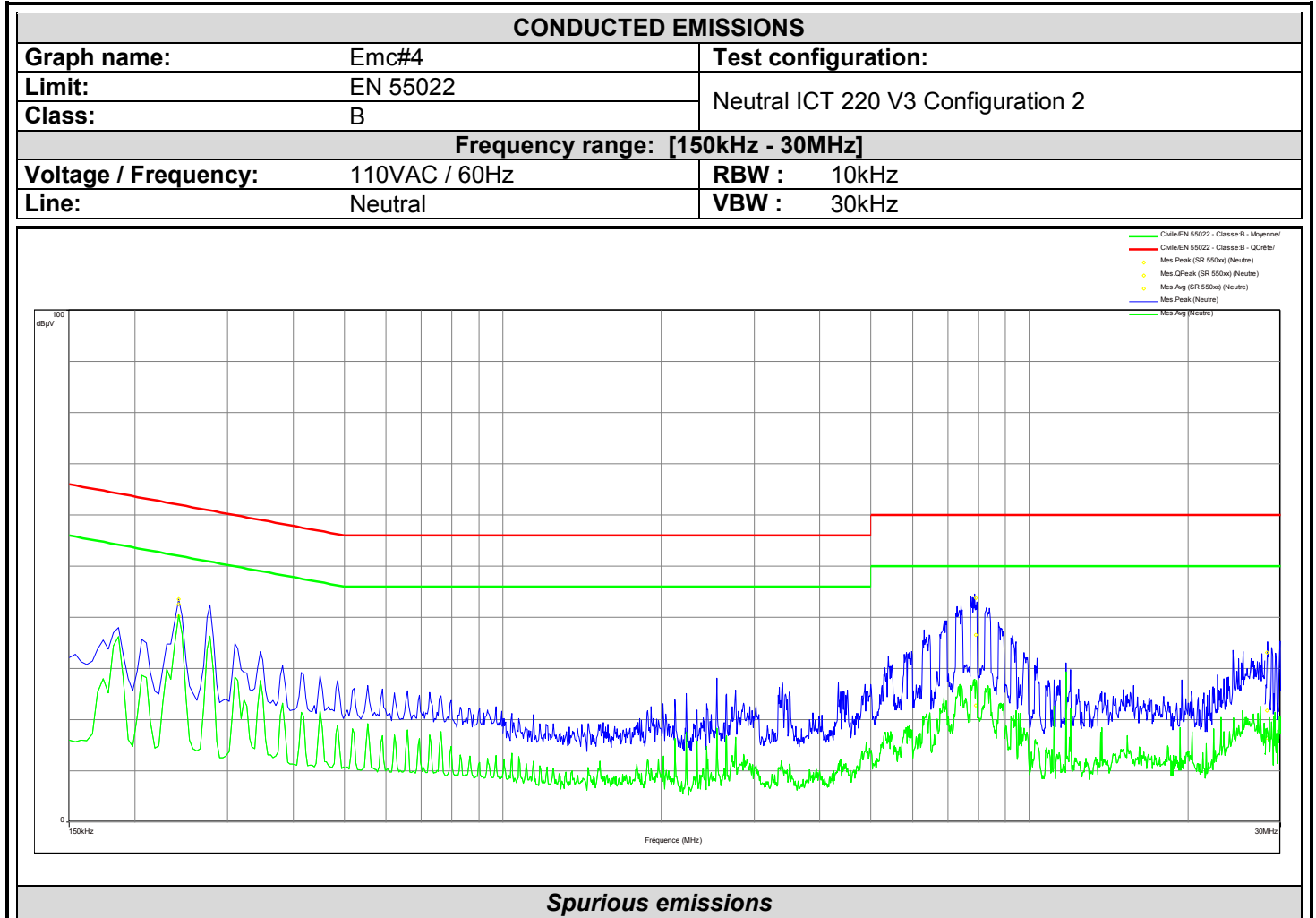
L C I E



Frequency (MHz)	Mes.Peak (dBµV)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)
0.242	43.66	42.65	62.03	-19.38	40.38	52.03	-11.65
7.978	44.13	36.29	60	-23.71	21.45	50	-28.55
26.67	30.51	24.59	60	-35.41	18.87	50	-31.13



L C I E



Frequency (MHz)	Mes.Peak (dBµV)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)
0.242	43.54	42.53	62.03	-19.5	40.26	52.03	-11.76
7.917	43.74	36.5	60	-23.5	22.75	50	-27.25
28.289	33.09	21.81	60	-38.19	16.48	50	-33.52