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STS 024

Schweizerischer Prüfstellendienst
Service suisse d'essai
Swiss testing service



Report: Rapport: Bericht:	Electromagnetic compatibility and Radio spectrum Matters	Report no: Rapport no: Bericht Nr:	16'566A*
Product name: Nom du produit: Produktname	IS76 Ferrite Beacon Controller IS76 Ferrite Beacon Antenna FCC ID: ZU6-CRS-NC-IS76	Mandate no: Mandat no: Auftrag Nr:	20109747
Serial no: No de série: Seriennummer:	Controller: 026069600900000544 Antenna : ---	Model number: Numéro de modèle: Modellnummer:	Controller: F.01U.140.033 / CRS-NC-IS76-CO Antenna: F.01U.140.034 / CRS-NC-IS76-AN
Customer: Client: Kunde:	TeleAlarm SA Rue du Pont 23 2300 La Chaux-de-Fonds Switzerland	Date of test: Date de l'essai: Prüfdatum:	December 2010 to February 2011

* Replaces report no 16'566

Standards / Normes / Normen		Result Résultat Ergebnis
EN 61000-4-6, (10 V_{emf})	(Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields)	Pass
47 CFR, Part 15	(Subpart C, Intentional radiator: §§ 15.207/209)	Pass
EN 300 330-2 V1.5.1	(Short Range Devices 9kHz – 30MHz / appareils à faible portée 9kHz – 30MHz / Geräte geringer Reichweite 9kHz – 30MHz)	Pass

Test performed by
Essai effectué par :
Prüfer

Mr A. Bieri, Mr E. de Raemy and Mr Baumgartner

A. Bieri C-A Baumgartner

Test report prepared by
Rapport d'essai préparé par :
Berichtersteller

Mr A. Bieri, Mr E. de Raemy and Mr Baumgartner

E. de Raemy

Test report controlled and approved by
Rapport d'essai contrôlé et approuvé par :
Prüfbericht kontrolliert und genehmigt durch

Mr A. Trabold

A. Trabold

Rossens, September 22, 2011

(Issue Date / Date d'édition / Ausstelldatum)

V2010Dez13

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The present document results from tests on a specimen and does not prejudice to the conformity of all the manufactured products. - Le présent document résulte d'essais sur un spécimen. Il ne préjuge pas de la conformité de l'ensemble des produits fabriqués à l'objet essayé. - Dieser Bericht beinhaltet die Prüfergebnisse eines Mustergerätes. Es kann daraus nicht auf die Übereinstimmung der Seriegeräte mit dem Mustergerät geschlossen werden. q:\mandats\2010\20109747_telealarm_bosch_security\rap_telealarm_16566a_balise_is76.doc

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1. Summary of test results / Résumé des résultats d'essais / Zusammenfassung der Prüfergebnisse (EN 61000-4-6)

✓ Pass / Réussi / Bestanden

✗ Fail / Echoué / Nicht bestanden

Ø Not applicable to this product / Pas applicable à ce produit / Nicht anwendbar für dieses Produkt

— Not tested / Pas testé / Nicht geprüft

■ No requirements / Pas d'exigence / Keine Anforderung

§	Test Type / Type d'essai / Art der Prüfung	Result / Résultat / Ergebnis
7	Immunity / Immunité / Störfestigkeit	EN 61000-4-6
7.1	Radio frequency common mode Fréquence radio en mode commun HF-Strom common mode EN 61000-4-6:2009 IEC 61000-4-6:2008	(Level 3 = 10 V _{emf}) ✓

§	Test Type / Type d'essai / Art der Prüfung	Result / Résultat / Ergebnis
9	Transmitter / Émetteur / Sender	EN 300 330 - 2
9.1	Transmitter carrier output levels Niveau de sortie de la porteuse Trägerausgangspegel	✓
9.2	Permitted frequency range of the modulation bandwidth Plage de fréquence permise de la bande passante de la modul. Erlaubter Frequenzgang der Modulationsbandbreite	✓
9.3	Spurious emissions Émissions parasites Nebenaussendung	✓
9.4	Duty cycle Rapport cyclique Einschaltdauer	✓
-	Receiver / Récepteur / Empfänger	EN 300 330 - 2
-	Adjacent channel selectivity Sélectivité des canaux adjacents Nebenchannalselektivität	Ø ¹
-	Blocking or desensitization Blocage de signaux parasites Filtern und Abblocken von Nebenaussendung	Ø ¹
-	Spurious emissions Émissions parasites Nebenaussendung	Ø ¹

1. No receiver included / Pas de récepteur inclus / Beinhaltet keinen Empfänger

§	Test Type / Type d'essai / Art der Prüfung	Result / Résultat / Ergebnis
6	Emission / Emission / Störaussendung	CFR 47 Part 15 Sub C
6.1	Conducted emission Émission par conduction Geleitete Emission CFR 47 § 15.207	✓
6.2	Radiated emission – H-field Émission par rayonnement – Champ H Gestahlte Emission – H-Feld CFR 47 § 15.209	✓
-	Radiated emission – EM-field Émission par rayonnement – Champ EM Gestahlte Emission – EM-Feld CFR 47 § 15.209	Ø ¹⁾
6	Emission / Emission / Störaussendung	CFR 47 Part 2 Sub C
6.3	Designation of emission Désignation d'émission Bezeichnung der Emission FCC 47 §2.201 FCC 47 §2.202	30K7 P1D

1. Measurements at frequencies above 30 MHz are not required as the highest frequency of the EUT is 136 kHz.

2. Applied standards / Normes appliquées / Verwendete Normen

EN 61000-4-6, Edition 3 2008	<p>Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields</p> <p>Compatibilité électromagnétique (CEM) – Partie 4-6: Techniques d'essai et de mesure – Immunité aux perturbations conduites, induites par les champs radioélectriques</p> <p>Elektromagnetische Verträglichkeit (EMV) - Teil 4-6: Prüf- und Messverfahren - Störfestigkeit gegen leitungsgeführte Störgrößen, induziert durch hochfrequente Felder</p>
47 CFR Part 15 Subpart C : 2010	Code of Federal Regulations - Title 47 - Telecommunication, Part 15, Subpart C: "Intentional Radiators"
EN 300 330-1 V1.7.1 : 2010	<p>Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz; Part 1: Technical characteristics and test methods</p> <p>Compatibilité Electromagnétique et Spectre Radioélectrique (ERM); Appareils de Faible Portée (AFP); Equipement radio dans la gamme de fréquences 9 kHz à 25 MHz et équipements à boucle inductive dans la gamme de fréquences 9 kHz à 30 MHz; Partie 1 : Caractéristiques techniques et méthodes de test</p> <p>Elektromagnetische Verträglichkeit und Funkspektrumangelegenheiten (ERM); Funkgeräte geringer Reichweite (SRD); Funkeinrichtungen mit Betriebsfrequenzen im Bereich von 9 kHz bis 25 MHz und Induktionsschleifensysteme im Bereich von 9 kHz bis 30 MHz; Teil 1 : Technische Merkmale und Testmethoden</p>
EN 300 330-2 V1.5.1 : 2010	<p>Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD) - Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz; Part 2: Harmonized EN under article 3.2 of the R&TTE Directive</p> <p>Télécommunications - CEM et spectre radioélectrique (ERM) - Appareils à faible portée (SRD) - Équipements radioélectriques dans la bande de fréquences 9 kHz à 25 MHz et systèmes à boucle d'induction de 9 kHz à 30 MHz - Partie 2 : EN harmonisée couvrant l'article 3.2 de la Directive R&TTE</p> <p>Elektromagnetische Verträglichkeit und Funkspektrumangelegenheiten (ERM) - Funkanlagen mit geringer Reichweite (SRD) - Funkgeräte im Frequenzbereich 9 kHz bis 25 MHz und induktive Schleifensysteme im Frequenzbereich 9 kHz bis 30 MHz; Teil 2: Harmonisierte EN nach Artikel 3.2 der R&TTE-Richtlinie</p>

3. Client / Client / Kunde

Client name and address Nom et adresse du client Name und Adresse des Kunden	<p>TeleAlarm SA Rue du Pont 23 2300 La Chaux-de-Fonds Switzerland</p>
Contact Person / Responsable / Kontaktperson	Mr Jean-Luc Chappuis
Telephone / Téléphone / Telefon	+41 32 911 11 11
Fax / Télécopieur / Telefax	+41 32 911 11 00
E-mail / Courrier électronique / E-mail	jean-luc.chappuis@ch.bosch.com
Mandate no / No. de mandat / Auftragsnr.	20109747

4. Equipment under test / Equipement à l'essai / Prüfling

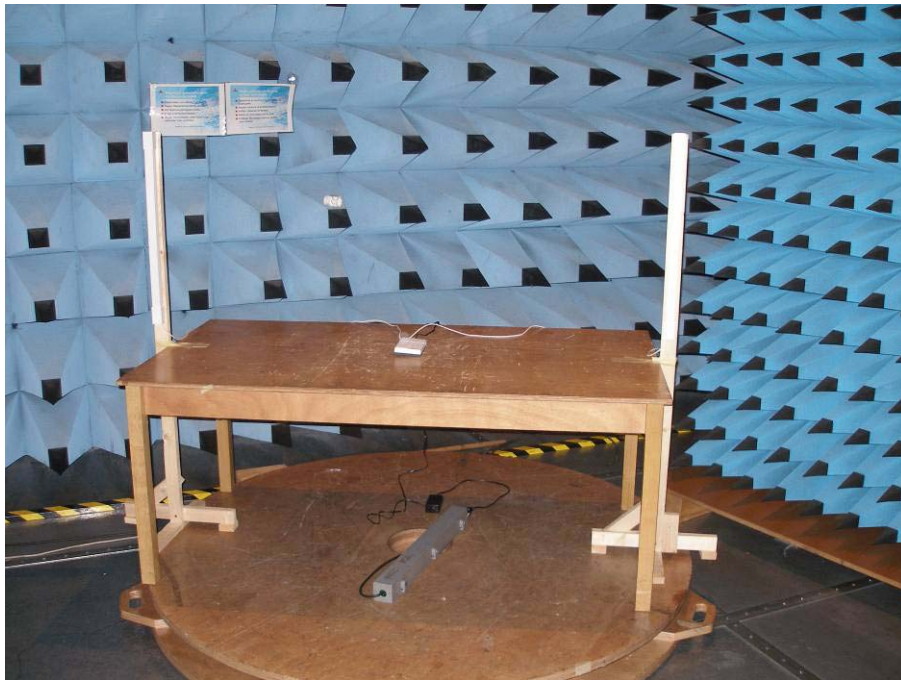
4.1 Identification / Identification / Identifikation

Manufacturer name and address Nom et adresse du fabricant Name und Adresse des Herstellers	TeleAlarm SA Rue du Pont 23 2300 La Chaux-de-Fonds Switzerland
Production country / Pays de fabrication / Ursprungsland	Switzerland
Brand name / nom de marque / Verkaufsmarke	Bosch
Product name / Nom du produit / Produktname	IS76 Ferrite Beacon Controller IS76 Ferrite Beacon Antenna FCC ID: ZU6-CRS-NC-IS76
Product description / Description du produit / Produktbeschreibung	Radio beacon
Model number / Numéro de modèle / Modellnummer	Controller: F.01U.140.033 / CRS-NC-IS76-CO Antenna: F.01U.140.034 / CRS-NC-IS76-AN
Serial no / No. de série / Seriennummer	Controller: 026069600900000544 Antenna : ---
Software version / Version du logiciel / Softwareversion	No software
Highest frequency / Fréquence la plus élevée / Höchste Frequenz	68 kHz (transmitter frequency) 136 kHz (digital frequency)
Supply / Alimentation / Speisung	U = 90 - 230 V 50/60 Hz (external power module) or auxiliary 24VDC
Technical documentation Documentation technique Technische Dokumentation	None. The equipment is completely identified by the numbers and references listed above. Documentation traceability and product identification are under the responsibility of and assured by TeleAlarm SA.

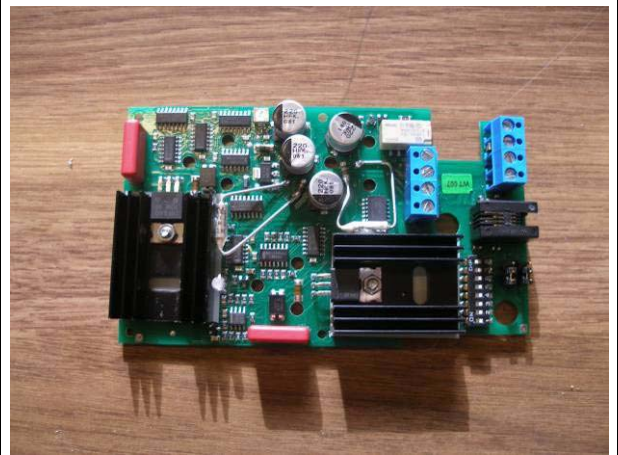
4.2 Product family / Famille de produit / Produkt-Familienvielfalt

Tested equip. / Appareil testé / Geprüftes Gerät	Covered versions / Versions couvertes / Abgedeckte Versionen	Explanation / Explication / Erklärung
IS76 Ferrite Beacon Controller with two IS76 Ferrite Beacon Antenna	IS76 Ferrite Beacon Controller with one IS76 Ferrite Beacon Antenna	The IS76 controller used with two antennas is the worst condition. The tests of this report are also valid for the IS76 controller used with one antenna.

4.3 Pictures of the EUT / Photos de l'EST / Fotos des Prüflings



EUT with two antennas



4.4 Classification / Classification / Klassierung

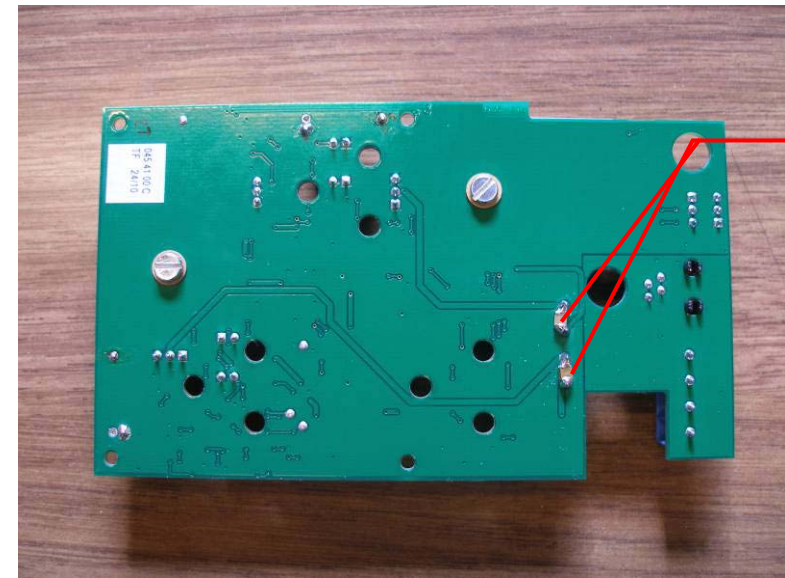
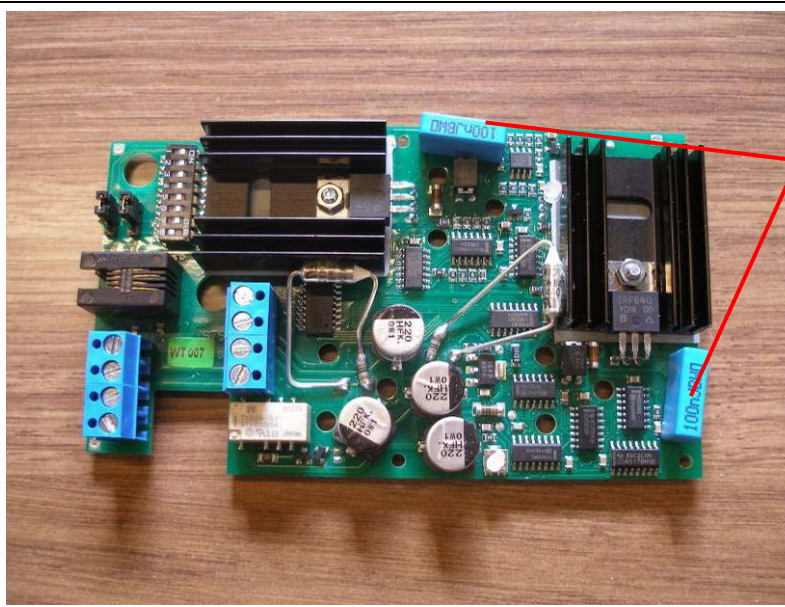
None

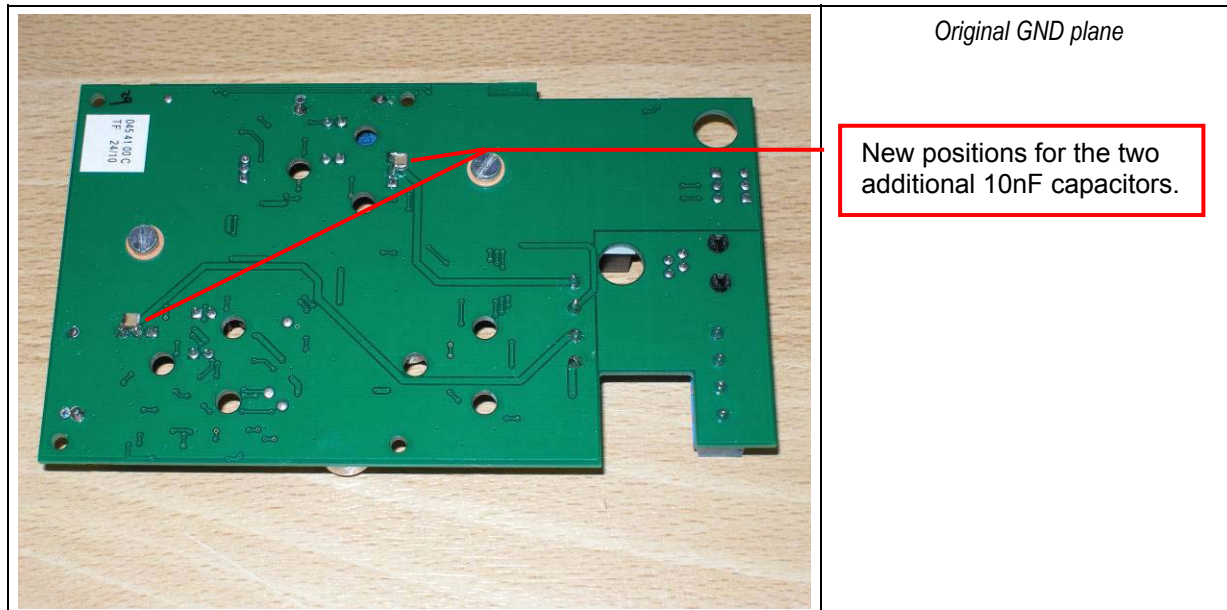
4.5 Ports / Accès / Anschlüsse

Port / Accès / Anschluss	Cable / Câble / Kabel			Remark / Remarque / Bemerkung
	Max. length / Longueur max. / Max. Länge	Type / Type / Typ	Screen / Blindage / Schirm	
<i>Mains</i>	<i>Not applicable</i>	<i>N + L</i>	<i>No</i>	<i>230 VAC to 24 V converter</i>
<i>External power</i>	<i>Not applicable</i>	<i>---</i>	<i>No</i>	<i>Parallel to Mains</i>
<i>Relay</i>	<i>3 m</i>	<i>---</i>	<i>No</i>	<i>Normally contact open</i>
<i>Antenna 1</i>	<i>10 m</i>	<i>---</i>	<i>No</i>	<i>Ferrite antenna</i>
<i>Antenna 2</i>	<i>10 m</i>	<i>---</i>	<i>No</i>	<i>Ferrite antenna</i>

4.6 Modifications / Modifications / Angebrachte Änderungen

4.6.1 Level / Niveau / Niveau: 1

	<p><i>Original GND plane</i></p> <p>2 x 10 nF added between the 2 wires of each antenna</p>
	<p>Value of C23 and C24 increased from 47 nF to 100 nF and connected to GND</p>

4.6.2 Level / Niveau / Niveau: 2**5. Test conditions / Conditions d'essai / Testbedingungen****5.1 Climatic conditions, location and date / conditions climatiques, lieu et date / klimatische Bedingungen, Ort und Datum**

Location / Lieu / Ort:	Date / Date / Datum:	Temp. / Temp. / Temp.:	Pressure / Pression / Druck [QFF]:	Rel. humidity / Humidité rel. / Rel. Luftfeuchtigkeit:
montena emc sa 1728 Rossens Switzerland	December 22, 2010	22 °C	1005 hPa	32 %
	February 18, 2011	23 - 24 °C	1013-1015 hPa	28 - 30 %
	February 22, 2011	22 - 23 °C	1013-1016 hPa	27 - 28 %
	August 03, 2011	25 °C	1022 hPa	53 %

5.2 Attendant persons / Personnes présentes / Anwesende Personen

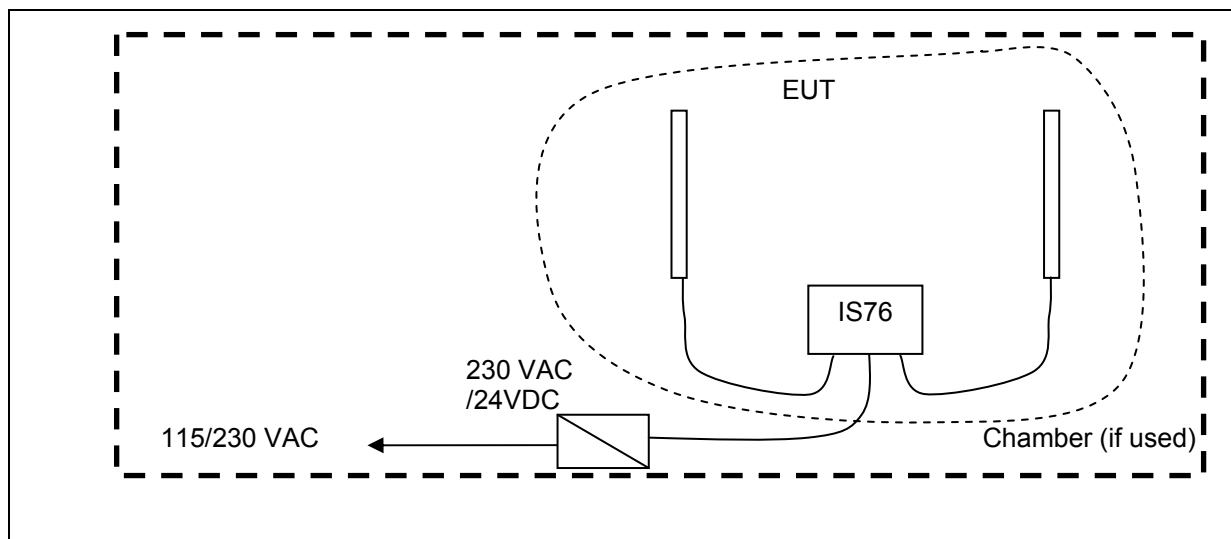
Test Engineer(s) / Ingénieur(s) d'essai / Prüfsingenieur(e) :

Mr A. Bieri, Mr E. de Raemy and Mr Baumgartner

Other(s) / Autre(s) / Andere :

Name / Nom / Name	Company / Société / Firma
Mr Jean-Luc Chappuis (partially present)	TeleAlarm SA

5.3 Test configuration / Configuration d'essai / Prüfkfiguration



5.4 Operating conditions / Conditions de fonctionnement / Betriebszustand

Normal operation : continuous emission with modulation; EUT with both antennas connected

5.5 Monitoring of the EUT / Surveillance de l'EST / Überwachung des Prüflings

The performance of the EUT during the test was monitored as following / La surveillance de l'EST durant le test a été réalisée de la manière suivante / Die Überwachung des Prüflings während der Prüfung erfolgte folgendermassen:

Verification of emission of a valid frame with a receiver. If the receiver gets a wrong frame or if a frame is missing, the output signal is raised to logic "high". The output signal is checked with an oscilloscope.

5.6 Auxiliary equipment / Matériel auxiliaire / Zusatzgeräte

The following pieces of equipment are used for the monitoring of the EUT or are necessary for the EUT but they are not part of the EUT / Les équipements suivants servent à la surveillance de l'EST ou sont indispensables au fonctionnement de celui-ci mais ne font pas partie de l'EST / Folgende Geräte werden für die Überwachung des Prüflings gebraucht oder sind notwendig für die korrekte Funktion. Sie gehören jedoch nicht zum Prüfling.

Product / Produit / Produkt	Brand / Marque / Marke	Model No.	ID	Remark / Remarque / Bemerkung
230VAC / 24VDC power supply	ENG	3A-302DA20	---	---
68 kHz receiver	Telealarm	S37L	---	Special software to achieve the verification as described in §5.5

	115-230VAC / 24VDC power supply
	Receiver with oscilloscope

5.7 Performance criteria / Critères de performance / Bewertungskriterien

General requirements:	Requirements according to the EUT:
<p align="center">Criterion A:</p> <p>The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed.</p>	
<p align="center">Criterion B:</p> <p>The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed.</p>	
<p align="center">Criterion C:</p> <p>Temporary loss of function is allowed, provided the function is self recoverable or can be restored by the operation of the controls.</p>	

6. Emission tests

6.1 FCC - Conducted emission - Interference voltage

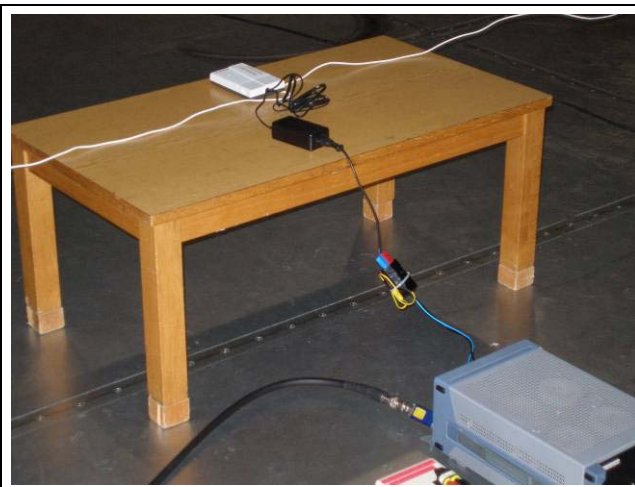
Test site: ☐ anechoic chamber (foam) ☐ shielded room
☒ anechoic chamber (ferrites) ☐ laboratory
☐ open test site ☐

Meas. uncertainty: ± 3.6 dB

Measuring method: The conducted disturbance is measured using a spectrum analyser and a line impedance substitution network (LISN). The measurement of the voltage against the earth is carried out successively. The peak values are recorded continuously on the graph. The values that exceed the limit are remeasured with a measuring receiver.

Modifications: ☐ None ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Test set-up:



Remarks: Tested with antennas attached.

Test equipment:

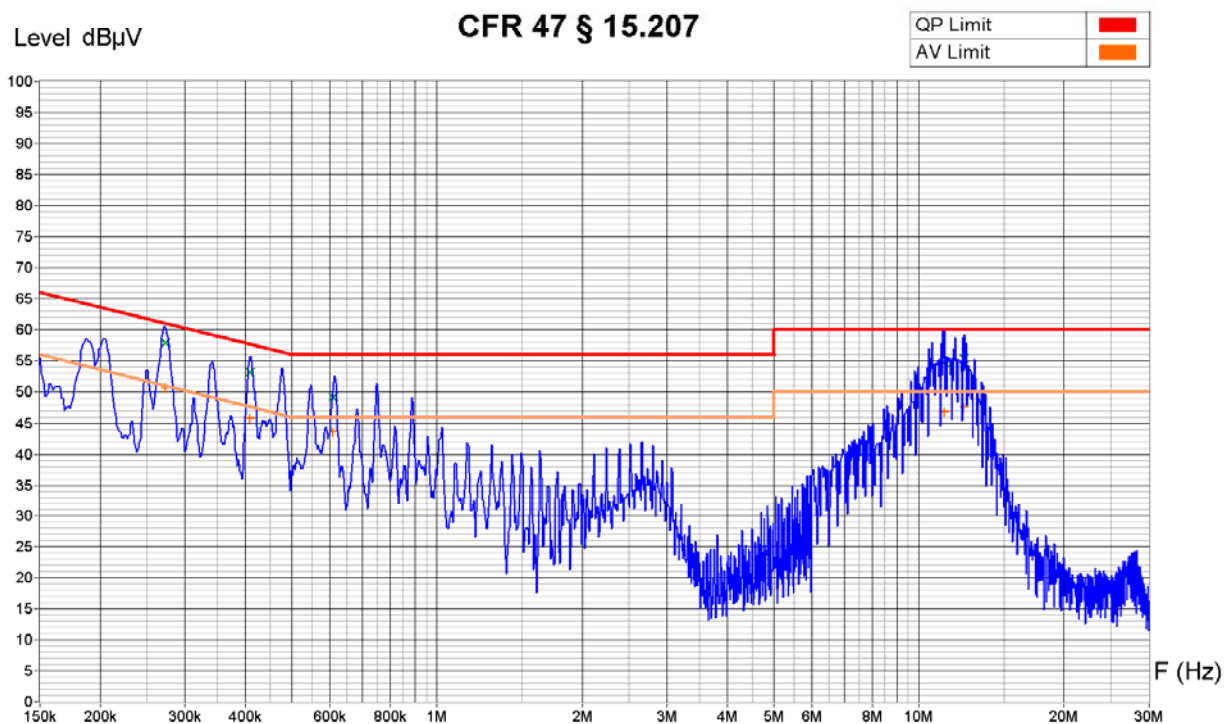
Spectrum analyser	<input checked="" type="checkbox"/> 10-70	<input type="checkbox"/> 94-24	<input type="checkbox"/> 02-06	<input type="checkbox"/> 03-45	<input type="checkbox"/> 05-39	<input type="checkbox"/> 07-53
Receiver	<input type="checkbox"/> 85-12	<input type="checkbox"/> 90-11	<input checked="" type="checkbox"/> 10-70	<input type="checkbox"/> 04-28	<input type="checkbox"/> 06-29	
LISN	<input type="checkbox"/> 85-13 <input type="checkbox"/> 04-04	<input type="checkbox"/> 90-08 <input type="checkbox"/> 04-05	<input type="checkbox"/> 94-36	<input type="checkbox"/> 94-40	<input type="checkbox"/> 95-12	<input checked="" type="checkbox"/> 00-43
Protection 10 dB	<input type="checkbox"/> 91-45 <input type="checkbox"/> 96-38	<input checked="" type="checkbox"/> 91-44 <input type="checkbox"/> included in LISN	<input type="checkbox"/> 95-30	<input type="checkbox"/> 95-33	<input type="checkbox"/> 95-35	<input type="checkbox"/> 95-36
Protection 20 dB	<input type="checkbox"/> 91-46	<input type="checkbox"/> 95-33	<input type="checkbox"/> 95-38	<input type="checkbox"/> included in LISN		
Cables	<input type="checkbox"/> 06-00	<input checked="" type="checkbox"/> 06-01	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Measurement Type : Voltage Interference
 Supply : Line 1
 Other :



Equipment Under Test : IS76
 Set-Up : See picture
 Operating Conditions : Normal operation at 115V 60Hz
 Remarks : Mod level 2



Zone	150 KHz - 1 MHz	1 MHz - 6 MHz	6 MHz - 30 MHz
Video Bandwidth	30 KHz	30 KHz	30 KHz
Resol Bandwidth	9 KHz	9 KHz	9 KHz

Receiver Measures

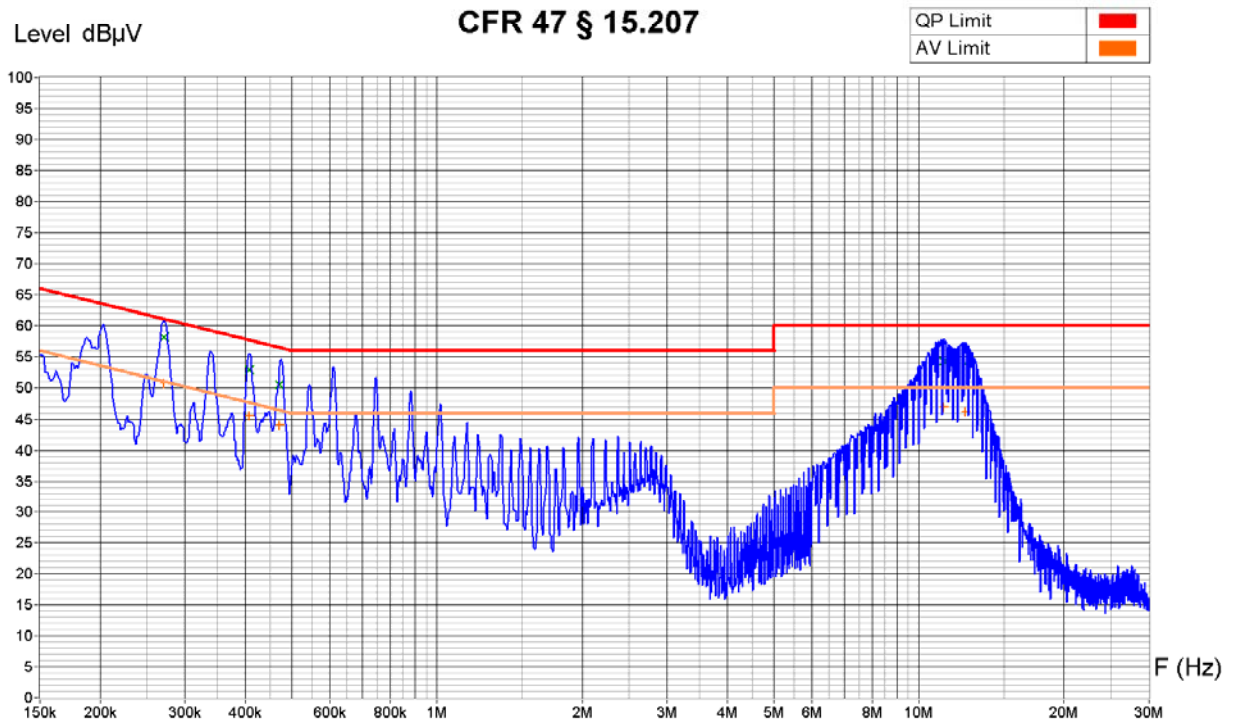
Frequency	Peak	QuasiPeak (x)	Average (+)	QP Margin
272.80 KHz	61.1 dBμV	58.0 dBμV	50.7 dBμV	3.1 dB
408.80 KHz	56.1 dBμV	53.2 dBμV	45.8 dBμV	4.5 dB
608 KHz	51.7 dBμV	49.2 dBμV	43.5 dBμV	6.8 dB
11.30 MHz	57.6 dBμV	54.9 dBμV	46.9 dBμV	5.1 dB
12.38 MHz	58.1 dBμV	55.5 dBμV	47.5 dBμV	4.5 dB

Operator: C-A Baumgartner
 Date/Time: 09.08.2011 15:21
 Filename:
 C_115_60_P.png/.txt

Measurement Type : Voltage Interference
 Supply : Neutral
 Other :



Equipment Under Test : IS76
 Set-Up : see picture
 Operating Conditions : Normal operation at 115V 60Hz
 Remarks : Mod level 2



Zone	150 KHz - 1 MHz	1 MHz - 6 MHz	6 MHz - 30 MHz
Video Bandwidth	30 KHz	30 KHz	30 KHz
Resol Bandwidth	9 KHz	9 KHz	9 KHz

Receiver Measures

Frequency	Peak	QuasiPeak (x)	Average (+)	QP Margin
271.60 KHz	61.1 dB μ V	58.1 dB μ V	50.9 dB μ V	2.9 dB
407.30 KHz	55.8 dB μ V	53.0 dB μ V	45.6 dB μ V	4.7 dB
471 KHz	53.2 dB μ V	50.6 dB μ V	44.0 dB μ V	5.9 dB
11.26 MHz	57.0 dB μ V	54.4 dB μ V	46.9 dB μ V	5.6 dB
12.48 MHz	56.5 dB μ V	53.9 dB μ V	46.2 dB μ V	6.1 dB

Operator: C-A Baumgartner
 Date/Time: 09.08.2011 15:32
 Filename:
 C_115_60_N.png/.txt

6.2 FCC - Radiated emission - Magnetic field

Test site: ☐ anechoic chamber (ferrites) ☐ open test site
☒ anechoic chamber (foam) ☐

Meas. distance: ☐ 3 m ☒ 10 m ☐ 30 m

Meas. uncertainty: ± 2.8 dB (10 m)

Position of EUT: 0.8 m (height above floor of equipment under test)

Measuring method: The magnetic disturbance radiated by the equipment under test is measured using a spectrum analyser and a wide band magnetic antenna. The antenna is moved from 1 to 4 m in height (lowest part of loop), first in the direction of the apparatus under test, then at 90° to the apparatus and if required also horizontally. If possible the turning table is operated through 360° during the measurement. The recording is carried out taking into account the maximum value of the disturbance appearing during the functioning of the apparatus under test. The peak values are recorded continuously on a graph. The values exceeding the limits are remeasured using a measuring receiver.

Modifications up to level: ☐ None ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Test set-up:



Remarks:

- Limit values expressed in dB μ V/m and transformed to a measuring distance of 10m (factor used = 40 dB/decade). e.g.: for $f = 9$ kHz the limit is $2400/f(\text{kHz})\mu\text{V/m}$ at 300 m;

$$20 \log \left(\frac{2400 \frac{\mu\text{V}}{\text{m}}}{9 \frac{\mu\text{V}}{\text{m}}} \right) + 40 \log \left(\frac{300 \text{ m}}{10 \text{ m}} \right) = 107.6 \frac{\text{dB}\mu\text{V}}{\text{m}} \text{ at } 10 \text{ m}$$

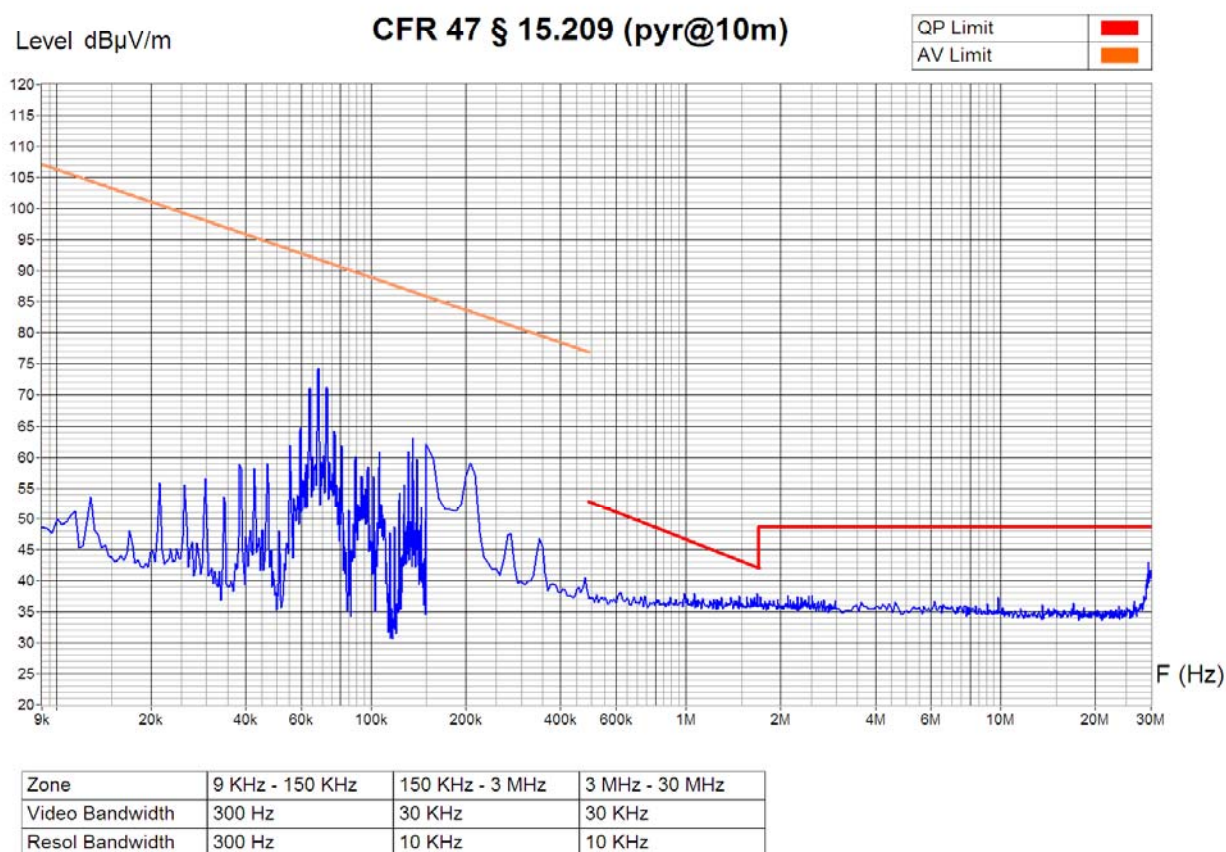
Test equipment:

Spectrum analyser	<input type="checkbox"/> 88-14	<input type="checkbox"/> 94-24	<input type="checkbox"/> 02-06	<input type="checkbox"/> 03-45	<input type="checkbox"/> 05-39	<input checked="" type="checkbox"/> 07-53
Receiver	<input type="checkbox"/> 85-12	<input type="checkbox"/> 90-11	<input checked="" type="checkbox"/> 94-34	<input type="checkbox"/> 04-28	<input type="checkbox"/> 06-29	<input type="checkbox"/>
Preamplifier	<input type="checkbox"/> 90-01	<input type="checkbox"/> 95-86	<input type="checkbox"/> 05-56	<input type="checkbox"/> 05-59	<input type="checkbox"/> 05-62	<input type="checkbox"/> 05-87
Antenna (typ: magnetic)	<input checked="" type="checkbox"/> 90-25	<input type="checkbox"/> 90-28	<input type="checkbox"/> 99-32	<input type="checkbox"/>		
Cables	<input checked="" type="checkbox"/> 06-00	<input type="checkbox"/> 06-01	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Measurement Type : Radiated Field
Polarisation : Parallel
Table Angle : 0 - 360°
Antenna Height : 1 - 4 m

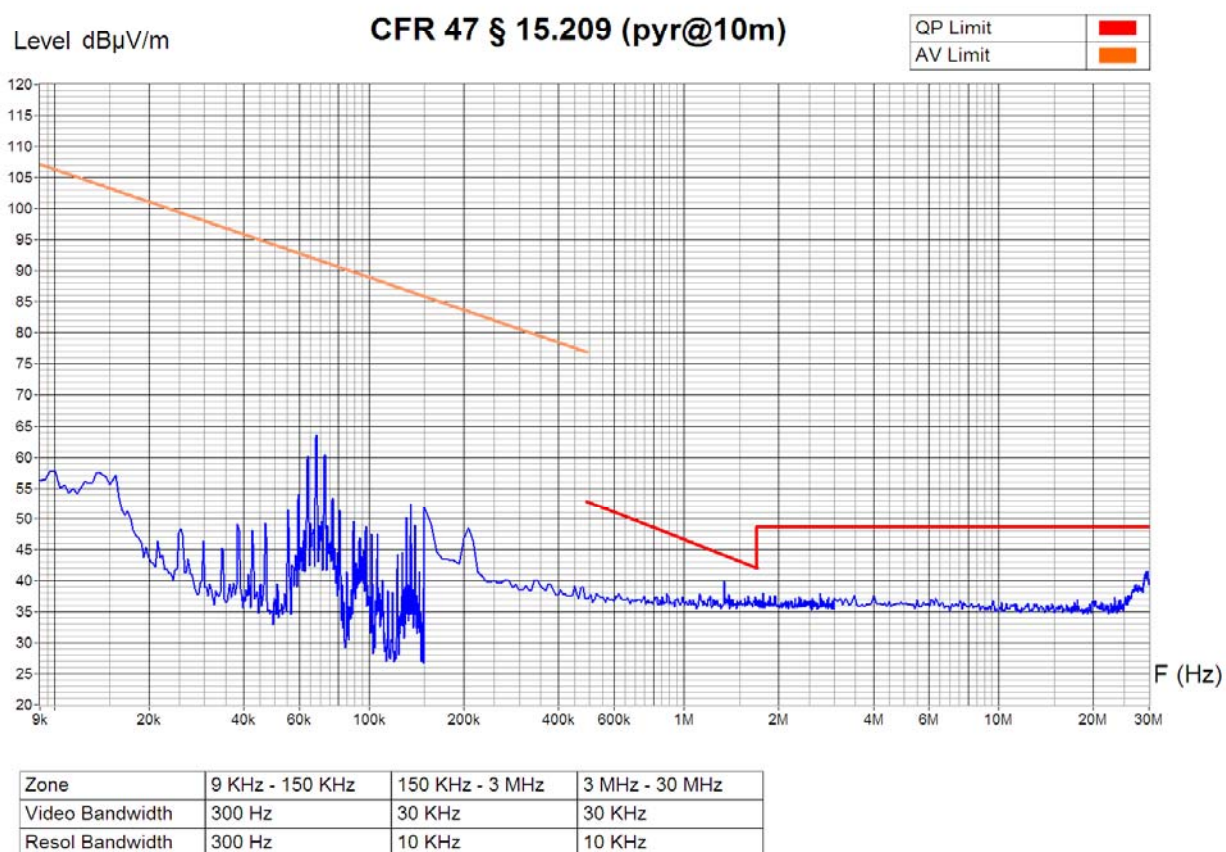
Equipment Under Test : IS76
Set-Up : See picture
Operating Conditions : Normal operation
Remarks : Modified, with original AC/DC adapter (230VAC / 24VDC)



Operator: E. de Raemy
Date/Time: 18.02.2011 10:32
Filename:
FCC15209H_par02_dBuV.png/.txt

Measurement Type : Radiated Field
 Polarisation : Perpendicular
 Table Angle : 0 - 360°
 Antenna Height : 1 - 4 m

 Equipment Under Test : IS76
 Set-Up : See picture
 Operating Conditions : Normal operation
 Remarks : Modified, with original AC/DC adapter (230VAC / 24VDC)



Operator: E. de Raemy
 Date/Time: 18.02.2011 10:57
 Filename:
 FCC15209H_per02_dBuV.png/.txt

6.3 Necessary Bandwidth

Introduction: Channel-bandwidth measured at -30 dBc..

Test site: ☐ anechoic chamber (foam) ☐ open test site
☐ anechoic chamber (ferrites) ☒ laboratory

Test method: Measurement of the conducted power on the antenna connector or on the test fixture.

Meas. uncertainty: 9kHz – 3GHz: ± 1 dB
 3GHz – 6.7GHz: ± 2.1 dB
 6.7GHz – 13.2GHz: ± 2.6 dB
 13.2GHz – 19GHz: ± 2.8 dB
 19GHz – 26.5GHz: ± 3 dB
 ± 2.6 μ Hz/Hz

Test set-up:



Remarks: ---

Test equipment:

Spectrum analyser	<input type="checkbox"/> 88-14	<input type="checkbox"/> 94-24	<input checked="" type="checkbox"/> 02-06	<input type="checkbox"/> 03-45	<input type="checkbox"/> 05-39	<input type="checkbox"/> 07-53
Receiver	<input type="checkbox"/> 85-12	<input type="checkbox"/> 90-11	<input type="checkbox"/> 94-34	<input type="checkbox"/> 04-28	<input type="checkbox"/> 06-29	<input type="checkbox"/>
Temperature chamber	<input checked="" type="checkbox"/> 06-66					
Temperature probe	<input type="checkbox"/> 91-11	<input type="checkbox"/> 03-05	<input type="checkbox"/> 05-34	<input checked="" type="checkbox"/> 08-03		
Variable transformer	<input type="checkbox"/> 75-04	<input checked="" type="checkbox"/> 04-37				
Power supply	<input type="checkbox"/> 99-04	<input type="checkbox"/> 04-31				
Multimeter	<input type="checkbox"/> 89-07	<input type="checkbox"/> 90-38	<input type="checkbox"/> 92-25	<input type="checkbox"/> 94-51	<input type="checkbox"/> 02-03	<input type="checkbox"/> 03-22
	<input type="checkbox"/> 04-47	<input type="checkbox"/> 04-104	<input type="checkbox"/> 04-105	<input type="checkbox"/> 06-51	<input checked="" type="checkbox"/> 06-52	
Cables	<input checked="" type="checkbox"/> RG223 1.5m (no 145)					

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Results of the test

Client: TeleAlarm SA

Apparatus: IS76 Ferrite Beacon Controller
 IS76 Ferrite Beacon Antenna
 FCC ID: ZU6-CRS-NC-IS76

Operating mode: Normal modulation, only tested antenna connected

Cables connected to the EUT:

- 1 x antenna cable
- power supply


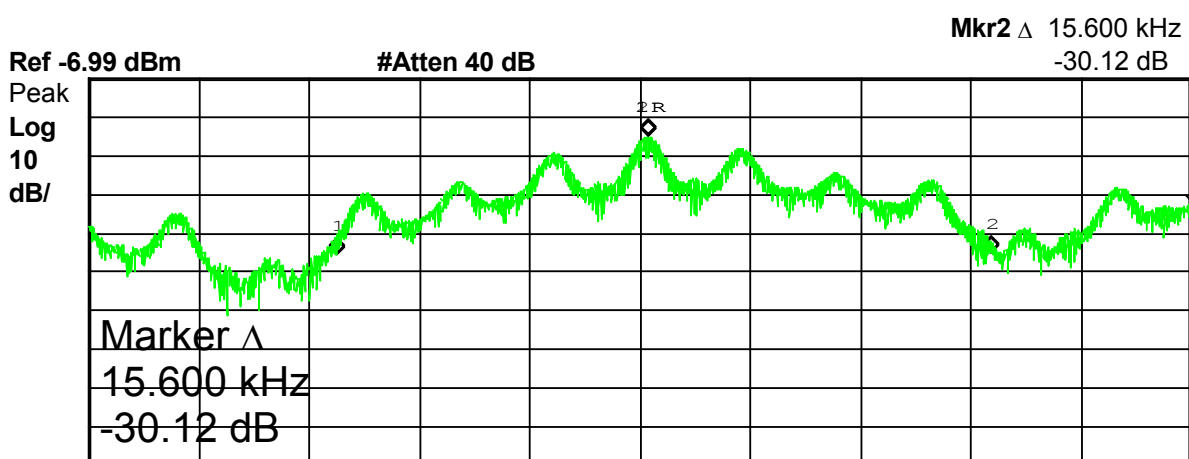
Remarks: ---

 Modifications up to level: ☐ None ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Normal test conditions

Temp [°C]	U [V]	Frequency [kHz]	f min [kHz]	f max [kHz]	Bandwidth [kHz]	Remarks	Pass	
							Yes	No
22	230	67.85	53.55	83.6300	30.1	---	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Extreme test conditions

Extreme test conditions							Pass	
Temp [°C]	U [V]	Frequency [kHz]	f min [kHz]	f max [kHz]	Bandwidth [kHz]	Remarks	Yes	No
0.2	253	68.400	53.475	84.200	30.725	---	<input checked="" type="checkbox"/>	<input type="checkbox"/>
-0.8	90	68.350	54.225	83.950	29.725	---	<input checked="" type="checkbox"/>	<input type="checkbox"/>
37.6	253	67.350	53.050	82.900	29.85	---	<input checked="" type="checkbox"/>	<input type="checkbox"/>
38.5	90	67.775	53.450	83.050	29.6	---	<input checked="" type="checkbox"/>	<input type="checkbox"/>

 Agilent 14:18:22 22 Feb 2011


Center 68 kHz Span 50 kHz
 #Res BW 1 kHz VBW 1 kHz #Sweep 1 s (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Freq	68.350 kHz	-22.06 dBm
1Δ	(1)	Freq	-14.125 kHz	-30.2 dB
2R	(1)	Freq	68.350 kHz	-22.06 dBm
2Δ	(1)	Freq	15.600 kHz	-30.12 dB

Date of test: February 22, 2011
 Operator: E. de Raemy

7. Immunity tests

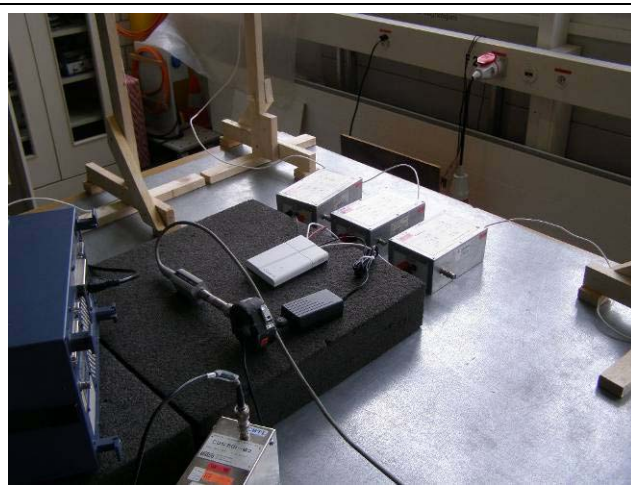
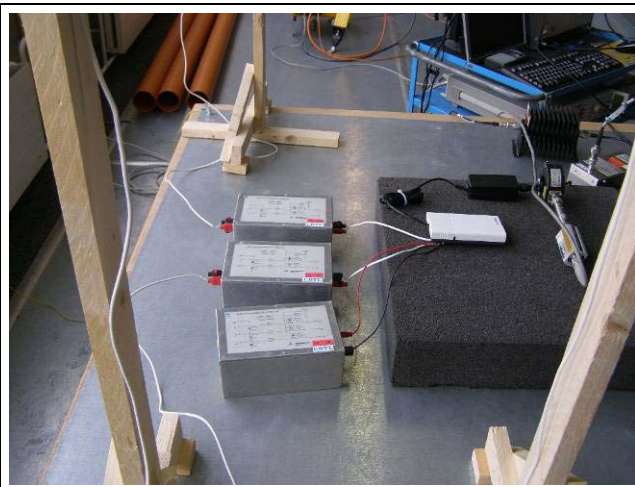
7.1 Immunity to conducted disturbances induced by radio-frequency fields

Introduction: The object of this test is to determine the immunity of equipment when subjected to conducted disturbances coming from intended radiofrequency transmitters. These disturbances can be found as common mode currents on the conductors and the screens of the cables.

Meas. uncertainty: ± 1.85 dB

Measuring method: The HF voltage is injected on the cables using different coupling/decoupling networks. All connected cables shall be provided with the appropriate coupling and decoupling devices. The voltage is calibrated without the equipment under test. The step time is depending on the reaction time of the tested equipment.

Test set-up:



Remarks: ---

Test equipment:

HF-Generator	<input type="checkbox"/> 88-23	<input checked="" type="checkbox"/> 00-42	<input type="checkbox"/> 03-39	<input type="checkbox"/> 04-03	<input type="checkbox"/> 04-89	<input type="checkbox"/> 07-02
Amplifier	<input checked="" type="checkbox"/> 88-15	<input checked="" type="checkbox"/> 88-19				
Power attenuator	<input type="checkbox"/> 95-18	<input type="checkbox"/> 99-23	<input checked="" type="checkbox"/> 04-07	<input type="checkbox"/> 05-75	<input type="checkbox"/> 09-42	
HF-powermeter	<input type="checkbox"/> 95-97	<input type="checkbox"/> 01-15	<input type="checkbox"/> 01-17	<input checked="" type="checkbox"/> 03-07	<input type="checkbox"/> 04-96	<input type="checkbox"/> 05-20
HF-probe	<input type="checkbox"/> 92-03 <input type="checkbox"/> 10-27	<input type="checkbox"/> 05-74 <input type="checkbox"/> 10-28	<input type="checkbox"/> 05-88	<input type="checkbox"/> 07-03	<input checked="" type="checkbox"/> 09-03	<input type="checkbox"/> 09-04
Current clamp	<input checked="" type="checkbox"/> 96-09	<input type="checkbox"/>				
Coupling networks	<input checked="" type="checkbox"/> 04-92	<input type="checkbox"/>	<input type="checkbox"/>	Typ = M2		
Coupling networks	<input checked="" type="checkbox"/> 05-06	<input checked="" type="checkbox"/> 05-07	<input type="checkbox"/>	Typ = AF2		
Coupling networks	<input checked="" type="checkbox"/> 05-09	<input type="checkbox"/>	<input type="checkbox"/>	Typ = AF3 (only for decoupling)		
Electromagnetic clamp	<input type="checkbox"/> 88-26	<input type="checkbox"/> 96-24	<input type="checkbox"/>			
Cables	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Artificial hand	<input type="checkbox"/> 10-45	<input type="checkbox"/> 10-58	<input type="checkbox"/>			

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Test results

Client: TeleAlarm SA

Apparatus: IS76 Ferrite Beacon Controller
 IS76 Ferrite Beacon Antenna
 FCC ID: ZU6-CRS-NC-IS76

Operating mode: Normal operation

Cables connected: See § 4.5

Observation of apparatus: See § 5.5

Remarks: Additional test according to special requirements of EN 50130-4 for alarm systems

Description and dimensions of the EUT: See § 4

Modifications up to level: ☒ None ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Test site: ☐ anechoic chamber (ferrites) ☐ anechoic chamber (foam)
☒ laboratory ☐

Frequency step: ☒ 1 % ☐ 4 % ☐Step time: ☐ 0.5 s ☒ 1 s (AM) ☒ 3 s (Pulse)Level of test required: ☐ 1 V_{emf} ☐ 3 V_{emf} ☒ 10 V_{emf} ☐Frequency band: ☒ 0.15 - 100 MHz ☐ 0.15 - 230 MHz ☐

Modulation: ☒ AM, 1 kHz, 80 % ☐ AM, 400 Hz, 80 % ☒ Pulse 1 Hz / 50% duty cycle

Performance criterion: ☒ A ☐ B ☐ C ☐

Coupling	CDN	Terminated* (50 Ω)	CDN	Freq. [MHz]	Lev. [V]	Remarks	Pass Yes	No
Power supply	04-92	Relay and Antenna1	05-09 05-06	0.15 – 100	10	AM: At 66 MHz short influence (communication delay), otherwise no influence observed PM: No influence observed	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Antenna 1 (J2)	05-06	Power supply, Antenna2, relay	04-92 05-07 05-09	0.15 – 100	10	AM: No influence observed PM: No influence observed	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Antenna 2 (J3)	05-07	Power supply, Antenna1, relay	04-92 05-06 05-09	0.15 – 100	10	AM: No influence observed PM: No influence observed	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Relay	AF2	Power supply, Antenna1	04-92 05-06	0.15 – 100	10	AM: No influence observed PM: No influence observed	<input checked="" type="checkbox"/>	<input type="checkbox"/>

* According to special requirements of EN 50130-4 for alarm systems, one of each port type has to be terminated with 50 Ω

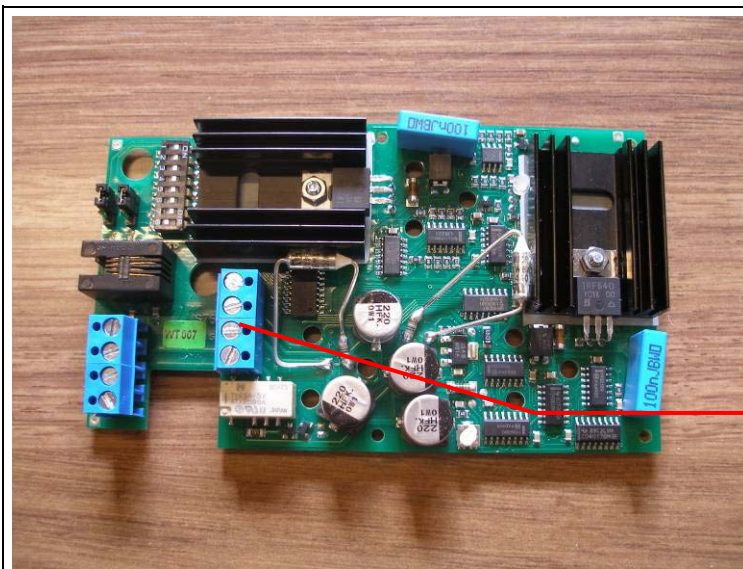
Not tested port	Explanation
External power supply	Parallel to main power supply, therefore no tests

Date of test: December 22, 2011
 Operator: A. Bieri

8. Transmitter and receiver characteristics

8.1 Classification

Extreme temperature range / Plage de température extrême / Extrem-Temperaturbereich	<input type="checkbox"/> Category I (General) -20 C to +55 C <input type="checkbox"/> Category II (Portable) -10 C to +55 C <input checked="" type="checkbox"/> Category III (Normal indoor use) 0 C to +35 C
Operating modes / Modes de fonctionnement / Funktionszustände	<input checked="" type="checkbox"/> Transmit <input type="checkbox"/> Receive (<input type="checkbox"/> receiver used in combination with permanently co-located transmitter) <input type="checkbox"/> Standby
Antenna implementation / Implémentation de l'antenne / Antennenausführung	<input type="checkbox"/> Integral antenna <input checked="" type="checkbox"/> Loop antenna, area = $< 0.05 \text{ m}^2$ <input checked="" type="checkbox"/> Max length of any antenna loop element = 0.6 m <input type="checkbox"/> Temporary antenna connector <input checked="" type="checkbox"/> Permanent antenna connector
Product class / Classe de produit / Produkteklasse	<input checked="" type="checkbox"/> Product class 1 Inductive loop coil transmitter with an integral antenna or a dedicated antenna. Loop antenna area $< 30 \text{ m}^2$; and the length of any antenna loop element shall be $< \lambda/4\text{m}$ or $< 30\text{m}$ whichever is shorter <input type="checkbox"/> Product class 2 Inductive loop coil transmitter with a customizable antenna. Loop antenna area $< 30 \text{ m}^2$; and the length of any antenna loop element shall be $< \lambda/4\text{m}$ or $< 30\text{m}$ whichever is shorter <input type="checkbox"/> Product class 3 Inductive large size loop coil transmitter with a customizable antenna. Loop antenna area $> 30 \text{ m}^2$; single turn loop <input type="checkbox"/> Product class 4 E-field transmitter



Internal permanent
antenna connector

8.2 Transmitter characteristics

Method of frequency generation / Génération de fréquence / Erzeugung der Frequenz	<input type="checkbox"/> Crystal <input type="checkbox"/> Synthesizer <input checked="" type="checkbox"/> RC
Transmitter operating frequency range (OFR)	68 kHz
Channel separation (if applicable)	-
Number of channels	1
Duty cycle / Rapport cyclique / Einschaltdauer	<input type="checkbox"/> Software controlled cycles: Transmitter ON: sec/hr Transmitter OFF: sec/hr <input checked="" type="checkbox"/> Manually operated or event dependant cycles: Description of the pattern: <i>Designed to transmit permanently a identifying signal</i> <input type="checkbox"/> Once triggered follows a pre-programmed cycle. Cycle: Transmitter ON: Transmitter OFF: <input checked="" type="checkbox"/> Once triggered continuous transmission until trigger is released or manually reset. Typical usage pattern: Transmitter ON: 100% Transmitter OFF: 0% The above cycle times define the following classes: <input type="checkbox"/> Class 1: Duty cycle ratio < 0.1% <input type="checkbox"/> Class 2: Duty cycle ratio < 1.0% <input type="checkbox"/> Class 3: Duty cycle ratio < 10% <input checked="" type="checkbox"/> Class 4: Duty cycle ratio ≤ 100%
Variable carrier output / Sortie de porteuse variable / Variable Ausgangsleistung	<input checked="" type="checkbox"/> Transmitter carrier output is not variable <input type="checkbox"/> Transmitter carrier output is variable RF output max RF output min <input type="checkbox"/> RF output continuously variable <input type="checkbox"/> RF output stepped dB per step

Modulation / Modulation / Modulation	<input type="checkbox"/> Amplitude <input type="checkbox"/> Frequency: Deviation kHz <input type="checkbox"/> Phase <input checked="" type="checkbox"/> Pulse Pulse repetition frequency: <i>it depends on the data</i> ¹⁾ Duty cycle: <i>it depends on the data</i> ¹⁾ <input type="checkbox"/> Other <i>1) A logic "1" is transmitted by a pulse length of 58.8 μs and a "0" by a pulse length of 117.6 μs.</i>
	<input type="checkbox"/> Transmitter can be operated without modulation <input checked="" type="checkbox"/> Transmitter can only be operated with modulation

8.3 Power source

Power source / Alimentation / Versorgung	<input checked="" type="checkbox"/> AC supply 230 VAC; 50 Hz <input checked="" type="checkbox"/> Single phase <input type="checkbox"/> Three phase or <input checked="" type="checkbox"/> ext. DC supply 24 VDC Extreme upper voltage 24 VDC Extreme lower voltage 22 VDC <input type="checkbox"/> Battery VDC Extreme upper voltage VDC Extreme lower voltage VDC <input type="checkbox"/> Alkaline <input type="checkbox"/> Nickel cadmium <input type="checkbox"/> Lead acid <input type="checkbox"/> Leclanche <input type="checkbox"/> Lithium-Ion <input type="checkbox"/>
Automatic switch off / Arrêt automatique / Automatische Abschaltung	<input type="checkbox"/> Applies V cut-off voltage <input checked="" type="checkbox"/> Does not apply

9. Transmitter parameters

9.1 Transmitter carrier output levels

Test site: ☒ anechoic chamber (foam) ☐ open test site
☐ anechoic chamber (ferrites) ☒ laboratory

Test method: The magnetic field radiated by the equipment under test is measured using a spectrum analyser and a wide band magnetic antenna. The turning table with the EUT is operated through 360° during the measurement. The recording is carried out taking into account the maximum value of the disturbance appearing during the functioning of the apparatus under test. The peak values (max hold) are recorded continuously on graph. If necessary QP values are remeasured using a measuring receiver. During extreme test condition, the conducted power on the antenna connector or on the test fixture is measured.

Meas. uncertainty: 9kHz – 3GHz: ± 1 dB

Test set-up:



Test equipment:

Spectrum analyser	<input type="checkbox"/> 88-14	<input type="checkbox"/> 94-24	<input checked="" type="checkbox"/> 02-06	<input type="checkbox"/> 03-45	<input type="checkbox"/> 05-39	<input type="checkbox"/> 07-53
Receiver	<input type="checkbox"/> 85-12	<input type="checkbox"/> 90-11	<input type="checkbox"/> 94-34	<input type="checkbox"/> 04-28	<input type="checkbox"/> 06-29	<input type="checkbox"/>
Temperature chamber	<input checked="" type="checkbox"/> 06-66					
Temperature probe	<input type="checkbox"/> 91-11	<input type="checkbox"/> 03-05	<input type="checkbox"/> 05-34	<input checked="" type="checkbox"/> 08-03		
Variable transformer	<input type="checkbox"/> 75-04	<input checked="" type="checkbox"/> 04-37				
Power supply	<input type="checkbox"/> 99-04	<input type="checkbox"/> 04-31				
Multimeter	<input type="checkbox"/> 89-07	<input type="checkbox"/> 90-38	<input type="checkbox"/> 92-25	<input type="checkbox"/> 94-51	<input type="checkbox"/> 02-03	<input type="checkbox"/> 03-22
	<input type="checkbox"/> 04-47	<input type="checkbox"/> 04-104	<input type="checkbox"/> 04-105	<input type="checkbox"/> 06-51	<input checked="" type="checkbox"/> 06-52	
Cables	<input checked="" type="checkbox"/> RG223 1.5m (no 145)					

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Results of the test

Client: TeleAlarm SA

Apparatus: IS76 Ferrite Beacon Controller
 IS76 Ferrite Beacon Antenna
 FCC ID: ZU6-CRS-NC-IS76

Operating mode: Normal modulation, only tested antenna connected

Cables connected to the EUT:

- 1 x antenna cable
- power supply

Remarks:

- Limit at 68 kHz = 60.2 dB μ A/m at 10 m (=70.2 dB μ A/m - 10 dB according EN 300 330-1, note 1 of table 5)
- Maximum field strength measured = 22.8 dB μ A/m at 10 m (see §9.3.1)
- EUT mounted in test fixture

Modifications up to level: ☐ None ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5**Normal test conditions**

Temp [°C]	U [V]	Frequency [kHz]	P [dBm]		H @ 10m [dBμA/m]	Limit @ 10m [dBμA/m]	Remarks	Pass	
								Yes	No
22.5	230	67.9	-22.0		22.8	60.2	---	<input checked="" type="checkbox"/>	<input type="checkbox"/>

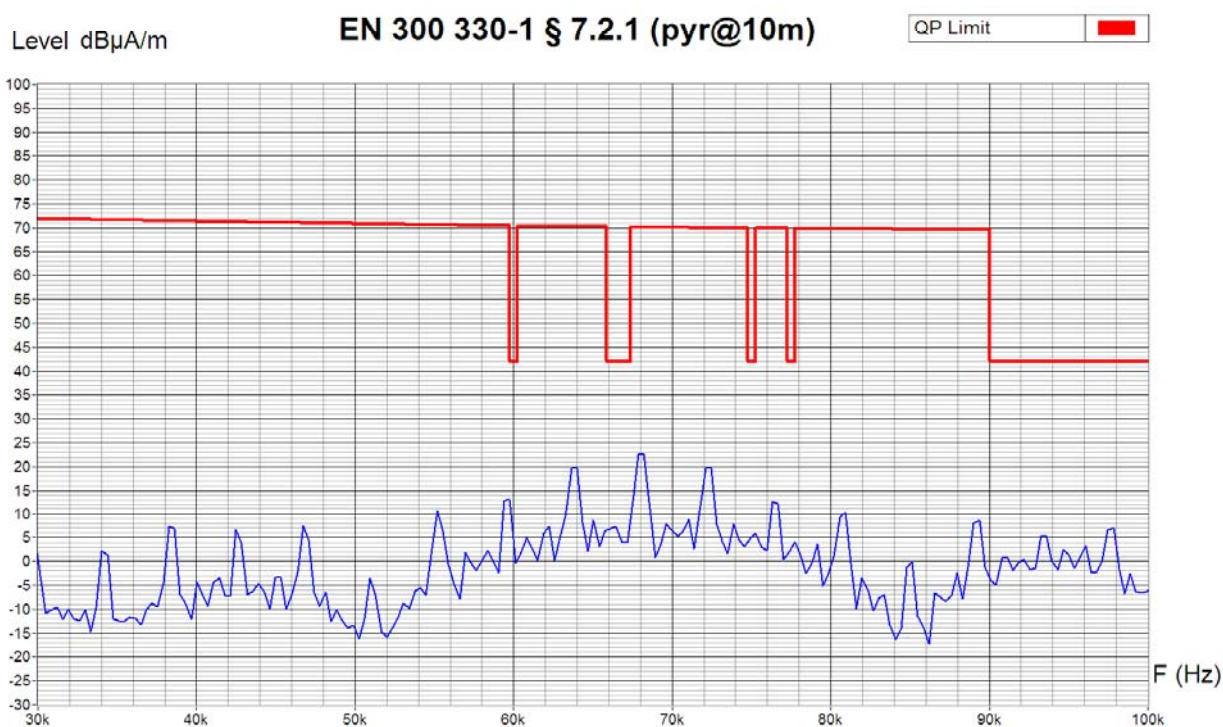
Extreme test conditions

Temp [°C]	U [V]	Frequency [kHz]	P [dBm]	Variation [dB]	H @ 10m [dBµA/m]	Limit @ 10m [dBµA/m]	Remarks	Pass	
								Yes	No
0.2	253	68.4	-22.1	-0.10	22.7	60.2	---	<input checked="" type="checkbox"/>	<input type="checkbox"/>
-0.8	90	68.4	-22.1	-0.10	22.7	60.2	---	<input checked="" type="checkbox"/>	<input type="checkbox"/>
37.6	253	67.4	-22.1	-0.10	22.7	60.2	---	<input checked="" type="checkbox"/>	<input type="checkbox"/>
38.5	90	67.8	-22.1	-0.10	22.7	60.2	---	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Measurement Type : Radiated Field
Polarisation : Parallel
Table Angle : 0 - 360°
Antenna Height : 1 - 4 m



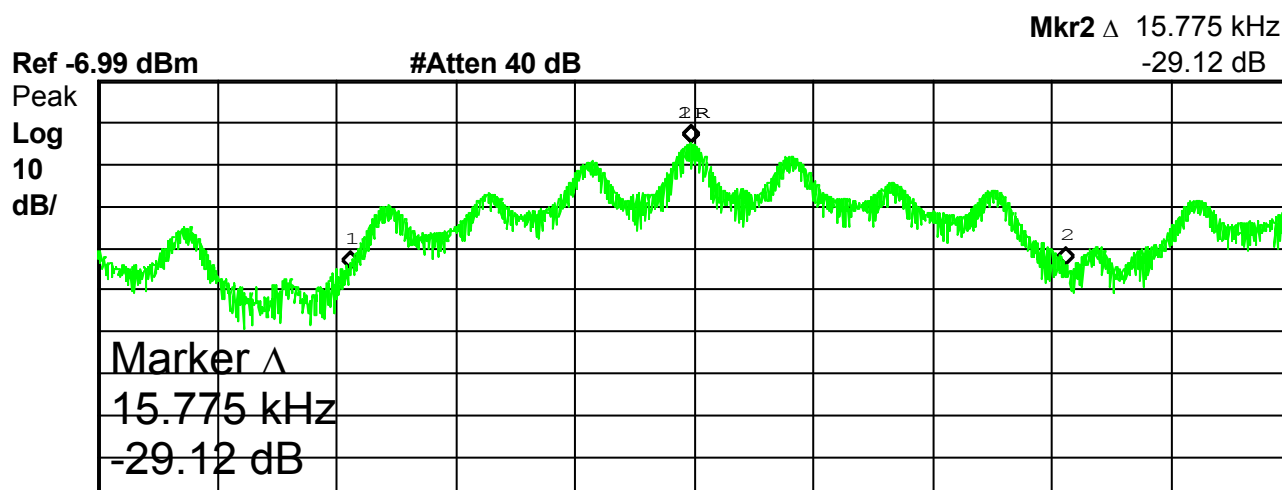
Equipment Under Test : IS76
Set-Up : See picture
Operating Conditions : Normal operation
Remarks : Modified, with original AC/DC adapter (230VAC / 24VDC)



Zone	9 KHz - 150 KHz	150 KHz - 3 MHz	3 MHz - 30 MHz
Video Bandwidth	300 Hz	30 KHz	30 KHz
Resol Bandwidth	300 Hz	10 KHz	10 KHz

Operator: E. de Raemy
Date/Time: 18.02.2011 10:32
Filename:
TX_output_level_par02.png/.txt

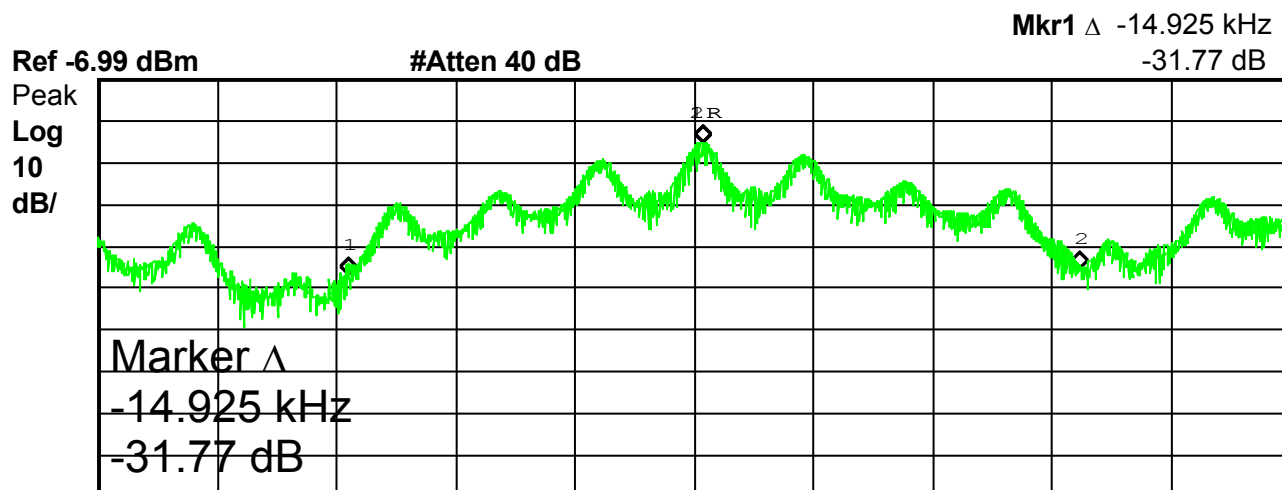
Agilent 13:58:06 22 Feb 2011



Center 68 kHz				Span 50 kHz
#Res BW 1 kHz		VBW 1 kHz		#Sweep 1 s (2001 pts)
Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Freq	67.850 kHz	-22.03 dBm
1Δ	(1)	Freq	-14.300 kHz	-30.01 dB
2R	(1)	Freq	67.850 kHz	-22.03 dBm
2Δ	(1)	Freq	15.775 kHz	-29.12 dB

Normal test conditions: $T = 22.5^{\circ}\text{C}$ / $U = 230\text{V}/50\text{Hz}$

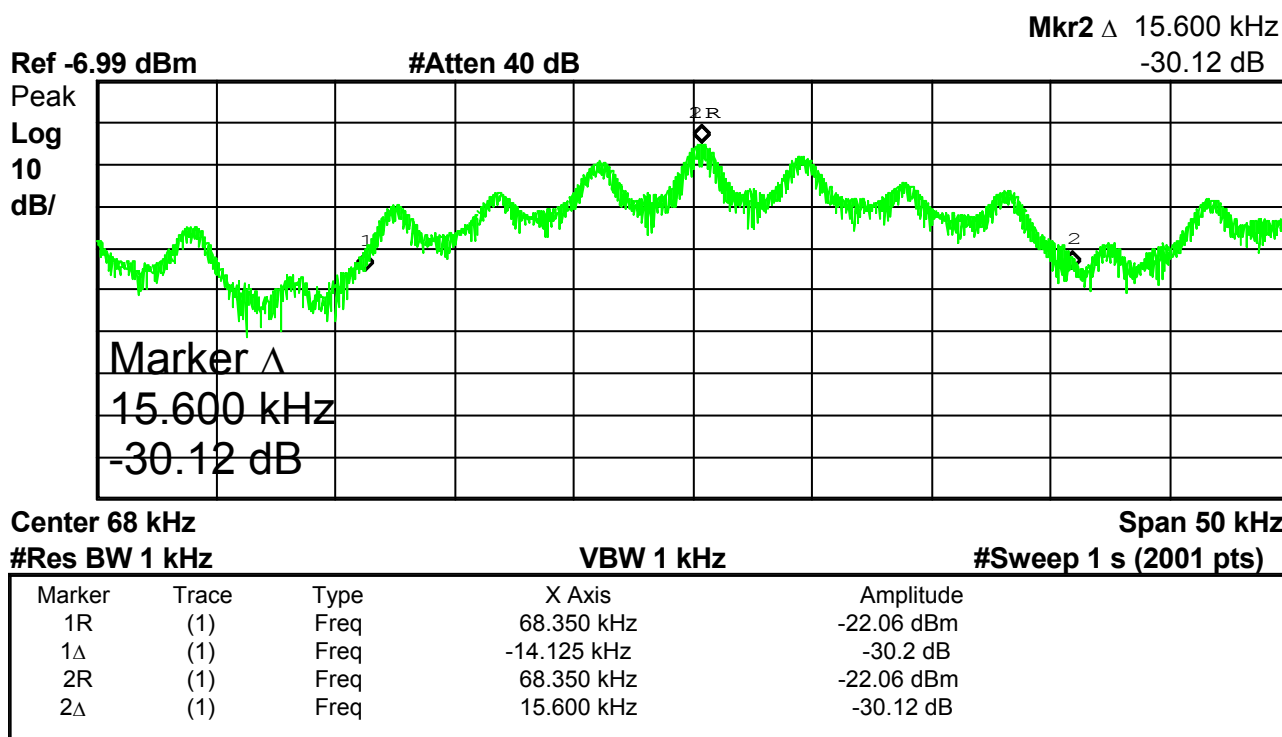
Agilent 14:14:47 22 Feb 2011



Center 68 kHz				Span 50 kHz
#Res BW 1 kHz		VBW 1 kHz		#Sweep 1 s (2001 pts)
Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Freq	68.400 kHz	-22.07 dBm
1Δ	(1)	Freq	-14.925 kHz	-31.77 dB
2R	(1)	Freq	68.400 kHz	-22.07 dBm
2Δ	(1)	Freq	15.800 kHz	-30.22 dB

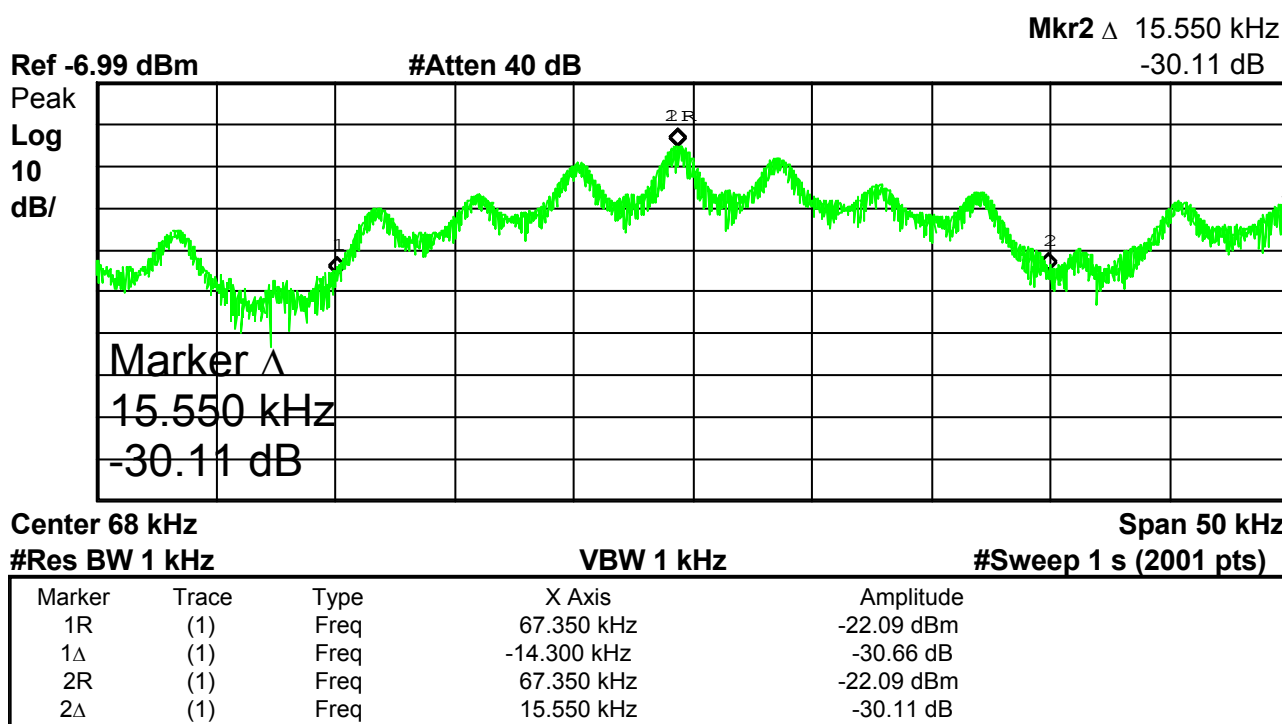
Extreme test conditions : $T = 0.2^{\circ}\text{C}$ / $U = 253\text{V}/50\text{Hz}$

Agilent 14:18:22 22 Feb 2011



Extreme test conditions : : T = -0.8°C / U = 90V/50Hz

Agilent 15:42:35 22 Feb 2011

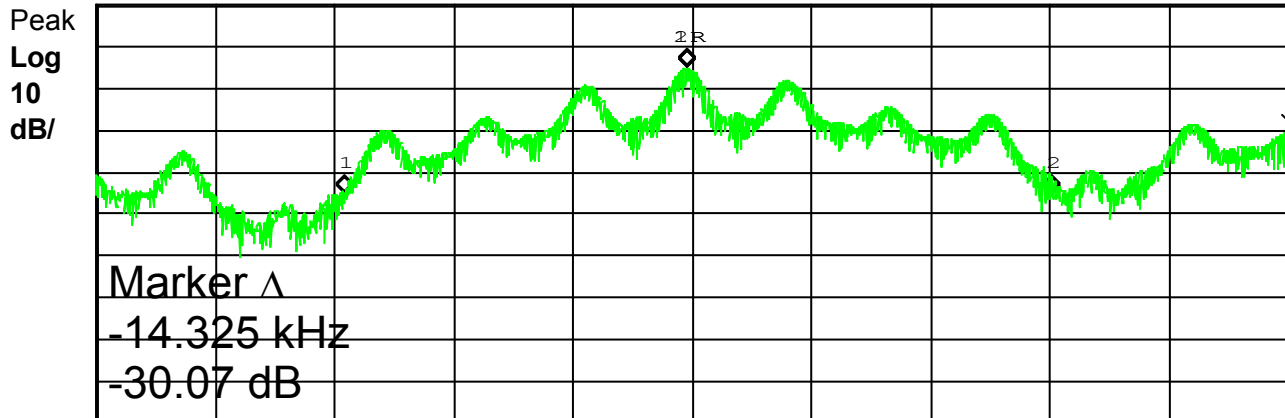


Extreme test conditions : : T = 37.6°C / U = 253V/50Hz

Agilent 15:40:17 22 Feb 2011

Mkr1 Δ -14.325 kHz
-30.07 dB

Ref -6.99 dBm #Atten 40 dB



Center 68 kHz

Span 50 kHz

#Res BW 1 kHz

VBW 1 kHz

#Sweep 1 s (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Freq	67.775 kHz	-22.05 dBm
1 Δ	(1)	Freq	-14.325 kHz	-30.07 dB
2R	(1)	Freq	67.775 kHz	-22.05 dBm
2 Δ	(1)	Freq	15.275 kHz	-30.1 dB

Extreme test conditions : : T = 38.5°C / U = 90V/50Hz

Date of test: February 22, 2011
Operator: E. de Raemy

9.2 Permitted range of operating frequencies / Modulation bandwidth

Introduction: The range of modulation bandwidth includes all associated side bands above the appropriate spurious level and the frequency error and drift under extreme test conditions.

Test site: ☐ anechoic chamber (foam) ☐ open test site
☐ anechoic chamber (ferrites) ☒ laboratory

Test method: Measurement of the conducted power on the antenna connector or on the test fixture.

Meas. uncertainty: 9kHz – 3GHz: ± 1 dB
 3GHz – 6.7GHz: ± 2.1 dB
 6.7GHz – 13.2GHz: ± 2.6 dB
 13.2GHz – 19GHz: ± 2.8 dB
 19GHz – 26.5GHz: ± 3 dB
 ± 2.6 μ Hz/Hz

Test set-up:

Remarks: - - -

Test equipment:

Spectrum analyser	<input type="checkbox"/> 88-14	<input type="checkbox"/> 94-24	<input checked="" type="checkbox"/> 02-06	<input type="checkbox"/> 03-45	<input type="checkbox"/> 05-39	<input type="checkbox"/> 07-53
Receiver	<input type="checkbox"/> 85-12	<input type="checkbox"/> 90-11	<input type="checkbox"/> 94-34	<input type="checkbox"/> 04-28	<input type="checkbox"/> 06-29	<input type="checkbox"/>
Temperature chamber	<input checked="" type="checkbox"/> 06-66					
Temperature probe	<input type="checkbox"/> 91-11	<input type="checkbox"/> 03-05	<input type="checkbox"/> 05-34	<input checked="" type="checkbox"/> 08-03		
Variable transformer	<input type="checkbox"/> 75-04	<input checked="" type="checkbox"/> 04-37				
Power supply	<input type="checkbox"/> 99-04	<input type="checkbox"/> 04-31				
Multimeter	<input type="checkbox"/> 89-07	<input type="checkbox"/> 90-38	<input type="checkbox"/> 92-25	<input type="checkbox"/> 94-51	<input type="checkbox"/> 02-03	<input type="checkbox"/> 03-22
	<input type="checkbox"/> 04-47	<input type="checkbox"/> 04-104	<input type="checkbox"/> 04-105	<input type="checkbox"/> 06-51	<input checked="" type="checkbox"/> 06-52	
Cables	<input checked="" type="checkbox"/> RG223 1.5m (no 145)					

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Results of the test

Client: TeleAlarm SA

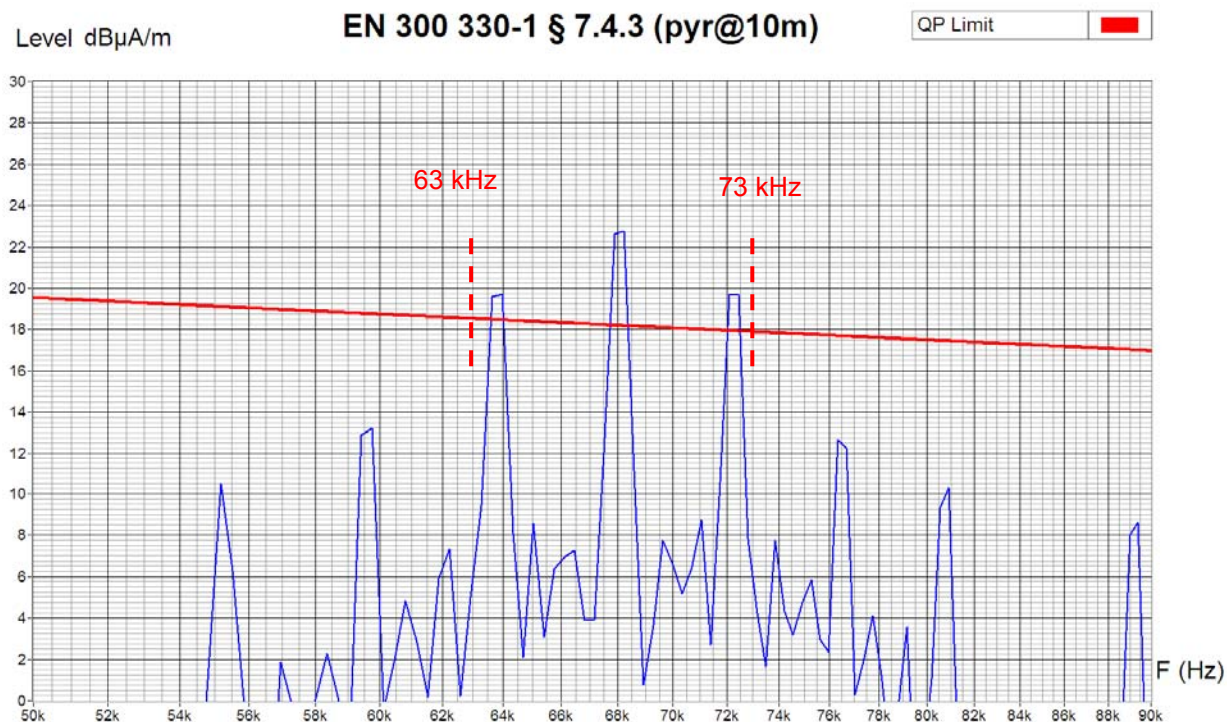
Apparatus: IS76 Ferrite Beacon Controller
 IS76 Ferrite Beacon Antenna
 FCC ID: ZU6-CRS-NC-IS76

Operating mode: Normal modulation, only tested antenna connected

Cables connected to the EUT:

- 1 x antenna cable
- power supply

Remarks: ---

 Modifications up to level: ☐ None ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Zoom of plot "Spurious9kHz-30MHz_par02"

Zone	9 KHz - 150 KHz	150 KHz - 3 MHz	3 MHz - 30 MHz
Video Bandwidth	300 Hz	30 KHz	30 KHz
Resol Bandwidth	300 Hz	9 KHz	9 KHz

Assigned frequency band

f min [kHz]		f max [kHz]
60.25		70

Normal test conditions

Temp [°C]	U [V]	Frequency [kHz]	f min [kHz]	f max [kHz]	Bandwidth [kHz]	Remarks	Pass Yes No	
22	230	67.85	53.55	83.6300	30.1	See remark 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Extreme test conditions

Temp [°C]	U [V]	Frequency [kHz]	f min [kHz]	f max [kHz]	Bandwidth [kHz]	Remarks	Pass Yes No	
0.2	253	68.400	53.475	84.200	30.725	See remark 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
-0.8	90	68.350	54.225	83.950	29.725	See remark 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
37.6	253	67.350	53.050	82.900	29.85	See remark 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
38.5	90	67.775	53.450	83.050	29.6	See remark 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Remark:

- 1) The measurements in this table do not consider the limit of unwanted emission. For this reason the measured BW is too large. Nevertheless, these measurements allow to show, that the emission parameters do not significantly change during the extreme test conditions. (Plots of the measurements are those of § 9.1). As shown in the plot of the previous page, the modulation bandwidth, under consideration of spurious emission limit, is less than 10 kHz and fulfils the assigned frequency band under normal and extreme test conditions.

Date of test: February 22, 2011
 Operator: E. de Raemy

9.3 Spurious emissions

9.3.1 Spurious emissions (radiated from 9 kHz to 30 MHz)

Test site: ☐ anechoic chamber (ferrites) ☐ open test site
☒ anechoic chamber (foam) ☐

Meas. distance: ☐ 3 m ☒ 10 m ☐ 30 m ☐ m

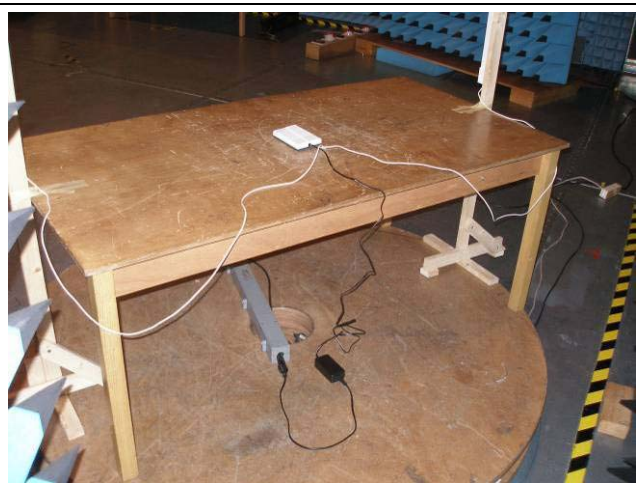
Meas. uncertainty: ± 2.8 dB (10 m)

Position of EUT: 0.8 m (height above floor of equipment under test)

Measuring method: The magnetic disturbance radiated by the equipment under test is measured using a spectrum analyser and a wide band magnetic antenna. The antenna is moved from 1 to 4 m in height (lowest part of loop), first in the direction of the apparatus under test, then at 90° to the apparatus and if required also horizontally. If possible the turning table is operated through 360° during the measurement. The recording is carried out taking into account the maximum value of the disturbance appearing during the functioning of the apparatus under test. The peak values are recorded continuously on a graph. The values exceeding the limits are remeasured using a measuring receiver.

Modifications up to level: ☐ None ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Test set-up:



Remarks: ---

Test equipment:

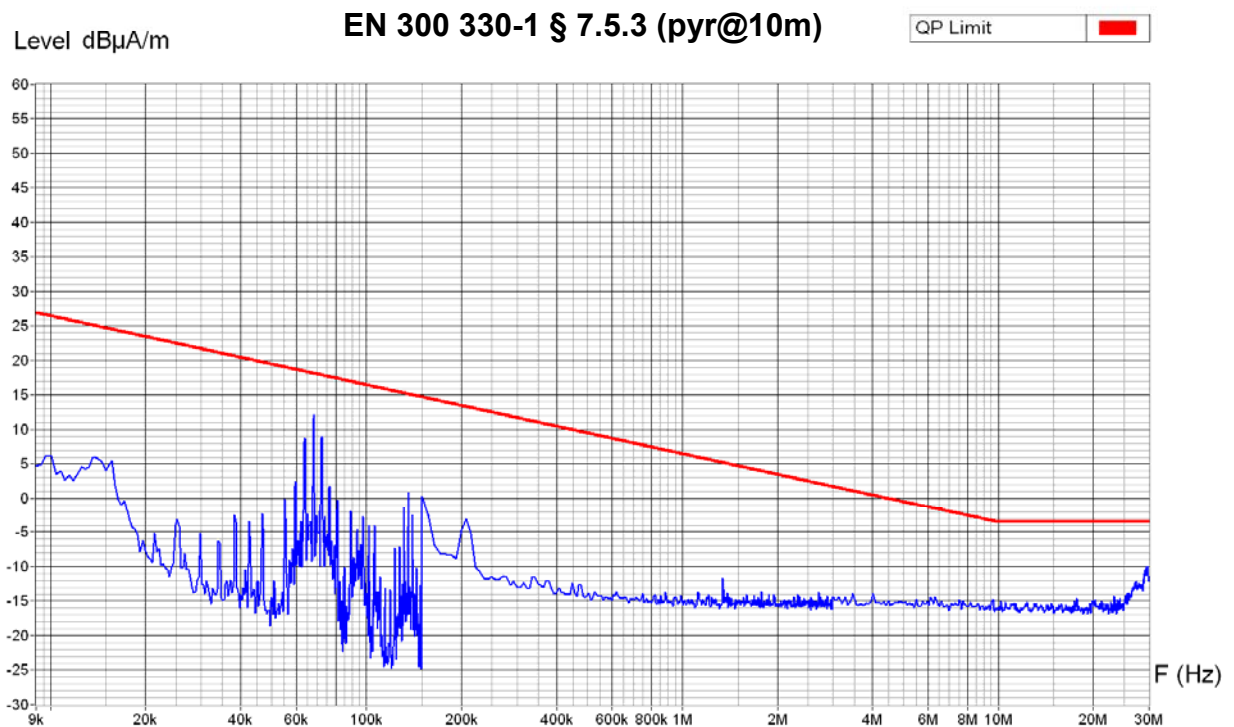
Spectrum analyser	<input type="checkbox"/> 88-14	<input type="checkbox"/> 94-24	<input type="checkbox"/> 02-06	<input type="checkbox"/> 03-45	<input type="checkbox"/> 05-39	<input checked="" type="checkbox"/> 07-53
Receiver	<input type="checkbox"/> 85-12	<input type="checkbox"/> 90-11	<input checked="" type="checkbox"/> 94-34	<input type="checkbox"/> 04-28	<input type="checkbox"/> 06-29	<input type="checkbox"/>
Preamplifier	<input type="checkbox"/> 90-01	<input type="checkbox"/> 95-86	<input type="checkbox"/> 05-56	<input type="checkbox"/> 05-59	<input type="checkbox"/> 05-62	<input type="checkbox"/> 05-87
Antenna (typ: magnetic)	<input checked="" type="checkbox"/> 90-25	<input type="checkbox"/> 90-28	<input type="checkbox"/> 99-32	<input type="checkbox"/>		
Cables	<input checked="" type="checkbox"/> 06-00	<input type="checkbox"/> 06-01	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Measurement Type : Radiated Field
Polarisation : Perpendicular
Table Angle : 0 - 360°
Antenna Height : 1 - 4 m



Equipment Under Test : IS76
Set-Up : See picture
Operating Conditions : Normal operation
Remarks : Modified, with original AC/DC adapter (230VAC / 24VDC)



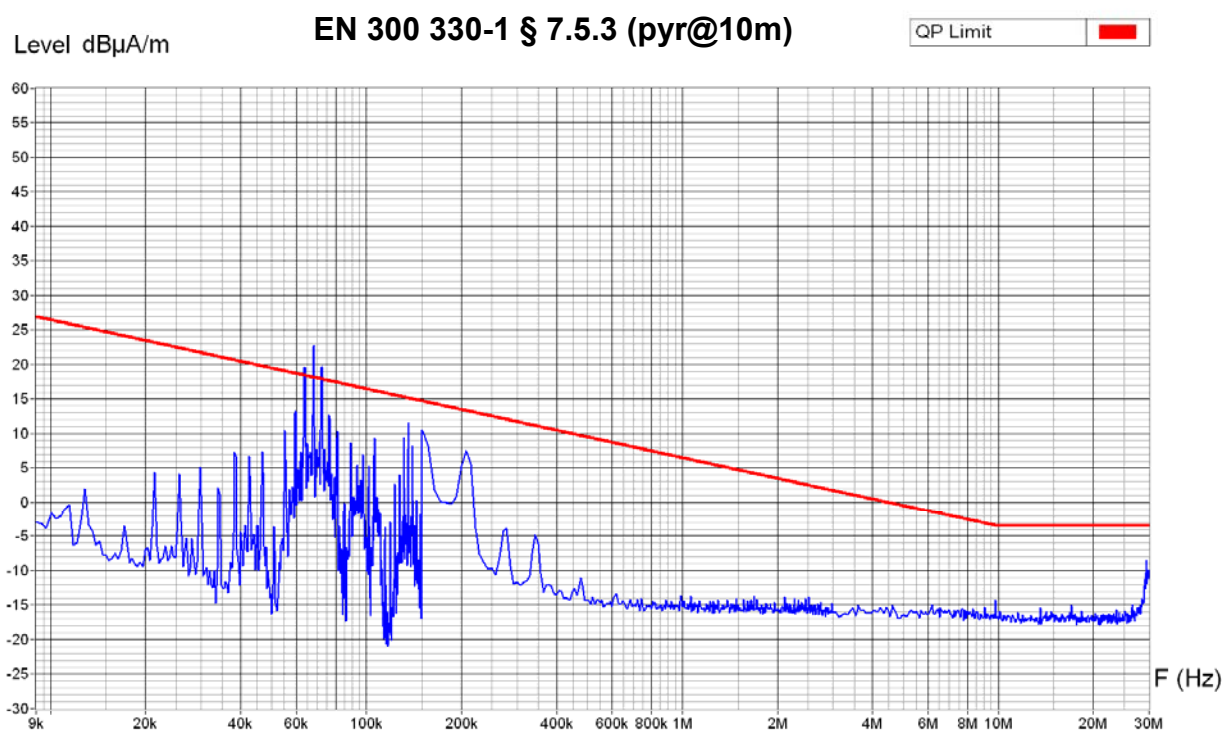
Zone	9 KHz - 150 KHz	150 KHz - 3 MHz	3 MHz - 30 MHz
Video Bandwidth	300 Hz	30 KHz	30 KHz
Resol Bandwidth	300 Hz	9 KHz	9 KHz

Operator: E. de Raemy
Date/Time: 18.02.2011 10:57
Filename:
Spurious9kHz-
30MHz_per02.png/.txt

Measurement Type : Radiated Field
 Polarisation : Parallel
 Table Angle : 0 - 360°
 Antenna Height : 1 - 4 m



Equipment Under Test : IS76
 Set-Up : See picture
 Operating Conditions : Normal operation
 Remarks : Modified, with original AC/DC adapter (230VAC / 24VDC)



Zone	9 KHz - 150 KHz	150 KHz - 3 MHz	3 MHz - 30 MHz
Video Bandwidth	300 Hz	30 KHz	30 KHz
Resol Bandwidth	300 Hz	9 KHz	9 KHz

Operator: E. de Raemy
 Date/Time: 18.02.2011 10:32
 Filename:
 Spurious9kHz-
 30MHz_par02.png/.txt

9.3.2 Spurious emissions (radiated from 30 MHz to 1000 MHz)

Test site: ☐ anechoic chamber (foam) ☐ open test site
☒ anechoic chamber (ferrites) ☐

Distance: ☐ 30 m ☒ 10 m ☐ 3 m ☐

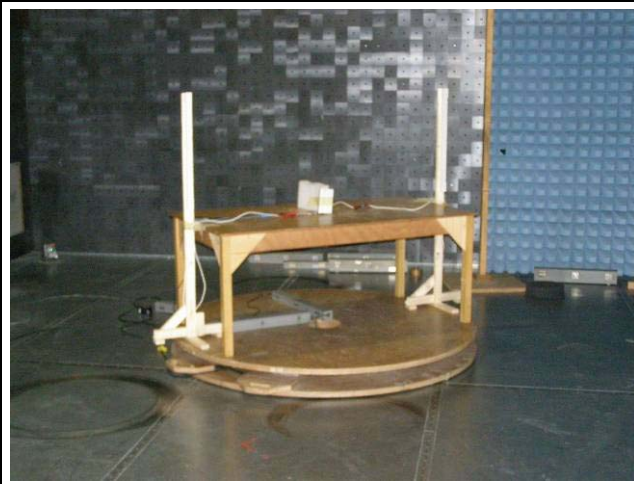
Position of EUT: 0.8 m (height of the equipment under test above floor)

Meas. uncertainty: Field: ± 4.6 dB ($f < 300$ MHz) / ± 3.7 dB ($f > 300$ MHz)
 Substitution: ± 1.3 dB ($f < 300$ MHz) / ± 1.6 dB ($f > 300$ MHz)

Test method: The electromagnetic disturbance radiated by the equipment is measured using a spectrum analyser and a wide band antenna. The max hold levels values are recorded on the graph. The values exceeding a limit are remeasured manually using a receiver. The ERP / EIRP values are determined replacing the EUT by a substitution antenna (dipole or other). The limits on the plots represent the equivalent field levels for the required power limits.

Modifications up to level: ☐ None ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Test set-up:



Remarks:

- Limits calculated with $E_{[V/m]} = \frac{\sqrt{30 P_{[W]} G}}{d_{[m]}}$ with $G = \text{numeric gain of Tx antenna}$
 $= 1$ (for isotropic radiator, $P_{W \text{ EIRP}}$)
 $= 1.64$ (for dipole antenna, $P_{W \text{ ERP}}$)

Test equipment:

Spectrum analyser	<input type="checkbox"/> 94-24	<input type="checkbox"/> 02-06	<input type="checkbox"/> 03-45	<input type="checkbox"/> 05-39	<input type="checkbox"/> 07-53	<input checked="" type="checkbox"/> 10-70
Receiver	<input type="checkbox"/> 85-04	<input type="checkbox"/> 90-43	<input type="checkbox"/> 94-35	<input type="checkbox"/> 04-29	<input checked="" type="checkbox"/> 10-70	
Preamplifier	<input type="checkbox"/> 90-01	<input type="checkbox"/> 95-86	<input type="checkbox"/> 05-56	<input checked="" type="checkbox"/> 05-59	<input type="checkbox"/> 05-62	<input type="checkbox"/> 05-87
Antenna (bilog)	<input checked="" type="checkbox"/> 94-03	<input type="checkbox"/> 05-38	<input type="checkbox"/>			
Substitution antenna	<input type="checkbox"/> 89-01	<input type="checkbox"/>				
Cables	<input type="checkbox"/> 06-00	<input checked="" type="checkbox"/> 06-01	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

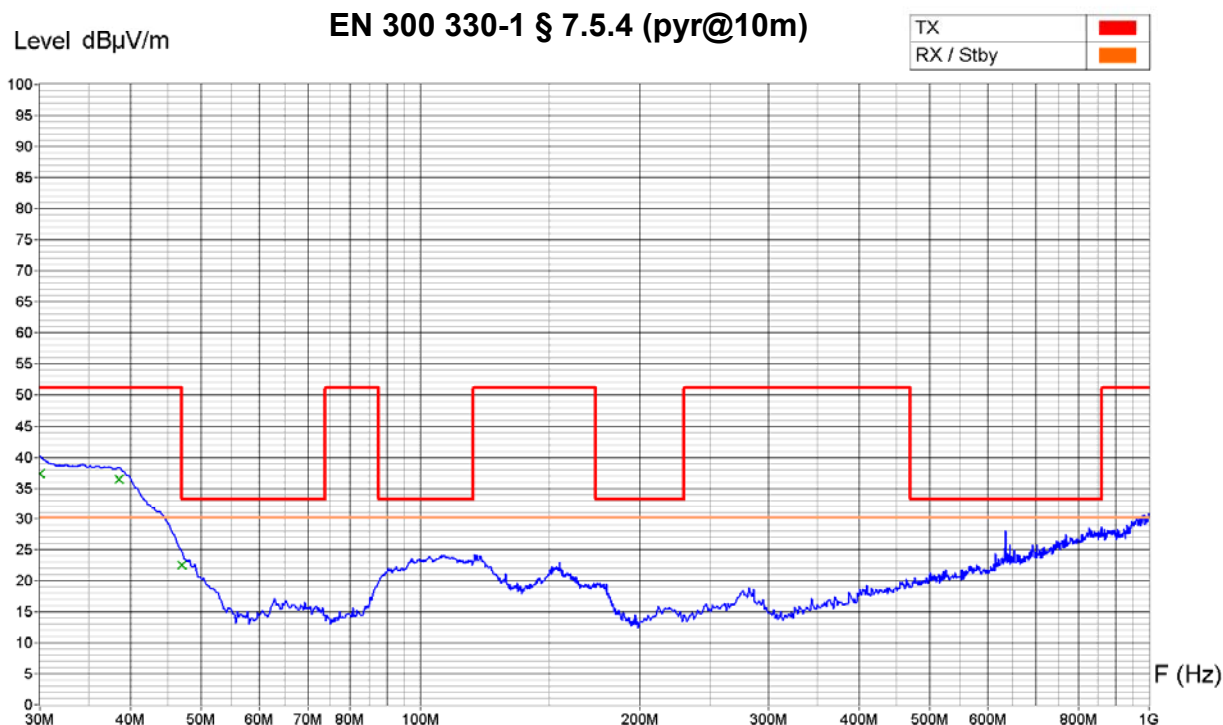
Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Measurement Type : Radiated Field
 Polarisation : Vertical
 Table Angle : 0 - 360°
 Antenna Height : 1 - 4 m



Equipment Under Test : IS76
 Set-Up : See picture
 Operating Conditions : Normal operation (=continuous emission)
 Remarks : Modified, with original AC/DC adapter (230VAG / 24VDC)

Level dBμV/m EN 300 330-1 § 7.5.4 (pyr@10m)



Zone	30 MHz - 199 MHz	199 MHz - 1 GHz
Video Bandwidth	300 KHz	300 KHz
Resol Bandwidth	100 KHz	100 KHz

Receiver Measures

Frequency	Peak	QuasiPeak (x)	Average (+)	QP Margin
30 MHz	41.4 dBμV/m	37.3 dBμV/m	26.0 dBμV/m	13.8 dB
38.50 MHz	39.8 dBμV/m	36.4 dBμV/m	23.6 dBμV/m	14.7 dB
47 MHz	26.7 dBμV/m	22.4 dBμV/m	10.4 dBμV/m	28.7 dB

Operator: E. de Raemy
 Date/Time: 22.02.2011 17:02
 Filename:
 Spurious30-1000M_v02.png/.txt

Measurement Type : Radiated Field
Polarisation : Horizontal
Table Angle : 0 - 360°
Antenna Height : 1 - 4 m

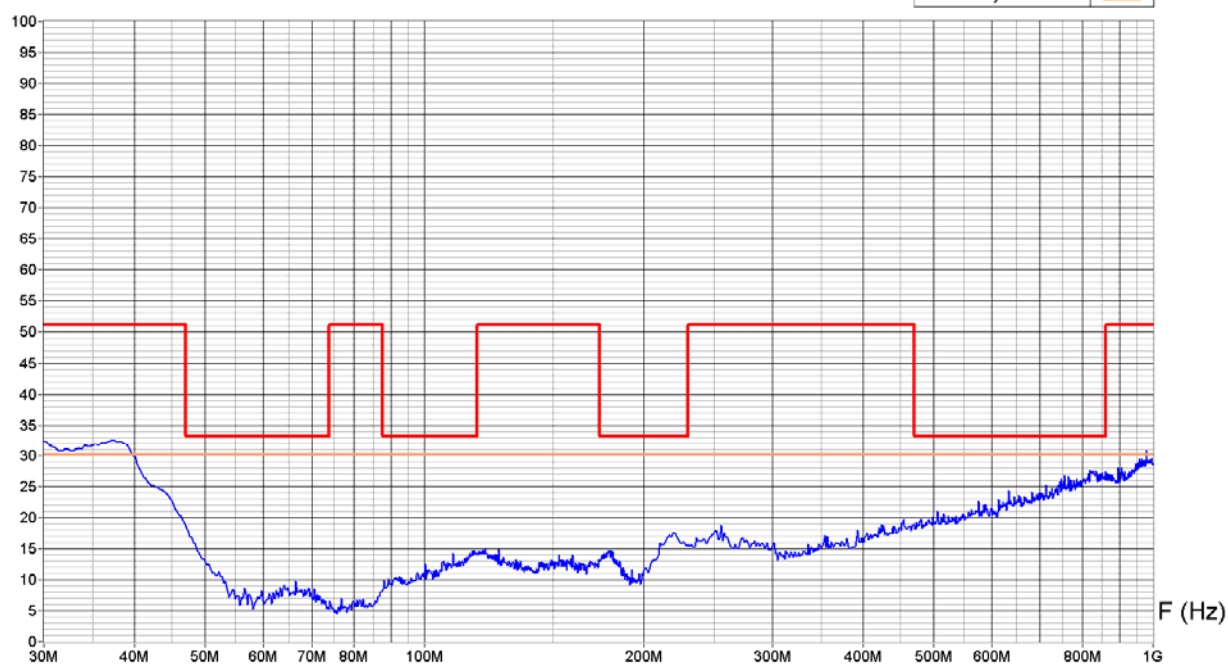


Equipment Under Test : IS76
Set-Up : See picture
Operating Conditions : Normal operation (=continuous emission)
Remarks : Modified, with original AC/DC adapter (230VAG / 24VDC)

Level dB μ V/m

EN 300 330-1 § 7.5.4 (pyr@10m)

TX	█
RX / Stby	█



Zone	30 MHz - 199 MHz	199 MHz - 1 GHz
Video Bandwidth	300 KHz	300 KHz
Resol Bandwidth	100 KHz	100 KHz

Operator: E. de Raemy
Date/Time: 22.02.2011 17:32
Filename:
Spurious30-1000M_h02.png/.txt

9.4 Duty cycle

Introduction: The duty cycle is defined as the ratio, expressed as a percentage, of the maximum transmitter "on" time monitored over one hour, relative to a one hour period.

Client: TeleAlarm SA

Apparatus: IS76 Ferrite Beacon Controller
IS76 Ferrite Beacon Antenna
FCC ID: ZU6-CRS-NC-IS76

Remarks: - - -

Operated: Manually

Transmitter ON: Continuously

Transmitter OFF: never

Duty cycle class	Duty cycle ratio
1	< 0.1 %
2	< 1,0 %
3	< 10 %
4	Up to 100 %

Date of test: February 22, 2011
Operator: E. de Raemy