



Informe de ensayo nº:
Test report No:

NIE: 42959REM.002

Partial Test Report

FCC Rules and Regulations 47 CFR Chapter I Part 15 Subpart B (10-01-13 Edition); ICES-003 ISSUE 5 (2012)

&

ANSI C63.4-2009: American National standard for methods of measurements of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9kHz to 40GHz.

Identificación del objeto ensayado.....: Identification of item tested	LE70-915 S-ONE 915MHZ WITH FREQUENCY HOPPING CONFIGURATION AND LE70-915 WITH BOOTLOADER OVER THE AIR DIGITAL MODULATION CONFIGURATION
Marca Trade	TELIT LE70-915
Modelo y/o referencia tipo Model and /or type reference	LE70-915/DIP WA
Otra identificación del producto.....: Other identification of the product	S/N: GOE2950003P and S/N: GOE295003H
Versión final del HW Final HW version	3990401152
Versión final del SW Final SW version	GO.S01.01.03-B001 GO.B00.01.0C and GO.S00.02.04-C005.GO.B800.01.0C
FCC ID	Not provided data
IC ID	Not provided data
Características Features	Not provided data
Fabricante Manufacturer	TELIT COMMUNICATION S.P.A. Via stazione di prosecco 5/B, 34010 Sgonico (Italy)
Método de ensayo solicitado, norma.....: Test method requested, standard	FCC Rules and Regulations 47 CFR Chapter I Part 15 Subpart B (10-01-13 Edition); ICES-003 ISSUE 5 (2012) & ANSI C63.4-2009
Resultado Summary	IN COMPLIANCE
Aprobado por (nombre / cargo y firma) Approved by (name / position & signature)	Rafael López Martín LAB EMC Manager
Fecha de realización Date of issue	2015-03-18
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Competences and guarantees

AT4 wireless is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

In order to assure the traceability to other national and international laboratories, AT4 wireless has a calibration and maintenance program for its measurement equipment.

AT4 wireless guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at AT4 wireless at the time of performance of the test.

AT4 wireless is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of AT4 wireless.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of AT4 wireless and the Accreditation Bodies.

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the AT4 wireless internal document PODT000.

Usage of samples

Samples under test have been selected by: the Client.

Sample S/03 is composed of the following elements:

Control Nº	Description	Model	Serial number	Reception date
42959B/009	LE70-915 Module S-ONE 915MHz with frequency hopping configuration	TELIT LE70-915	GOE2950003P	2015-02-12

Auxiliary elements used with the sample S/03:

Control Nº	Description	Model	Serial number	Reception date
42959B/002	Test board	B xE EVK	GMDM0000078	2014-07-03
42959B/003	Antenna	---	---	2014-07-03
CTC-7421-D	Laptop	---	CTC-7421-D	---

Sample S/04 is composed of the following elements:

Control Nº	Description	Model	Serial number	Reception date
42959B/011	LE70-915 Module Bootlander OTA digital modulation configuration	TELIT LE70-915	GOE2950003H	2015-02-12

Auxiliary elements used with the sample S/04:

Control Nº	Description	Model	Serial number	Reception date
42959B/001	Test board	B xE EVK	GMDM0000069	2014-07-03
42959B/003	Antenna	---	---	2014-07-03
CTC-7421-D	Laptop	---	CTC-7421-D	---

Test sample description

The sample consists of a LE70-915 module (S-ONE 915MHz) with frequency hopping configuration and a LE-915 module with Bootloader over the air digital modulation configuration.

Identification of the client

TELIT COMMUNICATION S.P.A.
Via stazione di prosecco 5/B, 34010 Sgonico (Italy)

Testing period

The performed test started on 2015-03-02 and finished on 2015-03-05.
The tests have been performed at AT4 wireless.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 80 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 1 Ω

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 30 °C
Relative humidity	Min. = 45 % Max. = 60 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 1 Ω
Normal site attenuation (NSA)	< ±4 dB at 10 m distance between item under test and receiver antenna, (30 MHz to 1000 MHz)
Site VSWR	< ±6 dB at 3m distance between item under test and receiver antenna, (1 GHz to 18 GHz)
Field homogeneity	More than 75% of illuminated surface is between 0 and 6 dB (26 MHz to 18 GHz).

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 30 °C
Relative humidity	Min. = 45 % Max. = 60 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 1 Ω

Remarks and comments

The test has been performed by the technical personnel: Antonio Ruiz, Mario Alberto Ureña & Pedro Manuel Valenzuela.

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 150 kHz to 30 MHz is $I = \pm 3,60$ dB for quasi-peak measurements, $I = \pm 3,48$ dB for peak measurements ($k = 2$).

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 30 MHz to 1 GHz is $I = \pm 4,57$ dB for quasi-peak measurements, $I = \pm 4,48$ dB for peak measurements ($k = 2$) and from 1 to 12,75 GHz is $I = \pm 3,43$ dB for average and peak measurements.

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 12,75 GHz to 26 GHz is $I = \pm 4,09$ dB for average and peak measurements.

Testing verdicts (Legend)

Not applicable	N/A
Pass	P
Fail	F
Not measured	N/M

List of equipment used during the test					
CONTROL NUMBER	DESCRIPTION	MANUFACTURER	MODEL	LAST CALIBRATION	NEXT CALIBRATION
1999	EMI Receptor	ROHDE & SCHWARZ	ESIB 26	2013-05-30	2015-05-30
1935	EMI Receptor	ROHDE & SCHWARZ	ESPI 3	2013-12-11	2015-12-11
2932	Bilog Hybrid Antenna	SUNOL	JB6	2014-05-11	2017-05-11
0246	Horn Antenna	HP	11966E	2012-04-27	2015-04-27
1658	RF Amplifier	SCHAFFNER	CPA9231A	2013-06-11	2015-06-11
1975	RF Amplifier	MITEQ	JS4	2014-05-22	2016-05-22
3783	RF Amplifier	BONN ELEKTRONIK	BLMA 0118-3A	2013-04-23	2015-05-19
0258	Transient Limiter	HP	119471A	2014-10-02	2016-10-02
1650	Artificial Network	SCHWARZBECK	NNLK - 8121	2013-06-25	2015-06-25

Appendix A – Test result

CONTENT

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DESCRIPTION OF THE OPERATION MODES

The operation modes used by the samples to which the present report refers, are shown in the following table:

OPERATION MODE	DESCRIPTION
OM#01	EUT ON. Equipment in IDLE mode. Power supply: 12Vdc.
OM#02	EUT ON. Equipment in IDLE mode. Power supply: 5Vdc by USB cable connected to an auxiliary laptop (115Vac)

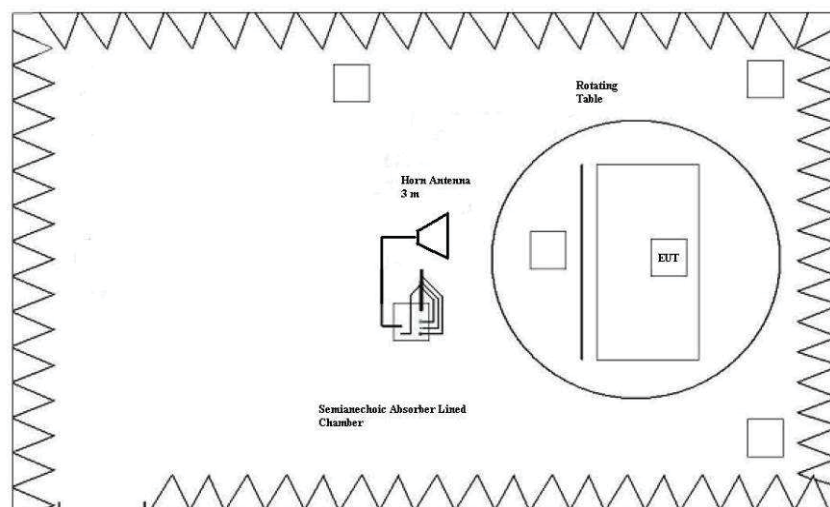
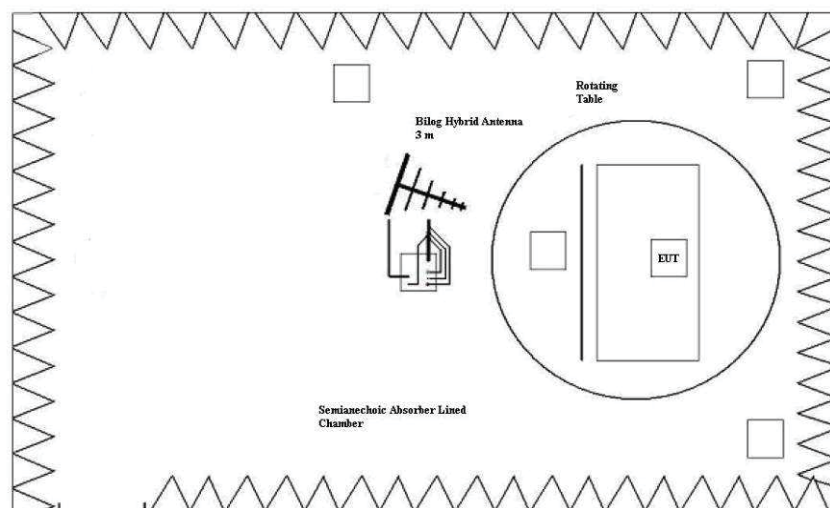
RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE.

LIMITS:	Product standard:	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B (10-01-13 Edition); ICES-003 ISSUE 5 (2012) & ANSI C63.4-2009
	Test standard:	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B (10-01-13 Edition); ICES-003 ISSUE 5 (2012) & ANSI C63.4-2009

LIMITS OF INTERFERENCE CLASS B:

The applied limit for radiated emissions, 3 m distance, according with the requirements of FCC Rules and Regulations 47 CFR Part 15.109, Subpart B (10-01-13 Edition); ICES-003 ISSUE 5 (2012) & ANSI C63.4-2009 in the frequency range 30 MHz to 26 GHz, for Class B equipment, which is a transmitter in a band over 500 MHz, was:

Frequency range (MHz)	QP Limit for 3 m ($\mu\text{V/m}$)	QP Limit for 3 m ($\text{dB}\mu\text{V/m}$)
30 to 88	100	40
88 to 216	150	43,52
216 to 960	200	46,02
Above 960	500	53,98
Above 1000	Limit for 3m AVG	Limit for 3m PK
	53.98 $\text{dB}\mu\text{V/m}$	73.98 $\text{dB}\mu\text{V/m}$



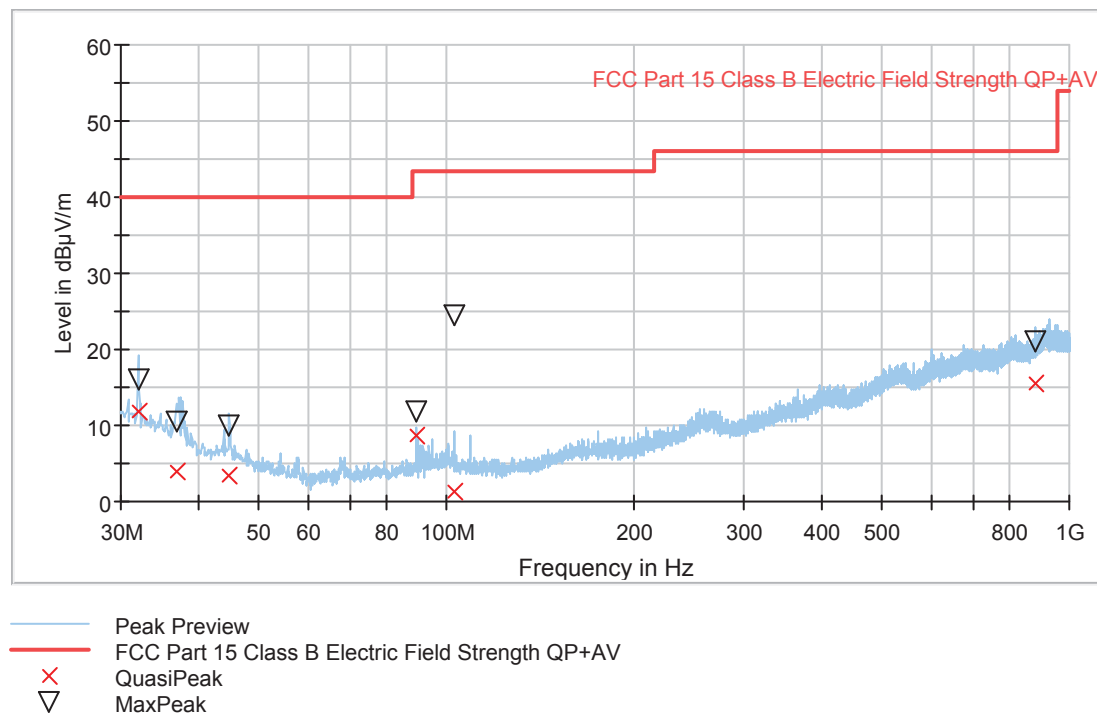
TESTED SAMPLES:	S/03 & 04
TESTED OPERATION MODES:	OM#01
TEST RESULTS :	CRmmnn: CR, Condición de Radiación; mm: Sample number; nn: Operation mode.

CRmmnn	Description	Result
CR0301	EUT ON. Equipment in IDLE mode. Power supply: 12Vdc. Range: 30MHz o 1GHz.	P
CR0301_RA1_PH	EUT ON. Equipment in IDLE mode. Power supply: 12Vdc. Range: 1GHz o 18GHz. Horizontal polarization.	P
CR0301_RA1_PV	EUT ON. Equipment in IDLE mode. Power supply: 12Vdc. Range: 1GHz o 18GHz. Vertical polarization.	P
CR0401	EUT ON. Equipment in IDLE mode. Power supply: 12Vdc. Range: 30MHz o 1GHz.	P
CR0401_RA1_PH	EUT ON. Equipment in IDLE mode. Power supply: 12Vdc. Range: 1GHz o 18GHz. Horizontal polarization.	P
CR0401_RA1_PV	EUT ON. Equipment in IDLE mode. Power supply: 12Vdc. Range: 1GHz o 18GHz. Vertical polarization.	P

Radiated Emission: CR0301

Project: 42959REM.001
Company: TELIT COMMUNICATIONS S.P.A.
Sample: S/03
Operation mode: OM#01
Description: EUT ON. Equipment in Idle mode. Power Supply: 12VDC

Full Spectrum



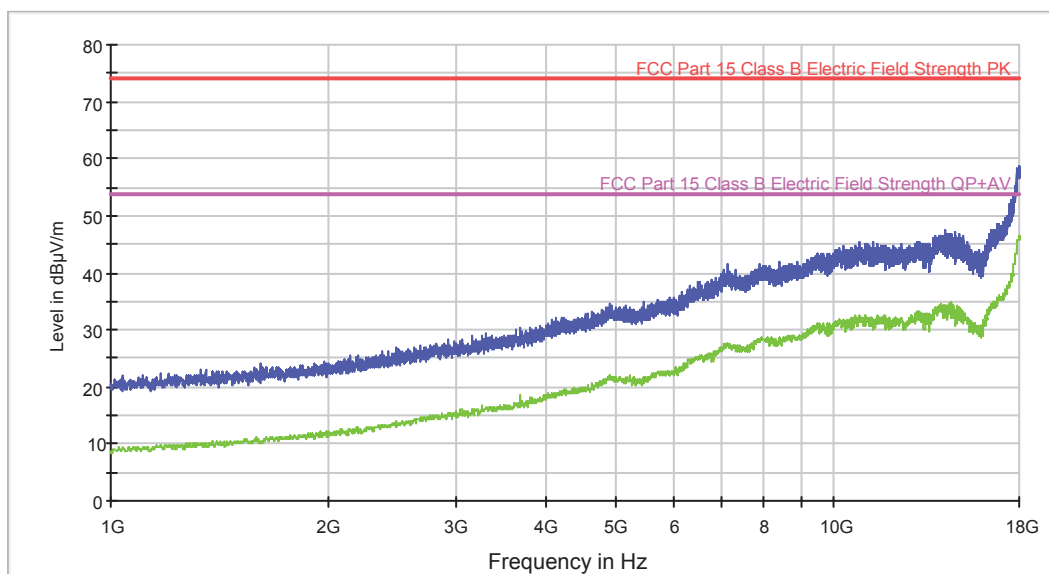
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
32.006494	11.86	---	40.00	28.14	122.0	V	182.0
32.006494	---	15.97	---	---	122.0	V	182.0
36.900000	3.98	---	40.00	36.02	370.0	V	207.0
36.900000	---	10.61	---	---	370.0	V	207.0
44.774026	---	10.05	---	---	171.0	V	271.0
44.774026	3.49	---	40.00	36.51	171.0	V	271.0
89.361039	---	11.93	---	---	154.0	V	83.0
89.361039	8.71	---	43.50	34.79	154.0	V	83.0
102.838961	---	24.36	---	---	393.0	V	20.0
102.838961	1.36	---	43.50	42.14	393.0	V	20.0
880.354545	---	21.11	---	---	332.0	H	276.0
880.354545	15.57	---	46.00	30.43	332.0	H	276.0

Radiated Emission: CR0301RA1_PH

Project: 42959REM.001
 Company: TELIT COMMUNICATIONS S.P.A.
 Sample: S/03
 Operation mode: OM#01
 Description: EUT ON. Equipment in Idle mode. Power Supply: 12VDC.
 Horizontal Polarization.

ER EMI FCC 15 Class B



MaxPeak-ClearWrite-PK+ Average-ClearWrite-AVG
 FCC Part 15 Class B Electric Field Strength PK FCC Part 15 Class B Electric Field Strength QP+AV

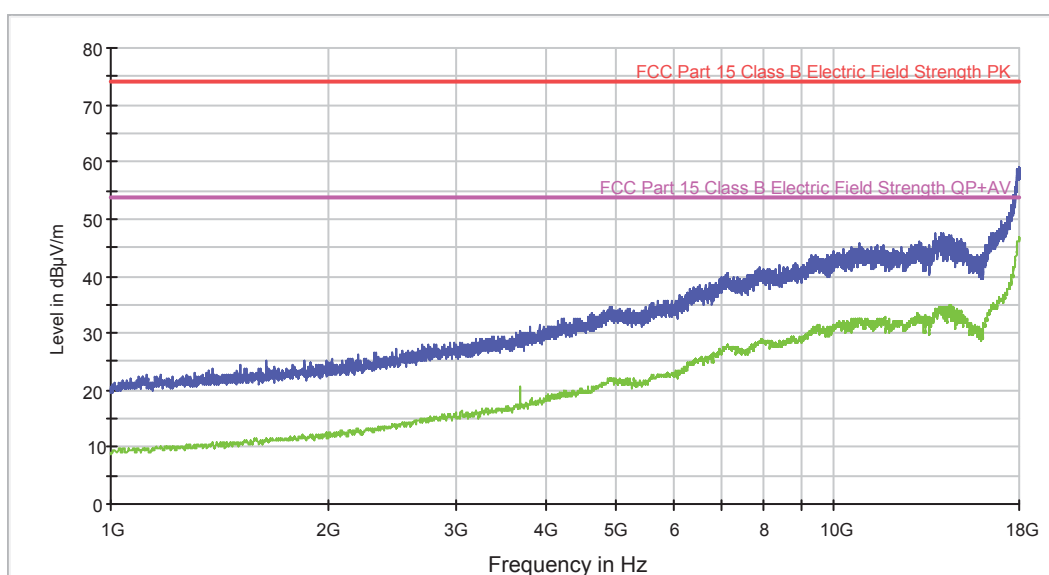
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
1331.000000	23.0	10.0
1610.000000	24.0	10.6
2379.000000	26.2	13.2
3164.000000	29.0	15.5
4234.000000	32.1	19.2
5468.000000	34.8	21.2
7137.000000	41.5	27.4
10032.000000	43.9	31.2
13065.000000	45.5	32.9
17946.000000	58.7	45.9

Radiated Emission: CR0301RA1_PV

Project: 42959REM.001
Company: TELIT COMMUNICATIONS S.P.A.
Sample: S/03
Operation mode: OM#01
Description: EUT ON. Equipment in Idle mode. Power Supply: 12VDC. Vertical Polarization.

ER EMI FCC 15 Class B



— MaxPeak-ClearWrite-PK+ — Average-ClearWrite-AVG
— FCC Part 15 Class B Electric Field Strength PK — FCC Part 15 Class B Electric Field Strength QP+AV

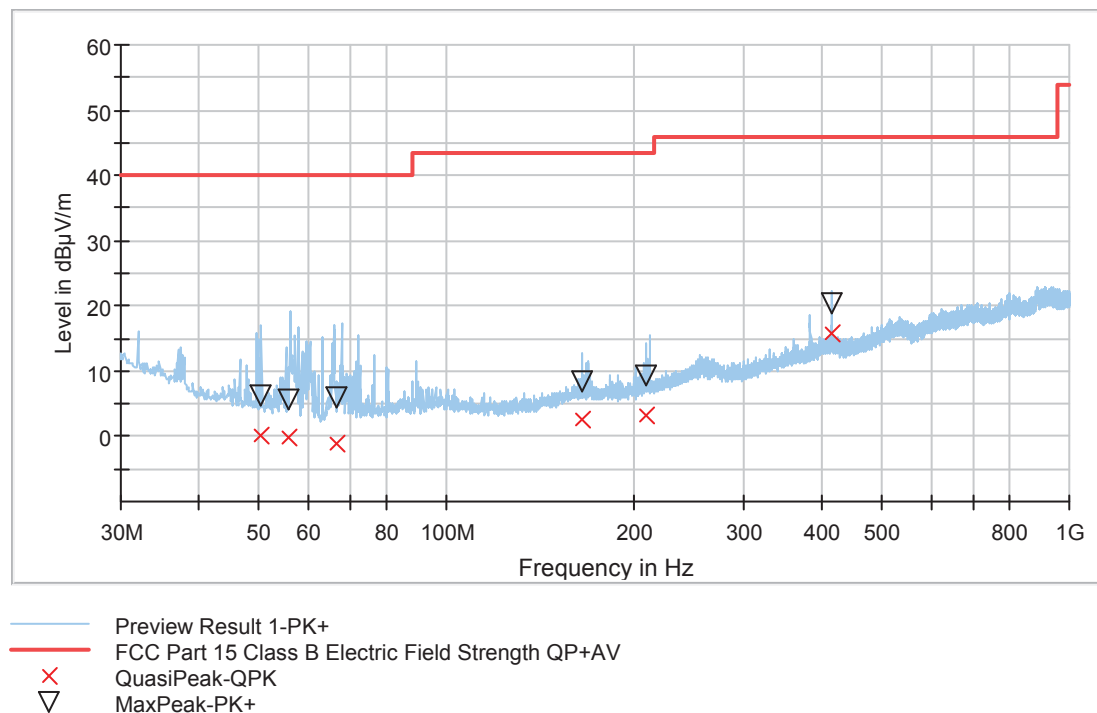
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
1304.000000	23.1	10.3
1641.000000	25.1	11.4
2319.000000	26.5	13.3
3050.000000	28.5	16.3
4200.000000	32.4	19.4
5610.000000	35.3	22.5
7137.000000	40.7	27.6
9950.000000	44.4	31.3
13061.000000	46.0	33.3
17992.000000	59.2	46.5

Radiated Emission: CR0401

Project: 42959REM.001
Company: TELIT COMMUNICATIONS S.P.A.
Sample: S/04
Operation mode: OM#01
Description: EUT ON. Equipment in Idle mode. Power Supply: 12VDC

Full Spectrum



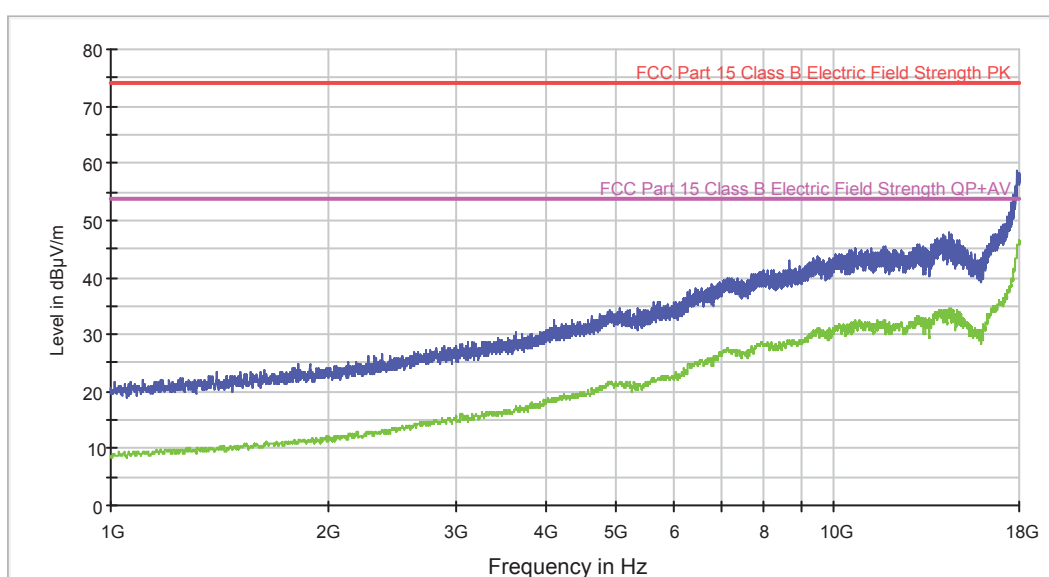
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Height (cm)	Pol	Azimuth (deg)
50.419481	0.25	---	311.0	H	293.0
50.419481	---	6.22	311.0	H	293.0
55.855844	-0.28	---	362.0	H	130.0
55.855844	---	5.63	362.0	H	130.0
66.431169	-1.01	---	400.0	H	137.0
66.431169	---	6.11	400.0	H	137.0
165.580519	2.44	---	373.0	H	301.0
165.580519	---	8.30	373.0	H	301.0
209.031169	3.06	---	224.0	H	154.0
209.031169	---	9.35	224.0	H	154.0
416.500000	15.84	---	133.0	V	10.0
416.500000	---	20.31	133.0	V	10.0

Radiated Emission: CR0401RA1_PH

Project: 42959REM.001
 Company: TELIT COMMUNICATIONS S.P.A.
 Sample: S/04
 Operation mode: OM#01
 Description: EUT ON. Equipment in Idle mode. Power Supply: 12VDC.
 Horizontal Polarization.

ER EMI FCC 15 Class B



— MaxPeak-ClearWrite-PK+ — Average-ClearWrite-AVG
 — FCC Part 15 Class B Electric Field Strength PK — FCC Part 15 Class B Electric Field Strength QP+AV

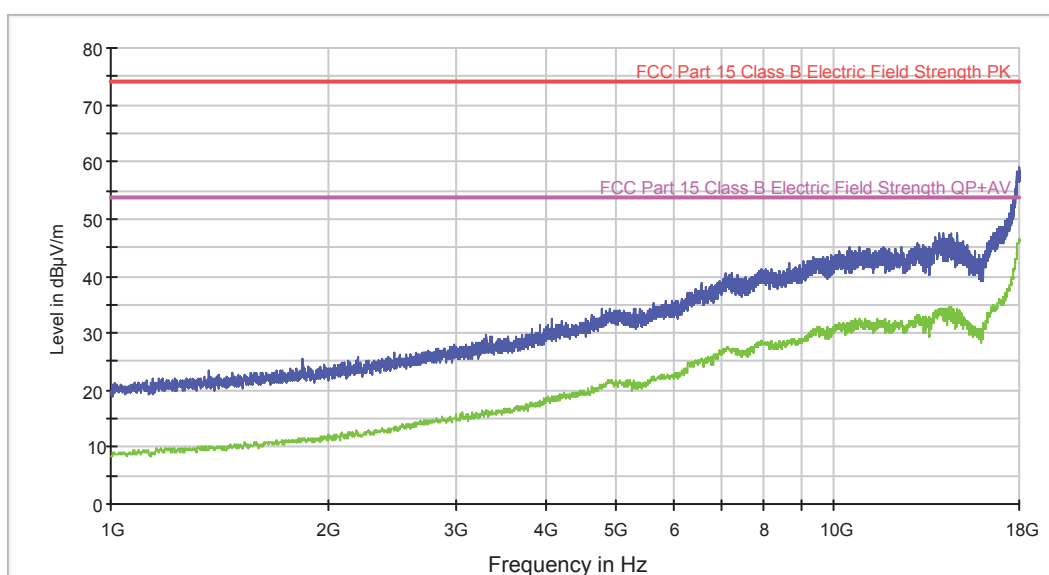
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
1248.000000	22.4	9.4
1635.000000	23.8	10.7
2376.000000	26.4	13.3
3155.000000	28.5	15.9
4095.000000	32.6	18.8
5617.000000	35.5	22.2
7135.000000	40.0	27.4
10008.000000	44.0	30.7
13137.000000	45.7	32.7
17935.000000	58.8	45.5

Radiated Emission: CR0401RA1_PV

Project: 42959REM.001
Company: TELIT COMMUNICATIONS S.P.A.
Sample: S/04
Operation mode: OM#01
Description: EUT ON. Equipment in Idle mode. Power Supply: 12VDC. Vertical Polarization.

ER EMI FCC 15 Class B



— MaxPeak-ClearWrite-PK+ — Average-ClearWrite-AVG
— FCC Part 15 Class B Electric Field Strength PK — FCC Part 15 Class B Electric Field Strength QP+AV

Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
1301.000000	22.2	9.9
1773.000000	23.6	11.3
2192.000000	25.9	12.7
3160.000000	28.3	15.7
4076.000000	32.4	18.6
5615.000000	35.2	22.2
7053.000000	40.5	27.0
10027.000000	43.7	31.1
13031.000000	45.8	32.9
17995.000000	59.1	46.3

CONTINUOUS CONDUCTED EMISSION ON POWER LEADS

LIMITS:	Product standard :	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B (10-01-13 Edition); ICES-003 ISSUE 5 (2012) & ANSI C63.4-2009
	Test standard :	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART B (10-01-13 Edition); ICES-003 ISSUE 5 (2012) & ANSI C63.4-2009

CLASS B

The applied limit for continuous conducted emissions in power leads, according with the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B (10-01-13 Edition); ICES-003 ISSUE 5 (2012) & ANSI C63.4-2009, in the frequency range 0,15 to 30 MHz, for Class B equipment was:

Frequency range (MHz)	Limit (dBμV)	
	Quasi-peak	Average
0,15 to 0,5	66-56	56-46
0,5 to 5	56	46
5 to 30	60	50

TESTED SAMPLES:	S/03 & 04
TESTED OPERATION MODES:	OM#02
TEST RESULTS :	CCmmnnhh: CC, Conducted Condition; mm: Sample number; nn: Operation mode; hh: wire

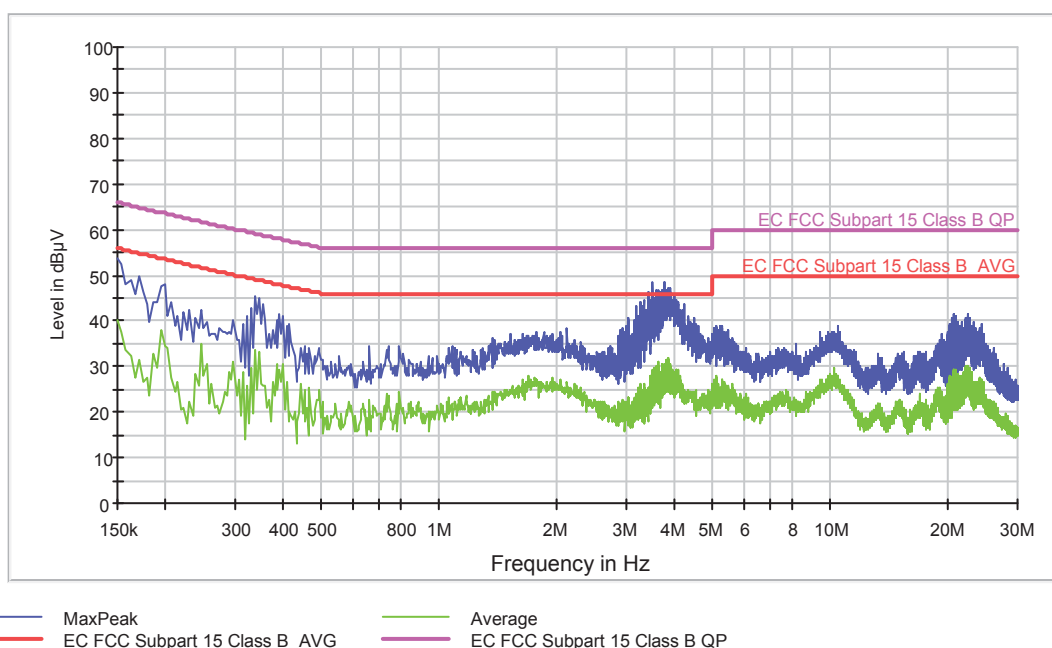
CCmmnnhh	Description	Result
CC03020N	Neutral wire noise	P
CC0302L1	Phase wire noise	P
CC04020N	Neutral wire noise	P
CC0402L1	Phase wire noise	P

Continuous Conducted Emission : CC03020N

Detector : Peak / Average / Cuasi-peak

Project: 42959REM.002
Company: TELIT COMMUNICATIONS S.P.A.
Sample: S/03
Operation mode: OM#02
Description: EUT ON. Equipment in Idle mode. Power Supply: 5VDC by USB cable connected to an auxiliary laptop (115Vac). Neutral Wire Noise

EC FCC Class B ESU40 CC



Subrange Maxima

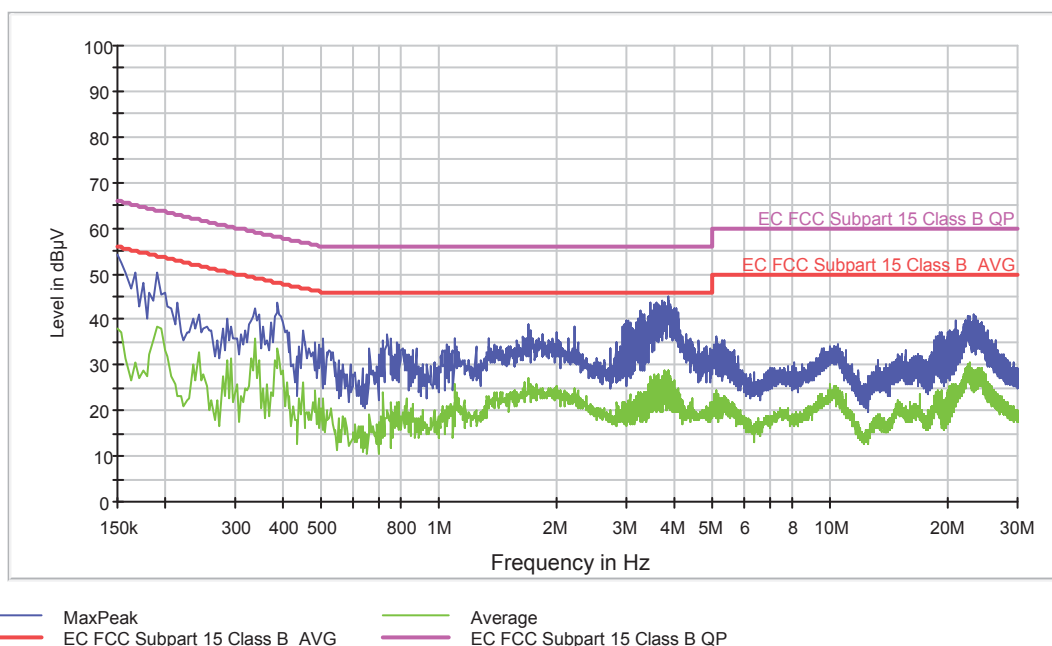
Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.150000	53.8	40.2
0.338000	45.6	33.6
0.662000	34.6	22.6
0.738000	34.5	23.5
2.118000	38.5	26.8
3.514000	48.7	29.1
3.766000	48.7	30.2
10.366000	39.0	27.9
10.598000	37.8	27.0
20.634000	41.5	28.1

Continuous Conducted Emission : CC0302L1

Detector : Peak / Average / Cuasi-peak

Project: 42959REM.002
Company: TELIT COMMUNICATIONS S.P.A.
Sample: S/03
Operation mode: OM#02
Description: EUT ON. Equipment in Idle mode. Power Supply: 5VDC by USB cable connected to an auxiliary laptop (115Vac). Phase Wire Noise.

EC FCC Class B ESU40 CC



Subrange Maxima

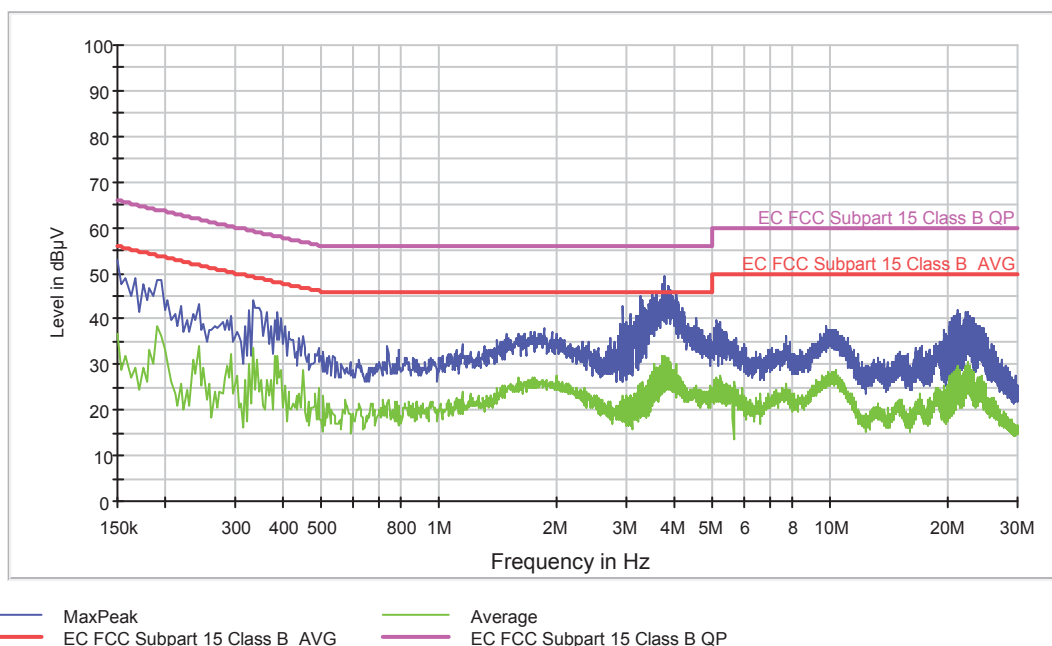
Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.150000	54.2	38.1
0.386000	43.5	33.5
0.446000	37.6	26.3
0.754000	36.0	21.7
1.690000	39.0	27.3
3.574000	43.8	24.0
3.842000	45.2	28.9
10.386000	34.6	24.5
10.434000	34.4	24.2
23.250000	41.2	28.7

Continuous Conducted Emission : CC04020N

Detector : Peak / Average / Cuasi-peak

Project: 42959REM.002
Company: TELIT COMMUNICATIONS S.P.A.
Sample: S/04
Operation mode: OM#02
Description: EUT ON. Equipment in Idle mode. Power Supply: 5VDC by USB cable connected to an auxiliary laptop (115Vac). Neutral Wire Noise.

EC FCC Class B ESU40 CC



Subrange Maxima

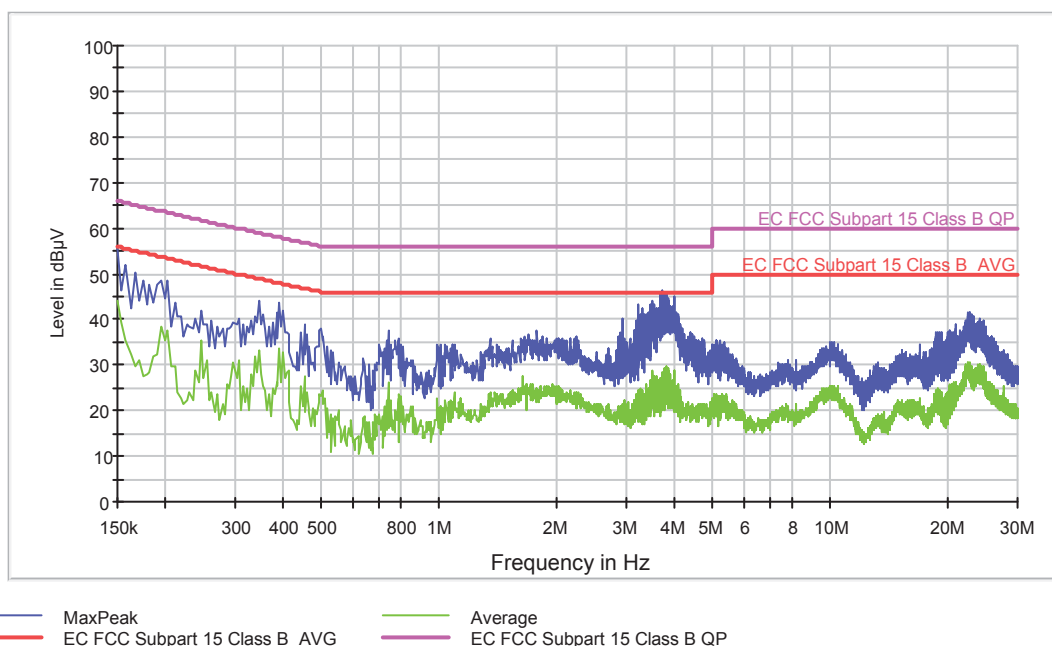
Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.150000	52.9	36.8
0.334000	44.1	33.5
0.446000	36.3	28.9
1.142000	34.6	24.0
1.846000	38.0	26.2
3.490000	45.7	27.6
3.762000	49.2	31.9
9.710000	38.4	26.2
10.442000	37.1	26.7
21.194000	41.9	29.3

Continuous Conducted Emission : CC0402L1

Detector : Peak / Average / Cuasi-peak

Project: 42959REM.002
Company: TELIT COMMUNICATIONS S.P.A.
Sample: S/04
Operation mode: OM#02
Description: EUT ON. Equipment in Idle mode. Power Supply: 5VDC by USB cable connected to an auxiliary laptop (115Vac). Phase Wire Noise

EC FCC Class B ESU40 CC



Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.150000	55.5	43.9
0.346000	44.1	33.3
0.450000	38.7	27.4
0.738000	37.5	26.1
1.778000	37.4	24.9
3.514000	44.2	28.7
3.710000	46.2	23.4
9.986000	35.1	25.3
10.402000	34.7	25.0
22.554000	41.6	29.4