DEKRA Testing and Certification, S.A.U.
Parque Tecnológico de Andalucía,
c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España

Informe de ensayo nº:
Test report No:

NIE: 54008REM.001A2

Test report (Modification 2)

FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-16 Edition)
&
ICES-003 ISSUE 6 (January 2016, updated April 2017)

Identificación del objeto ensayado .....: Identification of item tested	RF Transceiver / Mast-mounted Base Station
Marca .....: Trademark	PowerTrunk
Modelo y/o referencia tipo .....: Model and /or type reference	MBS Unit -1
Otra identificación del producto .....: Other identification of the product	Product code: D148101PT S/N: 918439 (MBS Unit -1 with AC power supply)
Versión final del HW .....: Final HW version	CCP: 00.11.12.10
Versión final del SW .....: Final SW version	CCP: 00.11.12.10
FCC ID .....:	WT7PTMBS450B
IC .....:	8624A-PTMBS450B
Características.....: Features	See page 4
Fabricante .....: Manufacturer	TELTRONIC S.A.U. Polígono Malpica, C/F Oeste 50016 Zaragoza, SPAIN
Método de ensayo solicitado, norma .....: Test method requested, standard	FCC CFR 47, Part 15, Subpart B (10-1-16 Edition) & ICES-003 Issue 6 (January 2016, updated April 2017) ANSI C63.4 (2014)
Resultado.....: Summary	IN COMPLIANCE
Aprobado por (nombre / cargo y firma) .....: Approved by (name / position & signature)	Rafael López EMC Lab Manager RAFAEL LÓPEZ MARTÍN 2019.01.28 16:14:10 +01'00'
Fecha de realización .....: Date of issue	2019-01-28
Formato de informe No.....: Report template No	FDT11_20

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Competences and guarantees

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In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification, S.A.U. has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification, S.A.U. 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 DEKRA Testing and Certification, S.A.U. at the time of performance of the test.

DEKRA Testing and Certification, S.A.U. 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.

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.
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Uncertainty

Uncertainty (factor k=2) was calculated according to the DEKRA Testing and Certification, S.A.U. internal document PODT000.

Usage of samples

Samples under test have been selected by: the Client.

Sample S/01 is composed of the following elements:

Control Nº	Description	Model	Code	Serial number	Reception date
54008B/001	RF Transceiver / Mast-mounted Base Station 425-470MHz with AC power supply	MBS Unit -1	D148101PT	918439	2017-09-01
54008B/003	Ethernet cable	---	---	---	2017-09-01
54008B/004	POE/ETH cable	---	---	---	2017-09-01
54008B/005	POE cable	---	---	---	2017-09-01
54008B/006	SYNC cable	---	---	---	2017-09-01
54008B/007	DIV cable	---	---	---	2017-09-01
54008B/008	Power cable	---	---	---	2017-09-01

Test sample description

The MBS Unit is a TETRA and TI D-LMR single-carrier module (digital RF transceiver) that has been designed for indoor or outdoor installation in different locations such as walls, towers or masts. Up to two MBS Units can be interconnected to deploy a full-featured Mast-mounted Base Station (MBS). It can be either DC or AC power-supplied. The MBS Unit -1 operates and provides an RF output power of 10 W in the frequency bands 425-430 MHz and 450-470 MHz.

Features:

Power Supply:

MBS Unit -1 with AC power supply:

- Nominal voltage: 110/220 VAC. 50/60 Hz
- Operational voltage range: [90 - 264 VAC]

Access scheme:

TDMA with 4 physical channels (time slots) per RF channel.

Modulation scheme:

π/4-DQPSK with a modulation rate of 18 Ksym/s, equivalent to 36 Kbits/s. Based upon it, two digital communication systems are supported:

- TETRA:

Modulation low-pass filter: Square-root raised cosine filter with a roll-off factor of 0.35.

- TI D-LMR:

Modulation low-pass filter: Square-root raised cosine filter with a roll-off factor of 0.2.

RF channel bandwidth (channel spacing):

25 KHz

Spectral efficiency:

One voice & data physical channel with a rate of 9 Kbits/s is allocated a 6.25 KHz equivalent channel bandwidth.

Frequency band:

TX: 425-430 MHz, 450-470 MHz

RX: 425-430 MHz, 450-470 MHz

RF output power (nominal):

TETRA: 40 dBm (10 W)

TI D-LMR: 40 dBm (10 W)

RF authorized bandwidth:

TETRA: 22 KHz

TI D-LMR: 20 KHz

Emission designators:

TETRA: 22K0D7D, 22K0D7E, 22K0D7W

TI D-LMR: 20K0D7D, 20K0D7E, 20K0D7W

Additional features:

Audio low-pass filter (root-raised cosine filter).

Options:

EQUIPMENT	CODE+OPTIONS	SERIAL NUMBER
MBS Unit – 1 VAC	D148101PT O148017PT O148015PT O148032PT O148016PT O148014PT O148057PT O485002PT	918439

D148101PT - MBS 425-470 MHz POWERTRUNK-T

O148017PT - VAC OPTION (power supply: 220/110 VAC)

O148015PT - SUBBAND MBS TX450-RX460-BW5 OPTION

O148032PT - SUBBAND MBS TX453-RX459-BW2 OPTION

O148016PT - SUBBAND MBS TX455-RX465-BW5 OPTION

O148014PT - SUBBAND MBS TX465-RX455-BW5 OPTION

O148057PT - LITE OPTION

O485002PT - TETRA CARRIER AIR INTERFACE ENCRYPTION OPTION

Note: Four subband options have been considered to cover all test frequencies being required by FCC and ISED, but some more are also available. Only one of them can be chosen for a single MBS Unit to operate in a real in-field application.

Identification of the client

TELTRONIC S.A.U.
Polígono Malpica, C/F Oeste
50016 Zaragoza, SPAIN

Testing period

The performed test started on 2017-09-01 and finished on 2017-09-06.

The tests have been performed at DEKRA Testing and Certification, S.A.U.

Environmental conditions

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

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

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

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

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

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 60 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

Modifications to the reference test report

It was introduced the following modifications in respect to the test report number 54008REM.001 related with the same samples, in the next clauses and sub-clauses:

By client requirement it was modified some typos in the test report.

By client requirement it was indicated in the test report that the operation modes OM#001 is Idle & Rx mode.

This modification test report cancels and replaces the test reports 54008REM.001 & 54008REM.001A1.

Remarks and comments

The tests have been performed by the technical personnel: Alberto Parada, David Rubio, Ismael Gamarro & Víctor Acedo.

The total uncertainty of the measurement system for the measured conducted disturbance characteristics of EUT from 150kHz to 30 MHz is I = ± 3,9 dB for quasi-peak measurements, I = ± 3,2 dB for average measurements (k = 2)

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 30 MHz to 1000 MHz is I = ± 4,9 dB for quasi-peak measurements, I = ± 4,6 dB for peak measurements (k = 2)

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 1000 MHz to 18 GHz is I = ± 2,6 dB for peaks and average measurements (k = 2)

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
2942	EMI TEST Receiver	ROHDE & SCHWARZ	ESU40	2016-06-14	2017-10-09
4578	Bilog Antenna	ETS LINDGREN	3142E	2017-04-03	2020-04-03
2933	Preamplifier	A.H Systems	PAM-0207	2016-09-19	2017-09-19
4612	Horn Antenna	SCHWARZBECK	BBHA 9120 D	2016-12-19	2019-12-19
3783	Preamplifier	BONN ELEKTRONIK	BLMA 0118-3A	2017-05-03	2018-05-03
4656	Horn Antenna	SCHWARZBECK	BBHA 9170	2017-03-24	2020-03-24
1975	Preamplifier	MITEQ	JS4-12002600-30-5A	2015-10-06	2017-10-06
4570	Thermohigrometer	HW GROUP	HWg-STE	2017-04-25	2018-04-25
4567	Thermohigrometer	HW GROUP	HWg-STE	2017-04-25	2018-04-25
4522	EMC measurement software	ROHDE & SCHWARZ	EMC32 V9.01	---	---

Appendix A – Test result

APPENDIX A CONTENT

DESCRIPTION OF THE OPERATION MODES

The operation modes described in this paragraph constitute a functionality of the sample under test for itself. 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. IDLE & RX mode 450 MHz – 470 MHz. Power Supply: 115 Vac
OM#02	EUT ON. TX mode 450 MHz – 470 MHz. Power Supply: 115 Vac

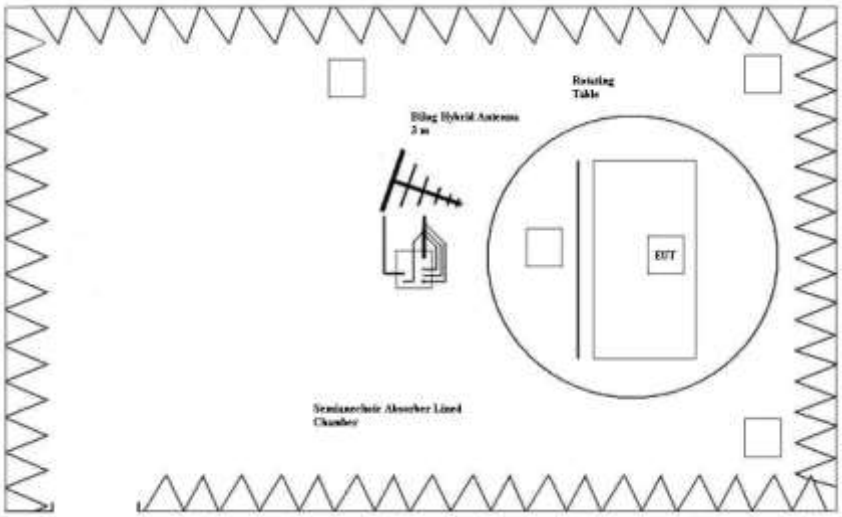
RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE

LIMITS:	Product standard:	FCC CFR 47, Part 15, Subpart B (10-1-16 Edition), Secs. 15.109; ICES-003 Issue 6 (January 2016, updated April 2017) & ANSI C63.4 (2014)
	Test standard:	FCC CFR 47, Part 15, Subpart B (10-1-16 Edition), Secs. 15.109; ICES-003 Issue 6 (January 2016, updated April 2017) & ANSI C63.4 (2014)

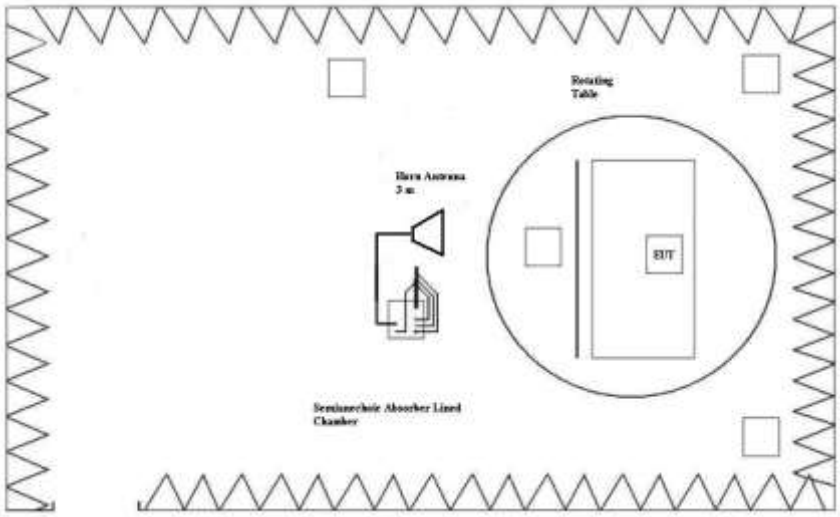
Limits of interference Class B

The applied limit for radiated emissions, 3 m distance, according with the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B (10-1-16 Edition), Secs. 15.109 & ICES-003 Issue 6 (January 2016, updated April 2017) in the frequency range 30 MHz to 18 GHz for class B equipments.

Frequency range (MHz)	QP Limit for 3 m		PK Limit for 3 m
	(µV/m)	(dBµV/m)	(dBµV/m)
30 to 88	100	40	---
88 to 216	150	43.5	---
216 to 960	200	46	---
Above 960	500	54	74



Setup for measurements < 1GHz.



Setup for measurements > 1GHz.

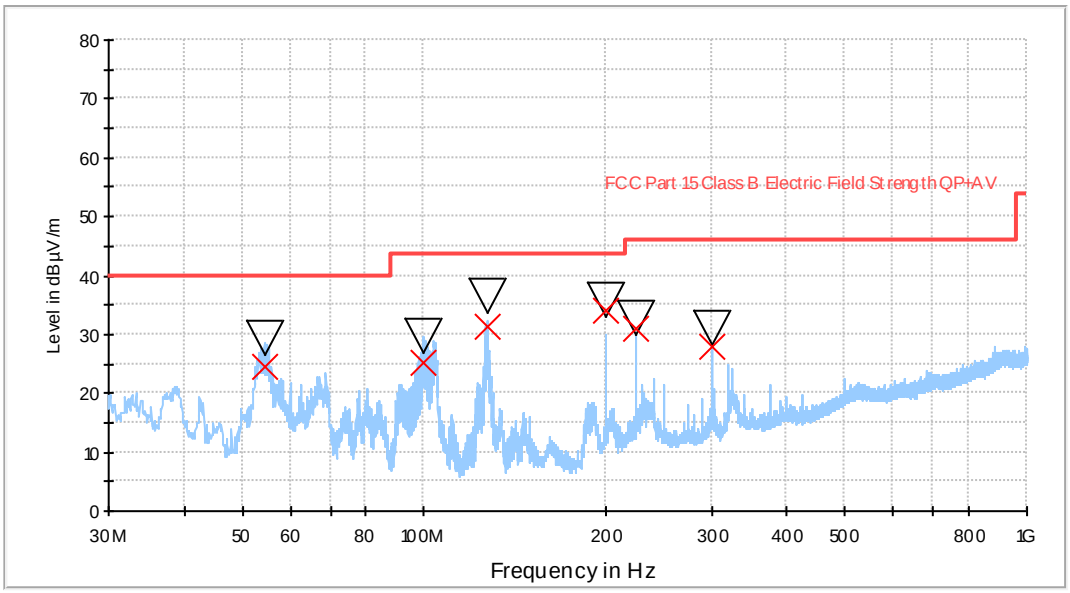
TESTED SAMPLE:	S/01
TESTED OPERATION MODES:	OM#01
TEST RESULTS:	CRmmnnRRPP: CR, Radiated Condition; mm: Sample number; nn: Operation mode; RR: Range; PP: Polarization.

CRmmnnRRPP	Description	Result
CR0101LR	Range: 30 MHz - 1000 MHz.	P
CR0101HR1_PH	Range: 1 GHz - 18 GHz. Horizontal Polarization.	P
CR0101HR1_PV	Range: 1 GHz - 18 GHz. Vertical Polarization.	P

Radiated Emission. CR0101LR

Project:	54008REM.001
Company:	TELTRONIC S.A.U.
Sample:	S/01
Operation mode:	OM#01
Description:	EUT ON. IDLE & RX mode 450 MHz – 470 MHz. Power supply: 115Vac

FCC class B



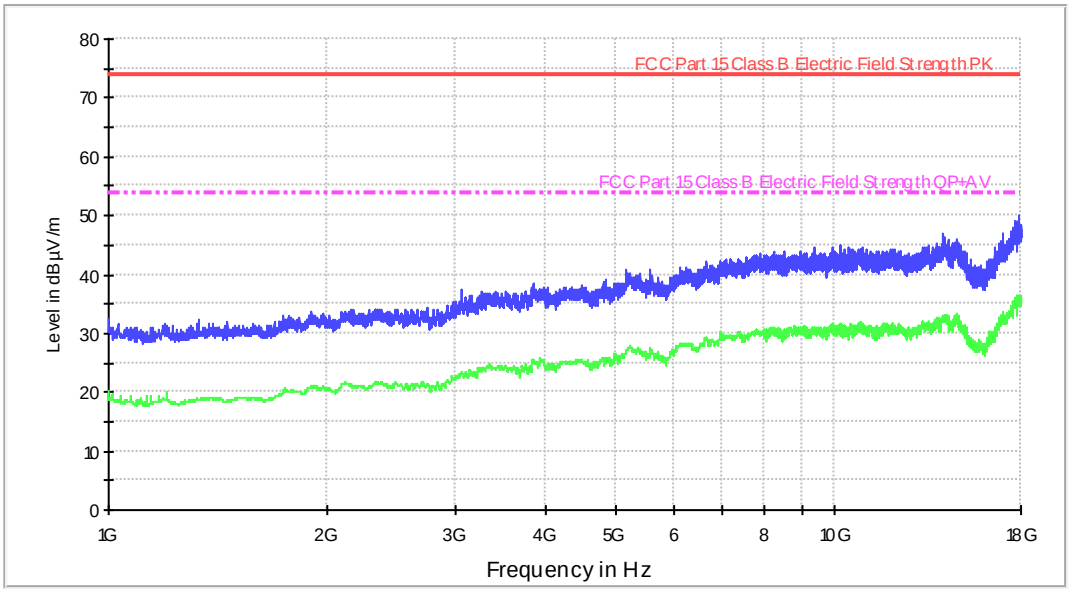
Maximizations

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)
54.419038	29.2	24.5	98.0	V	288.0
99.592184	29.8	25.2	115.0	V	55.0
127.457715	36.3	31.2	98.0	V	141.0
199.978958	35.6	34.0	219.0	V	108.0
224.980962	32.8	30.9	244.0	V	185.0
299.942886	30.8	27.8	164.0	V	185.0

Radiated Emission. CR0101HR1_PH

Project:	54008REM.001
Company:	TELTRONIC S.A.U.
Sample:	S/01
Operation mode:	OM#01
Description:	EUT ON. IDLE & RX mode 450 MHz – 470 MHz. Power supply: 115Vac.

FCC 1-18GHz class B



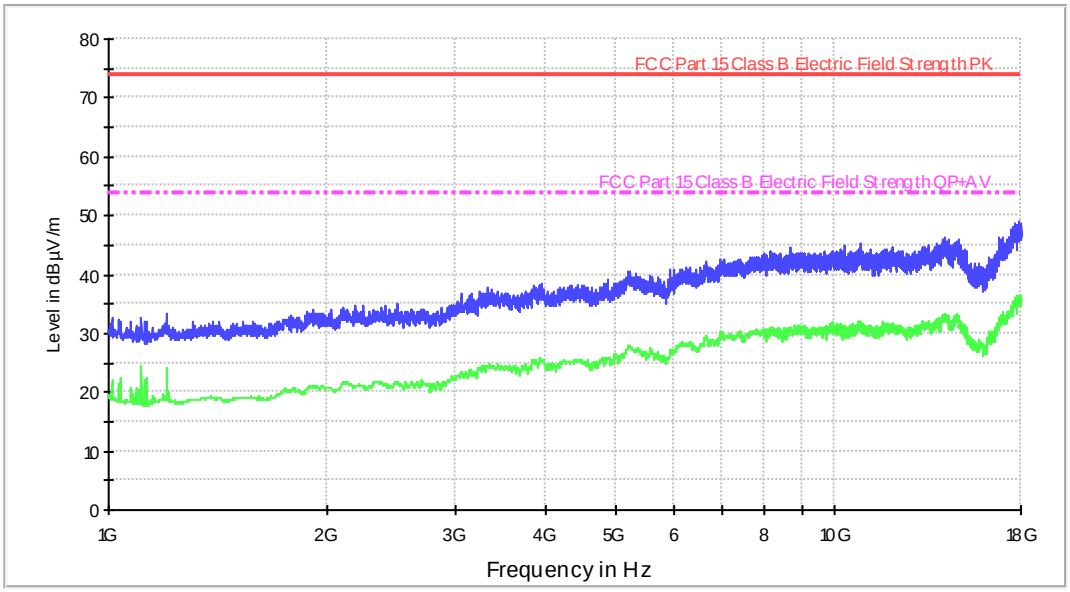
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
1000.000000	32.8	20.4
1737.000000	33.2	20.0
2356.000000	34.1	21.5
3055.000000	37.3	23.1
3843.000000	38.6	25.4
5166.000000	40.9	27.3
7529.000000	42.8	29.7
9337.000000	44.6	30.5
10133.000000	44.9	31.0
17885.000000	50.0	36.0

Radiated Emission. CR0101HR1_PV

Project:	54008REM.001
Company:	TELTRONIC S.A.U.
Sample:	S/01
Operation mode:	OM#01
Description:	EUT ON. IDLE & RX mode 450 MHz – 470 MHz. Power supply: 115Vac.

FCC 1-18GHz class B



Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV/m)	Average-ClearWrite (dBµV/m)
1200.000000	33.2	24.2
1768.000000	32.6	20.2
2237.000000	34.6	21.2
3063.000000	36.7	23.4
3935.000000	38.3	25.4
5200.000000	40.5	28.0
7027.000000	42.6	29.2
8672.000000	44.7	30.8
10815.000000	45.2	31.2
17889.000000	49.0	35.5

CONTINUOUS CONDUCTED EMISSION

LIMITS:	Product standard :	FCC CFR 47, Part 15, Subpart B (10-1-16 Edition), Secs. 15.107; ICES-003 Issue 6 (January 2016, updated April 2017) & ANSI C63.4 (2014)
	Test standard :	FCC CFR 47, Part 15, Subpart B (10-1-16 Edition), Secs. 15.107; ICES-003 Issue 6 (January 2016, updated April 2017) & ANSI C63.4 (2014)

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 (10-1-16 Edition), Secs. 15.107 & ICES-003 Issue006 (January 2016, updated April 2017), in the frequency range 0,15 to 30 MHz, for Class B equipment was:

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

*Decreases with the logarithm of the frequency.

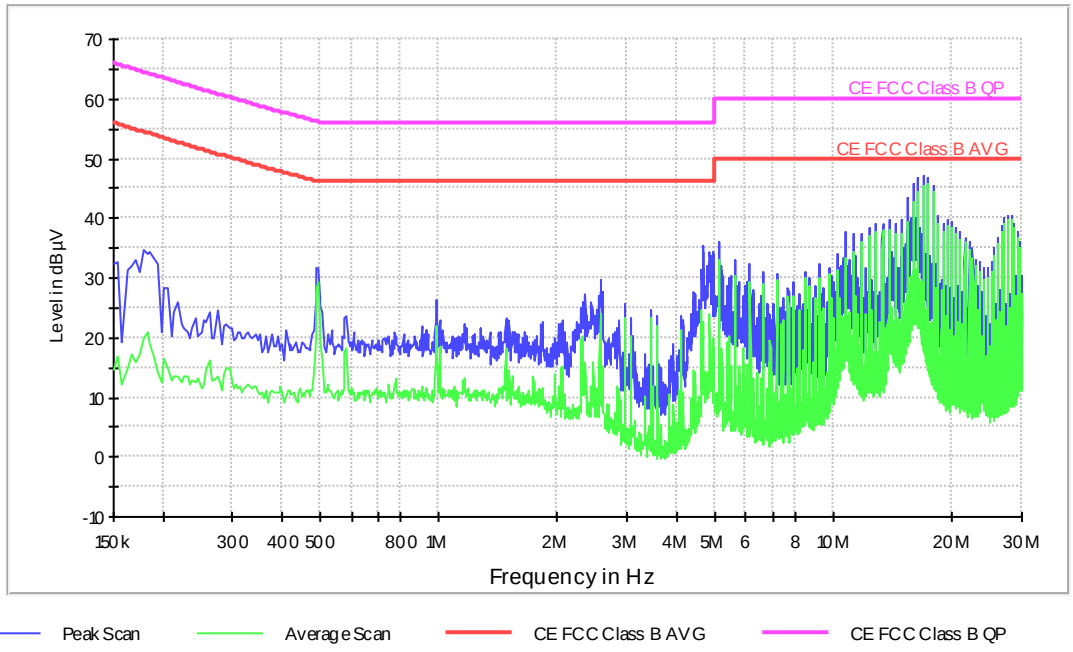
TESTED SAMPLES:	S/01
TESTED OPERATION MODES:	OM#01 & OM#02
TEST RESULTS:	CCmmnnhh: CC, Conducted Condition; mm: Sample number; nn: Operation mode; hh: wire

CCmmnnhh	**DESCRIPTION**	**RESULT**
CC0101N	Range: 150kHz – 30MHz. Neutral wire noise.	P
CC0101L1	Range: 150kHz – 30MHz. Phase wire noise.	P
CC0102N	Range: 150kHz – 30MHz. Neutral wire noise.	P
CC0102L1	Range: 150kHz – 30MHz. Phase wire noise.	P

Conducted Emission. CC0101L1

Project:	54008REM.001
Company:	TELTRONIC S.A.U.
Sample:	S/01
Operation mode:	OM#01
Description:	EUT ON. IDLE & RX mode 450 MHz - 470 MHz. Power supply: 115Vac. Phase wire noise.

FCC Class B



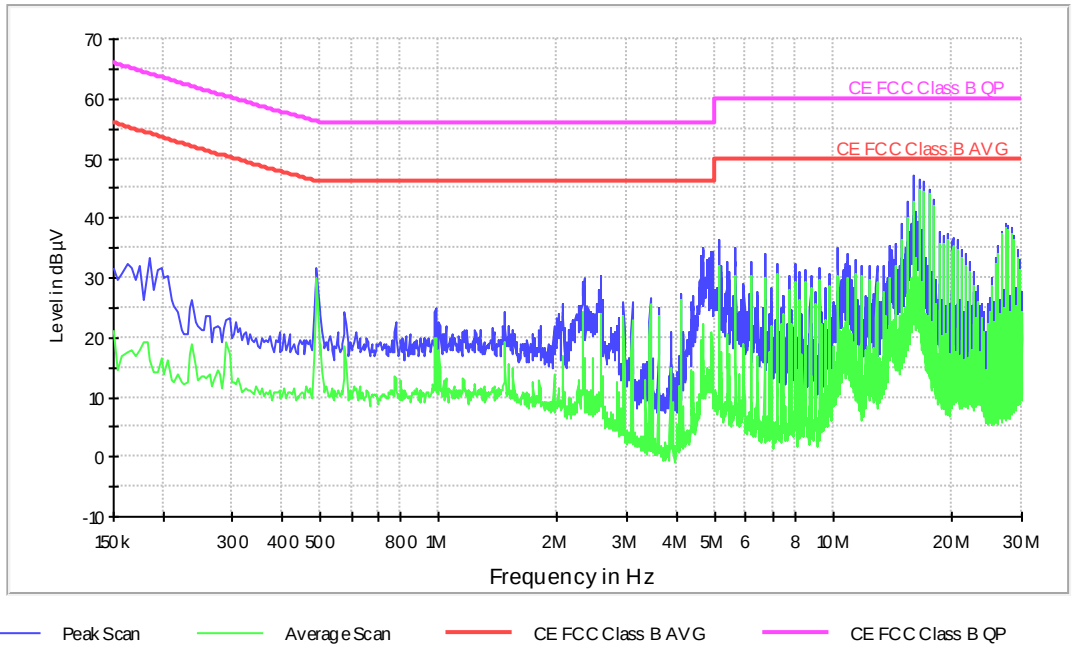
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.178000	34.6	19.9
0.274000	24.8	13.7
0.494000	31.8	29.4
0.986000	26.3	22.1
1.478000	23.4	18.3
2.562000	29.6	23.8
5.122000	36.0	31.9
10.238000	34.0	31.4
16.894000	47.1	45.6
17.918000	45.5	44.4

Conducted Emission. CC0101N

Project:	54008REM.001
Company:	TELTRONIC S.A.U.
Sample:	S/01
Operation mode:	OM#01
Description:	EUT ON. IDLE & RX mode 450 MHz - 470 MHz. Power supply: 115Vac. Neutral wire noise.

FCC Class B



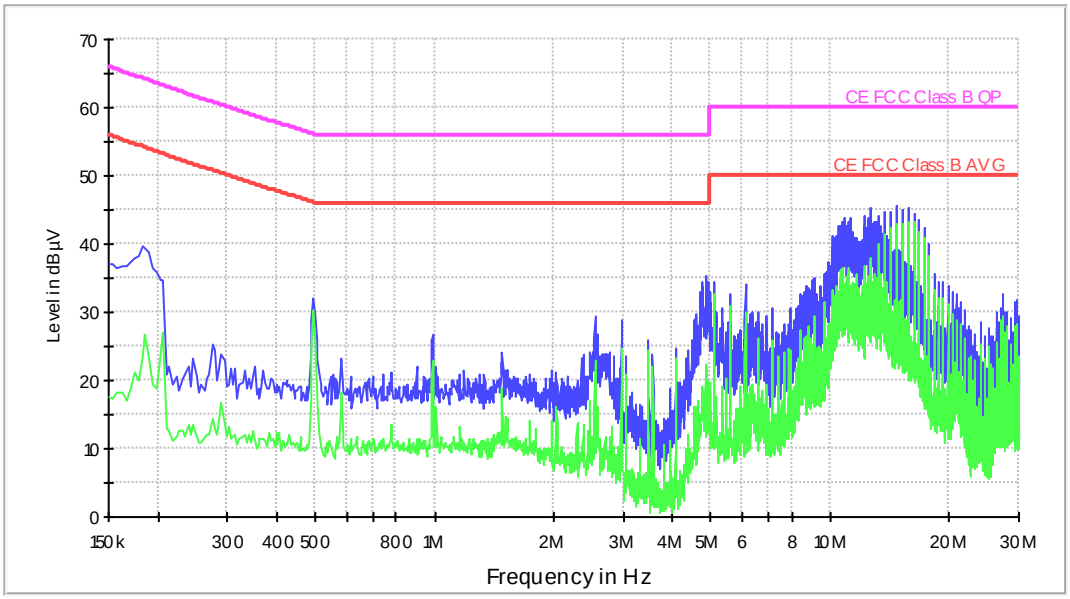
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.186000	33.3	16.2
0.262000	23.7	13.7
0.490000	31.7	29.8
0.982000	24.9	19.9
2.062000	25.8	12.0
2.574000	30.3	23.9
5.142000	36.4	31.9
10.282000	34.9	30.3
15.934000	47.3	42.6
17.986000	43.1	42.2

Conducted Emission. CC0102L1

Project:	54008REM.001
Company:	TELTRONIC S.A.U.
Sample:	S/01
Operation mode:	OM#02
Description:	EUT ON. TX mode 450 - 470 MHz. Power supply: 115Vac . Phase wire noise.

FCC Class B



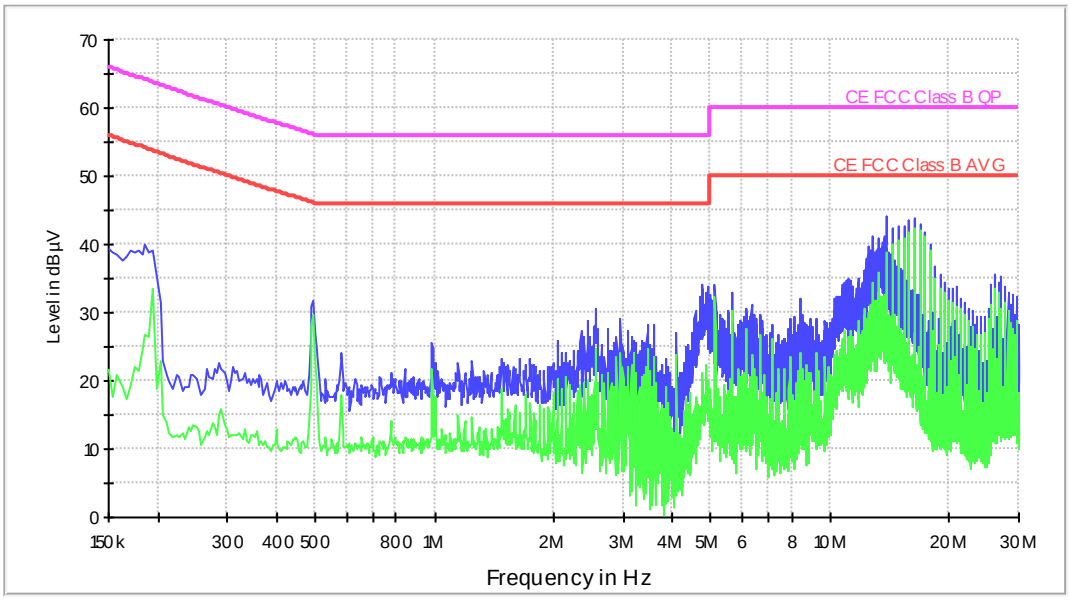
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.182000	39.7	23.5
0.274000	25.3	14.3
0.494000	31.9	30.2
0.990000	26.7	22.8
1.482000	24.2	18.8
2.542000	29.4	23.0
4.846000	35.4	21.8
10.170000	41.2	33.3
14.746000	45.6	42.9
17.794000	40.1	36.3

Conducted Emission. CC0102N

Project:	54008REM.001
Company:	TELTRONIC S.A.U.
Sample:	S/01
Operation mode:	OM#02
Description:	EUT ON. TX 450 - 470 MHz. Power supply: 115Vac . Neutral wire noise.

FCC Class B



Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.186000	40.0	26.9
0.286000	22.8	14.9
0.494000	31.6	29.7
0.986000	25.6	21.8
2.046000	26.0	20.2
2.558000	30.6	24.6
5.118000	34.3	32.4
10.362000	32.2	23.6
13.814000	44.0	37.1
17.910000	40.0	39.0