



FCC TEST REPORT / IC TEST REPORT

APPLICANT

Company: **Multiplex Modellsport GmbH & Co. KG**
 Address: **Westliche Gewerbestr. 1**
D - 75015 Bretten-Gölshausen (Germany)
 Witness(es) at tests: -

EQUIPMENT UNDER TEST (EUT)

Equipment: **Transmitter remote control**
 Model/Type: **Cockpit SX9 Trinity**
 Serial No.: **# 4260574660130**

TEST

Arrival of EUT: **2018-01-30**
 Date of measurement: **2018-02-08**
 Standards: **47 CFR Part 15, Subpart B, class B**
ICES-003 Issue 6, class B
 Results: **Passed - Details see test result summary**
 Performed by: **Dipl.-Ing. Th. W. Stein**

LABORATORY

Test site: **Nemko GmbH & Co. KG, Pfinztal, (Germany)**
 FCC Reg. No.: **973501**
 IC File No.: **10921A-1**

TEST REPORT

Identification No.: **FC-1801-347031-001**
 Date of Report: **2018-07-02**

Provided by: **Dipl.-Ing. Th. W. Stein**
 Person responsible

Signature

Approved by: **Dipl.-Ing. M. Korny**
 Person responsible

Signature

QM-V-5.10-2 e / Rev 5.10

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1 General information

1.1 Description of Equipment under test (EUT)

The EuT is a transmitter control unit for model planes.

1.2 Technical data

Maximum internal frequency (CPU)	120 MHz
Power supply of EuT	5 V DC (is supplied with an external power supply for charging only)

1.3 Climatic conditions

parameter	actual range
Ambient temperature	20 - 22 °C
Relative humidity	30 - 32 %
Atmospheric pressure	1002 - 1004 mbar

1.4 Other comments

For conducted emission the AC-Adaptor MPX was in use with 115 V / 60 Hz.

1.5 Test equipment

See list of test equipment in clause 4.

1.6 Project history

test report (Ident.-No.)	date of report	modification of the EuT	Change in standard in clause:
FC-1801-347031-001	2018-07-02	-	initial test report

2 Test Report Summary

2.1 General

The tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with:

47 CFR Part 15, Subpart B, class B
ICES-003 Issue 6, class B

The test methods have been in accordance with 47 CFR Part 15 and RSS where applicable.

- ☒ Production Unit
☐ Pre-production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) AND CONFIGURATIONS TESTED.
Deviations from, additions to, or exclusions from the test specifications
are described in "Test results".



TEST REPORT NO.: FC-1801-347031-001

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2.2 Test Summary

Section in CFR 47		Result
15.109	Spurious radiated emissions	PASS
15.107	AC power line conducted emissions	PASS

Section in RSS		Result
ICES-003 clause 6.2	Spurious radiated emissions	PASS
ICES-003 clause 6.1	AC power line conducted emissions	PASS

Explanations:

PASS The EUT passed that particular test.

FAIL The EUT failed that particular test.

X The measurement was done, but there is no applicable performance criteria.

3 Test Results

3.1 Spurious radiated emissions

The test was performed as a compliance test. The test parameters concerned were as follows:

Parameter	Specification
Frequency range	30 - 2000 MHz (normal operation)
Limits FCC	§15.109 class B
Limits IC	ICES-003 clause 6.2 class B
Test uncertainty U95	4.17 dB (30 - 200 MHz) horizontal 4.77 dB (30 - 200 MHz) vertical 4.54 dB (200 - 1000 MHz) horizontal 6.38 dB (200 - 1000 MHz) vertical 7.07 dB (1 - 6 GHz)

Test method and limits

The test was performed in a test chamber according to ANSI C63.4-2009 / ANSI C63.4-2014:.. The EUT was placed on a non-conductive 0.8 m high support standing on the turntable (see fig. 1, 2). In order to find the maximum levels of the disturbance radiation the angle of the turntable, the height of the measuring antenna and the lay-out of the EUT cables were varied during the tests. The test was performed separately with the measuring antenna being both in horizontal and vertical polarizations.

Receiver bandwidth and measuring distance:

Frequency band MHz	Receiver bandwidth kHz	Measuring distance m
30-1000	120	3
1000-2000	1000	3

FCC Part 15.109 / ICES-003 class B limit values

Frequency band MHz	Quasi-peak $\mu\text{V/m}$	Quasi-peak $\text{dB}(\mu\text{V/m}) @3 \text{ m}$	Average $\text{dB}(\mu\text{V/m}) @3 \text{ m}$
30 - 88	100 @3 m	40.0 @3 m	-
88 - 216	150 @3 m	43.5 @3 m	-
216-960	200 @3 m	46.0 @3 m	-
960-1000	500 @3 m	54.0 @3 m	-
1000-2000	-	73.98 @3 m *)	53.98 @3 m

*) Peak

Test result: Passed.

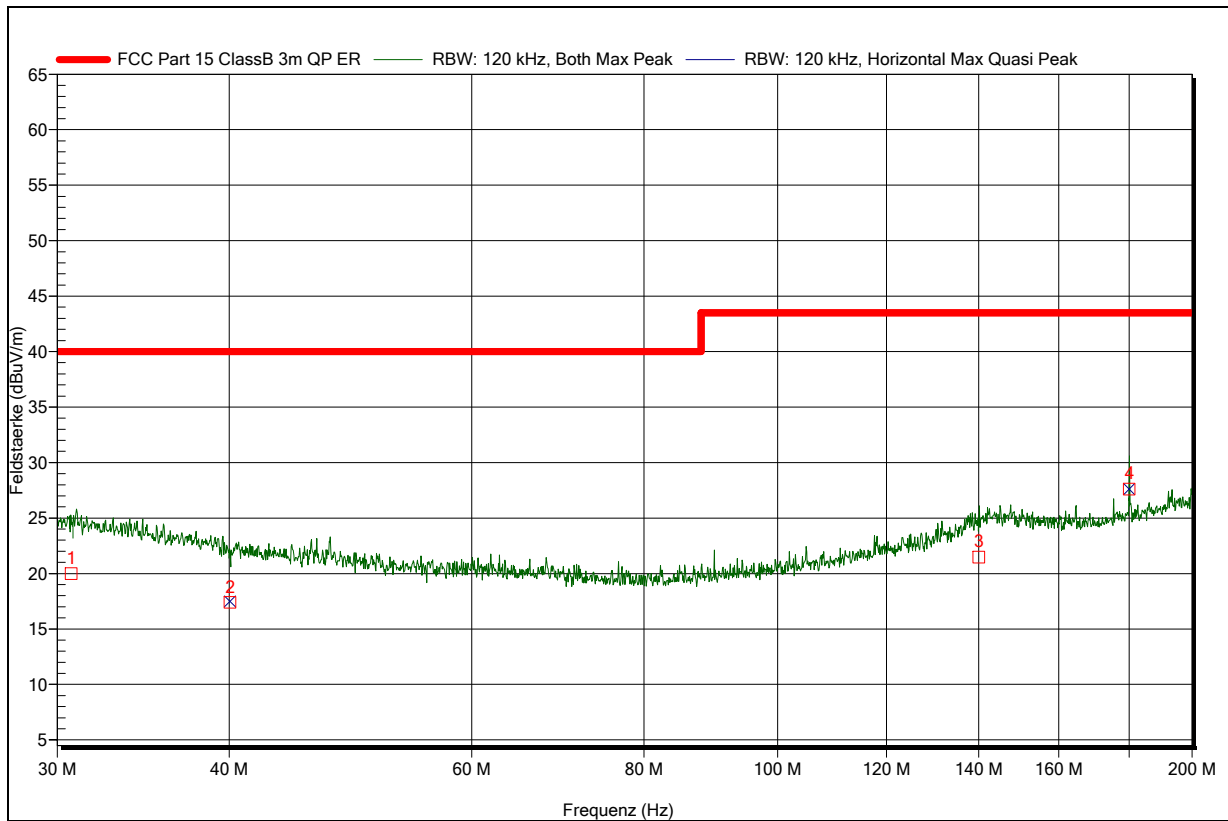
Test Equipment Used: (30 MHz < f < 200 MHz):
1-0040; 1-0361; 1-0364; 1-0604; 1-0619; 1-0624

Test Equipment Used: (200 MHz < f < 1 GHz):
1-0055; 1-0361; 1-0364; 1-0604; 1-0619; 1-0624

Test Equipment Used: (1 GHz > f > 2 GHz):
1-0361; 1-0611; 1-0614; 1-0615; 1-0619; 1-0620; 1-0624

3.2 Measurement results

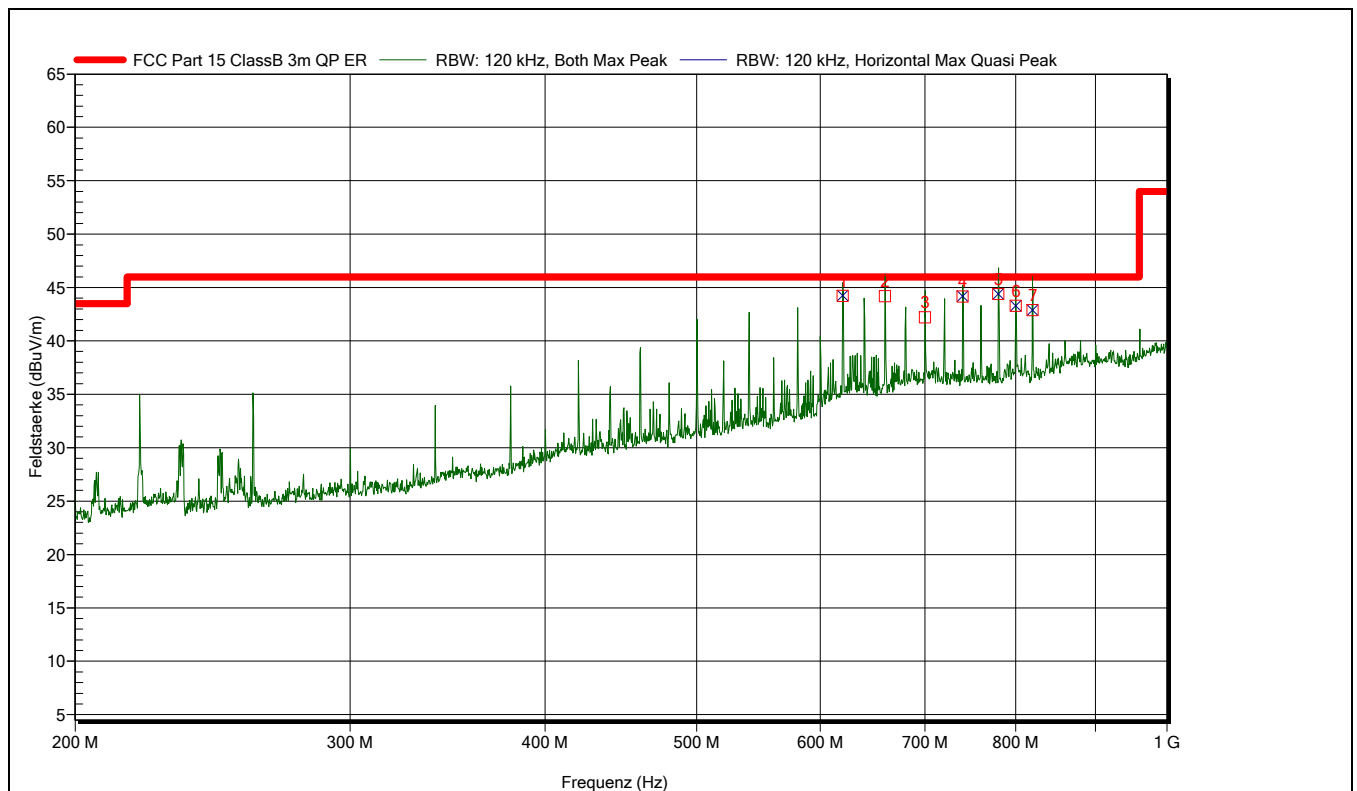
3.2.1 Diagram 347031-1ER (30 MHz – 200 MHz)



3.2.2 Table 347031-1ER Quasipeak (30 MHz – 200 MHz)

Peak No.	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Correction	Quasi-Peak Status	Angle	Height	Polarization
1	30,720 MHz	19,99 dBuV/m	40,00 dBuV/m	-20,01 dB	24,2 dB	Pass	-10,00 Grad	1,3 m	Vertical
2	40,050 MHz	17,39 dBuV/m	40,00 dBuV/m	-22,61 dB	22 dB	Pass	43,00 Grad	3,4 m	Horizontal
3	139,980 MHz	21,47 dBuV/m	43,50 dBuV/m	-22,03 dB	22,5 dB	Pass	259,00 Grad	1 m	Vertical
4	180,000 MHz	27,61 dBuV/m	43,50 dBuV/m	-15,89 dB	23,7 dB	Pass	280,00 Grad	2,2 m	Horizontal

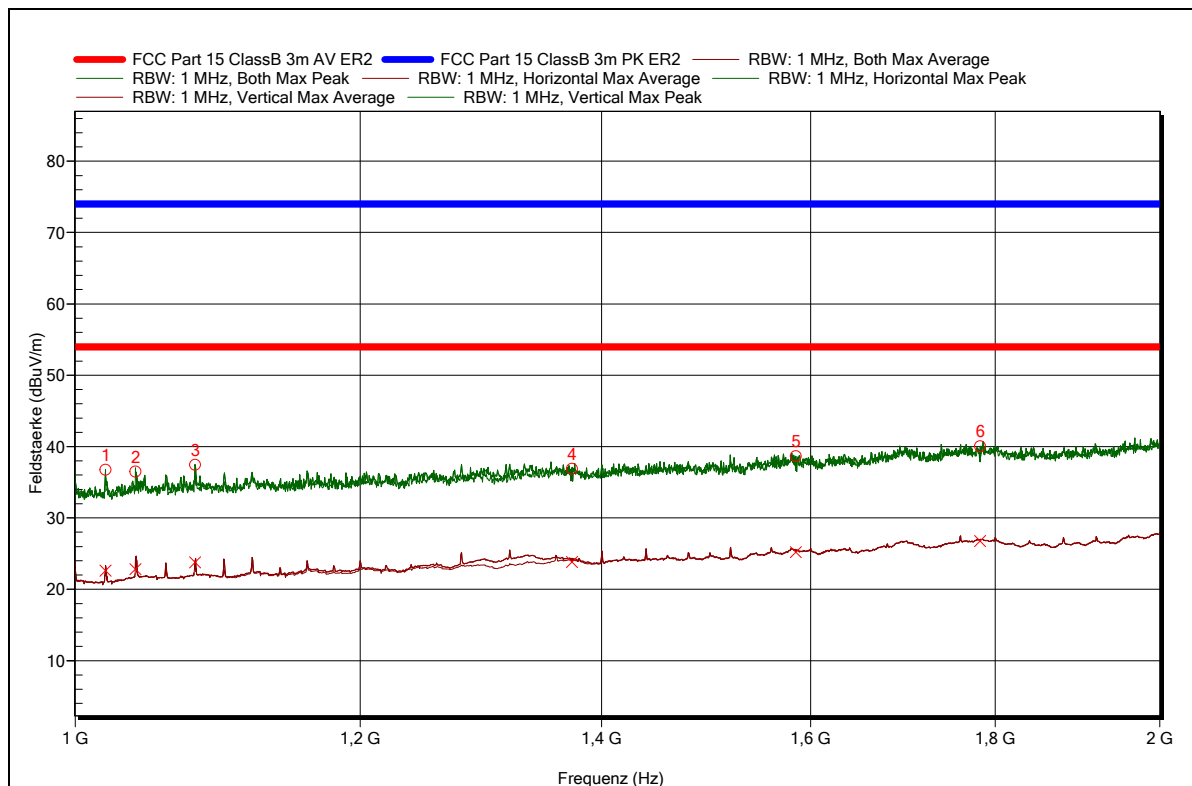
3.2.3 Diagram 343031-2ER (200 MHz – 1000 MHz)



3.2.4 Table 347031-2ER Quasipeak (200 MHz – 1000 MHz)

Peak No.	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Correction	Quasi-Peak Status	Angle	Height	Polarization
1	619,970 MHz	44,22 dBuV/m	46,00 dBuV/m	-1,78 dB	20,9 dB	Pass	259,00 Grad	3,8 m	Horizontal
2	659,960 MHz	44,20 dBuV/m	46,00 dBuV/m	-1,8 dB	21,4 dB	Pass	157,00 Grad	1 m	Vertical
3	699,980 MHz	42,22 dBuV/m	46,00 dBuV/m	-3,78 dB	22,7 dB	Pass	189,00 Grad	2,6 m	Vertical
4	739,970 MHz	44,16 dBuV/m	46,00 dBuV/m	-1,84 dB	22,6 dB	Pass	9,00 Grad	1,2 m	Horizontal
5	779,960 MHz	44,38 dBuV/m	46,00 dBuV/m	-1,62 dB	22,7 dB	Pass	11,00 Grad	1,1 m	Horizontal
6	799,970 MHz	43,29 dBuV/m	46,00 dBuV/m	-2,71 dB	23,3 dB	Pass	21,00 Grad	1,1 m	Horizontal
7	819,950 MHz	42,87 dBuV/m	46,00 dBuV/m	-3,13 dB	23,1 dB	Pass	34,00 Grad	1 m	Horizontal

3.2.5 Diagram 347031-ER2 (1000 MHz – 2000 MHz)



3.2.6 Table 347031-ER2 Peak (1000 MHz – 2000 MHz)

Peak No.	Frequency	Peak	Peak Limit	Peak Difference	Peak Correction	Peak Status	Angle	Height	Polarization
1	1.020 GHz	36.77 dBuV/m	73.98 dBuV/m	-37.21 dB	-11.7 dB	Pass	-30.00 Grad	1 m	Horizontal
2	1.040 GHz	36.48 dBuV/m	73.98 dBuV/m	-37.5 dB	-11.3 dB	Pass	-6.00 Grad	1 m	Horizontal
3	1.080 GHz	37.47 dBuV/m	73.98 dBuV/m	-36.51 dB	-11 dB	Pass	-51.00 Grad	1 m	Horizontal
4	1.374 GHz	36.90 dBuV/m	73.98 dBuV/m	-37.08 dB	-8.7 dB	Pass	10.00 Grad	1 m	Horizontal
5	1.585 GHz	38.66 dBuV/m	73.98 dBuV/m	-35.32 dB	-7.2 dB	Pass	-10.00 Grad	1 m	Vertical
6	1.783 GHz	40.04 dBuV/m	73.98 dBuV/m	-33.94 dB	-5.3 dB	Pass	142.00 Grad	1 m	Horizontal

3.2.7 Table 347031-ER2 Average (1000 MHz – 2000 MHz)

Peak No.	Frequency	Average	Average Limit	Average Difference	Average Correction	Average Status	Angle	Height	Polarization
1	1.020 GHz	22.63 dBuV/m	53.98 dBuV/m	-31.35 dB	-11.7 dB	Pass	-30.00 Grad	1 m	Horizontal
2	1.040 GHz	22.82 dBuV/m	53.98 dBuV/m	-31.16 dB	-11.3 dB	Pass	-6.00 Grad	1 m	Horizontal
3	1.080 GHz	23.78 dBuV/m	53.98 dBuV/m	-30.2 dB	-11 dB	Pass	-51.00 Grad	1 m	Horizontal
4	1.374 GHz	23.83 dBuV/m	53.98 dBuV/m	-30.15 dB	-8.7 dB	Pass	10.00 Grad	1 m	Horizontal
5	1.585 GHz	25.20 dBuV/m	53.98 dBuV/m	-28.78 dB	-7.2 dB	Pass	-10.00 Grad	1 m	Vertical
6	1.783 GHz	26.76 dBuV/m	53.98 dBuV/m	-27.22 dB	-5.3 dB	Pass	142.00 Grad	1 m	Horizontal

3.3 AC power line conducted emissions

The test was performed as a compliance test. The test parameters concerned were as follows:

Parameter	Specification
Frequency range	0.15 - 30 MHz
Limits FCC	§15.107 class B
Limits IC	ICES-003 clause 6.1 class B
Test uncertainty U95	4.06 dB (9 kHz - 150 kHz) 3.58 dB (150 kHz - 30 MHz)

Test method and limits

The test was performed according to ANSI C63.4-2009 / ANSI C63.4-2014 inside a shielded room where the floor and one of the walls of the test site comprised the reference ground plane (RGP). The test was performed at the AC input of the supplied AC/DC converter. For the duration of the test EUT and external supply were placed on a non-conductive support 0.8 m high 0.4 m apart from the vertical RGP (see fig. 3). The excess lengths of the cables of the EUT were made into bundles 30 -40 cm in length. The power input cable of the external supply was connected to an artificial mains network. The test was performed separately on each phase and also on the neutral wire.

The disturbances were first examined by performing a spectrum scan by using a peak detector. The general procedure in the conducted disturbance emission test is that no further measurements are necessary if the disturbance levels measured by using the peak detector are below the limit value defined for the measurement performed by using an average detector. If not, then at the test frequencies concerned the measurement is performed also by using a quasi -peak detector. If the disturbance levels measured by using the quasi-peak detector are below the limit value defined for the measurement performed by using an average detector, then measurements by using the average detector are not necessary.

FCC Part 15.107 / ICES-003 class B limit values

Frequency MHz	Quasi-peak dB μ V	Average dB μ V
0.15 – 0.5	66 - 56	56 -46
0.5 – 5	56	46
5 – 30	60	50

Test result: Passed

The EuT was in charging mode

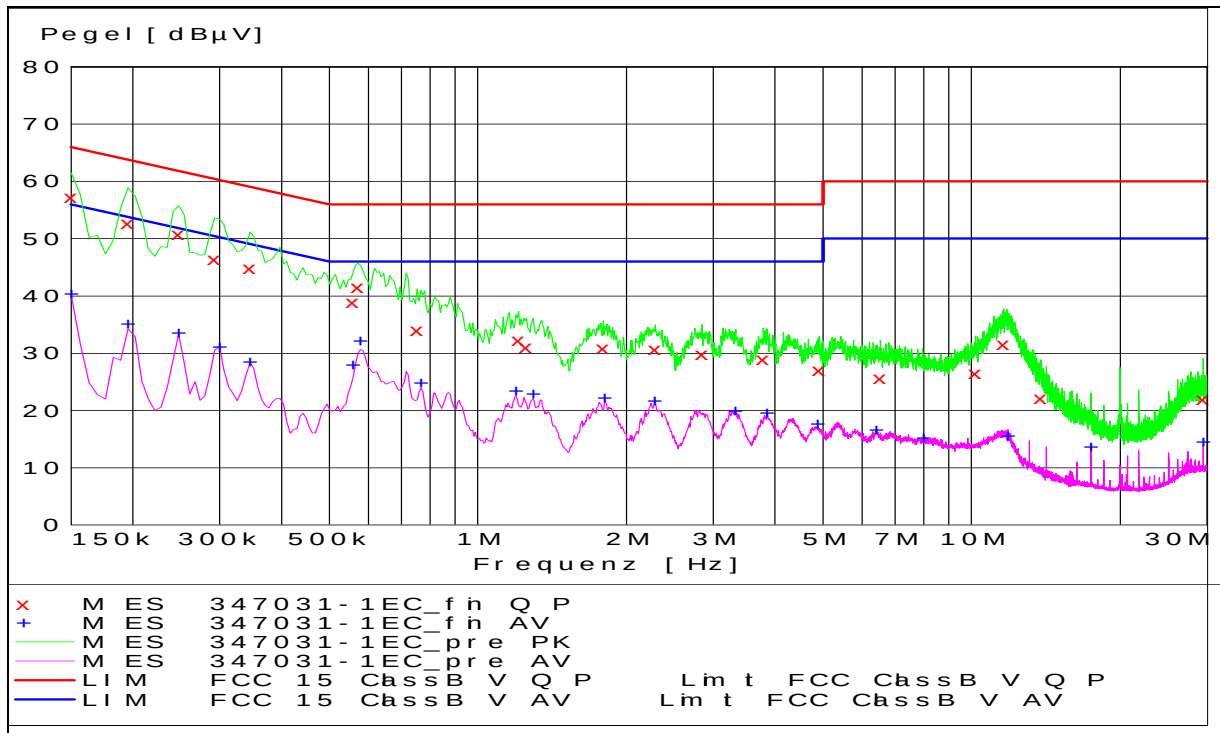
Test Equipment Used:

1-0054; 1-0069; 1-0071; 1-0072; 1-0361; 1-0364

3.4 Measurement results

3.4.1 Diagram 347031-1EC (0.15 - 30 MHz)

3.4.2



3.4.3 Table Final measurements 347031-1EC_fin QP (0.15 - 30 MHz)

Frequenz MHz	Pegel dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.150000	57.30	10.00	66.00	8.70	N	FLO
0.195500	52.80	10.00	63.80	11.00	N	FLO
0.247500	50.80	10.00	61.80	11.00	N	FLO
0.293000	46.40	10.00	60.40	14.10	N	FLO
0.345000	45.00	10.00	59.10	14.00	N	FLO
0.559500	38.90	10.00	56.00	17.10	N	FLO
0.572500	41.60	10.00	56.00	14.40	N	FLO
0.754500	34.00	10.00	56.00	22.00	N	FLO
1.209500	32.30	10.00	56.00	23.70	N	FLO
1.255000	31.10	10.00	56.00	24.90	N	FLO
1.794500	31.00	10.10	56.00	25.00	N	FLO
2.288500	30.80	10.10	56.00	25.20	N	FLO
2.847500	29.90	10.10	56.00	26.10	N	FLO
3.790000	29.00	10.20	56.00	27.00	N	FLO
4.914500	27.10	10.20	56.00	28.90	N	FLO
6.546000	25.70	10.30	60.00	34.30	N	FLO
10.192500	26.60	10.50	60.00	33.40	L1	FLO
11.635500	31.60	10.60	60.00	28.40	L1	FLO
13.832500	22.10	10.80	60.00	37.90	N	FLO
29.478000	22.00	10.90	60.00	38.00	N	FLO

3.4.4 Table Final measurements 347031-1EC_fin AV (0.15 - 30 MHz)

Frequenz MHz	Pegel dB μ V	Transd dB	Limit dB μ V	Margin dB	Line	PE
0.150000	40.30	10.00	56.00	15.70	N	FLO
0.195500	35.20	10.00	53.80	18.60	N	FLO
0.247500	33.50	10.00	51.80	18.40	N	FLO
0.299500	31.10	10.00	50.30	19.20	N	FLO
0.345000	28.50	10.00	49.10	20.50	N	FLO
0.559500	28.00	10.00	46.00	18.00	N	FLO
0.579000	32.10	10.00	46.00	13.90	N	FLO
0.767500	24.90	10.00	46.00	21.10	N	FLO
1.196500	23.50	10.00	46.00	22.50	N	FLO
1.294000	23.00	10.00	46.00	23.00	N	FLO
1.807500	22.10	10.10	46.00	23.90	N	FLO
2.282000	21.70	10.10	46.00	24.30	N	FLO
3.322000	19.90	10.20	46.00	26.10	N	FLO
3.855000	19.60	10.20	46.00	26.40	N	FLO
4.882000	17.70	10.20	46.00	28.30	N	FLO
6.403000	16.60	10.30	50.00	33.40	N	FLO
7.995500	15.20	10.40	50.00	34.80	N	FLO
11.863000	15.60	10.60	50.00	34.40	N	FLO
17.466000	13.70	11.00	50.00	36.30	N	FLO
29.471500	14.60	10.90	50.00	35.40	N	FLO

4 Test equipment used

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment and ancillaries are identified (numbered) by the test house.

Ref No	Instrument/ ancillary	Manufacturer	Type of instrument/ ancillary	Cal. Date	Cal. Due
1-0037	Artificial mains network, 3ph	Rohde & Schwarz	ESH2-Z5	2017-09	2018-09
1-0040	Biconical antenna	Rohde & Schwarz	HK116	2015-08	2018-08
1-0054	Pulse limiter	Rohde & Schwarz	ESH3-Z2	2017-09	2018-09
1-0055	LopPer antenna	Rohde & Schwarz	HL223	2015-08	2018-08
1-0069	Measuring receiver	Rohde & Schwarz	ESHS 10	2017-09	2018-09
1-0071	EMI-Software ES-K1	Rohde & Schwarz	ES-K1 V 1.4	-	-
1-0072	Artificial mains network, 1ph	Rohde & Schwarz	ESH3-Z5	2017-09	2018-09
1-0080	Turntable	H. Deisel	DS 420	-	-
1-0200	Trilog antenna	Schwarzbeck	VULB 9163	2015-12	2018-12
1-0361	Semi anechoic chamber	Reinhold & Mahla	3m	2017-06	2020-06
1-0364	Antenna cable 2	Kabelwerk Eupen	RF/Cord CMS / RG 214-N/7	2016-09	2019-09
1-0604	EMI test receiver	Rohde & Schwarz	ESU8	2017-09	2018-09
1-0611	Signal analyzer	Rohde & Schwarz	FSV 40	2017-09	2018-09
1-0614	Log.-per. antenna	Schwarzbeck Mess-Elektronik	STLP 9148	2016-11	2019-11
1-0615	Pre amplifier	Schwarzbeck Mess-Elektronik	BBV-9718	2017-09	2018-09
1-0619	Coaxial cable (to SAC)	Huber+Suhner	SF106/2x11N-651/2m	2016-09	2019-09
1-0620	Antenna cable 3	Huber+Suhner	SF106/2x11N-651/3m	2016-09	2019-09
1-0624	EMI-Software Radimation	DARE	Radimation	-	-
1-0870	10 dB Attenuator	mini circuits	BW-N10W5+	2016-09	2019-09
1-0770	Horn antenna	Schwarzbeck	BBHA 9170	2015-02	2018-02
1-0781	Pre amplifier	Schwarzbeck	BBV 9721	2017-09	2018-09
1-0782	Antenna cable	Huber & Suhner	FB142A	2015-07	2018-07
1-0806	Controller	Innco	CO 3000	-	-
1-0807	Antenna mast	Innco	MA-400-XPET	-	-
1-0925	Coaxial cable	Harbour	SMA	2017-09	2018-09
1-0927	Coaxial cable	Harbour	SMA	2017-09	2018-09

5 Photos of the EuT

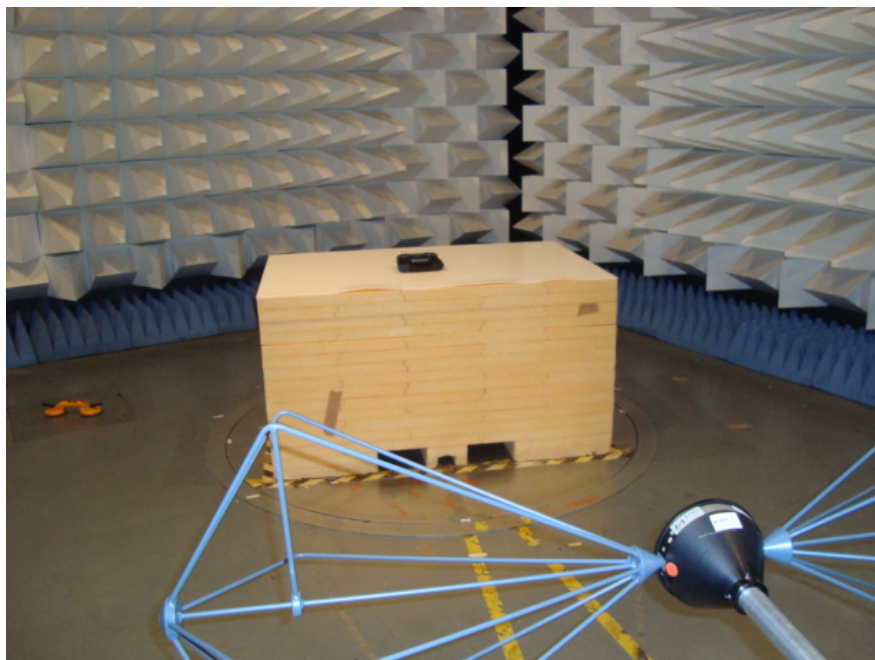


Figure 1 EUT / test set up - spurious radiated emissions ($30 \text{ MHz} < f < 200 \text{ MHz}$)

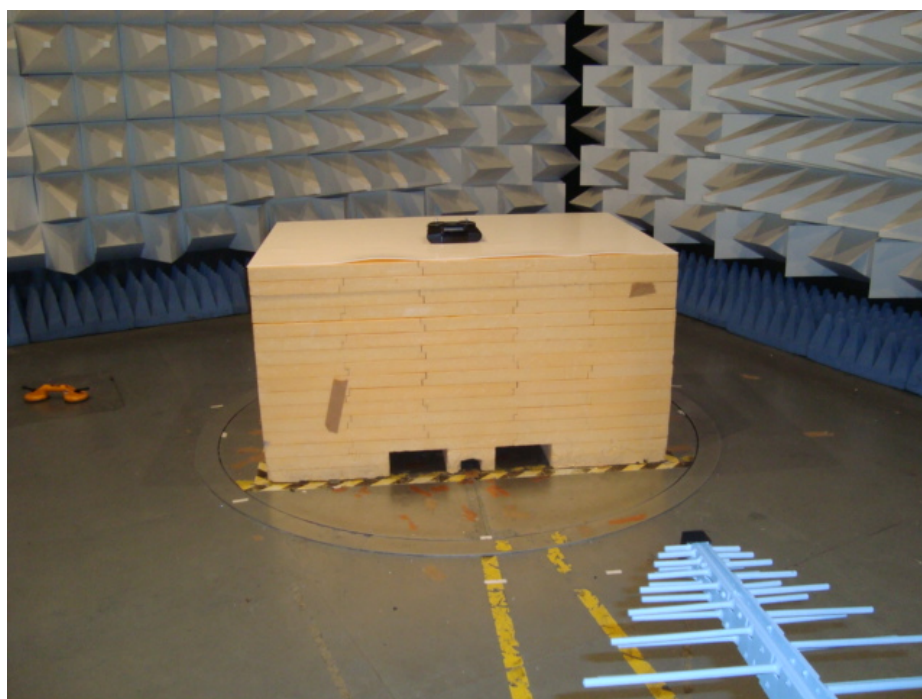


Figure 2 EUT / test set up - spurious radiated emissions ($200 \text{ MHz} < f < 1000 \text{ MHz}$)

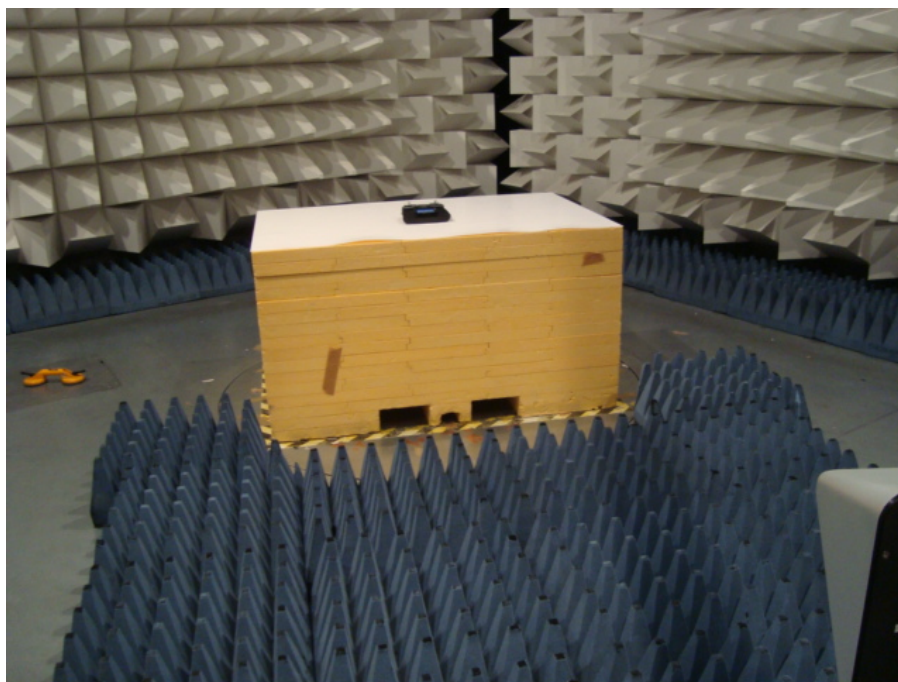


Figure 3 EUT / test set up - spurious radiated emissions (> 1 GHz)



Figure 4 EUT / test set up - spurious conducted emissions



Figure 5 EUT / type label



Figure 6 EUT / front side



Figure 7 EUT / AC-Adaptor MPX