DEKRA Testing and Certification, S.A.U.
Parque Tecnológico de Andalucía,
c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España
C.I.F. A29 507 456

Nº 51/LE147

Test report No:
NIE: 62016RRF.001

Partial Test report
ETSI EN 300 328 v 2.1.1 (2016-11)

(*) Identification of item tested	Scalextric Advance car
(*) Trademark	SCALEXTRIC - SCX
(*) Model and /or type reference tested	SD02177
Other identification of the product	HW version: V2.0 SW version: C-10.04
(*) Features	Proprietary 2.4 GHz (nRF24L01)
Manufacturer	SCALE COMPETITION XTREME, S.L. C/ Camps I Fabres 3, 2º 2ª, 08006 Barcelona (Spain)
Test method requested, standard	ETSI EN 300 328 v2.1.1 (2016-11): Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU. - 4.3.2.9 Transmitter unwanted emissions in the spurious domain (radiated). - 4.3.2.10 Receiver spurious emissions (radiated).
Approved by (name / position & signature)	Jose Carlos Luque RF Lab. Supervisor 74841983Y JOSE CARLOS LUQUE (C:A29507456) Firmado digitalmente por 74841983Y JOSE CARLOS LUQUE (C:A29507456) Fecha: 2020.02.04 13:44:23 +01'00'
Date of issue	2020-02-04
Report template No	FDT08_22 (*) "Data provided by the client"

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Uncertainty

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

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").
2. The sample consists of a toy car powered with 14V through the track and connected to the controller by 2.4GHz wireless transmission.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: the client.

- Sample S/01 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Reception
62016/001	Scalextric track	SCX	--	2020/01/02
62016/002	AC/DC Adaptor	Helms-Man	SRP1401500TE	2020/01/02
62016/011	Scalextric Advance Car	Mercedes AMG GT3	--	2020/01/02

Sample S/01 has undergone the following test(s): RADIATED tests on low channel for transmitter unwanted emissions indicated in Appendix B.

- Sample S/02 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Reception
62016/001	Scalextric track	SCX	--	2020/01/02
62016/002	AC/DC Adaptor	Helms-Man	SRP1401500TE	2020/01/02
62016/015	Scalextric Advance Car	--	--	2020/01/02

Sample S/02 has undergone the following test(s): RADIATED tests on high channel for transmitter unwanted emissions indicated in Appendix B.

- Sample S/03 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Reception
62016/001	Scalextric track	SCX	--	2020/01/02
62016/002	AC/DC Adaptor	Helms-Man	SRP1401500TE	2020/01/02
62016/007	Scalextric Advance Car	Mercedes AMG GT3	--	2020/01/02

Sample S/03 has undergone the following test(s): RADIATED tests for receiver spurious emissions indicated in Appendix B.

Test sample description

Ports…… :	Port name and description	Cable					
		Specified max length [m]	Attached during test	Shielded	Coupled to patient(3)		
			☐	☐	☐		
Supplementary information to the ports…… :							
Rated power supply .....:	Voltage and Frequency			Reference poles			
				L1	L2	L3	N	PE
	☐	AC:		☐	☐	☐	☐	☐
	☒	DC: 14 Vdc						
Rated Power .....:	14 V							
Clock frequencies.....:	16 MHz							
Other parameters .....:								
Software version .....:	V2.0							
Hardware version .....:	C-10.04							
Dimensions in cm (W x H x D) ....:	140x43x63 cm (aprox.)							
Mounting position .....:	☐	Table top equipment						
	☐	Wall/Ceiling mounted equipment						
	☐	Floor standing equipment						
	☐	Hand-held equipment						
	☒	Other:						
Modules/parts.....:	Module/parts of test item		Type		Manufacturer		
Accessories (not part of the test item) .....:	Description		Type		Manufacturer		
Documents as provided by the applicant.....:	Description		File name		Issue date		

(3) Only for Medical Equipment

Identification of the client

SCALE COMPETITION XTREME, S.L.

c/ Camps I Fabres 3, 2º 2ª, 08006 Barcelona (Spain)

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2020-01-02
Date (finish)	2020-01-03

Document history

Report number	Date	Description
62016RRF.001	2020-02-04	First release

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. = 20 % Max. = 75 %

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

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

Remarks and comments

The tests have been performed by the technical personnel: Nicolas Salguero and Cristina Calle.

Used instrumentation:

Radiated Measurements:

		Last Calibration	Due Calibration
1.	Semianechoic Absorber Lined Chamber ETS LINDGREN FACT 3 200 STP	N/A	N/A
2	EMI Test Receiver 7 GHz ROHDE AND SCHWARZ ESR7	2019/10	2021/10
3	RF Pre-amplifier 40 dB, 10 MHz - 6 GHz BONN ELEKTRONIK BLNA 0160-01N	2019/02	2020/02
4	Biconical/Log Antenna 30MHz - 6GHz ETS LINDGREN 3142E	2017/04	2020/04
5	Spectrum analyser Rohde & Schwarz FSW50	2018/02	2020/02
6	RF Pre-amplifier G>30dB, 1-18GHz BONN ELEKTRONIK BLMA 0118-3A	2019/04	2020/04
7	Broadband Horn antenna 1-18 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9120 D	2019/11	2022/11

Testing verdicts

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

Summary

1. Proprietary Protocol 2.4 GHz

ETSI EN 300 328			
	Requirement – Test case	Verdict	Remark
4.3.2.2	Transmitter. RF Output Power	N/M	(2)
4.3.2.3	Transmitter. Power Spectral Density	N/M	(2)
4.3.2.4	Transmitter. Duty cycle, Tx-Sequence, Tx-gap	N/A	(1)
4.3.2.5	Medium Utilisation	N/A	(1)
4.3.2.6	Adaptivity	N/A	(1)
4.3.2.7	Occupied Channel Bandwidth	N/M	(2)
4.3.2.8	Transmitter unwanted emissions in the out-of-band domain	N/M	(2)
4.3.2.9	Transmitter unwanted emissions in the spurious domain (conducted)	N/A	
4.3.2.9	Transmitter unwanted emissions in the spurious domain (radiated)	P	
4.3.2.10	Receiver spurious emissions (conducted)	N/A	
4.3.2.10	Receiver spurious emissions (radiated)	P	
4.3.2.11	Receiver blocking	N/M	(2)
4.3.2.12	Geo-location capability	N/A	(3)

Supplementary information and remarks:

(1) The equipment is declared as non-adaptive equipment using other forms of modulation than FHSS. The maximum declared RF Output power level is less than 10 dBm e.i.r.p.

(2) Only radiated spurious emission tests were performed. The device incorporates the same RF module as model **SD02103** which complete results (conducted and radiated) are included in report number 62016RRF.002.

(3) The equipment does not implement geo-location capability as defined in clauses 4.3.1.13.2 and 4.3.2.12.2.

Appendix A: Application form for Proprietary Protocol 2.4 GHz.

Information as required by EN 300 328 V2.1.1, clause 5.4.1

In accordance with EN 300 328, clause 5.4.1, the following information is provided by the manufacturer.

a) The type of modulation used by the equipment:

☐ FHSS

☒ other forms of modulation

b) In case of FHSS modulation:

- In case of non-Adaptive Frequency Hopping equipment:

  The number of Hopping Frequencies: ……..

- In case of Adaptive Frequency Hopping Equipment:

  The maximum number of Hopping Frequencies: ……..

  The minimum number of Hopping Frequencies: ……..

- The (average) Dwell Time: ……..

c) Adaptive / non-adaptive equipment:

☒ non-adaptive Equipment

☐ adaptive Equipment without the possibility to switch to a non-adaptive mode

☐ adaptive Equipment which can also operate in a non-adaptive mode

d) In case of adaptive equipment:

The maximum Channel Occupancy Time implemented by the equipment: ..... ms

☐ The equipment has implemented an LBT based DAA mechanism

- In case of equipment using modulation different from FHSS:

  ☐ The equipment is Frame Based equipment

  ☐ The equipment is Load Based equipment

  ☐ The equipment can switch dynamically between Frame Based and Load Based equipment

  The CCA time implemented by the equipment: ..... µs

☐ The equipment has implemented a non-LBT based DAA mechanism

☐ The equipment can operate in more than one adaptive mode

☐ The equipment has implemented Short Control Signalling Transmissions

e) In case of non-adaptive Equipment:

The maximum RF Output Power: …0……. dBm

The maximum RF Output Power (e.i.r.p.): …0……. dBm

The maximum (corresponding) Duty Cycle: …… %

Equipment with dynamic behaviour, that behaviour is described here. (e.g. the different combinations of duty cycle and corresponding power levels to be declared):

.....

.....

.....

f) The worst case operational mode for each of the following tests:

- RF Output Power

  0 dBm e.i.r.p.....

- Power Spectral Density

  Below the limit.....

- Duty cycle, Tx-Sequence, Tx-gap

  N/A (below 10 dBm e.i.r.p.).....

- Accumulated Transmit time, Frequency Occupation & Hopping Sequence (only for FHSS equipment)

  N/A (not FHSS) .....

- Hopping Frequency Separation (only for FHSS equipment)

  N/A (not FHSS).....

- Medium Utilization

  N/A (below 10 dBm e.i.r.p.).....

- Adaptivity & Receiver Blocking

  Receiver Blocking Class 3.....

- Nominal Channel Bandwidth

  1 MHz.....

- Transmitter unwanted emissions in the OOB domain

  Below the limit.....

- Transmitter unwanted emissions in the spurious domain

  Below the limit.....

- Receiver spurious emissions

  Below the limit.....

g) The different transmit operating modes (tick all that apply):

☒ Operating mode 1: Single Antenna Equipment

☒ Equipment with only one antenna

☐ Equipment with two diversity antennas but only one antenna active at any moment in time

☐ Smart Antenna Systems with two or more antennas, but operating in a (legacy) mode where only one antenna is used. (e.g. IEEE 802.11™ [i.3] legacy mode in smart antenna systems)

☐ Operating mode 2: Smart Antenna Systems - Multiple Antennas without beam forming

☐ Single spatial stream / Standard throughput / (e.g. IEEE 802.11™[i.3] legacy mode)

☐ High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 1

☐ High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 2

NOTE: Add more lines if more channel bandwidths are supported.

☐ Operating mode 3: Smart Antenna Systems - Multiple Antennas with beam forming

☐ Single spatial stream / Standard throughput (e.g. IEEE 802.11™ [i.3] legacy mode)

☐ High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 1

☐ High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 2

NOTE: Add more lines if more channel bandwidths are supported.

h) In case of Smart Antenna Systems:

- The number of Receive chains: .....
- The number of Transmit chains: .....

☐ symmetrical power distribution

☐ asymmetrical power distribution

In case of beam forming, the maximum (additional) beam forming gain: ..... dB

NOTE: The additional beam forming gain does not include the basic gain of a single antenna.

i) Operating Frequency Range(s) of the equipment:

- Operating Frequency Range 1: …2401…… MHz to …2479……. MHz
- Operating Frequency Range 2: …….. MHz to …….. MHz
- NOTE: Add more lines if more Frequency Ranges are supported.

j) Nominal Channel Bandwidth(s):

- Nominal Channel Bandwidth 1: …1……. MHz
- Nominal Channel Bandwidth 2: ……... MHz

NOTE: Add more lines if more channel bandwidths are supported.

k) Type of Equipment (stand-alone, combined, plug-in radio device, etc.):

☒ Stand-alone

☐ Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment)

☐ Plug-in radio device (Equipment intended for a variety of host systems)

☐ Other .....

l) The normal and the extreme operating conditions that apply to the equipment:

Normal operating conditions (if applicable):

Operating temperature: …25…… ° C

Other (please specify if applicable): …… ° C

Extreme operating conditions:

Operating temperature range: Minimum …0…..° C Maximum …45.….° C

Other (please specify if applicable): Minimum …… ° C Maximum ……° C

Details provided are for the: ☒ stand-alone equipment

☐ combined (or host) equipment

☐ test jig

m) The intended combination(s) of the radio equipment power settings and one or more antenna assemblies and their corresponding e.i.r.p levels:

- Antenna Type:

☒ Integral Antenna

Antenna Gain: …0……. dBi

If applicable, additional beamforming gain (excluding basic antenna gain): ..... dB

☐ Temporary RF connector provided

☐ No temporary RF connector provided

☐ Dedicated Antennas (equipment with antenna connector)

☐ Single power level with corresponding antenna(s)

☐ Multiple power settings and corresponding antenna(s)

Number of different Power Levels: .....

Power Level 1: ..... dBm

Power Level 2: ..... dBm

Power Level 3: ..... dBm

NOTE 1: Add more lines in case the equipment has more power levels.

NOTE 2: These power levels are conducted power levels (at antenna connector).

- For each of the Power Levels, provide the intended antenna assemblies, their corresponding gains (G) and the resulting e.i.r.p. levels also taking into account the beamforming gain (Y) if applicable

Power Level 1: ..... dBm

Number of antenna assemblies provided for this power level: .....

Assembly #	Gain (dBi)	e.i.r.p. (dBm)	Part number or model name
1			
2			
3			
4			

NOTE 3: Add more rows in case more antenna assemblies are supported for this power level.

Power Level 2: ..... dBm

Number of antenna assemblies provided for this power level: .....

Assembly #	Gain (dBi)	e.i.r.p. (dBm)	Part number or model name
1			
2			
3			
4			

NOTE 4: Add more rows in case more antenna assemblies are supported for this power level.

Power Level 3: ..... dBm

Number of antenna assemblies provided for this power level: .....

Assembly #	Gain (dBi)	e.i.r.p. (dBm)	Part number or model name
1			
2			
3			
4			

NOTE 5: Add more rows in case more antenna assemblies are supported for this power level.

n) The nominal voltages of the stand-alone radio equipment or the nominal voltages of the combined (host) equipment or test jig in case of plug-in devices:

Details provided are for the: ☒ stand-alone equipment

☐ combined (or host) equipment

☐ test jig

Supply Voltage ☐ AC mains State AC voltage …….. V

☒ DC State DC voltage …14….. V

In case of DC, indicate the type of power source

☐ Internal Power Supply

☒ External Power Supply or AC/DC adapter

☐ Battery

☐ Other:

o) Describe the test modes available which can facilitate testing:

.....

.....

.....

p) The equipment type (e.g. Bluetooth®, IEEE 802.11™[i.3], IEEE 802.15.4™[i.4], proprietary, etc.):

……..Proprietary (nRF24L01).....

q) If applicable, the statistical analysis referred to in clause 5.4.1 q)

(to be provided as separate attachment)

r) If applicable, the statistical analysis referred to in clause 5.4.1 r)

(to be provided as separate attachment)

s) Geo-location capability supported by the equipment:

☐ Yes

☐ The geographical location determined by the equipment as defined in clause 4.3.1.13.2 or clause 4.3.2.12.2 is not accessible to the user.

☒ No

t) Describe the minimum performance criteria that apply to the equipment (see clause 4.3.1.12.3 or clause 4.3.2.11.3):

.....

.....

.....

Appendix B: Test results. Proprietary Protocol 2.4 GHz.

INDEX

TEST CONDITIONS

POWER SUPPLY (V):

Vn:	14 Vdc
Type of power supply:	External DC Power supply.

TEMPERATURE (ºC):

Tn:	+15 to +35
Tmin:	0 (*)
Tmax:	+45 (*)

The subscript ‘n’ indicates normal test conditions.

The subscripts min and max indicates extreme test conditions (minimum and maximum respectively).

(*): Declared by applicant.

TEST FREQUENCIES FOR RADIATED TESTS:

Low Channel:	2401 MHz
High Channel:	2479 MHz

PRODUCT INFORMATION

The following information is provided by the supplier, in accordance with clause 5.4.1:

Information	Description
Modulation:	Other than FHSS
Adaptivity:	Non-adaptive
Maximum RF Output Power (e.i.r.p.):	0 dBm
Operation mode 1: Single Antenna Equipment:	Equipment with only one antenna.
- Operating Frequency Range:	2401 – 2479 MHz
- Nominal Channel Bandwidth:	1 MHz
Extreme Operating Conditions:	
- Temperature Range:	0 to +45 ºC
Type of Antenna:	Integral.
Antenna Gain:	0 dBi
Nominal Voltage:	
- Supply Voltage:	14 Vdc
- Type of Power Source:	AC/DC Adaptor
Type of Equipment:	Proprietary 2.4 GHz (nRF24L01)
Geo-location capability:	No

Test modes available:

- Continuous modulated carrier at 2401 MHz and 2479 MHz.
- Continuous reception at 2401 MHz and 2479 MHz.

TEST 4.3.2.9: Transmitter unwanted emissions in the spurious domain.

LIMITS:

The transmitter unwanted emissions in the spurious domain shall not exceed the values given in the next table:

In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and e.i.r.p. for emissions above 1 GHz.

Frequency range	Maximum power	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 862 MHz	-54 dBm	100 kHz
862 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12,75 GHz	-30 dBm	1 MHz

RESULTS:

RADIATED:

The level of spurious emissions was measured as their effective radiated power when radiated by cabinet and antenna.

Frequency range 30 MHz – 1 GHz

The spurious frequencies detected do not depend on either the operating channel or the modulation mode.

No radiated spurious frequencies detected at less than 6 dB below the limit.

Measurement uncertainty (dB): <± 3.81

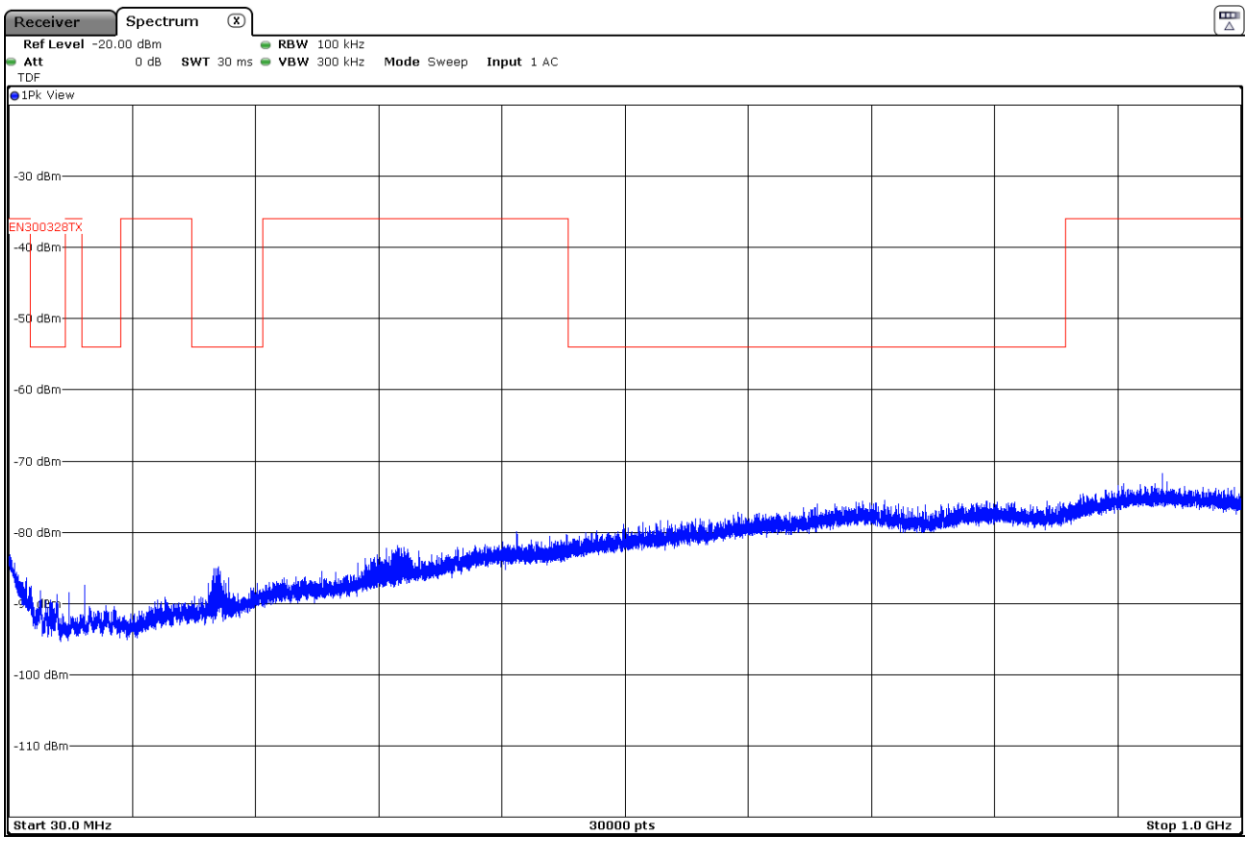
Frequency range 1 – 12.75 GHz

No radiated spurious frequencies detected at less than 6 dB below the limit for both the Low and High Channels for all modulations.

Measurement uncertainty (dB): <± 4.72

Verdict: PASS

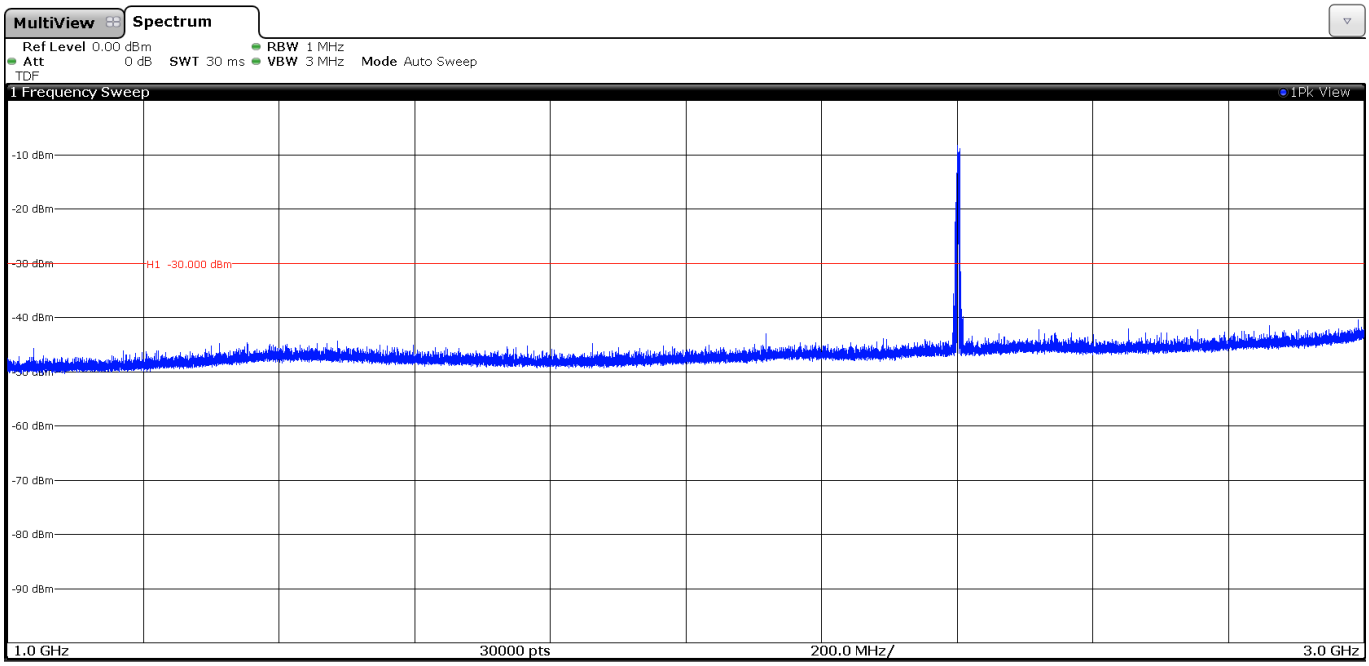
FREQUENCY RANGE 30 MHz - 1 GHz



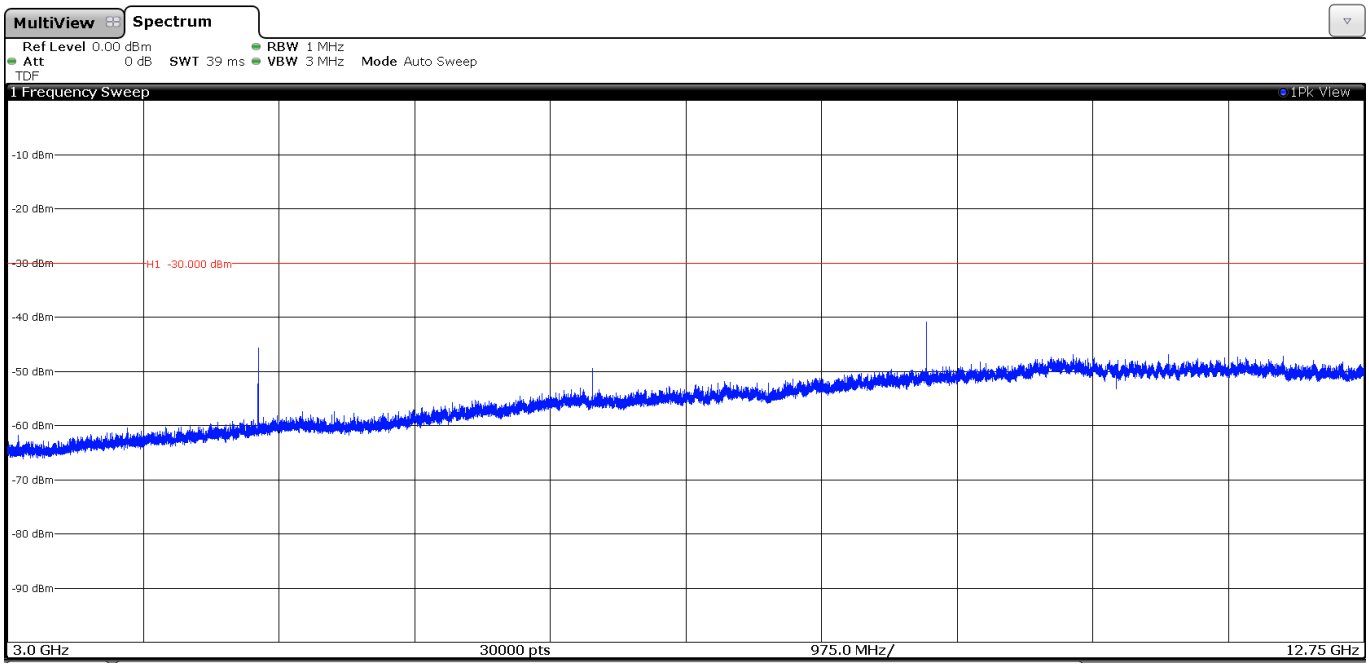
Note: This plot is valid for all channels.

FREQUENCY RANGE 1 – 12.75 GHz

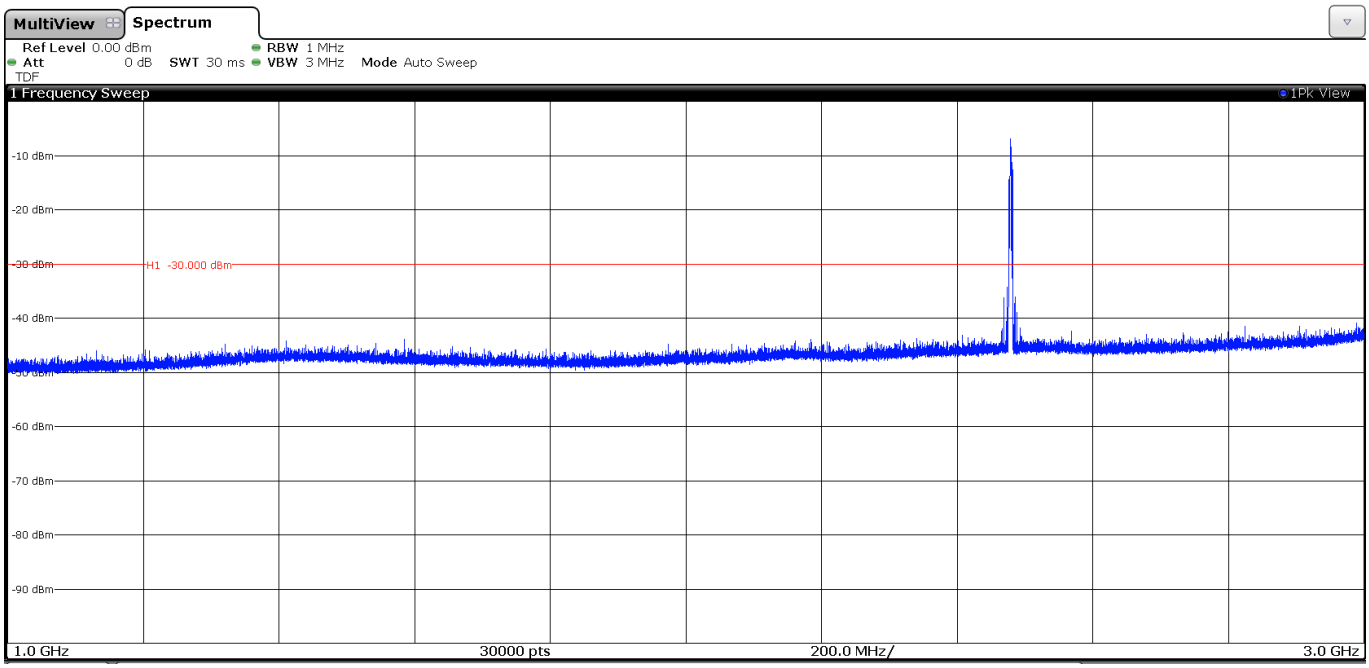
- Low Channel:



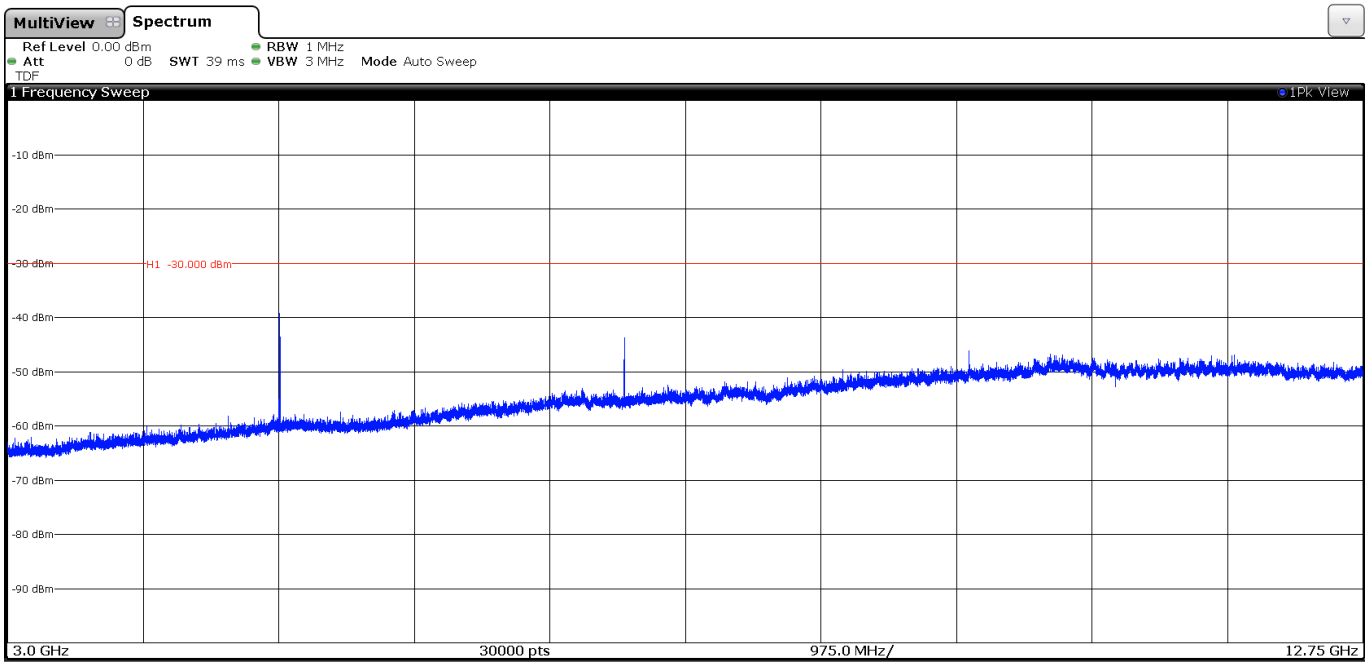
The peak shown in the plot above the limit is the carrier frequency.



- High channel:



The peak shown in the plot above the limit is the carrier frequency.



TEST 4.3.2.10: Receiver spurious emissions.

LIMITS:

In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and e.i.r.p. for emissions above 1 GHz.

Frequency Range	Maximum power	Measurement bandwidth
30 MHz - 1 GHz	-57 dBm	100 kHz
1 - 12.75 GHz	-47 dBm	1 MHz

RESULTS:

RADIATED:

The level of spurious emissions was measured as their effective radiated power when radiated by cabinet and antenna.

Frequency range 30 MHz – 1 GHz

The spurious frequencies detected do not depend on either the operating channel or the modulation mode.

No spurious frequencies detected at less than 6 dB below the limit.

Measurement uncertainty (dB): <± 3.81

Frequency range 1 – 12.75 GHz

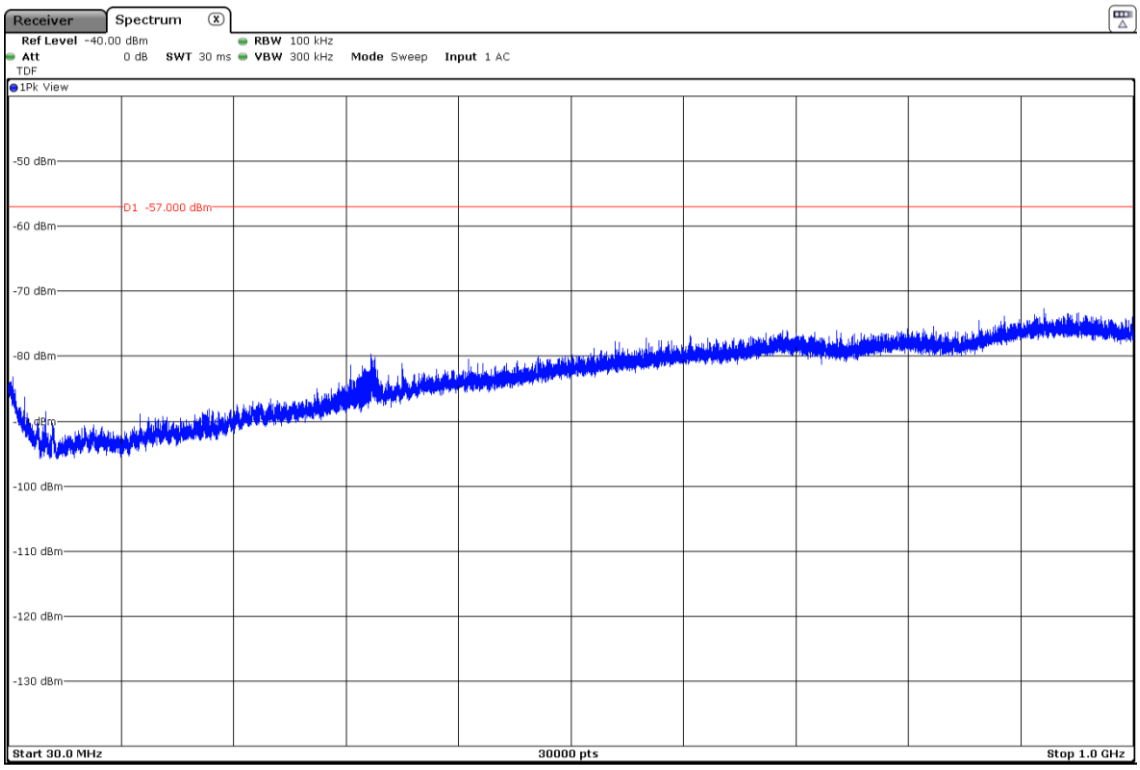
The spurious frequencies detected do not depend on either the operating channel or the modulation mode.

No spurious frequencies detected at less than 6 dB below the limit.

Measurement uncertainty (dB): <± 4.72

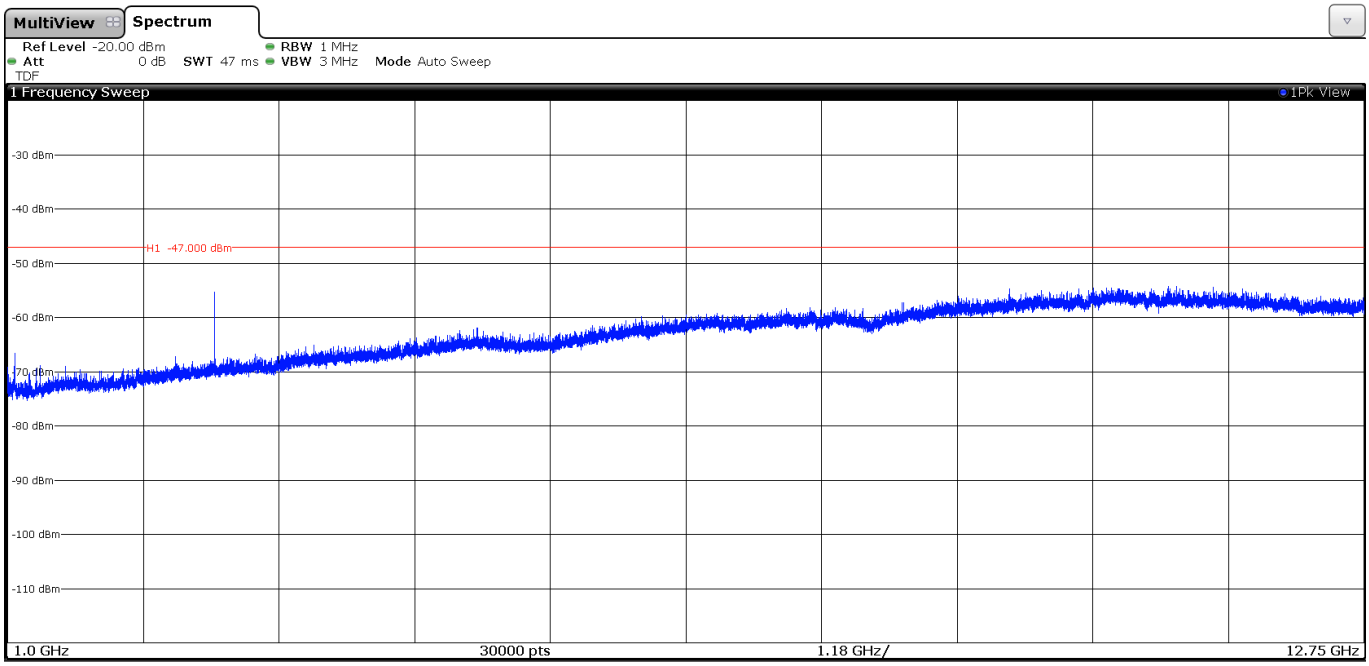
Verdict: PASS

FREQUENCY RANGE 30 MHz - 1 GHz



Note: This plot is valid for all channels.

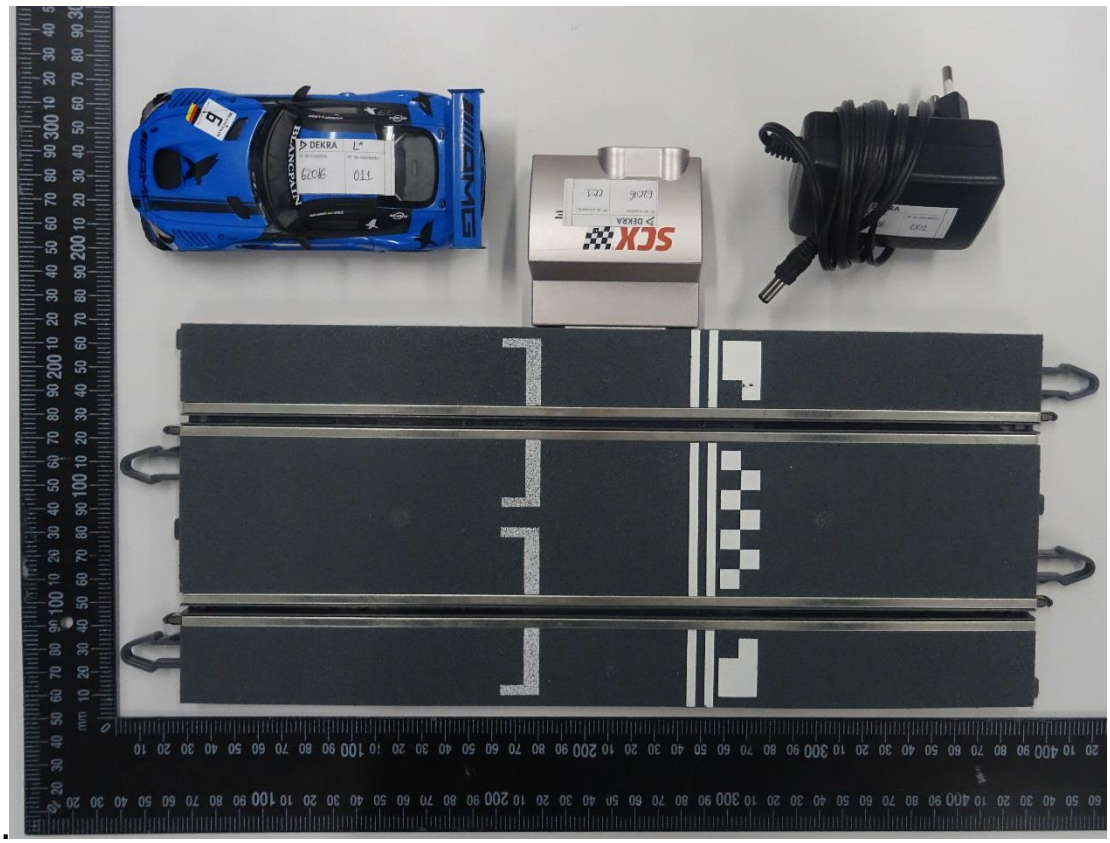
Frequency range 1 – 12.75 GHz



Note: This plot is valid for all channels.

Appendix C: Photographs.

EQUIPMENT FOR RADIATED MEASUREMENTS




MINERVA OIL
SCX