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

DEKRA

ENAC ENSAYOS Nº 51/LE147

Test report No:
NIE: 62016REM.001

Test report

Final draft ETSI EN 301 489-1 V2.2.2 (2019-09): ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility &
Draft ETSI EN 301 489-17 V3.2.0 (2017-03): ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU

(*) Identification of item tested	SCALEXTRIC ADVANCE SET – GT3
(*) Trademark	SCALEXTRIC
(*) Model and /or type reference tested	E10283S500
Other identification of the product	HW version: V2.0 (Car) and V1.4 (Controller) SW version: C-10.04 (car version) and M-10.14 (controller version)
(*) Features	Proprietary 2.4 GHz
Manufacturer	SCALE COMPETITION XTREME, S.L. C/ Camps I Fabres 3, 2º 2ª 08006, Barcelona, SPAIN
Test method requested, standard	Final draft ETSI EN 301 489-1 V2.2.2 (2019-09) & Draft ETSI EN 301 489-17 V3.2.0 (2017-03)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Rafael López EMC Consumer & RF Lab. Manager RAFAEL LÓPEZ MARTÍN 2020.02.10 17:34:02 +01'00'
Date of issue	2020-02-10
Report template No	FDT08_22 (*) "Data provided by the client"

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Competences and guarantees

DEKRA Testing and Certification 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.

DEKRA Testing and Certification is a testing laboratory competent to carry out the tests described in this report.

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

DEKRA Testing and Certification 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 at the time of performance of the test.

DEKRA Testing and Certification 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 internal document PODT000.

The total uncertainty of the measurement system for the measured conducted disturbance characteristics of EUT from 150 kHz to 30 MHz is I = ± 3,9 dB for quasi-peak measurements, I = ± 3,2 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 1000 MHz is I = ± 5 dB for quasi-peak measurements, I = ± 4,7 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 6000MHz is I = ± 4,8 dB for average and I = ± 4,2 dB for peaks measurements (k = 2).

The total uncertainty of the measurement system for the harmonic current measurement, is:
Current Harmonics: Intensity = ± 0,73%
Voltage Harmonics: Voltage = ± 0,58%
Confidence level: k=2.

The total uncertainty of the measurement system for the voltage fluctuations and flicker measurement is:
Pst Meter: I = ± 0,58%
Plt Meter: I = ± 0,58%
Idc = 0,58%
Idmax = 0,58%
Confidence level: k=2.

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 set of tracks, with two cars which you can manage them with a wireless controller. The cars are powered through the track at 14v, and the controllers are powered at 3v by batteries.

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

Usage of samples

Samples under test have been selected by: The client.

Sample S/01 (for radiated emission test) is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
62016/002	AC/DC charger	---	SRP1401500TE	2020-01-02
62016/007	Car	Mercedes AMG GT3	---	2020-01-02
62016/008	Remote control	---	---	2020-01-02
62016/014	Track	---	---	2020-01-03

Sample S/02 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
62016/002	AC/DC charger	---	SRP1401500TE	2020-01-02
62016/012	Remote control	---	---	2020-01-03
62016/013	Car	Mercedes AMG GT3	---	2020-01-03
62016/014	Track	---	---	2020-01-03

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: Car 14 V, Controller 3 V (two batteries AAA)						
Rated Power .....:	--						
Clock frequencies .....:	16 MHz						
Other parameters.....:	--						
Software version .....:	C-10.04 (car version) and M-10.14 (controller version)						
Hardware version.....:	V2.0 (Car) and V1.4 (Controller)						
Dimensions in cm (W x H x D)....:	--						
Mounting position.....:	☒ 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		
	--						

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)	2020-01-03
Date (finish)	2020-01-07

Document history

Report number	Date	Description
62016REM.001	2020-01-27	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. = 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

Remarks and comments

The tests have been performed by the technical personnel: Carlos Haro, Ismael Gamarro, Victoria Olmedo & Jose Antonio Santiago.

Testing verdicts

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

List of equipment used during the test

Control Number	Description	Model	Manufacturer	Next Calibration
2439	THREE-PHASE POWER SOURCE 5kVA	5001IX	CALIFORNIA INSTRUMENTS	2020-11-08
3394	HARMONICS AND FLICKER THREE-PHASE ANALYZER	PACS 3-75	CALIFORNIA INSTRUMENTS	2019-11-10
3395	THREE-PHASE PHYSICAL IMPEDANCE NETWORK	OMNI 3-18i	CALIFORNIA INSTRUMENTS	2019-11-07
3541	HYBRID BILOG ANTENNA 30MHz-6GHz	JB6	SUNOL SCIENCES CORPORATION	2021-10-10
3548	USB TEMPERATURE AND HUMIDITY SENSOR	HUMIDIPROBE	PICO TECHNOLOGY	2020-04-02
3598	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	2021-03-19
4432	THREE-PHASE COUPLING NETWORK 32A	CNI503B7	EM TEST	2021-02-27
4454	THREE-PHASE AC SWITCH	NSG 2200-3	TESEQ	2021-03-11
4523	EMI TEST RECEIVER 20Hz-26.5GHz	ESU26	ROHDE AND SCHWARZ	2020-02-21
4530	AVG POWER SENSOR 6 GHZ	NRP-Z91	ROHDE AND SCHWARZ	2020-06-07
4545	SIGNAL GENERATOR 9kHz-1.1GHz	SMC100A	ROHDE AND SCHWARZ	2020-02-13
4573	REGISTRADOR TEMPERATURA Y HUMEDAD RELATIVA	HWg-STE	HW GROUP	2020-04-05
4574	ELECTROSTATIC DISCHARGE SIMULATOR (ESD)	ONYX	HAEFELY	2020-07-05
4583	PUNTA DE PISTOLA ESD	ONYX	HAEFELY	Before the test
4584	PUNTA DE PISTOLA ESD	ONYX	HAEFELY	Before the test
4591	RF AMPLIFIER 125W 9KHz-400MHz	BBA100	ROHDE AND SCHWARZ	Before the test

Control Number	Description	Model	Manufacturer	Next Calibration
4628	ULTRA COMPACT SIMULATOR	UCS 500N5	EM TEST	2020-06-12
4629	THREE-PHASE COUPLING NETWORK 32A	CNI503A2	EM TEST	2021-03-04
4635	SONDA DE INYECCIÓN DE CORRIENTE, 10kHz – 400MHz	F-120-6A	FCC	Before the test
4679	THREE-PHASE ARTIFICIAL V-NETWORK 32A	PMM L3-32	NARDA	2020-04-30
4790	ATENUADOR 6 DB, 200W, DC A 3GHZ	50FH0-006-200	JFW	2021-02-21
5152	TRANSIENT LIMITER 10DB N CONNECTOR	VTSD 9561-F	SCHWARZBECK	2020-04-15
5641	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2021-07-31
6064	SEMIANECHOIC ABSORBER LINED CHAMBER	SAC-3	Frankonia	---
6121	PRE-AMPLIFIER G>40dB 10MHz-6GHz	BLNA 0160-01N	BONN ELEKTRONIK	Before the test
6129	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2020-04-03
6231	GENERADOR DE SEÑAL RF	SMB100A	ROHDE AND SCHWARZ	2021-11-04
6232	AVG POWER SENSOR 6 GHZ	NRP6A	ROHDE AND SCHWARZ	2020-10-23
6236	POWER AMPLIFIER 250W/110W/100W 80MHz-1GHz/0,69GHz-3,2GHz/2,5GHz-6GHz	BBA150-BC250D110+E100	ROHDE AND SCHWARZ	Before the test
6330	SHIELDED ROOM		FRANKONIA	---
6671	AVG POWER SENSOR 6 GHZ	NRP6A	ROHDE AND SCHWARZ	2020-05-30

Summary

Emission Test		
Requirement – Test case	**Verdict**	**Remark**
Radiated emission test (30 MHz – 1000 MHz)	Pass	--
Radiated emission test (1 GHz – 6 GHz)	Pass	--
Conducted emission test (150 kHz to 30 MHz)	Pass	--
Discontinuous disturbance (clicks) on AC power leads	N/A	See 1
Harmonic current emissions	Pass	--
Voltage changes, voltage fluctuations and flicker	Pass	--
Supplementary information and remarks: 1) The test is not applicable according to the Standard.		

Immunity test		
Requirement – Test case	**Verdict**	**Remark**
Electrostatic discharge	Pass	--
Radio-frequency electromagnetic fields	Pass	--
Fast transients	Pass	--
Surges	Pass	--
Injected currents	Pass	--
Power frequency magnetic fields	N/A	See 1
Transients and surges in the vehicular environment	N/A	See 1
Voltage dips and short interruptions	Pass	--
Supplementary information and remarks: 1) The test is not applicable according to the Standard.		

Appendix A: Test results

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: Stand Alone Basis. Circuit power supply: 230Vac; Remote control power supply: 3Vdc (Internal batteries)
OM#02	EUT ON. Proprietary 2.4GHz communication established between moving car and remote control. Circuit power supply: 230Vac; Remote control power supply: 3Vdc (Internal batteries)
OM#03	EUT ON. Proprietary 2.4GHz communication established between stationary car and remote control. Circuit power supply: 230Vac; Remote control power supply: 3Vdc (Internal batteries)

FAILS CRITERIA FOR IMMUNITY TEST

According to Final draft ETSI EN 301 489-1 V2.2.2 (2019-09):

6.1 Performance criteria for continuous phenomena

During the test, the equipment shall:

- continue to operate as intended;
- not unintentionally transmit;
- not unintentionally change its operating state;
- not unintentionally change critical stored data.

6.2 Performance criteria for transient phenomena

For all ports and transient phenomena with the exception described below, the following applies:

- The application of the transient phenomena shall not result in a change of the mode of operation (e.g. unintended transmission) or the loss of critical stored data.
- After application of the transient phenomena, the equipment shall operate as intended.

For surges applied to symmetrically operated wired network ports intended to be connected directly to outdoor lines the following criteria applies:

- For products with only one symmetrical port intended for connection to outdoor lines, loss of function is allowed, provided the function is self-recoverable, or can be otherwise restored. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.
- For products with more than one symmetrical port intended for connection to outdoor lines, loss of function on the port under test is allowed, provided the function is self-recoverable. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

According to Draft ETSI EN 301 489-17 V3.2.0 (2017-03):

Criteria	During test	After test
A	Shall operate as intended (see note 1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 3). Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function (one or more). May show degradation of performance (see note 2). Shall be no unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3). Shall be no loss of stored data or user programmable functions.
C	May be loss of function (one or more).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3).

NOTE 1: Operate as intended during the test allows a level of degradation not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.
NOTE 2: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.
NOTE 3: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

MONITORING FOR IMMUNITY TEST

For every operation mode, the monitoring performed over the samples under test is shown in the following table:

OPERATION MODE	CONTINUOUS PHENOMENA MONITORING	TRANSIENT PHENOMENA MONITORING
OM#01	N/A	N/A
OM#02	By means of a video camera, it is monitored that the car does not change its normal operating mode (vehicle circling on the track).	By means of a video camera, it is monitored that the car does not change its normal operating mode (vehicle circling on the track).
OM#03	By means of a video camera, it is monitored that the car does not change its normal operating mode (vehicle stopped).	By means of a video camera, it is monitored that the car does not changue its normal operating mode (vehicle stopped).

CONDUCTED EMISSION. HARMONIC CURRENT MEASUREMENT

LIMITS:	Product Standard:	Final draft ETSI EN 301 489-1 V2.2.2 (2019-09) & Draft ETSI EN 301 489-17 V3.2.0 (2017-03)
	Test Standard:	EN 61000-3-2 (2014)

Class A:

ODDS HARMONICS		EVENS HARMONICS	
HARMONIC ORDER	**MAXIMUM CURRENT (A)**	**HARMONIC ORDER**	**MAXIMUM CURRENT (A)**
2	1.62	3	3.45
4	0.64	5	1.71
6	0.45	7	1.15
$8 \leq n \leq 40$	0.34*8/n	9	0.60
		11	0.49
		13	0.31
		$15 \leq n \leq 39$	0.22*15/n

TESTED SAMPLES:	S/02
OPERATION MODES TESTED:	OM#02
TEST RESULTS:	CCmmnnAF: CC, Conduction condition; mm: Sample nº; nn: Operation mode; AF: Test code, Fluctuating harmonics.

CCmmnnAF	DESCRIPTION	RESULT
CC0202AF	Fluctuating harmonic measurement.	P

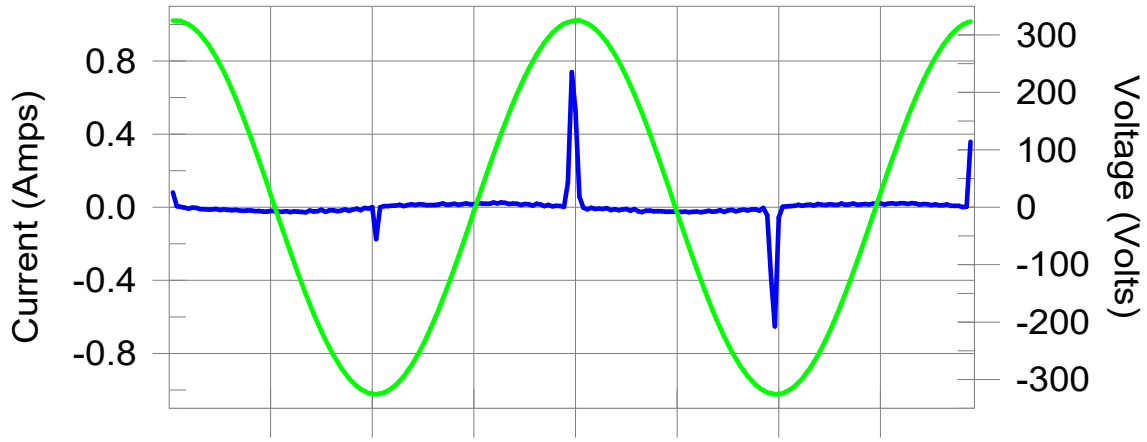
Harmonics: CC0202AF

Harmonics – Class-A per Ed. Ed. 5.0

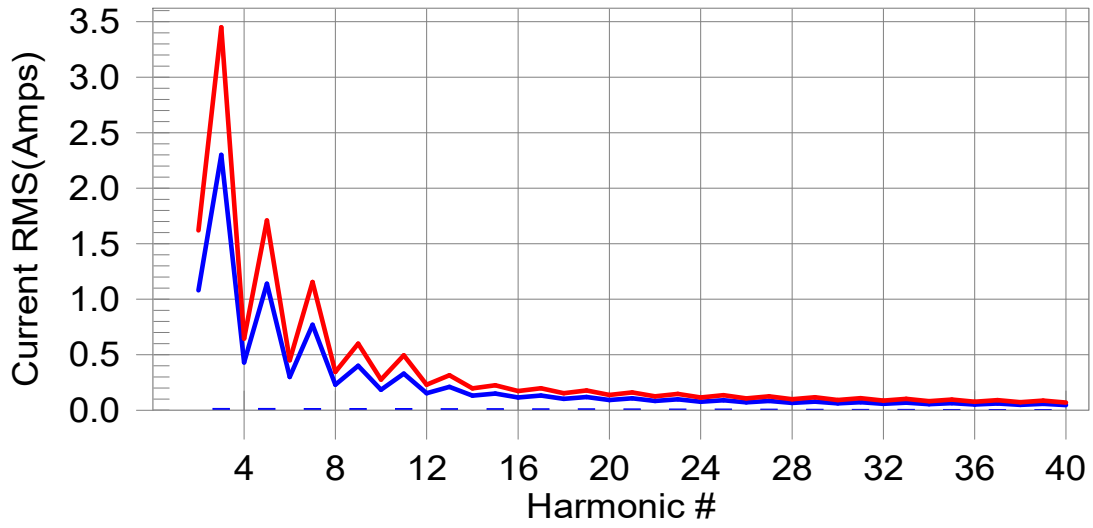
EUT: SCALEXTRIC ADVANCE SET – GT3 **Tested by: Dekra TC**
Test category: Class-A per Ed. 5.0 **Test Margin: 100**
Test date: 1/7/2020 **Start time: 6:55:07 PM** **End time: 7:00:18 PM**
Test duration (min): 5 **Data file name: H-000181.cts_data**
Comment: S/02 OM#02
Customer: SCALEXTRIC

Test Result: Pass **Source qualification: Normal**

Current & voltage waveforms



Harmonics and Class A limit line **European Limits**



Test result: Pass **Worst harmonics H27-8.2% of 150% limit, H27-11.6% of 100% limit**

Harmonics: CC0202AF (cont.)

Current Test Result Summary

EUT: SCALEXTRIC ADVANCE SET – GT3 **Tested by: Dekra TC**
Test category: Class-A per Ed. 5.0 **Test Margin: 100**
Test date: 1/7/2020 **Start time: 6:55:07 PM** **End time: 7:00:18 PM**
Test duration (min): 5 **Data file name: H-000181.cts_data**
Comment: S/02 OM/02
Customer: SCALEXTRIC

Test Result: Pass **Source qualification: Normal**
THC(A): 0.052 **I-THD(%): 218.4** **POHC(A): 0.028** **POHC Limit(A): 0.251**

Highest parameter values during test:

V_RMS (Volts):	230.17	Frequency(Hz):	49.99
I_Peak (Amps):	0.852	I_RMS (Amps):	0.076
I_Fund (Amps):	0.024	Crest Factor:	15.266
Power (Watts):	3.9	Power Factor:	0.294

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	1.080	N/A	0.002	1.620	N/A	Pass
3	0.016	2.300	0.7	0.018	3.450	0.5	Pass
4	0.001	0.430	N/A	0.002	0.645	N/A	Pass
5	0.016	1.140	1.4	0.016	1.710	0.9	Pass
6	0.001	0.300	N/A	0.002	0.450	N/A	Pass
7	0.015	0.770	2.0	0.016	1.155	1.4	Pass
8	0.001	0.230	N/A	0.002	0.345	N/A	Pass
9	0.015	0.400	3.8	0.016	0.600	2.6	Pass
10	0.001	0.184	N/A	0.002	0.276	N/A	Pass
11	0.015	0.330	4.4	0.015	0.495	3.0	Pass
12	0.001	0.153	N/A	0.001	0.230	N/A	Pass
13	0.014	0.210	6.8	0.015	0.315	4.6	Pass
14	0.001	0.131	N/A	0.001	0.197	N/A	Pass
15	0.014	0.150	9.1	0.014	0.225	6.2	Pass
16	0.001	0.115	N/A	0.001	0.173	N/A	Pass
17	0.013	0.132	9.9	0.013	0.198	6.8	Pass
18	0.001	0.102	N/A	0.001	0.153	N/A	Pass
19	0.012	0.118	10.5	0.013	0.178	7.2	Pass
20	0.001	0.092	N/A	0.001	0.138	N/A	Pass
21	0.012	0.107	11.1	0.012	0.161	7.6	Pass
22	0.001	0.084	N/A	0.001	0.125	N/A	Pass
23	0.011	0.098	11.4	0.011	0.147	7.8	Pass
24	0.000	0.077	N/A	0.001	0.115	N/A	Pass
25	0.010	0.090	11.6	0.011	0.135	8.0	Pass
26	0.000	0.071	N/A	0.001	0.107	N/A	Pass
27	0.010	0.083	11.6	0.010	0.125	8.2	Pass
28	0.000	0.066	N/A	0.001	0.099	N/A	Pass
29	0.009	0.078	11.5	0.009	0.116	8.1	Pass
30	0.000	0.061	N/A	0.001	0.092	N/A	Pass
31	0.008	0.073	11.2	0.009	0.109	7.9	Pass
32	0.000	0.058	N/A	0.001	0.086	N/A	Pass
33	0.007	0.068	10.9	0.008	0.102	7.7	Pass
34	0.000	0.054	N/A	0.001	0.081	N/A	Pass
35	0.007	0.064	10.4	0.007	0.096	7.4	Pass
36	0.000	0.051	N/A	0.001	0.077	N/A	Pass
37	0.006	0.061	9.8	0.007	0.091	7.2	Pass
38	0.000	0.048	N/A	0.001	0.073	N/A	Pass
39	0.005	0.058	9.1	0.006	0.087	6.8	Pass
40	0.000	0.046	N/A	0.001	0.069	N/A	Pass

Harmonics: CC0202AF (cont.)

Voltage Source Verification Data

EUT: SCALEXTRIC ADVANCE SET – GT3 **Tested by: Dekra TC**
Test category: Class-A per Ed. 5.0 **Test Margin: 100**
Test date: 1/7/2020 **Start time: 6:55:07 PM** **End time: 7:00:18 PM**
Test duration (min): 5 **Data file name: H-000181.cts_data**
Comment: S/02 OM/02
Customer: SCALEXTRIC

Test Result: Pass **Source qualification: Normal**

Highest parameter values during test:

Voltage (Vrms):	230.17	Frequency(Hz):	49.99
I_Peak (Amps):	0.852	I_RMS (Amps):	0.076
I_Fund (Amps):	0.024	Crest Factor:	15.266
Power (Watts):	3.9	Power Factor:	0.294

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.163	0.460	35.38	OK
3	0.583	2.071	28.16	OK
4	0.068	0.460	14.79	OK
5	0.059	0.921	6.38	OK
6	0.040	0.460	8.78	OK
7	0.051	0.690	7.44	OK
8	0.032	0.460	7.03	OK
9	0.050	0.460	10.84	OK
10	0.029	0.460	6.32	OK
11	0.039	0.230	17.13	OK
12	0.018	0.230	7.76	OK
13	0.027	0.230	11.84	OK
14	0.016	0.230	7.04	OK
15	0.023	0.230	9.93	OK
16	0.015	0.230	6.47	OK
17	0.022	0.230	9.71	OK
18	0.012	0.230	5.22	OK
19	0.023	0.230	9.90	OK
20	0.013	0.230	5.67	OK
21	0.022	0.230	9.75	OK
22	0.013	0.230	5.66	OK
23	0.020	0.230	8.61	OK
24	0.009	0.230	4.07	OK
25	0.022	0.230	9.76	OK
26	0.011	0.230	4.89	OK
27	0.022	0.230	9.40	OK
28	0.009	0.230	4.00	OK
29	0.017	0.230	7.54	OK
30	0.009	0.230	3.96	OK
31	0.016	0.230	7.08	OK
32	0.010	0.230	4.40	OK
33	0.019	0.230	8.24	OK
34	0.008	0.230	3.51	OK
35	0.016	0.230	7.15	OK
36	0.007	0.230	2.93	OK
37	0.015	0.230	6.39	OK
38	0.006	0.230	2.64	OK
39	0.013	0.230	5.48	OK
40	0.008	0.230	3.55	OK

CONDUCTED EMISSION. VOLTAGE FLUCTUATIONS AND FLICKER MEASUREMENT

LIMITS:	Product standard:	Final draft ETSI EN 301 489-1 V2.2.2 (2019-09) & Draft ETSI EN 301 489-17 V3.2.0 (2017-03)
	Test standard:	EN 61000-3-3 (2013)

Pst < 1	Short duration flicker indicator
Plt < 0,65	Long duration flicker indicator
Dc ≤ 3,3%	Relative steady-state voltage variation
Dmax ≤ 4%	Maximum relative voltage variation
d(t) ≤ 3,3%	For a duration of 500ms

TESTED SAMPLES:	S/02
OPERATION MODES TESTED:	OM#02
TEST RESULTS:	CCmmnnFK: CC, Conducted Condition; mm: Sample number; nn: Operation mode; FK: Flicker test code.

CCmmnnFK	DESCRIPTION	RESULT
CC0202FK	Flicker measurement.	P

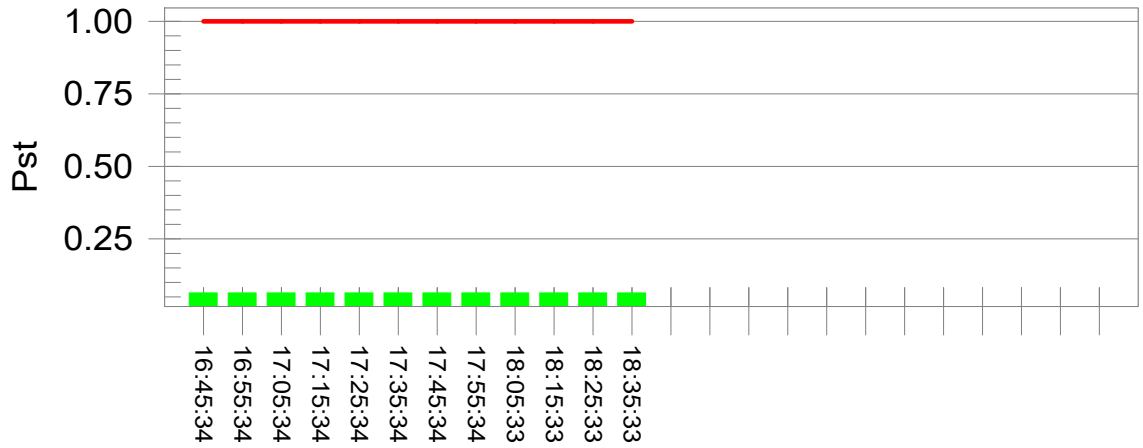
Flickers: CC0202FK

Flicker Test Summary per EN/IEC61000-3-3 Ed. 3.0 (2013)

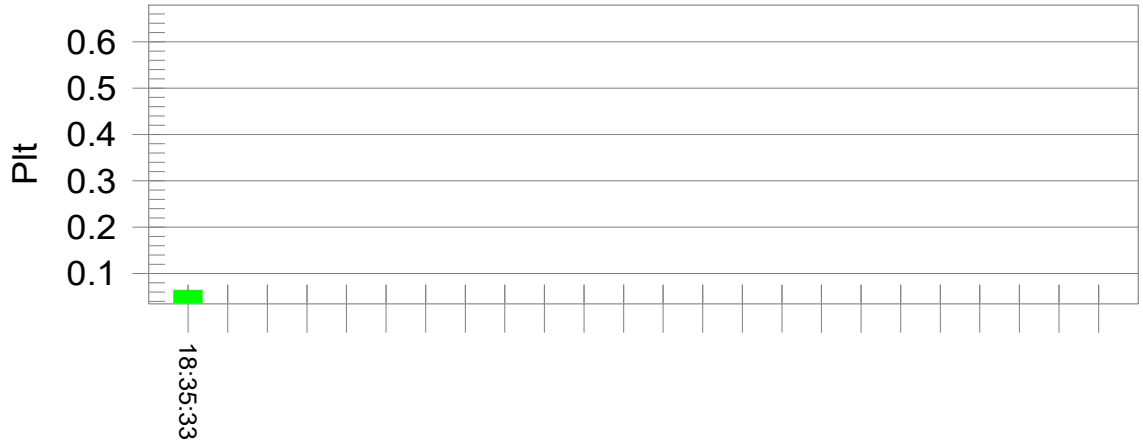
EUT: SCALEXTRIC ADVANCE SET – GT3 **Tested by: Dekra TC**
Test category: All parameters **Test Margin: 100**
Test date: 1/7/2020 **Start time: 4:35:13 PM** **End time: 6:36:46 PM**
Test duration (min): 120 **Data file name: F-000179.cts_data**
Comment: S/02 OM#02
Customer: SCALEXTRIC

Test Result: Pass **Status: Test Completed**

Pst_i and limit line **European Limits**



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt):	**230.06**			
T-max (mS):	**0**	**Test limit (mS):**	**500.0**	**Pass**
Highest dc (%):	**0.00**	**Test limit (%):**	**3.30**	**Pass**
Highest dmax (%):	**0.00**	**Test limit (%):**	**4.00**	**Pass**
Highest Pst (10 min. period):	**0.064**	**Test limit:**	**1.000**	**Pass**
Highest Plt (2 hr. period):	**0.064**	**Test limit:**	**0.650**	**Pass**

CONTINUOUS CONDUCTED EMISSION ON POWER LEADS

LIMITS:	Product standard:	Final draft ETSI EN 301 489-1 V2.2.2 (2019-09) & Draft ETSI EN 301 489-17 V3.2.0 (2017-03)
	Test standard:	EN 55032 (2015) / AC (2016-07)

Limits for EN 55032 (2015) / AC (2016-07) Class B: Mains ports

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

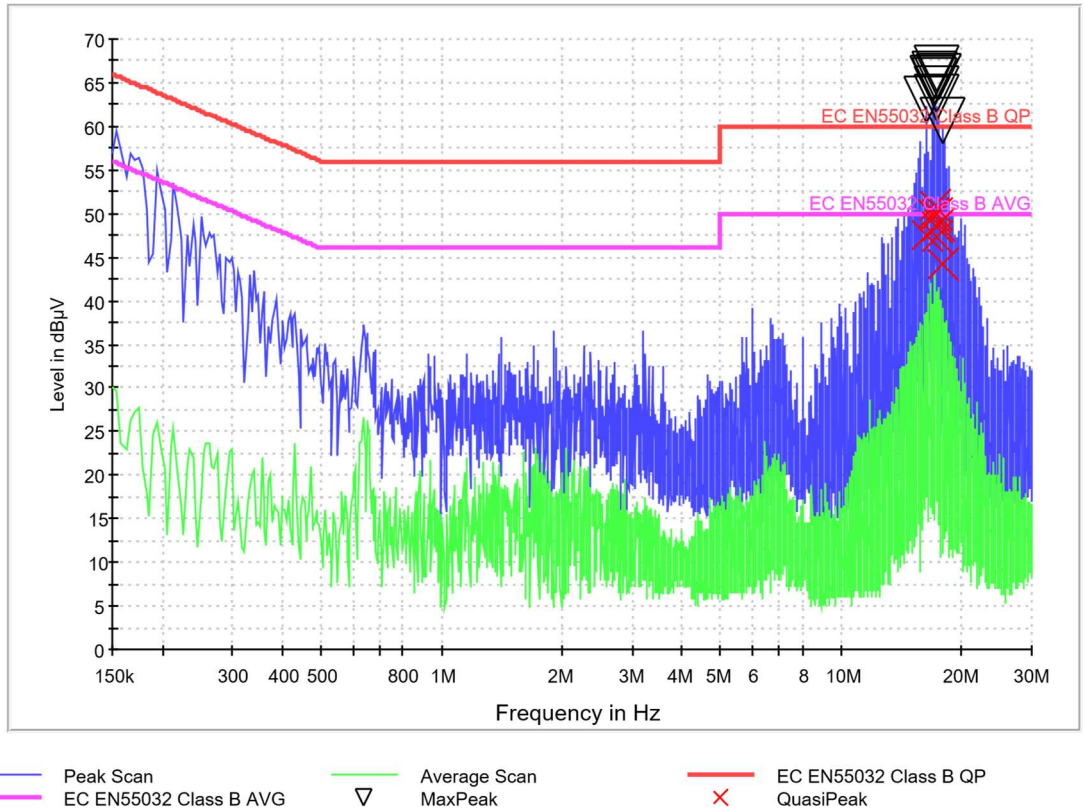
TESTED SAMPLES:	S/02
TESTED OPERATION MODES:	OM#02 & OM#03
TEST RESULTS:	CCmmnnhh: CC, Conducted Condition; mm: Sample number; nn: Operation mode; hh: wire

CCmmnnhh	DESCRIPTION	RESULT
CC0202N	Range: 150kHz – 30MHz. Neutral wire noise	P
CC0202L1	Range: 150kHz – 30MHz. Phase wire noise	P
CC0203N	Range: 150kHz – 30MHz. Neutral wire noise	P
CC0203L1	Range: 150kHz – 30MHz. Phase wire noise	P

Conducted Emission: CC0202N

Project:	62016REM.001
Company:	SCALE COMPETITION XTREME, S.L.
Sample:	S/02
Operation mode:	OM#02
Description:	EUT ON. 2.4GHz communication established between moving car and remote control. Circuit power supply: 230Vac; Remote control power supply: 3Vdc (Internal batteries). Neutral wire noise

EC EN 55032 Class B



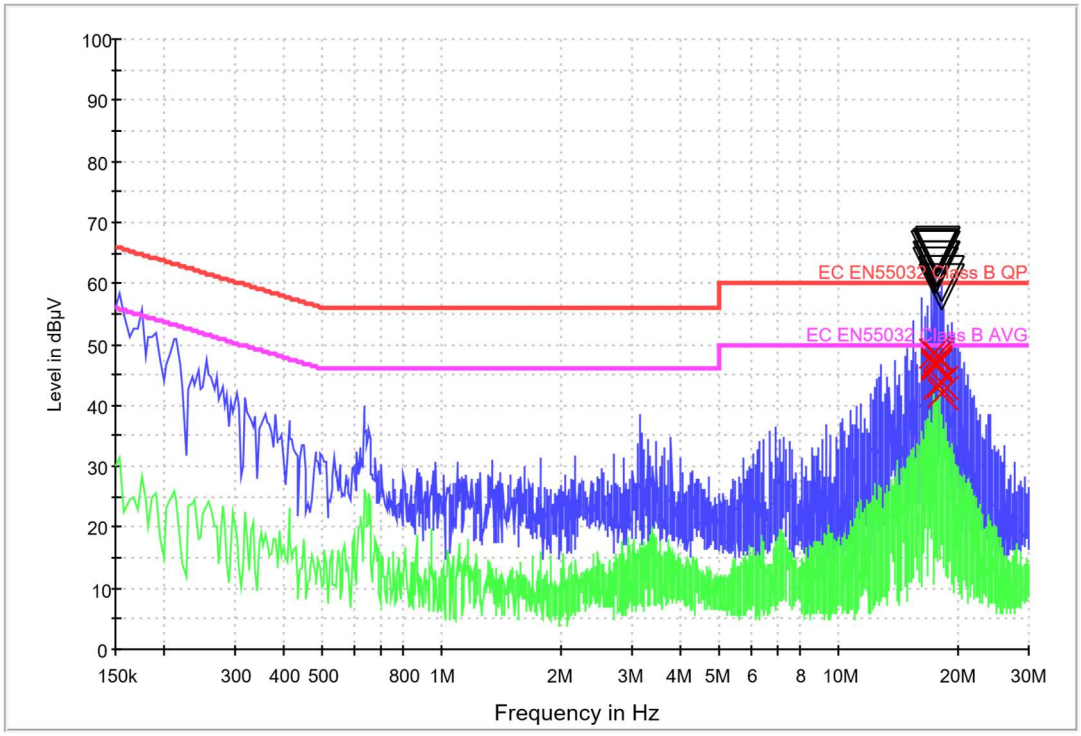
Result Table

Frequency (MHz)	MaxPeak (dBµV)	QuasiPeak (dBµV)
16.406000	63.1	47.6
16.974000	65.6	49.9
17.034000	65.3	51.0
17.082000	65.9	49.7
17.254000	66.7	49.9
17.338000	63.4	47.2
17.414000	64.3	48.5
17.486000	65.7	48.7
18.050000	60.6	44.2

Conducted Emission: CC0202L1

Project:	62016REM.001
Company:	SCALE COMPETITION XTREME, S.L.
Sample:	S/02
Operation mode:	OM#02
Description:	EUT ON. 2.4GHz communication established between moving car and remote control. Circuit power supply: 230Vac; Remote control power supply: 3Vdc (Internal batteries). Phase wire noise

EC EN 55032 Class B



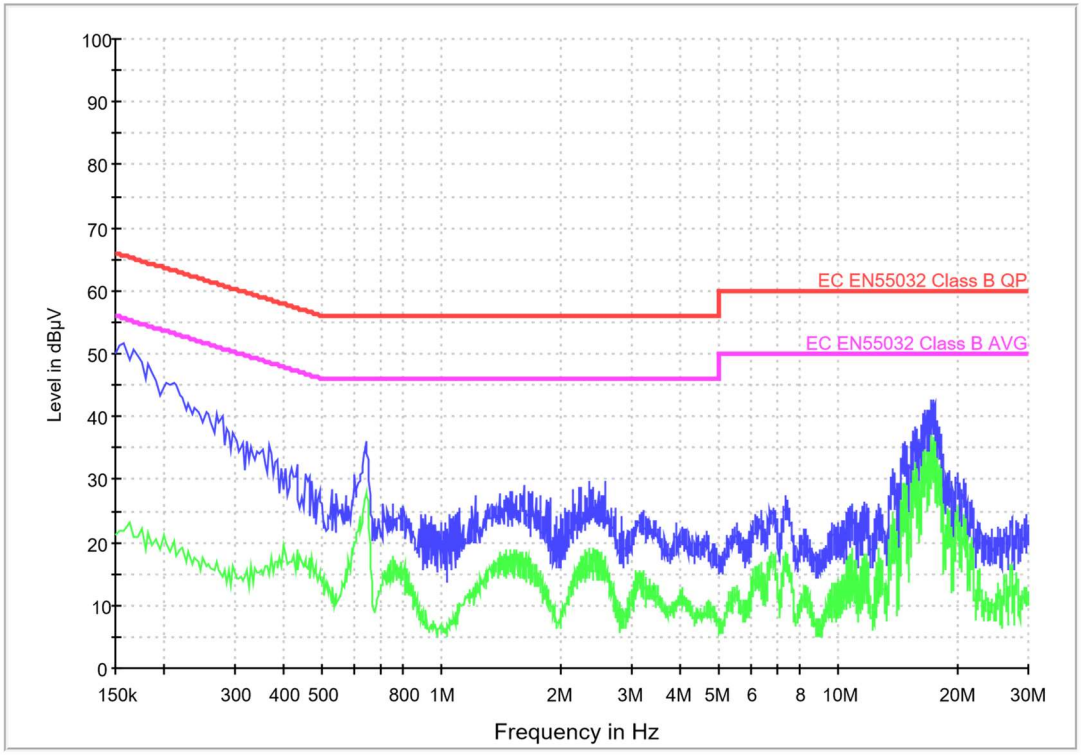
Result Table

Frequency (MHz)	MaxPeak (dBµV)	QuasiPeak (dBµV)
17.306000	65.0	48.6
17.378000	63.1	46.5
17.430000	62.2	46.8
17.554000	65.2	47.1
17.590000	64.8	48.2
17.654000	65.4	48.0
18.074000	60.6	42.1
18.098000	59.6	43.5
17.654000	63.0	43.2

Conducted Emission: CC0203N

Project:	62016REM.001
Company:	SCALE COMPETITION XTREME, S.L.
Sample:	S/02
Operation mode:	OM#03
Description:	EUT ON. 2.4GHz communication established between stationary car and remote control. Circuit power supply: 230Vac; Remote control power supply: 3Vdc (Internal batteries). Neutral wire noise

EC EN 55032 Class B



Peak Scan Average Scan EC EN55032 Class B QP EC EN55032 Class B AVG

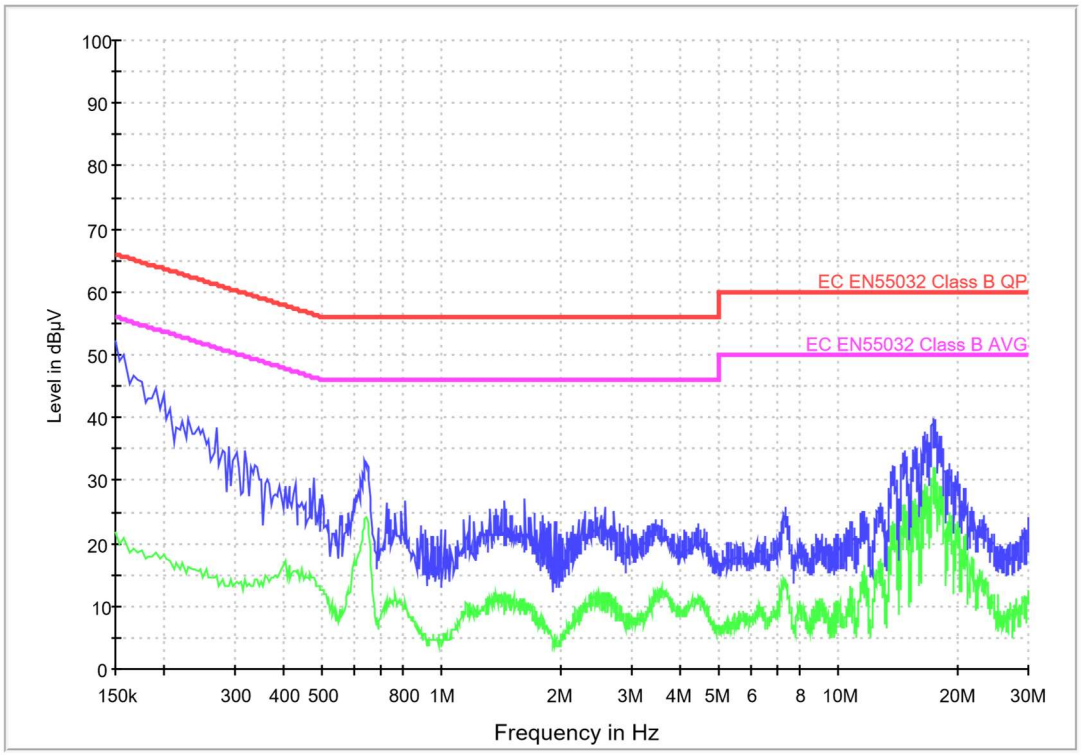
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.158000	51.8	21.8
0.270000	40.5	16.8
0.642000	36.0	27.8
1.210000	27.4	13.4
1.602000	29.2	14.4
2.570000	29.9	16.5
6.094000	23.5	15.8
7.342000	27.3	17.5
17.174000	42.8	36.6
17.670000	39.5	32.0

Conducted Emission: CC0203L1

Project:	62016REM.001
Company:	SCALE COMPETITION XTREME, S.L.
Sample:	S/02
Operation mode:	OM#03
Description:	EUT ON. 2.4GHz communication established between stationary car and remote control. Circuit power supply: 230Vac; Remote control power supply: 3Vdc (Internal batteries). Phase wire noise

EC EN 55032 Class B



Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.150000	52.5	21.7
0.270000	38.3	15.0
0.638000	33.3	23.7
0.806000	26.9	10.7
1.618000	27.0	10.7
2.426000	25.8	10.3
4.414000	23.0	10.8
7.298000	25.7	14.4
17.362000	39.9	32.0
17.674000	37.3	27.3

RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE

LIMITS:	Product standard:	Final draft ETSI EN 301 489-1 V2.2.2 (2019-09) & Draft ETSI EN 301 489-17 V3.2.0 (2017-03)
	Test standard:	EN 55032 (2015) / AC (2016-07)

Limits for EN 55032 (2015) / AC (2016-07) Class B:

Frequency range (MHz)	Measured field limit at 3 m (dBμV/m) Quasi-Peak measurement
30 to 230	40
230 to 1000	47

FREQUENCY RANGE (MHz)	Measured field limit at 3 m (dBμV/m)	
	AVERAGE	PEAK
1000 to 3000	50	70
3000 to 6000	54	74

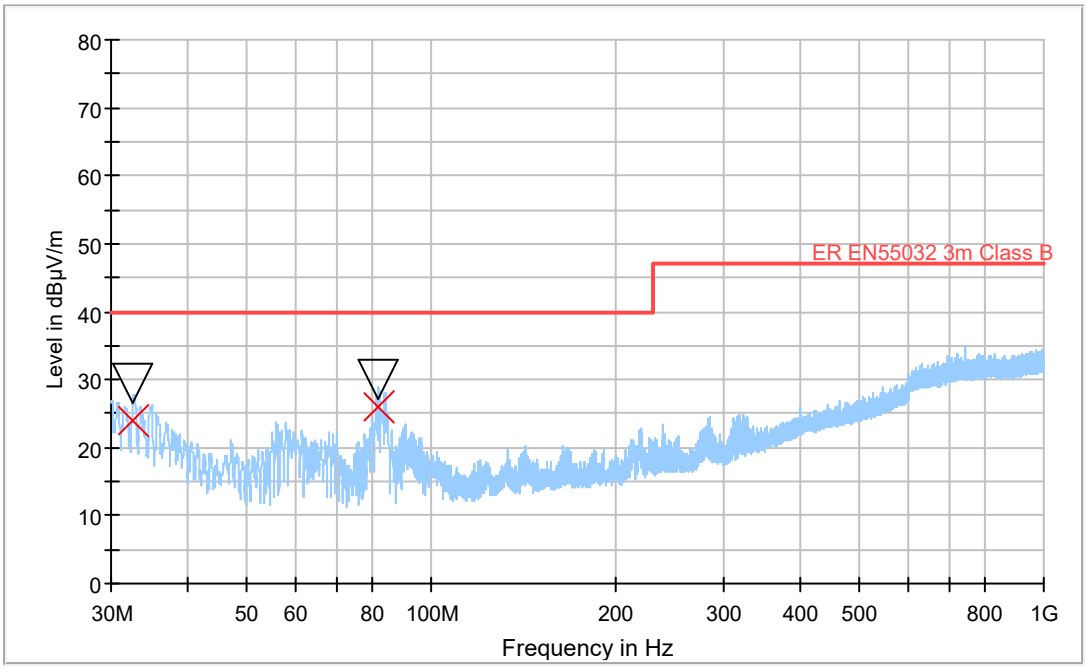
TESTED SAMPLES:	S/01
TESTED OPERATION MODES:	OM#01
TEST RESULTS:	CRmmnn: CR, Radiated condition; mm: Sample number; nn: Operation mode; RR: Measured range.

CRmmnnRR	DESCRIPTION	RESULT
CR0101LR	Range: 30 MHz - 1000 MHz.	P
CR0101HR	Range: 1000 MHz - 6000 MHz.	P

Radiated Emission: CR0101LR

Project:	62016REM.001
Company:	SCALE COMPETITION XTREME, S.L.
Sample:	S/01
Operation mode:	OM#01
Description:	EUT ON: Stand Alone Basis. Circuit power supply: 230Vac; Remote control power supply: 3Vdc (Internal batteries)

ER EN 55032 Class B



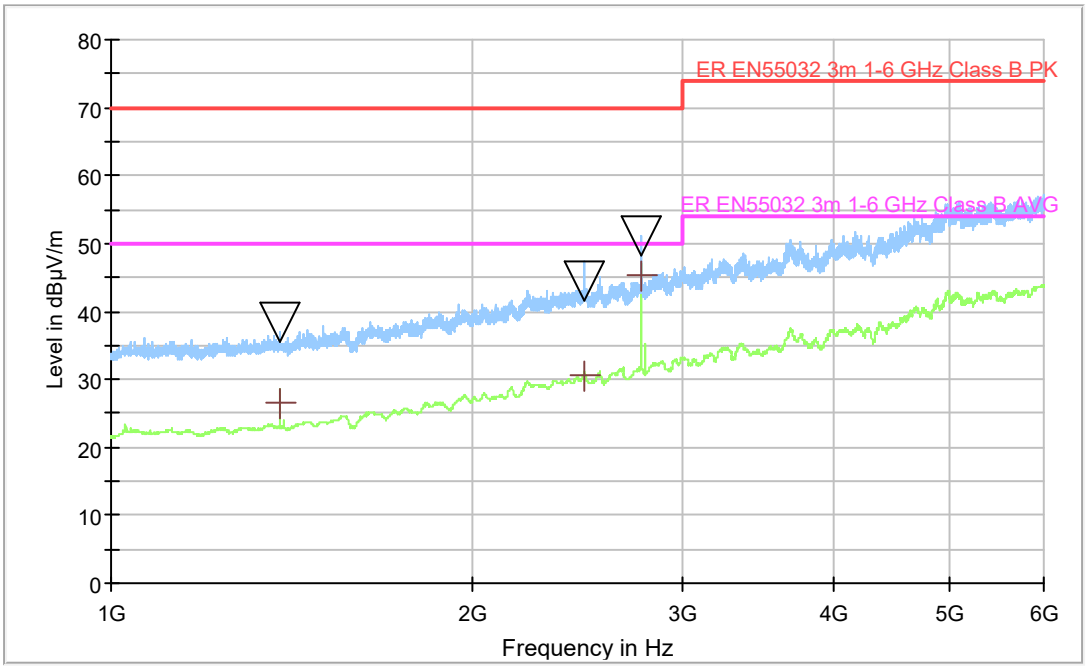
Maximizations

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
32.644000	23.86	29.48	40.00	16.14	120.0	V	-81.0
82.031000	25.87	29.97	40.00	14.13	138.0	V	-134.0

Radiated Emission: CR0101HR

Project:	62016REM.001
Company:	SCALE COMPETITION XTREME, S.L.
Sample:	S/01
Operation mode:	OM#01
Description:	EUT ON: Stand Alone Basis. Circuit power supply: 230Vac; Remote control power supply: 3Vdc (Internal batteries)

ER EN 55032 Class B (1-6GHz)



Maximizations

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Azimuth (deg)
1383.270000	38.39	26.52	50.00	23.48	H	11.0
2483.770000	44.55	30.55	50.00	19.45	H	-147.0
2765.740000	51.03	45.47	50.00	4.53	H	19.0

RADIATED RF ELECTROMAGNETIC FIELD IMMUNITY TEST

LIMITS:	Product standard:	Final draft ETSI EN 301 489-1 V2.2.2 (2019-09) & Draft ETSI EN 301 489-17 V3.2.0 (2017-03)
	Test standard:	EN 61000-4-3 (2006) / A1 (2008) / A2 (2010)

RANGE	FREQUENCY	MODULATION	STEP	LEVEL
A	80-1000MHz	AM 1 kHz Prof: 80%	LOG 1%	3 V/m
B	1000-6000MHz	AM 1 kHz Prof: 80%	LOG 1%	3 V/m

TESTED SAMPLES:	S/02
TESTED OPERATION MODES:	OM#02 & OM#03
FAIL CRITERIA AND MONITORING:	A
ZONES/COUPLING CABLES (CPL):	

CPL	DESCRIPTION
1	EUT frontal
2	EUT rear side
3	EUT left side
4	EUT right side

TEST RESULTS :

CPL	S/	OM#	RANGE	POL	COMMENTS	RESULT
1 2 3 4	02	02	A	H, V	Ok, no fails detected.	P
1 2 3 4	02	02	B	H, V	Ok, no fails detected.	P
1 2 3 4	02	03	A	H, V	Ok, no fails detected.	P
1 2 3 4	02	03	B	H, V	Ok, no fails detected.	P

IMMUNITY TO CONDUCTED DISTURBANCES, INDUCED BY RADIOFREQUENCY FIELDS

LIMITS:	Product standard:	Final draft ETSI EN 301 489-1 V2.2.2 (2019-09) & Draft ETSI EN 301 489-17 V3.2.0 (2017-03)
	Test standard:	EN 61000-4-6 (2014)

RANGE	FREQUENCY	MODULATION	STEP	LEVEL
A	150 kHz - 80 MHz	AM 1 kHz Prof: 80%	1%	3 Vrms

TESTED SAMPLES:	S/02
TESTED OPERATION MODES:	OM#02 & OM#03
FAIL CRITERIA AND MONITORING:	A
ZONES/COUPLING CABLES (CPL):	

CPL	DESCRIPTION
1	AC input power supply

TEST RESULTS:

CPL	RANGE	S/	OM#	COMMENTS	RESULT
1	A	02	02	Ok, no fails detected	P
1	A	02	03	Ok, no fails detected	P

ELECTRICAL FAST TRANSIENT / BURST IMMUNITY TEST

LIMITS:	Product standard:	Final draft ETSI EN 301 489-1 V2.2.2 (2019-09) & Draft ETSI EN 301 489-17 V3.2.0 (2017-03)
	Test standard:	EN 61000-4-4 (2012)

TYPE	APPLICATION	LEVEL(kV)	REPETITION RATE(kHz)
1	AC Power Supply Line	±1kV	5kHz

TESTED SAMPLES:	S/02
TESTED OPERATION MODES:	OM#02 & OM#03
FAIL CRITERIA AND MONITORING:	B
ZONES/COUPLING CABLES (CPL):	

CPL	DESCRIPTION	TYPE
A	AC power supply line (N = Neutral wire)	1
B	AC power supply line (L1 = Phase wire)	1

TEST RESULTS:

CPL	S/	OM#	COMMENTS	RESULT
A+B	02	02	Ok, no fails detected	P
A+B	02	03	Ok, no fails detected	P

SURGE INMUNITY TEST

LIMITS:	Product standard:	Final draft ETSI EN 301 489-1 V2.2.2 (2019-09) & Draft ETSI EN 301 489-17 V3.2.0 (2017-03)
	Test standard:	EN 61000-4-5 (2014)

TYPE	APPLICATION	LEVEL (kV) SYMMETRICAL COUPLING	LEVEL (kV) ASYMMETRICAL COUPLING
1	AC Power Supply	±0.5 kV; ±1 kV	±0.5 kV; ±1 kV; ±2 kV

TESTED SAMPLES:	S/02
TESTED OPERATION MODES:	OM#02 & OM#03
FAIL CRITERIA AND MONITORING:	B
ZONES/COUPLING CABLES (CPL):	

CPL	DESCRIPTION	TYPE
A	Symmetrical: L1→N.	1

TEST RESULTS:	

CPL	S/	OM#	COMMENTS	RESULT
A	02	02	Ok, no fails detected.	P
A	02	03	Ok, no fails detected.	P

VOLTAGE DIPS, SHORT INTERRUPTIONS AND VOLTAGE VARIATIONS IMMUNITY TEST

LIMITS:	Product standard:	Final draft ETSI EN 301 489-1 V2.2.2 (2019-09) & Draft ETSI EN 301 489-17 V3.2.0 (2017-03)
	Test standard:	EN 61000-4-11 (2004)

Immunity levels for voltage interruptions:

TEST	SEVERITY LEVEL
A	100% during 5 s

Immunity levels for voltage dips and variations:

TEST	SEVERITY LEVEL
B	100% during 10ms
C	100% during 20ms
D	30% during 500 ms

TESTED SAMPLES:	S/02
TESTED OPERATION MODES:	OM#02 & OM#03
FAIL CRITERIA AND MONITORING:	B for voltage variations and C for voltage interruptions.
ZONES/COUPLING CABLES (CPL):	

TEST	S/	OM#	COMMENTS	RESULT
A	02	02	EUT switches off during the test.	P
B	02	02	Ok, no fails detected.	P
C	02	02	Ok, no fails detected.	P
D	02	02	Ok, no fails detected.	P
A	02	03	EUT switches off during the test.	P
B	02	03	Ok, no fails detected.	P
C	02	03	Ok, no fails detected.	P
D	02	03	Ok, no fails detected.	P

ELECTROSTATIC DISCHARGE INMUNITY TEST

LIMITS:	Product standard:	Final draft ETSI EN 301 489-1 V2.2.2 (2019-09) & Draft ETSI EN 301 489-17 V3.2.0 (2017-03)
	Test standard:	EN 61000-4-2 (2009)

COUPLING	LEVEL
Indirect contact discharge:	±4kV
Direct contact discharge:	±4kV
Air direct discharge:	±2kV; ±4kV; ±8kV

TESTED SAMPLES:	S/02
TESTED OPERATION MODES:	OM#02 & OM#03
MONITORING AND FAIL CRITERIA:	B
NUMBER OF DISCHARGES FOR POINT:	10
ZONES/COUPLING CABLES (CPL):	

CPL	DESCRIPTION	COUPLING TYPE			
		ICH	ICV	DC	DA
1	EUT Frontal	X	X		
2	EUT right side	X	X		
3	EUT rear side	X	X		
4	EUT left side	X	X		
5	Rail			X	
6	Car			X	
7	Enclosure Car				X
8	Remote control				X
9	AD/DC				X

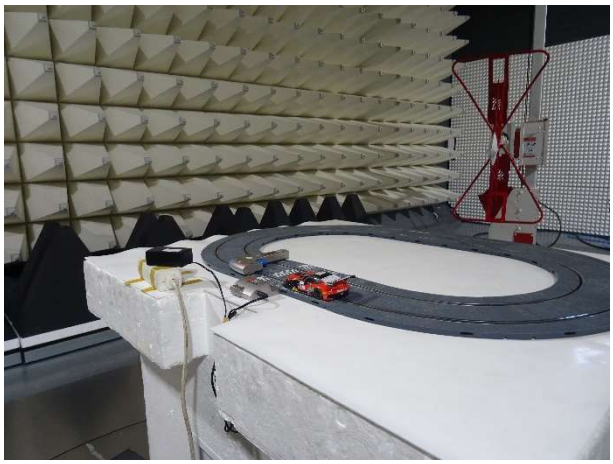
COUPLING RESUME : ICH (Indirect by contact on horizontal plane)
ICV (Indirect by contact on vertical plane), DC (Direct by contact), DA (Direct by air)

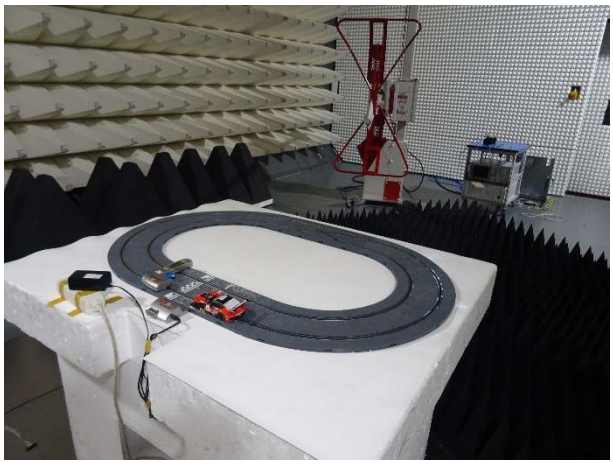
TEST RESULTS:

CPL	S/	OM#	COMMENTS	RESULT
1 to 4	02	02	Ok, no fails detected.	P
5 & 6	02	02	Ok, no fails detected.	P
7 to 9	02	02	Ok, no fails detected.	P
1 to 4	02	03	Ok, no fails detected.	P
5 & 6	02	03	Ok, no fails detected.	P
7 to 9	02	03	Ok, no fails detected.	P

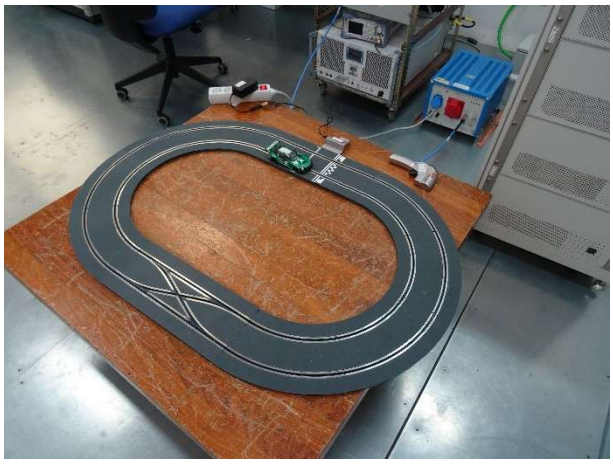
Appendix B: Photographs

Radiated emission test

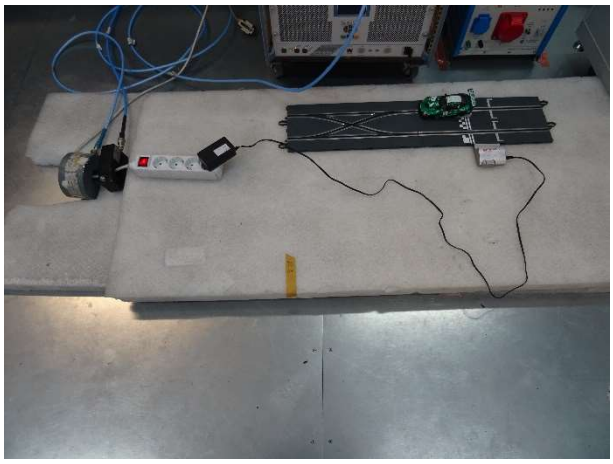




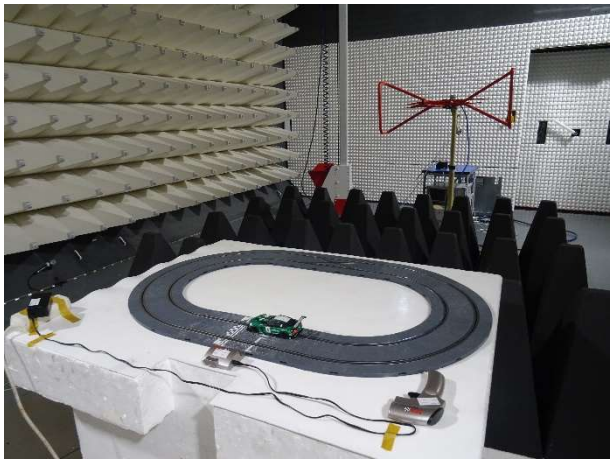
Conducted emission test



Conducted immunity test



Radiated immunity test



Harmonic current measurement

Fast transient immunity test

Electrostatic discharge immunity test

Voltage dips, short interruptions and voltage variations immunity test