T E S T R E P O R T
No.: 18-1-0006201T01

According to:
FCC Regulations
Part 15.107 & Part 15.109

for

Prodrive Technologies B.V.

Carrier Controller
CCS, UL + CCM-IO-ETH

Laboratory Accreditation and Listings	
DAkkS Deutsche Akkreditierungsstelle D-PL-12047-01-01	MRA US-EU 0003
accredited according to DIN EN ISO/IEC 17025	

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Table of contents

Page

1. Summary of test results 4

1.1. TEST OVERVIEW ACCORDING FCC PART 15B 5

1.2. Attestation 5

2. Administrative Data 6

2.1. Identification of the testing laboratory 6

2.2. Test location 6

2.3. Organizational items 6

2.4. Applicant's details 6

2.5. Manufacturer's details 6

3. Equipment under test (EUT) 7

3.1. EUT: Type, S/N etc. and short descriptions used in this test report 7

3.2. Auxiliary Equipment (AE): Type, S/N etc. and short descriptions 7

3.3. EUT set-ups 7

3.4. EUT operating mode 8

3.5. Additional declaration and description of EUT 9

3.6. Configuration of cables used for testing 10

4. Description of test system set-up's 11

4.1. Test system set-up for AC power-line conducted emission measurements 11

4.2. Test system set-up for radiated electric field measurement 30 MHz to 1 GHz 12

4.3. Test system set-up for radiated electric field measurement above 1 GHz 13

5. Measurements 14

5.1. General Limit - Conducted emissions on AC-Power lines 14

5.2. General Limit - Radiated field strength emissions, 30 MHz - 1 GHz 15

5.3. General Limit - Radiated emissions, 1 GHz - 6 GHz 16

5.4. Measurement uncertainties 17

6. Abbreviations used in this report 18

7. Accreditation details of CETECOM's laboratories and test sites 18

8. Instruments and Ancillary 19

8.1. Used equipment "CTC" 19

9. Versions of test reports (change history) 19

Table of annex	Total pages
SEPARATE ANNEX 1: DIAGRAMS OF TESTING	12
SEPARATE ANNEX 2: SET-UP PHOTOGRAPHS	6

The listed attachments are an integral part of this report.

1. Summary of test results

The test results apply exclusively to the test samples as presented in this Report. The CETECOM GmbH does not assume responsibility for any conclusions and generalizations taken in conjunction with other specimens or samples of the type of the item presented to tests. Also we refer on special conditions which the applicant should fulfill according §2.927 to §2.948, special focus regarding modification of the equipment and availability of sample equipment for market surveillance tests.

The Equipment Under Test (in this report, hereinafter referred as EUT) is a digital device. For this test report typical operating mode were tested according intended use of the equipment **excluding wireless operating** modes.

Following tests have been performed to show compliance with applicable FCC Part 15, Subpart B (Unintentional Radiators) of the CFR 47 Rules, September 2018.

1.1. TEST OVERVIEW ACCORDING FCC PART 15B

No. of Diagram group	Test Cases	Port	References, Standards & Limits			EUT set-up	EUT op-mode	Result
			FCC	IC	Limits			
1.01	AC Power Lines Conducted emissions 0.15 – 30 MHz	AC Power lines	§15.107	ANSI C63.4	☒ Class A ☐ Class B	1	1	passed
2.01	Radiated emissions 9 kHz - 30 MHz	Cabinet + Inter-connecting cables	§15.109	RSS-Gen., Issue 4 Table 5	2400/F(kHz) µV/m 24000/F(kHz) µV/m 30 µV/m	-	-	not applied
3.01	Radiated emissions 30 MHz-1 GHz	Cabinet + Inter-connecting cables	§15.109	ANSI C63.4	☒ Class A ☐ Class B	1	1	passed
3.02	Radiated emissions 30 MHz-1 GHz	Cabinet + Inter-connecting cables	§15.109	ANSI C63.4	☒ Class A ☐ Class B	2	1	passed
4.01	Radiated emissions above 1 GHz	Cabinet + Inter-connecting cables	§15.109	ANSI C63.4	☒ Class A ☐ Class B	1	1	passed
4.02	Radiated emissions above 1 GHz	Cabinet + Inter-connecting cables	§15.109	ANSI C63.4	☒ Class A ☐ Class B	2	1	passed

1.2. Attestation

I declare that all measurements were performed by me or under my supervision and that all measurements have been performed and are correct to my best knowledge. All requirements as shown in above table are met in accordance with enumerated standards.

V. Briddigkeit
Responsible for test section

CETECOM GmbH
Mündelheimer Weg 35
40472 Düsseldorf
Tel.: +49 (0) 211 - 171 497-0
Fax: +49 (0) 211 - 171 497-27

Z. Guennoun
Responsible for test report

2. Administrative Data

2.1. Identification of the testing laboratory

Company name:	CETECOM GmbH
Address:	Mündelheimer Weg 35 40472 Düsseldorf Germany
Responsible for testing laboratory:	Volker Briddigkeit
Deputy:	Dipl.-Ing. Niels Jeß

2.2. Test location

2.2.1. Test laboratory "CTC"

Company name:	see chapter 2.1. Identification of the testing laboratory

2.3. Organizational items

Responsible for test report and project leader:	A. Ueberbach
Receipt of EUT:	2018-05-23
Date(s) of test:	2017-07-21 and 2018-08-01 to 2018-09-14
Date of report:	2018-10-09
Version of template:	2016-08-18 V. Briddigkeit [CETECOM]

2.4. Applicant's details

Applicant's name:	Prodrive Technologies B.V.
Address:	Science Park Eindhoven 5501 5692 EM Son (Netherlands)
Contact person:	Mr. Pim heemskerk

2.5. Manufacturer's details

Manufacturer's name:	please see Applicant's details
Address:	please see Applicant's details

3. Equipment under test (EUT)

3.1. EUT: Type, S/N etc. and short descriptions used in this test report

Short descrip-tion*)	EUT	Type	S/N serial number	HW hardware status	SW software status
EUT A	Carrier ControllerEUT Name	Master CCM-IO-ETH (62803)	18-08-858-611	6752-1500-0103	CPU: 6752-1400-2608 UC: 6752-1400-3012
EUT B	Carrier Controller	Slave CCS, UL (64534)	18-10-A02-FW3	6752-1600-1500	CPU: NA UC: 6752-1400-3012

*) EUT short description is used to simplify the identification of the EUT in this test report.

3.2. Auxiliary Equipment (AE): Type, S/N etc. and short descriptions

AE short descrip-tion *)	Auxiliary Equipment	Type	S/N serial number	HW hardware status	SW software status
AE 1	Main harness	--	Cable 1	--	--
AE 2	Cross Belt Motor	80ZWX-15.0505-A	NO #2	100VDC, 1.8N.m 4244 RPM	--
AE 3	DELL Notebook	Latitude E5470	GZ8ZTF2	INTEL Core i7 vPro	Windows Pro
AE 4	Eupen ROD Antenna DS_CAB-R-50_RMC-12-CH	RMC 12-CH-HLFR	--	--	--
AE 5	SEW Eurodrive SWG Antenna	Coupler R-SMA 5.0 GHz	--	--	--
AE 6	XANTREX DC Supply	XFR150-18	E00127650	--	--

*) AE short description is used to simplify the identification of the auxiliary equipment in this test report.

3.3. EUT set-ups

EUT set-up no.*)	Combination of EUT and AE	Remarks
set. 1	EUT A + EUT B + AE 1 + AE 2 + AE 3 + AE 4 + AE 6	AE 2, AE 3 and AE 6 outside SAC during radiated emission
set. 2	EUT A + EUT B + AE 1 + AE 2 + AE 3 + AE 5 + AE 6	AE 2, AE 3 and AE 6 outside SAC during radiated emission

*) EUT set-up no. is used to simplify the identification of the EUT set-up in this test report.

3.4. EUT operating mode

EUT operating mode no.*)	Description of operating mode	Additional information
op. 1	Radio Idle / All interfaces active / Status: 698	-

*) EUT operating mode no. is used to simplify the test report.

3.5. Additional declaration and description of EUT

(Applicant's declaration, ☐ = not selected, ☒ = selected)

Set-up 1	☒ Table top ☐ floor-standing ☐ wall-mounted ☐ not defined	typical use ☐ portable use ☒ fixed use ☐ vehicular use	typical operating cycle of EUT. ☒ > 0,5 sec. ☐ :
Place of use	☒ Residential, commercial and light industry ☒ Industrial environment ☐ vehicular use		
Highest frequency generated or used in the device or on which the device operates or tunes Operation Mode: Continuous switching of valves each second Remark: no test of wireless functions	☐ below 1.705 MHz -> up to 30 MHz ☐ 1.705 MHz – 108 MHz -> up to 1 GHz ☐ 108 MHz -500 MHz -> up to 2 GHz ☐ 500MHz 1000 MHz -> up to 5 GHz ☒ 1600 MHz (Main PLL) -> 10 GHz		
Power line: ☐ AC ☐ L1, ☐ L2, ☐ L3, ☐ N ☐ 12V, ☐ 24V, ☐ 120V, ☐ 400V ☒ 100 V DC (AC 230V / 50Hz over Adaptor for mains conducted emission test)	EUT-grounding: ☒ none ☐ with power supply ☐ additional: ground bonding strap on the case	(in case of deviation during tests the single details are described on chapter 4)	

Other Ports (description of interconnecting cables)	Connector	total cable length used during the test	shielding	connected during test
GW connect CCM DC Input	-	☐> 1m ☒> 2m ☐ > 3m ☐	☐ screened ☒ unscreened	☒ yes ☐ no
GW connect CCs DC Input	-	☐> 1m ☒> 2m ☐ > 3m ☐ : 5.0m	☐ screened ☒ unscreened	☒ yes ☐ no
CCM X102 (Pick up)	M12	☐> 1m ☐> 2m ☒ > 3m ☐	☒ screened ☐ unscreened	☒ yes ☐ no
CCM X104 (F-BUS Input)	M12	☐> 1m ☐> 2m ☐ > 3m ☒< 1m	☒ screened ☐ unscreened	☒ yes ☐ no
CCM X106 (Antenna)	SMA	☒> 1m ☐> 2m ☐ > 3m ☐< 1m	☒ screened ☐ unscreened	☒ yes ☐ no
CCM X 105 (F-BUS Output)	M12	☐> 1m ☐> 2m ☐ > 3m ☒< 1m	☒ screened ☐ unscreened	☒ yes ☐ no
CCM X 108 (Mot Pwr)	M12	☐> 1m ☐> 2m ☒ > 3m ☐	☒ screened ☐ unscreened	☒ yes ☐ no
CCM X 109 (Mot Enc)	M12	☐> 1m ☐> 2m ☒ > 3m ☐	☒ screened ☐ unscreened	☒ yes ☐ no
CCM X103 (D10)	M12	☐> 1m ☐> 2m ☐ > 3m ☒< 1m	☒ screened ☐ unscreened	☒ yes ☐ no
CCS X103 (D10)	M12	☒> 1m ☐> 2m ☐ > 3m ☐< 1m	☒ screened ☐ unscreened	☒ yes ☐ no
CCM X103 (Ethernet)	M12	☐> 1m ☐> 2m ☒ > 3m ☐	☒ screened ☐ unscreened	☒ yes ☐ no
Does EUT contain devices susceptible to magnetic fields, e.g. Hall elements, electrodynamics microphones, etc.?				☐ yes ☒ no
Is mounting position / usual operating position defined?				☒ yes ☐ no

3.6. Configuration of cables used for testing

Cable number	Item	Type	S/N serial number	HW hardware status	Cable length
Cable 1	GW connect CCM DC Input	unshielded	unknown	unknown	2.0 m
Cable 2	GW connect CCs DC Input	unshielded	unknown	unknown	2.0 m
Cable 3	CCM X102 (Pick up)	shielded	unknown	unknown	7.0 m
Cable 4	CCM X104 (F-BUS Input)	shielded	unknown	unknown	0.5 m
Cable 5	CCM X106 (Antenna)	shielded	unknown	unknown	1.05 m
Cable 6	CCM X 105 (F-BUS Output)	shielded	unknown	unknown	0.5 m
Cable 7	CCM X 108 (Mot Pwr)	shielded	unknown	unknown	10.0 m
Cable 8	CCM X 109 (Mot Enc)	shielded	unknown	unknown	10.0 m
Cable 9	CCM X103 (D10)	shielded	unknown	unknown	0.6 m
Cable 10	CCS X103 (D10)	shielded	unknown	unknown	1.4 m
Cable 11	CCM X103 (Ethernet)	shielded	unknown	unknown	10.0 m

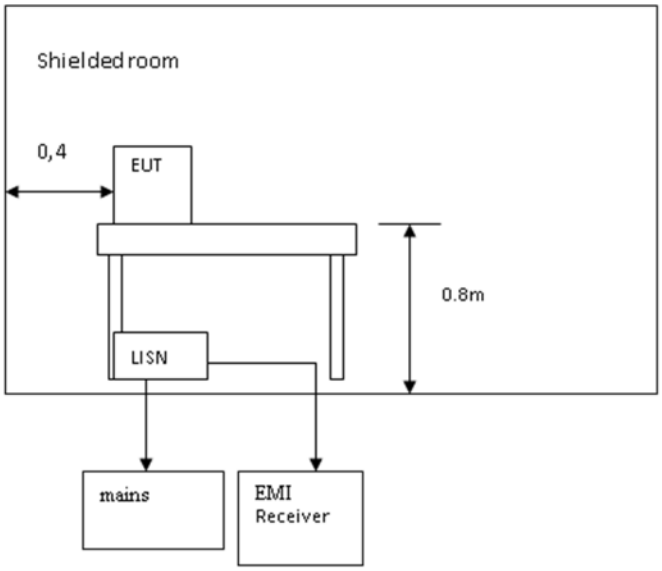
4. Description of test system set-up's

4.1. Test system set-up for AC power-line conducted emission measurements

Specification: ANSI C63.4-2014 chapter 7

General Description: The radio frequency voltage conducted back into the AC power line in the frequency range 150 kHz to 30 MHz has to be investigated. Compliance should be tested by measuring the radio frequency voltage between each power line and ground at the power terminals in the stated frequency range.
A 50 Ohm / 50 µH line impedance stabilization network (LISN) is used coupling the interface to the measurement equipment. The EUT power input leads are connected through the LISN to the AC-power source. The LISN enclosure is electrically connected to the ground plane. The measuring instrument is connected to the coaxial output of the LISN.
Tabletop devices were set-up on a 80 cm height above reference ground plane, floor standing equipment 10 cm raised above ground plane. Measurements have been performed on each phase line and neutral line of the devices AC-power lines. The EUT was power supplied with 120 V/60 Hz. The EUT was tested in the defined operating mode and installed (connected) to accessory equipment according the general description of use given by the applicant.

Schematic:



Testing method: **Exploratory, preliminary measurements** as a first step, determines the worst-case phase line (neutral or phase) as well as the most critical operating mode of the equipment. A complete frequency-sweep with PK-Detector is performed on each current-carrying conductor.

Final testing for power phases and critical frequencies (Margin to AV- or QP limit lower than 3 dB) as a second step includes measurements with receivers detector set to Quasi-Peak and Average.

Formula:

$V_C = V_R + C_L$ (1)
$M = L_T - V_C$ (2)

V_C = measured Voltage –corrected value
V_R = Receiver reading
C_L = Cable loss
M = Margin
L_T = Limit

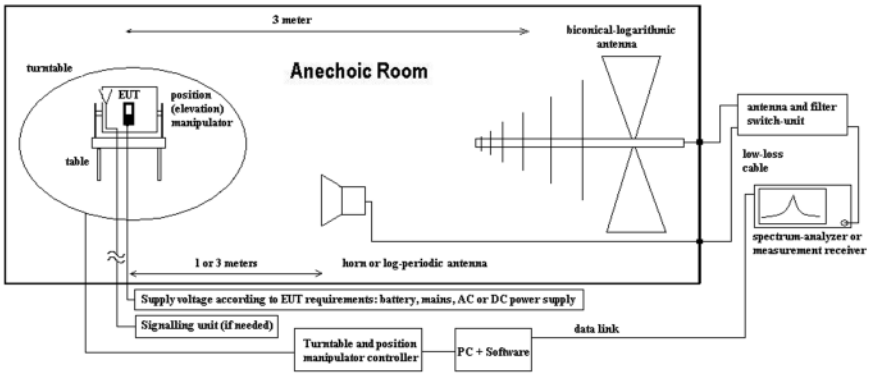
Values are in dB, positive margin means value is below limit.

4.2. Test system set-up for radiated electric field measurement 30 MHz to 1 GHz

Specification: ANSI C63.4-2014 chapter 8.2.3

General Description: Evaluating the field emissions have to be done first by an exploratory emissions measurement and a final measurement for most critical frequencies. The tests are performed in a NSA-compliant semi anechoic chamber (SAC) recognized by the regulatory commissions.

Schematic:



Testing method:

Exploratory, preliminary measurements

The EUT and its associated accessories are placed on a non-conductive position manipulator (tipping device) of 0.8 m height which is placed on the turntable. By rotating the turntable (range 0° to 360°, step 90°) and the EUT itself either on 3-orthogonal axis (portable equipment) or 2-orthogonal axis (defined operational position of EUT) the emission spectrum and it's characteristics was recorded with an EMI-receiver, broadband antenna and software.

Measurement antenna: horizontal and vertical, heights: 1,0 m and 1,82 m as worst-case determined by an exploratory emission measurements. The results are documented in a diagram. Critical frequencies (low margin to limit) are saved within a table for further investigations. If various operating modes are supported, further investigations are made to find the worst-case of them. Also the interconnection cables and equipment position were varied in order to maximize the emissions.

Final measurement on critical frequencies

Based on the exploratory measurements, the most critical frequencies are re-measured by main-taining the EUT's worst-case operation mode, cable position, etc. either on 10m OATS or 3m semi-anechoic chamber.

First a frequency zoom around the critical frequency is done to locate the frequency more precisely. After this step, for all identified critical frequencies, the maximum peak was determined.

Following parameters were varied: the turntable angle continuously in the range 0 to 360 degree, the EUT itself either over 3-orthogonal axis (not defined usage position) or 2-orthogonal axis (defined usage position). The measurement antenna height between 1 m and 4 m.

On the determined worst-case position, a final measurement with necessary bandwidth and detector according standard has been carried out.

Formula:

$E_C = E_R + AF + C_L + D_F - G_A$ (1)

$M = L_T - E_C$ (2)

AF = Antenna factor
C_L = Cable loss
D_F = Distance correction factor (if used)
E_C = Electrical field – corrected value
E_R = Receiver reading
G_A = Gain of pre-amplifier (if used)
L_T = Limit
M = Margin

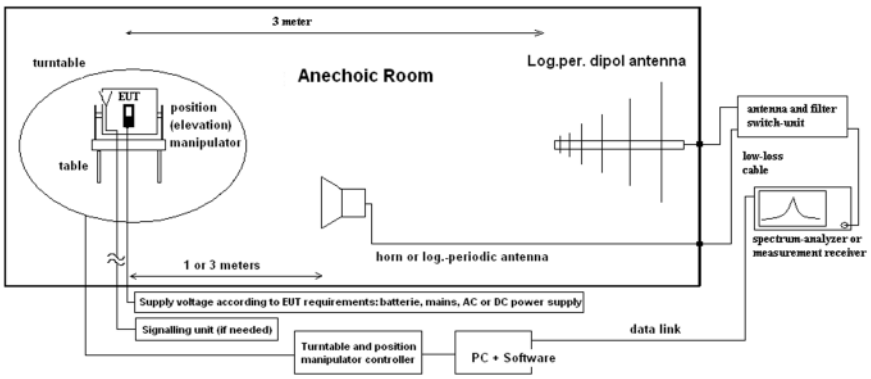
All units are dB-units, positive margin means value is below limit.

4.3. Test system set-up for radiated electric field measurement above 1 GHz

Specification: ANSI C63.4-2014 chapter 8.3

General Description: Evaluating the emissions have to be done first by an exploratory emissions measurement and a final measurement for most critical frequencies. The tests are performed in a CISPR 16-1-4:2010 compliant semi anechoic room (SAR) with the ground covered with absorber recognized by the regulatory commission. The measurement distance was set to 3 meter for frequencies up to 18 GHz and 2 meter above 18 GHz. A logarithmic periodic antenna is used for the frequency range 30 MHz to 1 GHz. Horn antennas are used for frequency range 1 GHz to 40 GHz. The EUT is aligned within 3 dB beam width of the measurement antenna with three orthogonal axis measurements on the EUT.

Schematic:



Testing method:

Exploratory, preliminary measurements
The EUT and its associated accessories are placed on the turntable. By rotating the turntable (range 0° to 360°, step 15 the emission spectrum and it's characteristics was recorded with an EMI-receiver, broadband antenna and software.
The measurements are performed in horizontal and vertical polarization of the measurement antennas. The results are documented in a diagram. Critical frequencies (low margin to limit) are saved within a table for further investigations. If various operating modes are supported, further investigations are made to find the worst-case of them. Also the interconnection cables and equipment position were varied in order to maximize the emissions.

Final measurement on critical frequencies
Based on the exploratory measurements, the most critical frequencies are re-measured by maintaining the EUT's worst-case operation mode, cable position, etc.

First a frequency zoom around the critical frequency is done to locate the frequency more precisely. After this step, for all identified critical frequencies, the maximum peak was determined.
Following parameters were varied: the turntable angle continuously in the range 0 to 360 degree,
The measurement antenna height is being varied between 1 m and 4 m and being tilted

On the determined worst-case position, a final measurement with necessary bandwidth and detector according standard has been carried out.
On the determined worst-case position, a final measurement with necessary bandwidth and detector according standard has been carried out.

Formula:

$E_C = E_R + AF + C_L + D_F - G_A$ (1)

$M = L_T - E_C$ (2)

E_C = Electrical field – corrected value
E_R = Receiver reading
M = Margin
L_T = Limit
AF = Antenna factor
C_L = Cable loss
D_F = Distance correction factor (if used)
G_A = Gain of pre-amplifier (if used)

All units are dB-units, positive margin means value is below limit.

5. Measurements

5.1. General Limit - Conducted emissions on AC-Power lines

5.1.1. Test location and equipment

test location	☒ CETECOM Duesseldorf (Chapter 2.2.1)					☐ Please see Chapter 2.2.2			
test site	☐ 25911	EMI field < 1GHz; SAC5	☐	25912	EMI field > 1GHz; SAC5	☒ 25341	Shielded room laboratory 1		
Receiver	☐ 25311	ESU 40	☒	25370	ESR 7	☐ 25235	ESCS 30		
Antenna	☐ 25038	HFH2-Z2	☐	25357	HL562E	☐ 25364	HF907		
LISN	☒ 25021	ESH2-Z5	☐	25156	ESH3-Z6	☐ 25263	ESH3-Z6		
signalling	☐ 25xxx	CMU 200	☐	25xxx	CMU 200	☐ 594	CMW500	☐ not used	
DC voltage	☐ 25036	HP 6267 B	☐			☐			
AC voltage	☒ 230 V 50 Hz via Power Supply XANTREX XFR150-18					☐	120 V 60 Hz via EM Test DPA 503N		

5.1.2. Requirements

FCC		Part 15, Subpart B, §15.107			
ANSI		C63.4-2014, § 5.2, 6, 7			
Limit	Frequency [MHz]	☒ Conducted limit Class B		☐ Conducted limit Class A	
		QUASI-Peak [dBµV]	AVERAGE [dBµV]	QUASI-Peak [dBµV]	AVERAGE [dBµV]
	0.15 – 0.5	66 to 56*	56 to 46*	79	66
	0.5 – 5	56	46	73	60
	5 – 30	60	50	73	60
Remark: * decreases with the logarithm of the frequency					

5.1.3. Test condition and test set-up

Signal link to test system (if used):		☐ air link	☐ cable connection	☒ none
EUT-grounding		☒ none	☐ with power supply	☐ additional connection
Equipment set up		☒ table top (40 cm distance to reference ground plane (wall)		☐ floor standing EUT stands isolated on reference ground plane (floor)
Climatic conditions		Temperature: (23±3°C)		Rel. humidity: (55±20)%
EMI-Receiver or Analyzer settings	Scan data	☐ 9 – 150 kHz, RBW = 200 Hz, Step = 61 Hz ☒ 150 kHz – 30 MHz RBW = 9 kHz, Step = 4 kHz ☐ other:		
	Scan-Mode Pre-measurement Final measurement	10 dB EMI-Receiver Mode Peak and average detector, Repetitive-Scan, max-hold, sweep-time 10 ms per frequency point Average & Quasi-peak detector at critical frequencies		
General measurement procedures		Please see chapter "Test system set-up for AC power line conducted emissions measurements"		

5.1.4. Measurement results

The results are presented below in summary form only. For more information please see the diagrams

EUT	set-up no.:		set-up 1		
Diagram-No.	EUT operating mode no. or commend	Used Detector	Power line	Additional (scan-) information or remarks	Result
1.01	EUT operating mode 1	☒ Peak (pre-scan) ☒ AV (pre-scan and final) ☒ QP (final)	N, L1	-	passed

5.2. General Limit - Radiated field strength emissions, 30 MHz - 1 GHz

5.2.1. Test location and equipment

test location	☒ CETECOM Duesseldorf (Chapter 2.2.1)					☐ Please see Chapter 2.2.2		
test site	☒ 25911	EMI field < 1GHz; SAC5	☐ 25912	EMI field > 1GHz; SAC5		☐ 25901	EMI conducted	
Receiver	☐ 25311	ESU 40	☒ 25348	ESR 7		☐		
Antenna	☐ 25038	HFH2-Z2	☒ 25357	HL562E		☐ 25364	HF907	
LISN	☐ 25261	ESH2-Z5	☐ 25156	ESH3-Z6		☐ 25263	ESH3-Z6	
signalling	☐ 20547	CMU 200	☐ 25xxx	CMU 200		☐ 20594	CMW500	☐ not used
DC voltage	☐ 25036	HP 6267 B	☒ 100 V	Via Power Supply XANTREX XFR150-18		☐ 25289	24V via TDK-Lambda Americas Inc.	
AC voltage	☐ 230 V 50 Hz via public mains					☐ 25289	120 V 60 Hz via EM Test DPA 503N	

5.2.2. Requirements/Limits

FCC		☒ Part 15 Subpart B, §15.109, class B ☐ Part 15 Subpart C, §15.209 @ frequencies defined in §15.205	
ANSI		☒ C63.4-2014 ☐ C63.10-2013	
Limit	Frequency [MHz]	Radiated emissions limits, 3 meters	
		QUASI Peak [µV/m]	QUASI-Peak [dBµV/m]
	30 - 88	100	40.0
	88 - 216	150	43.5
	216 - 960	200	46.0
	above 960	500	49.0

5.2.3. Test condition and measurement test set-up

Signal link to test system (if used):		☐ air link	☐ cable connection	☒ none
EUT-grounding		☒ none	☐ with power supply	☐ additional connection
Equipment set up		☒ table top 0.8 m height		☐ floor standing
Climatic conditions		Temperature: (25±3°C)		Rel. humidity: (48±20)%
EMI-Receiver (Analyzer) Settings	Scan frequency range: Scan-Mode Detector RBW/VBW Mode: Scan step Sweep-Time	☒ 30 – 1000 MHz ☐ other: ☒ 6 dB EMI-Receiver Mode ☐ 3 dB spectrum analyser mode Peak / Quasi-peak 120 kHz Repetitive-Scan, max-hold 40 kHz 10 ms		
General measurement procedures		Please see chapter "Test system set-up for electric field measurement in the range 30 MHz to 1 GHz"		

5.2.4. MEASUREMENT RESULTS

The results are presented below in summary form only. For more information please see diagrams included in annex 1.

Table of measurement results:

Dia-gram no.	Frequency range	Set-up no.	OP-mode no.	Remark	Used detector			Result
					PK	AV	QP	
3.01	30 MHz – 1 GHz	1	1	-	☒	☐	☒	passed
3.02	30 MHz – 1 GHz	2	1	-	☒	☐	☒	passed

Remark: see diagrams in annex 1 for more details

5.3. General Limit - Radiated emissions, 1 GHz - 6 GHz

5.3.1. Test location and equipment absorber modified SAC

test location	☒ CETECOM Duesseldorf (Chapter 2.2.1)				☐ Please see Chapter 2.2.2			
test site	☐ 25911	EMI field < 1GHz; SAC5	☒ 25912	EMI field > 1GHz; SAC5	☐ 25901	EMI conducted		
Receiver	☐ 25311	ESU 40	☒ 25348	ESR 7	☐			
Antenna	☐ 25038	HFH2-Z2	☐ 25357	HL562E	☒ 25364	HF907		
LISN	☐ 25261	ESH2-Z5	☐ 25156	ESH3-Z6	☐ 25263	ESH3-Z6		
signalling	☐ 20547	CMU 200	☐ 25xxx	CMU 200	☐ 20594	CMW500	☐ not used	
DC voltage	☐ 25036	HP 6267 B	☒ 100 V	Via Power Supply XANTREX XFR150-18	☐ 25289	24V via TDK-Lambda Americas Inc.		
AC voltage	☐ 230 V 50 Hz via public mains				☐ 25289	120 V 60 Hz via EM Test DPA 503N		

5.3.2. Requirements/Limits (CLASS B equipment)

FCC	☒ Part 15 Subpart B, §15.109 class B			
IC	☐ RSS-Gen., Issue 4, Chapter 8.9, Table 4+6 (transmitter licence exempt) ☐ RSS-Gen., Issue 4, Chapter 8.9, Table 2 (receiver) ☐ ICES-003, Issue 6, Chapter 6.2.2, Table 7 (class B)			
ANSI	☒ C63.4-2014 ☐ C63.10-2013			
Frequency [MHz]	Limits			
	AV [µV/m]	AV [dBµV/m]	Peak [µV/m]	Peak [dBµV/m] or [dBm/MHz]
above 1 GHz for frequencies as defined in §15.205	500	54.0	5000	74.0 dBµV/m

5.3.3. Test condition and measurement test set-up

Signal link to test system (if used):		☐ air link	☐ cable connection	☐ none
EUT-grounding		☒none	☐ with power supply	☐ additional connection
Equipment set up		☒ table top		☐floor standing
Climatic conditions		Temperature: (21.1±3°C)		Rel. humidity: (43±20)%
EMI-Receiver (Analyzer) Settings	Scan frequency range: Scan-Mode Detector RBW/VBW Mode: Scan step Sweep-Time	☒ 1 – 6 GHz ☐ other: ☒ 6 dB EMI-Receiver Mode ☐ 3 dB spectrum analyser mode Peak / Average 1 MHz Repetitive-Scan, max-hold 400 kHz 10 ms		
General measurement procedures		Please see chapter "Test system set-up for radiated electric field measurements above 1 GHz"		

5.3.4. Measurement Results

The results are presented below in summary form only. For more information please see diagrams included in annex 1.

Table of measurement results:

Dia-gram no.	Carrier Channel		Frequency range	Set-up no.	OP-mode no.	Remark	Used detector			Result
	Range	No.					PK	AV	QP	
4.01	nominal	--	1 - 6 GHz	1	1		☒	☒	☐	passed
4.02	nominal	--	1 - 6 GHz	2	1		☒	☒	☐	passed

Remark: see diagrams in annex 1 for more details

5.4. Measurement uncertainties

The reported uncertainties are calculated based on the standard uncertainty multiplied with the appropriate coverage factor **k**, such that a confidence level of approximately 95% is achieved.
For uncertainty determination, each component used in the concrete measurement set-up was taken in account and it's contribution to the overall uncertainty according it's statistical distribution calculated.

Following table shows expectable uncertainties for each measurement type performed.

RF-Measurement	Reference	Frequency range	Calculated uncertainty based on a confidence level of 95%	Remarks
Conducted emissions (U_{CISPR})	CISPR 16-2-1	9 kHz - 150 kHz 150 kHz - 30 MHz	4.0 dB 3.6 dB	-
Radiated emissions Enclosure	CISPR 16-2-3	30 MHz - 1 GHz 1 GHz - 18 GHz	4.2 dB 5.1 dB	E-Field
Disturbance power	CISPR 16-2-2	30 MHz - 300 MHz	-	-
Radiated emissions Enclosure	-	150 kHz - 30 MHz 30 MHz - 1 GHz 1 GHz - 20 GHz	5.0 dB 4.2 dB 3.17 dB	Magnetic field E-field Substitution

Table: measurement uncertainties, valid for conducted/radiated measurements

6. Abbreviations used in this report

The abbreviations	
ANSI	American National Standards Institute
AV , AVG, CAV	Average detector
EIRP	Equivalent isotropically radiated power, determined within a separate measurement
EGPRS	Enhanced General Packet Radio Service
EUT	Equipment Under Test
FCC	Federal Communications Commission, USA
IC	Industry Canada
n.a.	not applicable
Op-Mode	Operating mode of the equipment
PK	Peak
RBW	resolution bandwidth
RF	Radio frequency
RSS	Radio Standards Specification, Dokuments from Industry Canada
Rx	Receiver
TCH	Traffic channel
Tx	Transmitter
QP	Quasi peak detector
VBW	Video bandwidth
ERP	Effective radiated power

7. Accreditation details of CETECOM's laboratories and test sites

Ref.-No.	Accreditation Certificate	Valid for laboratory area or test site	Accreditation Body
-	D-PL-12047-01-01	All laboratories and test sites of CETECOM GmbH, Essen	DAkkS, Deutsche Akkreditierungsstelle GmbH
337 487 558 348 348	MRA US-EU 0003	Radiated Measurements 30 MHz to 1 GHz, 3 m / 10 m (OATS) Radiated Measurements 30 MHz to 1 GHz, 3 m (SAC) Radiated Measurements above 1 GHz, 3 m (FAR) Mains Ports Conducted Interference Measurements Telecommunication Ports Conducted Interference Measurement.	FCC, Federal Communications Commission Laboratory Division, USA
337 487 550 558	3462D-1 3462D-2 3462D-2 3462D-3	Radiated Measurements 30 MHz to 1 GHz, 3 m / 10 m (OATS) Radiated Measurements 30 MHz to 1 GHz, 3 m (SAR) Radiated Measurements 1 GHz to 6 GHz, 3 m (SAR) Radiated Measurements above 1 GHz, 3 m (FAR)	IC, Industry Canada Certification and Engineering Bureau
487 550 348 348	R-2666 G-301 C-2914 T-1967	Radiated Measurements 30 MHz to 1 GHz, 3 m (SAR) Radiated Measurements 1 GHz to 6 GHz, 3 m (SAR) Mains Ports Conducted Interference Measurements Telecommunication Ports Conducted Interference Measurements.	VCCI, Voluntary Control Council for Interference by Information Technology Equipment, Japan
OATS = Open Area Test Site, SAC = Semi Anechoic Chamber, FAR = Fully Anechoic Room			

8. Instruments and Ancillary

8.1. Used equipment "CTC"

The "Ref.-No" in the left column of the following tables allows the clear identification of the laboratory equipment.

8.1.1. Test software and firmware of equipment

Ref.-No.	Equipment	Type	Serial-No.	Version of Firmware or Software during the test
358	Semi Anechoic Chamber	Albatross	No. 5	- -
348	EMI Test Receiver	ESR 7	825132/017	Firm.= 1.21 , OTP=2.0, GRA=2.0
370	EMI Test Receiver	ESR 7	101715	-
235	EMI Test Receiver	ESCS 30	100160	Firm.= 2.30, OTP= 02.01, GRA= 02.36
311	EMI Test Receiver	ESU40	1000-30	Firmware=4.43 SP3, Bios=V5.1-16-3, Spec. =01.00
358	Ultra-Broadband Antenna	HL562E	100824	- -
364	Double Rigid Horn Antenna	HF907	102488	- -
352	Continuous switch Unit	OSP	100123	Firmware=06.06
000	EMI Test Software	EMC 32	-	EMC 32 Version 9.26
021	Line Impedance Stabilization Network [1]	ESH2-Z5	872460/004	CISPR 16 compliant
261	Line Impedance Stabilization Network [2]	ESH2-Z5	871777/041	CISPR 16 compliant
316	Multifunction AC/DC power Source	Netwave 20	V1227113059	Firmware= 5.03.03
360	Antenna Tower	BAM 4.5-P	091/17791115	- -
361	Controller TT & Tower	NCD	202/17791115	Firmware= 0.4.03
363	Turn Table	TT 4.0-4t	553/17791115	- -
362	Measurement table	PTT 1.5 x1x0.8	127	- -

8.1.2. Single instruments and test systems

Ref.-No.	Equipment	Type	Serial-No.	Manufacturer	Interval of calibration	Remark	Cal due
358	Semi Anechoic Chamber	SAC	No. 5	Albatross	10 Y	-	05 / 2026
348	EMI Test Receiver	ESR 7	825132/017	Rohde & Schwarz	24 M	-	12 / 2017
370	EMI Test Receiver	ESR 7	101715	Rohde & Schwarz	24 M	-	01 / 2018
235	EMI Test Receiver	ESCS 30	100160	Rohde & Schwarz	24 M	-	07 / 2018
311	EMI Test Receiver	ESU40	1000-30	Rohde & Schwarz	24 M	-	07 / 2018
358	Ultra-Broadband Antenna	HL562E	100824	Rohde & Schwarz	36 M	-	12 / 2018
364	Double Rigid Horn Antenna	HL562E	102488	Rohde & Schwarz	36 M	-	12 / 2018
352	Continuous switch Unit	OSP	100123	Rohde & Schwarz	36 M	-	12 / 2018
000	EMI Test Software	EMC 32	-	Rohde & Schwarz	- .-	-	- -
021	Line Impedance Stabilization Network [1]	ESH2-Z5	872460/004	Rohde & Schwarz	24 M	1a	06/ 2018
261	Line Impedance Stabilization Network [1]	ESH2-Z5	871777/041	Rohde & Schwarz	24 M	3	06 / 2018
316	Multifunction AC/DC power Source	Netwave 20	V1227113059	EM-Test	36 M	1g	05 / 2018
360	Antenna Tower	BAM 4.5-P	872460/004	Maturo	- .-	-	- -
361	Controller TT & Tower	NCD	871777/041	Maturo	- .-	-	- -
363	Turn Table	TT 4.0-4t	V1227113059	Maturo	- .-	-	- -
362	Measurement table	PTT 1.5 x1x0.8	127	Maturo	- .-	-	- -

8.1.3. Legend

Interval of calibration	12 M	12 month
	24 M	24 month
	36 M	36 month
	10 Y	10 Years
	24/12 M	Calibration every 24 months, between this every 12 months internal validation
	36/12 M	Calibration every 36 months, between this every 12 months internal validation
	Pre-m	Check before starting the measurement
	-	Without calibration

9. Versions of test reports (change history)

Version	Applied changes	Date of release
--	Initial Release	2018-10-09