

Prüfbericht-Nr.: <i>Test Report No.:</i>	60250437-001	Auftrags-Nr.: <i>Order No.:</i>	3285682_110	Seite 1 von 19 <i>Page 1 of 19</i>
Kunden-Referenz-Nr.: — <i>Client Reference No.:</i>		Auftragsdatum: 18.02.2019 <i>Order date:</i>		
Auftraggeber: TÜV Rheinland InterCert Kft., <i>Client:</i> Váci út 48/a-b, H-1132 BUDAPEST				
Prüfgegenstand: DIGITAL (IP) LPR CAMERA <i>Test item:</i>				
Bezeichnung / Typ-Nr.: MICROCAM02 <i>Identification / Type No.:</i> (FCC ID: XCW-MICROCAM-02)				
Auftrags-Inhalt: Prüfung der elektromagnetischen Verträglichkeit EMV / Test of electromagnetic compatibility EMC <i>Order content:</i>				
Prüfgrundlage: Teilprüfung / Partial test <i>Test specification:</i> 47 CFR FCC Part 15 Subpart B — — —				
Wareneingangsdatum: 06.05.2019 <i>Date of receipt:</i>				
Prüfmuster-Nr.: A000230279-001 <i>Test sample No.:</i>				
Prüfzeitraum: 21.05.2019 <i>Testing period:</i>				
Ort der Prüfung: Nürnberg / Nuremberg <i>Place of testing:</i>				
Prüflaboratorium: EMV Labor / EMC test lab <i>Testing laboratory:</i>				
Prüfergebnis*: PASS <i>Test result*:</i>				
geprüft von / tested by: 21.05.2019 Oliver Wagner, SV <i>Datum</i> <i>Name / Stellung</i> <i>Unterschrift</i>		kontrolliert von / reviewed by: 21.05.2019 Dr. Tobias Wirth, SV <i>Datum</i> <i>Name / Stellung</i> <i>Unterschrift</i>		
Sonstiges / Other: —				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>			Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>	
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

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Liste der verwendeten Prüfmittel
List of used test equipment

Prüfmittel <i>Test equipment</i>	Prüfmittel-Nr. / ID-Nr. <i>Equipment No. / ID-No.</i>	Nächste Kalibrierung <i>Next calibration</i>
Umschaltmatrix <i>Commutation relay</i>	KRM4-5811-T-S1	09331
Netznachbildung <i>LISN</i>	ESH2-Z5	2728096
Impulsbegrenzer 10 dB <i>Limiter</i>	ESH3-Z2	2732546
Messempfänger <i>Receiver</i>	ESU 8	2728148
Schirmkabine <i>Shielded room</i>	SR 2	—

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Produktbeschreibung
Product description

1	Baugleiche Modelle <i>Identical types</i>	—
2	Beschreibung <i>Description</i>	DIGITAL (IP) LPR CAMERA
3	Seriennummer <i>Serial number</i>	1189586
4	Hersteller <i>Manufacturer</i>	ARH Inc.
5	Bemessungsspannung <i>Rated voltage</i>	12 VDC (PoE+)
6	Bemessungsfrequenz <i>Rated frequency</i>	—
7	Bemessungsstrom <i>Rated current</i>	—
8	Bemessungsleistung <i>Rated power consumption</i>	15 W
9	Prüflingstyp <i>Equipment type</i>	Wall/Ceiling mounted equipment
10	Gerätekategorie <i>Equipment categorie</i>	—
11	Anzahl der Phasen <i>Number of phases</i>	—
12	Schutzklasse <i>Protection class</i>	III - Schutzkleinspannung/Safety extra-low voltage
13	Hardwareversion <i>Hardware version</i>	—
14	Softwareversion <i>Software version</i>	—
15	Abmessungen <i>Dimensions</i>	183 x 160 x 57
16	Sonstiges <i>Other</i>	—

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Absatz		Messergebnisse - Bemerkungen	Bewertung																					
Clause	Anforderungen - Prüfungen / Requirements - Tests	Measuring results - Remarks																						
17	Funkstörspannung <i>Conducted voltage emissions</i> 47 CFR FCC Part 15 Subpart B	<i>Details in protocol number:</i> #16 <i>Operating mode:</i> Videostream <i>EUT:</i> MICROCAM02 (A000230279-001) <i>Terminals:</i> Netzleitung / Supply line <i>Remarks:</i> —	P <input checked="" type="checkbox"/> F <input type="checkbox"/> N/A <input type="checkbox"/> N/T <input type="checkbox"/>																					
	Grenzwerte <i>Limits</i> <i>Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.</i>	<table border="1"> <thead> <tr> <th>Frequenz <i>Frequency</i> [MHz]</th><th>Quasi-Spitzenwert <i>Quasi-peak</i> [dB(µV)]</th><th>Mittelwert <i>Average</i> [dB(µV)]</th></tr> </thead> <tbody> <tr> <td>0.15 – 0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr> <tr> <td>0.5 – 5</td><td>56</td><td>46</td></tr> <tr> <td>5 – 30</td><td>60</td><td>50</td></tr> </tbody> </table> <p>*Decreases with the logarithm of the frequency.</p> <p><i>For a Class A digital device that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms LISN. Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.</i></p> <table border="1"> <thead> <tr> <th>Frequenz <i>Frequency</i> [MHz]</th><th>Quasi-Spitzenwert <i>Quasi-peak</i> [dB(µV)]</th><th>Mittelwert <i>Average</i> [dB(µV)]</th></tr> </thead> <tbody> <tr> <td>0.15 – 0.5</td><td>79</td><td>66</td></tr> <tr> <td>0.5 – 30</td><td>73</td><td>60</td></tr> </tbody> </table>	Frequenz <i>Frequency</i> [MHz]	Quasi-Spitzenwert <i>Quasi-peak</i> [dB(µV)]	Mittelwert <i>Average</i> [dB(µV)]	0.15 – 0.5	66 to 56*	56 to 46*	0.5 – 5	56	46	5 – 30	60	50	Frequenz <i>Frequency</i> [MHz]	Quasi-Spitzenwert <i>Quasi-peak</i> [dB(µV)]	Mittelwert <i>Average</i> [dB(µV)]	0.15 – 0.5	79	66	0.5 – 30	73	60	
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Absatz		Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / Requirements - Tests	Measuring results - Remarks	Evaluation
<p>Methode <i>Method</i> <i>The test setup was according to ANSI C63.4. The EUT was placed on a non-conducting table at a height of 0.8 m above the reference ground plane and 0.4 m away from the conducting walls of a shielded room. The Artificial Mains Network (AMN) was placed 0.8 m away from the boundary of the unit under test and bonded to the ground reference plane. All other units of the EUT and associated equipment were at least 0.8 m from the AMN. Supporting units were connected to other AMN if necessary. Conducted voltage measurements on all mains lines were made at the output of the AMN. The whole required frequency range was investigated for maximum conducted interferences.</i></p>			

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18	Änderungsverzeichnis <i>Change history</i>		
Rev. No.	List of revisions	Date	Author
1	First edition (60250437-001)	2019-05-21	Oliver Wagner

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19	Kalibrierung Calibration
	<p><i>Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.</i></p> <p><i>All measurement equipment calibrations are traceable to DKD or where calibration is performed outside Germany, to equivalent nationally recognized standards organizations.</i></p>
20	Registrierung Registration
	<p><i>The measurement facilities for conducted and for radiated disturbance measurement of the TRLP, have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules. Measurement data will be accepted in conjunction with applications for Certification under Parts 15 and 18 of the Commission's Rules.</i></p> <p>FCC Registration-Number: 939976</p> <p>Bundesnetzagentur Registriernummer: BNetzA-CAB-17/21-16</p>
21	Angewendete Standards Applied Standards
	<p><i>According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:</i></p> <ul style="list-style-type: none">- Title 47 CFR FCC Part 15 Subpart B- ANSI C63.4-2014 (Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz)- ICES-003:2016 (Issue 6) (Information Technology Equipment (Including Digital Apparatus) — Limits and Methods of Measurement) <p><i>For frequencies f ≤ 1000 MHz the test setup and test was done according to: ANSI C63.4-2014. For frequencies f > 1000 MHz the test setup and test was done according to ANSI C63.4-2014.</i></p>

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22	Testkonfiguration <i>Equipment used during test</i>																								
	Prüfgegenstand <i>Equipment under test</i>																								
	<table> <thead> <tr> <th>Nr.</th> <th>Produktart <i>No.</i> <i>Product type</i></th> <th>Hersteller <i>Manufacturer</i></th> <th>Modell <i>Model</i></th> <th>Kommentare <i>Comments</i></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>DIGITAL (IP) LPR CAMERA</td> <td>ARH Inc.</td> <td>MICROCAM02</td> <td>—</td> </tr> </tbody> </table>					Nr.	Produktart <i>No.</i> <i>Product type</i>	Hersteller <i>Manufacturer</i>	Modell <i>Model</i>	Kommentare <i>Comments</i>	1	DIGITAL (IP) LPR CAMERA	ARH Inc.	MICROCAM02	—										
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	Hilfsmittel / Peripherie <i>Auxiliary Equipment / Peripherals</i>																								
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23	Ein-/Ausgabeanschlüsse <i>Input/Output ports</i>																								
	<table> <thead> <tr> <th>Nr.</th> <th>Name <i>No.</i></th> <th>Art* <i>Type*</i></th> <th>Kabel- länge <i>Cable length</i></th> <th>Kabel geschirmt <i>Cable shielded</i></th> <th>Kommentare <i>Comments</i></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Enclosure</td> <td>N/E</td> <td>—</td> <td>—</td> <td>None</td> </tr> <tr> <td>2</td> <td>Ethernet (PoE)</td> <td>TP, DC</td> <td>5 m</td> <td>Yes</td> <td>PoE: 12 VDC</td> </tr> </tbody> </table>					Nr.	Name <i>No.</i>	Art* <i>Type*</i>	Kabel- länge <i>Cable length</i>	Kabel geschirmt <i>Cable shielded</i>	Kommentare <i>Comments</i>	1	Enclosure	N/E	—	—	None	2	Ethernet (PoE)	TP, DC	5 m	Yes	PoE: 12 VDC		
Nr.	Name <i>No.</i>	Art* <i>Type*</i>	Kabel- länge <i>Cable length</i>	Kabel geschirmt <i>Cable shielded</i>	Kommentare <i>Comments</i>																				
1	Enclosure	N/E	—	—	None																				
2	Ethernet (PoE)	TP, DC	5 m	Yes	PoE: 12 VDC																				
	<small>* AC = AC Power Port DC = DC Power Port N/E = Non-Electrical I/O = Signal Input or Output Port (Not Involved in Process Control) TP = Telecommunication Ports</small>																								

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24	Interne Betriebsfrequenzen <i>Internal operating frequencies</i>													
	Nr. Frequenz No. Frequency	Beschreibung Description												
	1 766 MHz	ARM Dual Core 2x766Mhz												
	2 1 GHz	ARM Quad Core 4x1Ghz for ANPR												
<i>For an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:</i>														
<table border="1"><thead><tr><th>Highest frequency generated or used in the device or on which the device operates or tunes (MHz)</th><th>Upper frequency of measurement range (MHz)</th></tr></thead><tbody><tr><td>Below 1.705</td><td>30</td></tr><tr><td>1.705–108</td><td>1000</td></tr><tr><td>108–500</td><td>2000</td></tr><tr><td>500–1000</td><td>5000</td></tr><tr><td>Above 1000</td><td>5th harmonic of the highest frequency or 40 GHz, whichever is lower.</td></tr></tbody></table>		Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)	Below 1.705	30	1.705–108	1000	108–500	2000	500–1000	5000	Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower.	
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Below 1.705	30													
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108–500	2000													
500–1000	5000													
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower.													
25	Betriebsarten <i>Operating modes</i>													
	<i>The EUT has been connected with peripherals pursuant ANSI C63.4 and was operated in a configuration to maximize its emission characteristics in a typical application.</i>													
	Nr. Beschreibung No. Description													
	1 Videostream <i>Videostream</i>													

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26	Prüfaufbau <i>EUT configuration</i>						
	<p>Der Prüfaufbau erfolgte entsprechend den Angaben der genannten EMV-Normen.</p> <p>Die Messungen und Tests wurden unter "worst case"-Bedingungen durchgeführt, d.h. es wurden typische Anordnungen und Betriebszustände gewählt bzw. angenommen, die maximale Störaussendung und Störempfindlichkeit vermuten lassen (sogenannte "Ungünstigste Konfiguration").</p> <p>Einzelheiten der Geräteeinstellungen sind u.a. der Fotodokumentation zu entnehmen.</p> <p>Soweit nicht anders angegeben, gelten diese Angaben für alle nachfolgenden Messungen.</p> <p><i>The test setup was made in accordance with mentioned EMC standards.</i></p> <p><i>Measurements and tests were executed under "worst case" conditions. Typical EUT arrangements or operating modes were chosen or assumed which let suspect maximum emission or susceptibility (a so called "unfavourable configuration").</i></p> <p><i>Details of test setup or adjustments are (particularly) shown inside the photo documentation. As far as not mentioned otherwise these statements are valid for all following tests.</i></p>						
27	Besondere EMV-Massnahmen <i>Special EMC measures</i>						
	Keine / None						
28	Klimatische Bedingungen <i>Climatic conditions</i>						
	<table><tr><td>Umgebungstemperatur <i>Ambient Temperature</i></td><td>15 - 35 °C</td></tr><tr><td>Relative Luftfeuchte <i>Relative Humidity</i></td><td>30 - 60 %</td></tr><tr><td>Luftdruck <i>Air pressure</i></td><td>860 - 1060 mbar</td></tr></table>	Umgebungstemperatur <i>Ambient Temperature</i>	15 - 35 °C	Relative Luftfeuchte <i>Relative Humidity</i>	30 - 60 %	Luftdruck <i>Air pressure</i>	860 - 1060 mbar
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29	<p>Aussage zur Messunsicherheit <i>Statement of the measurement uncertainty</i></p> <p>Die in diesem Dokument genannten Daten und Ergebnisse sind wahr und genau. Der Leser wird darauf hingewiesen, dass innerhalb der Kalibriergrenzen der Geräte und Einrichtungen Fehler auftreten können. Die Messunsicherheit wurde für alle Prüfungen in diesem Prüfbericht gemäß CISPR 16-4 "Anforderungen an Geräte und Einrichtungen sowie Festlegung der Verfahren zur Messung der hochfrequenten Störaussendung (Funkstörungen) und Störfestigkeit – Teil 4-2: Unsicherheiten, Statistik und Modelle zur Ableitung von Grenzwerten (Störmodell) – Messgeräte-Unsafeitheit" berechnet und ist im Qualitätssicherungssystem gemäß ISO / IEC 17025 dokumentiert. Darüber hinaus können Veränderungen bei den Bauteilen und im Herstellungsprozess zu einer zusätzlichen Abweichung führen. Der Hersteller ist alleine verantwortlich dafür, dass zukünftige Geräte die einschlägigen Normen und Standards einhalten.</p> <p><i>The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the quality system acc. to ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation.</i></p> <p><i>The manufacturer has the sole responsibility of continued compliance of the device.</i></p>
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30	Messunsicherheiten <i>Measurement uncertainties</i>																																
Folgende Messunsicherheiten wurden nach CISPR 16-4-2 ermittelt. Es handelt sich um die erweiterte Messunsicherheit, mit einer Wahrscheinlichkeit von 95%, dass die Werte im zugeordneten Intervall liegen ($k = 2$). <i>The following measurement uncertainties have been calculated in accordance with CISPR 16-4-2. The stated values are the expanded uncertainty values, the measurand lies within the assigned range of values with a probability of 95% ($k = 2$).</i>																																	
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Funkstörspannung Conducted voltage emissions	PASS
Prüfungsbezeichnung u. -nummer <i>Test name and number</i>	Conducted voltage emissions in operating mode videostream #16
Datum des Tests <i>Test date</i>	21.05.2019
Angewendete Norm <i>Applied Standard</i>	47 CFR FCC Part 15 Subpart B
Prüfmethode <i>Test method</i>	ANSI C63.4-2014
Temperatur (°C) <i>Temperature</i>	22.2
Luftfeuchte (% rH) <i>Humidity</i>	28.1
Luftdruck (mbar) <i>Air pressure</i>	977.0
Bearbeiter <i>Tested by</i>	Wagner
Modellbezeichnung <i>Model</i>	MICROCAM02
Prüfmuster-Nr. <i>Test sample No.:</i>	A000230279-001
Betriebsart <i>Operating mode</i>	Videostream
Anschlüsse <i>Tested terminals</i>	Netzleitung / Supply line
Grenzwert <i>Limit</i>	47 CFR Part 15 section 15.107 Class B
Bemerkung <i>Remarks</i>	—
Version der Prüfsoftware <i>Version of testing software</i>	3.17.0.29

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Verwendete Prüfmittel
Used test equipment

Typ	Hersteller <i>Manufacturer</i>	Modell	ID	Kalibriert am <i>Last calibration</i>	Nächste Kalibrierung <i>Next calibration</i>
Umschaltmatrix <i>Commutation relay</i>	MTS Systemtechnik	KRM4-5811-T-S1	09331	—	—
Impulsbegrenzer 10 dB <i>Limiter</i>	Rohde & Schwarz	ESH3-Z2	2732546	01.2019	01.2021
Netznachbildung <i>LISN</i>	Rohde & Schwarz	ESH2-Z5	2728096	11.2016	11.2019
Messempfänger <i>Receiver</i>	Rohde & Schwarz	ESU 8	2728148	08.2018	08.2019
Schirmkabine <i>Shielded room</i>	TDK	SR 2	—	—	—

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Prüfparameter zu Funkstörspannung

#16

Test parameter of Conducted voltage emissions
operating mode videotest, A000230279-001, MICROCAM02

Startfrequenz <i>Start Frequency</i>	Stopfrequenz <i>Stop Frequency</i>	Schrittweite <i>Frequency step</i>	Anschluss <i>Terminal</i>	Durchlaufzeit <i>Sweep time</i>	ZF-Bandbreite <i>IF bandwidth</i>
150kHz	30MHz	2.25kHz	Phasc 1	10 ms/Pts	9kHz

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150kHz	30MHz	2.25kHz	Neutral	10 ms/Pts	9kHz

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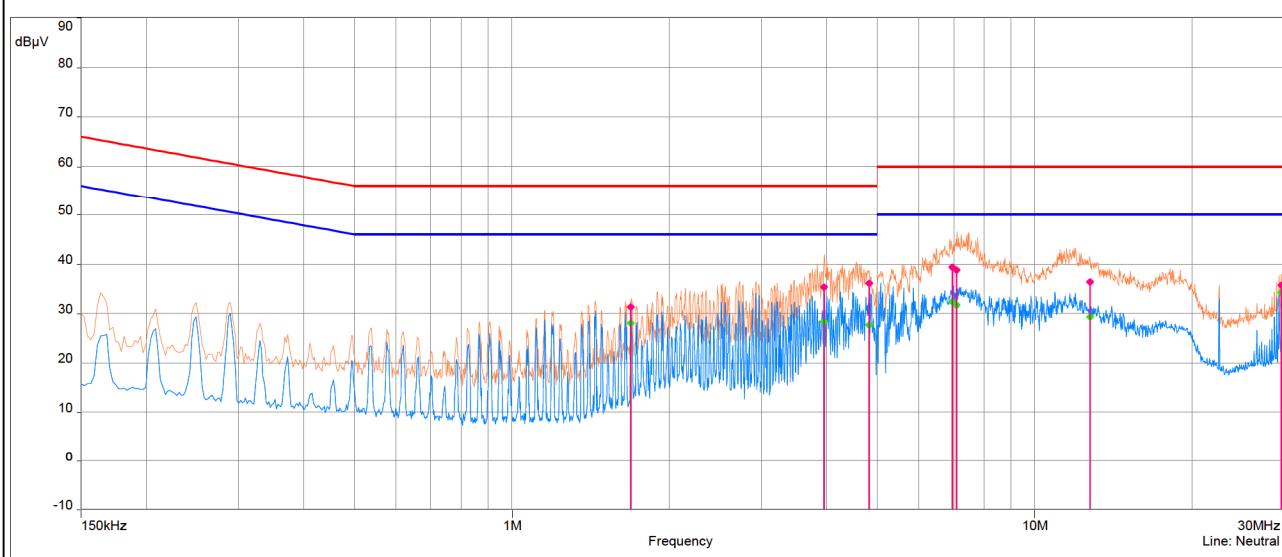
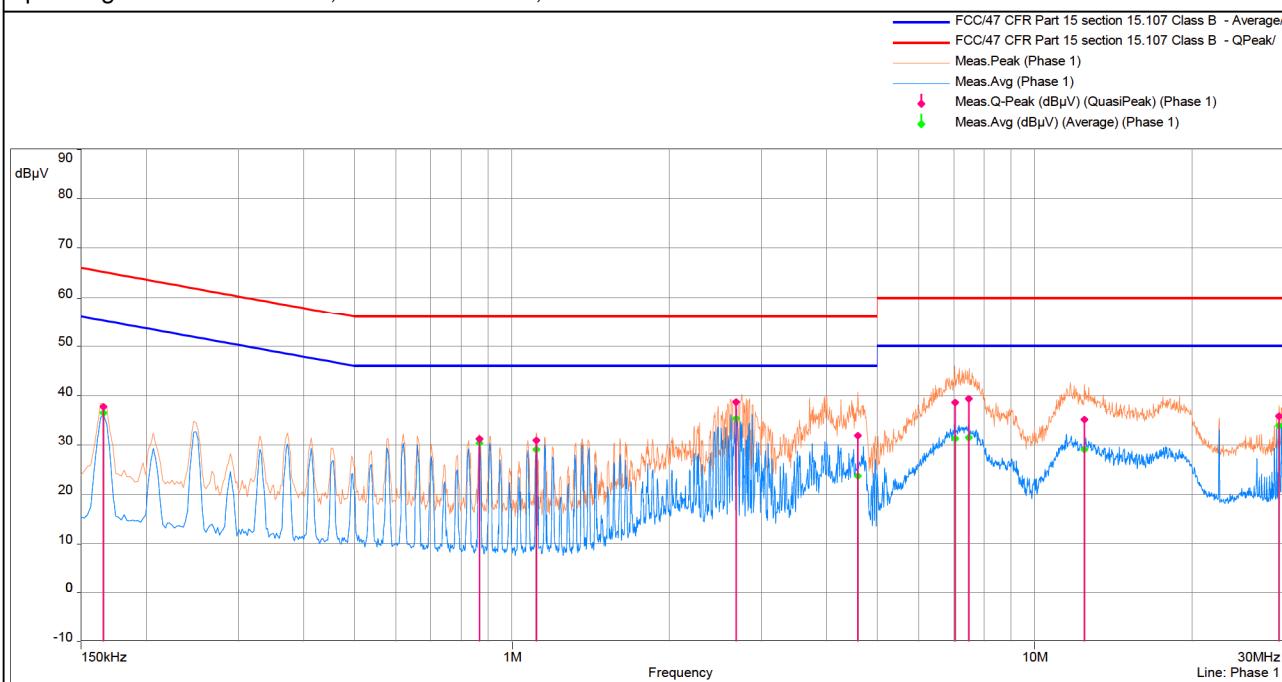
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Messdiagramme zu Funkstörspannung

#16

Graphical presentation of Conducted voltage emissions
operating mode videotostream, A000230279-001, MICROCAM02



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Messdaten zu Funkstörspannung

#16

Measurement data of Conducted voltage emissions
operating mode videotest, A000230279-001, MICROCAM02

Average (16)

Frequency (MHz)	Meas.Avg (dB μ V)	Limit (dB μ V)	Meas.-Lim (dB)	Line	Comments	Correction (dB)
0.165	36.56	55.17	-18.61	Phase 1	Pass	10.06
0.867	30.42	46.00	-15.58	Phase 1	Pass	10.11
1.114	29.02	46.00	-16.98	Phase 1	Pass	10.11
2.683	35.39	46.00	-10.61	Phase 1	Pass	10.16
4.593	23.66	46.00	-22.34	Phase 1	Pass	10.21
7.052	31.39	50.00	-18.61	Phase 1	Pass	10.30
7.485	31.52	50.00	-18.48	Phase 1	Pass	10.30
12.459	29.09	50.00	-20.91	Phase 1	Pass	10.45
29.353	33.96	50.00	-16.04	Phase 1	Pass	10.59
1.689	28.13	46.00	-17.87	Neutral	Pass	10.13
3.957	28.38	46.00	-17.62	Neutral	Pass	10.20
4.821	27.70	46.00	-18.30	Neutral	Pass	10.22
6.963	32.39	50.00	-17.61	Neutral	Pass	10.29
7.093	31.78	50.00	-18.22	Neutral	Pass	10.30
12.752	29.35	50.00	-20.65	Neutral	Pass	10.46
29.663	34.27	50.00	-15.73	Neutral	Pass	10.58

QuasiPeak (16)

Frequency (MHz)	Meas.Q-Peak (dB μ V)	Limit (dB μ V)	Meas.-Lim (dB)	Line	Comments	Correction (dB)
0.165	37.77	65.17	-27.40	Phase 1	Pass	10.06
0.867	31.28	56.00	-24.72	Phase 1	Pass	10.11
1.114	30.97	56.00	-25.03	Phase 1	Pass	10.11
2.683	38.73	56.00	-17.27	Phase 1	Pass	10.16
4.593	31.97	56.00	-24.03	Phase 1	Pass	10.21
7.052	38.58	60.00	-21.42	Phase 1	Pass	10.30
7.485	39.40	60.00	-20.60	Phase 1	Pass	10.30
12.459	35.17	60.00	-24.83	Phase 1	Pass	10.45
29.353	35.83	60.00	-24.17	Phase 1	Pass	10.59
1.689	31.31	56.00	-24.69	Neutral	Pass	10.13
3.957	35.39	56.00	20.61	Neutral	Pass	10.20
4.821	36.16	56.00	-19.84	Neutral	Pass	10.22
6.963	39.42	60.00	-20.58	Neutral	Pass	10.29
7.093	38.79	60.00	-21.21	Neutral	Pass	10.30
12.752	36.42	60.00	-23.58	Neutral	Pass	10.46
29.663	35.70	60.00	-24.30	Neutral	Pass	10.58

Bemerkungen / Remarks:

Margin value = Measurement value – Limit value

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