

On **21/09/2022** document No. **TR09220011 [0]** is applied to the following elements:

<b>REFERENCE</b>	<b>DESCRIPTION</b>
<b>539201</b>	MINIKOM AMP. MATV 4I/1O "F" FM-BIII/DAB-U-U
<b>537302</b>	MINIKOM AMP. 1I/1O "F" 47..454/470..862MHz
<b>537310</b>	MINIKOM 1I/1O "F" 47..454/470..862MHz 110Vac

# Test Report

## EMC

Document No.: **IEI16071900002**

Date: **16-07-2019**

Description: **MINIKOM AMP.**

Reference: **539201 and 537302**

Made to: **Televes**

**Test Data**

Id	Description	Start Date	End Date	Conclusions
2173	EMC measurements in MINIKOM AMP.	02-07-2019	16-07-2019	

**Standards**

Standard	Title	Part	Section
EN 50083-2:2012 + A1:2015 IEC 60728-2:2018	Cable networks for television signals, sound signals and interactive services.	Part 2: Electromagnetic compatibility for equipment.	
EN 61000-6-1:2007 IEC 61000-6-1:2005	Electromagnetic compatibility (EMC).	Part 6-1: Generic standards. Immunity for residential, commercial and light-industrial.	
EN 61000-3-3:2013 IEC 61000-3-3:2013	Electromagnetic compatibility (EMC)	Part 3-3: Limits. Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <= 16 A per phase and not subject to conditional connection	

**Standard Paragraphs**

Standard	Paragraph	Title
EN 50083-2:2012	4.2.1	Disturbance voltage at the mains terminals in the frequency range from 150 kHz to 30 MHz
EN 50083-2:2012	4.2.2	Disturbance voltages from equipment at the AC mains frequency and its harmonics
EN 50083-2:2012	4.3.3.2	Measurement of radiation of active equipment in the frequency range 30 MHz to 1000 MHz using the absorbing clamp method
EN 50083-2:2012	4.4.3	External immunity to conducted disturbances, induced by radio-frequency fields (150 kHz-80 MHz)
EN 50083-2:2012	4.4.3	External immunity to radiated disturbances, induced by radio-frequency fields (80 MHz-3 GHz)
EN 50083-2:2012	4.6	Electrostatic discharge immunity test (ESD) for active equipment
EN 50083-2:2012	4.7	Electrical fast transient/burst immunity test for AC power ports
EN 61000-6-1:2007	8	Surge immunity test
EN 61000-6-1:2007	8	Voltage dips and voltage interruptions immunity tests

**Measurements made**

No.	Res.	Measure	DUTs	Standard Applied	Standard Method	Standard Limit
1		Conducted emissions	5480	EN 50083-2:2012 Paragraph: 4.2.1	EN 55032:2015	EN 50083-2:2012
2		Harmonic current emissions	5480	EN 50083-2:2012 Paragraph: 4.2.2	EN 61000-3-2:2014	EN 61000-3-2:2014
3		Radiated power (30MHz - 1000MHz)	5480	EN 50083-2:2012 Paragraph: 4.3.3.2	EN 50083-2:2012	EN 50083-2:2012
4		Radiated power (30MHz - 1000MHz)	5479	EN 50083-2:2012 Paragraph: 4.3.3.2	EN 50083-2:2012	EN 50083-2:2012
5		Immunity to conducted disturbances	5480	EN 50083-2:2012 Paragraph: 4.4.3	EN 61000-4-6:2014	EN 50083-2:2012
6		Immunity from radiated fields	5480	EN 50083-2:2012 Paragraph: 4.4.3	EN 61000-4-3:2006	EN 50083-2:2012
7		Immunity from radiated fields	5479	EN 50083-2:2012 Paragraph: 4.4.3	EN 61000-4-3:2006	EN 50083-2:2012
8		ESD	5480	EN 50083-2:2012 Paragraph: 4.6	EN 61000-4-2:2009	EN 50083-2:2012

**Measurements made (Cont.)**

No.	Res.	Measure	DUTs	Standard Applied	Standard Method	Standard Limit
9	✓	BURST	5480	EN 50083-2:2012 Paragraph: 4.7	EN 61000-4-4:2012	EN 50083-2:2012
10	✓	SURGES	5480	EN 61000-6-1:2007 Paragraph: 8	EN 61000-4-5:2014	EN 61000-6-1:2007
11	✓	Voltage dips, short interruptions and voltage variations	5480	EN 61000-6-1:2007 Paragraph: 8	EN 61000-4-11:2004	EN 61000-6-1:2007
12	✓	Voltage changes, voltage fluctuations and flicker	5480	EN 61000-3-3:2013	EN 61000-3-3:2013	EN 61000-3-3:2013

**D.U.T.**

Id	Trade Mark	Reference	Model	Manufacturer	D.U.T.
5480	Televes	539201		Televes	MINIKOM AMP. MATV 4I/1O F FM-BIII/DAB-U-U
5479	Televes	537302		Televes	MINIKOM AMP. 1I/1O F 47..454/470..862MHz

Made by:

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Diego Rodríguez Noguero

Checked By:

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Olalla Daponte Villanueva

Approved by:

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Summary	Pag. 2
D.U.T. Description Id. 5480	Pag. 5
D.U.T. Description Id. 5479	Pag. 7
1. Disturbance voltage at the mains terminals in the frequency range from 150 kHz to 30 MHz	Pag. 9
2. Disturbance voltages from equipment at the AC mains frequency and its harmonics	Pag. 12
3. Measurement of radiation of active equipment in the frequency range 30 MHz to 1000 MHz using the absorbing clamp method	Pag. 14
4. Measurement of radiation of active equipment in the frequency range 30 MHz to 1000 MHz using the absorbing clamp method	Pag. 20
5. External immunity to conducted disturbances, induced by radio-frequency fields (150 kHz-80 MHz)	Pag. 23
6. External immunity to radiated disturbances, induced by radio-frequency fields (80 MHz-3 GHz)	Pag. 28
7. External immunity to radiated disturbances, induced by radio-frequency fields (80 MHz-3 GHz)	Pag. 34
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**D.U.T. Description Id. 5480**

**Administrative Data**

D.U.T. Id: **5480**

In Date: **02-07-2019**

**Product Data**

D.U.T.: **MINIKOM AMP. MATV 4I/10 F FM-BIII/DAB-U-U**

Trade Mark: **Televes**

Reference: **539201**

Manufacturer: **Televes**

State Development: **VPs**

Description: **MINIKOM AMP. MATV 4I/10 "F" FM-BIII/DAB-U-U**

**Technical Data**

Type: **Active**

No. of Ports: **8**

Chassis: **MiniKom**

Port	Type	Range	Direction	Connector	Comments
1	Chassis			Enclosure	
2	RF + DC	470MHz-862MHz	Input	F Connector	UHF (70mA 12V)
3	Radio Frequency	470MHz-862MHz	Input	F Connector	UHF2
4	RF + DC	174MHz-400MHz	Input	F Connector	BIII/DAB (70mA 12V)
5	Radio Frequency	88MHz-108MHz	Input	F Connector	FM
6	RF Test	88-108 / 174-400 / 470-862MHz	Output	F Connector	Test
7	Radio Frequency	88-108 / 174-400 / 470-862MHz	Output	F Connector	Output
8	Power	AC	Input	Power Connector	230Vac 56/60Hz Imax:0.045A

**D.U.T. Images**



Name **IMG\_0096**



Name **IMG\_0097**



Name **IMG\_0098**

### D.U.T. Images (Cont.)



Name **IMG\_0099**

**D.U.T. Description Id. 5479**

**Administrative Data**

D.U.T. Id: **5479**

In Date: **02-07-2019**

**Product Data**

D.U.T.: **MINIKOM AMP. 11/10 F 47..454/470..862MHz**

Trade Mark: **Televes**

Reference: **537302**

Manufacturer: **Televes**

State Development: **VPs**

Description: **MINIKOM AMP. 11/10 "F" 47..454/470..862MHz**

**Technical Data**

Type: **Active**

No. of Ports: **5**

Chassis: **MiniKom**

Port	Type	Range	Direction	Connector	Comments
1	Chassis			Enclosure	
2	RF + DC	47MHz-454MHz/470MHz-862MHz	Input	F Connector	70mA 12V
3	Radio Frecuency	47MHz-454MHz/470MHz-862MHz	Output	F Connector	Output
4	RF Test	47MHz-454MHz/470MHz-862MHz	Output	F Connector	Test
5	Power	AC	Input	Power Connector	230Vac 56/60Hz Imax:0.045A

**D.U.T. Images**



Name **IMG\_0092**



Name **IMG\_0093**



Name **IMG\_0094**



### D.U.T. Images (Cont.)



Name **IMG\_0095**

**1. Disturbance voltage at the mains terminals in the frequency range from 150 kHz to 30 MHz**

**Measure**

TSP Id.: **PEE-EMI-001**

Date: **11-07-2019**

Title: **Conducted emissions**

**Standard**

TSP Id.: **NOR-APAR-291**

Standard: **EN 50083-2:2012**

Paragraph: **4.2.1**

Title: **Cable networks for television signals, sound signals and interactive services.  
Part 2: Electromagnetic compatibility for equipment.**

Paragraph: **Disturbance voltage at the mains terminals in the frequency range from 150 kHz to 30 MHz**

Equivalent Standards: **UNE-EN 50083-2:2013  
IEC 60728-2:2018**

**Standard Limit**

Standard: **EN 50083-2:2012**

Title: **Cable networks for television signals, sound signals and interactive services.  
Part 2: Electromagnetic compatibility for equipment.**

Equivalent Standards: **UNE-EN 50083-2:2013  
IEC 60728-2:2018**

**Standard Method**

Standard: **EN 55032:2015**

Title: **Electromagnetic compatibility of multimedia equipment. Emission requirements.**

Equivalent Standards: **UNE-EN 55032:2016  
CISPR 32:2015**

**Measure D.U.Ts**

Id	Trade Mark	Reference	Model	Manufacturer	D.U.T.
5480	Televes	539201		Televes	MINIKOM AMP. MATV 4I/10 F FM-BIII/DAB-U-U

**Environmental Conditions**

Temperature: **22.1°C**

Humidity: **52.1%**

Atmospheric Pressure: **1003mbar**

**Used Equipment**

Id	Equipment	Trade Mark	Model	Serial No.
47	Faraday chamber Siemens Model B8 3107A 353	Siemens	B8 3107A 353	
22	LISN ESH3-Z5 Rohde&Schwarz	R&S	ESH3-Z5	834129/001
75	Measurement receiver R&S ESCI 3 9KHz-3GHz	R&S	ESCI-ref 1166.5950.03	100393



**2. Disturbance voltages from equipment at the AC mains frequency and its harmonics**

**Measure**

TSP Id.: **PEE-EMI-010**

Date: **12-07-2019**

Title: **Harmonic current emissions**

**Standard**

TSP Id.: **NOR-APAR-292**

Standard: **EN 50083-2:2012**

Paragraph: **4.2.2**

Title: **Cable networks for television signals, sound signals and interactive services.  
Part 2: Electromagnetic compatibility for equipment.**

Paragraph: **Disturbance voltages from equipment at the AC mains frequency and its harmonics**

Equivalent Standards: **UNE-EN 50083-2:2013  
IEC 60728-2:2018**

**Standard Method | Standard Limit**

Standard: **EN 61000-3-2:2014**

Title: **Electromagnetic compatibility (EMC)  
Part 3-2: Limits. Limits for harmonic current emissions (equipment input current)**

Equivalent Standards: **UNE-EN 61000-3-2:2014  
CEI 61000-3-2:2014**

**Measure D.U.Ts**

Id	Trade Mark	Reference	Model	Manufacturer	D.U.T.
5480	Televes	539201		Televes	MINIKOM AMP. MATV 4I/1O F FM-BIII/DAB-U-U

**Environmental Conditions**

Temperature: **22.1°C**

Humidity: **52.1%**

Atmospheric Pressure: **1003mbar**

**Used Equipment**

Id	Equipment	Trade Mark	Model	Serial No.
178	PC Harmonics and flicker control	Dell (Intel)	Optiplex GX 100	37049956003
114	Proflin 2105-400, P/N: 7000-445-1 Schaffner	Schaffner	NSG 1007	54636
113	CCN 1000-1, P/N: 5004-417-1 Schaffner	Schaffner	CCN 1000	71995

**Measure Data**

Port No.: **8**

Measure No.: **1**

Measure Date: **12-07-2019**

**Flicker Test Summary per EN/IEC61000-3-3 (Run time)**

EUT: MINIKOM AMP. MATV 4I/10 F FM-BIII/DAB-U-U

Tested by: EN 61000-3-3:2013

Test category: All parameters (European limits)

Test Margin: 100

Test date: 11/07/19

Start time: 10:43:53

End time: 10:54:13

Test duration (min): 10

Data file name: F-000355.cts\_data

Comment:

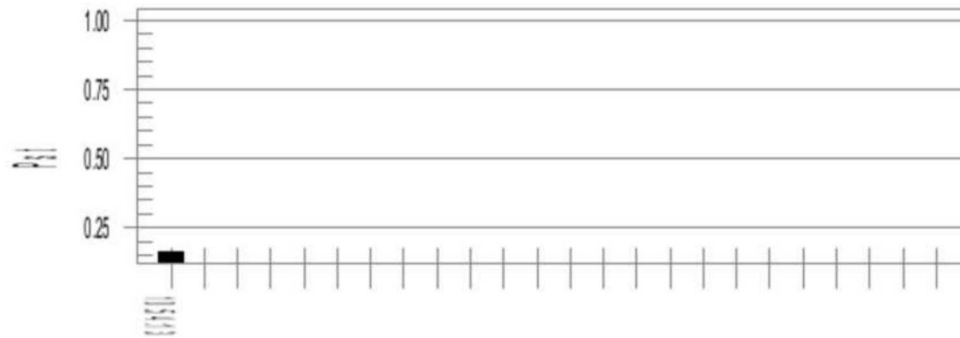
Customer: Televes

Test Result: **Pass**

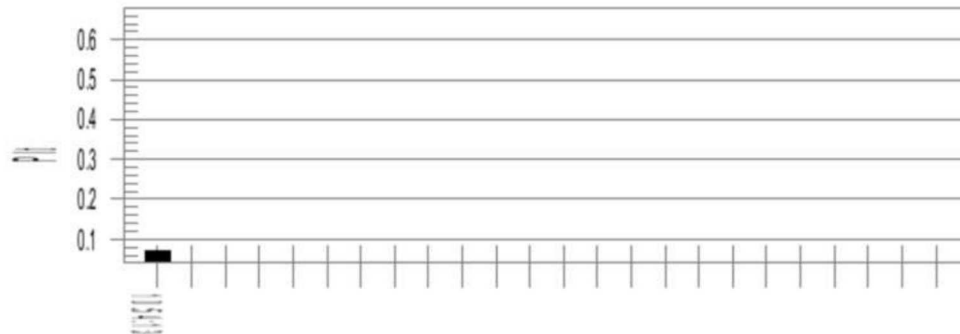
Status: **Test Completed**

Pst, and limit line

European Limits



Plt and limit line



**Parameter values recorded during the test:**

Vrms at the end of test (Volt): **229.99**

Highest dt (%): **0.00**

Time(mS) > dt: **0.0**

Highest dc (%): **0.00**

Highest dmax (%): **0.00**

Highest Pst (10 min. period): **0.160**

Highest Plt (2 hr. period): **0.070**

Test limit (%): **3.30** **Pass**

Test limit (mS): **500.0** **Pass**

Test limit (%): **3.30** **Pass**

Test limit (%): **4.00** **Pass**

Test limit: **1.000** **Pass**

Test limit: **0.650** **Pass**

**3. Measurement of radiation of active equipment in the frequency range 30 MHz to 1000 MHz using the absorbing clamp method**

**Measure**

TSP Id.: **PEE-EMI-006** Date: **15-07-2019**

Title: **Radiated power. Manual absorbing clamp method**

**Standard**

TSP Id.: **NOR-APAR-294**

Standard: **EN 50083-2:2012** Paragraph: **4.3.3.2**

Title: **Cable networks for television signals, sound signals and interactive services. Part 2: Electromagnetic compatibility for equipment.**

Paragraph: **Measurement of radiation of active equipment in the frequency range 30 MHz to 1000 MHz using the absorbing clamp method**

Equivalent Standards: **UNE-EN 50083-2:2013 IEC 60728-2:2018**

**Standard Method | Standard Limit**

Standard: **EN 50083-2:2012**

Title: **Cable networks for television signals, sound signals and interactive services. Part 2: Electromagnetic compatibility for equipment.**

Equivalent Standards: **UNE-EN 50083-2:2013 IEC 60728-2:2018**

**Measure D.U.Ts**

Id	Trade Mark	Reference	Model	Manufacturer	D.U.T.
5480	Televes	539201		Televes	MINIKOM AMP. MATV 4I/10 F FM-BIII/DAB-U-U

**Environmental Conditions**

Temperature: **22.1°C** Humidity: **52.1%** Atmospheric Pressure: **1003mbar**

**Used Equipment**

Id	Equipment	Trade Mark	Model	Serial No.
27	Analyzer EMC HP8591EM	HP	8591EM	3412A00118
28	Signal Generator HP 250KHz a 3GHz ESG 3000A	HP	ESG 3000A modelo E4421A	GB36260108
23	Absorbing Clamp 30-1000MHz MDS21	R&S	MDS21	832231/043

**Measure Data**

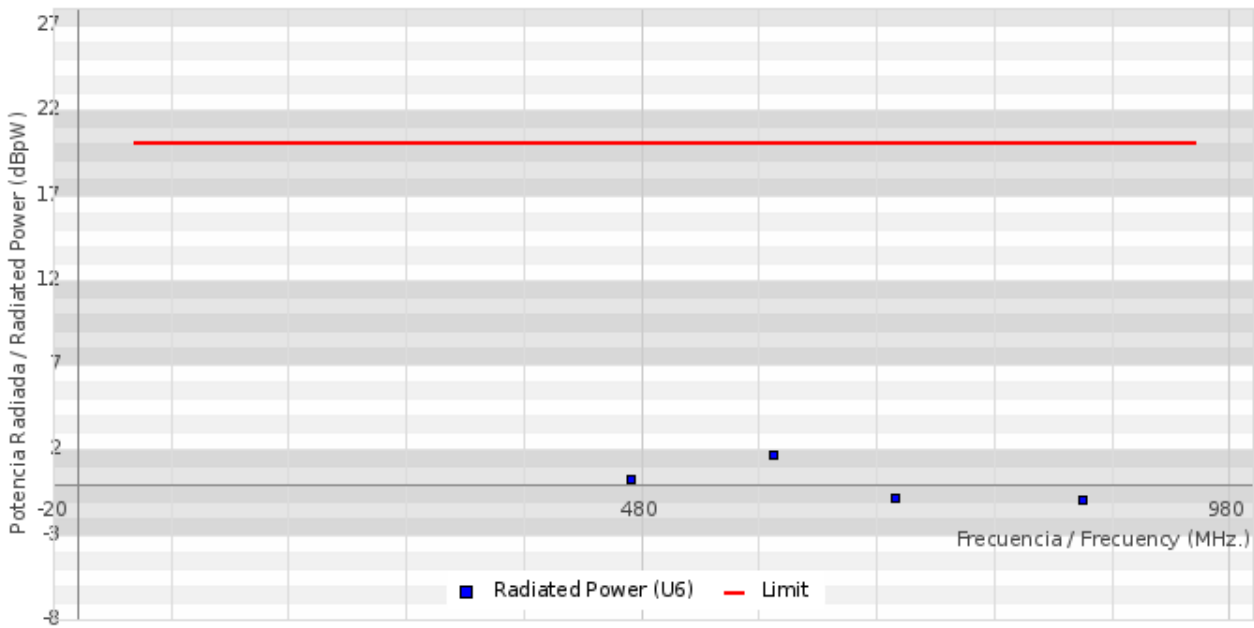
Port No.:	<b>2</b>	Measure No.:	<b>1</b>	Measure Date:	<b>16-07-2019</b>
Type:	<b>RF + DC</b>	Range:	<b>470MHz-862MHz</b>	Direction:	<b>Input</b>
Connector:	<b>F Connector</b>	Comments:	<b>UHF (70mA 12V)</b>		

**Data Table**

Band	Frequency (MHz)	Level (dBpW)	Limit
TV Band IV (Channels 21 - 69)	471.25	0.28	20.00
TV Band IV (Channels 21 - 69)	591.25	1.69	20.00
TV Bands V (Channels 37 - 69)	695.25	-0.81	20.00
TV Bands V (Channels 37 - 69)	855.25	-0.89	20.00

**Graph**

MINIKOM AMP. MATV 4I/10 F FM-BIII/DAB-U-U - Port No 2 RF + DC 470MHz-862MHz Input F Connector





**Measure Data**

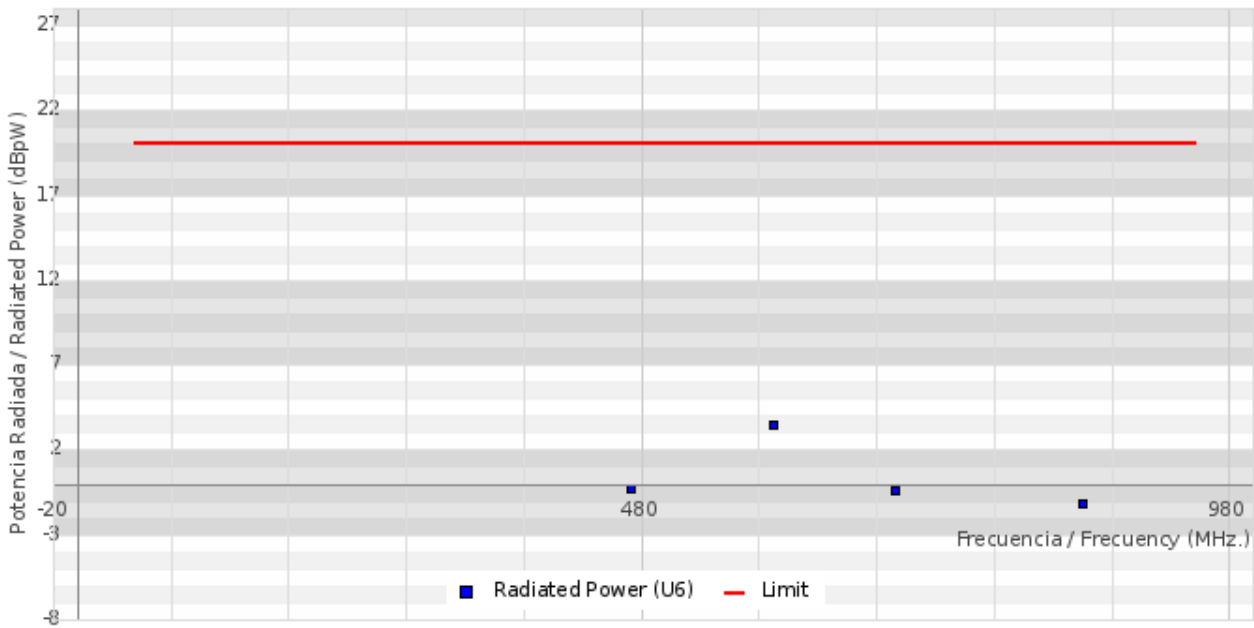
Port No.:	<b>3</b>	Measure No.:	<b>1</b>	Measure Date:	<b>16-07-2019</b>
Type:	<b>Radio Frecuency</b>	Range:	<b>470MHz-862MHz</b>	Direction:	<b>Input</b>
Connector:	<b>F Connector</b>	Comments:	<b>UHF2</b>		

**Data Table**

Band	Frequency (MHz)	Level (dBpW)	Limit
TV Band IV (Channels 21 - 69)	471.25	-0.24	20.00
TV Band IV (Channels 21 - 69)	591.25	3.50	20.00
TV Bands V (Channels 37 - 69)	695.25	-0.39	20.00
TV Bands V (Channels 37 - 69)	855.25	-1.20	20.00

**Graph**

MINIKOM AMP. MATV 4I/10 F FM-BIII/DAB-U-U - Port No 3 Radio Frecuency 470MHz-862MHz Input F Connector



**Measure Data**

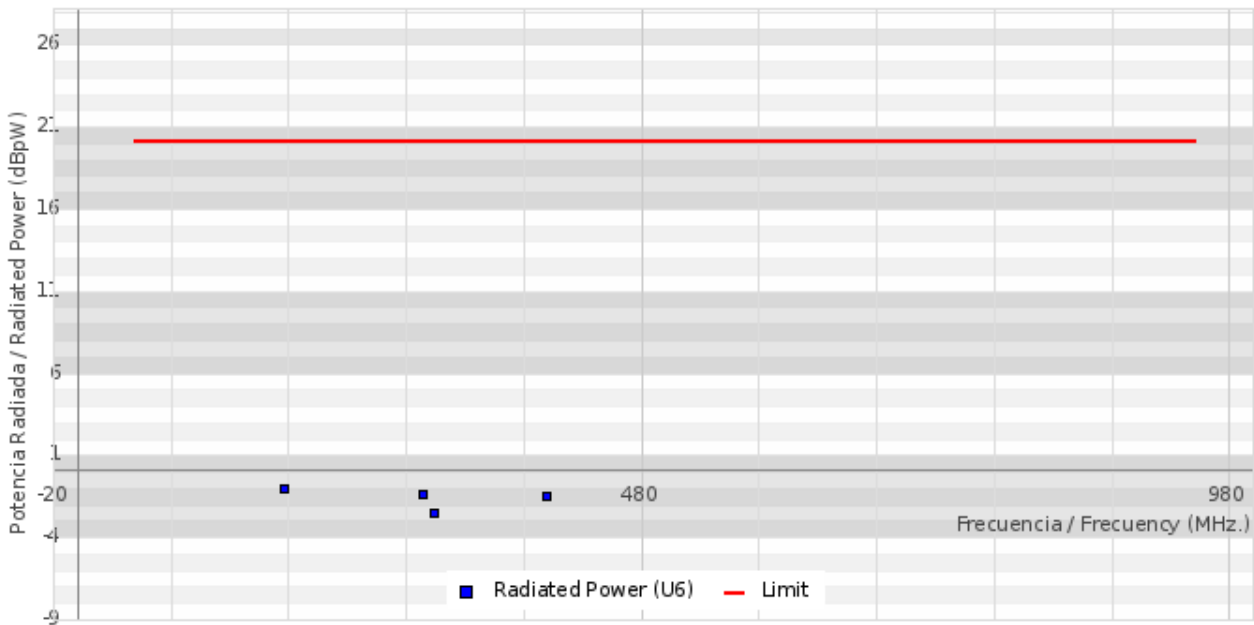
Port No.:	<b>4</b>	Measure No.:	<b>1</b>	Measure Date:	<b>16-07-2019</b>
Type:	<b>RF + DC</b>	Range:	<b>174MHz-400MHz</b>	Direction:	<b>Input</b>
Connector:	<b>F Connector</b>	Comments:	<b>BIII/DAB (70mA 12V)</b>		

**Data Table**

Band	Frequency (MHz)	Level (dBpW)	Limit
TV Band III (Channels 5 - 12)	175.25	-1.08	20.00
High S Band	294.25	-1.47	20.00
Hyperband	303.25	-2.61	20.00
Hyperband	399.25	-1.59	20.00

**Graph**

MINIKOM AMP. MATV 4I/10 F FM-BIII/DAB-U-U - Port No 4 RF + DC 174MHz-400MHz Input F Connector



**Measure Data**

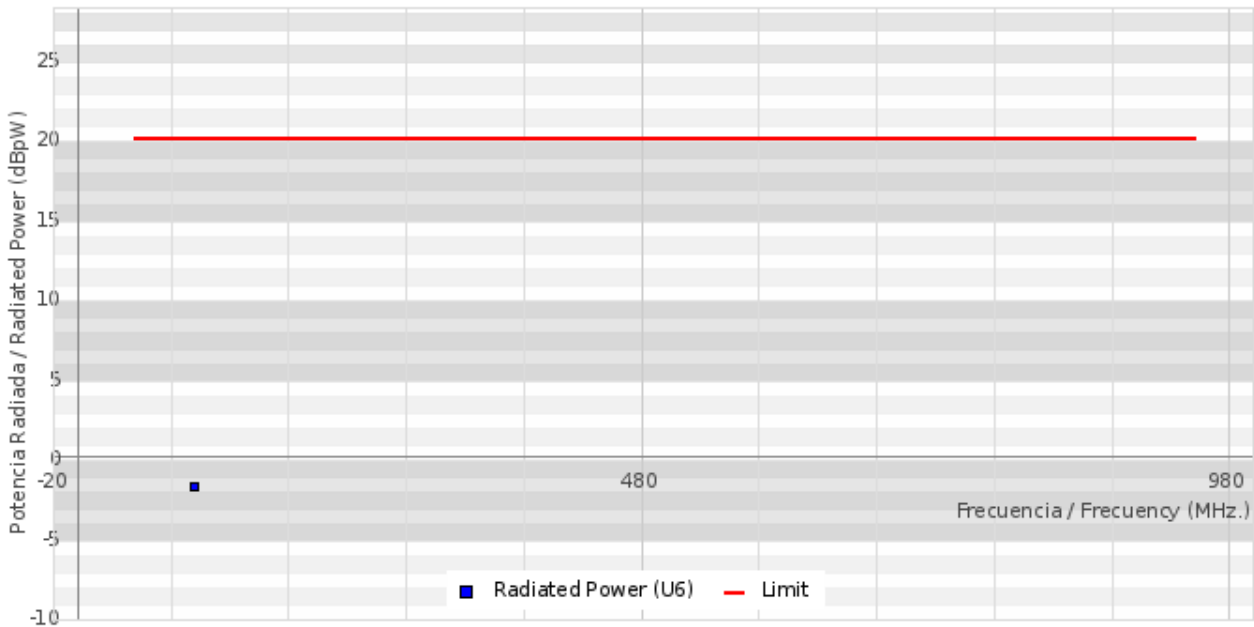
Port No.:	<b>5</b>	Measure No.:	<b>1</b>	Measure Date:	<b>16-07-2019</b>
Type:	<b>Radio Frequency</b>	Range:	<b>88MHz-108MHz</b>	Direction:	<b>Input</b>
Connector:	<b>F Connector</b>	Comments:	<b>FM</b>		

**Data Table**

Band	Frequency (MHz)	Level (dBpW)	Limit
<b>FM Radio Band II</b>	<b>100.00</b>	<b>-1.88</b>	<b>20.00</b>

**Graph**

MINIKOM AMP. MATV 4I/10 F FM-BIII/DAB-U-U - Port No 5 Radio Frequency 88MHz-108MHz Input F Connector



**Measure Data**

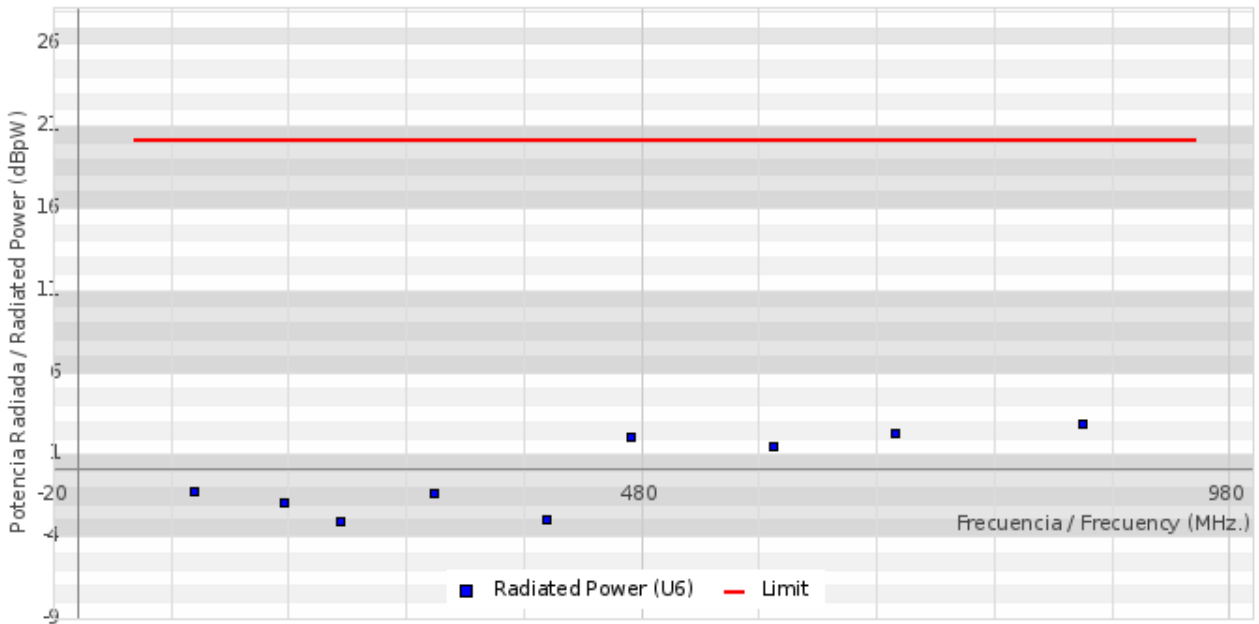
Port No.:	<b>7</b>	Measure No.:	<b>1</b>	Measure Date:	<b>16-07-2019</b>
Type:	<b>Radio Frequency</b>	Range:	<b>88-108 / 174-400 / 470-862MHz</b>	Direction:	<b>Output</b>
Connector:	<b>F Connector</b>	Comments:	<b>Output</b>		

**Data Table**

Band	Frequency (MHz)	Level (dBpW)	Limit
FM Radio Band II	100.00	-1.33	20.00
TV Band III (Channels 5 - 12)	175.25	-2.06	20.00
TV Band III (Channels 5 - 12)	224.25	-3.17	20.00
Hyperband	303.25	-1.42	20.00
Hyperband	399.25	-3.06	20.00
TV Band IV (Channels 21 - 69)	471.25	2.01	20.00
TV Band IV (Channels 21 - 69)	591.25	1.42	20.00
TV Bands V (Channels 37 - 69)	695.25	2.17	20.00
TV Bands V (Channels 37 - 69)	855.25	2.74	20.00

**Graph**

IINIKOM AMP. MATV 4I/10 F FM-BIII/DAB-U-U - Port No 7 Radio Frequency 88-108 / 174-400 / 470-862MHz Output F Connector



**4. Measurement of radiation of active equipment in the frequency range 30 MHz to 1000 MHz using the absorbing clamp method**

**Measure**

TSP Id.: **PEE-EMI-006** Date: **15-07-2019**

Title: **Radiated power. Manual absorbing clamp method**

**Standard**

TSP Id.: **NOR-APAR-294**

Standard: **EN 50083-2:2012** Paragraph: **4.3.3.2**

Title: **Cable networks for television signals, sound signals and interactive services. Part 2: Electromagnetic compatibility for equipment.**

Paragraph: **Measurement of radiation of active equipment in the frequency range 30 MHz to 1000 MHz using the absorbing clamp method**

Equivalent Standards: **UNE-EN 50083-2:2013 IEC 60728-2:2018**

**Standard Method | Standard Limit**

Standard: **EN 50083-2:2012**

Title: **Cable networks for television signals, sound signals and interactive services. Part 2: Electromagnetic compatibility for equipment.**

Equivalent Standards: **UNE-EN 50083-2:2013 IEC 60728-2:2018**

**Measure D.U.Ts**

Id	Trade Mark	Reference	Model	Manufacturer	D.U.T.
5479	Televes	537302		Televes	MINIKOM AMP. 11/10 F 47..454/470..862MHz

**Environmental Conditions**

Temperature: **22.1°C** Humidity: **52.1%** Atmospheric Pressure: **1003mbar**

**Used Equipment**

Id	Equipment	Trade Mark	Model	Serial No.
27	Analyzer EMC HP8591EM	HP	8591EM	3412A00118
28	Signal Generator HP 250KHz a 3GHz ESG 3000A	HP	ESG 3000A modelo E4421A	GB36260108
23	Absorbing Clamp 30-1000MHz MDS21	R&S	MDS21	832231/043

**Measure Data**

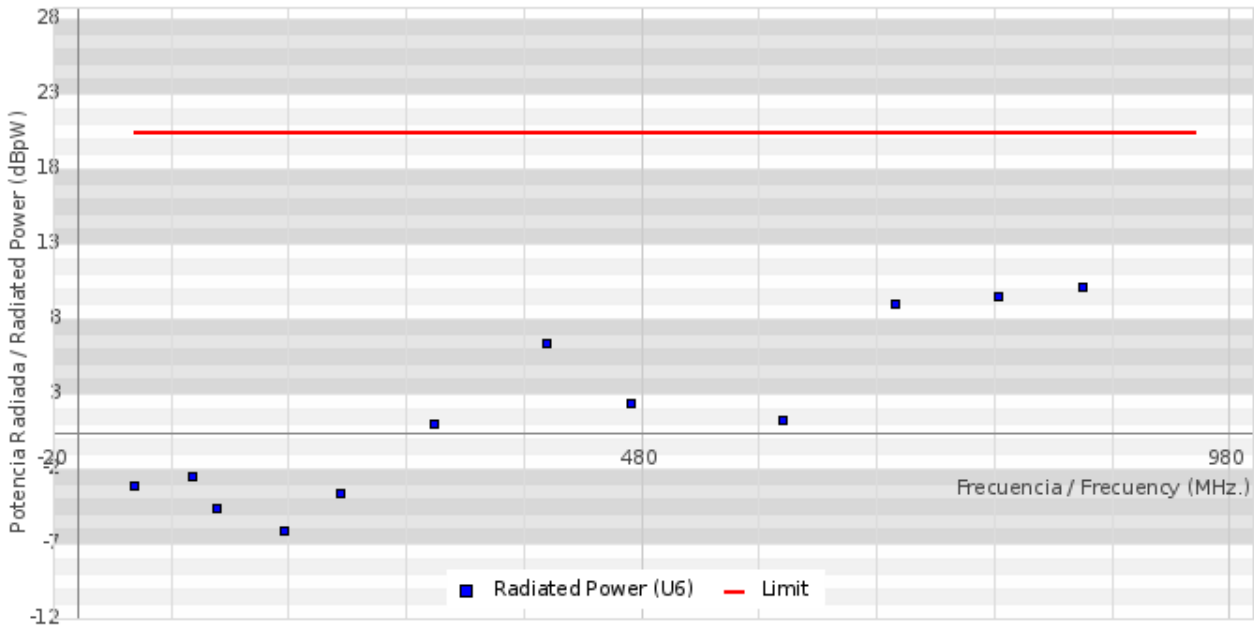
Port No.:	<b>2</b>	Measure No.:	<b>1</b>	Measure Date:	<b>15-07-2019</b>
Type:	<b>RF + DC</b>	Range:	<b>47MHz-454MHz/470MHz-862MHz</b>	Direction:	<b>Input</b>
Connector:	<b>F Connector</b>	Comments:	<b>70mA 12V</b>		

**Data Table**

Band	Frequency (MHz)	Level (dBpW)	Limit
TV Band I (Channels 2 - 4)	48.25	-3.56	20.00
FM Radio Band II	98.00	-2.90	20.00
Low S Band	119.25	-5.06	20.00
TV Band III (Channels 5 - 12)	175.25	-6.52	20.00
TV Band III (Channels 5 - 12)	224.25	-4.06	20.00
Hyperband	303.25	0.65	20.00
Hyperband	399.25	5.97	20.00
TV Band IV (Channels 21 - 69)	471.25	2.01	20.00
TV Band IV (Channels 21 - 69)	599.25	0.85	20.00
TV Bands V (Channels 37 - 69)	695.25	8.61	20.00
TV Bands V (Channels 37 - 69)	783.25	9.11	20.00
TV Bands V (Channels 37 - 69)	855.25	9.71	20.00

**Graph**

MINIKOM AMP. 1I/10 F 47..454/470..862MHz - Port No 2 RF + DC 47MHz-454MHz/470MHz-862MHz Input F Connector



**Measure Data**

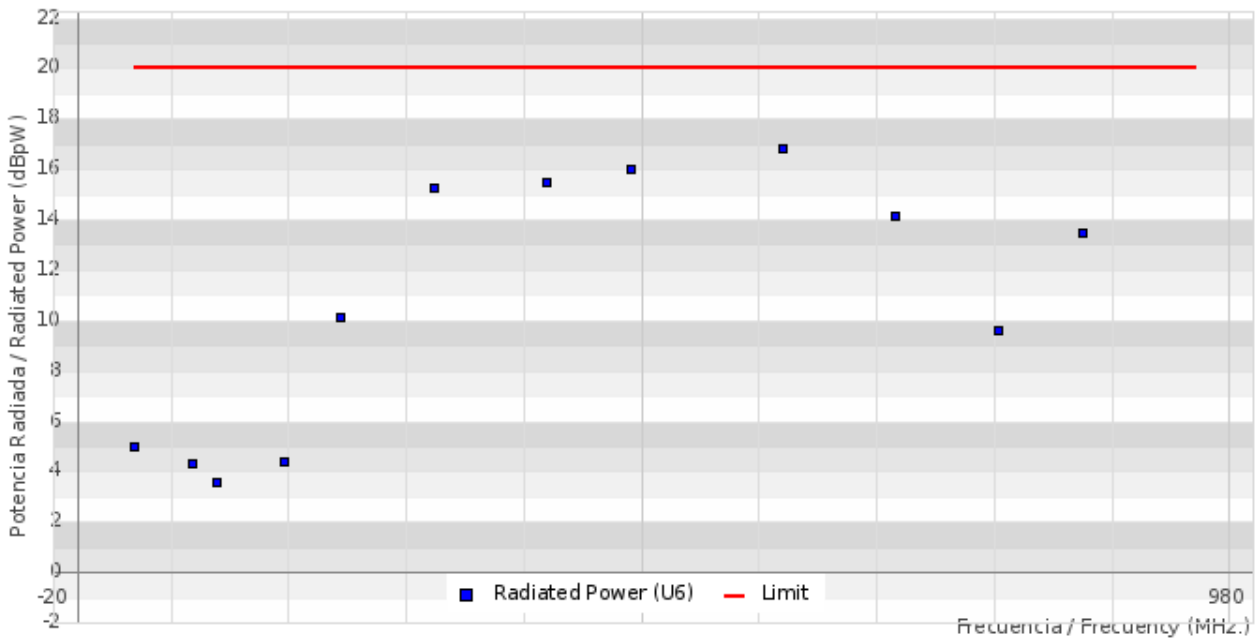
Port No.:	<b>3</b>	Measure No.:	<b>1</b>	Measure Date:	<b>15-07-2019</b>
Type:	<b>Radio Frequency</b>	Range:	<b>47MHz-454MHz/470MHz-862MHz</b>	Direction:	<b>Output</b>
Connector:	<b>F Connector</b>	Comments:	<b>Output</b>		

**Data Table**

Band	Frequency (MHz)	Level (dBpW)	Limit
TV Band I (Channels 2 - 4)	48.25	5.01	20.00
FM Radio Band II	98.00	4.27	20.00
Low S Band	119.25	3.55	20.00
TV Band III (Channels 5 - 12)	175.25	4.35	20.00
TV Band III (Channels 5 - 12)	224.25	10.11	20.00
Hyperband	303.25	15.22	20.00
Hyperband	399.25	15.44	20.00
TV Band IV (Channels 21 - 69)	471.25	16.00	20.00
TV Band IV (Channels 21 - 69)	599.25	16.81	20.00
TV Bands V (Channels 37 - 69)	695.25	14.15	20.00
TV Bands V (Channels 37 - 69)	783.25	9.57	20.00
TV Bands V (Channels 37 - 69)	855.25	13.44	20.00

**Graph**

MINIKOM AMP. 1I/10 F 47..454/470..862MHz - Port No 3 Radio Frequency 47MHz-454MHz/470MHz-862MHz Output F Connector



**5. External immunity to conducted disturbances, induced by radio-frequency fields (150 kHz-80 MHz)**

**Measure**

TSP Id.: **PEE-INM-001**

Date: **12-07-2019**

Title: **External immunity to induced voltage. Automatic test with EM test equipment**

**Standard**

TSP Id.: **NOR-APAR-296**

Standard: **EN 50083-2:2012**

Paragraph: **4.4.3**

Title: **Cable networks for television signals, sound signals and interactive services. Part 2: Electromagnetic compatibility for equipment.**

Paragraph: **External immunity to conducted disturbances, induced by radio-frequency fields (150 kHz-80 MHz)**

Equivalent Standards: **UNE-EN 50083-2:2013  
IEC 60728-2:2018**

**Standard Limit**

Standard: **EN 50083-2:2012**

Title: **Cable networks for television signals, sound signals and interactive services. Part 2: Electromagnetic compatibility for equipment.**

Equivalent Standards: **UNE-EN 50083-2:2013  
IEC 60728-2:2018**

**Standard Method**

Standard: **EN 61000-4-6:2014**

Title: **Electromagnetic compatibility (EMC). Part 4-6: Testing and measurement techniques. Immunity to conducted disturbances, induced by radio-frequency fields**

Equivalent Standards: **UNE-EN 61000-4-6:2014  
IEC 61000-4-6:2013**

**Measure D.U.Ts**

Id	Trade Mark	Reference	Model	Manufacturer	D.U.T.
5480	Televes	539201		Televes	MINIKOM AMP. MATV 4I/10 F FM-BIII/DAB-U-U

**Environmental Conditions**

Temperature: **22.1°C**

Humidity: **52.1%**

Atmospheric Pressure: **1003mbar**



**Used Equipment**

Id	Equipment	Trade Mark	Model	Serial No.
52	CWS 500A / CNC 508 EM TEST	EMTEST	CWS500   CNC508	1099-10   0500-01

**Measure Data**

Port No.:	<b>2</b>	Measure No.:	<b>1</b>	Measure Date:	<b>12-07-2019</b>
Type:	<b>RF + DC</b>	Range:	<b>470MHz-862MHz</b>	Direction:	<b>Input</b>
Connector:	<b>F Connector</b>	Comments:	<b>UHF (70mA 12V)</b>		
		Measure:	<b>Out-Band</b>		
Measurement Range:	<b>0.15MHz - 80MHz</b>	Voltage (V):	<b>1.78</b>	Voltage (dBµV):	<b>125</b>
Modulation:	<b>80% AM (1KHz)</b>	Frequency Steps:	<b>1%</b>	Time Spent:	<b>0.5ss</b>
Acceptance Criteria:	<b>A - No loss of Functionality or Activity</b>				
Result:	<b>✔ (A - No loss of Functionality or Activity)</b>				

**Data Table**

Frequency (MHz)	Pass
480	✔
680	✔
850	✔

**Measure Data**

Port No.:	<b>3</b>	Measure No.:	<b>1</b>	Measure Date:	<b>15-07-2019</b>
Type:	<b>Radio Frequency</b>	Range:	<b>470MHz-862MHz</b>	Direction:	<b>Input</b>
Connector:	<b>F Connector</b>	Comments:	<b>UHF2</b>		
		Measure:	<b>Out-Band</b>		
Measurement Range:	<b>0.15MHz - 80MHz</b>	Voltage (V):	<b>1.78</b>	Voltage (dBµV):	<b>125</b>
Modulation:	<b>80% AM (1KHz)</b>	Frequency Steps:	<b>1%</b>	Time Spent:	<b>0.5ss</b>
Acceptance Criteria:	<b>A - No loss of Functionality or Activity</b>				
Result:	<b>✔ (A - No loss of Functionality or Activity)</b>				

**Data Table**

Frequency (MHz)	Pass
480	✔
680	✔
850	✔

**Measure Data**

Port No.:	<b>4</b>	Measure No.:	<b>1</b>	Measure Date:	<b>15-07-2019</b>
Type:	<b>RF + DC</b>	Range:	<b>174MHz-400MHz</b>	Direction:	<b>Input</b>
Connector:	<b>F Connector</b>	Comments:	<b>BIII/DAB (70mA 12V)</b>		
		Measure:	<b>Out-Band</b>		
Measurement Range:	<b>0.15MHz - 80MHz</b>	Voltage (V):	<b>1.78</b>	Voltage (dBµV):	<b>125</b>
Modulation:	<b>80% AM (1KHz)</b>	Frequency Steps:	<b>1%</b>	Time Spent:	<b>0.5ss</b>
Acceptance Criteria:	<b>A - No loss of Functionality or Activity</b>				
Result:	<b>✔ (A - No loss of Functionality or Activity)</b>				

**Data Table**

Frequency (MHz)	Pass
176	✔

**Measure Data**

Port No.:	<b>5</b>	Measure No.:	<b>1</b>	Measure Date:	<b>15-07-2019</b>
Type:	<b>Radio Frequency</b>	Range:	<b>88MHz-108MHz</b>	Direction:	<b>Input</b>
Connector:	<b>F Connector</b>	Comments:	<b>FM</b>		
		Measure:	<b>Out-Band</b>		
Measurement Range:	<b>0.15MHz - 80MHz</b>	Voltage (V):	<b>1.78</b>	Voltage (dBµV):	<b>125</b>
Modulation:	<b>80% AM (1KHz)</b>	Frequency Steps:	<b>1%</b>	Time Spent:	<b>0.5ss</b>
Acceptance Criteria:	<b>A - No loss of Functionality or Activity</b>				
Result:	<b>✔ (A - No loss of Functionality or Activity)</b>				

**Data Table**

Frequency (MHz)	Pass
48	✔
100	✔

**Measure Data**

Port No.:	<b>8</b>	Measure No.:	<b>2</b>	Measure Date:	<b>15-07-2019</b>
Type:	<b>Power</b>	Range:	<b>AC</b>	Direction:	<b>Input</b>
Connector:	<b>Power Connector</b>	Comments:	<b>230Vac 56/60Hz I<sub>max</sub>:0.045A</b>		
		Measure:	<b>Out-Band</b>		
Measurement Range:	<b>0.15MHz - 80MHz</b>	Voltage (V):	<b>1.78</b>	Voltage (dBμV):	<b>125</b>
Modulation:	<b>80% AM (1KHz)</b>	Frequency Steps:	<b>1%</b>	Time Spent:	<b>0.5ss</b>
Acceptance Criteria:	<b>A - No loss of Functionality or Activity</b>				
Result:	<b>✔ (A - No loss of Functionality or Activity)</b>				

**Data Table**

Frequency (MHz)	Pass
100	✔
176	✔
480	✔
680	✔
850	✔

**6. External immunity to radiated disturbances, induced by radio-frequency fields (80 MHz-3 GHz)**

**Measure**

TSP Id.: **PEE-INM-003** Date: **15-07-2019**

Title: **External immunity to radiated fields. Anechoic chamber measurement**

Description: **Radiated, radio-frequency, electromagnetic field immunity test**

**Standard**

TSP Id.: **NOR-APAR-297**

Standard: **EN 50083-2:2012** Paragraph: **4.4.3**

Title: **Cable networks for television signals, sound signals and interactive services. Part 2: Electromagnetic compatibility for equipment.**

Paragraph: **External immunity to radiated disturbances, induced by radio-frequency fields (80 MHz-3 GHz)**

Equivalent Standards: **UNE-EN 50083-2:2013  
IEC 60728-2:2018**

**Standard Limit**

Standard: **EN 50083-2:2012**

Title: **Cable networks for television signals, sound signals and interactive services. Part 2: Electromagnetic compatibility for equipment.**

Equivalent Standards: **UNE-EN 50083-2:2013  
IEC 60728-2:2018**

**Standard Method**

Standard: **EN 61000-4-3:2006**

Title: **Electromagnetic compatibility (EMC). Part 4-3: Testing and measurement techniques. Radiated, radio-frequency, electromagnetic field immunity test.**

Equivalent Standards: **UNE-EN 61000-4-3:2007  
IEC 61000-4-3:2006**

**Measure D.U.Ts**

Id	Trade Mark	Reference	Model	Manufacturer	D.U.T.
5480	Televes	539201		Televes	MINIKOM AMP. MATV 4I/1O F FM-BIII/DAB-U-U

**Environmental Conditions**

Temperature: **22.1°C**

Humidity: **52.1%**

Atmospheric Pressure: **1003mbar**

**Used Equipment**

Id	Equipment	Trade Mark	Model	Serial No.
142	Power amplifier BLWA 0830-160/100/20D BONN Elektronik (80MHz-3GHz)	BONN Elektronik	BLWA 0830-160/100/20D	056113B
48	Ultra broadband antenna R&S HL 562 Ultralog	R&S	4041.3000.02	100211
43	Anechoic chamber Albatros M-CDC Model B83117	Albatross Projects	B83117-A1431-T162	22180
138	Signal generator R&S (9KHz-3.3GHz)	R&S	SML03-ref 1090.3000.13	102478

**Measure Data**

Port No.:	1	Measure No.:	1	Measure Date:	15-07-2019
Type:	Chassis				
Connector:	Enclosure				
Unwanted signal range:	80MHz - 88MHz	Measure:	Out-Band		
Voltage (V/m):	1.78	Voltage (dBµV/m):	125	Modulation:	80% AM (1KHz)
Acceptance Criteria:	A - No loss of Functionality or Activity				
Result:	✔ (A - No loss of Functionality or Activity)				

**Data Table**

Frequency (MHz)	Pass
100	✔
176	✔
480	✔
680	✔
850	✔


**Measure Data**

Port No.:	1	Measure No.:	2	Measure Date:	15-07-2019
Type:	Chassis				
Connector:	Enclosure				
Unwanted signal range:	88MHz - 108MHz	Measure:	In-Band		
Voltage (V/m):	0.2	Voltage (dBµV/m):	106	Modulation:	80% AM (1KHz)
Acceptance Criteria:	A - No loss of Functionality or Activity				
Result:	✔ (A - No loss of Functionality or Activity)				






**Data Table**

Frequency (MHz)	Pass
176	✔
300	✔
470	✔
680	✔
860	✔


**Measure Data**

Port No.:	<b>1</b>	Measure No.:	<b>3</b>	Measure Date:	<b>15-07-2019</b>
Type:	<b>Chassis</b>				
Connector:	<b>Enclosure</b>				
Unwanted signal range:	<b>108MHz - 174MHz</b>			Measure:	<b>Out-Band</b>
Voltage (V/m):	<b>1.78</b>	Voltage (dBµV/m):	<b>125</b>	Modulation:	<b>80% AM (1KHz)</b>
Acceptance Criteria:	<b>A - No loss of Functionality or Activity</b>				
Result:	 <b>(A - No loss of Functionality or Activity)</b>				






**Data Table**

Frequency (MHz)	Pass
100	
176	
480	
680	
850	

**Measure Data**

Port No.:	<b>1</b>	Measure No.:	<b>4</b>	Measure Date:	<b>15-07-2019</b>
Type:	<b>Chassis</b>				
Connector:	<b>Enclosure</b>				
Unwanted signal range:	<b>174MHz - 400MHz</b>			Measure:	<b>In-Band</b>
Voltage (V/m):	<b>0.2</b>	Voltage (dBµV/m):	<b>106</b>	Modulation:	<b>80% AM (1KHz)</b>
Acceptance Criteria:	<b>A - No loss of Functionality or Activity</b>				
Result:	 <b>(A - No loss of Functionality or Activity)</b>				

**Data Table**

Frequency (MHz)	Pass
176	
300	
470	
680	
860	



**Measure Data**

Port No.:	1	Measure No.:	5	Measure Date:	15-07-2019
Type:	Chassis				
Connector:	Enclosure				
Unwanted signal range:	400MHz - 470MHz	Measure:	Out-Band		
Voltage (V/m):	1.78	Voltage (dBµV/m):	125	Modulation:	80% AM (1KHz)
Acceptance Criteria:	A - No loss of Functionality or Activity				
Result:	(A - No loss of Functionality or Activity)				

**Data Table**

Frequency (MHz)	Pass
100	
176	
480	
680	
850	


**Measure Data**

Port No.:	1	Measure No.:	6	Measure Date:	15-07-2019
Type:	Chassis				
Connector:	Enclosure				
Unwanted signal range:	470MHz - 790MHz	Measure:	In-Band		
Voltage (V/m):	0.2	Voltage (dBµV/m):	106	Modulation:	80% AM (1KHz)
Acceptance Criteria:	A - No loss of Functionality or Activity				
Result:	(A - No loss of Functionality or Activity)				






**Data Table**

Frequency (MHz)	Pass
176	
300	
470	
680	
860	


**Measure Data**

Port No.:	1	Measure No.:	7	Measure Date:	15-07-2019
Type:	Chassis				
Connector:	Enclosure				
Unwanted signal range:	790MHz - 862MHz	Measure:	In-Band		
Voltage (V/m):	1	Voltage (dBµV/m):	120	Modulation:	80% AM (1KHz)
Acceptance Criteria:	A - No loss of Functionality or Activity				
Result:	 (A - No loss of Functionality or Activity)				






**Data Table**

Frequency (MHz)	Pass
176	
300	
470	
680	
860	

**Measure Data**

Port No.:	1	Measure No.:	8	Measure Date:	15-07-2019
Type:	Chassis				
Connector:	Enclosure				
Unwanted signal range:	862MHz - 3000MHz	Measure:	Out-Band		
Voltage (V/m):	1.78	Voltage (dBµV/m):	125	Modulation:	80% AM (1KHz)
Acceptance Criteria:	A - No loss of Functionality or Activity				
Result:	 (A - No loss of Functionality or Activity)				

**Data Table**

Frequency (MHz)	Pass
100	
176	
480	
680	
850	

**7. External immunity to radiated disturbances, induced by radio-frequency fields (80 MHz-3 GHz)**

**Measure**

TSP Id.: **PEE-INM-003**

Date: **15-07-2019**

Title: **External immunity to radiated fields. Anechoic chamber measurement**

Description: **Radiated, radio-frequency, electromagnetic field immunity test**

**Standard**

TSP Id.: **NOR-APAR-297**

Standard: **EN 50083-2:2012**

Paragraph: **4.4.3**

Title: **Cable networks for television signals, sound signals and interactive services. Part 2: Electromagnetic compatibility for equipment.**

Paragraph: **External immunity to radiated disturbances, induced by radio-frequency fields (80 MHz-3 GHz)**

Equivalent Standards: **UNE-EN 50083-2:2013  
IEC 60728-2:2018**

**Standard Limit**

Standard: **EN 50083-2:2012**

Title: **Cable networks for television signals, sound signals and interactive services. Part 2: Electromagnetic compatibility for equipment.**

Equivalent Standards: **UNE-EN 50083-2:2013  
IEC 60728-2:2018**

**Standard Method**

Standard: **EN 61000-4-3:2006**

Title: **Electromagnetic compatibility (EMC). Part 4-3: Testing and measurement techniques. Radiated, radio-frequency, electromagnetic field immunity test.**

Equivalent Standards: **UNE-EN 61000-4-3:2007  
IEC 61000-4-3:2006**

**Measure D.U.Ts**

Id	Trade Mark	Reference	Model	Manufacturer	D.U.T.
5479	Televes	537302		Televes	MINIKOM AMP. 11/10 F 47..454/470..862MHz

**Environmental Conditions**

Temperature: **22.1°C**


Humidity: **52.1%**

Atmospheric Pressure: **1003mbar**








**Used Equipment**

Id	Equipment	Trade Mark	Model	Serial No.
142	Power amplifier BLWA 0830-160/100/20D BONN Elektronik (80MHz-3GHz)	BONN Elektronik	BLWA 0830-160/100/20D	056113B
48	Ultra broadband antenna R&S HL 562 Ultralog	R&S	4041.3000.02	100211
43	Anechoic chamber Albatros M-CDC Model B83117	Albatross Projects	B83117-A1431-T162	22180
138	Signal generator R&S (9KHz-3.3GHz)	R&S	SML03-ref 1090.3000.13	102478


**Measure Data**

Port No.:	1	Measure No.:	1	Measure Date:	16-07-2019
Type:	Chassis				
Connector:	Enclosure				
Unwanted signal range:	80MHz - 454MHz	Measure:	In-Band		
Voltage (V/m):	0.2	Voltage (dBµV/m):	106	Modulation:	80% AM (1KHz)
Acceptance Criteria:	A - No loss of Functionality or Activity				
Result:	 (A - No loss of Functionality or Activity)				







**Data Table**

Frequency (MHz)	Pass
48	
144	
176	
300	
470	
680	
860	


**Measure Data**

Port No.:	1	Measure No.:	2	Measure Date:	16-07-2019
Type:	Chassis				
Connector:	Enclosure				
Unwanted signal range:	454MHz - 470MHz	Measure:	Out-Band		
Voltage (V/m):	1.78	Voltage (dBµV/m):	125	Modulation:	80% AM (1KHz)
Acceptance Criteria:	A - No loss of Functionality or Activity				
Result:	 (A - No loss of Functionality or Activity)				








**Data Table**

Frequency (MHz)	Pass
48	
100	
176	
480	
680	
850	


**Measure Data**

Port No.:	<b>1</b>	Measure No.:	<b>3</b>	Measure Date:	<b>16-07-2019</b>
Type:	<b>Chassis</b>				
Connector:	<b>Enclosure</b>				
Unwanted signal range:	<b>470MHz - 790MHz</b>	Measure:	<b>In-Band</b>		
Voltage (V/m):	<b>0.2</b>	Voltage (dBµV/m):	<b>106</b>	Modulation:	<b>80% AM (1KHz)</b>
Acceptance Criteria:	<b>A - No loss of Functionality or Activity</b>				
Result:	 <b>(A - No loss of Functionality or Activity)</b>				








**Data Table**

Frequency (MHz)	Pass
48	
144	
176	
300	
470	
680	
860	

**Measure Data**

Port No.:	<b>1</b>	Measure No.:	<b>4</b>	Measure Date:	<b>16-07-2019</b>
Type:	<b>Chassis</b>				
Connector:	<b>Enclosure</b>				
Unwanted signal range:	<b>790MHz - 862MHz</b>	Measure:	<b>In-Band</b>		
Voltage (V/m):	<b>1</b>	Voltage (dBµV/m):	<b>120</b>	Modulation:	<b>80% AM (1KHz)</b>
Acceptance Criteria:	<b>A - No loss of Functionality or Activity</b>				
Result:	 <b>(A - No loss of Functionality or Activity)</b>				

**Data Table**

Frequency (MHz)	Pass
48	
144	
176	
300	
470	
680	
860	

**Measure Data**

Port No.:	<b>1</b>	Measure No.:	<b>5</b>	Measure Date:	<b>16-07-2019</b>
Type:	<b>Chassis</b>				
Connector:	<b>Enclosure</b>				
Unwanted signal range:	<b>862MHz - 3000MHz</b>			Measure:	<b>Out-Band</b>
Voltage (V/m):	<b>1.78</b>	Voltage (dBµV/m):	<b>125</b>	Modulation:	<b>80% AM (1KHz)</b>
Acceptance Criteria:	<b>A - No loss of Functionality or Activity</b>				
Result:	<b>✅ (A - No loss of Functionality or Activity)</b>				

**Data Table**

Frequency (MHz)	Pass
48	✅
100	✅
176	✅
480	✅
680	✅
850	✅

**8. Electrostatic discharge immunity test (ESD) for active equipment**

**Measure**

TSP Id.: **PEE-INM-010**

Date: **15-07-2019**

Title: **Electrostatic discharge immunity test (ESD)**

**Standard**

TSP Id.: **NOR-APAR-301**

Standard: **EN 50083-2:2012**

Paragraph: **4.6**

Title: **Cable networks for television signals, sound signals and interactive services.  
Part 2: Electromagnetic compatibility for equipment.**

Paragraph: **Electrostatic discharge immunity test (ESD) for active equipment**

Equivalent Standards: **UNE-EN 50083-2:2013  
IEC 60728-2:2018**

**Standard Method**

Standard: **EN 61000-4-2:2009**

Title: **Electromagnetic compatibility (EMC).  
Part 4-2: Testing and measurement techniques.  
Electrostatic discharge immunity test.**

Equivalent Standards: **UNE-EN 61000-4-2:2010  
IEC 61000-4-2:2008**

**Standard Limit**

Standard: **EN 50083-2:2012**

Title: **Cable networks for television signals, sound signals and interactive services.  
Part 2: Electromagnetic compatibility for equipment.**

Equivalent Standards: **UNE-EN 50083-2:2013  
IEC 60728-2:2018**

**Measure D.U.Ts**

Id	Trade Mark	Reference	Model	Manufacturer	D.U.T.
5480	Televes	539201		Televes	MINIKOM AMP. MATV 4I/10 F FM-BIII/DAB-U-U

**Environmental Conditions**

Temperature: **22.1°C**

Humidity: **52.1%**


Atmospheric Pressure: **1003mbar**



**Used Equipment**

Id	Equipment	Trade Mark	Model	Serial No.
65	ESD Simulator System	Schaffner	NSG 438	516

**Measure Data**

Port No.:	<b>1</b>	Measure No.:	<b>1</b>	Measure Date:	<b>15-07-2019</b>
Type:	<b>Chassis</b>				
Connector:	<b>Enclosure</b>				
D.U.T Position:	<b>Table</b>				
Point Description:	<b>User-accessible points</b>				
Level:	<b>2</b>	Discharge voltage:	<b>4 kV</b>	No. of Discharges:	<b>20</b>
Discharge Type:	<b>Direct - contact</b>	Polarity:	<b>±</b>	Discharges Frequency:	<b>1 Hz</b>
Acceptance Criteria:	<b>B - Temporal Loss of Function or Activity with auto recovery</b>				
Result:	 <b>(A - No loss of Functionality or Activity)</b>				

**9. Electrical fast transient/burst immunity test for AC power ports**

**Measure**

TSP Id.: **PEE-INM-007** Date: **12-07-2019**

Title: **Electrical fast transient/burst immunity test**

Description: **Electrical fast transient/burst immunity test**

**Standard**

TSP Id.: **NOR-APAR-302**

Standard: **EN 50083-2:2012** Paragraph: **4.7**

Title: **Cable networks for television signals, sound signals and interactive services.  
Part 2: Electromagnetic compatibility for equipment.**

Paragraph: **Electrical fast transient/burst immunity test for AC power ports**

Equivalent Standards: **UNE-EN 50083-2:2013  
IEC 60728-2:2018**

**Standard Method**

Standard: **EN 61000-4-4:2012**

Title: **Electromagnetic compatibility (EMC).  
Part 4-4: Testing and measurement techniques.  
Electrical fast transient/burst immunity test.**

Equivalent Standards: **UNE-EN 61000-4-4:2013  
IEC 61000-4-4:2012**

**Standard Limit**

Standard: **EN 50083-2:2012**

Title: **Cable networks for television signals, sound signals and interactive services.  
Part 2: Electromagnetic compatibility for equipment.**

Equivalent Standards: **UNE-EN 50083-2:2013  
IEC 60728-2:2018**

**Measure D.U.Ts**

Id	Trade Mark	Reference	Model	Manufacturer	D.U.T.
5480	Televes	539201		Televes	MINIKOM AMP. MATV 4I/1O F FM-BIII/DAB-U-U

**Environmental Conditions**Temperature: **22.1°C**Humidity: **52.1%**Atmospheric Pressure: **1003mbar****Used Equipment**

Id	Equipment	Trade Mark	Model	Serial No.
86	Ultra compact simulator Immunity UCS 500M6B EM TEST, S/N: V051500279	EMTEST	UCS 500M6B	V0515100279

**Measure Data**

Port No.:	<b>8</b>	Measure No.:	<b>1</b>	Measure Date:	<b>12-07-2019</b>
Type:	<b>Power</b>	Range:	<b>AC</b>	Direction:	<b>Input</b>
Connector:	<b>Power Connector</b>	Comments:	<b>230Vac 56/60Hz Imax:0.045A</b>		
D.U.T Position:	<b>Table</b>				
Coupling:	<b>Line to ground / Neutral to ground</b>	Application Mode:	<b>Asynchronous</b>	Polarity:	<b>±</b>
Peak Voltage:	<b>1kV</b>	Level:	<b>2</b>		
Wave form:	<b>5/50</b>	Rise time (Impulse):	<b>5ns</b>	Duration at 50% (Pulse):	<b>50ns</b>
Repetition Frequency (Pulse):	<b>5kHz</b>	Duration (Burst):	<b>15ms</b>	Period (Burst):	<b>300ms</b>
Test Duration:	<b>240s</b>	No. of Burst:	<b>800</b>	No. of Pulses:	<b>60000</b>
Acceptance Criteria:	<b>B -Temporal Loss of Function or Activity with auto recovery</b>				
Result:	<b>✔ (A - No loss of Functionality or Activity)</b>				

**10. Surge immunity test**

**Measure**

TSP Id.: **PEE-INM-008**

Date: **12-07-2019**

Title: **Surge immunity test**

Description: **Surge immunity test**

**Standard**

TSP Id.: **NOR-APAR-013**

Standard: **EN 61000-6-1:2007**

Paragraph: **8**

Title: **Electromagnetic compatibility (EMC).  
Part 6-1: Generic standards. Immunity for residential, commercial and light-industrial.**

Paragraph: **Surge immunity test**

Equivalent Standards: **UNE-EN 61000-6-1:2007  
IEC 61000-6-1:2005**

**Standard Limit**

Standard: **EN 61000-6-1:2007**

Title: **Electromagnetic compatibility (EMC).  
Part 6-1: Generic standards. Immunity for residential, commercial and light-industrial.**

Equivalent Standards: **UNE-EN 61000-6-1:2007  
IEC 61000-6-1:2005**

**Standard Method**

Standard: **EN 61000-4-5:2014**

Title: **Electromagnetic compatibility (EMC).  
Part 4-5: Testing and measurement techniques.  
Surge immunity test.**

Equivalent Standards: **UNE-EN 61000-4-5:2015  
IEC 61000-4-5:2014**

**Measure D.U.Ts**

Id	Trade Mark	Reference	Model	Manufacturer	D.U.T.
5480	Televes	539201		Televes	MINIKOM AMP. MATV 4I/1O F FM-BIII/DAB-U-U

**Environmental Conditions**Temperature: **22.1°C**Humidity: **52.1%**Atmospheric Pressure: **1003mbar****Used Equipment**

Id	Equipment	Trade Mark	Model	Serial No.
86	Ultra compact simulator Immunity UCS 500M6B EM TEST, S/N: V051500279	EMTEST	UCS 500M6B	V0515100279

**Measure Data**

Port No.:	<b>8</b>	Measure No.:	<b>1</b>	Measure Date:	<b>12-07-2019</b>
Type:	<b>Power</b>	Range:	<b>AC</b>	Direction:	<b>Input</b>
Connector:	<b>Power Connector</b>	Comments:	<b>230Vac 56/60Hz Imax:0.045A</b>		
D.U.T Position:	<b>Table</b>				
Level:	<b>3</b>	Peak Voltage:	<b>1kV</b>	Coupling:	<b>Line to Line</b>
Front Length:	<b>1,2µs [U] / 8µs [I]</b>	Time to Half Value:	<b>50µs [U] / 20µs [I]</b>	Time between pulses:	<b>6s</b>
Open circuit Voltage:	<b>1,2/50</b>	Short circuit current:	<b>8/20</b>	No. of Pulses:	<b>40</b>
Gap:	<b>0°, 90°, 180°, 270°</b>	Polarity:	<b>±</b>	Test Duration:	<b>4min</b>
Acceptance Criteria:	<b>B -Temporal Loss of Function or Activity with auto recovery</b>				
Result:	<b>✔ (A - No loss of Functionality or Activity)</b>				

**Measure Data**

Port No.:	<b>8</b>	Measure No.:	<b>2</b>	Measure Date:	<b>12-07-2019</b>
Type:	<b>Power</b>	Range:	<b>AC</b>	Direction:	<b>Input</b>
Connector:	<b>Power Connector</b>	Comments:	<b>230Vac 56/60Hz Imax:0.045A</b>		
D.U.T Position:	<b>Table</b>				
Level:	<b>3</b>	Peak Voltage:	<b>2kV</b>	Coupling:	<b>Line to ground / Neutral to ground</b>
Front Length:	<b>1,2µs [U] / 8µs [I]</b>	Time to Half Value:	<b>50µs [U] / 20µs [I]</b>	Time between pulses:	<b>6s</b>
Open circuit Voltage:	<b>1,2/50</b>	Short circuit current:	<b>8/20</b>	No. of Pulses:	<b>80</b>
Gap:	<b>0°, 90°, 180°, 270°</b>	Polarity:	<b>±</b>	Test Duration:	<b>8min</b>
Acceptance Criteria:	<b>B -Temporal Loss of Function or Activity with auto recovery</b>				
Result:	<b>✔ (A - No loss of Functionality or Activity)</b>				



**11. Voltage dips and voltage interruptions immunity tests**

**Measure**

TSP Id.: **PEE-INM-009**

Date: **12-07-2019**

Title: **Voltage dips, short interruptions and voltage variations immunity tests**

Description: **Voltage dips, short interruptions and voltage variations immunity tests**

**Standard**

TSP Id.: **NOR-APAR-014**

Standard: **EN 61000-6-1:2007**

Paragraph: **8**

Title: **Electromagnetic compatibility (EMC).  
Part 6-1: Generic standards. Immunity for residential, commercial and light-industrial.**

Paragraph: **Voltage dips and voltage interruptions immunity tests**

Equivalent Standards: **UNE-EN 61000-6-1:2007  
IEC 61000-6-1:2005**

**Standard Method**

Standard: **EN 61000-4-11:2004**

Title: **Electromagnetic compatibility (EMC)  
Part 4-11: Testing and measurement techniques.  
Voltage dips, short interruptions and voltage variations immunity tests.**

Equivalent Standards: **UNE-EN 61000-4-11:2005  
IEC 61000-4-11:2004**

**Standard Limit**

Standard: **EN 61000-6-1:2007**

Title: **Electromagnetic compatibility (EMC).  
Part 6-1: Generic standards. Immunity for residential, commercial and light-industrial.**

Equivalent Standards: **UNE-EN 61000-6-1:2007  
IEC 61000-6-1:2005**

**Measure D.U.Ts**

Id	Trade Mark	Reference	Model	Manufacturer	D.U.T.
5480	Televes	539201		Televes	MINIKOM AMP. MATV 4I/1O F FM-BIII/DAB-U-U

**Environmental Conditions**Temperature: **22.1°C**Humidity: **52.1%**Atmospheric Pressure: **1003mbar****Used Equipment**

Id	Equipment	Trade Mark	Model	Serial No.
86	Ultra compact simulator Immunity UCS 500M6B EM TEST, S/N: V051500279	EMTEST	UCS 500M6B	V0515100279

**Measure Data**

Port No.:	<b>8</b>	Measure No.:	<b>1</b>	Measure Date:	<b>12-07-2019</b>
Type:	<b>Power</b>	Range:	<b>AC</b>	Direction:	<b>Input</b>
Connector:	<b>Power Connector</b>	Comments:	<b>230Vac 56/60Hz Imax:0.045A</b>		
D.U.T Position:	<b>Table</b>				
Supply Voltage:	<b>230V</b>	Supply Frequency:	<b>50Hz</b>		
Class:	<b>2</b>	Test Level:	<b>70%</b>	Peak Voltage:	<b>161V</b>
Event Duration:	<b>500ms</b>	Event Duration (T):	<b>25</b>	Event No.:	<b>3</b>
Time Between Events:	<b>10s</b>	Angle:	<b>0°, 45°, 90°, 135°, 180°, 225°, 270°, 315°</b>		
Acceptance Criteria:	<b>C - Loss of Function or Temporary Activity that Requires the Action of the Operator or a System Reset</b>				
Result:	<b>✔ (B -Temporal Loss of Function or Activity with auto recovery)</b>				

**Measure Data**

Port No.:	<b>8</b>	Measure No.:	<b>2</b>	Measure Date:	<b>12-07-2019</b>
Type:	<b>Power</b>	Range:	<b>AC</b>	Direction:	<b>Input</b>
Connector:	<b>Power Connector</b>	Comments:	<b>230Vac 56/60Hz Imax:0.045A</b>		
D.U.T Position:	<b>Table</b>				
Supply Voltage:	<b>230V</b>	Supply Frequency:	<b>50Hz</b>		
Class:	<b>2</b>	Test Level:	<b>0%</b>	Peak Voltage:	<b>0V</b>
Event Duration:	<b>10ms</b>	Event Duration (T):	<b>0.5</b>	Event No.:	<b>3</b>
Time Between Events:	<b>10s</b>	Angle:	<b>0°, 45°, 90°, 135°, 180°, 225°, 270°, 315°</b>		
Acceptance Criteria:	<b>B -Temporal Loss of Function or Activity with auto recovery</b>				
Result:	<b>✔ (A - No loss of Functionality or Activity)</b>				

**Measure Data**

Port No.:	<b>8</b>	Measure No.:	<b>3</b>	Measure Date:	<b>12-07-2019</b>
Type:	<b>Power</b>	Range:	<b>AC</b>	Direction:	<b>Input</b>
Connector:	<b>Power Connector</b>	Comments:	<b>230Vac 56/60Hz Imax:0.045A</b>		
D.U.T Position:	<b>Table</b>				
Supply Voltage:	<b>230V</b>	Supply Frequency:	<b>50Hz</b>		
Class:	<b>2</b>	Test Level:	<b>0%</b>	Peak Voltage:	<b>0V</b>
Event Duration:	<b>20ms</b>	Event Duration (T):	<b>1</b>	Event No.:	<b>3</b>
Time Between Events:	<b>10s</b>	Angle:	<b>0°, 45°, 90°, 135°, 180°, 225°, 270°, 315°</b>		
Acceptance Criteria:	<b>B - Temporal Loss of Function or Activity with auto recovery</b>				
Result:	<b>✔ (A - No loss of Functionality or Activity)</b>				

**Measure Data**

Port No.:	<b>8</b>	Measure No.:	<b>4</b>	Measure Date:	<b>12-07-2019</b>
Type:	<b>Power</b>	Range:	<b>AC</b>	Direction:	<b>Input</b>
Connector:	<b>Power Connector</b>	Comments:	<b>230Vac 56/60Hz Imax:0.045A</b>		
D.U.T Position:	<b>Table</b>				
Supply Voltage:	<b>230V</b>	Supply Frequency:	<b>50Hz</b>		
Class:	<b>2</b>	Test Level:	<b>0%</b>	Peak Voltage:	<b>0V</b>
Event Duration:	<b>5000ms</b>	Event Duration (T):	<b>250</b>	Event No.:	<b>3</b>
Time Between Events:	<b>10s</b>	Angle:	<b>0°</b>		
Acceptance Criteria:	<b>C - Loss of Function or Temporary Activity that Requires the Action of the Operator or a System Reset</b>				
Result:	<b>✔ (B - Temporal Loss of Function or Activity with auto recovery)</b>				

**12. Voltage changes, voltage fluctuations and flicker**

**Measure**

TSP Id.: **PEE-EMI-011**

Date: **12-07-2019**

Title: **Voltage changes, voltage fluctuations and flicker**

**Standard**

TSP Id.: **NOR-COMP-112**

Standard: **EN 61000-3-3:2013**

Title: **Electromagnetic compatibility (EMC)  
Part 3-3: Limits. Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current**

**Standard | Standard Method | Standard Limit**

Standard: **EN 61000-3-3:2013**

Title: **Electromagnetic compatibility (EMC)  
Part 3-3: Limits. Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current**

**Measure D.U.Ts**

Id	Trade Mark	Reference	Model	Manufacturer	D.U.T.
5480	Televes	539201		Televes	MINIKOM AMP. MATV 4I/1O F FM-BIII/DAB-U-U

**Environmental Conditions**

Temperature: **22.1°C**

Humidity: **52.1%**

Atmospheric Pressure: **1003mbar**

**Used Equipment**

Id	Equipment	Trade Mark	Model	Serial No.
178	PC Harmonics and flicker control	Dell (Intel)	Optiplex GX 100	37049956003
114	Proflin 2105-400, P/N: 7000-445-1 Schaffner	Schaffner	NSG 1007	54636
113	CCN 1000-1, P/N: 5004-417-1 Schaffner	Schaffner	CCN 1000	71995

**Measure Data**

Port No.: **8**

Measure No.: **1**

Measure Date: **12-07-2019**

**Harmonics – Class-A per EN/IEC 61000-3-2 (Run time)**

EUT: MINIKOM AMP. MATV 4I/10 F FM-BIII/DAB-U-U

Tested by: EN 61000-3-2:2014

Test category: Class-A (2004-11) (European limits)

Test Margin: 100

Test date: 11/07/19

Start time: 11:06:38

End time: 11:07:49

Test duration (min): 1

Data file name: H-000356.cts\_data

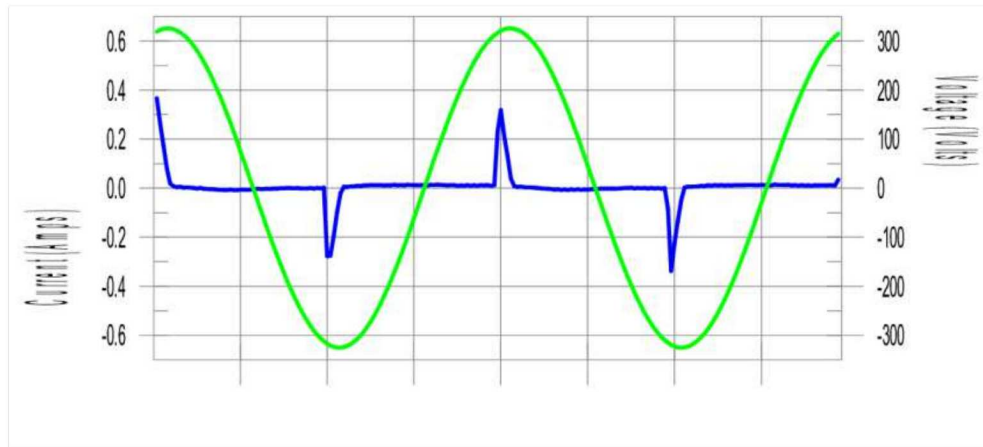
Comment:

Customer: Televes

Test Result: Pass

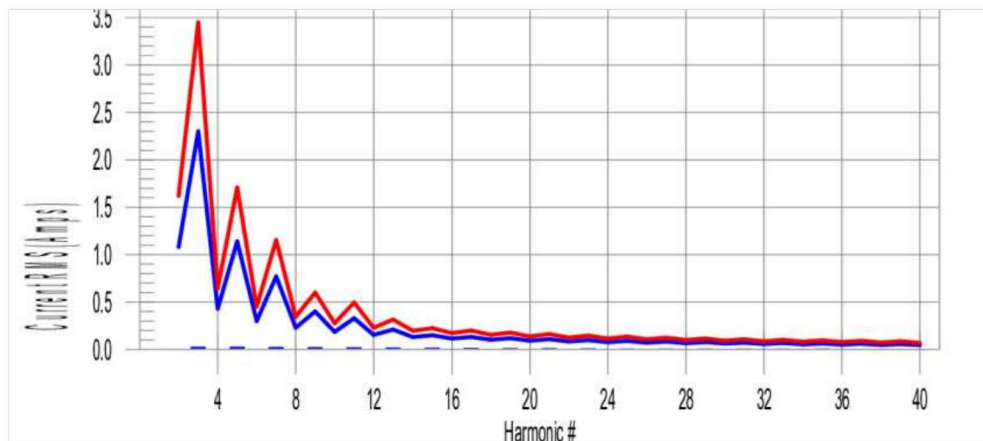
Source qualification: Normal

**Current & voltage waveforms**



**Harmonics and Class A limit line**

**European Limits**



**Test result: Pass Worst harmonic was #15 with 6.33% of the limit.**

**Measure Data (Cont.)**

Port No.: **8**

Measure No.: **1**

Measure Date: **12-07-2019**

**Current Test Result Summary (Run time)**

EUT: MINIKOM AMP. MATV 4I/10 F FM-BIII/DAB-U-U

Tested by: EN 61000-3-2:2014

Test category: Class-A (2004-11) (European limits)

Test Margin: 100

Test date: 11/07/19

Start time: 11:06:38

End time: 11:07:49

Test duration (min): 1

Data file name: H-000356.cts\_data

Comment:

Customer: Televes

Test Result: Pass

Source qualification: Normal

THC(A): 0.06 I-THD(%): 221.33

POHC(A): 0.017 POHC Limit(A): 0.251

Highest parameter values during test:

V_RMS (Volts): 230.14	Frequency(Hz): 50.00
I_Peak (Amps): 0.377	I_RMS (Amps): 0.065
I_Fund (Amps): 0.026	Crest Factor: 5.838
Power (Watts): 5.6	Power Factor: 0.382

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	1.080	0.1	0.001	1.620	0.07	Pass
3	0.023	2.300	1.0	0.025	3.450	0.72	Pass
4	0.001	0.430	0.2	0.001	0.645	0.16	Pass
5	0.022	1.140	1.9	0.023	1.710	1.34	Pass
6	0.000	0.300	0.1	0.001	0.450	0.18	Pass
7	0.021	0.770	2.7	0.022	1.155	1.87	Pass
8	0.000	0.230	0.1	0.001	0.345	0.19	Pass
9	0.019	0.400	4.9	0.020	0.600	3.34	Pass
10	0.000	0.184	0.2	0.001	0.276	0.25	Pass
11	0.018	0.330	5.4	0.018	0.495	3.68	Pass
12	0.000	0.153	0.2	0.001	0.230	0.30	Pass
13	0.016	0.210	7.5	0.016	0.315	5.17	Pass
14	0.000	0.131	0.2	0.001	0.197	0.32	Pass
15	0.014	0.150	9.2	0.014	0.225	6.33	Pass
16	0.000	0.115	0.2	0.001	0.173	0.34	Pass
17	0.012	0.132	9.0	0.012	0.199	6.16	Pass
18	0.000	0.102	0.3	0.001	0.153	0.36	Pass
19	0.010	0.118	8.5	0.010	0.178	5.81	Pass
20	0.000	0.092	0.2	0.001	0.138	0.36	Pass
21	0.008	0.107	7.8	0.009	0.161	5.38	Pass
22	0.000	0.084	0.2	0.000	0.125	0.34	Pass
23	0.007	0.098	7.1	0.007	0.147	4.88	Pass
24	0.000	0.077	0.3	0.000	0.115	0.35	Pass
25	0.006	0.090	6.5	0.006	0.135	4.54	Pass
26	0.000	0.071	0.3	0.000	0.106	0.37	Pass
27	0.005	0.083	6.2	0.005	0.125	4.30	Pass
28	0.000	0.066	0.3	0.000	0.099	0.40	Pass
29	0.005	0.078	6.1	0.005	0.116	4.19	Pass
30	0.000	0.061	0.3	0.000	0.092	0.44	Pass
31	0.004	0.073	6.1	0.005	0.109	4.24	Pass
32	0.000	0.058	0.4	0.000	0.086	0.51	Pass
33	0.004	0.068	6.3	0.004	0.102	4.37	Pass
34	0.000	0.054	0.4	0.000	0.081	0.56	Pass
35	0.004	0.064	6.4	0.004	0.096	4.45	Pass
36	0.000	0.051	0.5	0.000	0.077	0.61	Pass
37	0.004	0.061	6.5	0.004	0.091	4.48	Pass
38	0.000	0.048	0.6	0.000	0.073	0.65	Pass
39	0.004	0.058	6.4	0.004	0.087	4.40	Pass
40	0.000	0.046	0.7	0.000	0.069	0.68	Pass

**Measure Data (Cont.)**

Port No.: **8**

Measure No.: **1**

Measure Date: **12-07-2019**

**Voltage Source Verification Data (Run time)**

EUT: MINIKOM AMP. MATV 4I/10 F FM-BIII/DAB-U-U

Tested by: EN 61000-3-2:2014

Test category: Class-A (2004-11) (European limits)

Test Margin: 100

Test date: 11/07/19

Start time: 11:06:38

End time: 11:07:49

Test duration (min): 1

Data file name: H-000356.cts\_data

Comment:

Customer: Televes

Test Result: Pass

Source qualification: Normal

**Highest parameter values during test:**

Voltage (Vrms):	230.14	Frequency(Hz):	50.00
I_Peak (Amps):	0.377	I_RMS (Amps):	0.065
I_Fund (Amps):	0.026	Crest Factor:	5.838
Power (Watts):	5.6	Power Factor:	0.382

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.120	0.460	26.18	OK
3	0.570	2.071	27.50	OK
4	0.092	0.460	19.94	OK
5	0.058	0.920	6.30	OK
6	0.085	0.460	18.49	OK
7	0.036	0.690	5.18	OK
8	0.038	0.460	8.29	OK
9	0.041	0.460	8.88	OK
10	0.018	0.460	4.01	OK
11	0.012	0.230	5.18	OK
12	0.022	0.230	9.41	OK
13	0.025	0.230	11.05	OK
14	0.017	0.230	7.20	OK
15	0.014	0.230	5.87	OK
16	0.019	0.230	8.19	OK
17	0.025	0.230	10.88	OK
18	0.021	0.230	9.05	OK
19	0.018	0.230	7.68	OK
20	0.013	0.230	5.76	OK
21	0.024	0.230	10.45	OK
22	0.013	0.230	5.74	OK
23	0.029	0.230	12.53	OK
24	0.010	0.230	4.50	OK
25	0.019	0.230	8.09	OK
26	0.009	0.230	3.75	OK
27	0.024	0.230	10.61	OK
28	0.009	0.230	3.74	OK
29	0.019	0.230	8.22	OK
30	0.008	0.230	3.52	OK
31	0.017	0.230	7.19	OK
32	0.008	0.230	3.37	OK
33	0.015	0.230	6.68	OK
34	0.008	0.230	3.54	OK
35	0.015	0.230	6.44	OK
36	0.008	0.230	3.36	OK
37	0.014	0.230	5.92	OK
38	0.007	0.230	3.19	OK
39	0.012	0.230	5.38	OK
40	0.011	0.230	4.67	OK