

Electromagnetic compatibility laboratory

EMC Test Report - Annex 1

Ref. No. 8551-PT-E0014-14

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Test specification

Emission : Requirements according to:

Product standard ETSI EN 301 489-1

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements

Product standard ETSI EN 301 489-7

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 7: Specific conditions for mobile and portable radio and ancillary equipment of digital cellular radio tele

Measurement method:

Radiated emission EN 55022

Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement

Conducted emission EN 55022

Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement

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Immunity : Requirements according to:

Product standard ETSI EN 301 489-1

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements

Product standard ETSI EN 301 489-7

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 7: Specific conditions for mobile and portable radio and ancillary equipment of digital cellular radio tele

Measurement methods:

ESD

EN 61000-4-2

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

Radiated immunity

EN 61000-4-3

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

Burst

EN 61000-4-4

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

Surge

EN 61000-4-5

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

Conducted immunity

EN 61000-4-6

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

Volt. Dips and interruptions EN 61000-4-11

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

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Summary of EMC Tests

	Used standards		
	Class/Level	Result	Remark
ETSI EN 301 489-1 V1.9.2: 2011		pass	
ETSI EN 301 489-7 V1.3.1: 2005		pass	
ČSN EN 55022 ed3: 2011 radiated emission conducted emission	B B	pass pass	
ČSN EN 61000-4-2 ed.2: 2009		pass	
ČSN EN 61000-4-3 ed.3: 2006 + A1: 2008 + Z1: 2010 + Změna A2: 2011		pass	
ČSN EN 61000-4-4 ed. 3: 2013		pass	
ČSN EN 61000-4-5 ed. 2: 2007		pass	
ČSN EN 61000-4-6 ed. 3: 2009		pass	

Remark : Standards designated as ČSN EN xxxx are Czech versions of European standards EN xxxx.

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Uncertainties of measurement according to EA - 4/16

Standard	measurement	Uncertainty [dB]	Remark
ČSN EN 55022	EM field 30 MHz-300 MHz / bicon. antenna	3,6	
	EM field 30 MHz-1000 MHz /logper. antenna	3,9	
	voltage with NNB 11 coupling	2,3	
	EM field 1GHz - 6 GHz horn antenna 3 m	3,7	
	current with SMZ 11 coupling	3,4	
	voltage with ENY 22 coupling	2,1	
ČSN EN 55014-1	power 30 MHz - 300 MHz (MDS 21)	2,5	
	voltage with NNB 11 coupling	2,3	
	voltage with TK12 coupling	3,4	
ČSN EN 55011	EM field 9 kHz - 30 MHz / loop antenna	3,4	1
	EM field 30 MHz-300 MHz / bicon. antenna	3,6	1
	EM field 30 MHz-1000 MHz /logper. antenna	3,9	1
	voltage with NNB 11 coupling	2,3	
	voltage with TK12 coupling	3,4	
	current with SMZ 11 coupling	3,4	
ČSN EN 55013+A12	EM field 30 MHz-300 MHz / bicon. antenna	3,6	
	EM field 30 MHz-1000 MHz /logper. antenna	3,9	
	voltage with NNB 11 coupling	2,3	
	power 30 MHz - 300 MHz (MDS 21)	2,5	
ČSN EN 55015	voltage with NNB 11 coupling	2,3	
	attenuation (fluorescent lamp equivalents)	3,0	
	voltage with TK12 coupling	3,4	
	radiated emissions up to 30 MHz	3,4	
ČSN EN 50121-3	EM field 9 kHz - 30 MHz / loop antenna	3,4	1
	EM field 30 MHz-300 MHz / bicon. antenna	3,6	1
	EM field 30 MHz-1000 MHz /logper. antenna	3,9	1
ČSN EN 61000-3-2	harmonic current emissions	1,8	
ČSN EN 61000-3-3	voltage variations and flicker	1,8	
ČSN EN 61000-4-2	electrostatic discharge	2,7	
ČSN EN 61000-4-3	EM field immunity test	2,8	
ČSN EN 61000-4-4	burst immunity test	2,2	
ČSN EN 61000-4-5	surge immunity test	2,2	
ČSN EN 61000-4-6	Conducted RF Disturbances Immunity Test	1,8	
ČSN EN 61000-4-11	Voltage Dips and Interruptions Immunity Test	2,2	

Explanation to Remarks

1 Valid for laboratory measurement - uncertainty of site not involved
 Uncertainty is expressed according to EA-4/16 - level of reliability is 95%.

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General EUT information

Description of EUT (from viewpoint of the testing)	
<input checked="" type="checkbox"/> table top equipment	<input type="checkbox"/> floor standing equipment
Mains voltage: 230 V AC	Clock frequencies [MHz]: not specified
KULON-C is a standalone street light controller designed for remote (over GSM) street lighting system maintainance.	

List of cables		
Input / Output	Length	Shielded / Nonshielded
power input 230 V AC	> 3 m	N
input "sensor 1"	> 3 m	N
input "sensor 2"	> 3 m	N
GSM antenna port	> 3 m	N
output 1	> 3 m	N
input 230 V 1-N	> 3 m	N

EUT specification and monitoring during immunity tests	
<input type="checkbox"/> defined by customer	<input type="checkbox"/> defined in the standard
LED "BUS" must light. LED "GSM" must flash at 1 Hz normally. After dialing the number of the device (number of the SIM card) from mobile phone the device has to answer the call and the indication of the LED "GSM" will change from flashing to a steady lighting. After releasing the call LED "GSM" starts flashing again.	

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Radiated Disturbance EN 55022

Date of test: 6.3.2014
Ambient temperature: 20 °C ± 3 °C
Relative humidity: 32 % ± 10%
Measured by: M. Svoboda

Frequency range [MHz]	Measuring distance	Antenna	Class	Result
30 - 1000	10m	C102	B	P
1000 - 6000	3 m	C148	B	P

Legend of column "Result": P ...pass acc. to the limits of standard ČSN EN 55022
F ... fails acc. to the limits of standard ČSN EN 55022

Uncertainties of measurement see Page No. 5

Test equipment:	Serial No.	Ident. No.
EMI test receiver R/S ESIB26	100216	C106
Broadband antenna BTA-M	0600	C109
Anechoic chamber 10m in TESTCOM	-	C093
Horn antenna ETS Lindgren 3115	91564	C148

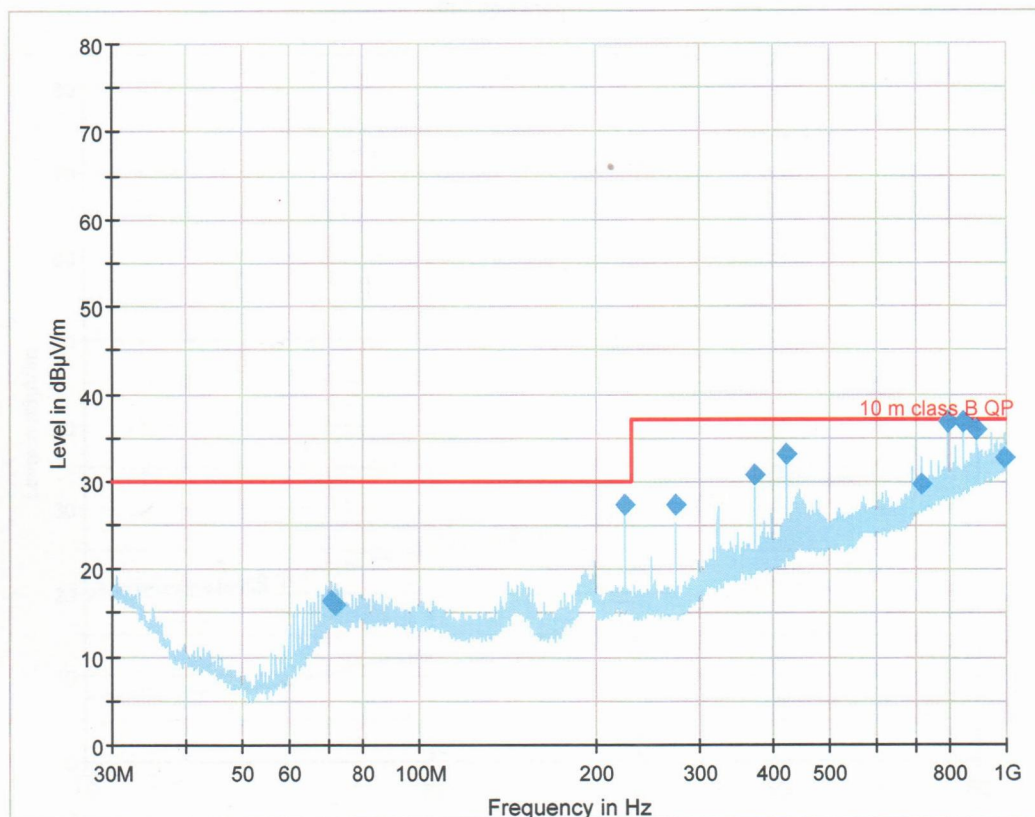
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Measured data - 30 MHz to 1000 MHz



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
70.380000	16.36	30.00	13.64	1000.0	120.000	315.0	V	274.0
71.460000	16.05	30.00	13.95	1000.0	120.000	155.0	V	-2.0
222.960000	27.33	30.00	2.67	1000.0	120.000	126.0	V	101.0
272.520000	27.30	37.00	9.70	1000.0	120.000	362.0	H	304.0
371.580000	30.87	37.00	6.13	1000.0	120.000	300.0	H	49.0
421.140000	33.26	37.00	3.74	1000.0	120.000	262.0	H	83.0
718.380000	29.78	37.00	7.22	1000.0	120.000	123.0	H	56.0
792.720000	36.90	37.00	0.10	1000.0	120.000	105.0	H	326.0
842.220000	36.85	37.00	0.15	1000.0	120.000	245.0	V	321.0
891.840000	36.00	37.00	1.00	1000.0	120.000	300.0	H	326.0
990.840000	32.67	37.00	4.33	1000.0	120.000	274.0	H	-6.0

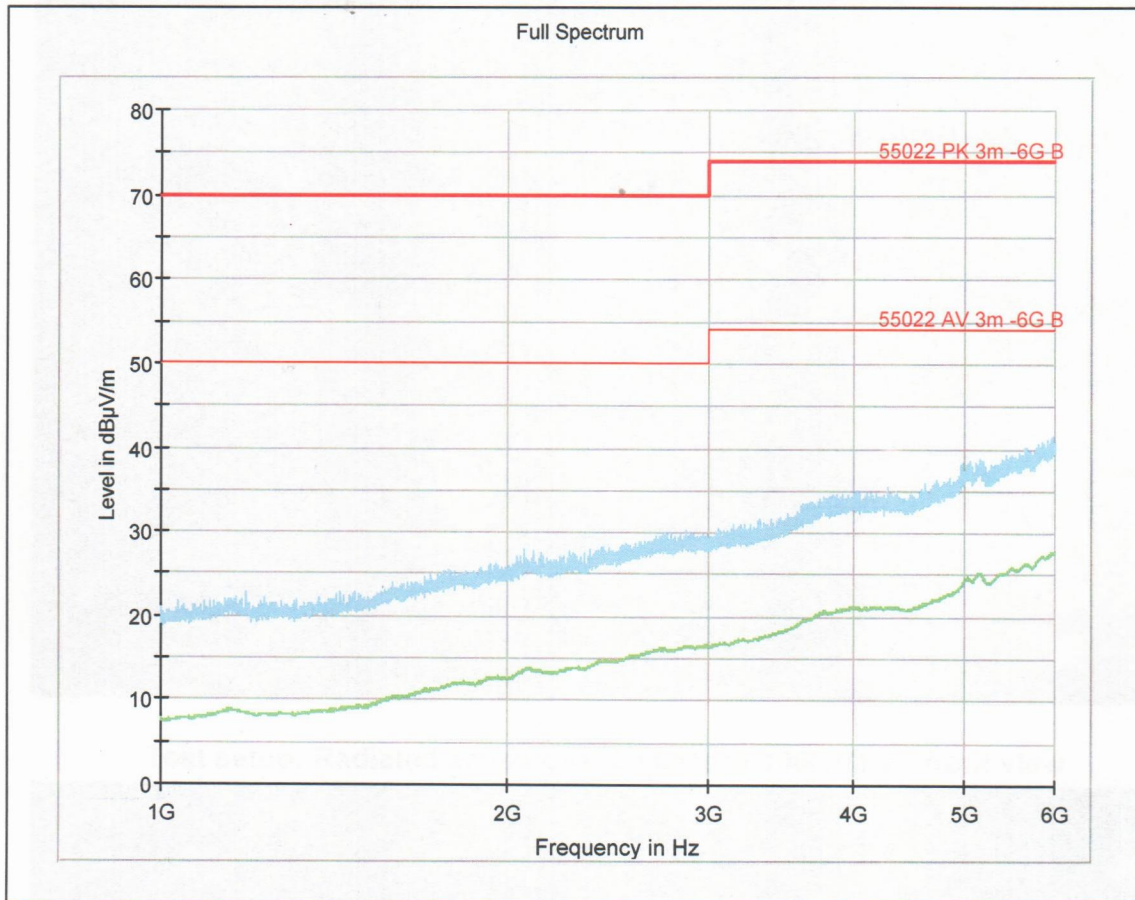
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Measured data - 1 GHz to 6 GHz



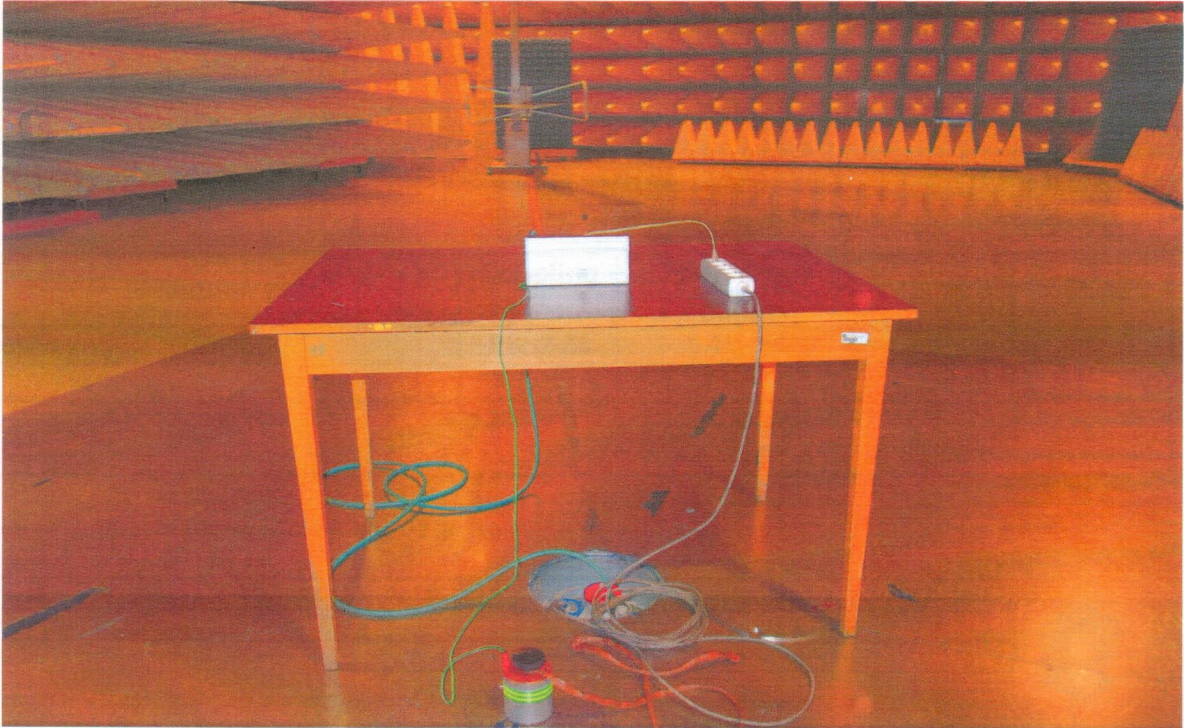
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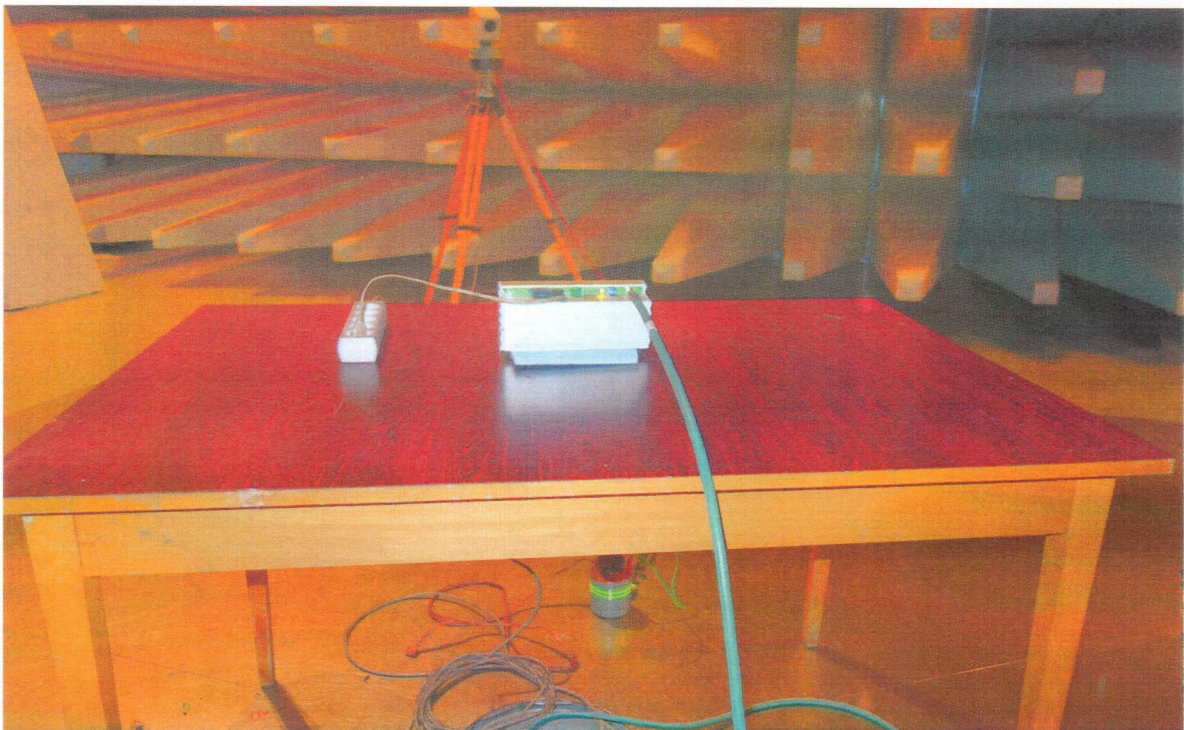
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Test setup: Radiated emissions 30 MHz to 1000 MHz - rear view



Test setup: Radiated emissions 30 MHz to 1000 MHz - front view



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Conducted Emissions

EN 55022

Date of test: 28.1.2014
Ambient temperature: 21 °C ± 3 °C
Relative humidity: 37 % ± 10%
Measured by: P. Nohejl

Measured port	Coupling element	Freq. range [MHz]	Class	Res.
napájecí vstup 230 VAC	ESH2-Z5	0.15 - 30	B	P
Legend of column "Result": P ...pass acc. to the limits of standard ČSN EN 55022 F ... fails acc. to the limits of standard ČSN EN 55022				

Uncertainties of measurement see Page No. 3

Test equipment:	Serial No.	Ident. No.
EMI test receiver R/S ESHS 30	832351/008	C003
Artificial network R/S ESH2-Z5	100220	C135

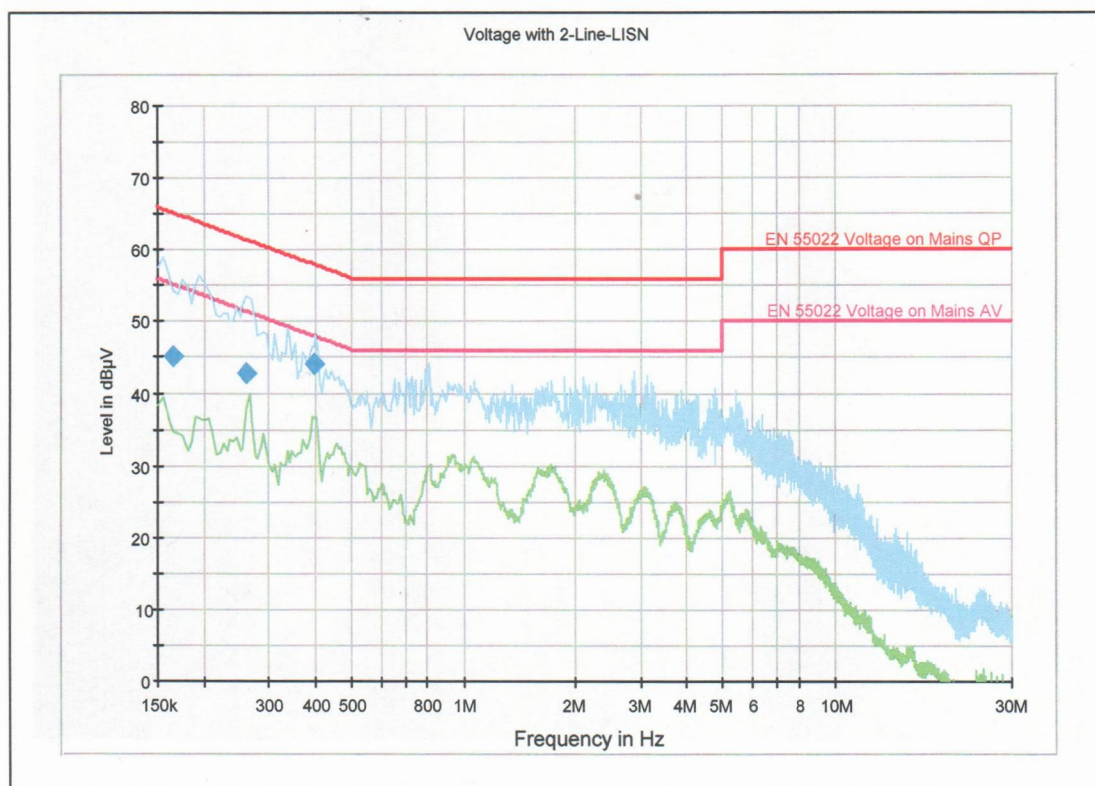
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Measured data



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.165000	45.1	1000.00	10.000	FL	L1	0.0	20.1	65.2	
0.260000	42.7	1000.00	10.000	FL	N	0.0	18.7	61.4	
0.395000	44.0	1000.00	10.000	FL	N	0.0	14.0	58.0	

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