

Test report

2016 11315051 EMC FULL

Date of issue: November 29, 2016

Applicant:

MyGnar, Inc.

Product:

Storage Device

Model:

GBX128V1

Specifications:

- ◆ FCC 47 CFR Part 15, Subpart B – Verification
- ◆ ICES-003 Issue 6 June 2016
- ◆ EN 55032: 2015
- ◆ EN 55024: 2010
- ◆ EN 301 489-17 V2.2.1 (2012-09)
- ◆ EN 61000-3-2: 2014
- ◆ EN 61000-3-3: 2013

Lab and test locations

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Tested by	Greg Woelke, EMC Test Engineer
Reviewed by	James Morris, EMC & Wireless Divisions Manager
Review date	January 24, 2017
Reviewer signature	

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko USA's ISO/IEC 17025 accreditation.

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Table of Contents

Table of Contents	3
Section 1 Report summary	4
1.1 Test specifications	4
1.2 Exclusions	4
1.3 Statement of compliance	4
1.4 Test report revision history	4
Section 2 Summary of test results	5
2.1 Radiated emissions	5
2.2 Conducted emissions	5
Section 3 Equipment under test (EUT) details	6
3.1 Applicant	6
3.2 Manufacturer	6
3.3 Sample information	6
3.4 EUT information	6
3.5 EUT exercise and monitoring details	6
3.6 EUT setup details	7
Section 4 Engineering considerations	8
4.1 Modifications incorporated in the EUT	8
4.2 Technical judgment	8
4.3 Deviations from laboratory tests procedures	8
Section 5 Test conditions	9
5.1 Atmospheric conditions	9
5.2 Power supply range	9
Section 6 Measurement uncertainty	10
6.1 Uncertainty of measurement	10
Section 7 Terms and definitions	11
7.1 Performance criterion	11
7.2 General definitions	11
Section 8 Testing data	14
8.1 AC mains power input/output ports	14
8.2 Radiated Emissions	20
8.3 Clause 8.5 – Harmonic current emissions (AC mains input port)	24
8.4 Clause 8.6 – Voltage fluctuations and flicker (AC mains input port)	30
8.5 Clause 9.2 – Radio frequency electromagnetic field (0.08 to 1 and 1.4 to 2.7 GHz)	33
8.6 Clause 9.3 – Electrostatic discharge	36
8.7 Clause 9.4 – Fast transients, common mode	41
8.8 Clause 9.5 – Radio frequency, common mode	44
8.9 Clause 9.7 – Voltage dips and interruptions	46
8.10 Clause 9.8 – Surges	49
Section 9 EUT photos	51
9.1 External photos	51

Section 1 Report summary

1.1 Test specifications

FCC 47 CFR Part 15, Subpart B – Verification	Title 47: Telecommunication; PART 15—RADIO FREQUENCY DEVICES
ICES-001 Issue 4 January 2016	Information technology equipment (ITE), including digital apparatus.
EN 55032: 2015	Electromagnetic compatibility of multimedia equipment – Emission requirements
EN 55024: 2010	Information technology equipment, Immunity characteristics, Limits and methods of measurement
EN 301 489-17 V2.2.1 (2012-09)	Electromagnetic compatibility and Radio spectrum Matters (ERM) ElectroMagnetic Compatibility (EMC) standard for radio equipment; Part 17: Specific conditions for Broadband Data Transmission Systems
EN 301 489-1 V1.9.2 (2011-09)	Electromagnetic compatibility and Radio spectrum Matters (ERM) ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements <i>Special note: Utilized newer version than specified in EN 301 489-17.</i>
EN 61000-3-2: 2014	Limits for harmonic current emissions (equipment input current \leq 16 A per phase)
EN 61000-3-3: 2013	Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current \leq 16 A per phase and not subject to conditional connection

1.2 Exclusions

None

1.3 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was performed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See “Summary of test results” for full details.

1.4 Test report revision history

Table 1.4-1: Test report revision history

Revision #	Details of changes made to test report
1	Original report issued

Notes: None

Section 2 Summary of test results

2.1 Radiated emissions

Radiated Emissions were verified during Radio Equipment testing and then verified during EMC testing.

Table 2.1-1: Requirements for radiated emissions at the frequencies up to 1 GHz for Class B equipment

Table clause	Frequency range [MHz]	Distance [m]	Measurement Detector type/ bandwidth	Class B limits dB(μ V/m)		Verdict
				SAC		
A4.1	30 – 230	10	Quasi Peak/120 kHz	30		Pass
	230 – 1000			37		
FCC	30 – 88	3	Quasi Peak/120 kHz	40		Pass
	88 – 216			43.5		
	216 – 960			46		
	960 – 1000			54		

Notes: SAC – Semi Anechoic Chamber

Table 2.1-2: Requirements for radiated emissions at the frequencies above 1 GHz for Class B equipment

Table clause	Frequency range [MHz]	Distance [m]	Measurement Detector type/ bandwidth	Class B limits dB(μ V/m)		Verdict
				SAC		
A5.1	1000 – 3000	3	Peak/1 MHz	70		Pass
	3000 – 6000			74		
FCC	1000 – 18000	3	Peak/1 MHz	74		Pass

Notes: SAC – Semi Anechoic Chamber

2.2 Conducted emissions

Table 2.2-1: Requirements for conducted emissions from the AC mains power ports of Class B equipment

Table clause	Frequency range [MHz]	Coupling device (See table A.7 ¹)	Detector type/ bandwidth	Class B limits dB(μ V/m)	Verdict
A9.1 and FCC	0.15 – 0.5	AMN	Quasi Peak/9 kHz	66 – 56	Pass
	0.5 – 5			56	
	5 – 30			60	
A9.2 and FCC	0.15 – 0.5	AMN	CAverage/9 kHz	56 – 46	Pass
	0.5 – 5			46	
	5 – 30			50	

Notes: ¹ With reference to EN 55032. FCC and ICES-003 Limits are met.

Section 3 Equipment under test (EUT) details

3.1 Applicant

Company name	MyGnar, Inc.
Address	2640 Lincoln Blvd, Suite 2A
City	Santa Monica
Province/State	CA
Postal/Zip code	90404
Country	USA

3.2 Manufacturer

Company name	Express Manufacturing, Inc.
Address	3519 West Warner Ave.
City	Santa Ana
Province/State	CA
Postal/Zip code	92704
Country	USA

3.3 Sample information

Receipt date	November 15, 2016
Nemko sample ID number	315051

3.4 EUT information

Product name	Storage Device
Model	GBX128V1
Serial number	none
Trade Name	GNARBOX
Power requirements	100-240V AC
Description/theory of operation	Read media from USB, SD and microSD cards to backup and transfer data via WiFi hotspot.
Operational frequencies	2400-2483.5 MHz WiFi
Software details	No Software.

3.5 EUT exercise and monitoring details

EUT was set to continuously transfer data and monitored for disruption during immunity testing. Testing was performed in AC power mode with optional wall mount 5VDC USB power adapter. EUT has no stand-alone ancillary equipment. For radiated emissions test results refer to EN 300 328 test report.

3.6 EUT setup details

Table 3.6-1: EUT sub assemblies

Description	Brand name	Model/Part number	Serial number	Rev.
N/A				

Table 3.6-2: EUT interface ports

Description	Qty.
Micro USB	1
USB 2.0	1
USB 3.0	1
Micro SD Card	1
SD Card	1

Table 3.6-3: Support equipment

Description	Brand name	Model/Part number	Serial number	Rev.
Wall Mount Power Supply	Apple	A1265	None	N/A
USB 2.0 Thumb Drive	Samsung	8GB	None	N/A
USB 3.0 Thumb Drive	Sandisk	2GB	None	N/A
SD Memory Card	Generic	2GB	None	N/A

Table 3.6-4: Inter-connection cables

Cable description	From	To	Length (m)
USB Cable	EUT	Wall Mount Power Supply	1



Figure 3.6-1: Setup Photo

Section 4 Engineering considerations

4.1 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5 Test conditions

5.1 Atmospheric conditions

Temperature	15–30 °C
Relative humidity	20–75 %
Air pressure	86–106 kPa

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages $\pm 5\%$, for which the equipment was designed.

Section 6 Measurement uncertainty

6.1 Uncertainty of measurement

Nemko USA Inc. has calculated measurement uncertainty and is documented in EMC/MUC/001 "Uncertainty in EMC measurements." Measurement uncertainty was calculated using the methods described in CISPR 16-4 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC measurements; as well as described in UKAS LAB34: The expression of Uncertainty in EMC Testing. Measurement uncertainty calculations assume a coverage factor of $K=2$ with 95% certainty.

Section 7 Terms and definitions

7.1 Performance criterion

Performance criteria: Reference clause 6 of EN 301 489-17 2.2.1 (2012-09)

7.2 General definitions

7.2.1 EN 61000-3-2 (Harmonic emissions)

For the purpose of harmonic current limitation, equipment is classified as follows:

Class A	<ul style="list-style-type: none"> – Balanced three-phase equipment; – Household appliances excluding equipment identified as Class D; – Tools excluding portable tools; – Dimmers for incandescent lamps; – Audio equipment. <p>Equipment not specified in one of the three other classes shall be considered as Class A equipment.</p>
Class B	<ul style="list-style-type: none"> – Portable tools; – Arc welding equipment, which is not professional equipment.
Class C	<ul style="list-style-type: none"> – Lighting equipment.
Class D	<p>Equipment having a specified power according to 6.2.2 less than or equal to 600 W, of the following types:</p> <ul style="list-style-type: none"> – Personal computers and personal computer monitors; – Television receivers.

7.2.2 EN 61000-3-3 (Flicker)

Voltage fluctuation	Series of changes of r.m.s voltage evaluated as a single value for each successive half-period between zero-crossings of the source voltage.
Flicker	Impression of unsteadiness of visual sensation induced by a light stimulus whose luminance or spectral distribution fluctuates with time.
Short-term flicker indicator, <i>Pst</i>	The flicker severity evaluated over a short period (in minutes); <i>Pst</i> = 1 is the conventional threshold of irritability.
Long-term flicker indicator, <i>Plt</i>	The flicker severity evaluated over a long period (a few hours) using successive <i>Pst</i> values.

7.2 General definitions, continued

7.2.3 EN 61000-4-2 (Electrostatic discharge)

Electrostatic discharge; ESD	A transfer of electric charge between bodies of different electrostatic potential in proximity or through direct contact.
Contact discharge method	A method of testing, in which the electrode of the test generator is held in contact with the EUT, and the discharge actuated by the discharge switch within the generator.
Air discharge method	A method of testing, in which the charged electrode of the test generator is brought close to the EUT, and the discharge actuated by a spark to the EUT.
Direct application	Application of the discharge directly to the EUT.
Indirect application	Application of the discharge to a coupling plane in the vicinity of the EUT, and simulation of personnel discharge to objects, which are adjacent to the EUT.
Coupling plane	A metal sheet or plate, to which discharges are applied to simulate electrostatic discharge to objects adjacent to the EUT. HCP: Horizontal Coupling Plane; VCP: Vertical Coupling Plane.

7.2.4 EN 61000-4-6 (Immunity to conducted disturbances, induced by radio-frequency fields)

Clamp injection	Clamp injection is obtained by means of a clamp-on “current” injecting device on the cable.
Coupling/decoupling network CDN	Electrical circuit incorporating the functions of both the coupling and decoupling networks.
Sweep	Continuous or incremental traverse over a range of frequencies.

7.2.5 EN 61000-4-3: (Radiated, radio-frequency, electromagnetic field)

Continuous waves (CW)	Electromagnetic waves, the successive oscillations of which are identical under steady-state conditions, which can be interrupted or modulated to convey information.
Electromagnetic (EM) wave	Radiant energy produced by the oscillation of an electric charge characterized by oscillation of the electric and magnetic fields.
Field strength	The term “field strength” is applied only to measurements made in the far field. The measurement may be of either the electric or the magnetic component of the field and may be expressed as V/m, A/m or W/m ² ; any one of these may be converted into the others.
Sweep	Continuous or incremental traverse over a range of frequencies.

7.2 General definitions, continued

7.2.6 EN 61000-4-5 (Surge)

Surge	Transient wave of electrical current, voltage, or power propagating along a line or a circuit and characterized by a rapid increase followed by a slower decrease.
Ground (reference)	Part of the Earth considered as conductive, the electrical potential of which is conventionally taken as zero, being outside the zone of influence of any earthing (grounding) arrangement.

7.2.7 EN 61000-4-4 (Electrical fast transient/burst)

Burst	Sequence of a limited number of distinct pulses or an oscillation of limited duration.
Common mode (coupling)	Simultaneous coupling to all lines versus the ground reference plane.
Ground reference plane	Flat conductive surface whose potential is used as a common reference.
Coupling clamp	Device of defined dimensions and characteristics for common mode coupling of the disturbance signal to the circuit under test without any galvanic connection to it.
Transient	Pertaining to or designating a phenomenon or a quantity which varies between two consecutive steady states during a time interval which is short compared with the time-scale of interest.

7.2.8 EN 61000-4-11 (Voltage dips, short interruptions and voltage variations)

Voltage dip	A sudden reduction of the voltage at a particular point of an electricity supply system below a specified dip threshold followed by its recovery after a brief interval.
Short interruption	A sudden reduction of the voltage on all phases at a particular point of an electric supply system below a specified interruption threshold followed by its restoration after a brief interval.

Section 8 Testing data

8.1 AC mains power input/output ports

8.1.1 References

EN 55032: 2015

8.1.2 Test summary

Verdict	Pass		
Test date	November 15, 2016	Temperature	22 °C
Test engineer	Greg Woelke, EMC Test Engineer	Air pressure	1005 mbar
Test location	Ground Plane	Relative humidity	45 %

8.1.3 Notes

None

8.1.4 Setup details

Port under test	AC Mains
EUT setup configuration	Table top
Measurement details	A preview measurement was generated with the receiver in continuous scan mode. Emissions detected within 6 dB or above limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.

Receiver settings:

Resolution bandwidth	9 kHz
Video bandwidth	30 kHz
Detector mode	Peak (preview measurement); Quasi-peak and Average (final measurement)
Trace mode	Max Hold
Measurement time	100 ms (preview measurement); 1000 ms (final measurement)

Table 8.1-1: Clause 8.4 – AC mains power input/output ports equipment list

Asset Tag	Description	Manufacturer	Model	Serial #	Next Cal
E1019	Two Line V-Network	Rohde & Schwarz	ENV216	101045	15-Jun-2017
E1026	EMI Test Receiver	Rohde & Schwarz	ESCI 7	100800	17-Mar-2017

Notes: [Choose an item.](#)

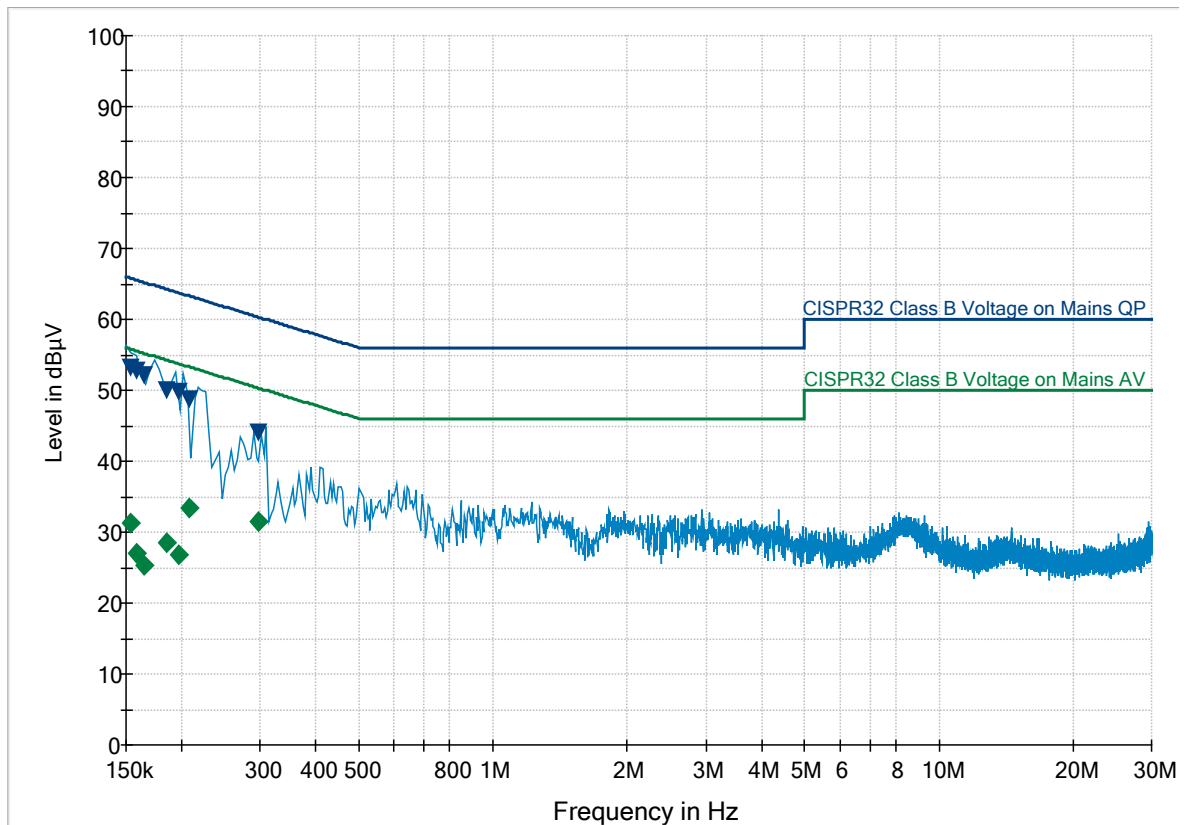
Table 8.1-2: Clause 8.4 – AC mains power input/output ports software details

Manufacturer of Software	Details
R&S	EMC32 V10.00.00

Notes: None

8.1.5 Test data

Full Spectrum



The spectral plot has been corrected with transducer factors. (i.e. cable loss, LISN factors, and attenuators)

Figure 8.1-1: Clause 8.4 – AC mains power input/output ports spectral plot on phase line and neutral line

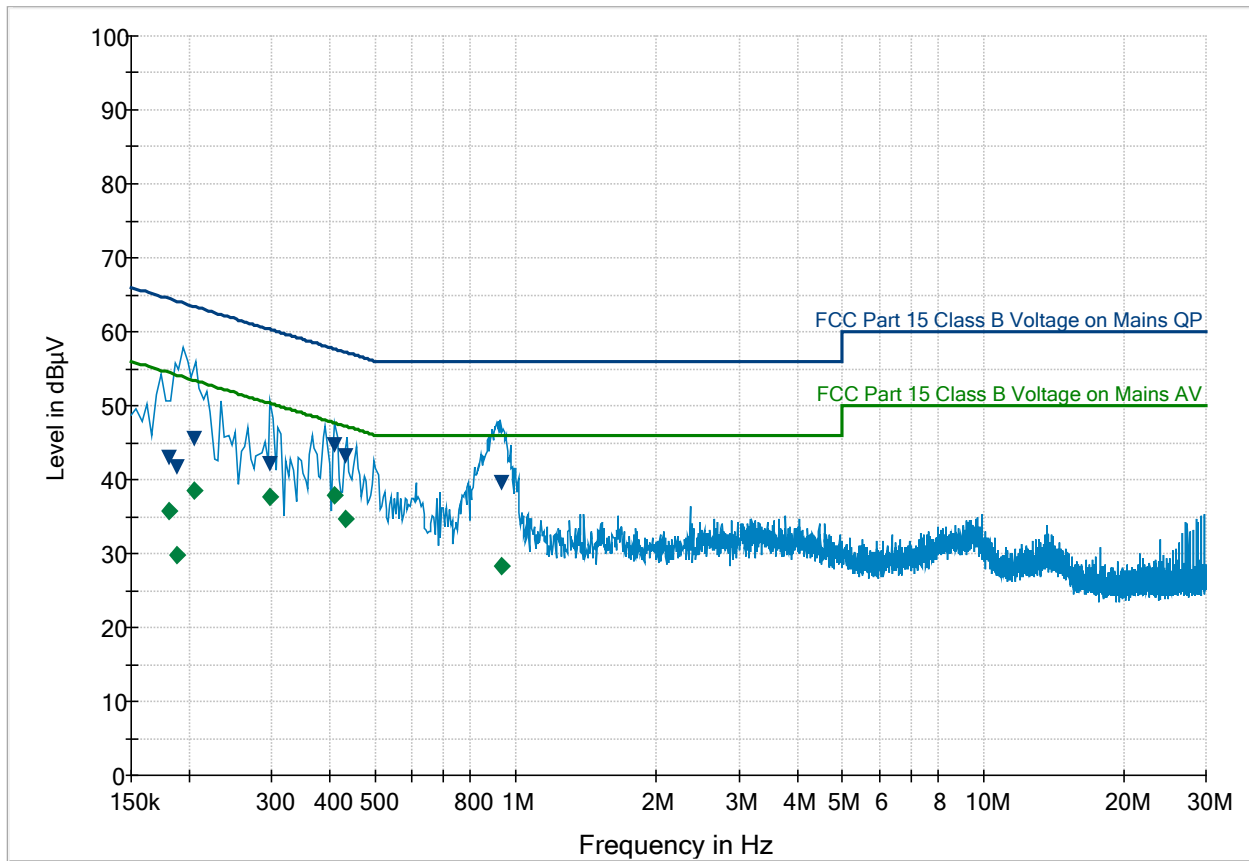
8.1.5 Test data, continued

Table 8.1-3: Clause 8.4 – AC mains power input/output ports (Quasi-Peak and Average) results

Frequency (MHz)	QuasiPeak (dB μ V)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.154	---	31.2	55.7	-24.5	5000	9	L1	ON	19.5
0.154	53.1	---	65.7	-12.6	5000	9	L1	ON	19.5
0.158	52.6	---	65.5	-12.8	5000	9	N	ON	19.5
0.158	---	27.0	55.5	-28.5	5000	9	N	ON	19.5
0.164	52.0	---	65.2	-13.1	5000	9	N	ON	19.5
0.164	---	25.4	55.2	-29.8	5000	9	N	ON	19.5
0.184	49.9	---	64.2	-14.2	5000	9	L1	ON	19.5
0.184	---	28.4	54.2	-25.8	5000	9	L1	ON	19.5
0.196	49.7	---	63.7	-14.0	5000	9	N	ON	19.5
0.196	---	26.8	53.7	-26.9	5000	9	N	ON	19.5
0.208	---	33.4	53.2	-19.8	5000	9	N	ON	19.5
0.208	48.6	---	63.2	-14.6	5000	9	N	ON	19.5
0.296	---	31.5	50.3	-18.8	5000	9	L1	ON	19.5
0.296	43.9	---	60.3	-16.3	5000	9	L1	ON	19.5

Notes: ¹ Result (dB μ V) = receiver/spectrum analyzer value (dB μ V) + correction factor (dB)
² Correction factor (dB) = LISN factor IL (dB) + cable loss (dB) + attenuator (dB)

Full Spectrum



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)	Comment
0.180	42.9	---	64.4	-21.4	5000	9	N	ON	19.5	10:27:56 AM - 11/15/2016
0.180	---	35.8	54.4	-18.6	5000	9	N	ON	19.5	10:27:56 AM - 11/15/2016
0.188	41.7	---	64.1	-22.3	5000	9	L1	ON	19.5	10:27:16 AM - 11/15/2016
0.188	---	29.7	54.1	-24.3	5000	9	L1	ON	19.5	10:27:16 AM - 11/15/2016
0.204	45.6	---	63.4	-17.8	5000	9	L1	ON	19.5	10:27:26 AM - 11/15/2016
0.204	---	38.4	53.4	-14.9	5000	9	L1	ON	19.5	10:27:26 AM - 11/15/2016
0.296	42.2	---	60.3	-18.1	5000	9	N	ON	19.5	10:28:06 AM - 11/15/2016
0.296	---	37.5	50.3	-12.7	5000	9	N	ON	19.5	10:28:06 AM - 11/15/2016
0.408	44.5	---	57.6	-13.0	5000	9	L1	ON	19.5	10:27:36 AM - 11/15/2016
0.408	---	37.9	47.6	-9.7	5000	9	L1	ON	19.5	10:27:36 AM - 11/15/2016
0.432	43.1	---	57.2	-14.0	5000	9	L1	ON	19.5	10:27:46 AM - 11/15/2016
0.432	---	34.6	47.2	-12.5	5000	9	L1	ON	19.5	10:27:46 AM - 11/15/2016
0.928	---	28.3	46.0	-17.6	5000	9	N	ON	19.5	10:28:16 AM - 11/15/2016
0.928	39.4	---	56.0	-16.5	5000	9	N	ON	19.5	10:28:15 AM - 11/15/2016

8.1.6 Setup photos

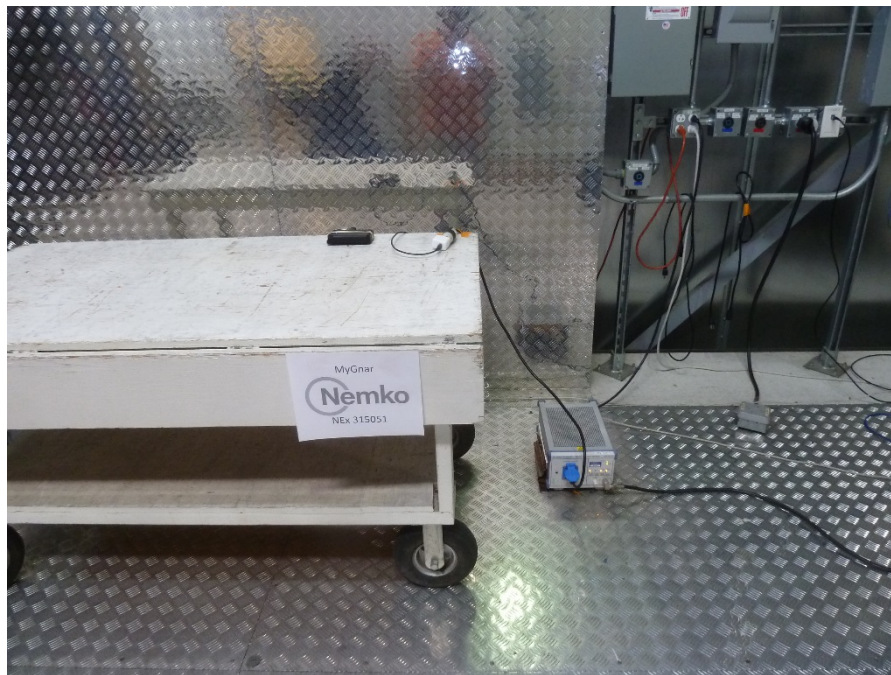


Figure 8.1-2: Clause 8.4 – AC mains power input/output ports setup photo



Figure 8.1-3: Clause 8.4 – AC mains power input/output ports setup photo

8.2 Radiated Emissions

8.2.1 References

FCC Part 15B

8.2.2 Test summary

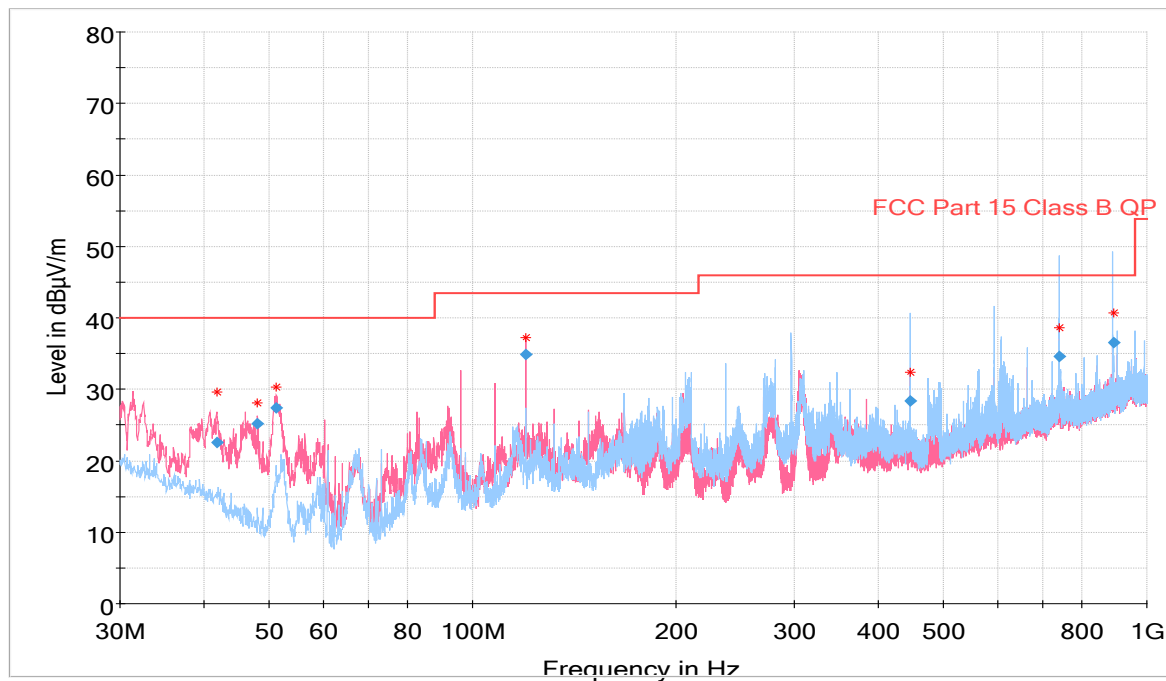
Verdict	Pass		
Test date	November 15, 2016	Temperature	22 °C
Test engineer	Greg Woelke, EMC Test Engineer	Air pressure	1005 mbar
Test location	10 meter	Relative humidity	45 %

8.2.3 Notes

None

8.2.4 Radiated Emissions, <1GHz

Full Spectrum



Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
41.817000	22.58	40.00	17.42	1000.0	120.000	258.5	V	157.0	14.2	1:03:10 PM - 8/9/2016
48.025000	25.23	40.00	14.77	1000.0	120.000	111.3	V	250.0	10.9	1:10:53 PM - 8/9/2016
51.123000	27.35	40.00	12.65	1000.0	120.000	113.9	V	69.0	9.3	12:59:42 PM - 8/9/2016
120.007500	34.94	43.50	8.56	1000.0	120.000	105.3	V	164.0	13.5	1:07:11 PM - 8/9/2016
445.579500	28.42	46.00	17.58	1000.0	120.000	291.7	H	10.0	20.8	12:47:43 PM - 8/9/2016
742.122000	34.55	46.00	11.45	1000.0	120.000	363.2	H	90.0	26.5	12:55:29 PM - 8/9/2016
891.580500	36.49	46.00	9.51	1000.0	120.000	185.5	H	65.0	28.2	12:51:38 PM - 8/9/2016

Section 8
Test name
Specification

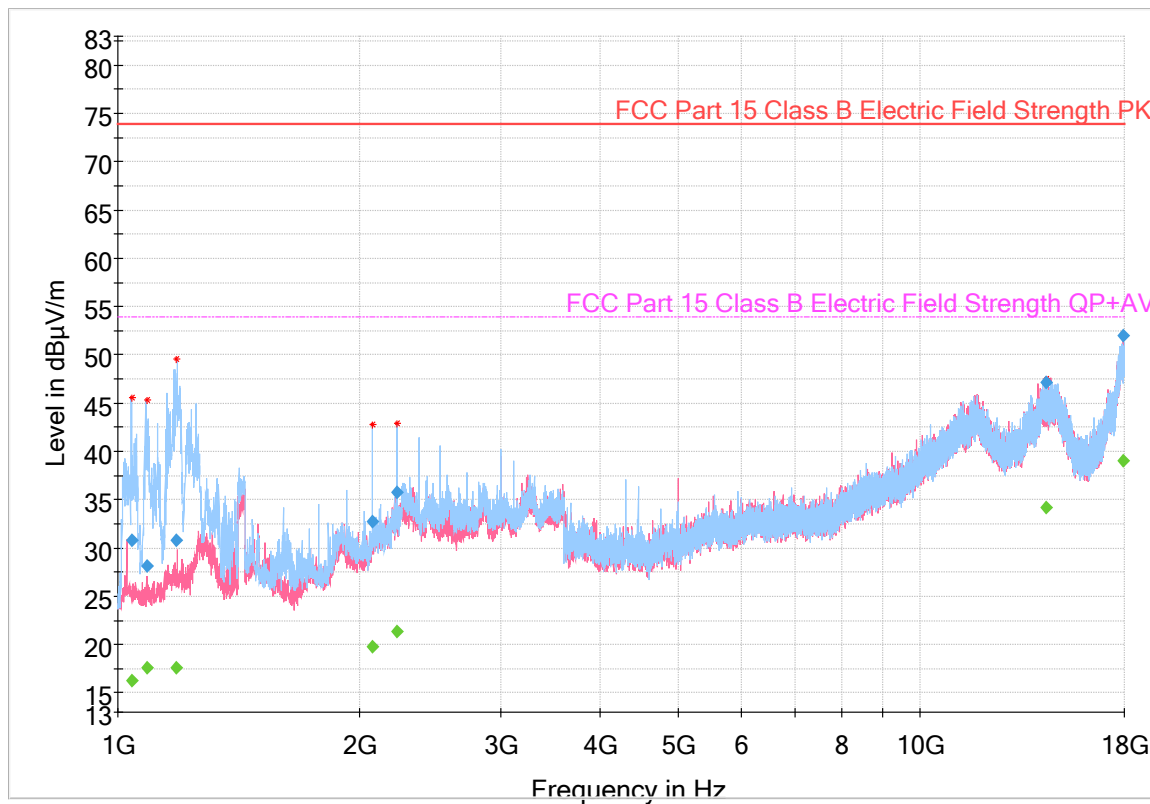
Testing data
Clause 8.4 – AC mains power input/output ports
EN 301 489-17 V2.2.1 (2012-09)



Compliance			
Compliant?	Yes	Additional Comments	N/A

8.2.5 Radiated Emissions, >1GHz

Full Spectrum



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr (dB)	Comment
1040.100000	30.82	---	73.90	43.08	1000.	1000.000	156.1	H	168.0	-3.0	1:51:54 PM - 8/9/2016
1040.100000	---	16.32	53.90	37.58	1000.	1000.000	156.1	H	168.0	-3.0	1:51:54 PM - 8/9/2016
1086.766667	28.13	---	73.90	45.77	1000.	1000.000	121.9	H	224.0	-2.4	1:44:36 PM - 8/9/2016
1086.766667	---	17.66	53.90	36.24	1000.	1000.000	121.9	H	224.0	-2.4	1:44:36 PM - 8/9/2016
1183.833333	30.81	---	73.90	43.09	1000.	1000.000	147.4	H	98.0	-1.8	1:42:10 PM - 8/9/2016
1183.833333	---	17.55	53.90	36.35	1000.	1000.000	147.4	H	98.0	-1.8	1:42:10 PM - 8/9/2016
2080.333333	---	19.82	53.90	34.09	1000.	1000.000	105.5	H	166.0	3.0	1:47:04 PM - 8/9/2016
2080.333333	32.70	---	73.90	41.20	1000.	1000.000	105.5	H	166.0	3.0	1:47:04 PM - 8/9/2016
2229.200000	---	21.32	53.90	32.58	1000.	1000.000	103.7	H	265.0	2.1	1:49:28 PM - 8/9/2016
2229.200000	35.74	---	73.90	38.16	1000.	1000.000	103.7	H	265.0	2.1	1:49:28 PM - 8/9/2016

Section 8*Testing data***Test name***Clause 8.4 – AC mains power input/output ports***Specification***EN 301 489-17 V2.2.1 (2012-09)*

14395.80000	---	34.14	53.90	19.76	1000.	1000.000	185.3	V	278.0	26.5	1:58:39 PM - 8/9/2016
14395.80000	47.21	---	73.90	26.69	1000.	1000.000	185.3	V	278.0	26.5	1:58:39 PM - 8/9/2016
17918.40000	---	39.05	53.90	14.85	1000.	1000.000	122.7	V	18.0	30.9	1:55:16 PM - 8/9/2016
17918.40000	52.05	---	73.90	21.85	1000.	1000.000	122.7	V	18.0	30.9	1:55:16 PM - 8/9/2016

8.3 Clause 8.5 – Harmonic current emissions (AC mains input port)

8.3.1 References

EN 61000-3-2: 2014

8.3.2 Test summary

Verdict	Pass		
Test date	November 16, 2016	Temperature	21 °C
Test engineer	Greg Woelke, EMC Test Engineer	Air pressure	1001 mbar
Test location	Ground Plane	Relative humidity	56 %

8.3.3 Notes

None

8.3.4 Setup details

Port under test	AC Mains
Measurement time	30 min

Table 8.2-1: Clause 8.5 – Harmonic current emissions (AC mains input port) equipment list

Asset Tag	Description	Manufacturer	Model	Serial #	Next Cal
1851	IX Series Programmable AC & DC Power Source Analyzer	California Instruments/Ametek	90003ix		02-Jul-2017

Notes: N/A - not applicable

Table 8.2-2: Clause 8.5 – Harmonic current emissions (AC mains input port) test software details

Manufacturer of Software	Details
California Instruments	AC Source CIGui SII Version 3.0.0

Notes: None

8.3.5 Test data, continued

Measurement data

Harmonics – Class-A per Ed. 4.0 (2014) (Run time)

EUT: GBX128V1	Tested by: Greg Woelke	
Test category: Class-A per Ed. 4.0 (2014) (European limits)	Test Margin: 100	
Test date: 11/16/2016	Start time: 9:14:07 AM	End time: 9:44:29 AM
Test duration (min): 30	Data file name: H-000486.cts_data	
Comment: NEx. 315051		
Customer: MyGnar, Inc.		

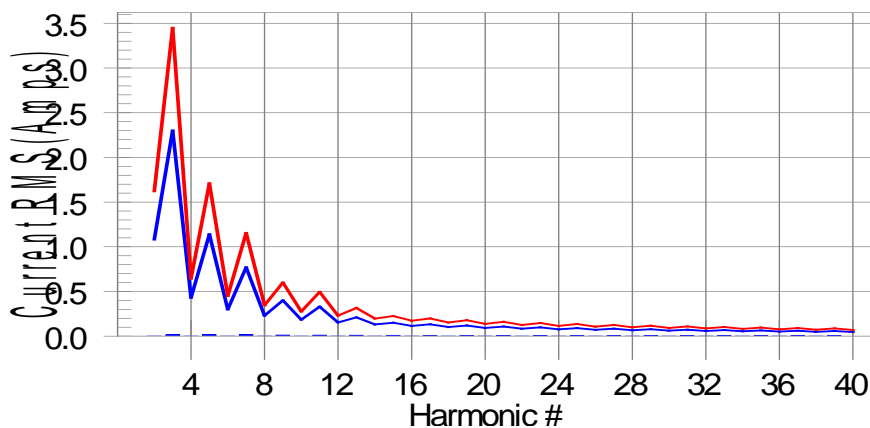
Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line

European Limits



Test result: Pass Worst harmonic was #17 with 7.1% of the limit.

Current Test Result Summary (Run time)

Section 8 Testing data
 Test name Clause 8.5 – Harmonic current emissions (AC mains input port)
 Specification EN 301 489-17 V2.2.1 (2012-09)



EUT: GBX128V1 Tested by: Greg Woelke
 Test category: Class-A per Ed. 4.0 (2014) (European limits) Test Margin: 100
 Test date: 11/16/2016 Start time: 9:14:07 AM End time: 9:44:29 AM
 Test duration (min): 30 Data file name: H-000486.cts_data
 Comment: NEx. 315051
 Customer: MyGnar, Inc.

Test Result: Pass Source qualification: Normal
 THC(A): 0.039 I-THD(%): 259.2 POHC(A): 0.011 POHC Limit(A): 0.251
 Highest parameter values during test:

V_RMS (Volts):	230.18	Frequency(Hz):	50.00
I_Peak (Amps):	0.393	I_RMS (Amps):	0.053
I_Fund (Amps):	0.017	Crest Factor:	8.960
Power (Watts):	3.8	Power Factor:	0.363

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	1.080	N/A	0.002	1.620	N/A	Pass
3	0.015	2.300	0.6	0.016	3.450	0.5	Pass
4	0.001	0.430	N/A	0.002	0.645	N/A	Pass
5	0.014	1.140	1.2	0.016	1.710	0.9	Pass
6	0.001	0.300	N/A	0.002	0.450	N/A	Pass
7	0.014	0.770	1.8	0.015	1.155	1.3	Pass
8	0.001	0.230	N/A	0.002	0.345	N/A	Pass
9	0.013	0.400	3.2	0.014	0.600	2.4	Pass
10	0.001	0.184	N/A	0.002	0.276	N/A	Pass
11	0.012	0.330	3.7	0.013	0.495	2.7	Pass
12	0.001	0.153	N/A	0.002	0.230	N/A	Pass
13	0.011	0.210	5.4	0.012	0.315	3.9	Pass
14	0.001	0.131	N/A	0.002	0.197	N/A	Pass
15	0.010	0.150	6.9	0.011	0.225	4.9	Pass
16	0.001	0.115	N/A	0.002	0.173	N/A	Pass
17	0.009	0.132	7.1	0.010	0.198	5.0	Pass
18	0.001	0.102	N/A	0.002	0.153	N/A	Pass
19	0.008	0.118	7.0	0.009	0.178	4.9	Pass
20	0.001	0.092	N/A	0.002	0.138	N/A	Pass
21	0.007	0.107	6.8	0.008	0.161	4.7	Pass
22	0.001	0.084	N/A	0.002	0.125	N/A	Pass
23	0.006	0.098	6.5	0.007	0.147	4.5	Pass
24	0.001	0.077	N/A	0.002	0.115	N/A	Pass
25	0.005	0.090	6.1	0.006	0.135	4.2	Pass
26	0.001	0.071	N/A	0.002	0.107	N/A	Pass
27	0.005	0.083	N/A	0.005	0.125	N/A	Pass
28	0.001	0.066	N/A	0.002	0.099	N/A	Pass
29	0.004	0.078	N/A	0.004	0.116	N/A	Pass
30	0.001	0.061	N/A	0.002	0.092	N/A	Pass
31	0.003	0.073	N/A	0.004	0.109	N/A	Pass
32	0.001	0.058	N/A	0.002	0.086	N/A	Pass
33	0.003	0.068	N/A	0.003	0.102	N/A	Pass
34	0.001	0.054	N/A	0.001	0.081	N/A	Pass
35	0.003	0.064	N/A	0.003	0.096	N/A	Pass
36	0.001	0.051	N/A	0.001	0.077	N/A	Pass
37	0.002	0.061	N/A	0.003	0.091	N/A	Pass
38	0.001	0.048	N/A	0.001	0.073	N/A	Pass
39	0.002	0.058	N/A	0.003	0.087	N/A	Pass
40	0.001	0.046	N/A	0.001	0.069	N/A	Pass

Voltage Source Verification Data (Run time)

Section 8
Test name
Specification

Testing data
Clause 8.5 – Harmonic current emissions (AC mains input port)
EN 301 489-17 V2.2.1 (2012-09)



EUT: GBX128V1
Test category: Class-A per Ed. 4.0 (2014) (European limits)
Test date: 11/16/2016
Test duration (min): 30
Comment: NEx. 315051
Customer: MyGnar, Inc.

Tested by: Greg Woelke
Test Margin: 100
Start time: 9:14:07 AM
End time: 9:44:29 AM
Data file name: H-000486.cts_data

Test Result: Pass Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms):	230.18	Frequency(Hz):	50.00
I_Peak (Amps):	0.393	I_RMS (Amps):	0.053
I_Fund (Amps):	0.017	Crest Factor:	8.960
Power (Watts):	3.8	Power Factor:	0.363

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.022	0.460	4.71	OK
3	0.520	2.071	25.10	OK
4	0.039	0.460	8.56	OK
5	0.018	0.921	1.91	OK
6	0.044	0.460	9.54	OK
7	0.036	0.690	5.14	OK
8	0.008	0.460	1.84	OK
9	0.105	0.460	22.78	OK
10	0.007	0.460	1.45	OK
11	0.069	0.230	29.97	OK
12	0.008	0.230	3.28	OK
13	0.034	0.230	14.75	OK
14	0.004	0.230	1.69	OK
15	0.015	0.230	6.39	OK
16	0.010	0.230	4.40	OK
17	0.006	0.230	2.43	OK
18	0.018	0.230	7.75	OK
19	0.013	0.230	5.58	OK
20	0.014	0.230	6.03	OK
21	0.007	0.230	2.88	OK
22	0.003	0.230	1.51	OK
23	0.005	0.230	2.28	OK
24	0.005	0.230	2.00	OK
25	0.005	0.230	2.17	OK
26	0.003	0.230	1.32	OK
27	0.005	0.230	2.26	OK
28	0.004	0.230	1.54	OK
29	0.004	0.230	1.57	OK
30	0.005	0.230	2.37	OK
31	0.003	0.230	1.16	OK
32	0.003	0.230	1.09	OK
33	0.004	0.230	1.56	OK
34	0.002	0.230	0.92	OK
35	0.003	0.230	1.12	OK
36	0.003	0.230	1.16	OK
37	0.003	0.230	1.48	OK
38	0.002	0.230	1.02	OK
39	0.004	0.230	1.58	OK
40	0.008	0.230	3.56	OK

Section 8
Test name
Specification

Testing data
Clause 8.5 – Harmonic current emissions (AC mains input port)
EN 301 489-17 V2.2.1 (2012-09)



8.3.6 Setup photos



Figure 8.2-1: Clause 8.5 – Harmonic current emissions (AC mains input port) setup photo

8.4 Clause 8.6 – Voltage fluctuations and flicker (AC mains input port)

8.4.1 References

EN 61000-3-3: 2013

8.4.2 Test summary

Verdict	Pass		
Test date	November 16, 2016	Temperature	21 °C
Test engineer	Greg Woelke, EMC Test Engineer	Air pressure	1001 mbar
Test location	Ground Plane	Relative humidity	56 %

8.4.3 Notes

None

8.4.4 Setup details

Port under test	AC Mains
Measurement time	30 min

Table 8.3-1: Clause 8.6 – Voltage fluctuations and flicker (AC mains input port) equipment list

Asset Tag	Description	Manufacturer	Model	Serial #	Next Cal
1851	IX Series Programmable AC & DC Power Source Analyzer	California Instruments/Ametek	90003ix	N/A	02-Jul-2017

Notes: N/A - not applicable

Table 8.3-2: Clause 8.6 – Voltage fluctuations and flicker (AC mains input port) test software details

Manufacturer of Software	Details
California Instruments	AC Source CIGui SII Version 3.0.0

Notes: None

8.4.5 Test data, continued

Measurement data

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

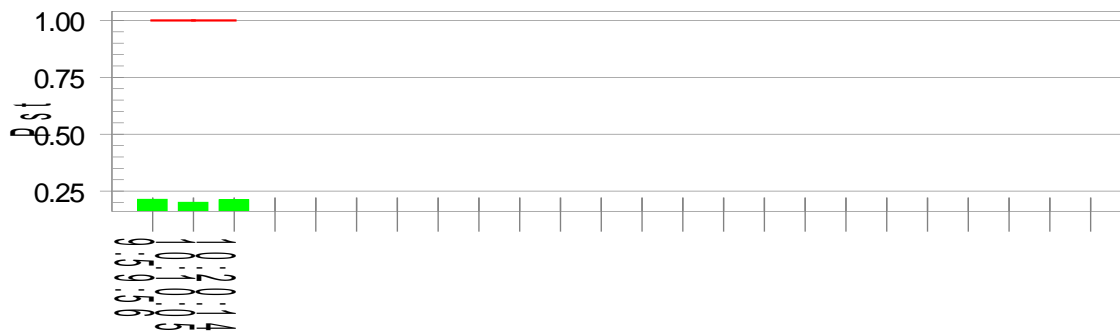
EUT: GBX128V1
 Test category: All parameters (European limits)
 Test date: 11/16/2016
 Test duration (min): 30
 Comment: NEx. 315051
 Customer: MyGnar, Inc.

Tested by: Greg Woelke
 Test Margin: 100
 Start time: 9:49:26 AM
 End time: 10:20:15 AM
 Data file name: F-000487.cts_data

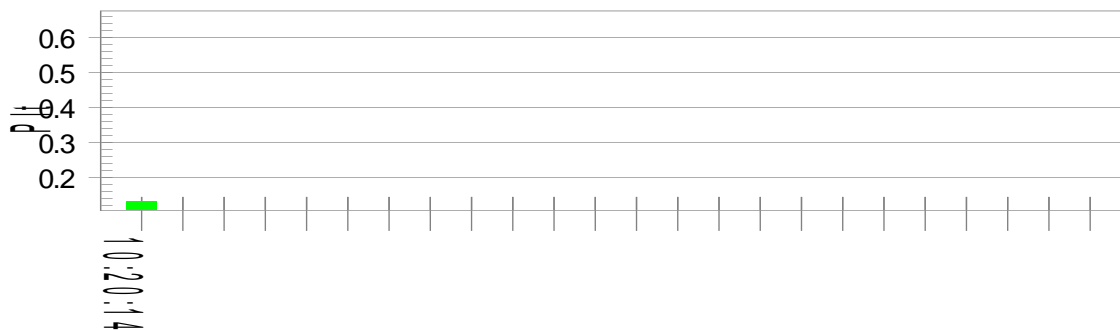
Test Result: Pass Status: Test Completed

Pst_i and limit line

European Limits



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt): 230.16
 Highest dt (%): 0.00 Test limit (%): N/A N/A

Section 8

Testing data

Test name

Clause 8.6 – Voltage fluctuations and flicker (AC mains input port)

Specification

EN 301 489-17 V2.2.1 (2012-09)



T-max (mS):	0	Test limit (mS):	500.0	Pass
Highest dc (%):	0.00	Test limit (%):	3.30	Pass
Highest dmax (%):	0.06	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.214	Test limit:	1.000	Pass
Highest Plt (2 hr. period):	0.132	Test limit:	0.650	Pass

8.4.6 Setup photos



Figure 8.3-1: Clause 8.6 – Voltage fluctuations and flicker (AC mains input port) setup photo

8.5 Clause 9.2 – Radio frequency electromagnetic field (0.08 to 1 and 1.4 to 2.7 GHz)

8.5.1 References

EN 61000-4-3: 2006 + A1: 2008 + A2: 2010

8.5.2 Test summary

Verdict	Pass		
Test date	November 15, 2016	Temperature	21 °C
Test engineer	Greg Woelke, EMC Test Engineer	Air pressure	1005 mbar
Test location	RFI Chamber	Relative humidity	47 %

8.5.3 Notes

None

8.5.4 Setup details

Table 8.4-1: Clause 9.2 – Radio frequency electromagnetic field (0.08 to 1 and 1.4 to 2.7 GHz) equipment list

Asset Tag	Description	Manufacturer	Model	Serial #	Next Cal
43	RF Amplifier	Amplifier Research	200T1G3M3	19649	N/R
728	Microwave Horn Antenna	Amplifier Research	AT4002A (0.8 to 5 GHz)	23811	N/R
740	RF Amplifier	Amplifier Research	500W1000M5	23680	N/R
E1014	DRG Horn Antenna	A.H.Systems, Inc.	SAS-570	174	12-Dec-2016
E1128	Signal Generator	ROHDE & SCHWARZ	SMB100A	177768	09-Aug-2017
43	RF Amplifier	Amplifier Research	200T1G3M3 (800 to 28)	19649	N/R

Notes: N/A - not applicable

Table 8.4-2: Clause 9.2 – Radio frequency electromagnetic field (0.8 to 1 and 1.4 to 2.7 GHz) test software details

Manufacturer of Software	Details
ETS-LINDGREN	TILE! Version 6.0.4.548

Notes: None

8.5.5 Test data

Table 8.4-3: Clause 9.2 – Radio frequency electromagnetic field (0.8 to 1 and 1.4 to 2.7 GHz) results

Step size increment	1 %
Dwell time¹	3 s
Antenna polarization	Vertical and Horizontal
Modulation	CW signal amplitude modulated (AM) with 80 % depth with a 1 kHz sine wave
EUT setup configuration	Table top
EUT position facing antenna	Front side, back side, left side and right side

Frequency range, MHz		Test level, V/m	Comments
80	1000	3	No degradation
1400	2700	3	No degradation

- Notes:
- ¹The dwell time at each frequency was not less than the time necessary for the EUT to be exercised and to be able to respond. The time to exercise the EUT is not interpreted as a total time of a program or a cycle but related to the reaction time in case of failure of the EUT.
 - ²The exclusion band for immunity testing shall be calculated as follows:
 - lower limit of exclusion band = lowest allocated band edge frequency -5 %;
 - upper limit of exclusion band = highest allocated band edge frequency +5 %.

8.5.6 Setup photo



Figure 8.4-1: Clause 9.2 – Radio frequency electromagnetic field (0.8 to 1 and 1.4 to 2.7 GHz) setup photo



Figure 8.4-2: Clause 9.2 – Radio frequency electromagnetic field (0.8 to 1 and 1.4 to 2.7 GHz) setup photo

8.6 Clause 9.3 – Electrostatic discharge

8.6.1 References

EN 61000-4-2: 2009

8.6.2 Test summary

Verdict	Pass		
Test date	November 17, 2016	Temperature	21 °C
Test engineer	Brian Gibson, EMC Test Engineer	Air pressure	100.2 mbar
Test location	ESD Room	Relative humidity	38 %

8.6.3 Notes

None

8.6.4 Setup details

Table 8.5-1: Clause 9.3 – Electrostatic discharge equipment list

Asset Tag	Description	Manufacturer	Model	Serial #	Last Cal
818	ESD Gun	Schaffner	NSG-435	5111	03-Mar-2017

Notes: N/A - not applicable

8.6.5 Test data

Table 8.5-2: Clause 9.3 – Electrostatic discharge results

EUT setup configuration:	Table top	
ESD repetition rate:	1 pulse per second	
Discharges:	10 contact discharges and 10 air discharges at each polarity	
Contact discharge	Test voltage (±kV)	Comments
Please refer to “Electrostatic discharge test location points” photos of this section	2, 4	See Notes
Indirect discharge	Test voltage (±kV)	Comments
HCP (all sides)	2, 4	No degradation
VCP (all sides)	2, 4	No degradation
Air discharge	Test voltage (±kV)	Comments
Please refer to “Electrostatic discharge test location points” photos of this section	2, 4, 8	See Notes

Notes: When USB port/top aluminum cover is subjected to 4kV, EUT goes into a standby mode and requires user intervention to power cycle.

8.6.5 Test data, continued

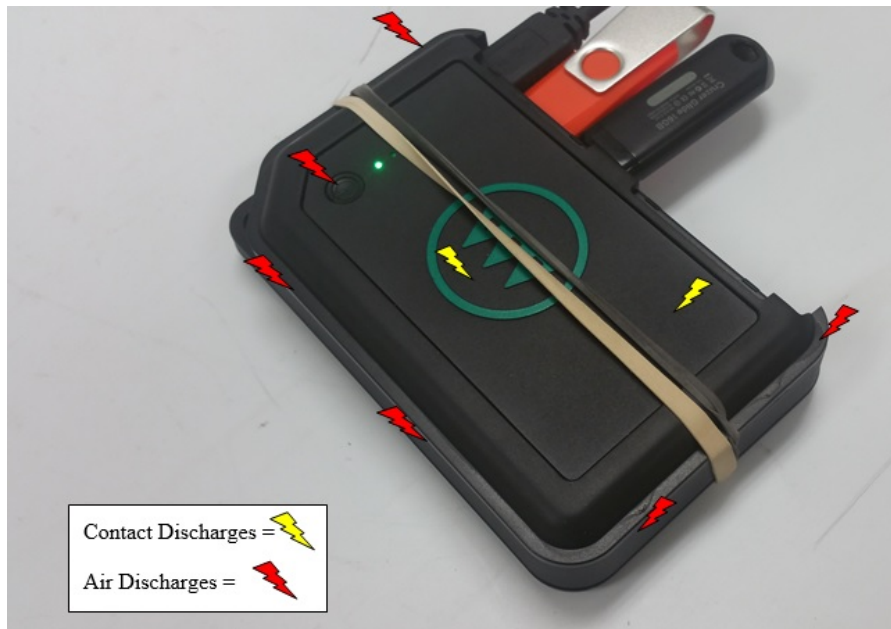


Figure 8.5-1: Clause 9.3 – Electrostatic discharge location point's photo

8.6.5 Test data, continued

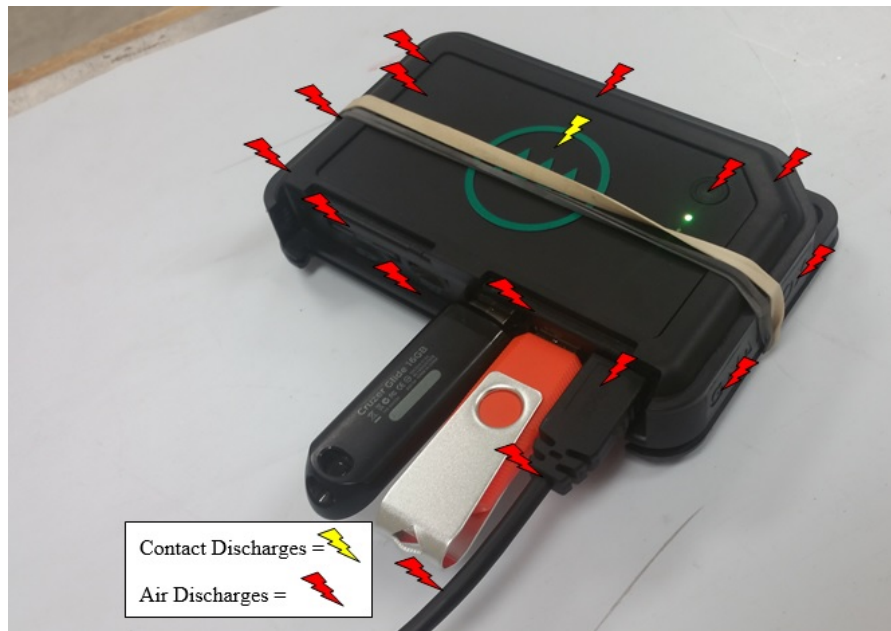


Figure 8.5-2: Clause 9.3 – Electrostatic discharge location point's photo

8.6.6 Setup photo



Figure 8.5-3: Clause 9.3 – Electrostatic discharge setup photo

8.7 Clause 9.4 – Fast transients, common mode

8.7.1 References

EN 61000-4-4: 2004 + A1: 2010

8.7.2 Test summary

Verdict	Pass		
Test date	November 16, 2016	Temperature	22 °C
Test engineer	Brian Gibson, EMC Test Engineer	Air pressure	999 mbar
Test location	Ground Plane	Relative humidity	57 %

8.7.3 Notes

None

8.7.4 Setup details

Table 8.6-1: Clause 9.4 – Fast transients, common mode equipment list

Asset Tag	Description	Manufacturer	Model	Serial #	Next Cal
E1124	Main Frame	TESEQ AG	NSG 3060	1845	28-May-2017
E1125	CDN	TESEQ AG	CDN 3061	1584	28-May-2017

Notes: N/A - not applicable

Table 8.6-2: Clause 9.4 – Fast transients, common mode test software details

Manufacturer of Software	Details
TESEQ	Advanced Test Solution for EMC, Version 1.3.1

Notes: None

8.7.5 Test data

Table 8.6-3: Clause 9.4 – Fast transients, common mode results

Wave shape (Tr / Td):	5/50 ns (Tr = rise time, Td= duration time)
Repetition frequency:	5 kHz
Burst duration:	15 ms
Burst period:	300 ms
Test duration:	60 s

Port	Test voltage (±kV)	Comments
AC input ¹	1	No degradation

- Notes:
- ¹Transient applied asynchronous (relation to power supply)
 - ²The test voltage was applied simultaneously between a ground reference plane and all of the power supply terminals and the protective or functional earth port on the EUT cabinet
 - ³The test voltage was applied via capacitive coupling clamp
 - ⁴ Applicable to DC ports of radio equipment and associated ancillary equipment, if the cables may be longer than 3 m.
 - ⁵ Applicable to signal, telecommunication and control ports, of radio equipment and associated ancillary equipment, if the cables may be longer than 3 m

8.7.6 Setup photos

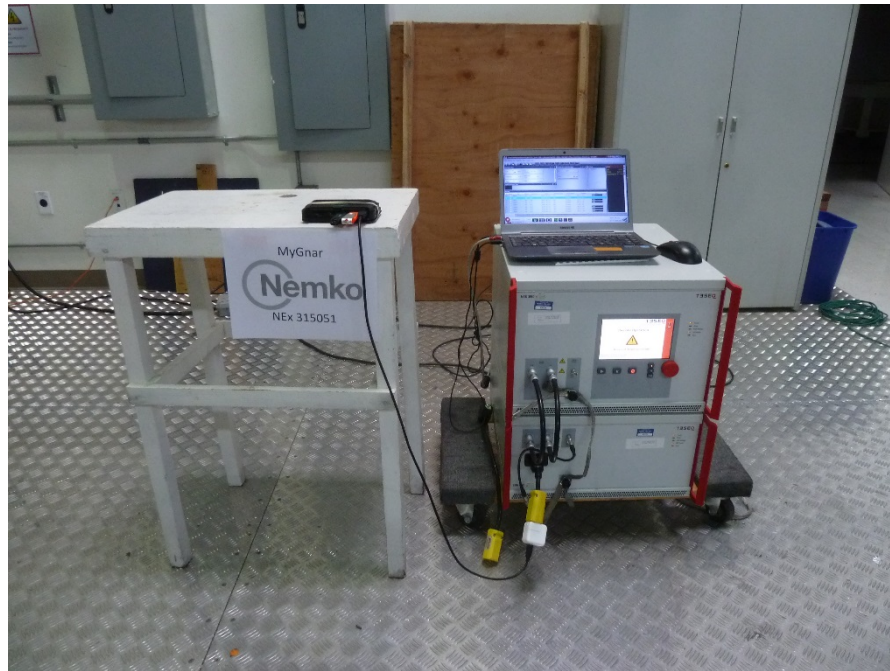


Figure 8.6-1: Clause 9.4 – Fast transients, common mode setup photo

8.8 Clause 9.5 – Radio frequency, common mode

8.8.1 References

EN 61000-4-6: 2009

8.8.2 Test summary

Verdict	Pass		
Test date	November 16, 2016	Temperature	22 °C
Test engineer	Brian Gibson, EMC Test Engineer	Air pressure	999 mbar
Test location	Ground Plane	Relative humidity	57 %

8.8.3 Notes

None.

8.8.4 Setup details

Table 8.7-1: Clause 9.5 – Radio frequency, common mode equipment list

Asset Tag	Description	Manufacturer	Model	Serial #	Next Cal
846	CDN	FCC	FCC-801-M3-25A	5015	09-Feb-2017
913	RF Amplifier	EIN	3100L	103	N/R
729	Generator, Signal	Hewlett Packard	8656A	2402A05973	27-Apr-2017

Notes: N/A - not applicable

Table 8.7-2: Clause 9.5 – Radio frequency, common mode test software details

Manufacturer of Software	Details
ETS-LINDGREN	TILE! Version 6.0.4.548

Notes: None

8.8.5 Test data

Table 8.7-3: Clause 9.5 – Radio frequency, common mode results

Frequency range:	0.15–80 MHz
Step size increment:	1 %
Dwell time¹:	3 s
Signal level:	3 V _{RMS}
Modulation:	CW signal amplitude modulated (AM) with 80 % depth with a 1 kHz sine wave

Ports investigated	Coupling method	50 Ω termination point	Comments
AC Mains	CDN	CDN	No degradation

- Notes: ¹The dwell time at each frequency was not less than the time necessary for the EUT to be exercised and to be able to respond. The time to exercise the EUT is not interpreted as a total time of a program or a cycle but related to the reaction time in case of failure of the EUT.
- EUT operational frequencies within specified test band were also assessed.
 - Applicable to signal, telecommunication control and DC of radio equipment and associated ancillary equipment, if the cables may be longer than 3 m.

8.8.6 Setup photo



Figure 8.7-1: Clause 9.5 – Radio frequency, common mode setup photo

8.9 Clause 9.7 – Voltage dips and interruptions

8.9.1 References

EN 61000-4-11: 2004

8.9.2 Test summary

Verdict	Pass		
Test date	November 16, 2016	Temperature	21 °C
Test engineer	Greg Woelke, EMC Test Engineer	Air pressure	1001 mbar
Test location	Ground Plane	Relative humidity	56 %

8.9.3 Notes

None

8.9.4 Setup details

Table 8.8-1: Clause 9.7 – Voltage dips and interruptions equipment list

Asset Tag	Description	Manufacturer	Model	Serial #	Next Cal
1851	IX Series Programmable AC & DC Power Source Analyzer	California Instruments/Ametek	90003ix		02-Jul-2017

Notes: N/A - not applicable

Table 8.8-2: Clause 9.7 – Voltage dips and interruptions test software details

Manufacturer of Software	Details
California Instruments	AC Source CIGui SII Version 3.0.0

Notes: None

8.9.5 Test data

Table 8.8-3: Clause 9.7 – Voltage dips results

Variation/dip repetition:		Sequence of three dips/interruptions with an interval of 10 seconds between each test		
Port	Voltage reduction (%)	Periods	Comments	
AC Mains	100	0.5	No degradation	
	100	1	No degradation	
	30	25	No degradation	

Notes: Changes occurred at the 0 crossings of the voltage waveform

Table 8.8-4: Clause 9.7 – Voltage interruptions results

Variation/dip repetition:		Sequence of three dips/interruptions with an interval of 10 seconds between each test		
Port	Voltage reduction (%)	Periods	Comments	
AC Mains	100	250	No degradation	

Notes: Changes occurred at the 0 crossings of the voltage waveform

8.9.6 Setup photo



Figure 8.8-1: Clause 9.7 – Voltage dips and interruptions setup photo

8.10 Clause 9.8 – Surges

8.10.1 References

EN 61000-4-5: 2006

8.10.2 Test summary

Verdict	Pass		
Test date	November 16, 2016	Temperature	21 °C
Test engineer	Greg Woelke, EMC Test Engineer	Air pressure	1001 mbar
Test location	Ground Plane	Relative humidity	53 %

8.10.3 Notes

None

8.10.4 Setup details

Table 8.9-1: Clause 9.8 – Surges equipment list

Asset Tag	Description	Manufacturer	Model	Serial #	Next Cal
E1124	Main Frame	TESEQ AG	NSG 3060	1845	28-May-2017
E1125	CDN	TESEQ AG	CDN 3061	1584	28-May-2017

Notes: N/A - not applicable

Table 8.9-2: Clause 9.8 – Surges test software details

Manufacturer of Software	Details
TESEQ	Advanced Test Solution for EMC, Version 1.3.1

Notes: None

8.10.5 Test data

Table 8.9-3: Clause 9.8 – Surges at input AC power ports results

Open circuit voltage (T₁ / T₂):	1.2/50 μs (T ₁ = front time, T ₂ = time to half value)
Short circuit current (T₁ / T₂):	8/20 μs (T ₁ = front time, T ₂ = time to half value)
Surge pulse interval:	30 s
Number of pulses:	5 positive and 5 negative

Test port	Coupling	Test voltage (±kV)	Comments
AC Mains	Phase to Neutral	1	No degradation
	Phase to ground	2	Two wire plug, not tested
	Neutral to ground	2	Two wire plug, not tested

- Notes:
- **Phase to neutral coupling** : Surge applied with generator output impedance set to 2 Ω
 - **Phase/neutral to ground coupling** : Surge applied with generator output impedance set to 12 Ω
 - Surge applied synchronous (relation to power supply): 0, 90, 180, and 270°

8.10.6 Setup photo

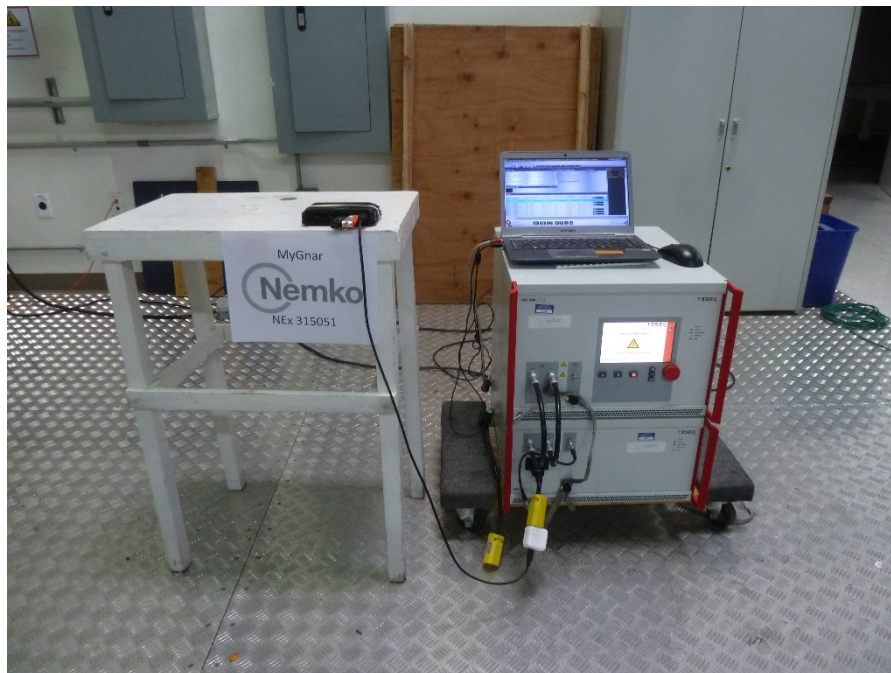


Figure 8.9-1: Clause 9.8 – Surges setup photo

Section 9 EUT photos

9.1 External photos



Figure 9.1-1: Front view photo



Figure 9.1-2: Rear view photo



Figure 9.1-3: Top view photo