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LP-009

Test report

Number:	**T251-0861/16 M1**	Project file:	C20160918
		Date:	2016-09-23
		Pages:	84
Product:	**PN7462AU Customer Demo Board**		
Type reference:	**PNEV7462B**		
Ratings:	5 VDC via USB or External 7,0-13,5 VDC Operating clock frequency: 13,56 MHz Protection class: III.		
Trademark:	NXP		
Applicant:	**NXP SEMICONDUCTORS GmbH** **Mikron - Weg 1, AT-8101 Gratkorn, Austria**		
Manufacturer:	Četrta pot, d.o.o., Kranj Planina 3, SI-4000 Kranj, Slovenia		
Place of manufacture:	Četrta pot, d.o.o., Kranj Planina 3, SI-4000 Kranj, Slovenia		

Summary of testing

Testing method:	FCC Part 15, Subpart C
Testing location:	SIQ Ljubljana, Trpinčeva ulica 37 A, SI-1000 Ljubljana, Slovenia
Remarks:	Date of receipt of test items: 2016-03-24, 2016-09-22 Number of items tested: 1 Date of performance of tests: 2016-07-20 - 2016-08-24, 2016-09-23 The test results presented in this report relate only to the items tested. The product complies with the requirements of the testing methods. /

Tested by: Andrej Škof **Approved by:** Marjan Mak

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1 GENERAL

History sheet			
Date	Report No.	Change	Revision
2016-08-26	T251-0861/16	Initial Test Report issued.	--
2016-09-23	T251-0861/16 M1	Included additional Conducted emission measurements with AC/DC Adapter, PHIHONG, Model: PSA15R-120P6 Updated Test procedure for Radiated emission measurements from 9 kHz to 30 MHz.	1.0

Environmental conditions:
Ambient temperature: 15°C to 35°C
Relative humidity: 30% to 60%
Atmospheric pressure: 860 mbar to 1060 mbar

1.1 Equipment under test

PN7462AU Customer Demo Board
Type: PNEV7462B

Auxiliary Equipment used during the testing:

- AC/DC Adapter, PHIHONG, Model: PSC15R-075, Input: 100-240 V~, 50/60 Hz, Output: 7,5 VDC, 2 A (used at all tests)
- AC/DC Adapter, PHIHONG, Model: PSA15R-120P6, Input: 100-240 V~, 50/60 Hz, Output: 12 VDC, 1.25 A (used only at Condcuted emission test)
- Laptop, Helwett-Packard, HP EliteBook 8560p (Radiated emission measurements)
- Laptop, Helwett-Packard, HP ProBook 4540s (Conducted emission measurements)
- Test software, PN7462AU NFC Cockpit v1.3.0.0
- USB cable, length: 115 cm

Tested sample SIQ number:
S20164287 – PNEV7462B V2.2
S20151978 – AC/DC Adapter, PHIHONG, Model: PSC15R-
S20166136 - AC/DC Adapter, PHIHONG, Model: PSA15R-120P6

Picture of EUT

1.1.1 General product information

FCC ID: OWRPNEV7462B
Antenna requirements (15.203): PNEV7462B V2.2 has PCB antenna and can not be replaced by end user.

Customer Demo Board PN7462AU, PNEV7462B V2.2, is first evaluation board which represents one single integrated circuit controller solution for RF interface (ISO/IEC 14443, ISO/IEC 15693, ISO/IEC 18000-3m3, Full NFC support) and contact interface (ISO/IEC 7816). It includes ortex-M0 core microcontroller and it can be loaded with fully-custom applications. The onboard two USB connectors permits direct connection and communication with personal computer. LPC-Link2 debug adapter is added on the board. LPCExpresso connector to add a LPCExpresso board is present too. For smart card evaluation purposes are added two different connectors.
Power supply is via two USB ports or via external power supply (7.0-13.5 V DC / 1000 mA).
Card reading/writing distance: 30-50 mm
Antenna: PCB type, 65 mm x 65 mm

1.2 ANSI C63.4 Subpart selection

Subpart C: Intentional Radiators

1.3 Class statement requirements

- The Class A statement cautions that operation of the device in a residential area is likely to cause harmful interference.
- The Class B statement offers several suggestions for minimizing interference to radio or TV receivers, including reorienting the receiving antenna and moving the Class B device farther away from the receiver.

1.4 Occupied bandwidth measurement

Fundamental frequency	Minimum resolution bandwidth
9 kHz to 30 MHz	1 kHz
30 to 1000 MHz	10 kHz
1000 MHz to 40 GHz	100 kHz

1.5 Quasi-peak detector

Frequency range	Bandwidth (-6dB)
10 Hz to 20 kHz	Full range (wideband)
10 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz
30 MHz to 1 GHz	120 kHz

1.6 Peak, rms, and average detectors

Frequency range	Bandwidth (-6dB)
10 Hz to 20 kHz	10, 100, 1000 Hz
10 kHz to 150 kHz	1 and 10 kHz
150 kHz to 30 MHz	1 and 10 kHz
30 MHz to 1 GHz	10 and 100 kHz
1 GHz to 40 GHz	0.1, 1.0 and 10 MHz

2 LIMITS FOR ALL SUBPARTS

2.1 Subpart C: Intentional Radiators

2.1.1 Section 15.207, Conducted emission limits:

Frequency Range (MHz)	Limits (dBµV)	
	Quasi-peak	Average
0.15 to 0.5	66 – 56*	56 – 46*
0.5 to 5.0	56	46
5.0 to 30.0	60	50

* Decreases with the logarithm of the frequency.

The shown limits in table shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

- For carrier current systems containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.
- For all other carrier current systems: 1000 µV within the frequency band 535-1705 kHz, as measured using a 50 µH/50 ohms LISN.
- Carrier current systems operating below 30 MHz are also subject to the radiated emission limits as appropriate.

2.1.2 Section 15.209, Radiated emission limits:

Limits:

Frequency Range (MHz)	Limits (dBµV/m)		Test distance (m)
	VERTICAL	HORIZONTAL	
0,009 to 0,490	20*log(2400/F(kHz))	20*log(2400/F(kHz))	300
0,490 to 1,705	20*log(24000/F(kHz))	20*log(24000/F(kHz))	30
1,705 to 30,0	30	30	30
30 to 88	40**	40**	3
88 to 216	43.5**	43.5**	3
216 to 960	46**	46**	3
Above 960	54	54	3

** Except as provided in paragraph below, fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz.

Perimeter protection systems may operate in the 54-72 MHz and 76-88 MHz bands under the provisions of this section. The use of such perimeter protection systems is limited to industrial, business and commercial applications.

Additional provisions to the general radiated emission limitations – Section15.215: In no case shall the level of the unwanted emissions from an intentional radiator operating under these additional provisions exceed the field strength of the fundamental emission as per clause 15.209.
Intentional radiators operating under the alternative provisions to the general emission limits must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

3 ALL TEST EQUIPMENT AND THEIR DESCRIPTION

3.1 General information

Description	Model No.	SIQ No.	Last calibration	Calibrated until	Calibration period	Used
Rohde-Schwarz, RFI receiver	ESU8	105187	2015-11	2017-11	24 months	
Rohde-Schwarz, RFI receiver	ESU26	100428	2016-02	2018-02	24 months	X
Rohde & Schwarz, Artificial main network	ESH2-Z5	106899	2015-05	2017-05	24 months	X
ETS, Anechoic chamber	3m	103949	2014-11	2016-11	24 months	X
R&S, Antenna	HFH2-Z2	/	2015-09	2017-09	24 months	X
EMCO, Antenna	3142B	104351	2015-09	2017-09	24 months	X
EMCO, Antenna	3115	103002	2015-09	2017-09	24 months	X
Heinrich Deisel, Turn table	DS 420.00	103337	NA	NA	NA	X
Antenna tower	/	/	NA	NA	NA	X
Controller for turn table and antenna tower	/	/	NA	NA	NA	X

3.2 Other instrument information and auxiliary equipment

Description	Model No.	Bandwidth	Detector functions	Antenna factors	Cable loss	Range
Rohde-Schwarz, AMN	ENV216	/	/	/	/	9 kHz do 30 MHz
Rohde-Schwarz, RFI receiver	ESU8	200Hz, 9kHz, 120kHz, 1MHz	Peak, Q-peak, Average	/	/	20 Hz – 8 GHz
Rohde-Schwarz, RFI receiver	ESU26	200Hz, 9kHz, 120kHz, 1MHz	Peak, Q-peak, Average	/	/	20 Hz – 26.5 GHz
Hewlett Packard, RF Spectrum Analyzer	8593E	200Hz, 9kHz, 120kHz, 1MHz	Peak, Q-peak, Average	/	/	9 kHz – 26.5 GHz
Rohde & Schwarz, Artificial main network	ESH 2-Z5	/	/	/	/	9 kHz – 30 MHz
ETS, Anechoic chamber	3m	/	/	/	/	30 MHz – 18 GHz
EMCO, Antenna	model 3142	/	/	See tables below	/	26 MHz – 2 GHz
EMCO, Antenna	model 3115	/	/	See tables below	/	1 GHz – 18 GHz
Schwarzbeck Mess-Elektronik, Horn antenna	BBHA9120E	/	/	See tables below	/	450 MHz – 6 GHz
SIQ, Conducted emission cable	SIQ	/	/	/	See tables below	/
SIQ, Radiated emission cable	SIQ	/	/	/	See tables below	/

3.2.1 Cable loss and attenuation of radiated emission

3.2.1.1 Conducted emission cable (SIQ-K024)

Point	Frequency (9kHz-30MHz)	Cable length (meters)	Loss (dB)
1	190 kHz	1	0,4
2	530 kHz	1	0,26
3	2,53 MHz	1	0,16
4	5,19 MHz	1	0,07
5	11,05 MHz	1	0,03
6	22,01 MHz	1	0,06
7	24,03 MHz	1	0,04

3.2.1.2 Radiated emission attenuation

Point	Frequency (30 MHz – 26,5 GHz)	Attenuation (dB)
1	30 MHz	0,501
2	150 MHz	1,174
3	400 MHz	2,034
4	800 MHz	2,995
5	1 GHz	3,416
6	1,363	1,666667
7	2,686	3,58333
8	5,332	5,25
9	7,978	6,25
10	10,624	7,5
11	13,27	8,333333
12	15,916	9,166666
13	18,562	9,833333
14	21,208	10,66667
15	23,854	11,5
16	26,5	12,16667

4 CONVERSION FACTORS AND ALL OTHER FORMULAS

Unit	Conversion unit	Formula of conversion
dBμV	dBμV/m	dBμV/m = dBμV + AF
μV/m	dBμV/m	dBμV/m = 20log(X(μV/m)/1μV)

	Test distance stated in standard	Test distance of measurement	Conversion factor
Class B	3 m	3 m	/
Class A	10 m	3 m	20dB/decade

5 GENERAL AND SPECIAL CONDITIONS DESCRIPTION

5.1 General condition description

Interconnect and power cabling (or wiring)

5.1.1 Test arrangement for conducted emissions

Interconnecting cables that hang closer than 40 cm to the ground-plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω. LISN can be placed on top of, or immediately beneath, reference ground-plane.
All other equipment powered from additional LISN(s).
Multiple outlet strip can be used for multiple power cords of non-EUT equipment.
LISN at least 80 cm from nearest part of EUT chassis.

Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.

Non-EUT components of EUT system being tested.

Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.

Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground-plane.

5.1.2 Test arrangement for conducted emissions- floor-standing equipment

Excess I/O cables shall be bundled in the center. If bundling is not possible, the cables shall be arranged in serpentine fashion. Bundling shall not exceed 40 cm in length.

Excess power cords shall be bundled in the center or shortened to appropriate length.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. If bundling is not possible, the cable shall be arranged in serpentine fashion.

EUT and all cables shall be insulated, if required, from the ground-plane by up to 12 mm of insulating material.

EUT connected to one LISN. LISN can be placed on top of, or immediately beneath, the ground-plane.
All other equipment powered from a second LISN or additional LISN(s).
Multiple outlet strip can be used for multiple power cords of non-EUT equipment.

5.1.3 Test arrangement for radiated emissions tabletop equipment

Interconnecting cables that hang closer than 40 cm to the ground-plane shall be folded back and forth in the center, forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated if required using the correct terminating impedance. The total length shall not exceed 1 m.

If LISNs are kept in the test setup for radiated emissions, it is preferred that they be installed under the ground-plane with the receptacle flush with the ground-plane.

Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.

Non-EUT components of EUT system being tested.

Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.

No vertical conducting plane used.

Power cords drape to the floor and are routed over to receptacle.

5.1.4 Test arrangement for radiated emissions floor-standing equipment

Excess I/O cables shall be bundled in center. If bundling is not possible, the cables shall be arranged in serpentine fashion. Bundling not to exceed 40 cm in length.

Excess power cords shall be bundled in the center or shortened to appropriate length.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. If bundling is not possible, the cable shall be arranged in a serpentine fashion.

EUT and all cables shall be insulated, if required, from the ground-plane by up to 12 mm of insulating material.

If LISNs are kept in the test setup for radiated emissions, it is preferred that they be installed under the ground-plane with the receptacle flush with the ground plane.

Overhead cable trays and suspended ceilings

5.1.5 Test arrangement for floor-standing equipment

Only one vertical riser may be used where typical of system under test.

Excess power cord shall be bundled in the center or shortened to appropriate length.

EUT and cables shall be insulated from ground-plane by up to 12 mm. Where the manual has specified or there exists a code of practice for installation of the EUT, the test arrangement shall allow the use of this practice for the tests.

Power cords being measured connected to one LISN. All other system power cords powered through other LISN(s). A multiple receptacle strip may be used for other power cords.

For *conducted* tests, the LISNs may be placed on top of or immediately beneath and bonded directly to the ground-plane. For *radiated* tests, the LISN(s), if used, should be installed under, with the receptacle flush with the ground-plane.

5.1.6 Placement and manipulation of interconnect cabling (or wiring) of tabletop equipment

LISN(s) may have to be positioned to the side of the table to meet the criterion that the LISN receptacle shall be 80 cm away from the EUT. LISN(s) may be above ground-plane only for conducted emission measurements.

Accessories, such as ac power adapter, if typically table-mounted, shall occupy peripheral positions as is applicable.

Accessories, which are typically floor-mounted, shall occupy a floor position directly below the portion of the EUT to which they are typically connected. T

Table length may be extended beyond 1.5 m with peripherals aligned with the back edge. The table depth may be extended beyond 1 m. The 40 cm distance to the vertical conducting plane shall be maintained for conducted emission testing.

Placement of wall-mounted equipment

5.1.7 Test configuration/arrangement for combination floor-standing and tabletop equipment

Interconnecting cables that hang closer than 40 cm to the ground-plane shall be folded back and forth in the center, forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated if required using the correct terminating impedance.

If LISNs are kept in the test setup for radiated emissions, it is preferred that they be installed under the ground-plane with the receptacle flush with the ground-plane.

Cables of hand-operated devices, such as keyboards, mice, etc., have to be placed as for normal use.

Non-EUT components of EUT system being tested.

I/O cable to floor-standing unit drapes to the ground-plane and shortened or excess bundled. Cables not reaching the metal ground-plane are draped to the height of the connector or 40 cm, whichever is lower.

Power cords and signal cables shall drape to the floor. No extension cords shall be used to the power receptacles.

The floor-standing unit can be placed under the table if its height permits.

5.2 Special condition description

If for some reason the above measurement conditions can’t be met, the description below should be used as an appropriate measurement condition and placement.

(Description is written additionally as the measurements differ – all is within test procedure)

6 TEST SUMMARY

STANDARDS (details on first page)	Tested yes	Tested no	Sample pass	Sample not pass
ANSI C63.10-2013; FCC Part 15, Subpart C	☑	☐	☑	☐

Test	FCC 47 CFR Part 15 section	Section within the report	Conclusion
Conducted emission	15.207	7.1	PASS
Radiated emission	15.209	7.2	PASS
Bandwidth of the emission	15.215	7.3	PASS
Spectrum mask	15.225	7.4	PASS
Frequency tolerance of the carrier signal	15.225	7.5	PASS

6.1 Operating voltages/frequencies used for testing

Section	Test	Operating conditions
7.1	Conducted emission	EUT powered via USB or EXT DC power port AC/DC adapter, PC: 120 V, 60 Hz
7.2	Radiated emission	EUT powered via USB or EXT DC power port AC/DC adapter, PC: 120 V, 60 Hz
7.3.	Bandwidth of the emission	EUT powered via USB or EXT DC power port AC/DC adapter, PC: 120 V, 60 Hz
7.4	Spectrum mask	EUT powered via USB or EXT DC power port AC/DC adapter, PC: 120 V, 60 Hz
7.5	Frequency tolerance of the carrier signal	EUT powered via USB or EXT DC power port

7 EMISSION TESTS

7.1 Conducted emission measurement (15.207)

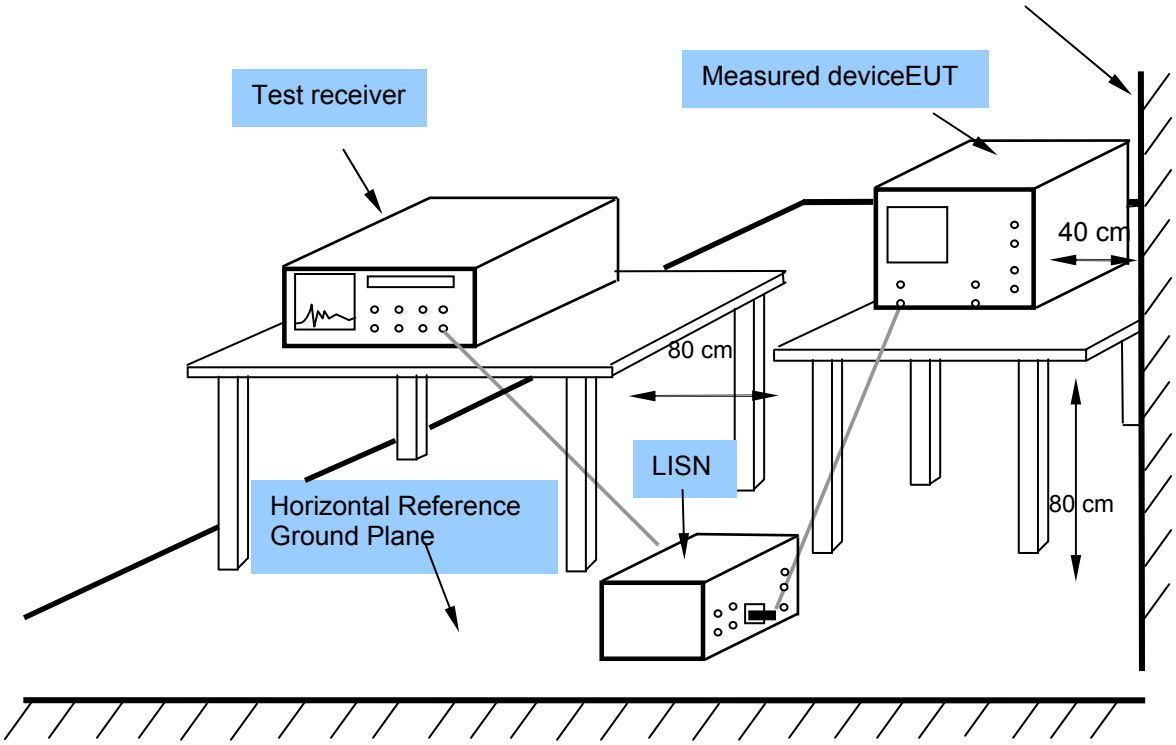
7.1.1 Test instruments

Description	Model No.	SIQ No.	Last calibration	Calibrated until	Calibration period	Used
Rohde-Schwarz, RFI receiver	ESU26	100428	2016-02	2018-02	24 months	X
Rohde & Schwarz, Artificial main network	ESH2-Z5	100406	2015-05	2017-05	24 months	X

7.1.2 Test procedure

- The EUT is placed on a non-conductive 0.8 meters high table, 0.4 meters from the vertical conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). LISN provide 50 Ohm / 50 μH + 5 Ohm of coupling impedance for the measuring instrument.
- Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.
- AC power lines of EUT are checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz is searched using PEAK, QUASI-PEAK and AVERAGE function of the receiver. Bandwidth is set to 9 kHz.
- If applicable functions are changed (data transfer speed, clock speed,…) it should be noted in the test report.

7.1.3 Test setup



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.1.4 Test results

Device passed the requirements stated in FCC part 15, Subpart C, Section 15.207
EUT powered via USB power port:

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C20160918

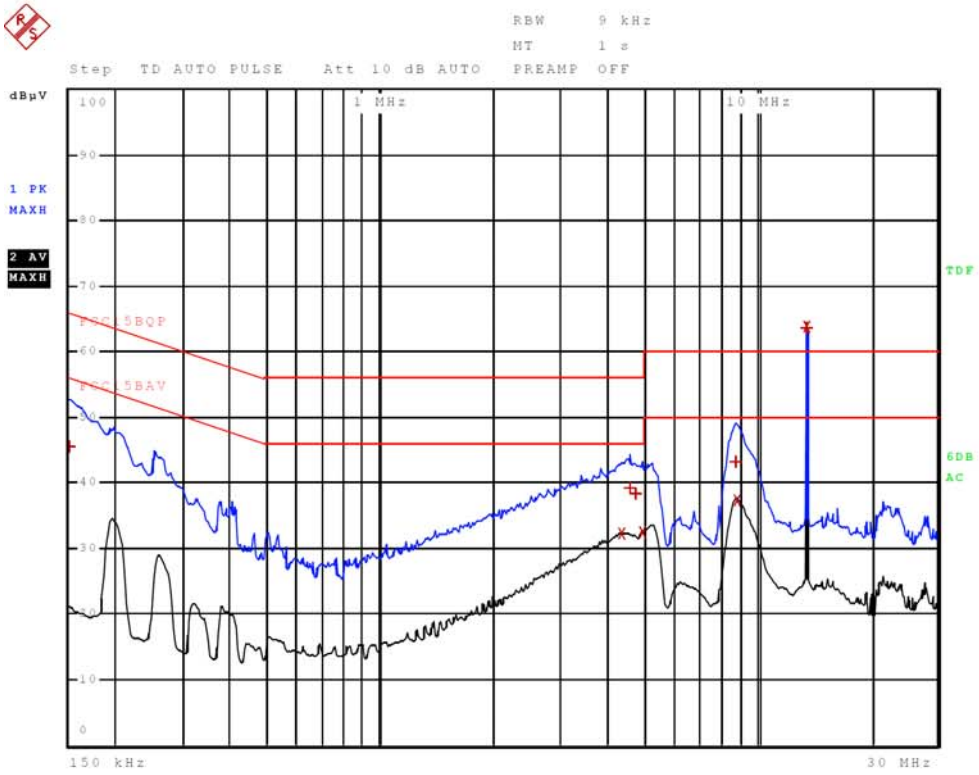
25.Jul 16 14:07

Meas Type	CONDUCTED EMISSION
Equipment under Test	PNEV7462B
Manufacturer	NPX SEMICONDUCTORS GmbH
OP Condition	Uin:120 V, 60 Hz (USB), WAITING
Operator	ANDREJ SKOF
Test Spec	
PHASE	

Time Domain Scan (1 Range)

Scan Start:	150 kHz
Scan Stop:	30 MHz
Detector:	Trace 1: MAX PEAK Trace 2: Average
Transducer:	ENV216

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	30 ms	Auto	0 dB	INPUT2



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C20160918

25.Jul 16 14:07

Meas Type	CONDUCTED EMISSION
Equipment under Test	PNEV7462B
Manufacturer	NPX SEMICONDUCTORS GmbH
OP Condition	Uin:120 V, 60 Hz (USB), WAITING
Operator	ANDREJ SKOF

Test Spec
PHASE

Final Measurement

Meas Time: 1 s
Margin: 15 dB
Subranges: 9

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
2	13.560000000 MHz	63.76	CISPR Averag	13.76
1	13.560000000 MHz	63.61	Quasi Peak	3.61
2	8.801250000 MHz	37.26	CISPR Averag	-12.74
2	4.989750000 MHz	32.47	CISPR Averag	-13.53
2	4.362000000 MHz	32.30	CISPR Averag	-13.70
1	4.596000000 MHz	39.18	Quasi Peak	-16.82
1	8.776500000 MHz	43.16	Quasi Peak	-16.84
1	4.735500000 MHz	38.25	Quasi Peak	-17.75
1	150.000000000 kHz	45.43	Quasi Peak	-20.57

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25.Jul 16 14:05

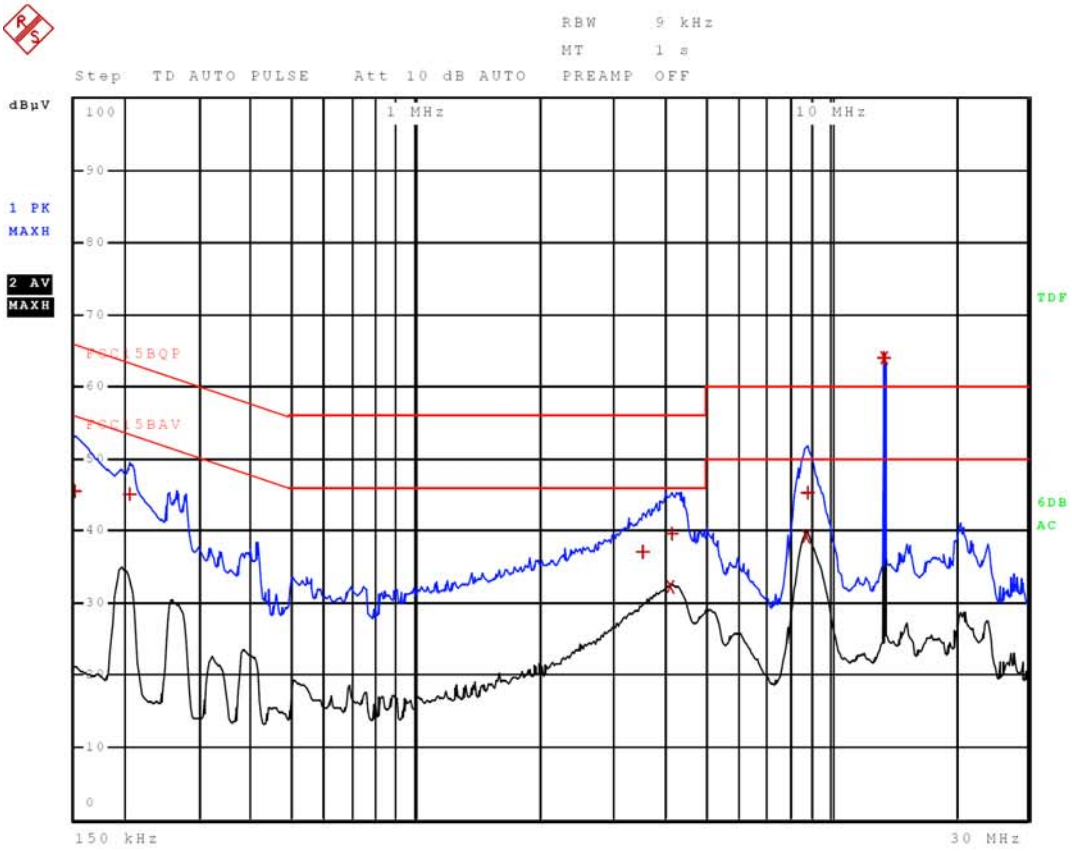
Meas Type	CONDUCTED EMISSION
Equipment under Test	PNEV7462B
Manufacturer	NPX SEMICONDUCTORS GmbH
OP Condition	Uin:120 V, 60 Hz (USB), WAITING
Operator	ANDREJ SKOF

Test Spec
NEUTRAL

Time Domain Scan (1 Range)

Scan Start: 150 kHz
Scan Stop: 30 MHz
Detector: Trace 1: MAX PEAK Trace 2: Average
Transducer: ENV216

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	30 ms	Auto	0 dB	INPUT2



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C20160918

25.Jul 16 14:05

Meas Type	CONDUCTED EMISSION
Equipment under Test	PNEV7462B
Manufacturer	NPX SEMICONDUCTORS GmbH
OP Condition	Uin:120 V, 60 Hz (USB), WAITING
Operator	ANDREJ SKOF

Test Spec
NEUTRAL

Final Measurement

Meas Time: 1 s
Margin: 15 dB
Subranges: 9

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
2	13.560000000 MHz	64.04	CISPR Averag	14.04
1	13.560000000 MHz	63.90	Quasi Peak	3.90
2	8.731500000 MHz	39.14	CISPR Averag	-10.86
2	4.103250000 MHz	32.24	CISPR Averag	-13.76
1	8.810250000 MHz	45.37	Quasi Peak	-14.63
1	4.157250000 MHz	39.52	Quasi Peak	-16.48
1	201.750000000 kHz	45.09	Quasi Peak	-18.45
1	3.520500000 MHz	37.15	Quasi Peak	-18.85
1	150.000000000 kHz	45.50	Quasi Peak	-20.50

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25.Jul 16 14:01

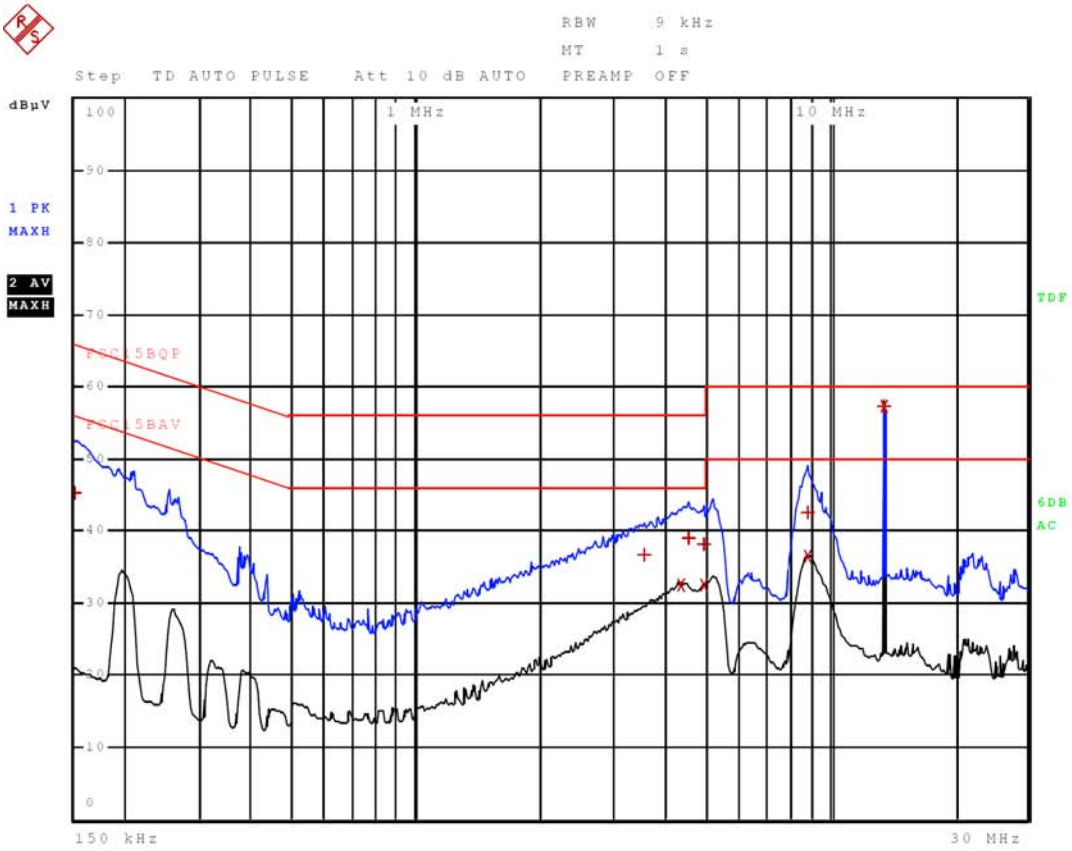
Meas Type	CONDUCTED EMISSION
Equipment under Test	PNEV7462B
Manufacturer	NPX SEMICONDUCTORS GmbH
OP Condition	Uin:120 V, 60 Hz (USB), READING
Operator	ANDREJ SKOF

Test Spec
PHASE

Time Domain Scan (1 Range)

Scan Start: 150 kHz
Scan Stop: 30 MHz
Detector: Trace 1: MAX PEAK Trace 2: Average
Transducer: ENV216

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	30 ms	Auto	0 dB	INPUT2



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C20160918

25.Jul 16 14:01

Meas Type	CONDUCTED EMISSION
Equipment under Test	PNEV7462B
Manufacturer	NPX SEMICONDUCTORS GmbH
OP Condition	Uin:120 V, 60 Hz (USB), READING
Operator	ANDREJ SKOF

Test Spec
PHASE

Final Measurement

Meas Time: 1 s
Margin: 15 dB
Subranges: 10

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
2	13.560000000 MHz	57.29	CISPR Averag	7.29
1	13.560000000 MHz	57.18	Quasi Peak	-2.82
2	8.808000000 MHz	36.51	CISPR Averag	-13.49
2	4.996500000 MHz	32.48	CISPR Averag	-13.52
2	4.359750000 MHz	32.44	CISPR Averag	-13.56
1	4.564500000 MHz	38.93	Quasi Peak	-17.07
1	8.796750000 MHz	42.65	Quasi Peak	-17.35
1	4.967250000 MHz	38.16	Quasi Peak	-17.84
1	3.547500000 MHz	36.61	Quasi Peak	-19.39
1	150.000000000 kHz	45.22	Quasi Peak	-20.78

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C20160918

25.Jul 16 14:03

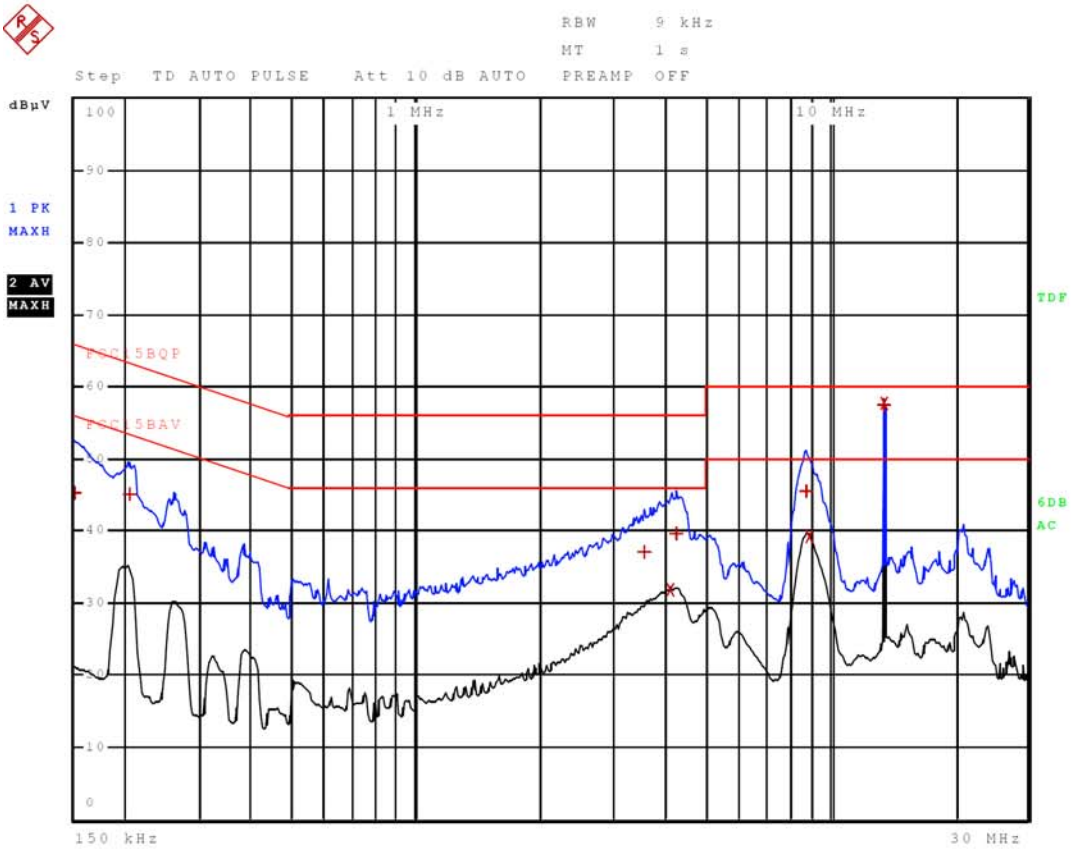
Meas Type	CONDUCTED EMISSION
Equipment under Test	PNEV7462B
Manufacturer	NPX SEMICONDUCTORS GmbH
OP Condition	Uin:120 V, 60 Hz (USB), READING
Operator	ANDREJ SKOF

Test Spec
NEUTRAL

Time Domain Scan (1 Range)

Scan Start: 150 kHz
Scan Stop: 30 MHz
Detector: Trace 1: MAX PEAK Trace 2: Average
Transducer: ENV216

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	30 ms	Auto	0 dB	INPUT2



ROHDE&SCHWARZ

C20160918

25.Jul 16 14:03

Meas Type	CONDUCTED EMISSION
Equipment under Test	PNEV7462B
Manufacturer	NPX SEMICONDUCTORS GmbH
OP Condition	Uin:120 V, 60 Hz (USB), READING
Operator	ANDREJ SKOF

Test Spec
NEUTRAL

Final Measurement

Meas Time: 1 s
Margin: 15 dB
Subranges: 9

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
2	13.560000000 MHz	57.59	CISPR Averag	7.59
1	13.560000000 MHz	57.51	Quasi Peak	-2.49
2	8.882250000 MHz	39.11	CISPR Averag	-10.89
2	4.105500000 MHz	31.93	CISPR Averag	-14.07
1	8.733750000 MHz	45.50	Quasi Peak	-14.50
1	4.247250000 MHz	39.56	Quasi Peak	-16.44
1	201.750000000 kHz	45.06	Quasi Peak	-18.48
1	3.556500000 MHz	37.16	Quasi Peak	-18.84
1	150.000000000 kHz	45.26	Quasi Peak	-20.74

EUT powered via External AC/DC Adapter PSC15R-075:

ROHDE&SCHWARZ

C20160918

25.Jul 16 13:15

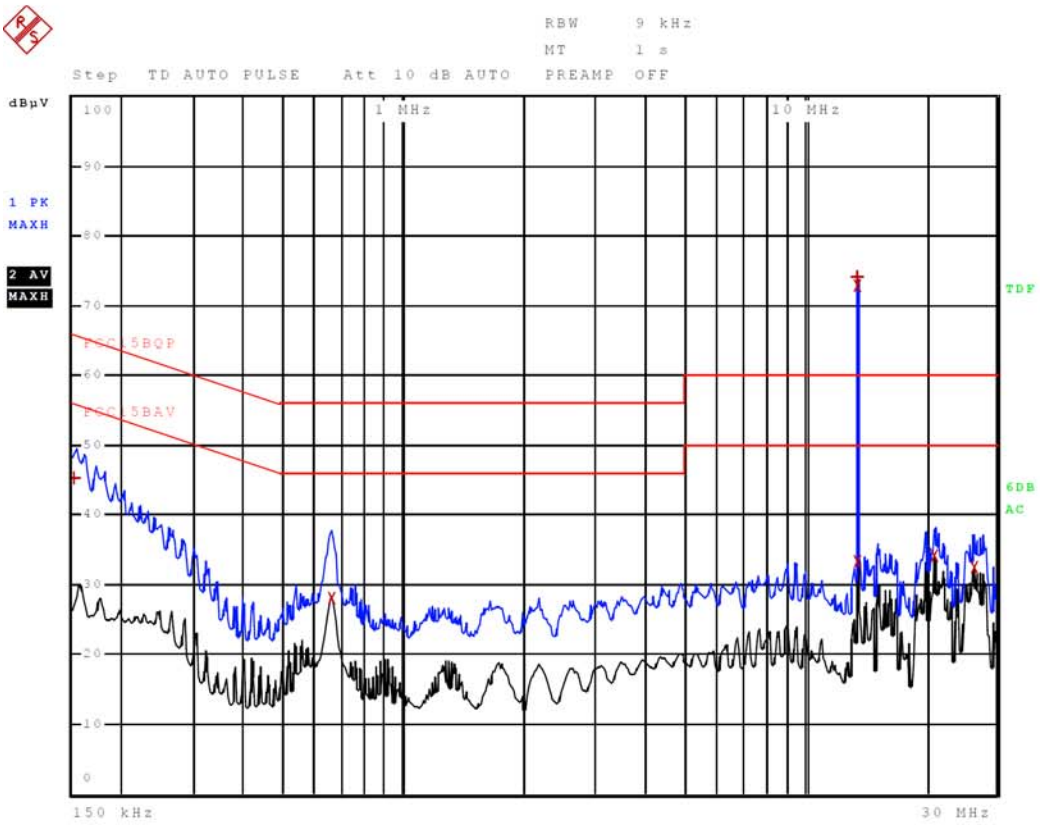
Meas Type	CONDUCTED EMISSION
Equipment under Test	PNEV7462B
Manufacturer	NPX SEMICONDUCTORS GmbH
OP Condition	Uin:120 V, 60 Hz (EXT PS), WAITING
Operator	ANDREJ SKOF

Test Spec
PHASE

Time Domain Scan (1 Range)

Scan Start: 150 kHz
Scan Stop: 30 MHz
Detector: Trace 1: MAX PEAK Trace 2: Average
Transducer: ENV216

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	30 ms	Auto	0 dB	INPUT2



ROHDE&SCHWARZ

C20160918

25.Jul 16 13:15

Meas Type	CONDUCTED EMISSION
Equipment under Test	PNEV7462B
Manufacturer	NPX SEMICONDUCTORS GmbH
OP Condition	Uin:120 V, 60 Hz (EXT PS), WAITING
Operator	ANDREJ SKOF

Test Spec
PHASE

Final Measurement

Meas Time:	1 s
Margin:	18 dB
Subranges:	7

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
2	13.560000000 MHz	72.76	CISPR Averag	22.76
1	13.560000000 MHz	73.95	Quasi Peak	13.95
2	21.077250000 MHz	34.16	CISPR Averag	-15.84
2	13.548750000 MHz	33.26	CISPR Averag	-16.74
2	26.310750000 MHz	32.42	CISPR Averag	-17.58
2	658.500000000 kHz	28.05	CISPR Averag	-17.95
1	152.250000000 kHz	45.17	Quasi Peak	-20.70

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C20160918

25.Jul 16 13:14

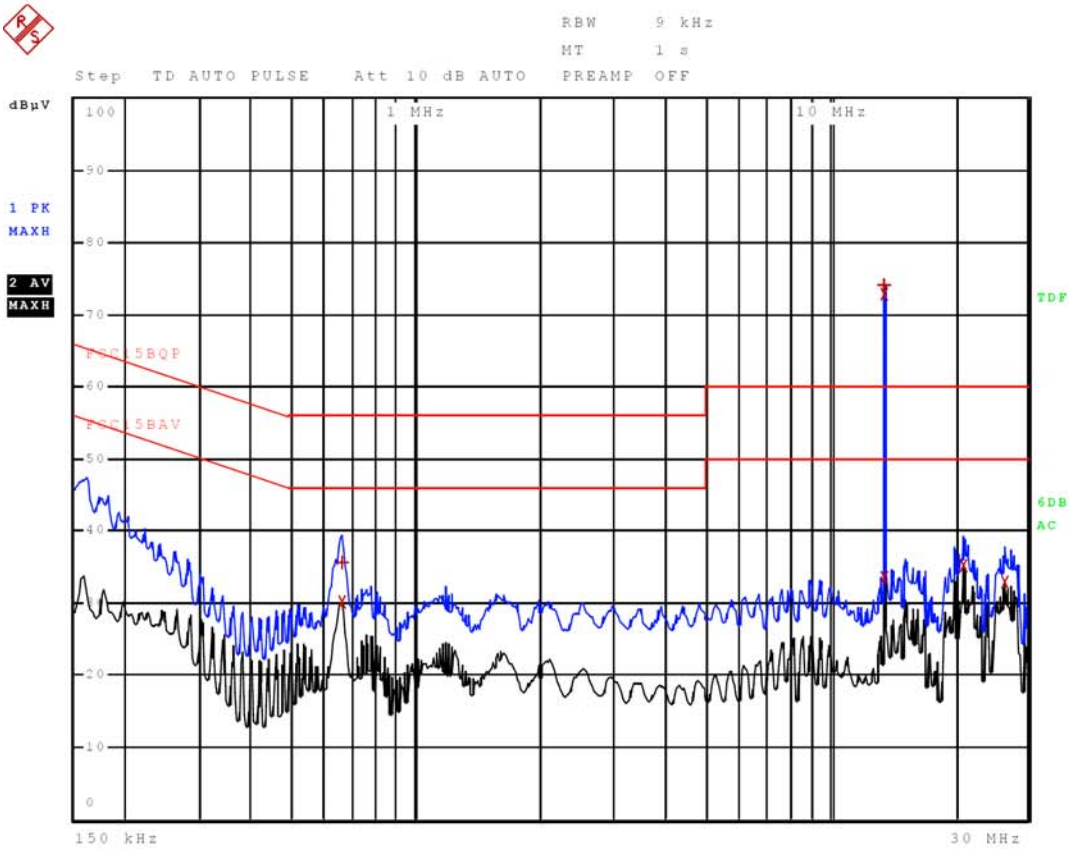
Meas Type	CONDUCTED EMISSION
Equipment under Test	PNEV7462B
Manufacturer	NPX SEMICONDUCTORS GmbH
OP Condition	Uin:120 V, 60 Hz (EXT PS), WAITING
Operator	ANDREJ SKOF

Test Spec
NEUTRAL

Time Domain Scan (1 Range)

Scan Start: 150 kHz
Scan Stop: 30 MHz
Detector: Trace 1: MAX PEAK Trace 2: Average
Transducer: ENV216

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	30 ms	Auto	0 dB	INPUT2



ROHDE&SCHWARZ

C20160918

25.Jul 16 13:14

Meas Type	CONDUCTED EMISSION
Equipment under Test	PNEV7462B
Manufacturer	NPX SEMICONDUCTORS GmbH
OP Condition	Uin:120 V, 60 Hz (EXT PS), WAITING
Operator	ANDREJ SKOF

Test Spec
NEUTRAL

Final Measurement

Meas Time:	1 s
Margin:	18 dB
Subranges:	7

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
2	13.560000000 MHz	72.88	CISPR Averag	22.88
1	13.560000000 MHz	74.10	Quasi Peak	14.10
2	21.077250000 MHz	35.17	CISPR Averag	-14.83
2	658.500000000 kHz	30.16	CISPR Averag	-15.84
2	13.548750000 MHz	33.44	CISPR Averag	-16.56
2	26.310750000 MHz	32.85	CISPR Averag	-17.15
1	658.500000000 kHz	35.64	Quasi Peak	-20.36

ROHDE&SCHWARZ

C20160918

25.Jul 16 13:10

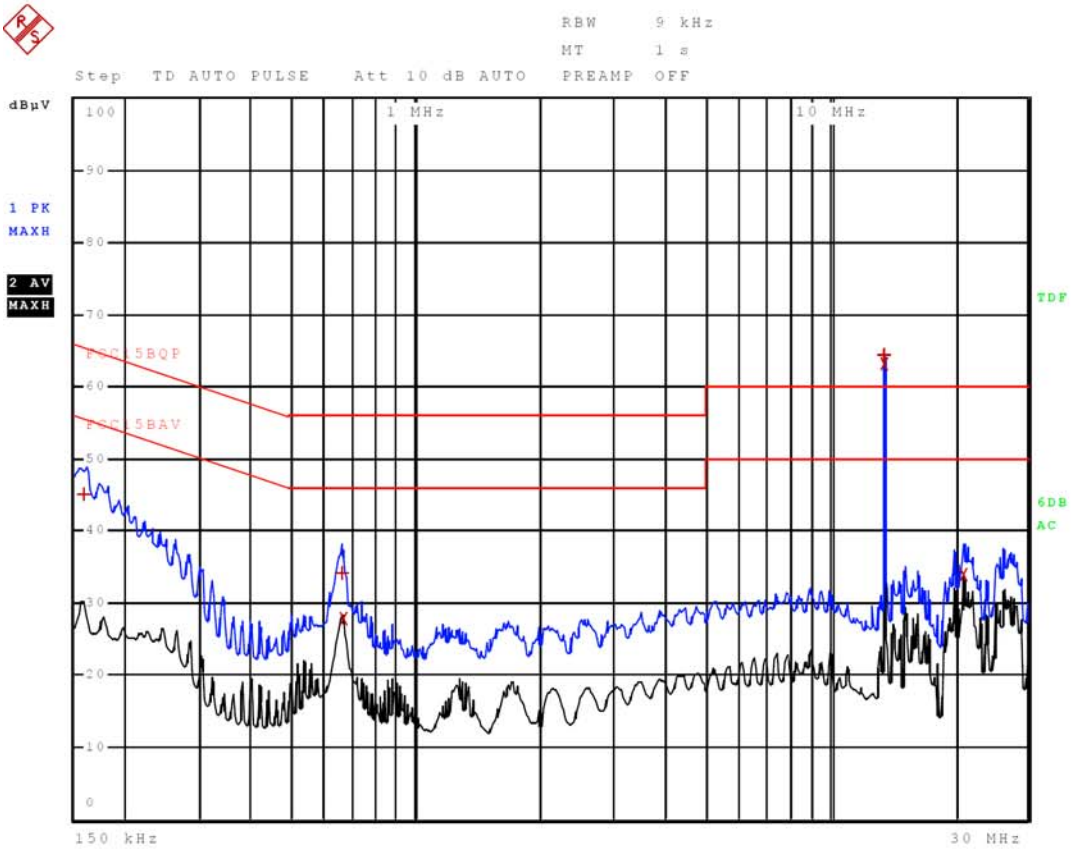
Meas Type	CONDUCTED EMISSION
Equipment under Test	PNEV7462B
Manufacturer	NPX SEMICONDUCTORS GmbH
OP Condition	Uin:120 V, 60 Hz (EXT PS), READING
Operator	ANDREJ SKOF

Test Spec
PHASE

Time Domain Scan (1 Range)

Scan Start: 150 kHz
Scan Stop: 30 MHz
Detector: Trace 1: MAX PEAK Trace 2: Average
Transducer: ENV216

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	30 ms	Auto	0 dB	INPUT2



ROHDE&SCHWARZ

C20160918

25.Jul 16 13:10

Meas Type	CONDUCTED EMISSION
Equipment under Test	PNEV7462B
Manufacturer	NPX SEMICONDUCTORS GmbH
OP Condition	Uin:120 V, 60 Hz (EXT PS), READING
Operator	ANDREJ SKOF

Test Spec
PHASE

Final Measurement

Meas Time:	1 s
Margin:	18 dB
Subranges:	6

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
2	13.560000000 MHz	63.14	CISPR Averag	13.14
1	13.560000000 MHz	64.37	Quasi Peak	4.37
2	21.077250000 MHz	33.95	CISPR Averag	-16.05
2	665.250000000 kHz	27.92	CISPR Averag	-18.08
1	159.000000000 kHz	44.97	Quasi Peak	-20.55
1	663.000000000 kHz	34.23	Quasi Peak	-21.77

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C20160918

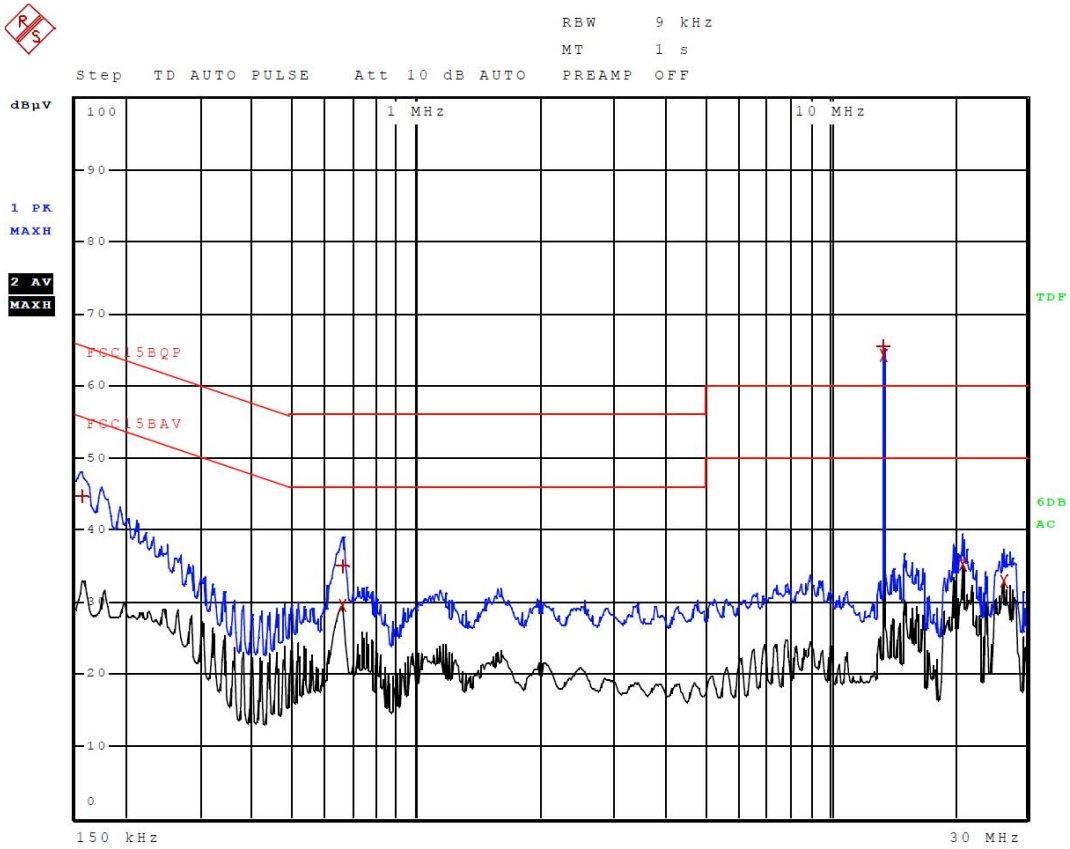
25.Jul 16 13:13

Meas Type	CONDUCTED EMISSION
Equipment under Test	PNEV7462B
Manufacturer	NPX SEMICONDUCTORS GmbH
OP Condition	Uin:120 V, 60 Hz (EXT PS), READING
Operator	ANDREJ SKOF
Test Spec	
NEUTRAL	

Time Domain Scan (1 Range)

Scan Start: 150 kHz
Scan Stop: 30 MHz
Detector: Trace 1: MAX PEAK Trace 2: Average
Transducer: ENV216

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	30 ms	Auto	0 dB	INPUT2



ROHDE&SCHWARZ

C20160918

25.Jul 16 13:13

Meas Type CONDUCTED EMISSION
Equipment under Test PNEV7462B
Manufacturer NPX SEMICONDUCTORS GmbH
OP Condition Uin:120 V, 60 Hz (EXT PS), READING
Operator ANDREJ SKOF
Test Spec
NEUTRAL

Final Measurement

Meas Time: 1 s
Margin: 18 dB
Subranges: 7

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
2	13.560000000 MHz	64.13	CISPR Averag	14.13
1	13.560000000 MHz	65.37	Quasi Peak	5.37
2	21.077250000 MHz	35.14	CISPR Averag	-14.86
2	660.750000000 kHz	29.56	CISPR Averag	-16.44
2	26.310750000 MHz	32.83	CISPR Averag	-17.17
1	658.500000000 kHz	35.05	Quasi Peak	-20.95
1	154.500000000 kHz	44.58	Quasi Peak	-21.17

EUT powered via External AC/DC Adapter PSA15R-120P6:

ROHDE&SCHWARZ

C20160918

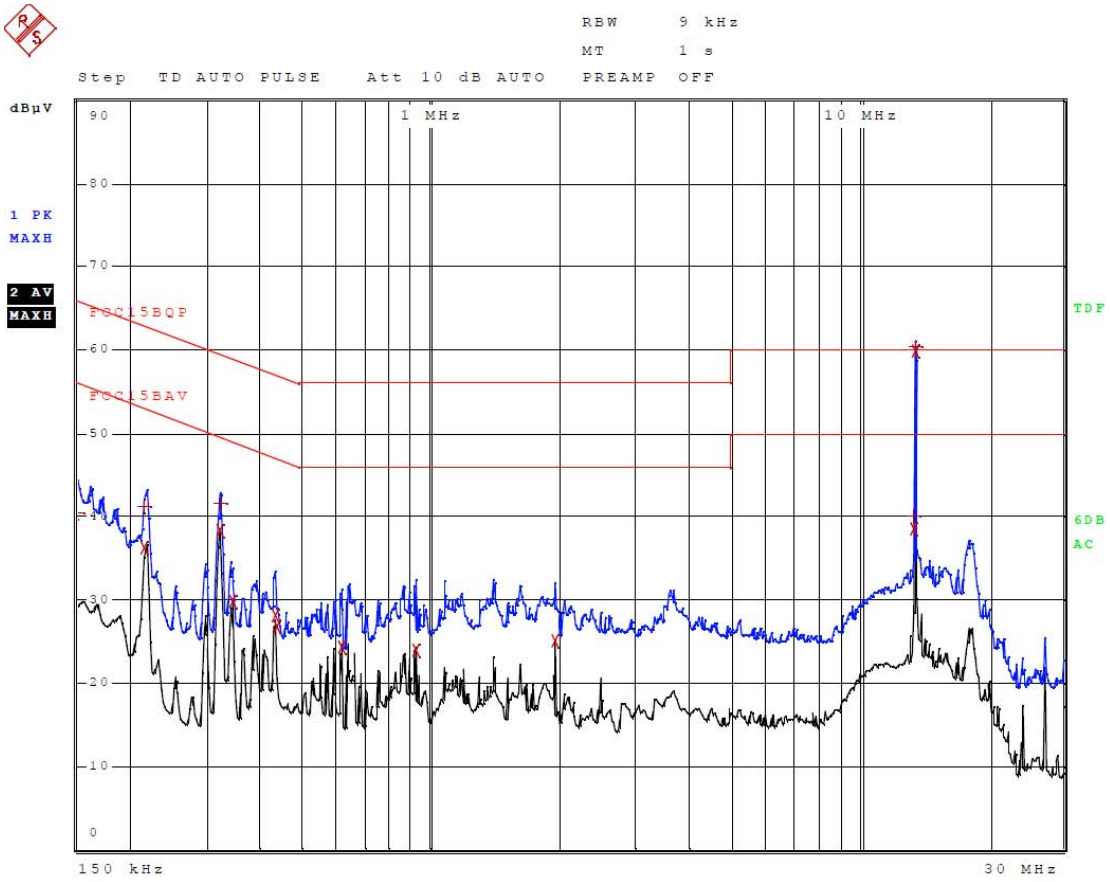
Meas Type	CONDUCTED EMISSION
Equipment under Test	PNEV7462B
Manufacturer	NXP SEMICONDUCTORS GmbH
OP Condition	Uin: 120 V, 60 Hz, (EXT PS 12 V) WAITING
Operator	ANDREJ SKOF

Test Spec
PHASE

Time Domain Scan (1 Range)

Scan Start: 150 kHz
Scan Stop: 30 MHz
Detector: Trace 1: MAX PEAK Trace 2: Average
Transducer: ENV216

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	30 ms	Auto	0 dB	INPUT2



ROHDE&SCHWARZ

C20160918

Meas Type	CONDUCTED EMISSION
Equipment under Test	PNEV7462B
Manufacturer	NXP SEMICONDUCTORS GmbH
OP Condition	Uin: 120 V, 60 Hz, (EXT PS 12 V) WAITING
Operator	ANDREJ SKOF
Test Spec	
PHASE	

Final Measurement

Meas Time:	1 s
Margin:	22 dB
Subranges:	15

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
2	13.560000000 MHz	59.76	CISPR Averag	9.76
1	13.560000000 MHz	60.47	Quasi Peak	0.47
2	321.000000000 kHz	38.34	CISPR Averag	-11.34
2	13.452000000 MHz	38.44	CISPR Averag	-11.56
2	215.250000000 kHz	36.13	CISPR Averag	-16.87
1	321.000000000 kHz	41.55	Quasi Peak	-18.13
2	431.250000000 kHz	28.12	CISPR Averag	-19.10
2	341.250000000 kHz	29.86	CISPR Averag	-19.31
1	13.452000000 MHz	40.01	Quasi Peak	-19.99
2	433.500000000 kHz	26.69	CISPR Averag	-20.49
2	1.941000000 MHz	24.99	CISPR Averag	-21.01
2	615.750000000 kHz	24.31	CISPR Averag	-21.69
1	215.250000000 kHz	41.12	Quasi Peak	-21.88
2	917.250000000 kHz	23.91	CISPR Averag	-22.09
1	150.000000000 kHz	40.43	Quasi Peak	-25.57

ROHDE&SCHWARZ

C20160918

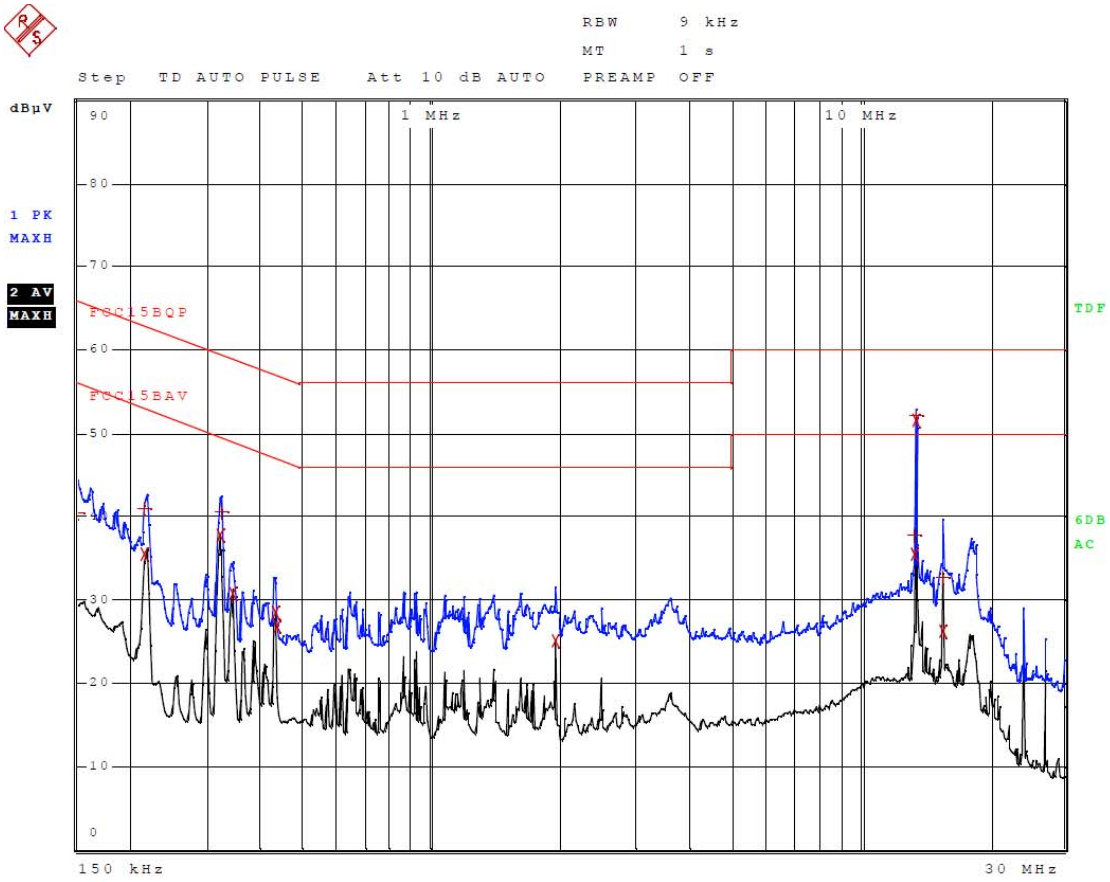
Meas Type	CONDUCTED EMISSION
Equipment under Test	PNEV7462B
Manufacturer	NXP SEMICONDUCTORS GmbH
OP Condition	Uin: 120 V, 60 Hz, (EXT PS 12 V) WAITING
Operator	ANDREJ SKOF

Test Spec
NEUTRAL

Time Domain Scan (1 Range)

Scan Start: 150 kHz
Scan Stop: 30 MHz
Detector: Trace 1: MAX PEAK Trace 2: Average
Transducer: ENV216

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	30 ms	Auto	0 dB	INPUT2



ROHDE&SCHWARZ

C20160918

Meas Type CONDUCTED EMISSION
Equipment under Test PNEV7462B
Manufacturer NXP SEMICONDUCTORS GmbH
OP Condition Uin: 120 V, 60 Hz, (EXT PS 12 V) WAITING
Operator ANDREJ SKOF
Test Spec
NEUTRAL

Final Measurement

Meas Time: 1 s
Margin: 22 dB
Subranges: 15

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
2	13.560000000 MHz	51.61	CISPR Averag	1.61
1	13.560000000 MHz	52.02	Quasi Peak	-7.98
2	321.000000000 kHz	37.70	CISPR Averag	-11.98
2	13.452000000 MHz	35.55	CISPR Averag	-14.45
2	215.250000000 kHz	35.50	CISPR Averag	-17.50
2	341.250000000 kHz	30.68	CISPR Averag	-18.49
2	431.250000000 kHz	28.46	CISPR Averag	-18.77
1	323.250000000 kHz	40.57	Quasi Peak	-19.05
2	433.500000000 kHz	26.69	CISPR Averag	-20.50
2	1.941000000 MHz	25.06	CISPR Averag	-20.94
1	215.250000000 kHz	40.88	Quasi Peak	-22.12
1	13.452000000 MHz	37.66	Quasi Peak	-22.34
2	15.589500000 MHz	26.28	CISPR Averag	-23.72
1	150.000000000 kHz	40.31	Quasi Peak	-25.69
1	15.589500000 MHz	32.57	Quasi Peak	-27.43

ROHDE&SCHWARZ

C20160918

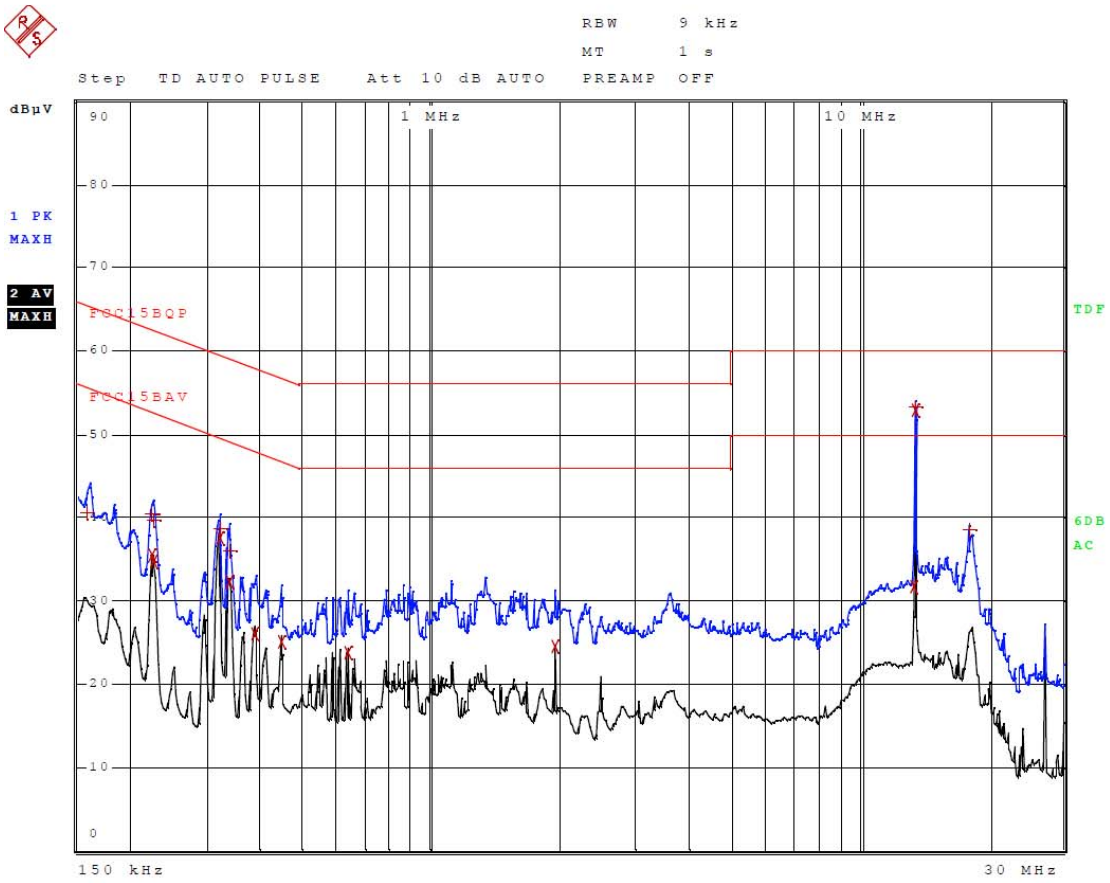
Meas Type	CONDUCTED EMISSION
Equipment under Test	PNEV7462B
Manufacturer	NXP SEMICONDUCTORS GmbH
OP Condition	Uin: 120 V, 60 Hz, (EXT PS 12 V), READING
Operator	ANDREJ SKOF

Test Spec
PHASE

Time Domain Scan (1 Range)

Scan Start: 150 kHz
Scan Stop: 30 MHz
Detector: Trace 1: MAX PEAK Trace 2: Average
Transducer: ENV216

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	30 ms	Auto	0 dB	INPUT2



ROHDE&SCHWARZ

C20160918

Meas Type	CONDUCTED EMISSION
Equipment under Test	PNEV7462B
Manufacturer	NXP SEMICONDUCTORS GmbH
OP Condition	Uin: 120 V, 60 Hz, (EXT PS 12 V), READING
Operator	ANDREJ SKOF

Test Spec
PHASE

Final Measurement

Meas Time:	1 s
Margin:	22 dB
Subranges:	17

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
2	13.560000000 MHz	52.76	CISPR Averag	2.76
1	13.560000000 MHz	53.23	Quasi Peak	-6.77
2	318.750000000 kHz	37.53	CISPR Averag	-12.21
2	336.750000000 kHz	32.17	CISPR Averag	-17.12
2	222.000000000 kHz	35.50	CISPR Averag	-17.24
2	224.250000000 kHz	34.74	CISPR Averag	-17.92
2	13.449750000 MHz	31.73	CISPR Averag	-18.27
1	318.750000000 kHz	38.75	Quasi Peak	-20.99
2	1.941000000 MHz	24.57	CISPR Averag	-21.43
1	18.039750000 MHz	38.46	Quasi Peak	-21.54
2	447.000000000 kHz	25.08	CISPR Averag	-21.85
2	386.250000000 kHz	26.05	CISPR Averag	-22.09
2	636.000000000 kHz	23.68	CISPR Averag	-22.32
1	222.000000000 kHz	40.41	Quasi Peak	-22.34
1	224.250000000 kHz	39.61	Quasi Peak	-23.05
1	336.750000000 kHz	35.95	Quasi Peak	-23.33
1	159.000000000 kHz	40.58	Quasi Peak	-24.93

ROHDE&SCHWARZ

C20160918

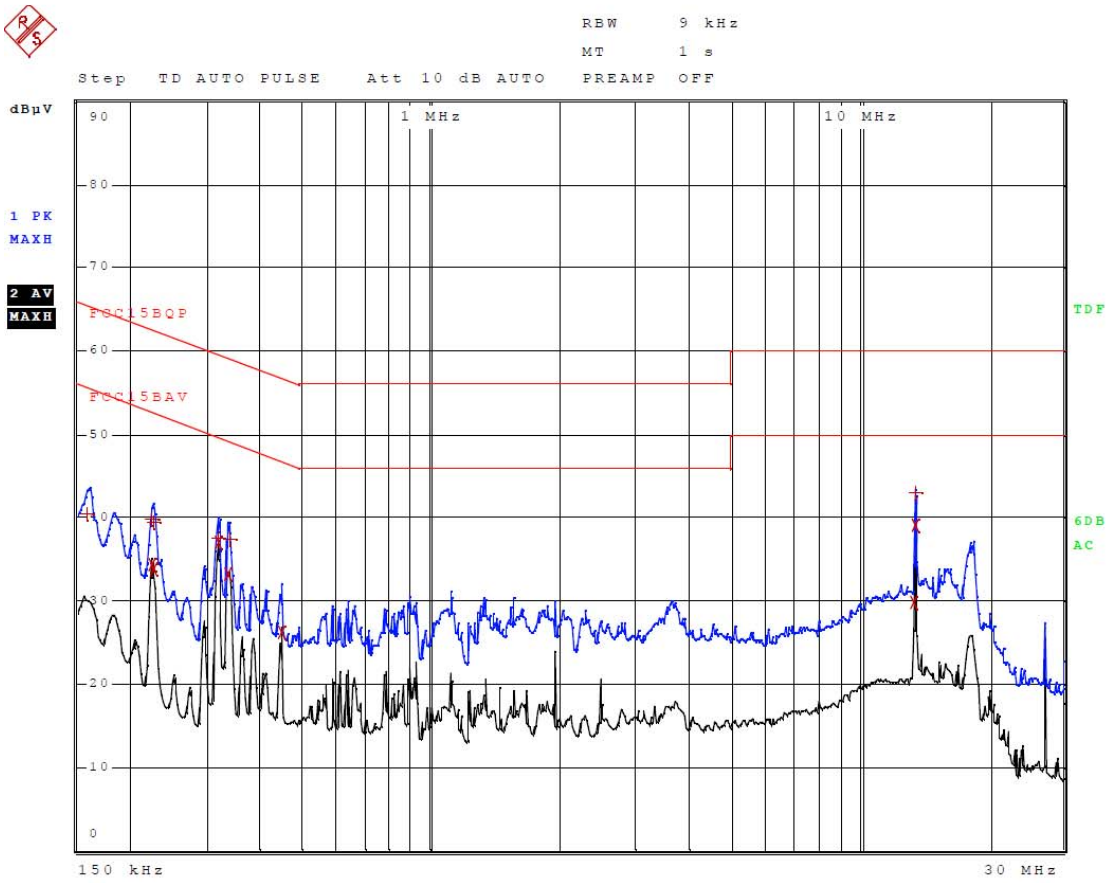
Meas Type	CONDUCTED EMISSION
Equipment under Test	PNEV7462B
Manufacturer	NXP SEMICONDUCTORS GmbH
OP Condition	Uin: 120 V, 60 Hz, (EXT PS 12 V), READING
Operator	ANDREJ SKOF

Test Spec
NEUTRAL

Time Domain Scan (1 Range)

Scan Start: 150 kHz
Scan Stop: 30 MHz
Detector: Trace 1: MAX PEAK Trace 2: Average
Transducer: ENV216

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	30 ms	Auto	0 dB	INPUT2



ROHDE&SCHWARZ

C20160918

Meas Type	CONDUCTED EMISSION
Equipment under Test	PNEV7462B
Manufacturer	NXP SEMICONDUCTORS GmbH
OP Condition	Uin: 120 V, 60 Hz, (EXT PS 12 V), READING
Operator	ANDREJ SKOF
Test Spec	

NEUTRAL

Final Measurement

Meas Time:	1 s
Margin:	22 dB
Subranges:	13

Trace	Frequency	Level (dBµV)	Detector	Delta Limit/dB
2	13.560000000 MHz	39.10	CISPR Averag	-10.90
2	316.500000000 kHz	36.94	CISPR Averag	-12.86
2	334.500000000 kHz	33.17	CISPR Averag	-16.16
1	13.560000000 MHz	42.97	Quasi Peak	-17.03
2	222.000000000 kHz	34.40	CISPR Averag	-18.34
2	224.250000000 kHz	33.75	CISPR Averag	-18.91
2	13.449750000 MHz	29.77	CISPR Averag	-20.23
2	444.750000000 kHz	26.09	CISPR Averag	-20.88
1	336.750000000 kHz	37.27	Quasi Peak	-22.01
1	316.500000000 kHz	37.60	Quasi Peak	-22.20
1	222.000000000 kHz	39.83	Quasi Peak	-22.91
1	224.250000000 kHz	39.42	Quasi Peak	-23.24
1	159.000000000 kHz	40.29	Quasi Peak	-25.22

7.2 Radiated emission measurement (15.209)

7.2.1 Test instruments

Description & Manufacturer	Model No.	SIQ No.	Last calibration	Calibrated until	Calibration period	Used
ETS, Anechoic chamber	3m	103949	2014-11	2016-11	24 months	X
Rohde-Schwarz, RFI receiver	ESU8	105187	2015-11	2017-11	24 months	
Rohde-Schwarz, RFI receiver	ESU26	100428	2018-02	2018-02	24 months	X
R&S, Antenna	HFH2-Z2	/	2015-09	2017-09	24 months	X
EMCO, Antenna	3142B	104351	2015-09	2017-09	24 months	X
EMCO, Antenna	3115	103002	2015-09	2017-09	24 months	X
Heinrich Deisel, Turn table	DS 420.00	103337	NA	NA	NA	X
Antenna tower	/	/	NA	NA	NA	X
Controller for turn table and antenna tower	/	/	NA	NA	NA	X

7.2.2 Test procedure for measurements from 9 kHz to 30 MHz

1. Radiated emission in the frequency range 9 kHz to 30 MHz are measured Active loop Antenna.
2. First preliminary measurements were performed in Semi-anechoic chamber at a distance of 3 m using active loop antenna.
3. The EUT was placed on the top of a rotating table 0.8 meters above the ground in an Anechoic Chamber. The table and antenna was rotated 360 degrees to determine the position of the highest radiation.
4. Final measurements were done at a distance of 10 m at Open Area Test Site due to low emissions measured during preliminary measurements acc. to the clauses from Part 15, Sections 15.31(d) and 15.31(f)(2). Test results were extrapolated by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

7.2.3 Test procedure for measurements from 30 MHz to 1 GHz

5. The EUT was placed on the top of a rotating table 0.8 meters above the ground in an Anechoic Chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
6. The EUT was set 3 m away from the interference-receiving antenna, which was mounted on the top of variable-height antenna tower.
7. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
8. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
9. The test-receiver system was set to PEAK and QUAS-PEAK Detect Function and Specified Bandwidth with Maximum Hold Mode.
10. The highest points would be re-tested one by one using the quasi-peak method.