COMPLIANCE ENGINEERING IRELAND LTD

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.088T

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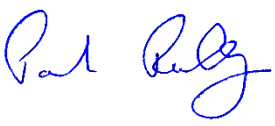
Test Report By	Michael Kirby
FCC Site Registration	92592
IC Site Registration	8517-A2, 8517-A1
Date	5th Feb 2019
IC Equipment Authorisation	Test Report
EUT Description	RFID Module
FCC ID	SCCNUR0W1
IC ID	5137A-NUR0W1
Authorised by	**Paul Reilly**
Authorised Signature :	

TEST SUMMARY

The equipment complies with the requirements according to the following standards.

FCC Spec.	IC Spec.	Test Parameters	Status
15.109	RSS-Gen-4 8.9 ICES-003-6 6.2	Radiated Emissions	Pass
15.107 15.209	RSS-Gen-4 8.8 ICES-003-6 6.1	Conducted Emissions on the mains	Pass

Test Method as per Ansi 63-4 :2014

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Exhibit A – Technical Report

Table of Contents

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1.0 EUT Description

Model:	NUR2-0W1
Type:	RFID Module
FCC ID:	SCCNUR0W1
Company:	Nordic ID Oy
Type of radio:	Stand-alone
Transmitter Type:	RFID FHSS

The NUR-0W1 is an RFID module using frequency hopping in the 902-928MHz frequency band.

1.1 EUT Operation

1.1.1 Operating Conditions during Test:

The RFID module was fitted to a host pcb to allow powering and control of the module. The EUT was in standby mode for all tests.

1.1.2 Type of EUT NUR-0W1 RFID with portable computer

RFID module Power requirements 4.5Vdc

1.1.3 Cable lengths and types

RFID module

Cable Description	Type	Length Metres
Antenna Cable	Coaxial	1
USB cable to computer	unshielded	2

Laptop

Cable Description	Type	Length Metres
Laptop to DC power	unshielded	1.8
Mains lead	unshielded	0.8

1.1.4 Peripherals

Laptop ASUS X501A
AC Adapter ASUS ADP65JHBB

PSU Type Hewlett Packard E3620A
set to 4.5Vdc. for all tests

1.1.5 Environmental conditions

	Temperature	Relative Humidity
Test	°C	%
Conducted Emissions	18	49
Radiated Emissions <1GHz	18	48

1.2 Modifications

No modifications were required in order to pass the test specifications.

1.3 Date of Test

The tests were carried out on 15th Oct 2018 and 4th Feb 2019.

2.0 Results for Conducted emissions on the mains

Conducted Emissions on the mains measurements were performed as per C63.4 2014 .
Measurement uncertainty = +/- 2.9dB

3.1 Laptop

Detector	Frequency	Reading	Margin	Phase
QP/ Ave	MHz	dBuV	dB	L/N
Quasi-Peak	0.1523	46.62	-19.32	Live
Average	0.5775	35.11	-10.89	Live
Quasi-Peak	0.5798	40.77	-15.23	Live
Quasi-Peak	0.6585	27.53	-28.47	Live
Quasi-Peak	0.724	32.67	-23.33	Live
Quasi-Peak	2.373	33.41	-22.59	Live

Detector	Frequency	Reading	Margin	Phase
QP/ Ave	MHz	dBuV	dB	L/N
Quasi-Peak	0.1523	48.54	-17.4	Neutral
Average	0.5798	35.20	-10.8	Neutral
Quasi-Peak	0.5820	41.53	-14.47	Neutral
Quasi-Peak	0.6585	27.66	-28.34	Neutral
Quasi-Peak	0.7328	32.81	-23.19	Neutral
Quasi-Peak	1.1243	24.05	-31.95	Neutral
Quasi-Peak	1.1265	24.72	-31.28	Neutral
Average	2.4225	31.27	-14.73	Neutral
Quasi-Peak	2.8028	33.42	-22.58	Neutral

Test Result Pass

2.2 PSU

Detector	Frequency	Reading	Margin	Phase
QP/ Ave	MHz	dBuV	dB	L/N
Average	12.7523	21.56	-28.44	Live
Quasi-Peak	12.7815	26.29	-33.71	Live
Average	12.9300	21.58	-28.42	Live

Detector	Frequency	Reading	Margin	Phase
QP/ Ave	MHz	dBuV	dB	L/N
Quasi-Peak	12.6758	25.35	-34.65	Neutral
Average	12.8378	20.60	-29.4	Neutral

Test Result Pass

3. Radiated Measurements

3.1 Radiated Emissions Measurements

The EUT was centred on a motorized turntable, which allows 360-degree rotation.
Emissions were measured using an antenna positioned at a distance of 3 metres from the EUT (as measured from the closest point of the EUT). The radiated emissions peaks were maximised by configuring the EUT, by rotating the EUT, and by raising and lowering the antenna from 1 to 4 metres.
Emissions below 1 GHz were measured on a test table height of 0.8metres in a semi anechoic chamber using a resolution bandwidth of 100KHz.
Emissions above 1 GHz were measured on a test table height of 1.5metres in a fully anechoic chamber using a resolution bandwidth of 1MHz

An initial prescan was carried out to determine the worst-case configuration
Measurements performed according to the procedures in ANSI C63.4-2014

Frequency	Quasi peak Level	Antenna Factor	Preamp Gain	Cable Loss	Antenna Polarity	Final Field Strength Quasi Peak	Average Limit	Margin
MHz	dBuV/m	dB	dB	dB	V/H	dBuV/m	dBuV/m	dB
180.75	14.2	9.6	0	0.2	Horizontal	24.0	43.5	19.5
194.49	14.2	8.6	0	0.2	Horizontal	23.0	43.5	20.5
259.08	12.8	13	0	0.2	Horizontal	26.0	46.0	20.0
263.34	14.6	13.7	0	0.2	Horizontal	28.5	46.0	17.5
451.44	16.5	16.5	0	1.2	Horizontal	34.2	46.0	11.8
30.78	4.5	19.3	0	0.2	Vertical	24.0	40.0	16.0
32.25	7.5	18.3	0	0.2	Vertical	26.0	40.0	14.0
53.82	16.6	7.2	0	0.2	Vertical	24.0	40.0	16.0
194.18	15.4	8.6	0	0.2	Vertical	24.2	43.5	19.3
263.54	17.3	13.7	0	0.2	Vertical	31.2	46.0	14.8
323.76	10.4	13.4	0	1.2	Vertical	25.0	46.0	21.0
398.31	9.8	15.2	0	1.2	Vertical	26.2	46.0	19.8
413.82	11.5	16	0	1.2	Vertical	28.7	46.0	17.3
451.44	15.6	16.5	0	1.2	Vertical	33.3	46.0	12.7
526.68	11.3	17.6	0	1.2	Vertical	30.1	46.0	15.9

4 List of Test Equipment

Instrument	Manufacturer	Model	Serial Num	CEI Ref	Cal Due Date	Cal Interval Months
Microwave Preamplifier	Hewlett Packard	83017A	3123A00175	805	29-Sep-19	12
Spectrum Analyser 30Hz-40GHz	Rohde& Schwarz	FSP40	100053	850	11-Dec-21	36
Test Receiver 3.6GHz	Rohde& Schwarz	ESR	1316.3003k03-101625-s	869	07-Jun-20	36
Antenna Biconical	Schwarzbeck	VHBB 9124	9124 667	871	03-Sep-21	36
Anechoic Chamber	CEI	SAR 10M	845	845	16-Mar-19	36
Antenna Horn	EMCO	3115	9905-5809	655	06-Nov-19	24
Fully Anechoic Chamber	CEI	FAR 3M	906	906	22-Mar-21	36
Antenna Log Periodic	Chase	UPA6108	1072	609	03-Sep-21	36

5 Measurement Uncertainties

Measurement	Uncertainty
Radio Frequency	+/- $5x10^{-7}$
Maximum Frequency Deviation	+/- 1.7 %
Conducted Emissions	+/- 1 dB
Radiated Emission 30MHz-100MHz	+/- 5.3 dB
Radiated Emission 100MHz-300MHz	+/- 4.7 dB
Radiated Emission 300MHz-1GHz	+/- 3.9 dB
Radiated Emission 1GHz-40GHz	+/- 3.8 dB

The measurement uncertainties stated were calculated with a k=2 for a confidence level of over 95% as per ETS TR100 028.

Appendix A

Additional Test Results
For
Radiated Spurious Emissions

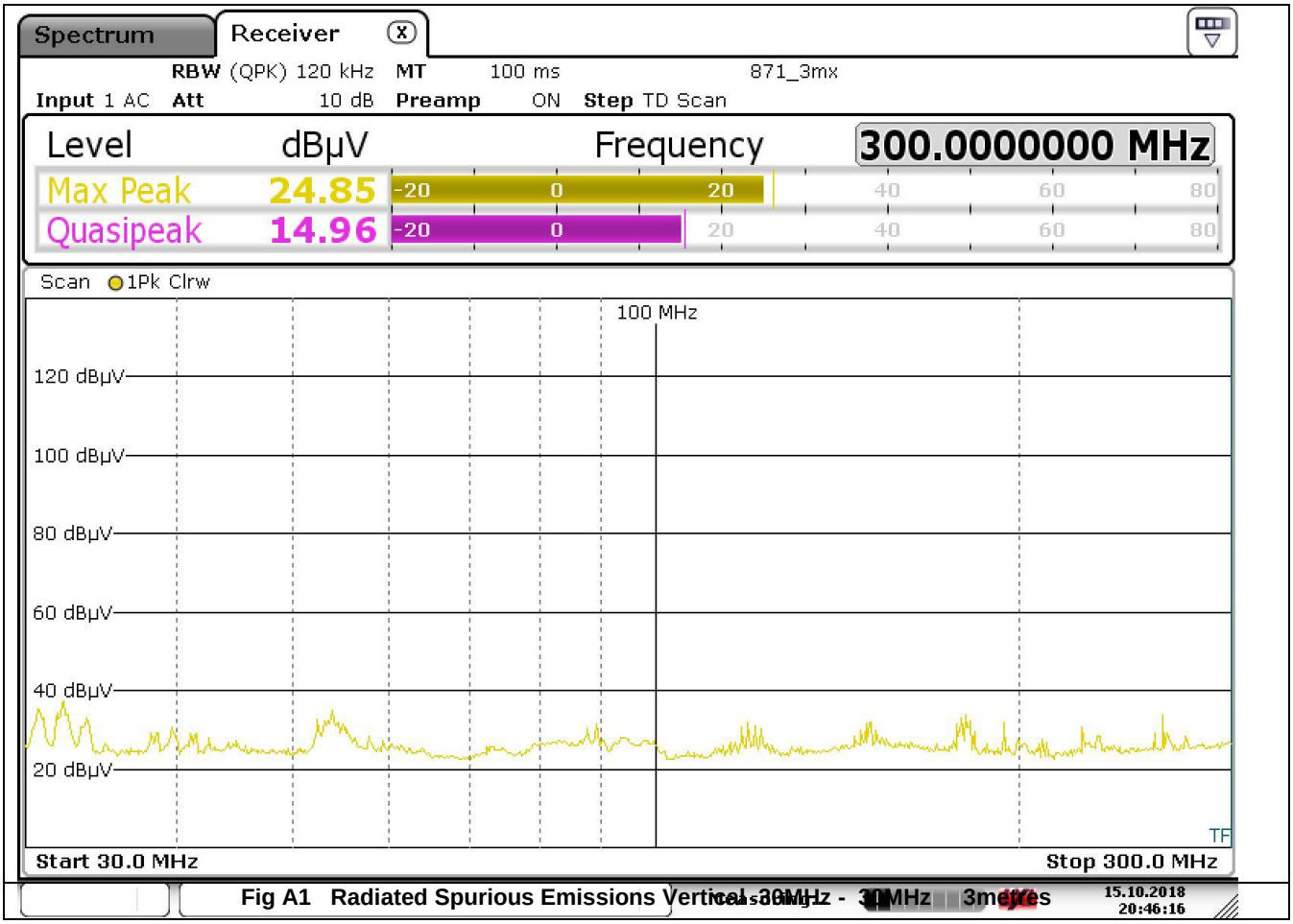

Fig A1 Radiated Spurious Emissions Vertical 30MHz - 300MHz 3metres

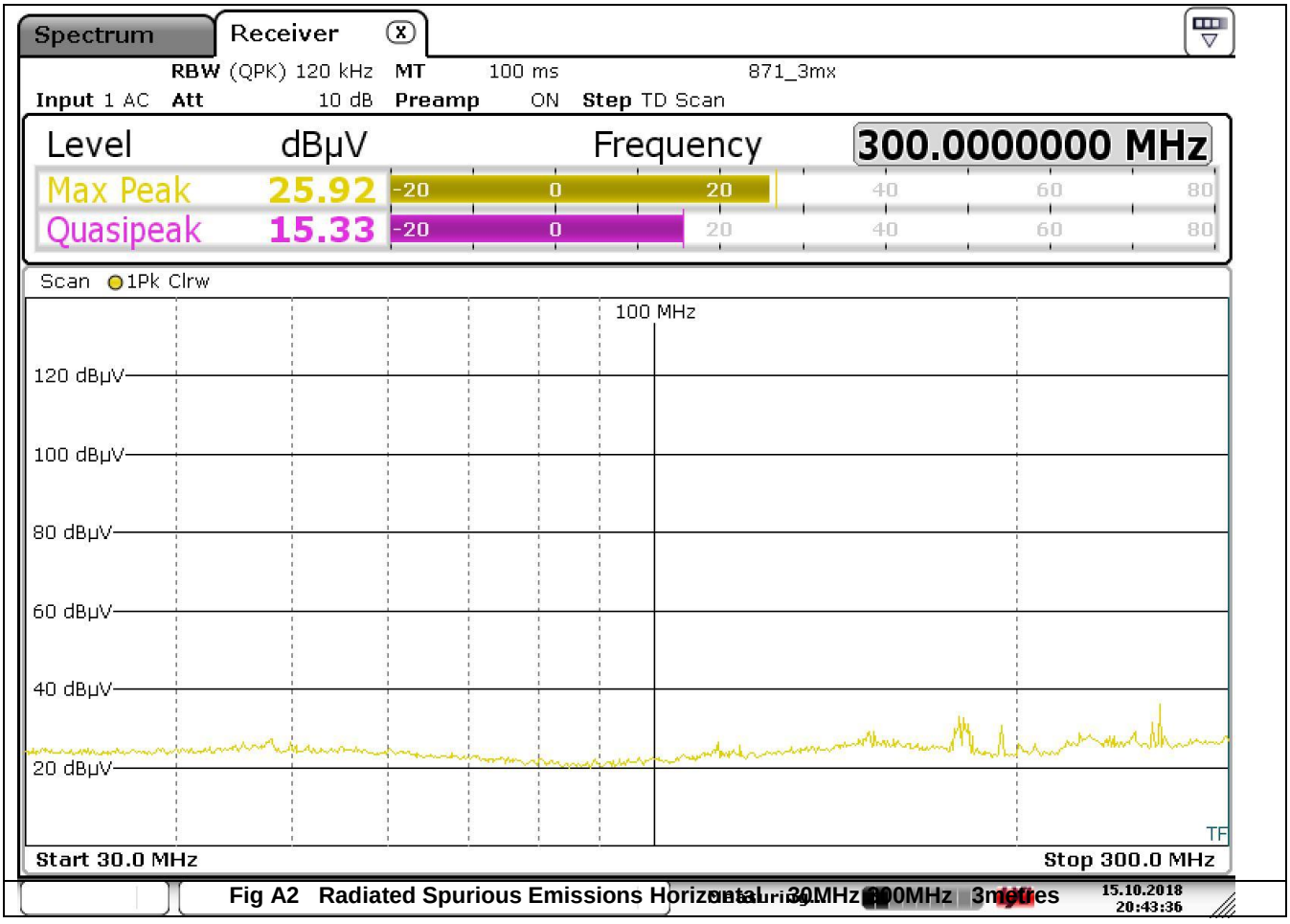

Fig A2 Radiated Spurious Emissions Horizontal 30MHz - 300MHz 3metres

Date: 15.OCT.2018 20:43:37

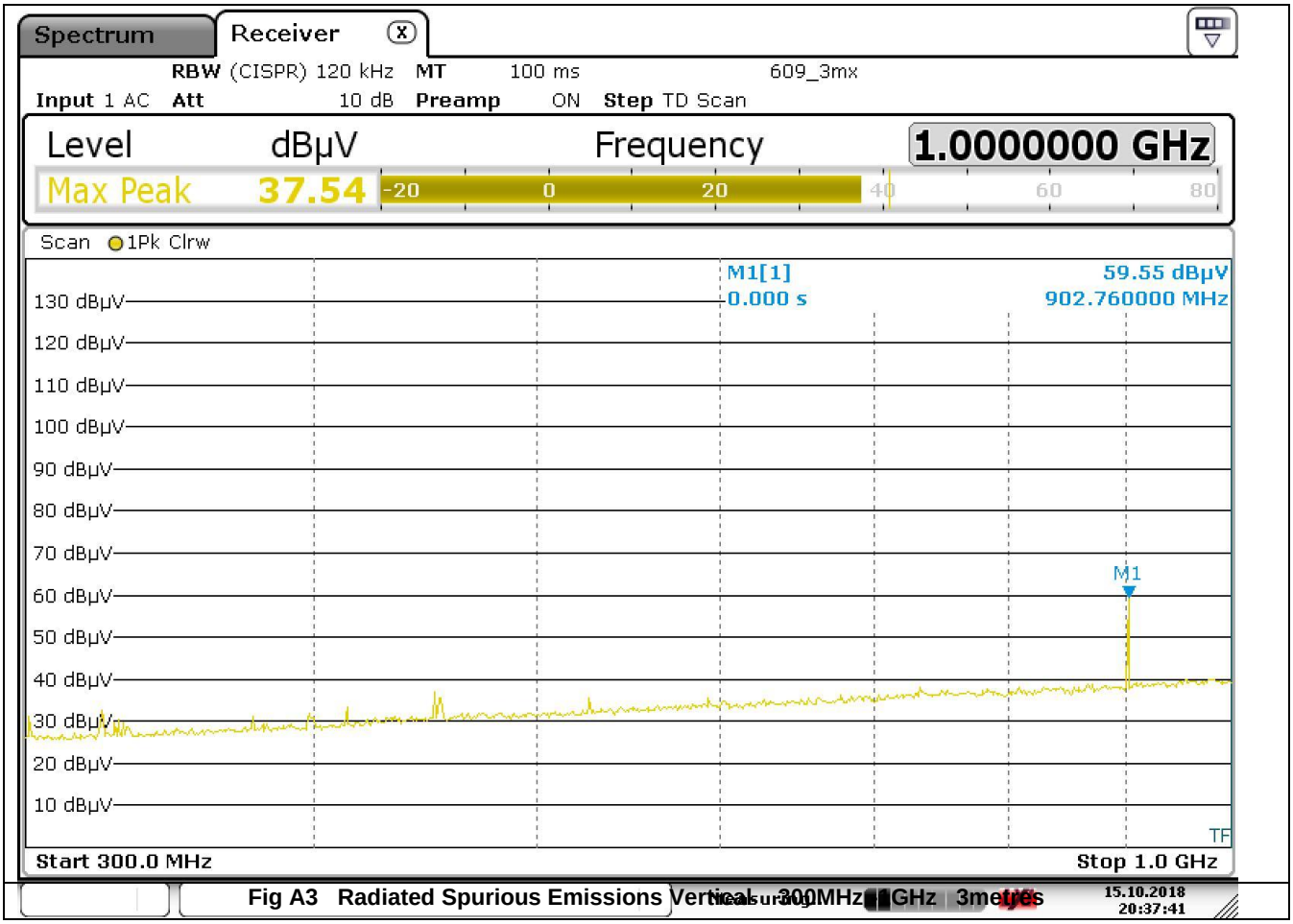

Fig A3 Radiated Spurious Emissions Vertical 300MHz-1GHz 3metres

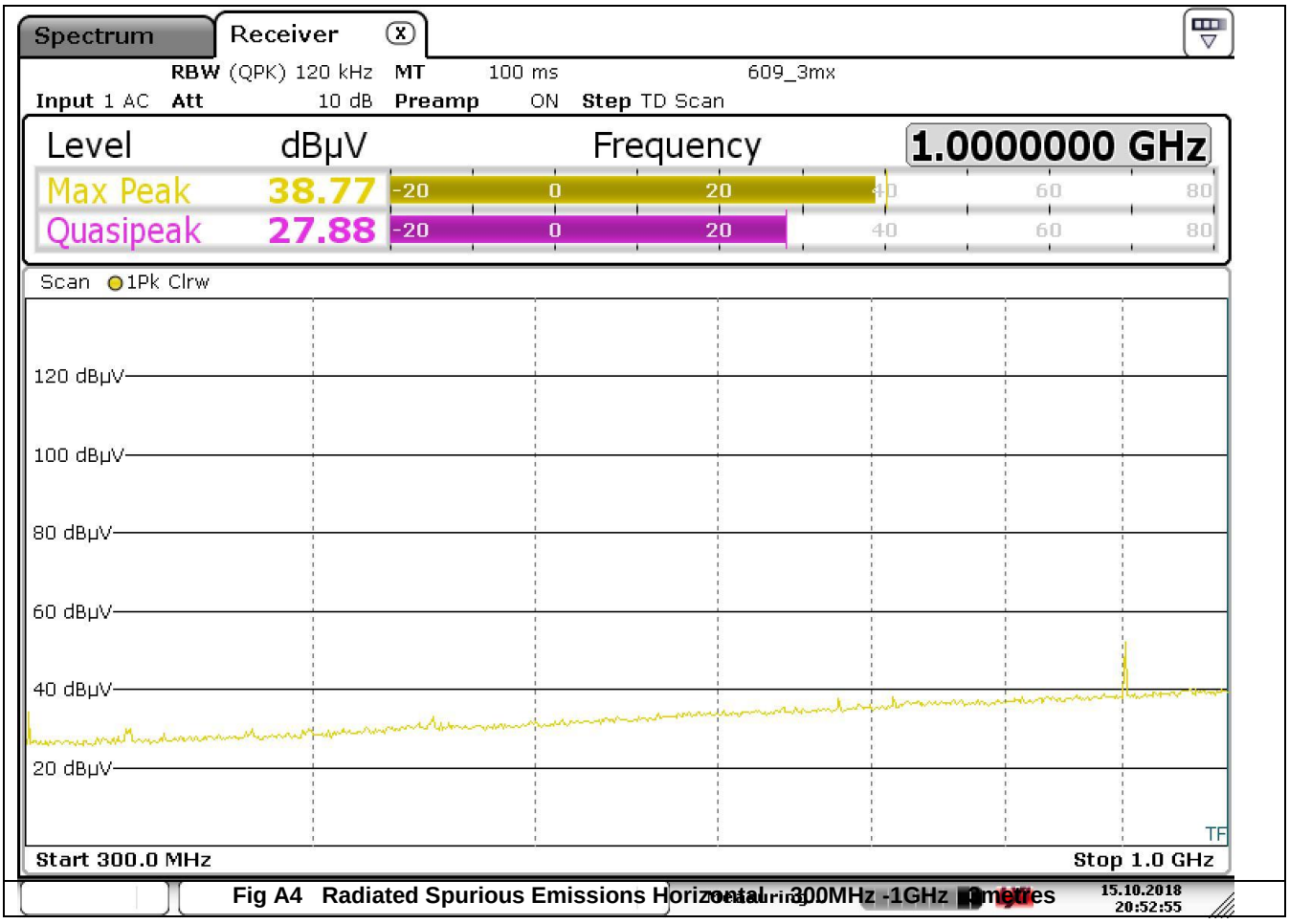

Fig A4 Radiated Spurious Emissions Horizontal 300MHz -1GHz 3metres

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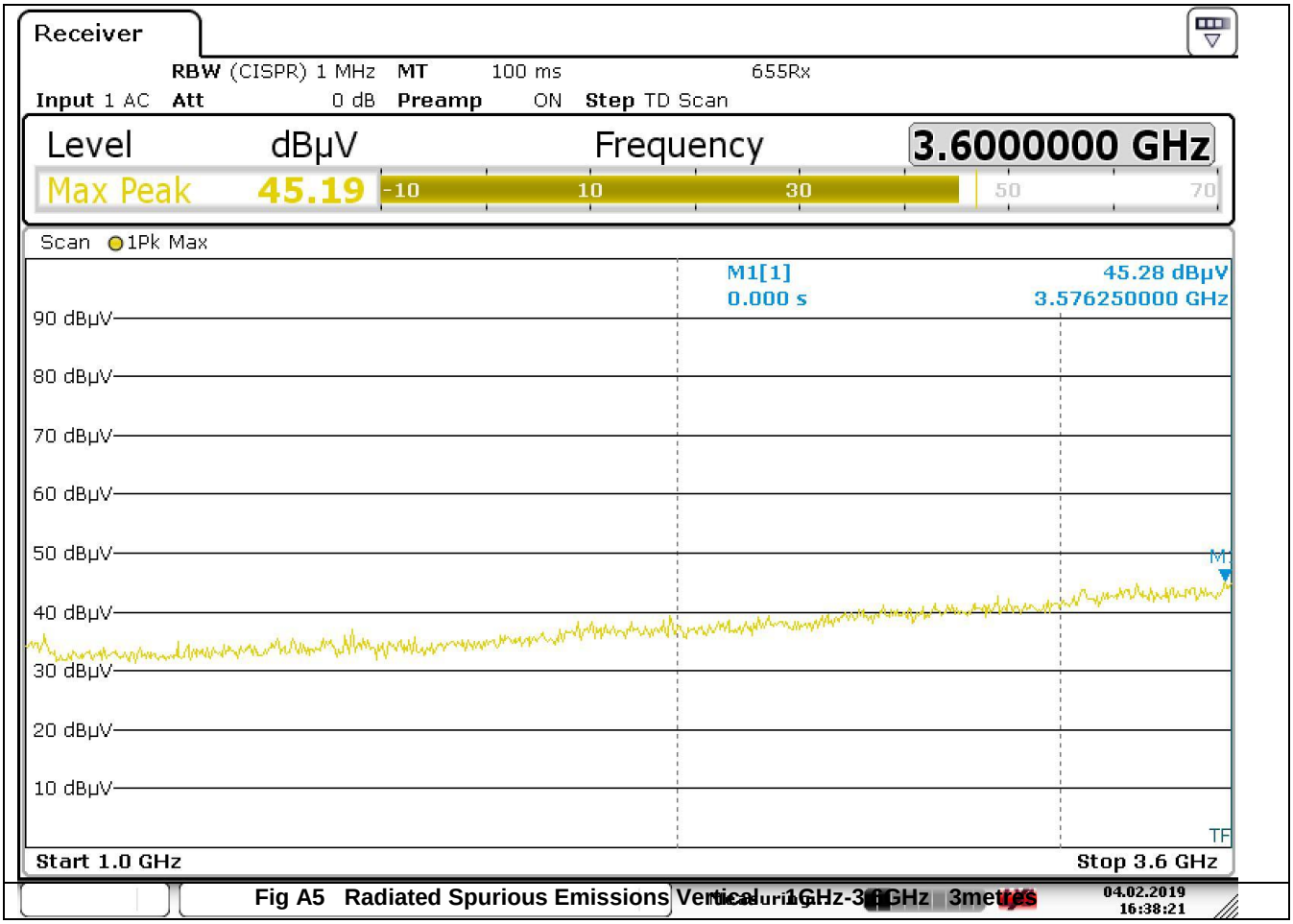


Fig A5 Radiated Spurious Emissions Vertical 1GHz-3.6GHz 3metres

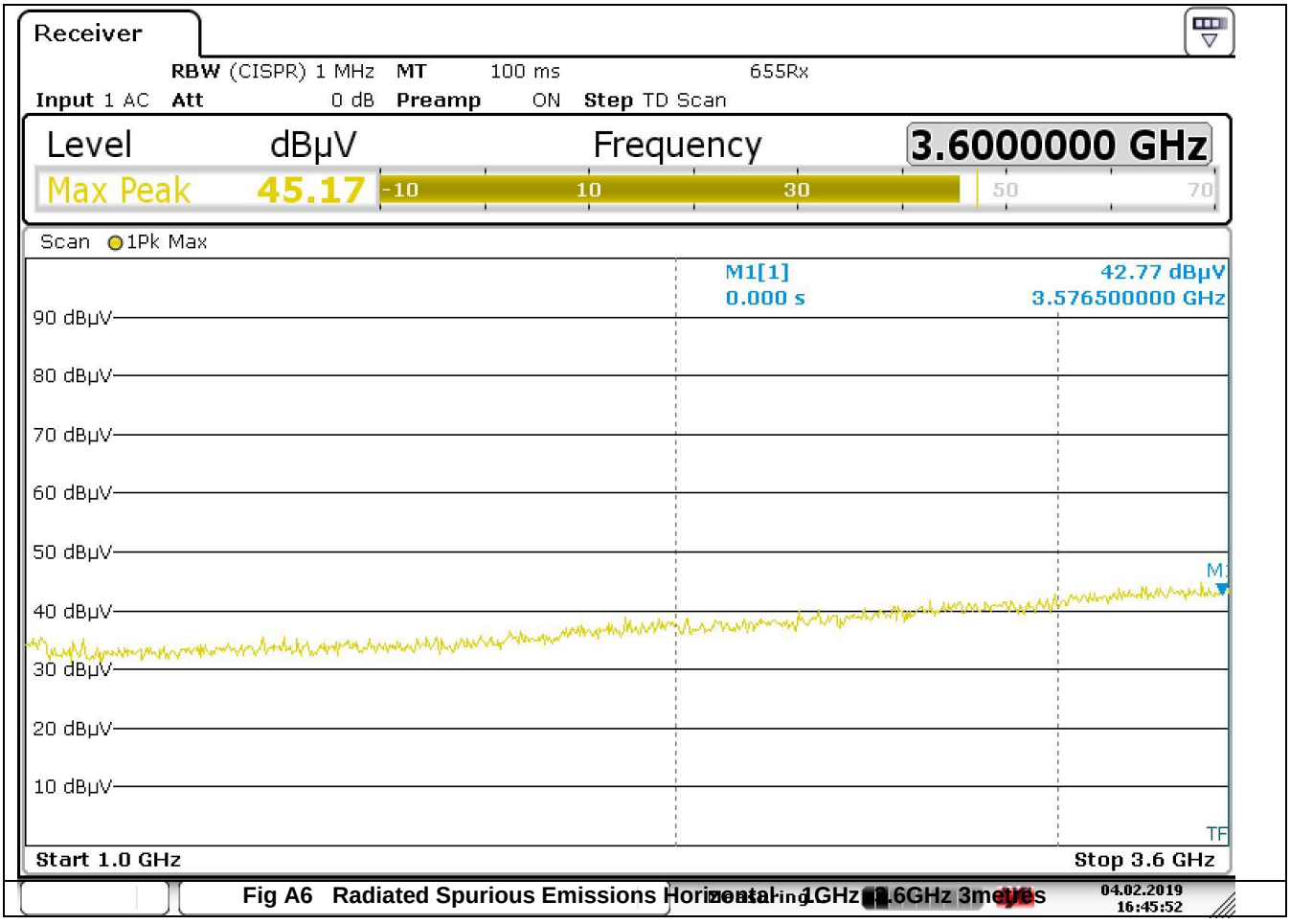
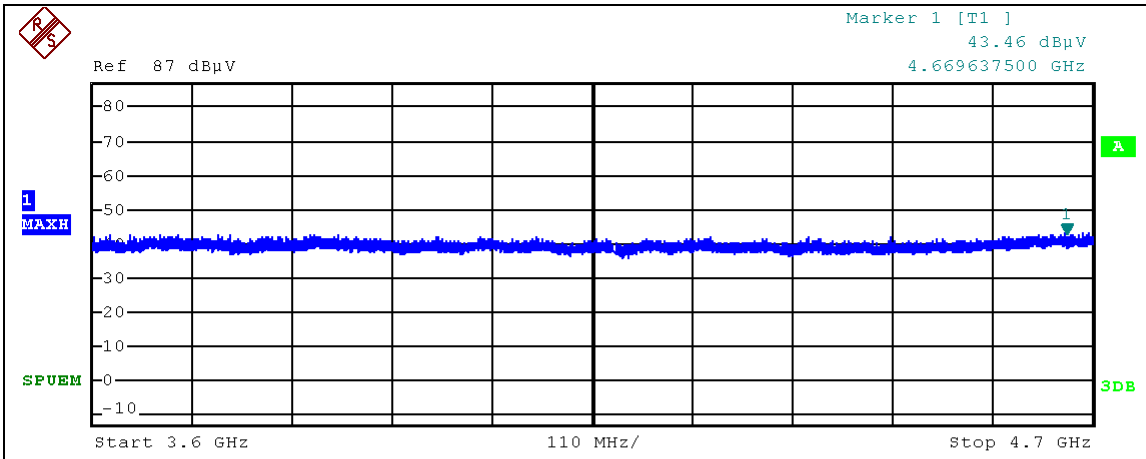


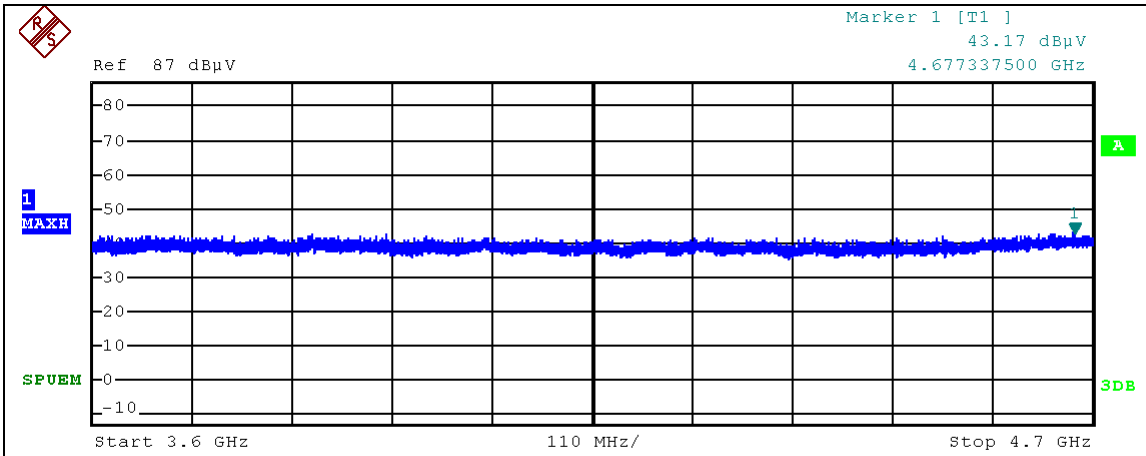
Fig A6 Radiated Spurious Emissions Horizontal 1GHz-3.6GHz 3metres

Date: 4.FEB.2019 16:45:52



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
3.600 G	4.000 G	1.00 M	3.870750 G	-63.98	-200.00
4.000 G	4.700 G	1.00 M	4.688800 G	-63.47	-200.00

Fig A7 Radiated Spurious Emissions Vertical 3.6GHz-4.7GHz 3metres



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
3.600 G	4.000 G	1.00 M	3.923050 G	-64.30	-200.00
4.000 G	4.700 G	1.00 M	4.677338 G	-63.83	-200.00

Fig A8 Radiated Spurious Emissions Horizontal 3.6GHz-4.7GHz 3metres

Appendix B

Conducted Emissions on the mains

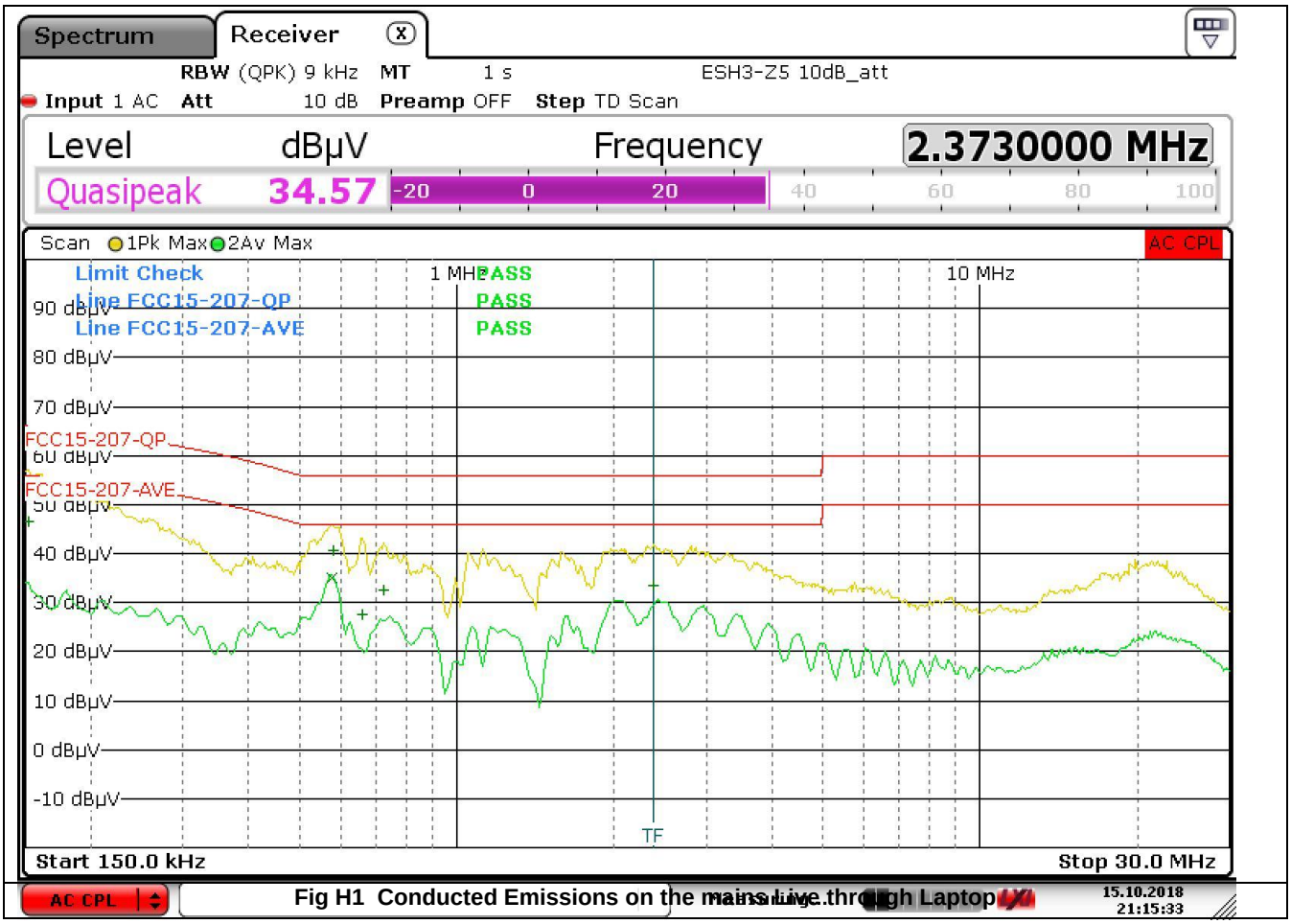


Fig H1 Conducted Emissions on the mains Live through Laptop

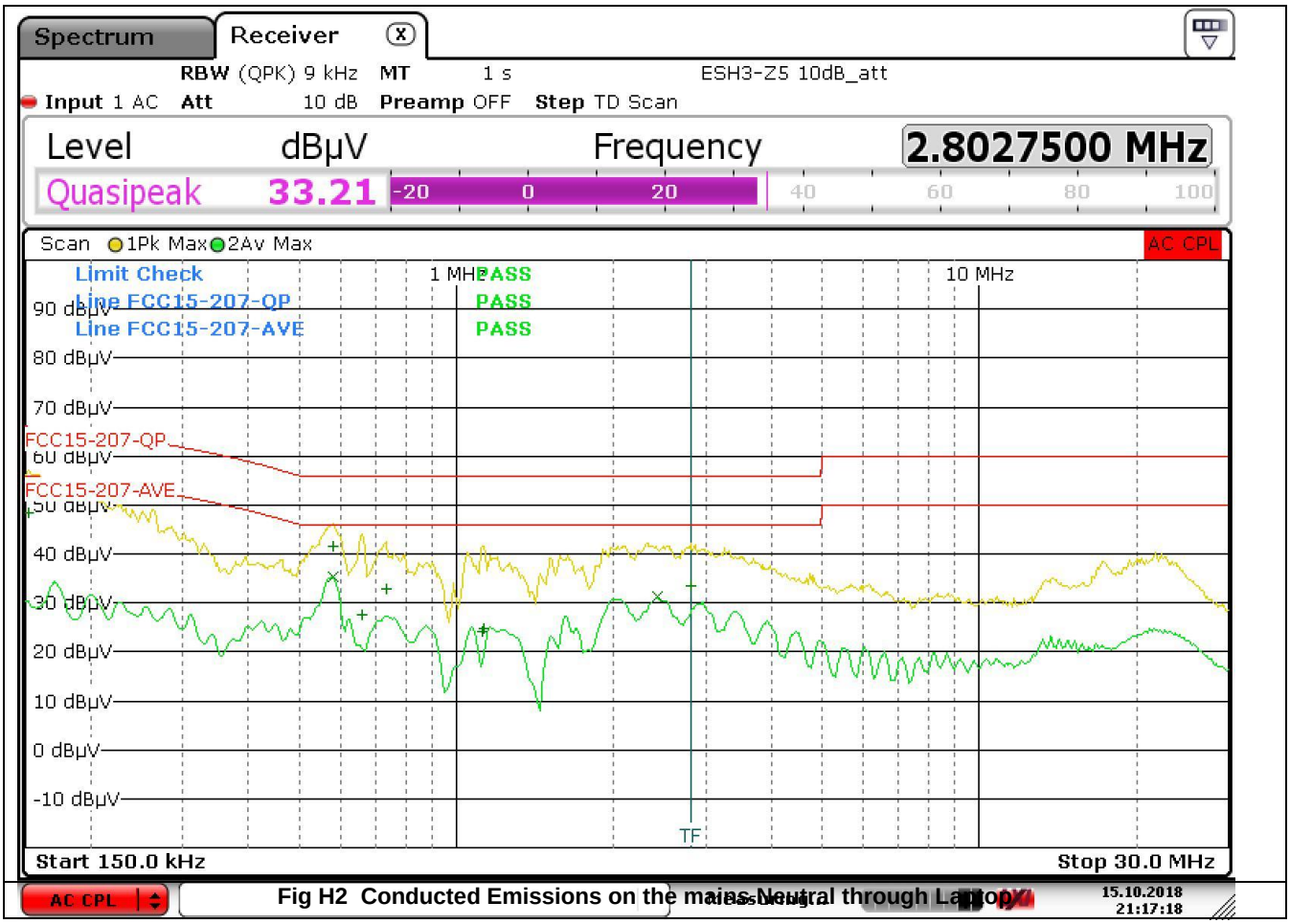


Fig H2 Conducted Emissions on the mains Neutral through Laptop

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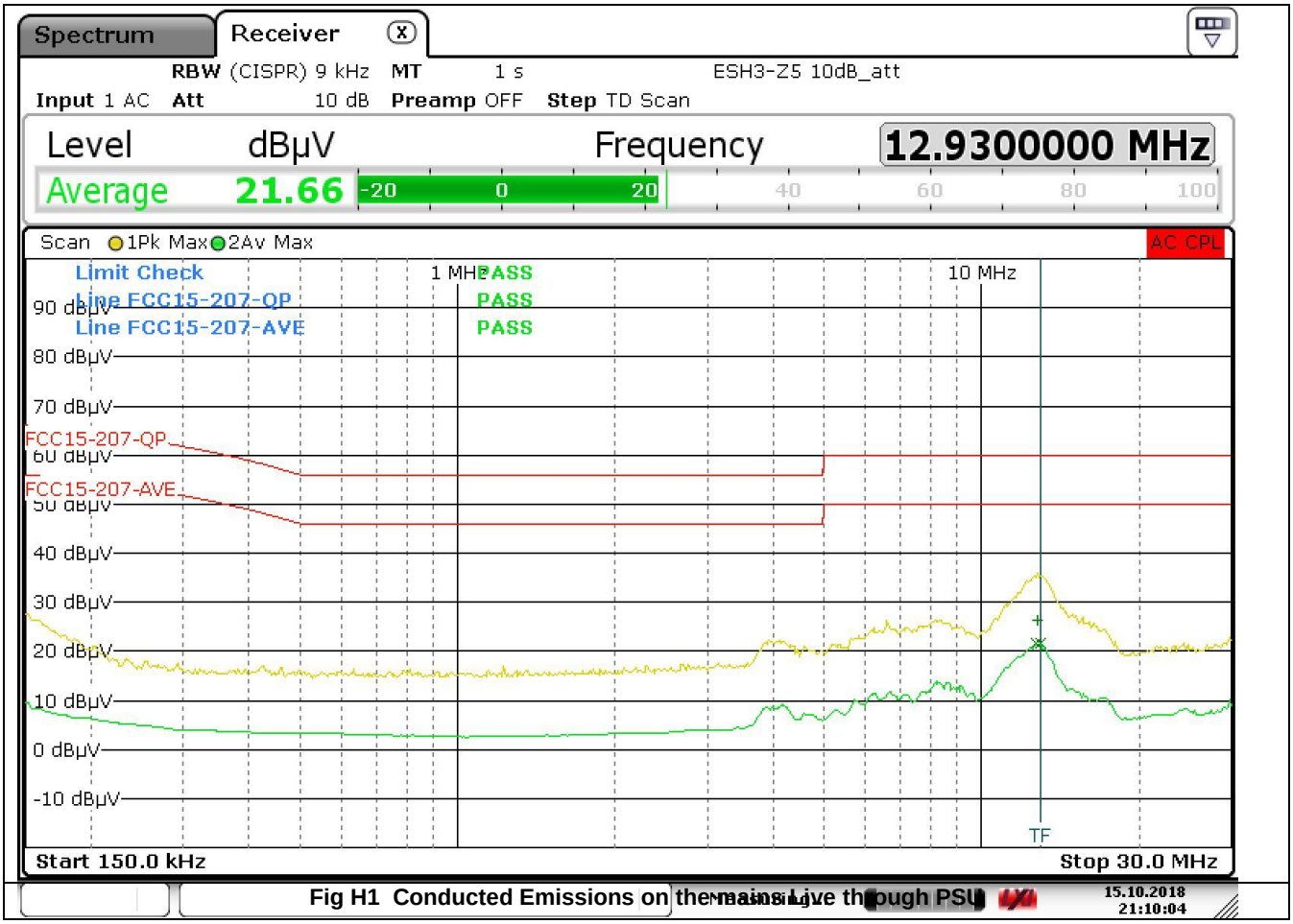

Fig H1 Conducted Emissions on the mains Live through PSU

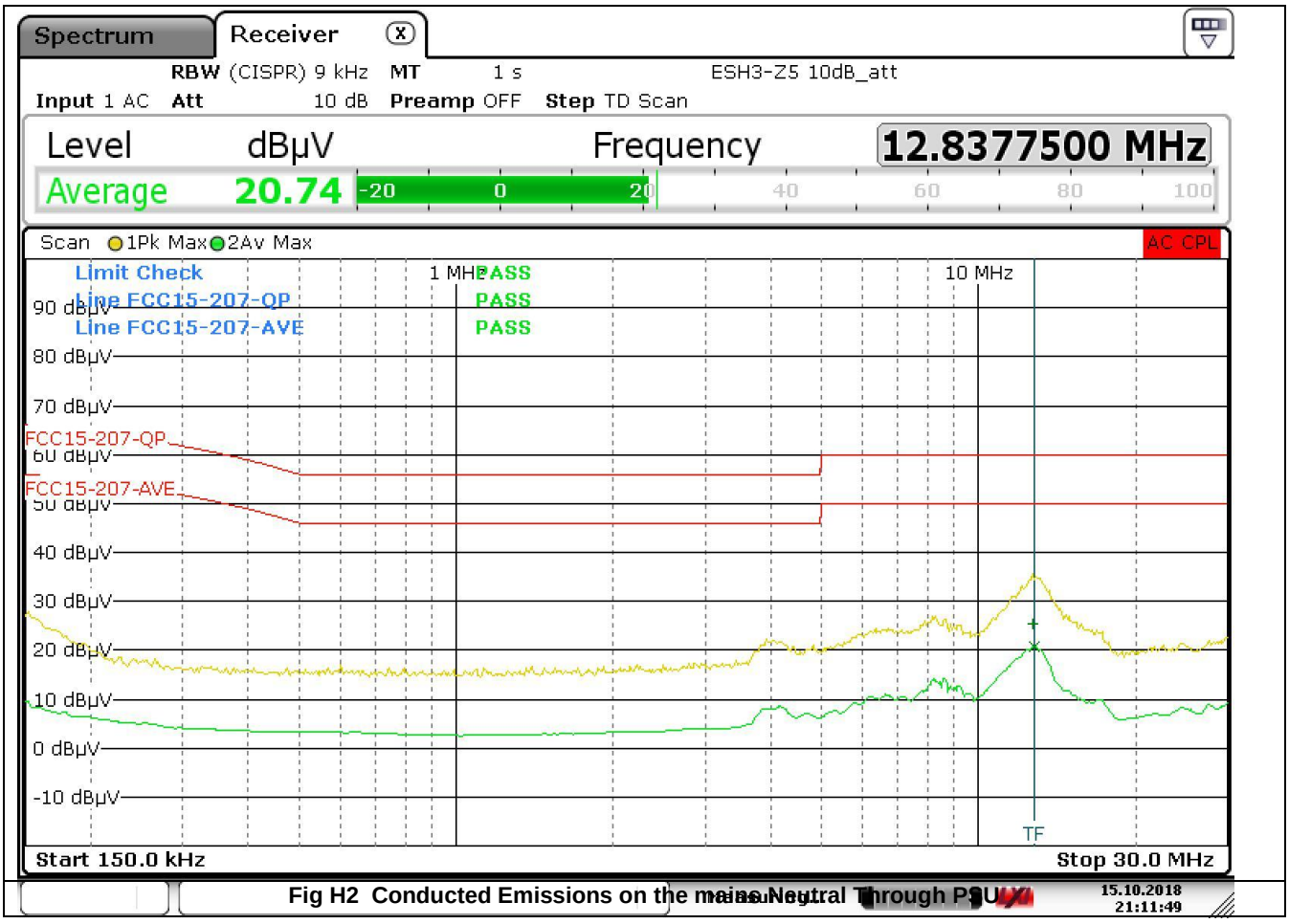

Fig H2 Conducted Emissions on the mains Neutral Through PSU

Date: 15.OCT.2018 21:11:49

Appendix C Test Set up

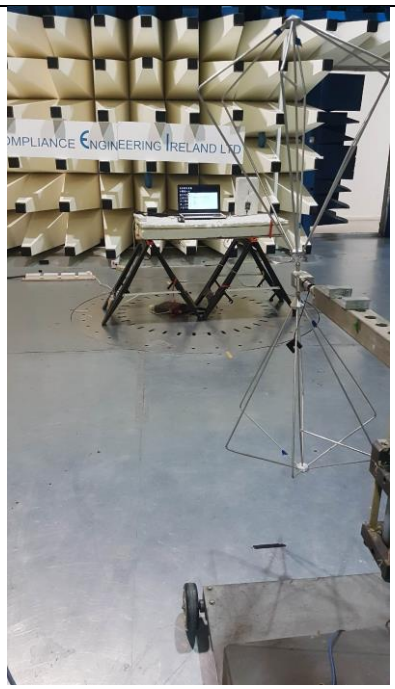

Fig C1 Radiated Emissions

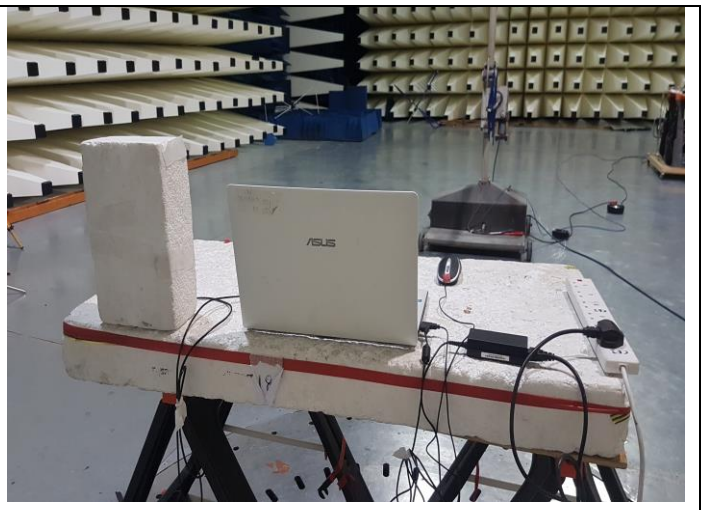

Fig C2 Radiated Emissions

Fig C3 Radiated Emissions >1GHz

Fig C4 Radiated Emissions >1GHz

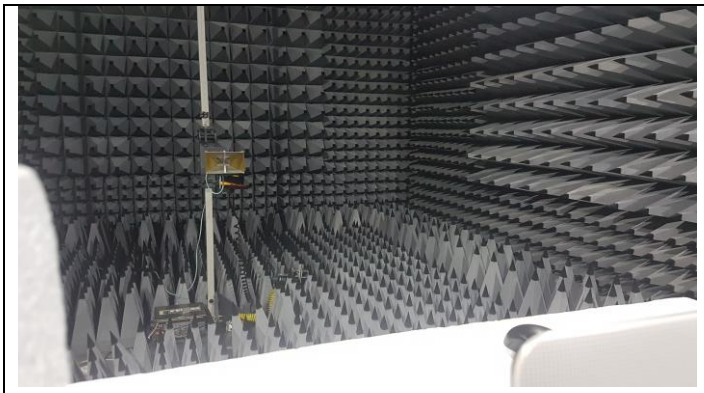

Fig C5 Radiated Emissions >1GHz

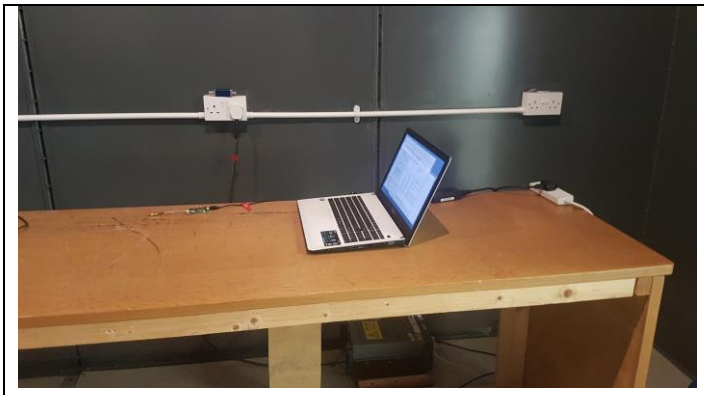

Fig C6 Conducted Emissions mains Laptop

Fig C7 Conducted Emissions mains Laptop

Fig C8 Conducted Emissions mains PSU

Fig C9 Conducted Emissions mains PSU

End of Report