Test Report EMC

Test Location:

Independent Test Laboratories Ltd
218A Annex Road, Middleton,
Christchurch 8024, New Zealand

Equipment under Test:

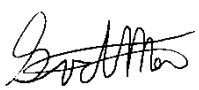
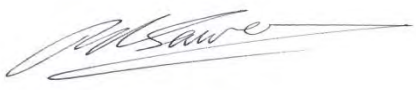
Applicant:	Core Transport Technologies Inc
Manufacturer:	Core Transport Technologies Inc, 105 Trafalgar Street, Nelson, 7010, New Zealand
File number:	ITL EMC 171066
EUT:	Multi Radio Equipment including ancillary equipment
Brand/model:	NINA B1
EUT received:	06 July 2017

Applied standards:

Australian / New Zealand Standard (AS/NZS)	European Standard	IEC/CISPR-Standard
AS/NZS 4268	ESTI EN301 489-1	CENELEC EN55032
-	ESTI EN301 489-3	-
-	ESTI EN 300 220-1	-

Remarks to the Standards:	Tested to selected clauses of the standards for New Zealand and Australia emissions evaluation only. SRD radio equipment frequency hopping transmitter for fixed industrial use and integral antenna

Result:	**PASS.**

Date of issue:	31 July 2017	
Tested by:	Schalk van der Merwe ***EMC Test Engineer***	
Reviewed:	Richard Sawers ***Manager – EMC Testing Services***	

Contents Directory

1 Description of the Sample (EUT)

Type of EUT:	Multi Radio Equipment including ancillary equipment
Model:	NINA B1
Serial number:	-

Technical data:

Rated voltage:	230 V a.c 50Hz.
Rated power EIRP:	None
Operating frequency:	2400 – 2483.5MHz

Operating frequency above 470 MHz:	Yes
Operating frequency below 470 MHz:	No
Frequency hopping:	Yes
Direct Sequence Spread Spectrum:	No

General remarks: The Core TT NINA B1 device is a reader to be associated with compatible tags which become live when in close proximity to the reader. The tag is able to be interrogated and transfer data to the reader. The Core TT NINA B1 reader consists of a UP (Intel Atom X5-Z8350) processor board, WiFi and Bluetooth modules together with a Cellular dongle.

The Core TT NINA B1 reader was configured in a manner representative of typical operation. Testing does not signify compliance to any requirements related to spectrum management or use of the equipment.

The NINA B1 reader was housed in a black plastic enclosure and was powered by a 5 V d.c. / 4A mains adapter 240 V a.c. supply permanently wired to the device.

The highest clock frequency in use was 1.92 GHz.

The dimensions of the test item were as follows:

Length (mm)	Width (mm)	Height (mm)
195	115	65

Table of compliant modules

Module	Approval Reference
NINA B1	FCC ID: XPYNINAB1
ODIN-W160	FCC ID: PVH0953
MULTITECH USB Modem MTD-H5-2.0	FCC ID: AU792U10E06831
Huawei E3531i Dongle	HUAWEI D.O.C. 5/5/2014
Proant Inside WLAN Antenna	N/A
Main Processor UP-CHT02-A10	CE/FCC CLASS A
PSU - FJ-SW2801200Z	ESTE D.O.C. E1509005

2 Test Conditions

2.1 Voltage during the Test (If not otherwise specified):

Nominal voltage:	240 V a.c. 50Hz powered from mains supply

2.2 Power Terminals AC or DC

No.	Description
1	AC

2.3 Operating modes used for Testing:

No.	Operating mode	Reason
1	All transmitters operating	Continuous frequency hopping

2.4 External antenna details

No.	Description	Manufacturer	Type designation	Remarks
1	None	-	-	-

General remarks.

Device did not meet requirements for stand alone limits therefore requiring the product specific limits of ETSI EN 300 220-1 (Cl. 7.8.3 applied). The methods of measurement for the parameters tested in this report were adopted from the ESTI EN 301 489-1 V2.2.0 standards with reference to guide ETSI EG 203 367.

Radiated emissions were performed in an Anechoic Chamber, as defined in CISPR 16-1-4.

Radiated measurements were made using the alternative method described in clause 5.3 of the standard. The measurement distance used was 3.0m.

Communications links were not established during testing as manufacturer stated all transmitters were operational.

3 Summary of Test results

3.1 Summary of emission tests in the frequency range 30 MHz – 6000 MHz

Test		Frequency	page	Remark	Result
1.	AC disturbance voltage Continuous	10 kHz - 30 MHz* 200Hz RBW 9 kHz RBW			**PASSED**
2.	Load disturbance voltage Continuous	148.5 kHz - 30 MHz 9 kHz RBW	-	---	**N/A**
3.	Maximum transmitter power for Australia and New Zealand	2400 – 2483.5MHz	6	Result: See results table Limit: Australia: 125 dBuV/m New Zealand: 125 dBuV/m	**PASSED**
4.	Transmitter spurious emissions for Australia and New Zealand	30 – 6000 MHz	7	Australia 5.00 uW New Zealand: 2.25 uW (69 dBuV/m)	**PASSED**
5.	Emission bandwidth	---	8	---	**NT**
6.	Operating frequencies for Australia and New Zealand	Australia: 2400 – 2483.5MHz New Zealand: 2400 – 2483.5MHz	9	---	**PASSED**

Abbreviations: ***P*** *= pass* ***F*** *= fail* ***N*** *= not applicable* ***NT*** *= not tested*

4 Test and measuring results

4.1 Measurement of RF disturbance voltage (10 kHz - 30 MHz)

4.1.1 Continuous RF disturbances AC port

General information about the Test:

Tested by:	Schalk van der Merwe
Test date:	20 July 2017

Instruments:				
Inventory number	Description	Manufacturer	Type	Cal. Due Date
ITL – EMC1001	EMI Receiver	Hewlett Packard	HP8546A	1/08/2017
ITL – EMC1037	LISN	Frankonia	C4-32	03/03/2018

Information concerning the Test:

Test set-up:	Refer to photos
Terminals tested:	Power adaptor 5 V d.c. / 4A
AC voltage	240 V a.c.
Mode/s	On

Result:	**PASSED**

4.2 Measurement EIRP

General information about the Test:

Tested by:	Schalk van der Merwe
Test date:	24 July 2017

Instruments:				
Inventory number	Description	Manufacturer	Type	Cal. Due Date
ITL - EMC1084	EMI Receiver	Rohde & Schwarz	ESIB40	30/03/2018
ITL - EMC1076	EMI Receiver	Hewlett Packard	HP8546A	24/01/2018
ITL - EMC1005	Antenna	Com Power	AC-220	07/02/2020

Information concerning the Test:

Test set-up:	Refer to photos at end of report
Mode used:	Continuous transmission under normal test conditions
Voltage [V]:	240 V a.c.50Hz
Environmental:	Within range + 15°C to + 30°C and relative humidity: 20% to 75%

The EIRP limits for Australia are contained in Tables 1 & 2 of the standard. The limits for New Zealand are contained in the Radiocommunications Regulations (General User Radio Licence for Short Range Devices) Notice 2017.

The limit for the frequency range 2400 MHz – 2483.5 MHz is (10 mW) 105.23dBuV/M @ 3M EIRP

Result:	**PASSED**

4.3 Transmitter spurious emissions for Australia and New Zealand

General information about the Test:

Tested by:	Schalk van der Merwe
Test date:	24 July 20172017

Instruments:				
Inventory number	Description	Manufacturer	Type	Cal. Due Date
ITL - EMC1084	EMI Receiver	Rohde & Schwarz	ESIB40	30/03/2018
ITL - EMC1005	Antenna	Com Power	AC-220	07/02/2020
ITL - EMC1006	Horn antenna	ETS Lindgren	3115	29/09/2017

Information concerning the Test:

Test set-up:	Refer to photos at end of report
Mode used:	Continuous transmission under normal test conditions with internal modulation.
Voltage [V]:	240 V a.c. 50Hz
Environmental:	Within range + 15°C to + 30°C and relative humidity: 20% to 75%

The spurious emissions limits for Australia are contained in Tables 1 & 2 of the standard. The limits for New Zealand are contained in the Radiocommunications Regulations (General User Radio Licence for Short Range Devices) Notice 2017.

The limit for the frequency range 30 MHz – 6000 MHz is 2.25uW. This was measured in a bandwidth of 100 kHz for frequencies between 30 – 1000 MHz and 1 MHz for frequencies between 1 – 6 GHz.

Result:	**PASSED**

4.4 Emission bandwidth

Not tested.

4.5 Operating frequencies for Australia and New Zealand

General information about the Test:

Tested by:	Schalk van der Merwe
Test date:	24 July 2017

Instruments:				
Inventory number	Description	Manufacturer	Type	Cal. Due Date
ITL - EMC1005	Antenna	Com Power	AC-220	07/02/2020
ITL - EMC1076	EMI Receiver	Hewlett Packard	HP8546A	24/01/2018

Information concerning the Test:

Test set-up:	Refer to photos at end of report
Mode used:	Continuous transmission under normal test conditions only
Voltage [V]:	Tests were conducted at nominal voltage
Environmental:	Tests were conducted at +21 °C and relative humidity: 20% to 75%

The operating frequency limits for Australia are 2400 MHz – 2483.5 as contained in Tables 1 & 2 of the AS/NZS 4268:2017 standard . The limits for New Zealand are 2400 MHz – 2483.5 MHz as contained in the Radiocommunications Regulations (General User Radio Licence for Short Range Devices) Notice 2017.

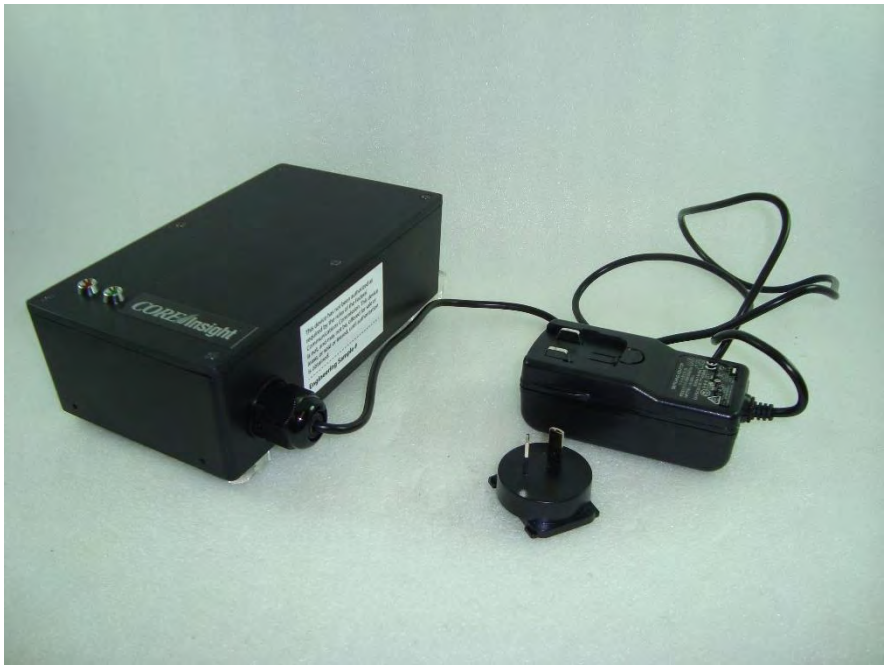
Result:	**PASSED**

5 Appendix

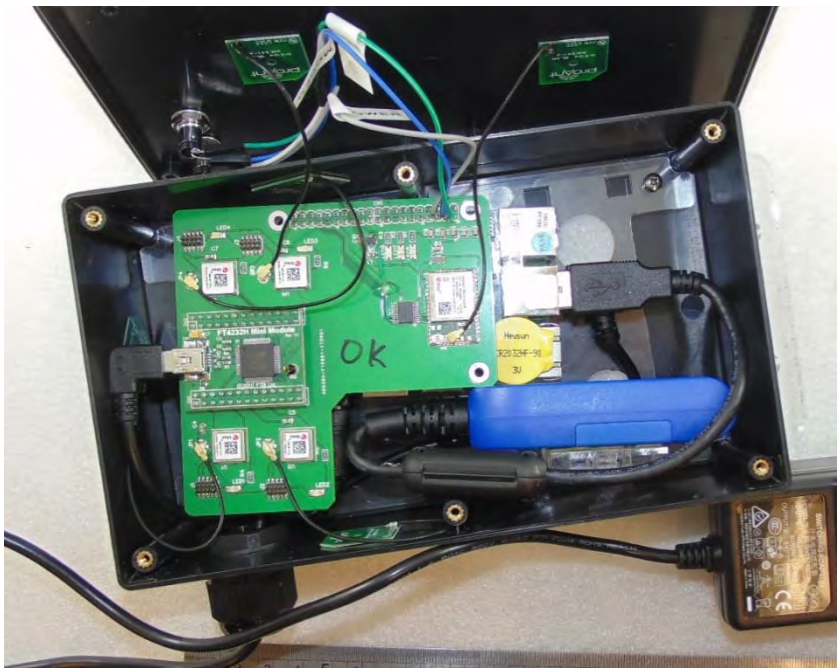
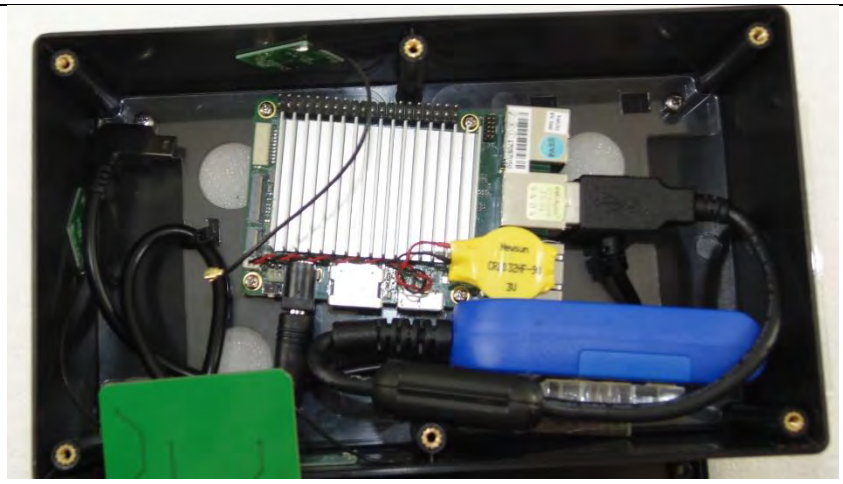
5.1 Setup photos

Conducted emissions setup	
Radiated emissions setup	

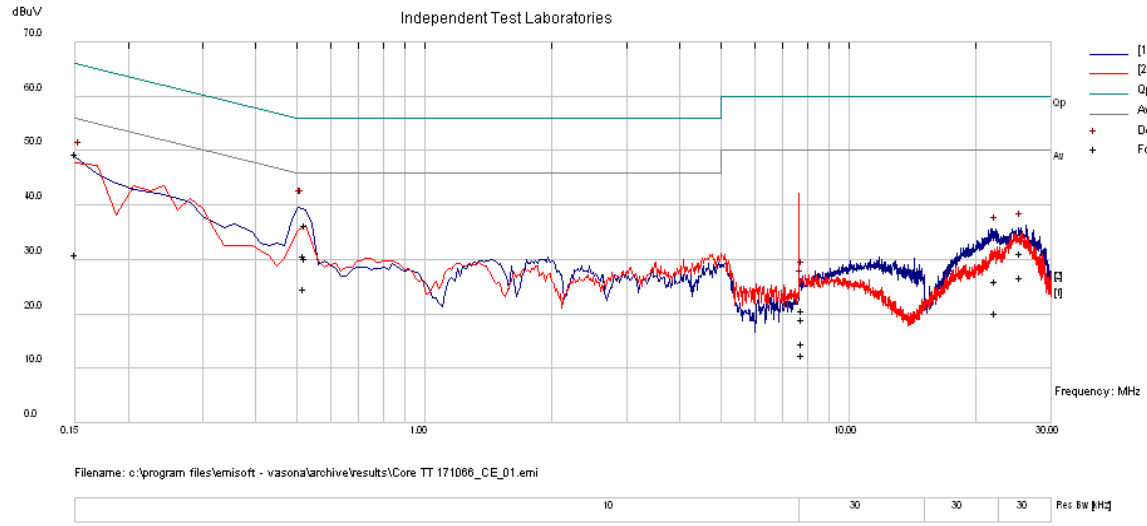
5.2 Sample photos and results

Overview and Label view	
Front View	

Top view	
Side view	

Inside box PCB view	
Bottom PCB view	

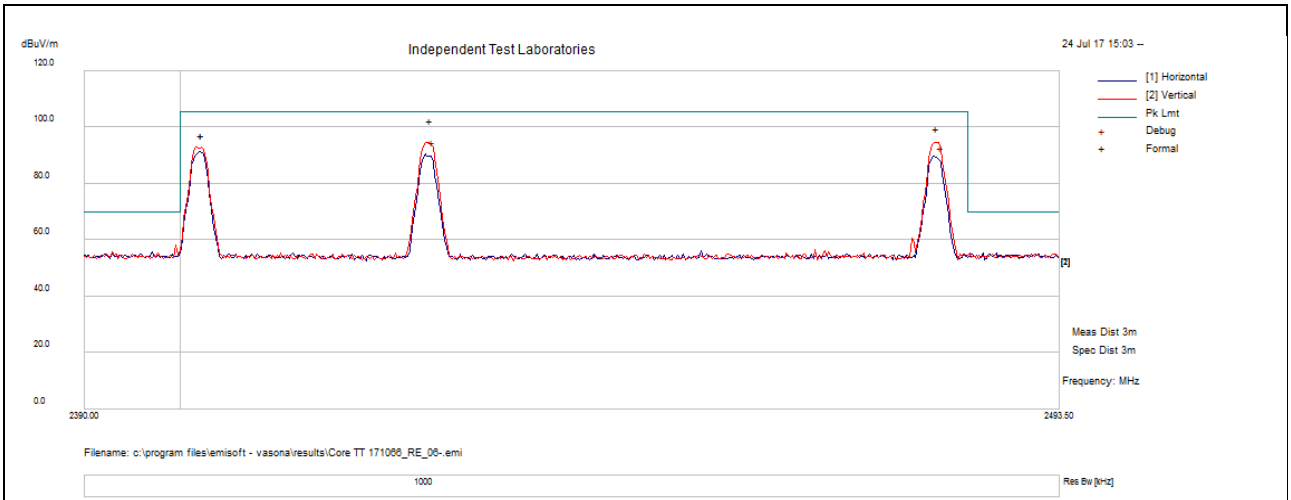
Conducted emissions results



Formally Assessed Peaks

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail
0.15067	39.3	10.01	0.22	49.53	Quasi Peak	Live	65.96	-16.43	Pass
0.15067	20.72	10.01	0.22	30.95	Average	Live	55.96	-25.01	Pass
0.51922	20.6	10.15	0.18	30.93	Quasi Peak	Neutral	56	-25.07	Pass
0.51922	14.32	10.15	0.18	24.65	Average	Neutral	46	-21.35	Pass
0.52512	26.06	10.15	0.17	36.38	Quasi Peak	Live	56	-19.62	Pass
0.52512	20.07	10.15	0.17	30.39	Average	Live	46	-15.61	Pass
7.76429	10.13	10.23	0.43	20.79	Quasi Peak	Neutral	60	-39.21	Pass
7.76429	4.08	10.23	0.43	14.74	Average	Neutral	50	-35.26	Pass
7.79359	2	10.23	0.43	12.66	Average	Live	50	-37.34	Pass
7.79359	8.55	10.23	0.43	19.21	Quasi Peak	Live	60	-40.79	Pass
22.28216	8.01	10.91	1.38	20.3	Average	Neutral	50	-29.7	Pass
22.28216	13.89	10.91	1.38	26.18	Quasi Peak	Neutral	60	-33.82	Pass
25.52831	14.18	10.98	1.59	26.75	Average	Live	50	-23.25	Pass
25.52831	18.63	10.98	1.59	31.2	Quasi Peak	Live	60	-28.8	Pass

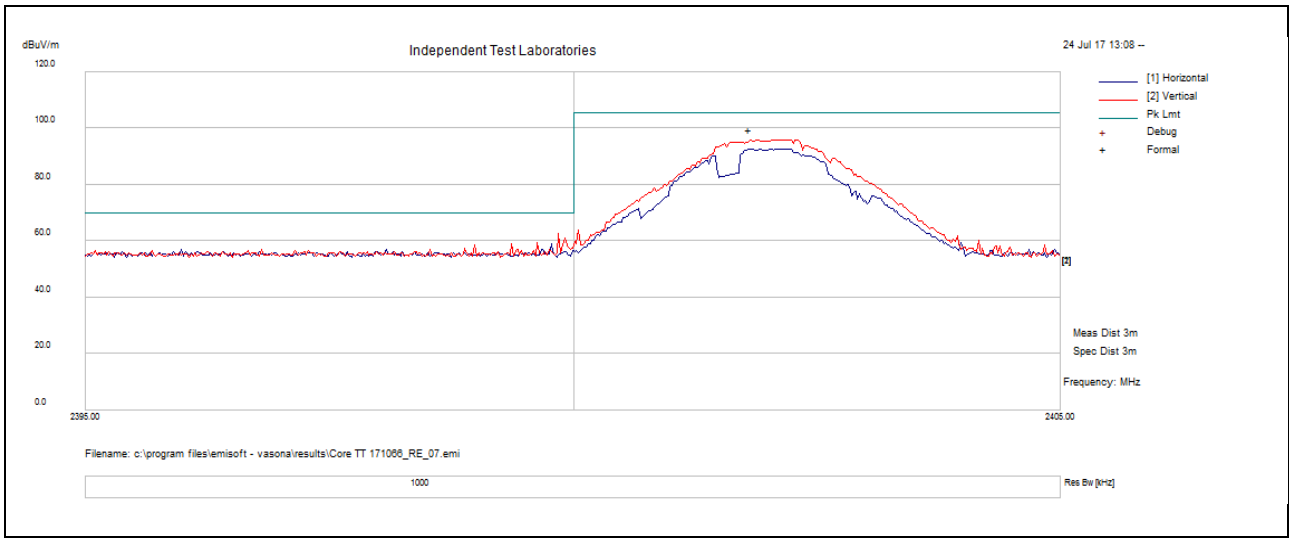
EIRP results

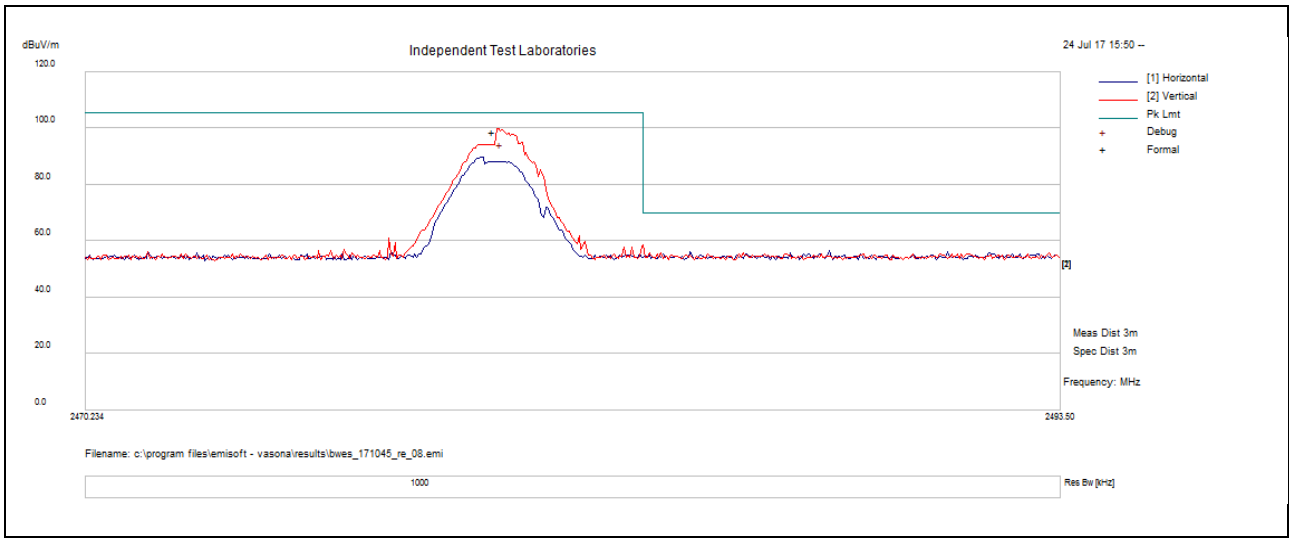


Formally Assessed Peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/	Margin dB	Pass /Fail
2401.813	68.93	1.96	28.32	99.2	Peak Max	V	100	347	105.23	-6.03	Pass
2425.682	70.54	1.97	28.38	100.88	Peak Max	V	100	35	105.23	-4.35	Pass
2480.234	66.49	1.99	28.51	96.98	Peak Max	V	100	52	105.23	-8.25	Pass

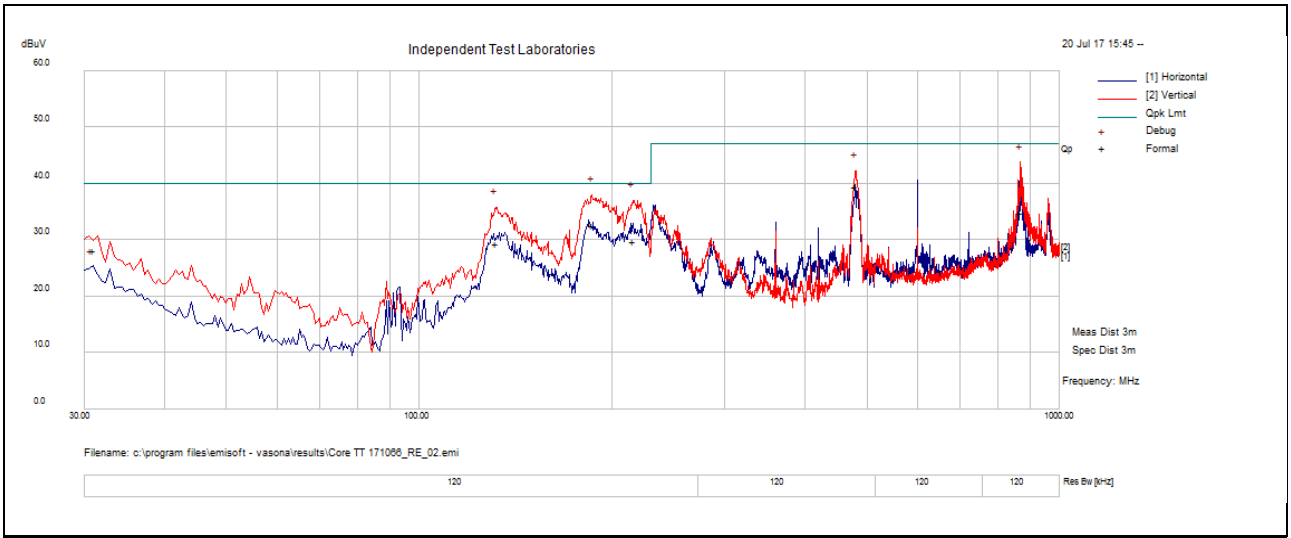
Operating frequencies





Transmitter spurious emission results

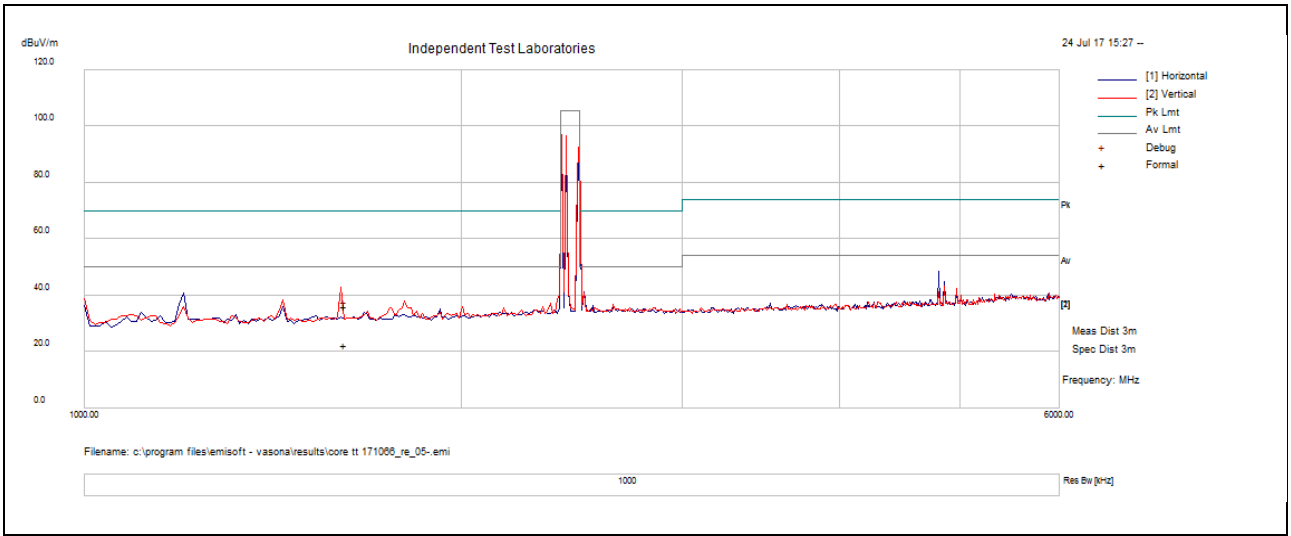
Frequency range 30 – 1000 MHz



Formally Assessed Peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail
30.964	6.58	0.18	21.33	28.09	Quasi Max	V	100	322	40	-11.91	Pass
131.786	17.36	0.36	11.72	29.44	Quasi Max	V	100	306	40	-10.56	Pass
186.170	23.07	0.47	9.1	32.64	Quasi Max	V	100	306	40	-7.36	Pass
215.856	18.97	0.51	10.35	29.83	Quasi Max	V	100	237	40	-10.17	Pass
480.005	22.1	0.76	16.7	39.55	Quasi Max	V	100	324	47	-7.45	Pass
868.079	12.11	1.14	21.66	34.91	Quasi Max	V	100	117	47	-12.09	Pass

Frequency range 1 – 6 GHz



Formally Assessed Peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
1613.789	38.72	1.61	-4.39	35.94	Peak Max	V	100	76	70	-34.06	Pass
1613.789	25.29	1.61	-4.39	22.51	Average Max	V	100	76	50	-27.49	Pass
4883.525	25.08	2.93	3.78	31.79	Average Max	H	100	62	54	-22.21	Pass
4883.525	38.52	2.93	3.78	45.23	Peak Max	H	100	62	74	-28.77	Pass
4905.902	25.49	2.94	3.8	32.23	Average Max	V	100	269	54	-21.77	Pass
4905.902	38.52	2.94	3.8	45.25	Peak Max	V	100	269	74	-28.75	Pass

END OF REPORT