FCC TEST REPORT

Product	:	Active Stylus
Trade mark	:	DELL
Model/Type reference	:	SPEN-DEL-02
Serial Number	:	N/A
Report Number	:	EED32M00002003
FCC ID	:	2ABWESPEN-DEL-02
Date of Issue	:	Apr. 13, 2020
Test Standards	:	47 CFR Part 15 Subpart C
Test result	:	PASS

Prepared for:

Sunwoda Electronic Co., Ltd.
1/F, 2/F of Area A&B&D, 3-9F, Administration Building,
No.2, Yihe Rd, Shilong Community, Shiyan Street,
Bao’an District, Shenzhen, China

Prepared by:

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Tested By:	mark.chen.	Compiled by:	Smile Zhong
	Mark Chen		Smile Zhong
Reviewed by:	Ware Xin	Approved by:	Sam Chuang
	Ware Xin		Sam Chuang
Date:	Apr. 13, 2020		Check No.:3096308653

CENTRE TESTING INTERNATIONAL GROUP CO.,LTD. CTI Report Seal

2 Version

Version No.	Date	Description
00	Apr. 13, 2020	Original

3 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15 Subpart C Section 15.203	ANSI C63.10-2013	PASS
Spurious Emissions	47 CFR Part 15 Subpart C Section 15.209	ANSI C63.10-2013	PASS

Remark:
The tested sample(s) and the sample information are provided by the client.

4 Contents

5 General Information

5.1 Client Information

Applicant:	Sunwoda Electronic Co., Ltd.
Address of Applicant:	1/F, 2/F of Area A&B&D, 3-9F, Administration Building, No.2, Yihe Rd, Shilong Community, Shiyan Street, Bao’an District, Shenzhen, China
Manufacturer:	Sunwoda Electronic Co., Ltd.
Address of Manufacturer:	1/F, 2/F of Area A&B&D, 3-9F, Administration Building, No.2, Yihe Rd, Shilong Community, Shiyan Street, Bao’an District, Shenzhen, China
Factory:	Shenzhen Sunwoda Intelligent Hardware Co., Ltd.
Address of Factory:	101, No. 6-6, Yanshan Road, Yanchuan Community, Yanluo Street, Bao’an District, Shenzhen City, Guangdong Province, P.R. China

5.2 General Description of EUT

Product Name:	Active Stylus	
Model No.(EUT):	SPEN-DEL-02	
Trade Mark:	DELL	
EUT Supports Radios application:	18KHz-210KHz	
Power Supply:	Li-ion Cell Battery	30mAh 3.8V

5.3 Product Specification subjective to this standard

Frequency Range:	18KHz-210KHz
Operation Frequency	175kHz
Modulation Type:	MFSK
Test Power Grade:	Default
Test Software of EUT:	Default
Test voltage:	DC 3.8V
Sample Received Date:	Jan. 03, 2020
Sample tested Date:	Jan. 03, 2020 to Mar. 18, 2020

5.4 Test Environment and Mode

Operating Environment:	
Temperature:	23.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010mbar
Test mode:	
Transmitting mode:	Keep the EUT in transmitting mode with modulation.

5.5 Description of Support Units

The EUT has been tested with associated equipment below.

Associated equipment name		Manufacture	model	S/N serial number	Supplied by	Certification
AE1	Notebook	DELL	DELL 3490	D245DX2	DELL	CE&FCC

5.6 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd
Building C, Hongwei Industrial Park Block 70, Bao'an District, Shenzhen, China
Telephone: +86 (0) 755 33683668 Fax:+86 (0) 755 33683385
No tests were sub-contracted.
FCC Designation No.: CN1164

5.7 Deviation from Standards

None.

5.8 Abnormalities from Standard Conditions

None.

5.9 Other Information Requested by the Customer

None.

5.10 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.9×10^{-8}
2	RF power, conducted	0.46dB (30MHz-1GHz)
		0.55dB (1GHz-18GHz)
3	Radiated Spurious emission test	4.3dB (30MHz-1GHz)
		4.5dB (1GHz-12.75GHz)
4	Conduction emission	3.5dB (9kHz to 150kHz)
		3.1dB (150kHz to 30MHz)
5	Temperature test	0.64°C
6	Humidity test	3.8%
7	DC power voltages	0.026%

6 Equipment List

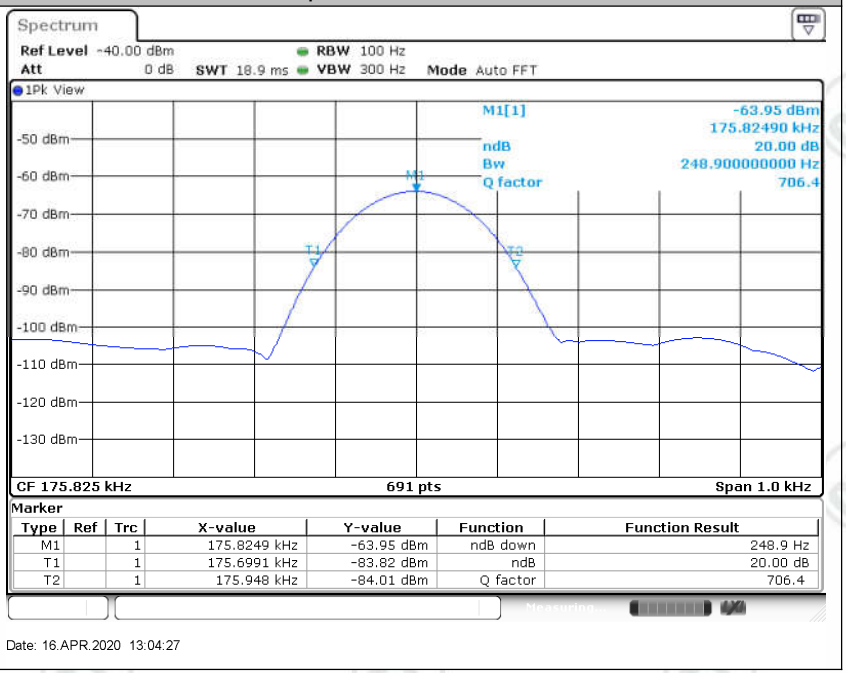
3M Semi/full-anechoic Chamber					
Equipment	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
3M Chamber & Accessory Equipment	TDK	SAC-3	---	05-24-2019	05-23-2022
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-618	07-26-2019	07-25-2020
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-076	04-25-2018	04-24-2021
Receiver	R&S	ESCI7	100938-003	10-21-2019	10-20-2020
Multi device Controller	maturo	NCD/070/10711112	---	---	---
Temperature/ Humidity Indicator	Shanghai qixiang	HM10	1804298	07-26-2019	07-25-2020
Cable line	Fulai(7M)	SF106	5219/6A	---	---
Cable line	Fulai(6M)	SF106	5220/6A	---	---
Cable line	Fulai(3M)	SF106	5216/6A	---	---
Cable line	Fulai(3M)	SF106	5217/6A	---	---

7 Test results and Measurement Data

7.1 20dB Bandwidth

Mode	Channel	20dB Bandwidth	Verdict
SRD	1	248.9	PASS

20dB Bandwidth

Graphs	
1	

7.2 Radiated Spurious Emissions

Test Requirement: 47 CFR Part 15C Section 15.209

Test Method: ANSI C63.10

Test Site: Measurement Distance: 3m (Semi-Anechoic Chamber)

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Test Setup:

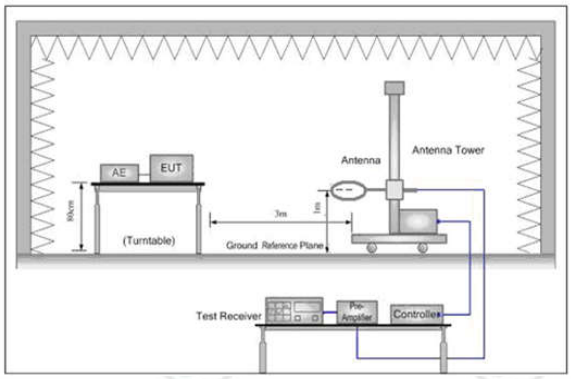


Figure 1. Below 30MHz

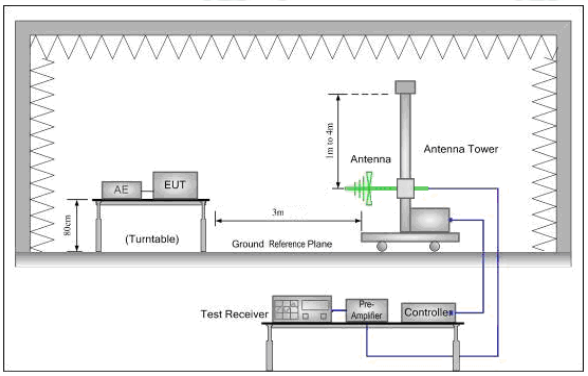


Figure 2. 30MHz to 1GHz

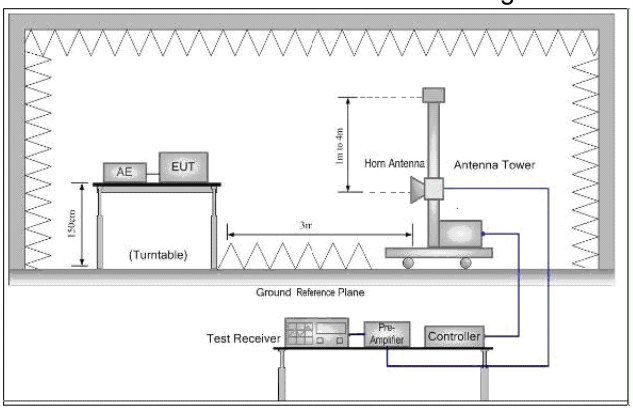


Figure 3. Above 1GHz

Test Procedure:

Below 1GHz test procedure as below:

The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.

The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

The antenna 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.

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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table table was turned from 0 degrees to 360 degrees to find the maximum reading.

The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).

Test the EUT in the lowest channel ,middle channel, the Highest channel

The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.

Repeat above procedures until all frequencies measured was complete.

Limit:
(Spurious Emissions)

Frequency	Field strength (microvolt/meter)	Limit (dBμV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

Limit:
(Field strength of the fundamental signal)

Frequency	Limit (dBμV/m @3m)	Remark
175KHz	102.69	Average Value
	122.69	Peak Value

Test Setup:

Exploratory Test Mode: Transmitting mode

Final Test Mode: Transmitting mode

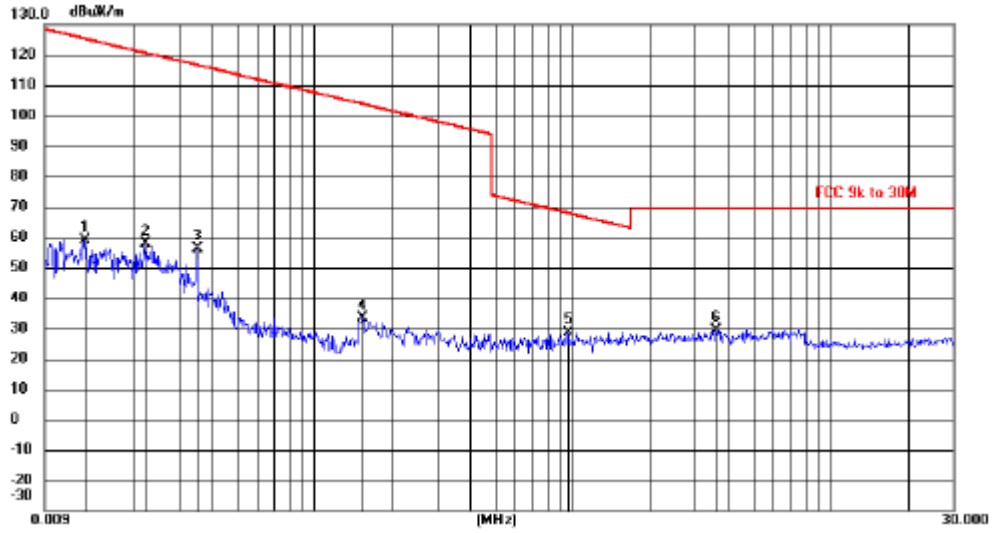
Instruments Used: Refer to section 6 for details

Test Results: Pass

Measurement Data

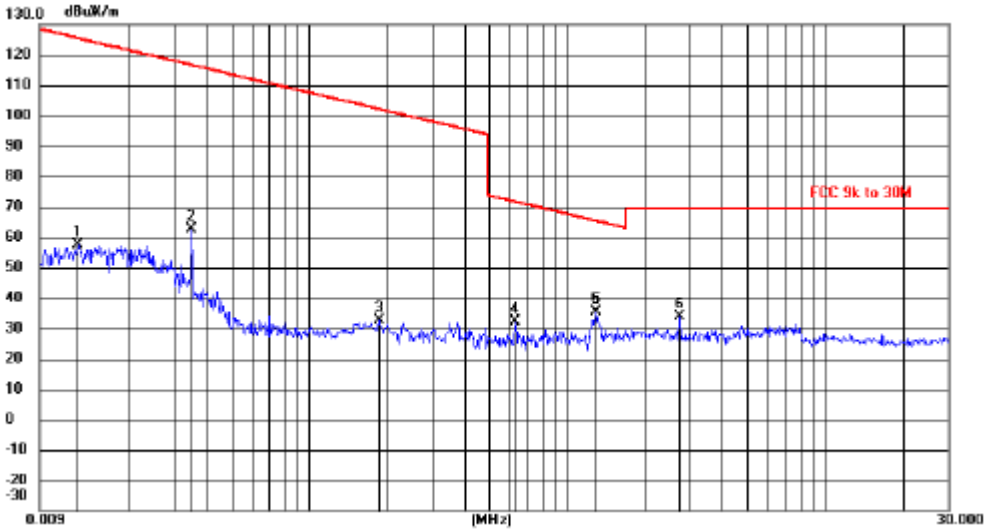
Product	:	Active Stylus	**Model/Type reference**	:	SPEN-DEL-02
Temperature	:	23.0 °C	**Humidity**	:	52%

Spurious Emissions



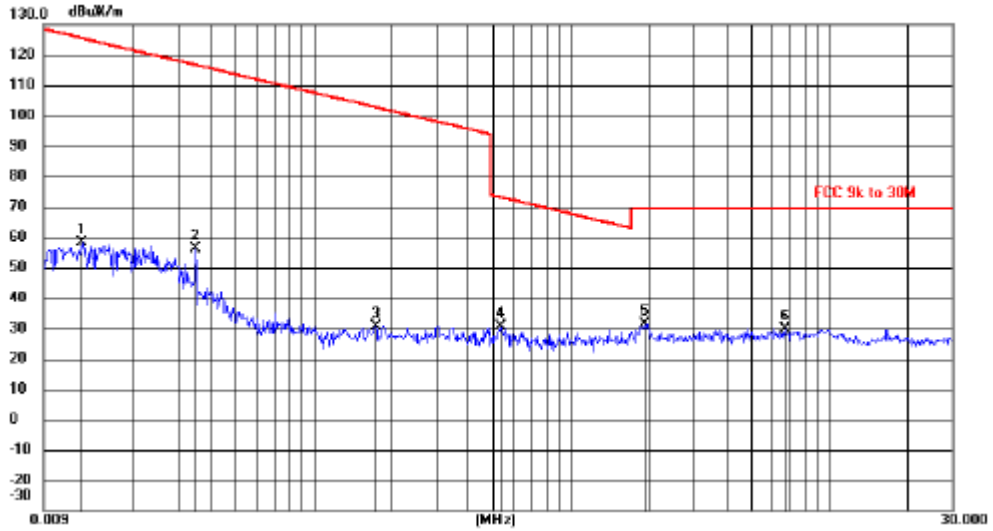
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		0.0128	58.81	0.05	58.86	125.35	-66.49	peak			
2		0.0220	57.55	0.10	57.65	120.67	-63.02	peak			
3		0.0352	55.99	0.16	56.15	116.60	-60.45	peak			
4		0.1539	33.18	0.36	33.54	103.83	-70.29	peak			
5	*	0.9580	28.58	0.08	28.66	67.99	-39.33	peak			
6		3.5980	29.49	0.04	29.53	69.50	-39.97	peak			

Note:
Polarization:X



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		0.0126	57.31	0.05	57.36	125.40	-68.04	peak			
2		0.0349	62.49	0.16	62.65	116.61	-53.96	peak			
3		0.1860	32.23	0.41	32.64	102.16	-69.52	peak			
4		0.6288	32.05	0.10	32.15	71.64	-39.49	peak			
5	*	1.2953	35.50	0.08	35.58	65.38	-29.80	peak			
6		2.7342	33.77	0.05	33.82	69.50	-35.68	peak			

Note:
Polarization:Y



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		0.0126	58.31	0.05	58.36	125.40	-67.04	peak			
2		0.0349	55.99	0.16	56.15	116.61	-60.46	peak			
3		0.1748	30.35	0.39	30.74	102.70	-71.96	peak			
4		0.5324	30.47	0.10	30.57	73.08	-42.51	peak			
5	*	1.9387	31.43	0.07	31.50	69.50	-38.00	peak			
6		6.7786	29.87	0.04	29.91	69.50	-39.59	peak			

Note:
Polarization:Z

7.3 AC Power Line Conducted Emission

Test Procedure:	Test frequency range :150KHz-30MHz 1)The mains terminal disturbance voltage test was conducted in a shielded room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. 3)The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.
Limit:	

Frequency range (MHz)	Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

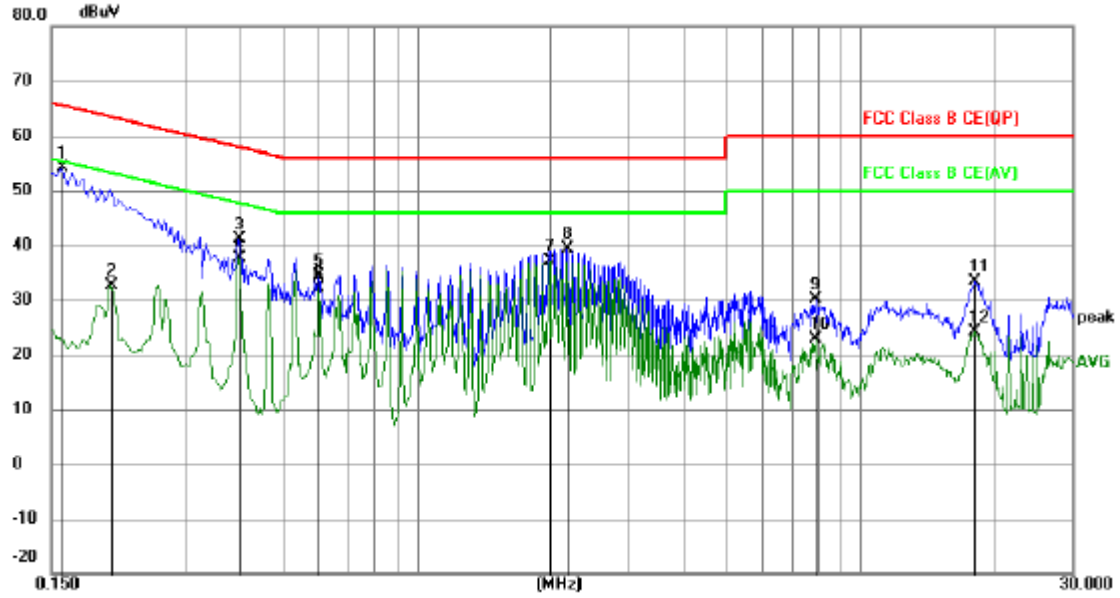
* The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.
NOTE : The lower limit is applicable at the transition frequency

Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.
Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

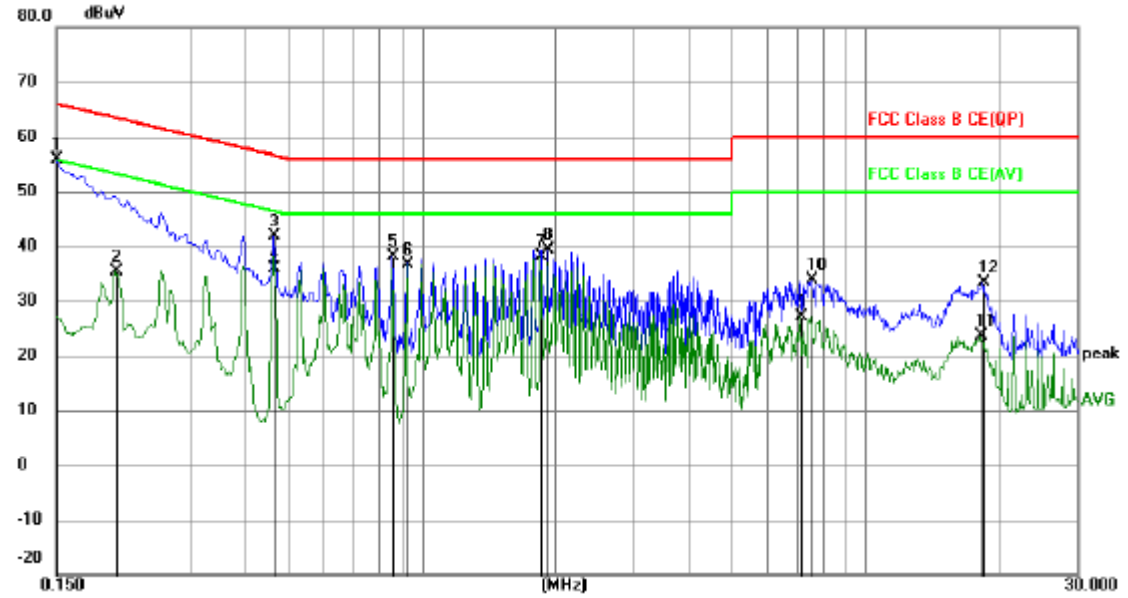
Product	:	Active Stylus	**Model/Type reference**	:	SPEN-DEL-02
Temperature	:	24°C	**Humidity**	:	52%

Live line:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1590	44.15	9.98	54.13	65.52	-11.39	QP	
2		0.2040	22.69	10.02	32.71	53.45	-20.74	AVG	
3		0.3975	31.15	10.00	41.15	57.91	-16.76	QP	
4		0.3975	27.51	10.00	37.51	47.91	-10.40	AVG	
5		0.6000	24.17	10.12	34.29	56.00	-21.71	QP	
6		0.6000	21.96	10.12	32.08	46.00	-13.92	AVG	
7	*	1.9950	27.30	9.83	37.13	46.00	-8.87	AVG	
8		2.1840	29.58	9.83	39.41	56.00	-16.59	QP	
9		7.8945	20.36	9.88	30.24	60.00	-29.76	QP	
10		7.8945	13.10	9.88	22.98	50.00	-27.02	AVG	
11		18.0465	23.32	9.95	33.27	60.00	-26.73	QP	
12		18.0465	14.09	9.95	24.04	50.00	-25.96	AVG	

Neutral line:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	45.94	9.97	55.91	66.00	-10.09	peak	
2		0.2040	25.40	10.02	35.42	53.45	-18.03	AVG	
3		0.4650	31.93	10.00	41.93	56.60	-14.67	peak	
4		0.4661	26.00	10.00	36.00	46.58	-10.58	AVG	
5		0.8610	28.21	9.92	38.13	56.00	-17.87	peak	
6		0.9285	26.66	9.92	36.58	46.00	-9.42	AVG	
7	*	1.8555	28.35	9.84	38.19	46.00	-7.81	AVG	
8		1.9230	29.66	9.84	39.50	56.00	-16.50	peak	
9		7.1565	17.39	9.86	27.25	50.00	-22.75	AVG	
10		7.5615	23.89	9.87	33.76	60.00	-26.24	peak	
11		18.1545	13.72	9.95	23.67	50.00	-26.33	AVG	
12		18.3570	23.48	9.95	33.43	60.00	-26.57	peak	

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.