

FCC - TEST REPORT

Report Number : **60.790.18.057.01R01** Date of Issue : December 4, 2018

Model : **165-00471**

Product Type : **Power Distribution Unit**

Applicant : Merchandising Technologies Inc.

Address : Unit B, 9/F., Great Wall Factory Building 11 Cheung Shun Street, Lai Chi Kok, Kowloon, Hong Kong

Production Facility : Jabil Circuit (Guangzhou) Limited.

Address : 128, Jun Cheng Road, Guangzhou Economic And Technological Development District, GuangDong Province, PRC.

Test Result : ☒ **Positive** ☐ **Negative**

Total pages including Appendices : 18

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2 Description of Equipment Under Test

Description of the Equipment Under Test

Product:	Power Distribution Unit
Model no.:	165-00471
FCC ID:	2AA2X-165-00471
Rating:	125V ~ 60Hz
Frequency:	125kHz (Tx and Rx)
Modulation:	AM

3 Summary of Test Standards

Test Standards
FCC Part 15 Subpart C 10-1-17 Edition Federal Communications Commission, PART 15 — Radio Frequency Devices, Subpart C — Unintentional Radiators

All the tests were performed using the procedures from ANSI C63.4(2014) and ANSI C63.10 (2013).

4 Details about the Test Laboratory

Site 1

Company name: TÜV SÜD Hong Kong Ltd.
3/F, West Wing, Lakeside 2,
10 Science Park West Avenue,
Science Park, Shatin, Hong Kong

Site 2

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13 Zhiheng Wisdomland Business Park,
Nantou Checkpoint Road 2,
Shenzhen 518052, P.R.China
FCC Registration Number: 514049

Emission Tests	
Test Item	Test Site
FCC Part 15 Subpart C	
FCC Title 47 Part 15.205, 15.209 Spurious Radiated Emission	Site 2
FCC Title 47 Part 15.207 Conduct Emission	Site 2
FCC Title 47 Part 15.215 20dB Bandwidth	Site 2

4.1 Test Equipment Site List

Radiated emission Test – Site 2

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2019-7-6
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100398	2019-7-6
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2019-6-28
Horn Antenna	Rohde & Schwarz	HF907	102294	2019-6-28
Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2019-7-6
Signal Generator	Rohde & Schwarz	SMY01	839369/005	2019-7-6
Attenuator	Agilent	8491A	MY39264334	2019-7-6
3m Semi-anechoic chamber	TDK	9X6X6	----	2020-7-7
Test software	Rohde & Schwarz	EMC32	Version 9.15.00	N/A

Conducted Emission Test - Site 2

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 3	101782	2019-7-6
LISN	Rohde & Schwarz	ENV4200	100249	2019-7-6
LISN	Rohde & Schwarz	ENV432	101318	2019-7-6
LISN	Rohde & Schwarz	ENV216	100326	2019-7-6
ISN	Rohde & Schwarz	ENY81	100177	2019-7-6
ISN	Rohde & Schwarz	ENY81-CA6	101664	2019-7-6
High Voltage Probe	Rohde & Schwarz	TK9420(VT9420)	9420-584	2019-6-30
RF Current Probe	Rohde & Schwarz	EZ-17	100816	2019-6-30
Attenuator	Shanghai Huaxiang	TS2-26-3	080928189	2019-7-6
Test software	Rohde & Schwarz	EMC32	Version9.15.00	N/A

20dB Bandwidth, Transmission Time – Site 2

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Signal Analyzer	Rohde & Schwarz	FSV40	101030	2019-7-6

4.2 Measurement System Uncertainty

Measurement System Uncertainty Emissions

System Measurement Uncertainty	
Items	Extended Uncertainty
Uncertainty for Radiated Emission in 3m chamber 9kHz-30MHz	4.46dB
Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz	Horizontal: 4.91dB; Vertical: 4.89dB;
Uncertainty for Radiated Emission in 3m chamber 1000MHz-18000MHz	Horizontal: 4.80dB; Vertical: 4.79dB;
Uncertainty for Conducted Emission at AC Power Line 150kHz-30MHz	3.21dB
Uncertainty for frequency test	0.6×10^{-7}

5 Summary of Test Results

Emission Tests				
FCC Part 15 Subpart C				
Test Condition	Pages	Test Result		
		Pass	Fail	N/A
FCC Title 47 Part 15.205, 15.209 Spurious Radiated Emission	12-14	☒	☐	☐
FCC Title 47 Part 15.207 Conduct Emission	15-16	☒	☐	☐
FCC Title 47 Part 15.215 20dB Bandwidth	17	☒	☐	☐

6 General Remarks

Remarks

This submittal(s) (test report) is intended for **FCC ID: 2AA2X-165-00471**, complies with Section 15.205, 15.207, 15.209, 15.215 of the FCC Part 15, Subpart C rules.

The TX and RX frequency range is 125kHz.

SUMMARY:

- All tests according to the regulations cited on page 8 were

■ - Performed

□ - **Not** Performed

- The Equipment Under Test

■ - **Fulfills** the general approval requirements.

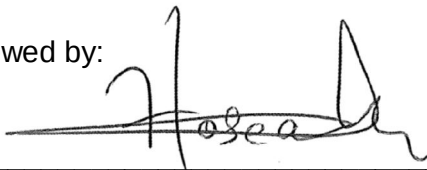
□ - **Does not** fulfill the general approval requirements.

Sample Received Date: November 15, 2018

Testing Start Date: November 16, 2018

Testing End Date: November 28, 2018

Reviewed by:



Hosea CHAN
EMC Project Engineer

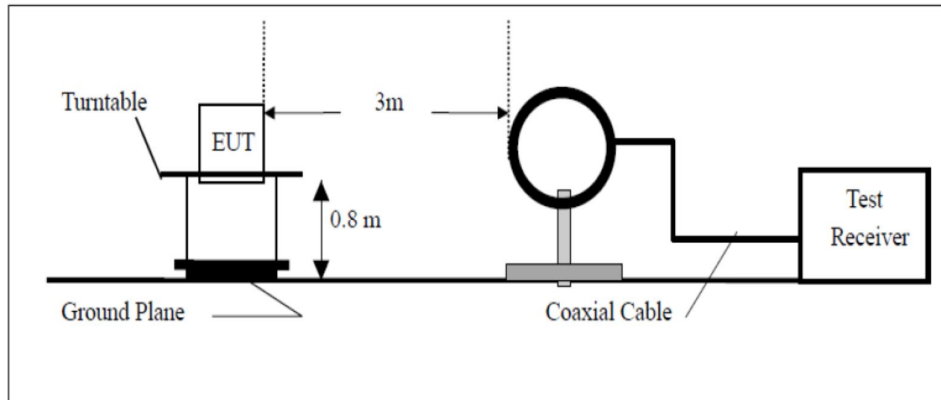
Prepared by:



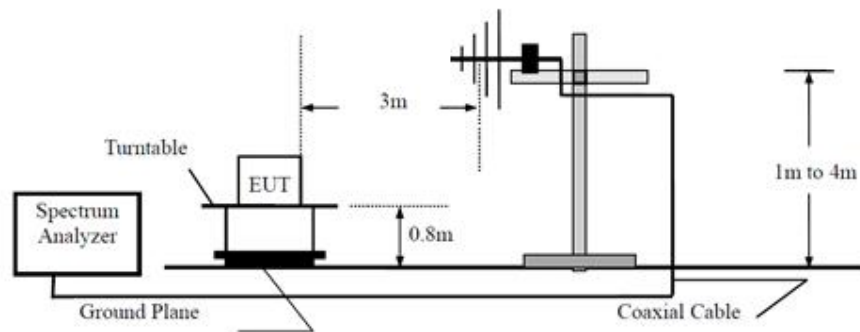
Eric LI
EMC Senior Project Engineer

7 Test Setups

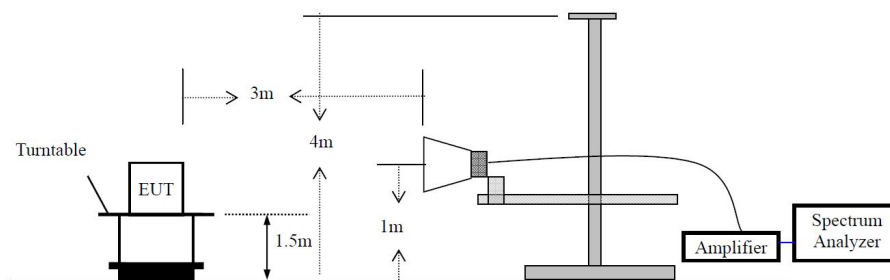
7.1 Radiated test setups 9kHz-30MHz



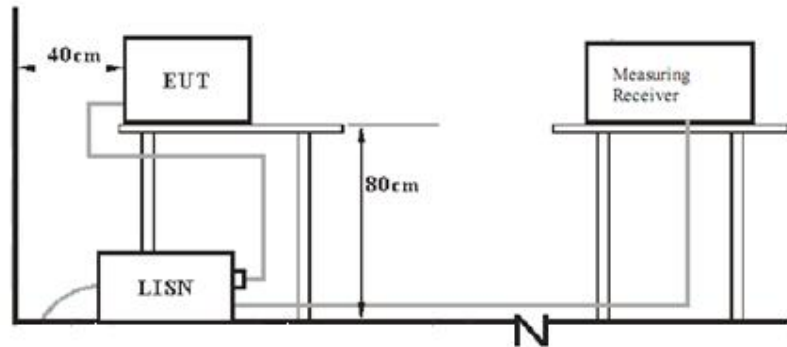
7.2 Radiated test setups Below 1GHz



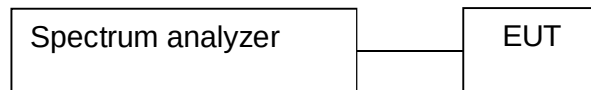
7.3 Radiated test setups Above 1GHz



7.4 AC Power Line Conducted Emission test setups



7.5 Conducted RF test setups



8 Emission Test Results

8.1 Spurious Radiated Emission

EUT: 165-00471
Op Condition: Operated, TX Mode
Test Specification: FCC15.205, 15.209
Comment: 120V AC
Remark: 9kHz to 30MHz

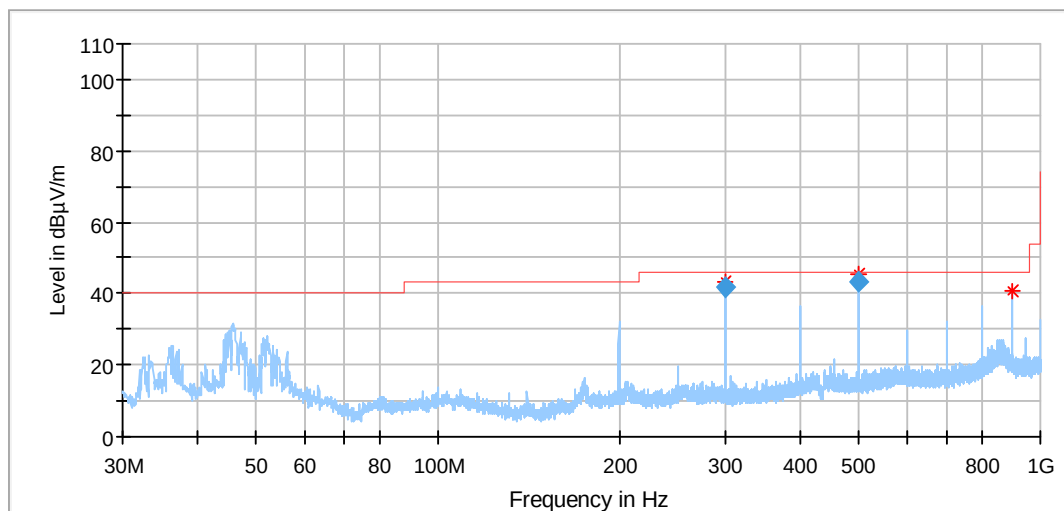
Test Result	
☒	Passed
☐	Not Passed

Frequency MHz	Result dB μ V/m	Limit dB μ V/m	Margin dB	Detector PK/QP/AV
0.125	51.35	105.67	-54.32	Peak
0.250	57.22	99.65	-42.43	Peak
0.470	56.86	94.16	-37.30	Peak

Spurious Radiated Emission

EUT: 165-00471
 Op Condition: Operated, TX Mode
 Test Specification: FCC15.205, 15.209
 Comment: 120V AC
 Remark: 30MHz to 1GHz, Antenna: Horizontal

Test Result	
☒	Passed
☐	Not Passed

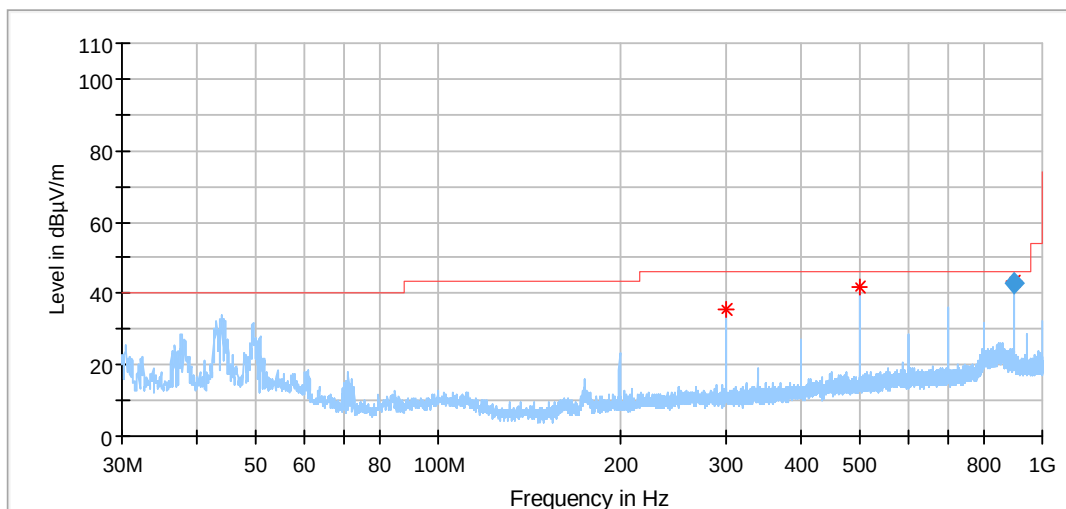


Frequency (MHz)	Quasi Peak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Corr. (dB)
299.983333	41.58	46.00	-4.42	-25.7
500.006333	43.22	46.00	-2.78	-21.6
900.036111	40.80	46.00	-5.20	-15.4

Spurious Radiated Emission

EUT: 165-00471
 Op Condition: Operated, TX Mode
 Test Specification: FCC15.205, 15.209
 Comment: 120V AC
 Remark: 30MHz to 1GHz, Antenna: Vertical

Test Result	
☒	Passed
☐	Not Passed

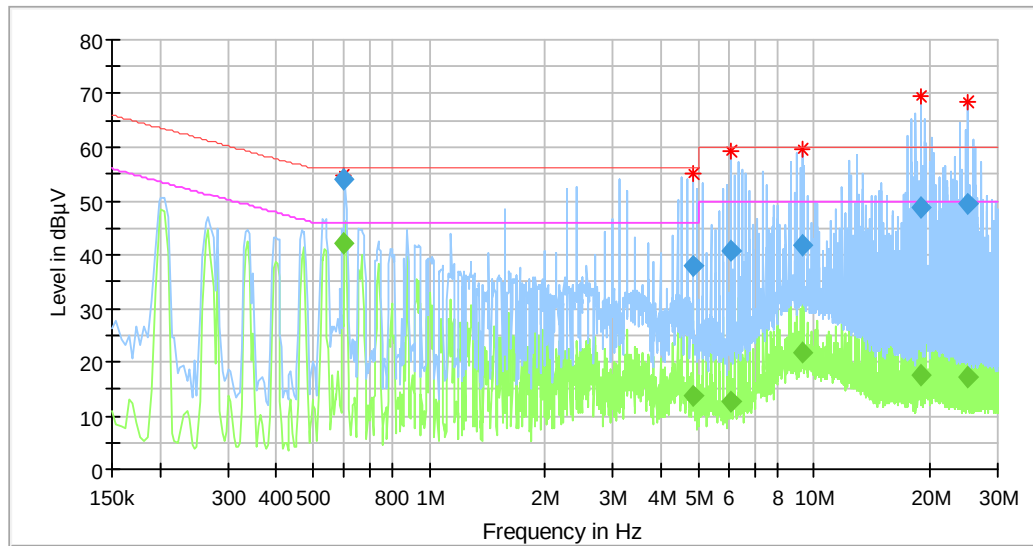


Frequency (MHz)	Quasi Peak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Corr. (dB)
299.983333	35.45	46.00	-10.55	-25.7
500.018889	41.52	46.00	-4.48	-21.6
900.036111	42.61	46.00	-3.39	-15.4

8.2 Conducted Emission at AC Power Line

EUT: 165-00471
 Op Condition: Operated, TX Mode
 Test Specification: FCC15.207
 Comment: 120V AC
 Remark: L Line

Test Result
☒ Passed
☐ Not Passed



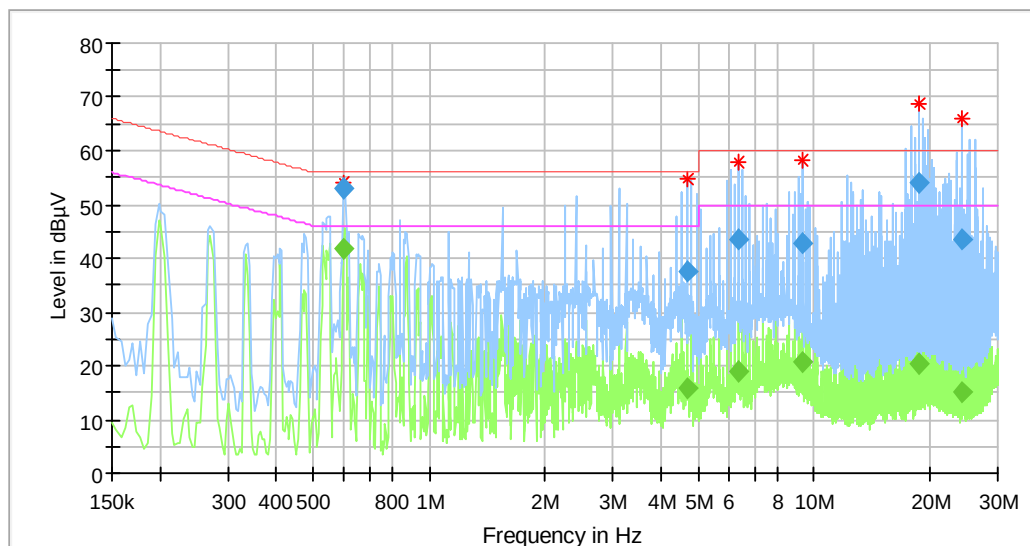
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)
0.597500	---	42.09	46.00	-3.91
0.597500	53.94	---	56.00	-2.06
4.833500	---	13.71	46.00	-32.29
4.833500	37.95	---	56.00	-18.05
6.105500	---	12.80	50.00	-37.20
6.105500	40.67	---	60.00	-19.33
9.313500	---	21.67	50.00	-28.33
9.313500	41.84	---	60.00	-18.16
18.821500	---	17.40	50.00	-32.60
18.821500	48.92	---	60.00	-11.08
25.045500	---	17.10	50.00	-32.90
25.045500	49.43	---	60.00	-10.57

Conducted Emission at AC Power Line

EUT: 165-00471
 Op Condition: Operated, TX Mode
 Test Specification: FCC15.207
 Comment: 120V AC
 Remark: N Line

Test Result
☒ Passed
☐ Not Passed



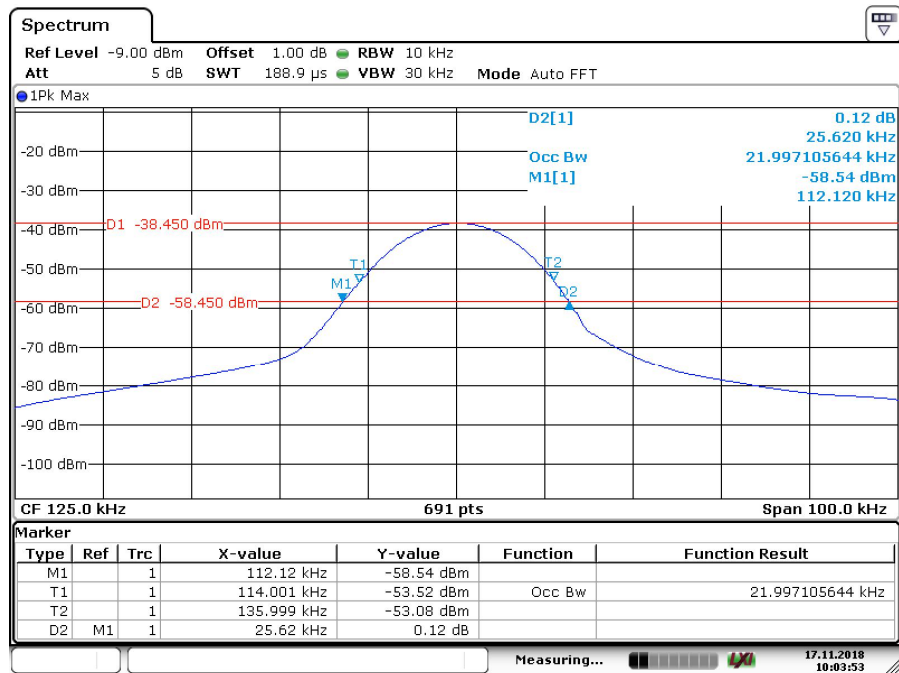
Final_Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)
0.601500	---	41.73	46.00	-4.27
0.601500	53.13	---	56.00	-2.87
4.665500	---	15.69	46.00	-30.31
4.665500	37.43	---	56.00	-18.57
6.361500	---	18.88	50.00	-31.12
6.361500	43.38	---	60.00	-16.62
9.357500	---	20.86	50.00	-29.14
9.357500	42.97	---	60.00	-17.03
18.781500	---	20.35	50.00	-29.65
18.781500	54.01	---	60.00	-5.99
24.162500	---	15.19	50.00	-34.81
24.162500	43.35	---	60.00	-16.65

8.3 6dB & 99% Bandwidth

EUT: 165-00471
 Op Condition: Operated, TX Mode
 Test Specification: FCC15.215, 20dB Bandwidth
 Comment: 120V AC

Test Result	
☒	Passed
☐	Not Passed



Date: 17.NOV.2018 10:03:53

Bandwidth	Measured Value
20dB bandwidth	25.6 kHz
99% bandwidth	22.0 kHz

9 Appendix A - General Product Information

Radiofrequency radiation exposure evaluation

According to KDB 447498 D01v06 section 4.3.1, For frequencies below 100 MHz and test separation distances ≤ 50 mm, the Numeric threshold is determined as:

Step a)

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR

Step b)

$\{[\text{Power allowed at numeric threshold for 50mm in step a)}] + [(\text{test separation distance} - 50\text{mm}) \cdot (f(\text{MHz})/150)]\}$ mW

Step c) 1)

For test separation distances $> 50\text{mm}$ and $< 200\text{mm}$, the power threshold at the corresponding test separation distance at 100MHz in step b) is multiplied by $[1 + \log(100/f(\text{MHz}))]$

Step c) 2)

For test separation distances $\leq 50\text{mm}$, the power threshold determined by the equation in c) 1) for 50mm and 100MHz is multiplied by $\frac{1}{2}$.

>> The fundamental frequency of the EUT is 125kHz, the test separation distance is $\leq 50\text{mm}$.
(Manufacturer specified the separation distance is: 20mm)

Step a)

>> Numeric threshold, $\text{mW} / 50\text{mm} \cdot \sqrt{0.1\text{GHz}} \leq 3.0$
Numeric threshold $\leq 474.3\text{mW}$

Step b)

>> Numeric threshold $\leq 474.3\text{mW} + (50\text{mm} - 50\text{mm} \cdot 100\text{MHz}/150)$
Numeric threshold $\leq 474.3\text{mW}$

Step c) 1) & c) 2)

>> Numeric threshold $\leq 474.3\text{mW} \cdot [1 + \log 100/100\text{MHz}] \cdot \frac{1}{2}$
Numeric threshold $\leq 237.15\text{mW}$

>> The transmitter strength of EUT measured is: 51.35 dB μ V/m
The power calculated is 0.00249619mW
Which is smaller than the Numeric threshold.
Therefore, the device is exempt from stand-alone SAR test requirements.