TEST REPORT

Dt&C

DT&C Co., Ltd.

42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042

Tel : 031-321-2664, Fax : 031-321-1664

1. Report No. : DREFCC1907-0211
2. Client / Applicant
   - Name : MOTREX CO., LTD.
   - Address : Seoyoung Bldg., 25, Hwangsaeul-ro 258beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea
3. Use of Report : Grant of Certification
4. Product Name / Model Name / FCC ID : SMART DISPLAY / MS300ASK3 / BP9-MS300ASK3
5. Test Standard : ANSI C 63.4 : 2014
   FCC Part 15 Subpart B
   (FM Broadcast receiver)
6. Date of Test : Jul. 16. 2019 ~ Jul. 17. 2019
7. Testing Environment : Temperature (23 ~ 25) °C , Humidity (46 ~ 53) % R.H.
8. Test Result : Refer to the attached Test Result

Affirmation	Tested by Name : JooHo Kim (Signature)	Reviewed by Name : DaeHwa Eun (Signature)

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose.

Jul. 22. 2019

DT&C Co., Ltd.

If this report is required to confirmation of authenticity, please contact to report@dtnc.net

CONTENTS

1. General Remarks

This report contains the result of tests performed by :

DT&C Co., Ltd.
42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042
http://www.dtnc.net
Tel: +82-31-321-2664 Fax: +82-31-321-1664

2. Test Laboratory

DT&C Co., Ltd. has been accredited / filed / authorized by the agencies listed in the following table;

Certificate	Nation	Agency	Code	Remark
Accreditation	Korea	KOLAS	393	ISO/IEC 17025
	South Africa	SABS	0006	ISO/IEC 17025
	Ghana	NCA	NCA agreement 23rd,Oct,2018	-
Site Filing	USA	FCC	KR0034 101842 678747, 596748, 804488, 165783	Accredited 2.948 Listed
	Canada	IC	5740A-3 5740A-4	Registered
	Japan	VCCI	C-1427 R-3385, R-4076, R-4180, R-4496, T-1442, G-10338, G-754, G-10815, G-20051	Registered
Certification	Korea	KC	KR0034	Designation
	Germany	TUV	CARAT 089112 0006 Rev.00	ISO/IEC 17025
	Russia	RMRS	17.10189.296	ISO/IEC 17025

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the “General requirements for the competent of calibration and testing laboratory”.

3. General Information of EUT

Applicant	MOTREX CO., LTD. Seoyoung Bldg., 25, Hwangsaeul-ro 258beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea
Manufacturer	MOTREX CO., LTD. Seoyoung Bldg., 25, Hwangsaeul-ro 258beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea
Factory	MOTREX CO., LTD. 62-7, Pungsesandan 4-ro, Pungse-myeon, Dongnam-gu, Cheonan-si, Chungcheongnam-do, Korea
Product Name	SMART DISPLAY
Model Name	MS300ASK3
Add Model Name	None
FCC ID	BP9-MS300ASK3
Maximum Internal Frequency	1 GHz
Software Version	SK3.MEX.0000.013.190710
Hardware Version	Rev0.1
Rated Power	DC 12 V
Remarks	

Related Submittal(s) / Grant(s)
Original submittal only

4. EUT Operations and Test Configurations

4.1 Principle of Configuration Selection

Emission :
The equipment under test (EUT) was configured to measure its highest possible radiation level.
The test modes were adapted accordingly in reference to the instructions for use.
For each testing mode different configurations were used,
Refer to the individual tests.

4.2 EUT Operation Mode

No.	Mode	Description
1	AM	AM receiving mode(MF)
2	FM	FM receiving mode (VHF)
3	USB	USB play mode(1 kHz tone)

4.3 Test Configuration Mode

No.	Mode	Description
1	Receiving	The EUT is connected to the SIGNAL GENERATOR and is receiving radio frequency. And continuously output audio signal. EMS testing we checked the SNR by audio analyzer
2	USB	The EUT is connected to USB memory to play the music. (1 kHz tone). EMS testing we checked the SNR by audio analyzer.

4.4 Supported Equipment

Used*	Product Type	Manufacturer	Model	Remarks
AE	DC Power supply	SMtechno	SPD30-5D	305DPL226
AE	SPEAKER	N/A	N/A	None
AE	USB	Sandisk	ULTRA FLAIR 3.0	None
SIM	SIGNAL GENERATOR	Rohde & Schwarz	SMT03	100417

*Abbreviations:
AE - Auxiliary/Associated Equipment, or
SIM - Simulator

4.5 EUT In/Output Port

Name	Type*	Cable Max. >3 m	Cable Shielded	Cable Back shell	Remarks
DC IN	DC	1.8	Non shield	Plastic	None
Antenna	I/O	3.0	Shield	Plastic	None
Speaker	I/O	1.6	Non shield	Plastic	None
Multimedia box	I/O	1.8	Non shield	Plastic	None

*Abbreviations:
AC = AC Power Port DC = DC Power Port N/E = Non-Electrical
I/O = Signal Input or Output Port
TP = Telecommunication Ports

4.6 Test Voltage and Frequency

Case	Voltage (V)	Frequency (Hz)	Phases	Remarks
1	12 V DC	-	-	None

5. Test Summary

Test Items	Applied Standards	Results
Conducted Disturbance	ANSI C63.4 : 2014	**N/A (Note 1)**
Radiated Disturbance	ANSI C63.4 : 2014	**C**
Antenna Power Conduction	ANSI C63.4 : 2014	**C**
Note 1) The EUT is not a device connected to the AC mains.		
C=Comply N/C=Not Comply N/T=Not Tested N/A=Not Applicable		

-Conducted Disturbance

Frequency [MHz]	Phase	Result [dBµV]	Detector	Limit [dBµV]	Margin [dB]
-	-	-	-	-	-

-Radiated Disturbance

Frequency [MHz]	Pol.	Result [dBµV/m]	Detector	Limit [dBµV/m]	Margin [dB]
201.599	H	40.41	Quasi-Peak	43.50	3.09

6. Test Environment

Test Items	Test date (YYYY-MM-DD)	Temp. (℃)	Humidity (% R.H.)	Pressure (kPa)
Radiated Disturbance	2019-07-16	25	46	-
Antenna Power Conduction	2019-07-17	23	53	

7. Test Results : Emission

7.1 Conducted Disturbance

ANSI C63.4	Mains terminal disturbance voltage	Result
Method: The AMN placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane. This distance was between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment were at least 0,8 m from the AMN. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on mains lines were made at the output of the AMN. The measuring port of the LISN for EUT was connected to spectrum analyzer. Using conducted emission test software, the emissions were scanned with peak detector mode. After scanning over the frequency range, suspected emissions were selected to perform final measurement. When performing final measurement, the receiver was used which has Quasi-Peak detector and CISPR Average detector. For (0.15 ~ 30) MHz frequency range, Quasi-Peak detector with 10 kHz RBW and 30 kHz VBW was used. By varying the configuration of the test sample and the cable routing it was attempted to maximize the emission.		**Not Applicable**

Fully configured sample scanned over the following frequency range	**Frequency range on each side of line**	**Measurement Point**
	150 kHz to 30 MHz	**Mains**
EUT mode	**Test configuration mode**	**N/A**
(Refer to clauses 4)	**EUT Operation mode**	**N/A**

Limits – Class A

Frequency (MHz)	Limit dBµV	
	Quasi-Peak	Average
0.15 to 0.50	79	66
0.50 to 30	73	60

Limits – Class B

Frequency (MHz)	Limit dBµV	
	Quasi-Peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Measurement Instrument					
Description	**Model**	**Manufacturer**	**Identifier**	**Cal. Date**	**Cal. Due**
-	-	-	-	-	-

Mains terminal disturbance voltage _Measurement data			
Test configuration mode	**N/A**	**EUT Operation mode**	**N/A**
Test voltage (V)	**N/A**	**Test Frequency (Hz)**	**N/A**

Calculation

N : Neutral phase, L1 : Live phase
C.FACTOR(dB) : Pulse Limiter(dB) + Cable loss(dB) + Insertion loss of LISN(dB)
Result(dBμV) : Reading Value(dBμV) + C.FACTOR(dB)
Margin(dB) : Limit(dBμV) - Result(dBμV)

7.2 Radiated Disturbance

ANSI C63.4	Radiated disturbance 30 MHz – 40 GHz	Result
Method: Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 10 or 3 meter below 1GHz and 3 meter above 1GHz. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in horizontal and vertical polarities. Final measurements were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4 m. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable. For final measurement below 1 GHz frequency range, Quasi-Peak detector with (RBW = 120 kHz Bandwidth) was used. For final measurement above 1 GHz frequency range, Peak detector with (RBW = 1 MHz Bandwidth) and CISPR Average detector with (RBW = 1 MHz Bandwidth) were used.		**Comply**

EUT mode (Refer to clauses 4)	**Test configuration mode**	**1, 2**
	EUT Operation mode	**1, 2, 3**

Radiated Disturbance below 1 000 MHz

Frequency range (MHz)	**Quasi-peak limit dBµV/m**	
	Class A (10 m distance)	**Class B (3 m distance)**
30 to 88	39.1	40
88 to 216	43.5	43.5
216 to 960	46.4	46
960 to 1 000	49.5	54

According to 15.109(g), as an alternative to the radiated emission limit shown above, digital devices may be shown to comply with the standards contained in Third Edition of the International Special Committee on Radio Interference (CISPR), Pub. 22 shown.

Frequency range (MHz)	**Quasi-peak limit dBµV/m**	
	Class A (10 m distance)	**Class B (10 m distance)**
30 to 230	40	30
230 to 1 000	47	37

Radiated Disturbance for above 1 000 MHz at a measurement distance of 3 m

Frequency range (GHz)	**Peak limit dBµV/m**		**Average limit dBµV/m**	
	Class A	**Class B**	**Class A**	**Class B**
1 to 40	80	74	60	54

The test frequency range of Radiated Disturbance measurements are listed below.

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	**Upper frequency of measurement range (MHz)**
Below 108	1 000
108 – 500	2 000
500 – 1 000	5 000
Above 1 000	5^{th} harmonic of the highest frequency or 40 GHz, whichever is lower

Measurement Instrument					
Description	**Model**	**Manufacturer**	**Identifier**	**Cal. Date**	**Cal. Due**
MEASUREMENT SOFTWARE	EMI-R VER. 2.00.0177	TSJ	N/A	N/A	N/A
EMI TEST RECEIVER	ESU40	ROHDE&SCHWARZ	100525	2018.12.18	2019.12.18
TRILOG BROADBAND TEST-ANTENNA WITH 6DB ATT	VULB9160	SCHWARZBECK	9160-3339	2018.10.22	2020.10.22
	8491B	H.P	18403	2018.10.22	2020.10.22
LOW NOISE PRE AMPLIFIER	MLA-100K01-B01-26	TSJ	1252741	2019.02.18	2020.02.18
HORN ANTENNA	3117	ETS-LINDGREN	152093	2018.03.26	2020.03.26
PRE AMPLIFIER	8449B	H.P	3008A00887	2018.08.31	2019.08.31
HORN ANTENNA WITH	EM-6969	ELECTRO-METRICS	156	2019.02.13	2021.02.13
PREAMPLIFIER	MLA-0618-B03-34	TSJ	1785642	2018.12.27	2019.12.27
(NOTE : THE MEASUREMENT ANTENNAS WERE CALIBRATED IN ACCORDANCE TO THE REQUIREMENTS OF C63.5-2017.)					

Radiated disturbance at (30 ~ 1000) MHz _Measurement data			
Test configuration mode	**1**	**EUT Operation mode**	**1**
Test voltage (V)	**DC 12 V**	**Test Frequency (Hz)**	**-**

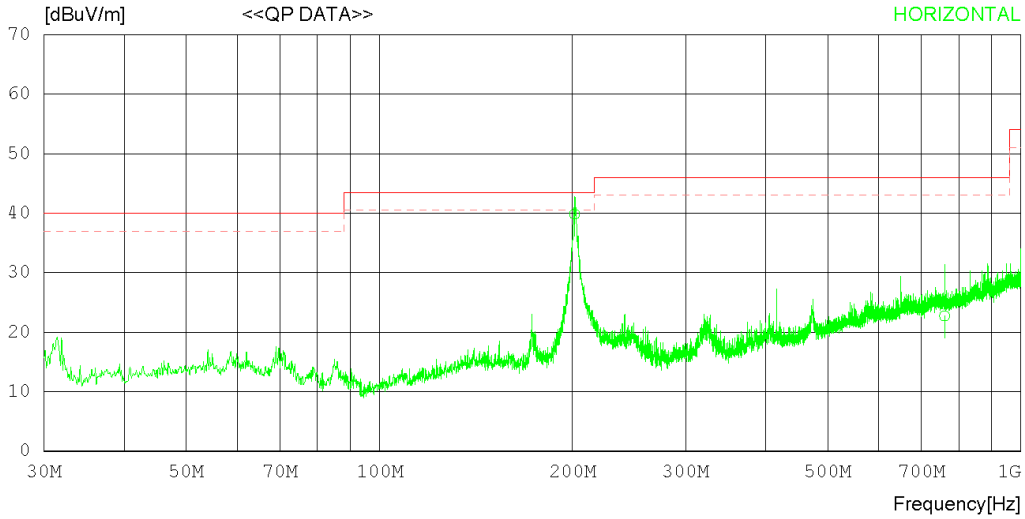
RADIATED EMISSION

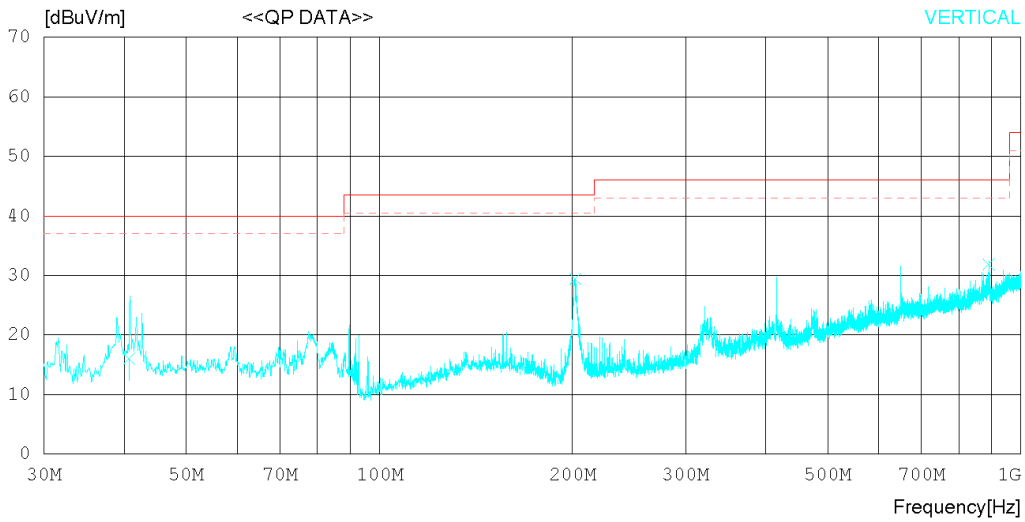
Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition AM

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m)
MARGIN: 3 dB





RADIATED EMISSION

Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition AM

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m)
MARGIN: 3 dB

No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	201.497	47.40	16.07	1.93	25.60	39.80	43.50	3.70	125	320
2	760.218	16.70	28.40	3.43	25.81	22.72	46.00	23.28	114	69
----- Vertical ------										
3	40.710	23.50	17.16	1.20	25.81	16.05	40.00	23.95	107	129
4	201.850	37.00	16.09	1.94	25.61	29.42	43.50	14.08	215	38
5	891.662	24.90	29.30	3.49	25.83	31.86	46.00	14.14	130	20

Radiated disturbance at (1 ~ 6) GHz _Peak measurement data			
Test configuration mode	**1**	**EUT Operation mode**	**1**
Test voltage (V)	**DC 12 V**	**Test Frequency (Hz)**	**-**

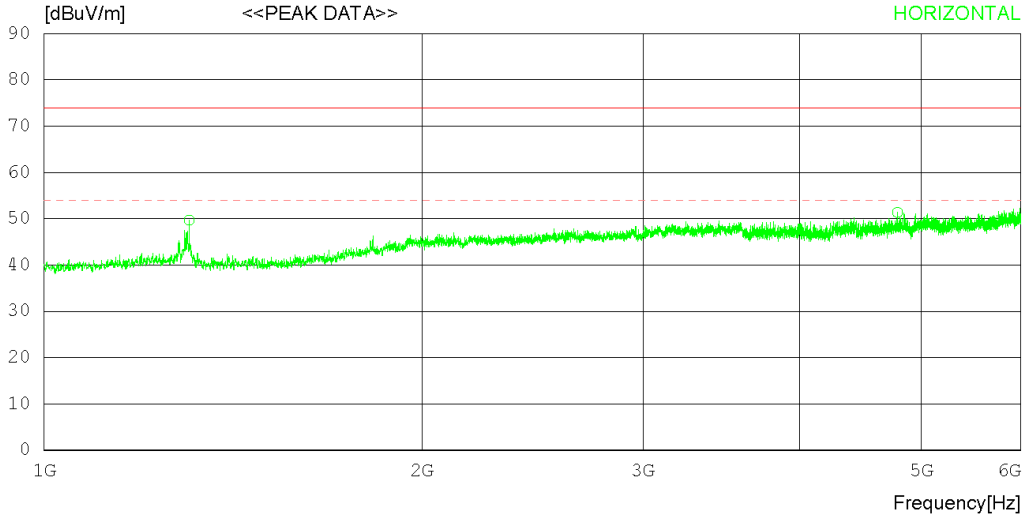
RADIATED EMISSION

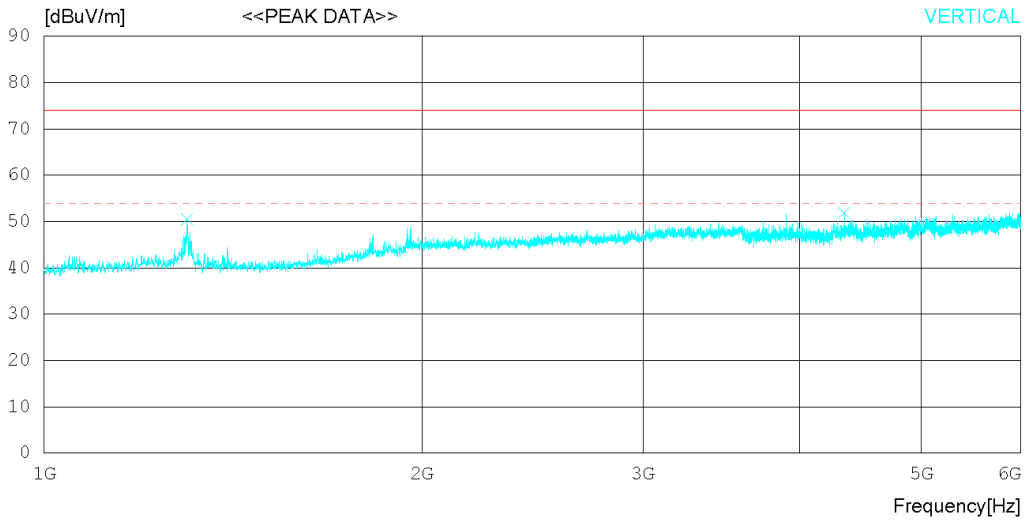
Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition AM

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Peak)
FCC Part15 Subpart.B Class B (3m) - GHz(Average)





RADIATED EMISSION

Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition AM

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Peak)
FCC Part15 Subpart.B Class B (3m) - GHz(Average)

No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	1305.000	51.60	28.72	4.88	35.54	49.66	74.0	24.34	300	218
2	4785.625	41.40	34.00	10.53	34.58	51.35	74.0	22.65	200	358
----- Vertical ------										
3	1299.375	52.40	28.80	4.86	35.54	50.52	74.0	23.48	300	218
4	4338.750	43.00	33.68	9.66	34.44	51.90	74.0	22.1	300	54

Radiated disturbance at (1 ~ 6) GHz _Average measurement data			
Test configuration mode	**1**	**EUT Operation mode**	**1**
Test voltage (V)	**DC 12 V**	**Test Frequency (Hz)**	**-**

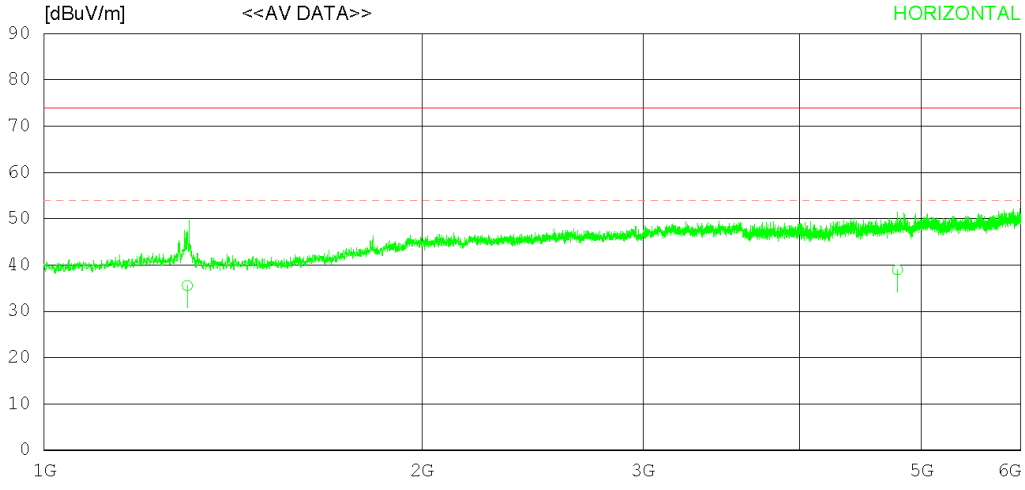
RADIATED EMISSION

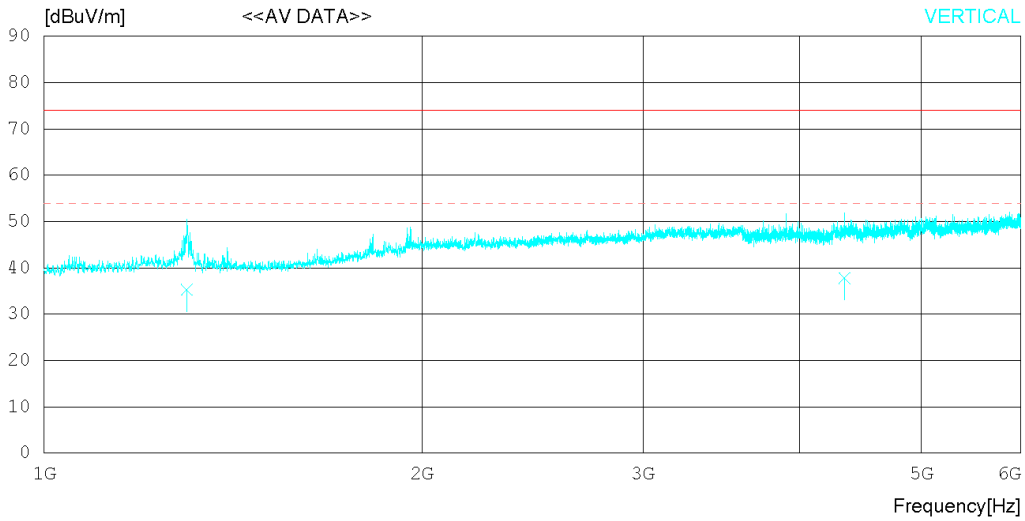
Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition AM

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Average)
FCC Part15 Subpart.B Class B (3m) - GHz(Peak)





RADIATED EMISSION

Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition AM

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Average)
FCC Part15 Subpart.B Class B (3m) - GHz(Peak)

No.	FREQ [MHz]	READING CAV [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	1300.235	37.40	28.80	4.88	35.54	35.54	54.00	18.46	270	94
2	4783.772	29.00	34.00	10.52	34.58	38.94	54.00	15.06	196	113
----- Vertical ------										
3	1299.173	37.20	28.80	4.86	35.54	35.32	54.00	18.68	267	305
4	4339.913	28.90	33.68	9.66	34.44	37.80	54.00	16.20	300	195

Radiated disturbance at (6 ~ 18) GHz _Peak measurement data			
Test configuration mode	**1**	**EUT Operation mode**	**1**
Test voltage (V)	**DC 12 V**	**Test Frequency (Hz)**	**-**

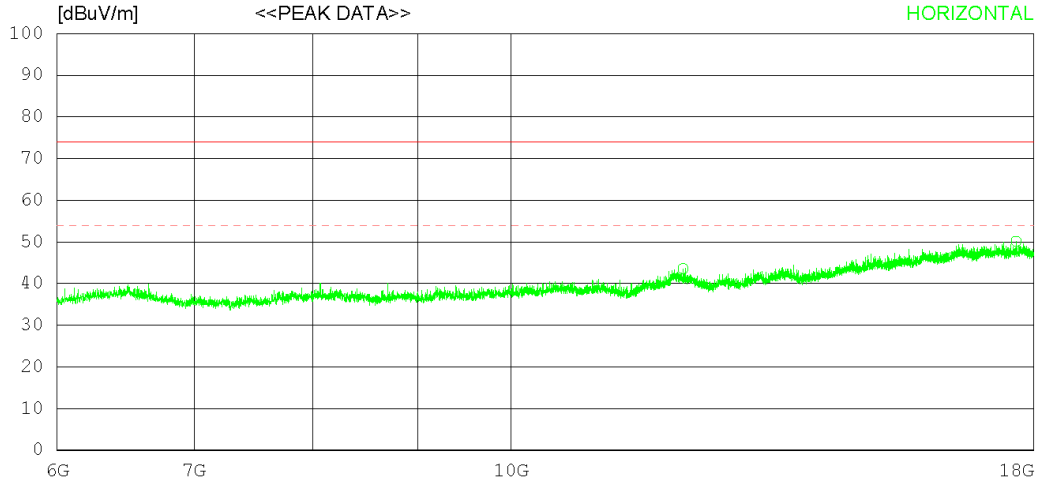
RADIATED EMISSION

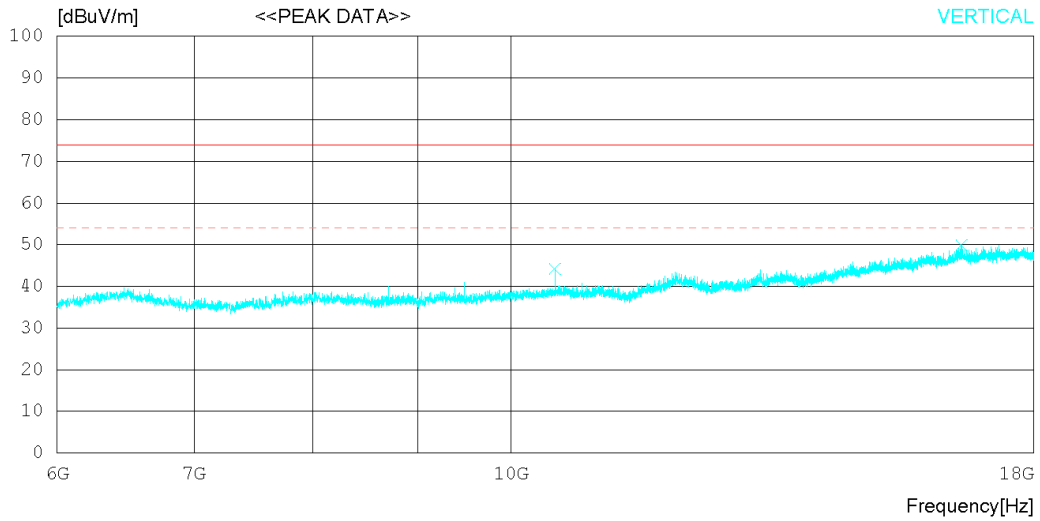
Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition AM

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Peak)
FCC Part15 Subpart.B Class B (3m) - GHz(Average)





* The measurement is performed above 18 GHz up to 40 GHz and not found emissions above 18 GHz.

RADIATED EMISSION

Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition AM

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Peak)
FCC Part15 Subpart.B Class B (3m) - GHz(Average)

No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	12132.000	32.40	33.47	15.59	37.89	43.57	74.0	30.43	300	150
2	17643.000	30.20	38.05	19.75	37.88	50.12	74.0	23.88	300	332
----- Vertical ------										
3	10503.000	35.20	32.48	14.65	38.13	44.20	74.0	29.8	300	261
4	16590.000	29.70	37.09	20.05	36.89	49.95	74.0	24.05	100	358

Radiated disturbance at (6 ~ 18) GHz _Average measurement data			
Test configuration mode	**1**	**EUT Operation mode**	**1**
Test voltage (V)	**DC 12 V**	**Test Frequency (Hz)**	**-**

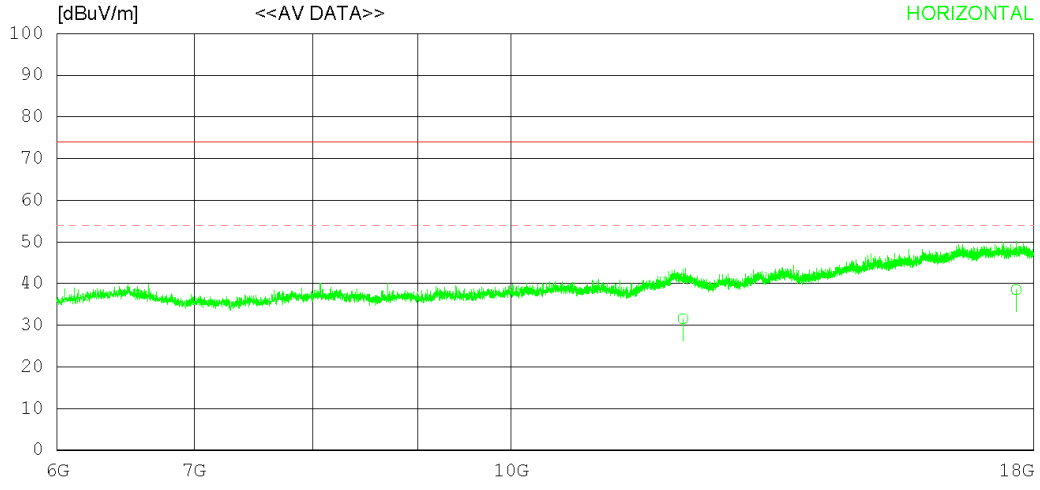
RADIATED EMISSION

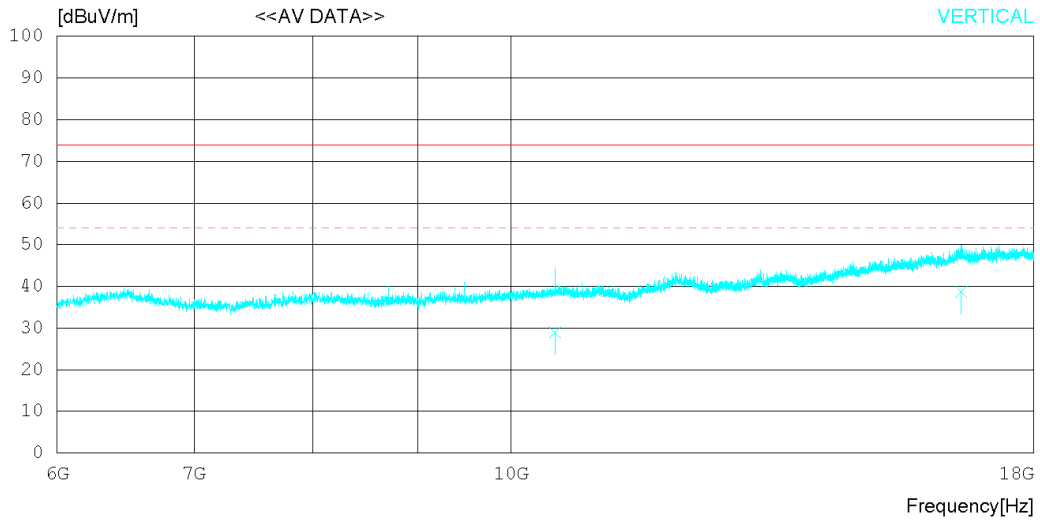
Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition AM

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Average)
FCC Part15 Subpart.B Class B (3m) - GHz(Peak)





* The measurement is performed above 18 GHz up to 40 GHz and not found emissions above 18 GHz.

RADIATED EMISSION

Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition AM

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Average)
FCC Part15 Subpart.B Class B (3m) - GHz(Peak)

No.	FREQ [MHz]	READING CAV [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	12130.200	20.40	33.47	15.59	37.89	31.57	54.00	22.43	314	126
2	17643.290	18.60	38.05	19.75	37.88	38.52	54.00	15.48	305	169
----- Vertical ------										
3	10504.970	20.00	32.48	14.65	38.13	29.00	54.00	25.00	268	80
4	16587.580	18.40	37.08	20.04	36.89	38.63	54.00	15.37	120	344

Radiated disturbance at (30 ~ 1000) MHz _Measurement data			
Test configuration mode	**1**	**EUT Operation mode**	**2**
Test voltage (V)	**DC 12 V**	**Test Frequency (Hz)**	**-**

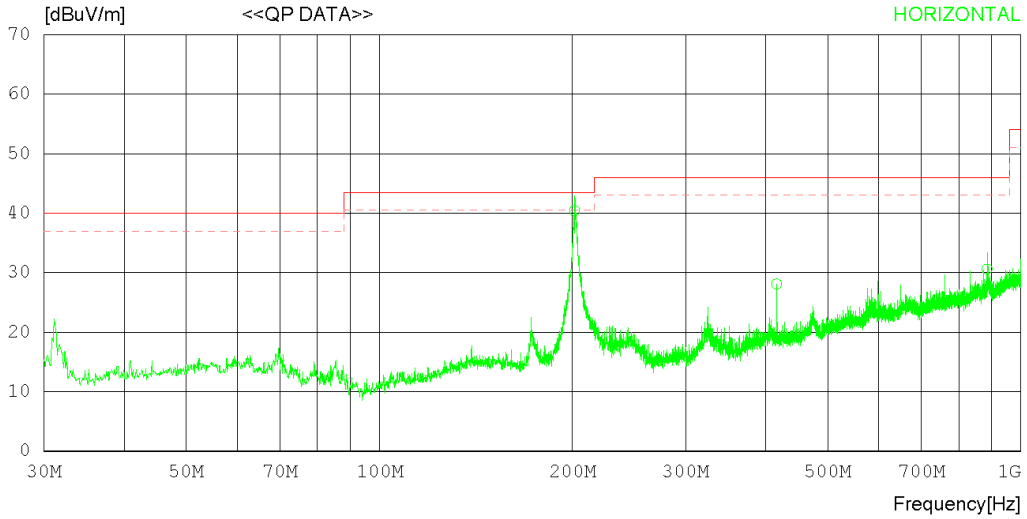
RADIATED EMISSION

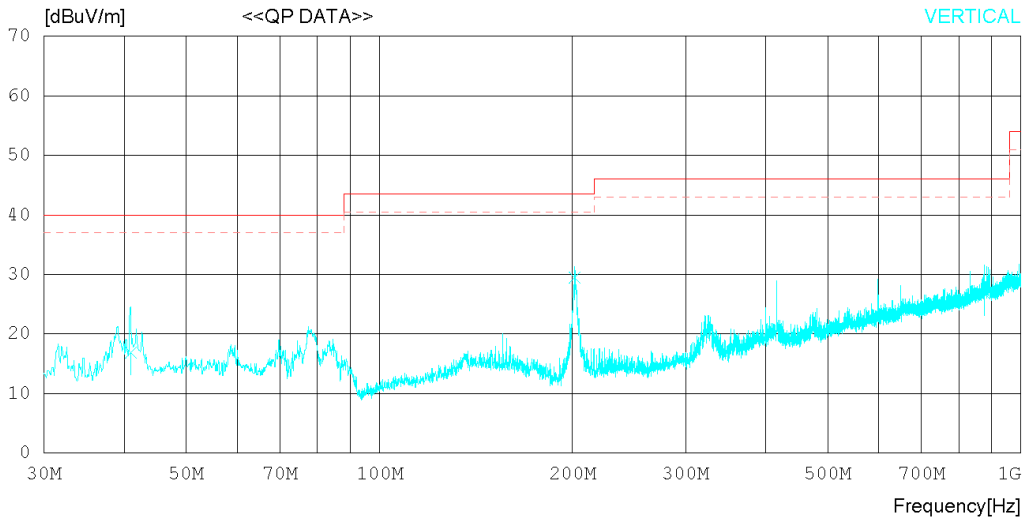
Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition FM

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m)
MARGIN: 3 dB





RADIATED EMISSION

Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition FM

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m)
MARGIN: 3 dB

No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	201.599	48.00	16.08	1.93	25.60	40.41	43.50	3.09	221	150
2	415.937	29.40	21.90	2.56	25.77	28.09	46.00	17.91	104	87
3	885.879	23.70	29.22	3.50	25.82	30.60	46.00	15.40	187	342
----- Vertical ------										
4	40.976	24.20	17.29	1.20	25.81	16.88	40.00	23.12	154	90
5	201.625	37.10	16.08	1.93	25.60	29.51	43.50	13.99	110	156
6	877.927	20.00	29.12	3.53	25.80	26.85	46.00	19.15	123	264

Radiated disturbance at (1 ~ 6) GHz _Peak measurement data			
Test configuration mode	**1**	**EUT Operation mode**	**2**
Test voltage (V)	**DC 12 V**	**Test Frequency (Hz)**	**-**

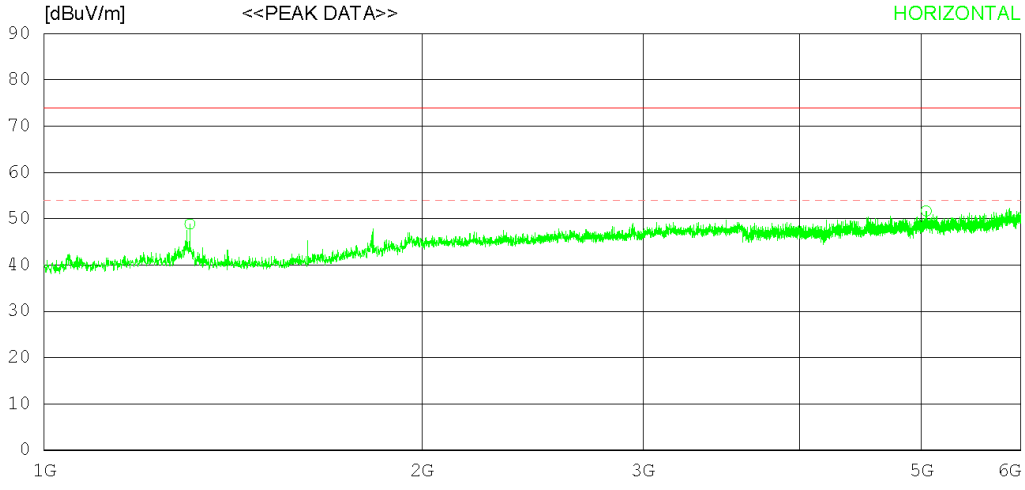
RADIATED EMISSION

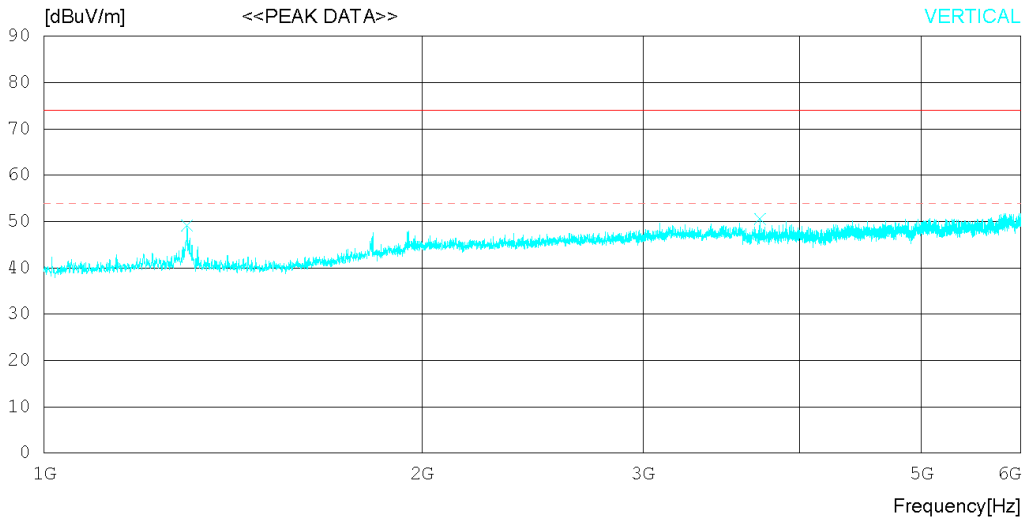
Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition FM

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Peak)
FCC Part15 Subpart.B Class B (3m) - GHz(Average)





RADIATED EMISSION

Date 2019-07-16

Order No.	DTNC1906-05086
Power Supply	DC 12 V
Temp/Humi	25 'C 46 % R.H.
Test Condition	FM

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Peak)
FCC Part15 Subpart.B Class B (3m) - GHz(Average)

No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	1306.250	50.80	28.70	4.88	35.53	48.85	74.0	25.15	299	223
2	5043.750	41.40	34.19	10.72	34.65	51.66	74.0	22.34	299	358
----- Vertical ------										
3	1300.000	51.00	28.80	4.88	35.54	49.14	74.0	24.86	300	358
4	3718.750	43.40	33.00	8.67	34.48	50.59	74.0	23.41	200	358

Radiated disturbance at (1 ~ 6) GHz _Average measurement data			
Test configuration mode	**1**	**EUT Operation mode**	**2**
Test voltage (V)	**DC 12 V**	**Test Frequency (Hz)**	**-**

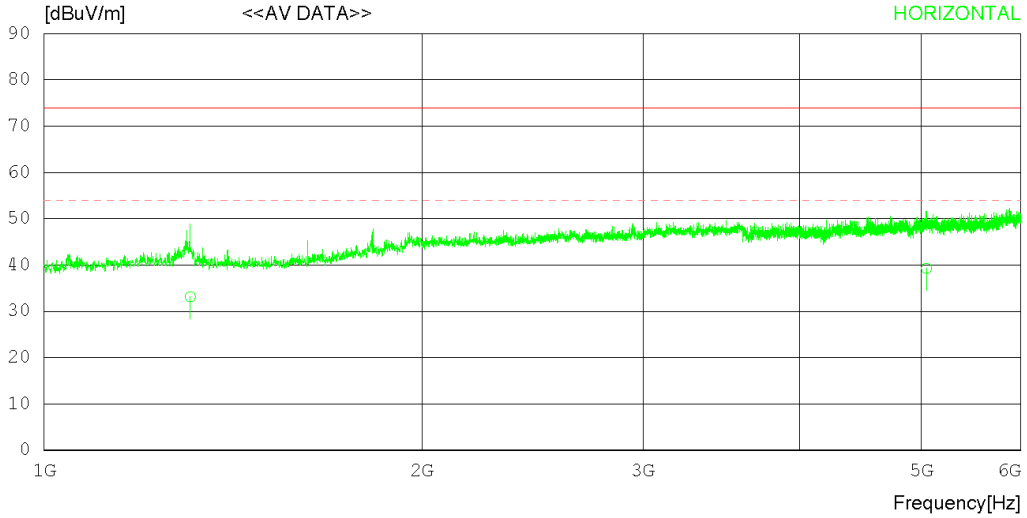
RADIATED EMISSION

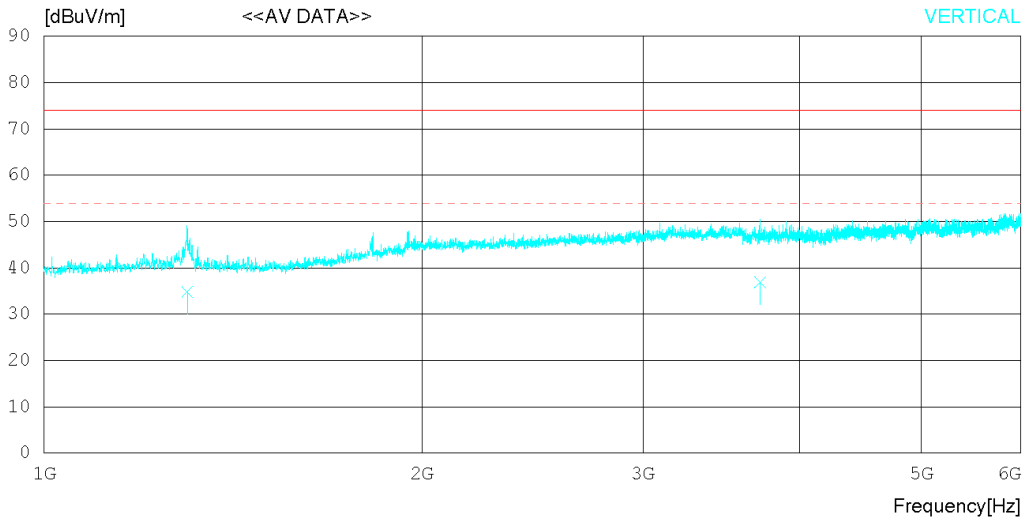
Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition FM

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Average)
FCC Part15 Subpart.B Class B (3m) - GHz(Peak)





RADIATED EMISSION

Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition FM

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Average)
FCC Part15 Subpart.B Class B (3m) - GHz(Peak)

No.	FREQ [MHz]	READING CAV [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	1307.665	35.10	28.68	4.89	35.53	33.14	54.00	20.86	317	84
2	5044.361	29.00	34.19	10.72	34.65	39.26	54.00	14.74	280	221
----- Vertical ------										
3	1300.273	36.70	28.80	4.88	35.54	34.84	54.00	19.16	298	76
4	3719.841	29.70	33.00	8.67	34.48	36.89	54.00	17.11	173	331

Radiated disturbance at (6 ~ 18) GHz _Peak measurement data			
Test configuration mode	**1**	**EUT Operation mode**	**2**
Test voltage (V)	**DC 12 V**	**Test Frequency (Hz)**	**-**

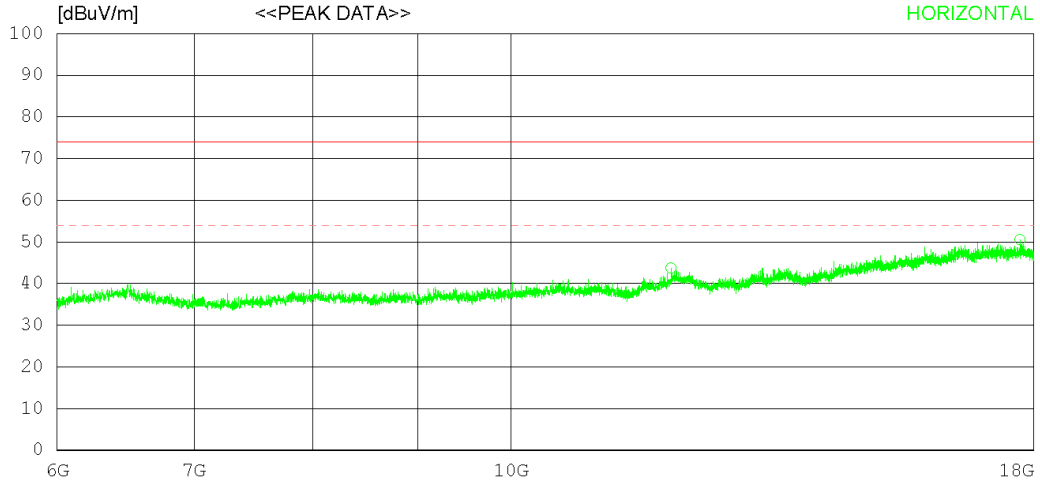
RADIATED EMISSION

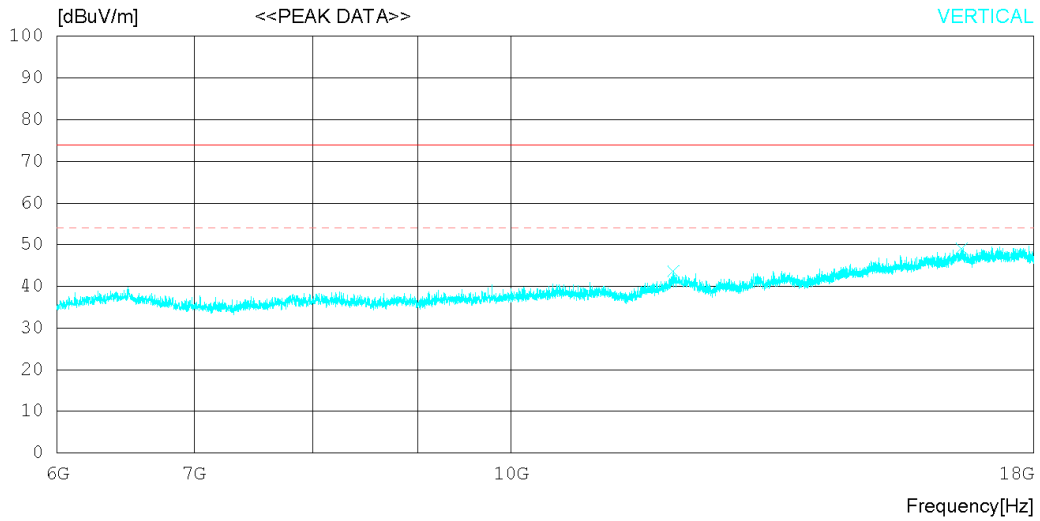
Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition FM

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Peak)
FCC Part15 Subpart.B Class B (3m) - GHz(Average)





* The measurement is performed above 18 GHz up to 40 GHz and not found emissions above 18 GHz.

RADIATED EMISSION

Date 2019-07-16

Order No.	DTNC1906-05086
Power Supply	DC 12 V
Temp/Humi	25 'C 46 % R.H.
Test Condition	FM

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Peak)
FCC Part15 Subpart.B Class B (3m) - GHz(Average)

No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	11967.000	32.40	33.43	15.62	37.72	43.73	74.0	30.27	100	284
2	17719.500	30.70	38.10	19.72	37.98	50.54	74.0	23.46	100	344
----- Vertical ------										
3	11997.000	32.10	33.46	15.68	37.67	43.57	74.0	30.43	100	158
4	16593.000	28.80	37.09	20.06	36.89	49.06	74.0	24.94	100	0

Radiated disturbance at (6 ~ 18) GHz _Average measurement data			
Test configuration mode	**1**	**EUT Operation mode**	**2**
Test voltage (V)	**DC 12 V**	**Test Frequency (Hz)**	**-**

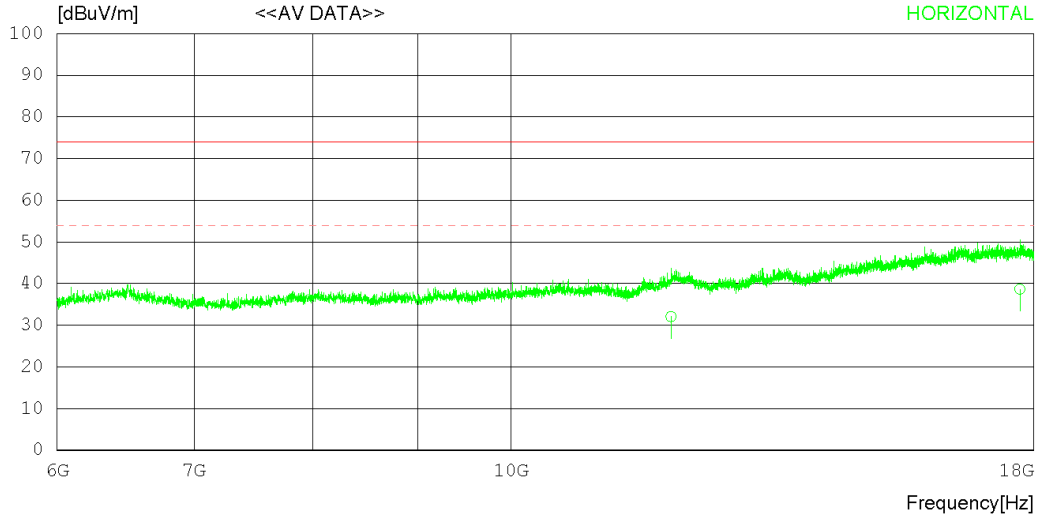
RADIATED EMISSION

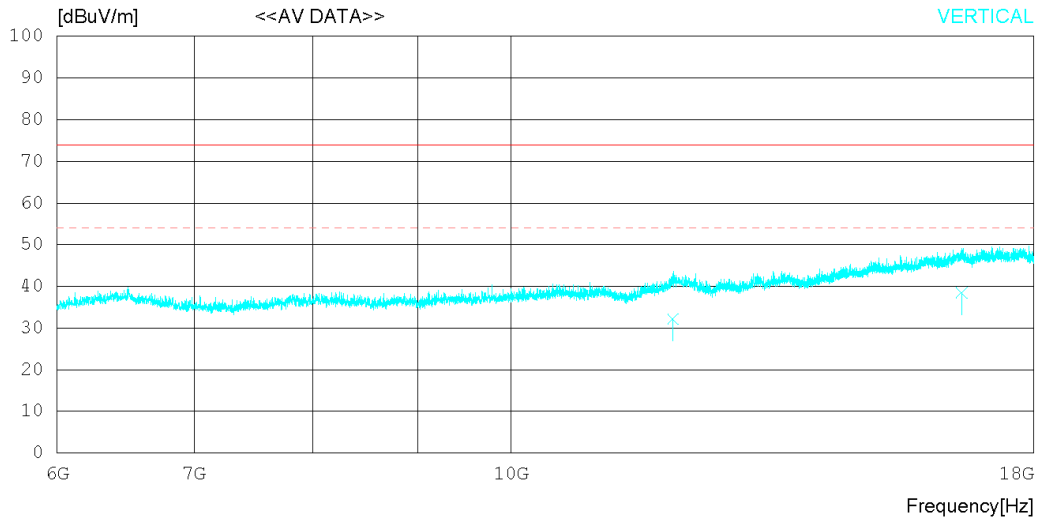
Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition FM

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Average)
FCC Part15 Subpart.B Class B (3m) - GHz(Peak)





* The measurement is performed above 18 GHz up to 40 GHz and not found emissions above 18 GHz.

RADIATED EMISSION

Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition FM

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Average)
FCC Part15 Subpart.B Class B (3m) - GHz(Peak)

No.	FREQ [MHz]	READING CAV [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	11968.43020.70	33.43	15.62	37.71	32.04	54.00	21.96		126	93
2	17718.79018.80	38.10	19.72	37.98	38.64	54.00	15.36		100	350
----- Vertical ------										
3	11996.07020.70	33.46	15.68	37.67	32.17	54.00	21.83		132	4
4	16595.24018.20	37.09	20.08	36.90	38.47	54.00	15.53		110	50

Radiated disturbance at (30 ~ 1000) MHz _Measurement data			
Test configuration mode	**2**	**EUT Operation mode**	**3**
Test voltage (V)	**DC 12 V**	**Test Frequency (Hz)**	**-**

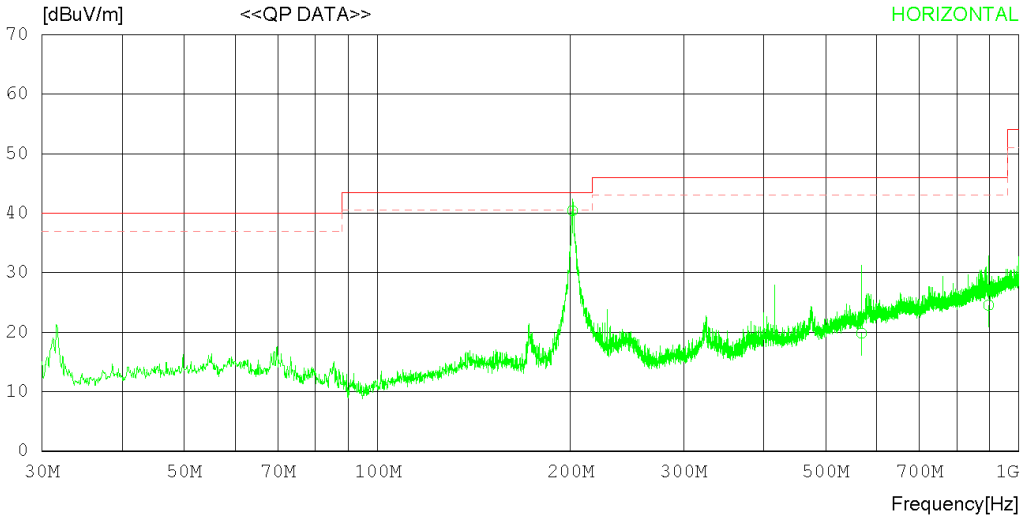
RADIATED EMISSION

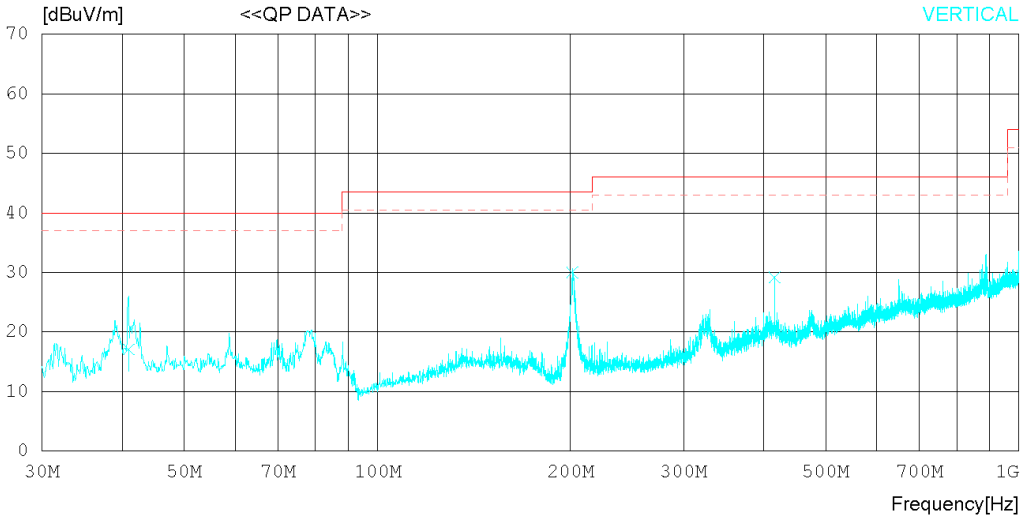
Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition USB

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m)
MARGIN: 3 dB





RADIATED EMISSION

Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition USB

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m)
MARGIN: 3 dB

No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	201.439	48.00	16.07	1.93	25.60	40.40	43.50	3.10	105	345
2	568.418	17.20	25.14	2.97	25.48	19.83	46.00	26.17	269	240
3	896.936	17.60	29.30	3.47	25.84	24.53	46.00	21.47	213	138
----- Vertical ------										
4	40.972	24.40	17.29	1.20	25.81	17.08	40.00	22.92	140	96
5	201.339	37.60	16.07	1.93	25.60	30.00	43.50	13.50	186	275
6	415.984	30.50	21.90	2.56	25.77	29.19	46.00	16.81	107	199

Radiated disturbance at (1 ~ 6) GHz _Peak measurement data			
Test configuration mode	**2**	**EUT Operation mode**	**3**
Test voltage (V)	**DC 12 V**	**Test Frequency (Hz)**	**-**

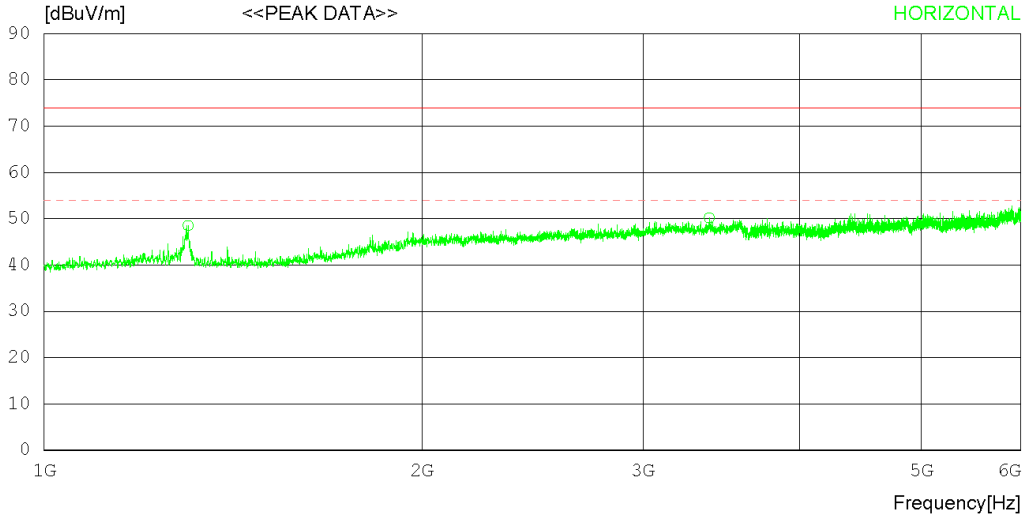
RADIATED EMISSION

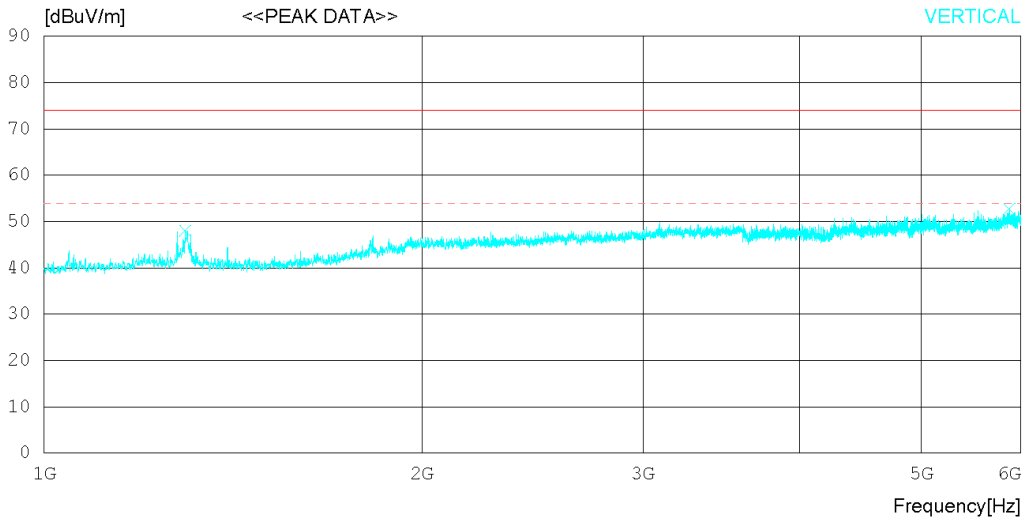
Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition USB

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Peak)
FCC Part15 Subpart.B Class B (3m) - GHz(Average)





RADIATED EMISSION

Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition USB

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Peak)
FCC Part15 Subpart.B Class B (3m) - GHz(Average)

No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	1302.500	50.40	28.76	4.88	35.54	48.50	74.0	25.5	300	197
2	3388.125	44.00	32.80	8.04	34.65	50.19	74.0	23.81	100	0
----- Vertical ------										
3	1295.000	49.90	28.79	4.86	35.55	48.00	74.0	26	100	222
4	5873.750	41.30	34.95	11.27	34.74	52.78	74.0	21.22	199	212

Radiated disturbance at (1 ~ 6) GHz _Average measurement data			
Test configuration mode	**2**	**EUT Operation mode**	**3**
Test voltage (V)	**DC 12 V**	**Test Frequency (Hz)**	**-**

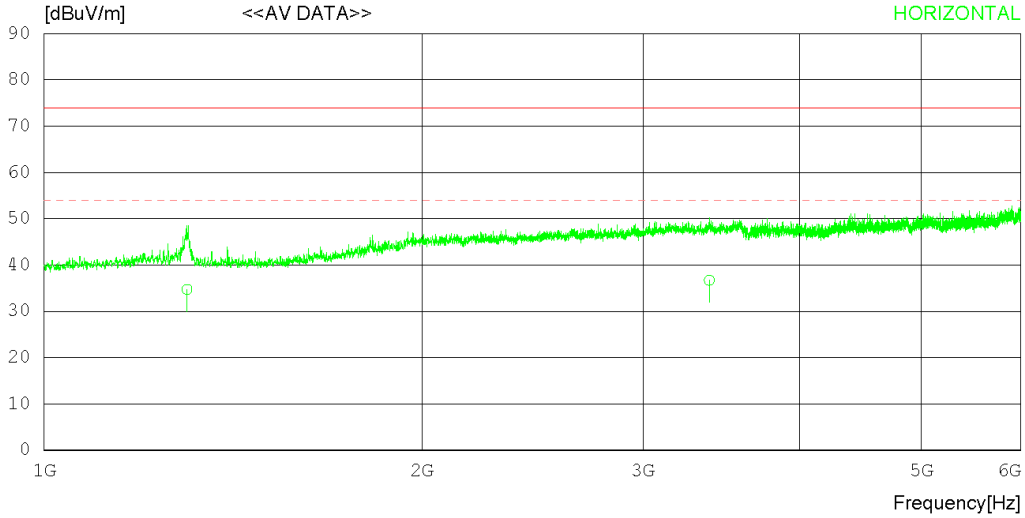
RADIATED EMISSION

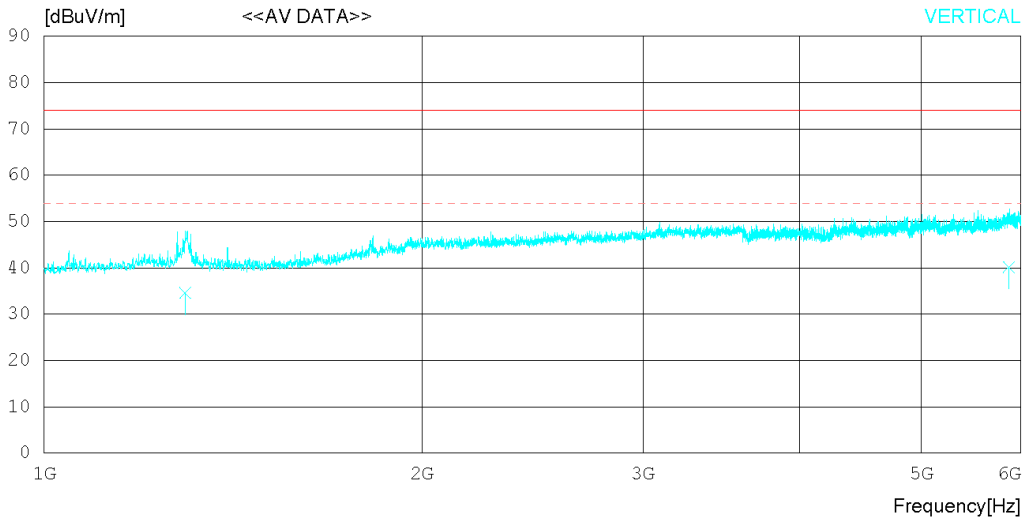
Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition USB

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Average)
FCC Part15 Subpart.B Class B (3m) - GHz(Peak)





RADIATED EMISSION

Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition USB

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Average)
FCC Part15 Subpart.B Class B (3m) - GHz(Peak)

No.	FREQ [MHz]	READING CAV [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	1299.765	36.60	28.80	4.86	35.54	34.72	54.00	19.28	287	132
2	3387.602	30.50	32.80	8.04	34.65	36.69	54.00	17.31	106	20
----- Vertical ------										
3	1295.883	36.50	28.79	4.86	35.55	34.60	54.00	19.40	137	233
4	5870.810	28.70	34.94	11.27	34.74	40.17	54.00	13.83	212	59

Radiated disturbance at (6 ~ 18) GHz _Peak measurement data			
Test configuration mode	**2**	**EUT Operation mode**	**3**
Test voltage (V)	**DC 12 V**	**Test Frequency (Hz)**	**-**

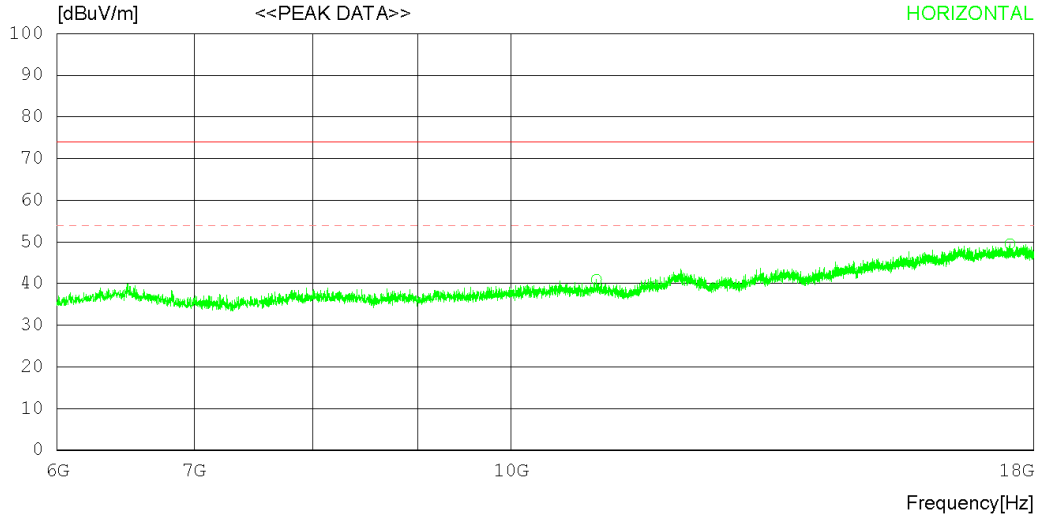
RADIATED EMISSION

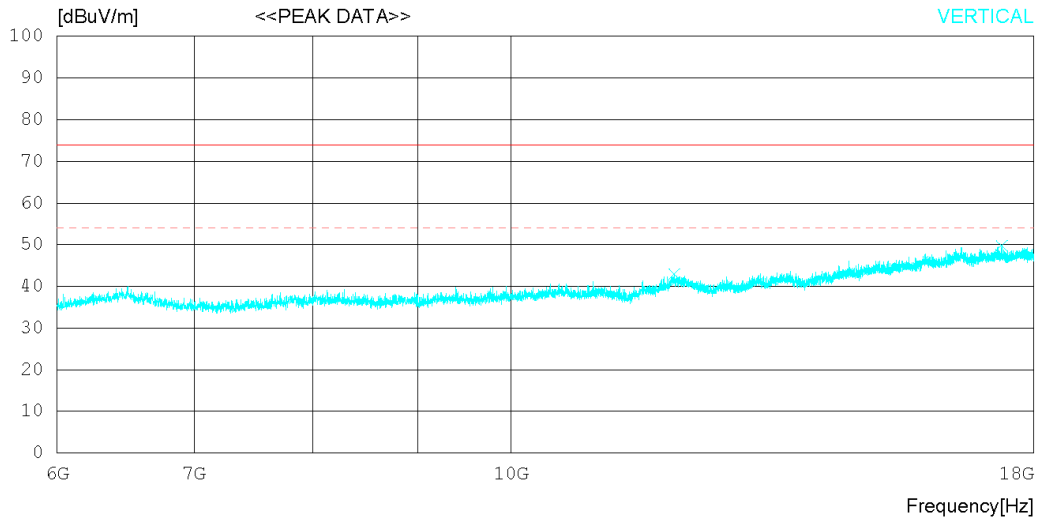
Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition USB

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Peak)
FCC Part15 Subpart.B Class B (3m) - GHz(Average)





* The measurement is performed above 18 GHz up to 40 GHz and not found emissions above 18 GHz.

RADIATED EMISSION

Date 2019-07-16

Order No.	DTNC1906-05086
Power Supply	DC 12 V
Temp/Humi	25 'C 46 % R.H.
Test Condition	USB

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Peak)
FCC Part15 Subpart.B Class B (3m) - GHz(Average)

No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	11004.000	31.70	32.41	14.94	38.10	40.95	74.0	33.05	200	214
2	17523.000	29.50	37.95	19.75	37.71	49.49	74.0	24.51	100	25
----- Vertical ------										
3	12013.500	31.50	33.46	15.67	37.68	42.95	74.0	31.05	200	354
4	17358.000	29.90	37.83	19.63	37.56	49.80	74.0	24.2	100	0

Radiated disturbance at (6 ~ 18) GHz _Average measurement data			
Test configuration mode	**2**	**EUT Operation mode**	**3**
Test voltage (V)	**DC 12 V**	**Test Frequency (Hz)**	**-**

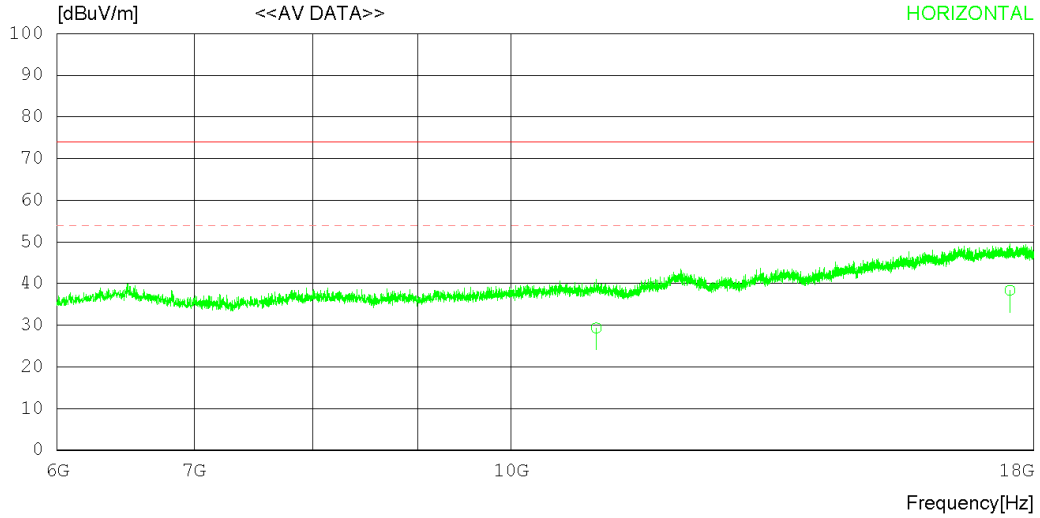
RADIATED EMISSION

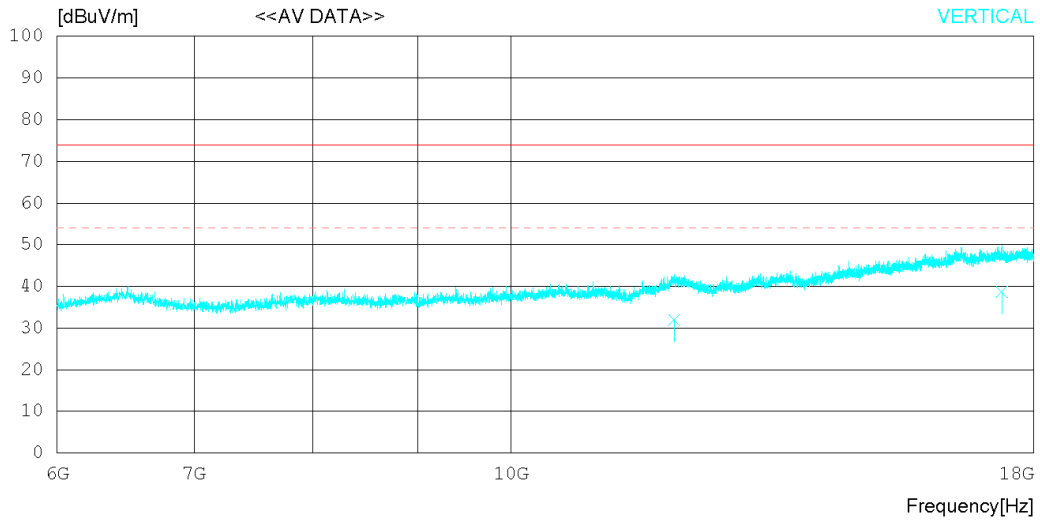
Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition USB

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Average)
FCC Part15 Subpart.B Class B (3m) - GHz(Peak)





* The measurement is performed above 18 GHz up to 40 GHz and not found emissions above 18 GHz.

RADIATED EMISSION

Date 2019-07-16

Order No. DTNC1906-05086
Power Supply DC 12 V
Temp/Humi 25 'C 46 % R.H.
Test Condition USB

Memo

LIMIT : FCC Part15 Subpart.B Class B (3m) - GHz(Average)
FCC Part15 Subpart.B Class B (3m) - GHz(Peak)

No.	FREQ [MHz]	READING CAV [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	11003.47020.10	32.41	14.94	38.10	29.35	54.00	24.65		215	56
2	17521.72018.40	37.95	19.75	37.71	38.39	54.00	15.61		114	90
----- Vertical ------										
3	12012.71020.50	33.46	15.67	37.68	31.95	54.00	22.05		228	317
4	17358.70018.80	37.83	19.63	37.56	38.70	54.00	15.30		103	90

Calculation

N : Neutral phase, L1 : Live phase
C.FACTOR(dB) : Pulse Limiter(dB) + Cable loss(dB) + Insertion loss of LISN(dB)
Result(dBµV) : Reading Value(dBµV) + C.FACTOR(dB)
Margin(dB) : Limit(dBµV) - Result(dBµV)

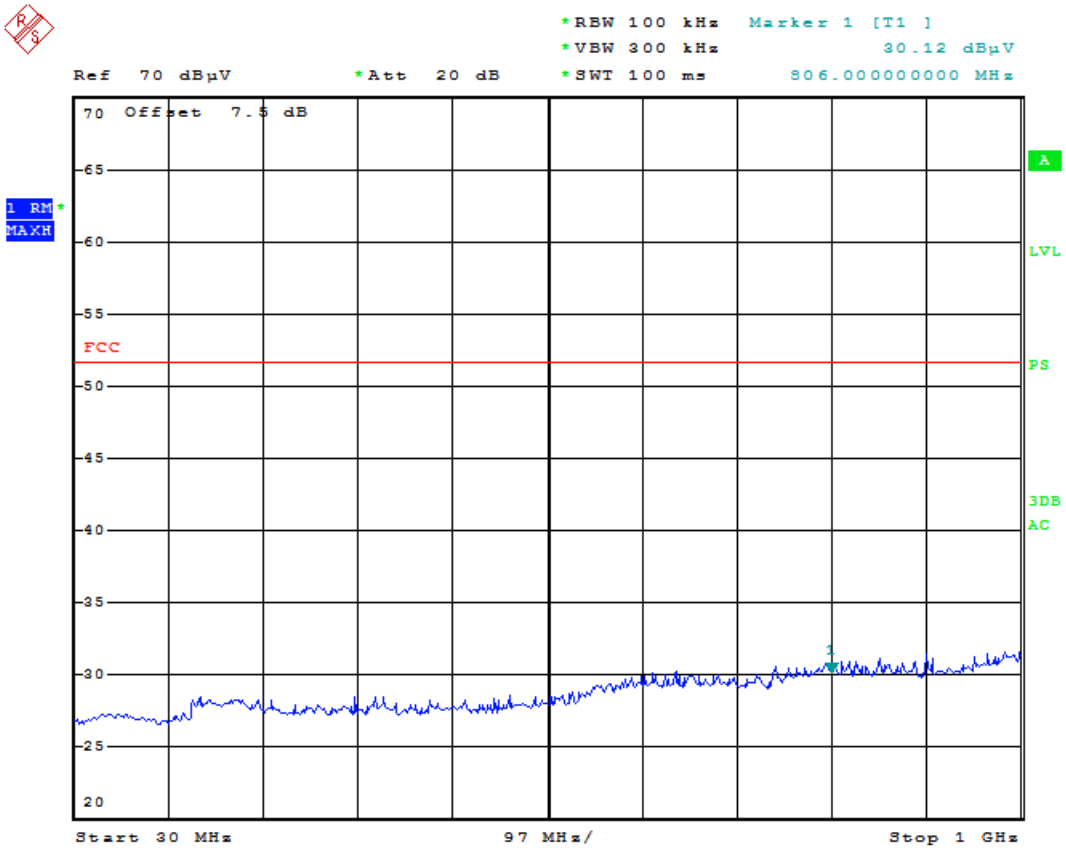
7.3 Antenna Power Conduction

ANSI C63.4	Antenna power conduction	Result
Method: Power on the receive antenna terminals was to be determined by measurement of the voltage present at these terminals. Antenna conducted power measurements was performed with the EUT antenna terminals connected directly to measuring instrument using a impedance-Matching network to connect the measurement Instrument to the antenna terminals of the EUT. The losses in decibels in impedance-matching network and cables was added to the measured values in dBμV. The measurements were repeated with the receiver tuned to a frequency until all of frequencies had been successively measured. Power in the receive antenna terminals in the ratio of V^2 /R, where V is the loss-corrected voltage measured at the antenna terminals, and R is the impedance of the measuring instrument		**Comply**

Fully configured sample scanned over the following frequency range	**Frequency range on each side of line**	**Limit**
	30 MHz to 2 150 MHz	**2 nW (51.7 dBμV)**
Measurement Point	**Tuner port**	
EUT mode (Refer to clauses 4)	**Test configuration mode**	**1**
	EUT Operation mode	**2**

Measurement Instrument					
Description	**Model**	**Manufacturer**	**Identifier**	**Cal. Date**	**Cal. Due**
EMI TEST RECEIVER	ESU	ROHDE & SCHWARZ	100538	2019.01.23	2020.01.23
SPLITTER	ZFRSC-123-S+	MINI CIRCUITS	SF139801142	2019.07.15	2020.07.15

Antenna Power Conduction _Measurement data graph			
Test configuration mode	1	EUT Operation mode	2
Test voltage (V)	DC 12 V	Test Frequency (Hz)	-



8. Revision History

Date	Description	Revised By	Reviewed By
Jul. 22. 2019	Initial report	JooHo Kim	DaeHwa Eun

-End of test report-