FCC Test Report

Report Number		UCSFR-1409-006		
Applicant	Company Name	ID-Teck Co Ltd		
	Address	684-1, Deaungchon-Dong, Gangsuh-Gu, Seoul, South Korea		
Product	Product Name	Proximity Reader		
	FCC ID	OYUPROX10H		
	Model Name	PROX10H		
	Family Model Name	PROX10		
	Manufacturer	ID-Teck Co Ltd		
	Serial No.	-	Country of origin	Korea
Other	Receipt Date	2014.09.01	Receipt Number	UCS-R-2014-619
	Issued Date	2014.09.24	Tested Date	2014.09.11 ~ 2014.09.15
Standards		FCC CFR 47 PART 15 SUBPART C, Section 15.209		
Tested by		H. K. Lee (Sign)		
Approved by		Y. M. Choi (Sign)		

UCS Co., Ltd.

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Contents

Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
UCSFR-1409-006	24-Sep-14	Initial Issue	All

1. Applicant Information

Applicant Name : ID-Teck Co Ltd
Address : 684-1, Deaungchon-Dong, Gangsuh-Gu, Seoul, South Korea
Manufacturer : ID-Teck Co Ltd
Address : 684-1, Deaungchon-Dong, Gangsuh-Gu, Seoul, South Korea
Country of Origin : Korea

2. EUT (Equipment under test) Information

Equipment Class	DCD – Part 15, Low Power Transmitter below 1 705 kHz
Product name	Proximity Reader
Model name	PROX10H
Family Model name	PROX10
Power source	DC 12 V
Frequency range	0.125 MHz
Modulation Technique	FSK
Antenna Type	Integral loop coil antenna

2.1 Model differences

- The following lists consist of the added model and their differences.

Model Name	Differences	Tested
PROX10H	Basic Model	☑
PROX10	This model is identical to basic model, except for model firmware only.	☐

Note 1: Applicant consigns only basic model to test. Therefore this test report just guarantees the units, which have been tested.

Note 2: The Applicant/manufacturer is responsible for the compliance of all variants.

3. Laboratory Information

UCS Co., Ltd.
#702, Anyang Megavalley799, Gwanyang2-dong, Dongan-gu, Anyang-si, Gyeonggi-do, 431-767, Korea

ER Center
#476-4, Hwalcho-dong, Hwaseong-si, Gyeonggi-do, 445-150, Korea

Test site
- FCC Registration Number : 803225
- This test site is in compliance with ISO/IEC 17025 for general requirements for the competence of testing and calibration laboratories.

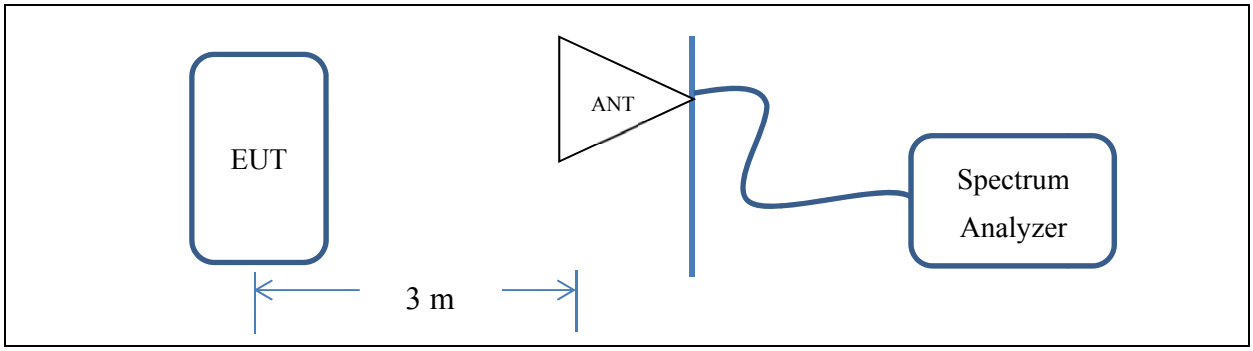
4. Test Configuration and Condition

4.1 EUT operating condition

- The EUT had been tested under the operating condition.
- There are one channels have been tested as following:

Channel	Frequency [MHz]
Fundamental	0.125

4.2 EUT test configuration diagram



[System Block Diagram of Test Configuration]

4.3 Peripheral equipments list for test

Equipment Name	Model	Serial Number	Manufacturer
Notebook	PSMDCK-06L001	-	HP
TEST JIG	iCON100	5GC1Z00C1390170	ID-Teck Co Ltd

4.4 Cable connections

Start		End		Cable	
Name	I/O Port	Name	I/O Port	Length	Spec.
Notebook	RS232	EUT	RS232	3.0	Shielded

4.5 EUT modifications

-. None

5. Summary of Test Results and Measurement Procedures

5.1 Summary of test results

Standard	Test Item	CFR 47 Section	Result
FCC CFR 47 Subpart C Part 15.209	Antenna Requirement	15.203	PASS
	Conducted Emissions	15.207	PASS
	Field Strength of Radiated Emissions	15.209	PASS
	20 dB bandwidth	N/A	PASS

5.2 AC powerline conducted emission test

The EUT was connected to adaptor and the power of adaptor was connected to LISN. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.10: 2009 to determine the worse operating conditions.

5.3 Radiated emission test

Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2009 to determine the worse operating conditions. The radiated emissions measurements were performed on the 10 m Semi Anechoic Chamber.
For frequencies from 150 kHz to 30 MHz measurements were made of the magnetic H field.
The measuring antenna is an electrically screened loop antenna.
The frequency spectrum from 30 MHz to 1 000 MHz was scanned and maximum emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and verticalpolarization of the receiving antenna.

6. Test Results

6.1 Antenna requirement

6.1.1 Regulation

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.
The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section.
The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

6.1.2 Results: PASS

The transmitter has an intergral Loop coil antenna.

6.2 AC power line conducted emissions

6.2.1 Regulation

According to §15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission [MHz]	Conducted limit [dBμV]	
	Qausi-peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency.

According to §15.107(a), for unintentional device, except for Class A digital devices, line conducted emission limits are the same as the above table.

6.2.2 Test procedure

1. The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 cm in which is located 40 cm away from the vertical wall and 1.5m away from the side wall of the shielded room.
2. Each current-carrying conductor of the EUT power cord was individually connected through a 50 Ω / 50 μH LISN, which is an input transducer to a Spectrum Analyzer or an EMI/Field Intensity Meter, to the input power source.
3. Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
4. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.
5. The measurements were made with the detector set to PEAK amplitude within a bandwidth of 10 kHz or to QUASI-PEAK and AVERAGE within a bandwidth of 9 kHz. The EUT was in transmitting mode during the measurements.

6.2.3 Test data

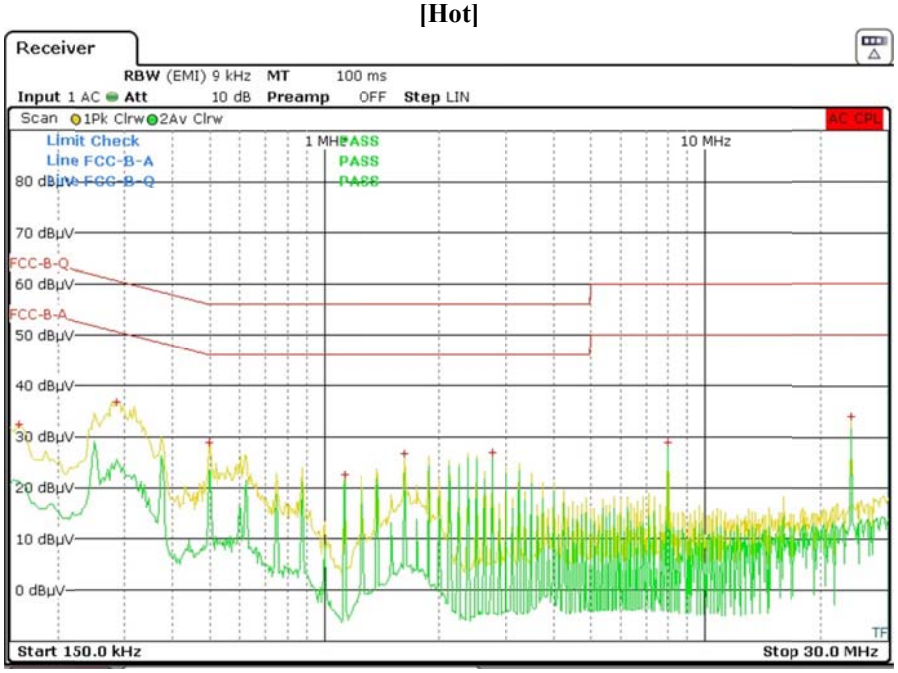
Table 28: Measured values of the AC Power Line Conducted Emissions

Frequency [MHz]	Factor		Line	Quasi-Peak			Average		
	LISN [dB]	Cable [dB]		Limit [dBµV]	Reading [dBµV]	Results [dBµV]	Limit [dBµV]	Reading [dBµV]	Results [dBµV]
0.16	0.05	0.03	H	65.46	32.41	32.49			
0.29	0.04	0.04	H	60.52	36.84	36.92			
0.63	0.04	0.06	N	56.00	29.80	29.89			
1.75	0.06	0.10	N	56.00	28.79	28.95			
2.75	0.06	0.14	H	56.00	27.02	27.22			
8.00	0.13	0.36	N	60.00	29.22	29.71		-	
15.49	0.43	0.49	N	60.00	41.03	41.95		-	-
24.00	0.44	0.57	N	60.00	35.00	36.01		-	-

* Remark: “H”: Hot Line, “N”: Neutral Line

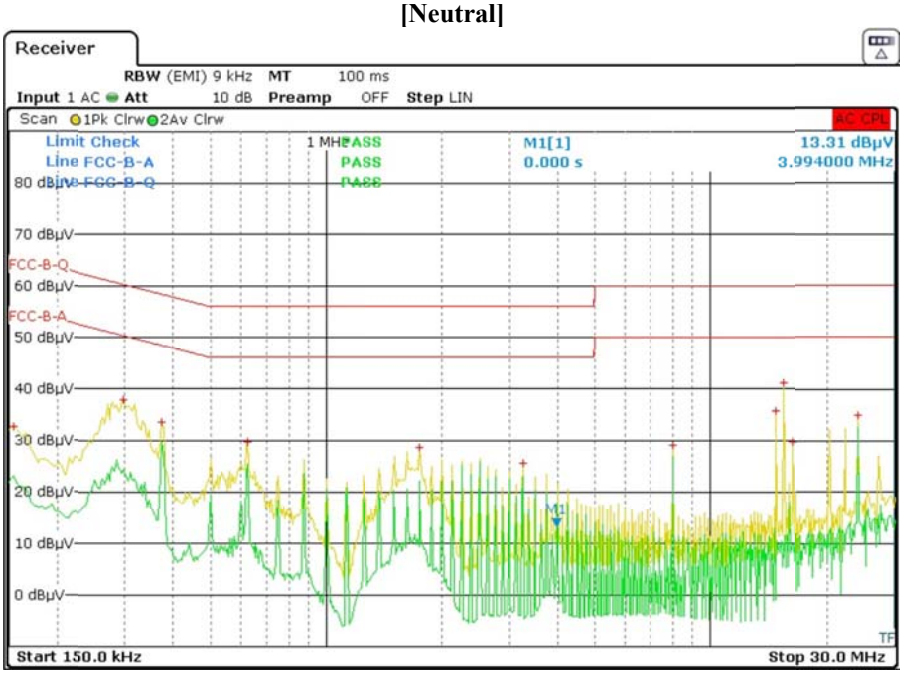
6.2.4 Graph of the AC power line conducted emissions

[Hot]



*——— : Quasi-Peak, ——— : Averrage

[Neutral]



*——— : Quasi-Peak, ——— : Averrage

6.3 Field strength of radiated emissions

6.3.1 Regulation

According to §15.209(a), for an intentional device, the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the following values:

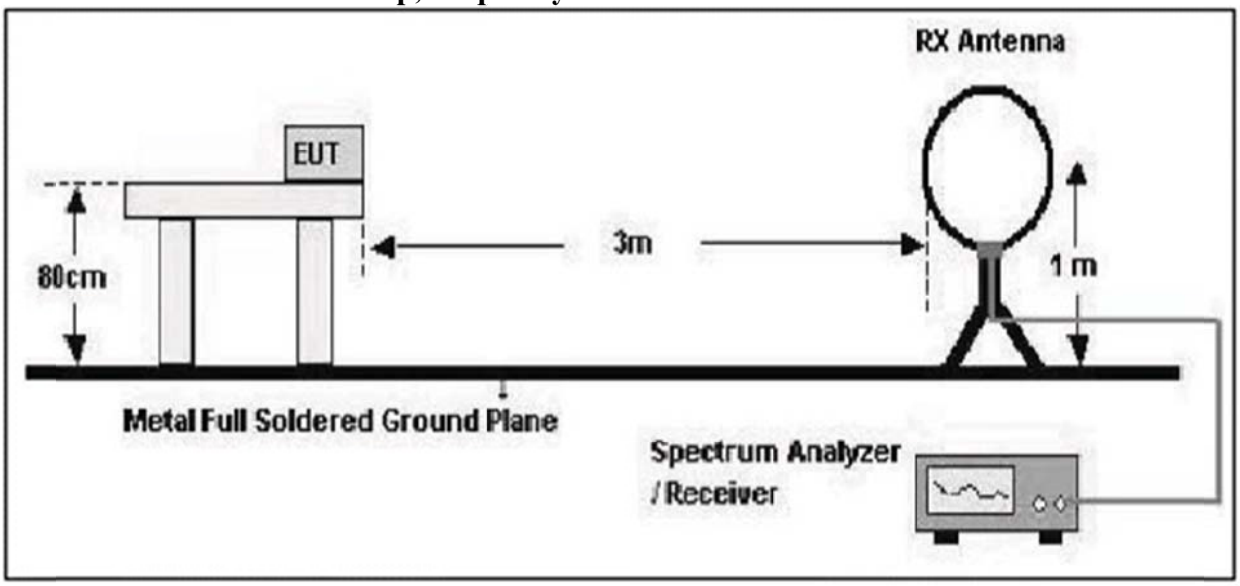
Frequency [MHz]	Field strength [μV/m]	Field strength [dBμV/m]	Measurement distance [m]
0.009 ~ 0.490	2 400 / F (kHz)	-	300
0.490 ~ 1.705	24 000 / F (kHz)	-	30
1.705 ~ 30	30	29.5	30
30 ~ 88	100	40.0	3
88 ~ 216	150	43.5	3
216 ~ 960	200	46.0	3
Above 960	300	54.0	3

According to §15.109(a), for an unintentional device, except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the above table.

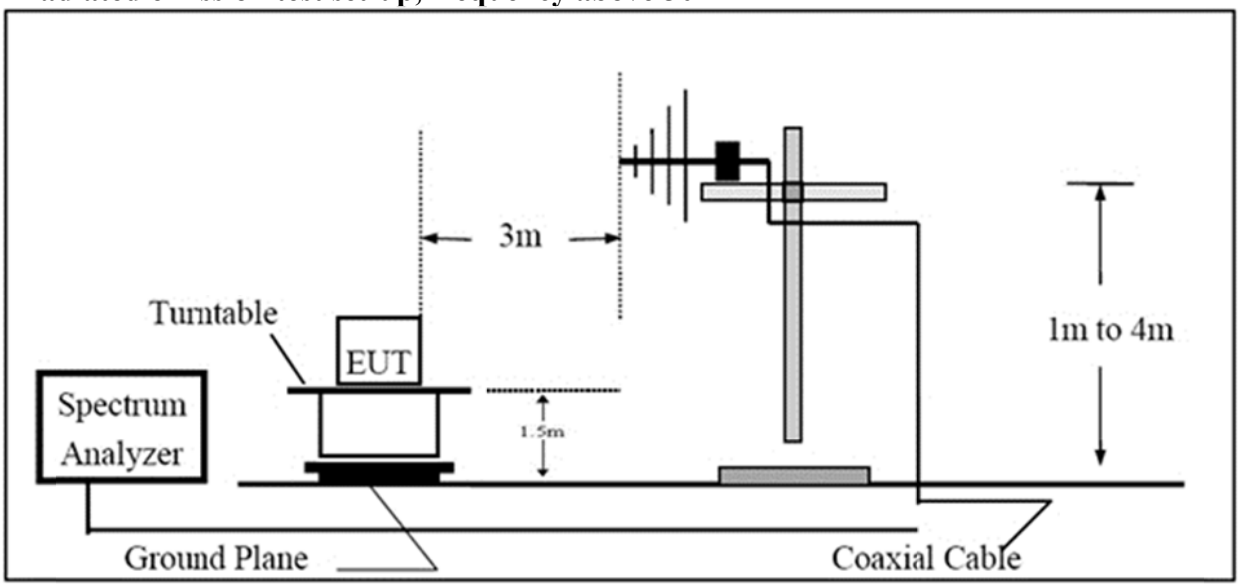
** The emission limits shown in the above table are based on measurement instrumentation employing a CISPR quasi-peak detector and above 1000 MHz are based on the average value of measured emissions.

6.3.2 Test setup layout

6.3.2.1 Radiated emission test set-up, frequency below 30 MHz



6.3.2.2 Radiated emission test set-up, frequency above 30 MHz



6.3.3 Test procedure

1. The preliminary radiated measurements were performed to determine the frequency producing the maximum emissions in an anechoic chamber at a distance of 3 meters for above 30 MHz, and at 1 meter distance for below 30 MHz.
2. The EUT was placed on the top of the 0.8-meter height, 1 × 1.5 meter non-metallic table. To find the maximum emission levels, the height of a measuring antenna was changed and the turntable was rotated 360°.
3. The antenna polarization was also changed from vertical to horizontal. The spectrum was scanned from 9 kHz to 30 MHz using the loop antenna, from 30 to 1 000 MHz using the Trilog broadband antenna, and from 1 GHz to tenth harmonic of the highest fundamental frequency using the horn antenna.
4. To obtain the final measurement data, the EUT was arranged on a turntable situated on a 4 × 4 meter at the Open Area Test Site. The EUT was tested at a distance 3 meters.
5. Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.
6. The EUT is situated in three orthogonal planes (if appropriate)
7. The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT.
8. If the emission on which a radiated measurement must be made is located at the edge of the authorized band of operation, then the alternative “marker-delta” method may be employed.

6.3.4 Test data for below 30 MHz

Table 1 : Measured values of the field strength of emissions							
Frequency [MHz]	**Reading [dBμV]**	**Ant. Pol. [V/H]**	**Ant. Factor [dB/m]**	**Cable Loss [dB]**	**Emission Level [dBμV/m]**	**Limit [dBμV/m]**	**Margin [dB]**
Quasi-peak data, emissions below 30 MHz							
0.019	52.58	H	14.03	0.02	66.63	122.03	-55.40
0.125	55.10	H	12.16	0.03	67.29	105.67	-38.38
17.88	25.34	H	9.44	0.60	35.38	69.54	-34.16

1. Emission Level [dBμV/m] = Reading [dBμV] + Ant. Factor [dB/m] + Cable Loss [dB]
2. Margin [dB] = Emission Level [dBμV/m] – Limit [dBμV/m]
3. Limit calculation: Limit at specified distance + 40log (300/3) = Limit + 80 dB for up to 0.49 MHz
   Limit at specified distance + 40log (30/3) = Limit + 40 dB for above 0.49 MHz, Below 30 MHz
4. H = Horizontal, V = Vertical Polarization

6.3.5 Test data for above 30 MHz

Table 2 : Measured values of the field strength of emissions								
Frequency [MHz]	**Reading [dBμV]**	**Ant. Pol. [V/H]**	**Ant. Factor [dB/m]**	**Cable Loss [dB]**	**Amp Gain [dB]**	**Emission Level [dBμV/m]**	**Limit [dBμV/m]**	**Margin [dB]**
159.54	50.31	H	8.42	4.23	31.64	31.32	43.52	-12.20
338.77	47.45	V	14.46	6.62	31.50	37.03	46.02	-8.99
372.61	44.24	V	15.18	7.00	31.50	34.92	46.02	-11.10
405.85	44.65	V	15.85	7.39	31.50	36.39	46.02	-9.63
362.62	46.52	H	14.97	6.88	31.50	36.87	46.02	-9.15
566.10	34.55	H	18.78	8.93	31.57	30.69	46.02	-15.33
634.29	45.10	H	19.80	9.51	31.57	42.84	46.02	-3.18

1. Emission Level [dBμV/m] = Reading [dBμV] + Ant. Factor [dB/m] + Cable Loss [dB] – Amp Gain [dB]
2. Margin [dB] = Emission Level [dBμV/m] – Limit [dBμV/m]
3. H = Horizontal, V = Vertical Polarization

6.4 20 dB bandwidth

6.4.1 Test condition

- Set RBW of Spectrum analyzer to 100 Hz, Span = 5 kHz, Sweep = auto
- The 20 dB bandwidth is defined as the frequency range where the power is higher than the peak power minus 20 dB

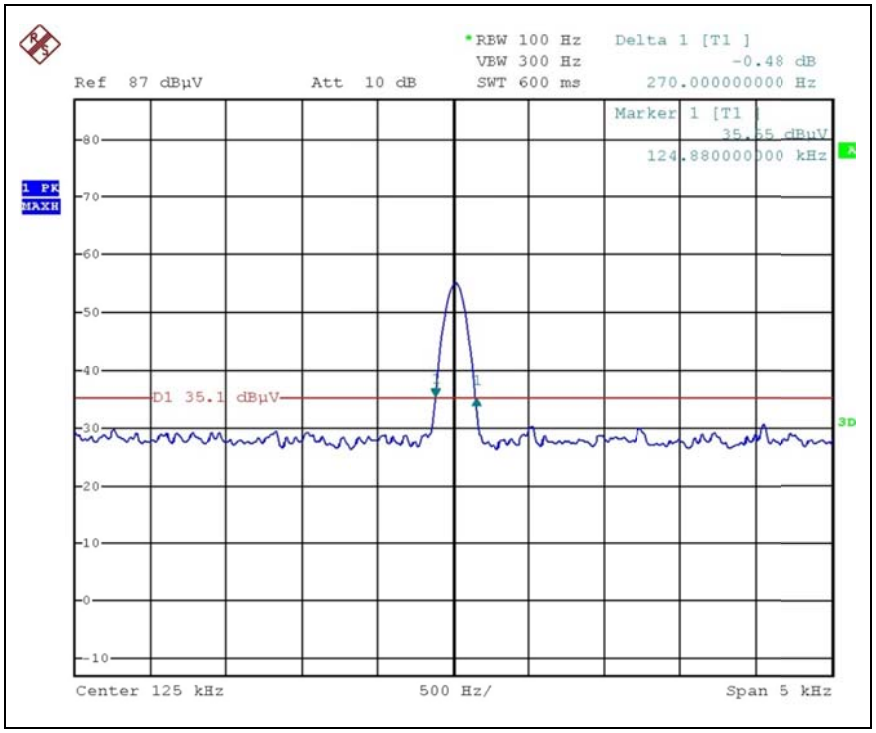
6.4.2 Test data

Table 3 : Measured values of the 20 dB Bandwidth

Frequency [MHz]	Result [Hz]	Limit [Hz]	Remark
0.125	270	None	The point 20 dB down from the modulated carrier

Remark: Please refer to Graph Data for bandwidth for test data.

6.4.3 Graph of the 20 dB bandwidth



7. Test Equipment Used For Test

Use	Description	Manufacturer	Model Name	Serial Number	Specifications	Next Cal. Data	DUE CAL
☐	Spectrum Analyzer	H.P	E4407B	US39010225	9 kHz ~ 26.5 GHz	2015-02-13	1 Year
☐	EPM-P SERIES POWER METER	Agilent	E4416A	GB38272722	1 CH 100-240 VAC	2015-08-28	1 Year
☐	Power Sensor	Agilent	8481A	US41030240	MAX.23 dBm AVG, 18 GHz	2015-08-28	1 Year
■	Test receiver	ROHDE & SCHWARZ	ESPI3	101171	9 kHz ~ 3 GHz	2015-08-08	1 Year
■	BI-LOG ANT	SCHWARZBECK	VULB 9163	700	30 MHz ~ 1 GHz	2016-02-28	2 Years
■	Loop Antenna	EMCO	6502	9801-3191	9 kHz ~ 30 MHz	2016-02-04	2 Years
☐	Horn antenna	Schwarzbeck	BBHA 9120D	769	1 GHz ~ 18 GHz	2015-11-29	2 Years
☐	Horn antenna	Schwarzbeck	BBHA 9120D	768	1 GHz ~ 18 GHz	2016-02-26	2 Years
☐	Horn antenna	Schwarzbeck	BBHA9170	BBHA9170178	18 GHz ~ 40 GHz	2016-02-26	2 Years
■	Amplifier	310N	291723	SONOMA	9 kHz ~ 1 GHz	2015-09-02	1 Year
☐	Amplifier	Agilent	8449B	120005	1 GHz ~ 26.5 GHz	2015-03-10	1 Year
■	DC Power Supply	Maynuo	M8811	080010960011103046	30 V 5 A	2015-08-29	1 Year
■	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESR7	101120	10 Hz ~ 7 GHz	2015-01-03	1 Year
■	LISN	SCHWARZBECK	NSLK 8127	8127518	9 kHz ~ 30 MHz	2015-08-28	1 Year