TEST REPORT

KCTL Inc.
28 Mosan-gil, Jeongnam-myeon, Hwaseong-si,
Gyeonggi-do, Republic of Korea(18516)
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1. Client

- Name : FINEDIGITAL Inc.
- Address : 7th Floor, Fine Venture Bldg., 345-1 Yatap-dong, Bundang-gu, Seongnam-si, Gyeonggi-do, 463-828 KOREA
- Date of Receipt : 2019-10-18

2. Use of Report : -

3. Name of Product and Model : Dash Cam / LX2000

4. Manufacturer and Country of Origin : FINEDIGITAL Inc. / Korea

5. Date of Test : 2019-11-01 - 2019-11-15

6. Test method used : ANSI C63.4:2014
FCC Part 15 Subpart B, Class B

7. Test Results : Complied

Affirmation	Tested by Name : Hyungkeun Min (Signature)	Technical Manager Name : Jaehyun Park (Signature)

2019-11-15

KCTL Inc.

REPORT REVISION HISTORY

Date	Revision	Page No
2019-11-04	Originally issued	-
2019-11-15	Change Class A to Class B	1, 6, 12, 13, 16, 17, 18, 19, 20

Contents

1. Applicant information

Applicant:	FINEDIGITAL Inc.
Address:	7th Floor, Fine Venture Bldg., 345-1 Yatap-dong, Bundang-gu, Seongnam-si, Gyeonggi-do, 463-828 KOREA
Telephone:	+82-31-788-8713
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Contact name:	Poongki Min

Manufacturer:	FINEDIGITAL Inc.
Address:	7th Floor, Fine Venture Bldg., 345-1 Yatap-dong, Bundang-gu, Seongnam-si, Gyeonggi-do, 463-828 KOREA
Telephone:	+82-31-788-8713
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E-mail:	pkmin@finedigital.com
Contact name:	Poongki Min

2. Laboratory information

Address

KCTL Inc. (Hwaseong Lab.)

28, Mosan-gil, Jeongnam-myeon, Hwaseong-si, Gyeonggi-do, 18516, Korea

Telephone Number: 82 31 286 5881

Facsimile Number: 82 31 8059 1154

FCC Site Designation No: KR0040

KOLAS NO.: KT231

SITE MAP

3. Test system configuration

3.1 Operation environment

	Temperature	Humidity	Pressure
Chamber 10 m (RE)	18.1 °C	35.2 % R.H.	-
Chamber 3 m (RE)	16.5 °C	48.3 % R.H.	-

Test site

These testing items were performed following locations;

Test item	Test site
Radiated Emission (Below 1 GHz)	10 m Chamber
Radiated Emission (Above 1 GHz)	3 m Chamber

3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC.
The factors contributing to uncertainties are test receiver, cable loss, antenna factor calibration, Antenna directivity, antenna factor variation with height, antenna phase center variation, antenna frequency interpolation, measurement distance variation, site imperfection, mismatch, and system repeatability. Based on CISPR 16-4-2, the measurement uncertainty level with a 95 % confidence level was applied.

Radiated Emission measurement (Confidence level about 95 %, k = 2)		
10 m Chamber	30 MHz ~ 1 GHz	3 m : 4.96 dB
		10 m : 4.96 dB
3 m Chamber	1 GHz ~ 6 GHz	3 m : 6.40 dB

3.3 Measurement Program

These test items were performed by software programs;

Test item	Measurement Program	Used
Radiated Emission(Below 1 GHz)	EMI_V 2.01.0060 (tsj corporation)	☒
Radiated Emission(Above 1 GHz)	TEPTO-DV/RE V 3.1.0047 (tsj corporation)	☒

4. Description of EUT

4.1 General information

ITEM	SPEC.	REMARKS
Model Name	FineVu LX2000	
Dimension / Weight	Front : 98.5 x 60.9 x 31.0mm / 96g Rear : 53.4 x 29 x 42.3mm / 30g	Excluding cables and cradle.
Memory Capacity	Micro SD Card (16G/32G/64G)	MLC, Class10 or above recommended / SDXC compatible
Recording Mode	Driving recording mode	1 min. interval recording
	Event (impact) recording mode	20 sec. recording (5 sec. before / 15 sec. after impact)
	Emergency recording mode	20 sec. recording (5 sec. before / 15 sec. after impact)
	Parking (impact & motion detection) recording	20 sec. recording (5 sec. before / 15 sec. after impact)
	Driving time lapse recording	30fps recording after impact detected
	Parking time lapse recording	30fps recording after impact detected
Lens	Full HD wide angle lens	
Image Sensor	Front/Rear : 2M pixels CMOS Image Sensor	
Viewing Angle	Front : 155° / Rear : 140°	
Resolution	Front : Full HD 1920x1080@30fps Rear : Full HD 1920x1080@30fps	
Encoding	Video : H.264 / Audio : PCM	AVI (2Video-1Audio)
Display	3.5" IPS LCD (800x480) with touch	
Mic.	Built-in	
Speaker	Built-in	8 ohm
Acceleration Sensor	3-Axis Acceleration G-Sensor	
Input Voltage	DC 12V - 24V	
Backup Battery	Built-in Super Capacitor	
Power Consumption	3.5W	Based on 2CH, LCD off, GPS off
Temperature	Operation Temperature : -10℃ ~ 60℃ (14℉~140℉) Storage Temperature : -20℃ ~ 70℃ (-4℉~158℉)	
Interface	Power Port(3.5 Ø), Rear Camera Port (2.5 Ø), External GPS Port(2.5 Ø)	
Certificate	KC (R-R-FDK-FineR018), FCC (PWS-FINEVULX2000)	

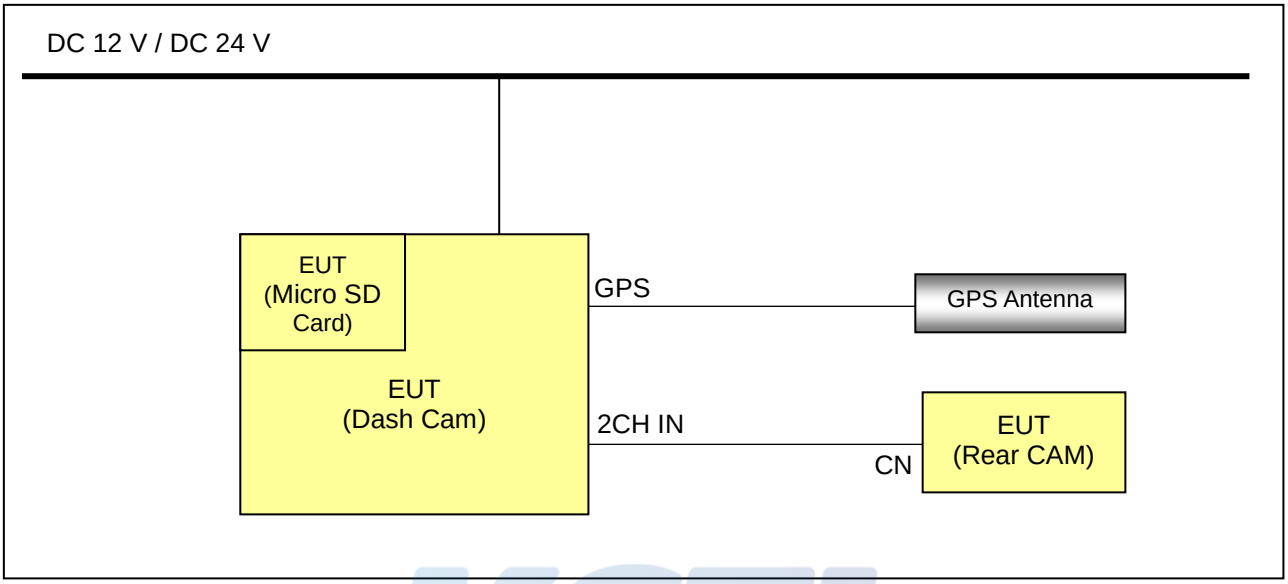
4.2 Product description

Type of product	Dash Cam
Model name (Basic)	LX2000
Model name (Variant)	-
Difference	-
Trade name	-
Serial no	-
Testing voltage	DC 12 V / DC 24 V
Input range	DC 12 V / DC 24 V
Internal clock frequency	800 MHz

4.3 Auxiliary equipments

Type	Model / Part #	S/N	Manufacturer
GPS Antenna	-	-	FINEDIGITAL Inc.

4.4 Test configuration



	Start		End		Cable	
	Name	I/O port	Name	I/O port	Length (m)	Spec.
1	**Dash Cam (EUT)**	GPS	GPS Antenna	-	0.8	Shield
2		Micro SD	Micro SD Card(EUT)	-	-	-
3		2CH IN	Rear CAM (EUT)	CN	6.4	Shield

4.5 Operating conditions

The EUT was configured as normal intended use.

Test mode	Normal operating
1 [F-CAM MODE]	After connecting the EUT with the peripherals, it was tested while checking the images taken by the Dash Cam.
2 [R-CAM MODE]	After connecting the EUT with the peripherals, it was tested while monitoring the image recording to the EUT through Dash Cam.

5. Summary of test results

In the above configuration tested, The EUT complied with the requirement of the specification

5.1 Summary of EMI emission test results

FCC Part 15 Subpart B (Class B)

ANSI C63.4 – 2014

Applied	Test items	Test method	Result
☐	Conducted Emission	ANSI C63.4:2014 FCC Part 15 Subpart B, Class B	N/A
☒	Radiated Emission	ANSI C63.4:2014 FCC Part 15 Subpart B, Class B	Pass

Note: The Conducted Emission test was not apply to the EUT is powered by DC Power.

The data collected shows that EUT the complied with technical requirements of above rules part 15.107(a), (d) and 15.109(a).

6. Test results

6.1 Radiated Emission

Test specification	FCC Part 15, Section 15.109, Class B		
Testing voltage	DC 12 V / DC 24 V		
Test facility	10 m Chamber / 3 m Chamber		
Test distance	10 m / 3 m		
Date	2019-11-15 / 2019-11-01		
Temperature (°C)	18.1 °C / 16.5 °C	Humidity (% R.H.)	35.2 % R.H. / 48.3 % R.H.
Remarks	Pass		

6.1.1 Limits of radiated emission measurement

☒ Limits below 1 ㎓

Frequency [㎒]	Class A (dB(㎶/m)) @ 10 m	Class B (dB(㎶/m)) @ 3 m
30-88	39	40
88-216	43.5	43.5
216-960	46.4	46
Above 960	49.5	54

☒ Limits above 1 ㎓

Frequency [㎓]	Class A @ 3 m		Class B @ 3 m	
	Average limit (dB(㎶/m))	Peak limit (dB(㎶/m))	Average limit (dB(㎶/m))	Peak limit (dB(㎶/m))
1 ~	60	80	54	74
Note - The lower limit applies at the transition frequency.				

6.1.2 Measurement procedure

The test was done at a 10 m Chamber with a quasi-peak detector.
EUT was placed on a non-metallic table height of 0.8 m above the reference ground plane.
Cables were folded back and forth forming a bundle 0.3 m to 0.4 m long and were hanged at a 0.4 m height to the ground plane. Cables connected to EUT were fixed to cause maximum emission.
Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.
The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

6.1.3 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. Date	Used
Test Receiver	ESCI	100561	Rohde & Schwarz	2020-09-19	☒
BI-LOG Ant.	VULB9160	3121	Schwarzbeck	2020-03-12	☒
Amplifier	310N	185938	SONOMA	2020-01-03	☒
Double Ridge Horn Antenna	SAS-571	500	A.H. SYSTEMS	2020-10-16	☒
PREAMPLIFIER	87405C	MY47010666	AGILENT	2020-01-03	☒
SIGNAL ANALYZER	FSV	101244	Rohde & Schwarz	2020-02-19	☒

6.1.4 Sample calculation

The field strength is calculated adding the antenna Factor, cable loss and, Antenna pad adding, subtracting the amplifier gain from the measured reading.
The sample calculation is as follow:

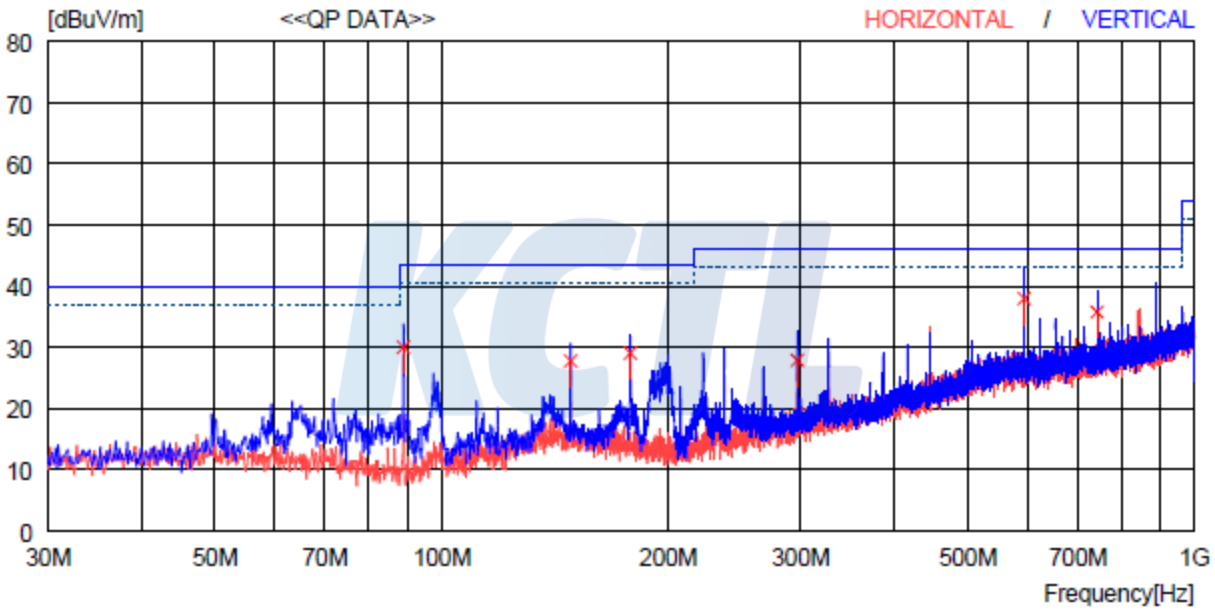
Result QP[dB(μV/m)] = Reading QP[dB(μV)] + ANT FACTOR [dB/m] + LOSS [dB] - GAIN [dB]
Result QP : The final measure
Reading QP : Instrument readings
ANT FACTOR: Antenna Factor
LOSS: Cable Loss
GAIN: Amplifier Gain

6.1.5 Radiated emission measurement result

Graph and Data

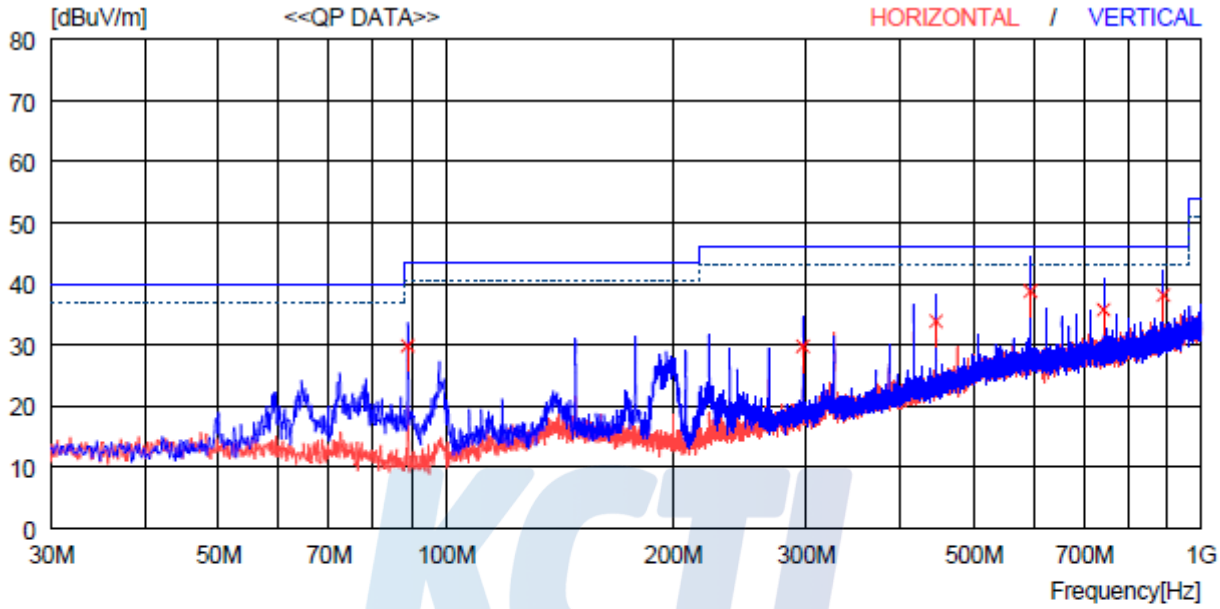
30 MHz ~ 1 GHz

[DC 12 V - F-CAM MODE]



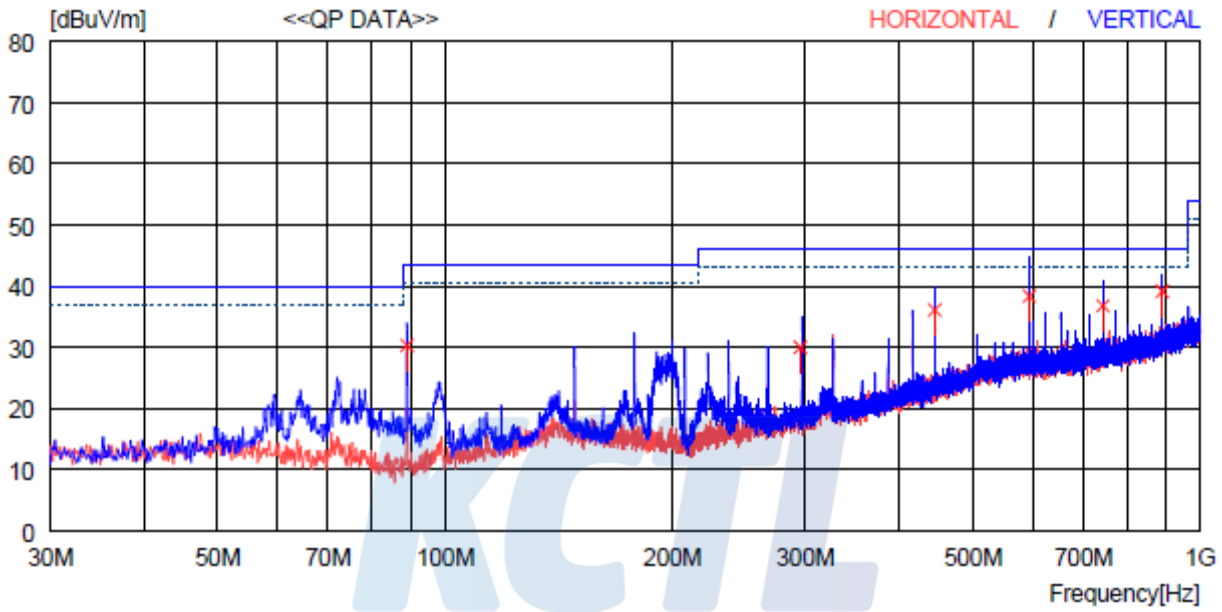
No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT QP [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [deg]
---- Vertical -----										
1	89.049	45.3	14.8	1.5	31.6	30.0	43.5	13.5	164	218
2	148.443	38.7	18.5	2.1	31.5	27.8	43.5	15.7	219	155
3	178.139	39.5	18.8	2.3	31.5	29.1	43.5	14.4	356	92
4	296.941	36.2	19.9	3.2	31.4	27.9	46.0	18.1	184	265
5	594.059	37.4	26.1	6.2	31.7	38.0	46.0	8.0	269	138
6	742.642	33.9	28.2	5.6	31.9	35.8	46.0	10.2	213	214

[DC 12 V - R-CAM MODE]



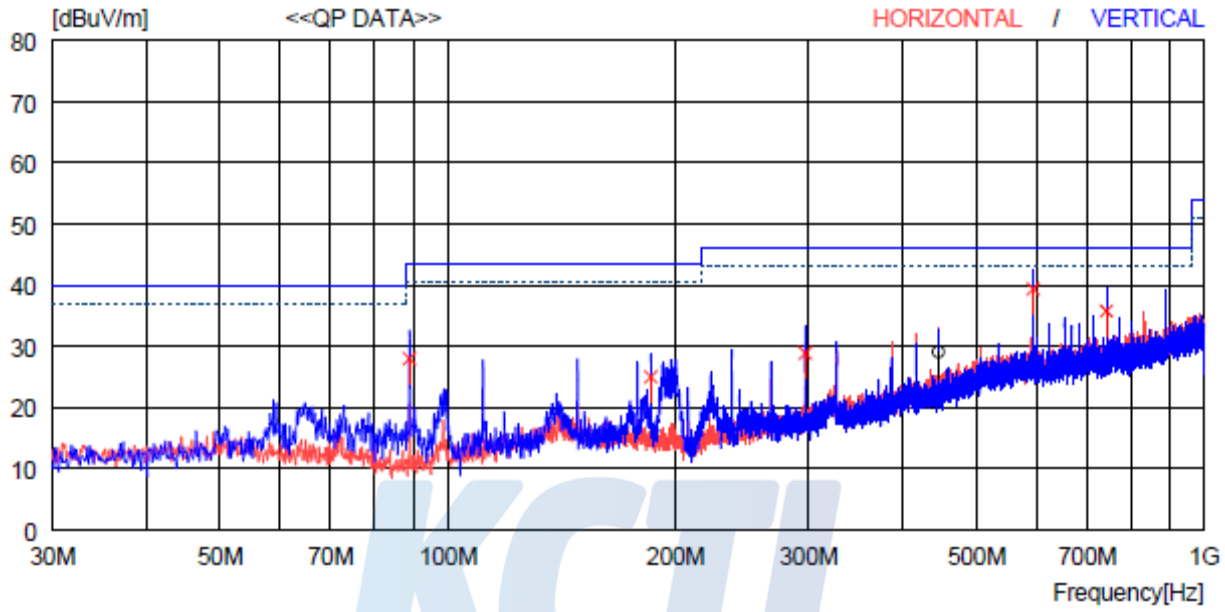
No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT QP [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [deg]
--- Vertical ---										
1	89.049	45.2	14.8	1.5	31.6	29.9	43.5	13.6	168	236
2	296.993	38.1	19.9	3.2	31.4	29.8	46.0	16.2	248	135
3	445.524	36.9	23.2	5.3	31.5	33.9	46.0	12.1	316	211
4	594.055	38.2	26.1	6.2	31.7	38.8	46.0	7.2	293	196
5	742.586	33.9	28.2	5.6	31.9	35.8	46.0	10.2	351	312
6	891.118	34.2	29.5	5.9	31.4	38.2	46.0	7.8	196	39

[DC 24 V - F-CAM MODE]



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT QP [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [deg]
---- Vertical -----										
1	89.062	45.6	14.8	1.5	31.6	30.3	43.5	13.2	154	310
2	295.623	38.3	19.9	3.2	31.4	30.0	46.0	16.0	218	270
3	445.312	39.1	23.2	5.3	31.5	36.1	46.0	9.9	297	241
4	593.872	37.8	26.1	6.2	31.7	38.4	46.0	7.6	328	359
5	743.688	34.9	28.2	5.6	31.9	36.8	46.0	9.2	198	182
6	890.925	35.2	29.5	5.9	31.4	39.2	46.0	6.8	153	57

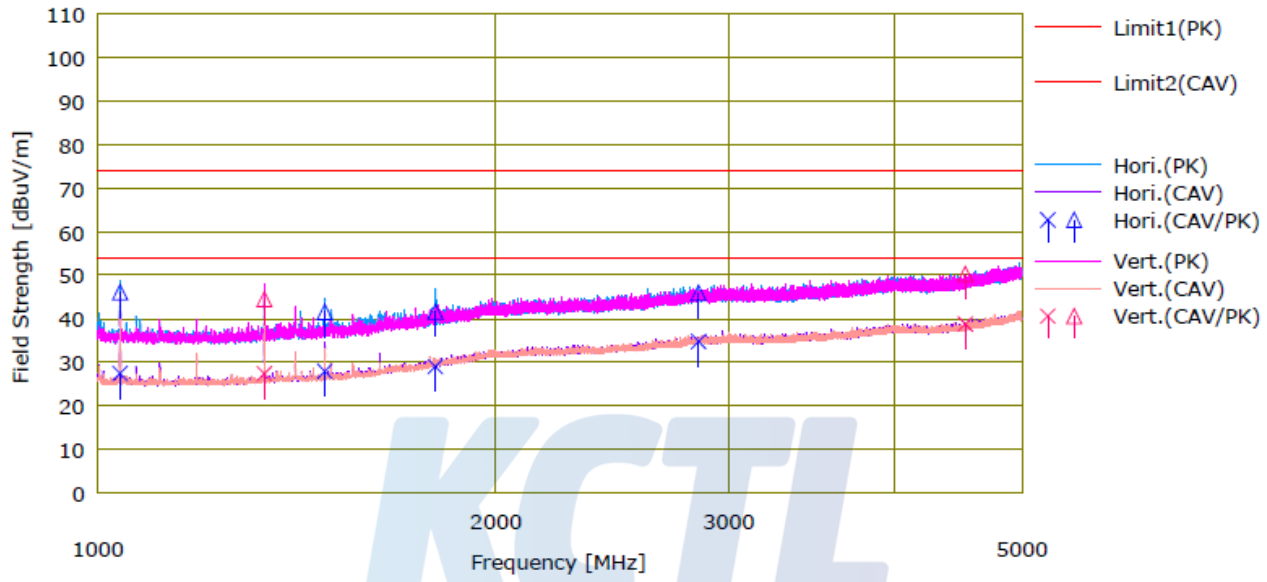
[DC 24 V - R-CAM MODE]



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT QP [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [deg]
--- Horizontal ---										
1	445.524	32.1	23.2	5.3	31.5	29.1	46.0	16.9	168	38
--- Vertical ---										
2	89.049	43.3	14.8	1.5	31.6	28.0	43.5	15.5	236	218
3	185.532	36.0	18.1	2.4	31.5	25.0	43.5	18.5	311	135
4	296.941	37.2	19.9	3.2	31.4	28.9	46.0	17.1	189	56
5	594.059	38.8	26.1	6.2	31.7	39.4	46.0	6.6	265	228
6	742.642	33.9	28.2	5.6	31.9	35.8	46.0	10.2	319	129

1 ㎓ – 5 ㎓

[DC 12 V - F-CAM MODE]



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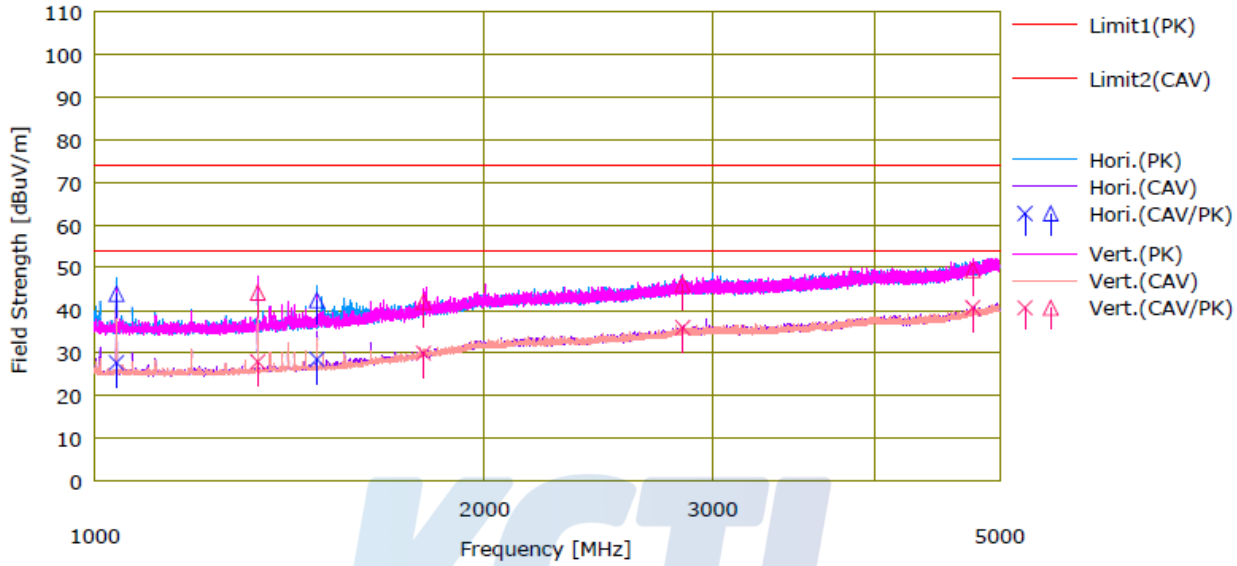
	[MHz]	[dBuV]	[dBuV]	[dB/m]	dBuV/m	dBuV/m	dBuV/m	dBuV/m	[dB]	[dB]	[H/V]	[cm]	[deg]		
1	1039.506	28.72	47.32	-1.25	27.47	46.07	74.00	54.00	27.93	26.53	Hori.	138	249	Horn	
2	1336.235	28.14	45.24	-0.76	27.38	44.48	74.00	54.00	29.52	26.62	Vert.	229	192	Horn	
3	1485.159	28.57	42.18	-0.60	27.97	41.58	74.00	54.00	32.42	26.03	Hori.	318	308	Horn	
4	1800.034	27.66	40.31	1.36	29.02	41.67	74.00	54.00	32.33	24.98	Hori.	156	185	Horn	
5	2847.220	28.41	39.58	6.33	34.74	45.91	74.00	54.00	28.09	19.26	Hori.	215	319	Horn	
6	4531.930	29.15	40.63	9.67	38.82	50.30	74.00	54.00	23.70	15.18	Vert.	318	191	Horn	

[DC 12 V - R-CAM MODE]



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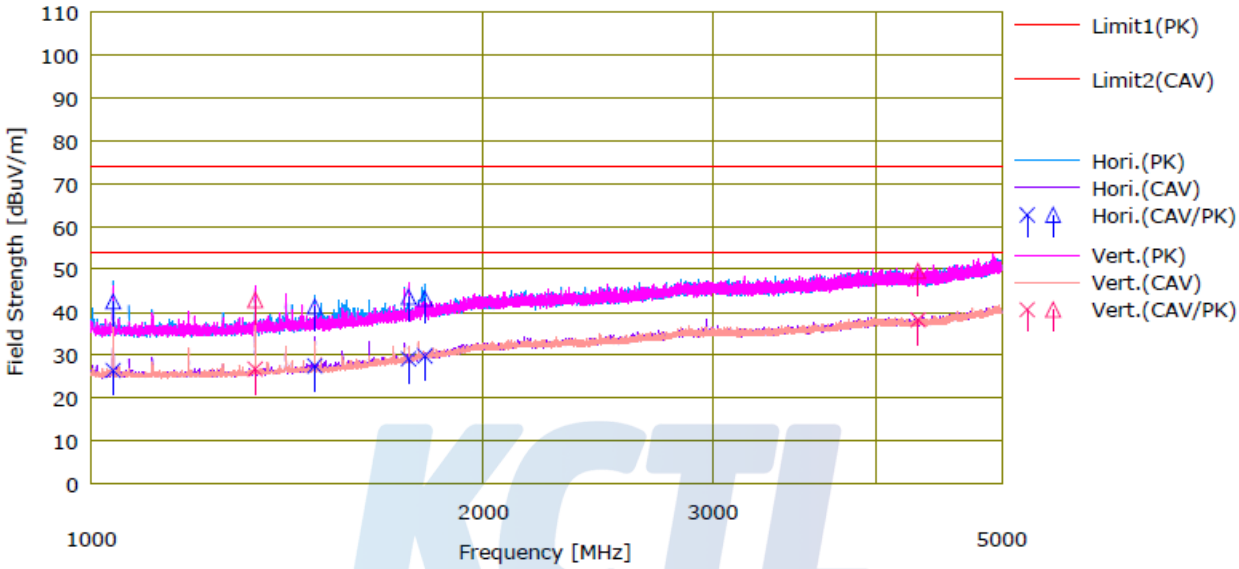
1	1039.478	28.96	45.12	-1.25	27.71	43.87	74.00	54.00	30.13	26.29	Hori.	156	249	Horn	
2	1336.242	28.73	44.83	-0.76	27.97	44.07	74.00	54.00	29.93	26.03	Vert.	227	192	Horn	
3	1484.773	29.12	42.96	-0.60	28.52	42.36	74.00	54.00	31.64	25.48	Hori.	315	307	Horn	
4	1794.731	28.51	40.54	1.44	29.95	41.98	74.00	54.00	32.02	24.05	Vert.	268	213	Horn	
5	2846.037	29.60	39.72	6.33	35.93	46.05	74.00	54.00	27.95	18.07	Vert.	243	133	Horn	
6	4768.200	29.88	38.65	10.71	40.59	49.36	74.00	54.00	24.64	13.41	Vert.	168	37	Horn	

[DC 24 V - F-CAM MODE]



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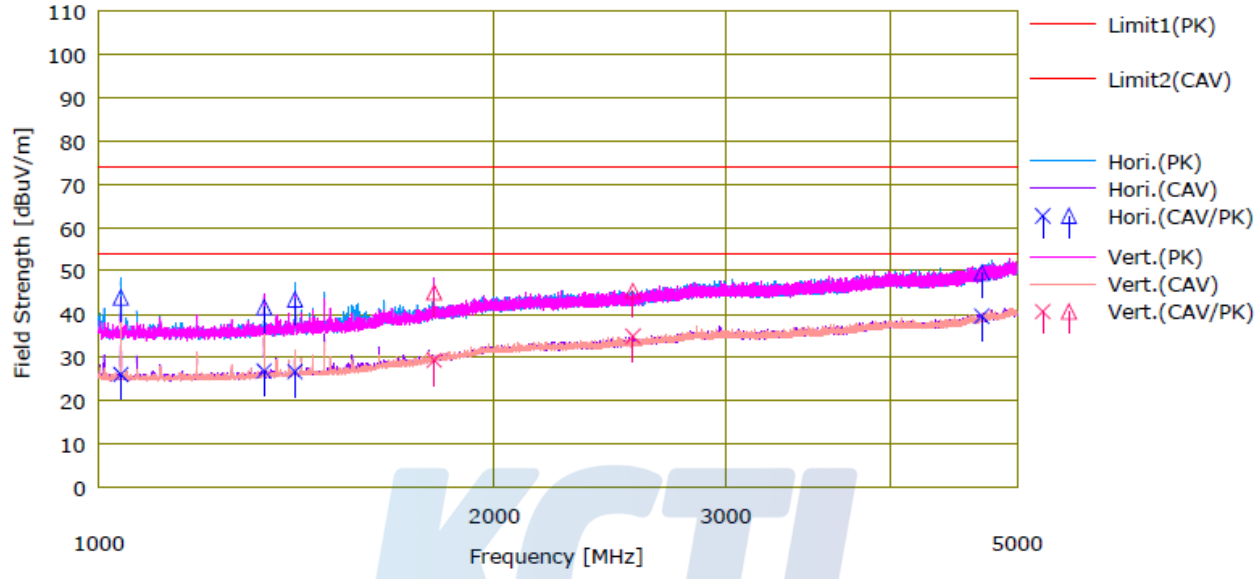
1	1039.366	27.69	43.73	-1.25	26.44	42.48	74.00	54.00	31.52	27.56	Hori.	163	251	Horn	
2	1336.498	27.47	43.62	-0.76	26.71	42.86	74.00	54.00	31.14	27.29	Vert.	228	208	Horn	
3	1484.711	28.10	41.87	-0.60	27.50	41.27	74.00	54.00	32.73	26.50	Hori.	313	307	Horn	
4	1752.550	28.14	42.56	0.99	29.13	43.55	74.00	54.00	30.45	24.87	Hori.	297	291	Horn	
5	1804.224	28.33	41.71	1.46	29.79	43.17	74.00	54.00	30.83	24.21	Hori.	164	264	Horn	
6	4313.362	29.18	40.50	9.08	38.26	49.58	74.00	54.00	24.42	15.74	Vert.	198	69	Horn	

[DC 24 V - R-CAM MODE]



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	[MHz]	[dBuV]	[dBuV]	[dB/m]	dBuV/m	dBuV/m	dBuV/m	dBuV/m	[dB]	[dB]	[H/V]	[cm]	[deg]		
1	1039.694	27.35	45.11	-1.25	26.10	43.86	74.00	54.00	30.14	27.90	Hori.	156	249	Horn	
2	1336.669	27.66	42.37	-0.77	26.89	41.60	74.00	54.00	32.40	27.11	Hori.	218	213	Horn	
3	1410.627	27.31	43.98	-0.58	26.73	43.40	74.00	54.00	30.60	27.27	Hori.	315	158	Horn	
4	1800.289	27.89	43.55	1.46	29.35	45.01	74.00	54.00	28.99	24.65	Vert.	286	316	Horn	
5	2550.172	28.31	38.73	6.61	34.92	45.34	74.00	54.00	28.66	19.08	Vert.	156	63	Horn	
6	4701.949	29.12	39.12	10.43	39.55	49.55	74.00	54.00	24.45	14.45	Hori.	198	274	Horn	