Test Report

HK L&M INDUSTRIAL CO., LIMITED.

21.5 inch double-sided LCD advertising display

Model No.: LM22-DSA-2A, LM22-DSA-2B, LM22-DSA-2C, LM22-DSA-2D, LM22-DSA-2E, LM22-DSA-2F, LM22-DSA-2G, LM22-DSA-2H, LM22-DSA-2I, LM22-DSA-2J

FCC ID: 2AFOTSZLMY2015

Prepared for	:	HK L&M INDUSTRIAL CO., LIMITED.
Address	:	6/F,Zhengqilong Industrial Zone,No. 108, Gushu 1st Rd.,Xixiang, Bao'an,Shenzhen,Guangdong
Prepared by	:	EMTEK (SHENZHEN)CO., LTD.
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Report Number	:	ES150730401E1
Date of Test	:	November 12, 2015 to December 24, 2015
Date of Report	:	December 24, 2015

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TEST REPORT DESCRIPTION

Applicant	:	HK L&M INDUSTRIAL CO., LIMITED
Manufacturer	:	Shenzhen L&M Electronic Technology Co., Ltd
Trade Mark	:	N/A
EUT	:	21.5 inch double-sided LCD advertising display
Model No.	:	LM22-DSA-2A, LM22-DSA-2B, LM22-DSA-2C, LM22-DSA-2D, LM22-DSA-2E, LM22-DSA-2F, LM22-DSA-2G, LM22-DSA-2H, LM22-DSA-2I, LM22-DSA-2J
Power Supply	:	AC 100-120V/7A 50/60Hz, AC 200-240V/4A 50/60Hz

Measurement Procedure Used:

According to FCC Part 2.1051 and FCC Part 22.917(a) and FCC KDB 971168 D01 Power Meas License Digital Systems v02r02
The device described above is tested by EMTEK(SHENZHEN) CO., LTD. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and EMTEK(SHENZHEN) CO., LTD. is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of EMTEK(SHENZHEN) CO., LTD.

Date of Test	:	November 12, 2015 to December 24, 2015
Prepared by	:	Andy Wei/Editor
Reviewer	:	Joe Xia/Supervisor
Approved & Authorized Signer	:	Lisa Wang/Manager

Modified Information

Version	Report No.	Revision Data	Summary
Ver.1.0	ES150730401E1	2015-12-24	Original Version

1. SUMMARY OF TEST RESULT

EMISSION		
Description of Test Item	Standard & Limits	Results
Receiver Spurious Emission	§22.917(a)	Pass
Note: N/A is an abbreviation for Not Applicable.		

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

EUT	:	21.5 inch double-sided LCD advertising display
Model Number	:	LM22-DSA-2A, LM22-DSA-2B, LM22-DSA-2C, LM22-DSA-2D, LM22-DSA-2E, LM22-DSA-2F, LM22-DSA-2G, LM22-DSA-2H, LM22-DSA-2I, LM22-DSA-2J
Test Voltage	:	AC 100-120V/7A 50/60Hz, AC 200-240V/4A 50/60Hz
Applicant	:	HK L&M INDUSTRIAL CO., LIMITED
Address	:	6/F,Zhengqilong Industrial Zone,No. 108, Gushu 1st Rd.,Xixiang, Bao'an,Shenzhen,Guangdong
Manufacturer	:	Shenzhen L&M Electronic Technology Co., Ltd
Address	:	6/F,Zhengqilong Industrial Zone,No. 108, Gushu 1st Rd.,Xixiang, Bao'an,Shenzhen,Guangdong
Date of Received	:	November 12, 2015
Date of Test	:	November 12, 2015 to December 24, 2015

2.2. Description of Test Facility

Site Description

EMC Lab. : Accredited by CNAS, 2013.10.29
The certificate is valid until 2016.10.28
The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2005)
The Certificate Registration Number is L2291.

Accredited by TUV Rheinland Shenzhen 2010.5.25
The Laboratory has been assessed according to the requirements ISO/IEC 17025.

Accredited by FCC, April 17, 2013
The Certificate Registration Number is 709623.

Accredited by Industry Canada, November 29, 2012
The Certificate Registration Number is 46405-4480.

Name of Firm : EMTEK(SHENZHEN) CO., LTD.

Site Location : Bldg 69, Majialong Industry Zone,
Nanshan District, Shenzhen, Guangdong, China

2.3. Measurement Uncertainty

Test Item		Uncertainty
Conducted Emission Uncertainty	:	3.16dB(9k~150kHz Conduction 2#) 2.90dB(150k-30MHz Conduction 2#)
Radiated Emission Uncertainty (3m Chamber)	:	3.78dB (30M~1GHz Polarize: H) 4.27dB (30M~1GHz Polarize: V)

3. MEASURING DEVICE AND TEST EQUIPMENT

Radiated Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	Period of validity
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	05/15/2016
Pre-Amplifier	HP	8447D	2944A07999	05/15/2016
Bilog Antenna	Schwarzbeck	VULB9163	142	05/15/2016
Loop Antenna	ARA	PLA-1030/B	1029	05/15/2016
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	05/15/2016
Horn Antenna	Schwarzbeck	BBHA 9120	D143	05/15/2016
Cable	Schwarzbeck	AK9513	ACRX1	05/15/2016
Cable	Rosenberger	N/A	FP2RX2	05/15/2016
Cable	Schwarzbeck	AK9513	CRPX1	05/15/2016
Cable	Schwarzbeck	AK9513	CRRX2	05/15/2016

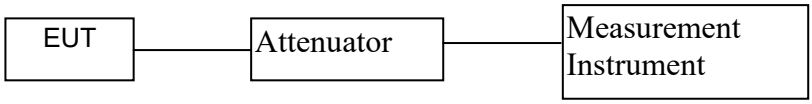
Radio Frequency Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	Period of validity
Spectrum Analyzer	Agilent	E4407B	88156318	05/15/2016
Power meter	Anritsu	ML2495A	0824006	05/15/2016
Power sensor	Anritsu	MA2411B	0738172	05/15/2016
Radio Communication Tester	R&S	CMU200	1100.0008.02	05/15/2016
Radio Communication Tester	R&S	CMW500	12010002K50-140822-2K	05/15/2016

4. RECEIVER SPURIOUS EMISSION

RADIO FREQUENCY TEST SETUP 1

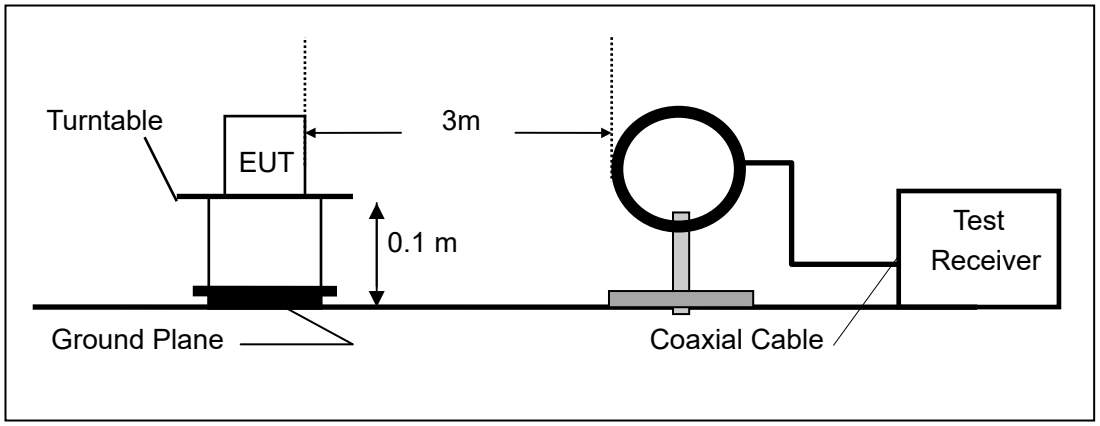
The component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by software to emit the specified signals for the purpose of measurements.



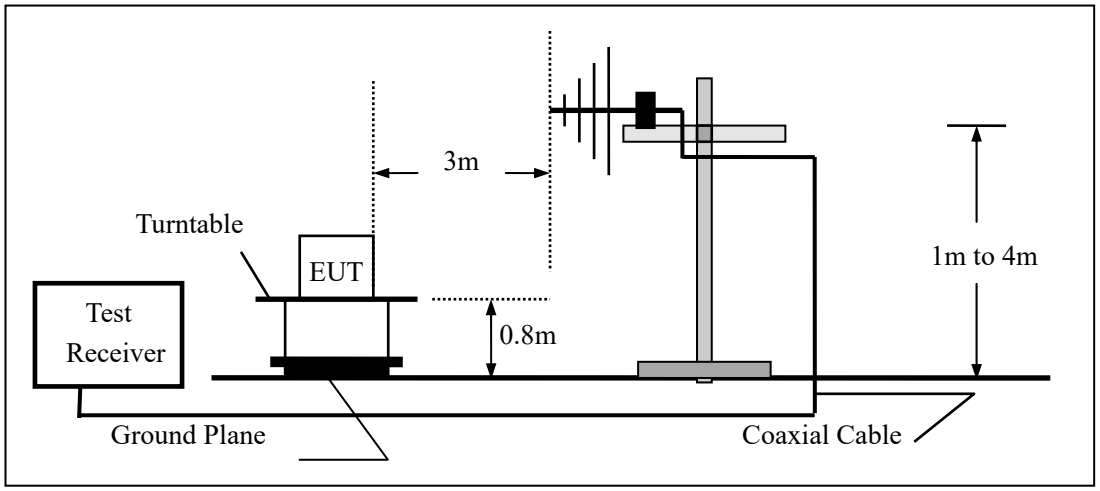
RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m.The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.
The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

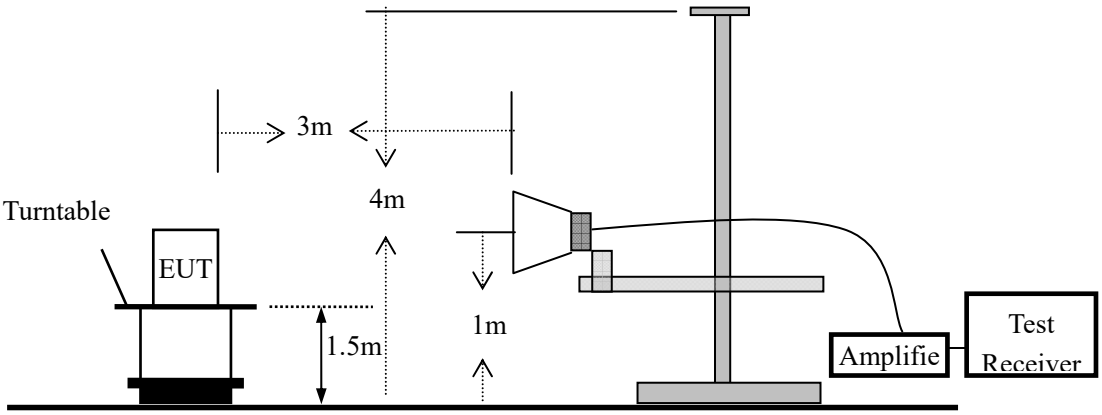
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(c) Radiated Emission Test Set-Up, Frequency above 1000MHz



Applicable Standard

According to FCC Part 2.1051 and FCC Part 22.917(a) and FCC KDB 971168 D01 Power Meas License Digital Systems v02r02

Conformance Limit

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

Test Configuration

Test according to clause 6.2 radio frequency test setup

Test Configuration

Connect the EUT to Universal Radio Communication Tester CMU200 or CMU500 via the antenna connector.
The EUT was communicated with the BTS simulator through Air interface. The Mobile Station operated on the typical channel and the Mobile Station worked in idle mode, transmitter was not work in this test.
Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
then the following procedure can be used to determine spurious emission

a) RBW = 1 MHz for f ≥ 1 GHz(1GHz to 25GHz), 100 kHz for f < 1 GHz(30MHz to 1GHz), 200Hz for f<150KHz(9KHz to 150KHz), 9KHz for f<30MHz(150KHz to 30KHz)
b) Set VBW ≥ 3 × RBW.
c) Set span wide enough to fully capture the emission being measured
d) Sweep time = auto couple.
e) Detector = peak.
f) Ensure that the number of measurement points ≥ span/RBW.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the peak amplitude level.

Step1. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.
Step2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
Step3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
Step4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
Step5. Make the measurement with the spectrum analyzer's RBW , VBW , taking the record of maximum spurious emission.
Step6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
Step7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
Step8. Taking the record of output power at antenna port.
Step9. Repeat step 7 to step 8 for another polarization.
Step10. Emission level (dBm) = output power + substitution Gain.Test Results

Test Results

. Test Mode	Channel Number	Channel Frequency (MHz)	Worst Result Mode	Verdict
GSM 850	128	824.2	☐GSM	PASS
	189	836.4		PASS
	251	848.8		PASS
GPRS 850	128	824.2	☐GPRS	PASS
	189	836.4		PASS
	251	848.8		PASS
WCDMA 850	4132	826.4	☐WCDMA	PASS
	4182	836.4		PASS
	4233	846.6		PASS
NOTE1: N/A (Not Applicable)				

Operation Mode	Channel Number	Channel Frequency (MHz)	Worst Result Mode	Verdict
PCS1900	512	1850.2	☐GSM	PASS
	661	1880.0		PASS
	810	1909.8		PASS
GPRS1900	512	1850.2	☐GPRS	PASS
	661	1880.0		PASS
	810	1909.8		PASS
WCDMA1900	9262	1852.4	☐WCDMA	PASS
	9400	1880.0		PASS
	9538	1907.6		PASS

All modes have been tested, and the worst result recorded was report as below

GSM850 (GSM Link), 9KHz to 30MHz

The low frequency, which started from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line, and that was not reported per 2.1057 (c).

GSM850 (GSM Link), 30MHz to 1GHz

Frequency (MHz)	Ant. Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
Middle Channel 189 (836.40MHz)							
449.95	H	-44.45	3.04	-2.56	-50.05	-13	-37.05
449.95	V	-44.88	3.04	-2.56	-50.48	-13	-37.48

GSM850 (GSM Link), Above 1GHz

Frequency (MHz)	Ant. Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
Middle Channel 189 (836.40MHz)							
2546.45	H	-53.15	7.14	10.5	-49.79	-13	-36.79
2546.45	V	-52.25	7.14	10.5	-48.89	-13	-35.89

GSM850 (GPRS 12 Link), 9KHz to 30MHz

The low frequency, which started from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line, and that was not reported per 2.1057 (c).

GSM850 (GPRS 12 Link), 30MHz to 1GHz

Frequency (MHz)	Ant. Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
Middle Channel 189 (836.40MHz)							
444.78	H	-43.16	3.25	-2.68	-49.09	-13	-36.09
444.78	V	-42.28	3.25	-2.68	-48.21	-13	-35.21

GSM850 (GPRS 12 Link), Above 1GHz

Frequency (MHz)	Ant. Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
Middle Channel 189 (836.40MHz)							
2459.75	H	-50.3	7.25	-3.82	-61.37	-13	-48.37
2459.75	V	-50.5	7.25	-3.82	-61.57	-13	-48.57

WCDMA Band V 9KHz to 30MHz

The low frequency, which started from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line, and that was not reported per 2.1057 (c).

WCDMA Band V 30MHz to 1GHz

Frequency (MHz)	Ant. Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
Middle Channel 4182 (836.50MHz)							
626.96	H	-45.3	4.15	-3.05	-52.5	-13	-39.5
626.96	V	-46.22	4.15	-3.05	-53.42	-13	-40.42

WCDMA Band V Above 1GHz

Frequency (MHz)	Ant. Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
Middle Channel 4182 (836.50MHz)							
2804.15	H	-50.01	8.95	10.34	-48.62	-13	-35.62
2804.15	V	-49.35	8.95	10.34	-47.96	-13	-34.96

GSM1900 (GSM Link), 9KHz to 30MHz

The low frequency, which started from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line, and that was not reported per 2.1057 (c).

GSM 1900 (GSM Link), 30MHz to 1GHz

Frequency (MHz)	Ant. Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Middle Channel 661 (1880.00MHz)							
554.75	H	-44.67	4.64	-2.21	-51.52	-13	-38.52
554.75	V	-44.28	4.64	-2.21	-51.13	-13	-38.13

GSM 1900 (GSM Link), Above 1GHz

Frequency (MHz)	Ant. Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Middle Channel 661 (1880.00MHz)							
3434.94	H	-48.67	9.15	10.22	-47.60	-13	-34.60
3434.94	V	-48.20	9.15	10.22	-47.13	-13	-34.13

GSM1900 (GPRS 12 Link), 9KHz to 30MHz

The low frequency, which started from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line, and that was not reported per 2.1057 (c).

GSM1900 (GPRS 12 Link), 30MHz to 1GHz

Frequency (MHz)	Ant. Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Middle Channel 661 (1880.00MHz)							
568.01	H	-46.32	4.5	-3.5	-54.32	-13	-41.32
568.01	V	-47.42	4.5	-3.5	-55.42	-13	-42.42

GSM1900 (GPRS 12 Link), Above 1GHz

Frequency (MHz)	Ant. Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Middle Channel 661 (1880.00MHz)							
3590.24	H	-48.52	9.34	10.7	-47.16	-13	-34.16
3590.24	V	-47.45	9.34	10.7	-46.09	-13	-33.09

WCDMA Band II 9KHz to 30MHz

The low frequency, which started from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line, and that was not reported per 2.1057 (c).

WCDMA Band II 30MHz to 1GHz

Frequency (MHz)	Ant. Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Middle Channel 9400 (1880MHz)							
826.15	H	-50.12	5.32	2.7	-52.74	-13	-39.74
826.15	V	-49.45	5.32	2.7	-52.07	-13	-39.07

WCDMA Band II Above 1GHz

Frequency (MHz)	Ant. Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Middle Channel 9400 (1880MHz)							
3566.37	H	-49.30	8.80	10.80	-47.30	-13	-34.30
3566.37	V	-50.60	8.80	10.80	-48.60	-13	-35.60

END OF REPORT