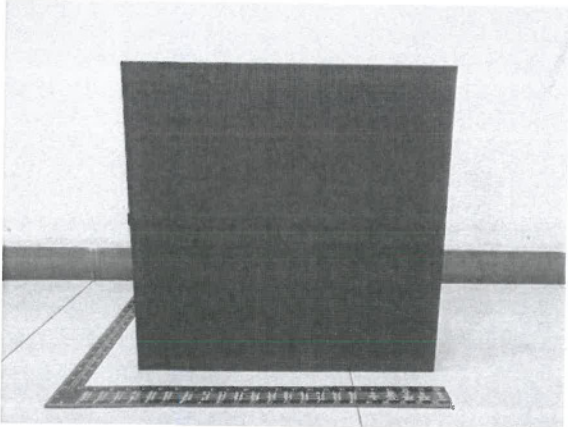


Prüfbericht-Nr.: Test Report No.:		50109929 001		Auftrags-Nr.: Order No.:		164110095		Seite 1 von 31 Page 1 of 31	
Kunden-Referenz-Nr.: Client Reference No.:		463089		Auftragsdatum: Order date.:		02 Nov. 2017			
Auftraggeber: Client:		Shenzhen Dicolor Optoelectronics Co., Ltd. Dicolor Industrial park, No.18 Zhongtai Road, GongMing Town, GuangMing New District, Shenzhen, P.R. China							
Prüfgegenstand: Test item:		Full Color LED Display							
Bezeichnung / Typ-Nr.: Identification / Type No.:		A-261, A-291, A-391							
Auftrags-Inhalt: Order content:		TUV Rheinland - EMC service							
Prüfgrundlage: Test specification:		EN 55032:2012 EN 61000-3-2:2014 EN 61000-3-3:2013 EN 55024:2010							
Wareneingangsdatum: Date of receipt:		17 October 2017							
Prüfmuster-Nr.: Test sample No.:		ES171017999E							
Prüfzeitraum: Testing period:		Refer to test report							
Ort der Prüfung: Place of testing:		Refer to section 2.1							
Prüflaboratorium: Testing laboratory:		TÜV Rheinland (Shenzhen) Co., Ltd.							
Prüfergebnis*: Test result*:		Pass							
geprüft von / tested by:				kontrolliert von / reviewed by:					
24.11.2017		Felix Tao Project Manager		24.11.2017		Tiger Su Technical Certifier			
Datum Date	Name/Stellung Name/Position	Unterschrift Signature		Datum Date	Name/Stellung Name/Position	Unterschrift Signature			
Sonstiges / Other:									
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:				Prüfmuster vollständig und unbeschädigt Test item complete and undamaged					
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specifications(s) F(ail) = failed a.m. test specifications(s) N/A = not applicable N/T = not tested									
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>									

TEST SUMMARY

5.1.1 HARMONICS ON AC MAINS

RESULT: Pass

5.1.2 VOLTAGE FLUCTUATIONS ON AC MAINS

RESULT: Pass

5.1.3 MAINS TERMINAL CONTINUOUS DISTURBANCE VOLTAGE

RESULT: Pass

5.2.1 RADIATED DISTURBANCE (BELOW 1GHz)

RESULT: Pass

5.2.2 RADIATED DISTURBANCE (ABOVE 1GHz)

RESULT: Pass

6.2.1 RADIO-FREQUENCY ELECTROMAGNETIC FIELD AMPLITUDE MODULATED (RS)

RESULT: Pass

6.2.2 RADIO-FREQUENCY CONTINUOUS CONDUCTED (CS)

RESULT: Pass

6.3.1 ELECTRICAL FAST TRANSIENTS (EFT)

RESULT: Pass

6.3.2 SURGE

RESULT: Pass

6.3.3 ELECTROSTATIC DISCHARGES (ESD)

RESULT: Pass

6.4.1 VOLTAGE DIPS AND INTERRUPTIONS

RESULT: Pass

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1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix 1: Test result

Appendix 2: Measurement uncertainties

2. Test Sites

2.1 Test Facilities

EMTEK (Shenzhen) Co., Ltd.
Bldg. 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China

The tests at the test site have been conducted under the supervision of a TÜV engineer.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until
Conducted Emission (EMTEK)				
EMI Test Receiver	Rohde & Schwarz	ESCI	26115-010-0027	2018-05-20
L.I.S.N.	Rohde & Schwarz	ENV216	101161	2018-05-20
50Ω Coaxial Switch	Anritsu	MP59B	6100175589	2018-05-21
Voltage Probe	Rohde & Schwarz	ESH2-Z3	100122	2018-05-21
Radiated Emission (3m Chamber) (EMTEK)				
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	2018-05-21
Pre-Amplifier	A.H.	PAM-0126	1415261	2018-05-20
Pre-Amplifier	HP	8447F	2944A07999	2018-05-20
Bilog Antenna	Schwarzbeck	VULB9163	142	2018-05-20
Loop Antenna	Schwarzbeck	FMZB 1519	1519-012	2018-05-20
Horn Antenna	Schwarzbeck	BBHA 9120	707	2018-05-20
Cable	Schwarzbeck	AK9513	ACRX1	2018-05-21
Cable	Rosenberger	N/A	FP2RX2	2018-05-21
Cable	Schwarzbeck	AK9513	CRPX1	2018-05-21
Cable	Schwarzbeck	AK9513	CRRX2	2018-05-21
Harmonics & Flicker, Voltage Dips and Interruptions (EMTEK)				
AC Power Source	TESEQ	NSG 1007-45/45KVA	1305A02873	2018-05-20
Signal Conditioning Unit	TESEQ	CCN 1000-3	1305A02873	2018-05-20
Three Phase Impedance Network	TESEQ	INA2197/37A	1305A02873	2018-05-20
Three Phase Impedance Network	TESEQ	INA 2196/75A	1305A02874	2018-05-20
Proflin 2100 AC Switching Unit	TESEQ	NSG2200-3	A22714	2018-05-20
Radio-Frequency Electromagnetic Field Amplitude Modulated (RS) (EMTEK)				
Signal Generator	Agilent	N5181A	MY50145187	2018-05-20
RF Power Meter. Dual Channel	BOONTON	4232A	10539	2018-05-21
50ohm Diode Power Sensor	BOONTON	51011EMC	34236/34238	2018-05-21
50ohm Diode Power Sensor	BOONTON	51011EMC	36164	2018-05-21
Field Strength Meter	DARE	RSS1006A	10I00037SO22	2018-05-21

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Kind of Equipment	Manufacturer	Type	S/N	Calibrated until
Power Amplifier	MILMEGA	80RF1000-175	1059345	2018-05-20
Power Amplifier	MILMEGA	AS0102-55	1018770	2018-05-20
Power Amplifier	MILMEGA	AS1860-50	1059346	2018-05-20
Log.-Per. Antenna	Schwarzbeck	VULP 9118E	811	2018-05-21
Broad-Band Horn Antenna	Schwarzbeck	STLP 9149	9149-227	2018-05-21
Multi-Function Interface System	DARE	CTR1009B	12I00250SNO 72	N/A
Automatic Switch Group	DARE	RSW1004A	N/A	N/A
ESD (EMTEK)				
ESD Tester	TESEQ AG	NSG 438A	130	2018-05-21
Radio-Frequency Continuous Conducted (CS) (EMTEK)				
Simulator	EMTEST	CWS500C	0900-12	2018-05-21
CDN	EMTEST	CDN-M2	5100100100	2018-05-21
CDN	EMTEST	CDN-M3	0900-11	2018-05-21
Injection Clamp	EMTEST	F-2031-23MM	368	2018-05-21
Attenuator	EMTEST	ATT6	0010222A	2018-05-21
EFT (EMTEK)				
Burst Tester	HAEFELY	PEFT4010	080981-16	2018-05-21
Coupling Clamp	HAEFELY	IP-4A	147147	2018-05-21
Surge (EMTEK)				
Surge Controller	HAEFELY	Psurge 8000	174031	2018-05-21
Impulse Module	HAEFELY	PIM 100	174124	2018-05-21
Coupling Decoupling Filter	HAEFELY	PCD 130	172181	2018-05-21
Coupling Module	HAEFELY	PCD122	174354	2018-05-21
Surge Impulse Module	HAEFELY	PIM 120	174435	2018-05-21
Coupling Module	HAEFELY	PCD 126A	174387	2018-05-21
Impulse Module	HAEFELY	PIM 110	174391	2018-05-21
Impulse Module	HAEFELY	PIM 150	178707	2018-05-21

3. General Product Information

3.1 Product Function and Intended Use

The EUTs are Full Color LED Display used for information technology equipment. All models are identical except the type designation and enclosure.

Class A equipment shall have the following warning in the instructions for use, to inform the user of the risk of operating this equipment in a residential environment:

Warning: This equipment is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.

For more information refer to the Circuit Diagram & Instruction Manual.

3.2 Ratings and System Details

Rated input voltage:	AC 100-240V
Rated frequency:	50/60Hz
Rated input current:	10A
Rated output:	AC 100-240V, 50/60Hz, 9A
Protection class:	I

3.3 Independent Operation Modes

The basic operation modes are:

- A. On (Displaying white light / colored light or Running 'H' pattern)
- B. Off

3.4 Input / Output Ports

Port #	Name	Type*	Cable Max. >3m	Cable Shielded	Comments
0	Enclosure	N/E	—	—	None
1	AC Input	AC	Yes	Non-shielded	None
2	AC Output	AC	No	Non-shielded	None
3	Signal Input	I/O	Yes	Non-shielded	None
4	Signal Output	I/O	No	Non-shielded	None

*AC = AC Power Port DC = DC Power Port N/E = Non-Electrical
I/O = Signal Input or Output Port (Not Involved in Process Control)
TP = Telecommunication Ports

3.5 Noise Generating and Noise Suppressing Parts

Sources of Interference:

- 1) IC Circuits
- 2) Transformer

Others refer to the Circuit Diagram/Photo Document for details.

Noise Suppressing Parts:

- 1) Inductor
- 2) Capacitor

Others refer to Circuit Diagram/Photo Document for details.

3.6 Submitted Documents

- Circuit Diagram
- Rating Label
- PCB Layout
- Instruction Manual

4. Test Set-up and Operation Modes

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.

Immunity: The equipment under test (EUT) was configured to have its highest possible susceptibility against the tested phenomena. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5 & 6.

Pre-test in all operation modes, and find out the worst case for compliance test.

According to section 3.1, full tests were applied on model A-261.

4.3 Special Accessories and Auxiliary Equipment

The EUT was tested together with the following accessories:

Kind of Equipment	Manufacturer	Type	S/N
Laptop	Lenovo	E430	0101006140400549
Sending Card	Nova	MSD300	0025430

The EUT was tested with following cables:

Cable name	Length (m)	Shield	Core No.	Detachable
AC Power Cord	1.8	No	3	Yes
Signal Cable	2.5	No	8	Yes

4.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

5. Test Results EMISSION

5.1 Emission in the Frequency Range up to 30 MHz

5.1.1 Harmonics on AC Mains

RESULT:**Pass**

Date of testing	:	2017-10-19
Test procedure	:	EN 61000-3-2:2014
Class	:	A
Limit	:	Table 1
Measured harmonics	:	1 – 40

Test setup

Input Voltage	:	AC 230V $\pm$ 2%, 50Hz
Operation Condition	:	According to Annex C.10
Operation mode	:	A
Earthing	:	Connected

Refer to attached Appendix 1.

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5.1.2 Voltage Fluctuations on AC Mains**RESULT:****Pass**

Date of testing	:	2017-10-19
Test procedure	:	EN 61000-3-3:2013
Limit	:	Clause 5

Test setup

Input Voltage	:	AC 230V±2%, 50Hz
Operation Condition	:	According to Clause 6.6
Operation mode	:	A
Earthing	:	Connected

Refer to attached Appendix 1.

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5.1.3 Mains Terminal Continuous Disturbance Voltage**RESULT:****Pass**

Date of testing	:	2017-11-03
Test standard	:	EN 55032:2012
Frequency range	:	0.15 - 30MHz
Classification	:	Class A
Limits	:	Table A.8 of EN 55032:2012
Kind of test site	:	Shielded room
Tested Port	:	AC Mains

Test setup

Input Voltage	:	AC 100-240V, 50/60Hz
Operation Condition	:	According to Annex D
Operation mode	:	A
Artificial hand	:	Not applied
Earthing	:	Connected
Ambient temperature	:	22°C
Relative humidity	:	55%
Atmospheric pressure	:	101kPa

Refer to attached Appendix 1.

5.2 Emission in the Frequency Range above 30 MHz

5.2.1 Radiated Disturbance (Below 1GHz)

RESULT:**Pass**

Date of testing	:	2017-11-06
Test standard	:	EN 55032:2012
Frequency range	:	30 - 1000MHz *
Classification	:	Class A
Limits	:	Table A.2 of EN 55032:2012
Kind of test site	:	3m Semi-Anechoic Chamber
Tested Port	:	Enclosure

Test setup

Input Voltage	:	AC 100-240V, 50/60Hz
Operation Condition	:	According to Annex D
Operation mode	:	A
Earthing	:	Connected
Ambient temperature	:	22°C
Relative humidity	:	50%
Atmospheric pressure	:	101kPa

Refer to attached Appendix 1.

*Remark: The highest internal source of an EUT is defined as the highest frequency generated or used within the EUT or on which the EUT operates or tunes, details refer to section 3.5.

- ☐ highest frequency is less than 108MHz, measurement shall only be made up to 1GHz
- ☐ highest frequency is between 108 & 500MHz, measurement shall only be made up to 2GHz
- ☐ highest frequency is between 500 & 1GHz, measurement shall only be made up to 5GHz
- ☐ highest frequency is above 1GHz, measurement shall be made up to 5 times the highest frequency or 6GHz, whichever is less

Method: Measurements were made in a 3-meter semi-anechoic chamber or Open Area Test Site that complies to CISPR 16. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 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 (quasi-peak detector below 1GHz) 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.

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5.2.2 Radiated Disturbance (Above 1GHz)**RESULT:****Pass**

Date of testing	:	2017-11-06
Test standard	:	EN 55032:2012
Frequency range	:	1 – 6GHz*
Classification	:	Class A
Limits	:	Table A.3 of EN 55032:2012
Kind of test site	:	3m Semi-Anechoic Chamber
Tested Port	:	Enclosure

Test setup

Input Voltage	:	AC 100-240V, 50/60Hz
Operation Condition	:	According to Annex D
Operation mode	:	A
Earthing	:	Connected
Ambient temperature	:	22°C
Relative humidity	:	50%
Atmospheric pressure	:	101kPa

Refer to attached Appendix 1.

*Remark: The highest internal source of an EUT is defined as the highest frequency generated or used within the EUT or on which the EUT operates or tunes, details refer to section 3.5.

- ☐ highest frequency is less than 108MHz, measurement shall only be made up to 1GHz
- ☐ highest frequency is between 108 & 500MHz, measurement shall only be made up to 2GHz
- ☐ highest frequency is between 500 & 1GHz, measurement shall only be made up to 5GHz
- ☐ highest frequency is above 1GHz, measurement shall be made up to 5 times the highest frequency or 6GHz, whichever is less.

Method: Measurements were made in a 3-meter semi-anechoic chamber or Open Area Test Site that complies to CISPR 16. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 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 (average detector above 1GHz) 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.

6. Test Results IMMUNITY

6.1 Test Summary

According to EN 55024:2010, the EUT shall be tested in accordance with clause 4, 6 & 10, and comply with the performance criterion in table 1, 2 & 4 of clause 10.

Continuous Disturbance

Power-Frequency Magnetic Fields *	Criterion A
Radio-Frequency Electromagnetic Field Amplitude Modulated (RS)	Criterion A
Radio-Frequency Continuous Conducted (CS)	Criterion A

Transient Disturbance

Fast Transients (EFT)	Criterion B
Surge	Criterion B
Electrostatic Discharges (ESD)	Criterion B

Power Supply Alterations

Voltage Dips and Interruptions	Criterion B & C
--------------------------------	----------------------------

* The EUT does not contain devices susceptible to magnetic field, therefore the Power-Frequency Magnetic Fields test is not necessary.

6.2 Continuous Disturbances

6.2.1 Radio-Frequency Electromagnetic Field Amplitude Modulated (RS)

RESULT:**Pass**

Date of Testing	:	2017-11-14
Test Specification	:	EN 55024:2010
Basic Standard	:	IEC 61000-4-3:2006+A1+A2
Criterion	:	A
Frequency Range	:	80 - 1000MHz
Test Level	:	3V/m (Unmodulated, r.m.s.)
Modulation	:	AM 80%, 1kHz sine-wave
Tested Port	:	Enclosure

Test setup

Input Voltage	:	AC 100-240V, 50/60Hz
Operation Mode	:	A
Earthing	:	Connected
Ambient temperature	:	See Appendix 1
Relative humidity	:	See Appendix 1
Atmospheric pressure	:	See Appendix 1

Refer to attached Appendix 1.

6.2.2 Radio-Frequency Continuous Conducted (CS)**RESULT:****Pass**

Date of testing	:	2017-11-14
Test Specification	:	EN 55024:2010
Basic Standard	:	IEC 61000-4-6:2008
Criterion	:	A
Frequency range	:	0.15 - 80 MHz
Source impedance	:	150Ω
Test level	:	3V (Unmodulated, r.m.s.)
Modulation	:	AM 80%, 1kHz sine-wave
Sweep mode	:	automatic
Sweep rate	:	< 1.5×10 ⁻³ decade / sec.
Tested Port	:	AC Mains, Signal Port

Test setup

Input Voltage	:	AC 100-240V, 50/60Hz
Operation Mode	:	A
Earthing	:	Connected
Ambient temperature	:	See Appendix 1
Relative humidity	:	See Appendix 1
Atmospheric pressure	:	See Appendix 1

Refer to attached Appendix 1.

6.3 Transient Disturbances

6.3.1 Electrical Fast Transients (EFT)

RESULT:**Pass**

Date of testing	:	2017-11-14
Test Standard	:	EN 55024:2010
Basic Standard	:	IEC 61000-4-4:2004
Criterion	:	B
Test level	:	0.5kV, 1kV
Test duration	:	≥60sec
Rise time	:	5/50ns
Repetition frequency	:	5kHz
Tested Port	:	AC Mains, Signal Port

Test setup

Input Voltage	:	AC 100-240V, 50/60Hz
Operation Mode	:	A
Earthing	:	Connected
Ambient temperature	:	See Appendix 1
Relative humidity	:	See Appendix 1
Atmospheric pressure	:	See Appendix 1

Refer to attached Appendix 1.

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6.3.2 Surge**RESULT:****Pass**

Date of testing	:	2017-11-14
Test Specification	:	EN 55024:2010
Basic Standard	:	IEC 61000-4-5:2005
Criterion	:	B & C
Source impedance	:	2Ω, 12Ω, 42Ω
Test level	:	±0.5kV, ±1kV, ±2kV
Coupling phases	:	0°, 90°, 180°, 270°
Number of surges	:	5 (for each combination of parameters)
Repetition rate	:	Max. 1/min
Tested Port	:	AC Mains, Signal Port

Test Setup

Input Voltage	:	AC 100-240V, 50/60Hz
Operation Mode	:	A
Earthing	:	Connected
Ambient temperature	:	See Appendix 1
Relative humidity	:	See Appendix 1
Atmospheric pressure	:	See Appendix 1

Refer to attached Appendix 1.

6.3.3 Electrostatic Discharges (ESD)**RESULT:****Pass**

Date of testing	:	2017-11-14
Test Standard	:	EN 55024:2010
Basic Standard	:	IEC 61000-4-2:2008
Criterion	:	B
Test level	:	±2.0, ±4.0, ±8.0kV (air discharge) ±2.0, ±4.0kV (contact discharge)
Number of discharges	:	>10
Tested Port	:	Enclosure

Test Setup

Input Voltage	:	AC 100-240V, 50/60Hz
Operation Mode	:	A
Earthing	:	Connected
Ambient temperature	:	See Appendix 1
Relative humidity	:	See Appendix 1
Atmospheric pressure	:	See Appendix 1

Refer to attached Appendix 1.

6.4 Power Supply Alterations

6.4.1 Voltage Dips and Interruptions

RESULT:**Pass**

Date of testing	:	2017-11-14
Test Specification	:	EN 55024:2010
Basic Standard	:	IEC 61000-4-11:2004
Criterion	:	B & C
Tested Port	:	AC Mains

Test Setup

Input Voltage	:	AC 100-240V, 50/60Hz
Operation Mode	:	A
Earthing	:	Connected
Ambient temperature	:	See Appendix 1
Relative humidity	:	See Appendix 1
Atmospheric pressure	:	See Appendix 1

Refer to attached Appendix 1.

7. Photographs of the Test Set-Up

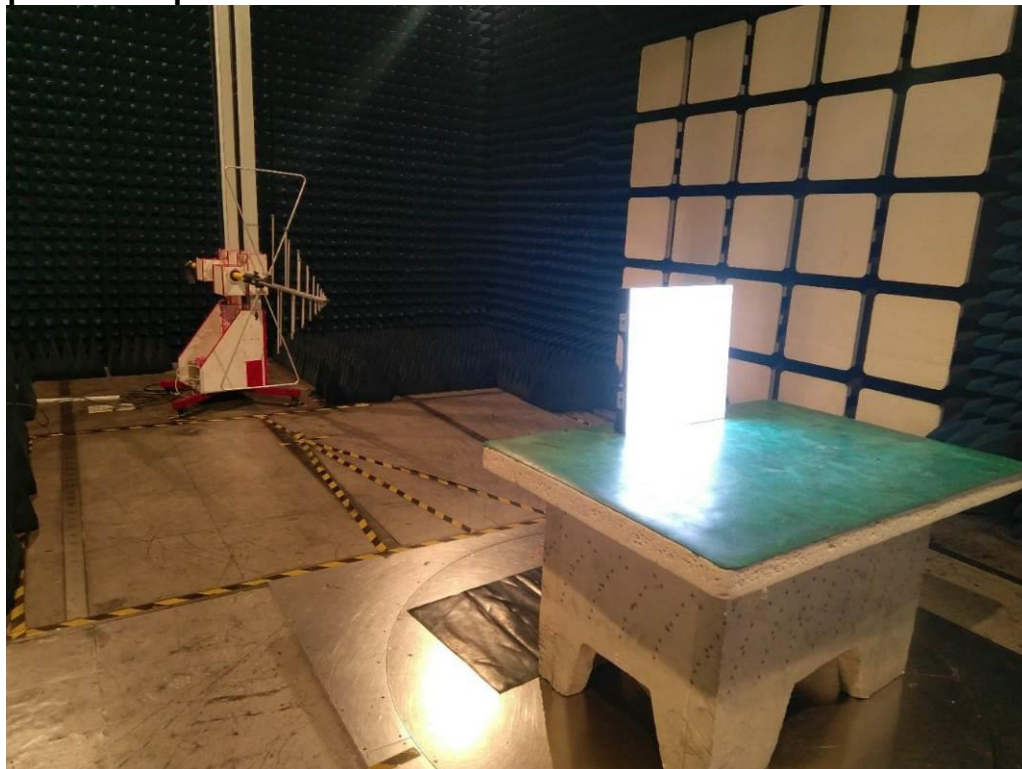
Photograph 1: Set-up for Harmonics and Voltage Fluctuations on AC Mains



Photograph 2: Set-up for Mains Terminal Continuous Disturbance Voltage



Photograph 3: Set-up for Radiated Disturbance



Photograph 4: Set-up for Radio-Frequency Electromagnetic Field (RS)



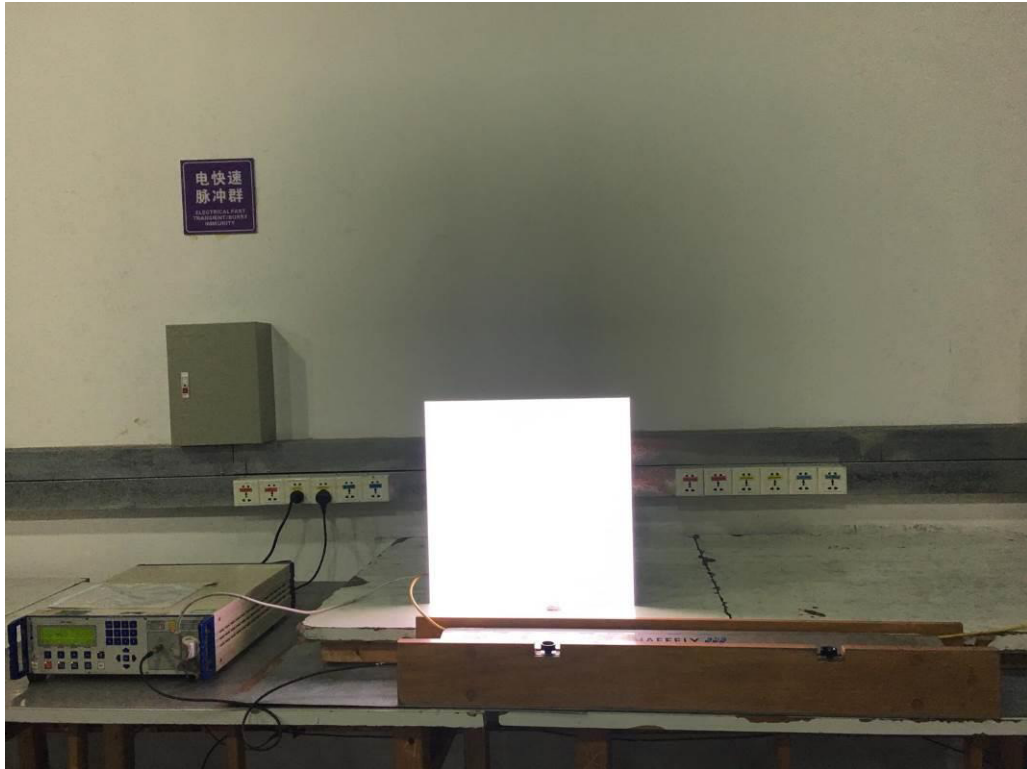
Photograph 5: Set-up for Conducted Susceptibility on AC Power and Signal Ports (CS)





Photograph 6: Set-up for Fast Transients on AC Power and Signal Ports



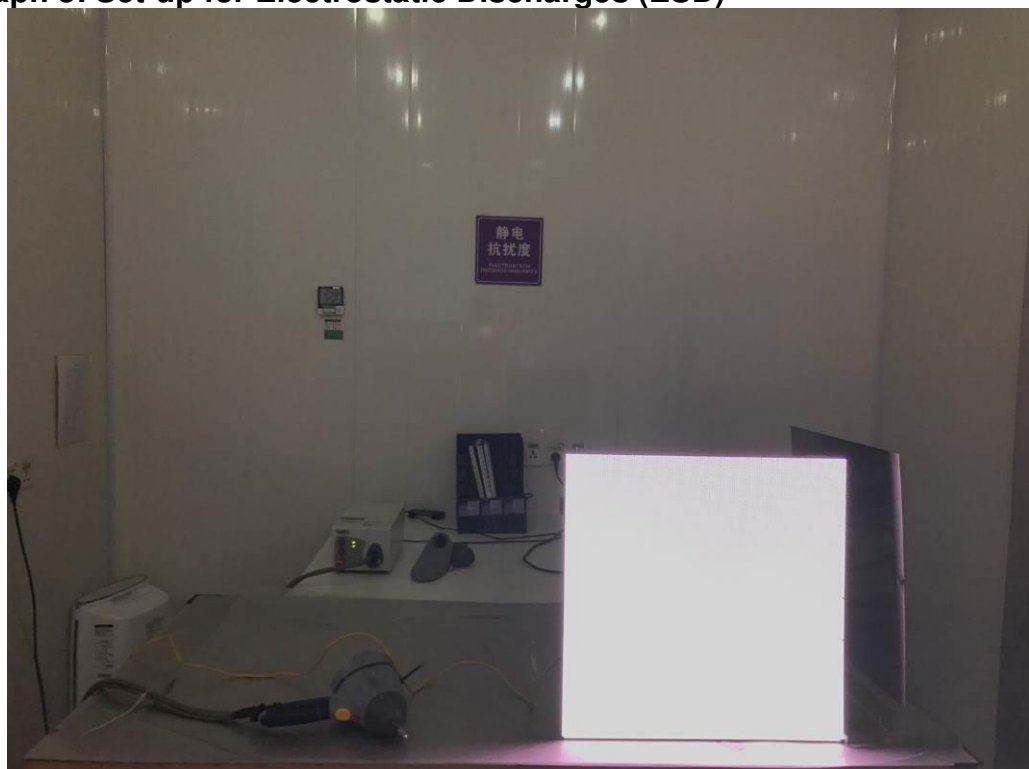


Photograph 7: Set-up for Surge on AC Power and Signal Ports





Photograph 8: Set-up for Electrostatic Discharges (ESD)



Photograph 9: Set-up for Voltage Dips and Interruptions



8. List of Tables

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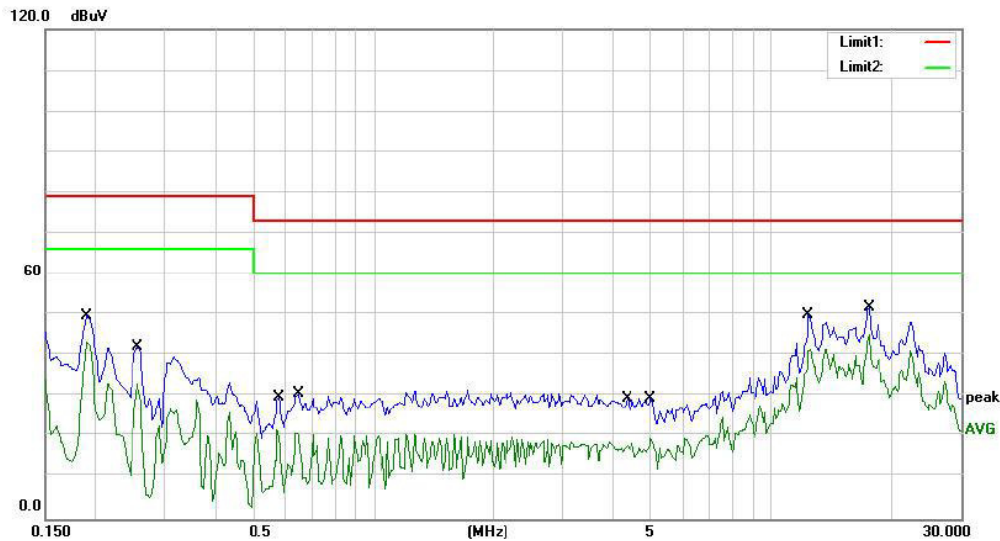
Shenzhen EMTEK Co., Ltd.
Bldg. 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, 518052 P.R. China
www.emtek.com.cn Tel: +86-755-2695 4280 Fax: +86-755-2695 4282



Conducted Emission Measurement

File: Dicolor

Date: 2017/11/03



Site: Conduction #1

Phase: L1

Temperature: 22

Limit: (CE)EN55032 class A_QP

Power: AC 230V/50Hz

Humidity: 55 %

EUT: Full Color LED Display

M/N: A-261

Mode: ON

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1900	49.59	0.00	49.59	79.00	-29.41	QP	
2		0.1900	43.40	0.00	43.40	66.00	-22.60	AVG	
3		0.2550	42.14	0.00	42.14	79.00	-36.86	QP	
4		0.2550	33.16	0.00	33.16	66.00	-32.84	AVG	
5		0.5750	21.88	0.00	21.88	60.00	-38.12	AVG	
6		0.6500	30.76	0.00	30.76	73.00	-42.24	QP	
7		4.3500	29.66	0.00	29.66	73.00	-43.34	QP	
8		5.0000	19.60	0.00	19.60	60.00	-40.40	AVG	
9		12.4250	50.03	0.00	50.03	73.00	-22.97	QP	
10		12.5250	41.46	0.00	41.46	60.00	-18.54	AVG	
11		17.5750	51.75	0.00	51.75	73.00	-21.25	QP	
12	*	17.5750	45.13	0.00	45.13	60.00	-14.87	AVG	

*:Maximum data x:Over limit l:over margin Comment: Factor build in receiver. Operator:XF

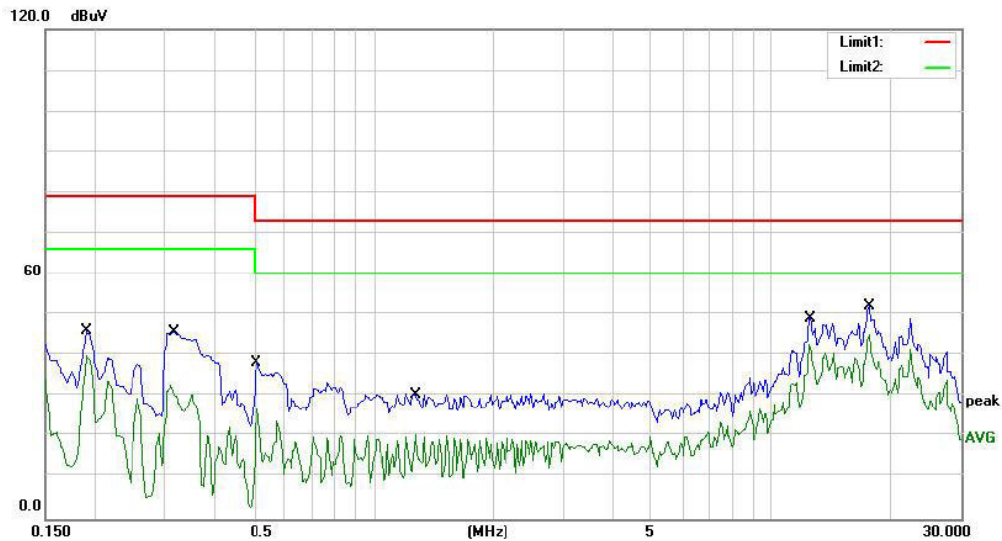
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EMTEK 
Access to the World

Conducted Emission Measurement

File: Dicolor

Date: 2017/11/03



Site: Conduction #1

Phase: N

Temperature: 22

Limit: (CE)EN55032 class A_QP

Power: AC 230V/50Hz

Humidity: 55 %

EUT: Full Color LED Display

M/N: A-261

Mode: ON

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1900	45.95	0.00	45.95	79.00	-33.05	QP	
2		0.1900	39.98	0.00	39.98	66.00	-26.02	AVG	
3		0.3150	45.89	0.00	45.89	79.00	-33.11	QP	
4		0.3150	32.84	0.00	32.84	66.00	-33.16	AVG	
5		0.5100	38.39	0.00	38.39	73.00	-34.61	QP	
6		0.5100	26.77	0.00	26.77	60.00	-33.23	AVG	
7		1.2800	30.55	0.00	30.55	73.00	-42.45	QP	
8		1.2800	20.63	0.00	20.63	60.00	-39.37	AVG	
9		12.5250	49.19	0.00	49.19	73.00	-23.81	QP	
10		12.5250	42.63	0.00	42.63	60.00	-17.37	AVG	
11		17.5750	51.93	0.00	51.93	73.00	-21.07	QP	
12	*	17.5750	45.13	0.00	45.13	60.00	-14.87	AVG	

*:Maximum data x:Over limit l:over margin Comment: Factor build in receiver. Operator:XF

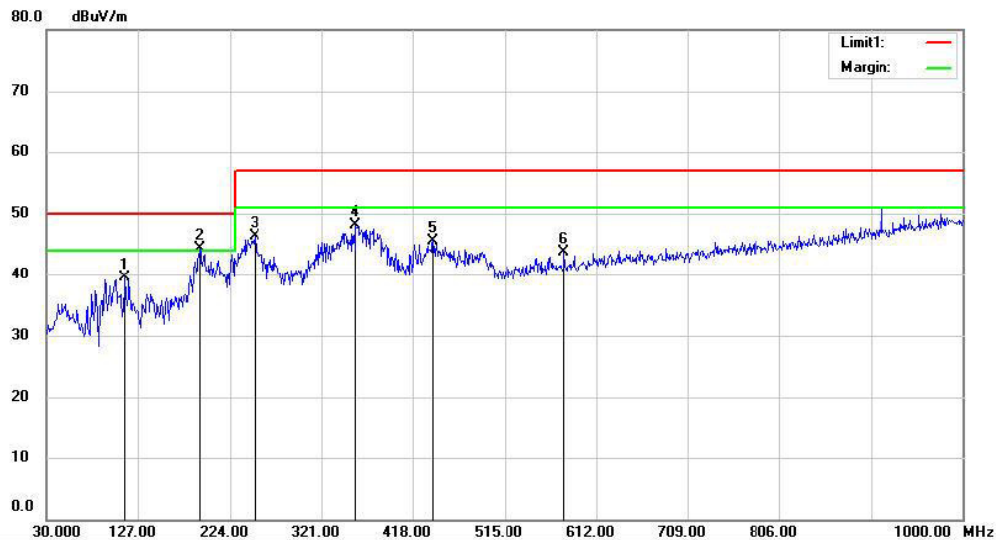
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Radiated Emission Measurement

File: Dicolor

Date: 2017/11/06



Site: 3m Chamber #1

Polarization: **Horizontal**

Temperature: 22 C

Limit: (RE)EN55032 class A

Power: AC 230V/50Hz

Humidity: 50 %

EUT: Full Color LED Display

M/N: A-261

Mode: ON

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1		112.4500	52.84	-13.42	39.42	50.00	-10.58	QP		
2	*	191.9900	57.35	-13.05	44.30	50.00	-5.70	QP		
3		250.1900	56.80	-10.42	46.38	57.00	-10.62	QP		
4		356.8900	55.54	-7.50	48.04	57.00	-8.96	QP		
5		439.3400	51.62	-6.09	45.53	57.00	-11.47	QP		
6		578.0500	47.74	-4.06	43.68	57.00	-13.32	QP		

*:Maximum data x:Over limit l:over margin

Operator: RJB

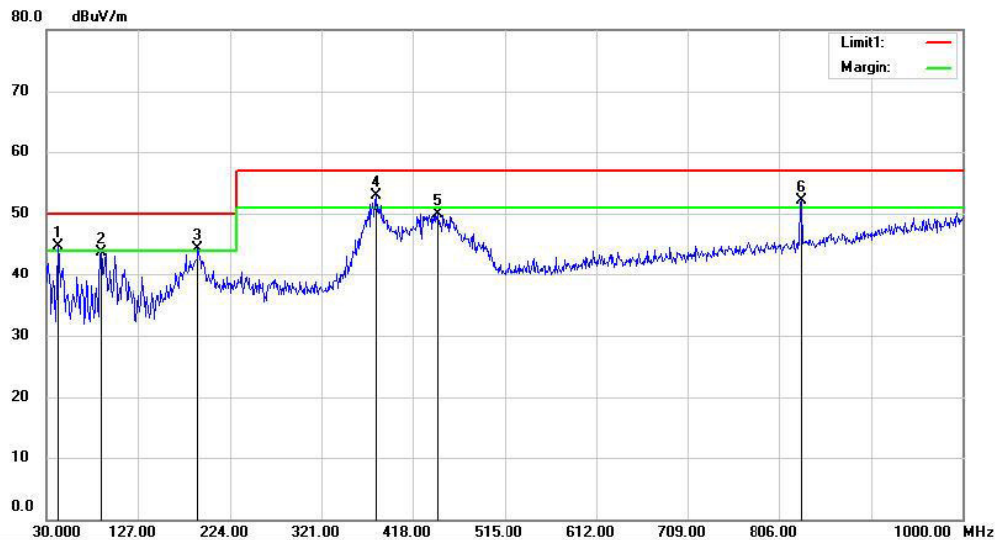
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Radiated Emission Measurement

File : Dicolor

Date: 2017/11/06



Site 3m Chamber #1

Polarization: **Vertical**

Temperature: 22 C

Limit: (RE)EN55032 class A

Power: AC 230V/50Hz

Humidity: 50 %

EUT: Full Color LED Display

M/N: A-261

Mode: ON

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Comment
1	!	42.6100	56.41	-11.72	44.69	50.00	-5.31	QP		
2		87.2300	59.50	-15.89	43.61	50.00	-6.39	QP		
3	!	190.0500	57.61	-13.25	44.36	50.00	-5.64	QP		
4	*	378.2300	60.06	-7.11	52.95	57.00	-4.05	QP		
5		444.1900	55.89	-6.00	49.89	57.00	-7.11	QP		
6	!	829.2800	52.38	-0.26	52.12	57.00	-4.88	QP		

*:Maximum data x:Over limit !:over margin

Operator: RJB

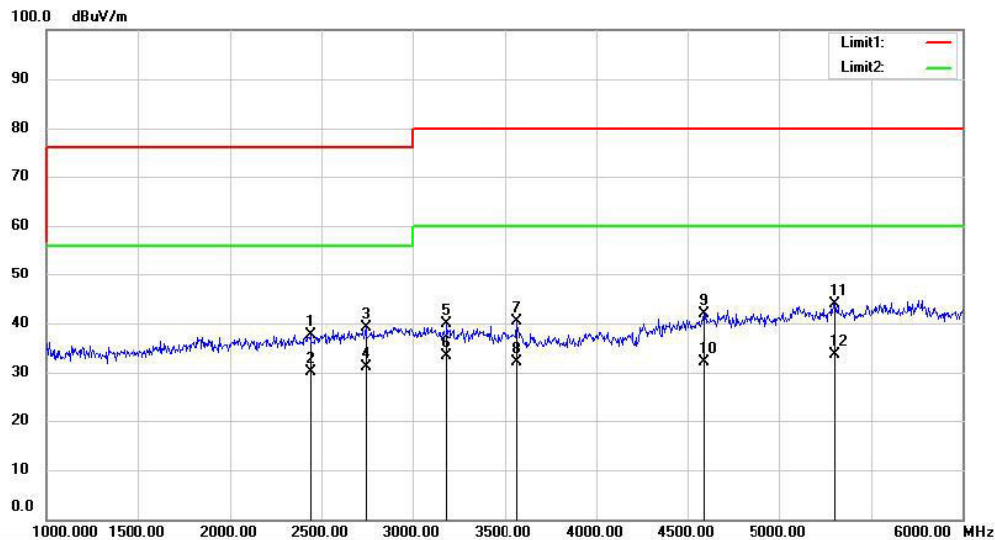
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Radiated Emission Measurement

File : Dicolor

Date: 2017/11/06



Site 3m Chamber #1

Polarization: **Horizontal**

Temperature: 22 C

Limit: (RE)EN55032 class A

Power: AC 230V/50Hz

Humidity: 50 %

EUT: Full Color LED Display

M/N: A-261

Mode: ON

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Comment
1		2440.000	51.44	-13.77	37.67	76.00	-38.33	peak		
2		2440.000	44.02	-13.77	30.25	56.00	-25.75	AVG		
3		2740.000	51.89	-12.73	39.16	76.00	-36.84	peak		
4	*	2740.000	43.98	-12.73	31.25	56.00	-24.75	AVG		
5		3185.000	51.58	-11.67	39.91	80.00	-40.09	peak		
6		3185.000	44.93	-11.67	33.26	60.00	-26.74	AVG		
7		3570.000	51.45	-11.17	40.28	80.00	-39.72	peak		
8		3570.000	43.31	-11.17	32.14	60.00	-27.86	AVG		
9		4590.000	49.24	-7.46	41.78	80.00	-38.22	peak		
10		4590.000	39.71	-7.46	32.25	60.00	-27.75	AVG		
11		5305.000	49.82	-5.88	43.94	80.00	-36.06	peak		
12		5305.000	39.57	-5.88	33.69	60.00	-26.31	AVG		

*:Maximum data x:Over limit l:over margin

Operator: RJB

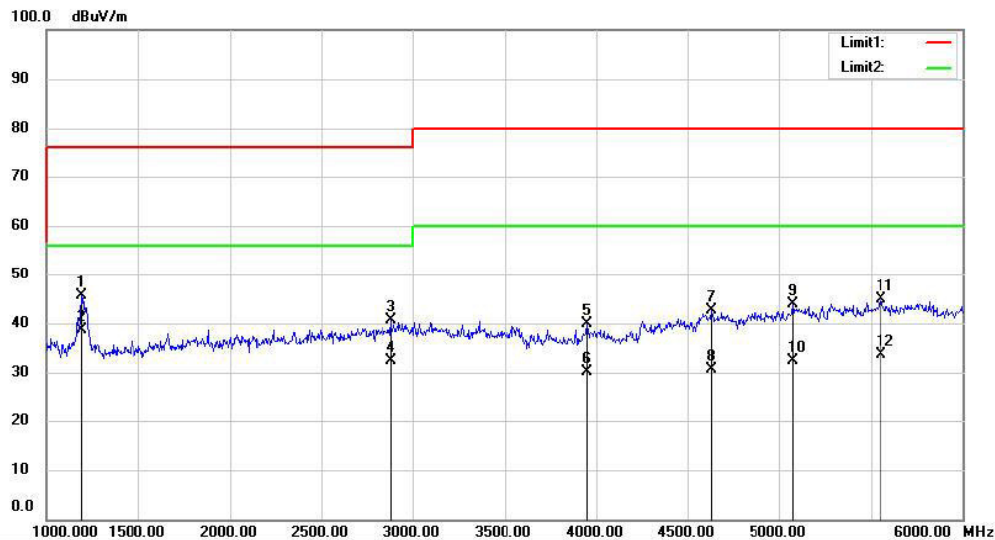
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Bldg. 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, 518052 P. R. China
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Radiated Emission Measurement

File: Dicolor

Date: 2017/11/06



Site: 3m Chamber #1

Polarization: **Vertical**

Temperature: 22 C

Limit: (RE)EN55032 class A

Power: AC 230V/50Hz

Humidity: 50 %

EUT: Full Color LED Display

M/N: A-261

Mode: ON

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1		1190.000	62.34	-16.69	45.65	76.00	-30.35	peak		
2	*	1190.000	55.31	-16.69	38.62	56.00	-17.38	AVG		
3		2880.000	52.93	-12.23	40.70	76.00	-35.30	peak		
4		2880.000	44.49	-12.23	32.26	56.00	-23.74	AVG		
5		3950.000	49.75	-9.79	39.96	80.00	-40.04	peak		
6		3950.000	40.04	-9.79	30.25	60.00	-29.75	AVG		
7		4630.000	49.95	-7.42	42.53	80.00	-37.47	peak		
8		4630.000	37.98	-7.42	30.56	60.00	-29.44	AVG		
9		5075.000	50.49	-6.68	43.81	80.00	-36.19	peak		
10		5075.000	38.95	-6.68	32.27	60.00	-27.73	AVG		
11		5555.000	50.09	-5.18	44.91	80.00	-35.09	peak		
12		5555.000	38.83	-5.18	33.65	60.00	-26.35	AVG		

*:Maximum data x:Over limit l:over margin

Operator: RJB

Teseq Proflin
4542 Luterbach, Switzerland

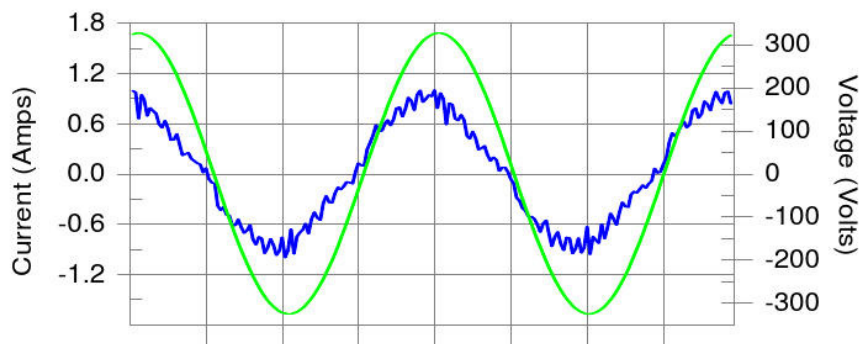
Harmonics – Class-A per Ed. 4.0 (2014)(Run time) incl. inter-harmonics

EUT: Full Color LED Display
Test category: Class-A per Ed. 4.0 (2014) (European limits)
Test date: 2017/10/19
Test duration (min): 2.5
Comment: ON
Customer: Dicolor

Tested by: ZZY
Test Margin: 100
Start time: 18:17:45
End time: 18:20:38
Data file name: WIN2105_H-000257.cts_data

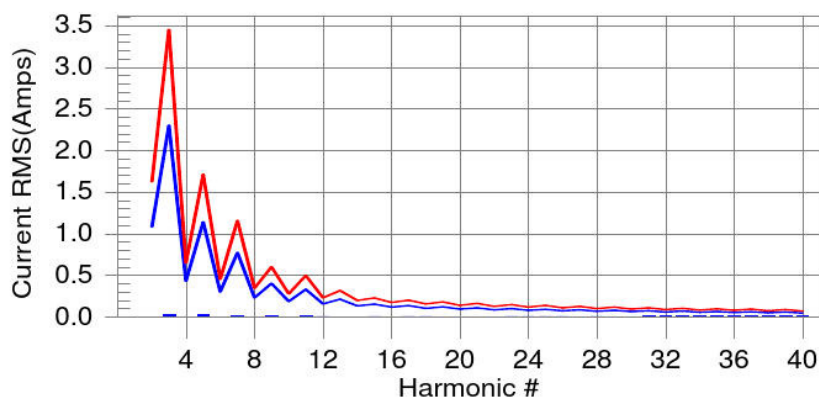
Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line

European Limits



Test result: Pass **Worst harmonic was #38 with 23.6% of the limit.**

Teseq Proflin
4542 Luterbach, Switzerland

Current Test Result Summary (Run time)

EUT: Full Color LED Display
Test category: Class-A per Ed. 4.0 (2014) (European limits)
Test date: 2017/10/19
Test duration (min): 2.5
Comment: ON
Customer: Dicolor

Tested by: ZZY
Test Margin: 100
Start time: 18:17:45
End time: 18:20:38
Data file name: WIN2105_H-000257.cts_data

Test Result: Pass Source qualification: Normal
THC: 0.060 A I-THD: 9.9 % POHC(A): 0.026 A POHC Limit(A): 0.251 A
Highest parameter values during test:
V_RMS (Volts): 230.608
I_Peak (Amps): 1.126
I_Fund (Amps): 0.614
Power (Watts): 136.7
Frequency(Hz): 50.00
I_RMS (Amps): 0.620
Crest Factor: 1.821
Power Factor: 0.957

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.006	1.080	0.5	0.007	1.620	0.4	Pass
3	0.026	2.300	1.1	0.027	3.450	0.8	Pass
4	0.002	0.430	N/A	0.002	0.645	N/A	Pass
5	0.030	1.140	2.6	0.030	1.710	1.7	Pass
6	0.002	0.300	N/A	0.002	0.450	N/A	Pass
7	0.017	0.770	2.2	0.018	1.155	1.5	Pass
8	0.002	0.230	N/A	0.002	0.345	N/A	Pass
9	0.012	0.400	3.1	0.014	0.600	2.3	Pass
10	0.002	0.184	N/A	0.002	0.276	N/A	Pass
11	0.007	0.330	2.2	0.008	0.495	1.6	Pass
12	0.002	0.153	N/A	0.003	0.230	N/A	Pass
13	0.006	0.210	2.7	0.006	0.315	2.0	Pass
14	0.005	0.131	4.1	0.006	0.197	2.9	Pass
15	0.005	0.150	N/A	0.005	0.225	N/A	Pass
16	0.007	0.115	6.2	0.008	0.173	4.5	Pass
17	0.005	0.132	N/A	0.005	0.198	N/A	Pass
18	0.005	0.102	N/A	0.005	0.153	N/A	Pass
19	0.006	0.118	5.0	0.007	0.178	3.8	Pass
20	0.006	0.092	6.3	0.006	0.138	4.5	Pass
21	0.006	0.107	5.2	0.006	0.161	3.7	Pass
22	0.007	0.084	8.4	0.007	0.125	5.8	Pass
23	0.003	0.098	N/A	0.003	0.147	N/A	Pass
24	0.004	0.077	N/A	0.004	0.115	N/A	Pass
25	0.003	0.090	N/A	0.004	0.135	N/A	Pass
26	0.003	0.071	N/A	0.004	0.107	N/A	Pass
27	0.006	0.083	7.0	0.006	0.125	5.1	Pass
28	0.005	0.066	N/A	0.005	0.099	N/A	Pass
29	0.006	0.078	8.3	0.007	0.116	6.1	Pass
30	0.006	0.061	10.4	0.007	0.092	7.4	Pass
31	0.008	0.073	11.0	0.009	0.109	8.1	Pass
32	0.008	0.058	14.7	0.009	0.086	10.5	Pass
33	0.010	0.068	15.2	0.012	0.102	11.3	Pass
34	0.010	0.054	18.9	0.011	0.081	13.4	Pass
35	0.011	0.064	17.4	0.012	0.096	12.8	Pass
36	0.011	0.051	22.1	0.012	0.077	15.5	Pass
37	0.012	0.061	19.4	0.013	0.091	14.4	Pass
38	0.011	0.048	23.6	0.012	0.073	16.5	Pass
39	0.012	0.058	20.3	0.013	0.087	14.6	Pass
40	0.008	0.046	17.1	0.009	0.069	13.3	Pass

Teseq Proflin
4542 Luterbach, Switzerland

Voltage Source Verification Data (Run time)

EUT: Full Color LED Display
Test category: Class-A per Ed. 4.0 (2014) (European limits)
Test date: 2017/10/19
Test duration (min): 2.5
Comment: ON
Customer: Dicolor

Tested by: ZZY
Test Margin: 100
Start time: 18:17:45
End time: 18:20:38
Data file name: WIN2105_H-000257.cts_data

Test Result: Pass Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms): 230.608	Frequency(Hz): 50.00
I Peak (Amps): 1.126	I RMS (Amps): 0.620
I Fund (Amps): 0.614	Crest Factor: 1.821
Power (Watts): 136.7	Power Factor: 0.957

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.095	0.461	20.66	OK
3	0.136	2.075	6.55	OK
4	0.029	0.461	6.30	OK
5	0.042	0.922	4.58	OK
6	0.011	0.461	2.45	OK
7	0.060	0.692	8.66	OK
8	0.016	0.461	3.48	OK
9	0.051	0.461	11.10	OK
10	0.015	0.461	3.25	OK
11	0.039	0.231	17.12	OK
12	0.010	0.231	4.30	OK
13	0.024	0.231	10.54	OK
14	0.018	0.231	7.62	OK
15	0.026	0.231	11.46	OK
16	0.021	0.231	9.01	OK
17	0.021	0.231	9.27	OK
18	0.011	0.231	4.93	OK
19	0.026	0.231	11.07	OK
20	0.022	0.231	9.66	OK
21	0.017	0.231	7.47	OK
22	0.014	0.231	5.96	OK
23	0.015	0.231	6.36	OK
24	0.009	0.231	3.83	OK
25	0.017	0.231	7.32	OK
26	0.010	0.231	4.22	OK
27	0.018	0.231	7.65	OK
28	0.011	0.231	4.91	OK
29	0.018	0.231	8.01	OK
30	0.010	0.231	4.53	OK
31	0.018	0.231	7.82	OK
32	0.011	0.231	4.82	OK
33	0.020	0.231	8.66	OK
34	0.011	0.231	4.56	OK
35	0.017	0.231	7.57	OK
36	0.009	0.231	3.93	OK
37	0.021	0.231	9.16	OK
38	0.010	0.231	4.31	OK
39	0.022	0.231	9.60	OK
40	0.013	0.231	5.60	OK

Teseq Proflite
4542 Luterbach, Switzerland

Flicker Test Summary per EN/IEC61000-3-3 (Run time)

EUT: Full Color LED Display
Test category: All parameters (European limits)
Test date: 2017/10/19
Test duration (min): 10
Comment: ON
Customer: Dicolor

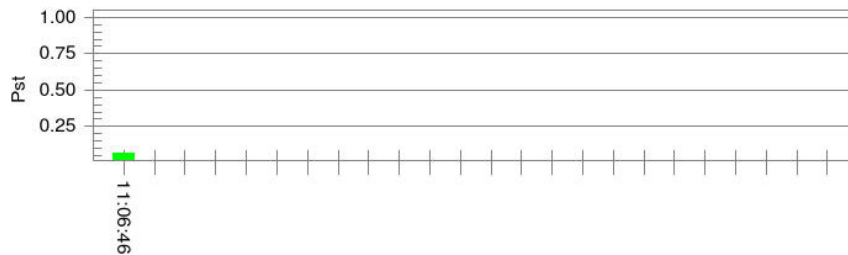
Tested by: ZZY
Test Margin: 100
Start time: 15:55:16
End time: 16:05:33
Data file name: WIN2105_F-000311.cts_data

Test Result: Pass

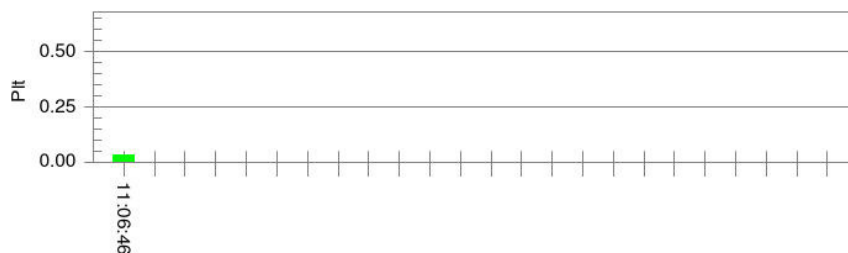
Status: Test Completed

Pst and limit line

European Limits



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt):	230.24		
Highest dt (%):	0.00	Test limit (%):	N/A
T-max (mS):	0.0	Test limit (mS):	500.0
Highest dc (%):	0.00	Test limit (%):	3.30
Highest dmax (%):	-0.04	Test limit (%):	4.00
Highest Pst (10 min. period):	0.064	Test limit:	1.000
Highest Plt (2 hr. period):	0.028	Test limit:	0.650



ESD Immunity Test Data

Standard	☒ EN 61000-4-2 ☐ IEC 61000-4-2	Result: ☒ PASS / ☐ FAIL
Applicant: <u>Dicolor</u>		
EUT: <u>Full Color LED Display</u> M/N: <u>A-261</u>		
Air Discharge: $\pm$ <u>2, 4, 8</u> kV Criterion: <u>B</u>		
Contact Discharge: $\pm$ <u>2, 4</u> kV #For Positive and negative each 10/25 times		
Ambient Condition: <u>24</u> °C <u>53</u> %RH <u>101</u> kPa		
Input Voltage: <u>AC 230</u> V <u>50</u> Hz		
Operation Mode: ON		
Location	Kind A-Air Discharge C-Contact Discharge	Results
HCP	C	A
VCP	C	A
Metal	C	A
Slot	A	A
LED	A	A
Note: No observable change		

Discharge should be considered on Contact Air and Horizontal Coupling Plane (HCP) and Vertical Coupling plane (VCP).

Date: 2017/11/14

Test: ZCJ



RS Immunity Test Data

Standard	☒ EN 61000-4-3 ☐ IEC 61000-4-3		Result: ☒ PASS / ☐ FAIL	
Applicant: <u>Dicolor</u>				
EUT: <u>Full Color LED Display</u> M/N: <u>A-261</u>				
Input Voltage: <u>AC 230</u> V <u>50</u> Hz				
Ambient Condition: <u>24</u> °C <u>53</u> %RH <u>101</u> kPa				
Field Strength: <u>3</u> V/m Criterion: <u>A</u>				
Frequency Range: <u>80</u> MHz to <u>1000</u> MHz				
Modulation: ☐ None ☒ AM ☐ Pulse <u>1</u> KHz <u>80</u> %				
Operation Mode: <u>ON</u>				
	Frequency Rang 1: <u>80</u> to <u>1000</u> MHz		Frequency Rang 2: _____ to _____ MHz	
Steps	#	/	%	# / %
	Horizontal		Vertical	
Front	A		A	
Right	A		A	
Rear	A		A	
Left	A		A	
Note: No observable change				

Date: 2017/11/14

Test: ZCJ



EFT/B Immunity Test Data

Standard	☒ EN 61000-4-4 ☐ IEC 61000-4-4		Result: ☒ PASS / ☐ FAIL
Applicant: <u>Dicolor</u>			
EUT: <u>Full Color LED Display</u> M/N: <u>A-261</u>			
Input Voltage: <u>AC 230</u> V <u>50</u> Hz Criterion: <u>B</u>			
Ambient Condition: <u>24</u> °C <u>53</u> % RH <u>101</u> kPa			
Operation Mode: ON			
Line: ☒ AC mains		Line: ☒ Signal ☐ DC Line	
Coupling: ☒ Direct		Coupling: ☒ Capacitive	
Test Time: 120s			
Line	Test Voltage	Result(+)	Result(-)
L	1KV	A	A
N	1KV	A	A
PE	1KV	A	A
L、N	1KV	A	A
L、PE	1KV	A	A
N、PE	1KV	A	A
L、N、PE	1KV	A	A
Signal Line	0.5KV	A	A
Note: No observable change			

Date: 2017/11/14

Test: ZCJ



Surge Immunity Test Data

Standard	☒ EN 61000-4-5 ☐ IEC 61000-4-5	Result: ☒ PASS / ☐ FAIL									
Applicant: <u>Dicolor</u>											
EUT: <u>Full Color LED Display</u> M/N: <u>A-261</u>											
Repetition: <u>5 times per test</u> Interval: <u>60 seconds</u> Criterion: <u>B & C</u>											
Ambient Condition: <u>24</u> °C <u>53</u> %RH <u>101</u> kPa											
Input Voltage: <u>AC 230</u> V <u>50</u> Hz											
Operation Mode: <u>ON</u>											
Line: ☒ AC Mains ☐ DC Supply ☒ Signal Line											
Conductor	Volt	500V		1.0kV		2.0kV		3.0kV		4.0kV	
	Phase	+	-	+	-	+	-	+	-	+	-
L-N	0°	A	A	A	A						
	90°	A	A	A	A						
	180°	A	A	A	A						
	270°	A	A	A	A						
L-PE	0°	A	A	A	A	A	A				
	90°	A	A	A	A	A	A				
	180°	A	A	A	A	A	A				
	270°	A	A	A	A	A	A				
N-PE	0°	A	A	A	A	A	A				
	90°	A	A	A	A	A	A				
	180°	A	A	A	A	A	A				
	270°	A	A	A	A	A	A				
DC Supply	P-N										
	P-PE										
	N-PE										
Signal Line		A	A	A	A						
Note: No observable change											

Date: 2017/11/14

Test: ZCJ



C/S Immunity Test Data

Standard	☒ EN 61000-4-6 ☐ IEC 61000-4-6	Result: ☒ PASS / ☐ FAIL		
Applicant: <u>Dicolor</u>				
EUT: <u>Full Color LED Display</u> M/N: <u>A-261</u>				
Input Voltage: <u>AC 230</u> V <u>50</u> Hz Criterion: <u>A</u>				
Ambient Condition: <u>24</u> °C <u>53</u> %RH <u>101</u> kPa				
Modulation: ☐ None ☒ AM ☐ Pulse 1kHz <u>80</u> %				
Operation Mode: ON				
Frequency Range	Injected Position	Strength (unmodulated)	Criterion	Result
0.15 - 80MHz	AC Mains	3V.r.m.s	A	A
0.15 - 80MHz	Signal line	3V.r.m.s	A	A
Operation Mode:				
Frequency Range	Injected Position	Strength (unmodulated)	Criterion	Result
Remark: 1 Modulation Signal: 1 kHz 80%AM				
Note: No observable change				

Date: 2017/11/14

Test: ZCJ



Voltage Dips & Short Interruptions Immunity Test Data

Standard	☒ EN 61000-4-11 ☐ IEC 61000-4-11	Result: ☒ Pass / ☐ Fail		
Applicant: <u>Dicolor</u>				
EUT: <u>Full Color LED Display</u> M/N: <u>A-261</u>				
Input Voltage : <u>AC 230V/50 Hz</u>				
Ambient Condition: <u>24</u> °C <u>53</u> %RH <u>101</u> kPa				
Operation Mode: <u>ON</u>				
Test Level %UT	Voltage Dips & Short Interruptions %UT	Duration (In Periods)	Criterion ☐ A ☒ B ☒ C ☐ D	Result
0	100	0.5P	B	A
0	100	250P	C	B
70	30	25P	C	A
Operation Mode:				
Test Level %UT	Voltage Dips & Short Interruptions %UT	Duration (In Periods)	Criterion ☐ A ☐ B ☐ C ☐ D	Result
Note : The EUT stopped working at 0%UT (250P) Test Level, it can be restored after the test by itself.				

Date: 2017/11/14

Test: ZCJ

Measurement Uncertainties

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus.

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Table 1: Measurement Uncertainty levels

Test	Parameters	Expanded uncertainty (U_{lab})	Expanded uncertainty (U_{cisp})
Conducted Emission	Level accuracy (9kHz to 150kHz) (150kHz to 30MHz)	± 2.96 dB ± 2.74 dB	± 3.8 dB ± 3.4 dB
Power disturbance	Level accuracy (30MHz to 300MHz)	± 2.53 dB	± 4.5 dB
Electromagnetic Radiated Emission (3-loop)	Level accuracy (9kHz to 30MHz)	± 3.70 dB	N/A
Radiated Emission	Level accuracy (30MHz to 1000MHz, Horizontal) (30MHz to 1000MHz, Vertical)	± 3.78 dB ± 4.27 dB	± 6.3 dB
Radiated Emission	Level accuracy (above 1000MHz, Horizontal) (above 1000MHz, Vertical)	± 4.46 dB ± 4.46 dB	N/A
Mains Harmonic	Voltage	$\pm 0.07\%$	N/A
Voltage Fluctuations & Flicker	Voltage	$\pm 1.80\%$	N/A

As U_{lab} in all applicable tests listed above are less than U_{cisp} according to CISPR 16-4-2:2011,

- compliance is deemed to occur if no measured disturbance exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance exceeds the disturbance limit.