

FCC CERTIFICATION TEST REPORT

For
FCC ID:TI7-GC8

Report Reference No. : 15FAS10036 11

Date of issue : 2016-2-1

Testing Laboratory : ATT Product Service Co., Ltd.

Address : No. 3, ChangLianShan Industrial Park, ChangAn Town,
DongGuan City, GuangDong, China.

Applicant's name..... : Rosen Entertainment Systems

Address : 1120 California AVE,CORONA,CA92881,USA

Manufacturer..... : Rosen Entertainment Systems

Test specification:

Test item description..... : Dual MultimediaHeadrest Replacement Entertainment
System

Trade Mark..... : --

Model/Type reference : GC8

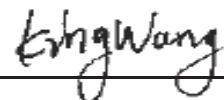
Ratings..... : 12Vd.c by car battery

Responsible Engineer



(Smile Wang/ Engineer)

Approved by



(King Wang /EMC Manager)

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TEST REPORT DECLARE

Applicant	:	Rosen Entertainment Systems
Address	:	1120 California AVE,CORONA,CA92881,USA
Equipment under Test	:	Dual MultimediaHeadrest Replacement Entertainment System
Model No	:	GC8
Trade Mark	:	--
Manufacturer	:	Rosen Entertainment Systems
Address	:	1120 California AVE,CORONA,CA92881,USA

Test Standard Used: FCC RULES AND REGULATIONS PART 15 SUBPART C: 2013

Test procedure used: ANSI C63.4: 2014, ANSI C63.10:2013

We Declare:

The equipment described above is tested by ATT Product Service Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and ATT Product Service Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

Our opinion is that the equipment provided for test compliance with the requirement of the above FCC standards.

Report No:	15FAS10036 11		
Date of Test:	2016-1-20 to 2016-1-30	Date of Report:	2016-2-1

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of ATT Product Service Co., Ltd.

1. Summary of test Standards and results

The EUT have been tested according to the applicable standards as referenced below.

Description of Test Item	Standard	Results
20dB Bandwidth	FCC Part 15: 15.239	PASS
Field Strength of Fundamental Emissions	FCC Part 15. 239	PASS
Radiated Emission	FCC Part 15.209	PASS

2. General test information

2.1 ACCREDITATIONS

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

USA **FCC** **Registration Number :923232**
Canada **INDUSTRY CANADA** **Registration Number 11033A**

2.2 Description of EUT

EUT* Name	:	Dual MultimediaHeadrest Replacement Entertainment System
Model Number	:	GC8
Trade Mark	:	--
EUT function description	:	Please reference user manual of this device
Power supply	:	12Vd.c by car battery
Operation frequency	:	88.1-92.1MHz
Modulation	:	FM
Antenna Type	:	built-in FPC antenna, maximum PK gain:0dBi
Date of Receipt	:	2015/04/10
Sample Type	:	Signle production

2.3 Accessories of EUT

Description of Accessories	Manufacturer	Model number or Type	Other
/	/	/	/

2.4 Assistant equipment used for test

Description of Assistant equipment	Manufacturer	Model number or Type	EMC Compliance	SN
/	/	/	/	/

2.5 Block diagram of EUT configuration for test

Channel List

Channels	Frequency (MHz)	Channels	Frequency (MHz)	Channels	Frequency (MHz)
1	88.1	35	89.7	67	90.7
2	88.3	36	89.3	68	90.9
3	88.5	37	89.5	69	91.1
4	88.7	38	89.7	70	91.3
5	88.9	39	89.9	71	91.5
6	89.1	40	90.1	72	91.7
7	89.3	41	90.3	73	91.7
8	89.5	42	90.5	74	92.1

Note:

2.6 Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	21-25℃
Humidity range:	40-75%
Pressure range:	86-106kPa

2.7 Measurement uncertainty

Test Item	Uncertainty
Uncertainty for Conduction emission test	2.44dB
Uncertainty for Radiation Emission test (9KHz-30MHz)	3.21dB
Uncertainty for Radiation Emission test (30MHz-200MHz)	3.42 dB (Polarize: V)
	3.52 dB (Polarize: H)
Uncertainty for Radiation Emission test (200MHz-1GHz)	3.52 dB (Polarize: V)
	3.54 dB (Polarize: H)
Uncertainty for radio frequency	1×10-9
Uncertainty for conducted RF Power	0.65dB

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3. 20dB Bandwidth

3.1 Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Due.	Cal. Interval
	EMI Test Receiver	R&S	ESCI	101307	2016/12/19	1Y
	Attenuator	Mini-Circuits	BW-S10W2	101109	2016/12/19	1Y
	RF Cable	Micable	C10-01-01-1	100309	2016/12/19	1Y

3.2 Block diagram of test setup



3.3 Applicable Standard

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §15.239, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

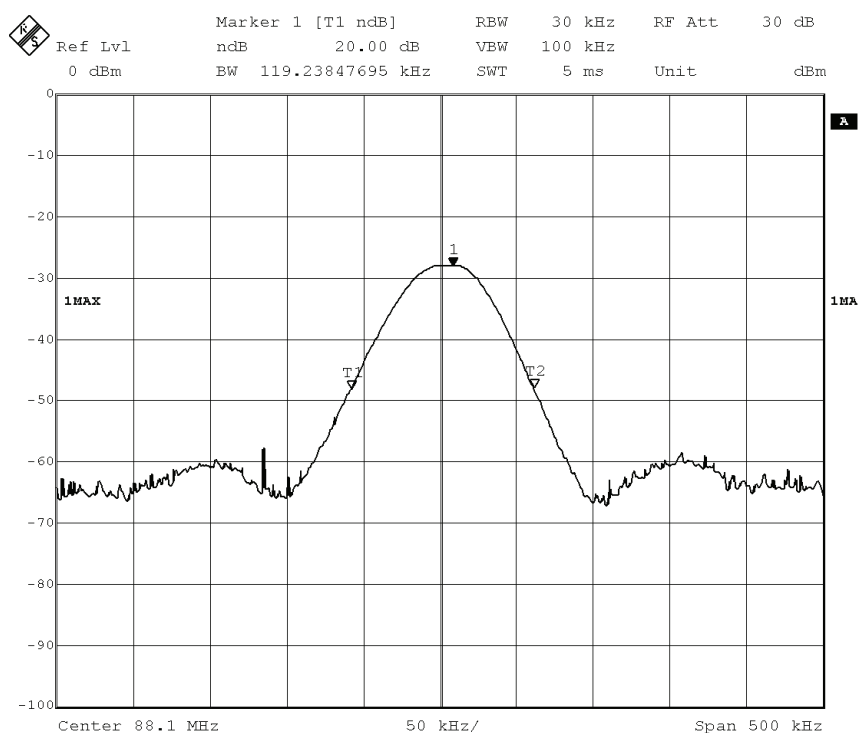
3.4 Test Procedure

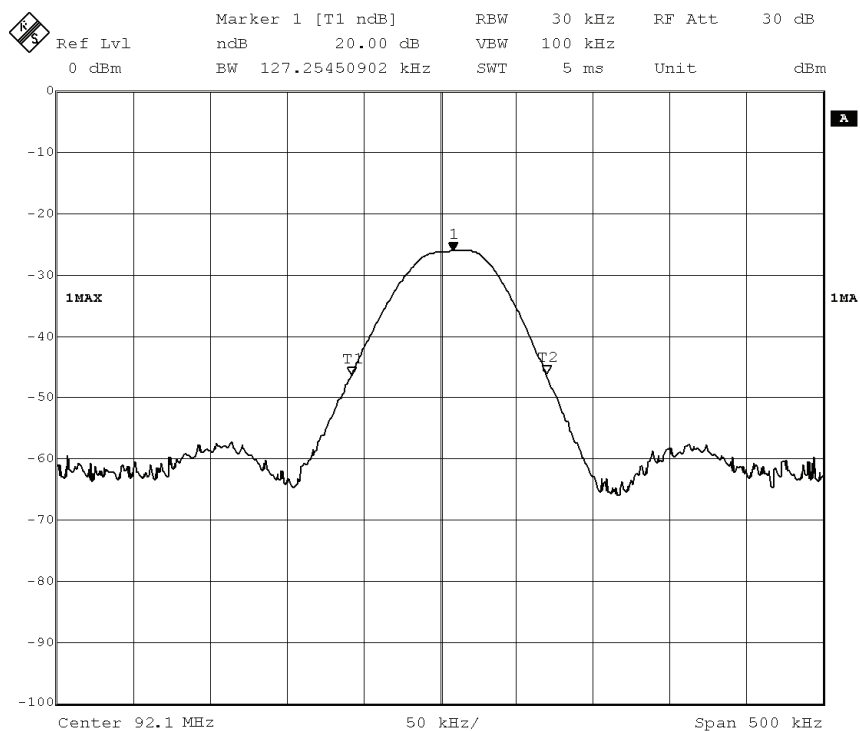
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on the test table without connection to measurement instrument. Turn on the EUT. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20dB bandwidth and 99% bandwidth from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

3.5 Test Result

EUT: DVD ENTERTAINMENT SYSTEM			
Mode	Freq (MHz)	20dB bandwidth (KHz)	Conclusion
Tx	88.1	119	PASS
	92.1	127	PASS

3.6 Original test data





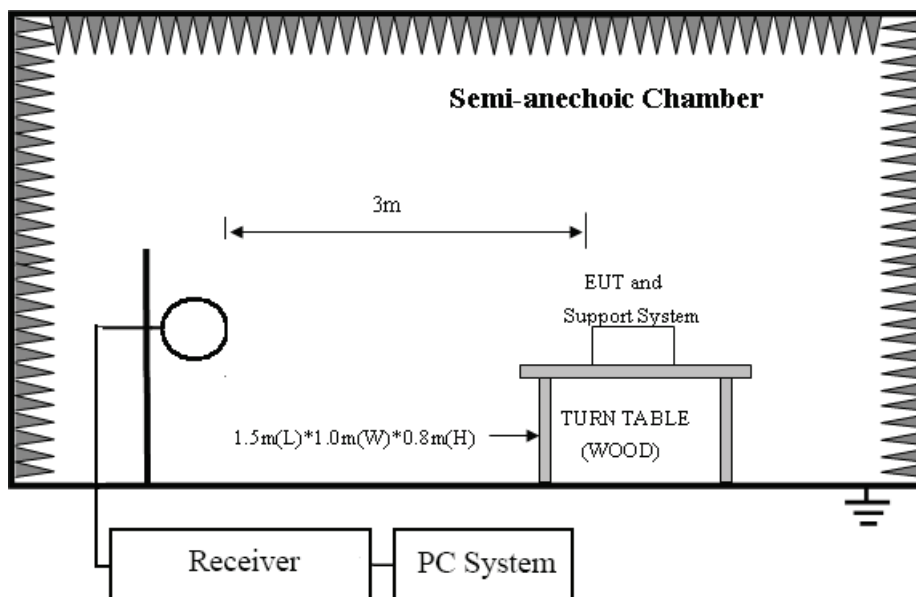
5. RADIATED EMISSION

5.1 Test equipment

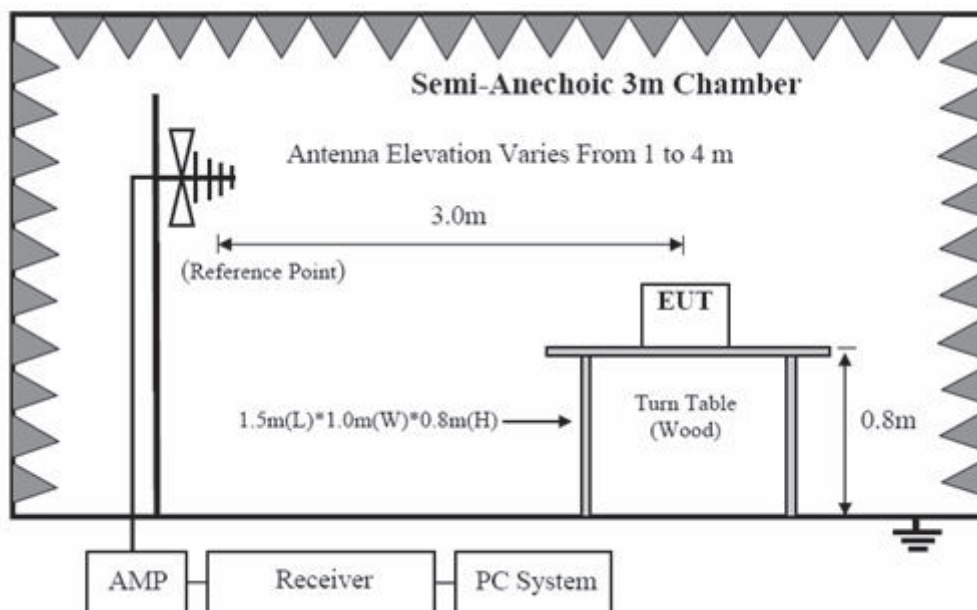
Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Due.	Cal. Interval
1	EMI Test Receiver	R&S	ESCI	101307	2015/12/26	1Y
2	Spectrum analyzer	Agilent	E4407B	US40240708	2015/07/13	1Y
3	Loop antenna	Chase	HLA6120	20129	2015/12/26	1Y
4	Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	2015/12/26	1Y
5	Double Ridged Horn Antenna	R&S	HF907	100276	2015/12/26	1Y
6	Pre-Amplifier	R&S	SCU-01	10049	2015/12/26	1Y
7	Pre-amplifier	A.H.	PAM0-0118	360	2015/12/26	1Y
8	RF Cable	R&S	R01	10403	2015/12/26	1Y
9	RF Cable	R&S	R02	10512	2015/12/26	1Y
10	Horn Antenna	EMCO	3116	9608-4877	2015/12/26	1Y

5.2 Block diagram of test setup

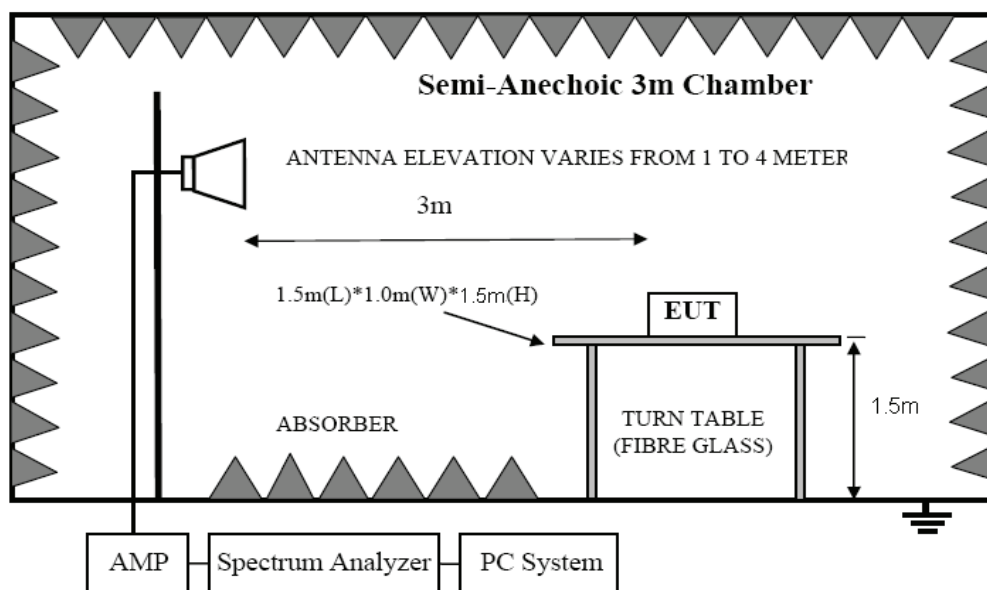
In 3m Anechoic Chamber Test Setup Diagram for below 30MHz



In 3m Anechoic Chamber Test Setup Diagram for below 1GHz



In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.

5.3 Limit

FCC 15.209 Limit

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$ at 3 m
0.009 ~ 0.49	300	2400/F(kHz)	65.0
0.49 ~ 1.705	30	2400/F(kHz)	45.0
1.705 ~ 30	30	30	69.5
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

5.3.4 Limit for this EUT

The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.4:2014. The specification used was the FCC 15.209.

5.4 Test Procedure

- (1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.
- (2) Setup EUT and assistant system according clause 2.4 and 8.2
- (3) Test antenna was located 3m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.
 - (a) Change work frequency or channel of device if practicable.
 - (b) Change modulation type of device if practicable.
 - (c) Change power supply range from 85% to 115% of the rated supply voltage
 - (d) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions
- (4) Spectrum frequency from 9KHz to 25GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 9KHz to 30MHz and 18GHz to 25GHz, so below final test was performed with frequency range from 30MHz to 18GHz.
- (5) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 2013 on Radiated Emission test.
- (6) For emissions from 30MHz to 1GHz, Quasi-Peak values were measured with EMI Receiver and the bandwidth of Receiver is 120 KHz.

5.5 Test result

PASS. (See below detailed test result)

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C and section 15.205, 15.209 and 15.239, Vertical and Horizontal mode all have been tested, Horizontal mode is the worse case .with the worst margin reading of:

Radiated Emission Test Result

Test Site	: 3m Chamber		
EUT	: Dual MultimediaHeadrest Replacement Entertainment System	Model No.:	: GC8
Power Supply	: 12Vd.c by car battery	Test Mode	: Keeping TX
Condition	: Temp:24.5'C,Humi:55%	Antenna/Distance	: 3m

Frequency (MHz)	Receiver		Rx Antenna		Cable Loss (dB)	Amplifier Gain (dB)	Result Level (dBμV/m)	Limit (dBμV/ m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)					
TX 88.1MHz									
88.1	60.85	PK	V	10.50	0.46	27.70	42.95	68.00	-25.05
88.1	53.25	AV	V	10.50	0.46	27.70	34.46	48.00	-13.54
88.1	61.94	PK	H	10.50	0.46	27.70	47.11	68.00	-20.89
88.1	55.62	AV	H	10.50	0.46	27.70	44.66	48.00	-3.34
88.0	47.63	QP	V	10.40	0.46	27.60	30.89	40.00	-9.11
88.0	51.40	QP	H	10.40	0.46	27.60	34.66	40.00	-5.34
176.2	45.81	QP	V	12.30	0.75	27.10	31.76	43.50	-11.74
176.2	52.63	QP	H	12.30	0.75	27.10	38.58	43.50	-4.92
264.3	46.28	QP	V	15.00	1.29	26.50	36.07	46.00	-9.93
264.3	52.14	QP	H	15.00	1.29	26.50	41.93	46.00	-4.07
352.4	47.50	QP	V	15.10	1.67	27.00	37.27	46.00	-8.73
352.4	50.46	QP	H	15.10	1.67	27.00	40.23	46.00	-5.77
440.5	41.05	QP	V	19.70	2.13	27.20	35.68	46.00	-10.32
440.5	45.57	QP	H	19.70	2.13	27.20	40.20	46.00	-5.80
TX 92.1MHz									
92.1	59.58	PK	V	10.50	0.47	27.70	41.70	68.00	-26.30
92.1	52.01	AV	V	10.50	0.47	27.70	37.92	48.00	-10.08
92.1	61.33	PK	H	10.50	0.47	27.70	47.38	68.00	-20.62
92.1	53.87	AV	H	10.50	0.47	27.70	44.57	48.00	-3.43
108.0	43.65	QP	V	10.90	0.51	27.60	27.46	43.50	-16.04
108.0	49.24	QP	H	10.90	0.51	27.60	33.05	43.50	-10.45
184.2	47.42	QP	V	12.40	0.77	27.00	33.59	43.50	-9.91
184.2	51.38	QP	H	12.40	0.77	27.00	37.55	43.50	-5.95
276.3	43.58	QP	V	15.20	1.30	26.60	33.48	46.00	-12.52
276.3	48.61	QP	H	15.20	1.30	26.60	38.51	46.00	-7.49
368.4	45.34	QP	V	15.10	1.69	27.00	35.13	46.00	-10.87
368.4	49.70	QP	H	15.10	1.69	27.00	39.49	46.00	-6.51
460.5	42.52	QP	V	19.90	2.16	27.20	37.38	46.00	-8.62
460.5	46.16	QP	H	19.90	2.16	27.20	41.02	46.00	-4.98

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss – Amp Factor
 2. If Peak Result comply with QP limit, QP Result is deemed to comply with QP limit

6 Antenna Requirements

6.1 Limit

For intentional device, according to FCC 47 CFR Section 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. And according to FCC 47 CFR Section 15.249 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

6.2 Result

The EUT has an internal chip antenna permanently soldering on the printed circuit board, which complied with 15.203, the maximum gain was 0dBi.