

Report No.: SZEM150700414404

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FCC REPORT

Application No:SZEM1604002867CRApplicant:Arts Electronics Co., Ltd.Manufacturer:Arts Electronics Co., Ltd.Factory:Arts Electronics Co., Ltd.

Product Name: HD KARAOKE SYSTEM WITH BLUETOOTH

Model No.(EUT): SDL366, SDL485BK

Add Model No.: SDL485W

Trade Mark: singing machine FCC ID: TZISDL366

Standards: 47 CFR Part 15, Subpart C (2015)(only for AC Power Line Conducted

Emission, Conducted Peak Output Power, Radiated Spurious Emissions and Restricted bands around fundamental frequency (Radiated

Emission))

Date of Receipt: 2016-05-02

Date of Test: 2016-05-10 to 2016-05-16

Date of Issue: 2016-06-17

Test Result: PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Jack Zhang EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.



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2 Version

Revision Record							
Version	Chapter	Date	Modifier	Remark			
00		2016-06-17		Original			

Authorized for issue by:		
Tested By	Brir Chen	2016-05-16
	(Bill Chen) /Project Engineer	Date
Prepared By	Joyce Shi (Joyce Shi)/Clerk	2016-06-17 Date
Checked By	Eric Fu (Eric Fu) /Reviewer	2016-06-17 Date



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3 Test Summary

Test Item	Test Requirement	Test method	Result
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 (2013)	PASS
Conducted Peak Output Power	47 CFR Part 15, Subpart C Section 15.247 (b)(1)	ANSI C63.10 (2013)	PASS
Radiated Spurious emissions	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 (2013)	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 (2013)	PASS



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Remark:

Model No.: SDL366, SDL485BK, SDL485W

This test report (Ref. No.: SZEM150700414404) is only valid with the original test report (Ref. No.:

SZEM150700414403).

Review this report and original report, this report just changing the model.

According to the declaration from the applicant, the models in this report and models in original report were identical.

The added models SDL485BK and SDL485W are identical with original model SDL366 in RF circuitry, only different on audio amplifier IC and keyboard location.

The updated model SDL366 is identical with original model SDL366 in RF circuitry, only different on output rating of adapter, audio amplifier IC and rated power of speaker.

The model SDL485BK is totally the same with the model SDL485W, only different on model No. and cabinet of color.

The added models SDL485BK and SDL485W are identical with the updated model SDL366 in RF circuitry, only different on output rating of adapter, rated power of speaker and keyboard location.

Model No.	Adapter	Audio amplifier IC	Speaker
SDL366 (Original)	DC 9V 1.3A	CS8508E	4ohm 5W
SDL366 (Updated)	DC 12V 1.5A	CS8622E	4ohm 10W
SDL485BK;	DC 9V 1.3A	CS8622E	4ohm 5W
SDL485W			

Considering to the difference, pre-scan were performed on the sample in this report to find the items which can be influential to the result in the original test report for fully retest.

Therefore in this report AC Power Line Conducted Emission, Conducted Peak Output Power, Radiated Spurious Emissions and Restricted bands around fundamental frequency (Radiated Emission) were fully retested on Model SDL366 and SDL485BK, shown the data in this report, other tests please refer to original report SZEM150700414404.



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5 General Information

5.1 Client Information

Applicant:	Arts Electronics Co., Ltd.
Address of Applicant:	NO. 1, SHANGXING LU, SHANGJIAO COMMUNITY, CHANGAN TOWN, DONGGUAN CITY, GUANGDONG PROVINCE, CHINA
Manufacturer:	Arts Electronics Co., Ltd.
Address of Manufacturer:	NO. 1, SHANGXING LU, SHANGJIAO COMMUNITY, CHANGAN TOWN, DONGGUAN CITY, GUANGDONG PROVINCE, CHINA
Factory:	Arts Electronics Co., Ltd.
Address of Factory:	NO. 1, SHANGXING LU, SHANGJIAO COMMUNITY, CHANGAN TOWN, DONGGUAN CITY, GUANGDONG PROVINCE, CHINA

5.2 General Description of EUT

Product Name:	HD KARAOKE SYSTEM WITH BLUETOOTH
Model No.:	SDL366, SDL485BK
Trade Mark:	singing machine
Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	BT V2.1+EDR
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, π/4DQPSK, 8DPSK
Number of Channel:	79
Hopping Channel Type:	Adaptive Frequency Hopping systems
Sample Type:	Fixed production
Antenna Type:	Integral
Antenna Gain:	0dBi
Power Supply:	For model No.: SDL366
	Switching power adapter
	Model: GME18A-120150FUR
	Input: AC 100-240V 50-60Hz 0.8A
	Output: DC 12V 1.5A
	For model No.: SDL485BK; SDL485W
	Switching power adapter
	Model: GME12A-090130FUR
	Input: AC 100-240V 50-60Hz 0.4A
	Output: DC 9V 1.3A
Test Voltage:	AC 120V 60Hz



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Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	20	2422MHz	40	2442MHz	60	2462MHz
1	2403MHz	21	2423MHz	41	2443MHz	61	2463MHz
2	2404MHz	22	2424MHz	42	2444MHz	62	2464MHz
3	2405MHz	23	2425MHz	43	2445MHz	63	2465MHz
4	2406MHz	24	2426MHz	44	2446MHz	64	2466MHz
5	2407MHz	25	2427MHz	45	2447MHz	65	2467MHz
6	2408MHz	26	2428MHz	46	2448MHz	66	2468MHz
7	2409MHz	27	2429MHz	47	2449MHz	67	2469MHz
8	2410MHz	28	2430MHz	48	2450MHz	68	2470MHz
9	2411MHz	29	2431MHz	49	2451MHz	69	2471MHz
10	2412MHz	30	2432MHz	50	2452MHz	70	2472MHz
11	2413MHz	31	2433MHz	51	2453MHz	71	2473MHz
12	2414MHz	32	2434MHz	52	2454MHz	72	2474MHz
13	2415MHz	33	2435MHz	53	2455MHz	73	2475MHz
14	2416MHz	34	2436MHz	54	2456MHz	74	2476MHz
15	2417MHz	35	2437MHz	55	2457MHz	75	2477MHz
16	2418MHz	36	2438MHz	56	2458MHz	76	2478MHz
17	2419MHz	37	2439MHz	57	2459MHz	77	2479MHz
18	2420MHz	38	2440MHz	58	2460MHz	78	2480MHz
19	2421MHz	39	2441MHz	59	2461MHz		

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency		
The Lowest channel	2402MHz		
The Middle channel	2441MHz		
The Highest channel	2480MHz		



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5.3 Test Environment

Operating Environment	Operating Environment:				
Temperature:	25.0 °C				
Humidity:	53 % RH				
Atmospheric Pressure:	1015mbar				

5.4 Description of Support Units

The EUT has been tested independent unit.

5.5 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch E&E Lab,

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.



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5.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

•CNAS (No. CNAS L2929)

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

VCCI

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

FCC – Registration No.: 556682

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 556682.

• Industry Canada (IC)

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

5.7 Deviation from Standards

None.

5.8 Abnormalities from Standard Conditions

None.

5.9 Other Information Requested by the Customer

None.



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5.10 Equipment List

	Conducted Emission							
Item	Test Equipment	Manufacturer	rer Model No. Inventory No.		Cal. date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)		
1	Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2016-05-13	2017-05-13		
2	LISN	Rohde & Schwarz	ENV216	SEM007-01	2015-10-09	2016-10-09		
3	LISN	ETS- LINDGREN	3816/2	SEM007-02	2016-04-25	2017-04-25		
4	8 Line ISN	Fischer Custom Communication s Inc.	FCC- TLISN-T8- 02	EMC0120	2015-08-30	2016-08-30		
5	4 Line ISN	Fischer Custom Communication s Inc.		EMC0121	2015-08-30	2016-08-30		
6	2 Line ISN	Fischer Custom Communication s Inc.		EMC0122	2015-08-30	2016-08-30		
7	EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2016-04-25	2017-04-25		
8	DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2015-10-09	2016-10-09		



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	RE in Chamber							
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)		
1	3m Semi-Anechoic Chamber	ETS- LINDGREN	N/A	SEM001-01	2016-05-13	2017-05-13		
2	EMI Test Receiver	Agilent Technologies	N9038A	SEM004-05	2015-09-16	2016-09-16		
3	BiConiLog Antenna (26-3000MHz)	ETS- LINDGREN	3142C	SEM003-01	2014-11-01	2017-11-01		
4	Double-ridged horn (1-18GHz)	ETS- LINDGREN	3117	SEM003-11	2015-10-17	2018-10-17		
5	Horn Antenna (18-26GHz)	ETS- LINDGREN	3160	SEM003-12	2014-11-24	2017-11-24		
6	Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEM005-01	2016-04-25	2017-04-25		
7	Band filter	Amindeon	Asi 3314	SEM023-01	N/A	N/A		
8	DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2015-10-09	2016-10-09		
9	Loop Antenna	Beijing Daze	ZN30401	SEM003-09	2015-05-13	2018-05-13		

	RE in Chamber					
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
1	3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2016-05-13	2017-05-13
2	EMI Test Receiver	Rohde & Schwarz	ESIB26	SEM004-04	2016-04-25	2017-04-25
3	BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-02	2014-11-15	2017-11-15
4	Amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2015-10-09	2016-10-09
5	Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2015-06-14	2018-06-14
6	Low Noise Amplifier	Black Diamond Series	BDLNA- 0118- 352810	SEM005-05	2015-10-09	2016-10-09
7	Band filter	Amindeon	Asi 3314	SEM023-01	N/A	N/A



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	RF connected test					
Item	Test Equipment	Manufacturer	Manufacturer Model No. Inventory No.		Cal. date	Cal.Due date
iteiii	rest Equipment	Maridiacturei	Wodel No.	inventory No.	(yyyy-mm-dd)	(yyyy-mm-dd)
1	DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2015-10-09	2016-10-09
2	Spectrum Analyzer	Rohde &	FSP	SEM004-06	2015-10-17	2016-10-17
	Spectrum Analyzen	Schwarz FSP SE		3EIVI004-00	2013-10-17	2010-10-17
3	Signal Congretor	Rohde &	SML03	SEM006-02	2016-04-25	2017-04-25
3	Signal Generator	Schwarz	SIVILUS	3EIVIUU6-U2	2016-04-25	2017-04-25
	Power Meter	Rohde &	NRVS	SEM014-02	2015-10-09	2016 10 00
4	Power Meter	Schwarz	NHVS	SEIVIU14-02	2015-10-09	2016-10-09



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6 Test results and Measurement Data

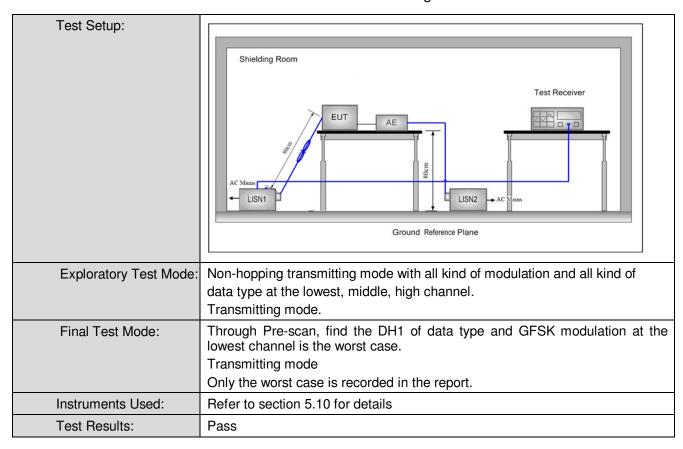
6.1 Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.2	207					
Test Method:	ANSI C63.10: 2013						
Test Frequency Range:	150kHz to 30MHz						
Limit:	Limit (dBuV)						
	Frequency range (MHz)	Quasi-peak	Average				
	0.15-0.5	66 to 56*	56 to 46*				
	0.5-5	56	46				
	5-30	60	50				
	* Decreases with the logarithn	n of the frequency.		-			
Test Procedure:	 The mains terminal disturt room. 	oance voltage test was	s conducted in a shie	elded			
	2) The EUT was connected to	AC power source thro	ough a LISN 1 (Line				
	Impedance Stabilization N	etwork) which provides	s a 50Ω/50μH + 5Ω lin	near			
	impedance. The power cal						
	connected to a second LIS		=				
	•	the same way as the LISN 1 for the unit being					
	measured. A multiple socket outlet strip was used to connect multiple						
	power cables to a single L exceeded.	ISN provided the rating	of the LISN was not				
	The tabletop EUT was place.	ced upon a non-metalli	c table 0 8m above th	he			
	ground reference plane. A	•					
	placed on the horizontal gr	•	,				
	4) The test was performed wi		erence plane. The re	ar			
	of the EUT shall be 0.4 m	from the vertical ground	d reference plane. Th	ne			
	vertical ground reference p	plane was bonded to th	e horizontal ground				
	reference plane. The LISN	•	-	he			
	unit under test and bonded to a ground reference plane for LISNs						
	mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units						
	the EUT and associated ed			2.			
	5) In order to find the maximu		•	to			
	equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.						
	71101 003.10. 2013 011 001	iduoted iniedoureniielit.					



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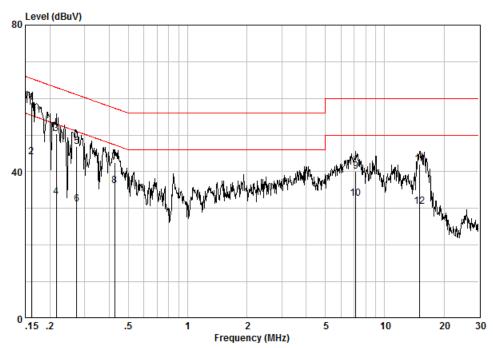
Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

For Model: SDL366

Live line:



Site : Shielding Room Condition : CE LINE Model : 2867CR (SDL366)

Test mode : TX

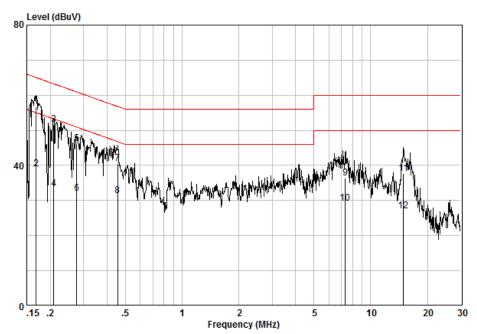
	Freq	Loss	Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1 @	0.16155	0.02	9.60	49.30	58.92	65.38	-6.47	QP
2	0.16155	0.02	9.60	34.40	44.02	55.38	-11.37	Average
3	0.21506	0.02	9.60	40.70	50.32	63.01	-12.69	QP
4	0.21506	0.02	9.60	23.60	33.22	53.01	-19.79	Average
5	0.27297	0.01	9.60	37.20	46.81	61.03	-14.22	QP
6	0.27297	0.01	9.60	21.50	31.11	51.03	-19.92	Average
7	0.42598	0.01	9.60	32.90	42.51	57.33	-14.82	QP
8	0.42598	0.01	9.60	26.50	36.11	47.33	-11.22	Average
9	7.137	0.01	9.68	30.40	40.09	60.00	-19.91	QP
10	7.137	0.01	9.68	23.00	32.69	50.00	-17.31	Average
11	15.066	0.02	9.76	32.40	42.18	60.00	-17.82	QP
12	15.066	0.02	9.76	20.70	30.48	50.00	-19.52	Average



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Neutral line:



Site : Shielding Room Condition : CE NEUTRAL Model : 2867CR (SDL366)

Test mode : TX

		Cable	LISN	Read		Limit	Over	
	Freq	Loss	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1 @	0.16854	0.02	9.60	47.10	56.72	65.03	-8.31	QP
2	0.16854	0.02	9.60	29.40	39.02	55.03	-16.01	Average
3	0.20833	0.02	9.62	42.00	51.64	63.27	-11.64	QP
4	0.20833	0.02	9.62	23.80	33.44	53.27	-19.84	Average
5	0.27587	0.01	9.62	36.60	46.23	60.94	-14.71	QP
6	0.27587	0.01	9.62	22.50	32.13	50.94	-18.81	Average
7	0.45395	0.01	9.63	30.90	40.54	56.80	-16.27	QP
8	0.45395	0.01	9.63	21.70	31.34	46.80	-15.47	Average
9	7.329	0.01	9.75	26.70	36.46	60.00	-23.54	QP
10	7.329	0.01	9.75	19.40	29.16	50.00	-20.84	Average
11	14.907	0.01	9.90	27.70	37.61	60.00	-22.39	QP
12	14.907	0.01	9.90	17.10	27.01	50.00	-22.99	Average

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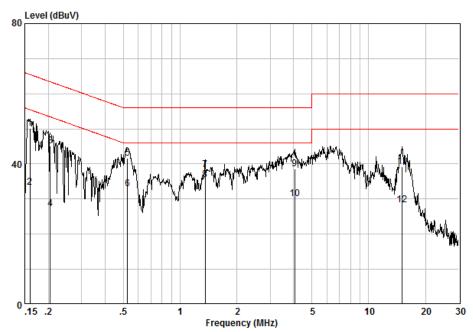


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For Model: SDL485BK

Live line:



Site : Shielding Room Condition : CE LINE Model : 2867CR (SDL485)

Test mode : TX

		Cable	LISN	Read		Limit	Over	
	Freq	Loss	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.15985	0.02	9.60	40.50	50.12	65.47	-15.36	QP
2	0.15985	0.02	9.60	23.80	33.42	55.47	-22.06	Average
3	0.20505	0.02	9.60	35.60	45.22	63.40	-18.19	QP
4	0.20505	0.02	9.60	17.60	27.22	53.40	-26.19	Average
5	0.52654	0.01	9.60	32.10	41.71	56.00	-14.29	QP
6	0.52654	0.01	9.60	23.30	32.91	46.00	-13.09	Average
7	1.356	0.02	9.59	28.80	38.41	56.00	-17.59	QP
8	1.356	0.02	9.59	25.90	35.51	46.00	-10.49	Average
9	4.049	0.01	9.63	28.90	38.55	56.00	-17.45	QP
10	4.049	0.01	9.63	20.50	30.15	46.00	-15.85	Average
11	15.066	0.02	9.76	29.50	39.28	60.00	-20.72	QP
12	15.066	0.02	9.76	18.50	28.28	50.00	-21.72	Average

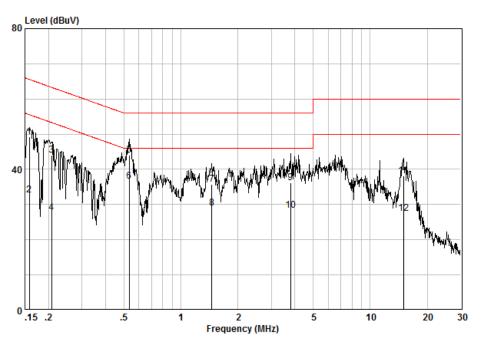
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Neutral line:



Site : Shielding Room Condition : CE NEUTRAL Model : 2867CR (SDL485)

Test mode : TX

		Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
		MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1		0.15816	0.02	9.61	39.60	49.23	65.56	-16.33	QP
2		0.15816	0.02	9.61	23.10	32.73	55.56	-22.83	Average
3		0.20723	0.02	9.62	34.30	43.94	63.32	-19.38	QP
4		0.20723	0.02	9.62	18.00	27.64	53.32	-25.68	Average
5		0.53215	0.01	9.63	34.50	44.14	56.00	-11.86	QP
6	@	0.53215	0.01	9.63	27.00	36.64	46.00	-9.36	Average
7		1.456	0.02	9.64	26.00	35.66	56.00	-20.34	QP
8		1.456	0.02	9.64	19.40	29.06	46.00	-16.94	Average
9		3.799	0.02	9.68	26.40	36.09	56.00	-19.91	QP
10		3.799	0.02	9.68	18.70	28.39	46.00	-17.61	Average
11		14.986	0.01	9.90	28.30	38.21	60.00	-21.79	QP
12		14.986	0.01	9.90	17.50	27.41	50.00	-22.59	Average

Notes:

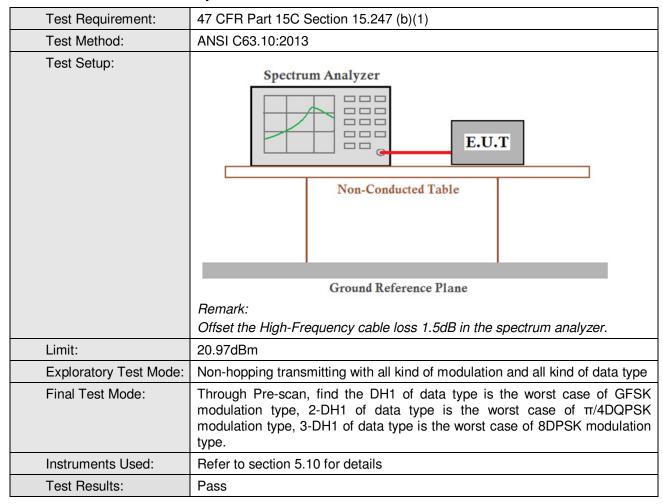
- 1. The following Quasi-Peak and Average measurements were performed on the EUT:
- 2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.



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6.2 Conducted Peak Output Power





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Measurement Data

For SDL366

	GFSK mod	e	
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	0.49	20.97	Pass
Middle	0.95	20.97	Pass
Highest	1.38	20.97	Pass
	π/4DQPSK m	ode	
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	0.53	20.97	Pass
Middle	0.92	20.97	Pass
Highest	1.34	20.97	Pass
	8DPSK mod	de	
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	0.48	20.97	Pass
Middle	0.91	20.97	Pass
Highest	1.33	20.97	Pass

For SDL485BK

	GFSK mode						
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result				
Lowest	-0.73	20.97	Pass				
Middle	-0.20	20.97	Pass				
Highest	0.19	20.97	Pass				
	π/4DQPSK n	node					
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result				
Lowest	-0.71	20.97	Pass				
Middle	-0.25	20.97	Pass				
Highest	0.18	20.97	Pass				
	8DPSK mo	de					
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result				
Lowest	-0.72	20.97	Pass				
Middle	-0.28	20.97	Pass				
Highest	0.18	20.97	Pass				



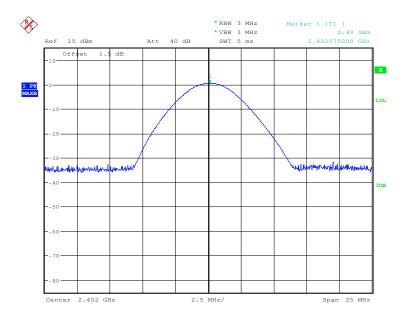
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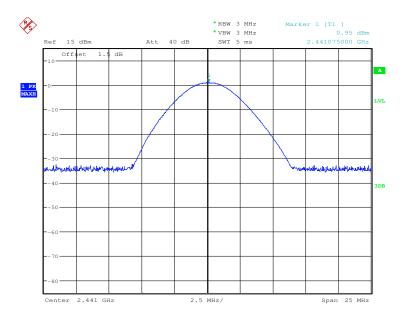
For SDL366

Test plot as follows:

Test mode:	GFSK	Test channel:	Lowest
------------	------	---------------	--------





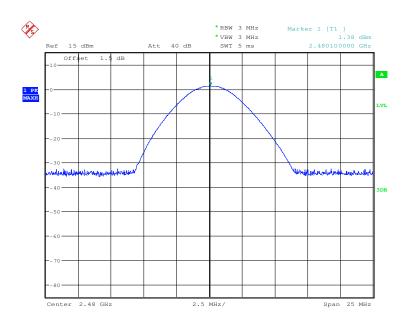




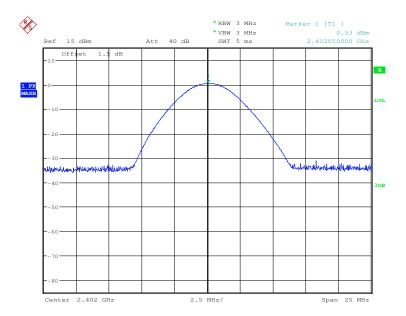
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Test mode: GFSK Test channel: Highest





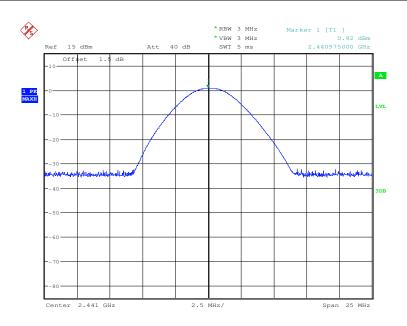




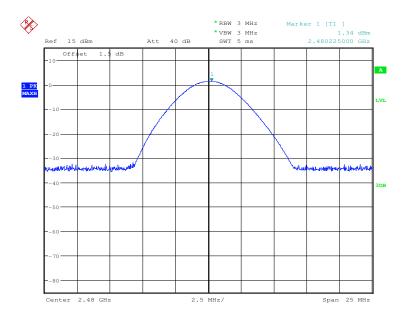
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Test mode: π/4DQPSK Test channel: Middle





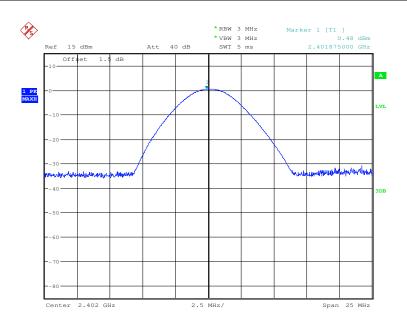




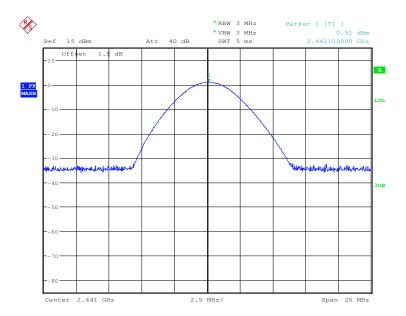
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Test mode: 8DPSK Test channel: Lowest





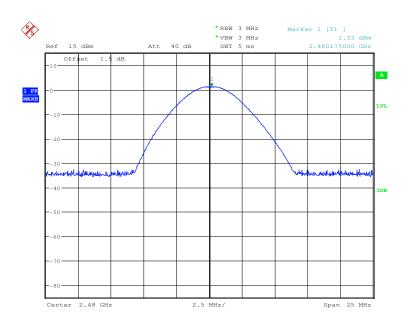




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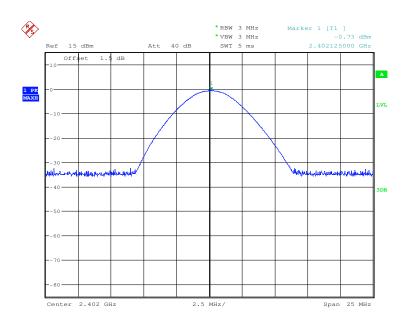
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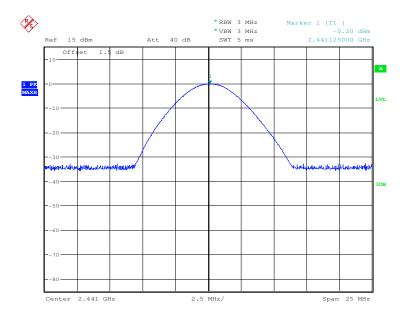
For SDL485BK

Test plot as follows:

Test mode: GFSK Test channel: Lowest





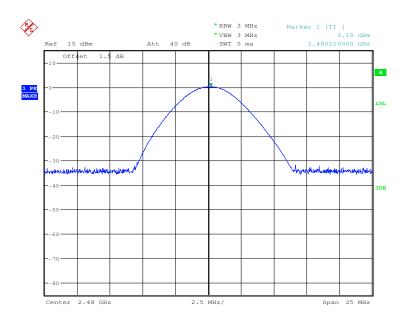




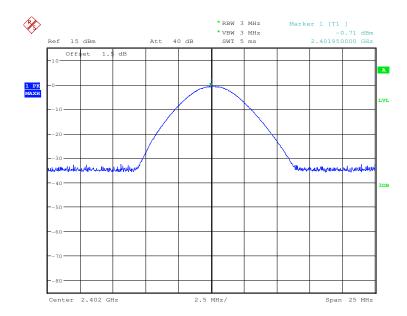
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Test mode: GFSK Test channel: Highest





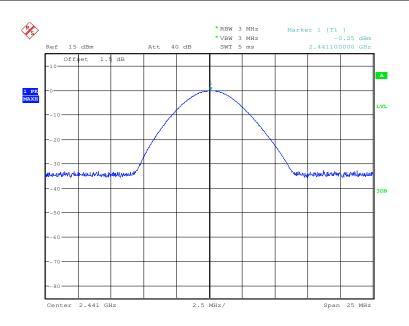




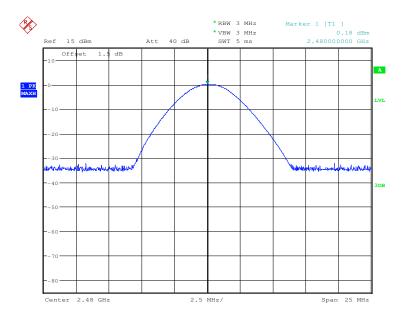
Report No.: SZEM150700414404

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Test mode: π/4DQPSK Test channel: Middle





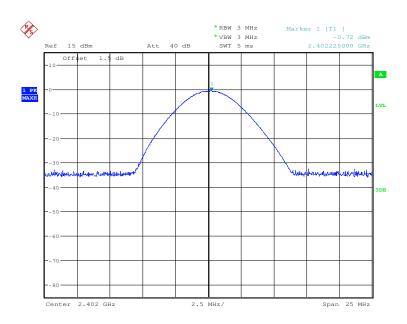




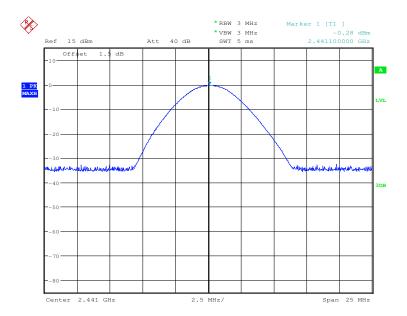
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Test mode: 8DPSK Test channel: Lowest





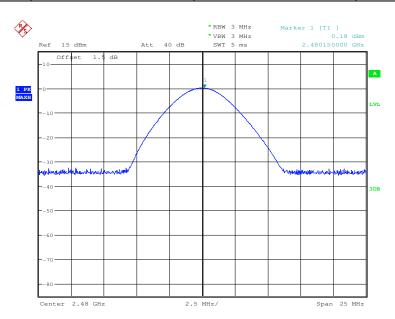




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6.3 Radiated Spurious Emission

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205						
Test Method:	ANSI C63.10: 2013						
Test Site:	Measurement Distance	: 3n	า				
Receiver Setup:	Frequency		Detector	RBW	VBW	Remark	
	0.009MHz-0.090MH	Z	Peak	10kHz	z 30kHz	Peak	
	0.009MHz-0.090MH	Z	Average	10kHz	z 30kHz	Average	
	0.090MHz-0.110MH	Z	Quasi-peak	10kHz	30kHz	Quasi-peak	
	0.110MHz-0.490MH	Z	Peak	10kHz	30kHz	Peak	
	0.110MHz-0.490MH	Z	Average	10kHz	30kHz	Average	
	0.490MHz -30MHz		Quasi-peak	10kHz	z 30kHz	Quasi-peak	
	30MHz-1GHz		Quasi-peak	100 kH	lz 300kHz	Quasi-peak	
	Above 1GHz		Peak	1MHz	: 3MHz	Peak	
	Above Tariz		Peak	1MHz	ı 10Hz	Average	
Limit:	Frequency		eld strength crovolt/meter)	Limit (dBuV/m)	Remark	Measureme distance (n	
	0.009MHz-0.490MHz	2	400/F(kHz)	-	-	300	
	0.490MHz-1.705MHz	24	1000/F(kHz)	-	-	30	
	1.705MHz-30MHz		30	-	-	30	
	30MHz-88MHz		100	40.0	Quasi-peak	3	
	88MHz-216MHz		150	43.5	Quasi-peak	3	
	216MHz-960MHz		200	46.0	Quasi-peak	3	
	960MHz-1GHz		500	54.0	Quasi-peak	3	
	Above 1GHz		500	54.0	Average	3	
	Note: 15.35(b), Unless emissions is 20dE applicable to the peak emission lev	3 ab equi	ove the maxim pment under to	num perm est. This p	itted average	emission limit	

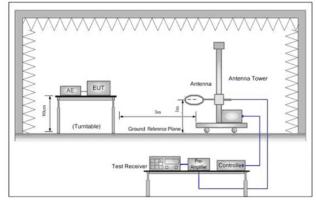
[&]quot;This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at www.sgs.com/terms and conditions.htm and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only."



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Test Setup:



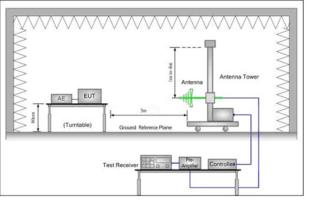


Figure 1. Below 30MHz

Figure 2. 30MHz to 1GHz

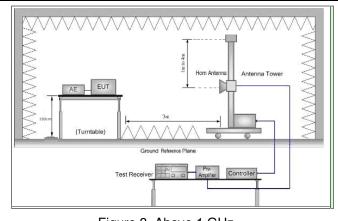


Figure 3. Above 1 GHz

Test Procedure:

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified



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	 g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. h. Test the EUT in the lowest channel (2402MHz),the middle channel
	 (2441MHz), the Highest channel (2480MHz) i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. j. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Non-hopping transmitting mode with all kind of modulation and all kind of data type
	Transmitting mode
Final Test Mode:	Through Pre-scan, find the DH1 of data type and GFSK modulation is the worst case. Pretest the EUT at Transmitting mode, found the Transmitting mode which it is worse case
	For below 1GHz part, through pre-scan, the worst case is the lowest channel. Only the worst case is recorded in the report.
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass



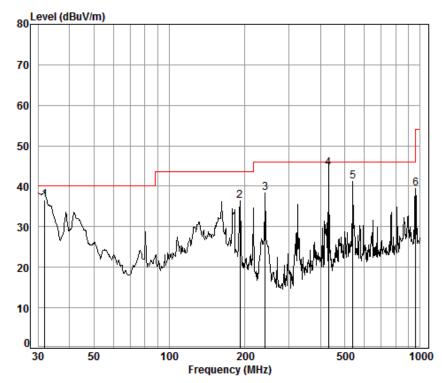
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6.3.1 Radiated Emission below 1GHz

30MHz~1GHz (QP)					
Test mode:	Transmitting	Vertical			

For Model: SDL366



Condition: 3m VERTICAL

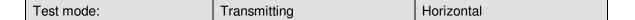
Job No : 2867CR Test mode: TX mode : SDL366

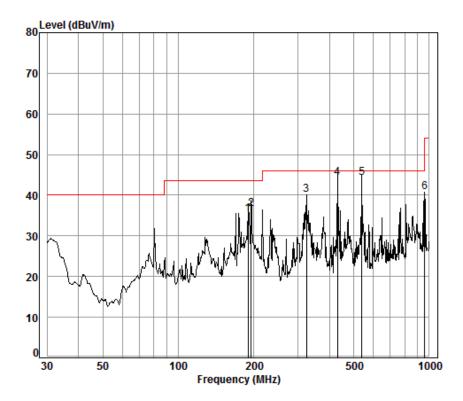
	Freq			Preamp Factor			Limit Line	Over Limit
_	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	31.95	0.60	17.73	27.40	45.59	36.52	40.00	-3.48
2	191.07	1.39	10.11	26.89	51.84	36.45	43.50	-7.05
3	240.83	1.63	11.92	26.74	51.45	38.26	46.00	-7.74
4 pp	431.03	2.33	16.45	27.23	52.91	44.46	46.00	-1.54
5	539.48	2.64	18.75	27.62	47.49	41.26	46.00	-4.74
6	958.79	3.66	23.38	26.67	39.03	39.40	46.00	-6.60



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Condition: 3m HORIZONTAL

Job No : 2867CR Test mode: TX mode

: SDL366

D-ALL	_
BuV/m dBuV/m dB	3
36.71 43.50 -6.79 40.12 46.00 -5.88 44.21 46.00 -1.79	3
-	

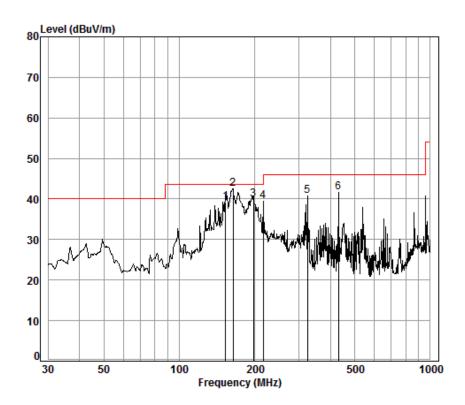


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30MHz~1GHz (QP)				
Test mode:	Transmitting	Vertical		

For Model: SDL485BK



Condition: 3m VERTICAL

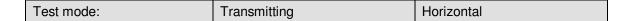
Job No : 2867CR Test mode: TX mode : SDL485

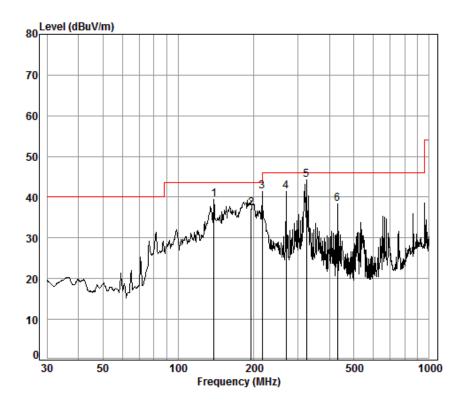
		Cable	Ant	Preamp	Read		Limit	0ver
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	153.20	1.32	9.76	25.82	54.01	39.27	43.50	-4.23
2 pp	163.76	1.34	10.03	25.81	56.91	42.47	43.50	-1.03
3	197.89	1.40	6.40	25.78	57.83	39.85	43.50	-3.65
4	216.02	1.49	7.59	25.76	56.07	39.39	46.00	-6.61
5	324.46	1.98	11.41	25.69	53.00	40.70	46.00	-5.30
6	431.03	2.33	13.01	25.65	52.04	41.73	46.00	-4.27



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Condition: 3m HORIZONTAL

Job No : 2867CR Test mode: TX mode : SDL485

		Cable	Ant	Preamp	Read		Limit	0ver
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
	138.87	1.29	8.12	25.84	55.90	39.47	43.50	-4.03
	195.14	1.39	6.40	25.78	55.26	37.27	43.50	-6.23
	216.02	1.49	7.59	25.76	58.16	41.48	46.00	-4.52
	269.43	1.77	9.03	25.72	56.31	41.39	46.00	-4.61
pp	324.46	1.98	11.41	25.69	56.48	44.18	46.00	-1.82
	431.03	2.33	13.01	25.65	48.73	38.42	46.00	-7.58



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6.3.2 Transmitter Emission above 1GHz

For SDL366

Worse case	mode:	GFSK(DH1)		Test channel:		Lowes	Lowest		mark:	Peak	
Frequency (MHz)	Antenr Facto (dB/m	r	Cable Loss (dB)	Fa	amp ctor dB)	Read Level (dBuV)	Level (dBuV/m)		t Line IV/m)	Over Limit (dB)	Polarization
4804.000	34.10)	8.87	38	3.75	45.73	49.95	7	'4	-24.05	Vertical
7206.000	35.60)	10.68	37	7.64	40.81	49.45	7	'4	-24.55	Vertical
9608.000	37.10)	12.50	36	3.35	35.26	48.51	7	' 4	-25.49	Vertical
4804.000	34.10)	8.87	38	3.75	45.37	49.59	7	'4	-24.41	Horizontal
7206.000	35.60)	10.68	37	7.64	42.00	50.64	7	'4	-23.36	Horizontal
9608.000	37.10)	12.50	36	3.35	36.79	50.04	7	'4	-23.96	Horizontal

Worse case mode:		GFSK(DH1)		Test channel:			Middle		Remark:		Peak
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Prear Facto (dB	or	Read Level (dBuV)	_	Level BuV/m)	Limit (dBu\		Over Limit (dB)	Polarization
4882.000	34.18	8.98	38.7	7	45.32	4	49.71	74	1	-24.29	Vertical
7323.000	35.54	10.72	37.5	9	44.41	ļ	53.08	74	1	-20.92	Vertical
9764.000	37.10	12.58	36.1	4	38.54	į	52.08	74	1	-21.92	Vertical
4882.000	34.18	8.98	38.7	7	45.09	4	49.48	74	1	-24.52	Horizontal
7323.000	35.54	10.72	37.5	59	42.74	į	51.41	74	1	-22.59	Horizontal
9764.000	37.10	12.58	36.1	4	38.58	į	52.12	74	1	-21.88	Horizontal

Worse case	mode:	GFSK(DH1)		Test channel:		Hig	Highest		emark:	Peak
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Prea Fac (dE	tor	Read Level (dBuV)	Level (dBuV/m		Line V/m)	Over Limit (dB)	Polarization
4960.000	34.26	9.09	38.	78	48.36	52.93	7	4	-21.07	Vertical
7440.000	35.60	10.77	37.	54	37.34	46.17	7	4	-27.83	Vertical
9926.563	37.23	12.67	35.9	93	36.72	50.69	7	4	-23.31	Vertical
4960.000	34.26	9.09	38.	78	46.33	50.90	7	4	-23.10	Horizontal
7440.000	35.60	10.77	37.	54	38.02	46.85	7	4	-27.15	Horizontal
9920.000	37.22	12.67	35.9	93	37.73	51.69	7	4	-22.31	Horizontal



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For SDL485BK

Worse case	mode:	GFSK(DH1)		Test channel:		Lowes	Lowest		mark:	Peak
Frequency (MHz)	Antenn Facto (dB/m	r Loss	Fa	eamp actor dB)	Read Level (dBuV)	Level (dBuV/m)		: Line V/m)	Over Limit (dB)	Polarization
4804.000	34.10	8.87	38	8.75	45.05	49.27	7	'4	-24.73	Vertical
7206.000	35.60	10.68	37	7.64	42.01	50.65	7	'4	-23.35	Vertical
9608.000	37.10	12.50	36	6.35	34.97	48.22	7	'4	-25.78	Vertical
4804.000	34.10	8.87	38	8.75	45.46	49.68	7	'4	-24.32	Horizontal
7206.000	35.60	10.68	37	7.64	42.10	50.74	7	'4	-23.26	Horizontal
9608.000	37.10	12.50	36	6.35	35.19	48.44	7	'4	-25.56	Horizontal

Worse case	mode:	GFSK(DH	GFSK(DH1) T		Test channel:		Middl	е	Remark:		Peak
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Prea Fact (dB	tor	Read Level (dBuV)	_	₋evel BuV/m)	Limit (dBu\		Over Limit (dB)	Polarization
4882.000	34.18	8.98	38.7	77	44.74	4	19.13	74	1	-24.87	Vertical
7323.000	35.54	10.72	37.5	59	45.21	5	53.88	74	1	-20.12	Vertical
9764.000	37.10	12.58	36.1	14	40.42	5	53.96	74	1	-20.04	Vertical
4882.000	34.18	8.98	38.7	77	45.43	4	19.82	74	1	-24.18	Horizontal
7323.000	35.54	10.72	37.5	59	44.80	5	53.47	74	1	-20.53	Horizontal
9764.000	37.10	12.58	36.1	14	38.00	5	51.54	74	1	-22.46	Horizontal

Worse case	mode:	GFSK(DH1)		Test channel:		Highe	Highest		emark:	Peak
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Prea Fac (dE	tor	Read Level (dBuV)	Level (dBuV/m)	Limit (dBu\		Over Limit (dB)	Polarization
4960.000	34.26	9.09	38.	78	46.48	51.05	74	1	-22.95	Vertical
7440.000	35.60	10.77	37.	54	38.93	47.76	74	1	-26.24	Vertical
9920.000	37.22	12.67	35.	93	36.77	50.73	74	1	-23.27	Vertical
4960.000	34.26	9.09	38.	78	45.84	50.41	74	1	-23.59	Horizontal
7440.000	35.60	10.77	37.	54	39.00	47.83	74	1	-26.17	Horizontal
9920.000	37.22	12.67	35.	93	38.04	52.00	74	1	-22.00	Horizontal



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Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor

- 2) Scan from 9kHz to 25GHz, the disturbance above 13GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 3) As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.

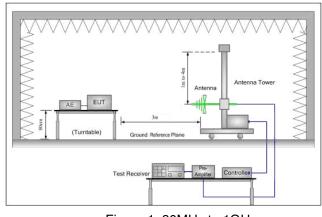


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6.4 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15C Section 15	5.209 and 15.205									
Test Method:	ANSI C63.10: 2013	ANSI C63.10: 2013									
Test Site:	Measurement Distance: 3m										
Limit:	Frequency Limit (dBuV/m @3m) Remark										
	30MHz-88MHz	40.0	Quasi-peak Value								
	88MHz-216MHz	43.5	Quasi-peak Value								
	216MHz-960MHz	46.0	Quasi-peak Value								
	960MHz-1GHz	54.0	Quasi-peak Value								
	Abovo 1CHz	54.0	Average Value								
	Above IGHZ	Above 1GHz 74.0 Peak Value									
Test Setup:											



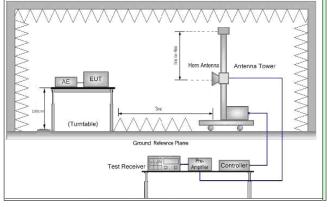


Figure 1. 30MHz to 1GHz

Figure 2. Above 1 GHz



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Test Procedure:	 a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. b. For above 1GHz, the EUT was placed on the top of a rotating table
	1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
	c. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
	d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
	e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
	f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
	g. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel h. Test the EUT in the lowest channel, the Highest channel
	i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
	j. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Non-hopping transmitting mode with all kind of modulation and all kind of data type Transmitting mode
Final Test Mode:	Through Pre-scan, find the DH5 of data type and GFSK modulation is the worst case.
	Pretest the EUT at Transmitting mode, found the Transmitting mode which it is worse case
	Only the worst case is recorded in the report.
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass



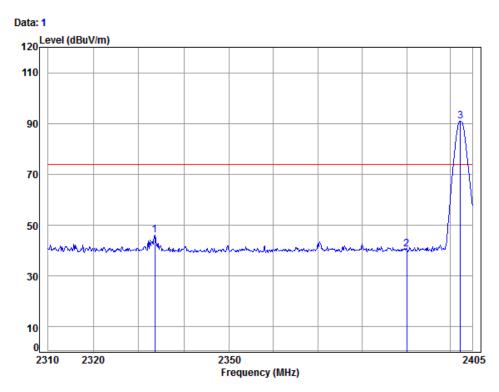
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Test plot as follows:

For SDL366

Worse case mode:	GFSK (DH5)	Test channel:	Lowest	Remark:	Peak	Vertical	
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Test Site: FCC PART C 247 PKchamber Vertical

EUT: 2867CR

Test mode: 2402 Band edge

Marker					Measured dBuV/m			Remark
1	2333.58	28.41	5.29	50.53	46.12	74.00	-27.88	
2	2390.00	28.57	5.34	44.75	40.55	74.00	-33.45	
3	2402.29	28.61	5.35	95.03	90.88	74.00	16.88	

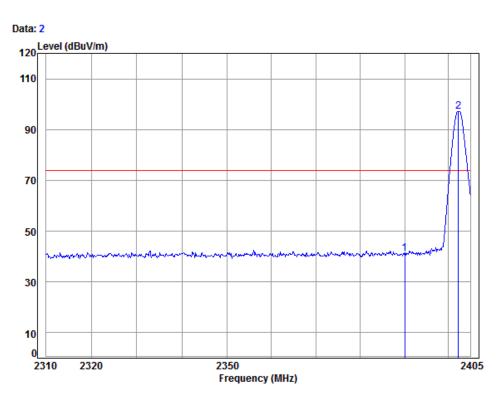
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Worse case mode: GFSK (DH5) Test channel: Lowest Remark: Peak Horizontal



Test Site: FCC PART C 247 PKchamber Horizontal

EUT: 2867CR

Test mode: 2402 Band edge

Marker		_	Measured dBuV/m		Remark
	 	 	41.26 97.27	 	

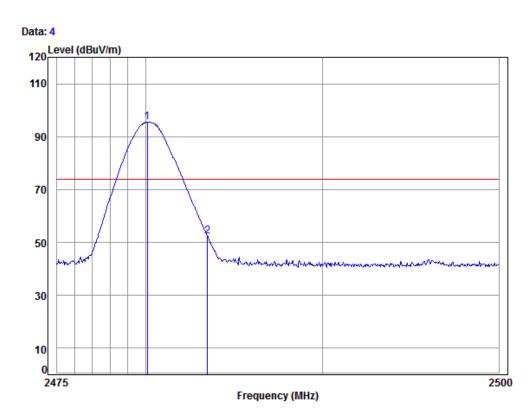
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Worse case mode:	GFSK (DH5)	Test channel:	Highest	Remark:	Peak	Vertical
TTOICE CASE IIICACI	G. C. (DC)	1 Oot onamon	19	i tomanti		· or troat



Test Site: FCC PART C 247 PKchamber Vertical

EUT: 2867CR

Test mode: 2480 Band edge

Marker					Measured dBuV/m			Remark
1 2	2480.10	28.97	5.41	99.16	95.42	74.00	21.42	
2 2	2483.50	28.98	5.41	56.18	52.45	74.00	-21.55	

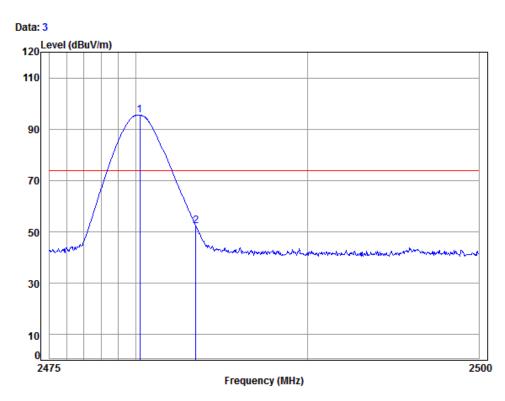
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Worse case mode: GFSK (DH5) Test channel: Highest Remark: Peak Horizontal



Test Site: FCC PART C 247 PKchamber Horizontal

EUT: 2867CR

Test mode: 2480 Band edge

Marker				_	Measured dBuV/m			Remark
1	2480.25	28.97	5.41	99.18	95.44	74.00	21.44	
2	2483.50	28.98	5.41	56.08	52.35	74.00	-21.65	

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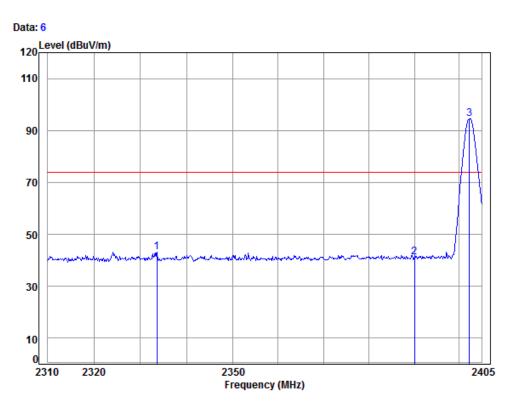


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For SDL485BK

Worse case mode: GFSK (DH5) Test channel: Lowest Remark: Peak Vertical



Test Site: FCC PART C 247 PKchamber

Vertical

EUT: 2867CR

Test mode: 2402 Band edge

Marker				_	Measured dBuV/m		Over dBuV	Remark
1	2333.58	28.41	5.29	47.64	43.23	74.00	-30.77	
2	2390.00	28.57	5.34	45.54	41.34	74.00	-32.66	
3 :	2402.29	28.61	5.35	98.66	94.51	74 99	20 51	

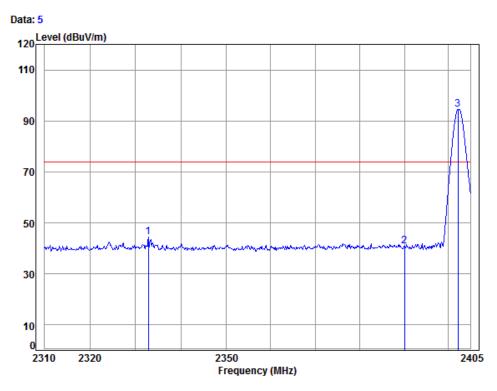
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Worse case mode: GFSK (DH5) Test channel: Lowest Remark: Peak Horizontal



Test Site: FCC PART C 247 PKchamber

Horizontal

EUT: 2867CR

Test mode: 2402 Band edge

Marker				0	Measured dBuV/m	Limit dBuV/m	Over dBuV	Remark
	2332.83 2390.00	28.40 28.57	5.29 5.34	48.89 45.13	44.47 40.93		-29.53 -33.07	
		28.61			94.48		20.48	

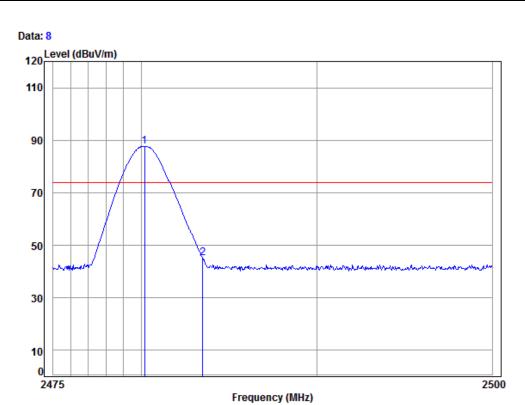
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Worse case mode:	GFSK (DH5)	Test channel:	Highest	Remark:	Peak	Vertical	ì
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Test Site: FCC PART C 247 PKchamber Vertical

EUT: 2867CR

Test mode: 2480 Band edge

Marker				_	Measured dBuV/m			Remark
1 2	2480.20	28.97	5.41	91.42	87.68	74.00	13.68	
2 2	2483.50	28.98	5.41	48.86	45.13	74.00	-28.87	

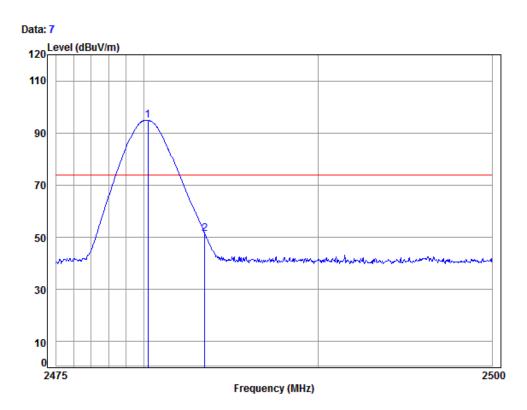
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Worse case mode:	GESK (DH5)	Test channel:	Highest	Remark:	Peak	Horizontal
Worse dase mode.	ar or (brio)	1 Cot onamic.	riigiicat	i iomani.	i can	1 10112011tai



Test Site: FCC PART C 247 PKchamber Horizontal

EUT: 2867CR

Test mode: 2480 Band edge

Remark1 : 2# Remark2 :

Marker					Measured dBuV/m			Remark
1	2480.25	28.97	5.41	98.55	94.81	74.00	20.81	
2	2483.50	28.98	5.41	55.19	51.46	74.00	-22.54	

Note

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor

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7 Photographs - EUT Test Setup

7.1 Conducted Emission

Test model No.: SDL366



Test model No.: SDL485BK





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7.2 Radiated Emission

Test model No.: SDL366







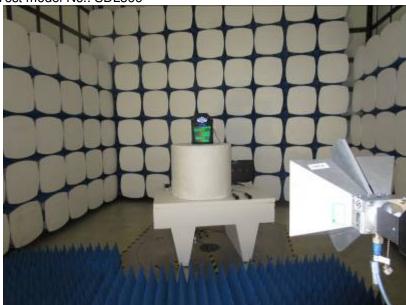


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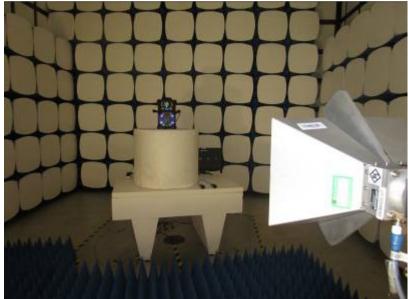
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7.3 Radiated Spurious Emission

Test model No.: SDL366



Test model No.: SDL485BK



8 Photographs - EUT Constructional Details

Refer to Appendix A - Photographs of EUT Constructional Details for SZEM1604002867CR.