

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

Product Name: BM684 Smartcard reader

Brand Name: BQT

Model Name: BM684, BM680, BM686, BM688, BT815-BM, BT900-BM, BT950

Model Differences: Detail please see page 5

FCC ID: QVL-BM68X

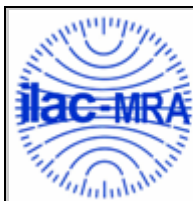
Report No.: ER/2010/C0015

Issue Date: Dec. 31, 2010

FCC Rule Part: §15.225

Prepared for: BQT Solutions Australia Pty Ltd
Level 1, 82 Waterloo Road, North Ryde, NSW
2113, Australia

Prepared by: SGS Taiwan Ltd.
Electronics & Communication Laboratory
No. 134, Wu Kung Rd., Wuku Industrial Zone,
Taipei County, Taiwan



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VERIFICATION OF COMPLIANCE

Applicant: BQT Solutions Australia Pty Ltd
 Level 1, 82 Waterloo Road, North Ryde, NSW 2113, Australia
Product Name: BM684 Smartcard reader
FCC ID: QVL-BM68X
Brand Name: BQT
Model No.: BM684, BM680, BM686, BM688, BT815-BM, BT900-BM, BT950
Model Difference: Detail please see page 5
File Number: ER/2010/C0015
Date of Test: Dec. 21, 2010 ~ Dec. 30, 2010
Date of EUT Received: Dec. 21, 2010

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.225.

The test results of this report relate only to the tested sample identified in this report.

Test By:



Date:

Dec. 31, 2010

Bondi Liu / Engineer

Prepared By:



Date:

Dec. 31, 2010

Eva Kao / Asst. Supervisor

Approved By



Date:

Dec. 31, 2010

Willis Chen / Asst. Manager

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Version

Version No.	Date	Description
00	Dec. 31, 2010	Initial creation of document

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1 GENERAL INFORMATION

1.1 Product Description

Product Name	BM684 Smartcard reader
Brand Name	BQT
Model Name	BM684, BM680, BM686, BM688, BT815-BM, BT900-BM, BT950
Model Difference	Please see below diversity description list
Power Supply	12V dc

Diversity Description List

Model	BM680	BM684	BM686	BM688	BT815-BM	BT900-BM	BT950
Appearance	BQT Mini case (Charcoal)	BQT Mini case (Charcoal)	BQT Mini case (Charcoal)	BQT Mini case (Charcoal)	BQT 815 case (Charcoal, Ivory)	BQT 900 case (Silver cover with Charcoal base)	BQT 950 case (Charcoal)
Function/Capability	Read smart card, Wiegand data output, Buzzer and LED input control	Read smart card, Wiegand data output, Buzzer and LED input control	Read smart card, Wiegand data output, Buzzer and LED input control	Read smart card, Wiegand or RS485 data output, Buzzer and LED input control	Read smart card, Wiegand or RS485 data output, Buzzer and LED input control	Read smart card, Wiegand or RS485 data output, Buzzer and LED input control	Read smart card, Wiegand or RS485 data output, Buzzer and LED input control

RFID:

Operating Frequency	13.56MHz
Transmit Power	< 123dBuV/m at 3m.
Number of Channels	1
Operating Mode	Point-to-Point
Antenna Type	Printed Antenna
Module Type	ASK

The EUT is compliance with RFID Standard.

This report applies for RFID.

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1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **QVL-BM68X** filing to comply with Section 15.225 of the FCC Part 15, Subpart C Rules.

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 2003. Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003. FCC Registration Number are: 990257 and 236194, Canada Registration Number: 4620A-04.

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 29, Pau-Tou-Tsuo Valley Chia-Pau Tsuen, Linkou Hsiang, Taipei county, which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. SGS Site No. 1(3 & 10 meters) and FCC Registration Number: 94644.

1.5 Special Accessories

Not available for this EUT intended for grant.

1.6 Equipment Modifications

Not available for this EUT intended for grant.

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2 System Test Configuration

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. the Tx frequency was fixed which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. According to the requirements in Section 7 and 13 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

2.3.2 Radiated Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 8 and 13 of ANSI C63.4-2003.

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2.4 Limitation

(1) Conducted Emission

According to section 15.207(a) Conducted Emission Limits is as following.

Frequency range MHz	Limits dB (uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note		
1.The lower limit shall apply at the transition frequencies		
2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

(2) Radiated Emission

- The field strength of any emission within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
- Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
- The field strength of any emissions appearing outside of the 13.110-14.010 MHz shall not exceed the general radiated emission limits in section 15.209(Intentional Radiators general limit).as below.

Frequency (MHz)	Field strength $\mu\text{V}/\text{m}$	Distance (m)	Field strength at 3m $\text{dB}\mu\text{V}/\text{m}$
1.705-30	30	30	69.54
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

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- Remark:
1. Emission level in dBuV/m=20 log (uV/m)
 2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
 3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of § 15.205
 4. Emission spurious frequency which appearing within the Restricted Bands specified in provision of §15.205, then the general radiated emission limits in § 15.209 apply.

(3) Frequency Tolerance

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

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2.5 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

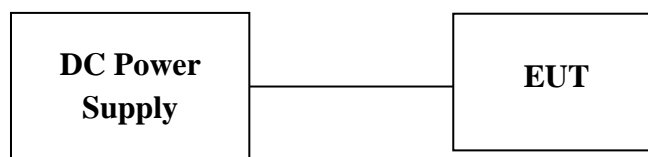


Table 5-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	FCC ID	Series No.	Data Cable	Power Cord
1.	DC Power Supply	Topward	3303D	N/A	N/A	Un-Shielding	Un-Shielding

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3 Summary of Test Results

FCC Rules	Description Of Test	Result
§ 15.207	Conducted Emission	Compliant
§ 15.225 (a)-(d)	Radiated Emission	Compliant
§ 15.225 (e)	Frequency Stability	Compliant

4 Description of test modes

The EUT was tested when placed horizontally on the EUT table as on a counter, and also when placed vertically on the table as when mounted on a wall. This report shows the results from testing in the worst-case emission configuration

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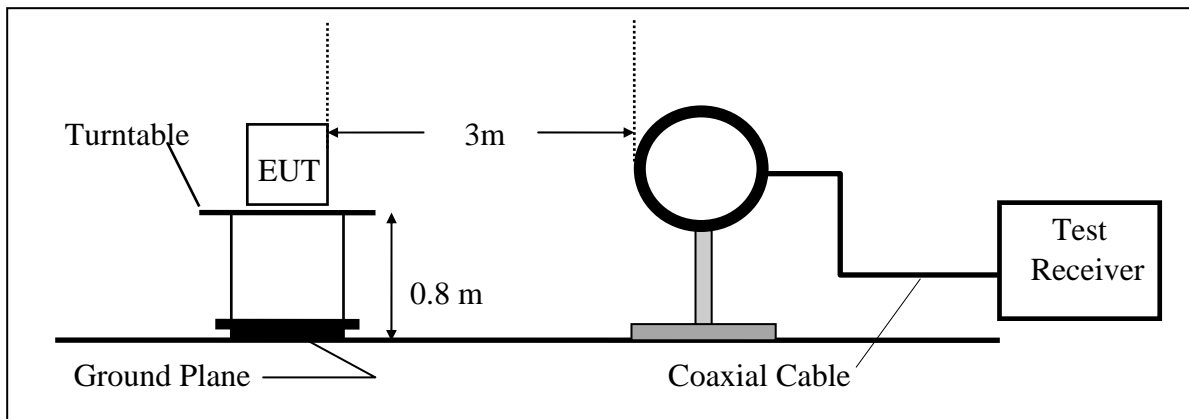
6 Radiated Emission Test

6.1 Measurement Procedure

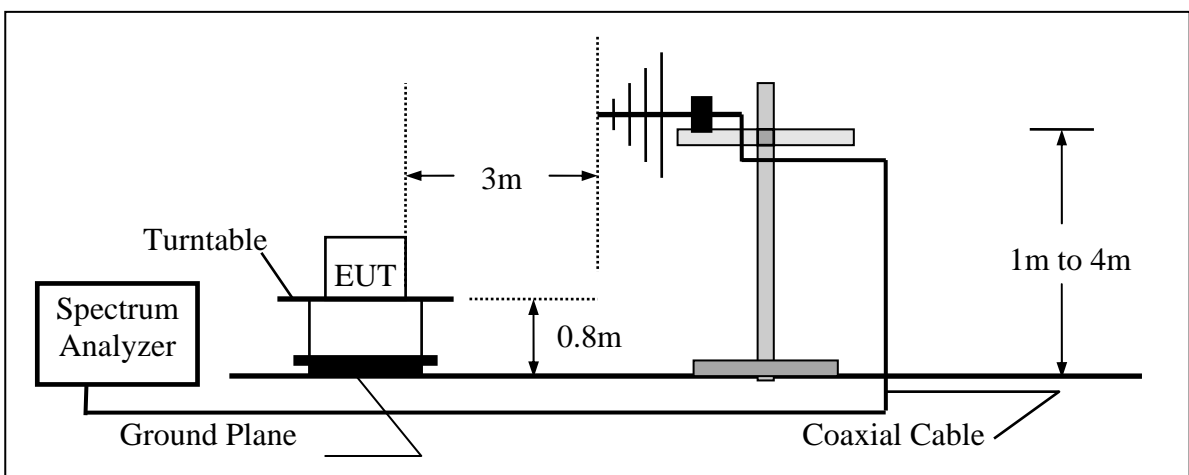
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.

6.2 Test SET-UP (Block Diagram of Configuration)

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



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



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6.3 Measurement Equipment Used:

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	R&S	FSP 40	100034	02/12/2010	02/11/2011
Bilog Antenna	SCHWAZBECK	VULB9160	3136	11/19/2010	11/18/2011
Horn antenna	SCHWAZBECK	BBHA 9120D	309/320	03/09/2009	03/08/2011
Pre-Amplifier	Agilent	8447D	1937A02834	11/28/2010	11/27/2011
Pre-Amplifier	Agilent	8449B	3008A01973	01/05/2010	01/04/2011
Radio Communication Analyzer	R & S	CMU200	102189	08/12/2010	08/11/2012
DC Block	Agilent	BLK-18	155452	07/05/2010	07/04/2011
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	HD	MA240-N	240/657	N.C.R	N.C.R
Controller	HD	HD100	N/A	N.C.R	N.C.R
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-10M	10m	01/05/2010	01/04/2011
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	01/05/2010	01/04/2011
3m Site	SGS	966 chamber	N/A	09/06/2010	09/05/2011

6.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

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6.5 Measurement Result

Operation Mode: Transmitting Mode
Fundamental Frequency: 13.56 MHz
Temperature : 25 °C
Humidity : 65 %

Test Date : Dec. 30, 2010
Test By: Bondi
Pol: Vertical

Freq. (MHz)	Ant.Pol. H/V	Detector		Factor (dB)	Actual FS (dBuV/m)	Limit@3m (dBuV/m)	Safe Margin (dB)	Note
		Mode (PK/AV/QP)	Reading (dBuV)					
13.56	H	Peak	71.19	-5.30	65.89	123.99	-58.10	F
27.12	H	Peak	--					
40.68	H	Peak	--					
54.24	H	Peak	--					
67.80	H	Peak	--					
81.36	H	Peak	--					
94.92	H	Peak	--					
108.48	H	Peak	--					
122.04	H	Peak	--					
135.60	H	Peak	--					
665.35	H	Peak	32.81	-5.54	27.27	46.00	-18.73	E
786.60	H	Peak	32.27	-4.27	28.00	46.00	-18.00	E
875.84	H	Peak	33.56	-2.58	30.98	46.00	-15.02	E

Remark:

- (1) Measuring frequencies from 25 MHz to the 1GHz .
- (2) Radiated emissions measured in frequency range from 25 MHz to 1000MHz were made with an instrument using Peak detector mode.
- (3) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (4) Data of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of SPA between 25MHz to 30MHz was 10KHz; 30MHz to 1GHz was 100KHz.

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Operation Mode: Transmitting Mode
Fundamental Frequency: 13.56 MHz
Temperature : 25 °C
Humidity : 65 %

Test Date : Dec. 30, 2010
Test By: Bondi
Pol: Horizontal

Freq. (MHz)	Ant.Pol. H/V	Detector	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit@3m (dBuV/m)	Safe	Note
		Mode (PK/AV/QP)					Margin (dB)	
13.56	H	Peak	76.46	-5.30	71.16	123.99	-52.83	F
27.12	H	Peak	--					
40.68	H	Peak	--					
54.24	H	Peak	--					
67.80	H	Peak	--					
81.36	H	Peak	--					
94.92	H	Peak	--					
108.48	H	Peak	--					
122.04	H	Peak	39.09	-14.27	24.82	69.54	-44.72	H
135.60	H	Peak	--					
204.60	H	Peak	45.79	-16.02	29.77	43.50	-13.73	E
245.34	H	Peak	45.30	-14.29	31.01	46.00	-14.99	E
257.95	H	Peak	47.86	-14.08	33.78	46.00	-12.22	E
313.24	H	Peak	39.52	-13.06	26.46	46.00	-19.54	E
447.10	H	Peak	35.78	-9.04	26.74	46.00	-19.26	E

Remark:

- (1) Measuring frequencies from 25 MHz to the 1GHz .
- (2) Radiated emissions measured in frequency range from 25 MHz to 1000MHz were made with an instrument using Peak detector mode.
- (3) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (4) Data of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of SPA between 25MHz to 30MHz was 10KHz; 30MHz to 1GHz was 100KHz.

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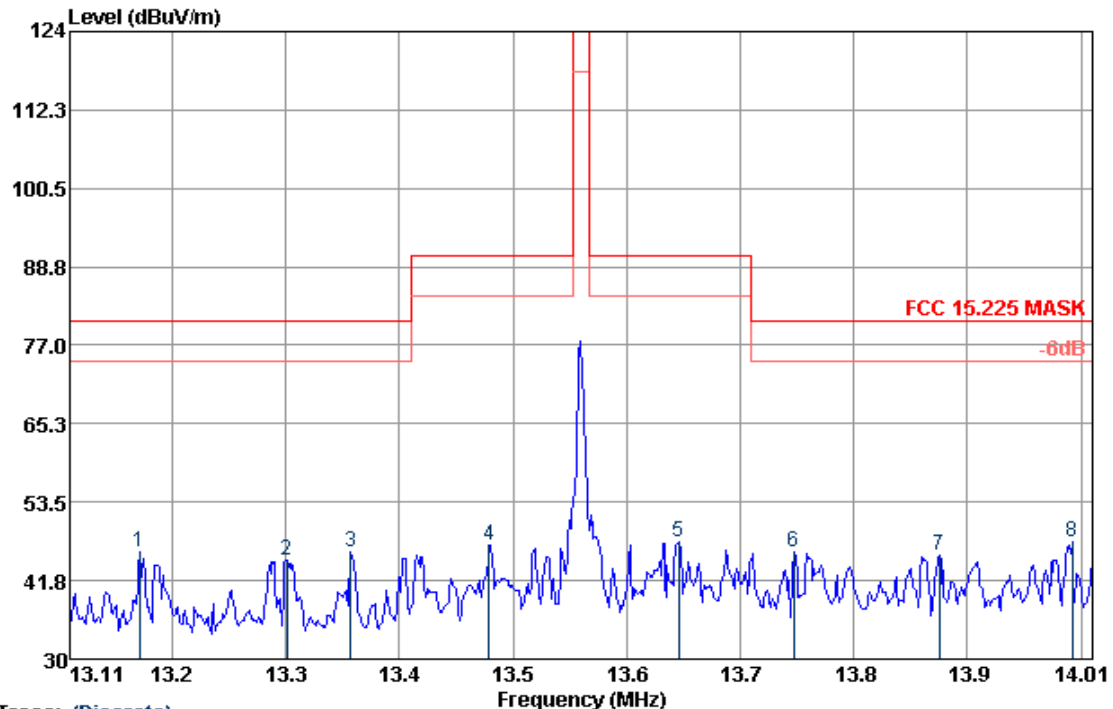
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Radiated Mask

Vertical:



Site : RF SITE 1
 Condition : FCC 15.225 MASK 3m VERTICAL
 Project No. : ER/2010/C0014~16
 Applicant : BQT
 EUT Description: BM684 Smartcard reader
 EUT Model : BM684
 Test Mode : Mask
 Temp./Humid. : 25 deg. C/65 RH
 Engineer : Bondi

	Freq	Read Level	Pol/Phase	Antenna Factor	Cable Loss	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV		dB/m	dB	dB/m	dBuV/m	dBuV/m	dB	
1	13.17	51.49	VERTICAL	22.65	0.38	-5.50	45.99	80.51	-34.52	Peak
2	13.30	50.34	VERTICAL	22.69	0.38	-5.45	44.89	80.51	-35.62	Peak
3	13.36	51.35	VERTICAL	22.72	0.38	-5.42	45.93	80.51	-34.58	Peak
4	13.48	52.33	VERTICAL	22.78	0.38	-5.35	46.98	90.47	-43.49	Peak
5	13.65	52.76	VERTICAL	22.87	0.38	-5.25	47.51	90.47	-42.96	Peak
6	13.75	51.15	VERTICAL	22.91	0.39	-5.19	45.96	80.51	-34.55	Peak
7	13.88	50.57	VERTICAL	22.99	0.39	-5.10	45.47	80.51	-35.04	Peak
8 p	13.99	52.46	VERTICAL	23.05	0.39	-5.03	47.43	80.51	-33.08	Peak

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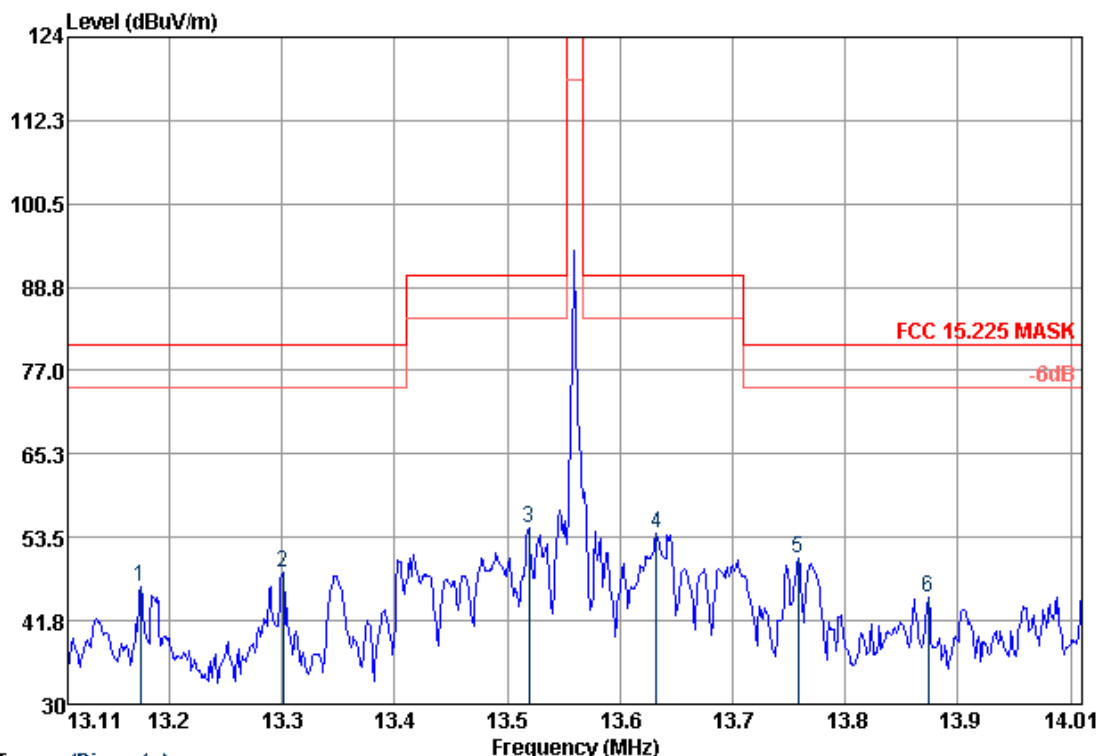
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Horizontal:



Trace: (Discrete)

Site : RF SITE 1

Condition : FCC 15.225 MASK 3m HORIZONTAL

Project No. : ER/2010/C0014~16

Applicant : BQT

EUT Description: BM684 Smartcard reader

EUT Model : BM684

Test Mode : Mask

Temp./Humid. : 25 deg. C/65 RH

Engineer : Bondi

	Freq	Read Level	Pol/Phase	Antenna Factor	Cable Loss	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV		dB/m	dB	dB/m	dBuV/m	dBuV/m	dB	
1	13.17	52.17	HORIZONTAL	22.65	0.38	-5.50	46.67	80.51	-33.84	Peak
2	13.30	53.96	HORIZONTAL	22.69	0.38	-5.45	48.51	80.51	-32.00	Peak
3	13.52	60.02	HORIZONTAL	22.81	0.38	-5.32	54.70	90.47	-35.77	Peak
4	13.63	59.24	HORIZONTAL	22.87	0.38	-5.25	53.99	90.47	-36.48	Peak
5 p	13.76	55.64	HORIZONTAL	22.93	0.39	-5.17	50.47	80.51	-30.04	Peak
6	13.87	50.15	HORIZONTAL	22.99	0.39	-5.10	45.05	80.51	-35.46	Peak

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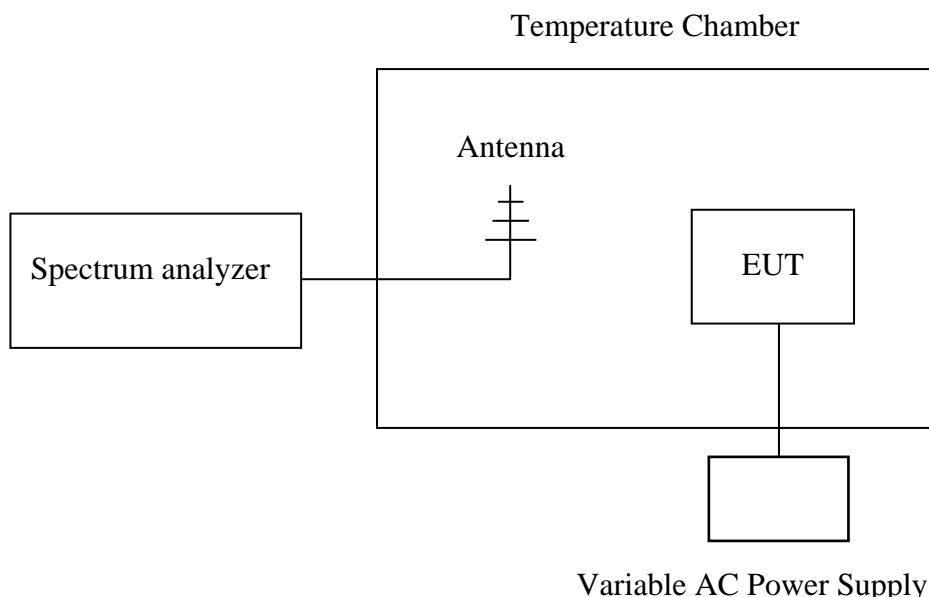
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7 Frequency Tolerance

7.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation
3. Set SPA Center Frequency = fundamental frequency, RBW, VBW= 10kHz, Span =100kHz.
4. Set SPA Max hold. Mark peak.

7.2 Test SET-UP (Block Diagram of Configuration)



7.3 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY43360126	04/19/2010	04/18/2012
Temperature Chamber	TERCHY	MHG-120LF	911009	04/30/2010	04/29/2012
AC Power Supply	APW-105N	887592	All Power	N/A	N/A

7.4 Measurement Results

Refer to attached data chart.

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A. Temperature Variation

Power Supply	Environment	Frequency	Delta (Hz)	Limit (KHz)
V DC	Temperature (°C)	(MHz)		
12	-20	13.559665	-27.50	+/- 1.356
12	-10	13.55966	-22.50	+/- 1.356
12	0	13.5596575	-20.00	+/- 1.356
12	10	13.5596525	-15.00	+/- 1.356
12	20	13.5596375	0.00	+/- 1.356
12	30	13.5596275	10.00	+/- 1.356
12	40	13.5596225	15.00	+/- 1.356
12	50	13.5596175	20.00	+/- 1.356

B. Supply Voltage Variation

Power Supply	Environment	Frequency	Delta (Hz)	Limit (KHz)
V AC	Temperature (°C)	(MHz)		
20	20	13.5596300	7.50	+/- 1.356
12	20	13.5596375	0.00	+/- 1.356
7	20	13.5596275	10.00	+/- 1.356

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