ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT CLASS II PC REPORT

OF

Product Name:	**Wireless RF Keypad (for Southco EA-R03-103)**
Brand Name:	**southco®**
Model No. :	**EA-R03-103**
Model Different:	**N/A**
FCC ID:	**YKR03103**
Report No.:	**ER/2010/60010-03**
Issue Date:	**Jan. 05, 2012**
Rule Part:	**§15.231**
Prepared by:	**Southco. Inc.** **210 North Brinton Lake Road Concordville PA 19331-0116 United States**
Prepared by:	**SGS Taiwan Ltd.** **Electronics & Communication Laboratory** **No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei County, Taiwan.**

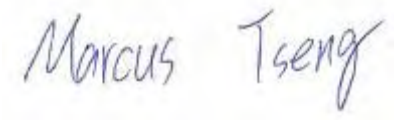
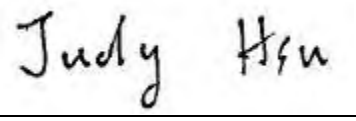
VERIFICATION OF COMPLIANCE

Applicant:	Southco. Inc. 210 North Brinton Lake Road Concordville PA 19331-0116 United States
Manufacture information 1:	LEYTON TECHNOLOGIES LIMITED. No.6, New Pioneering Park West Area of Ningbo Free Trade Zone, Beilun, Ningbo, China
Manufacture information 2:	TESOR PLUS CORP. 6th Floor, No.11,Alley 11, Lane 327, Section 2,Chung-Shan Road, Zhonghe Dist., New Taipei City Taiwan
Product Name:	Wireless RF Keypad (for Southco EA-R03-103)
Brand Name:	southco®
FCC ID:	YKR03103
Model No.:	EA-R03-103
Model Difference:	N/A
File Number:	ER/2010/60010-03
Date of test:	Dec. 02, 2011 ~ Dec. 30, 2011
Date of EUT Received:	Dec. 02, 2011

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory 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 15.231.

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

Test By:		***Date:***	Jan. 05, 2012
	Marcus Tseng / Engineer		
Prepared By:		***Date:***	Jan. 05, 2012
	Judy Hsu / Clerk		
Approved By:		***Date:***	Jan. 05, 2012
	Jim Chang / Supervisor		

Version

Version No.	Date	Description
00	Jan. 05, 2012	Initial creation of document

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1. GENERAL INFORMATION

1.1 Product Description

Product Name	Wireless RF Keypad (for Southco EA-R03-103)
Brand Name	southco®
Model No.	EA-R03-103
Model Difference:	N/A
Class II Permissive change:	1. battery clip change 2. circuit design changes to lower power consumption. The New PCB to add Q2,Q3 transistor. Transistor use on Q2, Q3 location in the layout to reduced power consumption. U1 Microprocessor is the processor that controls the Q3 to send a data to drive Q2 to turn the power ON or OFF.
Power Supply	3V from Lithium battery

SRD 433.92MHz TX:

Operating Frequency	433.92 MHz
Transmit Power	< 80.8dBuV/m Max.
Modulation Technique	ASK
Number of Channels	1
Operating Mode	Point-to-Point
Antenna Designation	PCB Loop antenna

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **YKR03103** filing to comply with Section 15.231 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. 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-4

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. 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.

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 (Not apply in the report)

The EUT is a placed on as 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 a placed on as 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 and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna. according to the requirements in Section 8 and 13 and Subclause 8.3.1.2 of ANSI C63.4-2003.

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

According to 15.231(b), the field strength of emissions from Intentional Radiators operated under this section shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental		Field Strength of Spurious	
	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)
40.66 - 40.70	67.04	2,250	40	100
70 - 130	61.94	1,250	34	50
130 - 174	* 61.94 - 71.48	* 1,250 -3,750	* 34 – 43.5	* 50 to 150
174 - 260	71.48	3,750	43.5	150
260 - 470	* 71.48 - 81.94	* 3,750 - 12,500	* 43.5 - 54	* 150 to 500
above 470	81.94	12,500	74	500

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 ξ 15.205
4. Emission spurious frequency which appearing within the Restricted Bands specified in provision of ξ15.205, then the general radiated emission limits in ξ 15.209 apply.
5. For the band 130-174MHz, uV/m at 3meters = 56.81818(F) – 6136.3636;
For the band 260-470MHz uV/m at 3meters = 41.6667(F) – 7083.3333;
Where F is the frequency in MHz.
6. 433.92MHz limit = 41.6667 * 433.92 – 7083.33333= 10996.681 uV/m
= 80.8dBuV/m

2.5 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

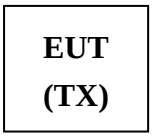


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1.	N/A					

3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207	Conducted Emission	N/A
§15.231	Radiated Emission	Compliant
§15.231(c)	20dB Bandwidth	Compliant
	Duty Cycle Test (Pulse Modulation)	N/A
§15.231(a)(1)	Release Time Measurement	Compliant

4. Description of test modes

The EUT has been tested under engineering test mode condition. and the EUT staying in continuous transmitting mode. The Frequency 433.92 MHz is chosen for testing.

5. CONDUCTED EMISSIONS TEST (NOT APPLY IN THE REPORT)

5.1 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

5.2 Test SET-UP (Block Diagram of Configuration)

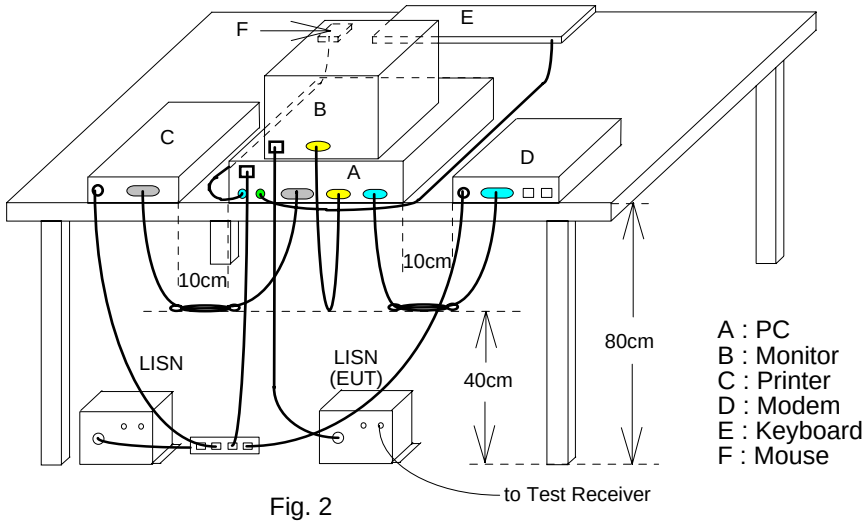


Fig. 2

5.3 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCS30	828985/004	09/23/2010	09/22/2012
LISN	Rolf-Heine	NNB-2/16Z	99012	03/31/2011	03/30/2012
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	03/31/2011	03/30/2012
Coaxial Cables	N/A	WK CE Cable	N/A	01/04/2011	01/05/2013

5.4 Measurement Result:

N/A

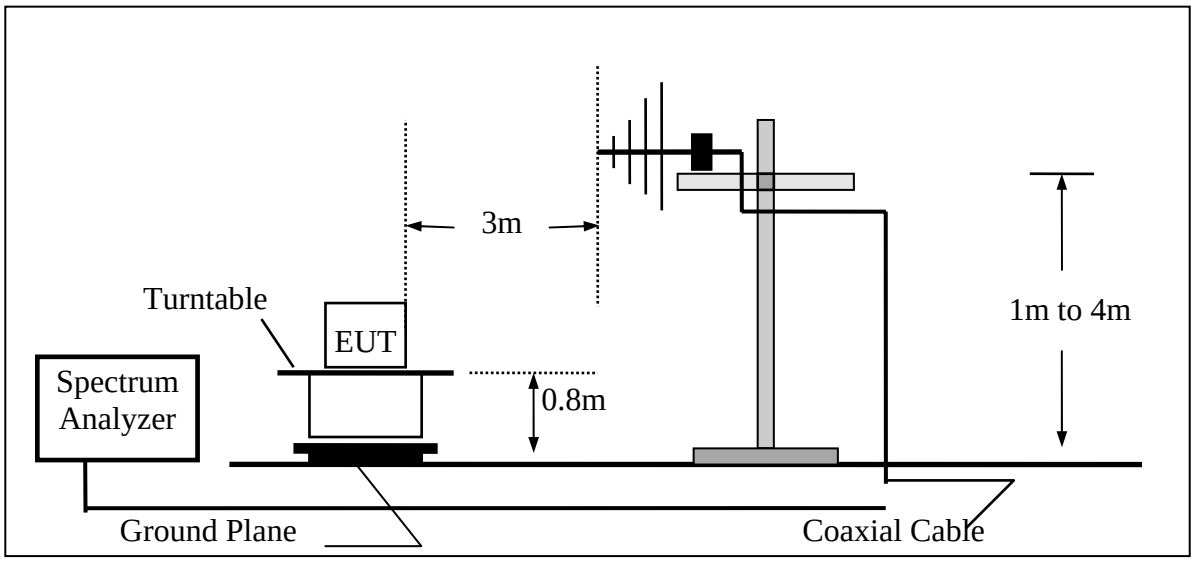
6. RADIATED EMISSION TEST

6.1 Measurement Procedure

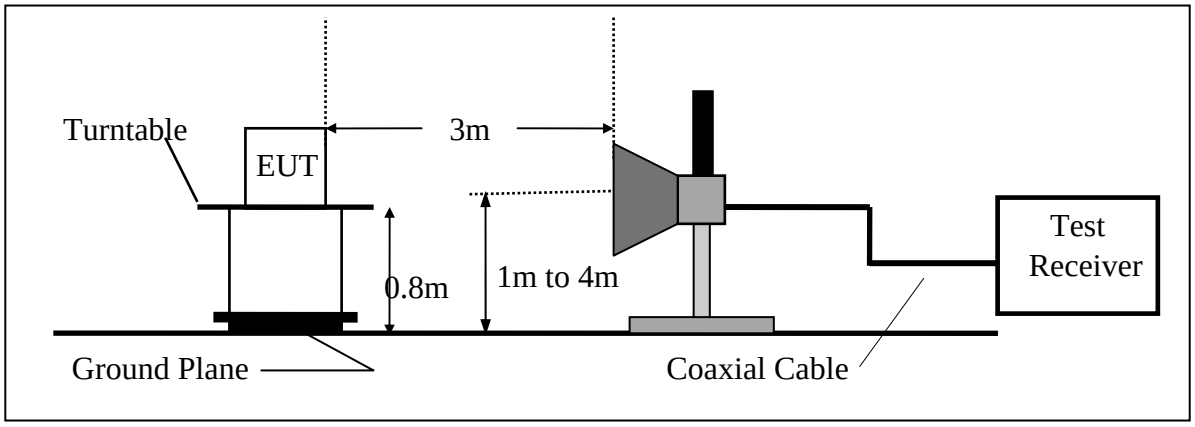
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above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

6.2 Test SET-UP (Block Diagram of Configuration)

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



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



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	03/30/2011	03/29/2012
Bilog Antenna	SCHWAZBECK	VULB9160	3136	11/19/2011	11/18/2013
Horn antenna	ETS.LINDGREN	3117	123995	03/19/2011	03/18/2013
Pre-Amplifier	Agilent	8447D	1937A02834	11/28/2011	11/27/2013
Pre-Amplifier	Agilent	8449B	3008A01973	01/05/2011	01/04/2012
Radio Communication Analyzer	R & S	CMU200	102189	08/12/2010	08/11/2012
DC Block	Agilent	BLK-18	155452	01/05/2011	01/04/2012
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	01/05/2011	01/04/2012
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	01/05/2011	01/04/2012
3m Site	SGS	966 chamber	N/A	07/15/2011	07/14/2012

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

Average Value = Peak Value + 20 Log (Ton/Tp) ……. Pulse Modulation

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

6.5 Measurement Result

Operation Band	:433.92 MHz	Test Date	:2011-12-28
Fundamental Frequency	:433.92 MHz	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:TX MAIN	Engineer	:Marcus
EUT Pol.	:E2	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.
"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
433.92	F	Average	60.94	-9.70	51.24	80.80	-29.56
433.92	F	Peak	67.52	-9.70	57.82	100.80	-42.98

Operation Band	:433.92 MHz	Test Date	:2011-12-28
Fundamental Frequency	:433.92 MHz	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:TX MAIN	Engineer	:Marcus
EUT Pol.	:E2	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.
"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
433.92	F	Average	46.44	-9.70	36.74	80.80	-44.06
433.92	F	Peak	53.02	-9.70	43.32	100.80	-57.48

Operation Band	:433.92 MHz	Test Date	:2011-12-28
Fundamental Frequency	:433.92 MHz	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:TX	Engineer	:Marcus
EUT Pol.	:E2	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.
"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
40.67	S	Peak	26.99	-13.35	13.64	40.00	-26.36
144.46	S	Peak	27.88	-12.25	15.63	43.00	-27.37
286.08	S	Peak	29.80	-12.20	17.60	46.00	-28.40
556.82	S	Peak	27.52	-7.85	19.67	46.00	-26.33
623.64	S	Peak	28.68	-6.24	22.44	46.00	-23.56
776.90	S	Peak	28.17	-3.91	24.26	46.00	-21.74
867.84	H	Peak	26.01	-2.70	23.31	80.80	-57.69
1301.76	---						
1735.68	---						
2169.60	---						
2603.52	---						
3037.44	---						
3471.36	---						
3905.28	---						
4339.20	---						

Operation Band	:433.92 MHz	Test Date	:2011-12-28
Fundamental Frequency	:433.92 MHz	Temp./Humi.	:27 deg_C / 66 RH
Operation Mode	:TX	Engineer	:Marcus
EUT Pol.	:E2	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.
"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Safe Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
143.49	S	Peak	28.68	-12.20	16.48	43.00	-26.52
284.14	S	Peak	27.18	-12.28	14.90	46.00	-31.10
556.82	S	Peak	27.96	-7.85	20.11	46.00	-25.89
605.21	S	Peak	27.86	-6.71	21.15	46.00	-24.85
732.28	S	Peak	27.57	-4.46	23.11	46.00	-22.89
825.20	S	Peak	27.62	-3.24	24.38	46.00	-21.62
867.84	H	Peak	26.32	-2.70	23.62	80.80	-57.18
1301.76	---						
1735.68	---						
2169.60	---						
2603.52	---						
3037.44	---						
3471.36	---						
3905.28	---						
4339.20	---						

7. 20DB OCCUPIED BANDWIDTH

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 =500KHz.
4. Set SPA Max hold. Mark peak, -20dB.

7.2 Test SET-UP (Block Diagram of Configuration)

Same as 6.3 Radiated Emission Measurement.

7.3 Measurement Equipment Used:

Same as 6.3 Radiated Emission Measurement.

7.4 Measurement Results

Refer to attached data chart.

The center frequency **f_c is 433.92MHz,** according to the Rules, section 15.231(C), the Bandwidth of Center Frequency at-20dB should be calculated as following:

433.92 X 0.0025 = 1.0848(MHz)

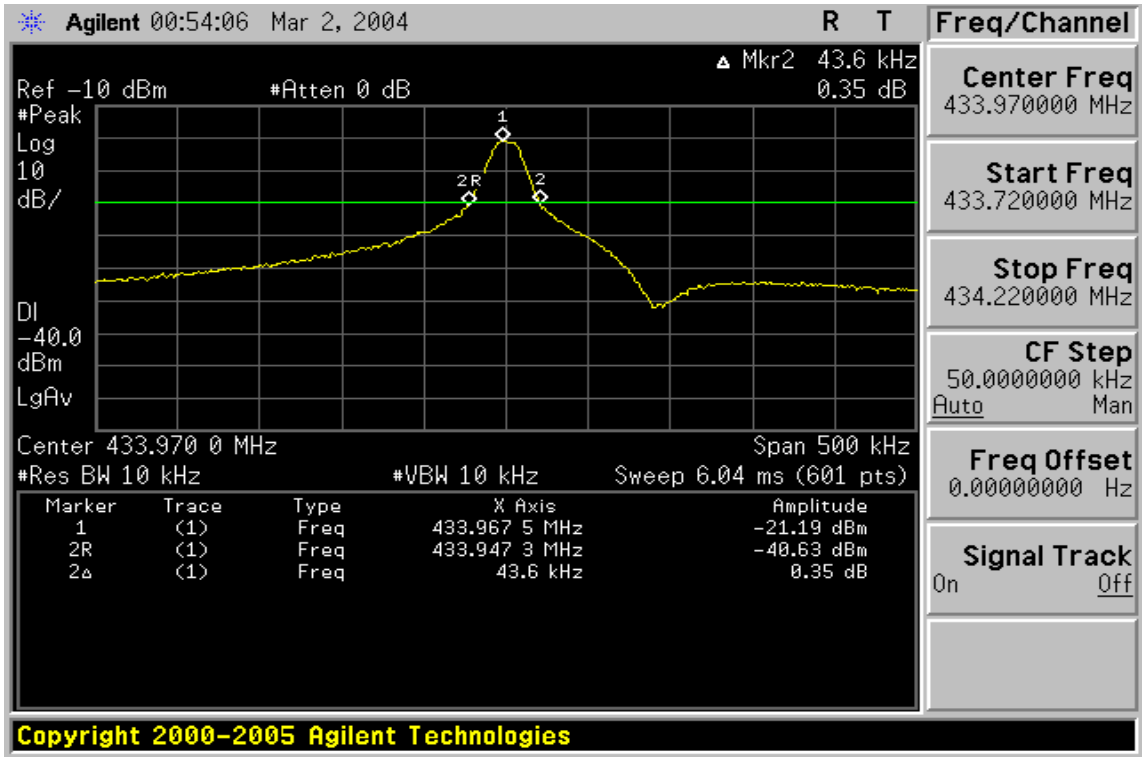
So, the Uper/Lower frequencies limit should be specified as:

$f_{(U)} = f_c + \Delta f/2 = 433.92 + 0.5424 = 434.46$(MHz)

$f_{(L)} = f_c - \Delta f/2 = 433.92 – 0.5424 = 433.377$ (MHz)

Measurement Result:
-20dB bandwidth = 43.6 kHz which within allowed frequency range.

20dB Band Width Test Data



8. DUTY CYCLE MEASUREMENT

8.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set ETU normal operating mode.
3. Set SPA Center Frequency = fundamental frequency, RBW, VBW= 100KHz, Span =0 Hz. Adjacent sweep.
4. Set SPA View. Mark delta.

8.2 Test SET-UP (Block Diagram of Configuration)

Same as 6.3 Radiated Emission Measurement.

8.3 Measurement Equipment Used:

Same as 6.3 Radiated Emission Measurement.

8.4 Measurement Results:

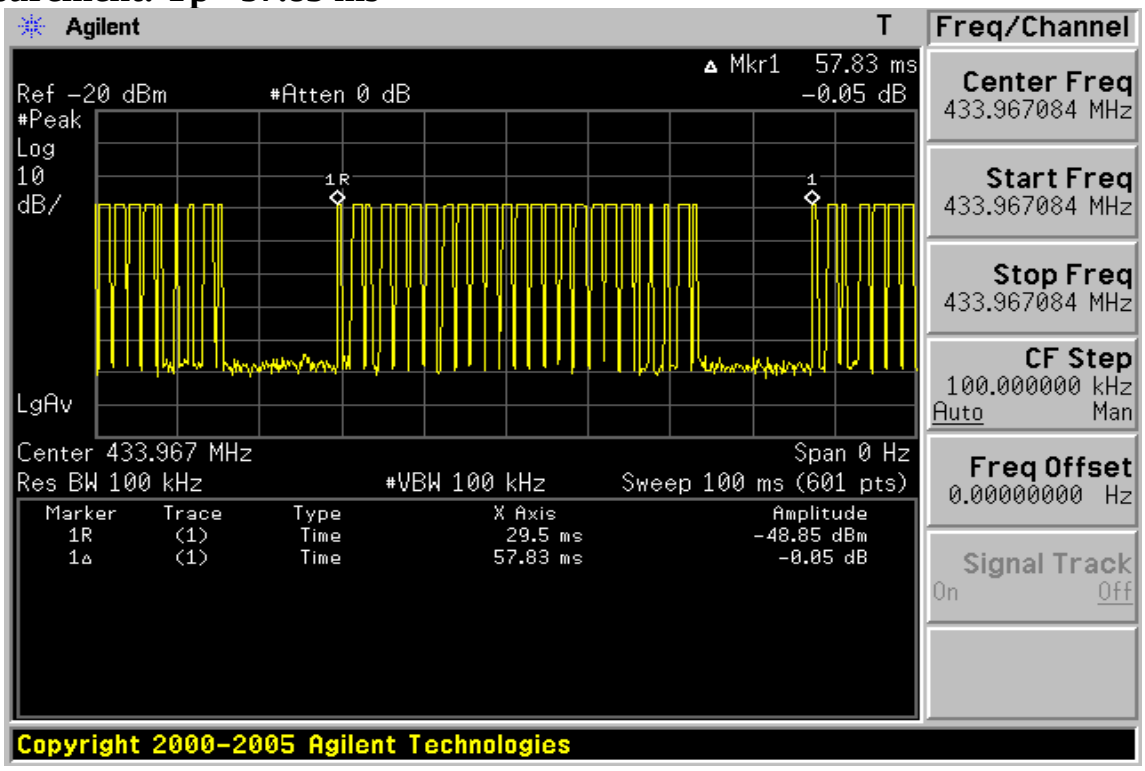
Ton = 1.233(ms)*20 + 0.25(ms)*5 = 25.91(ms)

Tp =57.83 (ms),

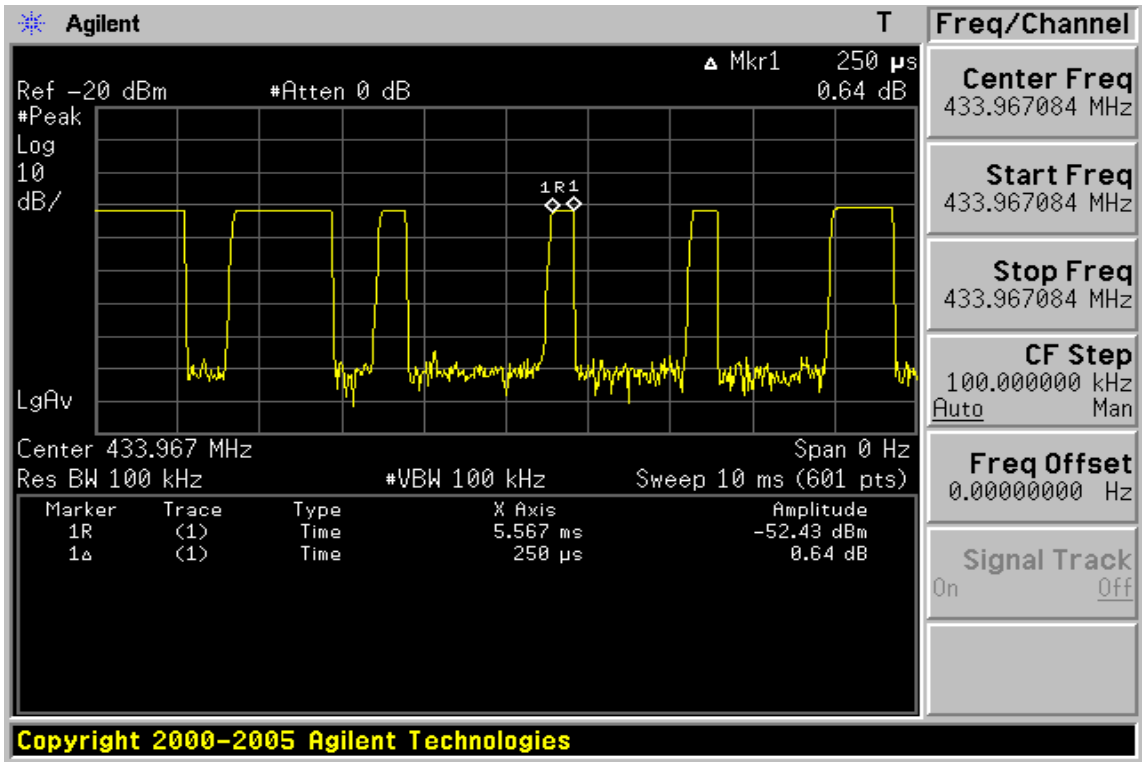
Average Correction Factory = 20log (Ton/Tp) =20log (25.91/57.83)

= -6.9737 dB

Measurement: Tp =57.83 ms



TO 1



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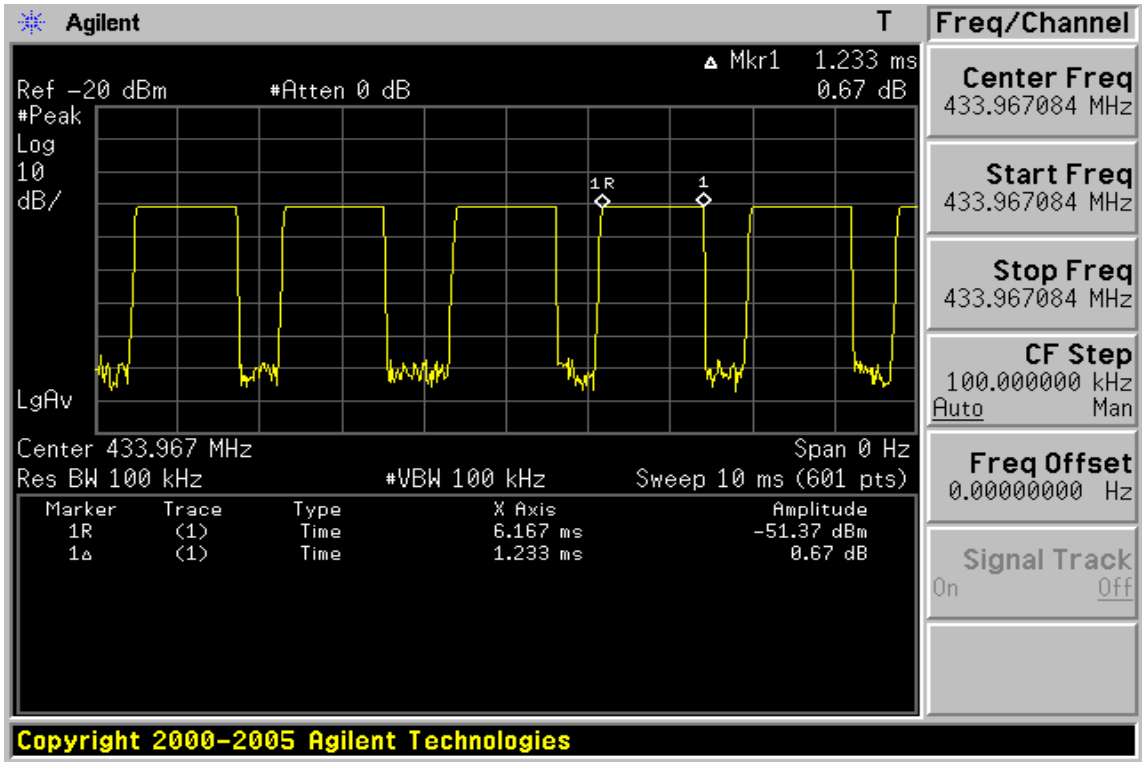

9. RELEASE TIME MEASUREMENT:

15.231 (a) (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

9.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set SPA Center Frequency = fundamental frequency, RBW, VBW= 100 KHz, Span =0Hz. Sweep Time= 7s.
3. Set EUT as normal operation and press Transmitter bottom for 2 s,
4. Set SPA Max hold. Delta Mark.

9.2 Test SET-UP (Block Diagram of Configuration)

Same as 6.3 Radiated Emission Measurement.

9.3 Measurement Equipment Used:

Same as 6.3 Radiated Emission Measurement.

Measurement Results

The release time less than 5 s.

Refer to attached data chart.