

FCC RADIO TEST REPORT FCC ID:2ADXX-SG2

Product: alarm system

Trade Name: N/A

Model Name: SG2

Serial Model: SG2-GSM, SG2-wifi+GSM

Report No.: NTEK-2015NT01091057F2

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TEST RESULT CERTIFICATION



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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15, Subpart C (15.231)					
Standard Section	Test Item	Judgment	Remark		
15.207	Conducted Emission	Pass			
15.203 Antenna Requirement		Pass			
15.231	15.231 Radiated Spurious Emission				
15.231	Occupied Bandwidth	Pass			
15.231	Transmitter Timeout	Pass			

NOTE:

(1) "N/A" denotes test is not applicable in this Test Report.



1.1 TEST FACILITY

NTEK Testing Technology Co., Ltd

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FCC Registration No.:238937; IC Registration No.:9270A-1

CNAS Registration No.:L5516

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $\mathbf{y} \pm \mathbf{U}$, where expended uncertainty \mathbf{U} is based on a standard uncertainty multiplied by a coverage factor of $\mathbf{k=2}$, providing a level of confidence of approximately 95 % $^{\circ}$

No.	Item	Uncertainty
1	Conducted Emission Test	±1.38dB
2	RF power,conducted	±0.16dB
3	Spurious emissions,conducted	±0.21dB
4	All emissions,radiated(<1G)	±4.68dB
5	All emissions,radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	alarm system			
Trade Name	N/A			
Model Name	SG2			
Serial Model	SG2-GSM, SG2-wifi+G	SM		
Model Difference	All the models are the sexcept the model name	same circuit and RF module,		
	The EUT is a alarm sys	tem		
	Operation Frequency:	315MHz		
	Modulation Type:	ASK		
	Number Of Channel	1CH.		
Product Description	Antenna Designation:	Helical Antenna		
	Antenna Gain(Peak)	0 dBi		
	Output Power:	86.71 dBuV/m		
Channel List	N/A			
	Model:KA23-1200800U	SS		
Adapter	Input: 100-240V~,50/60Hz,0.35A			
	Output: 12.0V,800mA			
Battery	DC 7.4V ,500mAh			

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.

Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	N/A	N/A	Helical Antenna	N/A	0	Antenna



2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	TX

For Conducted Emission		
Final Test Mode	Description	
Mode 1	TX	

For Radiated Emission			
Final Test Mode Description			
Mode 1	TX		



2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted Emission Test



Radiated Spurious Emission Test

E-1 EUT

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2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Brand	Model/Type No.	Series No.	Note
E-1	alarm system	N/A	SG2	N/A	EUT
E-2	Adapter	N/A	KA23-1200800USS	N/A	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	1.2m	

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in <code>[Length]</code> column.



2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibratio n period
1	Spectrum Analyzer	Agilent	E4407B	MY4510804 0	2014.07.06	2015.07.05	1 year
2	Test Receiver	R&S	ESPI	101318	2014.06.07	2015.06.06	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2014.07.06	2015.07.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	620026441 6	2014.06.07	2015.06.06	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2014.06.07	2015.06.06	1 year
6	Horn Antenna	EM	EM-AH-101 80	2011071402	2014.07.06	2015.07.05	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2014.07.06	2015.07.05	1 year
8	Amplifier	EM	EM-30180	060538	2014.12.22	2015.12.21	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2014.06.08	2015.06.07	1 year
10	Power Meter	R&S	NRVS	100696	2014.07.06	2015.07.05	1 year
11	Power Sensor	R&S	URV5-Z4	0395.1619. 05	2014.07.06	2015.07.05	1 year

Conduction Test equipment

00110	Conduction rest equipment						
Item	Kind of Equipment	Manufactu rer	Type No.	Serial No.	Last calibration	Calibrated until	Calibratio n period
1	Test Receiver	R&S	ESCI	101160	2014.06.06	2015.06.05	1 year
2	LISN	R&S	ENV216	101313	2014.08.24	2015.08.23	1 year
3	LISN	EMCO	3816/2	00042990	2014.08.24	2015.08.23	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	620026441 7	2014.06.07	2015.06.06	1 year
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	2014.06.07	2015.06.06	1 year
6	Absorbing clamp	R&S	MOS-21	100423	2014.06.08	2015.06.07	1 year



3. ANTENNA REQUIREMENT

3.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 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.

3.2 EUT ANTENNA

	The EUT antenna is	permanent	attached an	tenna. It coi	mply with	the s	standard r	equiremen
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4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

Class A		(dBuV)	Class B	(dBuV)	Standard
FREQUENCY (MHz)	Quasi-peak	Average	Quasi-peak	Average	Stariuaru
0.15 -0.5			66 - 56 *	56 - 46 *	CISPR
0.50 -5.0			56.00	46.00	CISPR
5.0 -30.0			60.00	50.00	CISPR

0.15 -0.5	66 - 56 *	56 - 46 *	LP002.
0.50 -5.0	56.00	46.00	LP002.
5.0 -30.0	60.00	50.00	LP002.

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz



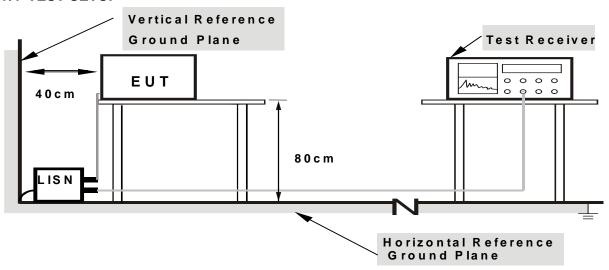
4.1.2 TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

4.1.4 TEST SETUP



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes



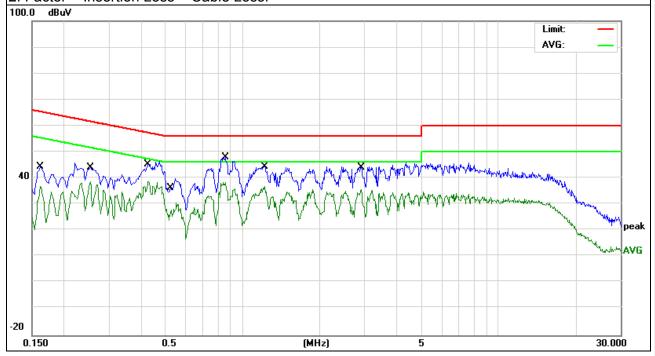
4.1.5 TEST RESULT

EUT:	alarm system	Model Name. :	SG2
Temperature :	26 ℃	Relative Humidity:	54%
Pressure :	1010hPa	Phase :	L
TASI VOHADA .	DC 12V form Adapter AC 120V/60Hz	Test Mode :	Mode 1

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
(MHz)	(dBµV)	(dB)	(dBµV)	(dBµV)	(dB)	
0.1620	34.73	9.62	44.35	65.36	-21.01	QP
0.1620	27.37	9.62	36.99	55.36	-18.37	AVG
0.5240	34.29	9.56	43.85	56.00	-12.15	QP
0.2540	29.22	9.52	38.74	51.62	-12.88	AVG
0.4299	34.08	9.29	43.37	57.25	-13.88	QP
0.4299	29.38	9.29	38.67	47.25	-8.58	AVG
0.8578	38.06	9.58	47.64	56.00	-8.36	QP
0.8578	28.79	9.58	38.37	46.00	-7.63	AVG
1.2217	34.60	9.58	44.18	56.00	-11.82	QP
1.2217	27.15	9.58	36.73	46.00	-9.27	AVG
2.9020	34.06	9.60	43.66	56.00	-12.34	QP
2.9020	26.01	9.60	35.61	46.00	-10.39	AVG

Remark:

- All readings are Quasi-Peak and Average values.
 Factor = Insertion Loss + Cable Loss.

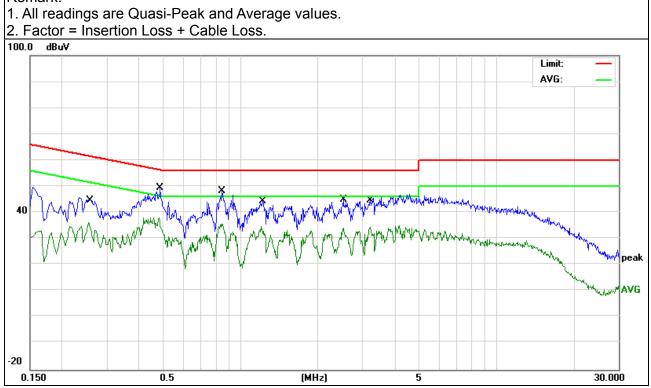




EUT:	alarm system	Model Name. :	SG2
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	N
Test vollage .	DC 12V form Adapter AC 120V/60Hz	Test Mode:	Mode 1

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
(MHz)	(dBµV)	(dB)	(dBµV)	(dBµV)	(dB)	
0.2540	35.49	9.46	44.95	61.62	-16.67	QP
0.2540	26.93	9.46	36.39	51.62	-15.23	AVG
0.4786	38.40	9.47	47.87	56.36	-8.49	QP
0.4786	28.68	9.47	38.15	46.36	-8.21	AVG
0.8497	36.30	9.45	45.75	56.00	-10.25	QP
0.8497	26.31	9.45	35.76	46.00	-10.24	AVG
1.1976	32.52	9.46	41.98	56.00	-14.02	QP
1.1976	25.35	9.46	34.81	46.00	-11.19	AVG
2.5178	32.94	9.45	42.39	56.00	-13.61	QP
2.5178	24.61	9.45	34.06	46.00	-11.94	AVG
3.2179	33.94	9.45	43.39	56.00	-12.61	QP
3.2179	24.97	9.45	34.42	46.00	-11.58	AVG

Remark:





4.2 RADIATED EMISSION MEASUREMENT

4.2.1 Radiated Emission Limits (FCC 15.209)

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission level (dBuV/m)=20log Emission level (uV/m).

LIMITS OF RADIATED EMISSION MEASUREMENT (FCC 15.231)

	•	•
Fundamental Frequency (MHz)	Field Strength of fundamental (microvolts/meter)	Field Strength of Unwanted Emissions (microvolts/meter)
40.66 - 40.70	2250.00	225.00
70 - 130	1250.00	125.00
130 - 174	1,250 to 3,750 **	125 to 375 **
174 - 260	3750.00	375.00
260 - 470	3,750 to 12,500 **	375 to 1,250 **
Above 470	12500.00	1250.00

Notes:

(1) ** linear interpolations

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, uV/m at 3 meters = 56.81818(F) - 6136.3636; for the band 260-470 MHz, uV/m at 3 meters = 41.6667(F) - 7083.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in 93 Section 15.209, whichever limit permits a higher field strength.



Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1MHz / 1MHz for Peak

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.2.2 TEST PROCEDURE

- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m meter test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

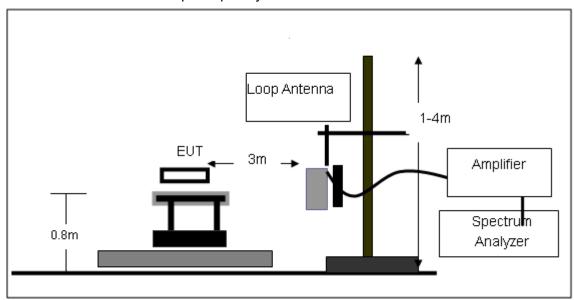
4.2.3 DEVIATION FROM TEST STANDARD

No deviation

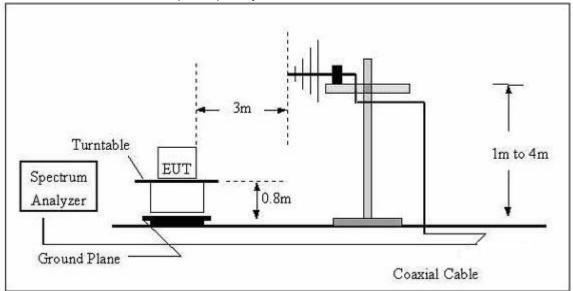


4.2.4 TEST SETUP

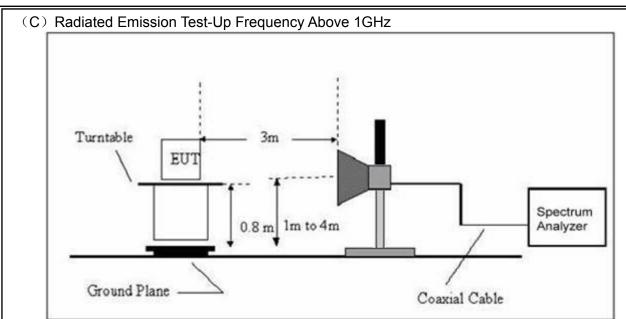
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz









4.2.5 TEST RESULTS (BELOW 30MHz)

EUT:	alarm system	Model Name. :	SG2
Temperature :	20 ℃	Relative Humidtity:	48%
Pressure :	1010 hPa	Test Voltage :	N/A
Test Mode :	TX	Polarization :	

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
				N/A
				N/A

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =40 log (specific distance/test distance)(dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.



4.2.6 TEST RESULTS (BETWEEN 30 - 4000 MHZ)

EUT:	alarm system	Model Name :	SG2
Temperature :	20 ℃	Relative Humidity:	48%
Pressure :	1010 hPa	Test Voltage :	DC 7.4V
Test Mode :	TX	Polarization :	Horizontal

Frequency	Average Factor	Field Strength	Field Strength	Limit(PK)	Limit(AV)	State
MHz	dB	dBuV/m (PK)	dBuV/m (AV)	dBuV/m	dBuV/m	State
315.0000	-13.35	86.71	73.36	95.60	75.60	pass
630.0000	-13.35	49.17	35.82	75.60	55.60	pass
945.0000	-13.35	44.01	30.66	75.60	55.60	pass
1575.0000	-13.35	42.45	29.10	75.60	55.60	pass

EUT:	alarm system	Model Name :	SG2
Temperature :	20 ℃	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	DC 7.4V
Test Mode :	TX	Polarization :	Vertical

Frequency	Average Factor	Field Strength	Field Strength	Limit(PK)	Limit(AV)	State
MHz	dB	dBuV/m (PK)	dBuV/m (AV)	dBuV/m	dBuV/m	State
315.0000	-13.35	86.68	73.33	95.60	75.60	pass
630.0000	-13.35	47.62	34.27	75.60	55.60	pass
945.0000	-13.35	42.96	29.61	75.60	55.60	pass
1575.0000	-13.35	39.12	25.77	75.60	55.60	pass

Note: 1. EUT Pre-scan X/Y/Z orientation, only worst case is presented in the report(Z orientation).

2. *Calculate Average value based on Duty Cycle correction factor:

Duty Cycle=Ton/(Ton+Toff)= $(1.55\text{ms}\times1+0.5167\text{ ms}\times24)/64.8\text{ms} = 0.215=21.5\%$

Duty Cycle factor=20lg(Duty Cycle)=20lg(0.215)= -13.35dB

Average=Peak+ Duty Cycle factor

2. Pulse Desensitization Correction Factor

Pulse Width(PW)=13.95ms

2/PW=2/13.95ms=0.14kHz

RBW(100kHz) > 2/PW (0.14KHz)

Therefore PDCF is not needed



4.2.7 Duty Cycle

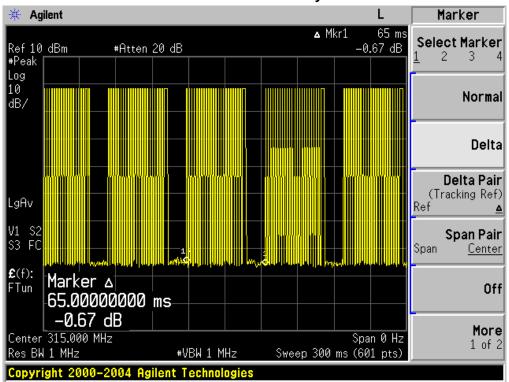
The duty cycle is simply the on time divided by the period:

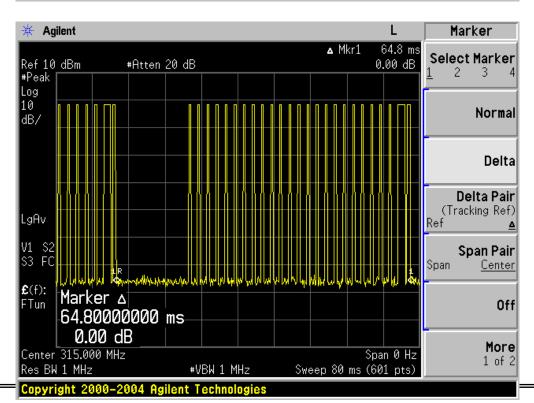
The duration of one cycle = 64.8ms

Effective period of the cycle = 1.55ms $\times 1+0.5167$ ms $\times 24=13.95$ ms

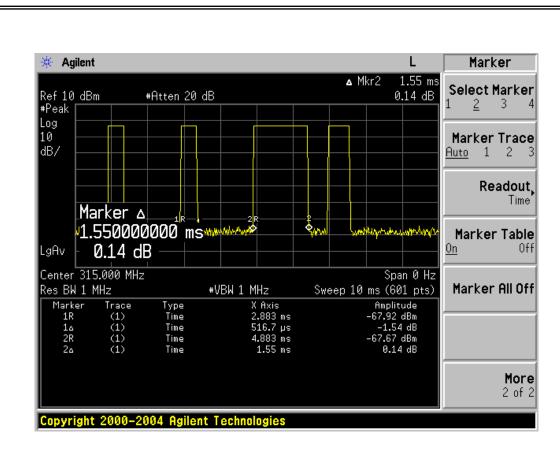
Duty Cycle = 13.9508ms/64.8ms = 0.215

The duration of one cycle











5. BANDWIDTH TEST

5.1 TEST PROCEDURE

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Limit: 315MHz*0.25%=787.5KHz

5.2 DEVIATION FROM STANDARD

No deviation.

5.3 TEST SETUP

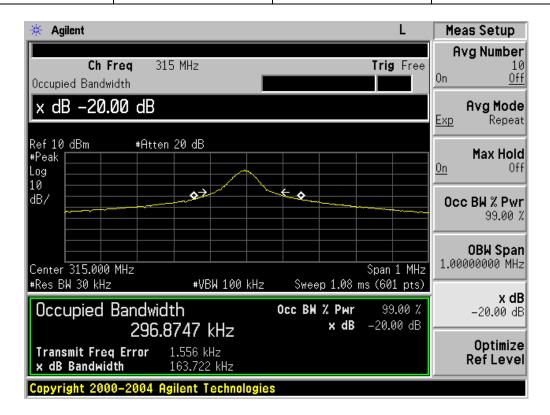
EUT	SPECTRUM
	ANALYZER



5.4 TEST RESULTS

EUT:	alarm system	Model Name :	SG2
Temperature :	26 ℃	Relative Humidity:	53%
Pressure :	1020 hPa	Test Power :	DC 7.4V
Test Mode :	TX CH 1		

Test Channe		20 dBc Bandwidth	Limit
	(MHz)	(kHz)	(kHz)
CH01	315	163.722	787.5





6. TRANSMITTER TIMEOUT

6.1 REQUIREMENTS

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

 Result: The EUT does not have a automatically activated transmitter.
- 2 A transmitter activated automatically shall cease transmission within 5 seconds after activation.

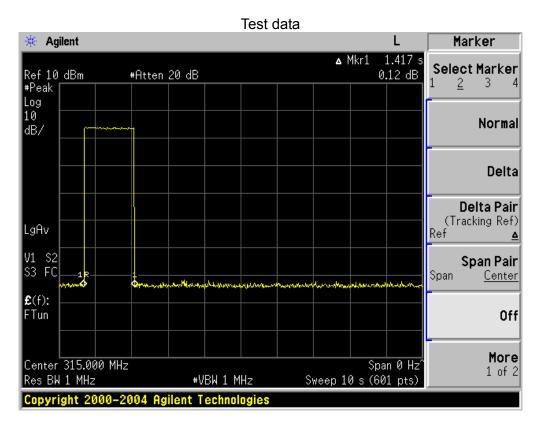
Result: The EUT has a automatically activated transmitter, please refer to below detail data.

3 Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour

Result: The EUT does not employ periodic transmission.

4 Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.

Result: The section is not applicable to EUT.



THE DURATION OF EACH TRANSMISSION	LIMIT	RESULT
1.417s	<5s	PASS



7. EUT TEST PHOTO



