

Test Report for FCC

FCC ID : QT2T-EMS315YOUNG

Report Number		ESTRFC1707-005		
Applicant	Company name	YOUNG ELECTRONICS CORP.		
	Address	28 Annam-ro 417beong-gil, Bupyeong-gu, Incheon, Korea		
	Telephone	+82-32-505-5347/8		
Product	Product name	GARAGE DOOR TRANSMITTER		
	Model No.	A-315	Manufacturer	YOUNG ELECTRONICS CORP.
	Serial No.	NONE	Country of origin	KOREA
Test date	5-Jul-17		Date of issue	7-Jul-17
Testing location	347-69, Jungbu-daero 147beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do 467-811, R. O. Korea			
Standard	FCC PART 15 Subpart C(15.209), ANSI C 63.10(2013)			
Measurement facility registration number		659627		
Tested by	Senior Engineer H.K. Lee		(Signature)	
Reviewed by	Engineering Manager I.K. Hong		(Signature)	
Abbreviation	OK, Pass = Complied, Fail = Failed, N/A = not applicable			
* Note - This test report is not permitted to copy partly without our permission - This test result is dependent on only equipment to be used - This test result based on a single evaluation of one sample of the above mentioned				

Contents

1. Laboratory Information	3
2. Description of EUT	4
3. Test Standards	5
4. Measurement condition	6
5. Measurement of radiated emission	8
5.1 Radiated emission limits, general requirements	8
5.2 Measurement equipment	8
5.3 Environmental conditions	8
5.4 Test data	9
6. Measurement of 20dB Bandwidth	11
6.1 Limit	11
6.2 Test Result	11
6.3 Test Plot	12
7. Measurement of 20dB Bandwidth	13
7.1 Limit	13
7.2 Test Result	13
7.3 Test Plot	14
7. Photographs of test setup	15
8. Photographs of EUT	16

Appendix 1. Special diagram
Appendix 2. Antenna Requirement

1. Laboratory Information

1.1 General

This EUT (Equipment Under Test) has been shown to be capable of compliance with the applicable technical standards and is tested in accordance with the measurement procedures as indicated in this report. ESTECH Lab attests to accuracy of test data. All measurement reported herein were performed by ESTECH Co., Ltd.

ESTECH Lab assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

1.2 Test Lab.

Corporation Name : ESTECH Co., Ltd.

Head Office : Suite 1015 World Meridian II, 123 Gasan Digital 2-ro, Geumcheon-gu,
Seoul 153-759, R. O. Korea

EMC/Telecom/Safety Test Lab : 347-69, Jungbu-daero 147beon-gil, Majang-myeon, Icheon-si,
Gyeonggi-do 467-811, R. O. Korea

1.3 Official Qualification(s)

KCC : Granted Accreditation from Ministry of Information & Communication for EMC, Safety
and Telecommunication

KOLAS : Accredited Lab By Korea Laboratory Accreditation Schema base on CENELEC

FCC : Filed Laboratory at Federal Communications Commission

VCCI : Granted Accreditation from Voluntary Control Council for Interference from ITE

2. Description of EUT

2.1 Summary of Equipment Under Test

Product : GARAGE DOOR TRANSMITTER
Model Number : A-315
Serial Number : NONE
Manufacturer : Suprema Inc.
Country of origin : KOREA
Operating Frequency : 315 MHz
Antenna Type : PCB Antenna
Modulation Type : OOK
Channel Spacing : 1

Power Rating : DC12V/23A
(Battery)

Receipt Date : 23-Mar-17

X-tal list(s) or
Frequencies generated : The highest operating frequency is CPU 1.4 GHz

2.2 General descriptions of EUT

Working voltage : DC12V/23A
Frequency : 315MHZ
Frequency stabilization mode : Crystal frequency stabilization
Coding mode : Singlechip
Standby current : 0mA
Working current : <18mA
Power : ≤12mW
Distance : >60M(Open area receive above -100dbm)
modulation mode : OOK
Working tempature : -20℃—70℃

3. Test Standards

Test Standard : FCC PART 15

This Standard sets out the regulations under which an intentional, unintentional, or incidental radiator may be operated without an individual license. It also contains the technical specifications, administrative requirements and other conditions relating to the marketing of Part 15 devices.

Test Method : ANSI C 63.10 (2013)

This standard sets forth uniform methods of measurement of radio-frequency (RF) signals and noise emitted from both unintentional and intentional emitters of RF energy in the frequency range 9 kHz to 40 GHz. Methods for the measurement of radiated and AC power-line conducted radio noise are covered and may be applied to any such equipment unless otherwise specified by individual equipment requirements. These methods cover measurement of certain devices that deliberately radiate energy, such as intentional emitters, but does not cover licensed transmitters. This standard is not intended for certification/approval of avionic equipment or for industrial, scientific, and medical (ISM) equipment. These methods apply to the measurement of individual units or systems comprised of multiple units.

Summary of Test Results

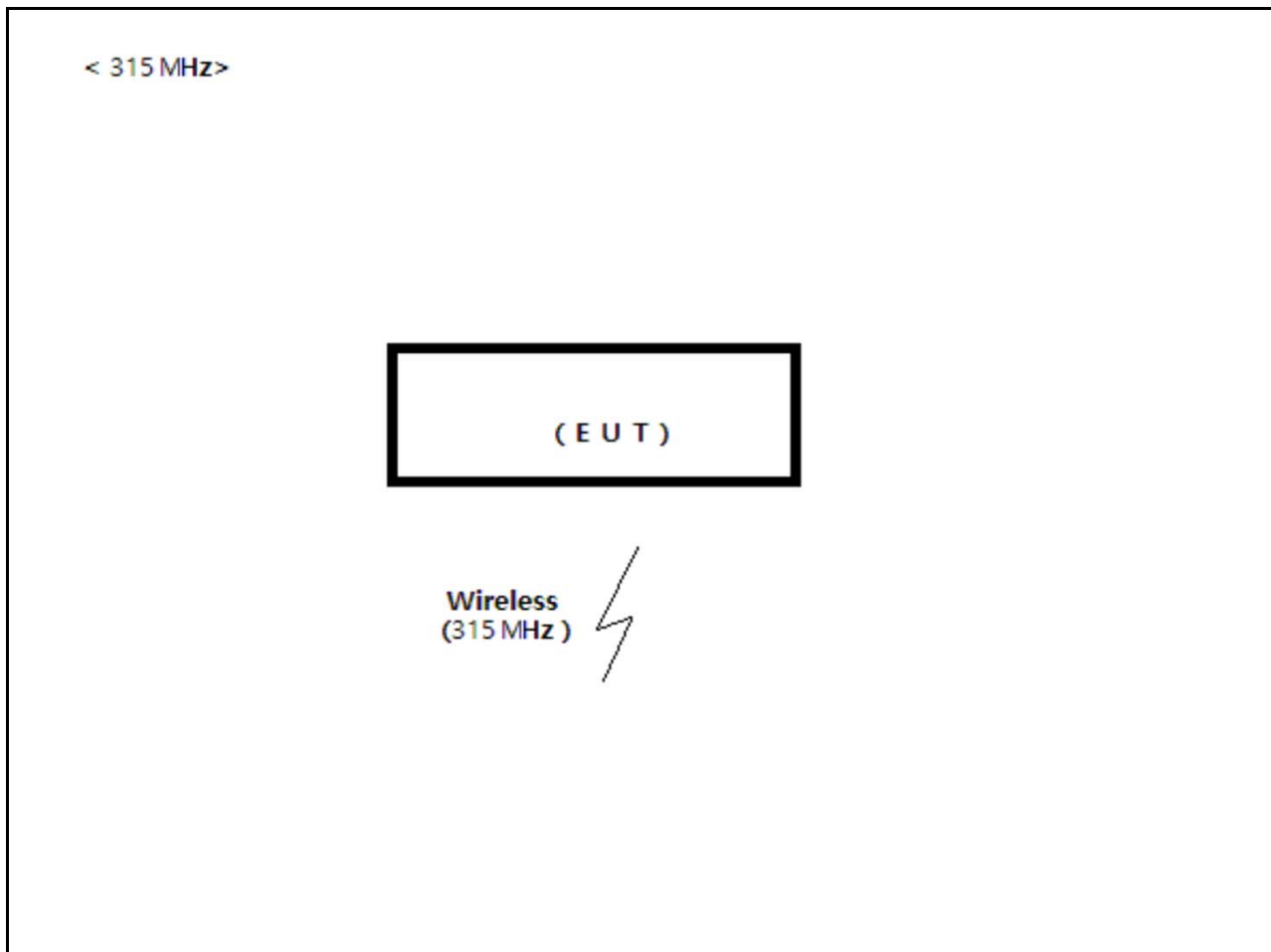
Applied Standard : 47 CFR Part 15, Subpart C				
Standard	Test Type	Result	Remark	Limit
15.203	Antenna Requirement	Pass	See Appendix 1	
15.207	AC Power Conducted Emission	Pass	Meet the requirement	NA
15.205	Restricted bands	Pass	Meet the requirement	
15.209	Radiated Emission	Pass	Meet the requirement	
15.231(c)	Occupied channel bandwidth	Pass	Meet the requirement	
15.231(a)(1)	Periodic operation characteristics	Pass	Meet the requirement	

4. Measurement Condition

4.1 EUT Operation.

- The EUT was tested, under transmission
- 1. Normal communication with RF OUT Frequency(315 MHz).

4.2 Configuration and Peripherals



4.3 EUT and Support equipment

Equipment Name	Model Name	S/N	Manufacturer	Remark (FCC ID)
GARAGE DOOR TRANSMITTER	A-315	NONE	YOUNG ELECTRONICS CORP.	EUT

4.4 Cable Connecting

Start Equipment		End Equipment		Cable Standard		Remark
Name	I/O port	Name	I/O port	Length	Shielded	
-	-	-	-	-	-	-

5. Measurement of radiated disturbance

The EUT was placed on the top of a rotating table 0.8 m above the ground at a 3 m Open test site. The table was rotated 360 ° to determine the position of the highest radiation. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel and perpendicular of the antenna are set to make the measurement. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 ° to find the maximum reading. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

5.1 Radiated emission limits, general requirements

Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength(microvolt/meter)	Distance(meter)
0.009–0.490	2400/F(KHz)	300
0.490–1.705	24000/F(KHz)	30
1.705–30	30	30
30–88	100**	3
88–216	150**	3
216–960	200**	3
Above 960	500	3

* dBuV/m=20*log(uV/m) * Distance factor=40dB / decade(15.31(f))

5.2 Measurement equipments

Equipment Name	Type	Manufacturer	Serial No.	Next Calibration date
TEST Receiver	ESC17	ROHDE & SCHWARZ	100916	15–Nov–17
Logbicon Antenna	VULB 9168	SCHWARZBECK	193	12–Apr–19
Turn Table	DT3000–2t	Innco System GmbH	N/A	–
Antenna Mast	MA4000–EP	Innco System GmbH	N/A	–
PREAMPLIFIER	8449B	AGILENT	3008A00581	15–Nov–17
Horn Antenna	BBHA9120D	SCHWARZBECK	469	25–Aug–17
Test Receiver	ESPI7	ROHDE & SCHWARZ	100185	15–Nov–17
Spectrum Analyzer	R3273	ADVANTEST	121200664	21–Oct–17
Turn Table	DT1500–S	Innco System GmbH	N/A	–
Antenna Mast	MA4000–EP	Innco System GmbH	N/A	–
Pyramidal Horn Antenna	3160–09–01	EST–LINDGREN	102642	25–Aug–17
BLUETOOTH TESTER	TC–3000A	TESCOM	3000A5B0298	4–Jan–18
Antenna Master & Turn table controller	C02000–P	Innco System GmbH	C02000/642 /28051111/L	–

5.3 Environmental Condition

Test Place 10 m Semi–anechoic chamber
 Temperature (°C) : 21.1 °C
 Humidity (%) : 49.5 % R.H.

5.4 Test data(30 MHz ~ 1 000 MHz)

Test Date : 5-Jul-17

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Result Value(Quasi-peak)		
				Ant Factor (dB)	Cable (dB)	Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
295.30	9.13	H	1.0	13.50	2.68	46.00	25.31	20.69
315.00	54.78	H	1.0	14.05	2.77	75.60	71.60	4.00
567.30	-3.12	H	1.0	19.31	3.80	46.00	19.99	26.01
630.00	3.38	H	2.0	20.22	4.03	46.00	27.63	18.37
777.70	-2.03	H	1.8	22.36	4.55	46.00	24.88	21.12
945.00	9.56	H	1.6	24.05	5.08	46.00	38.69	7.31
978.10	-1.90	H	1.4	24.42	5.17	54.00	27.69	26.31
315.00	36.65	V	1.0	14.05	2.77	75.60	53.47	22.13
481.60	-3.25	V	1.2	17.45	3.45	46.00	17.65	28.35
630.00	5.29	V	1.8	20.22	4.03	46.00	29.54	16.46
711.30	(2.02)	V	1.7	21.30	4.31	46.00	23.59	22.41
837.30	(2.33)	V	1.5	23.10	4.75	46.00	25.52	20.48
891.30	(2.32)	V	1.0	23.63	4.92	46.00	26.23	19.77
945.00	4.92	V	1.0	24.05	5.08	46.00	34.05	11.95
Remark	H : Horizontal, V : Vertical *Result Value = Reading + Antenna + Cable loss *Correction Factor = Ant Factor + Cable *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection							

10.3-1 Test Data for Bluetooth(Basic Rate)

Test Date : 5-Jul-17

Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction (dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
PEAK(RBW:1 MHz VBW:3 MHz)									
1576.00	45.56	H	1.0	26.19	-31.29	0.00	74.00	40.47	33.53
1890.00	51.95	H	1.0	25.55	-30.76	0.00	74.00	46.74	27.26
2206.00	49.00	H	1.5	25.74	-30.29	0.00	74.00	44.45	29.55
2454.00	48.52	H	1.5	26.41	-29.87	0.00	74.00	45.06	28.94
1834.00	42.12	V	1.5	25.67	-30.96	0.00	74.00	36.83	37.17
2554.00	41.63	V	1.0	26.54	-29.82	0.00	74.00	38.35	35.65
3034.00	46.80	V	1.5	28.36	-29.4	0.00	74.00	45.73	28.27
3958.00	34.60	V	1.5	29.26	-27.9	0.00	74.00	35.94	38.06
Average (RBW:1 MHz VBW:1 kHz)									
1576.00	30.43	H	1.8	26.20	-31.30	1.02	54.00	26.35	27.65
1890.00	46.48	H	1.8	25.55	-30.76	1.02	54.00	42.29	11.71
2206.00	37.77	H	1.5	25.74	-30.30	1.02	54.00	34.22	19.78
2520.00	40.62	H	1.5	26.41	-29.87	1.02	54.00	38.18	15.82
1890.00	30.23	V	1.5	25.55	-30.76	1.02	54.00	26.04	27.96
2554.00	28.81	V	1.8	26.55	-29.81	1.02	54.00	26.57	27.43
3018.00	34.76	V	1.8	28.36	-29.4	1.02	54.00	34.71	19.29
3956.00	34.60	V	1.7	29.25	-27.9	1.02	54.00	36.94	17.06
Remark	H : Horizontal, V : Vertical TEST MODE : Bluetooth Basic Rate-CH0 (2 402 MHz) *The TX signal wasn't detected from 3th harmonics. *Result Value = Reading + Ant Factor + Cable loss - Amplifier Gain + Duty Cycle Correction Factor *Margin = Limit - Result *The resolution bandwidth and video bandwidth of spectrum analyzer is 1 MHz and 1 kHz for average detection at frequency above 1 GHz. FYI : Duty Cycle Correction Factor (79 channel hopping) a. Time to cycle through all channels= Δ t= τ [ms] x 79 channels = 241.582 ms, where τ = pulse width b. 100 ms/ Δ t [ms] = H → Round up to next highest integer, H ' =1 c. Worst Case Dwell Time = τ [ms] x H ' = 3.058ms d. Duty Cycle Correction = 20log (Worst Case Dwell Time/ 100ms) dB = - 30.29 dB								

6. Measurement of 20dB Bandwidth

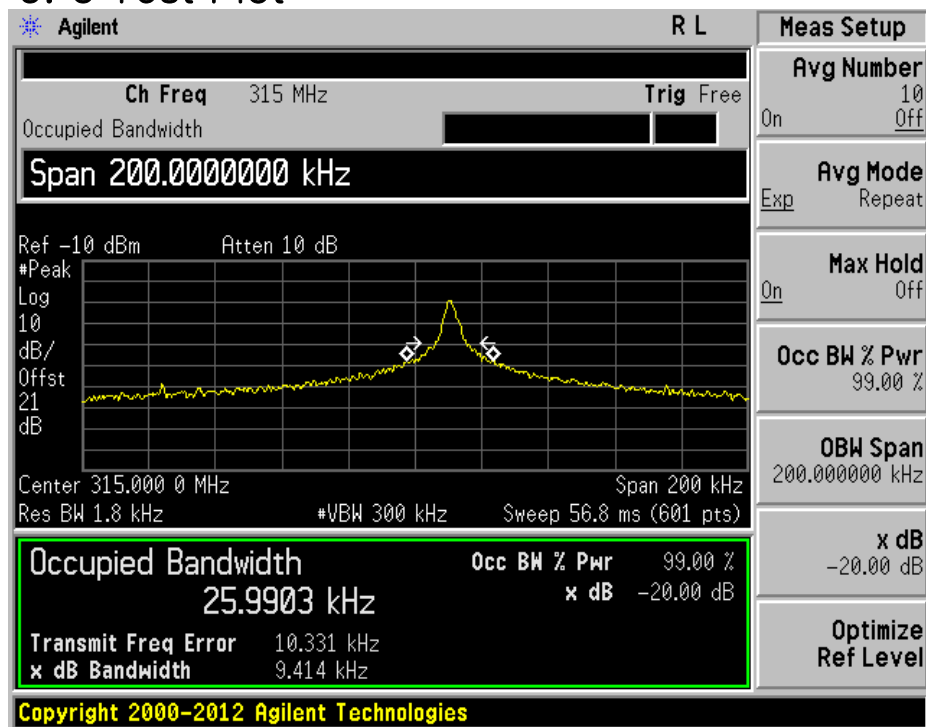
According to 15.231(c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

6.1 Limit

Frequency (MHz)	20dB Bandwidth (kHz)	Limit (kHz)
315	25.99	787

7.2 Test Result : PASS

6. 3 Test Plot



7. Measurement of 20dB Bandwidth

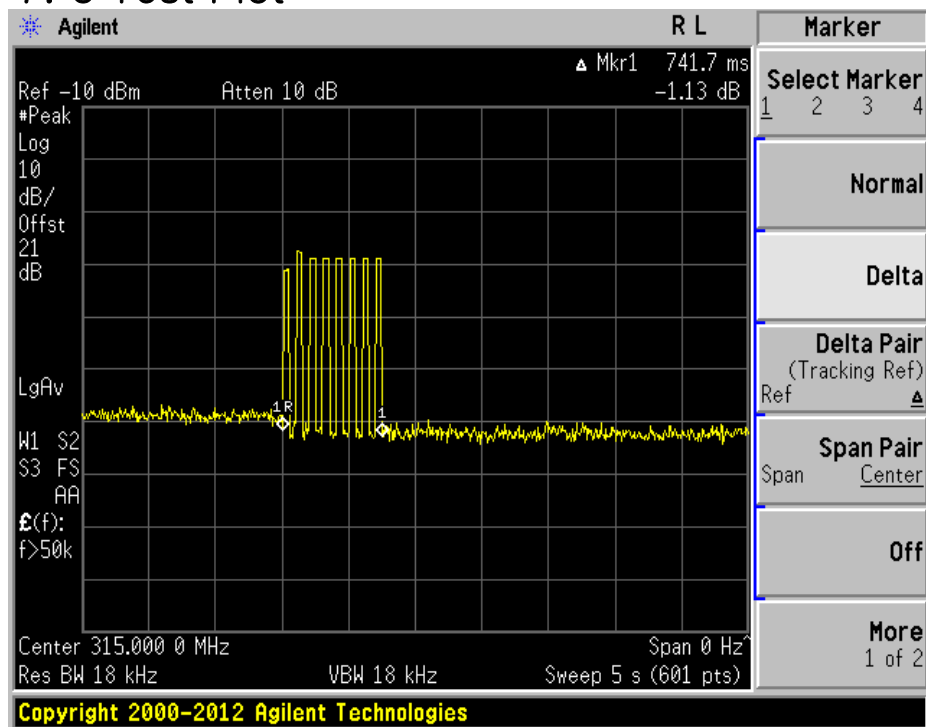
Set SPAN=0Hz
Set RBW=10kHz
Set VBW=30kHz
Set SWEET TIME=5s

7.1 Limit

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

7.2 Test Result : PASS

7. 3 Test Plot



8.0 Photographs of EUT

[Front]



[Rear]



Appendix 1. Antenna Requirement

Regulation

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Result

–Complied

The transmitter has an integral PCB antenna.