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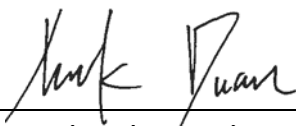


MPE Report

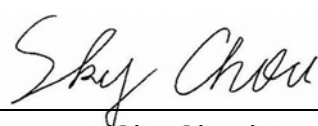
Test Report No.	: 1708FS21
Applicant	: Ocean Star Electronics Limited
Product Type	: Bluetooth Speaker with Chromecast built-in
Trade Name	: TOSHIBA
Model Number	: TY-GC1000
Date of Received	: Nov. 10, 2016
Test Period	: Nov. 16 ~ Dec. 21, 2016
Date of Issued	: Aug. 25, 2017
Test Specification	: ANSI / IEEE Std.C95.1-1992 / IEEE Std. 1528-2013 47 CFR § 2.1091 47 CFR § 1.1310
Location of Test Lab.	: Chang-an Lab.

1. The test operations have to be performed with cautious behavior, the test results are as attached.
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Approved By :


(Mark Duan)

Tested By :


(Sky Chou)



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1. Description of Equipment under Test (EUT)

Applicant	Ocean Star Electronics Limited Unit 15, 8/F., Wah Wai Centre, 38-40 Au Pui Wan Street, Fo Tan, Hong Kong			
Manufacturer	Ocean Star Electronics Limited Unit 15, 8/F., Wah Wai Centre, 38-40 Au Pui Wan Street, Fo Tan, Hong Kong			
Product Type	Bluetooth Speaker with Chromecast built-in			
Trade Name	TOSHIBA			
Model Number	TY-GC1000			
FCC ID	LMZ-GC1000			
Frequency Range	Operate Band		Frequency Range (MHz)	
	IEEE 802.11b / 802.11g / 802.11n 2.4GHz 20MHz		2412 - 2462	
	IEEE 802.11a U-NII Band I		5180 - 5240	
	IEEE 802.11a U-NII Band II-A		5260 - 5320	
	IEEE 802.11a U-NII Band II-C		5500 - 5700	
	IEEE 802.11a U-NII Band III		5745 - 5825	
	IEEE 802.1ac / 802.11n 5GHz 20MHz U-NII Band I		5180 - 5240	
	IEEE 802.1ac / 802.11n 5GHz 20MHz U-NII Band II-A		5260 - 5320	
	IEEE 802.1ac / 802.11n 5GHz 20MHz U-NII Band II-C		5500 - 5700	
	IEEE 802.1ac / 802.11n 5GHz 20MHz U-NII Band III		5745 - 5825	
	IEEE 802.1ac / 802.11n 5GHz 40MHz U-NII Band I		5190 - 5230	
	IEEE 802.1ac / 802.11n 5GHz 40MHz U-NII Band II-A		5270 - 5310	
	IEEE 802.1ac / 802.11n 5GHz 40MHz U-NII Band II-C		5510 - 5670	
	IEEE 802.1ac / 802.11n 5GHz 40MHz U-NII Band III		5755 - 5795	
	IEEE 802.11ac 80MHz U-NII Band I		5210	
	IEEE 802.11ac 80MHz U-NII Band II-A		5290	
	IEEE 802.11ac 80MHz U-NII Band II-C		5530	
	IEEE 802.11ac 80MHz U-NII Band III		5775	
	Bluetooth BR/EDR		2402 - 2480	
	Bluetooth LE		2402 - 2480	
Antenna information	Model Number	Type	Max. Gain (dBi)	
	GY 9000	PCB Antenna	2.4GHz	2
			5GHz	4
Antenna Delivery	All of operate bands are 1TX/1RX (Diversity)			
Temperature Range	0 ~ 35°C			
RF Evaluation	0.035 mW/cm2			

The above equipment was tested by A Test Lab Techno Corp. For compliance with the requirements set forth in 47 CFR § 2.1091 / 47 CFR § 1.1310. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties



2. Human Exposure Assessment

Due to the design and installation of this product, it is not possible to conduct SAR evaluation. This is because client either manufactures or supplies the antenna(s) that will be used in the installation of this product. Therefore, this product will be evaluated as a mobile device per 47 CFR § 1.1310 titled "Radiofrequency radiation exposure limits", generally referred to as MPE limits.

In 47 CFR § 2.1091, paragraph (b) defines a mobile device as "a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 cm is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. " This product is intended to be installed into a vehicle such that the unit is physically secured at one location. In the installation guide supplied with the product,

Client has made the following statement: "IMPORTANT: To meet the FCC's RF Exposure Guidelines, the antenna should be installed so there is at least 20 cm of separation between the body of the user and nearby persons and the antenna". Based on the installation of the transceiver and the antenna, the transmitters radiating structure is more than 20 cm from the user. Thus, this product is a "mobile device" as defined in section § 2.1091 paragraph (b).

Exposure evaluation

$$S = \frac{PG}{4\pi R^2}$$

Where

S: power density

P: power input to the antenna

G: power gain of the antenna in the direction of interest relative to an isotropic radiator.

R: distance to the center of radiation of the antenna.



3. RF Output Power

The conducted power turn-up tolerance reference manufacturer specification.

Band	Data Rate (Mbps)	Frequency (MHz)	Average Conducted power (dBm)	
			ANT-0	ANT-1
IEEE 802.11b	1	2412	16.50	16.42
		2437	16.56	16.53
		2462	16.62	16.58
	2	2437	16.50	16.43
	5.5	2437	16.45	16.39
	11	2437	16.31	16.30
IEEE 802.11g	6	2412	13.15	13.10
		2437	13.19	13.15
		2462	13.22	13.19
	9	2437	13.12	13.05
	12	2437	13.07	13.01
	18	2437	13.01	12.97
	24	2437	12.99	12.91
	36	2437	12.94	12.87
	48	2437	12.88	12.80
	54	2437	12.82	12.76
IEEE 802.11n 2.4GHz 20MHz	6.5	2412	11.80	11.75
		2437	11.98	11.94
		2462	12.04	11.97
	13	2437	11.92	11.85
	19.5	2437	11.87	11.81
	26	2437	11.82	11.74
	39	2437	11.76	11.71
	52	2437	11.71	11.69
	58.5	2437	11.68	11.65
	65	2437	11.62	11.56

Band	Data Rate (Mbps)	Frequency (MHz)	Average Conducted power (dBm)	
			ANT-0	ANT-1
IEEE 802.11a	6	5180	14.99	14.89
		5200	15.13	15.10
		5220	15.14	15.11
		5240	14.98	14.93
		5260	14.93	14.85
		5280	14.85	14.81
		5300	14.67	14.64
		5320	14.58	14.52
		5500	14.36	14.29
		5520	14.46	14.39
		5540	14.53	14.43
		5560	14.67	14.58
		5580	14.47	14.37
		5660	14.79	14.77
		5680	14.73	14.68
		5700	14.66	14.63
		5745	14.82	14.72
		5765	14.77	14.71
		5785	14.72	14.68
		5805	14.67	14.60
		5825	14.55	14.46
	54	5180	14.95	14.89
		5200	15.04	14.96
		5220	15.10	15.01
		5240	14.96	14.89
		5260	14.83	14.79
		5280	14.81	14.77
		5300	14.59	14.56
		5320	14.49	14.45
		5500	14.33	14.31
		5520	14.43	14.38
		5540	14.49	14.44
		5560	14.65	14.61
		5580	14.40	14.31
		5660	14.76	14.71
		5680	14.63	14.58
		5700	14.63	14.55
		5745	14.80	14.73
		5765	14.72	14.69
		5785	14.66	14.56
		5805	14.59	14.54
		5825	14.51	14.44

Band	Data Rate (Mbps)	Frequency (MHz)	Average Conducted power (dBm)	
			ANT-0	ANT-1
IEEE 802.11ac 20MHz	6.5	5180	13.82	13.78
		5200	13.61	13.58
		5220	13.56	13.47
		5240	13.53	13.48
		5260	13.28	13.21
		5280	13.35	13.32
		5300	13.26	13.18
		5320	13.29	13.25
		5500	13.13	13.10
		5520	13.21	13.17
		5540	13.24	13.15
		5560	13.14	13.11
		5580	13.26	13.22
		5660	13.32	13.28
		5680	13.45	13.36
		5700	13.52	13.49
		5745	13.61	13.57
		5765	13.51	13.49
		5785	13.38	13.35
		5805	13.35	13.27
		5825	13.43	13.37
	78	5180	13.78	13.70
		5200	13.58	13.48
		5220	13.48	13.46
		5240	13.51	13.46
		5260	13.24	13.22
		5280	13.33	13.23
		5300	13.21	13.16
		5320	13.25	13.21
		5500	13.04	12.99
		5520	13.15	13.12
		5540	13.17	13.13
		5560	13.07	13.01
		5580	13.17	13.09
		5660	13.29	13.25
		5680	13.38	13.33
		5700	13.43	13.35
		5745	13.58	13.51
		5765	13.44	13.42
		5785	13.30	13.25
		5805	13.31	13.23
		5825	13.38	13.32

Band	Data Rate (Mbps)	Frequency (MHz)	Average Conducted power (dBm)	
			ANT-0	ANT-1
IEEE 802.11ac 40MHz	13.5	5190	12.83	12.78
		5230	12.76	12.68
		5270	12.43	12.38
		5310	12.49	12.46
		5510	12.38	12.32
		5550	12.46	12.43
		5670	12.56	12.51
		5755	12.59	12.56
		5795	12.46	12.41
	180	5190	12.74	12.67
		5230	12.69	12.67
		5270	12.40	12.35
		5310	12.42	12.35
		5510	12.36	12.33
		5550	12.40	12.36
		5670	12.49	12.43
		5755	12.55	12.47
		5795	12.39	12.37
IEEE 802.11ac 80MHz	29.3	5210	10.56	10.53
		5290	10.42	10.35
		5530	10.25	10.17
		5775	10.21	10.11
	390	5210	10.49	10.45
		5290	10.33	10.25
		5530	10.18	10.14
		5775	10.17	10.12

Band	Frequency (MHz)	Packet Type	Average Conducted power (dBm)	
			ANT-0	ANT-1
Bluetooth BR GFSK	2402	DH1	9.56	---
		DH3	9.59	---
		DH5	9.61	---
	2441	DH1	9.00	---
		DH3	9.03	---
		DH5	9.07	---
	2480	DH1	8.53	---
		DH3	8.56	---
		DH5	8.58	---
Bluetooth EDR $\pi/4$ -DQPSK	2402	2DH1	7.09	---
		2DH3	7.12	---
		2DH5	7.14	---
	2441	2DH1	6.52	---
		2DH3	6.56	---
		2DH5	6.59	---
	2480	2DH1	6.01	---
		2DH3	6.05	---
		2DH5	6.07	---
Bluetooth EDR 8DPSK	2402	3DH1	7.29	---
		3DH3	7.32	---
		3DH5	7.35	---
	2441	3DH1	6.74	---
		3DH3	6.77	---
		3DH5	6.89	---
	2480	3DH1	6.24	---
		3DH3	6.27	---
		3DH5	6.29	---
Bluetooth LE	2402	---	2.30	2.10
	2440		1.84	1.65
	2480		1.41	1.20



4. Test Result

Band	Data Rate (Mbps)	Frequency (MHz)	Limit (mw)	Distance [R] (cm)	Max tune-up Power (upper limit) [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	[P] x [G] with Duty cycle [TP] (mW)	Power Density [S] (mw/cm ²)
IEEE 802.11b	1	2412	1	20	16.70	2	1.58	1	73.9	0.015
		2437	1	20	16.70	2	1.58	1	73.9	0.015
		2462	1	20	16.70	2	1.58	1	73.9	0.015
IEEE 802.11g	6	2412	1	20	13.30	2	1.58	1	33.78	0.007
		2437	1	20	13.30	2	1.58	1	33.78	0.007
		2462	1	20	13.30	2	1.58	1	33.78	0.007
IEEE 802.11n 2.4GHz 20MHz	6.5	2412	1	20	12.10	2	1.58	1	25.62	0.005
		2437	1	20	12.10	2	1.58	1	25.62	0.005
		2462	1	20	12.10	2	1.58	1	25.62	0.005

Band	Data Rate (Mbps)	Frequency (MHz)	Limit (mw)	Distance [R] (cm)	Max tune-up Power (upper limit) [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	[P] x [G] with Duty cycle [TP] (mW)	Power Density [S] (mw/cm ²)
IEEE 802.11a	6	5180	1	20	15.20	4	2.51	1	83.11	0.017
		5200	1	20	15.20	4	2.51	1	83.11	0.017
		5220	1	20	15.20	4	2.51	1	83.11	0.017
		5240	1	20	15.20	4	2.51	1	83.11	0.017
		5260	1	20	15.20	4	2.51	1	83.11	0.017
		5280	1	20	15.20	4	2.51	1	83.11	0.017
		5300	1	20	15.20	4	2.51	1	83.11	0.017
		5320	1	20	15.20	4	2.51	1	83.11	0.017
		5500	1	20	15.20	4	2.51	1	83.11	0.017
		5520	1	20	15.20	4	2.51	1	83.11	0.017
		5540	1	20	15.20	4	2.51	1	83.11	0.017
		5560	1	20	15.20	4	2.51	1	83.11	0.017
		5580	1	20	15.20	4	2.51	1	83.11	0.017
		5660	1	20	15.20	4	2.51	1	83.11	0.017
		5680	1	20	15.20	4	2.51	1	83.11	0.017
		5700	1	20	15.20	4	2.51	1	83.11	0.017
		5745	1	20	15.20	4	2.51	1	83.11	0.017
		5765	1	20	15.20	4	2.51	1	83.11	0.017
		5785	1	20	15.20	4	2.51	1	83.11	0.017
		5805	1	20	15.20	4	2.51	1	83.11	0.017
		5825	1	20	15.20	4	2.51	1	83.11	0.017

Band	Data Rate (Mbps)	Frequency (MHz)	Limit (mw)	Distance [R] (cm)	Max tune-up Power (upper limit) [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	[P] x [G] with Duty cycle [TP] (mW)	Power Density [S] (mw/cm ²)
IEEE 802.11ac 20MHz	6.5	5180	1	20	14.00	4	2.51	1	63.05	0.013
		5200	1	20	14.00	4	2.51	1	63.05	0.013
		5220	1	20	14.00	4	2.51	1	63.05	0.013
		5240	1	20	14.00	4	2.51	1	63.05	0.013
		5260	1	20	14.00	4	2.51	1	63.05	0.013
		5280	1	20	14.00	4	2.51	1	63.05	0.013
		5300	1	20	14.00	4	2.51	1	63.05	0.013
		5320	1	20	14.00	4	2.51	1	63.05	0.013
		5500	1	20	14.00	4	2.51	1	63.05	0.013
		5520	1	20	14.00	4	2.51	1	63.05	0.013
		5540	1	20	14.00	4	2.51	1	63.05	0.013
		5560	1	20	14.00	4	2.51	1	63.05	0.013
		5580	1	20	14.00	4	2.51	1	63.05	0.013
		5660	1	20	14.00	4	2.51	1	63.05	0.013
		5680	1	20	14.00	4	2.51	1	63.05	0.013
		5700	1	20	14.00	4	2.51	1	63.05	0.013
		5745	1	20	14.00	4	2.51	1	63.05	0.013
		5765	1	20	14.00	4	2.51	1	63.05	0.013
		5785	1	20	14.00	4	2.51	1	63.05	0.013
		5805	1	20	14.00	4	2.51	1	63.05	0.013
		5825	1	20	14.00	4	2.51	1	63.05	0.013
IEEE 802.11ac 40MHz	13.5	5190	1	20	13.00	4	2.51	1	50.08	0.010
		5230	1	20	13.00	4	2.51	1	50.08	0.010
		5270	1	20	13.00	4	2.51	1	50.08	0.010
		5310	1	20	13.00	4	2.51	1	50.08	0.010
		5510	1	20	13.00	4	2.51	1	50.08	0.010
		5550	1	20	13.00	4	2.51	1	50.08	0.010
		5670	1	20	13.00	4	2.51	1	50.08	0.010
		5755	1	20	13.00	4	2.51	1	50.08	0.010
		5795	1	20	13.00	4	2.51	1	50.08	0.010

Band	Data Rate (Mbps)	Frequency (MHz)	Limit (mw)	Distance [R] (cm)	Max tune-up Power (upper limit) [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	[P] x [G] with Duty cycle [TP] (mW)	Power Density [S] (mw/cm ²)
IEEE 802.11ac 80MHz	29.3	5210	1	20	10.60	4	2.51	1	28.82	0.006
		5290	1	20	10.60	4	2.51	1	28.82	0.006
		5530	1	20	10.60	4	2.51	1	28.82	0.006
		5775	1	20	10.60	4	2.51	1	28.82	0.006
Bluetooth BR/EDR DH5	1	2402	1	20	9.80	2	1.58	1	15.09	0.003
		2441	1	20	9.80	2	1.58	1	15.09	0.003
		2480	1	20	9.80	2	1.58	1	15.09	0.003
Bluetooth LE	1	2402	1	20	2.40	2	1.58	1	2.75	0.001
		2440	1	20	2.40	2	1.58	1	2.75	0.001
		2480	1	20	2.40	2	1.58	1	2.75	0.001

Note:

1. Mobile or fixed location transmitters, minimum separation distance is 20cm, even if calculations indicate MPE distance is less.
2. The Numeric Gain calculated by $10^{(\text{ant. Gain(dBi)} / 10)}$.
3. Each band max power which perform MPE of any configurations.
4. The MPE results are evaluated by lowest data rate for WLAN.
5. The device operating IEEE 802.11 a/b/g/ n/ac mode is 1TX (Diversity).
6. The device operating Bluetooth BR/EDR is 1TX (Diversity).
7. The device operating Bluetooth LE is 1TX only.

Simultaneous MPE :

$$\text{Total MPE} = \text{Bluetooth MPE} + 2.4\text{GHz MPE} + 5\text{GHz MPE} = 0.003 + 0.015 + 0.017 = 0.035 \text{ mW/cm}^2 < 1\text{mW/cm}^2$$