RF Exposure Report

Report No.:	SA180919D02
FCC ID:	P27-SOR4105T
Test Model:	SOR4105T
Received Date:	Sep. 19, 2018
Test Date:	Oct. 5 ~ Nov. 27, 2018
Issued Date:	Dec. 12, 2018
Applicant:	Sercomm Corp.
Address:	8F, No. 3-1, YuanQu St., NanKang, Taipei 115, Taiwan, R.O.C. (NanKang Software Park)
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)
FCC Registration / Designation Number:	198487 / TW2021

Testing Laboratory
2021

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Release Control Record

Issue No.	Description	Date Issued
SA180919D02	Original release.	Dec. 12, 2018

1 Certificate of Conformity

Product:	Harman Magic Box
Brand:	Sprint & Harman Kardon
Test Model:	SOR4105T
Sample Status:	Engineering sample
Applicant:	Sercomm Corp.
Test Date:	Oct. 5 ~ Nov. 27, 2018
Standards:	FCC Part 2 (Section 2.1091) KDB 447498 D01 General RF Exposure Guidance v06 IEEE C95.1-1992

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Annie Chang , **Date:** Dec. 12, 2018

Annie Chang / Senior Specialist

Approved by : Rex. Lai , **Date:** Dec. 12, 2018

Rex Lai / Associate Technical Manager

2 RF Exposure

2.1 Limits For Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (minutes)
Limits For General Population / Uncontrolled Exposure				
300-1500	…	…	F/1500	30
1500-100,000	…	…	1.0	30

F = Frequency in MHz

2.2 MPE Calculation Formula

$Pd = (Pout*G) / (4*pi*r^2)$

where

Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

2.3 Classification

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. So, this device is classified as **Mobile Device**.

2.4 Calculation Result Of Maximum Conducted Power

Sercomm module (WiFi):

Function	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
WLAN (2412-2462MHz)	26.06	6.22	20	0.3363	1
WLAN (5180-5240MHz)	25.28	6.37	20	0.2909	1
WLAN (5745-5825MHz)	25.67	6.35	20	0.3168	1

NOTE:
2.4GHz Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2$ / 2] = 6.22dBi
5.0GHz Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2$ / 2] = 6.37dBi (For 5180-5240MHz)
5.0GHz Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2$ / 2] = 6.35dBi (For 5745-5825MHz)
The Max Power = Max tune up power

Samsung module (FCC ID: A3LSIP005AFS30) (WiFi + BT + Zigbee):

Function	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
WLAN (2412-2462MHz)	15.00	3.8	20	0.0151	1
WLAN (5180-5240MHz)	13.50	5.5	20	0.0158	1
WLAN (5250-5350MHz)	13.50	5.5	20	0.0158	1
WLAN (5470-5725MHz)	13.50	5.5	20	0.0158	1
WLAN (5745-5825MHz)	10.50	5.5	20	0.0079	1
Bluetooth	7.5	3.8	20	0.0027	1
Bluetooth LE	6.50	3.8	20	0.0021	1
Zigbee (Dipole)	16.50	3.8	20	0.0213	1
Zigbee (FLEX)	16.50	3.2	20	0.0186	1

NOTE:
2.4GHz Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2$ / 2] = 3.8dBi
5.0GHz Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2$ / 2] = 5.5dBi
The Max Power = Max tune up power

Frequency Band (MHz)	EIRP (dBm)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
LTE Band 25: 1852.5~1912.5MHz, 1855~1910MHz	28.94	20	0.1559	1

Frequency Band (MHz)	EIRP (dBm)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
LTE Band 41_BTS: 2510~2560MHz, 2630~2680MHz	29.48	20	0.1765	1

Frequency Band (MHz)	EIRP (dBm)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
LTE Band 41_CPE: 2502.5~2567.5MHz, 2622.5~2687.5MHz 2505.0~2565.0MHz, 2625.0~2685.0MHz 2507.5~2562.5MHz, 2627.5~2682.5MHz 2510.0~2560.0MHz, 2630.0~2680.0MHz	32.09	20	0.3219	1

NOTE: BTS Band 41 low band and CPE Band 41 low band cannot transmit at same time.
BTS Band 41 high band and CPE Band 41 high band cannot transmit at same time.
CPE mode & Sercomm WiFi module cannot transmit at same time.
Sercomm WiFi module 2.4GHz & 5.0GHz cannot transmit at same time.
Samsung WiFi module 2.4GHz & 5.0GHz & BT cannot transmit at same time.
Sercomm WiFi module 2.4GHz and Samsung WiFi module 2.4GHz cannot transmit at same time.
Sercomm WiFi module 5.0GHz and Samsung WiFi module 5.0GHz cannot transmit at same time.

Conclusion:

The formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1

CPD = Calculation power density

LPD = Limit of power density

BTS Band 41 + CPE Band 25 + Samsung module (2.4G WiFi + Zigbee) =
0.1765+0.1559+0.0151+0.0213=0.3688
BTS Band 41 + CPE Band 41 + Samsung module (2.4G WiFi + Zigbee) =
0.1765+0.3219+0.0151+0.0213=0.5348
BTS Band 41 + CPE Band 41 + Samsung module (5.0G WiFi + Zigbee) =
0.1765+0.3219+0.0158+0.0213=0.5355
BTS Band 41 + CPE Band 41 + Samsung module (Bluetooth + Zigbee) =
0.1765+0.3219+0.0027+0.0213=0.5224
BTS Band 41 + CPE Band 41 + Samsung module (Bluetooth LE + Zigbee) =
0.1765+0.3219+0.0021+0.0213=0.5218
BTS Band 41 + Sercomm module (5.0G WiFi) + Samsung module (Bluetooth LE + Zigbee) =
0.1765+0.3168+0.0021+0.0213=0.5167
BTS Band 41 + Sercomm module (5.0G WiFi) + Samsung module (2.4G WiFi + Zigbee) =
0.1765+0.3168+0.0151+0.0213=0.5297
BTS Band 41 + Sercomm module (2.4G WiFi) + Samsung module (5.0G WiFi + Zigbee) =
0.1765+0.3363+0.0158+0.0213=0.5499
BTS Band 41 + Sercomm module (2.4G WiFi) + Samsung module (Bluetooth + Zigbee) =
0.1765+0.3363+0.0027+0.0213=0.5368
Therefore the maximum calculations of above situations are less than the "1" limit.

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