1. RF Exposure Requirements

1.1 General Information

Client Information

Applicant:	Dhyan Networks and Technologies, Inc
Address of applicant:	160 Stanford Ave Fremont, CA, USA
Manufacturer:	Guangzhou Shuwang Technology Co., Ltd.
Address of manufacturer:	Room 3-303, Letianyungu, Nansha District, Guangzhou City

General Description of EUT:

Product Name:	Smart Solar Light Controller
Trade Name:	Ohli Node
Model No.:	SCC-120-NBG
Adding Model(s):	SCC-040-NB; SCC-060-NB; SCC-090-NB; SCC-120-NB; SCC-040-NBG; SCC-060-NBG; SCC-090-NBG
Rated Voltage:	DC12.8V/25.6V
Adapter Model:	/
Software Version:	SCx-sv1.0.7
Hardware Version:	SCx-hv1.0.2
IMEI:	/
Device Category:	Fixed Device
FCC ID:	2A729-SCC-120-NBG

Technical Characteristics of EUT:	
4G	
Support Networks:	FDD-LTE
Support Band:	FDD-LTE Band 2, 4, 5, 12, 13
Uplink Frequency:	FDD-LTE Band 2: Tx: 1850-1910MHz, FDD-LTE Band 4: Tx: 1710-1755MHz, FDD-LTE Band 5: Tx: 824-849MHz, FDD-LTE Band 12: Tx: 699-716MHz, FDD-LTE Band 13: Tx: 777-787MHz
Downlink Frequency:	FDD-LTE Band 2: Rx: 1930-1990MHz, FDD-LTE Band 4: Rx: 2110-2155MHz, FDD-LTE Band 5: Rx: 869-894MHz, FDD-LTE Band 12: Rx: 729-746MHz, FDD-LTE Band 13: Rx: 746-756MHz
RF Output Power:	FDD-LTE Band 2: 19.41dBm, FDD-LTE Band 4: 19.97dBm, FDD-LTE Band 5: 21.16dBm, FDD-LTE Band 12: 20.73dBm, FDD-LTE Band 13: 21.38dBm

Type of Emission:	FDD-LTE Band 2: 185KG7D
	FDD-LTE Band 4: 184KG7D
	FDD-LTE Band 5: 195KG7D
	FDD-LTE Band 12: 195KG7D
	FDD-LTE Band 13: 184KG7D
Type of Modulation:	BPSK,QPSK
Antenna Type:	Cabinet Antenna
Antenna Gain:	FDD-LTE Band 2: 2.07dBi
	FDD-LTE Band 4: 1.14dBi
	FDD-LTE Band 5: 1.72dBi
	FDD-LTE Band 12: 0.86dBi
	FDD-LTE Band 13: 0.87dBi

1.2 RF Exposure Exemption

According to §1.1307(b)(3) and KDB 447498 D04 Interim General RF Exposure Guidance v01, system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

Option A: FCC Rule Part 1.1307 (b)(3)(i)(A):The available maximum time-averaged power is no more than 1mW, regardless of separation distance.

Option B: FCC Rule Part 1.1307 (b)(3)(i)(B): The available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. P_{th} is given by:

$$P_{th} \ (mW) = \begin{cases} ERP_{20 \ cm}(d/20 \ cm)^x & d \leq 20 \ cm \\ ERP_{20 \ cm} & 20 \ cm < d \leq 40 \ cm \end{cases}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20 \ cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \ cm} \ (mW) = \begin{cases} 2040f & 0.3 \ GHz \leq f < 1.5 \ GHz \\ 3060 & 1.5 \ GHz \leq f \leq 6 \ GHz \end{cases}$$

d = the separation distance (cm);

Option C: FCC Rule Part 1.1307 (b)(3)(i)(C): The minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. R must be at least λ/2π, where λ is the free-space operating wavelength in meters.

Single RF Sources Subject to Routine Environmental Evaluation	
RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R^2
1.34-30	3,450 R^2/f^2
30-300	3.83 R^2
300-1,500	0.0128 R^2f
1,500-100,000	19.2R^2

For Multiple RF sources: FCC Rule Part 1.1307(b)(3)(ii):

(A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required).

(B) In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^{a} \frac{P_i}{P_{th,i}} + \sum_{j=1}^{b} \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

1.3 Calculated Result

Radio Access Technology	Prediction Frequency	Tune-up Power	Antenna Gain	Tune-up Time-Averaged Power	ERP
	(MHz)	(dBm)	(dBi)	(dBm)	(dBm)
LTE Band 2	1850	20.0	2.07	20.00	19.92
LTE Band 4	1710	20.0	1.14	20.00	18.99
LTE Band 5	824	21.5	1.72	21.50	21.07
LTE Band 12	699	21.0	0.86	21.00	19.71
LTE Band 13	777	21.5	0.87	21.50	20.22

Radio Access Technology	Option	Min. Distance (cm)	Max. Power (dBm)	Max. Power (mW)	Exposure Limit (mW)	Ratio	Result Pass/Fail
LTE Band 2	C	20.00	19.92	98.17	768.00	0.13	Pass
LTE Band 4	C	20.00	18.99	79.25	768.00	0.10	Pass
LTE Band 5	C	20.00	21.07	127.94	421.89	0.30	Pass
LTE Band 12	C	20.00	19.71	93.54	357.89	0.26	Pass
LTE Band 13	C	20.00	20.22	105.20	397.82	0.26	Pass

Note: 1. For GSM, Duty cycle factor = 9 dB for 1 Tx slot, 6 dB for 2 Tx slots, 4.25 dB for 3 Tx slots, 3 dB for 4 Tx slots;

2. Tune-up time-average power = Tune-up Power - Duty cycle factor in dB

2. Output Power=EIRP- Antenna Gain; ERP=EIRP-2.15dB

3. Option A, B and C refers as clause 1.2.

4. For option B, Max (time-averaged power, effective radiated power (ERP)) converts to Max. Power. For option C, ERP converts to Max. Power;

5. For option B, P_{th} (mW) converts to Exposure Limit (mW); For option C, ERP (W) converts to Exposure Limit (mW).

6. Ratio= Tune-up ERP (mW)/ Exposure Limit (mW)

Mode for Simultaneous Multi-band Transmission:

Radio Access Technology	Ratio 1	Ratio 2	Simultaneous Ratio	Limit	Result Pass/Fail
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Result: Pass