RF Exposure Evaluation declaration

Product Name : DCM (Data Communication Module)

Model No. : 5-104348-192

FCC ID : H8NCDD6020

Applicant : ASKEY COMPUTER CORP.

Address : 10F, NO.119, JIANKANG RD., ZHONGHE DIST., NEW TAIPEI CITY 23585

Date of Receipt : Oct. 13, 2017

Date of Declaration : Nov. 23, 2017

Report No. : 17A0157R-SAUSP03V00

Report Version : V1.0

Testing Laboratory
3023

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	DCM (Data Communication Module)
Model No.	5-104348-192
Trade Name	DSC
IMEI No.	35324409
FCC ID	H8NCDD6020
TX Frequency	WCDMA Band 2: 1852.4 MHz ~ 1907.6 MHz WCDMA Band 4: 1712.4 MHz ~ 1752.6 MHz WCDMA Band 5: 826.4 MHz ~ 846.6 MHz LTE Band 2: 1850 MHz ~1910 MHz LTE Band 4: 1710 MHz~1755 MHz LTE Band 5: 824 MHz ~849 MHz LTE Band 17 : 704 MHz~716 MHz LTE Band 26 : 814 MHz~849 MHz LTE Band 41: 2496 MHz ~2690 MHz 2412-2462MHz for 802.11b/g/n-20BW, 2422-2452MHz for 802.11n-40BW BT 2402-2480MHz
Rx Frequency	WCDMA Band 2: 1932.4 MHz ~ 1987.6 MHz WCDMA Band 4: 2112.4 MHz ~ 2152.6 MHz WCDMA Band 5: 871.4 MHz ~ 891.6 MHz LTE Band 2: 1930 MHz ~1990 MHz LTE Band 4: 2110 MHz ~2155 MHz LTE Band 5: 869 MHz ~894 MHz LTE Band 17 : 734 MHz~746 MHz LTE Band 26: 859 MHz ~894 MHz LTE Band 41: 2496 MHz ~2690 MHz 2412-2462MHz for 802.11b/g/n-20BW, 2422-2452MHz for 802.11n-40BW BT 2402-2480MHz
HW Version	Rev2
SW Version	90-00223-M-00-57-00-DV-102717
Antenna Type	Multi Band Dipole Antenna Sentinel 3in1 Adhesive Mount 2*LTE MIMO & GNSS Antenna

1.2. Antenna List :

No.	Manufacturer	Part No.	Peak Gain
1	STAF	N/A (WWAN Main or Aux)	2.56 dBi for 746-960 MHz 3.32 dBi for 1575.42-2170 MHz 2.69 dBi for 2496-2690 MHz
2	taoglas	MA250.A.LBI.001 (WWAN Main or Aux MIMO-1 Cable 3m)	0.42 dBi for 698-803 MHz 0.99 dBi for 824-894 MHz 3.29 dBi for 1710-1880 MHz 3.29 dBi for 1850-1990 MHz 2.35 dBi for 2490-2690 MHz
		MA250.A.LBI.001 (WWAN Main or Aux MIMO-2 Cable 3m)	2.95 dBi for 698-803 MHz 0.44 dBi for 824-894 MHz 3.23 dBi for 1710-1880 MHz 1.77 dBi for 1850-1990 MHz 2.37 dBi for 2490-2690 MHz
3	ASKEY	CDD6020 (WLAN / BT)	2.74dBi for 2.4GHz

Note: Each antenna has been evaluated and only the worst case (higher gain antenna) is presented in the report.

2. RF Exposure Evaluation

2.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b).

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)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	F/1500	30
1500-100,000	--	--	1	30

F= Frequency in MHz

Friis Formula

Friis transmission 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

Pd is the limit of MPE, 1 mW/cm^2. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

2.2. Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

The temperature and related humidity: 23.1℃and 52％ RH.

2.3. Test Result of RF Exposure Evaluation

Product : DCM (Data Communication Module)
Test Item : RF Exposure Evaluation
Test Site : N/A

WCDMA Band 2-Peak Gain: 3.32dBi; WCDMA Band 4-Peak Gain: 3.32dBi; WCDMA Band 5-Peak Gain: 2.56dBi

Band	Frequency (MHz)	Conducted Peak Power (dBm)	Maximum ERP/EIRP (W)	Maximum ERP/EIRP Limit(W)	Duty Cycle (%)	Conducted Average Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm2)	Limit (mW/cm2)	Pass/Fail
2	1907.6	24.63	0.624	2	100	24.63	290.4	0.124	1.00	Pass
4	1752.6	23.23	0.452	1	100	23.23	210.4	0.090	1.00	Pass
5	846.6	24.39	0.302	7	100	24.39	274.8	0.099	0.56	Pass

LTE Band 2 (For Part 24) -Peak Gain: 3.32dBi

Frequency	Conducted Peak Power (dBm)	Maximum ERP/EIRP (W)	Maximum ERP/EIRP Limit (W)	Duty Cycle (%)	Conducted Average Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)	Pass/Fail
1855	23.54	0.485	2	100	23.54	225.94	0.0965	1	Pass
1880	23.53	0.484	2	100	23.53	225.42	0.0963	1	Pass
1907.5	23.45	0.475	2	100	23.45	221.31	0.0946	1	Pass

LTE Band 4 (For Part 27) -Peak Gain: 3.32dBi

Frequency	Conducted Peak Power (dBm)	Maximum ERP/EIRP (W)	Maximum ERP/EIRP Limit (W)	Duty Cycle (%)	Conducted Average Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)	Pass/Fail
1720	23.21	0.450	1	100	23.21	209.41	0.0895	1	Pass
1732.5	23.17	0.446	1	100	23.17	207.49	0.0887	1	Pass
1745	23.44	0.474	1	100	23.44	220.80	0.0943	1	Pass

LTE Band 5 (For Part 22) -Peak Gain: 2.56dBi

Frequency	Conducted Peak Power (dBm)	Maximum ERP/EIRP (W)	Maximum ERP/EIRP Limit (W)	Duty Cycle (%)	Conducted Average Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)	Pass/Fail
826.5	22.54	0.197	7	100	22.54	179.47	0.0644	0.551	Pass
836.5	22.52	0.196	7	100	22.52	178.65	0.0641	0.558	Pass
846.5	22.59	0.200	7	100	22.59	181.55	0.0651	0.564	Pass

LTE Band 17 (For Part 27) -Peak Gain: 2.95dBi

Frequency	Conducted Peak Power (dBm)	Maximum ERP/EIRP (W)	Maximum ERP/EIRP Limit (W)	Duty Cycle (%)	Conducted Average Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)	Pass/Fail
706.5	22.72	0.225	3	100	22.72	187.07	0.0734	0.471	Pass
710	22.46	0.212	3	100	22.46	176.20	0.0691	0.473	Pass
713.5	22.50	0.214	3	100	22.50	177.83	0.0698	0.476	Pass

LTE Band 26 (For Part 22) -Peak Gain: 2.56dBi

Frequency	Conducted Peak Power (dBm)	Maximum ERP/EIRP (W)	Maximum ERP/EIRP Limit (W)	Duty Cycle (%)	Conducted Average Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)	Pass/Fail
831.5	22.53	0.197	7	100	22.53	179.06	0.0642	0.554	Pass
836.5	22.57	0.199	7	100	22.57	180.72	0.0648	0.558	Pass
844	22.48	0.195	7	100	22.48	177.01	0.0635	0.563	Pass

LTE Band 41 (For Part 27) -Peak Gain:2.69dBi

Frequency	Conducted Peak Power (dBm)	Maximum ERP/EIRP (W)	Maximum ERP/EIRP Limit (W)	Duty Cycle (%)	Conducted Average Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)	Pass/Fail
2498.5	23.20	0.388	2	100	23.2	208.93	0.0772	1	Pass
2593	23.14	0.383	2	100	23.14	206.06	0.0762	1	Pass
2687.5	23.06	0.376	2	100	23.06	202.30	0.0748	1	Pass

LTE Band 26 (For Part 90) -Peak Gain: 2.56dBi

Frequency	Conducted Peak Power (dBm)	Maximum ERP/EIRP (W)	Maximum ERP/EIRP Limit (W)	Duty Cycle (%)	Conducted Average Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)	Pass/Fail
814.7	22.57	0.199	7	100	22.57	180.72	0.0648	0.543	Pass
819	22.62	0.201	7	100	22.62	182.81	0.0656	0.546	Pass
821.5	22.48	0.195	7	100	22.48	177.01	0.0635	0.548	Pass

Note: The conducted output power is refer to report No.: 17A0157R-HPUSP46V00, 17A0157R-HPUSP35V00, 17A0157R-HPUSP56V01 from the DEKRA.

WLAN

Peak Gain: 2.74dBi

Band	Frequency	Conducted Peak Power (dBm)	Duty Cycle (%)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)	Pass/Fail
2.4	2437	19.74	83.4	78.6	0.0294	1	Pass

Bluetooth

Peak Gain: 2.74dBi

Band	Frequency	Conducted Peak Power (dBm)	Duty Cycle (%)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)	Pass/Fail
2.4	2480	3.53	75	1.7	0.0006	1	Pass

Note: The conducted output power is refer to report No.: 17A0157R-RFUSP01V00, 17A0157R-RFUSP01V00-A, 17A0157R-RFUSP26V00 from the DEKRA.

2.4. calculations for Multi-Transsmitter

Mode	Exposure Calculations	result	Limit	Pass/Fail
WLAN	0.1768	0.2068	1	Pass
BT	0.0294			
WWAN	0.0006			