Excellence in Compliance Testing

Certification Exhibit

Digital Transmission System

FCC ID: RTTAB-WLNB

FCC Rule Part: 15.247

ACS Report Number(s): 07-0457

Manufacturer: DPAC Technologies
Model(s): ABDB-AN-DPxxx

RF Exposure

General Information:

Applicant: DPAC Technologies
ACS Project: 07-0457
Device Category: Mobile
Environment: General Population/Uncontrolled Exposure
Exposure Conditions: Greater than 20 centimeters
Simultaneous Tx: Yes

Technical Information:

Radio	900 MHz LAN *FCC ID: SK9AMI-2A*	2.4GHz Zigbee (Register PCB) *FCC ID: SK9AMI-2A*	2.4GHz Zigbee (Cell Relay PCB) *FCC ID: SK9AMI-2A*	WiFi Module *FCC ID: RTTAB-WLNB*
Antenna Type	single-band patch	half wavelength slot	single-band slot	Microstrip patch
Antenna Gain	3dBi	1dBi	4dBi	5dBi
Conducted Power	21.92dBm	18.71dBm	-12.61dBm	15.66dBm
Maximum EIRP	0.310W	0.094W	0.138mW	0.116W
Maximum ERP	0.189W	0.057W	0.084mW	0.071W

MPE Calculation:

Calculated Conducted Power (15.249) – Host 2.4GHz Zigbee Radio
For the purpose of determining Power Density for the 2.4GHz Zigbee radio in the host device (FCC ID: SK9AMI-2A, IC:864G-AMI2A), the conducted RF power must first be calculated.

The power was calculated using the following equation:

$$P = (E * d)^2 / 30 * G$$

Where: G = Numeric Gain of the transmitting antenna with reference to an isotropic radiator
d = The distance in meters from which the field strength was measured
E = The measured maximum fundamental field strength in V/m

Table 1: Maximum Fundamental Field Strength

Frequency (MHz)	Uncorrected Reading (dBµV/m)	Antenna Polarity (H/V)	Total Correction Factor (dB)	Corrected Reading (dBµV/m)
2405	87.86	H	-1.24	86.62

Table 2: Peak Output Power

Frequency (MHz)	Numeric Gain	Distance (m)	Max. Fund. Field Strength (V/m)	Output Power (dBm)
2405	2.51	3	0.0214	-12.61

Power Density

The Power Density (mW/cm^2) is calculated as follows:

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

Where:
S = power density (in appropriate units, e.g. mW/cm2)
P = power input to the antenna (in appropriate units, e.g., mW)
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 (appropriate units, e.g., cm)

MPE Calculator for Mobile Equipment Limits for General Population/Uncontrolled Exposure*							
Transmit Frequency (MHz)	Radio Power (dBm)	Power Density Limit (mW/Cm2)	Radio Power (mW)	Antenna Gain (dBi)	Antenna Gain (mW eq.)	Distance (cm)	Power Density (mW/cm^2)
902.25	21.92	0.60	155.60	3	1.995	20	0.062
2405	18.71	1.00	74.30	1	1.259	20	0.019
2405	-12.61	1.00	0.05	4	2.512	20	0.000
2412	15.66	1.00	36.81	5	3.162	20	0.023

Summation of Power Densities – Simultaneous Transmissions

This application for equipment authorization involves multiple transmitters which can operate simultaneously and therefore the maximum RF exposure is determined by the summation of power densities. The host 900 MHz LAN and host high power Zigbee radio can not operate simultaneously there it is not appropriate to include both of those power density values in the same summation of power densities. For the sake of providing the worst case data, the highest power density from those two transmitters (900 MHz LAN) will be applied for the calculations.

The maximum power density as calculated by a summation of power densities for each simultaneous transmission combination as follows:

900MHz LAN:	0.062 (mW/cm^2)
2.4GHz Zigbee:	0.000 (mW/cm^2)
802.11b:	0.023 (mW/cm^2)
TOTAL:	**0.085 (mW/cm^2)**

Installation Guidelines:

The installation manual shall contain text similar to the following advising how to install the equipment to maintain compliance with the FCC RF exposure requirements:

"RF Exposure (Intentional Radiators Only)
In accordance with FCC requirements of human exposure to radiofrequency fields, the radiating element shall be installed such that a minimum separation distance of 20cm is maintained from the general population."

Conclusion:

This device complies with the MPE requirements by providing adequate separation between the device, any radiating structure and the general population.