RF Exposure

Venus 20-US-4G-PCIE-M2, Venus 20-CN-4G-NA-M2, and Venus 20-US-4G-NA-M2 are Engineering control equipments in the GSM/UMTS/LTE system. The GSM frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900, but only GSM850/1900 test data included in this report. The UMTS frequency band are band I /II /IV/V/VI/VIII/XVIIII, but only band II and Band IV and Band V test data included in this report.
The LTE frequency band is Band I/II/III/IV/V/VII/VIII/XII/XIII/XVIII/XVIIII/XX/XXV/XXVI/XXVIII/XXXVIII/XXXVIIII/XXXX/XXXXI, but only Band II/IV/V/VII/XII/XIII/XXV/XXVI/XXXVIII/XXXXI test data included in this report. The Engineering control equipments implements such functions as RF signal receiving/transmitting, LTE/UMTS and GPRS/EDGE protocol. Externally it provides micro SD card interface and USIM card interface. The EUT is powered by DC 12V/12.5A. For more detailed features description, please refer to the user's manual.

Limits

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f2)	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	f/300	6
1500-100,000	/	/	5	6

(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f2)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

F=frequency in MHz
*=Plane-wave equivalent power density
RF exposure compliance will need to be determined with respect to 1.1307(c) and (d) of the FCC rules. The emissions should be within the limits at 300kHz in Table 1 of 1.1310(use the 300kHz limits for 150kHz:614V/m,1.63A/m).

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 id 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.

EUT RF Exposure Evaluation

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.0 / 2.0 in linear scale. Output Power Into Antenna & RF Exposure Evaluation Distance:

Operating Band	Frequency (MHz)	Antenna Gain (dBi)	Max Conducted Average Output Power (dBm)	Output Power to Antenna (dBm)	EIRP(ERP) Limit (dBm)	Output Power to Antenna (mw)	Power Density at R = 20 cm (mW/cm2)	Limit (mW/cm2)	conclusion
GSM850	824.20	4.04	30.00	31.89	38.50	1000.0000	0.5043	0.5495	PASS
GSM1900	1850.20	3.14	30.00	33.14	33.00	1000.0000	0.4099	1.0000	PASS
WCDMA B2	1852.40	4.04	25.00	29.04	33.00	316.2278	0.1595	1.0000	PASS
WCDMA B4	1712.40	3.14	25.00	28.14	30.00	316.2278	0.1296	1.0000	PASS
WCDMA B5	826.40	3.75	25.00	26.60	38.45	316.2278	0.1492	0.5509	PASS
LTE B2	1850.70	3.14	25.00	28.14	33.00	316.2278	0.1296	1.0000	PASS
LTE B4	1710.70	3.75	25.00	28.75	30.00	316.2278	0.1492	1.0000	PASS
LTE B5	824.70	4.04	25.00	26.89	38.48	316.2278	0.1595	0.5498	PASS
LTE B7	2502.50	4.79	25.00	29.79	33.00	316.2278	0.1896	1.0000	PASS
LTE B12	699.70	2.82	25.00	25.67	34.77	316.2278	0.1204	0.4665	PASS
LTE B13	799.50	3.80	25.00	26.65	34.77	316.2278	0.1509	0.5330	PASS
LTE B25	1850.70	3.21	25.00	28.21	33.00	316.2278	0.1317	1.0000	PASS
LTE B26 (814-824)	814.70	3.80	25.00	26.65	50.00	316.2278	0.1509	0.5431	PASS
LTE B26 (824-849)	824.70	4.04	25.00	26.89	38.45	316.2278	0.1595	0.5498	PASS
LTE B38	2572.50	4.40	25.00	29.40	33.00	316.2278	0.1733	1.0000	PASS
LTE B41	2498.50	4.79	25.00	29.79	33.00	316.2278	0.1896	1.0000	PASS