Evaluation of RF Exposure for SIM900B module

In this application we seek modular approval to the SIM900B module for use in mobile configuration. Based on the FCC OET Bulletin 65 Supplement C and 47 CFR ¡ì2.1091, we have concluded that the SIM900B will comply with the FCC rules on RF exposure for mobile devices if the antenna gain does not exceed 7.3 dBi in cellular band and 9.0 dBi in PCS band. The following analysis will demonstrate such compliance. The analysis will be done in two US bands.

Operation in cellular band (824-849MHz):

Cal formula: Power Density = EIRP*DutyCycle/$(4\pi R^2)$

According to report: SHEMO10050067103

We know:

Max conducted Power: 33.1dBm

Duty cycle : 0.25 at GPRS 10 operation

Distance(R): 20cm

Taken Antenna gain: 7.3dBi into calculated

We can know the:

Power density= 10^((33.1+7.3)/10)*0.25/(4*3.1415*20^2)

=0.545mW/cm^2

The MPE limit for General Population/Uncontrolled Exposure is shown in the FCC OET Bulletin 65 Supplement C and can be calculated as follows:

MPE limit = 824/1500 = 0.55 mW/cm^2

GSM 850-FCC Part 22 has a maximum 7W (38.45dBm) EIRP limit

Duty cycle: 0.25(duty cycle factor=10log(0.25)=-6.0)

We can calculate the RF power with duty cycle(0.25):

Conducted power + Antenna gain +ducy cycle factor

=33.1+7.3+(-6.0)=34.4dBm<7W(38.45dBm)

As we can see the MPE limit is complied with FCC rules on RF exposure.

Operation in cellular band (1850-1910MHz):

Cal formula: Power Density = EIRP*DutyCycle/$(4\pi R^2)$

According to report: SHEMO10050067103

We know:

Max conducted Power: 30.0dBm

Duty cycle : 0.25 at GPRS 10 operation

Distance(R): 20cm

Taken Antenna gain: 12.9dBi into calculated

We can know the:

Power density= 10^((30.0+12.9)/10)*0.25/(4*3.1415*20^2)

=0.97mW/cm^2

The MPE limit for General Population/Uncontrolled Exposure is shown in the FCC OET Bulletin 65 Supplement C as follows:

MPE limit = 1.0 mW/cm^2

GSM1900-FCC Part 24 has a maximum 2W (33dBm) EIRP limit
Duty cycle: 0.25(duty cycle factor=10log(0.25)=-6.0)
We can calculate the RF power with duty cycle(0.25):
Conducted power + Antenna gain +ducy cycle factor
=30.0+12.9+(-6.0)=36.9dBm>2W(33dBm)
As the power excess the FCC 24's limit, so the antenna gain 12.9dBi is too large too not available.
We can calculate the Max antenna gain by use the max EIRP limit 33dBm,
Gain=EIRP limit-Conducted peak power - duty cycle factor
=33-30-(-6)=9.0dBi<12.9dBi
So the antenna Gain 9.0dBi is available.
As we can see the MPE limit is complied with FCC rules on RF exposure.