

## § 15.247 (e)(i) and § 2.1091 - RF EXPOSURE

According to §15.247(e)(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated.

### Limits for General Population/Uncontrolled Exposure

| Frequency Range (MHz)                               | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm <sup>2</sup> ) | Averaging Time (minutes) |
|---|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| Limits for General Population/Uncontrolled Exposure |                               |                               |                                     |                          |
| 0.3-1.34  | 614                           | 1.63                          | *(100)                              | 30                       |
| 1.34-30   | 824/f                         | 2.19/f                        | *(180/f <sup>2</sup> )              | 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

### MPE Prediction

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density

P = power input to antenna

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

Base:

Maximum peak output power at antenna input terminal: 15.76 (dBm)

Maximum peak output power at antenna input terminal: 37.67 (mW)

Prediction distance: 20 (cm)

Predication frequency: 2400 (MHz)

Antenna Gain (typical): 0 (dBi)

Maximum antenna gain: 1 (numeric)

Power density at predication frequency at 20 cm: 0.0075(mW/cm<sup>2</sup>)

MPE limit for uncontrolled exposure at prediction frequency: 1.0 (mW/cm<sup>2</sup>)

### Test Result

The predicted power density level at 20 cm is 0.0075 mW/cm<sup>2</sup>. This is below the uncontrolled exposure limit of 1mW/cm<sup>2</sup> at 2400 MHz. The EUT is used at least 20cm away from user's body. It is determined as mobile equipment.

### TCB Exclusions List for Portable Device

According to §1.1310 and §2.1093 RF exposure is calculated.

| Exposure category  | <u>low threshold</u>  | <u>high threshold</u>                                 |
|--------------------|---|---|
| general population | $(60/f_{\text{GHz}}) \text{ mW}, d < 2.5 \text{ cm}$<br>$(120/f_{\text{GHz}}) \text{ mW}, d \geq 2.5 \text{ cm}$  | $(900/f_{\text{GHz}}) \text{ mW}, d < 20 \text{ cm}$  |
| occupational       | $(375/f_{\text{GHz}}) \text{ mW}, d < 2.5 \text{ cm}$<br>$(900/f_{\text{GHz}}) \text{ mW}, d \geq 2.5 \text{ cm}$ | $(2250/f_{\text{GHz}}) \text{ mW}, d < 20 \text{ cm}$ |

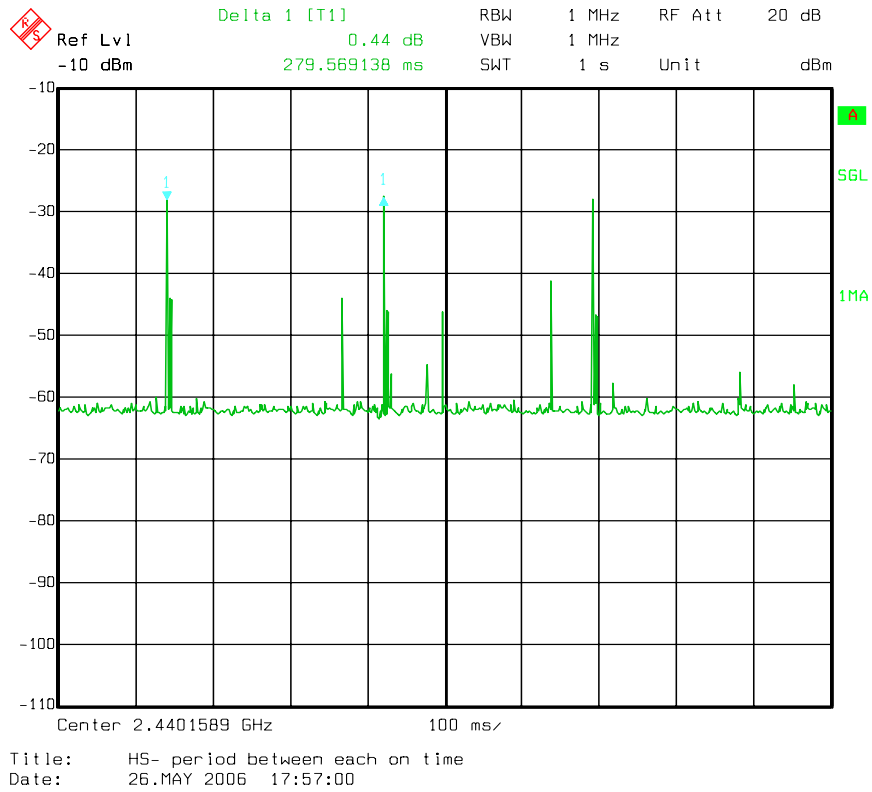
For 2.4GHz device, Low Threshold = 25 mw, High Threshold = 375mW

Duty cycle = On time / period

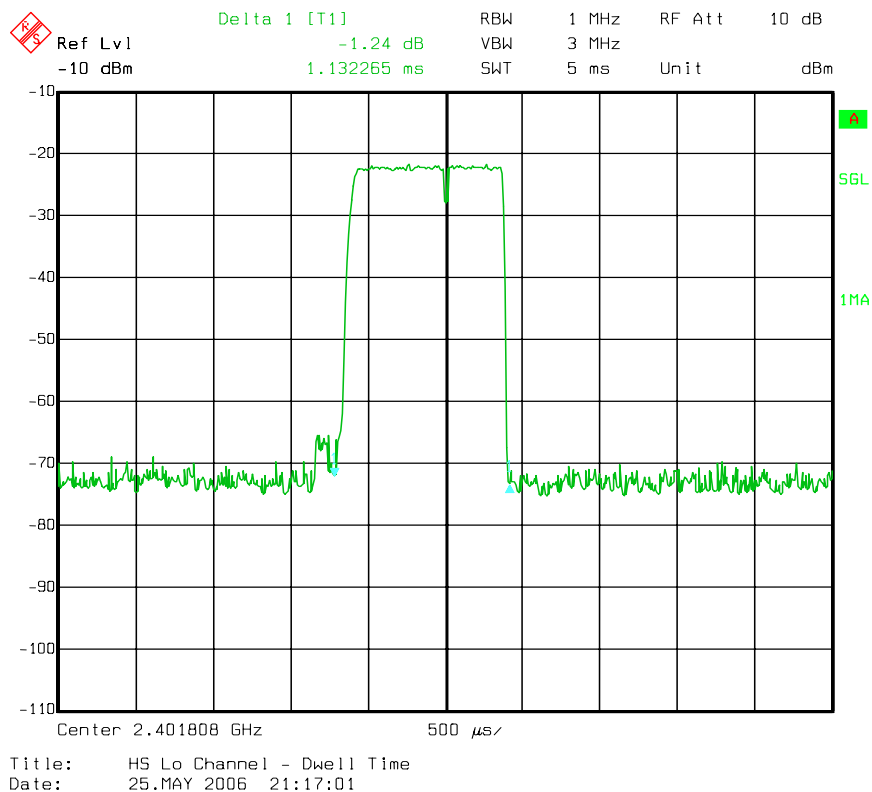
$$= 1.1323 \text{ ms} / 279.57 \text{ ms}$$
$$= 0.00405$$

EUT Average output power = Peak power \* Duty Cycle = 29.51 \* 0.00405 = 0.1195 mw.

Therefore, EUT is not subject to any SAR evaluation.



Plot showing period between each On time



Plot showing On time duration