

**Evaluation of the CSI Model DSP85-PSS8 BDA
For
Compliance with FCC Guidelines
For Human Exposure to Radio Frequency
Electromagnetic Fields**

July 30, 2009

General

The CSI Model DSP85-PSS8 Bi-directional amplifier is considered to be a “mobile” device operating in both the Specialized Mobile Service authorized under part 90. As such, the equipment is required to be evaluated for RF exposure if operated below 1.5 GHz with an effective radiated power (ERP) of 1.5 watts or more, as defined in 2.1091 of FCC rules.

Downlink

For the downlink portion of the Model DSP85-PSS8 BDA, the maximum rated output power is +30 dBm (1000 mW) in the SMR Band (<1.5 GHz). As stated in the Model DSP85-PSS8 Manual, the maximum authorized indoor antenna gain is 3 dBi, corresponding to a typical Omni-Directional antenna. The Table below shows the results of the calculated ERP, neglecting cable losses.

Frequency	Power Out	Ant Gain	EIRP	ERP	Limit
851-869 MHz	30 dBm	3 dBi	33 dBm	1212 mW	1.5 W

Since the calculated ERP of 1212 mW is less than the allowable limit of 1.5 W, this path is exempt from further analysis.

The Cautions in the Model DSP85-PSS8 manual clearly define the antenna selection and installation criteria in order to maintain a minimum 20-centimeter separation.

Uplink

For the uplink portion of the Model DSP85-PSS8 BDA, the maximum rated output power is +28dbm (630 mW) in the SMR Band (<1.5 GHz). As stated in the Model DSP85-PSS8 Manual, the maximum authorized outdoor antenna gain is 14 dBi, corresponding to a typical Multi-Element Yagi-Directional antenna. The Table below shows the results of the calculated ERP for both cases, neglecting cable losses.

Frequency	Power Out	Ant Gain	EIRP	ERP	Limit
806-824 MHz	28 dBm	14 dBi	42 dBm	9605 mW	1.5 W

As shown in the above table, the SMR band exceeds the allowable limit and must be evaluated for minimum separation distances in order to comply with the exposure limits of 1.1310 of the FCC rules.

Using the guidelines in FCC OET Bulletin 65 and Supplement C, the power density at a reasonable distance from the maximum gain antenna was calculated. The following assumptions are made concerning these calculations:

SMR Band
Po = 630 mw average
Cable Loss = 0 dB
Ant Gain = 14 dBi
Frequency = 815 MHz
Main Beam (worst-case)
Rooftop 100% reflection
Reasonable Distance = 4 feet (120 cm)

Therefore, from OET Bulletin 65,

$$S = (PG)/4\pi R^2 \quad \text{or} \quad S = \text{EIRP}/4\pi R^2$$

For 100% reflection, a doubling of the field strength can be expected. The above equation can be modified to,

$$S = (2)^2 PG/4\pi R^2 = \text{EIRP}/\pi R^2$$

Solving for S at a distance of 4 feet (120 cm) gives,

$$S = (630) (25) / \pi (120)^2 = \boxed{0.35 \text{ mw/cm}^2}$$

From FCC rules 1.1311, Table 1B, the allowable limit for uncontrolled exposure is $f(\text{MHz}) / 1500$. At 836.5 MHz this corresponds to a level of 0.54 mw/cm^2 .

The calculated value of 0.35 is below both the limit thereby showing compliance under worst-case operating conditions.

As in the case of the downlink, the Cautions in the Model DSP85-CP manual clearly define the antenna selection and installation criteria in order to maintain a conservative 4-foot separation.