Maximum Permissible Exposure Calculations

DAMM TETRA Base Stations BS421, BS411, BS412, BS414

Product: Document No.: 128948/5

Introduction

The European limits for maximum permissible exposure are defined in document 1995/519/EC, Council Recommandation of 12. July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz), Annex II, Table 1, of this document defines the basic restrictions. Annex III, Table 2, defines the reference levels of exposure. Meeting the reference levels ensures the meeting of the basic restrictions.

From table 2, in the frequency range from 10 to 400 MHz, the maximum power density(S) is 2 W/m². From 400 to 2000 MHz, the maximum power density is F/200 W/m², where (f) is the frequency. The DAMM TETRA Base Stations BS421,BS411, BS412 and BS414 transmits in the UHF band in different frequency bands.

Calculation of Safety Distance at MPE limit

$$S = \frac{PG}{4\pi R^2} \quad \text{or} \quad R = \sqrt{\frac{PG}{4\pi S}}$$

S= Power Density
P= (Power input to the antenna)
G= Power gain of the antenna in the direction of interest relative to an isotropic radiator
R= Distance to the centre of radiation of the antenna

BS421 10W 1 carriers Ptot= Carrier + 10log(N) +3 dB (ant.gain) = 20W
BS411 10W 8 carriers Ptot= Carrier + 10log(N) +3 dB (ant.gain) = 160W
BS411H 25W 8 carriers Ptot= Carrier + 10log(N) +3 dB (ant.gain) = 400W
BS412 7,5W 2 carriers Ptot= Carrier + 10log(N) +3 dB (ant.gain) = 30W
BS414 10W 4 carriers Ptot= Carrier + 10log(N) +3 dB (ant.gain) = 80W
BS414H 25W 4 carriers Ptot= Carrier + 10log(N) +3 dB (ant.gain) = 200W

Safety Distance from centre of radiation of the antenna (cm)

Freq. Band (MHz)	Table 2	Maximum power density S (mW/cm²)	BS421 Safety Distance 1 Ch.	BS411 Safety Distance 8 Ch.	BS411H Safety Distance 8 Ch.	BS414 Safety Distance 4 Ch.	BS414H Safety Distance 4 Ch.	BS412 Safety Distance 2 Ch.
336 – 346	2/10	0,2	89,21	252,31	398,94	178,41	282,10	109,26
360 – 370	2/10	0,2	89,21	252,31	398,94	178,41	282,10	109,26
390 – 400	2/10	0,2	89,21	252,31	398,94	178,41	282,10	109,26
420 – 430	(f/200)/10	0,2125	86,54	244,78	387,03	173,09	273,67	105,99
460 – 470	(f/200)/10	0,2325	82,74	234,02	370,01	165,47	261,64	101,33
850 – 870	(f/200)/10	0,43	60,84	172,08	272,08	121,68	192,39	74,51

Council Recommandation 1995/519/EC
Relevant Standard EN50385:2002

Date: 2011-10-06

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