RF Exposure Requirements - MPE

Project #:	**G101207197**	Test Area:	Intertek Louisville
Test Method:	FCC CFR47 Part 1.1310	Test Date:	09/25/2013
EUT Model #:	M9		
EUT Serial #:	FCC1		
Manufacturer:	GE Analytical		
EUT Description:	TOC Analyzer		
Notes:	13.56MHz RFID Reader		

The following limit is from table 1 (B) Limits for General Population/Uncontrolled Exposure in FCC part 1.1310:

Power Density Limit for 13.56MHz: 180/f^2(mW/cm2) = 180/183.874 = 0.979 mW/cm^2

The following calculation was used to determine compliance to the above limit. The calculation is from FCC OET bulletin 65.

Power Density(S) =PG/4πR^2 or S=EIRP/4πR^2

Where:
S = power density (in appropriate units, e.g. mW/cm^2)
P = power input to the antenna (mW).
G = numeric 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 (cm)

In this case, 20cm will be used.
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13.56MHz RFID Radio

Maximum measured radiated field strength at 3-meters = 49.01 dBuV/m

Maximum typical gain declared by the manufacture = +1.0 dBi = 1.26 (numeric gain)

Production Tolerance declared = +/- 1.85dB

Calculated power input to the antenna = Measured Field Strength – Antenna Gain + Production Tolerance

49.01 dBuV/m – (+1.0dBi) + 1.85dB = 49.86 dBuV/m = EIRP -45.37dBm = 0.00002905 mW

Power Density

Power (mW)	Gain (dbi)	Gain numeric	Distance (cm)	Power Density (mW/cm^2)
0.00002905	+1.0	1.26	20	0.00000000728

Therefore: Power Density Margin (Δ Limit) = 0.00000000728 – 0.979 = -0.978999993 mW/cm^2

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Reference Conversion Equations:

1. Gain numeric = $10^{(dBi/10)}$

2. Gain (dBi) = 10 log(Gain numeric)

3. dBm to Watts (W) = $10^{((dBm - 30)/10)}$

5. E (dBuV/m) = EIRP (dBm) – 20log D + 104.8