MAXIMUM LINEAR GAIN DETERMINATION USING MPE

Re-arrange the formula of Power Density in terms of maximum gain,

It yields,

$G = S*(4\pi*R^2) - P$

Where,

S = F/1500 mW/cm2 (300-1500Mhz) or 1.0 mW/cm2 (1.5GHz-100GHz)

P = Conducted Output Power Measured at Antenna Port with respect to applied band.

G = Maximum Linear Gain

R = 20cm

Maximum Linear Gain Determination using ERP/EIRP
As per 27.50 (d)(4) ERP/EIRP is limited as 1W for LTE Band4.
As per 27.50 (b)(9) ERP/EIRP is limited as 30W for LTE Band13.
As per 90.542 (a)(6) ERP/EIRP is limited as 30W for LTE Band14.

Maximum allowable gain that complies with them can be obtained by the following relationship.

EIRP/ERP = Maximum Allowable Gain + Maximum Burst Power as measured at antenna terminal
Re-arrange the above equation in terms of Maximum Allowable Gain, *It yields,*

Maximum Allowable Gain = EIRP/ERP – Maximum Burst Power as measured at antenna terminal

Maximum Source-based Time Average power for LTE mode:
Refer to report No.: ER-2015-40058 page 19, 23.99dBm for LTE Band 4
Refer to report No.: ER-2015-40058 page 20, 23.81dBm for LTE Band 13 at 748.5MHz
Refer to report No.: ER-2015-400183 page 16, 23.50dBm for LTE Band14 at 790.5MHz

THE COMPUTATION OF MAXIMUM ALLOWABLE LINEAR GAIN USING MPE LIMIT

Operation in LTE Band 4 (1710.0 – 1755.0MHz)
Given the maximum source-based time-averaged power as 23.99dBm, and MPE limit as 1.0mW/cm^2.
Therefore, antenna gain is calculated as 13.02dBi

Operation in LTE Band 13 (777.0 – 787.0MHz)
Given the maximum source-based time-averaged power as 23.81dBm, and MPE limit as 0.499 mW/cm2.

Therefore, antenna gain is calculated as 10.18dBi

Operation in LTE Band 14 (788.0-798.0MHz)

Given the maximum source-based time-averaged power as 23.44dBm, and MPE limit as 0.527 mW/cm2.

Therefore, antenna gain is calculated as 10.79dBi

THE COMPUTATION OF MAXIMUM ALLOWABLE LINEAR GAIN USING ERP/EIRP LIMIT

Operation in LTE Band 4 (1710.0 – 1755.0MHz)

Given the maximum source-based time-averaged power as 23.99dBm, and EIRP limit as 1W
Therefore, antenna gain is calculated as 6.01dBi

Operation in LTE Band 13 (777.0 – 787.0MHz)

Given the maximum source-based time-averaged power as 23.81dBm, and ERP limit as 30W.

Therefore, antenna gain is calculated as 20.96dBi

Operation in LTE Band 14 (788.0-798.0MHz)

Given the maximum source-based time-averaged power as 23.44dBm, and ERP limit as 30W.

Therefore, antenna gain is calculated as 21.33dBi