BRYANT SOLUTIONS®
RF ENGINEERING & TRAINING SERVICES

APPLICATION NOTE

OTA Mexico Border Measurements

OVER-THE-AIR MEASUREMENTS	Mexico border U.S. carrier power flux density and mobile RSRP pass/fail levels. Measurements should be performed on ALL pertinent carriers in the lower and upper 700 MHz bands.
PSD MOBILE PASS/FAIL LEVEL (COMPOSITE OF ALL CARRIERS)	RSRP = -102.6 dBm/0.015 MHz + $10\text{Log}_{10}(1/0.015)$ = -102.6 dBm/0.015 MHz + 18.2 dB = -84.4 dBm/MHz
PFD PASS/FAIL LEVEL (COMPOSITE OF ALL CARRIERS)	-96 dBW/m^2/MHz = -66 dBm/m^2/MHz OTA measurements will typically be in dBμV/m and need to be converted.
IMPORTANT CARRIER SETTINGS	Use lowest frequency/band/measurement. Pertinent sites/carriers should be at design power (using AILG or OCNS).
IMPORTANT CONVERTIONS	dBm = dBW + 30 dB dBμV = dBm + 107.0 dB (where Z = 50 Ω and bandwidths are equal.) dBμV = dBm + 115.8 dB (where Z = 120π ≈ 377 Ω and bandwidths are equal.)

FIELD STRENGTH MEASUREMENTS

$$\text{P(mW/m}^2) = \left\{\frac{(\text{E}10^{-6})^2}{\text{Z}}\right\}1000 = \frac{\text{V}^2 10^{-12} 10^3}{\text{Z}} = \frac{\text{V}^2 10^{-9}}{\text{Z}} \text{ where E} = \frac{\mu\text{V}}{\text{m}} \text{ and Z} = 377\ \Omega$$

$$\text{P(dBm/m}^2) = 10\text{Log}_{10}\text{E}^2 + 10\text{Log}_{10}10^{-9} - 10\text{Log}_{10}\text{Z} + 10\text{Log}_{10}\frac{1}{\text{RBW}} \text{ where RBW = MHz}$$

$$\text{P(dBW/m}^2) = 10\text{Log}_{10}\text{E}^2 + 10\text{Log}_{10}10^{-12} - 10\text{Log}_{10}\text{Z} + 10\text{Log}_{10}\frac{1}{\text{RBW}}$$

OTA FIELD SETTINGS			CALCULATIONS	
dBμV/m	μV/m	Integrated BW (MHz)	dBm/m^2/MHz	dBW/m^2/MHz
46.8	218.8	0.5	-66	-96

MOBILE RSRP MEASUREMENTS

$\text{P(dBm)} = 10\text{Log}_{10}\text{E}^2 - 10\text{Log}_{10}\text{f}^2 - 77$, where E = μV/m and f = MHz

$$\text{P(dBm)} + 77 = 10\text{Log}_{10}\left(\frac{\text{E}}{\text{f}}\right)^2 = 10\text{Log}_{10}\left(\frac{\text{E}}{\text{f}}\right)$$

$$\frac{\text{P(dBm)} + 77}{20} = \text{Log}_{10}\left(\frac{\text{E}}{\text{f}}\right)$$

$$\text{E} = \text{f}10^{\frac{\text{P(dBm)}+77}{20}}$$

OTA FIELD SETTINGS				CALCULATIONS	
P(dBm)/0.015 MHz	P(dBm)/MHz	f (MHz)	μV/m	dBm/m^2/MHz	dBW/m^2/MHz
-102.6	-84.4	734	314.5	-66	-96

