This filing is for the Vanguard 3G cellular/WIFI mobile broadband router FCC ID: EOT14071R2 consisting of embedded WIFI DTS transmitter and pre-existing licensed WWAN modular transmitter. The Vanguard 3G can only be configured with one of the following pre-existing certified WWAN modules

- GSM FCC ID: N7NMC8790
- GSM2 FCC ID: N7NMC8775
- CDMA FCC ID: N7N-MC5727

Item 7 of KDB 447498 has been addressed in this MPE exhibit.

As explained on page 13 of the user manual the closest separation distance between WIFI and WWAN co-transmitting antennas and the minimum separation distance between transmitting antennas from all persons is 20 cm.

The MPE compliance boundary has been assessed for all possible combinations of WIFI/WWAN co-transmitting antennas as follow:

FCC ID: EOT14071R2 (2.4 GHz) + GSM FCC ID: N7NMC8790 (800 MHz CELL)
FCC ID: EOT14071R2 (2.4 GHz) + GSM FCC ID: N7NMC8790 (1900 MHz PCS)
FCC ID: EOT14071R2 (2.4 GHz) + GSM2 FCC ID: N7NMC8775 (800 MHz CELL)
FCC ID: EOT14071R2 (2.4 GHz) + GSM2 FCC ID: N7NMC8775 (1900 MHz PCS)
FCC ID: EOT14071R2 (2.4 GHz) CDMA FCC ID: N7N-MC5727 (800 MHz CELL)
FCC ID: EOT14071R2 (2.4 GHz) CDMA FCC ID: N7N-MC5727 (1900 MHz CELL)

For RF exposure purposes the average conducted output power was measured using FCC DTS Power Option 2.

Spectrum analyzer settings:
RBW = 1 MHz, VBW = 3 MHz, Sample detector, Power average of 100 sweeps. Power was calculated over 26 dB EBW

WIFI Average Conducted Output Power

Mode	Frequency, MHz	Output Power, dBm	Output Power, mW
802.11b	2412	20.18	0.1042
	2437	20.93	0.1239
	2462	**21.65**	**0.1462**
802.11g	2412	17.83	0.0607
	2437	18.71	0.0743
	2462	18.27	0.0671

WiFi MPE Calculation FCC ID: EOT14071R2

Prediction of MPE limit at a given distance

Equation from

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density
P = power input to the antenna
G = power gain of the antenna in the direction of interest relative to isotropic
R = distance to the center of radiation of the antenna

	WiFi	
	WiFi	
Maximum peak output power at antenna input terminal:	21.65	(dBm)
Maximum peak output power at antenna input terminal:	146.2	(mW)
Antenna gain(typical):	5.5	(dBi)
Maximum antenna gain:	3.548	(numeric)
Prediction distance:	20	(cm)
Sourse Based Time Average Duty Cycle:	100	(%)
Prediction frequency:	2450	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1.0	(mW/cm^2)
Power density at prediction frequency:	0.103	(mW/cm^2)
Power density at prediction frequency:	1.032	(W/m^2)
Margin of Compliance:	9.86	(dB)

GSM MPE Calculation FCCID: N7NMC8790 Module

		CELL			PCS	
Power		31.83	(dBm)		28.71	(dBm)
Power		1524	(mW)		743	(mW)
Antenna gain		5	(dBi)		4	(dBi)
Antenna gain		3.162	(numeric)		2.512	(numeric)
Distance		20	(cm)		20	(cm)
Duty Cycle		50	(%)		100	(%)
Frequency		824	(MHz)		1900	(MHz)
MPE Limit		0.549	(mW/cm^2)		1	(mW/cm^2)
Power density		0.479	(mW/cm^2)		0.371	(mW/cm^2)
Margin		0.59	(dB)		4.30	(dB)
EIRP		33.82	(dBm)		32.71	(dBm)
ERP		31.68	(dBm)		30.57	(dBm)
ERP		1.472	(W)		1.140	(W)
Limit		1.5	(W)		3	(W)
Margin		0.081	(dB)		4.20	(dB)

Power density calculated using OET Bulletin 65 equation 3: GP/4piR^2
Power density limits: 1.1310 (B) Limits for General Population/Uncontrolled Exposure
ERP limits: 2.1091 2.1091 Radiofrequency radiation exposure evaluation: mobile devices

GSM2 MPE Calculation FCCID: N7NMC8775 Module

		CELL			PCS	
1		CELL			PCS	
2	Power	31.96	(dBm)		26.70	(dBm)
3	Power	1570	(mW)		468	(mW)
4	Antenna gain	5	(dBi)		4	(dBi)
5	Antenna gain	3.162	(numeric)		2.512	(numeric)
6	Distance	20	(cm)		20	(cm)
7	Duty Cycle	25	(%)		100	(%)
8	Frequency	824	(MHz)		1900	(MHz)
9	MPE Limit	0.549	(mW/cm^2)		1	(mW/cm^2)
10	Power density	0.247	(mW/cm^2)		0.234	(mW/cm^2)
11	Margin	3.47	(dB)		6.31	(dB)
12						
13	EIRP	30.94	(dBm)		30.70	(dBm)
14	ERP	28.80	(dBm)		28.56	(dBm)
15	ERP	0.759	(W)		0.718	(W)
16	Limit	1.5	(W)		3	(W)
17	Margin	2.961	(dB)		6.21	(dB)
18						
19	Power density calculated using OET Bulletin 65 equation 3: GP/4piR^2
20	Power density limits: 1.1310 (B) Limits for General Population/Uncontrolled Exposure
21	ERP limits: 2.1091 2.1091 Radiofrequency radiation exposure evaluation: mobile devices
22						

CDMA MPE Calculation FCC ID: N7N-MC5727 Module

		CELL			PCS	
	Power	25.13	(dBm)		24.84	(dBm)
	Power	326	(mW)		305	(mW)
	Antenna Gain	5.1	(dBi)		4.15	(dBi)
	Antenna Gain	3.236	(numeric)		2.600	(numeric)
	Distance	20	(cm)		20	(cm)
	Duty Cycle	100	(%)		100	(%)
	Frequency	824	(MHz)		1900	(MHz)
	MPE limit	0.549	(mW/cm^2)		1.000	(mW/cm^2)
	Power density	0.210	(mW/cm^2)		0.158	(mW/cm^2)
	Margin	4.18	(dB)		8.02	(dB)
	EIRP	30.23	(dBm)		28.99	(dBm)
	ERP	28.09	(dBm)		26.85	(dBm)
	ERP	0.644	(W)		0.484	(W)
	Limit	1.5	(W)		3	(W)
	Margin	3.67	(dB)		7.92	(dB)

Power density calculated using OET Bulletin 65 equation 3: GP/4piR^2
Power density limits: 1.1310 (B) Limits for General Population/Uncontrolled Exposure
ERP limits: 2.1091 2.1091 Radiofrequency radiation exposure evaluation: mobile devices

Fractional MPE Calculation

	WiFi	GSM-CELL	
Power Densty (mW/cm^2)	0.103	0.479	
Power Density Limit (mW/cm^2)	1	0.549	Total
Fractional Power Density (%)	0.103	0.873	0.976
	WiFi	GSM-PCS	
Power Densty (mW/cm^2)	0.103	0.371	
Power Density Limit (mW/cm^2)	1	1.000	Total
Fractional Power Density (%)	0.103	0.371	0.475
	WiFi	GSM2-CELL	
Power Densty (mW/cm^2)	0.103	0.247	
Power Density Limit (mW/cm^2)	1	0.549	Total
Fractional Power Density (%)	0.103	0.450	0.553
	WiFi	GSM2-PCS	
Power Densty (mW/cm^2)	0.103	0.234	
Power Density Limit (mW/cm^2)	1	1.000	Total
Fractional Power Density (%)	0.103	0.234	0.337
	WiFi	CDMA-CELL	
Power Densty (mW/cm^2)	0.103	0.210	
Power Density Limit (mW/cm^2)	1	0.549	Total
Fractional Power Density (%)	0.103	0.382	0.485
	WiFi	CDMA-PCS	
Power Densty (mW/cm^2)	0.103	0.158	
Power Density Limit (mW/cm^2)	1	1.000	Total
Fractional Power Density (%)	0.103	0.158	0.261

MPE Contour WiFi -GSM-CELL
WiFi FCC ID: EOT14071R2 and GSM Module FCCID: N7NMC8790

	A	B	C	D	E	F	G	H	I	J
1	Antenna No.		Total	1	2	3	4	5	6	
2	Tx Status			On	Off	Off	On	Off	Off	
3	Frequency	MHz		824	1850	1900	2450	2450	5800	
4	MPE Limit	mW/cm^2		0.55	0.00	0.00	1.00	0.00	0.00	
5	Max % MPE	%	95.5	87.3	0.0	0.0	10.3	0.0	0.0	
6	Power	(W)	0.908	0.762	0.000	0.000	0.146	0.000	0.000	
7	Antenna Gain	dBi		5.00	0.00	0.00	5.50	0.00	0.00	
8	EIRP	(W)	2.93	2.410	0.000	0.000	0.519	0.000	0.000	
9	X	(cm)		-10.0	0.0	0.0	10.0	0.0	0.0	
10	Y	(cm)		0.0	0.0	0.0	0.0	0.0	0.0	
11	Sector			FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
12	Arc			FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
13	θ_1		input	-120	-120	-120	-120	-120	-120	
14	θ_2	degs		60	60	60	60	60	60	
15	θ_1		actual	-120	-120	-120	-120	-120	-120	
16	θ_2			60	60	60	60	60	60	
17		-45	-44	-43	-42	-41	-40	-39	-38	-3

% MPE Contour

Note: The 0% contour surrounding the antennas identifies a 20 cm perimeter surrounding all active antennas
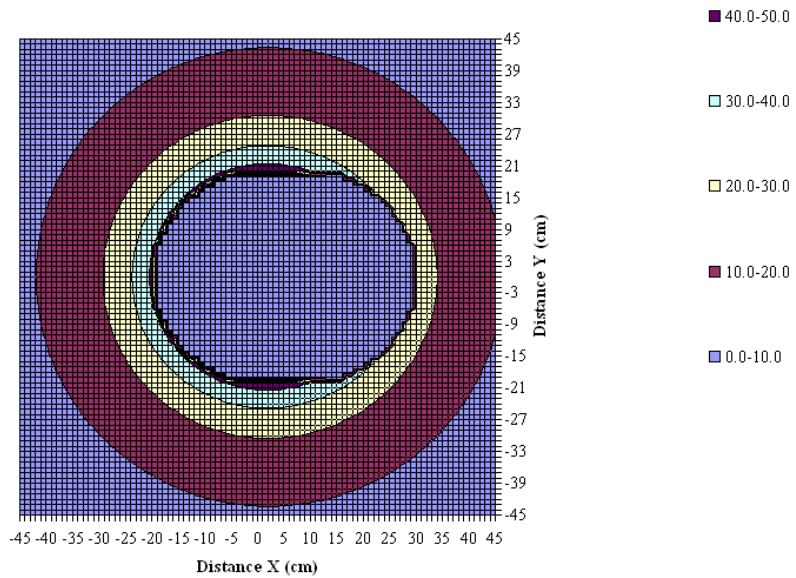

- ■ 80.0-100.0
- □ 60.0-80.0
- □ 40.0-60.0
- ■ 20.0-40.0
- ■ 0.0-20.0
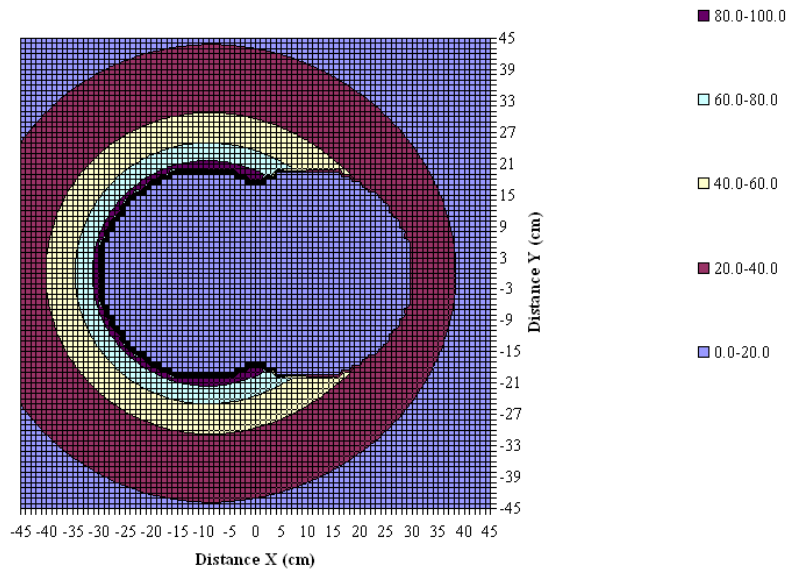
MPE Contour WiFi-GSM-PCS
WiFi FCC ID: EOT14071R2 and GSM Module FCCID: N7NMC8790

	A	B	C	D	E	F	G	H	I
1	Antenna No.		Total	1	2	3	4	5	6
2	Tx Status			Off	Off	On	On	Off	Off
3	Frequency	MHz		824	1850	1900	2450	2450	5800
4	MPE Limit	mW/cm^2		0.00	0.00	1.00	1.00	0.00	0.00
5	Max % MPE	%	45.7	0.0	0.0	37.1	10.3	0.0	0.0
6	Power	(W)	0.889	0.000	0.000	0.743	0.146	0.000	0.000
7	Antenna Gain	dBi		0.00	0.00	4.00	5.50	0.00	0.00
8	EIRP	(W)	2.39	0.000	0.000	1.866	0.519	0.000	0.000
9	X	(cm)		-10.0	0.0	0.0	10.0	0.0	0.0
10	Y	(cm)		0.0	0.0	0.0	0.0	0.0	0.0
11	Sector			FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
12	Arc			FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
13	θ_1		input	-120	-120	-120	-120	-120	-120
14	θ_2	degs		60	60	60	60	60	60
15	θ_1		actual	-120	-120	-120	-120	-120	-120
16	θ_2			60	60	60	60	60	60
17		-45	-44	-43	-42	-41	-40	-39	-38

% MPE Contour

Note: The 0% contour surrounding the antennas identifies a 20 cm perimeter surrounding all active antennas


Legend:
- 40.0-50.0
- 30.0-40.0
- 20.0-30.0
- 10.0-20.0
- 0.0-10.0

Distance Y (cm)

Distance X (cm)

MPE Contour WiFi –GSM2-CELL
WiFi FCC ID: EOT14071R2 and GSM2 Module FCCID: N7NMC8775

	A	B	C	D	E	F	G	H	I	
	Antenna No.		Total	1	2	3	4	5	6	
	Tx Status			On	Off	Off	On	Off	Off	
	Frequency	MHz		824	1850	1900	2450	2450	5800	
	MPE Limit	mW/cm²		0.55	0.00	0.00	1.00	0.00	0.00	
	Max % MPE	%	53.7	45.0	0.0	0.0	10.3	0.0	0.0	
	Power	(W)	0.539	0.393	0.000	0.000	0.146	0.000	0.000	
	Antenna Gain	dBi		5.00	0.00	0.00	5.50	0.00	0.00	
	EIRP	(W)	1.76	1.241	0.000	0.000	0.519	0.000	0.000	
	X	(cm)		-10.0	0.0	0.0	10.0	0.0	0.0	
	Y	(cm)		0.0	0.0	0.0	0.0	0.0	0.0	
	Sector			FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
	Arc			FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
	θ_1		input	-120	-120	-120	-120	-120	-120	
	θ_2	degs		60	60	60	60	60	60	
	θ_1		actual	-120	-120	-120	-120	-120	-120	
	θ_2			60	60	60	60	60	60	
		-45	-44	-43	-42	-41	-40	-39	-38	

% MPE Contour

Note: The 0% contour surrounding the antennas identifies a 20 cm perimeter surrounding all active antennas
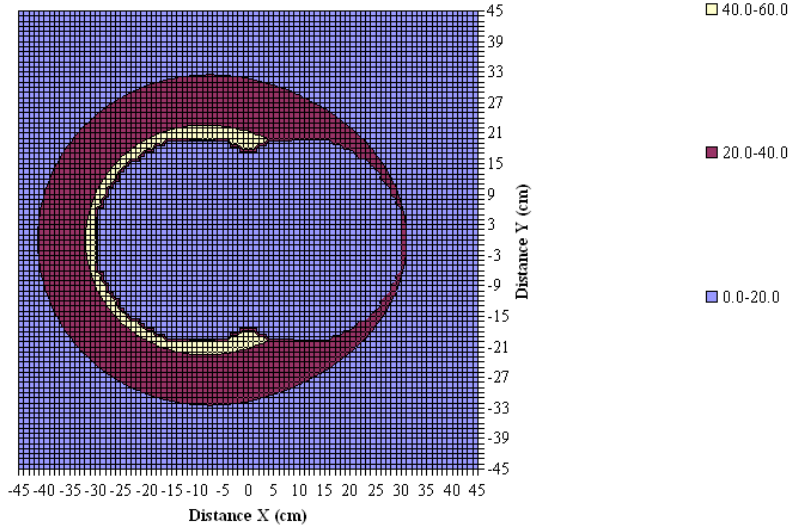
MPE Contour WiFi-GSM2-PCS
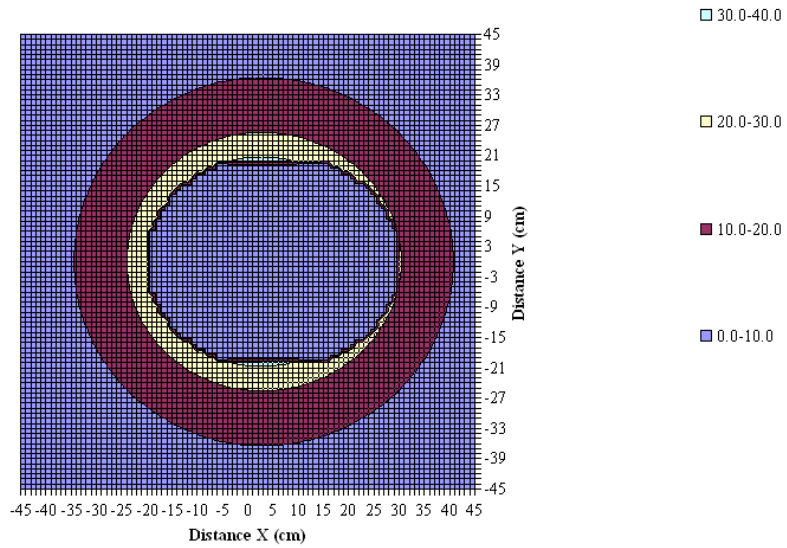## WiFi FCC ID: EOT14071R2 and GSM Module FCCID: N7NMC8775

	A	B	C	D	E	F	G	H	I
1	Antenna No.		Total	1	2	3	4	5	6
2	Tx Status			Off	Off	On	On	Off	Off
3	Frequency	MHz		824	1850	1900	2450	2450	5800
4	MPE Limit	mW/cm²		0.00	0.00	1.00	1.00	0.00	0.00
5	Max % MPE	%	32.1	0.0	0.0	23.4	10.3	0.0	0.0
6	Power	(W)	0.614	0.000	0.000	0.468	0.146	0.000	0.000
7	Antenna Gain	dBi		0.00	0.00	4.00	5.50	0.00	0.00
8	EIRP	(W)	1.69	0.000	0.000	1.176	0.519	0.000	0.000
9	X	(cm)		-10.0	0.0	0.0	10.0	0.0	0.0
10	Y	(cm)		0.0	0.0	0.0	0.0	0.0	0.0
11	Sector			FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
12	Arc			FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
13	θ_1		input	-120	-120	-120	-120	-120	-120
14	θ_2	degs		60	60	60	60	60	60
15	θ_1		actual	-120	-120	-120	-120	-120	-120
16	θ_2			60	60	60	60	60	60
17		-45	-44	-43	-42	-41	-40	-39	-38

% MPE Contour

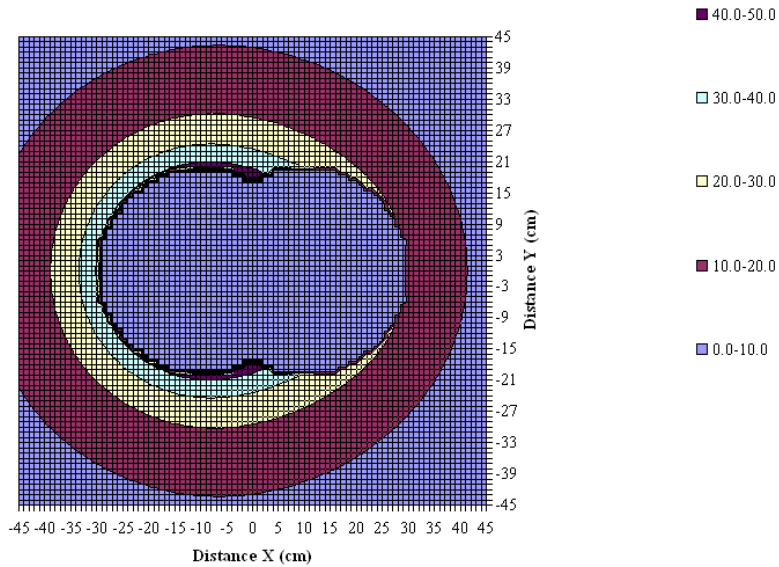Note: The 0% contour surrounding the antennas identifies a 20 cm perimeter surrounding all active antennas

Legend:
- □ 30.0-40.0
- □ 20.0-30.0
- ■ 10.0-20.0
- ■ 0.0-10.0

Distance Y (cm)

Distance X (cm)

MPE Contour WiFi-CDMA-CELL
WiFi FCC ID: EOT14071R2 and CDMA Module N7N-MC5727

	A	B	C	D	E	F	G	H	I	J
1	Antenna No.		Total	1	2	3	4	5	6	
2	Tx Status			On	Off	Off	On	Off	Off	
3	Frequency	MHz		824	1850	1900	2450	2450	5800	
4	MPE Limit	mW/cm^2		0.55	0.00	0.00	1.00	0.00	0.00	
5	Max % MPE	%	47.0	38.2	0.0	0.0	10.3	0.0	0.0	
6	Power	(W)	0.472	0.326	0.000	0.000	0.146	0.000	0.000	
7	Antenna Gain	dBi		5.10	0.00	0.00	5.50	0.00	0.00	
8	EIRP	(W)	1.57	1.055	0.000	0.000	0.519	0.000	0.000	
9	X	(cm)		-10.0	0.0	0.0	10.0	0.0	0.0	
10	Y	(cm)		0.0	0.0	0.0	0.0	0.0	0.0	
11	Sector			FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
12	Arc			FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
13	θ_1		input	-120	-120	-120	-120	-120	-120	
14	θ_2	degs		60	60	60	60	60	60	
15	θ_1		actual	-120	-120	-120	-120	-120	-120	
16	θ_2			60	60	60	60	60	60	
17		-45	-44	-43	-42	-41	-40	-39	-38	-37

% MPE Contour

Note: The 0% contour surrounding the antennas identifies a 20 cm perimeter surrounding all active antennas

40.0-50.0
30.0-40.0
20.0-30.0
10.0-20.0
0.0-10.0

MPE Contour WiFi-CDMA-PCS
WiFi FCC ID: EOT14071R2 and CDMA Module N7N-MC5727

	A	B	C	D	E	F	G	H	I	J
	Antenna No.		Total	1	2	3	4	5	6	
2	Tx Status			Off	Off	On	On	Off	Off	
3	Frequency	MHz		824	1850	1900	2450	2450	5800	
4	MPE Limit	mW/cm^2		0.00	0.00	1.00	1.00	0.00	0.00	
5	Max % MPE	%	24.6	0.0	0.0	15.8	10.3	0.0	0.0	
6	Power	(W)	0.451	0.000	0.000	0.305	0.146	0.000	0.000	
7	Antenna Gain	dBi		0.00	0.00	4.15	5.50	0.00	0.00	
8	EIRP	(W)	1.31	0.000	0.000	0.793	0.519	0.000	0.000	
9	X	(cm)		-10.0	0.0	0.0	10.0	0.0	0.0	
10	Y	(cm)		0.0	0.0	0.0	0.0	0.0	0.0	
11	Sector			FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
12	Arc			FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
13	θ_1		input	-120	-120	-120	-120	-120	-120	
14	θ_2	degs		60	60	60	60	60	60	
15	θ_1		actual	-120	-120	-120	-120	-120	-120	
16	θ_2			60	60	60	60	60	60	
17		-45	-44	-43	-42	-41	-40	-39	-38	-3

Note: The 0% contour surrounding the antennas identifies a 20 cm perimeter surrounding all active antennas

% MPE Contour

Legend:
- 20.0-25.0
- 15.0-20.0
- 10.0-15.0
- 5.0-10.0
- 0.0-5.0