

**ANALYSIS RECORD**

<b>Test/Analysis Report:</b> 7220-0012-00	<b>Rev:</b> A
<b>Product:</b> Hub and Remote TRAs	
<b>Configuration:</b> See Table 1	
<b>Specification:</b> IEEE C95.1-1991	
<b>Test / Analysis Date:</b> Sept 8, 1999	
<b>Engineer:</b> Jay McCandless	
<b>Cognizant Engineer:</b> Tom Mehrkens	
<b>Pass / Fail:</b> PASS	
<b>Notice of other test findings:</b>	

**1.0 Introduction****1.1 Scope:**

This report describes the analysis used and the results to determine conformance or non-conformance with IEEE C95.1-1991 (IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields 3 kHz to 300 GHz, which states that the maximum safe power density applied to the human body from 15 to 300 GHz is 10 mW / cm squared averaged over 6 minutes at 15 GHz and 1.8 minutes at 40.

**1.2 Purpose:**

As long as Wavtrace can show that the worse case maximum power density possible to apply to the body is less than 10mW/cm than no further action is required.

**2.0 Analysis:****2.1 Background**

Our worst case power density applied to the human body analysis has the following assumptions:

- A human eye is applied to the radiating aperture, either the center of the horn for the hub TRA, or the center of the dish for the remote TRA.



- The power density is constant over long periods of time >1.8 minutes. However, since we are transmitting only half the time the power density is ½ the transmitted power.
- The transmitted power is reduced by 0.5 dB due to losses in the waveguide bend and radiating aperture.
- In most cases the aperture has a power taper across it, so the peak power is greater than the average power by 2 dB ( $10\log\pi/2$ ) for each plane that has a taper.
- With the above caveats, the power density is calculated by dividing the radiated power by the area of the radiating aperture.

## 2.2 Analysis Chart (Table 1)

TRA Configuration / Assembly #	Antenna / Assembly #	Radiating Aperture Size (cm squared)	Transmit Power for: 4 QAM 16 QAM 64 QAM (dBm)	E plane taper gain (dB)	H plane taper gain (dB)	Time averaging + Insertion loss (3.5 dB)	Peak Radiated Power (mW)	Worst Case Power Density (mW/cm squared)	Verdict
ASSY, HUB TRA, 30 DEG VPOL, HG, 38 GHz / #2000-0106-01	2000-0004-04	12.19	13	0	2	-3.5	14.13	1.16	SAFE
			10				7.079458	0.58	SAFE
			7				3.548134	0.29	SAFE
ASSY, HUB TRA, 30 DEG HPOL, HG, 38 GHz / #2000-0104-01	2000-0017-02	12.19	13	2	2	-3.5	22.39	1.84	SAFE
			10				11.22018	0.92	SAFE
			7				5.623413	0.46	SAFE
ASSY, HUB TRA, 30 DEG VPOL, HG, 31 GHz / #2000-0174-00	2000-0014-00	20.080605	13	0	2	-3.5	14.13	0.70	SAFE
			10				7.079458	0.35	SAFE
			7				3.548134	0.18	SAFE
ASSY, HUB TRA, 30 DEG HPOL, HG, 31 GHz / #2000-0172-00	2000-0122-00	20.080605	13	2	2	-3.5	22.39	1.11	SAFE
			10				11.22018	0.56	SAFE
			7				5.623413	0.28	SAFE
ASSY, HUB TRA, 30 DEG VPOL, HG, 28 GHz / #2000-0110-01	2000-0014-00	20.080605	13	0	2	-3.5	14.13	0.70	SAFE
			10				7.079458	0.35	SAFE
			7				3.548134	0.18	SAFE
ASSY, HUB TRA, 30 DEG HPOL, HG, 28 GHz / #2000-0108-01	2000-0122-00	20.080605	13	2	2	-3.5	22.39	1.11	SAFE
			10				11.22018	0.56	SAFE
			7				5.623413	0.28	SAFE
ASSY, REMOTE TRA, VPOL & HPOL, 38 GHz / #2000-0046-00 & #2000-0047-00	6585-0004-00	558.65	13	2	2	-3.5	22.39	0.04	SAFE
			10				11.22018	0.02	SAFE
			7				5.623413	0.01	SAFE
ASSY, REMOTE TRA, VPOL & HPOL, 31 GHz / #2000-0118-00 & #2000-0119-00	6585-0003-00	558.65	13	2	2	-3.5	22.39	0.04	SAFE
			10				11.22018	0.02	SAFE
			7				5.623413	0.01	SAFE
ASSY, REMOTE TRA, VPOL & HPOL, 28 GHz / #2000-0048-00 & #2000-0049-00	6585-0003-00	558.65	13	2	2	-3.5	22.39	0.04	SAFE
			10				11.22018	0.02	SAFE
			7				5.623413	0.01	SAFE

## 3.0 Results/Recommendations

The results show that all present TRA configurations are safe.