

Test Report
For
Kenton Electronics
Vest Transceiver
FCC ID: S8ZKEN-TON-TR1000

DUT: Lasertron Laser Tag Vest

Test Date: 11-April-2005

Manufacturer: Kenton Electronics
187 Green Acres Road
Tonawanda, NY 14150
(972) 234-5000

Conducted by: Control Design & Testing, Inc.
6010 Red Fox Drive
Spotsylvania, VA 22553
(540) 582-2826

CD&T

FCC ID: S8ZKEN-TON-TR1000

A. DEVICE UNDER TEST

The product is body worn vest that is used as part of an arena game known as Laser Tag. The vest incorporates a transceiver that communicates with a ceiling mounted base station where scorekeeping and other functions are performed. This a commercial device used in facilities specially designed as Laser Tag arenas and will not transmit unless initialized by the base station. The product is designed to operate under the provisions of Part 15.249 of the FCC rules.

The device consists of five printed circuit assemblies housed in four plastic enclosures (2 large enclosures mounted on the front and back and 2 smaller enclosures mounted on the shoulders). The enclosures are attached to the fabric material with plastic snaps. The four assemblies are connected by a wire harness terminated in header connectors. Power is provided by a 4.8 volt rechargeable battery pack. The product incorporates a mechanical disconnect in the charging jack to disable the circuitry while charging.

The transmit frequency is 916.500 MHz., nominal. The modulation is on/off pulse keying using an NRZ data format. The transceiver circuit is contained on a single printed circuit board mounted in a plastic sub-enclosure inside one of the larger main enclosures. The rf section is regulated at 3.3 volts and consists of an RF Monolithics TR1000L transmitter hybrid IC, a two element antenna matching network and a custom patch antenna. The antenna is soldered directly to the transceiver board at eight points. There is no provision to connect an external antenna.

The receiver section of this device is a sequenced TRF, clocked at approximately 745 kHz., and does not have a local oscillator.

B. MEASUREMENT PROCEDURE: RADIATED EMISSIONS

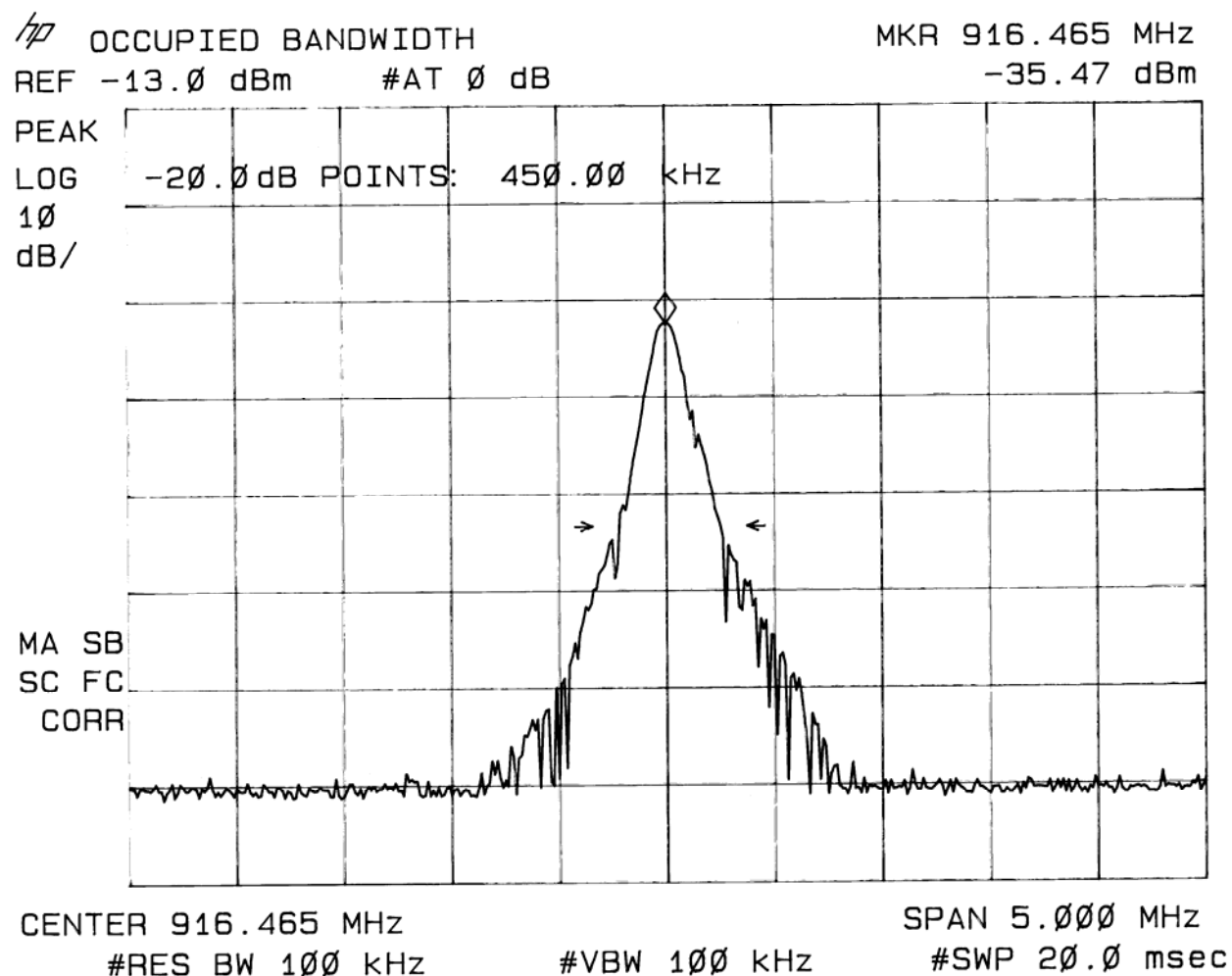
Testing of this device was conducted at the Carl T. Jones test facility located in Springfield, Virginia. FCC Site #90490, IC #3101

The highest clock frequency in this product is 3.68 Mhz. The device, as tested in the receive mode, was scanned from 30 MHz. to 1 GHz. The emissions detected in the this mode were determined not to be related to the transceiver circuit but were being generated by the processing circuit on the second main board. These emissions appeared to be identical in both transmit and receive and are listed in Table 1 below.

Transmitter field strength measurements were conducted according to the procedures set forth in ANSI C63.4 (1992). The device under test was placed on a turntable, 0.8 meters high, centered at three meters distant from the measurement antenna. The device was placed in the center of the turntable and tested in two positions as shown in the setup photographs.

For the purpose of radiated emissions testing, the sample was programmed to transmit a constant stream of typical data packets. The occupied bandwidth (Plot 1) was also taken in this mode.

Plot 1



The field strength measurements were taken using an HP8596E spectrum analyzer, an EMCO 3121C dipole set, and an EMCO 3115 double ridge guide horn. The device was scanned from 30 MHz. to 10 GHz. and all emissions were noted.

At each detected emission frequency, the device was measured by rotating the turntable and adjusting the antenna height over a range of 1 to 4 meters to obtain the maximum output level. This procedure was performed with both horizontal and vertical antenna polarizations. The peak reading for each frequency was recorded in the fourth column in Table 1 below.

Measurements taken for weak emissions were performed by reducing the distance from the measurement antenna to 1 meter and factoring -9.54dB into the calculation. This method was used for the 7th harmonic of the transmit fundamental.

Table 1

RADIATED EMISSIONS DATA							
CLIENT: KENTON				FCC ID: S8ZKEN-TON-TR1000			
ANTENNA: DIPOLES/DRG HORN				EUT: VEST TRANSCEIVER			
PART 15.249, 15.109				TEST DATE: 11-April-05			
Frequency In MHz.	Ant. Polar. H/V	Ant. Factor dB	Peak reading dBm	Duty Cycle -dB	Peak Power uV/m@3m	Corrected Power uV/m@3m	FCC Limit uV/m@3m
51.625	H	5.1	-66.17		198		300
55.315	H	5.2	-64.51		242		300
103.250	H	9.9	-76.33		107		500
106.945	H	10.1	-74.15		140		500
110.630	V	10.1	-73.89		145		500
165.945	H	15.2	-81.80		105		500
916.465	V	30.5	-43.88		47973		50000
1832.930	V	30.2	-90.07		227		500
2749.395	V	33.4	-95.20		182		500
3665.860	H	35.7	-99.36		147		500
4582.325	V	36.6	-102.53		113		500
5498.790	V	38.6	-107.23		83		500
6415.255	H	39.1	-110.64		59		500