UNISYS

PCTC
Product Compliance Test Center
2476 Swedesford Road, Malvern, PA 19355

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FCC Application Processing Branch

Correspondence Reference Number: 13172
Applicant: Checkpoint Systems, Inc.
731 Confirmation Number: EA96999
Product: Counterpoint IX
FCC ID Number: DO4CP1900

Gentlemen,

Please accept the following in response to your requests submitted through E-Mail on the above referenced product.

Question 1: The confidential letter did not list the block diagram. The test procedure cannot be held confidential. And you must justify confidentiality of the internal photo's. Provide a corrected confidential letter accordingly.

Response 1: A revised confidentiality letter has been uploaded along with this letter.

Question 2: With regard to your reply on disabling the hopping function during tests, you submitted a correspondence that explains how the device was tested. The correspondence allowed you to make measurements while the device was sweeping. However, it required that peak measurements be made and that the peak measurements be adjusted for pulse desensitivity.

The test report indicates that Quasi-peak measurements data were reported on the fundamental. Please report the true peak measurements as corrected with pulse desensitization. (With a pulse width of 6uS and assuming a 10 kHz RBW, a pulse desensitization of 19 dB would need to be added to the peak measurement to obtain the true peak measurement.)

Then from the true peak measurement, the average level is 16.5 dB lower (With a 6 μS on and 34 μS off signal or %15 duty cycle).

Please report data showing compliance with the Peak and average limits.

Response 2: Peak measurement of the fundamental was performed as follows:

TEST EQUIPMENT INFORMATION:

The equipment used to perform the peak measurement of the fundamental are listed in the test report submitted earlier.

The characteristics of the pulse to be measured are listed below:

Pulse on time:	6 microseconds
Pulse off time:	34 microseconds
Pulse Period:	40 microseconds
Pulse Duty Cycle ($40 \times 10^{-6} / 6 \times 10^{-6}$):	15%

PULSE DESENSITIZATION FACTOR -- α_P (per HP Application Note 150-2):

The Pulse Desensitization Factor was calculated using the guidance and assumptions contained in the HP Application Note 150-2. Specifically, since the device utilizes a pulsed digital hopping transmitter where the transmitter is enabled for a 6 microsecond burst, the effective pulse width factor (τ_{eff}) was assumed to be $6x10^{-6}$. The IF Amplifier Constant (K) was assumed to be approximately 1.5 per the discussion on HP IF filters in the Application Note.

This results in the following calculation:

$$\alpha_P = 20\log_{10}(\tau_{eff} * K * B)$$

where,

$$\tau_{eff} = 6\ x\ 10^{-6}\ \text{sec}$$

$$K = IF\ \ Amplifier\,Const.\ (K \approx 1.5)$$

$$B = IF\ \ Bandwidth\ (10\ kHz)$$

or,

$$\alpha_P = 20\log_{10}(6x10^{-6} * 1.5 * 10{,}000)$$

$$\alpha_P = 20\log_{10}(0.09)$$

$$\alpha_P = 20.9$$

MEASUREMENT RESULT -- PEAK:

Center Frequency:	8.2 MHz
Frequency Span:	2 MHz
Resolution Bandwidth:	10 kHz
Video Bandwidth:	10 kHz
Measurement Distance:	30 Meters
Indicated Level of the Fundamental (from Analyzer screen):	34.5 dBµV
Antenna Correction Factor at 8.2 MHz:	-1.8 dB/m
Corrected Peak Reading: (Ind. Level + Corr. Factor)	32.7 dBµV/m
Desensitization Factor:	20.9 dB
True Peak: (Corr'd Level + Desensitization Factor)	53.6 dBµV/m

MEASUREMENT RESULT – PEAK vs. LIMIT

The measurement procedure (fax from Ed Gibbons to Checkpoint) states that "a 20 dB reduction from the true peak is to be compared to the limit of 100 µV/m (or, 40 dBµV/m) at 30 meters."

True Peak:	53.6
Reduction:	-20.0 dB
Corrected Peak: (True Peak + Reduction)	33.6 dBµV/m
Limit:	40 dBµV/m
Margin with Limit:	-6.4 dB

MEASUREMENT RESULT -- AVERAGE

As indicated above, the transmitter pulse is on for 6 microseconds and off for 34 microseconds for a total period of 40 microseconds, or a duty cycle of 15%. This would result in the following calculations if the transmitter were operating at a 25 kHz rate all the time.

True Peak:	53.6
Pulse Duty Cycle:	15%
Correction:	-16.5 dB
Average Level: (True Peak + Correction)	37.1 dBµV/m
Limit:	40 dBµV/m
Margin with Limit:	-2.9 dB

The average value calculated as above however overstates the real average because the transmitter is not running constantly in a 15% duty cycle. The transmitter has 32 possible frequencies with which it can use. Of these 32 frequencies, 16 are utilized during any 100 millisecond period. During this 100 millisecond period, the transmitter is enabled, or on, for 6 microseconds, and then off for 34 microseconds at the first of the 16 selected frequencies, followed immediately by the next frequency (6 microseconds on, 34 microseconds off) and so on through to the 16^{th} frequency after which the transmitter goes idle. This takes a total of 640 microseconds (16 periods X 40 microseconds/period). The balance of the 100 milliseconds is dead time where the transmitter is idle. The transmitter is operating at a 25 kHz rate and a duty cycle of 15% for a total of 640 microseconds out of 100 milliseconds.

A better calculation of the duty cycle, should based on a total on time versus total off time in any 100 millisecond period would appear as follows:

Pulse On Time:	6×10^{-6} seconds
Pulse Off Time:	34×10^{-6} seconds
Pulse Period:	40×10^{-6} seconds
Total Pulse On Time in any 100 ms period:	$16 \times (6 \times 10^{-6}$ seconds); or, 96×10^{-6} seconds
Total Pulse Off Time in any 100 ms period	100×10^{-3} seconds – 96×10^{-6} seconds; or, 99.904×10^{-3} seconds
Duty Cycle (total on time/total off time)	$(96 \times 10^{-6}$ seconds) / $(99.904 \times 10^{-3}$ seconds) or, 9.6×10^{-6} %
$20 \log_{10}$ (Duty Cycle)	-60.3 dB
True Peak (from above)	53.6
Average	53.6 dBuV/m – 60.3 dB or, -6.7 dBuV/m
Limit:	40 dBµV/m
Margin with Limit:	-46.7 dB

Question 3: We will not allow these systems to operate in the restricted band. Since the device does not hop in the restricted band, this is not a problem for this device. The frequency range will be modified on the grant to exclude the restricted band frequencies.

Response 3: None

I hope these responses satisfy your questions. If more information is required, please contact Eric Eckstein (eeckstein@checkpt.com) or Nemish Shah (nshah@checkpt.com) at Checkpoint Systems, Inc., or myself (daniel.mis@unisys.com) or Paul Banker (paul.banker@unisys.com) at Unisys Corpration.

Regards,

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