

## Mike Kuo

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**To:** Generic Office of Engineering Technology

**Subject:** RE: Request for additional information

Hi Martin :

In term of Peak Vs Average Power issues :

Qualcomm has done a study to discuss Peak Vs Average power while performing regulatory testing:

For regulatory testing to date, a CDMA device is typically configured in a static channel configuration where there is a degree of variation in the instantaneous output power. This variation is defined as the ratio of the instantaneous peak value of a signal to its time-averaged value and referred to as the peak to average ratio (PAR). This variation is inherent in all multiplexed systems, but in the case of CDMA reverse link, it can be minimized by appropriate modulation techniques such as HPSK in CDMA2000, 1x EVDO and in UMTS.

During a dynamic network call, the PAR average will vary more since the transmit power of the mobile's multiplexed channels change continuously as a result of the data requirements of the active link. As previously mentioned, for regulatory testing the device is configured in a fixed channel configuration such that this additional PAR variation is not present. In addition, when the device is transmitting at maximum output power, the device's RF calibration restricts the transmit power such that the phone cannot exceed the calibrated value of maximum transmit power that is stored as a parameter in the device itself.

The PAR is directly related to the physical channel structure of a CDMA transmitter. Therefore, some channel configurations result in higher PAR than others. The magnitude and frequency of the peaks is a statistical occurrence, where the typical peak is no more than 3.2-5.5 dB above the average power for 99% of the total occurrences for the highest PAR modes. These peaks appear as random narrow band spurs in the CDMA waveform. Larger peaks are possible, but will occur with no more than 1% probability.

When these statistical peaks occur, the duration is less than 1 microsecond and has negligible impact on the average power.

Qualcomm did average output power with average power meter and peak output power with spectrum analyzer in various CDMA 1x configuration and EVDO Rev.0 . Below are the summary of test result from Qualcomm.

### **Measured with average power meter**

Configuration	Mode	3GPP Reference	Paragraph	Channel Configuration	Power Meter Measurement (dBm)
1	1x	4.4.5.2	3	Fundamental Channel Test Mode 1 with 9600 bps data rate only.	24.43
2	1x	4.4.5.2	4	Fundamental Channel Test Mode 3 with 9600 bps data rate only	24.34
NOT SUPPORTED BY TEST EQUIPMENT	1x	4.4.5.2	5	Dedicated Control Channel Test Mode 3 with 9600 bps data rate and 100% frame activity.	-
NOT SUPPORTED BY TEST EQUIPMENT	1x	4.4.5.2	9	Fundamental Channel Test Mode 3 with 1500 bps Fundamental Channel data rate only and 9600 bps Dedicated Control Channel with 100 % frame activity.	-
3	1x	4.4.5.2	10	Supplemental Channel Test Mode 3 with 9600 bps Fundamental Channel and 9600 bps Supplemental Channel 0 data rate.	23.86
NOT SUPPORTED BY TEST EQUIPMENT	1x	4.4.5.2	11	Supplemental Channel Test Mode 3 with 9600 bps Dedicated Control Channel with 100% frame activity and 9600 bps Supplemental Channel 0 data rate.	-
4	EV-DO Rev 0	3.1.2.3.4.2		Test Application FTAP configured so that the Forward Traffic Channel data rate corresponds to the 2-slot version of 307.2 kbps, and the ACK Channel is transmitted at all the slots	24.35

Measured with spectrum analyzer :

Peak output power for Configuration #1= 24.5 dBm  
Peak output power for Configuration #2= 24.43 dBm  
Peak output power for Configuration #3= 23.86 dBm  
Peak output power for Configuration #4= 24.41 dBm

Configuration #	Mode	3GPP Reference	Paragraph Reference	Channel Configuration
1	1x	4.4.5.2	3	Fundamental Channel Test Mode 1 with 9600 bps data rate only.
2	1x	4.4.5.2	4	Fundamental Channel Test Mode 3 with 9600 bps data rate only
NOT SUPPORTED BY TEST EQUIPMENT	1x	4.4.5.2	5	Dedicated Control Channel Test Mode 3 with 9600 bps data rate and 100% frame activity.
NOT SUPPORTED BY TEST EQUIPMENT	1x	4.4.5.2	9	Fundamental Channel Test Mode 3 with 1500 bps Fundamental Channel data rate only and 9600 bps Dedicated Control Channel with 100 % frame activity.
3	1x	4.4.5.2	10	Supplemental Channel Test Mode 3 with 9600 bps Fundamental Channel and 9600 bps Supplemental Channel 0 data rate.
NOT SUPPORTED BY TEST EQUIPMENT	1x	4.4.5.2	11	Supplemental Channel Test Mode 3 with 9600 bps Dedicated Control Channel with 100% frame activity and 9600 bps Supplemental Channel 0 data rate.
4	EV-DO Rev 0	3.1.2.3.4.2		Test Application FTAP configured so that the Forward Traffic Channel data rate corresponds to the 2-slot version of 307.2 kbps, and the ACK Channel is transmitted at all the slots

As indicated above, the Peak Vs Average is less than 1/4 dB difference.

Audit questions on Pantech & Curitel Communications, Inc., FCC ID:PP4PN-E330

The average output power measured during the preliminary tests are the following :

Part 22/24 portion			Average Power ( Mid Channel)	99% Bandwidth ( Mid Channel)	26dB Bandwidth ( Mid Channel)	Condu Low Chan
Cellular Band	1XRTT	RC3/SO2	24.8	1.265	1.435	-17.52
	1XRTT	RC3/SO32 ( +F-SCH)	24.9	1.270	1.435	-16.38
	1XRTT	RC3/SO32 ( +SCH)	24.9	1.270	1.435	-16.85
	1XRTT	RC3/SO55	24.9	1.270	1.435	-16.12
	EVDO		24.9	1.270	1.435	-16.58
PCS Band	1XRTT	RC3/SO2	24.9	1.270	1.430	-27.89
	1XRTT	RC3/SO32 ( +F-SCH)	24.9	1.270	1.420	-29.63
	1XRTT	RC3/SO32 ( +SCH)	24.9	1.270	1.435	-28.18
	1XRTT	RC3/SO55	25.0	1.270	1.435	-27.27
	EVDO		24.9	1.270	1.430	-28.56

The peak output power listed in the Part 22/24 test report are the following :

### Maximum Power Output table for PN-E330

Band	Channel	SO2	SO2	SO55	SO55	TDSO SO32	1xEvDO Rev.0	1x F
		RC1/1	RC3/3	RC1/1	RC3/3	RC3/3	(FTAP)	(F
CDMA	1013	24.8	24.9	24.9	24.9	24.8	24.9	:
	363	24.9	24.8	24.9	24.9	24.9	24.9	:
	777	24.8	24.8	24.9	24.9	24.9	24.9	:
PCS	25	24.9	24.8	24.9	24.9	24.9	24.8	:
	600	25.0	24.9	25.0	25.0	24.9	24.9	:
	1175	24.9	24.9	24.8	24.9	24.8	24.9	:

By comparing to the average power table and peak power table, there is almost no difference between average power and peak power. As confirmed by the test lab which performed the tests, above average output power and peak output power are the carrier output power as indicated on the Agilent 8960. Actually, they are all peak output power reading.

With above statement, I do think HAC tests performed by the test lab have followed 3 G certification guideline. If you have any question, please feel free to contact me.

Best Regards

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-----Original Message-----

From: Generic Office of Engineering Technology [<mailto:oetech@fccsun27w.fcc.gov>]  
Sent: Friday, August 25, 2006 8:04 AM  
To: Mike Kuo  
Subject: Request for additional information

To: Mike Kuo  
From: Martin Perrine  
Martin.Perrine@fcc.gov  
FCC Equipment Authorization Branch

Re: FCC ID: PP4PN-E330

Applicant: Pantech & Curitel Communications, Inc.  
Correspondence Reference Number: 31445  
731 Confirmation Number: TC307001  
Date of Original Email: 08/25/2006

Subject: Request for additional information

Regarding your answer to question 2. HAC evaluation must account for peak power and not average. Please readdress your answer accordingly. Please provide peak power measurements associated with the various modes.

8/30/2006

The items indicated above must be submitted before processing can continue on the above referenced application. Failure to provide the requested information within 30 days of the original e-mail date may result in application dismissal pursuant to Section 2.917(c).

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