Thomas Cokenias <tom@tncokenias.org> **Mon, Aug 3, 2009 at 3:25 PM**
To: Tim Dwyer <tim.dwyer@ccsemc.com>
Cc: Avner Ruta <avner.ruta@alvarion.com>, Mihaela Sorodoc <mihaela.sorodoc@alvarion.com>

Hi Tim,

Avner, Mihaeia and I have finally gotten together the answers to the highlighted questions, which are in line below. I apologize for the confusion, this project was on an accelerated schedule, we were coordinating among engineers in 4 countries, and there were some things that got temporarily lost in the translations. Hopefully you will now have all you need to grant this last product, but please call me if you need something else and we will get it to you.

best regards

Tom
cell 650 302 0887

On Jul 30, 2009, at 10:20 AM, Tim Dwyer wrote:

> Tom,
>
> Still no response that I can see to the green highlighted comments sent on 7/13. If you sent one, please re-send because I have not received anything.
>
> Tim
>
> On Mon, Jul 13, 2009 at 7:29 PM, Tim Dwyer <tim.dwyer@ccsemc.com> wrote:
> Hi Tom,
>
> > Review of this application is complete. Please reply to the following items. If you have questions, please ask.
> >
> > Q1: Combined output power is required to be listed on the grant for MIMO operation. Output power and PSD measurements in the test report were shown only for each chain separately but combined output power and PSD results were not shown or used to determine maximum power for MIMO. The maximum single chain power is listed in the application. Please provide a revised report or report addendum to show maximum combined power and PSD for MIMO operation.
>
> ANS1 The two chain test data is attached in revised report.
>
> Q1.1: Measurements for each chain are now included, but final combined power and PSD results are still not shown. Maximum combined conducted rsults must be provided and maximum combined power will be listed on the grant. A separate line item must be included if the product is capable of operation in single chain mode.
> ANS1.1 Test report document 2chainEXTR58BST.pdf shows final combined power and psd results, see page 24. The product is capable of single chain operating mode, so the maximum powers at each of the bandwidths are as follow :

Frequency range	EBW	1chain Max Peak Power	2 chain combined Max Peak Power
5727.5-5847.5	5 MHz	26.89 dBm	29.75 dBm
5730-5845	10 MHz	26.61 dBm	29.67 dBm

I am sending Claire Hoque an email asking for separate line item for single chain mode operation to be added to Form 731

> > Q2: Please confirm that this product will be used solely in P2MP applications and it is not for P2P installation. If operation in P2P configuration is intended, 15.247(b)(4)(iii) and 15.247(c)(1)(iii) require information concerning responsibilities for P2P operation to be contained in the user manual.
>
> ANS2 This is a point to multi point product
>
> Q2.1: RF Exposure exhibit includes calculations for P2P operation. If P2P operation is supported, please provide information in the user manual as above. If P2P operation is not supported, please remove from MPE evaluation. FCC has recently

reminded TCB's of importance of consistency throughout application documents.

ANS2.1 The note regarding P2P has been removed from the MPE calculation data sheet.

> Q3: Please provide revised MPE evaluation if external antennas will be installed with antenna to antenna separation distance less than the MPE distance. If antennas will be installed only with antenna to antenna separation distance greater than the MPE distance, please confirm that this information will be provided to installers.

ANS3 The user manual calls out 2m separation distance, well beyond MPE distance

Q3.1: User manual calls out 2 m separation distance antenna to persons. If user manual also calls out separation distance antenna to antenna, please provide a reference to the user manual page. Since external antennas have higher gain than internal antenna, if antenna to antenna distance will be less than the MPE separation distance, please prpovide evaluation for such operation in the revised MPE exhibit to include effects of antenna pattern overlap. If external antennas must be installed with greater than MPE separation, information must be provided in the user manual so that installers are aware. This applies to external antennas. For internal antenna(s), see Q4

ANS3.1 Section 2.5 (p64 of 206 pdf) lists minimum separation distances for antennas:) 0.5m in neighboring sectors, 1.3 m in same sector. Worst case MPE case is when maximum eirp is generated. In this case, it is when both chains are driving both antennas, since the maximum power output for one chain is approximately 3 dB less than that for both chains operating simultaneously. Since this product operates P2MP only, eirp is limited to 36 dBm eirp maximum, no matter what antenna or whether the product is driving a single antenna or two antennas.

The attached MPE calculations were assuming internal sector dual antennas were both active in MIMO transmission. These antennas are closer together than the minimum recommended separation distances for external antennas, so RFx from these antennas is worst case,the radiated RF energy is more concentrated at a point in space than it would be from two antennas pointing in the same direction (same sector) spaced 0.5 m apart; the sum contribution from each antenna would be less since the distance to the observer is more. See drawing MPE2.pdf for details. Calculations show MPE is well below 1.0 mW/cm2 limits for the worst case of assuming single point source for the dual slant internal sector antenna, both elements driven to maximum power to achieve 36 dBm eirp total.

> Q4: The internal dual antenna appears to be driven simultaneously by both chains in MIMO and possibly in other modes. Please provide details about modes in which the dual antenna is driven by both chains simultaneously and provide revised MPE evaluation since this is a co-located antenna configuration. MPE evaluation should be consistent with power levels in item Q1.
>
> .

Q4.1 The referenced section does not provide specific information to explain if and how both chains simultaneously provide power to the internal antenna (or external antennas) and if so how much power to each antenna port. For example, does the product operate only in MIMO mode? Can it operate in non-MIMO single or dual chain mode, providing output power to either or both output chains simultaneously? Can it operate in dual chain mode simultaneously with output on different channels? Normally modes of operation are specified in the operation description or test report.
Revised MPE evaluation was not provided as requested. Since the antenna elements in the internal antenna are obviously separated by less than the separation distance, and appear to be <20cm (so are co-located), this must be addressed in the MPE. Is the MPE evaluation for dual chain operation or single chain? Internal or external antennas? The MPE evaluation document does not specify the mode(s) evaluated. The MPE evaluation does not specify whether the it is for single chain or for single chain, simultaneous dual-chain or spatial multiplexing MIMO operation.

ANS4.1 I believe the MPE questions have been answered in ANS3.1 above. Here is a clarification of the operating modes:

MIMO
SISO - one chain operating or both chains operating at one TX frequency only

Worst case output power is for two chain SISO or MIMO operation, as single chain power is approximately 3 dB lower than dual chain operation.

All antennas can be driven in one of these ways

> Q5: Professional installation is required for this product. Installers must be provided with power and antenna gain limits for complying with the rules. This information is not shown in the user manual. Please provide a clear list of maximum power, antenna gain and mode (MIMO/SISO) configuration information and confirm that professional installers will be provided with this information.
>
> ANS5 Please see on chapter **1.4.6** the description of the antennas used by 5.x system.
> In chapter **4.7.2.2.2** please find the DFS description for radios that have DFS capability and on chapter **4.7.2.2.1.6** you can find the power limits per country code implementation.
>
> Q5.1 Please confirm that the 36 dBm EIRP is the maximum possible combined output power that can be set after the professional installer selects US/FCC operation

ANS5.1 Confirmed 36 dBm eirp as maximum output of this radio. Page 42/206 of the manual has professional installation warning. Page 33/206 lists maximum total power for each type of antenna. The cable loss for external antennas is 0.7 dBm as documented in the SII test report.

> Q6: The authorization letter submitted is signed by Avi Mazaltov. Please provide a letter signed by the contact named in the FCC database.contact per KDB 852934 requirements.
> http://fjallfoss.fcc.gov/oetcf/kdb/forms/FTSSearchResultPage.cfm?id=33316&switch=P
>
> ANS6 Authorization letter with correct signatory attached.
>
> Revised letter is acceptable

Hopefully all your questions have now been answered. If you have any issues remaining please copy all and we will get those taken care of ASAP.

best regards

Tom

4 attachments

MPE2.pdf
10K

2chainEXTR58BST.pdf
294K

EXTR58MPE.pdf
38K

Latest Manual_Extreme_ _Ver1.1_090708.pdf
1541K

Thomas Cokenias <tom@tncokenias.org> **Mon, Aug 3, 2009 at 3:31 PM**
To: Claire Hoque <claire.hoque@ccsemc.com>
Cc: Tim Dwyer <tim.dwyer@ccsemc.com>

Hi Claire,

Tim Dwyer said this radio will need separate line item on Form 731 for dual chain and single chain operation. My answer below has the power levels for each mode of operation, please update the Form 731.

best regards

Tom

Q1.1: Measurements for each chain are now included, but final combined power and PSD results are still not shown. Maximum combined conducted rsults must be provided and maximum combined power will be listed on the grant. A separate line item must be included if the product is capable of operation in single chain mode.

ANS1.1 Test report document 2chainEXTR58BST.pdf shows final combined power and psd results, see page 24. The product is capable of single chain operating mode, so the maximum powers at each of the bandwidths are as follow :

Frequency range	EBW	1chain Max Peak Power	2 chain combined Max Peak Power
5727.5-5847.5	5 MHz	0.487 watts	0.944 watts
5730-5845	10 MHz	0.458 watts	0.926 watts