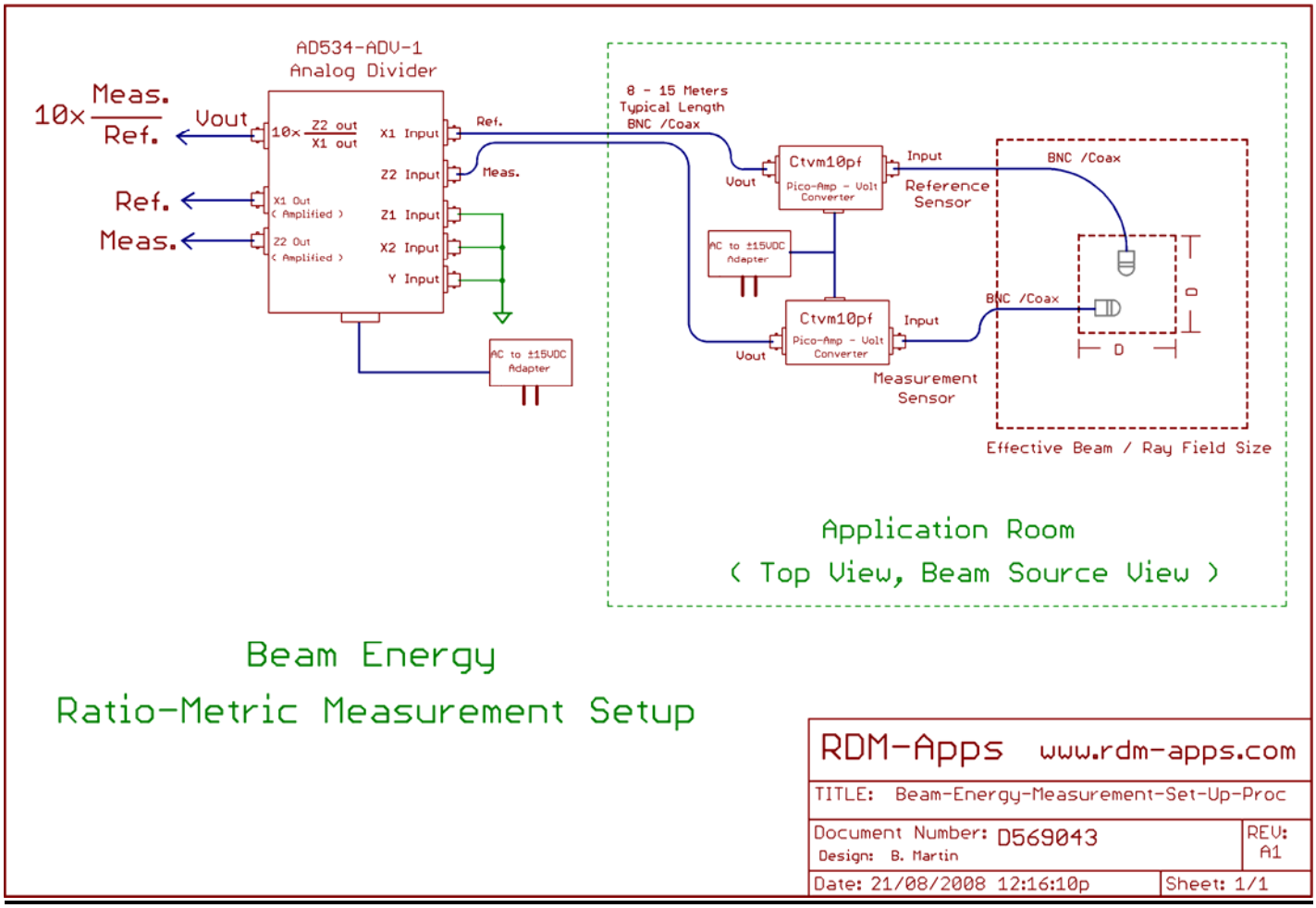

< Refer to Safety Notes at the End of this Document ! >>

This Document is for Reference purposes only! Although customers use this document for their application(s), this document does not reflect the opinions and/or recommendations of the RDM-Apps staff or owner.

Ratiometric Measurement Detail (www.documentation.rdm-apps.com)

Hardware Requirements:

Qty.	Desc.
1	AD534-ADV-1 Analog Voltage Divider Module
2	Ctvm10pf Current (pico-amp) to Voltage Converter Modules.
2	Photon, Electron Sensor
2	AC to ±15VDC Adapters
2	10 meter BNC male to BNC male RG-58/u coaxial cable.
1	5 digit or better Digital Volt Meter.

Setup Procedure:

Measurement sessions using different beam energies usually require the operator to make minor post-amplifier gain and offset adjustments to optimize the applicable beam energy measurement noise-signal ratio and signal measurement range. The following procedure has been most efficient and accurate for us:

1.) Connect the reference sensor, measurement sensor, Ctvm modules and AC adapter in the application room as indicated in the above diagram. Position the Ctvm modules as far away as possible from the beam energy. The Ctvm modules will serve as the pre-amplifiers (pre-amp) for both the reference and measurement signals.

The gain & offset settings for these pre-amps usually require a one time adjustment to cover as many beam energy settings as possible. User gain and offset adjustments necessary for different beam energies should be made using the post-amplifiers in the AD534-ADV-1 module located outside the application room. Ask the manufacturer (RDM-Apps) to preset the gain for each pre-amp to best accommodate the beam energies and / or sensors you will use most. For example, a pre-amp gain setting of 400pA/V (Input / Output) for a typical 0.3cm^3 PTW Semiflex Ionizing Chamber biased at -300V has worked well for us when used with most photon or electron energies less than 25MV and greater than 5MV. Obviously, other sensors for other applications or environments may vary significantly. **The Ctvm Module low pass filters must be disabled when used with Beam Energy Source Devices providing pulsed beam energies.** If necessary refer to the Ctvm module setup instructions (www.documentation.rdm-apps.com).

2.) Use the 10 meter BNC coaxial cables to interconnect the AD534-ADV-1 module positioned outside the application room to the pre-amps inside the application room as indicated in the above diagram. Larger cable lengths can result in hysteresis or measurement error. The AD534 module is an active device and does require the same type AC adapter as the pre-amps.

3.) With the beam energy OFF, position the reference & measurement sensors within a high energy orthogonal area about the central axis of your beam source, at the required distance from the beam source as shown in the above drawing. Make sure the sensors don't block or shadow each other from the beam source. This orthogonal area typically is significantly smaller than the area at the beam source itself. The energy at any point in this area should be no less than 80% of the maximum energy you plan on detecting during your measurement session. For example, in oncology a 4cm^2 area about the beam central axis that is 100cm (SSD, Dmax) from the beam source has worked for us when the beam source field size collimator setting is from 6cm^2 to 20cm^2 for a specific energy setting.

4.) With the beam energy OFF connect a DVM to the X1 output (reference) on the AD534 module. Adjust the reference offset until the DVM readout is as close to 0.0V as possible.

5.) With the beam energy OFF connect a DVM to the Z2 output (measurement) on the AD534 module. Adjust the measurement offset until the DVM readout is as close to 0.0V as possible.

6.) With the beam energy ON connect a DVM to the X1 output (reference) on the AD534 module. Adjust the reference gain until the DVM readout is approximately 5-6 volts.

7.) With the beam energy ON connect a DVM to the Z2 output (measurement) on the AD534 module. Adjust the measurement gain until the DVM readout is approximately 5-6 volts.

Notes:
The operator should repeat steps 4 through 7 to assure a proper setup. It is suggested to make sure both the reference and the measurement gain adjustment potentiometers are initially set to mid-range prior to step 4. For example, if the gain adjustment potentiometers are 10 turn devices then initially set both to 5 turns. Extremely high and low gain states can cause confusion when making sequential offset and gain adjustments. Also, the AD534 maximum ±10V input / output limitation warrants the 5-6V gain adjustments in steps 6 & 7 to attain the best noise-signal ratio and still leave enough headroom for the wedged fields.

At this point you should be ready to position the measurement sensor to any reasonable location within the beam for Ratiometric readings. The reference sensor should remain stationary at the original location as set in step 3 for your entire measurement session.

Nothing in this Document / Application Note directly or indirectly intentionally implies or states that:
1.) Anyone be subject to any type of Beam Energy that is unsafe and/or harmful.
2.) Anyone be within any unsafe proximity of any type of Beam Energy.

Observe any and all applicable safety precautions. This is for reference only. Contact RDM-Apps for specific applications.