

## Effects of Metallic Glass on Donor Unit

### Overview

A common issue found in applications that require the SpotCell Donor Unit (DU) to be installed indoors, is the effect of metallic glass on DU performance. This application note recommends ways the DU can be installed in order to minimize these effects.

### Return Loss

Return loss is an antenna parameter that indicates the amount of RF signal that is absorbed by the antenna versus that which is reflected back.

Good signal absorption means a greater amount of gain is applied by the antenna to the signal as it is radiated into free space. A good antenna might have a value of 10dB return loss (90% absorbed & 10% reflected).

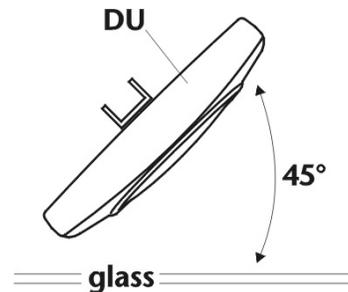
The SpotCell DU has a return loss value of better than 12dB into free space. When installing the DU near metallic glass is necessary, our goal is to produce a similar return loss value as to what is measured into free space. This will be an indication that the DU will be able to apply the necessary gain for the application.

### Recommended Installation

Tests have shown that return loss degrades as the DU is positioned closer to a sheet of glass that has a thermal (metallic) coating. This is a result of the DU antenna beam reflecting back into the DU, causing the antenna to detune. The effect of this detuning is to significantly reduce the antenna forward gain, reducing the level of a BS signal received through the glass.

The most effective way of installing the DU next to metallic glass is to place the DU at least 24 inches back from the glass and/or to angle the DU towards the window at 45 degrees. If the antenna is placed at an angle towards the glass, the reflected signal does not return directly to it, therefore the antenna return loss and gain are not affected.

Tests have shown that this method of DU installation will produce a return loss similar to free space, even with the closest edge of the DU almost touching the glass.



**Figure 1 – DU angled 45° to window (top view)**

For more details on testing, reference the SpotCell Technical Note 102 - Effects of Metallic Glass on Donor Units