

MIMO-friendly Window

Glazing unit for multiple input multiple output (MIMO) technology



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Intellectual Property

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Description

In the context of structures such as trains and buildings, windows with various characteristics are used to obtain different desired outcomes. For example, windows with better thermal properties are used to reduce energy consumption, or they may be coated with a sun protection coating to reduce transmission of infrared radiation.

These structures often consist of metallic components, either in its housing or in its coating layers, resulting in a strong attenuation of electromagnetic (EM) radiation. Nowadays, the universal use of wireless communication on the EM spectrum necessitates window glazing which is appropriately designed. The design of such glazing is further complicated by the use of multiple input multiple output (MIMO) systems which are often used to increase data transfer rates or reliability of a communication system compared to their single input single output (SISO) counterparts, as transmission losses are amplified with multiple emitters and receivers. This invention offers a glazing unit which provides low and balanced attenuation for a wide range of broadband frequencies and MIMO systems.

The technology consists of a glazing unit comprising a pair of windowpanes adapted to allow low and balanced transmission loss for EM radiation. It includes a coating with specific thermal properties placed on one or more of the surfaces in the windowpanes and is divided into electrically conductive patches.

Advantages

Current designs of insulating glazing units do not simultaneously optimize for MIMO systems over a range of broadband frequencies and thus lead to significant and unbalanced attenuation of signals at many frequencies. Windowpanes solely designed for trains to enhance thermal insulation with conductive layers also leads to the same result.

The windowpanes in this invention are arranged such that EM radiation propagates through all its layers with minimal and balanced transmission loss even from MIMO systems and for high angles of incidence. Additionally, the low thermal emissivity coating layer on one or more of the surfaces provides energy saving capabilities.

Applications

- Railway carriages
- Buildings