

Solutions for Touchscreen Applications with High EMC Requirements

Contributed by **SCHURTER**

Touch panel products for the European market must comply with European directives and be CE certified. An essential requirement is that these products meet the requirements for electromagnetic compatibility (EMC). But which are these?

Other electrical devices in the immediate vicinity of a touch panel must not affect the operation of this device. The touch panel must therefore have high immunity to interference. Conversely, the panel must not interfere with other products, so its own emissions must be low. The EMC requirement classes vary depending on the application area of the application. For example, medical devices require a higher interference immunity for safety reasons.

EMC Specialist

EMC specialist SCHURTER has decades of experience in the field of EMC. This can be seen in the fact that the EMC properties of both the touch screens and the end product are already taken into account at the design stage. To achieve a well thought-out design in the field of EMC, SCHURTER engineers are often involved in the project right from the start. Preferably a joint development team is put together. This has the advantage

that all specific requirements are recorded at an early stage and included in the design.

Clever Design

Emitted interference (emission) and immunity are not only determined by the electronic circuits and their components, but also by the mechanical construction, the positioning of the electronic assemblies, the choice of materials and the cable routing. Since SCHURTER takes these influences into account in the early design phase, EMC problems are avoided (**Figure 1**). Subsequent, costly modifications after completion of the product are therefore avoided.

Low Emissions

Many electronic devices nowadays work with highly integrated, high clocked circuits, which are often the cause of emitted interference signals. Furthermore, these signals often have a very high edge steepness, which leads to further harmon-

ics. By choosing the right components and filter elements, these emissions are effectively combated at source.

Emission Source Controller

The touch screen controller chip used by SCHURTER is a potential source of emissions if not properly wired. By designing an optimised, customised PCB layout in cooperation with the customer and the chip manufacturer, the emission is kept as low as possible. Consideration is given to correct routing, filtering of signal lines, demarcation of supply lines and placement of ground planes in the PCB. A multi-layer design provides additional shielding against high-frequency interference signals. As the capacitive touch screen is located on the outside of the end product, it can act as a transmitting antenna for higher frequencies. For these frequencies and their harmonics it is sometimes necessary to integrate an internal shielding of the electronics in the form of metal foil or a complete metal housing.

High Interference Immunity

A PCAP touchscreen must never trigger an action if it is not touched (a so-called ghost touch). A touch screen can be disturbed by high-frequency energy from outside. This can be conducted or radiated disturbing

energy. Additional precautions are taken to achieve the required high immunity to interference. These can consist of hardware solutions such as signal and power line filtering, the shielding of printed circuit boards and the wiring. On the other hand, the touch screen controller chip also has a number of built-in software functions. These include a noise suppression algorithm and the frequency hopping method. Taking all aspects into account, SCHURTER carefully selects the best possible solution.

Conducted Interference Immunity

The developers at SCHURTER have professional test equipment at their disposal to determine the conducted immunity (Figure 2). Already with the first prototypes, the immunity is verified at the level of pre-compliance tests in official test laboratories. If interference is detected during such a test, the engineer will adjust the correct parameters in the controller firmware while in progress and fine-tune the optimal functionality.

Assembly of the Controller

For optimum EMC properties of the end product, both in terms of emission and immunity, it is essential that the touch screen controller is correctly mounted. Especially the ground connections, the wiring and the electrical connection with other components of the device are essential in this respect. Ground connections, whether separate or not, are also important as they help determine the final performance of a touchscreen. For customers, SCHURTER provides detailed assembly instructions for the correct installation of the touch panel with the corresponding controller.

Touchscreen Sensor and Capacitive Touch Points

An important component in the design is the sensor. The sensor can be made of polyester or ITO glass. Touch points can also be integrated directly on a printed circuit board. An optimal conductor pattern of the sensor is essential for good functionality. Conductive ITO glass allows transparent switching areas for easy backlighting. The sensor itself is laminated or bonded behind the selected cover lens material. A connection lug made of polyester or Kapton is required for each sensor. As the sensors are manufactured using an etching or



Figure 1: Conducted immunity EMC test setup for touchscreens.



Figure 2: Performing a conducted immunity EMC test.

screen printing process, they are available in any desired size and shape. SCHURTER manufactures the sensor design itself, matching the respective application. In addition to environmental interference, a touch sensor can also pick up interference signals from the LC display below. This can be solved via the electronics of the controller or via an additional transparent shielding foil between display and sensor.

SCHURTER designs and manufactures the touchscreen sensors in-house. This allows SCHURTER to incorporate the specific EMC requirements into the design. SCHURTER's own facilities offer great design freedom, so that every diagonal and every shape is available.

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WEB LINK

[1] **SCHURTER Input Systems:** www.schurter.com/en/Products/Input-Systems