



# Frequency Multiplexed Projected Capacitive Touch Screen

Robert D. McCulloch & Albert M. David

A D Metro, Ottawa, Canada

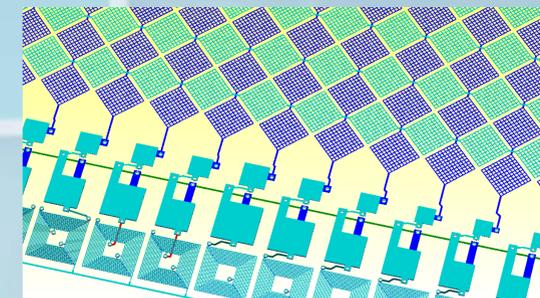
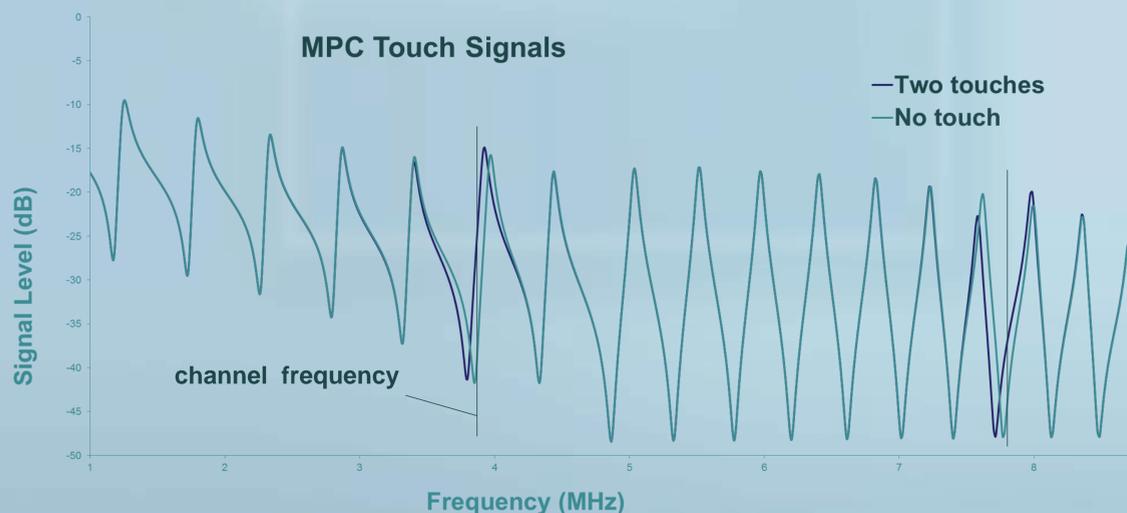
## A D Metro Innovation delivers projected capacitive touchscreen freedom

- One controller is compatible with all frequency multiplexed touch screens.
- Interface uses few lines.
- Touch screen may be meters away from controller.
- Tolerates harsher radio interference.

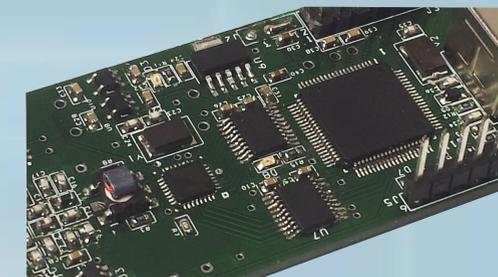
## Theory of Operation

Like FM radio, multiplexed projected capacitive (MPC) touch screens use a separate carrier frequency to address and sample each diamond pattern row or column. This eliminates individual wires for each row and column as used by traditional PCAP. MPC eliminates problematic, dense conductor cables while enhancing touch performance.

MPC Touch signals are revealed by the extent each carrier gets frequency modulated by the capacitance of a touch. Once touch signals are collected, the MPC controller computes touch locations the same as traditional PCAP, based on the degree of touch measured among many neighbouring rows and columns.



Resonant electronic filter components are integrated with the MPC touch screen diamond pattern. These filters direct frequency modulated controller signals to (and from) the correct rows and columns.



**Adaptive MPC Controller automatically learns how many rows and columns to manage**

## Results of Streamlined Wiring

MPC's Simple cable and adaptive controller mean that one controller is compatible with all MPC touch screen sizes. Adaptive MPC controllers scan when a new touch screen is connected and thereafter control the rows and columns detected during the scan. No need for a variety of complex cables when each touch screen uses the same few lines.

Simplifying wiring eliminates key drivers of PCAP touch screen cost – high pin-count cables and yield loss during their assembly.

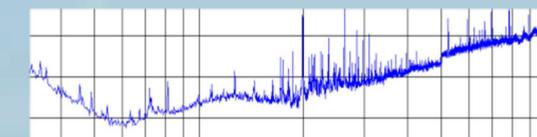


MPC dispenses with different controllers and unique, short cables for each touch screen. One controller fits anywhere and fits all.

## Multi-Frequency Performance

In traditional PCAP, crosstalk between multiple signal lines is a challenge that imposes limitations. MPC sends multiple signals using different frequencies on the same buss line. This eliminates cable crosstalk and allows MPC touch screens and controllers to be positioned without strict limitations and conveniently located.

Radio interference that may freeze traditional PCAP touch screens usually only affects one or two channels of an MPC system. This is because of the discrete frequency nature of typical radio interference. Critical touch screen functions are not lost when only one or two individual channels experience interference. Operators can still swipe and activate large buttons.



**Discrete Frequencies seen in Typical Radio Interference**