

## **WHITE PAPER**

# **PCAP and AR Touchscreens in a Rugged Environment**

This document reviews the differences and similarities between a Projected Capacitive touchscreen (PCAP) and an Analog Resistive touchscreen (AR) for rugged environment applications. The two can be summarized by noting that PCAP touch works with electrical capacitance (familiar to smartphone users) whereas AR touch works with the application of pressure.

**Projected Capacitive (PCAP):** PCAP touchscreens use a transparent conductive coating of sensors. When a capacitive body (finger or stylus) contacts the surface, the sensors detect the conductive properties and register a touch event.

**Analog Resistive (AR):** AR touchscreens have two transparent layers separated by a thin gap. Each layer’s internal surface features a conductive coating. Touch events are recorded when the two layers are pressed against each other, allowing voltage to pass through.

## Multi-Touch Capabilities

### PCAP Technology

- Supports up to 10 simultaneous touches
- Full gesture support: pinch, scroll, rotation, zoom, flip
- Excellent responsivity for multi-touch operations

### AR Technology

- Typically limited to single touch
- Some models support basic multi-touch
- Optimized for single-point precision input

	PCAP Touchscreen	AR Touchscreen
Multi-Touch	Great - Up to 10	Good - Up to 2
Touch Detection	Good – requires capacitive object	Great – any object
Toughness	Great - Up to 9H hardness	Good – Up to 7H hardness
Optical Transmissivity	Great	Good – can degrade over time
Water/Dust/Humidity	Good – can be calibrated for best (Great) performance	Great
EMI	Great	Great

## Environmental Performance

Parameter	Detail
<b>DURABILITY</b>	
<b>PCAP: Scratch Resistance</b>	Features chemically strengthened glass (Gorilla Glass) with 9H pencil hardness for superior scratch resistance allowing for continued use even after being cracked or damaged <a href="#">PCAP Superior</a>
<b>AR: Material Construction</b>	Plastic upper sensor layer with optional glass protection layer for additional ruggedness <a href="#">AR Flexible</a>
<b>DISPLAY CHARACTERISTICS</b>	
<b>PCAP: Sunlight Readability</b>	Superior sunlight readability with clear, bright display performance <a href="#">PCAP Superior</a>
<b>AR: Light Output</b>	Multiple layers can result in reduced light output due to reflectance on surface; susceptible to yellowing or hazing over time <a href="#">AR Limitation</a>
<b>INPUT METHODS</b>	
<b>Environmental Conditions</b>	Both technologies work with fingers, gloves or stylus and perform well in dusty, humid or moist conditions <a href="#">Equal Performance</a>
<b>PCAP: Input Requirements</b>	Requires capacitive-compatible input devices; calibration needed for varying input sizes <a href="#">PCAP Specific</a>
<b>AR: Input Flexibility</b>	Works with pressure input from finger, glove or stylus - more flexible input options <a href="#">AR Flexible</a>

## Qualification Tests

Below: qualification tests that have been performed and qualified on ArgonFDS display products with PCAP and AR touchscreens.

EMI Qualification RTCA DO-160F	Electrical MIL-STD-461G	Environmental Qualification RTCA DO-160F
Magnetic Effect	RE102	Altitude
Inrush Current	RS103	Decompression
Voltage Spike	CS101, Audio Freq CS	Overpressure
Induced Signal Susceptibility	CS114	Ground Survival High Temp
Emission of RF Energy, Radiated	CS115	Operating High Temp
Emission of RF Energy, Conducted	CS116	Operating Low Temp
Lightning Induced Transient Susceptibility	CS118	Short Time Operating Low Temp
RE102	CE102	Short Time Operating Low Temp
CS114 CS115 CS116		Sand and Dust Fungus Resistance Waterproof
CS118 CE102		Humidity Flammability
		Vibration (Functional Shock & Operational Safety

## Electro-Magnetic Conditions

PCAP: Requires specific EMI protection; can meet MIL-STD-461F standard for radiated emissions and electromagnetic compatibility and MIL-STE-1275E for electrostatic discharge

## Cost Considerations

PCAP and AR touchscreens are similar in cost.

# Conclusion

**Choosing between PCAP and AR technologies should be based on specific application requirements, particularly:**

- Input method requirements
- Environmental conditions
- Display clarity needs
- EMI protection requirements
- Expected service life

Each technology offers distinct advantages in rugged environments, making the final selection dependent on specific use-case priorities.

## ArgonFDS Touchscreen-Enabled Rugged Tablets



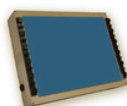
5 Inch Rugged Tablet AT50



7 Inch Rugged Tablet AT70



10 Inch Rugged Tablet AT104



12 Inch Rugged Tablet AT121



8 Inch Rugged Tablet AT84



15 Inch Rugged Tablet AT150