Panasonic
BUSINESS

TOUCHSCREEN DISPLAY TECHNOLOGY

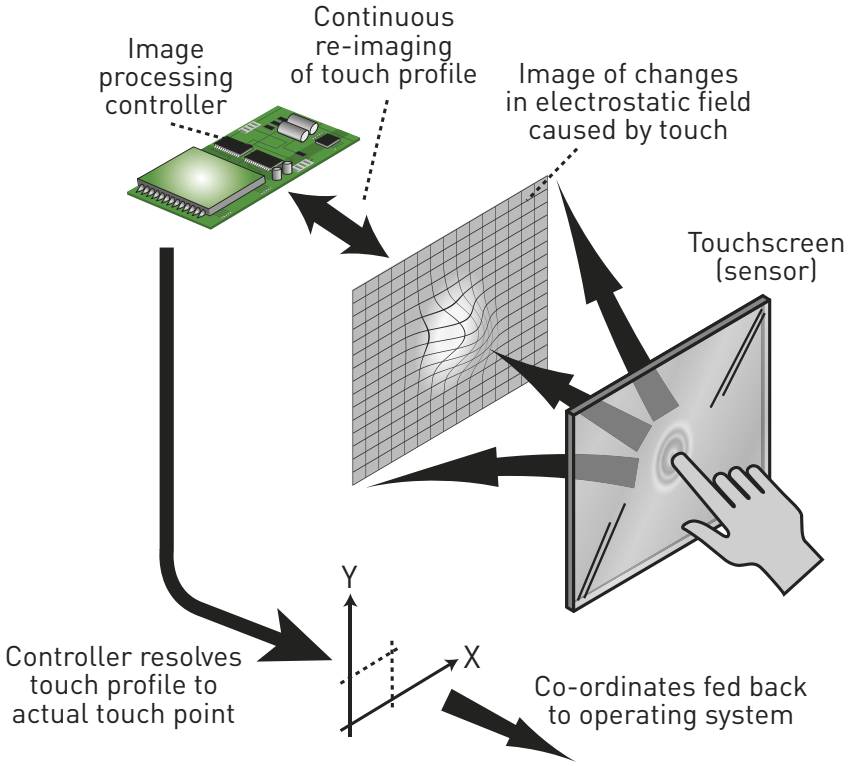
YOUR IN-DEPTH GUIDE

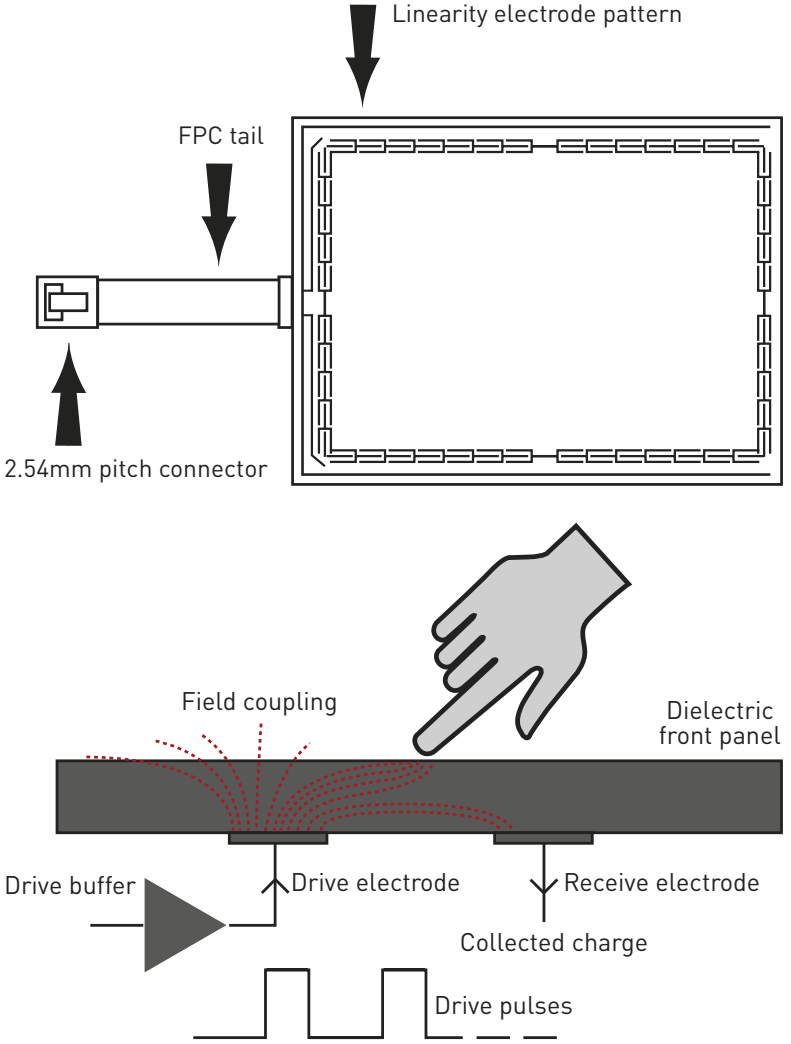
TOUGHBOOK TOUGHPAD

WHAT IS...
A CAPACITIVE TOUCHSCREEN?

A capacitive touchscreen panel is coated with a material that stores electrical charges. When the panel is touched, a small amount of charge is drawn to the point of contact. Circuits located at each corner of the panel measure the charge and send the information to the controller for processing.

Capacitive touchscreen panels must be touched with a finger, unlike resistive and surface wave panels that can be operated by either fingers or stylus. Capacitive touchscreens aren't affected by outside elements and have high clarity.

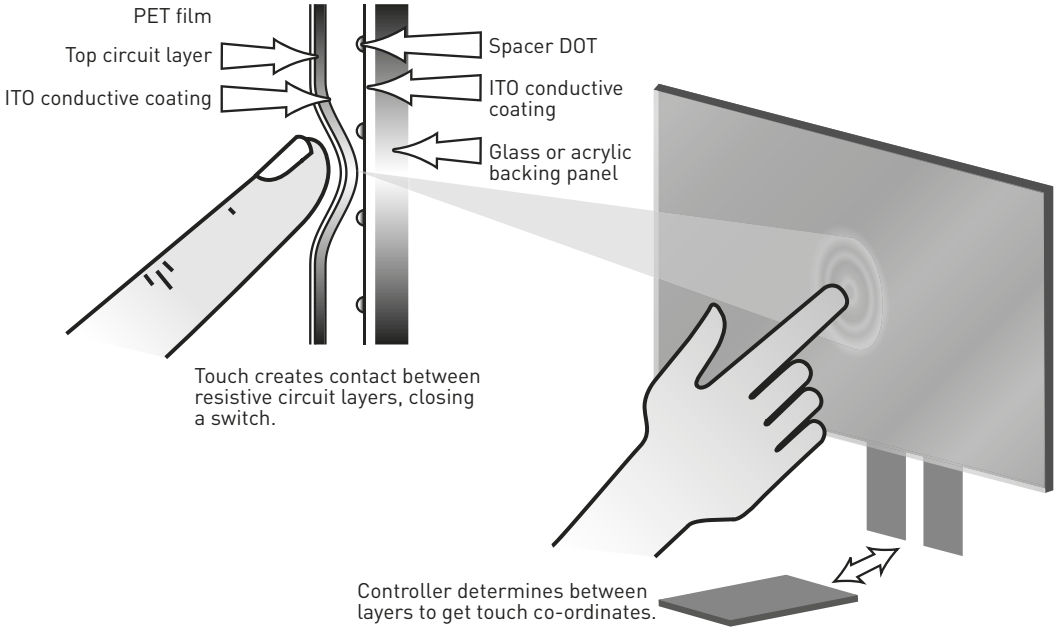


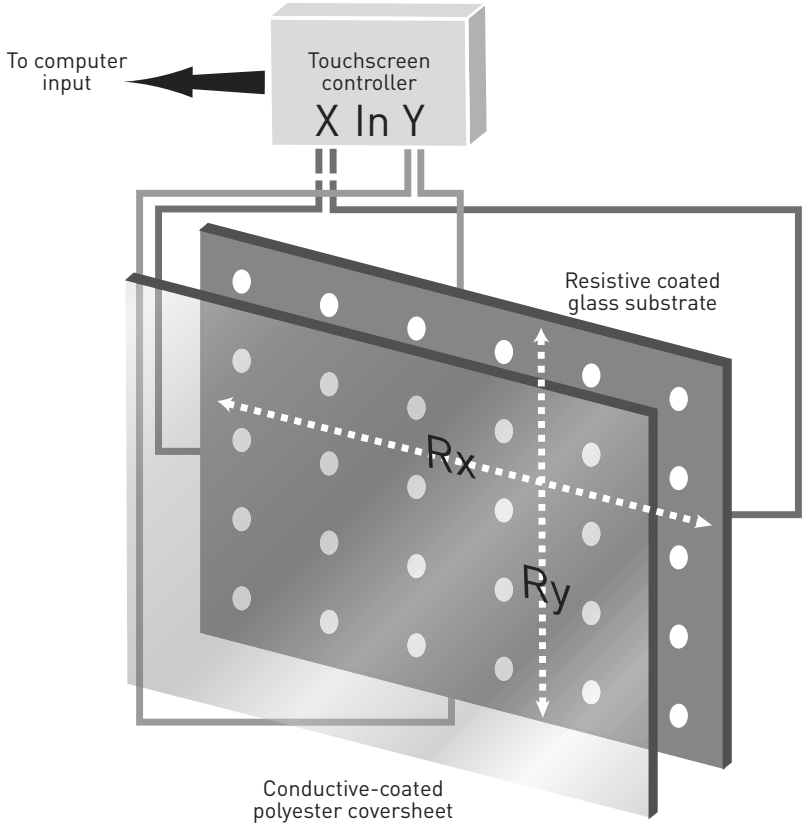


WHAT IS...
A RESISTIVE TOUCHSCREEN?

A resistive touchscreen panel is coated with a thin, metallic, electrically conductive and resistive layer. This causes a change in the electrical current which is registered as a touch event and sent to the controller for processing.

Resistive touchscreen panels are generally more affordable and work well with almost every stylus-like object. They aren't affected by outside elements such as dust or water, can even be controlled by gloved hands and are therefore the ideal companion for rugged PCs.





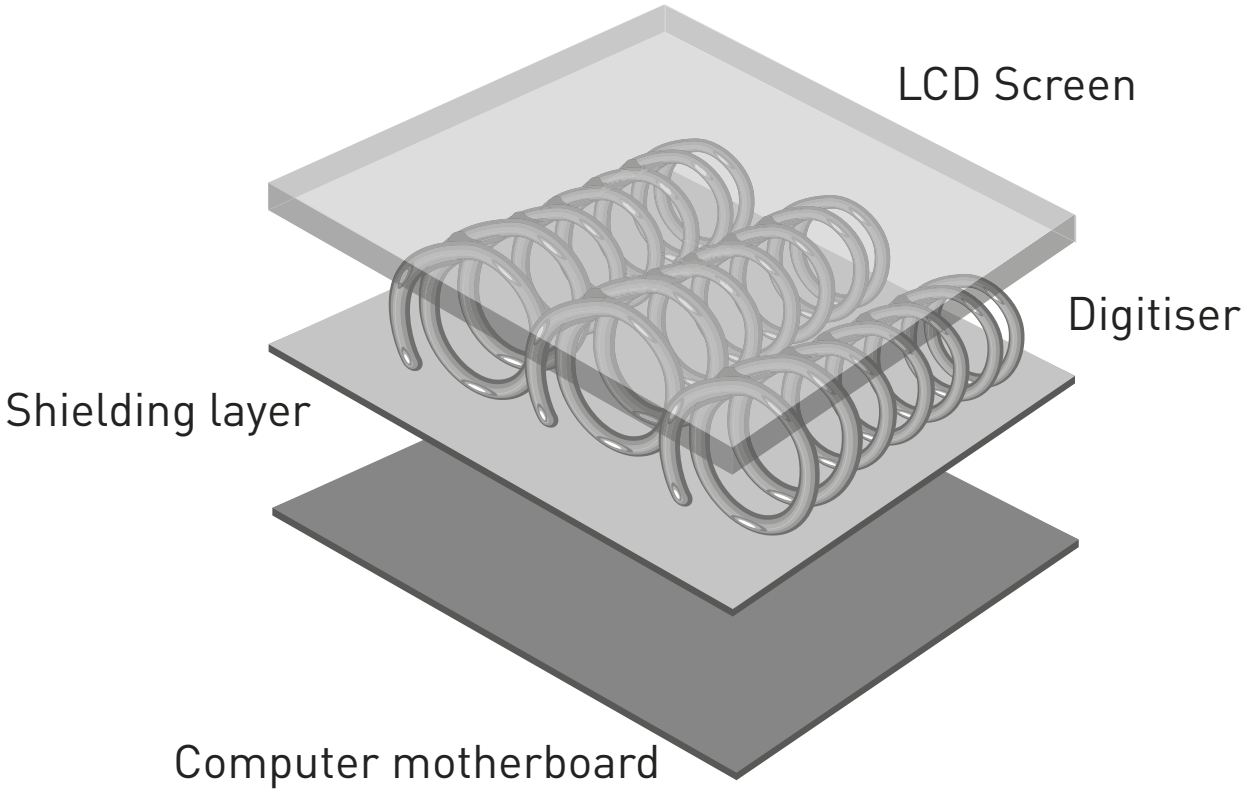
WHAT IS...
A DIGITISER TOUCHSCREEN?

Digitiser touchscreens make use of electromagnetic induction technology, where the horizontal and vertical wires of the screen operate as both transmitting and receiving coils. The tablet generates an electromagnetic signal, which is received by the stylus. The wires in the tablet then change to a receiving mode and read the signal generated by the stylus.

Modern arrangements also provide pressure sensitivity and one or more switches (similar to the buttons on a mouse), with the electronics for this information present in the stylus itself, not the tablet.

By using electromagnetic signals, the tablet is able to sense the stylus position without the stylus having to even touch the surface, and powering the pen with this signal means that devices used with the tablet never need batteries.

The core benefit of this type of screen is the accuracy of the digitiser pen. So detailed drawings and signatures are possible. What's more, because a special digitiser pen is needed, the touchscreen can't be used with fingers or hands, eliminating accidental input errors.



WHAT IS...
A 'TRANSFLECTIVE PLUS'™ DISPLAY?

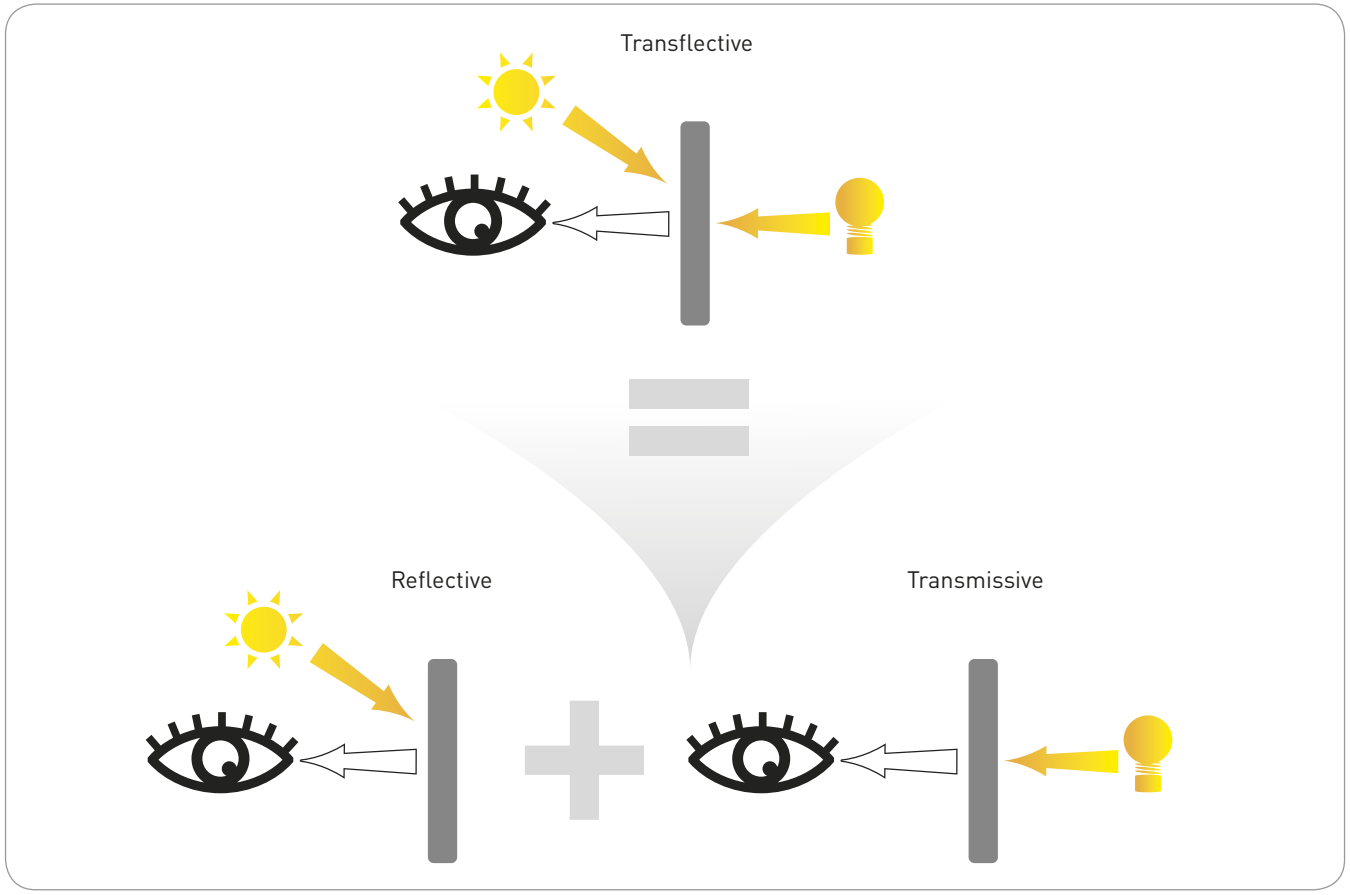
A transflective display reflects and transmits light (transflective = transmissive + reflective). Under bright illumination, the display acts mainly as a reflective display with the contrast being constant with illuminance. Only in dim and dark ambient situations will an auxiliary transmissive backlight be provided.

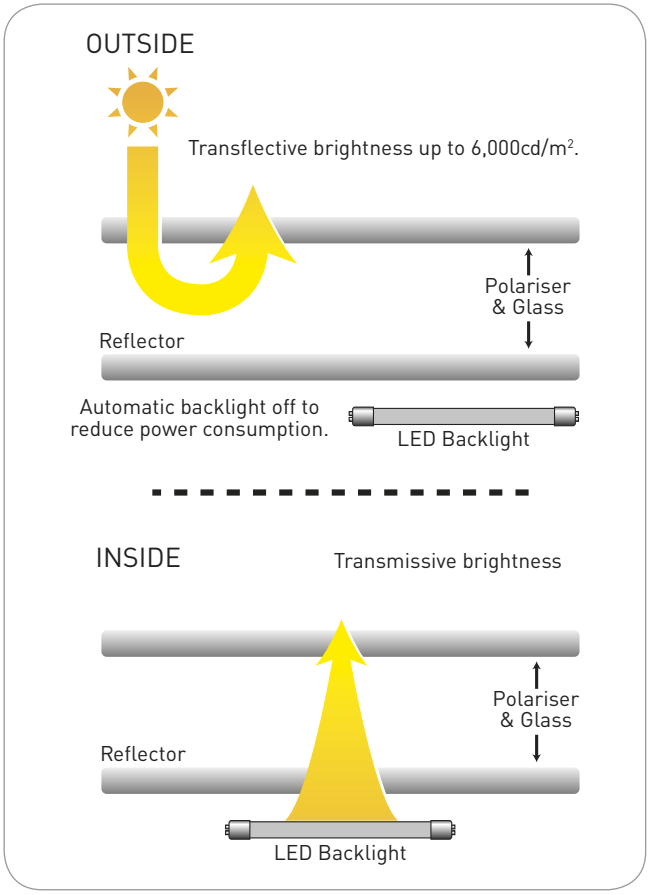
A transflective LCD can be read over a wide range of illuminance levels, when an illuminance sensor is added for control of the backlight. In portable electronic devices the transflective mode of operation helps to save battery life, since in bright environments no backlighting is required.

The essential component for a transflective LCD is the Reflector, a polymer sheet that reflects and transmits at the same time.

Displays that reflect light with minimal reflective glare are most readable in bright sunlight. But are least readable without direct sunlight – in twilight for example.

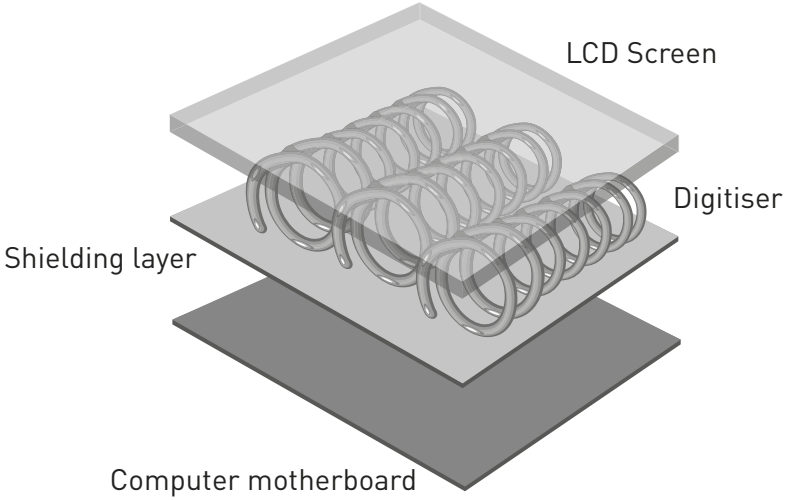
With this in mind, Panasonic has introduced a special display technology – 'Transflective Plus'™ – to ensure better readability from all angles and in all outdoor conditions. 'Transflective Plus'™ displays can reach display brightness scores of up to 6.000 candela, under direct sunlight. Giving you premium viewing quality in every outdoor situation.

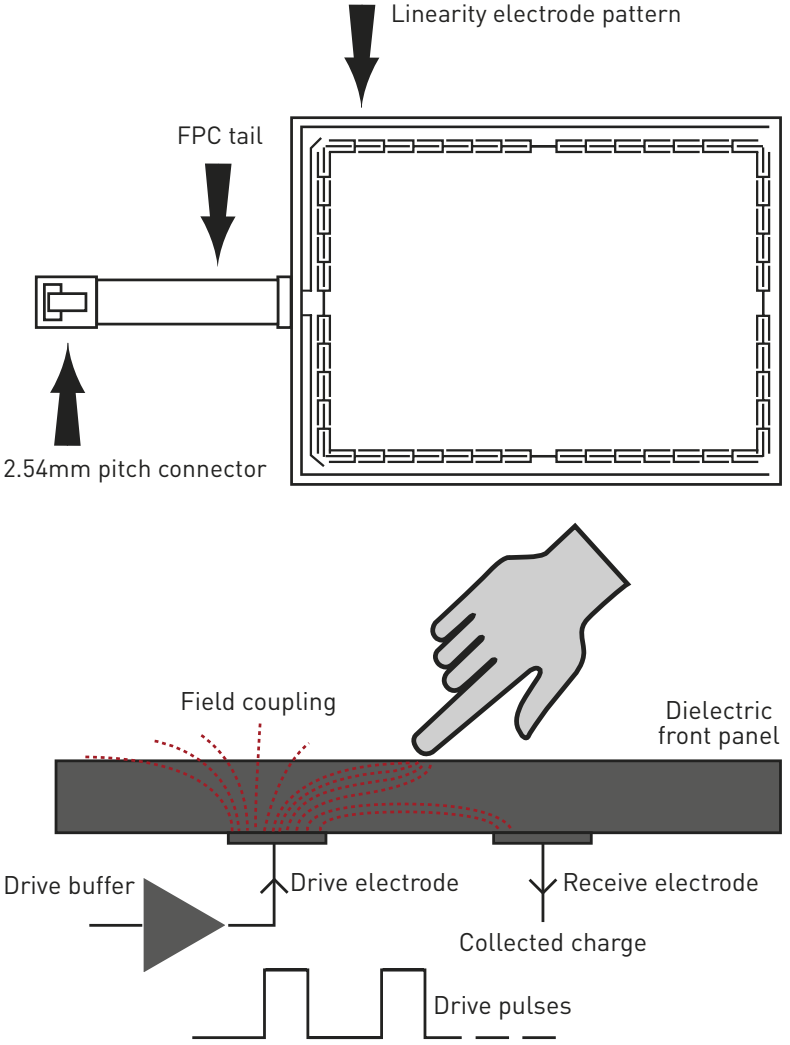




WHAT IS...
DUAL TOUCH?

Dual touch is the combination of capacitive touchscreen and digitiser technology. It enables the operator to use the GUI with fingers, as well as with a digitiser pen. The key benefit of this combination is the intuitive handling via finger and the accuracy (signature capture, handwriting recognition) of the pen providing the flexibility to choose the right display input mode on demand.





WHAT IS...
MULTI-TOUCH?

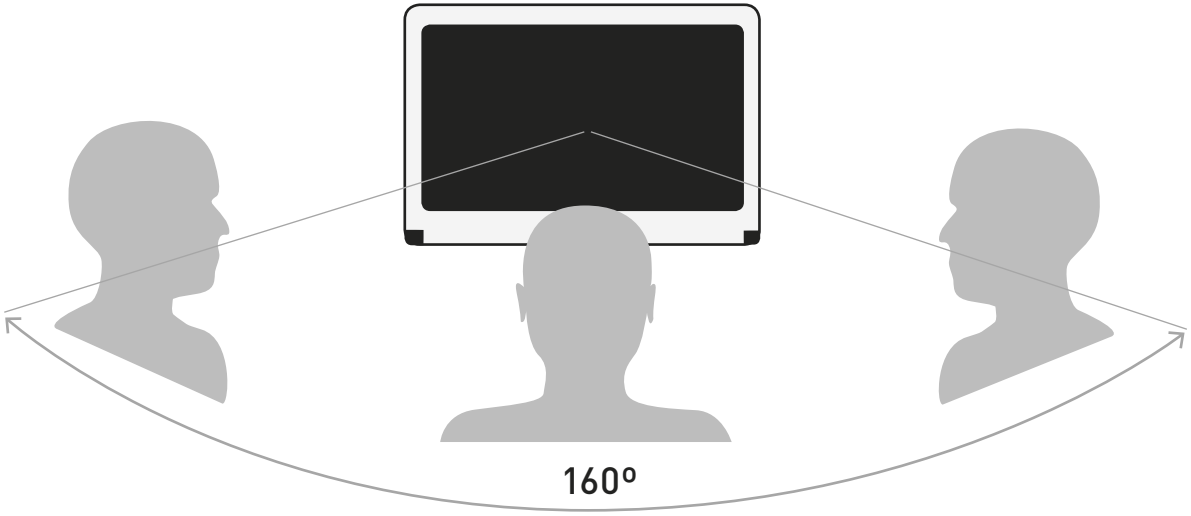
Multi-touch is a method of input on a touchscreen that allows two or more fingers to be used on the screen at one time. Multi-touch allows pinching and stretching gestures on the screen to control zooming.

A multi-touch display is pressure sensitive, as well as gesture sensitive, which are predefined motions that are commands to perform an action, such as rotate the object on the z-axis.

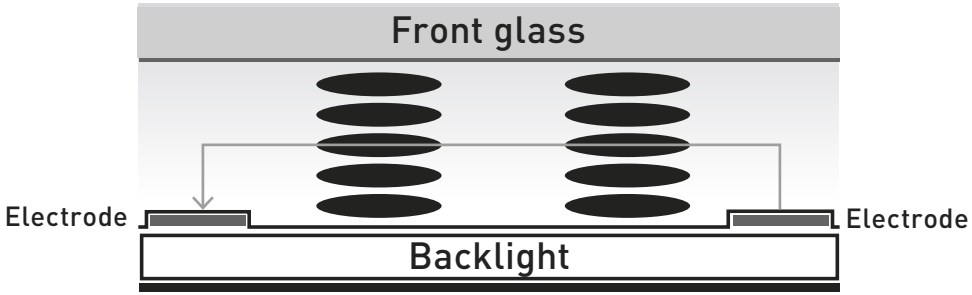
WHAT IS...
IPS?

In IPS (In-Plane Switching) technology the liquid crystal runs horizontally, giving it a wide viewing angle, fast response speed and a simple pixel structure.

IPS panels employ pairs of electrodes at the sides of each cell, running the electric field horizontally through the material. This approach keeps the liquid crystals parallel to the front of the panel, increasing the viewing angle.



IPS PANEL DESIGN

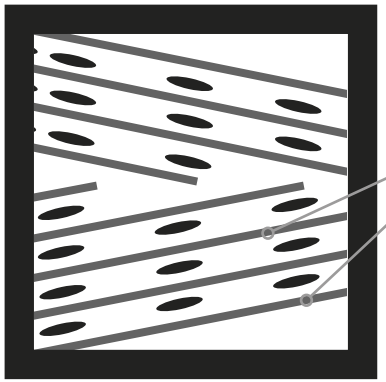


CONVENTIONAL
Loss of contrast and colours appear washed out.

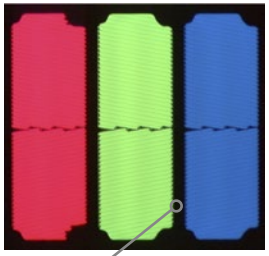
IPS
Virtually no change in contrast and colour.

WHAT IS...
IPSα?

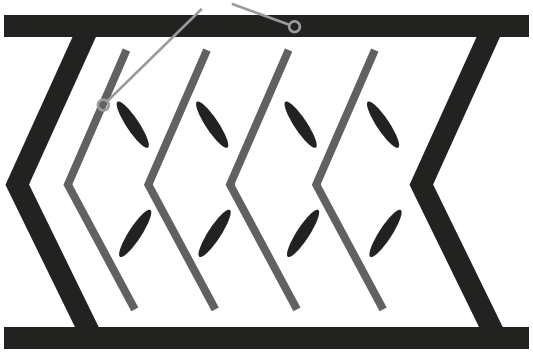
	Transmittance	Point of image quality	Front view of a pixel, (red, green, blue)
IPS-PRO	x1.0	• High transmittance • High contrast ratio • Wide viewing angle	
IPSα	**x1.5**	• **High resolution** • High transmittance • High contrast ratio • Wide viewing angle	



Fine pitch ITO
(Indium Tin Oxide)

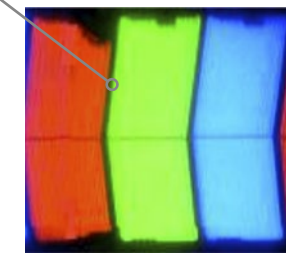


Two layers of ITO



Lines are shielded

Black space
is smaller than
IPS-Pro II

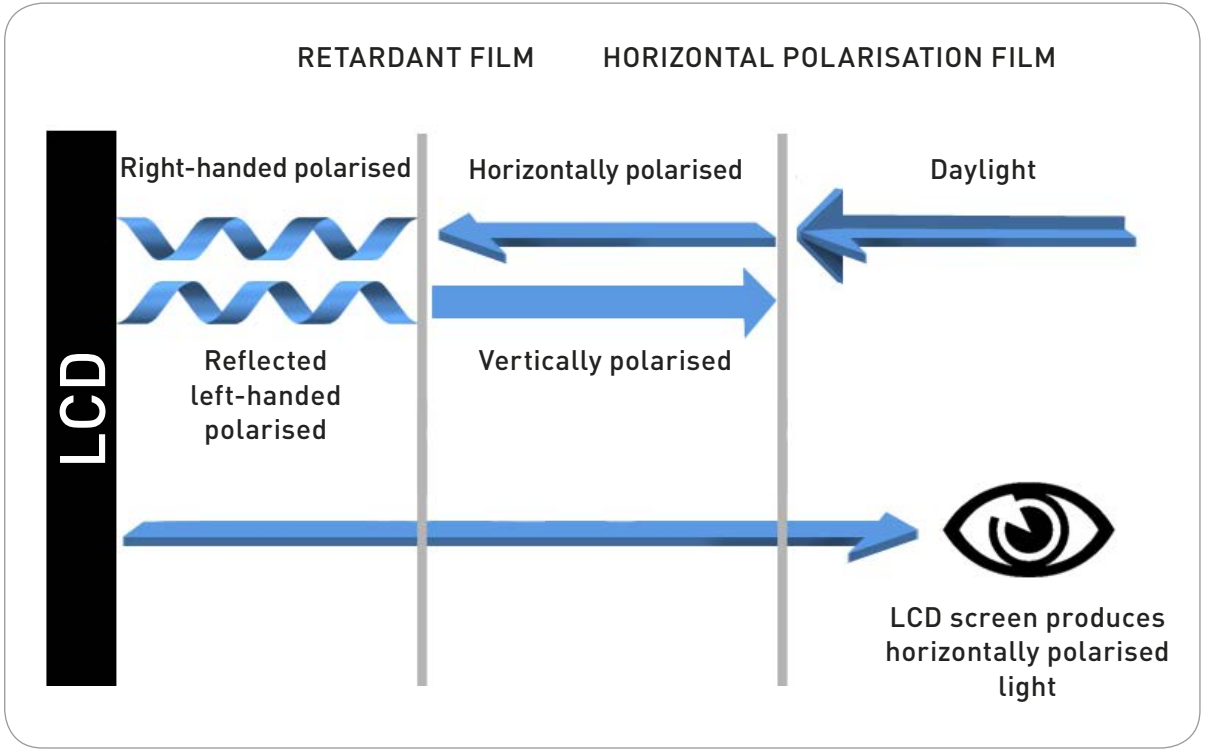


WHAT IS...
‘CIRCULUMIN’™ TECHNOLOGY?

Circular polariser film passes only horizontally polarised light

- Retardant film converts horizontal polarisation to right-handed circular polarisation
- Upon reflection, right-handed polarisation changes into left-handed polarisation
- Retardant film converts left-handed polarised light to vertically polarised light
- Polariser film rejects vertically polarised light
- Outbound light from the LCD is horizontally polarised, so it can pass all the way through
  (in fact, direction polariser film is chosen to match LCD polarisation)

The main effect is that sunlight is adsorbed and the reflection rate is minimised, which provides perfect sunlight readability. Panasonic CircuLumin™ technology provides full circle viewability in all lighting conditions. Optimising a display for sunlight viewability can have a side effect of reducing visibility in other lighting conditions. Panasonic CircuLumin™ technology solves this and allows for full circle viewability, from bright sunlight to pitch darkness.



THE TOUCHSCREEN RANGE
CONFIGURATIONS

Model	CF-31	CF-D1
	Standard	**Standard**
Input device	Resistive touch	Capacitive touchscreen
Display brightness	1,200cd/m²	400cd/m²
IPS		✔
IPSα		
Dual touch		
Anti-glare	✔	✔
Anti-reflection	✔	✔
CircuLumin™	✔	
Protection film	✔	✔
Transflective plus™		
Direct bonding		✔
Multi-touch		
Standard signatures	✔	✔
High-res drawings and signatures		
Digitiser pen		
Stylus pen	✔	✔
Gloves	✔	✔

CF-31

CF-D1

THE TOUCHSCREEN RANGE
CONFIGURATIONS

Model	CF-53	CF-54
	Touchscreen	**FHD model with Touchscreen**
Input device	Resistive touch	Capacitive touchscreen
Display brightness	1,000cd/m²	1,000cd/m²
IPS		✔
IPSα		
Dual touch		
Anti-glare	✔	✔
Anti-reflection	✔	✔
CircuLumin™	✔	
Protection film	✔	✔
Transflective plus™		
Direct bonding		✔
Multi-touch		Ten-finger multi-touch
Standard signatures	✔	✔
High-res drawings and signatures		
Digitiser pen		
Stylus pen	✔	✔
Gloves	✔	✔

CF-53


CF-54

THE TOUCHSCREEN RANGE
CONFIGURATIONS

Model	FZ-E1/FZ-X1	FZ-F1/FZ-N1	FZ-A2
	Touchscreen	**Touchscreen**	**Touchscreen**
Input device	Capacitive multi-touch	Capacitive multi-touch	Capacitive multi-touch
Display brightness	500cd/m²	500cd/m²	800cd/m²
IPS			✔
IPSα			
Dual touch			
Anti-glare		✔	✔
Anti-reflection	✔	✔	✔
CircuLumin™			
Protection film	✔	✔	✔
Transflective plus™			
Direct bonding	✔	✔	✔
Multi-touch	Ten-finger multi-touch	Ten-finger multi-touch	Ten-finger multi-touch
Standard signatures	Thick nib only	✔	✔
High-res drawings and signatures		✔	
Digitiser pen			
Stylus pen	Thick nib only	✔ (both active & passive pen)	✔
Gloves	✔	✔	✔


FZ-E1 FZ-X1


FZ-F1 FZ-N1

FZ-A2

THE TOUCHSCREEN RANGE
CONFIGURATIONS

Model	CF-C2	CF-MX4
	Touchscreen	**Touchscreen**
Input device	Capacitive multi-touch & digitiser	Capacitive multi-touch
Display brightness	500cd/m²	
IPS	✔	✔
IPSα		
Dual touch		
Anti-glare	✔	✔
Anti-reflection	✔	✔
CircuLumin™		
Protection film	✔	✔
Transflective plus™		
Direct bonding	✔	
Multi-touch	Ten-finger multi-touch	Ten-finger multi-touch
Standard signatures	✔	✔
High-res drawings and signatures	✔	
Digitiser pen	✔	
Stylus pen		✔
Gloves		

CF-C2

CF-MX4

THE TOUCHSCREEN RANGE
CONFIGURATIONS

Model	CF-20		FZ-G1
	Touchscreen	**Dual touch**	**Touchscreen**
Input device	Capacitive multi-touch	Capacitive multi-touch & digitiser	Capacitive multi-touch & digitiser
Display brightness	800cd/m²	800cd/m²	800cd/m²
IPS	✔	✔	
IPSα			✔
Dual touch		✔	
Anti-glare	✔	✔	✔
Anti-reflection	✔	✔	✔
CircuLumin™			
Protection film	✔	✔	✔
Transflective plus™			
Direct bonding	✔	✔	✔
Multi-touch	Ten-finger multi-touch	Ten-finger multi-touch	Ten-finger multi-touch
Standard signatures	✔	✔	✔
High-res drawings and signatures		✔	✔
Digitiser pen		✔	✔
Stylus pen	✔		
Gloves	✔	✔	✔

CF-20

FZ-G1

THE TOUCHSCREEN RANGE
CONFIGURATIONS

Panasonic
BUSINESS

Model	FZ-Y1		FZ-M1/FZ-B2
	Performance	Value/Standard	Touchscreen
Input device	Capacitive touchscreen	Capacitive touchscreen	Capacitive touchscreen
Display brightness	300cd/m²	300cd/m²	500cd/m²
IPS			✔
IPSα	✔	✔	
Dual touch			
Anti-glare			✔
Anti-reflection			✔
CircuLumin™			
Protection film			✔
Transflective plus™			
Direct bonding	✔	✔	✔
Multi-touch	Ten-finger multi-touch	Ten-finger multi-touch	Ten-finger multi-touch
Standard signatures	✔	✔	✔
High-res drawings and signatures	✔		
Digitiser pen			
Stylus pen	✔ (Electronic Touch Pen)		✔
Gloves			✔

FZ-Y1 Performance

FZ-M1

FZ-B2

TOUGHBOOK

TOUGHPAD

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