
	Overview Touch Panels				
	Resistive Touch	Capacitive Touch	Infra - Red Touch	SAW Touch (Sound Acoustic Wave)	Inductive Touch
Description of function	<ul style="list-style-type: none"> Transparent conductive coatings (Indium Tin Oxide), typically on a foil and a glass surface, are connected during operating. This contact causes a program interrupt and by using 4 - wire technology the connecting point can be evaluated with high precision. If using the 5 - wire technology for touch panels $\geq 10"$, the touch point accuracy can be increased significantly. 	<ul style="list-style-type: none"> Coated, but transparent glass plates, working like a capacitor, are driven by an electrical signal. A touch operating is causing an offset in the electrical charge, which can be detected and evaluated. 	<ul style="list-style-type: none"> By using special infra - red LED's and photocells an optical grid is created in front of the screen. When the grid is interrupted by touching, the signal is detected and converted into the X - Y coordinate. 	<ul style="list-style-type: none"> By using piezoelements (Ultrasonic system) and special reflectors a acoustic digital grid is created in front of the screen. A touch operation, causing an absorption of the acoustic wave, can be determined and the X - Y coordinates can be evaluated 	<ul style="list-style-type: none"> A special signal pen with an integrated electrical coil causes a modification of the electromagnetic field around conduits on a operating board. The modification and direction of the electromagnetic field causes a voltage offset which can be detected and evaluated
Advantage	<ul style="list-style-type: none"> High detection accuracy Operating with finger, gloves and objects is possible. Intuitive operating Low sensitivity against static and dynamic moisture Usage in wet and dusty rooms is possible Touch panel itself can be integrated in the front cover Low power consumption 	<ul style="list-style-type: none"> Limited sensitive against moisture Limited usage in wet rooms is possible Multiple Touch function can be realized Touch panel itself can be integrated in the front cover 	<ul style="list-style-type: none"> High transparency Touch itself can be made robust and safe against vandalism Usage in environmental with static moisture and fluids 	<ul style="list-style-type: none"> High transparency Touch itself can be made robust and safe against vandalism Usage in environmental with static moisture and fluids 	<ul style="list-style-type: none"> No malfunction caused by hand or finger thenar Touch itself can be made robust and safe against vandalism Inclination of Sensor pen and/or operating pressure can be detected. Touchless operating is possible
Disadvantage	<ul style="list-style-type: none"> Slightly limited transparency Limited protection against mechanical damage Limited resistance against chemical substances Multiple touch is not possible 	<ul style="list-style-type: none"> Slightly limited transparency Limited protection against mechanical damage Limited resistance against chemical substances Dynamic moisture and/or high dust are causing malfunction Does not work with artificial replacements (Arm, Hand, Finger) Complicate interface and software 	<ul style="list-style-type: none"> Insects can cause malfunction Sensitive in environmental with dynamic moisture Big outline dimensions Not suitable for dusty environmental High energy consumption Very expensive 	<ul style="list-style-type: none"> Operation only with naked fingers, no gloves, stylus or other objects Usage in wet rooms is not possible. Dynamic moisture or dust cause malfunction Limited detection accuracy High energy consumption Very expensive 	<ul style="list-style-type: none"> Operating only with specific sensor pen and integrated inductor Pure touch function, seldom for operating direct on the screen High power consumption Not suitable for small touch dimensions Very expensive

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	Resistive Touch	Capacitive Touch	Infra - Red Touch	SAW Touch (Sound Acoustic Wave)	Inductive Touch
Specifics	<ul style="list-style-type: none"> • Low cost • Many applications • Attractive for individual solutions in small and high volumes • Can be combined with front foil 	<ul style="list-style-type: none"> • Favorable only in high volumes • Mainly for consumer products • Can be combined with front foil • Possibility of multiple touch 	<ul style="list-style-type: none"> • Usage mostly for midsize and big screens. • Big outline dimensions • Public usage 	<ul style="list-style-type: none"> • Usage mostly for midsize and big screens. • Big outline dimensions • Public usage 	<ul style="list-style-type: none"> • Only for specific systems, such as graphic boards • Especially for design jobs and CAD machines
Electrical Interface	<ul style="list-style-type: none"> • Controller with simple software or • usage of standard IC's: i.e.: MXB7843 (Maxim), MK712 (Micro Clock), ADS7846 (Texas Instruments) etc 	<ul style="list-style-type: none"> • Complicated and comprehensive software. • Driver with special IC's (mostly based on consumer market) • Very short conductive connections to the touch panel itself are mandatory • Dielectric value of Touch panel material must be considered 	<ul style="list-style-type: none"> • Special IC's are needed • Special programming with product based Software 	<ul style="list-style-type: none"> • Special IC's are needed • Special programming with product based Software 	<ul style="list-style-type: none"> • Special IC's are needed • Specific and system based software
Typical applications	<ul style="list-style-type: none"> • Handheld applications • Measuring instruments • Medical equipment • Medical diagnosis • Cell-phones • Smart phones • Robot systems • Navigator systems • Copy machines • Industrial PCs 	<ul style="list-style-type: none"> • Smartphones • Cell-phones • Navigator systems • Electronic amusement 	<ul style="list-style-type: none"> • Infotainment • Ticket machines • Cashier machines with typical screen size > 12" 	<ul style="list-style-type: none"> • Gambling house • Info-centre • Ticket machines • Industrial usage with typical screen size > 12" 	<ul style="list-style-type: none"> • Tablet PCs • Graphic tablet • Pocket book
Product examples	