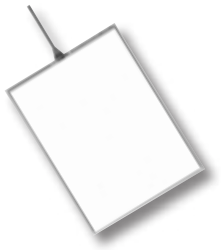
Contents Touch Screens & Membranes

FT 4-Wire Touch Screens

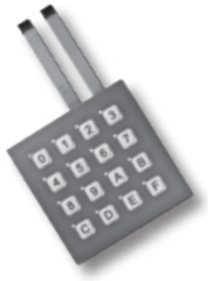
- With FPC Tails L4
- With Printed Tails L10

FT Digital Touch Screens L18

FT 5-Wire Touch Screens.....L20



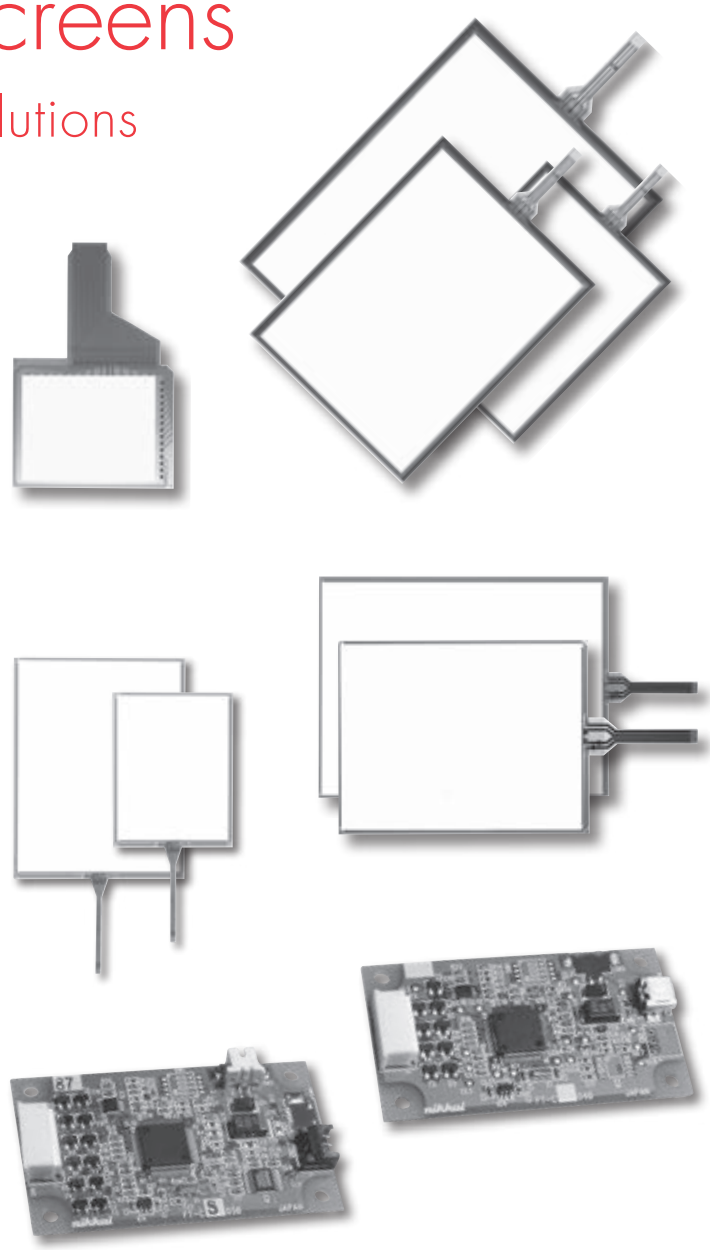
TP01 4-Wire Multi-Touch Screens L26



FM Membranes L39

Resistive Touch Screens

4-Wire, 5-Wire & Digital Solutions



NKK's transparent touch screens are engineered to complement the application of choice while offering superior durability and flexibility. With options in multiple sizes, and choices of input by finger, gloved finger or stylus, we maintain a consistent focus on impeccable quality and value added solutions with the diverse needs of our customers at the forefront.

Whether an application requires the 4- or 5-wire technology, the features include metal tails (analog), contact reliability with a connector, and ANR film, eliminating many of the typical visual artifacts. The film surface is non-glare and resin coated for ease of use and integrity of the surface.

Additional benefits of NKK's 5-wire touch screens include:

- Screens highly resistant to static electricity and noise pollution
- Drift-free operation despite any temperature fluctuation
- Greater touch point density translating to more precision and reduction of false actuations
- Quicker response time

DISTINCTIVE CHARACTERISTICS

- Wide Range of Available Sizes
- Custom Solutions a Specialty
- Digital and Analog Solutions
- Controllers Available
- Anti-Newton Ring (ANR) Technology for Analog Touch Screens
- Design Minimizes Visual Artifacts
- RoHS Compliant

APPLICATIONS

- Information Kiosks
- Industrial Automation
- Banking, Exchange Management Systems
- Office Automation
- Gaming/Entertainment
- Medical Equipment
- Hand-held Devices
- Hospitality & Restaurant
- Broadcast

General Specifications

Electrical Capacity (Resistive Load)

Power Level: 1mA @ 5V DC (resistive load)

Other Ratings

XY Resistive Value: 250 ~ 850Ω; Wide: 120 ~ 1,500Ω
Linearity: ±1.5% maximum
Insulation Impedance: 10MΩ minimum @ 25V DC
Expected Operational Life: Writing: 50,000 operations minimum (approximately 30mm movement with stylus)
Tapping: 1,000,000 operations minimum (pressing force 4.9N using silicone rubber, hardness 60°)
Touch Activation Force: 1.47N maximum
Chattering Time: 10 milliseconds maximum
Light Transmission: 80% typical (Touch Panel portion)
Surface Hardness: 2H minimum (JIS K5600)

Environmental Data

Operating Temperature Range: –20°C ~ +70°C (–4°F ~ +158°F)
Storage Temperature Range: –40°C ~ +80°C (–40°F ~ +176°F)
Relative Humidity: +60°C (+140°F), humidity 90%, 240 hours

TYPICAL ORDERING EXAMPLE

FT | AS | 00 | – | 10.6 | A | W | – | 4 | A

Number of Keys

00	Analog

Screen Size

5.7	5.7″
6.5	6.5″
8.4	8.4″
10.4	10.4″
10.6	10.6″
12.1	12.1″
15	15.0″
15.6	15.6″
19	19.0″

Input Method

A	Finger or Stylus

***Position of Tail (Analog)**

No Code	Left or Right (Horizontal)
V	Top or Bottom (Vertical)
S	Narrow Frame Type 1 (Horizontal)
N	Narrow Frame Type 2 (Horizontal)
W	Wide Type (Horizontal)

*Aspect Ratio:
Narrow Frame: 4:3
Wide Frame: 16:9

Type

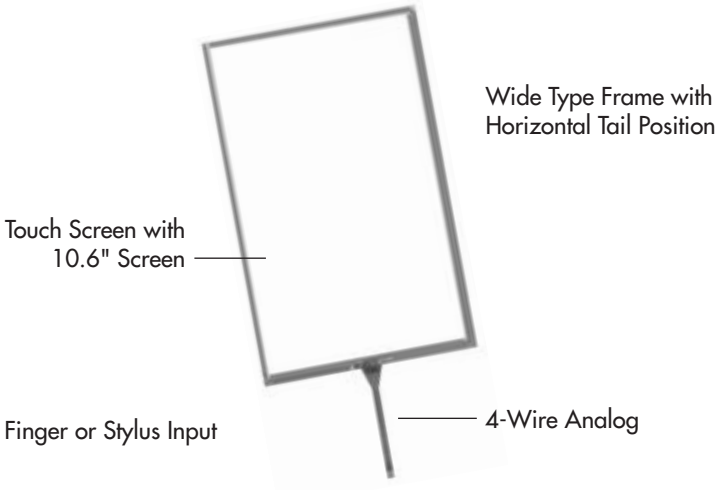
4	4-Wire

Tail

A	FPC Tail 1.0mm Pitch

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

FTAS00–10.6AW–4A



PART NUMBERS & DESCRIPTIONS

FTAS00-5.7AS-4A

FTAS00-6.5AS-4A

FTAS00-8.4AS-4A

FTAS00-10.4AS-4A

FTAS00-10.4AV-4A

FTAS00-10.6AW-4A

FTAS00-12.1AN-4A

FTAS00-12.1AW-4A

FTAS00-15AN-4A

FTAS00-15.6AW-4A

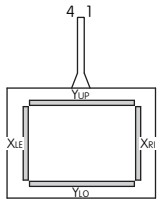
FTAS00-19AN-4A

4-Wire Analog Touch Screens

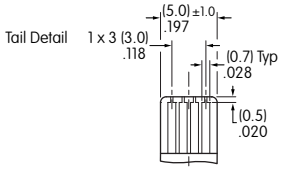
Tail	Part Number	Screen Size in Inches	Key Area Dimensions	Viewing Area Dimensions	External Dimensions	Panel Thickness	Terminal Detail 4 Pin .039″ (1.0mm) Pitch
Narrow Frame Type 1 Horizontal Tail	FTAS00-5.7AS-4A	5.7	4.535″ x 3.402″ (115.2mm x 86.4mm)	4.764″ x 3.606″ (121.0mm x 91.6mm)	5.157″ x 3.976″ (131.0mm x 101.0mm)	.055″ (1.4mm)	Length 2.559 ″ (65.0mm)
	FTAS00-6.5AS-4A	6.5	5.197″ x 3.898″ (132.0mm x 99.0mm)	5.433″ x 4.134″ (138.0mm x 105.0mm)	5.906″ x 4.567″ (150.0mm x 116.0mm)	.055″ (1.4mm)	Length 2.559″ (65.0mm)
	FTAS00-8.4AS-4A	8.4	6.728″ x 5.102″ (170.9mm x 129.6mm)	6.949″ x 5.331″ (176.5mm x 135.4mm)	7.343″ x 5.685″ (186.5mm x 144.4mm)	.083″ (2.1mm)	Length 3.150″ (80.0mm)
	FTAS00-10.4AS-4A	10.4	8.315″ x 6.236″ (211.2mm x 158.4mm)	8.465″ x 6.394″ (215.0mm x 162.4mm)	8.882″ x 6.748″ (225.6mm x 171.4mm)	.083″ (2.1mm)	Length 3.150″ (80.0mm)
Vertical Tail	FTAS00-10.4AV-4A	10.4	8.354″ x 6.276″ (212.2mm x 159.4mm)	8.520″ x 6.433″ (216.4mm x 163.4mm)	8.917″ x 7.205″ (226.5mm x 183.0mm)	.083″ (2.1mm)	Length 3.150″ (80.0mm)
Narrow Frame Type 2 Horizontal Tail	FTAS00-12.1AN-4A	12.1	9.677″ x 7.256″ (245.8mm x 184.3mm)	9.827″ x 7.406″ (249.6mm x 188.1mm)	10.236″ x 7.795″ (260.0mm x 198.0mm)	.083″ (2.1mm)	Length 3.150″ (80.0mm)
	FTAS00-15AN-4A	15.0	11.972″ x 8.980″ (304.1mm x 228.1mm)	12.130″ x 9.138″ (308.1mm x 232.1mm)	12.669″ x 9.665″ (321.8mm x 245.5mm)	.083″ (2.1mm)	Length 3.150″ (80.0mm)
	FTAS00-19AN-4A	19.0	14.815″ x 11.850″ (376.3mm x 301.0mm)	15.039″ x 12.102″ (382.0mm x 307.4mm)	15.571″ x 12.638″ (395.5mm x 321.0mm)	.083″ (2.1mm)	Length 3.150″ (80.0mm)
Wide Type Horizontal Tail	FTAS00-10.6AW-4A	10.6	9.071″ x 5.441″ (230.4mm x 138.2mm)	9.189″ x 5.563″ (233.4mm x 141.3mm)	9.756″ x 6.094″ (247.8mm x 154.8mm)	.083″ (2.1mm)	Length 3.150″ (80.0mm)
	FTAS00-12.1AW-4A	12.1	10.280″ x 6.425″ (261.12mm x 163.2mm)	10.404″ x 6.551″ (264.26mm x 166.4mm)	10.827″ x 6.929″ (275.0mm x 176.0mm)	.083″ (2.1mm)	Length 3.150″ (80.0mm)
	FTAS00-15.6AW-4A	15.6	13.551″ x 7.618″ (344.2mm x 193.5mm)	13.681″ x 7.748″ (347.5mm x 196.8mm)	14.276″ x 8.433″ (362.6mm x 214.2mm)	.083″ (2.1mm)	Length 3.150″ (80.0mm)

TYPICAL DIMENSIONS

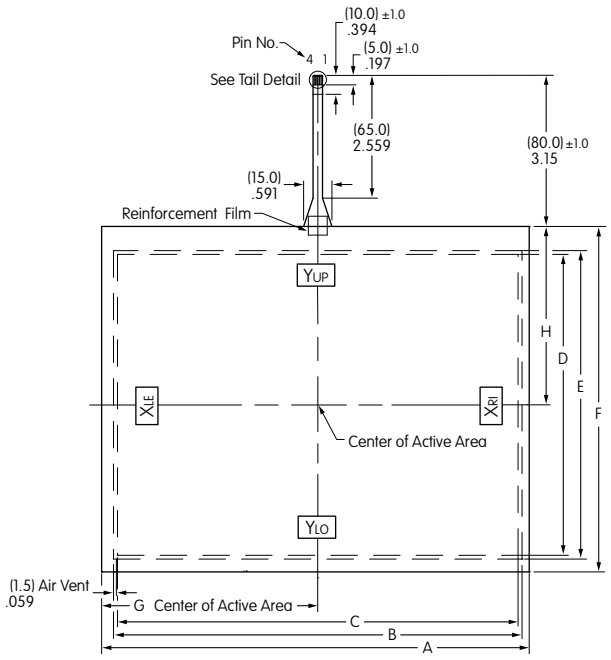
Vertical Tail

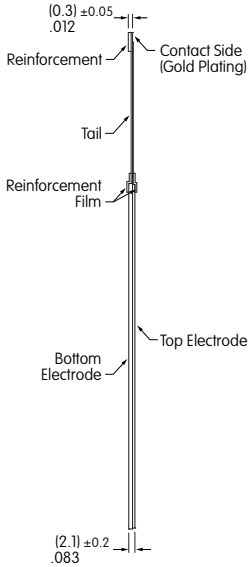


YUP, YLO: Bottom Electrode Terminal
XLE, XRI: Top Electrode Terminal



Pins	Signal
1	Y_{UP}
2	Y_{LO}
3	X_{LE}
4	X_{RI}



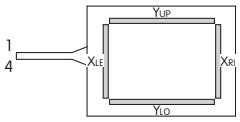


Typical Dimensions for Vertical Frame

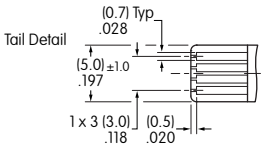
Part Number	Screen Size in Inches	Dim A	Dim B Viewable Area	Dim C Active Area	Dim D Active Area	Dim E Viewable Area	Dim F	Dim G Center of Active Area (Horizontal)	Dim H Center of Active Area (Vertical)
FTAS00-10.4AV-4A	10.4	8.917″ (226.5±0.3mm)	8.520″ (216.4mm)	8.354″ (212.2mm)	6.276″ (159.4mm)	6.433″ (163.4mm)	7.205″ (183.0±0.3mm)	4.508″ (114.5mm)	3.720″ (94.5mm)

TYPICAL DIMENSIONS

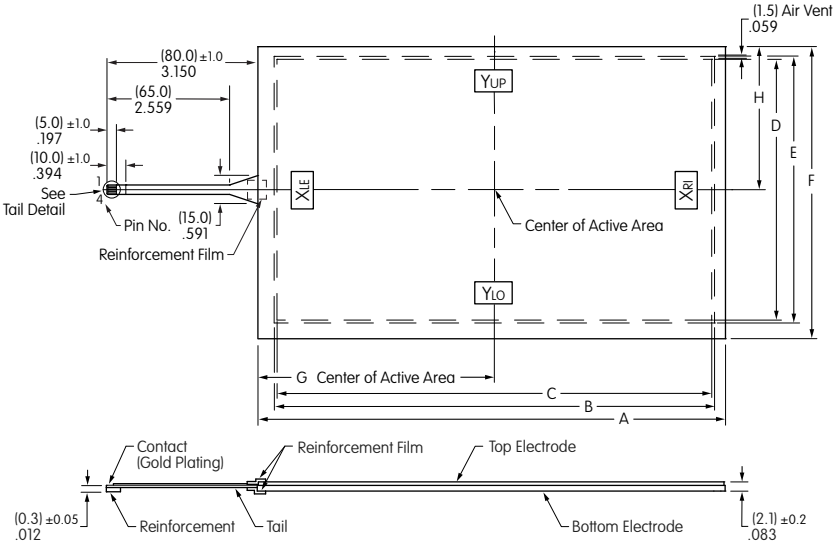
Horizontal Tail & Wide Frame



YUP, YLO: Bottom Electrode Terminal
XLE, XRI: Top Electrode Terminal



Pins	Signal
1	Y_{UP}
2	Y_{LO}
3	X_{LE}
4	X_{RI}

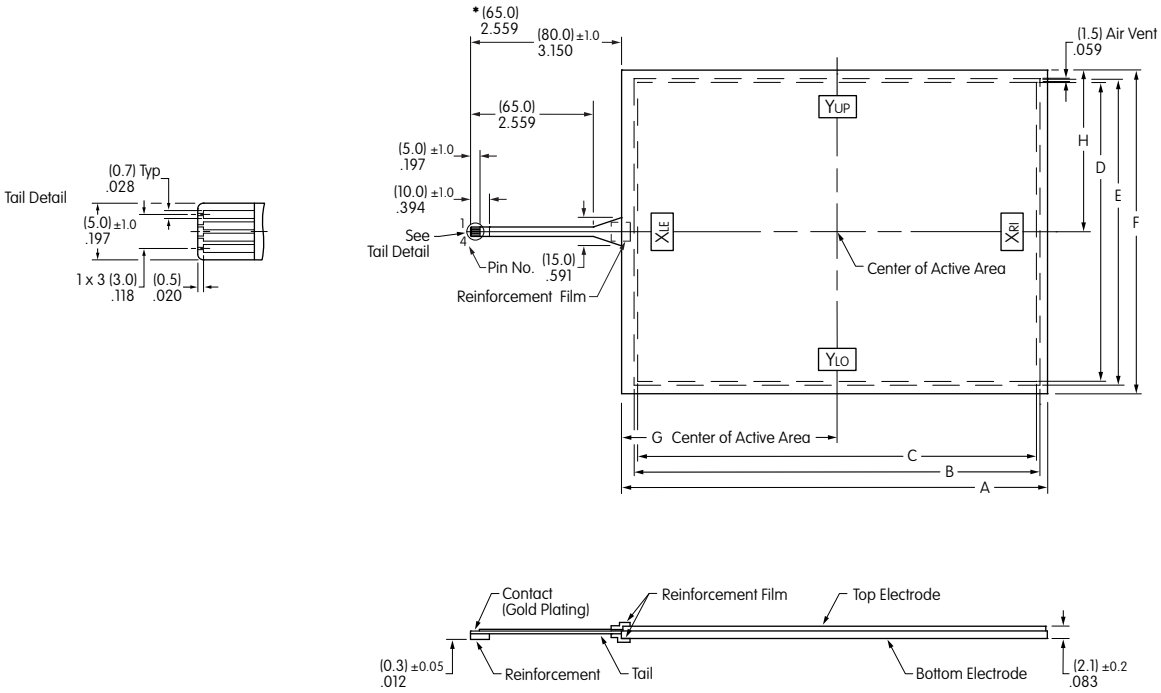


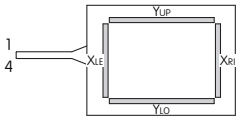
Typical Dimensions for Wide Horizontal Frames

Part Number	Screen Size in Inches	Dim A	Dim B Viewable Area	Dim C Active Area	Dim D Active Area	Dim E Viewable Area	Dim F	Dim G Center of Active Area (Horizontal)	Dim H Center of Active Area (Vertical)
FTAS00-10.6AW-4A	10.6	9.756″ (247.8±0.3mm)	9.189″ (233.4mm)	9.071″ (230.4mm)	5.441″ (138.2mm)	5.563″ (141.3mm)	6.095″ (154.8±0.3mm)	4.933″ (125.3mm)	2.984″ (75.8mm)
FTAS0012.1AW-4A	12.1	10.827″ (275.0±0.3mm)	10.404" (264.26mm)	10.280" (261.12mm)	6.425" (163.2mm)	6.551" (166.4mm)	6.929" (176.0±0.3mm)	5.468" (138.89mm)	3.465″ (88.0mm)
FTAS0015.6AW-4A	15.6	14.276" (362.6±0.3mm)	13.681" (347.5mm)	13.551" (344.2mm)	7.618" (193.5mm)	7.748" (196.8mm)	8.433" (214.2±0.3mm)	7.138" (181.3mm)	4.217″ (107.1mm)

TYPICAL DIMENSIONS

Horizontal Tail & Narrow Frame





YUP, YLO: Bottom Electrode Terminal
XLE, XRI: Top Electrode Terminal

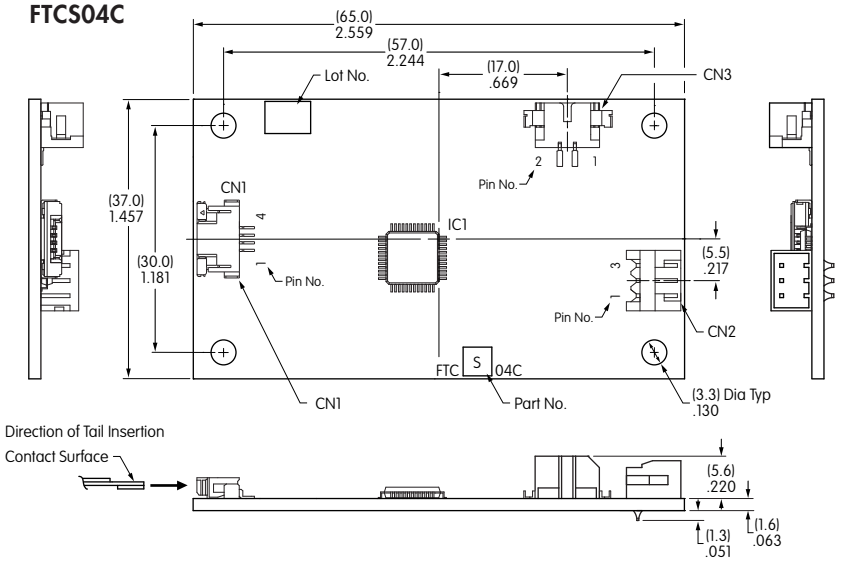
Pins	Signal
1	Y_{UP}
2	Y_{LO}
3	X_{LE}
4	X_{RI}

Typical Dimensions for Narrow Frames

Part Number	Screen Size in Inches	Dim A	Dim B Viewable Area	Dim C Active Area	Dim D Active Area	Dim E Viewable Area	Dim F	Dim G Center of Active Area (Horizontal)	Dim H Center of Active Area (Vertical)
* FTAS00-5.7AS-4A	5.7	5.157″ (131.0±0.3mm)	4.764″ (121.0mm)	4.535″ (115.2mm)	3.402″ (86.4mm)	3.606″ (91.6mm)	3.976″ (101.0±0.3mm)	2.648″ (67.25mm)	1.988″ (50.5mm)
* FTAS00-6.5AS-4A	6.5	5.906″ (150.0±0.3mm)	5.433″ (138.0mm)	5.197″ (132.0mm)	3.898″ (99.0mm)	4.134″ (105.0mm)	4.567″ (116.0±0.3mm)	3.031″ (77.0mm)	2.284″ (58.0mm)
FTAS00-8.4AS-4A	8.4	7.343″ (186.5±0.3mm)	6.949″ (176.5mm)	6.728″ (170.9mm)	5.102″ (129.6mm)	5.331″ (135.4mm)	5.685″ (144.4±0.3mm)	3.734″ (94.85mm)	2.843″ (72.2mm)
FTAS00-10.4AS-4A	10.4	8.882″ (225.6±0.3mm)	8.465″ (215.0mm)	8.315″ (211.2mm)	6.236″ (158.4mm)	6.394″ (162.4mm)	6.748″ (171.4±0.3mm)	4.492″ (114.1mm)	3.374″ (85.7mm)
FTAS00-12.1AN-4A	12.1	10.236″ (260.0±0.3mm)	9.827″ (249.6mm)	9.677″ (245.8mm)	7.256″ (184.3mm)	7.406″ (188.1mm)	7.795″ (198.0±0.3mm)	5.177″ (131.5mm)	3.850″ (97.8mm)
FTAS00-15AN-4A	15.0	12.669″ (321.8±0.3mm)	12.130″ (308.1mm)	11.972″ (304.1mm)	8.980″ (228.1mm)	9.138″ (232.1mm)	9.665″ (245.5±0.3mm)	6.398″ (162.5mm)	4.833″ (122.75mm)
FTAS00-19AN-4A	19.0	15.571″ (395.5±0.3mm)	15.039″ (382.0mm)	14.815″ (376.3mm)	11.850″ (301.0mm)	12.102″ (307.4mm)	12.638″ (321.0±0.3mm)	7.799″ (198.1mm)	6.319″ (160.5mm)

Controller Board for RS232C

FTCS04C



CN1 4-Wire Analog Touch Screen Connector - 4 Pins

Pin No.	Symbol	Description
1	Y0	For Y_{UP} or Y_{LO}
2	Y1	
3	X0	For X_{RI} or X_{LE}
4	X1	

CN2 RS232C Header Connector - 3 Pins

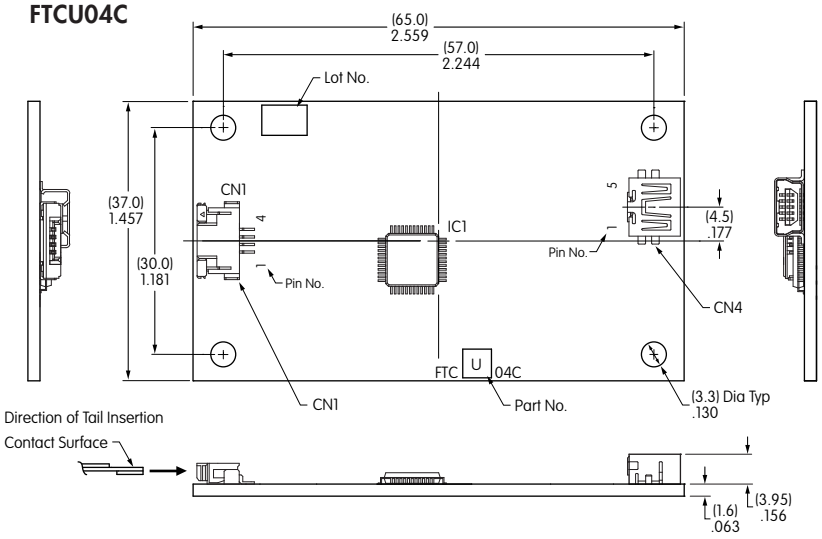
Controller Board Side			
Pin No.	Symbol	Description	Computer Side
1	RD	Receiving Data (IN)	Sending Data
2	SD	Sending Data (OUT)	Receiving Data
3	GND	GND	GND

CN3 Header Connector for Power Supply - 2 Pins

Pin No.	Symbol	Description
1	V_{CC}	Supply Voltage
2	GND	GND

Controller Board for USB

FTCU04C



CN1 4-Wire Analog Touch Screen Connector - 4 Pins

Pin No.	Symbol	Description
1	Y0	For Y_{UP} or Y_{LO}
2	Y1	
3	X0	For X_{RI} or X_{LE}
4	X1	

CN4 Header Connector for USB - 5 Pins

Pin No.	Symbol	Description
1	V_{CC}	USB V_{CC}
2	D –	USB D –
3	D +	USB D +
4	GND	USB GND
5	GND	Shield GND

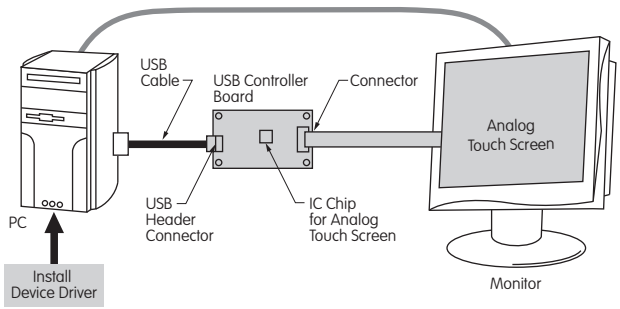
Controller Boards & Drivers

DISTINCTIVE CHARACTERISTICS

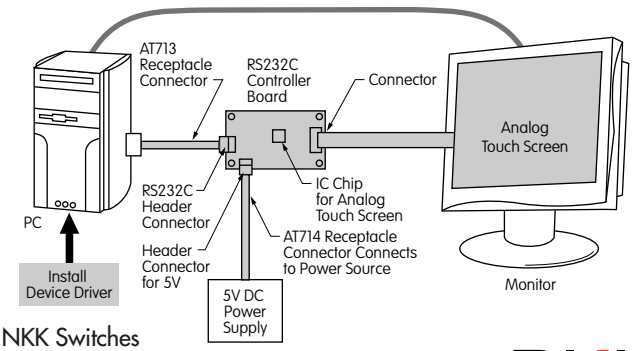
- Compatible with Control Board USB/RS232C
- Equipped with EPROM for Saving Setting Data
- Device Drivers are Windows 7, 8 & 10 Compatible

Controller Boards		
Type	Part No.	Communication Protocol
4-Wire	FTCS04C	RS232C
4-Wire	FTCU04C	USB

System Configuration for USB



System Configuration for RS232C



Available through NKK Switches

4-Wire Touch Screens with FPC Tails

General Specifications		
Items	**FTCS04C**	**FTCU04C**
Interface	RS232C	USB 2.0 Full Speed
Clock	16MHz	16MHz
Supply Voltage	5.0V	5.0V (Bus Power)
Resolution	10bit	10bit
Current Consumption	40mA maximum	100mA maximum
Communication Speed	9600 bps	———
Communication Format	Data Length: 8bit Parity: None Stop Bit: 1	———

Touch panels can be operated the same as PC mouse functions by combining a control board or device driver and analog touch screen.

The controller board is designed specifically for touch screens with the FPC tails. Refer to the product data sheet for detailed specifications, available by contacting NKK Switches.

Absolute Maximum Ratings

Items	Symbols	Minimum	Maximum	Notes
Supply Voltage	V_{CC}	−0.3V	+5.5V	——
Input Voltage	V_{TP}	——	V_{CC}	Touch Panel Input
	*V_{RS}	−15V	+15V	RS232C
Operating Temperature	T_{OPR}	−20°C −4°F	+70°C +158°F	——
Storage Temperature	T_{STG}	−25°C −13°F	+85°C +185°F	——

*V_{RS}: Applies Only to RS232C

Recommended Values

Items	Symbols	Minimum	Typical	Maximum	Notes
Supply Voltage	V_{CC}	+4.75V	+5.0	+5.25V	——
Operating Temperature	T_{OPR}	−20°C −4°F	——	+70°C +158°F	No Condensation

IC Chip & Accessories

DISTINCTIVE CHARACTERISTICS

- Interface: USB and RS232C
- High Speed and Accuracy
- Built-in Calibration Function
- Data Function Removal Built In to Eliminate Noise

IC FTCSU548

The IC is for use with the 4-wire transparent touch screens. When the screen is touched, it recognizes the position of the touch by the level of analog voltage detected by the A/D. The A/D converter receives the value and sends a set of coordinate values as serial data or USB.

General Specifications for IC FTCSU548	
Package	LFQFP 48 Pins
Interface	Serial Interface (Asynchronous) or USB (Full Speed 2.0)
Supply Voltage	3.3/5.0V Typ; USB Available for 5V Only
*** Rated Output Current**	High Level: −170mA Low Level: +170mA
Operation Frequency	16MHz
A/D Converter Resolution	10bit
Operating Temperature	−20°C ~ +85°C (−4°F ~ +185°F)
Storage Temperature	−40°C ~ +125°C (−40°F ~ +257°F)

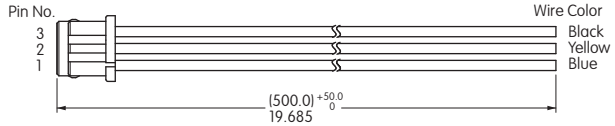
* Total Output Electric Current Amount of all the I/O Port

Contact NKK Switches for the IC data sheet.

OPTIONAL ACCESSORIES

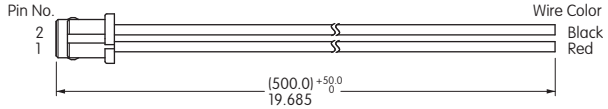
Receptacle Connector & Wire Assembly for RS232C

AT713 is the Receptacle Connector with code to connect to RS232C communication of the controller boards. It is compatible with FTCS04C. The cable length is adjustable.



Receptacle Connector & Wire Assembly for Power Supply

AT714 is a Receptacle Connector with code to connect to FTCS04C power source of the control boards. The cable length is adjustable.



General Specifications

Electrical Capacity (Resistive Load)

Power Level: 1mA @ 5V DC (resistive load)

Other Ratings

XY Resistive Value: 250 ~ 850Ω; Wide: 120 ~ 1,500Ω
Linearity: ±1.5% maximum
Insulation Impedance: 10MΩ minimum @ 25V DC
Expected Operational Life: Writing: 50,000 operations minimum (approximately 30mm movement with stylus)
Tapping: 1,000,000 operations minimum (pressing force 4.9N using silicone rubber, hardness 60°)
Touch Activation Force: 1.47N maximum
Chattering Time: 10 milliseconds maximum
Light Transmission: 80% typical (Touch Panel portion)
Surface Hardness: 2H minimum (JIS K5600)

Environmental Data

Operating Temperature Range: –20°C ~ +70°C (–4°F ~ +158°F)
Storage Temperature Range: –40°C ~ +80°C (–40°F ~ +176°F)
Relative Humidity: +60°C (+140°F), humidity 90%, 240 hours

TYPICAL ORDERING EXAMPLE

FT | AS | 00 | – | 12.1 | A | N | – | 4

Number of Keys

00	Analog

Screen Size

5.7	5.7″
6.5	6.5″
8.4	8.4″
10.4	10.4″
10.6	10.6″
12.1	12.1″
15	15.0″
15.6	15.6″
19	19.0″

Input Method

A	Finger or Stylus

***Position of Tail (Analog)**

No Code	Left or Right (Horizontal)
V	Top or Bottom (Vertical)
S	Narrow Frame Type 1 (Horizontal)
N	Narrow Frame Type 2 (Horizontal)
W	Wide Type (Horizontal)

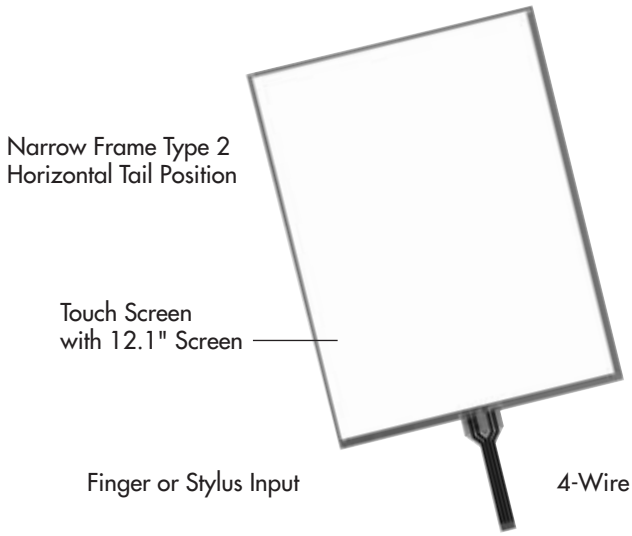
*Aspect Ratio:
Narrow Frame: 4:3
Wide Frame: 16:9

Type

4	4-Wire

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

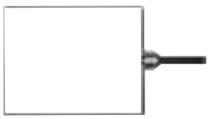
FTAS00–12.1AN–4



PART NUMBERS & DESCRIPTIONS

FTAS00-5.7AS-4

FTAS00-6.5AS-4



FTAS00-8.4AS-4

FTAS00-10.4AS-4

FTAS00-10.4AV-4

FTAS00-10.6AW-4

FTAS00-12.1AN-4

FTAS00-12.1AW-4

FTAS00-15AN-4

FTAS00-15.6AW-4

FTAS00-19AN-4

4-Wire Analog Touch Screens

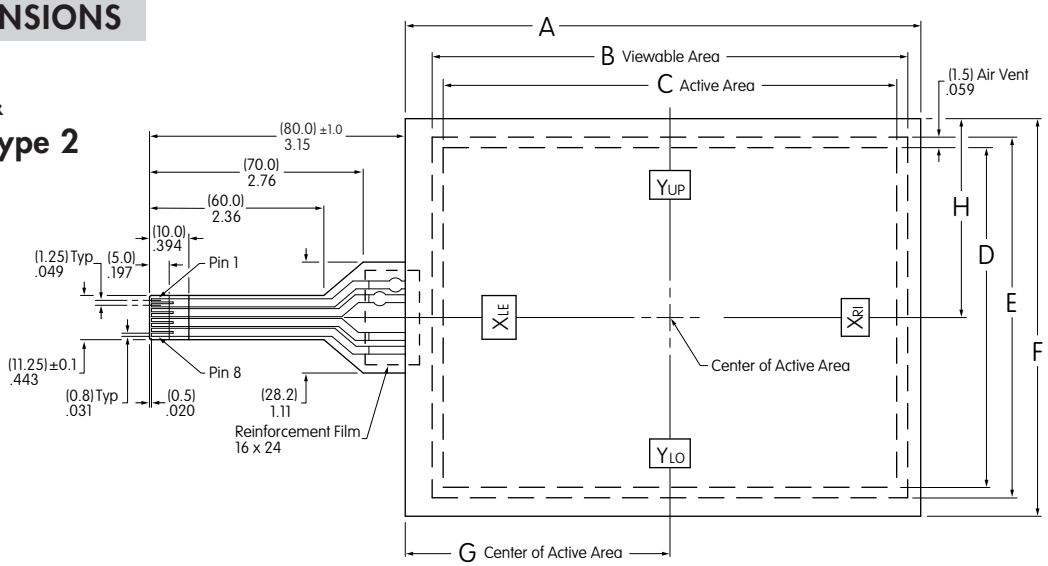
Tail	Part Number	Screen Size in Inches	Key Area Dimensions	Viewing Area Dimensions	External Dimensions	Panel Thickness	* Terminal Detail 8 Pin .049″ (1.25mm) Pitch
Narrow Frame Type 1 Horizontal Tail	FTAS00-5.7AS-4	5.7	4.54″ x 3.40″ (115.2mm x 86.4mm)	4.76″ x 3.61″ (121.0mm x 91.6mm)	5.16″ x 3.98″ (131.0mm x 101.0mm)	.055″ (1.4mm)	Length 2.559″ (65.0mm)
	FTAS00-6.5AS-4	6.5	5.20″ x 3.90″ (132.0mm x 99.0mm)	5.43″ x 4.13″ (138.0mm x 105.0mm)	5.91″ x 4.57″ (150.0mm x 116.0mm)		Length 2.559″ (65.0mm)
	FTAS00-8.4AS-4	8.4	6.73″ x 5.10″ (170.9mm x 129.6mm)	6.95″ x 5.33″ (176.5mm x 135.4mm)	7.34″ x 5.69″ (186.5mm x 144.4mm)	.083″ (2.1mm)	Length 3.150″ (80.0mm)
	FTAS00-10.4AS-4	10.4	8.32″ x 6.24″ (211.2mm x 158.4mm)	8.47″ x 6.39″ (215.0mm x 162.4mm)	8.88″ x 6.75″ (225.6mm x 171.4mm)		Length 3.150″ (80.0mm)
Vertical Tail	FTAS00-10.4AV-4	10.4	8.35″ x 6.28″ (212.2mm x 159.4mm)	8.52″ x 6.43″ (216.4mm x 163.4mm)	8.92″ x 7.20″ (226.5mm x 183.0mm)		Length 3.150″ (80.0mm)
Narrow Frame Type 2 Horizontal Tail	FTAS00-12.1AN-4	12.1	9.677″ x 7.256″ (245.8mm x 184.3mm)	9.827″ x 7.406″ (249.6mm x 188.1mm)	10.236″ x 7.795″ (260.0mm x 198.0mm)		Length 3.150″ (80.0mm)
	FTAS00-15AN-4	15.0	11.972″ x 8.980″ (304.1mm x 228.1mm)	12.130″ x 9.138″ (308.1mm x 232.1mm)	12.669″ x 9.665″ (321.8mm x 245.5mm)		Length 3.150″ (80.0mm)
	FTAS00-19AN-4	19.0	14.815″ x 11.850″ (376.3mm x 301.0mm)	15.039″ x 12.102″ (382.0mm x 307.4mm)	15. 571″ x 12.638″ (395.5mm x 321.0mm)		Length 3.150″ (80.0mm)
Wide Type Horizontal Tail	FTAS00-10.6AW-4	10.6	9.071″ x 5.441″ (230.4mm x 138.2mm)	9.189″ x 5.563″ (233.4mm x 141.3mm)	9.756″ x 6.094″ (247.8mm x 154.8mm)		Length 3.150″ (80.0mm)
	FTAS00-12.1AW-4	12.1	10.280″ x 6.425″ (261.12mm x 163.2mm)	10.404″ x 6.551″ (264.26mm x 166.4mm)	10.827″ x 6.929″ (275.0mm x 176.0mm)		Length 3.150″ (80.0mm)
	FTAS00-15.6AW-4	15.6	13.551″ x 7.618″ (344.2mm x 193.5mm)	13.681″ x 7.748″ (347.5mm x 196.8mm)	14.276″ x 8.433″ (362.6mm x 214.2mm)		Length 3.150″ (80.0mm)

Note: For other sizes or frame types, contact the factory.

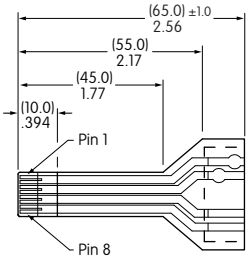
* 4 pin available with 1.0mm or 1.25mm pitch. Contact factory for details.

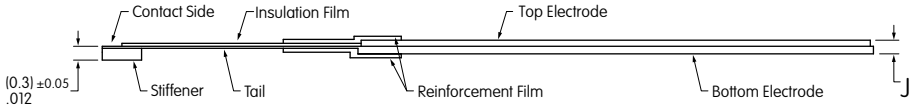
TYPICAL DIMENSIONS

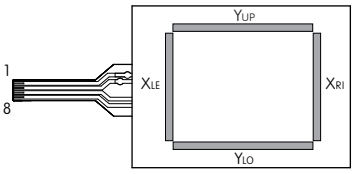
Horizontal Tail & Narrow Frame Type 2



Tail Dimensions for
FTAS00-5.7AS-4
FTAS00-6.5AS-4







XLE, XRI: Top Electrode Terminal
YUP, YLO: Bottom Electrode Terminal

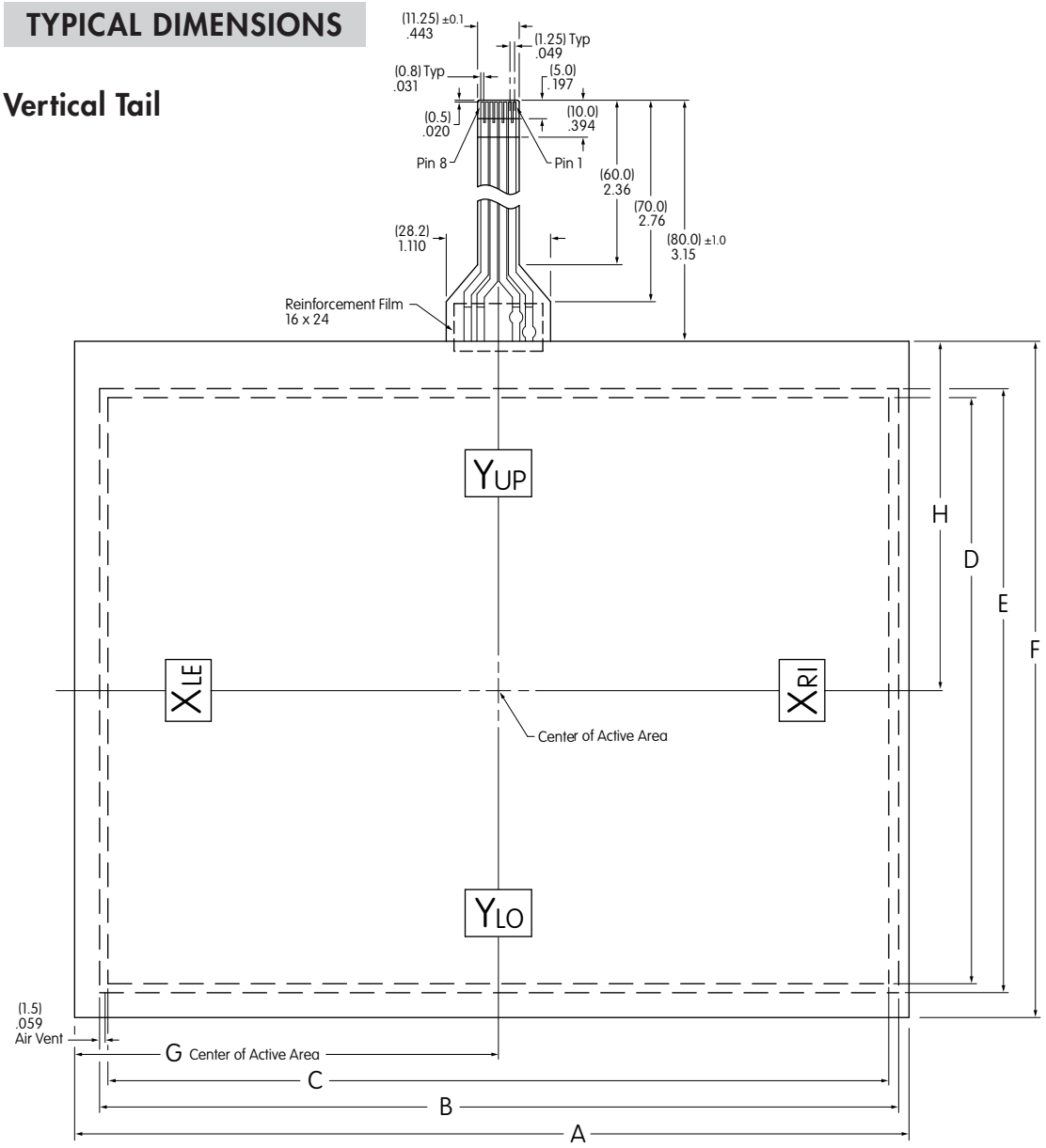
Pins	Signal
1, 2	Y_{UP}
3, 4	Y_{LO}
5, 6	X_{LE}
7, 8	X_{RI}

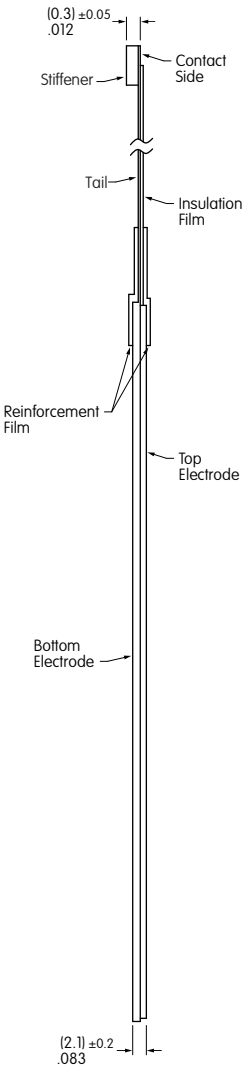
4-Wire Analog Touch Screen Dimensions

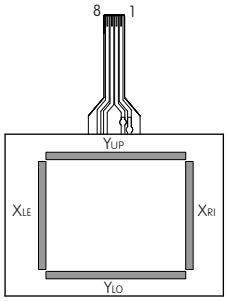
Part Number	Screen Size in Inches	Dim A	Dim B Viewable Area	Dim C Active Area	Dim D Active Area	Dim E Viewable Area	Dim F	Dim G Center of Active Area (Horizontal)	Dim H Center of Active Area (Vertical)	Dim J
FTAS00-5.7AS-4	5.7	5.16″ (131.0±0.3mm)	4.76″ (121.0mm)	4.54″ (115.2mm)	3.40″ (86.4mm)	3.61″ (91.6mm)	3.98″ (101.0±0.3mm)	2.65″ (67.25mm)	1.99″ (50.5mm)	.055″ (1.4mm)
FTAS00-6.5AS-4	6.5	5.91″ (150.0±0.3mm)	5.43″ (138.0mm)	5.20″ (132.0mm)	3.90″ (99.0mm)	4.13″ (105.0mm)	4.57″ (116.0±0.3mm)	3.03″ (77.0mm)	2.28″ (58.0mm)	.055″ (1.4mm)
FTAS00-8.4AS-4	8.4	7.34″ (186.5±0.3mm)	6.95″ (176.5mm)	6.73″ (170.9mm)	5.10″ (129.6mm)	5.33″ (135.4mm)	5.69″ (144.4±0.3mm)	3.73″ (94.85mm)	2.84″ (72.2mm)	.083″ (2.1mm)
FTAS00-10.4AS-4	10.4	8.88″ (225.6±0.3mm)	8.46″ (215.0mm)	8.31″ (211.2mm)	6.24″ (158.4mm)	6.39″ (162.4mm)	6.75″ (171.4±0.3mm)	4.49″ (114.1mm)	3.37″ (85.7mm)	.083″ (2.1mm)

TYPICAL DIMENSIONS

Vertical Tail







XLE, XRI: Top Electrode Terminal
YUP, YLO: Bottom Electrode Terminal

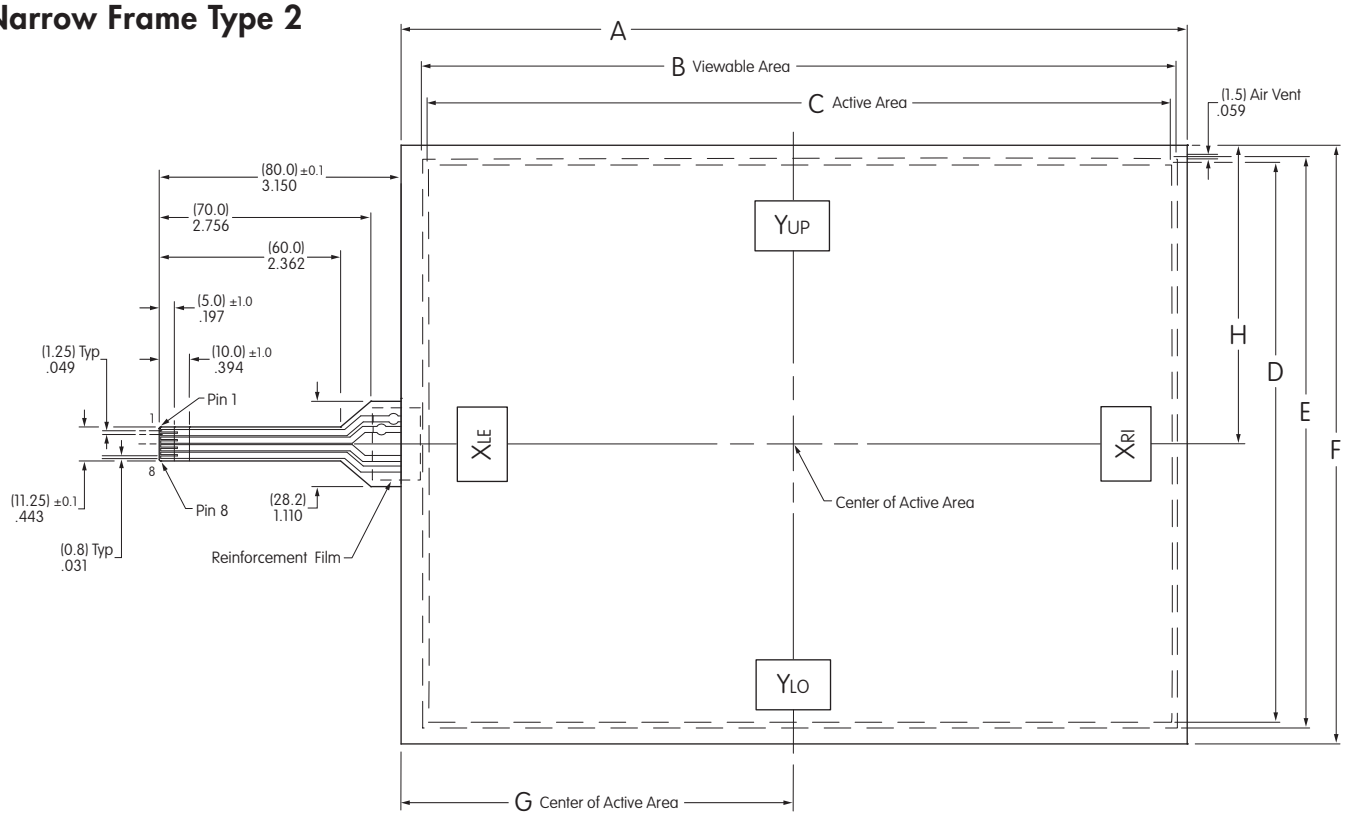
Pins	Signal
1, 2	Y_{UP}
3, 4	Y_{LO}
5, 6	X_{RI}
7, 8	X_{LE}

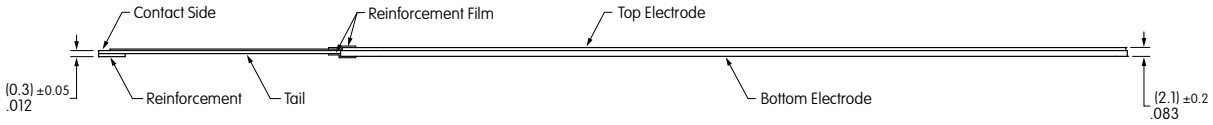
4-Wire Analog Touch Screen Dimensions

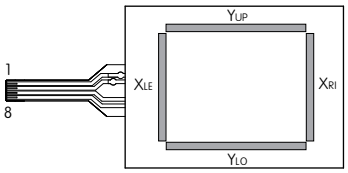
Part Number	Screen Size in Inches	Dim A	Dim B Viewable Area	Dim C Active Area	Dim D Active Area	Dim E Viewable Area	Dim F	Dim G Center of Active Area (Horizontal)	Dim H Center of Active Area (Vertical)
FTAS00-10.4AV-4	10.4	8.92″ (226.5±0.3mm)	8.52″ (216.4mm)	8.35″ (212.2mm)	6.28″ (159.4mm)	6.43″ (163.4mm)	7.20″ (183.0±0.3mm)	4.51″ (114.5mm)	3.72″ (94.5mm)

TYPICAL DIMENSIONS

Horizontal Tail & Narrow Frame Type 2







YUP, YLO: Top Electrode Terminal
XLE, XRI: Bottom Electrode Terminal

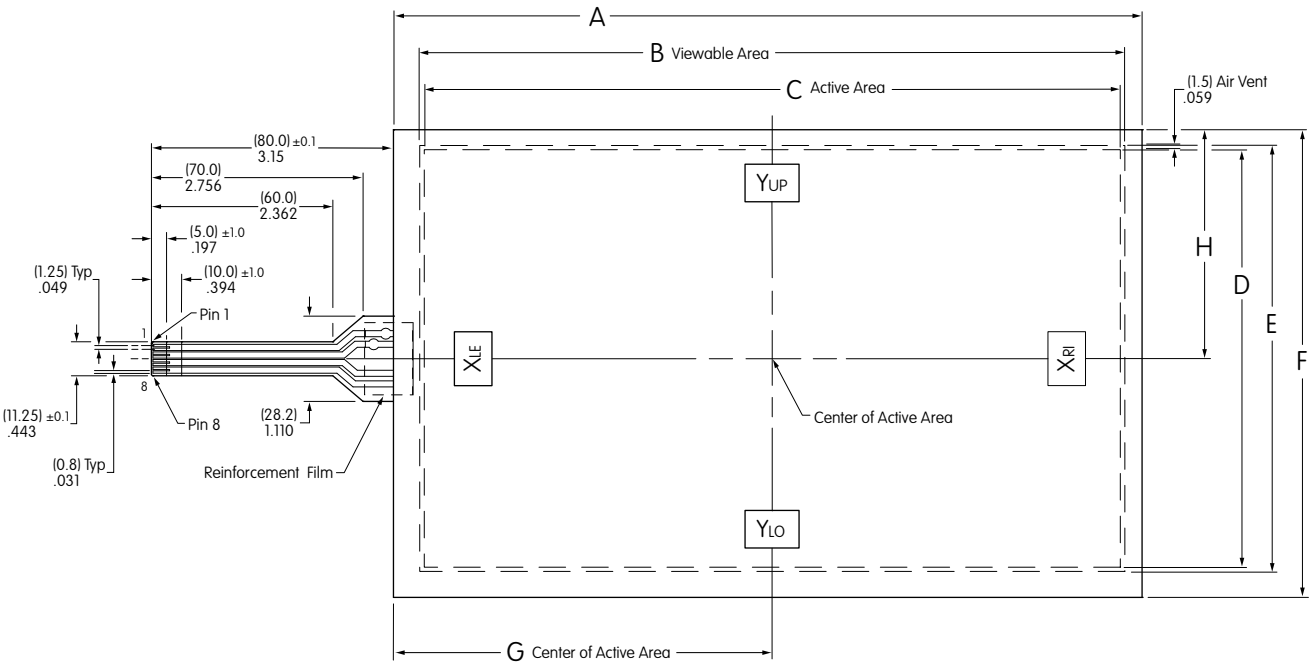
Pins	Signal
1, 2	Y_{UP}
3, 4	Y_{LO}
5, 6	X_{LE}
7, 8	X_{RI}

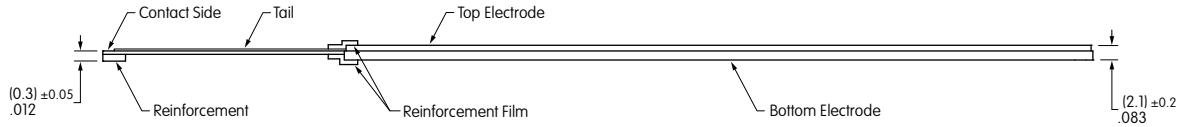
Typical Dimensions

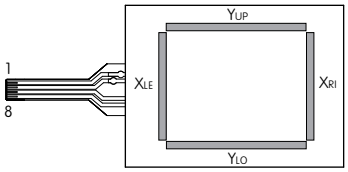
Part Number	Screen Size in Inches	Dim A	Dim B Viewable Area	Dim C Active Area	Dim D Active Area	Dim E Viewable Area	Dim F	Dim G Center of Active Area (Horizontal)	Dim H Center of Active Area (Vertical)
FTAS00-12.1AN-4	12.1	10.236″ (260.0±0.3mm)	9.827″ (249.6mm)	9.677″ (245.8mm)	7.256″ (184.3mm)	7.406″ (188.1mm)	7.795″ (198.0±0.3mm)	5.177″ (131.5mm)	3.850″ (97.8mm)
FTAS00-15AN-4	15.0	12.669″ (321.8.±0.3mm)	12.130″ (308.1mm)	11.972″ (304.1mm)	8.980″ (228.1mm)	9.138″ (232.1mm)	9.665″ (245.5±0.3mm)	6.398″ (162.5mm)	4.833″ (122.75mm)
FTAS00-19AN-4	19.0	15.571″ (395.5.±0.3mm)	15.039″ (382.0mm)	14.815″ (376.3mm)	11.850″ (301.0mm)	12.102″ (307.4mm)	12.638″ (321.0±0.3mm)	7.799″ (198.1mm)	6.319″ (160.5mm)

TYPICAL DIMENSIONS

Horizontal Tail & Wide Frame







YUP, YLO: Top Electrode Terminal
XLE, XRI: Bottom Electrode Terminal

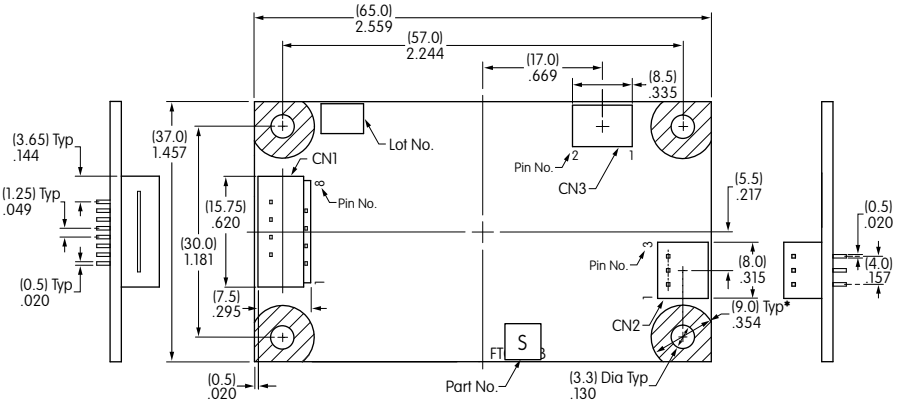
Pins	Signal
1, 2	Y_{UP}
3, 4	Y_{LO}
5, 6	X_{LE}
7, 8	X_{RI}

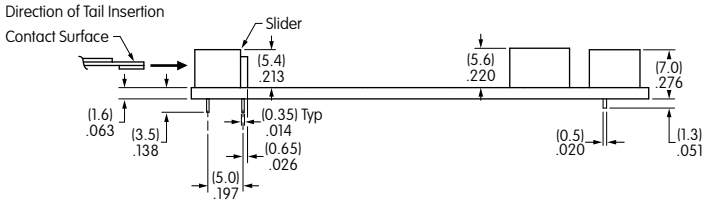
Typical Dimensions

Part Number	Screen Size in Inches	Dim A	Dim B Viewable Area	Dim C Active Area	Dim D Active Area	Dim E Viewable Area	Dim F	Dim G Center of Active Area (Horizontal)	Dim H Center of Active Area (Vertical)
FTAS00-10.6AW-4	10.6	9.756″ (247.8±0.3mm)	9.189″ (233.4mm)	9.071″ (230.4mm)	5.441″ (138.2mm)	5.563″ (141.3mm)	6.094″ (154.8±0.3mm)	4.933″ (125.3mm)	2.984″ (75.8mm)
FTAS00-12.1AW-4	12.1	10.827″ (275.0±0.3mm)	10.404″ (264.26mm)	10.280″ (261.12mm)	6.425″ (163.2mm)	6.551″ (166.4mm)	6.929″ (176.0±0.3mm)	5.468″ (138.89mm)	3.465″ (88.0mm)
FTAS00-15.6AW-4	15.6	14.276″ (362.6±0.3mm)	13.681″ (347.5mm)	13.551″ (344.2mm)	7.618″ (193.5mm)	7.748″ (196.8mm)	8.433″ (214.2±0.3mm)	7.138″ (181.3mm)	4.217″ (107.1mm)

Controller Board for RS232C

FTCS04B for RS232C





CN1 4-Wire Analog Touch Screen Connector - 8 Pins

Pin No.	Symbol	Description
1, 2	Y0	For Y_{UP} or Y_{LO}
3, 4	Y1	
5, 6	X0	For X_{RI} or X_{LE}
7, 8	X1	

CN2 RS232C Header Connector - 3 Pins

Controller Board Side			
Pin No.	Symbol	Description	Computer Side
1	RD	Receiving Data (IN)	Sending Data
2	SD	Sending Data (OUT)	Receiving Data
3	GND	GND	GND

CN3 Header Connector for Power Supply - 2 Pins

Pin No.	Symbol	Description
1	V_{CC}	Supply Voltage
2	GND	GND

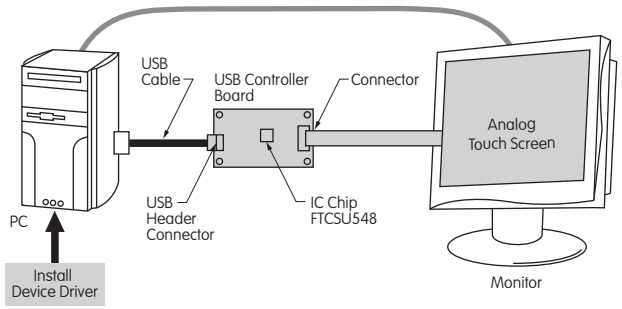
Controller Boards & Drivers

DISTINCTIVE CHARACTERISTICS

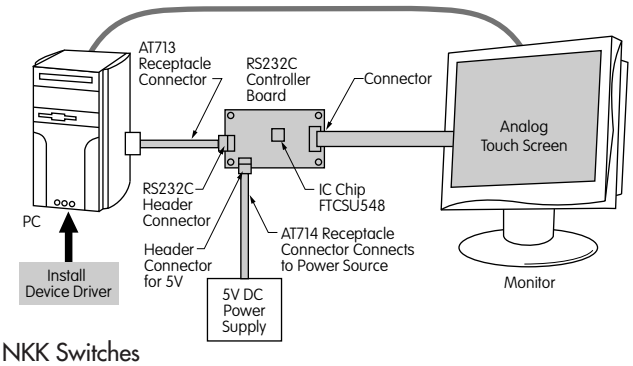
- Compatible with Control Board USB/RS232C
- Equipped with EPROM for Saving Setting Data
- Device Drivers are Windows 7 and 8 Compatible

Controller Boards		
Type	Part No.	Communication Protocol
4-Wire	FTCS04B	RS232C
4-Wire	FTCU04B	USB

System Configuration for USB



System Configuration for RS232C



Available through NKK Switches

General Specifications		
Items	FTCS04B	FTCU04B
Interface	RS232C	USB 2.0 Full Speed
Clock	6MHz	6MHz
Supply Voltage	5.0V	5.0V
Resolution	10bit	10bit
Current Consumption	40mA maximum	100mA maximum
Communication Speed	9600 bps	———
Communication Format	Data Length: 8bit Parity: None Stop Bit: 1	———

Touch panels can be operated the same as PC mouse functions by combining a control board or device driver and analog touch screen.

For specifications or technical data for the controller boards and drivers, see NKK's web site or call our engineering support personnel.

Absolute Maximum Ratings

Items	Symbols	Minimum	Maximum	Notes
Supply Voltage	V_{CC}	−0.3V	+5.5V	——
Input Voltage	V_{TP}	——	V_{CC}	Touch Panel Input
	*V_{RS}	−15V	+15V	RS232C
Operating Temperature	T_{OPR}	0°C +32°F	+70°C +158°F	——
Storage Temperature	T_{STG}	−25°C −13°F	+85°C +185°F	——

*V_{RS}: Applies Only to RS232C

Recommended Values

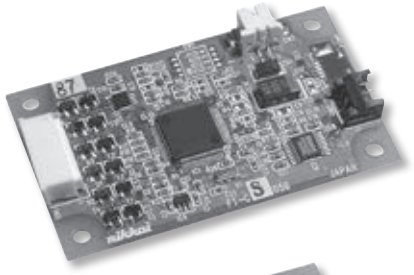
Items	Symbols	Minimum	Typical	Maximum	Notes
Supply Voltage	V_{CC}	+4.75V	+5	+5.25V	——
Operating Temperature	T_{OPR}	0	——	+70°C +158°F	No Condensation

DISTINCTIVE CHARACTERISTICS

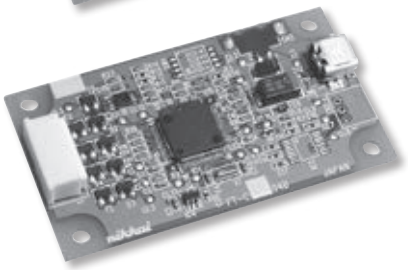
- High Quality and Reliability
- Easy Integration Replacing Mouse Functionality
- Compatible with Control Board USB/RS232C
- Device Driver Compatible with Vista and Windows XP Operating Systems

NKK offers controller boards compatible with USB or with RS232C. See web site or contact factory for specifications and technical data for any of the controller boards and drivers.

Controller Boards Available for RS232C



Controller Boards Available for USB



IC Chip & Accessories

DISTINCTIVE CHARACTERISTICS

- Interface: USB and RS232C
- High Speed and Accuracy
- Built-in Calibration Function
- Data Function Removal Built In to Eliminate Noise

IC FTCSU548

The IC is for use with the 5- and 4-wire transparent touch screens, and is available for those who prefer to design their own controller boards. When the screen is touched, it recognizes the position of the touch by the level of analog voltage detected by the A/D. The A/D converter receives the value and sends a set of coordinate values as serial data or USB.

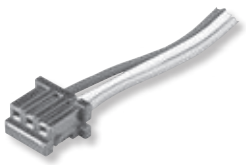
General Specifications for IC FTCSU548	
Package	LFQFP 48 Pins
Interface	Serial Interface (Asynchronous) or USB (Full Speed 2.0)
Supply Voltage	3.3/5.0V Typ; USB Available for 5V Only
*** Rated Output Current**	High Level: −170mA Low Level: +170mA
Operation Frequency	16MHz
A/D Converter Resolution	10bit
Operating Temperature	−20°C ~ +85°C (−4°F ~ +185°F)
Storage Temperature	−40°C ~ +125°C (−40°F ~ +257°F)

* Total Output Electric Current Amount of all the I/O Port

OPTIONAL ACCESSORIES

AT713 Receptacle Connector

This Receptacle Connector with code connects to RS232C communication of the controller boards.



AT714 Receptacle Connector

AT714 is a Receptacle Connector with code to connect to power source of the control boards.

For more details and dimensioned drawings of the accessories, go to NKK's web site or call our engineering support personnel.

General Specifications

Electrical Capacity (Resistive Load)

Power Level: 1mA @ 5V DC

Other Ratings

Insulation Impedance: 10MΩ minimum @ 25V DC
Expected Operational Life: Tapping: 1,000,000 operations minimum (using silicone rubber, hardness 60°)
Touch Activation Force: 1.47N maximum
Chattering Time: 10 milliseconds maximum
Light Transmission: 78% standard (Touch Panel portion)
Surface Hardness: 3H minimum (JIS K5400)

Environmental Data

Operating Temperature Range: –20°C ~ +70°C (–4°F ~ +158°F)
Storage Temperature Range: –40°C ~ +80°C (–40°F ~ +176°F)
Relative Humidity: +60°C (+140°F), humidity 90%, 240 hours

TYPICAL ORDERING EXAMPLE

FT AS 225 – 5.7 A – N

Number of Keys	
225	Digital

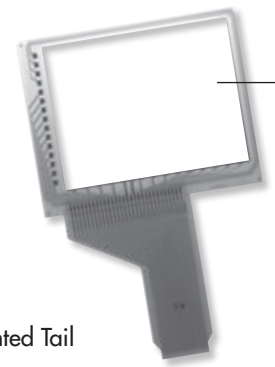
Screen Size	
5.7	5.7″

Input Method	
A	Finger or Stylus

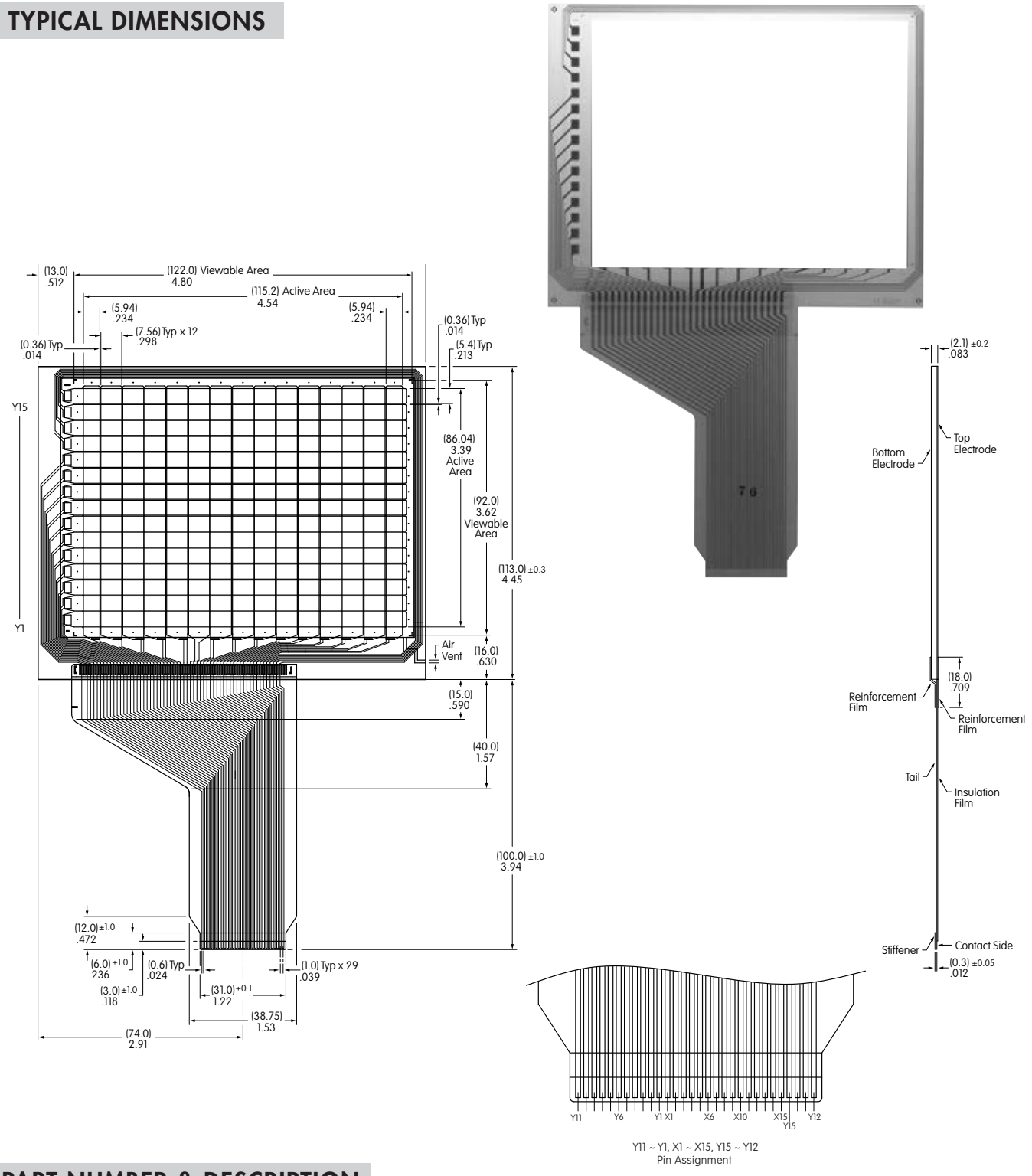
Type	
N	Digital

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

FTAS225–5.7A–N



TYPICAL DIMENSIONS



Y11 ~ Y1, X1 ~ X15, Y15 ~ Y12
Pin Assignment

PART NUMBER & DESCRIPTION

Digital Touch Screen Dimensions

Part Number	Screen Size in Inches	Key Area Dimensions	Viewing Area Dimensions	External Dimensions	Panel Thickness	Terminal Detail 30 Pin .039″ (1.0mm) Pitch
FTAS225-5.7AN	5.7	4.54″ x 3.39″ (115.2mm x 86.04mm)	4.80″ x 3.62″ (122.0mm x 92.0mm)	5.51″ x 4.45″ (140.0mm x 113.0mm)	.083″ (2.1mm)	Length 3.94″ (100.0mm)

Note: Number of keys for Digital Touch Screen: 15 x 15.

General Specifications

Electrical Capacity (Resistive Load)

Power Level: 1mA @ 5.5V DC (resistive load)

Other Ratings

XY Resistive Value: 20 ~ 80Ω
Linearity: ±2.0% maximum
Insulation Impedance: 10MΩ minimum @ 25V DC
Expected Operational Life: Writing: 50,000 operations minimum (approximately 30mm movement with stylus)
Tapping: 10,000,000 operations minimum (pressing force 4.9N using silicone rubber, hardness 60°)
Touch Activation Force: 0.05 ~ 0.8N
Chattering Time: 10 milliseconds maximum
Light Transmission: 80% standard (Touch Panel portion)
Surface Hardness: 2H minimum (JIS K5600)

Environmental Data

Operating Temperature Range: –20°C ~ +70°C (–4°F ~ +158°F)
Storage Temperature Range: –40°C ~ +80°C (–40°F ~ +176°F)
Relative Humidity: +60°C (+140°F), humidity 90%, 240 hours

TYPICAL ORDERING EXAMPLE

FT | AS | 00 | – | 10.4 | A | – | 5

Number of Keys	
00	Analog

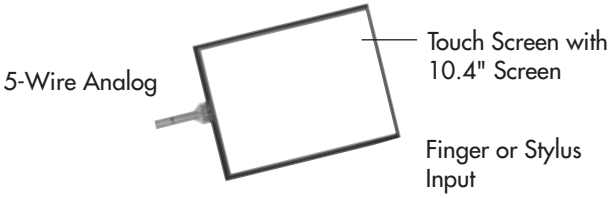
Screen Size	
10.4	10.4″
12.1	12.1″
15	15.0″

Input Method	
A	Finger or Stylus

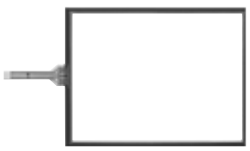
Type	
5	5-Wire

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

FTAS00–10.4A–5



PART NUMBERS & DESCRIPTIONS



FTAS00-10.4A-5

FTAS00-12.1A-5

FTAS00-15A-5

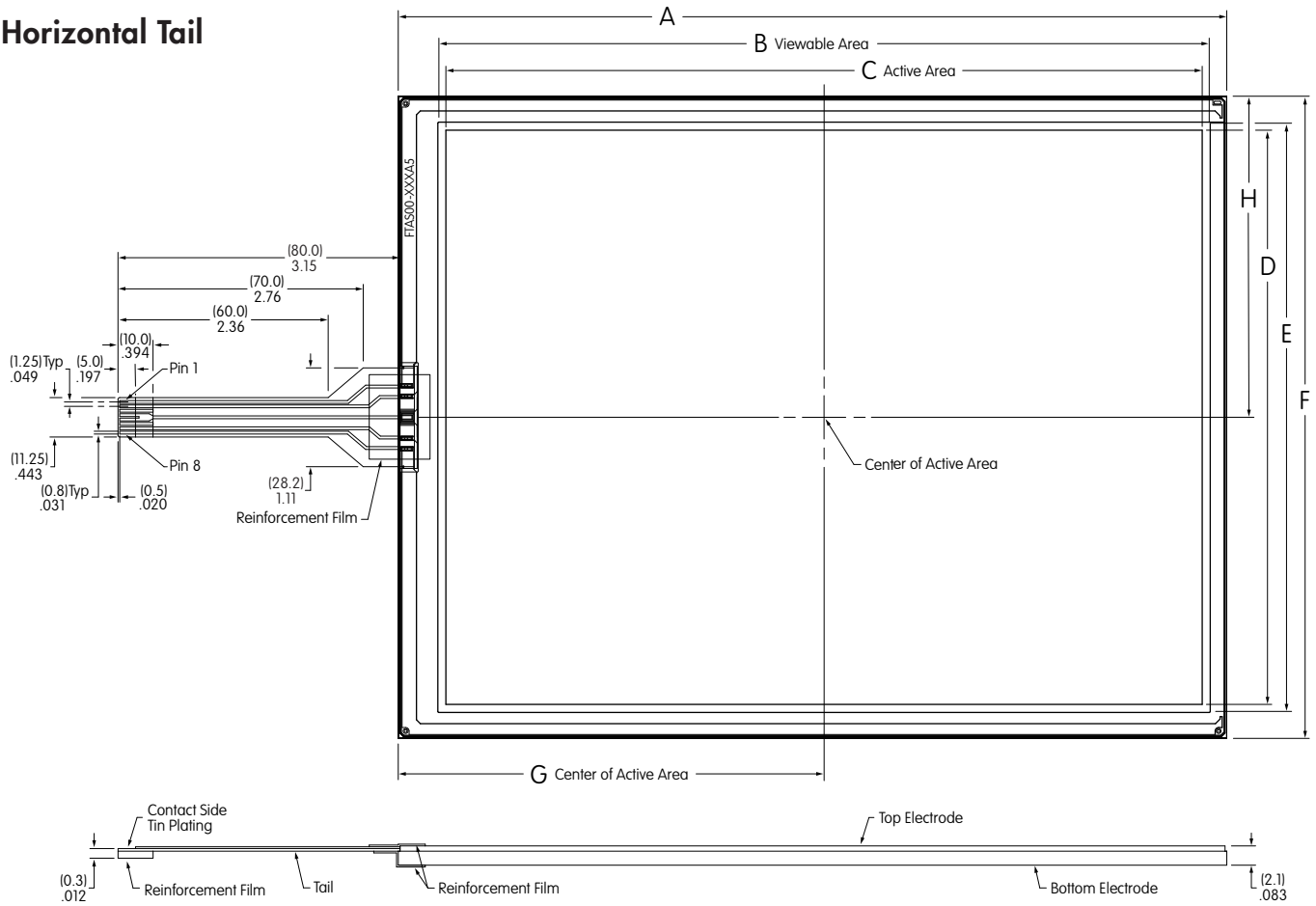
5-Wire Analog Touch Screens

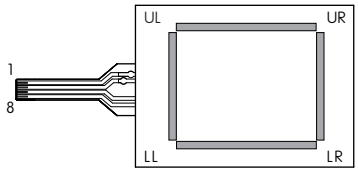
Part Number	Screen Size in Inches	Key Area Dimensions	Viewing Area Dimensions	External Dimensions	Panel Thickness	Terminal Detail 8 Pin .049″ (1.25mm) Pitch
FTAS00-10.4A-5	10.4	8.5″ x 6.45″ (215.9mm x 163.9mm)	8.66″ x 6.61″ (219.9mm x 167.9mm)	9.31″ x 7.22″ (236.5mm x 183.3mm)	.083″ (2.1mm)	Length 3.150″ (80.0mm)
FTAS00-12.1A-5	12.1	9.8″ x 7.37″ (249.0mm x 187.2mm)	9.94″ x 7.50″ (252.4mm x 190.6mm)	10.52″ x 8.1″ (267.1mm x 205.8mm)	.083″ (2.1mm)	Length 3.150″ (80.0mm)
FTAS00-15A-5	15.0	12.05″ x 9.06″ (306.1mm x 230.1mm)	12.19″ x 9.19″ (309.5mm x 233.5mm)	12.79″ x 9.79″ (324.8mm x 248.7mm)	.083″ (2.1mm)	Length 3.150″ (80.0mm)

Note: See web site for dimensioned drawings for all 5-Wire Analog Touch Screens.

TYPICAL DIMENSIONS

Horizontal Tail





UL, LL, UR, LR: Bottom Electrode Terminal
SENSE: Top Electrode Terminal

Pins	Signal
1	UR
2	UL
3	NC
4, 5	SENSE
6	NC
7	LL
8	LR

5-Wire Analog Touch Screen Dimensions

Part Number	Screen Size in Inches	Dim A	Dim B Viewable Area	Dim C Active Area	Dim D Active Area	Dim E Viewable Area	Dim F	Dim G Center of Active Area (Horizontal)	Dim H Center of Active Area (Vertical)
FTAS00-10.4A-5	10.4	9.31″ (236.5±0.3mm)	8.66″ (219.9mm)	8.50″ (215.9mm)	6.45″ (163.9m)	6.61″ (167.9mm)	7.22″ (183.3±0.3mm)	4.79″ (121.55mm)	3.61″ (91.65mm)
FTAS00-12.1A-5	12.1	10.52″ (267.1±0.3mm)	9.94″ (252.4mm)	9.80″ (249.0mm)	7.37″ (187.2mm)	7.50″ (190.6mm)	8.10″ (205.8±0.3mm)	5.37″ (136.4mm)	4.05″ (102.9mm)
FTAS00-15A-5	15.0	12.79″ (324.8±0.3mm)	12.19″ (309.5mm)	12.05″ (306.1mm)	9.06″ (230.1mm)	9.19″ (233.5mm)	9.79″ (248.7±0.3mm)	6.49″ (164.95mm)	4.90″ (124.35mm)

Controller Boards & Drivers

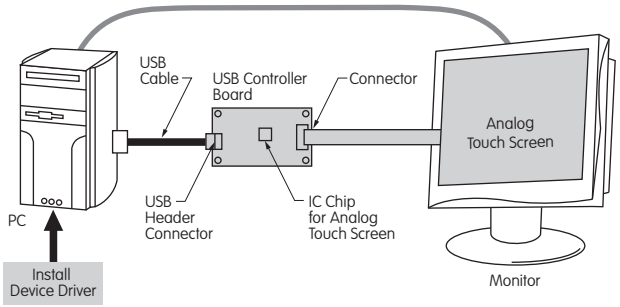
DISTINCTIVE CHARACTERISTICS

- Compatible with Control Board USB/RS232C
- Equipped with EPROM for Saving Setting Data
- Device Drivers are Windows 7, 8 & 10 Compatible

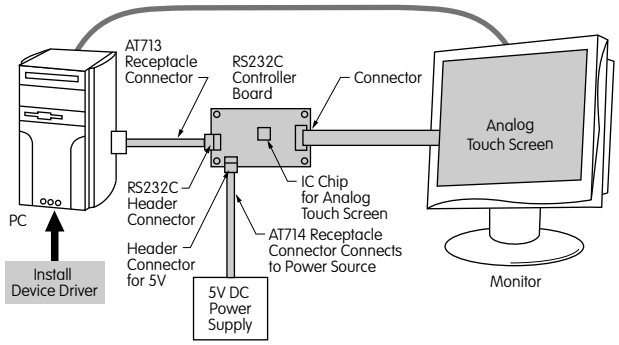
Touch panels can be operated the same as PC mouse functions by combining a control board or device driver and analog touch screen.

For specifications or technical data for the controller boards and drivers, see NKK's web site or call our engineering support personnel.

System Configuration for USB



System Configuration for RS232C



Available through NKK Switches

General Specifications

Items	FTCS05B	FTCU05B
Interface	RS232C	USB 2.0 Full Speed
Clock	6MHz	6MHz
Supply Voltage	5.0V	5.0V (Bus Power)
Resolution	10bit	10bit
Current Consumption	350mA maximum	350mA maximum
Communication Speed	9600 bps	———
Communication Format	Data Length: 8bit Parity: None Stop Bit: 1	———

Absolute Maximum Ratings

Items	Symbols	Minimum	Maximum	Notes
Supply Voltage	V_{CC}	−0.3V	+5.5V	——
Input Voltage	V_{TP}	——	V_{CC}	Touch Panel Input
	*V_{RS}	−15V	+15V	RS232C
Operating Temperature	T_{OPR}	0	+70°C +158°F	——
Storage Temperature	T_{STG}	−25°C −13°F	+85°C +185°F	——

*V_{RS}: Applies Only to RS232C

Recommended Values

Items	Symbols	Minimum	Typical	Maximum	Notes
Supply Voltage	V_{CC}	+4.75V	+5.0	+5.25V	——
Operating Temperature	T_{OPR}	0	——	+70°C +158°F	No Condensation

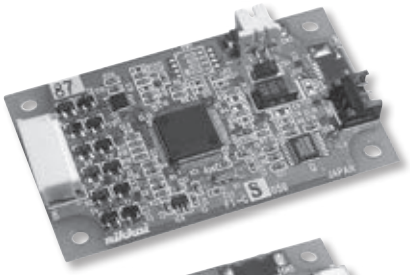
Controller Boards & Drivers

DISTINCTIVE CHARACTERISTICS

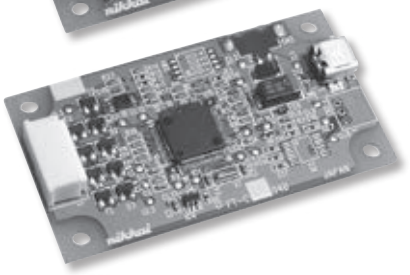
- High Quality and Reliability
- Easy Integration Replacing Mouse Functionality
- Compatible with Control Board USB/RS232C
- Device Driver Compatible with Vista and Windows XP Operating Systems

Controller Boards		
Type	**Part No.**	**Communication Protocol**
5-Wire	**FTCS05B**	RS232C
5-Wire	**FTCU05B**	USB

Controller Boards Available for RS232C



Controller Boards Available for USB



NKK offers controller boards compatible with USB or with RS232C. See web site or contact factory for specifications and technical data for any of the controller boards and drivers.

IC Chip & Accessories

DISTINCTIVE CHARACTERISTICS

- Interface: USB and RS232C
- High Speed and Accuracy
- Built-in Calibration Function
- Data Function Removal Built In to Eliminate Noise

IC FTCSU548

The IC is for use with the 5- and 4-wire transparent touch screens, and is available for those who prefer to design their own controller boards. When the screen is touched, it recognizes the position of the touch by the level of analog voltage detected by the A/D. The A/D converter receives the value and sends a set of coordinate values as serial data or USB.

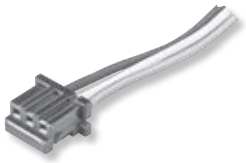
General Specifications for IC FTCSU548	
Package	LFQFP 48 Pins
Interface	Serial Interface (Asynchronous) or USB (Full Speed 2.0)
Supply Voltage	3.3/5.0V Typ; USB Available for 5V Only
*** Rated Output Current**	High Level: –170mA Low Level: +170mA
Operation Frequency	16MHz
A/D Converter Resolution	10bit
Operating Temperature	–20°C ~ +85°C (–4°F ~ +185°F)
Storage Temperature	–40°C ~ +125°C (–40°F ~ +257°F)

* Total Output Electric Current Amount of all the I/O Port

OPTIONAL ACCESSORIES

AT713 Receptacle Connector

This Receptacle Connector with code connects to RS232C communication of the controller boards.



AT714 Receptacle Connector

AT714 is a Receptacle Connector with code to connect to power source of the control boards.

For more details and dimensioned drawings of the accessories, go to NKK's web site or call our engineering support personnel.

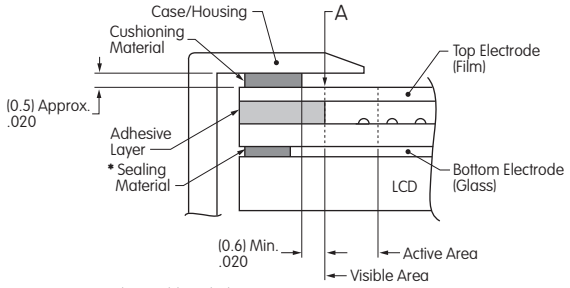
STORAGE, HANDLING & INSTALLATION

Handling of Controller Board

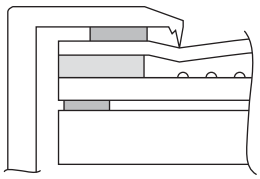
- Use arc prevention to protect device from static electricity.
- Power source should be activated after host and touch panel are connected.
- When inserting connector CN1 and touch panel tail, be sure the slider of connector CN1 is pulled. Do not pull more than 10 times.
- Do not alter the product.
- Do not use any commands other than the ones outlined in the specifications.
- Place the product away from noise source (such as inverter from LCD operation) since tail can be affected by noise.
- If device driver (USB) does not work after installation, reboot the host computer while connected to the controller board.
- This product does not support suspended mode (USB).
- Protocol of USB transmission is one frame per one transaction.
- Contact factory if not using the protocol above.
- Warranty for one year after delivery. NKK warranties the 4-wire touch panel when it is used with the NKK control board and driver. Do not use third party control boards. NKK is not responsible for results of using damaged equipment with the controller boards.
- NKK Switches cannot assume responsibility for damages caused by software side during use of the touch screens.
- The touch screen pressed position may shift depending on various factors such as age, improper tail insertion or extreme temperatures. In such cases, recalibration is necessary.

Installation

- Products are ESD sensitive and ESD protection is required.
- Do not pull on the tail. Do not apply stress to the tail area.
- Avoid vibration or shock. Avoid any force or stress that may cause deformation to the product.
- The touch screen mounting should not be loose. This may cause an adverse effect on detecting performance during operation.
- Ensure there are no burrs around the edges of the case or housing that can cause false actuation. The edges of the case or housing should not enter the keying area.
- The case or housing and upper electrode should have a space of about 0.5mm to accommodate expansion or shrinkage due to temperature variances. If a shock barrier is used, do not press hard on the upper electrode area. Any shock barrier should be installed more than 0.6mm away from A.



* Example: Double-sided Tape



Example of Burr on Housing Interferes with Operation at Point A

- To secure the touch screen, secure the lower portion with a device such as the LCD display panel. Do not attach the upper electrode with double-sided tape or similar product to avoid stress that can damage the upper or lower electrode.
- In order to balance upper and lower pressure, an air vent may be installed. Ensure that no liquid or oil will enter into the device.
- Avoid air pressure applied to the touch screen as it may cause the top electrode to force air through the air vent, effecting electric endurance. If pressure inside of the touch panel is reduced through the air vent, it may cause interference fringes or may remain in ON status.
- Ensure that the glass is handled carefully to prevent breakage during installation.
- Moisture from condensation on tail connection or edges may result in migration, causing short circuit failure.
- Remove protective film from the touch screen after installation is completed.

STORAGE, HANDLING & INSTALLATION

Handling Precautions

- When opening product, take precaution with up/down and front/back directions. Glass edges are not chamfered, and corners or edges can be sharp. Wear gloves when handling the product.
- Do not pick up the product by the tail or pull the tail area.
- Use gloves or finger cots to prevent fingerprints on surface.
- When handling the product, hold it outside of the viewing area.
- Avoid stacking multiple products or placing other items on the product.
- When packing or storing, the glass should be positioned face up.

Operating Precautions

- Operate with fingers or a touch screen stylus only.
- Do not press hard with a pen or similar object between viewing area and key area.

Design Precautions

- With analog type, resistive value change (by aging or individual differences) can dislocate the input area. Input area can be calibrated with software.
- When installing on top of an LCD, noise from the display device can create misoperation. To avoid noise, implement grounding the display device frame.
- Do not create software for simultaneous touch points, as analog type will read the center point between two touch points.
- When used to draw a line, analog type will have a break at dot spacer. Compensate for this with software.
- Contact resistance may cause chatter depending on pressing condition. Software should detect signal after it stabilizes.

Other Precautions

- Clean with a soft cloth and ethanol. Do not use any cleaning agents other than ethanol.
- Store product in original package and store at the temperature and humidity range specified.
- Do not store in an environment with acids or other corrosive gases or where condensation may occur.
- Products are guaranteed based on evaluation of standards within the moisture tolerance and usage temperature range, but not guaranteed to operate perpetually at this temperature.
- Note that an incorrect type of connector may damage the print surface.
- Calibration data from one touch panel should not be applied to another panel; each should be calibrated individually.
- Recalibration is necessary if connector has been removed from the tail and reconnected.
- All specifications based on the tested touch screens only. Evaluate the products after installation with customer's equipment.
- NKK Switches reserves the right to make product improvement changes without notice.

General Specifications

Electrical Capacity (Resistive Load)

Power Level: 1mA @ 5.5V DC (resistive load)

Other Ratings

XY Resistive Value: 250 ~ 850Ω; Wide: 120 ~ 1,500Ω
Linearity: ±1.5% maximum
Insulation Impedance: 10MΩ minimum @ 25V DC
Expected Operational Life: Writing: 50,000 operations minimum (approximately 30mm movement with stylus)
Tapping: 1,000,000 operations minimum (pressing force 4.9N using silicone rubber, hardness 60°)
Touch Activation Force: 0.02 ~ 1.0N maximum
Chattering Time: 10 milliseconds maximum
Light Transmission: 80% typical (Touch Panel portion)
Surface Hardness: 3H minimum (JIS K5400)

Environmental Data

Operating Temperature Range: –20°C ~ +70°C (–4°F ~ +158°F)
Storage Temperature Range: –40°C ~ +80°C (–40°F ~ +176°F)
Relative Humidity: +40°C (+104°F), humidity 90%, 240 hours

TYPICAL TOUCH SCREEN ORDERING EXAMPLE

TP01 | 104A | — | 4 | K | [ ]

Screen Size & Aspect Ratio	
104A	10.4″
106W	10.6″
121A	12.1″
121W	12.1″
150A	15.0″
156W	15.6″
190A	19.0″

Note: Aspect Ratio
Code A = 4:3
Code W = 16:9

Type	
4	4-Wire Analog

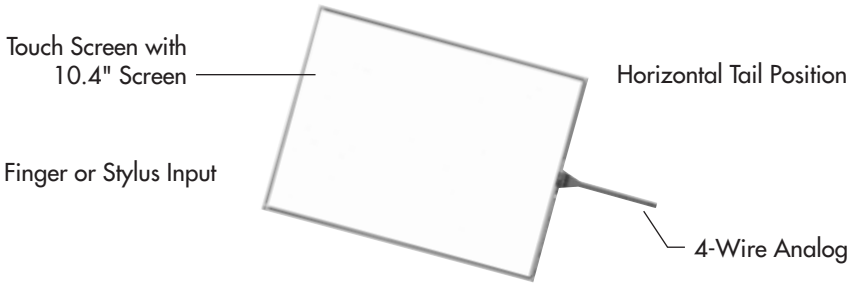
Operation	
K	Light Touch

Package Options	
No Code	Touch Screen Only
B	* Touch Screen & Controller Board
C	* Touch Screen & IC Chip

* Controller boards & IC chips for Multi-Touch Screens available only with package options.

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

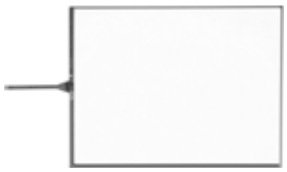
TP01104A–4K



PART NUMBERS & DESCRIPTIONS

TP01104A-4K

TP01106W-4K

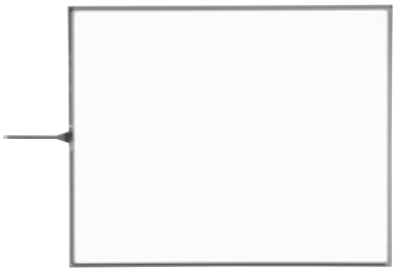


TP01121A-4K

TP01121W-4K

TP01150A-4K

TP01156W-4K



TP01190A-4K

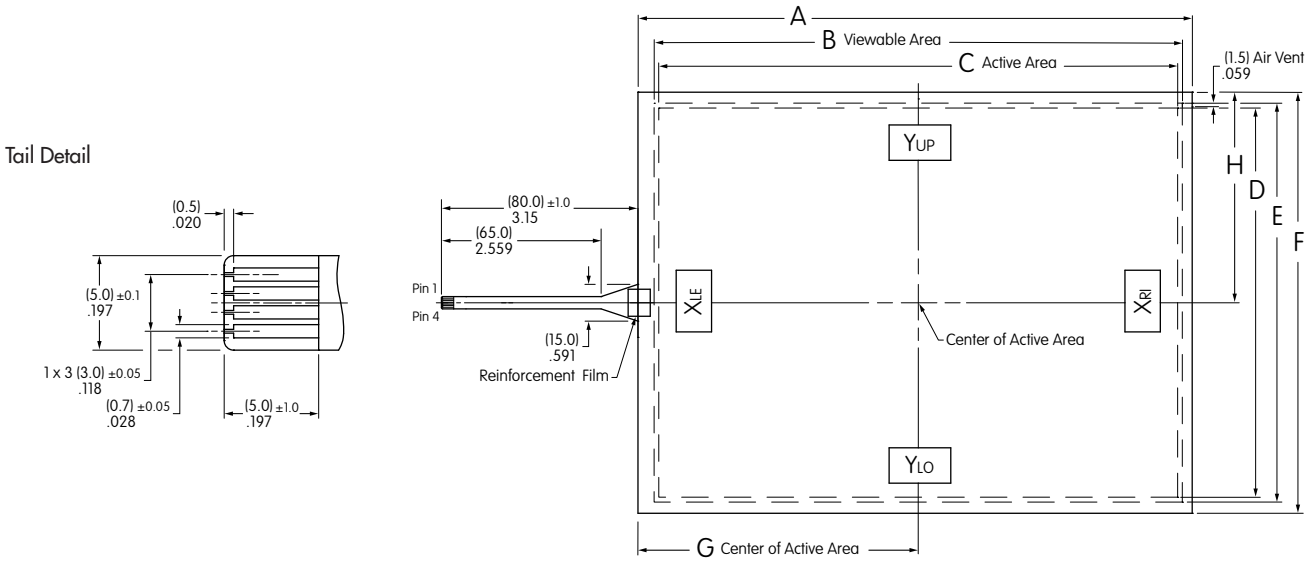
4-Wire Analog Touch Screens

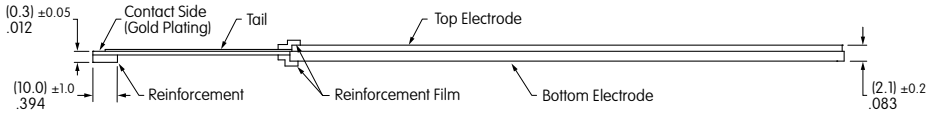
Tail	Part Number	Screen Size in Inches	Key Area Dimensions	Viewing Area Dimensions	External Dimensions	Panel Thickness	Terminal Detail 4 Pin .039″ (1.0mm) Pitch
Aspect Ratio 4:3 Horizontal Tail	TP01104A-4K	10.4	8.315″ x 6.236″ (211.2mm x 158.4mm)	8.465″ x 6.394″ (215.0mm x 162.4mm)	8.882″ x 6.748″ (225.6mm x 171.4mm)	.083″ (2.1mm)	Length 3.150″ (80.0mm)
	TP01121A-4K	12.1	9.677″ x 7.256″ (245.8mm x 184.3mm)	9.827″ x 7.406″ (249.6mm x 188.1mm)	10.236″ x 7.795″ (260.0mm x 198.0mm)	.083″ (2.1mm)	Length 3.150″ (80.0mm)
	TP01150A-4K	15.0	11.972″ x 8.980″ (304.1mm x 228.1mm)	12.130″ x 9.138″ (308.1mm x 232.1mm)	12.669″ x 9.665″ (321.8mm x 245.5mm)	.083″ (2.1mm)	Length 3.059″ (77.7mm)
	TP01190A-4K	19.0	14.815″ x 11.850″ (376.3mm x 301.0mm)	15.039″ x 12.102″ (382.0mm x 307.4mm)	15.571″ x 12.638″ (395.5mm x 321.0mm)	.083″ (2.1mm)	Length 3.150″ (80.0mm)
Aspect Ratio 16:9 Wide Frame with Horizontal Tail	TP01106W-4K	10.6	9.071″ x 5.441″ (230.4mm x 138.2mm)	9.189″ x 5.563″ (233.4mm x 141.3mm)	9.756″ x 6.094″ (247.8mm x 154.8mm)	083″ (2.1mm)	Length 3.150″ (80.0mm)
	TP01121W-4K	12.1	10.280″ x 6.425″ (261.12mm x 163.2mm)	10.404″ x 6.551″ (264.26mm x 166.4mm)	10.827″ x 6.929″ (275.0mm x 176.0mm)	.083″ (2.1mm)	Length 3.150″ (80.0mm)
	TP01156W-4K	15.6	13.551″ x 7.618″ (344.2mm x 193.5mm)	13.681″ x 7.748″ (347.5mm x 196.8mm)	14.276″ x 8.433″ (362.6mm x 214.2mm)	.083″ (2.1mm)	Length 3.150″ (80.0mm)

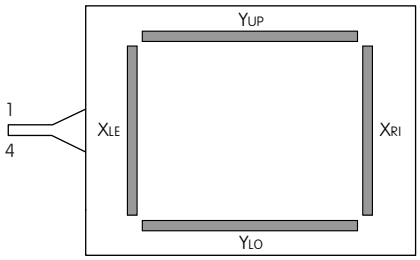
TYPICAL 10.4 DIMENSIONS

Horizontal Tail

Aspect Ratio 4:3







YUP, YLO: Bottom Electrode Terminal
XLE, XRI: Top Electrode Terminal

Pins	Signal
1	Y_{UP}
2	Y_{LO}
3	X_{LE}
4	X_{RI}

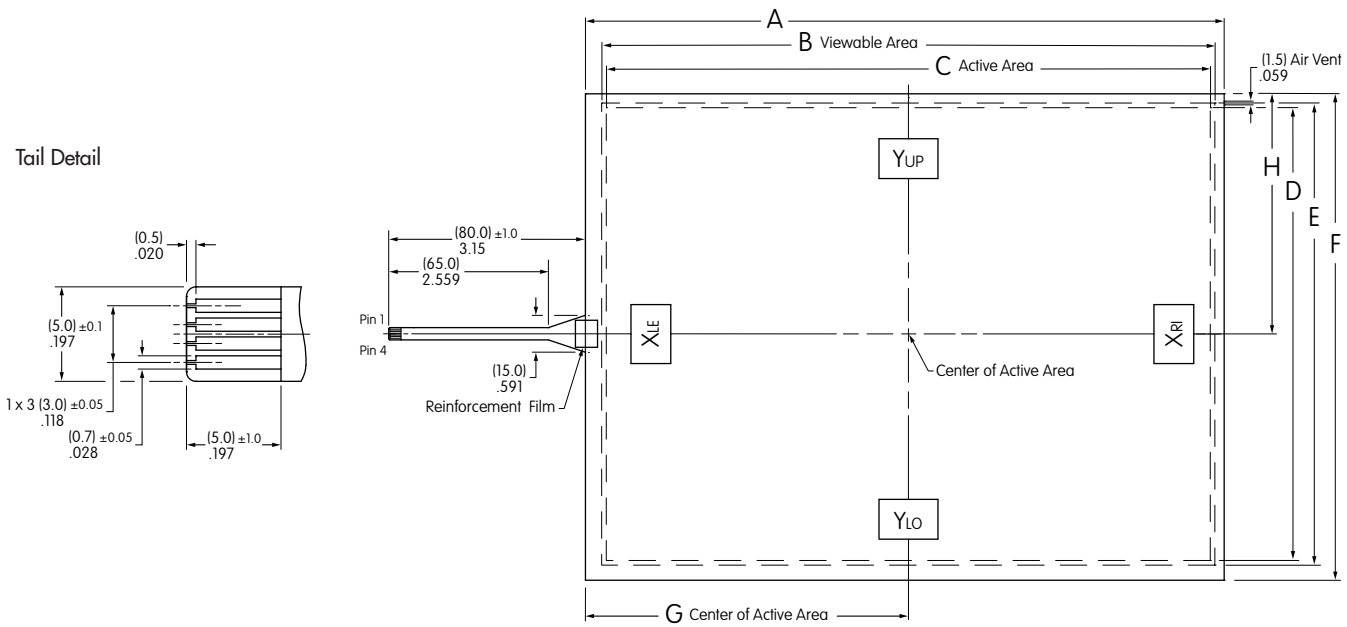
Typical Dimensions

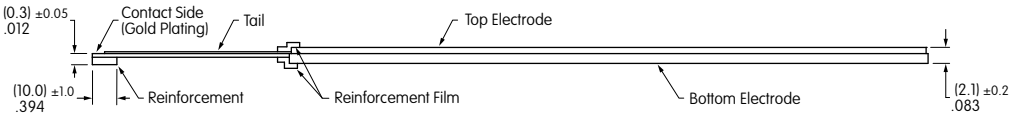
Part Number	Screen Size in Inches	Dim A	Dim B Viewable Area	Dim C Active Area	Dim D Active Area	Dim E Viewable Area	Dim F	Dim G Center of Active Area (Horizontal)	Dim H Center of Active Area (Vertical)
TP01104A-4K	10.4	8.882″ (225.6.±0.3mm)	8.465″ (215.0mm)	8.315″ (211.2mm)	6.236″ (158.4mm)	6.394″ (162.4mm)	6.748″ (171.4±0.3mm)	4.492″ (114.1mm)	3.374″ (85.7mm)

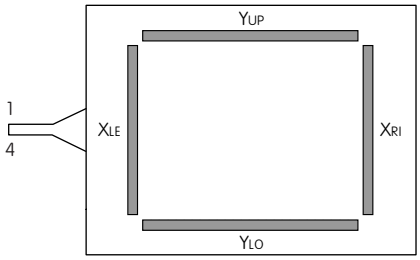
TYPICAL 12.1 DIMENSIONS

4-Wire with Horizontal Tail

Aspect Ratio 4:3







Pins	Signal
1	Y_{UP}
2	Y_{LO}
3	X_{LE}
4	X_{RI}

Y_{UP}, Y_{LO}: Bottom Electrode Terminal
X_{LE}, X_{RI}: Top Electrode Terminal

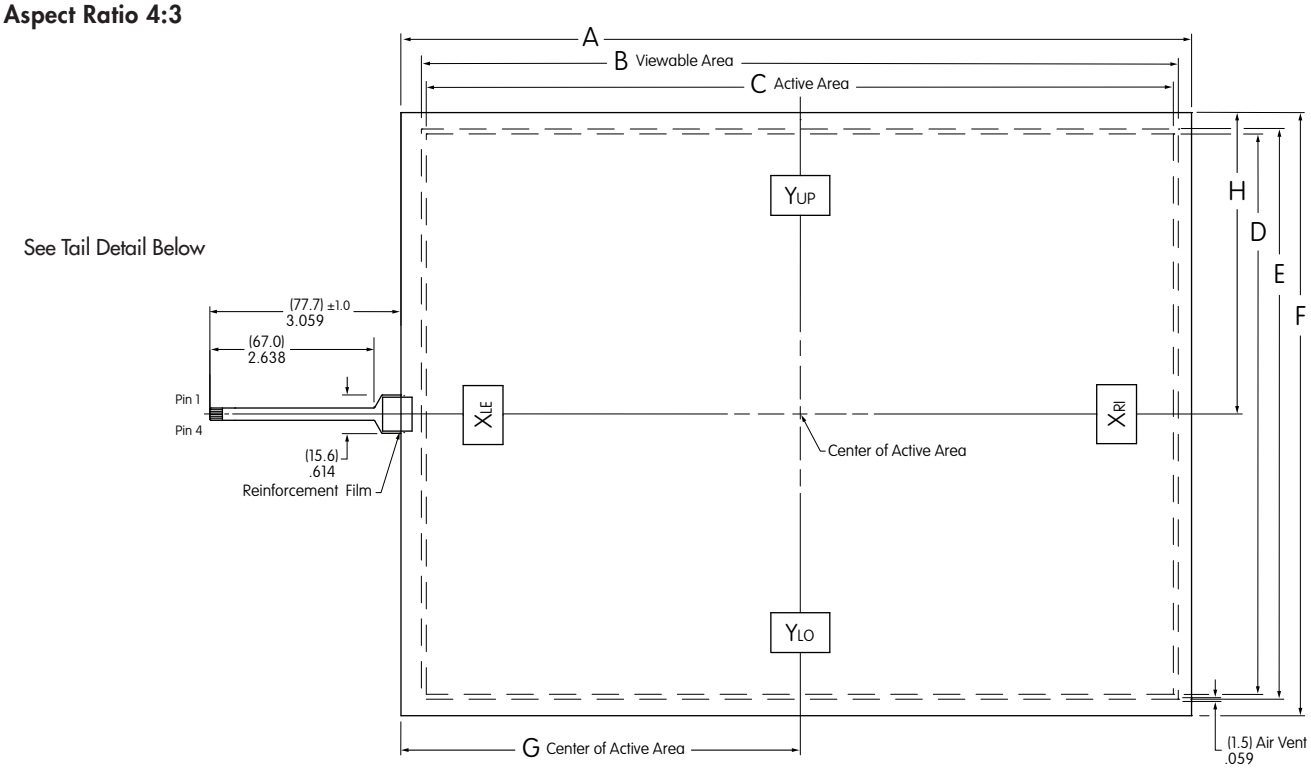
Typical Dimensions

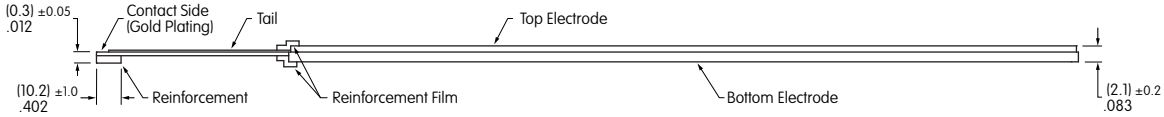
Part Number	Screen Size in Inches	Dim A	Dim B Viewable Area	Dim C Active Area	Dim D Active Area	Dim E Viewable Area	Dim F	Dim G Center of Active Area (Horizontal)	Dim H Center of Active Area (Vertical)
TP01121A-4K	12.1	10.236″ (260.0±0.3mm)	9.827″ (249.6mm)	9.677″ (245.8mm)	7.256″ (184.3mm)	7.406″ (188.1mm)	7.795″ (198.0±0.3mm)	5.177″ (131.5mm)	3.850″ (97.8mm)

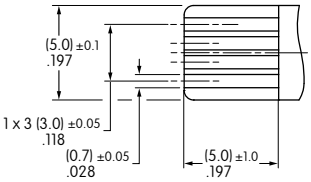
TYPICAL 15.0 DIMENSIONS

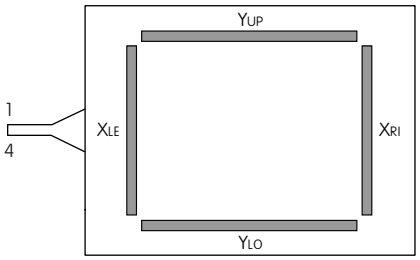
4-Wire with Horizontal Tail

Aspect Ratio 4:3









YUP, YLO: Bottom Electrode Terminal
XLE, XRI: Top Electrode Terminal

Pins	Signal
1	YUP
2	YLO
3	XLE
4	XRI

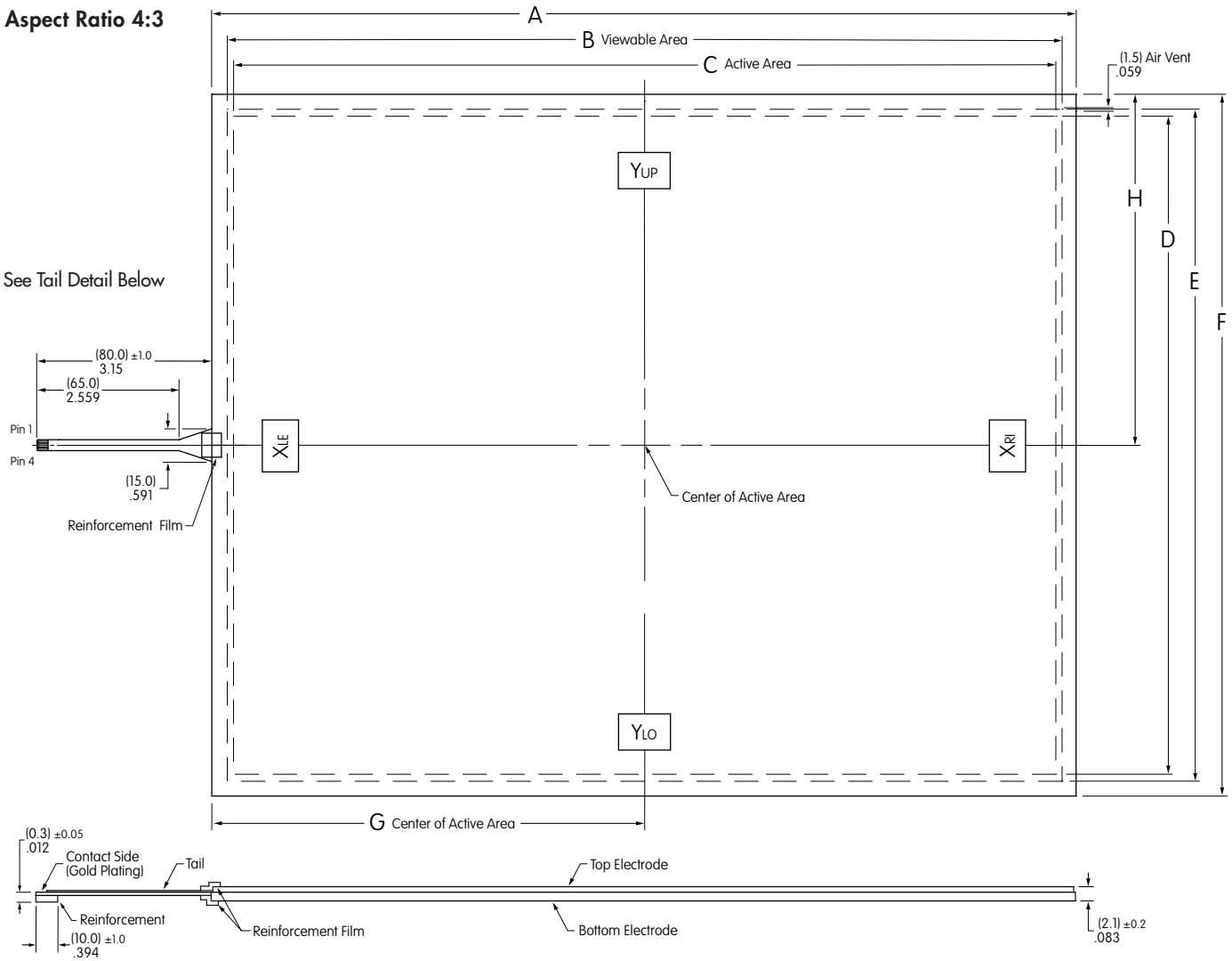
Typical Dimensions

Part Number	Screen Size in Inches	Dim A	Dim B Viewable Area	Dim C Active Area	Dim D Active Area	Dim E Viewable Area	Dim F	Dim G Center of Active Area (Horizontal)	Dim H Center of Active Area (Vertical)
TP01150A-4K	15.0	12.669″ (321.8±0.3mm)	12.130″ (308.1mm)	11.972″ (304.1mm)	8.980″ (228.1mm)	9.138″ (232.1mm)	9.665″ (245.5±0.3mm)	6.398″ (162.5mm)	4.833″ (122.75mm)

TYPICAL 19.0 DIMENSIONS

4-Wire with Horizontal Tail

Aspect Ratio 4:3



Pins	Signal
1	Y_{UP}
2	Y_{LO}
3	X_{LE}
4	X_{RI}

Y_{UP}, Y_{LO}: Bottom Electrode Terminal
X_{LE}, X_{RI}: Top Electrode Terminal

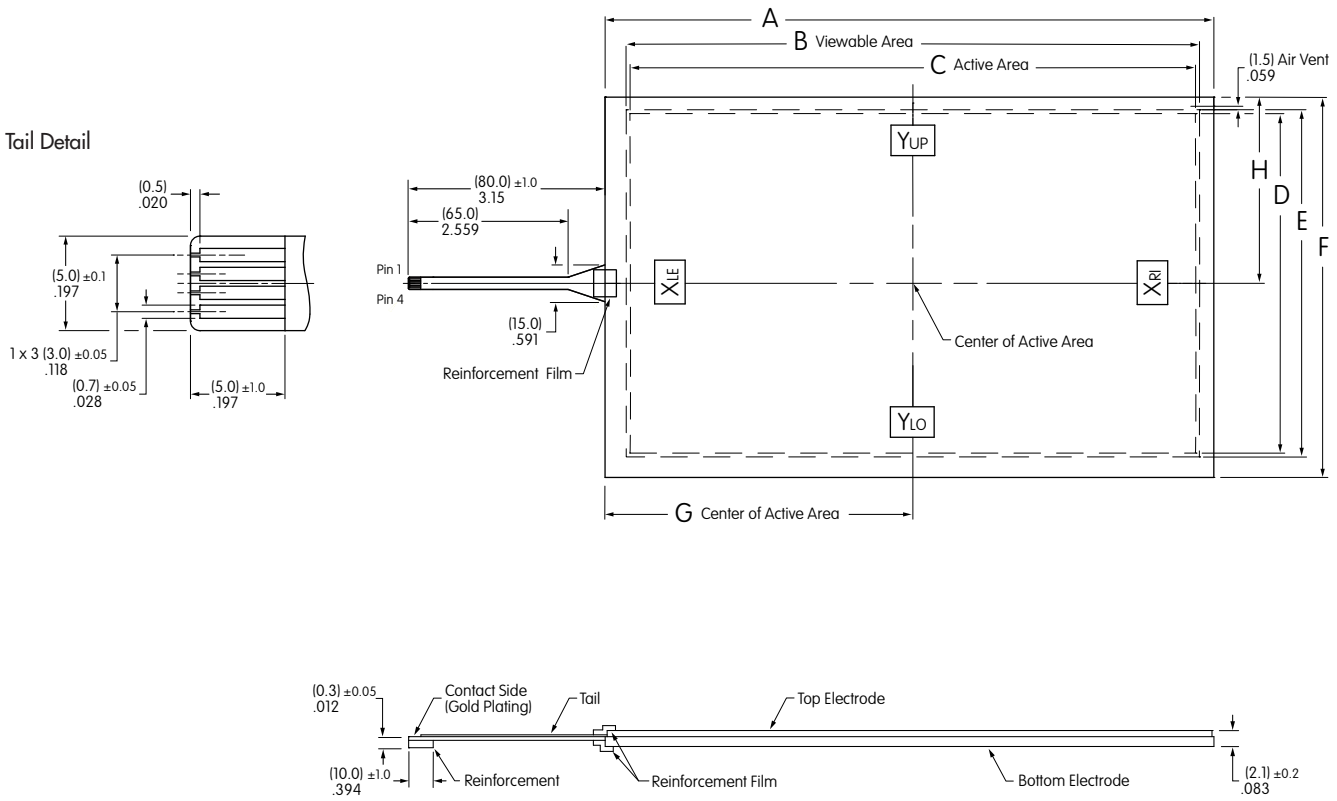
Typical Dimensions

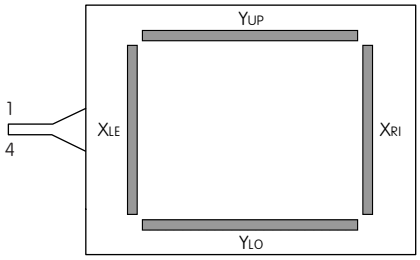
Part Number	Screen Size in Inches	Dim A	Dim B Viewable Area	Dim C Active Area	Dim D Active Area	Dim E Viewable Area	Dim F	Dim G Center of Active Area (Horizontal)	Dim H Center of Active Area (Vertical)
TP01190A-4K	19.0	15.571″ (395.5±0.3mm)	15.039″ (382.0mm)	14.815″ (376.3mm)	11.850″ (301.0mm)	12.102″ (307.4mm)	12.638″ (321.0±0.3mm)	7.799″ (198.1mm)	6.319″ (160.5mm)

TYPICAL 10.6 DIMENSIONS

Horizontal Tail & Wide Frame

Aspect Ratio 16:9





YUP, YLO: Bottom Electrode Terminal
XLE, XRI: Top Electrode Terminal

Pins	Signal
1	Y_{UP}
2	Y_{LO}
3	X_{LE}
4	X_{RI}

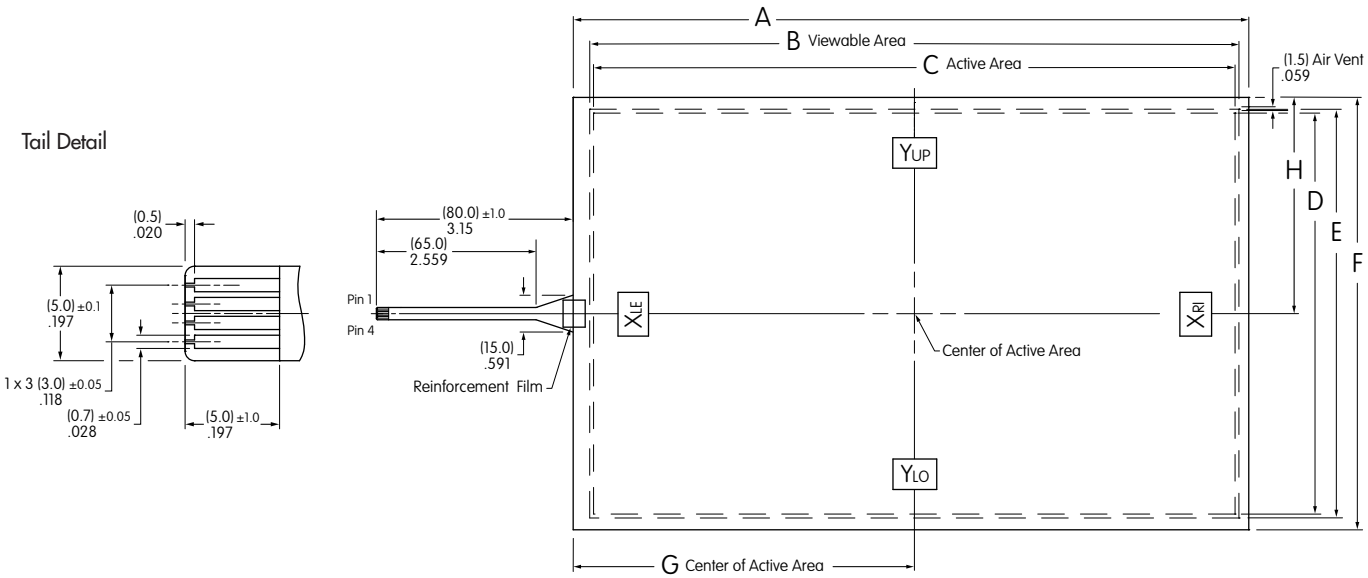
Typical Dimensions

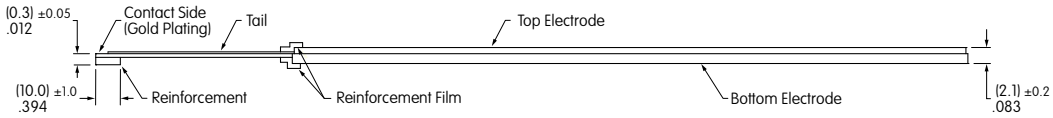
Part Number	Screen Size in Inches	Dim A	Dim B Viewable Area	Dim C Active Area	Dim D Active Area	Dim E Viewable Area	Dim F	Dim G Center of Active Area (Horizontal)	Dim H Center of Active Area (Vertical)
TP01106W-4K	10.6	9.756″ (247.8mm)	9.189″ (233.4mm)	9.071″ (230.4mm)	5.441″ (138.2mm)	5.563″ (141.3mm)	6.094″ (154.8±0.3mm)	4.933″ (125.3mm)	2.984″ (75.8mm)

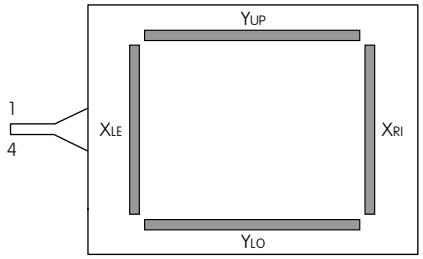
TYPICAL 12.1 DIMENSIONS

4-Wire Wide Type with Horizontal Tail

Aspect Ratio 16:9







Pins	Signal
1	Y_{UP}
2	Y_{LO}
3	X_{LE}
4	X_{RI}

Y_{UP}, Y_{LO}: Bottom Electrode Terminal
X_{LE}, X_{RI}: Top Electrode Terminal

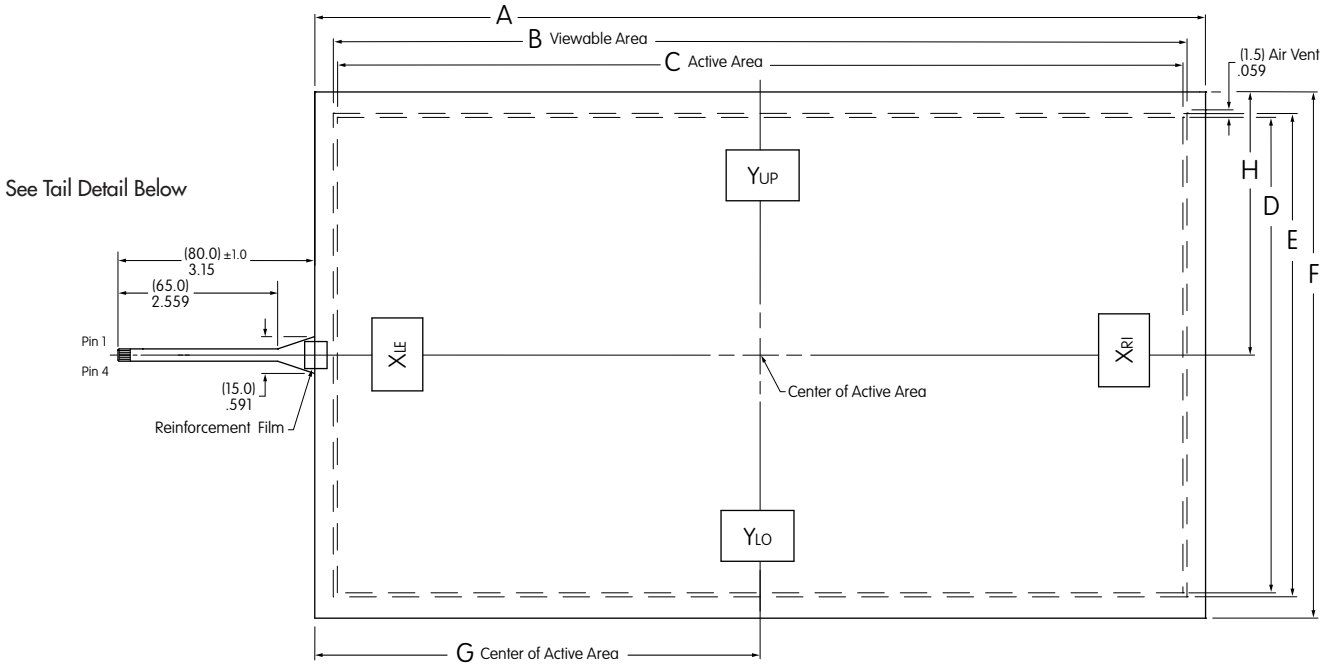
Typical Dimensions

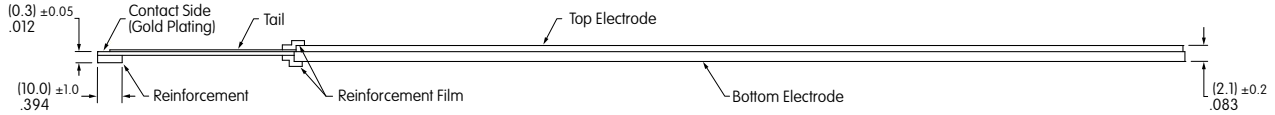
Part Number	Screen Size in Inches	Dim A	Dim B Viewable Area	Dim C Active Area	Dim D Active Area	Dim E Viewable Area	Dim F	Dim G Center of Active Area (Horizontal)	Dim H Center of Active Area (Vertical)
TP01121W-4K	12.1	10.827″ (275.0±0.3mm)	10.404″ (264.26mm)	10.280″ (261.12mm)	6.425″ (163.2mm)	6.551″ (166.4mm)	6.929″ (176.0±0.3mm)	5.468″ (138.89mm)	3.465″ (88.0mm)

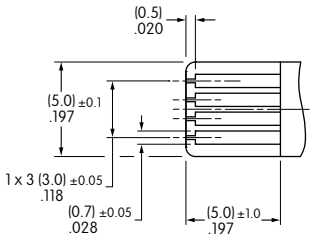
TYPICAL 15.6 DIMENSIONS

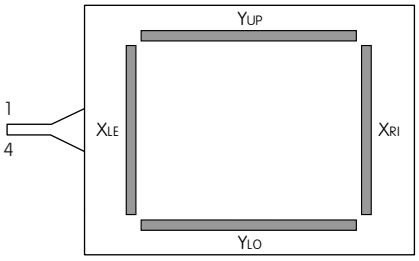
4-Wire Wide Type with Horizontal Tail

Aspect Ratio 16:9









YUP, YLO: Bottom Electrode Terminal
XLE, XRI: Top Electrode Terminal

Pins	Signal
1	Y_{UP}
2	Y_{LO}
3	X_{LE}
4	X_{RI}

Typical Dimensions

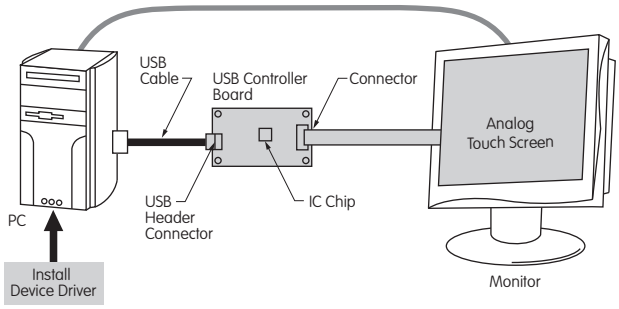
Part Number	Screen Size in Inches	Dim A	Dim B Viewable Area	Dim C Active Area	Dim D Active Area	Dim E Viewable Area	Dim F	Dim G Center of Active Area (Horizontal)	Dim H Center of Active Area (Vertical)
TP01156AW-4	15.6	14.276″ (362.6±0.3mm)	13.681″ (347.5mm)	13.551″ (344.2mm)	7.618″ (193.5mm)	7.748″ (196.8mm)	8.433″ (214.2±0.3mm)	7.138″ (181.3mm)	4.217″ (107.1mm)

4-Wire Multi-Touch Screen Controller Boards & Drivers

DISTINCTIVE CHARACTERISTICS

- Compatible with Controller Board USB
- Device Driver is *Windows 7, 8 & 10 Compatible

System Configuration for USB



Available through NKK Switches

Controller Boards		
Type	**Part No.**	**Communication Protocol**
4-Wire	* TP01104A-4KB	USB

* Includes any of the TP01 Multi-Touch Screen models. Controller boards are not sold separately, but in a package with any of the TP01 screen sizes.

NKK's analog touch panels can be operated the same as PC mouse functions by combining a controller board or device driver and analog touch screen. This includes the screen's multi-touch capabilities.

For specifications or technical data for the controller boards and drivers, see NKK's web site or call our engineering support personnel.

NKK offers the option to order a controller board in a package with a touch screen. See ordering table for details.

Absolute Maximum Ratings

Items	Symbols	Minimum	Maximum
Supply Voltage	V_{CC}	+4.5V	+5.5V
Input Voltage	V_{TP}	——	V_{CC}
Operating Temperature	T_{OPR}	–20°C (–4°F)	+70°C (+158°F)
Storage Temperature	T_{STG}	–30°C (–22°F)	+85°C (+185°F)

Recommended Values

Items	Symbols	Minimum	Typical	Maximum	Notes
Supply Voltage	V_{CC}	+4.5V	+5	+5.5V	——
Operating Temperature	T_{OPR}	–20°C (–4°F)	——	+70°C (+158°F)	No Condensation

IC Chip for Analog Multi-Touch Screens

DISTINCTIVE CHARACTERISTICS

- Interface: USB
- Compatible with * Windows 7, 8 & 10
- High Speed and Accuracy
- Built-in Calibration Function
- Data Function Removal Built In to Eliminate Noise

The IC is for use with the 4-wire transparent touch screens. When the screen is touched, it recognizes the position of the touch by the level of analog voltage detected by the A/D. The A/D converter receives the value and sends a set of coordinate values as serial data or USB.

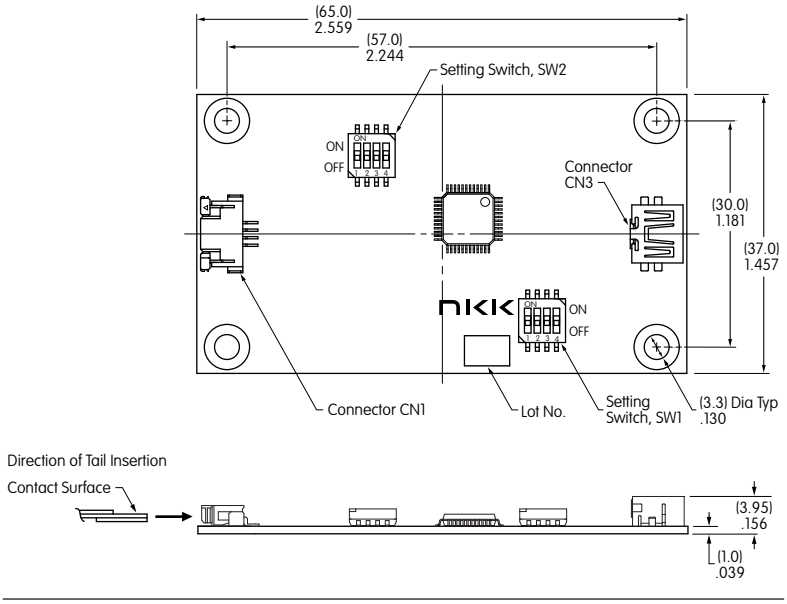
Contact NKK Switches for the IC data sheet.

NKK offers the option to order an IC chip in a package with a touch screen. See ordering table for details.

* Windows is a registered trademark of Microsoft Corporation.

4-Wire Multi-Touch Screen Controller Board for USB

Controller Board for USB



CN1 4-Wire Analog Touch Screen Connector - 4 Pins

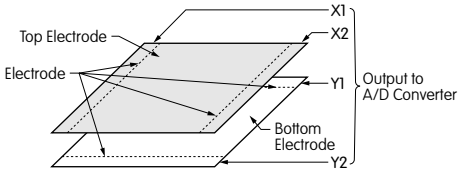
Pin No.	Symbol	Description
1	Y_{UP}	Touch Screen Drive Output PSW2
2	Y_{LO}	Touch Screen Drive Output PSW1, PSW5
3	X_{LE}	Touch Screen Drive Output PSW4
4	X_{RI}	Touch Screen Drive Output PSW3, PSW6

CN3 Header Connector for USB - 5 Pins

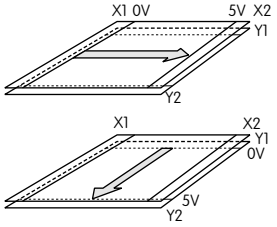
Pin No.	Symbol	Description
1	V_{CC}	V_{CC}
2	D –	D –
3	D +	D +
4	GND	V_{SS} (OV)
5	FG	Shield GND

ANALOG TOUCH SCREENS

1. The analog touch screen has a two-layer structure consisting of polyester film with an ITO membrane and sheet of glass. The surfaces of top and bottom electrodes have a uniform resistive film. One electrode draws in the X-axis direction, the other on the Y-axis direction. When pressure is applied, it changes the resistance value between X1 and X2 and Y1 and Y2, then converts to a digital signal.

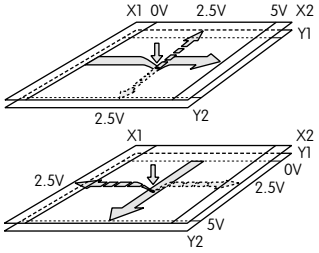


2. To interpret the touched position, 5V is applied to the top electrode (X1 and X2). Then the voltage on the arrow direction evenly changes.

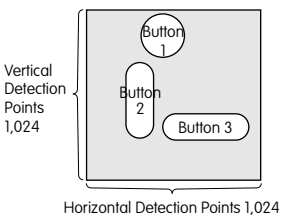


3. With a touch to the center of the top electrode film, the touched position contacts the bottom film (glass), and 2.5V is output to Y1 (or Y2). The output signal is then converted to a digital signal and can be recognized as an X-axis coordinate value. In the same way, the Y-axis coordinate value can be read from Y1 and Y2 on the bottom electrode. Then the position where the X and Y axis coordinate value intersected is read as the contact position.

4. The resolution of the analog touch screens is relatively higher than the digital models and contributes to the variety of the screen designs available, including those displaying buttons. Since analog types generally detect signals as a point but not as a number on the keys, the signals may be input as text or drawings with a pen. The vertical and horizontal resolution (detection points) is 1,024 when a 10bit A/D converter is used.



The active area of each button is independent of each other, resulting in no interference between the areas.



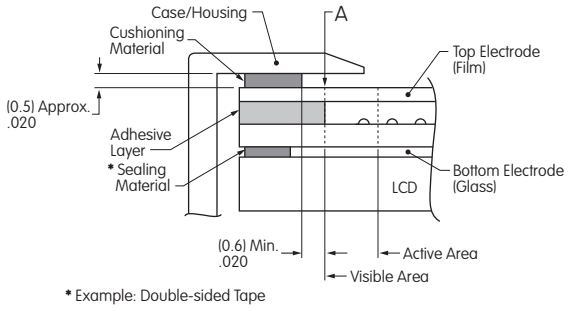
STORAGE, HANDLING & INSTALLATION

Handling of Controller Board

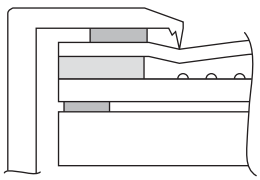
- Use arc prevention to protect device from static electricity.
- Power source should be activated after host and touch panel are connected.
- When inserting connector CN1 and touch panel tail, be sure the slider of connector CN1 is pulled. Do not pull more than 10 times.
- Do not alter the product.
- Do not use any commands other than the ones outlined in the specifications.
- Place the product away from noise source (such as inverter from LCD operation) since tail can be affected by noise.
- If device driver (USB) does not work after installation, reboot the host computer while connected to the controller board.
- Warranty for one year after delivery. NKK warranties the 4-wire touch panel when it is used with the NKK control board and driver. Do not use third party control boards. NKK is not responsible for results of using damaged equipment with the controller boards.
- NKK Switches cannot assume responsibility for damages caused by software side during use of the touch screens.
- The touch screen pressed position may shift depending on various factors such as age, improper tail insertion or extreme temperatures. In such cases, recalibration is necessary.

Installation

- Products are ESD sensitive and ESD protection is required.
- Do not pull on the tail. Do not apply stress to the tail area.
- Avoid vibration or shock. Avoid any force or stress that may cause deformation to the product.
- The touch screen mounting should not be loose. This may cause an adverse effect on detecting performance during operation.
- Ensure there are no burrs around the edges of the case or housing that can cause false actuation. The edges of the case or housing should not enter the keying area.
- The case or housing and upper electrode should have a space of about 0.5mm to accommodate expansion or shrinkage due to temperature variances. If a shock barrier is used, do not press hard on the upper electrode area. Any shock barrier should be installed more than 0.6mm away from A.



* Example: Double-sided Tape



Example of Burr on Housing Interferes with Operation at Point A

- To secure the touch screen, secure the lower portion with a device such as the LCD display panel. Do not attach the upper electrode with double-sided tape or similar product to avoid stress that can damage the upper or lower electrode.
- In order to balance upper and lower pressure, an air vent may be installed. Ensure that no liquid or oil will enter into the device.
- Avoid air pressure applied to the touch screen as it may cause the top electrode to force air through the air vent, effecting electric endurance. If pressure inside of the touch panel is reduced through the air vent, it may cause interference fringes or may remain in ON status.
- Ensure that the glass is handled carefully to prevent breakage during installation.
- Moisture from condensation on tail connection or edges may result in migration, causing short circuit failure.
- Remove protective film from the touch screen after installation is completed.

STORAGE, HANDLING & INSTALLATION

Handling Precautions

- When opening product, take precaution with up/down and front/back directions. Glass edges are not chamfered, and corners or edges can be sharp. Wear gloves when handling the product.
- Do not pick up the product by the tail or pull the tail area.
- Use gloves or finger cots to prevent fingerprints on surface.
- When handling the product, hold it outside of the viewing area.
- Avoid stacking multiple products or placing other items on the product.
- When packing or storing, the glass should be positioned face up.

Operating Precautions

- Operate with fingers or a touch screen stylus only.
- Do not press hard with a pen or similar object between viewing area and key area.

Design Precautions

- With analog type, resistive value change (by aging or individual differences) can dislocate the input area. Input area can be calibrated with software.
- When installing on top of an LCD, noise from the display device can create misoperation. To avoid noise, implement grounding the display device frame.
- Do not create software for simultaneous touch points, as analog type will read the center point between two touch points.
- When used to draw a line, analog type will have a break at dot spacer. Compensate for this with software.
- Contact resistance may cause chatter depending on pressing condition. Software should detect signal after it stabilizes.

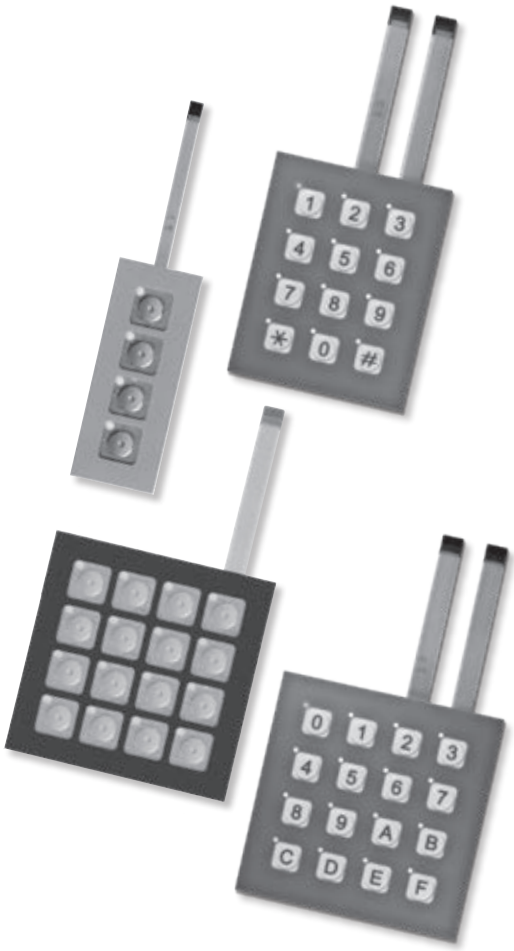
Other Precautions

- Clean with a soft cloth and ethanol. Do not use any cleaning agents other than ethanol.
- Store product in original package and store at the temperature and humidity range specified.
- Do not store in an environment with acids or other corrosive gases or where condensation may occur.
- Products are guaranteed based on evaluation of standards within the moisture tolerance and usage temperature range, but not guaranteed to operate perpetually at this temperature.
- Note that an incorrect type of connector may damage the print surface.
- Calibration data from one touch panel should not be applied to another panel; each should be calibrated individually.
- Recalibration is necessary if connector has been removed from the tail and reconnected.
- All specifications based on the tested touch screens only. Evaluate the products after installation with customer's equipment.
- NKK Switches reserves the right to make product improvement changes without notice.

Series FM

DISTINCTIVE CHARACTERISTICS

- Nonilluminated options in 4 or 16 keys, illuminated choices in 12 or 16 keys
- 1.0mm (.039") tail pitch
- Easily integrated into designs: replaces multiple mechanical switches, soldered wires and cable assemblies
- Card insertion into design supports customized legends for nonilluminated models
- Actuating dome offers crisp, tactile feedback to positively indicate circuit transfer
- Illuminated models feature legends on embossed keypads
- Adhesive backing for easy mounting



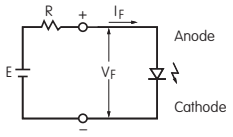
GENERAL SPECIFICATIONS

Power Level	20mA @ 24V DC
Contact Resistance	500Ω maximum (10mA @ 10V DC)
Insulation Resistance	100 megohms minimum @ 250V DC minimum
Dielectric Strength	250V AC minimum for one minute minimum
Operational Life	1,000,000 operations minimum
Contact Timing	10 milliseconds maximum
Nominal Operating Force	1.0N ~ 6.0N
Stroke: Nonilluminated Illuminated with Overlay	 .016" ~ .039" (0.4mm ~ 1.0mm) .020" ~ .047" (0.5mm ~ 1.2mm)
Operating Temperature Range	–15°C ~ +50°C (+5°F ~ +122°F) illuminated
	–15°C ~ +55°C (+5°F ~ +131°F) nonilluminated

LED SPECIFICATIONS

Single Element LED Color: Amber			Unit
Forward Voltage (Typical)	V_F	2.1	V
Forward Current (Typical)	I_F	20	mA
Forward Current (Maximum)	I_F	30	mA
* Forward Peak Current (Max)	I_{FM}	195	mA
Reverse Voltage (Maximum)	V_R	5.0	V

The electrical specifications shown are determined at a basic temperature of 25°C. LED is an integral part of the switch. LEDs are not sold separately.



$$R = \frac{E - V_F}{I_F}$$

Where: R = Resistor Value (Ohms)
E = Source Voltage (V)
V_F = Forward Voltage (V)
I_F = Forward Current (A)

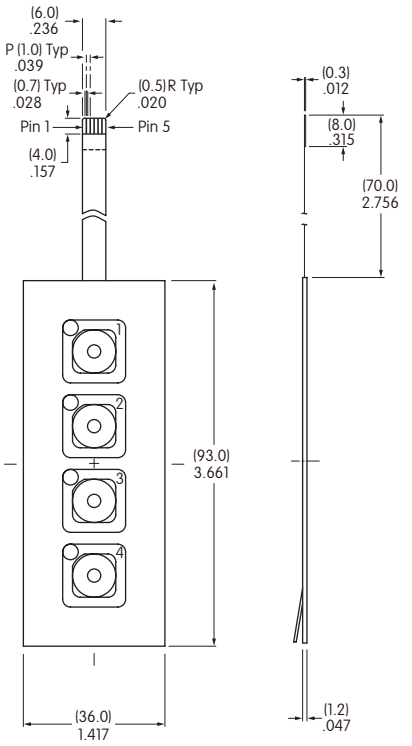
LED circuits are isolated and require an external power source.
If the source voltage exceeds the rated voltage, a ballast resistor is required.

* Note: Pulse width 0.1msec maximum with a maximum duty cycle ratio of 1/10

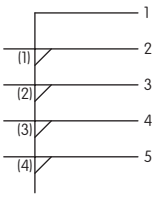
Ordering Information	Description				
Part Number	Illumination	Number of Keys	Surface Sheet Black (D)	Surface Sheet Gray (E)	Overlay
FMBN04BD	Nonilluminated	4	•		
FMBN04BE		4		•	
FMBN16BD		16	•		
FMBN16BE		16		•	
FMBP12BF	Dot Illuminated with Overlay	12			Gray Surface Sheet with Embossed White Keypad and Gray Legends
FMBP16BF		16			

TYPICAL SWITCH DIMENSIONS

Nonilluminated • 4 or 16 Keys

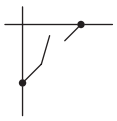


Switch Circuit Matrix For 4 Key

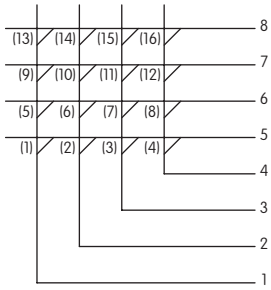


Key numbers in parenthesis are not actually on panel and are for reference only

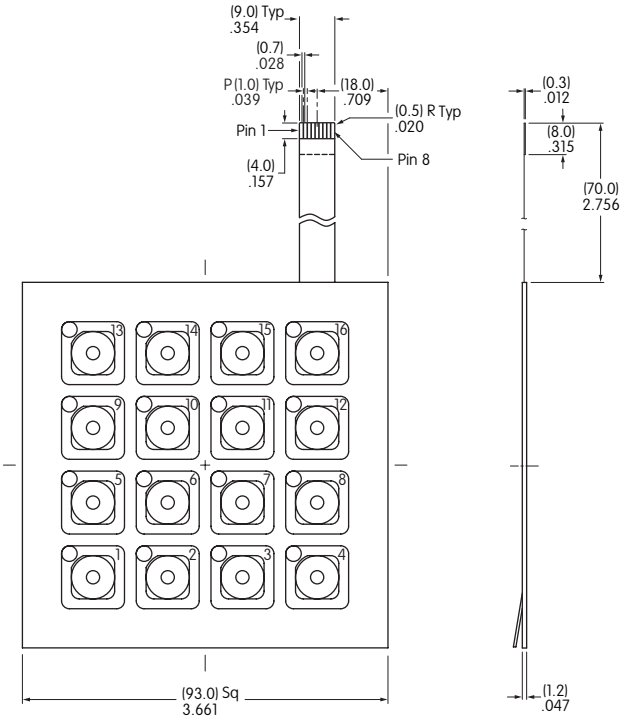
Switch Circuit Matrix Detail For 4 or 16 Key



Switch Circuit Matrix For 16 Key



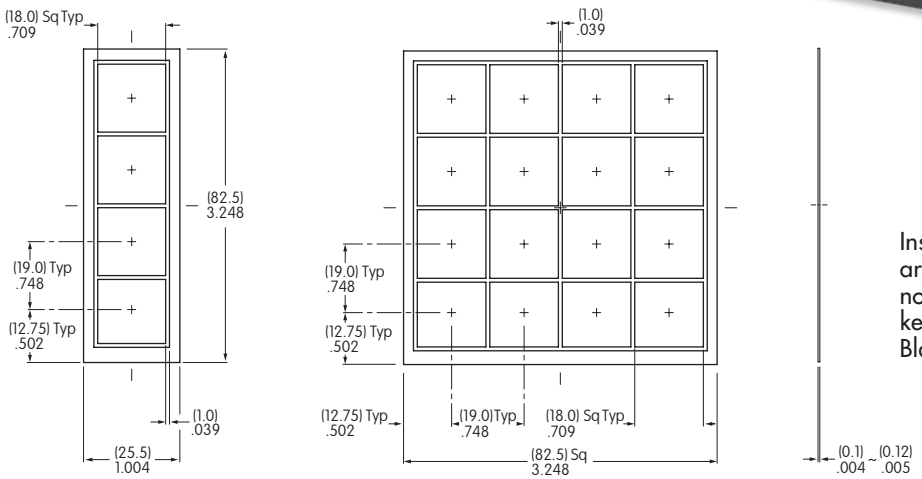
Key numbers in parenthesis are not actually on panel and are for reference only



FMBN04BE
Gray Surface Sheet

FMBN16BD
Black Surface Sheet

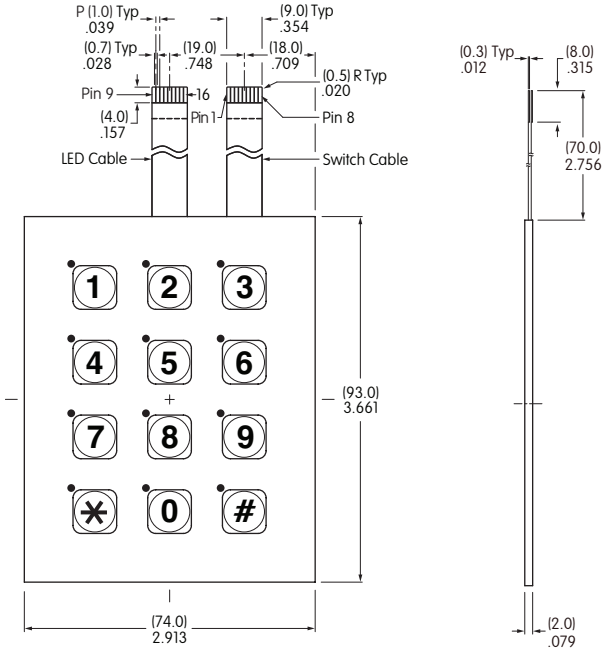
Insertable Legend Card for 4 Key or 16 Key



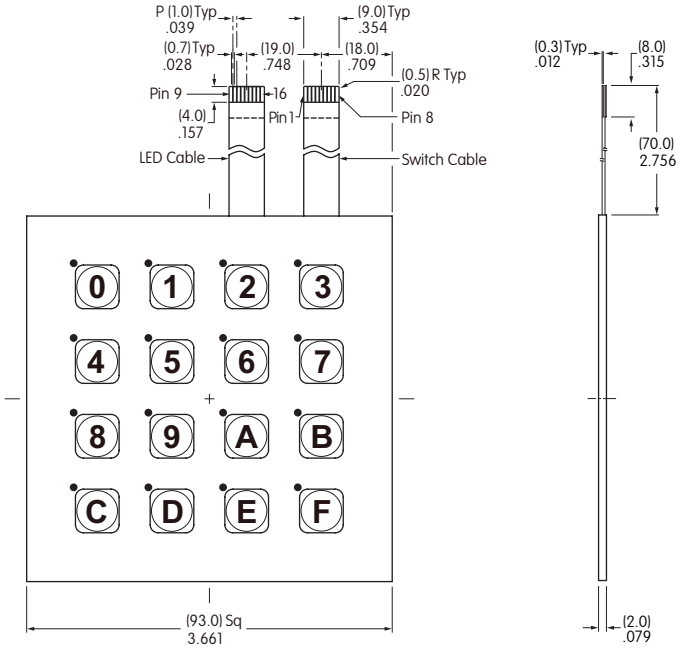
Insertable Legend Cards are supplied with the nonilluminated switch keypad assembly in Black, Gray and Yellow

TYPICAL SWITCH DIMENSIONS

Illuminated • 12 or 16 Keys

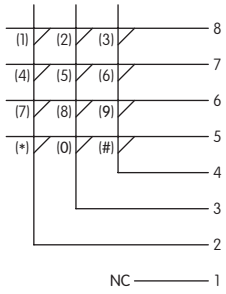


Dot illumination at upper left corner of each keypad

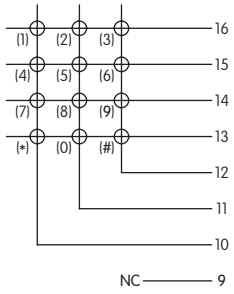


Dot illumination at upper left corner of each keypad

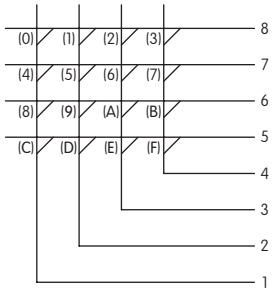
Switch Circuit Matrix For 12 Key



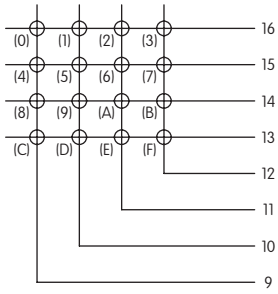
LED Circuit Matrix For 12 Key



Switch Circuit Matrix For 16 Key



LED Circuit Matrix For 16 Key

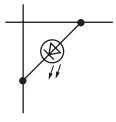


Key numbers in parenthesis are not actually on panel and are for reference only

FMBP12BF

Switch Circuit Matrix Detail For 12 or 16 Key

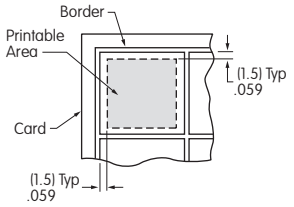
LED Circuit Matrix Detail For 12 or 16 Key



FMBP16BF

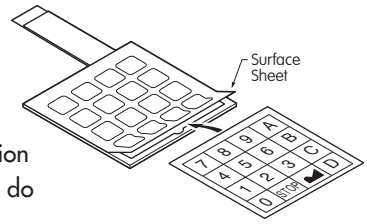
INSERTABLE LEGEND CARDS

Instructions for Customizing Insertable Legends



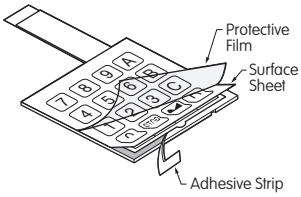
The membrane keypad assembly comes with three insertable legend cards: yellow, gray and black. The following provides guidelines for creating and insertion of legend cards for the membrane switch keypad assembly. Read all of the instructions prior to customizing and inserting the legend card.

- Using the borders on the insertable legend card as a guide, be sure characters on the card are about 1.5mm (.059") within these borders. This is the printable area.
- Legend characters may be drawn, printed, etc. Be sure that application choice is completely dry before inserting into membrane keypad assembly.



Instructions for Inserting Legend Card

- Note correct orientation of insertable legend card. Insert card under surface sheet, and use caution to avoid bending the membrane keypad assembly. Do not use pointed object to insert card, and do not remove surface sheet.
- Align and center all legend characters within the squares of the surface sheet.
- Smooth any wrinkles or air pockets from surface sheet.
- Peel off adhesive strip from the membrane keypad assembly.
- The legend card is now firmly in place and cannot be removed.
- Detach the protective film.



Connectors

Recommended Connectors for 5 Pin

Straight: FCI Part No. SLW5S-5C7LF
Right Angle: FCI Part No. SLW5R-5C7LF

Recommended Connectors for 8 Pin

Straight: FCI Part No. SLW8S-5C7LF
Right Angle: FCI Part No. SLW8R-5C7LF

PRECAUTIONS FOR HANDLING

- Assembly of legend card insert is handled by the customer. Therefore, we recommend to evaluate the finished product with the card assembled.
- Nonilluminated products have a loophole on each key. It is possible to add optional illumination by installing appropriate LEDs. Legend card does not have loopholes.
- To test proper electrical operation of switches, use of an electric buzzer is recommended.
- Use an additional chattering prevention circuit for the switch circuit.
- Do not operate switches with pointed objects (i.e. screwdrivers) to prevent perforation of film overlay.
- Use an FPC connector that corresponds to the printed circuit. Contact factory for suitable connectors.
- During assembly and installation of legends place devices on a level, sturdy surface. We do not recommend assembly and installation of device using a free hand or on a soft surface.
- Do not fold, bend, or apply pressure to the product.
- These devices contain adhesive that may emit noise. This does not affect product functionality.
- Do not depress any switch areas during assembly/installation.
- These membrane switches are built with air vents. Prior to installation, make corresponding holes to allow air vents to function. These holes should first be aligned with the membrane switch device, then made on the body of the final installation structure. Do not allow water or oil to penetrate through the air vents. Entry of any liquids through the air vents may cause contact failure.

APPLICATIONS

- Communication equipment
- Automation equipment
- Office machines
- Electronic equipment
- Electronic equipment for national security
- Amusement equipment