Layout Guidelines for PSoC CapSense – Best practices - Quick Reference

The information and parameters in the following table are recommendations for achieving optimal sensitivity for capacitive sensing with PSoC CapSense and CapSense Express (hereafter called PSoC for the purpose of this document) devices. These recommendations are not hard, fast rules. Rather, they serve as a guide for designers as CapSense applications are developed. For more information and explanations of each of these parameters, please refer to AN2292, AN2394 and the User Module datasheets for CSA and CSD.

Sl	Category	Min	Max	Recommendations/Remarks
1.	Button Shape			Solid round pattern or rectangle with curved edges
2.	Button Size			10 mm
3.	Button-Button spacing	1 mm		8 mm (adjacent buttons to be ground, if spacing is less)
4.	Button Ground Clearance	0.5mm	4mm	Button ground clearance = Overlay Thickness
5.	Ground Flood - Top layer			Hatched ground 7 mil trace and 45 mil grid
6.	Ground Flood - Bottom layer			Hatched ground 7 mil trace and 70 mil grid
7.	Slider Segment pattern			Saw Tooth pattern
8.	No of Slider segments	5		Max - Depends on Available i/o pins of PSoC.
9.	Slider Segment Size	2 mm	5 mm	2 mm
10.	Slider Segment Spacing	0.5 mm	2 mm	Slider segment spacing=Overlay thickness
11.	Trace Length from Sensor to PSoC - Buttons		300 mm	< 100 mm. Trace length should be as minimum as possible. For long trace length design requires large sensing pads and a thin overlay in order to maximize the signal from the sensor.
12.	Trace Length from Sensor to PSoC - Slider		230 mm	< 100 mm.
13.	Trace Width	0.17 mm	0.20 mm	0.17 mm (7 mil)
14.	Trace Routing			Traces should be routed on the non sensor side. If any non CapSense trace crosses CapSense trace, ensure that intersection is orthogonal.
15.	Via Position for the sensors			Via should be placed near the edge of the button/slider to reduce trace length thereby increasing sensitivity.
16.	Via Hole Size for sensor traces			10 mil
17.	No. of via on sensor trace	1	2	1
18.	CapSense and LED resistor placement			Place CapSense and LED resistors close to PSoC for noise suppression .CapSense resistors have highest priority place them first.
19.	Distance between any CapSense trace to Ground Flood	10 mil	20 mil	20 mil
20.	PSoC placement			Mount PSoC on the layer opposite to sensor. The distance between PSoC and sensors should be minimum.
21.	Placement of Components in 2 layer PCB			Top layer-Sensor pads and bottom layer-PSoC, other components and traces.
22.	Placement of Components in 4 layer PCB			Top layer-Sensor pads, Layer-2-traces, Layer-3-ground, Bottom layer- PSoC and other components.
23.	Overlay Thickness - Buttons	0 mm	4 mm	2 mm
24.	Overlay Thickness - Slider	0 mm	2 mm	1 mm
25.	Overlay material			Needs to be non-conductive material. Glass, ABS Plastic, Formica
26.	Overlay Adhesives			Adhesive should be non conductive and dielectrically homogenous. Use 467MP and 468MP adhesives made by 3M.
27.	Board Thickness	0.5 mm		Standard board thickness for CapSense FR4 based designs is 1.6 mm.