



THIS SPEC IS OBSOLETE

Spec No: 001-73878

Spec Title: CAPSENSE[®] EXPRESS[™]
SIMPLE. CONFIGURABLE. HIGH-
PERFORMANCE

Sunset Owner: GUL

Replaced By: None

WORLD'S EASIEST CAPACITIVE TOUCH-SENSING SOLUTION

CAPSense® EXPRESS™ WITH SMARTSense™ AUTO-TUNING TAKES THE GUESSWORK OUT OF TOUCH-SENSING DESIGN

Cypress's CapSense Express solutions make button replacement easy by eliminating unnecessary software tools, firmware development, device programming, and system tuning. This reduces time-to-market and eliminates the learning curve for designers who are new to capacitive touch-sensing interfaces.

ADVANCED TOUCH-SENSING SOLUTION

In a typical CapSense application, there can be significant variation in baseline signal counts due to variability in environmental and noise conditions. Cypress's revolutionary SmartSense™ Auto-tuning technology, built into CapSense Express, establishes, monitors and maintains the requisite SNR (Signal-to-Noise Ratio) levels for optimal CapSense performance. Further, in moving from the prototype stage to mass production, manufacturing variations in PCB and/or overlay material can affect the parasitic or intrinsic capacitance of the system. SmartSense auto-tuning automatically detects the sensor capacitance threshold level and dynamically optimizes system performance.

The CapSense Express family makes the most of Cypress's broad technology portfolio and years of user-interface know-how so designers can focus on end product development and timely market introductions.

KEY APPLICATIONS

- Security Panels
- Card Reader Keypad
- Biometric Scanner Keypad
- Fire Alarm Control Panel
- Thermostat

BUILDING CONTROLS



WHITE GOODS



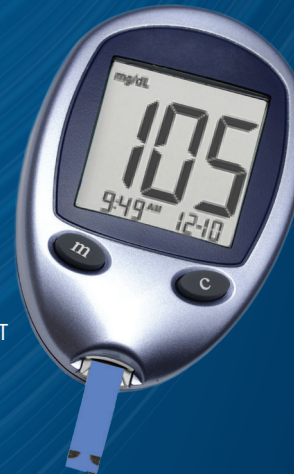
SMALL APPLIANCES



CONSUMER ELECTRONICS



MEDICAL EQUIPMENT



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FOR MORE INFORMATION ON CAPSense EXPRESS :

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CAPSense® EXPRESS™
SIMPLE. CONFIGURABLE. HIGH-PERFORMANCE.



ABOUT CYPRESS

Cypress delivers high-performance, mixed-signal, programmable solutions that provide customers with rapid time-to-market and exceptional system value. Cypress offerings include the flagship PSoC® programmable system-on-chip families and derivatives such as PowerPSoC® solutions for high-voltage and LED lighting applications, CapSense® touch sensing and TrueTouch® solutions for touchscreens. Cypress is the world leader in USB controllers, including the high-performance West Bridge® solution that enhances connectivity and performance in multimedia handsets. Cypress is also a leader in high-performance memories and programmable timing devices. Cypress serves numerous markets including consumer, mobile handsets, computation, data communications, automotive, industrial and military. Cypress trades on the NASDAQ Global Select Market under the ticker symbol CY. Visit Cypress online at www.cypress.com.

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CAPSENSE™ EXPRESS:
THE SMART AND SIMPLE ANSWER TO BUTTON REPLACEMENT

Cypress offers the broadest portfolio of capacitive touch-sensing products on the market. Its CapSense Express MBR family of capacitive touch-sensing controllers is designed for a wide range of applications, with broad operating ranges, strong immunity to RF and AC noise, and the ability to operate at very low power levels.

The CY8CMBR2044 solution provides up to four hardware-configurable CapSense buttons with direct LED drive capability. It is provided in the smallest CapSense Express package, a 16-pad QFN (3x3x0.6mm).

PRODUCT INFORMATION

Part Number	Description	Output	Features	Voltage Range	Power	Package
CY8CMBR2044	4 button HW Configurable CapSense controller	GPO	SmartSense Auto-tuning, 4 Buttons, 4 LEDs	1.71 to 5.5 V	15 uA Active, 100 nA Deep Sleep	16-pad QFN (3x3 x0.6mm)
CY8CMBR2010	10 button HW Configurable CapSense controller	GPO	SmartSense Auto-tuning, 10 buttons, 10 LEDs with breathing effects	1.71 to 5.5 V	15 uA Active, 100 nA Deep Sleep	32-pad QFN
CY8CMBR2110	10 button I2C Configurable CapSense controller	GPO	SmartSense Auto-tuning, 10 buttons, 10 LEDs with breathing effects	1.71 to 5.5 V	15 uA Active, 100 nA Deep Sleep	32-pad QFN
CY8CMBR2016	16 button HW Configurable CapSense controller	Matrix Keypad Scan, Matrix Truth Table, Encoded GPO	SmartSense Auto-tuning, 4x4 matrix OR 16 buttons, 16 LEDs	1.71 to 5.5 V	15 uA Active, 100 nA Deep Sleep	48-pad QFN (6x6x0.6mm)
CY8CMBR2116	16 button I2C Configurable CapSense controller	I2C, Matrix Keypad Scan, Matrix Truth Table, Encoded GPO	SmartSense Auto-tuning, 4x4 matrix OR 16 buttons, 16 LEDs	1.71 to 5.5 V	15 uA Active, 100 nA Deep Sleep	48-pad QFN (6x6x0.6mm)
CY8C201xxx	10 button I2C Configurable CapSense controller	I2C	10 Buttons, Slider Segments	2.4 to 5.25 V	1.5 mA Active, 4 uA Deep Sleep	8, 16 SOIC; 16 QFN

JUMP START YOUR DEVELOPMENT

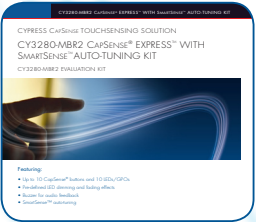
Cypress offers multiple kits to help you quickly evaluate the performance of our CapSense technology and prototype your designs.



CY8CMBR2044
STARTER KIT
CapSense Express Kit with SmartSense Auto-Tuning and four hardware-configurable CapSense buttons.



TERASIC CY8CMBR2016
EVALUATION KIT
Developed with a third party partner Terasic, this kit evaluates the 16-button CapSense Express device, with jumpers available to simulate pin settings.



CY8CMBR2010
DEVELOPMENT KIT
Coming Soon! A 10-button CapSense solution paired with the new EZ-Click Customizer Tool.

DESIGN TOOLBOX:
CONCEPT TO CAPSENSE IN THREE EASY STEPS

The CapSense Express Design Toolbox provides step-by-step guidance for the sensor design and layout process, which saves valuable engineering resources and test time, improves yield and speeds time-to-volume.

STEP 1:
LAYOUT ESTIMATOR

With the Layout Estimator, you enter the overlay thickness and overlay material as well as the capacitance of the material. The tool will provide you a minimum button diameter and maximum trace length required for your design.

Table A- Estimator		
Input Parameters	Value	Units
Overlay Thickness	1.0mm	
Overlay - Dielectric constant	2.9	Positive
Capacitance of trace per inch	2.0	pF
Minimum Recommended Button Diameter (based on minimum 0.25pF Finger response)		
Noise Conditions - Low (0.05 pF Noise)	4	mm
Noise Conditions - Medium (0.075 pF Noise)	6	mm
Noise Conditions - High (0.1 pF Noise)	7	mm

Choose overlay and thickness

STEP 2:
THE CP AND POWER ESTIMATOR

The Cp and Power Estimator ensures that you have the appropriate parasitic capacitance for your design. The tool also allows you to adjust the scan rate to optimize power consumption and response time.

Table A: Cp Calculator		
Sensor	Button diameter	Trace length
CS0	12mm	20mm
CS1	12mm	200mm
CS2	12mm	100mm
CS3	12mm	20mm
Table B: Power calculator		
Select Output Interface	Truth Table	
Select Scan Rate	4ms	
Approximate Scan Rate value	2%	
% of time finger is on the sensors		
Max Sleep Current	0.0013	mA

Choose size of button and distance from chip

STEP 3:
MASS PRODUCTION

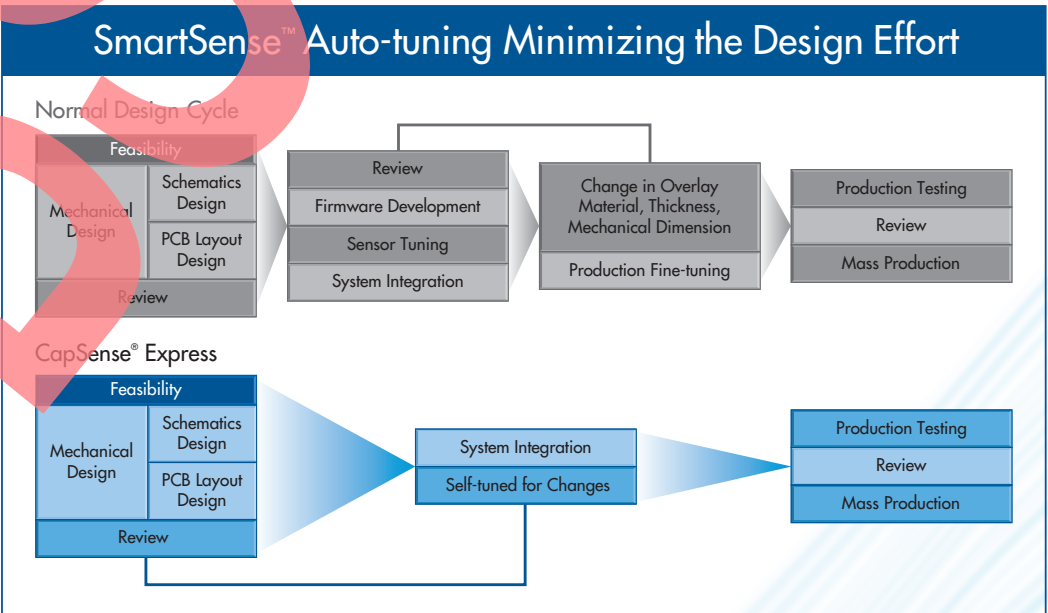
This final step allows you to check the viability of your design. If the design is not ready for mass production, the tool will let you know, and adjustments can be made to pass the test.

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Sensor	Button diameter	Trace length
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CS1	12mm	200mm
CS2	12mm	100mm
CS3	12mm	20mm



SIMPLIFICATION OF THE DESIGN PROCESS

CapSense Express with SmartSense Auto-tuning simplifies the design process by eliminating firmware development and manual tuning to accelerate time-to-market.



EZ-CLICK™ CUSTOMIZER TOOL:
CUSTOMIZE BUTTON AND LED PROPERTIES WITH POINT-AND-CLICK CONFIGURATION

The EZ-Click Customizer Tool accelerates time-to-market by providing simple graphical configuration options for Cypress devices. This development tool is outside of any additional firmware tools, is quick to learn, and easy to use.

Select Buttons

Configure Individual Button Properties

Optimize Power

Configure LED "Breathing" Effect

Configure Individual LED Properties