Features

- Automotive Electronics Council (AEC) Q100 qualified

- Multi-touch capacitive touchscreen (CYAT8165X)/ trackpad (CYAT7165X) controller
  - 32-bit Arm® Cortex® CPU
  - Register-configurable
  - Noise-suppression technologies for display and EMI
    - Effective 20-V drive for higher signal-to-noise ratio (SNR)[1]
    - AutoArmor™ improves both electromagnetic emissions and immunity
    - External display synchronization
  - Water rejection and wet-finger tracking using DualSense
  - Multitouch glove with automatic mode switching
    - Ten fingers with thin glove (≤1-mm thick)
    - Two fingers with thick glove (≤5-mm thick)
  - Large object rejection
  - Automatic baseline tracking to environmental changes
  - Low-power look-for-touch mode
  - Field upgrades via bootloader
  - Cypress Manufacturing Test Kit (MTK)
  - Touchscreen sensor self-test
  - Low-power CapSense™ wake-up button with power consumption of 50 µA
  - Low-power wake-on-touchscreen with power consumption of 120 µA

- System performance (configuration dependent)
  - Screen sizes up to 8.5-inch diagonal
    - 6.2-mm electrode pitch; 16:9 aspect ratio
  - Up to 48 sense pins, 560 intersections; 16:9 aspect ratio (28 x 20)
  - Reports up to ten fingers
  - Small finger support down to 4 mm
  - Refresh rate up to 250 Hz; other rates configurable
  - TX frequency up to 350 kHz

- Power (configuration-dependent)
  - 1.71- to 1.95-V and 3.0- to 5.5-V logic and digital I/Os supply
  - 3.0- to 5.5-V analog supply
  - 9-mW average power
  - 11-µW typical deep-sleep power

- Sensor and system design (configuration-dependent)
  - Supports a variety of touchscreen sensors and stackups
    - Manhattan, diamond
    - Sensor-on-Lens (SOL)
    - On-cell
    - Plastic (PET) and glass-sensor substrates
    - LCD, AMOLED, and IPS displays
    - Metal mesh

- Communication interface
  - I²C slave at 100 and 400 kbps
  - SPI slave bit rates up to 8 Mbps

- Packages
  - 100-pin TQFP 14 × 14 × 1.4 mm (0.5-mm pitch)
  - 64-pin TQFP 10 × 10 × 1.4 mm (0.5-mm pitch)
  - 56-pin QFN wettable flank, 8 × 8 × 1 mm (0.5-mm pitch)

- Ambient temperature range
  - Automotive-A: –40 °C to 85 °C
  - Automotive-S: –40 °C to 105 °C

Note

1. Effective voltage when using 17 multi-phase TX and 5-V V_{CCTX} supply.

Ordering Information

Table 1 lists the CYAT8165X/7165X touchscreen/trackpad controllers.

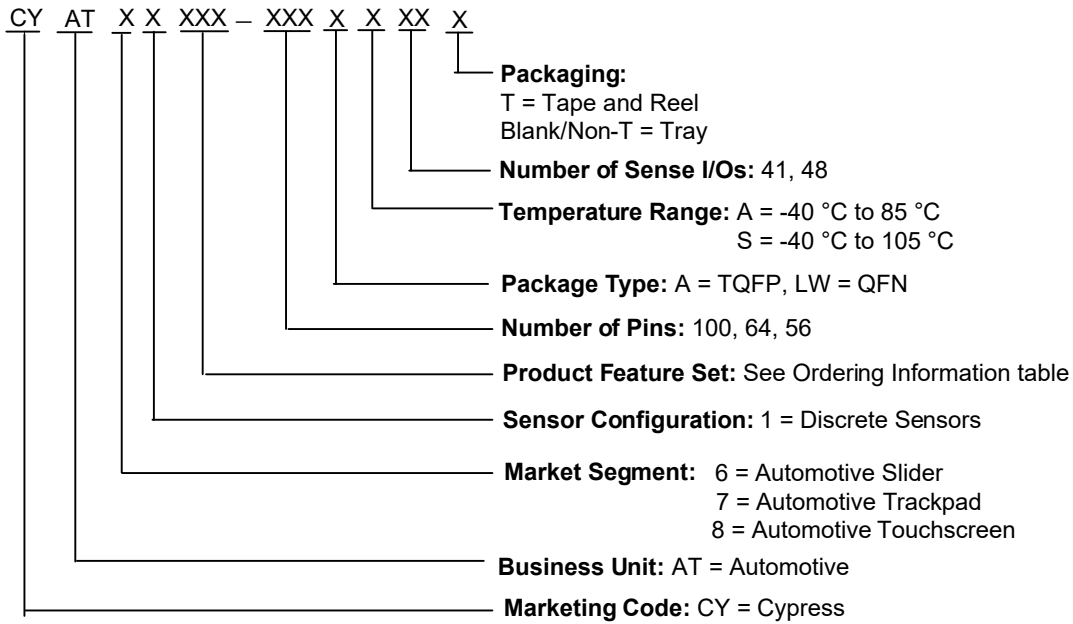**Table 1. Ordering Information[2]**

Marketing Part Number	Number of Sense Pins	Number of Fingers	Wake up Button Support (or) Wake-on-Screen Support	Capsense Buttons	Water Rejection	Thin Glove Support	Gestures	Thick Overlay/Thick Glove Support	Package
CYAT81650-100AA48	48	10	–	–	–	–	–	–	100-pin TQFP
CYAT81650-100AS48	48	10	–	–	–	–	–	–	100-pin TQFP
CYAT81652-100AA48	48	10	–	✔	✔	✔	–	–	100-pin TQFP
CYAT81652-100AS48	48	10	–	✔	✔	✔	–	–	100-pin TQFP
CYAT81655-100AA48	48	10	–	✔	✔	✔	✔	–	100-pin TQFP
CYAT81655-100AS48	48	10	–	✔	✔	✔	✔	–	100-pin TQFP
CYAT81658-100AA48	48	10	–	✔	✔	✔	✔	✔	100-pin TQFP
CYAT81658-100AS48	48	10	–	✔	✔	✔	✔	✔	100-pin TQFP
CYAT81659-100AA48	48	10	✔	✔	✔	✔	✔	✔	100-pin TQFP
CYAT81659-100AS48	48	10	✔	✔	✔	✔	✔	✔	100-pin TQFP
CYAT81650-64AA48	48	10	–	–	–	–	–	–	64-pin TQFP
CYAT81650-64AS48	48	10	–	–	–	–	–	–	64-pin TQFP
CYAT81652-64AA48	48	10	–	✔	✔	✔	–	–	64-pin TQFP
CYAT81652-64AS48	48	10	–	✔	✔	✔	–	–	64-pin TQFP
CYAT81655-64AA48	48	10	–	✔	✔	✔	✔	–	64-pin TQFP
CYAT81655-64AS48	48	10	–	✔	✔	✔	✔	–	64-pin TQFP
CYAT81658-64AA48	48	10	–	✔	✔	✔	✔	✔	64-pin TQFP
CYAT81658-64AS48	48	10	–	✔	✔	✔	✔	✔	64-pin TQFP
CYAT81659-64AA48	48	10	✔	✔	✔	✔	✔	✔	64-pin TQFP
CYAT81659-64AS48	48	10	✔	✔	✔	✔	✔	✔	64-pin TQFP
CYAT71658-56LWA41[3]	41	10	✔	✔	✔	✔	✔	✔	56-pin QFN
CYAT71658-56LWS41[3]	41	10	✔	✔	✔	✔	✔	✔	56-pin QFN

Custom generic part numbers with customized firmware available for trackpad applications.

Notes
2. All devices have the following base features: Water Rejection, DisplayArmor, AutoArmor, DualSense, CapSense buttons, and Large Object Detection and Rejection.
3. These are trackpad part numbers.

Ordering Code Definitions

```
CY  AT  X  X  XXX  –  XXX  X  X  XX  X
```

Packaging:
T = Tape and Reel
Blank/Non-T = Tray

Number of Sense I/Os: 41, 48

Temperature Range: A = -40 °C to 85 °C
S = -40 °C to 105 °C

Package Type: A = TQFP, LW = QFN

Number of Pins: 100, 64, 56

Product Feature Set: See Ordering Information table

Sensor Configuration: 1 = Discrete Sensors

Market Segment: 6 = Automotive Slider
7 = Automotive Trackpad
8 = Automotive Touchscreen

Business Unit: AT = Automotive

Marketing Code: CY = Cypress

Document History Page

Document Title: CYAT8165X/7165X (41/48 I/Os), PSoC™ Automotive Multitouch All-Points Touchscreen/Trackpad Controller Document Number: 002-16617			
Revision	**ECN**	**Submission Date**	**Description of Change**
**	5437893	09/16/2016	Initial release
*A	6689991	10/03/2019	Updated Features, Ordering Information, and Sales, Solutions, and Legal Information.
*B	7031970	11/27/2020	Updated the title to "CYAT8165X/7165X (41/48 I/Os), Automotive MultiTouch All-Points Touchscreen/Trackpad Controller". Added trackpad reference. Added AEC Q100 qualification statement in Features. Added 56-pin QFN in Ordering Information. Updated Ordering Code Definitions.
*C	7762698	05/16/2022	Updated to the PSoC™ Automotive Multitouch branding guidelines.

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