



SUMMARY

CYAT8165X/7165X (41/48 I/Os)

PSoC™ Automotive Multitouch All-Points Touchscreen/Trackpad Controller

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_{CC}TX supply.

Ordering Information

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

Table 1. Ordering Information^[2]

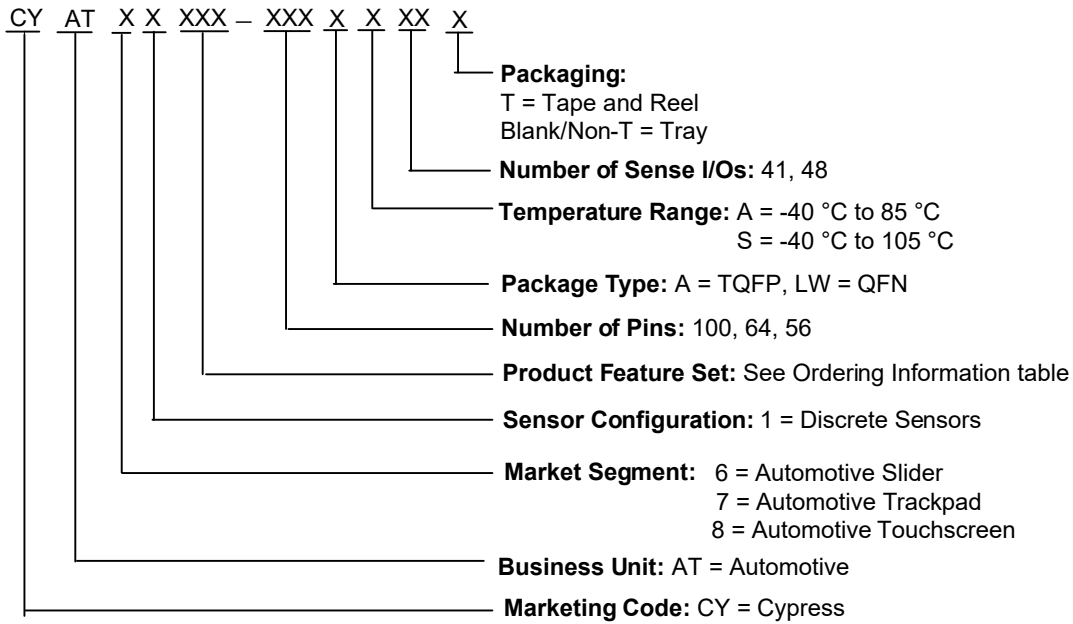
| Marketing Part Number | Number of Sense Pins | Number of Fingers | Wake up Button Support (or) Wake-on-Screen Support | Capsense Buttons | Water Rejection | Thin Glove Support | Gestures | Thick Overlay/Thick Glove Support | Package |
|----------------------------------|----------------------|-------------------|--|------------------|-----------------|--------------------|----------|-----------------------------------|--------------|
| 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



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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