

MIGRATION FROM CFA635 TO CFA735 MODULE FAMILIES

Using CFA635 emulation, the CFA735 is mechanically and code-compatible with the CFA635 family. An EOL (End of Life) notice was issued for the CFA635. See [Part Change Notice #10365](#). From the beginning, the CFA735 was designed as a module that could replace the CFA635 in as many installations as possible. While a very close replacement, the CFA735 is not a 100% drop in replacement.

The entire design process was to make the CFA735 a physical replacement for the CFA635 built on a next generation hardware design. Physically, the CFA735 and CFA635 share the same base design. There are some minor changes to the functional specifications between the CFA735 running in CFA635 emulation mode. These differences are outlined in later sections of this document.

Physically, the CFA635 and CFA735 share:

- Physical dimensions – There is an ~0.5mm height difference due to the FFC extending below the bezel
- Keypad
- Keypad location
- Mounting points
- Bi-Color LED locations
- Supported interfaces
- Command structure
- Communication packet structure
- Features and functionality

Visually, the CFA635 and CFA735 from the front are very similar. Once the modules are mounted in an enclosure / chassis, any differences are negligible.

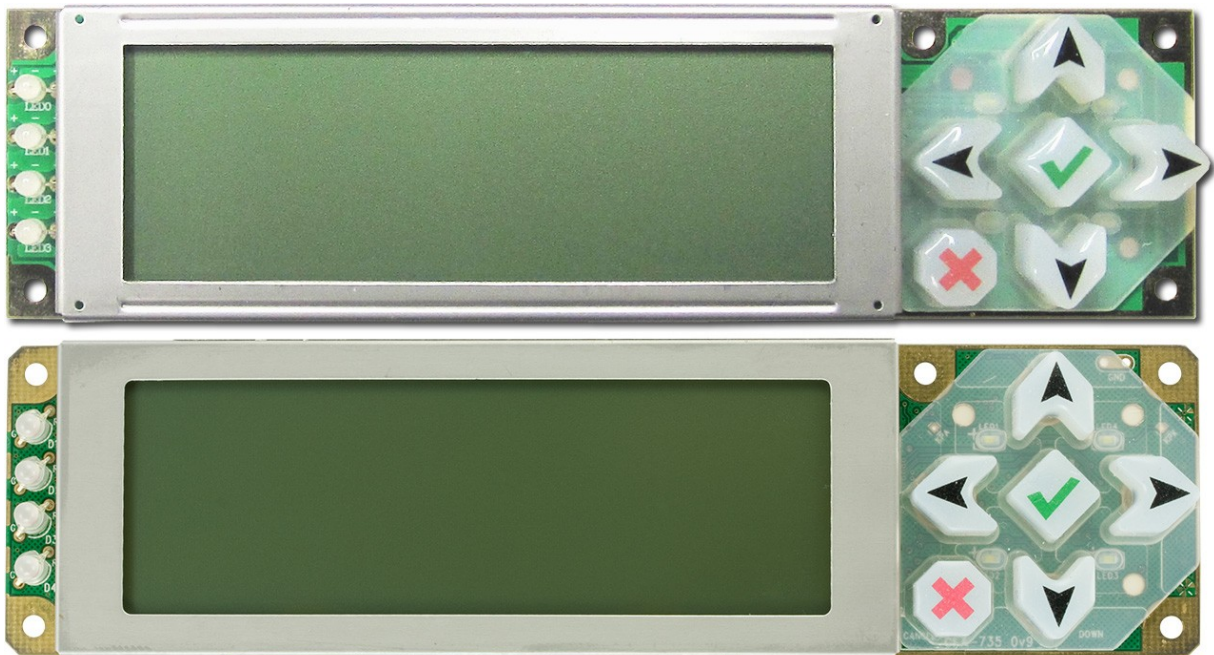
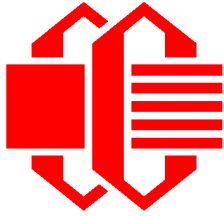


Figure 1: Front view of the CFA635 and the CFA735 with positive FSTN LCD. In the image, the CFA635 is the upper module.



Visually, there are significant differences when looking at the back of the module. Physically, the key areas are the same.

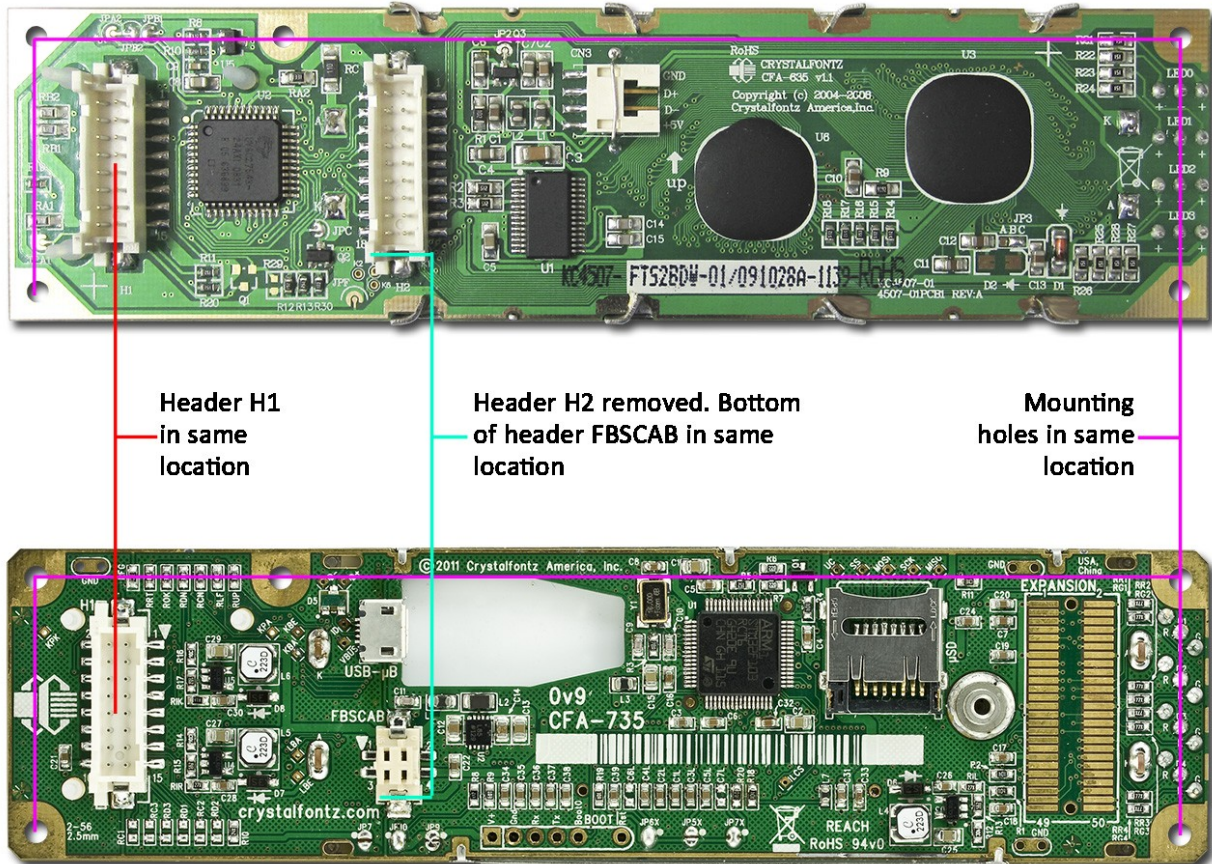
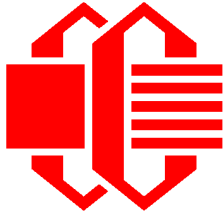


Figure 2: Back view and comparison of the CFA635 to the CFA735.

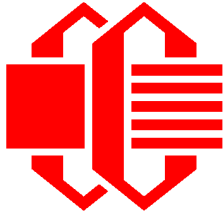
GENERAL DIFFERENCES

- The CFA735 operates as a 20 x 4 character display.
- The CFA635 is powered by a Cypress PSoC® microcontroller and has a Samsung S6A0073 LCD controller. The CFA735 is powered by an ST-Micro STM32F103 series 32-bit ARM-based microcontroller and has a Sitronix ST7529 LCD driver/controller.
- The supply voltage for the CFA635 is +5.0 typical. The supply voltage for the CFA735 is +3.3v or +5.5v. The GPIO[0,1,2,3,4] signals on the H1 connector are at a +3.3v logic level but are +5v tolerant when configured as inputs. The minimum input low level voltage is -0.3v, the maximum input low level voltage is +1.17v. The minimum input high level voltage is +1.55v, the maximum input high level voltage is +5.5v.
- Overall module dimensions width and depth (thickness) are the same. The CFA735 is slightly taller, ~0.5 mm due to the FFC through the bezel. Keypad and mounting holes are the same.
- CFA735 has a wider temperature range than a CFA635.
- The CFA635 requires different firmware for USB interface. The CFA735 supports serial *and* USB interface with the same firmware. *The CFA735 USB driver is not the same as the CFA635 USB driver. You will need to install the CFA735 USB driver.* Command structure and communication packet structure are the same.

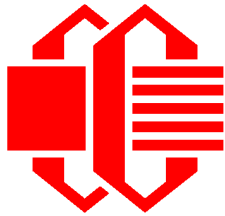


- The CFA635 firmware command set is emulated on the CFA735, except for Command 22 Send Command Directly to the LCD controller.
- A system cooling accessory board is available for the CFA635. See [SCAB](#). The CFA735 will have a system cooling accessory board [FBSCAB](#), available when the CFA735 is released.
- All GPIO access is directly from the CFA735 via the H1 header. There is no GPIO pass-through to the FBSCAB.
- The CFA735 has 5 GPIOs available via H1, GPIO[0] - GPIO[4]. The CFA635 has only 4 via H1, GPIO[0] – GPIO[3]. GPIO[4] was reserved for DOW functionality.

PART NUMBERS		
VARIANT DESCRIPTION (LISTED BY DISPLAY COLOR)	CFA635 Family	CFA735 Family
Base part numbers		
Black (dark) pixels on white (light) background	CFA635-TFE-KL	CFA735-TFK-KR
	CFA635-TFE-KS	CFA735-TFK-KT
	CFA635-TFE-KU	CFA735-TFK-KR or CFA735-TFK-KT
White (light) pixels on blue background	CFA635-TMF-KL	CFA735-TML-KR
	CFA635-TMF-KS	CFA735-TML-KT
	CFA635-TMF-KU	CFA735-TML-KR or CFA735-TML-KT
Black (dark) pixel on yellow-green background	CFA635-YYE-KL	CFA735-YYK-KR
	CFA635-YYE-KS	CFA735-YYK-KT
	CFA635-YYE-KU	CFA735-YYK-KR or CFA735-YYK-KT

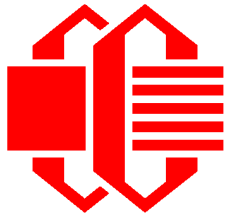


CABLE PART NUMBERS		
Interface	CFA635 Family	CFA735 Family
USB – to external USB-A	WRUSBY03	WRUSBY27
USB - to internal system board header	WRUSBY11	WRUSBY34
USB – to internal system board header	WRUSBY33	WRUSBY34
Serial (full swing RS-232) - to external DB9	WR232Y08	WR232Y08
Serial (full swing RS-232) – to internal 0.100” 10 pin	WR232Y22	WR232Y22
Power	WRPWRY24	WRPWRY24
ATX Functionality (Power on / off / reset)	WRPWRY25	WRPWRY25
SCAB / FBSCAB connectivity - long	WREXTY15	WREXTY37
SCAB / FBSCAB connectivity – short (ie: bracket)	WREXTY19	WREXTY37
Fan connectivity / extension	WRFANX01 ^{1.}	WRFANX01 ^{2.}
DOW temperature probes	WRDOWY17 ^{3.}	WRDOWY17 ^{4.}
ATX Functionality with SCAB / FBSCAB	WRPWRY14 ^{5.}	WRPWRY25 ^{5.}
<p>Notes: Cable part numbers in bold indicate new cable utilized</p> <ol style="list-style-type: none"> Up to 3 fans for Serial (suffix -KL or -KS) or up to 4 fans for USB (suffix -KU) Up to 4 fans for all interfaces (suffix -KT or -KR) Up to 32 in series Up to 16 in series When using the CFA735 with an FBSCAB and ATX functionality, the ATX control is directly from the CFA735 and not the FBSCAB. There is no GPIO pass through to the FBSCAB – H1 on the CFA735 is utilized for GPIO connectivity. 		

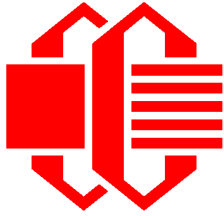


HARDWARE DIFFERENCES

	CFA635 Family	CFA735 Family
Mechanical Specifications		
<i>All major dimensions, including mounting holes and keypad, are the same.</i>		
Pixel Size	0.600 (W) x 0.650 (H) mm	0.300 (W) x 0.325 (H) mm
Pixel Pitch Size	0.600 (W) x 0.650 (H) mm	0.325 (W) x 0.350 (H) mm
5x7 Standard Character	3.20 (W) x 4.85 (H) mm	3.225 (W) x 4.875 (H) mm
6x8 Character Matrix	3.90 (W) x 5.60 (H) mm	Same.
Viewing Area	82.95 (W) x 27.50 (H) mm	83.10 (W) x 27.54 (H) mm <i>Identical with CFA635 in CFA635 emulation.</i>
Active Area	77.95 (W) x 22.35 (H) mm	79.27 (W) x 23.78 (H) mm <i>Identical with CFA635 in CFA635 emulation.</i>
Module Overall Width & Height	142 (W) x 37.00 (H) mm	142 (W) x 37.08 (H) mm Height includes flex at bottom.
Weight	<i>CFA635-xxx-KL: 66 grams</i>	<i>CFA735-xxx-KR: 57 grams</i>
	<i>CFA635-xxx-KU: 66 grams</i>	<i>CFA735-xxx-KR: 57 grams</i>
	<i>CFA635-xxx-KS: 71 grams</i>	<i>CFA735-xxx-KT: 62 grams</i>
LEDs in edge-lit LED Backlight	8 LEDs, 4 per side. Uses current limited voltage source.	12 LEDs, 6 per side. Uses constant current LED driver.
Bezel	Stainless steel.	Stainless steel.
Connectors	Two connectors: H1 connector – 16 pins H2 connector – 18 pins	Two connectors: H1 – 16 pins FBSCAB – 4 pins
MicroSD Card Slot	None	On back of PCB.
<p>Note: Leave the supplied dummy microSD card in the slot. If you remove the dummy card and leave the slot empty when the module is powered on, you can irreparably damage the module.</p> <p>The microSD card slot may be used for future firmware updates. Firmware updates are announced through our PCN (Parts Change Notices) system. To ensure that the appropriate people in your organization receive notices, please ask them to subscribe at www.crystalfontz.com/news/pcn.php.</p>		



Electrical Specifications		
Interfaces:	One interface per module.	Two interfaces may be used simultaneously.
	-KL = TTL "Logic Level" Serial	CFA735-xxx-KR: TTL "Logic Level" Serial and USB.
	-KU = USB	CFA735-xxx-KR: TTL "Logic Level" Serial and USB.
	-KS = "Full Swing" RS-232 Serial. Includes mounted CFA-RS232 board.	CFA735-xxx-KT: "Full Swing" RS-232 Serial and USB. Includes mounted CFA-RS232 board.
Absolute Maximum Ratings:		
Temperature Range	Standard: Operating temperature 0°C to 50°C Storage temperature -10°C to 60°C	Wide: Operating temperature -20°C to 70°C Storage temperature -30°C to 80°C
Input Supply Voltage	$V_{DD} = +5.25\text{v}$ maximum	$V_{DD} = +5.5\text{v}$ maximum
DC Characteristics:		
Input Supply Voltages	+4.75v minimum +5.0v typical +5.25v maximum	+3.3v minimum +3.3v or +5.0v typical +5.5v maximum
Logic/GPIO Input High Voltage	If $V_{DD} = 5.0\text{v}$: $V_{IH} = +2.1\text{v}$ minimum, V_{DD} maximum	If $V_{DD} = 3.3\text{v}$: $V_{IH} = +1.55\text{v}$ minimum, +5.5v maximum
Logic/GPIO Input Low Voltage	$V_{IL} = V_{SS}$ minimum, +.08v maximum	$V_{IL} = -0.3\text{v}$ minimum, +1.17v maximum
Output High Voltage	Not specified.	$V_{OH} = +2.4\text{v}$ minimum, +3.3v maximum
Output Low Voltage (For TTL "Logic Level Serial only)	Not specified.	$V_{OL} = +0.4\text{v}$ minimum, +1.3v maximum
Additional Electrical Criteria:		
Typical GPIO Current Limits	Sink: 25 mA Source: 10 mA	Sink: 8 mA Source: 8 mA
<i>These are the typical GPIO current limits when sinking or sourcing all 5 GPIO pins simultaneously. If you need more information, please contact (888) 206-9720 or (509) 892-1200.</i>		
Backlight Control	PWM Frequency: 300 Hz nominal	DAC (Digital-to-Analog Converter) controlling the constant current LED driver.

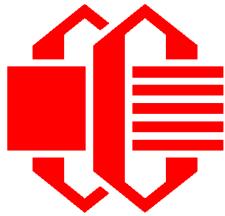


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Typical Current Consumption (Logic + all LEDs at 100% includes LCD backlight, keypad backlight, and the 4 status lights)	<i>CFA635-TFE-xx</i> : 267 mA @ +5.25v <i>CFA635-TMF-xx</i> : 285 mA @ +5.25v <i>CFA635-YYE-xx</i> : 330 mA @ +5.25v	<i>CFA735-TFK-xx</i> : 369 mA @ +3.3v <i>CFA735-TML-xx</i> : 368 mA @ +3.3v <i>CFA735-YYK-xx</i> : 375 mA @ +3.3v
		<i>CFA735-TFK-xx</i> : 268 mA @ +4.75v <i>CFA735-TML-xx</i> : 250 mA @ +4.75v <i>CFA735-YYK-xx</i> : 292 mA @ +4.75v
		<i>CFA735-TFK-xx</i> : 258 mA @ +5.0v <i>CFA735-TML-xx</i> : 240 mA @ +5.0v <i>CFA735-YYK-xx</i> : 276 mA @ +5.0v

Accessories		
System Cooling Accessory Board	Yes. See SCAB .	Yes. The FBSCAB will be available when the CFA735 is released.
DOW Devices including WR-DOW-Y17 Temperature Sensors	Connect up to 32 devices on the SCAB or the CFA635.	Connect up to 16 devices. An FBSCAB is required to support DOW devices. DOW devices are no longer tied to GPIO4.
Bracket, SLED, and Overlay	Yes.	Yes.

DEMONSTRATION SOFTWARE		
	CFA635 Family	CFA735 Family
Windows Command Demonstration	635 WinTest	635 WinTest
CrystalControl2 displays system information on your PC.	CC2 (CrystalControl2)	CC2 (CrystalControl2)
Linux-compatible command-line example programs with C source code.	linux cli examples	linux cli examples . It will show as /dev/ttyACMx instead of /dev/ttyUSBx.



FIRMWARE COMMAND DIFFERENCES

CFA735 FW 0v9

Command 1 (0x01): Get Hardware & Firmware Version	
CFA735 Family	Example uses current CFA735 version numbers and expanded functionality. Valid data_length is 0 to 255.
CFA635 Family	Example used CFA635 version numbers. Valid data_length is 0 to 16.
Command 5 (0x05): Reset Functions	
CFA735 Family	Command offers an expanded set of choices: Reload Boot Settings, Reset Host, Power Off Host, CFA735 Soft Reboot, or CFA735 Soft Reboot and Settings Reset.
CFA635 Family	Reboot CFA635, Reset Host, or Power Off Host.
Command 22 (0x16): Send Command Directly to the LCD Controller	
CFA735 Family	Deprecated.
CFA635 Family	Supported.
Command 28 (0x1C): Set ATX Power Switch Functionality	
CFA735 Family	Function 4: Expanded to add AUTO_POLARITY (0x01) similar to CFA533 ATX commands, LEDs can be configured to follow host power state (0x08). Slight adjustment on description of pulse timing (data[1]).
CFA635 Family	Function 4: AUTO_POLARITY not supported.
Command 28 (0x1C): Set ATX Power Switch Functionality, Command 34 (0x22): Set or Set and Configure GPIO Pin, Command 35 (0x23): Read GPIO Pin Levels and Configuration State	
CFA735 Family	Omitted "slow" mode. All GPIO transitions are considered "fast".
CFA635 Family	Distinction is made between "fast" and "slow" modes.
Commands and cross-references within commands that require the SCAB accessory	
CFA735 Family	The FBSCAB system cooling accessory board will be available when the CFA735 is released. All commands labeled "SCAB Required" will be labeled "FBSCAB Required". Fan 4 can be used.
CFA635 Family	In all commands labeled "SCAB Required", for the CFA635-xxx-KS modules, "Note: Fan 4 is disabled and unused in the CFA635+SCAB"