
CH7217A USB Type-C DP Alt Mode to HDMI 2.0 Converter with PD 3.0 Controller

FEATURES

- Compliant with DisplayPort Alternate Mode on USB Type C standard
- Compliant with DisplayPort Specification version 1.4 and Embedded DisplayPort (eDP) Specification version 1.4
- Support up to 4 Main Link Lanes at 1.62Gbps, 2.7Gbps (HBR), 5.4Gbps (HBR2), or 8.1Gbps (HBR3) link rate
- Automotive DP input signal detection and Lane swap supported for compliance with the USB type C cable plug orientation switch
- AUX CH polarity inversion supported for USB type C cable plug orientation switch
- Adaptive DisplayPort receiver equalization supported for the compensation of input signal attenuation
- Support Fast and full Link Training
- Support eDP Authentication: Alternative Scramble Seed, Reset and Alternative Framing
- HDMI transmitter compliant with HDMI specification version 2.0 and DVI specification version 1.0
- HDMI transmitter supports up to 6.0Gbps data-rate for video timing of 4Kx2K@60Hz
- SCDC supported on HDMI DDC
- CEC tunneling over AUX is supported
- High-Dynamic-Range (HDR) Static Metadata: HDR10 (SMPTE ST2084), Hybrid Log-Gamma (HLG), Dolby Vision (SMPTE ST2084) are supported
- RGB/YCC444/422 to YCC444/422/420 conversions are supported, deep color depth up to 16 bit
- Progressive 3D video formats supported
- HDCP engine compliant with HDCP 2.2 and HDCP 1.4 specification with internal HDCP Keys
- HDCP 1.4/2.2 repeater supported
- 2 USB Type-C ports integrated compliant with USB Type-C Cable and Connector Specification revision 2.0
- Compliant with USB Power Delivery Specification Revision 3.0, with USB Power Delivery BMC transceiver integrated on USB Type-C ports
- Charge Through function support
- Fast Role Swap support
- SPDIF/IIS input supported with audio sampling rate up to 192KHz
- On-chip Audio Decoder which support 8 channel Audio input from DP Rx and output from HDMI Tx, support LPCM(16/20/24 bit) format with sampling rate up to 192kHz, compressed audio formats (AC3, DTS, DTS-HD MA, and Dolby MAT) and HBR audio formats with frame rate up to 1536kHz
- Integrated Ra, Rd and Rp for USB Type-C
- Embedded MCU to handle the control logic
- Full speed USB billboard module supported with USB 2.0 PHY integrated

GENERAL DESCRIPTION

Chrontel's CH7217A is a low-cost, low-power semiconductor device that translates the DisplayPort signal to HDMI/DVI through the USB Type-C connector. This innovative USB Type-C based DisplayPort receiver with an integrated HDMI Transmitter is specially designed to target the USB Type-C to HDMI converter, adapter and dongle device. Through the CH7217A's advanced decoding/encoding algorithm, the input DisplayPort high-speed serialized multimedia data can be seamlessly converted to HDMI/DVI output.

The CH7217A's DP/eDP receiver is compliant with the DisplayPort Specification 1.4 and Embedded DisplayPort (eDP) Specification version 1.4. With sophisticated DisplayPort signal detection and the Lane Swap/AUX polarity inversion logic, the CH7217A supports USB Type-C cable plug orientation switch. With internal HDCP key Integrated, the device support HDCP 2.2 specifications. In the device's receiver block, which supports four DisplayPort Main Link Lanes input with data rate running at 1.62Gbps, 2.7Gbps, 5.4Gbps or 8.1Gbps, and converted the input signal to HDMI output up to 4Kx2k@60Hz. Leveraging the USB Power Delivery control logic, the USB billboard module for USB device identify and DisplayPort's unique source/sink "Link Training" routine, the CH7217A is capable of instantly bring up the video display to the HDMI/DVI TV/Monitor when the initialization process is completed.

The CH7217A also supports up to 8-channel audio input from either DP Rx or SPDIF/IIS port and output from HDMI Tx with sample rate up to 192 KHz. Available audio bandwidth depends on the pixel clock frequency, the video format timing, and whether or not content protection re-synchronization is needed.

With sophisticated MCU and the embedded ROM, CH7217A supports auto-boot and EDID buffer. Leveraging the firmware auto-loaded from the embedded ROM, CH7217A supports DP input detection, HDMI connection detection, and determine to enter into Power saving mode automatically.

- Embedded ROM, integrated EDID Buffer
- IIC Slave, USB 2.0 are available for firmware update
- IIC slave interface are available for debug
- Low power architecture, support Auto Power Saving mode and low stand-by current
- Low power architecture
- RoHS compliant and Halogen free package
- Offered in 68 pin QFN package

APPLICATION

- USB Type C to HDMI 2.0 Adapter/Docking Stations
- USB Type-C Monitor/Projector/TV Display
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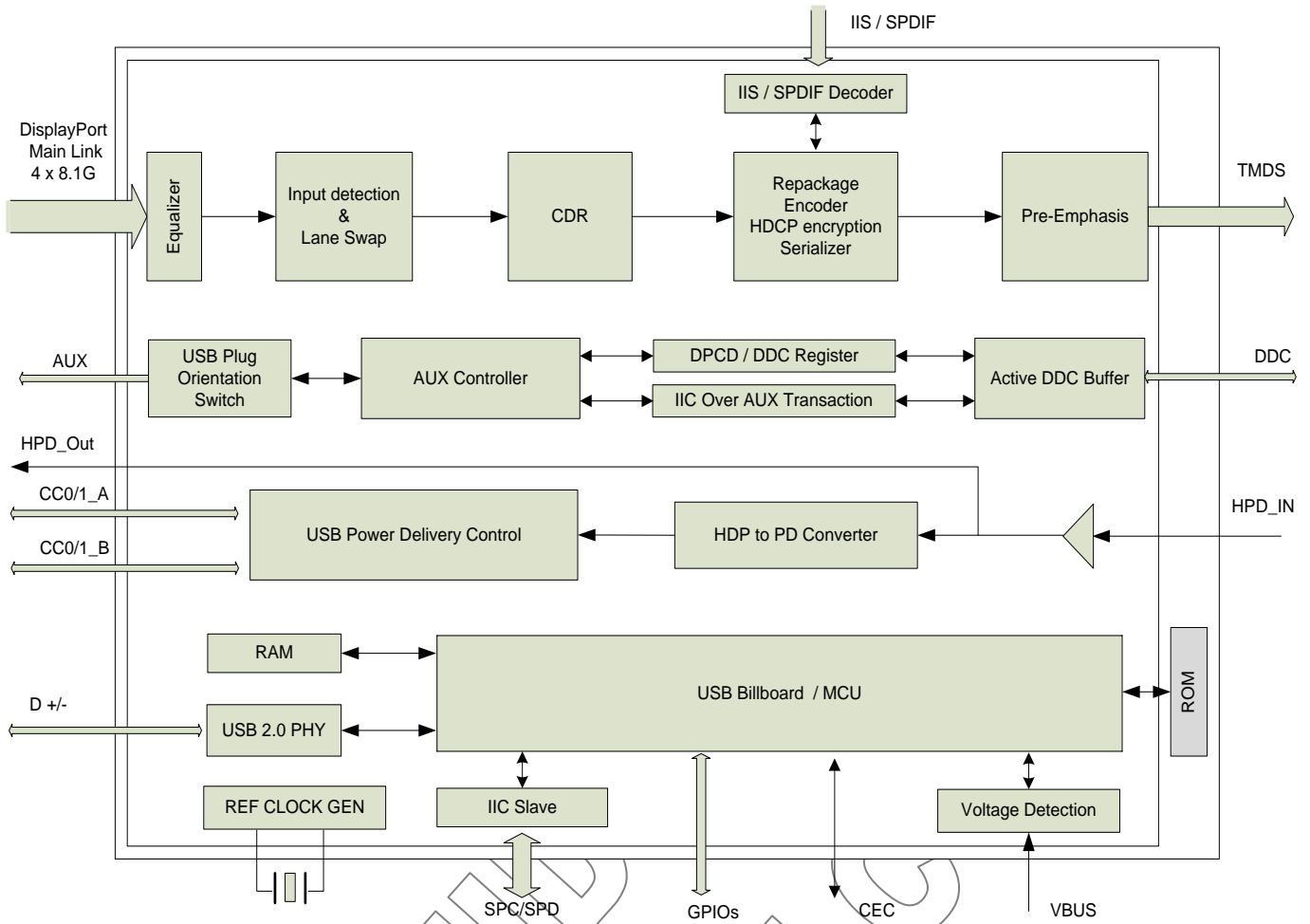


Figure 1: CH7217A Functional Block Diagram

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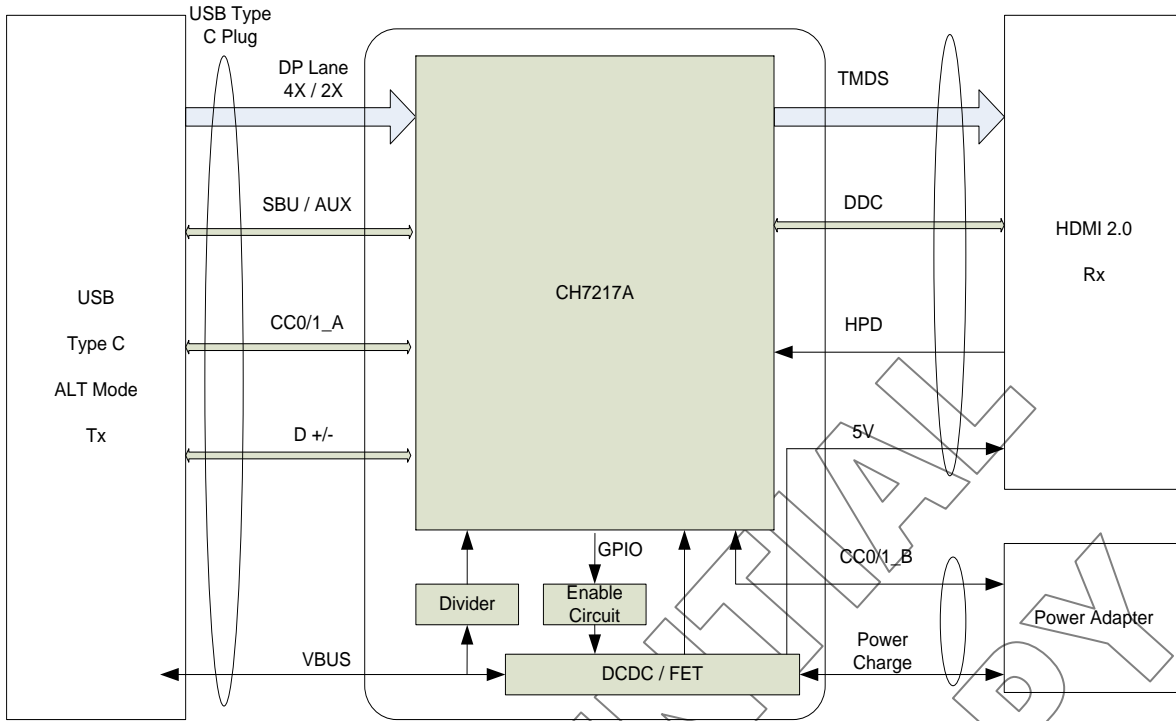


Figure 2: CH7217A USB Type-C to HDMI 2.0 + Power Charge Docking Application Block Diagram

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1.0 PIN-OUT

1.1 Package Diagram

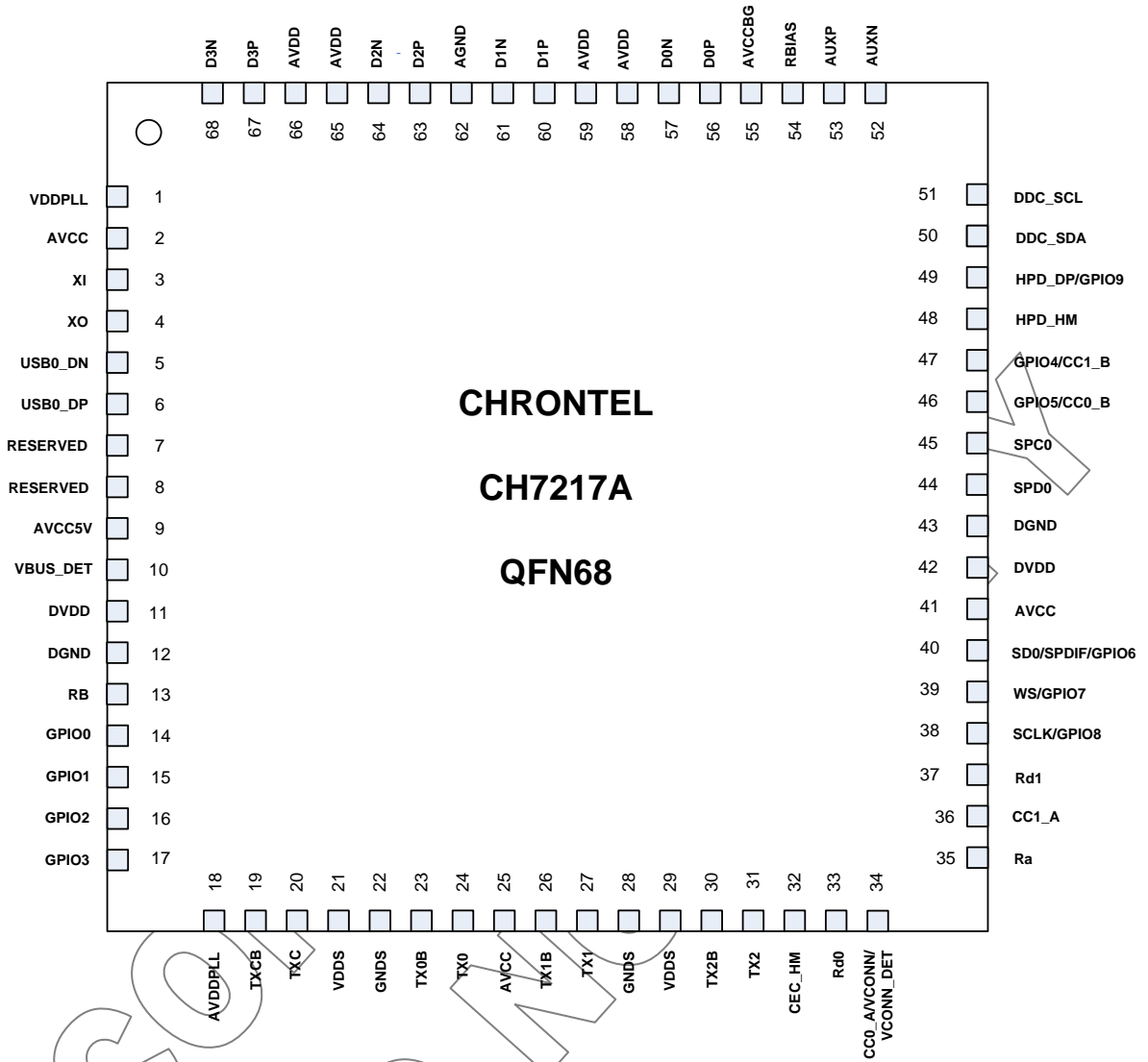


Figure 3: CH7217A 68-Pin QFN Pin Out

1.2 Pin Description

Table 1: 68 QFN Pin Name Descriptions

Pin #	Type	Symbol	Description
3	In	XI	Crystal Input / External Reference Input A parallel resonance crystal should be attached between this pin and XO. An external 3.3V CMOS compatible clock also can drive the XI Input
4	Out	XO	Crystal Output A parallel resonance crystal should be attached between this pin and XI / FIN. However, if an external CMOS clock is attached to XI/FIN, XO should be left open
5,6	In/Out	USB_DN/ USB_DP	D+/- Input of USB Type C Interface
7,8		RESERVED	RESERVED Pins
10	In	VBUS_DET	USB VBUS Voltage Detection Voltage input 0 ~ 5V
13	In	RB	Reset* Input (Internal pull-up) When this pin is low, the device is held in the power-on reset condition. When this pin is high, reset is controlled through the serial port register.
14~17	In/Out	GPIO[3:0]	General Purpose Input/Output Interface
19,20	Out	TXCB/ TXC	HDMI Clock Outputs These pins provide the differential clock output for the HDMI
24,25	Out	TX0B/ TX0	HDMI Data Channel 0 Outputs These pins provide the TMDS differential outputs for data channel 0
26,27	Out	TX1B/ TX1	HDMI Data Channel 1 Outputs These pins provide the TMDS differential outputs for data channel 1
30,31	Out	TX2B/ TX2	HDMI Data Channel 2 Outputs These pins provide the TMDS differential outputs for data channel 2
33	In	Rd0	USB Type-C Dead Battery Rd Resistor Connect CC0_A to this pin to enable dead battery Rd on CC0_A pin
34	In/Out	CC0_A	USB Type-C Configure Channel 0
	In	VCONN	VCONN Input Connect this pin to VCONN pin of USB Type-C Plug Connector if CH7217A is used in VCONN Power Accessory mode.
	In	VCONN_DET	USB VCONN Voltage Detection Voltage input 2.7 ~ 5.5v
35	In	Ra	Ra Resistor When used in typeC accessory mode, this pin needs connect to CC0.
36	In/Out	CC1_A	USB Type-C Configure Channel 1
37	In	Rd1	USB Type-C Dead Battery Rd Resistor Connect CC1_A to this pin to enable dead battery Rd on CC1_A pin
38	In/Out	GPIO8	General Purpose Input/Output Interface
	In	SCLK	I2S Clock Signal
39	In/Out	GPIO7	General Purpose Input/Output Interface
	In	WS	I2S Channel Select Signal
40	In/Out	GPIO6	General Purpose Input/Output Interface
	In	SD0	I2S Data Input
		SPDIF	SPDIF Audio Signal Input
44	In/Out	SPD0	Serial Port Data Input / Output

			This pin functions as the bi-directional data pin of the serial port. External pull-up 6.8 K Ω resistor is required
45	In	SPC0	Serial Port Clock Input This pin functions as the clock pin of the serial port. External pull-up 6.8 K Ω resistor is required
46	In/Out	GPIO5	General Purpose Input/Output
	In/Out	CC0_B	USB Type-C Configure Channel 2
47	In/Out	GPIO4	General Purpose Input/Output
	In/Out	CC1_B	USB Type-C Configure Channel 2
48	In	HPD_HM	HDMI Tx HPD Input
49	Out	HPD_DP	DP Rx HPD Output
	In/Out	GPIO9	General Purpose Input/Output
50	In	DDC_SDA	Serial Port Data to HDMI Receiver The pin should be connected to data signal of HDMI DDC. This pin requires a pull-up 1.8 k Ω resistor to the desired voltage level
51	Out	DDC_SCL	Serial Port Clock Output to HDMI Receiver The pin should be connected to clock signal of HDMI DDC. This pin requires a pull-up 1.8k Ω resistor to the desired voltage level
52,53	In/Out	AUXN/AUXP	AUX Channel Differential Input/Output These two pins are DisplayPort AUX Channel control, which supports a half-duplex, bi-directional AC-coupled differential signal.
54	In	RBIAS	HDMI Swing Control This pin sets the swing level of the HDMI outputs. A 1K-ohm with 1% tolerance resistor should be connected between this pin and ground using short and wide traces.
56,57	In	D0P/ D0N	DP Main Link Differential Lane 0 Input These pins accept four AC-coupled differential pair signals from the DisplayPort transmitter.
60,61	In	D1P/ D1N	DP Main Link Differential Lane 1 Input These pins accept four AC-coupled differential pair signals from the DisplayPort transmitter.
63,64	In	D2P/ D2N	DP Main Link Differential Lane 2 Input These pins accept four AC-coupled differential pair signals from the DisplayPort transmitter.
67,68	In	D3P/ D3N	DP Main Link Differential Lane 3 Input These pins accept four AC-coupled differential pair signals from the DisplayPort transmitter.
1	Power	VDDPLL	PLL Power Supply (1.2V)
2,25,41,55	Power	AVCC	Analog Power Supply(3.3V)
9	Power	AVCC5V	Analog Power Supply (5V)
11,42	Power	DVDD	Digital Core/IO Power Supply (1.2V)
12,43	Power	DGND	Digital Ground
18	Power	AVDDPLL	PLL Power Supply (1.2V)
21,29	Power	VDDS	Serializer Power Supply (1.2V)
22,28	Power	GNDS	Ground
58,59,65,66	Power	AVDD	Analog Power Supply (1.2V)
62	Power	AGND	Analog Ground

2.0 PACKAGE DIMENSION

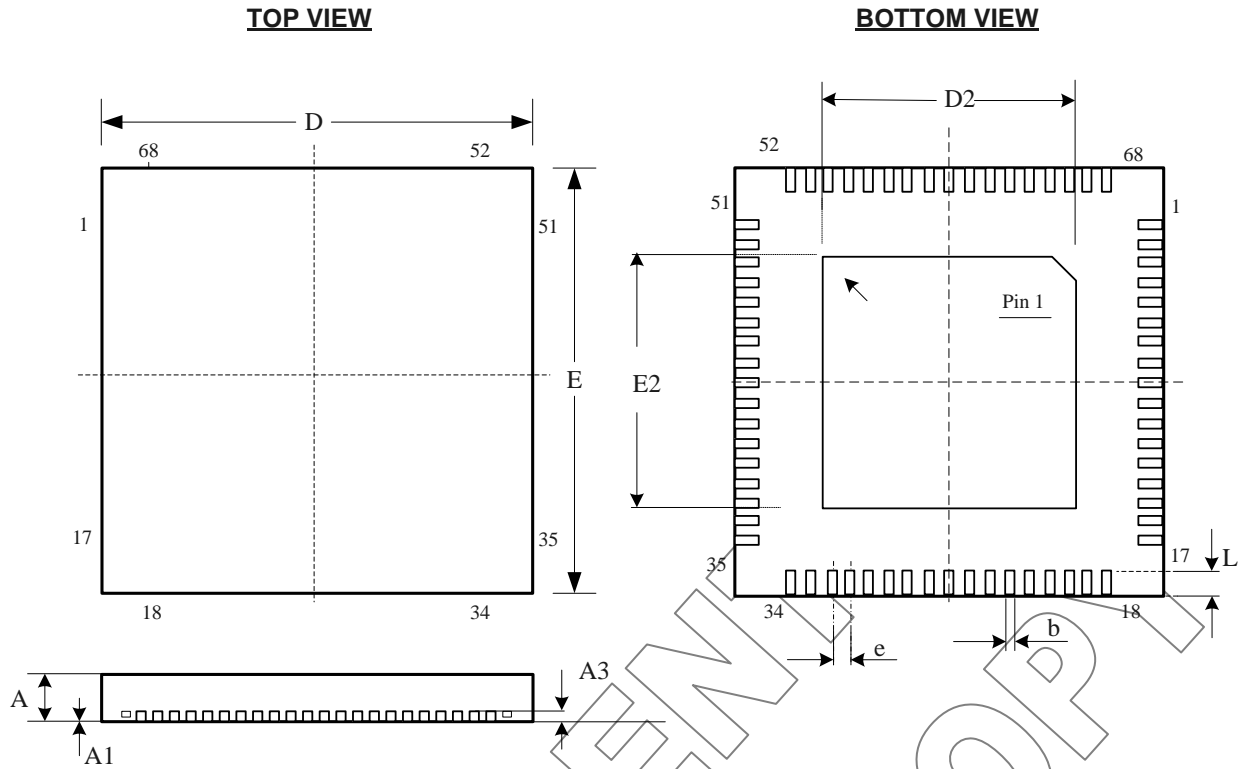


Figure 4: 68 Pin QFN Package (8x8 mm)

Table of Dimensions

No. of Leads		SYMBOL									
68 (8x8 mm)		D	E	D2	E2	e	b	L	A	A1	A3
Milli-meters	MIN	7.90	7.90	6.10	6.10	0.30	0.15	0.35	0.80	0.00	0.20REF
	MAX	8.10	8.10	6.30	6.30	0.50	0.25	0.45	0.90	0.05	

Notes:

- All dimensions conform to JEDEC standard MO-207.

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ORDERING INFORMATION				
Part Number	Package Type	Content Protection	Operating Temperature Range	Minimum Order Quantity
CH7217A-BF	68 QFN, Lead-free	None	Commercial : 0 to 70°C	260/Tray
CH7217A-BFK	68 QFN, Lead-free	HDCP 1.4 / 2.2	Commercial : 0 to 70°C	260/Tray

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