
CH7214C USB Type C Logic Controller

FEATURES

- Compliant with USB Type-C Cable and Connector Specification Revision 1.4
- Compliant with the latest Power Delivery Specification Revision 3.0
- Supports VESA DisplayPort Alt. Mode 1.0a
- Bi-directional conversion between the HPD signal and Power Delivery VDM
- Support DisplayPort AUX CH DC voltage level detection
- USB Type-C SBU and DisplayPort AUX CH Switch integrated
- Configurable USB Type-C Ports. Device can be designed with Type-C plug or Type-C receptacle connector. CC logic and Power Delivery protocol support one sink port and one charging port
- Rp and Rd resistors for DFP/UFP/DRP integrated together with the Ra termination resistor for VCONN Powered Accessory
- Support up to 5V@3A USB Type-C Current and Source Power Rules defined in USB PD Specification Revision 3.0 in Source role.
- Support Dead Battery
- Support CDP and DCP mode of Battery Charging Specification Revision 1.2
- Support Type-C plug orientation detection
- Integrated USB Billboard Class, Version 1.21 for supporting USB Type-C Alt. Mode
- GPIO/I2C/SPI/UART control interface with external component.
- VCONN power supply supported, with 5V to 3.3V and 3.3V to 1.2V Regulator integrated to save the BOM cost
- Power charging control output support
- Embedded MCU to handle the control logic
- Support device boot up by loading firmware from the embedded EEPROM automatically
- IIC slave interface and USB 2.0 interface are available for firmware update and debug
- Crystal free
- Low power architecture
- RoHS compliant and Halogen free package
- Offered in 40-Pin QFN (5 x 5 mm)

APPLICATION

- USB Type-C Docking Device
- USB Type-C to Multi-video adapter
- USB Power Charge Controller

GENERAL DESCRIPTION

Chrontel's CH7214C is a low cost USB Type-C logic controller. The device is targeted for system designers implementing USB Type-C devices with DisplayPort capabilities and USB Power Delivery 3.0 support. The CH7214C integrates the USB Type-C plug orientation and attached detection mechanism on the CC (Channel Communication) pins. Its robust Power Delivery 3.0 module using the BMC protocol can enable USB Type-C devices operating in various power management roles including Consumer, Provider and Power Role Swap. CH7214C also supports the battery charging with specification revision 1.2.

The DisplayPort Alt. mode is another alternative interface supported in the CH7214C. A built-in Billboard Class can be automatically exposed to the USB 2.0 D+/- bus if a Type-C PD Source (DFP) does not equip USB Type-C Alt. Mode features that support DisplayPort signal transmission. The CH7214C's bi-directional signal converter for the DisplayPort HPD (hot plug detection) and VDM (Vendor Defined Message) is capable of translating the HPD to the appropriated VDM to Type-C DP device and vice versa. In addition to hardware support of PHY and Link layers, the CH7214C has an internal microprocessor to handle the cable logic communication and can be programmed for customization according to the application of USB Type-C platforms

In order to save the BOM cost of the end product such as cable, the CH7214C also integrates all necessary components and circuits, such as LDO, clock generation, isolation circuit, R_a, R_d and R_p etc.

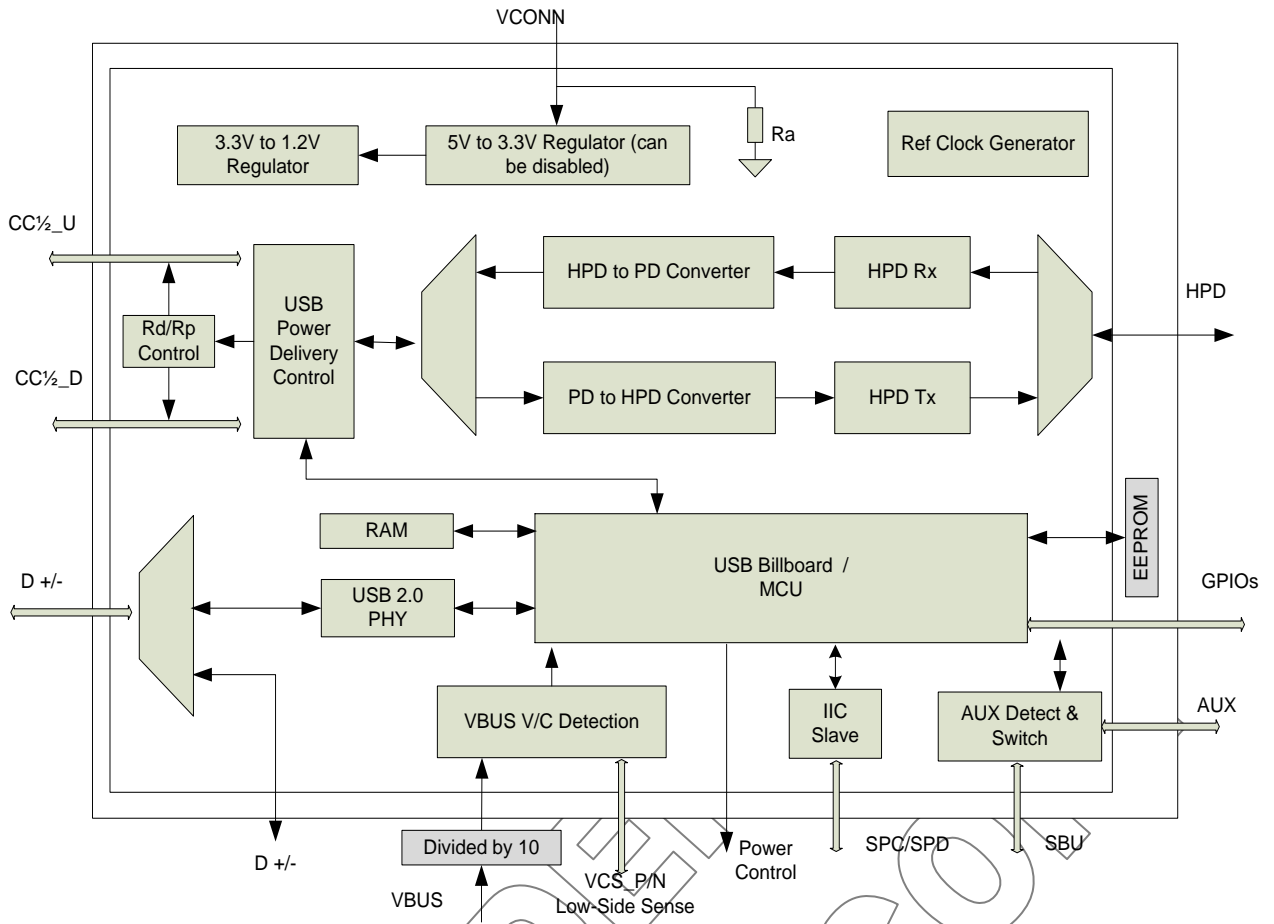


Figure 1: CH7214C Functional Block Diagram

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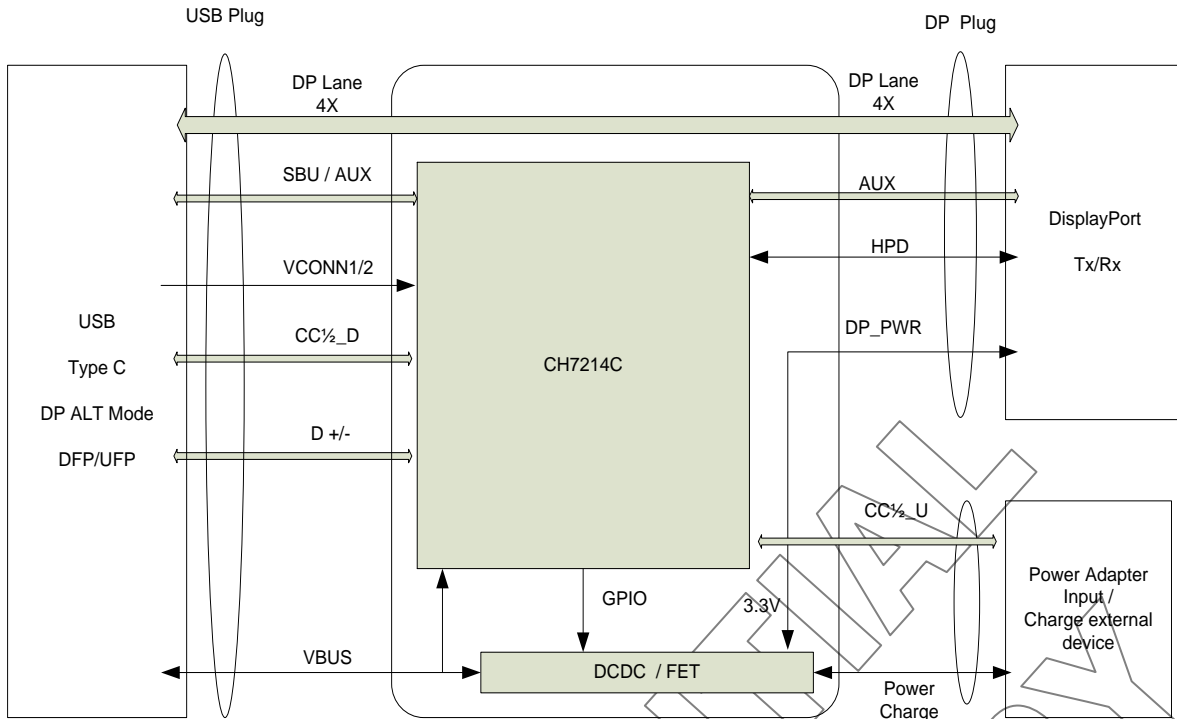


Figure 2: CH7214C USB to DP Bidirectional Conversion + Power Charge Docking Station Block Diagram

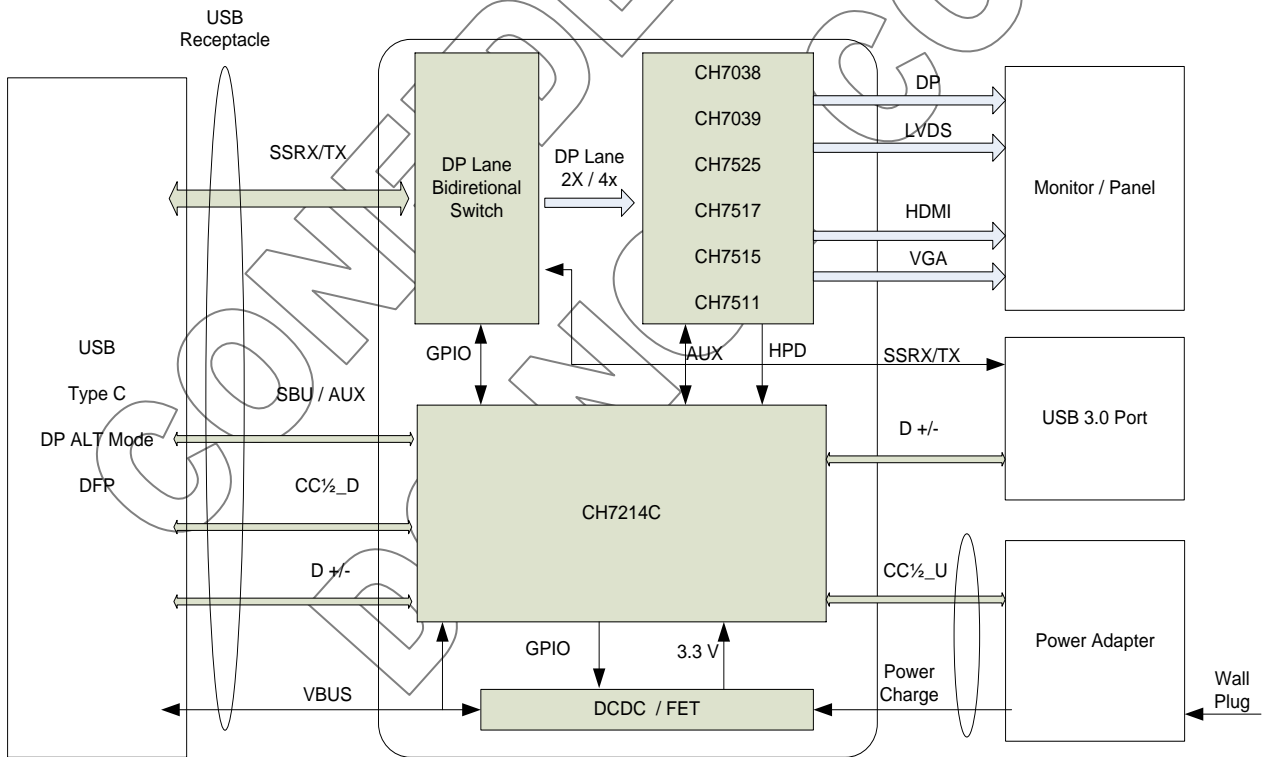


Figure 3: CH7214C USB to Multi-video interfaces + U3 + Power Charge Station Block Diagram

1.0 PIN-OUT

1.1 Package Diagram

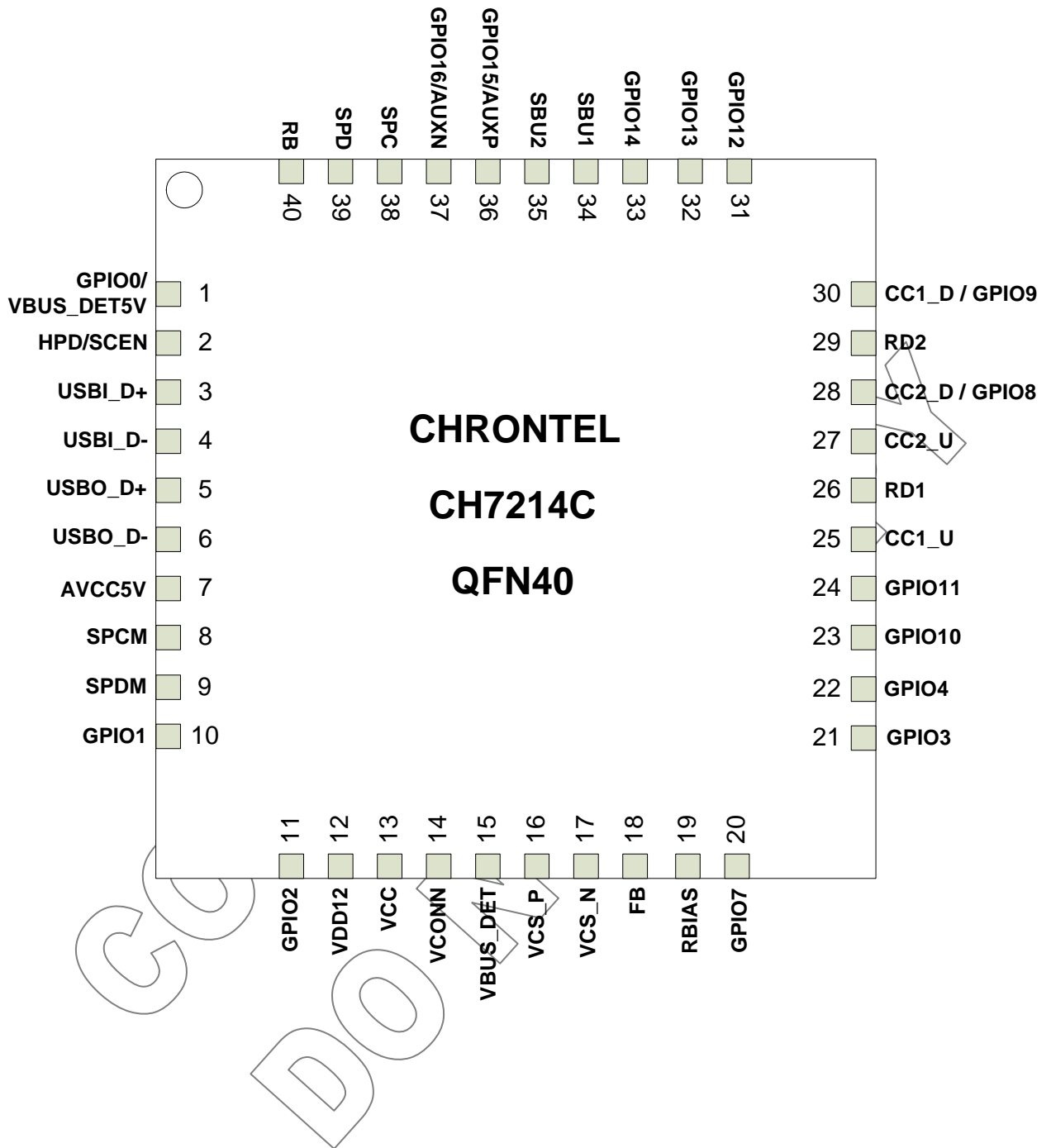


Figure 4: CH7214C 40 pin QFN Pin Out

1.2 Pin Description

Table 1: QFN 40 Pin Description

Pin #	Type	Symbol	Description
1	I/O	GPIO0	General Purpose Input/Output
	I	VBUS_5VDET	5V-only VBUS Detection
2	I/O	HPD	DisplayPort HPD
3	I/O	USBI_D+	USB Billboard Positive Data Line
4	I/O	USBI_D-	USB Billboard Negative Data Line
5	I/O	USBO_D+	USB Switch Positive Data Line
6	I/O	USBO_D-	USB Switch Negative Data Line
8	O	SPCM	I2C Master Serial Port Clock This pin requires a pull-up 10kΩ Resistor to the desired voltage level.
9	I/O	SPDM	I2C Master Serial Port Data This pin requires a pull-up 10kΩ Resistor to the desired voltage level.
10,11,20~24,31~33	I/O	GPIO[4:1],GPIO 7, GPIO[11:10], GPIO[14:12]	General Purpose Input/Output
15	I	VBUS_DET	Scaled Input for VBUS Voltage Level Detection
16	I	VCS_P	Scaled Input for VBUS Current Sense
17	I	VCS_N	Scaled Input for VBUS Current Sense
18	O	FB	Feedback Control to External DC-DC
24	I	RBIAS	Analog Reference Resistor External resistor is 10K with 1% accuracy
25	I/O	CC1_U	Upstream Type-C Port Configuration Channel 1
26	I	RD1	Upstream Type-C Port CC1_U Rd Connection;
27	I/O	CC2_U	Upstream Type-C Port Configuration Channel 2
28	I/O	GPIO8	General Purpose Input/Output
	I/O	CC2_D	Downstream Type-C Port Configuration Channel 2
29	I	RD2	Downstream Type-C Port CC1_D Rd Connection;
30	I/O	GPIO9	General Purpose Input/Output
	I/O	CC1_D	Downstream Type-C Port Configuration Channel 1
34	I/O	SBU1	USB Type-C Sideband Use 1
35	I/O	SBU2	USB Type-C Sideband Use 2
36	I	AUXP	DisplayPort Positive AUX CH
	I/O	GPIO15	General Purpose Input/Output
37	I	AUXN	DisplayPort Negative AUX CH
	I/O	GPIO16	General Purpose Input/Output
38	I	SPC	I2C Slave Serial Port Clock Input External pull-up 6.8 kΩ Resistor is required.
39	I/O	SPD	I2C Slave Serial Port Data Input / Output External pull-up 6.8 kΩ Resistor is required.
40	I	RB	Chip Reset Low to 0V for reset. Typical High level is 3.3V

7	PWR	AVCC5V	5V Power Supply for USB
12	PWR	VDD12	Digital Power Supply(1.2V)
13	PWR	VCC	3.3V Power Supply
14	PWR	VCONN	Vconn Power Supply These pins connect to VCONN of the plug on the other side of the USB Type-C cable.
thermal pad		AVSS	Ground

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2.0 PACKAGE DIMENSION

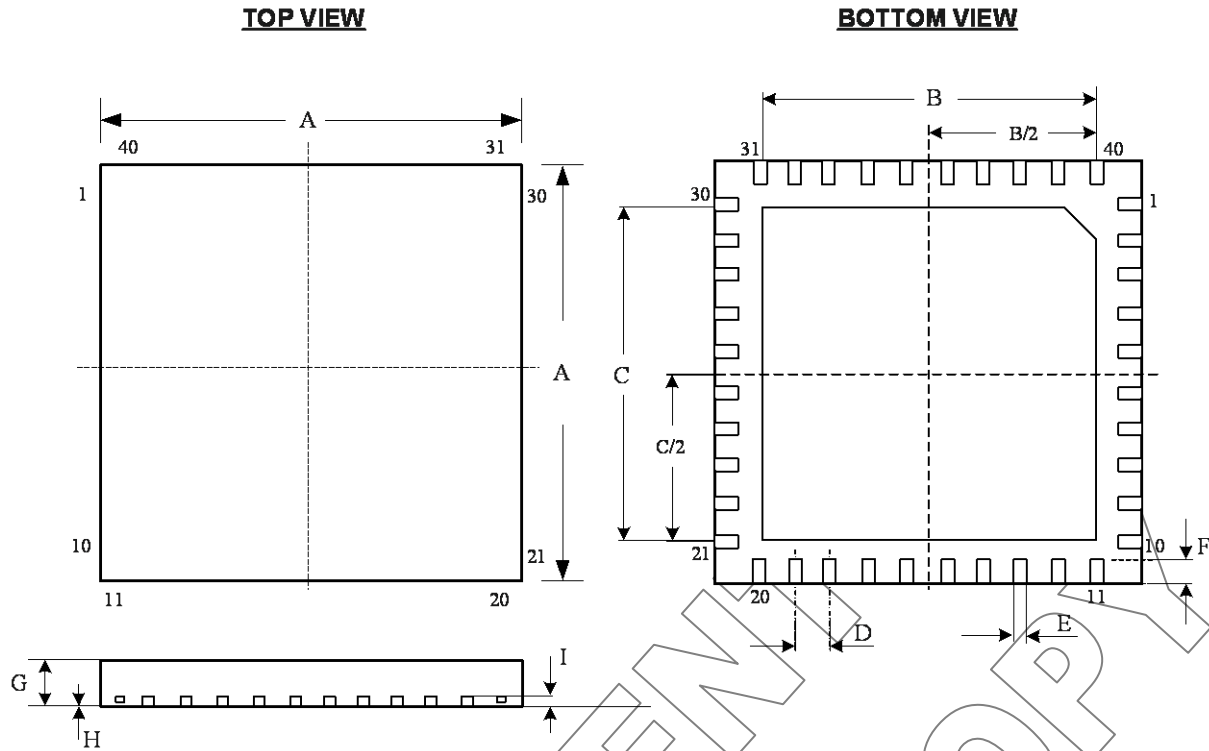


Figure 5: 40 Pin VQFN Package

Table 4: Table of Dimensions

No. of Leads		SYMBOL								
40 (5 X 5 mm)		A	B	C	D	E	F	G	H	I
Milli-meters	MIN	4.90	3.20	3.20	0.4	0.15	0.35	0.70	0	0.203
	MAX	5.10	3.40	3.40		0.25	0.45	0.80	0.05	REF

Notes:

1. Conforms to JEDEC standard JESD-30 MO-220.

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ORDERING INFORMATION			
Part Number	Package Type	Operating Temperature Range	Minimum Order Quantity
CH7214C-BF	40 QFN, Lead-free	Commercial: 0 to 70°C	490/Tray

Chrontel

Chrontel International Limited

129 Front Street, 5th floor,

Hamilton, Bermuda HM12

www.chrontel.com

E-mail: sales@chrontel.com