LC29D (C)&LC29H (CA) Hardware Difference Introduction

GNSS Module Series

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	Ensure that the product may be used in the country and the required environment, as well as that it conforms to the local safety and environmental regulations.
	Keep away from explosive and flammable materials. The use of electronic products in extreme power supply conditions and locations with potentially explosive atmospheres may cause fire and explosion accidents.
	The product must be powered by a stable voltage source, and the wiring shall conform to security precautions and fire prevention regulations.
	Proper ESD handling procedures must be followed throughout the mounting, handling and operation of any devices and equipment that incorporate the module to avoid ESD damages.

About the Document

Document Information	
Title	**LC29D (C)&LC29H (CA) Hardware Difference Introduction**
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-	2022-01-12	Creation of the document
1.0	2022-06-13	First official release

Contents

Table Index

1 Introduction

This document describes the hardware differences between LC29D (C) and LC29H (CA)* in terms of pin assignment, supported constellations and module performances. The two modules are based on different chipsets from different vendors.

1.1. Special Mark

Table 1: Special Mark

Mark	Definition
*	Unless otherwise specified, when an asterisk (*) is used after a function, feature, interface, pin name, or argument, it indicates that the function, feature, interface, pin, or argument is under development and currently not supported; and the asterisk (*) after a model indicates that the sample of such model is currently unavailable.

2 Hardware Difference Introduction

2.1. General Information

Table 2: General Information

Module	Appearance	Packaging	Dimensions (mm)	Supply Voltage	
LC29D (C)		24 LCC pins	12.2 × 16.0 × 2.4	VCC	2.7–3.6 V Typ. 3.3 V
				IO Voltage	Typ. 3.3 V
LC29H (CA)*		24 LCC pins	12.2 × 16.0 × 2.5	VCC	3.1–3.6 V Typ. 3.3 V
				V_BCKP	2.2–3.6 V Typ. 3.3 V
				IO Voltage	Typ. 2.8 V

2.2. Pin Assignment

The differences between the pins of the LC29D (C) and LC29H (CA)* modules are listed below.

Figure 1: Pin Assignment

NOTE

Pins written in red text (e.g., pin 1 on both modules) have different functions.

2.2.1. Pin Description

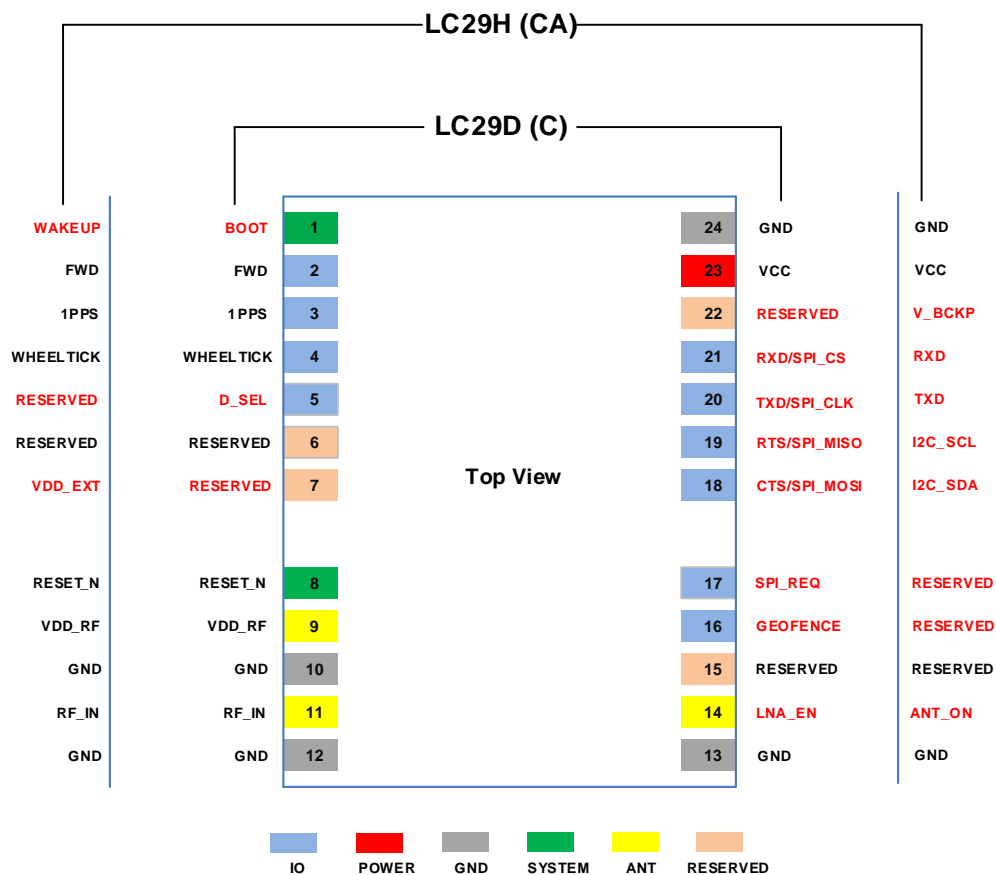**Table 3: Pin Description**

Pin No.	Pin Name		I/O	Description
	LC29D (C)	**LC29H (CA)***		
1	BOOT	WAKEUP	DI	On LC29D (C), the pin is used for controlling the module startup mode; On LC29H (CA)*, the pin is used for waking up the module from the Backup mode.
2	FWD	FWD*	DI	Forward/Backward status signal input.
3	1PPS	1PPS	DO	One pulse per second.
4	WHEELTICK	WHEELTICK*	DI	Odometer/Wheel-tick pulse input.
5	D_SEL	RESERVED	DI	On LC29D (C), the pin is used for selecting the UART or SPI interface. It is pulled up internally (D_SEL = 1) by default, which means pins 18–21 can be used as UART interface. If it is pulled down externally (D_SEL = 0), pins 18–21 can be used as SPI interface. On LC29H (CA)*, the pin is RESERVED.
6	RESERVED	RESERVED	-	Reserved.
7	RESERVED	VDD_EXT	PO	On LC29D (C), the pin is RESERVED; On LC29H (CA)*, the pin is used for providing 2.8 V for external circuit.
8	RESET_N	RESET_N	DI	Resets the module.
9	VDD_RF	VDD_RF	PO	Supplies power for external RF components.
10	GND	GND	-	Ground.
11	RF_IN	RF_IN	AI	GNSS antenna interface.

12	GND	GND	-	Ground.
13	GND	GND	-	Ground.
14	LNA_EN	ANT_ON	DO(I)	On LC29D (C), the pin is used for external LNA and active antenna power control. On LC29H (CA)*, the pin is used for active antenna power control in power saving modes.
15	RESERVED	RESERVED	DI	Reserved.
16	GEOFENCE	RESERVED	DO	On LC29D (C), the pin is used for indicating geofence status. On LC29H (CA)*, the pin is RESERVED.
17	SPI_REQ	RESERVED	DO	On LC29D (C), the pin is used for indicating SPI data validity. On LC29H (CA)*, the pin is RESERVED.
18	CTS/SPI_MOSI	I2C_SDA*	DI(O)	On LC29D (C), pins 18–21 can be used as UART/SPI interface for NMEA standard sentence output, PGLOR/PQTM command input and output, Bream sentence input and output and firmware upgrade. On LC29H (CA)*, pins 18 and 19 are used as I2C interface for standard NMEA message output, binary data input/output and PAIR/PQTM command input/output. Pins 20 and 21 are used as UART interface for standard NMEA message output, binary data input/output, PAIR/PQTM command input/output and firmware upgrade.
19	RTS/SPI_MISO	I2C_SCL*	DI	
20	TXD/SPI_CLK	TXD	D(I)O	
21	RXD/SPI_CS	RXD	DI	
22	RESERVED	V_BCKP	PI	On LC29D (C), the pin is RESERVED; On LC29H (CA)*, the pin is used as the backup power supply for backup domain.
23	VCC	VCC	PI	Main power supply.
24	GND	GND	-	Ground.

> **NOTE**
>
> For detailed differences in pin description between the two modules, see *documents [1]* and *[2]*.

2.3. Supported Constellations

LC29D (C) and LC29H (CA)* modules support GPS + GLONASS + Galileo + BDS + QZSS by default. Constellations supported by the two modules are listed in the table below.

Table 4: Supported Constellations

Constellations		LC29D (C)	LC29H (CA)*
GPS	L1 C/A	●	●
	L5	●	●
GLONASS	L1	●	●
Galileo	E1	●	●
	E5a	●	●
BDS	B1I	●	●
	B2a	-	●
QZSS	L1 C/A	●	●
	L5	●	●
IRNSS	L5	●	-
SBAS	L1	-	●

> **NOTE**
>
> For more information about constellation configurations of the two modules, see *documents [3]* and *[4]*.

2.4. Module Performance

2.4.1. Power Consumption

Table 5: Power Consumption

Power Consumption [1] (G3 [2] + BDS + QZSS)	LC29D (C)	LC29H (CA)*	Unit
Acquisition	46	28	mA
Tracking	46	28	mA
Backup mode [3]	-	25	µA

2.4.2. Electrical Specification

Table 6: Absolute Maximum Ratings

Parameter	Description	LC29D (C)		LC29H (CA)*		Unit
		Min.	Max.	Min.	Max.	
VCC	Main Power Supply Voltage	-0.3	3.6	-0.3	4.3	V
V_BCKP	Backup Supply Voltage	-	-	-0.3	4.3	V
V_{IN}_IO	Input Voltage at IO Pins	-0.3	3.6	-0.3	3.08	V
P_{RF_IN}	Input Power at RF_IN	-	15	-	15	dBm
T_storage	Storage Temperature	-40	90	-40	90	°C

[1] Room temperature, all satellites at -130 dBm.
[2] G3 is GPS + GLONASS + Galileo.
[3] The LC29D (C) module does not support the Backup mode. Force the LC29H (CA)* module to enter the Backup mode by sending software commands. For more information, see *document [4]*.

Table 7: Recommended Operating Conditions

Parameter	Description	LC29D (C)			LC29H (CA)*			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
VCC	Main Power Supply Voltage	2.7	3.3	3.6	3.1	3.3	3.6	V
V_BCKP	Backup Supply Voltage	-	-	-	2.2	3.3	3.6	V
VDD_EXT	Power Output Voltage	-	-	-	-	2.8	-	V
IO_Domain	Digital IO Pin Domain Voltage	-	3.3	-	-	2.8	-	V
V_{IL}	Digital IO Pin Low-Level Input Voltage	0	-	$0.35 \times VCC$	-0.3	0	0.7	V
V_{IH}	Digital IO Pin High-Level Input Voltage	$0.65 \times VCC$	-	$VCC + 0.3$	1.75	-	3.08	V
V_{OL}	Digital IO Pin Low-Level Output Voltage	-	-	0.4	-	-	0.35	V
V_{OH}	Digital IO Pin High-Level Output Voltage	VCC - 0.4	-	-	2.1	-	-	V
RESET_N	Low-level Input Voltage	-0.3	-	0.35	-0.3	-	0.1	V
VDD_RF	VDD_RF Voltage	-	3.3	-	3.1	3.3	3.6	V
WAKEUP	Low-Level Output Voltage	-	-	-	-0.3	0	0.7	V
	High-level Input Voltage	-	-	-	3.0	3.3	3.6	V
T_operating	Operating Temperature	-40	25	+85	-40	25	+85	°C

> **NOTE**
>
> Operation beyond the "Operating Conditions" is not recommended and extended exposure beyond the "Operating Conditions" may affect device reliability.

Table 8: Supply Current

Parameter	Description	Condition	LC29D (C)		LC29H (CA)*	
			$I_{Typ.}$ [4]	I_{PEAK} [4]	$I_{Typ.}$ [4]	I_{PEAK} [4]
I_{VCC} [5]	Current at VCC	Acquisition	46 mA	79 mA	28 mA	54 mA
		Tracking	46 mA	79 mA	28 mA	54 mA
I_{V_BCKP} [6]	Current at V_BCKP	Continuous mode	-	-	74 µA	113 µA
		Backup mode	-	-	25 µA	60 µA

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[4] Room temperature, measurements are taken with typical voltage.
[5] Used to determine the maximum current capability of power supply.
[6] Used to determine the required battery current capacity.

2.4.3. RF Sensitivity

Table 9: Conducted RF Sensitivity

Configuration		LC29D (C)	LC29H (CA)*	Unit
G3 [7] + BDS + QZSS	Acquisition	-148	-147	dBm
	Reacquisition	-157	-159	dBm
	Tracking	-163	-165	dBm

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[7] G3 is GPS + GLONASS + Galileo.

3 Appendix References

Table 10: Related Documents

Document Name
[1] Quectel_LC29D(C,F)_Hardware_Design
[2] Quectel_LC29H_Series_Hardware_Design
[3] Quectel_LC29D(C,F)&LC79D(D)_GNSS_Protocol_Specification
[4] Quectel_LC29H&LC79H_GNSS_Protocol_Specification

Table 11: Terms and Abbreviations

Abbreviation	Description
1PPS	One Pulse Per Second
ANT	Antenna
BDS	BeiDou Navigation Satellite System
CTS	Clear to Send
DI	Digital Input
DO	Digital Output
Galileo	Galileo Satellite Navigation System (EU)
GLONASS	Global Navigation Satellite System (Russia)
GPS	Global Positioning System
GND	Ground
GNSS	Global Navigation Satellite System
I/O	Input/Output

IRNSS	India Regional Navigation Satellite System
I2C	Inter-Integrated Circuit
LCC	Leadless Chip Carrier (package)
NMEA	NMEA (National Marine Electronics Association) 0183 Interface Standard
PI	Power Input
PO	Power Output
QZSS	Quasi-Zenith Satellite System
RXD	Receive Data (Pin)
RTS	Ready to Send/Request to Send
SPI	Serial Peripheral Interface