



# Technical Specification Document

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## C16QS

Cat 1.bis LTE Module

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Cavli  
C Series

RoHS  
Compliant

LTE Cat 1.bis

CAVLI  
wireless

C16QS

PN: C16QS - XXXX  
SN: XXXXXXXX  
IMEI: XXXXXXXXXXXXXXXX



# Cavli C-Series C16QSModule

## Cat 1.bis LTE Module



C16QS is a series of new LTE Cat1.bis modules with optional integrated GNSS and eSIM optimised for IoT applications with low cost and low power consumption. It is compliant to 3GPP Rel14 Cat.1bis standards and ideal for customers interested in switching from legacy 2G and 3G solutions to LTE.

C16QS comes with unique features that enables easy product development and faster go to market for product makers. Its enhanced tracking features that processes GPS data on the edge, independent LTE and GNSS power supply and sleep features and low power modes making it ideal for applications such as asset tracking, POS and remote monitoring and energy metering.

C16QS comes in 5 variants - Europe and Asia, South East Asia, North America, Latin America and Global variant respectively, covering different countries and regions. Being pin compatible with Cavli C42QM and C42GM modules which enables easy migration.

## Key features



LTE Cat 1.bis



Integrated GNSS



Small Form  
Factor Design



USB 2.0 Interface



eSIM



Cavli Hubble  
Platform



Low Power  
Consumption



Power  
Saving Mode

	<b>C16QS-EA</b> EMEA and APAC	<b>C16QS-NA</b> North America	<b>C16QS-AN</b> Australia, New Zealand, Taiwan, Japan and S. Korea	<b>C16QS-LA</b> Latin America	<b>C16QS-WW</b> Global
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## Basic Information

CPU	ARM Cortex M3 processor @ 204MHz clock	ARM Cortex M3 processor @ 204MHz clock	ARM Cortex M3 processor @ 204MHz clock	ARM Cortex M3 processor @ 204MHz clock	ARM Cortex M3 processor @ 204MHz clock
Memory	4MB NOR Flash + 1.25MB RAM	4MB NOR Flash + 1.25MB RAM	4MB NOR Flash + 1.25MB RAM	4MB NOR Flash + 1.25MB RAM	4MB NOR Flash + 1.25MB RAM
OS	FreeRTOS	FreeRTOS	FreeRTOS	FreeRTOS	FreeRTOS
Package	LGA & mPCIe <sup>3</sup>	LGA & mPCIe <sup>3</sup>	LGA & mPCIe <sup>3</sup>	LGA & mPCIe <sup>3</sup>	LGA & mPCIe <sup>3</sup>
Dimensions	26.5 x 22.5 x 2.3 mm	26.5 x 22.5 x 2.3 mm	26.5 x 22.5 x 2.3 mm	26.5 x 22.5 x 2.3 mm	26.5 x 22.5 x 2.3 mm
Weight	3.9 g	3.9 g	3.9 g	3.9 g	3.9 g
Operating Temperature	-30°C to +85 °C	-30°C to +85 °C	-30°C to +85 °C	-30 °C to +85 °C	-30 °C to +85 °C

## Radio Frequency Bands

RAT	Cat1.bis	Cat1.bis	Cat1.bis	Cat1.bis	Cat1.bis
Transmission Rates (Peak)	DL 10Mbps & UL 5 Mbps	DL 10Mbps & UL 5 Mbps	DL 10Mbps & UL 5 Mbps	DL 10Mbps & UL 5 Mbps	DL 10Mbps & UL 5 Mbps
LTE Band List	B1/ B3/ B5/ B8/ B20	B2/ B4/ B5/ B12/ B13/ B66	B1/ B3/ B5/ B8/ B18/ B19/ B26/ B28	B2/ B3/ B4/ B7/ B8/ B28	B1/ B2/ B3/ B4/ B5/ B8/ B12/ B18/ B19/ B20/ B26/ B28/ B66

<sup>1</sup>Optional

<sup>2</sup>Needs SDK. Not available currently

<sup>3</sup>In Progress

	C16QS-EA	C16QS-NA	C16QS-AN	C16QS-LA	C16QS-WW
3GPP Release	14	14	14	14	14
<b>GNSS Capability</b>					
GNSS (GNA Variant)	GPS/ BeiDou	GPS/ BeiDou	GPS/ BeiDou	GPS/ BeiDou	GPS/ BeiDou
<b>Network Protocols</b>					
Internet Protocols	TCP(S), HTTP(S), FTP(S), MQTT(S), UDP, PPP	TCP(S), HTTP(S), FTP(S), MQTT(S), UDP, PPP	TCP(S), HTTP(S), FTP(S), MQTT(S), UDP, PPP	TCP(S), HTTP(S), FTP(S), MQTT(S), UDP, PPP	TCP(S), HTTP(S), FTP(S), MQTT(S), UDP, PPP
<b>Interfaces</b>					
UART	x3	x3	x3	x3	x3
USB 2.0	x1	x1	x1	x1	x1
USIM (DSSS) (1.8V / 3.0V)	x1	x1	x1	x1	x1
SWD	x1	x1	x1	x1	x1
Network Status Indicator	x1	x1	x1	x1	x1
Power ON Status Indicator	x1	x1	x1	x1	x1
ADC <sup>2</sup>	x2	x2	x2	x2	x2
I2S <sup>2</sup>	x1	x1	x1	x1	x1
I2C <sup>2</sup>	x1	x1	x1	x1	x1
SPI <sup>2</sup>	x1	x1	x1	x1	x1

<sup>1</sup>Optional

<sup>2</sup>Needs SDK. Not available currently

<sup>3</sup>In Progress

	C16QS-EA	C16QS-NA	C16QS-AN	C16QS-LA	C16QS-WW
GPIO <sup>1</sup>	x4	x4	x4	x4	x4
Main ANT	x1	x1	x1	x1	x1
GNSS ANT <sup>1</sup>	x1	x1	x1	x1	x1

## Electrical Characteristics

Operating Voltage	Range: 3.4 V to 4.2 V Typical: 3.7 V	Range: 3.4 V to 4.2 V Typical: 3.7 V	Range: 3.4 V to 4.2 V Typical: 3.7 V	Range: 3.4 V to 4.2 V Typical: 3.7 V	Range: 3.4 V to 4.2 V Typical: 3.7 V
TxD Peak (@23dBm)	620 mA	620 mA	TBD	TBD	TBD
TxD Typical	70 mA	68 mA	TBD	TBD	TBD
TxD Idle (@23dBm)	18 mA	16 mA	TBD	TBD	TBD
Sleep Mode	TBD	TBD	TBD	TBD	TBD
GNSS (Fix)	60 mA	60 mA	60 mA	60 mA	60 mA

## Enhanced Features

SMS-SG	Yes	Yes	Yes	Yes	Yes
DFOTA <sup>3</sup>	Yes	Yes	Yes	Yes	Yes
AGNSS Support	Yes	Yes	Yes	Yes	Yes

## Driver Support

USB Driver	Windows 7 and above, Linux Kernel 4.4 – 5.15	Windows 7 and above, Linux Kernel 4.4 – 5.15	Windows 7 and above, Linux Kernel 4.4 – 5.15	Windows 7 and above, Linux Kernel 4.4 – 5.15	Windows 7 and above, Linux Kernel 4.4 – 5.15
RNDIS Driver	Windows 7 and above	Windows 7 and above	Windows 7 and above	Windows 7 and above	Windows 7 and above

<sup>1</sup>Optional

<sup>2</sup>Needs SDK. Not available currently

<sup>3</sup>In Progress

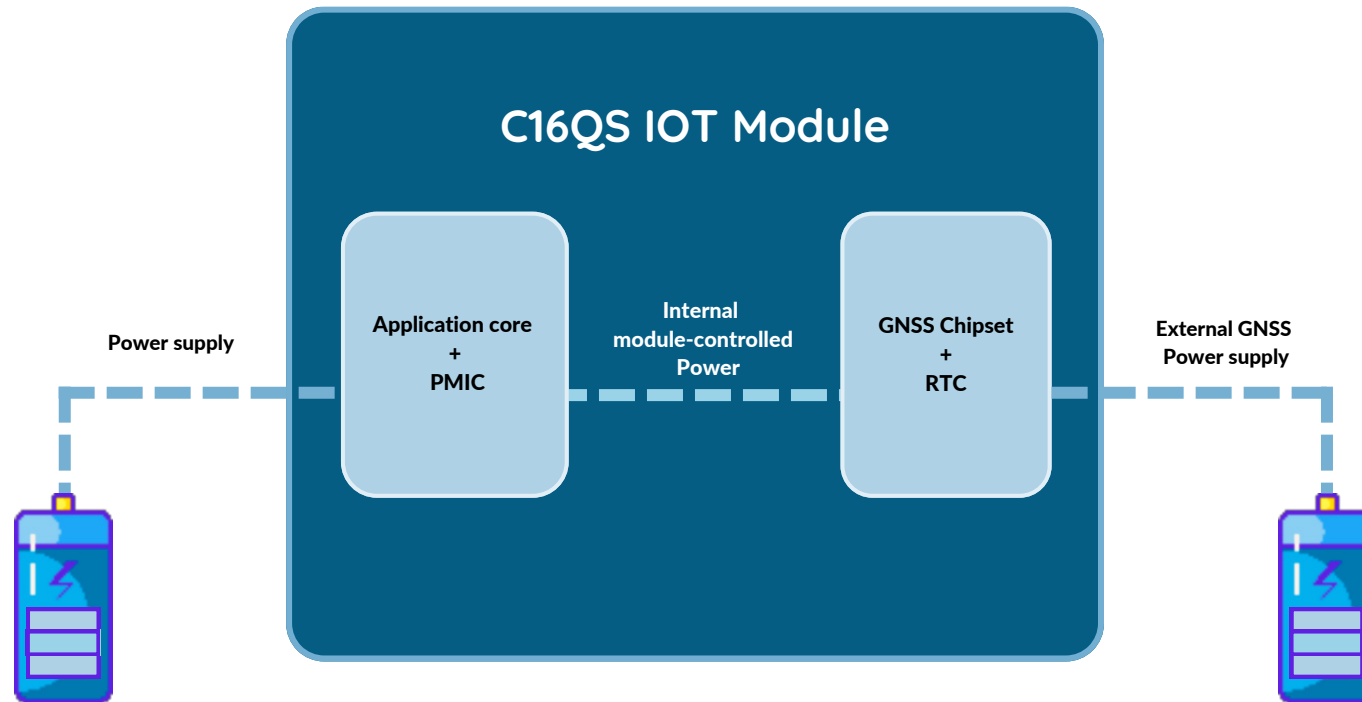
	C16QS-EA	C16QS-NA	C16QS-AN	C16QS-LA	C16QS-WW
CDC ACM Driver	Linux Kernel 4.4 – 5.15	Linux Kernel 4.4 – 5.15	Linux Kernel 4.4 – 5.15	Linux Kernel 4.4 – 5.15	Linux Kernel 4.4 – 5.15
<b>Certifications</b>					
Regulatory	Europe : CE UK : UKCA Canada : IC <sup>3</sup>	America : FCC Canada : IC Europe : CE	Europe : CE Taiwan : NCC <sup>3</sup>	Europe : CE <sup>3</sup> Brazil : ANATEL	Global : GCF <sup>3</sup> Europe : CE America : FCC Canada : IC
Carrier	Telefonica <sup>3</sup> /DT <sup>3</sup> /Orange <sup>3</sup>	Verizon <sup>3</sup> /AT&T <sup>3</sup> /T-Mobile	TBD	TBD	Verizon <sup>3</sup> /AT&T <sup>3</sup> /TMobile <sup>3</sup>
Others	RoHS/REACH	RoHS/REACH	RoHS/REACH	RoHS/REACH	RoHS/REACH
Conformance	Global : GCF <sup>3</sup> South Africa : ICASA	NA : PTCRB <sup>3</sup>	TBD	TBD	Global : GCF <sup>3</sup> NA : PTCRB <sup>3</sup>
<b>Other Features</b>					
Integrated GNSS	Optional	Optional	Optional	Optional	Optional
Integrated eSIM + Hubble	Optional	Optional	Optional	Optional	Optional

<sup>1</sup>Optional

<sup>2</sup>Needs SDK. Not available currently

<sup>3</sup>In Progress

# Independent Operation of GNSS and Cellular



C16QS has a feature that enables independent functionality of its baseband and GNSS cores. The provision for an external supply to the GNSS core directly enables the user to utilize the location services without powering the baseband core. The GNSS services can also be accessed via the modem's Cavli proprietary AT commands.

# Product Variants



Features	EA EMEA and APAC	NA North America	AN Australia, New Zealand, Taiwan, Japan and South Korea	LA Latin America	WW Global
Modem Only	C16QS-EA-S00N	C16QS-NA-S00N	C16QS-AN-S00N	C16QS-LA-S00N	C16QS-WW-S00N
Modem + eSIM	C16QS-EA-S00H	C16QS-NA-S00H	C16QS-AN-S00H	C16QS-LA-S00H	C16QS-WW-S00H
Modem + GNSS (L1)	C16QS-EA-GNAN	C16QS-NA-GNAN	C16QS-AN-GNAN	C16QS-LA-GNAN	C16QS-WW-GNAN
Modem + eSIM + GNSS (L1)	C16QS-EA-GNAH	C16QS-NA-GNAH	C16QS-AN-GNAH	C16QS-LA-GNAH	C16QS-WW-GNAH

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