

## Product Summary

# TOBY-L4 uCPU series

## LTE Advanced (Cat 6) modules with uCPU Linux app programming



Standard



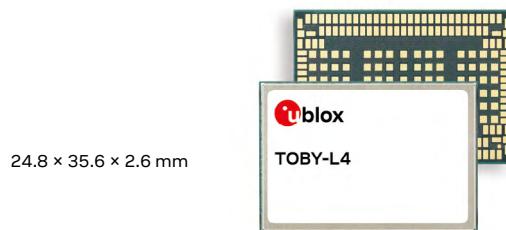
Professional



Automotive

### Most powerful application CPU in the industry

- uCPU embedded Linux application programming capability with 19000 DMIPS total processing power
- Very comprehensive set of interfaces including RGMII/RMII and analog audio
- Pre-integrated u-blox GNSS and Wi-Fi components
- Temperature range -40 °C to +85 °C, with eCall setup up to +95 °C
- State of the art security implementation



24.8 × 35.6 × 2.6 mm

### Product description

The TOBY-L4 series supports LTE Cat 6 TDD, LTE Cat 6 FDD, UMTS and GSM connectivity in a compact LGA package. Developers can host their applications directly in the module in a configurable Linux OS, enabling customers to save the cost of an external CPU, memory and peripherals in order to optimize the total cost. Customer application development in a standard Linux/Yocto environment based on HW virtualization benefits from the flexible open source Linux community. The extremely powerful embedded CPU has 19000 DMIPS, allowing the development of complex and demanding applications, such as Cat 6 Wi-Fi hot spotting and in-car telephony. With no processor bottleneck, the application can be scaled up as needed. The module comes with an extremely comprehensive set of HW interfaces (including RGMII/RMII for Ethernet and analog audio) so that applications do not need expensive external components, such as serial to Ethernet bridges or audio codecs.

With 3GPP Rel. 10 and LTE Cat 6 supporting carrier aggregation, which provides data throughput up to 300 Mbit/s, the modules are the perfect choice for applications requiring the highest data rates.

The -40 °C to +85 °C temperature range supports the establishment of an eCall at +95 °C for at least 2 minutes. Complemented by a set of state-of-the art security features, TOBY-L4 modules are the ideal product for the development of all kinds of automotive devices, such as smart antennas and in-dash telematics/infotainment devices.

TOBY-L4 modules are manufactured in ISO/TS 16949 certified sites, with the highest production standards and the highest quality and reliability. Each module is fully tested and inspected during production. Modules are qualified according to ISO 16750 – for systems installed in vehicles.

	TOBY-L4006-01	TOBY-L4106-01	TOBY-L4206-01	TOBY-L4906-01
<b>Grade</b>				
Automotive	•	•	•	•
Professional				
Standard				
<b>Regions</b>				
	N. America	EMEA	APAC/Brazil	China
<b>Access Technology</b>				
GSM/GPRS bands	D2	D1	Q	D1
UMTS/HSPA [MHz]	850, 1700, 1900	900, 2100	850, 900, 2100	900, 2100
LTE FDD bands	2, 4, 5, 7, 12, 13, 29	1, 3, 7, 8, 20	1, 3, 5, 7, 8, 9, 19, 28	1, 3
LTE TDD bands		38		39, 40, 41
Data rate	Cat 6	Cat 6	Cat 6	Cat 6
<b>Positioning</b>				
GNSS via modem §	•	•	•	•
AssistNow Software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CellLocate®	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Interfaces</b>				
UART	4	4	4	4
USB	1*	1*	1*	1*
DDC (I <sup>2</sup> C)	2	2	2	2
SDIO (Master)	1	1	1	1
RGMII/RMII	1	1	1	1
GPIO	14	14	14	14
<b>Audio</b>				
Analog audio	1	1	1	1
Digital audio	1	1	1	1
<b>Features</b>				
Antenna detection	•	•	•	•
Jamming detection	•	•	•	•
Embedded TCP/UDP	•	•	•	•
Embedded FTP/HTTP	•	•	•	•
Embedded TLS 1.2	•	•	•	•
FW update via USB	•	•	•	•
FOTA	•	•	•	•
Rx diversity	•	•	•	•
Dual stack IPv4/IPv6	•	•	•	•
MIMO 2x2	•	•	•	•

D1 = Dual-band 900/1800 MHz  
 D2 = Dual-band 850/1900 MHz  
 Q = Quad-band  
 ☐ = Available in future FW

Cat 6 = 300 Mb/s download, 50 Mb/s upload  
 \* = USB used for tracing and firmware update  
 § = external GNSS can be controlled via the modem

# TOBY-L4 uCPU series



## Features

LTE	Cat 6 (300 Mbit/s DL, 50 Mbit/s UL) 3GPP Release 10 FDD and TDD bands: – TOBY-L4006: 2, 4, 5, 7, 12, 13, 29 (N. America) – TOBY-L4106: 1, 3, 7, 8, 20, 38 (EMEA) – TOBY-L4206: 1, 3, 5, 7, 8, 9, 19, 28 (APAC/Brazil) – TOBY-L4906: 1, 3, 39, 40, 41 (China) Carrier aggregation All channel bandwidths: 1.4 - 20 MHz MIMO 2x2, Rx diversity
UMTS/DC-HSPA+	Bands: – TOBY-L4006: 2, 4, 5 (N. America) – TOBY-L4106: 1, 8 (EMEA) – TOBY-L4206: 1, 5, 8 (APAC/Brazil) – TOBY-L4906: 1, 8 (China) 42 Mbit/s downlink, 5.76 Mbit/s uplink
GSM	Bands: – TOBY-L4006: 2, 5 (N. America) – TOBY-L4106: 3, 8 (EMEA) – TOBY-L4206: 2, 3, 5, 8 (APAC/Brazil) – TOBY-L4906: 3, 8 (China) GPRS & EDGE Class 33
SMS	MT/MO PDU / Text mode SMS over IMS and via SMS-C
Voice	VoLTE and CSFB Codec: HR/FR/EFR/AMR/AMR-WB Echo cancelation & noise reduction

## Software features

uCPU embedding programming (Linux/Yocto)  
Full modem / customer application separation through HW virtualization

Protocols	Dual stack IPv4 / IPv6 Embedded TCP/IP, UDP/IP HTTP/FTP/SSL (Secure Socket Layer) eSIM and Bearer Independent Protocol
-----------	---

Network	Jamming detection
---------	-------------------

eCall / ERA Glonass  
SW pre-integration of GNSS and Wi-Fi  
AssistNow software for fastest Time-To-First-Fix<sup>1</sup>  
CellLocate® & Hybrid Positioning<sup>1</sup>

Firmware upgrade	Via USB Via FOTA
------------------	---------------------

## Security features

Secure boot and secure update  
Crypto HW accelerator / true random number generator  
Secure debugging  
Secure file system  
Secure services provided by dedicated Security Virtual Machine / Trusted Execution Environment

<sup>1</sup> = Available in future firmware

## Further information

For contact information, see [www.u-blox.com/contact-us](http://www.u-blox.com/contact-us).

For more product details and ordering information, see the [product data sheet](#).

## Package

248-pin LGA (Land Grid Array): 24.8 x 35.6 x 2.6 mm, 4.8 g

## Electrical data

Power supply 3.8 V nominal, range 3.3 V to 4.4 V

## Environmental data, quality & reliability

Operating temperature –40 °C to +85 °C (extended range)  
eCall at +95 °C for at least 2 minutes

RoHS compliant (lead-free)

Automotive qualification

Manufactured in ISO-TS 16949 certified production sites

## Planned certifications and approvals

TOBY-L4006-01 FCC, ISED (formerly known as IC), PTCRB, GCF, AT&T

TOBY-L4106-01 RED (formerly known as R&TTE), GCF

TOBY-L4206-01 PTCRB, GCF, Anatel

TOBY-L4906-01 CCC

Contact your nearest u-blox office for a full list of certifications.

## Interfaces

Serial 4 UART (1 can be configured to SPI)  
1 USB 3.0/2.0  
1 SDIO (Wi-Fi interface)  
1 SPI  
1 RGMII / RMII  
2 I<sup>2</sup>C / DDC

GPIO<sup>2</sup> Up to 14 GPIOs, configurable

Audio 1 digital and 1 analog

(U)SIM 2 SIM supporting 1.8 V and 3 V, SIM toolkit

Other 1 4-bit MMC (eMMC/SD memory)  
2 ADC

<sup>2</sup> = Other interfaces can be configured as GPIO if primary function not used

## Support products

EVK-L4x Evaluation kits for TOBY-L4 series

## Product variants

TOBY-L4006-01 LTE Cat 6 FDD / DC-HSPA+ / GSM modules for North America;  
LTE bands 2, 4, 5, 7, 12, 13, 29

TOBY-L4106-01 LTE Cat 6 FDD and TDD / DC-HSPA+ / GSM modules for Europe, Asia;  
LTE bands 1, 3, 7, 8, 20, 38

TOBY-L4206-01 LTE Cat 6 FDD / DC-HSPA+ / GSM modules for APAC;  
LTE bands 1, 3, 5, 7, 8, 9, 19, 28

TOBY-L4906-01 LTE Cat 6 FDD and TDD / DC-HSPA+ / GSM modules for China;  
LTE bands 1, 3, 39, 40, 41

## Legal Notice:

u-blox reserves all rights to this document and the information contained herein. Products, names, logos and designs described herein may in whole or in part be subject to intellectual property rights. Reproduction, use, modification or disclosure to third parties of this document or any part thereof without the express permission of u-blox is strictly prohibited.

The information contained herein is provided "as is". No warranty of any kind, either express or implied, is made in relation to the accuracy, reliability, fitness for a particular purpose or content of this document. This document may be revised by u-blox at any time. For most recent documents, please visit [www.u-blox.com](http://www.u-blox.com).  
Copyright © 2019, u-blox AG