LTE-M / NB-IoT modules

C

	LTE-M / NB-IoT modules with Secure Cloud							
	ALEX-R510M8S	SARA-R500S	SARA-R510S	SARA-R510M8S	SARA-R540S	SARA-R422	SARA-R422S	SARA-R422M8S
Grade								
Automotive								
Professional	•	•	•	•	•	•	•	•
Standard								
Physical								
Image								
Size [mm]	14 x 14 x 1.5	16.0 x 26.0 x 2.2				16.0 x 26.0 x 2.5		
Package and pins	133-pin LGA	96-pin LGA				96-pin LGA		
Regions	Multi-region	Multi-region				Multi-region		
Access technology								
GSM/GPRS bands						Q	Q	Q
LTE-M / NB-IoT bands	1, 2, 3, 4, 5, 8, 12, 13, 17, 18, 19, 20, 25, 26, 28, 66, 71, 85				*	1, 2, 3, 4, 5, 8, 12, 13, 20, 25, 26, 28, 66, 85		
Data rate	M1/NB2	M1/NB2	M1/NB2	M1/NB2	M1/NB2	M1/NB2	M1/NB2	M1/NB2
450 MHz spectrum power class					26 dBm			
410 MHz spectrum power class					23 dBm			
Positioning								
Integrated u-blox GNSS receiver	•			•				•
GNSS antenna interface	•			•				•
External GNSS control via modem		•	•		•		•	
Compatible with u-blox services								
MQTT Anywhere, MQTT Flex	•	•	•	•	•		•	•
AssistNow™	•	•	•	•	•		•	•
CellLocate®	•	•	•	•	•		•	•
IoT Security-as-a-Service	•	•	•	•	•		•	•
Interfaces								
UART	2	2	2	2	2	1	1	1
USB (for diagnostics)	1	1	1	1	1	1	1	1
DDC (I2C)	1	1	1	1	1	1	1	1
USIM	1	1	1	1	1	1	1	1
GPIO	11	6	6	6	6	6	6	6
Digital audio		□	□	□			□	□
Features								
Secure boot, updates, production	•	•	•	•		•	•	•
Root of trust	SE	SE	SE	SE	SE	TEE	TEE	TEE
MQTT, MQTT-SN	•	•	•	•	•		•	•
Antenna dynamic tuning	•	•	•	•	•			
CellTime ™		•	•	•	•			
Power save mode (PSM)	•	•	•	•	•	•	•	•
Ultra low power save mode	•		•		•	•	•	•
Last gasp	•	•	•	•	•		•	•
Antenna detection	•	•	•	•	•	•	•	•
Embedded TCP/UDP stack	•	•	•	•	•	•	•	•
Embedded HTTPS, FTPS	•	•	•	•	•		•	•
Embedded TLS, DTLS	•	•	•	•	•		•	•
eDRX	•	•	•	•	•	•	•	•
FW update via serial	•	•	•	•	•	•	•	•
uFOTA	•	•	•	•	•	•	•	•
Dual stack IPv4/IPv6	•	•	•	•	•		•	•
Embedded CoAP/DTLS	•	•	•	•	•		•	•
LwM2M device management	•	•	•	•	•	•	•	•

M1 = LTE Cat M1, Rel 13 (300 kb/s DL, 375 kb/s UL)
LTE Cat M1, Rel 14 (300 kb/s DL, 1200 kb/s UL)
NB2 = Cat NB2 (125 kb/s DL, 140 kb/s UL)
Q = quad-band

□ = available in future firmware
TEE = trusted execution environment
SE = secure element

* = LTE bands 1, 2, 3, 4, 5, 8, 12, 13, 18, 19, 20, 25, 26, 28, 31, 66, 71, 72, 73, 85, 87, 88

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u-blox

LTE-M / NB-IoT modules

	LTE-M / NB-IoT modules						LTE Cat NB2
	SARA-R410M-63B	SARA-R410M-73B	SARA-R410M-83B	SARA-R410M-52B	SARA-R410M-02B	SARA-R412M	SARA-N310 [A]
Grade							
Automotive							
Professional	•	•	•	•	•	•	•
Standard							
Physical							
Image							
Size [mm]			16.0 x 26.0 x 2.5				16.0 x 26.0 x 2.4
Package and pins			96-pin LGA				96-pin LGA
Regions	Japan	Korea	Multi-region	N America	Multi-region	Multi-region	Multi-region
Access technology							
GSM/GPRS bands						Q	
LTE-M / NB-IoT bands	1, 8, 19	3, 5, 26	3, 5, 8, 20, 28	2, 4, 5, 12, 13	*	*	3, 5, 8, 20, 28, +
Data rate	M1	M1	M1/NB1	M1	M1/NB1	M1/NB1	NB2
Positioning							
External GNSS control via modem	•	•	•	•	•	•	
Compatible with u-blox services							
MQTT Anywhere	•	•	•				
MQTT Flex							•
AssistNow™	•	•	•	•	•	•	•
CellLocate®	•	•	•		•	•	•
IoT Security-as-a-Service	•	•	•				
Interfaces							
UART	1	1	1	1	1	1	2
USB	1	1	1	1	1	1	
DDC (I2C)	1	1	1	1	1	1	
USIM	1	1	1	1	1	1	1
ADC							2
GPIO	6	6	6	6	6	6	8
Features							
Root of trust	TEE	TEE	TEE				
MQTT-SN	•	•	•				•
MQTT	•	•	•	•	•	•	•
SIM detection	•	•	•	•	•	•	□
Jamming detection							•
Power save mode (PSM)	•	•	•	•	•	•	•
Ultra-low / deep sleep mode	•	•	•	•	•	•	•
Last gasp	•	•	•	•	•	•	•
Antenna detection	•	•	•	•	•	•	•
Embedded TCP/UDP stack	•	•	•	•	•	•	•
Embedded HTTPS, FTPS	•	•	•	•	•	•	•
Embedded TLS, DTLS	•	•	•	•	•	•	•
eDRX	•	•	•	•	•	•	•
FW update via serial	•	•	•	•	•	•	•
FOTA / uFOTA	•	•	•	•	•	•	•
Dual stack IPv4/IPv6	•	•	•	•	•	•	•
Embedded CoAP/DTLS	•	•	•				•
LwM2M device management	•	•	•	•	•	•	•

M1 = LTE Cat M1, Rel 13 (300 kb/s DL, 375 kb/s UL)
LTE Cat M1, Rel 14 (300 kb/s DL, 1200 kb/s UL)
NB1 = Cat NB1 (27.2 kb/s DL, 62.5 kb/s UL)
NB2 = Cat NB2 (125 kb/s DL, 140 kb/s UL)

Q = quad-band
□ = available in future FW
TEE = trusted execution environment
A = ATEX variant available

+ = LTE bands 1, 2, 4, 12, 13, 18, 19, 26, 66, 71, 85 available in future firmware

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LTE Cat 1 modules

	LTE Cat 1 modules									
	LARA-R202	LARA-R203	LARA-R204	LARA-R211	LARA-R281	LARA-R220	LARA-R280	TOBY-R200-02B	TOBY-R200-82B	TOBY-R202
Grade										
Automotive										
Professional	•	•	•	•	•	•	•	•	•	•
Standard										
Physical										
Image										
Size [mm]	24.0 x 26.0 x 2.6							24.8 x 35.6 x 2.6		
Package and pins	100-pin LGA							152-pin LGA		
Regions	North America	North America	North America	EMEA	EMEA	Japan	APAC	North America	Global	North America
Access technology										
GSM/GPRS bands				D1				Q	Q	
UMTS/HSPA [MHz]	850, 1900				2100		2100	850, 900, 1900, 2100	850, 900, 1900, 2100	850, 1900
LTE bands	2, 4, 5, 12	2, 4, 12	4, 13	3, 7, 20	1, 3, 8, 20, 28	1, 19	3, 8, 28	2, 4, 5, 12	1, 2, 4, 5, 8, 12	2, 4, 5, 12
Data rate	Cat 1	Cat 1	Cat 1	Cat 1	Cat 1	Cat 1	Cat 1	Cat 1	Cat 1	Cat 1
Positioning										
External GNSS control via modem	•	•		•	•	•	•	•	•	•
AssistNow software	•	•		•	•	•	•	•	•	•
CellLocate®	•	•		•	•	•	•	•	•	•
Interfaces										
UART	1	1	1	2	1	1	1	1	1	1
USB	1	1	1	1	1	1	1	1	1	1
HSIC	H	H	H	H	H	H	H			
DDC (I2C)	1	1	1	1	1	1	1	1	1	1
SDIO (master)	H	H	H	H	H	H	H	H	H	H
GPIO	9	9	9	9	9	9	9	9	9	9
Audio										
Digital audio	1	1		1	1		1	1	1	1
Features										
VoLTE	v	v		•	c		c	v	v	v
Antenna detection	•	•	•	•	•	•	•	•	•	•
Embedded TCP/UDP	•	•	•	•	•	•	•	•	•	•
Embedded FTP/HTTP	•	•	•	•	•	•	•	•	•	•
Embedded TLS 1.2	•	•	•	•	•	•	•	•	•	•
FW update via serial	•	•	•	•	•	•	•	•	•	•
FOTA	•	•	•	•	•	•	•	•	•	•
Rx diversity	•	•	•	•	•	•	•	•	•	•
Dual stack IPv4/IPv6	•	•	•	•	•	•	•	•	•	•

Q = quad-band
D1 = dual-band 900/1800 MHz

Cat 1 = LTE Cat 1 (10 Mb/s DL, 5 Mb/s UL)

□ = available in future firmware version
v = VoLTE available and AT&T certified

c = CSFB only
H = hardware-ready

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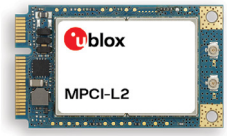
LTE Cat 4 modules

	LTE Cat 4 modules									
	TOBY-L200	TOBY-L201	TOBY-L210	TOBY-L220	TOBY-L280	MPCI-L200	MPCI-L201	MPCI-L210	MPCI-L220	MPCI-L280
Grade										
Automotive	•		•		•					
Professional	•	•	•	•	•	•	•	•	•	•
Standard										
Physical										
Image										
Size [mm]	24.8 x 35.6 x 2.6					30.0 x 51.0 x 3.7				
Package and pins	152-pin LGA					52-pin PCI Express Full-Mini Card Type F2				
Region	North America	North America	EMEA/ APAC	Japan	S. America/ APAC	North America	North America	EMEA/ APAC	Japan	S. America/ APAC
Access technology										
GSM/GPRS bands	Q		Q		Q	Q		Q		Q
UMTS/HSPA [MHz]	850, 900, 1700, 1900, 2100	850, 1900	850, 900, 1900, 2100	850, 900, 2100	850, 900, 1900, 2100	850, 900, 1700, 1900, 2100	850, 1900	850, 900, 1900, 2100	850, 900, 2100	850, 900, 1900, 2100
LTE FDD bands	2, 4, 5, 7, 17	2, 4, 5, 13, 17	1, 3, 5, 7, 8, 20	1, 3, 5, 6, 8, 19	1, 3, 5, 7, 8, 28	2, 4, 5, 7, 17	2, 4, 5, 13, 17	1, 3, 5, 7, 8, 20	1, 3, 5, 6, 8, 19	1, 3, 5, 7, 8, 28
Data rate	Cat 4	Cat 4	Cat 4	Cat 4	Cat 4	Cat 4	Cat 4	Cat 4	Cat 4	Cat 4
Interfaces										
UART	1	1	1	1	1					
USB	1	1	1	1	1	1	1	1	1	1
DDC (I2C)	1		1	1	1					
SDIO (master)	1	1	1	1	1					
GPIO	14	14	14	14	14					
Audio										
Digital audio	1		1	1	1					
Features										
Network indication	•	•	•	•	•	•	•	•	•	•
Antenna detection	•	•	•	•	•					
Embedded TCP/UDP	•	•	•	•	•	•	•	•	•	•
Embedded FTP/HTTP	•	•	•	•	•	•	•	•	•	•
Embedded TLS 1.2	•	•	•	•	•	•	•	•	•	•
FW update via serial	•	•	•	•	•	•	•	•	•	•
FOTA	•	•	•	•	•	•	•	•	•	•
Rx diversity	•	•	•	•	•	•	•	•	•	•
Dual stack IPv4/IPv6	•	•	•	•	•	•	•	•	•	•
MIMO 2x2	•	•	•	•	•	•	•	•	•	•

Q = quad-band

Cat 4 = LTE Cat 4 (150 Mb/s download, 50 Mb/s upload)

GSM and UMTS modules

	GSM/GPRS modules	UMTS/HSPA modules		
	SARA-G450	SARA-U201 [A]	LISA-U200	LISA-U201
Grade				
Automotive		•		•
Professional		•	•	•
Standard	•			
Physical				
Image				
Size [mm]	16.0 x 26.0 x 2.4	16.0 x 26.0 x 3.0	22.4 x 33.2 x 2.6	
Package and pins	96-pin LGA	96-pin LGA	76-pin LCC	
Region	Global	Global	Global	Global
Access technology				
GSM/GPRS bands	Q	Q	Q	Q
UMTS/HSPA [MHz]		800, 850, 900, 1900, 2100	800, 850, 900, 1700, 1900, 2100	800, 850, 900, 1900, 2100
Data rate	L *	M	M	M
Positioning				
External GNSS control via modem	•	•	•	•
AssistNow software	•	•	•	•
CellLocate®	•	•	•	•
eCall / ERA GLONASS		•	•	•
Interfaces				
UART	3	2	1	1
USB		1	1	1
DDC for u-blox GNSS	•	1	1	1
SPI			1	1
GPIO	4	9	14	14
Audio				
Analog audio	1			
Digital audio		1	2	2
Features				
Antenna detection	•	•	•	•
Jamming detection	•	•	•	•
Embedded TCP/UDP	•	•	•	•
Embedded FTP/HTTP	•	•	•	•
Embedded SSL	•	•	•	•
FW update via serial	•	•	•	•
FOTA		•	•	•
Rx diversity				
Dual stack IPv4/IPv6	•	•	•	•

* = GPRS class 12 (downgradeable to class 10 via AT command)

Q = quad-band

L = GPRS (85.6 kb/s)
M = 7.2 / 5.76 Mb/s down/up

A = ATEX variant available

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Form factors, technologies, and regions

For each module variant, the main and fallback technologies are shown in the regions where they are to be used.

	EMEA					North America					South America					APAC				
Modules	**G**	**U**	**N**	**R**	**L**	**G**	**U**	**N**	**R**	**L**	**G**	**U**	**N**	**R**	**L**	**G**	**U**	**N**	**R**	**L**
ALEX-R510M8S			●	●				●	●				●	●				●	●	
SARA-R500S			●	●				●	●				●	●				●	●	
SARA-R510S			●	●				●	●				●	●				●	●	
SARA-R510M8S			●	●				●	●				●	●				●	●	
SARA-R540S			●	●				●	●				●	●				●	●	
SARA-R422	•		●	●		•		●	●		•		●	●		Δ		●	●	
SARA-R422S	•		●	●		•		●	●		•		●	●		Δ		●	●	
SARA-R422M8S	•		●	●		•		●	●		•		●	●		Δ		●	●	
SARA-R410M-63B																			**J**	
SARA-R410M-73B																			**K**	
SARA-R410M-83B																		**A**	**A**	
SARA-R410M-52B									●											
SARA-R410M-02B			●	●				●	●				●	●				●	●	
SARA-R412M	•		●	●		•		●	●		•		●	●		Δ		●	●	
SARA-N310			●										●					●		
SARA-G450	●					●					●					Δ				
SARA-U201	•	●				•	●				•	●				Δ	♦			
LISA-U200	•	●				•	●				•	●				Δ	♦			
LISA-U201	•	●				•	●				•	●				Δ	●			
LARA-R202							•		●											
LARA-R203									●											
LARA-R204									●											
LARA-R211	•			●																
LARA-R281		•		●																
LARA-R220																			**J**	
LARA-R280																	•		●	
TOBY-R200-02B						•	•		●											
TOBY-R200-82B	•	•		●		•	•		●		•	•		●		Δ	•		●	
TOBY-R202							•		●											
TOBY/MPCI-L200						•	•			●	•	•			●					
TOBY/MPCI-L201							•			●		•			●					
TOBY/MPCI-L210	•	•			●											Δ	♦			♦
TOBY/MPCI-L220																	**J**			**J**
TOBY/MPCI-L280											•	•			●	Δ	•			●

Legend:

G = GSM/GPRS

U = UMTS/HSPA

N = NB-IoT

R = LTE-M, LTE Cat 1

L = LTE Cat 4

● = Main technology

• = Fallback technology

o = Main technology; supported in most, but not all, countries of the region

Δ = GSM/GPRS in APAC, but not supported in Japan or Korea

♦ = Some versions have a special firmware version for Japan and Korea; see product documentation

J = Japan only

K = Korea only

A = Australia primarily

For a detailed view of our product offering, see our guided product selector:
www.u-blox.com/guided-product-selector

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