

LTE-M / NB-IoT modules with Secure Cloud



LTE-M / NB-IoT modules									
	SARA-R500S	SARA-R510S	SARA-R510M8S	SARA-R410M-63B	SARA-R410M-73B	SARA-R410M-83B	SARA-R422	SARA-R422S	SARA-R422M8S
Grade									
Automotive									
Professional	•	•	•	•	•	•	•	•	•
Standard									
Physical									
Image									
Size [mm]	16.0 x 26.0 x 2.2			16.0 x 26.0 x 2.5			16.0 x 26.0 x 2.5		
Package and pins	96-pin LGA			96-pin LGA			96-pin LGA		
Regions	Multi-region			Japan	Korea	Multi-region	Multi-region		
Access technology									
GSM/GPRS bands	Q								
LTE bands	1, 2, 3, 4, 5, 8, 12, 13, 17, 18, 19, 20, 25, 26, 28 NB-IoT only: 66, 71, 85			1, 8, 19	3, 5, 26	3, 5, 8, 20, 28	1, 2, 3, 4, 5, 8, 12, 13, 20, 25, 26, 28 NB-IoT only: 66, 71, 85		
Data rate	M1/NB2	M1/NB2	M1/NB2	M1	M1	M1/NB1	M1/NB2		
Positioning									
Integrated u-blox GNSS receiver			•						•
GNSS antenna interface			•						•
GNSS via modem §	•	•	•	•	•	•		•	•
AssistNow Software	•	•	•	•	•	•		•	•
CellLocate®	•	•	•	•	•	•		•	•
Interfaces									
UART	2	2	2	1	1	1	1	1	1
USB	D	D	D	1	1	1	D	D	D
DDC (I2C)	1	1	1	1	1	1	1	1	1
SPI	□	□	□						
SDIO (master)	□	□	□						
USIM	1	1	1	1	1	1	1	1	1
GPIO	6	6	6	6	6	6	6	6	6
Digital audio	□	□	□					□	□
Features									
Secure Cloud Services	v 1.1	v 1.1	v 1.1	v 1	v 1	v 1		v 1	v 1
Root of Trust	SE	SE	SE	•	•	•	•	•	•
Antenna dynamic tuning	•	•	•						
CellTime	•	•	•						
Ultra low PSM	•	•	•	•	•	•	•	•	•
Last gasp	•	•	•	•	•	•	•	•	•
Antenna detection	•	•	•	•	•	•	•	•	•
Embedded TCP/UDP stack	•	•	•	•	•	•	•	•	•
Embedded HTTPS, FTPS	•	•	•	•	•	•	•	•	•
Embedded TLS, DTLS	•	•	•	•	•	•	•	•	•
Power Save Mode Rel. 12	•	•	•	•	•	•	•	•	•
eDRX	•	•	•	•	•	•	•	•	•
FW update via serial	•	•	•	•	•	•	•	•	•
uFOTA	•	•	•	•	•	•	•	•	•
Dual stack IPv4/IPv6	•	•	•	•	•	•	•	•	•
CoAP/DTLS	•	•	•	•	•	•	•	•	•
MQTT	•	•	•	•	•	•	•	•	•
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
 D = for diagnostics



SE = Secure element

§ = external GNSS control via modem
 □ = Available in future firmware

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LTE-M / NB-IoT modules



	LTE-M / NB-IoT modules			LTE Cat NB2 modules	
	SARA-R410M-52B	SARA-R410M-02B	SARA-R412M	SARA-N300	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	N America	Multi-region	Multi-region	China	Multi-region
Access technology					
GSM/GPRS bands			Q		
LTE bands	2, 4, 5, 12, 13	*	*	3, 5, 8	3, 5, 8, 20, 28, +
Data rate	M1	M1/NB1	M1/NB1	NB2	NB2
Positioning					
GNSS via modem §	•	•	•		
AssistNow Software	•	•	•		
Interfaces					
UART	1	1	1	2	2
USB	1	1	1		
DDC (I2C)	1	1	1		
USIM	1	1	1	1	1
ADC				2	2
GPIO	6	6	6	5	5
Features					
Last gasp	•	•	•	•	•
SIM detection	•	•	•	•	•
Antenna detection	•	•	•	•	•
Embedded TCP/UDP stack	•	•	•	•	•
Embedded HTTPS, TLS	•	•	•	•	•
Power Save Mode Rel.12	•	•	•	•	•
eDRX	•	•	•	•	•
Deep sleep mode	•	•	•	•	•
FW update via serial	•	•	•	•	•
FOTA / uFOTA	•	•	•	•	•
Dual stack IPv4/IPv6	•	•	•	•	•
Embedded CoAP/DTLS				•	•
Embedded MQTT-SN				•	•
Embedded MQTT	•	•	•		•
LwM2M device management	•	•	•		•
Jamming detection				•	•

NB1 = Cat NB1 (27.2 kb/s DL, 62.5 kb/s UL)
NB2 = Cat NB2 (125 kb/s DL, 140 kb/s UL)

A = ATEX variant

□ = Available in future firmware

+ = 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



	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]								24.8 x 35.6 x 2.6		
Package and pins								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										
GNSS 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
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)

§ = external GNSS can be controlled via the modem

□ = Available in future firmware version

v = VoLTE available and AT&T certified

c = CSFB only

H = Hardware-ready

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LTE Cat 6 modules



	LTE Cat 6 smart modem (onboard uCPU)				LTE Cat 6 slim modem			
	TOBY-L4006-01	TOBY-L4106-01	TOBY-L4206-01	TOBY-L4906-01	TOBY-L4006-51	TOBY-L4106-51	TOBY-L4206-51	TOBY-L4906-51
Grade								
Automotive	•	•	•	•	•	•	•	•
Professional								
Standard								
Physical								



Image

Size [mm]	24.8 x 35.6 x 2.6							
Package and pins	248-pin LGA							
Regions	N. America	EMEA	APAC/Brazil	China	N. America	EMEA	APAC/Brazil	China
Access technology								
GSM/GPRS bands	D2	D1	Q	D1	D2	D1	Q	D1
UMTS/HSPA [MHz]	850, 1700, 1900	900, 2100	800, 850, 900, 2100	900, 2100	850, 1700, 1900	900, 2100	800, 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	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		38		39, 40, 41
Data rate	Cat 6	Cat 6	Cat 6	Cat 6	Cat 6	Cat 6	Cat 6	Cat 6
Positioning								
GNSS via modem §	•	•	•	•	□	□	□	□
AssistNow Software	□	□	□	□	□	□	□	□
CellLocate®	□	□	□	□	□	□	□	□
Interfaces								
UART	4	4	4	4				
USB	1*	1*	1*	1*	1	1	1	1
DDC (I2C)	2	2	2	2	1	1	1	1
SDIO (master)	1	1	1	1				
RGMII/RMII	1	1	1	1	1	1	1	1
GPIO	14	14	14	14	9	9	9	9
Audio								
Analog audio	1	1	1	1	1	1	1	1
Digital audio	1	1	1	1	1	1	1	1
Features								
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

Cat 6 = LTE 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

□ = Available in future firmware version

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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)

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GSM and UMTS modules



	GSM/GPRS modules			UMTS/HSPA(+) modules			
	SARA-G450	SARA-G340 ^A	SARA-G350 ^A	SARA-U201 ^A	LISA-U200	LISA-U201	LISA-U230
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	EMEA/APAC	Global	Global	Global	Global	Global
Access technology							
GSM/GPRS bands	Q	D1	Q	Q	Q	Q	Q
UMTS/HSPA [MHz]				800, 850, 900, 1900, 2100	800, 850, 900, 1700, 1900, 2100	800, 850, 900, 1900, 2100	800, 850, 900, 1700, 1900, 2100
Data rate	L*	L	L	M	M	M	+
Positioning							
GNSS via modem §	•	•	•	•	•	•	•
AssistNow Software	•	•	•	•	•	•	•
CellLocate®	•	•	•	•	•	•	•
eCall / ERA GLONASS		•	•	•	•	•	
Interfaces							
UART	3	2	2	2	1	1	1
USB				1	1	1	1
DDC for u-blox GNSS	•	1	1	1	1	1	1
SPI					1	1	1
GPIO	4	4	4	9	14	14	14
Audio							
Analog audio	•	1	1				
Digital audio		1	1	1	2	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	•	•	•	•	•	•	

§ = Control of external GNSS via the modem
 * = GPRS class 12 (downgradeable to class 10 via AT command)

D1 = Dual-band 900/1800 MHz
 D2 = Dual-band 850/1900 MHz
 Q = Quad-band

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

A = ATEX variant available
 + = 21.1 / 5.76 Mb/s down/up

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