



NWK100: Extrovert 4G LTE Modem

Ideal for today's mobile, edge computing and Industrial Internet of Things applications, the NWK100 enables reliable cellular connectivity anywhere.

onlogic.com/nwk100



Failover Protection

For mission critical data, the NWK100 connects you to the 4G LTE network as a vital backup method for transferring information, especially in mobile or fluctuating power environments.

Pre-installed & Pre-certified

The NWK100 has been pre-certified for end device use in a wide range of our industrial PC systems, giving you the freedom to choose the platform that works best for your needs.

Secure & Protected

The NWK100 gives you the reliable connectivity of the 4G network, combined with the peace of mind in knowing your data is safe from security threats and even environmental challenges.



US Office

Phone: +1 802 861 2300

Email: info@onlogic.com

www.onlogic.com

EU Office

Phone: +31 85 2733760

Email: info@onlogic.eu

www.onlogic.com

NWK100 Product Manual

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Important Notices and Warnings

Important Notice

Due to the nature of wireless communications, transmission and reception of data can never be guaranteed. Data may be delayed, corrupted (i.e., have errors) or be totally lost. Although significant delays or losses of data are rare when wireless devices such as the Extrovert family of products are used in a normal manner with a well constructed network, the Extrovert family of products should not be used in situations where failure to transmit or receive data could result in damage of any kind to other equipment, the user or any other party, including but not limited to personal injury, death or loss of property. OnLogic accepts no responsibility for damages of any kind resulting from failures, delays or errors in data transmitted or received. The purchase and use of the Extrovert family of products does not come with, or constitute a wireless or data plan. A separate plan with your carrier is required.

Safety and Hazards

CAUTION: For your own safety and to ensure continued proper operation, Extrovert products should not be used where explosive atmospheres may be present or where radio interference may cause damage to, or disruption in service from, other equipment.

IMPORTANT NOTE: Maintain at least 20 cm of separation between the LTE antenna and the user’s body while in regular operation. Do not use Extrovert products in the vicinity of medical equipment as it may cause potentially disruptive interference.

Do not co-locate an Extrovert-enabled device with any other transmitting system.

To comply with FCC/IC regulations in North America that limit both maximum RF output power and human exposure to RF radiation (SAR), the maximum antenna gain including cable loss in a mobile-only exposure condition must not exceed the limits outlined in the table below.

Device	Technology	Band	Frequency	Maximum antenna gain (dBi)
EM7455 Embedded Module	LTE	2	1850-1910	6
		4	1710-1755	6
		5	824-849	6
		7	2500-2570	6
		12	699-716	6
		13	777-787	6
		25	1850-1915	6
		26	814-849	6
		30	2305-2315	1 (See *Important note below.)
		41	2496-2690	6
	UMTS	2	1850-1910	6
		4	1710-1755	6
		5	824-849	6

*Important: The FCC and IC have a strict EIRP limit in Band 30 for mobile and portable stations in order to protect adjacent satellite radio, aeronautical mobile telemetry, and deep space network operations. Mobile and portable stations must not have antenna gain exceeding 1 dBi in Band 30. Additionally, both the FCC and IC prohibit the use of external vehicle-mounted antennas for mobile and portable stations in this band.

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EU Office

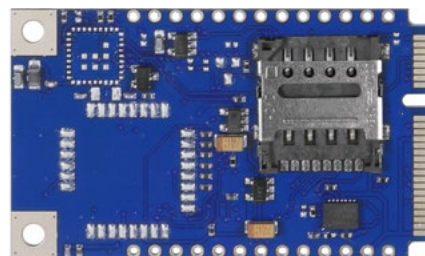
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Specifications

SKU	NWK100	Operating Temp. Range	-40°C ~ 85°C
Carrier	AT&T	Drivers Supported	Ubuntu Windows 7 Windows 8.1 Windows 10 Windows Embedded 7
Connectivity	LTE GSM UMTS/DC-HSPA+	Regulatory Information	CE Conformity 1999/5/EC FCC Class B RoHS
Bands	<p>LTE: Cat 4 (150Mb/s DL, Mb/s UL) 3GPP Release 9 FDD Bands: 2, 4, 5, 7, 17 (N. America) All Channel Bandwidths: 1.4 - 20 MHz MIMO 2x2 Rx Diversity</p> <p>GSM: 850, 900, 1800, 1900 GPRS & EDGE Class 12</p> <p>UMTS/DC-HSPA+: 850, 900, AWS, 1900, 2100 42 Mb/s downlink, 5.76 Mb/s uplink</p> <p>SMS: MT/MO PDU / Text mode SMS over IMS and via SMS-C</p> <p>Voice: CSFB Codec: HR, FR, EFR, AMR, AMR-WB Echo cancelation & noise reduction</p>	Protocols	Dual stack IPv4 / IPv6 Embedded TCP/IP, UDP/IP HTTP/FTP/SSL (Secure Socket Layer) Bearer Independent Protocol (BIP)
Data Range	Cat 4 (150 Mb/s DL, 50 Mb/s UL)	Network	Jamming Detection
Interface	Mini PCIe (Full Height)	Wi-Fi Interface	To ELLA-W1 module
SIM Card Socket Size	2FF (Mini-SIM)	Firmware Upgrade	Via UART and USB Via FOTA
Signal Type	USB 2.0 (on Mini PCIe)	Power Supply	3.8 V nominal, range 3.4 V to 4.35 V
Expansion Options	SIM Card Socket PCIe Mini Card (full height)	Consumption Current	Connected mode LTE max power: 610 mA Idle mode: 1.1 mA
		Serial	1 UART 1 USB 2.0 (high-speed, 480 Mb/s) 1 SDIO (Master)
		GPIO	Up to 14 GPIOs, configurable
		(U)SIM	Supports 1.8 V and 3 V, SIM toolkit
		Audio	1 Digital

Dimensional Drawings

All measurements in mm



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Product Information

Product Description

The OnLogic NWK100 is based on the PCI Express Mini Card standard with a USB 2.0 interface and utilizes UBLOX TOBY-L200 Cellular Module.

The NWK100 is an available option within OnLogic's full range of industrial PCs. See www.onlogic.com to select your PC platform. Add 4G LTE connectivity during the system configuration stage. Unless specifically authorized, the NWK100 is not available for individual sale as a component.

High Speed Connectivity

Based on UBLOX TOBY-L200 Cellular Module, OnLogic 4G modem supports the latest 4G and 3G networks in North America. The mPCIe form factor allows easy integration into smaller and thinner devices. Optimized for low power consumption, OnLogic 4G modems are ideal for today's mobile computing, networking, and industrial IoT applications. This powerful LTE module supports throughput of up to 150 Mb/s with LTE Cat 4.

Antenna RF interfaces (ANT1 / ANT2)

NWK100 is based on UBLOX TOBY-L200 module and provides two RF interfaces for connecting the external antennas:

The ANT1 represents the primary RF input/output for transmission and reception of LTE/3G/2G RF signals. The ANT1 pin of NWK100 has a nominal characteristic impedance of 50 Ω and must be connected to the primary Tx / Rx antenna through a 50 Ω transmission line to allow proper RF transmission and reception.

The ANT2 represents the secondary RF input for the reception of the LTE RF signals for the Down-Link MIMO 2 x 2 radio technology supported by NWK100 as required feature for LTE category 4 UEs, and for the reception of 3G RF signals for the Down-Link Rx diversity radio technology supported by NWK100 as additional feature for 3G DC-HSDPA category 24 UEs. The ANT2 pin of NWK100 has a nominal characteristic impedance of 50 Ω and must be connected to the secondary Rx antenna through a 50 Ω transmission line to allow proper RF reception.

USB in Windows

USB drivers are provided for Windows operating system platforms can be obtained from the NWK100 product page at www.onlogic.com.

USB drivers are available for the following operating system platforms:

- Windows Vista
- Windows 7
- Windows 8
- Windows 8.1
- Windows 10
- Windows Embedded CE 6.0
- Windows Embedded Compact 7
- Windows Embedded Compact 2013

The module firmware can be upgraded over the USB interface by means of the FOTA feature, or using the u-blox EasyFlash tool.

USB in Linux/Android

It is not required to install a specific driver for each Linux-based or Android-based operating system (OS) to use the module USB interface, which is compatible with standard Linux/Android USB kernel drivers. The full capability and configuration of the module USB interface can be reported by running "lsusb -v" or an equivalent command available in the host operating system when the module is connected.

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Setting up AT terminal applications for communication with NWK100

1. Determine which COM port is being used by the NWK100. Open the Windows Device Manager (devmgmt.msc), then open the Modems flyout and right click the u-blox Modem device. Right-click Properties. On the Modem tab, the COM device used is listed at the top.
2. Run the AT terminal application (e.g. puTTY), select Serial in the connection type and configure the port with these settings:
 - Data rate: 115200 b/s
 - Stop bits: 1
 - Data bits: 8
 - Flow control: HW
 - Parity: N
3. Click Open.
4. The AT terminal is ready to use. For the complete list of AT commands supported by the modules and their syntax, see the u-blox AT Commands Manual.

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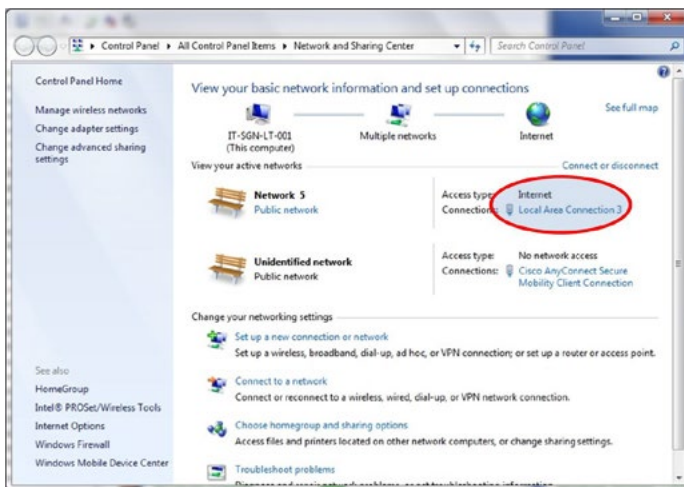
NWK100 setup for Internet browsing (Windows)

Use the AT terminal to enter the following AT command lines:

1. Perform the following procedure to activate an external PDP context with the preferred APN:

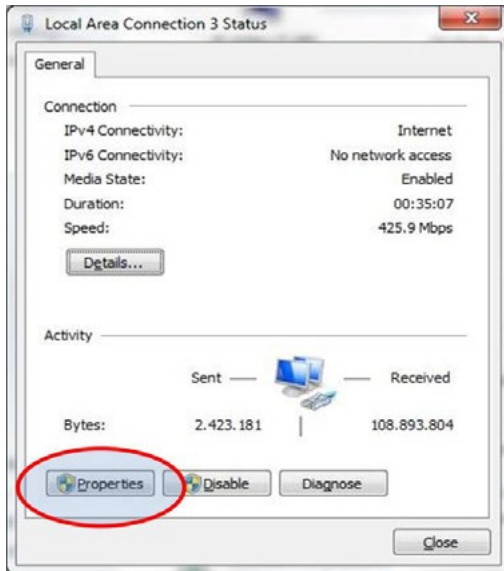
Command sent bt DTE (user)	DCE response (module)	Description				
AT+UBMCONF?	+UBMCONF: 1 OK	Check the +UBMCONF <networking_mode>, which must be 1 = Router mode (as the factory-programmed value) for the context activation procedure herein described.				
AT+CFUN=4	OK	Set the module in airplane mode. The module will deregister from network and both RF Tx and RF Rx will be disabled.				
AT+CGDCONT=1,"IP","ibox.tim.it"	OK	Define a PDP context with preferred APN: in this example, the "ibox.tim.it" APN is selected.				
AT+UCGDFLT=1,"IP","ibox.tim.it"	OK	Define the initial PDP context with preferred APN. This will be activated only if the module registers to an LTE network.				
AT+CFUN=1	OK	Set the module to full functionality. The module starts the automatic network registration.				
AT+CPIN?	+CPIN: READY OK	Check the SIM PIN status and act accordingly.				
AT+COPS?	+COPS: 0,0,"I TIM",7 OK	Check the +COPS <Act> and act accordingly: If <Act> = 7 (LTE, as it is in this example) Then no further action is needed Else activate the context with +CGACT as following: <table border="1" data-bbox="878 1050 1419 1123"> <thead> <tr> <th>Command sent by DTE</th> <th>DCE Response</th> </tr> </thead> <tbody> <tr> <td>AT+CGACT=1,1</td> <td>OK</td> </tr> </tbody> </table>	Command sent by DTE	DCE Response	AT+CGACT=1,1	OK
Command sent by DTE	DCE Response					
AT+CGACT=1,1	OK					
AT+CGCONTRDP	+CGCONTRDP: 4,5,"ibox.tim.it.mnc001.mcc222.gprs","5.168.209.178.255.255.255","5.168.209.178","83.224.70.94","83.224.56.132","0.0.0.0","0.0.0.0",0 OK	Check the DNS primary server address: in this example, the DNS primary server address is 83.224.70.94.				

2. Open "Network and Sharing Center" and click on Local Area Connection (associated to RNDIS interface):

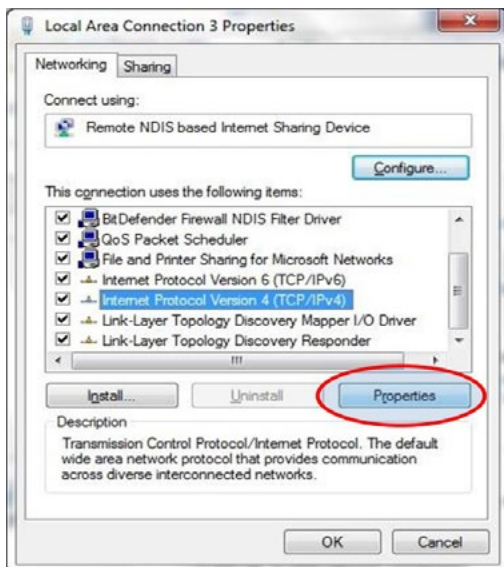


NWK100 setup for Internet browsing (Windows) (cont.)

3. Click on Properties:



4. Search for "Internet Protocol Version 4 (TCP/IPv4)" and click on Properties:



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Phone: +1 802 861 2300

Email: info@onlogic.com

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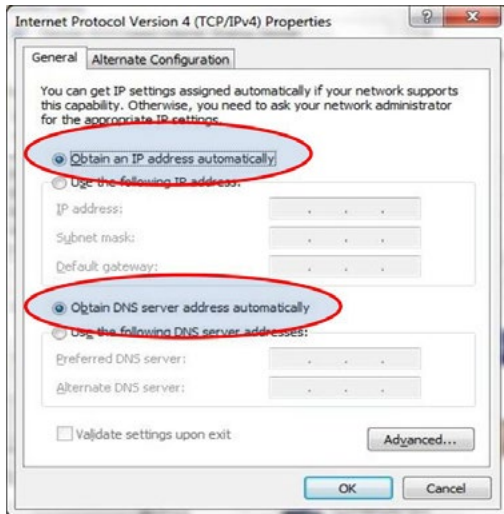
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Email: info@onlogic.eu

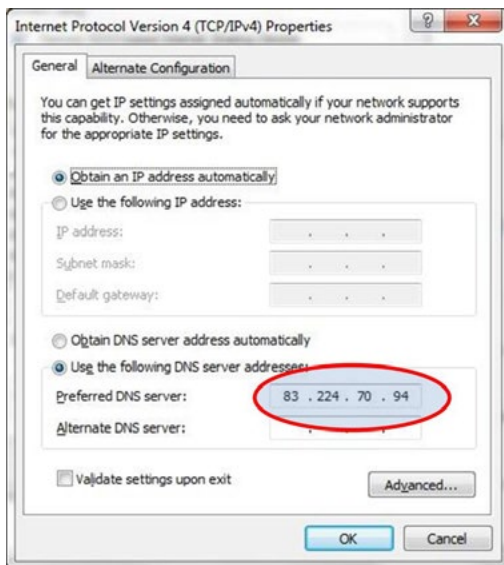
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NWK100 setup for Internet browsing (Windows) (cont.)

5. Check the Obtain an IP address automatically and Obtain DNS server address automatically option.



6. If it is not possible to surf the web, then manually set the DNS server address: for example, use the DNS server returned by the network (in this example, 83.224.70.94)



AT Commands

For a complete description and syntax of the AT commands supported by each TOBY-L2 series cellular module product version, see the u-blox AT commands Manual. For detailed examples of AT commands for network registration and configuration, context activation, data connection management, SIM management, module interfaces configurations and other settings, see the u-blox AT Commands Examples Application Note. For detailed examples of AT commands for TOBY-L2 series cellular module networking and IP connectivity configuration, see the u-blox TOBY-L2 series Networking Modes Application Note.

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Phone: +1 802 861 2300

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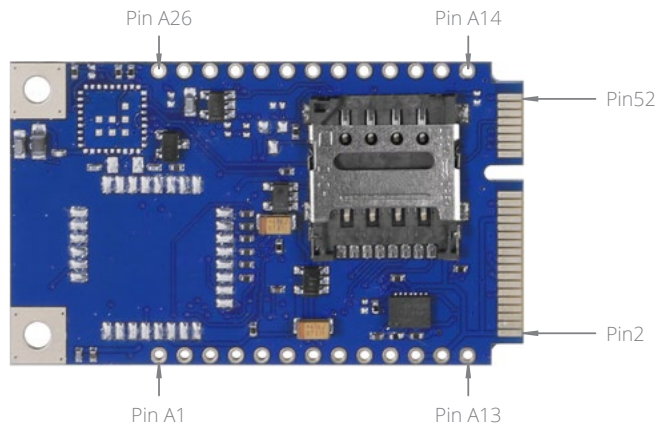
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Pin Connectors



PIN Number	PIN Description
2, 24, 39, 41, 52	VCC Power Power Input
4, 9, 15, 18, 21, 26, 27, 29, 34, 35, 37, 40, 43, 50	GND Power Ground
8	SIM_VCC External SIM signal—Power supply for the SIM
10	SIM_IO Input/Output External SIM signal—Data I/O
12	SIM_CLK Output External SIM signal—Clock
14	SIM_RST Output External SIM signal—Reset
20	W_DISABLE_N Input
36	USB_DN
38	USB_DP
42	LED_WWAN
1, 3, 5, 6, 7, 9, 11, 13, 16, 17, 19, 22, 23, 25, 28, 30, 31, 32, 33, 44, 45, 46, 47, 48, 49, 51	Not Connected
A1-A26	Not Used

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Email: info@onlogic.eu

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