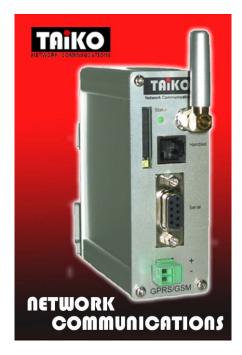


## **Tri-Band GSM/GPRS Modem**

## TNC-G110 USER'S MANUAL

Rev 1.2 19 June 2006





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## TNC-G110 USER'S MANUAL

## Safety Precautions

- This modem is intended for use when supplied with power from a DC source between 9 VDC to 36 VDC. Other usage will invalidate any approval given to this modem and may be dangerous.
- The modem generates radio frequency (RF) power. When using the modem care must be taken on safety issues related to RF interference as well as regulations of RF equipment.
- Usage of modem in aircrafts is illegal and it may cause danger to aircraft operation and disrupt cellular network. Offenders may face suspension or revocation of cellular telephone services, or legal action or both.
- Uses of modem are not advisable at explosive environments. Users are to restrain himself from using radio equipments at these areas where blasting actions are taking place. E.g.: fuel depots, chemical plants.
- The use of the Alert device to operate a vehicle's lights or horn on public roads is not permitted.
- It is advised that hand-held microphone or telephone handset should not be used by the driver while the vehicle is moving, except in an emergency. Speak only into a fixed, neck slung or clipped-on microphone when it would not distract your attention from the road.
- Be sure that the modem will not be interfering with nearby equipment. For example: pacemakers or medical equipment. The antenna of the modem should be away from computers, office equipment, home appliance, etc.
- Antenna of the device should be at least 30 cm from the human body.
- Do not put the antenna inside metallic box, containers, etc.
- Check for any regulation or law authorizing the use of GSM in vehicle in your country before installing the modem. Consult your vehicle dealer for any possible interference of electronic parts by the modem. Vehicle installation of modem must be by qualified personnel.
- Non-radiating cable (e.g. coaxial cables) are to be used to connect radio equipment to antenna.
- Antenna should be mounted at placement that considerations are taken that no part of human body can get too close to any part of antenna unless there is an intervening metallic screen (e.g. metallic roof).
- Be careful when the modem is powered by the vehicle's main battery. The battery may be drained after an extended period.

#### Protecting your modem

To ensure error-free usage, please install and operate your modem with care. Do remember the following:

- Do not expose the modem to extreme conditions such as high humidity/rain, high temperatures, direct sunlight, caustic/harsh chemicals, dust, or water.
- Do not try to disassemble or modify the modem. There is no user serviceable part inside and the warranty would be void.
- Do not drop, hit or shake the modem. Do not use the modem under extreme vibrating condition.
- Do not pull the antenna or power supply cable. Attach/ detach by holding the connector.
- Connect the modem only according to the instruction manual. Failure to do it will void the warranty.
- In case of problem, please contact authorized dealer.



#### 1. INTRODUCTION

TNC-G110 is a ready-to-use GSM modem for voice, data, fax and SMS services. It also supports GPRS (Class 10) for hi-speed data transfer. TNC-G110 can be easily controlled by using AT command for all kinds of operations. With standard 9-pin RS232 port(optional IEEE1394 USB cable for TNC-G110U model) and telephone-RJ22 the TNC-G110 can be set up with minimal effort.

#### Package

The TNC-G110 package should include the following: TNC-G110 x 1 Antenna (Duck type, 3mm) (Optional) Safety note x 1

#### INTERFACES

SIM holder with eject button Status indicator RJ 11 Phone Jack 9 pin Sub-D female connector DIP switch at back plate to select DTR reset function. (Default: DTR disabled by DIP switch 1 to ON position) 2 pin DC power header

#### Status indicator

The LED will indicate differ	ent status of the modem:
On	Modem switched on
Off	Modem switched off
Flashing rapidly	Modem searching for network
(Start up)	-
Flashing slowly	Modem is in transmission/communication (GSM only)
Flashing rapidly	Modem is in GPRS mode
(After network is found)	

#### SMA female antenna connector

Connect this to an external antenna with SMA male connector. Make sure the antenna is for the GSM900/1800/1900 frequency with impedance of 50ohm, and also connector is secured tightly.

#### 9 pin Sub--D Female Connector

The connector provides serial link to the modem.

#### 9-PIN D-SUB Female connector (RS232)

Pin Number	Name	EIA Designation	Туре
1	DCD	Data Carrier Detect	Output
2	TX	Transmit Data	Output
3	RX	Receive Data	Input
4	DSR	Data Set Ready	Output
5	GND	Ground	
6	DTR	Data Terminal Ready	Input
7	RTS	Request to Send	Input
8	CTS	Clear to Send	Output
9	RI	Ring Indicator	Output



#### IEEE1394 USB cable interface for TNC-G110U

If you choose the *TNC-G110U*, it provides serial link by IEEE1394 USB cable (USB Type A to Type B connector).

#### Specification of microphone and speaker to be connected :

Parameter	Min	Typical	Max	Remark
Phone current @2V/2kohm		0.5		mA
Phone input level			100	mVpp
Speaker output current 150ohm/1nF		16		mA
Speaker Impedence			32	Ohm

#### 2-PIN connector (Power, Input / Output)

#### Pin assignment of 2-pin connector Pin number Name Functions

Pin number	Name	Function
1	POWER –DC	Power negative input
2	POWER +DC	Power positive input

## 2. INSTALLATION

#### 2.1 Mounting the modem

The modem can only be mounted onto a standard 35mm Din-rail.

#### 2.2 Install the SIM card

Use a flat tip screw driver or paper clip to press the SIM holder eject button. The SIM holder will come out a little. Then take out the SIM holder.

Note: DO NOT pull out the SIM holder without pushing the ejector.

Put the SIM card to the tray; Make sure it sits properly in the tray. Put the tray back into the slot.

#### 2.3 Connect the external antenna (SMA type)

Connect this to an external antenna with SMA male connector. Make sure the antenna is for the GSM900/1800/1900 frequency with impedance of 50ohm, and also connector is secured tightly. Note : Please use antenna designed for GSM 900/1800/1900 MHz operation. Incorrect antenna

will affect communication and even damage the modem. Antenna of the device should be at least 30 cm from the human body.

#### 2.4 Connect the DC power supply

Connect the open ending of the included power cord to a DC supply. Refer to the following for power supply requirement.

## Power Supply Requirement:

Supply voltage:

9V~ 36V



Peak current at 12V supply: Average current at 12V supply in idle mode 2A 30mA

Connect the power connector to the modem. The modem will turn on automatically. The status indicator will lit on and start to flash very fast. The modem will start to register to the network and after a few seconds the status indicator on the modem will be flashing slowly (registered to the network successfully refer 1.2.1).

#### 2.5 Connect the modem to external device( Connect the power supply first before this)

You can use the optional RS-232 cable to connect the modem's SUB-D connector (IEEE1394 USB cable for TNC-G110U) to external controller/computer. The following section in the next page describes how to communicate with the modem software in Microsoft Windows environment.



## 3. WORKING WITH TNC-G110

#### Checking the modem (using Microsoft WindowsTM HyperTerminal as example)

On the first power-up attempt, you can use terminal software to communicate with the modem through an RS-232 serial Port (USB port for TNC-G110U). Following examples are using the HyperTerminal in Windows 2000. (*Make sure that the DTR reset function is disabled by setting DIP switch 1 at the back plate to ON position before proceeding*)

🔁 Communications
File Edit View Favorites Tools Help
😓 Back 🔹 🤿 🖈 🛅 🔞 Search 🖓 Folders 🔇 🦉 🧏 💥 🖄 🥅
Address 🔂 Communications 🔽 🔗 Go
Communications
Select an item to view its description. See also: <u>My Documents</u> <u>My Network Places</u> <u>My Computer</u>
] 1 object(s) 0 bytes 🖳 My Computer 🌈

On Windows 2000, start the HyperTerminal program. Assign a name for a new session.

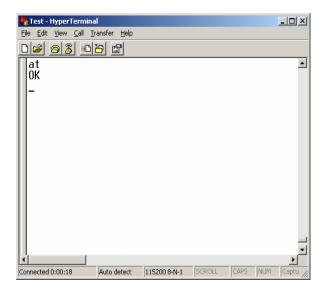
Connection Description	? ×
New Connection	
Enter a name and choose an icon for the connection:	
Name:	
GPRS Modem	
<u>l</u> con:	
	<b>N</b>
OK Ca	incel



? × COM8 Properties Port Settings Bits per second: 115200 • Data bits: 8 • Parity: None • Stop bits: 1 • Elow control: None -Restore Defaults ΟK Cancel

Choose the correct Com port and baud rate settings (115200bps, 8bits, no paritybit, 1 stop bit).

On the terminal screen, type "AT" to check for "OK" response from the modem





#### **Basic Operation :**

Followings are examples of some AT commands. Please refer to the AT Command document for a full description.

Note : Issue AT+CMEE=1 to have extended error code (+CME ERROR)

Description	AT commands	Modem response	Comments
	AT+CREG?	CREG= <mode>,1</mode>	Modem registered to the network
Network Registration Checking		CREG= <mode>,2</mode>	Registration lost, re-registration attempt
		CREG= <mode>,0</mode>	Modem not registration on the network, no registration attempt
Receiving signal strength	AT+CSQ	+CSQ: 20,0	The first parameter has to be at least 15 for normal communication
		RING	An incoming call is waiting
Receiving an incoming call	ATA		Answer the call
		ок	
	ATD1234567;		Don't forget the « ; » at the end for « voice » call
		ок	Communication established
Make a call		CME ERROR : 11	PIN code not entered (with + CMEE = 1 mode)
		CME ERROR : 3	AOC credit exceeded or a communication is already established
Make an emergency	ATD 112;		Don't forget the « ; » at the end for « voice » call
call		ок	
Communication loss		NO CARRIER	
Hang up	ATH		
nung up		ок	
	AT+CPIN=1234		
		ок	PIN Code accepted
Enter PIN code		+CME ERROR : 16	Incorrect PIN Code (with +CMEE = 1 mode)
		+CME ERROR : 3	PIN already entered (with +CMEE = 1 mode)

#### Basic command for sending & receiving SMS

- 1. Set the Echo ON ATE1.
- 2. Set to text mode. AT+CMGF=1
- Send an SMS. E.g. we want to send to this phone number: 91234123 AT+CMGS="91234123"(CLICK enter after this) >Type your message here (press Ctrl-Z to send a message).
- 4. To read all message: AT+CMGL="ALL"



## 4. TROUBLESHOOTING

#### 4.1 The modem's LED does not blink

Check if the modem has connected to a 9-36V power supply properly Check if the power connector is properly inserted Check the fuse on the power cord Check that the antenna is connected properly to the SMA connector

#### 4.2 The modem does not response to the terminal program

The default setting of the modem's baud rate is as follow: AT+IPR=0

This is set for auto-baudrate detection. The modem will lock on to whatever baudrate it detects first until the user power off and on again.

User can still change the baudrate again in runtime by issuing this command: AT+IPR=(desired baudrate, eg. 9600/19200/...)



## 5. TNC-G110 WINDOW2000 GPRS SETUP GUIDE

This document describes how to use TNC-G110 and a PC with Windows 2000 to make a GPRS Internet Dial-up.

#### Setup requirement

The following items are necessary for the setup:

- TNC-G110 with serial cable(IEEE1394 cable for TNC-G110U) and power supply
- PC with Windows 2000 installed, and a free RS-232 port(USB port for TNC-G110U)
- · A SIM card with GPRS service subscribed

## **CONFIGURATING TNC-G110**

#### Setting up HyperTerminal

Refer to Chapter 2 and 3 of TNC-G110 USER GUIDE, set up TNC-G110 and HyperTerminal. (Make sure that the DTR reset function is disabled by setting DIP switch 1 at the back plate to ON position before starting the configuration of TNC-G110)

Setting serial port speed

Open a hyperterminal at baud rate of 115,200bps Power up the TNC-G110 modem. a)Type AT&F and enter. b)Type AT&W and enter Now you can close the HyperTerminal

#### ADDING A MODEM TO WINDOWS 2000

On Windows 2000, Choose "**Start**", then choose "Control Panel folder

Double click the 'Modem' icon

If your system have no modem installed it will show the 'Install New Modem' dialogue box, otherwise it will show 'Modem Properties' (see) You can then press 'Add' button On 'Install New Modem' dialogue box, click 'Don't detect my modem'. Then press 'Next'



Add/Remove Hardware Wizard					
Install New Modem Do you want Windows to detect your modem?					
	<ul> <li>Windows will now try to detect your modem. Before continuing, you should:</li> <li>1. If the modem is attached to your computer, make sure it is turned on.</li> <li>2. Quit any programs that may be using the modem.</li> <li>Click Next when you are ready to continue.</li> <li>Image: Don't detect my modem; I will select it from a list.</li> </ul>				
	< Back Next > Cancel				



Choose 'Standard 56000bps Modem', then press 'Next'

Add/Remove Hardware Wizard
Install New Modem
Select the manufacturer and model of your modem. If your modem is not listed, or if you have an installation disk, click Have Disk.
Manufacturers: Models:
[Standard Modern Types]       Communications cable between two computers         3Com       Standard 56000 bps X56Flex Modern         3X       Standard 56000 bps V90 Modern         Accer       Standard 56000 bps X2 Modern         Action To the standard 56000 bps X2 Modern       Standard 56000 bps X2 Modern
Have Disk
<u> </u>

Add/Remove Hardware Wizard

## Choose the COM port where the TNC-G110 connected, then press 'Next'

Install New Modem Select the port(s) you want to install the modem on.					
	You have selected the following modem: Standard 56000 bps V90 Modem On which ports do you want to install it?				
	<pre>&lt; Back Next &gt; Cancel</pre>				

Now the modem has been installed. Select Advanced Tab

Phone And Modem Options			
Dialing Rules Modems Advanced			
The following modems are insta	illed:		
Modem	Attached To		
PCTEL 2304WT V.92 MDC Modem	СОМЗ		
Standard 56000 bps K56Flex Modem	COM4		
Standard 56000 bps V90 Modem	COM4		
1			
A <u>d</u> d	<u>Remove</u> Properties		
OK Cancel Apply			



Set Maximum Port Speed to 115200	

On '**Extra settings**', type the APN information here. (Consult your Network Operator for the correct APN settings)

Common setting is : +CGDCONT=1,"IP",""

Standard 56000 bps ¥90 Modem Properties	<u>?</u> ×
General Diagnostics Advanced	
Port: COM4	
Speaker volume	- 1
Off On	
Maximum Port Speed	
115200	
Dial Control	
☑ Wait for dial tone before dialing	
OK Car	ncel

Standard 56000 bps ¥90 Modem Properties 🛛 🛛 🗙
General Diagnostics Advanced
Extra Settings
E <u>x</u> tra initialization commands:
+CGDCONT=1,"IP","
Change Default Preferences
change <u>D</u> eradic Preferences
OK Cancel

Standard 56000 bps ¥90 Modem Properties <u>?</u>× General Diagnostics Advanced Modem Information Field Value Hardware ID usrk2\_gen Command Response . ATQ0V1E0 AT+GMM OK MULTIBAND 900E 1800 AT+FCLASS=? +FCLASS: (0,1,2) AT#CLS=? COMMAND NOT SUPPORTED • Ŀſ Query Modem -Logging-Append to Log ⊻iew log ΟK Cancel

Select the Diagnostics tab and click Quey Modem

You should receive modem response at the window. This will indicate the modem is setup correctly

Close all dialog boxes and the modem setup is completed



- 🗆 🗵

#### MAKING A DIAL-UP NETOWORKING

On Windows 2000, go to 'Accessories' \_ 'Communication' \_ 'Dial-up Networking'

Double click 'Make a New Connection'

Select Network Connection Type

Select setup connection manually



📴 Network and Dial-up Connections



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Select the modem that you have configure earlier



Key in the telephone number \*99\*\*\*1#

And uncheck "Use area code and dialing rules

×
×
Cancel

Depending type of ISP which may requires username and password, leave this as blank for now.

Internet Connection Wizard	×
Step 2 of 3: Internet account logon information	×
Type the user name and password you use to log on to your ISP. Your user name may also be referred to as your Member ID or User ID. If you do not know this information, contact your ISP.	
Username: Dessword	
< <u>B</u> ack <u>Next</u> >	Cancel

Give a connection name

Example : TNC-G110

Check "No" to Internet mail account

An Internet that program is installed on your computer. Internet that all allows you to receive and used encodimensages. To successfully use up your internet that account, you must have already signed up for information. By use ensing any winternet that account, you must have already signed up for jour information. By use ensing any winternet that wated asks you to provide, contact your write to set up on informet rend account now? C Yes C Net	Set Up Your Internet Mail Account		ž
an email account with an internet service provide and datamed insortiant connection information. If you are missing any information the without and a size you to provide, contact you informent service provider. Do you want to set up an internet mell account now? C Yes		stemet mail allows you to	
C Yes	an e-mail account with an Internet service provider and information. If you are missing any information the wizard	obtained important connection	
	Do you want to set up an Internet mail account now?		
@ Ng	C Yes		
		<back next=""></back>	Cancel
<gask [newt="">] Cancel</gask>			



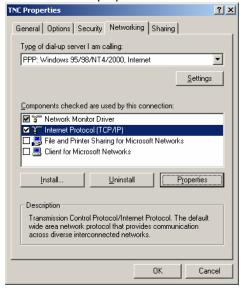
OK Cancel

Click "finish" to complete the dialup networking setup	<image/> <image/>
Some more editing is required before the setup is complete.	DishUp Networking
Right-click the just-made GPRS dialup icon. Then choose ' <b>Properties</b> '	Deck     Convect     Up     Create     Dial       Address     Imive In-Networking     Imive In-Networking       Imive In-Up Networking     Imive In-Networking       Imited In-Up Networking     Imited In-Networking       Imited In-Up Networking </td
Select the modem and click the Configure button	GPRS Properties       ? ×         General       Options       Security       Networking       Sharing         Connect using: <ul> <li>Connect using:</li> <li>Modem - Standard 56000 bps V90 Modem (COM4)</li> <li>Modem - PTEL 2304v/T V.92 MDC Modem (COM3)</li> <li>Modem - Standard 56000 bps K56Flex Modem (COM3)</li> <li>Modem - Standard 56000 bps K56Flex Modem (COM4)</li> <li>All devices call the same numbers</li> <li>Cgnfigure</li> <li>Phone number for Standard 56000 bps V90 Modem</li> <li>Arge code:</li> <li>g9***1#</li> <li>Altergates</li> <li>Cognity/region code:</li> <li>Use dialing rules</li> <li>Bules</li> <li>Vise icon in taskbar when connected</li> <li>OK</li> <li>Cancel</li> </ul>
Select Maximum speed to be 115200bps	Modem Configuration       2 ×         Standard 56000 bps V90 Modem (COM4)         Maximum speed (bps):       115200         Modem grotocol       •         Hardware features       •         Egable hardware flow control       •         Enable modem error control       •         Initialization       •         Show terminal window       •         Bun script:       •         Edt       Browse
All contents are subjected to change without prior notice Rev 1.2 Page 16 of 27	I✓ Enable modem speaker OK Cancel

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Click the Networking Tab and select Internet Protocol TCP/IP Double click the properties



met Protocol (	(TCP/IP) Proper	ties		?
eneral				
/ou can get IP se	ttings assigned aut	omatically it	your network	ork
administrator for th	ability. Otherwise, yo ne appropriate IP se	ettings.	ask your new	UIK
Obtain an IF	address automatic	ally		
S	wing IP address: -			
[P address:				
C Obtain DNS	server address aut	tomaticallu		
	wing DNS server a	-		
Preferred DNS	server:			
<u>A</u> lternate DNS	server:			_
			A	dyanced
			ОК	Cancel
		_	UK	
S Properties				?
			·	
ieneral Option	IS Security Ne	etworking	Sharing	
– Dialing option	18			
🔽 Display p	progress while co	nnecting		
Prompt for	or name and pas	sword cer	tificate etc.	
		011010,001	anoato, oto.	
I Include <u>\</u>	<u>M</u> indows logon d			
	<u>M</u> indows logon d or phone <u>n</u> umber	lomain		
Prompt fo	or phone <u>n</u> umber	lomain		
Prompt for Redialing option	or phone <u>n</u> umber	lomain		
Prompt for Redialing option <u>R</u> edial attem	or phone <u>n</u> umber ions	lomain	3	
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Prompt for Redialing opti <u>R</u> edial attem <u>I</u> ime betwee	or phone <u>n</u> umber ions	lomain	3	
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Prompt for Redialing opting Redial attem Ime betweet Idle time before	or phone <u>n</u> umber ions pts: en redial attempts ore hanging up: line is dropped	lomain	3 1 minute	* * *
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Prompt fr Redialing opti Redial attem Jime betwee Idle time befr Redial if Nultiple devic Dial all devi	or phone <u>n</u> umber pts: en redial attempts ore hanging up: line is dropped	iomain ::	3 1 minute never	
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Prompt fr Redialing opti Bedial attem Time betweet Idle time befor Redial if Nultiple devic Dial all devic	or phone <u>n</u> umber pts: en redial attempts ore hanging up: line is dropped	iomain ::	3 1 minute never	Cancel
Prompt fr Redialing opti Bedial attem Time betweet Idle time befor Redial if Nultiple devic Dial all devic	or phone <u>n</u> umber pts: en redial attempts ore hanging up: line is dropped	iomain ::	3 1 minute never	Cancel
Prompt fr Redialing opti Bedial attem Time betweet Idle time befor Redial if Nultiple devic Dial all devic	or phone <u>n</u> umber pts: en redial attempts ore hanging up: line is dropped	iomain ::	3 1 minute never	Cancel
Prompt fr Redialing opti Redial attem Jime betwee Idle time befr Redial if Redial if Dial all devic Dial all devic X-25	or phone <u>n</u> umber pts: en redial attempts ore hanging up: line is dropped	iomain ::	3 1 minute never	Cancel
Prompt fr Redialing opti Redial attem Ime betwee Idle time befr Redial if Redial if Multiple devic Dial all devic X.25	or phone <u>n</u> umber pts: en redial attempts ore hanging up: line is dropped	iomain ::	3 1 minute never	Cancel
Prompt fr Redialing opti Redial attem Ime betwee Idle time befr Redial if Redial if Redial if State Idle time befr Idle time	or phone <u>n</u> umber pts: en redial attempts ore hanging up: line is dropped		3 1 minute never	Cancel

Properties

<u>H</u>elp

Cancel

Select Options Tab and check the settings as shown

Then close all dialog boxes by pressing 'OK's.

Now you have finished the setup of GPRS

Now you can make a GPRS dial-up by double-click the GPRS icon. Remember to leave User name and password blank on connection (or refer to your network operator's instruction)

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<u>D</u>ial



## 6. TROUBLE SHOOTING

Problem	Action
Dial-up Networking reports modem is not responding	Check if the modem is ready, LED is flashing slowly
	Check the serial port setting of Maestro and Windows modem device
	Check connection cable
	Check if the modem is used by another program
Dial-up not successful	Check if GPRS service ready from the network
	Try entering command: AT+CGQREQ=1,0,0,3,0,0 by using HyperTerminal
Dial-up successful, but disconnect immediately	Check APN setting, consult your network operator
Dial-up successful, but cannot access the Internet	Check your Windows' Internet settings
	Check signal strength Note:Dial-up Networking will NOT drop even signal is lost; it_will try to recover soon



## 7. TECHNICAL SPECIFICATIONS

## **TNC-G110**

Tri-Band GSM900/DCS1800/PCS1900 GSM/GPRS modem

The TNC-G110 from Taiko is an intelligently designed and powerful tri-band GSM/GPRS class10 modem. The modem is designed for a variety of applications, such as alert device, remote monitoring, car phone, vehicle tracking, vending machines, ATMs, Wireless pay phone and traffic control.

The TNC-G110 is the ideal solution for those seeking to develop wireless applications based on GSM/GPRS technology.



## **APPLICATION**

- Fleet Management
- Traffic control
- Vending machines
- Mobile Trunk
- Car Phone/Telematics
- Wireless Terminal
- Alarm/Securities System
- Remote control

### Features

### **DTR Hard-Reset Feature**

To reset the modem, it can be easily done by triggering the DTR signal to the modem. (Set DIP switch 1 at back plate to OFF) The modem will detect any transition in the voltage level of this incoming DTR signal as a signal to perform a power reset instead of powering on & off the modem physically. This feature will be good for modems that are installed at remote locations. The host device (PLC/PC) which is connected to our modem can initial a reset to the modem whenever the modem seemed to "hang" for no apparent reasons by just triggering the DTR signal.

All contents are subjected to change without prior notice



### **General Characteristics**

1) BAND: EGSM 900/DCS 1800/PCS 1900 MHZ

	тх	RX
EGSM	880~915MHz	925~960MHz
DCS	1710~1785MHz	1805~1880MHz
PCS	1850~1910MHz	1930~1990MHz

### 2) GSM/GPRS: Phase 2/2+ Compliance

- i. GPRS Multi Slot Class 10
- ii. GPRS Mobile Station Class B:
- iii. Coding Scheme: CS-1, CS-2, CS-3, CS-4
- iv. GPRS data downlink transfer: max. 85.6 kbps
- v. GPRS data uplink transfer: max. 42.8 kbps
- 3) Support SIM Interface
- 4) Physical
  - Dimension: 95(H) x 35(W) x 74(D) mm
  - Weight: 210 g
- 5) Power Operation Voltage: 9~36Vdc
- 6) Power Consumption:

Voice Call	
GSM 900	<ul> <li>@power level #5 &lt;350mA,Typical 240mA</li> <li>@power level #10,Typical 130mA</li> <li>@power level #19,Typical 86mA</li> </ul>
GSM1800/1900	<ul> <li>@power level #0 &lt;300mA,Typical 200mA</li> <li>@power level #10,Typical 87mA</li> <li>@power level #15,Typical 80mA</li> </ul>
GPRS Data	
DATA mode, GPRS (1 Rx,1 Tx)	
GSM 900	<ul> <li>@power level #5 &lt;350mA,Typical 230mA</li> <li>@power level #10,Typical 125mA</li> <li>@power level #19,Typical 84mA</li> </ul>



GSM1800/1900	<ul> <li>@power level #0 &lt;300mA,Typical 180mA</li> <li>@power level #10,Typical 83mA</li> <li>@power level #15,Typical 76mA</li> </ul>	
DATA mode, GPRS (	3 Rx, 2 Tx )	
GSM 900	<ul> <li>@power level #5 &lt;550mA,Typical 450mA</li> <li>@power level #10,Typical 225mA</li> <li>@power level #19,Typical 142mA</li> </ul>	
GSM1800/1900	<ul> <li>@power level #0 &lt;450mA,Typical 340mA</li> <li>@power level #10,Typical 140mA</li> <li>@power level #15,Typical 127mA</li> </ul>	
DATA mode, GPRS ( 4 Rx,1 Tx )		
GSM 900	<ul> <li>@power level #5 &lt;350mA,Typical 270mA</li> <li>@power level #10,Typical 160mA</li> <li>@power level #19,Typical 120mA</li> </ul>	
GSM1800/1900	<ul> <li>@power level #0 &lt;300mA,Typical 220mA</li> <li>@power level #10,Typical 120mA</li> <li>@power level #15,Typical 113mA</li> </ul>	

## Software Interface

GSM 07.07:	Digital cellular telecommunications (Phase 2+); AT command set for GSM Mobile Equipment (ME)
GSM 07.10:	Support GSM 07.10 multiplexing protocol
GSM 07.05:	Digital cellular telecommunications (Phase 2+); Use of Data Terminal Equipment – Data Circuit terminating Equipment (DTE – DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)
GSM 11.14:	Digital cellular telecommunications system (Phase 2+); Specification of the SIM Application Toolkit for the Subscriber Identity Module – Mobile Equipment (SIM – ME) interface
GSM 11.11:	Digital cellular telecommunications system (Phase 2+); Specification of the Subscriber Identity Module – Mobile Equipment (SIM – ME) interface
GSM 03.38:	Digital cellular telecommunications system (Phase 2+); Alphabets and language-specific information
GSM 11.10	Digital cellular telecommunications system (Phase 2); Mobile Station (MS) conformance specification; Part 1: Conformance specification



Note: For software AT commands, please refer to the TNC-G110 AT Command List.

### Voice/Data Service

#### **Tele Service**

- Speech Service with EFR (Enhance Full Rate)/FR (Full Rate)/HR (Half Rate) Codec.
- Emergency Call
- DTMF Tone Generation

### Short Message Service

- SMS with MT (Mobile Terminate)/PP, MO (Mobile Originated)/PP
- Delivery Report
- Cell Broadcast
- Support transmission of SMS alternatively over CSD or GPRS

#### FAX Service

- Direction: MOC (Mobile originated call) & MTC (Mobile terminated call)
- Fax GSM TS 3.45 fax transparent mode
- TS 61, 62
- TIA/EIA 578, Fax class 1, Interface to PC for GSM & PSTN
- ITU-T V.17 (14400 bps), V29 (9600bps), V27ter (2400/4800 bps)
- Transmission speed rate: 2400, 4800, 7200, 9600bps

### **Circuit Switch**

- Data GSM TS 4.21 transparent mode
- Data GSM TS4.22 transparent mode
- Data transmission mode: asynchronous (normal)
- Radio channel: full rate
- Transmission speed rate: 2400, 4800, 9600 bps with data compression max 14400bps

### Packet Switch

- GPRS Class B device
- Multi-Slot Transmission up to Class 10,
- Coding Scheme CS1 CS4 Supported

### **Supplementary Service**

### Number identification

- Calling line identification presentation (CLIP)
- Calling line identification restriction (CLIR)
- Connected line identification presentation (CoLP)

### Call Offering

Call forwarding unconditional (CFU)



- Call forwarding on mobile subscriber busy (CFB)
- Call forwarding on no reply (CFNRy)
- Call forwarding on mobile subscriber not reachable (CFNRc)

### **Call Completion**

- Call waiting (CW)
- Call hold (HOLD)

### **Multi-Party**

MPTY Supported

### **Call-barring**

- Barring of all outgoing calls (BAOC)
- Barring of outgoing international calls (BOIC)
- Barring of outgoing international calls (BOIC- xHC)
- Barring of all incoming calls (BAIC)
- Barring of incoming calls when roaming (BIC-Roam)

### **RF functionalities**

### **Maximum TX Power**

The performance of the transmitter meets test requirement GSM 11.10 Chapter 13.

Band	Max	Min
EGSM	33 dBm ±2dBm	0dBm ±5dBm
DCS	30 dBm ±2dBm	±5dBm
PCS	30 dBm ±2dBm	±5dBm

### **Parametric Performance**

Tests carried out at -20°C, 25°C and 60°C for each voltage 3.6V, 3.8V and 4.0V. The Measure Peak Phase, RMS Phase, frequency error, power level, and static sensitivity meets GSM 11.10 specifications

Band	Peak Phase Error	RMS Phase Error
EGSM	<20°	<5°
DCS	<20°	<5°
PCS	<20°	<5

### Sensitivity

The performance of the receiver meets test requirement GSM 11.10 Chapter 14.

Band	Typical	Min
EGSM	-106 dBm	-104 dBm
DCS	-105 dBm	-103 dBm
PCS	-105 dBm	-103 dBm



## **Radio Frequency**

Radio Frequency (900 MHz EGSM)	
Frequency Range	TX 880-915 MHz; RX 925-960 MHz
Channel Spacing	200 KHz
Number of Channels	124 Carriers x 8 (TDMA)
Modulation	GMSK
Duplex Spacing	45 MHz
Frequency Stability	+/- 0.1 ppm (Uplink TX)
Power Output	33 dBm Class 4 (2 W peak)
Output Impedance	50 Ohm
Spurious Emission	-36 dBm up to 1 GHz (< -30 dBm > 1 GHz)
Radio Frequency (1800 MHz)	
Frequency Range	TX 1710-1785 MHz; RX 1805-1880 MHz
Channel Spacing	200 KHz
Number of Channels	374 Carriers x 8 (TDMA)
Modulation	GMSK
Duplex Spacing	95 MHz
Frequency Stability	+/- 0.1 ppm (Uplink TX)
Power Output	30 dBm – 0 dBm
Output Impedance	50 Ohm
Spurious Emission	-36 dBm up to 1 GHz (< -30 dBm > 1 GHz) Compatible with phase 2 feature
Radio Frequency (1900 MHz)	
Frequency Range	TX: 1850~1910MHz; RX: 1930~1990MHz
Channel Spacing	200KHz
Number of Channels	299 Carriers x 8 (TDMA)
Modulation	GMSK
Duplex Spacing	80 MHz
Frequency Stability	+/- 0.1 ppm (Uplink TX)
Power Output	30 dBm – 0 dBm
Output Impedance	50 Ohm
Spurious Emission	-36 dBm up to 1 GHz (< -30 dBm > 1 GHz) Compatible with phase 2 feature



### Hardware Interface

### **RS232**

The RS232 interface includes the following features – Hardware flow control (DSR, RTS/CTS) –

Auto-baud rate with the possibility of baud rates ranging from 1200 to 115.2K bits. The pins assignments are shown in the table below:

Pin No.	Description	Direction
1	Carrier Detect (DCD)	Output
2	TransmitData (TX)	Output
3	Receive Data (RX)	Input
4	Data Terminal Ready (DTR)	Output
5	Ground (GND)	
6	Data Set Ready (DRS)	Input
7	Request to Send (RTS)	Output
8	Clear to Send (CTS)	Input
9	Ring Indicator (RI)	Output

## LED

LED is dedicated for paging identification. The status is listed as follows:

State	Status
Off	TNC-G110 is not running
64ms On/ 800ms Off	TNC-G110 does not find the network
64ms On/ 3000ms Off	TNC-G110 find the network
64ms On/ 300ms Off	TNC-G110 communication

### **SIM Function**

The SIM Card digital interface in ABB insures the translation of logic levels between DBB and SIM Card for the transmission of 3 different signals: a clock signal, derived from a clock elaborated in DBB, to SIM Card (SIM\_CLK); a reset signal, from DBB to the SIM Card (SIM\_RST); and serial data from DBB to SIM Card (SIM\_IO) and vice-versa.

### **Audio Function**

Audio interface is provided via a handset connector for voice communication.

### Antenna

SMA connector Antenna interface (50 Ohm)

### **Power connector**

2way, 3.5mm pitch connector for Vdc power interface. Reverse power connection protection is provided



### **Environmental**

Operational temperature:  $-20 \sim +60 \degree C$ Functional temperature:  $-20 \sim +70 \degree C$ Storage temperature:  $-40 \sim +85 \degree C$ 

## Order information

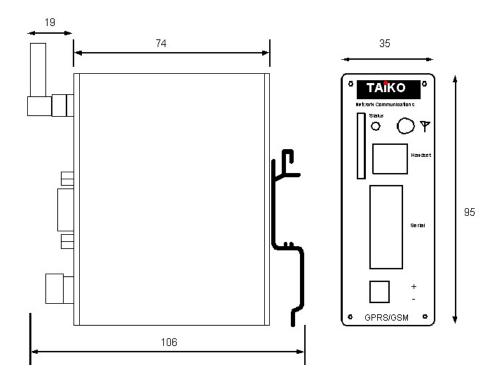
TNC-G110 900/1800/1900 MHz Tri-band GSM / GPRS Modem

## **Optional Accessories**

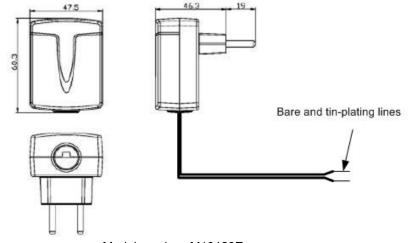
GSM-D4-3		GSM Standard antenna
GSM-D4-5		GSM Remote antenna (with 2.5m extension cable)
CAB -232		RS232C cable, 3m
ADP-24012	I	nput 240Vdc, Output12Vdc, 800mA Power adapter



## Physical Package



## **Accessories**



#### Model number: M10120E