



LM3001 BLUETOOTH 5.0 DUAL MODE GATEWAY USER GUIDE







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OVERVIEW

This document explains how to set up and operate the LM3001 Bluetooth Gateway. The LM3001 is a device used to bridge connected Bluetooth devices to a wired network infrastructure.

To follow the examples in this guide, the user will require the following items:

- ፠ LM Technologies' LM3001
- 🗱 LM068 Bluetooth serial adapter with mini-USB cable for power*
- ፠ Ethernet cable
- 🗱 12 V, 1 A, DC power supply with negative outer sleeve. Connector size, 11 mm x 5.5 mm
- 🗱 Serial and TCP/IP Terminal Application

* The LM068 is used as an example device because of its versatility and ease of use. Other Bluetooth devices can be substituted to follow these examples. Please ensure the connection role of the device matches that of the LM068 to follow the chosen example.





1. LM3001

1.1. FEATURES

- Web configuration capable with internet browser using default IP 192.168.1.111
- * Supports point to multipoint wireless connections
- Supported internet protocols: TCP/IP, HTTP, FTP, ARP, DHCP
- Bluetooth 5.0 supported
- Supports Bluetooth SPP connections as a central or peripheral device
- Supports connections as a Bluetooth Low Energy central device
- Supports Bluetooth pairing
- 🛞 Up to 4 external antennas supported
- 🛞 Rated USB load of 0.3 A

1.2. OVERVIEW

The LM3001 features several LEDs for UI as well as multiple ports for user interaction.



Figure 1: LM3001 Overview Image

STATUS LEDS (FROM LEFT TO RIGHT)	PURPOSE
PWR	On when the device is powered
LAN	On when the device is connected to a wired network
RST	On briefly at power up. On when the device is performing a factory reset
USB	On when system is undergoing an upgrade
SYS	Flashes quickly at start up. When system is running, it flashes four times to indicate that all four Bluetooth modules are working as expected
STAT	Status LED, on after start up



2. USING THE LM3001 WITH AN INTERNET BROWSER

2.1. ACCESSING THE LM3001

The LM3001 can be accessed for configuration using an internet browser when the device is powered and connected, via ethernet, to a personal computer (PC). Follow the instructions below to gain access to the device for configuration.

- 1. Connect a LAN cable to the connector located at reference "K" to connect the LM3001 to a PC/router/etc.
- 2. Connect an appropriate power supply to the power port at reference "L".
- **3.** After the LM3001 is powered, the System Status LED at reference "B" will flash rapidly. After a few seconds, when the device is initialized, the System Status LED will repeat a pattern of flashing four times and then stopping, indicating that all four Bluetooth devices are functioning correctly. The Power LED at reference "F" will remain on and solid.
- 4. When the LM3001 is connected to a wired, ethernet network, the LAN Indicator LED will remain on and solid.
- 5. Using an internet browser, navigate to the address <u>http://192.168.1.111/</u> (the default IP address) to access the configuration settings for the device. The default username is "admin" and the default password is "admin". Please note that the IP address, username and password can be changed by the user.

	Л		
	εs		BLUETOOTH ACCESS POIN
LM3001LX	CURRENT CONFIGURA	TION OF THE DEVICE	
> STATE INFORMATION > PORT CONFIGURATION	MEMORY CAPACITY		
> PORT CONFIGURATION > GATEWAY CONFIGURATION	TOTAL CAPACITY	2134 M BYTES	
SYSTEM CONFIGURATION	REMARKA CARACTEV	186.5 M BYTES	
	DEVICE PARAMETERS		
	BLUETOOTH PIN CODE	0000	
	DEVICE NAME	LM_BTOW	
	PORT CONFIGURATION		
	ACQUIRE DYNAMIC IP ADDRESS	YES	
	IP ADDRESS	1921681111	
	SUBNET MASK ADDRESS	255 255 255 0	
	DEFAULT GATEWAY		
	PERFERRED DNS SERVER		
	STANDBY DNS SERVER		
	FIRMWARE VERSION		
	MAJOR VERSION: GW_VE0409001.20193	1024 MINOR VERSION: 2.3.0_20230801	



2.2. ESTABLISHING TCP CONNECTION WITH THE LM3001 AS A CLIENT

By default, the LM3001 is capable of accepting Bluetooth connections as an SPP peripheral device. This means that connecting devices must be configured as an SPP central device, capable of performing scans and establishing connections.

To ensure that Bluetooth devices can connect to the wired network, via the LM3001, the LM3001 must first establish a TCP connection to a device, such as a PC. Using an internet browser, navigate to the LM3001 using the default address <u>http://192.168.1.111/</u>. From there, navigate to Gateway Configuration -> Server Configuration as shown in the image below.

	RVER CONFIGU			BLU	JETOOTH ACCESS PO
	RVER CONFIGU				
		RATION			
SE STATE INFORMATION	RVER CONFIGURATI	ON			
> STATE INFORMATION > PORT CONFIGURATION OPER	ATION MODE	BOTH	~		
> GATEWAY CONFIGURATION SERVI	ER IP FOR SPP/BLE	192.168.1.100			
	ER PORT FOR SPP/BLE	7777			
SERVER CONFIGURATION MANUAL PAIR	ER IP FRO HID	192.168.1.100			
	ER PORT FOR HID	7778			
> SYSTEM CONFIGURATION S	AVE TO FLASH	SAVEGAPPLY	CANCEL		

In the text box labelled "Server IP for SPP/BLE" enter the IP address of the PC which will be connecting to the LM3001. Click "Save and Apply", then "Save to Flash" and lastly, restart the LM3001.

The LM3001 can now be accessed via a TCP Server inspection tool. In this guide, the Hercules SETUP Utility is used as an example. See the image below in which a test command, "AT+SYSINFO?\r\n" is sent to the LM3001 and configuration details are printed.



Second Sector Sector And Sector And Second Sector And S	– 🗆 X
UDP Setup Serial TCP Client TCP Server UDP Test Mode About	
Received data	Server status
+ETH0IP:192.168.1.111	Port Close
+ETHOMAC:00-1b-35-17-56-75	
+LOCALBTCOUNT:3	TEA authorization TEA key 1: 01020304 3: 090A0B0C
+TOTALMEM:120MB +TOTALFLASH:213MB	2: 05060708 4: 0D0E0F10
ok	
, Sent data	11:08:15: 192.168.1.111 Client
AT+SYSINFO?	11:08:16: 192.168.1.111 Client + 11:08:16: 192.168.1.111 Client + 11:20:53: All connections closed 11:22:12: 192.168.1.111 Client + 11:24:21: 192.168.1.111 Client + 11:57:15: All connections closed 11:58:35: 192.168.1.111 Client +
	Clients count: 1
Send	
AT+SYSINFO?	Send HUgroup
Cursor decode Server settings	www.HW-group.com
HEX Decimal Decoder Input Server echo	Hercules SETUP utility
0A 10 Redirect to UDP	Version 3.1.2

2.3. ESTABLISHING A BLUETOOTH CONNECTION WITH LM3001 AS PERIPHERAL

The LM068 serial adaptor can be used to establish a Bluetooth connection to the LM3001. If using an LM068 with firmware version UNI_0300 or above, the LM068 must be initialized as an SPP central device before connecting to the LM3001. A serial terminal application is needed to interact with the LM068. In this case another instance of Hercules is being used.

Use the commands "AT*ENBSPP=ON\r\n" and "AT*ROLE=MASTER\r\n" to ensure the LM068 is configured correctly. See the image below for the correct settings for the LM068.



S Hercules SETUP utility by HW-group.com		– 🗆 🗙
UDP Setup Serial TCP Client TCP Server UDP Test Mode At	out	
Received/Sent data		2.32
at*enbspp=onat*enbspp=on		Serial
OK		Name
Module soft-ResetUniversal_FW_Message_Loop	p	COM3
at*role=masterat*role=master		Baud
OK		19200 -
at*settings=?		Data size
OK		8
NAME=LM068_UniversalC7		destinants.
LENAME=LM068_UniversalLEC7		Parity
ADDR=34c9-f0-8dcfc7		none 👻
ATPLUSCMDFRMT=OFF		Handshake
ESC=ON		OFF *
PAIR=ON DCOV=ON		Mode
DEEPSLEEP=OFF		
BAUD=19200(2)		Free
STOP=Stop_One(0)		
PARITY=None (0)		
FLOW=OFF		1
ECHO=ON		X Close
RESP=ON		INVERVICE.
REPORT=ON		HWg FW update
FINDTIME=60		
ENBBLEPERI=OFF		
ENBSPP=ON		
SPPRole=MASTER		
ACON=OFF		
MODEM=NONE		
BOND=0000-00-000000		
ENBHIDHOST=OFF		
ENBGAP=OFF		
DPIN=OFF		
PIN=1234		
VER=068LM_Universal_04.00		
UARTCONF=UART_THROUGHPUT		
UPGRADEINT=UART BOOTMODE-get=3		
BOOTMODE-config=3		
REP*:SETTINGS=END		
in the deep floorer		
Modern lines		
🔘 CD 🔘 RI 🔘 DSR 🌒 CTS	I DIM I HIS	
Send		in the second second
at*enbspp=on	HEX Send	HWgroup
at*role=master	THEX Send	www.HW-group.com
		Hercules SETUP stility
at"conn=	☐ HEX Send	Version 3.1.2



Next use the "AT*FIND=ON\r\n" command to begin scanning for LM3001, with the default Bluetooth name of LMGW. Once the LM3001 is found, use the command "AT*FIND=OFF\r\n" to end the scan. See the image below for an example.

at*find=onat*find=on OK		
REP*:FIND=Start		
	1 1/072	
= 1 34c9-f0-801da1		
= 2 34c9-f0-886f35	LMGW	
= 4 34c9-f0-8a60a4	LMGW	
= 5 34c9-f0-8a6615	LMGW	
at*find=offat*find=o	ff	
OK		
		~
Modem lines		22
	CD 🔘 RI 🔘 DSR 🌒 CI	52
	CD 🔘 RI 🔘 DSR 🌒 CI	52
0	CD 🕥 RI 🔘 DSR 🌒 CI	52
Send	CD 🕥 RI 🔘 DSR 🅥 CI	TS T DTR T RTS

Now, use the command "AT*CONN=<ADDRESS>\r\n", where <ADDRESS> is the selected device's Bluetooth address in the format "34c9f0123456", which is case insensitive. The image below shows a successful connection.

at*conn=34c9f08a60a4at*conn=34c9f08a60a4 OK IND*:PAIR=OK,34c9-f0-8a60a4 OK IND*:CONNECTED=34c9-f0-8a60a4	~
Modem lines © CD © RI © DSR © CTS Send	DTR RTS
at*enbspp=on	☐ HEX Send
at*role=master	☐ HEX Send
at*conn=34c9f08a60a4	☐ HEX Send



Once the Bluetooth connection is established, data can be sent between the Bluetooth device and the LM3001. See image below for example.

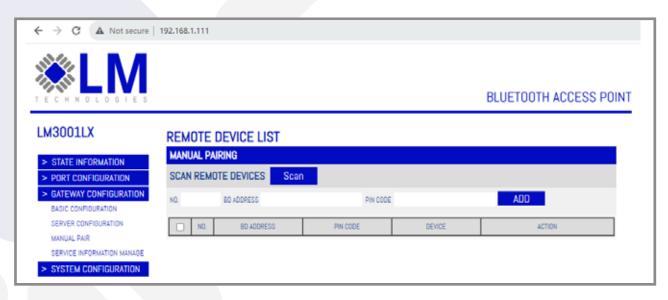
S Herrules SETUP utility by HW-group-ten	- 0 X	Services (ETUP utility by HW-group.com	- D X
UDP Setup Senal TCP Client TCP Server UDP Test Mode About Received/Sert data		UDP Setup Senial TCP Client TCP Server UDP Text Mode About Perceived data	1
BOOTNODE-get=3 * BOOTNODE-config=3 BOOTNODE-config=3 BEP:SITINGS=END stifind=constifind=con OK BEP:FIND=Start = 1 34c5=rCo=Solidal LMOW = 3 063e=5c=Solidal LMOW = 3 063e=5c=Solidal LMOW = 3 34c5=rCo=Sa4Ca4 LMOW = 3 34c5=rCo=Sa4Ca4 LMOW	Seciel Targer Targer Data size (0)	+ETHOLP:192.168.1.111 * +ETHOMAC:00-1b-35-17-56-75 +LOCALBTCOUNT:3 +TOTALNEN:120NB +TOTALNEN:213NB OK	Server status Print TTTT TEA extractation TEA extractation 1.[0100004 3.[0904080C 2.[0008076 4.[0008010] Clear authorization
at findmoffat findmoff	OFF +	test message from the 18045	Client connection status
at comm=3409201a4Da4ba14Comm=3409200a4Oa4 OK IND*:FAIR=OK.340P=20-5a40a4 OK IND*:CONNECTED=3409-20-5a40a4 Test message to the LN0060 * Modemines CD PRI DDR CTS CDTR CRS	Hote Free	Serteds AT-SYSINFO) test message to the LMO68	11 0915 192 1961 111 Dent + A 11 0916 192 1961 111 Dent - A 11 2052 Ad connections class 11 2252 4 connections class 11 2252 192 1961 111 Dent 11 2251 192 1961 111 Dent 11 34 21 192 1961 111 Dent 11 59 55 192 1961 111 Dent + 15 59 55 192 1961 111 Dent + Dents court 1
Send		Send	CHEND COUVE. 1
afterbisphen IF HEX_Send (afterheiter IF HEX_Send (afterheiter IF HEX_Send (afterheiter IF HEX_Send	Hungroup Hercies SETUP entity Version 3.1.2	AT-SYSINF07 IF HEX Cuttor decode HDX Decode Input IS 56 Foremation Reduct to UDP	Send HUD group snou-FW group and Herciles SETSP etility Version 3.1.2

For further information on setting up and operating the LM068, please see the LM068 product page on the LM Technologies' website.

24. ESTABLISHING A BLUETOOTH CONNECTION WITH LM3001 AS CENTRAL

The LM3001 is also able to connect to Bluetooth peripheral devices, with the LM3001 acting as the central device. In this configuration, the LM3001 is able to automatically establish connections with peripheral devices which have already been paired. In this guide an LM068 serial adapter is used as a Bluetooth peripheral device. If using an LM068 with firmware version UNI_0400 or above, then the commands "AT*ENBSPP=ON\r\n" and "AT*ROLE=SLAVE\r\n" will need to be used to ensure that the LM068 is configured correctly.

Using an internet browser, navigate to the default LM3001 address of http://192.168.1.111/ to access the configuration settings. Navigate to the Gateway Configuration -> Manual Pairing section to configure Bluetooth devices. Use the scan button, shown in the image below, on the Manual Pairing page to begin searching for the LM068





A new tab will open while the LM3001 is searching for Bluetooth devices to connect with. When the appropriate device becomes available, put the pin code in the text box and click the "Add List" button. The following image shows where to find the pin code and Bluetooth address when using the LM068.

IN RESULT RE	SCAN		192.168 Success	1.111 says	
BO ADDRESS	NAME OF CLASS	PIN CODE			OK (
	Audio/Video,Video Display a			Abolitar	
	Audio/Video,Video Display a			ADD UST	
34 C9 F0 98 63 98	Uncategorized.			ADD LIST	
14 CR FO SE 07 FB	Uncategorized,	1234		ADD UST	
	Audio/Video,Video Display a			ADD UST	
34:09:50.09:50:40	Uncategorized,			ADD LIST	

Security Bernard Security By HW-group.com	– 🗆 X
UDP Setup Serial TCP Client TCP Server UDP Test Mode About	
Received/Sent data	r Serial
at	Name
OK	COM20
at*settings=?	
OK	Baud
NAME=LM068_UniversalF6	19200 💌
LENAME=LM068_UniversalLEF6	Data size
ADDR=34c9-f0-9b07f6 ATPLUSCMDFRMT=OFF	8 🗸
ESC=ON	Parity
PAIR=ON	
DCOV=ON	none
DEEPSLEEP=OFF	Handshake
BAUD=19200(2)	OFF 💌
STOP=Stop One(0)	Mode
PARITY=None (0)	Free
FLOW=OFF	
ECHO=ON	
RESP=ON	
REPORT=ON	🗶 Close
FINDTIME=60	
ENBBLEPERI=OFF	HWg FW update
ENBSPP=ON	
SPPRole=SLAVE	
ACON=OFF	
MODEM=NONE BOND=0000-00-000000	
ENBHIDHOST=OFF	
ENBITLIOST-OFF ENBGAP=OFF	
DPIN=OFF	
PIN=1234	
VER=068LM Universal 04.00	
UARTCONF=UART THROUGHPUT	
UPGRADEINT=UART	
BOOTMODE-get=2	
BOOTMODE-config=2	
REP*:SETTINGS=END	
Modem lines	
CD	



Navigate back to the original Manual Pairing page and refresh to view the previously discovered device. Using the "Device" drop down list to select one of the HCl device, corresponding to Bluetooth devices on the LM3001, in this case HCl-0 is used. See image below for reference.

+ → C ▲ Not secure	192.168.1.111				
					BLUETOOTH ACCESS PO
LM3001LX	REMOTE	DEVICE LIST			
> STATE INFORMATION	MANUAL PA	IRING			
> PORT CONFIGURATION	SCAN REMO	TE DEVICES Scan			
> GATEWAY CONFIGURATION BASIC CONFIGURATION	NO.	BD ADDRESS	PIN CODE		ADD
SERVER CONFIGURATION	□ N0.	80 ADDRESS	PIN CODE	DEVICE	ACTION
MANUAL PAIR	1	34:C9:F0:98:07:F6	1234	HCI-0 ¥	PAIRING DELETE
SERVICE INFORMATION MANAGE > SYSTEM CONFIGURATION					
STSTEM CONFIDURATION					

After the device is selected and configured, click the "Pairing" button to pair the LM068 with the LM3001. The web page should show a success message, as shown in the image below.

						58.1.111 says F0:98:07:F6] Success	OK	
LM3001LX	REM	OTE	DEVICE LIST	l				
> STATE INFORMATION	MANU	IAL P/	JRING					
> PORT CONFIGURATION	SCAN	REM	OTE DEVICES Scan					
> GATEWAY CONFIGURATION BASIC CONFIGURATION	NO.		BD ADDRESS	P	IN CODE		ADD	
SERVER CONFIGURATION		NQ.	BD ADDRESS	PIN CODE		DEVICE	ACTION	
MANUAL PAIR		1	34:C9:F0:98:07:F6	1234		HCI-0 V	PAIRING DELETE	
SERVICE INFORMATION MANAGE SYSTEM CONFIGURATION								

Next, Navigate to the Gateway Configuration -> Server Information Manage page and select the device which was previously paired from the drop down box using its Bluetooth Address. Configure the device to be a Master, using the SPP profile and the socket type required. In this case, the LM3001 is configured as a TCP server. See following image for reference. Click the "Add" button when done.



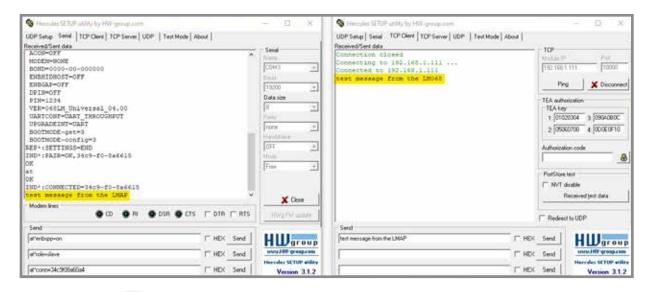
← → C ▲ Not secure	192.168.1.111		
TECHNOLOGIES			BLUETOOTH ACCESS POIN
LM3001LX	DEVICE SERVER CONFIGU		
	BASIC CONFIGURATION	VALUA	
> STATE INFORMATION			
> PORT CONFIGURATION	BLUETOOTH ADDRESS	34:C9:F0:9B:07:F6	
> GATEWAY CONFIGURATION	GATEWAY BLUETOOTH ROLE	Master ×	
BASIC CONFIGURATION	CONNECT PROFILE	SPP V	
SERVER CONFIGURATION			
MANUAL PAIR	SOCKET TYPE	TCP Server 🗸	
SERVICE INFORMATION MANAGE	ADD		
> SYSTEM CONFIGURATION	NUU		
	DEVICE SERVICE LIST		
	COUNT BLUETOOTH BLUETOOTH BLUETOOTH CONNE ADDRESS ROLE	CT PROFILE SOCKET TYPE SERVER ADDRESS SERVI	CE PORT STATUS OPERATION

When the device has been added successfully, it's connection status and port can be viewed as shown in the following image.

	N				
	E S			BLUETOOTH A	CCESS POIN
LM3001LX	DEVICE SERVER CONF	IGURATION			
> STATE INFORMATION	BASIC CONFIGURATION				
> PORT CONFIGURATION	BLUETOOTH ADDRESS		~		
> GATEWAY CONFIGURATI BASIC CONFIGURATION	ON GATEWAY BLUETOOTH ROLE	Master	~		
SERVER CONFIGURATION	CONNECT PROFILE	SPP	*		
MANUAL PAIR	SOCKET TYPE	TCP Client	~		
SERVICE INFORMATION MAN SYSTEM CONFIGURATIO	INFORMATION OF SERVED TO	CONNECT			
	SERVER ADDRESS				
	SERVICE PORT				
	ADD				
	DEVICE SERVICE LIST				
	COUNT BLUETOOTH ADDRESS BLUETOOTH ROLE	CONNECT PROFILE SOCKET TYPE SER	VER ADDRESS SERVICE PORT	STATUS OPERAT	non
	1 34:C9:F0:98:07:F6 MASTER	SPP TCP SERVER	10000	BLUETOOTH CONNECTED,SOCKET DISCONNECTED	TE



At this stage the devices are connected via Bluetooth and data can be transferred using the terminal app Hercules, as shown in the image below.



3. USING THE LM3001 WITH AT COMMANDS

3.1. ACCESSING THE AT COMMAND INTERFACE

Follow the four steps in section 2.1. Accessing the LM3001 to ensure the LM3001 is properly connected to the host device. When these steps are complete, it is necessary to use a TCP terminal application (such as Hercules) to establish communications with the LM3001. Users must connect to LM3001's IP address (default is 192.168.1.111) and the fixed IP port 1500 to send AT commands.

The AT commands are case insensitive, and every AT command must end with the characters "\r\n" (which are the carriage return and new line characters or ASCII characters 0x0D 0x0A).

3.2. AT COMMANDS

3.2.1 Query System Information

Command	Reply
AT+SYSINF0?\r\n	\r\n+ETH0IP: <eth0ip>\r\n \r\n+ETH0IP:<eth0ip>\r\n \r\n+WLAN0IP:<wlan0ip>\r\n \r\n+WLAN0MAC:<wlan0mac>\r\n \r\n+H0CALBTC0UNT:<count>\r\n \r\n+T0TALMEM:<memorysize>\r\n \r\n+T0TALFLASH:<flashsize>\r\n \r\n0K\r\n</flashsize></memorysize></count></wlan0mac></wlan0ip></eth0ip></eth0ip>



PARAMETER DESCRIPTION:

ethOip: Ethernet IP address ethOmac: Ethernet MAC address wlanOip: wireless network IP address wlanOmac: wireless network MAC address count: amount of Bluetooth modules embedded in the gateway memorysize: memory size of the gateway flashsize: storage size of the gateway

COMMAND DESCRIPTION:

This command is used for the server to inquire basic information of connected gateway. When there are various Bluetooth gateways in a distributed system, users can locate, distinguish Bluetooth gateway and some other information based on MAC address.

3.2.2 QUERY SYSTEM STATE

Command	Reply
AT+SYSSTATE?\r\n	\r\n+BLECONNCOUNT: <count>\r\n \r\n+IDLEMEM:<idlememorysize>\r\n \r\n+IDLEFLASH:<idleflashsize>\r\n \r\n+IDLECPU:<idlecpupercentage>\r\n \r\nOK\r\n</idlecpupercentage></idleflashsize></idlememorysize></count>

PARAMETER DESCRIPTION:

count: number of connected devices idlememorysize: Current idle memory size idleflashsize: Current idle flash size idlecpupercentage: Current idle CPU percentage

COMMAND DESCRIPTION:

This command is used for the server to query the running status of the Bluetooth gateway.

3.2.3 SET SYSTEM USERNAME AND PASSWORD

Command	Reply
AT+USERACCOUNT= <name>,<password>\r\n</password></name>	\r\n0K\r\n

3.24 SET/QUERY SYSTEM TIME

Command	Reply
AT+SETDATE= <year>,<month>,<-</month></year>	\r\n0K\r\n
day>, <hour>,<minute>,<second>\r\n</second></minute></hour>	
AT+GETDATE?\r\n	\r\nGETDATE: <year>,<month>,<-</month></year>
	day>, <hour>,<minute>,<second>\r\n</second></minute></hour>
	\r\nOK\r\n

EXAMPLE:

AT+SETDATE=2023,1,5,16,35,12\r\n



3.2.5 SET/QUERY NTP SERVER

Command	Reply
AT+NTPSERVER= <server>\r\n</server>	\r\n0K\r\n
AT+NTPSERVER?\r\n	\r\NTPSERVER: <server>\r\n \r\n0K\r\n</server>

EXAMPLE:

AT+SETDATE=2023,1,5,16,35,12\r\n

3.2.6 QUERY MAJOR VERSION

Command	Reply
AT+MAJORVER?\r\n	\r\n+MAJORVER: <version>\r\n \r\n0K\r\n</version>

PARAMETER DESCRIPTION:

version: query Bluetooth gateway system version

COMMAND DESCRIPTION:

This command is used for server to query Bluetooth gateway system version

3.2.7 QUERY MINOR VERSION

Command	Reply
AT+MINORVER?\r\n	\r\n+MINORVER: <version>\r\n \r\n0K\r\n</version>

PARAMETER DESCRIPTION:

version: query Bluetooth gateway system version

COMMAND DESCRIPTION:

This command is used for server to query Bluetooth gateway system version

3.2.8 SET/QUERY ETHERNET DHCP

Command	Reply
AT+ETHDHCP= <dhcp>\r\n</dhcp>	\r\n0K\r\n
AT+ETHDHCP?\r\n	\r\n+ETHDHCP: <dhcp>\r\n</dhcp>
	\r\n0K\r\n

PARAMETER DESCRIPTION:

dhcp: 0 Disabled, using static IP 1 enable

EXAMPLE: AT+ETHDHCP=1\r\n



3.2.9 SET/QUERY ETHERNET IP

Command	Reply
AT+ETHIP= <ipaddr>\r\n</ipaddr>	\r\n0K\r\n
AT+ETHIP?\r\n	\r\n+ETHIP: <ipaddr>\r\n \r\n0K\r\n</ipaddr>

PARAMETER DESCRIPTION:

ipaddr: Ethernet IP address

EXAMPLE:

AT+ETHIP=192.168.1.111\r\n

3.2.10 SET/QUERY ETHERNET SUBNET MASK

Command	Reply
AT+ETHMASK= <ipaddr>\r\n</ipaddr>	\r\n0K\r\n
AT+ETHMASK?\r\n	\r\n+ETHMASK: <ipaddr>\r\n \r\n0K\r\n</ipaddr>

PARAMETER DESCRIPTION:

ipaddr: Ethernet IP address subnet mask

EXAMPLE:

AT+ETHMASK=255.255.255.0\r\n

3.2.11 SET/QUERY ETHERNET GATEWAY IP

Command	Reply
AT+ETHGATEWAY= <ipaddr>\r\n</ipaddr>	\r\n0K\r\n
AT+ETHGATEWAY?\r\n	\r\n+ETHGATEWAY: <ipaddr>\r\n \r\n0K\r\n</ipaddr>

PARAMETER DESCRIPTION:

ipaddr:

EXAMPLE:

AT+ETHGATEWAY=192.168.1.1\r\n

3.2.12 SET/QUERY ETHERNET DNS

Command	Reply
AT+ETHFIRSTDNS= <ipaddr>\r\n</ipaddr>	\r\n0K\r\n
AT+ETHFIRSTDNS?\r\n	\r\n+ETHFIRSTDNS: <ipaddr>\r\n \r\nOK\r\n</ipaddr>
AT+ETHSECONDDNS= <ipaddr>\r\n</ipaddr>	\r\n0K\r\n
AT+ETHSECONDDNS?\r\n	\r\n+ETHSECONDDNS: <ipaddr>\r\n \r\nOK\r\n</ipaddr>



PARAMETER DESCRIPTION:

ipaddr:

EXAMPLE:

AT+ETHFIRSTDNS=8.8.8\r\n

3.2.13 QUERY ETHERNET MAC ADDRESS

Command	Reply
AT+ETHMAC?\r\n	\r\n+ETHMAC: <mac>\r\n</mac>
	\r\nOK\r\n

3.2.14 SET/QUERY GATEWAY NAME

Command	Reply
AT+BTDEVICENAME= <name>\r\n</name>	\r\n0K\r\n
AT+BTDEVICENAME?\r\n	\r\n+BTDEVICENAME: <name>\r\n \r\n0K\r\n</name>

PARAMETER DESCRIPTION:

name: less than 64 bytes

EXAMPLE:

AT+BTDEVICENAME=LM_GATEWAY\r\n

3.2.15 SET/QUERY GATEWAY NAME

Command	Reply
AT+BTDEVICENAME= <name>\r\n</name>	\r\n0K\r\n
AT+BTDEVICENAME?\r\n	\r\n+BTDEVICENAME: <name>\r\n</name>
	\r\nOK\r\n

PARAMETER DESCRIPTION:

name: less than 64 bytes

EXAMPLE:

AT+BTDEVICENAME=LM_GATEWAY\r\n

3.2.16 SET/QUERY CLASSIC BLUETOOTH PINCODE

Command	Reply
AT+BTPINCODE= <pincode>\r\n</pincode>	\r\n0K\r\n
AT+BTPINCODE?\r\n	\r\n+BTPINCODE: <pincode>\r\n \r\n0K\r\n</pincode>

PARAMETER DESCRIPTION:

pincode: max 16 bytes

EXAMPLE:

AT+BTPINCODE=1234\r\n



3.2.17 SET/QUERY CLASSIC BLUETOOTH ENCRYPTION

Command	Reply
AT+BTENCENABLE= <enable>\r\n</enable>	\r\n0K\r\n
AT+BTENCENABLE?\r\n	\r\n+BTENCENABLE: <enable>\r\n \r\n0K\r\n</enable>

PARAMETER DESCRIPTION:

enable: O disable

1 enable

EXAMPLE:

AT+BTENCENABLE=1\r\n

3.2.18 SET/QUERY CLASSIC BLUETOOTH DEVICE CODE

Command	Reply
AT+BTCOD= <cod>\r\n</cod>	\r\n0K\r\n
AT+BTCOD?\r\n	\r\n+BTCOD: <cod>\r\n</cod>
	\r\n0K\r\n

PARAMETER DESCRIPTION:

cod: 6 bytes, all characters are hexadecimal digits or letters. That is, ~ 9, A, B, C, D, E, F

EXAMPLE:

AT+BTCOD=000100\r\n

3.2.19 SET/QUERY CLASSIC BLUETOOTH SUPERVERSION TIMEOUT

Comma	and	Reply
AT+BTS	SUPTIMEOUT= <timeout>\r\n</timeout>	\r\n0K\r\n
AT+BTS	SUPTIMEOUT?\r\n	\r\n+BTSUPTIMEOUT: <timeout>\r\n \r\nOK\r\n</timeout>

PARAMETER DESCRIPTION:

timeout: unit: second. Range: 1-40

EXAMPLE:

AT+BTSUPTIMEOUT=5\r\n

3.2.20 SET/QUERY CLASSIC BLUETOOTH SAVE LINK KEY

Command	Reply
AT+BTSAVELINKKEY= <enable>\r\n</enable>	\r\n0K\r\n
AT+BTSAVELINKKEY?\r\n	\r\n+BTSAVELINKKEY: <enable>\r\n \r\n0K\r\n</enable>

PARAMETER DESCRIPTION:

enable: O Not save 1 save



EXAMPLE:

AT+BTSAVELINKKEY=1\r\n

3.2.21 SET REMOTE BLUETOOTH ADDRESS AND PINCODE

Command	Reply
AT+SETSPECIFICPINCODE= <addr>,<pincode>\r\n</pincode></addr>	\r\n0K\r\n

PARAMETER DESCRIPTION:

addr: Mac address of remote BT device pincode: max 16 bytes

EXAMPLE:

AT+SETSPECIFICPINCODE=00A3C80653F9,1234\r\n

3.2.22 DELETE REMOTE BLUETOOTH ADDRESS AND PINCODE

Command	Reply
AT+DELSPECIFICPINCODE= <addr>\r\n</addr>	\r\n0K\r\n

PARAMETER DESCRIPTION:

addr: Mac address of remote BT device

EXAMPLE:

AT+SETSPECIFICPINCODE=00A3C80653F9,1234\r\n

3.2.23 QUERY REMOTE BLUETOOTH ADDRESS AND PINCODE

Command	Reply
AT+GETSPECIFICPINCODE?\r\n	\r\n+GETSPECIFICPINCODE: <addr>,<pincode>\r\n</pincode></addr>
	\r\n0K\r\n

PARAMETER DESCRIPTION:

addr: Mac address of remote BT device pincode: max 16 bytes

3.2.24 SET/QUERY CLASSIC BLUETOOTH MODE

Command	Reply
AT+BTSERVICEMODE= <mode>\r\n</mode>	\r\n0K\r\n
AT+BTSERVICEMODE?\r\n	\r\n+BTSERVICEMODE: <mode>\r\n \r\nOK\r\n</mode>

PARAMETER DESCRIPTION:

mode: 1 SPP

2 HID

3 Both SPP and HID

EXAMPLE:

AT+BTSERVICEMODE=3\r\n



3.2.25 SET/QUERY SPP SERVER IP

Command	Reply
AT+BTSPPSERVERIP= <ipaddr>\r\n</ipaddr>	\r\n0K\r\n
AT+BTSPPSERVERIP?\r\n	\r\n+BTSPPSERVERIP: <ipaddr>\r\n \r\n0K\r\n</ipaddr>

PARAMETER DESCRIPTION:

ipaddr:

EXAMPLE:

AT+BTSPPSERVERIP=192.168.1.100\r\n

3.2.26 SET/QUERY SPP SERVER PORT

Command	Reply
AT+BTSPPSERVERPORT= <port>\r\n</port>	\r\n0K\r\n
AT+BTSPPSERVERPORT?\r\n	\r\n+BTSPPSERVERPORT: <port>\r\n \r\n0K\r\n</port>

PARAMETER DESCRIPTION:

port: port number of TCP socket, less than 65536

EXAMPLE:

AT+BTSPPSERVERPORT=7777\r\n

3.2.27 SET/QUERY HID SERVER IP

Command	Reply
AT+BTHIDSERVERIP= <ipaddr>\r\n</ipaddr>	\r\n0K\r\n
AT+BTHIDSERVERIP?\r\n	\r\n+BTHIDSERVERIP: <ipaddr>\r\n \r\n0K\r\n</ipaddr>

PARAMETER DESCRIPTION:

ipaddr:

EXAMPLE:

AT+BTHIDSERVERIP=192.168.1.100\r\n

3.2.28 SET/QUERY HID SERVER PORT

Command	Reply
AT+BTHIDSERVERPORT= <port>\r\n</port>	\r\n0K\r\n
AT+BTHIDSERVERPORT?\r\n	\r\n+BTHIDSERVERPORT: <port>\r\n \r\n0K\r\n</port>

PARAMETER DESCRIPTION:

port: port number of TCP socket, less than 65536

EXAMPLE:

AT+BTHIDSERVERPORT=7778\r\n



3.2.29 QUERY SURROUNDING CLASSIC BLUETOOTH DEVICE

Command	Reply
AT+BTINQ\r\n	\r\n+BTINQ: <addr>,<cod>\r\n</cod></addr>
	\r\n0K\r\n

PARAMETER DESCRIPTION:

addr: MAC address of remote BT device cod: Device code of remote BT device

3.2.30 PAIR WITH CLASSIC BLUETOOTH DEVICE

Command	Reply
AT+BTPAIR= <addr>,<hcix>\r\n</hcix></addr>	\r\n+BTPAIR: <addr>,<result>\r\n \r\n0K\r\n</result></addr>

PARAMETER DESCRIPTION:

addr: MAC address of remote BT device hcix: serial number of BT module embedded in the gateway. Range:0-3 result: pairing result. 0: fail. 1: succeed.

Note: Please first send command AT+SETSPECIFICPINCODE to set the pair password of the remote Bluetooth device, then send this command AT+BTPAIR to pair the remote Bluetooth device

EXAMPLE:

AT+BTPAIR=00A3C80653F9,3\r\n

3.2.31 DELETE THE PAIR INFORMATION OF CLASSIC BLUETOOTH DEVICE

Command	Reply
AT+BTPAIRDEL= <addr>\r\n</addr>	\r\n0K\r\n

PARAMETER DESCRIPTION:

addr: MAC address of remote BT device

EXAMPLE:

AT+BTPAIRDEL=00A3C80653F9\r\n

3.2.32 QUERY THE PAIRED INFORMATION OF ALL PAIRED CLASSIC BLUETOOTH DEVICES

Command	Reply
AT+BTPAIREDLIST\r\n	$r\n+BTPAIREDLIST:,\r\n$
	\r\n0K\r\n

PARAMETER DESCRIPTION:

addr: MAC address of remote BT device hcix: the serial number of BT module embedded in the gateway, range:0 - 3



3.2.33 ADD THE SERVER CONFIGURATION INFORMATION OF A CLASSIC BLUETOOTH DEVICE

Command	Reply
AT+ADDBTDEVICESERVERCONFIG= <addr>,<role>,<profile>, <sockettype>\r\n</sockettype></profile></role></addr>	\r\nOK\r\n
AT+ADDBTDEVICESERVERCONFIG= <addr>,<role>,<profile>, <sockettype>,<serverip>,<serverport>\r\n</serverport></serverip></sockettype></profile></role></addr>	\r\nOK\r\n

PARAMETER DESCRIPTION:

addr: MAC address of remote BT device

	1 the gateway works as master device
profile:	1 SPP
	2 HID
sockettype:	0 TCP Client
	1 TCP Server
	2 UDP Client
	3 UDP Server
Noto · The corver	in and convernant narameters need to be

Note : The serverip and serverport parameters need to be set only when the gateway is working as the client. serverip:

serverport: port number, less than 65536

EXAMPLE:

AT+ADDBTDEVICESERVERCONFIG=00A3C80653F9,0,1,1\r\n AT+ADDBTDEVICESERVERCONFIG=00A3C80653F9,0,1,0,192.168.1.100,7777\r\n

3.2.34 DELETE THE SERVER CONFIGURATION INFORMATION OF CLASSIC BLUETOOTH DEVICE

Command	Reply
AT+DELBTDEVICESERVERCONFIG= <addr>,<role>,<profile>\r\n</profile></role></addr>	\r\n0K\r\n

PARAMETER DESCRIPTION:

addr: MAC address of remote BT device

- role: 0 the gateway works as slave device
 - 1 the gateway works as master device
- profile: 1 SPP

2 HID

EXAMPLE:

AT+DELBTDEVICESERVERCONFIG=00A3C80653F9,0,1\r\n

3.2.34 QUERY THE SERVER CONFIGURATION INFORMATION OF CLASSIC BLUETOOTH DEVICES

Command	Reply
AT+GETBTDEVICESERVERCONFIG?\r\n	\r\n+GETBTDEVICESERVERCONFIG: <addr>, <role>,<profile>,<sockettype>,<serverip>, <serverport>,<status>\r\n \r\nOK\r\n</status></serverport></serverip></sockettype></profile></role></addr>



PARAMETER DESCRIPTION:

addr: MAC addre	ess of remote BT device
role:	O the gateway works as slave device
	1 the gateway works as master device
profile:	1 SPP
	2 HID
sockettype:	0 TCP Client
	1 TCP Server
	2 UDP Client
	3 UDP Server
serverip: IP add	ress
serverport: port	number, less than 65536
status:	O Bluetooth connected, socket connected
	1 Bluetooth connected, socket unconnected
	2 reserved
	3 Bluetooth disconnected
	4 Bluetooth is connecting
	č

3.2.35 Query Paired BLE Devices

Command	Reply
AT+BLEPAIRED?\r\n	\r\n+BLEPAIRED: <index>,<addr></addr></index>
	\r\nOK\r\n

COMMAND DESCRIPTION:

When connecting to the BLE device, if the BLE device requires authentication, the Bluetooth gateway performs simple authentication. For BLE devices that do not require authentication, the Bluetooth gateway does not perform authentication when connecting to them. For connections that go through the authentication pairing process, the Bluetooth gateway will record the pairing information of these devices. This command is used to query information about authenticated BLE devices stored on the current Bluetooth gateway.

PARAMETER DESCRIPTION:

index: the serial number of BT module embedded in the gateway addr: MAC address of paired BLE device

3.2.36 DELETE THE PAIRED BLE DEVICE

Command	Reply
AT+BLEUNPAIR= <index>,<addr>\r\n</addr></index>	\r\n0K\r\n

COMMAND DESCRIPTION:

Delete the paired BLE device

PARAMETER DESCRIPTION:

Index: the serial number of BT module embedded in the gateway addr: MAC address of paired BLE device



3.2.37 SCAN SURROUNDING BLE DEVICE

Command	Reply
AT+BLEINQ= <operation>,<filter>,<time>\r\n</time></filter></operation>	\r\n0K\r\n

COMMAND DESCRIPTION:

This command is used to start or stop scanning for surrounding BLE devices.

PARAMETER DESCRIPTION:

operation:

0 Stop scanning

1 Start scanning

filter:

O During the scanning process, it will return one record when searched one broadcasting data, no matter it is the same broadcast data sent by the same device.

1 During this search, the same broadcast data of the same device is returned only once time: indicates the duration of the scanning, unit: second. If set it to 0, the duration is unlimited.

Note: When the gateway is in the scanning state, if the server sends a connection command or the Bluetooth module in the Bluetooth gateway is experiences an error, then the scanning may be automatically stopped.

Scan Result

\r\n+BLEINQRESULT:<addr>,<addrtype>,<name>,<bctype>,<bcdata>,<rssi>\r\n

PARAMETER DESCRIPTION:

addr: MAC address of scanned BLE device addrtype: address type of scanned BLE device

0 PUBLIC

1 RANDOM

name: name of BLE device, may be empty

bctype: broadcast type of scanned BLE device. Refer to section [Vol 2] PartE, 7.7.65.2 of Bluetooth Technical Specification Core V4.2 for the definition of the specific broadcast type.

0 ADV_IND 1 ADV_DIRECT_IND 2 ADV_SCAN_IND 3 ADV_NONCONN_IND 4 SACN RSP

bcdata: Refer to section [Vol 3] Part C 11 of Bluetooth Technical Specification Core_V4.2 for the specific broadcast format.

rssi: signal strength between BLE device and Bluetooth gateway

Scan Complete Response

\r\n+BLEINQCOMPLETE:<state>\r\n

PARAMETER DESCRIPTION:

state:

0 fail to start scanning surrounding BLE devices, resulting in the scanning completed 1 scanning completed normally



3.2.38 QUERY PAIRED BLE DEVICES

Command	Reply
AT+BLECONN= <addr>,<addrtype>\r\n</addrtype></addr>	\r\n0K\r\n

PARAMETER DESCRIPTION:

addr: MAC address of the BLE device to be connected addrtype: address type of BLE device

- 0 PUBLIC
- 1 RANDOM

Connection Result	
\r\n+BLECONN: <addr>,<state>\r\n</state></addr>	

PARAMETER DESCRIPTION:

addr: MAC address of the connected BLE device state: connection result

- 0 fail
- 1 succeed

3.2.39 DISCONNECT BLE DEVICE

Command	Reply
AT+BLEDISC= <addr>\r\n</addr>	\r\n0K\r\n

PARAMETER DESCRIPTION:

addr: MAC address of the BLE device to be disconnected

3.240 QUERY THE CHARACTERISTIC VALUE OF BLE DEVICE

Command	Reply
AT+CHAR= <addr>\r\n</addr>	\r\n0K\r\n

PARAMETER DESCRIPTION:

addr: MAC address of the BLE device to be disconnected

Query Result

\r\n+CHARACTERISTIC:<addr>,<serviceuuid>,<charuuid>,<properties>\r\n

PARAMETER DESCRIPTION:

addr: MAC address of the connected BLE device serviceuuid: service UUID charuuid: characteristic UUID properties: characteristic properties 0x01 BROADCAST

0x01 BROADCAST 0x02 READ 0x04 WRITE_WITHOUT_RESP 0x08 WRITE 0x10 NOTIFY 0x20 INDICATE 0x40 AUTH 0x80 EXT_PROP



COMMAND DESCRIPTION:

Note: After the BLE remote device is successfully connected, the gateway automatically returns the characteristic value of the BLE device. Users can also query this information using this command.

3.2.41 READ THE CHARACTERISTIC VALUE OF BLE DEVICE

Command	Reply
AT+READCHAR= <addr>,<charuuid>\r\n</charuuid></addr>	\r\n0K\r\n

PARAMETER DESCRIPTION:

addr: MAC address of the connected BLE device charuuid: characteristic UUID

Read Result

\r\n+READCHAR:<addr>,<charuuid>,<data>\r\n

PARAMETER DESCRIPTION:

addr: MAC address of the connected BLE device charuuid: characteristic UUID data: data read from characteristic

3.2.42 WRITE THE CHARACTERISTIC VALUE OF BLE DEVICE

Command	Reply
AT+WRITECHAR= <addr>,<charuuid>,<data>\r\n</data></charuuid></addr>	\r\n0K\r\n

COMMAND DESCRIPTION:

This command is used to send data to the characteristic that supports write attributes.

PARAMETER DESCRIPTION:

addr: MAC address of the connected BLE device charuuid: characteristic UUID data: data written to characteristic

3.243 NOTIFY THE CHARACTERISTIC VALUE OF BLE DEVICE

Notification Result \r\n+NOTIFY:<addr>,<charuuid>,<data>\r\n

COMMAND DESCRIPTION:

This command is used to notify the server after the gateway received the data from the connected BLE device.

PARAMETER DESCRIPTION:

addr: MAC address of the connected BLE device charuuid: characteristic UUID data: data notified from peripheral



3.244 QUERY THE SIGNAL STRENGTH OF THE CONNECTED BLE DEVICE

Command	Reply
AT+RSSI= <addr>\r\n</addr>	\r\n+RSSI: <addr>,<rssi>\r\n</rssi></addr>
	\r\nOK\r\n

PARAMETER DESCRIPTION:

addr: MAC address of the connected BLE device rssi: signal strength between BLE device and gateway

3.245 RESET THE LOCAL BLUETOOTH MODULE

Command	Reply
AT+RESETBT\r\n	\r\n0K\r\n

Note: After this command is sent, the Bluetooth modules in the Bluetooth gateway will be reset, and all the previously connected devices will be disconnected.

3.246 SYSTEM RESTART

Command	Reply
AT+reboot\r\n	\r\n0K\r\n

COMMAND DESCRIPTION:

This command is used for the server to restart the gateway. After the gateway successfully restarted, it will re-establish the TCP Socket connection with the server.

3.247 RESTORE FACTORY DEFAULT SETTINGS

Command	Reply
AT+RESTORESET\r\n	\r\n0K\r\n

COMMAND DESCRIPTION:

This command is used to restore the LM3001 to factory settings.

3.248 QUERY MAC ADDRESS OF LOCAL BLUETOOTH MODULE

Command	Reply
AT+GETLOCALBT\r\n	\r\n+GETLOCALBT: <hcix>,<addr>\r\n \r\n0K\r\n</addr></hcix>

PARAMETER DESCRIPTION:

hcix: serial number of local BT module embedded in the gateway, range:0 - 3 addr: MAC address of local BT module

3.249 QUERY THE CURRENT CONNECTION STATE OF BLUETOOTH GATEWAY

Command	Reply
	\r\n+BTCONNLIST: <no>,<hcix>,<addr>,<name>, <lq>,<rssi>,<port>,<conntime>\r\n \r\n0K\r\n</conntime></port></rssi></lq></name></addr></hcix></no>



PARAMETER DESCRIPTION:

no: index number hcix: serial number of local BT module embedded in the gateway, range:0 - 3 addr: MAC address of connected BT device name: device name of connected BT device lq: link quality rssi: signal strength port: socket port number corresponding to the current link. It can be obtained only after sending command AT+ADDBTDEVICESERVERCONFIG to set the server configuration information of the Bluetooth device. conntime: connection time

GLOSSARY

TERMS

Term	Definition
SPP	Serial Port Profile
LM3001	LM Bluetooth Gateway
ТСР	Transport Control Protocol
IP	Internet Protocol
LAN	Local Area Network
WLAN	Wireless Local Area Network

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and your body.

15.19 LABELLING REQUIREMENTS.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

15.21 INFORMATION TO USER.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.105 INFORMATION TO THE USER.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio technician for help.