BandLuxe® M280 Series HSUPA Module Datasheet (3.3V standard version)

Class:	Datasheet
Doc. No.:	M280-D-001
Doc. Version:	1.2
Publish Date:	2009-Dec-24

BandRich M280
Datasheet
Document Number: M280-*D-001*

BandRich Inc.
8F., No. 188, Baociao Rd., Sindian City
TAIPEI, TAIWAN, R.O.C.
http://www.bandrich.com

Revision History

Revision	Date	Description
1.0	2010-02-25	Draft Document Creation

Table of Contents

List of Figures

List of Tables

Section 1 Introduction

1.1 General Description

The M280 module series is PCI Express Mini Card providing WWAN (HSUPA, HSDPA, WCDMA, EGPRS) connectivity to laptops or any other device equipped with a PCI Express Mini Card slot.

Figure 1-1 Top View

Figure 1-2 Bottom View

1.2 Features

1.2.1 WCDMA

- FDD 850/1900/2100 MHz
- Power Class 3 (+24dBm)
- WCDMA 384/384 kbps downlink/uplink modem operation
- HSUPA 5.76 Mbps uplink modem operation
- HSDPA 7.2 Mbps downlink modem operation
- Supports UL and DL Compressed Modes
- Supports Circuit and Packet-Switched Data
- M280V supports 3G voice call via PCM interface

1.2.2 E-GPRS

- 850/900/1800/1900 MHz
- GSM Power Class 4 (2W) for 850/900 bands
- GSM Power Class 1 (1W) for 1800/1900 bands
- EDGE class E2 (+27 dBm in 850/900 bands, +26 dBm in 1800/1900 bands)
- GPRS/EGPRS Multislot Class 12 (4 slots Rx, 4 slots Tx, 5 slots active max)
- GPRS/EGPRS Class B Type 1 MT
- GPRS CS1-CS4; EGPRS MCS1-MCS9
- Circuit Switched Data: 14.4 and 9.6 kbps
- M280V supports GSM voice call via PCM interface

1.2.3 Baseband Functionality

The M280 module interfaces with host device through PCI Express Mini Card interface. The interface equips with USB2.0 interface, USIM interface, LED control signal, Wake# signal to request host device return from sleep/suspended state, and W_Disable# signal to disable radio operation. There are several GPIO pins (2.6V compatible) reserved for customized applications, please contact BandRich for discussion. Besides the above mentioned interfaces, M280V also provides PCM interfaces reserved for voice applications.

1.2.4 Software Functionality

M280 module series is supplied with device driver of Microsoft Windows 7, Vista 32/64, Windows XP SP2 above, Windows 2000 SP4 above, Mac OSX , and Linux. The information of firmware version operated on M280 as below:

Table 1-1 Firmware Version Information

FW Version	Description
240065-xxx-xxx	Standard version for HSUPA 5.76 Mbps.

Section 2 Interface Description

2.1 M280 Block Diagram

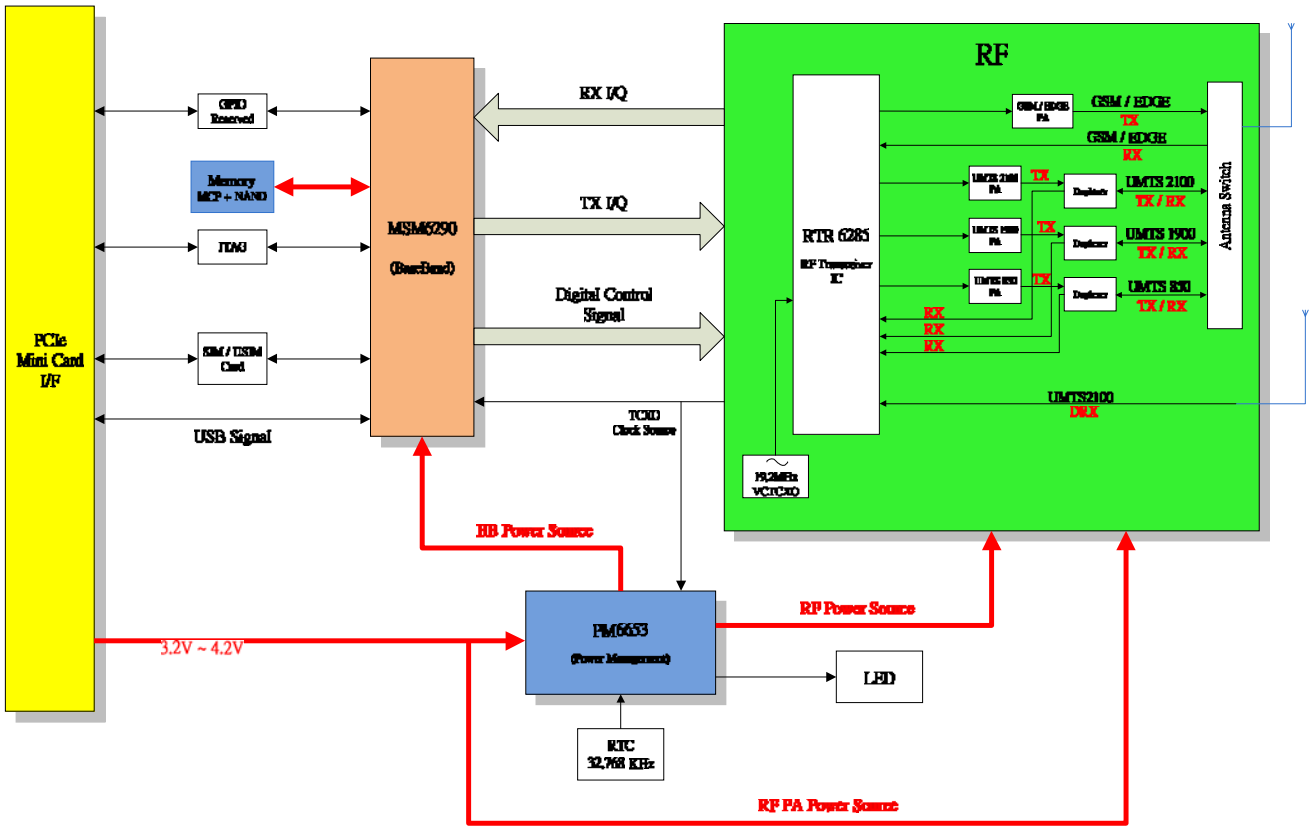


Figure 2-1 M280 Block Diagram

2.2 M280 PCI-Express Mini Card Interface

2.2.1 Pin Description

Table 2-1 M280 Module Series Connector Pin-out

Pin No.	Name	Pin No.	Name
1	WAKE#	2	Vcc
3	N.C.	4	GND
5	N.C.	6	N.C.
7	N.C.	8	UIM_PWR
9	GND	10	UIM_DATA
11	N.C.	12	UIM_CLK
13	N.C.	14	UIM_RESET
15	GND	16	UIM_VPP(Optional)
Mechanical Key			
17	N.C.	18	N.C.
19	WAKEUP#(Optional)	20	W_DISABLE#
21	GND	22	PERST#
23	N.C.	24	N.C.
25	N.C.	26	GND
27	GND	28	N.C.
29	GND	30	N.C.
31	N.C.	32	N.C.
33	N.C.	34	GND
35	GND	36	USB_D-
37	GND	38	USB_D+
39	Vcc	40	GND
41	Vcc	42	LED_WWAN#
43	GND	44	N. C.
45	PCM_CLK (M280V only)	46	N. C.
47	PCM_DOUT (M280V only)	48	N.C.
49	PCM_DIN (M280V only)	50	GND
51	PCM_SYNC (M280V only)	52	Vcc

For more information, please refer to PCI-SIG, PCI Express Mini Card Electromechanical Specification 1.2. http://www.pcisig.com/home

2.2.2 System Interface Signals

Table 2-2 summarizes the signal and power lines that are supported by the system interface.

Table 2-2 System Interface Signals

Signal Group	Signal	Direction	Description	Pin Number
Power	Vcc (4pins)		Power source	2, 39, 41, 52
	GND (13 pins)		Return current path	4, 9, 15, 21, 26, 27, 29, 34, 35, 37, 40, 43, 50
USB	USB_D+, USB_D-	Input / output	USB serial data interface compliant to the USB 2.0 specification	36, 38
Auxiliary Signals (2.6V Vdd Compliant)	PERST#	Input	Level trigger signal. Functional reset to the module	22
Communications Specific Signals (2.6V Vdd Compliant)	WAKE#	Output	Active Low, edge-trigger signal. This signal is used to request that the system return from a sleep/suspended state to service a function initiated wake event.	1
	LED_WWAN#	Output	Active low signals. The signal is used to allow the module to provide status indicators via LED devices that will be provided by the system.	42
	W_DISABLE#	Input	Active low, level trigger signal. This signal is used by the system to disable radio operation on the module.	20
User Identity Module (UIM) Signals	UIM_PWR (1 pin)	Output	Power source for the UIM. Compliant to the ISO/IEC 7816-3 specification (VCC).	8
	UIM_RESET	Output	UIM reset signal. Compliant to the ISO/IEC 7816-3 specification (RST).	14
	UIM_CLK	Output	UIM clock signal. Compliant to the ISO/IEC 7816-3 specification (CLK).	12
	UIM_VPP (Not implemented in M280 series)	Output	Variable supply voltage (e.g., programming voltage) for class A devices. Refer to ISO/IEC 7816-3 for operating class definitions. This signal is reserved for future use for devices of other classes. Compliant to the ISO/IEC 7816-3 specification (VPP).	16
	UIM_DATA	Input / output	UIM data signal. Compliant to the ISO/IEC 7816-3 specification (I/O).	10
	PCM_CLK	Output	PCM clock for auxiliary codec port	45

Signal Group	Signal	Direction	Description	Pin Number
PCM (M280V only)	PCM_DOUT	Output	PCM data output for auxiliary codec port	47
	PCM_DIN	Input	PCM data input for auxiliary codec port	49
	PCM_SYNC	Output	PCM data strobe for auxiliary codec port	51

2.2.3 Power Source and Ground

M280 uses only 3.2V ~ +4.2V power source. For detail electrical characteristics, please refer to section 5.2.2.

2.3 Network LED indicator (optional)

The Network LED indicated device is ground-referenced current sink. The host drives the device to provide a current path and an appropriate voltage for LED for M280 module. Table 2-3 describes the LED output characteristics in different states.

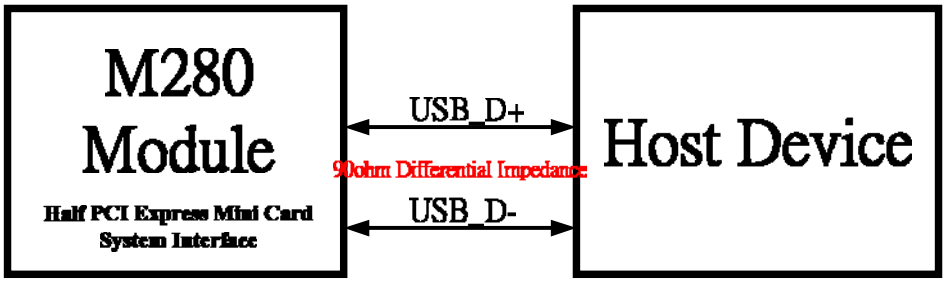
Table 2-3 LED Output

LED State	Module Status Description	LED Characteristics
OFF	Module is not powered.	LED is OFF.
ON	Module is powered on.	LED is ON.

2.4 USB Interface

M280 and M280V module are compliant with USB2.0 in all three modes (Low speed, Full speed, and high speed). When two devices are connected via a USB interface, one of the devices must act as a host, and the other device must act as a peripheral. The host is responsible for initiating and controlling traffic on the bus. For example, the USB specification requires PCs to act as hosts, and other devices such as M280 to act as devices.

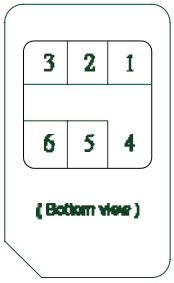
Figure 2-3 USB Interface



2.5 USIM Interface

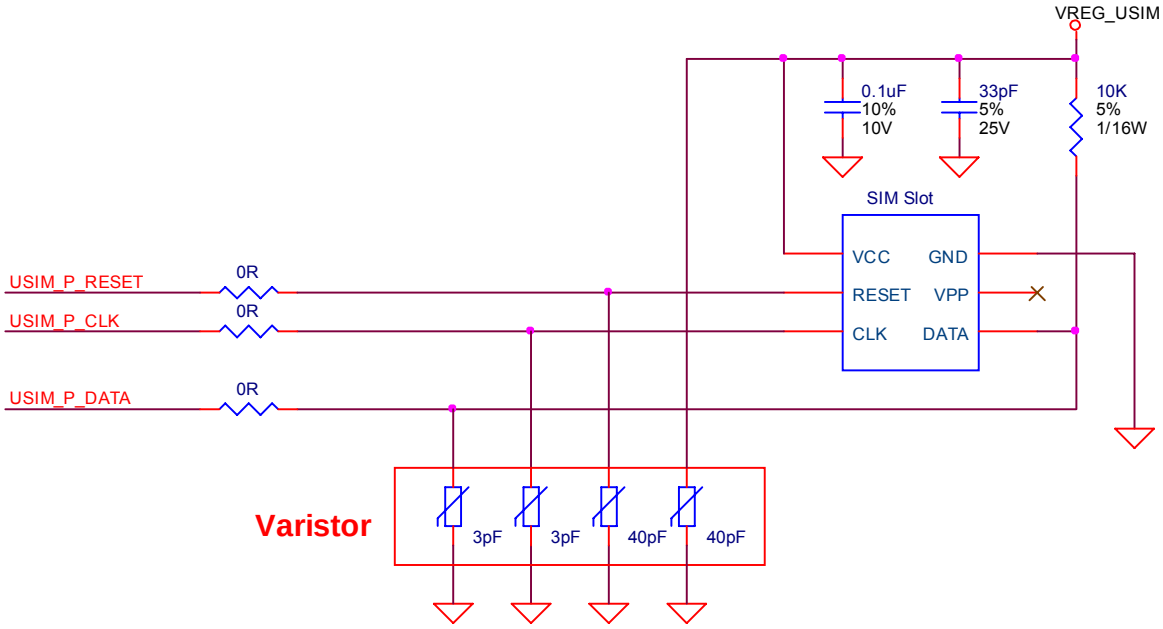
The universal subscriber identification module (USIM) is a smart card for UMTS/GSM cellular applications. The USIM provides the required subscription information to allow the mobile equipment to attach to a GSM or UMTS network. The USIM also provides the subscriber's verification procedures as well as authentication methods for network authentication during the network registration procedures. Upon power-up or after a soft-reset, the clock and data lines to the USIM will be active through the initialization process. Table 2-4 shows the SIM card pin definition. It's recommended to implement hardware USIM detection mechanism or complete avoiding USIM hot-plug through mechanical design. The reference design for hardware USIM detection is provided in the "Application Note for BandLuxe Module USIM Detection Recommendation".

Table 2-4 SIM Card Pin Definition

	Pin No.	Description
	1	Vcc
	2	RST
	3	CLK
	4	GND
	5	Vpp
	6	I/O

- USIM_CLK and USIM_RST signal, include 33pF filter capacitors is required to be placed near the SIM connector.
- Route all USIM signals carefully – isolate them from sensitive analog and RF signals.
- External ESD diodes are necessary to protect the chip on the module; the ESD diodes should be placed near the connector.
- Refer to the reference circuits below:

Figure 2-3 USIM Circuits Reference



2.6 Auxiliary Signals Interface

2.6.1 WAKE# (Optional)

The WAKE# signal is an open drain, active low signal that is driven low by the module to reactivate the host. The M280V module would pull WAKE# down for 250ms to send the interrupt to host when it had received a mobile terminated voice call. This auxiliary signal interface is reserved for future use for M280 module.

If the wakeup process is used, the Vcc supply must be present and used for this function. The assertion and de-assertion of WAKE# are asynchronous to any system clock. If implemented in the host platform, a host pull-up resistor (≥5 kΩ) tied to no higher than Vcc is required on this pin.

2.6.2 W_DISABLE#

Active low signal used by the system to disable radio operation on the module. The W_DISABLE# signal is provided to allow users to disable, via a system-provided switch, the module's radio operation in order to meet public safety regulations or when otherwise desired.
The W_DISABLE# signal is an active low, level trigger signal that when asserted (driven low) by the host

system (Figure 2-4), the module shall disable radio operation. All transients resulting from mechanical switches need to be de-bounced by host system circuitry.

In normal operation, the module will disassociate with the wireless network and cease any further operations (transmit/receive) as soon as possible after the W_DISABLE# signal is asserted. Given that a graceful disassociation with the wireless network fails to complete in a timely manner, the module shall discontinue any communications with the network and assure that its radio operation has ceased no later than 30 seconds following the initial assertion of the W_DISABLE# signal. Once the disabling process is complete, the WWAN LED shall indicate the disabled condition to the host.

To reduce power consumption in the above mode, the module would further get into sleep (power saving) mode to turn off Baseband functionality except Real-Time-Clock circuitry and SDRAM self-refresh.

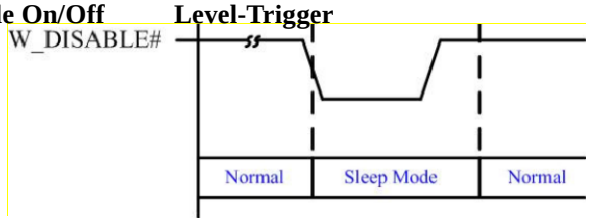
The module would initiate resuming normal operation when host de-asserts the W_DISABLE# signal.

Table 2-5 Radio Operational States

W_DISABLE#	Radio Operation
De-asserted	Enabled (RF operation allowed)
Asserted	Disabled (no RF operation allowed)

The host system is required to assure that W_DISABLE# be in a deterministic state (asserted or de-asserted) whenever power is applied to the module.

Figure 2-4 System Sleep Mode On/Off Level-Trigger

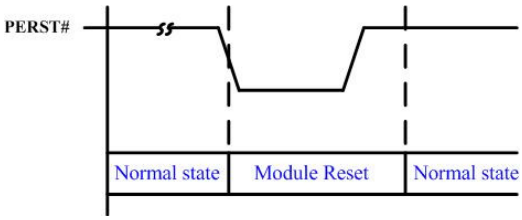


2.6.3 PERST#

The PERST# signal is a level trigger signal used by the host system to force a warm rest of the module. The PERST# is normally de-asserted (high) to indicate when the system power sources are within their specified voltage tolerance and are stable. The host system can force a hardware reset on the module via asserting (driving low) PERST# signal for more than 1 second. Afterwards the host system must pull back the PERST# signal to high level and the module will continue the reset process and return to normal operation. PERST# signal will also be asserted when power is switched off.

This PERST# signal is an optional feature. The module will reset itself during the power-on process, and the host doesn't need to reset the module.

Figure 2-5 Module Reset



2.7 Antenna Guidelines and RF Connection

This section describes general guidelines for the design of multi-band antenna required for the M280 module series.

2.7.1 Antenna specifications

Frequency range

- GSM850 (824-894 MHz)
- EGSM900 (880-960 MHz)
- DCS1800 (1710-1880 MHz)
- PCS1900 (1850-1990 MHz)
- WCDMA 850/1900/2100 (824-894 / 1850-1990 / 1920-2170 MHz)

Gain

- Radiation pattern: omni-directional
- Gain averaged in space in all frequencies: > -3dBm
- Gain for Diversity Antenna
  1. Within 3 dB comparing to gain of primary antenna recommended
  2. No worse than 6 dB of gain of primary antenna

Maximum VSWR

- < 2.5:1 with 50 reference impedance

Polarization

- Linear

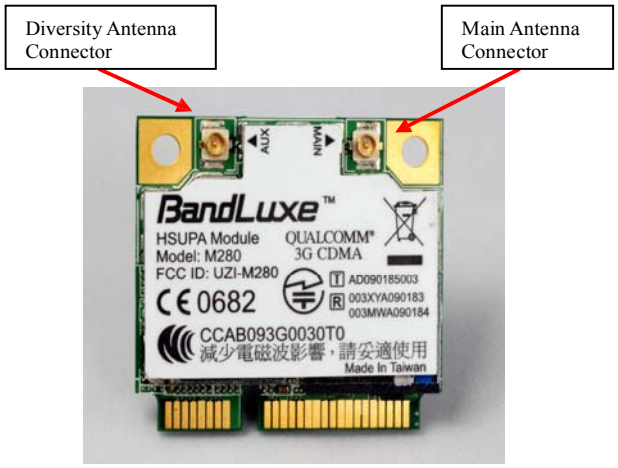
2.7.2 WLAN Antenna Isolation

Based upon the known isolation and the linear gain of the WLAN receiver there is a minimum requirement for the out of band isolation in the GSM and UMTS bands. The isolation is depending upon the antenna isolation, WLAN and mobile standard, the output power of the mobile, the linearity of the WLAN receiver IIP3 and the front-end filter (blocking filter). Therefore it is preferred to use WLAN modules with blocking filter.

2.7.3 Antenna connector

The antenna connector type used is a U.FL microwave coaxial connector. It is also can be used for testing purpose.

Figure 2-6 Antenna Connector Position and Type



2.8 PCM Interface

The PCM interface can be used in two modes, and supports Linear, A-Law and μ-Law compounding algorithms:

- Auxiliary PCM that runs at 128 kHz and uses a 62.5 μs sync pulse (half a time frame).
- Primary PCM that runs at 2.048 MHz and uses 488 ns sync pulse (one 2.048 MHz clock tick).

Section 3 Device Driver Interface

Basically the module will manifest itself as a composite USB device which creates stubs which the other higher level drivers hook into and provide their respective function. The composite USB device could be modem, NDIS interface, AT command interface or diagnostics interface. All device drivers used by OS have been created for Microsoft Windows 7, Vista 32/64, Windows XP SP2 above, Mac OSX, and Linux.

Either the modem or the NDIS interface can be used to transfer data; and AT command interface or diagnostic interface could be used to send/receive information of the module via the Connection Manager (CM) application. For more information about supporting AT commands please refer to section 4.

This page is leave in blank for note or memo use

Section 4 AT Command Set Reference

For the description of BandLuxe AT Command API, please refer to Appendix B for reference.

For the description of BandLuxe proprietary AT Command API, please refer to Appendix C for reference.

For the call related BandLuxe proprietary AT Command API, please refer to Appendix D for the description.

This page is leave in blank for note or memo use

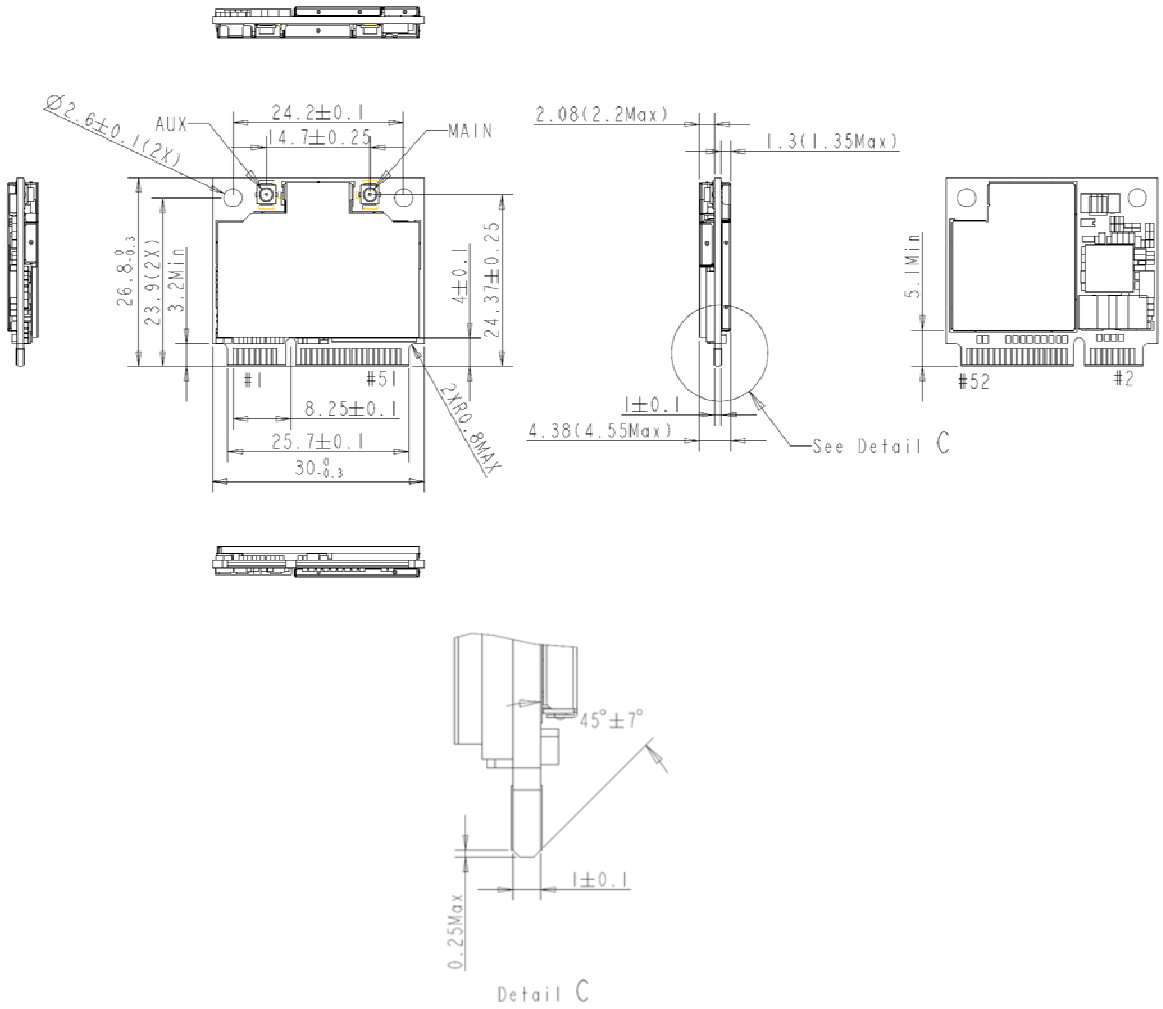
Section 5 Physical Characteristics

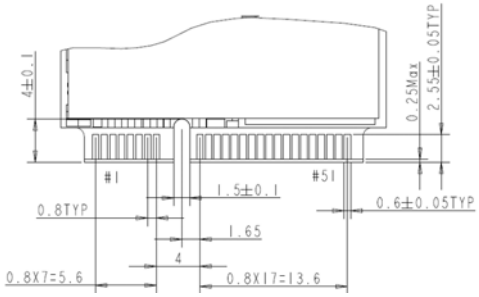
5.1 Dimensions

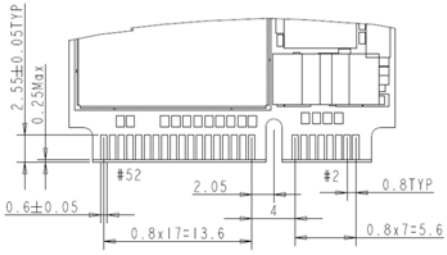
Table 5-1 M280 Dimensions

Dimensions	Length	26.8 mm
	Width	30 mm
	Thickness	4.25 mm
	Weight	Approx 10 g

Figure 5-1 M280 Dimensioned View




4±0.1
0.25Max
2.55±0.05TYP
#1
#51
1.5±0.1
0.8TYP
0.6±0.05TYP
1.65
4
0.8X7=5.6
0.8X17=13.6


2.55±0.05TYP
0.25Max
#52
#2
2.05
0.8TYP
0.6±0.05
4
0.8x17=13.6
0.8x7=5.6

5.2 DC Electrical Specification

5.2.1 Absolute Maximum Ratings

Operating M280 module under conditions that exceed those listed in Table 5-3 result in damage to the device. Absolute maximum ratings are limiting values, and are considered individually, while all other parameters are within their specified operating ranges. Functional operation of the M280 module under any other conditions in Table 5-3 is not implied.

Table 5-2 M280 and M280V Electrical Specification

Parameter	Symbol	Min.	Max.	Units
Storage temperature	TS	-30	+85	^{0}C
Supply voltage	Vcc	-0.5	4.5	Vdc
Voltage applied to any input or output pin	Vin	-0.5	Vdd + 0.5	Vdc

5.2.2 Recommended Operating Conditions

Table 5-3 M280 and M280V Recommended Operating Conditions

Parameter	**Symbol**	**Min.**	**Typ.**	**Max.**	**Units**
Operating temperature		-10		+55	^{0}C
Supply voltage	Vcc	3.2	3.8	4.2	Vdc

5.2.3 DC Characteristics

Table 5-4 DC Characteristics, Vdd=2.6V

Parameter	Symbol	Min.	Max.	Units
High-level input voltage, CMOS/Schmitt	V_IH	0.65xVdd	Vdd+0.3	Volts
Low-level input voltage, CMOS/Schmitt	V_IL	-0.3	0.35xVdd	Volts
Schmitt hysteresis voltage	V_SHYS	150		mV
Input high leakage current	I_IH	—	1	uA
Input low leakage current	I_IL	-1	—	uA
Input high leakage current with pull-down	I_IHPD	10	60	uA
Input low leakage current with pull-up	I_ILPU	-60	-10	uA
High-level, three-state leakage current	I_OZH	—	1	uA
Low-level, three-state leakage current	I_OZL	-1	—	uA
High-level, three-state leakage current with pull-down	I_OZHPD	10	60	uA
Low-level, three-state leakage current with pull-up	I_OZLPU	-60	-10	uA
High-level, three-state leakage current with keeper	I_OZHKP	-25	-5	uA
Low-level, three-state leakage current with keeper	I_OZLKP	5	25	uA
High-level output voltage, CMOS	V_OH	Vdd-0.45	Vdd	Volts
Low-level output voltage, CMOS	V_OL	0.0	0.45	Volts
High-voltage tolerant input leakage with a keeper	I_IHVKP	-1	1	uA
Input capacitance	C_IN	—	7	pF

5.3 RF System Specification

The RF performance is compliant with 3GPP Mobile Station Minimum Performance specifications. Please refer to those documents for detailed specifications and test methods. The typical values of maximum transmit power and receiver sensitivity at different modes is listed below.

5.3.1 WCDMA Power

Table 5-5 WCDMA Power Specification

Modulation	Mode	Power Class	Max Power	Tolerance	
				Normal	Extreme
WCDMA	BANDI	3	24 dBm	+1/-3 dB	+1.7/-3.7 dB
	BAND II	3	24 dBm	+1/-3 dB	+1.7/-3.7 dB
	BAND V	3	24 dBm	+1/-3 dB	+1.7/-3.7 dB

5.3.2 WCDMA Sensitivity

Table 5-6 WCDMA Sensitivity Specification

Modulation	Mode	<REF I_{OR}>	
CDMA	BANDI	-106.7	dBm
	BAND II	-104.7	dBm
	BAND V	-104.7	dBm

5.3.3 GSM Power/Sensitivity

Table 5-7 GSM Power / Sensitivity Specification

Modulation	Mode	Power Class	Max Power	Tolerance	
				Normal	Extreme
GMSK	GSM850/900	4	33 dBm	±2 dB	±2.5 dB
	DCS/PCS	1	30 dBm	±2 dB	±2.5 dB
EDGE	GSM850/900	E2	27 dBm	±3 dB	±4 dB
	DCS/PCS	E2	26 dBm	+3/-4 dB	+4/-4.5 dB

Modulation	Frequency Band	Sensitivity	
GMSK	850	-104	dBm
	900	-104	dBm
	1800	-102	dBm
	1900	-102	dBm

5.3.4 Power Consumption

Table 5-8 M280 Power Consumption

Test Condition	M280 (Average)
Flying Mode	80 mA
Flying Mode with suspend power saving	3.4 mA
Sleep Mode	1.5 mA
Idle Mode	84 mA
Idle Mode with suspend power saving (USB ON)	13 mA
HSDPA 7.2Mbps/384Kbp (Max. RF output power)	600 mA
HSUPA 3.6Mbps/2Mbps (Max. RF output power)	585 mA
WCDMA (Max. RF output power)	580 mA
WCDMA (0dBm RF output power)	205 mA
GPRS/EDGE 4DL/1UL (13dBm RF output power)	165 mA

5.4 Thermal Dissipation

When the module performs continuous voice call or continuously sending/receiving data packets, the surface temperature of the module shielding case at different ambient air temperature are listed below:

T≦80°C ± 5°C on surface (ambient air temperature at 55°C) T
≦60°C ± 5°C on surface (ambient air temperature at 25°C)

Test Configuration

Temperature: 25/55 °C
Humidity: 90% humidity
Duration Time: 4 hrs per condition.
Test Mode: Operation mode

Section 6 Packing Information

For the information about packing of shipment, packing material, and storage environment recommendation, please refers to “BandLuxe Module Packing and Storage Recommendation”.

This page is leave in blank for note or memo use

Appendix A Abbreviations and Acronyms

The abbreviations and acronyms used in this document.

Table A-1 Abbreviations and Acronyms Table

Abbreviations	Full Name
ACM	Accumulated Call Meter
ASCII	American Standard Code for Information Interchange
AT	Attention commands
CB	Cell Broadcast
CBS	Cell Broadcasting Service
CCM	Call Control Meter
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
CMOS	Complementary Metal-Oxide Semiconductor
CR	Carriage Return
CSD	Circuit Switched Data
CTS	Clear To Send
DAI	Digital Audio Interface
DCD	Data Carrier Detected
DCE	Data Communications Equipment
DRX	Data Receive
DSR	Data Set Ready
DTA	Data Terminal Adaptor
DTE	Data Terminal Equipment
DTMF	Dual Tone Multi Frequency
DTR	Data Terminal Ready
EMC	Electromagnetic Compatibility
ETSI	European Telecommunications Equipment Institute
FTA	Full Type Approval (ETSI)
GPRS	General Radio Packet Service
GPS	Global Positioning System
GSM	Global System for Mobile communication
HF	Hands Free
HSDPA	High Speed Downlink Packet Access
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
IRA	International Reference Alphabet
ITU	International Telecommunications Union
IWF	Inter-Working Function
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LF	Linefeed
ME	Mobile Equipment
MMI	Man Machine Interface
MO	Mobile Originated
MS	Mobile Station

Abbreviations	Full Name
MT	Mobile Terminated
OEM	Other Equipment Manufacturer
PB	Phone Book
PDU	Protocol Data Unit
PH	Packet Handler
PIN	Personal Identity Number
PLMN	Public Land Mobile Network
PUCT	Price per Unit Currency Table
PUK	PIN Unblocking Code
RACH	Random Access Channel
RLP	Radio Link Protocol
RMS	Root Mean Square
RTS	Ready To Send
RI	Ring Indicator
SCA	Service Center Address
SIM	Subscriber Identity Module
SMD	Surface Mounted Device
SMS	Short Message Service
SMSC	Short Message Service Center
SS	Supplementary Service
TIA	Telecommunications Industry Association
UDUB	User Determined User Busy
UMTS	Universal Mobile Telecommunications System
USB	Universal Serial Bus
USSD	Unstructured Supplementary Service Data
WCDMA	Wideband Code Division Multiple Access
3gpp	3rd Generation Partnership Project

Appendix B BandLuxe AT Command API

Appendix B lists the standard AT command that are implemented in BandLuxe M280 module series. For detail command usage and possible response, please check 3GPP TS 27.007, AT command set for User Equipment (UE).

Table B-1 Abbreviations and Acronyms Table

BandLuxe HSPA Modem AT Command Interface API Serial Port Name: BandLuxe AT CMD Interface		
AT Command	**Command description**	**Command Format**
AT&F	Set all current parameters to manufacturer defaults	AT&F[<mode>]
AT&V	Display current configuration	AT&V[<mode>]
ATE	Enable command echo	ATE
ATI	Display product identification information	ATI
ATQ	Set result code presentation mode	ATQ[<value>]
ATV	Set result code format mode	ATV[<value>]
ATZ	Set all current parameters to user defined profile	ATZ[<mode>]
ATS3	Write command line termination character	S3=<n> S3? S3=?
ATS4	Set response formatting character	S4=<n> S4? S4=?
ATS5	Write command line editing character	S5=<n> S5? S5=?
AT+GMI	Request manufacturer identification	AT+GMI
AT+GMM	Request model identification	AT+GMM
AT+GMR	Request revision identification of software status	AT+GMR
AT+GSN	Request serial number identification	AT+GSN
AT+GCAP	Request complete TA capabilities list	AT+GCAP AT+GCAP?
AT+CBST	Select bearer service type	AT+CBST=[<speed>[, <name>[, <ce>]]] AT+CBST? AT+CBST=?
AT+CRLP	Select radio link protocol param	AT+CRLP=[<iws>[, <mws>[, <T1>[, <N2>]]]] AT+CRLP? AT+CRLP=?
AT+CREG	Network registration	AT+CREG=[<n>] AT+CREG? AT+CREG=?
AT+CGREG	GPRS network registration status	AT+CGREG=[<n>] AT+CGREG? AT+CGREG=?

AT Command	Command description	Command Format
AT+CFUN	Full functionality mode	AT+CFUN=<mode>[,<rst>] AT+CFUN? AT+CFUN=?
AT+GCAP	Request complete TA capabilities list	AT+GCAP AT+GCAP=?
AT+CSCS	Used Character Set	AT+CSCS=[<chset>] AT+CSCS? AT+CSCS=?
AT+CEER	Cause Location ID for the extended error report	AT+CEER
AT+CMEE	Report Mobile Terminal Error	AT+CMEE=[<n>] AT+CMEE? AT+CMEE=?
AT+CGDCONT	Define PDP Context	AT+CGDCONT=[<cid> [,<PDP_type> [,<APN> [,<PDP_addr> [,<d_comp> ,<h_comp>]]]]] AT+CGDCONT? AT+CGDCONT=?
AT+CGDSCONT	Define Secondary PDP Context	AT+CGDSCONT=[<cid>,<p_cid>[,<d_comp>[,<h_comp>]]] AT+CGDSCONT? AT+CGDSCONT=?
AT+CGTFT	Traffic Flow Template	AT+CGTFT=[<cid>, [<packet filter identifier>, <evaluation precedence index> [,<source address and subnet mask> [,<protocol number (ipv4) / next header (ipv6)> [,<destination port range> [,<source port range> [,<ipsec security parameter index (spi)> [,<type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask> [,<flow label (ipv6)>]]]]]]]] AT+CGTFT? AT+CGTFT=?
AT+CGEQREQ	3G Quality of Service Profile (Requested)	AT+CGEQREQ=[<cid> [,<Traffic class> [,<Maximum bitrate UL> [,<Maximum bitrate DL> [,<Guaranteed bitrate UL> [,<Guaranteed bitrate DL> [,<Delivery order> [,<Maximum SDU size> [,<SDU error ratio> [,<Residual bit error ratio> [,<Delivery of erroneous SDUs> [,<Transfer delay> [,<Traffic handling priority> [,<Source statistics descriptor> [,<Signalling indication>]]]]]]]]]]]]] AT+CGEQREQ? AT+CGEQREQ=?

AT Command	Command description	Command Format
AT+CGEQMIN	3G Quality of Service Profile (Minimum acceptable)	AT+CGEQMIN=[<cid> [,<Traffic class> [,<Maximum bitrate UL> [,<Maximum bitrate DL> [,<Guaranteed bitrate UL> [,<Guaranteed bitrate DL> [,<Delivery order> [,<Maximum SDU size> [,<SDU error ratio> [,<Residual bit error ratio> [,<Delivery of erroneous SDUs> [,<Transfer delay> [,<Traffic handling priority> [,<Source statistics descriptor> [,<Signalling indication>]]]]]]]]]]]]]] AT+CGEQMIN? AT+CGEQMIN=?
AT+CGQREQ	Quality of Service Profile (Requested)	AT+CGQREQ=[<cid>[,<precedence>[,<delay>[,<reliability.> [,<peak>[,<mean>]]]]]] AT+CGQREQ? AT+CGQREQ=?
AT+CGQMIN	Quality of Service Profile (Minimum acceptable)	AT+CGQMIN=[<cid>[,<precedence>[,<delay>[,<reliability.> [,<peak>[,<mean>]]]]]] AT+CGQMIN? AT+CGQMIN=?
AT+CGEREP	Subscriber number	AT+CGEREP=[<mode>[,<bfr>]] AT+CGEREP? AT+CGEREP=?
AT+CGPADDR	Show PDP address	AT+CGPADDR=[<cid> [,<cid> [,…]]] AT+CGPADDR=?
AT+CGCLASS	GPRS mobile station class	AT+CGCLASS= [<class>] AT+CGCLASS? AT+CGCLASS=?
AT+CGSMS	Select service for MO SMS messages	AT+CGSMS=[<service>] AT+CGSMS? AT+CGSMS=?
AT+CSMS	Select Message Service	AT+CSMS=<service> AT+CSMS? AT+CSMS=?
AT+CMGF	Select SMS message format	AT+CMGF=[<mode>] AT+CMGF? AT+CMGF=?
AT+CSCA	Service Centrer Address	AT+CSCA=<sca>[,<tosca>] AT+CSCA? AT+CSCA=?
AT+CSMP	Set SMS text mode parameters	
AT+CSDH	Show SMS text mode parameters	AT+CSDH=[<show>] AT+CSDH? AT+CSDH=?

AT Command	Command description	Command Format
AT+CSQ	Request signal strength	AT+CSQ AT+CSQ=?
AT+CPIN	Check PIN Status	AT+CPIN=<pin>[,<newpin>] AT+CPIN? AT+CPIN=?
AT+CGATT	PS attach / detach	AT+CGATT= [<state>] AT+CGATT? AT+CGATT=?
AT+CGACT	PDP context activate or deactivate	AT+CGACT=[<state> [,<cid>[,<cid>[,…]]]] AT+CGACT? AT+CGACT=?
AT+CGCMOD	PDP Context Modify	AT+CGCMOD=[<cid>[,<cid>[,…]]] AT+CGCMOD=?
AT+CPBS	Select phone book memory storage	AT+CPBS=<storage> AT+CPBS? AT+CPBS=?
AT+CPBR	Read Phonebook Memory entries	AT+CPBR=<index1>[,<index2>] AT+CPBR?
AT+CPBF	Find Phonebook Memory entries	AT+CPBF=<findtext> AT+CPBF=?
AT+CPBW	Write phone book entry	AT+CPBW=[<index>][,<number>[,<type>[,<text>]]] AT+CPBW=?
AT+CPMS	Preferred Message Storage	AT+CPMS=<mem1>[, <mem2>[,<mem3>]] AT+CPMS? AT+CPMS=?
AT+CNMI	New Message Indications to TE	AT+CNMI=[<mode>[,<mt>[,<bm>[,<ds>[,<bfr>]]]]] AT+CNMI? AT+CNMI=?
AT+CMGL	List Messages	AT+CMGL[=<stat>] AT+CMGL=?
AT+CMGR	Read Message	AT+CMGR=<index> AT+CMGR=?
AT+CMGS	Send SMS message	AT+CMGS=<da>[,<toda>] AT+CMGS=?
AT+CMGD	Delete SMS message	AT+CMGD=<index> AT+CMGD=?
AT+CNMA	New SMS message acknowledge to ME/TE	AT+CNMA AT+CNMA=?
AT+COPS	Operator selection	AT+COPS[=<mode>[, <format>[, <oper>]]] AT+COPS? AT+COPS=?
AT+CLCK	Facility lock	AT+CLCK=<fac>,<mode>[,<passwd>[,<class>]] AT+CLCK=?

AT Command	Command description	Command Format
AT+CPWD	Change password	AT+CPWD=<fac>,<oldpwd>,<newpwd> AT+CPWD=?
AT+CUSD	Unstructured supplementary service data	AT+CUSD=[<n>[,<str>[,<dcs>]]] AT+CUSD? AT+CUSD=?
AT+CIMI	Read IMSI	AT+CIMI AT+CIMI=?
AT+CGMI	Request manufacturer identification	AT+CGMI
AT+CGMM	Request model identification	AT+CGMM
AT+CGMR	Request revision identification	AT+CGMR
AT+CGSN	Request product serial number identification	AT+CGSN
AT+CNUM	Subscriber number	AT+CNUM AT+CNUM=?
AT+CSIM	Generic SIM access	+COLP=[<n>]
AT+CRSM	Restricted SIM access	AT+CRSM=<command>[,<fileid>[,<P1>,<P2>,<P3>[,<data>]]] AT+CRSM=?
AT+COPN	Read operator names	AT+COPN AT+COPN=?
AT+CPOL	Preferred PLMN list	AT+CPOL=[<index>][,<format>[,<oper>]] AT+CPOL? AT+CPOL=?
AT+CPLS	Selection of preferred PLMN list	AT+CPLS=<list> AT+CPLS? AT+CPLS=?
AT+CTZR	Time Zone Reporting	AT+CTZR=<onoff> AT+CTZR? AT+CTZR=?
AT+CPINC	The retries count of PIN1, PIN2, PUK1 or PUK2	AT+CPINC AT+CPINC=?

Appendix C BandLuxe Proprietary AT Command API

Appendix C lists the BandLuxe proprietary AT command that are implemented in BandLuxe M280 module series.

C.1 AT$SYSMODE – Query current network type

C.1.1 DESCRIPTION

Query current network type

C.1.2 SYNTAX

Command	Possible response(s)
$SYSMODE=<format>	OK
$SYSMODE[?]	$SYSMODE: <mode> OK
$SYSMODE=?	$SYSMODE: (0-1) OK

C.1.3 PARAMETERS

<format>
[0] alphanumeric <mode>
1 numeric <mode>

<mode>

Numeric Mode	Alphanumeric Mode
0	NO SERVICE
1	GSM
2	GPRS
3	EDGE
4	WCDMA
5	HSDPA

C.1.4 Examples

test command example:

AT$SYSMODE=?

$SYSMODE: (0-1)

OK

query command example:

AT$SYSMODE?

$SYSMODE: NO SERVICE

OK

set command example:

AT$SYSMODE =1

OK

C.2 AT$PREFNETTYPE – Set Prefer network type

C.2.1 DESCRIPTION

Set prefer network type

C.2.2 SYNTAX

Command	Possible response(s)
$PREFNETTYPE=<mode>	OK
$PREFNETTYPE?	$PREFNETTYPE: <mode> OK
$PREFNETTYPE=?	$PREFNETTYPE: (0-4) OK

C.2.3 PARAMETERS

<mode>
- 0 WCDMA only
- 1 WCDMA first
- 2 Automatic
- 3 GSM first
- 4 GSM only

C.2.4 Examples

test command example:

AT$PREFNETTYPE=?

$PREFNETTYPE: (0-4)

OK

query command example:

AT$PREFNETTYPE?

$PREFNETTYPE: 1

OK

set command example:

AT$ PREFNETTYPE =1
OK

Appendix D Call Related Standard AT Command API and BandLuxe Proprietary AT Command API

This Appendix list call related BandLuxe proprietary AT commands and examples of some call related standard AT commands implemented in M280V module. BandLuxe M280V module also provides unsolicited information of the call states for call management.

D.1 Select type of address +CSTA

D.1.1 DESCRIPTION

Set command selects the type of number for further dialing commands (D) according to GSM/UMTS specifications. Test command returns values supported a compound value.

D.1.2 SYNTAX

Command	Possible response(s)
+CSTA=[<type>]	
+CSTA?	+CSTA :<type>
+CSTA= ?	+CSTA : (list of supported<type>s)

D.1.3 PARAMETERS

<type>: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7); default 145 when dialing string includes international access code character "+", otherwise 129

D.1.4 Examples

test command example:

AT+CSTA=3

ERROR

AT+CSTA=145

OK

AT+CSTA?

+CSTA:145

OK

query command example:

AT+CSTA= ?

+CSTA : (129,145)

OK

set command example:

AT+CSTA?
+CSTA:129

D.2 Originate a call : ATD<dialstring> ;

D.2.1 DESCRIPTION

Originate a call

D.2.2 SYNTAX

Command	Possible response(s)
D<dialstring> ;	OK ERROR NO CARRIOR

D.2.3 PARAMETERS

<dialstring>
Dailing string

D.2.4 Examples

test command example:

ATD123;

OK

D.3 Answer a call : ATA

D.3.1 DESCRIPTION

Answer a call

D.3.2 SYNTAX

Command	Possible response(s)
A	OK ERROR

D.3.3 PARAMETERS

NONE

D.3.4 Examples

test command example:

ATA

OK

D.4 Call Mode +CMOD

D.4.1 DESCRIPTION

Set command selects the call mode of further dialing commands (D) or for next answering command (A). Mode can be either single or alternating (in the present document, terms "alternating mode" and "alternating call" refer to all GSM/UMTS bearer and teleservices that incorporate more than one basic service (voice, data, fax) within one call). When single mode is selected the call originating and hang-up procedures are similar to procedures specified in ITU-T Recommendations V.25ter [14], T.31 [11] and T.32 [12]. In GSM/UMTS there can be voice followed by data (refer 3GPP TS 22.002 [1]), alternating voice/data (refer 3GPP TS 22.002 [1]) and alternating voice/fax calls (refer 3GPP TS 22.003 [2]). Refer next two subclauses for alternating call control methods. Test command returns values supported as a compound value.
NOTE: +CMOD shall be set to zero after a successfully completed alternating mode call. It shall be set to zero also after a failed answering. The power-up, factory (&F) and user resets (Z) shall also set the value to zero. This reduces the possibility that alternating mode calls are originated or answered accidentally.

D.4.2 SYNTAX

Command	Possible response(s)
+CMOD=[<mode>]	
+CMOD?	+CMOD :<mode>
+CMOD= ?	+CMOD: (list of supported<mode>s)

D.4.3 PARAMETERS

<mode>:
0 single mode
1 alternating voice/fax (teleservice 61)
2 alternating voice/data (bearer service 61)
3 voice followed by data (bearer service 81)
also all other values below 128 are reserved by the present document

D.4.4 Examples

test command example:

AT+CMOD=1

OK

query command example:

AT+CMOD= ?

+CMOD : (0)

OK

set command example:

AT+CMOD?
+CMOD:0

OK

D.5 Hangup call : AT+CHUP

D.5.1 DESCRIPTION

Execution command causes the TA to hang up the current GSM/UMTS call of the MT.

D.5.2 SYNTAX

Command	Possible response(s)
+CHUP	
+CHUP= ?	

D.5.3 PARAMETERS

NONE

D.5.4 Examples

test command example:

AT+CHUP

OK

query command example:

AT+CHUP= ?

OK

D.6 Cellular Result Code +CRC

D.6.1 DESCRIPTION

Set command controls whether or not the extended format of incoming call indication or GPRS network request for PDP context activation or notification for VBS/VGCS calls is used. When enabled, an incoming call is indicated to the TE with unsolicited result code `+CRING: <type>` instead of the normal `RING`.

Test command returns values supported as a compound value.
***ETSI* 3GPP TS 27.007 version 5.4.0 Release 5 33 ETSI TS 127 007 V5.4.0 (2003-09)**
NOTE: Similar command may be found in TIA IS-99 [15] and TIA IS-135 [16].

D.6.2 SYNTAX

Command	Possible response(s)
+CRC=[<mode>]	
+CRC ?	+CRC : <mode>
+CRC= ?	+CRC : (list of supported<mode>s)

D.6.3 PARAMETERS

`<mode>`:
0 disables extended format
1 enables extended format
`<type>`:
`ASYNC [,<priority>[,<subaddr>,<satype>]]` asynchronous transparent

SYNC [,<priority>[,<subaddr>,<satype>]] synchronous transparent
REL ASYNC [,<priority>[,<subaddr>,<satype>]] asynchronous non-transparent
REL SYNC [,<priority>[,<subaddr>,<satype>]] synchronous non-transparent
FAX [,<priority>[,<subaddr>,<satype>]] facsimile (TS 62)
VOICE [,<priority>[,<subaddr>,<satype>]] normal voice (TS 11)
VOICE/*XXX* [,<priority>[,<subaddr>,<satype>]] voice followed by data (BS 81) (*XXX* is ASYNC, SYNC, REL ASYNC or REL SYNC)
ALT VOICE/*XXX* [,<priority>[,<subaddr>,<satype>]] alternating voice/data, voice first (BS 61)
ALT *XXX*/VOICE [,<priority>[,<subaddr>,<satype>]] alternating voice/data, data first (BS 61) ALT VOICE/FAX [,<priority>[,<subaddr>,<satype>]] alternating voice/fax, voice first (TS 61)
ALT FAX/VOICE [,<priority>[,<subaddr>,<satype>]] alternating voice/fax, fax first (TS 61)
GPRS <PDP_type>, <PDP_addr>[, [<L2P>][,<APN>]] GPRS network request for PDP context activation
VGC <GCA>, <GId>, <ackflag> [,<priority>] voice group call (TS 91)
VBC <GCA>, <GId>, <ackflag> [,<priority>] voice broadcast call (TS 92)
The optional <priority> indicates the eMLPP priority level of the incoming call by paging, notification or setup message. The priority level values are as defined in eMLPP specification 3GPP TS 22.067 [54].
<subaddr>: string type subaddress of format specified by <satype>
<satype>: type of subaddress octet in integer format (refer 3GPP TS 24.008 [8] subclause 10.5.4.8)
<PDP_type> ,<PDP_addr> and <APN> are as defined in the Define PDP Context (+CGDCONT) command. The optional <L2P> proposes a layer 2 protocol to use between the MT and the TE. It is defined in the Enter GPRS Data Mode (+CGDATA) command. If the MT is unable to announce to the TE the network's request (for example it is in V.25ter online data state) the MT shall reject the request. No corresponding unsolicited result code shall be issued when the MT returns to a command state.
<GCA> is a part of the group call reference as specified in 3GPP TS 23.003 [7] and indicates group call area.
<GId> is a part of the group call reference as specified in 3GPP TS 23.003 [7] and indicates group call identification.The <ackflag>=1 proposes that a predefined confirmation procedure is to be used after the call is ended. For <ackflag>=0 no confirmation procedure is required.

D.6.4 Examples

test command example:

AT+CRC=1

OK

query command example:

AT+CRC= ?

+CRC : (0,1)

OK

set command example:

AT+CRC?
+CRC:1

OK

D.7 DTMF control over the CS call in conversation state: AT+DTMF

D.7.1 DESCRIPTION

Execution command emulates MT keypad by giving each keystroke as a character while CS domain voice call is in

conversation state.

D.7.2 SYNTAX

Command	Possible response(s)
+DTMF= <cid>, <key>	+CME ERROR: <err>
+DTMF=?	

D.7.3 PARAMETERS

<cid>: integer type; call identification number as described in 3GPP TS 22.030 subclause 4.5.5.1.

<key>: DTMF digit; the representing character key is listed in the following table.

Char	IRA(dec)
#	35
*	42
0…9	48…57
A/a	65/97
B/b	66/98
C/c	67/99
D/d	68/100

D.7.4 Examples

query command example:

AT+DTMF= ?

OK

set command example:

AT+DTMF=1,1
OK

D.8 Call forwarding number and conditions : AT+CCFC

D.8.1 DESCRIPTION

This command allows control of the call forwarding supplementary service according to 3GPP TS 22.082. Registration, erasure, activation, deactivation, and status query are supported. When querying the status of a network service (<mode>=2) the response line for 'not active' case (<status>=0) should be returned only if service is not active for any <class>.
Test command returns reason values supported as a compound value.

D.8.2 SYNTAX

Command	Possible response(s)
+CCFC=<reason>,<mode> [,<number>[,<type> [,<class> [,<subaddr>[,<satype> [,<time>]]]]]]	+CME ERROR: <err> when <mode>=2 and command successful: +CCFC: <status>,<class1>[,<number>,<type> [,<subaddr>,<satype>[,<time>]]][<CR><LF>+CCFC: <status>,<class2>[,<number>,<type> [,<subaddr>,<satype>[,<time>]]] [...]]
+CCFC=?	+CCFC: (list of supported <reason>s)

D.8.3 PARAMETERS

<reason>:
0 unconditional
1 mobile busy
2 no reply
3 not reachable
4 all call forwarding (refer 3GPP TS 22.030 [19])
5 all conditional call forwarding (refer 3GPP TS 22.030 [19])
<mode>:
0 disable
1 enable
2 query status
3 registration
4 erasure
<number>: string type phone number of forwarding address in format specified by <type>
<type>: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7); default 145 when dialling string includes international access code character "+", otherwise 129
<subaddr>: string type subaddress of format specified by <satype>
<satype>: type of subaddress octet in integer format (refer TS 24.008 [8] subclause 10.5.4.8); default 128
<classx> is a sum of integers each representing a class of information (default 7):
1 voice (telephony)
2 data (refers to all bearer services; with <mode>=2 this may refer only to some bearer service if TA does not support values 16, 32, 64 and 128)
4 fax (facsimile services)
8 short message service
16 data circuit sync
32 data circuit async
64 dedicated packet access
128 dedicated PAD access
<time>:
1...30 when "no reply" is enabled or queried, this gives the time in seconds to wait before call is forwarded, default value 20
<status>:
0 not active
1 active

D.8.4 Examples

test command example:

AT+CCFC=2,1,”921654321” (Enable CFB)
OK

AT+CCFC=1 (Query CFNRy)
+CCFC: 1,7,”+35821654321”,145,,,20 (forward after 20 seconds)
OK

query command example:

AT+CCFC= ?
+CCFC :(0,1,2,3,4,5)

OK

D.9 Call waiting : AT+CCWA

D.9.1 DESCRIPTION

This command allows control of the Call Waiting supplementary service according to 3GPP TS 22.083. Activation, deactivation and status query are supported. When querying the status of a network service (<mode>=2) the response line for 'not active' case (<status>=0) should be returned only if service is not active for any <class>. Parameter <n> is used to disable/enable the presentation of an unsolicited result code +CCWA: <number>,<type>,<class>,[<alpha>][,<CLI validity>[,<subaddr>,<satype> [,<priority>]]] to the TE when call waiting service is enabled. Command should be abortable when network is interrogated. The interaction of this command with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standards.
Test command returns values supported as a compound value.

D.9.2 SYNTAX

Command	Possible response(s)
+CCWA=[<n>[,<mode>[,<class>]]]	+CME ERROR: <err> when <mode>=2 and command successful +CCWA: <status>,<class1> [<CR><LF>+CCWA: <status>,<class2> [...]]
+CCWA?	+CCWA: <n>
+CCWA=?	+CCWA: (list of supported <n>s)

D.9.3 PARAMETERS

<n> (sets/shows the result code presentation status to the TE):
0 disable
1 enable
<mode> (when <mode> parameter is not given, network is not interrogated):
0 disable
1 enable
2 query status
<classx> is a sum of integers each representing a class of information (default 7):
1 voice (telephony)
2 data (refers to all bearer services; with <mode>=2 this may refer only to some bearer service if TA does not support values 16, 32, 64 and 128)
4 fax (facsimile services)
8 short message service
16 data circuit sync
32 data circuit async
64 dedicated packet access
128 dedicated PAD access
<status>:
0 not active
1 active
<number>: string type phone number of calling address in format specified by <type>
<type>: type of address octet in integer format (refer TS 24.008 subclause 10.5.4.7)
<alpha>: optional string type alphanumeric representation of <number> corresponding to the entry found in phonebook; used character set should be the one selected with command Select TE Character Set +CSCS
<CLI validity>:
0 CLI valid
1 CLI has been withheld by the originator.
2 CLI is not available due to interworking problems or limitations of originating network.
When CLI is not available (<CLI validity>=2), <number> shall be an empty string ("") and **<type>** value will

not be significant. Nevertheless, TA may return the recommended value 128 for <type> ((TON/NPI unknown in accordance with TS 24.008 subclause 10.5.4.7).
When CLI has been withheld by the originator, (<CLI validity>=1) and the CLIP is provisioned with the "override category" option (refer 3GPP TS 22.081 and 3GPP TS 23.081), <number> and **<type>** is provided. Otherwise, TA shall return the same setting for <number> and <type> as if the CLI was not available.
<subaddr>: string type subaddress of format specified by <satype>
<satype>: type of subaddress octet in integer format (refer TS 24.008 subclause 10.5.4.8)
<priority>: optional digit type parameter indicating that the eMLPP priority level of the incoming call. The priority level values are as defined in eMLPP specification 3GPP TS 22.067.

D.9.4 Examples

test command example:

AT+CCWA=1,1

OK

query command example:

AT+CCWA= ?
+CCWA :(0-1)

OK

set command example:

AT+CCWA?
+CCWA:0

OK

D.10 Call related supplemenatry services : AT+CHLD

D.10.1 DESCRIPTION

This command allows the control of the following call related services:
- a call can be temporarily disconnected from the MT but the connection is retained by the network;
- multiparty conversation (conference calls);
- the served subscriber who has two calls (one held and the other either active or alerting) can connect the other parties and release the served subscriber's own connection.

Calls can be put on hold, recovered, released, added to conversation, and transferred similarly as defined in 3GPP TS 22.030.
This is based on the GSM/UMTS supplementary services HOLD (Call Hold; refer 3GPP TS 22.083 clause 2), MPTY (MultiParty; refer 3GPP TS 22.084) and ECT (Explicit Call Transfer; refer 3GPP TS 22.091). The interaction of this command with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standards.
NOTE: Call Hold, MultiParty and Explicit Call Transfer are only applicable to teleservice 11.
It is recommended (although optional) that test command returns a list of operations which are supported. The call number required by some operations shall be denoted by "x" (e.g. +CHLD: (0,1,1x,2,2x,3)).

D.10.2 SYNTAX

Command	Possible response(s)
+CHLD=[<n]	+CME ERROR: <err>
+CHLD= ?	[+CHLD: (list of supported <n>s)]

D.10.3 PARAMETERS

<n>: integer type; equals to numbers entered before SEND button in 3GPP TS 22.030 [19] subclause 4.5.5.1
NOTE: The "directory number" case shall be handled with dial command D, and the END case with hangup command H (or +CHUP). The 4*"directory number" case is handled with +CTFR command.

D.10.4 Examples

test command example:

AT+CHLD=2 (put first call on hold and answer the second one)

OK

AT+CHLD=1 (release the second (active) call and recover the first(held) call)

OK

query command example:

AT+CHLD= ?

+CHLD :(0,1,1x,2,2x,3,4)

OK

D.11 AT$CPI – Request current call status

D.11.1 DESCRIPTION

Standard AT command +CLCC can not meet the implementation requirement because it is not an unsolicited command. User has to poll the call status. It wastes the computing power.
We offer two unsolicited commands to reflect current call status. It is easier for MMI designer to implement the dialer application.

D.11.2 SYNTAX

Command	Possible response(s)
$CPI=<n>	
$CPI=?	$CPI= 0, 1
$CPI?	$CPI = <n>
Unsolicited call progress indication format	$CPI: <cid>, <dir>, <stat>, <mode>, <mpty>, <tch>, <number>, <type> <CR><LF>

D.11.3 PARAMETERS

<n>:
0 no unsolicited call progress indication report to TE
1 enable the unsolicited report function
<cId>: integer type; call identification number as described in 3GPP TS 22.030 [19] subclause 4.5.5.1;
<dir>:
0 mobile originated (MO) call
1 mobile terminated (MT) call

<stat> (state of the call):
0 active
1 held
2 dialing (MO call)
3 alerting (MO call)
4 incoming (MT call)
5 waiting (MT call)
6 disconnected
<mode> (bearer/teleservice):
0 voice
1 data
2 fax
3 voice followed by data, voice mode
4 alternating voice/data, voice mode
5 alternating voice/fax, voice mode
6 voice followed by data, data mode
7 alternating voice/data, data mode
8 alternating voice/fax, fax mode
9 unknown
<mpty>:
0 call is not one of multiparty (conference) call parties
1 call is one of multiparty (conference) call parties
<tch>: TCH assigned flag; It is used to indicate if Traffic Channel has be assigned.
<number>: string type phone number in format specified by <type>
<type>: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7)

D.12 User Scenario

D.12.1 Originate call

```
atd123;                                  (originate call to number: 123)
OK
$CPI:1,0,2,0,0,0,"123",129               (call in dialing state)
$CPI:1,0,3,0,0,1,"123",129               (call in alerting state)
$CPI:1,0,0,0,0,1,"123",129               (call in active state)
AT+CHUP                                  (Hangup call)
OK
$CPI:1,0,6,0,0,0,"123",129               (call in disconnected state)
```

D.12.2 Termination call

```
RING                                     (incoming call)
$CPI:1,1,4,0,0,1,"0277051073",128        (call in incoming state, call number = “0277051073”)
ata                                      (answer call)
OK                                       (respose OK)
$CPI:1,1,0,0,0,1,"0277051073",128        (call in active state)
at+chup                                  (hangup call)
OK
$CPI:1,1,6,0,0,0,"0277051073",128        (call in disconnected state)
```

D.12.3 PIN Code Enable

```
at+clck="sc",1,"0000"
OK
```

D.12.4 Enter PIN Code

```
at+cpin="0000"
OK
```

D.12.5 PIN Code Disable

```
at+clck="sc",0,"0000"
OK
```