Z-COM,Inc.
7F-2,No.9.Prosperity RD.I
SBIP Hsinchu,300 Taiwan
Tel:886-3-5777364
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Z-Com

XG-182M

IEEE 802.11g Wireless Module

Release 0.4

7F-2,No.9.Prosperity RD. I
SBIP Hsinchu,300 Taiwan
Tel:886-3-5777364
Fax:886-3-5773359

FCC Statement

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user authority to operate the equipment.

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 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/TV technician for help.

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.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

IEEE 802.11b or 802.11g operation of this product in the U.S.A. is firmware-limited to channels 1 through 11.

CAUTION:

To comply with FCC RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons.
This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter
This device is intended only for OEM integrators under the following conditions:
The antenna must be installed such that 20 cm is maintained between the antenna and users. For laptop installations, the antenna must be installed to ensure that the proper spacing is maintained in the event the users places the device in their lap during use (i.e. positioning of antennas must be placed in the upper portion of the LCD panel only to ensure 20 cm will be maintained if the user places the device in their lap for use) and The transmitter module may not be co-located with any other transmitter or antenna. As long as the 2 conditions above are met, further transmitter testing will not be required.
However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

This transmitter module is authorized only for use in devices where the antenna may be installed such that 20 cm may be maintained between the antenna and users (for example access points, routers, wireless ASDL modems, certain laptop configurations, and similar equipment). The final end product must be labeled in a visible area with the following: "Contains TX FCC ID:M4Y-XG182MV02 ".

RF Exposure Manual Information That Must be Included

The users manual for end users must include the following information in a prominent location "IMPORTANT NOTE: To comply with FCC RF exposure compliance requirements, the antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter."

Additional Information That Must be Provided to OEM Integrators

The end user should NOT be provided any instructions on how to remove or install the device.

Service Center in U.S.A

Company Name : Zcomax.
Company Address:14545 Valley View Ave., Suite S Santa Fe Springs, CA 90670
Tel:562-926-4588

依據　低功率電波輻射性電機管理辦法

第十二條　經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

第十四條　低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前項合法通信，指依電信規定作業之無線電信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

1. Introduction

Designing for IEEE 802.11b/g WLAN network standard that works at 2.4 GHz Direct Sequence Spread Spectrum (DSSS), Z-Com XG-182M, a SDIO module, can be embedded in cellular phones, video, voice and multimedia applications. It target embedded and small form factor SDIO WLAN devices, offering the lowest possible power consumption.

Main features are:

- MAC/Baseband/RF WLAN system-on-chip (SoC)
- IEEE 802.11g wireless LAN standard
- IEEE 802.11b wireless LAN standard
- Bluetooth coexistence interface supported
- IEEE 802.11i security standard
- WPA/WPA2/WPA-PSK/WPA2-PSK
- AES /40- and 128-bit WEP/TKIP support based on 802.11i standard
- Quality of Service (QoS) compliant to the WMM and draft IEEE 802.11e standards
- IEEE 802.1x security standard
- EAP-TLS/EAP-TTLS/EAP-PEAP
- Deep sleep mode supported, lower power consumption
- RoHs compliant

2. Specification

This section defines the hardware and software features, which will be required for Z-Com XG-182M

2.1 Hardware Specification

Feature	Additional Information		
Chip Solution	MAC/BB/RF : 88w8686 (QFN Package)		
Host Interface	- SDIO/SPI - Board to board connector - LGA pad		
Connector	- Board to board connector (NAIS AXK850145Y)		
Antenna	- One External Antenna - Hirose U.FL-R-SMT compliant connector		
EEPROM	- 8Kbit		
Power Supply	Supply voltage	+3.3V± 7%	Max. voltage=6.5V
	Consumption current	400mA (typ.)	Peak < 700mA
	Internal voltage	+3.3V, +1.8V, +1.2V	
Operating Requirement	Operating Temperature: 0^0C to 55^0 C Operating Humidity: 5 ~90% Storage Temperature: -20^0C to 80^0 C Storage Humidity: 5 ~90%		
Dimension	*20mm(L)*23mm(W)*3.85mm(H)*		
Weight	TBD		

2.2 Firmware Specification

Feature	Additional Information
Standard	- IEEE 802.11i security standard - IEEE 802.1x security standard - IEEE 802.11e standard
Operating Mode	- Infrastructure mode - Ad-hoc mode
Power Management	- Power save mode - Deep sleep mode
Security	- WPA/WPA2/WPA-PSK/WPA2-PSK - 40- and 128-bit WEP - EAP-TLS/EAP-TTLS/EAP-PEAP
Supported OS	- WinCE 5.0 - Linux 2.6

2.3 Wireless RF Specification

Standard	IEEE 802.11g standard IEEE 802.11b standard
Data Rate	11g: 54M/48M/36M/24M/18M/12M/9/6Mbps 11b: 11Mbps/5.5Mbps/2Mbps/1Mbps
Transmission/Emission Type	Direct Sequence Spread Spectrum (DSSS)
Security	AES/40- and 128-bit WEP/TKIP
RF Frequency Range	USA (FCC): 2.412GHz ~ 2.462GHz (Ch1-11) Europe (CE): 2.412GHz ~ 2.472GHz (Ch1-13) Japan (TELEC): 2.412GHz ~ 2.472GHz (Ch1-13)
Data modulation type	OFDM/QAM-64/QAM-16/QPSK/BPSK DSSS/CCK/DQPSK/DBPSK
Output Power +-2dB	11g : 18.06dBm @ 54Mbps 11b : 20.09dBm @ 11/5.5/2/1Mbps
Sensitivity	11g: 54M : -68dBm 11b: 11M : -82dBm

2.4 Pin definition

XG-182M Pin Definition of CON1 (NAIS AXK850145Y) and LGA

CON1 Pin #	LGA Pin#	Pin Name	I/O	Connection	Description
2	17	BT_STATE	I	88W8686 Pin.56	Bluetooth State 0 = normal priority, Rx 1 = high priority, Tx Priority is signaled after BT_PRIORITY has been asserted. After priority signaling, BT_STATE indicates the Tx/Rx mode of Bluetooth radio.
3	6	BT_FREQ	I	88W8686 Pin.57	4-Wire BCA Mode: Bluetooth Frequency Asserted (logic high) when the Bluetooth transceiver hops into the restricted channels defined by the coexistence mechanism. 2-Wire, 3-Wire BCA Mode: Tie to ground (VSS)
4	7	BT_TX_CON	O	88W8686	Bluetooth WLAN Active

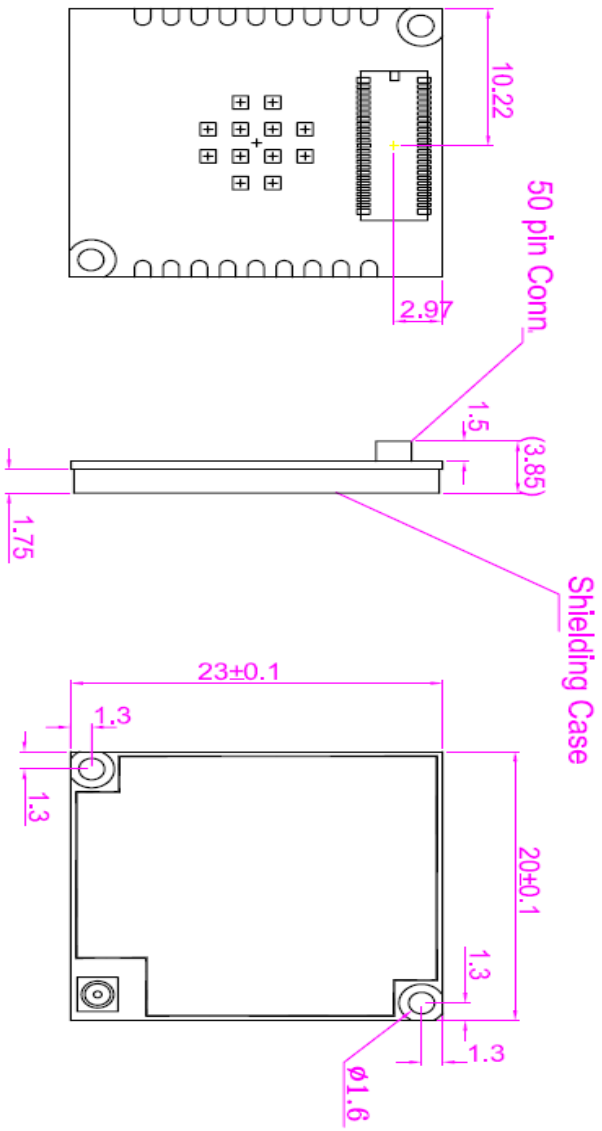
		FIRM		Pin.58	2-Wire BCA Mode: When high, WLAN is transmitting or receiving packets. 3-Wire BCA Mode: 0 = Bluetooth device allowed to transmit 1 = Bluetooth device not allowed to transmit This pin drives low when PDn is asserted. In WLAN Sleep mode, all I/O pads are powered down. This pad must stay at a low state even in power down mode.
5	8	BT_PRIORITY	I	88W8686 Pin.59	Bluetooth Priority 2-Wire BCA Mode: When high, Bluetooth is transmitting or receiving high priority packets. 3-Wire BCA Mode: When high, Bluetooth is transmitting or receiving packets.
49	9	SDIO_SPI_SEL	O	88W8686 Pin.22 or Pin.24	High or NC for SDIO, low for SPI interface
9	13	SPI_SDI/SD_CMD	I/O	88W8686 Pin.43	G-SPI Mode: SPI_SDI G-SPIData Input SDIO 4-bit Mode: SD_CMD Command/Response SDIO 1-bit Mode: SD_CMD Command Line SDIO SPI Mode: SD_CMD Data Input
10	12	SPI_SINTn/ SD_D2	I/O	88W8686 Pin.46	G-SPI Mode: SPI_SINTn G-SPI Interrupt Output (active low) SDIO 4-bit Mode: SD_D2 Data Line Bit[2] or Read Wait (optional) SDIO 1-bit Mode: SD_D2 Read Wait (optional) SDIO SPI Mode: SD_D2 Reserved
25	11	SPI_SCSn/SD_D0	I	88W8686 Pin.44	G-SPI Mode: SPI_SCSn G-SPI Chip Select Input (active low) SDIO 4-bit Mode: SD_D0 Data Line Bit [0] SDIO 1-bit Mode: SD_D0 Data Line SDIO SPI Mode: SD_D0 Data Output

32	16	SPI_CLK/SD_CLK	I/O	88W8686 Pin.42	G-SPI Mode: SPI_CLK G-SPI Clock Input SDIO 4-bit Mode: SD_CLK Clock Input SDIO 1-bit Mode: SD_CLK Clock Input SDIO SPI Mode: SD_CLK Clock Input
34	15	SPI_SDO/SD_D1	I/O	88W8686 Pin.45	G-SPI Mode: SPI_SDO G-SPI Data Output SDIO 4-bit Mode: SD_D1 Data Line Bit [1] SDIO 1-bit Mode: SD_D1 Interrupt SDIO SPI Mode: SD_D1 Reserved
35	14	SD_D3	I/O	88W8686 Pin.47	SDIO 4-bit Mode: SD_D3 Data Line Bit [3] SDIO 1-bit Mode: SD_D3 Reserved SDIO SPI Mode: SD_D3 Card Select (active low)
39	5	GPIO0	I/O	88W8686 Pin.11	Internal pull-up General Purpose Input/Output These pins are asynchronous to internal clocks. Several of these pins can be selected to perform alternate functions such as an LED controller. When not used, these pins should be left floating. GPIO1 – LED output (strap pin) (Tx power or Rx ready LED) GPIO0 – external oscillator control/SLEEPn; Wake up control During power down sleep mode, the external crystal oscillator is disabled, and, if implemented, also powered down by GPIO0
46	4	GPIO1	I/O	88W8686 Pin.40	
13,38	2,3	3.3V	Power	—	Power supply from host
1, 50	1,18,10	GND	Ground	—	Ground
6,7,8,11,12,14,15,16,17,18,19,2	NC	NC	NC	NC	NC

0,21,22,23,24,26,27,28,29,30,31,33,36,37,40,4142,43,44,45,47,48					

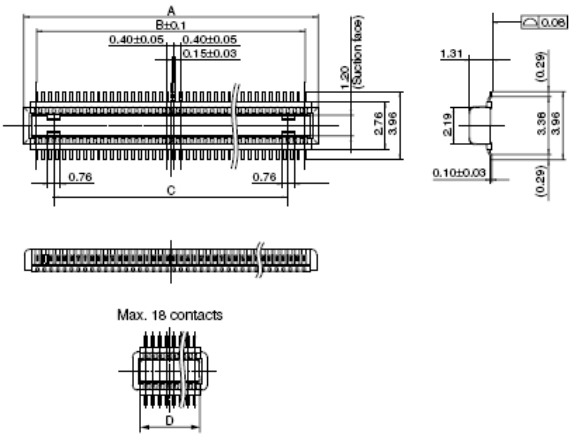
3. Physical Specification

3.1 Mechanical Drawing



3.2 Connector Drawing

(NAIS AXK850 145Y)



General tolerance: ±0.2

Dimension table (mm)

Number of contacts/ dimension	A	B	C	D
14	3.9	2.4	—	3.04
16	4.3	2.8	—	3.44
20	5.1	3.6	1.6	—
22	5.5	4.0	2.0	—
24	5.9	4.4	2.4	—
26	6.3	4.8	2.8	—
28	6.7	5.2	3.2	—
30	7.1	5.6	3.6	—
34	7.9	6.4	4.4	—
36	8.3	6.8	4.8	—
40	9.1	7.6	5.6	—
44	9.9	8.4	6.4	—
50	11.1	9.6	7.6	—
54	11.9	10.4	8.4	—
60	13.1	11.6	9.6	—
64	13.9	12.4	10.4	—
70	15.1	13.6	11.6	—
80	17.1	15.6	13.6	—
90	19.1	17.6	15.6	—
100	21.1	19.6	17.6	—

Note: "Products with V notch" and "products with V notch and post edge horseshoe bend" are mating compatible.

3.3 LGA Drawing

Fig 5.3.1 XG-182M See-Through Drawing

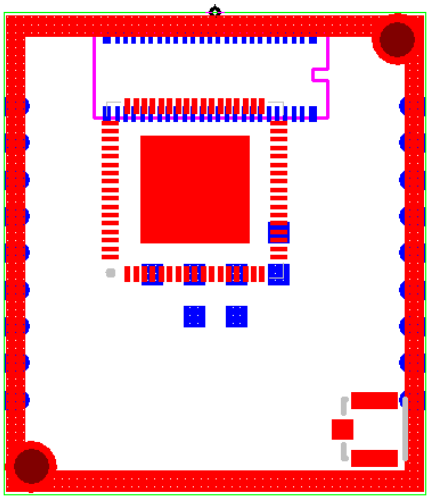


Fig 5.3.2 XG-182M Top View Drawing

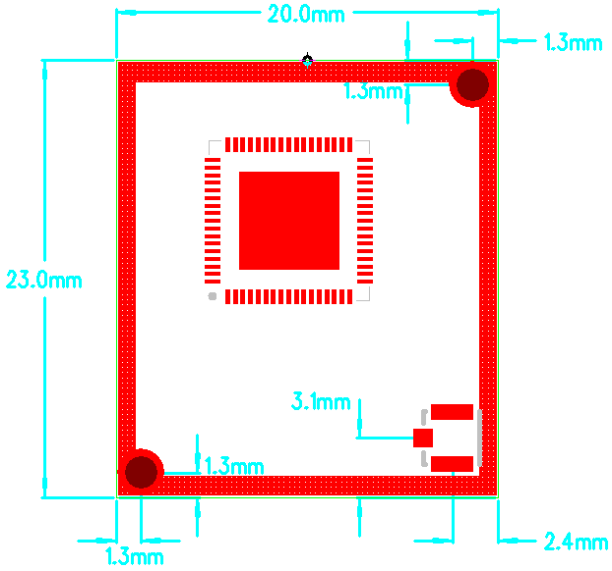
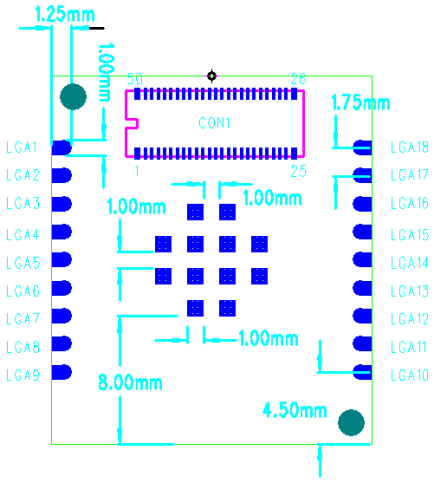


Fig 5.3.3 XG-182M Bottom View Drawing



4. Necessary Approval

(base on customer's requirement)

4.1 Country Approval

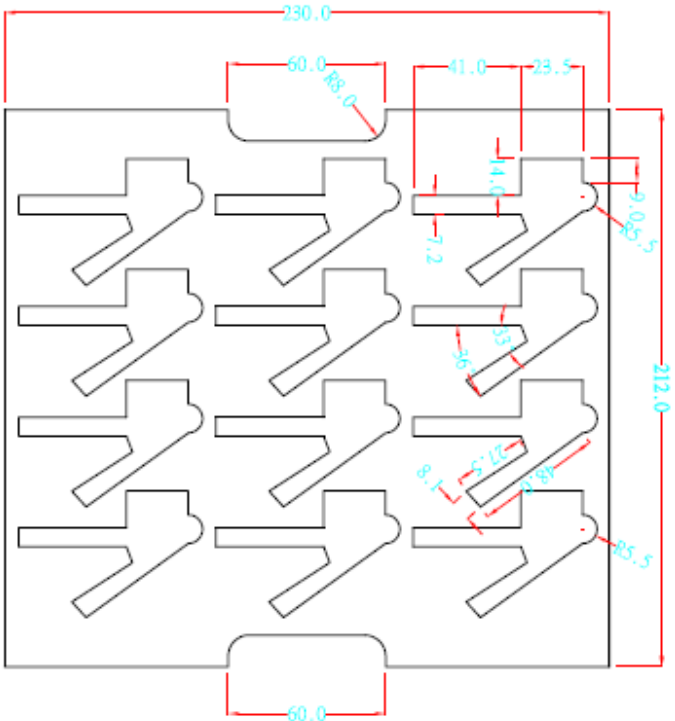
Safety	*European Union (CE mark)*	EN60950
EMI	*North America* *European Union (CE mark)* *Telec*	FCC Part 15 Class B EN55022 Class B EN300 328 STD-33 STD-66 VCCI
EMS	*European Union (CE mark)*	EN301 489-1 EN301 489-17

5. Packaging Specification

The following items will be required for the complete packaging of the Z-Com XG-182M:

Item	Comments
EPE Tray	● Suitable size and material to protect product
Inner Box	● Suitable size and material to protect product
Carton	● Suitable size and material to protect product
XG-182M	● WLAN module

5.1 Package drawing (Reference only)



6. Documents:

8.1 Reliability Test Plan: TBD

7. Warranty

One year warranty on the product.

7. Test program

```
Version:          1.1.3.04
Date:             09/16/05 (16:32:31)

Note:

debugLog 0
D:\XG-880M\zcommfgtool\xg880mmfgtool\0_0_0_1\utility\setup.ini
adapter_prefix ZCOM XG880m 802.11g CF card
Delay 1
maxWait 100
Retry 0
SpiDelay 0
UsbSpy 0
Open \Device\{A1576B69-FE79-4133-9E98-FCE6D9D678C3}
 DutIf_InitConnection: 0

CF8385P TEST MENU
------------------
10. Change Rx Antenna (1 for Antenna 1; 2 for Antenna 2; 3 for Diversity)
11. Get RF Channel
12. Set RF Channel (decimal)
13. Get RF DataRate (rate)
        (1 for  1M;  2 for  2M;  3 for 5.5M; 4 for 11M,  5 for 22M,
         6 for  6M;  7 for  9M;  8 for 12M;  9 for 18M, 10 for 24M,
        11 for 36M, 12 for 48M, 13 for 54M, 14 for 72M)
15. Get Tx Power setting at PA
16. Set Tx Power at PA (decimal decimal 1|0) (targetPower Correction DacX)
17. Set Continous Tx Mode
        (enable datarate (pattern=0))
18. Set CW Tx Mode (enable)
19. Set Carrier Suppression Tx Mode(enable)
22. Set Power at Antenna Using Cal data (decimal decimal) (ch pow)
25. Set DutyCycle Tx Mode
```

```
18. Set CW Tx Mode (enable)
19. Set Carrier Suppression Tx Mode(enable)
22. Set Power at Antenna Using Cal data (decimal decimal) (ch pow)
25. Set DutyCycle Tx Mode
        (enable dataRate ((payloadweight =50)(pattern=0)(shortPreamble=0))
26. Set Power Mode (0 for Active Idle; 1 for PowerSave(Long)  4 for PowerSave(Sho
rt))
27. Xosc Calibration (TU =10)
28. PSM cycling (NumOfCycle=1 (decimal) SleepDur=1000000(us)(decimal)
                rxDur=1000000(us)(decimal)  StableDelay=2000(us)(decimal))
31. Clear received packet Count (Start Rx FER test)
32. Get received packet Count (Stop Rx FER test)
33. Tx MultiCast Packet (0x)(len=400) (0x)(Count=64) (rate=4)
        (pattern=0xAA) (shortPreamble=1) (bssid-xx.xx.xx.xx.xx.xx)
34. Enable BSSID filter (enable bssid-xx.xx.xx.xx.xx.xx ssid-string)
37. SPI build-in header download (Use 38 to verify it)
39. SPI download from hex file. (Use 40 to verify it)
41. Dump E2PROM content
45. Read MACAddress
46. Write MACAddress (xx.xx.xx.xx.xx.xx)
49. Set PID/VID/ClassID
50. Get PID/VID/ClassID
53. Write CalTable (from file:CalDataFile.txt)
54. Read CalTable
57. Read HW Information
88. FW Version
89. Load Dut configuration file (FileName)
91. Get Rf Vga control (extMode setting)
92. Set Rf Vga control (extMode(0|1) setting(6 bits))
93. Get Rf Lc Cap control (extMode setting)
94. Set Rf Lc Cap control (extMode setting(3 bits))
99. Exit
Enter option:
```

DutApiSD83xxp TX Mode command:

12 1	Chose Antenna
22 1 13	Set target power
25 1 13	Enable Duty Cycle Mode
25 0	Disable
17 1 13	Enable Continuous Mode
17 0	Disable

DutApiSD83xxp Read/Write EEPROM command:

53	Read EEPROM
54	Write EEPROM