



MG245X
ISP Programming Guide
(In-System-Programming)

(VER.1.0)

REVISION HISTORY

Version	Date	Description
VER.1.0	2008.2.12	▪ First Version Release

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1. INTRODUCTION

MG245X(MG2455/MG2450), a ZigBee Single Chip of RadioPulse, is operated in 2.4GHz ISM frequency band.

MG245X has ZigBee RF Transceiver, modem, 8051 Processor, 8KB Data Memory and 97KB Flash Memory.

This document explains how to download the program image to FLASH Memory used as code memory of MG245X.

MG245X can distinguish Normal Mode and Programming Mode(ISP mode) by external pin. For the detail information of the pin, refer to 'MG2455/MG2450 Data sheet'.

When MG245X is operated as ISP mode, it uses UART1 for the connection with the host based on the PC. The following shows the configuration for it.

Port	UART1(P1.0-RX, P1.1-TX)
Baud Rate	115200bps
Data Bit	8-bit
Parity	No Parity
Stop Bits	1-Stop

ISP Serial packet Format:

Sync:0x55	Command	Addr-MSB	Addr-LSB	Size-MSB	Size-LSB
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Flash Word : 4 Bytes

Addr and Size are based on Flash Word Unit

2. FlowChart

The following shows the process to download the program image to FLASH Memory used as code memory of MG245X.

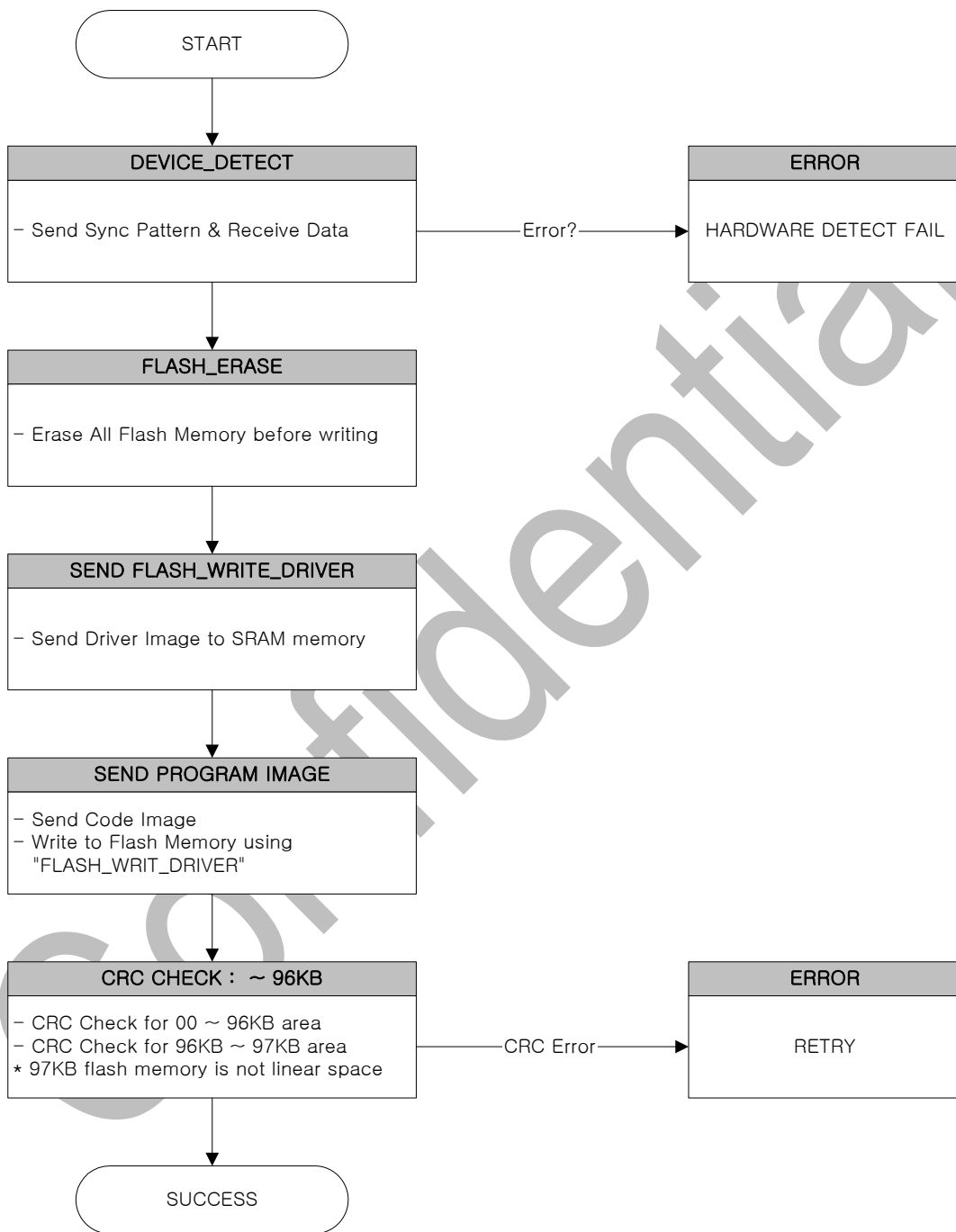


Figure 1. Process for downloading the program image

① **DEVICE_DETECT**

TX	0x55,0xFF,0xFF,0xFF,0xFF,0xFF
RX	0x55,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF

② **FLASH_ERASE**

BANK DEFAULT SET

TX	0x55,0x05,0x00,0x00,0x00,0x00
RX	0x55,0x05,0x00,0x00,0x00,0x00,0x00,0x00

TX	0x55,0x03,0x80,0x00,0x00,0x00
RX	0x55,0x03,0x80,0x00,0x00,0x00,0x00,0x00

③ **SEND_FLASH_WRIT_DRIVER**

BANK DEFAULT SET

TX	0x55,0x05,0x00,0x00,0x00,0x00
RX	0x55,0x05,0x00,0x00,0x00,0x00,0x00,0x00

TX	0x55,0x09,??,??,??,??
RX	0x55,0x09,??,??,??,??,0x00,00

TX	??,??,??,??,??,??,??,??,??, (Data)
----	--------------------------------------

④ **SEND_PROGRAM_IMAGE**

BANK SWITCH TO SRAM

TX	0x55,0x05,0x00,0x00,0x00,0x40
RX	0x55,0x05,0x00,0x00,0x00,0x40,0x00,0x00

TX	0x55,0x09,??,??,??,??
RX	0x55,0x09,??,??,??,??,0x00,0x00

TX	??,??,??,??,??,??,??,??,??, (Data)
----	--------------------------------------

FLASH WRITING

TX	0x55,0x06,0x00,0x03,0x00,0x00
RX	0x55,0x06,0x00,0x03,0x00,0x00,0x00,0x00

⑤ **CRC_CHECK**

BANK DEFAULT SET

TX	0x55,0x05,0x00,0x00,0x00,0x00
RX	0x55,0x05,0x00,0x00,0x00,0x00,0x00,0x00

TX	0x55,0x04,0x00,0x00,0x60,0x00
RX	0x55,0x04,0x00,0x00,0x60,0x00,??
TX	0x55,0x04,0x80,0x00,0x01,0x00
RX	0x55,0x04,0x80,0x00,0x01,0x00,??

3. MG245X ISP Command

When MG245X executes ISP mode, there is ROM used as bootloader in the MG245X. In ISP mode, ISP function is executed by this ROM code.

ISP command supported in ROM of MG245X is as follows.

Identifier	Description	
0x00	Flash Read	
0x01	Flash Write	Not Used
0x02	Flash Page Erase	
0x03	Flash Mass Erase	
0x04	Flash Check Sum calculation	
0x05	Flash Bank Setup	
0x06	Execution	
0x07	Flash Status Check	
0x08	RAM Read	
0x09	RAM Write	

ISP commands above performs the functionality in ROM with 'isp_cmd' function provided as a source and corresponding function has the following functionality.

Prototype	void isp_cmd(u_char cmd, unsigned addr, unsigned size)
Parameter	cmd : ISP command addr(2byte) : Address size(2byte) : Data Size
Description	Execute corresponding ISP command in the ROM of MG245X.
Return	void

RAM Write Example

RAM WRITE (Write 0x000A byte in 0x0000 address)

```

HOST      : 55 09 0000 000A      ; command
MG245X    : 55 09 0000 000A 00    ; command response
HOST      : 00010203040506070809 ; code data
MG245X    : 00                    ; dummy byte

```

Code Execution Example

CODE WRITE (LCALL 0x0003 address.)

```

HOST      : 55 06 0003 0000      ; command
MG245X    : 55 06 0003 0000 00    ; return value

```

4. ISP Programming

The following explains the functionality of ISP Sync, Flash Write, Flash Read for ISP programming of MG245X.

①ISP Sync

Prototype	void isp_sync(void)
Parameter	void
Description	Can check whether MG245X enter to ISP mode or no normally.
	Tx 0x55,0xFF,0xFF,0xFF,0xFF,0xFF
	RX 0x55,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF
Return	void

②Flash Write

Prototype	void ihx_fsh_writ(const char *fname)
Parameter	fname: The name of Intel hex file to write in the flash.
Description	Write the desired data to the flash.
Return	void

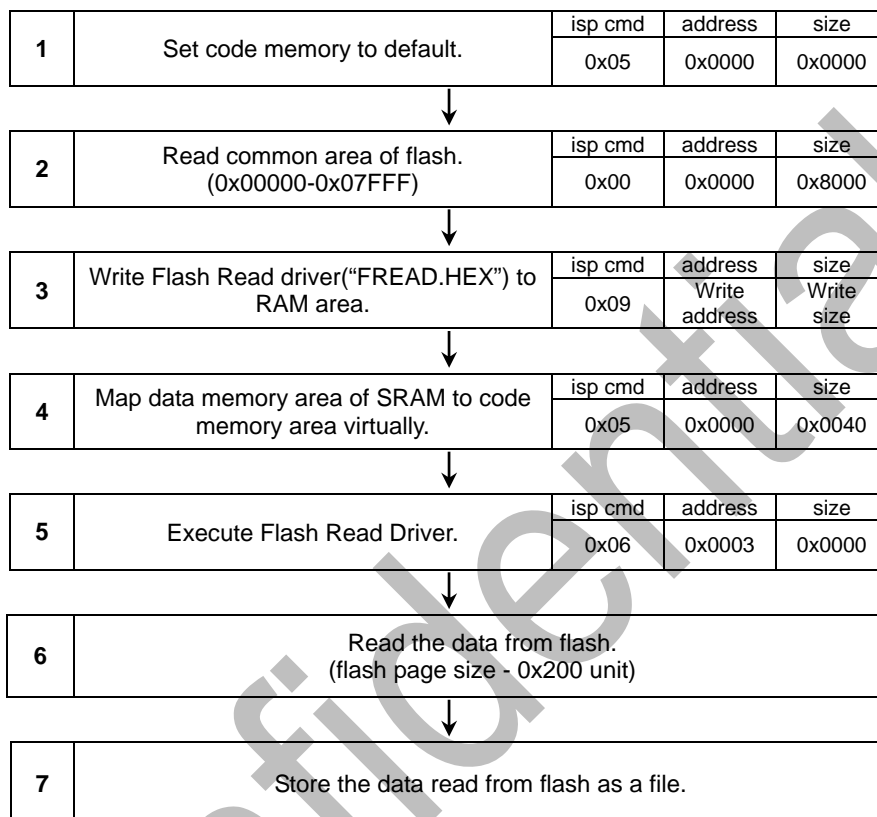
The following is the process for writing to flash of MG245X.

1	Total Flash Erase	isp cmd	address	size
		0x03	0x8000	0x0000
↓				
2	Set Code Memory to default.	isp cmd	address	size
		0x05	0x0000	0x0000
↓				
3	Driver to execute flash write Write ("FWRIT.HEX") to RAM.	isp cmd	address	size
		0x09	Write address	Write size
↓				
4	Execute a driver by mapping data memory area of SRAM to code memory area virtually.	isp cmd	address	size
		0x05	0x0000	0x0040
↓				
5	Write the data, which you want to write to flash, to RAM and execute it. (flash page size - 0x200 unit)	isp cmd	address	size
		0x09	Write address	Write size
		0x06	0x0003	0x0000
↓				
6	Set code memory to default.	isp cmd	address	size
		0x05	0x0000	0x0000
↓				
7	Set mcu_wait during flash operation.	isp cmd	address	size
		0x09	0x270E	0x0001
↓				
8	Check CRC	isp cmd	address	size
		0x04	Start address	size

③Flash Read

Prototype	void ihx_fsh_read(const char *fname)
Parameter	fname : The name of Intel hex file to store the data read from flash.
Description	Read the data of flash.
Return	void

The following is the process for reading from the flash of MG245X.



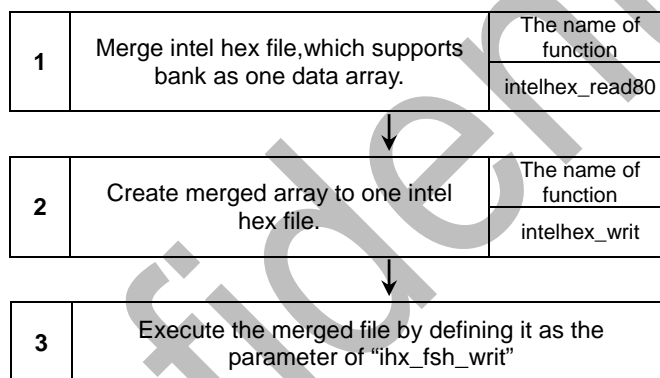
5. FLASH BANK Support

When you want to write the intel hex file, which supports bank function, to flash, please merge corresponding hex file as one hex file by "intelhex_read80" function of the library provided.

Prototype	void intelhex_read80 (const char *f0, const char *f1, const char *f2, const char *f3, u_char *codes)
Parameter	f0 : The name of file to write to BANK 0. f1 : The name of file to write to BANK 1. f2 : The name of file to write to BANK 2. (NOT support) f3 : The name of file to write to BANK 3. codes : The array for merged total data.
Description	Merge a hex file of BANK 0, 1, 2, 3 by one data array.
Return	void

CAUTION: It is recommended that f3(BANK3) should NOT be used as application usage.

The following is the process for flash write of MG245X when BANK is supported.



6. Source Files

Source files are provided to develop the ISP download program of MG245X.

This source files is same as the library used when developing 'Device-Programmer tool' and a user can develop MG245X ISP download program based on the environment and purpose of development.

The following is the source file list of ISP programming.

File name	Description	
serial.h serial.c	serial interface	Please modify serial interface based on your environment of development.
intelhex.h intelhex.c	Intelhex format routines	Execute the function of read, write etc. of intel hex file.
mg2455_isp.c	ISP main routine	Has main routine including total ISP example.
mg2455_rom_isp.h mg2455_rom_isp.c	ISP host handler for internal ROM	
mg2455_ihx_isp.h mg2455_ihx_isp.c	ISP host handler for internal ROM	
mg2455_ihx_merge32k.c	ISP host handler for internal ROM	Functions related to merge intel hex file.
FREAD.HEX	Use when flash read.	
FWRIT.HEX	Use when flash write.	

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About RadioPulse Inc.

RadioPulse is a Being Wireless solution provider offering wireless communication & network technologies and developing next generation wireless networking technologies.

The new wireless networking solutions envisioned by RadioPulse will enable user to enjoy wireless technologies with easy interface.

Founded in April of 2003, the company maintains its headquarters and R&D center in Seoul, Korea.

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