GPIO와 LED
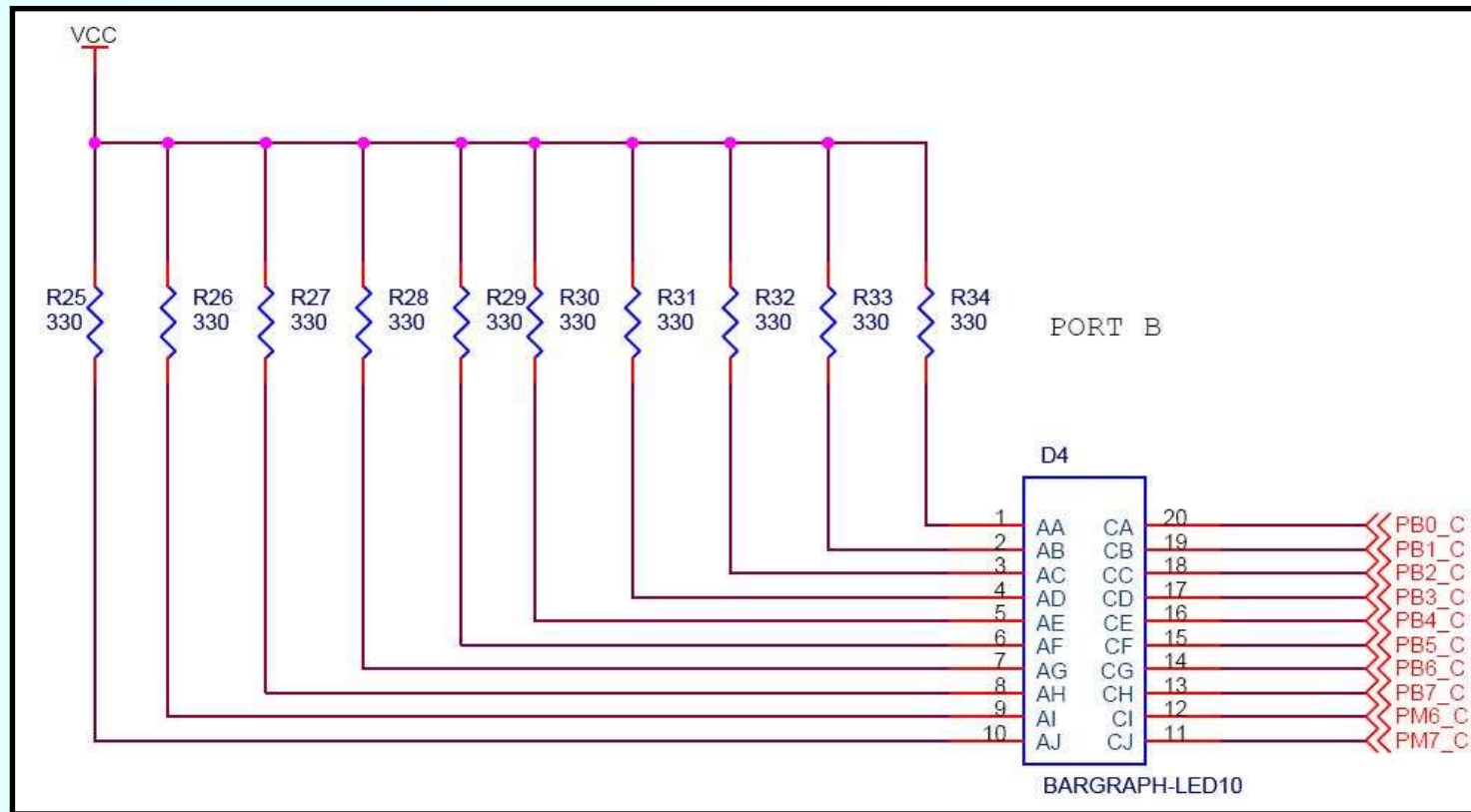
HCS12의 LED 회로도

- 포트 B와 M에 연결된 BAR-LED
- 포트 B는 MEBI (Multiplexed External Bus Interface)
- 포트 M은 PIM (Port Integration Module)

GPIO 제어

Port Register B

- '0' -> LOW
- '1' -> HIGH

	BIT 7	6	5	4	3	2	1	BIT 0
Read: Write:	Bit 7	6	5	4	3	2	1	Bit 0
Reset:	—	—	—	—	—	—	—	—
Single Chip:	PB7	PB6	PB5	PB4	PB3	PB2	PB1	PB0
Expanded Wide, Emulation Narrow with IVIS, and Peripheral:	AB/DB7	AB/DB6	AB/DB5	AB/DB4	AB/DB3	AB/DB2	AB/DB1	AB/DB0
Expanded Narrow:	AB7	AB6	AB5	AB4	AB3	AB2	AB1	AB0

Data Direction Register B

- '0' -> 해당 비트를 입력으로 설정
- '1' -> 해당 비트를 출력으로 설정

	BIT 7	6	5	4	3	2	1	BIT 0
Read: Write:	Bit 7	6	5	4	3	2	1	Bit 0
Reset:	0	0	0	0	0	0	0	0

Embedded System Lab.

Definitions - S12CPU15V1_2.h 헤더 파일 확인

	BIT 7	6	5	4	3	2	1	BIT 0
Read: Write:	Bit 7	6	5	4	3	2	1	Bit 0
Reset:	—	—	—	—	—	—	—	—
Single Chip:	PB7	PB6	PB5	PB4	PB3	PB2	PB1	PB0
Expanded Wide, Emulation Narrow with IVIS, and Peripheral:	AB/DB7	AB/DB6	AB/DB5	AB/DB4	AB/DB3	AB/DB2	AB/DB1	AB/DB0
Expanded Narrow:	AB7	AB6	AB5	AB4	AB3	AB2	AB1	AB0

	BIT 7	6	5	4	3	2	1	BIT 0
Read: Write:	Bit 7	6	5	4	3	2	1	Bit 0
Reset:	0	0	0	0	0	0	0	0

```
typedef union uPORTB
  {
  tU08  byte;
  struct
    {
    tU08 ptb0    :1;        /*i/o port pins */
    tU08 ptb1    :1;
    tU08 ptb2    :1;
    tU08 ptb3    :1;
    tU08 ptb4    :1;
    tU08 ptb5    :1;
    tU08 ptb6    :1;
    tU08 ptb7    :1;
    }bit;
  }tPORTB;

#define PTB0    0x01    /*bit masks */
#define PTB1    0x02
#define PTB2    0x04
#define PTB3    0x08
#define PTB4    0x10
#define PTB5    0x20
#define PTB6    0x40
#define PTB7    0x80
```
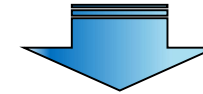
```
typedef union uDDRB
  {
  tU08  byte;
  struct
    {
    tU08 ddrb0    :1;    /*data direction bits (0:input;1:output) */
    tU08 ddrb1    :1;
    tU08 ddrb2    :1;
    tU08 ddrb3    :1;
    tU08 ddrb4    :1;
    tU08 ddrb5    :1;
    tU08 ddrb6    :1;
    tU08 ddrb7    :1;
    }bit;
  }tDDRB;

#define DDRB0    0x01    /*bit masks */
#define DDRB1    0x02
#define DDRB2    0x04
#define DDRB3    0x08
#define DDRB4    0x10
#define DDRB5    0x20
#define DDRB6    0x40
#define DDRB7    0x80
```

Port Register M

- '0' -> LOW
- '1' -> HIGH

	Bit 7	6	5	4	3	2	1	Bit 0
Read: Write:	PTM7	PTM6	PTM5	PTM4	PTM3	PTM2	PTM1	PTM0
CAN:	TXCAN3	RXCAN3	TXCAN2	RXCAN2	TXCAN1	RXCAN1	TXCAN0	RXCAN0
BDLC:							TXB	RXB
Reset	0	0	0	0	0	0	0	0

Data Direction Register M

- '0' -> 해당 비트를 입력으로 설정
- '1' -> 해당 비트를 출력으로 설정

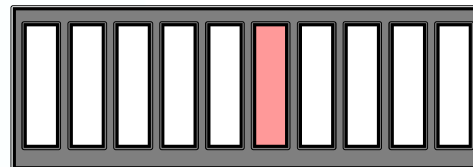|	Bit 7	6	5	4	3	2	1	Bit 0
Read: Write:	DDRM7	DDRM6	DDRM5	DDRM4	DDRM3	DDRM2	DDRM1	DDRM0
Reset:	0	0	0	0	0	0	0	0

Embedded System Lab.

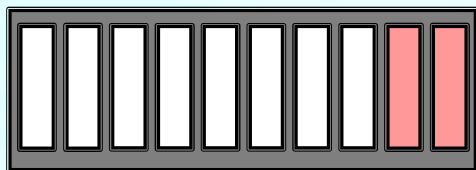## LED바와 2진수와의 관계
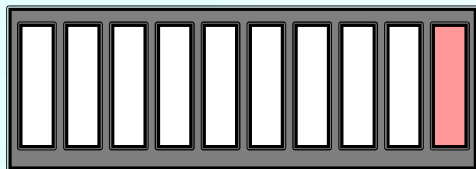
10진수 : 1
2진수 : 0000 0001
16진수 : 0x01
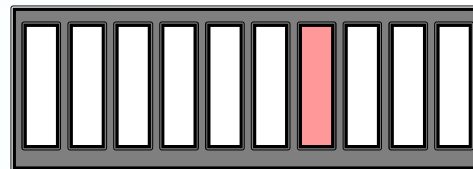
10진수 : 8
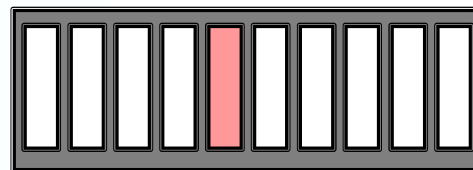2진수 : 0000 1000
16진수 : 0x08
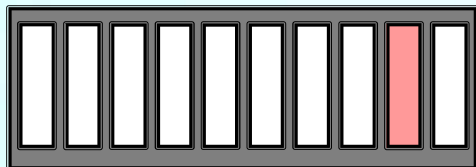
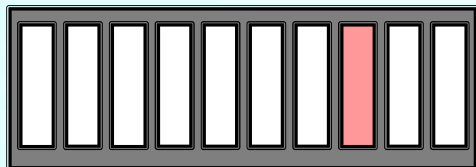10진수 : 2
2진수 : 0000 0010
16진수 : 0x02
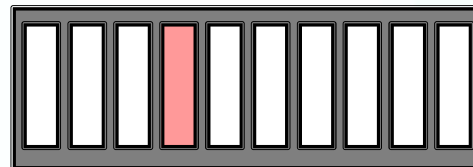
10진수 : 16
2진수 : 0001 0000
16진수 : 0x10

10진수 : 3
2진수 : 0000 0011
16진수 : 0x03

10진수 : 32
2진수 : 0010 0000
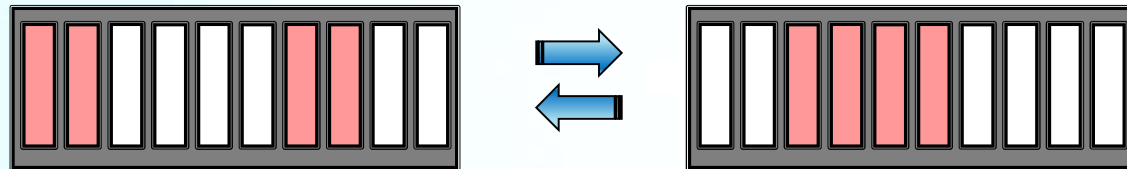16진수 : 0x20

10진수 : 4
2진수 : 0000 0100
16진수 : 0x04

10진수 : 64
2진수 : 0100 0000
16진수 : 0x40

Embedded System Lab.
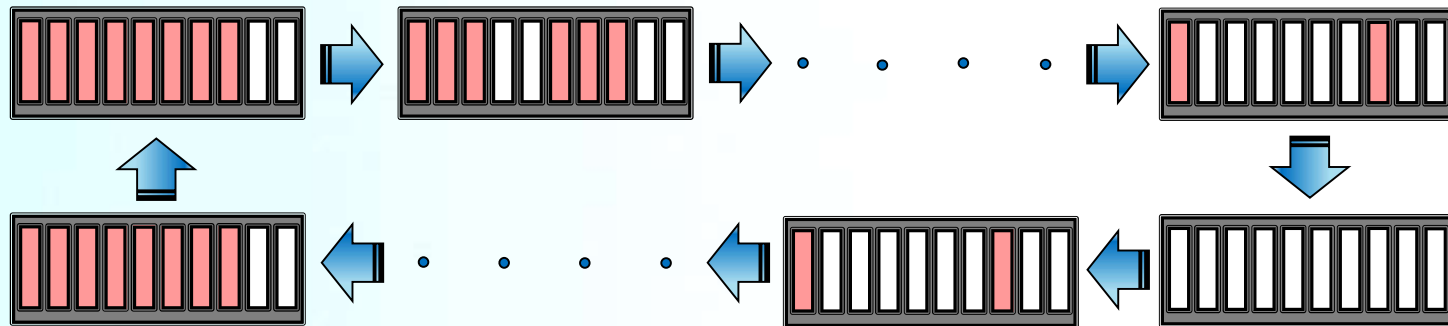
GPIO 제어

실습 1 - LED 점멸

- 1,2,7,8 번째 LED 점멸 후 3,4,5,6 LED 점멸 ➔ 앞의 상황 반복

■ 실습 2

■ LED로 그림과 같이 블록 채웠다가 비우기 (Port B만 이용)

■ 실습 3

■ 1~8번의 LED에서 두 개의 포인트가 각각 shift