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DI 機能

MA-E3xx シリーズでは CPLD により実装していた、チャタリング除去フィルター、カウンターの機能をマイコンで実装しています。

機能は I2C 経由(Bus No.1, I2C-Address 0x4f)で利用します。

アドレスマップ

DI 機能は I2C の下記アドレスにマップされています。

Name	Address	Bit	Reset Value	Description
Filtered DI(R/O)	0x06	[7:5] Reserved		
		[4] OPT-Switch		OPT-Switch
		[3:0] DI3..0		DI Status ¹⁾
Raw DI(R/O)	0x07	[7:5] Reserved		
		[4] OPT-Switch		OPT-Switch
		[3:0] DI3..0		DI Status(チャタリング除去フィルターなし)
DI Event Enable(R/W)	0x0a	[7:5] Reserved	xxx	
		[4] OPT-Switch	x	OPT-Switch ²⁾
		[3:0] DI3..0 Enable	0000	1: Enable
DI Polarity(R/W)	0x0b	[7:5] Reserved	xxx	
		[4] OPT-Switch	x	OPT-Switch ³⁾
		[3:0] DI3..0 Polarity	0000	0: Rising / 1: Falling
Counter Control (R/W)	0x10	[7:5] Reserved	xxx	
		[4] Counter4 Start (OPT-Switch)	0	1: Enable
		[3] Counter3 Start	0	
		[2] Counter2 Start	0	
		[1] Counter1 Start	0	
		[0] Counter0 Start	0	
Counter Match Enable (R/W)	0x11	[7:5] Reserved	xxx	
		[4] Counter4 Match Event Enable	0	1: Enable
		[3] Counter3 Match Event Enable	0	
		[2] Counter2 Match Event Enable	0	
		[1] Counter1 Match Event Enable	0	
		[0] Counter0 Match Event Enable	0	

Name	Address	Bit	Reset Value	Description
Counter Match Status (R/W1c)	0x12	[7:5] Reserved	xxx	1: Match / Write 1 to clear
		[4] Counter4 Match	0	
		[3] Counter3 Match	0	
		[2] Counter2 Match	0	
		[1] Counter1 Match	0	
[0] Counter0 Match	0			
Counter Compare0 (R/W)	0x13	[7:0]	00000000	
Counter Compare1 (R/W)	0x14	[7:0]	00000000	
Counter Compare2 (R/W)	0x15	[7:0]	00000000	
Counter Compare3 (R/W)	0x16	[7:0]	00000000	
Counter Compare4 (R/W)	0x17	[7:0]	00000000	
Counter Value0 (R/W)	0x18	[7:0]	00000000	
Counter Value1 (R/W)	0x19	[7:0]	00000000	
Counter Value2 (R/W)	0x1a	[7:0]	00000000	
Counter Value3 (R/W)	0x1b	[7:0]	00000000	
Counter Value4 (R/W)	0x1c	[7:0]	00000000	

サンプルプログラム

File	Stat	SHA1SUM	Info
libdi.tar.gz	2021/11/15 13:31 3.1 KB	c23c8d6bffaac9249ea8d2f0be51c049a307c46a	DI サンプル

```
import std/options
import std/strformat
import lib/msp430

proc main() =
# ライブラリ初期化
let di = newMsp430(1, 0x4f)

# Read DI Status
let di_stat_opt = di.get_di_status()
if di_stat_opt.isSome:
echo &"* DI Value: {di_stat_opt.get()}"

# Read DI Polarity
let di_pol_opt = di.get_di_polarity()
if di_pol_opt.isSome:
```

```
    echo &"* DI Polarity: {di_pol_opt.get()}"

for idx in countUp(0, 4):
    # Read DI Counter Enable
    let enable_opt = di.get_counter_onoff(idx)
    if not enable_opt.isSome:
        continue
    let enable = enable_opt.get()
    if enable:
        echo &"* DI[{idx}] Counter is enable."
    else:
        # Enable DI Counter
        let res = di.onoff_counter(idx, true)
        echo &"* DI[{idx}] Counter: set enable -> result: {res}"

    # Read DI Counter Value
    let val_opt = di.get_counter_val(idx)
    if val_opt.isSome:
        let val = val_opt.get()
        echo &"* DI[{idx}] Counter Value: 0x{val:02x}"

when isMainModule:
    main()
```

Usage

```
root@gemini:~# /tmp/di_sample
* DI Value: @[0, 0, 0, 0, 0]
* DI Polarity: @[Rising, Rising, Rising, Rising, Rising]
* DI[0] Counter: set enable -> result: true
* DI[0] Counter Value: 0x00
* DI[1] Counter: set enable -> result: true
* DI[1] Counter Value: 0x00
* DI[2] Counter: set enable -> result: true
* DI[2] Counter Value: 0x00
* DI[3] Counter: set enable -> result: true
* DI[3] Counter Value: 0x00
* DI[4] Counter: set enable -> result: true
* DI[4] Counter Value: 0x00

root@gemini:~# /tmp/di_sample
* DI Value: @[0, 0, 0, 0, 0]
* DI Polarity: @[Rising, Rising, Rising, Rising, Rising]
* DI[0] Counter is enable.
* DI[0] Counter Value: 0x00
* DI[1] Counter is enable.
* DI[1] Counter Value: 0x00
```

```
* DI[2] Counter is enable.  
* DI[2] Counter Value: 0x00  
* DI[3] Counter is enable.  
* DI[3] Counter Value: 0x00  
* DI[4] Counter is enable.  
* DI[4] Counter Value: 0x04 <----- OPT-Switch をポチポチ押した
```

1)
DI を 64Hz 2bit shift register でフィルタ処理(チャタリング除去)した状態を取得できます
2) , 3)
USBのコンソール横の Option Switch

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