DSP开发笔记

Taurus

2024/12/24

C2000Ware介绍

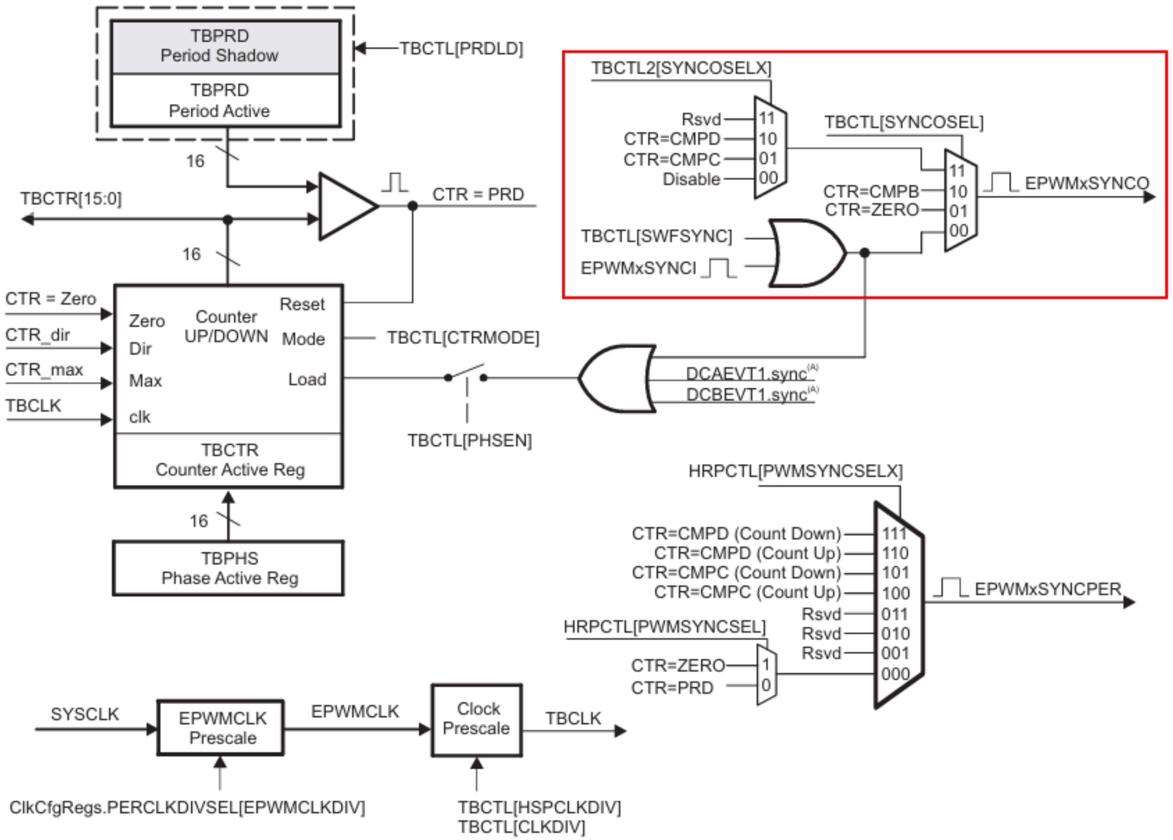
Table 1-1. C2000Ware Root Directories

Directory Name	Description
boards	Contains the hardware design schematics, BOM, gerber files, and documentation for C2000 controlCARDS,
device_support	Contains all device-specific support files, bit field headers and device development user's guides.
docs	Contains the C2000Ware package user's guides and the HTML index page of all package documentation.
driverlib	Contains the device-specific driver library and driver-based peripheral examples.
libraries	Contains the device-specific and core libraries.

目录名称	描述
boards	包含 C2000 控制套件的硬件设计原理图、物料清单、光绘文件和文档
device_support	包含所有特定设备的支持文件、位域头文件和设备开发用户指南
docs	包含 C2000Ware 软件包用户指南和所有软件包文档的 HTML 索引页面
driverlib	包含特定设备的驱动程序库和基于驱动程序的外设示例
libraries	包含特定设备和核心库

28379D芯片ePWM移相工作原理

Figure 15-5. Time-Base Submodule Signals and Registers



A. These signals are generated by the digital compare (DC) submodule.

Signal	Description
EPWMxSYNCI	Time-base synchronization input. Input pulse used to synchronize the time-base counter with the counter of ePWM module earlier in the synchronization chain. An ePWM peripheral can be configured to use or ignore this signal. For the first ePWM module in each synchronization chain, this signal may come from a device pin via INPUT5 or INPUT6 of the Input X-BAR or from a previous ePWM module. For subsequent ePWM modules in each chain, this signal is passed from another ePWM peripheral. For example, EPWM2SYNCI is generated by the ePWM1 peripheral, EPWM3SYNCI is generated by ePWM2 and so forth. For information on the synchronization order of a particular device, see Section 15.4.3.3.
EPWMxSYNCO	Time-base synchronization output. This output pulse is used to synchronize the counter of an ePWM module later in the synchronization chain. The ePWM module generates this signal from one of three event sources: 1. EPWMxSYNCI (Synchronization input pulse) 2. CTR = Zero: The time-base counter equal to zero (TBCTR = 0x00). 3. CTR = CMPB: The time-base counter equal to the counter-compare B (TBCTR = CMPB) register.

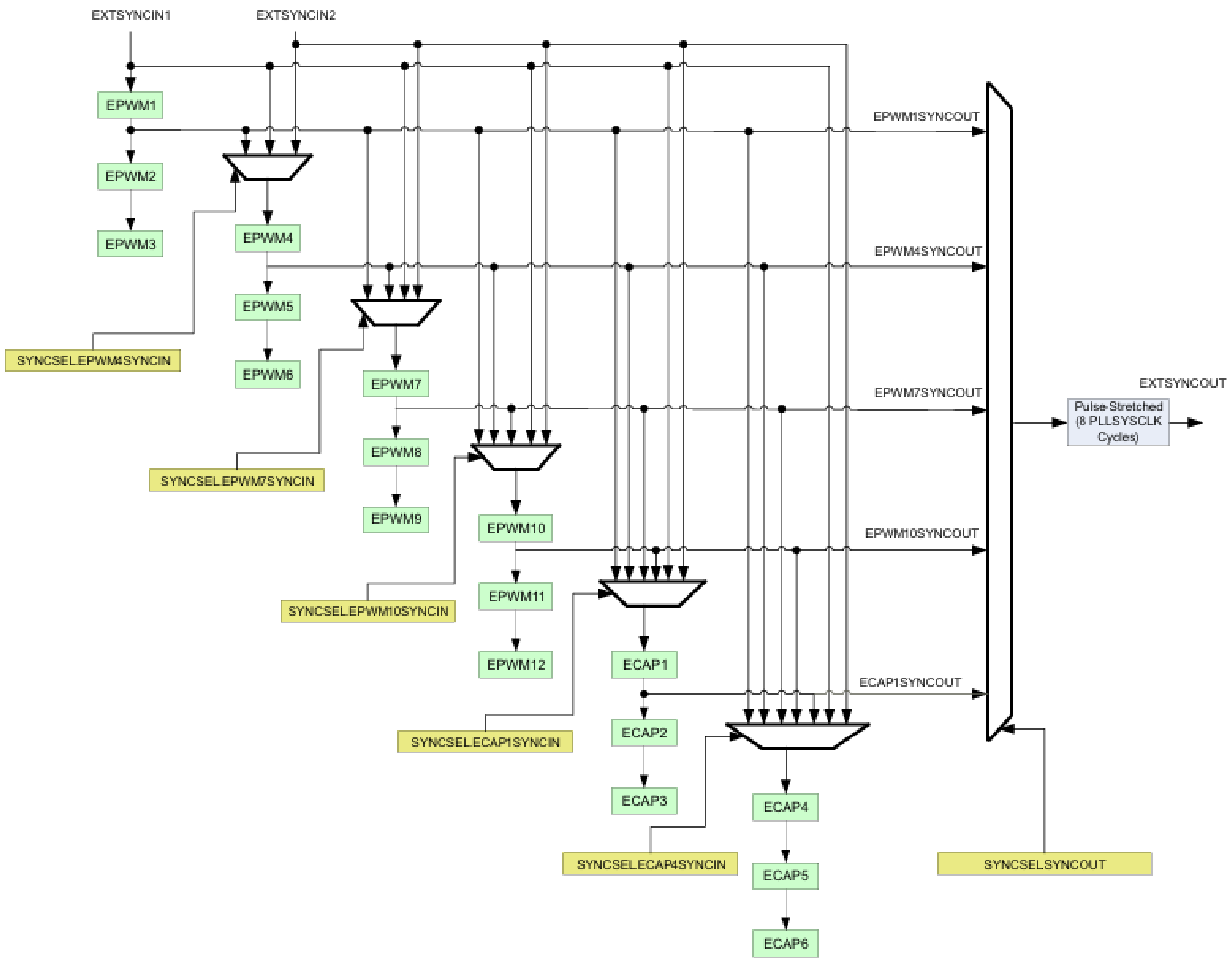


图 8-51. 同步链架构

- ➢ EPWM1SYNCI：来自外部GPIO；
- ➢ EPWM1SYNCO：来自CTR=CMPB/CTR=ZERO /EPWM1SYNCI等；
- ➢ EPWM2SYNCI： EPWM1SYNCO；
- ➢ EPWM2SYNCO：来自CTR=CMPB/CTR=ZERO /EPWM1SYNCI等；
- ➢ ……

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■ 产生同步输入脉冲信号EPWMxSYNCI时，TBCTR马上加载为TBPHS。

Figure 15-8. Time-Base Up-Count Mode Waveforms

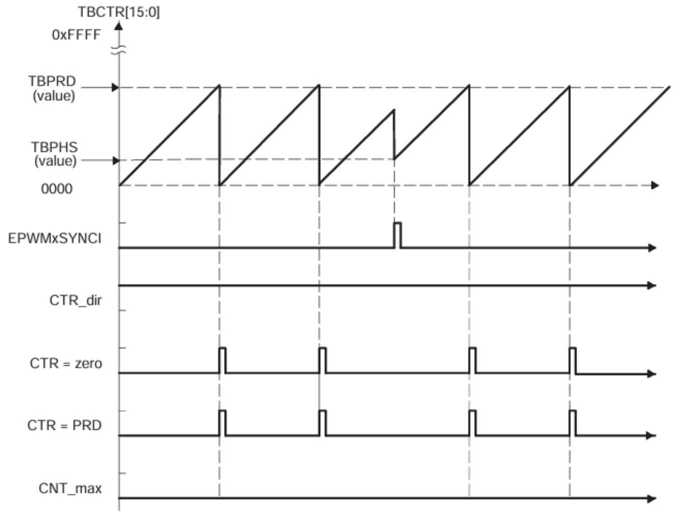


Figure 15-9. Time-Base Down-Count Mode Waveforms

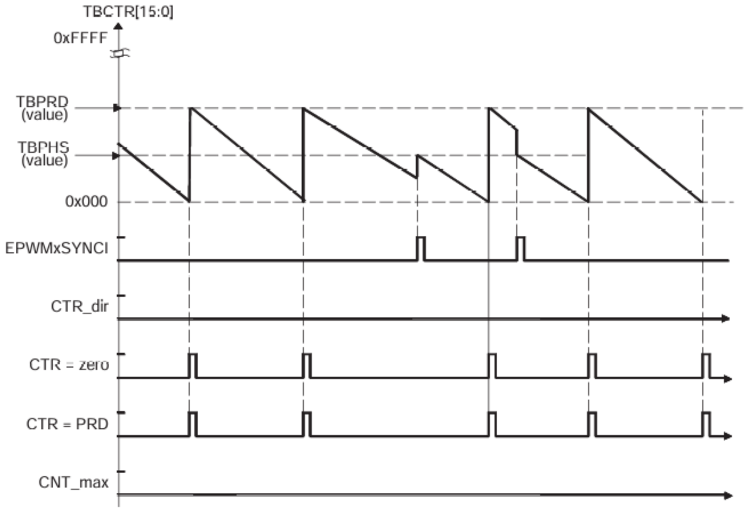


Figure 15-10. Time-Base Up-Down-Count Waveforms, TBCTL[PHSDIR = 0] Count Down On Synchronization Event

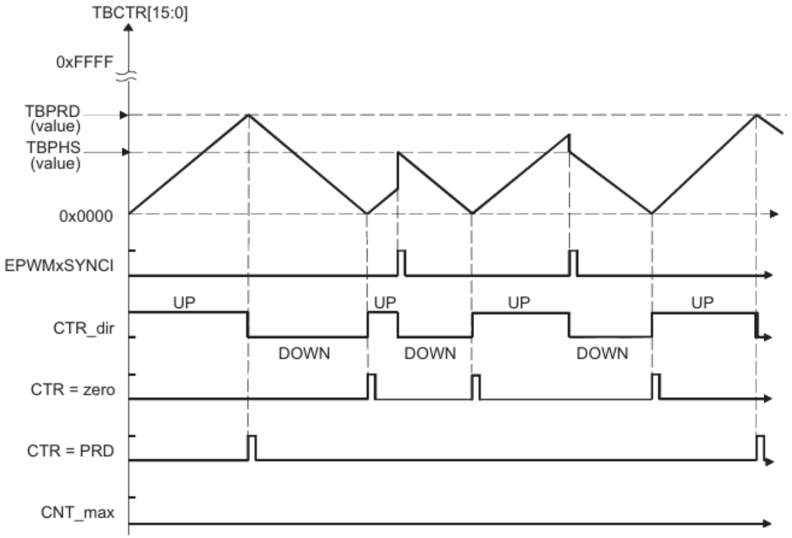
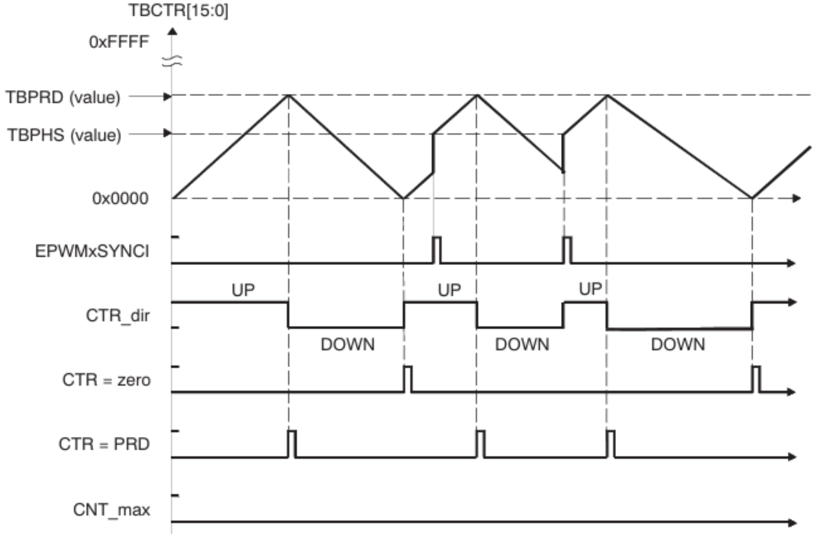
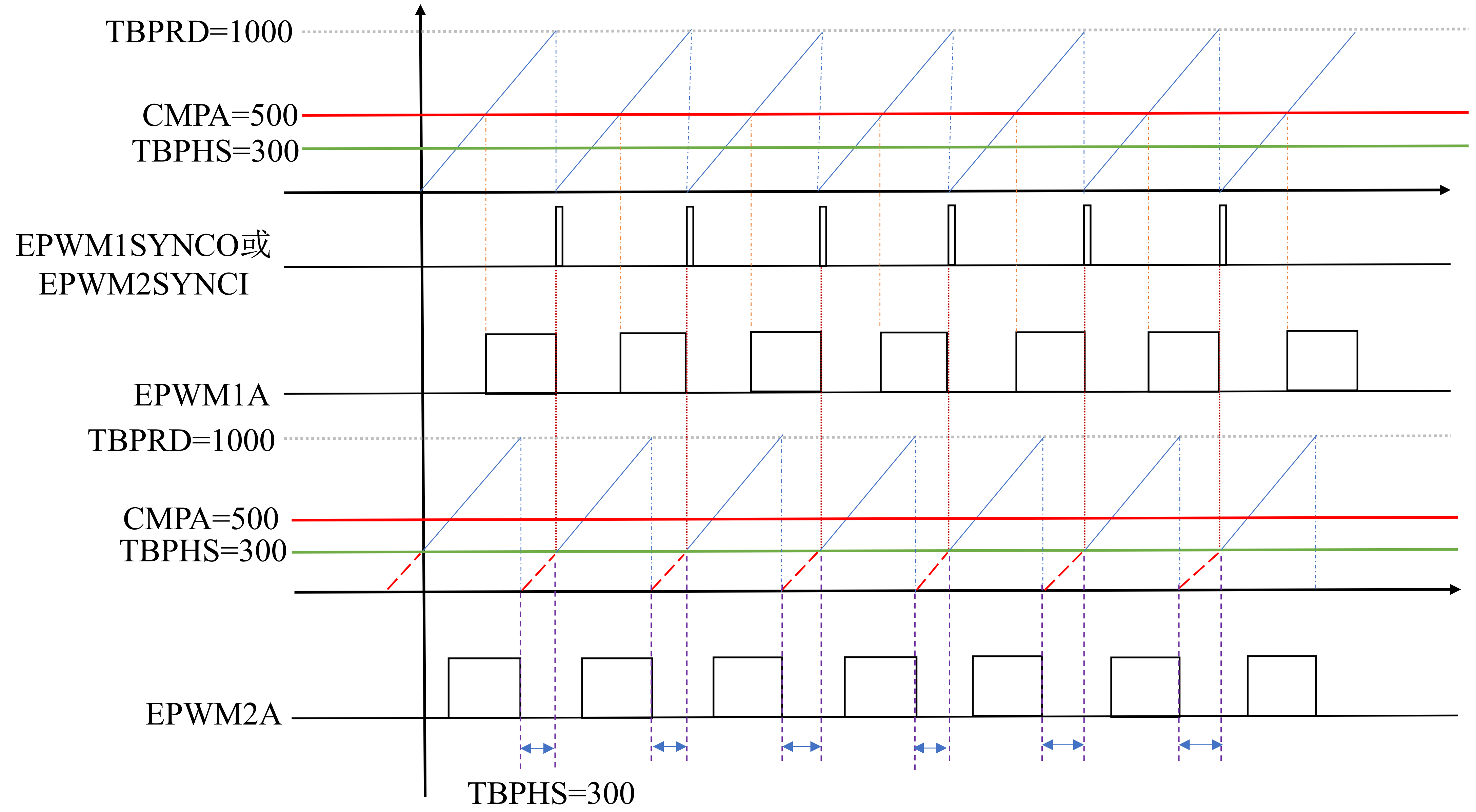


Figure 15-11. Time-Base Up-Down Count Waveforms, TBCTL[PHSDIR = 1] Count Up On Synchronization Event



28379D芯片ePWM移相工作原理

■ EPWM1A：参考PWM波； EPWM2A：相对EPWM1A移相波形。



DSP芯片CAN报文接收过滤

Figure 22-44. CAN_IF1ARB Register

31	30	29	28	27	26	25	24
MsgVal	Xtd	Dir	ID				
R/W-0h	R/W-0h	R/W-0h	R/W-0h				
23	**22**	**21**	**20**	**19**	**18**	**17**	**16**
ID							
R/W-0h							
15	**14**	**13**	**12**	**11**	**10**	**9**	**8**
ID							
R/W-0h							
7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
ID							
R/W-0h							

标准帧ID[18:28]

扩展帧ID[0:28]

28-0	ID	R/W	0h	Message Identifier ID[28:0] 29-bit Identifier ("Extended Frame") ID[28:18] 11-bit Identifier ("Standard Frame") Note: This bit is write protected by Busy bit. Reset type: SYSRSn

Figure 22-45. CAN_IF1MCTL Register

31	30	29	28	27	26	25	24
RESERVED							
R-0h							
23	**22**	**21**	**20**	**19**	**18**	**17**	**16**
RESERVED							
R-0h							
15	**14**	**13**	**12**	**11**	**10**	**9**	**8**
NewDat	MsgLst	IntPnd	UMask	TxIE	RxIE	RmtEn	TxRqst
R/W-0h	R/W-0h	R/W-0h	R/W-0h	R/W-0h	R/W-0h	R/W-0h	R/W-0h
7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
EoB	RESERVED			DLC			
R/W-0h	R-0h			R/W-0h			

使用过滤机制，需要使能UMask

Figure 22-43. CAN_IF1MSK Register

31	30	29	28	27	26	25	24
MXtd	MDir	RESERVED	Msk				
R/W-1h	R/W-1h	R-1h	R/W-1FFFFFFFh				
23	**22**	**21**	**20**	**19**	**18**	**17**	**16**
Msk							
R/W-1FFFFFFFh							
15	**14**	**13**	**12**	**11**	**10**	**9**	**8**
Msk							
R/W-1FFFFFFFh							
7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Msk							
R/W-1FFFFFFFh							

标准帧IDmask[18:28]

扩展帧IDmask[0:28]

28-0	Msk	R/W	1FFFFFFFh	Identifier Mask- 0 The corresponding bit in the identifier of the message object is not used for acceptance filtering (don't care). 1 The corresponding bit in the identifier of the message object is used for acceptance filtering. Note: This bit is write protected by Busy bit. Reset type: SYSRSn

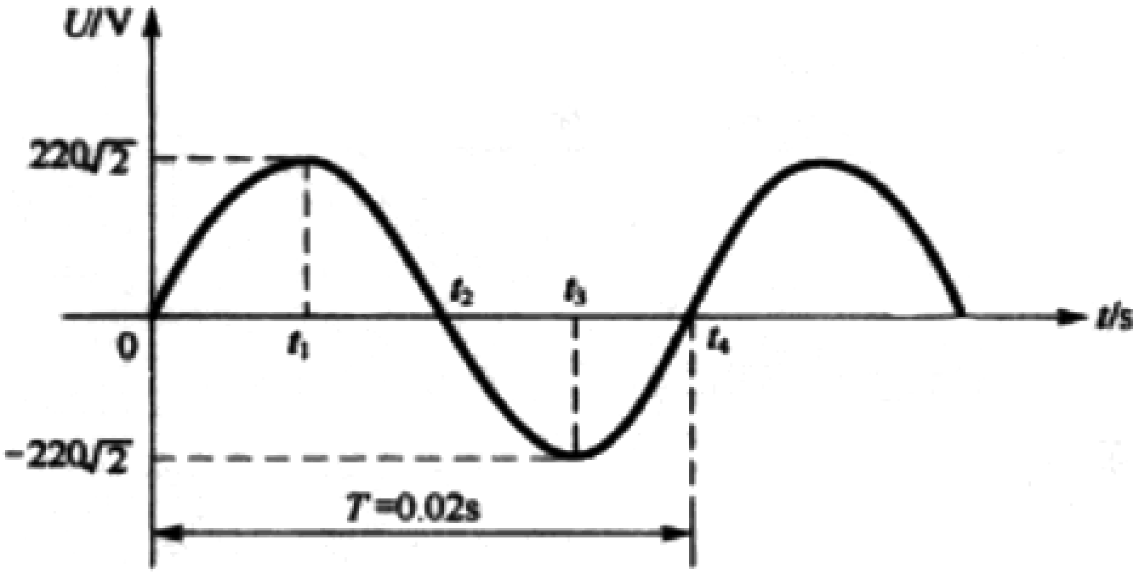
0：不启用过滤，相应位原始ID值为任意(0或1)

1：启动过滤，相应位保持原始ID值不变

Bit	Field	Type	Reset	Description
12	UMask	R/W	0h	Use Acceptance Mask 0 Mask ignored 1 Use Mask (Msk[28:0], MXtd, and MDir) for acceptance filtering If the UMask bit is set to one, the message object's mask bits have to be programmed during initialization of the message object before MsgVal is set to one. Note: This bit is write protected by Busy bit. Reset type: SYSRSn

- 标准帧（ID范围为0x000-0x7FF）；扩展帧（ID范围为0x10000000-0x1FFFFFFF）
- 对于标准帧：若IFxMask [18:28]为0x0，则标准帧ID对应的11位全部不启用过滤，可为任意值，即范围为0x0-0x7FF，此时设置的ID任意；
- 对于扩展帧：若IFxMask [0:28]为0x0，则扩展帧ID对应的29位全部不启用过滤，可为任意值，即范围为0x0-0x1FFFFFFF，此时设置的ID任意；
- 对于标准帧ID=0x60，其二进制为**000 0*110* 0000**，若IFxMask [18:28]为0x70，其二进制为**000 0*111* 0000**，即过滤ID中的[4:6]，其余位任意，此时可接收 [4:6]位为110的报文，否则不接收；扩展帧同理；
- 对于标准帧ID=0x60，其二进制为**000 0*110* 0*000***，若IFxMask [18:28]为0x75，其二进制为**000 0*111* 0*101***，即过滤ID中的[0, 2, 4:6]，其余位任意，此时可接收[0, 2, 4:6]位分别为0、0 、110的报文，否则不接收；扩展帧同理。

交流电有效值计算原理与实现



$$u(t)=\sqrt{2}U\sin(\omega t+\varphi)$$
$$=\sqrt{2}U\sin(2\pi ft+\varphi)$$
$$=U_m\sin(2\pi ft+\varphi)$$
$$=U_m\sin(\frac{2\pi t}{T}+\varphi)$$

$u(t)$——瞬时值；U——有效值；$U_m=\sqrt{2}U$——最大值；

ω——角频率；f——频率；$T=\frac{1}{f}$——周期；φ——初相位。

- ■ 交流电的有效值是根据它的热效应确定的。交流电流 i 通过电阻 R 在一个周期内所产生的热量和直流电流 I 通过同一电阻 R 在相同时间内所产生的热量相等，则这个直流电流 I 的数值叫做交流电流 i 的有效值，用大写字母表示，如 I、U等。
- □ 一个周期内直流电通过电阻 R 所产生的热量为：

$$Q=I^2RT$$

- □ 交流电通过同样的电阻 R，在一个周期内所产生热量：

$$Q=\int_0^T i^2Rdt$$

- □ 根据定义，这两个电流所产生的热量应相等，即

$$I^2RT=\int_0^T i^2Rdt$$

$$I=\sqrt{\frac{1}{T}\int_0^T i^2dt}=\sqrt{\frac{1}{T}\int_{t_0}^{t_0+T} i^2dt}$$ ——交流电流有效值定义；

$$U=\sqrt{\frac{1}{T}\int_0^T u^2dt}=\sqrt{\frac{1}{T}\int_{t_0}^{t_0+T} u^2dt}$$ ——交流电压有效值定义；

- □ 离散化：在时域中，对于离散点的积分即求和，即：

$$U=\sqrt{\frac{1}{T}\sum_{j=1}^{m}u^2(\mathrm{k}_j)}$$

$$I=\sqrt{\frac{1}{T}\sum_{j=1}^{m}i^2(\mathrm{k}_j)}$$

$\mathrm{k}_j-\mathrm{k}_{j-1}$：采样时间间隔，且$\mathrm{k}_m-\mathrm{k}_1=T$；采样间隔越小，计算的有效值越接近理论值，此时有效值等于均方根。

感谢聆听　批评指正

Taurus

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