65 HAL TIM Generic Driver

65.1 TIM Firmware driver registers structures

65.1.1 TIM_Base_InitTypeDef

Data Fields

- ***uint32_t Prescaler***
- ***uint32_t CounterMode***
- ***uint32_t Period***
- ***uint32_t ClockDivision***
- ***uint32_t RepetitionCounter***
- ***uint32_t AutoReloadPreload***

Field Documentation

- ***uint32_t TIM_Base_InitTypeDef::Prescaler***
  Specifies the prescaler value used to divide the TIM clock. This parameter can be a number between Min_Data = 0x0000 and Max_Data = 0xFFFF
- ***uint32_t TIM_Base_InitTypeDef::CounterMode***
  Specifies the counter mode. This parameter can be a value of ***TIM_Counter_Mode***
- ***uint32_t TIM_Base_InitTypeDef::Period***
  Specifies the period value to be loaded into the active Auto-Reload Register at the next update event. This parameter can be a number between Min_Data = 0x0000 and Max_Data = 0xFFFF.
- ***uint32_t TIM_Base_InitTypeDef::ClockDivision***
  Specifies the clock division. This parameter can be a value of ***TIM_ClockDivision***
- ***uint32_t TIM_Base_InitTypeDef::RepetitionCounter***
  Specifies the repetition counter value. Each time the RCR downcounter reaches zero, an update event is generated and counting restarts from the RCR value (N). This means in PWM mode that (N+1) corresponds to:the number of PWM periods in edge-aligned modethe number of half PWM period in center-aligned mode This parameter must be a number between Min_Data = 0x00 and Max_Data = 0xFF.
  Note: This parameter is valid only for TIM1 and TIM8.
- ***uint32_t TIM_Base_InitTypeDef::AutoReloadPreload***
  Specifies the auto-reload preload. This parameter can be a value of ***TIM_AutoReloadPreload***

65.1.2 TIM_OC_InitTypeDef

Data Fields

- ***uint32_t OCMode***
- ***uint32_t Pulse***
- ***uint32_t OCPolarity***
- ***uint32_t OCNPolarity***
- ***uint32_t OCFastMode***
- ***uint32_t OCIdleState***
- ***uint32_t OCNIdleState***

Field Documentation

- ***uint32_t TIM_OC_InitTypeDef::OCMode***
  Specifies the TIM mode. This parameter can be a value of ***TIM_Output_Compare_and_PWM_modes***
- ***uint32_t TIM_OC_InitTypeDef::Pulse***
  Specifies the pulse value to be loaded into the Capture Compare Register. This parameter can be a number between Min_Data = 0x0000 and Max_Data = 0xFFFF
- ***uint32_t TIM_OC_InitTypeDef::OCPolarity***
  Specifies the output polarity. This parameter can be a value of ***TIM_Output_Compare_Polarity***
- ***uint32_t TIM_OC_InitTypeDef::OCNPolarity***
  Specifies the complementary output polarity. This parameter can be a value of ***TIM_Output_Compare_N_Polarity***
  Note: This parameter is valid only for TIM1 and TIM8.
- ***uint32_t TIM_OC_InitTypeDef::OCFastMode***
  Specifies the Fast mode state. This parameter can be a value of ***TIM_Output_Fast_State***
  Note: This parameter is valid only in PWM1 and PWM2 mode.
- ***uint32_t TIM_OC_InitTypeDef::OCIdleState***
  Specifies the TIM Output Compare pin state during Idle state. This parameter can be a value of ***TIM_Output_Compare_Idle_State***
  Note: This parameter is valid only for TIM1 and TIM8.
- ***uint32_t TIM_OC_InitTypeDef::OCNIdleState***
  Specifies the TIM Output Compare pin state during Idle state. This parameter can be a value of ***TIM_Output_Compare_N_Idle_State***
  Note: This parameter is valid only for TIM1 and TIM8.

65.1.3 TIM_OnePulse_InitTypeDef

Data Fields

- ***uint32_t OCMode***
- ***uint32_t Pulse***
- ***uint32_t OCPolarity***
- ***uint32_t OCNPolarity***
- ***uint32_t OCIdleState***
- ***uint32_t OCNIdleState***
- ***uint32_t ICPolarity***
- ***uint32_t ICSelection***
- ***uint32_t ICFilter***

Field Documentation

- ***uint32_t TIM_OnePulse_InitTypeDef::OCMode***
  Specifies the TIM mode. This parameter can be a value of ***TIM_Output_Compare_and_PWM_modes***
- ***uint32_t TIM_OnePulse_InitTypeDef::Pulse***
  Specifies the pulse value to be loaded into the Capture Compare Register. This parameter can be a number between Min_Data = 0x0000 and Max_Data = 0xFFFF
- ***uint32_t TIM_OnePulse_InitTypeDef::OCPolarity***
  Specifies the output polarity. This parameter can be a value of ***TIM_Output_Compare_Polarity***
- ***uint32_t TIM_OnePulse_InitTypeDef::OCNPolarity***
  Specifies the complementary output polarity. This parameter can be a value of ***TIM_Output_Compare_N_Polarity***
  Note: This parameter is valid only for TIM1 and TIM8.

- ***uint32_t TIM_OnePulse_InitTypeDef::OCIdleState***
  Specifies the TIM Output Compare pin state during Idle state. This parameter can be a value of ***TIM_Output_Compare_Idle_State***
  Note: This parameter is valid only for TIM1 and TIM8.
- ***uint32_t TIM_OnePulse_InitTypeDef::OCNIdleState***
  Specifies the TIM Output Compare pin state during Idle state. This parameter can be a value of ***TIM_Output_Compare_N_Idle_State***
  Note: This parameter is valid only for TIM1 and TIM8.
- ***uint32_t TIM_OnePulse_InitTypeDef::ICPolarity***
  Specifies the active edge of the input signal. This parameter can be a value of ***TIM_Input_Capture_Polarity***
- ***uint32_t TIM_OnePulse_InitTypeDef::ICSelection***
  Specifies the input. This parameter can be a value of ***TIM_Input_Capture_Selection***
- ***uint32_t TIM_OnePulse_InitTypeDef::ICFilter***
  Specifies the input capture filter. This parameter can be a number between Min_Data = 0x0 and Max_Data = 0xF

65.1.4 TIM_IC_InitTypeDef

Data Fields

- ***uint32_t ICPolarity***
- ***uint32_t ICSelection***
- ***uint32_t ICPrescaler***
- ***uint32_t ICFilter***

Field Documentation

- ***uint32_t TIM_IC_InitTypeDef::ICPolarity***
  Specifies the active edge of the input signal. This parameter can be a value of ***TIM_Input_Capture_Polarity***
- ***uint32_t TIM_IC_InitTypeDef::ICSelection***
  Specifies the input. This parameter can be a value of ***TIM_Input_Capture_Selection***
- ***uint32_t TIM_IC_InitTypeDef::ICPrescaler***
  Specifies the Input Capture Prescaler. This parameter can be a value of ***TIM_Input_Capture_Prescaler***
- ***uint32_t TIM_IC_InitTypeDef::ICFilter***
  Specifies the input capture filter. This parameter can be a number between Min_Data = 0x0 and Max_Data = 0xF

65.1.5 TIM_Encoder_InitTypeDef

Data Fields

- ***uint32_t EncoderMode***
- ***uint32_t IC1Polarity***
- ***uint32_t IC1Selection***
- ***uint32_t IC1Prescaler***
- ***uint32_t IC1Filter***
- ***uint32_t IC2Polarity***
- ***uint32_t IC2Selection***
- ***uint32_t IC2Prescaler***
- ***uint32_t IC2Filter***

Field Documentation

- ***uint32_t TIM_Encoder_InitTypeDef::EncoderMode***
  Specifies the active edge of the input signal. This parameter can be a value of ***TIM_Encoder_Mode***
- ***uint32_t TIM_Encoder_InitTypeDef::IC1Polarity***
  Specifies the active edge of the input signal. This parameter can be a value of ***TIM_Input_Capture_Polarity***
- ***uint32_t TIM_Encoder_InitTypeDef::IC1Selection***
  Specifies the input. This parameter can be a value of ***TIM_Input_Capture_Selection***
- ***uint32_t TIM_Encoder_InitTypeDef::IC1Prescaler***
  Specifies the Input Capture Prescaler. This parameter can be a value of ***TIM_Input_Capture_Prescaler***
- ***uint32_t TIM_Encoder_InitTypeDef::IC1Filter***
  Specifies the input capture filter. This parameter can be a number between Min_Data = 0x0 and Max_Data = 0xF
- ***uint32_t TIM_Encoder_InitTypeDef::IC2Polarity***
  Specifies the active edge of the input signal. This parameter can be a value of ***TIM_Input_Capture_Polarity***
- ***uint32_t TIM_Encoder_InitTypeDef::IC2Selection***
  Specifies the input. This parameter can be a value of ***TIM_Input_Capture_Selection***
- ***uint32_t TIM_Encoder_InitTypeDef::IC2Prescaler***
  Specifies the Input Capture Prescaler. This parameter can be a value of ***TIM_Input_Capture_Prescaler***
- ***uint32_t TIM_Encoder_InitTypeDef::IC2Filter***
  Specifies the input capture filter. This parameter can be a number between Min_Data = 0x0 and Max_Data = 0xF

65.1.6 TIM_ClockConfigTypeDef

Data Fields

- ***uint32_t ClockSource***
- ***uint32_t ClockPolarity***
- ***uint32_t ClockPrescaler***
- ***uint32_t ClockFilter***

Field Documentation

- ***uint32_t TIM_ClockConfigTypeDef::ClockSource***
  TIM clock sources This parameter can be a value of ***TIM_Clock_Source***
- ***uint32_t TIM_ClockConfigTypeDef::ClockPolarity***
  TIM clock polarity This parameter can be a value of ***TIM_Clock_Polarity***
- ***uint32_t TIM_ClockConfigTypeDef::ClockPrescaler***
  TIM clock prescaler This parameter can be a value of ***TIM_Clock_Prescaler***
- ***uint32_t TIM_ClockConfigTypeDef::ClockFilter***
  TIM clock filter This parameter can be a number between Min_Data = 0x0 and Max_Data = 0xF

65.1.7 TIM_ClearInputConfigTypeDef

Data Fields

- ***uint32_t ClearInputState***
- ***uint32_t ClearInputSource***
- ***uint32_t ClearInputPolarity***
- ***uint32_t ClearInputPrescaler***
- ***uint32_t ClearInputFilter***

Field Documentation

- ***uint32_t TIM_ClearInputConfigTypeDef::ClearInputState***
  TIM clear Input state This parameter can be ENABLE or DISABLE
- ***uint32_t TIM_ClearInputConfigTypeDef::ClearInputSource***
  TIM clear Input sources This parameter can be a value of ***TIM_ClearInput_Source***
- ***uint32_t TIM_ClearInputConfigTypeDef::ClearInputPolarity***
  TIM Clear Input polarity This parameter can be a value of ***TIM_ClearInput_Polarity***
- ***uint32_t TIM_ClearInputConfigTypeDef::ClearInputPrescaler***
  TIM Clear Input prescaler This parameter can be a value of ***TIM_ClearInput_Prescaler***
- ***uint32_t TIM_ClearInputConfigTypeDef::ClearInputFilter***
  TIM Clear Input filter This parameter can be a number between Min_Data = 0x0 and Max_Data = 0xF

65.1.8 TIM_MasterConfigTypeDef

Data Fields

- ***uint32_t MasterOutputTrigger***
- ***uint32_t MasterOutputTrigger2***
- ***uint32_t MasterSlaveMode***

Field Documentation

- ***uint32_t TIM_MasterConfigTypeDef::MasterOutputTrigger***
  Trigger output (TRGO) selection This parameter can be a value of ***TIM_Master_Mode_Selection***
- ***uint32_t TIM_MasterConfigTypeDef::MasterOutputTrigger2***
  Trigger output2 (TRGO2) selection This parameter can be a value of ***TIM_Master_Mode_Selection_2***
- ***uint32_t TIM_MasterConfigTypeDef::MasterSlaveMode***
  Master/slave mode selection This parameter can be a value of ***TIM_Master_Slave_Mode***

65.1.9 TIM_SlaveConfigTypeDef

Data Fields

- ***uint32_t SlaveMode***
- ***uint32_t InputTrigger***
- ***uint32_t TriggerPolarity***
- ***uint32_t TriggerPrescaler***
- ***uint32_t TriggerFilter***

Field Documentation

- ***uint32_t TIM_SlaveConfigTypeDef::SlaveMode***
  Slave mode selection This parameter can be a value of ***TIM_Slave_Mode***
- ***uint32_t TIM_SlaveConfigTypeDef::InputTrigger***
  Input Trigger source This parameter can be a value of ***TIM_Trigger_Selection***
- ***uint32_t TIM_SlaveConfigTypeDef::TriggerPolarity***
  Input Trigger polarity This parameter can be a value of ***TIM_Trigger_Polarity***
- ***uint32_t TIM_SlaveConfigTypeDef::TriggerPrescaler***
  Input trigger prescaler This parameter can be a value of ***TIM_Trigger_Prescaler***
- ***uint32_t TIM_SlaveConfigTypeDef::TriggerFilter***
  Input trigger filter This parameter can be a number between Min_Data = 0x0 and Max_Data = 0xF

65.1.10 TIM_BreakDeadTimeConfigTypeDef

Data Fields

- ***uint32_t OffStateRunMode***
- ***uint32_t OffStateIDLEMode***
- ***uint32_t LockLevel***
- ***uint32_t DeadTime***
- ***uint32_t BreakState***
- ***uint32_t BreakPolarity***
- ***uint32_t BreakFilter***
- ***uint32_t Break2State***
- ***uint32_t Break2Polarity***
- ***uint32_t Break2Filter***
- ***uint32_t AutomaticOutput***

Field Documentation

- ***uint32_t TIM_BreakDeadTimeConfigTypeDef::OffStateRunMode***
  TIM off state in run mode This parameter can be a value of ***TIM_OSSR_Off_State_Selection_for_Run_mode_state***
- ***uint32_t TIM_BreakDeadTimeConfigTypeDef::OffStateIDLEMode***
  TIM off state in IDLE mode This parameter can be a value of ***TIM_OSSI_Off_State_Selection_for_Idle_mode_state***
- ***uint32_t TIM_BreakDeadTimeConfigTypeDef::LockLevel***
  TIM Lock level This parameter can be a value of ***TIM_Lock_level***
- ***uint32_t TIM_BreakDeadTimeConfigTypeDef::DeadTime***
  TIM dead Time This parameter can be a number between Min_Data = 0x00 and Max_Data = 0xFF
- ***uint32_t TIM_BreakDeadTimeConfigTypeDef::BreakState***
  TIM Break State This parameter can be a value of ***TIM_Break_Input_enable_disable***
- ***uint32_t TIM_BreakDeadTimeConfigTypeDef::BreakPolarity***
  TIM Break input polarity This parameter can be a value of ***TIM_Break_Polarity***
- ***uint32_t TIM_BreakDeadTimeConfigTypeDef::BreakFilter***
  Specifies the break input filter. This parameter can be a number between Min_Data = 0x0 and Max_Data = 0xF
- ***uint32_t TIM_BreakDeadTimeConfigTypeDef::Break2State***
  TIM Break2 State This parameter can be a value of ***TIM_Break2_Input_enable_disable***
- ***uint32_t TIM_BreakDeadTimeConfigTypeDef::Break2Polarity***
  TIM Break2 input polarity This parameter can be a value of ***TIM_Break2_Polarity***
- ***uint32_t TIM_BreakDeadTimeConfigTypeDef::Break2Filter***
  TIM break2 input filter. This parameter can be a number between Min_Data = 0x0 and Max_Data = 0xF
- ***uint32_t TIM_BreakDeadTimeConfigTypeDef::AutomaticOutput***
  TIM Automatic Output Enable state This parameter can be a value of ***TIM_AOE_Bit_Set_Reset***

65.1.11 TIM_HandleTypeDef

Data Fields

- ***TIM_TypeDef * Instance***
- ***TIM_Base_InitTypeDef Init***
- ***HAL_TIM_ActiveChannel Channel***
- ***DMA_HandleTypeDef * hdma***

- ***HAL_LockTypeDef Lock***
- ***__IO HAL_TIM_StateTypeDef State***

Field Documentation

- ***TIM_TypeDef* TIM_HandleTypeDef::Instance***
  Register base address
- ***TIM_Base_InitTypeDef TIM_HandleTypeDef::Init***
  TIM Time Base required parameters
- ***HAL_TIM_ActiveChannel TIM_HandleTypeDef::Channel***
  Active channel
- ***DMA_HandleTypeDef* TIM_HandleTypeDef::hdma[7]***
  DMA Handlers array This array is accessed by a ***DMA_Handle_index***
- ***HAL_LockTypeDef TIM_HandleTypeDef::Lock***
  Locking object
- ***__IO HAL_TIM_StateTypeDef TIM_HandleTypeDef::State***
  TIM operation state

65.2 TIM Firmware driver API description

65.2.1 TIMER Generic features

The Timer features include:

1. 16-bit up, down, up/down auto-reload counter.
2. 16-bit programmable prescaler allowing dividing (also on the fly) the counter clock frequency either by any factor between 1 and 65536.
3. Up to 4 independent channels for:
   – Input Capture
   – Output Compare
   – PWM generation (Edge and Center-aligned Mode)
   – One-pulse mode output

65.2.2 How to use this driver

1. Initialize the TIM low level resources by implementing the following functions depending on the selected feature:
   – Time Base: HAL_TIM_Base_MspInit()
   – Input Capture: HAL_TIM_IC_MspInit()
   – Output Compare: HAL_TIM_OC_MspInit()
   – PWM generation: HAL_TIM_PWM_MspInit()
   – One-pulse mode output: HAL_TIM_OnePulse_MspInit()
   – Encoder mode output: HAL_TIM_Encoder_MspInit()
2. Initialize the TIM low level resources:
   a. Enable the TIM interface clock using __HAL_RCC_TIMx_CLK_ENABLE();
   b. TIM pins configuration
      – Enable the clock for the TIM GPIOs using the following function: __HAL_RCC_GPIOx_CLK_ENABLE();
      – Configure these TIM pins in Alternate function mode using HAL_GPIO_Init();
3. The external Clock can be configured, if needed (the default clock is the internal clock from the APBx), using the following function: HAL_TIM_ConfigClockSource, the clock configuration should be done before any start function.
4. Configure the TIM in the desired functioning mode using one of the Initialization function of this driver:
   – HAL_TIM_Base_Init: to use the Timer to generate a simple time base

  - HAL_TIM_OC_Init and HAL_TIM_OC_ConfigChannel: to use the Timer to generate an Output Compare signal.
  - HAL_TIM_PWM_Init and HAL_TIM_PWM_ConfigChannel: to use the Timer to generate a PWM signal.
  - HAL_TIM_IC_Init and HAL_TIM_IC_ConfigChannel: to use the Timer to measure an external signal.
  - HAL_TIM_OnePulse_Init and HAL_TIM_OnePulse_ConfigChannel: to use the Timer in One Pulse Mode.
  - HAL_TIM_Encoder_Init: to use the Timer Encoder Interface.
5. Activate the TIM peripheral using one of the start functions depending from the feature used:
  - Time Base: HAL_TIM_Base_Start(), HAL_TIM_Base_Start_DMA(), HAL_TIM_Base_Start_IT()
  - Input Capture: HAL_TIM_IC_Start(), HAL_TIM_IC_Start_DMA(), HAL_TIM_IC_Start_IT()
  - Output Compare: HAL_TIM_OC_Start(), HAL_TIM_OC_Start_DMA(), HAL_TIM_OC_Start_IT()
  - PWM generation: HAL_TIM_PWM_Start(), HAL_TIM_PWM_Start_DMA(), HAL_TIM_PWM_Start_IT()
  - One-pulse mode output: HAL_TIM_OnePulse_Start(), HAL_TIM_OnePulse_Start_IT()
  - Encoder mode output: HAL_TIM_Encoder_Start(), HAL_TIM_Encoder_Start_DMA(), HAL_TIM_Encoder_Start_IT().
6. The DMA Burst is managed with the two following functions: HAL_TIM_DMABurst_WriteStart() HAL_TIM_DMABurst_ReadStart()

65.2.3 Time Base functions

This section provides functions allowing to:

- Initialize and configure the TIM base.
- De-initialize the TIM base.
- Start the Time Base.
- Stop the Time Base.
- Start the Time Base and enable interrupt.
- Stop the Time Base and disable interrupt.
- Start the Time Base and enable DMA transfer.
- Stop the Time Base and disable DMA transfer.

This section contains the following APIs:

- ***HAL_TIM_Base_Init()***
- ***HAL_TIM_Base_DeInit()***
- ***HAL_TIM_Base_MspInit()***
- ***HAL_TIM_Base_MspDeInit()***
- ***HAL_TIM_Base_Start()***
- ***HAL_TIM_Base_Stop()***
- ***HAL_TIM_Base_Start_IT()***
- ***HAL_TIM_Base_Stop_IT()***
- ***HAL_TIM_Base_Start_DMA()***
- ***HAL_TIM_Base_Stop_DMA()***

65.2.4 Time Output Compare functions

This section provides functions allowing to:

- Initialize and configure the TIM Output Compare.
- De-initialize the TIM Output Compare.
- Start the Time Output Compare.
- Stop the Time Output Compare.
- Start the Time Output Compare and enable interrupt.
- Stop the Time Output Compare and disable interrupt.
- Start the Time Output Compare and enable DMA transfer.
- Stop the Time Output Compare and disable DMA transfer.

This section contains the following APIs:

- ***HAL_TIM_OC_Init()***
- ***HAL_TIM_OC_DeInit()***
- ***HAL_TIM_OC_MspInit()***
- ***HAL_TIM_OC_MspDeInit()***
- ***HAL_TIM_OC_Start()***
- ***HAL_TIM_OC_Stop()***
- ***HAL_TIM_OC_Start_IT()***
- ***HAL_TIM_OC_Stop_IT()***
- ***HAL_TIM_OC_Start_DMA()***
- ***HAL_TIM_OC_Stop_DMA()***

65.2.5 Time PWM functions

This section provides functions allowing to:

- Initialize and configure the TIM OPWM.
- De-initialize the TIM PWM.
- Start the Time PWM.
- Stop the Time PWM.
- Start the Time PWM and enable interrupt.
- Stop the Time PWM and disable interrupt.
- Start the Time PWM and enable DMA transfer.
- Stop the Time PWM and disable DMA transfer.

This section contains the following APIs:

- ***HAL_TIM_PWM_Init()***
- ***HAL_TIM_PWM_DeInit()***
- ***HAL_TIM_PWM_MspInit()***
- ***HAL_TIM_PWM_MspDeInit()***
- ***HAL_TIM_PWM_Start()***
- ***HAL_TIM_PWM_Stop()***
- ***HAL_TIM_PWM_Start_IT()***
- ***HAL_TIM_PWM_Stop_IT()***
- ***HAL_TIM_PWM_Start_DMA()***
- ***HAL_TIM_PWM_Stop_DMA()***

65.2.6 Time Input Capture functions

This section provides functions allowing to:

- Initialize and configure the TIM Input Capture.
- De-initialize the TIM Input Capture.
- Start the Time Input Capture.
- Stop the Time Input Capture.
- Start the Time Input Capture and enable interrupt.
- Stop the Time Input Capture and disable interrupt.
- Start the Time Input Capture and enable DMA transfer.
- Stop the Time Input Capture and disable DMA transfer.

This section contains the following APIs:

- ***HAL_TIM_IC_Init()***
- ***HAL_TIM_IC_DeInit()***
- ***HAL_TIM_IC_MspInit()***
- ***HAL_TIM_IC_MspDeInit()***
- ***HAL_TIM_IC_Start()***
- ***HAL_TIM_IC_Stop()***
- ***HAL_TIM_IC_Start_IT()***
- ***HAL_TIM_IC_Stop_IT()***
- ***HAL_TIM_IC_Start_DMA()***
- ***HAL_TIM_IC_Stop_DMA()***

65.2.7 Time One Pulse functions

This section provides functions allowing to:

- Initialize and configure the TIM One Pulse.
- De-initialize the TIM One Pulse.
- Start the Time One Pulse.
- Stop the Time One Pulse.
- Start the Time One Pulse and enable interrupt.
- Stop the Time One Pulse and disable interrupt.
- Start the Time One Pulse and enable DMA transfer.
- Stop the Time One Pulse and disable DMA transfer.

This section contains the following APIs:

- ***HAL_TIM_OnePulse_Init()***
- ***HAL_TIM_OnePulse_DeInit()***
- ***HAL_TIM_OnePulse_MspInit()***
- ***HAL_TIM_OnePulse_MspDeInit()***
- ***HAL_TIM_OnePulse_Start()***
- ***HAL_TIM_OnePulse_Stop()***
- ***HAL_TIM_OnePulse_Start_IT()***
- ***HAL_TIM_OnePulse_Stop_IT()***

65.2.8 Time Encoder functions

This section provides functions allowing to:

- Initialize and configure the TIM Encoder.
- De-initialize the TIM Encoder.
- Start the Time Encoder.
- Stop the Time Encoder.

- Start the Time Encoder and enable interrupt.
- Stop the Time Encoder and disable interrupt.
- Start the Time Encoder and enable DMA transfer.
- Stop the Time Encoder and disable DMA transfer.

This section contains the following APIs:

- ***HAL_TIM_Encoder_Init()***
- ***HAL_TIM_Encoder_DeInit()***
- ***HAL_TIM_Encoder_MspInit()***
- ***HAL_TIM_Encoder_MspDeInit()***
- ***HAL_TIM_Encoder_Start()***
- ***HAL_TIM_Encoder_Stop()***
- ***HAL_TIM_Encoder_Start_IT()***
- ***HAL_TIM_Encoder_Stop_IT()***
- ***HAL_TIM_Encoder_Start_DMA()***
- ***HAL_TIM_Encoder_Stop_DMA()***

65.2.9 IRQ handler management

This section provides Timer IRQ handler function.

This section contains the following APIs:

- ***HAL_TIM_IRQHandler()***

65.2.10 Peripheral Control functions

This section provides functions allowing to:

- Configure The Input Output channels for OC, PWM, IC or One Pulse mode.
- Configure External Clock source.
- Configure Complementary channels, break features and dead time.
- Configure Master and the Slave synchronization.
- Configure the DMA Burst Mode.

This section contains the following APIs:

- ***HAL_TIM_OC_ConfigChannel()***
- ***HAL_TIM_IC_ConfigChannel()***
- ***HAL_TIM_PWM_ConfigChannel()***
- ***HAL_TIM_OnePulse_ConfigChannel()***
- ***HAL_TIM_DMABurst_WriteStart()***
- ***HAL_TIM_DMABurst_WriteStop()***
- ***HAL_TIM_DMABurst_ReadStart()***
- ***HAL_TIM_DMABurst_ReadStop()***
- ***HAL_TIM_GenerateEvent()***
- ***HAL_TIM_ConfigOCrefClear()***
- ***HAL_TIM_ConfigClockSource()***
- ***HAL_TIM_ConfigTI1Input()***
- ***HAL_TIM_SlaveConfigSynchronization()***
- ***HAL_TIM_SlaveConfigSynchronization_IT()***
- ***HAL_TIM_ReadCapturedValue()***

65.2.11 TIM Callbacks functions

This section provides TIM callback functions:

- Timer Period elapsed callback
- Timer Output Compare callback
- Timer Input capture callback
- Timer Trigger callback
- Timer Error callback

This section contains the following APIs:

- ***HAL_TIM_PeriodElapsedCallback()***
- ***HAL_TIM_OC_DelayElapsedCallback()***
- ***HAL_TIM_IC_CaptureCallback()***
- ***HAL_TIM_PWM_PulseFinishedCallback()***
- ***HAL_TIM_TriggerCallback()***
- ***HAL_TIM_ErrorCallback()***

65.2.12 Peripheral State functions

This subsection permits to get in run-time the status of the peripheral and the data flow.

This section contains the following APIs:

- ***HAL_TIM_Base_GetState()***
- ***HAL_TIM_OC_GetState()***
- ***HAL_TIM_PWM_GetState()***
- ***HAL_TIM_IC_GetState()***
- ***HAL_TIM_OnePulse_GetState()***
- ***HAL_TIM_Encoder_GetState()***

65.2.13 Detailed description of functions

HAL_TIM_Base_Init

Function name	**HAL_StatusTypeDef HAL_TIM_Base_Init (TIM_HandleTypeDef * htim)**
Function description	Initializes the TIM Time base Unit according to the specified parameters in the TIM_HandleTypeDef and initialize the associated handle.
Parameters	• **htim:** TIM Base handle
Return values	• **HAL:** status

HAL_TIM_Base_DeInit

Function name	**HAL_StatusTypeDef HAL_TIM_Base_DeInit (TIM_HandleTypeDef * htim)**
Function description	DeInitialize the TIM Base peripheral.
Parameters	• **htim:** TIM Base handle
Return values	• **HAL:** status

HAL_TIM_Base_MspInit

Function name	**void HAL_TIM_Base_MspInit (TIM_HandleTypeDef * htim)**
Function description	Initializes the TIM Base MSP.
Parameters	• **htim:** TIM handle
Return values	• **None:**

HAL_TIM_Base_MspDeInit

Function name	**void HAL_TIM_Base_MspDeInit (TIM_HandleTypeDef * htim)**
Function description	DeInitialize TIM Base MSP.
Parameters	• **htim:** TIM handle
Return values	• **None:**

HAL_TIM_Base_Start

Function name	**HAL_StatusTypeDef HAL_TIM_Base_Start (TIM_HandleTypeDef * htim)**
Function description	Starts the TIM Base generation.
Parameters	• **htim:** : TIM handle
Return values	• **HAL:** status

HAL_TIM_Base_Stop

Function name	**HAL_StatusTypeDef HAL_TIM_Base_Stop (TIM_HandleTypeDef * htim)**
Function description	Stops the TIM Base generation.
Parameters	• **htim:** : TIM handle
Return values	• **HAL:** status

HAL_TIM_Base_Start_IT

Function name	**HAL_StatusTypeDef HAL_TIM_Base_Start_IT (TIM_HandleTypeDef * htim)**
Function description	Starts the TIM Base generation in interrupt mode.
Parameters	• **htim:** : TIM handle
Return values	• **HAL:** status

HAL_TIM_Base_Stop_IT

Function name	**HAL_StatusTypeDef HAL_TIM_Base_Stop_IT (TIM_HandleTypeDef * htim)**
Function description	Stops the TIM Base generation in interrupt mode.
Parameters	• **htim:** : TIM handle

Return values
- **HAL:** status

HAL_TIM_Base_Start_DMA

Function name **HAL_StatusTypeDef HAL_TIM_Base_Start_DMA (TIM_HandleTypeDef * htim, uint32_t * pData, uint16_t Length)**

Function description Starts the TIM Base generation in DMA mode.

Parameters
- **htim:** : TIM handle
- **pData:** The source Buffer address.
- **Length:** The length of data to be transferred from memory to peripheral.

Return values
- **HAL:** status

HAL_TIM_Base_Stop_DMA

Function name **HAL_StatusTypeDef HAL_TIM_Base_Stop_DMA (TIM_HandleTypeDef * htim)**

Function description Stops the TIM Base generation in DMA mode.

Parameters
- **htim:** : TIM handle

Return values
- **HAL:** status

HAL_TIM_OC_Init

Function name **HAL_StatusTypeDef HAL_TIM_OC_Init (TIM_HandleTypeDef * htim)**

Function description Initializes the TIM Output Compare according to the specified parameters in the TIM_HandleTypeDef and initialize the associated handle.

Parameters
- **htim:** TIM Output Compare handle

Return values
- **HAL:** status

HAL_TIM_OC_DeInit

Function name **HAL_StatusTypeDef HAL_TIM_OC_DeInit (TIM_HandleTypeDef * htim)**

Function description DeInitialize the TIM peripheral.

Parameters
- **htim:** TIM Output Compare handle

Return values
- **HAL:** status

HAL_TIM_OC_MspInit

Function name **void HAL_TIM_OC_MspInit (TIM_HandleTypeDef * htim)**

Function description Initializes the TIM Output Compare MSP.

Parameters
- **htim:** TIM handle

Return values
- **None:**

HAL_TIM_OC_MspDeInit

Function name **void HAL_TIM_OC_MspDeInit (TIM_HandleTypeDef * htim)**

Function description DeInitialize TIM Output Compare MSP.

Parameters
- **htim:** TIM handle

Return values
- **None:**

HAL_TIM_OC_Start

Function name **HAL_StatusTypeDef HAL_TIM_OC_Start (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description Starts the TIM Output Compare signal generation.

Parameters
- **htim:** : TIM Output Compare handle
- **Channel:** : TIM Channel to be enabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected
  - TIM_CHANNEL_5: TIM Channel 5 selected
  - TIM_CHANNEL_6: TIM Channel 6 selected

Return values
- **HAL:** status

HAL_TIM_OC_Stop

Function name **HAL_StatusTypeDef HAL_TIM_OC_Stop (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description Stops the TIM Output Compare signal generation.

Parameters
- **htim:** : TIM handle
- **Channel:** : TIM Channel to be disabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected
  - TIM_CHANNEL_5: TIM Channel 5 selected
  - TIM_CHANNEL_6: TIM Channel 6 selected

Return values
- **HAL:** status

HAL_TIM_OC_Start_IT

Function name **HAL_StatusTypeDef HAL_TIM_OC_Start_IT (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description Starts the TIM Output Compare signal generation in interrupt mode.

Parameters
- **htim:** : TIM OC handle
- **Channel:** : TIM Channel to be enabled This parameter can be one of the following values:

  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected
  - TIM_CHANNEL_5: TIM Channel 5 selected
  - TIM_CHANNEL_6: TIM Channel 6 selected

Return values
- **HAL:** status

HAL_TIM_OC_Stop_IT

Function name
HAL_StatusTypeDef HAL_TIM_OC_Stop_IT (TIM_HandleTypeDef * htim, uint32_t Channel)

Function description
Stops the TIM Output Compare signal generation in interrupt mode.

Parameters
- **htim:** : TIM Output Compare handle
- **Channel:** : TIM Channel to be disabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected
  - TIM_CHANNEL_5: TIM Channel 5 selected
  - TIM_CHANNEL_6: TIM Channel 6 selected

Return values
- **HAL:** status

HAL_TIM_OC_Start_DMA

Function name
HAL_StatusTypeDef HAL_TIM_OC_Start_DMA (TIM_HandleTypeDef * htim, uint32_t Channel, uint32_t * pData, uint16_t Length)

Function description
Starts the TIM Output Compare signal generation in DMA mode.

Parameters
- **htim:** : TIM Output Compare handle
- **Channel:** : TIM Channel to be enabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected
  - TIM_CHANNEL_5: TIM Channel 5 selected
  - TIM_CHANNEL_6: TIM Channel 6 selected
- **pData:** The source Buffer address.
- **Length:** The length of data to be transferred from memory to TIM peripheral

Return values
- **HAL:** status

HAL_TIM_OC_Stop_DMA

Function name
HAL_StatusTypeDef HAL_TIM_OC_Stop_DMA (TIM_HandleTypeDef * htim, uint32_t Channel)

Function description: Stops the TIM Output Compare signal generation in DMA mode.

Parameters:
- **htim:** : TIM Output Compare handle
- **Channel:** : TIM Channel to be disabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected
  - TIM_CHANNEL_5: TIM Channel 5 selected
  - TIM_CHANNEL_6: TIM Channel 6 selected

Return values:
- **HAL:** status

HAL_TIM_PWM_Init

Function name: **HAL_StatusTypeDef HAL_TIM_PWM_Init (TIM_HandleTypeDef * htim)**

Function description: Initializes the TIM PWM Time Base according to the specified parameters in the TIM_HandleTypeDef and initialize the associated handle.

Parameters:
- **htim:** TIM handle

Return values:
- **HAL:** status

HAL_TIM_PWM_DeInit

Function name: **HAL_StatusTypeDef HAL_TIM_PWM_DeInit (TIM_HandleTypeDef * htim)**

Function description: DeInitialize the TIM peripheral.

Parameters:
- **htim:** TIM handle

Return values:
- **HAL:** status

HAL_TIM_PWM_MspInit

Function name: **void HAL_TIM_PWM_MspInit (TIM_HandleTypeDef * htim)**

Function description: Initializes the TIM PWM MSP.

Parameters:
- **htim:** TIM handle

Return values:
- **None:**

HAL_TIM_PWM_MspDeInit

Function name: **void HAL_TIM_PWM_MspDeInit (TIM_HandleTypeDef * htim)**

Function description: DeInitialize TIM PWM MSP.

Parameters:
- **htim:** TIM handle

Return values:
- **None:**

HAL_TIM_PWM_Start

Function name **HAL_StatusTypeDef HAL_TIM_PWM_Start (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description Starts the PWM signal generation.

Parameters
- **htim:** : TIM handle
- **Channel:** : TIM Channels to be enabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected
  - TIM_CHANNEL_5: TIM Channel 5 selected
  - TIM_CHANNEL_6: TIM Channel 6 selected

Return values
- **HAL:** status

HAL_TIM_PWM_Stop

Function name **HAL_StatusTypeDef HAL_TIM_PWM_Stop (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description Stops the PWM signal generation.

Parameters
- **htim:** : TIM handle
- **Channel:** : TIM Channels to be disabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected
  - TIM_CHANNEL_5: TIM Channel 5 selected
  - TIM_CHANNEL_6: TIM Channel 6 selected

Return values
- **HAL:** status

HAL_TIM_PWM_Start_IT

Function name **HAL_StatusTypeDef HAL_TIM_PWM_Start_IT (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description Starts the PWM signal generation in interrupt mode.

Parameters
- **htim:** : TIM handle
- **Channel:** : TIM Channel to be enabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected

Return values
- **HAL:** status

HAL_TIM_PWM_Stop_IT

Function name **HAL_StatusTypeDef HAL_TIM_PWM_Stop_IT**

(TIM_HandleTypeDef * htim, uint32_t Channel)

Function description: Stops the PWM signal generation in interrupt mode.

Parameters:
- **htim:** : TIM handle
- **Channel:** : TIM Channels to be disabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected

Return values:
- **HAL:** status

HAL_TIM_PWM_Start_DMA

Function name: **HAL_StatusTypeDef HAL_TIM_PWM_Start_DMA (TIM_HandleTypeDef * htim, uint32_t Channel, uint32_t * pData, uint16_t Length)**

Function description: Starts the TIM PWM signal generation in DMA mode.

Parameters:
- **htim:** : TIM handle
- **Channel:** : TIM Channels to be enabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected
- **pData:** The source Buffer address.
- **Length:** The length of data to be transferred from memory to TIM peripheral

Return values:
- **HAL:** status

HAL_TIM_PWM_Stop_DMA

Function name: **HAL_StatusTypeDef HAL_TIM_PWM_Stop_DMA (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description: Stops the TIM PWM signal generation in DMA mode.

Parameters:
- **htim:** : TIM handle
- **Channel:** : TIM Channels to be disabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected

Return values:
- **HAL:** status

HAL_TIM_IC_Init

Function name: **HAL_StatusTypeDef HAL_TIM_IC_Init (TIM_HandleTypeDef * htim)**

Function description: Initializes the TIM Input Capture Time base according to the

specified parameters in the TIM_HandleTypeDef and initialize the associated handle.

Parameters
- **htim:** TIM Input Capture handle

Return values
- **HAL:** status

HAL_TIM_IC_DeInit

Function name **HAL_StatusTypeDef HAL_TIM_IC_DeInit (TIM_HandleTypeDef * htim)**

Function description DeInitialize the TIM peripheral.

Parameters
- **htim:** TIM Input Capture handle

Return values
- **HAL:** status

HAL_TIM_IC_MspInit

Function name **void HAL_TIM_IC_MspInit (TIM_HandleTypeDef * htim)**

Function description Initializes the TIM INput Capture MSP.

Parameters
- **htim:** TIM handle

Return values
- **None:**

HAL_TIM_IC_MspDeInit

Function name **void HAL_TIM_IC_MspDeInit (TIM_HandleTypeDef * htim)**

Function description DeInitialize TIM Input Capture MSP.

Parameters
- **htim:** TIM handle

Return values
- **None:**

HAL_TIM_IC_Start

Function name **HAL_StatusTypeDef HAL_TIM_IC_Start (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description Starts the TIM Input Capture measurement.

Parameters
- **htim:** : TIM Input Capture handle
- **Channel:** : TIM Channels to be enabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected

Return values
- **HAL:** status

HAL_TIM_IC_Stop

Function name **HAL_StatusTypeDef HAL_TIM_IC_Stop (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description — Stops the TIM Input Capture measurement.

Parameters
- **htim:** : TIM handle
- **Channel:** : TIM Channels to be disabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected

Return values
- **HAL:** status

HAL_TIM_IC_Start_IT

Function name — **HAL_StatusTypeDef HAL_TIM_IC_Start_IT (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description — Starts the TIM Input Capture measurement in interrupt mode.

Parameters
- **htim:** : TIM Input Capture handle
- **Channel:** : TIM Channels to be enabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected

Return values
- **HAL:** status

HAL_TIM_IC_Stop_IT

Function name — **HAL_StatusTypeDef HAL_TIM_IC_Stop_IT (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description — Stops the TIM Input Capture measurement in interrupt mode.

Parameters
- **htim:** : TIM handle
- **Channel:** : TIM Channels to be disabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected

Return values
- **HAL:** status

HAL_TIM_IC_Start_DMA

Function name — **HAL_StatusTypeDef HAL_TIM_IC_Start_DMA (TIM_HandleTypeDef * htim, uint32_t Channel, uint32_t * pData, uint16_t Length)**

Function description — Starts the TIM Input Capture measurement on in DMA mode.

Parameters
- **htim:** : TIM Input Capture handle
- **Channel:** : TIM Channels to be enabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected

  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected
- **pData:** The destination Buffer address.
- **Length:** The length of data to be transferred from TIM peripheral to memory.

Return values
- **HAL:** status

HAL_TIM_IC_Stop_DMA

Function name **HAL_StatusTypeDef HAL_TIM_IC_Stop_DMA (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description Stops the TIM Input Capture measurement in DMA mode.

Parameters
- **htim:** : TIM Input Capture handle
- **Channel:** : TIM Channels to be disabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected

Return values
- **HAL:** status

HAL_TIM_OnePulse_Init

Function name **HAL_StatusTypeDef HAL_TIM_OnePulse_Init (TIM_HandleTypeDef * htim, uint32_t OnePulseMode)**

Function description Initializes the TIM One Pulse Time Base according to the specified parameters in the TIM_HandleTypeDef and initialize the associated handle.

Parameters
- **htim:** TIM OnePulse handle
- **OnePulseMode:** Select the One pulse mode. This parameter can be one of the following values:
  - TIM_OPMODE_SINGLE: Only one pulse will be generated.
  - TIM_OPMODE_REPETITIVE: Repetitive pulses will be generated.

Return values
- **HAL:** status

HAL_TIM_OnePulse_DeInit

Function name **HAL_StatusTypeDef HAL_TIM_OnePulse_DeInit (TIM_HandleTypeDef * htim)**

Function description DeInitialize the TIM One Pulse.

Parameters
- **htim:** TIM One Pulse handle

Return values
- **HAL:** status

HAL_TIM_OnePulse_MspInit

Function name **void HAL_TIM_OnePulse_MspInit (TIM_HandleTypeDef * htim)**

Function description Initializes the TIM One Pulse MSP.

Parameters
- **htim:** TIM handle

Return values
- **None:**

HAL_TIM_OnePulse_MspDeInit

Function name **void HAL_TIM_OnePulse_MspDeInit (TIM_HandleTypeDef * htim)**

Function description DeInitialize TIM One Pulse MSP.

Parameters
- **htim:** TIM handle

Return values
- **None:**

HAL_TIM_OnePulse_Start

Function name **HAL_StatusTypeDef HAL_TIM_OnePulse_Start (TIM_HandleTypeDef * htim, uint32_t OutputChannel)**

Function description Starts the TIM One Pulse signal generation.

Parameters
- **htim:** : TIM One Pulse handle
- **OutputChannel:** : TIM Channels to be enabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected

Return values
- **HAL:** status

HAL_TIM_OnePulse_Stop

Function name **HAL_StatusTypeDef HAL_TIM_OnePulse_Stop (TIM_HandleTypeDef * htim, uint32_t OutputChannel)**

Function description Stops the TIM One Pulse signal generation.

Parameters
- **htim:** : TIM One Pulse handle
- **OutputChannel:** : TIM Channels to be disable This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected

Return values
- **HAL:** status

HAL_TIM_OnePulse_Start_IT

Function name **HAL_StatusTypeDef HAL_TIM_OnePulse_Start_IT (TIM_HandleTypeDef * htim, uint32_t OutputChannel)**

Function description Starts the TIM One Pulse signal generation in interrupt mode.

Parameters
- **htim:** : TIM One Pulse handle
- **OutputChannel:** : TIM Channels to be enabled This parameter can be one of the following values:

– TIM_CHANNEL_1: TIM Channel 1 selected
– TIM_CHANNEL_2: TIM Channel 2 selected

Return values
- **HAL:** status

HAL_TIM_OnePulse_Stop_IT

Function name **HAL_StatusTypeDef HAL_TIM_OnePulse_Stop_IT (TIM_HandleTypeDef * htim, uint32_t OutputChannel)**

Function description Stops the TIM One Pulse signal generation in interrupt mode.

Parameters
- **htim:** : TIM One Pulse handle
- **OutputChannel:** : TIM Channels to be enabled This parameter can be one of the following values:
  – TIM_CHANNEL_1: TIM Channel 1 selected
  – TIM_CHANNEL_2: TIM Channel 2 selected

Return values
- **HAL:** status

HAL_TIM_Encoder_Init

Function name **HAL_StatusTypeDef HAL_TIM_Encoder_Init (TIM_HandleTypeDef * htim, TIM_Encoder_InitTypeDef * sConfig)**

Function description Initializes the TIM Encoder Interface and initialize the associated handle.

Parameters
- **htim:** TIM Encoder Interface handle
- **sConfig:** TIM Encoder Interface configuration structure

Return values
- **HAL:** status

HAL_TIM_Encoder_DeInit

Function name **HAL_StatusTypeDef HAL_TIM_Encoder_DeInit (TIM_HandleTypeDef * htim)**

Function description DeInitialize the TIM Encoder interface.

Parameters
- **htim:** TIM Encoder handle

Return values
- **HAL:** status

HAL_TIM_Encoder_MspInit

Function name **void HAL_TIM_Encoder_MspInit (TIM_HandleTypeDef * htim)**

Function description Initializes the TIM Encoder Interface MSP.

Parameters
- **htim:** TIM handle

Return values
- **None:**

HAL_TIM_Encoder_MspDeInit

Function name **void HAL_TIM_Encoder_MspDeInit (TIM_HandleTypeDef * htim)**

Function description DeInitialize TIM Encoder Interface MSP.

Parameters
- **htim:** TIM handle

Return values
- **None:**

HAL_TIM_Encoder_Start

Function name **HAL_StatusTypeDef HAL_TIM_Encoder_Start (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description Starts the TIM Encoder Interface.

Parameters
- **htim:** : TIM Encoder Interface handle
- **Channel:** : TIM Channels to be enabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_ALL: TIM Channel 1 and TIM Channel 2 are selected

Return values
- **HAL:** status

HAL_TIM_Encoder_Stop

Function name **HAL_StatusTypeDef HAL_TIM_Encoder_Stop (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description Stops the TIM Encoder Interface.

Parameters
- **htim:** : TIM Encoder Interface handle
- **Channel:** : TIM Channels to be disabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_ALL: TIM Channel 1 and TIM Channel 2 are selected

Return values
- **HAL:** status

HAL_TIM_Encoder_Start_IT

Function name **HAL_StatusTypeDef HAL_TIM_Encoder_Start_IT (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description Starts the TIM Encoder Interface in interrupt mode.

Parameters
- **htim:** : TIM Encoder Interface handle
- **Channel:** : TIM Channels to be enabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_ALL: TIM Channel 1 and TIM Channel 2 are selected

Return values
- **HAL:** status

HAL_TIM_Encoder_Stop_IT

Function name
HAL_StatusTypeDef HAL_TIM_Encoder_Stop_IT (TIM_HandleTypeDef * htim, uint32_t Channel)

Function description
Stops the TIM Encoder Interface in interrupt mode.

Parameters
- **htim:** : TIM Encoder Interface handle
- **Channel:** : TIM Channels to be disabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_ALL: TIM Channel 1 and TIM Channel 2 are selected

Return values
- **HAL:** status

HAL_TIM_Encoder_Start_DMA

Function name
HAL_StatusTypeDef HAL_TIM_Encoder_Start_DMA (TIM_HandleTypeDef * htim, uint32_t Channel, uint32_t * pData1, uint32_t * pData2, uint16_t Length)

Function description
Starts the TIM Encoder Interface in DMA mode.

Parameters
- **htim:** : TIM Encoder Interface handle
- **Channel:** : TIM Channels to be enabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_ALL: TIM Channel 1 and TIM Channel 2 are selected
- **pData1:** The destination Buffer address for IC1.
- **pData2:** The destination Buffer address for IC2.
- **Length:** The length of data to be transferred from TIM peripheral to memory.

Return values
- **HAL:** status

HAL_TIM_Encoder_Stop_DMA

Function name
HAL_StatusTypeDef HAL_TIM_Encoder_Stop_DMA (TIM_HandleTypeDef * htim, uint32_t Channel)

Function description
Stops the TIM Encoder Interface in DMA mode.

Parameters
- **htim:** : TIM Encoder Interface handle
- **Channel:** : TIM Channels to be enabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_ALL: TIM Channel 1 and TIM Channel 2 are selected

Return values
- **HAL:** status

HAL_TIM_IRQHandler

Function name **void HAL_TIM_IRQHandler (TIM_HandleTypeDef * htim)**

Function description This function handles TIM interrupts requests.

Parameters
- **htim:** TIM handle

Return values
- **None:**

HAL_TIM_OC_ConfigChannel

Function name **HAL_StatusTypeDef HAL_TIM_OC_ConfigChannel (TIM_HandleTypeDef * htim, TIM_OC_InitTypeDef * sConfig, uint32_t Channel)**

Function description Initializes the TIM Output Compare Channels according to the specified parameters in the TIM_OC_InitTypeDef.

Parameters
- **htim:** TIM Output Compare handle
- **sConfig:** TIM Output Compare configuration structure
- **Channel:** : TIM Channels to configure This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected
  - TIM_CHANNEL_5: TIM Channel 5 selected
  - TIM_CHANNEL_6: TIM Channel 6 selected

Return values
- **HAL:** status

HAL_TIM_PWM_ConfigChannel

Function name **HAL_StatusTypeDef HAL_TIM_PWM_ConfigChannel (TIM_HandleTypeDef * htim, TIM_OC_InitTypeDef * sConfig, uint32_t Channel)**

Function description Initializes the TIM PWM channels according to the specified parameters in the TIM_OC_InitTypeDef.

Parameters
- **htim:** TIM PWM handle
- **sConfig:** TIM PWM configuration structure
- **Channel:** : TIM Channels to be configured This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected
  - TIM_CHANNEL_5: TIM Channel 5 selected
  - TIM_CHANNEL_6: TIM Channel 6 selected

Return values
- **HAL:** status

HAL_TIM_IC_ConfigChannel

Function name **HAL_StatusTypeDef HAL_TIM_IC_ConfigChannel (TIM_HandleTypeDef * htim, TIM_IC_InitTypeDef * sConfig,**

uint32_t Channel)

Function description: Initializes the TIM Input Capture Channels according to the specified parameters in the TIM_IC_InitTypeDef.

Parameters:
- **htim:** TIM IC handle
- **sConfig:** TIM Input Capture configuration structure
- **Channel:** : TIM Channels to be enabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected

Return values:
- **HAL:** status

HAL_TIM_OnePulse_ConfigChannel

Function name: **HAL_StatusTypeDef HAL_TIM_OnePulse_ConfigChannel (TIM_HandleTypeDef * htim, TIM_OnePulse_InitTypeDef * sConfig, uint32_t OutputChannel, uint32_t InputChannel)**

Function description: Initializes the TIM One Pulse Channels according to the specified parameters in the TIM_OnePulse_InitTypeDef.

Parameters:
- **htim:** TIM One Pulse handle
- **sConfig:** TIM One Pulse configuration structure
- **OutputChannel:** : TIM Channels to be enabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
- **InputChannel:** : TIM Channels to be enabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected

Return values:
- **HAL:** status

HAL_TIM_ConfigOCrefClear

Function name: **HAL_StatusTypeDef HAL_TIM_ConfigOCrefClear (TIM_HandleTypeDef * htim, TIM_ClearInputConfigTypeDef * sClearInputConfig, uint32_t Channel)**

Function description: Configures the OCRef clear feature.

Parameters:
- **htim:** TIM handle
- **sClearInputConfig:** pointer to a TIM_ClearInputConfigTypeDef structure that contains the OCREF clear feature and parameters for the TIM peripheral.
- **Channel:** specifies the TIM Channel This parameter can be one of the following values:
  - TIM_Channel_1: TIM Channel 1
  - TIM_Channel_2: TIM Channel 2
  - TIM_Channel_3: TIM Channel 3
  - TIM_Channel_4: TIM Channel 4
  - TIM_Channel_5: TIM Channel 5

– TIM_Channel_6: TIM Channel 6

Return values
- **None:**

HAL_TIM_ConfigClockSource

Function name **HAL_StatusTypeDef HAL_TIM_ConfigClockSource (TIM_HandleTypeDef * htim, TIM_ClockConfigTypeDef * sClockSourceConfig)**

Function description Configures the clock source to be used.

Parameters
- **htim:** TIM handle
- **sClockSourceConfig:** pointer to a TIM_ClockConfigTypeDef structure that contains the clock source information for the TIM peripheral.

Return values
- **HAL:** status

HAL_TIM_ConfigTI1Input

Function name **HAL_StatusTypeDef HAL_TIM_ConfigTI1Input (TIM_HandleTypeDef * htim, uint32_t TI1_Selection)**

Function description Selects the signal connected to the TI1 input: direct from CH1_input or a XOR combination between CH1_input, CH2_input & CH3_input.

Parameters
- **htim:** TIM handle.
- **TI1_Selection:** Indicate whether or not channel 1 is connected to the output of a XOR gate. This parameter can be one of the following values:
  – TIM_TI1SELECTION_CH1: The TIMx_CH1 pin is connected to TI1 input
  – TIM_TI1SELECTION_XORCOMBINATION: The TIMx_CH1, CH2 and CH3 pins are connected to the TI1 input (XOR combination)

Return values
- **HAL:** status

HAL_TIM_SlaveConfigSynchronization

Function name **HAL_StatusTypeDef HAL_TIM_SlaveConfigSynchronization (TIM_HandleTypeDef * htim, TIM_SlaveConfigTypeDef * sSlaveConfig)**

Function description Configures the TIM in Slave mode.

Parameters
- **htim:** TIM handle.
- **sSlaveConfig:** pointer to a TIM_SlaveConfigTypeDef structure that contains the selected trigger (internal trigger input, filtered timer input or external trigger input) and the) and the Slave mode (Disable, Reset, Gated, Trigger, External clock mode 1).

Return values
- **HAL:** status

HAL_TIM_SlaveConfigSynchronization_IT

Function name
HAL_StatusTypeDef HAL_TIM_SlaveConfigSynchronization_IT (TIM_HandleTypeDef * htim, TIM_SlaveConfigTypeDef * sSlaveConfig)

Function description
Configures the TIM in Slave mode in interrupt mode.

Parameters
- **htim:** TIM handle.
- **sSlaveConfig:** pointer to a TIM_SlaveConfigTypeDef structure that contains the selected trigger (internal trigger input, filtered timer input or external trigger input) and the) and the Slave mode (Disable, Reset, Gated, Trigger, External clock mode 1).

Return values
- **HAL:** status

HAL_TIM_DMABurst_WriteStart

Function name
HAL_StatusTypeDef HAL_TIM_DMABurst_WriteStart (TIM_HandleTypeDef * htim, uint32_t BurstBaseAddress, uint32_t BurstRequestSrc, uint32_t * BurstBuffer, uint32_t BurstLength)

Function description
Configure the DMA Burst to transfer Data from the memory to the TIM peripheral.

Parameters
- **htim:** TIM handle
- **BurstBaseAddress:** TIM Base address from when the DMA will starts the Data write This parameters can be on of the following values:
  - TIM_DMABASE_CR1
  - TIM_DMABASE_CR2
  - TIM_DMABASE_SMCR
  - TIM_DMABASE_DIER
  - TIM_DMABASE_SR
  - TIM_DMABASE_EGR
  - TIM_DMABASE_CCMR1
  - TIM_DMABASE_CCMR2
  - TIM_DMABASE_CCER
  - TIM_DMABASE_CNT
  - TIM_DMABASE_PSC
  - TIM_DMABASE_ARR
  - TIM_DMABASE_RCR
  - TIM_DMABASE_CCR1
  - TIM_DMABASE_CCR2
  - TIM_DMABASE_CCR3
  - TIM_DMABASE_CCR4
  - TIM_DMABASE_BDTR
  - TIM_DMABASE_DCR
- **BurstRequestSrc:** TIM DMA Request sources This parameters can be on of the following values:
  - TIM_DMA_UPDATE: TIM update Interrupt source
  - TIM_DMA_CC1: TIM Capture Compare 1 DMA source
  - TIM_DMA_CC2: TIM Capture Compare 2 DMA source

  - TIM_DMA_CC3: TIM Capture Compare 3 DMA source
  - TIM_DMA_CC4: TIM Capture Compare 4 DMA source
  - TIM_DMA_COM: TIM Commutation DMA source
  - TIM_DMA_TRIGGER: TIM Trigger DMA source
- **BurstBuffer:** The Buffer address.
- **BurstLength:** DMA Burst length. This parameter can be one value between: TIM_DMABurstLength_1Transfer and TIM_DMABurstLength_18Transfers.

Return values
- **HAL:** status

HAL_TIM_DMABurst_WriteStop

Function name **HAL_StatusTypeDef HAL_TIM_DMABurst_WriteStop (TIM_HandleTypeDef * htim, uint32_t BurstRequestSrc)**

Function description Stops the TIM DMA Burst mode.

Parameters
- **htim:** TIM handle
- **BurstRequestSrc:** TIM DMA Request sources to disable

Return values
- **HAL:** status

HAL_TIM_DMABurst_ReadStart

Function name **HAL_StatusTypeDef HAL_TIM_DMABurst_ReadStart (TIM_HandleTypeDef * htim, uint32_t BurstBaseAddress, uint32_t BurstRequestSrc, uint32_t * BurstBuffer, uint32_t BurstLength)**

Function description Configure the DMA Burst to transfer Data from the TIM peripheral to the memory.

Parameters
- **htim:** TIM handle
- **BurstBaseAddress:** TIM Base address from when the DMA will starts the Data read This parameters can be on of the following values:
  - TIM_DMABASE_CR1
  - TIM_DMABASE_CR2
  - TIM_DMABASE_SMCR
  - TIM_DMABASE_DIER
  - TIM_DMABASE_SR
  - TIM_DMABASE_EGR
  - TIM_DMABASE_CCMR1
  - TIM_DMABASE_CCMR2
  - TIM_DMABASE_CCER
  - TIM_DMABASE_CNT
  - TIM_DMABASE_PSC
  - TIM_DMABASE_ARR
  - TIM_DMABASE_RCR
  - TIM_DMABASE_CCR1
  - TIM_DMABASE_CCR2
  - TIM_DMABASE_CCR3
  - TIM_DMABASE_CCR4
  - TIM_DMABASE_BDTR
  - TIM_DMABASE_DCR

- **BurstRequestSrc:** TIM DMA Request sources This parameters can be on of the following values:
  - TIM_DMA_UPDATE: TIM update Interrupt source
  - TIM_DMA_CC1: TIM Capture Compare 1 DMA source
  - TIM_DMA_CC2: TIM Capture Compare 2 DMA source
  - TIM_DMA_CC3: TIM Capture Compare 3 DMA source
  - TIM_DMA_CC4: TIM Capture Compare 4 DMA source
  - TIM_DMA_COM: TIM Commutation DMA source
  - TIM_DMA_TRIGGER: TIM Trigger DMA source
- **BurstBuffer:** The Buffer address.
- **BurstLength:** DMA Burst length. This parameter can be one value between: TIM_DMABurstLength_1Transfer and TIM_DMABurstLength_18Transfers.

Return values
- **HAL:** status

HAL_TIM_DMABurst_ReadStop

Function name **HAL_StatusTypeDef HAL_TIM_DMABurst_ReadStop (TIM_HandleTypeDef * htim, uint32_t BurstRequestSrc)**

Function description Stop the DMA burst reading.

Parameters
- **htim:** TIM handle
- **BurstRequestSrc:** TIM DMA Request sources to disable.

Return values
- **HAL:** status

HAL_TIM_GenerateEvent

Function name **HAL_StatusTypeDef HAL_TIM_GenerateEvent (TIM_HandleTypeDef * htim, uint32_t EventSource)**

Function description Generate a software event.

Parameters
- **htim:** TIM handle
- **EventSource:** specifies the event source. This parameter can be one of the following values:
  - TIM_EVENTSOURCE_UPDATE: Timer update Event source
  - TIM_EVENTSOURCE_CC1: Timer Capture Compare 1 Event source
  - TIM_EVENTSOURCE_CC2: Timer Capture Compare 2 Event source
  - TIM_EVENTSOURCE_CC3: Timer Capture Compare 3 Event source
  - TIM_EVENTSOURCE_CC4: Timer Capture Compare 4 Event source
  - TIM_EVENTSOURCE_COM: Timer COM event source
  - TIM_EVENTSOURCE_TRIGGER: Timer Trigger Event source
  - TIM_EVENTSOURCE_BREAK: Timer Break event source
  - TIM_EVENTSOURCE_BREAK2: Timer Break2 event source

Return values
- **HAL:** status

HAL_TIM_ReadCapturedValue

Function name **uint32_t HAL_TIM_ReadCapturedValue (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description Read the captured value from Capture Compare unit.

Parameters
- **htim:** TIM handle.
- **Channel:** : TIM Channels to be enabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected

Return values
- **Captured:** value

HAL_TIM_PeriodElapsedCallback

Function name **void HAL_TIM_PeriodElapsedCallback (TIM_HandleTypeDef * htim)**

Function description Period elapsed callback in non-blocking mode.

Parameters
- **htim:** : TIM handle

Return values
- **None:**

HAL_TIM_OC_DelayElapsedCallback

Function name **void HAL_TIM_OC_DelayElapsedCallback (TIM_HandleTypeDef * htim)**

Function description Output Compare callback in non-blocking mode.

Parameters
- **htim:** : TIM OC handle

Return values
- **None:**

HAL_TIM_IC_CaptureCallback

Function name **void HAL_TIM_IC_CaptureCallback (TIM_HandleTypeDef * htim)**

Function description Input Capture callback in non-blocking mode.

Parameters
- **htim:** : TIM IC handle

Return values
- **None:**

HAL_TIM_PWM_PulseFinishedCallback

Function name **void HAL_TIM_PWM_PulseFinishedCallback (TIM_HandleTypeDef * htim)**

Function description PWM Pulse finished callback in non-blocking mode.

Parameters
- **htim:** : TIM handle

Return values
- **None:**

HAL_TIM_TriggerCallback

Function name **void HAL_TIM_TriggerCallback (TIM_HandleTypeDef * htim)**

Function description Hall Trigger detection callback in non-blocking mode.

Parameters
- **htim:** : TIM handle

Return values
- **None:**

HAL_TIM_ErrorCallback

Function name **void HAL_TIM_ErrorCallback (TIM_HandleTypeDef * htim)**

Function description Timer error callback in non-blocking mode.

Parameters
- **htim:** : TIM handle

Return values
- **None:**

HAL_TIM_Base_GetState

Function name **HAL_TIM_StateTypeDef HAL_TIM_Base_GetState (TIM_HandleTypeDef * htim)**

Function description Return the TIM Base handle state.

Parameters
- **htim:** TIM Base handle

Return values
- **HAL:** state

HAL_TIM_OC_GetState

Function name **HAL_TIM_StateTypeDef HAL_TIM_OC_GetState (TIM_HandleTypeDef * htim)**

Function description Return the TIM OC handle state.

Parameters
- **htim:** TIM Ouput Compare handle

Return values
- **HAL:** state

HAL_TIM_PWM_GetState

Function name **HAL_TIM_StateTypeDef HAL_TIM_PWM_GetState (TIM_HandleTypeDef * htim)**

Function description Return the TIM PWM handle state.

Parameters
- **htim:** TIM handle

Return values
- **HAL:** state

HAL_TIM_IC_GetState

Function name **HAL_TIM_StateTypeDef HAL_TIM_IC_GetState (TIM_HandleTypeDef * htim)**

Function description Return the TIM Input Capture handle state.

Parameters
- **htim:** TIM IC handle

Return values
- **HAL:** state

HAL_TIM_OnePulse_GetState

Function name **HAL_TIM_StateTypeDef HAL_TIM_OnePulse_GetState (TIM_HandleTypeDef * htim)**

Function description Return the TIM One Pulse Mode handle state.

Parameters
- **htim:** TIM OPM handle

Return values
- **HAL:** state

HAL_TIM_Encoder_GetState

Function name **HAL_TIM_StateTypeDef HAL_TIM_Encoder_GetState (TIM_HandleTypeDef * htim)**

Function description Return the TIM Encoder Mode handle state.

Parameters
- **htim:** TIM Encoder handle

Return values
- **HAL:** state

TIM_Base_SetConfig

Function name **void TIM_Base_SetConfig (TIM_TypeDef * TIMx, TIM_Base_InitTypeDef * Structure)**

Function description Time Base configuration.

Parameters
- **TIMx:** TIM peripheral
- **Structure:** TIM Base configuration structure

Return values
- **None:**

TIM_TI1_SetConfig

Function name **void TIM_TI1_SetConfig (TIM_TypeDef * TIMx, uint32_t TIM_ICPolarity, uint32_t TIM_ICSelection, uint32_t TIM_ICFilter)**

Function description Configure the TI1 as Input.

Parameters
- **TIMx:** to select the TIM peripheral.
- **TIM_ICPolarity:** : The Input Polarity. This parameter can be one of the following values:
  - TIM_ICPolarity_Rising
  - TIM_ICPolarity_Falling
  - TIM_ICPolarity_BothEdge
- **TIM_ICSelection:** specifies the input to be used. This parameter can be one of the following values:
  - TIM_ICSelection_DirectTI: TIM Input 1 is selected to be connected to IC1.
  - TIM_ICSelection_IndirectTI: TIM Input 1 is selected to be connected to IC2.
  - TIM_ICSelection_TRC: TIM Input 1 is selected to be

connected to TRC.
- **TIM_ICFilter:** Specifies the Input Capture Filter. This parameter must be a value between 0x00 and 0x0F.

Return values
- **None:**

Notes
- TIM_ICFilter and TIM_ICPolarity are not used in INDIRECT mode as TI2FP1 (on channel2 path) is used as the input signal. Therefore CCMR1 must be protected against un-initialized filter and polarity values.

TIM_OC2_SetConfig

Function name **void TIM_OC2_SetConfig (TIM_TypeDef * TIMx, TIM_OC_InitTypeDef * OC_Config)**

Function description Time Ouput Compare 2 configuration.

Parameters
- **TIMx:** to select the TIM peripheral
- **OC_Config:** The ouput configuration structure

Return values
- **None:**

TIM_ETR_SetConfig

Function name **void TIM_ETR_SetConfig (TIM_TypeDef * TIMx, uint32_t TIM_ExtTRGPrescaler, uint32_t TIM_ExtTRGPolarity, uint32_t ExtTRGFilter)**

Function description Configures the TIMx External Trigger (ETR).

Parameters
- **TIMx:** to select the TIM peripheral
- **TIM_ExtTRGPrescaler:** The external Trigger Prescaler. This parameter can be one of the following values:
  - TIM_ETRPRESCALER_DIV1: ETRP Prescaler OFF.
  - TIM_ETRPRESCALER_DIV2: ETRP frequency divided by 2.
  - TIM_ETRPRESCALER_DIV4: ETRP frequency divided by 4.
  - TIM_ETRPRESCALER_DIV8: ETRP frequency divided by 8.
- **TIM_ExtTRGPolarity:** The external Trigger Polarity. This parameter can be one of the following values:
  - TIM_ETRPOLARITY_INVERTED: active low or falling edge active.
  - TIM_ETRPOLARITY_NONINVERTED: active high or rising edge active.
- **ExtTRGFilter:** External Trigger Filter. This parameter must be a value between 0x00 and 0x0F

Return values
- **None:**

TIM_DMADelayPulseCplt

Function name **void TIM_DMADelayPulseCplt (DMA_HandleTypeDef * hdma)**

Function description TIM DMA Delay Pulse complete callback.

Parameters
- **hdma:** : pointer to DMA handle.

Return values
- **None:**

TIM_DMAError

Function name **void TIM_DMAError (DMA_HandleTypeDef * hdma)**

Function description TIM DMA error callback.

Parameters
- **hdma:** : pointer to DMA handle.

Return values
- **None:**

TIM_DMACaptureCplt

Function name **void TIM_DMACaptureCplt (DMA_HandleTypeDef * hdma)**

Function description TIM DMA Capture complete callback.

Parameters
- **hdma:** : pointer to DMA handle.

Return values
- **None:**

TIM_CCxChannelCmd

Function name **void TIM_CCxChannelCmd (TIM_TypeDef * TIMx, uint32_t Channel, uint32_t ChannelState)**

Function description Enables or disables the TIM Capture Compare Channel x.

Parameters
- **TIMx:** to select the TIM peripheral
- **Channel:** specifies the TIM Channel This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1
  - TIM_CHANNEL_2: TIM Channel 2
  - TIM_CHANNEL_3: TIM Channel 3
  - TIM_CHANNEL_4: TIM Channel 4
- **ChannelState:** specifies the TIM Channel CCxE bit new state. This parameter can be: TIM_CCx_ENABLE or TIM_CCx_Disable.

Return values
- **None:**

65.3 TIM Firmware driver defines

65.3.1 TIM

TIM Automatic Output Enable

TIM_AUTOMATICOUTPUT_ENABLE

TIM_AUTOMATICOUTPUT_DISABLE

TIM Auto-Reload Preload

TIM_AUTORELOAD_PRELOAD_DISABLE	TIMx_ARR register is not buffered
TIM_AUTORELOAD_PRELOAD_ENABLE	TIMx_ARR register is buffered

TIM Break input 2 Enable

TIM_BREAK2_DISABLE

TIM_BREAK2_ENABLE

TIM Break Input 2 Polarity

TIM_BREAK2POLARITY_LOW

TIM_BREAK2POLARITY_HIGH

TIM Break Input Enable

TIM_BREAK_ENABLE

TIM_BREAK_DISABLE

TIM Break Input Polarity

TIM_BREAKPOLARITY_LOW

TIM_BREAKPOLARITY_HIGH

TIM Break System

TIM_BREAK_SYSTEM_ECC	Enables and locks the ECC error signal with Break Input of TIM1/8/15/16/17
TIM_BREAK_SYSTEM_PVD	Enables and locks the PVD connection with TIM1/8/15/16/17 Break Input and also the PVDE and PLS bits of the Power Control Interface
TIM_BREAK_SYSTEM_SRAM2_PARITY_ERROR	Enables and locks the SRAM2_PARITY error signal with Break Input of TIM1/8/15/16/17
TIM_BREAK_SYSTEM_LOCKUP	Enables and locks the LOCKUP output of CortexM4 with Break Input of TIM1/15/16/17

TIM Channel

TIM_CHANNEL_1

TIM_CHANNEL_2

TIM_CHANNEL_3

TIM_CHANNEL_4

TIM_CHANNEL_5

TIM_CHANNEL_6

TIM_CHANNEL_ALL

TIM Clear Input Polarity

TIM_CLEARINPUTPOLARITY_INVERTED	Polarity for ETRx pin
TIM_CLEARINPUTPOLARITY_NONINVERTED	Polarity for ETRx pin

TIM Clear Input Prescaler

TIM_CLEARINPUTPRESCALER_DIV1	No prescaler is used
TIM_CLEARINPUTPRESCALER_DIV2	Prescaler for External ETR pin: Capture

	performed once every 2 events.
TIM_CLEARINPUTPRESCALER_DIV4	Prescaler for External ETR pin: Capture performed once every 4 events.
TIM_CLEARINPUTPRESCALER_DIV8	Prescaler for External ETR pin: Capture performed once every 8 events.

TIM Clear Input Source

TIM_CLEARINPUTSOURCE_ETR

TIM_CLEARINPUTSOURCE_OCREFCLR

TIM_CLEARINPUTSOURCE_NONE

TIM Clock Division

TIM_CLOCKDIVISION_DIV1

TIM_CLOCKDIVISION_DIV2

TIM_CLOCKDIVISION_DIV4

TIM Clock Polarity

TIM_CLOCKPOLARITY_INVERTED	Polarity for ETRx clock sources
TIM_CLOCKPOLARITY_NONINVERTED	Polarity for ETRx clock sources
TIM_CLOCKPOLARITY_RISING	Polarity for TIx clock sources
TIM_CLOCKPOLARITY_FALLING	Polarity for TIx clock sources
TIM_CLOCKPOLARITY_BOTHEDGE	Polarity for TIx clock sources

TIM Clock Prescaler

TIM_CLOCKPRESCALER_DIV1	No prescaler is used
TIM_CLOCKPRESCALER_DIV2	Prescaler for External ETR Clock: Capture performed once every 2 events.
TIM_CLOCKPRESCALER_DIV4	Prescaler for External ETR Clock: Capture performed once every 4 events.
TIM_CLOCKPRESCALER_DIV8	Prescaler for External ETR Clock: Capture performed once every 8 events.

TIM Clock Source

TIM_CLOCKSOURCE_ETRMODE2

TIM_CLOCKSOURCE_INTERNAL

TIM_CLOCKSOURCE_ITR0

TIM_CLOCKSOURCE_ITR1

TIM_CLOCKSOURCE_ITR2

TIM_CLOCKSOURCE_ITR3

TIM_CLOCKSOURCE_TI1ED

TIM_CLOCKSOURCE_TI1

TIM_CLOCKSOURCE_TI2

TIM_CLOCKSOURCE_ETRMODE1

TIM Commutation Source

TIM_COMMUTATION_TRGI

TIM_COMMUTATION_SOFTWARE

TIM Counter Mode

TIM_COUNTERMODE_UP

TIM_COUNTERMODE_DOWN

TIM_COUNTERMODE_CENTERALIGNED1

TIM_COUNTERMODE_CENTERALIGNED2

TIM_COUNTERMODE_CENTERALIGNED3

TIM DMA Base Address

TIM_DMABASE_CR1

TIM_DMABASE_CR2

TIM_DMABASE_SMCR

TIM_DMABASE_DIER

TIM_DMABASE_SR

TIM_DMABASE_EGR

TIM_DMABASE_CCMR1

TIM_DMABASE_CCMR2

TIM_DMABASE_CCER

TIM_DMABASE_CNT

TIM_DMABASE_PSC

TIM_DMABASE_ARR

TIM_DMABASE_RCR

TIM_DMABASE_CCR1

TIM_DMABASE_CCR2

TIM_DMABASE_CCR3

TIM_DMABASE_CCR4

TIM_DMABASE_BDTR

TIM_DMABASE_DCR

TIM_DMABASE_DMAR

TIM_DMABASE_OR1

TIM_DMABASE_CCMR3

TIM_DMABASE_CCR5

TIM_DMABASE_CCR6

TIM_DMABASE_OR2

TIM_DMABASE_OR3

TIM DMA Burst Length

TIM_DMABURSTLENGTH_1TRANSFER

TIM_DMABURSTLENGTH_2TRANSFERS

TIM_DMABURSTLENGTH_3TRANSFERS

TIM_DMABURSTLENGTH_4TRANSFERS

TIM_DMABURSTLENGTH_5TRANSFERS

TIM_DMABURSTLENGTH_6TRANSFERS

TIM_DMABURSTLENGTH_7TRANSFERS

TIM_DMABURSTLENGTH_8TRANSFERS

TIM_DMABURSTLENGTH_9TRANSFERS

TIM_DMABURSTLENGTH_10TRANSFERS

TIM_DMABURSTLENGTH_11TRANSFERS

TIM_DMABURSTLENGTH_12TRANSFERS

TIM_DMABURSTLENGTH_13TRANSFERS

TIM_DMABURSTLENGTH_14TRANSFERS

TIM_DMABURSTLENGTH_15TRANSFERS

TIM_DMABURSTLENGTH_16TRANSFERS

TIM_DMABURSTLENGTH_17TRANSFERS

TIM_DMABURSTLENGTH_18TRANSFERS

TIM DMA Sources

TIM_DMA_UPDATE

TIM_DMA_CC1

TIM_DMA_CC2

TIM_DMA_CC3

TIM_DMA_CC4

TIM_DMA_COM

TIM_DMA_TRIGGER

TIM Encoder Mode

TIM_ENCODERMODE_TI1

TIM_ENCODERMODE_TI2

TIM_ENCODERMODE_TI12

TIM ETR Polarity

TIM_ETRPOLARITY_INVERTED	Polarity for ETR source
TIM_ETRPOLARITY_NONINVERTED	Polarity for ETR source

TIM ETR Prescaler

TIM_ETRPRESCALER_DIV1	No prescaler is used

TIM_ETRPRESCALER_DIV2	ETR input source is divided by 2
TIM_ETRPRESCALER_DIV4	ETR input source is divided by 4
TIM_ETRPRESCALER_DIV8	ETR input source is divided by 8

TIM Extended Event Source

TIM_EVENTSOURCE_UPDATE	Reinitialize the counter and generates an update of the registers
TIM_EVENTSOURCE_CC1	A capture/compare event is generated on channel 1
TIM_EVENTSOURCE_CC2	A capture/compare event is generated on channel 2
TIM_EVENTSOURCE_CC3	A capture/compare event is generated on channel 3
TIM_EVENTSOURCE_CC4	A capture/compare event is generated on channel 4
TIM_EVENTSOURCE_COM	A commutation event is generated
TIM_EVENTSOURCE_TRIGGER	A trigger event is generated
TIM_EVENTSOURCE_BREAK	A break event is generated
TIM_EVENTSOURCE_BREAK2	A break 2 event is generated

TIM Exported Macros

__HAL_TIM_RESET_HANDLE_STATE

Description:

- Reset TIM handle state.

Parameters:

- __HANDLE__: TIM handle.

Return value:

- None

__HAL_TIM_ENABLE

Description:

- Enable the TIM peripheral.

Parameters:

- __HANDLE__: TIM handle

Return value:

- None

__HAL_TIM_MOE_ENABLE

Description:

- Enable the TIM main Output.

Parameters:

- __HANDLE__: TIM handle

Return value:

- None

__HAL_TIM_DISABLE

Description:

- Disable the TIM peripheral.

Parameters:

- __HANDLE__: TIM handle

Return value:

- None

__HAL_TIM_MOE_DISABLE

Description:

- Disable the TIM main Output.

Parameters:

- __HANDLE__: TIM handle

Return value:

- None

Notes:

- The Main Output Enable of a timer instance is disabled only if all the CCx and CCxN channels have been disabled

__HAL_TIM_MOE_DISABLE_UNCONDITIONALLY

Description:

- Disable the TIM main Output.

Parameters:

- __HANDLE__: TIM handle

Return value:

- None

Notes:

- The Main Output Enable of a timer instance is disabled unconditionally

__HAL_TIM_ENABLE_IT

Description:

- Enable the specified TIM interrupt.

Parameters:

- __HANDLE__: specifies the TIM Handle.
- __INTERRUPT__: specifies the TIM interrupt source to enable. This parameter can be one of the following values:
  - TIM_IT_UPDATE: Update interrupt
  - TIM_IT_CC1: Capture/Compare 1 interrupt
  - TIM_IT_CC2: Capture/Compare 2 interrupt
  - TIM_IT_CC3: Capture/Compare 3 interrupt
  - TIM_IT_CC4: Capture/Compare 4 interrupt
  - TIM_IT_COM: Commutation interrupt
  - TIM_IT_TRIGGER: Trigger interrupt
  - TIM_IT_BREAK: Break interrupt

Return value:

- None

__HAL_TIM_DISABLE_IT

Description:

- Disable the specified TIM interrupt.

Parameters:

- __HANDLE__: specifies the TIM Handle.
- __INTERRUPT__: specifies the TIM interrupt source to disable. This parameter can be one of the following values:
  - TIM_IT_UPDATE: Update interrupt
  - TIM_IT_CC1: Capture/Compare 1 interrupt
  - TIM_IT_CC2: Capture/Compare 2 interrupt
  - TIM_IT_CC3: Capture/Compare 3 interrupt
  - TIM_IT_CC4: Capture/Compare 4 interrupt
  - TIM_IT_COM: Commutation interrupt
  - TIM_IT_TRIGGER: Trigger interrupt
  - TIM_IT_BREAK: Break interrupt

Return value:

- None

__HAL_TIM_ENABLE_DMA

Description:

- Enable the specified DMA request.

Parameters:

- __HANDLE__: specifies the TIM Handle.
- __DMA__: specifies the TIM DMA request to enable. This parameter can be one of the following values:
  - TIM_DMA_UPDATE: Update DMA request
  - TIM_DMA_CC1: Capture/Compare 1 DMA request
  - TIM_DMA_CC2: Capture/Compare 2 DMA request
  - TIM_DMA_CC3: Capture/Compare 3 DMA request
  - TIM_DMA_CC4: Capture/Compare 4 DMA request
  - TIM_DMA_COM: Commutation DMA request
  - TIM_DMA_TRIGGER: Trigger DMA request

Return value:

- None

__HAL_TIM_DISABLE_DMA

Description:

- Disable the specified DMA request.

Parameters:

- __HANDLE__: specifies the TIM Handle.
- __DMA__: specifies the TIM DMA request to disable. This parameter can be one of the following values:
  - TIM_DMA_UPDATE: Update DMA request
  - TIM_DMA_CC1: Capture/Compare 1 DMA request
  - TIM_DMA_CC2: Capture/Compare 2 DMA request
  - TIM_DMA_CC3: Capture/Compare 3 DMA request
  - TIM_DMA_CC4: Capture/Compare 4 DMA request
  - TIM_DMA_COM: Commutation DMA request
  - TIM_DMA_TRIGGER: Trigger DMA request

Return value:

- None

__HAL_TIM_GET_FLAG

Description:

- Check whether the specified TIM interrupt flag is set or not.

Parameters:

- __HANDLE__: specifies the TIM Handle.
- __FLAG__: specifies the TIM interrupt flag to check. This parameter can be one of the following values:
  - TIM_FLAG_UPDATE: Update interrupt flag
  - TIM_FLAG_CC1: Capture/Compare 1 interrupt flag
  - TIM_FLAG_CC2: Capture/Compare 2 interrupt flag
  - TIM_FLAG_CC3: Capture/Compare 3 interrupt flag
  - TIM_FLAG_CC4: Capture/Compare 4 interrupt flag
  - TIM_FLAG_CC5: Compare 5 interrupt flag
  - TIM_FLAG_CC6: Compare 6 interrupt flag
  - TIM_FLAG_COM: Commutation interrupt flag
  - TIM_FLAG_TRIGGER: Trigger interrupt flag
  - TIM_FLAG_BREAK: Break interrupt flag

- TIM_FLAG_BREAK2: Break 2 interrupt flag
- TIM_FLAG_SYSTEM_BREAK: System Break interrupt flag
- TIM_FLAG_CC1OF: Capture/Compare 1 overcapture flag
- TIM_FLAG_CC2OF: Capture/Compare 2 overcapture flag
- TIM_FLAG_CC3OF: Capture/Compare 3 overcapture flag
- TIM_FLAG_CC4OF: Capture/Compare 4 overcapture flag

Return value:

- The: new state of __FLAG__ (TRUE or FALSE).

__HAL_TIM_CLEAR_FLAG

Description:

- Clear the specified TIM interrupt flag.

Parameters:

- __HANDLE__: specifies the TIM Handle.
- __FLAG__: specifies the TIM interrupt flag to clear. This parameter can be one of the following values:
  - TIM_FLAG_UPDATE: Update interrupt flag
  - TIM_FLAG_CC1: Capture/Compare 1 interrupt flag
  - TIM_FLAG_CC2: Capture/Compare 2 interrupt flag
  - TIM_FLAG_CC3: Capture/Compare 3 interrupt flag
  - TIM_FLAG_CC4: Capture/Compare 4 interrupt flag
  - TIM_FLAG_CC5: Compare 5 interrupt flag
  - TIM_FLAG_CC6: Compare 6 interrupt flag
  - TIM_FLAG_COM: Commutation interrupt flag
  - TIM_FLAG_TRIGGER: Trigger interrupt flag
  - TIM_FLAG_BREAK: Break interrupt flag
  - TIM_FLAG_BREAK2: Break 2 interrupt flag
  - TIM_FLAG_SYSTEM_BREAK: System Break interrupt flag
  - TIM_FLAG_CC1OF: Capture/Compare 1 overcapture flag
  - TIM_FLAG_CC2OF: Capture/Compare 2 overcapture flag
  - TIM_FLAG_CC3OF:

Capture/Compare 3 overcapture flag
  - TIM_FLAG_CC4OF: Capture/Compare 4 overcapture flag

Return value:

- The: new state of __FLAG__ (TRUE or FALSE).

__HAL_TIM_GET_IT_SOURCE

Description:

- Check whether the specified TIM interrupt source is enabled or not.

Parameters:

- __HANDLE__: TIM handle
- __INTERRUPT__: specifies the TIM interrupt source to check. This parameter can be one of the following values:
  - TIM_IT_UPDATE: Update interrupt
  - TIM_IT_CC1: Capture/Compare 1 interrupt
  - TIM_IT_CC2: Capture/Compare 2 interrupt
  - TIM_IT_CC3: Capture/Compare 3 interrupt
  - TIM_IT_CC4: Capture/Compare 4 interrupt
  - TIM_IT_COM: Commutation interrupt
  - TIM_IT_TRIGGER: Trigger interrupt
  - TIM_IT_BREAK: Break interrupt

Return value:

- The: state of TIM_IT (SET or RESET).

__HAL_TIM_CLEAR_IT

Description:

- Clear the TIM interrupt pending bits.

Parameters:

- __HANDLE__: TIM handle
- __INTERRUPT__: specifies the interrupt pending bit to clear. This parameter can be one of the following values:
  - TIM_IT_UPDATE: Update interrupt
  - TIM_IT_CC1: Capture/Compare 1 interrupt
  - TIM_IT_CC2: Capture/Compare 2 interrupt
  - TIM_IT_CC3: Capture/Compare 3 interrupt
  - TIM_IT_CC4: Capture/Compare 4 interrupt
  - TIM_IT_COM: Commutation interrupt
  - TIM_IT_TRIGGER: Trigger interrupt
  - TIM_IT_BREAK: Break interrupt

Return value:

- None

__HAL_TIM_IS_TIM_COUNTING_DOWN

Description:

- Indicates whether or not the TIM Counter is used as downcounter.

Parameters:

- __HANDLE__: TIM handle.

Return value:

- False: (Counter used as upcounter) or True (Counter used as downcounter)

Notes:

- This macro is particularly useful to get the counting mode when the timer operates in Center-aligned mode or Encoder mode.

__HAL_TIM_SET_PRESCALER

Description:

- Set the TIM Prescaler on runtime.

Parameters:

- __HANDLE__: TIM handle.
- __PRESC__: specifies the Prescaler new value.

Return value:

- None

__HAL_TIM_SET_COUNTER

Description:

- Set the TIM Counter Register value on runtime.

Parameters:

- __HANDLE__: TIM handle.
- __COUNTER__: specifies the Counter register new value.

Return value:

- None

__HAL_TIM_GET_COUNTER

Description:

- Get the TIM Counter Register value on runtime.

Parameters:

- __HANDLE__: TIM handle.

Return value:

- 16-bit: or 32-bit value of the timer counter register (TIMx_CNT)

__HAL_TIM_SET_AUTORELOAD

Description:

- Set the TIM Autoreload Register value on runtime without calling another time any Init function.

Parameters:

- __HANDLE__: TIM handle.
- __AUTORELOAD__: specifies the Counter register new value.

Return value:

- None

__HAL_TIM_GET_AUTORELOAD

Description:

- Get the TIM Autoreload Register value on runtime.

Parameters:

- __HANDLE__: TIM handle.

Return value:

- 16-bit: or 32-bit value of the timer auto-reload register(TIMx_ARR)

__HAL_TIM_SET_CLOCKDIVISION

Description:

- Set the TIM Clock Division value on runtime without calling another time any Init function.

Parameters:

- __HANDLE__: TIM handle.
- __CKD__: specifies the clock division value. This parameter can be one of the following value:
  - TIM_CLOCKDIVISION_DIV1: tDTS=tCK_INT
  - TIM_CLOCKDIVISION_DIV2: tDTS=2*tCK_INT
  - TIM_CLOCKDIVISION_DIV4: tDTS=4*tCK_INT

Return value:

- None

__HAL_TIM_GET_CLOCKDIVISION

Description:

- Get the TIM Clock Division value on runtime.

Parameters:

- __HANDLE__: TIM handle.

Return value:

- The: clock division can be one of the

following values:
  - TIM_CLOCKDIVISION_DIV1: tDTS=tCK_INT
  - TIM_CLOCKDIVISION_DIV2: tDTS=2*tCK_INT
  - TIM_CLOCKDIVISION_DIV4: tDTS=4*tCK_INT

__HAL_TIM_SET_ICPRESCALER

Description:

- Set the TIM Input Capture prescaler on runtime without calling another time

Parameters:

- __HANDLE__: TIM handle.
- __CHANNEL__: TIM Channels to be configured. This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected
- __ICPSC__: specifies the Input Capture4 prescaler new value. This parameter can be one of the following values:
  - TIM_ICPSC_DIV1: no prescaler
  - TIM_ICPSC_DIV2: capture is done once every 2 events
  - TIM_ICPSC_DIV4: capture is done once every 4 events
  - TIM_ICPSC_DIV8: capture is done once every 8 events

Return value:

- None

__HAL_TIM_GET_ICPRESCALER

Description:

- Get the TIM Input Capture prescaler on runtime.

Parameters:

- __HANDLE__: TIM handle.
- __CHANNEL__: TIM Channels to be configured. This parameter can be one of the following values:
  - TIM_CHANNEL_1: get input capture 1 prescaler value
  - TIM_CHANNEL_2: get input capture 2 prescaler value
  - TIM_CHANNEL_3: get input capture 3 prescaler value

– TIM_CHANNEL_4: get input capture 4 prescaler value

Return value:

- The: input capture prescaler can be one of the following values:
  – TIM_ICPSC_DIV1: no prescaler
  – TIM_ICPSC_DIV2: capture is done once every 2 events
  – TIM_ICPSC_DIV4: capture is done once every 4 events
  – TIM_ICPSC_DIV8: capture is done once every 8 events

__HAL_TIM_SET_COMPARE

Description:

- Set the TIM Capture Compare Register value on runtime without calling another time ConfigChannel function.

Parameters:

- __HANDLE__: TIM handle.
- __CHANNEL__: TIM Channels to be configured. This parameter can be one of the following values:
  – TIM_CHANNEL_1: TIM Channel 1 selected
  – TIM_CHANNEL_2: TIM Channel 2 selected
  – TIM_CHANNEL_3: TIM Channel 3 selected
  – TIM_CHANNEL_4: TIM Channel 4 selected
  – TIM_CHANNEL_5: TIM Channel 5 selected
  – TIM_CHANNEL_6: TIM Channel 6 selected
- __COMPARE__: specifies the Capture Compare register new value.

Return value:

- None

__HAL_TIM_GET_COMPARE

Description:

- Get the TIM Capture Compare Register value on runtime.

Parameters:

- __HANDLE__: TIM handle.
- __CHANNEL__: TIM Channel associated with the capture compare register This parameter can be one of the following values:
  – TIM_CHANNEL_1: get capture/compare 1 register value

  - TIM_CHANNEL_2: get capture/compare 2 register value
  - TIM_CHANNEL_3: get capture/compare 3 register value
  - TIM_CHANNEL_4: get capture/compare 4 register value
  - TIM_CHANNEL_5: get capture/compare 5 register value
  - TIM_CHANNEL_6: get capture/compare 6 register value

Return value:

- 16-bit: or 32-bit value of the capture/compare register (TIMx_CCRy)

__HAL_TIM_ENABLE_OCxPRELOAD

Description:

- Set the TIM Output compare preload.

Parameters:

- __HANDLE__: TIM handle.
- __CHANNEL__: TIM Channels to be configured. This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected
  - TIM_CHANNEL_5: TIM Channel 5 selected
  - TIM_CHANNEL_6: TIM Channel 6 selected

Return value:

- None

__HAL_TIM_DISABLE_OCxPRELOAD

Description:

- Reset the TIM Output compare preload.

Parameters:

- __HANDLE__: TIM handle.
- __CHANNEL__: TIM Channels to be configured. This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4

selected
- TIM_CHANNEL_5: TIM Channel 5 selected
- TIM_CHANNEL_6: TIM Channel 6 selected

Return value:

- None

__HAL_TIM_URS_ENABLE

Description:

- Set the Update Request Source (URS) bit of the TIMx_CR1 register.

Parameters:

- __HANDLE__: TIM handle.

Return value:

- None

Notes:

- When the USR bit of the TIMx_CR1 register is set, only counter overflow/underflow generates an update interrupt or DMA request (if enabled)

__HAL_TIM_URS_DISABLE

Description:

- Reset the Update Request Source (URS) bit of the TIMx_CR1 register.

Parameters:

- __HANDLE__: TIM handle.

Return value:

- None

Notes:

- When the USR bit of the TIMx_CR1 register is reset, any of the following events generate an update interrupt or DMA request (if enabled): _ Counter overflow underflow _ Setting the UG bit _ Update generation through the slave mode controller

__HAL_TIM_SET_CAPTURE POLARITY

Description:

- Set the TIM Capture x input polarity on runtime.

Parameters:

- __HANDLE__: TIM handle.
- __CHANNEL__: TIM Channels to be configured. This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1

selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected
- __POLARITY__: Polarity for TIx source
  - TIM_INPUTCHANNELPOLARITY_RISING: Rising Edge
  - TIM_INPUTCHANNELPOLARITY_FALLING: Falling Edge
  - TIM_INPUTCHANNELPOLARITY_BOTHEDGE: Rising and Falling Edge

Return value:

- None

TIM Flag Definition

TIM_FLAG_UPDATE

TIM_FLAG_CC1

TIM_FLAG_CC2

TIM_FLAG_CC3

TIM_FLAG_CC4

TIM_FLAG_CC5

TIM_FLAG_CC6

TIM_FLAG_COM

TIM_FLAG_TRIGGER

TIM_FLAG_BREAK

TIM_FLAG_BREAK2

TIM_FLAG_SYSTEM_BREAK

TIM_FLAG_CC1OF

TIM_FLAG_CC2OF

TIM_FLAG_CC3OF

TIM_FLAG_CC4OF

Group Channel 5 and Channel 1, 2 or 3

TIM_GROUPCH5_NONE

TIM_GROUPCH5_OC1REFC

TIM_GROUPCH5_OC2REFC

TIM_GROUPCH5_OC3REFC

TIM Input Capture Polarity

TIM_ICPOLARITY_RISING

TIM_ICPOLARITY_FALLING

TIM_ICPOLARITY_BOTHEDGE

TIM Input Capture Prescaler

TIM_ICPSC_DIV1	Capture performed each time an edge is detected on the capture input
TIM_ICPSC_DIV2	Capture performed once every 2 events
TIM_ICPSC_DIV4	Capture performed once every 4 events
TIM_ICPSC_DIV8	Capture performed once every 8 events

TIM Input Capture Selection

TIM_ICSELECTION_DIRECTTI	TIM Input 1, 2, 3 or 4 is selected to be connected to IC1, IC2, IC3 or IC4, respectively
TIM_ICSELECTION_INDIRECTTI	TIM Input 1, 2, 3 or 4 is selected to be connected to IC2, IC1, IC4 or IC3, respectively
TIM_ICSELECTION_TRC	TIM Input 1, 2, 3 or 4 is selected to be connected to TRC

TIM Input Channel polarity

TIM_INPUTCHANNELPOLARITY_RISING	Polarity for TIx source
TIM_INPUTCHANNELPOLARITY_FALLING	Polarity for TIx source
TIM_INPUTCHANNELPOLARITY_BOTHEDGE	Polarity for TIx source

TIM interrupt Definition

TIM_IT_UPDATE

TIM_IT_CC1

TIM_IT_CC2

TIM_IT_CC3

TIM_IT_CC4

TIM_IT_COM

TIM_IT_TRIGGER

TIM_IT_BREAK

TIM Lock level

TIM_LOCKLEVEL_OFF

TIM_LOCKLEVEL_1

TIM_LOCKLEVEL_2

TIM_LOCKLEVEL_3

TIM Master Mode Selection

TIM_TRGO_RESET

TIM_TRGO_ENABLE

TIM_TRGO_UPDATE

TIM_TRGO_OC1

TIM_TRGO_OC1REF

TIM_TRGO_OC2REF

TIM_TRGO_OC3REF

TIM_TRGO_OC4REF

TIM Master Mode Selection 2 (TRGO2)

TIM_TRGO2_RESET

TIM_TRGO2_ENABLE

TIM_TRGO2_UPDATE

TIM_TRGO2_OC1

TIM_TRGO2_OC1REF

TIM_TRGO2_OC2REF

TIM_TRGO2_OC3REF

TIM_TRGO2_OC4REF

TIM_TRGO2_OC5REF

TIM_TRGO2_OC6REF

TIM_TRGO2_OC4REF_RISINGFALLING

TIM_TRGO2_OC6REF_RISINGFALLING

TIM_TRGO2_OC4REF_RISING_OC6REF_RISING

TIM_TRGO2_OC4REF_RISING_OC6REF_FALLING

TIM_TRGO2_OC5REF_RISING_OC6REF_RISING

TIM_TRGO2_OC5REF_RISING_OC6REF_FALLING

TIM Master/Slave Mode

TIM_MASTERSLAVEMODE_ENABLE

TIM_MASTERSLAVEMODE_DISABLE

TIM One Pulse Mode

TIM_OPMODE_SINGLE

TIM_OPMODE_REPETITIVE

TIM OSSI OffState Selection for Idle mode state

TIM_OSSI_ENABLE

TIM_OSSI_DISABLE

TIM OSSR OffState Selection for Run mode state

TIM_OSSR_ENABLE

TIM_OSSR_DISABLE

TIM Output Compare and PWM Modes

TIM_OCMODE_TIMING

TIM_OCMODE_ACTIVE

TIM_OCMODE_INACTIVE

TIM_OCMODE_TOGGLE

TIM_OCMODE_PWM1

TIM_OCMODE_PWM2

TIM_OCMODE_FORCED_ACTIVE

TIM_OCMODE_FORCED_INACTIVE

TIM_OCMODE_RETRIGERRABLE_OPM1

TIM_OCMODE_RETRIGERRABLE_OPM2

TIM_OCMODE_COMBINED_PWM1

TIM_OCMODE_COMBINED_PWM2

TIM_OCMODE_ASSYMETRIC_PWM1

TIM_OCMODE_ASSYMETRIC_PWM2

TIM Output Compare Idle State

TIM_OCIDLESTATE_SET

TIM_OCIDLESTATE_RESET

TIM Complementary Output Compare Idle State

TIM_OCNIDLESTATE_SET

TIM_OCNIDLESTATE_RESET

TIM Complementary Output Compare Polarity

TIM_OCNPOLARITY_HIGH

TIM_OCNPOLARITY_LOW

TIM Complementary Output Compare State

TIM_OUTPUTNSTATE_DISABLE

TIM_OUTPUTNSTATE_ENABLE

TIM Output Compare Polarity

TIM_OCPOLARITY_HIGH

TIM_OCPOLARITY_LOW

TIM Output Compare State

TIM_OUTPUTSTATE_DISABLE

TIM_OUTPUTSTATE_ENABLE

TIM Output Fast State

TIM_OCFAST_DISABLE

TIM_OCFAST_ENABLE

TIM Slave mode

TIM_SLAVEMODE_DISABLE

TIM_SLAVEMODE_RESET

TIM_SLAVEMODE_GATED

TIM_SLAVEMODE_TRIGGER

TIM_SLAVEMODE_EXTERNAL1

TIM_SLAVEMODE_COMBINED_RESETTRIGGER

TIM TI1 Input Selection

TIM_TI1SELECTION_CH1

TIM_TI1SELECTION_XORCOMBINATION

TIM Trigger Polarity

TIM_TRIGGERPOLARITY_INVERTED	Polarity for ETRx trigger sources
TIM_TRIGGERPOLARITY_NONINVERTED	Polarity for ETRx trigger sources
TIM_TRIGGERPOLARITY_RISING	Polarity for TIxFPx or TI1_ED trigger sources
TIM_TRIGGERPOLARITY_FALLING	Polarity for TIxFPx or TI1_ED trigger sources
TIM_TRIGGERPOLARITY_BOTHEDGE	Polarity for TIxFPx or TI1_ED trigger sources

TIM Trigger Prescaler

TIM_TRIGGERPRESCALER_DIV1	No prescaler is used
TIM_TRIGGERPRESCALER_DIV2	Prescaler for External ETR Trigger: Capture performed once every 2 events.
TIM_TRIGGERPRESCALER_DIV4	Prescaler for External ETR Trigger: Capture performed once every 4 events.
TIM_TRIGGERPRESCALER_DIV8	Prescaler for External ETR Trigger: Capture performed once every 8 events.

TIM Trigger Selection

TIM_TS_ITR0

TIM_TS_ITR1

TIM_TS_ITR2

TIM_TS_ITR3

TIM_TS_TI1F_ED

TIM_TS_TI1FP1

TIM_TS_TI2FP2

TIM_TS_ETRF

TIM_TS_NONE

66 HAL TIM Extension Driver

66.1 TIMEx Firmware driver registers structures

66.1.1 TIM_HallSensor_InitTypeDef

Data Fields

- ***uint32_t IC1Polarity***
- ***uint32_t IC1Prescaler***
- ***uint32_t IC1Filter***
- ***uint32_t Commutation_Delay***

Field Documentation

- ***uint32_t TIM_HallSensor_InitTypeDef::IC1Polarity***
  Specifies the active edge of the input signal. This parameter can be a value of ***TIM_Input_Capture_Polarity***
- ***uint32_t TIM_HallSensor_InitTypeDef::IC1Prescaler***
  Specifies the Input Capture Prescaler. This parameter can be a value of ***TIM_Input_Capture_Prescaler***
- ***uint32_t TIM_HallSensor_InitTypeDef::IC1Filter***
  Specifies the input capture filter. This parameter can be a number between Min_Data = 0x0 and Max_Data = 0xF
- ***uint32_t TIM_HallSensor_InitTypeDef::Commutation_Delay***
  Specifies the pulse value to be loaded into the Capture Compare Register. This parameter can be a number between Min_Data = 0x0000 and Max_Data = 0xFFFF

66.1.2 TIMEx_BreakInputConfigTypeDef

Data Fields

- ***uint32_t Source***
- ***uint32_t Enable***
- ***uint32_t Polarity***

Field Documentation

- ***uint32_t TIMEx_BreakInputConfigTypeDef::Source***
  Specifies the source of the timer break input. This parameter can be a value of ***TIMEx_Break_Input_Source***
- ***uint32_t TIMEx_BreakInputConfigTypeDef::Enable***
  Specifies whether or not the break input source is enabled. This parameter can be a value of ***TIMEx_Break_Input_Source_Enable***
- ***uint32_t TIMEx_BreakInputConfigTypeDef::Polarity***
  Specifies the break input source polarity. This parameter can be a value of ***TIMEx_Break_Input_Source_Polarity*** Not relevant when analog watchdog output of the DFSDM1 used as break input source

66.2 TIMEx Firmware driver API description

66.2.1 TIMER Extended features

The Timer Extended features include:

1. Complementary outputs with programmable dead-time for:

- Output Compare
- PWM generation (Edge and Center-aligned Mode)
- One-pulse mode output

2. Synchronization circuit to control the timer with external signals and to interconnect several timers together.
3. Break input to put the timer output signals in reset state or in a known state.
4. Supports incremental (quadrature) encoder and hall-sensor circuitry for positioning purposes

66.2.2 How to use this driver

1. Initialize the TIM low level resources by implementing the following functions depending on the selected feature:
   - Hall Sensor output: HAL_TIMEx_HallSensor_MspInit()
2. Initialize the TIM low level resources:
   a. Enable the TIM interface clock using __HAL_RCC_TIMx_CLK_ENABLE();
   b. TIM pins configuration
      - Enable the clock for the TIM GPIOs using the following function: __HAL_RCC_GPIOx_CLK_ENABLE();
      - Configure these TIM pins in Alternate function mode using HAL_GPIO_Init();
3. The external Clock can be configured, if needed (the default clock is the internal clock from the APBx), using the following function: HAL_TIM_ConfigClockSource, the clock configuration should be done before any start function.
4. Configure the TIM in the desired functioning mode using one of the initialization function of this driver:
   - HAL_TIMEx_HallSensor_Init() and HAL_TIMEx_ConfigCommutationEvent(): to use the Timer Hall Sensor Interface and the commutation event with the corresponding Interrupt and DMA request if needed (Note that One Timer is used to interface with the Hall sensor Interface and another Timer should be used to use the commutation event).
5. Activate the TIM peripheral using one of the start functions:
   - Complementary Output Compare: HAL_TIMEx_OCN_Start(), HAL_TIMEx_OCN_Start_DMA(), HAL_TIMEx_OC_Start_IT()
   - Complementary PWM generation: HAL_TIMEx_PWMN_Start(), HAL_TIMEx_PWMN_Start_DMA(), HAL_TIMEx_PWMN_Start_IT()
   - Complementary One-pulse mode output: HAL_TIMEx_OnePulseN_Start(), HAL_TIMEx_OnePulseN_Start_IT()
   - Hall Sensor output: HAL_TIMEx_HallSensor_Start(), HAL_TIMEx_HallSensor_Start_DMA(), HAL_TIMEx_HallSensor_Start_IT().

66.2.3 Timer Hall Sensor functions

This section provides functions allowing to:

- Initialize and configure TIM HAL Sensor.
- De-initialize TIM HAL Sensor.
- Start the Hall Sensor Interface.
- Stop the Hall Sensor Interface.
- Start the Hall Sensor Interface and enable interrupts.
- Stop the Hall Sensor Interface and disable interrupts.
- Start the Hall Sensor Interface and enable DMA transfers.
- Stop the Hall Sensor Interface and disable DMA transfers.

This section contains the following APIs:

- ***HAL_TIMEx_HallSensor_Init()***

- ***HAL_TIMEx_HallSensor_DeInit()***
- ***HAL_TIMEx_HallSensor_MspInit()***
- ***HAL_TIMEx_HallSensor_MspDeInit()***
- ***HAL_TIMEx_HallSensor_Start()***
- ***HAL_TIMEx_HallSensor_Stop()***
- ***HAL_TIMEx_HallSensor_Start_IT()***
- ***HAL_TIMEx_HallSensor_Stop_IT()***
- ***HAL_TIMEx_HallSensor_Start_DMA()***
- ***HAL_TIMEx_HallSensor_Stop_DMA()***

66.2.4 Timer Complementary Output Compare functions

This section provides functions allowing to:

- Start the Complementary Output Compare/PWM.
- Stop the Complementary Output Compare/PWM.
- Start the Complementary Output Compare/PWM and enable interrupts.
- Stop the Complementary Output Compare/PWM and disable interrupts.
- Start the Complementary Output Compare/PWM and enable DMA transfers.
- Stop the Complementary Output Compare/PWM and disable DMA transfers.

This section contains the following APIs:

- ***HAL_TIMEx_OCN_Start()***
- ***HAL_TIMEx_OCN_Stop()***
- ***HAL_TIMEx_OCN_Start_IT()***
- ***HAL_TIMEx_OCN_Stop_IT()***
- ***HAL_TIMEx_OCN_Start_DMA()***
- ***HAL_TIMEx_OCN_Stop_DMA()***

66.2.5 Timer Complementary PWM functions

This section provides functions allowing to:

- Start the Complementary PWM.
- Stop the Complementary PWM.
- Start the Complementary PWM and enable interrupts.
- Stop the Complementary PWM and disable interrupts.
- Start the Complementary PWM and enable DMA transfers.
- Stop the Complementary PWM and disable DMA transfers.
- Start the Complementary Input Capture measurement.
- Stop the Complementary Input Capture.
- Start the Complementary Input Capture and enable interrupts.
- Stop the Complementary Input Capture and disable interrupts.
- Start the Complementary Input Capture and enable DMA transfers.
- Stop the Complementary Input Capture and disable DMA transfers.
- Start the Complementary One Pulse generation.
- Stop the Complementary One Pulse.
- Start the Complementary One Pulse and enable interrupts.
- Stop the Complementary One Pulse and disable interrupts.

This section contains the following APIs:

- ***HAL_TIMEx_PWMN_Start()***
- ***HAL_TIMEx_PWMN_Stop()***
- ***HAL_TIMEx_PWMN_Start_IT()***
- ***HAL_TIMEx_PWMN_Stop_IT()***

- ***HAL_TIMEx_PWMN_Start_DMA()***
- ***HAL_TIMEx_PWMN_Stop_DMA()***

66.2.6 Timer Complementary One Pulse functions

This section provides functions allowing to:

- Start the Complementary One Pulse generation.
- Stop the Complementary One Pulse.
- Start the Complementary One Pulse and enable interrupts.
- Stop the Complementary One Pulse and disable interrupts.

This section contains the following APIs:

- ***HAL_TIMEx_OnePulseN_Start()***
- ***HAL_TIMEx_OnePulseN_Stop()***
- ***HAL_TIMEx_OnePulseN_Start_IT()***
- ***HAL_TIMEx_OnePulseN_Stop_IT()***

66.2.7 Peripheral Control functions

This section provides functions allowing to:

- Configure the commutation event in case of use of the Hall sensor interface.
- Configure Output channels for OC and PWM mode.
- Configure Complementary channels, break features and dead time.
- Configure Master synchronization.
- Configure timer remapping capabilities.
- Enable or disable channel grouping

This section contains the following APIs:

- ***HAL_TIMEx_ConfigCommutationEvent()***
- ***HAL_TIMEx_ConfigCommutationEvent_IT()***
- ***HAL_TIMEx_ConfigCommutationEvent_DMA()***
- ***HAL_TIMEx_MasterConfigSynchronization()***
- ***HAL_TIMEx_ConfigBreakDeadTime()***
- ***HAL_TIMEx_ConfigBreakInput()***
- ***HAL_TIMEx_RemapConfig()***
- ***HAL_TIMEx_GroupChannel5()***

66.2.8 Extended Callbacks functions

This section provides Extended TIM callback functions:

- Timer Commutation callback
- Timer Break callback

This section contains the following APIs:

- ***HAL_TIMEx_CommutationCallback()***
- ***HAL_TIMEx_BreakCallback()***

66.2.9 Extended Peripheral State functions

This subsection permits to get in run-time the status of the peripheral and the data flow.

This section contains the following APIs:

- ***HAL_TIMEx_HallSensor_GetState()***

66.2.10 Detailed description of functions

HAL_TIMEx_HallSensor_Init

Function name	**HAL_StatusTypeDef HAL_TIMEx_HallSensor_Init (TIM_HandleTypeDef * htim, TIM_HallSensor_InitTypeDef * sConfig)**
Function description	Initializes the TIM Hall Sensor Interface and initialize the associated handle.
Parameters	• **htim:** TIM Encoder Interface handle • **sConfig:** TIM Hall Sensor configuration structure
Return values	• **HAL:** status

HAL_TIMEx_HallSensor_DeInit

Function name	**HAL_StatusTypeDef HAL_TIMEx_HallSensor_DeInit (TIM_HandleTypeDef * htim)**
Function description	DeInitialize the TIM Hall Sensor interface.
Parameters	• **htim:** TIM Hall Sensor handle
Return values	• **HAL:** status

HAL_TIMEx_HallSensor_MspInit

Function name	**void HAL_TIMEx_HallSensor_MspInit (TIM_HandleTypeDef * htim)**
Function description	Initializes the TIM Hall Sensor MSP.
Parameters	• **htim:** TIM handle
Return values	• **None:**

HAL_TIMEx_HallSensor_MspDeInit

Function name	**void HAL_TIMEx_HallSensor_MspDeInit (TIM_HandleTypeDef * htim)**
Function description	DeInitialize TIM Hall Sensor MSP.
Parameters	• **htim:** TIM handle
Return values	• **None:**

HAL_TIMEx_HallSensor_Start

Function name	**HAL_StatusTypeDef HAL_TIMEx_HallSensor_Start (TIM_HandleTypeDef * htim)**
Function description	Starts the TIM Hall Sensor Interface.
Parameters	• **htim:** : TIM Hall Sensor handle
Return values	• **HAL:** status

HAL_TIMEx_HallSensor_Stop

Function name	**HAL_StatusTypeDef HAL_TIMEx_HallSensor_Stop (TIM_HandleTypeDef * htim)**
Function description	Stops the TIM Hall sensor Interface.
Parameters	• **htim:** : TIM Hall Sensor handle
Return values	• **HAL:** status

HAL_TIMEx_HallSensor_Start_IT

Function name	**HAL_StatusTypeDef HAL_TIMEx_HallSensor_Start_IT (TIM_HandleTypeDef * htim)**
Function description	Starts the TIM Hall Sensor Interface in interrupt mode.
Parameters	• **htim:** : TIM Hall Sensor handle
Return values	• **HAL:** status

HAL_TIMEx_HallSensor_Stop_IT

Function name	**HAL_StatusTypeDef HAL_TIMEx_HallSensor_Stop_IT (TIM_HandleTypeDef * htim)**
Function description	Stops the TIM Hall Sensor Interface in interrupt mode.
Parameters	• **htim:** : TIM handle
Return values	• **HAL:** status

HAL_TIMEx_HallSensor_Start_DMA

Function name	**HAL_StatusTypeDef HAL_TIMEx_HallSensor_Start_DMA (TIM_HandleTypeDef * htim, uint32_t * pData, uint16_t Length)**
Function description	Starts the TIM Hall Sensor Interface in DMA mode.
Parameters	• **htim:** : TIM Hall Sensor handle • **pData:** The destination Buffer address. • **Length:** The length of data to be transferred from TIM peripheral to memory.
Return values	• **HAL:** status

HAL_TIMEx_HallSensor_Stop_DMA

Function name	**HAL_StatusTypeDef HAL_TIMEx_HallSensor_Stop_DMA (TIM_HandleTypeDef * htim)**
Function description	Stops the TIM Hall Sensor Interface in DMA mode.
Parameters	• **htim:** : TIM handle
Return values	• **HAL:** status

HAL_TIMEx_OCN_Start

Function name	**HAL_StatusTypeDef HAL_TIMEx_OCN_Start**

(TIM_HandleTypeDef * htim, uint32_t Channel)

Function description: Starts the TIM Output Compare signal generation on the complementary output.

Parameters:
- **htim:** : TIM Output Compare handle
- **Channel:** : TIM Channel to be enabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected

Return values:
- **HAL:** status

HAL_TIMEx_OCN_Stop

Function name: **HAL_StatusTypeDef HAL_TIMEx_OCN_Stop (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description: Stops the TIM Output Compare signal generation on the complementary output.

Parameters:
- **htim:** : TIM handle
- **Channel:** : TIM Channel to be disabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected

Return values:
- **HAL:** status

HAL_TIMEx_OCN_Start_IT

Function name: **HAL_StatusTypeDef HAL_TIMEx_OCN_Start_IT (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description: Starts the TIM Output Compare signal generation in interrupt mode on the complementary output.

Parameters:
- **htim:** : TIM OC handle
- **Channel:** : TIM Channel to be enabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected

Return values:
- **HAL:** status

HAL_TIMEx_OCN_Stop_IT

Function name: **HAL_StatusTypeDef HAL_TIMEx_OCN_Stop_IT (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description: Stops the TIM Output Compare signal generation in interrupt mode on the complementary output.

Parameters
- **htim:** : TIM Output Compare handle
- **Channel:** : TIM Channel to be disabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected

Return values
- **HAL:** status

HAL_TIMEx_OCN_Start_DMA

Function name **HAL_StatusTypeDef HAL_TIMEx_OCN_Start_DMA (TIM_HandleTypeDef * htim, uint32_t Channel, uint32_t * pData, uint16_t Length)**

Function description Starts the TIM Output Compare signal generation in DMA mode on the complementary output.

Parameters
- **htim:** : TIM Output Compare handle
- **Channel:** : TIM Channel to be enabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected
- **pData:** The source Buffer address.
- **Length:** The length of data to be transferred from memory to TIM peripheral

Return values
- **HAL:** status

HAL_TIMEx_OCN_Stop_DMA

Function name **HAL_StatusTypeDef HAL_TIMEx_OCN_Stop_DMA (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description Stops the TIM Output Compare signal generation in DMA mode on the complementary output.

Parameters
- **htim:** : TIM Output Compare handle
- **Channel:** : TIM Channel to be disabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected

Return values
- **HAL:** status

HAL_TIMEx_PWMN_Start

Function name **HAL_StatusTypeDef HAL_TIMEx_PWMN_Start (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description Starts the PWM signal generation on the complementary output.

Parameters
- **htim:** : TIM handle
- **Channel:** : TIM Channel to be enabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected

Return values
- **HAL:** status

HAL_TIMEx_PWMN_Stop

Function name **HAL_StatusTypeDef HAL_TIMEx_PWMN_Stop (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description Stops the PWM signal generation on the complementary output.

Parameters
- **htim:** : TIM handle
- **Channel:** : TIM Channel to be disabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected

Return values
- **HAL:** status

HAL_TIMEx_PWMN_Start_IT

Function name **HAL_StatusTypeDef HAL_TIMEx_PWMN_Start_IT (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description Starts the PWM signal generation in interrupt mode on the complementary output.

Parameters
- **htim:** : TIM handle
- **Channel:** : TIM Channel to be disabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected
  - TIM_CHANNEL_3: TIM Channel 3 selected
  - TIM_CHANNEL_4: TIM Channel 4 selected

Return values
- **HAL:** status

HAL_TIMEx_PWMN_Stop_IT

Function name **HAL_StatusTypeDef HAL_TIMEx_PWMN_Stop_IT (TIM_HandleTypeDef * htim, uint32_t Channel)**

Function description Stops the PWM signal generation in interrupt mode on the complementary output.

Parameters
- **htim:** : TIM handle
- **Channel:** : TIM Channel to be disabled This parameter can be one of the following values:
  - TIM_CHANNEL_1: TIM Channel 1 selected
  - TIM_CHANNEL_2: TIM Channel 2 selected

– TIM_CHANNEL_3: TIM Channel 3 selected
– TIM_CHANNEL_4: TIM Channel 4 selected

Return values
- **HAL:** status

HAL_TIMEx_PWMN_Start_DMA

Function name
HAL_StatusTypeDef HAL_TIMEx_PWMN_Start_DMA (TIM_HandleTypeDef * htim, uint32_t Channel, uint32_t * pData, uint16_t Length)

Function description
Starts the TIM PWM signal generation in DMA mode on the complementary output.

Parameters
- **htim:** : TIM handle
- **Channel:** : TIM Channel to be enabled This parameter can be one of the following values:
  – TIM_CHANNEL_1: TIM Channel 1 selected
  – TIM_CHANNEL_2: TIM Channel 2 selected
  – TIM_CHANNEL_3: TIM Channel 3 selected
  – TIM_CHANNEL_4: TIM Channel 4 selected
- **pData:** The source Buffer address.
- **Length:** The length of data to be transferred from memory to TIM peripheral

Return values
- **HAL:** status

HAL_TIMEx_PWMN_Stop_DMA

Function name
HAL_StatusTypeDef HAL_TIMEx_PWMN_Stop_DMA (TIM_HandleTypeDef * htim, uint32_t Channel)

Function description
Stops the TIM PWM signal generation in DMA mode on the complementary output.

Parameters
- **htim:** : TIM handle
- **Channel:** : TIM Channel to be disabled This parameter can be one of the following values:
  – TIM_CHANNEL_1: TIM Channel 1 selected
  – TIM_CHANNEL_2: TIM Channel 2 selected
  – TIM_CHANNEL_3: TIM Channel 3 selected
  – TIM_CHANNEL_4: TIM Channel 4 selected

Return values
- **HAL:** status

HAL_TIMEx_OnePulseN_Start

Function name
HAL_StatusTypeDef HAL_TIMEx_OnePulseN_Start (TIM_HandleTypeDef * htim, uint32_t OutputChannel)

Function description
Starts the TIM One Pulse signal generation on the complementary output.

Parameters
- **htim:** : TIM One Pulse handle
- **OutputChannel:** : TIM Channel to be enabled This parameter can be one of the following values:
  – TIM_CHANNEL_1: TIM Channel 1 selected

– TIM_CHANNEL_2: TIM Channel 2 selected

Return values
- **HAL:** status

HAL_TIMEx_OnePulseN_Stop

Function name **HAL_StatusTypeDef HAL_TIMEx_OnePulseN_Stop (TIM_HandleTypeDef * htim, uint32_t OutputChannel)**

Function description Stops the TIM One Pulse signal generation on the complementary output.

Parameters
- **htim:** : TIM One Pulse handle
- **OutputChannel:** : TIM Channel to be disabled This parameter can be one of the following values:
  – TIM_CHANNEL_1: TIM Channel 1 selected
  – TIM_CHANNEL_2: TIM Channel 2 selected

Return values
- **HAL:** status

HAL_TIMEx_OnePulseN_Start_IT

Function name **HAL_StatusTypeDef HAL_TIMEx_OnePulseN_Start_IT (TIM_HandleTypeDef * htim, uint32_t OutputChannel)**

Function description Starts the TIM One Pulse signal generation in interrupt mode on the complementary channel.

Parameters
- **htim:** : TIM One Pulse handle
- **OutputChannel:** : TIM Channel to be enabled This parameter can be one of the following values:
  – TIM_CHANNEL_1: TIM Channel 1 selected
  – TIM_CHANNEL_2: TIM Channel 2 selected

Return values
- **HAL:** status

HAL_TIMEx_OnePulseN_Stop_IT

Function name **HAL_StatusTypeDef HAL_TIMEx_OnePulseN_Stop_IT (TIM_HandleTypeDef * htim, uint32_t OutputChannel)**

Function description Stops the TIM One Pulse signal generation in interrupt mode on the complementary channel.

Parameters
- **htim:** : TIM One Pulse handle
- **OutputChannel:** : TIM Channel to be disabled This parameter can be one of the following values:
  – TIM_CHANNEL_1: TIM Channel 1 selected
  – TIM_CHANNEL_2: TIM Channel 2 selected

Return values
- **HAL:** status

HAL_TIMEx_ConfigCommutationEvent

Function name **HAL_StatusTypeDef HAL_TIMEx_ConfigCommutationEvent (TIM_HandleTypeDef * htim, uint32_t InputTrigger, uint32_t CommutationSource)**

Function description: Configure the TIM commutation event sequence.

Parameters:
- **htim:** TIM handle
- **InputTrigger:** : the Internal trigger corresponding to the Timer Interfacing with the Hall sensor This parameter can be one of the following values:
  - TIM_TS_ITR0: Internal trigger 0 selected
  - TIM_TS_ITR1: Internal trigger 1 selected
  - TIM_TS_ITR2: Internal trigger 2 selected
  - TIM_TS_ITR3: Internal trigger 3 selected
  - TIM_TS_NONE: No trigger is needed
- **CommutationSource:** : the Commutation Event source This parameter can be one of the following values:
  - TIM_COMMUTATION_TRGI: Commutation source is the TRGI of the Interface Timer
  - TIM_COMMUTATION_SOFTWARE: Commutation source is set by software using the COMG bit

Return values:
- **HAL:** status

Notes:
- This function is mandatory to use the commutation event in order to update the configuration at each commutation detection on the TRGI input of the Timer, the typical use of this feature is with the use of another Timer(interface Timer) configured in Hall sensor interface, this interface Timer will generate the commutation at its TRGO output (connected to Timer used in this function) each time the TI1 of the Interface Timer detect a commutation at its input TI1.

HAL_TIMEx_ConfigCommutationEvent_IT

Function name: **HAL_StatusTypeDef HAL_TIMEx_ConfigCommutationEvent_IT (TIM_HandleTypeDef * htim, uint32_t InputTrigger, uint32_t CommutationSource)**

Function description: Configure the TIM commutation event sequence with interrupt.

Parameters:
- **htim:** TIM handle
- **InputTrigger:** : the Internal trigger corresponding to the Timer Interfacing with the Hall sensor This parameter can be one of the following values:
  - TIM_TS_ITR0: Internal trigger 0 selected
  - TIM_TS_ITR1: Internal trigger 1 selected
  - TIM_TS_ITR2: Internal trigger 2 selected
  - TIM_TS_ITR3: Internal trigger 3 selected
  - TIM_TS_NONE: No trigger is needed
- **CommutationSource:** : the Commutation Event source This parameter can be one of the following values:
  - TIM_COMMUTATION_TRGI: Commutation source is the TRGI of the Interface Timer
  - TIM_COMMUTATION_SOFTWARE: Commutation source is set by software using the COMG bit

Return values:
- **HAL:** status

Notes:
- This function is mandatory to use the commutation event in

order to update the configuration at each commutation detection on the TRGI input of the Timer, the typical use of this feature is with the use of another Timer(interface Timer) configured in Hall sensor interface, this interface Timer will generate the commutation at its TRGO output (connected to Timer used in this function) each time the TI1 of the Interface Timer detect a commutation at its input TI1.

HAL_TIMEx_ConfigCommutationEvent_DMA

Function name
HAL_StatusTypeDef HAL_TIMEx_ConfigCommutationEvent_DMA (TIM_HandleTypeDef * htim, uint32_t InputTrigger, uint32_t CommutationSource)

Function description
Configure the TIM commutation event sequence with DMA.

Parameters
- **htim:** TIM handle
- **InputTrigger:** : the Internal trigger corresponding to the Timer Interfacing with the Hall sensor This parameter can be one of the following values:
  - TIM_TS_ITR0: Internal trigger 0 selected
  - TIM_TS_ITR1: Internal trigger 1 selected
  - TIM_TS_ITR2: Internal trigger 2 selected
  - TIM_TS_ITR3: Internal trigger 3 selected
  - TIM_TS_NONE: No trigger is needed
- **CommutationSource:** : the Commutation Event source This parameter can be one of the following values:
  - TIM_COMMUTATION_TRGI: Commutation source is the TRGI of the Interface Timer
  - TIM_COMMUTATION_SOFTWARE: Commutation source is set by software using the COMG bit

Return values
- **HAL:** status

Notes
- This function is mandatory to use the commutation event in order to update the configuration at each commutation detection on the TRGI input of the Timer, the typical use of this feature is with the use of another Timer(interface Timer) configured in Hall sensor interface, this interface Timer will generate the commutation at its TRGO output (connected to Timer used in this function) each time the TI1 of the Interface Timer detect a commutation at its input TI1.
- The user should configure the DMA in his own software, in This function only the COMDE bit is set

HAL_TIMEx_MasterConfigSynchronization

Function name
HAL_StatusTypeDef HAL_TIMEx_MasterConfigSynchronization (TIM_HandleTypeDef * htim, TIM_MasterConfigTypeDef * sMasterConfig)

Function description
Configures the TIM in master mode.

Parameters
- **htim:** TIM handle.
- **sMasterConfig:** pointer to a TIM_MasterConfigTypeDef

structure that contains the selected trigger output (TRGO) and the Master/Slave mode.

Return values
- **HAL:** status

HAL_TIMEx_ConfigBreakDeadTime

Function name
HAL_StatusTypeDef HAL_TIMEx_ConfigBreakDeadTime (TIM_HandleTypeDef * htim, TIM_BreakDeadTimeConfigTypeDef * sBreakDeadTimeConfig)

Function description
Configures the Break feature, dead time, Lock level, OSSI/OSSR State and the AOE(automatic output enable).

Parameters
- **htim:** TIM handle
- **sBreakDeadTimeConfig:** pointer to a TIM_ConfigBreakDeadConfigTypeDef structure that contains the BDTR Register configuration information for the TIM peripheral.

Return values
- **HAL:** status

HAL_TIMEx_ConfigBreakInput

Function name
HAL_StatusTypeDef HAL_TIMEx_ConfigBreakInput (TIM_HandleTypeDef * htim, uint32_t BreakInput, TIMEx_BreakInputConfigTypeDef * sBreakInputConfig)

Function description
Configures the break input source.

Parameters
- **htim:** TIM handle.
- **BreakInput:** Break input to configure This parameter can be one of the following values:
  - TIM_BREAKINPUT_BRK: Timer break input
  - TIM_BREAKINPUT_BRK2: Timer break 2 input
- **sBreakInputConfig:** Break input source configuration

Return values
- **HAL:** status

HAL_TIMEx_GroupChannel5

Function name
HAL_StatusTypeDef HAL_TIMEx_GroupChannel5 (TIM_HandleTypeDef * htim, uint32_t Channels)

Function description
Group channel 5 and channel 1, 2 or 3.

Parameters
- **htim:** TIM handle.
- **Channels:** specifies the reference signal(s) the OC5REF is combined with. This parameter can be any combination of the following values: TIM_GROUPCH5_NONE: No effect of OC5REF on OC1REFC, OC2REFC and OC3REFC TIM_GROUPCH5_OC1REFC: OC1REFC is the logical AND of OC1REFC and OC5REF TIM_GROUPCH5_OC2REFC: OC2REFC is the logical AND of OC2REFC and OC5REF TIM_GROUPCH5_OC3REFC: OC3REFC is the logical AND of OC3REFC and OC5REF

Return values
- **HAL:** status

HAL_TIMEx_RemapConfig

Function name	**HAL_StatusTypeDef HAL_TIMEx_RemapConfig (TIM_HandleTypeDef * htim, uint32_t Remap)**
Function description	Configures the TIMx Remapping input capabilities.
Parameters	• **htim:** TIM handle. • **Remap:** specifies the TIM remapping source.
Return values	• **HAL:** status

HAL_TIMEx_CommutationCallback

Function name	**void HAL_TIMEx_CommutationCallback (TIM_HandleTypeDef * htim)**
Function description	Hall commutation changed callback in non-blocking mode.
Parameters	• **htim:** : TIM handle
Return values	• **None:**

HAL_TIMEx_BreakCallback

Function name	**void HAL_TIMEx_BreakCallback (TIM_HandleTypeDef * htim)**
Function description	Hall Break detection callback in non-blocking mode.
Parameters	• **htim:** : TIM handle
Return values	• **None:**

HAL_TIMEx_HallSensor_GetState

Function name	**HAL_TIM_StateTypeDef HAL_TIMEx_HallSensor_GetState (TIM_HandleTypeDef * htim)**
Function description	Return the TIM Hall Sensor interface handle state.
Parameters	• **htim:** TIM Hall Sensor handle
Return values	• **HAL:** state

TIMEx_DMACommutationCplt

Function name	**void TIMEx_DMACommutationCplt (DMA_HandleTypeDef * hdma)**
Function description	TIM DMA Commutation callback.
Parameters	• **hdma:** : pointer to DMA handle.
Return values	• **None:**

66.3 TIMEx Firmware driver defines

66.3.1 TIMEx

TIM Extended Break input

TIM_BREAKINPUT_BRK

TIM_BREAKINPUT_BRK2

TIM Extended Break input source

TIM_BREAKINPUTSOURCE_BKIN

TIM_BREAKINPUTSOURCE_COMP1

TIM_BREAKINPUTSOURCE_COMP2

TIM_BREAKINPUTSOURCE_DFSDM1

TIM Extended Break input source enabling

TIM_BREAKINPUTSOURCE_DISABLE

TIM_BREAKINPUTSOURCE_ENABLE

TIM Extended Break input polarity

TIM_BREAKINPUTSOURCE_POLARITY_LOW

TIM_BREAKINPUTSOURCE_POLARITY_HIGH

TIM Extended Remapping

TIM_TIM1_ETR_ADC1_NONE

TIM_TIM1_ETR_ADC1_AWD1

TIM_TIM1_ETR_ADC1_AWD2

TIM_TIM1_ETR_ADC1_AWD3

TIM_TIM1_TI1_GPIO

TIM_TIM1_TI1_COMP1

TIM_TIM1_ETR_GPIO

TIM_TIM1_ETR_COMP1

TIM_TIM1_ETR_COMP2

TIM_TIM2_ITR1_TIM8_TRGO

TIM_TIM2_ITR1_OTG_FS_SOF

TIM_TIM2_ETR_GPIO

TIM_TIM2_ETR_LSE

TIM_TIM2_ETR_COMP1

TIM_TIM2_ETR_COMP2

TIM_TIM2_TI4_GPIO

TIM_TIM2_TI4_COMP1

TIM_TIM2_TI4_COMP2

TIM_TIM2_TI4_COMP1_COMP2

TIM_TIM3_TI1_GPIO
TIM_TIM3_TI1_COMP1
TIM_TIM3_TI1_COMP2
TIM_TIM3_TI1_COMP1_COMP2
TIM_TIM3_ETR_GPIO
TIM_TIM3_ETR_COMP1
TIM_TIM8_TI1_GPIO
TIM_TIM8_TI1_COMP2
TIM_TIM8_ETR_GPIO
TIM_TIM8_ETR_COMP1
TIM_TIM8_ETR_COMP2
TIM_TIM15_TI1_GPIO
TIM_TIM15_TI1_LSE
TIM_TIM15_ENCODERMODE_NONE
TIM_TIM15_ENCODERMODE_TIM2
TIM_TIM15_ENCODERMODE_TIM3
TIM_TIM15_ENCODERMODE_TIM4
TIM_TIM16_TI1_GPIO
TIM_TIM16_TI1_LSI
TIM_TIM16_TI1_LSE
TIM_TIM16_TI1_RTC
TIM_TIM17_TI1_GPIO
TIM_TIM17_TI1_MSI
TIM_TIM17_TI1_HSE_32
TIM_TIM17_TI1_MCO

67 HAL TSC Generic Driver

67.1 TSC Firmware driver registers structures

67.1.1 TSC_InitTypeDef

Data Fields

- ***uint32_t CTPulseHighLength***
- ***uint32_t CTPulseLowLength***
- ***uint32_t SpreadSpectrum***
- ***uint32_t SpreadSpectrumDeviation***
- ***uint32_t SpreadSpectrumPrescaler***
- ***uint32_t PulseGeneratorPrescaler***
- ***uint32_t MaxCountValue***
- ***uint32_t IODefaultMode***
- ***uint32_t SynchroPinPolarity***
- ***uint32_t AcquisitionMode***
- ***uint32_t MaxCountInterrupt***
- ***uint32_t ChannelIOs***
- ***uint32_t ShieldIOs***
- ***uint32_t SamplingIOs***

Field Documentation

- ***uint32_t TSC_InitTypeDef::CTPulseHighLength***
  Charge-transfer high pulse length This parameter can be a value of ***TSC_CTPulseHL_Config***
- ***uint32_t TSC_InitTypeDef::CTPulseLowLength***
  Charge-transfer low pulse length This parameter can be a value of ***TSC_CTPulseLL_Config***
- ***uint32_t TSC_InitTypeDef::SpreadSpectrum***
  Spread spectrum activation This parameter can be a value of ***TSC_CTPulseLL_Config***
- ***uint32_t TSC_InitTypeDef::SpreadSpectrumDeviation***
  Spread spectrum deviation This parameter must be a number between Min_Data = 0 and Max_Data = 127
- ***uint32_t TSC_InitTypeDef::SpreadSpectrumPrescaler***
  Spread spectrum prescaler This parameter can be a value of ***TSC_SpreadSpec_Prescaler***
- ***uint32_t TSC_InitTypeDef::PulseGeneratorPrescaler***
  Pulse generator prescaler This parameter can be a value of ***TSC_PulseGenerator_Prescaler***
- ***uint32_t TSC_InitTypeDef::MaxCountValue***
  Max count value This parameter can be a value of ***TSC_MaxCount_Value***
- ***uint32_t TSC_InitTypeDef::IODefaultMode***
  IO default mode This parameter can be a value of ***TSC_IO_Default_Mode***
- ***uint32_t TSC_InitTypeDef::SynchroPinPolarity***
  Synchro pin polarity This parameter can be a value of ***TSC_Synchro_Pin_Polarity***
- ***uint32_t TSC_InitTypeDef::AcquisitionMode***
  Acquisition mode This parameter can be a value of ***TSC_Acquisition_Mode***
- ***uint32_t TSC_InitTypeDef::MaxCountInterrupt***
  Max count interrupt activation This parameter can be set to ENABLE or DISABLE.