Secure Semiconductor IP

HF ISO14443 Firmware Specification

Software Specification

Firmware_SPECIFICATION

Project:	HF ISO14443 Firmware Specification
Authors:	INVIA Digital Team
Reference:	Firmware_SPECIFICATION
Revision:	alpha_0.1
Date:	December 18, 2019
Distribution:	CONFIDENTIAL, UNDER NDA

Revision History

Revision	Date	Comments
alpha_0.1	April 4, 2019	Initial version from montana project, v0.2 Adding `_LLHW_isohf_configTxDig4TypeA` for 106, 212 or 424kbits/s Tx bit rates selection Rev. hash: 39443df78ea122116a01897b2182363e3e3df6ca

Contents

Chapter 1

File Index

1.1 File List

Here is a list of all documented files with brief descriptions:

Chapter 2

File Documentation

2.1 api_isohfllhw.h File Reference

This file contains the Low Level Hardware functions used to safely drive the HF subsystem (ISO14443)

```
#include <stdint.h>
#include "platform_config.h"
#include "drivers/isohf.h"
```

Functions

- void _LLHW_isohf_disableFc (HFCTRL isohf)
- void _LLHW_isohf_enableFc (HFCTRL isohf)
- void _LLHW_isohf_waitUntilExec (HFCTRL isohf)
- void _LLHW_isohf_waitUntilTx (HFCTRL isohf)
- void _LLHW_isohf_waitUntilRx (HFCTRL isohf)
- void _LLHW_isohf_waitUntilPlatformHand (HFCTRL isohf)
- void _LLHW_isohf_configSkipISOALayer3 (HFCTRL isohf)
- void _LLHW_isohf_waitForRx (HFCTRL isohf, uint32_t back_to_halt)
- void _LLHW_isohf_launchTx (HFCTRL isohf, uint32_t back_to_halt, uint32_t silent_time, uint32_t tx_frame_size, uint32_t end_of_transaction)
- uint32_t _LLHW_isohf_getSilentTime (HFCTRL isohf, uint32_t min_n_val)
- void _LLHW_isohf_configTxDig4TypeA (HFCTRL isohf, uint32_t tx_bit_rate)
- void _LLHW_isohf_configRxDig4TypeA (HFCTRL isohf, uint32_t rx_bit_rate, uint32_t RxConfig_-table[3][2])

2.1.1 Detailed Description

This file contains the Low Level Hardware functions used to safely drive the HF subsystem (ISO14443)

Author

Bettina REBAUD (INVIA)

2.1.2 Function Documentation

2.1.2.1 void _LLHW_isohf_disableFc (HFCTRL *isohf*)

Disable the HF Fc Clock

This LLHW switches off the Fc clock extractor

2.1.2.2 void _LLHW_isohf_enableFc (HFCTRL *isohf*)

Enables the HF Fc Clock

This LLHW renables the HF Fc clock extractor

2.1.2.3 void _LLHW_isohf_waitUntilExec (HFCTRL *isohf*)

Wait until the SW reaches the Exec period

2.1.2.4 void _LLHW_isohf_waitUntilTx (HFCTRL *isohf*)

Wait until the SW reaches the Tx period

2.1.2.5 void _LLHW_isohf_waitUntilRx (HFCTRL *isohf*)

Wait until the SW reaches the Rx period

2.1.2.6 void _LLHW_isohf_waitUntilPlatformHand (HFCTRL *isohf*)

Wait until the SW has the hand on HF digital controller

2.1.2.7 void _LLHW_isohf_configSkipISOALayer3 (HFCTRL *isohf*)

Skip anticollision ISOA Layer3

This LLHW allows to directly jump in ISOA Layer 4 Shall be launch before HW FSM triggering with WaitRx

2.1.2.8 void _LLHW_isohf_waitForRx (HFCTRL *isohf,* uint32_t *back_to_halt*)

Configures and controls the HF Subsystem for catching next Rx frame

This LLHW configures the control register, sets the WAIT RX control

Caution: The IO RAM is assumed ready to be used by the HF digital controller

Parameters

in	*back_to_halt*	Allows to return in ISO Type A layer 3 and wait for new Rx frame use HF_P_CTRL_BACK2HALT when calling the LLHW or set to 0

2.1.2.9 void _LLHW_isohf_launchTx (HFCTRL *isohf*, uint32_t *back_to_halt*, uint32_t *silent_time*, uint32_t *tx_frame_size*, uint32_t *end_of_transaction*)

Configures and controls the HF Subsystem for launching the next Tx frame

This LLHW configures the control register, sets the LAUNCH TX control

Caution: The IO RAM is assumed ready to be used by the HF digital controller

Parameters

in	*back_to_halt*	Allows to return in ISO Type A layer 3 and wait for new Rx frame use HF_P_CTRL_BACK2HALT when calling the LLHW or set to 0
in	*silent_time*	Defines the number of slots to be waited before Tx frame sending 0 to 15 - no check on the value
in	*tx_frame_size*	Defines the Tx frame size in RAM buffer 1 to 0x400 - no check on the value
in	*end_of_transaction*	Removes the Tx to Rx automatic reversal use HF_P_CTRL_ENDOFTRANSAC when calling the driver or set to 0

2.1.2.10 uint32_t _LLHW_isohf_getSilentTime (HFCTRL *isohf*, uint32_t *min_n_val*)

Get the Silent Time Ts depending on current slot timer read value

To be done before Tx launch

Parameters

in	*min_n_val*	the LLHW will set the silent time such as to be reached the min_n_val in any case. Shall be set to 8 or 9

Returns

the LLHW returns the silent time to be used

2.1.2.11 void _LLHW_isohf_configTxDig4TypeA (HFCTRL *isohf*, uint32_t *tx_bit_rate*)

Front-end digital selection for Type A - Tx

This LLHW selects the :

- OOK or BPSK modulation (Tx)
- bit rates Configures and controls the HF Subsystem for catching next Rx frame

It keeps the last Rx configuration. This LLHW configures the control register, sets the WAIT RX control

Parameters

in	*tx_bit_rate*	Bit rate from 106 to 424 use DSI 0 = 106 kbits/s 1 = 212 kbits/s 2 = 424 kbits/s

2.1.2.12 void _LLHW_isohf_configRxDig4TypeA (HFCTRL *isohf,* uint32_t *rx_bit_rate,* uint32_t *RxConfig_table[3][2]*)

Front-end digital configuration for Type A - Rx

This LLHW configure the threshold of the RX decoder.

Parameters

in	*rx_bit_rate*	Bit rate from 106 to 424 use DRI 0 = 106 kbits/s 1 = 212 kbits/s 2 = 424 kbits/s
in	*RxConfig_table*	Table with 2 entries containing the Rx configurations for the whole Rx bit rates • Counter threshold [HFCTRL_DIGITAL_CNT0_CFG, HFCTRL_DIGITAL_CNT1_CFG]

Index