

ClockMatrix Firmware Version 4.9.5

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## 1. Overview

This document describes changes in the functionality and register map between firmware version 4.9.5 and version 4.8.7.

**Table 1. Related Documents**

Document Title	Document Description
Device Datasheet	Contains a functional overview of a specific device and hardware design related details including pinouts, AC and DC specifications, and applications information related to power filtering and terminations.
8A3xxx Family Programming Guide v4.8 dated September 30, 2020	Contain detailed register descriptions and address maps for all members of the family of devices. All devices use some subset of this register map.
8A3xxx Family Programming Guide v4.9 dated Apr 6, 2023	

## 2. Firmware Version Number

The firmware version can be read from the GENERAL\_STATUS registers as shown in the following table.

Register Module Base Address: C014h			Firmware Version v4.8.7	Firmware Version v4.9.5
Offset Address (Hex)	Individual Register Name	Register Description	Default Value	Default Value
010h	GENERAL_STATUS.MAJ_REL	Major release number	09h	09h
011h	GENERAL_STATUS.MIN_REL	Minor release number	08h	09h
012h	GENERAL_STATUS.HOTFIX_REL	Hotfix release number	07h	05h

### 3. Firmware Version 4.9.5 Functions Added Since Version 4.8.7

Issue Number	Description of Function
BRMBXR-3592	Added a soft control and status register (SCSR) for the received time of day (TOD) value via PWM. The new register is in module SCSR_PWM_RX_INFO.
BRMBXR-3231 BRMBXR-3406 BRMBXR-3422 BRMBXR-3590 BRMBXR-3610 BRMBXR-3621 BRMBXR-3622 BRMBXR-3641	Added support to use PWM to transmit and receive clocks that are asynchronous with the PWM carrier.
BRMBXR-3293	DPLL_TRANS_CTRL registers were made accessible to the user.
BRMBXR-3300	Added support to use GPIOx as a target for phase measurement with the Output TDC.
BRMBXR-3501 BRMBXR-3526	Added option for closed-loop pull-in to the LOCK_REC_PULL_IN_EN and LOCK_ACQ_PULL_IN_EN bit fields.
BRMBXR-3562	Added option for fast frame pulse switch to the FRAME_SYNC_MODE bit field.
BRMBXR-3594	Added counters in the SCSRs for PWM parity errors for each PWM decoder. The new registers are in module SCSR_PWM_RX_INFO.
BRMBXR-3224 BRMBXR-3597	Added TOD automatic update for PWM transmission.

### 4. Improvements in Version 4.9.5 Added Since Version 4.8.7

Issue Number: BRMBXR-3256	
Firmware	Functional Difference
v4.8.7	When a DPLL is in GPIO slave mode with GPIO slave active, then reference switches will be done using hitless reference switching. The DPLL will not align the phase of its outputs with the phase of the new reference. When a DPLL is placed into GPIO slave mode it does not automatically align its outputs with the phase of its reference.
v4.9.5	When a DPLL is in GPIO slave mode with GPIO slave active, then reference switches will not be done using hitless reference switching. The DPLL will align the phase of its outputs with the phase of the new reference. When a DPLL is placed into GPIO slave mode it automatically aligns its outputs with the phase of its reference.

Issue Number: BRMBXR-3301	
Firmware	Functional Difference
v4.8.7	PWM receivers cannot receive all 128 bytes of payload if the carrier frequency is lower than 50kHz.
v4.9.5	PWM receivers can receive 128 bytes with 8kHz carrier or higher.

## ClockMatrix Firmware Version 4.9.5 Release Notes

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### Issue Number: BRMBXR-3302

Firmware	Functional Difference
v4.8.7	If the OTP or EEPROM configuration has OUT_SYNC_DISABLE bit set to "1" then the output clock might not become active for a random interval of up to 8 seconds after power-on reset. This issue does not happen after a warm reset.
v4.9.5	This issue is corrected, and the output clock starts immediately after power-on reset.

### Issue Number: BRMBXR-3308

Firmware	Functional Difference
v4.8.7	DPLL_0 will not switch from disabled mode to write phase mode using the PLL_MODE bit field unless DPLL_0 is reset after changing the setting of the PLL_MODE bit field.
v4.9.5	This issue is corrected and DPLL_0 behaves as intended.

### Issue Number: BRMBXR-3349

Firmware	Functional Difference
v4.8.7	Outputs may be misaligned after the device is configured by the host.
v4.9.5	This issue is corrected, and outputs are aligned after the device is configured by the host.

### Issue Number: BRMBXR-3403

Firmware	Functional Difference
v4.8.7	The fine phase measurement algorithm may affect the decimator value of the DPLL when the FILTER_STATUS_UPDATE_EN bit is set.
v4.9.5	The decimator is controlled by the phase measurement algorithm only if the channel is in phase measurement mode.

### Issue Number: BRMBXR-3416

Firmware	Functional Difference
v4.8.7	When a channel is in Phase Measurement mode and the frequency of the channel FOD is set to zero Hz; if a new reference input is selected, valid phase measurement data will not be available for 10s.
v4.9.5	When a new reference input is selected for phase measurement the result is updated immediately after the measurement is finished, without any additional delay.

### Issue Number: BRMBXR-3427

Firmware	Functional Difference
v4.8.7	If the input reference is qualified when a DPLL is restarted, then the feedback divider might not be aligned properly with the Master Divider.
v4.9.5	This issue is corrected, and the feedback divider will be properly aligned with the Master Divider.

Issue Number: BRMBXR-3431	
Firmware	Functional Difference
v4.8.7	If two consecutive DPLL restart events occur within 1ms then subsequent reference switching instructions may not be accepted by the DPLL state machine.
v4.9.5	This issue is corrected, and reference switching instructions are accepted by the DPLL state machine.

Issue Number: BRMBXR-3512	
Firmware	Functional Difference
v4.8.7	The TOD read command register TOD_READ_TRIGGER is cleared before the TOD value is updated by the device. This was considered an improper sequence since the self clearing TOD_READ_TRIGGER indicates to the user that the command is completed. However, the TOD value is updated immediately after the TOD_READ_TRIGGER is cleared, so there was no chance of an error.
v4.9.5	The TOD read command register TOD_READ_TRIGGER is cleared after the TOD value is updated by the device. This is considered the proper sequence and there is still no chance of an error.

Issue Number: BRMBXR-3523	
Firmware	Functional Difference
v4.8.7	Satellite channels do not align properly when they are in phase measurement mode.
v4.9.5	This issue is corrected, satellite channels align properly when they are in phase measurement mode.

Issue Number: BRMBXR-3535	
Firmware	Functional Difference
v4.8.7	The outputs of a channel in phase measurement mode are affected when new inputs are selected for phase measurement.
v4.9.5	This issue is corrected, the outputs of a channel in phase measurement mode are not affected when new inputs are selected for phase measurement.

Issue Number: BRMBXR-3553	
Firmware	Functional Difference
v4.8.7	When a channel is configured as a "satellite channel" it is controlled by an internal automatic alignment algorithm that maintains alignment between the satellite channel and its source channel. On rare occasions, the automatic alignment algorithm can apply an unintended and small FFO to a satellite channel for up to 35 minutes.
v4.9.5	The satellite channels and automatic alignment algorithm operate as intended.

Issue Number: BRMBXR-3555	
Firmware	Functional Difference
v4.8.7	When a DISQUAL_TIMER bit field is set to 1.25ms the reference monitor may generate false alarms.
v4.9.5	The issue is corrected and the reference monitors operate as intended.

**Issue Number: BRMBXR-3598**

Firmware	Functional Difference
v4.8.7	For coarse phase measurement mode, the output of the TDC is filtered to improve measurement accuracy. The filtering is done by both the decimator filter and the loop filter. The device automatically detects steps in the filtered measured phase and opens the decimator bandwidth to respond more quickly.
v4.9.5	For coarse phase measurement mode, the output of the TDC is filtered to improve measurement accuracy. The filtering is done by the decimator filter only. The device automatically detects steps in the filtered measured phase and opens the decimator bandwidth to respond more quickly.

**Issue Number: BRMBXR-3599**

Firmware	Functional Difference
v4.8.7	For coarse phase measurement mode, the phase measurement values are provided to the user in both the DPLLx_FILTER_STATUS field and the DPLLx_PHASE_STATUS field.
v4.9.5	For coarse phase measurement mode, the phase measurement values are provided to the user in the DPLLx_PHASE_STATUS field only. In this mode, the DPLLx_FILTER_STATUS field remains available to the user according to its description in the programming guide.

**Issue Number: BRMBXR-3636**

Firmware	Functional Difference
v4.8.7	The DPLL phase pull-in procedure does not pull-in the phase offset when DPLL_PHASE_PULL_IN_OFFSET is 1 ns and the DPLL_PHASE_PULL_IN_SLOPE_LIMIT is 1ppb.
v4.9.5	The DPLL phase pull-in procedure does pull-in the phase offset when DPLL_PHASE_PULL_IN_OFFSET is 1 ns and the DPLL_PHASE_PULL_IN_SLOPE_LIMIT is 1ppb.

**Issue Number: BRMBXR-3644**

Firmware	Functional Difference
v4.8.7	When tod_frame_access_en = 1, if TOD frames are not discarded by the user, then over the course of many hours, TOD frames can accumulate in the receive FIFO.
v4.9.5	When tod_frame_access_en = 1, TOD frames cannot accumulate in the receive FIFO.

## 5. Renesas Internal Documentation

Issue Number	Description
BRMBXR-3289	These issues are related to Renesas documentation and interim firmware versions.
BRMBXR-3291	
BRMBXR-3294	
BRMBXR-3321	
BRMBXR-3333	
BRMBXR-3334	
BRMBXR-3338	
BRMBXR-3445	
BRMBXR-3456	
BRMBXR-3458	
BRMBXR-3500	
BRMBXR-3515	
BRMBXR-3539	
BRMBXR-3567	
BRMBXR-3573	
BRMBXR-3619	
BRMBXR-3627	

## 6. Register Differences Between Version 4.8.7 and Version 4.9.5

Register Module Base Address: C014h		
Offset Address (Hex)	Individual Register Name	Change
011h	GENERAL_STATUS.MIN_REL	Default value is 9.
012h	GENERAL_STATUS.HOTFIX_REL	Default value is 5.

Register Module Base Address: C03Ch		
Offset Address (Hex)	Individual Register Name	Change
022h	STATUS.DPLL0_REF_STAT.dpll0_input	Added option 0x1C = PWM sync phase (CLK28)

Register Module Base Address: C3B0h		
Offset Address (Hex)	Individual Register Name	Change
004h	DPLL_0.DPLL_CTRL_2.frame_sync_mode	Added new option, 3 = fast frame pulse switch.
023h	DPLL_0.DPLL_FASTLOCK_CFG_0.lock_rec_pull_in_en DPLL_0.DPLL_FASTLOCK_CFG_0.lock_rec_phase_snap_en DPLL_0.DPLL_FASTLOCK_CFG_0.lock_acq_pull_in_en DPLL_0.DPLL_FASTLOCK_CFG_0.lock_acq_phase_snap_en	Redefined these bits.
026h	DPLL_0.DPLL_FASTLOCK_PSL	Redefined this register.

Register Module Base Address: CB00h		
Offset Address (Hex)	Individual Register Name	Change
004h	PWM_ENCODER_0.PWM_ENCODER_CMD.tod_auto_update	New bit.

Register Module Base Address: CB40h		
Offset Address (Hex)	Individual Register Name	Change
005h	PWM_DECODER_0.PWM_DECODER_CMD.tod_frame_access_en	Redefined this bit.

Register Module Base Address: CBCCh		
Offset Address (Hex)	Individual Register Name	Change
000h	TOD_0.TOD_CFG.tod_out_sync_disable	Redefined this bit.

Register Module Base Address: CC90h		
Offset Address (Hex)	Individual Register Name	Change
00Eh	TOD_READ_SECONDARY_0.TOD_READ_SECONDARY_CMD	Revised the TRIGGER description above the Bit Field Locations and Descriptions table for this register.

Register Module Base Address: CD20h		
Offset Address (Hex)	Individual Register Name	Change
004h	INPUT_TDC.INPUT_TDC_FBD_CTRL.fdb_user_config_en	Redefined this bit.

Register Module Base Address: CD80h		
Offset Address (Hex)	Individual Register Name	Change
000h	PWM_SYNC_ENCODER_0.PWM_SYNC_ENCODER_PAYLOAD_CNFG	New register.
001h	PWM_SYNC_ENCODER_0.PWM_SYNC_ENCODER_PAYLOAD_SQUELCH_CNFG	New register.
002h	PWM_SYNC_ENCODER_0.PWM_SYNC_ENCODER_CMD	New register.

Register Module Base Address: CE00h		
Offset Address (Hex)	Individual Register Name	Change
000h	PWM_SYNC_DECODER_0.PWM_SYNC_DECODER_PAYLOAD_CNFG_0	New register.
001h	PWM_SYNC_DECODER_0.PWM_SYNC_DECODER_PAYLOAD_CNFG_1	New register.
002h	PWM_SYNC_DECODER_0.PWM_SYNC_DECODER_PAYLOAD_CNFG_2	New register.
003h	PWM_SYNC_DECODER_0.PWM_SYNC_DECODER_PAYLOAD_CNFG_3	New register.
004h	PWM_SYNC_DECODER_0.PWM_SYNC_DECODER_CMD	New register.

Register Module Base Address: CE80h		
Offset Address (Hex)	Individual Register Name	Change
000h	PWM_RX_INFO.PWM_TOD	New register.
00Ch	PWM_RX_INFO.PWM_DECODER0_ERRORS	New register.
010h	PWM_RX_INFO.PWM_DECODER1_ERRORS	New register.
014h	PWM_RX_INFO.PWM_DECODER2_ERRORS	New register.
018h	PWM_RX_INFO.PWM_DECODER3_ERRORS	New register.
01Ch	PWM_RX_INFO.PWM_DECODER4_ERRORS	New register.
020h	PWM_RX_INFO.PWM_DECODER5_ERRORS	New register.
024h	PWM_RX_INFO.PWM_DECODER6_ERRORS	New register.
028h	PWM_RX_INFO.PWM_DECODER7_ERRORS	New register.
02Ch	PWM_RX_INFO.PWM_DECODER8_ERRORS	New register.
030h	PWM_RX_INFO.PWM_DECODER9_ERRORS	New register.
034h	PWM_RX_INFO.PWM_DECODER10_ERRORS	New register.
038h	PWM_RX_INFO.PWM_DECODER11_ERRORS	New register.
03Ch	PWM_RX_INFO.PWM_DECODER12_ERRORS	New register.
040h	PWM_RX_INFO.PWM_DECODER13_ERRORS	New register.
044h	PWM_RX_INFO.PWM_DECODER14_ERRORS	New register.
048h	PWM_RX_INFO.PWM_DECODER15_ERRORS	New register.
04Ch	PWM_RX_INFO.PWM_SYNC_DECODER0_S QUELCH_STATUS	New register.
04Dh	PWM_RX_INFO.PWM_SYNC_DECODER1_S QUELCH_STATUS	New register.



Register Module Base Address: CE80h (Cont.)		
Offset Address (Hex)	Individual Register Name	Change
04Eh	PWM_RX_INFO.PWM_SYNC_DECODER2_S QUELCH_STATUS	New register.
04Fh	PWM_RX_INFO.PWM_SYNC_DECODER3_S QUELCH_STATUS	New register.
050h	PWM_RX_INFO.PWM_SYNC_DECODER4_S QUELCH_STATUS	New register.
051h	PWM_RX_INFO.PWM_SYNC_DECODER5_S QUELCH_STATUS	New register.
052h	PWM_RX_INFO.PWM_SYNC_DECODER6_S QUELCH_STATUS	New register.
053h	PWM_RX_INFO.PWM_SYNC_DECODER7_S QUELCH_STATUS	New register.
054h	PWM_RX_INFO.PWM_SYNC_DECODER8_S QUELCH_STATUS	New register.
055h	PWM_RX_INFO.PWM_SYNC_DECODER9_S QUELCH_STATUS	New register.
056h	PWM_RX_INFO.PWM_SYNC_DECODER10_S QUELCH_STATUS	New register.
057h	PWM_RX_INFO.PWM_SYNC_DECODER11_S QUELCH_STATUS	New register.
058h	PWM_RX_INFO.PWM_SYNC_DECODER12_S QUELCH_STATUS	New register.
059h	PWM_RX_INFO.PWM_SYNC_DECODER13_S QUELCH_STATUS	New register.
05Ah	PWM_RX_INFO.PWM_SYNC_DECODER14_S QUELCH_STATUS	New register.
05Bh	PWM_RX_INFO.PWM_SYNC_DECODER15_S QUELCH_STATUS	New register.

## 7. Revision History

Revision	Date	Description
1.00	Apr 19, 2023	Initial release.

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