

JEDEC STANDARD

DDR4 Registering Clock Driver - DDR4RCD01

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DDR4 REGISTERING CLOCK DRIVER - DDR4RCD01

Contents

1 Scope	1
2 Device standard	2
2.1 Description.....	2
2.2 Features and Functions.....	2
2.2.1 Direct CS Modes.....	3
2.2.2 Quad CS Modes.....	3
2.3 Initialization.....	5
2.3.1 Reset Initialization with Stable Power.....	7
2.4 Parity.....	8
2.4.1 Parity Timing Scheme Waveforms.....	9
2.5 Data Buffer Control Bus.....	12
2.5.1 Control Bus Signals.....	12
2.5.2 Control Bus Timing.....	12
2.5.3 Control Bus Commands.....	13
2.5.4 Command Sequences.....	13
2.5.5 Command Sequence Descriptions.....	14
2.6 DQ Bus Termination in LRDIMM application.....	23
2.7 Power saving modes.....	26
2.7.1 Register CKE Power Down.....	26
2.7.2 Clock Stopped Power Down Mode.....	32
2.8 Dual Frequency Support.....	35
2.8.1 Input Clock Frequency Change.....	35
2.9 Output Inversion Enabling/Disabling.....	37
2.9.1 1T Timing Only.....	41
2.10 ZQ Calibration.....	41
2.11 Latency Equalization Support.....	42
2.12 CA Bus Training Modes.....	42
2.13 Transparent Mode.....	44
2.14 Mechanical outline.....	45
2.15 Pinout.....	46
2.16 Terminal Functions Function tables.....	47
2.17 Logic diagram.....	52
2.18 Control Words.....	53
2.18.1 Address Mirroring.....	53
2.18.2 Control Word Decoding.....	54
2.18.3 RC00 - Global Features Control Word.....	55
2.18.4 RC01 - Clock Driver Enable Control Word.....	56
2.18.5 RC02 - Timing and IBT Control Word.....	56
2.18.6 RC03 - CA and CS Signals Driver Characteristics Control Word.....	56
2.18.7 RC04 - ODT and CKE Signals Driver Characteristics Control Word.....	57
2.18.8 RC05 - Clock Driver Characteristics Control Word.....	57
2.18.9 RC06 - Command Space Control Word.....	57
2.18.10 RC08 - Input/Output Configuration Control Word.....	58
2.18.11 RC09 - Power Saving Settings Control Word.....	58
2.18.12 RC0A - RDIMM Operating Speed.....	59
2.18.13 RC0B - Operating Voltage VDD and VrefCA Source Control Word.....	59
2.18.14 RC0C - Training Control Word.....	60
2.18.15 RC0D - DIMM Configuration Control Word.....	60
2.18.16 RC0E - Parity Control Word.....	60
2.18.17 RC0F - Command Latency Adder Control Word.....	61
2.18.18 RC1x - Internal VREFCA Control Word.....	62
2.18.19 I ² C Bus Control Words.....	63

DDR4 REGISTERING CLOCK DRIVER - DDR4RCD01

Contents

2.18.20 RC3x - Fine Granularity RDIMM Operating Speed.....	64
2.18.21 CW Selection Control Words	66
2.18.22 CW Data Control Word	67
2.18.23 IBT Control Word.....	67
2.18.24 ODT Input Buffer/IBT, QxODT Output Buffer and Timing Control Word	68
2.18.25 QxODT[1:0] Write Pattern Control Word	69
2.18.26 QxODT[1:0] Read Pattern Control Word.....	69
2.18.27 IBT and MRS Snoop Control Word	69
2.18.28 RCCx .. RCFFx - Error Log Register	70
3 I²C Bus Interface.....	71
3.1 Operating Range	71
3.2 External Pins	71
3.2.1 Serial Clock (SCL).....	71
3.2.2 Serial Data (SDA)	71
3.2.3 Select Address (SA0, SA1, SA2).....	72
3.3 System Management Access.....	73
3.3.1 Slave Address.....	74
3.3.2 Supported I ² C Bus Commands	74
3.3.3 Register Access Protocols	75
3.4 I ² C Bus Error Handling.....	80
3.5 I ² C Resets.....	80
3.5.1 I ² C Interface State Machine Reset.....	80
3.5.2 I ² C transactions during reset.....	80
4 Absolute maximum ratings	81
5 Input AC and DC Specifications.....	82
5.1 CA Input Receiver Specifications	83
5.2 AC and DC Logic Input Levels for Differential Signals	88
5.2.1 Differential signal definition	88
5.2.2 Differential swing requirements for CK _t /CK _c	88
5.2.3 Single-ended requirements for CK _t /CK _c	89
5.3 Differential Input Cross point voltage	90
5.4 Differential Input Slew Rate Definitions for CK.....	92
5.5 Input buffer characteristics	92
5.6 CMOS Rail-to-Rail Input Levels for DRST _n	94
5.7 Overshoot and Undershoot Specifications	95
5.8 VrefCA Specifications	96
6 Output AC and DC Specifications	103
6.1 Single-Ended Output Slew Rate	103
6.2 Differential Output Slew Rate Definitions for Yn _t / Yn _c and BCK _t / BCK _c	104
6.3 Differential Output Cross Point Voltage.....	105
6.4 Register R-on and Weak Drive Specifications for Each Drive Strength	106
6.5 ALERT _n Output Driver DC Electrical Characteristic	109
6.6 Clock driver Characteristics.....	109
7 DC specifications, IDD Specifications	113
7.1 DC Electrical Characteristics	113
7.2 IDD Specification Parameters and Test Conditions	113
8 Input/Output Capacitance	117
9 Timing requirements	119
10 I²C Electrical and Timing Specifications.....	121
11 Test circuits and switching waveforms	125
11.1 Parameter measurement information	125
11.2 Alert output load circuit and voltage measurement information	127
11.3 DDR4 Register Reference Load	128

DDR4 REGISTERING CLOCK DRIVER - DDR4RCD01

Contents

12 Recommended Filtering for the Analog Power supply (AVDD)	129
13 Reference to other applicable JEDEC standards and publications	130
Table1: Revision History	ii
Table2: DCS, DC - QxCS, QxC Mapping in Encoded QuadCS mode.....	3
Table3: DDR4RCD01 Device Initialization Sequence.....	6
Table4: DDR4RCD01 Device Initialization Sequence when Power and Clock are Stable.....	8
Table5: List of Signals for Data Buffer control	12
Table6: Data Buffer Control Bus Command Table	13
Table7: Multicycle Sequence for Write Commands.....	15
Table8: Multicycle Sequence for Read Commands.....	16
Table9: Multicycle Sequence for MRS Write Commands	18
Table10: Multicycle Sequence for BCW Write Commands.....	19
Table11: Multicycle Sequence for BCW Read Commands.....	21
Table12: Default Write, Read QxODT[1:0] Signal High Time.....	25
Table13: Address Inversion	38
Table14: Address Mirroring and Inversion.....	40
Table15: Ball Assignment - 253-ball FCBGA, 15 x 20 Grid, TOP VIEW	46
Table16: Terminal functions.....	47
Table17: Direct DualCS mode Function table (CS mode setting ‘00’)	49
Table18: Direct QuadCS mode Function table (CS mode setting ‘01’)	49
Table19: Encoded QuadCS mode Function table (CS mode setting ‘11’)	50
Table20: PLL function table	51
Table21: Address Mirroring.....	53
Table22: Control Word Decoding.....	55
Table23: RC00: Global Features Control Word	55
Table24: RC01: Clock Driver Enable Control Word.....	56
Table25: RC02: Timing and IBT Control Word.....	56
Table26: RC03: CA and CS Signals Driver Characteristics Control Word	56
Table27: RC04: ODT and CKE Signals Driver Characteristics Control Word.....	57
Table28: RC05: Clock Driver Characteristics Control Word.....	57
Table29: RC06: Command Space Control Word definition	57
Table30: RC08: Input/Output Configuration Control Word.....	58
Table31: Parity Checking and DC[2:0] & DA17 Inputs.....	58
Table32: RC09: Power Saving Settings Control Word	58
Table33: RC0A: RDIMM Operating Speed	59
Table34: RC0B: Operating Voltage VDD and VrefCA Source Control Word.....	59
Table35: RC0C: Training Control Word	60
Table36: RC0D: DIMM Configuration Control Word	60
Table37: RC0E: Parity Control Word.....	60
Table38: RC0F: Command Latency Adder Control Word.....	61
Table39: ALERT_n Pulse Width.....	61
Table40: RC1x: Internal VrefCA Control Word	62
Table41: RC2x: I ² C Bus Control Word.....	63
Table42: RC3x: Fine Granularity RDIMM Operating Speed.....	64
Table43: RC4x: CW Source Selection Control Word	66
Table44: RC5x: CW Destination Selection & Write/Read Additional QxODT[1:0] Signal High Time	66
Table45: RC6x: CW Data Control Word.....	67
Table46: CW read command bit assignment for 8-bit CWs.....	67
Table47: CW read command bit assignment for 4-bit CWs.....	67
Table48: RC7x: IBT Control Word	67
Table49: RC8x: ODT Input Buffer/IBT, QxODT Output Buffer and Timing Control Word.....	68

DDR4 REGISTERING CLOCK DRIVER - DDR4RCD01

Contents

Table50: RC9x: QxODT[1:0] Write Pattern Control Word	69
Table51: RCAX: QxODT[1:0] Read Pattern Control Word	69
Table52: RCBx: IBT and MRS Snoop Control Word	69
Table53: RCCx .. RCFx: Error Log Register.....	70
Table54: Unique I ² C Bus Addressing of DDR4 Registers in DIMM Applications	72
Table55: I ² C Bus command Encoding.....	74
Table56: I ² C Bus Protocol Addressing fields	75
Table57: Function 0 I ² C Bus Address Map	76
Table58: Double word byte order for I ² C Bus control word accesses.....	77
Table59: Status Field Encoding for I ² C Bus Reads	77
Table60: Absolute maximum ratings over operating free-air temperature range ¹	81
Table61: Operating Electrical Characteristics	82
Table62: CA Input Receiver Voltage Margin and AC Timing by Speed Bin for DDR4-1600/1866/2133/2400/2666/ 3200.....	87
Table63: AC and DC Input Levels for CK	88
Table64: Allowed time before ringback (tDVAC) for CK_t/CK_c	89
Table65: Single-ended levels for CK_t/CK_c	90
Table66: Cross point voltage for differential input signals (CK)	90
Table67: Differential Input Slew Rate Definition for CK_t/CK_c.....	92
Table68: Input IBT characteristics over specified operating free-air temperature range	92
Table69: CMOS rail to rail Input Levels for DRST_n	94
Table70: AC overshoot/undershoot specification for Address, Command and Control pins.....	95
Table71: AC overshoot/undershoot specification for Clock.....	96
Table72: Internal VrefCA Specifications	101
Table73: QVrefCA/BVrefCA Load Currents	102
Table74: QVrefCA and BVrefCA Specifications.....	102
Table75: Single-ended Output Slew Rate Definition	103
Table76: Single-ended output edge rates over specified operating temperature range	103
Table77: Differential Output Slew Rate Definition for Yn_t / Yn_c and BCK_t / BCK_c	104
Table78: Differential output edge rates over specified operating temperature range.....	105
Table79: Cross point voltage for Yn_t/Yn_c and BCK_t/BCK_c.....	105
Table80: Output Ron and Weak Drive	106
Table81: Output Driver DC Electrical Characteristics, entire operating temperature range	107
Table82: ALERT_n Output Driver DC Electrical Characteristics	109
Table83: Clock driver Characteristics at application frequency (frequency band 1)	109
Table84: Clock driver Characteristics at test frequency (frequency band 2).....	111
Table85: SSC and PLL Loop Filter Characteristics.....	112
Table86: DC Electrical Characteristics.....	113
Table87: Basic IDD Measurement Conditions	115
Table88: IDD3N Measurement-Loop Pattern	115
Table89: IDD3P1 and IDD3P2 Measurement-Loop Pattern	115
Table90: IDD4A, IDD4B Measurement-Loop Pattern.....	116
Table91: Silicon pad I/O Capacitance values	117
Table92: Package electrical specifications	118
Table93: Input Timing requirements	119
Table94: Output timing requirements.....	120
Table95: Operating Conditions for the I ² C Bus Interface	121
Table96: AC Measurement Conditions for I ² C BUS interface.....	121
Table97: Input Parameters for I ² C Bus interface.....	121
Table98: DC Characteristics for I ² C Bus interface.....	122
Table99: AC Characteristics for I ² C Bus interface.....	123

DDR4 REGISTERING CLOCK DRIVER - DDR4RCD01

Contents

Figure 1: Timing of clock and data during initialization sequence.....	5
Figure 2: Timing of clock and data during initialization sequence with stable power	7
Figure 3: Timing of clock, data and parity signals with parity checking disabled	10
Figure 4: Timing of clock, data and parity signals with checking enabled and latency=1	11
Figure 5: Timing of clock, data and parity signals with checking enabled and latency=2	11
Figure 6: Parity-Error Occurrence In Chip-Deselect Mode	12
Figure 7: WRITE Timing.....	16
Figure 8: READ Timing	17
Figure 9: MRS Write command sequence	19
Figure 10: Buffer Control Word Write command sequence.....	20
Figure 11: BCW Read command sequence	22
Figure 12: BODT timing (Dynamic ODT, t_{tCK} preamble, $CL=14$, $CWL=11$, $BL=8$, $AL=0$, CRC Disabled)	24
Figure 13: Power Down Mode Entry and Exit with IBT Off	27
Figure 14: Power Down Mode Entry and Exit with IBT On	29
Figure 15: Single Cycle Power Down Mode Entry and Exit with $CLA=1$	31
Figure 16: Clock Stopped Power Down Entry and Exit with IBT On.....	33
Figure 17: Clock Stopped Power Down Entry and Exit with IBT Off.....	34
Figure 18: Output Inversion Functional Diagram.....	37
Figure 19: Address Inversion Flow-chart	38
Figure 20: Timing During Normal Operation.....	41
Figure 21: Latency Equalizer Delays.....	42
Figure 22: Clock-to-CA Training Mode Examples	43
Figure 23: Ball Configuration	45
Figure 24: Logic diagram (positive logic)	52
Figure 25: Maximum RL Value Versus Bus Capacitance (CBUS) for an I ² C Bus.....	72
Figure 26: I ² C Bus Wiring Diagram	73
Figure 27: I ² C Bus Configuration Read (Block Write / Block Read, PEC enabled).....	78
Figure 28: I ² C Bus Configuration Read (Write Bytes / Read Bytes, PEC enabled).....	78
Figure 29: I ² C Bus Configuration Double Word Write (Block Write, PEC enabled).....	79
Figure 30: I ² C Bus Configuration Double Word Write (Write Bytes, PEC enabled)	79
Figure 31: I ² C Bus Configuration Word Write (Block Write, PEC disabled).....	79
Figure 32: I ² C Bus Configuration Byte Write (Write Bytes, PEC disabled)	80
Figure 33: CA Receiver(Rx) mask.....	83
Figure 34: Across pin V_{cent_CA} voltage variation.....	84
Figure 35: CA t_{cIPW} and $SRIN_cIVW$ definition (for each input pulse).....	84
Figure 36: $VIHL_AC(\min)$ requirement (for each input pulse)	85
Figure 37: CK to CA Timings at the DDR4RCD01 balls referenced from the internal latch.....	86
Figure 38: Definition of differential AC-swing and “time above AC-level” t_{DVAC}	88
Figure 39: Single-ended requirement for differential signals	89
Figure 40: Vix Definition (CK)	90
Figure 41: Differential Input Slew Rate Definition for CK_t/CK_c	92
Figure 42: Input Bus Termination: Definition of Voltages and Currents	93
Figure 43: $DRST_n$ Input Slew Rate Definition.....	94
Figure 44: Address, Command and Control Overshoot and Undershoot definition.....	95
Figure 45: Clock Overshoot and Undershoot definition.....	96
Figure 46: V_{ref} operating range(V_{refmin} , V_{refmax})	97
Figure 47: Example of V_{ref} set tolerance(max case only shown) and step size.....	98
Figure 48: V_{ref_time} for short and long timing diagram.....	99
Figure 49: V_{ref} step single step size increment case	99
Figure 50: V_{ref} step single step size decrement case.....	100

DDR4 REGISTERING CLOCK DRIVER - DDR4RCD01

Contents

Figure 51: Vref full step from Vrefmin to Vrefmax case	100
Figure 52: Vref full step from Vrefmax to Vrefmin case	101
Figure 53: Single-Ended Output Slew Rate Definition	103
Figure 54: Differential Output Slew Rate Definition for Yn_t / Yn_c and BCK_t / BCK_c.....	104
Figure 55: Vox Definition (Yn and BCK).....	105
Figure 56: Output Driver: Definition of Voltages and Currents	106
Figure 57: Clock Output (Yn) Skew	110
Figure 58: Definition for tstaoff and tdynoff.....	110
Figure 59: Qn Output Skew	111
Figure 60: Measurement Setup and Test Load for IDD Measurements	114
Figure 61: Correlation from simulated Channel IO Power to actual Channel IO Power supported by IDD Measurement 114	
Figure 62: Propagation Delay Timing	120
Figure 63: AC Measurement I/O Waveform	121
Figure 64: I ² C Bus AC Waveforms	124
Figure 65: Voltage waveforms; input clock.....	125
Figure 66: Voltage and current waveforms; inputs active and inactive times	125
Figure 67: Input Waveforms V _{IX} range measurement.....	125
Figure 68: Voltage waveforms; propagation delay times	126
Figure 69: Voltage waveforms address floating	126
Figure 70: Calculating the virtual V _{TT} crossing point.....	127
Figure 71: Load circuit, ALERT_n Outputs	128
Figure 72: Voltage waveforms, tALERT_HL Measurement.....	128
Figure 73: Reference Load for AC Timing and Output Slew Rate	128
Figure 74: AVDD Filtering.....	129

DDR4 REGISTERING CLOCK DRIVER - DDR4RCD01

1 **Scope**

This document defines standard specifications of DC interface parameters, switching parameters, and test loading for definition of the DDR4 Registering Clock Driver (RCD) with parity for driving address and control nets on DDR4 RDIMM and LRDIMM applications. Any TBDs as of this document, are under discussion by the formulating committee.

The terms 'Registering Clock Driver', 'RCD', 'register' or 'device' are used interchangeably to refer to this device in the remainder of this specification.

The purpose is to provide a standard for the DDR4RCD01 (see Note) logic device, for uniformity, multiplicity of sources, elimination of confusion, ease of device specification, and ease of use.

NOTE The designation DDR4RCD01 refers to the part designation of a series of commercial logic parts common in the industry. This designation is normally preceded by a series of manufacturer specific characters to make up a complete part designation.

2 Device standard

2.1 Description

This 32-bit 1:2 registering clock driver with parity is designed for 1.2 V VDD operation.

All inputs are pseudo-differential with an external or internal voltage reference. All outputs are full swing CMOS drivers optimized to drive single terminated 25..50 Ω traces in DDR4 RDIMM and LRDIMM applications. The clock outputs Yn_t and Yn_c and control net outputs QxCKEn, QxCSn and QxODTn can be driven with a different strength to compensate for different DIMM net topologies. By disabling unused outputs the power consumption is reduced.

The DDR4RCD01 operates from a differential clock (CK_t/CK_c). Inputs are registered at the crossing of CK_t going HIGH, and CK_c going LOW. The input signals could be either re-driven to the outputs or they could be used to access device internal control registers when certain input conditions are met. The control word mechanism is described in more detail in 2.18.2, Control Word Decoding.

2.2 Features and Functions

The DDR4RCD01 has three basic modes of operation associated with the DA[1:0] bits in the DIMM Configuration Control Word (RC0D):

- In **Direct DualCS mode** (DA[1:0] = 00) the component has two chip select inputs, DCS0_n and DCS1_n, and two copies of each chip select output, QACS0_n, QACS1_n, QBCS0_n and QBCS1_n. The inputs pins DC[2:0] are forwarded to two sets of output pins, QAC[2:0] and QBC[2:0]. This is the normal operating mode (“QuadCS disabled” and “Encoded CS disabled”).
- In **Direct QuadCS mode** (DA[1:0] = 01), the component has four chip select inputs, the two dedicated inputs DCS[1:0]_n and the DC[0] input pin functioning as DCS2_n and the DC[1] input pin functioning as DCS3_n, and two copies of each chip select output, QACS[3:0]_n and QBCS[3:0]_n. The input pin DC[2] is forwarded to two output pins, QAC[2] and QBC[2]. The output pins QAC[1:0] and QBC[1:0] are used as QACS[3:2]_n and QBCS[3:2]_n. This is the “QuadCS enabled” mode.

In the two modes above the DDR4 register does not need to decode input signals to generate any chip select outputs.

- In **Encoded QuadCS mode** (DA[1:0] = 11), two copies of four output chip selects, i.e., QACS[3:0]_n and QBCS[3:0]_n, are decoded out of two DCS[1:0]_n inputs and the DC[0] input. The input pin DC[2] is forwarded to two output pins, QAC[2] and QBC[2]. The output pins QAC[1:0] and QBC[1:0] are used as QACS[3:2]_n and QBCS[3:2]_n. This is the “Encoded QuadCS” mode.

When the DCS encoding is changed (i.e., when the setting in RC0D DA[1:0] is updated), it is necessary for the host to precondition the signals driven on the pins which will be turned into chip select inputs with the correct voltage levels. For example, it is necessary to drive DCS[3:2] both HIGH before RC0D DA[1:0] is updated from ‘00’ to ‘01’. This is necessary to prevent a violation of the t_{MRD} parameter.