



| Paragraph Number | LIST OF FIGURES | Page Number |
|-----------------------------|---|------------------------|
| 1-1 | MPC555 Block Diagram | 1-2 |
| 1-2 | MPC555 Memory Map | 1-6 |
| 1-3 | MPC555 Internal Memory Map | 1-7 |
| 2-1 | MPC555 Case Dimensions and Packaging | 2-2 |
| 2-2 | MPC555 Pinout Data | 2-3 |
| 2-3 | Type A Interface | 2-40 |
| 2-4 | Type B Interface | 2-41 |
| 2-5 | Type C Interface | 2-41 |
| 2-6 | Type CH Interface | 2-42 |
| 2-7 | Type CNH Interface | 2-42 |
| 2-8 | Type D Interface | 2-43 |
| 2-9 | Type E Interface | 2-44 |
| 2-10 | 3-V Type EOH Interface | 2-45 |
| 2-11 | Type F Interface | 2-46 |
| 2-12 | Type G Interface | 2-47 |
| 2-13 | Type H Interface | 2-48 |
| 2-14 | Type I Interface | 2-49 |
| 2-15 | Type IH Interface | 2-50 |
| 2-16 | Type J Interface | 2-51 |
| 2-17 | Type JD Interface | 2-52 |
| 2-18 | EPEE Pad (Type K) | 2-53 |
| 2-19 | Type L Interface | 2-54 |
| 2-20 | Type M Interface | 2-54 |
| 2-21 | Type N Interface | 2-55 |
| 2-22 | Type O Interface | 2-56 |
| 2-23 | Type P Interface | 2-57 |
| 2-24 | Type Q Interface | 2-58 |
| 2-25 | Type R Interface | 2-58 |
| 2-26 | Type S Interface | 2-59 |
| 3-1 | RCPU Block Diagram | 3-2 |
| 3-2 | Sequencer Data Path | 3-4 |
| 3-3 | RCPU Programming Model | 3-8 |
| 3-4 | Basic Instruction Pipeline | 3-38 |
| 4-1 | Burst Buffer Block Diagram | 4-2 |
| 4-2 | Exception Table Entries Mapping | 4-8 |
| 5-1 | MPC555 USIU Block Diagram | 5-2 |
| 6-1 | System Configuration and Protection Logic | 6-3 |
| 6-2 | MPC555 Memory Map | 6-5 |

| Paragraph Number | | Page Number |
|---------------------|--|----------------|
| 6-3 | SGPIO Cell | 6-9 |
| 6-4 | MPC555 Interrupt Structure | 6-10 |
| 6-5 | MPC555 Interrupt Configuration | 6-12 |
| 6-6 | RTC Block Diagram | 6-15 |
| 6-7 | PIT Block Diagram | 6-16 |
| 6-8 | SWT Block Diagram | 6-18 |
| 7-1 | Reset Configuration Basic Scheme | 7-7 |
| 7-2 | Reset Configuration Sampling Scheme For “Short” PORESET Assertion, Limp Mode Disabled | 7-8 |
| 7-3 | Reset Configuration Timing for “Short” $\overline{\text{PORESET}}$ Assertion, Limp Mode Enabled | 7-9 |
| 7-4 | Reset Configuration Timing for “Long” $\overline{\text{PORESET}}$ Assertion, Limp Mode Disabled | 7-9 |
| 7-5 | Reset Configuration Sampling Timing Requirements | 7-10 |
| 8-1 | Clock Unit Block Diagram | 8-2 |
| 8-2 | Main System Oscillator (OSCM) | 8-3 |
| 8-3 | System PLL Block Diagram | 8-5 |
| 8-4 | MPC555 Clocks | 8-7 |
| 8-5 | General System Clocks Select | 8-10 |
| 8-6 | Divided System Clocks Timing Diagram | 8-11 |
| 8-7 | Clocks Timing For DFNH = 1 (or DFNL = 0) | 8-12 |
| 8-8 | Clock Source Flow Chart | 8-14 |
| 8-9 | MPC555 Low-Power Modes Flow Diagram | 8-19 |
| 8-10 | Basic Power Supply Configuration | 8-22 |
| 8-11 | External Power Supply Scheme | 8-23 |
| 8-12 | Keep Alive Register Key State Diagram | 8-25 |
| 8-13 | No Standby, No KAPWR, All System Power On/Off | 8-26 |
| 8-14 | Standby and KAPWR, Other Power On/Off | 8-27 |
| 9-1 | Input Sample Window | 9-2 |
| 9-2 | MPC555 Bus Signals | 9-3 |
| 9-3 | Basic Transfer Protocol | 9-8 |
| 9-4 | Basic Flow Diagram of a Single Beat Read Cycle | 9-9 |
| 9-5 | Single Beat Read Cycle—Basic Timing—Zero Wait States | 9-10 |
| 9-6 | Single Beat Read Cycle—Basic Timing—One Wait State | 9-11 |
| 9-7 | Basic Flow Diagram of a Single Beat Write Cycle | 9-12 |
| 9-8 | Single Beat Basic Write Cycle Timing, Zero Wait States | 9-13 |
| 9-9 | Single Beat Basic Write Cycle Timing, One Wait State | 9-14 |
| 9-10 | Single Beat 32-Bit Data Write Cycle Timing, 16 Bit-Port Size | 9-15 |
| 9-11 | Basic Flow Diagram Of A Burst Read Cycle | 9-18 |
| 9-12 | Burst-Read Cycle—32-Bit Port Size—Zero Wait State | 9-19 |
| 9-13 | Burst-Read Cycle—32-Bit Port Size—One Wait State | 9-20 |
| 9-14 | Burst-Read Cycle—32-Bit Port Size—Wait States Between Beats | 9-21 |



| Paragraph Number | | Page Number |
|-----------------------------|---|------------------------|
| 9-15 | Burst-Read Cycle, 16-Bit Port Size | 9-22 |
| 9-16 | Basic Flow Diagram of a Burst Write Cycle | 9-23 |
| 9-17 | Burst-Write Cycle, 32-Bit Port Size, Zero Wait States | 9-24 |
| 9-18 | Burst-Inhibit Cycle, 32-Bit Port Size (Emulated Burst) | 9-25 |
| 9-19 | Non-Wrap Burst with Three Beats | 9-26 |
| 9-20 | Non-Wrap Burst with One Data Beat | 9-27 |
| 9-21 | Internal Operand Representation | 9-28 |
| 9-22 | Interface To Different Port Size Devices | 9-29 |
| 9-23 | Bus Arbitration Flowchart | 9-31 |
| 9-24 | Masters Signals Basic Connection | 9-32 |
| 9-25 | Bus Arbitration Timing Diagram | 9-33 |
| 9-26 | Internal Bus Arbitration State Machine | 9-35 |
| 9-27 | Termination Signals Protocol Basic Connection | 9-39 |
| 9-28 | Termination Signals Protocol Timing Diagram | 9-40 |
| 9-29 | Reservation On Local Bus | 9-41 |
| 9-30 | Reservation On Multilevel Bus Hierarchy | 9-42 |
| 9-31 | Retry Transfer Timing—Internal Arbiter | 9-44 |
| 9-32 | Retry Transfer Timing—External Arbiter | 9-45 |
| 9-33 | Retry On Burst Cycle | 9-46 |
| 9-34 | Basic Flow of an External Master Read Access | 9-48 |
| 9-35 | Basic Flow of an External Master Write Access | 9-49 |
| 9-36 | Peripheral Mode: External Master Reads from MPC555 — Two Wait States | 9-50 |
| 9-37 | Peripheral Mode: External Master Writes to MPC555; Two Wait States | 9-51 |
| 9-38 | Flow of Retry of External Master Read Access | 9-53 |
| 9-39 | Retry of External Master Access (Internal Arbiter) | 9-54 |
| 9-40 | Instruction Show Cycle Transaction | 9-55 |
| 9-41 | Data Show Cycle Transaction | 9-56 |
| | | |
| 10-1 | Memory Controller Function within the USIU | 10-1 |
| 10-2 | Memory Controller Block Diagram | 10-2 |
| 10-3 | MPC555 Simple System Configuration | 10-3 |
| 10-4 | Bank Base Address and Match Structure | 10-4 |
| 10-5 | MPC555 GPCM—Memory Devices Interface | 10-7 |
| 10-6 | Memory Devices Interface Basic Timing (ACS = 00,TRLX = 0) | 10-8 |
| 10-7 | Peripheral Devices Interface | 10-9 |
| 10-8 | Peripheral Devices Basic Timing (ACS = 11,TRLX = 0) | 10-9 |
| 10-9 | Relaxed Timing—Read Access (ACS = 11, SCY = 1, TRLX = 1) | 10-11 |
| 10-10 | Relaxed Timing—Write Access (ACS = 10, SCY = 0, CSNT = 0, TRLX = 1) | 10-12 |
| 10-11 | Relaxed Timing—Write Access (ACS = 11, SCY = 0, CSNT = 1, TRLX = 1) | 10-13 |



**Paragraph
Number**

**Page
Number**



| | | |
|-------|--|-------|
| 10-12 | Relaxed Timing–Write Access (ACS = 00, SCY = 0, CSNT = 1, TRLX = 1 | 10-14 |
| 10-13 | Consecutive Accesses (Write After Read, EHTR = 0) | 10-15 |
| 10-14 | Consecutive Accesses (Write After Read, EHTR = 1) | 10-16 |
| 10-15 | Consecutive Accesses (Read After Read From Different Banks, EHTR = 1) | 10-17 |
| 10-16 | Consecutive Accesses (Read After Read From Same Bank, EHTR = 1) | 10-18 |
| 10-17 | Aliasing Phenomena Illustration | 10-23 |
| 10-18 | Synchronous External Master Configuration For GPCM–Handled Memory Devices | 10-25 |
| 10-19 | Synchronous External Master Basic Access (GPCM controlled) | 10-26 |
| | | |
| 11-1 | L2U Bus Interface Block Diagram | 11-2 |
| 11-2 | DMP Basic Functional Diagram | 11-4 |
| 11-3 | Region Base Address Example | 11-6 |
| | | |
| 12-1 | UIMB Interface Module Block Diagram | 12-2 |
| 12-2 | IMB Clock – Full-Speed IMB Bus | 12-2 |
| 12-3 | IMB Clock – Half-Speed IMB Bus | 12-3 |
| 12-4 | Interrupt Synchronizer Signal Flow | 12-4 |
| 12-5 | Time-Multiplexing Protocol for IRQ pins | 12-5 |
| 12-6 | Interrupt Synchronizer Block diagram | 12-6 |
| | | |
| 13-1 | QADC64 Block Diagram | 13-1 |
| 13-2 | QADC64 Input and Output Signals | 13-3 |
| 13-3 | Example of External Multiplexing | 13-10 |
| 13-4 | QADC64 Module Block Diagram | 13-11 |
| 13-5 | Conversion Timing | 13-12 |
| 13-6 | Bypass Mode Conversion Timing | 13-13 |
| 13-7 | QADC64 Queue Operation with Pause | 13-15 |
| 13-8 | QADC64 Clock Subsystem Functions | 13-25 |
| 13-9 | QADC64 Clock Programmability Examples | 13-27 |
| 13-10 | QADC64 Interrupt Flow Diagram | 13-29 |
| 13-11 | Interrupt levels on IRQ with ILBS | 13-30 |
| 13-12 | QADC64 Conversion Queue Operation | 13-43 |
| | | |
| 14-1 | QSMCM Block Diagram | 14-2 |
| 14-2 | QSMCM Interrupt Levels | 14-6 |
| 14-3 | QSPI Interrupt Generation | 14-7 |
| 14-4 | QSPI Block Diagram | 14-14 |
| 14-5 | QSPI RAM | 14-22 |
| 14-6 | Flowchart of QSPI Initialization Operation | 14-27 |
| 14-7 | Flowchart of QSPI Master Operation (Part 1) | 14-28 |
| 14-8 | Flowchart of QSPI Master Operation (Part 2) | 14-29 |
| 14-9 | Flowchart of QSPI Master Operation (Part 3) | 14-30 |

| Paragraph Number | | Page Number |
|-----------------------------|---|------------------------|
| 14-10 | Flowchart of QSPI Slave Operation (Part 1) | 14-31 |
| 14-11 | Flowchart of QSPI Slave Operation (Part 2) | 14-32 |
| 14-12 | SCI Transmitter Block Diagram | 14-42 |
| 14-13 | SCI Receiver Block Diagram | 14-43 |
| 14-14 | Start Search Example | 14-57 |
| 14-15 | Queue Transmitter Block Enhancements | 14-63 |
| 14-16 | Queue Transmit Flow | 14-65 |
| 14-17 | Queue Transmit Software Flow | 14-66 |
| 14-18 | Queue Transmit Example for 17 Data Bytes | 14-67 |
| 14-19 | Queue Transmit Example for 25 Data Frames | 14-68 |
| 14-20 | Queue Receiver Block Enhancements | 14-69 |
| 14-21 | Queue Receive Flow | 14-72 |
| 14-22 | Queue Receive Software Flow | 14-73 |
| 14-23 | Queue Receive Example for 17 Data Bytes | 14-74 |
| | | |
| 15-1 | MIOS1 Block Diagram | 15-5 |
| 15-2 | MIOS1 Memory Map | 15-7 |
| 15-3 | MCPSM Block Diagram | 15-12 |
| 15-4 | MMCSM Block Diagram | 15-15 |
| 15-5 | MDASM Block Diagram | 15-20 |
| 15-6 | MPWMSM Block Diagram | 15-27 |
| 15-7 | MPIOSM One-Bit Block Diagram | 15-32 |
| 15-8 | MIOS Interrupt Structure | 15-34 |
| 15-9 | MIOS1 Example: Double Capture Pulse Width Measurement | 15-41 |
| 15-10 | MIOS1 Example: Double Capture Period Measurement | 15-42 |
| 15-11 | MIOS1 Example: Double Edge Output Compare | 15-43 |
| 15-12 | MIOS1 Example: Pulse Width Modulation Output | 15-45 |
| | | |
| 16-1 | TouCAN Block Diagram | 16-1 |
| 16-2 | Typical CAN Network | 16-3 |
| 16-3 | Extended ID Message Buffer Structure | 16-4 |
| 16-4 | Standard ID Message Buffer Structure | 16-4 |
| 16-5 | Interrupt levels on IRQ with ILBS | 16-19 |
| 16-6 | TouCAN Message Buffer Memory Map | 16-22 |
| | | |
| 17-1 | TPU3 Block Diagram | 17-1 |
| 17-2 | TPU3 Interrupt Levels | 17-5 |
| 17-3 | TCR1 Prescaler Control | 17-7 |
| 17-4 | TCR2 Prescaler Control | 17-8 |
| | | |
| 18-1 | DPTRAM Configuration | 18-2 |
| 18-2 | DPTRAM Memory Map | 18-3 |
| | | |
| 19-1 | CMF Array and Control Register Addressing | 19-4 |
| 19-2 | Shadow Information | 19-15 |
| 19-3 | Program State Diagram | 19-19 |



| Paragraph Number | | Page Number |
|-----------------------------|---|------------------------|
| 19-4 | Erase State Diagram | 19-23 |
| 19-5 | Pulse Status Timing | 19-25 |
| 19-6 | Censorship States and Transitions | 19-33 |
| 19-7 | EPEE Digital Filter and Latch | 19-34 |
| 19-8 | CMF_EPEE Timing Diagram | 19-35 |
| 19-9 | VPP and VDDL Power Switching | 19-36 |
| 19-10 | VPP Conditioning Circuit | 19-37 |
| | | |
| 20-1 | SRAM Block Diagram | 20-1 |
| 20-2 | SRAM Memory Map | 20-2 |
| | | |
| 21-1 | Watchpoints and Breakpoint Support in the CPU | 21-10 |
| 21-2 | Partially Supported Watchpoint/Breakpoint Example | 21-15 |
| 21-3 | Instruction Support General Structure | 21-17 |
| 21-4 | Load/Store Support General Structure | 21-20 |
| 21-5 | Functional Diagram of MPC555 Debug Mode Support | 21-23 |
| 21-6 | Debug Mode Logic | 21-25 |
| 21-7 | Debug Mode Reset Configuration | 21-27 |
| 21-8 | Asynchronous Clock Serial Communications | 21-35 |
| 21-9 | Synchronous Self Clock Serial Communication | 21-36 |
| 21-10 | Enabling Clock Mode Following Reset | 21-37 |
| 21-11 | Download Procedure Code Example | 21-42 |
| 21-12 | Slow Download Procedure Loop | 21-42 |
| 21-13 | Fast Download Procedure Loop | 21-42 |
| | | |
| 22-1 | JTAG Pins | 22-1 |
| 22-2 | Test Logic Block Diagram | 22-2 |
| 22-3 | TAP Controller State Machine | 22-4 |
| 22-4 | Bypass Register | 22-6 |
| 22-5 | Output Pin Cell (O.pin) | 22-8 |
| 22-6 | Observe-Only Input Pin Cell (I.Obs) | 22-8 |
| 22-7 | Output Control Cell (IO.CTL) | 22-9 |
| 22-8 | General Arrangement of Bidirectional Pin Cells | 22-9 |
| | | |
| D-1 | TPU3 Memory Map | D-1 |
| D-2 | PTA Parameters | D-4 |
| D-3 | QOM Parameters | D-6 |
| D-4 | TSM Parameters — Master Mode | D-8 |
| D-5 | TSM Parameters — Slave Mode | D-9 |
| D-6 | FQM Parameters | D-11 |
| D-7 | UART Transmitter Parameters | D-13 |
| D-8 | UART Receiver Parameters | D-14 |
| D-9 | NITC Parameters | D-16 |
| D-10 | COMM Parameters, Part 1 of 2 | D-18 |
| D-11 | COMM Parameters, Part 2 of 2 | D-19 |
| D-12 | HALLD Parameters | D-20 |



**Paragraph
Number**

**Page
Number**



| | | |
|------|--|------|
| D-13 | MCPWM Parameters — Master Mode | D-22 |
| D-14 | MCPWM Parameters — Slave Edge-Aligned Mode | D-23 |
| D-15 | MCPWM Parameters — Slave Ch A Non-Inverted Center-Aligned Mode ... | D-24 |
| D-16 | MCPWM Parameters — Slave Ch B Non-Inverted Center-Aligned Mode ... | D-25 |
| D-17 | MCPWM Parameters — Slave Ch A Inverted Center-Aligned Mode | D-26 |
| D-18 | MCPWM Parameters — Slave Ch B Inverted Center-Aligned Mode | D-27 |
| D-19 | FQD Parameters — Primary Channel | D-29 |
| D-20 | FQD Parameters — Secondary Channel | D-30 |
| D-21 | PPWA Parameters | D-32 |
| D-22 | OC Parameters | D-34 |
| D-23 | PWM Parameters | D-36 |
| D-24 | DIO Parameters | D-38 |
| D-25 | SPWM Parameters, Part 1 of 2 | D-40 |
| D-26 | SPWM Parameters, Part 2 of 2 | D-41 |
| D-27 | Two Possible SIOF Configurations | D-42 |
| D-28 | SIOF Parameters | D-43 |
| D-29 | SIOF Function Data Transition Example | D-47 |
| | | |
| E-1 | MPC555 Power Distribution Diagram — 3 V | E-2 |
| E-2 | MPC555 Power Distribution Diagram — 5 V, and Analog | E-3 |
| E-3 | Crystal Oscillator Circuit | E-4 |
| E-4 | RC Filter Example | E-5 |
| E-5 | Bypass Capacitors Example (Alternative) | E-6 |
| E-6 | RC Filter Example | E-6 |
| E-7 | LC Filter Example (Alternative) | E-7 |
| E-8 | PLL Off-Chip Capacitor Example | E-7 |
| | | |
| G-1 | Typical Program Time vs. V_{PP} and Temperature (for CDR1 “Target” Process) | G-13 |
| G-2 | CLKOUT Timing | G-15 |
| G-3 | External Clock Timing | G-22 |
| G-4 | Synchronous Output Signals Timing | G-23 |
| G-5 | Synchronous Active Pull-up And Open Drain Outputs Signals Timing | G-24 |
| G-6 | Synchronous Input Signals Timing | G-25 |
| G-7 | Input Data Timing in Normal Case | G-26 |
| G-8 | External Bus Read Timing (GPCM Controlled — ACS = ‘00’) | G-27 |
| G-9 | External Bus Read Timing (GPCM Controlled — TRLX = ‘0’ ACS = ‘10’) .. | G-28 |
| G-10 | External Bus Read Timing (GPCM Controlled — TRLX = ‘0’ ACS = ‘11’) .. | G-29 |
| G-11 | External Bus Read Timing (GPCM Controlled — TRLX = ‘1’, ACS = ‘10’, ACS = ‘11’) | G-30 |
| G-12 | Address Show Cycle Bus Timing | G-31 |
| G-13 | Address and Data Show Cycle Bus Timing | G-32 |
| G-14 | External Bus Write Timing (GPCM Controlled — TRLX = ‘0’, CSNT = ‘0’) . | G-33 |
| G-15 | . External Bus Write Timing (GPCM Controlled — TRLX = ‘0’, CSNT = ‘1’) G-34 | |
| G-16 | External Bus Write Timing (GPCM Controlled — TRLX = ‘1’, CSNT = ‘1’) . | G-35 |
| G-17 | External Master Read from Internal Registers Timing | G-36 |

| Paragraph Number | | Page Number |
|-----------------------------|--|------------------------|
| G-18 | External Master Write to Internal Registers Timing | G-37 |
| G-19 | Interrupt Detection Timing for External Level Sensitive Lines | G-38 |
| G-20 | Interrupt Detection Timing for External Edge Sensitive Lines | G-39 |
| G-21 | Debug Port Clock Input Timing | G-40 |
| G-22 | Debug Port Timings | G-41 |
| G-23 | Reset Timing — Configuration from Data Bus | G-43 |
| G-24 | Reset Timing — Data Bus Weak Drive during Configuration | G-44 |
| G-25 | Reset Timing — Debug Port Configuration | G-45 |
| G-26 | JTAG Test Clock Input Timing | G-47 |
| G-27 | JTAG-Test Access Port Timing Diagram | G-48 |
| G-28 | JTAG-TRST Timing Diagram | G-49 |
| G-29 | Boundary Scan (JTAG) Timing Diagram | G-50 |
| G-30 | QSPI Timing — Master, CPHA = 0 | G-54 |
| G-31 | QSPI Timing — Master, CPHA = 1 | G-54 |
| G-32 | QSPI Timing — Slave, CPHA = 0 | G-55 |
| G-33 | QSPI Timing — Slave, CPHA = 1 | G-55 |
| G-34 | TPU3 Timing | G-57 |
| G-35 | MCPSM Enable to vs_pclk Pulse Timing Diagram | G-58 |
| G-36 | MPWMSM Minimum Output Pulse Example Timing Diagram | G-59 |
| G-37 | MCPSM Enable to MPWMO Output Pin Rising Edge Timing Diagram | G-60 |
| G-38 | MPWMSM Enable to MPWMO Output Pin Rising Edge Timing Diagram ... | G-60 |
| G-39 | MPWMSM Interrupt Flag to MPWMO Output Pin Falling Edge Timing Diagram | G-61 |
| G-40 | MMCSM Minimum Input Pin (Either Load or Clock) Timing Diagram | G-62 |
| G-41 | MMCSM Clock Pin to Counter Bus Increment Timing Diagram | G-62 |
| G-42 | MMCSM Load Pin to Counter Bus Reload Timing Diagram | G-62 |
| G-43 | MMCSM Counter Bus Reload to Interrupt Flag Setting Timing Diagram | G-63 |
| G-44 | MMCSM Prescaler Clock Select to Counter Bus Increment Timing Diagram | G-63 |
| G-45 | MDASM Minimum Input Pin Timing Diagram | G-64 |
| G-46 | MDASM Input Pin to Counter Bus Capture Timing Diagram | G-65 |
| G-47 | MDASM Input Pin to MDASM interrupt Flag Timing Diagram | G-65 |
| G-48 | MDASM Minimum Output Pulse Width Timing Diagram | G-65 |
| G-49 | Counter Bus to MDASM Output Pin Change Timing Diagram | G-66 |
| G-50 | Counter Bus to MDASM Interrupt Flag Setting Timing Diagram | G-66 |
| G-51 | MPIO SM Input Pin to MPIO SM_DR (Data Register) Timing Diagram | G-67 |

