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Overview	1
Signal Descriptions	2
ColdFire Core	3
Enhanced Multiply-Accumulate Unit (EMAC)	4
Memory Management Unit (MMU)	5
Floating-Point Unit (FPU)	6
Local Memory	7
Debug Support	8
System Integration Unit (SIU)	9
Internal Clocks and Bus Architecture	10
General Purpose Timers (GPT)	11
Slice Timers (SLT)	12
Interrupt Controller (INTC)	13
Edge Port Module (EPORT)	14
General Purpose I/O (GPIO)	15
System SRAM	16
FlexBus	17
SDRAM Controller (SDRAMC)	18
PCI Bus Controller (PCI)	19
PCI Bus Arbiter (PCIARB)	20
FlexCAN	21
Integrated Security Engine (SEC)	22
IEEE 1149.1 Test Access Port (JTAG)	23
Multichannel DMA (MCD)	24
Comm Bus FIFO Interface	25
Comm Timer Module (CTM)	26
Programmable Serial Controller (PSC)	27
DMA Serial Peripheral Interface (DSPI)	28
I ² C Interface	29
USB 2.0 Device Controller	30
Fast Ethernet Controller (FEC)	31
Mechanical Data	32
Register Memory Map Quick Reference	A
Index	IND

1	Overview
2	Signal Descriptions
3	ColdFire Core
4	Enhanced Multiply-Accumulate Unit (EMAC)
5	Memory Management Unit (MMU)
6	Floating-Point Unit (FPU)
7	Local Memory
8	Debug Support
9	System Integration Unit (SIU)
10	Internal Clocks and Bus Architecture
11	General Purpose Timers (GPT)
12	Slice Timers (SLT)
13	Interrupt Controller (INTC)
14	Edge Port Module (EPORT)
15	General Purpose I/O (GPIO)
16	System SRAM
17	FlexBus
18	SDRAM Controller (SDRAMC)
19	PCI Bus Controller (PCI)
20	PCI Bus Arbiter (PCIARB)
21	FlexCAN
22	Integrated Security Engine (SEC)
23	IEEE 1149.1 Test Access Port (JTAG)
24	Multichannel DMA (MCD)
25	Comm Bus FIFO Interface
26	Comm Timer Module (CTM)
27	Programmable Serial Controller (PSC)
28	DMA Serial Peripheral Interface (DSPI)
29	I ² C Interface
30	USB 2.0 Device Controller
31	Fast Ethernet Controller (FEC)
32	Mechanical Data
A	Register Memory Map Quick Reference
IND	Index

Chapter 1 Overview

1.1	MCF548x Family Overview	1-1
1.2	MCF548x Block Diagram	1-2
1.3	MCF548x Family Products	1-3
1.4	MCF548x Family Features	1-3
1.4.1	ColdFire V4e Core Overview	1-5
1.4.2	Debug Module (BDM)	1-6
1.4.3	JTAG	1-6
1.4.4	On-Chip Memories	1-7
1.4.5	PLL and Chip Clocking Options	1-7
1.4.6	Communications I/O Subsystem	1-8
1.4.7	DDR SDRAM Memory Controller	1-10
1.4.8	Peripheral Component Interconnect (PCI)	1-10
1.4.9	Flexible Local Bus (FlexBus)	1-10
1.4.10	Security Encryption Controller (SEC)	1-11
1.4.11	System Integration Unit (SIU)	1-11

Chapter 2 Signal Descriptions

2.1	Introduction	2-1
2.1.1	Block Diagram	2-1
2.2	MCF548x External Signals	2-16
2.2.1	FlexBus Signals	2-16
2.2.2	SDRAM Controller Signals	2-18
2.2.3	PCI Controller Signals	2-19
2.2.4	Interrupt Control Signals	2-21
2.2.5	Clock and Reset Signals	2-21
2.2.6	Reset Configuration Pins	2-22
2.2.7	Ethernet Module Signals	2-24
2.2.8	Universal Serial Bus (USB)	2-26
2.2.9	DMA Serial Peripheral Interface (DSPI) Signals	2-26
2.2.10	FlexCAN Signals	2-27
2.2.11	I ² C I/O Signals	2-27
2.2.12	PSC Module Signals	2-28
2.2.13	DMA Controller Module Signals	2-28
2.2.14	Timer Module Signals	2-28
2.2.15	Debug Support Signals	2-29
2.2.16	Test Signals	2-30
2.2.17	Power and Reference Pins	2-30

Chapter 3 ColdFire Core

3.1	Core Overview	3-1
3.2	Features	3-1
	3.2.1 Enhanced Pipelines	3-2
	3.2.2 Debug Module Enhancements	3-6
3.3	Programming Model	3-7
	3.3.1 User Programming Model	3-9
	3.3.2 User Stack Pointer (A7)	3-9
	3.3.3 EMAC Programming Model	3-10
	3.3.4 FPU Programming Model	3-10
	3.3.5 Supervisor Programming Model	3-11
	3.3.6 Programming Model Table	3-13
3.4	Data Format Summary	3-15
	3.4.1 Data Organization in Registers	3-15
	3.4.2 EMAC Data Representation	3-17
3.5	Addressing Mode Summary	3-18
3.6	Instruction Set Summary	3-19
	3.6.1 Additions to the Instruction Set Architecture	3-19
	3.6.2 Instruction Set Summary	3-22
3.7	Instruction Execution Timing	3-27
	3.7.1 MOVE Instruction Execution Timing	3-28
	3.7.2 One-Operand Instruction Execution Timing	3-30
	3.7.3 Two-Operand Instruction Execution Timing	3-31
	3.7.4 Miscellaneous Instruction Execution Timing	3-32
	3.7.5 Branch Instruction Execution Timing	3-33
	3.7.6 EMAC Instruction Execution Times	3-34
	3.7.7 FPU Instruction Execution Times	3-35
3.8	Exception Processing Overview	3-36
	3.8.1 Exception Stack Frame Definition	3-38
	3.8.2 Processor Exceptions	3-39
3.9	Precise Faults	3-42

Chapter 4 Enhanced Multiply-Accumulate Unit (EMAC)

4.1	Introduction	4-1
	4.1.1 MAC Overview	4-2
	4.1.2 General Operation	4-2
4.2	Memory Map/Register Definition	4-5
	4.2.1 MAC Status Register (MACSR)	4-5
	4.2.2 Mask Register (MASK)	4-10
4.3	EMAC Instruction Set Summary	4-11
	4.3.1 EMAC Instruction Execution Timing	4-11
	4.3.2 Data Representation	4-12
	4.3.3 EMAC Opcodes	4-13

Chapter 5 Memory Management Unit (MMU)

5.1	Features	5-1
5.2	Virtual Memory Management Architecture	5-1
	5.2.1 MMU Architecture Features	5-1
	5.2.2 MMU Architecture Location	5-2
	5.2.3 MMU Architecture Implementation	5-3
5.3	Debugging in a Virtual Environment	5-7
5.4	Virtual Memory Architecture Processor Support	5-7
	5.4.1 Precise Faults	5-7
	5.4.2 Supervisor/User Stack Pointers	5-7
	5.4.3 Access Error Stack Frame Additions	5-8
5.5	MMU Definition	5-9
	5.5.1 Effective Address Attribute Determination	5-9
	5.5.2 MMU Functionality	5-10
	5.5.3 MMU Organization	5-10
	5.5.4 MMU TLB	5-18
	5.5.5 MMU Operation	5-19
5.6	MMU Implementation	5-20
	5.6.1 TLB Address Fields	5-20
	5.6.2 TLB Replacement Algorithm	5-21
	5.6.3 TLB Locked Entries	5-22
5.7	MMU Instructions	5-23

Chapter 6 Floating-Point Unit (FPU)

6.1	Introduction	6-1
	6.1.1 Overview	6-1
6.2	Operand Data Formats and Types	6-3
	6.2.1 Signed-Integer Data Formats	6-3
	6.2.2 Floating-Point Data Formats	6-3
	6.2.3 Floating-Point Data Types	6-4
6.3	Register Definition	6-7
	6.3.1 Floating-Point Data Registers (FP0–FP7)	6-7
	6.3.2 Floating-Point Control Register (FPCR)	6-7
	6.3.3 Floating-Point Status Register (FPSR)	6-9
	6.3.4 Floating-Point Instruction Address Register (FPIAR)	6-10
6.4	Floating-Point Computational Accuracy	6-11
	6.4.1 Intermediate Result	6-11
	6.4.2 Rounding the Result	6-12
6.5	Floating-Point Post-Processing	6-14
	6.5.1 Underflow, Round, and Overflow	6-14
	6.5.2 Conditional Testing	6-15
6.6	Floating-Point Exceptions	6-17
	6.6.1 Floating-Point Arithmetic Exceptions	6-18

6.6.2	Floating-Point State Frames	6-23
6.7	Instructions	6-25
6.7.1	Floating-Point Instruction Overview	6-25
6.7.2	Floating-Point Instruction Execution Timing	6-27
6.7.3	Key Differences between ColdFire and M68000 FPU Programming Models	6-28

Chapter 7 Local Memory

7.1	Interactions between Local Memory Modules	7-1
7.2	SRAM Overview	7-1
7.3	SRAM Operation	7-2
7.4	SRAM Register Definition	7-2
7.4.1	SRAM Base Address Registers (RAMBAR0/RAMBAR1)	7-2
7.5	SRAM Initialization	7-4
7.5.1	SRAM Initialization Code	7-5
7.6	Power Management	7-6
7.7	Cache Overview	7-6
7.8	Cache Organization	7-7
7.8.1	Cache Line States: Invalid, Valid-Unmodified, and Valid-Modified	7-8
7.8.2	The Cache at Start-Up	7-8
7.9	Cache Operation	7-10
7.9.1	Caching Modes	7-12
7.9.2	Cache Protocol	7-14
7.9.3	Cache Coherency (Data Cache Only)	7-15
7.9.4	Memory Accesses for Cache Maintenance	7-15
7.9.5	Cache Locking	7-17
7.10	Cache Register Definition	7-19
7.10.1	Cache Control Register (CACR)	7-19
7.10.2	Access Control Registers (ACR0–ACR3)	7-22
7.11	Cache Management	7-23
7.12	Cache Operation Summary	7-26
7.12.1	Instruction Cache State Transitions	7-26
7.12.2	Data Cache State Transitions	7-27
7.13	Cache Initialization Code	7-30

Chapter 8 Debug Support

8.1	Introduction	8-1
8.1.1	Overview	8-1
8.2	Signal Descriptions	8-2
8.2.1	Processor Status/Debug Data (PSTDDATA[7:0])	8-3
8.3	Real-Time Trace Support	8-5
8.3.1	Begin Execution of Taken Branch (PST = 0x5)	8-6
8.3.2	Processor Stopped or Breakpoint State Change (PST = 0xE)	8-7
8.3.3	Processor Halted (PST = 0xF)	8-8

8.4	Memory Map/Register Definition	8-9
8.4.1	Revision A Shared Debug Resources	8-11
8.4.2	Configuration/Status Register (CSR)	8-11
8.4.3	PC Breakpoint ASID Control Register (PBAC)	8-14
8.4.4	BDM Address Attribute Register (BAAR)	8-15
8.4.5	Address Attribute Trigger Registers (AATR, AATR1)	8-16
8.4.6	Trigger Definition Register (TDR)	8-17
8.4.7	Program Counter Breakpoint and Mask Registers (PBR _n , PBMR)	8-20
8.4.8	Address Breakpoint Registers (ABLR/ABLR1, ABHR/ABHR1)	8-21
8.4.9	Data Breakpoint and Mask Registers (DBR/DBR1, DBMR/DBMR1)	8-22
8.4.10	PC Breakpoint ASID Register (PBASID)	8-24
8.4.11	Extended Trigger Definition Register (XTDR)	8-25
8.5	Background Debug Mode (BDM)	8-28
8.5.1	CPU Halt	8-28
8.5.2	BDM Serial Interface	8-30
8.5.3	BDM Command Set	8-31
8.6	Real-Time Debug Support	8-51
8.6.1	Theory of Operation	8-51
8.6.2	Concurrent BDM and Processor Operation	8-54
8.7	Debug C Definition of PSTDDATA Outputs	8-54
8.7.1	User Instruction Set	8-54
8.7.2	Supervisor Instruction Set	8-60
8.8	ColdFire Debug History	8-61
8.8.1	ColdFire Debug Classic: The Original Definition	8-61
8.8.2	ColdFire Debug Revision B	8-62
8.8.3	ColdFire Debug Revision C	8-62
8.9	Freescale-Recommended BDM Pinout	8-63

Chapter 9 System Integration Unit (SIU)

9.1	Introduction	9-1
9.2	Features	9-1
9.3	Memory Map/Register Definition	9-1
9.3.1	Module Base Address Register (MBAR)	9-2

Chapter 10 Internal Clocks and Bus Architecture

10.1	Introduction	10-1
10.1.1	Block Diagram	10-1
10.1.2	Clocking Overview	10-2
10.1.3	Internal Bus Overview	10-2
10.1.4	XL Bus Features	10-3
10.1.5	Internal Bus Transaction Summaries	10-3
10.1.6	XL Bus Interface Operations	10-3
10.2	PLL	10-5

10.2.1	PLL Memory Map/Register Descriptions	10-5
10.2.2	System PLL Control Register (SPCR)	10-5
10.3	XL Bus Arbiter	10-6
10.3.1	Features	10-6
10.3.2	Arbiter Functional Description	10-6
10.3.3	XLB Arbiter Register Descriptions	10-8

Chapter 11 General Purpose Timers (GPT)

11.1	Introduction	11-1
11.1.1	Overview	11-1
11.1.2	Modes of Operation	11-1
11.2	External Signals	11-2
11.3	Memory Map/Register Definition	11-2
11.3.1	GPT Enable and Mode Select Register (GMSn)	11-3
11.3.2	GPT Counter Input Register (GCIRn)	11-5
11.3.3	GPT PWM Configuration Register (GPWMn)	11-6
11.3.4	GPT Status Register (GSRn)	11-7
11.4	Functional Description	11-8
11.4.1	Timer Configuration Method	11-8
11.4.2	Programming Notes	11-8

Chapter 12 Slice Timers (SLT)

12.1	Introduction	12-1
12.1.1	Overview	12-1
12.2	Memory Map/Register Definition	12-1
12.2.1	SLT Terminal Count Register (STCNTn)	12-2
12.2.2	SLT Control Register (SCRn)	12-2
12.2.3	SLT Timer Count Register (SCNTn)	12-3
12.2.4	SLT Status Register (SSRn)	12-4

Chapter 13 Interrupt Controller

13.1	Introduction	13-1
13.1.1	68K/ColdFire Interrupt Architecture Overview	13-1
13.2	Memory Map/Register Descriptions	13-4
13.2.1	Register Descriptions	13-6

Chapter 14 Edge Port Module (EPORT)

14.1	Introduction	14-1
14.2	Interrupt/General-Purpose I/O Pin Descriptions	14-1
14.3	Memory Map/Register Definition	14-2
14.3.1	Memory Map	14-2

14.3.2	Register Descriptions	14-2
--------	-----------------------------	------

Chapter 15 GPIO

15.1	Introduction	15-1
15.1.1	Overview	15-2
15.1.2	Features	15-3
15.2	External Pin Description	15-3
15.3	Memory Map/Register Definition	15-7
15.3.1	Register Overview	15-7
15.3.2	Register Descriptions	15-8
15.4	Functional Description	15-32
15.4.1	Overview	15-32

Chapter 16 32-Kbyte System SRAM

16.1	Introduction	16-1
16.1.1	Block Diagram	16-1
16.1.2	Features	16-2
16.1.3	Overview	16-2
16.2	Memory Map/Register Definition	16-2
16.2.1	System SRAM Configuration Register (SSCR)	16-3
16.2.2	Transfer Count Configuration Register (TCCR)	16-4
16.2.3	Transfer Count Configuration Register—DMA Read Channel (TCCRDR)	16-5
16.2.4	Transfer Count Configuration Register—DMA Write Channel (TCCRDW)	16-6
16.2.5	Transfer Count Configuration Register—SEC (TCCRSEC)	16-7
16.3	Functional Description	16-8

Chapter 17 FlexBus

17.1	Introduction	17-1
17.1.1	Overview	17-1
17.1.2	Features	17-1
17.1.3	Modes of Operation	17-1
17.2	Byte Lanes	17-2
17.3	Address Latch	17-2
17.4	External Signals	17-3
17.4.1	Chip-Select ($\overline{\text{FBCS}}[5:0]$)	17-4
17.4.2	Address/Data Bus (AD[31:0])	17-4
17.4.3	Address Latch Enable (ALE)	17-4
17.4.4	Read/Write ($\overline{\text{R/W}}$)	17-4
17.4.5	Transfer Burst ($\overline{\text{TBST}}$)	17-4
17.4.6	Transfer Size (TSIZ[1:0])	17-4
17.4.7	Byte Selects ($\overline{\text{BE/BWE}}[3:0]$)	17-5
17.4.8	Output Enable ($\overline{\text{OE}}$)	17-5

17.4.9	Transfer Acknowledge ($\overline{\text{TA}}$)	17-5
17.5	Chip-Select Operation	17-6
17.5.1	General Chip-Select Operation	17-6
17.5.2	Chip-Select Registers	17-7
17.6	Functional Description	17-12
17.6.1	Data Transfer Operation	17-12
17.6.2	Data Byte Alignment and Physical Connections	17-12
17.6.3	Address/Data Bus Multiplexing	17-13
17.6.4	Bus Cycle Execution	17-13
17.6.5	FlexBus Timing Examples	17-15
17.6.6	Burst Cycles	17-26
17.6.7	Misaligned Operands	17-31
17.6.8	Bus Errors	17-32

Chapter 18 SDRAM Controller (SDRAMC)

18.1	Introduction	18-1
18.2	Overview	18-1
18.2.1	Features	18-1
18.2.2	Terminology	18-1
18.2.3	Block Diagram	18-2
18.3	External Signal Description	18-2
18.3.1	SDRAM Data Bus (SDDATA[31:0])	18-2
18.3.2	SDRAM Address Bus (SDADDR[12:0])	18-2
18.3.3	SDRAM Bank Addresses (SDBA[1:0])	18-2
18.3.4	SDRAM Row Address Strobe ($\overline{\text{RAS}}$)	18-3
18.3.5	SDRAM Column Address Strobe ($\overline{\text{CAS}}$)	18-3
18.3.6	SDRAM Chip Selects (SDCS[3:0])	18-3
18.3.7	SDRAM Write Data Byte Mask (SDDM[3:0])	18-3
18.3.8	SDRAM Data Strobe (SDDQS[3:0])	18-3
18.3.9	SDRAM Clock (SDCLK[1:0])	18-3
18.3.10	Inverted SDRAM Clock ($\overline{\text{SDCLK}}$ [1:0])	18-3
18.3.11	SDRAM Write Enable ($\overline{\text{SDWE}}$)	18-3
18.3.12	SDRAM Clock Enable (SDCKE)	18-4
18.3.13	SDR SDRAM Data Strobe (SDRDQS)	18-4
18.3.14	SDRAM Memory Supply (SDVDD)	18-4
18.3.15	SDRAM Reference Voltage (VREF)	18-4
18.4	Interface Recommendations	18-4
18.4.1	Supported Memory Configurations	18-4
18.4.2	SDRAM SDR Connections	18-6
18.4.3	SDRAM DDR Component Connections	18-6
18.4.4	SDRAM DDR DIMM Connections	18-7
18.4.5	DDR SDRAM Layout Considerations	18-8
18.5	SDRAM Overview	18-9
18.5.1	SDRAM Commands	18-9

18.5.2	Power-Up Initialization	18-13
18.6	Functional Overview	18-15
18.6.1	Page Management	18-15
18.6.2	Transfer Size	18-15
18.7	Memory Map/Register Definition	18-16
18.7.1	SDRAM Drive Strength Register (SDRAMDS)	18-17
18.7.2	SDRAM Chip Select Configuration Registers (CSnCFG)	18-18
18.7.3	SDRAM Mode/Extended Mode Register (SDMR)	18-19
18.7.4	SDRAM Control Register (SDCR)	18-20
18.7.5	SDRAM Configuration Register 1 (SDCFG1)	18-21
18.7.6	SDRAM Configuration Register 2 (SDCFG2)	18-23
18.8	SDRAM Example	18-24
18.8.1	SDRAM Signal Drive Strength Settings	18-25
18.8.2	SDRAM Chip Select Settings	18-25
18.8.3	SDRAM Configuration 1 Register Settings	18-26
18.8.4	SDRAM Configuration 2 Register Settings	18-27
18.8.5	SDRAM Control Register Settings and PALL command	18-27
18.8.6	Set the Extended Mode Register	18-29
18.8.7	Set the Mode Register and Reset DLL	18-29
18.8.8	Issue a PALL command	18-30
18.8.9	Perform Two Refresh Cycles	18-31
18.8.10	Clear the Reset DLL Bit in the Mode Register	18-32
18.8.11	Enable Automatic Refresh and Lock Mode Register	18-33
18.8.12	Initialization Code	18-34

Chapter 19 PCI Bus Controller

19.1	Introduction	19-1
19.1.1	Block Diagram	19-1
19.1.2	Overview	19-1
19.1.3	Features	19-1
19.2	External Signal Description	19-2
19.2.1	Address/Data Bus (PCIAD[31:0])	19-2
19.2.2	Command/Byte Enables (PCICXBE[3:0])	19-2
19.2.3	Device Select (PCIDEVSEL)	19-3
19.2.4	Frame (PCIFRAME)	19-3
19.2.5	Initialization Device Select (PCIIDSEL)	19-3
19.2.6	Initiator Ready (PCIIRDY)	19-3
19.2.7	Parity (PCIPAR)	19-3
19.2.8	PCI Clock (CLKIN)	19-3
19.2.9	Parity Error (PCIPERR)	19-3
19.2.10	Reset (PCIRESET)	19-3
19.2.11	System Error (PCISERR)	19-3
19.2.12	Stop (PCISTOP)	19-3
19.2.13	Target Ready (PCITRDY)	19-4

19.3	Memory Map/Register Definition	19-4
19.3.1	PCI Type 0 Configuration Registers	19-6
19.3.2	General Control/Status Registers	19-13
19.3.3	Communication Subsystem Interface Registers	19-23
19.4	Functional Description	19-48
19.4.1	PCI Bus Protocol	19-48
19.4.2	Initiator Arbitration	19-55
19.4.3	Configuration Interface	19-56
19.4.4	XL Bus Initiator Interface	19-56
19.4.5	XL Bus Target Interface	19-63
19.4.6	Communication Subsystem Initiator Interface	19-66
19.4.7	PCI Clock Scheme	19-70
19.4.8	Interrupts	19-70
19.5	Application Information	19-70
19.5.1	XL Bus-Initiated Transaction Mapping	19-70
19.5.2	Address Maps	19-71
19.6	XL Bus Arbitration Priority	19-75

Chapter 20 PCI Bus Arbiter Module

20.1	Introduction	20-1
20.1.1	Block Diagram	20-1
20.1.2	Overview	20-1
20.1.3	Features	20-2
20.2	External Signal Description	20-2
20.2.1	Frame (PCIFRM)	20-2
20.2.2	Initiator Ready (PCIIRDY)	20-2
20.2.3	PCI Clock (CLKIN)	20-2
20.2.4	External Bus Grant (PCIBG[4:1])	20-2
20.2.5	External Bus Grant/Request Output ($\overline{\text{PCIBG0}}/\overline{\text{PCIREQOUT}}$)	20-3
20.2.6	External Bus Request (PCIBR[4:1])	20-3
20.2.7	External Request/Grant Input ($\overline{\text{PCIBR0}}/\overline{\text{PCIGNTIN}}$)	20-3
20.3	Register Definition	20-3
20.3.1	PCI Arbiter Control Register (PACR)	20-3
20.3.2	PCI Arbiter Status Register (PASR)	20-5
20.4	Functional Description	20-5
20.4.1	External PCI Requests	20-5
20.4.2	Arbitration	20-6
20.4.3	Master Time-Out	20-9
20.5	Reset	20-10
20.6	Interrupts	20-10

Chapter 21 FlexCAN

21.1	Introduction	21-1
------	--------------------	------

21.1.1	Block Diagram	21-1
21.1.2	The CAN System	21-2
21.1.3	Features	21-3
21.1.4	Modes of Operation	21-3
21.2	External Signals	21-5
21.2.1	CANTX[1:0]	21-5
21.2.2	CANRX[1:0]	21-5
21.3	Memory Map/Register Definition	21-5
21.3.1	FlexCAN Memory Map	21-5
21.3.2	Register Descriptions	21-6
21.4	Functional Overview	21-19
21.4.1	Message Buffer Structure	21-19
21.4.2	Message Buffer Memory Map	21-22
21.4.3	Transmit Process	21-23
21.4.4	Arbitration Process	21-24
21.4.5	Receive Process	21-24
21.4.6	Message Buffer Handling	21-25
21.4.7	CAN Protocol Related Frames	21-27
21.4.8	Time Stamp	21-28
21.4.9	Bit Timing	21-28
21.4.10	FlexCAN Error Counters	21-30
21.5	FlexCAN Initialization Sequence	21-31
21.5.1	Interrupts	21-31

Chapter 22 Integrated Security Engine (SEC)

22.1	Features	22-1
22.2	ColdFire Security Architecture	22-1
22.3	Block Diagram	22-2
22.4	Overview	22-2
22.4.1	Bus Interface	22-2
22.4.2	SEC Controller Unit	22-3
22.4.3	Crypto-Channels	22-3
22.4.4	Execution Units (EUs)	22-4
22.5	Memory Map/Register Definition	22-8
22.6	Controller	22-11
22.6.1	EU Access	22-11
22.6.2	Multiple EU Assignment	22-11
22.6.3	Multiple Channels	22-12
22.6.4	Controller Registers	22-12
22.7	Channels	22-18
22.7.1	Crypto-Channel Registers	22-19
22.8	ARC Four Execution Unit (AFEU)	22-28
22.8.1	AFEU Register Map	22-28
22.8.2	AFEU Reset Control Register (AFRCR)	22-28

22.8.3	AFEU Status Register (AFSR)	22-29
22.8.4	AFEU Interrupt Status Register (AFISR)	22-31
22.8.5	AFEU Interrupt Mask Register (AFIMR)	22-32
22.9	Data Encryption Standard Execution Units (DEU)	22-34
22.9.1	DEU Register Map	22-34
22.9.2	DEU Reset Control Register (DRCR)	22-34
22.9.3	DEU Status Register (DSR)	22-35
22.9.4	DEU Interrupt Status Register (DISR)	22-37
22.9.5	DEU Interrupt Mask Register (DIMR)	22-39
22.10	Message Digest Execution Unit (MDEU)	22-40
22.10.1	MDEU Register Map	22-40
22.10.2	MDEU Reset Control Register (MDRCR)	22-41
22.10.3	MDEU Status Register (MDSR)	22-41
22.10.4	MDEU Interrupt Status Register (MDISR)	22-43
22.10.5	MDEU Interrupt Mask Register (MDIMR)	22-44
22.11	RNG Execution Unit (RNG)	22-46
22.11.1	RNG Register Map	22-46
22.11.2	RNG Reset Control Register (RNGRCR)	22-46
22.11.3	RNG Status Register (RNGSR)	22-47
22.11.4	RNG Interrupt Status Register (RNGISR)	22-48
22.11.5	RNG Interrupt Mask Register (RNGIMR)	22-49
22.12	Advanced Encryption Standard Execution Units (AESU)	22-50
22.12.1	AESU Register Map	22-50
22.12.2	AESU Reset Control Register (AESRCR)	22-50
22.12.3	AESU Status Register (AESSR)	22-51
22.12.4	AESU Interrupt Status Register (AESISR)	22-53
22.12.5	AESU Interrupt Mask Register (AESIMR)	22-54
22.13	Descriptors	22-56
22.13.1	Descriptor Structure	22-56
22.13.2	Descriptor Chaining	22-61
22.13.3	Descriptor Type Formats	22-62
22.13.4	Descriptor Classes	22-64
22.14	EU Specific Data Packet Descriptors	22-67
22.14.1	AFEU Mode Options and Data Packet Descriptors	22-67
22.14.2	DEU Mode Options and Data Packet Descriptors	22-72
22.14.3	MDEU Mode Options and Data Packet Descriptors	22-77
22.14.4	RNG Data Packet Descriptors	22-82
22.14.5	AESU Mode Options and Data Packet Descriptors	22-83
22.14.6	Multi-Function Data Packet Descriptors	22-90

Chapter 23

IEEE 1149.1 Test Access Port (JTAG)

23.1	Introduction	23-1
23.1.1	Block Diagram	23-1
23.1.2	Features	23-2

23.1.3	Modes of Operation	23-2
23.2	External Signal Description	23-2
23.2.1	Detailed Signal Description	23-2
23.3	Memory Map/Register Definition	23-4
23.3.1	Memory Map	23-4
23.3.2	Register Descriptions	23-4
23.4	Functional Description	23-6
23.4.1	JTAG Module	23-6
23.4.2	TAP Controller	23-6
23.4.3	JTAG Instructions	23-7
23.5	Initialization/Application Information	23-9
23.5.1	Restrictions	23-9
23.5.2	Nonscan Chain Operation	23-9

Chapter 24 Multichannel DMA

24.1	Introduction	24-1
24.1.1	Block Diagram	24-1
24.1.2	Overview	24-2
24.1.3	Features	24-2
24.2	External Signals	24-3
24.2.1	$\overline{DREQ}[1:0]$	24-3
24.2.2	$\overline{DACK}[1:0]$	24-3
24.3	Memory Map/Register Definitions	24-3
24.3.1	DMA Task Memory	24-3
24.3.2	Memory Structure	24-4
24.3.3	DMA Registers	24-5
24.3.4	External Request Module Registers	24-20
24.4	Functional Description	24-22
24.4.1	Tasks	24-22
24.4.2	Descriptors	24-23
24.4.3	Task Initialization	24-23
24.4.4	Initiators	24-23
24.4.5	Prioritization	24-24
24.4.6	Context Switch	24-24
24.4.7	Data Movement	24-24
24.4.8	Data Manipulation	24-24
24.4.9	Line Buffers	24-26
24.4.10	Termination of Loop	24-27
24.4.11	Interrupts	24-27
24.4.12	Debug Unit	24-27
24.5	Programming Model	24-27
24.5.1	Register Initialization	24-27
24.5.2	Task Memory	24-28
24.6	Timing Diagrams	24-30

24.6.1	Level-Triggered Requests	24-30
24.6.2	Edge-Triggered Requests	24-30
24.6.3	Pipelined Requests	24-31

Chapter 25 Comm Bus FIFO Interface

25.1	Introduction	25-1
25.1.1	Block Diagram	25-1
25.1.2	Overview	25-1
25.1.3	Features	25-2
25.2	Memory Map/Register Definition	25-2
25.2.1	FIFO Interface Registers	25-2
25.3	Functional Description	25-12
25.3.1	Flow control	25-12
25.3.2	Wait Conditions	25-14
25.3.3	Error reporting	25-16
25.3.4	Debug Operation	25-17

Chapter 26 Comm Timer Module (CTM)

26.1	Introduction	26-1
26.1.1	Block Diagrams	26-1
26.1.2	Overview	26-3
26.2	External Signals	26-3
26.2.1	Comm Timer External Clock[7:0]	26-3
26.3	Memory Map/Register Definition	26-4
26.3.1	Timer Module Register Map	26-5
26.3.2	Register Descriptions	26-5
26.4	Functional Description	26-9
26.4.1	Fixed and Variable Timers In Baud Clock Generator Mode	26-9
26.4.2	Fixed Timer Channel in Task Initiator Mode	26-9
26.4.3	Variable Timer Channel in Task Initiator Mode	26-11

Chapter 27 Programmable Serial Controller (PSC)

27.1	Introduction	27-1
27.1.1	Block Diagram	27-1
27.1.2	Overview	27-1
27.1.3	Features	27-1
27.1.4	Modes of Operation	27-1
27.2	Signal Description	27-2
27.2.1	PSCnCTS/PSCBCLK	27-2
27.2.2	PSCnRTS/PSCFSYNC	27-2
27.2.3	PSCnrxd	27-2
27.2.4	pscntxd	27-3

27.2.5	Signal Properties in Each Mode	27-3
27.3	Memory Map/Register Definition	27-3
27.3.1	Overview	27-3
27.3.2	Module Memory Map	27-3
27.3.3	Register Descriptions	27-5
27.4	Functional Description	27-37
27.4.1	UART Mode	27-37
27.4.2	Multidrop Mode	27-38
27.4.3	Modem8 Mode	27-39
27.4.4	Modem16 Mode	27-40
27.4.5	AC97 Mode	27-41
27.4.6	SIR Mode	27-43
27.4.7	MIR Mode	27-43
27.4.8	FIR Mode	27-44
27.4.9	PSC FIFO System	27-45
27.4.10	Looping Modes	27-48
27.5	Resets	27-49
27.5.1	General	27-49
27.5.2	Description of Reset Operation	27-49
27.6	Interrupts	27-50
27.6.1	Description of Interrupt Operation	27-50
27.7	Software Environment	27-50
27.7.1	General	27-50
27.7.2	Configuration	27-51
27.7.3	Programming	27-57

Chapter 28

DMA Serial Peripheral Interface (DSPI)

28.1	Overview	28-1
28.2	Features	28-1
28.3	Block Diagram	28-2
28.4	Modes of Operation	28-2
28.4.1	Master Mode	28-2
28.4.2	Slave Mode	28-2
28.5	Signal Description	28-3
28.5.1	Overview	28-3
28.5.2	Detailed Signal Descriptions	28-3
28.6	Memory Map and Registers	28-4
28.6.1	DSPI Module Configuration Register (DMCR)	28-5
28.6.2	DSPI Transfer Count Register (DTCR)	28-7
28.6.3	DSPI Clock and Transfer Attributes Registers 0–7 (DCTARn)	28-7
28.6.4	DSPI Status Register (DSR)	28-11
28.6.5	DSPI DMA/Interrupt Request Select Register (DIRSR)	28-13
28.6.6	DSPI Tx FIFO Register (DTFR)	28-15
28.6.7	DSPI Rx FIFO Register (DRFR)	28-16

28.6.8	DSPI Tx FIFO Debug Registers 0–3 (DTFDRn)	28-17
28.6.9	DSPI Rx FIFO Debug Registers 0–3 (DRFDRn)	28-17
28.7	Functional Description	28-18
28.7.1	Start and Stop of DSPI Transfers	28-19
28.7.2	Serial Peripheral Interface (SPI)	28-20
28.7.3	DSPI Baud Rate and Clock Delay Generation	28-22
28.7.4	Transfer Formats	28-25
28.7.5	Continuous Serial Communications Clock	28-30
28.7.6	Interrupts/DMA Requests	28-31
28.8	Initialization and Application Information	28-33
28.8.1	How to Change Queues	28-33
28.8.2	Baud Rate Settings	28-33
28.8.3	Delay Settings	28-34
28.8.4	Calculation of FIFO Pointer Addresses	28-35

Chapter 29 I²C Interface

29.1	Introduction	29-1
29.1.1	Block Diagram	29-1
29.1.2	I2C Overview	29-2
29.1.3	Features	29-2
29.2	External Signals	29-2
29.3	Memory Map/Register Definition	29-3
29.3.1	I2C Register Map	29-3
29.3.2	Register Descriptions	29-3
29.4	Functional Description	29-8
29.4.1	START Signal	29-9
29.4.2	Slave Address Transmission	29-9
29.4.3	STOP Signal	29-9
29.4.4	Data Transfer	29-9
29.4.5	Acknowledge	29-10
29.4.6	Repeated Start	29-11
29.4.7	Clock Synchronization and Arbitration	29-11
29.4.8	Handshaking and Clock Stretching	29-12
29.5	Initialization Sequence	29-12
29.5.1	Transfer Initiation and Interrupt	29-13
29.5.2	Post-Transfer Software Response	29-14
29.5.3	Generation of STOP	29-15
29.5.4	Generation of Repeated START	29-16
29.5.5	Slave Mode	29-16
29.5.6	Arbitration Lost	29-18
29.5.7	Flow Control	29-18

Chapter 30 USB 2.0 Device Controller

30.1	Introduction	30-1
30.1.1	Overview	30-1
30.1.2	Features	30-1
30.1.3	Block Diagram	30-2
30.2	Memory Map/Register Definition	30-4
30.2.1	USB Memory Map	30-4
30.2.2	USB Request, Control, and Status Registers	30-9
30.2.3	USB Counter Registers	30-23
30.2.4	Endpoint Context Registers	30-27
30.2.5	USB Endpoint FIFO Registers	30-34
30.3	Functional Description	30-47
30.3.1	Interrupts	30-47
30.3.2	Device Initialization	30-47
30.3.3	Exception Handling	30-50
30.3.4	Data Transfer Operations	30-50

Chapter 31 Fast Ethernet Controller (FEC)

31.1	Introduction	31-1
31.1.1	MCF548x Family Products	31-1
31.1.2	Block Diagram	31-1
31.1.3	Overview	31-2
31.1.4	Features	31-3
31.1.5	Modes of Operation	31-3
31.2	External Signals	31-4
31.2.1	Transmit Clock (EnTXCLK)	31-4
31.2.2	Receive Clock (EnRXCLK)	31-4
31.2.3	Transmit Enable (EnTXEN)	31-4
31.2.4	Transmit Data[3:0] (EnTXD[3:0])	31-4
31.2.5	Transmit Error (EnTXER)	31-5
31.2.6	Receive Data Valid (EnRXDV)	31-5
31.2.7	Receive Data[3:0] (EnRXD[3:0])	31-5
31.2.8	Receive Error (EnRXER)	31-5
31.2.9	Carrier Sense (EnCRS)	31-5
31.2.10	Collision (EnCOL)	31-5
31.2.11	Management Data Clock (EnMDC)	31-5
31.2.12	Management Data (EnMDIO)	31-5
31.3	Memory Map/Register Definition	31-6
31.3.1	Top Level Module Memory Map	31-6
31.3.2	Detailed Memory Map (Control/Status Registers)	31-7
31.3.3	MIB Block Counters Memory Map	31-8
31.4	Functional Description	31-43
31.4.1	Initialization Sequence	31-43

31.4.2	Frame Control/Status Words	31-44
31.4.3	Network Interface Options	31-46
31.4.4	FEC Frame Transmission	31-46
31.4.5	FEC Frame Reception	31-47
31.4.6	Ethernet Address Recognition	31-48
31.4.7	Hash Algorithm	31-49
31.4.8	Full Duplex Flow Control	31-52
31.4.9	Inter-Packet Gap (IPG) Time	31-53
31.4.10	Collision Handling	31-53
31.4.11	Internal and External Loopback	31-53
31.4.12	Ethernet Error-Handling Procedure	31-54
31.4.13	MII Data Frame	31-55
31.4.14	MII Management Frame Structure	31-56

Chapter 32 Mechanical Data

32.1	Package	32-1
32.2	Pinout	32-1
32.3	Mechanical Diagrams	32-8
32.3.1	MCF5485/5484 Mechanical Diagram	32-8
32.3.2	MCF5483/5482 Mechanical Diagram	32-12
32.4	MCF5481/5480 Mechanical Diagram	32-16
32.5	Mechanicals 388-pin PBGA Package Outline	32-19

Appendix A MCF548x Memory Map

About This Book

The primary objective of this reference manual is to define the functionality of the MCF548x processors for use by software and hardware developers.

The information in this book is subject to change without notice, as described in the disclaimers on the title page of this book. As with any technical documentation, it is the readers' responsibility to be sure they are using the most recent version of the documentation.

To locate any published errata or updates for this document, refer to the world-wide web at <http://www.freescale.com/coldfire>.

Audience

This manual is intended for system software and hardware developers and applications programmers who want to develop products for the MCF548x. It is assumed that the reader understands operating systems, microprocessor system design, basic principles of software and hardware, and basic details of the ColdFire architecture.

Organization

Following is a summary and a brief description of the major sections of this manual:

- [Chapter 1, “Overview,”](#) includes general descriptions of the modules and features incorporated in the MCF548x, focussing in particular on new features.
- [Chapter 2, “Signal Descriptions,”](#) provides an alphabetical listing of MCF548x signals, including which are inputs or outputs, how they are multiplexed, and the state of each signal at reset.
- [Part I, “Processor Core,”](#) is intended for system designers who need to understand the operation of the MCF548x ColdFire core and its enhanced multiply/accumulate (EMAC) execution unit. It describes the programming and exception models, Harvard memory implementation, and debug module. Part 1 contains the following chapters:
 - [Chapter 3, “ColdFire Core,”](#) provides an overview of the microprocessor core of the MCF548x. The chapter begins with a description of enhancements from the V3 ColdFire core, and then fully describes the V4e programming model as it is implemented on the MCF548x. It also includes a full description of exception handling, data formats, an instruction set summary, and a table of instruction timings.
 - [Chapter 4, “Enhanced Multiply-Accumulate Unit \(EMAC\),”](#) describes the MCF548x enhanced multiply/accumulate unit, which executes integer multiply, multiply-accumulate, and miscellaneous register instructions. The EMAC is integrated into the operand execution pipeline (OEP).
 - [Chapter 5, “Memory Management Unit \(MMU\),”](#) describes describes the ColdFire virtual memory management unit (MMU), which provides virtual-to-physical address translation and memory access control.
 - [Chapter 6, “Floating-Point Unit \(FPU\),”](#) describes instructions implemented in the floating-point unit (FPU) designed for use with the ColdFire family of microprocessors.

- Chapter 7, “Local Memory,” describes the MCF548x implementation of the ColdFire V4e local memory specification.
- Chapter 8, “Debug Support,” describes the Revision C enhanced hardware debug support in the MCF548x. This revision of the ColdFire debug architecture encompasses earlier revisions.
- Part II, “System Integration Unit,” describes the system integration unit, which provides overall control of the bus and serves as the interface between the ColdFire core processor complex and internal peripheral devices. It includes a general description of the SIU and individual chapters that describe components of the SIU, such as the interrupt controller, general purpose timers, slice timers, and GPIOs. Part II contains the following chapters:
 - Chapter 9, “System Integration Unit (SIU),” describes the SIU programming model, bus arbitration, and system-protection functions for the MCF548x.
 - Chapter 10, “Internal Clocks and Bus Architecture,” describes the clocking and internal buses of the MCF548x and discusses the main functional blocks controlling the XL bus and the XL bus arbiter.
 - Chapter 11, “General Purpose Timers (GPT),” describes the functionality of the four general purpose timers, GPT0–GPT3.
 - Chapter 12, “Slice Timers (SLT),” describes the two slice timers, shorter term periodic interrupts, used in the MCF548x.
 - Chapter 13, “Interrupt Controller,” describes operation of the interrupt controller portion of the SIU. Includes descriptions of the registers in the interrupt controller memory map and the interrupt priority scheme.
 - Chapter 14, “Edge Port Module (EPORT),” describes EPORT module functionality.
 - Chapter 15, “GPIO,” describes the operation and programming model of the parallel port pin assignment, direction-control, and data registers.
- Part III, “On-Chip Integration,” describes the on-chip integration for the MCF548x device. It includes descriptions of the system SRAM, FlexBus interface, SDRAM controller, PCI, and SEC cryptography accelerator. Part III contains the following chapters:
 - Chapter 16, “32-Kbyte System SRAM,” describes the MCF548x on-chip system SRAM implementation. It covers general operations, configuration, and initialization.
 - Chapter 17, “FlexBus,” describes data transfer operations, error conditions, and reset operations. It describes transfers initiated by the MCF548x and by an external master, and includes detailed timing diagrams showing the interaction of signals in supported bus operations.
 - Chapter 18, “SDRAM Controller (SDRAMC),” describes configuration and operation of the synchronous DRAM controller component of the SIU. It includes a description of signals involved in DRAM operations, including chip select signals and their address, mask, and control registers.
 - Chapter 19, “PCI Bus Controller,” details the operation of the PCI bus controller for the MCF548x.
 - Chapter 20, “PCI Bus Arbiter Module,” describes the MCF548x PCI bus arbiter module, including timing for request and grant handshaking, the arbitration process, and the register in the PCI bus arbiter programming model.

- [Chapter 21, “FlexCAN,”](#) describes the MCF548 implementation of the controller area network (CAN) protocol. This chapter describes FlexCAN module operation and provides a programming model.
- [Chapter 22, “Integrated Security Engine \(SEC\),”](#) provides an overview of the MCF548x security encryption controller.
- [Chapter 23, “IEEE 1149.1 Test Access Port \(JTAG\),”](#) describes configuration and operation of the MCF548x JTAG test implementation. It describes the use of JTAG instructions and provides information on how to disable JTAG functionality.
- [Part IV, “Communications Subsystem,”](#) contains chapters that discuss the operation and configuration of the communications I/O subsystem including the MCF548x multichannel DMA, communications timer, PSC, FEC, DSPI, and USB2, and I²C.
 - [Chapter 24, “Multichannel DMA,”](#) provides an overview of the multichannel DMA controller module including the operation of the external DMA request signals.
 - [Chapter 26, “Comm Timer Module \(CTM\),”](#) contains a detailed description of the communications timer module, which functions as a baud clock generator or as a DMA task initiator.
 - [Chapter 27, “Programmable Serial Controller \(PSC\),”](#) provides an overview of asynchronous, synchronous, and IrDA 1.1 compliant receiver/transmitter serial communications of the MCF548x.
 - [Chapter 28, “DMA Serial Peripheral Interface \(DSPI\),”](#) describes the use of the DMA serial peripheral interface (DSPI) implemented on the MCF548x processor, including details of the DSPI data transfers. The chapter concludes with timing diagrams and the DSPI features that support Tx and Rx FIFO queue management.
 - [Chapter 29, “I²C Interface,”](#) describes the MCF548x I²C module, including I²C protocol, clock synchronization, and the registers in the I²C programming model. It also provides programming examples.
 - [Chapter 30, “USB 2.0 Device Controller,”](#) provides an overview of the USB 2.0 device controller module used in the MCF548x.
 - [Chapter 31, “Fast Ethernet Controller \(FEC\),”](#) provides a feature-set overview, a functional block diagram, and transceiver connection information for both MII (Media Independent Interface) and 7-wire serial interfaces. It also provides describes operation and the programming model.
- [Part V, “Mechanical,”](#) provides a pinout and both electrical and functional descriptions of the MCF548x signals. It also describes how these signals interact to support the variety of bus operations shown in timing diagrams.
 - [Chapter 32, “Mechanical Data,”](#) provides a functional pin listing and package diagram for the MCF548x.

Suggested Reading

This section lists additional reading that provides background for the information in this manual as well as general information about the ColdFire architecture.