

ADVANCED COMPUTING SYSTEMS

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MPM INSTRUCTION MANUAL

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2	Move Operations
3	Floating Point Arithmetic
4	Integer Arithmetic
5	Index Arithmetic
6	Compare Operations
7	Shift Operations
8	Logical Operations
9	Branch at Exit Operations
10	Input/Output Operations
11	Tag and Directory Operations
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ACH	Add continued, high order	4-9
ACL	Add continued, low order	4-8
ADN	Add double normalized	3-10
ADR	Add double rounded	3-11
ADU	Add double unnormalized	3-12
AI	Add integer	4-4
AN	Add normalized	3-10
ANDA	Logical and, arithmetic	8-3
ANDC	Logical and, condition	8-4
ANDX	Logical and, index	8-3
AR	Add rounded	3-11
AU	Add unnormalized	3-12
AX	Add index	5-4
AXC	Add index to short constant	5-9
AXCT	Add index to short constant and test	5-14
AXK	Add index to constant	5-9
AXT	Add index and test	5-13
BAND	Branch if and	9-4
BEQ	Branch if equal	9-4
BFAF	Branch if false and false	9-4
BFOF	Branch if false or false	9-4
BOR	Branch if or	9-4
BTAF	Branch if true and false	9-4
BTOF	Branch if true or false	9-4
BU	Branch unconditionally	9-4
BXOR	Branch if exclusive or	9-4

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CBA	Compare bytes, arithmetic	6-10
CBMA	Compare bytes multiple, arithmetic	6-10
CBMX	Compare bytes multiple, index	6-11
CBX	Compare bytes, index	6-11
CEQD	Compare equal, double	6-4
CEQI	Compare equal, integer	6-7
CEQN	Compare equal, normalized	6-3
CEQX	Compare equal, index	6-8
CEQXK	Compare index with constant, equal	6-9
CGED	Compare greater or equal, double	6-4
CGEI	Compare greater or equal, integer	6-7
CGEN	Compare greater or equal, normalized	6-3
CGEX	Compare greater or equal, index	6-8
CGEXK	Compare index with constant, greater or equal	6-9
CMEQD	Compare magnitude equal, double	6-6
CMEQN	Compare magnitude equal, normalized	6-5
CMGED	Compare magnitude greater or equal, double	6-6
CMGEN	Compare magnitude greater or equal, normalized	6-5
CNTAA	Count leading alike, arithmetic	8-5
CNTAX	Count leading alike, index	8-6
CNTDA	Count leading different, arithmetic	8-5
CNTS	Count to storage	1-7a
CNTDX	Count leading different, index	8-6
CNTT	Count total ones, arithmetic	8-5
CUGEI	Compare unsigned, greater or equal, integer	6-7
CUGEX	Compare unsigned, greater or equal, index	6-8
CUGEXK	Compare unsigned index with constant, greater or equal	6-9
CVF	Convert to full floating	3-28
CVI	Convert to integer	4-11
CVN	Convert to normalized	4-11
CVS	Convert to short floating	3-27

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DDN	Divide double normalized	3-22
DDR	Divide double rounded	3-23
DEN	Directory enter	11-3
DENP	Directory enter per physical	11-3
DEX	Directory examine	11-4
DEXP	Directory examine per physical	11-4
DI	Divide integer	4-7
DM	Directory move and invalidate	11-4
DMI	Divide mixed integer	4-7
DMN	Divide mixed normalized	3-24
DMR	Divide mixed rounded	3-24
DN	Divide normalized	3-22
DR	Divide rounded	3-23
DRUX	Divide with remainder, unsigned index	3-23
DRUXK	Divide with remainder unsigned index by constant	5-11
DRX	Divide with remainder, index	5-5
DRXK	Divide with remainder index by constant	5-10
DSC	Directory search per count	11-6
DSI	Directory search for invalid	11-5
DSS	Directory search for smaller	11-5
DSW	Directory swap	11-3
DUX	Divide unsigned index	5-8
DUXK	Divide unsigned index by constant	5-12
DX	Divide index	5-6
DXK	Divide index by constant	5-11
EQA	Logical equivalence, arithmetic	8-3
EQC	Logical equivalence, condition	8-4
EQX	Logical equivalence, index	8-3
EXIT	Exit	9-6
EXITL	Exit and save location	9-6

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FAFA	Logical false and false, arithmetic	8-3
FAFC	Logical false and false, condition	8-4
FAFX	Logical false and false, index	8-3
FOFA	Logical false or false, arithmetic	8-3
FOFC	Logical false or false, condition	8-4
FOFX	Logical false or false, index	8-3
HIO	Halt I/O	10-3a
IC	Interrupt call	9-15
IFA	Insert field, arithmetic	7-10
IFX	Insert field, index	7-10
IFZA	Insert field and zero, arithmetic	7-10
IFZX	Insert field and zero, index	7-10
IR	Interrupt return	9-16
ITUM	Invalidate tag and update MS	11-2
ITUMA	Invalidate tag and update MS per alternate key	11-2
IVIB	Invalidate instruction buffers and branch	9-11
LA	Load arithmetic	1-8
LAA	Load arithmetic per alternate key	1-9
LAH	Load arithmetic (half word format)	1-8
LAT	Load arithmetic, true indexing	1-14
LATH	Load arithmetic, true indexing (half word format)	1-14
LD	Load double arithmetic	1-12
LDH	Load double arithmetic (half word format)	1-12
LL	Load left half arithmetic	1-16
LMA	Load multiple arithmetic	1-22
LMAA	Load multiple arithmetic per alternate key	1-23a
LMX	Load multiple index	1-18
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LR	Load right half arithmetic	1-16
LX	Load index	1-4
LXA	Load index per alternate key	1-4
LXH	Load index (half word format)	1-4
MAC	Move arithmetic bit to condition bit	2-6
MAX	Move arithmetic to index	2-2
MCX	Move condition bit to index bit	2-6
MDN	Multiply double normalized	3-17
MDR	Multiply double rounded	3-18
MDU	Multiply double unnormalized	3-19
MI	Multiply integer	4-5
MKL	Move constant to left half arithmetic	2-3
MKR	Move constant to right half arithmetic	2-3
MLX	Move location to index	2-4
MMI	Multiply mixed integer	4-5
MMN	Multiply mixed normalized	3-20
MMU	Multiply mixed unnormalized	3-20
MN	Multiply normalized	3-17
MOT	Move one to T register bit	10-5
MR	Multiply rounded	3-18
MSX	Move special to index	2-4
MSXZ	Move special to index and zero	2-5
MTX	Move T register to index	10-4
MU	Multiply unnormalized	3-19
MX	Multiply index	5-4
MXA	Move index to arithmetic	2-2
MXC	Move index bit to condition bit	2-6
MXK	Multiply index by constant	5-10
MXS	Move index to special	2-4
MXSO	Move index to special by oring	2-5

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MXT	Move index to T register	10-4
MZT	Move zero to T register bit	10-5
ORA	Logical or, arithmetic	8-3
ORC	Logical or, condition	8-4
ORX	Logical or, index	8-3
PAUSE	Pause	9-12
PI	Pause with interrupt	9-12
RC	Reset channel	10-3b
RND	Round	3-25
RUX	Remainder unsigned index	5-8
RUXK	Remainder unsigned index by constant	5-12
RX	Remainder index	5-6
RXK	Remainder index by constant	5-11
SCAN	Scan	9-17
SCH	Subtract continued, high order	4-9
SCL	Subtract continued, low order	4-8
SDN	Subtract double normalized	3-13
SDR	Subtract double rounded	3-14
SDU	Subtract double unnormalized	3-15
SHA	Logical shift arithmetic	7-4
SHAC	Logical shift arithmetic by constant	7-4
SHD	Logical shift double	7-6
SHDC	Logical shift double by constant	7-6
SHDX	Logical shift double index	7-6
SHDXC	Logical shift double index by constant	7-6
SHX	Logical shift index	7-4
SHXC	Logical shift index by constant	7-4

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SI	Subtract integer	4-4
SIA	Integer shift arithmetic	7-12
SIAC	Integer shift arithmetic by constant	7-13
SID	Integer shift double	7-15
SIDC	Integer shift double by constant	7-15
SIO	Start I/O	10-2
SIOA	Start I/O per alternate key	10-3a
SIX	Integer shift index	7-12
SIXC	Integer shift index by constant	7-13
SKAND	Skip if and	9-9
SKEQ	Skip if equal	9-9
SKFAF	Skip if false and false	9-9
SKFOF	Skip if false or false	9-9
SKOR	Skip if or	9-9
SKTAF	Skip if true and false	9-9
SKTOF	Skip if true or false	9-9
SKXOR	Skip if exclusive or	9-9
SN	Subtract normalized	3-13
SNF	Set negative, floating	3-26
SNI	Set negative, integer	4-10
SNX	Set negative, index	5-13
SPF	Set positive, floating	3-26
SPI	Set positive, integer	4-10
SPX	Set positive, index	5-13
SR	Subtract rounded	3-14
STA	Store arithmetic	1-10
STAA	Store arithmetic per alternate key	1-11
STAH	Store arithmetic (half word format)	1-10
STAT	Store arithmetic, true indexing	1-14
STATH	Store arithmetic, true indexing (half word format)	1-14
STD	Store double arithmetic	1-13
STDH	Store double arithmetic (half word format)	1-13

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STL	Store left half arithmetic	1-16
STMA	Store multiple arithmetic	1-23b
STMAA	Store multiple arithmetic per alternate key	1-23c
STMX	Store multiple index	1-20
STMXA	Store multiple index per alternate key	1-21
STMZ	Store multiple zeros	1-24
STMZA	Store multiple zeros per alternate key	1-24
STR	Store right half arithmetic	1-16
STX	Store index	1-5
STXA	Store index per alternate key	1-6
STXH	Store index (half word format)	1-5
SU	Subtract unnormalized	3-15
SVC	Supervisor call	9-13
SVR	Supervisor return	9-14
SWS	Swap with storage	1-7b
SWSA	Swap with storage per alternate	1-7b
SX	Subtract index	5-4
TAFA	Logical true and false, arithmetic	8-3
TAFC	Logical true and false, condition	8-4
TAFX	Logical true and false, index	8-3
TC	Test channel	10-3b
TOFA	Logical true or false, arithmetic	8-3
TOFC	Logical true or false, condition	8-4
TOFX	Logical true or false, index	8-3
XORA	Logical exclusive or, arithmetic	8-3
XORC	Logical exclusive or, condition	8-4
XORX	Logical exclusive or, index	8-3