Mathematical Methods	Column 1	Test Name	Description	RST	CE II	NP_VALID M	ODE CMD	OPA	OPE	В	CIN Exp	ected RES	COUT	OFLOW	Tt G/L/E	ERR	comments/Check
Mile	Dir	ADD	Add two positives	0	1	11	1 ADD		10	20	0	30	0	0	0		0 PASS
Mile	Dir	SUB	Subtract positives	0	1	11	1 SUB		25	10	0	15	0	0	0		0 PASS
Martin M	Dir	ADD_CIN	Add with carry-in	0	1	11	1 ADD_CIN		5	7	1	13	0	0	0		0 PASS
Martin M	Dir	SUB_CIN	Sub with carry-in	0	1	11	1 SUB_CIN		20	4	1	15	0	0	0		0 PASS
Part	Dir	CMP_EQ	Compare equal	0	1	11	1 CMP		10	10	0	0	0	0	001		0 PASS
M. C. M. C	Dir	CMP_GT	Compare greater	0	1	11	1 CMP		15	10	0	0	0	0	100		0 PASS
Part	Dir	CMP_LT	Compare less	0	1	11	1 CMP		7	20	0	0	0	0	010		0 PASS
March Marc	Dir	INC_A	Increment A	0	1	1	1 INC_A		8 X		0	9	0	0	0		0 PASS
Part	Dir	DEC_A	Decrement A	0	1	1	1 DEC_A		8 X		0	7	0	0	0		0 PASS
Part	Dir	INC_B	Increment B	0	1	10	1 INC_B	Χ		4	0	5	0	0	0		0 PASS
State Stat	Dir	DEC_B	Decrement B	0	1	10	1 DEC_B	Χ		9	0	8	0	0	0		0 PASS
Part	Dir	NOT_A	Bitwise NOT A	0	1	1	0 NOT_A	8'hAA	Х		0 8'h5	5	0	0	0		0 PASS
Dir AND Stinise AND 0 1 1 11 0 AND Shift Shift 0 Shift	Dir	SHL1_A	Shift left A	0	1	1	0 SHL1_A	8'h05	Χ		0 8'h0	А	0	0	0		0 PASS
Dir OR Bitwise OR I Sinwise OR I I I I I I I I I I I I I I I I I I	Dir	SHR1_A	Shift right A	0	1	1	0 SHR1_A	8'h08	Χ		0 8'h0	4	0	0	0		0 PASS
Dir NCM. Mult Add sind Mul 0 1 11 0 NCR 8 hF 8 hF 8 hF 0 0 0 0 0 0 0 0 0	Dir	AND	Bitwise AND	0	1	11	0 AND	8'hF0	8'h0F		0 8'h0	0	0	0	0		0 PASS
DIV NO. MILL ADD AND MILL ADD A	Dir	OR	Bitwise OR	0	1	11	0 OR	8'hF0	8'h0F		0 8'hF	F	0	0	0		0 PASS
Dir SH_MUL Shit and Mul 0 1 1 11 11 11 11 11 11 11 11 11 11 11	Dir	XOR	Bitwise XOR	0	1	11	0 XOR	8'hF0	8'h0F		0 8'hF	F	0	0	0		0 PASS
Dir ROL Rotate right 0 1 1 11 0 ROL 981 1 1 0 802 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Dir	INC_MUL	Add and Mul	0	1	11	1 INC_MUL		8	2	0	27	0	0	0		0 PASS
Dir ROR ROTATE Fight 0 1 1 1 0 ROR SHOWS 1 1 1 0 ROR SHOWS 1 1 0 8 ROY 1 1 0 8 ROY 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Dir	SHL_MUL	Shift and Mul	0	1	11	1 SHL_MUL		3	2	0	12	0	0	0		0 PASS
Dir ADD_SIGN1 Add signed +ve +ve 0 1 1 11 1 ADD_SIGN 50 -10 0 40 0 0 10 0 0 0 0 PASS Dir ADD_SIGN_NEG Add signed +ve +ve 0 1 1 11 1 ADD_SIGN -10 20 0 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Dir	ROL	Rotate left	0	1	11	0 ROL	8'h81		1	0 8'h0	3	0	0	0		0 PASS
Dir ADD_SIGN_NEG Add signed +ve +ve 0 1 11 1 1 ADD_SIGN -10 20 0 10 0 0 0 0 0 0 0 0 0 0 0 To hit lessert he PASS Dir ADD_SIGN_EQ Add signed +ve +ve 0 1 1 11 1 1 ADD_SIGN 20 20 0 40 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Dir	ROR	Rotate right	0	1	11	0 ROR	8'h03		1	0 8'h8	1	0	0	0		0 PASS
Dir ADD_SIGN_EQ Add signed +ve +ve 0 1 1 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Dir	ADD_SIGN1	Add signed +ve + -ve	0	1	11	1 ADD_SIGN		50	-10	0	40	0	0	100		0 PASS
Dir SUB_SIGN1 Sub signed +ve +ve 0 1 1 11 1 SUB_SIGN 70 20 0 50 0 0 100 0 100 0 PASS Dir SUB_SIGN2 Sub signed +ve +ve 0 1 1 11 1 SUB_SIGN 10 20 0 -30 0 0 0 10 0 0 0 0 0 0 PASS Dir SUB_SIGN_EQ Sub signed +ve +ve 0 1 1 11 1 1 SUB_SIGN 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Dir	ADD_SIGN_NEG	Add signed +ve + +ve	0	1	11	1 ADD_SIGN	-	10	20	0	10	0	0	010		0 To hit lesser tha PASS
Dir SUB_SIGNZ Sub signed +ve + ve 0 1 1 11 1 SUB_SIGN -10 20 0 -30 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Dir	ADD_SIGN_EQ	Add signed +ve + +ve	0	1	11	1 ADD_SIGN		20	20	0	40	0	0	001		0 To hit equal to PASS
Dir SUB_SIGN_EQ Sub signed +ve - +ve 0 1 1 11 1 SUB_SIGN 20 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Dir	SUB_SIGN1	Sub signed +ve - +ve	0	1	11	1 SUB_SIGN		70	20	0	50	0	0	100		0 PASS
Dir NAND Bitwise NAND 0 1 1 11 0 NAND 8'hAA 8'hOF 0 8'hF5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Dir	SUB_SIGN2	Sub signed -ve - +ve	0	1	11	1 SUB_SIGN	-	10	20	0	-30	0	0	010		0 PASS
Dir NOR Bitwise NOR 0 1 1 11 0 NOR 8hA 8hOF 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Dir	SUB_SIGN_EQ	Sub signed +ve - +ve	0	1	11	1 SUB_SIGN		20	20	0	0	0	0	001		0 To hit equal to PASS
Dir XNOR Bitwise XNOR 0 1 11 0 XNOR 8'hG 8'hOF 0 8'hOO 0 0 - 0 PASS Dir NOT_B Bitwise NOT_B 0 1 10 0 NOT_B 8'h3C 0 8'hC3 0 0 - 0 PASS Dir SHR1_B Shift right opB by 1 0 1 10 0 SHR1_B X 8'h52 0 8'h59 0 0 - 0 PASS Dir SHL1_B Shift left opB by 1 0 1 10 0 SHL1_B X 8'h55 0 8'hFF 0 0 - 0 PASS Error ROL_ERR Rotate left 0 1 1 0 ROR 8'h03 8'hF1 0 8'h03 0 0 0 0 1 PASS	Dir	NAND	Bitwise NAND	0	1	11	0 NAND	8'hAA	8'h0F		0 8'hF	5	0	0	-		0 PASS
Dir NOT_B Bitwise NOT_B 0 1 10 0 NOT_B X 8'h3C 0 8'hC3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Dir	NOR	Bitwise NOR	0	1	11	0 NOR	8'hAA	8'h0F		0 8'h5	0	0	0	-		0 PASS
Dir SHR1_B Shift right opB by 1 0 1 10 0 SHR1_B X 8'hB2 0 8'h59 0 0 - 0 - 0 PASS Dir SHL1_B Shift left opB by 1 0 1 10 0 SHL1_B X 8'h55 0 8'hFF 0 0 - 0 - 0 PASS Error ROL_ERR Rotate left 0 1 1 11 0 ROL 8'h81 8'hF1 0 8'h03 0 0 0 1 PASS Error ROR_ERR Rotate right 0 1 1 11 0 ROR 8'h03 8'hF1 0 8'h81 0 0 0 1 PASS	Dir	XNOR	Bitwise XNOR	0	1	11	0 XNOR	8'hF0	8'h0F		0 8'h0	0	0	0	-		0 PASS
Dir SHL1_B Shift left opB by 1 0 1 10 0 SHL1_B X 8'h55 0 8'hFF 0 0 - 0 0 PASS Error ROL_ERR Rotate left 0 1 1 11 0 ROL 8'h81 8'hF1 0 8'h03 0 0 0 1 PASS Error ROR_ERR Rotate right 0 1 1 11 0 ROR 8'h03 8'hF1 0 8'h81 0 0 0 1 PASS	Dir	NOT_B	Bitwise NOT_B	0	1	10	0 NOT_B	Χ	8'h3C		0 8'hC	3	0	0	-		0 PASS
Error ROL_ERR Rotate left 0 1 1 11 0 ROL 8'h81 8'hF1 0 8'h03 0 0 0 1 PASS Error ROR_ERR Rotate right 0 1 1 11 0 ROR 8'h03 8'hF1 0 8'h81 0 0 1 1 PASS	Dir	SHR1_B	Shift right opB by 1	0	1	10	0 SHR1_B	Χ	8'hB2		0 8'h5	9	0	0	-		0 PASS
Error ROR_ERR Rotate right 0 1 1 1 0 ROR 8'h03 8'hF1 0 8'h81 0 0 0 1 PASS	Dir	SHL1_B	Shift left opB by 1	0	1	10	0 SHL1_B	Χ	8'h55		0 8'hF	F	0	0	-		0 PASS
	Error	ROL_ERR	Rotate left	0	1	11	0 ROL	8'h81	8'hF1		0 8'h0	3	0	0	0		1 PASS
Error ERR_CMD Invalid CMD (out of range) 0 1 1 1 4'b1111 5 5 0 X X XXX XXX 1 Should raise ERI PASS	Error	ROR_ERR	Rotate right	0	1	11	0 ROR	8'h03	8'hF1		0 8'h8	1	0	0	0		1 PASS
	Error	ERR_CMD	Invalid CMD (out of range)	0	1	11	1 4'b1111		5	5	0 X	X	X	(XXX		1 Should raise ERI PASS
Error ERR_INP_VALID Invalid inp_valid for 2-op 0 1 10 1 ADD 10 10 0 X X XXX XXXX 1 ERR for two op i PASS	Error	ERR_INP_VALID	Invalid inp_valid for 2-op	0	1	10	1 ADD		10	10	0 X	X	X	(XXX		1 ERR for two op i PASS
Error ERR_INP_VALIDA Invalid inp_valid for opA only 0 1 100 1 NC_A 15 X 0 X X X XXX 1 ERR: B only valic PASS	Error	ERR_INP_VALIDA	Invalid inp_valid for opA only	0	1	10	1 INC_A		15 X		0 X	Х	X	(XXX		1 ERR: B only valic PASS

Column 1	Test Name	Description	RST CE	INP_VALID	MODE CMD	OPA	ОРВ	CIN Expecte	d RES COUT	OFLOW T _T G/L/I	E ERR :omments/Check: ⊙ STATU:
Error	ERR_INP_VALIDB	Invalid inp_valid for opB only	0	1 1	1 INC_B	Х	5	0 X	Х	X XXX	1 ERR: A only valic PASS
Error	ERR_RST	Assert RST, outputs reset	1 X	XX	X XXXX	х	Χ		0	0 0 0	0 Outputs all zero PASS
Error	ERR_INP_ZERO	Invalid inp_valid for opA only	0	1 0	1 INC_A	FF X		0 X	Χ	X XXX	1 ERR: ip valid 00 PASS
Corner	CE_LOW	CE low, hold previous output	0	0 11	1 ADD	1	2	0 prev	prev	prev prev	prev No update when PASS
Corner	ADD_OVF	Add 255+1	0	1 11	1 ADD	255	1	0	256	1 0 -	0 not wrapping to PASS
Corner	SUB_UFLOW	Unsigned Underflow	0	1 11	1 SUB	1	2	0	511	0 1 -	0 PASS
Corner	ADD_MAX_INPUT	Max values	0	1 11	1 ADD	255	255	0	510	1 0 -	0 PASS
Corner	SIGNED_OVF	Signed Overflow	0	1 11	1 ADD_SIGN	127	10	0	137	0 1 100	0 127 max,0FLOW PASS
Corner	SIGNED_UFLOW	Signed Underflow	0	1 11	1 SUB_SIGN	-128	5	0	-133	0 1 010	0 OFLOW=1 for -ve PASS
Corner	DEC_A_OVF	Decrement 0	0	1 1	1 DEC_A	0 X		0	511	0 1 0	0 PASS
Corner	DEC_B_OVF	Decrement 0	0	1 10	1 DEC_B	X	0	0	511	0 1 0	0 PASS
Corner	INC_A_COUT	Increment 255	0	1 1	1 INC_A	255 X		0	256	1 0 0	0 PASS
Corner	INC_B_COUT	Increment 255	0	1 10	1 INC_B	Χ	255	0	256	1 0 0	0 PASS
Corner	SUB_CIN_EQ1	OP_A OP_B same	0	1 11	1 SUB_CIN	20	20	1 1FF		0 1 0	0 PASS
Corner	SUB_CIN_EQ0	OP_A OP_B same	0	1 11	1 SUB_CIN	20	20	0	0	0 0 0	0 PASS
Corner	SUB_CIN_UNDER	OP_A < OP_B	0	1 11	1 SUB_CIN	10	20	0	-10	0 1 0	0 PASS
Corner	INC_MUL_MAXA	Add and Mul	0	1 11	1 INC_MUL	119	1	0	240	0 0 0	0 PASS
Corner	INC_MUL_MAXB	Add and Mul	0	1 11	1 INC_MUL	1	127	0	256	0 0 0	0 PASS
Corner	INC_MUL_BIG	Add and Mul	0	1 11	1 INC_MUL	1	254	0	65025	0 0 0	0 To hit bits 15-10 PASS