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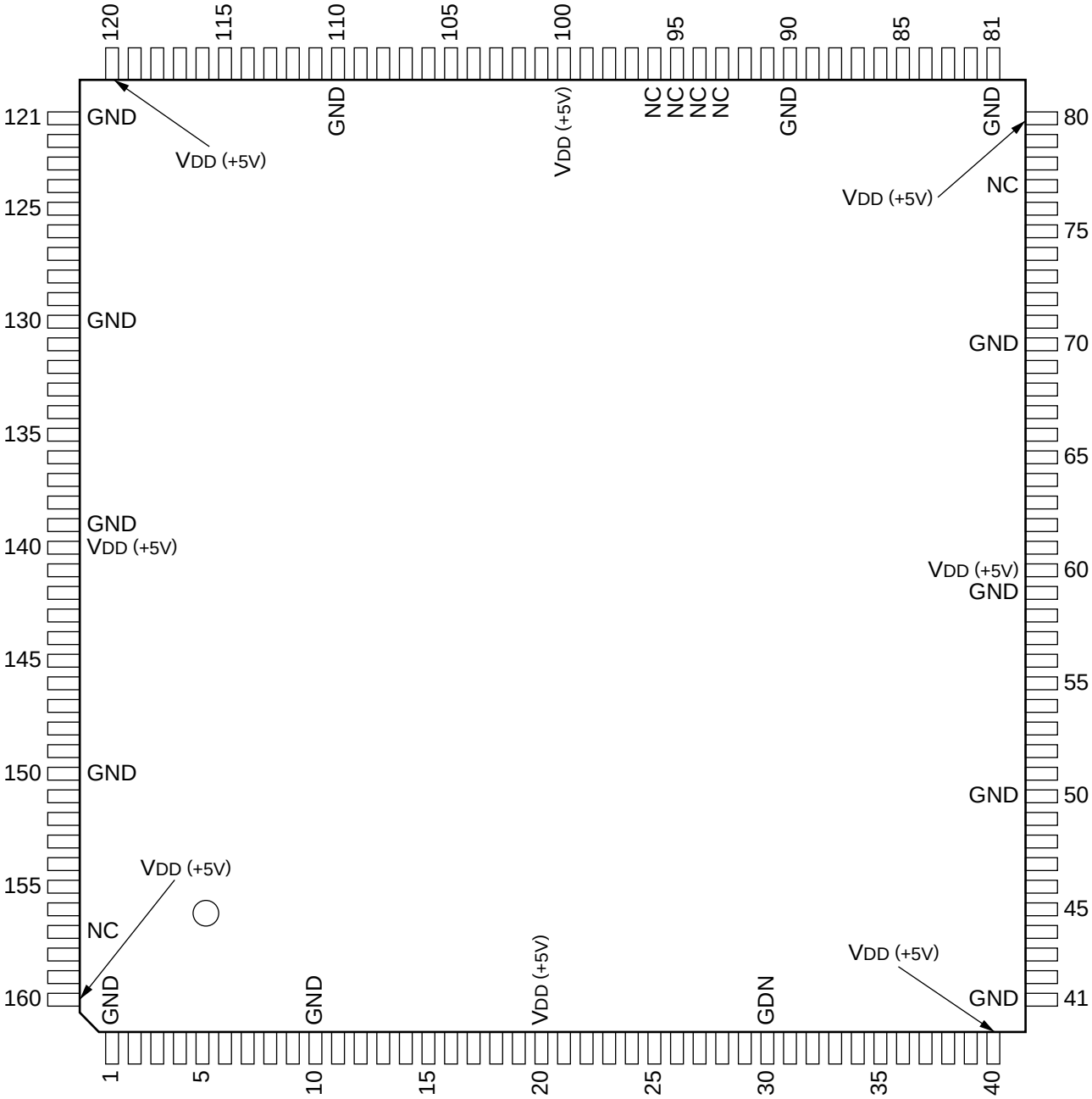
IL22

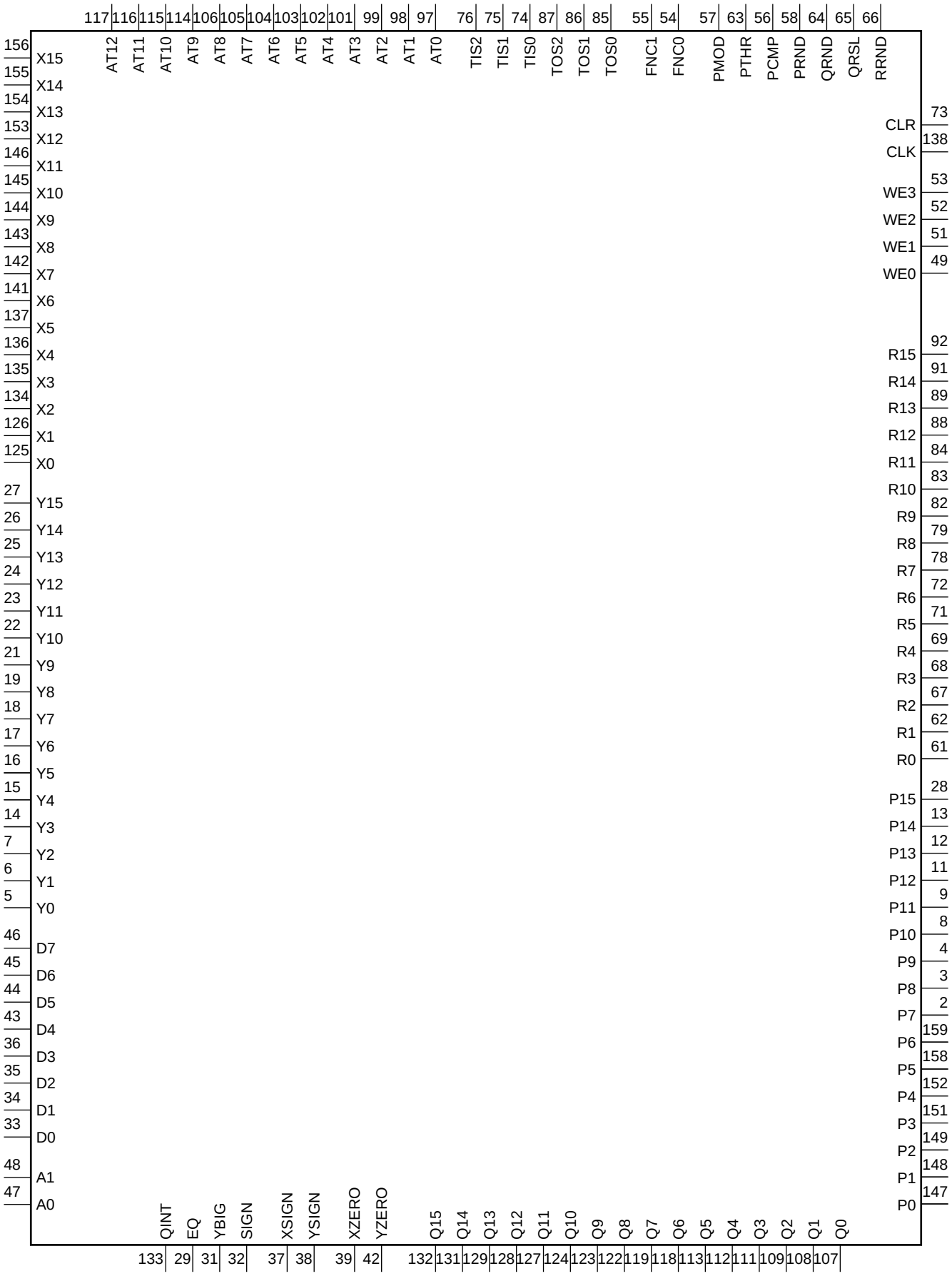
C-MOS POLAR COORDINATE CONVERTER

-TOP VIEW-



(V_{DD} = +5 V)

PIN NO.	I/O	SIGNAL	PIN NO.	I/O	SIGNAL	PIN NO.	I/O	SIGNAL	PIN NO.	I/O	SIGNAL	PIN NO.	I/O	SIGNAL
1	—	GND	33	I	D0	65	I	QRSL	97	I	AT0	129	O	Q13
2	O	P7	34	I	D1	66	I	RRND	98	I	AT1	130	—	GND
3	O	P8	35	I	D2	67	O	R2	99	I	AT2	131	O	Q14
4	O	P9	36	I	D3	68	O	R3	100	—	V_{DD}	132	O	Q15
5	I	Y0	37	O	XSIGN	69	O	R4	101	I	AT3	133	O	QINT
6	I	Y1	38	O	YSIGN	70	—	GND	102	I	AT4	134	I	X2
7	I	Y2	39	O	XZERO	71	O	R5	103	I	AT5	135	I	X3
8	O	P10	40	—	V_{DD}	72	O	R6	104	I	AT6	136	I	X4
9	O	P11	41	—	GND	73	I	CLR	105	I	AT7	137	I	X5
10	—	GND	42	O	YZERO	74	I	TIS0	106	I	AT8	138	I	CLK
11	O	P12	43	I	D4	75	I	TIS1	107	O	Q0	139	—	GND
12	O	P13	44	I	D5	76	I	TIS2	108	O	Q1	140	—	V_{DD}
13	O	P14	45	I	D6	77	—	NC	109	O	Q2	141	I	X6
14	I	Y3	46	I	D7	78	O	R7	110	—	GND	142	I	X7
15	I	Y4	47	I	A0	79	O	R8	111	O	Q3	143	I	X8
16	I	Y5	48	I	A1	80	—	V_{DD}	112	O	Q4	144	I	X9
17	I	Y6	49	I	WE0	81	—	GND	113	O	Q5	145	I	X10
18	I	Y7	50	—	GND	82	O	R9	114	I	AT9	146	I	X11
19	I	Y8	51	I	WE1	83	O	R10	115	I	AT10	147	O	P0
20	—	V_{DD}	52	I	WE2	84	O	R11	116	I	AT11	148	O	P1
21	I	Y9	53	I	WE3	85	I	TOS0	117	I	AT12	149	O	P2
22	I	Y10	54	I	FNC0	86	I	TOS1	118	O	Q6	150	—	GND
23	I	Y11	55	I	FNC1	87	I	TOS2	119	O	Q7	151	O	P3
24	I	Y12	56	I	PCMP	88	O	R12	120	—	V_{DD}	152	O	P4
25	I	Y13	57	I	PMOD	89	O	R13	121	—	GND	153	I	X12
26	I	Y14	58	I	PRND	90	—	GND	122	O	Q8	154	I	X13
27	I	Y15	59	—	GND	91	O	R14	123	O	Q9	155	I	X14
28	O	P15	60	—	V_{DD}	92	O	R15	124	O	Q10	156	I	X15
29	O	EQ	61	O	R0	93	—	NC	125	I	X0	157	—	NC
30	—	GND	62	O	R1	94	—	NC	126	I	X1	158	O	P5
31	O	YBIG	63	I	PTHR	95	—	NC	127	O	Q11	159	O	P6
32	O	SIGN	64	I	QRND	96	—	NC	128	O	Q12	160	—	V_{DD}

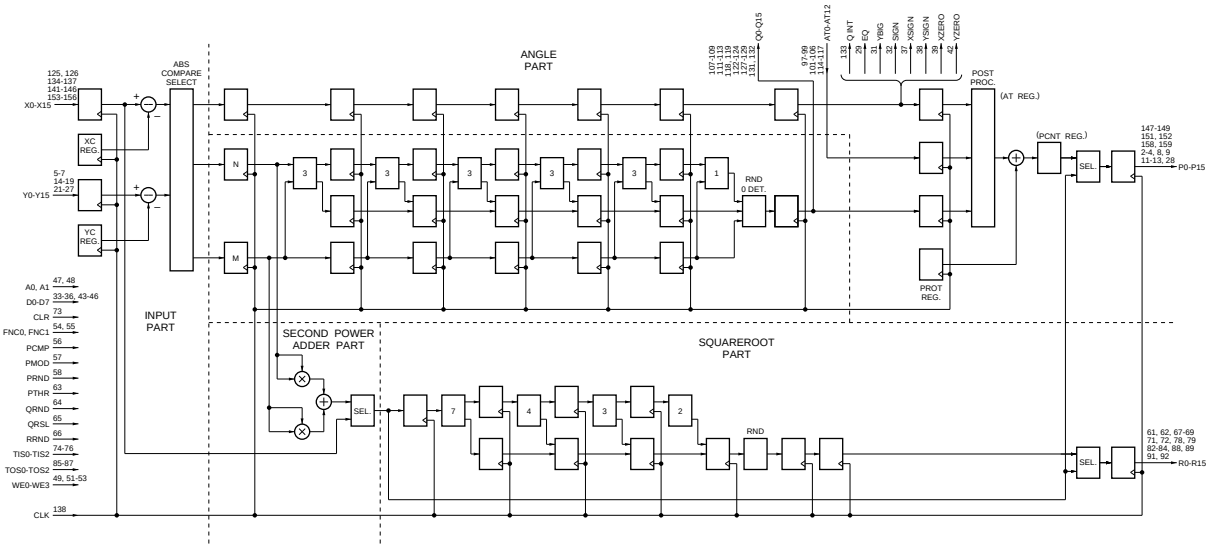

117 AT12
116 AT11
115 AT10
114 AT9
106 AT8
105 AT7
104 AT6
103 AT5
102 AT4
101 AT3
99 AT2
98 AT1
97 AT0
76 TIS2
75 TIS1
74 TIS0
87 TOS2
86 TOS1
85 TOS0
55 FNC1
54 FNC0
57 PMOD
63 PTHR
56 PCMP
58 PRND
64 QRND
65 QRSL
66 RRND
156 X15
155 X14
154 X13
153 X12
146 X11
145 X10
144 X9
143 X8
142 X7
141 X6
137 X5
136 X4
135 X3
134 X2
126 X1
125 X0
27 Y15
26 Y14
25 Y13
24 Y12
23 Y11
22 Y10
21 Y9
19 Y8
18 Y7
17 Y6
16 Y5
15 Y4
14 Y3
7 Y2
6 Y1
5 Y0
46 D7
45 D6
44 D5
43 D4
36 D3
35 D2
34 D1
33 D0
48 A1
47 A0
73 CLR
138 CLK
53 WE3
52 WE2
51 WE1
49 WE0
92 R15
91 R14
89 R13
88 R12
84 R11
83 R10
82 R9
79 R8
78 R7
72 R6
71 R5
69 R4
68 R3
67 R2
62 R1
61 R0
28 P15
13 P14
12 P13
11 P12
9 P11
8 P10
4 P9
3 P8
2 P7
159 P6
158 P5
152 P4
151 P3
149 P2
148 P1
147 P0
133 QINT
29 EQ
31 YBIG
32 SIGN
37 XSIGN
38 YSIGN
39 XZERO
42 YZERO
132 Q15
131 Q14
129 Q13
128 Q12
127 Q11
124 Q10
123 Q9
122 Q8
119 Q7
118 Q6
113 Q5
112 Q4
111 Q3
109 Q2
108 Q1
107 Q0

INPUT

A0, A1 ; CPU ADDRESS
AT0 - AT12 ; NEGATIVE/POSITIVE CONNECTION EXTERNAL ROM DATA
CLK ; CLOCK
CLR ; 0 = XC, YC, PROT, PCNT REGISTER CLEAR
D0 - D7 ; CPU DATA
FNC0, FNC1 ; FUNCTION SELECT
PCMP ; 1 = AT REGISTER USE
PMOD ; 0 = ROM 8/1 = ROM 13
PRND ; 1 = P ROUND UP NUMBERS OF FIVE AND AVOBE AND ANYTHING UNDER FIVE
PTHR ; 1 = ROM NON-COMPENSATION
QRND ; 1 = Q ROUND UP NUMBERS OF FIVE AND AVOBE AND ANYTHING UNDER FIVE
QRSL ; 0 = Q BIT-0 ROUND UP NUMBERS OF FIVE AND AVOBE AND ANYTHING UNDER FIVE
1 = Q BIT-2 ROUND UP NUMBERS OF FIVE AND AVOBE AND ANYTHING UNDER FIVE
RRND ; 1 = R ROUND UP NUMBERS OF FIVE AND AVOBE AND ANYTHING UNDER FIVE
TIS0 - TIS2 ; TEST INPUT SELECT
TOS0 - TOS2 ; TEST OUTPUT SELECT
WE0 - WE3 ; CPU DATA WRITE ENABLE
X0 - X15 ; CROSS COORDINATES X SIGNED/UNSIGNED FIXED-POINT WITH 4 BIT FRACTION
Y0 - Y15 ; CROSS COORDINATES Y SIGNED/UNSIGNED FIXED-POINT WITH 4 BIT FRACTION

OUTPUT

EQ ; XD = YD : 1
P0 - P15 ; POLAR COORDINATES θ ANGLE
Q0 - Q15 ; FRACTIONAL PART OF QUOTIENT EXTERNAL ROM ADDRESS
Q INT ; INTEGRAL PART OF QUOTIENT
R0 - R15 ; POLAR COORDINATES γ RADIUS
SIGN ; XD, YD = MINUS : 1
XSIGN ; XD = MINUS : 1
XZERO ; XD = ZERO :1
YBIG ; XD, YD COMPARATE (XD < YD = 1)
YSIGN ; YD = MINUS : 1
YZERO ; YD = ZERO :1
0 ; LOW LEVEL
1 ; HIGH LEVEL


ANGLE PART
INPUT PART
SECOND POWER ADDER PART
SQUAREROOT PART
ABS COMPARE SELECT
POST PROC.
(AT REG.)
(PCNT REG.)
PROT REG.
RND 0 DET.
RND
SEL
XC REG.
YC REG.
N
M
X0-X15
Y0-Y15
125, 126 134-137 141-146 153-156
5-7 14-19 21-27
47, 48
33-36, 43-46
73
54, 55
56
57
58
63
64
65
66
74-76
85-87
49, 51-53
138
A0, A1
D0-D7
CLR
FNC0, FNC1
PCMP
PMOD
PRND
PTHR
QRND
QRSL
RRND
TIS0-TIS2
TOS0-TOS2
WE0-WE3
CLK
107-109 111-113 118-119 122-124 127-129 131, 132
QX-QY15
97-99 101-106 114-117
AT0-AT12
132
Q INT
29
EQ
31
YBIG
32
SIGN
37
XSIGN
38
YSIGN
39
XZERO
42
YZERO
147-149 151, 152 158, 159 2-4, 8, 9 11-13, 28
P0-P15
61, 62, 67-69 71, 72, 78, 79 82-84, 88, 89 91, 92
R0-R15