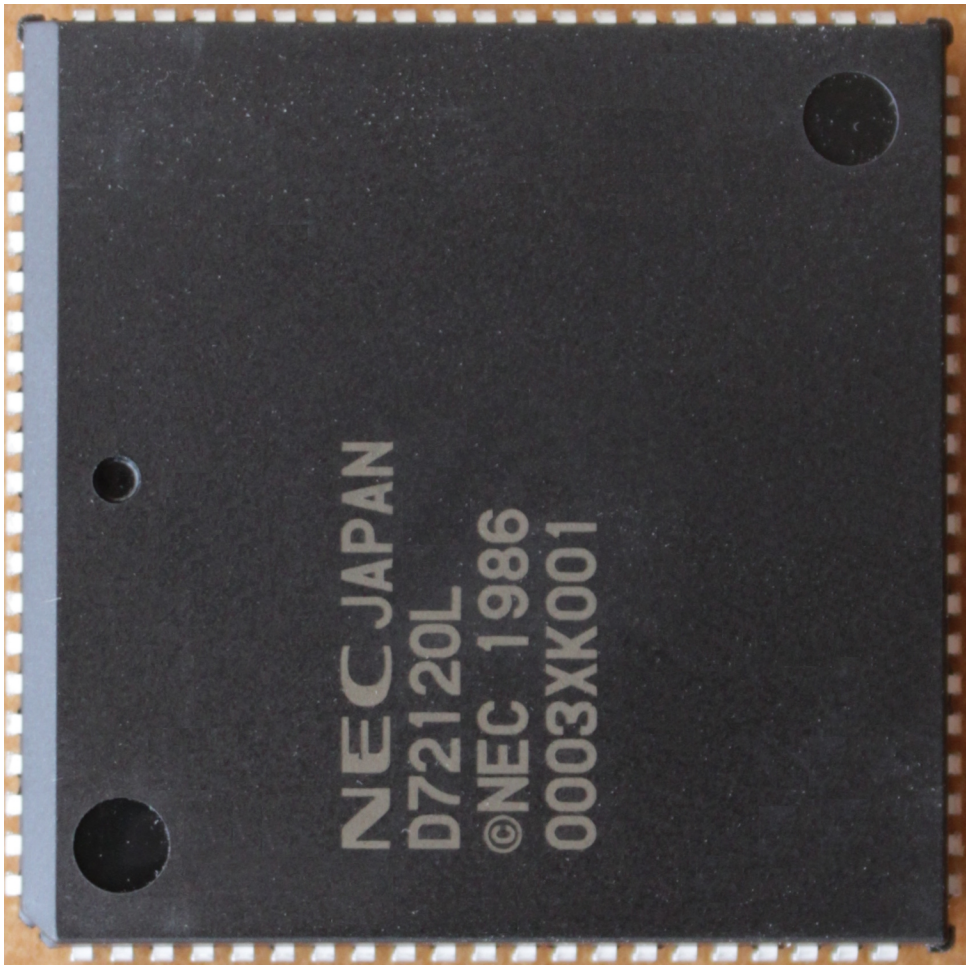
NEC JAPAN
D72120L
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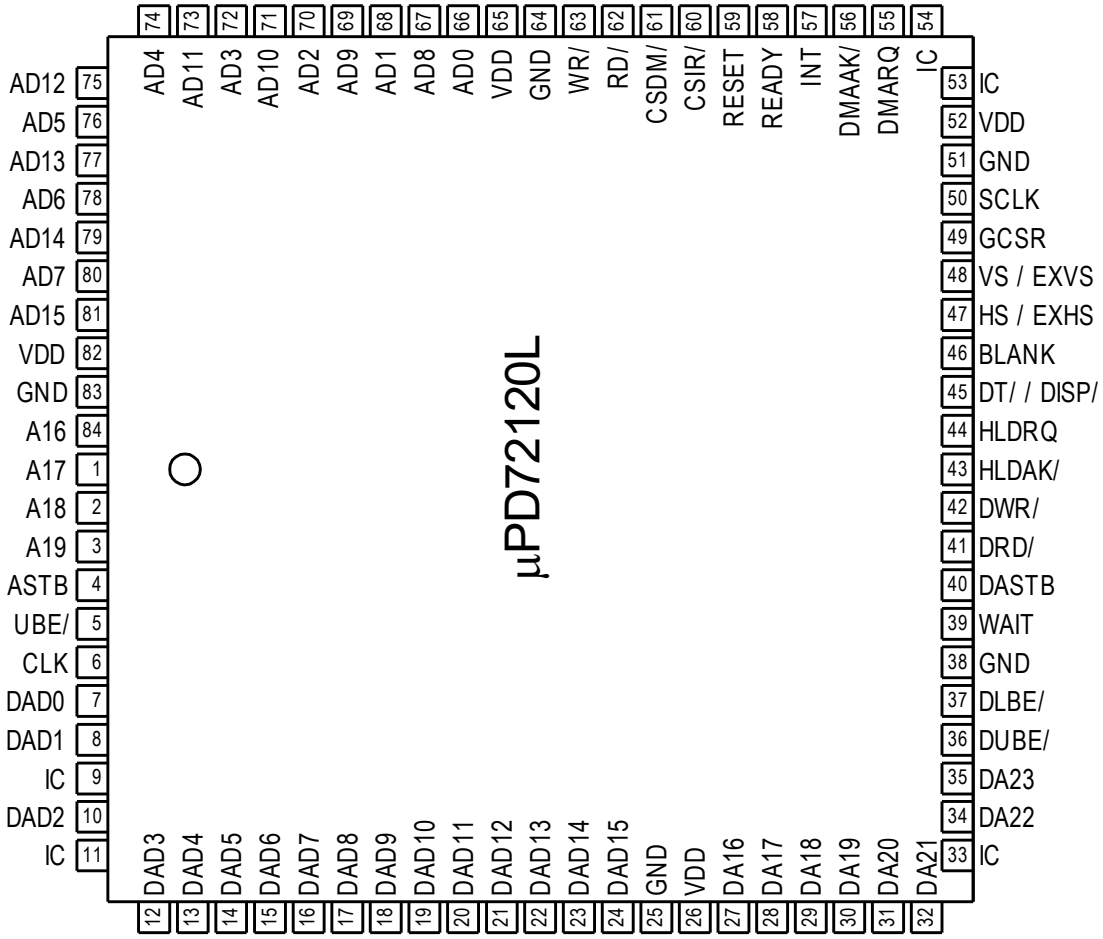

μPD72120L
AD12 75
AD5 76
AD13 77
AD6 78
AD14 79
AD7 80
AD15 81
VDD 82
GND 83
A16 84
A17 1
A18 2
A19 3
ASTB 4
UBE/ 5
CLK 6
DAD0 7
DAD1 8
IC 9
DAD2 10
IC 11
12 DAD3
13 DAD4
14 DAD5
15 DAD6
16 DAD7
17 DAD8
18 DAD9
19 DAD10
20 DAD11
21 DAD12
22 DAD13
23 DAD14
24 DAD15
25 GND
26 VDD
27 DA16
28 DA17
29 DA18
30 DA19
31 DA20
32 DA21
33 IC
34 DA22
35 DA23
36 DUBE/
37 DLBE/
38 GND
39 WAIT
40 DASTB
41 DRD/
42 DWR/
43 HLDAK/
44 HLDRQ
45 DT/ / DISP/
46 BLANK
47 HS / EXHS
48 VS / EXVS
49 GCSR
50 SCLK
51 GND
52 VDD
53 IC
54 IC
55 DMARQ
56 DMAAK/
57 INT
58 READY
59 RESET
60 CSIR/
61 CSDM/
62 RD/
63 WR/
64 GND
65 VDD
66 AD0
67 AD8
68 AD1
69 AD9
70 AD2
71 AD10
72 AD3
73 AD11
74 AD4

23 1o	47 2o	71 3o	95 4o	119 5o	143 6o	167 7o	191 8o	215 9o	239 ao	263 bo	287 co
22 1n	46 2n	70 3n	94 4n	118 5n	142 6n	166 7n	190 8n	214 9n	238 an	262 bn	286 cn
21 1m	45 2m	69 3m	93 4m	117 5m	141 6m	165 7m	189 8m	213 9m	237 am	261 bm	285 cm
20 1l	44 2l	68 3l	92 4l	116 5l	140 6l	164 7l	188 8l	212 9l	236 al	260 bl	284 cl
19 1k	43 2k	67 3k	91 4k	115 5k	139 6k	163 7k	187 8k	211 9k	235 ak	259 bk	283 ck
18 1j	42 2j	66 3j	90 4j	114 5j	138 6j	162 7j	186 8j	210 9j	234 aj	258 bj	282 cj
17 1i	41 2i	65 3i	89 4i	113 5i	137 6i	161 7i	185 8i	209 9i	233 ai	257 bi	281 ci
16 1h	40 2h	64 3h	88 4h	112 5h	136 6h	160 7h	184 8h	208 9h	232 ah	256 bh	280 ch
15 1g	39 2g	63 3g	87 4g	111 5g	135 6g	159 7g	183 8g	207 9g	231 ag	255 bg	279 cg
14 1f	38 2f	62 3f	86 4f	110 5f	134 6f	158 7f	182 8f	206 9f	230 af	254 bf	278 cf
13 1e	37 2e	61 3e	85 4e	109 5e	133 6e	157 7e	181 8e	205 9e	229 ae	253 be	277 ce
12 1d	36 2d	60 3d	84 4d	108 5d	132 6d	156 7d	180 8d	204 9d	228 ad	252 bd	276 cd
11 1c	35 2c	59 3c	83 4c	107 5c	131 6c	155 7c	179 8c	203 9c	227 ac	251 bc	275 cc
10 1b	34 2b	58 3b	82 4b	106 5b	130 6b	154 7b	178 8b	202 9b	226 ab	250 bb	274 cb
9 1a	33 2a	57 3a	81 4a	105 5a	129 6a	153 7a	177 8a	201 9a	225 aa	249 ba	273 ca
8 19	32 29	56 39	80 49	104 59	128 69	152 79	176 89	200 99	224 a9	248 b9	272 c9
7 18	31 28	55 38	79 48	103 58	127 68	151 78	175 88	199 98	223 a8	247 b8	271 c8
6 17	30 27	54 37	78 47	102 57	126 67	150 77	174 87	198 97	222 a7	246 b7	270 c7
5 16	29 26	53 36	77 46	101 56	125 66	149 76	173 86	197 96	221 a6	245 b6	269 c6
4 15	28 25	52 35	76 45	100 55	124 65	148 75	172 85	196 95	220 a5	244 b5	268 c5
3 14	27 24	51 34	75 44	99 54	123 64	147 74	171 84	195 94	219 a4	243 b4	267 c4
2 13	26 23	50 33	74 43	98 53	122 63	146 73	170 83	194 93	218 a3	242 b3	266 c3
1 12	25 22	49 32	73 42	97 52	121 62	145 72	169 82	193 92	217 a2	241 b2	265 c2
0 11	24 21	48 31	72 41	96 51	120 61	144 71	168 81	192 91	216 a1	240 b1	264 c1
Hugin Stack# vs. Coordinate (18 MP x 288 (12 x 24) Sectional Photos)											

Tools Utilized

(A) 18 MP (Mega Pixels) DSLR (Digital Single-Lens Reflex; TTL (Through The Lens)) camera (Image size : 5184 (W) x 3456 (H), 3:2) with mini HDMI interface and remote shutter release transceiver
(B) HDMI monitor TV (FHD (Full High Definition) 1920 x 1080)
(C) Metallurgical microscope (Object lens used; 10x) and camera adapter (Ocular lens; 2x)
(D) Hugin "Panorama photo stitcher"
(E) Gimp "GNU Image Manipulation Program"
(F) Intel i7 3.6 GHz Windows 10 Pro PC system with M.2 (PCIE 4 channels) SSD (Solid State Drive (Flash memory)) and 16 GB DDR4 (Double Data Rate fourth generation) 2400 (MT/s (Megatransfers per second)) synchronous DRAM

Hugin stitch processing took 4 hours and 35 minutes.

Micrograph Library

I am introducing total 25 die micrographs I made.

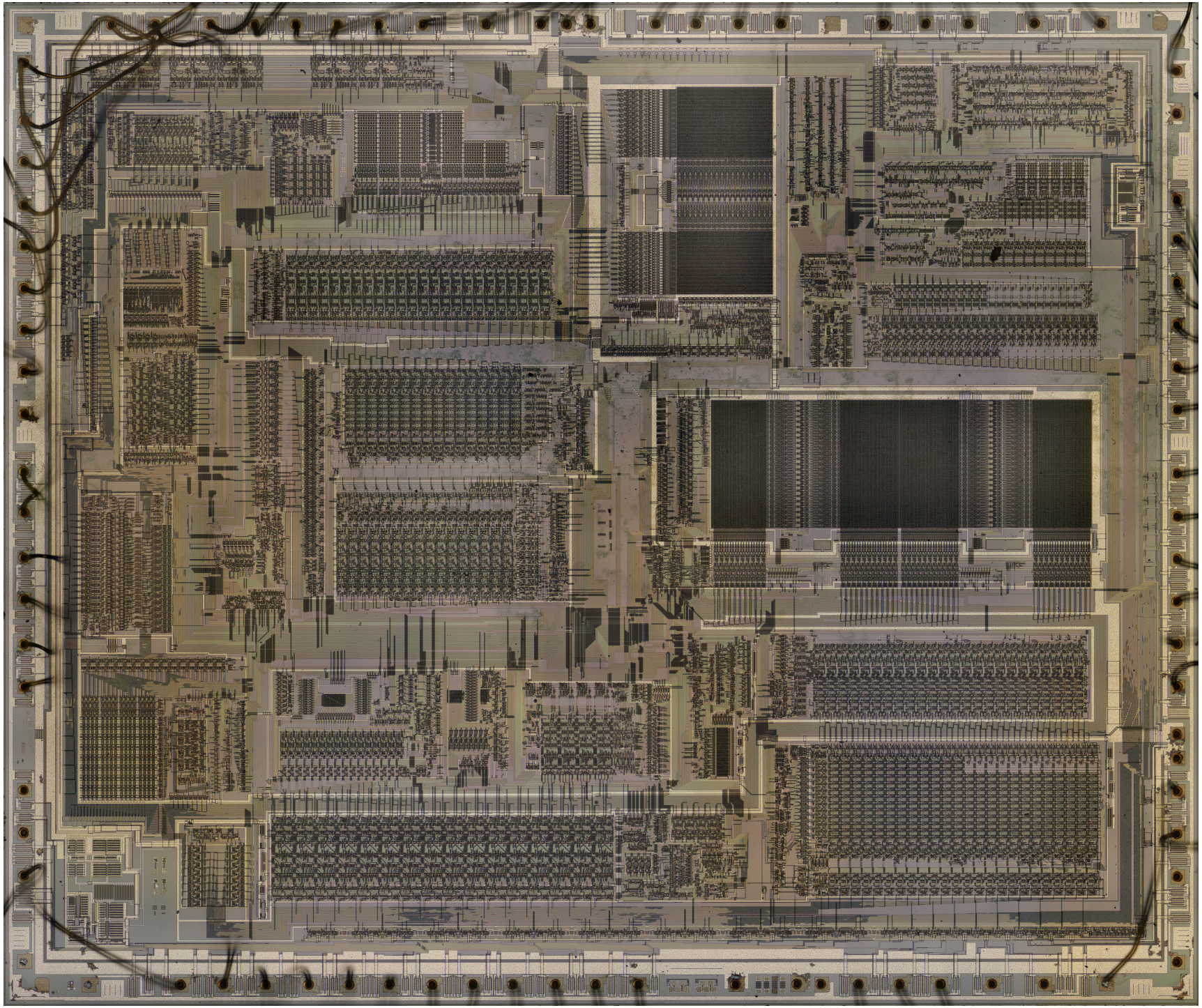
When zooming die micrograph using a smart phone or tablet, you possibly experience limited maximum available zoom factor (up to 2x), slow zooming speed, and sometimes freeze because of the factors such as slow CPU, insufficient main memory capacity, and simplified PDF viewer installed.

I recommend using a desk-top PC with large monitor TV (40”), fast CPU (i7), big capacity of main memory (32/16 GB), and fast GPU (8 GB) if possible.

Design company	Manufacturing company	Product name	Function
NEC		μPD282D	12 Digit Desk-top Calculator (ALU, Registers, etc.) <Tetsuji Oguchi>
		μPD941C	Single-chip 8 Digit 0 memory Desk-top Calculator <Tetsuji Oguchi>
		μPD946C	Single-chip 8 Digit 1 memory Desk-top Calculator
		μPD1201C	Single-chip 12 Digit 1 memory Desk-top Calculator with Printer Control <Tetsuji Oguchi>
		μPD777D	Single-chip Television Game Processor <Tetsuji Oguchi & Toshio Oura>
		μPD777C	
		μPD7220AD	Graphics Display Controller (GDC) <Tetsuji Oguchi>
NEC	Intel	iD82720	Graphics Display Controller (GDC) - License manufacturing (Second source) of μPD7220
NEC		μPD72120L	Advanced Graphics Display Controller (AGDC) <Tetsuji Oguchi, et al.>
		μPD765C	Floppy Disk Controller {NEC Fuchu Peripheral Equipment Division}
		μPD7720AD	Signal Processor {NEC Central Research}
		μPD277	Single-chip 8 Digit 1 memory Desk-top Calculator <Toshio Oura>
Casio	NEC	μPD977	Single-chip 8 Digit 1 memory Desk-top Calculator
		μPD871B	Digital watch
		μPD873G	
Intel		8080A	8 bit Microprocessor
		8085A	
		iD8086	16 bit Microprocessor
Intel	NEC	μPD8086D	16 bit Microprocessor - Reverse engineering of iD8086
	Oki	80C86A	16 bit Microprocessor - License manufacturing (Second source) of iD8086
Zilog		84C00	8 bit Microprocessor (Z80)
Nintendo	Ricoh	RP2C02	Television Game Processor (Family Computer with RP2A03)
Motorola	Ricoh	RP2A03	8 bit Microprocessor - Reverse engineering of Motorola 6800
	Motorola	68000	16 bit Microprocessor (Apple Macintosh)
TI		TMS9918A	Television Game Processor (Multiple chips)

{}; Architectural design by
<>; Architectural & Logic design by

Downloadable Files



µPD72120L 20x Die Photo 14000 x 11764 (165 MP) 6400% (64x) Tolerant Synthesized by Hugin