

JBT6K48-AS

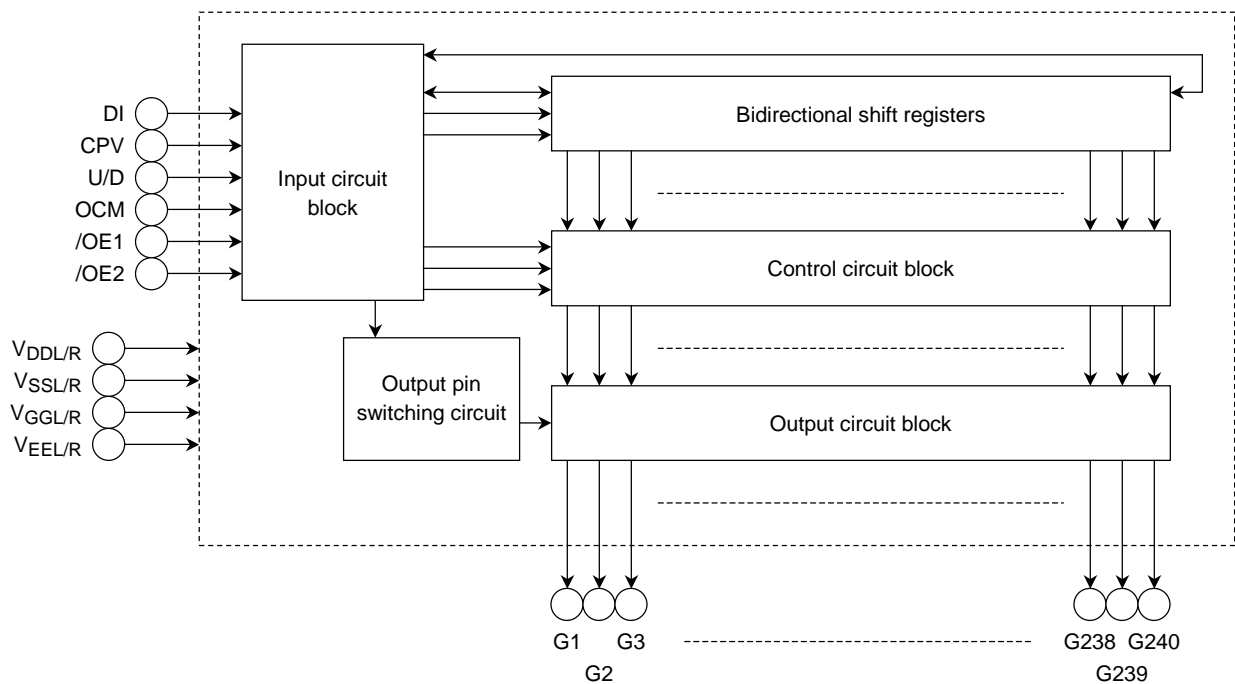
Gate Driver for TFT LCD Panel

The JBT6K48-AS is a 240-channel output gate driver for TFT-LCD. Combining the source driver JBT6K47-AS for TFT-LCD panel and the power supply IC JBT6K49-AS enables low power consumption operation. Based on high-speed CMOS, the JBT6K48-AS offers both low power consumption and high-speed operation.

Features

- LCD panel drive output pins: Switching 220 pins /240 pins output
- LCD panel drive output voltage: 13.0 to 33.0 V
- Power supply voltage (VDD): 2.5 to 3.6 V
- Data transfer method: Bidirectional shift registers
- Operating temperature: -20 to 75°C
- Package: Gold bump chip
- CMOS process
- Recommended driver: Source driver JBT6K47-AS for TFT-LCD panel
Power supply IC JBT6K49-AS

Block Diagram



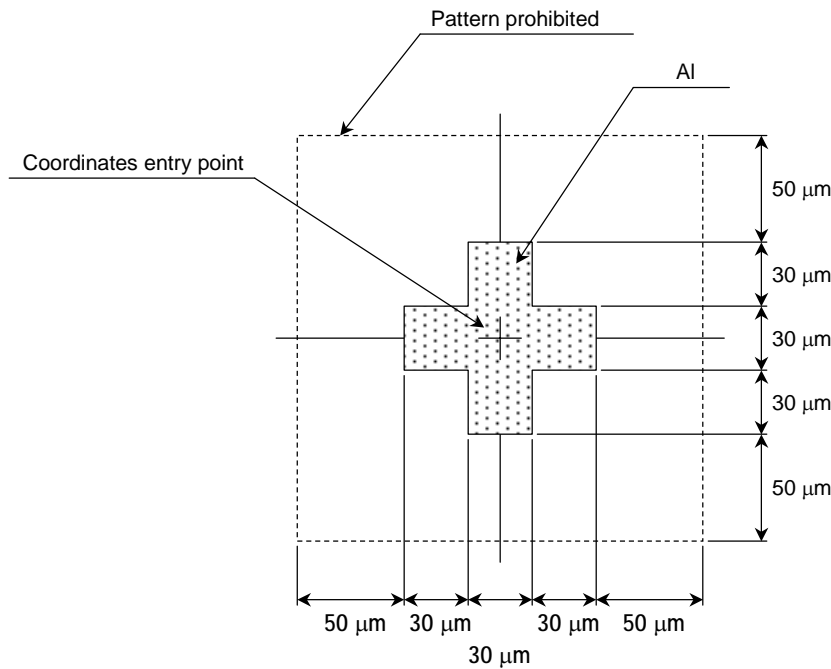
PAD Specification

| Item | Size | Unit |
|----------------------|-----------------|------|
| Chip size | 15470 × 1240 | μm |
| Chip end coordinates | (1) -7735, 620 | μm |
| | (2) 7735, -620 | |
| | (3) -7735, -620 | |
| | (4) 7735, 620 | |
| Bump pitch | 60 | μm |
| Bump height | 15 | μm |

| Pin Name | Numbers of Pin |
|----------------|---------------------------|
| Input pin | 96 |
| Output pin | 240 |
| TEG pin | 16 |
| DUMMY pin | 46 (Include DUV, DUG, DU) |
| Alignment mark | 2 |

Note 1: The TEG pin is a test pin reserved for electrical characteristics measurements, and must be left open.

Alignment mark specification



PAD Coordinates (1)

[Unit: μm]

| No. | Name | X POINT | Y POINT |
|-----|------|---------|---------|
| 1 | VEEL | -7258 | -482 |
| 2 | VEEL | -7173 | -482 |
| 3 | VEEL | -7088 | -482 |
| 4 | VEEL | -7003 | -482 |
| 5 | VEEL | -6918 | -482 |
| 6 | VEEL | -6833 | -482 |
| 7 | VEEL | -6748 | -482 |
| 8 | VEEL | -6663 | -482 |
| 9 | VEEL | -6578 | -482 |
| 10 | VEEL | -6493 | -482 |
| 11 | VEEL | -6408 | -482 |
| 12 | VEEL | -6323 | -482 |
| 13 | VDDL | -5948 | -482 |
| 14 | VDDL | -5863 | -482 |
| 15 | VDDL | -5778 | -482 |
| 16 | VDDL | -5693 | -482 |
| 17 | VDDL | -5608 | -482 |
| 18 | VDDL | -5523 | -482 |
| 19 | VDDL | -5438 | -482 |
| 20 | VDDL | -5353 | -482 |
| 21 | VSSL | -5108 | -482 |
| 22 | VSSL | -5023 | -482 |
| 23 | VSSL | -4938 | -482 |
| 24 | VSSL | -4853 | -482 |
| 25 | VSSL | -4768 | -482 |
| 26 | VSSL | -4683 | -482 |
| 27 | VSSL | -4598 | -482 |
| 28 | VSSL | -4513 | -482 |
| 29 | VSSL | -4428 | -482 |
| 30 | VSSL | -4343 | -482 |
| 31 | DU | -4098 | -482 |
| 32 | DU | -4013 | -482 |
| 33 | DU | -3928 | -482 |
| 34 | DU | -3843 | -482 |
| 35 | DU | -3758 | -482 |
| 36 | DU | -3673 | -482 |
| 37 | DU | -3588 | -482 |
| 38 | DU | -3503 | -482 |
| 39 | DUG | -3261 | -482 |
| 40 | DUG | -3176 | -482 |
| 41 | DUG | -3091 | -482 |
| 42 | DUG | -3006 | -482 |
| 43 | OCM | -2786 | -482 |

| No. | Name | X POINT | Y POINT |
|-----|--------|---------|---------|
| 44 | OCM | -2701 | -482 |
| 45 | OCM | -2616 | -482 |
| 46 | OCM | -2531 | -482 |
| 47 | DUV | -2311 | -482 |
| 48 | DUV | -2226 | -482 |
| 49 | DUV | -2141 | -482 |
| 50 | DUV | -2056 | -482 |
| 51 | U/D | -1836 | -482 |
| 52 | U/D | -1751 | -482 |
| 53 | U/D | -1666 | -482 |
| 54 | U/D | -1581 | -482 |
| 55 | DUG | -1361 | -482 |
| 56 | DUG | -1276 | -482 |
| 57 | DUG | -1191 | -482 |
| 58 | DUG | -1106 | -482 |
| 59 | CPV | -886 | -482 |
| 60 | CPV | -801 | -482 |
| 61 | CPV | -716 | -482 |
| 62 | CPV | -631 | -482 |
| 63 | DI | -436 | -482 |
| 64 | DI | -351 | -482 |
| 65 | DI | -266 | -482 |
| 66 | DI | -181 | -482 |
| 67 | DU | 39 | -482 |
| 68 | DU | 124 | -482 |
| 69 | DU | 209 | -482 |
| 70 | DU | 294 | -482 |
| 71 | /OE2 | 514 | -482 |
| 72 | /OE2 | 599 | -482 |
| 73 | /OE2 | 684 | -482 |
| 74 | /OE2 | 769 | -482 |
| 75 | /OE1 | 964 | -482 |
| 76 | /OE1 | 1049 | -482 |
| 77 | /OE1 | 1134 | -482 |
| 78 | /OE1 | 1219 | -482 |
| 79 | DUV | 1439 | -482 |
| 80 | DUV | 1524 | -482 |
| 81 | DUV | 1609 | -482 |
| 82 | DUV | 1694 | -482 |
| 83 | TEST17 | 1914 | -482 |
| 84 | TEST17 | 1999 | -482 |
| 85 | TEST17 | 2084 | -482 |
| 86 | TEST17 | 2169 | -482 |

| No. | Name | X POINT | Y POINT |
|-----|-------|---------|---------|
| 87 | DU | 2364 | -482 |
| 88 | DU | 2449 | -482 |
| 89 | DU | 2534 | -482 |
| 90 | DU | 2619 | -482 |
| 91 | TEG1 | 2848 | -482 |
| 92 | TEG2 | 2933 | -482 |
| 93 | TEG3 | 3018 | -482 |
| 94 | TEG4 | 3103 | -482 |
| 95 | TEG5 | 3188 | -482 |
| 96 | TEG6 | 3273 | -482 |
| 97 | TEG7 | 3358 | -482 |
| 98 | TEG8 | 3443 | -482 |
| 99 | TEG9 | 3528 | -482 |
| 100 | TEG10 | 3613 | -482 |
| 101 | TEG11 | 3698 | -482 |
| 102 | TEG12 | 3783 | -482 |
| 103 | TEG13 | 3868 | -482 |
| 104 | TEG14 | 3953 | -482 |
| 105 | TEG15 | 4038 | -482 |
| 106 | TEG16 | 4123 | -482 |
| 107 | VSSR | 4343 | -482 |
| 108 | VSSR | 4428 | -482 |
| 109 | VSSR | 4513 | -482 |
| 110 | VSSR | 4598 | -482 |
| 111 | VSSR | 4683 | -482 |
| 112 | VSSR | 4768 | -482 |
| 113 | VSSR | 4853 | -482 |
| 114 | VSSR | 4938 | -482 |
| 115 | VSSR | 5023 | -482 |
| 116 | VSSR | 5108 | -482 |
| 117 | VDDR | 5353 | -482 |
| 118 | VDDR | 5438 | -482 |
| 119 | VDDR | 5523 | -482 |
| 120 | VDDR | 5608 | -482 |
| 121 | VDDR | 5693 | -482 |
| 122 | VDDR | 5778 | -482 |
| 123 | VDDR | 5863 | -482 |
| 124 | VDDR | 5948 | -482 |
| 125 | VEER | 6323 | -482 |
| 126 | VEER | 6408 | -482 |
| 127 | VEER | 6493 | -482 |
| 128 | VEER | 6578 | -482 |
| 129 | VEER | 6663 | -482 |

PAD Coordinates (2)

[Unit: μm]

| No. | Name | X POINT | Y POINT |
|-----|------|---------|---------|
| 130 | VEER | 6748 | -482 |
| 131 | VEER | 6833 | -482 |
| 132 | VEER | 6918 | -482 |
| 133 | VEER | 7003 | -482 |
| 134 | VEER | 7088 | -482 |
| 135 | VEER | 7173 | -482 |
| 136 | VEER | 7258 | -482 |
| 137 | DU | 7587 | -305 |
| 138 | DU | 7587 | -205 |
| 139 | DU | 7587 | -105 |
| 140 | DU | 7587 | -5 |
| 141 | DU | 7587 | 95 |
| 142 | DU | 7587 | 195 |
| 143 | DU | 7587 | 295 |
| 144 | VGGR | 7463 | 411 |
| 145 | VGGR | 7403 | 411 |
| 146 | VGGR | 7343 | 411 |
| 147 | VGGR | 7283 | 411 |
| 148 | G1 | 7170 | 411 |
| 149 | G2 | 7110 | 411 |
| 150 | G3 | 7050 | 411 |
| 151 | G4 | 6990 | 411 |
| 152 | G5 | 6930 | 411 |
| 153 | G6 | 6870 | 411 |
| 154 | G7 | 6810 | 411 |
| 155 | G8 | 6750 | 411 |
| 156 | G9 | 6690 | 411 |
| 157 | G10 | 6630 | 411 |
| 158 | G11 | 6570 | 411 |
| 159 | G12 | 6510 | 411 |
| 160 | G13 | 6450 | 411 |
| 161 | G14 | 6390 | 411 |
| 162 | G15 | 6330 | 411 |
| 163 | G16 | 6270 | 411 |
| 164 | G17 | 6210 | 411 |
| 165 | G18 | 6150 | 411 |
| 166 | G19 | 6090 | 411 |
| 167 | G20 | 6030 | 411 |
| 168 | G21 | 5970 | 411 |
| 169 | G22 | 5910 | 411 |
| 170 | G23 | 5850 | 411 |
| 171 | G24 | 5790 | 411 |
| 172 | G25 | 5730 | 411 |

| No. | Name | X POINT | Y POINT |
|-----|------|---------|---------|
| 173 | G26 | 5670 | 411 |
| 174 | G27 | 5610 | 411 |
| 175 | G28 | 5550 | 411 |
| 176 | G29 | 5490 | 411 |
| 177 | G30 | 5430 | 411 |
| 178 | G31 | 5370 | 411 |
| 179 | G32 | 5310 | 411 |
| 180 | G33 | 5250 | 411 |
| 181 | G34 | 5190 | 411 |
| 182 | G35 | 5130 | 411 |
| 183 | G36 | 5070 | 411 |
| 184 | G37 | 5010 | 411 |
| 185 | G38 | 4950 | 411 |
| 186 | G39 | 4890 | 411 |
| 187 | G40 | 4830 | 411 |
| 188 | G41 | 4770 | 411 |
| 189 | G42 | 4710 | 411 |
| 190 | G43 | 4650 | 411 |
| 191 | G44 | 4590 | 411 |
| 192 | G45 | 4530 | 411 |
| 193 | G46 | 4470 | 411 |
| 194 | G47 | 4410 | 411 |
| 195 | G48 | 4350 | 411 |
| 196 | G49 | 4290 | 411 |
| 197 | G50 | 4230 | 411 |
| 198 | G51 | 4170 | 411 |
| 199 | G52 | 4110 | 411 |
| 200 | G53 | 4050 | 411 |
| 201 | G54 | 3990 | 411 |
| 202 | G55 | 3930 | 411 |
| 203 | G56 | 3870 | 411 |
| 204 | G57 | 3810 | 411 |
| 205 | G58 | 3750 | 411 |
| 206 | G59 | 3690 | 411 |
| 207 | G60 | 3630 | 411 |
| 208 | G61 | 3570 | 411 |
| 209 | G62 | 3510 | 411 |
| 210 | G63 | 3450 | 411 |
| 211 | G64 | 3390 | 411 |
| 212 | G65 | 3330 | 411 |
| 213 | G66 | 3270 | 411 |
| 214 | G67 | 3210 | 411 |
| 215 | G68 | 3150 | 411 |

| No. | Name | X POINT | Y POINT |
|-----|------|---------|---------|
| 216 | G69 | 3090 | 411 |
| 217 | G70 | 3030 | 411 |
| 218 | G71 | 2970 | 411 |
| 219 | G72 | 2910 | 411 |
| 220 | G73 | 2850 | 411 |
| 221 | G74 | 2790 | 411 |
| 222 | G75 | 2730 | 411 |
| 223 | G76 | 2670 | 411 |
| 224 | G77 | 2610 | 411 |
| 225 | G78 | 2550 | 411 |
| 226 | G79 | 2490 | 411 |
| 227 | G80 | 2430 | 411 |
| 228 | G81 | 2370 | 411 |
| 229 | G82 | 2310 | 411 |
| 230 | G83 | 2250 | 411 |
| 231 | G84 | 2190 | 411 |
| 232 | G85 | 2130 | 411 |
| 233 | G86 | 2070 | 411 |
| 234 | G87 | 2010 | 411 |
| 235 | G88 | 1950 | 411 |
| 236 | G89 | 1890 | 411 |
| 237 | G90 | 1830 | 411 |
| 238 | G91 | 1770 | 411 |
| 239 | G92 | 1710 | 411 |
| 240 | G93 | 1650 | 411 |
| 241 | G94 | 1590 | 411 |
| 242 | G95 | 1530 | 411 |
| 243 | G96 | 1470 | 411 |
| 244 | G97 | 1410 | 411 |
| 245 | G98 | 1350 | 411 |
| 246 | G99 | 1290 | 411 |
| 247 | G100 | 1230 | 411 |
| 248 | G101 | 1170 | 411 |
| 249 | G102 | 1110 | 411 |
| 250 | G103 | 1050 | 411 |
| 251 | G104 | 990 | 411 |
| 252 | G105 | 930 | 411 |
| 253 | G106 | 870 | 411 |
| 254 | G107 | 810 | 411 |
| 255 | G108 | 750 | 411 |
| 256 | G109 | 690 | 411 |
| 257 | G110 | 630 | 411 |
| 258 | G111 | 570 | 411 |

PAD Coordinates (3)

[Unit: μm]

| No. | Name | X POINT | Y POINT |
|-----|------|---------|---------|
| 259 | G112 | 510 | 411 |
| 260 | G113 | 450 | 411 |
| 261 | G114 | 390 | 411 |
| 262 | G115 | 330 | 411 |
| 263 | G116 | 270 | 411 |
| 264 | G117 | 210 | 411 |
| 265 | G118 | 150 | 411 |
| 266 | G119 | 90 | 411 |
| 267 | G120 | 30 | 411 |
| 268 | G121 | -30 | 411 |
| 269 | G122 | -90 | 411 |
| 270 | G123 | -150 | 411 |
| 271 | G124 | -210 | 411 |
| 272 | G125 | -270 | 411 |
| 273 | G126 | -330 | 411 |
| 274 | G127 | -390 | 411 |
| 275 | G128 | -450 | 411 |
| 276 | G129 | -510 | 411 |
| 277 | G130 | -570 | 411 |
| 278 | G131 | -630 | 411 |
| 279 | G132 | -690 | 411 |
| 280 | G133 | -750 | 411 |
| 281 | G134 | -810 | 411 |
| 282 | G135 | -870 | 411 |
| 283 | G136 | -930 | 411 |
| 284 | G137 | -990 | 411 |
| 285 | G138 | -1050 | 411 |
| 286 | G139 | -1110 | 411 |
| 287 | G140 | -1170 | 411 |
| 288 | G141 | -1230 | 411 |
| 289 | G142 | -1290 | 411 |
| 290 | G143 | -1350 | 411 |
| 291 | G144 | -1410 | 411 |
| 292 | G145 | -1470 | 411 |
| 293 | G146 | -1530 | 411 |
| 294 | G147 | -1590 | 411 |
| 295 | G148 | -1650 | 411 |
| 296 | G149 | -1710 | 411 |
| 297 | G150 | -1770 | 411 |
| 298 | G151 | -1830 | 411 |
| 299 | G152 | -1890 | 411 |
| 300 | G153 | -1950 | 411 |
| 301 | G154 | -2010 | 411 |

| No. | Name | X POINT | Y POINT |
|-----|------|---------|---------|
| 302 | G155 | -2070 | 411 |
| 303 | G156 | -2130 | 411 |
| 304 | G157 | -2190 | 411 |
| 305 | G158 | -2250 | 411 |
| 306 | G159 | -2310 | 411 |
| 307 | G160 | -2370 | 411 |
| 308 | G161 | -2430 | 411 |
| 309 | G162 | -2490 | 411 |
| 310 | G163 | -2550 | 411 |
| 311 | G164 | -2610 | 411 |
| 312 | G165 | -2670 | 411 |
| 313 | G166 | -2730 | 411 |
| 314 | G167 | -2790 | 411 |
| 315 | G168 | -2850 | 411 |
| 316 | G169 | -2910 | 411 |
| 317 | G170 | -2970 | 411 |
| 318 | G171 | -3030 | 411 |
| 319 | G172 | -3090 | 411 |
| 320 | G173 | -3150 | 411 |
| 321 | G174 | -3210 | 411 |
| 322 | G175 | -3270 | 411 |
| 323 | G176 | -3330 | 411 |
| 324 | G177 | -3390 | 411 |
| 325 | G178 | -3450 | 411 |
| 326 | G179 | -3510 | 411 |
| 327 | G180 | -3570 | 411 |
| 328 | G181 | -3630 | 411 |
| 329 | G182 | -3690 | 411 |
| 330 | G183 | -3750 | 411 |
| 331 | G184 | -3810 | 411 |
| 332 | G185 | -3870 | 411 |
| 333 | G186 | -3930 | 411 |
| 334 | G187 | -3990 | 411 |
| 335 | G188 | -4050 | 411 |
| 336 | G189 | -4110 | 411 |
| 337 | G190 | -4170 | 411 |
| 338 | G191 | -4230 | 411 |
| 339 | G192 | -4290 | 411 |
| 340 | G193 | -4350 | 411 |
| 341 | G194 | -4410 | 411 |
| 342 | G195 | -4470 | 411 |
| 343 | G196 | -4530 | 411 |
| 344 | G197 | -4590 | 411 |

| No. | Name | X POINT | Y POINT |
|-----|------|---------|---------|
| 345 | G198 | -4650 | 411 |
| 346 | G199 | -4710 | 411 |
| 347 | G200 | -4770 | 411 |
| 348 | G201 | -4830 | 411 |
| 349 | G202 | -4890 | 411 |
| 350 | G203 | -4950 | 411 |
| 351 | G204 | -5010 | 411 |
| 352 | G205 | -5070 | 411 |
| 353 | G206 | -5130 | 411 |
| 354 | G207 | -5190 | 411 |
| 355 | G208 | -5250 | 411 |
| 356 | G209 | -5310 | 411 |
| 357 | G210 | -5370 | 411 |
| 358 | G211 | -5430 | 411 |
| 359 | G212 | -5490 | 411 |
| 360 | G213 | -5550 | 411 |
| 361 | G214 | -5610 | 411 |
| 362 | G215 | -5670 | 411 |
| 363 | G216 | -5730 | 411 |
| 364 | G217 | -5790 | 411 |
| 365 | G218 | -5850 | 411 |
| 366 | G219 | -5910 | 411 |
| 367 | G220 | -5970 | 411 |
| 368 | G221 | -6030 | 411 |
| 369 | G222 | -6090 | 411 |
| 370 | G223 | -6150 | 411 |
| 371 | G224 | -6210 | 411 |
| 372 | G225 | -6270 | 411 |
| 373 | G226 | -6330 | 411 |
| 374 | G227 | -6390 | 411 |
| 375 | G228 | -6450 | 411 |
| 376 | G229 | -6510 | 411 |
| 377 | G230 | -6570 | 411 |
| 378 | G231 | -6630 | 411 |
| 379 | G232 | -6690 | 411 |
| 380 | G233 | -6750 | 411 |
| 381 | G234 | -6810 | 411 |
| 382 | G235 | -6870 | 411 |
| 383 | G236 | -6930 | 411 |
| 384 | G237 | -6990 | 411 |
| 385 | G238 | -7050 | 411 |
| 386 | G239 | -7110 | 411 |
| 387 | G240 | -7170 | 411 |

PAD Coordinates (4) [Unit: μm]

| No. | Name | X POINT | Y POINT |
|-----|---------------------|---------|---------|
| 388 | V _{GGL} | -7283 | 411 |
| 389 | V _{GGL} | -7343 | 411 |
| 390 | V _{GGL} | -7403 | 411 |
| 391 | V _{GGL} | -7463 | 411 |
| 392 | DU | -7587 | 295 |
| 393 | DU | -7587 | 195 |
| 394 | DU | -7587 | 95 |
| 395 | DU | -7587 | -5 |
| 396 | DU | -7587 | -105 |
| 397 | DU | -7587 | -205 |
| 398 | DU | -7587 | -305 |
| — | Alignment mark_L | -7548 | -433 |
| — | Alignment mark_R | 7548 | -433 |

Pin Description

| Pin Name | I/O | Function | | | | | | | | |
|------------------------------------|---|---|----------|-------------|-----|---|-----|---|----|----------------------------------|
| U/D | I | Data transfer direction switching pin Specifies the shift direction of the shift registers. <ul style="list-style-type: none"> U/D = H: G1 → G2 → G3 → G4 → G5 → ... → G240 U/D = L: G240 → G239 → G238 → G237 → ... → G1 Use the pin at DC level. For High, V _{DD} ; for Low, V _{SS} . | | | | | | | | |
| CPV | I | Vertical shift clock Shift clock for the shift registers. Data are shifted in sync with the rising edge of CPV. | | | | | | | | |
| DI | I | Vertical shift data input pin The data is input in the first stage of the shift register and latched in the shift register at the first rising edge of the CPV. | | | | | | | | |
| OCM | I | Output switching This pin switches numbers of LCD panel drive pins. OCM = H: 220 Output mode (G221 to G240 pin output indefinite voltage.) OCM = L: 240 Output mode | | | | | | | | |
| /OE1 | I | Output mode switching pin (1) <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Mode</th> <th>Output Mode</th> </tr> </thead> <tbody> <tr> <td>H</td> <td>Normal mode</td> </tr> <tr> <td>L</td> <td>All output off mode (ASYNC)</td> </tr> </tbody> </table> | Mode | Output Mode | H | Normal mode | L | All output off mode (ASYNC) | | |
| Mode | Output Mode | | | | | | | | | |
| H | Normal mode | | | | | | | | | |
| L | All output off mode (ASYNC) | | | | | | | | | |
| /OE2 | I | Output mode switching pin (2) <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Mode</th> <th>Output Mode</th> </tr> </thead> <tbody> <tr> <td>H</td> <td>Normal mode</td> </tr> <tr> <td>L</td> <td>All output off mode (sync with CPV)</td> </tr> </tbody> </table> | Mode | Output Mode | H | Normal mode | L | All output off mode (sync with CPV) | | |
| Mode | Output Mode | | | | | | | | | |
| H | Normal mode | | | | | | | | | |
| L | All output off mode (sync with CPV) | | | | | | | | | |
| G1 to G240 | O | LCD panel drive pins. | | | | | | | | |
| V _{DDL} /V _{DDR} | — | Power supply pin for internal logic | | | | | | | | |
| V _{SSL} /V _{SSR} | — | Power supply pin for internal logic | | | | | | | | |
| V _{GGL} /V _{GGR} | — | LCD panel drive pins | | | | | | | | |
| V _{EEL} /V _{EER} | — | LCD panel drive pins | | | | | | | | |
| TEST17 | I | Test pin (1) The pull down resistor is connected to this pin, and must be left open. | | | | | | | | |
| TEG1 to 16 | I | Test pin (2) This is a test pin, and must be left open. | | | | | | | | |
| DUG DUV DU | — | Dummy pin These pins are dummies, and each pin has an electric function such as, V _{DD} , V _{SS} or floating. The details are listed below. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Pin Name</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>DUG</td> <td>DUG ... A dummy pin for V_{SS}.</td> </tr> <tr> <td>DUV</td> <td>DUV ... A dummy pin for V_{DD}.</td> </tr> <tr> <td>DU</td> <td>DU ... A dummy pin for floating.</td> </tr> </tbody> </table> <p>Note 2: The DUG pin and the DUV pin are used to fix the level by the adjacent input pin. Do not use them as the reference power supply.</p> | Pin Name | Remarks | DUG | DUG ... A dummy pin for V _{SS} . | DUV | DUV ... A dummy pin for V _{DD} . | DU | DU ... A dummy pin for floating. |
| Pin Name | Remarks | | | | | | | | | |
| DUG | DUG ... A dummy pin for V _{SS} . | | | | | | | | | |
| DUV | DUV ... A dummy pin for V _{DD} . | | | | | | | | | |
| DU | DU ... A dummy pin for floating. | | | | | | | | | |

Device Function and Operation

- Setting the Data Transferring Direction**
 Setting U/D pin enables JBT6K48-AS shift the shift register in sync with the falling edge of the vertical shift clock input from the CPV pin. When the U/D pin data is fixed before the DI data is input, the function becomes valid.
- Inputting Data**
 The data is latched at the first falling edge of the CPV. The signal is output from the first falling edge of the CPV recognized the data.
- Switching Numbers of the Output Pin**
 The valid output pin can be switched either 220 pins or 240 pins using the COM pin. The details about the valid output pins are listed below.

| OCM | Valid output pin | Remarks |
|-----|------------------|--|
| 0 | G1 to G240 | |
| 1 | G1 to G220 | G221 to G240 output indefinite voltage level |

| OCM | U/D | Shifting Direction |
|-----|-----|--|
| 0 | 0 | G240 → G239 → G238 → …… → G3 → G2 → G1 |
| 0 | 1 | G1 → G2 → G3 → …… → G238 → G239 → G240 |
| 1 | 0 | G220 → G219 → G218 → …… → G3 → G2 → G1 |
| 1 | 1 | G1 → G2 → G3 → …… → G218 → G219 → G220 |

- Output mode switching function

JBT6K48-AS is capable to control the output signal using /OE1 and /OE2 pins. The /OE2 signal proceeds the /OE1 signal at output-off mode.

| /OE2 | /OE1 | Functions |
|------|------|---|
| 1 | 1 | Normal mode (Fig. 1) |
| | 0 | Output signals turn off unsynchronizing with CPV (Fig. 3) |
| 0 | 1 | Output signals turn off synchronizing with CPV (Fig. 2) |
| | 0 | /OE2 has priority no relation to /OE1 and output signals turn off |

a) Normal operation mode

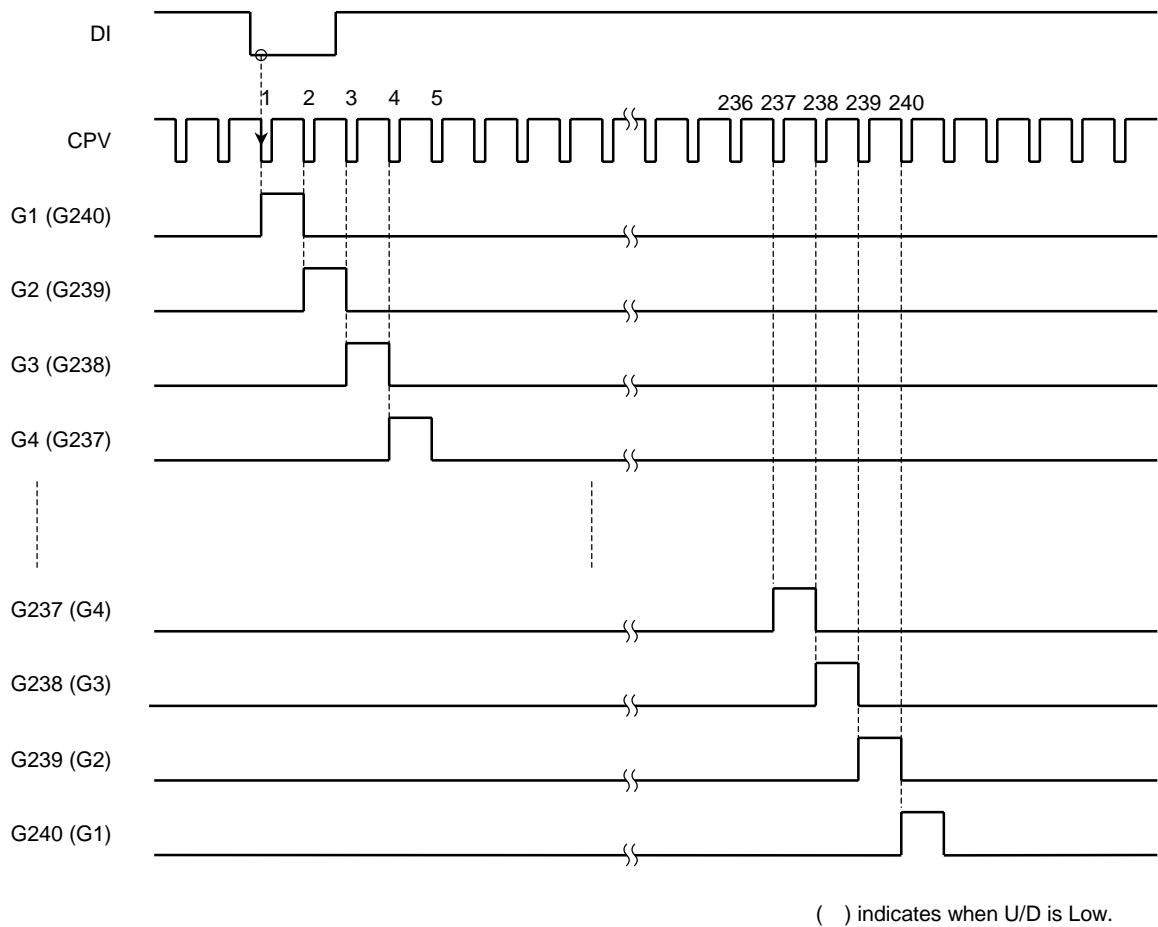


Figure 1

b) Normal mode + Sync off mode (/OE2)

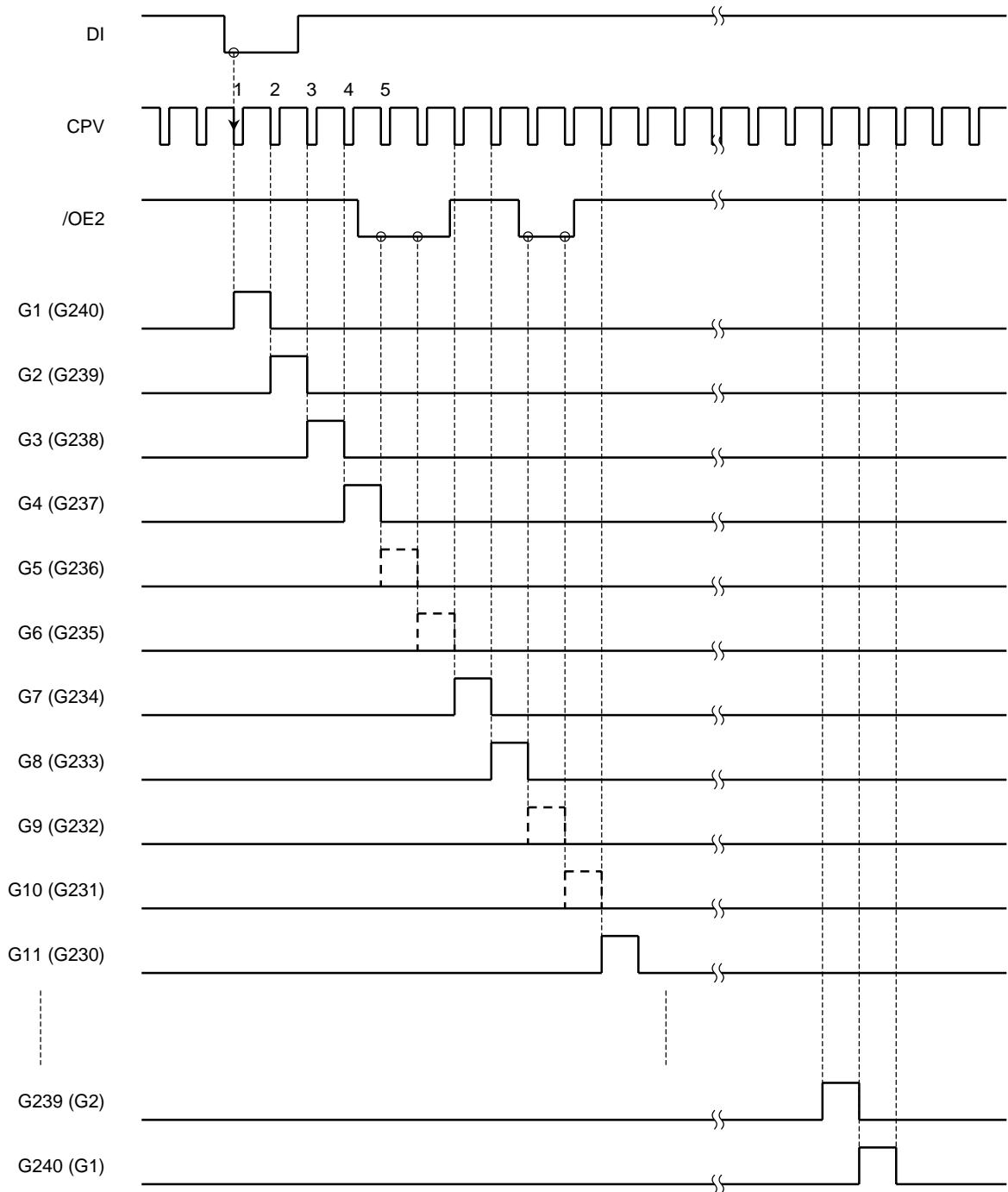


Figure 2

c) Normal mode+ ASYNC off mode (/OE1)

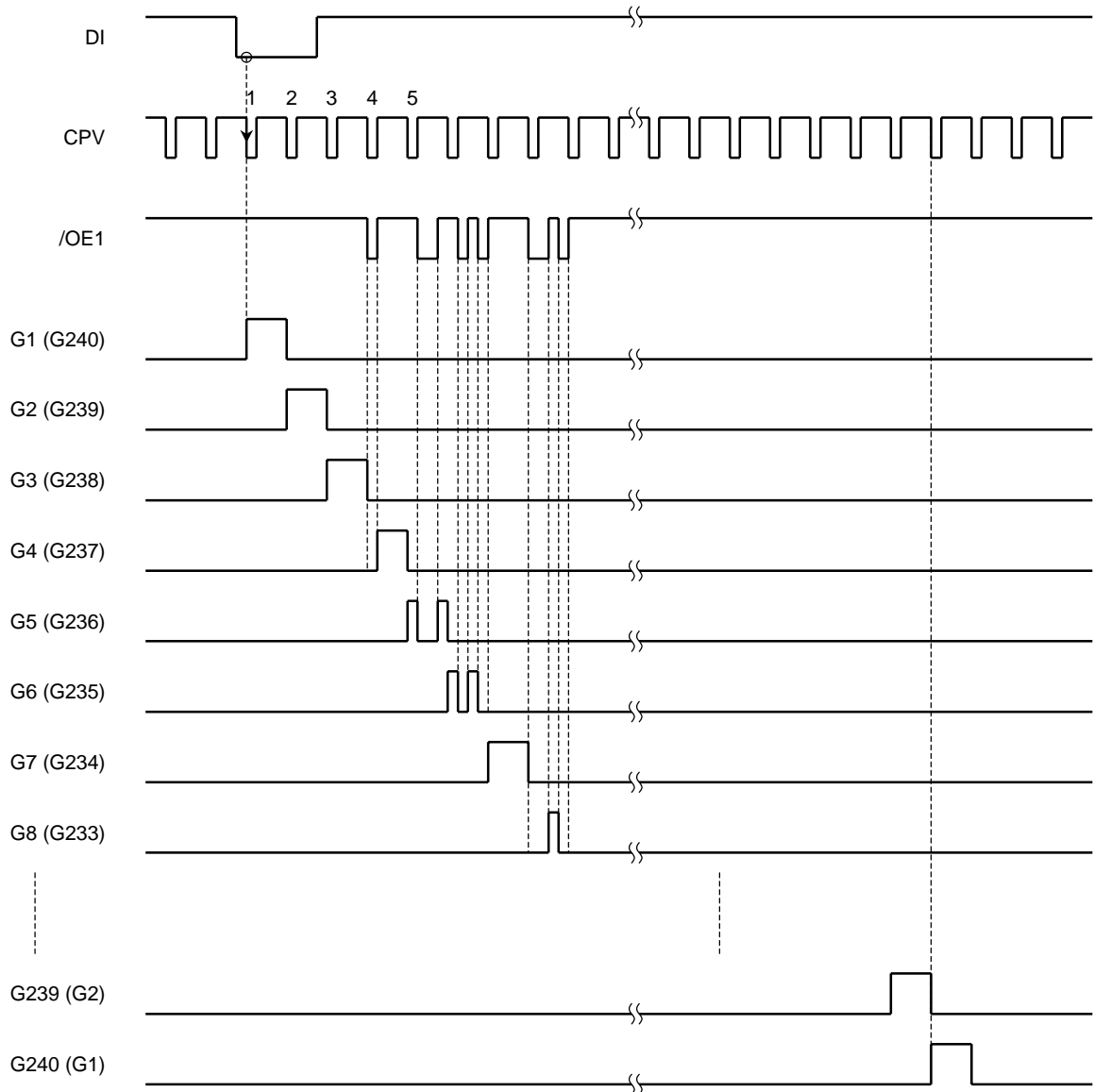


Figure 3

d) Synchronizing off mode + un-synchronizing off mode

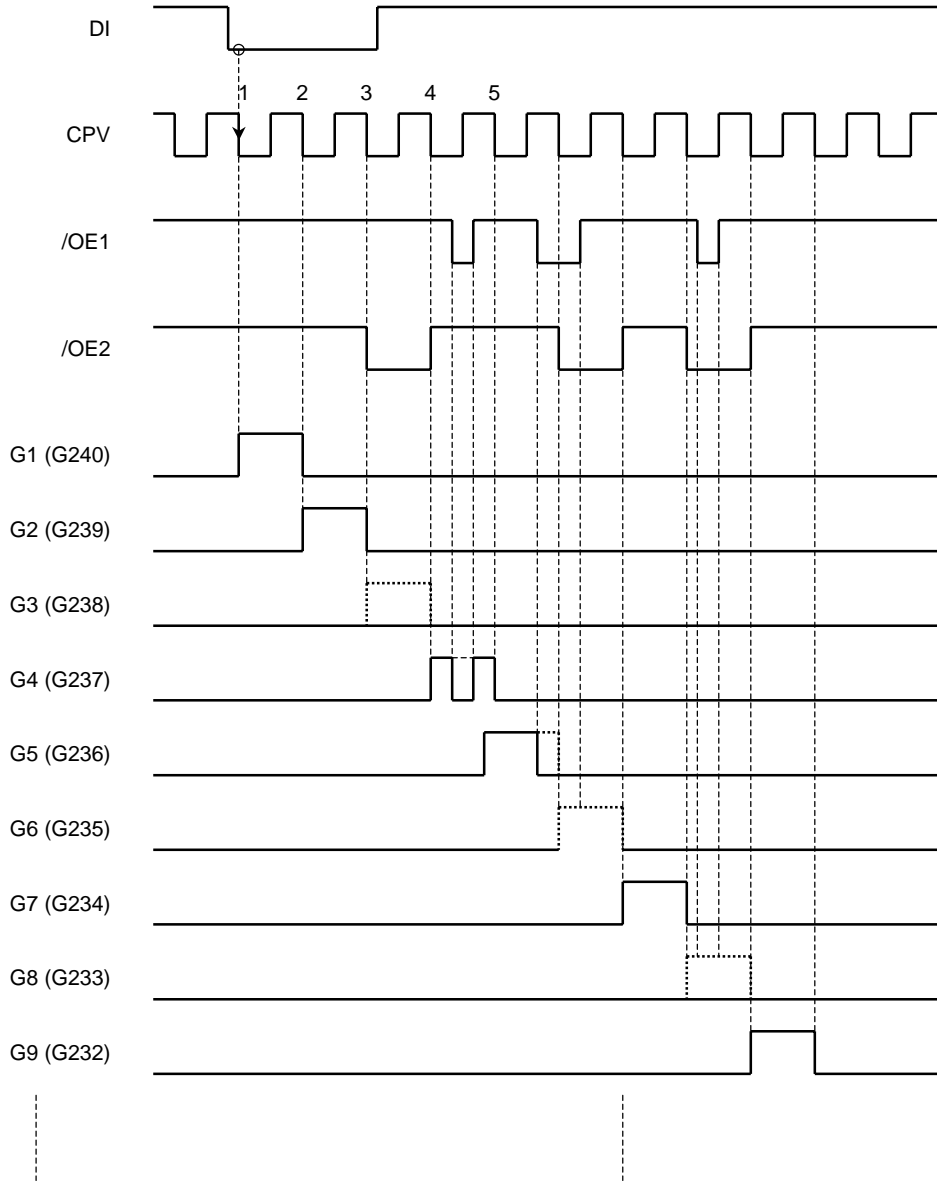


Figure 4

- Recommended Power-on and Power-off Sequence

If the logic power supply is applied under the floating condition, the device might be destructed by the large amounts of current because the LCD panel drive voltage is high. For this reason, apply the logic power supply first, then turn the LCD panel drive power supply on, or turn the both power supply on at the same timing. The internal logic condition is instable immediately after the logic power-on. Therefore, initialize the internal logic by transferring the clock for the continuous connecting and setting period using the CPV and DI input.

Turn the LCD panel drive power off first, then turn the logic power off, or turn the both power off at the same timing.

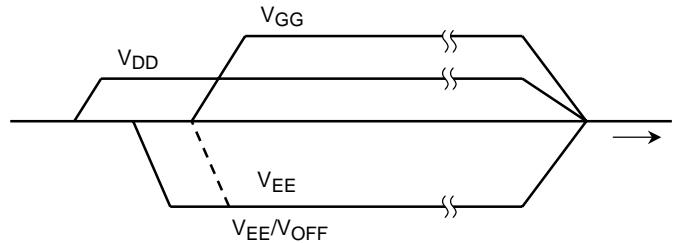
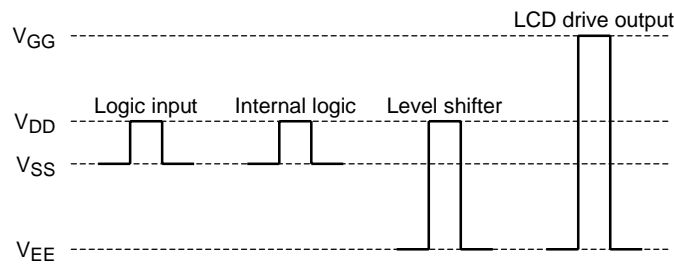


Figure 1

- Relations between power supplies



Maximum Ratings (Unless Otherwise Noted, $V_{SS} = 0\text{ V}$, $T_a = 25^\circ\text{C}$)

| Characteristics | Symbol | Rating | Unit |
|-----------------------|-------------------|------------------------|------------------|
| Supply voltage (1) | V_{DD} | -0.3 to 6.5 | V |
| Supply voltage (2) | V_{EE} | -20.0 to 0.3 | V |
| Supply voltage (3) | $V_{GG} - V_{EE}$ | -0.3 to 45.0 | V |
| Input voltage | V_{IN} | -0.3 to $V_{DD} + 0.3$ | V |
| Operating temperature | T_{opr} | -20 to 75 | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | -55 to 125 | $^\circ\text{C}$ |

Electrical Characteristics

DC Characteristics (1) (Unless Otherwise Noted, $V_{GG} - V_{EE} = 16.0$ to 33.0 V, $V_{DD} = 2.5$ to 3.6 V, $T_a = -20$ to 75°C)

| Characteristics | | Symbol | Test Circuit | Test Condition | Min | Typ. | Max | Unit | Relevant Pin |
|-------------------------|------------|---------------------|--------------|-----------------------------|-----------------|-------|-----------------|---------------|-------------------------------------|
| Supply voltage (1) | | V_{DD} | — | — | 2.5 | — | 3.6 | V | $V_{DDL/R}$ |
| Supply voltage (2) | | V_{EE} | — | — | -16.5 | -11.0 | -5 | V | $V_{EEL/R}$ |
| Supply voltage (3) | | V_{GG} | — | — | 8 | 12.5 | 16.5 | V | $V_{GGL/R}$ |
| Supply voltage (4) | | $ V_{GG} - V_{EE} $ | — | — | 16.0 | — | 33.0 | V | $V_{GGL/R}$, $V_{EEL/R}$ |
| Input voltage | Low level | V_{IL} | — | — | V_{SS} | — | 0.2 V_{DD} | V | DI, CPV, U/D, /OE1, /OE2, OCM |
| | High level | V_{IH} | | | 0.8 V_{DD} | — | V_{DD} | | |
| Output resistance | Low level | R_{OL} | — | $V_{OUT} = V_{OFF} + 0.5$ V | — | — | 7.5 | k Ω | G1 to G240 |
| | High level | R_{OH} | | $V_{OUT} = V_{GG} - 0.5$ V | — | — | 7.5 | | |
| Input leakage current | | I_{IN} | — | — | -1 | — | 1 | μA | DI, CPV, U/D, /OE1, /OE2, OCM |
| Operating frequency | | f_{CPV1} | — | — | — | 20 | 50 | kHz | CPV |
| Output load capacitance | | C_{L1} | — | (Note 3) | — | 36 | 100 | pF | G1-G240 |

Note 3: Load capacitance per an output pin.

DC Characteristics (2) (Unless Otherwise Noted, $V_{GG} - V_{EE} = 16.0$ to 33.0 V, $V_{DD} = 2.5$ to 3.6 V, $T_a = -20$ to 75°C
Typical value is $V_{DD} = 3.0$ V, $V_{GG} - V_{EE} = 30.0$ V, $CPV = 20$ kHz, $T_a = 25^\circ\text{C}$)

| Characteristics | | Symbol | Test Circuit | Test Condition | Min | Typ. | Max | Unit | Relevant Pin |
|-------------------------|--|----------|--------------|----------------|-----|------|-------|---------------|--|
| Current dissipation (1) | | I_{GG} | — | (Note 4, 5) | — | 3.2 | 30.0 | μA | $V_{GGL/R}$ |
| Current dissipation (2) | | I_{EE} | — | (Note 4, 5) | — | 3.3 | -30.0 | | $V_{EEL/R}$ |
| Current dissipation (3) | | I_{DD} | — | (Note 4) | — | 1.8 | 12.5 | | $V_{DDL/R}$ |
| Current dissipation (4) | | I_{SS} | — | (Note 4) | — | 1.7 | -13.0 | | $V_{SSL/R}$ |
| Current dissipation (5) | | STB | — | (Note 6) | -1 | — | 1 | | $V_{GGL/R}$, $V_{EEL/R}$, $V_{DDL/R}$, $V_{SSL/R}$ |

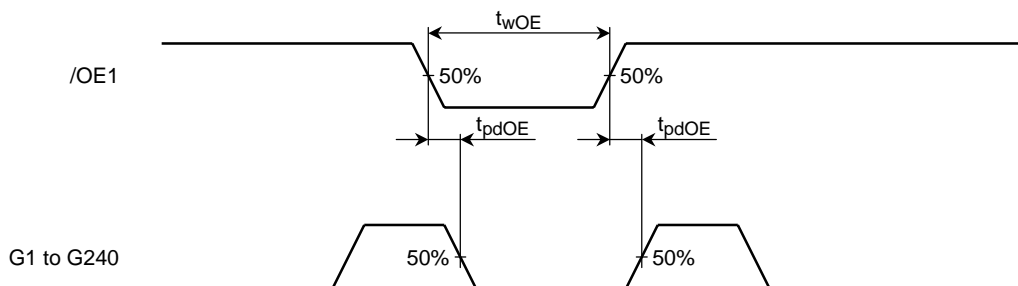
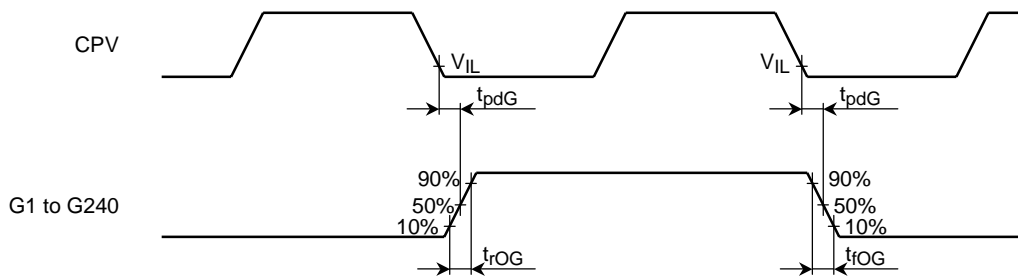
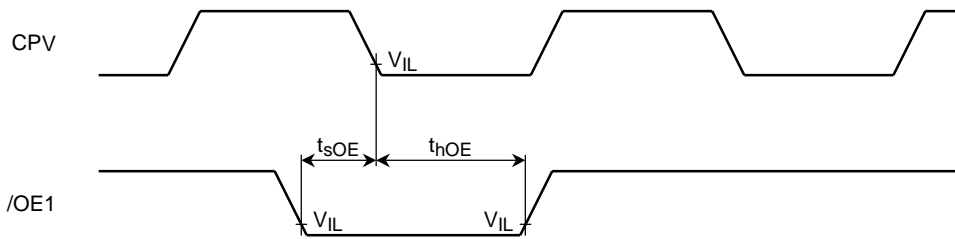
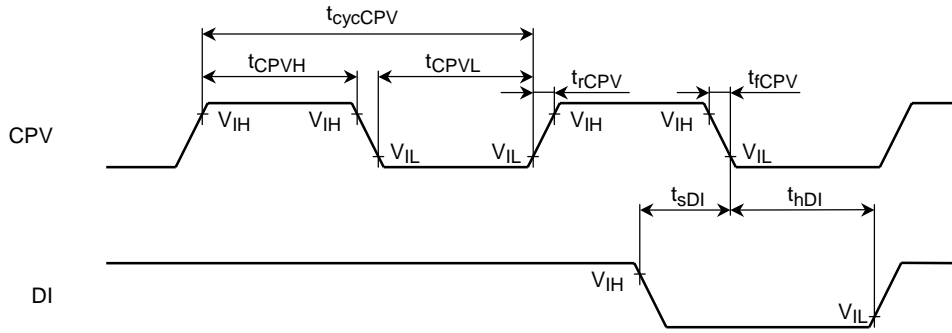
Note 4: $CPV = 50$ kHz

Note 5: $f_{Fram} = 70$ Hz

Note 6: $CPV = "L"$

AC Characteristics (Unless Otherwise Noted, $V_{GG} - V_{EE} = 30.0\text{ V}$, $V_{DD} = 2.5\text{ to }3.6\text{ V}$,
 $T_a = -20\text{ to }75^\circ\text{C}$)

| Characteristics | Symbol | Test Circuit | Test Condition | Min | Typ. | Max | Unit |
|----------------------------|---|--------------|-----------------------|-----|------|-----|---------------|
| CPV cycle time | t_{cycCPV} | — | — | | | 10 | μs |
| CPV pulse width Low level | t_{CPVL} | — | — | 500 | | | ns |
| CPV pulse width High level | t_{CPVH} | — | — | 5 | | | μs |
| CPV rising/falling time | t_{rCPV} / t_{fCPV} | — | — | | | 100 | ns |
| /OE enable time | t_{wOE} | — | — | 1 | | | μs |
| Data setup time | t_{sDI} | — | — | 100 | | | ns |
| | t_{sOE} | — | — | 100 | | | |
| Data hold time | t_{hDI} | — | — | 300 | | | ns |
| | t_{hOE} | — | — | 300 | | | |
| Output delay time (1) | t_{pdG} | — | $C_L = 100\text{ pF}$ | | | 2 | μs |
| Output delay time (2) | t_{pdOE} | — | $C_L = 100\text{ pF}$ | | | 2 | μs |
| Output rising/falling time | t_{rOG} / t_{fOG} | — | $C_L = 100\text{ pF}$ | | | 1.5 | μs |



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