



ST7262

1200CH System-On-Chip Driver for 800RGBx480 TFT LCD

Datasheet

Sitronix reserves the right to change the contents in this document without prior notice, please contact Sitronix to obtain the latest version of datasheet before placing your order. No responsibility is assumed by Sitronix for any infringement of patent or other rights of third parties which may result from its use.

© 2020 Sitronix Technology Corporation. All rights reserved.

Version 0.7

2020/06

Hazardous Substance Free
RoHS/ REACH Compliant

Sitronix Technology Corporation

Sitronix Technology Corp. reserves the right to change the contents in this document without prior notice.

LIST OF CONTENT

| | |
|--|-----------|
| 1. GENERAL DESCRIPTION | 5 |
| 2. FEATURES | 6 |
| 3. PAD ARRANGEMENT | 7 |
| 3.1 Output Bump Dimension | 7 |
| 3.2 Bump Dimension | 8 |
| 3.3 Alignment Mark Dimension | 8 |
| 4. PAD CENTER COORDINATES | 9 |
| 5. BLOCK DIAGRAM | 40 |
| 6. PIN DESCRIPTION | 41 |
| 6.1 Pin Function | 41 |
| 6.2 Hardware Pin Configuration Pin Mapping Software Register Setting | 45 |
| 7. COMMUNICATION INTERFACE | 46 |
| 7.1 3-wire Serial Interface | 46 |
| 7.2 I ² C Interface | 47 |
| 7.2.1 Bit Transfer | 47 |
| 7.2.2 START and STOP Conditions | 47 |
| 7.2.3 System Configuration | 48 |
| 7.2.4 Acknowledgment | 48 |
| 7.2.5 I ² C Interface Protocol | 49 |
| 7.3 RGB Interface | 50 |
| 7.3.1 SYNC Mode | 50 |
| 7.3.2 SYNC-DE Mode | 51 |
| 7.3.3 DE Mode | 52 |
| 7.3.4 Parallel 24-bit RGB Input Timing Table | 53 |
| 7.4 LVDS Interface | 54 |
| 7.4.1 LVDS Input Pin Mapping Table | 54 |
| 7.4.2 4 Lane VESA Data Format Color Bit Map | 54 |
| 7.4.3 4 Lane JEIDA Data Format Color Bit Map | 54 |
| 7.4.4 3 Lane VESA Mode Color Bit Map | 55 |
| 7.4.5 3 Lane JEIDA Mode Color Bit Map | 55 |
| 7.4.6 LVDS Input Timing Table | 55 |
| 8. REGISTER LIST | 57 |
| 8.1 Register Summary | 57 |
| 8.2 Command Table1 Register Description | 60 |
| 8.2.1 GRB、DISP CONTROL (10h) | 60 |
| 8.2.2 CONTRAST (11h) | 60 |
| 8.2.3 SUB_CONTRAST_R (12h) | 60 |
| 8.2.4 SUB_CONTRAST_B (13h) | 61 |

| | |
|--|-----------|
| 8.2.5 BRIGHTNESS (14h) | 61 |
| 8.2.6 SUB-BRIGHTNESS_R (15h) | 61 |
| 8.2.7 SUB-BRIGHTNESS_B (16h) | 61 |
| 8.2.8 H_BLANKING (17h) | 62 |
| 8.2.9 V_BLANKING (18h) | 62 |
| 8.2.10 DISPLAY MODE SETTING (19h) | 62 |
| 8.2.11 LVDS MODE SETTING (1Ah) | 63 |
| 8.2.12 RGB INTERFACE POLARITY SETTING (1Bh) | 63 |
| 8.2.13 OTP AUTO DOWNLOAD CONTROL (1Ch) | 64 |
| 8.3 Command Table2 Register Description | 65 |
| 8.3.1 GVDD SETTING (40h) | 65 |
| 8.3.2 GVCL SETTING (41h) | 66 |
| 8.3.3 VGHS, VGL SETTING (45h) | 67 |
| 8.3.4 SOURCE EQUALIZE TIME SETTING (46h) | 68 |
| 8.3.5 SOURCE OP-AMP POWER SETTING (47h) | 69 |
| 8.4 Gamma Table Register Description | 70 |
| 8.4.1 GAMMA SETTING (20h~29h, 30h~39h) | 70 |
| 8.5 OTP Table Register Description | 72 |
| 8.5.1 ID1 SETTING (01h) | 72 |
| 8.5.2 ID2 SETTING (02h) | 72 |
| 8.5.3 ID3 SETTING (03h) | 72 |
| 8.5.4 I ² C ID SETTING (04h) | 72 |
| 8.5.5 VCOM OFFSET SETTING (05h) | 73 |
| 8.5.6 OTP FUNCTION CONTROL (60h) | 73 |
| 8.5.7 OTP ACKNOWLEDGEMENT CONTROL (65h) | 74 |
| 8.5.8 COMMAND 2 PROGRAM TIMES (66h) | 74 |
| 8.5.9 GAMMA PROGRAM TIMES (67h) | 74 |
| 8.5.10 ID1 PROGRAM TIMES (68h) | 74 |
| 8.5.11 ID2 PROGRAM TIMES (69h) | 75 |
| 8.5.12 ID3 PROGRAM TIMES (6Ah) | 75 |
| 8.5.13 I ² C ID PROGRAM TIMES (6Bh) | 75 |
| 8.5.14 VCOM OFFEST PROGRAM TIMES (6Ch) | 75 |
| 9. ELECTRICAL SPECIFICATIONS | 76 |
| 9.1 Absolute Maximum Ratings | 76 |
| 9.2 DC Characteristics | 77 |
| 9.2.1 Recommended Operating Range | 77 |
| 9.2.2 DC Characteristics for Digital Circuit | 77 |
| 9.2.3 DC Characteristics for Analog Circuit | 77 |
| 9.2.4 DC Characteristics for LVDS Receiver Circuit | 78 |
| 9.3 AC Characteristics | 79 |

| | |
|--|-----------|
| 9.3.1 System Operation AC Characteristics | 79 |
| 9.3.2 System Bus Timing for I ² C Interface | 80 |
| 9.3.3 System Bus Timing for 3-Wire SPI Interface | 81 |
| 9.3.4 System Bus Timing for RGB Interface | 82 |
| 10. APPLICATION CIRCUIT | 84 |
| 10.1 External Component of Power Circuit | 84 |
| 10.1.1 OTP Application Circuit..... | 85 |
| 10.1.2 Reset Application Circuit..... | 85 |
| 10.2 Input Color Format Application Circuit | 86 |
| 10.2.1 Pin Assignment for RGB Interface | 86 |
| 10.2.2 Data Format | 87 |
| 10.2.3 16.7M (R G B, 8 8 8) INPUT COLOR FORMAT | 90 |
| 10.2.4 262K (R G B, 6 6 6) INPUT COLOR FORMAT..... | 90 |
| 10.2.5 65K (R G B, 5 6 5) INPUT COLOR FORMAT..... | 90 |
| 11. POWER ON/OFF SEQUENCE..... | 91 |
| 11.1 Power On Sequence..... | 91 |
| 11.2 Power Off Sequence..... | 91 |
| 12. RECOMMENDED PANEL ROUTING RESISTANCE..... | 92 |
| 13. COLOR FILTER ARRANGEMENT | 93 |
| 14. REVISION HISTORY | 94 |

1. GENERAL DESCRIPTION

IC offers all-in-one chip solution of 800RGBx480 for color dual gate TFT-LCD panel. The driver IC output ports consists of 1200 source channels and 20 gate control channels for panel application. This chip incorporated with digital timing generator, source and gate driver, power supply circuit and embedded 3-wire SPI and I²C interfaces for function setting. The display data bits sent from MCU via LVDS interface or RGB interface directly related to the pixels of LCD panel. The source output supports 256 gray scale with real 8-bit DAC to get a small output deviation for high color resolution. The power supply circuit incorporated with step-up circuit, regulators and operational amplifiers to generate power supply voltages to drive TFT LCD.

SITRONIX CONFIDENTIAL

2. FEATURES

- Display Resolution: arbitrary resolution up to 800*RGB (H) * 480(V)
 - 256 Gray Scale with True 8-bit DAC
 - full color mode: 16.7M, RGB(888) max
- LCD Driver Output Circuits
 - source outputs: 1200channels
 - gate outputs: 20 GIP control signals
 - common electrode output
- Microprocessor Interface
- - 3 lane and 4 lane LVDS interface
 - 24-bit RGB interface support: SYNC, SYNC-DE and DE mode
 - 3-wire SPI and I²C interface
- On Chip Build-In Circuits
 - DC/DC converter
 - Multi-OTP circuit
 - Timing controller
- Wide Supply Voltage Range
 - I/O voltage (VDDI to DGND): 3.1V ~3.6V
 - analog voltage (VDD to AGND): 3.1V ~3.6V
 - charge pump voltage (PVDD to PGND): 3.1V ~3.6V
 - enhance charge pump voltage (DUMMY(PVDD1) to PGND): 3.1V ~3.6V
- On-Chip Power System
 - GVDD: 4.960V ~ 5.968V
 - GVCL: -2.960V ~ -4.480V
 - VCOM: GND (Including built-in circuit for compensating feed-through voltage)
 - Maximum V_{op} : V_{op,max} ≤ GVDD-VCOM" = VCOM"-GVCL
- Optimized Layout for COG Assembly
- Built-in Multi-OTP Programming Circuit
 - Internal VPP power supply
- Multi-OTP Adjustable Parameters
 - 7-bit for VCOM offset adjustment
 - 7-bit ID1/ID2/ID3 OTP for end user use
 - 7-bit I2C I/F ID OTP for end user use
 - Command2 OTP for end user use
 - Gamma OTP for end user use
- Temperature Range: -30°C ~ 85°C
- Design for Consumer Applications; Automotive Related Products are Excluded

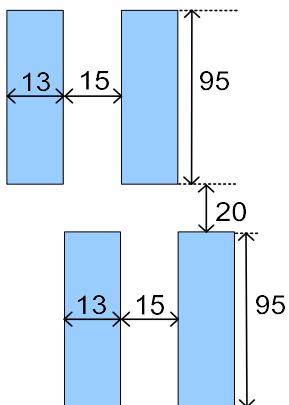
3. PAD ARRANGEMENT

3.1 Output Bump Dimension

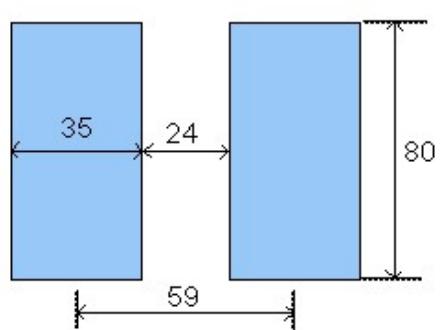


3.2 Bump Dimension

- (Pad NO. 399~1990)

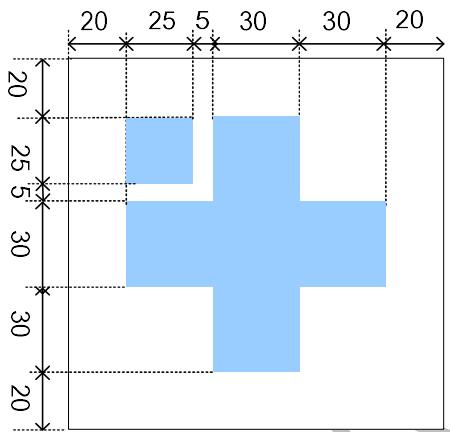


- (Pad NO. 1~398)

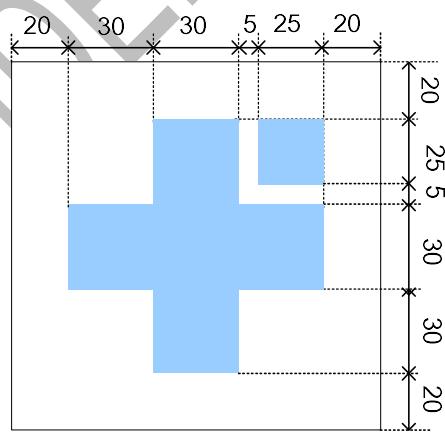


3.3 Alignment Mark Dimension

Alignment Mark: A1(X,Y)=(-11812,-337)



Alignment Mark: A2(X,Y)=(11812,-337)



4. PAD CENTER COORDINATES

| PAD No. | PIN Name | X | Y |
|---------|------------|--------|------|
| 1 | VPP | -11712 | -340 |
| 2 | VPP | -11653 | -340 |
| 3 | VPP | -11594 | -340 |
| 4 | VPP | -11535 | -340 |
| 5 | PGND | -11476 | -340 |
| 6 | PGND | -11417 | -340 |
| 7 | PGND | -11358 | -340 |
| 8 | PGND | -11299 | -340 |
| 9 | ENPROG | -11240 | -340 |
| 10 | DISP | -11181 | -340 |
| 11 | AUTODL | -11122 | -340 |
| 12 | TESTI[0] | -11063 | -340 |
| 13 | TESTI[1] | -11004 | -340 |
| 14 | TESTI[1] | -10945 | -340 |
| 15 | TESTI[2] | -10886 | -340 |
| 16 | TESTI[2] | -10827 | -340 |
| 17 | ERR_OUT | -10768 | -340 |
| 18 | ERR_OUT | -10709 | -340 |
| 19 | TESTOUT[0] | -10650 | -340 |
| 20 | TESTOUT[1] | -10591 | -340 |
| 21 | TESTOUT[2] | -10532 | -340 |
| 22 | TESTOUT[3] | -10473 | -340 |
| 23 | TESTOUT[4] | -10414 | -340 |
| 24 | TESTOUT[5] | -10355 | -340 |
| 25 | TESTOUT[6] | -10296 | -340 |
| 26 | TESTOUT[7] | -10237 | -340 |
| 27 | DGND | -10178 | -340 |
| 28 | DGND | -10119 | -340 |
| 29 | TESTI[3] | -10060 | -340 |
| 30 | TESTI[4] | -10001 | -340 |
| 31 | TESTI[5] | -9942 | -340 |
| 32 | TESTI[6] | -9883 | -340 |
| 33 | TESTI[7] | -9824 | -340 |

| PAD No. | PIN Name | X | Y |
|---------|-------------|-------|------|
| 34 | TESTI[8] | -9765 | -340 |
| 35 | TESTI[9] | -9706 | -340 |
| 36 | TESTI[10] | -9647 | -340 |
| 37 | TESTI[11] | -9588 | -340 |
| 38 | TESTI[12] | -9529 | -340 |
| 39 | TESTI[13] | -9470 | -340 |
| 40 | TESTI[14] | -9411 | -340 |
| 41 | DGND | -9352 | -340 |
| 42 | DGND | -9293 | -340 |
| 43 | DGND | -9234 | -340 |
| 44 | DGND | -9175 | -340 |
| 45 | DGND | -9116 | -340 |
| 46 | DGND | -9057 | -340 |
| 47 | DGND | -8998 | -340 |
| 48 | DGND | -8939 | -340 |
| 49 | VDDI | -8880 | -340 |
| 50 | VDDI | -8821 | -340 |
| 51 | VDDI | -8762 | -340 |
| 52 | VDDI | -8703 | -340 |
| 53 | VDDI | -8644 | -340 |
| 54 | VDDI | -8585 | -340 |
| 55 | VDDI | -8526 | -340 |
| 56 | VDDI | -8467 | -340 |
| 57 | SCL | -8408 | -340 |
| 58 | SCL | -8349 | -340 |
| 59 | SDA | -8290 | -340 |
| 60 | SDA | -8231 | -340 |
| 61 | SPI_I2C_SEL | -8172 | -340 |
| 62 | SPI_I2C_SEL | -8113 | -340 |
| 63 | CS | -8054 | -340 |
| 64 | CS | -7995 | -340 |
| 65 | GRB | -7936 | -340 |
| 66 | GRB | -7877 | -340 |

| PAD No. | PIN Name | X | Y | PAD No. | PIN Name | X | Y |
|---------|----------|-------|------|---------|----------|-------|------|
| 67 | DGND | -7818 | -340 | 100 | HSYNC | -5871 | -340 |
| 68 | DGND | -7759 | -340 | 101 | VSYNC | -5812 | -340 |
| 69 | DB[0] | -7700 | -340 | 102 | VSYNC | -5753 | -340 |
| 70 | DB[0] | -7641 | -340 | 103 | DE | -5694 | -340 |
| 71 | DB[1] | -7582 | -340 | 104 | DE | -5635 | -340 |
| 72 | DB[1] | -7523 | -340 | 105 | DGND | -5576 | -340 |
| 73 | DGND | -7464 | -340 | 106 | DGND | -5517 | -340 |
| 74 | DGND | -7405 | -340 | 107 | DGND | -5458 | -340 |
| 75 | DB[2] | -7346 | -340 | 108 | DGND | -5399 | -340 |
| 76 | DB[2] | -7287 | -340 | 109 | DGND | -5340 | -340 |
| 77 | DB[3] | -7228 | -340 | 110 | DGND | -5281 | -340 |
| 78 | DB[3] | -7169 | -340 | 111 | DGND | -5222 | -340 |
| 79 | DGND | -7110 | -340 | 112 | DGND | -5163 | -340 |
| 80 | DGND | -7051 | -340 | 113 | VDDI | -5104 | -340 |
| 81 | DB[4] | -6992 | -340 | 114 | VDDI | -5045 | -340 |
| 82 | DB[4] | -6933 | -340 | 115 | VDDI | -4986 | -340 |
| 83 | DB[5] | -6874 | -340 | 116 | VDDI | -4927 | -340 |
| 84 | DB[5] | -6815 | -340 | 117 | VDDI | -4868 | -340 |
| 85 | DGND | -6756 | -340 | 118 | VDDI | -4809 | -340 |
| 86 | DGND | -6697 | -340 | 119 | VDDI | -4750 | -340 |
| 87 | DB[6] | -6638 | -340 | 120 | VDDI | -4691 | -340 |
| 88 | DB[6] | -6579 | -340 | 121 | DG[0] | -4632 | -340 |
| 89 | DB[7] | -6520 | -340 | 122 | DG[0] | -4573 | -340 |
| 90 | DB[7] | -6461 | -340 | 123 | DG[1] | -4514 | -340 |
| 91 | DGND | -6402 | -340 | 124 | DG[1] | -4455 | -340 |
| 92 | DGND | -6343 | -340 | 125 | DG[2] | -4396 | -340 |
| 93 | DCLKP | -6284 | -340 | 126 | DG[2] | -4337 | -340 |
| 94 | DCLKP | -6225 | -340 | 127 | DG[3] | -4278 | -340 |
| 95 | DCLKN | -6166 | -340 | 128 | DG[3] | -4219 | -340 |
| 96 | DCLKN | -6107 | -340 | 129 | DG[4] | -4160 | -340 |
| 97 | DGND | -6048 | -340 | 130 | DG[4] | -4101 | -340 |
| 98 | DGND | -5989 | -340 | 131 | DG[5] | -4042 | -340 |
| 99 | Hsync | -5930 | -340 | 132 | DG[5] | -3983 | -340 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|------|
| 133 | DG[6] | -3924 | -340 |
| 134 | DG[6] | -3865 | -340 |
| 135 | DG[7] | -3806 | -340 |
| 136 | DG[7] | -3747 | -340 |
| 137 | DGND | -3688 | -340 |
| 138 | DGND | -3629 | -340 |
| 139 | DR[0] | -3570 | -340 |
| 140 | DR[0] | -3511 | -340 |
| 141 | DR[1] | -3452 | -340 |
| 142 | DR[1] | -3393 | -340 |
| 143 | DR[2] | -3334 | -340 |
| 144 | DR[2] | -3275 | -340 |
| 145 | DR[3] | -3216 | -340 |
| 146 | DR[3] | -3157 | -340 |
| 147 | DR[4] | -3098 | -340 |
| 148 | DR[4] | -3039 | -340 |
| 149 | DR[5] | -2980 | -340 |
| 150 | DR[5] | -2921 | -340 |
| 151 | DR[6] | -2862 | -340 |
| 152 | DR[6] | -2803 | -340 |
| 153 | DR[7] | -2744 | -340 |
| 154 | DR[7] | -2685 | -340 |
| 155 | DGND | -2626 | -340 |
| 156 | DGND | -2567 | -340 |
| 157 | VDIR | -2508 | -340 |
| 158 | VDIR | -2449 | -340 |
| 159 | HDIR | -2390 | -340 |
| 160 | HDIR | -2331 | -340 |
| 161 | SWAP | -2272 | -340 |
| 162 | SWAP | -2213 | -340 |
| 163 | DCLKPOL | -2154 | -340 |
| 164 | DCLKPOL | -2095 | -340 |
| 165 | HDPOL | -2036 | -340 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|------|
| 166 | HDPOL | -1977 | -340 |
| 167 | VDPOL | -1918 | -340 |
| 168 | VDPOL | -1859 | -340 |
| 169 | DGND | -1800 | -340 |
| 170 | DGND | -1741 | -340 |
| 171 | LVDS_FMT | -1682 | -340 |
| 172 | LVDS_FMT | -1623 | -340 |
| 173 | INTF | -1564 | -340 |
| 174 | INTF | -1505 | -340 |
| 175 | BIST_EN | -1446 | -340 |
| 176 | BIST_EN | -1387 | -340 |
| 177 | DUMMY | -1328 | -340 |
| 178 | DUMMY | -1269 | -340 |
| 179 | VCC | -1210 | -340 |
| 180 | VCC | -1151 | -340 |
| 181 | VCC | -1092 | -340 |
| 182 | VCC | -1033 | -340 |
| 183 | VDD | -974 | -340 |
| 184 | VDD | -915 | -340 |
| 185 | VDD | -856 | -340 |
| 186 | VDD | -797 | -340 |
| 187 | VDD | -738 | -340 |
| 188 | VDD | -679 | -340 |
| 189 | VDD | -620 | -340 |
| 190 | VDD | -561 | -340 |
| 191 | VDD | -502 | -340 |
| 192 | VDD | -443 | -340 |
| 193 | VDD | -384 | -340 |
| 194 | VDD | -325 | -340 |
| 195 | DUMMY | -266 | -340 |
| 196 | RGND | -207 | -340 |
| 197 | RGND | -148 | -340 |
| 198 | DUMMY | -89 | -340 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|------|
| 199 | AGND | -30 | -340 |
| 200 | AGND | 30 | -340 |
| 201 | AGND | 89 | -340 |
| 202 | AGND | 148 | -340 |
| 203 | AGND | 207 | -340 |
| 204 | AGND | 266 | -340 |
| 205 | AGND | 325 | -340 |
| 206 | AGND | 384 | -340 |
| 207 | AGND | 443 | -340 |
| 208 | AGND | 502 | -340 |
| 209 | AGND | 561 | -340 |
| 210 | AGND | 620 | -340 |
| 211 | DUMMY | 679 | -340 |
| 212 | SGND | 738 | -340 |
| 213 | SGND | 797 | -340 |
| 214 | SGND | 856 | -340 |
| 215 | SGND | 915 | -340 |
| 216 | SGND | 974 | -340 |
| 217 | SGND | 1033 | -340 |
| 218 | SGND | 1092 | -340 |
| 219 | SGND | 1151 | -340 |
| 220 | SGND | 1210 | -340 |
| 221 | SGND | 1269 | -340 |
| 222 | SGND | 1328 | -340 |
| 223 | SGND | 1387 | -340 |
| 224 | SGND | 1446 | -340 |
| 225 | SGND | 1505 | -340 |
| 226 | DUMMY | 1564 | -340 |
| 227 | V20 | 1623 | -340 |
| 228 | V20 | 1682 | -340 |
| 229 | DUMMY | 1741 | -340 |
| 230 | GVCL | 1800 | -340 |
| 231 | GVCL | 1859 | -340 |

| PAD No. | PIN Name | X | Y |
|---------|------------|------|------|
| 232 | DUMMY | 1918 | -340 |
| 233 | VGSP | 1977 | -340 |
| 234 | VGSP | 2036 | -340 |
| 235 | DUMMY | 2095 | -340 |
| 236 | GVDD | 2154 | -340 |
| 237 | GVDD | 2213 | -340 |
| 238 | DUMMY | 2272 | -340 |
| 239 | TESTOUT[8] | 2331 | -340 |
| 240 | TESTOUT[8] | 2390 | -340 |
| 241 | TESTOUT[8] | 2449 | -340 |
| 242 | TESTOUT[8] | 2508 | -340 |
| 243 | TESTOUT[9] | 2567 | -340 |
| 244 | TESTOUT[9] | 2626 | -340 |
| 245 | TESTOUT[9] | 2685 | -340 |
| 246 | TESTOUT[9] | 2744 | -340 |
| 247 | DUMMY | 2803 | -340 |
| 248 | SGND | 2862 | -340 |
| 249 | SGND | 2921 | -340 |
| 250 | SGND | 2980 | -340 |
| 251 | SGND | 3039 | -340 |
| 252 | SGND | 3098 | -340 |
| 253 | SGND | 3157 | -340 |
| 254 | SGND | 3216 | -340 |
| 255 | SGND | 3275 | -340 |
| 256 | SGND | 3334 | -340 |
| 257 | SGND | 3393 | -340 |
| 258 | SGND | 3452 | -340 |
| 259 | SGND | 3511 | -340 |
| 260 | DUMMY | 3570 | -340 |
| 261 | SVCL | 3629 | -340 |
| 262 | SVCL | 3688 | -340 |
| 263 | SVCL | 3747 | -340 |
| 264 | SVCL | 3806 | -340 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|------|
| 265 | SVCL | 3865 | -340 |
| 266 | SVCL | 3924 | -340 |
| 267 | DUMMY | 3983 | -340 |
| 268 | SVDD | 4042 | -340 |
| 269 | SVDD | 4101 | -340 |
| 270 | SVDD | 4160 | -340 |
| 271 | SVDD | 4219 | -340 |
| 272 | SVDD | 4278 | -340 |
| 273 | SVDD | 4337 | -340 |
| 274 | DUMMY | 4396 | -340 |
| 275 | PGND | 4455 | -340 |
| 276 | PGND | 4514 | -340 |
| 277 | PGND | 4573 | -340 |
| 278 | PGND | 4632 | -340 |
| 279 | PGND | 4691 | -340 |
| 280 | PGND | 4750 | -340 |
| 281 | PGND | 4809 | -340 |
| 282 | PGND | 4868 | -340 |
| 283 | PGND | 4927 | -340 |
| 284 | PGND | 4986 | -340 |
| 285 | PGND | 5045 | -340 |
| 286 | PGND | 5104 | -340 |
| 287 | PGND | 5163 | -340 |
| 288 | PGND | 5222 | -340 |
| 289 | PGND | 5281 | -340 |
| 290 | PGND | 5340 | -340 |
| 291 | PGND | 5399 | -340 |
| 292 | PGND | 5458 | -340 |
| 293 | PGND | 5517 | -340 |
| 294 | PGND | 5576 | -340 |
| 295 | PGND | 5635 | -340 |
| 296 | PGND | 5694 | -340 |
| 297 | PGND | 5753 | -340 |

| PAD No. | PIN Name | X | Y |
|---------|-------------|------|------|
| 298 | PGND | 5812 | -340 |
| 299 | PGND | 5871 | -340 |
| 300 | PGND | 5930 | -340 |
| 301 | DUMMY | 5989 | -340 |
| 302 | TESTOUT[10] | 6048 | -340 |
| 303 | TESTOUT[10] | 6107 | -340 |
| 304 | TESTOUT[10] | 6166 | -340 |
| 305 | TESTOUT[10] | 6225 | -340 |
| 306 | DUMMY | 6284 | -340 |
| 307 | AVDD1 | 6343 | -340 |
| 308 | AVDD1 | 6402 | -340 |
| 309 | AVDD1 | 6461 | -340 |
| 310 | AVDD1 | 6520 | -340 |
| 311 | DUMMY | 6579 | -340 |
| 312 | TESTOUT[11] | 6638 | -340 |
| 313 | TESTOUT[11] | 6697 | -340 |
| 314 | TESTOUT[11] | 6756 | -340 |
| 315 | TESTOUT[11] | 6815 | -340 |
| 316 | DUMMY | 6874 | -340 |
| 317 | AVCL1 | 6933 | -340 |
| 318 | AVCL1 | 6992 | -340 |
| 319 | AVCL1 | 7051 | -340 |
| 320 | AVCL1 | 7110 | -340 |
| 321 | DUMMY | 7169 | -340 |
| 322 | TESTOUT[12] | 7228 | -340 |
| 323 | TESTOUT[12] | 7287 | -340 |
| 324 | TESTOUT[12] | 7346 | -340 |
| 325 | TESTOUT[12] | 7405 | -340 |
| 326 | DUMMY | 7464 | -340 |
| 327 | PVDD | 7523 | -340 |
| 328 | PVDD | 7582 | -340 |
| 329 | PVDD | 7641 | -340 |
| 330 | PVDD | 7700 | -340 |

| PAD No. | PIN Name | X | Y |
|---------|-------------|------|------|
| 331 | PVDD | 7759 | -340 |
| 332 | PVDD | 7818 | -340 |
| 333 | PVDD | 7877 | -340 |
| 334 | PVDD | 7936 | -340 |
| 335 | PVDD | 7995 | -340 |
| 336 | PVDD | 8054 | -340 |
| 337 | PVDD | 8113 | -340 |
| 338 | PVDD | 8172 | -340 |
| 339 | PVDD | 8231 | -340 |
| 340 | PVDD | 8290 | -340 |
| 341 | PVDD | 8349 | -340 |
| 342 | PVDD | 8408 | -340 |
| 343 | PVDD | 8467 | -340 |
| 344 | PVDD | 8526 | -340 |
| 345 | PVDD | 8585 | -340 |
| 346 | PVDD | 8644 | -340 |
| 347 | PVDD | 8703 | -340 |
| 348 | PVDD | 8762 | -340 |
| 349 | PVDD | 8821 | -340 |
| 350 | PVDD | 8880 | -340 |
| 351 | PVDD | 8939 | -340 |
| 352 | PVDD | 8998 | -340 |
| 353 | DUMMY | 9057 | -340 |
| 354 | TESTOUT[13] | 9116 | -340 |
| 355 | TESTOUT[13] | 9175 | -340 |
| 356 | TESTOUT[13] | 9234 | -340 |
| 357 | TESTOUT[13] | 9293 | -340 |
| 358 | TESTOUT[13] | 9352 | -340 |
| 359 | TESTOUT[13] | 9411 | -340 |
| 360 | DUMMY | 9470 | -340 |
| 361 | VGHS | 9529 | -340 |
| 362 | VGHS | 9588 | -340 |
| 363 | VGHS | 9647 | -340 |

| PAD No. | PIN Name | X | Y |
|---------|---------------|-------|------|
| 364 | VGHS | 9706 | -340 |
| 365 | VGHS | 9765 | -340 |
| 366 | VGHS | 9824 | -340 |
| 367 | DUMMY | 9883 | -340 |
| 368 | VGL | 9942 | -340 |
| 369 | VGL | 10001 | -340 |
| 370 | VGL | 10060 | -340 |
| 371 | VGL | 10119 | -340 |
| 372 | VGL | 10178 | -340 |
| 373 | VGL | 10237 | -340 |
| 374 | DUMMY | 10296 | -340 |
| 375 | PGND | 10355 | -340 |
| 376 | PGND | 10414 | -340 |
| 377 | PGND | 10473 | -340 |
| 378 | PGND | 10532 | -340 |
| 379 | PGND | 10591 | -340 |
| 380 | PGND | 10650 | -340 |
| 381 | PGND | 10709 | -340 |
| 382 | PGND | 10768 | -340 |
| 383 | PGND | 10827 | -340 |
| 384 | PGND | 10886 | -340 |
| 385 | DUMMY (PVDD1) | 10945 | -340 |
| 386 | DUMMY (PVDD1) | 11004 | -340 |
| 387 | DUMMY (PVDD1) | 11063 | -340 |
| 388 | DUMMY (PVDD1) | 11122 | -340 |
| 389 | DUMMY (PVDD1) | 11181 | -340 |
| 390 | DUMMY (PVDD1) | 11240 | -340 |
| 391 | VCOM | 11299 | -340 |
| 392 | VCOM | 11358 | -340 |
| 393 | VCOM | 11417 | -340 |
| 394 | VCOM | 11476 | -340 |
| 395 | VCOM | 11535 | -340 |
| 396 | VCOM | 11594 | -340 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|------|
| 397 | VCOM | 11653 | -340 |
| 398 | VCOM | 11712 | -340 |
| 399 | VGHS | 11606 | 330 |
| 400 | VGHS | 11592 | 215 |
| 401 | VGHS | 11578 | 330 |
| 402 | VGHS | 11564 | 215 |
| 403 | VGHS | 11550 | 330 |
| 404 | VGHS | 11536 | 215 |
| 405 | VGL | 11522 | 330 |
| 406 | VGL | 11508 | 215 |
| 407 | VGL | 11494 | 330 |
| 408 | VGL | 11480 | 215 |
| 409 | VGL | 11466 | 330 |
| 410 | VGL | 11452 | 215 |
| 411 | GOR[1] | 11382 | 330 |
| 412 | GOR[1] | 11368 | 215 |
| 413 | GOR[1] | 11354 | 330 |
| 414 | GOR[2] | 11340 | 215 |
| 415 | GOR[2] | 11326 | 330 |
| 416 | GOR[2] | 11312 | 215 |
| 417 | GOR[3] | 11298 | 330 |
| 418 | GOR[3] | 11284 | 215 |
| 419 | GOR[3] | 11270 | 330 |
| 420 | GOR[4] | 11256 | 215 |
| 421 | GOR[4] | 11242 | 330 |
| 422 | GOR[4] | 11228 | 215 |
| 423 | GOR[5] | 11214 | 330 |
| 424 | GOR[5] | 11200 | 215 |
| 425 | GOR[5] | 11186 | 330 |
| 426 | GOR[6] | 11172 | 215 |
| 427 | GOR[6] | 11158 | 330 |
| 428 | GOR[6] | 11144 | 215 |
| 429 | GOR[7] | 11130 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|-----|
| 430 | GOR[7] | 11116 | 215 |
| 431 | GOR[7] | 11102 | 330 |
| 432 | GOR[8] | 11088 | 215 |
| 433 | GOR[8] | 11074 | 330 |
| 434 | GOR[8] | 11060 | 215 |
| 435 | GOR[9] | 11046 | 330 |
| 436 | GOR[9] | 11032 | 215 |
| 437 | GOR[9] | 11018 | 330 |
| 438 | GOR[10] | 11004 | 215 |
| 439 | GOR[10] | 10990 | 330 |
| 440 | GOR[10] | 10976 | 215 |
| 441 | VGHS | 10906 | 330 |
| 442 | VGHS | 10892 | 215 |
| 443 | VGHS | 10878 | 330 |
| 444 | VGHS | 10864 | 215 |
| 445 | VGHS | 10850 | 330 |
| 446 | VGHS | 10836 | 215 |
| 447 | VGL | 10822 | 330 |
| 448 | VGL | 10808 | 215 |
| 449 | VGL | 10794 | 330 |
| 450 | VGL | 10780 | 215 |
| 451 | VGL | 10766 | 330 |
| 452 | VGL | 10752 | 215 |
| 453 | DUMMY | 10682 | 330 |
| 454 | DUMMY | 10668 | 215 |
| 455 | DUMMY | 10654 | 330 |
| 456 | DUMMY | 10640 | 215 |
| 457 | DUMMY | 10626 | 330 |
| 458 | DUMMY | 10612 | 215 |
| 459 | DUMMY | 10598 | 330 |
| 460 | DUMMY | 10584 | 215 |
| 461 | DUMMY | 10570 | 330 |
| 462 | DUMMY | 10556 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|-----|
| 463 | DUMMY | 10542 | 330 |
| 464 | DUMMY | 10528 | 215 |
| 465 | DUMMY | 10514 | 330 |
| 466 | DUMMY | 10500 | 215 |
| 467 | DUMMY | 10486 | 330 |
| 468 | DUMMY | 10472 | 215 |
| 469 | DUMMY | 10458 | 330 |
| 470 | DUMMY | 10444 | 215 |
| 471 | DUMMY | 10430 | 330 |
| 472 | DUMMY | 10416 | 215 |
| 473 | DUMMY | 10402 | 330 |
| 474 | DUMMY | 10388 | 215 |
| 475 | DUMMY | 10374 | 330 |
| 476 | DUMMY | 10360 | 215 |
| 477 | DUMMY | 10346 | 330 |
| 478 | DUMMY | 10332 | 215 |
| 479 | DUMMY | 10318 | 330 |
| 480 | DUMMY | 10304 | 215 |
| 481 | DUMMY | 10290 | 330 |
| 482 | DUMMY | 10276 | 215 |
| 483 | DUMMY | 10262 | 330 |
| 484 | DUMMY | 10248 | 215 |
| 485 | DUMMY | 10234 | 330 |
| 486 | DUMMY | 10220 | 215 |
| 487 | DUMMY | 10206 | 330 |
| 488 | DUMMY | 10192 | 215 |
| 489 | DUMMY | 10178 | 330 |
| 490 | DUMMY | 10164 | 215 |
| 491 | DUMMY | 10150 | 330 |
| 492 | DUMMY | 10136 | 215 |
| 493 | DUMMY | 10122 | 330 |
| 494 | DUMMY | 10108 | 215 |
| 495 | DUMMY | 10094 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|-----|
| 496 | DUMMY | 10080 | 215 |
| 497 | DUMMY | 10066 | 330 |
| 498 | DUMMY | 10052 | 215 |
| 499 | DUMMY | 10038 | 330 |
| 500 | DUMMY | 10024 | 215 |
| 501 | DUMMY | 10010 | 330 |
| 502 | DUMMY | 9996 | 215 |
| 503 | DUMMY | 9982 | 330 |
| 504 | DUMMY | 9968 | 215 |
| 505 | DUMMY | 9954 | 330 |
| 506 | DUMMY | 9940 | 215 |
| 507 | DUMMY | 9926 | 330 |
| 508 | DUMMY | 9912 | 215 |
| 509 | DUMMY | 9898 | 330 |
| 510 | DUMMY | 9884 | 215 |
| 511 | DUMMY | 9870 | 330 |
| 512 | DUMMY | 9856 | 215 |
| 513 | DUMMY | 9842 | 330 |
| 514 | DUMMY | 9828 | 215 |
| 515 | DUMMY | 9814 | 330 |
| 516 | DUMMY | 9800 | 215 |
| 517 | DUMMY | 9786 | 330 |
| 518 | DUMMY | 9772 | 215 |
| 519 | DUMMY | 9758 | 330 |
| 520 | DUMMY | 9744 | 215 |
| 521 | DUMMY | 9730 | 330 |
| 522 | DUMMY | 9716 | 215 |
| 523 | DUMMY | 9702 | 330 |
| 524 | DUMMY | 9688 | 215 |
| 525 | DUMMY | 9674 | 330 |
| 526 | DUMMY | 9660 | 215 |
| 527 | DUMMY | 9646 | 330 |
| 528 | DUMMY | 9632 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|-----|
| 529 | DUMMY | 9618 | 330 |
| 530 | DUMMY | 9604 | 215 |
| 531 | DUMMY | 9590 | 330 |
| 532 | DUMMY | 9576 | 215 |
| 533 | DUMMY | 9562 | 330 |
| 534 | DUMMY | 9548 | 215 |
| 535 | DUMMY | 9534 | 330 |
| 536 | DUMMY | 9520 | 215 |
| 537 | DUMMY | 9506 | 330 |
| 538 | DUMMY | 9492 | 215 |
| 539 | DUMMY | 9478 | 330 |
| 540 | DUMMY | 9464 | 215 |
| 541 | DUMMY | 9450 | 330 |
| 542 | DUMMY | 9436 | 215 |
| 543 | DUMMY | 9422 | 330 |
| 544 | DUMMY | 9408 | 215 |
| 545 | DUMMY | 9394 | 330 |
| 546 | DUMMY | 9380 | 215 |
| 547 | DUMMY | 9366 | 330 |
| 548 | DUMMY | 9352 | 215 |
| 549 | DUMMY | 9338 | 330 |
| 550 | DUMMY | 9324 | 215 |
| 551 | SGND | 9254 | 330 |
| 552 | SGND | 9240 | 215 |
| 553 | SGND | 9226 | 330 |
| 554 | SGND | 9212 | 215 |
| 555 | SGND | 9198 | 330 |
| 556 | SGND | 9184 | 215 |
| 557 | SGND | 9170 | 330 |
| 558 | SGND | 9156 | 215 |
| 559 | SGND | 9142 | 330 |
| 560 | SGND | 9128 | 215 |
| 561 | SGND | 9114 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|-----|
| 562 | SGND | 9100 | 215 |
| 563 | SGND | 9086 | 330 |
| 564 | SGND | 9072 | 215 |
| 565 | SGND | 9058 | 330 |
| 566 | SGND | 9044 | 215 |
| 567 | S1 | 8974 | 330 |
| 568 | S2 | 8960 | 215 |
| 569 | S3 | 8946 | 330 |
| 570 | S4 | 8932 | 215 |
| 571 | S5 | 8918 | 330 |
| 572 | S6 | 8904 | 215 |
| 573 | S7 | 8890 | 330 |
| 574 | S8 | 8876 | 215 |
| 575 | S9 | 8862 | 330 |
| 576 | S10 | 8848 | 215 |
| 577 | S11 | 8834 | 330 |
| 578 | S12 | 8820 | 215 |
| 579 | S13 | 8806 | 330 |
| 580 | S14 | 8792 | 215 |
| 581 | S15 | 8778 | 330 |
| 582 | S16 | 8764 | 215 |
| 583 | S17 | 8750 | 330 |
| 584 | S18 | 8736 | 215 |
| 585 | S19 | 8722 | 330 |
| 586 | S20 | 8708 | 215 |
| 587 | S21 | 8694 | 330 |
| 588 | S22 | 8680 | 215 |
| 589 | S23 | 8666 | 330 |
| 590 | S24 | 8652 | 215 |
| 591 | S25 | 8638 | 330 |
| 592 | S26 | 8624 | 215 |
| 593 | S27 | 8610 | 330 |
| 594 | S28 | 8596 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|-----|
| 595 | S29 | 8582 | 330 |
| 596 | S30 | 8568 | 215 |
| 597 | S31 | 8554 | 330 |
| 598 | S32 | 8540 | 215 |
| 599 | S33 | 8526 | 330 |
| 600 | S34 | 8512 | 215 |
| 601 | S35 | 8498 | 330 |
| 602 | S36 | 8484 | 215 |
| 603 | S37 | 8470 | 330 |
| 604 | S38 | 8456 | 215 |
| 605 | S39 | 8442 | 330 |
| 606 | S40 | 8428 | 215 |
| 607 | S41 | 8414 | 330 |
| 608 | S42 | 8400 | 215 |
| 609 | S43 | 8386 | 330 |
| 610 | S44 | 8372 | 215 |
| 611 | S45 | 8358 | 330 |
| 612 | S46 | 8344 | 215 |
| 613 | S47 | 8330 | 330 |
| 614 | S48 | 8316 | 215 |
| 615 | S49 | 8302 | 330 |
| 616 | S50 | 8288 | 215 |
| 617 | S51 | 8274 | 330 |
| 618 | S52 | 8260 | 215 |
| 619 | S53 | 8246 | 330 |
| 620 | S54 | 8232 | 215 |
| 621 | S55 | 8218 | 330 |
| 622 | S56 | 8204 | 215 |
| 623 | S57 | 8190 | 330 |
| 624 | S58 | 8176 | 215 |
| 625 | S59 | 8162 | 330 |
| 626 | S60 | 8148 | 215 |
| 627 | S61 | 8134 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|-----|
| 628 | S62 | 8120 | 215 |
| 629 | S63 | 8106 | 330 |
| 630 | S64 | 8092 | 215 |
| 631 | S65 | 8078 | 330 |
| 632 | S66 | 8064 | 215 |
| 633 | S67 | 8050 | 330 |
| 634 | S68 | 8036 | 215 |
| 635 | S69 | 8022 | 330 |
| 636 | S70 | 8008 | 215 |
| 637 | S71 | 7994 | 330 |
| 638 | S72 | 7980 | 215 |
| 639 | S73 | 7966 | 330 |
| 640 | S74 | 7952 | 215 |
| 641 | S75 | 7938 | 330 |
| 642 | S76 | 7924 | 215 |
| 643 | S77 | 7910 | 330 |
| 644 | S78 | 7896 | 215 |
| 645 | S79 | 7882 | 330 |
| 646 | S80 | 7868 | 215 |
| 647 | S81 | 7854 | 330 |
| 648 | S82 | 7840 | 215 |
| 649 | S83 | 7826 | 330 |
| 650 | S84 | 7812 | 215 |
| 651 | S85 | 7798 | 330 |
| 652 | S86 | 7784 | 215 |
| 653 | S87 | 7770 | 330 |
| 654 | S88 | 7756 | 215 |
| 655 | S89 | 7742 | 330 |
| 656 | S90 | 7728 | 215 |
| 657 | S91 | 7714 | 330 |
| 658 | S92 | 7700 | 215 |
| 659 | S93 | 7686 | 330 |
| 660 | S94 | 7672 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|-----|
| 661 | S95 | 7658 | 330 |
| 662 | S96 | 7644 | 215 |
| 663 | S97 | 7630 | 330 |
| 664 | S98 | 7616 | 215 |
| 665 | S99 | 7602 | 330 |
| 666 | S100 | 7588 | 215 |
| 667 | S101 | 7574 | 330 |
| 668 | S102 | 7560 | 215 |
| 669 | S103 | 7546 | 330 |
| 670 | S104 | 7532 | 215 |
| 671 | S105 | 7518 | 330 |
| 672 | S106 | 7504 | 215 |
| 673 | S107 | 7490 | 330 |
| 674 | S108 | 7476 | 215 |
| 675 | S109 | 7462 | 330 |
| 676 | S110 | 7448 | 215 |
| 677 | S111 | 7434 | 330 |
| 678 | S112 | 7420 | 215 |
| 679 | S113 | 7406 | 330 |
| 680 | S114 | 7392 | 215 |
| 681 | S115 | 7378 | 330 |
| 682 | S116 | 7364 | 215 |
| 683 | S117 | 7350 | 330 |
| 684 | S118 | 7336 | 215 |
| 685 | S119 | 7322 | 330 |
| 686 | S120 | 7308 | 215 |
| 687 | S121 | 7294 | 330 |
| 688 | S122 | 7280 | 215 |
| 689 | S123 | 7266 | 330 |
| 690 | S124 | 7252 | 215 |
| 691 | S125 | 7238 | 330 |
| 692 | S126 | 7224 | 215 |
| 693 | S127 | 7210 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|-----|
| 694 | S128 | 7196 | 215 |
| 695 | S129 | 7182 | 330 |
| 696 | S130 | 7168 | 215 |
| 697 | S131 | 7154 | 330 |
| 698 | S132 | 7140 | 215 |
| 699 | S133 | 7126 | 330 |
| 700 | S134 | 7112 | 215 |
| 701 | S135 | 7098 | 330 |
| 702 | S136 | 7084 | 215 |
| 703 | S137 | 7070 | 330 |
| 704 | S138 | 7056 | 215 |
| 705 | S139 | 7042 | 330 |
| 706 | S140 | 7028 | 215 |
| 707 | S141 | 7014 | 330 |
| 708 | S142 | 7000 | 215 |
| 709 | S143 | 6986 | 330 |
| 710 | S144 | 6972 | 215 |
| 711 | S145 | 6958 | 330 |
| 712 | S146 | 6944 | 215 |
| 713 | S147 | 6930 | 330 |
| 714 | S148 | 6916 | 215 |
| 715 | S149 | 6902 | 330 |
| 716 | S150 | 6888 | 215 |
| 717 | S151 | 6874 | 330 |
| 718 | S152 | 6860 | 215 |
| 719 | S153 | 6846 | 330 |
| 720 | S154 | 6832 | 215 |
| 721 | S155 | 6818 | 330 |
| 722 | S156 | 6804 | 215 |
| 723 | S157 | 6790 | 330 |
| 724 | S158 | 6776 | 215 |
| 725 | S159 | 6762 | 330 |
| 726 | S160 | 6748 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|-----|
| 727 | S161 | 6734 | 330 |
| 728 | S162 | 6720 | 215 |
| 729 | S163 | 6706 | 330 |
| 730 | S164 | 6692 | 215 |
| 731 | S165 | 6678 | 330 |
| 732 | S166 | 6664 | 215 |
| 733 | S167 | 6650 | 330 |
| 734 | S168 | 6636 | 215 |
| 735 | S169 | 6622 | 330 |
| 736 | S170 | 6608 | 215 |
| 737 | S171 | 6594 | 330 |
| 738 | S172 | 6580 | 215 |
| 739 | S173 | 6566 | 330 |
| 740 | S174 | 6552 | 215 |
| 741 | S175 | 6538 | 330 |
| 742 | S176 | 6524 | 215 |
| 743 | S177 | 6510 | 330 |
| 744 | S178 | 6496 | 215 |
| 745 | S179 | 6482 | 330 |
| 746 | S180 | 6468 | 215 |
| 747 | S181 | 6454 | 330 |
| 748 | S182 | 6440 | 215 |
| 749 | S183 | 6426 | 330 |
| 750 | S184 | 6412 | 215 |
| 751 | S185 | 6398 | 330 |
| 752 | S186 | 6384 | 215 |
| 753 | S187 | 6370 | 330 |
| 754 | S188 | 6356 | 215 |
| 755 | S189 | 6342 | 330 |
| 756 | S190 | 6328 | 215 |
| 757 | S191 | 6314 | 330 |
| 758 | S192 | 6300 | 215 |
| 759 | S193 | 6286 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|-----|
| 760 | S194 | 6272 | 215 |
| 761 | S195 | 6258 | 330 |
| 762 | S196 | 6244 | 215 |
| 763 | S197 | 6230 | 330 |
| 764 | S198 | 6216 | 215 |
| 765 | S199 | 6202 | 330 |
| 766 | S200 | 6188 | 215 |
| 767 | S201 | 6174 | 330 |
| 768 | S202 | 6160 | 215 |
| 769 | S203 | 6146 | 330 |
| 770 | S204 | 6132 | 215 |
| 771 | S205 | 6118 | 330 |
| 772 | S206 | 6104 | 215 |
| 773 | S207 | 6090 | 330 |
| 774 | S208 | 6076 | 215 |
| 775 | S209 | 6062 | 330 |
| 776 | S210 | 6048 | 215 |
| 777 | S211 | 6034 | 330 |
| 778 | S212 | 6020 | 215 |
| 779 | S213 | 6006 | 330 |
| 780 | S214 | 5992 | 215 |
| 781 | S215 | 5978 | 330 |
| 782 | S216 | 5964 | 215 |
| 783 | S217 | 5950 | 330 |
| 784 | S218 | 5936 | 215 |
| 785 | S219 | 5922 | 330 |
| 786 | S220 | 5908 | 215 |
| 787 | S221 | 5894 | 330 |
| 788 | S222 | 5880 | 215 |
| 789 | S223 | 5866 | 330 |
| 790 | S224 | 5852 | 215 |
| 791 | S225 | 5838 | 330 |
| 792 | S226 | 5824 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|-----|
| 793 | S227 | 5810 | 330 |
| 794 | S228 | 5796 | 215 |
| 795 | S229 | 5782 | 330 |
| 796 | S230 | 5768 | 215 |
| 797 | S231 | 5754 | 330 |
| 798 | S232 | 5740 | 215 |
| 799 | S233 | 5726 | 330 |
| 800 | S234 | 5712 | 215 |
| 801 | S235 | 5698 | 330 |
| 802 | S236 | 5684 | 215 |
| 803 | S237 | 5670 | 330 |
| 804 | S238 | 5656 | 215 |
| 805 | S239 | 5642 | 330 |
| 806 | S240 | 5628 | 215 |
| 807 | S241 | 5614 | 330 |
| 808 | S242 | 5600 | 215 |
| 809 | S243 | 5586 | 330 |
| 810 | S244 | 5572 | 215 |
| 811 | S245 | 5558 | 330 |
| 812 | S246 | 5544 | 215 |
| 813 | S247 | 5530 | 330 |
| 814 | S248 | 5516 | 215 |
| 815 | S249 | 5502 | 330 |
| 816 | S250 | 5488 | 215 |
| 817 | S251 | 5474 | 330 |
| 818 | S252 | 5460 | 215 |
| 819 | S253 | 5446 | 330 |
| 820 | S254 | 5432 | 215 |
| 821 | S255 | 5418 | 330 |
| 822 | S256 | 5404 | 215 |
| 823 | S257 | 5390 | 330 |
| 824 | S258 | 5376 | 215 |
| 825 | S259 | 5362 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|-----|
| 826 | S260 | 5348 | 215 |
| 827 | S261 | 5334 | 330 |
| 828 | S262 | 5320 | 215 |
| 829 | S263 | 5306 | 330 |
| 830 | S264 | 5292 | 215 |
| 831 | S265 | 5278 | 330 |
| 832 | S266 | 5264 | 215 |
| 833 | S267 | 5250 | 330 |
| 834 | S268 | 5236 | 215 |
| 835 | S269 | 5222 | 330 |
| 836 | S270 | 5208 | 215 |
| 837 | S271 | 5194 | 330 |
| 838 | S272 | 5180 | 215 |
| 839 | S273 | 5166 | 330 |
| 840 | S274 | 5152 | 215 |
| 841 | S275 | 5138 | 330 |
| 842 | S276 | 5124 | 215 |
| 843 | S277 | 5110 | 330 |
| 844 | S278 | 5096 | 215 |
| 845 | S279 | 5082 | 330 |
| 846 | S280 | 5068 | 215 |
| 847 | S281 | 5054 | 330 |
| 848 | S282 | 5040 | 215 |
| 849 | S283 | 5026 | 330 |
| 850 | S284 | 5012 | 215 |
| 851 | S285 | 4998 | 330 |
| 852 | S286 | 4984 | 215 |
| 853 | S287 | 4970 | 330 |
| 854 | S288 | 4956 | 215 |
| 855 | S289 | 4942 | 330 |
| 856 | S290 | 4928 | 215 |
| 857 | S291 | 4914 | 330 |
| 858 | S292 | 4900 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|-----|
| 859 | S293 | 4886 | 330 |
| 860 | S294 | 4872 | 215 |
| 861 | S295 | 4858 | 330 |
| 862 | S296 | 4844 | 215 |
| 863 | S297 | 4830 | 330 |
| 864 | S298 | 4816 | 215 |
| 865 | S299 | 4802 | 330 |
| 866 | S300 | 4788 | 215 |
| 867 | SGND | 4718 | 330 |
| 868 | SGND | 4704 | 215 |
| 869 | SGND | 4690 | 330 |
| 870 | SGND | 4676 | 215 |
| 871 | SGND | 4662 | 330 |
| 872 | SGND | 4648 | 215 |
| 873 | SGND | 4634 | 330 |
| 874 | SGND | 4620 | 215 |
| 875 | SGND | 4606 | 330 |
| 876 | SGND | 4592 | 215 |
| 877 | SGND | 4578 | 330 |
| 878 | SGND | 4564 | 215 |
| 879 | SGND | 4550 | 330 |
| 880 | SGND | 4536 | 215 |
| 881 | SGND | 4522 | 330 |
| 882 | SGND | 4508 | 215 |
| 883 | S301 | 4438 | 330 |
| 884 | S302 | 4424 | 215 |
| 885 | S303 | 4410 | 330 |
| 886 | S304 | 4396 | 215 |
| 887 | S305 | 4382 | 330 |
| 888 | S306 | 4368 | 215 |
| 889 | S307 | 4354 | 330 |
| 890 | S308 | 4340 | 215 |
| 891 | S309 | 4326 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|-----|
| 892 | S310 | 4312 | 215 |
| 893 | S311 | 4298 | 330 |
| 894 | S312 | 4284 | 215 |
| 895 | S313 | 4270 | 330 |
| 896 | S314 | 4256 | 215 |
| 897 | S315 | 4242 | 330 |
| 898 | S316 | 4228 | 215 |
| 899 | S317 | 4214 | 330 |
| 900 | S318 | 4200 | 215 |
| 901 | S319 | 4186 | 330 |
| 902 | S320 | 4172 | 215 |
| 903 | S321 | 4158 | 330 |
| 904 | S322 | 4144 | 215 |
| 905 | S323 | 4130 | 330 |
| 906 | S324 | 4116 | 215 |
| 907 | S325 | 4102 | 330 |
| 908 | S326 | 4088 | 215 |
| 909 | S327 | 4074 | 330 |
| 910 | S328 | 4060 | 215 |
| 911 | S329 | 4046 | 330 |
| 912 | S330 | 4032 | 215 |
| 913 | S331 | 4018 | 330 |
| 914 | S332 | 4004 | 215 |
| 915 | S333 | 3990 | 330 |
| 916 | S334 | 3976 | 215 |
| 917 | S335 | 3962 | 330 |
| 918 | S336 | 3948 | 215 |
| 919 | S337 | 3934 | 330 |
| 920 | S338 | 3920 | 215 |
| 921 | S339 | 3906 | 330 |
| 922 | S340 | 3892 | 215 |
| 923 | S341 | 3878 | 330 |
| 924 | S342 | 3864 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|-----|
| 925 | S343 | 3850 | 330 |
| 926 | S344 | 3836 | 215 |
| 927 | S345 | 3822 | 330 |
| 928 | S346 | 3808 | 215 |
| 929 | S347 | 3794 | 330 |
| 930 | S348 | 3780 | 215 |
| 931 | S349 | 3766 | 330 |
| 932 | S350 | 3752 | 215 |
| 933 | S351 | 3738 | 330 |
| 934 | S352 | 3724 | 215 |
| 935 | S353 | 3710 | 330 |
| 936 | S354 | 3696 | 215 |
| 937 | S355 | 3682 | 330 |
| 938 | S356 | 3668 | 215 |
| 939 | S357 | 3654 | 330 |
| 940 | S358 | 3640 | 215 |
| 941 | S359 | 3626 | 330 |
| 942 | S360 | 3612 | 215 |
| 943 | S361 | 3598 | 330 |
| 944 | S362 | 3584 | 215 |
| 945 | S363 | 3570 | 330 |
| 946 | S364 | 3556 | 215 |
| 947 | S365 | 3542 | 330 |
| 948 | S366 | 3528 | 215 |
| 949 | S367 | 3514 | 330 |
| 950 | S368 | 3500 | 215 |
| 951 | S369 | 3486 | 330 |
| 952 | S370 | 3472 | 215 |
| 953 | S371 | 3458 | 330 |
| 954 | S372 | 3444 | 215 |
| 955 | S373 | 3430 | 330 |
| 956 | S374 | 3416 | 215 |
| 957 | S375 | 3402 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|-----|
| 958 | S376 | 3388 | 215 |
| 959 | S377 | 3374 | 330 |
| 960 | S378 | 3360 | 215 |
| 961 | S379 | 3346 | 330 |
| 962 | S380 | 3332 | 215 |
| 963 | S381 | 3318 | 330 |
| 964 | S382 | 3304 | 215 |
| 965 | S383 | 3290 | 330 |
| 966 | S384 | 3276 | 215 |
| 967 | S385 | 3262 | 330 |
| 968 | S386 | 3248 | 215 |
| 969 | S387 | 3234 | 330 |
| 970 | S388 | 3220 | 215 |
| 971 | S389 | 3206 | 330 |
| 972 | S390 | 3192 | 215 |
| 973 | S391 | 3178 | 330 |
| 974 | S392 | 3164 | 215 |
| 975 | S393 | 3150 | 330 |
| 976 | S394 | 3136 | 215 |
| 977 | S395 | 3122 | 330 |
| 978 | S396 | 3108 | 215 |
| 979 | S397 | 3094 | 330 |
| 980 | S398 | 3080 | 215 |
| 981 | S399 | 3066 | 330 |
| 982 | S400 | 3052 | 215 |
| 983 | S401 | 3038 | 330 |
| 984 | S402 | 3024 | 215 |
| 985 | S403 | 3010 | 330 |
| 986 | S404 | 2996 | 215 |
| 987 | S405 | 2982 | 330 |
| 988 | S406 | 2968 | 215 |
| 989 | S407 | 2954 | 330 |
| 990 | S408 | 2940 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|-----|
| 991 | S409 | 2926 | 330 |
| 992 | S410 | 2912 | 215 |
| 993 | S411 | 2898 | 330 |
| 994 | S412 | 2884 | 215 |
| 995 | S413 | 2870 | 330 |
| 996 | S414 | 2856 | 215 |
| 997 | S415 | 2842 | 330 |
| 998 | S416 | 2828 | 215 |
| 999 | S417 | 2814 | 330 |
| 1000 | S418 | 2800 | 215 |
| 1001 | S419 | 2786 | 330 |
| 1002 | S420 | 2772 | 215 |
| 1003 | S421 | 2758 | 330 |
| 1004 | S422 | 2744 | 215 |
| 1005 | S423 | 2730 | 330 |
| 1006 | S424 | 2716 | 215 |
| 1007 | S425 | 2702 | 330 |
| 1008 | S426 | 2688 | 215 |
| 1009 | S427 | 2674 | 330 |
| 1010 | S428 | 2660 | 215 |
| 1011 | S429 | 2646 | 330 |
| 1012 | S430 | 2632 | 215 |
| 1013 | S431 | 2618 | 330 |
| 1014 | S432 | 2604 | 215 |
| 1015 | S433 | 2590 | 330 |
| 1016 | S434 | 2576 | 215 |
| 1017 | S435 | 2562 | 330 |
| 1018 | S436 | 2548 | 215 |
| 1019 | S437 | 2534 | 330 |
| 1020 | S438 | 2520 | 215 |
| 1021 | S439 | 2506 | 330 |
| 1022 | S440 | 2492 | 215 |
| 1023 | S441 | 2478 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|-----|
| 1024 | S442 | 2464 | 215 |
| 1025 | S443 | 2450 | 330 |
| 1026 | S444 | 2436 | 215 |
| 1027 | S445 | 2422 | 330 |
| 1028 | S446 | 2408 | 215 |
| 1029 | S447 | 2394 | 330 |
| 1030 | S448 | 2380 | 215 |
| 1031 | S449 | 2366 | 330 |
| 1032 | S450 | 2352 | 215 |
| 1033 | S451 | 2338 | 330 |
| 1034 | S452 | 2324 | 215 |
| 1035 | S453 | 2310 | 330 |
| 1036 | S454 | 2296 | 215 |
| 1037 | S455 | 2282 | 330 |
| 1038 | S456 | 2268 | 215 |
| 1039 | S457 | 2254 | 330 |
| 1040 | S458 | 2240 | 215 |
| 1041 | S459 | 2226 | 330 |
| 1042 | S460 | 2212 | 215 |
| 1043 | S461 | 2198 | 330 |
| 1044 | S462 | 2184 | 215 |
| 1045 | S463 | 2170 | 330 |
| 1046 | S464 | 2156 | 215 |
| 1047 | S465 | 2142 | 330 |
| 1048 | S466 | 2128 | 215 |
| 1049 | S467 | 2114 | 330 |
| 1050 | S468 | 2100 | 215 |
| 1051 | S469 | 2086 | 330 |
| 1052 | S470 | 2072 | 215 |
| 1053 | S471 | 2058 | 330 |
| 1054 | S472 | 2044 | 215 |
| 1055 | S473 | 2030 | 330 |
| 1056 | S474 | 2016 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|-----|
| 1057 | S475 | 2002 | 330 |
| 1058 | S476 | 1988 | 215 |
| 1059 | S477 | 1974 | 330 |
| 1060 | S478 | 1960 | 215 |
| 1061 | S479 | 1946 | 330 |
| 1062 | S480 | 1932 | 215 |
| 1063 | S481 | 1918 | 330 |
| 1064 | S482 | 1904 | 215 |
| 1065 | S483 | 1890 | 330 |
| 1066 | S484 | 1876 | 215 |
| 1067 | S485 | 1862 | 330 |
| 1068 | S486 | 1848 | 215 |
| 1069 | S487 | 1834 | 330 |
| 1070 | S488 | 1820 | 215 |
| 1071 | S489 | 1806 | 330 |
| 1072 | S490 | 1792 | 215 |
| 1073 | S491 | 1778 | 330 |
| 1074 | S492 | 1764 | 215 |
| 1075 | S493 | 1750 | 330 |
| 1076 | S494 | 1736 | 215 |
| 1077 | S495 | 1722 | 330 |
| 1078 | S496 | 1708 | 215 |
| 1079 | S497 | 1694 | 330 |
| 1080 | S498 | 1680 | 215 |
| 1081 | S499 | 1666 | 330 |
| 1082 | S500 | 1652 | 215 |
| 1083 | S501 | 1638 | 330 |
| 1084 | S502 | 1624 | 215 |
| 1085 | S503 | 1610 | 330 |
| 1086 | S504 | 1596 | 215 |
| 1087 | S505 | 1582 | 330 |
| 1088 | S506 | 1568 | 215 |
| 1089 | S507 | 1554 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|-----|
| 1090 | S508 | 1540 | 215 |
| 1091 | S509 | 1526 | 330 |
| 1092 | S510 | 1512 | 215 |
| 1093 | S511 | 1498 | 330 |
| 1094 | S512 | 1484 | 215 |
| 1095 | S513 | 1470 | 330 |
| 1096 | S514 | 1456 | 215 |
| 1097 | S515 | 1442 | 330 |
| 1098 | S516 | 1428 | 215 |
| 1099 | S517 | 1414 | 330 |
| 1100 | S518 | 1400 | 215 |
| 1101 | S519 | 1386 | 330 |
| 1102 | S520 | 1372 | 215 |
| 1103 | S521 | 1358 | 330 |
| 1104 | S522 | 1344 | 215 |
| 1105 | S523 | 1330 | 330 |
| 1106 | S524 | 1316 | 215 |
| 1107 | S525 | 1302 | 330 |
| 1108 | S526 | 1288 | 215 |
| 1109 | S527 | 1274 | 330 |
| 1110 | S528 | 1260 | 215 |
| 1111 | S529 | 1246 | 330 |
| 1112 | S530 | 1232 | 215 |
| 1113 | S531 | 1218 | 330 |
| 1114 | S532 | 1204 | 215 |
| 1115 | S533 | 1190 | 330 |
| 1116 | S534 | 1176 | 215 |
| 1117 | S535 | 1162 | 330 |
| 1118 | S536 | 1148 | 215 |
| 1119 | S537 | 1134 | 330 |
| 1120 | S538 | 1120 | 215 |
| 1121 | S539 | 1106 | 330 |
| 1122 | S540 | 1092 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|-----|
| 1123 | S541 | 1078 | 330 |
| 1124 | S542 | 1064 | 215 |
| 1125 | S543 | 1050 | 330 |
| 1126 | S544 | 1036 | 215 |
| 1127 | S545 | 1022 | 330 |
| 1128 | S546 | 1008 | 215 |
| 1129 | S547 | 994 | 330 |
| 1130 | S548 | 980 | 215 |
| 1131 | S549 | 966 | 330 |
| 1132 | S550 | 952 | 215 |
| 1133 | S551 | 938 | 330 |
| 1134 | S552 | 924 | 215 |
| 1135 | S553 | 910 | 330 |
| 1136 | S554 | 896 | 215 |
| 1137 | S555 | 882 | 330 |
| 1138 | S556 | 868 | 215 |
| 1139 | S557 | 854 | 330 |
| 1140 | S558 | 840 | 215 |
| 1141 | S559 | 826 | 330 |
| 1142 | S560 | 812 | 215 |
| 1143 | S561 | 798 | 330 |
| 1144 | S562 | 784 | 215 |
| 1145 | S563 | 770 | 330 |
| 1146 | S564 | 756 | 215 |
| 1147 | S565 | 742 | 330 |
| 1148 | S566 | 728 | 215 |
| 1149 | S567 | 714 | 330 |
| 1150 | S568 | 700 | 215 |
| 1151 | S569 | 686 | 330 |
| 1152 | S570 | 672 | 215 |
| 1153 | S571 | 658 | 330 |
| 1154 | S572 | 644 | 215 |
| 1155 | S573 | 630 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-----|-----|
| 1156 | S574 | 616 | 215 |
| 1157 | S575 | 602 | 330 |
| 1158 | S576 | 588 | 215 |
| 1159 | S577 | 574 | 330 |
| 1160 | S578 | 560 | 215 |
| 1161 | S579 | 546 | 330 |
| 1162 | S580 | 532 | 215 |
| 1163 | S581 | 518 | 330 |
| 1164 | S582 | 504 | 215 |
| 1165 | S583 | 490 | 330 |
| 1166 | S584 | 476 | 215 |
| 1167 | S585 | 462 | 330 |
| 1168 | S586 | 448 | 215 |
| 1169 | S587 | 434 | 330 |
| 1170 | S588 | 420 | 215 |
| 1171 | S589 | 406 | 330 |
| 1172 | S590 | 392 | 215 |
| 1173 | S591 | 378 | 330 |
| 1174 | S592 | 364 | 215 |
| 1175 | S593 | 350 | 330 |
| 1176 | S594 | 336 | 215 |
| 1177 | S595 | 322 | 330 |
| 1178 | S596 | 308 | 215 |
| 1179 | S597 | 294 | 330 |
| 1180 | S598 | 280 | 215 |
| 1181 | S599 | 266 | 330 |
| 1182 | S600 | 252 | 215 |
| 1183 | SGND | 182 | 330 |
| 1184 | SGND | 168 | 215 |
| 1185 | SGND | 154 | 330 |
| 1186 | SGND | 140 | 215 |
| 1187 | SGND | 126 | 330 |
| 1188 | SGND | 112 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|-----|
| 1189 | SGND | 98 | 330 |
| 1190 | SGND | 84 | 215 |
| 1191 | SGND | 70 | 330 |
| 1192 | SGND | 56 | 215 |
| 1193 | SGND | 42 | 330 |
| 1194 | SGND | 28 | 215 |
| 1195 | SGND | -28 | 215 |
| 1196 | SGND | -42 | 330 |
| 1197 | SGND | -56 | 215 |
| 1198 | SGND | -70 | 330 |
| 1199 | SGND | -84 | 215 |
| 1200 | SGND | -98 | 330 |
| 1201 | SGND | -112 | 215 |
| 1202 | SGND | -126 | 330 |
| 1203 | SGND | -140 | 215 |
| 1204 | SGND | -154 | 330 |
| 1205 | SGND | -168 | 215 |
| 1206 | SGND | -182 | 330 |
| 1207 | S601 | -252 | 215 |
| 1208 | S602 | -266 | 330 |
| 1209 | S603 | -280 | 215 |
| 1210 | S604 | -294 | 330 |
| 1211 | S605 | -308 | 215 |
| 1212 | S606 | -322 | 330 |
| 1213 | S607 | -336 | 215 |
| 1214 | S608 | -350 | 330 |
| 1215 | S609 | -364 | 215 |
| 1216 | S610 | -378 | 330 |
| 1217 | S611 | -392 | 215 |
| 1218 | S612 | -406 | 330 |
| 1219 | S613 | -420 | 215 |
| 1220 | S614 | -434 | 330 |
| 1221 | S615 | -448 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|------|-----|
| 1222 | S616 | -462 | 330 |
| 1223 | S617 | -476 | 215 |
| 1224 | S618 | -490 | 330 |
| 1225 | S619 | -504 | 215 |
| 1226 | S620 | -518 | 330 |
| 1227 | S621 | -532 | 215 |
| 1228 | S622 | -546 | 330 |
| 1229 | S623 | -560 | 215 |
| 1230 | S624 | -574 | 330 |
| 1231 | S625 | -588 | 215 |
| 1232 | S626 | -602 | 330 |
| 1233 | S627 | -616 | 215 |
| 1234 | S628 | -630 | 330 |
| 1235 | S629 | -644 | 215 |
| 1236 | S630 | -658 | 330 |
| 1237 | S631 | -672 | 215 |
| 1238 | S632 | -686 | 330 |
| 1239 | S633 | -700 | 215 |
| 1240 | S634 | -714 | 330 |
| 1241 | S635 | -728 | 215 |
| 1242 | S636 | -742 | 330 |
| 1243 | S637 | -756 | 215 |
| 1244 | S638 | -770 | 330 |
| 1245 | S639 | -784 | 215 |
| 1246 | S640 | -798 | 330 |
| 1247 | S641 | -812 | 215 |
| 1248 | S642 | -826 | 330 |
| 1249 | S643 | -840 | 215 |
| 1250 | S644 | -854 | 330 |
| 1251 | S645 | -868 | 215 |
| 1252 | S646 | -882 | 330 |
| 1253 | S647 | -896 | 215 |
| 1254 | S648 | -910 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|-----|
| 1255 | S649 | -924 | 215 |
| 1256 | S650 | -938 | 330 |
| 1257 | S651 | -952 | 215 |
| 1258 | S652 | -966 | 330 |
| 1259 | S653 | -980 | 215 |
| 1260 | S654 | -994 | 330 |
| 1261 | S655 | -1008 | 215 |
| 1262 | S656 | -1022 | 330 |
| 1263 | S657 | -1036 | 215 |
| 1264 | S658 | -1050 | 330 |
| 1265 | S659 | -1064 | 215 |
| 1266 | S660 | -1078 | 330 |
| 1267 | S661 | -1092 | 215 |
| 1268 | S662 | -1106 | 330 |
| 1269 | S663 | -1120 | 215 |
| 1270 | S664 | -1134 | 330 |
| 1271 | S665 | -1148 | 215 |
| 1272 | S666 | -1162 | 330 |
| 1273 | S667 | -1176 | 215 |
| 1274 | S668 | -1190 | 330 |
| 1275 | S669 | -1204 | 215 |
| 1276 | S670 | -1218 | 330 |
| 1277 | S671 | -1232 | 215 |
| 1278 | S672 | -1246 | 330 |
| 1279 | S673 | -1260 | 215 |
| 1280 | S674 | -1274 | 330 |
| 1281 | S675 | -1288 | 215 |
| 1282 | S676 | -1302 | 330 |
| 1283 | S677 | -1316 | 215 |
| 1284 | S678 | -1330 | 330 |
| 1285 | S679 | -1344 | 215 |
| 1286 | S680 | -1358 | 330 |
| 1287 | S681 | -1372 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|-----|
| 1288 | S682 | -1386 | 330 |
| 1289 | S683 | -1400 | 215 |
| 1290 | S684 | -1414 | 330 |
| 1291 | S685 | -1428 | 215 |
| 1292 | S686 | -1442 | 330 |
| 1293 | S687 | -1456 | 215 |
| 1294 | S688 | -1470 | 330 |
| 1295 | S689 | -1484 | 215 |
| 1296 | S690 | -1498 | 330 |
| 1297 | S691 | -1512 | 215 |
| 1298 | S692 | -1526 | 330 |
| 1299 | S693 | -1540 | 215 |
| 1300 | S694 | -1554 | 330 |
| 1301 | S695 | -1568 | 215 |
| 1302 | S696 | -1582 | 330 |
| 1303 | S697 | -1596 | 215 |
| 1304 | S698 | -1610 | 330 |
| 1305 | S699 | -1624 | 215 |
| 1306 | S700 | -1638 | 330 |
| 1307 | S701 | -1652 | 215 |
| 1308 | S702 | -1666 | 330 |
| 1309 | S703 | -1680 | 215 |
| 1310 | S704 | -1694 | 330 |
| 1311 | S705 | -1708 | 215 |
| 1312 | S706 | -1722 | 330 |
| 1313 | S707 | -1736 | 215 |
| 1314 | S708 | -1750 | 330 |
| 1315 | S709 | -1764 | 215 |
| 1316 | S710 | -1778 | 330 |
| 1317 | S711 | -1792 | 215 |
| 1318 | S712 | -1806 | 330 |
| 1319 | S713 | -1820 | 215 |
| 1320 | S714 | -1834 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|-----|
| 1321 | S715 | -1848 | 215 |
| 1322 | S716 | -1862 | 330 |
| 1323 | S717 | -1876 | 215 |
| 1324 | S718 | -1890 | 330 |
| 1325 | S719 | -1904 | 215 |
| 1326 | S720 | -1918 | 330 |
| 1327 | S721 | -1932 | 215 |
| 1328 | S722 | -1946 | 330 |
| 1329 | S723 | -1960 | 215 |
| 1330 | S724 | -1974 | 330 |
| 1331 | S725 | -1988 | 215 |
| 1332 | S726 | -2002 | 330 |
| 1333 | S727 | -2016 | 215 |
| 1334 | S728 | -2030 | 330 |
| 1335 | S729 | -2044 | 215 |
| 1336 | S730 | -2058 | 330 |
| 1337 | S731 | -2072 | 215 |
| 1338 | S732 | -2086 | 330 |
| 1339 | S733 | -2100 | 215 |
| 1340 | S734 | -2114 | 330 |
| 1341 | S735 | -2128 | 215 |
| 1342 | S736 | -2142 | 330 |
| 1343 | S737 | -2156 | 215 |
| 1344 | S738 | -2170 | 330 |
| 1345 | S739 | -2184 | 215 |
| 1346 | S740 | -2198 | 330 |
| 1347 | S741 | -2212 | 215 |
| 1348 | S742 | -2226 | 330 |
| 1349 | S743 | -2240 | 215 |
| 1350 | S744 | -2254 | 330 |
| 1351 | S745 | -2268 | 215 |
| 1352 | S746 | -2282 | 330 |
| 1353 | S747 | -2296 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|-----|
| 1354 | S748 | -2310 | 330 |
| 1355 | S749 | -2324 | 215 |
| 1356 | S750 | -2338 | 330 |
| 1357 | S751 | -2352 | 215 |
| 1358 | S752 | -2366 | 330 |
| 1359 | S753 | -2380 | 215 |
| 1360 | S754 | -2394 | 330 |
| 1361 | S755 | -2408 | 215 |
| 1362 | S756 | -2422 | 330 |
| 1363 | S757 | -2436 | 215 |
| 1364 | S758 | -2450 | 330 |
| 1365 | S759 | -2464 | 215 |
| 1366 | S760 | -2478 | 330 |
| 1367 | S761 | -2492 | 215 |
| 1368 | S762 | -2506 | 330 |
| 1369 | S763 | -2520 | 215 |
| 1370 | S764 | -2534 | 330 |
| 1371 | S765 | -2548 | 215 |
| 1372 | S766 | -2562 | 330 |
| 1373 | S767 | -2576 | 215 |
| 1374 | S768 | -2590 | 330 |
| 1375 | S769 | -2604 | 215 |
| 1376 | S770 | -2618 | 330 |
| 1377 | S771 | -2632 | 215 |
| 1378 | S772 | -2646 | 330 |
| 1379 | S773 | -2660 | 215 |
| 1380 | S774 | -2674 | 330 |
| 1381 | S775 | -2688 | 215 |
| 1382 | S776 | -2702 | 330 |
| 1383 | S777 | -2716 | 215 |
| 1384 | S778 | -2730 | 330 |
| 1385 | S779 | -2744 | 215 |
| 1386 | S780 | -2758 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|-----|
| 1387 | S781 | -2772 | 215 |
| 1388 | S782 | -2786 | 330 |
| 1389 | S783 | -2800 | 215 |
| 1390 | S784 | -2814 | 330 |
| 1391 | S785 | -2828 | 215 |
| 1392 | S786 | -2842 | 330 |
| 1393 | S787 | -2856 | 215 |
| 1394 | S788 | -2870 | 330 |
| 1395 | S789 | -2884 | 215 |
| 1396 | S790 | -2898 | 330 |
| 1397 | S791 | -2912 | 215 |
| 1398 | S792 | -2926 | 330 |
| 1399 | S793 | -2940 | 215 |
| 1400 | S794 | -2954 | 330 |
| 1401 | S795 | -2968 | 215 |
| 1402 | S796 | -2982 | 330 |
| 1403 | S797 | -2996 | 215 |
| 1404 | S798 | -3010 | 330 |
| 1405 | S799 | -3024 | 215 |
| 1406 | S800 | -3038 | 330 |
| 1407 | S801 | -3052 | 215 |
| 1408 | S802 | -3066 | 330 |
| 1409 | S803 | -3080 | 215 |
| 1410 | S804 | -3094 | 330 |
| 1411 | S805 | -3108 | 215 |
| 1412 | S806 | -3122 | 330 |
| 1413 | S807 | -3136 | 215 |
| 1414 | S808 | -3150 | 330 |
| 1415 | S809 | -3164 | 215 |
| 1416 | S810 | -3178 | 330 |
| 1417 | S811 | -3192 | 215 |
| 1418 | S812 | -3206 | 330 |
| 1419 | S813 | -3220 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|-----|
| 1420 | S814 | -3234 | 330 |
| 1421 | S815 | -3248 | 215 |
| 1422 | S816 | -3262 | 330 |
| 1423 | S817 | -3276 | 215 |
| 1424 | S818 | -3290 | 330 |
| 1425 | S819 | -3304 | 215 |
| 1426 | S820 | -3318 | 330 |
| 1427 | S821 | -3332 | 215 |
| 1428 | S822 | -3346 | 330 |
| 1429 | S823 | -3360 | 215 |
| 1430 | S824 | -3374 | 330 |
| 1431 | S825 | -3388 | 215 |
| 1432 | S826 | -3402 | 330 |
| 1433 | S827 | -3416 | 215 |
| 1434 | S828 | -3430 | 330 |
| 1435 | S829 | -3444 | 215 |
| 1436 | S830 | -3458 | 330 |
| 1437 | S831 | -3472 | 215 |
| 1438 | S832 | -3486 | 330 |
| 1439 | S833 | -3500 | 215 |
| 1440 | S834 | -3514 | 330 |
| 1441 | S835 | -3528 | 215 |
| 1442 | S836 | -3542 | 330 |
| 1443 | S837 | -3556 | 215 |
| 1444 | S838 | -3570 | 330 |
| 1445 | S839 | -3584 | 215 |
| 1446 | S840 | -3598 | 330 |
| 1447 | S841 | -3612 | 215 |
| 1448 | S842 | -3626 | 330 |
| 1449 | S843 | -3640 | 215 |
| 1450 | S844 | -3654 | 330 |
| 1451 | S845 | -3668 | 215 |
| 1452 | S846 | -3682 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|-----|
| 1453 | S847 | -3696 | 215 |
| 1454 | S848 | -3710 | 330 |
| 1455 | S849 | -3724 | 215 |
| 1456 | S850 | -3738 | 330 |
| 1457 | S851 | -3752 | 215 |
| 1458 | S852 | -3766 | 330 |
| 1459 | S853 | -3780 | 215 |
| 1460 | S854 | -3794 | 330 |
| 1461 | S855 | -3808 | 215 |
| 1462 | S856 | -3822 | 330 |
| 1463 | S857 | -3836 | 215 |
| 1464 | S858 | -3850 | 330 |
| 1465 | S859 | -3864 | 215 |
| 1466 | S860 | -3878 | 330 |
| 1467 | S861 | -3892 | 215 |
| 1468 | S862 | -3906 | 330 |
| 1469 | S863 | -3920 | 215 |
| 1470 | S864 | -3934 | 330 |
| 1471 | S865 | -3948 | 215 |
| 1472 | S866 | -3962 | 330 |
| 1473 | S867 | -3976 | 215 |
| 1474 | S868 | -3990 | 330 |
| 1475 | S869 | -4004 | 215 |
| 1476 | S870 | -4018 | 330 |
| 1477 | S871 | -4032 | 215 |
| 1478 | S872 | -4046 | 330 |
| 1479 | S873 | -4060 | 215 |
| 1480 | S874 | -4074 | 330 |
| 1481 | S875 | -4088 | 215 |
| 1482 | S876 | -4102 | 330 |
| 1483 | S877 | -4116 | 215 |
| 1484 | S878 | -4130 | 330 |
| 1485 | S879 | -4144 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|-----|
| 1486 | S880 | -4158 | 330 |
| 1487 | S881 | -4172 | 215 |
| 1488 | S882 | -4186 | 330 |
| 1489 | S883 | -4200 | 215 |
| 1490 | S884 | -4214 | 330 |
| 1491 | S885 | -4228 | 215 |
| 1492 | S886 | -4242 | 330 |
| 1493 | S887 | -4256 | 215 |
| 1494 | S888 | -4270 | 330 |
| 1495 | S889 | -4284 | 215 |
| 1496 | S890 | -4298 | 330 |
| 1497 | S891 | -4312 | 215 |
| 1498 | S892 | -4326 | 330 |
| 1499 | S893 | -4340 | 215 |
| 1500 | S894 | -4354 | 330 |
| 1501 | S895 | -4368 | 215 |
| 1502 | S896 | -4382 | 330 |
| 1503 | S897 | -4396 | 215 |
| 1504 | S898 | -4410 | 330 |
| 1505 | S899 | -4424 | 215 |
| 1506 | S900 | -4438 | 330 |
| 1507 | SGND | -4508 | 215 |
| 1508 | SGND | -4522 | 330 |
| 1509 | SGND | -4536 | 215 |
| 1510 | SGND | -4550 | 330 |
| 1511 | SGND | -4564 | 215 |
| 1512 | SGND | -4578 | 330 |
| 1513 | SGND | -4592 | 215 |
| 1514 | SGND | -4606 | 330 |
| 1515 | SGND | -4620 | 215 |
| 1516 | SGND | -4634 | 330 |
| 1517 | SGND | -4648 | 215 |
| 1518 | SGND | -4662 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|-----|
| 1519 | SGND | -4676 | 215 |
| 1520 | SGND | -4690 | 330 |
| 1521 | SGND | -4704 | 215 |
| 1522 | SGND | -4718 | 330 |
| 1523 | S901 | -4788 | 215 |
| 1524 | S902 | -4802 | 330 |
| 1525 | S903 | -4816 | 215 |
| 1526 | S904 | -4830 | 330 |
| 1527 | S905 | -4844 | 215 |
| 1528 | S906 | -4858 | 330 |
| 1529 | S907 | -4872 | 215 |
| 1530 | S908 | -4886 | 330 |
| 1531 | S909 | -4900 | 215 |
| 1532 | S910 | -4914 | 330 |
| 1533 | S911 | -4928 | 215 |
| 1534 | S912 | -4942 | 330 |
| 1535 | S913 | -4956 | 215 |
| 1536 | S914 | -4970 | 330 |
| 1537 | S915 | -4984 | 215 |
| 1538 | S916 | -4998 | 330 |
| 1539 | S917 | -5012 | 215 |
| 1540 | S918 | -5026 | 330 |
| 1541 | S919 | -5040 | 215 |
| 1542 | S920 | -5054 | 330 |
| 1543 | S921 | -5068 | 215 |
| 1544 | S922 | -5082 | 330 |
| 1545 | S923 | -5096 | 215 |
| 1546 | S924 | -5110 | 330 |
| 1547 | S925 | -5124 | 215 |
| 1548 | S926 | -5138 | 330 |
| 1549 | S927 | -5152 | 215 |
| 1550 | S928 | -5166 | 330 |
| 1551 | S929 | -5180 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|-----|
| 1552 | S930 | -5194 | 330 |
| 1553 | S931 | -5208 | 215 |
| 1554 | S932 | -5222 | 330 |
| 1555 | S933 | -5236 | 215 |
| 1556 | S934 | -5250 | 330 |
| 1557 | S935 | -5264 | 215 |
| 1558 | S936 | -5278 | 330 |
| 1559 | S937 | -5292 | 215 |
| 1560 | S938 | -5306 | 330 |
| 1561 | S939 | -5320 | 215 |
| 1562 | S940 | -5334 | 330 |
| 1563 | S941 | -5348 | 215 |
| 1564 | S942 | -5362 | 330 |
| 1565 | S943 | -5376 | 215 |
| 1566 | S944 | -5390 | 330 |
| 1567 | S945 | -5404 | 215 |
| 1568 | S946 | -5418 | 330 |
| 1569 | S947 | -5432 | 215 |
| 1570 | S948 | -5446 | 330 |
| 1571 | S949 | -5460 | 215 |
| 1572 | S950 | -5474 | 330 |
| 1573 | S951 | -5488 | 215 |
| 1574 | S952 | -5502 | 330 |
| 1575 | S953 | -5516 | 215 |
| 1576 | S954 | -5530 | 330 |
| 1577 | S955 | -5544 | 215 |
| 1578 | S956 | -5558 | 330 |
| 1579 | S957 | -5572 | 215 |
| 1580 | S958 | -5586 | 330 |
| 1581 | S959 | -5600 | 215 |
| 1582 | S960 | -5614 | 330 |
| 1583 | S961 | -5628 | 215 |
| 1584 | S962 | -5642 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|-----|
| 1585 | S963 | -5656 | 215 |
| 1586 | S964 | -5670 | 330 |
| 1587 | S965 | -5684 | 215 |
| 1588 | S966 | -5698 | 330 |
| 1589 | S967 | -5712 | 215 |
| 1590 | S968 | -5726 | 330 |
| 1591 | S969 | -5740 | 215 |
| 1592 | S970 | -5754 | 330 |
| 1593 | S971 | -5768 | 215 |
| 1594 | S972 | -5782 | 330 |
| 1595 | S973 | -5796 | 215 |
| 1596 | S974 | -5810 | 330 |
| 1597 | S975 | -5824 | 215 |
| 1598 | S976 | -5838 | 330 |
| 1599 | S977 | -5852 | 215 |
| 1600 | S978 | -5866 | 330 |
| 1601 | S979 | -5880 | 215 |
| 1602 | S980 | -5894 | 330 |
| 1603 | S981 | -5908 | 215 |
| 1604 | S982 | -5922 | 330 |
| 1605 | S983 | -5936 | 215 |
| 1606 | S984 | -5950 | 330 |
| 1607 | S985 | -5964 | 215 |
| 1608 | S986 | -5978 | 330 |
| 1609 | S987 | -5992 | 215 |
| 1610 | S988 | -6006 | 330 |
| 1611 | S989 | -6020 | 215 |
| 1612 | S990 | -6034 | 330 |
| 1613 | S991 | -6048 | 215 |
| 1614 | S992 | -6062 | 330 |
| 1615 | S993 | -6076 | 215 |
| 1616 | S994 | -6090 | 330 |
| 1617 | S995 | -6104 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|-----|
| 1618 | S996 | -6118 | 330 |
| 1619 | S997 | -6132 | 215 |
| 1620 | S998 | -6146 | 330 |
| 1621 | S999 | -6160 | 215 |
| 1622 | S1000 | -6174 | 330 |
| 1623 | S1001 | -6188 | 215 |
| 1624 | S1002 | -6202 | 330 |
| 1625 | S1003 | -6216 | 215 |
| 1626 | S1004 | -6230 | 330 |
| 1627 | S1005 | -6244 | 215 |
| 1628 | S1006 | -6258 | 330 |
| 1629 | S1007 | -6272 | 215 |
| 1630 | S1008 | -6286 | 330 |
| 1631 | S1009 | -6300 | 215 |
| 1632 | S1010 | -6314 | 330 |
| 1633 | S1011 | -6328 | 215 |
| 1634 | S1012 | -6342 | 330 |
| 1635 | S1013 | -6356 | 215 |
| 1636 | S1014 | -6370 | 330 |
| 1637 | S1015 | -6384 | 215 |
| 1638 | S1016 | -6398 | 330 |
| 1639 | S1017 | -6412 | 215 |
| 1640 | S1018 | -6426 | 330 |
| 1641 | S1019 | -6440 | 215 |
| 1642 | S1020 | -6454 | 330 |
| 1643 | S1021 | -6468 | 215 |
| 1644 | S1022 | -6482 | 330 |
| 1645 | S1023 | -6496 | 215 |
| 1646 | S1024 | -6510 | 330 |
| 1647 | S1025 | -6524 | 215 |
| 1648 | S1026 | -6538 | 330 |
| 1649 | S1027 | -6552 | 215 |
| 1650 | S1028 | -6566 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|-----|
| 1651 | S1029 | -6580 | 215 |
| 1652 | S1030 | -6594 | 330 |
| 1653 | S1031 | -6608 | 215 |
| 1654 | S1032 | -6622 | 330 |
| 1655 | S1033 | -6636 | 215 |
| 1656 | S1034 | -6650 | 330 |
| 1657 | S1035 | -6664 | 215 |
| 1658 | S1036 | -6678 | 330 |
| 1659 | S1037 | -6692 | 215 |
| 1660 | S1038 | -6706 | 330 |
| 1661 | S1039 | -6720 | 215 |
| 1662 | S1040 | -6734 | 330 |
| 1663 | S1041 | -6748 | 215 |
| 1664 | S1042 | -6762 | 330 |
| 1665 | S1043 | -6776 | 215 |
| 1666 | S1044 | -6790 | 330 |
| 1667 | S1045 | -6804 | 215 |
| 1668 | S1046 | -6818 | 330 |
| 1669 | S1047 | -6832 | 215 |
| 1670 | S1048 | -6846 | 330 |
| 1671 | S1049 | -6860 | 215 |
| 1672 | S1050 | -6874 | 330 |
| 1673 | S1051 | -6888 | 215 |
| 1674 | S1052 | -6902 | 330 |
| 1675 | S1053 | -6916 | 215 |
| 1676 | S1054 | -6930 | 330 |
| 1677 | S1055 | -6944 | 215 |
| 1678 | S1056 | -6958 | 330 |
| 1679 | S1057 | -6972 | 215 |
| 1680 | S1058 | -6986 | 330 |
| 1681 | S1059 | -7000 | 215 |
| 1682 | S1060 | -7014 | 330 |
| 1683 | S1061 | -7028 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|-----|
| 1684 | S1062 | -7042 | 330 |
| 1685 | S1063 | -7056 | 215 |
| 1686 | S1064 | -7070 | 330 |
| 1687 | S1065 | -7084 | 215 |
| 1688 | S1066 | -7098 | 330 |
| 1689 | S1067 | -7112 | 215 |
| 1690 | S1068 | -7126 | 330 |
| 1691 | S1069 | -7140 | 215 |
| 1692 | S1070 | -7154 | 330 |
| 1693 | S1071 | -7168 | 215 |
| 1694 | S1072 | -7182 | 330 |
| 1695 | S1073 | -7196 | 215 |
| 1696 | S1074 | -7210 | 330 |
| 1697 | S1075 | -7224 | 215 |
| 1698 | S1076 | -7238 | 330 |
| 1699 | S1077 | -7252 | 215 |
| 1700 | S1078 | -7266 | 330 |
| 1701 | S1079 | -7280 | 215 |
| 1702 | S1080 | -7294 | 330 |
| 1703 | S1081 | -7308 | 215 |
| 1704 | S1082 | -7322 | 330 |
| 1705 | S1083 | -7336 | 215 |
| 1706 | S1084 | -7350 | 330 |
| 1707 | S1085 | -7364 | 215 |
| 1708 | S1086 | -7378 | 330 |
| 1709 | S1087 | -7392 | 215 |
| 1710 | S1088 | -7406 | 330 |
| 1711 | S1089 | -7420 | 215 |
| 1712 | S1090 | -7434 | 330 |
| 1713 | S1091 | -7448 | 215 |
| 1714 | S1092 | -7462 | 330 |
| 1715 | S1093 | -7476 | 215 |
| 1716 | S1094 | -7490 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|-----|
| 1717 | S1095 | -7504 | 215 |
| 1718 | S1096 | -7518 | 330 |
| 1719 | S1097 | -7532 | 215 |
| 1720 | S1098 | -7546 | 330 |
| 1721 | S1099 | -7560 | 215 |
| 1722 | S1100 | -7574 | 330 |
| 1723 | S1101 | -7588 | 215 |
| 1724 | S1102 | -7602 | 330 |
| 1725 | S1103 | -7616 | 215 |
| 1726 | S1104 | -7630 | 330 |
| 1727 | S1105 | -7644 | 215 |
| 1728 | S1106 | -7658 | 330 |
| 1729 | S1107 | -7672 | 215 |
| 1730 | S1108 | -7686 | 330 |
| 1731 | S1109 | -7700 | 215 |
| 1732 | S1110 | -7714 | 330 |
| 1733 | S1111 | -7728 | 215 |
| 1734 | S1112 | -7742 | 330 |
| 1735 | S1113 | -7756 | 215 |
| 1736 | S1114 | -7770 | 330 |
| 1737 | S1115 | -7784 | 215 |
| 1738 | S1116 | -7798 | 330 |
| 1739 | S1117 | -7812 | 215 |
| 1740 | S1118 | -7826 | 330 |
| 1741 | S1119 | -7840 | 215 |
| 1742 | S1120 | -7854 | 330 |
| 1743 | S1121 | -7868 | 215 |
| 1744 | S1122 | -7882 | 330 |
| 1745 | S1123 | -7896 | 215 |
| 1746 | S1124 | -7910 | 330 |
| 1747 | S1125 | -7924 | 215 |
| 1748 | S1126 | -7938 | 330 |
| 1749 | S1127 | -7952 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|-----|
| 1750 | S1128 | -7966 | 330 |
| 1751 | S1129 | -7980 | 215 |
| 1752 | S1130 | -7994 | 330 |
| 1753 | S1131 | -8008 | 215 |
| 1754 | S1132 | -8022 | 330 |
| 1755 | S1133 | -8036 | 215 |
| 1756 | S1134 | -8050 | 330 |
| 1757 | S1135 | -8064 | 215 |
| 1758 | S1136 | -8078 | 330 |
| 1759 | S1137 | -8092 | 215 |
| 1760 | S1138 | -8106 | 330 |
| 1761 | S1139 | -8120 | 215 |
| 1762 | S1140 | -8134 | 330 |
| 1763 | S1141 | -8148 | 215 |
| 1764 | S1142 | -8162 | 330 |
| 1765 | S1143 | -8176 | 215 |
| 1766 | S1144 | -8190 | 330 |
| 1767 | S1145 | -8204 | 215 |
| 1768 | S1146 | -8218 | 330 |
| 1769 | S1147 | -8232 | 215 |
| 1770 | S1148 | -8246 | 330 |
| 1771 | S1149 | -8260 | 215 |
| 1772 | S1150 | -8274 | 330 |
| 1773 | S1151 | -8288 | 215 |
| 1774 | S1152 | -8302 | 330 |
| 1775 | S1153 | -8316 | 215 |
| 1776 | S1154 | -8330 | 330 |
| 1777 | S1155 | -8344 | 215 |
| 1778 | S1156 | -8358 | 330 |
| 1779 | S1157 | -8372 | 215 |
| 1780 | S1158 | -8386 | 330 |
| 1781 | S1159 | -8400 | 215 |
| 1782 | S1160 | -8414 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|-----|
| 1783 | S1161 | -8428 | 215 |
| 1784 | S1162 | -8442 | 330 |
| 1785 | S1163 | -8456 | 215 |
| 1786 | S1164 | -8470 | 330 |
| 1787 | S1165 | -8484 | 215 |
| 1788 | S1166 | -8498 | 330 |
| 1789 | S1167 | -8512 | 215 |
| 1790 | S1168 | -8526 | 330 |
| 1791 | S1169 | -8540 | 215 |
| 1792 | S1170 | -8554 | 330 |
| 1793 | S1171 | -8568 | 215 |
| 1794 | S1172 | -8582 | 330 |
| 1795 | S1173 | -8596 | 215 |
| 1796 | S1174 | -8610 | 330 |
| 1797 | S1175 | -8624 | 215 |
| 1798 | S1176 | -8638 | 330 |
| 1799 | S1177 | -8652 | 215 |
| 1800 | S1178 | -8666 | 330 |
| 1801 | S1179 | -8680 | 215 |
| 1802 | S1180 | -8694 | 330 |
| 1803 | S1181 | -8708 | 215 |
| 1804 | S1182 | -8722 | 330 |
| 1805 | S1183 | -8736 | 215 |
| 1806 | S1184 | -8750 | 330 |
| 1807 | S1185 | -8764 | 215 |
| 1808 | S1186 | -8778 | 330 |
| 1809 | S1187 | -8792 | 215 |
| 1810 | S1188 | -8806 | 330 |
| 1811 | S1189 | -8820 | 215 |
| 1812 | S1190 | -8834 | 330 |
| 1813 | S1191 | -8848 | 215 |
| 1814 | S1192 | -8862 | 330 |
| 1815 | S1193 | -8876 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|-----|
| 1816 | S1194 | -8890 | 330 |
| 1817 | S1195 | -8904 | 215 |
| 1818 | S1196 | -8918 | 330 |
| 1819 | S1197 | -8932 | 215 |
| 1820 | S1198 | -8946 | 330 |
| 1821 | S1199 | -8960 | 215 |
| 1822 | S1200 | -8974 | 330 |
| 1823 | SGND | -9044 | 215 |
| 1824 | SGND | -9058 | 330 |
| 1825 | SGND | -9072 | 215 |
| 1826 | SGND | -9086 | 330 |
| 1827 | SGND | -9100 | 215 |
| 1828 | SGND | -9114 | 330 |
| 1829 | SGND | -9128 | 215 |
| 1830 | SGND | -9142 | 330 |
| 1831 | SGND | -9156 | 215 |
| 1832 | SGND | -9170 | 330 |
| 1833 | SGND | -9184 | 215 |
| 1834 | SGND | -9198 | 330 |
| 1835 | SGND | -9212 | 215 |
| 1836 | SGND | -9226 | 330 |
| 1837 | SGND | -9240 | 215 |
| 1838 | SGND | -9254 | 330 |
| 1839 | DUMMY | -9324 | 215 |
| 1840 | DUMMY | -9338 | 330 |
| 1841 | DUMMY | -9352 | 215 |
| 1842 | DUMMY | -9366 | 330 |
| 1843 | DUMMY | -9380 | 215 |
| 1844 | DUMMY | -9394 | 330 |
| 1845 | DUMMY | -9408 | 215 |
| 1846 | DUMMY | -9422 | 330 |
| 1847 | DUMMY | -9436 | 215 |
| 1848 | DUMMY | -9450 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|-------|-----|
| 1849 | DUMMY | -9464 | 215 |
| 1850 | DUMMY | -9478 | 330 |
| 1851 | DUMMY | -9492 | 215 |
| 1852 | DUMMY | -9506 | 330 |
| 1853 | DUMMY | -9520 | 215 |
| 1854 | DUMMY | -9534 | 330 |
| 1855 | DUMMY | -9548 | 215 |
| 1856 | DUMMY | -9562 | 330 |
| 1857 | DUMMY | -9576 | 215 |
| 1858 | DUMMY | -9590 | 330 |
| 1859 | DUMMY | -9604 | 215 |
| 1860 | DUMMY | -9618 | 330 |
| 1861 | DUMMY | -9632 | 215 |
| 1862 | DUMMY | -9646 | 330 |
| 1863 | DUMMY | -9660 | 215 |
| 1864 | DUMMY | -9674 | 330 |
| 1865 | DUMMY | -9688 | 215 |
| 1866 | DUMMY | -9702 | 330 |
| 1867 | DUMMY | -9716 | 215 |
| 1868 | DUMMY | -9730 | 330 |
| 1869 | DUMMY | -9744 | 215 |
| 1870 | DUMMY | -9758 | 330 |
| 1871 | DUMMY | -9772 | 215 |
| 1872 | DUMMY | -9786 | 330 |
| 1873 | DUMMY | -9800 | 215 |
| 1874 | DUMMY | -9814 | 330 |
| 1875 | DUMMY | -9828 | 215 |
| 1876 | DUMMY | -9842 | 330 |
| 1877 | DUMMY | -9856 | 215 |
| 1878 | DUMMY | -9870 | 330 |
| 1879 | DUMMY | -9884 | 215 |
| 1880 | DUMMY | -9898 | 330 |
| 1881 | DUMMY | -9912 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|--------|-----|
| 1882 | DUMMY | -9926 | 330 |
| 1883 | DUMMY | -9940 | 215 |
| 1884 | DUMMY | -9954 | 330 |
| 1885 | DUMMY | -9968 | 215 |
| 1886 | DUMMY | -9982 | 330 |
| 1887 | DUMMY | -9996 | 215 |
| 1888 | DUMMY | -10010 | 330 |
| 1889 | DUMMY | -10024 | 215 |
| 1890 | DUMMY | -10038 | 330 |
| 1891 | DUMMY | -10052 | 215 |
| 1892 | DUMMY | -10066 | 330 |
| 1893 | DUMMY | -10080 | 215 |
| 1894 | DUMMY | -10094 | 330 |
| 1895 | DUMMY | -10108 | 215 |
| 1896 | DUMMY | -10122 | 330 |
| 1897 | DUMMY | -10136 | 215 |
| 1898 | DUMMY | -10150 | 330 |
| 1899 | DUMMY | -10164 | 215 |
| 1900 | DUMMY | -10178 | 330 |
| 1901 | DUMMY | -10192 | 215 |
| 1902 | DUMMY | -10206 | 330 |
| 1903 | DUMMY | -10220 | 215 |
| 1904 | DUMMY | -10234 | 330 |
| 1905 | DUMMY | -10248 | 215 |
| 1906 | DUMMY | -10262 | 330 |
| 1907 | DUMMY | -10276 | 215 |
| 1908 | DUMMY | -10290 | 330 |
| 1909 | DUMMY | -10304 | 215 |
| 1910 | DUMMY | -10318 | 330 |
| 1911 | DUMMY | -10332 | 215 |
| 1912 | DUMMY | -10346 | 330 |
| 1913 | DUMMY | -10360 | 215 |
| 1914 | DUMMY | -10374 | 330 |

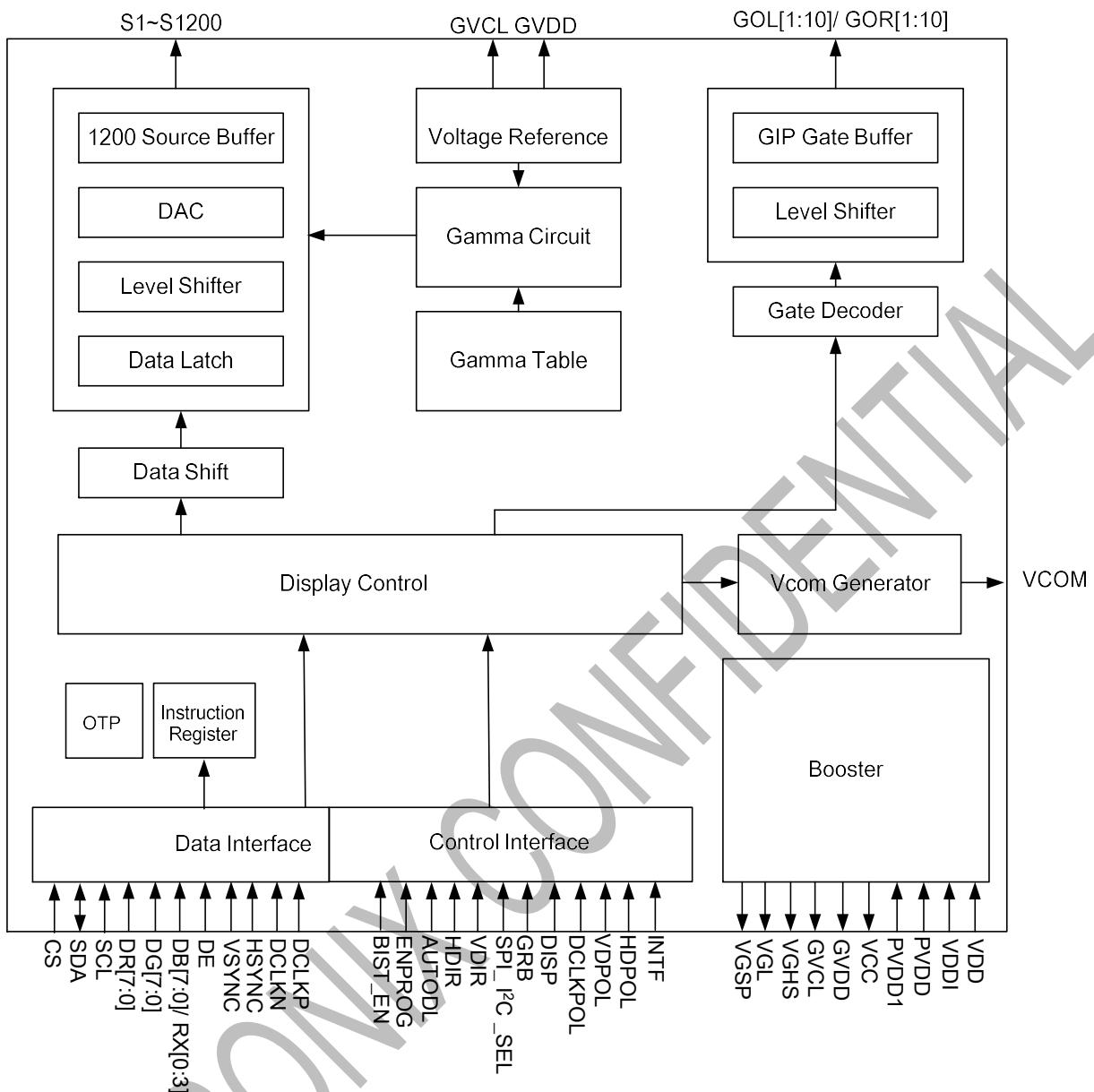
| PAD No. | PIN Name | X | Y |
|---------|----------|--------|-----|
| 1915 | DUMMY | -10388 | 215 |
| 1916 | DUMMY | -10402 | 330 |
| 1917 | DUMMY | -10416 | 215 |
| 1918 | DUMMY | -10430 | 330 |
| 1919 | DUMMY | -10444 | 215 |
| 1920 | DUMMY | -10458 | 330 |
| 1921 | DUMMY | -10472 | 215 |
| 1922 | DUMMY | -10486 | 330 |
| 1923 | DUMMY | -10500 | 215 |
| 1924 | DUMMY | -10514 | 330 |
| 1925 | DUMMY | -10528 | 215 |
| 1926 | DUMMY | -10542 | 330 |
| 1927 | DUMMY | -10556 | 215 |
| 1928 | DUMMY | -10570 | 330 |
| 1929 | DUMMY | -10584 | 215 |
| 1930 | DUMMY | -10598 | 330 |
| 1931 | DUMMY | -10612 | 215 |
| 1932 | DUMMY | -10626 | 330 |
| 1933 | DUMMY | -10640 | 215 |
| 1934 | DUMMY | -10654 | 330 |
| 1935 | DUMMY | -10668 | 215 |
| 1936 | DUMMY | -10682 | 330 |
| 1937 | VGL | -10752 | 215 |
| 1938 | VGL | -10766 | 330 |
| 1939 | VGL | -10780 | 215 |
| 1940 | VGL | -10794 | 330 |
| 1941 | VGL | -10808 | 215 |
| 1942 | VGL | -10822 | 330 |
| 1943 | VGHS | -10836 | 215 |
| 1944 | VGHS | -10850 | 330 |
| 1945 | VGHS | -10864 | 215 |
| 1946 | VGHS | -10878 | 330 |
| 1947 | VGHS | -10892 | 215 |

| PAD No. | PIN Name | X | Y |
|---------|----------|--------|-----|
| 1948 | VGHS | -10906 | 330 |
| 1949 | GOL[10] | -10976 | 215 |
| 1950 | GOL[10] | -10990 | 330 |
| 1951 | GOL[10] | -11004 | 215 |
| 1952 | GOL[9] | -11018 | 330 |
| 1953 | GOL[9] | -11032 | 215 |
| 1954 | GOL[9] | -11046 | 330 |
| 1955 | GOL[8] | -11060 | 215 |
| 1956 | GOL[8] | -11074 | 330 |
| 1957 | GOL[8] | -11088 | 215 |
| 1958 | GOL[7] | -11102 | 330 |
| 1959 | GOL[7] | -11116 | 215 |
| 1960 | GOL[7] | -11130 | 330 |
| 1961 | GOL[6] | -11144 | 215 |
| 1962 | GOL[6] | -11158 | 330 |
| 1963 | GOL[6] | -11172 | 215 |
| 1964 | GOL[5] | -11186 | 330 |
| 1965 | GOL[5] | -11200 | 215 |
| 1966 | GOL[5] | -11214 | 330 |
| 1967 | GOL[4] | -11228 | 215 |
| 1968 | GOL[4] | -11242 | 330 |
| 1969 | GOL[4] | -11256 | 215 |
| 1970 | GOL[3] | -11270 | 330 |
| 1971 | GOL[3] | -11284 | 215 |
| 1972 | GOL[3] | -11298 | 330 |
| 1973 | GOL[2] | -11312 | 215 |
| 1974 | GOL[2] | -11326 | 330 |
| 1975 | GOL[2] | -11340 | 215 |
| 1976 | GOL[1] | -11354 | 330 |
| 1977 | GOL[1] | -11368 | 215 |
| 1978 | GOL[1] | -11382 | 330 |
| 1979 | VGL | -11452 | 215 |
| 1980 | VGL | -11466 | 330 |

| PAD No. | PIN Name | X | Y |
|---------|----------|--------|------|
| 1981 | VGL | -11480 | 215 |
| 1982 | VGL | -11494 | 330 |
| 1983 | VGL | -11508 | 215 |
| 1984 | VGL | -11522 | 330 |
| 1985 | VGHS | -11536 | 215 |
| 1986 | VGHS | -11550 | 330 |
| 1987 | VGHS | -11564 | 215 |
| 1988 | VGHS | -11578 | 330 |
| 1989 | VGHS | -11592 | 215 |
| 1990 | VGHS | -11606 | 330 |
| 1991 | L_MARK | -11812 | -337 |
| 1992 | R_MARK | 11812 | -337 |

SITRONIX CONFIDENTIAL

5. BLOCK DIAGRAM



6. PIN DESCRIPTION

6.1 Pin Function

| Name | Type | Description | | |
|--|------|--|---|--|
| 3-Wire SPI / I ² C Interface Pins | | | | |
| SPI_I ² C_SEL | I | 3-wire SPI and I ² C interface control. | | |
| | | SPI_I ² C_SEL | Function Description | |
| | | L | I ² C interface | |
| CS | I | H | 3-wire SPI interface (Default) | |
| | | Serial communication chip selection. CS is not used in I ² C interface and should be connected to "H". | | |
| | | SDA | I/O Serial communication data input and output. | |
| SCL | | Serial communication clock input. | | |
| Control Pins | | | | |
| GRB | I | Global reset pin. When GRB is "L", internal initialization procedure is executed. | | |
| DISP | I | DISP sets the display mode. | | |
| | | DISP | Function Description | |
| | | L | Standby mode (Default) | |
| HDIR | I | H | Normal display mode | |
| | | Horizontal scan direction control pin. This pin must be connected to "H" or "L" according to system application. | | |
| | | HDIR | Function Description | |
| VDIR | I | L | From right to left | |
| | | H | From left to right(Default) | |
| | | Vertical scan direction control pin. This pin must be connected to "H" or "L" according to system application. | | |
| AUTODL | I | VDIR | Function Description | |
| | | L | From down to up. | |
| | | H | From up to down. (Default) | |
| ENPROG | I | OTP trim function control pin. When normal display, AUTODL should be set to "H" and the value in the OTP will be downloaded automatically. | | |
| | | AUTODL | Function Description | |
| | | L | Disable auto-refresh function | |
| ENPROG | I | H | Enable auto-refresh function(Default) | |
| | | OTP program control pin. Please keep it in "L" when OTP is not programming. | | |
| | | ENPROG | Function Description | |
| ENPROG | I | L | Disable OTP program function(Default) | |
| | | H | Enable OTP program function | |

| Name | Type | Description | |
|---|------|--|-------------------------------------|
| BIST_EN | I | BIST function control pin. | |
| | | BIST_EN | Function Description |
| | | L | Disable BIST function(Default) |
| | | H | Enable BIST function |
| INTF | I | Set RGB interface or LVDS interface. | |
| | | INTF | Function Description |
| | | L | RGB interface mode(Default) |
| | | H | LVDS interface mode |
| Interface Control Pins | | | |
| VDPOL | I | VDPOL sets VSYNC polarity in RGB interface and sets LVDS 3- / 4- lane in LVDS interface. | |
| | | MCU Type | VDPOL |
| | | RGB interface | L VSYNC polarity: positive |
| | | | H VSYNC polarity: negative(Default) |
| | | LVDS interface | L LVDS 3 lane |
| | | | H LVDS 4 lane(Default) |
| HDPOL | I | HDPOL sets HSYNC polarity in RGB interface. | |
| | | HDPOL | Function Description |
| | | L | HSYNC polarity: positive |
| | | H | HSYNC polarity: negative(Default) |
| HDPOL is not used in LVDS interface and should be connected to "H". | | | |
| DCLKPOL | I | DCLKPOL sets DCLK polarity in RGB interface. | |
| | | DCLKPOL | Function Description |
| | | L | DCLK polarity: positive |
| | | H | DCLK polarity: negative(Default) |
| DCLKPOL is not used in LVDS interface and should be connected to "H". | | | |
| LVDS_FMT | I | LVDS_FMT sets LVDS data format. | |
| | | LVDS_FMT | Function Description |
| | | L | VESA Mode |
| | | H | JEIDA Mode(Default) |
| LVDS_FMT is not used in RGB interface and should be connected to "L". | | | |
| SWAP | I | SWAP is a reserved test pin. Please set it according to the following table. | |
| | | MCU Type | Function Description |
| | | RGB interface | SWAP pin must be connected to "L". |
| | | LVDS interface | SWAP pin must be connected to "H" |

| Name | Type | Description | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------|--|--|----------------------|----------------------|------------------|---|---------|---|---------|--|---------|---------------------------------------|-------------------|---------|---|---------|---|---------|-----------------------------|---------|-----------------------------|---------|-----------------------------|---------|-----------------------------|
| Input Interface Pins | | | | | | | | | | | | | | | | | | | | | | | | | |
| DR[7:0] DG[7:0] DB[7:0] | I | <p>RGB interface and LVDS interface data input pins.</p> <p>LVDS pin define please refer to section 7.4.1 LVDS Input Pin Mapping Table.</p> <table border="1"> <thead> <tr> <th>MCU Type</th><th colspan="2">Function Description</th></tr> </thead> <tbody> <tr> <td rowspan="3">RGB interface</td><td>DR[7:0]</td><td>8 bit data bus display for red data.</td></tr> <tr> <td>DG[7:0]</td><td>8 bit data bus display for green data.</td></tr> <tr> <td>DB[7:0]</td><td>8 bit data bus display for blue data.</td></tr> <tr> <td rowspan="7">LVDS interface</td><td>DR[7:0]</td><td>DR[7:0] are not used in LVDS mode and should be connected to "L".</td></tr> <tr> <td>DG[7:0]</td><td>DG[7:0] are not used in LVDS mode and should be connected to "L".</td></tr> <tr> <td>DB[1:0]</td><td>LVDS input lane: RX0N/ RX0P</td></tr> <tr> <td>DB[3:2]</td><td>LVDS input lane: RX1N/ RX1P</td></tr> <tr> <td>DB[5:4]</td><td>LVDS input lane: RX2N/ RX2P</td></tr> <tr> <td>DB[7:6]</td><td>LVDS input lane: RX3N/ RX3P</td></tr> </tbody> </table> | MCU Type | Function Description | | RGB interface | DR[7:0] | 8 bit data bus display for red data. | DG[7:0] | 8 bit data bus display for green data. | DB[7:0] | 8 bit data bus display for blue data. | LVDS interface | DR[7:0] | DR[7:0] are not used in LVDS mode and should be connected to "L". | DG[7:0] | DG[7:0] are not used in LVDS mode and should be connected to "L". | DB[1:0] | LVDS input lane: RX0N/ RX0P | DB[3:2] | LVDS input lane: RX1N/ RX1P | DB[5:4] | LVDS input lane: RX2N/ RX2P | DB[7:6] | LVDS input lane: RX3N/ RX3P |
| MCU Type | Function Description | | | | | | | | | | | | | | | | | | | | | | | | |
| RGB interface | DR[7:0] | 8 bit data bus display for red data. | | | | | | | | | | | | | | | | | | | | | | | |
| | DG[7:0] | 8 bit data bus display for green data. | | | | | | | | | | | | | | | | | | | | | | | |
| | DB[7:0] | 8 bit data bus display for blue data. | | | | | | | | | | | | | | | | | | | | | | | |
| LVDS interface | DR[7:0] | DR[7:0] are not used in LVDS mode and should be connected to "L". | | | | | | | | | | | | | | | | | | | | | | | |
| | DG[7:0] | DG[7:0] are not used in LVDS mode and should be connected to "L". | | | | | | | | | | | | | | | | | | | | | | | |
| | DB[1:0] | LVDS input lane: RX0N/ RX0P | | | | | | | | | | | | | | | | | | | | | | | |
| | DB[3:2] | LVDS input lane: RX1N/ RX1P | | | | | | | | | | | | | | | | | | | | | | | |
| | DB[5:4] | LVDS input lane: RX2N/ RX2P | | | | | | | | | | | | | | | | | | | | | | | |
| | DB[7:6] | LVDS input lane: RX3N/ RX3P | | | | | | | | | | | | | | | | | | | | | | | |
| | <p>Pixel clock/ LVDS DCLKP control pin, this pin function is selected by INTF.</p> <table border="1"> <thead> <tr> <th>MCU Type</th><th colspan="2">Function Description</th></tr> </thead> <tbody> <tr> <td rowspan="3">RGB interface</td><td>RGB interface: pixel clock input pin</td><td></td></tr> <tr> <td>LVDS interface: DCLKP, detail pin define please refer to section 7.4.1LVDS Input Pin Mapping Table.</td><td></td></tr> </tbody> </table> | MCU Type | Function Description | | RGB interface | RGB interface: pixel clock input pin | | LVDS interface: DCLKP, detail pin define please refer to section 7.4.1LVDS Input Pin Mapping Table. | | | | | | | | | | | | | | | | | |
| MCU Type | Function Description | | | | | | | | | | | | | | | | | | | | | | | | |
| RGB interface | RGB interface: pixel clock input pin | | | | | | | | | | | | | | | | | | | | | | | | |
| | LVDS interface: DCLKP, detail pin define please refer to section 7.4.1LVDS Input Pin Mapping Table. | | | | | | | | | | | | | | | | | | | | | | | | |
| | <p>LVDS DCLKN control pin, this pin function is selected by INTF.</p> <table border="1"> <thead> <tr> <th>MCU Type</th><th colspan="2">Function Description</th></tr> </thead> <tbody> <tr> <td rowspan="5">RGB interface</td><td>RGB interface: DCLKN is not used in RGB interface and should be connected to "L".</td><td></td></tr> <tr> <td>LVDS interface: DCLKN, detail pin define please refer to section 7.4.1LVDS Input Pin Mapping Table.</td><td></td></tr> </tbody> </table> | MCU Type | Function Description | | RGB interface | RGB interface: DCLKN is not used in RGB interface and should be connected to "L". | | LVDS interface: DCLKN, detail pin define please refer to section 7.4.1LVDS Input Pin Mapping Table. | | | | | | | | | | | | | | | | | |
| MCU Type | Function Description | | | | | | | | | | | | | | | | | | | | | | | | |
| RGB interface | RGB interface: DCLKN is not used in RGB interface and should be connected to "L". | | | | | | | | | | | | | | | | | | | | | | | | |
| | LVDS interface: DCLKN, detail pin define please refer to section 7.4.1LVDS Input Pin Mapping Table. | | | | | | | | | | | | | | | | | | | | | | | | |
| | <p>Horizontal sync signal applied to the RGB interface.</p> <p>Hsync is not used in LVDS interface and should be connected to "L".</p> | | | | | | | | | | | | | | | | | | | | | | | | |
| | <p>Vertical sync signal applied to the RGB interface.</p> <p>Vsync is not used in LVDS interface and should be connected to "L".</p> | | | | | | | | | | | | | | | | | | | | | | | | |
| | <p>Data input enable applied to the RGB interface.</p> <p>DE is not used in LVDS interface and should be connected to "L".</p> | | | | | | | | | | | | | | | | | | | | | | | | |
| Source / Gate Driver Pins | | | | | | | | | | | | | | | | | | | | | | | | | |
| S[1200:1] | O | Source driver output signals. | | | | | | | | | | | | | | | | | | | | | | | |
| GOR[10:1] GOL[10:1] | O | GIP control signals | | | | | | | | | | | | | | | | | | | | | | | |

| Name | Type | Description |
|--------------------|------|--|
| VCOM Generator Pin | | |
| VCOM | O | Power supply for the TFT-LCD common electrode. |
| Power Supply Pins | | |
| VDDI | P | Power supply for digital I/O pins. |
| VDD | P | Power supply for analog circuit. |
| PVDD | P | Power supply for charge pump circuit. |
| DUMMY (PVDD1) | P | Power supply for charge pump circuit (enhance). The power supply is determined by system power, panel loading and display quality. |
| DGND | P | Ground pin for digital circuit. |
| AGND | P | Ground pin for analog circuit. |
| PGND | P | Ground pin for charge pump circuit. |
| SGND | P | Ground pin for source circuit. |
| RGND | P | Ground pin for reference circuit. |
| Power Circuit Pins | | |
| VGHS | C | Positive power supply for gate driver. |
| VGL | C | Negative power supply for gate driver. |
| SVDD | C | DC/DC converter for positive source OP-AMP driver. |
| SVCL | C | DC/DC converter for negative source OP-AMP driver. |
| GVDD | PO | Positive voltage output of grayscale power. |
| GVCL | PO | Negative voltage output of grayscale power. |
| AVDD1 | C | DC/DC converter for positive gamma and GVDD reference voltage. |
| AVCL1 | C | DC/DC converter for negative gamma and GVCL reference voltage. |
| VCC | PO | Monitor pin of internal digital power. |
| Test Pins | | |
| VGSP | T | Monitor pin for VCOM". |
| VPP | T | Reserved for OTP test only, please leave it open. |
| V20 | T | Reserved for testing only, please leave it open. |
| ERR_OUT | T | Reserved for testing only, please leave it open. |
| TEST_I[14:0] | T | Reserved for testing only, please leave these pins open. |
| TESTOUT[13:0] | T | Reserved for testing only, please leave these pins open. |
| DUMMY | D | Dummy pin, please leave these pins open. |

Note: 1. I: input, O: output, I/O: input/output, P: power input, PO: power out, D: dummy, T: test pin, C: capacitor pin

2. If hardware pin is not used, please fix to "H" by VDDI or "L" by DGND

6.2 Hardware Pin Configuration Pin Mapping Software Register Setting

The following settings can be selected by hardware pins and software registers.

| Hardware Setting (use in power on/off sequence) | Software Setting (use in normal operation mode) |
|--|--|
| GRB | 10h[3] |
| DISP | 10h[0] |
| VDIR | 19h[6] |
| HDIR | 19h[5] |
| AUTODL | 1Ch[2] |
| VDPOL | 1Bh[7] |
| HDPOL | 1Bh[6] |
| DCLKPOL | 1Bh[4] |

7. COMMUNICATION INTERFACE

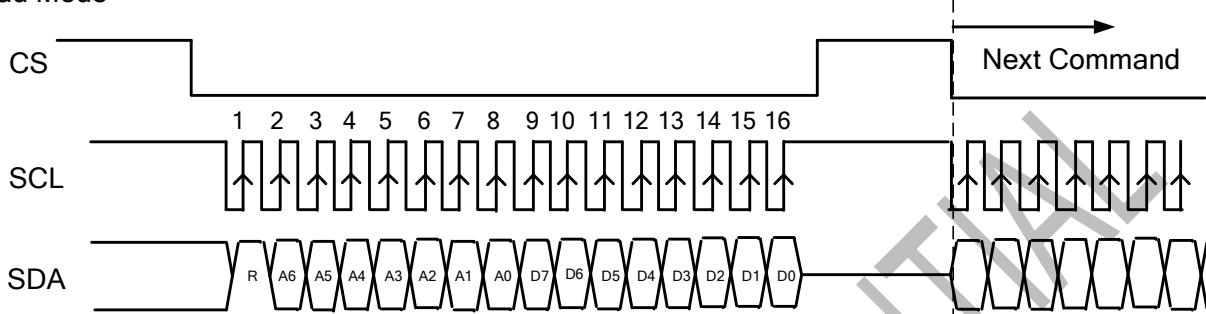
7.1 3-wire Serial Interface

R/W: Read/Write mode control bit.

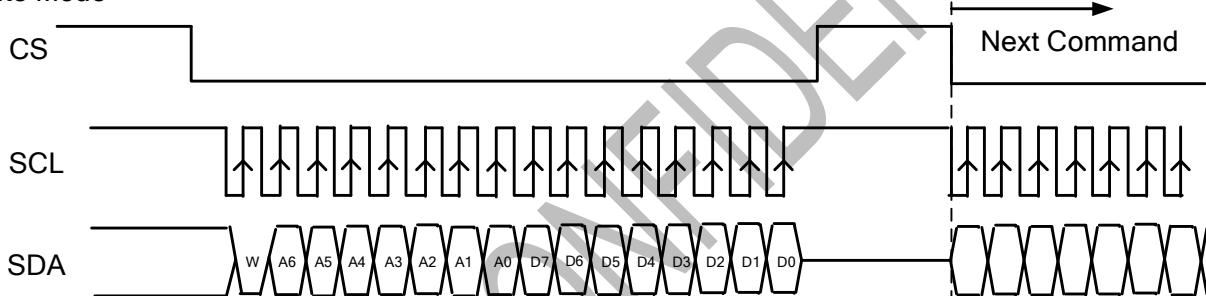
R/W=1: Read mode

R/W=0: Write mode

Read Mode



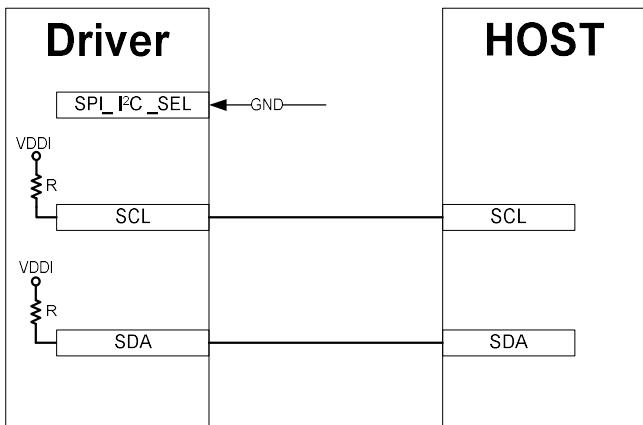
Write Mode



- a. Each serial command consists of 16 bits of data which is loaded one bit a time at the rising edge of serial clock SCL.
- b. Command loading operation starts from the falling edge of CS and is completed at the next rising edge of CS.
- c. The serial control block is operational after power on reset, but commands are established by the VSYNC signal. If command is transferred multiple times for the same register, the last command before the VSYNC signal is valid.
- d. If less than 16 bits of SCL are input while CS is low, the transferred data is ignored.
- e. If 16 bits or more of SCL are input while CS is low, the previous 16 bits of transferred data before the rising edge of CS pulse are valid data.
- f. Serial block operates with the SCL clock
- g. Serial data can be accepted in the power save mode.
- h. After power on reset or GRB reset, it is required 100ms delay to begin SPI communication.

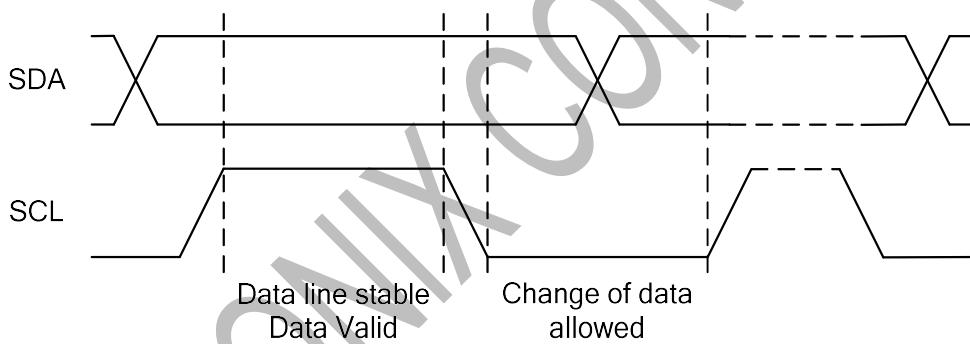
7.2 I²C Interface

The I²C Interface is bi-directional two-line communication between different ICs or modules. The two lines are a Serial Data line (SDA) and a Serial Clock line (SCL). Both lines have built-in pull up resistor which drives SDA and SCL to high when the bus is not busy. Data transfer can be initiated only when the bus is not busy.



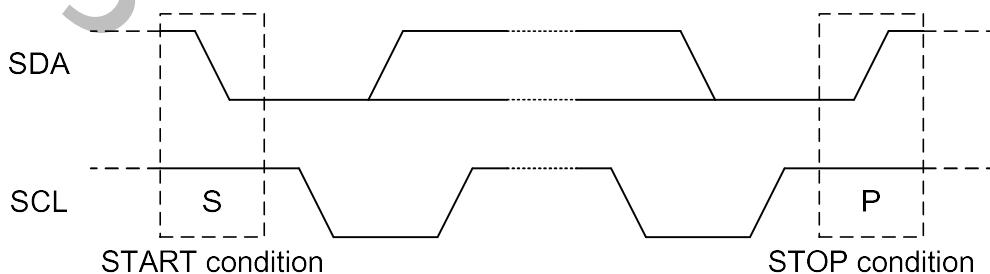
7.2.1 Bit Transfer

One data bit is transferred during each clock pulse. The data on the SDA line must remain stable during the HIGH period of the clock pulse because changes of SDA line at this time will be interpreted as START or STOP. Bit transfer is illustrated as follows.

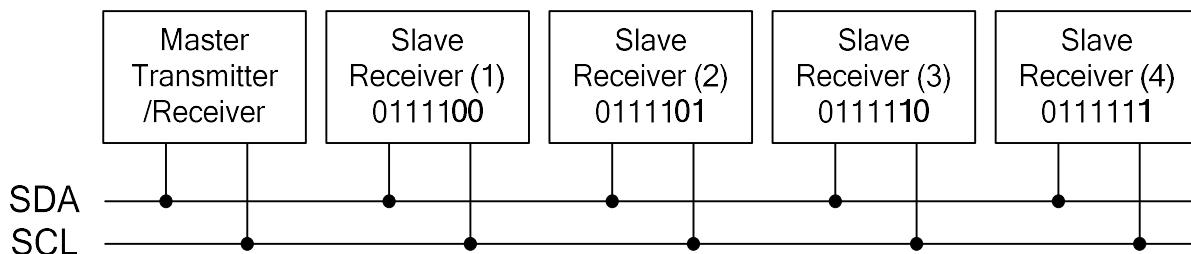


7.2.2 START and STOP Conditions

Both SDA and SCL lines remain HIGH when the bus is not busy. A HIGH-to-LOW transition of SDA, while SCL is HIGH is defined as the START condition (S). A LOW-to-HIGH transition of SDA while SCL is HIGH is defined as the STOP condition (P). The START and STOP conditions are illustrated as follows.



7.2.3 System Configuration

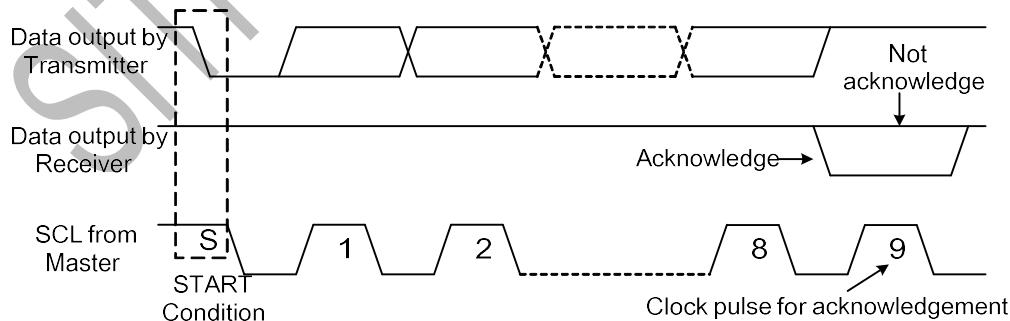


The system configuration is illustrated above and some word-definitions are explained below:

- a. Transmitter: the device which sends the data to the bus.
- b. Receiver: the device which receives the data from the bus.
- c. Master: the device which initiates a transfer generates clock signals and terminates a transfer.
- d. Slave: the device which is addressed by a master.
- e. Multi-Master: more than one master can attempt to control the bus at the same time without corrupting the message.
- f. Arbitration: the procedure to ensure that, if more than one master tries to control the bus simultaneously, only one is allowed to do so and the message is not corrupted.
- g. Synchronization: procedure to synchronize the clock signals of two or more devices.

7.2.4 Acknowledgment

Each byte of eight bits is followed by an acknowledge-bit. The acknowledge-bit is a HIGH signal put on SDA by the transmitter during the time when the master generates an extra acknowledge-related clock pulse. A slave receiver which is addressed must generate an acknowledge-bit after the reception of each byte. A master receiver must also generate an acknowledge-bit after the reception of each byte that has been clocked out of the slave transmitter. The device that acknowledges must pull-down the SDA line during the acknowledge-clock pulse, so that the SDA line is stable LOW during the HIGH period of the acknowledge-related clock pulse (set-up and hold times must be taken into consideration). A master receiver must signal an end-of-data to the slave transmitter by not generating an acknowledge-bit on the last byte that has been clocked out of the slave. In this event the transmitter must leave the data line HIGH to enable the master to generate a STOP condition. Acknowledgement on the I²C Interface is illustrated as follows.



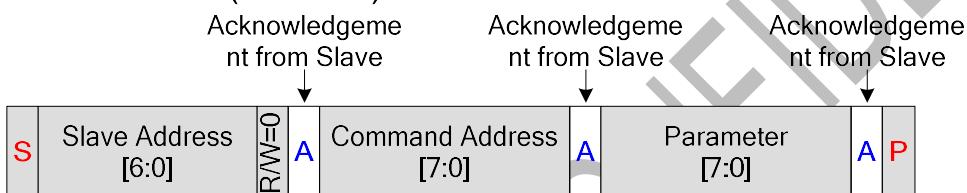
7.2.5 I²C Interface Protocol

The driver supports command/data write to addressed slaves on the bus. Before any data is transmitted on the I²C Interface, the device which should respond is addressed first. The default slave address is 0111100b and the three times I²C address could be OTP programing.

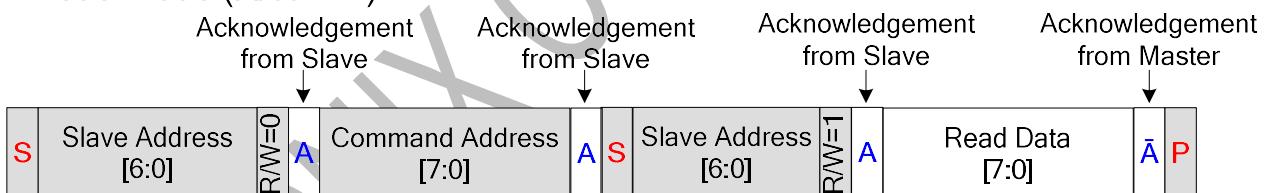
The sequence is initiated with a START condition (S) from the I²C Interface master, which is followed by the slave address. All slaves with the corresponding address acknowledge in parallel, all the others will ignore the I²C Interface transfer. After acknowledgement, one or more command or data words are followed and define the status of the addressed slaves.

Only the addressed slave makes the acknowledgement after each byte. At the end of the transmission the bus master issues a STOP condition (P). If no acknowledge is generated by the master after a byte, the driver stops transferring data to the master. The register write/ read transference sequence are described as follows.

Write Mode (R/W="0")



Read Mode (R/W="1")



S: start condition

P: stop condition

A: acknowledge

Ā: no-acknowledge

master to slave

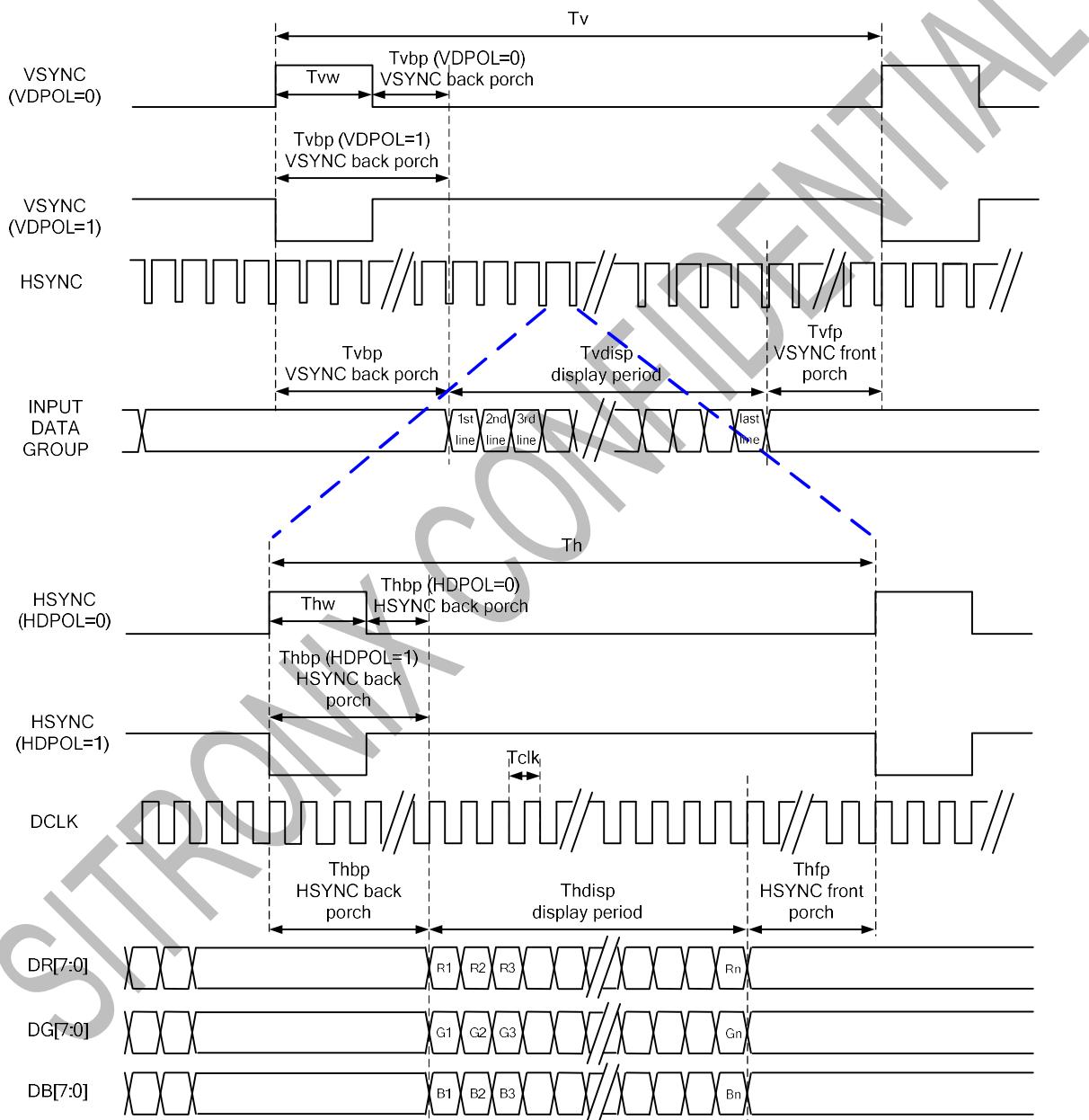
slave to master

7.3 RGB Interface

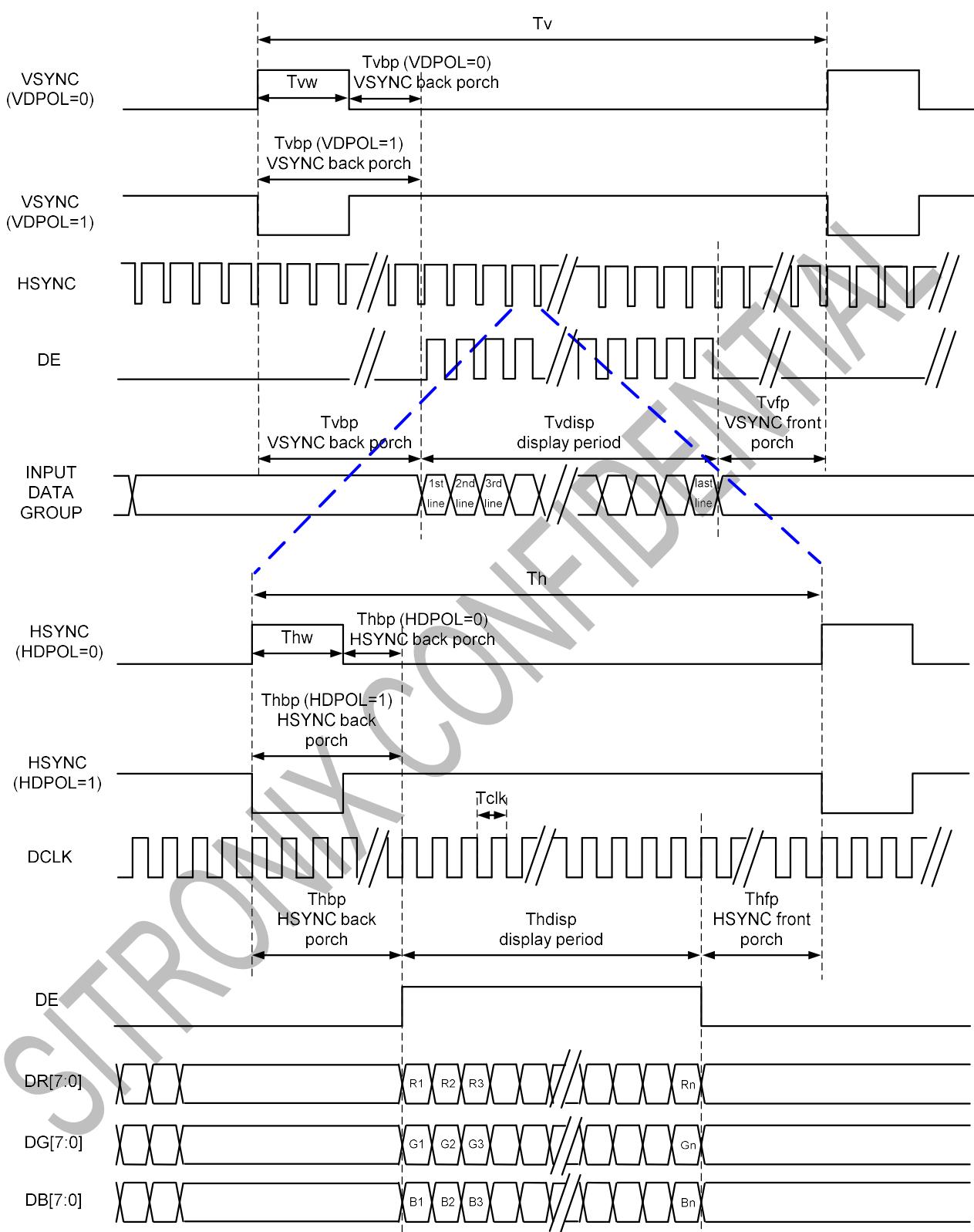
| RGB Mode Selection Table | DCLK | H SYNC | V SYNC | DE |
|--------------------------|-------|--------|--------|-------|
| SYNC - DE Mode | Input | Input | Input | Input |
| SYNC Mode | Input | Input | Input | GND |
| DE Mode | Input | GND | GND | Input |

Note: "Input" means these signals are driven by host side

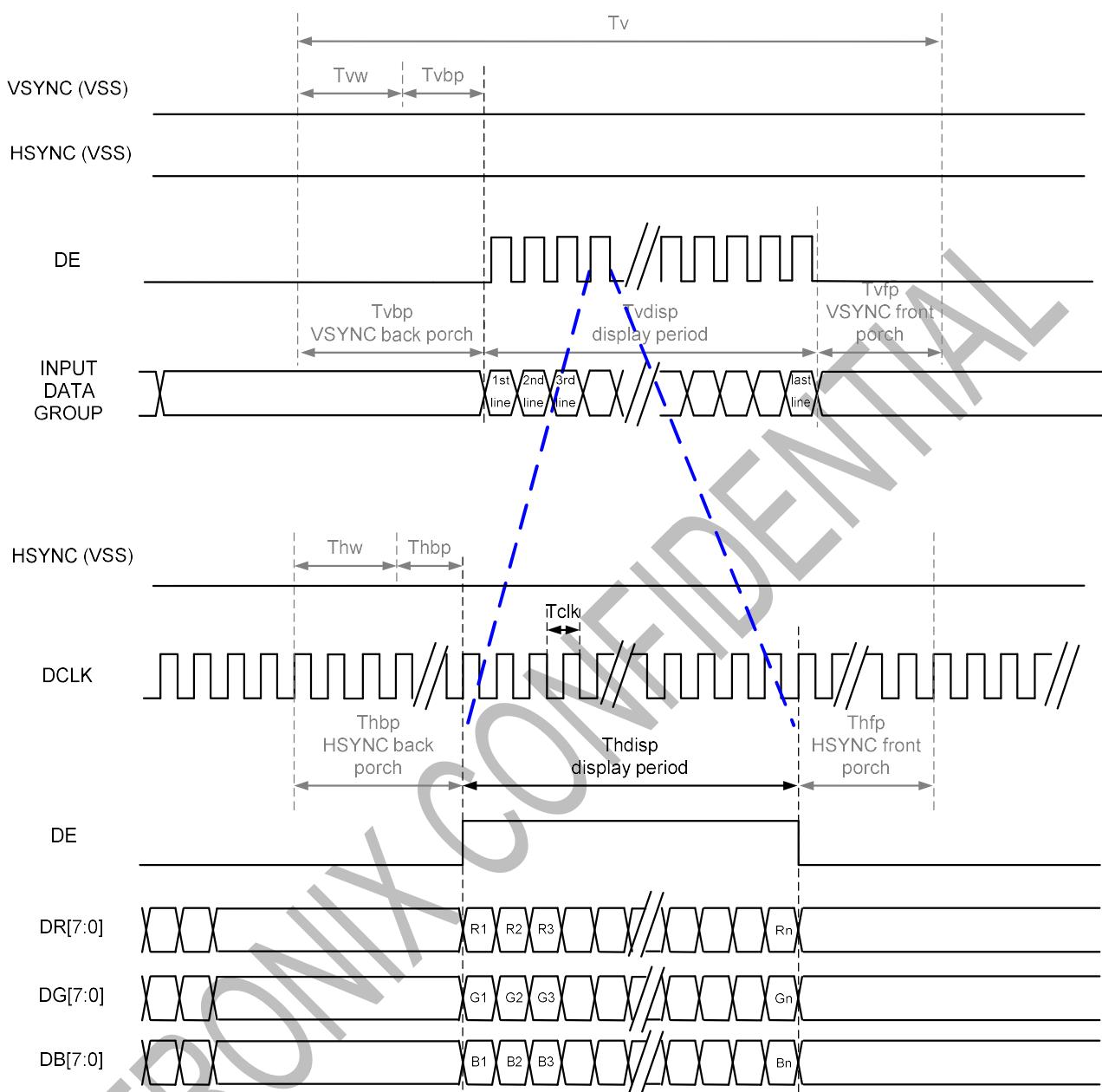
7.3.1 SYNC Mode



7.3.2 SYNC-DE Mode



7.3.3 DE Mode



7.3.4 Parallel 24-bit RGB Input Timing Table

Parallel 24-bit RGB Input Timing (PVDD=PVDD1=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C)

| Parallel 24-bit RGB Interface Timing Table | | | | | | |
|--|----------------|--------|------|------|------|--------|
| Item | Symbol | Min. | Typ. | Max. | Unit | Remark |
| DCLK Frequency | Fclk | 23 | 25 | 27 | MHz | |
| Hsync | Period Time | Th | 808 | 816 | 896 | DCLK |
| | Display Period | Thdisp | 800 | | | DCLK |
| | Back Porch | Thbp | 4 | 8 | 48 | DCLK |
| | Front Porch | Thfp | 4 | 8 | 48 | DCLK |
| | Pulse Width | Thw | 2 | 4 | 8 | DCLK |
| Vsync | Period Time | Tv | 492 | 496 | 504 | Hsync |
| | Display Period | Tvdisp | 480 | | | Hsync |
| | Back Porch | Tvbp | 6 | 8 | 12 | Hsync |
| | Front Porch | Tvfp | 6 | 8 | 12 | Hsync |
| | Pulse Width | Tvw | 2 | 4 | 8 | Hsync |

Note: 1. The minimum blanking time depends on the GIP timing of the panel specification

2. To ensure the compatibility of different panels, it is recommended to use the typical setting.

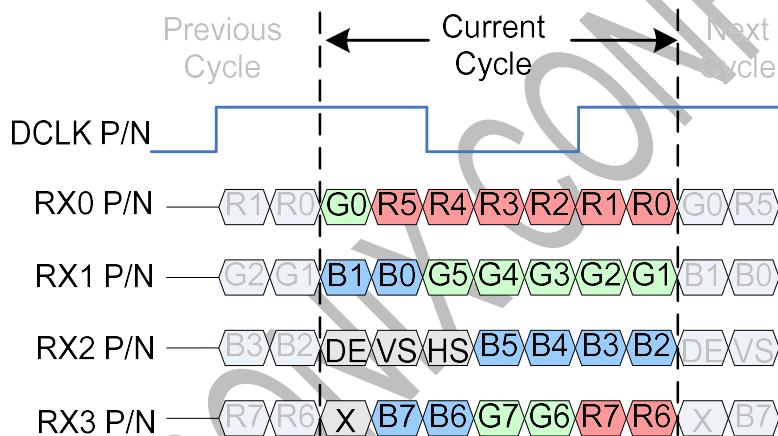
7.4 LVDS Interface

7.4.1 LVDS Input Pin Mapping Table

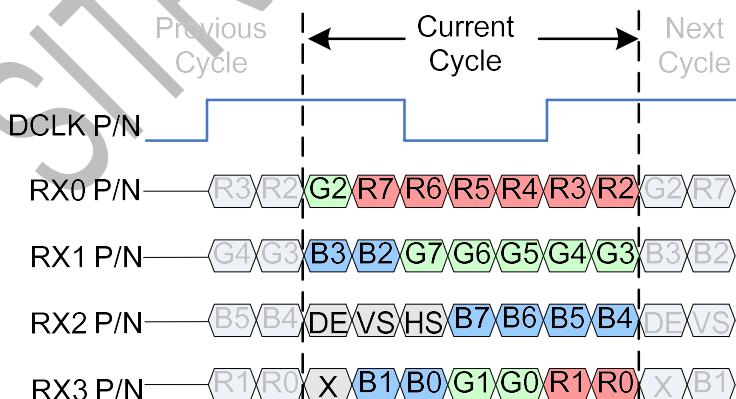
| Pin Name RGB (LVDS) | LVDS 3 Lane | LVDS 4 Lane |
|------------------------|-------------|-------------|
| DCLKN | DCLKN | DCLKN |
| DCLKP | DCLKP | DCLKP |
| DB0 | RX0P | RX0P |
| DB1 | RX0N | RX0N |
| DB2 | RX1P | RX1P |
| DB3 | RX1N | RX1N |
| DB4 | RX2P | RX2P |
| DB5 | RX2N | RX2N |
| DB6 | - | RX3P |
| DB7 | - | RX3N |

Note: Symbol “-“ means reserve pin and should fix to “L” by DGND.

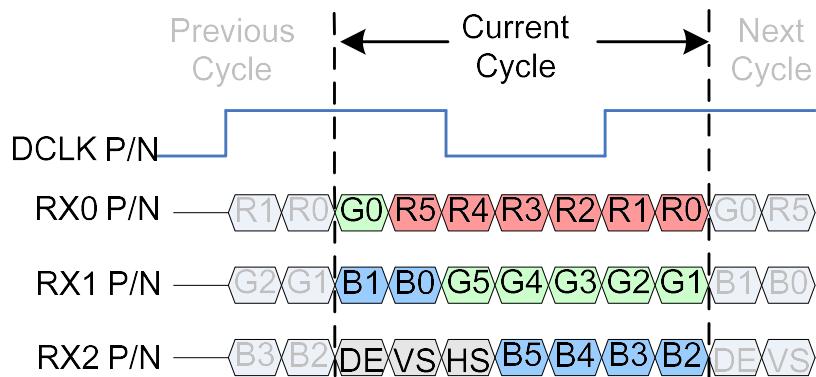
7.4.2 4 Lane VESA Data Format Color Bit Map



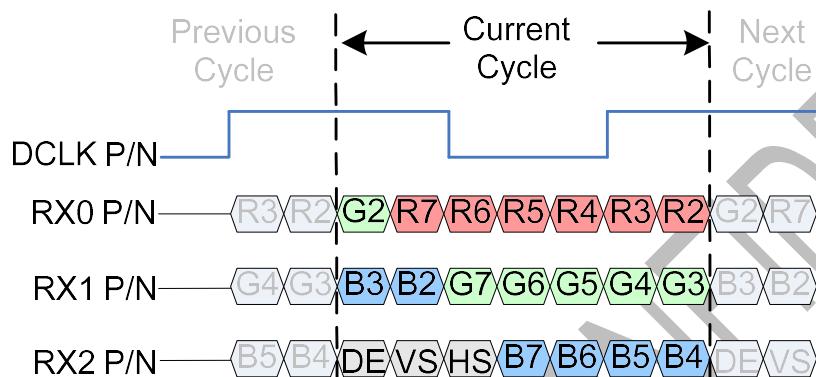
7.4.3 4 Lane JEIDA Data Format Color Bit Map



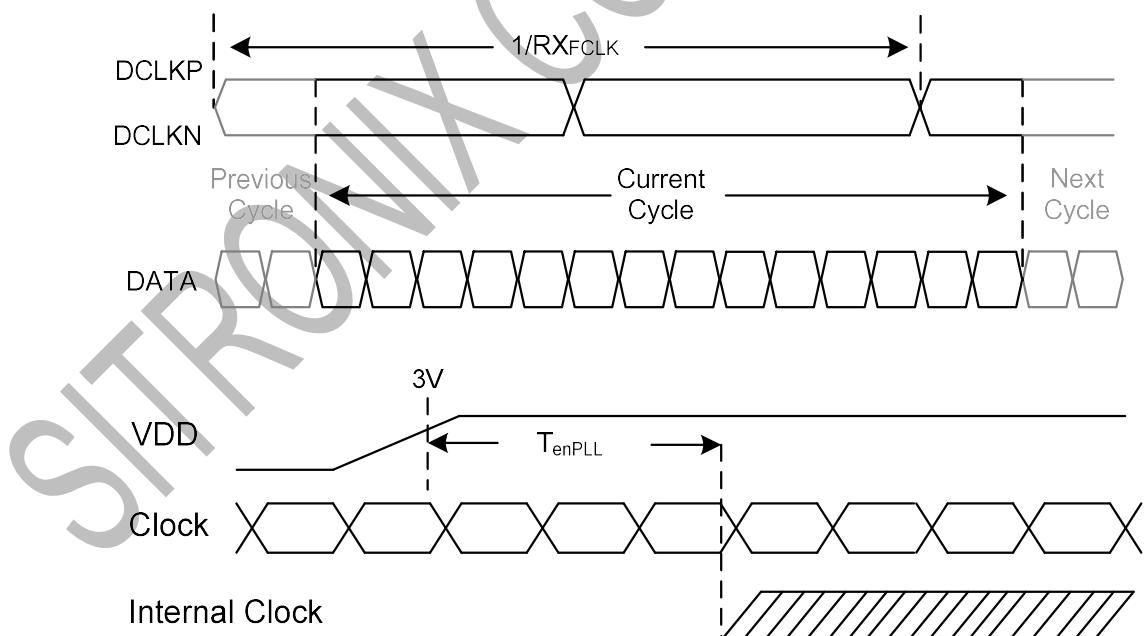
7.4.4 3 Lane VESA Mode Color Bit Map

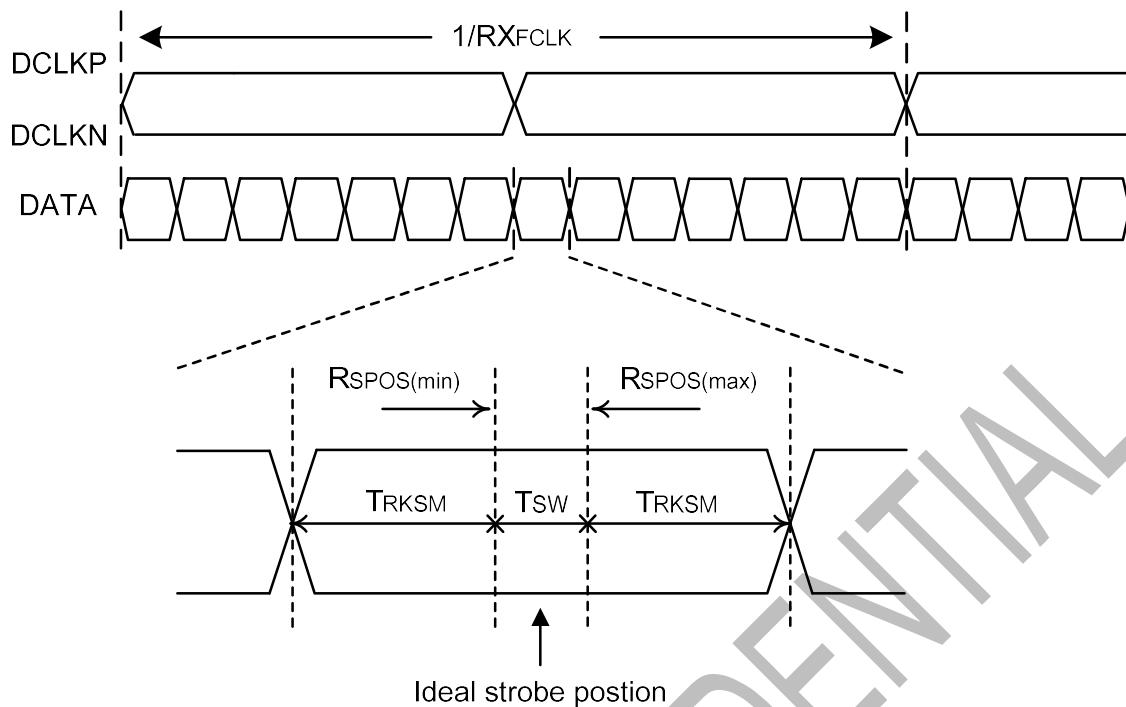


7.4.5 3 Lane JEIDA Mode Color Bit Map



7.4.6 LVDS Input Timing Table





RRKSM : Receiver strobe margin

RSPOS : Receiver strobe position

TSW : Strobe width (internal DATA sampling window)

LVDS Input Timing (PVDD=PVDD1=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C)

| Item | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|--|--------------------|-----------------------------|------|------|------|------------|
| Clock Frequency | RX _{FCLK} | 23 | 25 | 27 | MHz | |
| Input Data Skew Margin | TRSKM | 400 | | | ps | |
| Clock High Time | T _{LVCH} | 4/(7 x RX _{FCLK}) | | | ns | |
| Clock Low Time | T _{LVCL} | 3/(7 x RX _{FCLK}) | | | ns | |
| PLL Wake-up Time | T _{enPLL} | | | 150 | us | |
| LVDS Spread Spectrum Clocking (SSC) Tolerance of LVDS Receiver | | | | | | |
| Modulation Frequency | SSC _{MF} | | | 100 | KHz | |
| Modulation Rate | SSC _{MR} | | | +/-3 | % | |

8. REGISTER LIST

8.1 Register Summary

| COMMAND TABLE1 | | | | | | | | | | |
|----------------|------|----------|----------|-------|----------|-----------------------|-----------|----------------|----------|---------|
| Address | Type | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
| 10h | W | 0 | 0 | 0 | 0 | GRB | 0 | 0 | DISP | 08h |
| 11h | W | | | | | CONTRAST[7:0] | | | | 40h |
| 12h | W | 0 | | | | SUB_CONTRAST_R[6:0] | | | | 40h |
| 13h | W | 0 | | | | SUB_CONTRAST_B[6:0] | | | | 40h |
| 14h | W | | | | | BRIGHTNESS[7:0] | | | | 40h |
| 15h | W | 0 | | | | SUB_BRIGHTNESS_R[6:0] | | | | 40h |
| 16h | W | 0 | | | | SUB_BRIGHTNESS_B[6:0] | | | | 40h |
| 17h | W | | | | | H_BLANKING[7:0] | | | | 08h |
| 18h | W | | | | | V_BLANKING[7:0] | | | | 08h |
| 19h | W | MVA_TN | VDIR | HDIR | SBGR | 0 | 0 | 0 | 0 | - |
| 1Ah | W | LVDS_FMT | 1 | 0 | LANE_SEL | 0 | 0 | 0 | 0 | - |
| 1Bh | W | VDPOL | HDPOL | DEPOL | DCLKPOL | 0 | 1 | 1 | 1 | - |
| 1Ch | W | 0 | 0 | 0 | 0 | 0 | AUTODL | 0 | 0 | - |
| COMMAND TABLE2 | | | | | | | | | | |
| Address | Type | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
| 40h | R/W | 0 | 1 | | | VRHP[5:0] | | | | -- |
| 41h | R/W | 0 | | | | VRHN[6:0] | | | | -- |
| 45h | R/W | | VGL[2:0] | | 1 | | VGHS[2:0] | | 1 | -- |
| 46h | R/W | | T4T[1:0] | | T3T[1:0] | | T2T[1:0] | | T1T[1:0] | -- |
| 47h | R/W | 0 | 0 | 0 | 0 | 0 | | SOURCE_AP[2:0] | | -- |

Note: 1. When GRB is "Low", all registers reset to default values.

2. Symbol “-” means this value is set by the customer.
3. Symbol “--” means this value is OTP setting according to system application, panel loading and display quality.
4. Do not use instructions not listed in these tables.

| GAMMA COMMAND TABLE | | | | | | | | | | |
|---------------------|------|-----------|-------------|---------|------------|------------|------------|----|----|---------|
| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
| 20h | R/W | 0 | RATIO1[1:0] | | | | VRF0P[4:0] | | | |
| 21h | R/W | 0 | PFP6[3] | PFP0[3] | VOS0P[4:0] | | | | -- | |
| 22h | R/W | PFP0[2:0] | | | | PKP0[4:0] | | | | -- |
| 23h | R/W | PFP1[2:0] | | | | PKP1[4:0] | | | | -- |
| 24h | R/W | PFP2[2:0] | | | | PKP2[4:0] | | | | -- |
| 25h | R/W | PFP3[2:0] | | | | PKP3[4:0] | | | | -- |
| 26h | R/W | PFP4[2:0] | | | | PKP4[4:0] | | | | -- |
| 27h | R/W | PFP5[2:0] | | | | PKP5[4:0] | | | | -- |
| 28h | R/W | PFP6[2:0] | | | | PKP6[4:0] | | | | -- |
| 29h | R/W | 0 | 0 | 0 | PKP7[4:0] | | | | -- | |
| 30h | R/W | 0 | RATIO2[1:0] | | | VRF0N[4:0] | | | | -- |
| 31h | R/W | 0 | PFN6[3] | PFN0[3] | VOS0N[4:0] | | | | -- | |
| 32h | R/W | PFN0[2:0] | | | | PKN0[4:0] | | | | -- |
| 33h | R/W | PFN1[2:0] | | | | PKN1[4:0] | | | | -- |
| 34h | R/W | PFN2[2:0] | | | | PKN2[4:0] | | | | -- |
| 35h | R/W | PFN3[2:0] | | | | PKN3[4:0] | | | | -- |
| 36h | R/W | PFN4[2:0] | | | | PKN4[4:0] | | | | -- |
| 37h | R/W | PFN5[2:0] | | | | PKN5[4:0] | | | | -- |
| 38h | R/W | PFN6[2:0] | | | | PKN6[4:0] | | | | -- |
| 39h | R/W | 0 | 0 | 0 | PKN7[4:0] | | | | -- | |

Note: 1. When GRB is "Low", all registers reset to default values.

2. Symbol "--" means this value is OTP setting according to system application, panel loading and display quality.

3. Do not use instructions not listed in these tables.

| OTP COMMAND TABLE | | | | | | | | | | |
|-------------------|------|-------------|-------------------------|----|----|----|----------------------------------|--------|----|---------|
| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
| 01h | R/W | 0 | ID1[6:0] | | | | | | | |
| 02h | R/W | 0 | ID2[6:0] | | | | | | | |
| 03h | R/W | 0 | ID3[6:0] | | | | | | | |
| 04h | R/W | 0 | I ² CID[6:0] | | | | | | | |
| 05h | R/W | 0 | VMF[6:0] | | | | | | | |
| 60h | W | 0 | 1 | 0 | 0 | 0 | 1 | OTOPEN | 0 | 44h |
| 65h | W | OTPACK[7:0] | | | | | | | | 00h |
| 66h | R | 0 | 0 | 0 | 0 | 0 | CMD2 OTP TIME[2:0] | | | - |
| 67h | R | 0 | 0 | 0 | 0 | 0 | GAMMA OTP TIME[2:0] | | | - |
| 68h | R | 0 | 0 | 0 | 0 | 0 | ID1 OTP TIME[2:0] | | | - |
| 69h | R | 0 | 0 | 0 | 0 | 0 | ID2 OTP TIME[2:0] | | | - |
| 6Ah | R | 0 | 0 | 0 | 0 | 0 | ID3 OTP TIME[2:0] | | | - |
| 6Bh | R | 0 | 0 | 0 | 0 | 0 | I ² CID OTP TIME[2:0] | | | - |
| 6Ch | R | 0 | 0 | 0 | 0 | 0 | VMF OTP TIME[2:0] | | | - |

Note: 1. When GRB is "Low", all registers reset to default values.

2. Symbol “-” means this value is OTP read value.
3. Symbol “--” means this value is OTP setting according to parameters of system application, panel loading and display quality.
4. Do not use instructions not listed in these tables.

8.2 Command Table1 Register Description

8.2.1 GRB、DISP CONTROL (10h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|-----|----|----|------|---------|
| 10h | W | 0 | 0 | 0 | 0 | GRB | 0 | 0 | DISP | 08h |

| Designation | Description |
|-------------|--|
| GRB | Reset register setting GRB=0: reset all registers to default value GRB=1: normal operation |
| DISP | Display on/off control DISP=0: standby mode DISP=1: normal mode |

8.2.2 CONTRAST (11h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|----|----|----|---------|
| 11h | W | | | | | | | | | 40h |

| Designation | Description |
|---------------|---|
| CONTRAST[7:0] | Set RGB contrast level, the range of gain is 0~3.984 CONTRAST=00h: contrast gain=0 CONTRAST=40h: contrast gain=1 CONTRAST=FFh: contrast gain=3.984 |

8.2.3 SUB_CONTRAST_R (12h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|----|----|----|---------|
| 12h | W | 0 | | | | | | | | 40h |

| Designation | Description |
|---------------------|---|
| SUB_CONTRAST_R[6:0] | Set red color sub-contrast level, the range of gain is 0.75~1.246 SUB_CONTRAST_R=00h: contrast gain=0.75 SUB_CONTRAST_R=40h: contrast gain=1 SUB_CONTRAST_R=7Fh: contrast gain=1.246 |

8.2.4 SUB_CONTRAST_B (13h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|----|----|----|---------|
| 13h | W | 0 | | | | | | | | 40h |

| Designation | Description |
|---------------------|--|
| SUB_CONTRAST_B[6:0] | Set blue color sub-contrast level, the range of gain is 0.75~1.246 SUB_CONTRAST_B=00h: contrast gain=0.75 SUB_CONTRAST_B=40h: contrast gain=1 SUB_CONTRAST_B=7Fh: contrast gain=1.246 |

8.2.5 BRIGHTNESS (14h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|----|----|----|---------|
| 14h | W | | | | | | | | | 40h |

| Designation | Description |
|-----------------|---|
| BRIGHTNESS[7:0] | Set RGB brightness level, the range of brightness is -64~+191 BRIGHTNESS=00h: -64 BRIGHTNESS=40h: 0 BRIGHTNESS=FFh: +191 |

8.2.6 SUB-BRIGHTNESS_R (15h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|----|----|----|---------|
| 15h | W | 0 | | | | | | | | 40h |

| Designation | Description |
|------------------------|---|
| SUB_BRIGHTNESS_R [6:0] | Set red color sub-brightness level, the range of brightness is -64~+63 SUB_BRIGHTNESS_R=00h: -64 SUB_BRIGHTNESS_R=40h: 0 SUB_BRIGHTNESS_R=7Fh: +63 |

8.2.7 SUB-BRIGHTNESS_B (16h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|----|----|----|---------|
| 16h | W | 0 | | | | | | | | 40h |

| Designation | Description |
|------------------------|--|
| SUB_BRIGHTNESS_B [6:0] | Set blue color sub-brightness level, the range of brightness is -64~+63 SUB_BRIGHTNESS_B=00h: -64 SUB_BRIGHTNESS_B=40h: 0 SUB_BRIGHTNESS_B=7Fh: +63 |

8.2.8 H_BLANKING (17h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|----|----|----|---------|
| 17h | W | | | | | | | | | 08h |

| Designation | Description |
|-----------------|---|
| H_BLANKING[7:0] | The HSYNC back porch setting of RGB interface |

8.2.9 V_BLANKING (18h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|----|----|----|---------|
| 18h | R/W | | | | | | | | | 08h |

| Designation | Description |
|-----------------|---|
| V_BLANKING[7:0] | The VSYNC back porch setting of RGB interface |

8.2.10 DISPLAY MODE SETTING (19h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|--------|------|------|------|----|----|----|----|---------|
| 19h | W | MVA_TN | VDIR | HDIR | SBGR | 0 | 0 | 0 | 0 | - |

| Designation | Description |
|-------------|---|
| MVA_TN | MVA_TN=0: TN mode for panel display. MVA_TN=1: VA mode for panel display. |
| VDIR | Vertical scan direction setting VDIR= 0: from bottom to top, L(n)(first line) → L(n-1) →...→ L2 → L1(last line) VDIR= 1: from top to bottom, L1(first line) → L2 →...→ L(n-1) → L(n)(last line) |
| HDIR | Horizontal scan direction setting HDIR= 0: from right to left, Y(n)(first data) → Y(n-1) →...→ Y2 → Y1(last data) HDIR= 1: from left to right, Y1(first data) → Y2 →...→ Y(n-1) → Y(n)(last data) |
| SBGR | Data of red and blue exchange SBGR= 0: normal, DR[7:0]→DR[7:0] and DB[7:0]→DB[7:0] SBGR= 1: exchange, DR[7:0]→DB[7:0] and DB[7:0]→DR[7:0] |

8.2.11 LVDS MODE SETTING (1Ah)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----------|----|----|----------|----|----|----|----|---------|
| 1Ah | W | LVDS_FMT | 1 | 0 | LANE_SEL | 0 | 0 | 0 | 0 | - |

| Designation | Description | |
|-------------|-----------------------------------|-------------|
| LVDS_FMT | Set data format of LVDS interface | |
| | LVDS_FMT | Data Format |
| LANE_SEL | Set data lane of LVDS interface | |
| | LANE_SEL | Data Lane |

| LVDS_FMT | Data Format |
|----------|-------------|
| 0 | VESA |
| 1 | JEIDA |

| LANE_SEL | Data Lane |
|----------|-----------|
| 0 | 3 lane |
| 1 | 4 lane |

8.2.12 RGB INTERFACE POLARITY SETTING (1Bh)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|-------|-------|-------|---------|----|----|----|----|---------|
| 1Bh | W | VDPOL | HDPOL | DEPOL | DCLKPOL | 0 | 1 | 1 | 1 | - |

| Designation | Description |
|-------------|---|
| VDPOL | VSYNC polarity setting VDPOL= 0: positive polarity VDPOL= 1: negative polarity |
| HDPOL | HSYNC polarity setting HDPOL= 0: positive polarity HDPOL= 1: negative polarity |
| DEPOL | DE polarity setting DEPOL= 0: positive polarity DEPOL= 1: negative polarity |
| DCLKPOL | DCLK polarity setting DCLKPOL= 0: positive polarity DCLKPOL= 1: negative polarity |

8.2.13 OTP AUTO DOWNLOAD CONTROL (1Ch)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|--------|----|----|---------|
| 1Ch | W | 0 | 0 | 0 | 0 | 0 | AUTODL | 0 | 0 | - |

| Designation | Description |
|-------------|--|
| AUTODL | OTP auto-refresh function control AUTODL= 0: disable auto-refresh function AUTODL= 1: enable auto-refresh function |

SITRONIX CONFIDENTIAL

8.3 Command Table2 Register Description

8.3.1 GVDD SETTING (40h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|----|----|----|---------|
| 40h | R/W | 0 | 1 | | | | | | | -- |

| Designation | Description | | | | | | | |
|-------------|--------------------|--------|-----------|--------|-----------|--------|-----------|--------|
| VRHP[5:0] | GVDD level setting | | | | | | | |
| | VRHP[5:0] | GVDD | VRHP[5:0] | GVDD | VRHP[5:0] | GVDD | VRHP[5:0] | GVDD |
| | 000000 | 5.9680 | 010000 | 5.7120 | 100000 | 5.4560 | 110000 | 5.2000 |
| | 000001 | 5.9520 | 010001 | 5.6960 | 100001 | 5.4400 | 110001 | 5.1840 |
| | 000010 | 5.9360 | 010010 | 5.6800 | 100010 | 5.4240 | 110010 | 5.1680 |
| | 000011 | 5.9200 | 010011 | 5.6640 | 100011 | 5.4080 | 110011 | 5.1520 |
| | 000100 | 5.9040 | 010100 | 5.6480 | 100100 | 5.3920 | 110100 | 5.1360 |
| | 000101 | 5.8880 | 010101 | 5.6320 | 100101 | 5.3760 | 110101 | 5.1200 |
| | 000110 | 5.8720 | 010110 | 5.6160 | 100110 | 5.3600 | 110110 | 5.1040 |
| | 000111 | 5.8560 | 010111 | 5.6000 | 100111 | 5.3440 | 110111 | 5.0880 |
| | 001000 | 5.8400 | 011000 | 5.5840 | 101000 | 5.3280 | 111000 | 5.0720 |
| | 001001 | 5.8240 | 011001 | 5.5680 | 101001 | 5.3120 | 111001 | 5.0560 |
| | 001010 | 5.8080 | 011010 | 5.5520 | 101010 | 5.2960 | 111010 | 5.0400 |
| | 001011 | 5.7920 | 011011 | 5.5360 | 101011 | 5.2800 | 111011 | 5.0240 |
| | 001100 | 5.7760 | 011100 | 5.5200 | 101100 | 5.2640 | 111100 | 5.0080 |
| | 001101 | 5.7600 | 011101 | 5.5040 | 101101 | 5.2480 | 111101 | 4.9920 |
| | 001110 | 5.7440 | 011110 | 5.4880 | 101110 | 5.2320 | 111110 | 4.9760 |
| | 001111 | 5.7280 | 011111 | 5.4720 | 101111 | 5.2160 | 111111 | 4.9600 |

8.3.2 GVCL SETTING (41h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|----|----|----|---------|
| 41h | R/W | 0 | | | | | | | | -- |

| Designation | Description | | | | | | | |
|-------------|--------------------|---------|---------------|---------|---------------|---------|---------------|---------|
| VRHN[6:0] | GVCL level setting | | | | | | | |
| | VRHN[6: 0] | GVCL | VRHN[6: 0] | GVCL | VRHN[6: 0] | GVCL | VRHN[6: 0] | GVCL |
| | 0100000 | -4.4800 | 0111000 | -4.0960 | 1010000 | -3.7120 | 1101000 | -3.3280 |
| | 0100001 | -4.4640 | 0111001 | -4.0800 | 1010001 | -3.6960 | 1101001 | -3.3120 |
| | 0100010 | -4.4480 | 0111010 | -4.0640 | 1010010 | -3.6800 | 1101010 | -3.2960 |
| | 0100011 | -4.4320 | 0111011 | -4.0480 | 1010011 | -3.6640 | 1101011 | -3.2800 |
| | 0100100 | -4.4160 | 0111100 | -4.0320 | 1010100 | -3.6480 | 1101100 | -3.2640 |
| | 0100101 | -4.4000 | 0111101 | -4.0160 | 1010101 | -3.6320 | 1101101 | -3.2480 |
| | 0100110 | -4.3840 | 0111110 | -4.0000 | 1010110 | -3.6160 | 1101110 | -3.2320 |
| | 0100111 | -4.3680 | 0111111 | -3.9840 | 1010111 | -3.6000 | 1101111 | -3.2160 |
| | 0101000 | -4.3520 | 1000000 | -3.9680 | 1011000 | -3.5840 | 1110000 | -3.2000 |
| | 0101001 | -4.3360 | 1000001 | -3.9520 | 1011001 | -3.5680 | 1110001 | -3.1840 |
| | 0101010 | -4.3200 | 1000010 | -3.9360 | 1011010 | -3.5520 | 1110010 | -3.1680 |
| | 0101011 | -4.3040 | 1000011 | -3.9200 | 1011011 | -3.5360 | 1110011 | -3.1520 |
| | 0101100 | -4.2880 | 1000100 | -3.9040 | 1011100 | -3.5200 | 1110100 | -3.1360 |
| | 0101101 | -4.2720 | 1000101 | -3.8880 | 1011101 | -3.5040 | 1110101 | -3.1200 |
| | 0101110 | -4.2560 | 1000110 | -3.8720 | 1011110 | -3.4880 | 1110110 | -3.1040 |
| | 0101111 | -4.2400 | 1000111 | -3.8560 | 1011111 | -3.4720 | 1110111 | -3.0880 |
| | 0110000 | -4.2240 | 1001000 | -3.8400 | 1100000 | -3.4560 | 1111000 | -3.0720 |
| | 0110001 | -4.2080 | 1001001 | -3.8240 | 1100001 | -3.4400 | 1111001 | -3.0560 |
| | 0110010 | -4.1920 | 1001010 | -3.8080 | 1100010 | -3.4240 | 1111010 | -3.0400 |
| | 0110011 | -4.1760 | 1001011 | -3.7920 | 1100011 | -3.4080 | 1111011 | -3.0240 |
| | 0110100 | -4.1600 | 1001100 | -3.7760 | 1100100 | -3.3920 | 1111100 | -3.0080 |
| | 0110101 | -4.1440 | 1001101 | -3.7600 | 1100101 | -3.3760 | 1111101 | -2.9920 |
| | 0110110 | -4.1280 | 1001110 | -3.7440 | 1100110 | -3.3600 | 1111110 | -2.9760 |
| | 0110111 | -4.1120 | 1001111 | -3.7280 | 1100111 | -3.3440 | 1111111 | -2.9600 |

8.3.3 VGHS, VGL SETTING (45h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default | | | | | | | | | | | | | | |
|-------------|----------|--|----------|----|----|-----------|----|----|----|---------|-----------|----------|-----|----|-----|----|-----|------|-----|------|-----|-------|-----|-------|
| 45h | R/W | | VGL[2:0] | | 1 | VGHS[2:0] | | 1 | -- | | | | | | | | | | | | | | | |
| Designation | | Description | | | | | | | | | | | | | | | | | | | | | | |
| VGL[2:0] | | VGL level setting | | | | | | | | | | | | | | | | | | | | | | |
| VGHS[2:0] | | VGHS level setting | | | | | | | | | | | | | | | | | | | | | | |
| VGL[2:0] | | <table border="1"><thead><tr><th>VGL[2:0]</th><th>VGL (V)</th></tr></thead><tbody><tr><td>000</td><td>-7</td></tr><tr><td>001</td><td>-8</td></tr><tr><td>010</td><td>-8.5</td></tr><tr><td>011</td><td>-9.5</td></tr><tr><td>100</td><td>-10.5</td></tr><tr><td>101</td><td>-11.5</td></tr></tbody></table> | | | | | | | | | VGL[2:0] | VGL (V) | 000 | -7 | 001 | -8 | 010 | -8.5 | 011 | -9.5 | 100 | -10.5 | 101 | -11.5 |
| VGL[2:0] | VGL (V) | | | | | | | | | | | | | | | | | | | | | | | |
| 000 | -7 | | | | | | | | | | | | | | | | | | | | | | | |
| 001 | -8 | | | | | | | | | | | | | | | | | | | | | | | |
| 010 | -8.5 | | | | | | | | | | | | | | | | | | | | | | | |
| 011 | -9.5 | | | | | | | | | | | | | | | | | | | | | | | |
| 100 | -10.5 | | | | | | | | | | | | | | | | | | | | | | | |
| 101 | -11.5 | | | | | | | | | | | | | | | | | | | | | | | |
| VGHS[2:0] | | <table border="1"><thead><tr><th>VGHS[2:0]</th><th>VGHS (V)</th></tr></thead><tbody><tr><td>000</td><td>12</td></tr><tr><td>001</td><td>13</td></tr><tr><td>010</td><td>14</td></tr><tr><td>011</td><td>15</td></tr><tr><td>100</td><td>15.5</td></tr></tbody></table> | | | | | | | | | VGHS[2:0] | VGHS (V) | 000 | 12 | 001 | 13 | 010 | 14 | 011 | 15 | 100 | 15.5 | | |
| VGHS[2:0] | VGHS (V) | | | | | | | | | | | | | | | | | | | | | | | |
| 000 | 12 | | | | | | | | | | | | | | | | | | | | | | | |
| 001 | 13 | | | | | | | | | | | | | | | | | | | | | | | |
| 010 | 14 | | | | | | | | | | | | | | | | | | | | | | | |
| 011 | 15 | | | | | | | | | | | | | | | | | | | | | | | |
| 100 | 15.5 | | | | | | | | | | | | | | | | | | | | | | | |

8.3.4 SOURCE EQUALIZE TIME SETTING (46h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----------|----|----------|----|----------|----|----------|----|---------|
| 46h | R/W | T4T[1:0] | | T3T[1:0] | | T2T[1:0] | | T1T[1:0] | | -- |

| Designation | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------|---|--|--|--|----------|-----------|----|---|----|----|----|----|----|----|----------|-----------|----|---|----|----|----|----|----|----|----------|-----------|----|---|----|----|----|----|----|----|----------|-----------|----|-----|----|---|----|---|----|----|
| | <p>Source equalizing T4 timing setting</p> <table border="1"> <thead> <tr> <th>T4T[1:0]</th> <th>T4 (DCLK)</th> </tr> </thead> <tbody> <tr> <td>00</td> <td>6</td> </tr> <tr> <td>01</td> <td>12</td> </tr> <tr> <td>10</td> <td>24</td> </tr> <tr> <td>11</td> <td>48</td> </tr> </tbody> </table> <p>Source equalizing T3 timing setting</p> <table border="1"> <thead> <tr> <th>T3T[1:0]</th> <th>T3 (DCLK)</th> </tr> </thead> <tbody> <tr> <td>00</td> <td>1</td> </tr> <tr> <td>01</td> <td>12</td> </tr> <tr> <td>10</td> <td>24</td> </tr> <tr> <td>11</td> <td>48</td> </tr> </tbody> </table> <p>Source equalizing T2 timing setting</p> <table border="1"> <thead> <tr> <th>T2T[1:0]</th> <th>T2 (DCLK)</th> </tr> </thead> <tbody> <tr> <td>00</td> <td>1</td> </tr> <tr> <td>01</td> <td>12</td> </tr> <tr> <td>10</td> <td>24</td> </tr> <tr> <td>11</td> <td>48</td> </tr> </tbody> </table> <p>Source equalizing T1 timing setting</p> <table border="1"> <thead> <tr> <th>T1T[1:0]</th> <th>T1 (DCLK)</th> </tr> </thead> <tbody> <tr> <td>00</td> <td>OFF</td> </tr> <tr> <td>01</td> <td>1</td> </tr> <tr> <td>10</td> <td>6</td> </tr> <tr> <td>11</td> <td>12</td> </tr> </tbody> </table> | | | | T4T[1:0] | T4 (DCLK) | 00 | 6 | 01 | 12 | 10 | 24 | 11 | 48 | T3T[1:0] | T3 (DCLK) | 00 | 1 | 01 | 12 | 10 | 24 | 11 | 48 | T2T[1:0] | T2 (DCLK) | 00 | 1 | 01 | 12 | 10 | 24 | 11 | 48 | T1T[1:0] | T1 (DCLK) | 00 | OFF | 01 | 1 | 10 | 6 | 11 | 12 |
| T4T[1:0] | T4 (DCLK) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 00 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 01 | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | 48 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| T3T[1:0] | T3 (DCLK) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 00 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 01 | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | 48 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| T2T[1:0] | T2 (DCLK) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 00 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 01 | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | 48 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| T1T[1:0] | T1 (DCLK) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 00 | OFF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 01 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

8.3.5 SOURCE OP-AMP POWER SETTING (47h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|----|----------------|----|---------|
| 47h | R/W | 0 | 0 | 0 | 0 | 0 | | SOURCE_AP[2:0] | | -- |

| Designation | Description | | | | | | | | | | | | | | | | | | | |
|----------------|---|--|----------------|--------------|-----|------------------|-----|-------------------|-----|-----------------------------|-----|------------------|-----|---------------------------|-----|-----------------|-----|----------------------------|-----|-------------------|
| SOURCE_AP[2:0] | <p>Source driving ability setting. When value is higher, the source output current will increase.</p> <table border="1"><thead><tr><th>SOURCE_AP[2:0]</th><th>Source Power</th></tr></thead><tbody><tr><td>000</td><td>Level 1 (lowest)</td></tr><tr><td>001</td><td>Level 2 (minimal)</td></tr><tr><td>010</td><td>Level 3 (minimal to medium)</td></tr><tr><td>011</td><td>Level 4 (medium)</td></tr><tr><td>100</td><td>Level 5 (medium to large)</td></tr><tr><td>101</td><td>Level 6 (large)</td></tr><tr><td>110</td><td>Level 7 (large to highest)</td></tr><tr><td>111</td><td>Level 8 (highest)</td></tr></tbody></table> <p><i>Note: The setting value needs to be adjusted according to the display performance.</i></p> | | SOURCE_AP[2:0] | Source Power | 000 | Level 1 (lowest) | 001 | Level 2 (minimal) | 010 | Level 3 (minimal to medium) | 011 | Level 4 (medium) | 100 | Level 5 (medium to large) | 101 | Level 6 (large) | 110 | Level 7 (large to highest) | 111 | Level 8 (highest) |
| SOURCE_AP[2:0] | Source Power | | | | | | | | | | | | | | | | | | | |
| 000 | Level 1 (lowest) | | | | | | | | | | | | | | | | | | | |
| 001 | Level 2 (minimal) | | | | | | | | | | | | | | | | | | | |
| 010 | Level 3 (minimal to medium) | | | | | | | | | | | | | | | | | | | |
| 011 | Level 4 (medium) | | | | | | | | | | | | | | | | | | | |
| 100 | Level 5 (medium to large) | | | | | | | | | | | | | | | | | | | |
| 101 | Level 6 (large) | | | | | | | | | | | | | | | | | | | |
| 110 | Level 7 (large to highest) | | | | | | | | | | | | | | | | | | | |
| 111 | Level 8 (highest) | | | | | | | | | | | | | | | | | | | |

8.4 Gamma Table Register Description

8.4.1 GAMMA SETTING (20h~29h, 30h~39h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|-----------|-------------|---------|------------|----|----|-----------|-------------|---------|
| 20h | R/W | 0 | RATIO1[1:0] | | | | | | VRFP0P[4:0] | -- |
| 21h | R/W | 0 | PFP6[3] | PFP0[3] | VOS0P[4:0] | | | | | |
| 22h | R/W | PFP0[2:0] | | | | | | PKP0[4:0] | -- | |
| 23h | R/W | PFP1[2:0] | | | | | | PKP1[4:0] | -- | |
| 24h | R/W | PFP2[2:0] | | | | | | PKP2[4:0] | -- | |
| 25h | R/W | PFP3[2:0] | | | | | | PKP3[4:0] | -- | |
| 26h | R/W | PFP4[2:0] | | | | | | PKP4[4:0] | -- | |
| 27h | R/W | PFP5[2:0] | | | | | | PKP5[4:0] | -- | |
| 28h | R/W | PFP6[2:0] | | | | | | PKP6[4:0] | -- | |
| 29h | R/W | 0 | 0 | 0 | PKP7[4:0] | | | | | |
| 30h | R/W | 0 | RATIO2[1:0] | | | | | | VRFP0N[4:0] | -- |
| 31h | R/W | 0 | PFN6[3] | PFN0[3] | VOS0N[4:0] | | | | | |
| 32h | R/W | PFN0[2:0] | | | | | | PKN0[4:0] | -- | |
| 33h | R/W | PFN1[2:0] | | | | | | PKN1[4:0] | -- | |
| 34h | R/W | PFN2[2:0] | | | | | | PKN2[4:0] | -- | |
| 35h | R/W | PFN3[2:0] | | | | | | PKN3[4:0] | -- | |
| 36h | R/W | PFN4[2:0] | | | | | | PKN4[4:0] | -- | |
| 37h | R/W | PFN5[2:0] | | | | | | PKN5[4:0] | -- | |
| 38h | R/W | PFN6[2:0] | | | | | | PKN6[4:0] | -- | |
| 39h | R/W | 0 | 0 | 0 | PKN7[4:0] | | | | | |

| Designation | Description |
|-------------|----------------------|
| PKP0[4:0] | V16 gamma selection |
| PKN0[4:0] | |
| PKP1[4:0] | V32 gamma selection |
| PKN1[4:0] | |
| PKP2[4:0] | V48 gamma selection |
| PKN2[4:0] | |
| PKP3[4:0] | V80 gamma selection |
| PKN3[4:0] | |
| PKP4[4:0] | V176 gamma selection |
| PKN4[4:0] | |
| PKP5[4:0] | V208 gamma selection |
| PKN5[4:0] | |
| PKP6[4:0] | V224 gamma selection |
| PKN6[4:0] | |

| | |
|-------------|---------------------------------|
| PKP7[4:0] | V240 gamma selection |
| PKN7[4:0] | |
| VRF0P[4:0] | V8 gamma selection |
| VRF0N[4:0] | |
| VOS0P[4:0] | V248 gamma selection |
| VOS0N[4:0] | |
| PFP0[3:0] | V12 gamma selection |
| PFN0[3:0] | |
| PFP1[2:0] | V64 gamma selection |
| PFN1[2:0] | |
| PFP2[2:0] | V104 gamma selection |
| PFN2[2:0] | |
| PFP3[2:0] | V128 gamma selection |
| PFN3[2:0] | |
| PFP4[2:0] | V152 gamma selection |
| PFN4[2:0] | |
| PFP5[2:0] | V192 gamma selection |
| PFN5[2:0] | |
| PFP6[3:0] | V244 gamma selection |
| PFN6[3:0] | |
| RATIO1[1:0] | V248-V255 gamma ratio selection |
| RATIO2[1:0] | V0-V8 gamma ratio selection |

8.5 OTP Table Register Description

8.5.1 ID1 SETTING (01h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|----|----|----|---------|
| 01h | R/W | 0 | | | | | | | | -- |

| Designation | Description |
|-------------|-------------------------------|
| ID1[6:0] | Built-in OTP for ID1 setting. |

8.5.2 ID2 SETTING (02h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|----|----|----|---------|
| 02h | R/W | 0 | | | | | | | | -- |

| Designation | Description |
|-------------|-------------------------------|
| ID2[6:0] | Built-in OTP for ID2 setting. |

8.5.3 ID3 SETTING (03h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|----|----|----|---------|
| 03h | R/W | 0 | | | | | | | | -- |

| Designation | Description |
|-------------|-------------------------------|
| ID3[6:0] | Built-in OTP for ID3 setting. |

8.5.4 I²C ID SETTING (04h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|----|----|----|---------|
| 04h | R/W | 0 | | | | | | | | 78h |

| Designation | Description |
|-------------------------|--|
| I ² CID[6:0] | Built-in OTP for I ² C slave address setting. |

8.5.5 VCOM OFFSET SETTING (05h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|----|----|----|---------|
| 05h | R/W | 0 | | | | | | | | 40h |

| Designation | Description | | | | |
|-------------|---------------------|----------|---------------|---------------|--|
| VMF[6:0] | VCOM offset setting | | | | |
| VMF[6] | VMF[5:0] | VCOM" | GVDD | GVCL | |
| 0 | 000000 | VCOM+64d | VRHP[6:0]+64d | VRHN[6:0]+64d | |
| 0 | 000001 | VCOM+63d | VRHP[6:0]+63d | VRHN[6:0]+63d | |
| 0 | 000010 | VCOM+62d | VRHP[6:0]+62d | VRHN[6:0]+62d | |
| 0 | | | | | |
| 0 | 111110 | VCOM+2d | VRHP[6:0]+2d | VRHN[6:0]+2d | |
| 0 | 111111 | VCOM+1d | VRHP[6:0]+1d | VRHN[6:0]+1d | |
| 1 | 000000 | VCOM+0d | VRHP[6:0] | VRHN[6:0] | |
| 1 | 000001 | VCOM-1d | VRHP[6:0]-1d | VRHN[6:0]-1d | |
| 1 | 000010 | VCOM-2d | VRHP[6:0]-2d | VRHN[6:0]-2d | |
| 1 | | | | | |
| 1 | 111110 | VCOM-62d | VRHP[6:0]-62d | VRHN[6:0]-62d | |
| 1 | 111111 | VCOM-63d | VRHP[6:0]-63d | VRHN[6:0]-63d | |

Note: 1. d=16mV
2. Adjustable VCOM offset (OTP) can be used to compensate feedthrough tolerance and its limitation couldn't exceed the maximum voltage range of GVDD and GVCL.
3. $VCOM'' \leq GVDD - Vop = GVCL + Vop$
Vop is the operation voltage of liquid crystal.

```

graph TD
    OTP[OTP] --> VMF[6:0]
    VMF[6:0] --> SUM(( ))
    VCOM[VCOM<br/>(internal VCOM)] --> SUM
    SUM --> VCOM_double_prime["VCOM''<br/>(VGSP)"]
    
```

8.5.6 OTP FUNCTION CONTROL (60h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|----|--------|----|---------|
| 60h | W | 0 | 1 | 0 | 0 | 0 | 1 | OTOPEN | 0 | 44h |

| Designation | Description |
|-------------|---|
| OTOPEN | OTP programming function control OTOPEN = 0: disable OTP programming function OTOPEN = 1: enable OTP programming function |

8.5.7 OTP ACKNOWLEDGEMENT CONTROL (65h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|----|----|----|---------|
| 65h | W | | | | | | | | | 00h |

| Designation | Description | | | | | | | |
|-------------|----------------------------|---------------------------------|--|--|--|--|--|--|
| OTPACK[7:0] | OTP active selection item. | | | | | | | |
| | OTPACK[7:0] | Description | | | | | | |
| | 31h | ID1 program | | | | | | |
| | 32h | ID2 program | | | | | | |
| | 33h | ID3 program | | | | | | |
| | 34h | I ² C I/F ID program | | | | | | |
| | 3Ah | VCOM offset program | | | | | | |
| | 4Bh | Command 2 program | | | | | | |
| | 5Ch | Gamma program | | | | | | |

8.5.8 COMMAND 2 PROGRAM TIMES (66h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|--------------------|----|----|---------|
| 66h | R | 0 | 0 | 0 | 0 | 0 | CMD2 OTP TIME[2:0] | | | -- |

| Designation | Description | | | | | | | |
|--------------------|--|--|--|--|--|--|--|--|
| CMD2 OTP TIME[2:0] | Read COMMAND 2 remaining programmable times. | | | | | | | |

8.5.9 GAMMA PROGRAM TIMES (67h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|---------------------|----|----|---------|
| 67h | R | 0 | 0 | 0 | 0 | 0 | GAMMA OTP TIME[2:0] | | | -- |

| Designation | Description | | | | | | | |
|---------------------|--|--|--|--|--|--|--|--|
| GAMMA OTP TIME[2:0] | Read GAMMA remaining programmable times. | | | | | | | |

8.5.10 ID1 PROGRAM TIMES (68h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|-------------------|----|----|---------|
| 68h | R | 0 | 0 | 0 | 0 | 0 | ID1 OTP TIME[2:0] | | | -- |

| Designation | Description | | | | | | | |
|-------------------|--|--|--|--|--|--|--|--|
| ID1 OTP TIME[2:0] | Read ID1 remaining programmable times. | | | | | | | |

8.5.11 ID2 PROGRAM TIMES (69h)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|-------------------|----|----|---------|
| 69h | R | 0 | 0 | 0 | 0 | 0 | ID2 OTP TIME[2:0] | | -- | |

| Designation | Description |
|-------------------|--|
| ID2 OTP TIME[2:0] | Read ID2 remaining programmable times. |

8.5.12 ID3 PROGRAM TIMES (6Ah)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|-------------------|----|----|---------|
| 6Ah | R | 0 | 0 | 0 | 0 | 0 | ID3 OTP TIME[2:0] | | -- | |

| Designation | Description |
|-------------------|--|
| ID3 OTP TIME[2:0] | Read ID3 remaining programmable times. |

8.5.13 I²C ID PROGRAM TIMES (6Bh)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|----------------------------------|----|----|---------|
| 6Bh | R | 0 | 0 | 0 | 0 | 0 | I ² CID OTP TIME[2:0] | | -- | |

| Designation | Description |
|----------------------------------|---|
| I ² CID OTP TIME[2:0] | Read I ² CID remaining programmable times. |

8.5.14 VCOM OFFEST PROGRAM TIMES (6Ch)

| Address | TYPE | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Default |
|---------|------|----|----|----|----|----|-------------------|----|----|---------|
| 6Ch | R | 0 | 0 | 0 | 0 | 0 | VMF OTP TIME[2:0] | | -- | |

| Designation | Description |
|-------------------|--|
| VMF OTP TIME[2:0] | Read VCOM offset remaining programmable times. |

9. ELECTRICAL SPECIFICATIONS

9.1 Absolute Maximum Ratings

| Item | Symbol | Rating | Unit |
|------------------------------------|--------|-------------------|------|
| Power Supply Voltage | VDD | - 0.3 ~ +4.0 | V |
| IO Supply Voltage | VDDI | - 0.3 ~ +4.0 | V |
| Charge Pump Supply Voltage | PVDD | - 0.3 ~ +4.0 | V |
| Enhance Charge Pump Supply Voltage | PVDD1 | - 0.3 ~ +4.0 | V |
| Logic Input Voltage Range | VIN | -0.3 ~ VDDI + 0.3 | V |
| Logic Output Voltage Range | VOUT | -0.3 ~ VDDI + 0.3 | V |
| Operating Temperature Range | TOPR | -30 ~ +85 | °C |
| Storage Temperature Range | TSTG | -40 ~ +125 | °C |

Note:

1. That the stress exceeds the Limiting Value listed above it may cause the driver IC permanent damage.
These values are for stress only. IC should be operated under the DC/AC Characteristic conditions for normal operation. If these conditions are not met, IC operation may be error and the reliability may be deteriorated.
2. Parameters are valid over operating temperature range unless otherwise specified. All voltages are with respect to VSS unless otherwise noted.
3. Insure the voltage levels of VDDI, VDD, PVDD, PVDD1 always matches the correct relation:
 $3.1V \leq VDDI \leq VDD = PVDD = PVDD1 \leq 3.6V$
4. VIN should be less than or equal to 3.6V. ($VIN \leq 3.6V$)
5. Panel display quality depends on panel loading, and it may have the different performance at low/high temperature.
7. To avoid IC being affected by backlight temperature, it is recommended that the backlight led position shouldn't be near the periphery of IC.
8. IC can be operated normally at -30~85 degrees, but display quality at high/low temperatures may have different effect according to different panel characteristics.

9.2 DC Characteristics

DC Electrical Characteristics (PVDD=PVDD1=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C, Bare Chip)

9.2.1 Recommended Operating Range

DC Electrical Characteristics (PVDD=PVDD1=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C, Bare Chip)

| Item | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|------------------------------------|--------|------|------|------|------|------------|
| Supply Voltage | VDD | 3.1 | 3.3 | 3.6 | V | |
| IO Supply Voltage | VDDI | 3.1 | 3.3 | 3.6 | V | |
| Charge Pump Supply Voltage | PVDD | 3.1 | 3.3 | 3.6 | V | |
| Enhance Charge Pump Supply Voltage | PVDD1 | 3.1 | 3.3 | 3.6 | V | |

9.2.2 DC Characteristics for Digital Circuit

DC Electrical Characteristics (PVDD=PVDD1=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C, Bare Chip)

| Item | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---------------------------|--------|----------|------|----------|------|------------|
| Logic-High Input Voltage | Vih | 0.7VDDI | - | VDDI | V | |
| Logic-Low Input Voltage | Vil | DGND | - | 0.3VDDI | V | |
| Logic-High Output Voltage | Voh | VDDI-0.4 | - | VDDI | V | |
| Logic-Low Output Voltage | Vol | DGND | - | DGND+0.4 | V | |

9.2.3 DC Characteristics for Analog Circuit

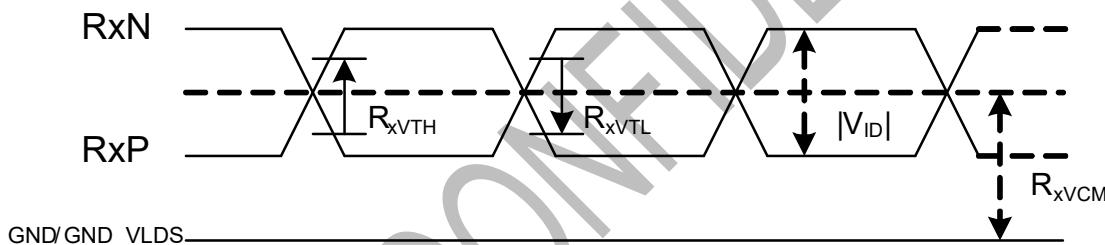
DC Electrical Characteristics (PVDD=PVDD1=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C, Bare Chip)

| Item | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|-----------------------------|--------|-------|------|------|------|---------------------|
| Positive High-Voltage Power | VGHS | 12 | 15 | 15.5 | V | No Load@ FR=60Hz |
| Negative High-Voltage Power | VGL | -11.5 | -10 | -7 | V | |
| Output Voltage Deviation | Vod | - | ±40 | ±50 | mV | |
| Standby Current | Isc | - | - | 50 | uA | |
| Operation Current | loc | - | 50 | - | mA | |

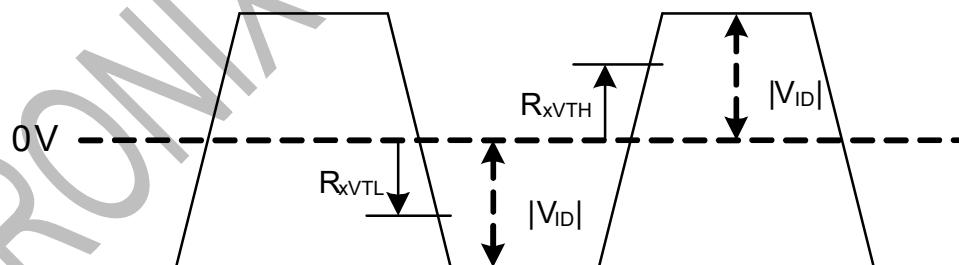
9.2.4 DC Characteristics for LVDS Receiver Circuit

| Item | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|------------------|----------------|------|-------------------|----------|-------------------|
| Differential Input High Threshold Voltage | R_{xVTH} | - | - | 0.1 | V | $R_{xVCM} = 1.2V$ |
| Differential Input Low Threshold Voltage | R_{xVTL} | -0.1 | - | - | V | |
| Input Voltage Range (Singled-End) | R_{xVIN} | 0 | - | VDD-1.0 | V | |
| Differential Input Common Mode Voltage | R_{xVCM} | $ V_{ID} / 2$ | - | 2.4- $ V_{ID} /2$ | V | |
| Differential Input Voltage | $ V_{ID} $ | 0.2 | - | 0.6 | V | |
| Differential Input Leakage Current | RV_{xiz} | -10 | - | 10 | uA | |
| LVDS Digital Operating Current | I_{vDD_LVDS} | - | 10 | 15 | mA | |
| LVDS Digital Stand-by Current | I_{STBD_LVDS} | - | 10 | 50 | uA | |
| Differential Input Termination Resistance | R_{ID} | 90 | 100 | 110 | Ω | |

Single End Signals



Differential Signals



9.3 AC Characteristics

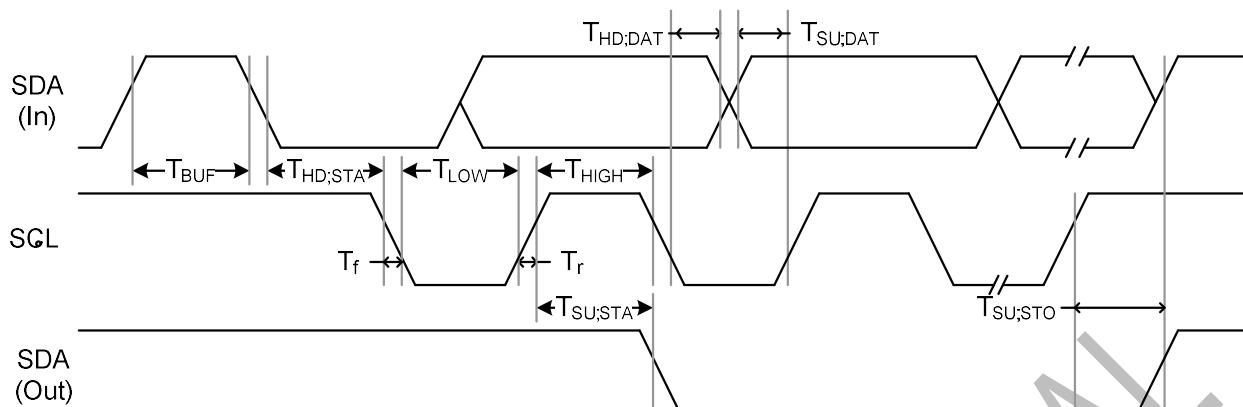
AC Electrical Characteristics (PVDD=PVDD1=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C, Bare Chip)

9.3.1 System Operation AC Characteristics

| Item | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|------------------------------|--------|------|------|------|------|--|
| VDD Power Source Slew Time | TPOR | - | - | 20 | ms | From 0V to 99% VDD |
| GRB Pulse Width | tRSTW | 10 | 50 | - | us | R=10Kohm, C=1uF |
| SD Output Stable Time | Tst | - | - | 12 | us | Output settled within +20mV Loading = 6.8k+28.2pF. |
| GD Output Rise and Fall Time | Tgst | - | - | 6 | us | Output settled (5%~95%), Loading = 4.7k+29.8pF |

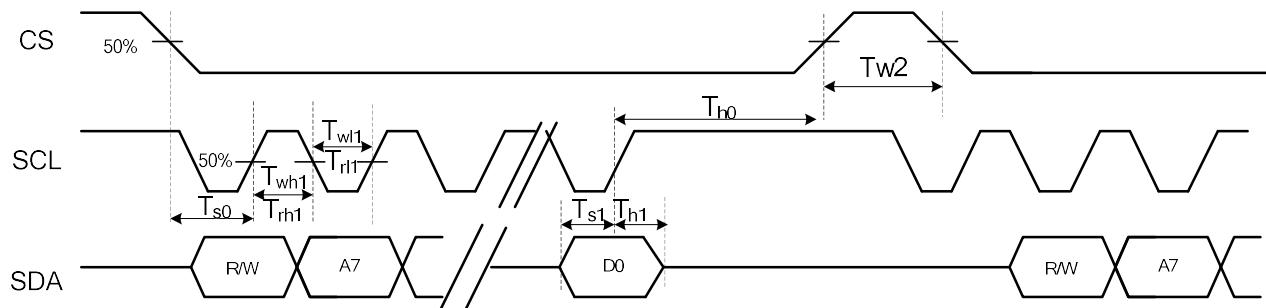
SITRONIX CONFIDENTIAL

9.3.2 System Bus Timing for I²C Interface



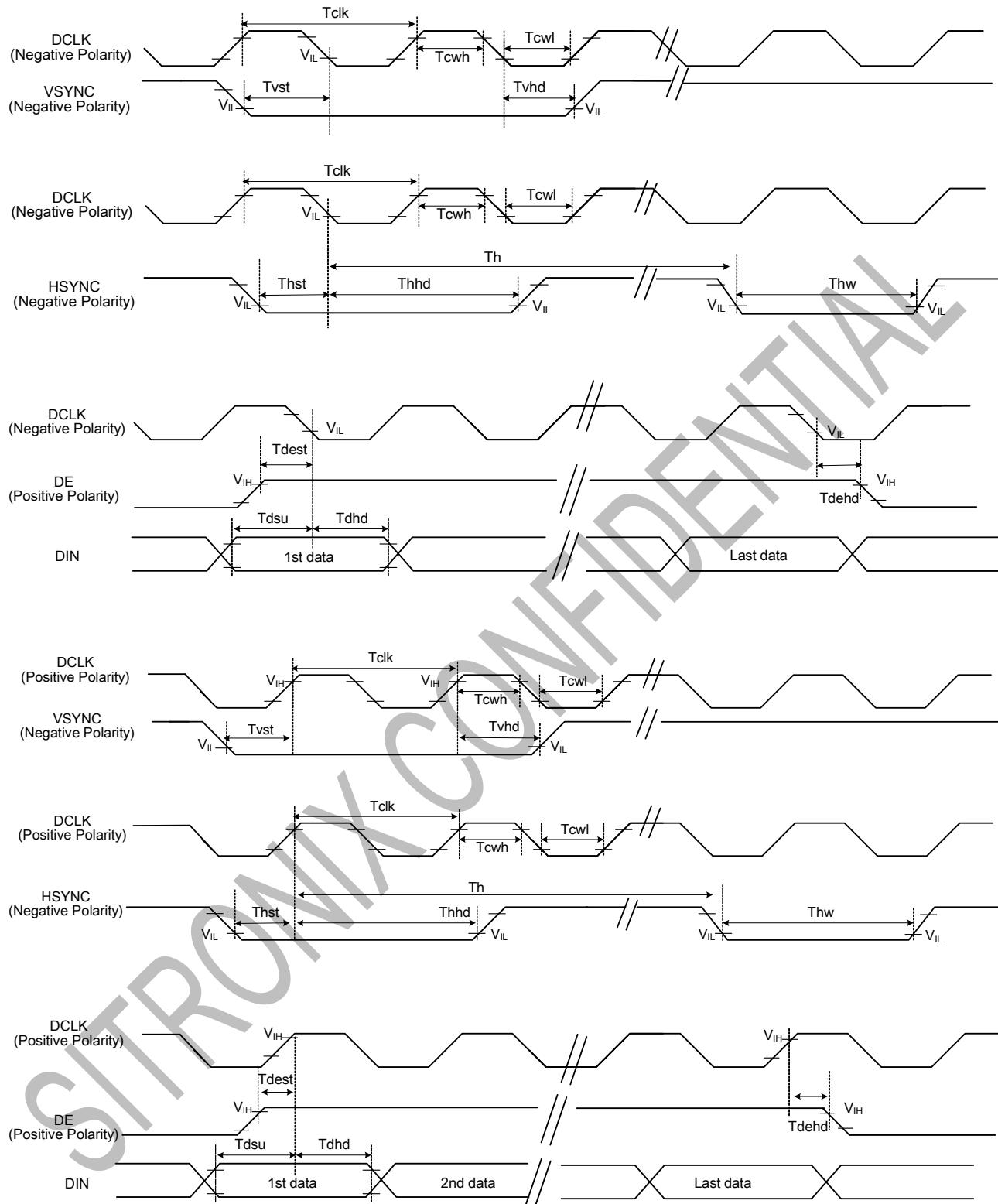
| Item | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|--|---------------------|----------|------|------|------|------------|
| SCL Clock Frequency | F _{SCL} | - | - | 400 | KHz | |
| SCL Clock Low Period | T _{LOW} | 1300 | - | - | ns | |
| SCL Clock High Period | T _{HIGH} | 600 | - | - | ns | |
| Signal Rise Time | T _r | 20+0.1Cb | - | 300 | ns | |
| Signal Fall Time | T _f | 20+0.1Cb | - | 300 | ns | |
| Start Condition Setup Time | T _{SU;STA} | 600 | - | - | ns | |
| Start Condition Hold Time | T _{HD;STA} | 600 | - | - | ns | |
| Data Setup Time | T _{SU;DAT} | 100 | - | - | ns | |
| Data Hold Time | T _{HD;DAT} | 0 | - | 900 | ns | |
| Setup Time for STOP Condition | T _{SU;STO} | 600 | - | - | ns | |
| Bus Free Time Between a STOP and START | T _{BUF} | 100 | - | - | ns | |
| Capacitive load represented by each bus line | C _b | - | - | 400 | pF | |
| Tolerable Spike Width on Bus | T _{sw} | - | - | 50 | ns | |

9.3.3 System Bus Timing for 3-Wire SPI Interface



| Item | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|------------------------------|-----------|------|------|------|------|------------|
| CS Input Setup Time | T_{s0} | 50 | - | - | ns | |
| Serial Data Input Setup Time | T_{s1} | 50 | - | - | ns | |
| CS Input Hold Time | T_{h0} | 50 | - | - | ns | |
| Serial Data Input Hold Time | T_{h1} | 50 | - | - | ns | |
| SCL Write Pulse High Width | T_{wh1} | 50 | - | - | ns | |
| SCL Write Pulse Low Width | T_{wl1} | 50 | - | - | ns | |
| SCL Read Pulse High Width | T_{rh1} | 300 | - | - | ns | |
| SCL Read Pulse Low Width | T_{rl1} | 300 | - | - | ns | |
| CS Pulse High Width | T_{w2} | 400 | - | - | ns | |

9.3.4 System Bus Timing for RGB Interface

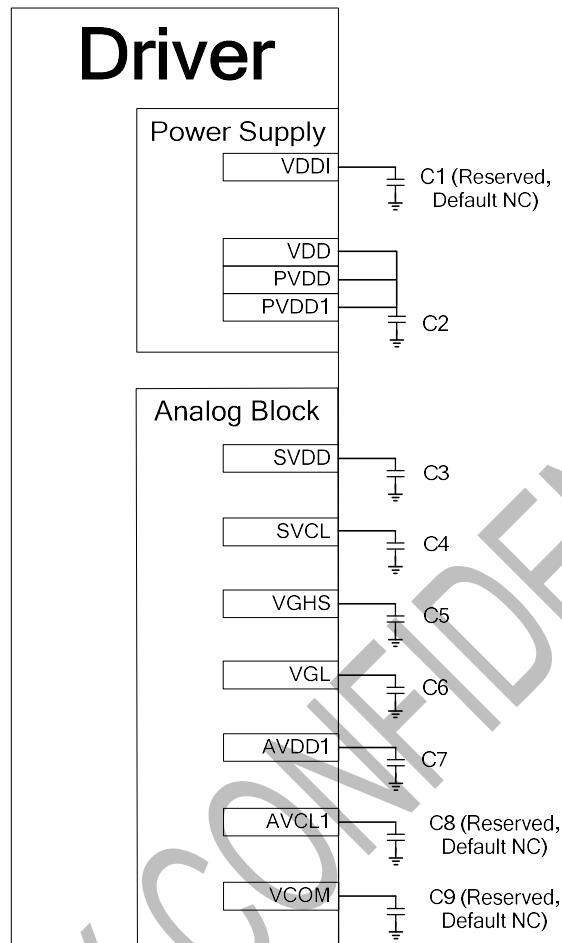


| Item | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|-------------------|--------|------|------|------|------|------------|
| CLK Pulse Duty | Tclk | 40 | 50 | 60 | % | |
| VSYNC Setup Time | Tvst | 10 | - | - | ns | |
| VSYNC Hold Time | Tvh | 10 | - | - | ns | |
| H SYNC Setup Time | Thst | 10 | - | - | ns | |
| H SYNC Hold Time | Thhd | 10 | - | - | ns | |
| Data Setup Time | Tdsu | 10 | - | - | ns | |
| Data Hold Time | Tdhd | 10 | - | - | ns | |
| DE Setup Time | Tdest | 10 | - | - | ns | |
| DE Hold Time | Tdehd | 10 | - | - | ns | |

SITRONIX CONFIDENTIAL

10. APPLICATION CIRCUIT

10.1 External Component of Power Circuit

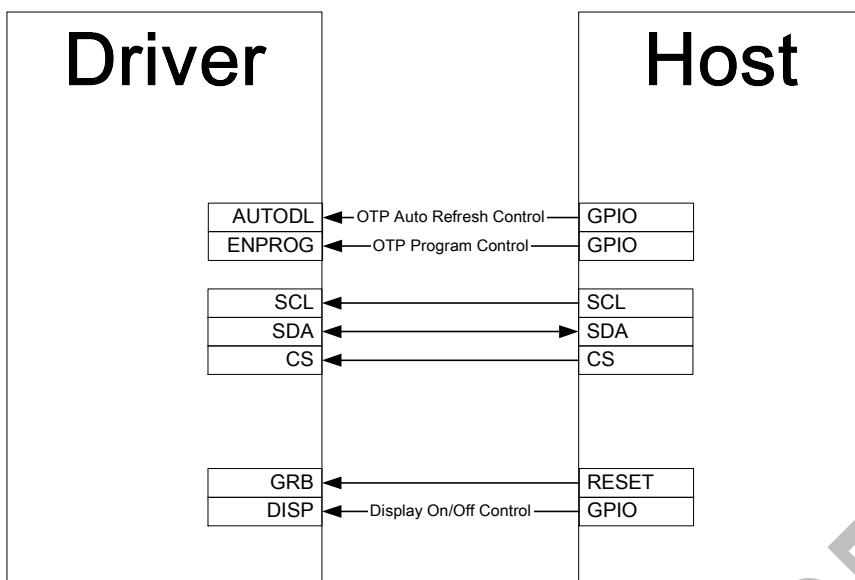


| Symbol | Capacitance (uF) | Voltage Proof (V) | Note |
|--------|------------------|-------------------|--|
| C1 | 2.2 | 6 | Default NC, if a single power supply, please connect to PVDD |
| C2 | 2.2 | 6 | |
| C3 | 2.2 | 10 | |
| C4 | 2.2 | 10 | |
| C5 | 2.2 | 25 | |
| C6 | 2.2 | 25 | |
| C7 | 2.2 | 10 | |
| C8 | 2.2 | 10 | Default NC |
| C9 | 2.2 | 6 | Default NC |

Note: 1. The capacitors are determined by system power, panel loading and display quality.

2. The C1 capacitor should be connected when LVDS interface application.

10.1.1 OTP Application Circuit



| Pin Connection | Description |
|----------------|-----------------------------------|
| AUTODL | OTP auto-refresh function control |
| ENPROG | OTP program function control |

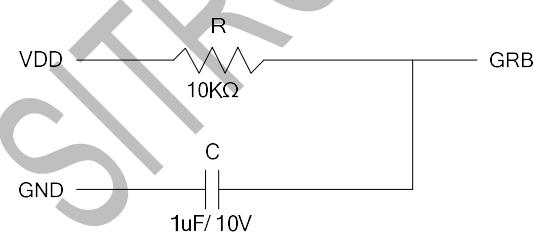
Note: 1. For detailed pin description please refer to section 6.1 PIN DESCRIPTION.

2. AUTODL, ENPROG, SCL, SDA, CS, GRB, DISP are the pins for OTP burning, please wire out to connector or keep reserved testing points.

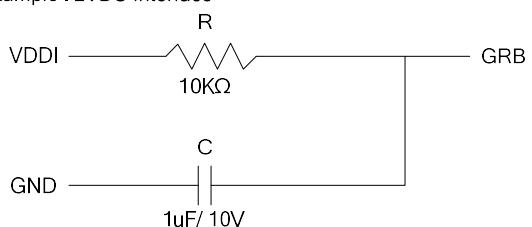
10.1.2 Reset Application Circuit

The input level of GRB pin can enable/disable power on reset function, please wire out to connector or use the following circuit to reset.

Single Power : VDDI, VDD, PVDD together
Example : RGB Interface



Dual Power : VDD, PVDD, DUMMY(PVDD1) together
VDDI is sparated from VDD, PVDD, DUMMY(PVDD1)
Example : LVDS Interface



10.2 Input Color Format Application Circuit

10.2.1 Pin Assignment for RGB Interface

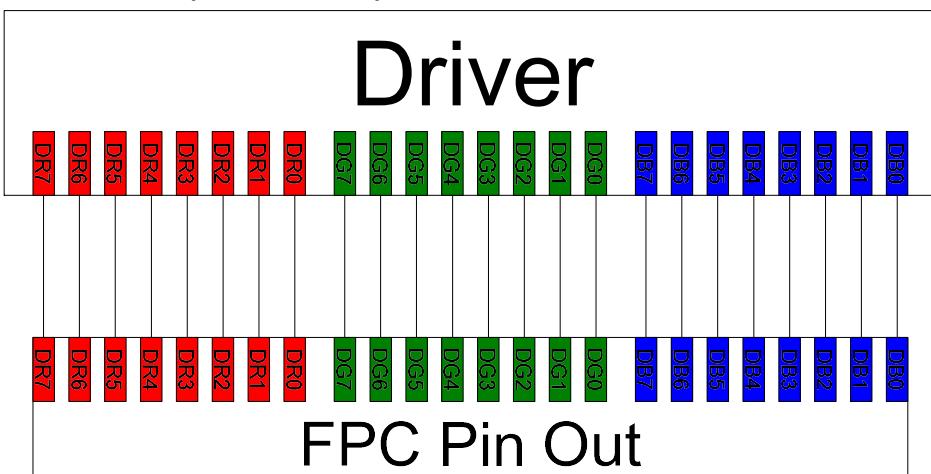
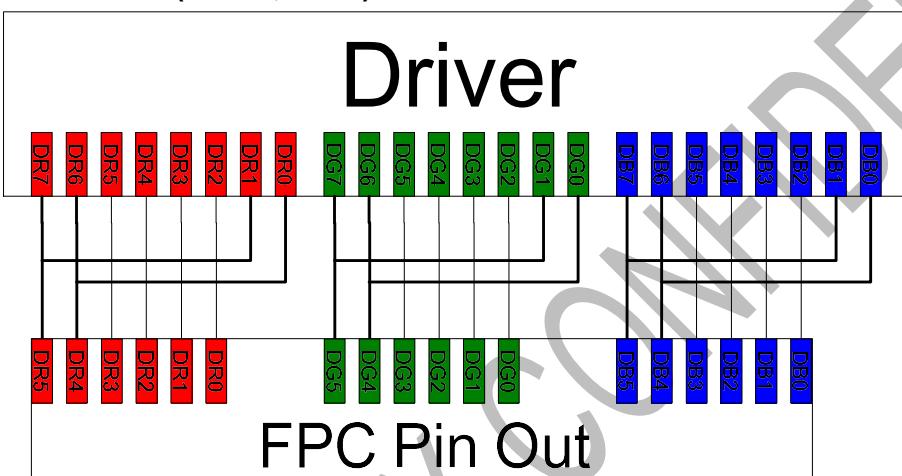
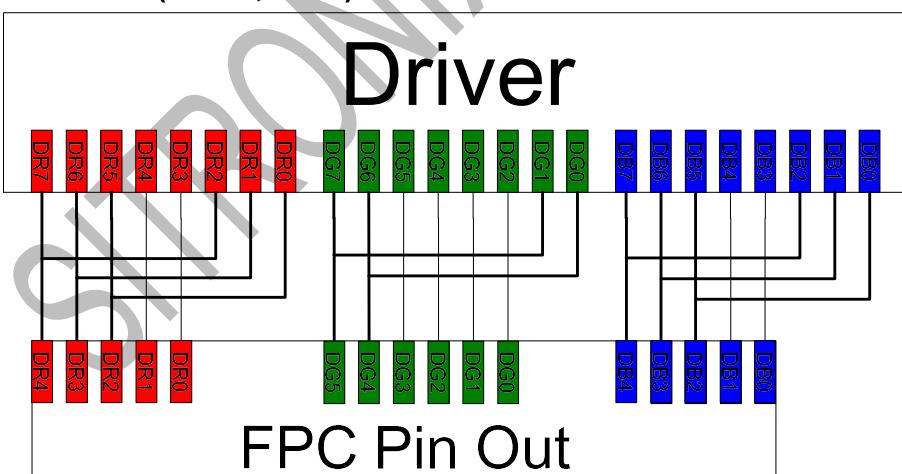
| Pin | | Parallel RGB | | |
|-------|-----------|--------------|-------|-------|
| | | 888 | 666 | 565 |
| VSYNC | SYNC Mode | VSYNC | VSYNC | VSYNC |
| | DE Mode | X | X | X |
| Hsync | SYNC Mode | Hsync | Hsync | Hsync |
| | DE Mode | X | X | X |
| DE | SYNC Mode | X | X | X |
| | DE Mode | DE | DE | DE |
| DCLK | | DCLK | DCLK | DCLK |
| DR0 | | R0 | X | X |
| DR1 | | R1 | X | X |
| DR2 | | R2 | R2 | X |
| DR3 | | R3 | R3 | R3 |
| DR4 | | R4 | R4 | R4 |
| DR5 | | R5 | R5 | R5 |
| DR6 | | R6 | R6 | R6 |
| DR7 | | R7 | R7 | R7 |
| DG0 | | G0 | X | X |
| DG1 | | G1 | X | X |
| DG2 | | G2 | G2 | G2 |
| DG3 | | G3 | G3 | G3 |
| DG4 | | G4 | G4 | G4 |
| DG5 | | G5 | G5 | G5 |
| DG6 | | G6 | G6 | G6 |
| DG7 | | G7 | G7 | G7 |
| DB0 | | B0 | X | X |
| DB1 | | B1 | X | X |
| DB2 | | B2 | B2 | X |
| DB3 | | B3 | B3 | B3 |
| DB4 | | B4 | B4 | B4 |
| DB5 | | B5 | B5 | B5 |
| DB6 | | B6 | B6 | B6 |
| DB7 | | B7 | B7 | B7 |

10.2.2 Data Format

| Parallel RGB888 | | | | | |
|-----------------|----------------------|----------------------|----------------------|-----|----------------------|
| Pin | 1 st Data | 2 nd Data | 3 rd Data | ... | N th Data |
| DR0 | 1'R0 | 2'R0 | 3'R0 | ... | N'R0 |
| DR1 | 1'R1 | 2'R1 | 3'R1 | ... | N'R1 |
| DR2 | 1'R2 | 2'R2 | 3'R2 | ... | N'R2 |
| DR3 | 1'R3 | 2'R3 | 3'R3 | ... | N'R3 |
| DR4 | 1'R4 | 2'R4 | 3'R4 | ... | N'R4 |
| DR5 | 1'R5 | 2'R5 | 3'R5 | ... | N'R5 |
| DR6 | 1'R6 | 2'R6 | 3'R6 | ... | N'R6 |
| DR7 | 1'R7 | 2'R7 | 3'R7 | ... | N'R7 |
| DG0 | 1'G0 | 2'G0 | 3'G0 | ... | N'G0 |
| DG1 | 1'G1 | 2'G1 | 3'G1 | ... | N'G1 |
| DG2 | 1'G2 | 2'G2 | 3'G2 | ... | N'G2 |
| DG3 | 1'G3 | 2'G3 | 3'G3 | ... | N'G3 |
| DG4 | 1'G4 | 2'G4 | 3'G4 | ... | N'G4 |
| DG5 | 1'G5 | 2'G5 | 3'G5 | ... | N'G5 |
| DG6 | 1'G6 | 2'G6 | 3'G6 | ... | N'G6 |
| DG7 | 1'G7 | 2'G7 | 3'G7 | ... | N'G7 |
| DB0 | 1'B0 | 2'B0 | 3'B0 | ... | N'B0 |
| DB1 | 1'B1 | 2'B1 | 3'B1 | ... | N'B1 |
| DB2 | 1'B2 | 2'B2 | 3'B2 | ... | N'B2 |
| DB3 | 1'B3 | 2'B3 | 3'B3 | ... | N'B3 |
| DB4 | 1'B4 | 2'B4 | 3'B4 | ... | N'B4 |
| DB5 | 1'B5 | 2'B5 | 3'B5 | ... | N'B5 |
| DB6 | 1'B6 | 2'B6 | 3'B6 | ... | N'B6 |
| DB7 | 1'B7 | 2'B7 | 3'B7 | ... | N'B7 |

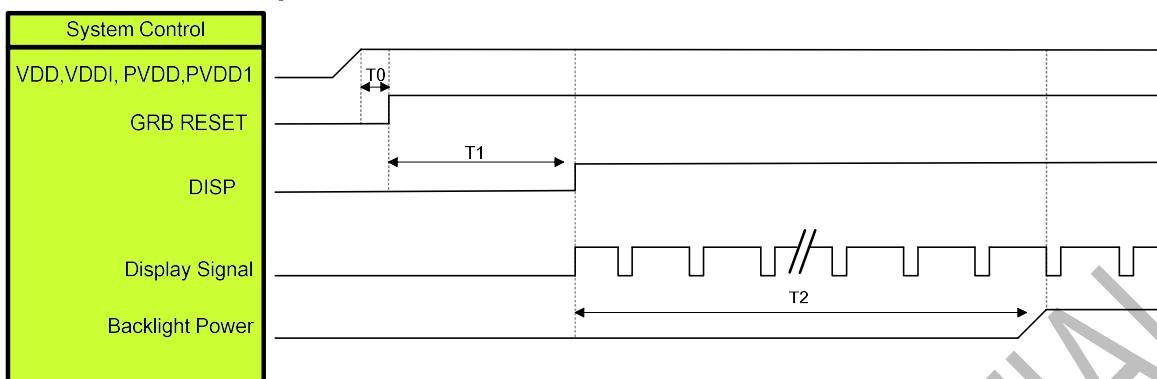
| Parallel RGB666 | | | | | |
|-----------------|----------------------|----------------------|----------------------|-----|----------------------|
| Pin | 1 st Data | 2 nd Data | 3 rd Data | ... | N th Data |
| DR0 | X | X | X | ... | X |
| DR1 | X | X | X | ... | X |
| DR2 | 1'R0 | 2'R0 | 3'R0 | ... | N'R0 |
| DR3 | 1'R1 | 2'R1 | 3'R1 | ... | N'R1 |
| DR4 | 1'R2 | 2'R2 | 3'R2 | ... | N'R2 |
| DR5 | 1'R3 | 2'R3 | 3'R3 | ... | N'R3 |
| DR6 | 1'R4 | 2'R4 | 3'R4 | ... | N'R4 |
| DR7 | 1'R5 | 2'R5 | 3'R5 | ... | N'R5 |
| DG0 | X | X | X | ... | X |
| DG1 | X | X | X | ... | X |
| DG2 | 1'G0 | 2'G0 | 3'G0 | ... | N'G0 |
| DG3 | 1'G1 | 2'G1 | 3'G1 | ... | N'G1 |
| DG4 | 1'G2 | 2'G2 | 3'G2 | ... | N'G2 |
| DG5 | 1'G3 | 2'G3 | 3'G3 | ... | N'G3 |
| DG6 | 1'G4 | 2'G4 | 3'G4 | ... | N'G4 |
| DG7 | 1'G5 | 2'G5 | 3'G5 | ... | N'G5 |
| DB0 | X | X | X | ... | X |
| DB1 | X | X | X | ... | X |
| DB2 | 1'B0 | 2'B0 | 3'B0 | ... | N'B0 |
| DB3 | 1'B1 | 2'B1 | 3'B1 | ... | N'B1 |
| DB4 | 1'B2 | 2'B2 | 3'B2 | ... | N'B2 |
| DB5 | 1'B3 | 2'B3 | 3'B3 | ... | N'B3 |
| DB6 | 1'B4 | 2'B4 | 3'B4 | ... | N'B4 |
| DB7 | 1'B5 | 2'B5 | 3'B5 | ... | N'B5 |

| Parallel RGB565 | | | | | |
|-----------------|----------------------|----------------------|----------------------|-----|----------------------|
| Pin | 1 st Data | 2 nd Data | 3 rd Data | ... | N th Data |
| DR0 | X | X | X | ... | X |
| DR1 | X | X | X | ... | X |
| DR2 | X | X | X | ... | X |
| DR3 | 1'R0 | 2'R0 | 3'R0 | ... | N'R0 |
| DR4 | 1'R1 | 2'R1 | 3'R1 | ... | N'R1 |
| DR5 | 1'R2 | 2'R2 | 3'R2 | ... | N'R2 |
| DR6 | 1'R3 | 2'R3 | 3'R3 | ... | N'R3 |
| DR7 | 1'R4 | 2'R4 | 3'R4 | ... | N'R4 |
| DG0 | X | X | X | ... | X |
| DG1 | X | X | X | ... | X |
| DG2 | 1'G0 | 2'G0 | 3'G0 | ... | N'G0 |
| DG3 | 1'G1 | 2'G1 | 3'G1 | ... | N'G1 |
| DG4 | 1'G2 | 2'G2 | 3'G2 | ... | N'G2 |
| DG5 | 1'G3 | 2'G3 | 3'G3 | ... | N'G3 |
| DG6 | 1'G4 | 2'G4 | 3'G4 | ... | N'G4 |
| DG7 | 1'G5 | 2'G5 | 3'G5 | ... | N'G5 |
| DB0 | X | X | X | ... | X |
| DB1 | X | X | X | ... | X |
| DB2 | X | X | X | ... | X |
| DB3 | 1'B0 | 2'B0 | 3'B0 | ... | N'B0 |
| DB4 | 1'B1 | 2'B1 | 3'B1 | ... | N'B1 |
| DB5 | 1'B2 | 2'B2 | 3'B2 | ... | N'B2 |
| DB6 | 1'B3 | 2'B3 | 3'B3 | ... | N'B3 |
| DB7 | 1'B4 | 2'B4 | 3'B4 | ... | N'B4 |

10.2.3 16.7M (R G B, 8 8 8) INPUT COLOR FORMAT**10.2.4 262K (R G B, 6 6 6) INPUT COLOR FORMAT****10.2.5 65K (R G B, 5 6 5) INPUT COLOR FORMAT**

11. POWER ON/OFF SEQUENCE

11.1 Power On Sequence

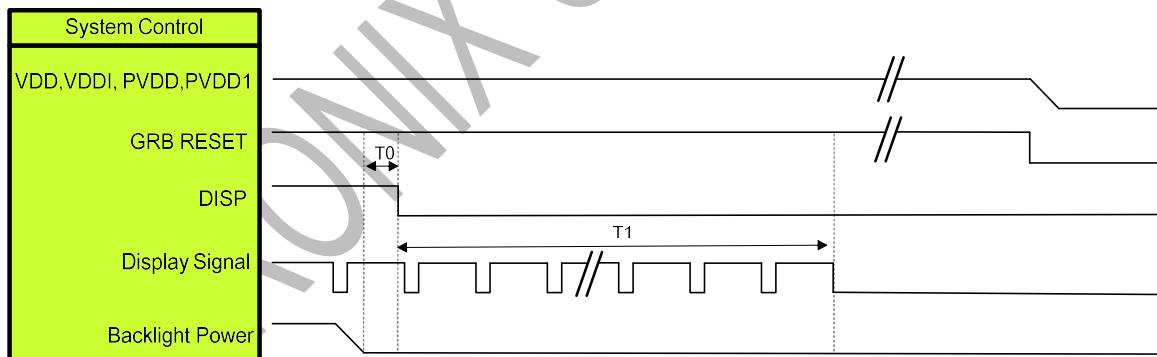


| Symbol | Description | Min. Time | Unit |
|--------|---|-----------|------|
| T0 | System power stability to GRB RESET signal | 0 | ms |
| T1 | GRB RESET = "High" to DISP = "High" | 10 | ms |
| T2 | Display Signal output to Backlight Power on | 250 | ms |

Note :

- When DISP pull "H" or "L", IC will execute the internal power on or power off procedures .Please be careful about the timing of DISP and do not interrupt it during power on or power off procedure, otherwise unexpected errors will occur.
- RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]
- LVDS interface Display signal: DCLK P/N; RX[3:0]P/N

11.2 Power Off Sequence



| Symbol | Description | Min. Time | Unit |
|--------|--|-----------|------|
| T0 | Backlight Power off to DISP = "Low" | 5 | ms |
| T1 | DISP = "Low" to IC internal voltage discharge complete | 100 | ms |

Note :

- When DISP pull "H" or "L", IC will execute the internal power on or power off procedures. Please be careful about the timing of DISP and do not interrupt it during power on or power off procedure, otherwise unexpected errors will occur.
- RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]
- LVDS interface Display signal: DCLK P/N; RX[3:0]P/N

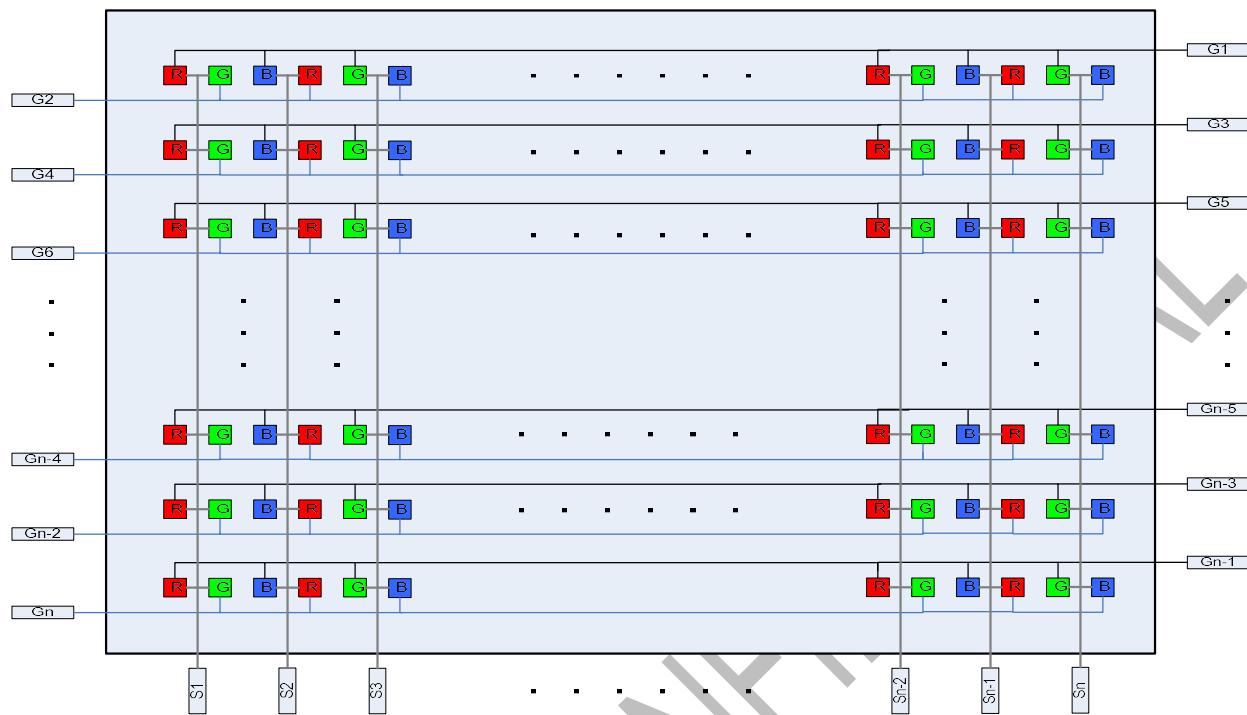
12. RECOMMENDED PANEL ROUTING RESISTANCE

The recommended wiring resistance values are given below. Resistance values will restrict the maximum current capability of the power supply system and thus must be designed within the recommended range.

| Pin Number | Pin Name | Unit: ohm |
|------------|-------------|-----------|
| 1 | VDDI | <1 |
| 2 | VDD | <1 |
| 3 | PVDD | <1 |
| 4 | PVDD1 | <1 |
| 5 | DGND | <1 |
| 6 | AGND | <1 |
| 7 | SGND | <1 |
| 8 | PGND | <1 |
| 9 | SVCL | <3 |
| 10 | SVDD | <3 |
| 11 | VCOM | <3 |
| 12 | RGND | <50 |
| 13 | AVCL1 | <50 |
| 14 | AVDD1 | <50 |
| 15 | GVDD | <50 |
| 16 | GVCL | <50 |
| 17 | VGSP | <50 |
| 18 | VCC | <50 |
| 19 | VGHS | <50 |
| 20 | VGL | <50 |
| 21 | SPI_I2C_SEL | <50 |
| 22 | CS | <50 |
| 23 | SDA | <50 |
| 24 | SCL | <50 |
| 25 | DISP | <50 |
| 26 | GRB | <50 |
| 27 | DCLKN | <50 |
| 28 | DCLKP | <50 |
| 29 | DR[7:0] | <50 |
| 30 | DG[7:0] | <50 |

13. COLOR FILTER ARRANGEMENT

This IC supports the stripe color filter of dual-gate application. The arrangement of color filter on panel is shown as below.



14. REVISION HISTORY

| Revision | Description | Date |
|----------|---|---------|
| V0.1 | 1 st edition | 2018/05 |
| V0.2 | 2 nd edition | 2018/07 |
| V0.3 | 3 rd edition | 2018/12 |
| V0.4 | Modify Pad CENTER COORDINATES (P9) | 2018/12 |
| V0.4a | Remove LVDS Function | 2019/04 |
| V0.4b | Modify features description (P6) Modify command description 19h/ 1Bh/1Ch (P58, P59) | 2019/05 |
| V0.4c | Modify note description (P71) | 2019/06 |
| V0.4d | Modify application circuit (P78) | 2019/06 |
| V0.4e | Modify Application Range of Power Supply Modify Bump Dimension Modify Typing Error | 2019/08 |
| 0.6a | Add LVDS Function Add Input Color Format Application Circuit | 2020/03 |
| 0.6b | Modify the Diagram of SYNC-DE Mode (P51) Modify the Timing of RGB Interface (P83) Modify External Component of Power Circuit (P84) | 2020/04 |
| 0.7 | Modify VCOM and OTP Description (P6) Add GRB Pin and Modify Table Format (P45) Modify the Timing Table of RGB Interface (P53) Modify VCOM Offset (05h) Description (P73) Modify Command Description 66h/ 67h/ 68h/ 68h/ 69h/ 6Ah/ 6Bh/ 6Ch (P74,P75) Add Backlight Description (P76) Add IC Temperature and Display Effect Description (P76) Modify DC Characteristics and Operation Current(P77) Add OTP Application Circuit (P85) Add Reset Application Circuit (P85) Add DISP Description of Power on/off Sequence (P91) | 2020/06 |