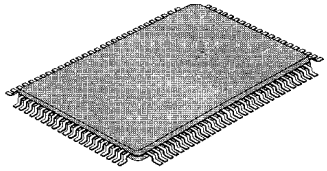
# KS0063B 80CH SEGMENT DRIVER FOR DOT MATRIX LCD

## INTRODUCTION

The KSOO63B is a LCD driver LSl which is fabricated by low power CMOS technology. Basically this LSl consists of 40×2 bit bidrectional shift register, 40×2 bit data latch and 40×2 bit LCD driver (refer to Fig 1). This LSl can be used segment driver.

## FUNCTION

- Dot matrix LCD driver with 80 channel output.
- Input/Output signal
  - Output : 40×2channel waveform for LCD driving
  - Input : - Serial display data and control pulse from the controller LSl.
    - Bias voltage ($V_1$ - $V_4$)



## FEATURES

- Display driving bias ; static-1/5
- Power supply voltage ; 2.7V ~ 5.5V
- Supply voltage for display : 0 ~ - 5V($V_{EE}$)
- interface

| driver (cascade connection) | controller |
|---|---|
| KS0065B, KS0063, Other KS0063B | KS0066/U |

- CMOS Process
- l00QFP and bare chip available

## BLOCK DIAGRAM

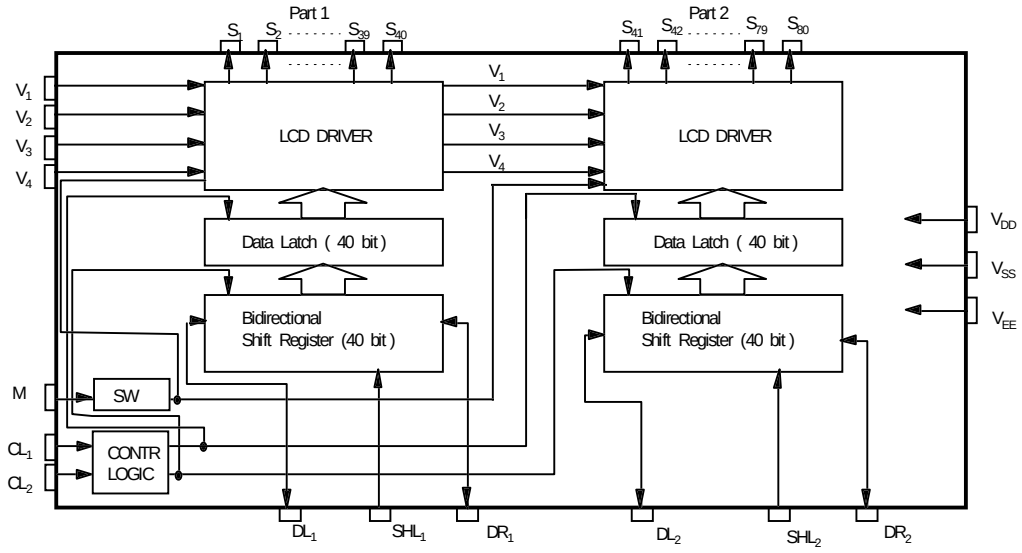



Fig. 1. KS0063 functional block diagram

**PIN CONFIGURATION**

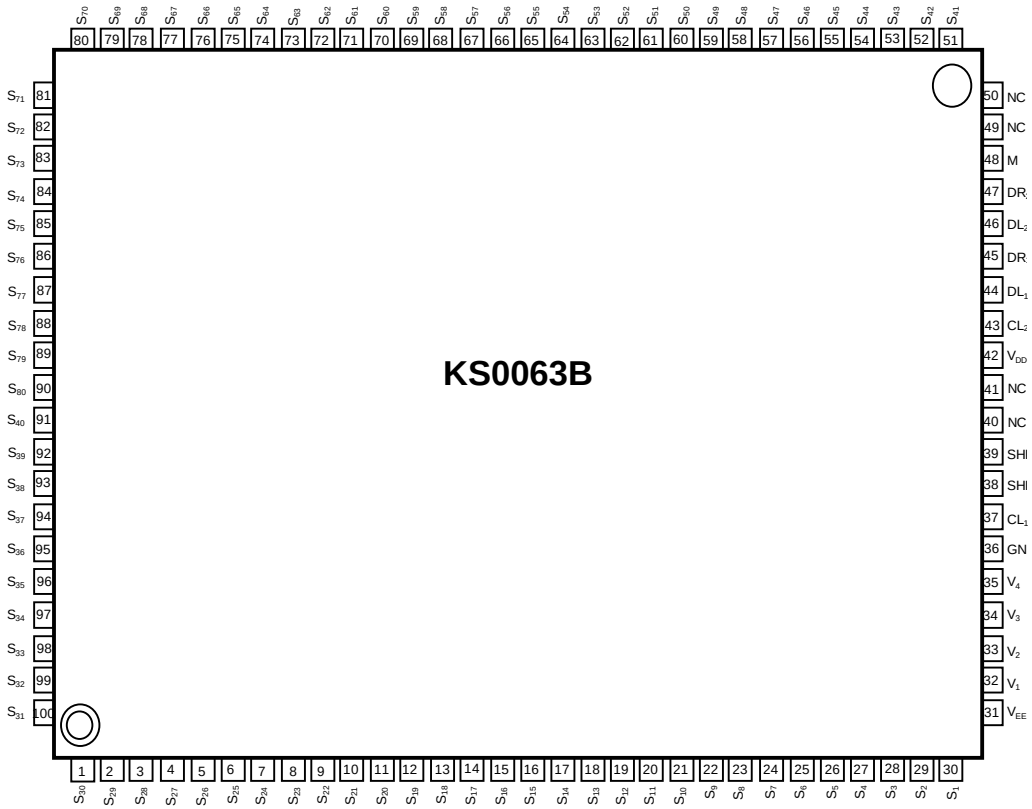



**Fig. 2.100QFP Top View**

## PIN DESCRIPTION

| PIN (NO.) | INPUT OUTPUT | NAME | | DESCRIPTION | INTERFACE |
|---|---|---|---|---|---|
| $V_{DD}$(42) | Power | Operating Voltage | | For logical circuit (2.7V ~ 5.5V) | Power Supply |
| $V_{SS}$(GND)(36) | | | | 0V (GND) | |
| $V_{EE}$(31) | | Negative Supply Voltage | | For LCD driver circuit (- 5V) | |
| V1, V2 (32,33) | Input | LCD driver output voltage level | | Bias voltage level for LCD drive (Select level) | Power |
| V3, V4 (34,35) | Input | | | Bias voltage level for LCD drive (Nonselect level) | |
| S1 - S40 | Output | Part 1 | LCD driver | LCD driver output | LCD |
| SHL1(38) | Input | | Data Interface | Selection of the shift direction of shift register | $V_{DD}$ or $V_{SS}$ |
| DL1, DR1 (44,45) | Input Output | | | Data Input/output of shift register (part 1) | Controller or KS0063B |
| S41 - S80 | Output | Part 2 | LCD driver | LCD driver output | LCD |
| SHL2 (39) | Input | | Data Interface | Selection of the shift direction of shift register | $V_{DD}$ or $V_{SS}$ |
| DL2, DR2 (46,47) | Input Output | | | Data Input/output of shift register (part 2) | Controller or KS0063 |
| M(48) | Input | Alternated signal for LCD driver output | | The alternating signal to convert LCD drive waveform to AC | Controller |
| CL1, CL2 (37,43) | Input | Data shift/latch clock | | CL1 : Data latch clock<br>CL2 : Data shift clock | |
| NC (40, 41, 49, 50) | | | | No connection | NC |

## MAXIMUM ABSOLUTE LIMIT ($T_a$=25 ˚C)

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Operating Voltage | $V_{DD}$ | -0.3~+7.0 | V |
| Driver Supply Voltage | $V_{LCD}$ | $V_{DD}$-13.5~$V_{DD}$+0.3 | V |
| Input Voltage 1 | $V_{IN1}$ | -0.3~$V_{DD}$+0.3 | V |
| Input Voltage 2 ($V_1$~$V_4$) | $V_{IN2}$ | $V_{DD}$+0.3~$V_{EE}$-0.3 | V |
| Operating Temperature | $T_{OPR}$ | -30~+85 | ˚C |
| Storage Temperature | $T_{STG}$ | -55~+125 | ˚C |

* Voltage greater than above may damage to the circuit
* $V_{EE}$ : connect a protection resistor (220Ω ±5%)

## ELECTRICAL CHARACTERISTICS

### DC CHARACTERISTICS ($V_{DD}$= 2.7V~5.5V, $V_{EE}$= 3~13V, $V_{SS}$=0V, Ta=-30 ~ +85 ˚C)

| Characteristic | Symbol | Test condition | Min | Max | Unit | Applicable pin |
|---|---|---|---|---|---|---|
| Operating Current | $I_{DD}$ | $f_{CL2}$ = 400KHz | - | 1 | mA | $V_{DD}$, $V_{EE}$ |
| Supply Current | $I_{EE}$ | $f_{CL1}$ = 1KHz | - | 10 | μA | |
| Input High Voltage | $V_{IH}$ | - | 0.7$V_{DD}$ | $V_{DD}$ | V | CL1, CL2,DL1, |
| Input Low Voltage | $V_{IL}$ | | 0 | 0.3$V_{DD}$ | | DL2, DR1, DR2, |
| Input Leakage Current | $I_{LKG}$ | $V_{IN}$ = 0 ~ $V_{DD}$ | -5 | 5 | μA | SHL1, SHL2, M |
| Output High Voltage | $V_{OH}$ | $I_{OH}$ = -0.4mA | $V_{DD}$-0.4 | - | | DL1, DL2, |
| Output Low Voltage | $V_{OL}$ | $I_{OL}$ = +0.4mA | | 0.4 | V | DR1, DR2 |
| Voltage Descending | $V_{D1}$ | $I_{ON}$ = 0.1mA for one of $S_1$ - $S_{80}$ | - | 1.1 | | V($V_1$-$V_4$)-S($S_1$-$S_{80}$) |
| | $V_{D2}$ | $I_{ON}$ = 0.05mA for each $S_1$ - $S_{80}$ | - | 1.5 | | |
| Leakage Current | $I_V$ | $V_{IN}$ = $V_{DD}$ ~ $V_{EE}$ (Output $S_1$ ~ $S_{80}$ ; floating) | -10 | 10 | μA | $V_1$ - $V_4$ |

### AC CHARACTERISTICS ($V_{DD}$= 2.7V~5.5V, $V_{EE}$= 3~13V, $V_{SS}$=0V, Ta=-30 ~ +85 ˚C)

| Characteristic | Symbol | Test condition | Min | Max | Unit | Applicable pin |
|---|---|---|---|---|---|---|
| Data Shift Frequency | $f_{CL}$ | - | - | 400 | KHz | CL2 |
| Clock High Level Width | $t_{WCKH}$ | - | 800 | - | ns | CL1, CL2 |
| Clock Low Level Width | $t_{WCKL}$ | - | 800 | - | | CL2 |
| Clock Set-up Time | $t_{SL}$ | from CL2 to CL1 | 500 | - | | CL1,CL2 |
| | $t_{LS}$ | from CL1 to CL2 | 500 | - | | |
| Clock Rise/Fall Time | $t_R$/$t_F$ | - | - | 200 | | |
| Data Set-up Time | $t_{SU}$ | - | 300 | - | | DL1,DL2,DR1,DR2 |
| Data Hold Time | $t_{DH}$ | - | 300 | - | | DL1,DL2,DR1,DR2 |
| Data Delay Time | $t_D$ | $C_L$ = 15pF | - | 500 | | DL1,DL2,DR1,DR2 |

### TIMING CHARACTERISTICS

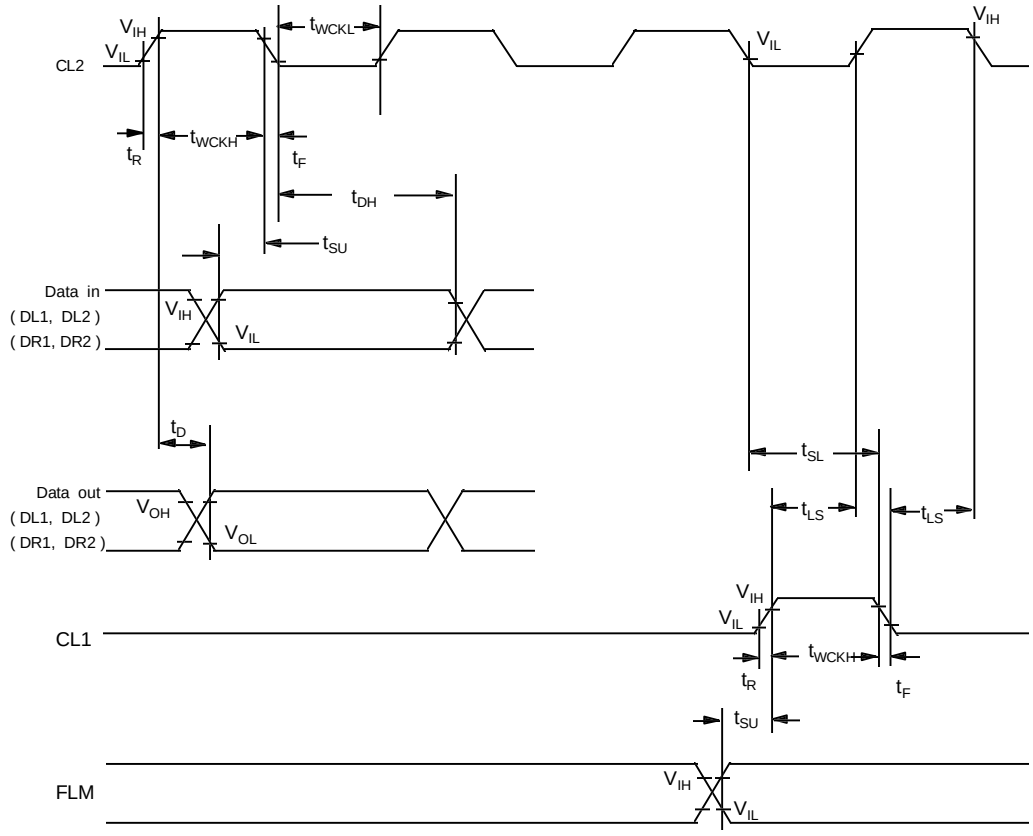
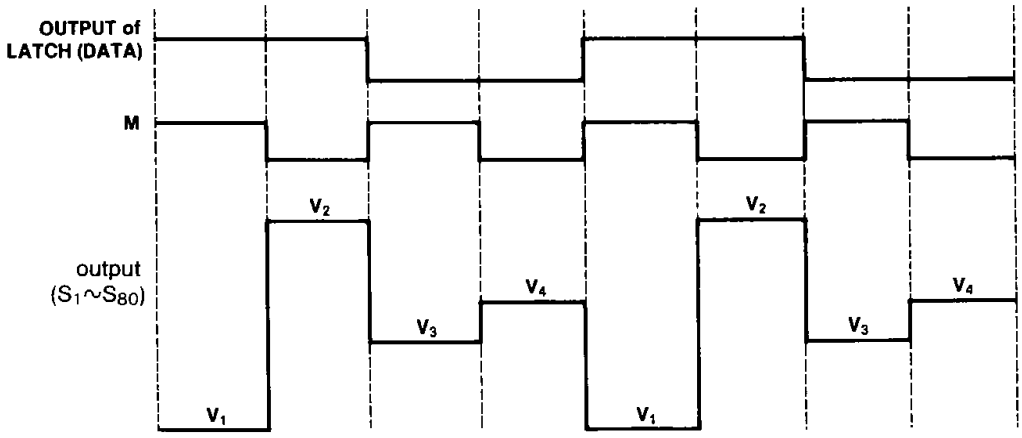
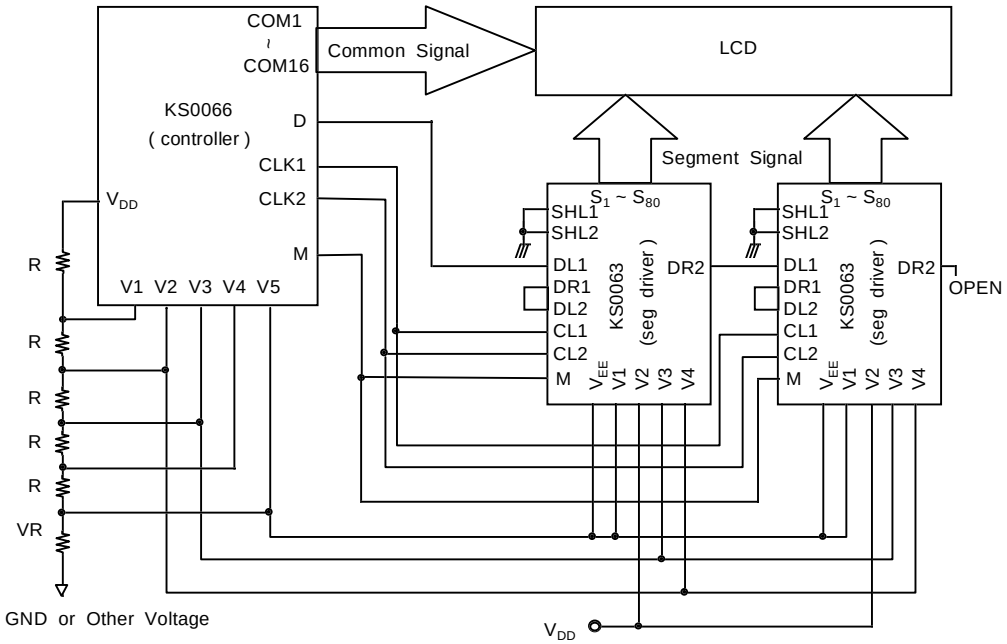



Fig. 3. AV characteristics

### LCD OUTPUT WAVEFORMS

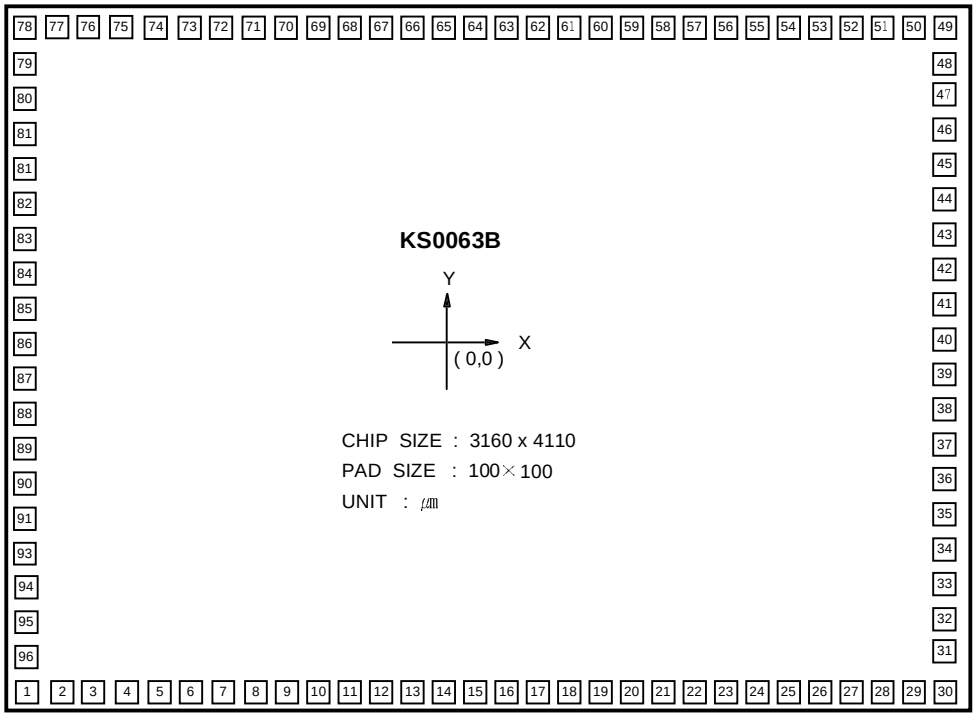



### APPLICATION CIRCUIT



# KS0063B 80CH SEGMENT DRIVER FOR DOT MATRIX LCD

## PAD DIAGRAM



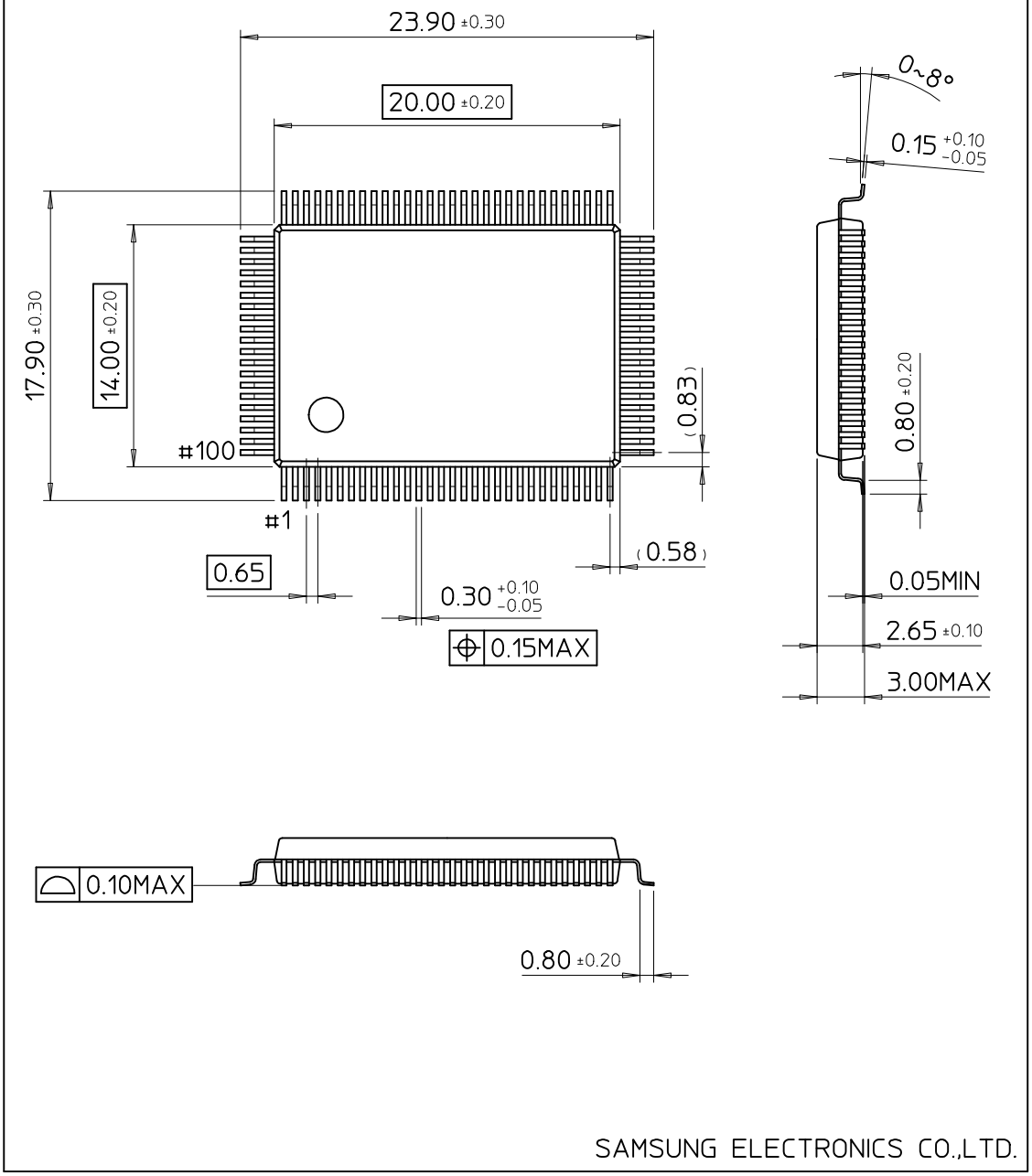
# KS0063B 80CH SEGMENT DRIVER FOR DOT MATRIX LCD

## PAD LOCATION

| PAD NUMBER | PAD NAME | COORDINATE X | COORDINATE Y | PAD NUMBER | PAD NAME | COORDINATE X | COORDINATE Y | PAD NUMBER | PAD NAME | COORDINATE X | COORDINATE Y |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | S42 | -1813 | -1352 | 33 | S74 | 1827 | -812 | 65 | S15 | -188 | 1352 |
| 2 | S43 | -1688 | -1352 | 34 | S75 | 1827 | -687 | 66 | S14 | -313 | 1352 |
| 3 | S44 | -1563 | -1352 | 35 | S76 | 1827 | -562 | 67 | S13 | -438 | 1352 |
| 4 | S45 | -1438 | -1352 | 36 | S77 | 1827 | -437 | 68 | S12 | -563 | 1352 |
| 5 | S46 | -1313 | -1352 | 37 | S78 | 1827 | -312 | 69 | S11 | -688 | 1352 |
| 6 | S47 | -1188 | -1352 | 38 | S79 | 1827 | -187 | 70 | S10 | -813 | 1352 |
| 7 | S48 | -1063 | -1352 | 39 | S80 | 1827 | -62 | 71 | S9 | -938 | 1352 |
| 8 | S49 | -938 | -1352 | 40 | S40 | 1827 | 63 | 72 | S8 | -1063 | 1352 |
| 9 | S50 | -813 | -1352 | 41 | S39 | 1827 | 188 | 73 | S7 | -1188 | 1352 |
| 10 | S51 | -688 | -1352 | 42 | S38 | 1827 | 313 | 74 | S6 | -1313 | 1352 |
| 11 | S52 | -563 | -1352 | 43 | S37 | 1827 | 438 | 75 | S5 | -1438 | 1352 |
| 12 | S53 | -438 | -1352 | 44 | S36 | 1827 | 563 | 76 | S4 | -1563 | 1352 |
| 13 | S54 | -313 | -1352 | 45 | S35 | 1827 | 688 | 77 | S3 | -1688 | 1352 |
| 14 | S55 | -188 | -1352 | 46 | S34 | 1827 | 813 | 78 | S2 | -1813 | 1352 |
| 15 | S56 | -63 | -1352 | 47 | S33 | 1827 | 938 | 79 | S1 | -1827 | 1087 |
| 16 | S57 | 62 | -1352 | 48 | S32 | 1827 | 1063 | 80 | VEE | -1827 | 962 |
| 17 | S58 | 187 | -1352 | 49 | S31 | 1827 | 1352 | 81 | V1 | -1827 | 837 |
| 18 | S59 | 312 | -1352 | 50 | S30 | 1687 | 1352 | 82 | V2 | -1827 | 712 |
| 19 | S60 | 437 | -1352 | 51 | S29 | 1562 | 1352 | 83 | V3 | -1827 | 587 |
| 20 | S61 | 562 | -1352 | 52 | S28 | 1437 | 1352 | 84 | V4 | -1827 | 462 |
| 21 | S62 | 687 | -1352 | 53 | S27 | 1312 | 1352 | 85 | GND | -1827 | 313 |
| 22 | S63 | 812 | -1352 | 54 | S26 | 1187 | 1352 | 86 | CL1 | -1827 | 188 |
| 23 | S64 | 937 | -1352 | 55 | S25 | 1062 | 1352 | 87 | SHL1 | -1827 | 63 |
| 24 | S65 | 1062 | -1352 | 56 | S24 | 937 | 1352 | 88 | SHL2 | -1827 | -62 |
| 25 | S66 | 1187 | -1352 | 57 | S23 | 812 | 1352 | 89 | VDD | -1827 | -187 |
| 26 | S67 | 1312 | -1352 | 58 | S22 | 687 | 1352 | 90 | CL2 | -1827 | -312 |
| 27 | S68 | 1437 | -1352 | 59 | S21 | 562 | 1352 | 91 | DL1 | -1827 | -437 |
| 28 | S69 | 1562 | -1352 | 60 | S20 | 437 | 1352 | 92 | DB1 | -1827 | -562 |
| 29 | S70 | 1687 | -1352 | 61 | S19 | 312 | 1352 | 93 | DL2 | -1827 | -687 |
| 30 | S71 | 1812 | -1352 | 62 | S18 | 187 | 1352 | 94 | DB2 | -1827 | -812 |
| 31 | S72 | 1827 | -1062 | 63 | S17 | 62 | 1352 | 95 | M | -1827 | -937 |
| 32 | S73 | 1827 | -937 | 64 | S16 | -63 | 1352 | 96 | S41 | -1827 | -1086 |

# 100-QFP-1420C

Dimensions in Milimeters




SAMSUNG ELECTRONICS CO.,LTD.