

**SANYO**

No.2290C

**LC7582,7582E,7582W**

LCD Driver

**Overview**

The LC7582,7582E,7582W is a general-purpose LCD driver designed for use in electronic tuning frequency display or microcomputer-controlled system applications.

**Features**

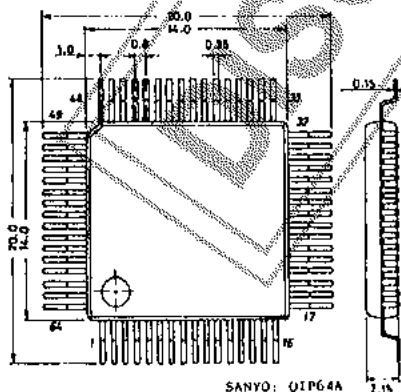
- 53 segments (max.) output (Static display)
- Drive system: 1/1duty (53 segments), 1/2duty (104 segments)
- Data input: 3 serial input pins
- 2 pins for 5-level AD converter (Level meter use, etc.)
- 2 display (DSP) pins for direct display
- INH pin for blanking out display

**Absolute Maximum Ratings** at  $T_a=25^\circ\text{C}$ ,  $V_{SS}=0\text{V}$ 

unit

|                             |              |                        |                                           |                      |
|-----------------------------|--------------|------------------------|-------------------------------------------|----------------------|
| Maximum Supply Voltage      | $V_{DD\max}$ | $V_{DD}$               | -0.3 to +7.0                              | V                    |
|                             | $V_{LCD}$    | $V_{LCD}$              | -0.3 to $V_{DD}+0.3$                      | V                    |
| Input Voltage               | $V_{IN(1)}$  | CE, CLK, DATA, INH     | -0.3 to +7.0                              | V                    |
|                             | $V_{IN(2)}$  | S44 to S47             | Output OFF (Used as AD1, AD2, DSP1, DSP2) | -0.3 to $V_{DD}+0.3$ |
|                             | $V_{IN(3)}$  | OSC                    | Output OFF                                | -0.3 to $V_{DD}+0.3$ |
| Output Voltage              | $V_{OUT}$    | OSC                    | Output OFF                                | -0.3 to $V_{DD}+0.3$ |
| Output Current              | $I_{OUT(1)}$ | S1 to S53              |                                           | 100 $\mu\text{A}$    |
|                             | $I_{OUT(2)}$ | COM1,2                 |                                           | 1.0 mA               |
| Allowable Power Dissipation | $P_{dmax}$   | $T_a=85^\circ\text{C}$ |                                           | 100 mW               |
| Operating Temperature       | $T_{opg}$    |                        | -30 to +85                                | $^\circ\text{C}$     |
| Storage Temperature         | $T_{stg}$    |                        | -40 to +125                               | $^\circ\text{C}$     |

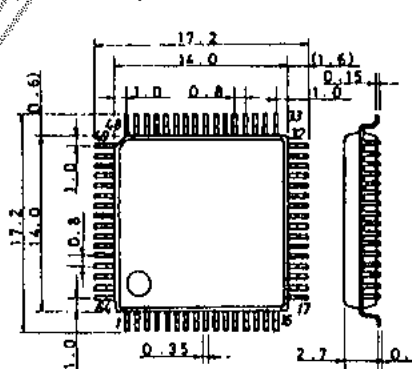
Case Outline 3057 [LC7582]  
(unit: mm)



SANYO: QIP64A

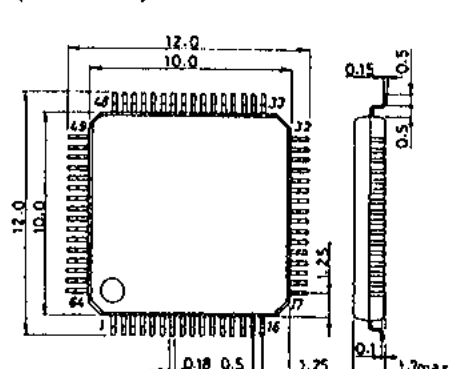
2.15

Case Outline 3159 [LC7582E]  
(unit: mm)



SANYO: QIP64E

Case Outline 3190 [LC7582W]  
(unit: mm)



SANYO: SQFP64

Specifications and information herein are subject to change without notice.

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N132JN/8071JK/6038YT/9026KI/TS No.2290-1/9

Allowable Operating Conditions at Ta=-30 to +85°C, V<sub>SS</sub>=0V

|                                  | Pin                 | min                | typ | max                | unit |
|----------------------------------|---------------------|--------------------|-----|--------------------|------|
| Supply Voltage                   | V <sub>DD</sub>     | 3.0                |     | 6.5                | V    |
|                                  | V <sub>LCD</sub>    | 3.0                |     | V <sub>DD</sub>    | V    |
| Input "H"-Level Voltage          | V <sub>IH</sub> (1) | 0.7V <sub>DD</sub> |     | 6.5                | V    |
| Input "L"-Level Voltage          | V <sub>IL</sub> (1) | 0                  |     | 0.3V <sub>DD</sub> | V    |
| Input "H"-Level Voltage          | V <sub>IH</sub> (2) | 0.7V <sub>DD</sub> |     | V <sub>DD</sub>    | V    |
| Input "L"-Level Voltage          | V <sub>IL</sub> (2) | 0                  |     | 0.3V <sub>DD</sub> | V    |
| Input "H"-Level Voltage          | V <sub>IH</sub> (3) | 0.8V <sub>DD</sub> |     | 6.5                | V    |
| Input "L"-Level Voltage          | V <sub>IL</sub> (3) | 0                  |     | 0.2V <sub>DD</sub> | V    |
| Recommended External Resistance  | R                   |                    | 51  |                    | kohm |
| Recommended External Capacitance | C                   |                    | 680 |                    | pF   |
| OSC Guaranteed Range             | f <sub>OSC</sub>    | 25                 | 50  | 100                | kHz  |
| "L"-Level Clock Pulse Width      | t <sub>DL</sub>     | 0.25               |     |                    | usec |
| "H"-Level Clock Pulse Width      | t <sub>DH</sub>     | 0.25               |     |                    | usec |
| Setup Time                       | t <sub>sup</sub>    | 0.25               |     |                    | usec |
| Data Hold Time                   | t <sub>dh</sub>     | 0.25               |     |                    | usec |
| Serial Data Pulse Width          | t <sub>1</sub>      | 1                  |     |                    | usec |
| "                                | t <sub>2</sub>      | 1.25               |     |                    | usec |
| "                                | t <sub>3</sub>      |                    |     | 1                  | usec |
| "                                | t <sub>4</sub>      | 4                  |     |                    | usec |

## Electrical Characteristics under Allowable Operating Conditions

|                          | Pin                 | min                    | typ                   | max | unit |
|--------------------------|---------------------|------------------------|-----------------------|-----|------|
| Input "H"-Level Current  | I <sub>IH</sub> (1) |                        |                       | 5   | uA   |
| Input "L"-Level Current  | I <sub>IL</sub> (1) |                        |                       | 5   | uA   |
| Input "H"-Level Current  | I <sub>IH</sub> (2) |                        |                       | 10  | uA   |
| Input "L"-Level Current  | I <sub>IL</sub> (2) |                        |                       | 10  | uA   |
| Input "H"-Level Current  | I <sub>IH</sub> (3) |                        |                       | 10  | uA   |
| Input "L"-Level Current  | I <sub>IL</sub> (3) |                        |                       | 10  | uA   |
| Output "H"-Level Voltage | V <sub>OH</sub> (1) | I <sub>O</sub> =-10uA  | V <sub>DD</sub> -1.0  |     | V    |
| Output "L"-Level Voltage | V <sub>OL</sub> (1) | I <sub>O</sub> =10uA   |                       | 1.0 | V    |
| Output "H"-Level Voltage | V <sub>OH</sub> (2) | I <sub>O</sub> =-100uA | V <sub>LCD</sub> -0.6 |     | V    |
| Output "L"-Level Voltage | V <sub>OL</sub> (2) | I <sub>O</sub> =100uA  |                       | 0.6 | V    |

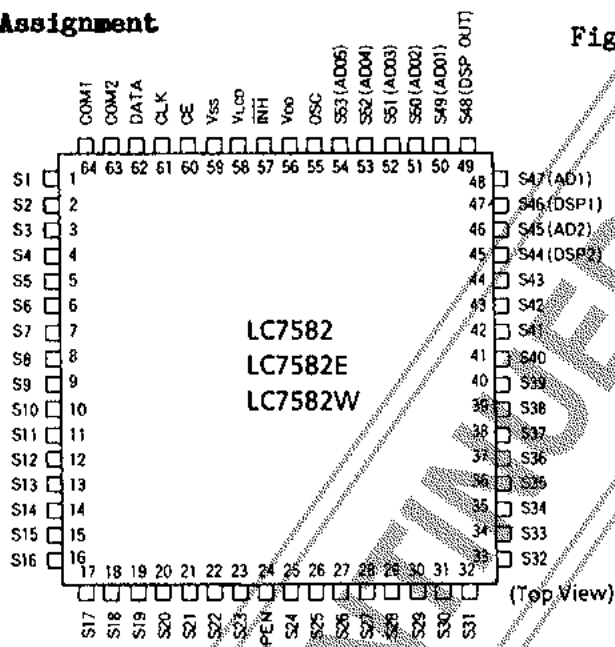
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LC7582,7582E,7582W

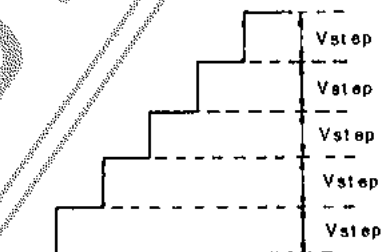
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|                           |            | Pin         |                                     | min          | typ         | max          | unit |
|---------------------------|------------|-------------|-------------------------------------|--------------|-------------|--------------|------|
| Center Level Voltage      | $V_{MID}$  | "           | $V_{LCD}=6.5V$ ,<br>$I_o=+100\mu A$ | 2.65         | 3.25        | 3.85         | V    |
| "                         | $V_{MID}$  | "           | $V_{LCD}=3.0V$ ,<br>$I_o=-100\mu A$ | 0.9          | 1.5         | 2.1          | V    |
| 1st Step Lighting Voltage | $V_{A1}$   | S45,S47     |                                     | $0.07V_{DD}$ | $0.1V_{DD}$ | $0.13V_{DD}$ | V    |
| 2nd                       | $V_{A2}$   | "           |                                     | $0.17V_{DD}$ | $0.2V_{DD}$ | $0.23V_{DD}$ | V    |
| 3rd                       | $V_{A3}$   | "           |                                     | $0.27V_{DD}$ | $0.3V_{DD}$ | $0.33V_{DD}$ | V    |
| 4th                       | $V_{A4}$   | "           |                                     | $0.37V_{DD}$ | $0.4V_{DD}$ | $0.43V_{DD}$ | V    |
| 5th                       | $V_{A5}$   | "           |                                     | $0.47V_{DD}$ | $0.5V_{DD}$ | $0.53V_{DD}$ | V    |
| Step Voltage Diff.        | $V_{step}$ | "           | See Fig.1                           | $0.09V_{DD}$ | $0.1V_{DD}$ | $0.11V_{DD}$ | V    |
| OSC Frequency             | $f_{osc}$  | osc         | $R=51k\Omega$ , $C=680pF$           | 40           | 50          | 60           | kHz  |
| Supply Current            | $I_{DD}$   |             |                                     |              |             | 1            | mA   |
| "                         | $I_{LCD}$  | $V_{LCD}$   |                                     |              |             | 2            | mA   |
| Hysteresis Voltage        | $V_H$      | CE,CLK,DATA | $V_{DD}=5V$                         | 0.3          |             |              | V    |

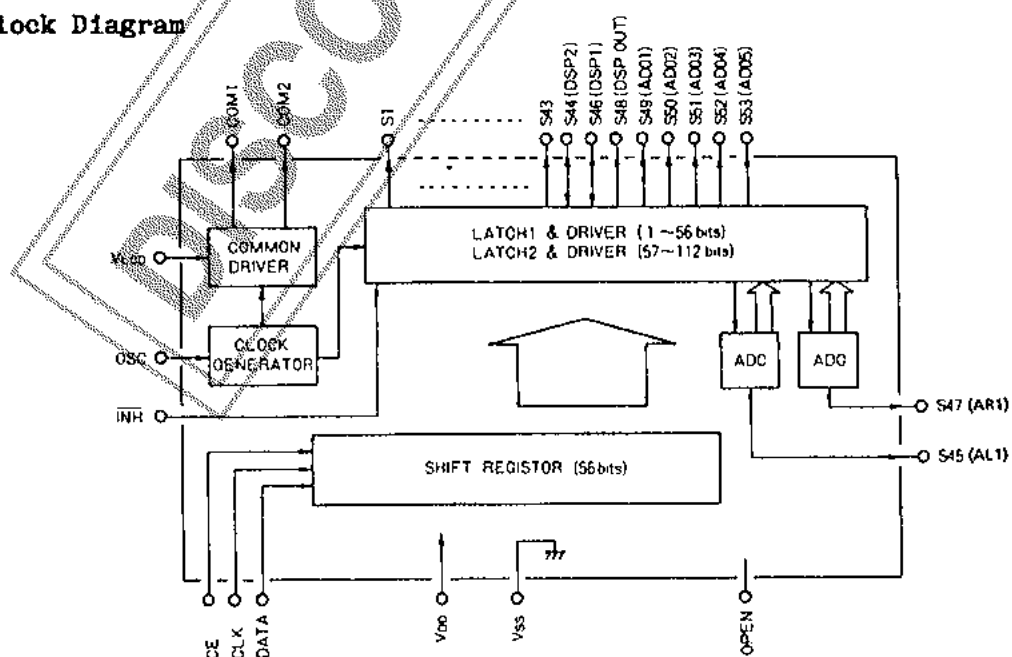
### Pin Assignment



**Fig. 1 Step Voltage Difference**  
Input voltage on S45(AD2), S47(AD1)



### Block Diagram





# Sample Transfers

- 1/1 duty

|    |    |    |  |  |  |     |     |   |    |   |
|----|----|----|--|--|--|-----|-----|---|----|---|
| D1 | D2 | D3 |  |  |  | D52 | D53 | 0 | D0 | 0 |
|----|----|----|--|--|--|-----|-----|---|----|---|

- 1/2 duty and 52 segments or less

|    |    |    |  |  |  |     |     |   |    |   |
|----|----|----|--|--|--|-----|-----|---|----|---|
| D1 | D2 | D3 |  |  |  | D52 | D53 | 1 | D0 | 0 |
|----|----|----|--|--|--|-----|-----|---|----|---|

- 1/2 duty and 52 segments or more

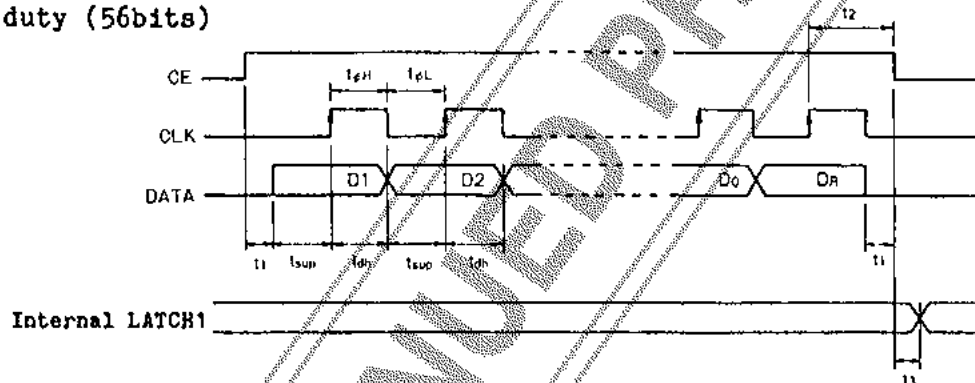
|    |    |    |  |  |  |     |     |   |    |   |     |     |     |  |  |  |      |      |   |   |   |
|----|----|----|--|--|--|-----|-----|---|----|---|-----|-----|-----|--|--|--|------|------|---|---|---|
| D1 | D2 | D3 |  |  |  | D52 | D53 | 1 | D0 | 0 | D54 | D55 | D56 |  |  |  | D105 | D106 | X | X | 1 |
|----|----|----|--|--|--|-----|-----|---|----|---|-----|-----|-----|--|--|--|------|------|---|---|---|

(Note) 1/2 duty and 52 segments or less do not allow transfer shown below.

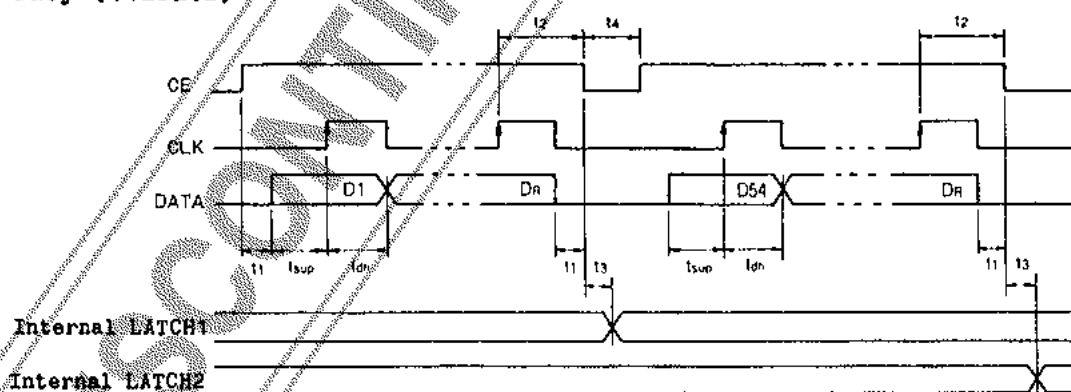
|     |     |     |  |  |  |      |      |   |   |   |
|-----|-----|-----|--|--|--|------|------|---|---|---|
| D54 | D55 | D56 |  |  |  | D105 | D106 | X | X | 1 |
|-----|-----|-----|--|--|--|------|------|---|---|---|

## Serial Data

- 1/1 duty (56bits)

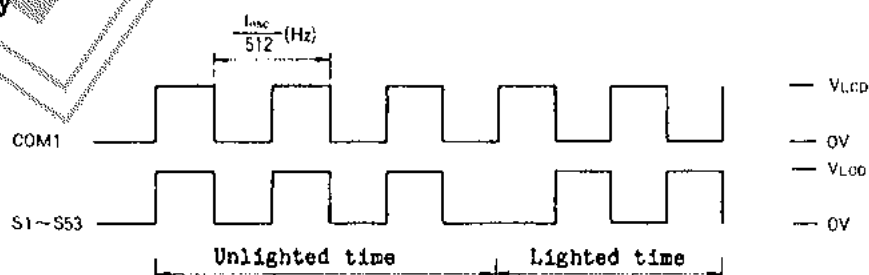


- 1/2 duty (112bits)

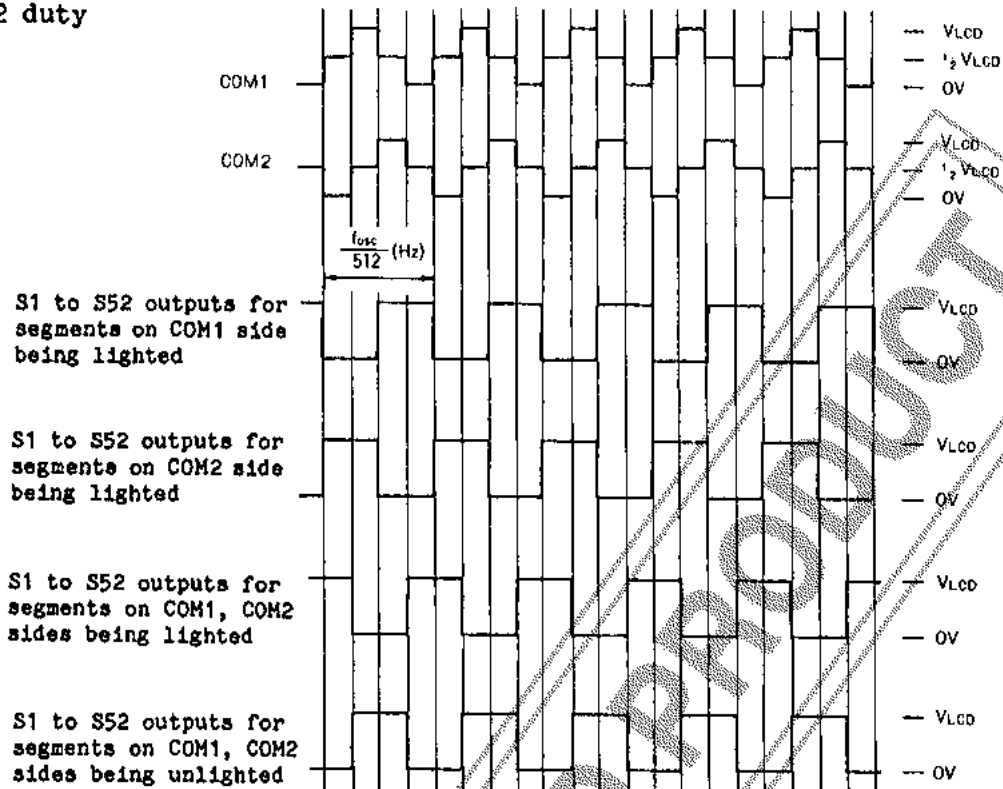


## Output Waveforms

- 1/1 duty



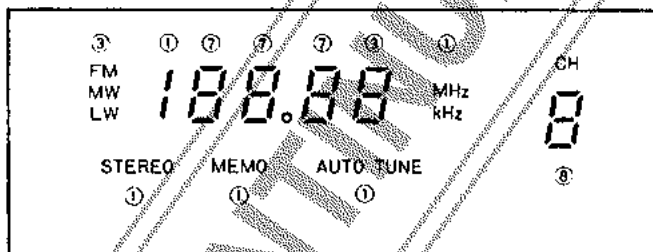
• 1/2 duty



Sample Display

• Static drive (1/1duty) (AD, DSP pins are not used.)

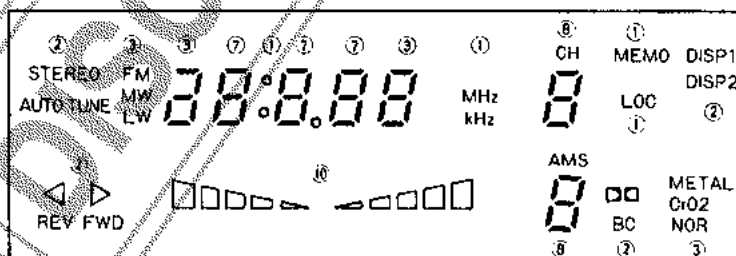
40 segments-used application (Up to 53 segments usable)



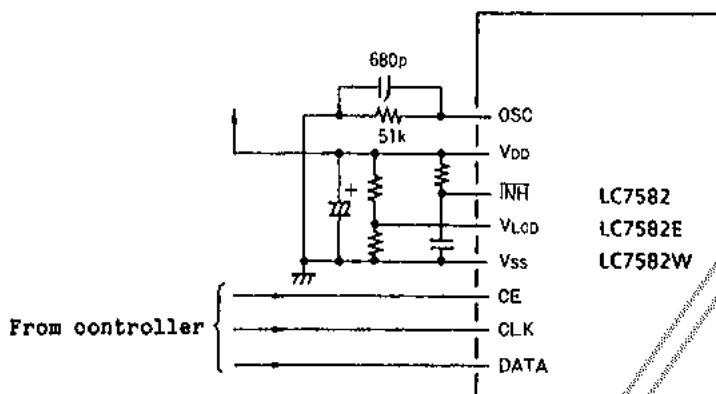
Note: ○ : Number of segments

• 1/2duty drive

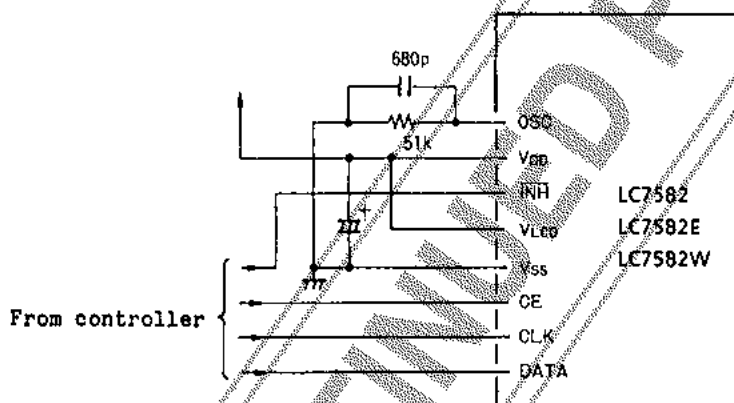
71 segments-used application (Up to 104 segments usable)



Sample Application Circuit 1



Sample Application Circuit 2



Note) The internal display data is indeterminate immediately after  $V_{DD}$  rise. If the display is kept lighted as it is, the display will have no meaning. The display is forced to be unlighted when the  $\overline{INH}$  is at "L" level. Do not release ("H") until the transfer of display data from the controller is completed.

## Correspondence between Transfer (External Input) Data and Output Pin

(Note) COM1 only is used at 1/1 duty.

| Output pin | OP       | 0       |                 | 1      |   | COM1 | COM2 |
|------------|----------|---------|-----------------|--------|---|------|------|
|            | DQ       | 0       | 1               | 0      | 1 |      |      |
|            | 1/1 duty |         | 1/2 duty        |        |   |      |      |
| S1         | D1       | D1      | D1              | D1     | ○ |      |      |
|            |          |         | D2              | D2     |   | ○    |      |
| S2         | D2       | D2      | D3              | D3     | ○ |      |      |
|            |          |         | D4              | D4     |   | ○    |      |
| S3         | D3       | D3      | D5              | D5     | ○ |      |      |
|            |          |         | D6              | D6     |   | ○    |      |
| S26        | D26      | D26     | D51             | D51    | ○ |      |      |
|            |          |         | D52             | D52    |   | ○    |      |
| S27        | D27      | D27     | D54             | D54    | ○ |      |      |
|            |          |         | D55             | D55    |   | ○    |      |
| S28        | D28      | D28     | D56             | D56    | ○ |      |      |
|            |          |         | D57             | D57    |   | ○    |      |
| S43        | D43      | D43     | D86             | D86    | ○ |      |      |
|            |          |         | D87             | D87    |   | ○    |      |
| S44        | D44      | D44     | D88             | ※DSP 2 | ○ |      |      |
|            |          |         | D89             |        |   | ○    |      |
| S45        | D45      | D45     | D90             | ※ALI   | ○ |      |      |
|            |          |         | D91             |        |   | ○    |      |
| S46        | D46      | ※DSP 1  | D92             | ※DSP 1 | ○ |      |      |
|            |          |         | D93             |        |   | ○    |      |
| S47        | D47      | ※ARI    | D94             | ※ARI   | ○ |      |      |
|            |          |         | D95             |        |   | ○    |      |
| S48        | D48      | ※DISPO1 | D96             | ※DSPO1 | ○ |      |      |
|            |          |         | D97             | ※DSPO2 |   | ○    |      |
| S49        | D49      | ※ARO1   | D98             | ※ARO1  | ○ |      |      |
|            |          |         | D99             | ※ALO1  |   | ○    |      |
| S50        | D50      | ※ARO2   | D100            | ※ARO2  | ○ |      |      |
|            |          |         | D101            | ※ALO2  |   | ○    |      |
| S51        | D51      | ※ARO3   | D102            | ※ARO3  | ○ |      |      |
|            |          |         | D103            | ※ALO3  |   | ○    |      |
| S52        | D52      | ※ARO4   | D104            | ※ARO4  | ○ |      |      |
|            |          |         | D105            | ※ALO4  |   | ○    |      |
| S53        | D53      | ※ARO5   | Always lighting | ※ARO5  | ○ |      |      |
|            |          |         | Always lighting | ※ALO5  |   | ○    |      |

## Note

- DSP1 : External display input data name. The output is DSP01.
- DSP01 : External display output data name. The input is DSP1.
- DSP2 : External display input data name. The output is DSP02.
- DSP02 : External display output data name. The input is DSP2.
- ARI : AD converter input data name. The output is ARO1 to 5.
- ARO1 to 5 : AD converter output data name. The input is ARI.
- ALI : AD converter input data name. The output is ALO1 to 5.
- ALO1 to 5 : AD converter output data name. The input is ALI.



## OSC Frequency

When determining the OSC frequency, see below.

Fig. 1 OSC Frequency at OSC Pin vs. CR

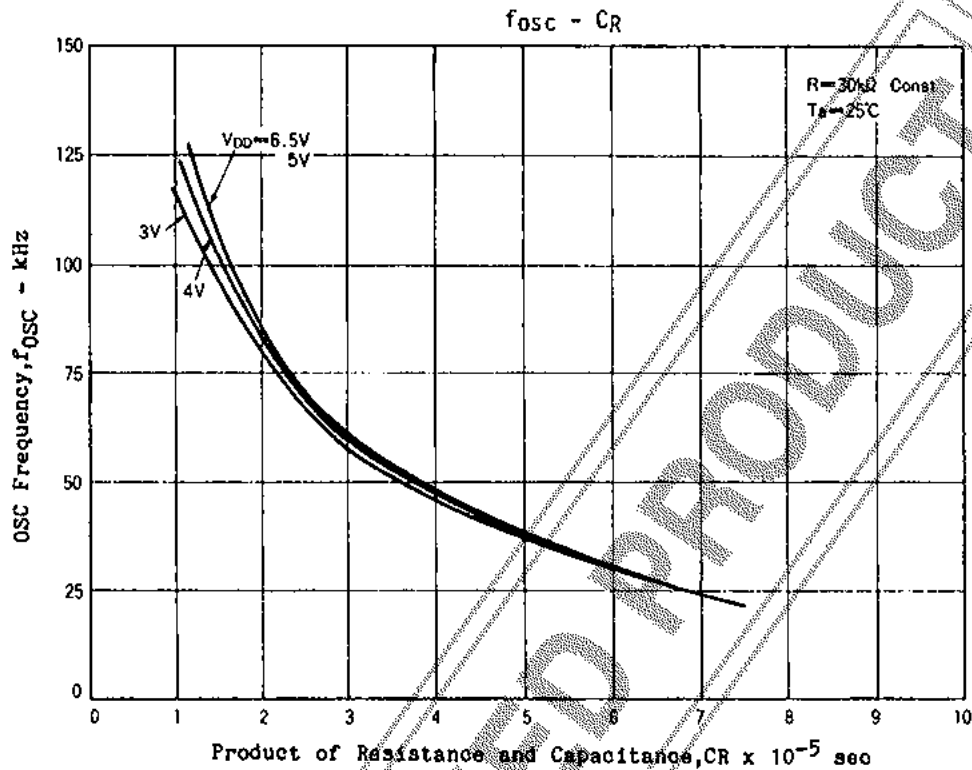
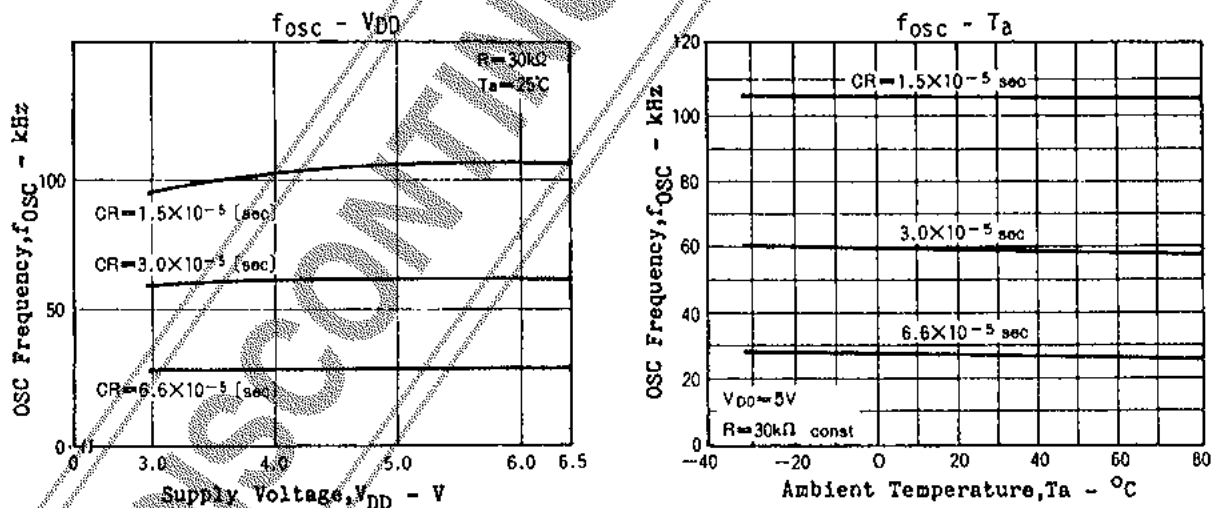


Fig. 2 OSC Frequency at OSC Pin vs.  $V_{DD}$



Recommended external resistor value 10kohms to 100kohms (carbon)

Recommended external capacitor value 330pF to 3300pF

330pF to 820pF (ceramic, temperature coefficient: 0)

1000pF to 3300pF (polyester, temperature coefficient: plus)

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