



CMOS LSI

SANYO	No. 4348	LC79430D
		Dot Matrix LCD Driver

Overview

The LC79430D is a large-scale dot matrix LCD common driver LSI. The LC79430D contains an 80-bit bidirectional shift register and is equipped with a 4-level LCD driver. The input/output pins for cascade connection can be used to further increase the IC's number of bits. The LC79430D can be used in conjunction with segment driver LC79400D, LC79401D (QIP100D) to drive a wide-screen LCD panel.

Features

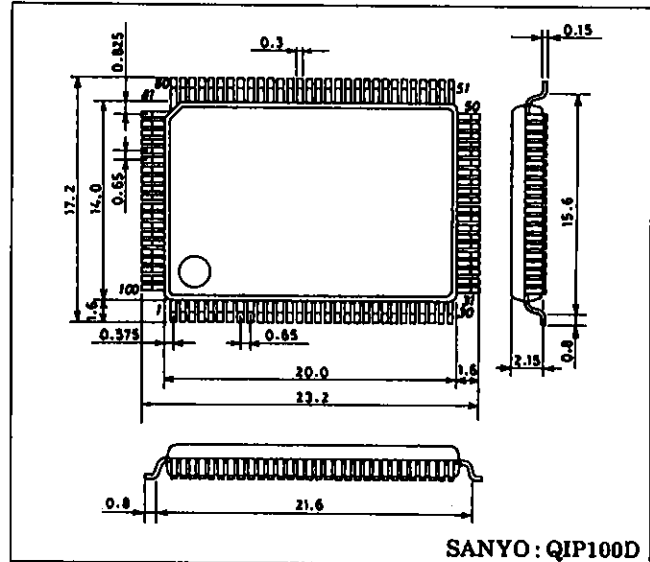
- On-chip LCD drive circuit (80 bits)
- Display duty selection ranging from 1/64 to 1/256
- On-chip input/output pins support further increases in bit number
- Supports externally supplied bias voltage
- On-chip 80-bit bidirectional shift register (supports 40-bit x 2 division)
- Supports single mode (80-bit shift register) and dual mode (40-bit x 2 shift register) applications
 - (1) O1 → O80
 - (2) O80 → O1 } Single mode
 - (3) O1 → O40 and O41 → O80
 - (4) O80 → O41 and O40 → O1 } Dual mode

All four of the shift direction selections listed above all supported.
- Operating power supply voltage/operating temperature include
 - V_{DD} (logic section) : 5 V ±10 % / -20 to +75 °C
 - $V_{DD}-V_{EE}$ (LCD section) : 12 V to 32 V / -20 to +75°C
- CMOS process

Package Dimensions

unit : mm

3180-QIP100D

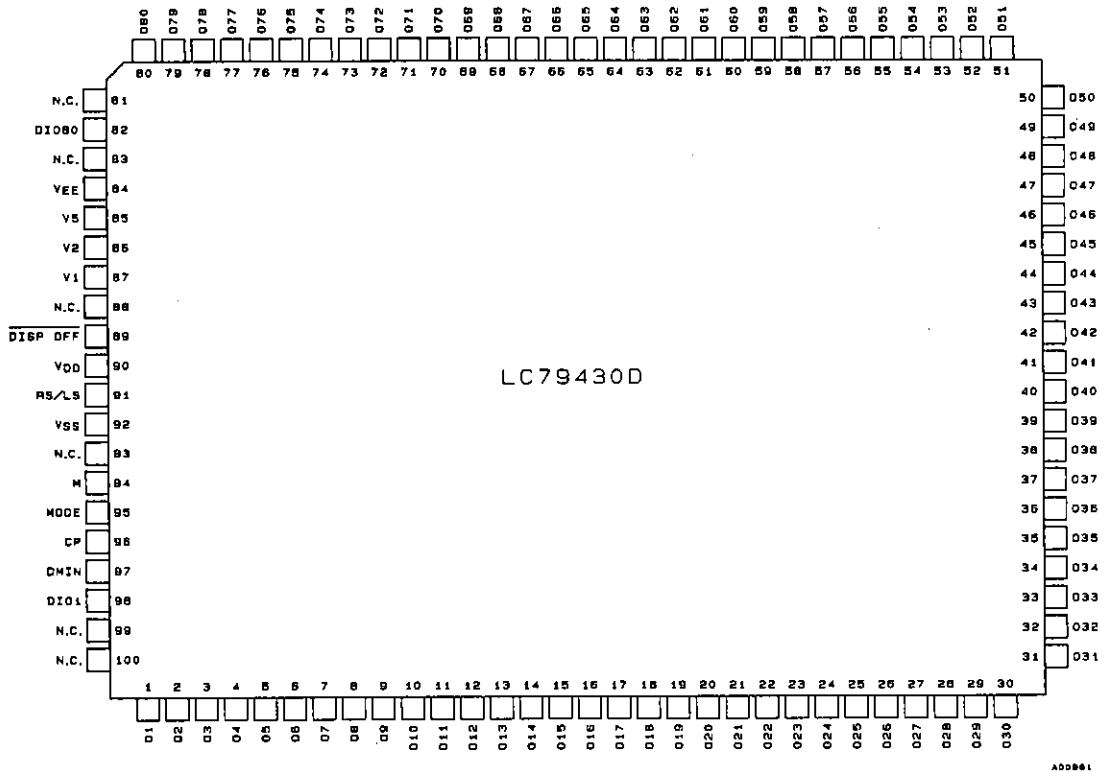


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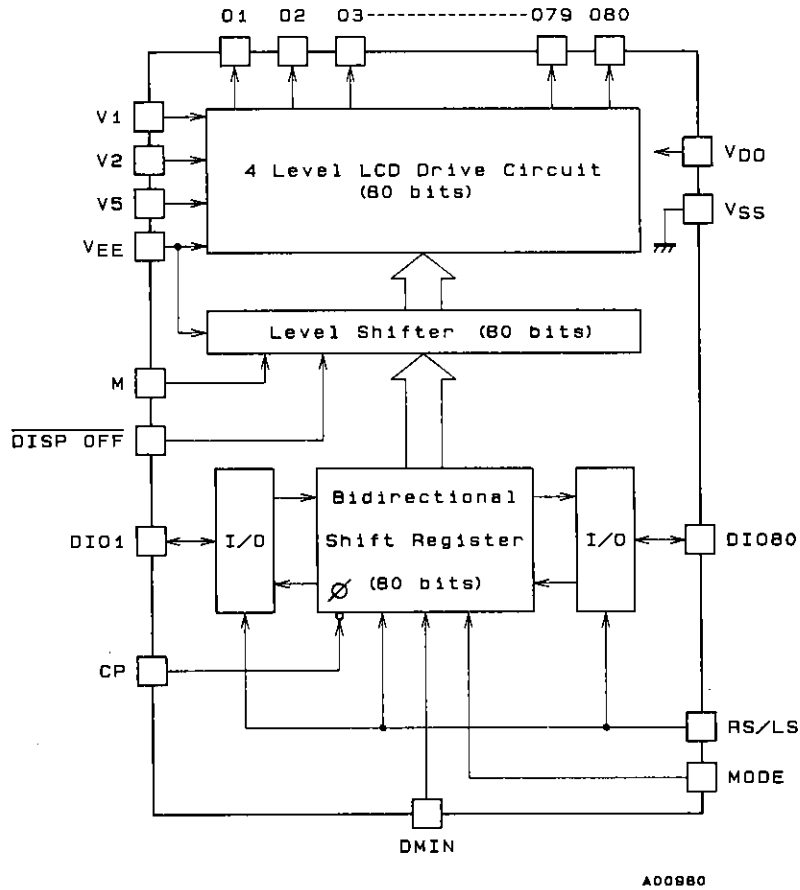
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LC79430D

Pin Assignment



Equivalent Circuit Block Diagram



Pin Descriptions

Pin No	Pin name	Input/Output	Functions																																			
90	V _{DD}	Power supply	V _{DD} and V _{SS} : Power supply for logic section																																			
92	V _{SS}																																					
84	V _{EE}																																					
87	V1	Power supply	V _{DD} and V _{EE} : Power supply for LCD drive circuit																																			
86	V2																																					
85	V5																																					
96	CP	Input	Bidirectional shift register shift clock (triggering on the trailing edge)																																			
98	DIO1	Input/Output	<table border="1"> <thead> <tr> <th>MODE</th> <th>RS/LS</th> <th>Data Transfer Direction</th> <th>DIO1</th> <th>DIO80</th> <th>DMIN</th> </tr> </thead> <tbody> <tr> <td rowspan="2">L (Single)</td> <td>L (Shift right)</td> <td>O1 → O80</td> <td>IN</td> <td>OUT</td> <td>*</td> </tr> <tr> <td>H (Shift left)</td> <td>O80 → O1</td> <td>OUT</td> <td>IN</td> <td>*</td> </tr> <tr> <td rowspan="3">H (Dual)</td> <td rowspan="2">L (Shift right)</td> <td>O1 → O40</td> <td rowspan="2">IN</td> <td rowspan="2">OUT</td> <td rowspan="2">IN</td> </tr> <tr> <td>O41 → O80</td> </tr> <tr> <td>H (Shift left)</td> <td>O80 → O41</td> <td>OUT</td> <td>IN</td> <td>IN</td> </tr> <tr> <td></td> <td></td> <td>O40 → O1</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>* Don't care (May be set to either "H" or "L")</p>	MODE	RS/LS	Data Transfer Direction	DIO1	DIO80	DMIN	L (Single)	L (Shift right)	O1 → O80	IN	OUT	*	H (Shift left)	O80 → O1	OUT	IN	*	H (Dual)	L (Shift right)	O1 → O40	IN	OUT	IN	O41 → O80	H (Shift left)	O80 → O41	OUT	IN	IN			O40 → O1			
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82	DIO80	Input/Output																																				
91	RS/LS	Input																																				
95	MODE	Input																																				
97	DMIN	Input																																				
94	M	Input	LCD drive output alternating current (AC) signal																																			
89	DISP OFF	Input	O1 to O80 output controlling input pins																																			
1 80	O1 O80	Output	<p>LCD drive output</p> <p>As shown in the following table, output levels switch in response to the particular combination of scan data, M and DISP OFF signals.</p> <table border="1"> <thead> <tr> <th>M</th> <th>Data</th> <th>DISP OFF</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>L</td> <td>L</td> <td>H</td> <td>V2</td> </tr> <tr> <td>L</td> <td>H</td> <td>H</td> <td>V_{EE}</td> </tr> <tr> <td>H</td> <td>L</td> <td>H</td> <td>V5</td> </tr> <tr> <td>H</td> <td>H</td> <td>H</td> <td>V1</td> </tr> <tr> <td>*</td> <td>*</td> <td>L</td> <td>V1</td> </tr> </tbody> </table> <p>* Don't care (May be set to either "H" or "L")</p>	M	Data	DISP OFF	Output	L	L	H	V2	L	H	H	V _{EE}	H	L	H	V5	H	H	H	V1	*	*	L	V1											
M	Data	DISP OFF	Output																																			
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L	H	H	V _{EE}																																			
H	L	H	V5																																			
H	H	H	V1																																			
*	*	L	V1																																			

Common Driver Multi-Unit Connection Circuits.

* Using single mode DMIN input pins are fixed to either "H" or "L".

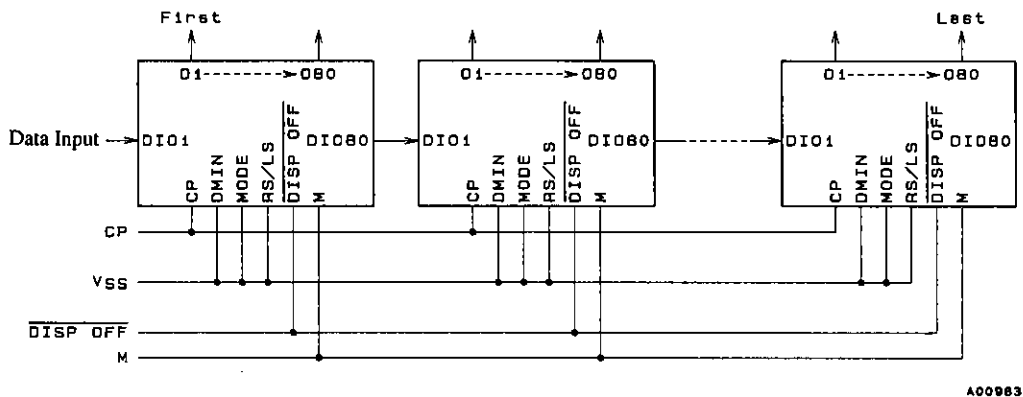


Figure 1 Single Mode (Right Directional Shift)

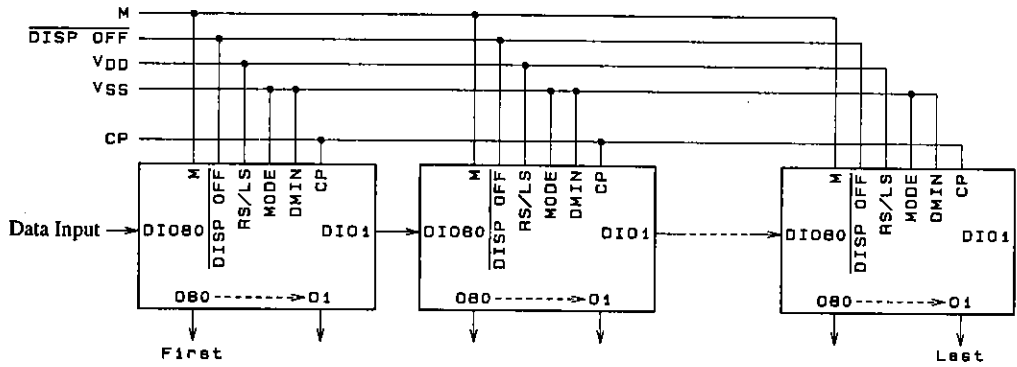


Figure 2 Single Mode (Left Directional Shift)

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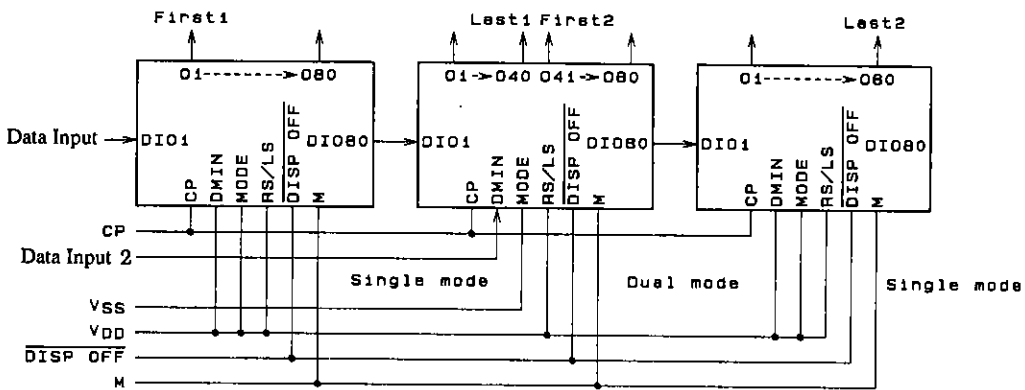


Figure 3 Dual Mode (Right Directional Shift)

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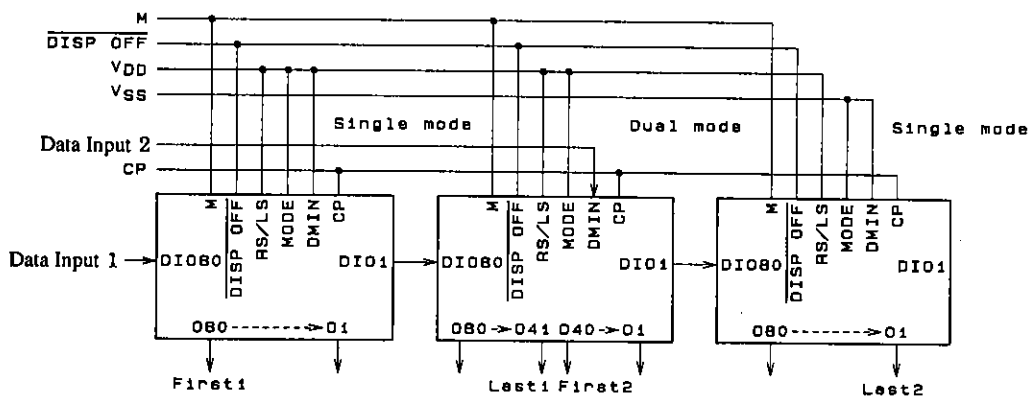


Figure 4 Dual Mode (Left Directional Shift)

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Specifications

Absolute Maximum Ratings at $T_a = 25 \pm 2^\circ\text{C}$, $V_{SS} = 0\text{V}$

			unit
Maximum supply voltage (LOGIC)	V_{DD} max	-0.3 to +7.0	V
Maximum supply voltage (LCD)	$V_{DD} - V_{EE}$ max *1	0 to 35	V
Maximum input voltage	V_I max	-0.3 to $V_{DD} + 0.3$	V
Storage temperature range	T_{stg}	-40 to +125	$^\circ\text{C}$

* 1: The following relations between elements should be maintained: $V_{DD} \geq V_I > V_2 > V_5 > V_{EE}$, $V_{DD} - V_2 \leq 7\text{V}$, $V_5 - V_{EE} \leq 7\text{V}$.

LC79430D

Allowable Operating Ranges at $T_a = -20$ to $+75^\circ\text{C}$, $V_{SS} = 0\text{V}$

			min	typ	max	unit
Supply voltage (LOGIC)	V_{DD}		4.5		5.5	V
Supply voltage (LCD)	$V_{DD}-V_{EE}$	*2, *3	12		32	V
Input "H" level voltage	V_{IH}	$\left[\begin{array}{l} \text{DIO1, DIO80, CP, M, DMIN,} \\ \text{MODE, RS/LS, } \overline{\text{DISP OFF}} \end{array} \right.$	$0.8V_{DD}$			V
Input "L" level voltage	V_{IL}		$\left[\begin{array}{l} \text{DIO1, DIO80, CP, M, DMIN,} \\ \text{MODE, RS/LS, } \overline{\text{DISP OFF}} \end{array} \right.$		$0.2V_{DD}$	
CP (Shift Clock)	f_{CP}	CP			1	MHz
CP (Pulse width)	t_{WC}	CP	63			ns
Setup time	t_{SETUP}	$\left[\begin{array}{l} \text{DIO1} \rightarrow \text{CP, DIO80} \rightarrow \text{CP,} \\ \text{DMIN} \rightarrow \text{CP} \end{array} \right.$	100			ns
Hold time	t_{HOLD}	$\left[\begin{array}{l} \text{DIO1} \rightarrow \text{CP, DIO80} \rightarrow \text{CP,} \\ \text{DMIN} \rightarrow \text{CP} \end{array} \right.$	100			ns
CP Rise-Fall Time	t_R	CP			50	ns
	t_F	CP			50	ns

*2 The following relations between elements should be maintained: $V_{DD} \geq V1 > V2 > V5 > V_{EE}$, $V_{DD} - V2 \leq 7\text{V}$, $V5 - V_{EE} \leq 7\text{V}$.

*3 When the power supply is turned on, power to the LCD drive is turned on after or simultaneously with the turning on of the logic section's power supply. When the power supply is turned off, the logic power supply is turned off after or at the same time the LCD driver power supply is turned off.

Electrical Characteristics at $T_a = 25 \pm 2^\circ\text{C}$, $V_{SS} = 0\text{V}$, $V_{DD} = 5\text{V} \pm 10\%$

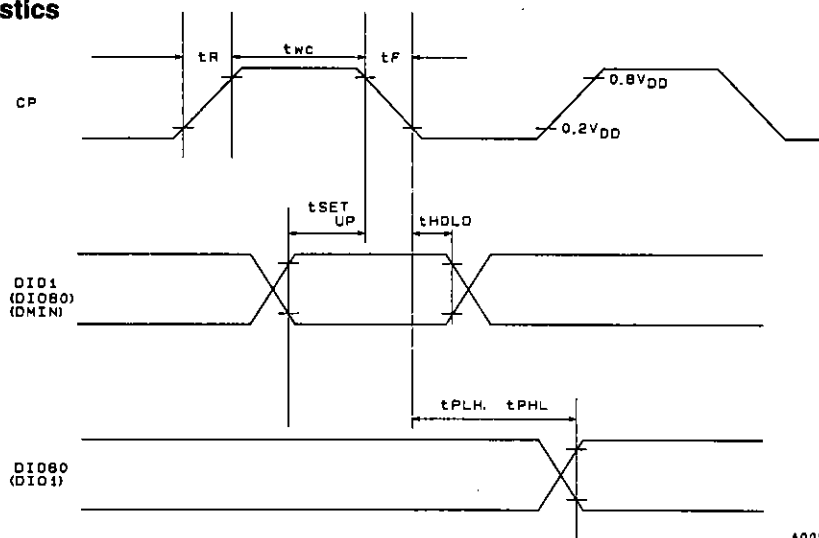
			min	typ	max	unit
Input "H" level current	I_{IH}	$\left[\begin{array}{l} V_{IN} = V_{DD}, V_{DD} = 5.5\text{V}; \text{DIO1, DIO80,} \\ \text{CP, M, DMIN, MODE, RS/LS, } \overline{\text{DISP OFF}} \end{array} \right.$			1	μA
Input "L" level current	I_{IL}	$\left[\begin{array}{l} V_{IN} = V_{SS}, V_{DD} = 5.5\text{V}; \text{DIO1, DIO80,} \\ \text{CP, M, DMIN, MODE, RS/LS, } \overline{\text{DISP OFF}} \end{array} \right.$	-1			μA
Output "H" level voltage	V_{OH}	$\left[\begin{array}{l} I_{OH} = -0.4\text{mA}, V_{DD} = 4.5\text{V}; \\ \text{DIO1, DIO80} \end{array} \right.$	$V_{DD}-0.4$			V
Output "L" level voltage	V_{OL}	$\left[\begin{array}{l} I_{OL} = 0.4\text{mA}, V_{DD} = 4.5\text{V}; \\ \text{DIO1, DIO80} \end{array} \right.$			0.4	V
Driver On Resistor	$R_{ON} (1)$	$\left[\begin{array}{l} V_{DD}-V_{EE} = 30\text{V}, V_{DE}-V_o = 0.5\text{V}, \\ V_{DD} = 4.5\text{V} *4; \text{O1 to O80} \end{array} \right.$			1.0	$\text{k}\Omega$
	$R_{ON} (2)$	$\left[\begin{array}{l} V_{DD}-V_{EE} = 20\text{V}, V_{DE}-V_o = 0.5\text{V}, \\ V_{DD} = 4.5\text{V} *4; \text{O1 to O80} \end{array} \right.$			1.0	$\text{k}\Omega$
Consumable current (1)	I_{SS}	$\left[\begin{array}{l} V_{DD}-V_{EE} = 30\text{V}, \text{CP} = 14\text{kHz,} \\ \text{no-load, } V_{DD} = 5.5\text{V}; V_{SS} \end{array} \right.$			100	μA
Consumable current (2)	I_{EE}	$\left[\begin{array}{l} V_{DD}-V_{EE} = 30\text{V}, \text{CP} = 14\text{kHz,} \\ \text{no-load, } V_{DD} = 5.5\text{V}; V_{EE} \end{array} \right.$			100	μA
Input Capacity	C_I	$f = 1\text{MHz}; \text{CP}$		5		pF

*4 $V_{DE} = V1$ or $V2$ or $V5$ or V_{EE} , $V1 = V_{DD}$, $V2 = 16/17 (V_{DD}-V_{EE})$, $V5 = 1/17 (V_{DD}-V_{EE})$

Switching Characteristics at $T_a = 25 \pm 2^\circ\text{C}$, $V_{SS} = 0\text{V}$, $V_{DD} = 5\text{V} \pm 10\%$

			min	typ	max	unit
Output Delay Time	t_{PLH}	$C_L = 15\text{pF}; \text{CP} \rightarrow \text{DIO1, CP} \rightarrow \text{DIO80}$			250	ns
	t_{PHL}	$C_L = 15\text{pF}; \text{CP} \rightarrow \text{DIO1, CP} \rightarrow \text{DIO80}$			250	ns

Switching Characteristics



A00982