

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

T6A92

COLUMN DRIVER LSI FOR A DOT MATRIX LCD

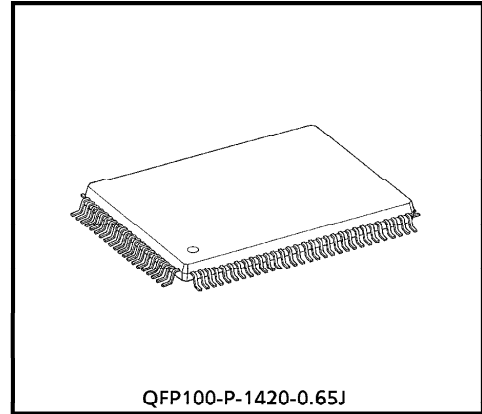
The T6A92 is a column driver with 80 output channels for a medium- or small-scale dot matrix LCD.

The T6A92 realizes low power LCD systems using the CMOS Si-Gate process.

The T6A92 has two types of data flow.

① $O_1 \rightarrow O_{80}$, ② $O_{80} \rightarrow O_1$

The T6A92 can be connected to extension drivers like the T6A39.



Weight: 1.6g (typ.)

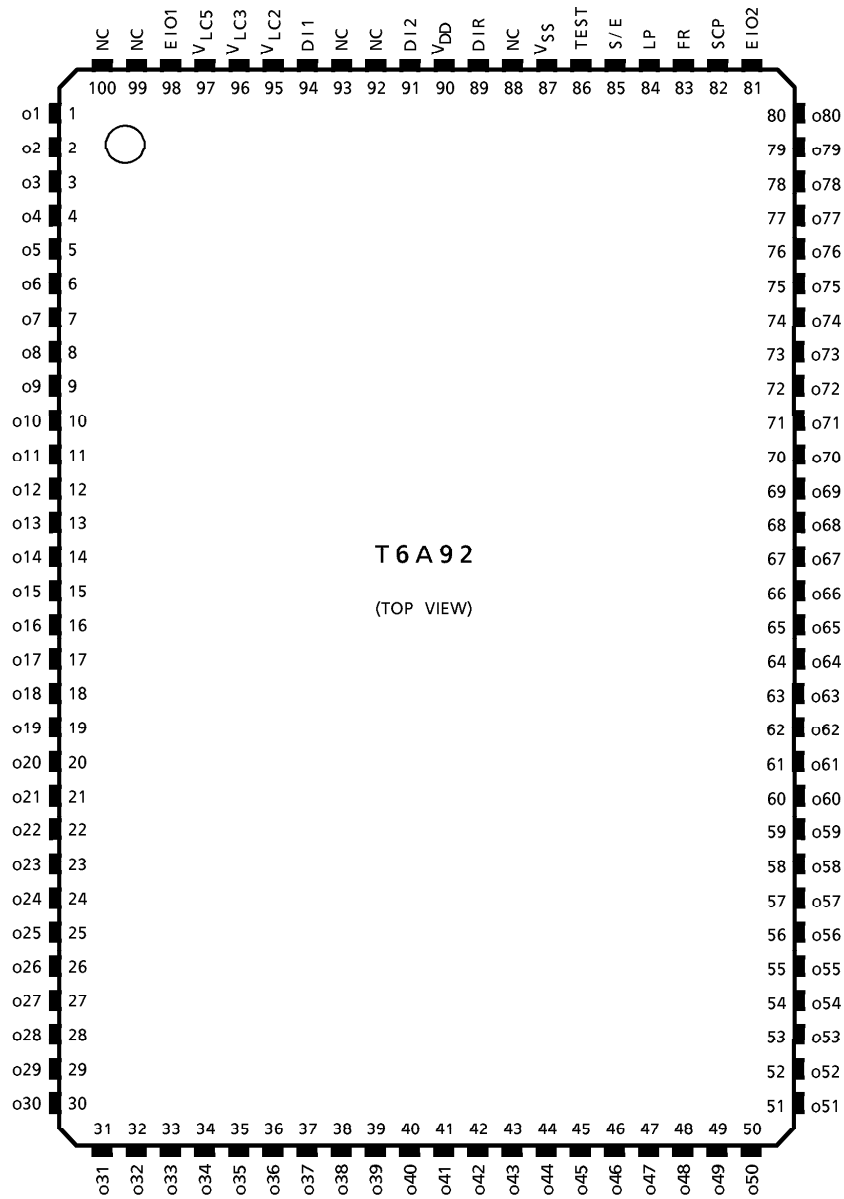
FEATURES

- 80-output column driver
- Data input format : 1-bit (ENABLE mode)
 : 2-bit (SHIFT mode)
- Two types of data flow :
 - ① $O_1 \rightarrow O_{80}$
 - ② $O_{80} \rightarrow O_1$
- Low power consumption
- Power supply : $5 V \pm 10\%$
- 100-pin plastic flat package

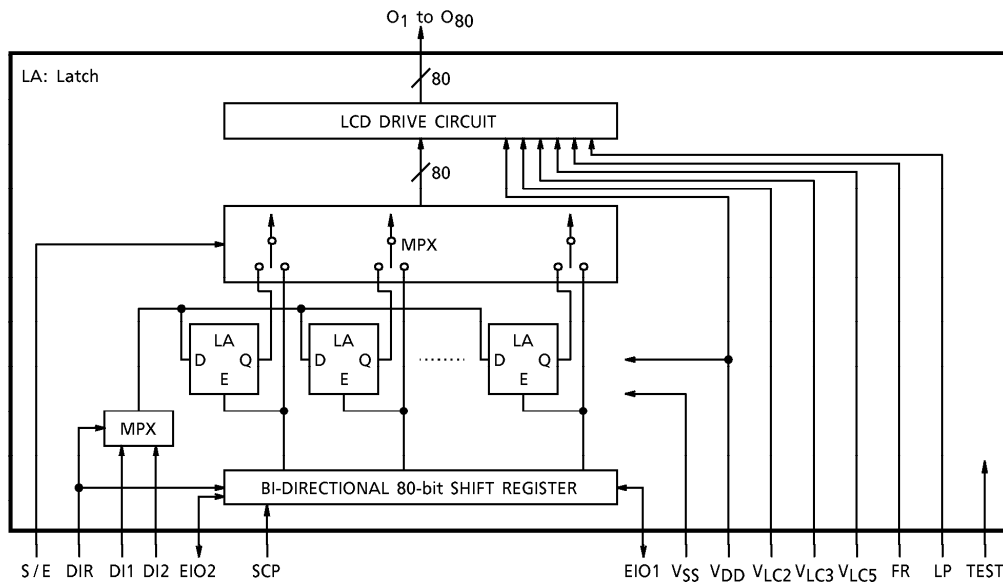
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PIN ASSIGNMENT



BLOCK DIAGRAM



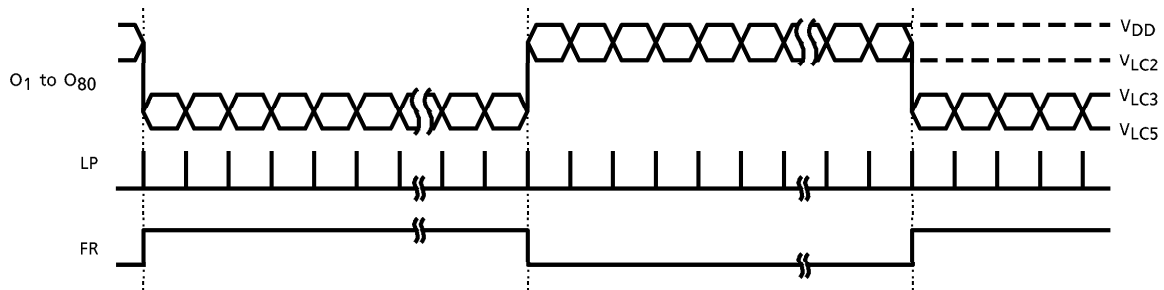
PIN FUNCTIONS

PIN NAME	I/O	FUNCTIONS	LEVEL
O1 to O80	Output	LCD drive signal output	V_{DD} to V_{LC5}
DI1, DI2	Input	Data signal input	V_{DD} to V_{SS}
EIO1, EIO2	I/O	ENABLE signal input/output When S/E = H, this pin is for input.	
SCP	Input	(Shift Clock Pulse) Shift clock pulse input	
FR	Input	(Frame) Frame signal input	
LP	Input	(Latch Pulse) Latch pulse signal input	
S/E	Input	Input for mode selection	
DIR	Input	Input data flow direction select	
TEST	Input	Test pin: usually connected to V_{SS} (0V)	
$V_{LC2, 3, 5}$	—	Power supply for LCD drive	—
V_{DD}	—	Power supply (5V)	
V_{SS}	—	Power supply (0V)	

FUNCTION OF DATA AND ENABLE PINS

S/E DIR	DI1	DI2	EIO1	EIO2	DATA FLOW	FIRST DATA	LAST DATA	MODE
L L	Open	DATA INPUT	ENABLE signal input	ENABLE signal output	O ₈₀ →O ₁	O ₁	O ₈₀	ENABLE
L H	DATA INPUT	Open	ENABLE signal output	ENABLE signal input	O ₁ →O ₈₀	O ₈₀	O ₁	
H L	Open	Open	DATA INPUT	DATA OUTPUT	O ₁ →O ₈₀	O ₈₀	O ₁	SHIFT
H H	Open	Open	DATA OUTPUT	DATA INPUT	O ₈₀ →O ₁	O ₁	O ₈₀	

TIMING DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

ITEM	SYMBOL	RATING	UNIT
Supply Voltage (1)	V _{DD} (Note 1)	-0.3 to 7.0	V
Supply Voltage (2)	V _{LC2} , V _{LC3} , V _{LC5} (Note 1, 2)	-0.3 to 7.0	V
Input Voltage	V _{IN} (Note 1)	-0.3 to V _{DD} + 0.3	V
Operating Temperature	T _{opr}	-20 to 75	°C
Storage Temperature	T _{stg}	-55 to 125	°C

(Note 1) Referenced to V_{SS} = 0V

(Note 2) Ensure that the following condition is always maintained.

$$V_{DD} \geq V_{LC2} \geq V_{LC3} \geq V_{LC5}$$

ELECTRICAL CHARACTERISTICS

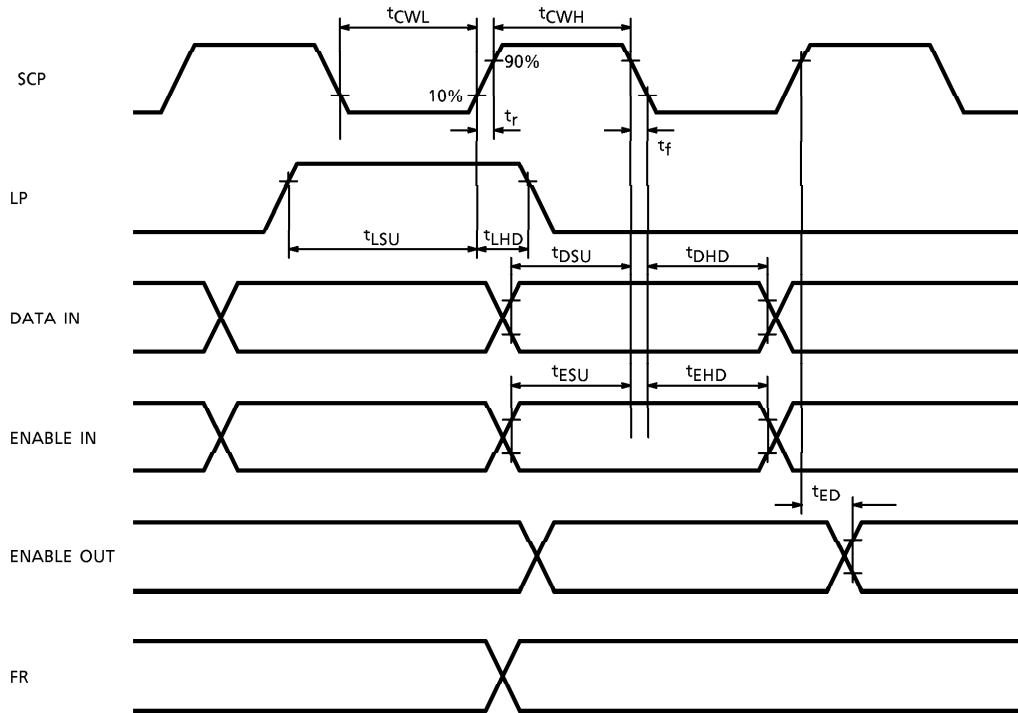
DC CHARACTERISTICS

TEST CONDITIONS (Unless otherwise noted, $V_{SS} = 0V$, $V_{DD} = 5.0V \pm 10\%$, $V_{LC5} = 0V$, $T_a = -20$ to $75^\circ C$)

ITEM	SYMBOL	TEST CIRCUIT	TEST CONDITIONS	MIN	TYP.	MAX	UNIT	PIN NAME	
Operating Voltage (1)	—	—	—	4.5	5.0	5.5	V	V_{DD}	
Operating Voltage (2)	—	—	—	0	—	$V_{DD} - 3.0$	V	V_{LC5}	
Input Voltage	H Level	V_{IH}	—	$V_{DD} - 1.0$	—	V_{DD}	V	(*)	
	L Level	V_{IL}	—	0	—	1.0	V	(*)	
Output Voltage	H Level	V_{OH}	$I_{OH} = -0.4mA$	$V_{DD} - 0.4$	—	V_{DD}	V	EIO1, EIO2	
	L Level	V_{OL}	$I_{OH} = 0.4mA$	0	—	0.4	V	EIO1, EIO2	
Output Resistance	R_{COL}	—	$I_d = \pm 50\mu A$	—	—	30	$k\Omega$	O ₁ to O ₈₀	
Operating Frequency	f_{scp}	—	$T_a = -20$ to $75^\circ C$	—	—	400	kHz	SCP	
Current Consumption	I_{SS}	—	$V_{DD} = 5.0V$ $V_{LC2} = 3.0V$ $V_{LC3} = 2.0V$ $V_{LC5} = 0.0V$ $f_{FR} = 39Hz$ $f_{scp} = 250kHz$ O ₁ to O ₈₀ : No Load	Binary Data Input	—	—	1.0	mA	V_{SS}
				Input Data : LOW Constant	—	—	0.4	mA	

(*) SCP, LP, FR, EIO1, EIO2, DI1, DI2, DIR, S/E, TEST

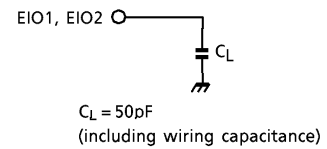
AC CHARACTERISTICS



TEST CONDITIONS ($V_{SS} = 0V$, $V_{DD} = 5V \pm 10\%$, $V_{LC5} = 0V$, $T_a = -20$ to $75^\circ C$)

LOAD CIRCUIT

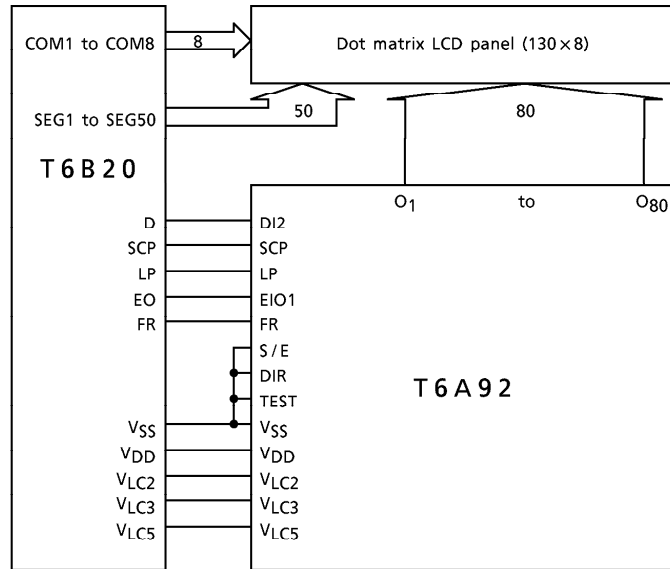
ITEM	SYMBOL	MIN	MAX	UNIT
Operating Frequency	f_{scp}	—	400	kHz
SCP Pulse Width	t_{CWH}, t_{CWL}	800	—	ns
SCP Rise / Fall Time	t_r, t_f	—	200	ns
LP Set-up Time	t_{LSU}	500	—	ns
LP Hold Time	t_{LHD}	—	10	ns
Data Set-up Time	t_{DSU} (Note 1)	300	—	ns
Data Hold Time	t_{DHD} (Note 1)	300	—	ns
Enable Set-up Time	t_{ESU} (Note 2)	300	—	ns
Enable Hold Time	t_{EHD} (Note 2)	300	—	ns
Enable Delay Time	t_{ED} (Note 3)	—	500	ns



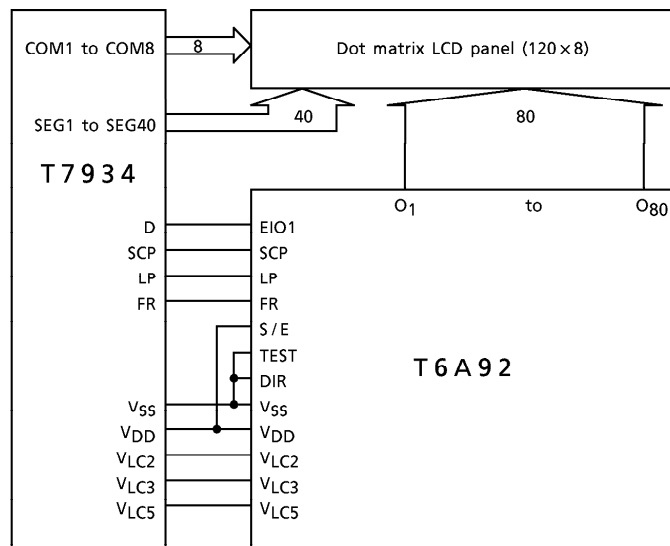
- (Note 1) Applies to DI1 and DI2
- (Note 2) Applies to EIO1 and EIO2
- (Note 3) With load circuit connected

APPLICATION CIRCUIT

- S/E=L (ENABLE mode)

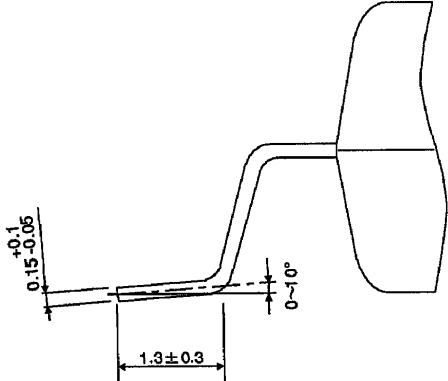
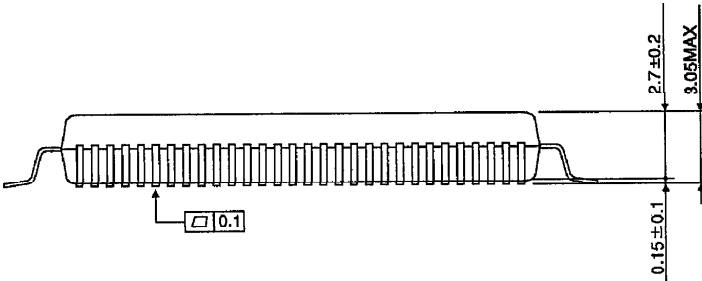
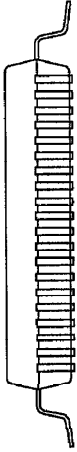
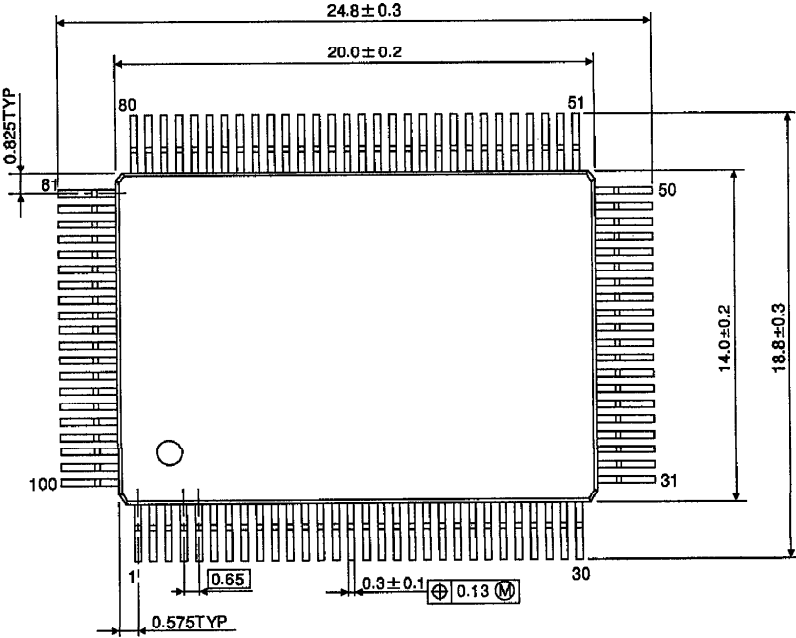


- S/E=H (SHIFT mode)



OUTLINE DRAWING
QFP100-P-1420-0.65J

Unit : mm



Weight : 1.6g (Typ.)