

T6A41

COLUMN DRIVER LSI FOR A DOT MATRIX LCD

The T6A41 is a column driver with 64-output channels for a medium-or small-scale dot matrix LCD.

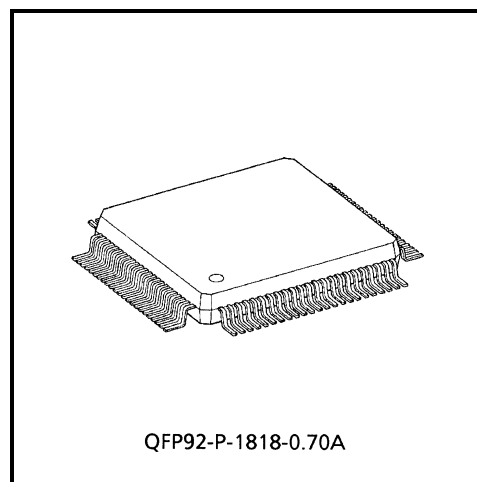
The T6A41 realizes low power LCD systems using the CMOS Si-Gate process.

The T6A41 has two bi-directional data Input / Output pins and three types of data flow (pin program):

(1) $O_1 \rightarrow O_{64}$, (2) $O_{64} \rightarrow O_1$, (3) $O_1 \rightarrow O_{32}$, $O_{64} \rightarrow O_{33}$.

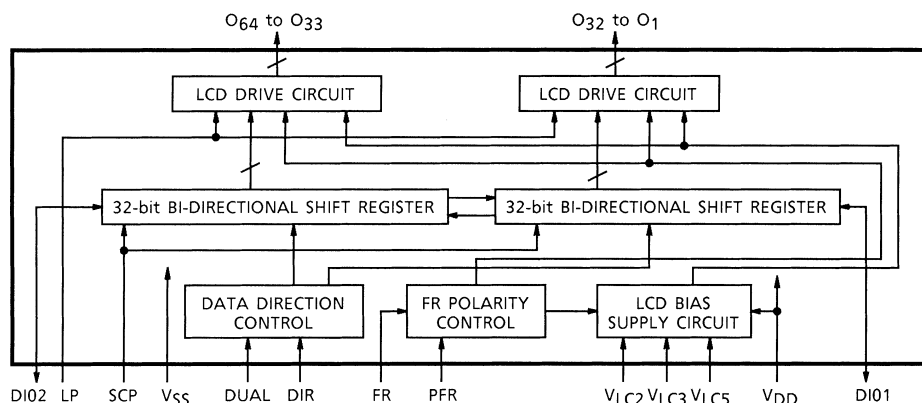
Features

- 64-output column driver
- Three types of data flow (bi-directional);
 - (1) $O_1 \rightarrow O_{64}$
 - (2) $O_{64} \rightarrow O_1$
 - (3) $O_1 \rightarrow O_{32}$, $O_{64} \rightarrow O_{33}$
- High speed operation
- Low power consumption
- Power supply: $5\text{ V} \pm 10\%$
- 92-pin plastic flat package



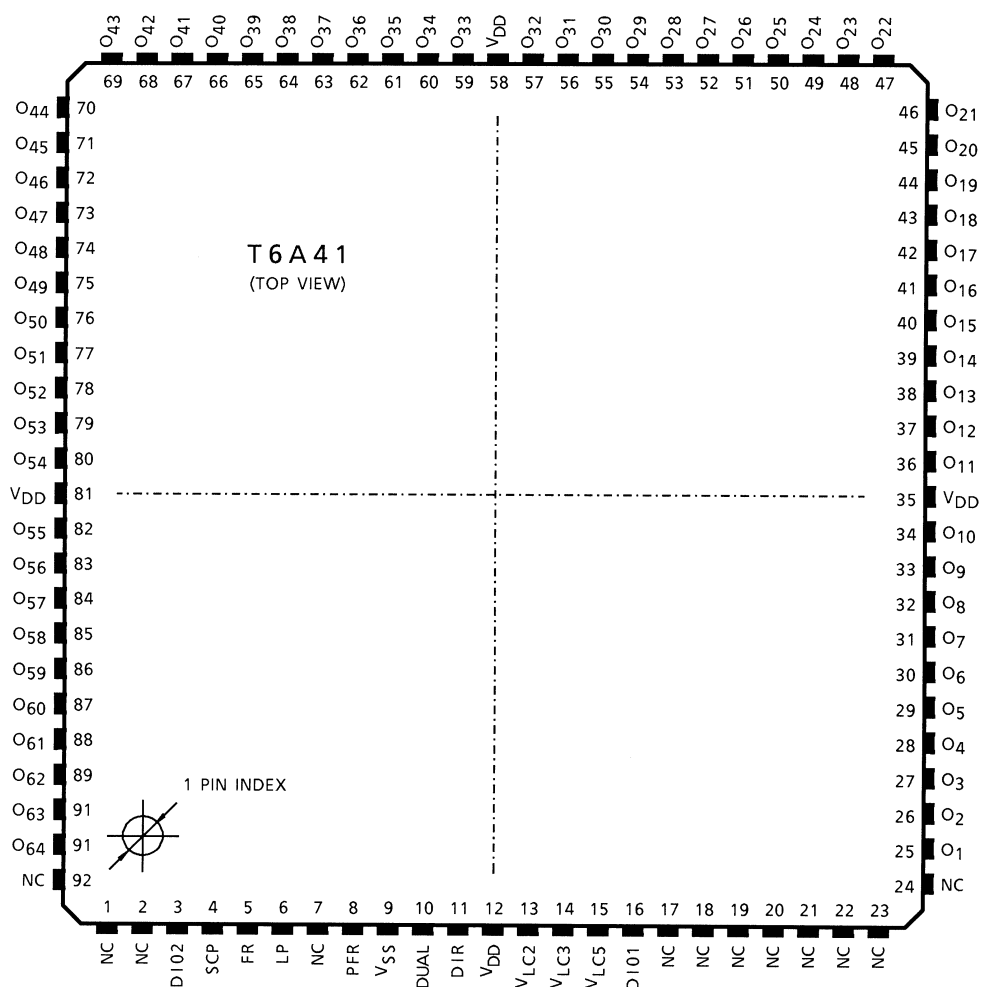
Weight: 1.4 g (typ.)

Block Diagram



000707EBA2

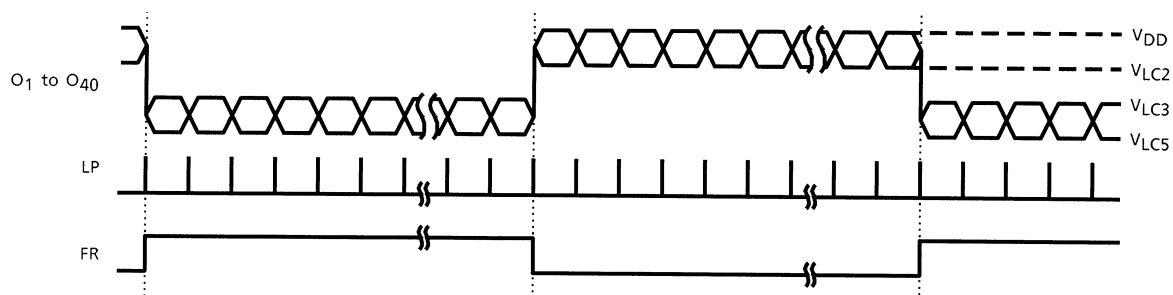
- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.



Pin Functions

Pin Name	I / O	Functions					Level	
O ₁ to O ₆₄	Output	LCD drive signal output					V _{DD} to V _{LC5}	
DIO1 , DIO2	I / O	Bi-directional data input and output					V _{DD} to V _{SS}	
SCP	Input	(Shift Clock Pulse) Shift clock pulse input						
FR	Input	(Frame) Frame signal input						
LP	Input	(Latch Pulse) Latch pulse signal input						
DUAL	Input	(Dual Mode) Selects dual mode or single mode data flow.	DUAL	DIR	DIO1	DIO21		Data Direction
			L	L	OUT	IN		O64 → O1
			L	H	IN	OUT		O1 → O64
			H	L	—	—		Do not use
			H	H	IN	IN	O1 → O32, O64 → O33	
DIR	Input	(Direction) Selects input data flow direction.						
PFR	Input	(Polarity of Flame) Usually connected to V _{SS}						
V _{LC2}	—	Power supply for LCD drive					—	
V _{LC3}	—	Power supply for LCD drive						
V _{LC5}	—	Power supply for LCD drive						
V _{DD}	—	Power supply (5 V)						
V _{SS}	—	Power supply (0 V)						

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} (Note1, 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} = 0 V

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

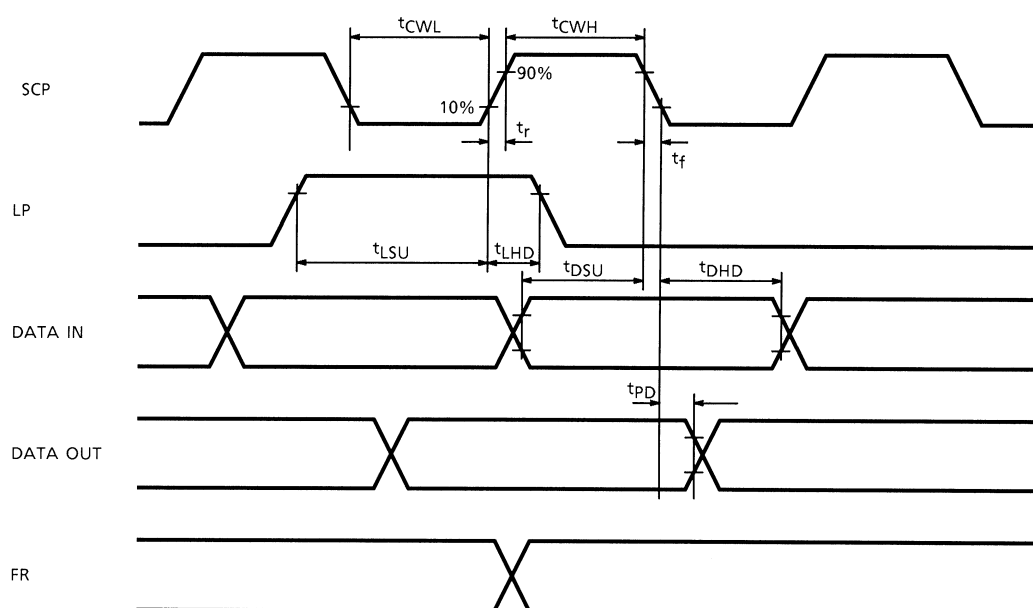
Test Conditions

(Unless Otherwise Noted, V_{SS} = 0 V, V_{DD} = 5.0 V ± 10%,
V_{LC5} = 0 V, Ta = -20 to 75°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} = -0.4 mA	V _{DD} -0.4	—	V _{DD}	V	DIO1, DIO2	
	L Level	V _{OL}	—	I _{Oh} = 0.4 mA	0	—	0.4	V	DIO1, DIO2	
Output Resistance		R _{COL}	—	I _d = ±50 μA	—	—	30	kΩ	O ₁ to O ₆₄	
Operating Frequency		f _{scp}	—	T _a = -20 to 75°C	—	—	400	kHz	SCP	
Current Consumption		I _{SS}	—	V _{DD} = 5.0 V V _{LC2} = 3.0 V V _{LC3} = 2.0 V V _{LC5} = 0.0 V f _{FR} = 39 Hz f _{SCP} = 250 kHz O ₁ to O ₈₀ : No Load	Binary Data Input	—	—	1.0	mA	V _{SS}
				Input Data : LOW Constant	—	—	0.4	mA		

*: DIO1, DIO2, SCP, FR, LP, PFR, DUAL, DIR

AC Characteristics



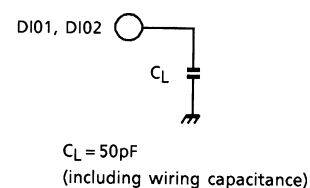
Test Conditions

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

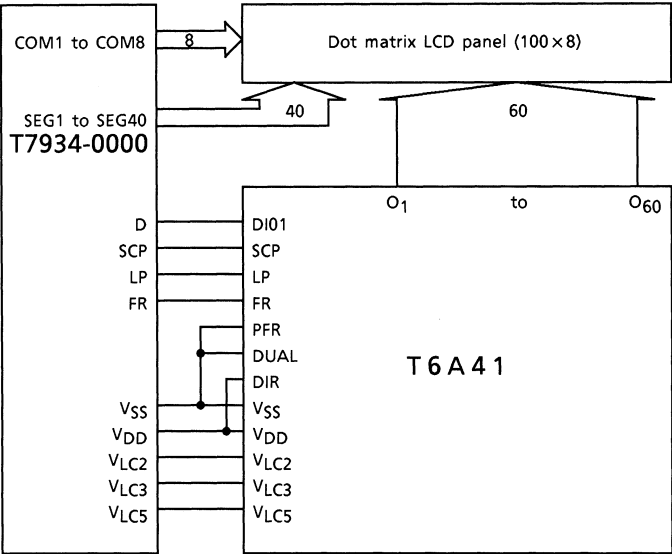
Item	Symbol	Min	Max	Unit
Operating Frequency	f_{SCP}	—	400	kHz
SCP Pulse Width	t_{CWH} , t_{CWL}	800	—	ns
SCP Rise / Fall Time	t_r , t_f	—	200	ns
LP Set-up Time	t_{LSU}	500	—	ns
LP Hold Time	t_{LHD}	—	10	ns
Data Set-up Time	t_{DSU}	300	—	ns
Data Hold Time	t_{DHD}	300	—	ns
Output Data Delay Time	t_{PD} (Note)	—	500	ns

Note: With load circuit connected

Load Circuit



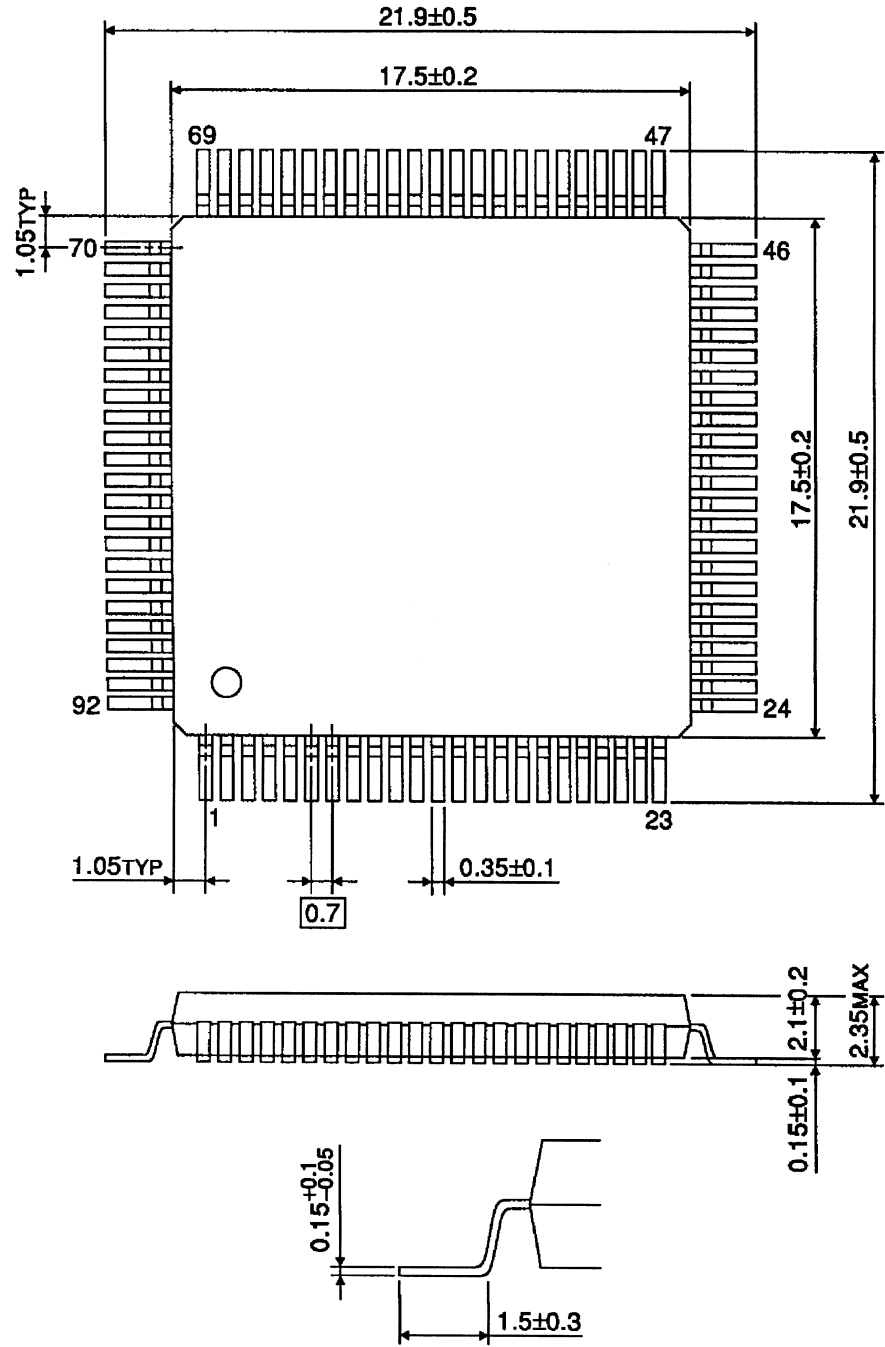
Application Circuit



Package Dimensions

QFP92-P-1818-0.70A

Unit : mm



Weight : 1.4g (Typ.)