

# SN751506, SN751516 DC PLASMA DISPLAY DRIVERS

SLDS034 – DECEMBER 1986 – REVISED JULY 1989

- Each Device Drives 32 Lines
- 180-V Open-Drain Parallel Outputs
- 220-mA Parallel Output Sink Current Capability
- CMOS-Compatible Inputs
- Strobe Input Provided
- Serial Data Output for Cascade Operation
- Inputs Have Built-In Electrostatic Discharge Protection

## description

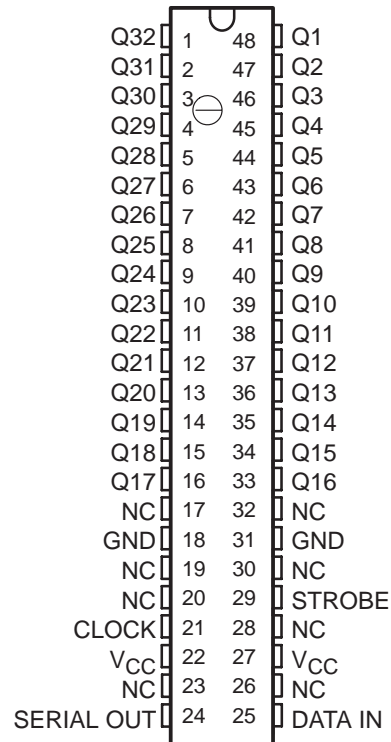
The SN751506 and the SN751516 are monolithic integrated circuits designed to drive the scan lines of a dc plasma panel display. The SN751516 pin sequence is reversed from the SN751506 for ease in printed-circuit-board layout.

Each device consists of a 32-bit shift register and 32 OR gates. Serial data is entered into the shift register on the high-to-low transition of the clock input. When STROBE is low, all Q outputs are in the off state. Outputs are open-drain JFET transistors with a breakdown voltage in excess of 180 V. The outputs have a 220-mA sink current capability in the on state. Only one Q output should be allowed to be in the on state at a time.

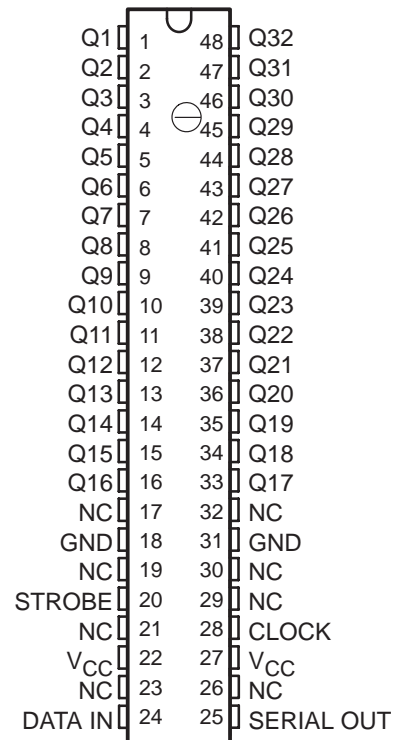
SERIAL OUT from the shift register can be used to cascade shift registers. This output is not affected by the STROBE input. All inputs are CMOS compatible with ESD protection built in.

The SN751506 and SN751516 are characterized for operation from 0°C to 70°C.

SN751506 . . . FT PACKAGE  
(TOP VIEW)



SN751516 . . . FT PACKAGE  
(TOP VIEW)



NC – No internal connection

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.



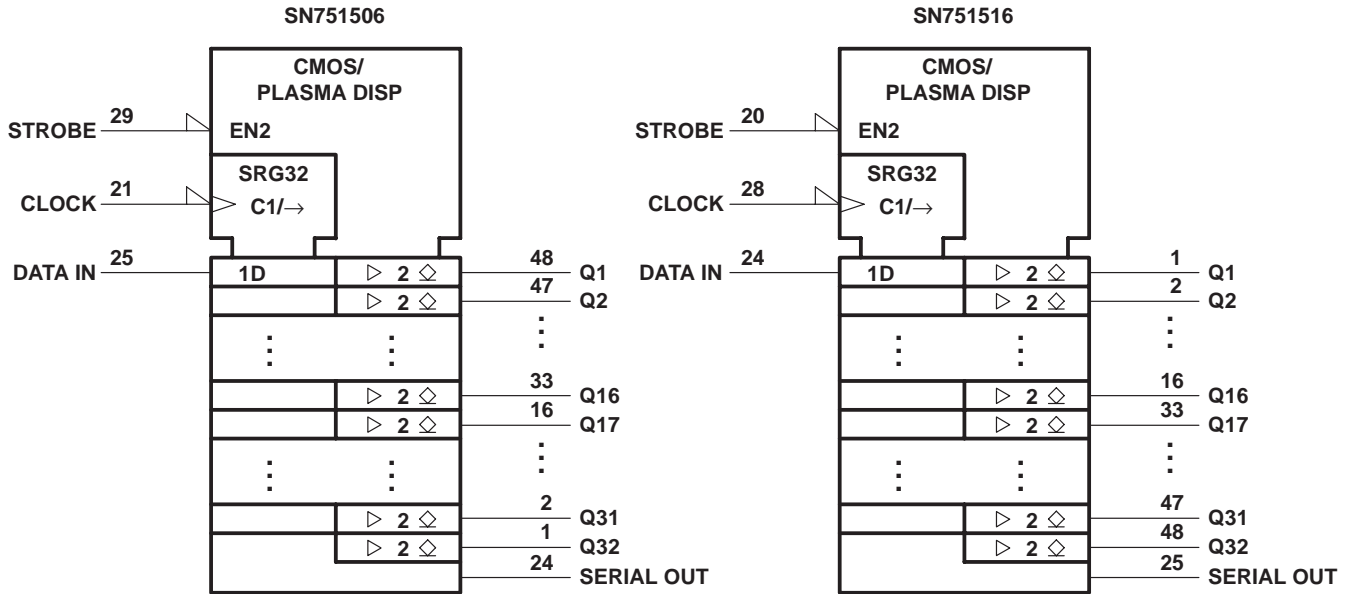
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# SN751506, SN751516 DC PLASMA DISPLAY DRIVERS

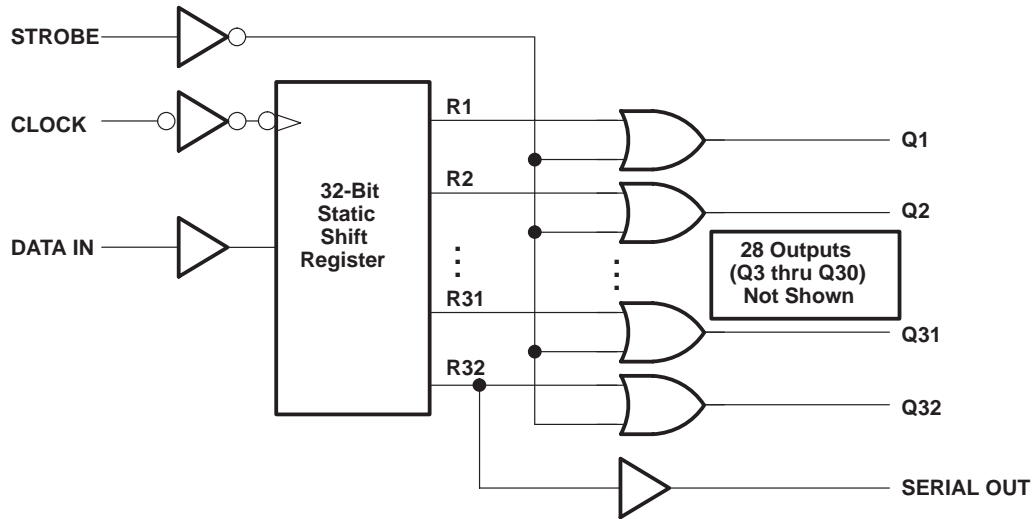
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## logic symbols†



† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

## logic diagram (positive logic)



FUNCTION TABLE

FUNCTION	CONTROL INPUTS		SHIFT REGISTERS R1 THRU R32	OUTPUTS	
	CLOCK	STROBE		SERIAL	Q1 THRU Q32
Load	↓	X	Load and shift‡	R32	Determined by STROBE
	No ↓	X	No change	R32	
Strobe	X	L	As determined above	R32	All high impedance R1 through R32
	X	H		R32	

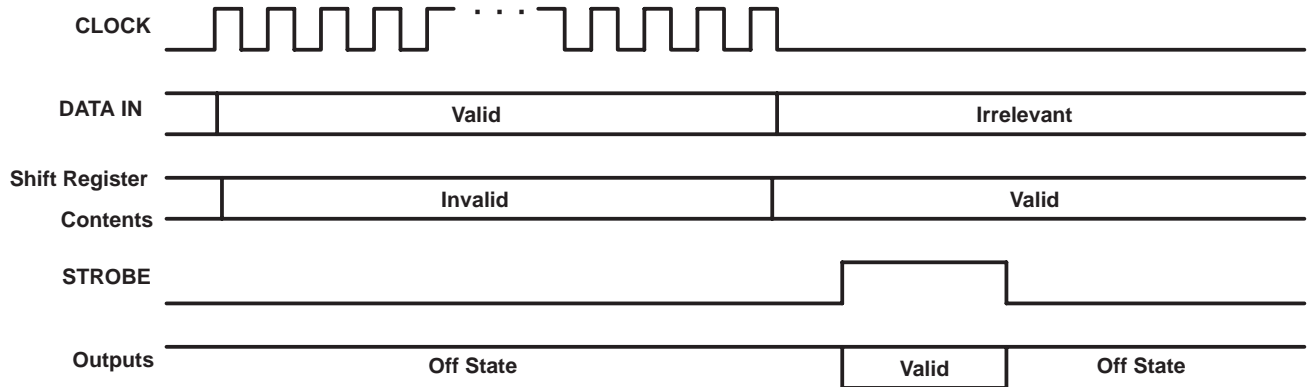
H = high level, L = low level, X = irrelevant, ↓ = high-to-low transition.

‡ R32 takes on the state of R31, R31 takes on the state of R30, . . . R2 takes on the state of R1, and R1 takes on the state of the data input.



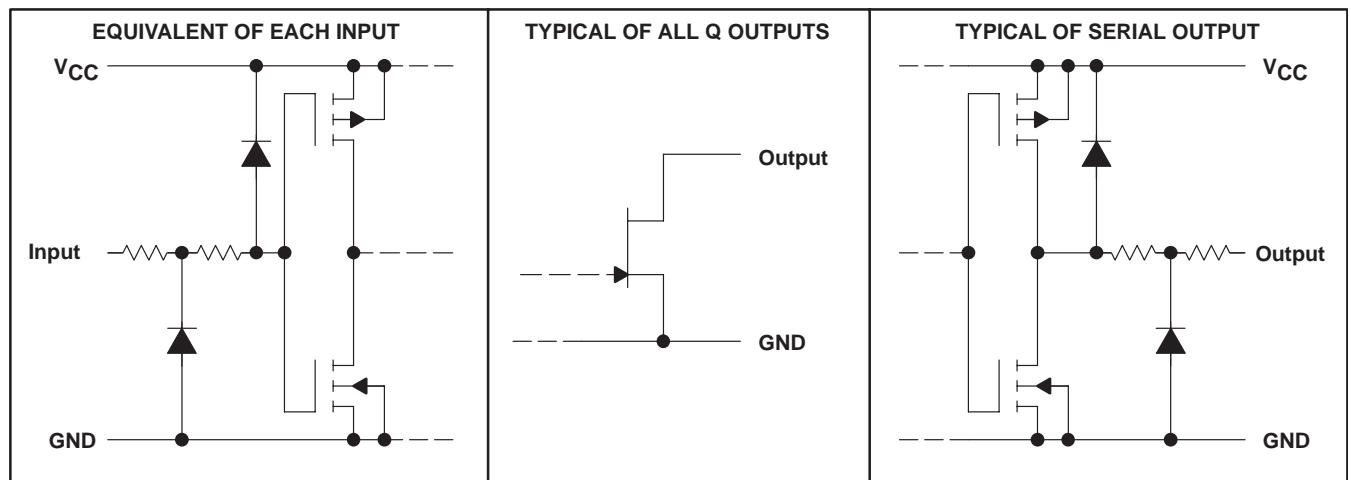
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## typical operating sequence



† Only 1 bit in 32 should be low in the input data.

## schematics of inputs and outputs



## absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage range, $V_{CC}$ (see Note 1)	–0.4 V to 7 V
On-state Q output voltage range, $V_O$	–0.4 V to 125 V
Off-state Q output voltage range, $V_O$	–0.4 V to 180 V
Input voltage range, $V_I$	–0.4 V to $V_{CC} + 0.4$ V
Serial output voltage range	–0.4 V to $V_{CC} + 0.4$ V
Q output on-state time duration (see Note 2)	100 $\mu$ s
Q output duty cycle (see Note 2)	1/200
Continuous total power dissipation at (or below) 25°C free-air temperature (see Note 3)	1025 mW
Operating free-air temperature range, $T_A$	0°C to 70°C
Storage temperature range	–55°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C

- NOTES:
1. Voltage values are with respect to GND.
  2. Only one Q output should be on at a time.
  3. For operation above 25°C free-air temperature, derate linearly to 656 mW at 70°C at the rate of 8.2 mW/°C.

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## recommended operating conditions

		MIN	NOM	MAX	UNIT
Supply voltage, $V_{CC}$		4	5	6	V
Peak on-state Q output voltage, $V_{O(on)}$				110	V
High-level input voltage, $V_{IH}$	$V_{CC} = 4\text{ V}$	3.2			V
	$V_{CC} = 6\text{ V}$	4.8			
Low-level input voltage, $V_{IL}$	$V_{CC} = 4\text{ V}$			0.8	V
	$V_{CC} = 6\text{ V}$			1.2	
Output current, $I_O$ ( $T_A = 25^\circ\text{C}$ )				220	mA
Clock frequency, $f_{clock}$				200	kHz
Pulse duration, CLOCK high or low, $t_w(\text{CLK})$		1.5†			$\mu\text{s}$
Pulse duration, DATA, $t_w\text{D}$		5			$\mu\text{s}$
Pulse duration, STROBE, $t_w(\text{STRB})$		2			$\mu\text{s}$
Setup time, DATA IN before CLOCK ↓, $t_{su}$		1			$\mu\text{s}$
Hold time, DATA IN after CLOCK ↓, $t_h$		1.2			$\mu\text{s}$
Operating free-air temperature, $T_A$		0		70	$^\circ\text{C}$

† The minimum clock period is 5  $\mu\text{s}$ .

## electrical characteristics, $V_{CC} = 5\text{ V}$ , $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$V_{OH}$	High-level output voltage	SERIAL OUT	$I_{OH} = -0.1\text{ mA}$	4.5		V
$V_{OL}$	Low-level output voltage	Q outputs	$I_{OL} = 180\text{ mA}$	6	10	V
		SERIAL OUT	$I_{OL} = 0.1\text{ mA}$		0.5	
$I_{O(off)}$	Off-state output current	Q outputs	$V_{OH} = 110\text{ V}$		1	$\mu\text{A}$
$I_{OL}$	Low-level output current	Q outputs	$V_{OL} = 16\text{ V}$	220		mA
$I_{IH}$	High-level input current	$V_I = V_{CC}$			1	$\mu\text{A}$
$I_{IL}$	Low-level input current	$V_I = 0$			-1	$\mu\text{A}$
$C_i$	Input capacitance				15	pF
$I_{CC}$	Supply current	All Q outputs off			1	mA
		One Q output on		20	40	

## switching characteristics, $V_{CC} = 5\text{ V}$ , $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{pd}$	Propagation delay time, CLOCK to SERIAL OUT	$C_L = 15\text{ pF}$		0.2	0.5	$\mu\text{s}$
$t_{DHL}$	Delay time, high-to-low-level Q output from STROBE or CLOCK inputs	$C_L = 150\text{ pF}$ , $R_L = 470\ \Omega$ , See Figures 2 and 3		0.2‡	0.6	$\mu\text{s}$
$t_{DLH}$	Delay time, low-to-high-level Q output from STROBE or CLOCK inputs			0.35‡	1	$\mu\text{s}$
$t_{THL}$	Transition time, high-to-low-level Q output			0.1	0.3	$\mu\text{s}$
$t_{TLH}$	Transition time, low-to-high-level Q output			0.35	1	$\mu\text{s}$

‡ Typical values are for clock inputs. Typical values from STROBE will be less.



PARAMETER MEASUREMENT INFORMATION

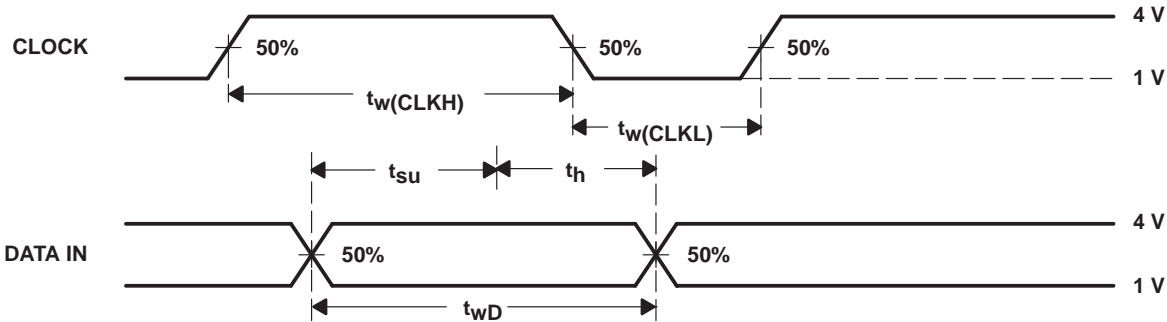


Figure 1. Input Timing Voltage Waveforms

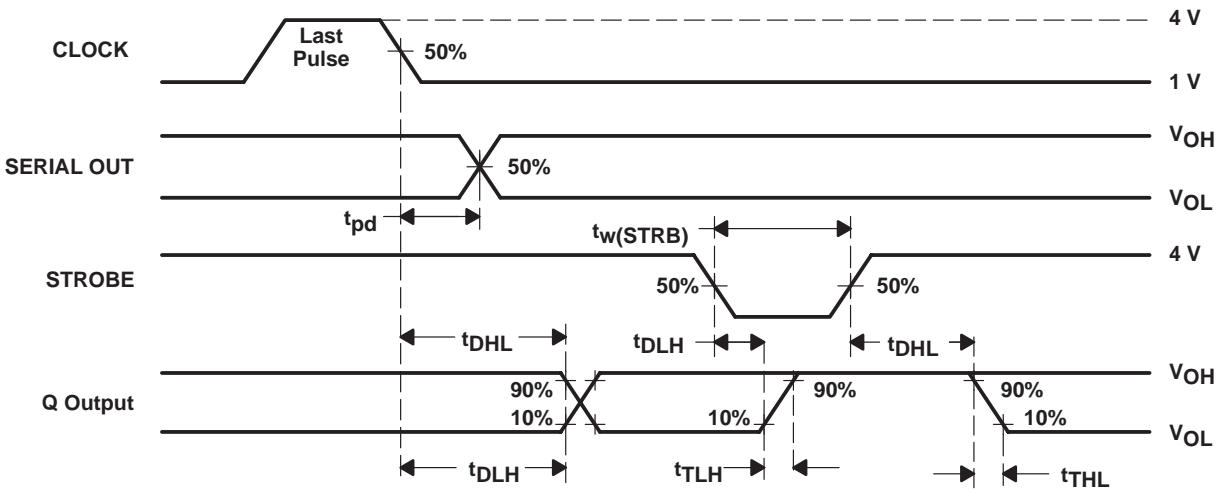


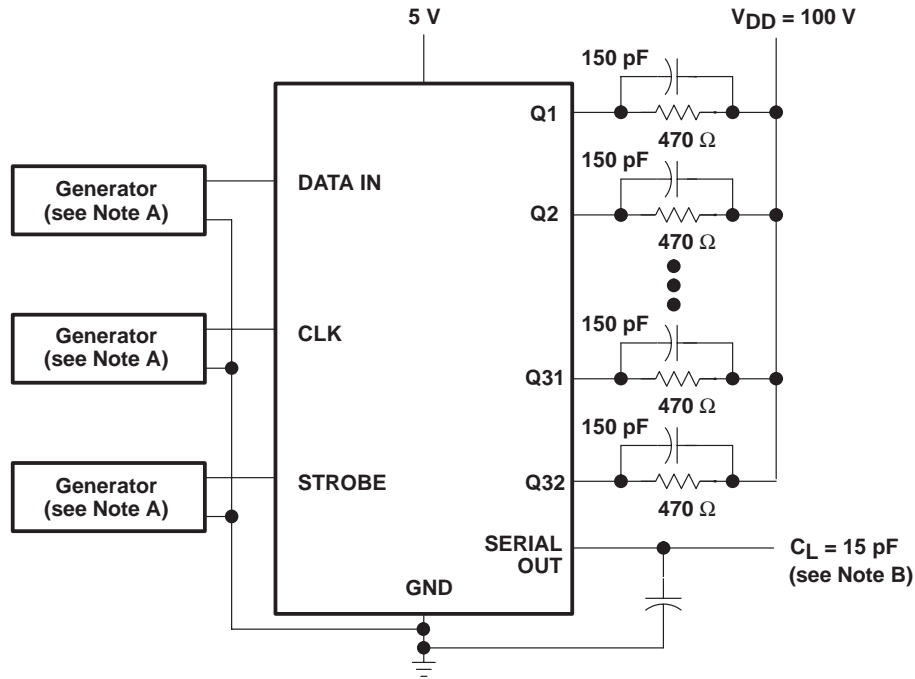
Figure 2. Switching Characteristics



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## PARAMETER MEASUREMENT INFORMATION



- NOTES: A. Input pulses are supplied by generators having the following characteristics:  $t_w = 1.25 \mu\text{s}$ ,  $\text{PRR} \leq 200 \text{ kHz}$ ,  $t_r \leq 30 \text{ ns}$ ,  $t_f \leq 30 \text{ ns}$ ,  $Z_0 = 50 \Omega$ .  
 B.  $C_L$  includes probe and jig capacitance.

Figure 3. Test Circuit

TYPICAL CHARACTERISTICS

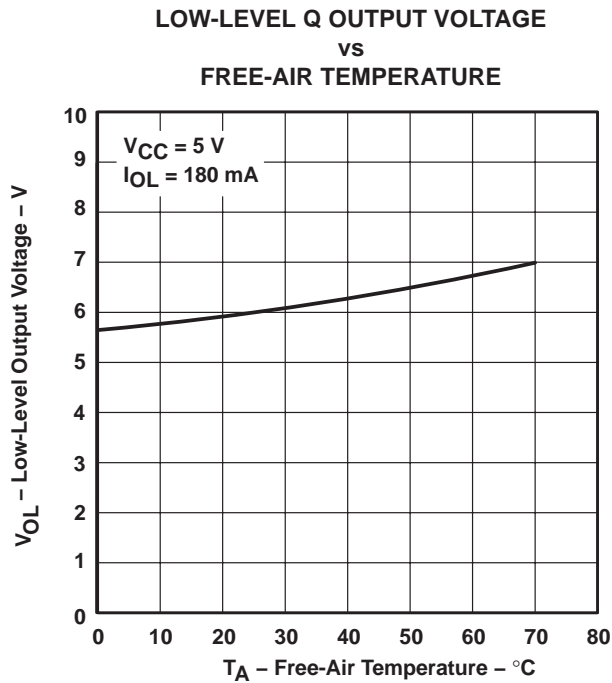


Figure 4

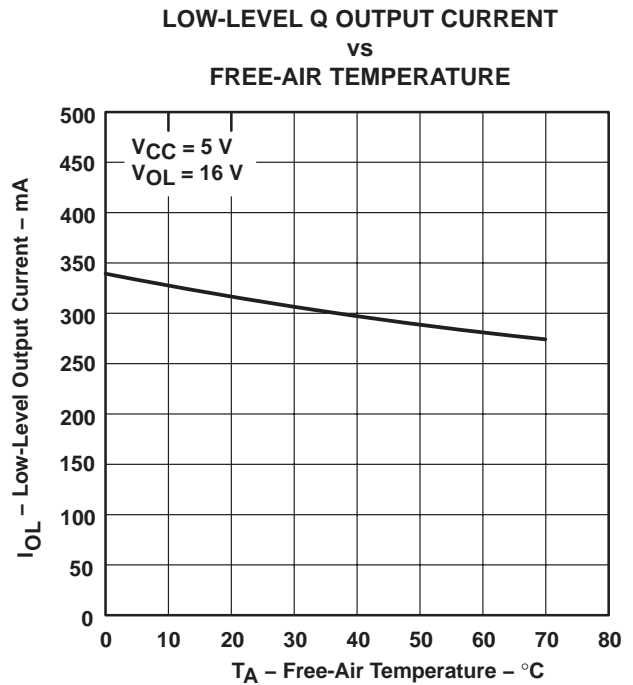


Figure 5

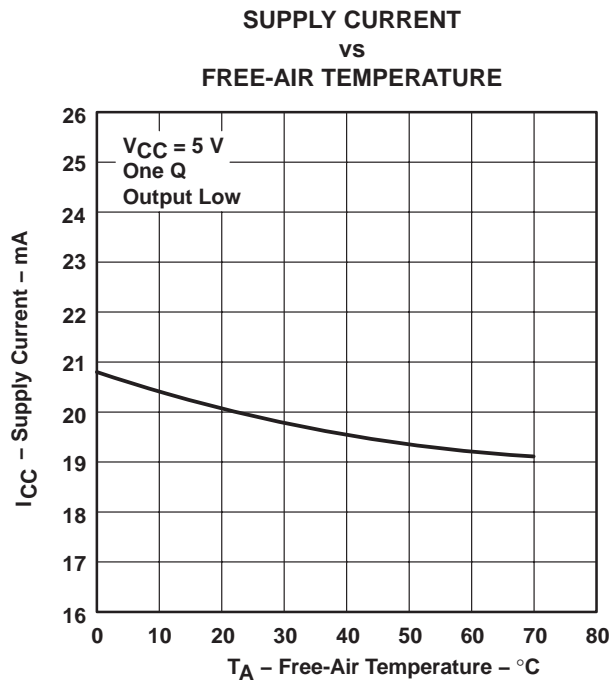


Figure 6

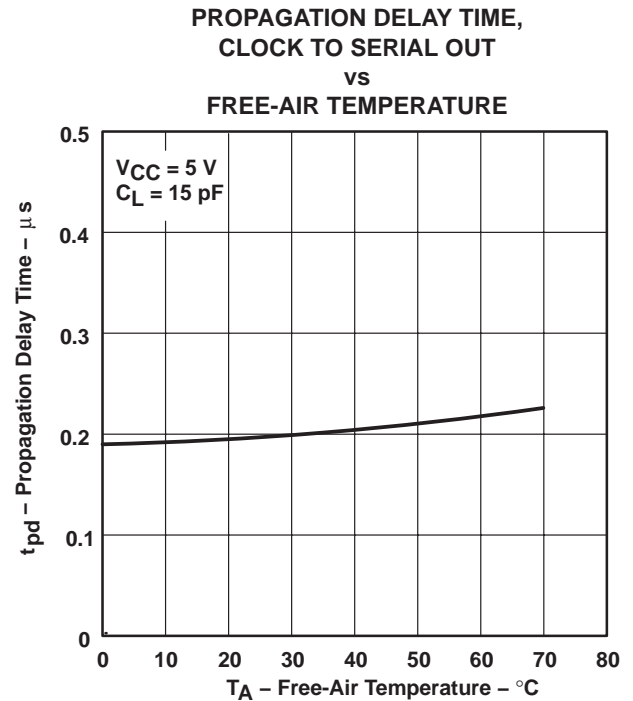
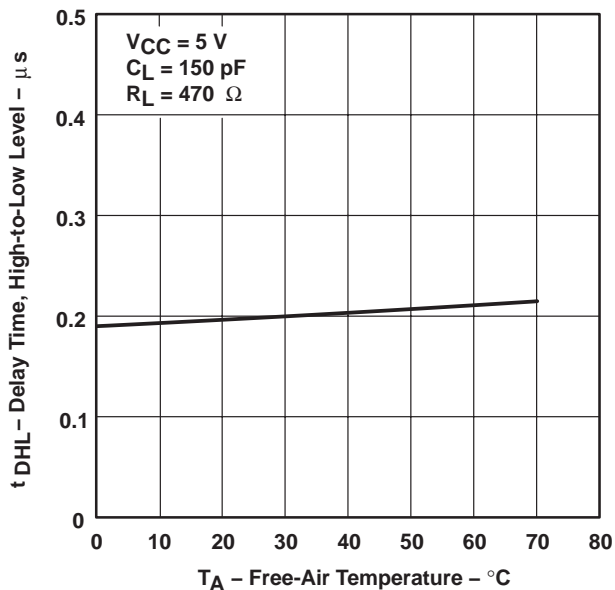


Figure 7

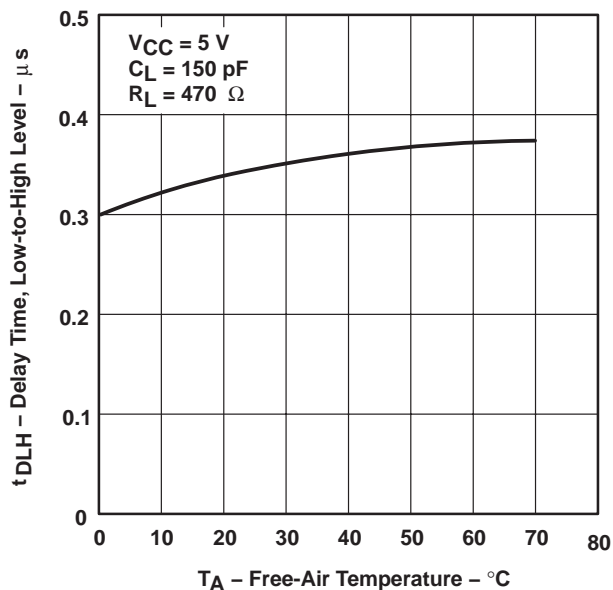
**TYPICAL CHARACTERISTICS**

**DELAY TIME,  
HIGH-TO-LOW-LEVEL Q OUTPUT  
vs  
FREE-AIR TEMPERATURE**



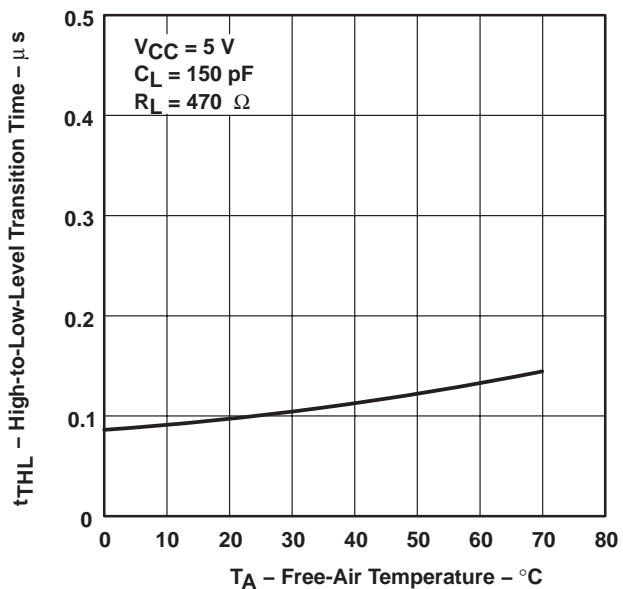
**Figure 8**

**DELAY TIME,  
LOW-TO-HIGH-LEVEL Q OUTPUT  
vs  
FREE-AIR TEMPERATURE**



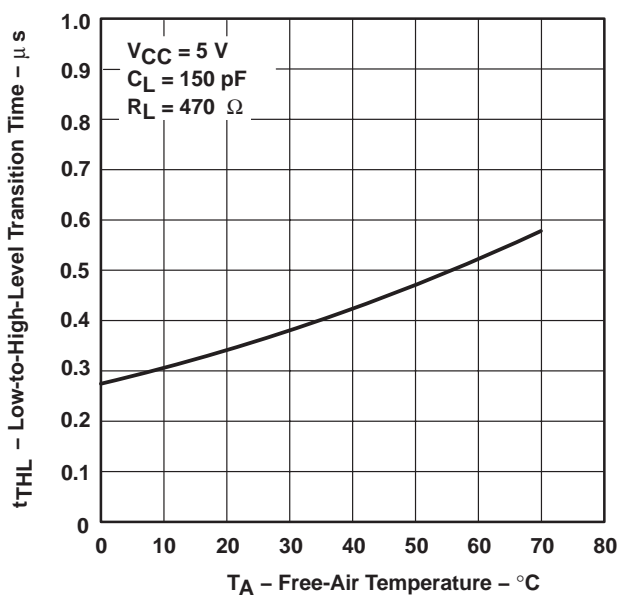
**Figure 9**

**TRANSITION TIME,  
HIGH-TO-LOW-LEVEL  
vs  
FREE-AIR TEMPERATURE**



**Figure 10**

**TRANSITION TIME,  
LOW-TO-HIGH-LEVEL Q OUTPUT  
vs  
FREE-AIR TEMPERATURE**



**Figure 11**



**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
SN751506FT	OBSOLETE	DFP	FT	48		TBD	Call TI	Call TI
SN751516FT	OBSOLETE	DFP	FT	48		TBD	Call TI	Call TI
SN751516FT	OBSOLETE	DFP	FT	48		TBD	Call TI	Call TI

<sup>(1)</sup> The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS) or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

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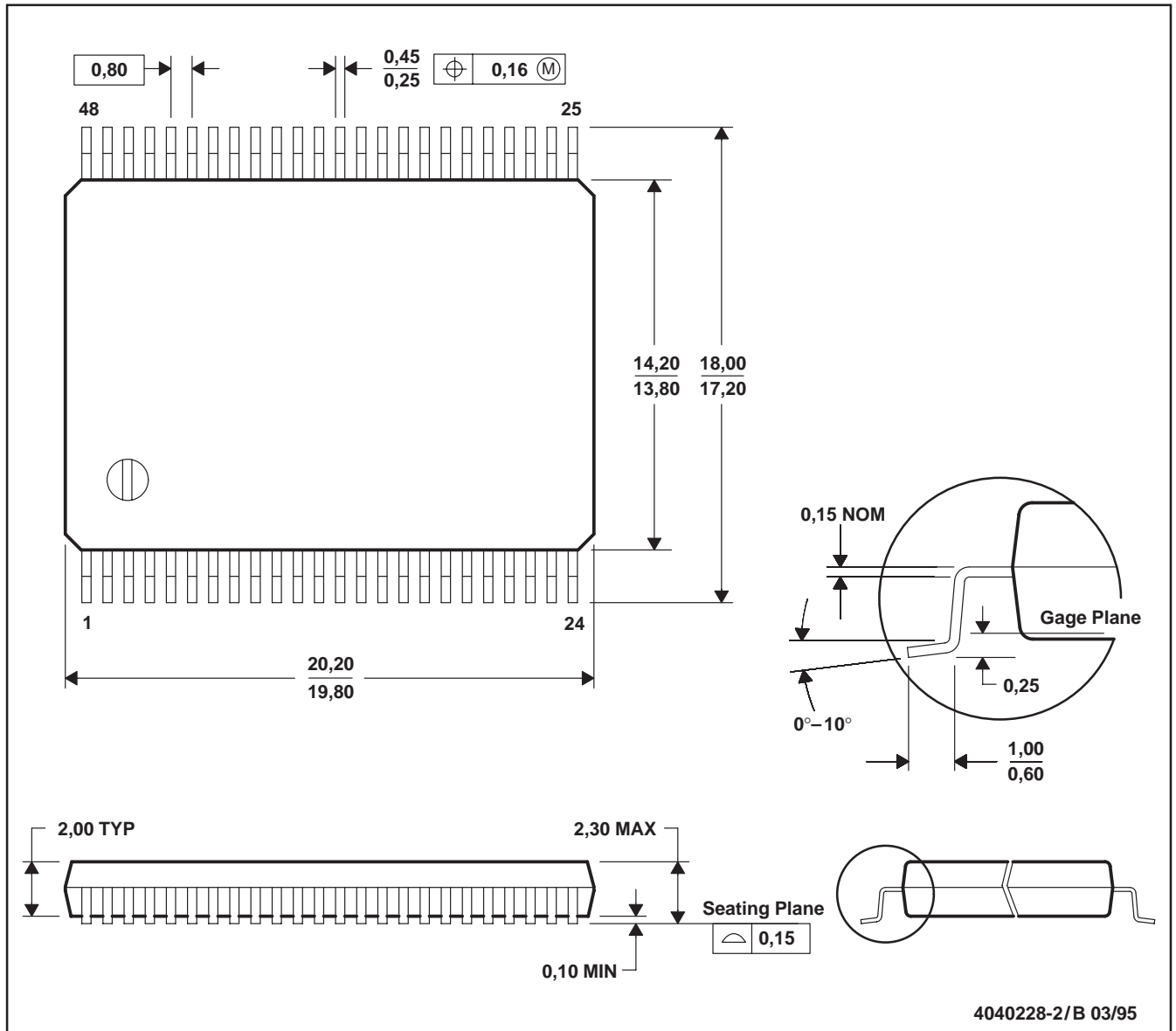
<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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PLASTIC DUAL FLATPACK



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 C. Contact field sales office to determine if a tighter coplanarity requirement is available for this package.

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