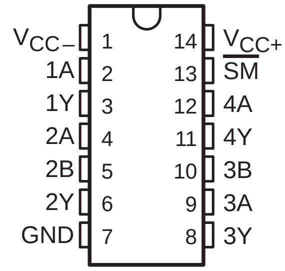
- **Meets ANSI EIA/TIA-232-E and ITU Recommendation V.28**
- **Very Low Supply Current**
- **Sleep Mode:**
  3-State Outputs in High-Impedance State
  Ultra-Low Supply Current . . . 17 μA Typ
- **Improved Functional Replacement for:**
  SN75188,
  Motorola MC1488,
  National Semiconductor DS14C88, and DS1488
- **CMOS- and TTL-Compatible Data Inputs**
- **On-Chip Slew-Rate Limit . . . 30 V/μs**
- **Output Current Limit . . . 10 mA Typ**
- **Wide Supply Voltage Range . . . ±4.5 V to ±15 V**

D OR N PACKAGE
(TOP VIEW)



NOT RECOMMENDED FOR NEW DESIGNS

description

The SN75C198 is a monolithic low-power BI-MOS device containing four low-power line drivers designed to interface data terminal equipment (DTE) with data circuit-terminating equipment (DCE) in conformance with the specifications of ANSI EIA/TIA-232-E. The drivers of the SN75C198 are similar to those of the SN75C188 quadruple driver. The drivers have a controlled-output slew rate that is limited to a maximum of 30 V/μs. This feature eliminates the need for external components.

The sleep-mode input, $\overline{SM}$, can switch the outputs to high impedance, which avoids the transmission of corrupted data during power-up and allows significant system power savings during data-off periods.

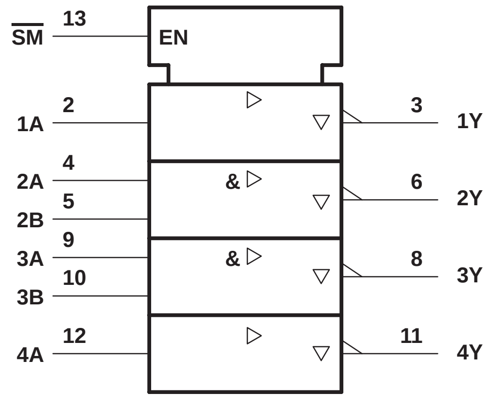
The SN75C198 is characterized for operation from 0°C to 70°C.

FUNCTION TABLE

INPUTS			OUTPUT
$\overline{SM}$	A	B	Y
H	H	H	L
H	L	X	H
H	X	L	H
L	X	X	Z

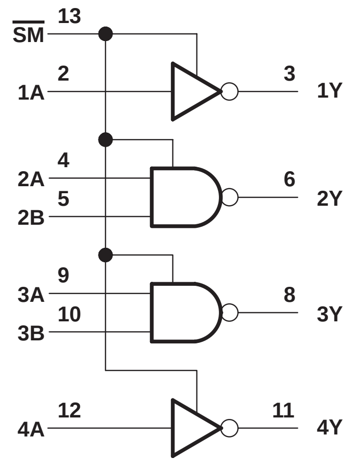
H = high level, L = low level, X = irrelevant, Z= high impedance

logic symbol†

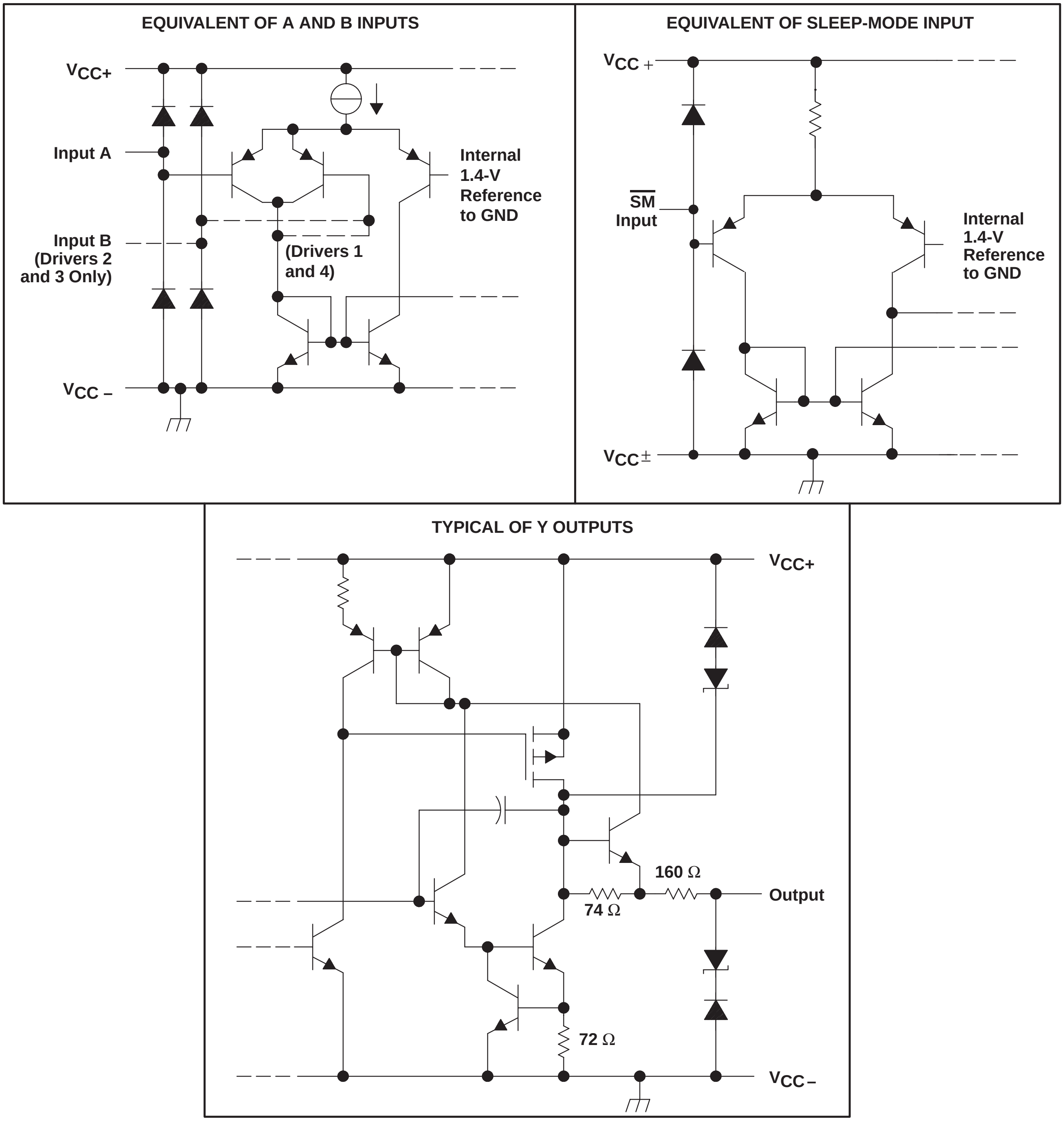


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)



schematics of inputs and outputs



All resistor values shown are nominal.

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

Supply voltage, V_{CC+} (see Note 1) . . . . 15 V
Supply voltage, V_{CC-} . . . . –15 V
Input voltage range, V_I . . . . –15 V to 15 V
Output voltage range, V_O . . . . V_{CC-} –6 V to V_{CC+} + 6 V
Continuous total power dissipation . . . . See Dissipation Rating Table
Operating free-air temperature range, T_A: SN75C198 . . . . 0°C to 70°C
Storage temperature range, T_{stg} . . . . –65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds . . . . 260°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE 1: All voltages are with respect to the network ground terminal.

DISSIPATION RATING TABLE

PACKAGE	$T_A \le 25°C$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25°C$	$T_A = 70°C$ POWER RATING
D	950 mW	7.6 mW/°C	608 mW
N	1150 mW	9.2 mW/°C	730 mW

recommended operating conditions

		MIN	NOM	MAX	UNIT
Supply voltage, V_{CC+}		4.5	12	15	V
Supply voltage, V_{CC-}		–4.5	–12	–15	V
Input voltage, V_I (see Figure 2)		$V_{CC-}+2$		V_{CC+}	V
High-level input voltage, V_{IH}		2			V
Low-level input voltage, V_{IL}	A and B inputs			0.8	V
	$\overline{SM}$ input			0.6	
Operating free-air temperature, T_A		0		70	°C

electrical characteristics over recommended operating free-air temperature range, $V_{CC\pm} = \pm 12$ V, $\overline{SM}$ at 2 V (unless otherwise noted)

PARAMETER		TEST CONDITIONS		MIN	TYP†	MAX	UNIT
V_{OH}	High-level output voltage	V_{IH} = 0.8 V, R_L = 3 kΩ	$V_{CC\pm} = \pm 5$ V	4			V
			$V_{CC\pm} = \pm 12$ V	10			
V_{OL}	Low-level output voltage (see Note 2)	V_{IH} = 2 V, R_L = 3 kΩ	$V_{CC\pm} = \pm 5$ V			–4	V
			$V_{CC\pm} = \pm 12$ V			–10	
I_{IH}	High-level input current	V_I = 5 V				10	µA
I_{IL}	Low-level input current	V_I = 0 V				–10	µA
I_{OZ}	High-impedance-state output current	$\overline{SM}$ at 0.6 V	V_O = 12 V, $V_{CC\pm} = \pm 12$ V			100	µA
			V_O = –12 V, $V_{CC\pm} = \pm 12$ V			–100	
$I_{OS(H)}$	High-level short-circuit output current‡	V_I = 0.8 V, V_O = 0 or V_{CC-}		–4.5	–10	–19.5	mA
$I_{OS(L)}$	Low-level short-circuit output current‡	V_I = 2 V, V_O = 0 or V_{CC+}		4.5	10	19.5	mA
r_o	Output resistance	$V_{CC\pm}$ = 0, V_O = –2 V to 2 V		300			Ω
I_{CC+}	Supply current from V_{CC+}	A and B inputs at 0.8 V or 2 V, No load	$V_{CC\pm} = \pm 5$ V		90	160	µA
			$V_{CC\pm} = \pm 12$ V		95	160	
		A and B inputs at 0.8 V or 2 V, R_L = 3 kΩ, $\overline{SM}$ at 0.6 V	$V_{CC\pm} = \pm 5$ V		40		
			$V_{CC\pm} = \pm 12$ V		40		
I_{CC-}	Supply current from V_{CC-}	A and B inputs at 0.8 V or 2 V, No load	$V_{CC\pm} = \pm 5$ V		–90	–160	µA
			$V_{CC\pm} = \pm 12$ V		–95	–160	
		A and B inputs at 0.8 V or 2 V, R_L = 3 kΩ, $\overline{SM}$ at 0.6 V	$V_{CC\pm} = \pm 5$ V		–40		
			$V_{CC\pm} = \pm 12$ V		–40		

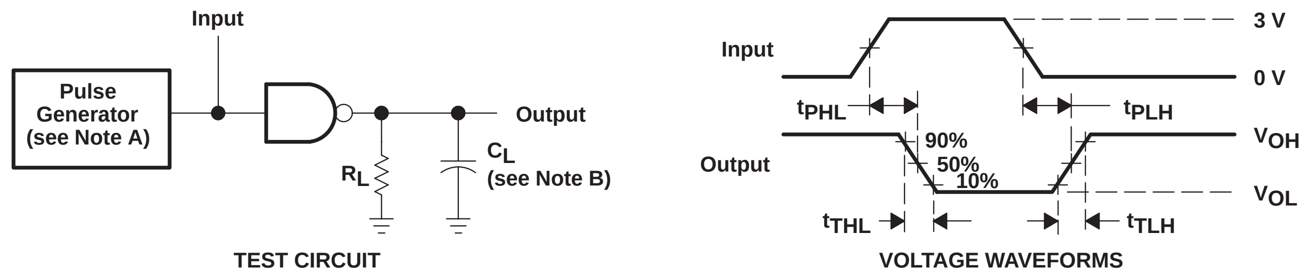
† All typical values are at T_A = 25°C.
‡ Not more than one output should be shorted at a time.
NOTE 2: The algebraic convention, where the more positive (less negative) limit is designated as maximum, is used in this data sheet for logic levels only, e.g., if –10 V is a maximum, the typical value is a more negative voltage.

switching characteristics over recommended operating free-air temperature range, $V_{CC\pm} = \pm 12$ V (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP†	MAX	UNIT
t_{PLH}	Propagation delay time, low- to high-level output§	R_L = 3 kΩ to 7 kΩ, C_L = 15 pF, See Figure 1			3	µs
t_{PHL}	Propagation delay time, high- to low-level output§				3.5	µs
t_{TLH}	Transition time, low- to high-level output¶		0.53	1	3.2	µs
t_{THL}	Transition time, high- to low-level output¶		0.53	1	3.2	µs
t_{TLH}	Transition time, low- to high-level output#	R_L = 3 kΩ to 7 kΩ, C_L = 2500 pF, See Figure 2		1.5		µs
t_{THL}	Transition time, high- to low-level output#			1.5		µs
t_{PZH}	Output enable time to high level	R_L = 3 kΩ to 7 kΩ, C_L = 15 pF, See Figure 3			50	µs
t_{PHZ}	Output disable time from high level				10	µs
t_{PZL}	Output enable time to low level	R_L = 3 kΩ to 7 kΩ, C_L = 15 pF, See Figure 4			15	µs
t_{PLZ}	Output disable time from low level				10	µs
SR	Output slew rate#	R_L = 3 kΩ to 7 kΩ, C_L = 15 pF	6	15	30	V/µs

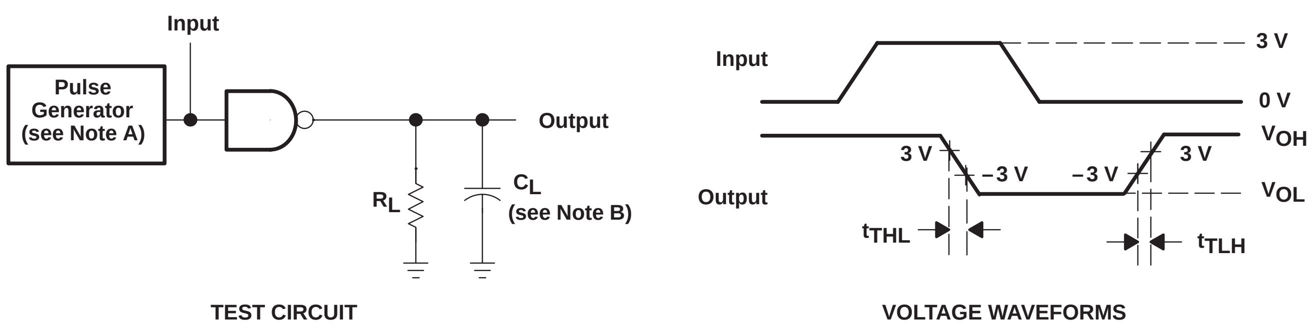
† All typical values are at T_A = 25°C.
§ t_{PHL} and t_{PLH} include the additional time due to on-chip slew rate and are measured at the 50% points.
¶ Measured between 10% and 90% points of output waveform
# Measured between 3-V and –3-V points of output waveform

PARAMETER MEASUREMENT INFORMATION



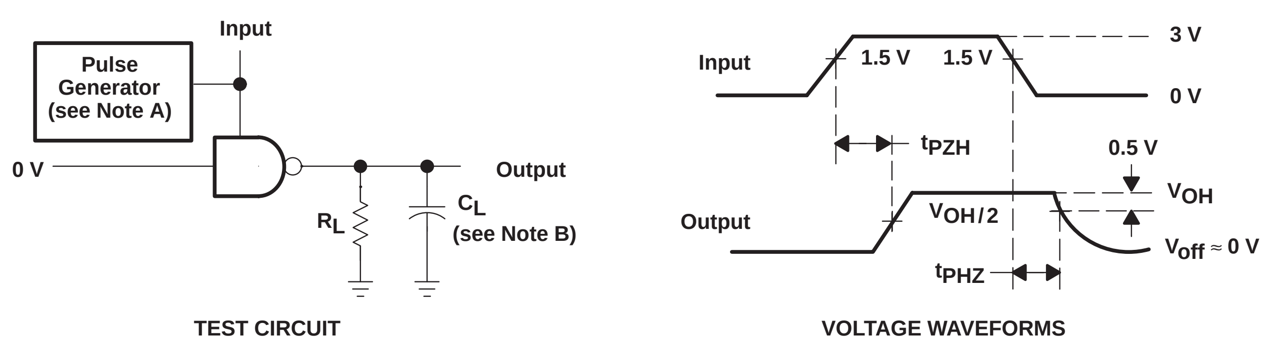
NOTES: A. The pulse generator has the following characteristics: t_W = 25 µs, PRR = 20 kHz, Z_O = 50 Ω, $t_r = t_f \le 50$ ns.
B. C_L includes probe and jig capacitance.

Figure 1. Test Circuit and Voltage Waveforms, Propagation and Transition Times



NOTES: A. The pulse generator has the following characteristics: t_W = 25 µs, PRR = 20 kHz, Z_O = 50 Ω, $t_r = t_f \le 50$ ns.
B. C_L includes probe and jig capacitance.

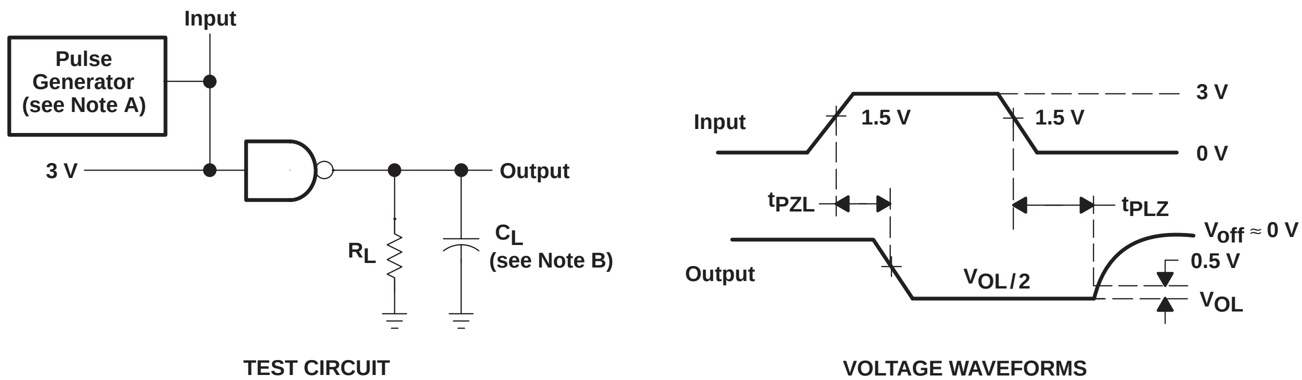
Figure 2. Test Circuit and Voltage Waveforms, Transition Times



NOTES: A. The pulse generator has the following characteristics: t_W = 25 µs, PRR = 20 kHz, Z_O = 50 Ω, $t_r = t_f \le 50$ ns.
B. C_L includes probe and jig capacitance.

Figure 3. Driver Test Circuit and Voltage Waveforms

PARAMETER MEASUREMENT INFORMATION



NOTES: A. The pulse generator has the following characteristics: t_W = 25 µs, PRR = 20 kHz, Z_O = 50 Ω, $t_r = t_f \leq 50$ ns.
B. C_L includes probe and jig capacitance.

Figure 4. Driver Test Circuit and Voltage Waveforms

TYPICAL CHARACTERISTICS

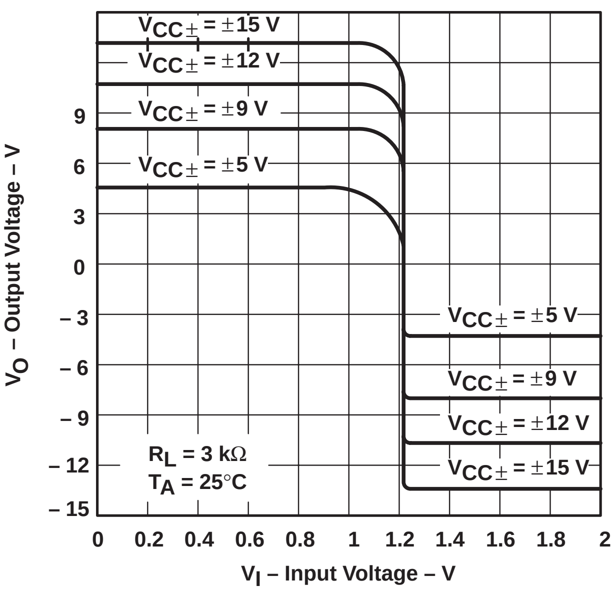


Figure 5

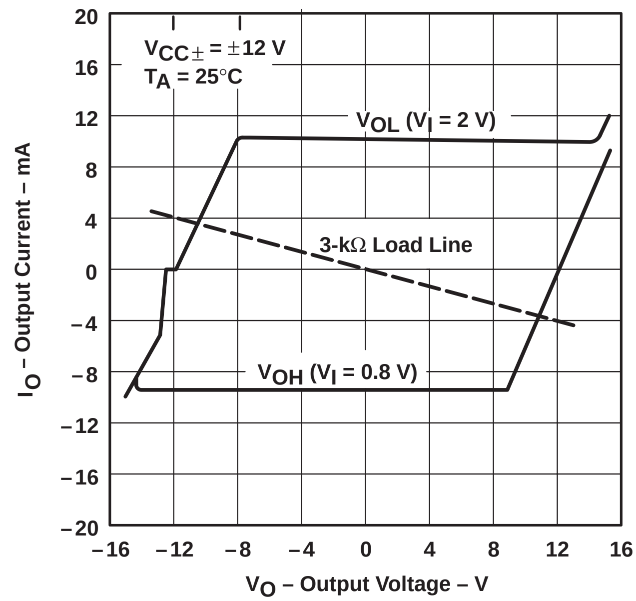


Figure 6

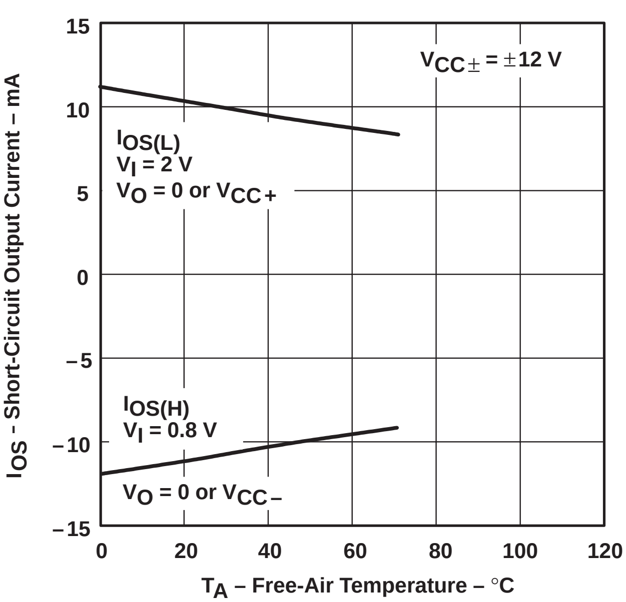


Figure 7

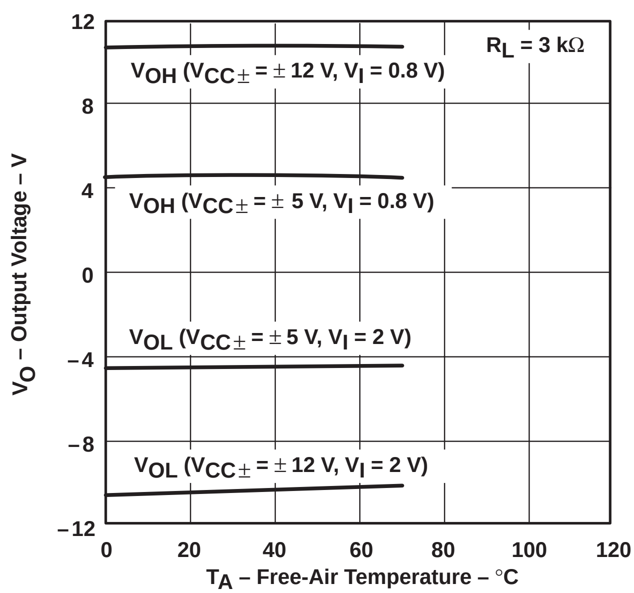


Figure 8

TYPICAL CHARACTERISTICS

INPUT CURRENT
vs
FREE-AIR TEMPERATURE

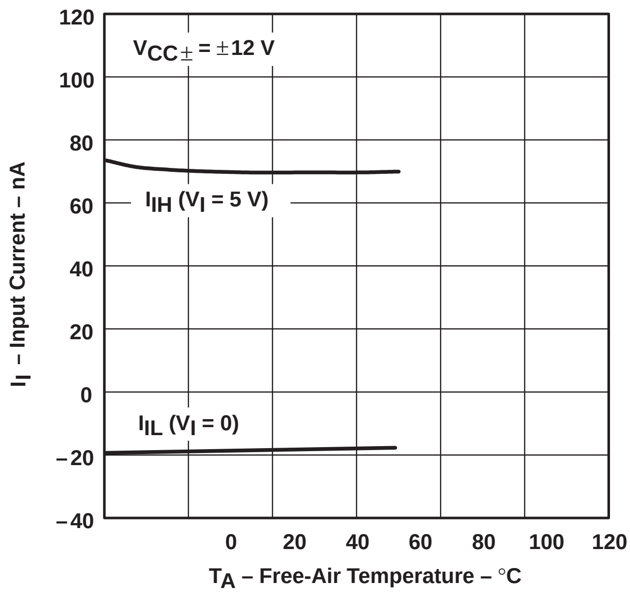


Figure 9

POWER-OFF OUTPUT RESISTANCE
vs
FREE-AIR TEMPERATURE

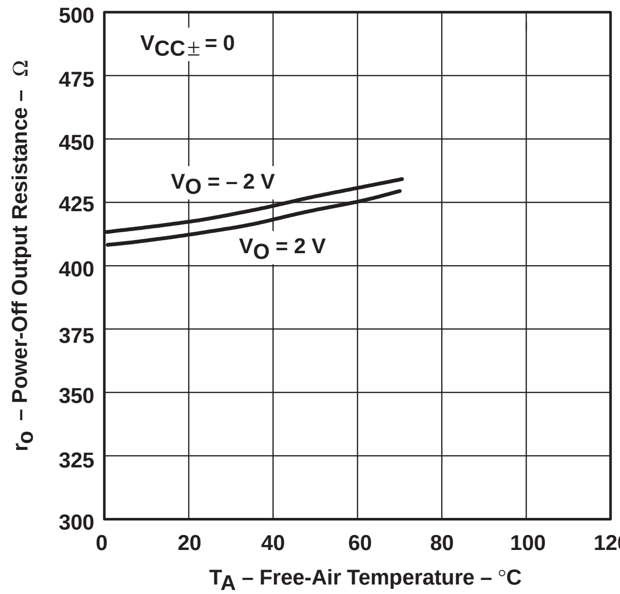


Figure 10

SUPPLY CURRENT
vs
FREE-AIR TEMPERATURE

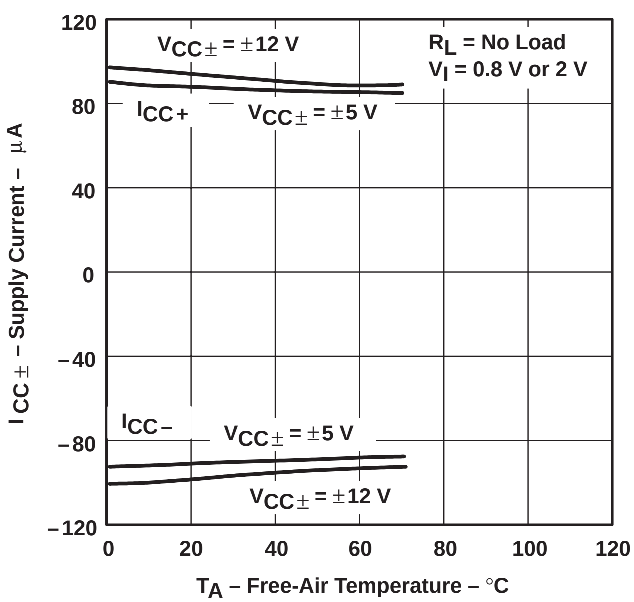


Figure 11

OUTPUT SLEW RATE
vs
FREE-AIR TEMPERATURE

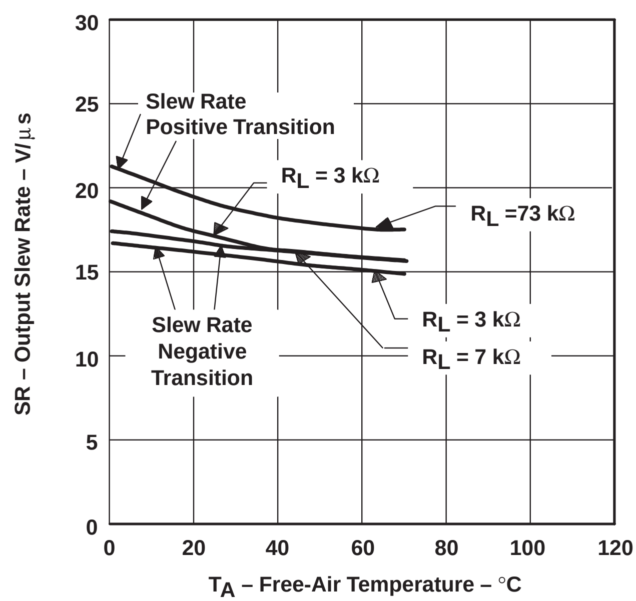


Figure 12

TYPICAL CHARACTERISTICS

PROPAGATION DELAY TIME vs FREE-AIR TEMPERATURE

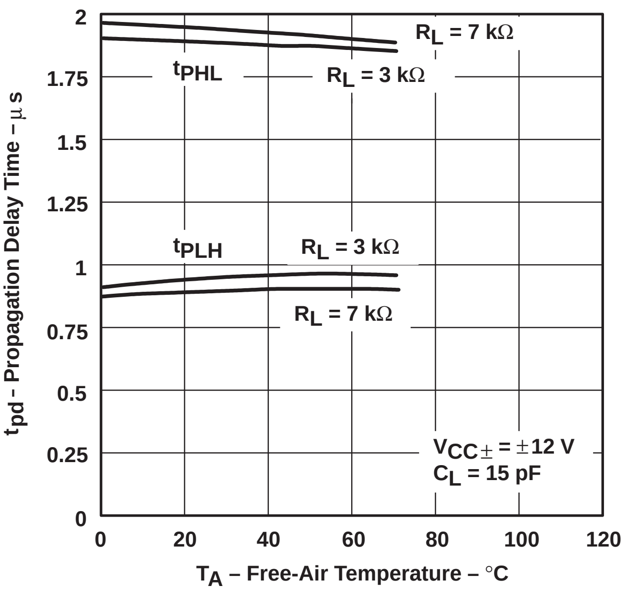


Figure 13

OUTPUT TRANSITION TIME vs FREE-AIR TEMPERATURE

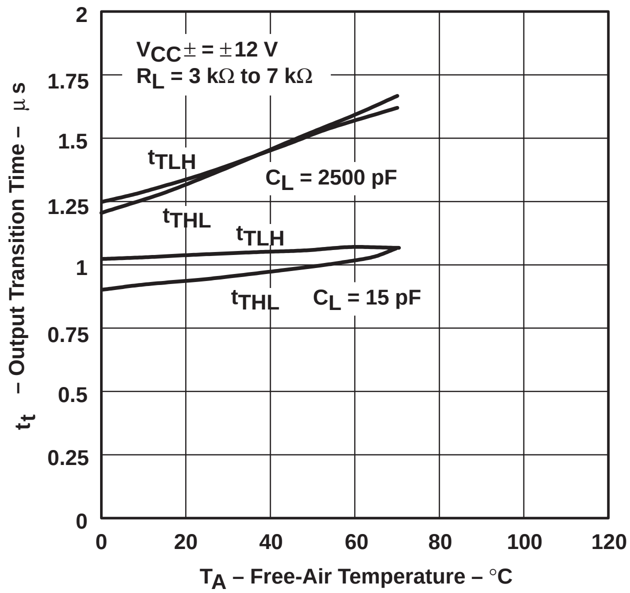


Figure 14

OUTPUT ENABLE TIME TO HIGH LEVEL vs FREE-AIR TEMPERATURE

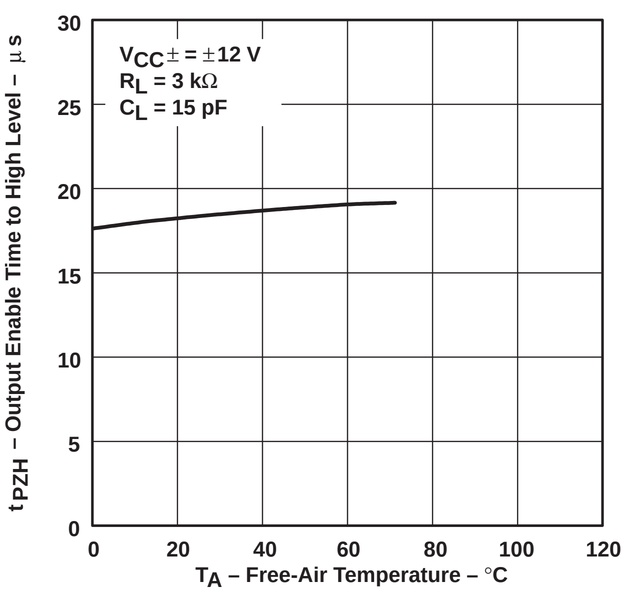


Figure 15

OUTPUT DISABLE TIME FROM HIGH LEVEL vs FREE-AIR TEMPERATURE

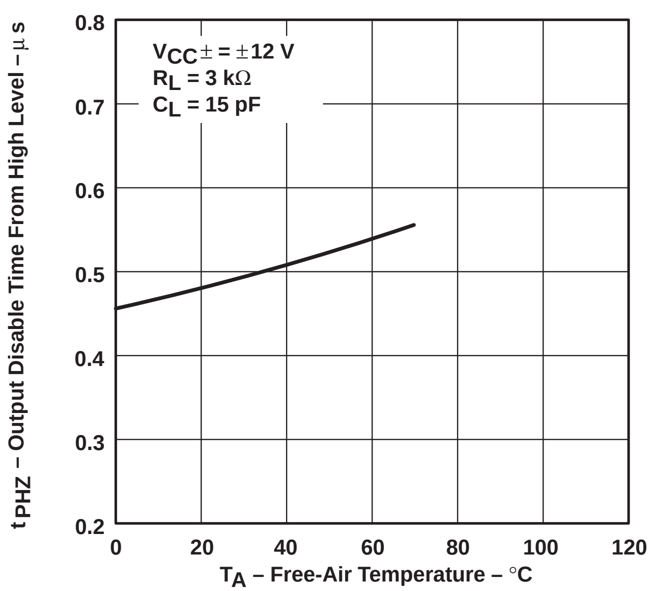


Figure 16

TYPICAL CHARACTERISTICS

OUTPUT ENABLE TIME TO LOW LEVEL vs FREE-AIR TEMPERATURE

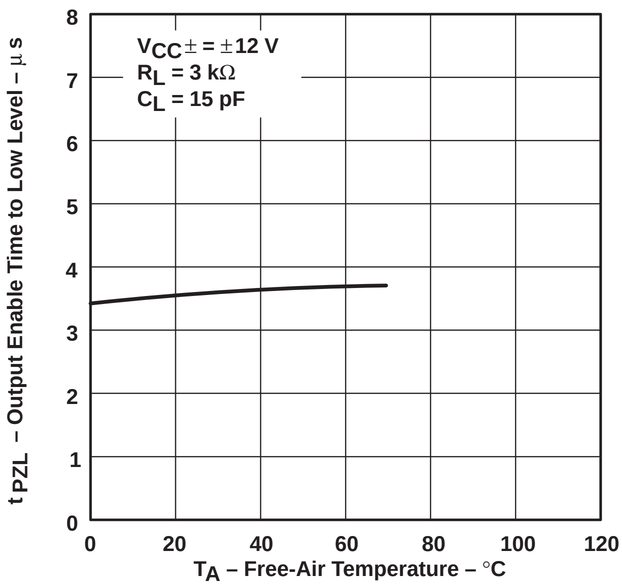


Figure 17

OUTPUT DISABLE TIME FROM LOW LEVEL vs FREE-AIR TEMPERATURE

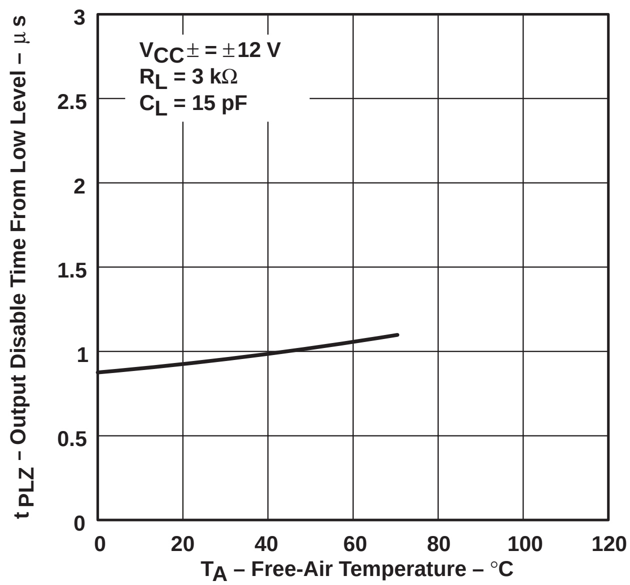


Figure 18

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