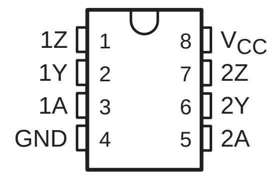
- **Meets or Exceeds the Requirements of ANSI EIA/TIA-422-B and ITU Recommendation V.11**
- **Single 5-V Supply**
- **Balanced-Line Operation**
- **TTL Compatible**
- **High Output Impedance in Power-Off Condition**
- **High-Current Active-Pullup Outputs**
- **Short-Circuit Protection**
- **Dual Channels**
- **Input Clamp Diodes**

D, P, OR PS† PACKAGE
(TOP VIEW)



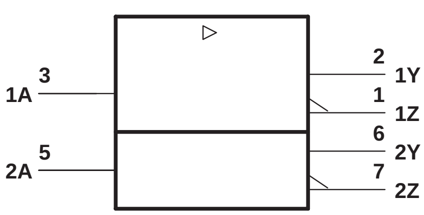
† The PS package is only available left-end taped and reeled, i.e., order SN75158PSLE.

description

The SN75158 is a dual differential line driver designed to satisfy the requirements set by the ANSI EIA/TIA-422-B and ITU V.11 interface specifications. The outputs provide complementary signals with high-current capability for driving balanced lines, such as twisted pair, at normal line impedance without high power dissipation. The output stages are TTL totem-pole outputs providing a high-impedance state in the power-off condition.

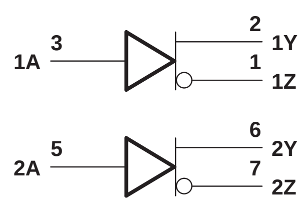
The SN75158 is characterized for operation from 0°C to 70°C.

logic symbol‡



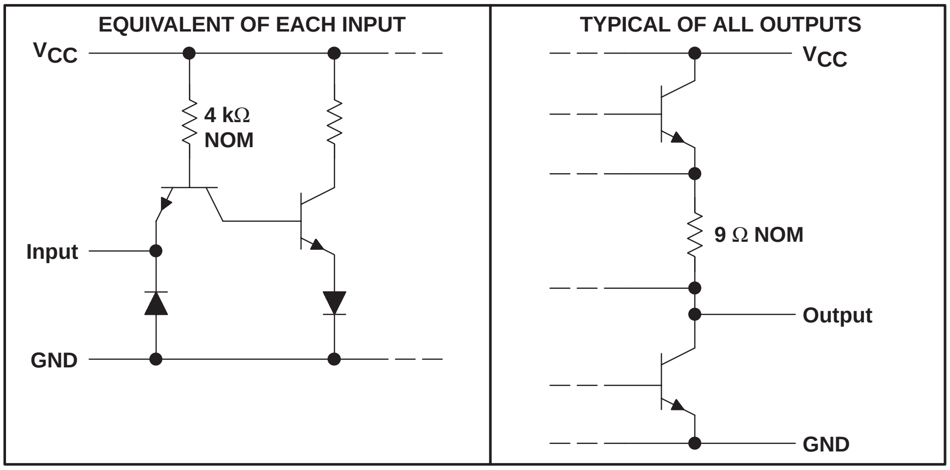
‡ This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

schematics of inputs and outputs



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

Supply voltage, V_{CC} (see Note 1) . . . . 7 V
Input voltage, V_I . . . . 5.5 V
Continuous total power dissipation . . . . See Dissipation Rating Table
Operating free-air temperature range, T_A . . . . 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 voltage values, except differential output voltage V_{OD}, are with respect to network ground terminal. V_{OD} is at the Y output with respect to the Z output.

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	725 mW	5.8 mW/°C	464 mW
P	1000 mW	8.0 mW/°C	640 mW
PS	450 mW	3.6 mW/°C	288 mW

recommended operating conditions

	MIN	NOM	MAX	UNIT
Supply voltage, V_{CC}	4.75	5	5.25	V
High-level input voltage, V_{IH}	2			V
Low-level input voltage, V_{IL}			0.8	V
High-level output current, I_{OH}			–40	mA
Low-level output current, I_{OL}			40	mA
Operating free-air temperature, T_A	0		70	°C

electrical characteristics over operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS†		MIN	TYP‡	MAX	UNIT
V_{IK}	Input clamp voltage	V_{CC} = MIN,	I_I = –12 mA		–0.9	–1.5	V
V_{OH}	High-level output voltage	V_{CC} = MIN, V_{IH} = 2 V,	V_{IL} = 0.8 V, I_{OH} = –40 mA	2.4	3		V
V_{OL}	Low-level output voltage	V_{CC} = MIN, V_{IH} = 2 V,	V_{IL} = 0.8 V, I_{OL} = 40 mA		0.2	0.4	V
$\|V_{OD1}\|$	Differential output voltage	V_{CC} = MAX,	I_O = 0		3.5	$2 \times V_{OD2}$	V
$\|V_{OD2}\|$	Differential output voltage	V_{CC} = MIN	R_L = 100 Ω, See Figure 1	2	3		V
ΔV_{OD}	Change in magnitude of differential output voltage§	V_{CC} = MIN			±0.02	±0.4	V
V_{OC}	Common-mode output voltage¶	V_{CC} = MAX			1.8	3	V
		V_{CC} = MIN			1.5	3	
ΔV_{OC}	Change in magnitude of common-mode output voltage§	V_{CC} = MIN or MAX			±0.02	±0.4	V
I_O	Output current with power off	V_{CC} = 0	V_O = 6 V		0.1	100	µA
			V_O = – 0.25 V		–0.1	–100	
			V_O = – 0.25 to 6 V			±100	
I_I	Input current at maximum input voltage	V_{CC} = MAX,	V_I = 5.5 V			1	mA
I_{IH}	High-level input current	V_{CC} = MAX,	V_I = 2.4 V			40	µA
I_{IL}	Low-level input current	V_{CC} = MAX,	V_I = 0.4 V		–1	–1.6	mA
I_{OS}	Short-circuit output current#	V_{CC} = MAX		–40	–90	–150	mA
I_{CC}	Supply current (both drivers)	V_{CC} = MAX, T_A = 25°C,	Inputs grounded, No load		37	50	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
‡ All typical values are at V_{CC} = 5 V and T_A = 25°C except for V_{OC}, for which V_{CC} is as stated under test conditions.
§ ΔV_{OD} and $\Delta|V_{OC}|$ are the changes in magnitudes of V_{OD} and V_{OC}, respectively, that occur when the input is changed from a high level to a low level.
¶ In ANSI Standard EIA/TIA-422-B, V_{OC}, which is the average of the two output voltages with respect to ground, is called output offset voltage, V_{OS}.
# Only one output should be shorted at a time, and duration of the short circuit should not exceed one second.

switching characteristics, V_{CC} = 5 V, T_A = 25°C

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}	Propagation delay time, low-to-high-level output	See Figure 2, Termination A		16	25	ns
t_{PHL}	Propagation delay time, high-to-low-level output			10	20	ns
t_{PLH}	Propagation delay time, low-to-high-level output	See Figure 2, Termination B		13	20	ns
t_{PHL}	Propagation delay time, high-to-low-level output			9	15	ns
t_{TLH}	Transition time, low-to-high-level output	See Figure 2, Termination A		4	20	ns
t_{TLH}	Transition time, high-to-low-level output			4	20	ns
	Overshoot factor	See Figure 2, Termination C			10%	

PARAMETER MEASUREMENT INFORMATION

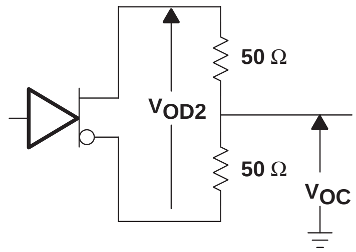
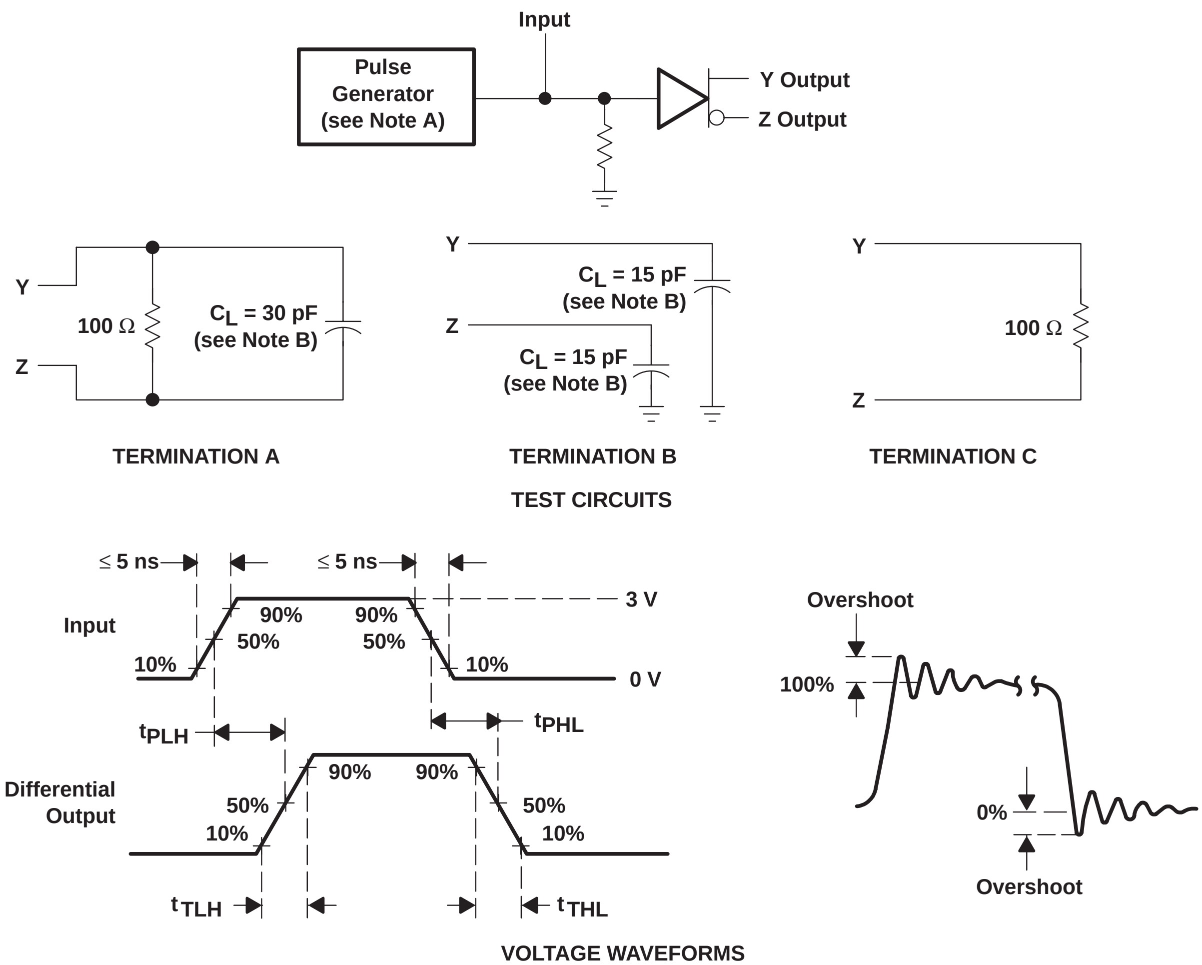


Figure 1. Differential and Common-Mode Output Voltages



NOTES: A. The pulse generator has the following characteristics: Z_O = 50 Ω, t_W = 25 ns, PRR ≤ 10 MHz.
B. C_L includes probe and jig capacitance.

Figure 2. Test Circuit and Voltage Waveforms

TYPICAL CHARACTERISTICS

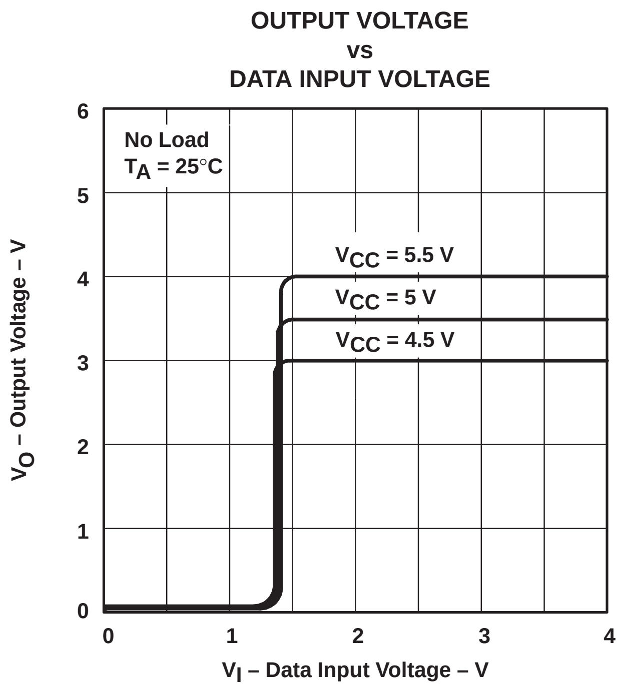


Figure 3

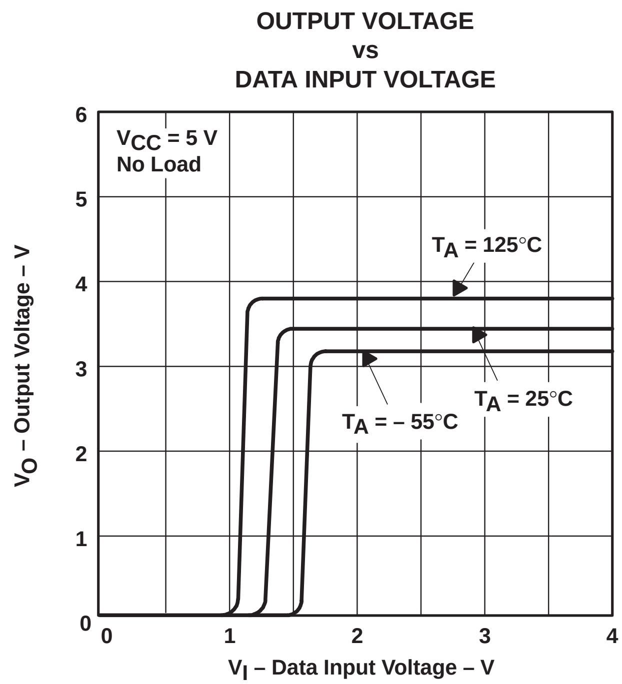


Figure 4

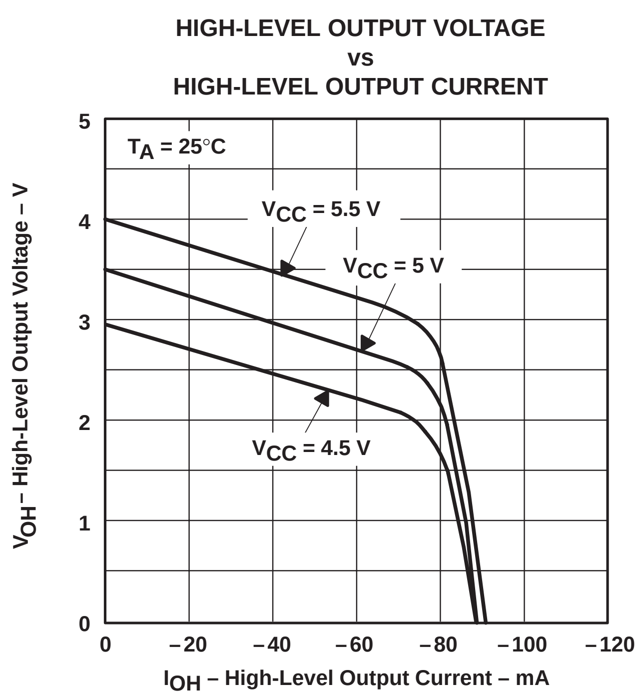


Figure 5

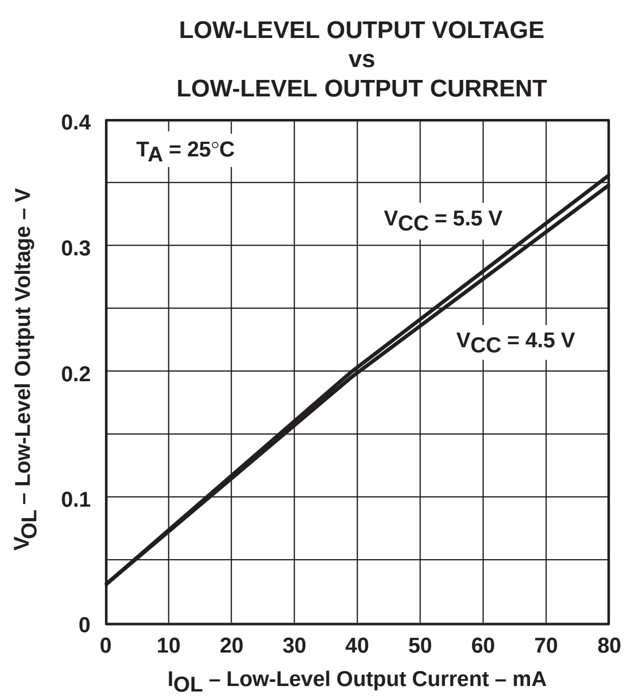


Figure 6

TYPICAL CHARACTERISTICS

OUTPUT VOLTAGE
vs
FREE-AIR TEMPERATURE

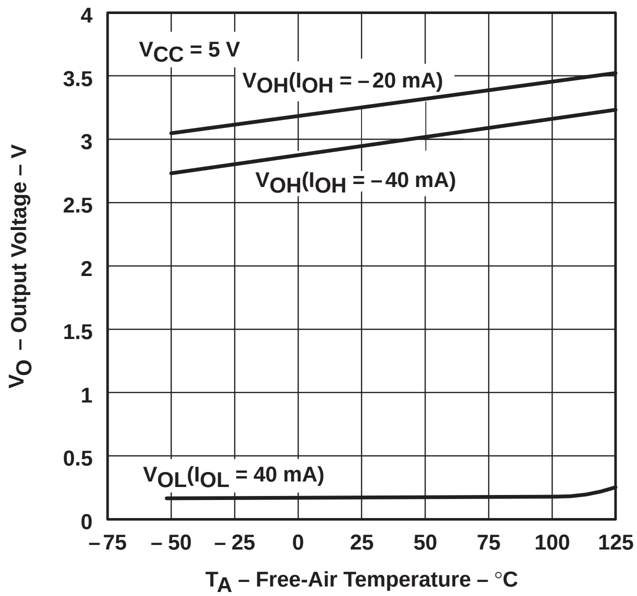


Figure 7

PROPAGATION DELAY TIMES
vs
FREE-AIR TEMPERATURE

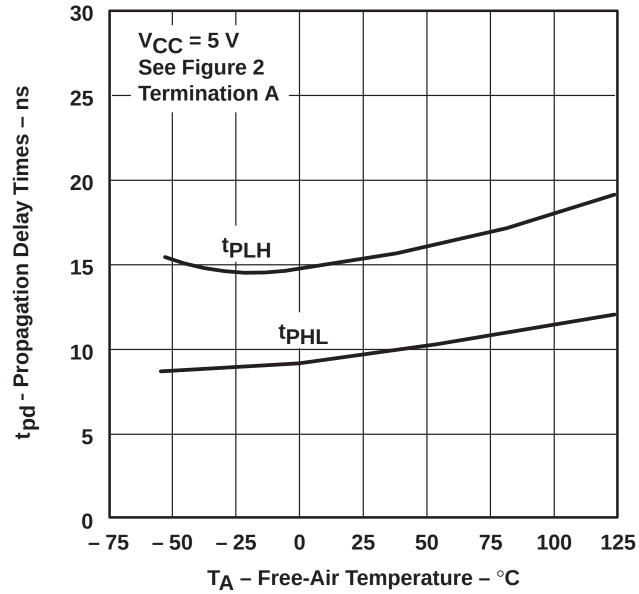


Figure 8

SUPPLY CURRENT
(BOTH DRIVERS)
vs
SUPPLY VOLTAGE

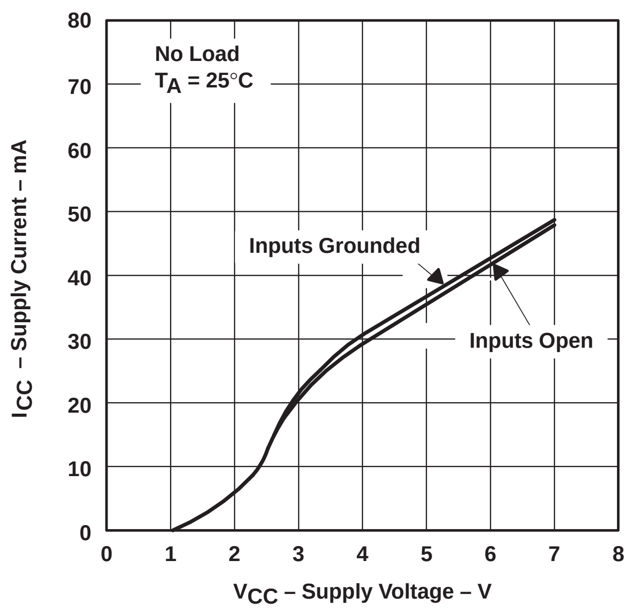


Figure 9

SUPPLY CURRENT
(BOTH DRIVERS)
vs
FREE-AIR TEMPERATURE

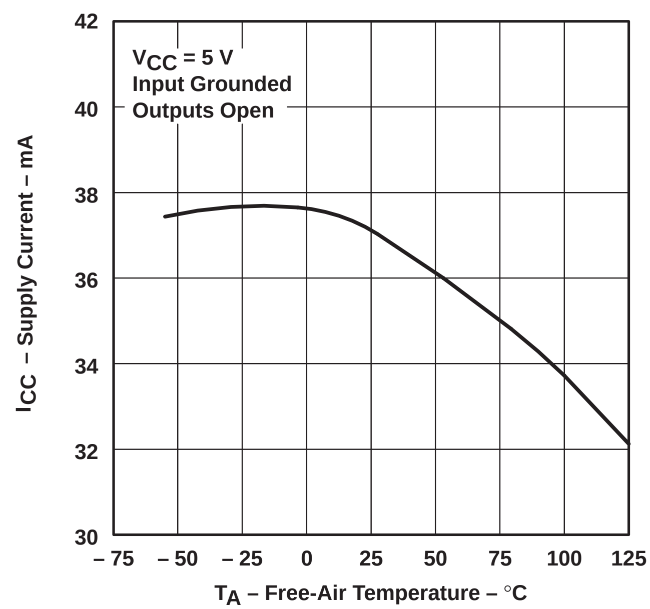


Figure 10

TYPICAL CHARACTERISTICS

SUPPLY CURRENT
(BOTH DRIVERS)
vs
FREQUENCY

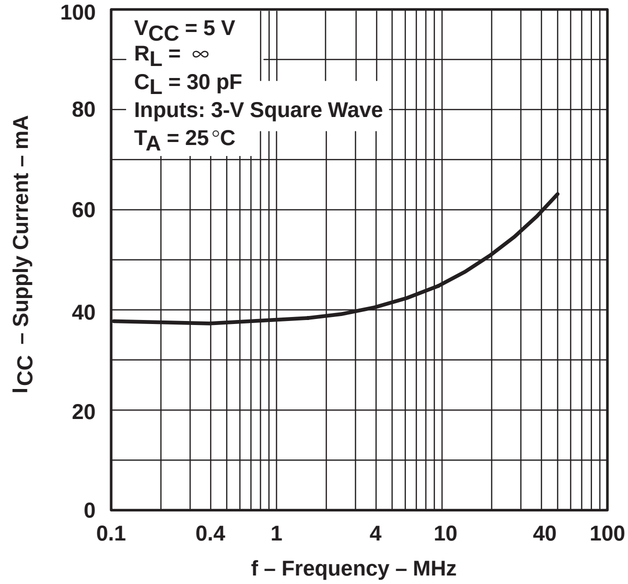


Figure 11