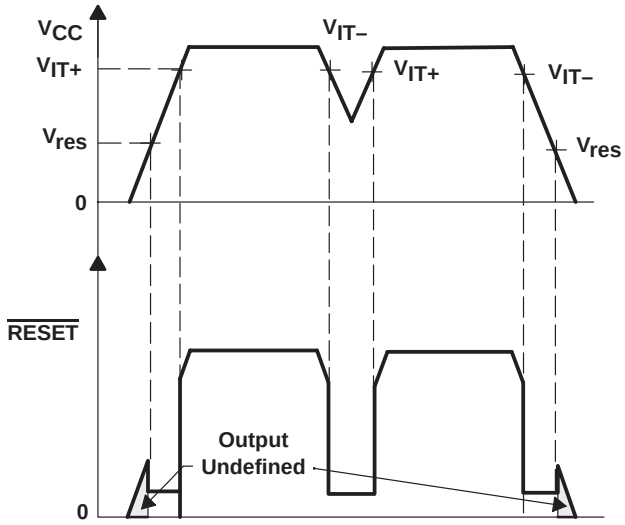
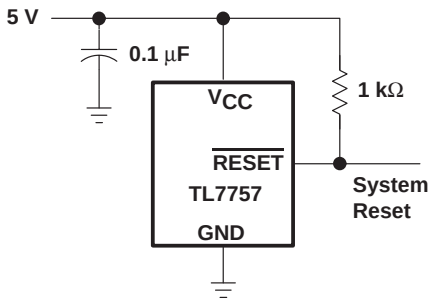
available features

- Power-On Reset Generator
- Automatic Reset Generation After Voltage Drop
- Low Standby Current . . . 20 μA
- Reset Output Defined When V_{CC} Exceeds 1 V
- Complementary Reset Output
- Precision Threshold Voltage 4.55 V ±120 mV
- High Output Sink Capability . . . 20 mA
- Comparator Hysteresis Prevents Erratic Resets

TYPICAL TIMING DIAGRAM



TYPICAL APPLICATION DIAGRAM



description

The TL7757 is a monolithic supply voltage supervisor designed for use in microcomputer and microprocessor systems. The supervisor monitors the supply voltage for undervoltage conditions. During power up, when the supply voltage, V_{CC}, attains a value approaching 1 V, the $\overline{\text{RESET}}$ output becomes active (low) to prevent undefined operation. If at any time, the supply voltage drops below threshold voltage level (V_{IT-}), the $\overline{\text{RESET}}$ output goes to the active (low) level until the supply undervoltage fault condition is eliminated.

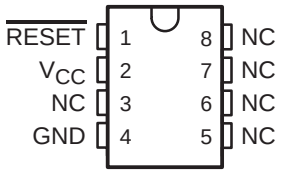
The C-suffix device is characterized for operation from 0°C to 70°C. The I-suffix device is characterized for operation from –40°C to 85°C. The M-suffix device is characterized for operation from –55°C to 125°C.

AVAILABLE OPTIONS

T_A	PACKAGED DEVICES			CHIP FORM (Y)
	SMALL OUTLINE (D)	TO-226AA (LP)	SOT-89 (PK)	
0°C to 70°C	TL7757CD	TL7757CLP	TL7757CPK	TL7757Y
–40°C to 85°C	TL7757ID	TL7757ILP	TL7757IPK	
–55°C to 125°C	TL7757MD	TL7757MLP	—	

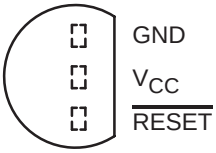
D and LP packages are available taped and reeled. Add R suffix to device type (e.g., TL7757CDR).
Chips are tested at 25°C.

D PACKAGE
(TOP VIEW)

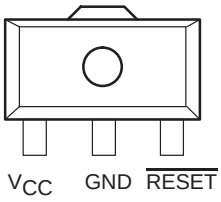


NC – No internal connection

LP PACKAGE
(TOP VIEW)



PK PACKAGE
(TOP VIEW)

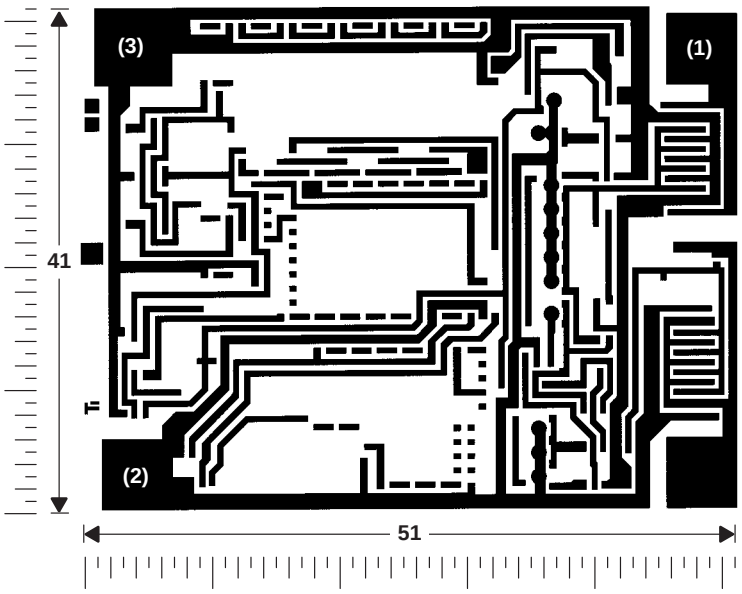


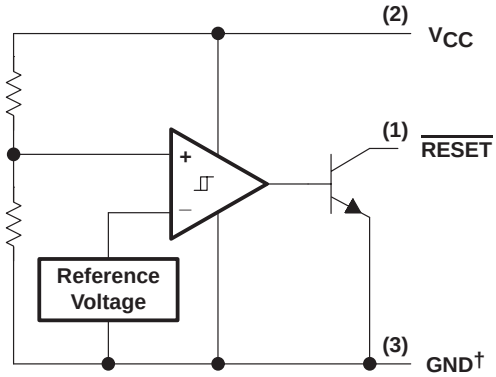
GND is in electrical contact with the tab.

TL7757Y chip information

This chip, when properly assembled, displays characteristics similar to the TL7757C. Thermal compression or ultrasonic bonding may be used on the doped aluminum bonding pads. The chips may be mounted with conductive epoxy or a gold-silicon preform.

BONDING PAD ASSIGNMENTS





† Backside of chip has an internal electrical connection to pad 4.

CHIP THICKNESS: 11 MILS TYPICAL

BONDING PADS: 4 × 4 MILS MINIMUM

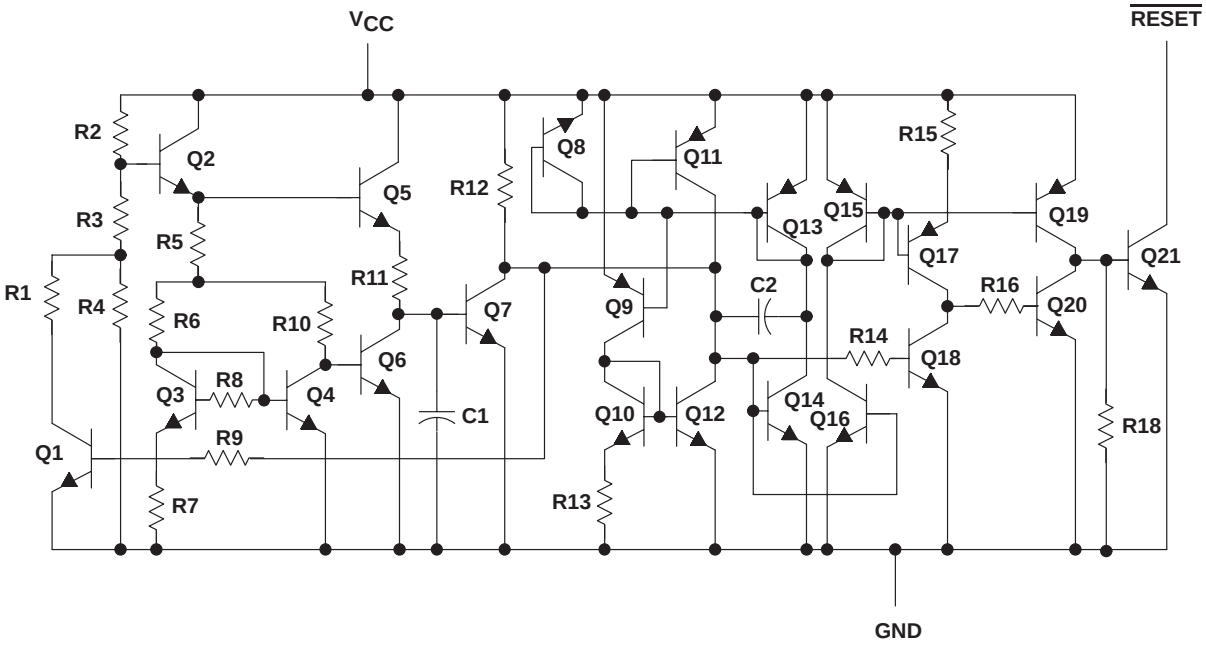
$T_J$max= 150°C

TOLERANCES ARE ±10%

ALL DIMENSIONS ARE IN MILS

NO BACKSIDE METALIZATION

equivalent schematic



ACTUAL DEVICE COMPONENT COUNT	
Transistors	27
Resistors	20
Capacitors	2

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

Supply voltage range, V_{CC} (see Note 1) . . . . . –0.3 V to 20 V
Offstate output voltage range (see Note 1) . . . . . –0.3 V to 20 V
Output current, I_O . . . . . 30 mA
Operating free-air temperature range, T_A: C-suffix . . . . . 0°C to 70°C
I-suffix . . . . . –40°C to 85°C
M-suffix . . . . . –55°C to 125°C
Continuous total power dissipation . . . . . See Dissipation Rating Tables
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 are with respect to network terminal ground.

DISSIPATION RATING TABLE 1 – FREE-AIR TEMPERATURE

PACKAGE	$T_A \le 25°C$ POWER RATING	DERATING FACTOR	DERATE ABOVE	$T_A = 70°C$	$T_A = 85°C$	$T_A = 125°C$
D	725 mW	5.8 mW/°C	T_A = 25°C	464 mW	377 mW	145 mW
LP	775 mW	6.2 mW/°C	T_A = 25°C	496 mW	403 mW	155 mW
PK	500 mW	4.0 mW/°C	T_A = 25°C	320 mW	260 mW	—

DISSIPATION RATING TABLE 2 – CASE TEMPERATURE

PACKAGE	$T_A \le 25°C$ POWER RATING	DERATING FACTOR	DERATE ABOVE	$T_A = 70°C$	$T_A = 85°C$
PK	3125 mW	25 mW/°C	T_C =110°C	2000 mW	1625 mW

recommended operating conditions

	C-SUFFIX		I-SUFFIX		M-SUFFIX		UNIT
	MIN	MAX	MIN	MAX	MIN	MAX	
Supply voltage, V_{CC}	1	7	1	7	1	7	V
High-level output voltage, V_{OH}		15		15		15	V
Low-level output current, I_{OL}		20		20		20	mA
Operating free-air temperature, T_A	0	70	–40	85	–55	125	°C

electrical characteristics at specified free-air temperature

PARAMETER		TEST CONDITIONS	T_A†	TL7757C			UNIT
				MIN	TYP	MAX	
V_{IT-}	Negative-going input threshold voltage at V_{CC}		25°C	4.43	4.55	4.67	V
			Full range	4.4		4.7	
V_{hys}‡	Hysteresis at V_{CC}		25°C	40	50	60	mV
			Full range	30		70	
V_{OL}	Low-level output voltage	I_{OL} = 20 mA, V_{CC} = 4.3 V	25°C		0.4	0.8	V
			Full range			0.8	
I_{OH}	High-level output current	V_{CC} = 7 V, V_{OH} = 15 V, See Figure 1	25°C			1	µA
			Full range			1	
V_{res}§	Power-up reset voltage	R_L = 2.2 kΩ, V_{CC} slew rate ≤ 5 V/µs	25°C		0.8	1	V
			Full range			1.2	
I_{CC}	Supply current	V_{CC} = 4.3 V	25°C		1400	2000	µA
			Full range			2000	
		V_{CC} = 5.5 V	Full range			40	

† Full range is 0°C to 70°C.
‡ This is the difference between positive-going input threshold voltage, V_{IT+}, and negative-going input threshold voltage, V_{IT-}.
§ This is the lowest voltage at which $\overline{\text{RESET}}$ becomes active.

switching characteristics at T_A = 25°C (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A†	TL7757C			UNIT
				MIN	TYP	MAX	
t_{PLH}	Propagation delay time, low-to-high-level output	V_{CC} slew rate ≤ 5 V/µs, See Figures 2 and 3	25°C		3.4	5	µs
			Full range			5	
t_{PHL}	Propagation delay time, high-to-low-level output	See Figures 2 and 3	25°C		2	5	µs
			Full range			5	
t_r	Rise time	V_{CC} slew rate ≤ 5 V/µs, See Figures 2 and 3	25°C		0.4	1	µs
			Full range			1	
t_f	Fall time	See Figures 2 and 3	25°C		0.05	1	µs
			Full range			1	
$t_{w(min)}$	Minimum pulse duration at V_{CC} for output response		25°C			5	µs
			Full range			5	

† Full range is 0°C to 70°C.

electrical characteristics at specified free-air temperature

PARAMETER		TEST CONDITIONS	T_A†	TL7757I			UNIT
				MIN	TYP	MAX	
V_{IT-}	Negative-going input threshold voltage at V_{CC}		25°C	4.43	4.55	4.67	V
			Full range	4.4		4.7	
V_{hys}‡	Hysteresis at V_{CC}		25°C	40	50	60	mV
			Full range	30		70	
V_{OL}	Low-level output voltage	I_{OL} = 20 mA, V_{CC} = 4.3 V	25°C		0.4	0.8	V
			Full range			0.8	
I_{OH}	High-level output current	V_{CC} = 7 V, V_{OH} = 15 V, See Figure 1	25°C			1	µA
			Full range			1	
V_{res}§	Power-up reset voltage	R_L = 2.2 kΩ, V_{CC} slew rate ≤ 5 V/µs	25°C		0.8	1	V
			Full range			1.2	
I_{CC}	Supply current	V_{CC} = 4.3 V	25°C		1400	2000	µA
			Full range			2100	
		V_{CC} = 5.5 V	Full range			40	

† Full range is –40°C to 85°C.
‡ This is the difference between positive-going input threshold voltage, V_{IT+}, and negative-going input threshold voltage, V_{IT-}.
§ This is the lowest voltage at which $\overline{\text{RESET}}$ becomes active.

switching characteristics at T_A = 25°C (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A†	TL7757I			UNIT
				MIN	TYP	MAX	
t_{PLH}	Propagation delay time, low-to-high-level output	V_{CC} slew rate ≤ 5 V/µs, See Figures 2 and 3	25°C		3.4	5	µs
			Full range			5	
t_{PHL}	Propagation delay time, high-to-low-level output	See Figures 2 and 3	25°C		2	5	µs
			Full range			5	
t_r	Rise time	V_{CC} slew rate ≤ 5 V/µs, See Figures 2 and 3	25°C		0.4	1	µs
			Full range			1	
t_f	Fall time	See Figures 2 and 3	25°C		0.05	1	µs
			Full range			1	
$t_{w(min)}$	Minimum pulse duration at V_{CC} for output response		25°C			5	µs
			Full range			5	

† Full range is –40°C to 85°C.

electrical characteristics at specified free-air temperature

PARAMETER		TEST CONDITIONS	T_A†	TL7757M			UNIT
				MIN	TYP	MAX	
V_{IT-}	Negative-going input threshold voltage at V_{CC}		25°C	4.43	4.55	4.67	V
			Full range	4.35		4.7	
V_{hys}‡	Hysteresis at V_{CC}		25°C	40	50	60	mV
			Full range	30		70	
V_{OL}	Low-level output voltage	I_{OL} = 20 mA, V_{CC} = 4.3 V	25°C		0.4	0.8	V
			Full range			0.8	
I_{OH}	High-level output current	V_{CC} = 7 V, V_{OH} = 15 V, See Figure 1	25°C			1	µA
			Full range			1	
V_{res}§	Power-up reset voltage	R_L = 2.2 kΩ, V_{CC} slew rate ≤ 5 V/µs	25°C		0.8	1	V
			Full range			1.2	
I_{CC}	Supply current	V_{CC} = 4.3 V	25°C		1400	2000	µA
			Full range			2500	
		V_{CC} = 5.5 V	Full range			40	

† Full range is –55°C to 125°C.
‡ This is the difference between positive-going input threshold voltage, V_{IT+}, and negative-going input threshold voltage, V_{IT-}.
§ This is the lowest voltage at which $\overline{\text{RESET}}$ becomes active.

switching characteristics at T_A = 25°C (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A†	TL7757M			UNIT
				MIN	TYP	MAX	
t_{PLH}	Propagation delay time, low-to-high-level output	V_{CC} slew rate ≤ 5 V/µs, See Figures 2 and 3	25°C		3.4	5*	µs
			Full range			5*	
t_{PHL}	Propagation delay time, high-to-low-level output	See Figures 2 and 3	25°C		2	5*	µs
			Full range			5*	
t_r	Rise time	V_{CC} slew rate ≤ 5 V/µs, See Figures 2 and 3	25°C		0.4	1*	µs
			Full range			1*	
t_f	Fall time	See Figures 2 and 3	25°C		0.05	1*	µs
			Full range			1	
$t_{w(min)}$	Minimum pulse duration at V_{CC} for output response		25°C			5*	µs
			Full range			5*	

*On products compliant to MIL-STD-883, Class B, this parameter is not production tested.
† Full range is –55°C to 125°C.

electrical characteristics at T_A = 25°C

PARAMETER		TEST CONDITIONS	TL7757Y			UNIT
			MIN	TYP	MAX	
V_{IT-}	Negative-going input threshold voltage at V_{CC}			4.55		V
V_{hys}†	Hysteresis at V_{CC}			50		mV
V_{OL}	Low-level output voltage	I_{OL} = 20 mA, V_{CC} = 4.3 V		0.4		V
I_{OH}	High-level output current	V_{CC} = 7 V, V_{OH} = 15 V, See Figure 1				µA
V_{res}‡	Power-up reset voltage	R_L = 2.2 kΩ, V_{CC} slew rate ≤ 5 V/µs		0.8		V
I_{CC}	Supply current	V_{CC} = 4.3 V		1400		µA
		V_{CC} = 5.5 V				

† This is the difference between positive-going input threshold voltage, V_{IT+}, and negative-going input threshold voltage, V_{IT-}.
‡ This is the lowest voltage at which $\overline{\text{RESET}}$ becomes active.

switching characteristics at T_A = 25°C

PARAMETER		TEST CONDITIONS	TL7757Y			UNIT
			MIN	TYP	MAX	
t_{PLH}	Propagation delay time, low-to-high-level output	V_{CC} slew rate ≤ 5 V/µs, See Figures 2 and 3		3.4		µs
t_{PHL}	Propagation delay time, high-to-low-level output	See Figures 2 and 3		2		µs
t_r	Rise time	V_{CC} slew rate ≤ 5 V/µs, See Figures 2 and 3		0.4		µs
t_f	Fall time	See Figures 2 and 3		0.05		µs

PARAMETER MEASUREMENT INFORMATION

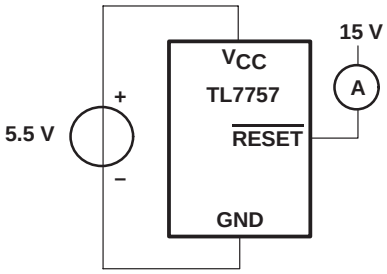
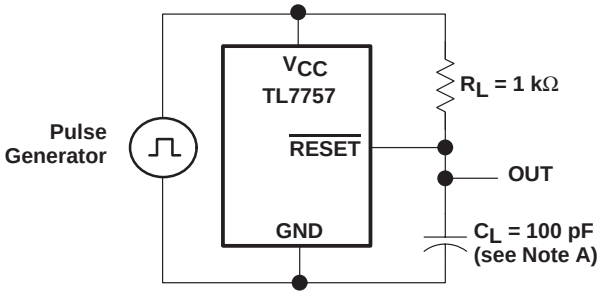
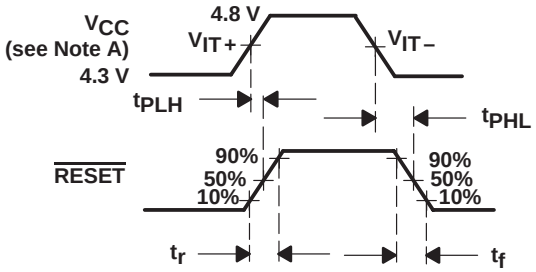


Figure 1. Test Circuit for Output Leakage Current



NOTE A: Includes jig and probe capacitance.

Figure 2. Test Circuit for $\overline{\text{RESET}}$ Output Switching Characteristics



NOTE A: V_{CC} slew rate ≤ 5 μs

Figure 3. Switching Diagram

TYPICAL CHARACTERISTICS†

Table of Graphs

			FIGURE
V_{CC}	Supply voltage	vs $\overline{\text{RESET}}$ output voltage	4
I_{CC}	Supply current	vs Supply voltage	5
		vs Free-air temperature	6
V_{OL}	Low-level output voltage	vs Low-level output current	7
		vs Free-air temperature	8
I_{OL}	Output current	vs Supply voltage	9
V_{IT-}	Input threshold voltage (negative-going V_{CC})	vs Free-air temperature	10
V_{res}	Power-up reset voltage	vs Free-air temperature	11
V_{res}	Power-up reset voltage and supply voltage	vs Time	12
	Propagation delay time		13

SUPPLY VOLTAGE vs $\overline{\text{RESET}}$ OUTPUT VOLTAGE

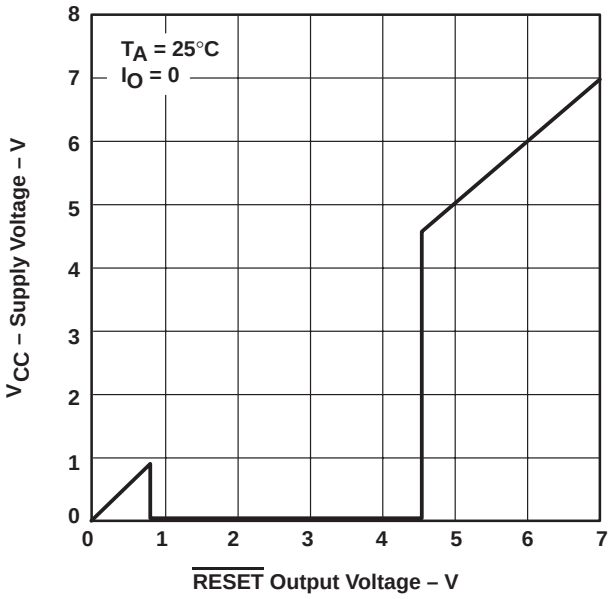


Figure 4

SUPPLY CURRENT vs SUPPLY VOLTAGE

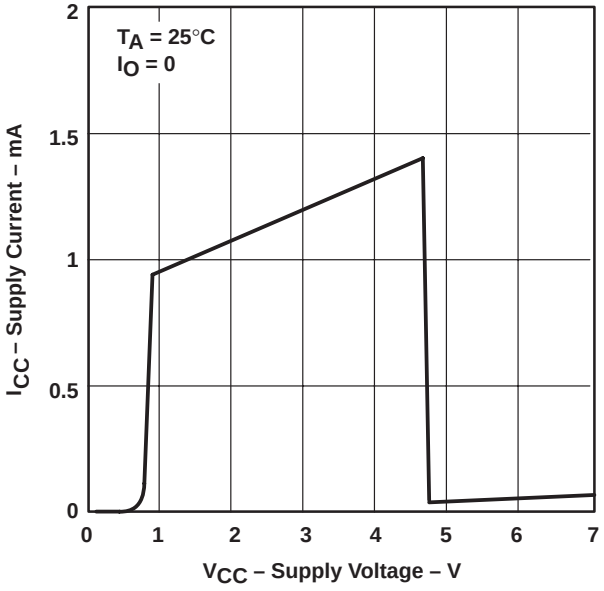


Figure 5

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS†

SUPPLY CURRENT vs FREE-AIR TEMPERATURE

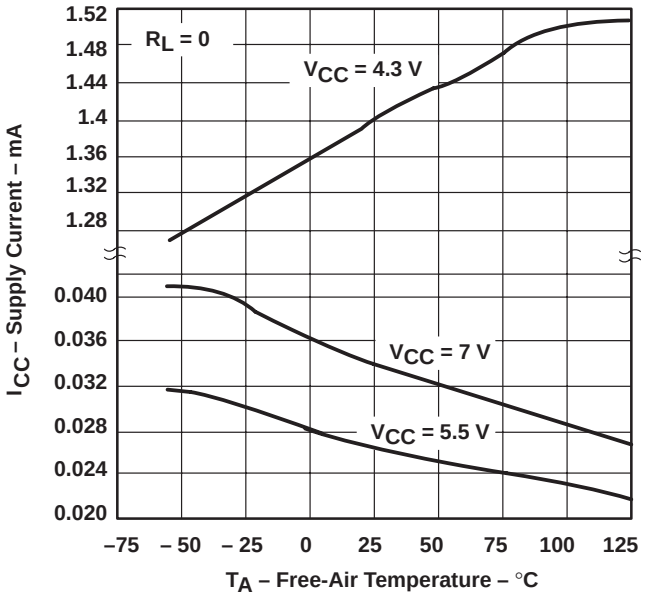


Figure 6

LOW-LEVEL OUTPUT VOLTAGE vs LOW-LEVEL OUTPUT CURRENT

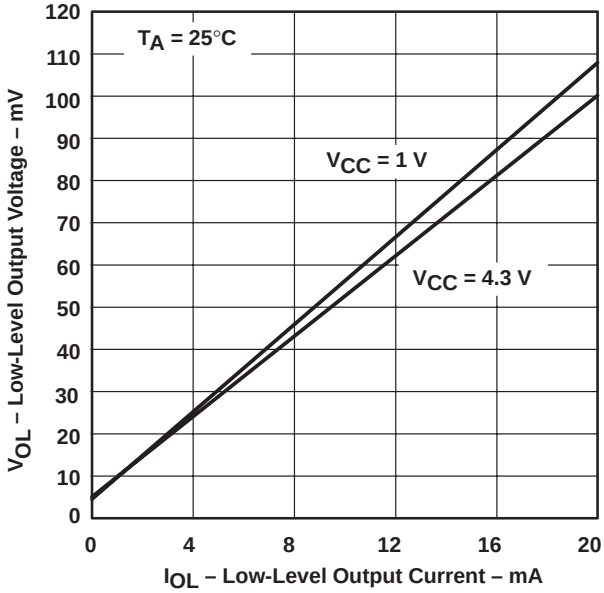


Figure 7

LOW-LEVEL OUTPUT VOLTAGE vs FREE-AIR TEMPERATURE

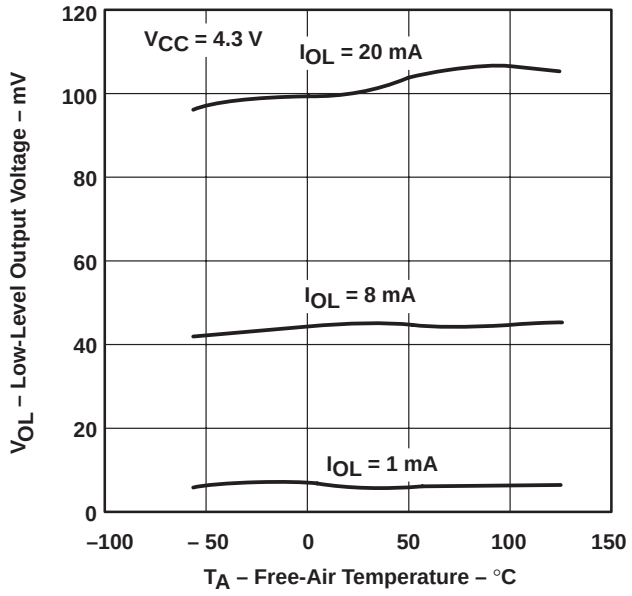


Figure 8

OUTPUT CURRENT vs SUPPLY VOLTAGE

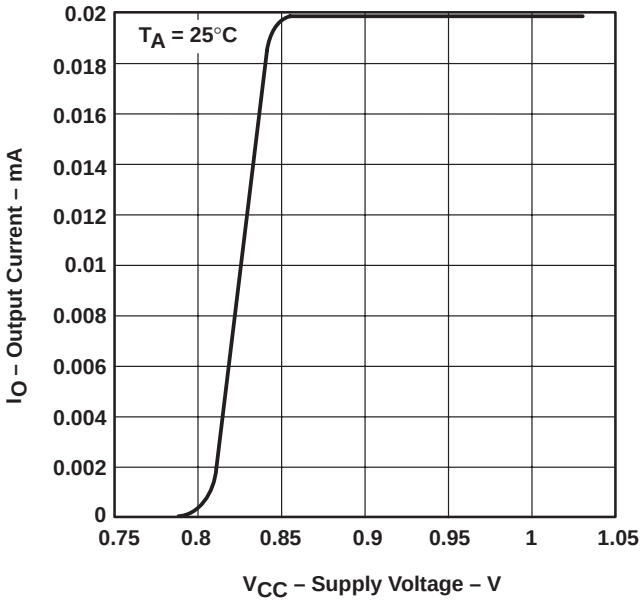


Figure 9

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS†

INPUT THRESHOLD VOLTAGE (NEGATIVE GOING V_{CC}) vs FREE-AIR TEMPERATURE

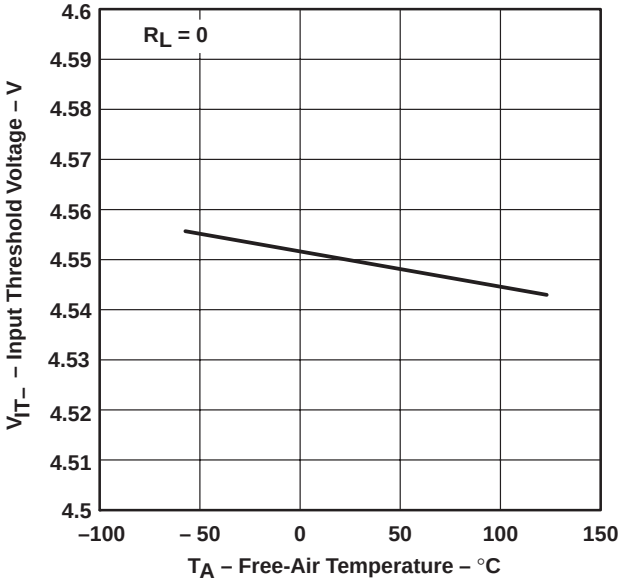


Figure 10

POWER-UP RESET VOLTAGE vs FREE-AIR TEMPERATURE

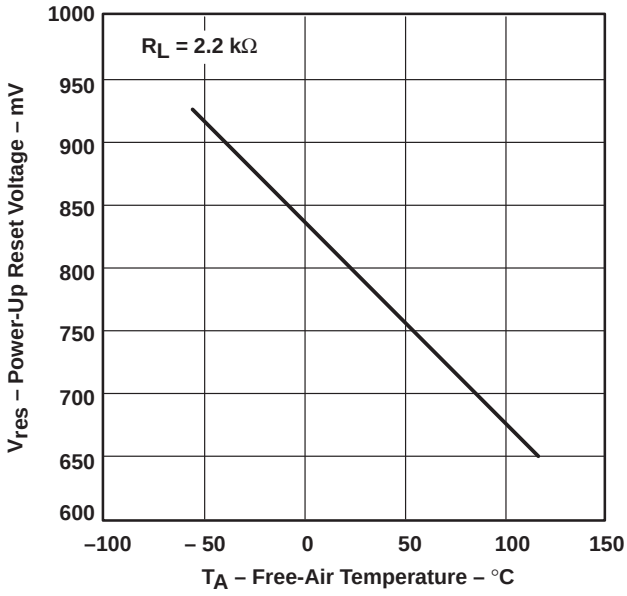


Figure 11

POWER-UP RESET VOLTAGE AND SUPPLY VOLTAGE vs TIME

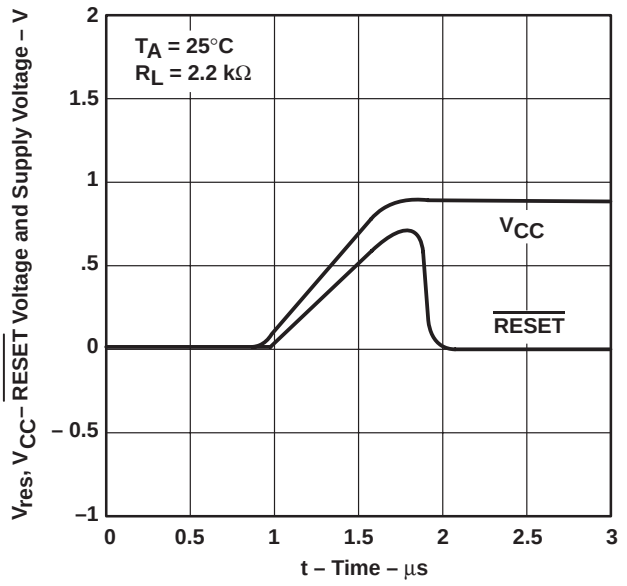


Figure 12

PROPAGATION DELAY TIME

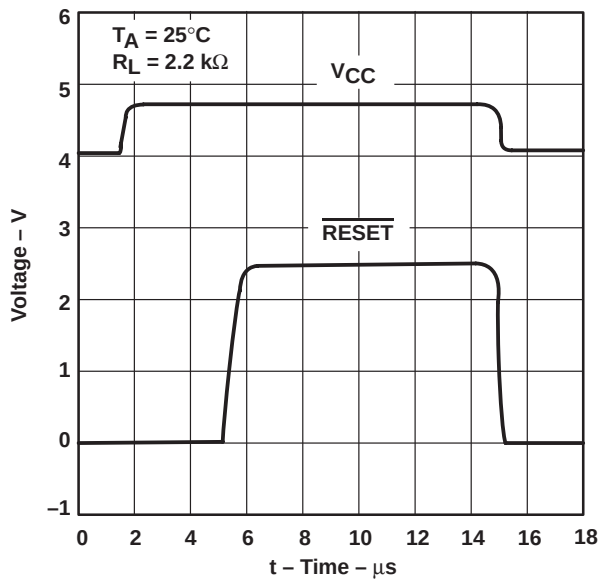


Figure 13

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

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