Ordering Information

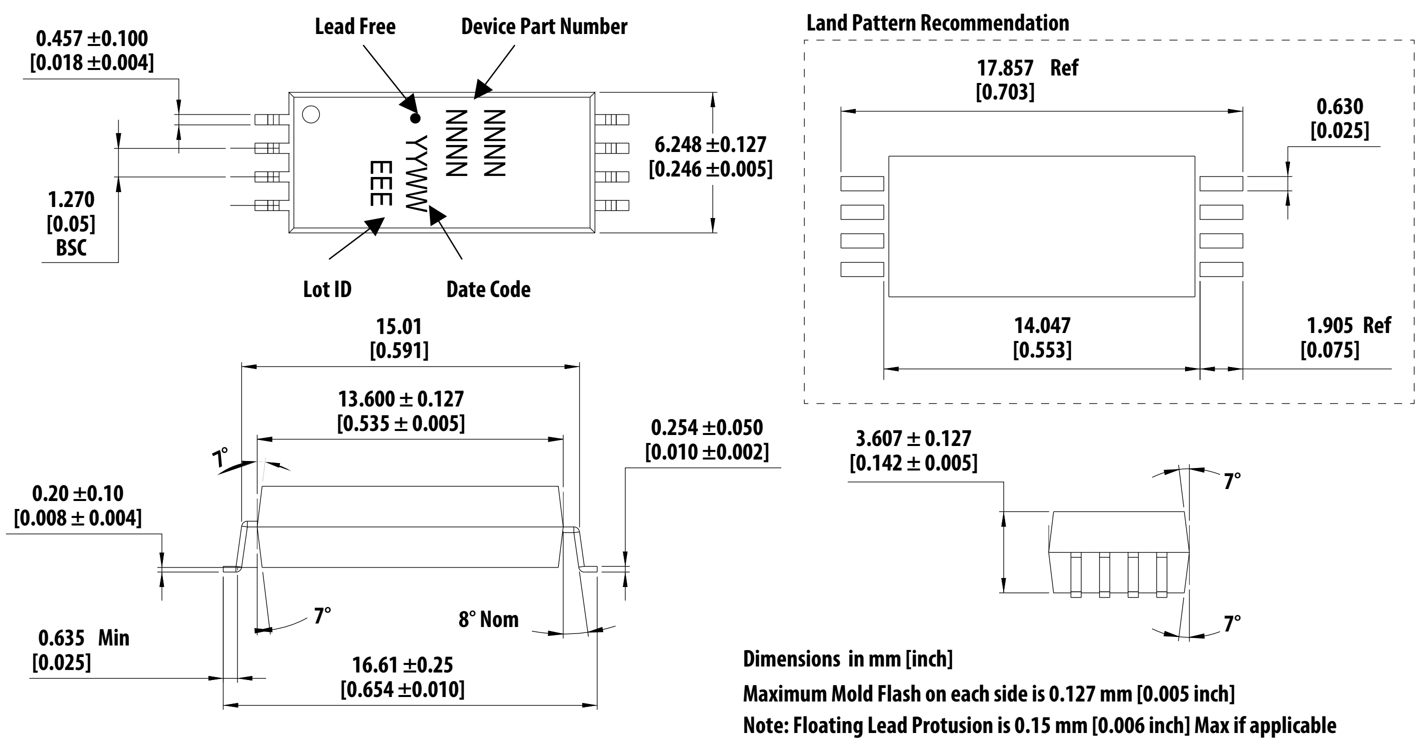
ACNT-H50L is UL Recognized with 7500V_{RMS} for 1 minute per UL1577.

Part Number	Option RoHS Compliant	Package	Surface Mount	Tape and Reel	UL 1577	IEC 60747-5-5	Quantity
ACNT-H50L	-000E	15-mm Stretched SO8	X		X	X	80 per tube
	-500E		X	X	X	X	1000 per reel

To order, choose a part number from the part number column and combine with the desired option from the option column to form an order entry.

Package Outline Drawing

ACNT-H50L Stretched SO8 Package



Solder Reflow Profile

Recommended reflow conditions are as per JEDEC Standard, J-STD-020 (latest revision). Non-Halide Flux should be used.

Regulatory Information

The ACNT-H50L is approved by the following organizations:

- **UL:** Approval under UL 1577, component recognition program up to V_{ISO} = 7500V_{RMS} File E55361.
- **CSA:** Approval under CSA Component Acceptance Notice #5, File CA 88324.
- **IEC 60747-5-5:** Maximum Working Insulation Voltage V_{IORM} = 2262 V_{PEAK}

Insulation and Safety Related Specifications

Parameter	Symbol	ACNT-H50L	Unit	Conditions
Minimum External Air Gap (External Clearance)	L(101)	14.2	mm	Measured from input terminals to output terminals, shortest distance through air.
Minimum External Tracking (External Creepage)	L(102)	15	mm	Measured from input terminals to output terminals, shortest distance path along body.
Minimum Internal Plastic Gap (Internal Clearance)		0.5	mm	Through insulation distance conductor to conductor, usually the straight line distance thickness between the emitter and detector.
Tracking Resistance (Comparative Tracking Index)	CTI	>300	V	DIN IEC 112/VDE 0303 Part 1
Isolation Group		IIIa		Material Group (DIN VDE 0110, 1/89, Table 1)

IEC 60747-5-5 Insulation Characteristics[a]

Description	Symbol	Characteristic	Unit
Installation Classification per DIN VDE 0110/39, Table 1 for rated mains voltage ≤ 600V_{RMS} for rated mains voltage ≤ 1000V_{RMS}		 I – IV I – IV	
Climatic Classification		40/105/21	
Pollution Degree (DIN VDE 0110/39)		2	
Maximum Working Insulation Voltage	V_{IORM}	2262	V_{peak}
Input to Output Test Voltage, Method b[a] V_{IORM} x 1.875 = V_{PR}, 100% Production Test with t_m = 1 sec, Partial Discharge < 5 pC	V_{PR}	4241	V_{peak}
Input to Output Test Voltage, Method a[a] V_{IORM} x 1.6 = V_{PR}, Type and Sample Test, t_m = 10 sec, Partial Discharge < 5 pC	V_{PR}	3619	V_{peak}
Highest Allowable Overvoltage (Transient Overvoltage t_{ini} = 60 sec)	V_{IOTM}	12000	V_{peak}
Safety-limiting values – Maximum Values Allowed in the Event of a Failure Case Temperature Input Current Output Power	 T_S $I_{S, INPUT}$ $P_{S, OUTPUT}$	 150 230 1000	 °C mA mW
Insulation Resistance at T_S, V_{IO} = 500V	R_S	$>10^9$	Ω

a. Refer to the optocoupler section of the Isolation and Control Components Designer's Catalog, under Product Safety Regulations section, (IEC 60747-5-5) for a detailed description of Method a and Method b partial discharge test profiles.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T_S	–55	125	°C
Operating Temperature	T_A	–40	105	°C
Average Forward Input Current	$I_{F(avg)}$	—	20	mA
Peak Forward Input Current (<1 µs Pulse Width, <10% Duty Cycle)	$I_{F(peak)}$	—	80	mA
Peak Transient Input Current (≤1 µs pulse width, <300 ps)	$I_{F(trans)}$	—	1	A
Reversed Input Voltage	V_R	—	5	V
Input Power Dissipation	P_{IN}	—	35	mW
Output Power Dissipation	P_O	—	100	mW
Average Output Current	$I_{O(AVG)}$	—	8	mA
Peak Output Current	$I_{O(PEAK)}$	—	16	mA
Supply Voltage	V_{CC}	–0.5	30	V
Output Voltage	V_O	–0.5	24	V
Lead Solder Temperature	T_{LS}	260°C for 10 sec, 1.6 mm below seating plane		
Solder Reflow Temperature Profile		Refer to Solder Reflow Profile section.		

Recommended Operating Conditions

Parameter	Symbol	Min.	Max.	Unit
Supply Voltage	V_{CC}	3.0	24	V
Input Current, High Level	I_{FH}	10	18	mA
Operating Temperature	T_A	–40	105	°C
Forward Input Voltage (OFF)	$V_{F(OFF)}$	—	0.8	V

Electrical Specifications (DC)

Over recommended operating T_A = –40°C to +105°C, supply voltage (3.0V ≤ V_{CC} ≤ 24V) and unless otherwise specified. All typical values are at T_A = 25°C.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions			Figure
Current Transfer Ratio	CTR[a]	31	50	80	%	T_A = 25°C	V_O = 0.4V	V_{CC} = 3.3V or 5V, I_F = 12 mA	Figure 2, Figure 3
		21	—	—	%		V_O = 0.5V		
Logic Low Output Voltage	V_{OL}	—	0.2	0.4	V	T_A = 25°C	I_O = 3 mA	V_{CC} = 3.3V or 5V	
		—	0.2	0.5	V		I_O = 1.6 mA	I_F = 12 mA	

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions			Figure
Logic High Output Current	I_{OH}	—	0.014	0.5	µA	$T_A = 25°C$	$V_O = V_{CC} =$ 5.5V	$I_F = 0$ mA	Figure 4, Figure 5
		—	0.06	1			$V_O = V_{CC} =$ 24V		
		—	—	80			$V_O = V_{CC} =$ 24V		
Logic Low Supply Current	I_{CCL}	—	200	400	µA		$I_F = 12$ mA, $V_O =$ open, $V_{CC} = 24V$		
Logic High Supply Current	I_{CCH}	—	—	2	µA		$I_F = 0$ mA, $V_O =$ open, $V_{CC} = 24V$		
Input Forward Voltage	V_F	1.10	1.45	1.70	V		$I_F = 12$ mA		Figure 1
Input Reversed Breakdown Voltage	BV_R	7	—	—	V		$I_R = 10$ µA		
Temperature Coefficient of Forward Voltage	$\Delta V_F/\Delta T_A$	—	–1.5	—	mV/°C		$I_F = 12$ mA		
Input Capacitance	C_{IN}	—	20	—	pF		f = 1 MHz, $V_F = 0$		

a. Current Transfer Ratio in percent is defined as the ratio of output collector current, I_O, to the forward LED input current, I_F, times 100%.

Switching Specifications

Over recommended operating (T_A = –40°C to +105°C), I_F = 12 mA, (3.0V ≤ V_{CC} ≤ 24V), unless otherwise specified.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions		Figure
Propagation Delay Time to Logic Low at Output	T_{PHL}	—	0.1	0.8	µs	$T_A = 25°C$	Pulse: f = 10 kHz, Duty cycle = 50%, V_{CC} = 3.3V, RL= 1.0 kΩ, CL = 15 pF, V_{THHL} = 1.5V	Figure 15
		—		1.0	µs			Figure 6, Figure 15
		—	0.1	0.8	µs	$T_A = 25°C$	Pulse: f = 10 kHz, Duty cycle = 50%, V_{CC} = 5.0V, R_L= 1.6 kΩ, C_L = 15 pF, V_{THHL} = 1.5V	Figure 15
		—		1.0	µs			Figure 7, Figure 15
		—	0.15	0.8	µs	$T_A = 25°C$	Pulse: f = 10 kHz, Duty cycle = 50%, V_{CC} = 24V, R_L= 8.2 kΩ, C_L = 15 pF, V_{THHL} = 1.5V	Figure 15
		—		1.0	µs			Figure 8, Figure 15
Propagation Delay Time to Logic High at Output	T_{PLH}	—	0.4	1.0	µs	$T_A = 25°C$	Pulse: f = 10 kHz, Duty cycle = 50%, V_{CC} = 3.3V, R_L = 1.0 kΩ, C_L = 15 pF V_{THLH} = 2.0V	Figure 15
		—		1.3	µs			Figure 6, Figure 15
		—	0.4	1.0	µs	$T_A = 25°C$	Pulse: f = 10 kHz, Duty cycle = 50%, V_{CC} = 5.0V, R_L = 1.6 kΩ, C_L = 15 pF, V_{THLH} = 2.0V	Figure 15
		—		1.3	µs			Figure 7, Figure 15
		—	0.4	1.0	µs	$T_A = 25°C$	Pulse: f = 10 kHz, Duty cycle = 50%, V_{CC} = 24V, R_L = 8.2 kΩ, C_L = 15 pF, V_{THLH} = 2.0V	Figure 15
		—		1.3	µs			Figure 8, Figure 15

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions		Figure
Propagation Delay Difference Between Any Two Parts[a]		—	0.4	0.8	µs	$T_A = 25°C$	Pulse: f = 10 kHz, Duty cycle = 50%, $V_{CC} = 3.3V$, $R_L = 1.0\ k\Omega$, $C_L = 15\ pF$, $V_{THHL} = 1.5V$, $V_{THLH} = 2.0V$	
		—	0.3	0.6	µs	$T_A = 25°C$	Pulse: f = 10 kHz, Duty cycle = 50%, $V_{CC} = 5.0V$, $R_L = 1.6\ k\Omega$, $C_L = 15\ pF$, $V_{THHL} = 1.5V$, $V_{THLH} = 2.0V$	
		—	0.3	0.6	µs	$T_A = 25°C$	Pulse: f = 10 kHz, Duty cycle = 50%, $V_{CC} = 24V$, $R_L = 8.2\ k\Omega$, $C_L = 15\ pF$, $V_{THHL} = 1.5V$, $V_{THLH} = 2.0V$	
Common-Mode Transient Immunity at Logic High Output[b]	$\|CM_H\|$	15	40	—	kV/µs	$T_A = 25°C$	$V_{CM} = 1500V$, $I_F = 0\ mA$, $R_L = 1.0\ k\Omega$ or $1.6\ k\Omega$, $V_{CC} = 3.3V/5V$	Figure 16
Common-Mode Transient Immunity at Logic Low Output[c]	$\|CM_L\|$	15	40	—	kV/µs	$T_A = 25°C$	$V_{CM} = 1500V$, $I_F = 12\ mA$, $R_L = 1.6\ k\Omega$, $V_{CC} = 5V$	Figure 16
		15	40	—	kV/µs	$T_A = 25°C$	$V_{CM} = 1500V$, $I_F = 12\ mA$, $R_L = 1.0\ k\Omega$, $V_{CC} = 3.3V$	Figure 16

a. The difference between t_{PLH} and t_{PHL} between any two parts under the same test condition.

b. Common transient immunity in a Logic High level is the maximum tolerable (positive) dV_{CM}/dt on the rising edge of the common-mode pulse, V_{CM}, to assure that the output remains in a Logic High state.

c. Common-mode transient immunity in a Logic Low level is the maximum tolerable (negative) dV_{CM}/dt on the falling edge of the common-mode pulse signal, V_{CM} to assure that the output remains in a Logic Low state.

Package Characteristics

All Typical at $T_A = 25°C$.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Input-Output Momentary Withstand Voltage[a]	V_{ISO}	7500	—	—	V_{rms}	RH ≤ 50%, t = 1 min., $T_A = 25°C$
Input-Output Resistance[a]	R_{I-O}	—	10^{14}	—	Ω	$V_{I-O} = 500V$ DC
Input-Output Capacitance[a]	C_{I-O}	—	0.6	—	pF	f = 1 MHz, $T_A = 25°C$

a. Device considered a two terminal device: pins 2 and 3 shorted together and pins 5, 6, and 8 shorted together.

Figure 1: Input Current vs. Forward Voltage

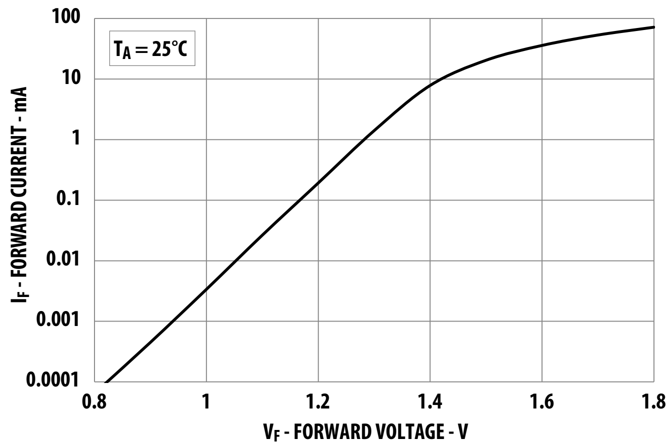


Figure 2: Typical Current Transfer Ratio vs. Temperature

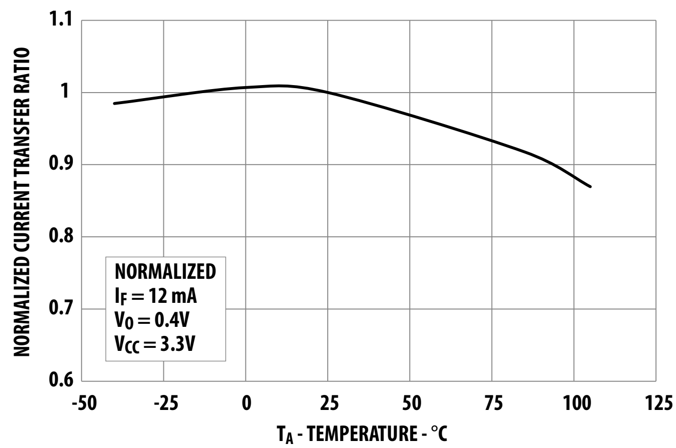


Figure 3: Typical Current Transfer Ratio vs. Temperature

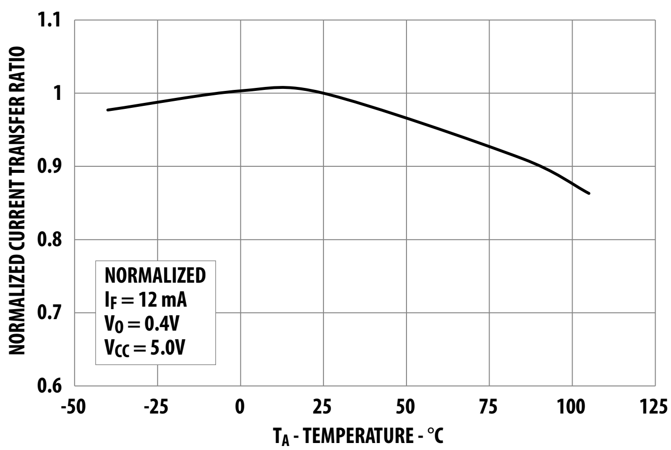


Figure 4: Typical Logic High Output Current vs. Temperature

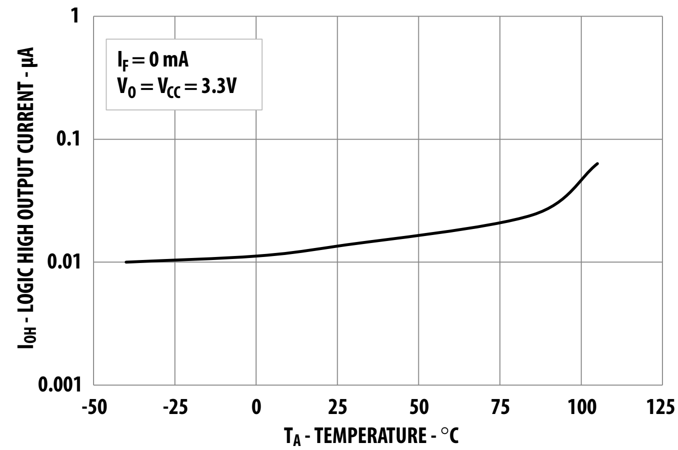


Figure 5: Typical Logic High Output Current vs. Temperature

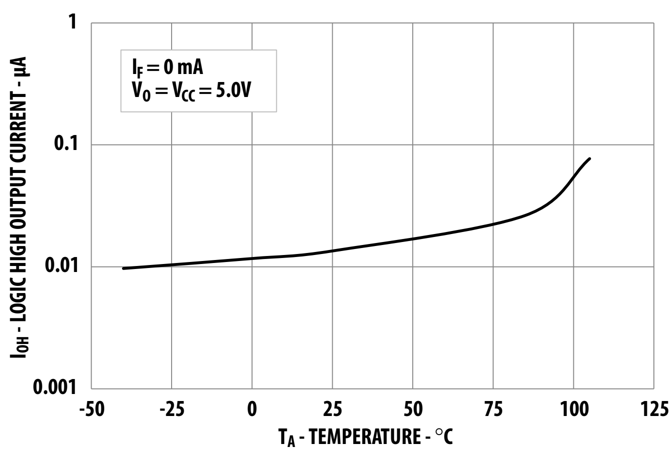


Figure 6: Typical Propagation Delay vs. Temperature

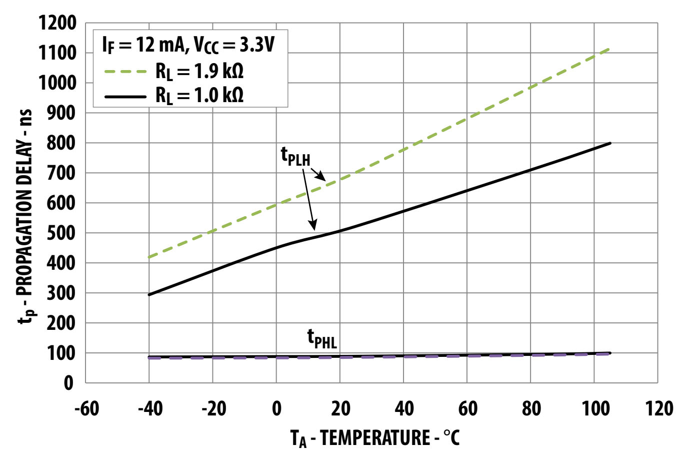


Figure 7: Typical Propagation Delay vs. Temperature

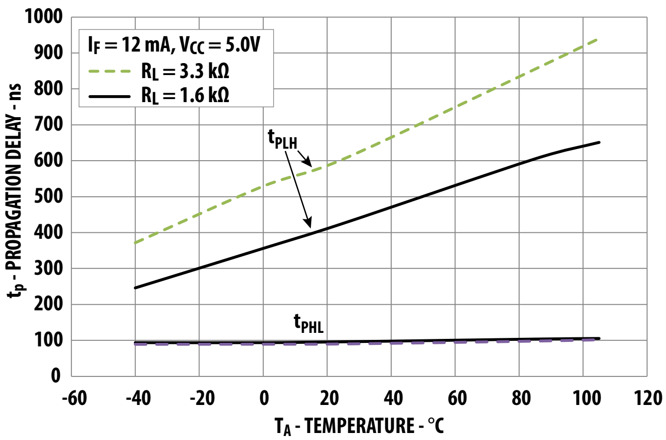


Figure 8: Typical Propagation Delay vs. Temperature

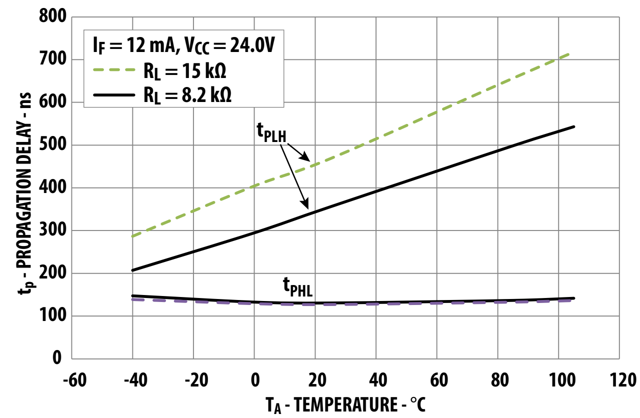


Figure 9: Typical Propagation Delay vs. Load Resistance

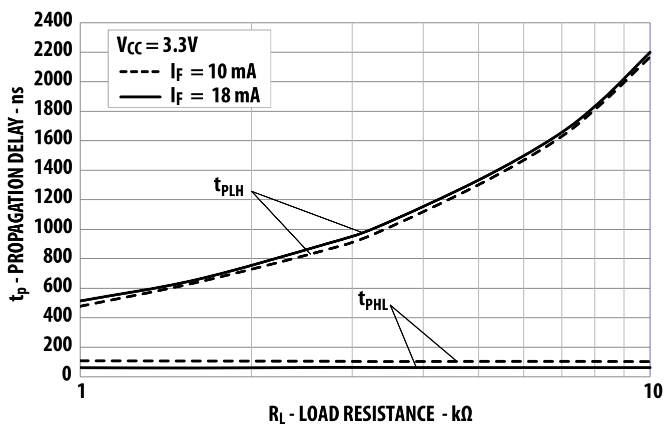


Figure 10: Typical Propagation Delay vs. Load Resistance

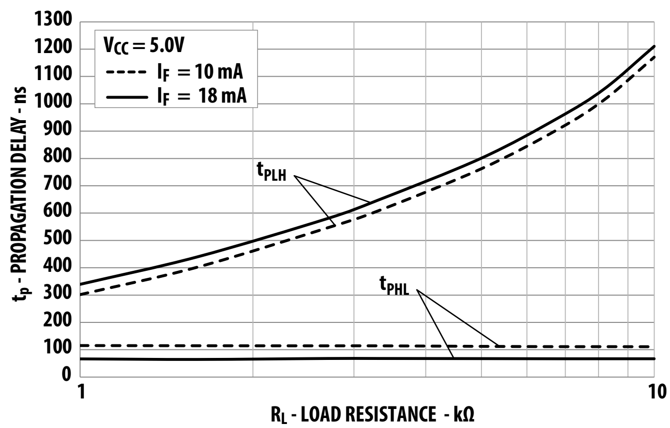


Figure 11: Typical Propagation Delay vs. Supply Voltage

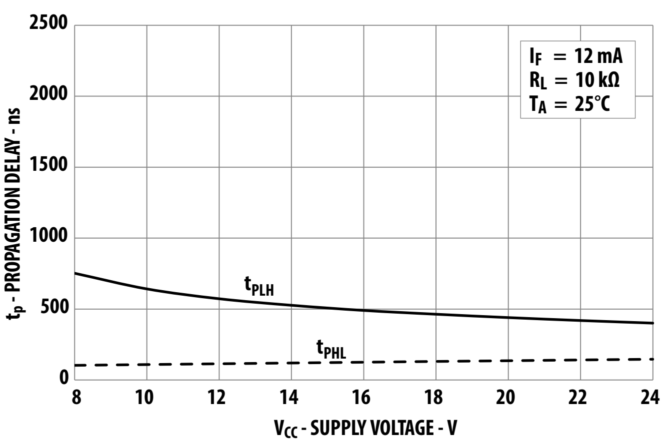


Figure 12: Typical Propagation Delay vs. Input Current

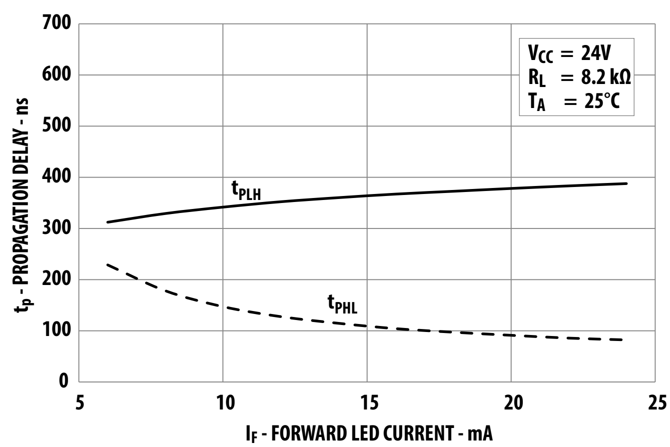


Figure 13: Current Transfer Ratio vs Input Current

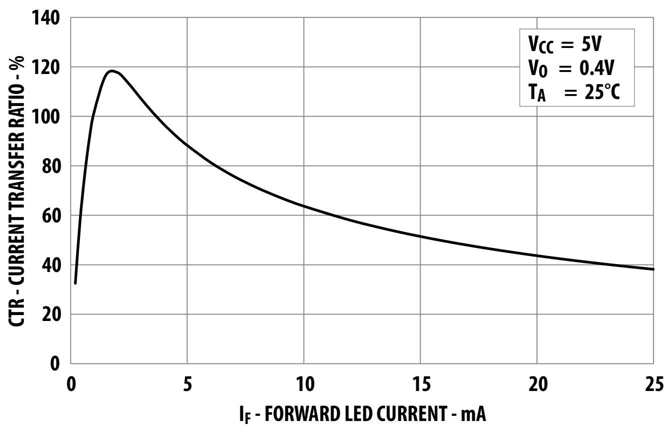
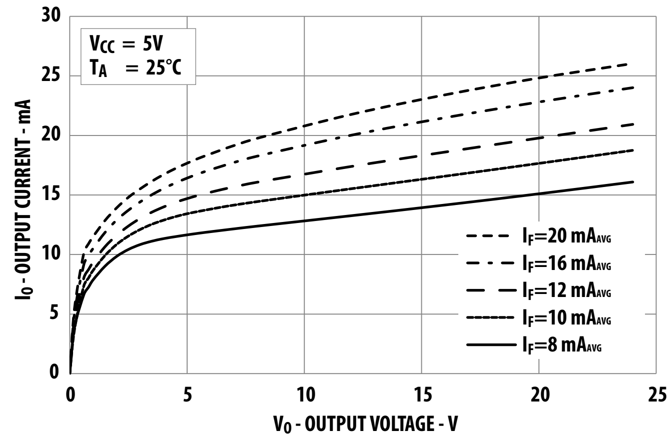


Figure 14: DC Pulse Transfer Characteristic



Test Circuits

Figure 15: Switching Test Circuits

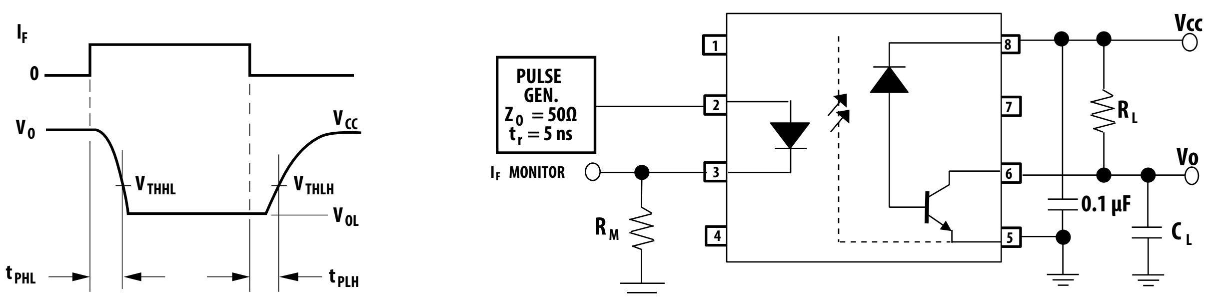
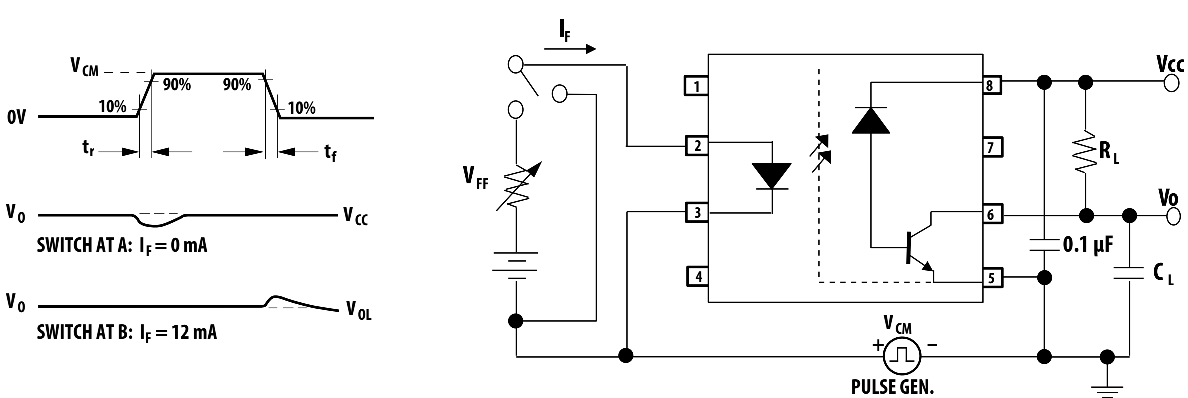


Figure 16: Test Circuit for Transient Immunity and Typical Waveforms



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