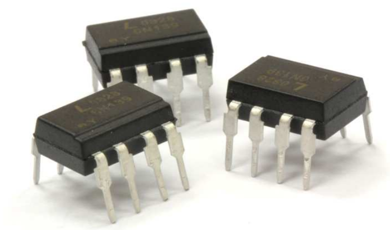
6N135, 6N136

Single Channel, High Speed Optocouplers

Jan.2009



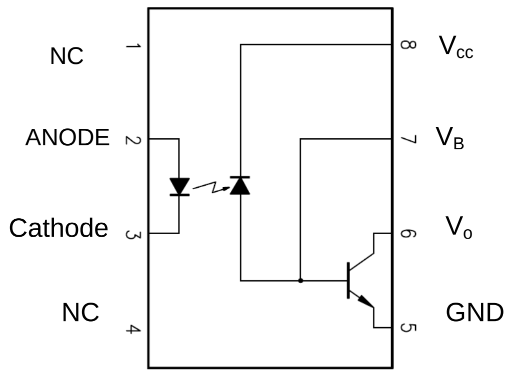
Description

The 6N135/6 consists of a high efficient AlGaAs Light Emitting Diode and a high speed optical detector. This design provides excellent AC and DC isolation between the input and output sides of the Optocoupler. Connection for the bias of the photodiode improves the speed that of a conventional phototransistor coupler by reducing the base-collector capacitances. The internal shield ensures high common mode transient immunity. A guaranteed common mode transient immunity is up to 1KV/μsec.

Features

- High speed – 1MBd typical
- Available in Dual-in-line, Wide lead spacing, Surface mounting package.
- Storable output.
- UL, CSA approval

Functional Diagram



6N135/6N136

Truth Table (Positive Logic)

LED	OUT
ON	L
OFF	H

A 0.1μF bypass Capacitor must be connected between Pin8 and Pin5

Application

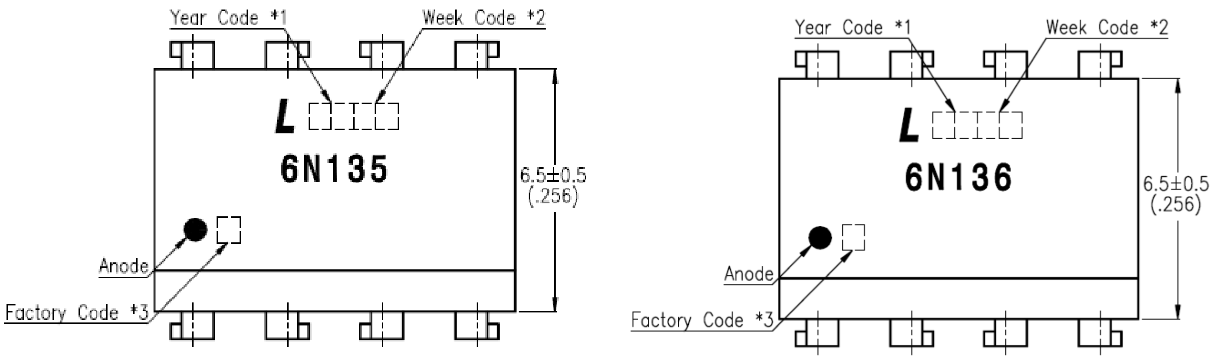
- High Voltage Isolation
- Isolation in line receivers
- Feedback element in switching mode power supplier
- Power transistor isolation in motor drives
- Interface between Microprocessor system, computer and their peripheral
- Replace pulse transformers.
- Replace slower optocoupler isolators.

Ordering Information

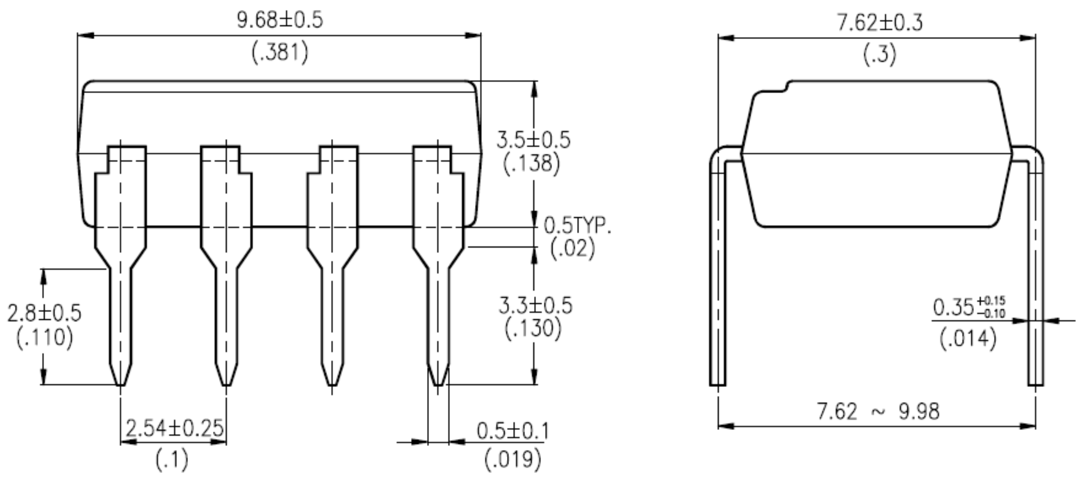
Part	Option	Minimum CMR		CTR	Remarks
		dV/dt (V/μs)	V_{CM} (V)		
6N135		1000	10	7	Single Channel, DIP-8
	M				Single Channel, Wide Lead Spacing
	S				Single Channel, SMD-8
6N136				19	Single Channel, DIP-8
	M				Single Channel, Wide Lead Spacing
	S				Single Channel, SMD-8

Package Dimensions

8-pin DIP Package (6N135 / 6N136)

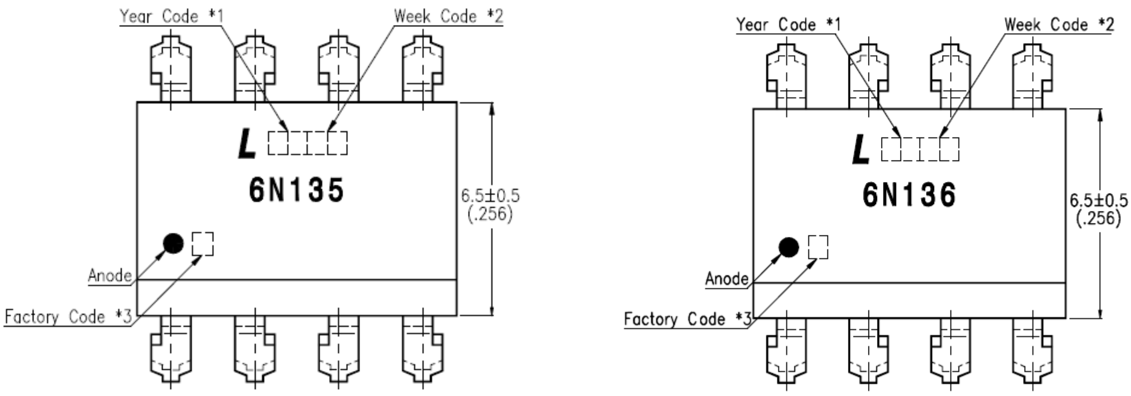


*1. Year date code.
*2. 2-digit work week.
*3. Factory identification mark
(Z : Taiwan, Y : Thailand).
Dimensions are in Millimeters and (Inches).



Package Dimensions

8-pin DIP Wide Lead Spacing Package (6N135M / 6N136M)



*1. Year date code.
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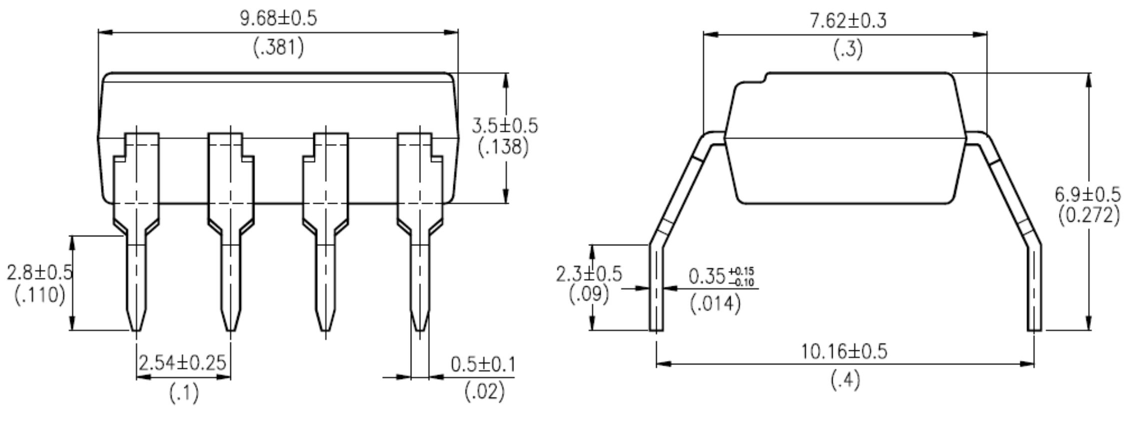
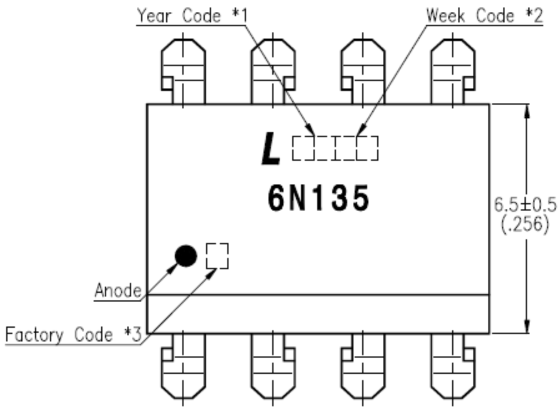
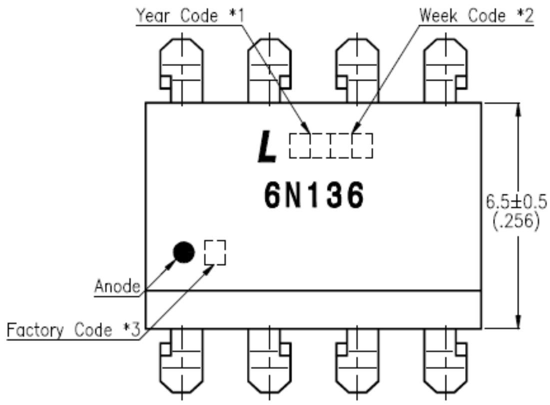
Dimensions are in Millimeters and (Inches).



Package Dimensions

8-pin DIP Surface Mount Package (6N135S / 6N136S)





*1. Year date code.
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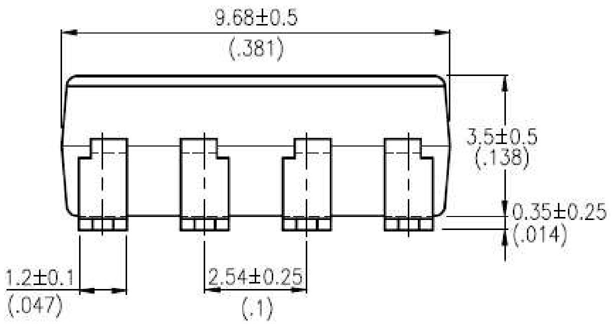
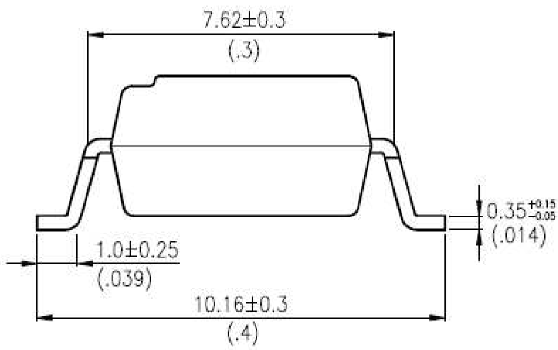
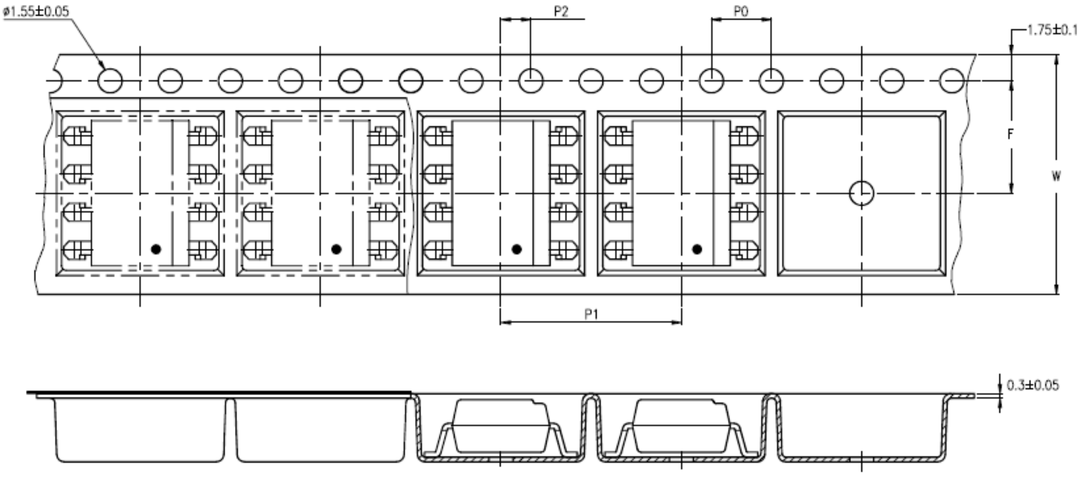
Dimensions are in Millimeters and (Inches).



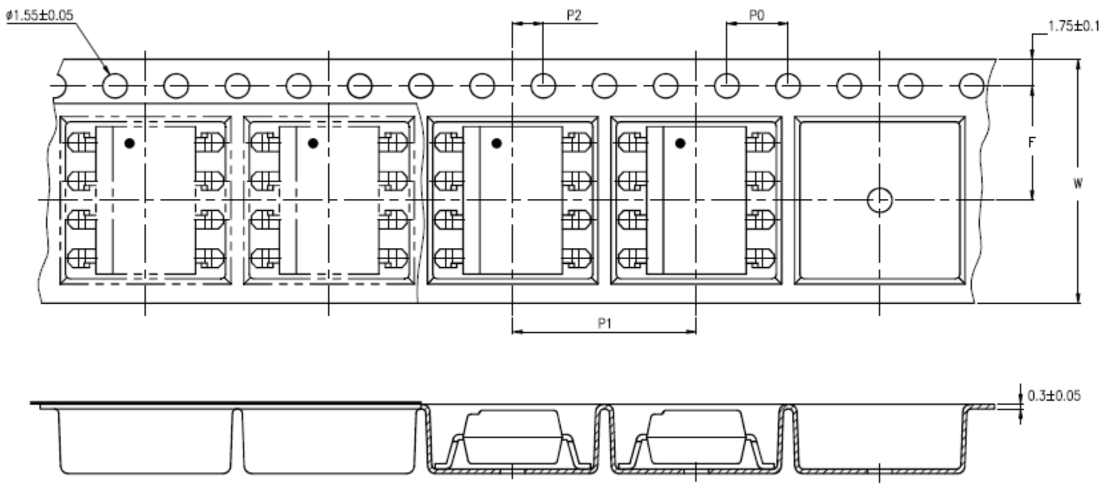


Taping Dimensions

6N135S/136S-TA

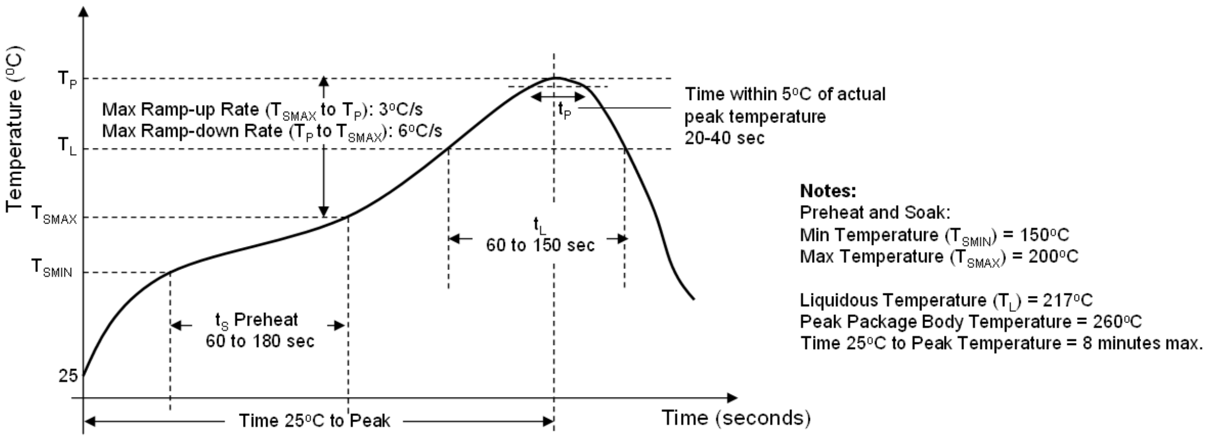


6N135S/136S-TA1



Description	Symbol	Dimensions in millimeters (inches)
Tape wide	W	16 ± 0.3 (.63)
Pitch of sprocket holes	P0	4 ± 0.1 (.15)
Distance of compartment	F P2	7.5 ± 0.1 (.295) 2 ± 0.1 (.079)
Distance of compartment to compartment	P1	12 ± 0.1 (.472)

Recommended Lead Free Reflow Profile



Absolute Maximum Ratings*1

Parameter	Symbol	Min	Max	Units	Note
Storage Temperature	T_{ST}	-55	125	^oC	
Operating Temperature	T_A	-40	85	^oC	
Isolation Voltage	V_{ISO}	5000		V_{RMS}	
Supply Voltage	V_{CC}		15	V	
Lead Solder Temperature * 2			260	°C	2
Input					
Average Forward Input Current	I_F		25	mA	
Reverse Input Voltage	V_R		5	V	
Input Power Dissipation	P_I		45	mW	
Output					
Output Collector Current	I_O		8	mA	
Output Collector Voltage	V_O	-0.5	20	V	
Output Collector Power Dissipation	P_O		100	mW	

1.Ambient temperature = 25^{o}C, unless otherwise specified. Stresses exceeding the absolute maximum ratings can cause permanent damage to the device. Exposure to absolute maximum ratings for long periods of time can adversely affect reliability.

2.260^{o}C for 10 seconds. Refer to Lead Free Reflow Profile.

Electrical Specifications

Parameters	Test Condition	Symbol	Device	Min	Typ	Max	Units
Input							
Input Forward Voltage	I_F =16mA, T_A=25℃	V_F	6N135 6N136		1.4	1.7	V
Input Reverse Voltage	I_R = 10μA	BV_R		5			V
Detector							
Current transfer ratio	I_F=16mA;Vcc=4.5V; T_A=25℃;Vo=0.4V	CTR	6N135	7	18	50	%
			6N136	19	24	50	
Logic low output voltage output voltage	I_F=16mA;Vcc=4.5V; I_o=1.1mA; T_A=25℃	V_{OL}	6N135		0.18	0.4	V
	I_F=16mA;Vcc=4.5V; I_o=3mA; T_A=25℃		6N136		0.25	0.4	
Logic high output current	I_F=0mA, Vo=Vcc=5.5V T_A=25℃	I_{OH}	6N135 6N136			0.5	μA
	I_F=0mA, Vo=Vcc=15V T_A=25℃					1	
Logic low supply current	I_F=16mA, V_o=open (Vcc=15V)	I_{ccL}	6N135 6N136		400		μA
Logic high supply current	I_F=0mA, V_o=open ; T_A=25℃ (Vcc=15V)	I_{ccH}	6N135 6N136			1	μA

*All Typical at T_A =25° C

Switching Specifications

T_A=0~70℃, Vcc=5V, unless otherwise specified.

Parameter	Test Condition	Symbol	Device	Min	Typ	Max	Units
Propagation Delay Time to Low Output Level	T_A=25℃ (R_L=4.1KΩ, I_F=16mA)	t_{PHL}	6N135		0.09	1.5	μs
	T_A=25℃ (R_L=1.9KΩ, I_F=16mA)		6N136		0.1	0.8	μs
Propagation Delay Time to High Output Level	T_A=25℃ (R_L=4.1KΩ, I_F=16mA)	t_{PLH}	6N135		0.8	1.5	μs
	T_A=25℃ (R_L=1.9KΩ, I_F=16mA)		6N136		0.4	0.8	μs
Logic High Common Mode Transient Immunity	I_F=0mA;V_{CM}=10Vp-p; R_L=4.1KΩ; T_A=25C	$\|CM_H\|$	6N135	1			KV/μs
	I_F=0mA;V_{CM}=10Vp-p; R_L=1.9KΩ; T_A=25C		6N136	1			KV/μs
Logic Low Common Mode Transient Immunity	I_F=0mA;V_{CM}=10Vp-p; R_L=4.1KΩ; T_A=25C	$\|CM_L\|$	6N135	1			KV/μs
	I_F=0mA;V_{CM}=10Vp-p; R_L=1.9KΩ; T_A=25C		6N136	1			KV/μs

*All Typical at T_A =25°C

Isolation Characteristics

Parameter	Test Condition	Symbol	Min	Typ	Max	Units
Input-Output Insulation Leakage Current	45% RH, t = 5s, V_{I-O} = 3kV DC, T_A = 25°C	I_{I-O}			1.0	μA
Withstand Insulation Test Voltage	RH ≤ 50%, t = 1min, T_A = 25°C	V_{ISO}	5000			V_{RMS}
Input-Output Resistance	V_{I-O} = 500V DC	R_{I-O}		10^{12}		Ω

*All Typical at T_A =25℃

Notes

1. A 0.1μF or bigger bypass capacitor for V_{CC} is needed as shown in Fig.1
2. Current Transfer Ratio is defined as the ratio of output collector current Io , to the forward LED input current IF, times 100.
3. The 1.9KΩ load represents 1TTL unit load of 1.6mA and the 5.6KΩ pull-up resistor.
4. The 4.1KΩ load represents 1LSTTL unit load of 0.36mA and the 6.1KΩ pull-up resistor.

Switching Time Test Circuit

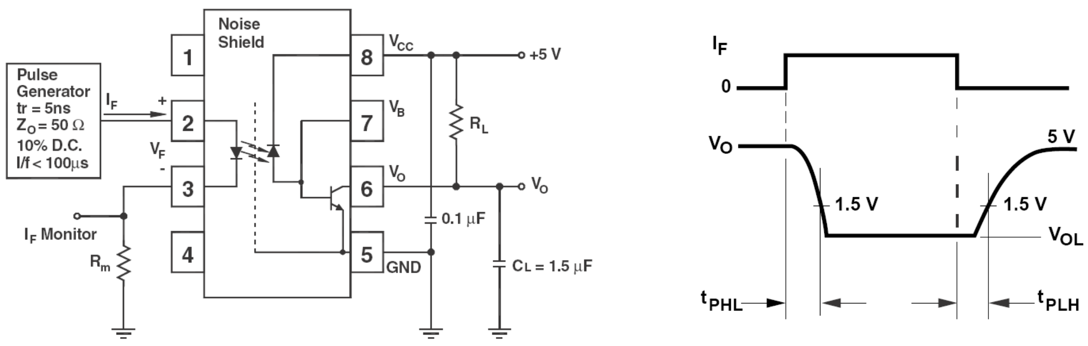


Figure 1: Single Channel Test Circuit for t_{PHL} and t_{PLH}

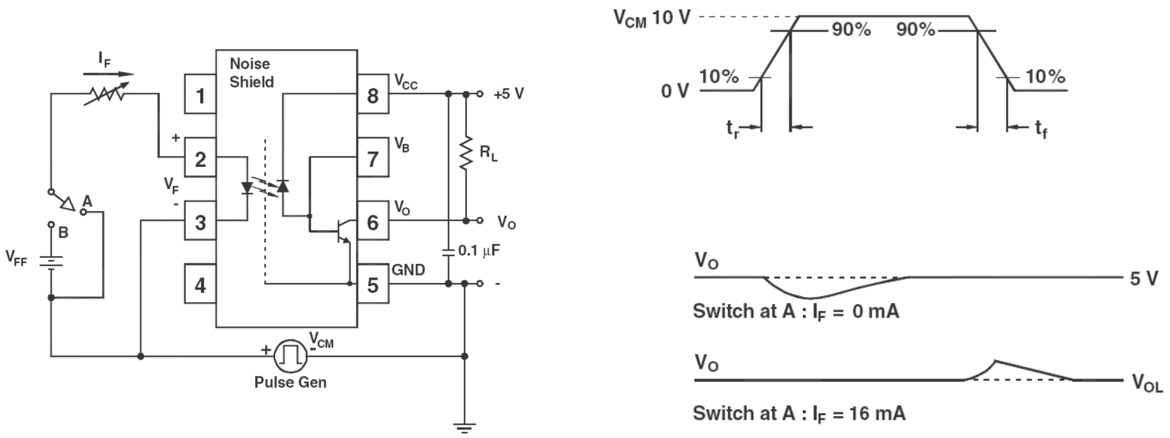


Figure 2: Single Channel Test Circuit for Common Mode Transient Immunity

Characteristics Curves

Figure 3: DC and pulsed transfer characteristics

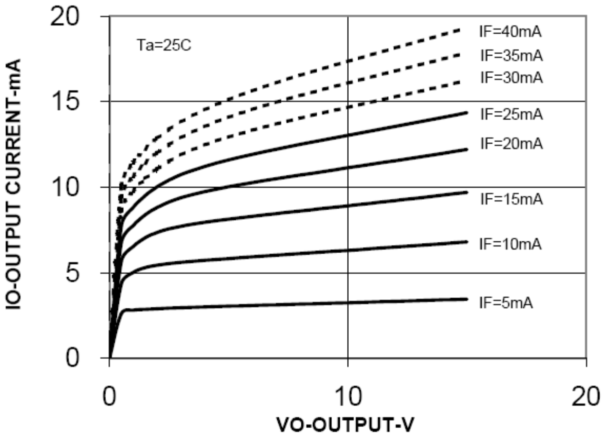


Figure 6: Current transfer ratio vs. input

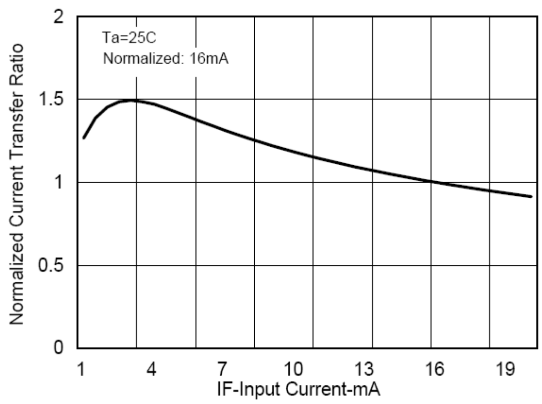


Figure 4: Input current vs. forward voltage

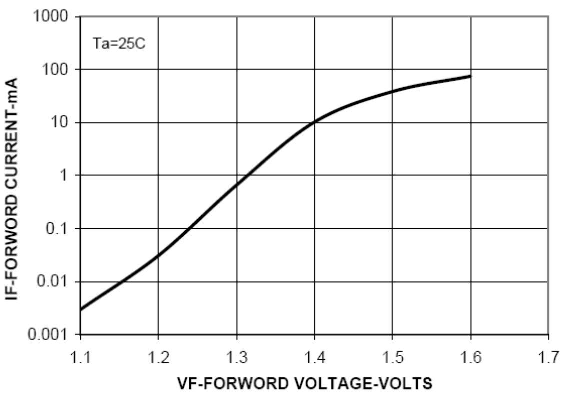


Figure 7: Current transfer ratio vs. temperature

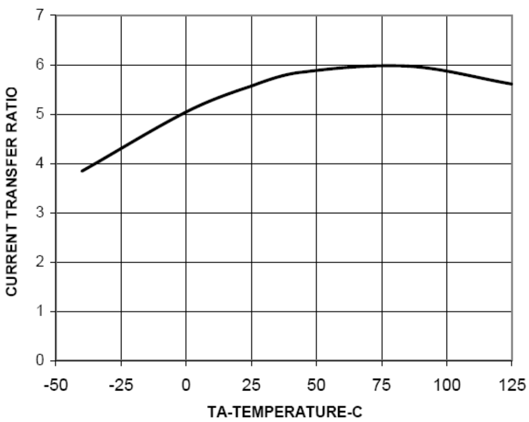


Figure 5: Logic high output current vs. temperature

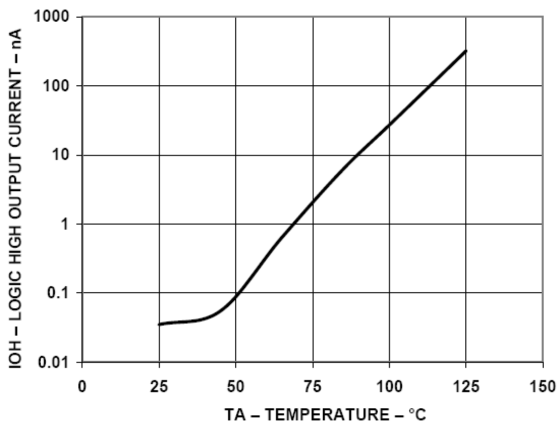
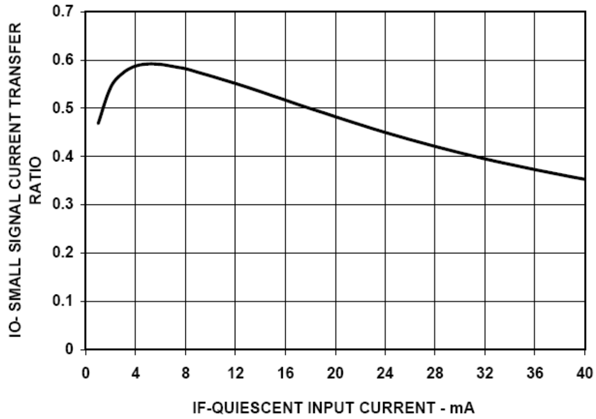


Figure 8: Small-signal current transfer ratio vs. quiescent current



Characteristics Curves

Figure 9: Propagation delay time vs. temperature

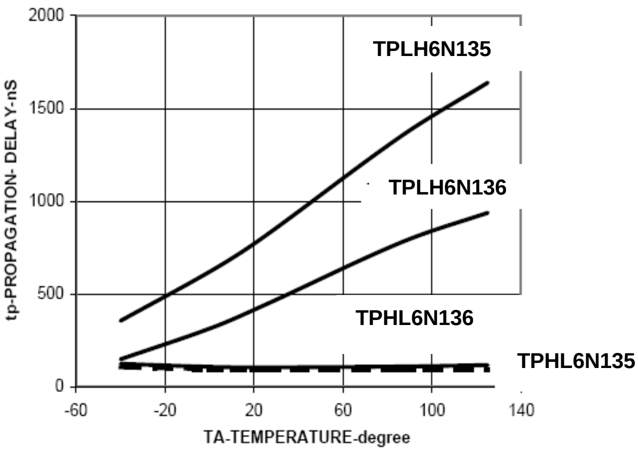
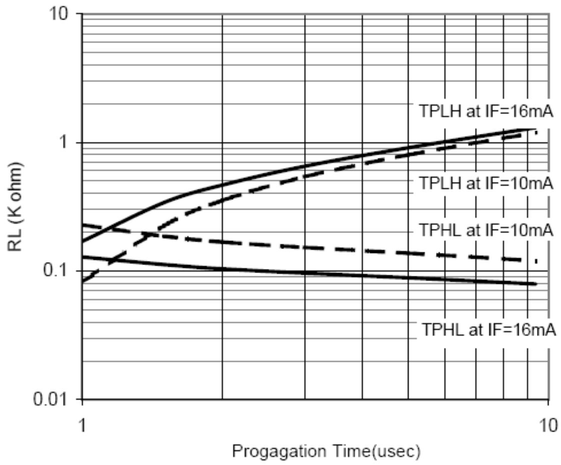


Figure 10: Propagation delay time vs. load resistance



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