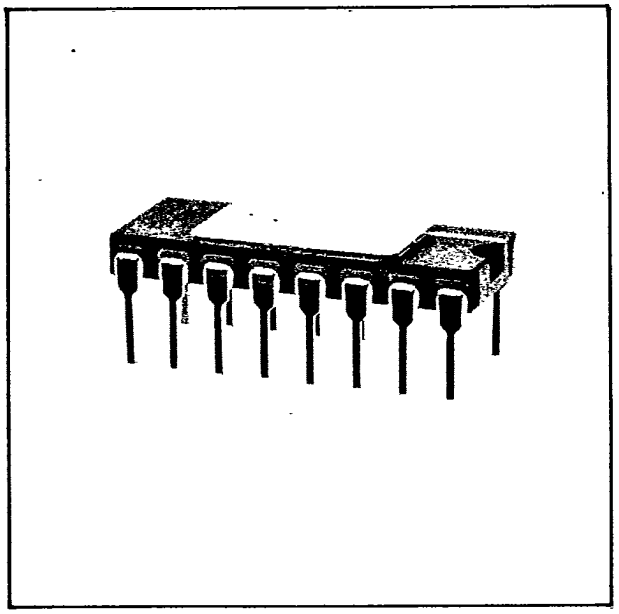
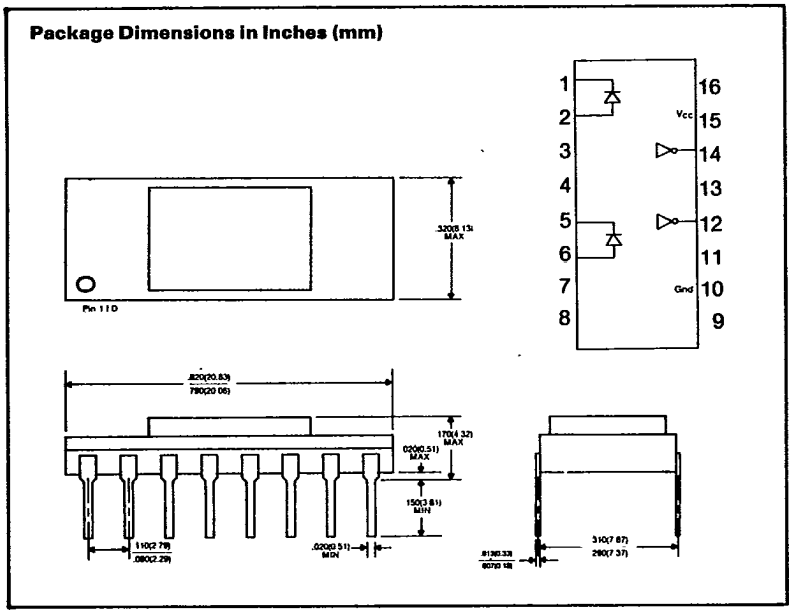
6N134
6N134/883B
Dual Channel Hermetically Sealed Optocoupler





FEATURES

- Hermetically Sealed
- High Speed
- TTL Compatible Input and Output
- High Common Mode Rejection
- 1500V dc Withstand Test Voltage
- Performance Guaranteed Over −55°C to + 125° Ambient Temperature Range

DESCRIPTION

The 6N134 consists of a pair of inverting optically coupled gates, each with a light emitting diode and a unique high gain integrated photon detector in a hermetically sealed ceramic package. The output of the detector is an open collector Schottky clamped transistor.

This unique dual coupler design provides maximum DC and AC circuit isolation between each input and output while achieving TTL circuit compatability. The isolator operational parameters are guaranteed from −55°C to +125°C, such that a minimum input current of 10mA in each channel will sink a six gate fanout (10mA) at the output with 4.5 to 5.5V Vcc applied to the detector. This isolation and coupling is achieved with a typical propagation delay of 60 nsec.

ABSOLUTE MAXIMUM RATINGS
(no derating required up to 125°C)

Storage Temperature	−65°C to +150°C
Operating Temperature	−55°C to +125°C
Lead Solder Temperature	260°C for 10s (1.6mm below seating plane)

Input Diode (each channel)

Peak Forward Current	40mA (≤ 1 msec Duration)
Average Forward Current	20mA
Reverse Voltage	5V
Power Dissipation	35mW

Output Detector (each channel)

Supply Voltage – Vcc	7V (1 Minute Maximum)
Current – Io	25mA
Collector Power Dissipation	40mW
Voltage – Vo	7V

Total Package (both channels)

Power Dissipation	350mW

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MARCH 1986

ELECTRICAL CHARACTERISTICS (Over recommended temperature −55°C to +125°C unless otherwise specified)

Parameter	Min.	Typ*	Max.	Units	Test Conditions	Fig.	Note
High Level Output Current I_{OH}		20	250	μA	V_{CC} = 5.5V, V_O = 5.5V, I_F = 250μA		1
Low Level Output Voltage V_{OL}		0.4	0.6	V	V_{CC} = 5.5V, I_F = 10mA, I_{OL} (sinking) = 10mA	4	1,9
High Level Supply Current I_{CCH}		15	28	mA	V_{CC} = 5.5V, I_F = O, (Both Channels)		
Low Level Supply Current I_{CCL}		20	36	mA	V_{CC} = 5.5V, I_F = 20mA (Both Channels)		
Input-Output Insulation Leakage Current − I_{IO}			1.0	μA	Relative Humidity = 45%, T_A = 25°C, t = 5s, V_{IO} = 1500 Vdc		2,10
Input Forward Voltage − V_F		1.5	1.75	V	I_F = 20mA, T_A = 25°C	1	1
			1.85	V	I_F = 20mA		1
Input Reverse Breakdown Voltage − BV_R	5			V	I_R = 10μA, T_A = 25°C		1
Propagation Delay Time to High Output Level − t_{PLH}			100	ns	R_L = 510Ω, C_L = 50pF, I_F = 13mA, T_A = 25°C	2,3	1,5
		60	90	ns	R_L = 510Ω, C_L = 15pF, I_F = 13mA, T_A = 25°C	2,3	1,5
Propagation Delay Time to Low Output Level − t_{PHL}			100	ns	R_L = 510Ω, C_L = 50pF, I_F = 13mA, T_A = 25°C	2,3	1,6
		55	90	ns	R_L = 510Ω, C_L = 15pF, I_F = 13mA, T_A = 25°C	2,3	1,6

*All typical values at V_{CC} = 5V, T_A = 25°C (each channel)

TYPICAL CHARACTERISTICS T_A = 25°C, V_{CC} = 5V

Parameter	Typ	Max.	Units	Test Conditions	Fig.	Note
Input Diode Temperature Coefficient − $\frac{\Delta V_F}{\Delta T_A}$	−1.9		mV/°C	I_F = 20mA		1
Resistance − R_{IO}	10^{12}		ohm	V_{IO} = 500V		3
Capacitance − C_{IO}	1.9		pF	f = 1 MHz		3
Input Capacitance − C_{IN}	60		pF	V_F = O, f = 1MHz		1
Input-Input Leakage Current − I_{II}	0.5		nA	Relative Humidity = 45%, V_{II} = 5OOV, t = 5s		4
Resistance − input-input − R_{II}	10^{12}		ohm	V_{II} = 500V		4
Capacitance − input-input − C_{II}	0.6		pF	f = 1MHz		4
Output Rise (10-90%) − t_r	35		ns			
Output Fall Time (90-10%) − t_f	35		ns	R_L = 510Ω, C_L = 15pF, I_F = 13mA		1
Common Mode Transient Immunity at Logic High Output Level − CM_H	100		V/μs	V_{CM} = 10V (peak), R_L = 510 Ω, I_F = 0mA, V_O (min.) = 2V	6	1,7
Common Mode Transient Immunity at Logic Low Output Level − CM_L	−400		V/μs	V_{CM} = 10V (peak), R_L = 510 Ω, I_F = 10mA, V_O (max.) = 0.8V	6	1,8

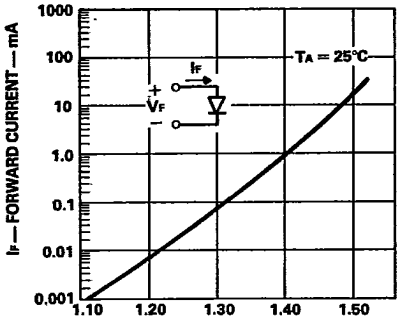
RECOMMENDED OPERATING CONDITIONS

	Sym.	Min.	Max.	Units
Input Current, Low Level Each Channel	I_{FL}	0	250	μA
Input Current, High Level Each Channel	I_{FH}	12.5*	20	mA
Supply Voltage, Output	V_{CC}	4.5	5.5	V
Fan Out (TTL Load), Each Channel	N		6	
Operating Temperature	T_A	-55	+125	°C

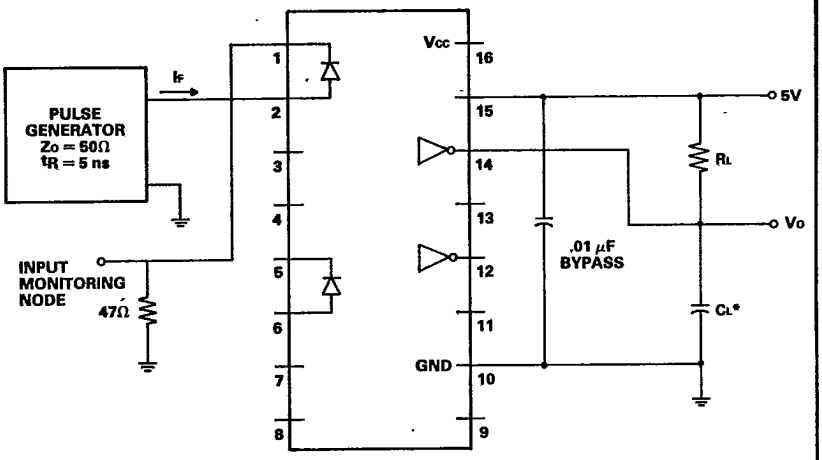
*12.5mA condition permits at least 20% CTR degradation guardband. Initial switching threshold is 10mA or less.

NOTES:

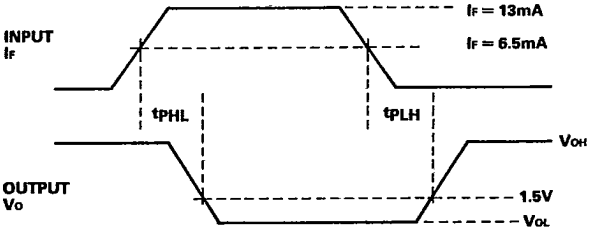
1. Each Channel.
2. Measured between pins 1 through 8 shorted together and pins 9 through 16 shorted together.
3. Measured between pins 1 and 2 or 5 and 6 shorted together, and pins 9 through 16 shorted together.
4. Measured between pins 1 and 2 shorted together, and pins 5 and 6 shorted together.
5. The t_{PLH} propagation delay is measured from the 6.5mA point on the trailing edge of the input pulse to the 1.5V point on the trailing edge of the output pulse.
6. The t_{PHL} propagation delay is measured from the 6.5mA point on the leading edge of the input pulse to the 1.5V point on the leading edge of the output pulse.
7. CM_H is the max. tolerable common mode transient to assure that the output will remain in a high logic state (ie., V_O > 2.0V).
8. CM_L is the max. tolerable common mode transient to assure that the output will remain in a low logic state (ie., V_O < 0.8V).
9. It is essential that a bypass capacitor (.01 to 0.1μF, ceramic) be connected from pin 10 to pin 15. Total lead length between both ends of the capacitor and the isolator pins should not exceed 20mm.
10. This is a momentary withstand test, not an operating condition.



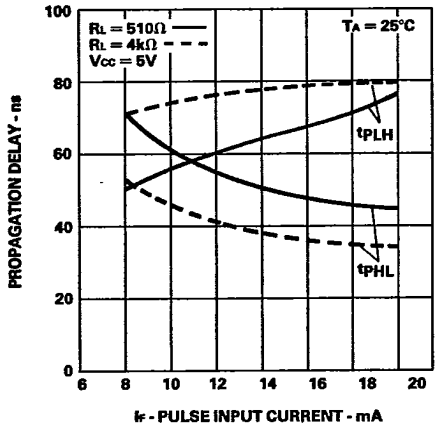
1. Input Diode Forward Characteristic



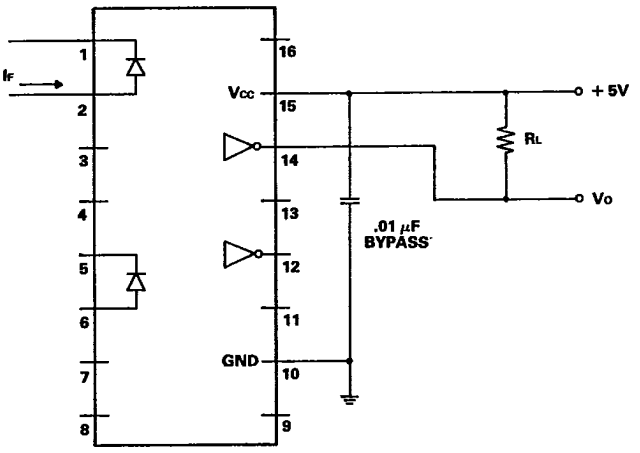
*CL INCLUDES PROBE AND STRAY WIRING CAPACITANCE.

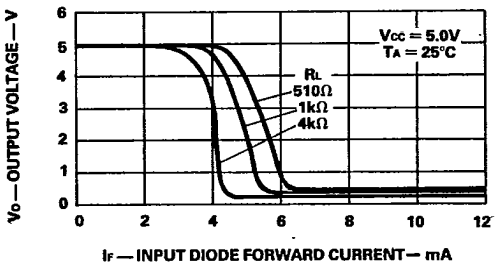


2. Test Circuit for t_{PHL} and t_{PLH}

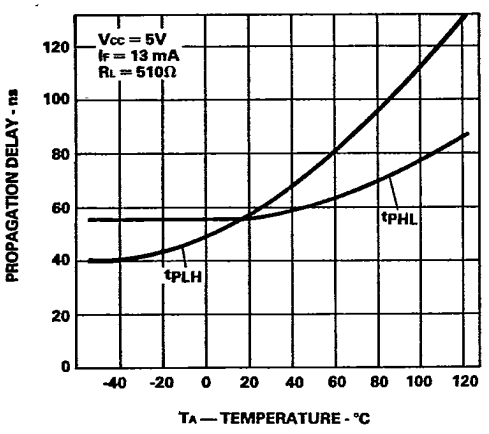


3. Propagation Delay, t_{PHL} and t_{PLH} vs. Pulse Input Current, I_{FH}

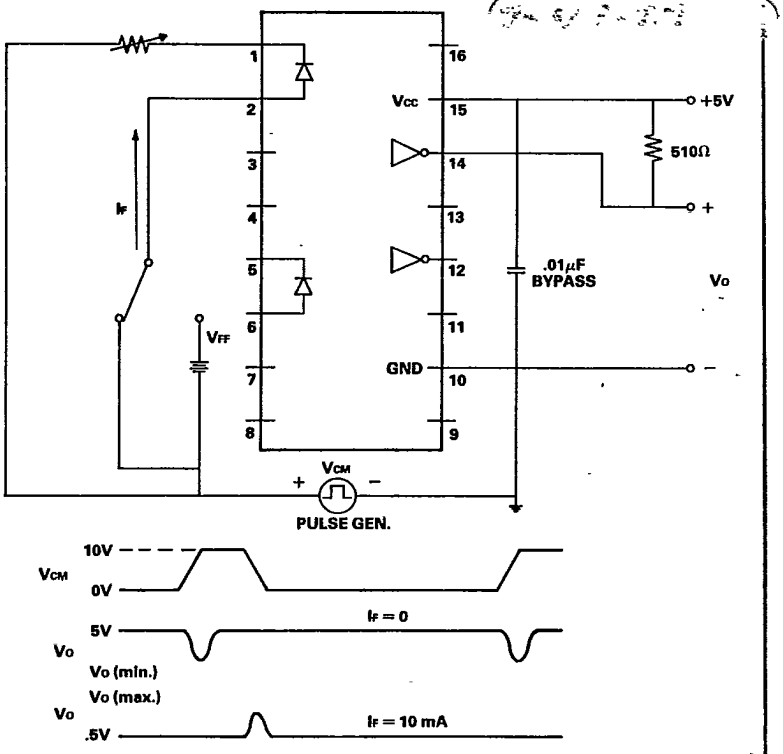




4. Input-Output Characteristics



5. Propagation Delay vs. Temperature



6. Typical Common Mode Rejection Characteristics/Circuit

MIL-STD-883 CLASS B TEST PROGRAM

Testing consists of 100% screening to Method 5004 and quality conformance inspection to Method 5005 of MIL-STD-882.

6N134/883B Clarifications:

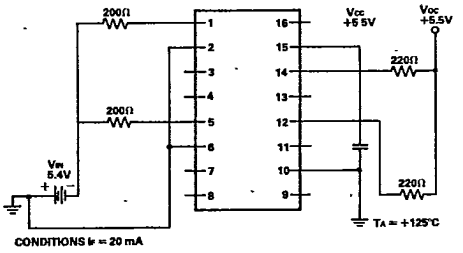
I. 100% screening per MIL-STD-883, Method 5004 constant acceleration — condition A not E.

II. Quality Conformance Inspection per MIL-STD-883, Method 5005, Group A, B, C and D.

Group A — See table below for specific electrical tests.
Group B —
Group C — Constant Acceleration — Condition A not E.
Group D — Constant Acceleration — Condition A not E.

PART NUMBERING SYSTEM

Commercial Product	Class B Product
6N134	6N134/883B



Operating Circuit for Burn-in and Steady State Life Tests.

GROUP A — ELECTRICAL TESTS

	LTPD
Subgroup 1 *Static tests at $T_A = 25°C$, I_{OH}, BV_R, I_{CCL}, I_{CCH}, V_{OL}, V_F, I_{OH1}, I_{IO} and CTR	2
Subgroup 2 * Static tests at $T_A = +125°C$, I_{OH}, BV_R, I_{CCL}, I_{CCH}, V_{OL}, V_F, I_{OH1} and CTR	3
Subgroup 3 * Static tests at $T_A = -55°C$, I_{OH}, BV_R, I_{CCL}, I_{CCH}, V_{OL}, V_F, I_{OH1} and CTR	5
Subgroups 4, 5, 6, 7 and 8 These subgroups are non-applicable to this device type	
Subgroup 9 * Switching tests at $T_A = 25°C$, t_{PLH} and t_{PHL}	2
Subgroup 10 * Switching tests at $T_A = +125°C$, t_{PLH} and t_{PHL}	3
Subgroup 11 * Switching tests at $T_A = -55°C$, t_{PLH} and t_{PHL}	5

* Limits and Conditions per Electrical Characteristics Table.