

Single Channel, High Speed Optocouplers

Technical Data

6N135/6
HCNW135/6
HCNW4502/3
HCPL-2502
HCPL-0452/3
HCPL-0500/1
HCPL-4502/3

Features

- **15 kV/ μ s Minimum Common Mode Transient Immunity at $V_{CM} = 1500$ V (4503/0453)**
- **High Speed: 1 Mb/s**
- **TTL Compatible**
- **Available in 8-Pin DIP, SO-8, Widebody Packages**
- **Open Collector Output**
- **Guaranteed Performance from Temperature: 0°C to 70°C**
- **Safety Approval**
 UL Recognized – 3750 V rms for 1 minute (5000 V rms for 1 minute for HCNW and Option 020 devices) per UL1577
 CSA Approved
 IEC/EN/DIN EN 60747-5-2 Approved
 $-V_{IORM} = 630$ V peak for HCPL-4503#060
 $-V_{IORM} = 1414$ V peak for HCNW devices
- **Dual Channel Version Available (253X/4534/053X/0534)**
- **MIL-PRF-38534 Hermetic Version Available (55XX/65XX/4N55)**

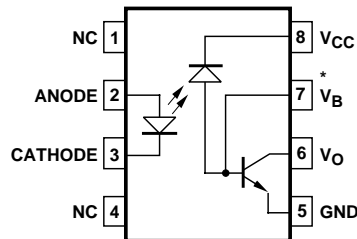
Applications

- **High Voltage Insulation**
- **Video Signal Isolation**
- **Power Transistor Isolation in Motor Drives**
- **Line Receivers**
- **Feedback Element in Switched Mode Power Supplies**
- **High Speed Logic Ground Isolation – TTL/TTL, TTL/CMOS, TTL/LSTTL**
- **Replaces Pulse Transformers**
- **Replaces Slow Phototransistor Isolators**
- **Analog Signal Ground Isolation**

Description

These diode-transistor optocouplers use an insulating layer between a LED and an integrated photodetector to provide electrical insulation between input and output. Separate connections for the photodiode bias and output-transistor collector increase the speed up to a hundred times that of a conventional phototransistor coupler by reducing the base-collector capacitance.

Functional Diagram



* NOTE: FOR 4502/3, 0452/3, PIN 7 IS NOT CONNECTED.

TRUTH TABLE (POSITIVE LOGIC)

LED	V_O
ON	LOW
OFF	HIGH

A 0.1 μ F bypass capacitor must be connected between pins 5 and 8.

CAUTION: It is advised that normal static precautions be taken in handling and assembly of this component to prevent damage and/or degradation which may be induced by ESD.

These single channel optocouplers are available in 8-Pin DIP, SO-8 and Widebody package configurations.

The 6N135, HCPL-0500, and HCNW135 are for use in TTL/CMOS, TTL/LSTTL or wide bandwidth analog applications. Current transfer ratio (CTR) for these devices is 7% minimum at $I_F = 16$ mA.

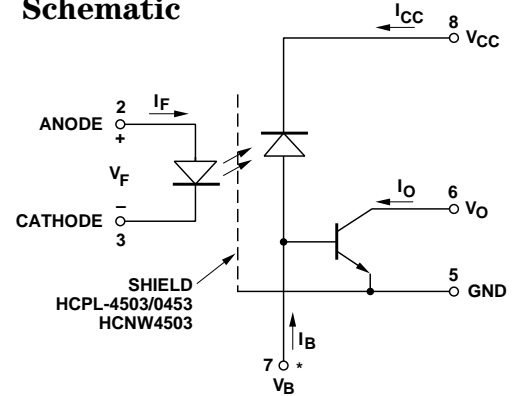
The 6N136, HCPL-2502, HCPL-0501, and HCNW136 are designed for high speed TTL/TTL applications. A standard 16 mA TTL sink current through the input LED will provide enough

output current for 1 TTL load and a 5.6 k Ω pull-up resistor. CTR for these devices is 19% minimum at $I_F = 16$ mA.

The HCPL-4502, HCPL-0452, and HCNW4502 provide the electrical and switching performance of the 6N136, HCPL-0501, and HCNW136 with increased ESD protection.

The HCPL-4503, HCPL-0453, and HCNW4503 are similar to the HCPL-4502, HCPL-0452, and HCNW4502 optocouplers but have increased common mode transient immunity of 15 kV/ μ s minimum at $V_{CM} = 1500$ V guaranteed.

Schematic



* NOTE: FOR HCPL-4502/3, HCPL-0452/3, HCNW4502/3, PIN 7 IS NOT CONNECTED.

Selection Guide

Minimum CMR		Current Transfer Ratio (%)	8-Pin DIP (300 Mil)		Small-Outline SO-8		Widebody (400 Mil)	Hermetic
dV/dt (V/ μ s)	V _{CM} (V)		Single Channel Package	Dual Channel Package*	Single Channel Package	Dual Channel Package*	Single Channel Package	Single and Dual Channel Packages*
1,000	10	7	6N135	HCPL-2530	HCPL-0500	HCPL-0530	HCNW135	
		19	6N136 HCPL-4502†	HCPL-2531	HCPL-0501 HCPL-0452†		HCNW136 HCNW4502†	
		15	HCPL-2502					
15,000	1500	19	HCPL-4503†	HCPL-4534	HCPL-0453†	HCPL-0534	HCNW4503†	
1,000	10	9						HCPL-55XX HCPL-65XX 4N55

*Technical data for these products are on separate Agilent publications.

†Pin 7, transistor base, is not connected.

Ordering Information

Specify Part Number followed by Option Number (if desired).

Example:

HCPL-4503#XXXX

- 020 = UL 5000 V rms/1 Minute Option*
- 060 = IEC/EN/DIN EN 60747-5-2 V_{IORM} = 630 V_{peak} Option**
- 300 = Gull Wing Surface Mount Option†
- 500 = Tape and Reel Packaging Option
- XXXE = Lead Free Option

Option data sheets available. Contact your Agilent sales representative or authorized distributor for information.

*For 6N135/6 and HCPL-4502/3 only.

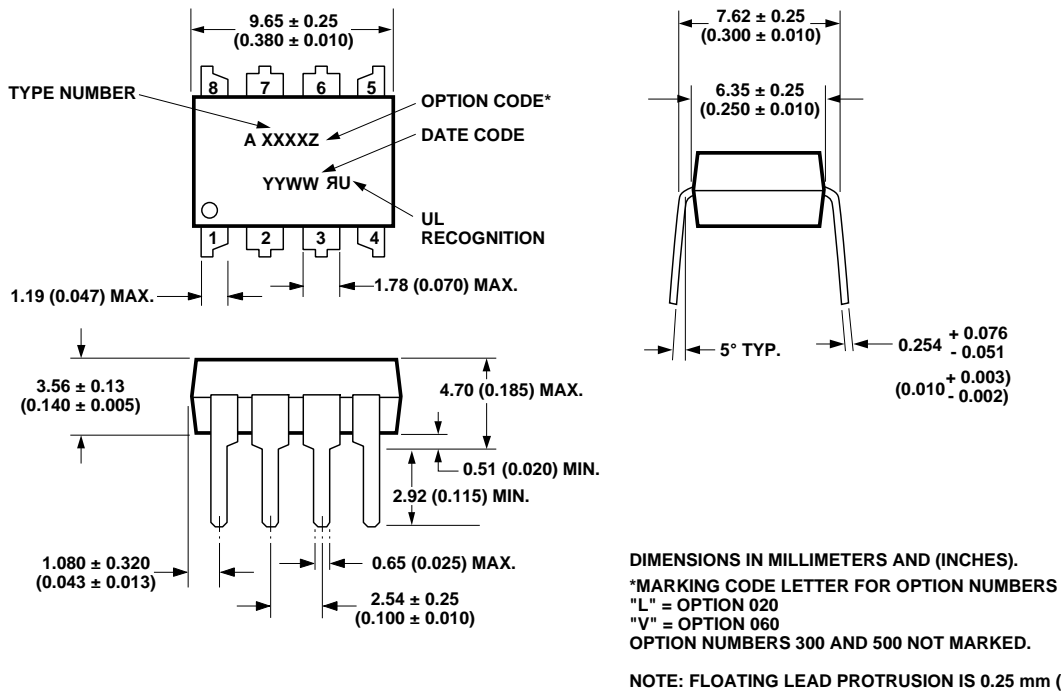
**For HCPL-4503 only. Combination of Option 020 and Option 060 is not available.

†Gull wing surface mount option applies to through hole parts only.

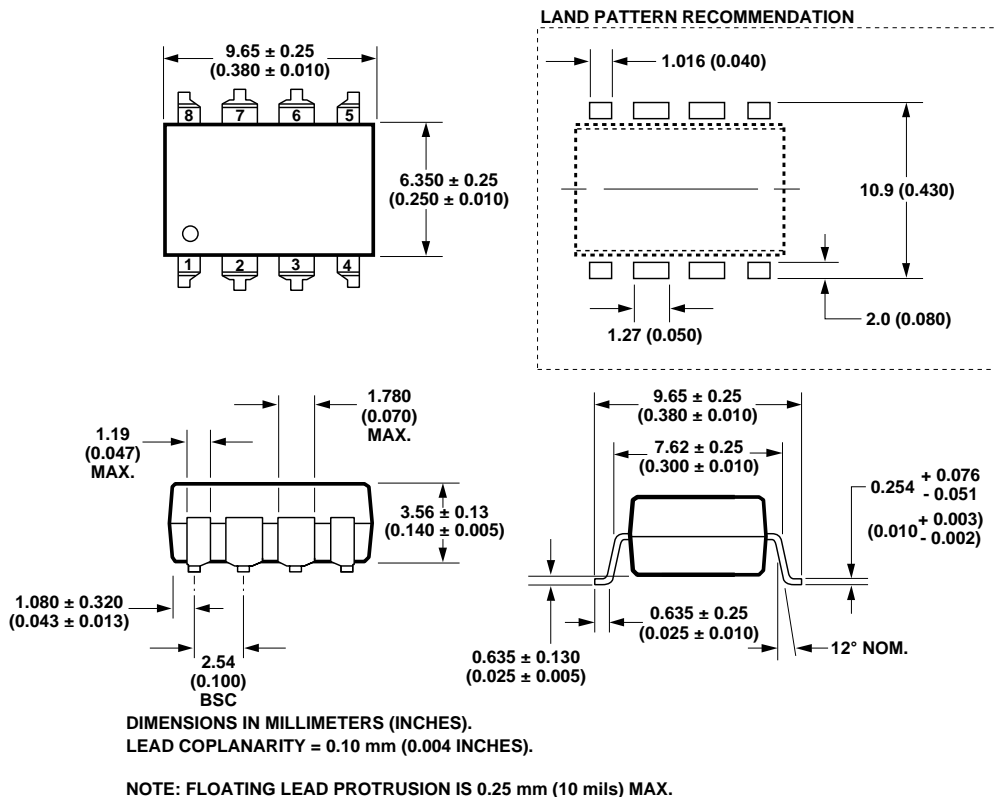
Remarks: The notation “#” is used for existing products, while (new) products launched since 15th July 2001 and lead free option will use “-”

Package Outline Drawings

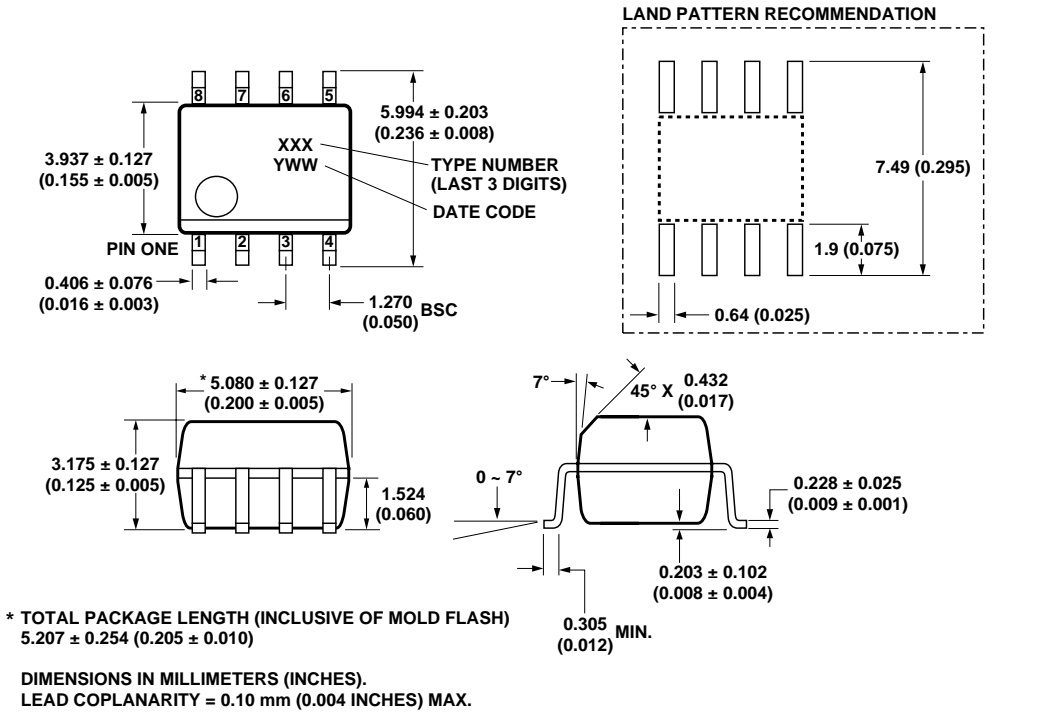
8-Pin DIP Package (6N135/6, HCPL-4502/3, HCPL-2502)



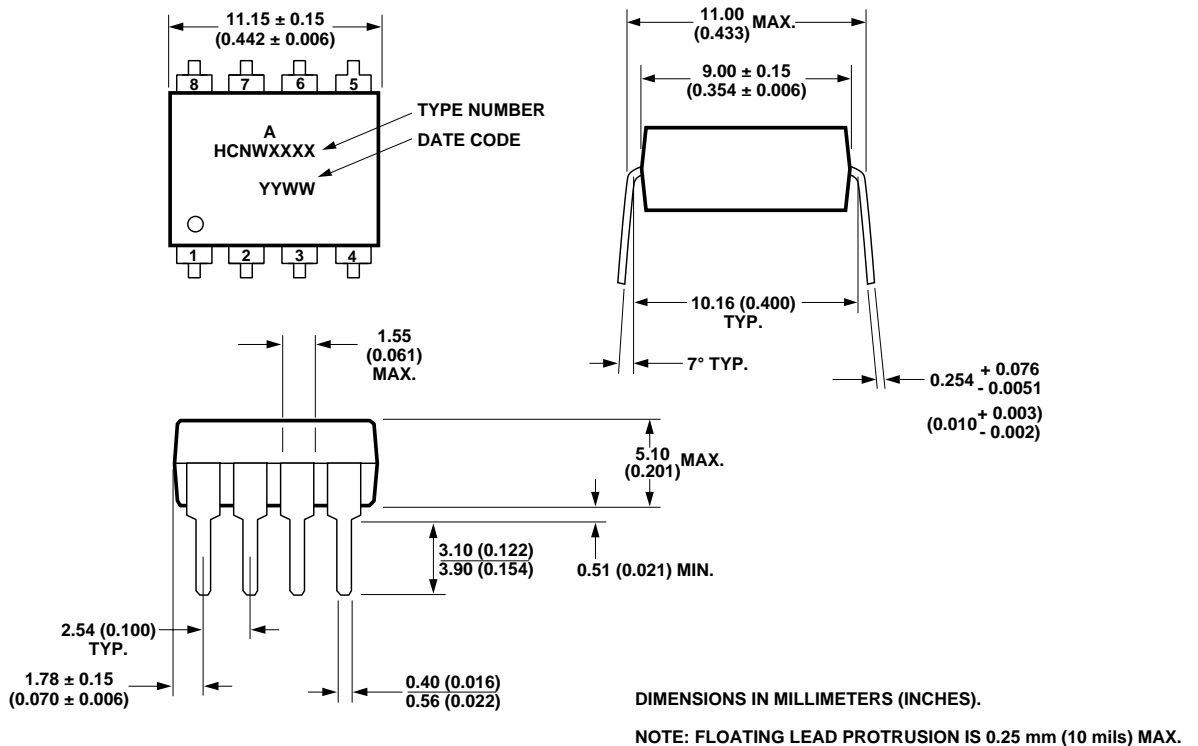
8-Pin DIP Package with Gull Wing Surface Mount Option 300 (6N135/6, HCPL-4502/3)



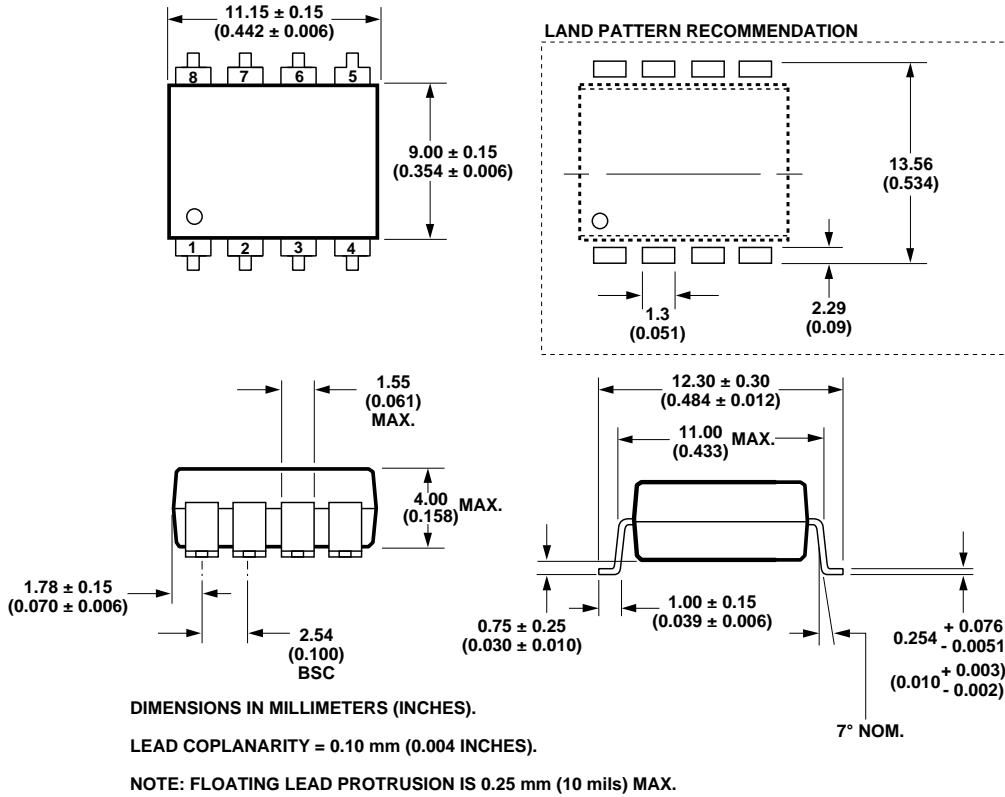
Small Outline SO-8 Package (HCPL-0500/1, HCPL-0452/3)



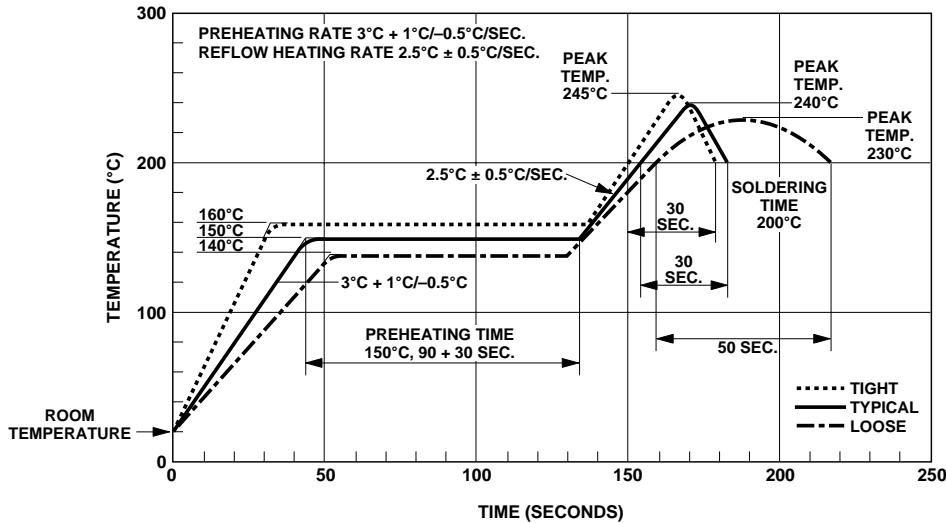
8-Pin Widebody DIP Package (HCNW135/6, HCNW4502/3)



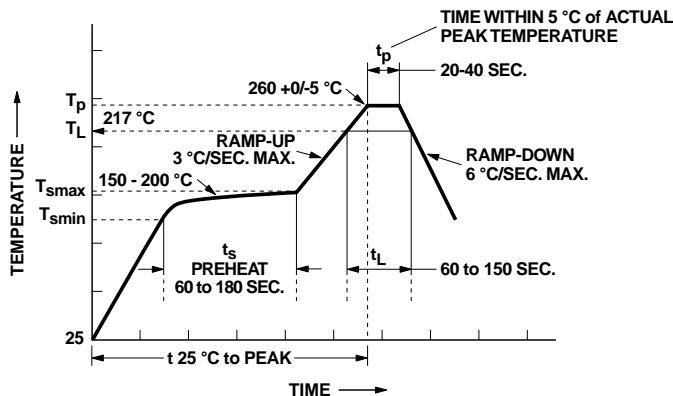
8-Pin Widebody DIP Package with Gull Wing Surface Mount Option 300 (HCNW135/6, HCNW4502/3)



Solder Reflow Temperature Profile



Recommended Pb-Free IR Profile



NOTES:
 THE TIME FROM 25 °C to PEAK TEMPERATURE = 8 MINUTES MAX.
 $T_{smax} = 200\text{ °C}$, $T_{smin} = 150\text{ °C}$

Regulatory Information

The devices contained in this data sheet have been approved by the following organizations:

UL

Recognized under UL 1577, Component Recognition Program, File E55361.

CSA

Approved under CSA Component Acceptance Notice #5, File CA 88324.

IEC/EN/DIN EN 60747-5-2

Approved under IEC 60747-5-2:1997 + A1:2002 EN 60747-5-2:2001 + A1:2002 DIN EN 60747-5-2 (VDE 0884 Teil 2):2003-01 (HCNW and Option 060 only)

Insulation and Safety Related Specifications

Parameter	Symbol	8-Pin DIP (300 Mil) Value	SO-8 Value	Widebody (400 Mil) Value	Units	Conditions
Minimum External Air Gap (External Clearance)	L(101)	7.1	4.9	9.6	mm	Measured from input terminals to output terminals, shortest distance through air.
Minimum External Tracking (External Creepage)	L(102)	7.4	4.8	10.0	mm	Measured from input terminals to output terminals, shortest distance path along body.
Minimum Internal Plastic Gap (Internal Clearance)		0.08	0.08	1.0	mm	Through insulation distance, conductor to conductor, usually the direct distance between the photoemitter and photodetector inside the optocoupler cavity.
Minimum Internal Tracking (Internal Creepage)		NA	NA	4.0	mm	Measured from input terminals to output terminals, along internal cavity.
Tracking Resistance (Comparative Tracking Index)	CTI	200	200	200	Volts	DIN IEC 112/VDE 0303 Part 1
Isolation Group		IIIa	IIIa	IIIa		Material Group (DIN VDE 0110, 1/89, Table 1)

Option 300 - surface mount classification is Class A in accordance with CECC 00802.

IEC/EN/DIN EN 60747-5-2 Insulation Related Characteristics (HCPL-4503 OPTION 060 ONLY)

Description	Symbol	Characteristic	Units
Installation classification per DIN VDE 0110/1.89, Table 1 for rated mains voltage ≤ 300 V rms for rated mains voltage ≤ 450 V rms		I-IV	
		I-III	
Climatic Classification		55/100/21	
Pollution Degree (DIN VDE 0110/1.89)		2	
Maximum Working Insulation Voltage	V_{IORM}	630	V _{peak}
Input to Output Test Voltage, Method b* $V_{IORM} \times 1.875 = V_{PR}$, 100% Production Test with $t_m = 1$ sec, Partial Discharge < 5 pC	V_{PR}	1181	V _{peak}
Input to Output Test Voltage, Method a* $V_{IORM} \times 1.5 = V_{PR}$, Type and sample test, $t_m = 60$ sec, Partial Discharge < 5 pC	V_{PR}	945	V _{peak}
Highest Allowable Overvoltage* (Transient Overvoltage, $t_{ini} = 10$ sec)	V_{IOTM}	6000	V _{peak}
Safety Limiting Values (Maximum values allowed in the event of a failure, also see Figure 9, Thermal Derating curve.) Case Temperature Input Current Output Power	T_S $I_{S,INPUT}$ $P_{S,OUTPUT}$	175 230 600	°C mA mW
Insulation Resistance at T_S , $V_{IO} = 500$ V	R_S	$\geq 10^9$	Ω

IEC/EN/DIN EN 60747-5-2 Insulation Related Characteristics (HCNW135/6, HCNW4502/3 ONLY)

Description	Symbol	Characteristic	Units
Installation classification per DIN VDE 0110/1.89, Table 1 for rated mains voltage ≤ 600 V rms for rated mains voltage ≤ 1000 V rms		I-IV	
		I-III	
Climatic Classification		55/85/21	
Pollution Degree (DIN VDE 0110/1.89)		2	
Maximum Working Insulation Voltage	V_{IORM}	1414	V _{peak}
Input to Output Test Voltage, Method b* $V_{IORM} \times 1.875 = V_{PR}$, 100% Production Test with $t_m = 1$ sec, Partial Discharge < 5 pC	V_{PR}	2652	V _{peak}
Input to Output Test Voltage, Method a* $V_{IORM} \times 1.5 = V_{PR}$, Type and sample test, $t_m = 60$ sec, Partial Discharge < 5 pC	V_{PR}	2121	V _{peak}
Highest Allowable Overvoltage* (Transient Overvoltage, $t_{ini} = 10$ sec)	V_{IOTM}	8000	V _{peak}
Safety Limiting Values (Maximum values allowed in the event of a failure, also see Figure 9, Thermal Derating curve.) Case Temperature Input Current Output Power	T_S $I_{S,INPUT}$ $P_{S,OUTPUT}$	150 400 700	°C mA mW
Insulation Resistance at T_S , $V_{IO} = 500$ V	R_S	$\geq 10^9$	Ω

*Refer to the front of the optocoupler section of the current catalog, under Product Safety Regulations section IEC/EN/DIN EN 60747-5-2, for a detailed description.

Note: Isolation characteristics are guaranteed only within the safety maximum ratings which must be ensured by protective circuits in application.

Absolute Maximum Ratings

Parameter	Symbol	Device	Min.	Max.	Units	Note
Storage Temperature*	T_S		-55	125	°C	
Operating Temperature*	T_A	8-Pin DIP SO-8	-55	100	°C	
		Widebody	-55	85		
Average Forward Input Current*	$I_{F(AVG)}$			25	mA	1
Peak Forward Input Current* (50% duty cycle, 1 ms pulse width) (50% duty cycle, 1 ms pulse width)	$I_{F(PEAK)}$	8-Pin DIP SO-8		50	mA	2
		Widebody		40		
Peak Transient Input Current* ($\leq 1 \mu s$ pulse width, 300 pps)	$I_{F(TRANS)}$	8-Pin DIP SO-8		1	A	
		Widebody		0.1		
Reverse LED Input Voltage* (Pin 3-2)	V_R	8-Pin DIP SO-8		5	V	
		Widebody		3		
Input Power Dissipation*	P_{IN}	8-Pin DIP SO-8		45	mW	3
		Widebody		40		
Average Output Current* (Pin 6)	$I_{O(AVG)}$			8	mA	
Peak Output Current*	$I_{O(PEAK)}$			16	mA	
Emitter-Base Reverse Voltage* (Pin 5-7, except 4502/3, 0452/3)	V_{EBR}			5	V	
Supply Voltage (Pin 8-5)	V_{CC}		-0.5	30	V	
Output Voltage (Pin 6-5)	V_O		-0.5	20	V	
Supply Voltage* (Pin 8-5)	V_{CC}		-0.5	15	V	
Output Voltage* (Pin 6-5)	V_O		-0.5	15	V	
Base Current* (Pin 7, except 4502/3, 0452/3)	I_B			5	mA	
Output Power Dissipation*	P_O			100	mW	4
Lead Solder Temperature* (Through-Hole Parts Only) 1.6 mm below seating plane, 10 seconds up to seating plane, 10 seconds	T_{LS}	8-Pin DIP		260	°C	
		Widebody		260	°C	
Reflow Temperature Profile	T_{RP}	SO-8 and Option 300	See Package Outline Drawings section			

*Data has been registered with JEDEC for the 6N135/6N136.

Electrical Specifications (DC)Over recommended temperature ($T_A = 0^\circ\text{C}$ to 70°C) unless otherwise specified. See note 13.

Parameter	Symbol	Device	Min.	Typ.**	Max.	Units	Test Conditions			Fig.	Note		
Current Transfer Ratio	CTR*	6N135	7	18	50	%	$T_A = 25^\circ\text{C}$	$V_O = 0.4\text{ V}$	$I_F = 16\text{ mA}$, $V_{CC} = 4.5\text{ V}$	1, 2, 4	5, 11		
		HCPL-0500						$V_O = 0.5\text{ V}$					
		HCNW135	5	19			$T_A = 25^\circ\text{C}$	$V_O = 0.4\text{ V}$					
		HCPL-2502	15		22			$V_O = 0.5\text{ V}$					
					15		25					$T_A = 25^\circ\text{C}$	$V_O = 0.4\text{ V}$
					19		24	50					$V_O = 0.5\text{ V}$
		6N136 HCPL-4502/3 HCPL-0501 HCPL-0452/3 HCNW136 HCNW4502/3	15	25			$V_O = 0.4\text{ V}$						
Logic Low Output Voltage	V_{OL}	6N135		0.1	0.4	V	$T_A = 25^\circ\text{C}$	$I_O = 1.1\text{ mA}$	$I_F = 16\text{ mA}$, $V_{CC} = 4.5\text{ V}$				
		HCPL-0500		0.1	0.5			$I_O = 0.8\text{ mA}$					
		HCNW135		0.1	0.4		$T_A = 25^\circ\text{C}$	$I_O = 3.0\text{ mA}$					
		6N136		0.1	0.5			$I_O = 2.4\text{ mA}$					
		HCPL-2502		0.1	0.5								
		HCPL-4502/3 HCPL-0501 HCPL-0452/3 HCNW136 HCNW4502/3		0.1	0.5								
Logic High Output Current	I_{OH}^*			0.003	0.5	μA	$T_A = 25^\circ\text{C}$	$V_O = V_{CC} = 5.5\text{ V}$	$I_F = 0\text{ mA}$	7			
				0.01	1		$T_A = 25^\circ\text{C}$	$V_O = V_{CC} = 15\text{ V}$					
					50			$V_O = V_{CC} = 15\text{ V}$					
Logic Low Supply Current	I_{CCL}			50	200	μA	$I_F = 16\text{ mA}$, $V_O = \text{Open}$, $V_{CC} = 15\text{ V}$				13		
Logic High Supply Current	I_{CCH}^*			0.02	1	μA	$T_A = 25^\circ\text{C}$	$I_F = 16\text{ mA}$, $V_O = \text{Open}$, $V_{CC} = 15\text{ V}$			13		
					2								
Input Forward Voltage	V_F^*	8-Pin DIP SO-8		1.5	1.7	V	$T_A = 25^\circ\text{C}$	$I_F = 16\text{ mA}$		3			
		Widebody	1.45	1.68	1.85		$T_A = 25^\circ\text{C}$	$I_F = 16\text{ mA}$					
			1.35		1.95								
Input Reverse Breakdown Voltage	BV_R^*	8-Pin DIP SO-8	5			V	$I_R = 10\text{ }\mu\text{A}$						
		Widebody	3				$I_R = 100\text{ }\mu\text{A}$						
Temperature Coefficient of Forward Voltage	$\Delta V_F / \Delta T_A$	8-Pin DIP SO-8		-1.6		mV/ $^\circ\text{C}$	$I_F = 16\text{ mA}$						
		Widebody		-1.9									
Input Capacitance	C_{IN}	8-Pin DIP SO-8		60		pF	$f = 1\text{ MHz}$, $V_F = 0\text{ V}$						
		Widebody		90									
Transistor DC Current Gain	h_{FE}	8-Pin DIP SO-8		150			$V_O = 5\text{ V}$, $I_O = 3\text{ mA}$						
				130			$V_O = 0.4\text{ V}$, $I_B = 20\text{ }\mu\text{A}$						
		Widebody	180		$V_O = 5\text{ V}$, $I_O = 3\text{ mA}$								
			160		$V_O = 0.4\text{ V}$, $I_B = 20\text{ }\mu\text{A}$								

*For JEDEC registered parts.

**All typicals at $T_A = 25^\circ\text{C}$.

Switching Specifications (AC)Over recommended temperature ($T_A = 0^\circ\text{C}$ to 70°C), $V_{CC} = 5\text{ V}$, $I_F = 16\text{ mA}$ unless otherwise specified.

Parameter	Sym.	Device	Min.	Typ.**	Max.	Units	Test Conditions		Fig.	Note
Propagation Delay Time to Logic Low at Output	t_{PHL}^*	6N135 HCPL-0500 HCNW135		0.2	1.5	μs	$T_A = 25^\circ\text{C}$	$R_L = 4.1\text{ k}\Omega$	5, 6, 11	8, 9
		6N136 HCPL-2502 HCPL-4502/3 HCPL-0501 HCPL-0452/3 HCNW136 HCNW4502/3		0.2	0.8		$T_A = 25^\circ\text{C}$	$R_L = 1.9\text{ k}\Omega$		
					1.0					
Propagation Delay Time to Logic High at Output	t_{PLH}^*	6N135 HCPL-0500 HCNW135		1.3	1.5	μs	$T_A = 25^\circ\text{C}$	$R_L = 4.1\text{ k}\Omega$	5, 6, 11	8, 9
		6N136 HCPL-2502 HCPL-4502/3 HCPL-0501 HCPL-0452/3 HCNW136 HCNW4502/3		0.6	0.8		$T_A = 25^\circ\text{C}$	$R_L = 1.9\text{ k}\Omega$		
					1.0					
Common Mode Transient Immunity at Logic High Level Output	$ CM_H $	6N135 HCPL-0500 HCNW135		1		$\text{kV}/\mu\text{s}$	$R_L = 4.1\text{ k}\Omega$	$I_F = 0\text{ mA}$, $T_A = 25^\circ\text{C}$, $V_{CM} = 10\text{ V}_{p-p}$ $C_L = 15\text{ pF}$	12	7, 8, 9
		6N136 HCPL-2502 HCPL-4502 HCPL-0501 HCPL-0452 HCNW4502		1			$R_L = 1.9\text{ k}\Omega$			
			HCPL-4503 HCPL-0453 HCNW4503	15	30					
Common Mode Transient Immunity at Logic Low Level Output	$ CM_L $	6N135 HCPL-0500 HCNW135		1		$\text{kV}/\mu\text{s}$	$R_L = 4.1\text{ k}\Omega$	$I_F = 16\text{ mA}$, $T_A = 25^\circ\text{C}$, $V_{CM} = 10\text{ V}_{p-p}$ $C_L = 15\text{ pF}$	12	7, 8, 9
		6N136 HCPL-2502 HCPL-4502 HCPL-0501 HCPL-0452 HCNW4502		1			$R_L = 1.9\text{ k}\Omega$			
			HCPL-4503 HCPL-0453 HCNW4503	15	30					
Bandwidth	BW	6N135/6 HCPL-2502 HCPL-0500/1		9		MHz	See Test Circuit		8, 10	10
		HCNW135/6		11						

*For JEDEC registered parts.

**All typicals at $T_A = 25^\circ\text{C}$.

Package Characteristics

Over recommended temperature ($T_A = 0^\circ\text{C}$ to 70°C) unless otherwise specified.

Parameter	Sym.	Device	Min.	Typ.*	Max.	Units	Test Conditions	Fig.	Note	
Input-Output Momentary Withstand Voltage**	V_{ISO}	8-Pin DIP SO-8	3750			V rms	RH < 50%, t = 1 min., $T_A = 25^\circ\text{C}$		6, 14	
		Widebody	5000						6, 15	
		8-Pin DIP (Option 020)	5000						6, 12, 15	
	I_{I-O}	8-Pin DIP			1	μA	45% RH, t = 5 s, $V_{I-O} = 3\text{ kVdc}$, $T_A = 25^\circ\text{C}$		6, 16	
Input-Output Resistance	R_{I-O}	8-Pin DIP SO-8		10^{12}		Ω	$V_{I-O} = 500\text{ Vdc}$		6	
		Widebody	10^{12}	10^{13}						$T_A = 25^\circ\text{C}$
			10^{11}							$T_A = 100^\circ\text{C}$
Input-Output Capacitance	C_{I-O}	8-Pin DIP SO-8		0.6		pF	f = 1 MHz		6	
		Widebody		0.5	0.6					

*All typicals at $T_A = 25^\circ\text{C}$.

**The Input-Output Momentary Withstand Voltage is a dielectric voltage rating that should not be interpreted as an input-output continuous voltage rating. For the continuous voltage rating refer to the IEC/EN/DIN EN 60747-5-2 Insulation Related Characteristics Table (if applicable), your equipment level safety specification or Agilent Application Note 1074 entitled "Optocoupler Input-Output Endurance Voltage," publication number 5963-2203E.

Notes:

- Derate linearly above 70°C free-air temperature at a rate of $0.8\text{ mA}/^\circ\text{C}$ (8-Pin DIP).
Derate linearly above 85°C free-air temperature at a rate of $0.5\text{ mA}/^\circ\text{C}$ (SO-8).
- Derate linearly above 70°C free-air temperature at a rate of $1.6\text{ mA}/^\circ\text{C}$ (8-Pin DIP).
Derate linearly above 85°C free-air temperature at a rate of $1.0\text{ mA}/^\circ\text{C}$ (SO-8).
- Derate linearly above 70°C free-air temperature at a rate of $0.9\text{ mW}/^\circ\text{C}$ (8-Pin DIP).
Derate linearly above 85°C free-air temperature at a rate of $1.1\text{ mW}/^\circ\text{C}$ (SO-8).
- Derate linearly above 70°C free-air temperature at a rate of $2.0\text{ mW}/^\circ\text{C}$ (8-Pin DIP).
Derate linearly above 85°C free-air temperature at a rate of $2.3\text{ mW}/^\circ\text{C}$ (SO-8).
- 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.
- Device considered a two-terminal device: Pins 1, 2, 3, and 4 shorted together and Pins 5, 6, 7, and 8 shorted together.
- Common mode transient immunity in a Logic High level is the maximum tolerable (positive) dV_{CM}/dt on the leading edge of the common mode pulse signal, V_{CM} , to assure that the output will remain in a Logic High state (i.e., $V_O > 2.0\text{ V}$). Common mode transient immunity in a Logic Low level is the maximum tolerable (negative) dV_{CM}/dt on the trailing edge of the common mode pulse signal, V_{CM} , to assure that the output will remain in a Logic Low state (i.e., $V_O < 0.8\text{ V}$).
- The $1.9\text{ k}\Omega$ load represents 1 TTL unit load of 1.6 mA and the $5.6\text{ k}\Omega$ pull-up resistor.
- The $4.1\text{ k}\Omega$ load represents 1 LSTTL unit load of 0.36 mA and $6.1\text{ k}\Omega$ pull-up resistor.
- The frequency at which the ac output voltage is 3 dB below its mid-frequency value.
- The JEDEC registration for the 6N136 specifies a minimum CTR of 15%. Agilent guarantees a minimum CTR of 19%.
- See Option 020 data sheet for more information.
- Use of a $0.1\text{ }\mu\text{F}$ bypass capacitor connected between pins 5 and 8 is recommended.
- In accordance with UL 1577, each optocoupler is proof tested by applying an insulation test voltage $\geq 4500\text{ V rms}$ for 1 second (leakage detection current limit, $I_{I-O} \leq 5\text{ }\mu\text{A}$). This test is performed before the 100% Production test shown in the IEC/EN/DIN EN 60747-5-2 Insulation Related Characteristics Table if applicable.
- In accordance with UL 1577, each optocoupler is proof tested by applying an insulation test voltage $\geq 6000\text{ V rms}$ for 1 second (leakage detection current limit, $I_{I-O} \leq 5\text{ }\mu\text{A}$). This test is performed before the 100% Production test shown in the IEC/EN/DIN EN 60747-5-2 Insulation Related Characteristics Table if applicable.
- This rating is equally validated by an equivalent ac proof test.

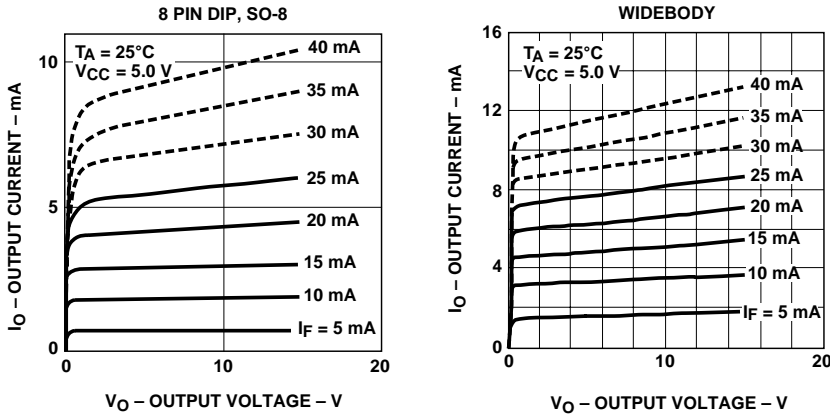


Figure 1. DC and Pulsed Transfer Characteristics.

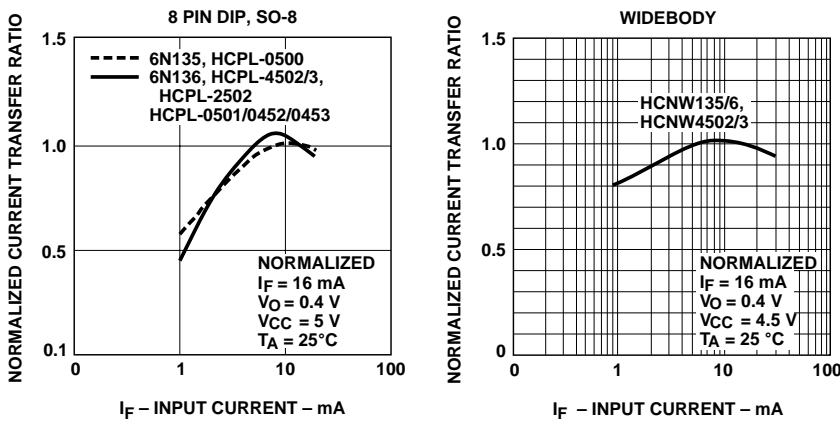


Figure 2. Current Transfer Ratio vs. Input Current.

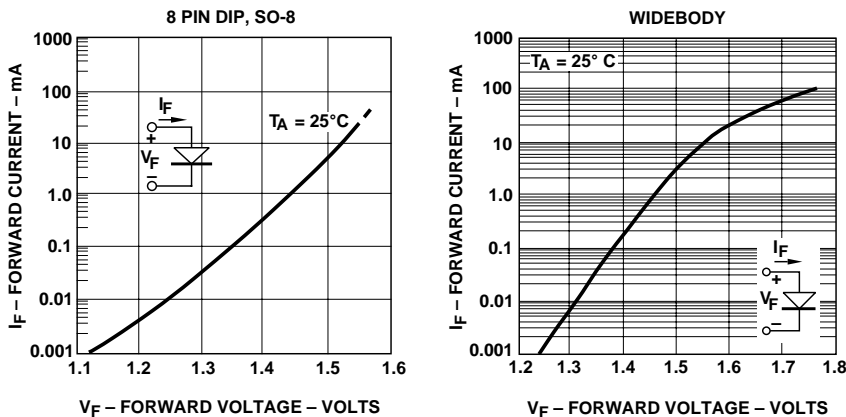


Figure 3. Input Current vs. Forward Voltage.

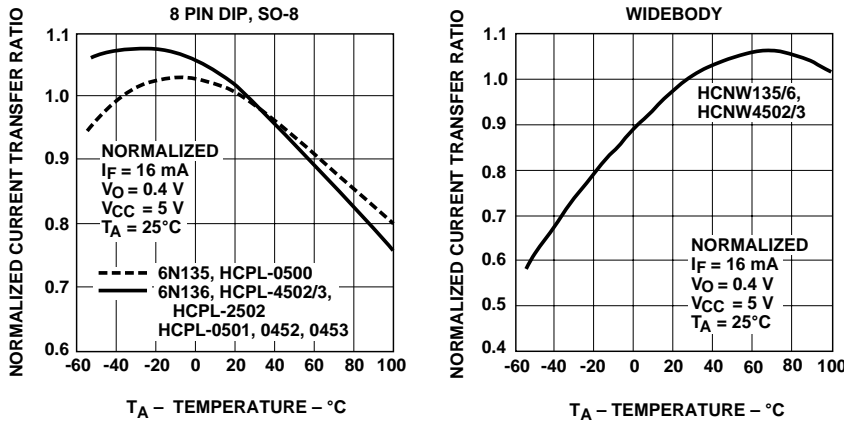


Figure 4. Current Transfer Ratio vs. Temperature.

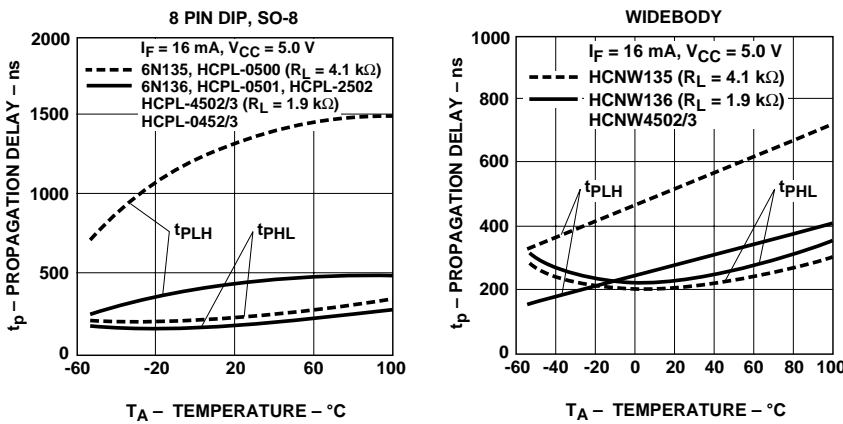


Figure 5. Propagation Delay vs. Temperature.

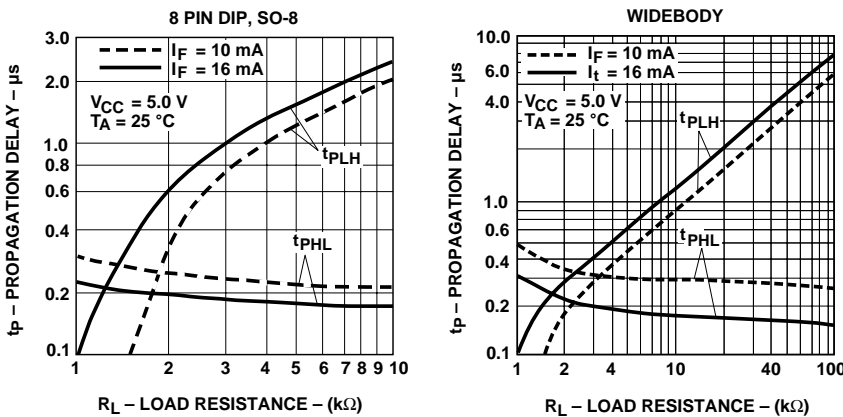


Figure 6. Propagation Delay Time vs. Load Resistance.

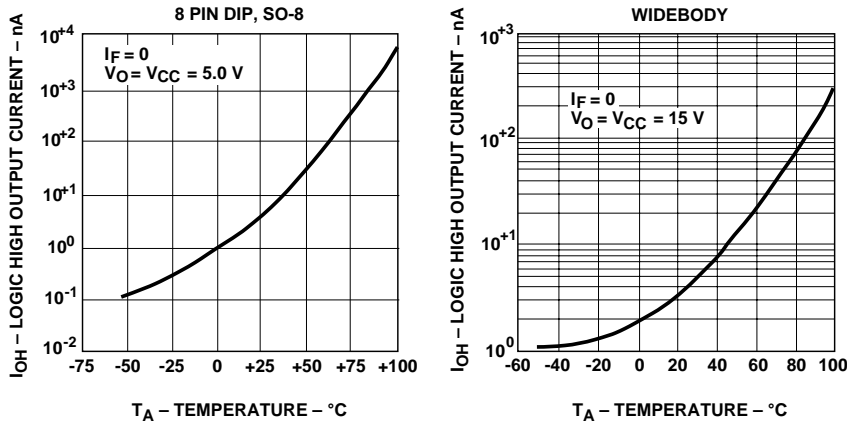


Figure 7. Logic High Output Current vs. Temperature.

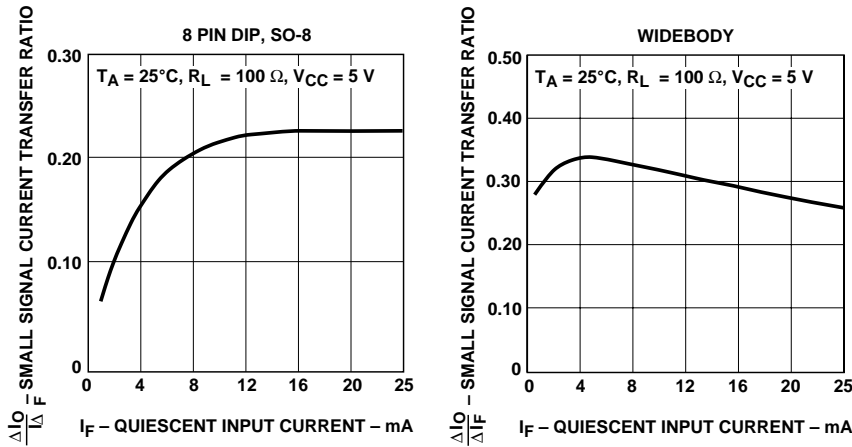


Figure 8. Small-Signal Current Transfer Ratio vs. Quiescent Input Current.

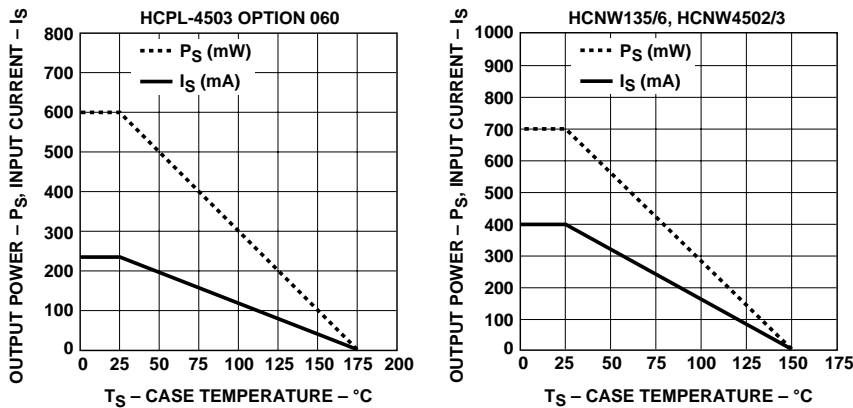


Figure 9. Thermal Derating Curve, Dependence of Safety Limiting Value with Case Temperature per IEC/EN/DIN EN 60747-5-2.

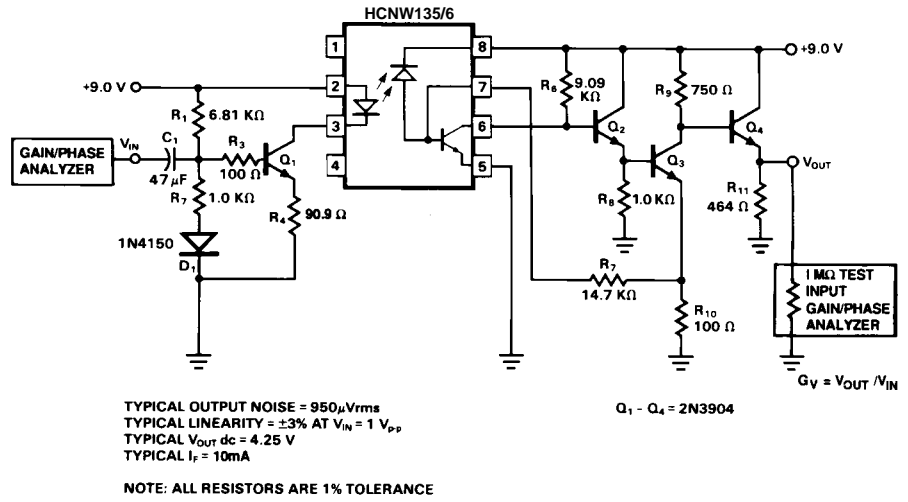
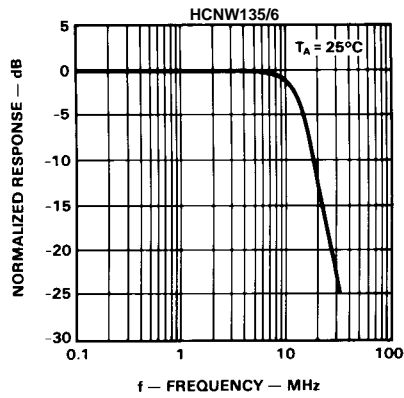
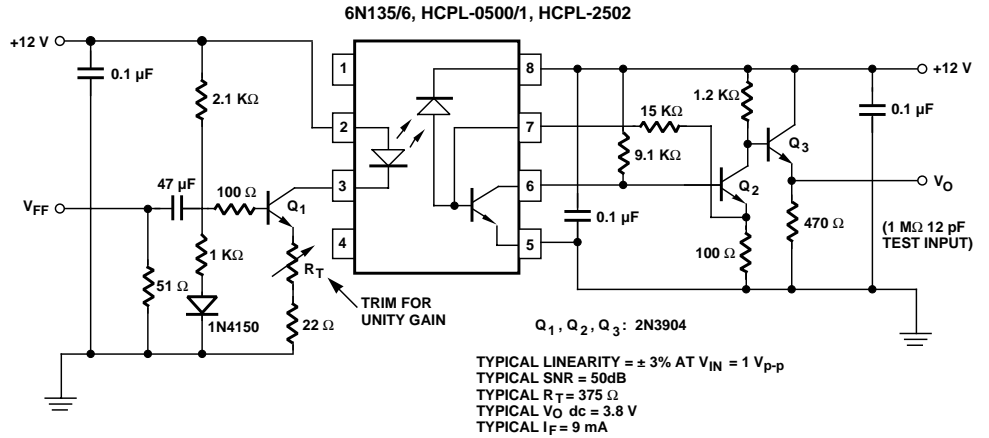
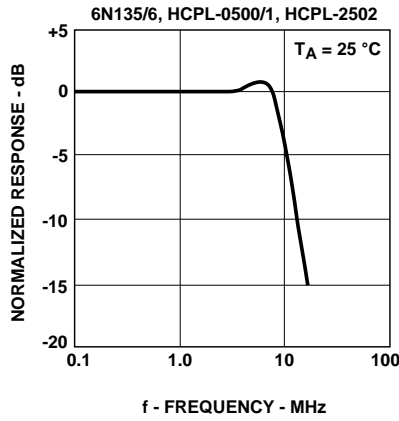


Figure 10. Frequency Response.

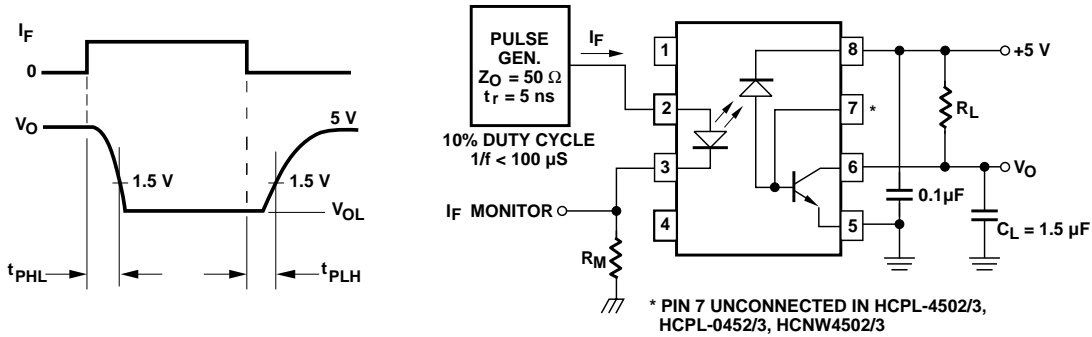


Figure 11. Switching Test Circuit.

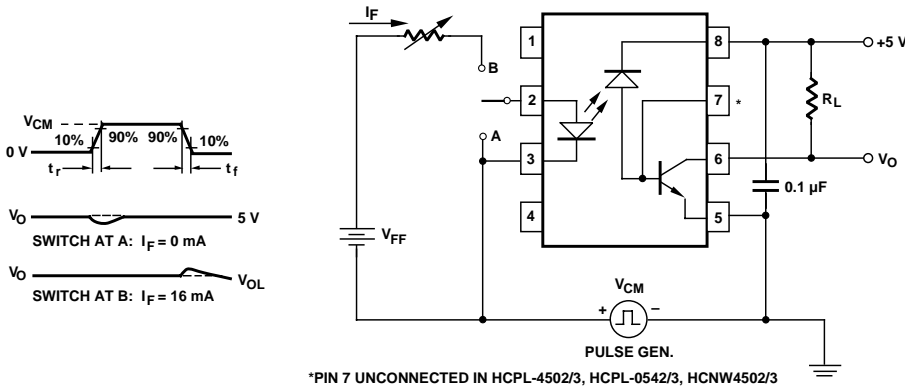


Figure 12. Test Circuit for Transient Immunity and Typical Waveforms.

www.agilent.com/semiconductors

For product information and a complete list of distributors, please go to our web site.

For technical assistance call:

Americas/Canada: +1 (800) 235-0312 or (916) 788-6763

Europe: +49 (0) 6441 92460

China: 10800 650 0017

Hong Kong: (+65) 6756 2394

India, Australia, New Zealand: (+65) 6755 1939

Japan: (+81 3) 3335-8152 (Domestic/International), or 0120-61-1280 (Domestic Only)

Korea: (+65) 6755 1989

Singapore, Malaysia, Vietnam, Thailand, Philippines, Indonesia: (+65) 6755 2044

Taiwan: (+65) 6755 1843

Data subject to change.

Copyright © 2004 Agilent Technologies, Inc.

Obsoletes 5989-0305EN

December 20, 2004

5989-2112EN

SUNSTAR 商斯达实业集团是集研发、生产、工程、销售、代理经销、技术咨询、信息服务等为一体的高科技企业，是专业高科技电子产品生产厂家，是具有 10 多年历史的专业电子元器件供应商，是中国最早和最大的仓储式连锁规模经营大型综合电子零部件代理分销商之一，是一家专业代理和分销世界各大品牌 IC 芯片和电子元器件的连锁经营综合性国际公司，专业经营进口、国产名厂名牌电子元件，型号、种类齐全。在香港、北京、深圳、上海、西安、成都等全国主要电子市场设有直属分公司和产品展示展销窗口门市部专卖店及代理分销商，已在全国范围内建成强大统一的供货和代理分销网络。我们专业代理经销、开发生产电子元器件、集成电路、传感器、微波光电元器件、工控机/DOC/DOM 电子盘、专用电路、单片机开发、MCU/DSP/ARM/FPGA 软件硬件、二极管、三极管、模块等，是您可靠的一站式现货配套供应商、方案提供商、部件功能模块开发配套商。商斯达实业公司拥有庞大的资料库，有数位毕业于著名高校——有中国电子工业摇篮之称的西安电子科技大学（西军电）并长期从事国防尖端科技研究的高级工程师为您精挑细选、量身订做各种高科技电子元器件，并解决各种技术问题。

微波光电部专业代理经销高频、微波、光纤、光电元器件、组件、部件、模块、整机；电磁兼容元器件、材料、设备；微波 CAD、EDA 软件、开发测试仿真工具；微波、光纤仪器仪表。欢迎国外高科技微波、光纤厂商将优秀产品介绍到中国、共同开拓市场。长期大量现货专业批发高频、微波、卫星、光纤、电视、CATV 器件：晶振、VCO、连接器、PIN 开关、变容二极管、开关二极管、低噪晶体管、功率电阻及电容、放大器、功率管、MMIC、混频器、耦合器、功分器、振荡器、合成器、衰减器、滤波器、隔离器、环行器、移相器、调制解调器；光电子器件和组件：红外发射管、红外接收管、光电开关、光敏管、发光二极管和发光二极管组件、半导体激光二极管和激光器组件、光电探测器和光接收组件、光发射接收模块、光纤激光器和光放大器、光调制器、光开关、DWDM 用光发射和接收器件、用户接入系统光收发器件与模块、光纤连接器、光纤跳线/尾纤、光衰减器、光纤适配器、光隔离器、光耦合器、光环行器、光复用器/转换器；无线收发芯片和模组、蓝牙芯片和模组。

更多产品请看本公司产品专用销售网站：

商斯达微波光电产品网：[HTTP://www.rfoe.net/](http://www.rfoe.net/)

商斯达中国传感器科技信息网：<http://www.sensor-ic.com/>

商斯达工控安防网：<http://www.pc-ps.net/>

商斯达电子元器件网：<http://www.sunstare.com/>

商斯达消费电子产品网：<http://www.icasic.com/>

商斯达实业科技产品网：<http://www.sunstars.cn/> 射频微波光电元器件销售热线：

地址：深圳市福田区福华路福庆街鸿图大厦 1602 室

电话：0755-83396822 83397033 83398585 82884100

传真：0755-83376182 (0) 13823648918 MSN: SUNS8888@hotmail.com

邮编：518033 E-mail:szss20@163.com QQ: 195847376

深圳赛格展销部：深圳华强北路赛格电子市场 2583 号 电话：0755-83665529 25059422

技术支持：0755-83394033 13501568376

欢迎索取免费详细资料、设计指南和光盘；产品凡多，未能尽录，欢迎来电查询。

北京分公司：北京海淀区知春路 132 号中发电子大厦 3097 号

TEL: 010-81159046 82615020 13501189838 FAX: 010-62543996

上海分公司：上海市北京东路 668 号上海赛格电子市场 D125 号

TEL: 021-28311762 56703037 13701955389 FAX: 021-56703037

西安分公司：西安高新开发区 20 所(中国电子科技集团导航技术研究所)

西安劳动南路 88 号电子商城二楼 D23 号

TEL: 029-81022619 13072977981 FAX:029-88789382