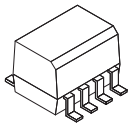
3.3 V Dual Channel High Speed − 10 MBit/s Logic Gate Optocouplers

HCPL062N



SOIC8
CASE 751DZ

Description

The HCPL062N optocouplers consist of an AlGaAs LED, optically coupled to a very high speed integrated photo−detector logic gate consisting of bipolar transistors on a CMOS process for reduced power consumption. The output features an open collector, thereby permitting wired OR outputs. The devices are housed in a compact small−outline package. The coupled parameters are guaranteed over the temperature range of −40°C to +85°C. An internal noise shield and provides superior common mode rejection.

Features

- Compact SO8 Package
- Very High Speed − 10 MBit/s
- Superior CMR − 25 kV/μs Minimum (1,000 Volts Common Mode)
- Logic Gate Output
- Wired OR−open Collector
- Fixed Threshold Detector Design Minimizes Thermal Impact on Switching Times
- U.L. Recognized (File # E90700)

Applications

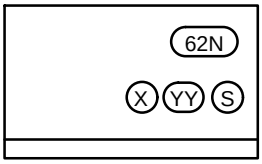
- Ground Loop Elimination
- Field Buses
- Line Receiver, Data Transmission
- Data Multiplexing
- Switching Power Supplies
- Pulse Transformer Replacement
- Computer−peripheral Interface
- Instrumentation Input/Output Isolation

TRUTH TABLE (POSITIVE LOGIC)

Input	Output
H	L
L	H

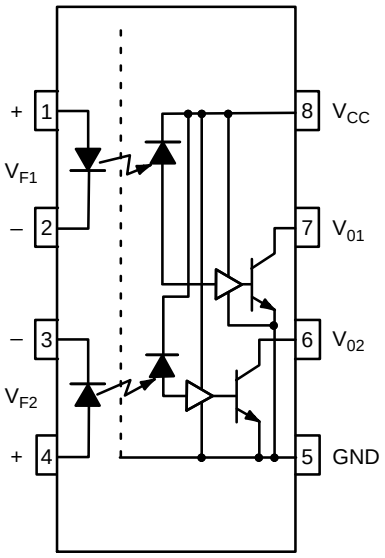
A 0.1 μF bypass capacitor must be connected between pins 8 and 5.

MARKING DIAGRAM



62N = Device number
X = One digit year code, e.g., ‘3’
YY = Two digit work week ranging from ‘01’ to ‘53’
S = Assembly package code

CIRCUIT DRAWING (Note 1)



NOTE:
1. The V_{CC} supply to each optoisolator must be bypassed by a 0.1 μF capacitor or larger. This can be either a ceramic or solid tantalum capacitor with good high frequency characteristic and should be connected no further than 3 mm from the V_{CC} and GND pins of each device.

ORDERING INFORMATION

See detailed ordering and shipping information on page 7 of this data sheet.

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ABSOLUTE MAXIMUM RATINGS (No derating required up to 85°C)

Symbol	Parameter	Value	Unit
T_{STG}	Storage Temperature	−40 to +125	°C
T_{OPR}	Operating Temperature	−40 to +85	°C
EMITTER			
I_F	DC/Average Forward Input Current (Each Channel)	50	mA
V_R	Reverse Input Voltage (Each Channel)	5.0	V
P_I	Power Dissipation	45	mW
DETECTOR			
V_{CC} (1 minute max)	Supply Voltage	7.0	V
I_O	Output Current (Each Channel)	15	mA
V_O	Output Voltage (Each Channel)	7.0	V
P_O	Collector Output Power Dissipation	85	mW

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
I_{FL}	Input Current, Low Level	0	250	μA
I_{FH}	Input Current, High Level	6.3 (Note 2)	15	mA
V_{CC}	Supply Voltage, Output	2.7	3.3	V
T_A	Operating Temperature	−40	+85	°C
N	Fan Out (TTL load)	−	5	TTL Loads
R_L	Output Pull−up	330	4K	Ω

2. 6.3 mA is a guard banded value which allows for at least 20% CTR degradation. Initial input current threshold value is 5.0 mA or less

ELECTRICAL CHARACTERISTICS (T_A = −40°C to +85°C, unless otherwise specified)

INDIVIDUAL COMPONENT CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min	Typ (Note 3)	Max	Unit
EMITTER						
V_F	Input Forward Voltage	I_F = 10 mA	−	−	1.8	V
		I_F = 10 mA, T_A = 25°C	−	−	1.75	
B_{VR}	Input Reverse Breakdown Voltage	I_R = 10 μA	5.0	−	−	V
$\Delta V_F/\Delta T_A$	Input Diode Temperature Coefficient	I_F = 10 mA	−	−1.5	−	mV/°C
DETECTOR						
I_{CCH}	High Level Supply Current	I_F = 0 mA, V_{CC} = 3.3 V	−	7.1	10	mA
I_{CCL}	Low Level Supply Current	I_F = 10 mA, V_{CC} = 3.3 V	−	6.7	15	mA

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SWITCHING CHARACTERISTICS (T_A = −40°C to +85°C, V_{CC} = 3.3 V, I_F = 7.5 mA, unless otherwise specified)

Symbol	AC Characteristics	Test Conditions	Min	Typ (Note 3)	Max	Unit
T_{PLH}	Propagation Delay Time to Output High Level	R_L = 350 Ω, C_L = 15 pF Note 4, Figure 10	−	−	90	ns
T_{PHL}	Propagation Delay Time to Output Low Level	R_L = 350 Ω, C_L = 15 pF Note 5, Figure 10	−	−	75	ns
$\|T_{PHL}-T_{PLH}\|$	Pulse Width Distortion	R_L = 350 Ω, C_L = 15 pF Figure 10	−	−	25	ns
t_r	Output Rise Time (10−90%)	R_L = 350 Ω, C_L = 15 pF Note 6, Figure 10	−	16	−	ns
t_f	Output Fall Time (90−10%)	R_L = 350 Ω, C_L = 15 pF Note 7, Figure 10	−	4	−	ns
$\|CM_H\|$	Common Mode Transient Immunity (at Output High Level)	R_L = 350 Ω, T_A = 25°C, I_F = 0 mA, V_{CC} = 3.3 V, $V_{O(Min.)}$ = 2 V $\|V_{CM}\|$ = 1,000 V Notes 8, 11, Figure 11	25,000	−	−	V/μs
$\|CM_L\|$	Common Mode Transient Immunity (at Output Low Level)	R_L = 350 Ω, T_A =25°C, I_F = 7.5 mA, V_{CC} = 3.3 V, $V_{O(Max.)}$ = 0.8 V $\|V_{CM}\|$ = 1,000 V Notes 9, 11, Figure 11	25,000	−	−	V/μs

TRANSFER CHARACTERISTICS (T_A = −40°C to +85°C, unless otherwise specified)

Symbol	AC Characteristics	Test Conditions	Min	Typ (Note 3)	Max	Unit
V_{OL}	Low Level Output Voltage	V_{CC} = 3.3 V, I_F = 5 mA, I_{OL} = 13 mA	−	−	0.6	V
I_{FT}	Input Threshold Current	V_{CC} = 3.3 V, V_O = 0.6 V, I_{OL} = 13 mA	−	−	5	mA

ISOLATION CHARACTERISTICS (T_A = −40°C to +85°C, unless otherwise specified)

Symbol	AC Characteristics	Test Conditions	Min	Typ (Note 3)	Max	Unit
I_{I-O}	Input−Output Insulation Leakage Current	Relative humidity = 45%, T_A = 25°C, t = 5 s V_{I-O} = 3000 VDC, Note 10	−	−	1.0	μA
V_{ISO}	Withstand Insulation Test Voltage	R_H < 50%, T_A = 25°C $I_{I-O} \le$ 2 μA, t = 1 min., Note 10	2500	−	−	V_{RMS}
R_{I-O}	Resistance (Input to Output)	V_{I-O} = 500 V, Note 10	−	1012	−	Ω
C_{I-O}	Capacitance (Input to Output)	f = 1 MHz, Note 10	−	0.6	−	pF

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

3. All typical values are at V_{CC} = 3.3 V, T_A = 25°C unless otherwise specified.
4. t_{PLH} − Propagation delay is measured from the 3.75 mA level on the HIGH to LOW transition of the input current pulse to the 1.5 V level on the LOW to HIGH transition of the output voltage pulse.
5. t_{PHL} − Propagation delay is measured from the 3.75 mA level on the LOW to HIGH transition of the input current pulse to the 1.5 V level on the HIGH to LOW transition of the output voltage pulse.
6. t_r − Rise time is measured from the 90% to the 10% levels on the LOW to HIGH transition of the output pulse.
7. t_f − Fall time is measured from the 10% to the 90% levels on the HIGH to LOW transition of the output pulse.
8. CM_H − The maximum tolerable rate of rise of the common mode voltage to ensure the output will remain in the high state (i.e., V_{OUT} > 2.0 V). Measured in volts per microsecond (V/μs).
9. CM_L − The maximum tolerable rate of fall of the common mode voltage to ensure the output will remain in the low output state (i.e., V_{OUT} < 0.8 V). Measured in volts per microsecond (V/μs).
10. Device considered a two−terminal device: Pins 1, 2, 3 and 4 shorted together, and Pins 5, 6, 7 and 8 shorted together.
11. The power supply bypass capacitors must be no further than 3 mm from the leads of the optocoupler. A low inductance ground plane width of with ≤ 5 nHy of series lead inductance is required.

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TYPICAL PERFORMANCE CURVES

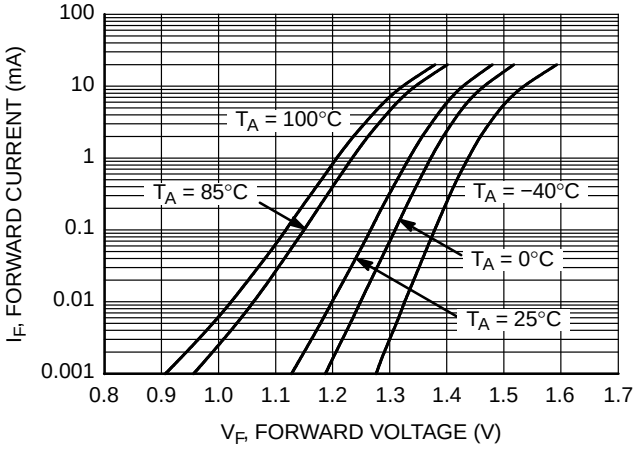


Figure 1. Forward Current vs. Forward Voltage

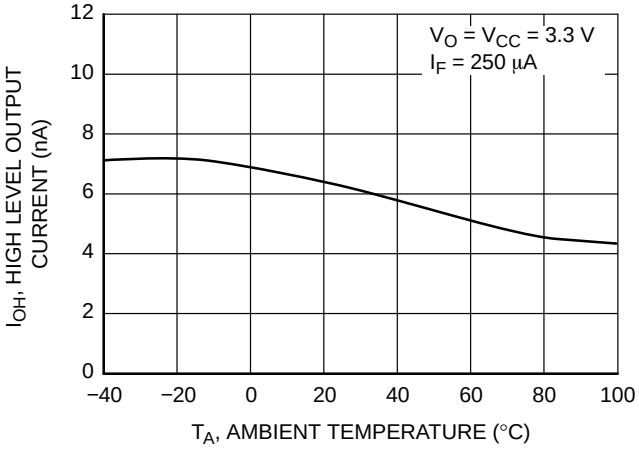


Figure 2. High Level Output Current vs. Ambient Temperature

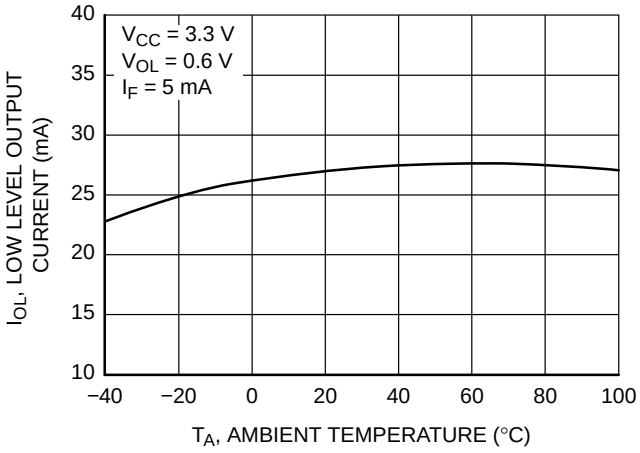


Figure 3. Low Level Output Current vs. Ambient Temperature

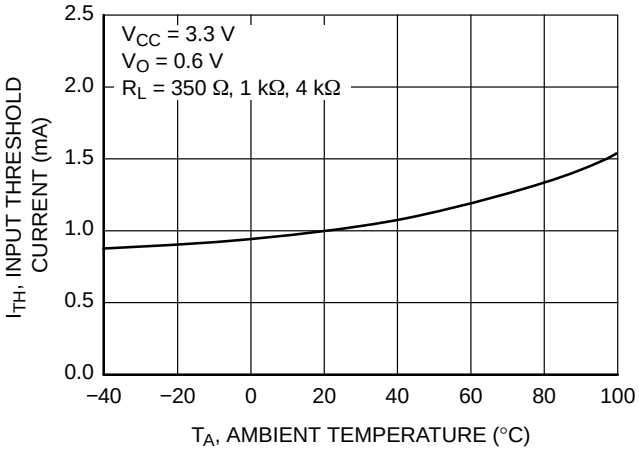


Figure 4. Input Threshold Current vs. Temperature

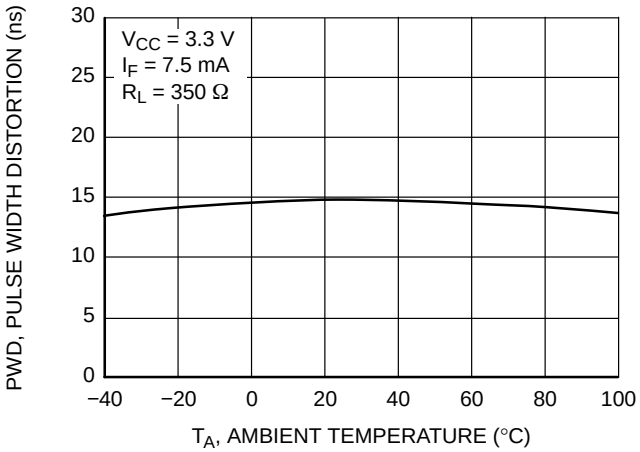


Figure 5. Pulse Width Distortion vs. Ambient Temperature

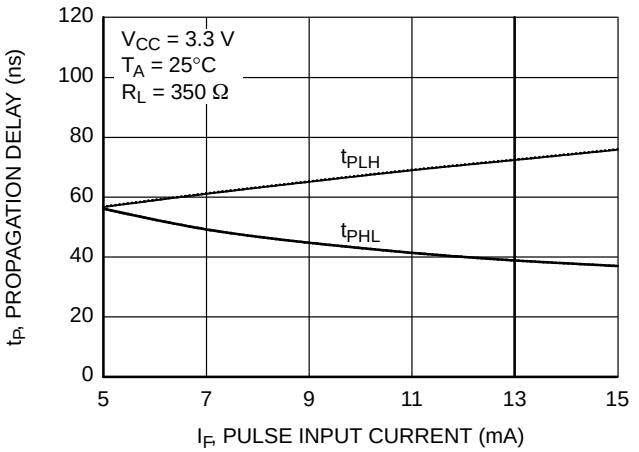


Figure 6. Propagation Delay vs. Pulse Input Current

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TYPICAL PERFORMANCE CURVES (Continued)

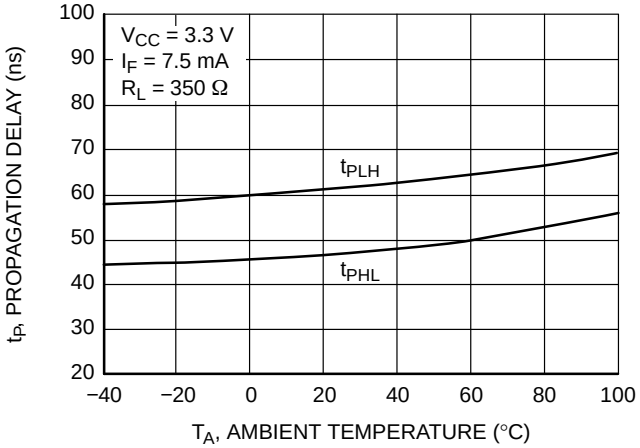


Figure 7. Propagation Delay vs. Ambient Temperature

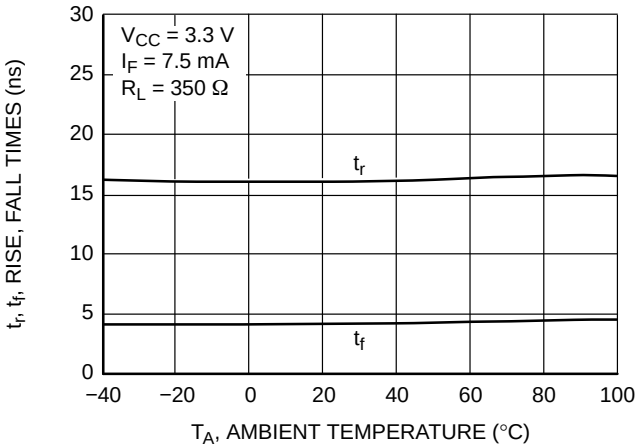


Figure 8. Rise and Fall Times vs. Ambient Temperature

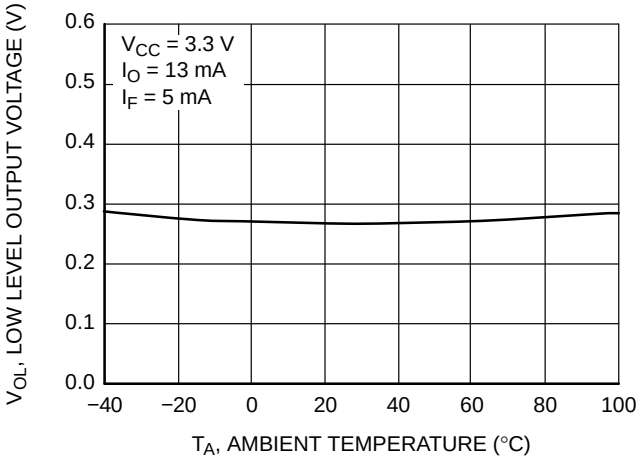


Figure 9. Low Level Output Voltage vs. Ambient Temperature

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TEST CIRCUITS

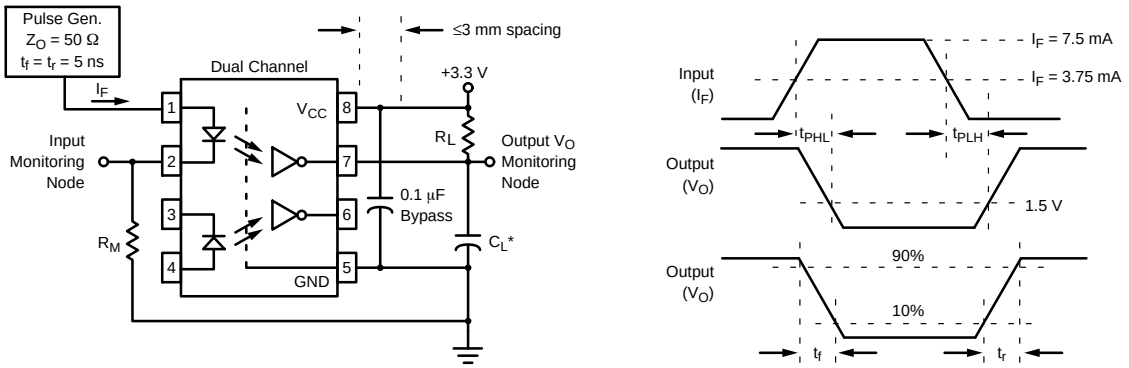


Figure 10. Test Circuit and Waveforms for t_{PLH}, t_{PHL}, t_r and t_f

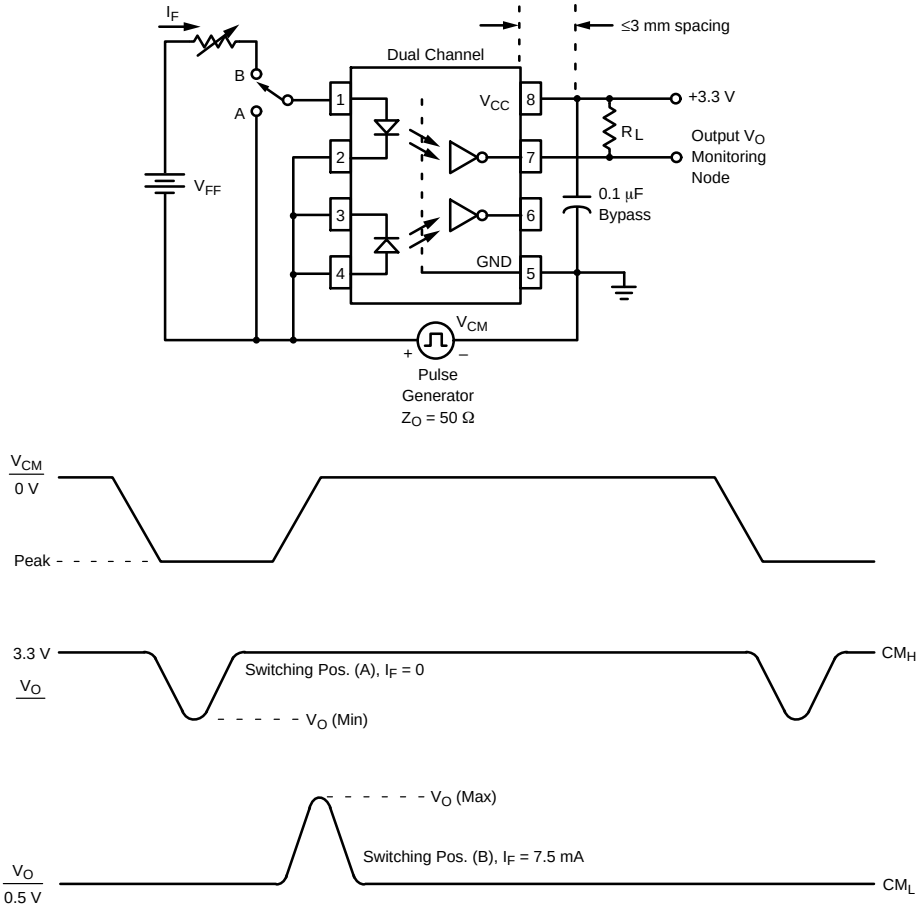


Figure 11. Test Circuit and Waveforms for Common Mode Transient Immunity

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REFLOW PROFILE

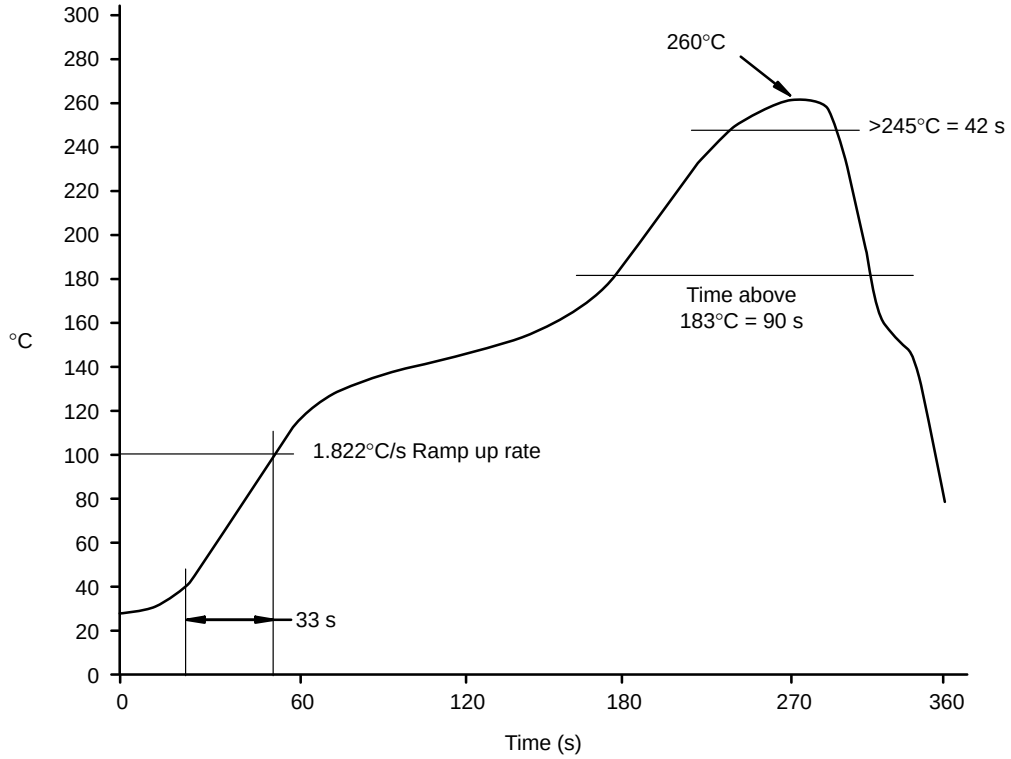


Figure 12. Reflow Profile

ORDERING INFORMATION

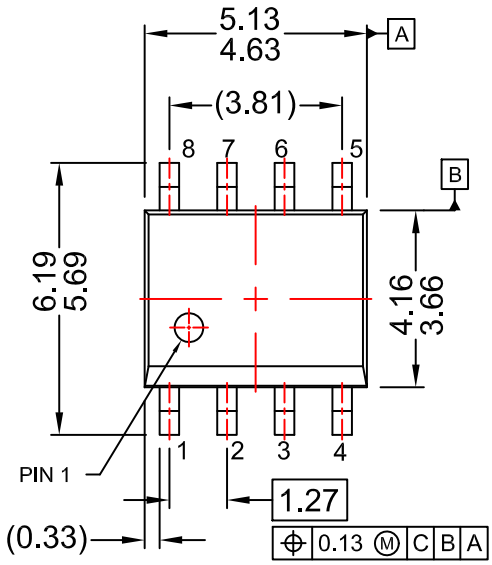
Option	Order Entry Identifier	Package Type	Shipping†
No Suffix	HCPL062N	SOIC8 (Pb−Free)	50 Units / Tube
R2	HCPL062NR2		2500 / Tape & Reel

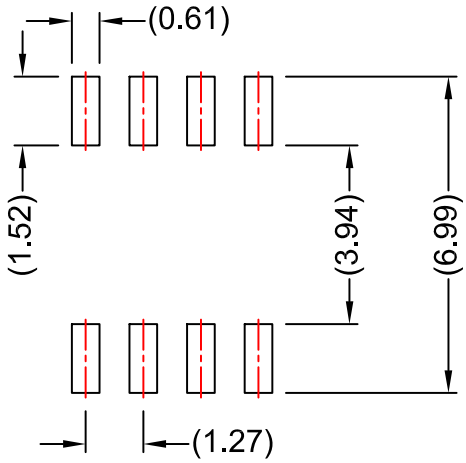
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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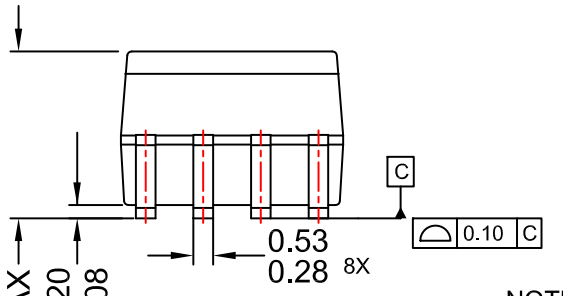
SOIC8
CASE 751DZ
ISSUE O

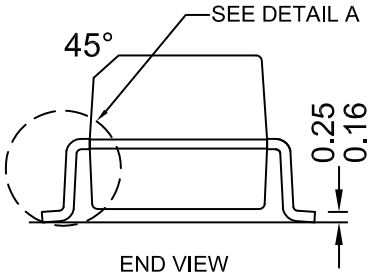
DATE 30 SEP 2016



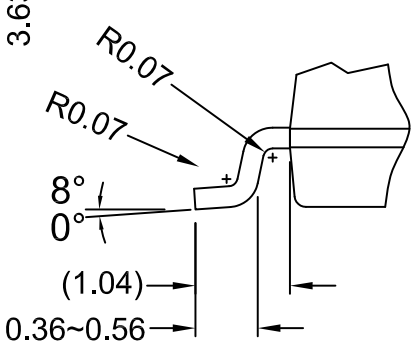


LAND PATTERN RECOMMENDATION





END VIEW



DETAIL A
SCALE: 2:1

NOTES:

A) NO STANDARD APPLIES TO THIS PACKAGE
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS DO NOT INCLUDE MOLD FLASH OR BURRS.
D) LANDPATTERN STANDARD: SOIC127P600X175-8M.

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