UMW HCPL-2601-xxxE

1.Description

HCPL-2601, are consists of an infrared emitting diode optically coupled to a high speed integrated photo detector logic gate with a strobable output. It is packaged in a 8-pin DIP package and available in wide-lead spacing and SMD options.

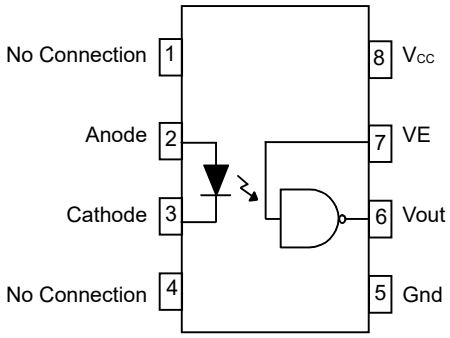
2.Features

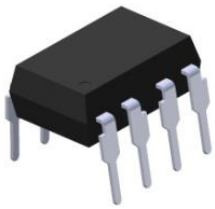
- High speed 10Mbit/s
- Guaranteed performance from -40 to 85°C
- Logic gate output
- High isolation voltage between input and output (Viso=5000 Vrms)
- Pb free and RoHS compliant.

3.Applications

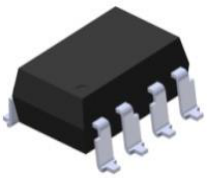
- Ground loop elimination
- LSTTL to TTL, LSTTL or 5 volt CMOS
- Line receiver, data transmission
- Data multiplexing
- Switching power supplies
- Pulse transformer replacement
- Computer peripheral interface
- High speed logic ground isolation

4.Pinning Information





DIP-8



SOP- 8

A 0.1μF bypass capacitor must be connected between pins 8 and 5 *3

5.Truth Table (Positive Logic)

LED	Enable	Output
ON	H	L
OFF	H	H
ON	L	H
OFF	L	H
ON	NC	L
OFF	NC	H

6.Absolute Maximum Ratings T_A= 25°C

Parameter		Symbol	Value	Units
Input	Forward current	I_F	20	mA
	Enable input voltage Not exceed V_{CC} by more than 500mV	V_E	V_{CC}+0.5	V
	Reverse voltage	V_R	5	V
	Power dissipation	P_D	45	mW
Output	Power dissipation	P_C	85	mW
	Output current	I_O	50	mA
	Output voltage	V_O	7	V
Supply voltage		V_{CC}	7	V
Isolation voltage *1		V_{ISO}	5000	V_{rms}
Operating temperature		T_{OPR}	-40 to 85	°C
Storage temperature		T_{STG}	-55 to 125	°C
Soldering temperature *2		T_{SOL}	260	°C

*1 AC for 1 minute, R.H.=40 ~ 60% R.H. In this test, pins 1,2,3 & 4 are shorted together,and pins 5,6,7 & 8 are shorted together.

*2 For 10 seconds.

7.Electrical Characteristics (T_A=0 to 70°C unless specified otherwise)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Input						
Forward voltage	V_F	I_F=10mA		1.4	1.8	V
Reverse voltage	V_R	I_R=10μA	5			V
Temperature coefficient of forward voltage	$\Delta V_F/\Delta T_A$	I_F=10mA		-1.8		mV/°C
Input capacitance	C_{IN}	V_F=0, f=1MHz		60		pF
Output						
High level supply current	I_{CCH}	I_F=0mA, V_E=0.5V, V_{CC}=5.5V		7	9	mA
Low level supply current	I_{CCL}	I_F=10mA, V_{CC}=5.5V, V_E=0.5V		9	12	mA
High level enable current	I_{EH}	V_E=2V, V_{CC}=5.5V		-0.6	-1.5	mA
Low level enable current	I_{EL}	V_E=0.5V, V_{CC}=5.5V		-0.8	-1.5	mA
High level enable voltage	V_{EH}	I_F=10mA, V_{CC}=5.5V	2			V
Low level enable voltage	V_{EL}	I_F=10mA, V_{CC}=5.5V			0.8	V

8.Transfer Characteristics (T_A=-40 to 85°C unless specified otherwise)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
HIGH Level Output Current	I_{OH}	V_{CC}=5.5V, V_O=5.5V I_F=250μA, V_E=2V		2.1	100	μA
LOW Level Output Voltage	V_{OL}	V_{CC}=5.5V, I_F=5mA V_E=2V, I_{CL}=13mA		0.35	0.6	V
Input Threshold Current	I_{FT}	V_{CC}=5.5V, V_O=0.6V V_E=2V, I_{OL}=13mA		2.5	5	mA

9.Switching Characteristics

(T_A=-40 to 85°C, V_{CC}=5V, I_F=7.5mA unless specified otherwise)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Propagation delay time to output High level	T_{PHL}	C_L=15pF, R_L=350Ω, T_A=25°C		35	75	ns
Propagation delay time to output Low level	T_{PLH}	C_L=15pF, R_L=350Ω, T_A=25°C		40	75	ns
Pulse width distortion	$\|T_{PHL}-T_{PLH}\|$	C_L=15pF, R_L=350Ω		5	35	ns
Output rise time	t_r	C_L=15pF, R_L=350Ω		40		ns
Output fall time	t_f	C_L=15pF, R_L=350Ω		10		ns
Enable Propagation Delay Time to Output High Level	t_{ELH}	I_F=7.5mA , V_{EH}=3.5V, C_L=15pF, R_L=350Ω		15		ns
Enable Propagation Delay Time to Output Low Level	t_{EHL}	I_F=7.5mA , V_{EH}=3.5V, C_L=15pF, R_L=350Ω		15		ns
Common Mode Transient Immunity at Logic High	$\|CM_H\|$	I_F=0mA , V_{OH}=2V, R_L=350Ω T_A=25°C, V_{CM}=50Vp-p	5000			V/μS
Common Mode Transient Immunity at Logic Low	$\|CM_L\|$	I_F=7.5mA ,V_{OL}=0.8V,R_L=350Ω T_A=25°C, V_{CM}=50Vp-p	5000			V/μS

10.1 Typical Characteristic

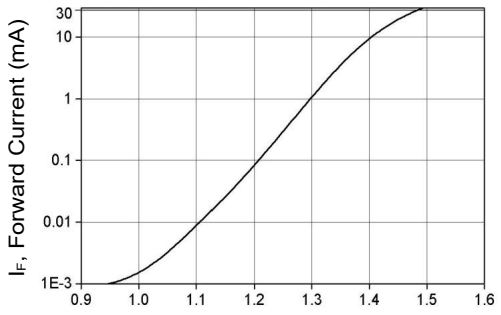


Figure 1: Input Diode Forward Voltage vs. Forward Current

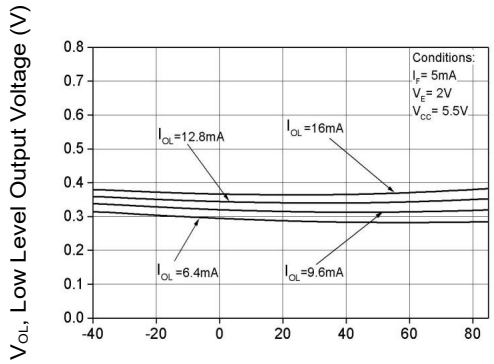


Figure 2: Low Level Output Voltage vs. Ambient Temperature

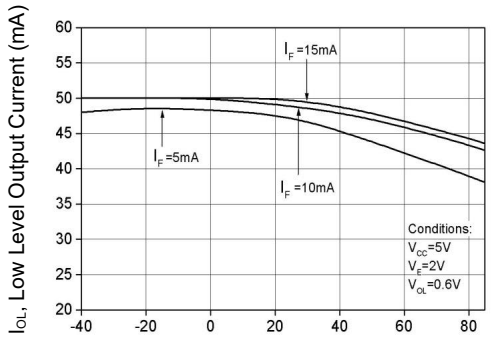


Figure 3: Low Level Output Current vs. Ambient Temperature

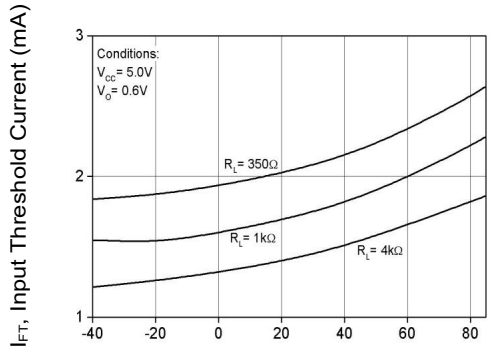


Figure 4: Input Threshold Current vs. Ambient Temperature

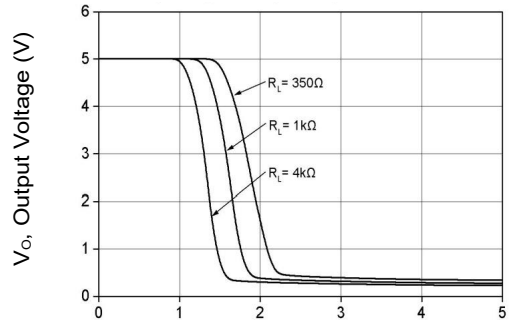


Figure 5: Output Voltage vs. Input Forward Current

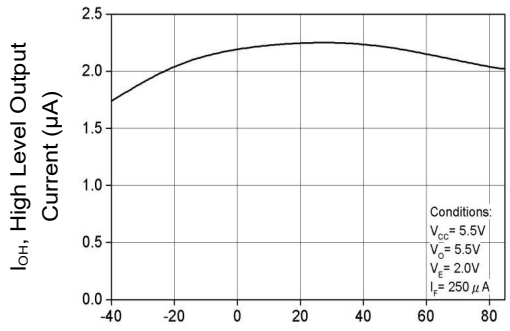


Figure 6: High Level Output Current vs. Temperature

10.2 Typical Characteristic

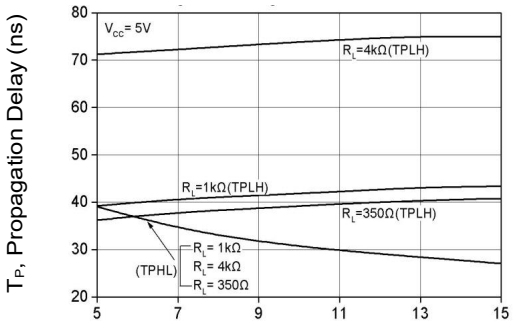


Figure 7: Switching Time vs. Forward Current

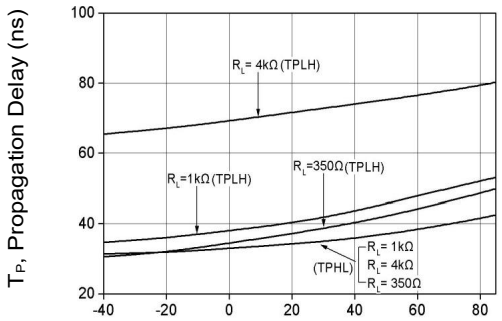


Figure 8: Switching Time vs.Temperature

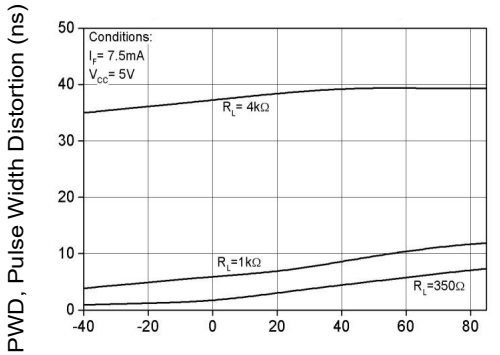


Figure 9: Pulse Width Distortion vs. Temperature

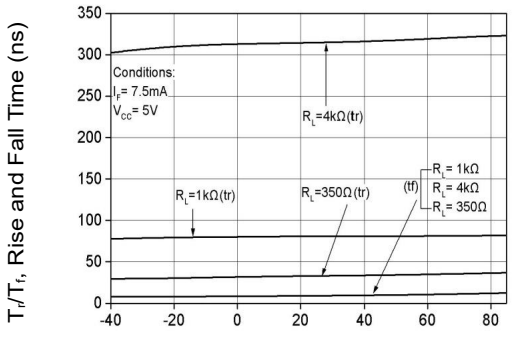


Figure 10: Rise and Fall Time vs. Temperature

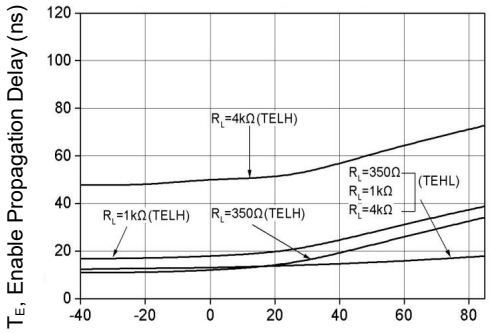
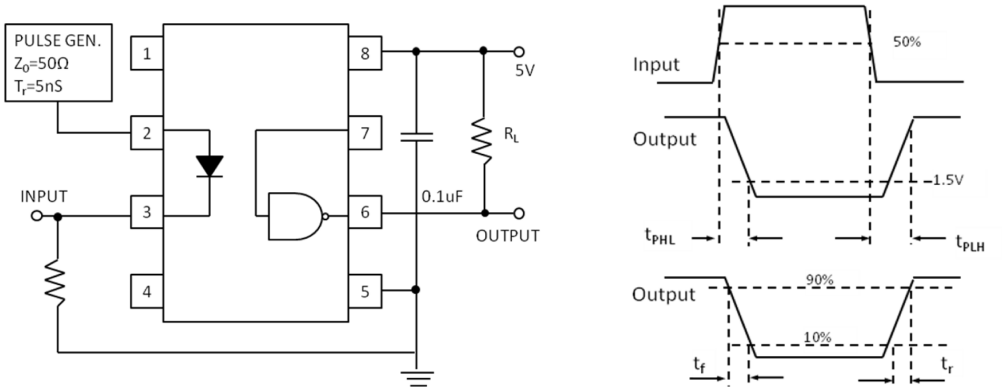
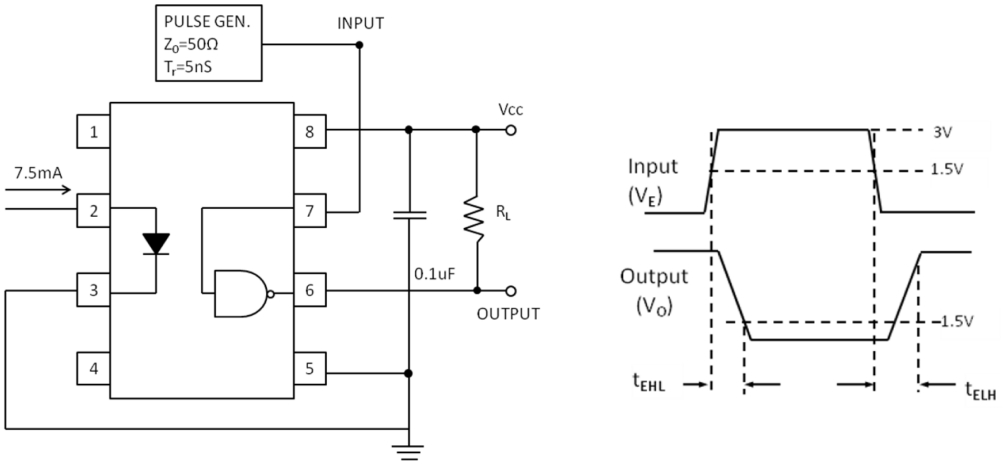


Figure 11: Enable Propagation Delay vs. Temperature

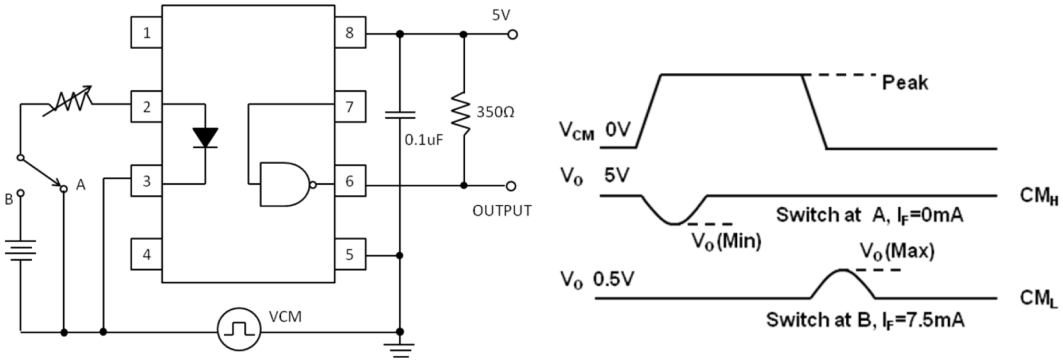
11.Test circuit



Test circuit and waveforms for t_{PHL}, t_{PLH}, t_r, and t_f

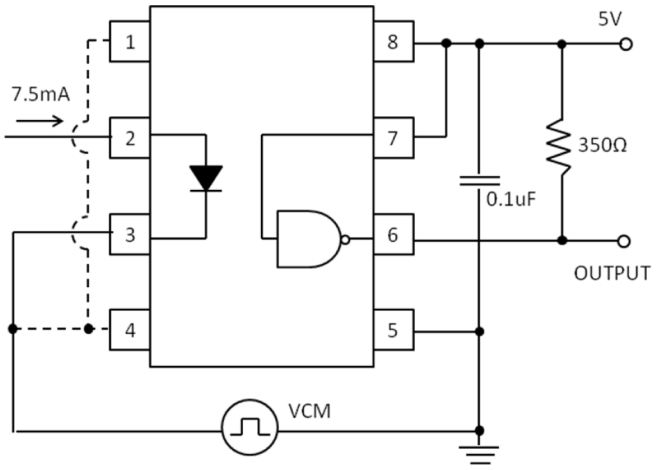


Test circuit and waveform for t_{EHL} and t_{ELH}

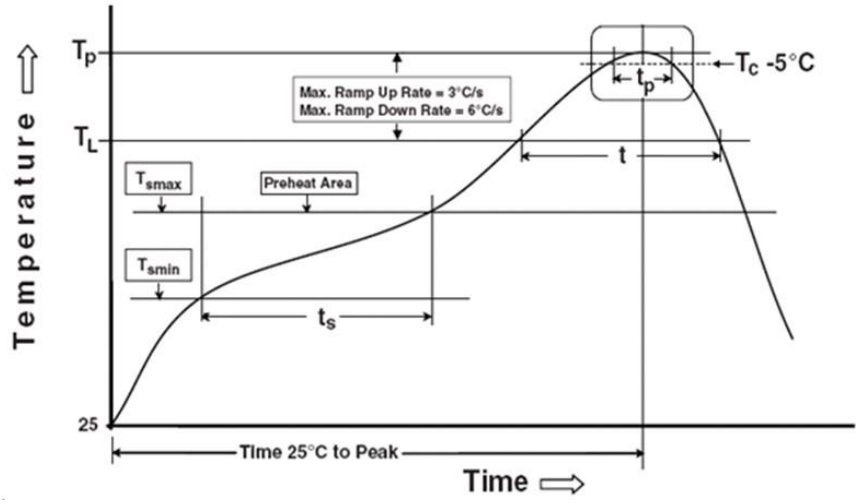


Test circuit Common mode Transient Immunity

12.Recommended Drive Circuit For ELfor High-CMR



13.Precautions for Use

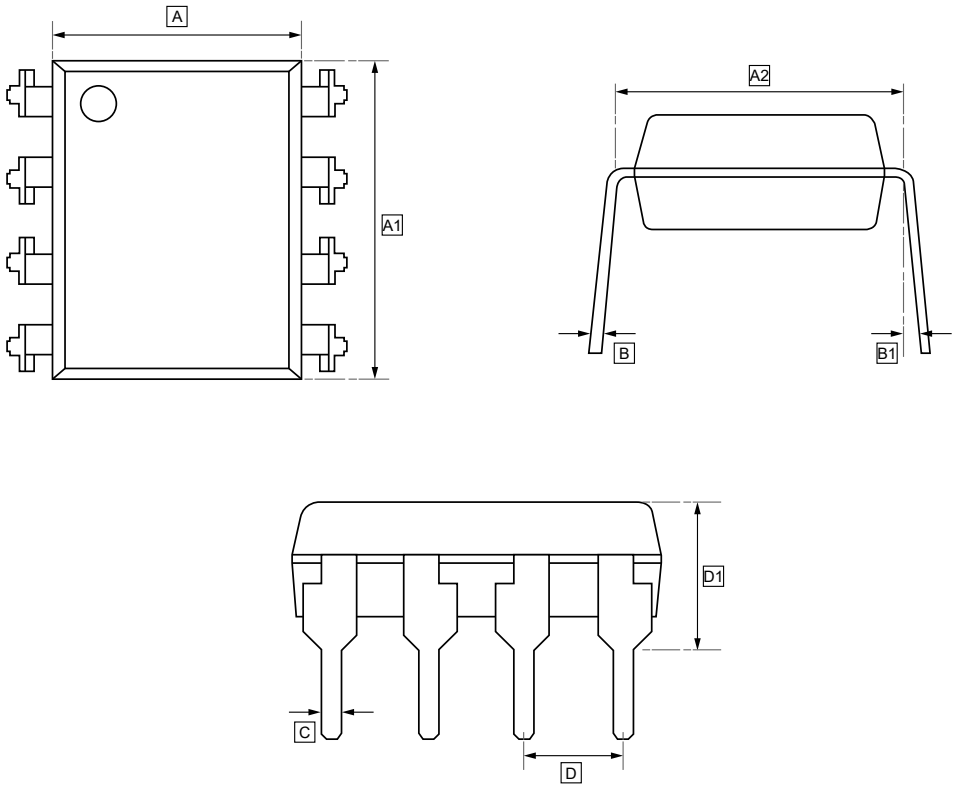


1. Soldering Condition

1.1 (A) Maximum Body Case Temperature Profile for evaluation of Reflow Profile

Preheat	
Temperature min (T_{smin})	150°C
Temperature max (T_{smax})	200°C
Time (T_{smin} to T_{smax}) (ts)	60-120 seconds
Average ramp-up rate (T_{smax} to T_p)	3°C/second max
Other	
Liquidus Temperature (T_L)	216°C
Time above Liquidus Temperature (t_L)	60-100 sec
Peak Temperature (T_p)	260°C
Time within 5°C of Actual Peak Temperature: T_p - 5°C	30s
Ramp- Down Rate from Peak Temperature	6°C /second max
Time 25°C to peak temperature	8 minutes max
Reflow times	3 times

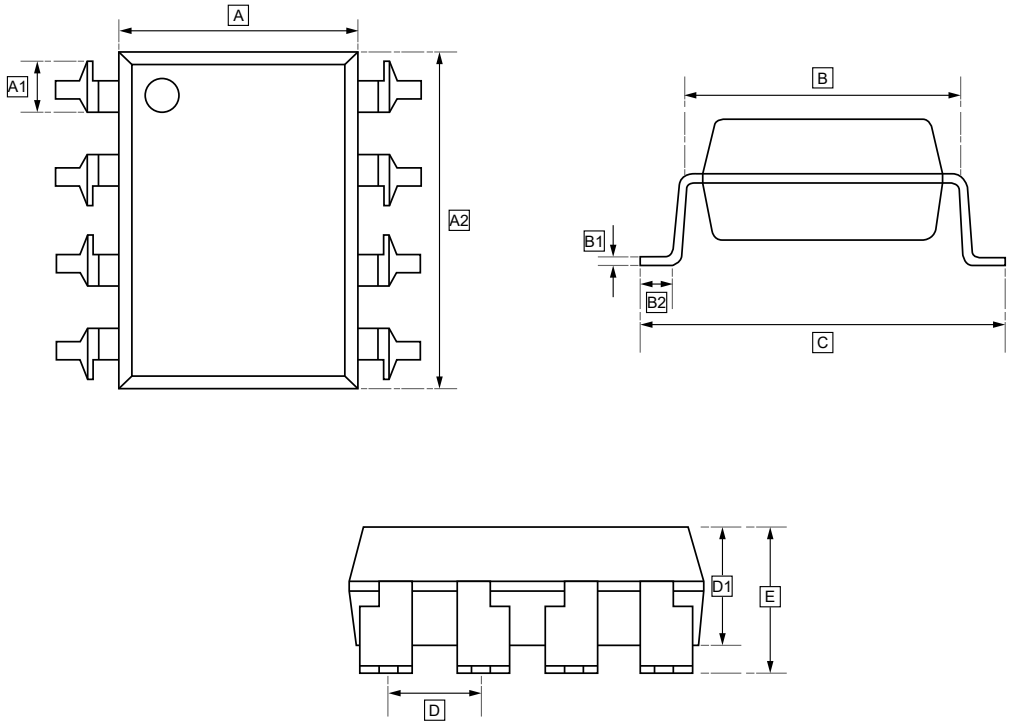
14.1 DIP-8 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	B	B1	C	D	D1
Min	6.30	9.46	7.62	0.25	5°	0.40	2.54	4.20
Max	6.90	10.06	TYP.		15°	0.60	TYP.	4.80

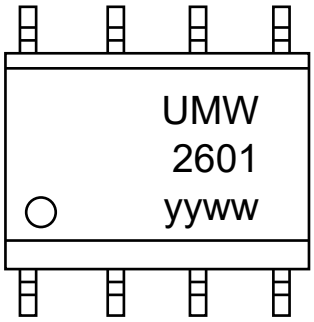
14.2 SOP-8 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	B	B1	B2	C	D	D1	E
Min	6.30	1.45	9.46	7.62	0.25	0.6	-	2.54	3.20	4.00
Max	6.90		10.06	TYP		-	10.3	TYP	3.80	4.60

15.Ordering Information



yy: Year Code
ww: Week Code

Order Code	Marking	Package	Base QTY	Delivery Mode
UMW HCPL-2601-000E	2601	DIP-8	2250	Tube and box
UMW HCPL-2601-500E	2601	SOP-8	1000	Tape and reel

16.Disclaimer

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