



ICPLM611

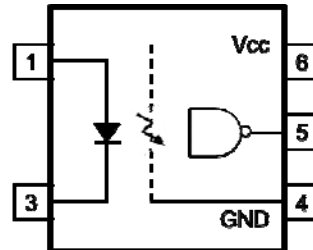


DESCRIPTION

The ICPLM611 consists of a high efficient AlGaAs light emitting diode and a high speed optical detector. This unique design provides maximum AC and DC circuit isolation while achieving LVTTTL/LVCMOS compatibility. The output of the optical detector features an open collector Schottky clamped transistor.

The internal shield provides a guaranteed common mode transient immunity specification of 10 KV/us at 3.3V/5V operation.

The device is in half pitch mini flat 5 pin package.



- 1 Anode
- 3 Cathode
- 4 GND
- 5 V_O
- 6 V_{CC}

A 0.1μF bypass Capacitor must be connected between Pins 6 and 4.

FEATURES

- Half Pitch 1.27mm
- High Speed 15Mbit/s Typical
- 3.3V/ 5V Dual Supply Voltages
- LVTTTL / LVCMOS Compatible
- Low Input Current Capability 3mA
- Guaranteed Performance from -40°C to 85°C
- Minimum Common Mode Transient Immunity 10kV/μs at V_{CM} 1000V
- High AC Isolation Voltage 3750V_{RMS}
- Pb Free and RoHS Compliant
- Safety Approvals Pending

APPLICATIONS

- Line Receivers
- Data Communication
- High Speed Logic Ground Isolation
- Pulse Transformer Replacement
- Switch Mode Power Supplies
- Ground Loop Elimination
- Computer Peripheral Interface

ORDER INFORMATION

- Supplied in Tape and Reel

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Stresses exceeding the absolute maximum ratings can cause permanent damage to the device.

Exposure to absolute maximum ratings for long periods of time

Input

Forward Current	20mA
Peak Forward Current	50mA
Pulse Width ≤ 50ns, Average Current ≤ 20mA	
Reverse Voltage	5V
Power dissipation	40mW

Output

Output Current	50mA
Output Voltage	7V
Supply Voltage	7V
Power Dissipation	85mW

Total Package

Isolation Voltage	3750V _{RMS}
Operating Temperature	-40 to 85 °C
Storage Temperature	-40 to 125 °C
Lead Soldering Temperature (10s)	260°C

can adversely affect reliability.

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ICPLM611

Truth Table

LED	Output
ON	L
OFF	H

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Operating Temperature	T_A	- 40	85	°C
Supply Voltage	V_{CC}	2.7	3.6	V
		4.5	5.5	
Input Current, High Level	$I_{F(ON)}$	5	15	mA
Input Current, Low Level	$I_{F(OFF)}$	0	250	μ A
Output Pull-up Resistance	R_L	330	4000	Ω
Fan Out ($R_L = 1k\Omega$ per channel)	N		5	TTL Loads



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ELECTRICAL CHARACTERISTICS ($T_A = -40$ to 85°C , $2.7\text{V} \leq V_{CC} \leq 3.6\text{V}$, $I_F = 7.5\text{mA}$ unless otherwise specified)

INPUT

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Forward Voltage	V_F	$I_F = 10\text{mA}$, $T_A = 25^\circ\text{C}$		1.38	1.80	V
Forward Voltage Temperature Coefficient	$\Delta V_F/\Delta T$	$I_F = 10\text{mA}$		-1.6		mV/°C
Reverse Voltage	V_R	$I_R = 10\mu\text{A}$	5.0			V
Input Capacitance	C_{IN}	$V_F = 0\text{V}$, $f = 1\text{MHz}$		34		pF

OUTPUT

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
High Level Supply Current	I_{CCH}	$I_F = 0\text{mA}$, $V_{CC} = 3.3\text{V}$		3.8	7	mA
Low Level Supply Current	I_{CCL}	$I_F = 10\text{mA}$, $V_{CC} = 3.3\text{V}$		5.8	10	mA
High Level Output Current	I_{OH}	$I_F = 250\mu\text{A}$, $V_{CC} = 3.3\text{V}$, $V_O = 3.3\text{V}$		5	100	μA
Low Level Output Voltage	V_{OL}	$I_F = 5\text{mA}$, $V_{CC} = 3.3\text{V}$, $I_{OL} = 13\text{mA}$		0.3	0.6	V

COUPLED

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Input Threshold Current	I_{TH}	$V_{CC} = 3.3\text{V}$, $V_O = 0.6\text{V}$, $I_{OL} = 13\text{mA}$		1.5	5	mA

SWITCHING

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Propagation Delay Time to High Output Level	t_{PLH}	$R_L = 350\Omega$, $C_L = 15\text{pF}$,		60	90	ns
Propagation Delay Time to Low Output Level	t_{PHL}			25	75	
Pulse Width Distortion	$ t_{PHL} - t_{PLH} $			35	45	
Propagation Delay Skew	t_{PSK}				40	
Output Rise Time (10% to 90%)	t_r				27	
Output Fall Time (90% to 10%)	t_f				7	



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ELECTRICAL CHARACTERISTICS ($T_A = -40$ to 85°C , $4.5\text{V} \leq V_{CC} \leq 5.5\text{V}$, $I_F = 7.5\text{mA}$ unless otherwise specified)

INPUT

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Forward Voltage	V_F	$I_F = 10\text{mA}$, $T_A = 25^\circ\text{C}$		1.38	1.80	V
Forward Voltage Temperature Coefficient	$\Delta V_F/\Delta T$	$I_F = 10\text{mA}$		-1.6		mV/°C
Reverse Voltage	V_R	$I_R = 10\mu\text{A}$	5.0			V
Input Capacitance	C_{IN}	$V_F = 0\text{V}$, $f = 1\text{MHz}$		34		pF

OUTPUT

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
High Level Supply Current	I_{CCH}	$I_F = 0\text{mA}$, $V_{CC} = 5.5\text{V}$		6	10	mA
Low Level Supply Current	I_{CCL}	$I_F = 10\text{mA}$, $V_{CC} = 5.5\text{V}$		8	13	mA
High Level Output Current	I_{OH}	$I_F = 250\mu\text{A}$, $V_{CC} = 5.5\text{V}$, $V_O = 5.5\text{V}$		3	100	μA
Low Level Output Voltage	V_{OL}	$I_F = 5\text{mA}$, $V_{CC} = 5.5\text{V}$, $I_{OL} = 13\text{mA}$		0.4	0.6	V

COUPLED

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Input Threshold Current	I_{TH}	$V_{CC} = 5.5\text{V}$, $V_O = 0.6\text{V}$ $I_{OL} \geq 13\text{mA}$		1.57	5	mA

SWITCHING

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Propagation Delay Time to High Output Level	t_{PLH}	$R_L = 350\Omega$, $C_L = 15\text{pF}$ $T_A = 25^\circ\text{C}$			100	ns
				45	75	
Propagation Delay Time to Low Output Level	t_{PHL}	$R_L = 350\Omega$, $C_L = 15\text{pF}$ $T_A = 25^\circ\text{C}$			100	
				25	75	
Pulse Width Distortion	$ t_{PHL} - t_{PLH} $	$R_L = 350\Omega$, $C_L = 15\text{pF}$		10	35	
Propagation Delay Skew	t_{PSK}				40	
Output Rise Time (10% to 90%)	t_r				21	
Output Fall Time (90% to 10%)	t_f			7		



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ELECTRICAL CHARACTERISTICS ($T_A = -40$ to 85°C unless otherwise specified)

SWITCHING

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Common Mode Transient Immunity at Logic High	CM _H	V _{CC} = 3.3V I _F = 0mA, R _L = 350Ω, V _{CM} = 1000Vp-p, T _A = 25°C	10	15		kV/μs
		V _{CC} = 5V I _F = 0mA, R _L = 350Ω, V _{CM} = 1000Vp-p, T _A = 25°C	10	15		
Common Mode Transient Immunity at Logic Low	CM _L	V _{CC} = 3.3V I _F = 10mA, R _L = 350Ω, V _{CM} = 1000Vp-p, T _A = 25°C	10	15		
		V _{CC} = 5V I _F = 10mA, R _L = 350Ω, V _{CM} = 1000Vp-p, T _A = 25°C	10	15		

ISOLATION

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Isolation Voltage	V _{ISO}	RH ≤ 50%, T _A = 25°C t = 1 min,	3750			V _{RMS}
Leakage Current	I _{I-O}	RH = 45%, T _A = 25°C V _{I-O} = 3kVDC, t = 5s			1.0	μA
Input-Output Resistance	R _{I-O}	V _{I-O} = 500VDC		10 ¹²		Ω
Input-Output Capacitance	C _{I-O}	f = 1MHz, T _A = 25°C		1.0		pF

* Typical values at T_A = 25°C



ELECTRICAL CHARACTERISTICS

NOTES

- V_{CC} supply must be bypassed by a $0.1\mu\text{F}$ capacitor or larger with good high frequency characteristic and should be connected as close as possible to the package V_{CC} and GND pins.
- Peaking drive circuit may be used to speed up the LED. Peak driving current may go up to 50mA with maximum pulse width 50ns, provided average current does not exceed 20mA.
- t_{PLH} is measured from the 3.75 mA point on the falling edge of the input pulse to the 1.5 V point on the rising edge of the output pulse.
- t_{PHL} is measured from the 3.75 mA point on the rising edge of the input pulse to the 1.5 V point on the falling edge of the output pulse.
- t_r Rise time is measured from the 10% to the 90% levels on the LOW to HIGH transition of the output pulse.
- t_f Fall time is measured from the 90% to the 10% levels on the HIGH to LOW transition of the output pulse.
- CM_H is the maximum tolerable rate of rise of the common mode voltage to assure that the output will remain in a high logic state (i.e., $V_O > 2.0\text{ V}$).
- CM_L is the maximum tolerable rate of fall of the common mode voltage to assure that the output will remain in a low logic state (i.e., $V_O < 0.8\text{ V}$).
- Isolation Test with device considered a two terminal device : pins 1 and 3 shorted together, and pins 4, 5 and 6 shorted together.



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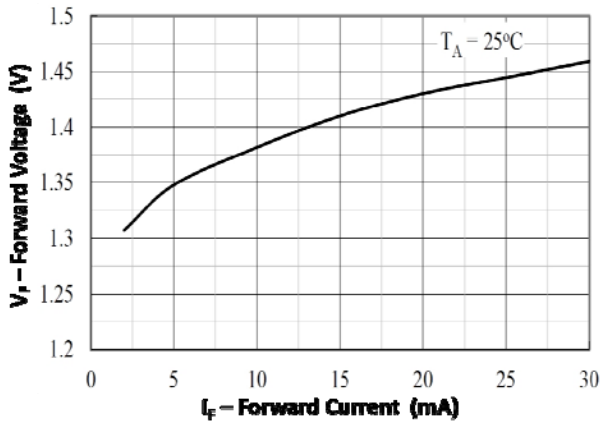


Fig 1 Forward Voltage vs Forward Current

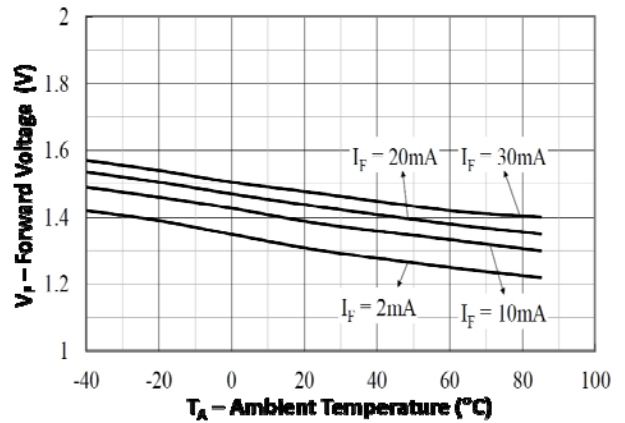


Fig 2 Forward Voltage vs T_A

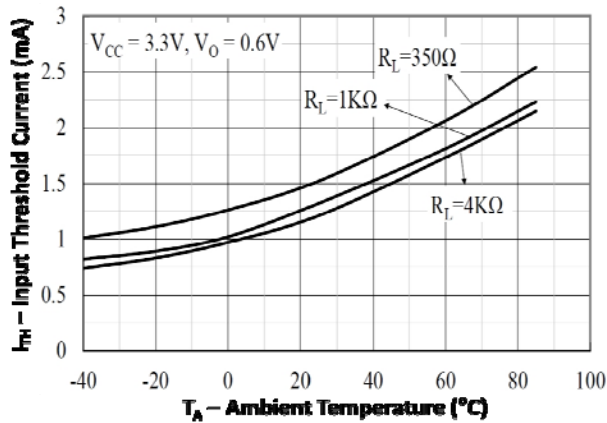


Fig 3 Input Threshold Current at V_{CC} 3.3V vs T_A

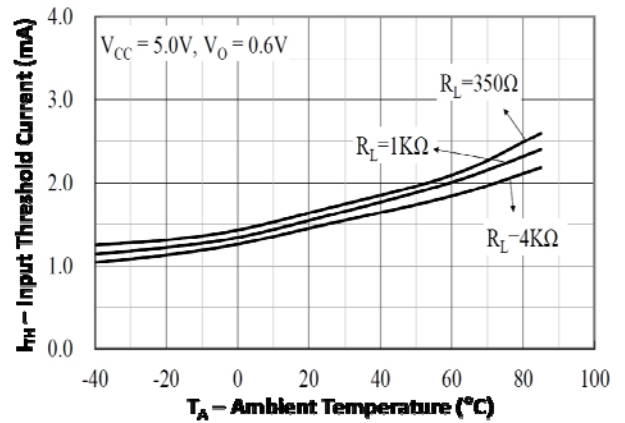


Fig 4 Input Threshold Current at V_{CC} 5.0V vs T_A

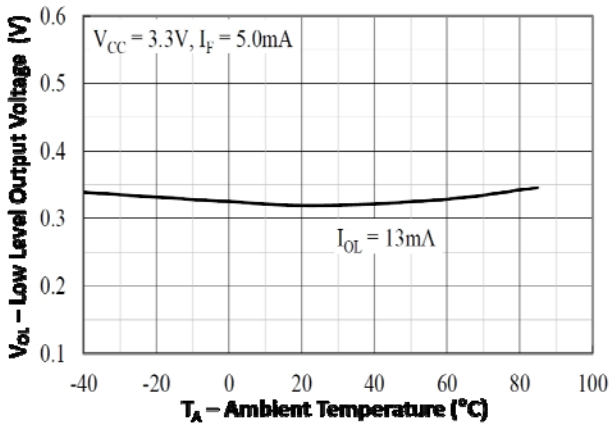


Fig 5 Low Level Output Voltage at V_{CC} 3.3V vs T_A

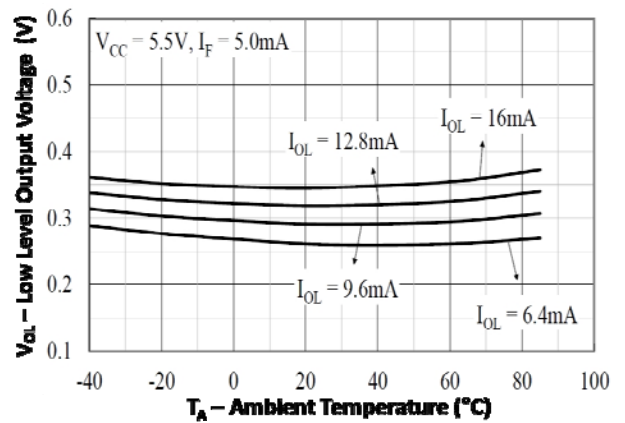


Fig 6 Low Level Output Voltage at V_{CC} 5.5V vs T_A



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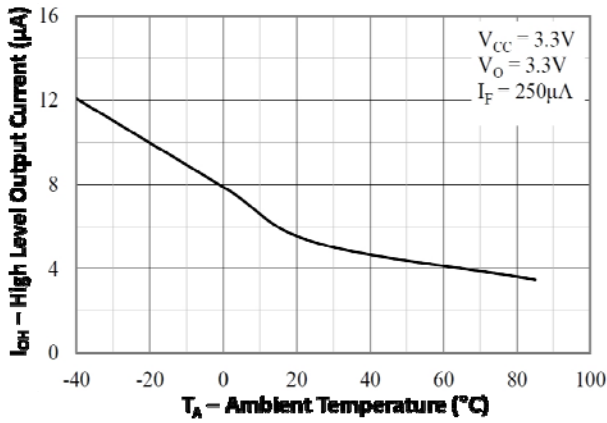


Fig 7 High Level Output Current at $V_{CC} 3.3V$ vs T_A

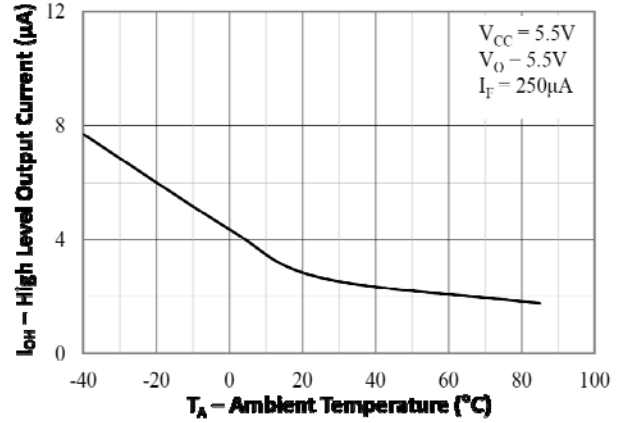


Fig 8 High Level Output Current at $V_{CC} 5.5V$ vs T_A

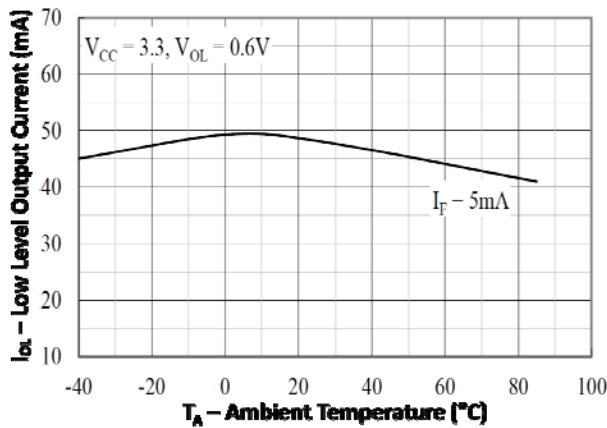


Fig 9 Low Level Output Current at $V_{CC} 3.3V$ vs T_A

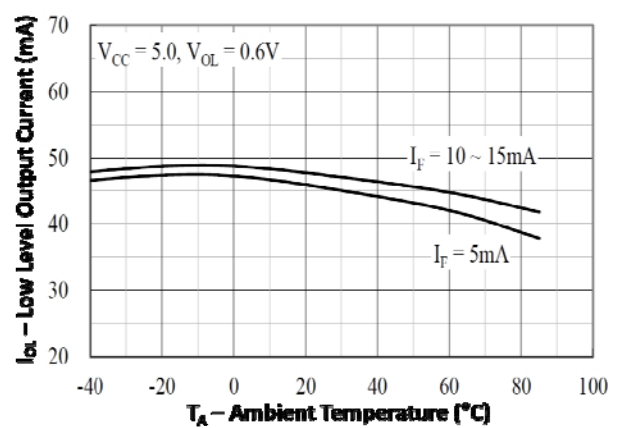


Fig 10 Low Level Output Current at $V_{CC} 5.0V$ vs T_A

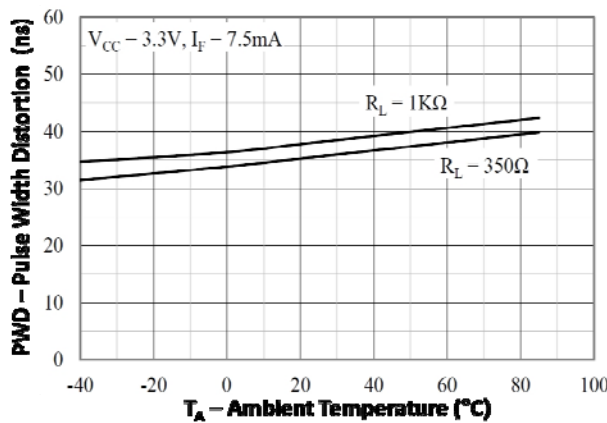


Fig 11 Pulse Width Distortion at $V_{CC} 3.3V$ vs T_A

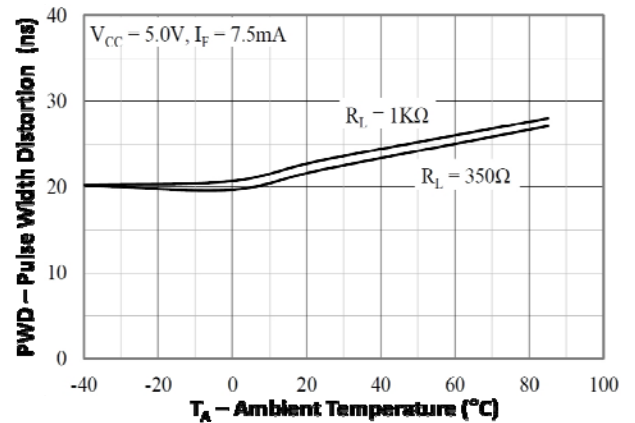


Fig 12 Pulse Width Distortion at $V_{CC} 5.0V$ vs T_A



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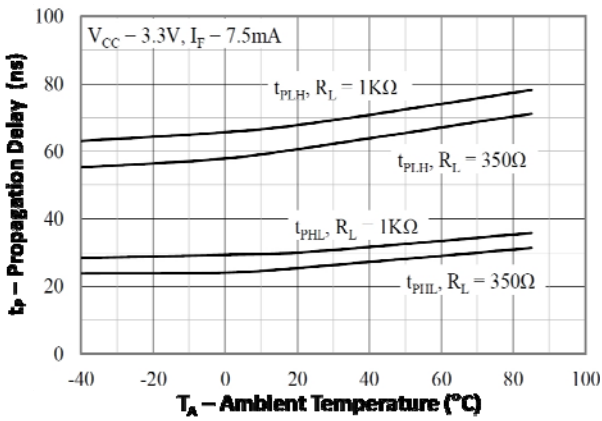


Fig 13 Propagation Delay at V_{CC} 3.3V vs T_A

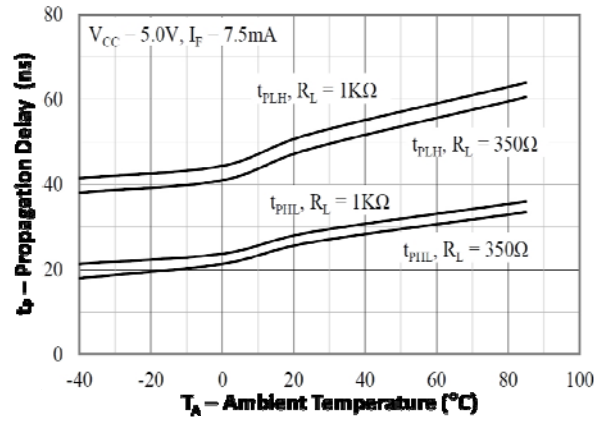
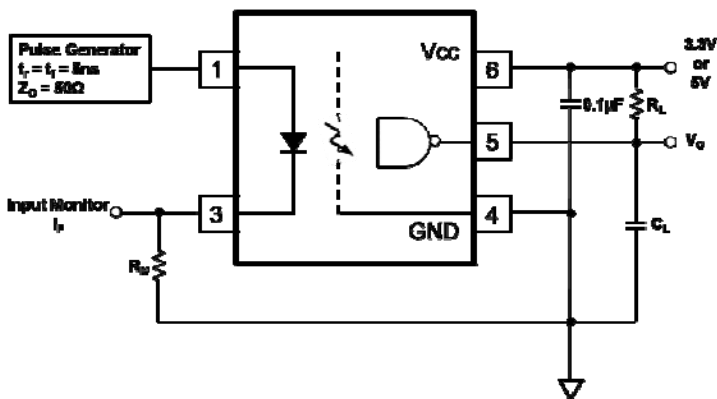
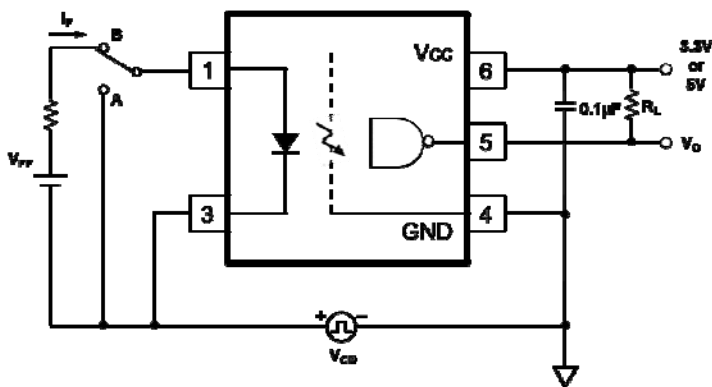
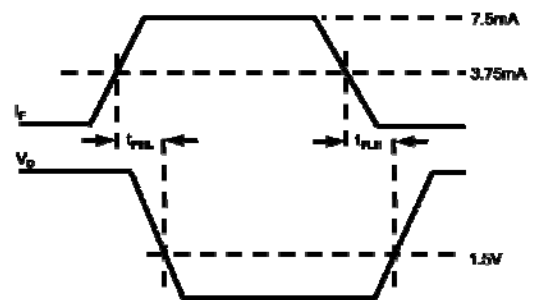


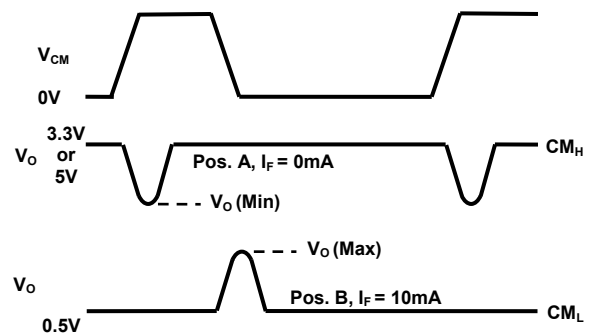
Fig 14 Propagation Delay at V_{CC} 5.0V vs T_A



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



Test Circuit for Common Mode Transient Immunity



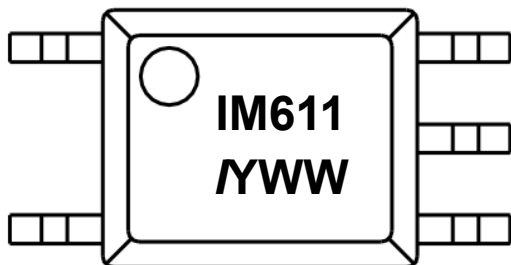


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ORDER INFORMATION

ICPLM611			
After PN	PN	Description	Packing quantity
None	ICPLM611	Surface Mount Tape and Reel	3000pcs per reel

DEVICE MARKING

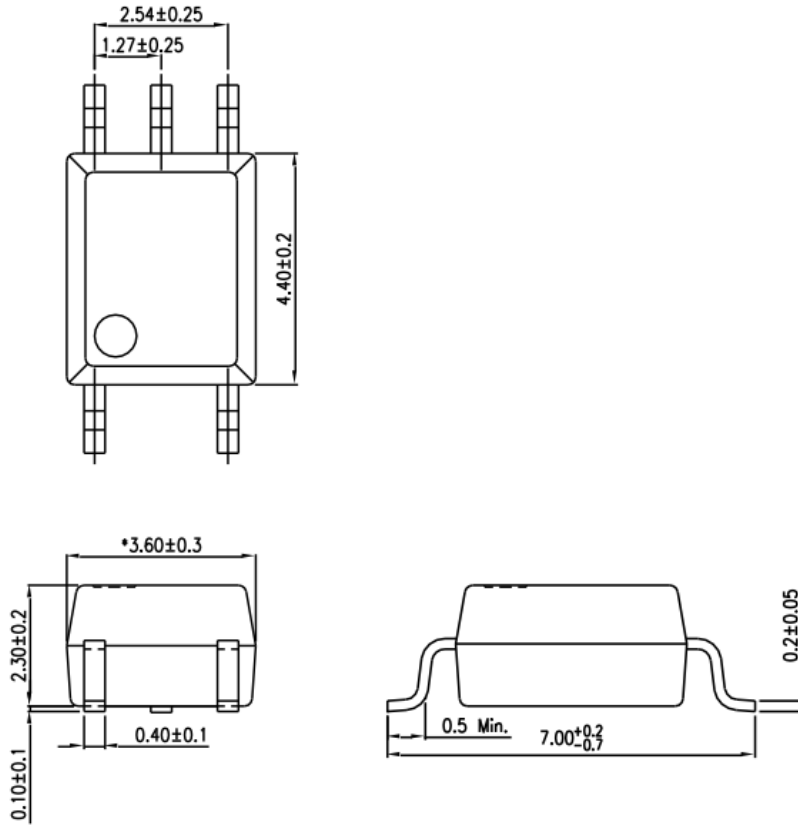


IM611 denotes Device Part Number
/ denotes Isocom
Y denotes 1 digit Year code
WW denotes 2 digit Week code

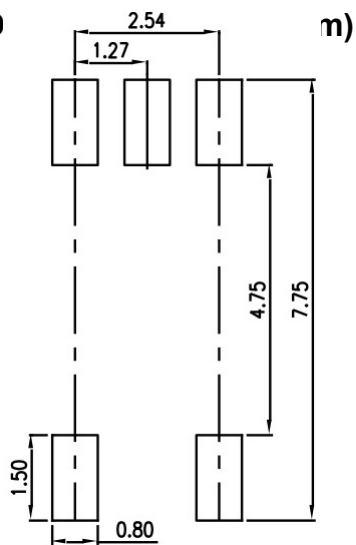


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PACKAGE DIMENSIONS (mm)



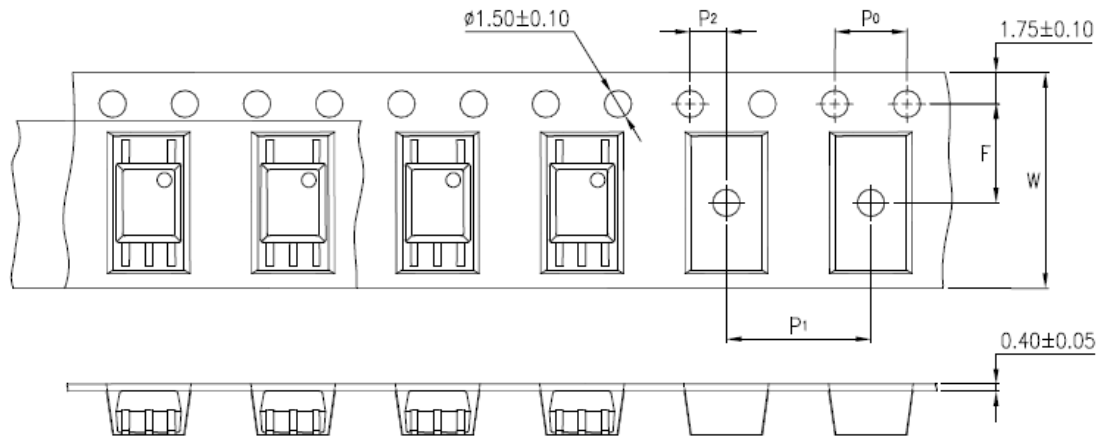
RECOMMEND





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TAPE AND REEL PACKAGING

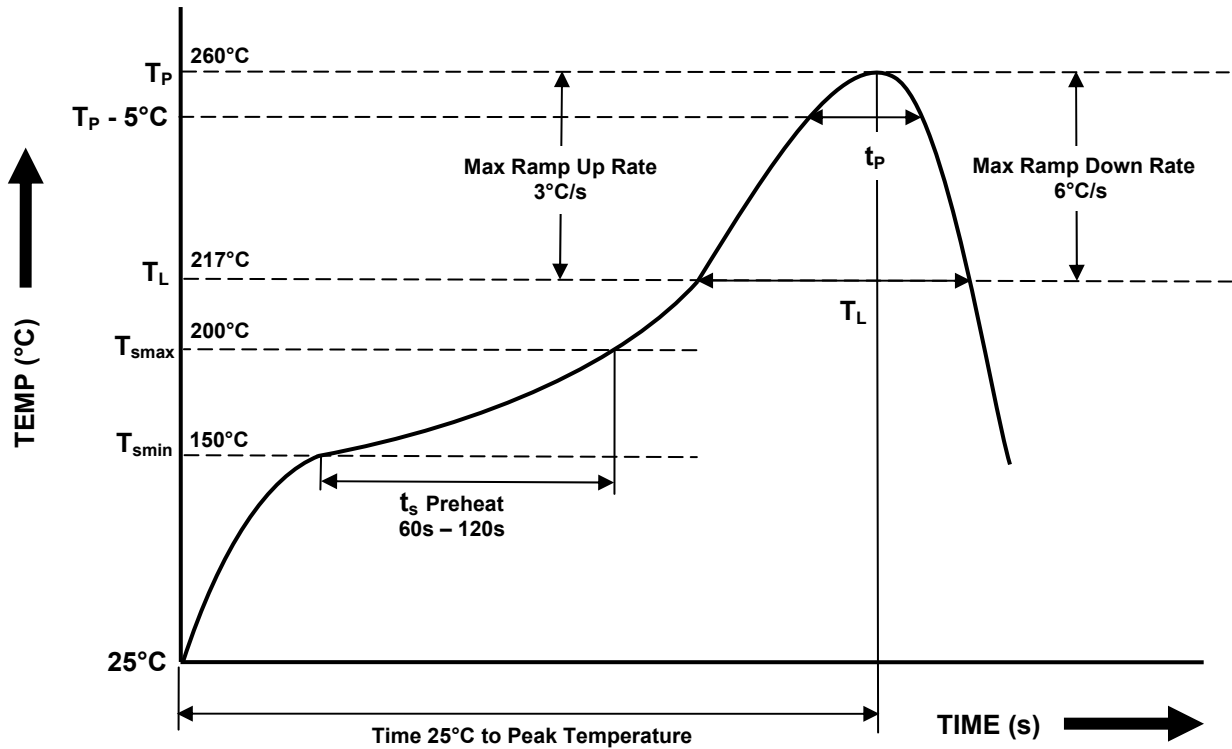


Description	Symbol	Dimension mm (inch)
Tape Width	W	12 ± 0.3 (0.472)
Pitch of Sprocket Holes	P_0	4 ± 0.1 (0.157)
Distance of Compartment to Sprocket Holes	F	5.5 ± 0.1 (0.217)
	P_2	2 ± 0.1 (0.079)
Distance of Compartment to Compartment	P_1	8 ± 0.1 (0.315)



ICPLM611

IR REFLOW SOLDERING TEMPERATURE PROFILE
(One Time Reflow Soldering is Recommended)



Profile Details	Conditions
Preheat - Min Temperature (T_{SMIN}) - Max Temperature (T_{SMAX}) - Time T_{SMIN} to T_{SMAX} (t_s)	150°C 200°C 60s - 120s
Soldering Zone - Peak Temperature (T_P) - Time at Peak Temperature - Liquidous Temperature (T_L) - Time within 5°C of Actual Peak Temperature ($T_P - 5^\circ C$) - Time maintained above T_L (t_L) - Ramp Up Rate (T_L to T_P) - Ramp Down Rate (T_P to T_L)	260°C 10s max 217°C 30s max 60s - 100s 3°C/s max 6°C/s max
Average Ramp Up Rate (T_{smax} to T_P)	3°C/s max
Time 25°C to Peak Temperature	8 minutes max



ISOCOM
COMPONENTS

ICPLM611

NOTES :

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- For equipment/application where high reliability or safety is required, such as space applications, nuclear power control equipment, medical equipment, etc., please contact our sales representatives.
- When requiring a device for any "specific" application, please contact our sales for advice.
- The contents described herein are subject to change without prior notice.
- Do not immerse device body in solder paste.



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