



ICPLM452, ICPLM453

DESCRIPTION

The ICPLM452 and ICPLM453 devices each consists of an infrared emitting diode optically coupled to a high speed integrated photo detector. A separate connection of the photodiode bias and output transistor collector increases the speed by several orders of magnitude over conventional phototransistor couplers by reducing the base-collector capacitance.

These devices belong to Isocom Compact Range of optocouplers.

FEATURES

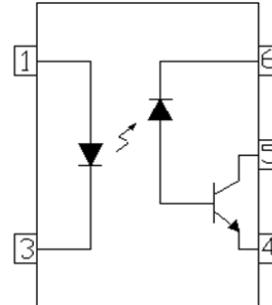
- High speed 1Mbit/s
- Half Pitch 1.27mm
- Common Mode Transient Immunity 15kV/ μ s min (ICPLM453)
- High AC Isolation Voltage 3750V_{RMS}
- Guaranteed Performance from 0°C to 70°C
- Operating Temperature Range from -40°C to 85°C
- Pb Free and RoHS Compliant
- Safety Approvals Pending

APPLICATIONS

- Line Receivers
- Field Bus Communication and Control
- Power Transformer Isolation in Motor Drives
- Replacement for Low Speed phototransistor Couplers
- High Speed Logic Ground isolation
- Analog Signal Ground Isolation

ORDER INFORMATION

- Available in Tape and Reel with 3000pcs per reel.



1. Anode
3. Cathode
4. GND
5. Vout
6. Vcc

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Input Diode

Forward Current	25mA
Peak Forward Current (50% Duty Cycle, 1ms P.W)	50mA
Peak Transient Current ($\leq 1\mu$ s P.W., 300pps)	1A
Reverse Voltage	5V
Power dissipation	45mW

Output

Output Current	8mA
Peak Output Current	16mA
Output Voltage	-0.5 to 20V
Supply Voltage	-0.5 to 30V
Power Dissipation	100mW

Total Package

Isolation Voltage	3750V _{RMS}
Operating Temperature	-40 to 85 °C
Storage Temperature	-55 to 125 °C
Lead Soldering Temperature (10s)	260°C

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ELECTRICAL CHARACTERISTICS ($T_A = 0^\circ\text{C}$ to 70°C unless otherwise specified)

INPUT

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Forward Voltage	V_F	$I_F = 16\text{mA}$		1.45	1.8	V
Reverse Voltage	V_R	$I_R = 10\mu\text{A}$, $T_A = 25^\circ\text{C}$	5.0			V
Temperature Coefficient of V_F	$\Delta V_F/\Delta T_A$	$I_F = 16\text{mA}$		-1.6		mV/ $^\circ\text{C}$

OUTPUT

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
High Level Supply Current	I_{CCH}	$I_F = 0\text{mA}$, $V_O = \text{Open}$, $V_{CC} = 15\text{V}$, $T_A = 25^\circ\text{C}$		0.05	1	μA
		$I_F = 0\text{mA}$, $V_O = \text{Open}$, $V_{CC} = 15\text{V}$			2	
Low Level Supply Current	I_{CCL}	$I_F = 16\text{mA}$, $V_O = \text{Open}$, $V_{CC} = 15\text{V}$		100	200	μA

COUPLED

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Current Transfer Ratio	CTR	$I_F = 16\text{mA}$, $V_O = 0.4\text{V}$, $V_{CC} = 4.5\text{V}$, $T_A = 25^\circ\text{C}$	20		50	%
		$I_F = 16\text{mA}$, $V_O = 0.5\text{V}$, $V_{CC} = 4.5\text{V}$	15			
High Level Output Current	I_{OH}	$I_F = 0\text{mA}$, $V_O = V_{CC} = 5.5\text{V}$, $T_A = 25^\circ\text{C}$		0.001	0.5	μA
		$I_F = 0\text{mA}$, $V_O = V_{CC} = 15\text{V}$, $T_A = 25^\circ\text{C}$		0.001	1	
		$I_F = 0\text{mA}$, $V_O = V_{CC} = 15\text{V}$			50	
Low Level Output Voltage	V_{OL}	$I_F = 16\text{mA}$, $I_O = 3\text{mA}$, $V_{CC} = 4.5\text{V}$, $T_A = 25^\circ\text{C}$			0.4	V
		$I_F = 16\text{mA}$, $I_O = 2.4\text{mA}$, $V_{CC} = 4.5\text{V}$			0.5	

* Typical values at $T_A = 25^\circ\text{C}$



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ELECTRICAL CHARACTERISTICS ($T_A = 0^\circ\text{C}$ to 70°C unless otherwise specified)

Switching Characteristics ($V_{CC} = 5\text{V}$ unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Propagation Delay Time to Logic Low	T_{PHL}	$I_F = 16\text{mA}$, $R_L = 1.9\text{k}\Omega$, $T_A = 25^\circ\text{C}$		0.4	0.8	μs
		$I_F = 16\text{mA}$, $R_L = 1.9\text{k}\Omega$,			1.0	
Propagation Delay Time to Logic High	T_{PLH}	$I_F = 16\text{mA}$, $R_L = 1.9\text{k}\Omega$, $T_A = 25^\circ\text{C}$		0.35	0.8	μs
		$I_F = 16\text{mA}$, $R_L = 1.9\text{k}\Omega$,			1.0	ns
Common Mode Transient Immunity at Logic High	CM_H	ICPLM452 $I_F = 0\text{mA}$, $R_L = 1.9\text{k}\Omega$, $V_{CM} = 10\text{Vp-p}$, $T_A = 25^\circ\text{C}$	5000			$\text{V}/\mu\text{s}$
		ICPLM453 $I_F = 0\text{mA}$, $R_L = 1.9\text{k}\Omega$, $V_{CM} = 1500\text{Vp-p}$, $T_A = 25^\circ\text{C}$	15000			
Common Mode Transient Immunity at Logic Low	CM_L	ICPLM452 $I_F = 16\text{mA}$, $R_L = 1.9\text{k}\Omega$, $V_{CM} = 10\text{Vp-p}$, $T_A = 25^\circ\text{C}$	5000			$\text{V}/\mu\text{s}$
		ICPLM453 $I_F = 16\text{mA}$, $R_L = 1.9\text{k}\Omega$, $V_{CM} = 1500\text{Vp-p}$, $T_A = 25^\circ\text{C}$	15000			

* Typical values at $T_A = 25^\circ\text{C}$

CM_H – The maximum tolerable rate of rise of the common mode voltage dV_{CM}/t , to ensure the output will remain in the HIGH state (i.e., $V_{OUT} > 2.0\text{V}$).

CM_L – The maximum tolerable rate of fall of the common mode voltage to dV_{CM}/t , to ensure the output will remain in the LOW output state (i.e., $V_{OUT} < 0.8\text{V}$).



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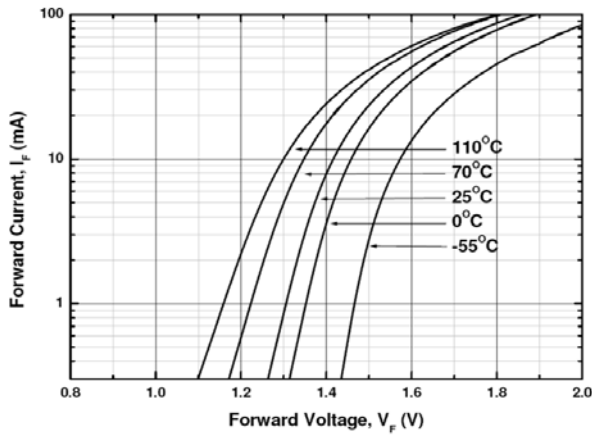


Fig 1 Forward Current vs Forward Voltage

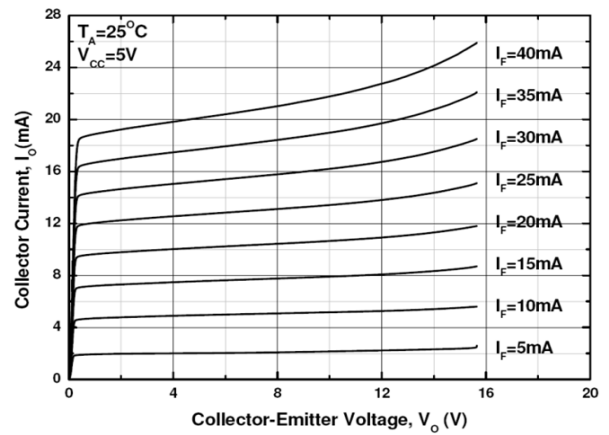


Fig 2 Output Current vs Output Voltage

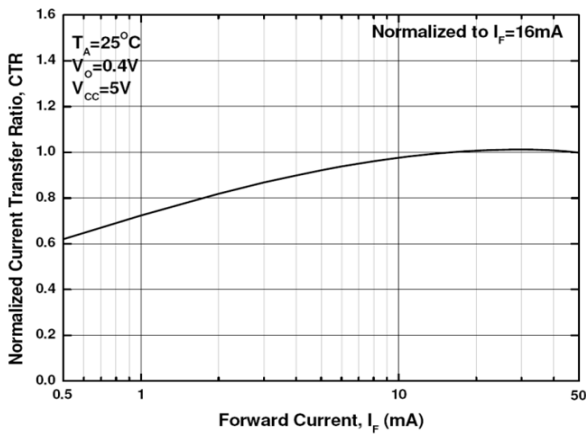


Fig 3 Normalized CTR vs Forward Current

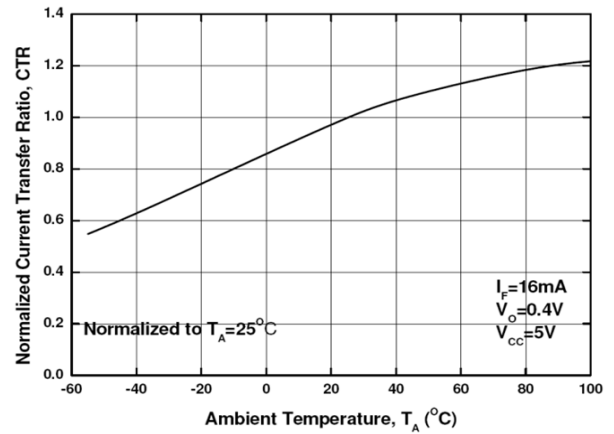


Fig 4 Normalized CTR vs T_A

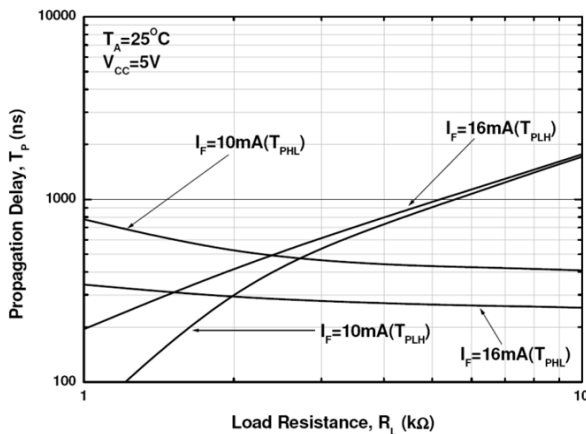


Fig 5 Propagation Delay vs Load Resistance

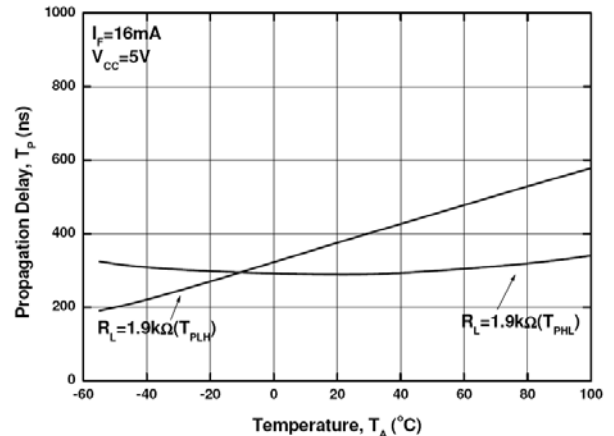


Fig 6 Propagation Delay vs T_A



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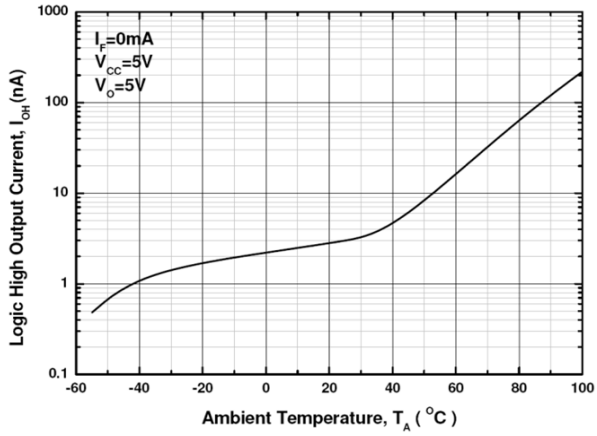


Fig 7 Logic High Output Current vs T_A

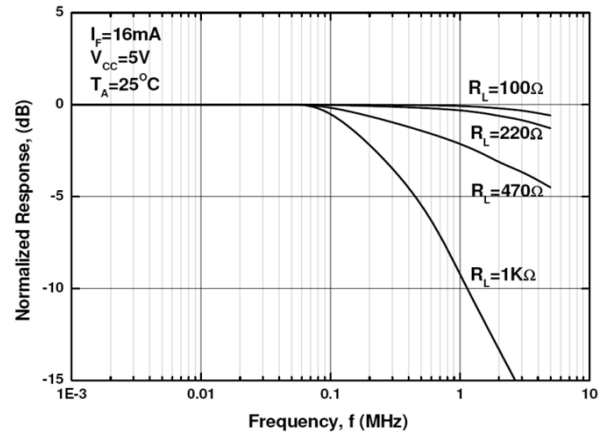


Fig 8 Frequency Response



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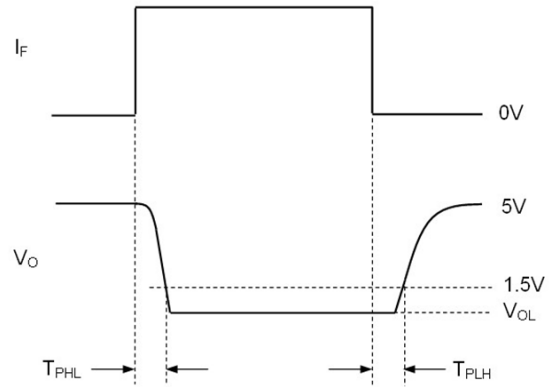
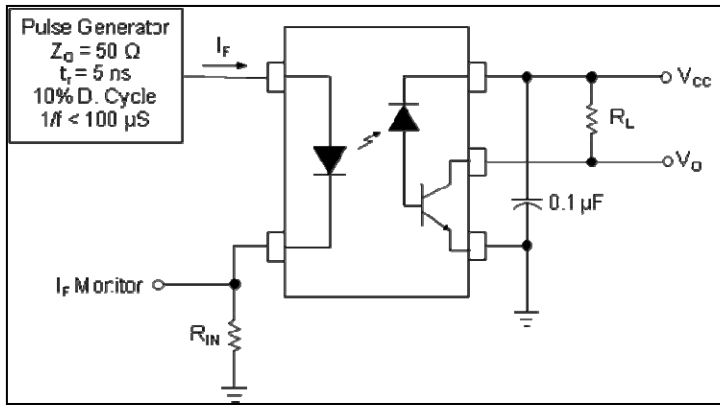


Fig 9 Switching Time Test Circuit

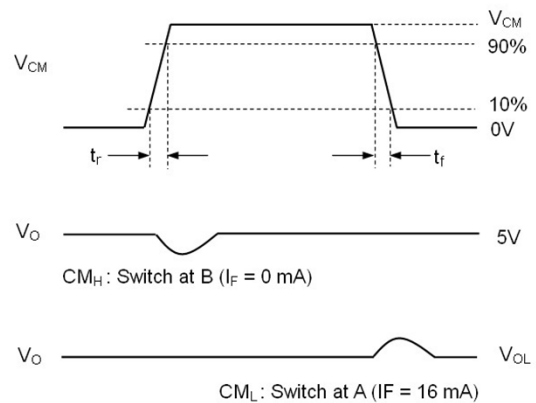
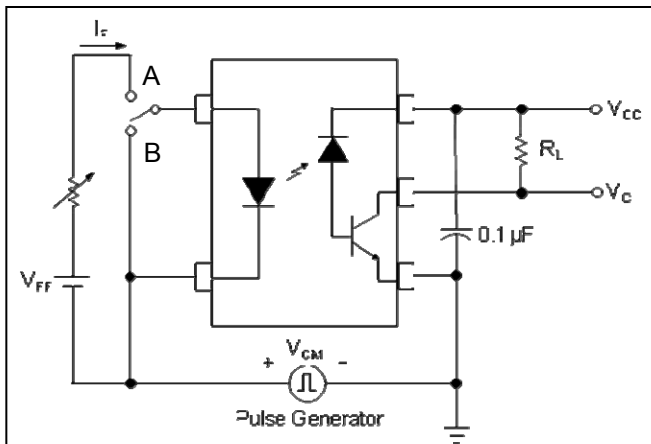


Fig 10 Common Mode Transient Immunity Test Circuit

Common mode transient immunity in 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., $V_O > 2.0V$).

Common mode transient immunity in 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., $V_O < 0.8V$).

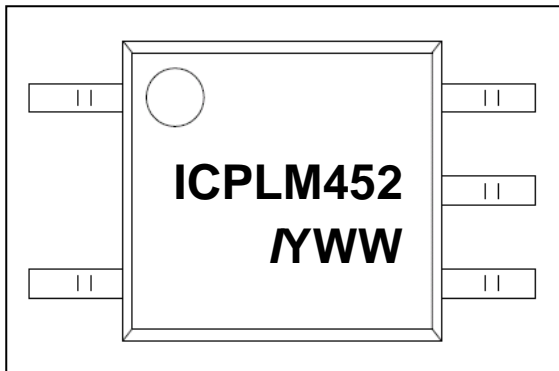


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ORDER INFORMATION

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After PN	PN	Description	Packing quantity
None	ICPLM452, ICPLM453	Surface Mount Tape & Reel	3000 pcs per reel

DEVICE MARKING

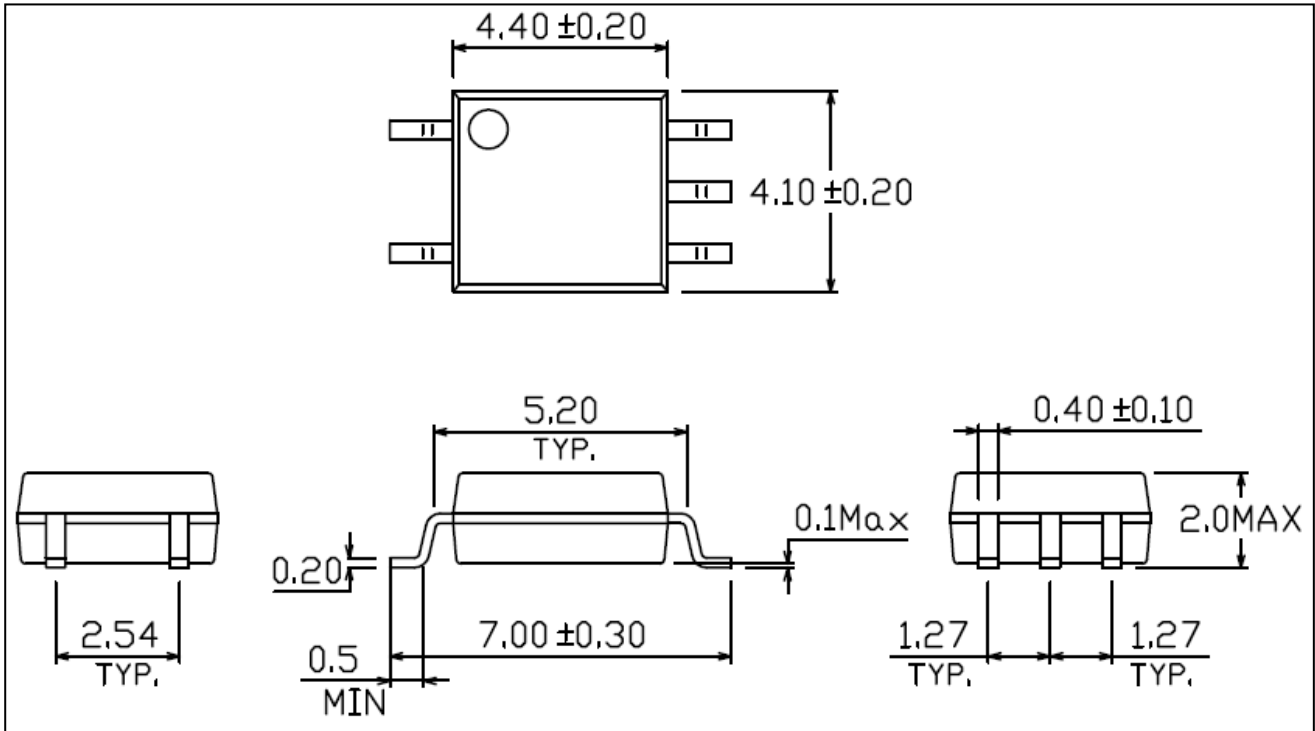


ICPLM600 denotes Device Part Number (ICPLM452 is used as example)
Y denotes 1 digit Year code
WW denotes 2 digit Week code
/ denotes Isocom

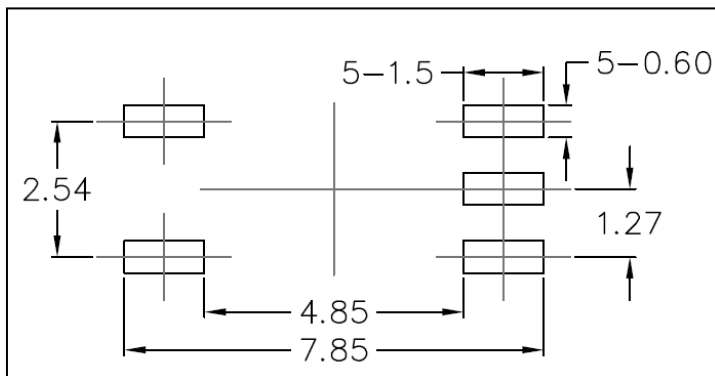


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PACKAGE DIMENSIONS (mm)



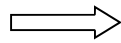
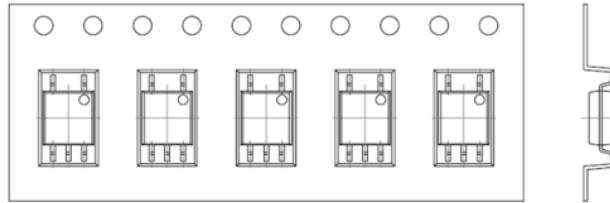
RECOMMENDED PAD LAYOUT (mm)



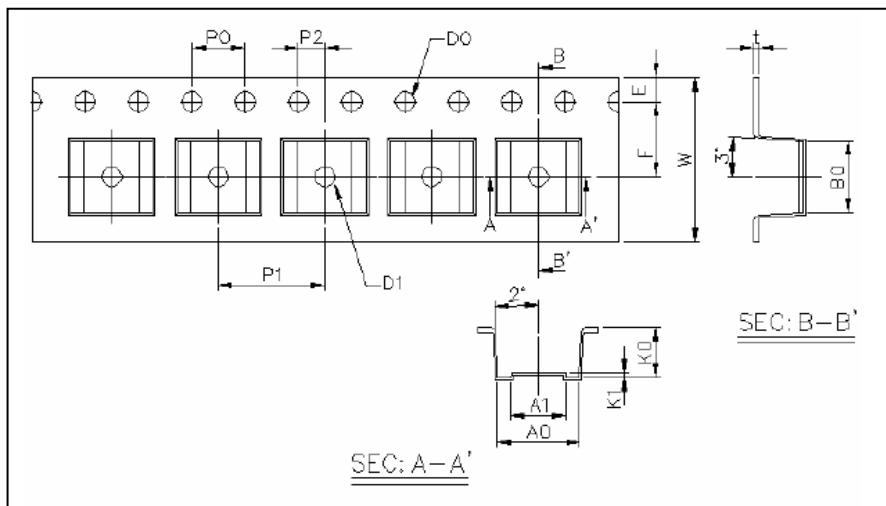


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TAPE AND REEL PACKAGING



Direction of feed from reel

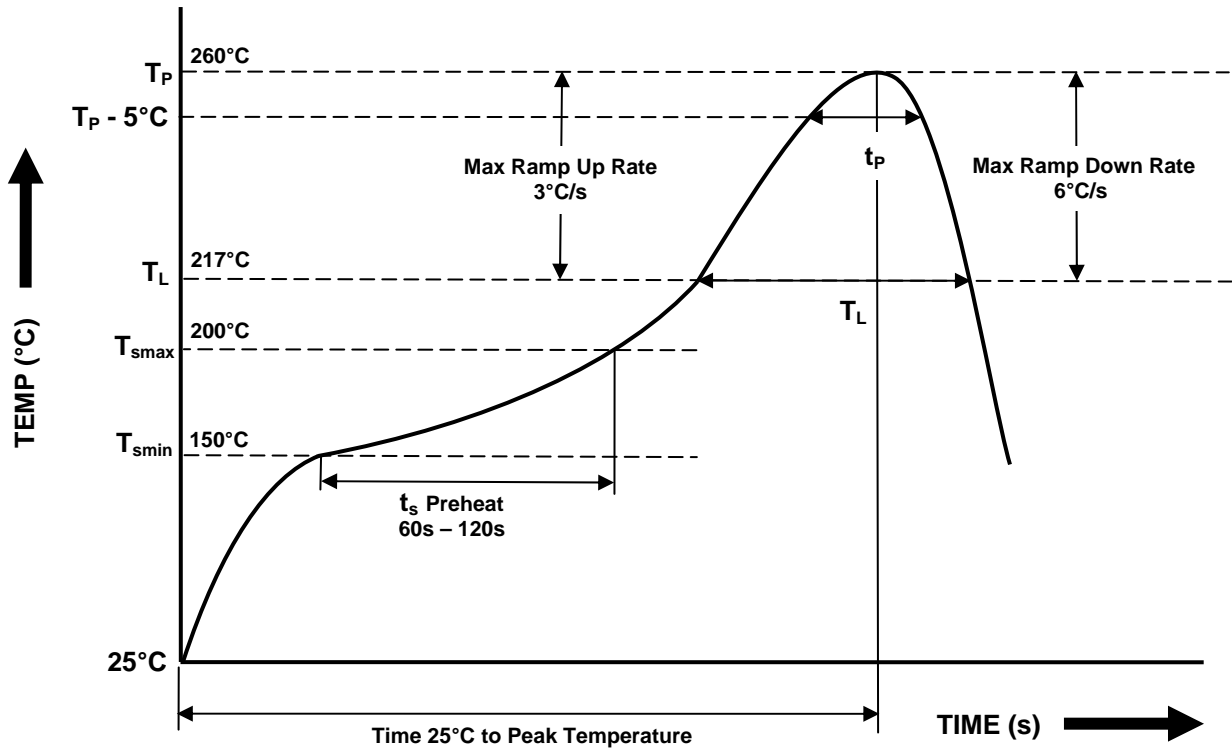


Dimension No.	A0	A1	B0	D0	D1	E	F
Dimension (mm)	6.2±0.1	4.1±0.1	5.28±0.1	1.5±0.1	1.5±0.3	1.75±0.1	5.5±0.1
Dimension No.	P0	P1	P2	t	W	K0	K0
Dimension (mm)	4.0±0.1	8.0±0.1	2.0±0.1	0.4±0.1	12.0 +0.3/-0.1	3.7±0.1	0.3±0.1



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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) - Liquidous Temperature (T_L) - Time within 5°C of Actual Peak Temperature ($T_P - 5^\circ\text{C}$) - 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 217°C 30s 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

