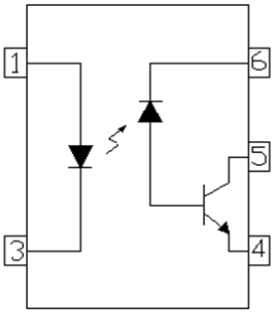
ICPLM452, ICPLM453

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.



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

FEATURES

- High speed 1Mbit/s
- Half Pitch 1.27mm
- Common Mode Transient Immunity 15kV/µs 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.

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 (≤ 1µs 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

ISOCOM COMPONENTS 2004 LTD
Unit 25B, Park View Road West, Park View Industrial Estate
Hartlepool, Cleveland, TS25 1UD, United Kingdom
Tel: +44 (0)1429 863 609 Fax : +44 (0)1429 863 581
e-mail: sales@isocom.co.uk
http://www.isocom.com

ISOCOM COMPONENTS ASIA LTD
Hong Kong Office,
Block A, 8/F, Wah Hing Industrial mansion,
36 Tai Yau Street, San Po Kong, Kowloon, Hong Kong.
Tel: +852 2995 9217 Fax : +852 8161 6292
e-mail sales@isocom.com.hk

ELECTRICAL CHARACTERISTICS (T_A = 0°C to 70°C unless otherwise specified)

INPUT

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

OUTPUT

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

COUPLED

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

* Typical values at T_A = 25°C

ELECTRICAL CHARACTERISTICS (T_A = 0°C to 70°C unless otherwise specified)

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

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

* Typical values at T_A = 25°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} > 2.0V).

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} < 0.8V).

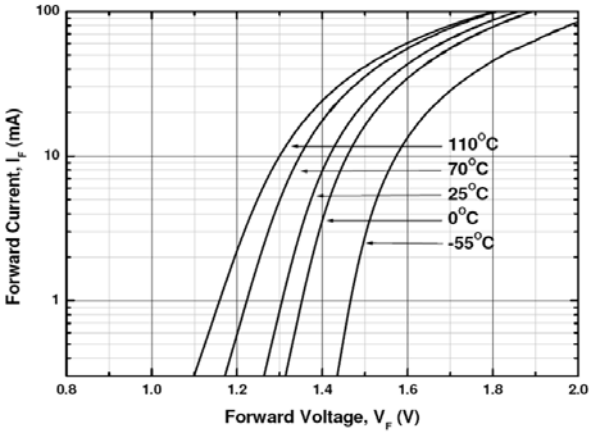


Fig 1 Forward Current vs Forward Voltage

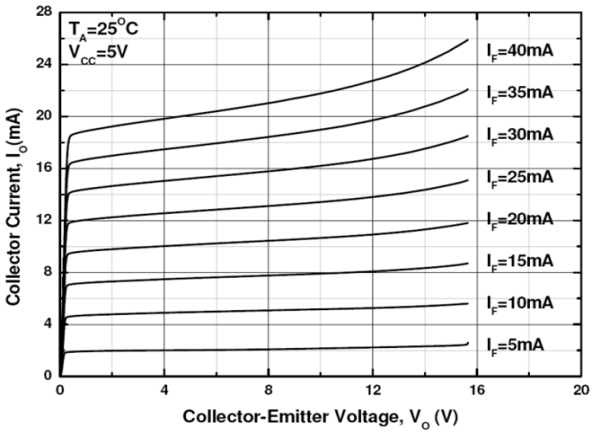


Fig 2 Output Current vs Output Voltage

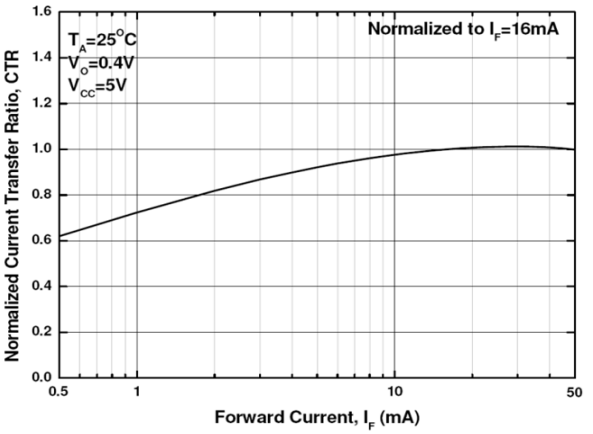


Fig 3 Normalized CTR vs Forward Current

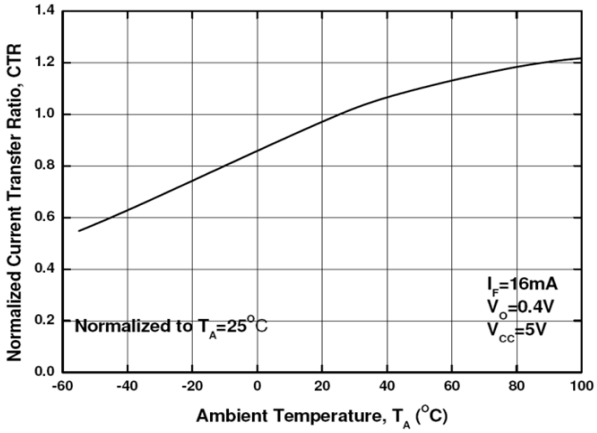


Fig 4 Normalized CTR vs T_A

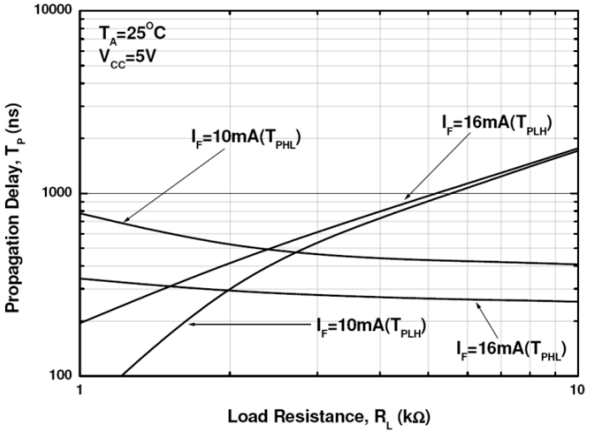


Fig 5 Propagation Delay vs Load Resistance

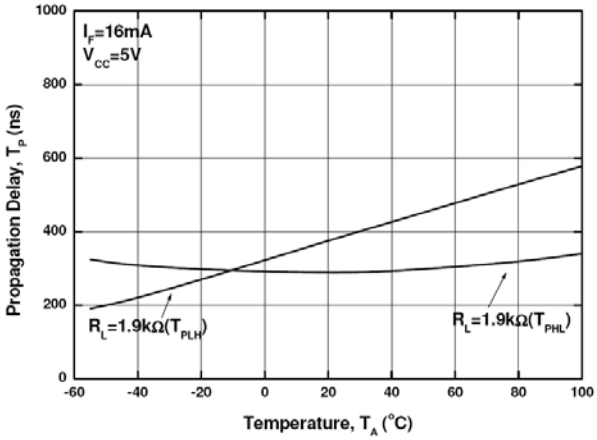


Fig 6 Propagation Delay vs T_A

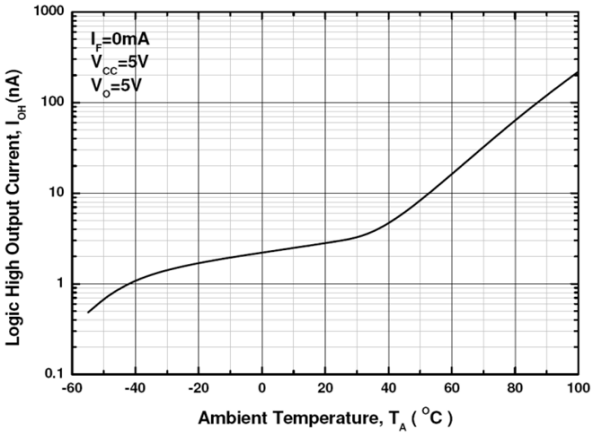


Fig 7 Logic High Output Current vs T_A

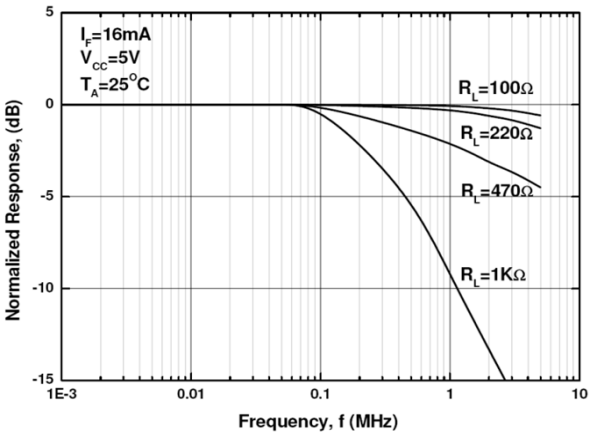


Fig 8 Frequency Response

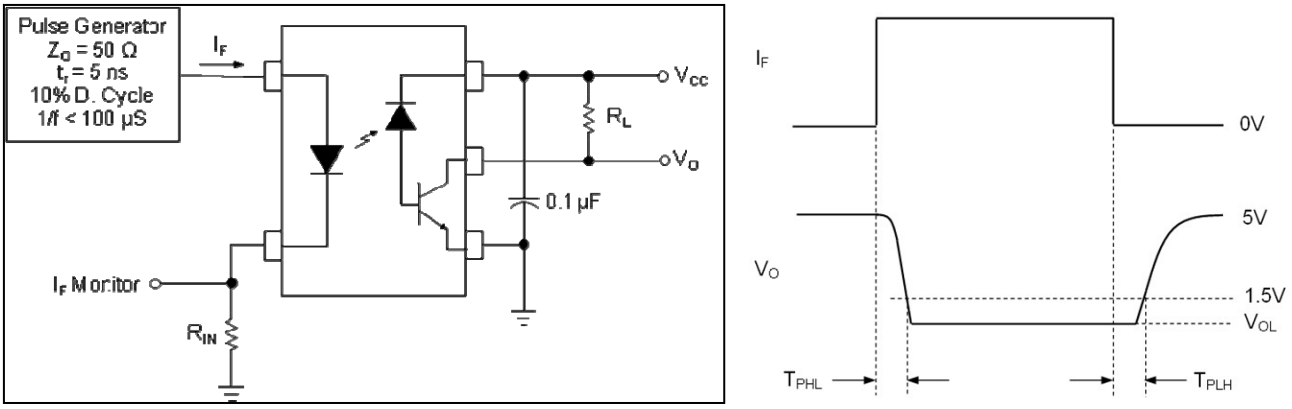


Fig 9 Switching Time Test Circuit

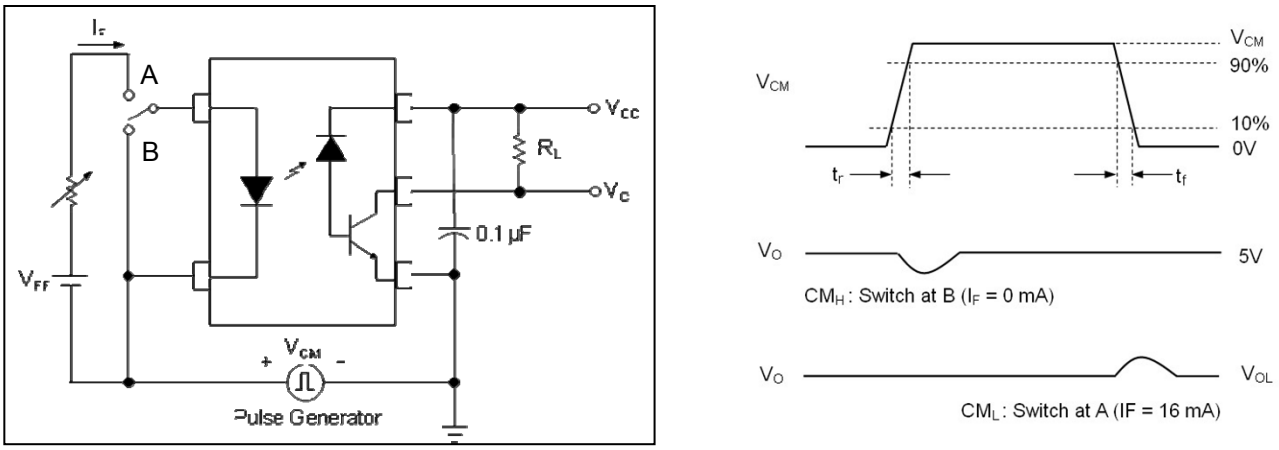


Fig 10 Common Mode Transient Immunity Test Circuit

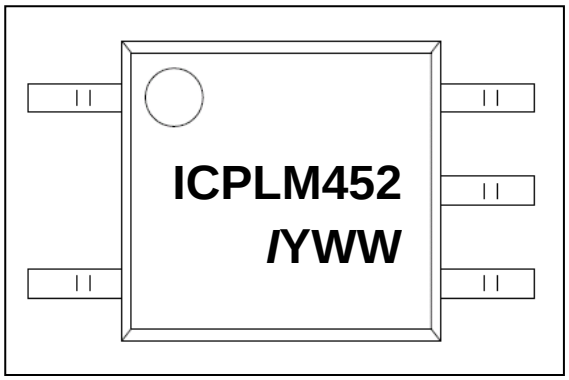
Common mode transient immunity in logic high level is the maximum tolerable (positive) dV_{CM}/dt on the leading edge of the common mode pulse signal V_{CM}, to assure that the output will remain in a logic high state (i.e., $V_O > 2.0V$).

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., $V_O < 0.8V$).

ORDER INFORMATION

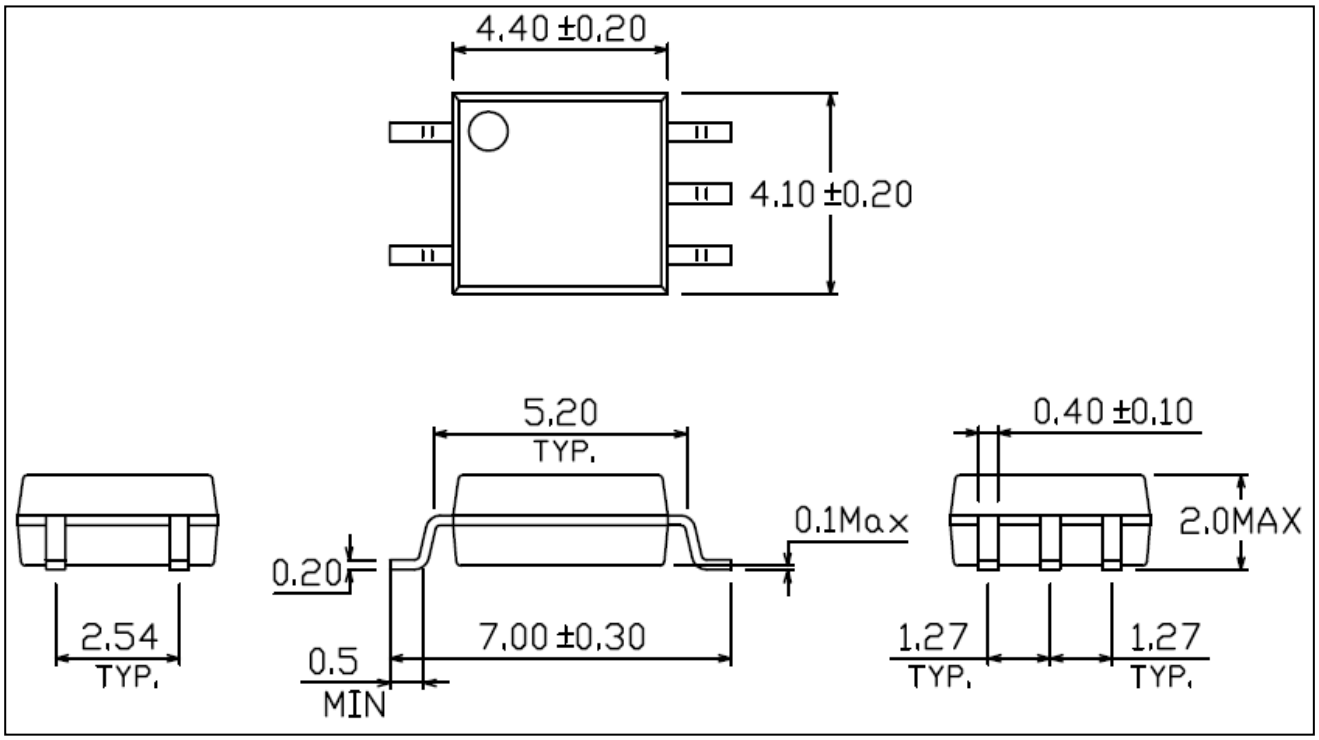
ICPLM452, ICPLM453			
After PN	**PN**	**Description**	**Packing quantity**
None	ICPLM452, ICPLM453	Surface Mount Tape & Reel	3000 pcs per reel

DEVICE MARKING

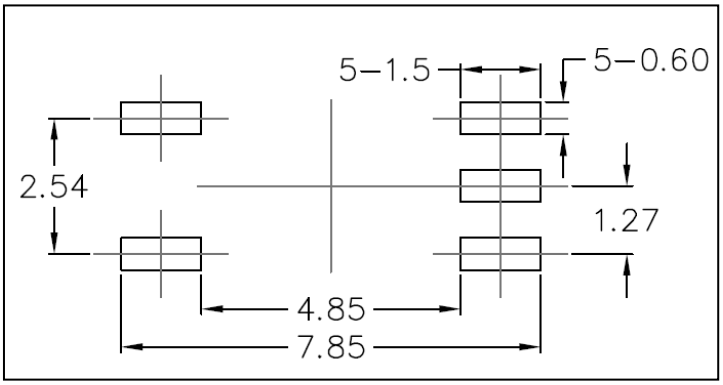


ICPLM600	denotes Device Part Number (ICPLM452 is used as example)
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
I	denotes Isocom

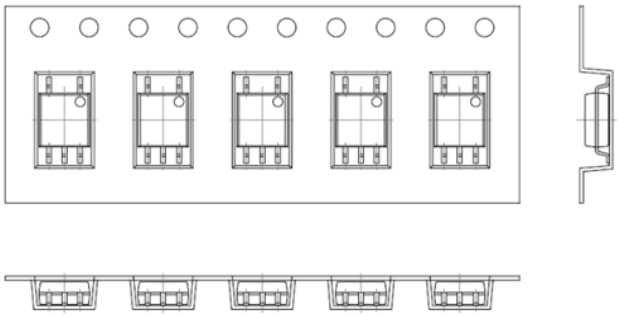
PACKAGE DIMENSIONS (mm)



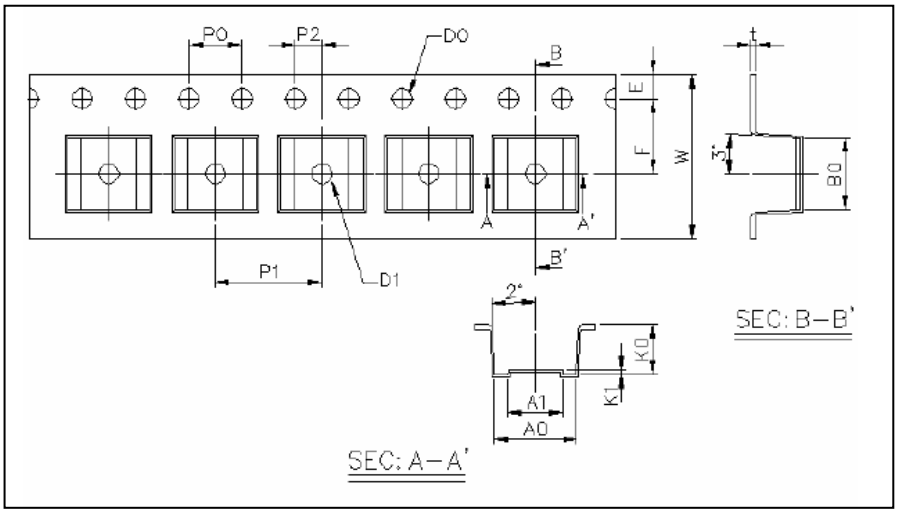
RECOMMENDED PAD LAYOUT (mm)



TAPE AND REEL PACKAGING

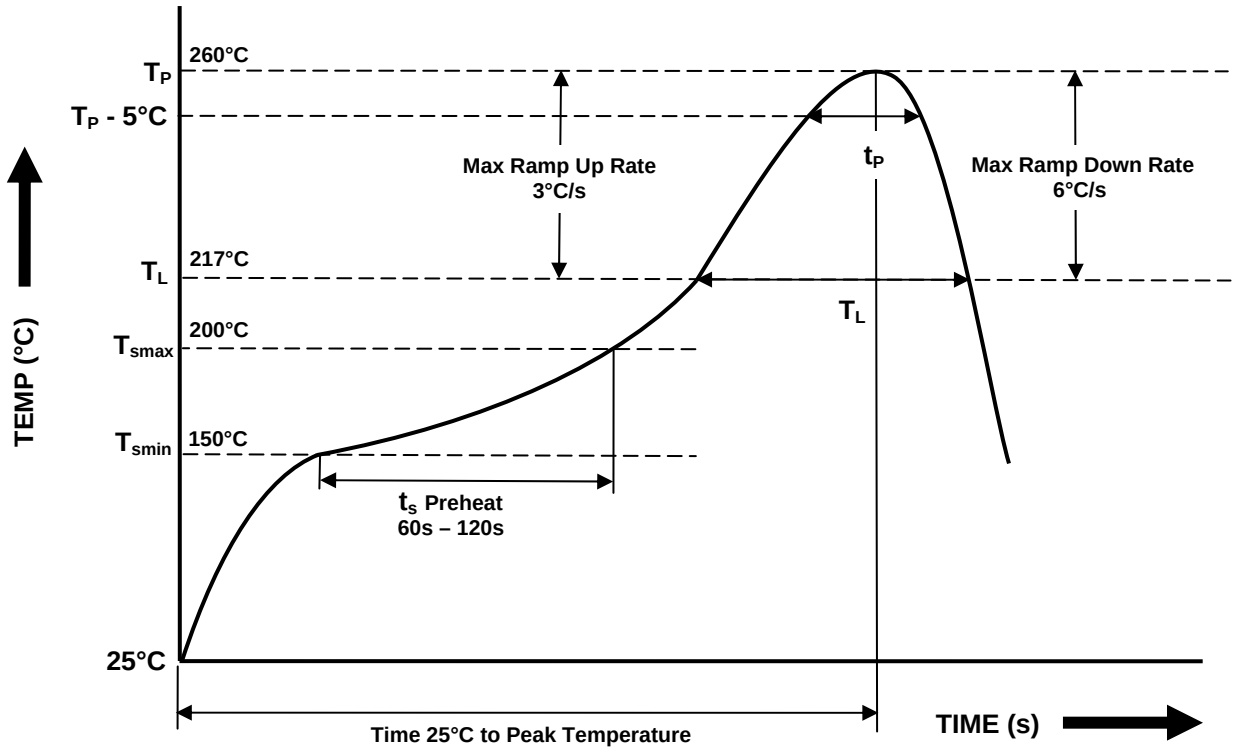


Direction of feed from reel



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

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°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

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- Do not immerse device body in solder paste.

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COMPONENTS

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