



## TLP321, TLP321-2, TLP321-4



### DESCRIPTION

The TLP321, TLP321-2 and TLP321-4 series of optically coupled isolator consist of an infrared light emitting diode and an NPN silicon photo transistor in a space efficient Dual In Line Plastic Package.

### FEATURES

- AC Isolation Voltage 5300V<sub>RMS</sub>
- CTR Selections Available
- Wide Operating Temperature Range -30°C to +100°C
- Lead Free and RoHS Compliant
- UL File E91231 Package Code "EE"
- VDE Approval Certificate No. 40028086

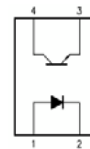
### APPLICATIONS

- Computer Terminals
- Industrial System Controllers
- Measuring Instruments
- Signal Transmission between Systems of Different Potentials and Impedances

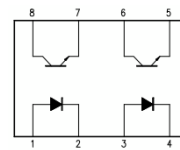
### ORDER INFORMATION

- Add X after PN for VDE Approval
- Add G after PN for 10mm lead spacing
- Add SM after PN for Surface Mount
- Add SMT&R after PN for Surface Mount Tape & Reel (Available for TLP321SM and TLP321-2SM)
- Consult Factory for Tape and Reel version of TLP321-4SM

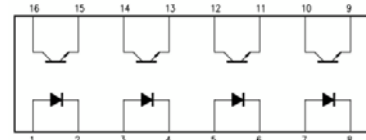
**TLP321**



**TLP321-2**



**TLP321-4**



### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 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 can adversely affect reliability.

#### Input

Forward Current	50mA
Reverse Voltage	6V
Power dissipation	70mW

#### Output

Collector to Emitter Voltage BV <sub>CEO</sub>	80V
Emitter to Collector Voltage BV <sub>ECO</sub>	6V
Collector Current	50mA
Power Dissipation	150mW

#### Total Package

Isolation Voltage	5300V <sub>RMS</sub>
Total Power Dissipation	200mW
Operating Temperature	-30 to 100 °C
Storage Temperature	-55 to 125 °C
Lead Soldering Temperature (10s)	260°C

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## TLP321, TLP321-2, TLP321-4

### ELECTRICAL CHARACTERISTICS (Ambient Temperature = 25°C unless otherwise specified)

#### INPUT

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Forward Voltage	$V_F$	$I_F = 10\text{mA}$	1.0	1.15	1.3	V
Reverse Voltage	$V_R$	$I_R = 10\mu\text{A}$	5.0			V
Reverse Leakage	$I_R$	$V_R = 5\text{V}$			10	$\mu\text{A}$
Terminal Capacitance	$C_t$	$V = 0\text{V}, f = 1\text{KHz}$		30	250	pF

#### OUTPUT

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector—Emitter breakdown Voltage	$BV_{CEO}$	$I_C = 0.5\text{mA}, I_F = 0\text{mA}$	80			V
Emitter—Collector breakdown Voltage	$BV_{ECO}$	$I_E = 100\mu\text{A}, I_F = 0\text{mA}$	6			V
Collector-Emitter Dark Current	$I_{CEO}$	$V_{CE} = 48\text{V}, I_F = 0\text{mA}$			100	nA



## TLP321, TLP321-2, TLP321-4

### ELECTRICAL CHARACTERISTICS (Ambient Temperature = 25°C unless otherwise specified)

#### COUPLED

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Current Transfer Ratio	CTR	$I_F = 5\text{mA}$ , $V_{CE} = 5\text{V}$	50		600	%
		Optional CTR Grades				
		BL	200		600	
		GB	100		600	
		GB ( $I_F = 1\text{mA}$ , $V_{CE} = 0.4\text{V}$ )	30			
Collector—Emitter Saturation Voltage	$V_{CE(sat)}$	$I_F = 8\text{mA}$ , $I_C = 2.4\text{mA}$ GB ( $I_F = 1\text{mA}$ , $I_C = 0.2\text{mA}$ )			0.4 0.4	V
Output Rise Time	$t_r$	$V_{CE} = 10\text{V}$ , $I_C = 2\text{mA}$ , $R_L = 100\Omega$		2		$\mu\text{s}$
Output Fall Time	$t_f$			3		
Turn-on Time	$t_{on}$			3		
Turn-off Time	$t_{off}$			3		

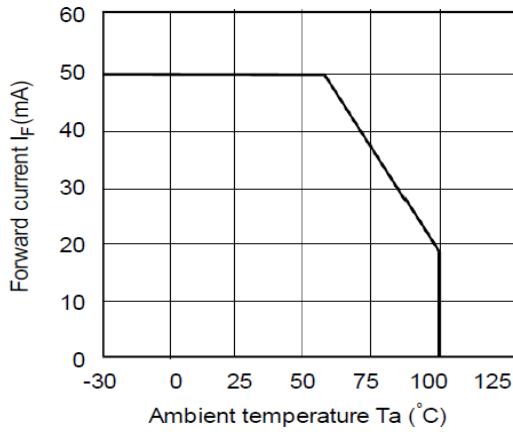
#### ISOLATION

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Input to Output Isolation Voltage	$V_{ISO}$	AC 1 minute, RH = 40 to 60% Note 1	5300			$V_{RMS}$
Input to Output Isolation Resistance	$R_{ISO}$	$V_{IO} = 500\text{V}$ Note 1	$5 \times 10^{10}$			$\Omega$

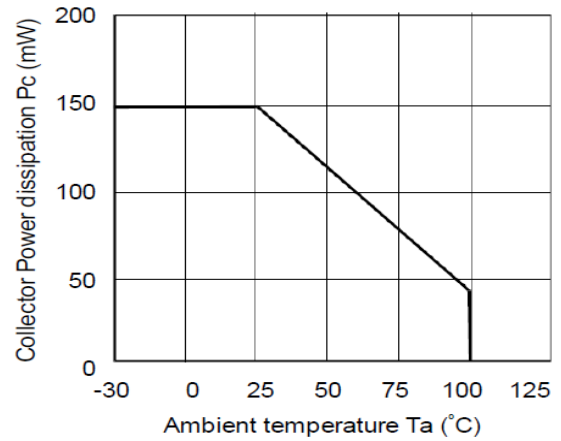
Note 1 : Measure with input leads shorted together and output leads shorted together.



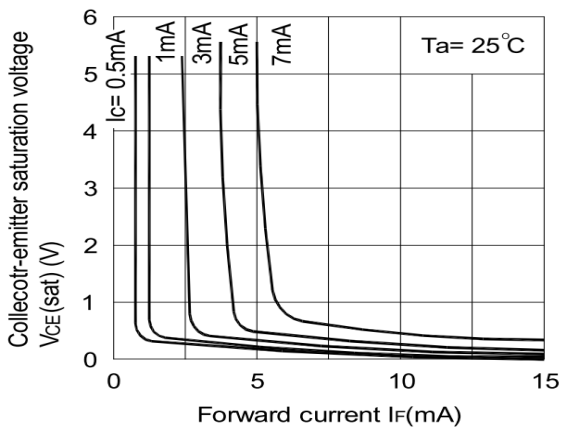
## TLP321, TLP321-2, TLP321-4



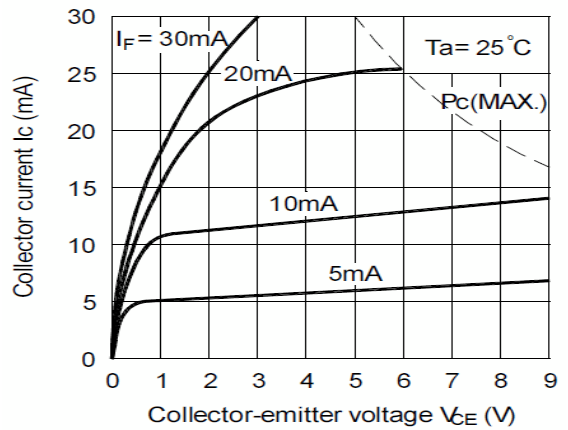
**Fig 1 Forward Current vs  $T_A$**



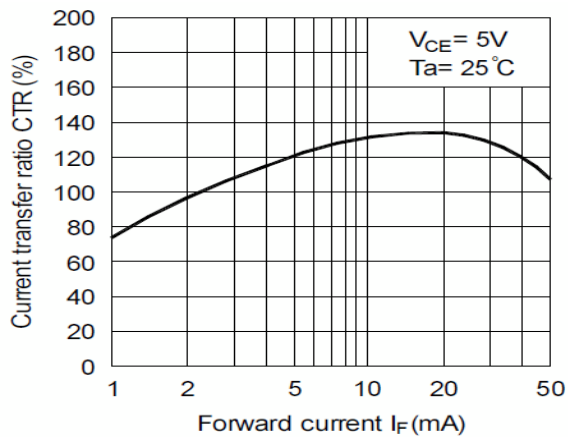
**Fig 2 Collector Power Dissipation vs  $T_A$**



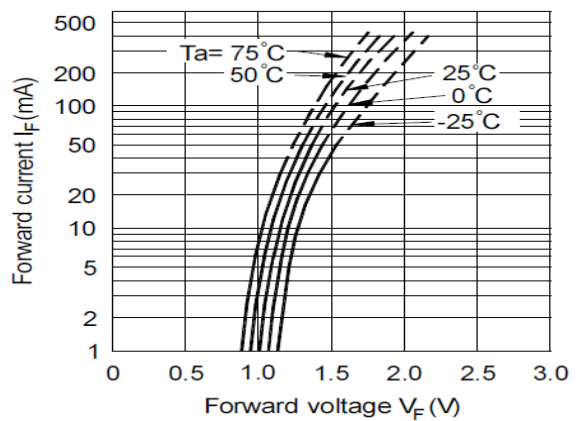
**Fig 3 Collector-emitter Saturation Voltage vs Forward Current**



**Fig 4 Collector Current vs Collector-emitter Voltage**



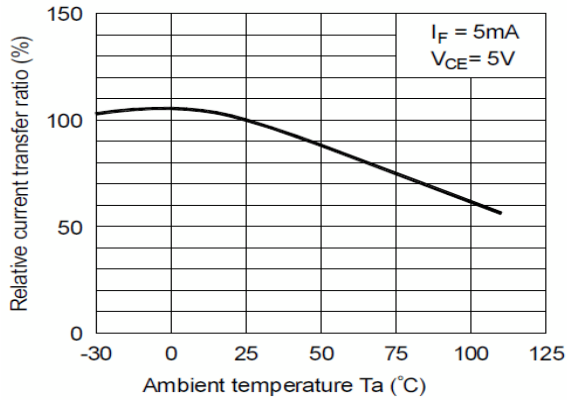
**Fig 5 Current Transfer Ratio vs Forward Current**



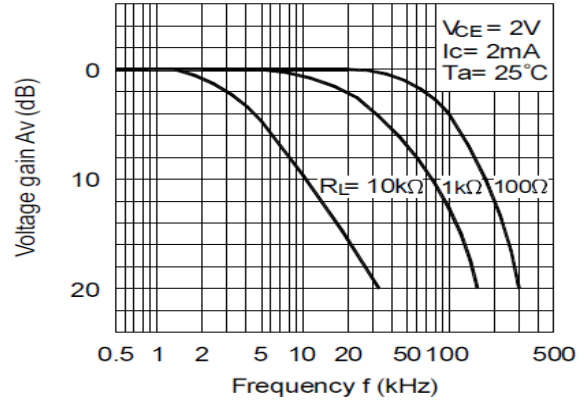
**Fig 6 Forward Current vs Forward Voltage**



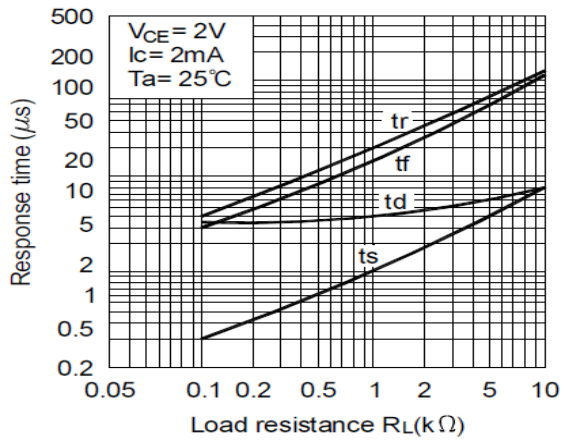
## TLP321, TLP321-2, TLP321-4



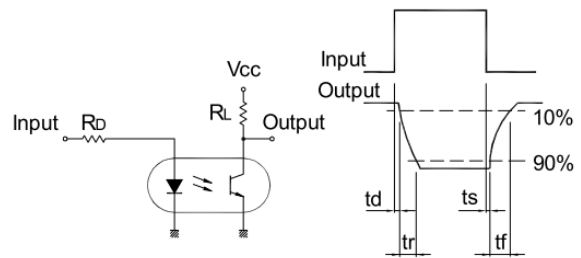
**Fig 7 Relative CTR vs  $T_A$**



**Fig 8 Frequency Response**



**Fig 9 Response Time vs Load Resistance**



**Response Time Test Circuit**



## TLP321, TLP321-2, TLP321-4

### ORDER INFORMATION

TLP321 (UL Approval)			
After PN	PN	Description	Packing quantity
None	TLP321, TLP321BL, TLP321GB	Standard DIP4	100 pcs per tube
G	TLP321G, TLP321BLG, TLP321GBG	10mm Lead Spacing	100 pcs per tube
SM	TLP321SM, TLP321BLSM, TLP321GBSM	Surface Mount	100 pcs per tube
SMT&R	TLP321SMT&R, TLP321BLSMT&R, TLP321GBSMT&R	Surface Mount Tape & Reel	1000 pcs per reel

TLP321-2 (UL Approval)			
After PN	PN	Description	Packing quantity
None	TLP321-2, TLP321-2BL, TLP321-2GB	Standard DIP8	50 pcs per tube
G	TLP321-2G, TLP321-2BLG, TLP321-2GBG	10mm Lead Spacing	50 pcs per tube
SM	TLP321-2SM, TLP321-2BLSM, TLP321-2GBSM	Surface Mount	50 pcs per tube
SMT&R	TLP321-2SMT&R, TLP321-2BLSMT&R, TLP321-2GBSMT&R	Surface Mount Tape & Reel	1000 pcs per reel

TLP321-4 (UL Approval)			
After PN	PN	Description	Packing quantity
None	TLP321-4, TLP321-4BL, TLP321-4GB	Standard DIP16	25 pcs per tube
G	TLP321-4G, TLP321-4BLG, TLP321-4GBG	10mm Lead Spacing	25 pcs per tube
SM	TLP321-4SM, TLP321-4BLSM, TLP321-4GBSM	Surface Mount	25 pcs per tube



**TLP321, TLP321-2, TLP321-4**

**ORDER INFORMATION**

<b>TLP321X (UL and VDE Approvals)</b>			
<b>After PN</b>	<b>PN</b>	<b>Description</b>	<b>Packing quantity</b>
None	TLP321X, TLP321XBL, TLP321XGB	Standard DIP4	100 pcs per tube
G	TLP321XG, TLP321XBLG, TLP321XGBG	10mm Lead Spacing	100 pcs per tube
SM	TLP321XSM, TLP321XBLSM, TLP321XGBSM	Surface Mount	100 pcs per tube
SMT&R	TLP321XSMT&R, TLP321XBLSMT&R, TLP321XGBXSMT&R	Surface Mount Tape & Reel	1000 pcs per reel

<b>TLP321-2X (UL and VDE Approvals)</b>			
<b>After PN</b>	<b>PN</b>	<b>Description</b>	<b>Packing quantity</b>
None	TLP321-2X, TLP321-2XBL, TLP321-2XGB	Standard DIP8	50 pcs per tube
G	TLP321-2XG, TLP321-2XBLG, TLP321-2XGBG	10mm Lead Spacing	50 pcs per tube
SM	TLP321-2XSM, TLP321-2XBLSM, TLP321-2XGBSM	Surface Mount	50 pcs per tube
SMT&R	TLP321-2XSMT&R, TLP321-2XBLSMT&R, TLP321-2XGBSMT&R	Surface Mount Tape & Reel	1000 pcs per reel

<b>TLP321-4X (UL and VDE Approvals)</b>			
<b>After PN</b>	<b>PN</b>	<b>Description</b>	<b>Packing quantity</b>
None	TLP321-4X, TLP321-4XBL, TLP321-4XGB	Standard DIP16	25 pcs per tube
G	TLP321-4XG, TLP321-4XBLG, TLP321-4XGBG	10mm Lead Spacing	25 pcs per tube
SM	TLP321-4XSM, TLP321-4XBLSM, TLP321-4XGBSM	Surface Mount	25 pcs per tube

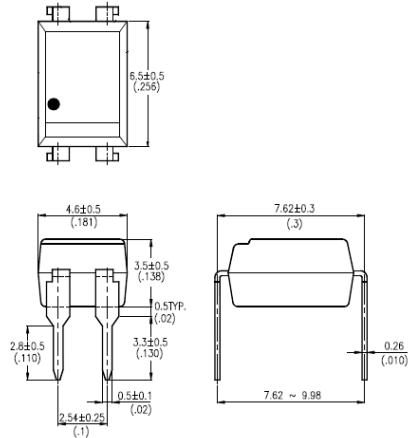


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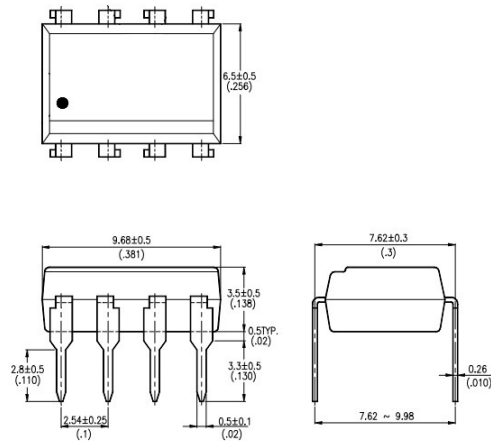
### PACKAGE DIMENSIONS in mm (inch)

#### DIP

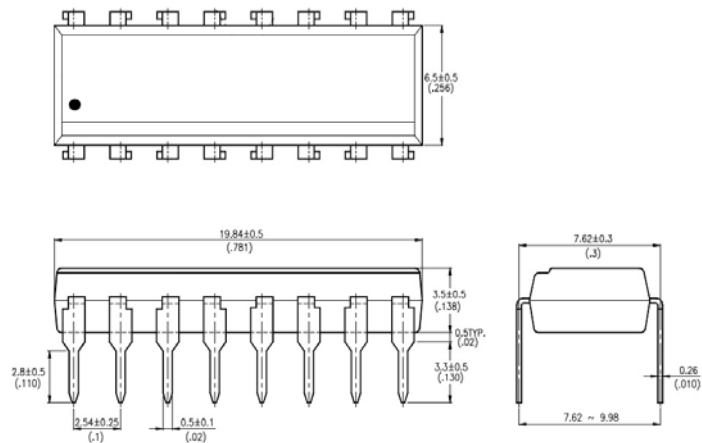
**TLP321**



**TLP321-2**



**TLP321-4**





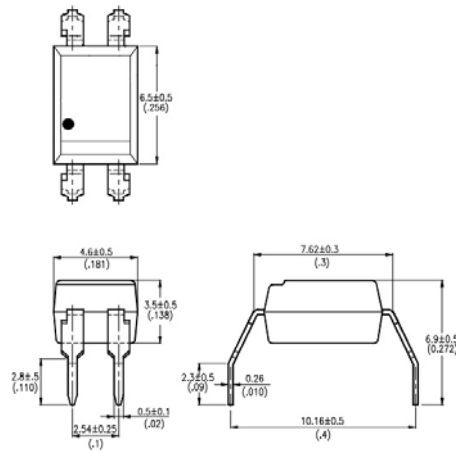


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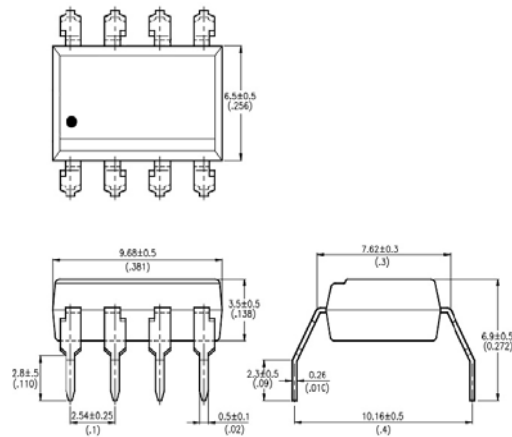
### PACKAGE DIMENSIONS in mm (inch)

#### G Form

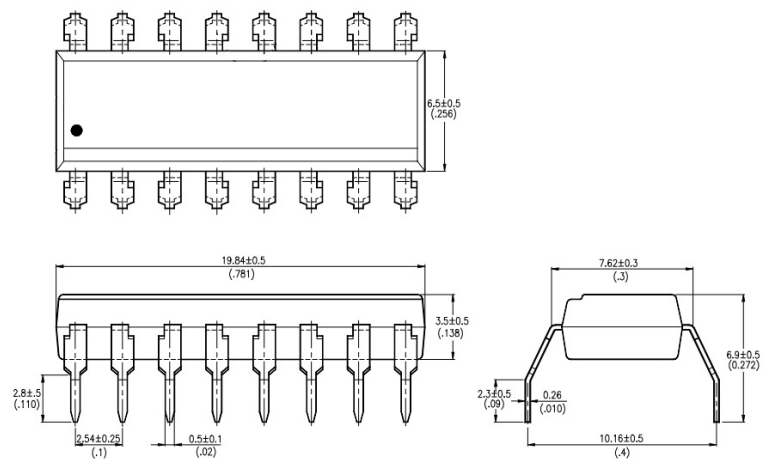
**TLP321G**



**TLP321-2G**



**TLP321-4G**



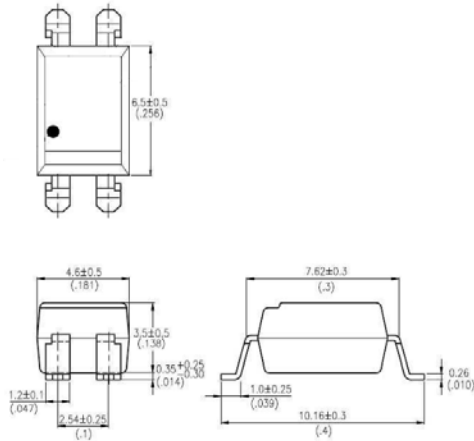


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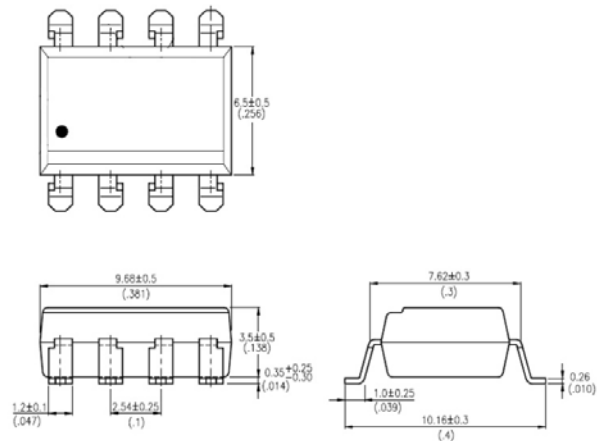
### PACKAGE DIMENSIONS in mm (inch)

#### SMD

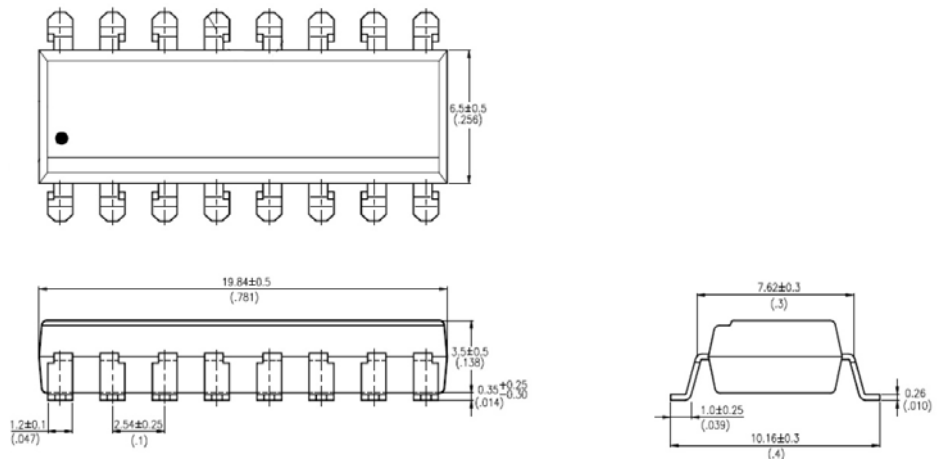
**TLP321SM**



**TLP321-2SM**



**TLP321-4SM**

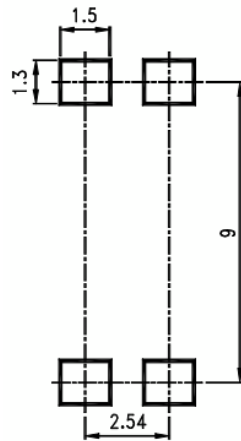




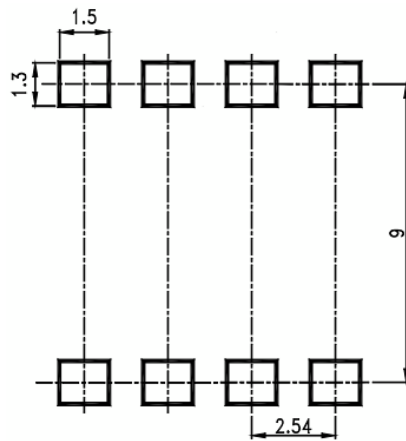
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### RECOMMENDED PAD LAYOUT FOR SMD (mm)

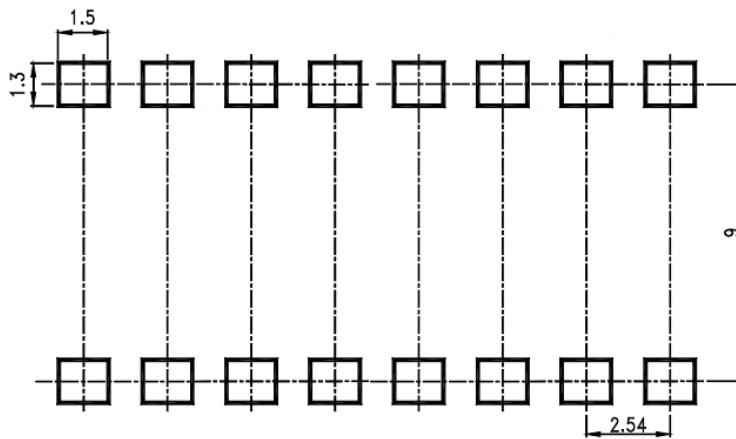
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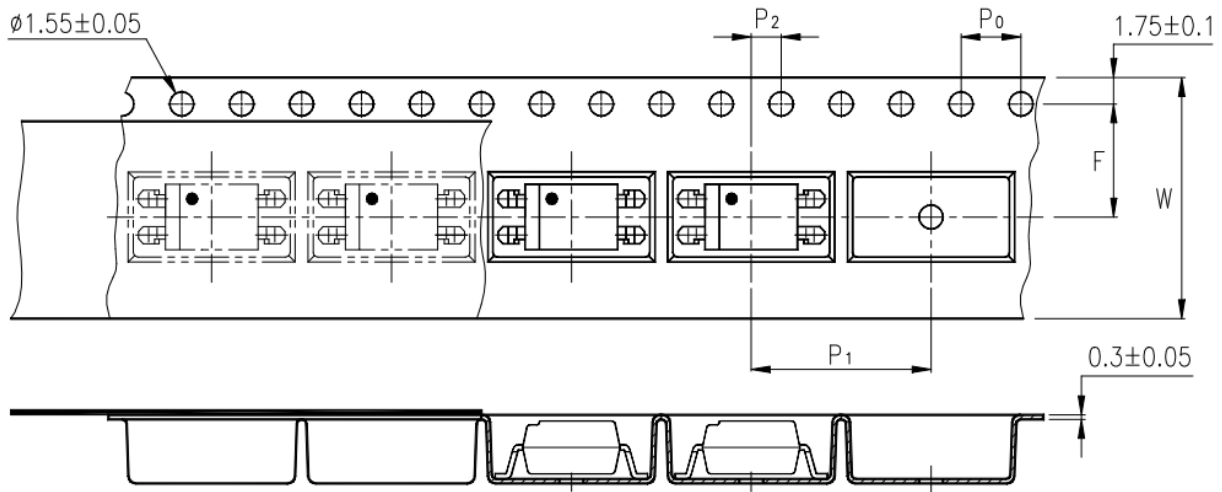
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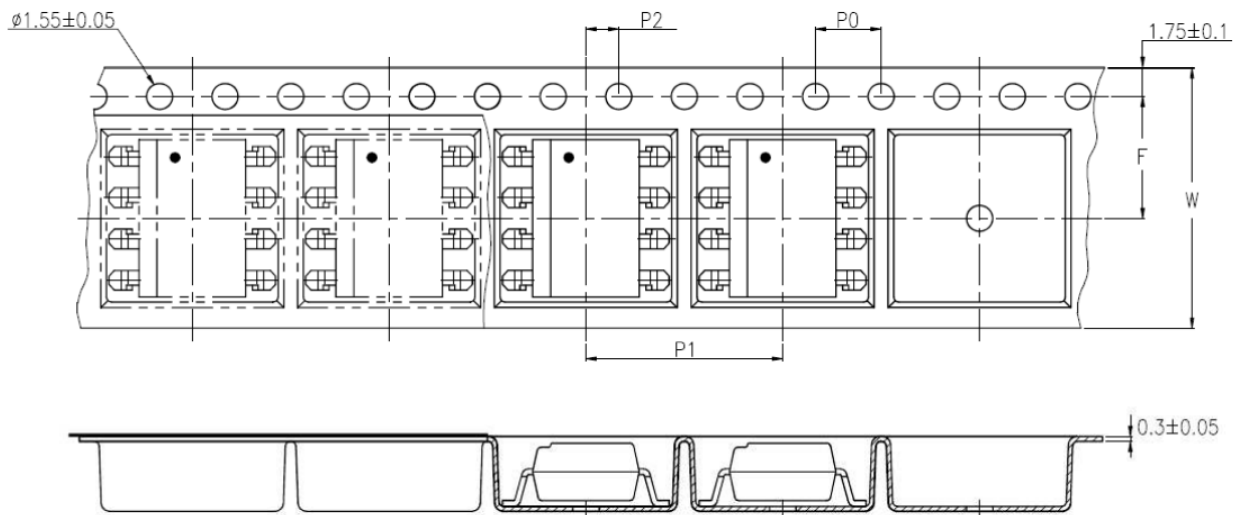


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### TAPE AND REEL PACKAGING



### TLP321SMT&R



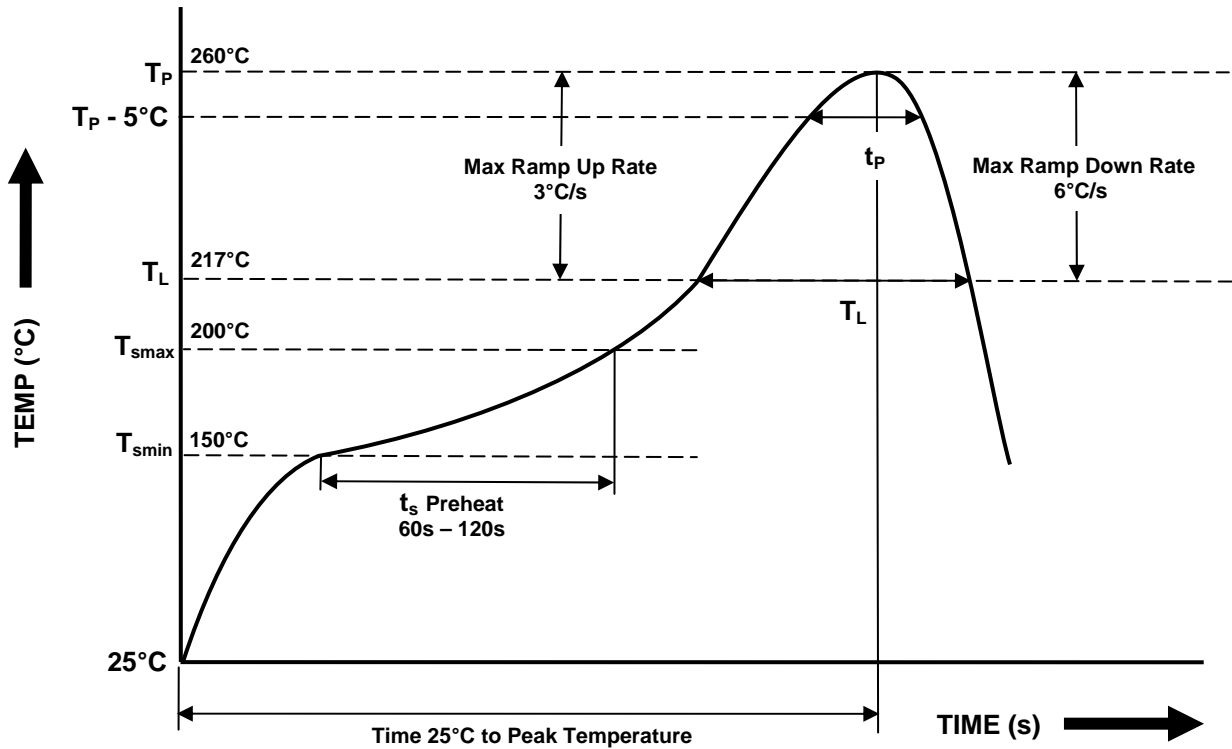
### TLP321-2SMT&R

Description	Symbol	Dimensions in mm ( inches )
Tape wide	W	$16 \pm 0.3$ ( .63 )
Pitch of sprocket holes	$P_0$	$4 \pm 0.1$ ( .15 )
Distance of compartment	F	$7.5 \pm 0.1$ ( .295 )
Distance of compartment to compartment	$P_2$	$2 \pm 0.1$ ( .079 )
Distance of compartment to compartment	$P_1$	$12 \pm 0.1$ ( .472 )



**TLP321, TLP321-2, TLP321-4**

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



Profile Details	Conditions
<b>Preheat</b> - Min Temperature ( $T_{SMIN}$ ) - Max Temperature ( $T_{SMAX}$ ) - Time $T_{SMIN}$ to $T_{SMAX}$ ( $t_s$ )	150°C 200°C 60s - 120s
<b>Soldering Zone</b> - 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



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## TLP321, TLP321-2, TLP321-4

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- The contents described herein are subject to change without prior notice.
- Do not immerse device body in solder paste.



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