



ISP321-1, ISP321-2, ISP321-4



DESCRIPTION

The ISP321-1, ISP321-2 and ISP321-4 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_{RMS}
- 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

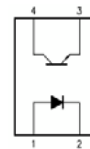
APPLICATIONS

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

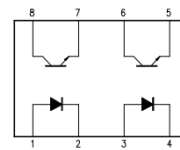
ORDER INFORMATION

- 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 ISP321-1SM and ISP321-2SM)
- Consult Factory for Tape and Reel version of ISP321-4SM

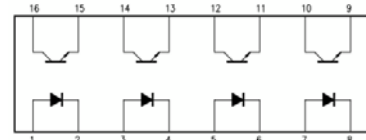
ISP321-1



ISP321-2



ISP321-4



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 can adversely affect reliability.

Input

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

Output

Collector to Emitter Voltage BV _{CEO}	80V
Emitter to Collector Voltage BV _{ECO}	6V
Collector Current	50mA
Power Dissipation	150mW

Total Package

Isolation Voltage	5300V _{RMS}
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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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	$I_R = 10\mu\text{A}$	6.0			V
Reverse Leakage	I_R	$V_R = 4\text{V}$			10	μA
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}	$V_{CE} = 20\text{V}, I_F = 0\text{mA}$			100	nA

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	$V_{CE} = 2\text{V},$ $I_C = 2\text{mA},$ $R_L = 100\Omega$		4		μs
Output Fall Time	t_f			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	5×10^{10}			Ω

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



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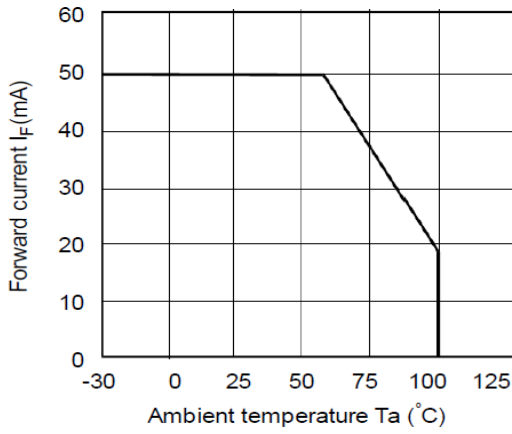


Fig 1 Forward Current vs T_A

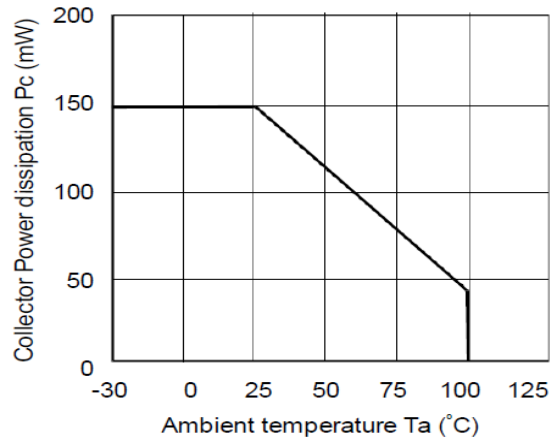


Fig 2 Collector Power Dissipation vs T_A

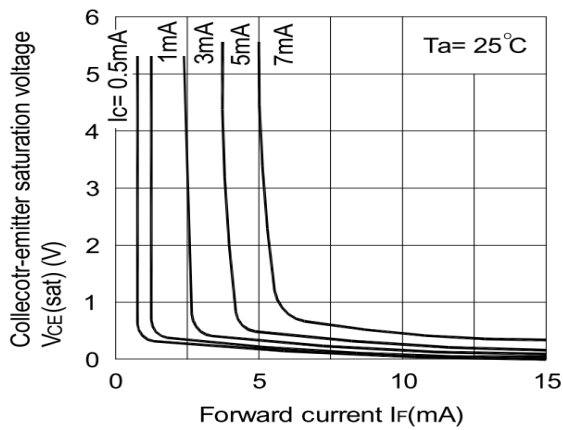


Fig 3 Collector-emitter Saturation Voltage vs Forward Current

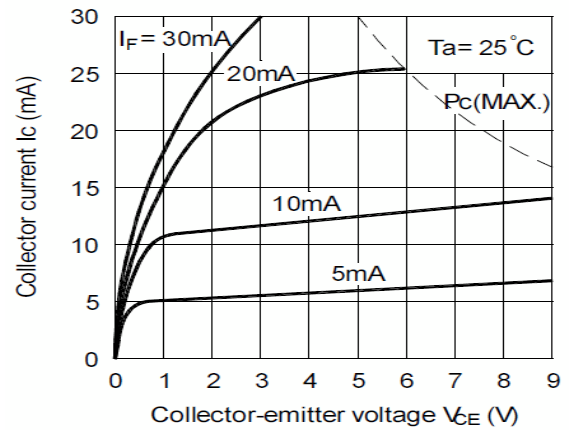


Fig 4 Collector Current vs Collector-emitter Voltage

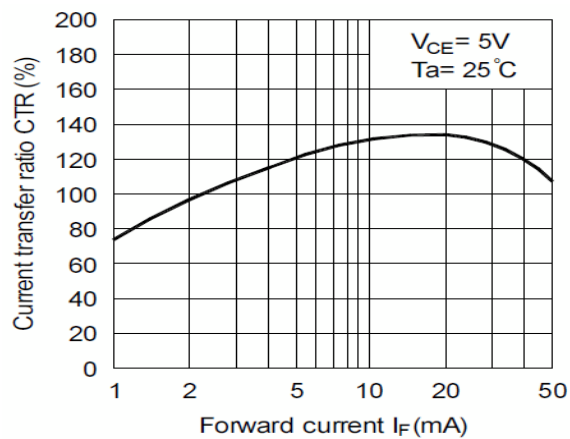


Fig 5 Current Transfer Ratio vs Forward Current

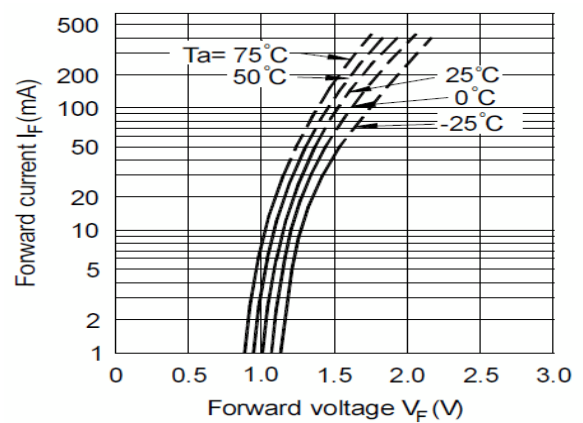


Fig 6 Forward Current vs Forward Voltage



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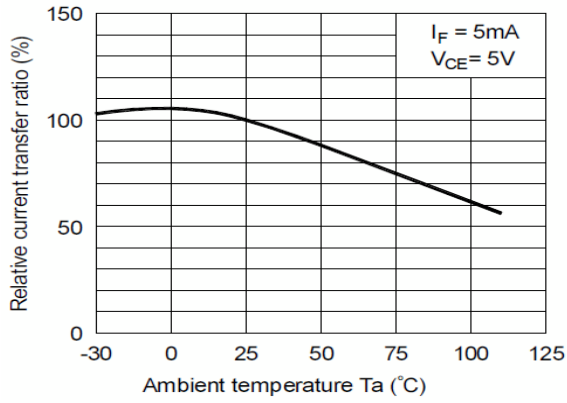


Fig 7 Relative CTR vs T_A

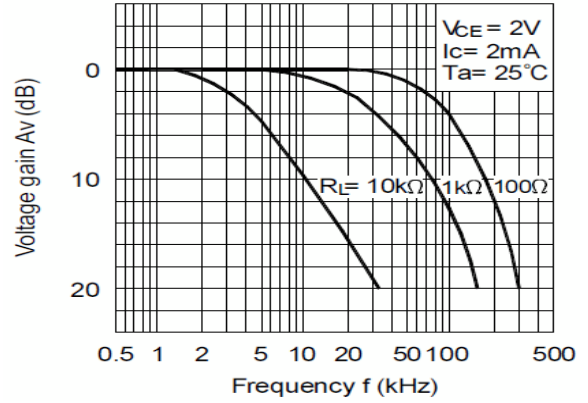


Fig 8 Frequency Response

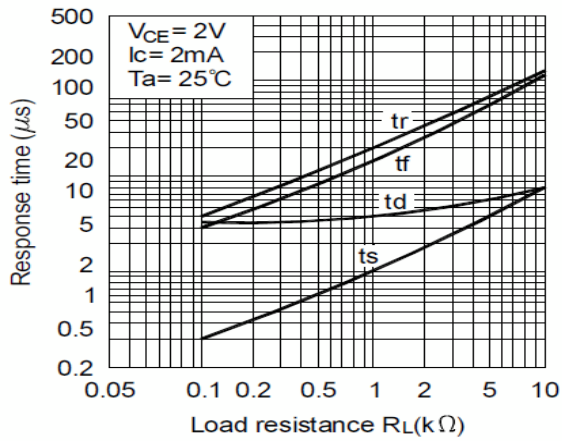
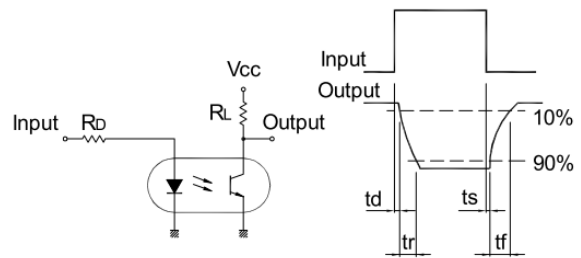


Fig 9 Response Time vs Load Resistance



Response Time Test Circuit



ISP321-1, ISP321-2, ISP321-4

ORDER INFORMATION

ISP321-1 (UL Approval)			
After PN	PN	Description	Packing quantity
None	ISP321-1, ISP321-1BL, ISP321-1GB	Standard DIP4	100 pcs per tube
G	ISP321-1G, ISP321-1BLG, ISP321-1GBG	10mm Lead Spacing	100 pcs per tube
SM	ISP321-1SM, ISP321-1BLSM, ISP321-1GBSM	Surface Mount	100 pcs per tube
SMT&R	ISP321-1SMT&R, ISP321-1BLSMT&R, ISP321-1GBSMT&R	Surface Mount Tape & Reel	1000 pcs per reel

ISP321-2 (UL Approval)			
After PN	PN	Description	Packing quantity
None	ISP321-2, ISP321-2BL, ISP321-2GB	Standard DIP8	50 pcs per tube
G	ISP321-2G, ISP321-2BLG, ISP321-2GBG	10mm Lead Spacing	50 pcs per tube
SM	ISP321-2SM, ISP321-2BLSM, ISP321-2GBSM	Surface Mount	50 pcs per tube
SMT&R	ISP321-2SMT&R, ISP321-2BLSMT&R, ISP321-2GBSMT&R	Surface Mount Tape & Reel	1000 pcs per reel

ISP321-4 (UL Approval)			
After PN	PN	Description	Packing quantity
None	ISP321-4, ISP321-4BL, ISP321-4GB	Standard DIP16	25 pcs per tube
G	ISP321-4G, ISP321-4BLG, ISP321-4GBG	10mm Lead Spacing	25 pcs per tube
SM	ISP321-4SM, ISP321-4BLSM, ISP321-4GBSM	Surface Mount	25 pcs per tube



ISP321-1, ISP321-2, ISP321-4

ORDER INFORMATION

ISP321X (UL and VDE Approvals)			
After PN	PN	Description	Packing quantity
None	ISP321-1X, ISP321-1XBL, ISP321-1XGB	Standard DIP4	100 pcs per tube
G	ISP321-1XG, ISP321-1XB LG, ISP321-1XGBG	10mm Lead Spacing	100 pcs per tube
SM	ISP321-1XSM, ISP321-1XBLSM, ISP321-1XGBSM	Surface Mount	100 pcs per tube
SMT&R	ISP321-1XSMT&R, ISP321-1XBLSMT&R, ISP321-1XGBSMT&R	Surface Mount Tape & Reel	1000 pcs per reel

ISP321-2X (UL and VDE Approvals)			
After PN	PN	Description	Packing quantity
None	ISP321-2X, ISP321-2XBL, ISP321-2XGB	Standard DIP8	50 pcs per tube
G	ISP321-2XG, ISP321-2XB LG, ISP321-2XGBG	10mm Lead Spacing	50 pcs per tube
SM	ISP321-2XSM, ISP321-2XBLSM, ISP321-2XGBSM	Surface Mount	50 pcs per tube
SMT&R	ISP321-2XSMT&R, ISP321-2XBLSMT&R, ISP321-2XGBSMT&R	Surface Mount Tape & Reel	1000 pcs per reel

ISP321-4X (UL and VDE Approvals)			
After PN	PN	Description	Packing quantity
None	ISP321-4X, ISP321-4XBL, ISP321-4XGB	Standard DIP16	25 pcs per tube
G	ISP321-4XG, ISP321-4XB LG, ISP321-4XGBG	10mm Lead Spacing	25 pcs per tube
SM	ISP321-4XSM, ISP321-4XBLSM, ISP321-4XGBSM	Surface Mount	25 pcs per tube

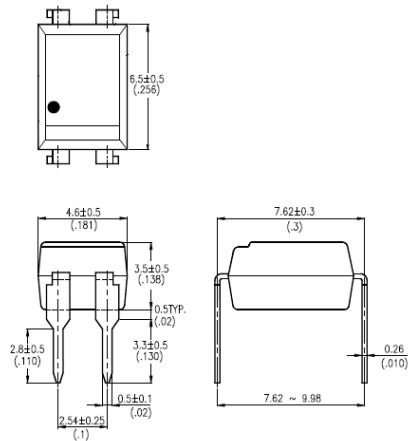


ISP321-1, ISP321-2, ISP321-4

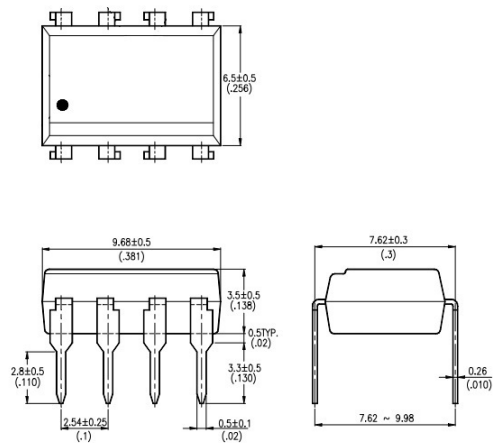
PACKAGE DIMENSIONS in mm (inch)

DIP

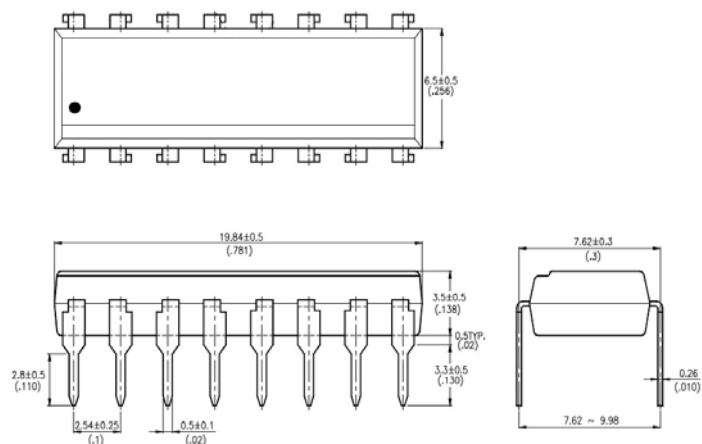
ISP321-1



ISP321-2



ISP321-4



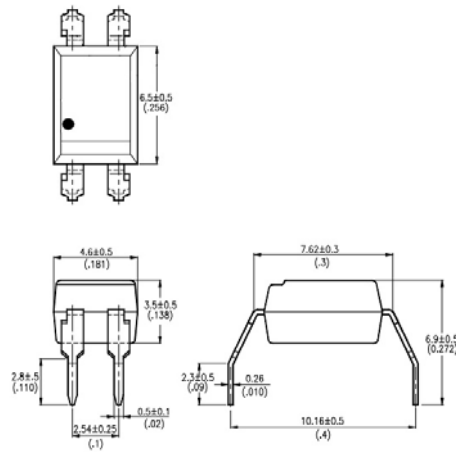


ISP321-1, ISP321-2, ISP321-4

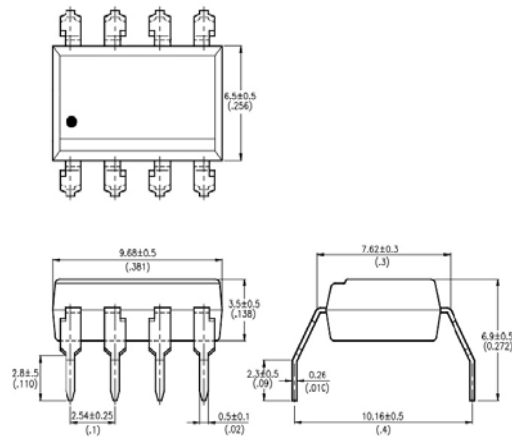
PACKAGE DIMENSIONS in mm (inch)

G Form

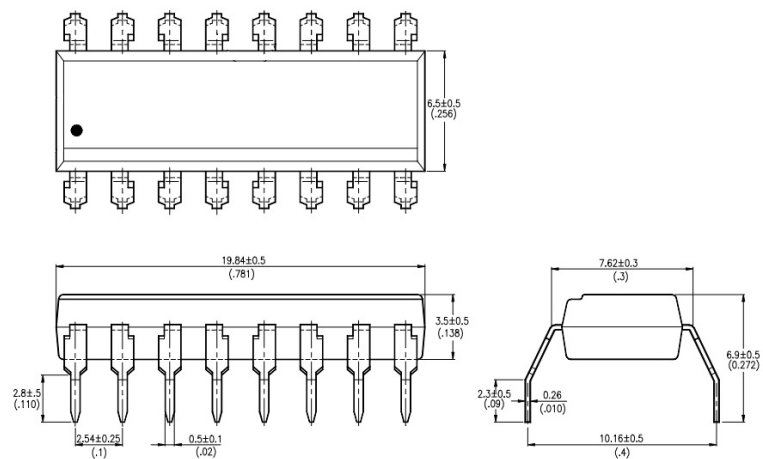
ISP321-1G



ISP321-2G



ISP321-4G



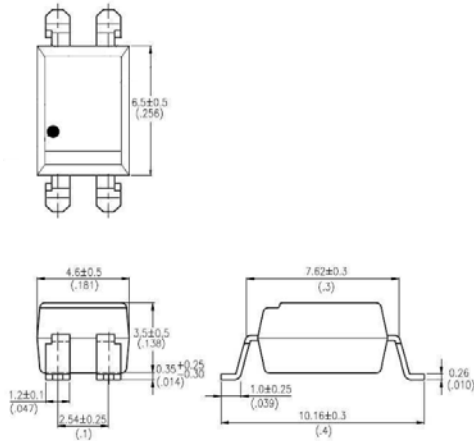


ISP321-1, ISP321-2, ISP321-4

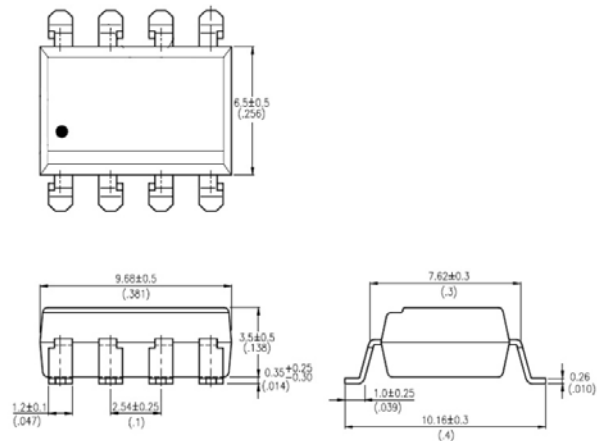
PACKAGE DIMENSIONS in mm (inch)

SMD

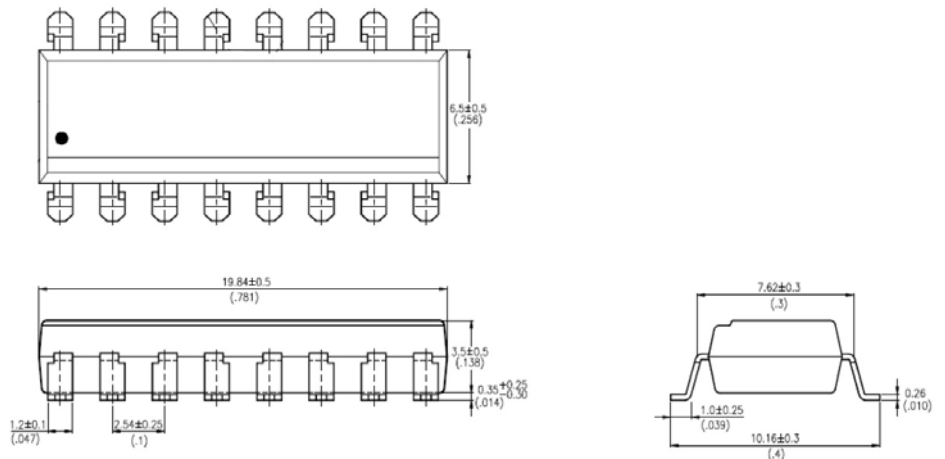
ISP321-1SM



ISP321-2SM



ISP321-4SM

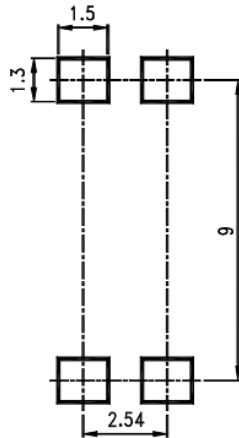




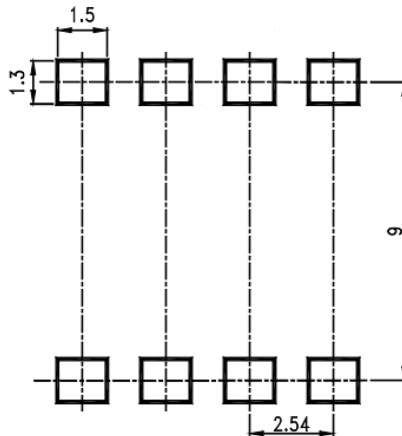
ISP321-1, ISP321-2, ISP321-4

RECOMMENDED PAD LAYOUT FOR SMD (mm)

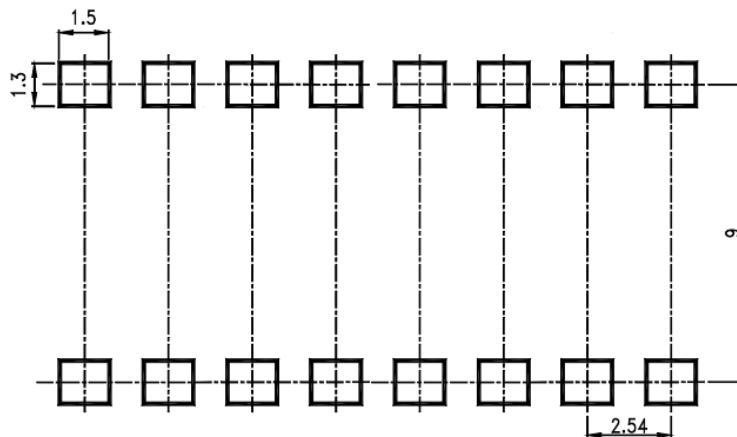
ISP321-1SM



ISP321-2SM



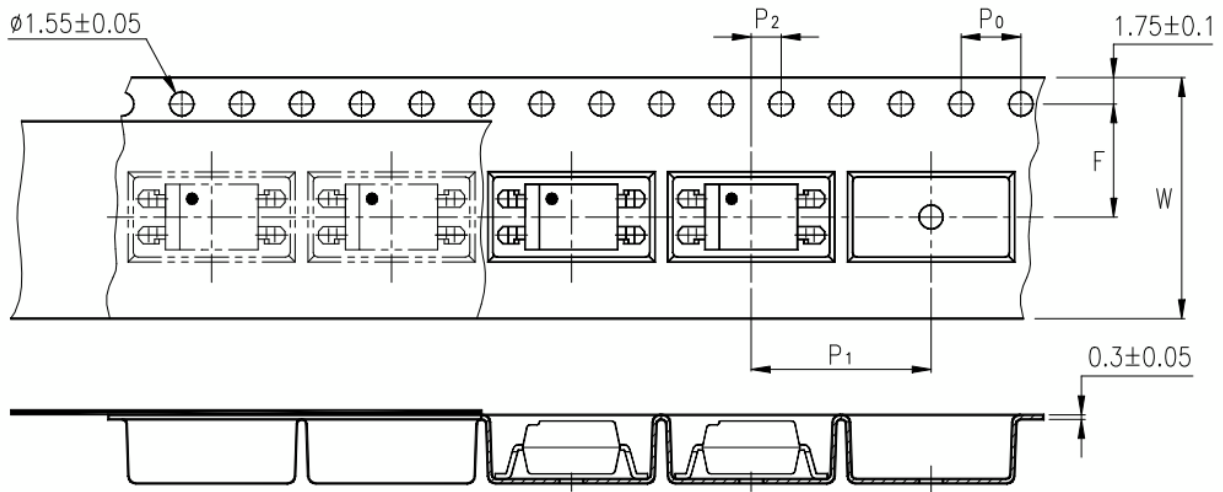
ISP321-4SM



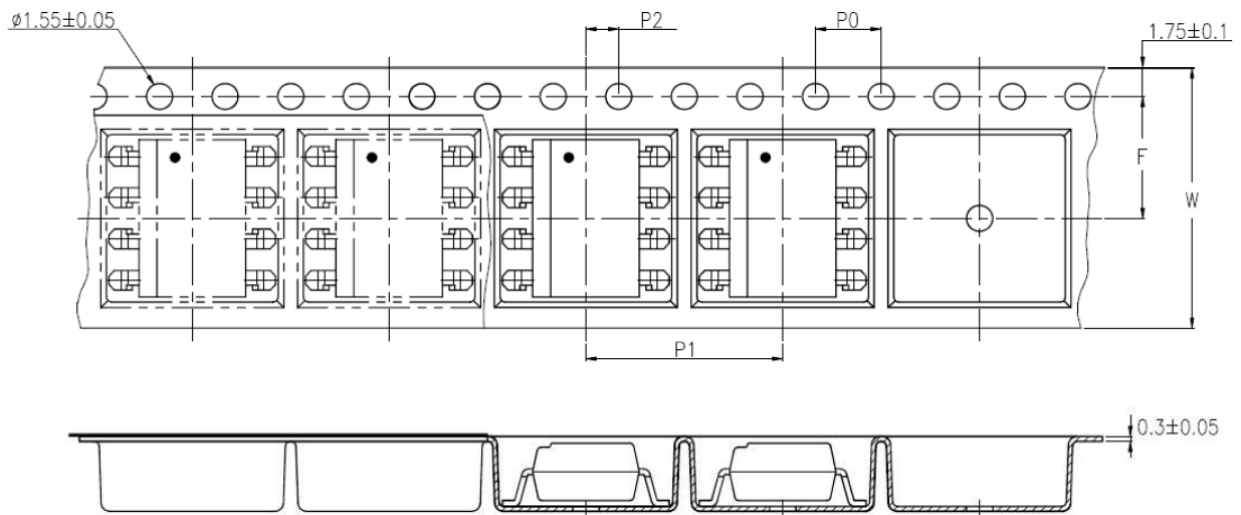


ISP321-1, ISP321-2, ISP321-4

TAPE AND REEL PACKAGING



ISP321-1SMT&R



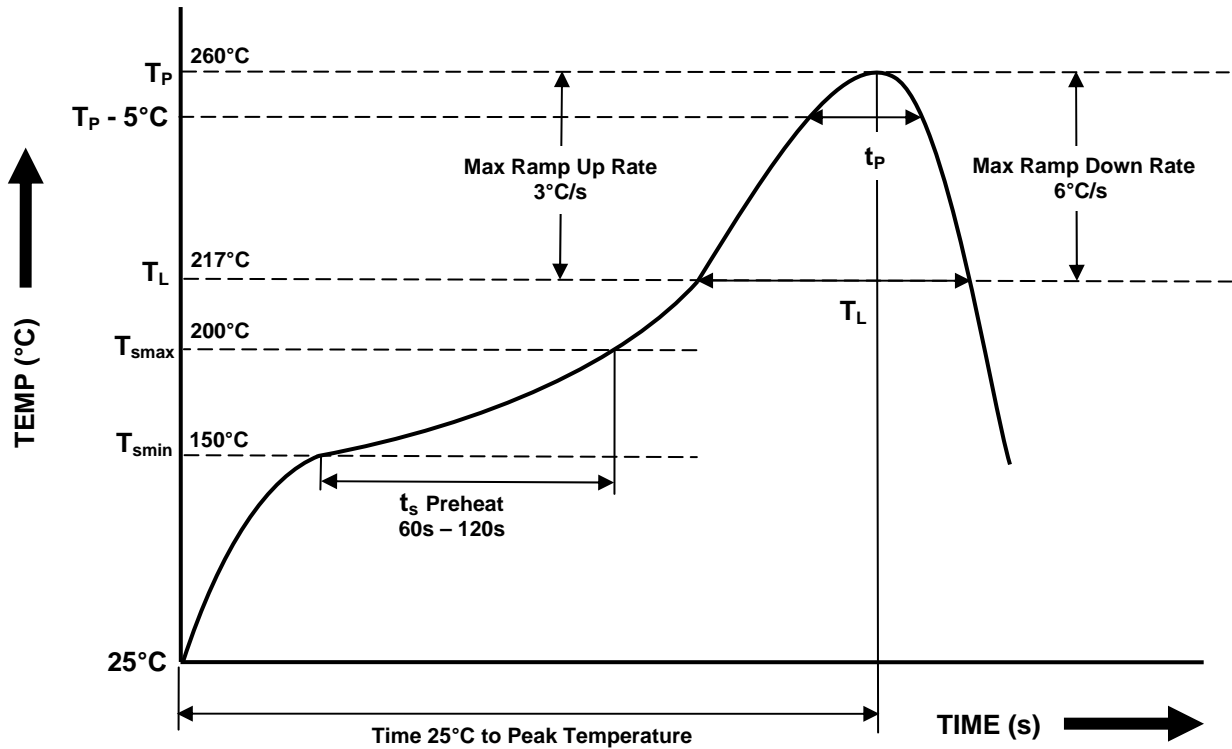
ISP321-2SMT&R

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



ISP321-1, ISP321-2, ISP321-4

**IR REFLOW SOLDERING TEMPERATURE PROFILE FOR SMD
(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

ISP321-1, ISP321-2, ISP321-4

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- The contents described herein are subject to change without prior notice.
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