## DESCRIPTION

The TLP521, TLP521-2 and TLP521-4 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.

ISOCOM

COMPONENTS

# FEATURES

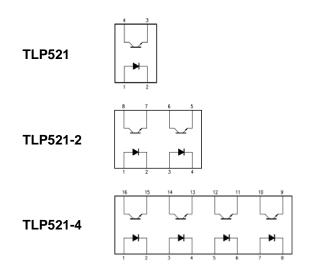
- AC Isolation Voltage 5300V<sub>RMS</sub>
- CTR Selections Available
- Wide Operating Temperature Range -30°C to +100°C
- Lead Free and RoHS Compliant
- UL File E91231 Package Code "EE"
- VDE Approval Certificate No. 40028086

# 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 TLP521SM and TLP521-2SM)
- Optional Order Part No. TLP521-1 for TLP521
  Consult Factory for Tape and Reel version of
- TLP521-4SM



#### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^{\circ}C$ )

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>	55V
Emitter to Collector Voltage BV <sub>ECO</sub>	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

#### ISOCOM COMPONENTS 2004 LTD

Unit 25B, Park View Road West, Park View Industrial Estate Hartlepool, Cleveland, TS25 1PE, 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 (Ambient Temperature = 25°C unless otherwise specified)

#### INPUT

ISOCOM

\_\_ COMPONENTS

–11––

Parameter	Symbol	Test Condition	Min	Тур.	Max	Unit
Forward Voltage	$\mathbf{V}_{\mathrm{F}}$	$I_F = 10 mA$	1.0	1.15	1.3	V
Reverse Voltage	V <sub>R</sub>	$I_R = 10 \mu A$	6.0			V
Reverse Leakage	I <sub>R</sub>	$V_R = 4V$			10	μΑ
Terminal Capacitance	Ct	V = 0V, f = 1KHz		30	250	pF

#### OUTPUT

Parameter	Symbol	Test Condition	Min	Тур.	Max	Unit
Collector—Emitter breakdown Voltage	BV <sub>CEO</sub>	$I_{\rm C} = 0.5 {\rm mA}, I_{\rm F} = 0 {\rm mA}$	55			V
Emitter—Collector breakdown Voltage	BV <sub>ECO</sub>	$I_{\rm E} = 100 \mu A, I_{\rm F} = 0 {\rm m} A$	6			V
Collector-Emitter Dark Current	I <sub>CEO</sub>	$V_{CE} = 20V, I_F = 0mA$			100	nA

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

#### COUPLED

**ISOCOM** 

COMPONENTS

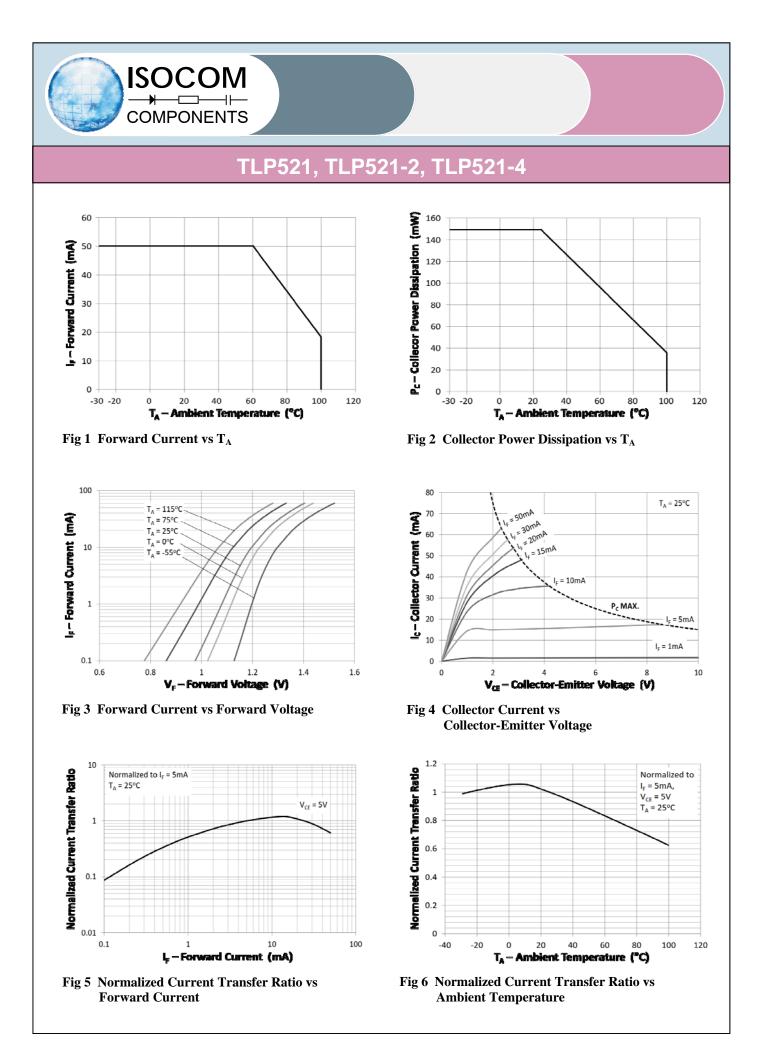
-11--

Parameter	Symbol	Test Condition	Min	Тур.	Max	Unit
Current Transfer Ratio	CTR	$I_F = 5 \text{mA}, V_{CE} = 5 \text{V}$	50		600	%
		Optional CTR Grades GR BL GB GB (I <sub>F</sub> = 1mA, V <sub>CE</sub> = 0.4V)	100 200 100 30		300 600 600	
Collector—Emitter Saturation Voltage	V <sub>CE(sat)</sub>	$I_F = 8mA, I_C = 2.4mA$ GB ( $I_F = 1mA, I_C = 0.2mA$ )			0.4 0.4	V
Output Rise Time	t <sub>r</sub>	$V_{CE} = 2V,$ Ic = 2mA,		4		μs
Output Fall Time	t <sub>f</sub>	$R_{L} = 100\Omega$		3		
Turn-on Time	t <sub>on</sub>			3		
Turn-off Time	$t_{\rm off}$			3		
Turn-on Time	t <sub>ON</sub>	$V_{CC} = 5V,$ $I_F = 16mA,$		2		μs
Turn-off Time	t <sub>OFF</sub>	$R_{\rm L} = 1.9 {\rm k}\Omega$		25		

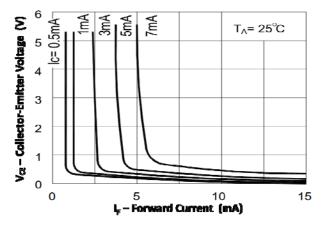
#### **ISOLATION**

Parameter	Symbol	Test Condition	Min	Тур.	Max	Unit
Input to Output Isolation Voltage	V <sub>ISO</sub>	AC 1 minute, RH = 40 to 60% Note 1	5300			V <sub>RMS</sub>
Input to Output Isolation Resistance	R <sub>ISO</sub>	$V_{IO} = 500V$ Note 1	5x10 <sup>10</sup>			Ω

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







-11-

Fig 7 Collector-Emitter Voltage vs Forward Current

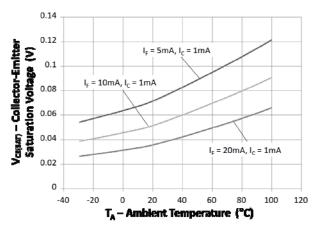


Fig 8 Collector-Emitter Voltage vs **Ambient Temperature** 

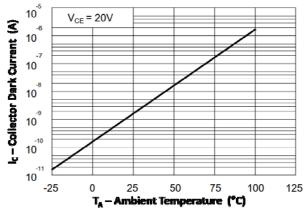


Fig 9 Collector Dark Current vs **Ambient Temperture** 



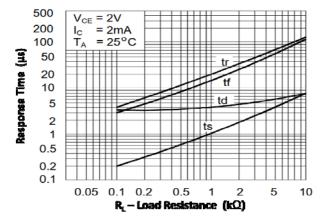


Fig 7 Response Time vs Load Resistance

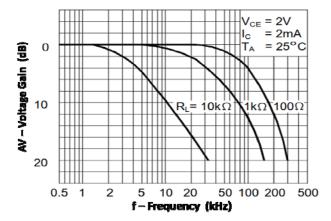
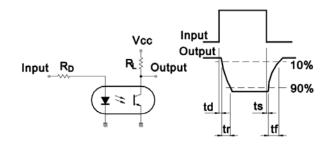
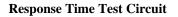
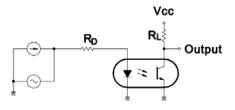


Fig 9 Frequency Response







**Frequency Response Test Circuit** 



#### **ORDER INFORMATION**

ISOCOM

COMPONENTS

	TLP521, TLP521-1 (UL Approval)					
After PN	PN	Description	Packing quantity			
None	TLP521, TLP521-1 TLP521GR, TLP521-1GR TLP521BL, TLP521-1BL, TLP521GB, TLP521-1GB	Standard DIP4	100 pcs per tube			
G	TLP521G, TLP521-1G, TLP521GRG, TLP521-1GRG, TLP521BLG, TLP521-1BLG TLP521GBG, TLP521-1GBG	10mm Lead Spacing	100 pcs per tube			
SM	TLP521SM, TLP521-1SM, TLP521GRSM, TLP521-1GRSM, TLP521BLSM, TLP521-1BLSM, TLP521GBSM, TLP521-1GBSM	Surface Mount	100 pcs per tube			
SMT&R	TLP521SMT&R, TLP521-1SMT&R TLP521GRSMT&R, TLP521-1GRSMT&R, TLP521BLSMT&R, TLP521-1BLSMT&R, TLP521GBSMT&R, TLP521-1GBSMT&R	Surface Mount Tape & Reel	1000 pcs per reel			

Note : Optional Order Part No. TLP521-1 for TLP521.



## **ORDER INFORMATION**

	TLP521-2 (UL Approval)					
After PN	PN	Description	Packing quantity			
None	TLP521-2, TLP521-2GR, TLP521-2BL, TLP521-2GB	Standard DIP8	50 pcs per tube			
G	TLP521-2G, TLP521-2GRG, TLP521-2BLG, TLP521-2GBG	10mm Lead Spacing	50 pcs per tube			
SM	TLP521-2SM, TLP521-2GRSM, TLP521-2BLSM, TLP521-2GBSM	Surface Mount	50 pcs per tube			
SMT&R	TLP521-2SMT&R, TLP521-2GRSMT&R, TLP521-2BLSMT&R, TLP521-2GBSMT&R	Surface Mount Tape & Reel	1000 pcs per reel			

	TLP521-4 (UL Approval)				
After PN	PN	Description	Packing quantity		
None	TLP521-4, TLP521-4GR, TLP521-4BL, TLP521-4GB	Standard DIP16	25 pcs per tube		
G	TLP521-4G, TLP521-4GRG, TLP521-4BLG, TLP521-4GBG	10mm Lead Spacing	25 pcs per tube		
SM	TLP521-4SM, TLP521-4GRSM, TLP521-4BLSM, TLP521-4GBSM	Surface Mount	25 pcs per tube		



### **ORDER INFORMATION**

	TLP521X, TLP521-1X (UL and VDE Approvals)				
After PN	PN	Description	Packing quantity		
None	TLP521X, TLP521-1X TLP521XGR, TLP521-1XGR TLP521XBL, TLP521-1XBL, TLP521XGB, TLP521-1XGB	Standard DIP4	100 pcs per tube		
G	TLP521XG, TLP521-1XG, TLP521XGRG, TLP521-1XGRG, TLP521XBLG, TLP521-1XBLG TLP521XGBG, TLP521-1XGBG	10mm Lead Spacing	100 pcs per tube		
SM	TLP521XSM, TLP521-1XSM, TLP521XGRSM, TLP521-1XGRSM, TLP521XBLSM, TLP521-1XBLSM, TLP521XGBSM, TLP521-1XGBSM	Surface Mount	100 pcs per tube		
SMT&R	TLP521XSMT&R, TLP521-1XSMT&R TLP521XGRSMT&R, TLP521-1XGRSMT&R, TLP521XBLSMT&R, TLP521-1XBLSMT&R, TLP521XGBSMT&R, TLP521-1XGBSMT&R	Surface Mount Tape & Reel	1000 pcs per reel		

Note : Optional Order Part No. TLP521-1 for TLP521.



## **ORDER INFORMATION**

	TLP521-2X (UL and VDE Approvals)					
After PN	PN	Description	Packing quantity			
None	TLP521-2X, TLP521-2XGR, TLP521-2XBL, TLP521-2XGB	Standard DIP8	50 pcs per tube			
G	TLP521-2XG, TLP521-2XGRG TLP521-2XBLG, TLP521-2XGBG	10mm Lead Spacing	50 pcs per tube			
SM	TLP521-2XSM, TLP521-2XGRSM, TLP521-2XBLSM, TLP521-2XGBSM	Surface Mount	50 pcs per tube			
SMT&R	TLP521-2XSMT&R, TLP521-2XGRSMT&R, TLP521-2XBLSMT&R, TLP521-2XGBSMT&R	Surface Mount Tape & Reel	1000 pcs per reel			

	TLP521-4X (UL and VDE Approvals)				
After PN	PN	Description	Packing quantity		
None	TLP521-4X, TLP521-4XGR, TLP521-4XBL, TLP521-4XGB	Standard DIP16	25 pcs per tube		
G	TLP521-4XG, TLP521-4XGRG, TLP521-4XBLG, TLP521-4XGBG	10mm Lead Spacing	25 pcs per tube		
SM	TLP521-4XSM, TLP521-4XGRSM, TLP521-4XBLSM, TLP521-4XGBSM	Surface Mount	25 pcs per tube		

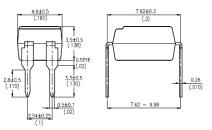


# PACKAGE DIMENSIONS in mm (inch)

DIP

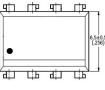
TLP521

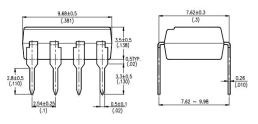


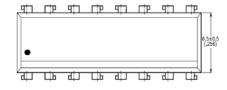


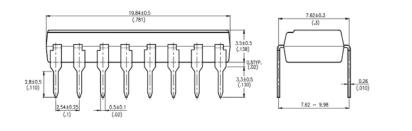
TLP521-2

TLP521-4







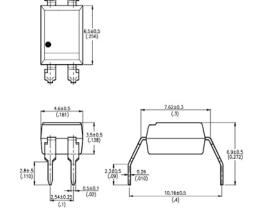




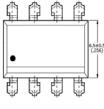
# PACKAGE DIMENSIONS in mm (inch)

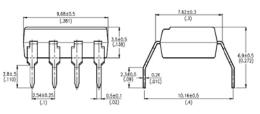
G Form

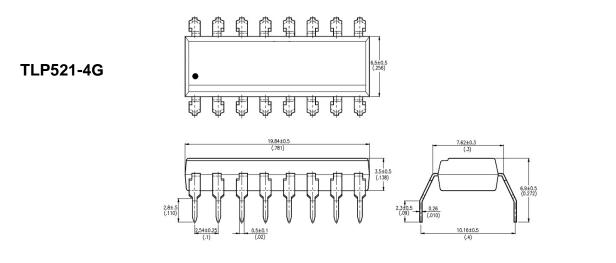
TLP521G

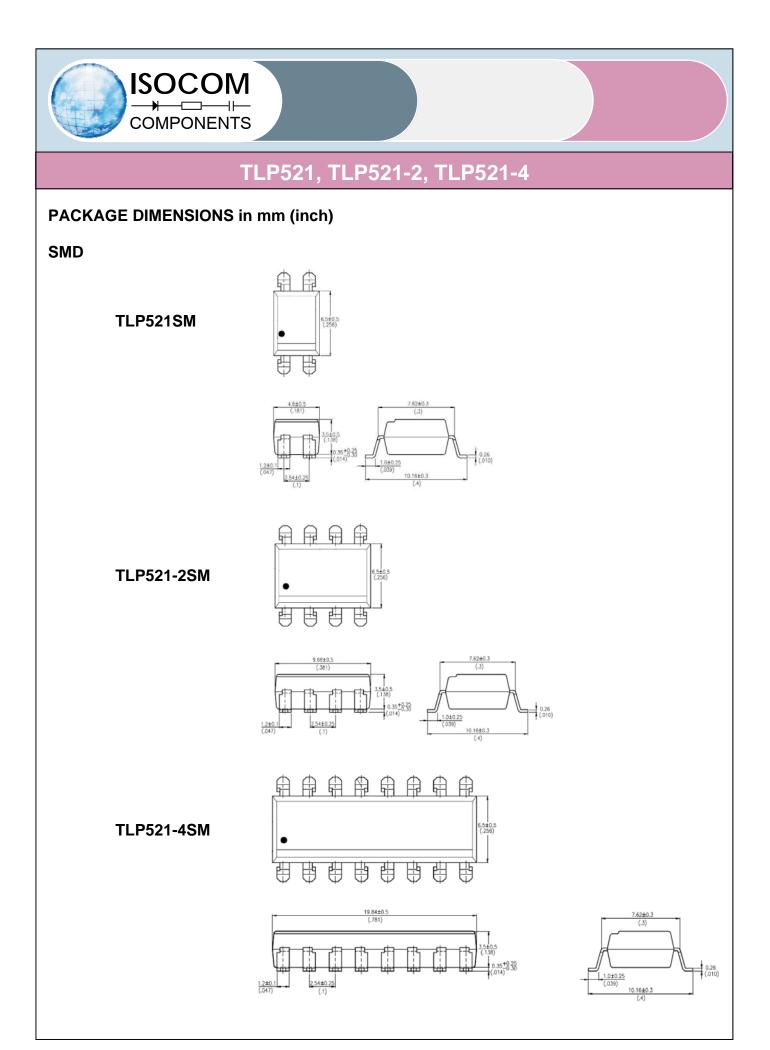


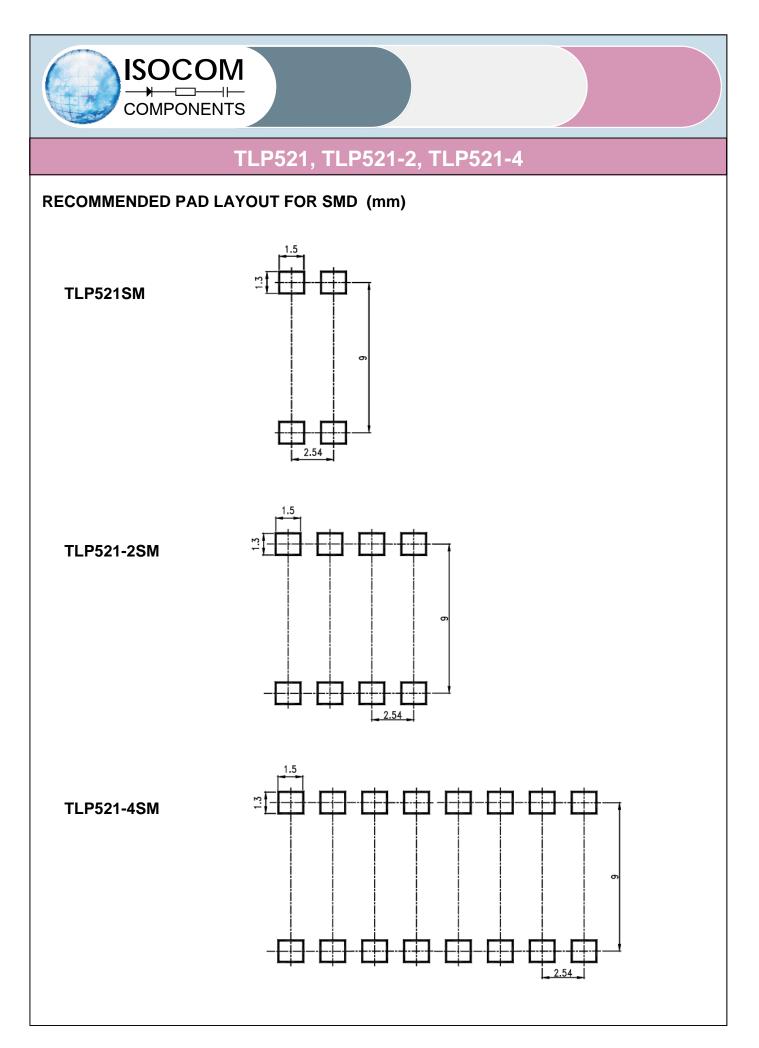
TLP521-2G





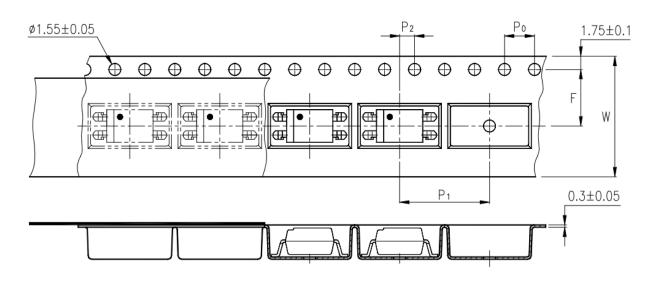




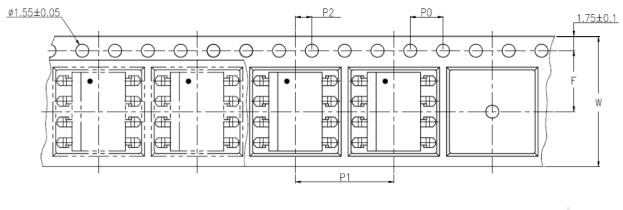


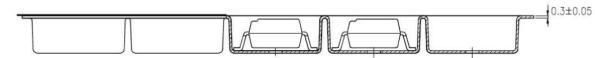


# TAPE AND REEL PACKAGING



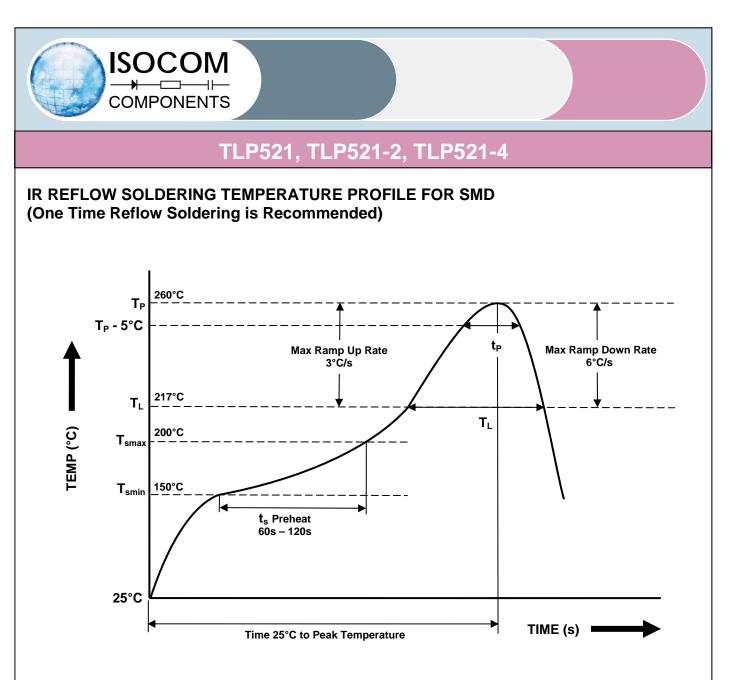
# TLP521SMT&R





# TLP521-2SMT&R

Description	Symbol	Dimensions in mm (inches)
Tape wide	W	16 ± 0.3 ( .63 )
Pitch of sprocket holes	Po	4 ± 0.1 ( .15 )
Distance of comportment	F	7.5 ± 0.1 ( .295 )
Distance of compartment	P2	$2 \pm 0.1$ ( .079 )
Distance of compartment to compartment	P1	12 ± 0.1 ( .472 )



Profile Details	Conditions
Preheat - Min Temperature (T <sub>SMIN</sub> ) - Max Temperature (T <sub>SMAX</sub> ) - Time T <sub>SMIN</sub> to T <sub>SMAX</sub> (t <sub>s</sub> )	150°C 200°C 60s - 120s
$\label{eq:solution} \begin{array}{l} \textbf{Soldering Zone} \\ & - \text{Peak Temperature } (T_{\text{P}}) \\ & - \text{Time at Peak Temperature} \\ & - \text{Liquidous Temperature } (T_{\text{L}}) \\ & - \text{Time within 5°C of Actual Peak Temperature } (T_{\text{P}} - 5^{\circ}\text{C}) \\ & - \text{Time maintained above } T_{\text{L}} \left( t_{\text{L}} \right) \\ & - \text{Ramp Up Rate } (T_{\text{L}} \text{ to } T_{\text{P}}) \\ & - \text{Ramp Down Rate } (T_{\text{P}} \text{ to } T_{\text{L}}) \end{array}$	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



### NOTES :

- Isocom is continually improving the quality, reliability, function or design and Isocom reserves the right to make changes without further notices.
- The products shown in this publication are designed for the general use in electronic applications such as office automation equipment, communications devices, audio/visual equipment, electrical application and instrumentation.
- 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.



ISOCOM

COMPONENTS

\_\_\_\_ISOCOM is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing ISOCOM products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such ISOCOM products could cause loss of human life, bodily injury or damage to property.

In developing your designs, please ensure that ISOCOM products are used within specified operating ranges as set forth in the most recent ISOCOM products specifications.

\_\_\_\_ The ISOCOM products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These ISOCOM products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation Instruments, traffic signal instruments, combustion control instruments, medical Instruments, all types of safety devices, etc... Unintended Usage of ISOCOM products listed in this document shall be made at the customer's own risk.

\_\_\_\_ Gallium arsenide (GaAs) is a substance used in the products described in this document. GaAs dust and fumes are toxic. Do not break, cut or pulverize the product, or use chemicals to dissolve them. When disposing of the products, follow the appropriate regulations. Do not dispose of the products with other industrial waste or with domestic garbage.

\_\_\_\_ The products described in this document are subject to the foreign exchange and foreign trade laws.

\_\_\_\_\_The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by ISOCOM Components for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of ISOCOM Components or others.

\_ The information contained herein is subject to change without notice.