

## ISP281



### DESCRIPTION

The ISP281 series optocoupler each consists of an infrared emitting diode optically coupled to an NPN silicon photo transistor.

This device belongs to Isocom Compact Range of Optocouplers.

### FEATURES

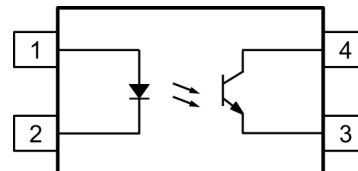
- Half Pitch 1.27mm
- CTR Selections Available
- Wide Operating Temperature Range  
- 55°C to +110°C
- High AC Isolation voltage 3750V<sub>RMS</sub>
- Lead Free and RoHS Compliant
- Safety Approvals Pending

### APPLICATIONS

- Switching Mode Power Supplies
- Computer Terminals
- Industrial System Controllers
- Measuring Instruments
- Signal Transmission between Systems of Differential Potentials and Impedances

### ORDER INFORMATION

- Available in Tape and Reel with 3000 pieces per reel



- 1 Anode
- 2 Cathode
- 3 Emitter
- 4 Collector

### 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
Pulse Forward Current	1A
Reverse Voltage	6V
Power Dissipation	70mW
Junction Temperature	125°C

#### Output

Collector to Emitter Voltage V <sub>CEO</sub>	80V
Emitter to Collector Voltage V <sub>ECC</sub>	7V
Collector Current	50mA
Power Dissipation	150mW
Junction Temperature	125°C

#### Total Package

Isolation Voltage	3750V <sub>RMS</sub>
Total Power Dissipation	200mW
Operating Temperature	-55 to 110°C
Storage Temperature	-55 to 150°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 Mansions  
36 Tai Yau Street, San Po Kong, Kowloon, Hong Kong  
Tel : +852 2995 9217 Fax : +852 8161 6292  
e-mail : sales@isocom.com.hk

## ISP281

### ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C, unless otherwise specified. Typical Values at T<sub>A</sub> = 25°C)

#### INPUT

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 20mA			1.4	V
Reverse Current	I <sub>R</sub>	V <sub>R</sub> = 4V			10	μA
Terminal Capacitance	C <sub>IN</sub>	V = 0V, f = 1KHz		30	250	pF

#### OUTPUT

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector-Emitter Breakdown Voltage	V <sub>CEO</sub>	I <sub>C</sub> = 0.1mA, I <sub>F</sub> = 0mA	80			V
Emitter-Collector Breakdown Voltage	V <sub>ECO</sub>	I <sub>E</sub> = 0.01mA, I <sub>F</sub> = 0mA	7			V
Collector Dark Current	I <sub>CEO</sub>	V <sub>CE</sub> = 20V, I <sub>F</sub> = 0mA			100	nA



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### ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C, unless otherwise specified. Typical Values at T<sub>A</sub> = 25°C)

#### COUPLED

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Current Transfer Ratio	CTR	I <sub>F</sub> = 5mA, V <sub>CE</sub> = 5V				%
		ISP281	50		600	
		ISP281A	80		160	
		ISP281B	130		260	
		ISP281C	200		400	
		ISP281D	300		600	
		ISP281E	100		200	
		ISP281GR	100		300	
ISP281GB	100		600			
Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	I <sub>F</sub> = 8mA, I <sub>C</sub> = 2.4mA			0.4	V
Floating Capacitance	C <sub>f</sub>	V = 0V, f = 1MHz		0.6	1	pF
Rise Time	t <sub>r</sub>	V <sub>CC</sub> = 10V, I <sub>C</sub> = 2mA, R <sub>L</sub> = 100Ω, f = 100Hz		2	18	μs
Fall Time	t <sub>f</sub>			3	18	
Turn-On Time	t <sub>ON</sub>			3		
Turn-Off Time	t <sub>OFF</sub>			3		
Storage Time	t <sub>s</sub>	V <sub>CC</sub> = 5V, I <sub>F</sub> = 16mA, R <sub>L</sub> = 1.9kΩ		25		
Turn-On Time	t <sub>ON</sub>			2		
Turn-Off Time	t <sub>OFF</sub>			40		

Any grade of the ISP281 will satisfy the base ISP281 specification.

Grade B will satisfy the ISP281GR specification

Grade B / C / D / E will satisfy the ISP281GB specification

#### ISOLATION

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Isolation Voltage	V <sub>ISO</sub>	R.H. = 40% to 60 %, t = 1 min	3750			V <sub>RMS</sub>
Input - Output Resistance	R <sub>I-O</sub>	V <sub>I-O</sub> = 500VDC, R.H. = 40% to 60 %	5 x 10 <sup>10</sup>	1 x 10 <sup>11</sup>		Ω

Device is considered a two terminal device : pins 1 and 2 are shorted together and pins 3 and 4 are shorted together.

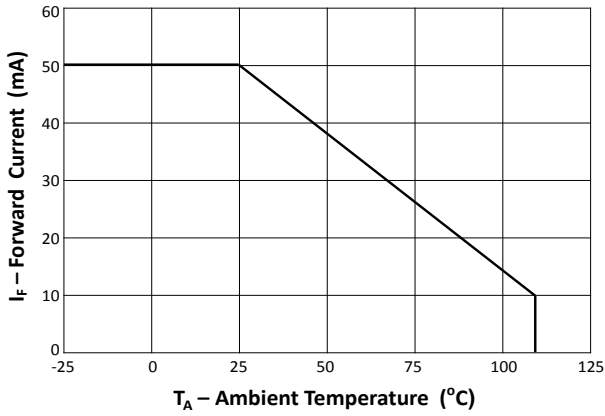


Fig 1 Forward Current vs Ambient Temperature

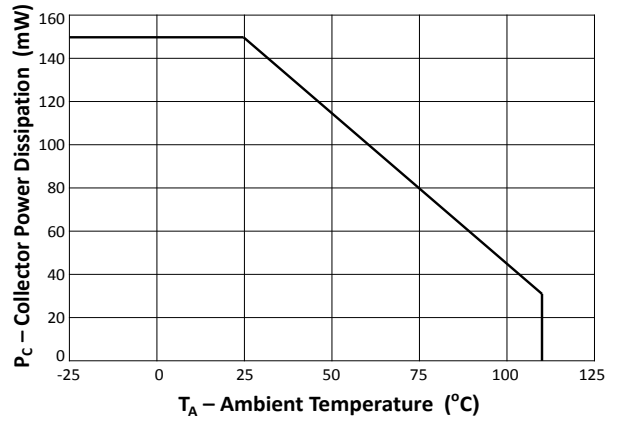


Fig 2 Collector Power vs Ambient Temperature

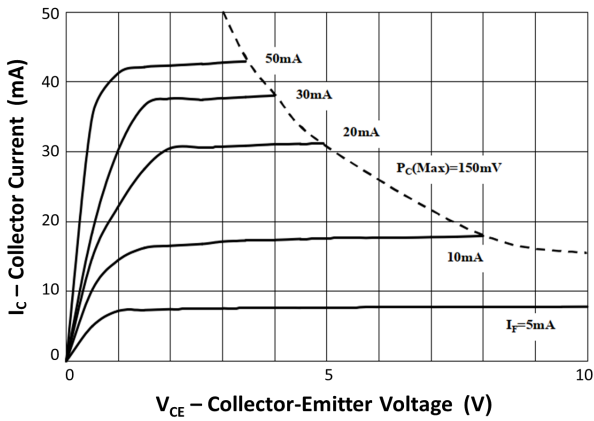


Fig 3 Collector Current vs Collector-Emitter Voltage (1)

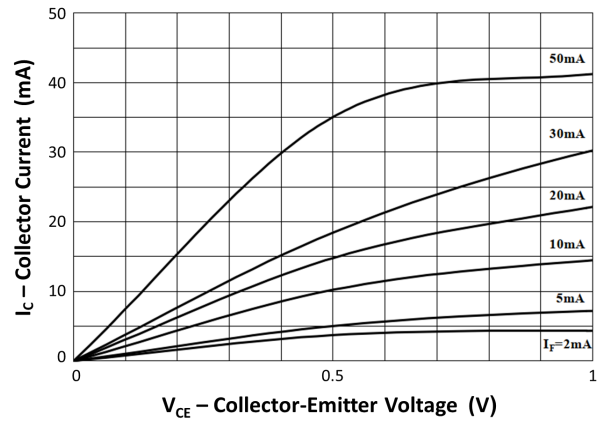


Fig 4 Collector Current vs Collector-Emitter Voltage (2)

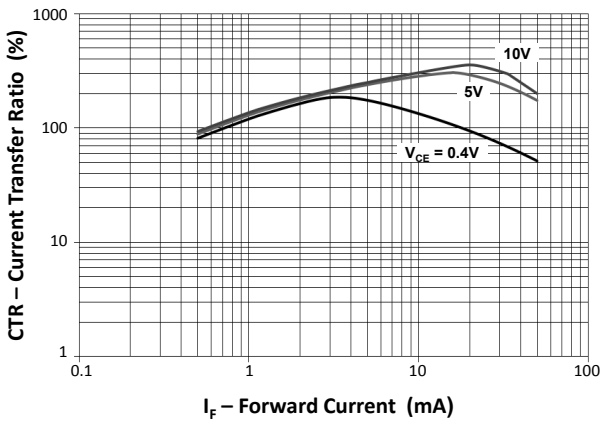


Fig 5 Current Transfer Ratio vs Forward Current

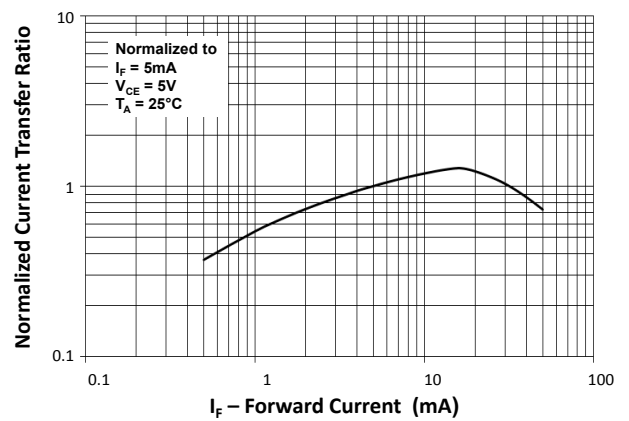


Fig 6 Normalized Current Transfer Ratio vs Forward Current

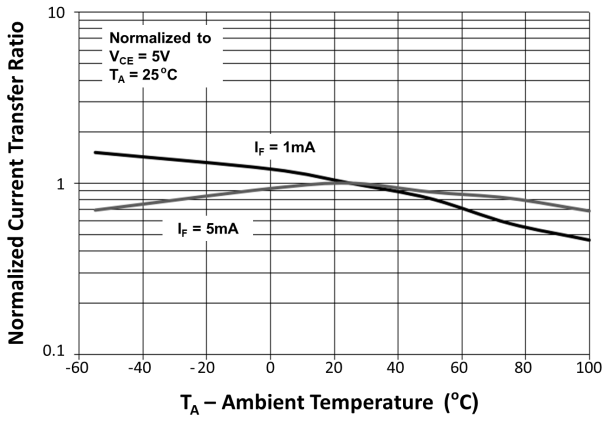


Fig 7 Normalized Current Transfer Ratio vs Ambient Temperature

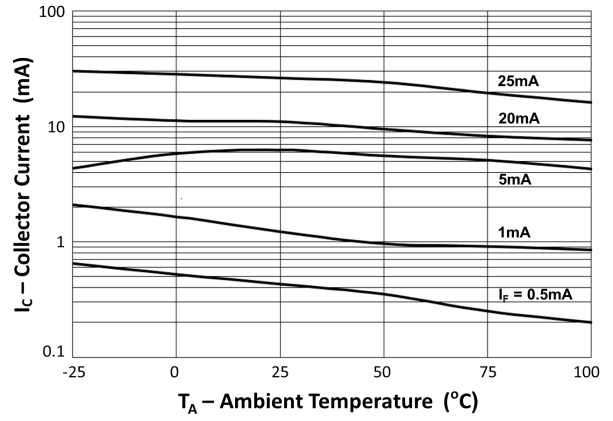


Fig 8 Collector Current vs Ambient Temperature

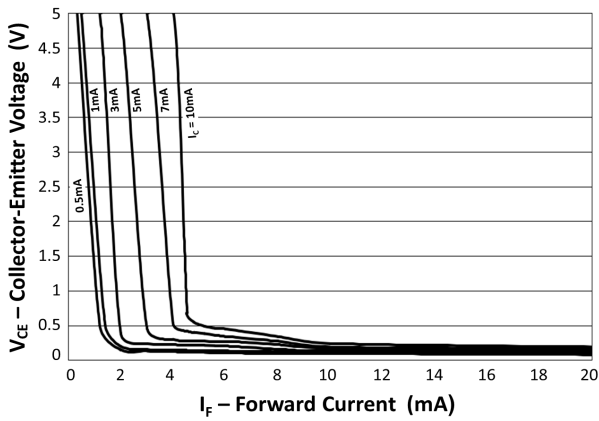


Fig 9 Collector-Emitter Voltage vs Forward Current

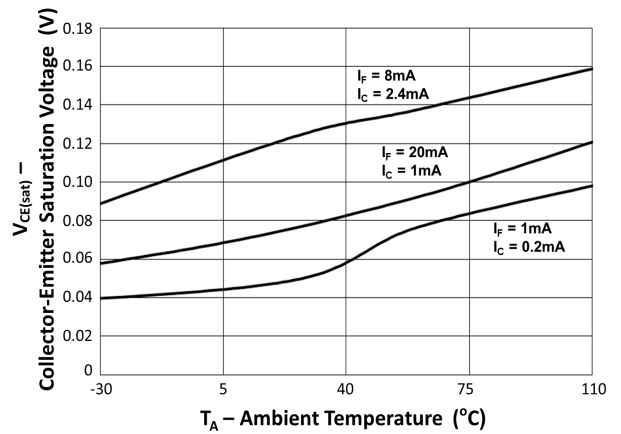


Fig 10 Collector-Emitter Saturation Voltage vs Ambient temperature

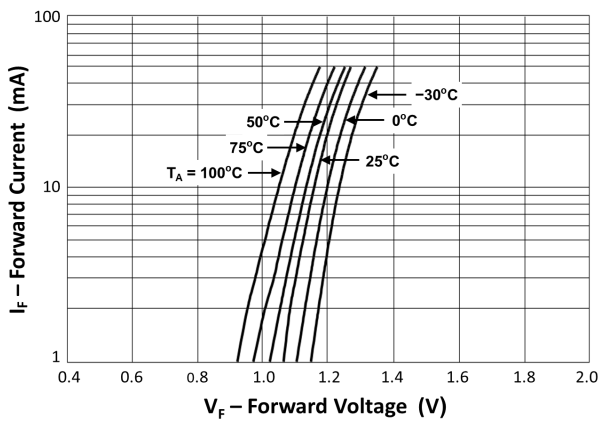


Fig 11 Forward Current vs Forward Voltage

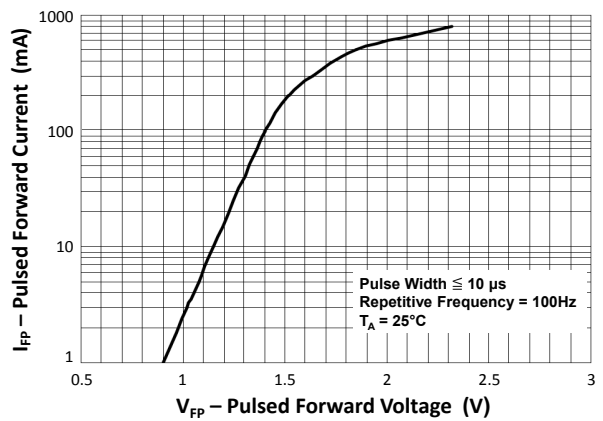


Fig 12 Pulsed Forward Current vs Pulsed Forward Voltage

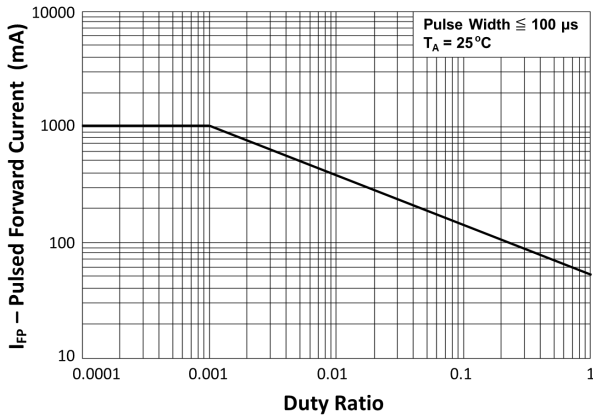


Fig 13 Pulsed Forward Current vs Duty Ratio

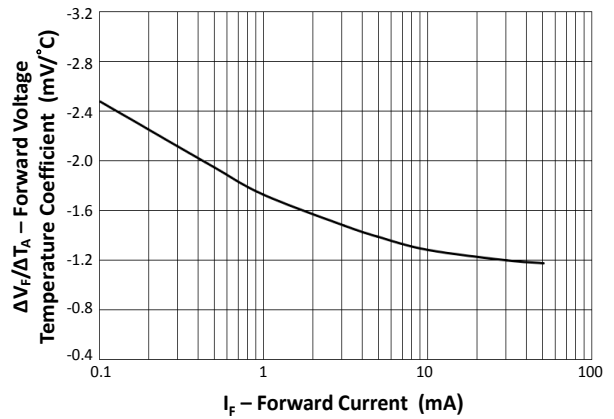


Fig 14 Forward Voltage Temperature Coefficient vs Forward Current

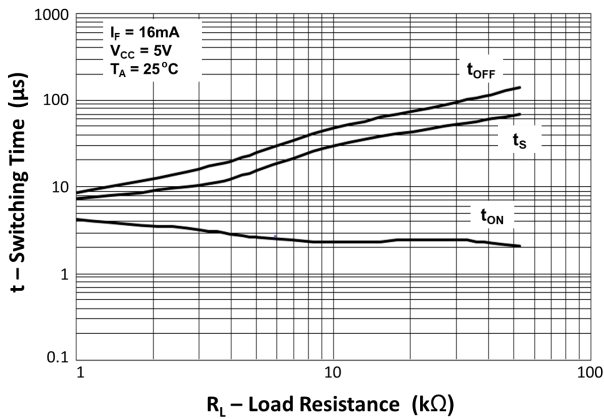


Fig 15 Switching Time vs Load Resistance

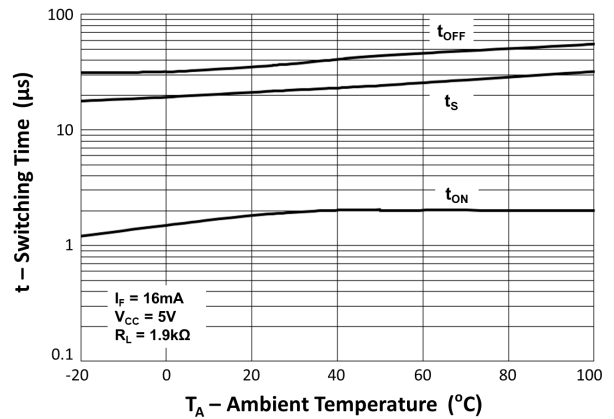


Fig 16 Switching Time vs Ambient temperature

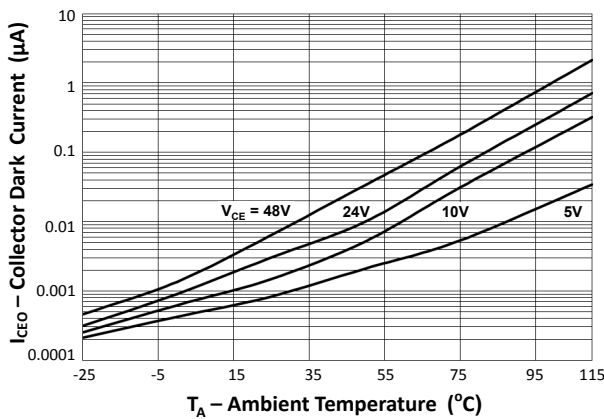


Fig 17 Collector Dark Current vs Ambient Temperature

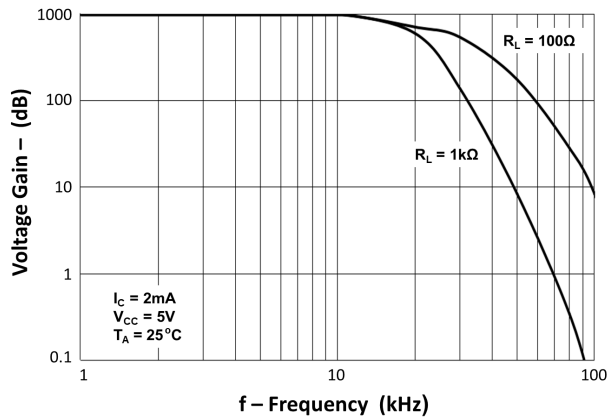
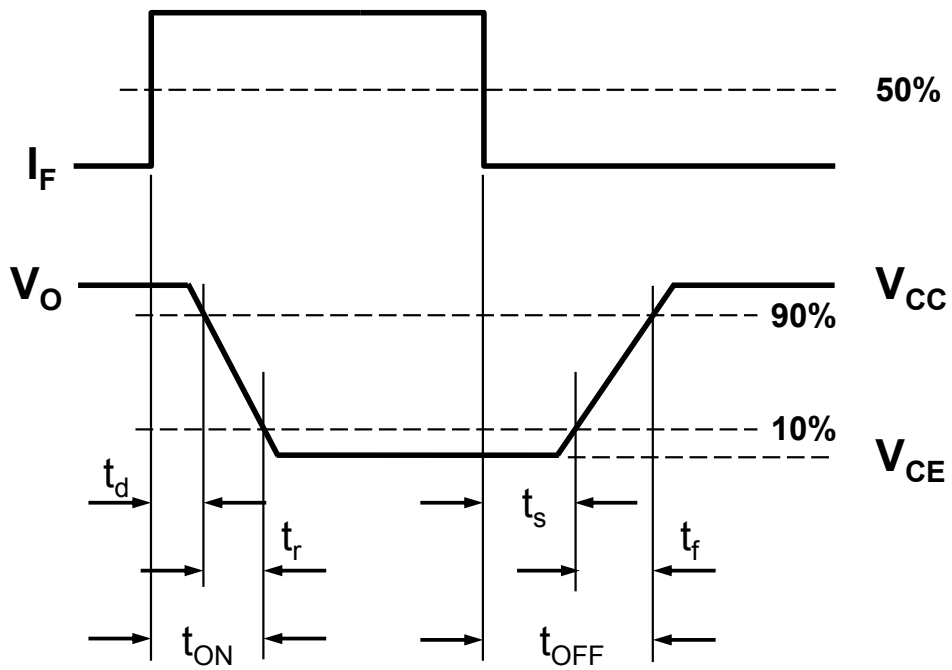
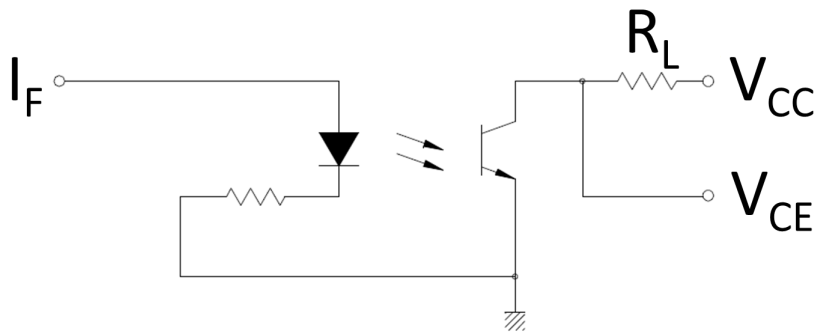


Fig 18 Frequency Response

# ISP281



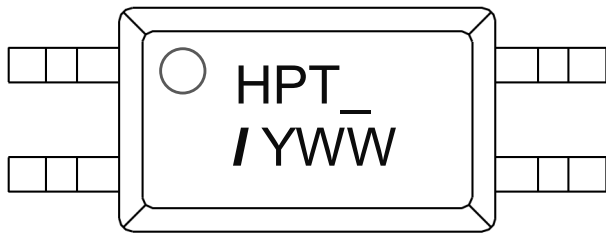
Switching Time Test Circuit and Waveform

## ISP281

### ORDER INFORMATION

ISP281			
After PN	PN	Description	Packing quantity
None	ISP281	Surface Mount Tape and Reel	3000 pcs per reel
Any CTR Grades	ISP281A, ISP281B, ISP281C ISP281D, ISP281E ISP281GR, ISP281GB	Surface Mount Tape and Reel	3000 pcs per reel
<b>NOTE : Multiple Grades may be supplied to meet the requested specification</b>			

### DEVICE MARKING

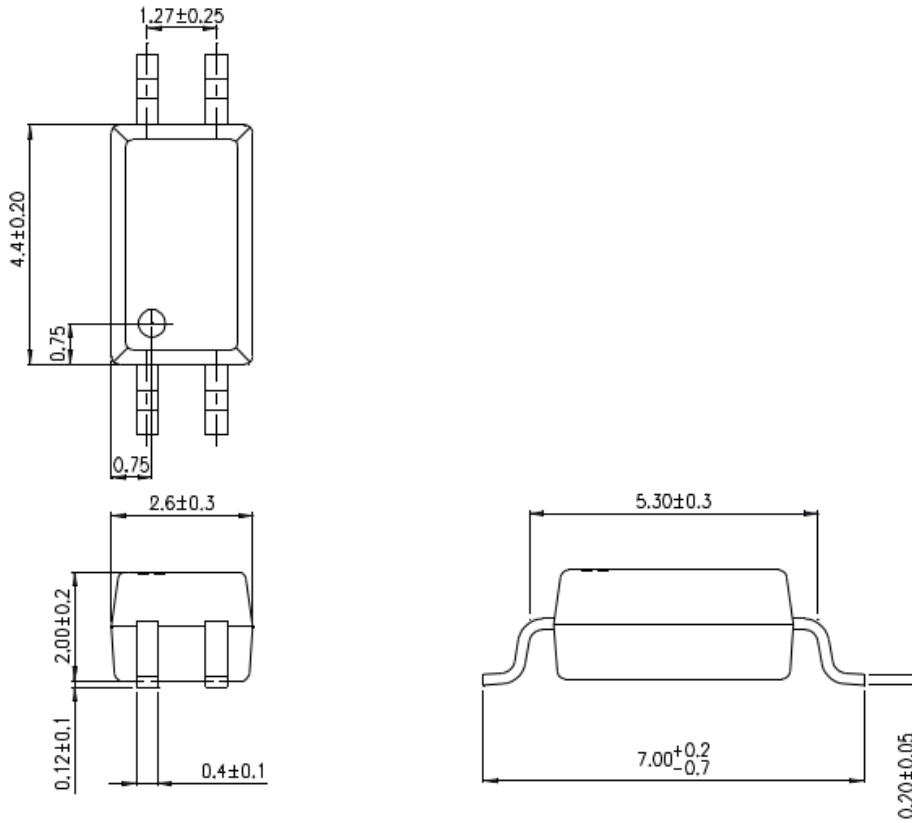


**HPT\_**      denotes Device Part Number where “\_” denotes CTR Grade  
**/**            denotes Isocom  
**Y**            denotes 1 digit Year code J = 2019, K = 2020 etc.  
**WW**        denotes 2 digit Week code

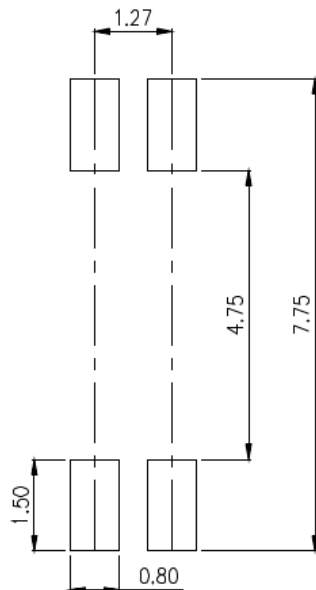


# ISP281

## PACKAGE DIMENSIONS in mm

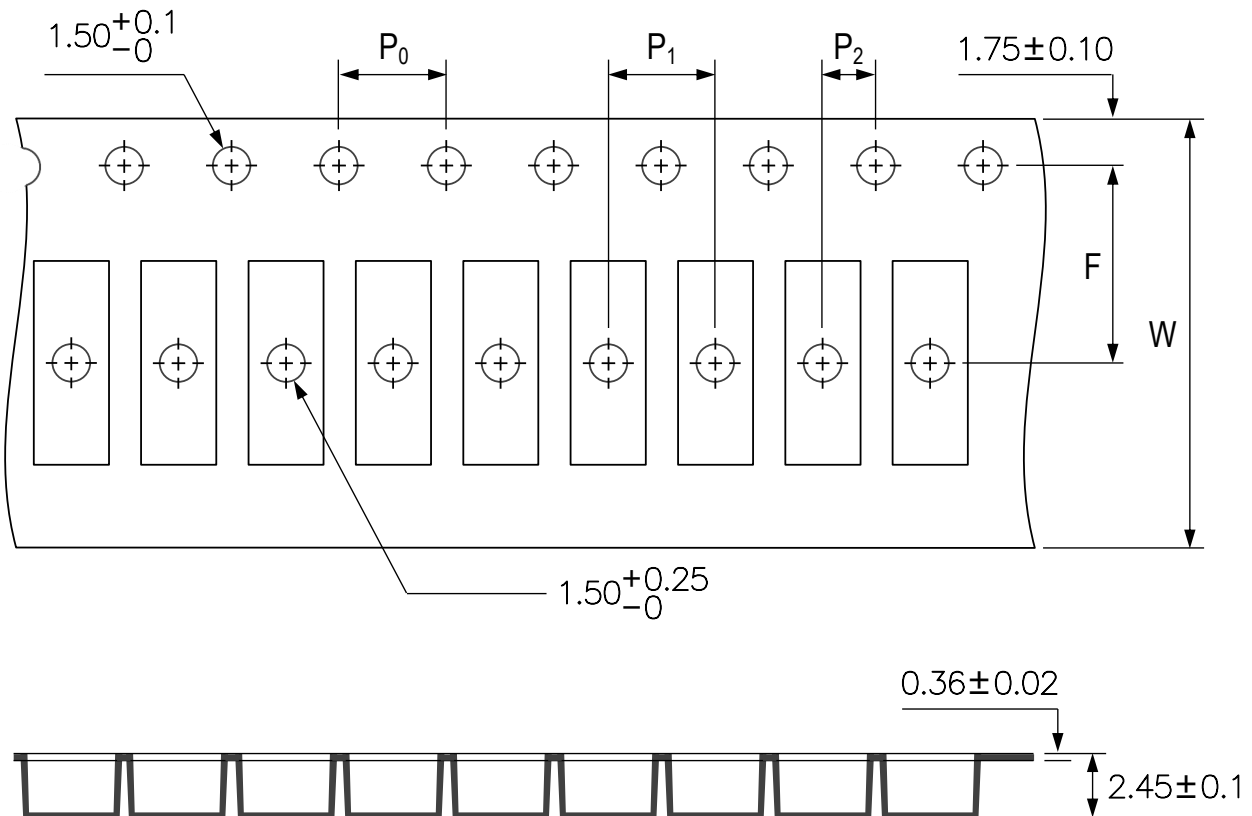


## RECOMMENDED PAD LAYOUT FOR SMD (mm)



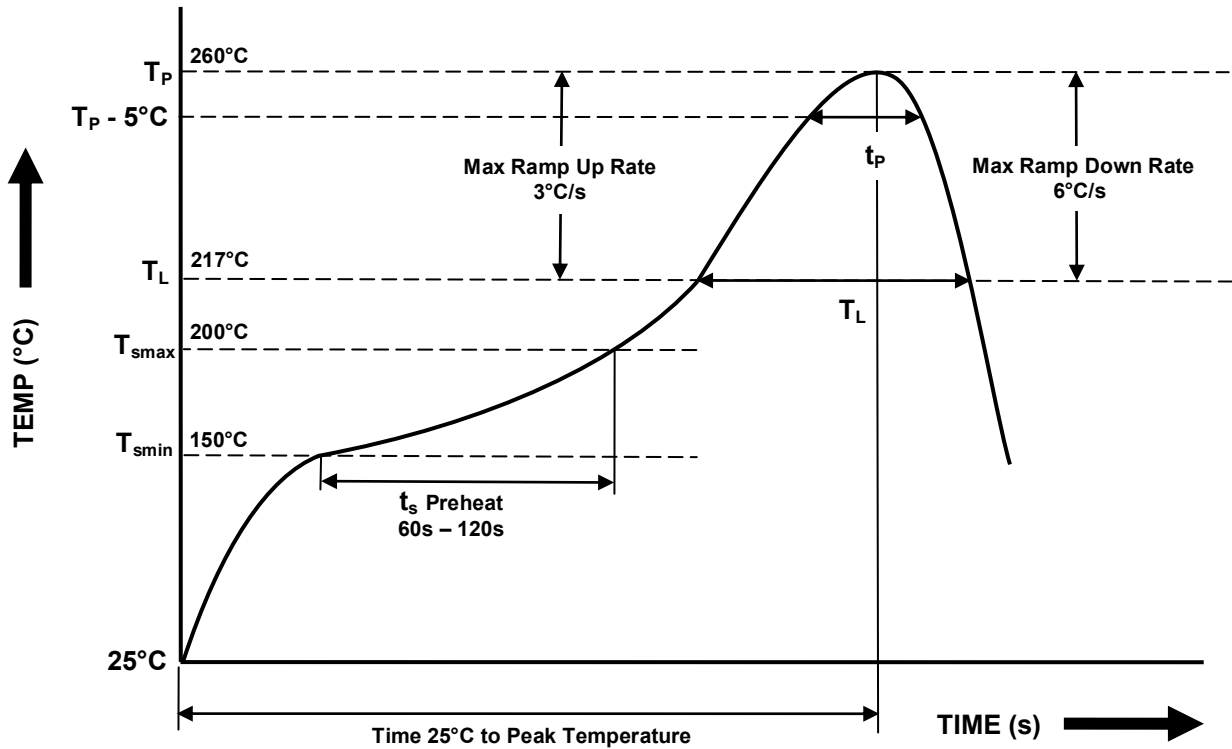
## ISP281

### TAPE AND REEL PACKAGING (mm)



Description	Symbol	Dimension mm (inch)
Tape Width	W	$16.00 \pm 0.30$ (0.63)
Pitch of Sprocket Holes	$P_0$	$4.00 \pm 0.10$ (0.16)
Distance of Compartment to Sprocket Holes	F	$7.50 \pm 0.10$ (0.30)
	$P_2$	$2.00 \pm 0.05$ (0.079)
Distance of Compartment to Compartment	$P_1$	$4.00 \pm 0.10$ (0.16)

**IR REFLOW SOLDERING TEMPERATURE PROFILE**  
**One Time Reflow Soldering is Recommended.**  
**Do not immerse device body in solder paste.**



Profile Details	Conditions
<b>Preheat</b> - 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
<b>Soldering Zone</b> - Peak Temperature (T <sub>P</sub> ) - Time at Peak Temperature - Liquidous Temperature (T <sub>L</sub> ) - Time within 5°C of Actual Peak Temperature (T <sub>P</sub> – 5°C) - Time maintained above T <sub>L</sub> (t <sub>L</sub> ) - Ramp Up Rate (T <sub>L</sub> to T <sub>P</sub> ) - Ramp Down Rate (T <sub>P</sub> to T <sub>L</sub> )	260°C 10s max 217°C 30s max 60s - 100s 3°C/s max 6°C/s max
Average Ramp Up Rate (T <sub>smax</sub> to T <sub>P</sub> )	3°C/s max
Time 25°C to Peak Temperature	8 minutes max



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