



# THE DATASHEET OF ISP817DXSM



## ISP817, ISP827, ISP847



### DESCRIPTION

The ISP817, ISP827 and ISP847 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  
-55°C to +110°C ISP817  
-30°C to +100°C ISP827 / ISP847
- Lead Free and RoHS Compliant
- UL File E91231 Package Code "EE"
- VDE Approval Certificate No. 40028086

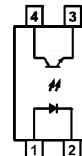
### APPLICATIONS

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

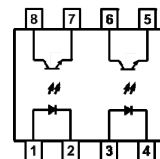
### ORDER INFORMATION

- 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 ISP817SM and ISP827SM)
- Consult Factory for Tape and Reel version of ISP847SM

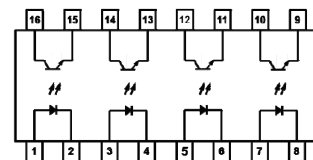
ISP817



ISP827



ISP847



### 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
Peak Forward Current	1A
Pulse 100µs, Frequency 100Hz	
Reverse Voltage	6V
Power dissipation	70mW

#### Output

Collector to Emitter Voltage V <sub>CEO</sub>	ISP817	80V
	ISP827 / ISP847	35V
Emitter to Collector Voltage V <sub>ECO</sub>		6V
Collector Current		50mA
Power Dissipation		150mW

#### Total Package

Isolation Voltage		5300V <sub>RMS</sub>
Total Power Dissipation		200mW
Operating Temperature	ISP817	-55 to 110 °C
	ISP827 / ISP847	-30 to 100 °C
Storage Temperature		-55 to 125 °C
Lead Soldering Temperature (10s)		260°C

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## ISP817, ISP827, ISP847

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

#### INPUT

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Forward Voltage	$V_F$	$I_F = 20\text{mA}$		1.2	1.4	V
Reverse Leakage	$I_R$	$V_R = 4\text{V}$			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	$BV_{CEO}$	$I_C = 0.1\text{mA}, I_F = 0\text{mA}$				V
		ISP817	80			
		ISP827 / ISP847	35			
Emitter–Collector Breakdown Voltage	$BV_{ECO}$	$I_E = 10\mu\text{A}, I_F = 0\text{mA}$	6			V
Collector–Emitter Dark Current	$I_{CEO}$	$V_{CE} = 20\text{V}, I_F = 0\text{mA}$			100	nA



**ISP817, ISP827, ISP847**

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

**COUPLED**

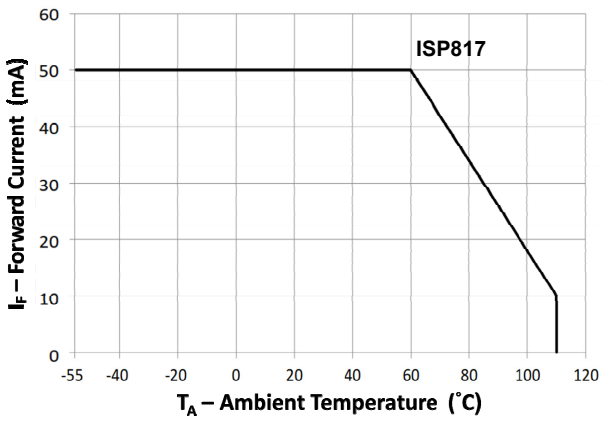
Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Current Transfer Ratio	CTR	$I_F = 5\text{mA}, V_{CE} = 5\text{V}$	50		600	%
		Optional CTR Grades				
		GB	100		600	
		BL	200		600	
		A	80		160	
		B	130		260	
		C	200		400	
D	300		600			
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	$I_F = 20\text{mA}, I_C = 1\text{mA}$		0.1	0.2	V
Floating Capacitance	$C_f$	$V = 0\text{V}, f = 1\text{MHz}$		0.6	1	pF
Cut-Off Frequency	$f_c$	$V_{CE} = 5\text{V}, I_C = 2\text{mA}, R_L = 100\Omega, -3\text{dB}$		80		kHz
Output Rise Time	$t_r$	$V_{CE} = 2\text{V}, I_C = 2\text{mA}, R_L = 100\Omega$		4	18	$\mu\text{s}$
Output Fall Time	$t_f$			3	18	

**ISOLATION**

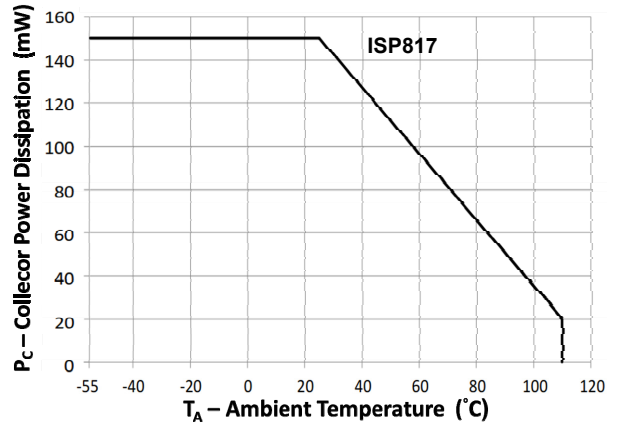
Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Input to Output Isolation Voltage	$V_{ISO}$	AC 1 minute, RH = 40% to 60% Note 1	5300			$V_{RMS}$
Input to Output Isolation Resistance	$R_{ISO}$	$V_{IO} = 500\text{V}, \text{RH} = 40\% \text{ to } 60\%$ Note 1	$5 \times 10^{10}$	$1 \times 10^{11}$		$\Omega$

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

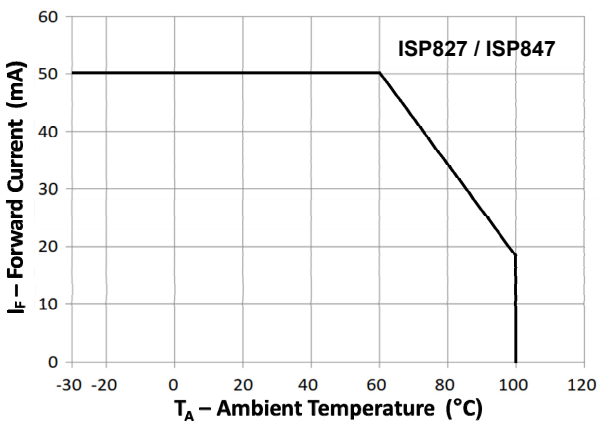
## ISP817, ISP827, ISP847



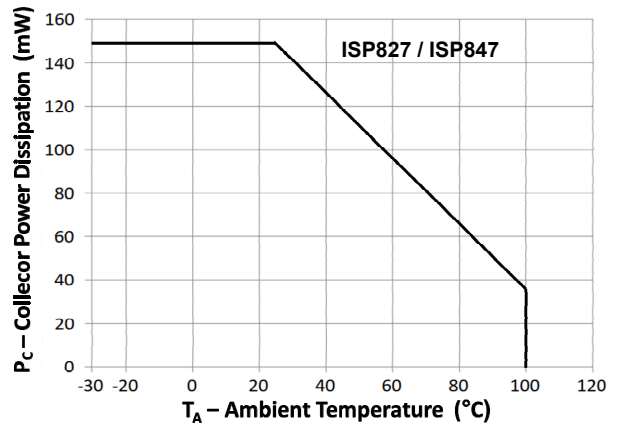
**Fig 1 Forward Current vs Ambient Temperature (1)**



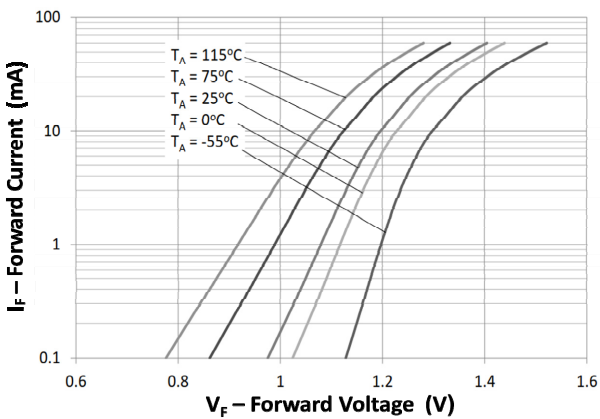
**Fig 2 Collector Power Dissipation vs Ambient Temperature (1)**



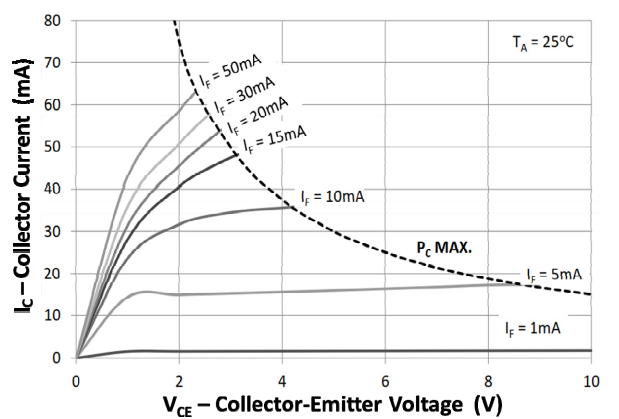
**Fig 3 Forward Current vs Ambient Temperature (2)**



**Fig 4 Collector Power Dissipation vs Ambient Temperature (2)**



**Fig 5 Forward Current vs Forward Voltage**



**Fig 6 Collector Current vs Collector-Emitter Voltage**

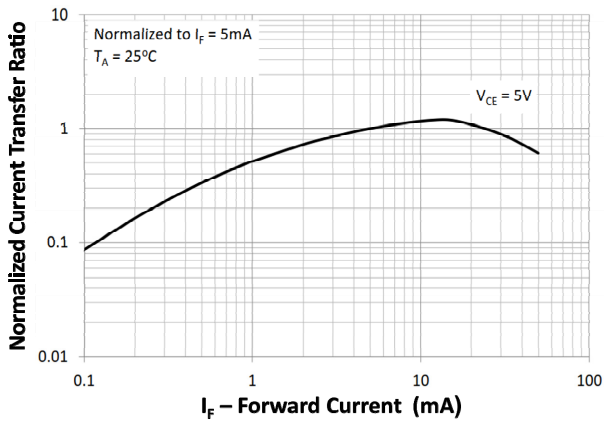


Fig 7 Normalized Current Transfer Ratio vs Forward Current

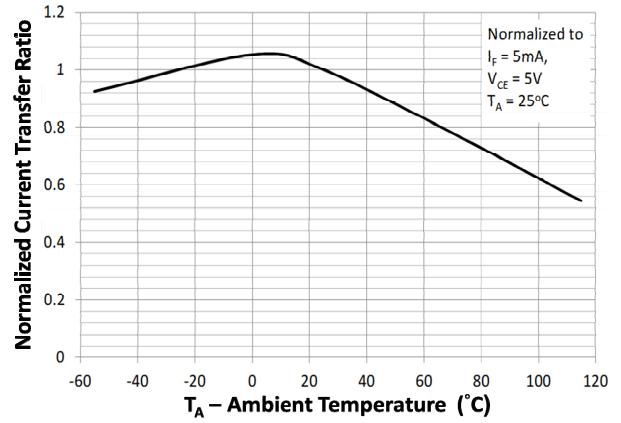


Fig 8 Normalized Current Transfer Ratio vs Ambient Temperature

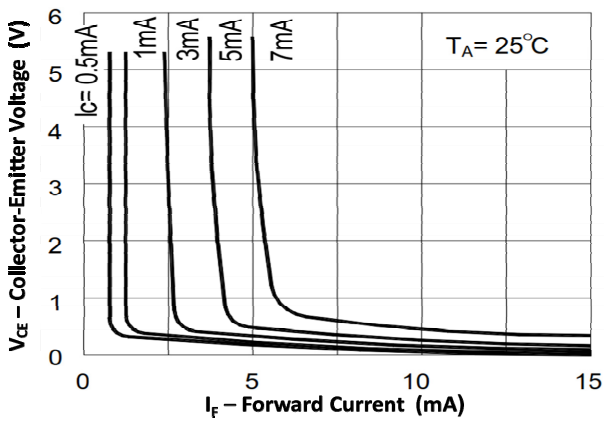


Fig 9 Collector-Emitter Voltage vs Forward Current

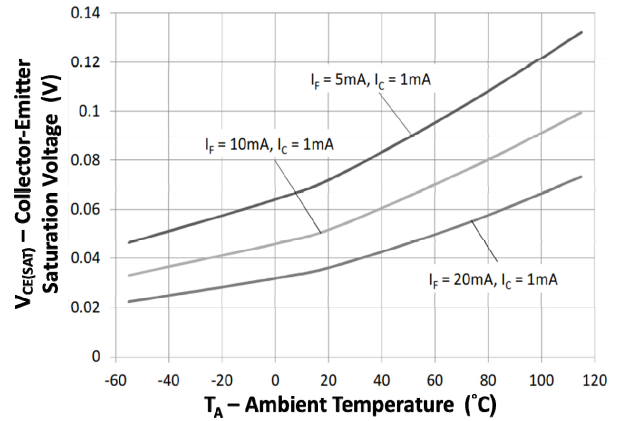


Fig 10 Collector-Emitter Saturation Voltage vs Ambient Temperature

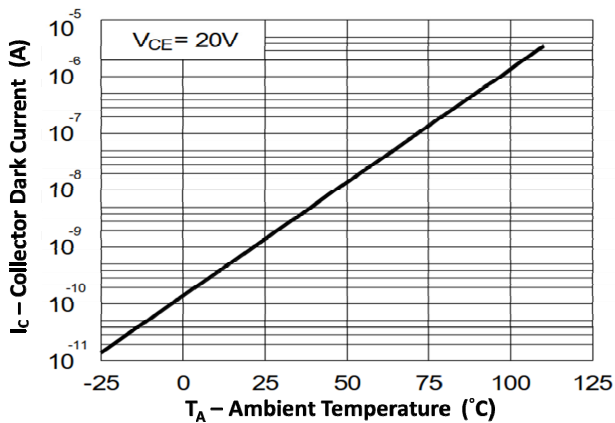


Fig 11 Collector Dark Current vs Ambient Temperature

ISP817, ISP827, ISP847

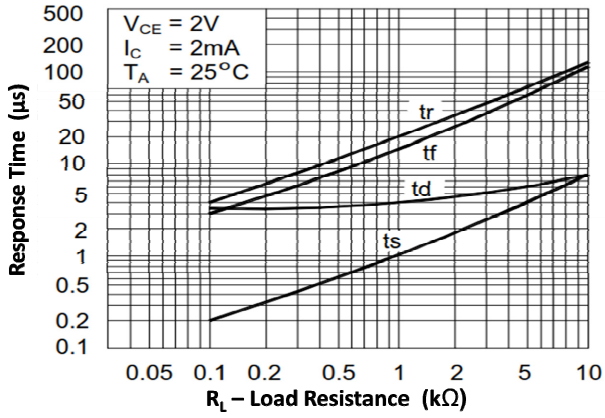
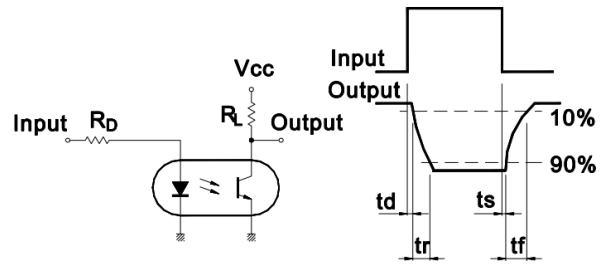


Fig 12 Response Time vs Load Resistance



Response Time Test Circuit

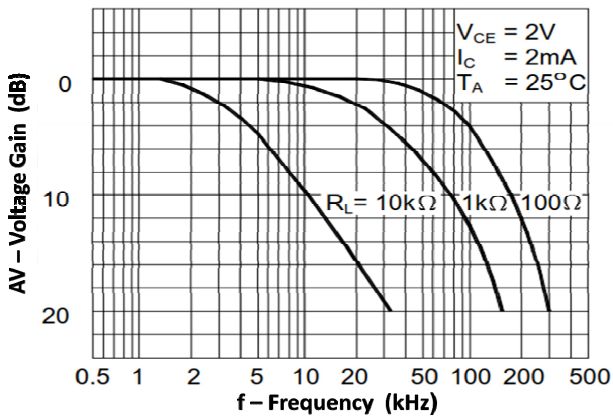
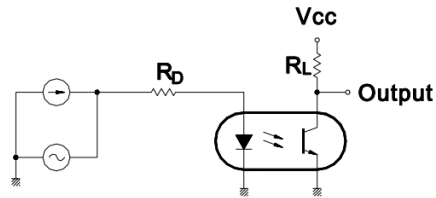


Fig 13 Frequency Response



Frequency Response Test Circuit



**ISP817, ISP827, ISP847**

**ORDER INFORMATION**

<b>ISP817 (UL Approval)</b>			
<b>After PN</b>	<b>PN</b>	<b>Description</b>	<b>Packing quantity</b>
None	ISP817, ISP817GB, ISP817BL, ISP817A, ISP817B, ISP817C, ISP817D	Standard DIP4	100 pcs per tube
G	ISP817G, ISP817GBG, ISP817BLG, ISP817AG, ISP817BG, ISP817CG, ISP817DG	10mm Lead Spacing	100 pcs per tube
SM	ISP817SM, ISP817GBSM, ISP817BLSM, ISP817ASM, ISP817BSM, ISP817CSM, ISP817DSM	Surface Mount	100 pcs per tube
SMT&R	ISP817SMT&R, ISP817GBSMT&R, ISP817BLSMT&R, ISP817ASMT&R, ISP817BSMT&R, ISP817CSMT&R, ISP817DSMT&R	Surface Mount Tape & Reel	1000 pcs per reel

<b>ISP827 (UL Approval)</b>			
<b>After PN</b>	<b>PN</b>	<b>Description</b>	<b>Packing quantity</b>
None	ISP827, ISP827GB, ISP827BL, ISP827A, ISP827B, ISP827C, ISP827D	Standard DIP8	50 pcs per tube
G	ISP827G, ISP827GBG, ISP827BLG, ISP827AG, ISP827BG, ISP827CG, ISP827DG	10mm Lead Spacing	50 pcs per tube
SM	ISP827SM, ISP827GBSM, ISP827BLSM, ISP827ASM, ISP827BSM, ISP827CSM, ISP827DSM	Surface Mount	50 pcs per tube
SMT&R	ISP827SMT&R, ISP827GBSMT&R, ISP827BLSMT&R, ISP827ASMT&R, ISP827BSMT&R, ISP827CSMT&R, ISP827DSMT&R	Surface Mount Tape & Reel	1000 pcs per reel

<b>ISP847 (UL Approval)</b>			
<b>After PN</b>	<b>PN</b>	<b>Description</b>	<b>Packing quantity</b>
None	ISP847, ISP847GB, ISP847BL, ISP847A, ISP847B, ISP847C, ISP847D	Standard DIP16	25 pcs per tube
G	ISP847G, ISP847GBG, ISP847BLG, ISP847AG, ISP847BG, ISP847CG, ISP847DG	10mm Lead Spacing	25 pcs per tube
SM	ISP847SM, ISP847GBSM, ISP847BLSM, ISP847ASM, ISP847BSM, ISP847CSM, ISP847DSM	Surface Mount	25 pcs per tube



**ISP817, ISP827, ISP847**

**ORDER INFORMATION**

<b>ISP817X (UL and VDE Approvals)</b>			
<b>After PN</b>	<b>PN</b>	<b>Description</b>	<b>Packing quantity</b>
None	ISP817X, ISP817XGB, ISP817XBL, ISP817XA, ISP817XB, ISP817XC, ISP817XD	Standard DIP4	100 pcs per tube
G	ISP817XG, ISP817XGBG, ISP817XBLG, ISP817XAG, ISP817XBG, ISP817XCG, ISP817XDG	10mm Lead Spacing	100 pcs per tube
SM	ISP817XSM, ISP817XGBSM, ISP817XBLSM, ISP817XASM, ISP817XBXSM, ISP817XCSM, ISP817XDMSM	Surface Mount	100 pcs per tube
SMT&R	ISP817XSMT&R, ISP817XGBSMT&R, ISP817XBLSMT&R, ISP817XASMT&R, ISP817XBSMT&R, ISP817XCSMT&R, ISP817XDSMT&R	Surface Mount Tape & Reel	1000 pcs per reel

<b>ISP827X (UL and VDE Approvals)</b>			
<b>After PN</b>	<b>PN</b>	<b>Description</b>	<b>Packing quantity</b>
None	ISP827X, ISP827XGB, ISP827XBL, ISP827XA, ISP827XB, ISP827XC, ISP827XD	Standard DIP8	50 pcs per tube
G	ISP827XG, ISP827XGBG, ISP827XBLG, ISP827XAG, ISP827XBG, ISP827XCG, ISP827XDG	10mm Lead Spacing	50 pcs per tube
SM	ISP827XSM, ISP827XGBSM, ISP827XBLSM, ISP827XASM, ISP827XBBSM, ISP827XCSM, ISP827XDMSM	Surface Mount	50 pcs per tube
SMT&R	ISP827XSMT&R, ISP827XGBSMT&R, ISP827XBLSMT&R, ISP827XASMT&R, ISP827XBSMT&R, ISP827XCSMT&R, ISP827XDSMT&R	Surface Mount Tape & Reel	1000 pcs per reel

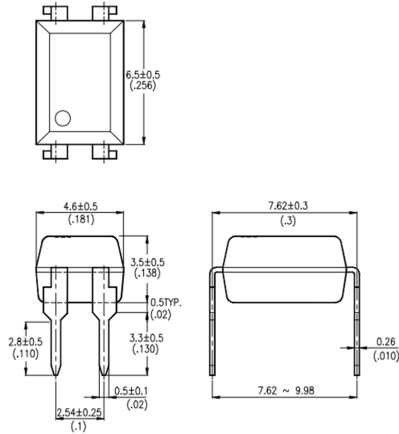
<b>ISP847 (UL and VDE Approvals)</b>			
<b>After PN</b>	<b>PN</b>	<b>Description</b>	<b>Packing quantity</b>
None	ISP847X, ISP847XGBL, ISP847XBL, ISP847XA, ISP847XB, ISP847XC, ISP847XD	Standard DIP16	25 pcs per tube
G	ISP847XG, ISP847XGBG, ISP847XBLG, ISP847XAG, ISP847XBG, ISP847XCG, ISP847XDG	10mm Lead Spacing	25 pcs per tube
SM	ISP847XSM, ISP847XGBSM, ISP847XBLSM, ISP847XASM, ISP847XBBSM, ISP847XCSM, ISP847XDMSM	Surface Mount	25 pcs per tube

# ISP817, ISP827, ISP847

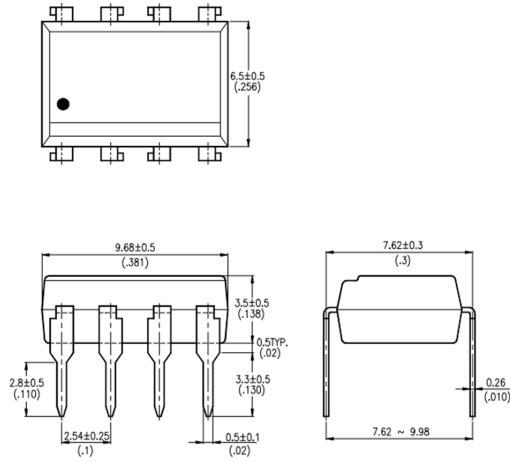
## PACKAGE DIMENSIONS in mm (inch)

### DIP

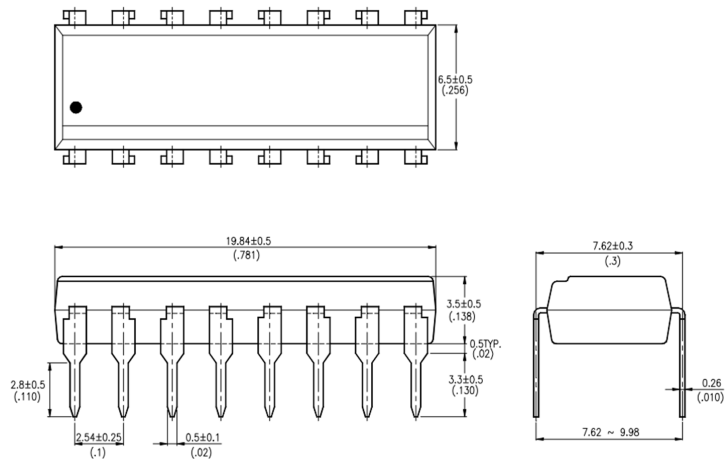
#### ISP817



#### ISP827



#### ISP847

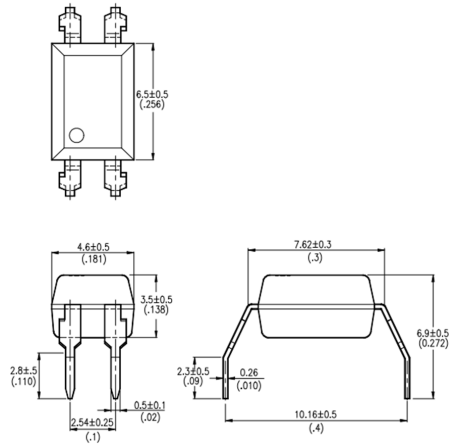


# ISP817, ISP827, ISP847

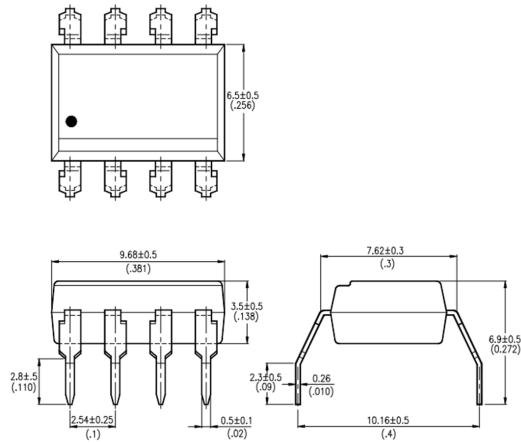
## PACKAGE DIMENSIONS in mm (inch)

### G Form

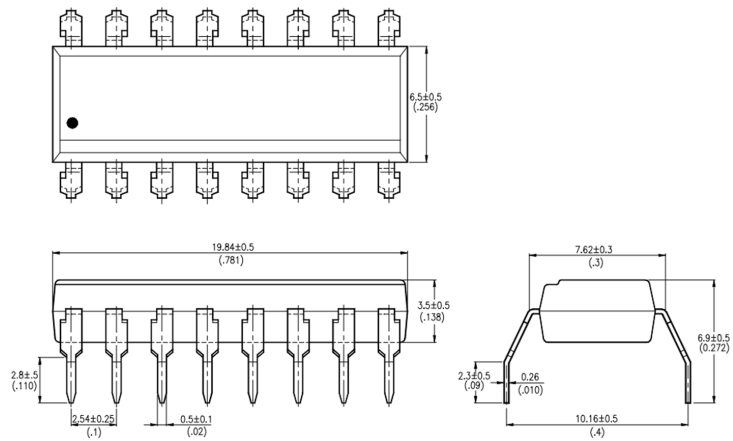
#### ISP817



#### ISP827



#### ISP847

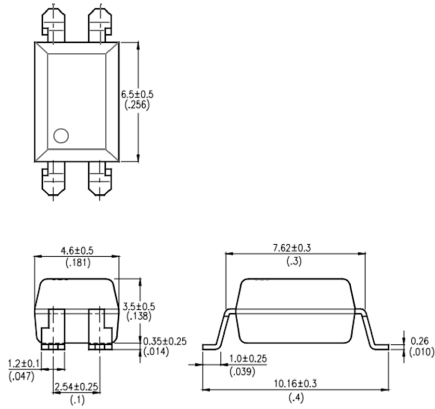


## ISP817, ISP827, ISP847

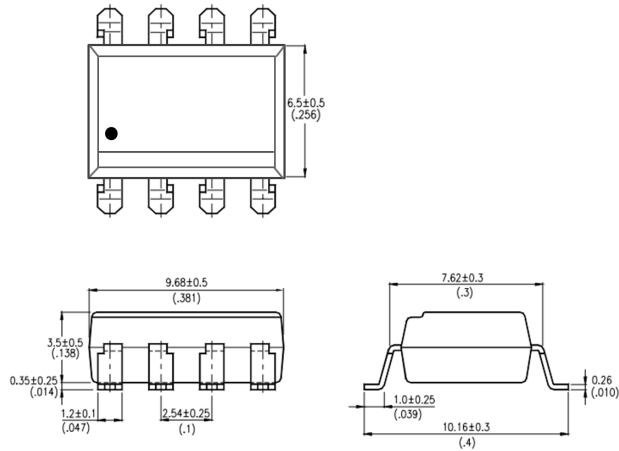
### PACKAGE DIMENSIONS in mm (inch)

#### SMD

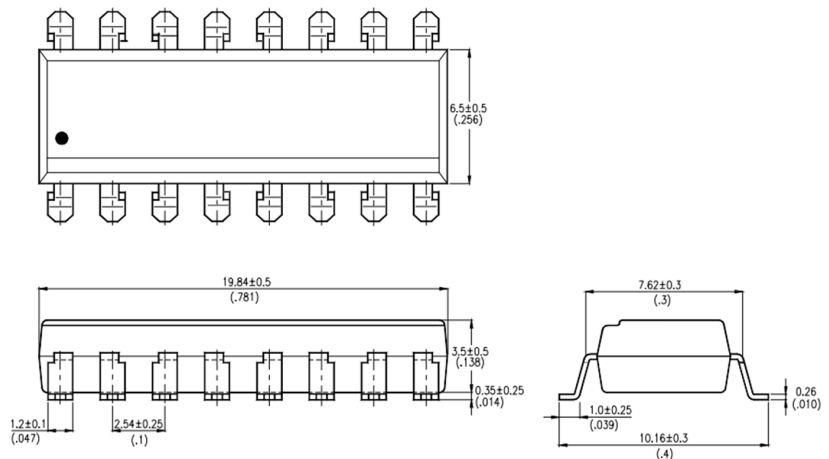
**ISP817**



**ISP827**



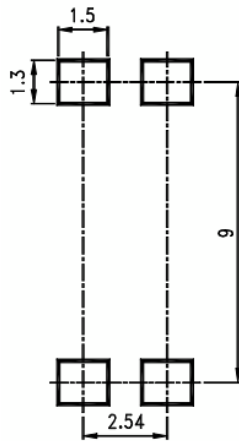
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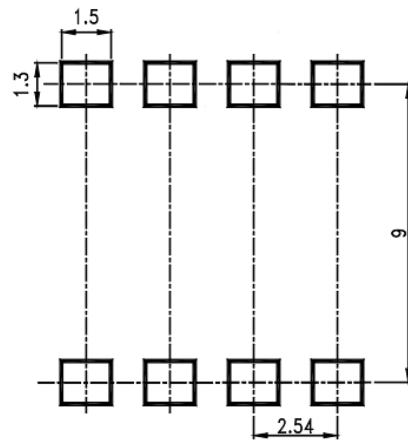
**ISP817, ISP827, ISP847**

**RECOMMENDED PAD LAYOUT FOR SMD (mm)**

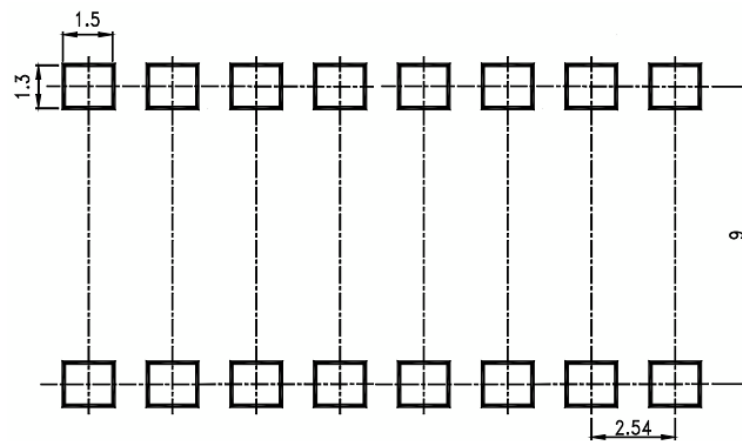
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**ISP827SM**



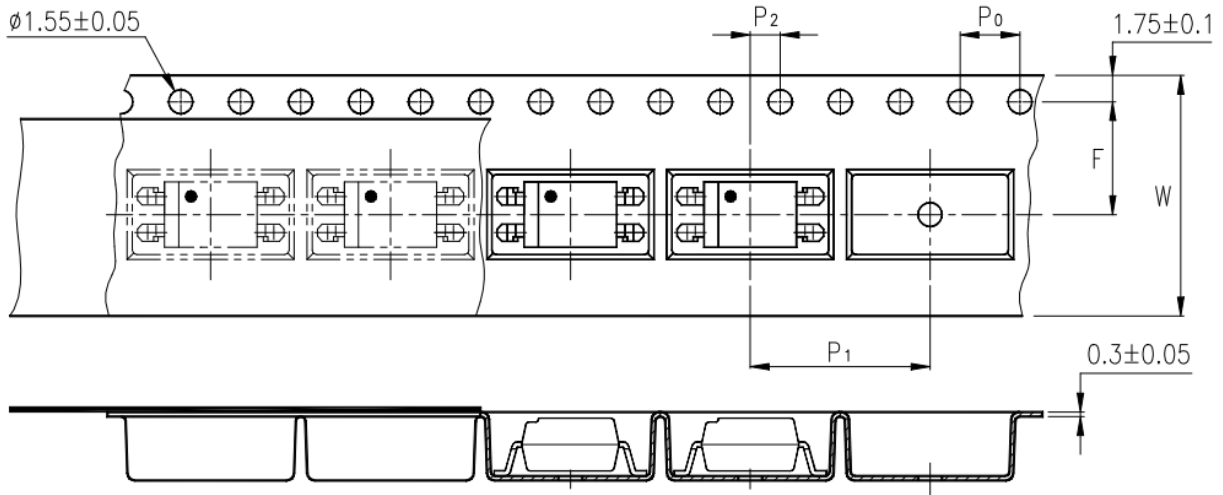
**ISP847SM**



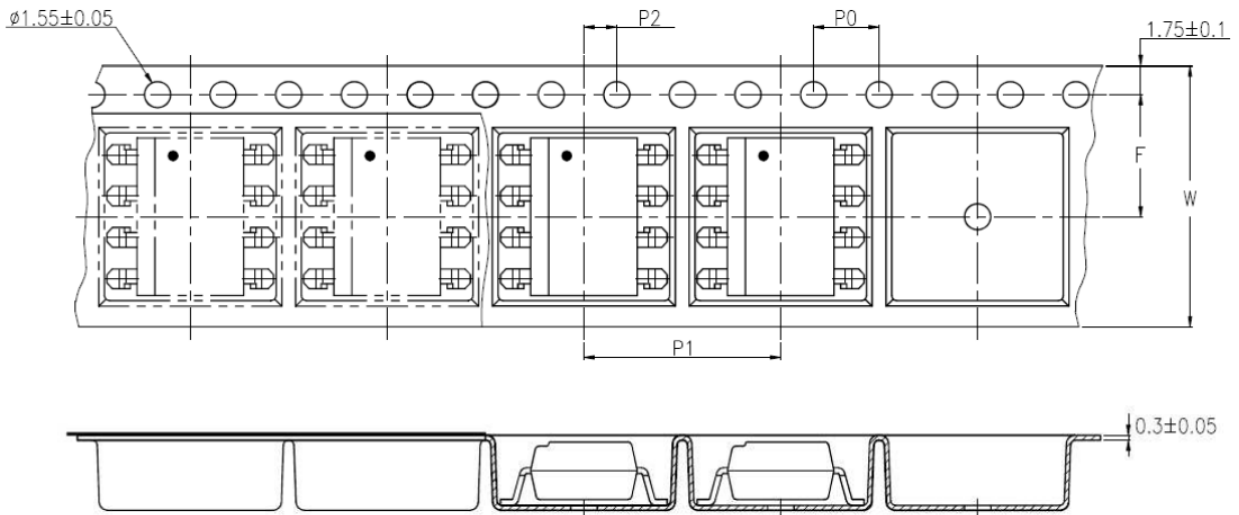
## ISP817, ISP827, ISP847

### TAPE AND REEL PACKAGING

#### ISP817SMT&R

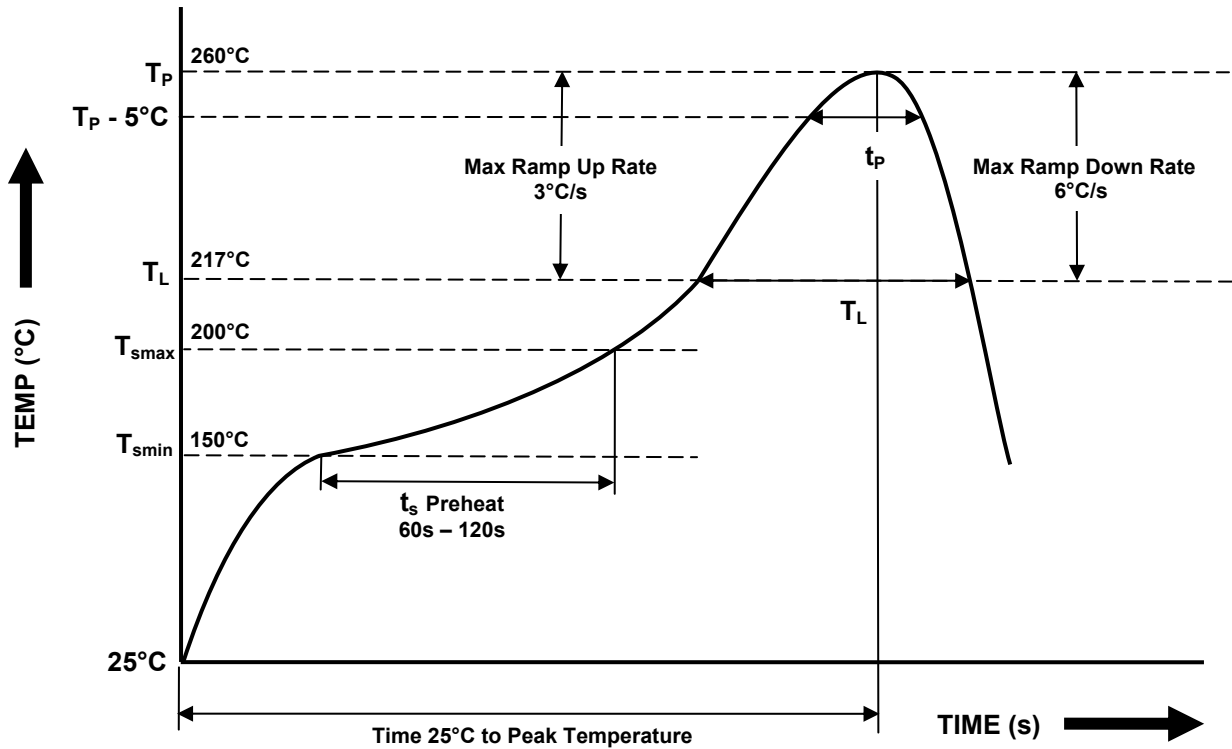


#### ISP827SMT&R



Description	Symbol	Dimension mm (inch)
Tape Width	W	$16 \pm 0.3$ (0.63)
Pitch of Sprocket Holes	$P_0$	$4 \pm 0.1$ (0.15)
Distance of Compartment to Sprocket Holes	F	$7.5 \pm 0.1$ (0.295)
	$P_2$	$2 \pm 0.1$ (0.079)
Distance of Compartment to Compartment	$P_1$	$12 \pm 0.1$ (0.472)

**IR REFLOW SOLDERING TEMPERATURE PROFILE FOR SMD**  
**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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