



## 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 5000V<sub>RMS</sub>
- CTR Selections Available
- Wide Operating Temperature Range  
-55°C to +110°C ISP817  
-40°C to +105°C ISP827 / ISP847
- RoHS Compliant
- UL File E91231 Package Code "EE"
- VDE Approval Certificate No. 40028086

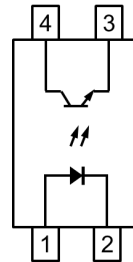
### APPLICATIONS

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

### ORDER INFORMATION

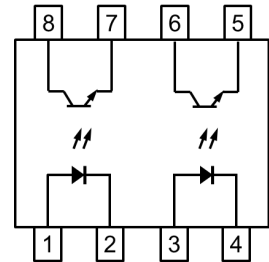
- Add X after PN for VDE Approval
- Add G after PN for 10mm lead spacing
- Add SM after PN for Surface Mount
- Add SMT&R after PN for Surface Mount Tape & Reel  
(Available for ISP817SM and ISP827SM)
- Consult Factory for Tape and Reel version of ISP847SM

#### ISP817



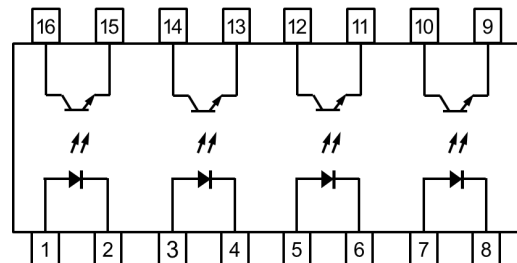
- 1 Anode
- 2 Cathode
- 3 Emitter
- 4 Collector

#### ISP827



- 1, 3 Anode
- 2, 4 Cathode
- 5, 7 Emitter
- 6, 8 Collector

#### ISP847



- 1, 3, 5, 7 Anode
- 2, 4, 6, 8 Cathode
- 9, 11, 13, 15 Emitter
- 10, 12, 14, 16 Collector

#### 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

## ISP817, ISP827, ISP847

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

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 (100 $\mu$ s, 100Hz)	1A
Reverse Voltage	6V
Power dissipation	70mW
Junction Temperature	125 °C

#### Output

Collector to Emitter Voltage $V_{CE0}$	
	ISP817 80V
	ISP827 / ISP847 35V
Emitter to Collector Voltage $V_{ECO}$	6V
Collector Current	50mA
Power Dissipation	150mW
Junction Temperature	125 °C

#### Total Package

Isolation Voltage	5000V <sub>RMS</sub>
Total Power Dissipation	200mW
Operating Temperature	ISP817 -55 to 110 °C
	ISP827 / ISP847 -40 to 105 °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	
		GR	100		300	
		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	$f_c$	$V_{CE} = 5\text{V}, I_C = 2\text{mA}$ $R_L = 100\Omega$ -3dB		80		kHz
Output Rise Time	$t_r$	$V_{CC} = 5\text{V}$ $I_C = 2\text{mA}$ $R_L = 100\Omega$		4	18	$\mu\text{s}$
Output Fall Time	$t_f$			3	18	

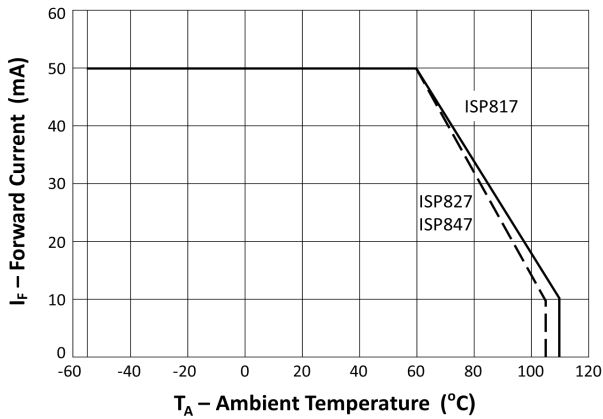
#### ISOLATION

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Input to Output Isolation Voltage	$V_{ISO}$	AC 1 minute, RH = 40% to 60%	5000			$V_{RMS}$
Input to Output Isolation Resistance	$R_{ISO}$	$V_{IO} = 500\text{VDC}$ RH = 40% to 60%	$5 \times 10^{10}$	$1 \times 10^{11}$		$\Omega$

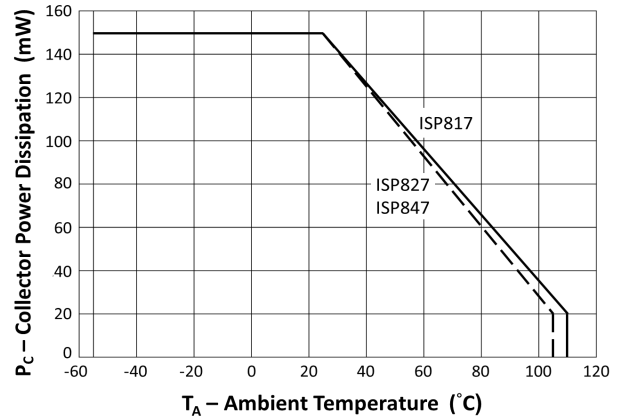
Measure with input leads shorted together and output leads shorted together.



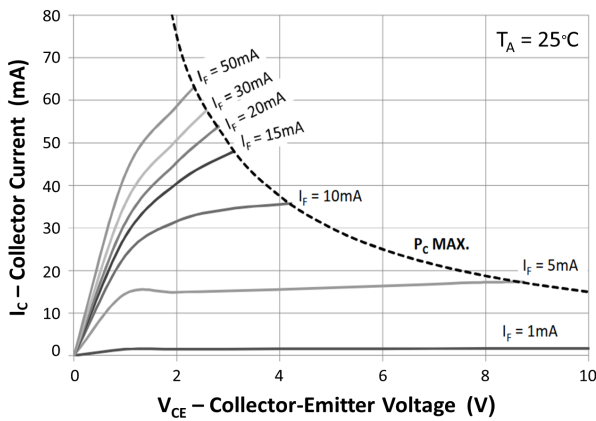
**ISP817, ISP827, ISP847**



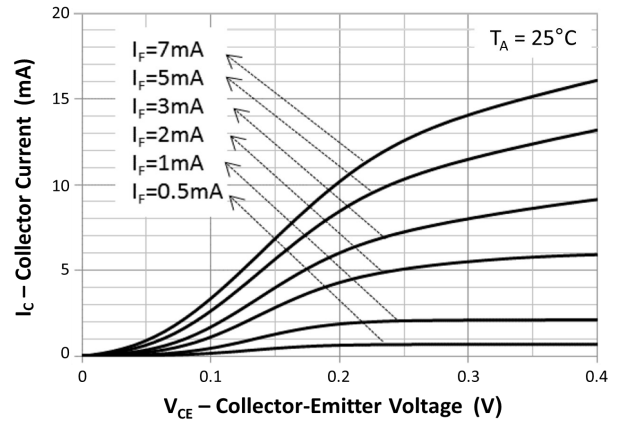
**Fig 1 Forward Current vs Ambient Temperature**



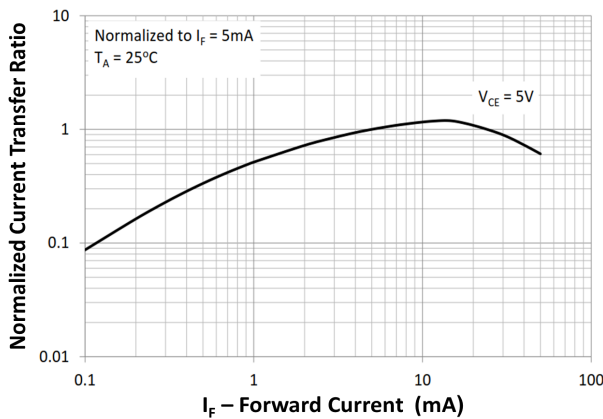
**Fig 2 Collector Power Dissipation vs Ambient Temperature**



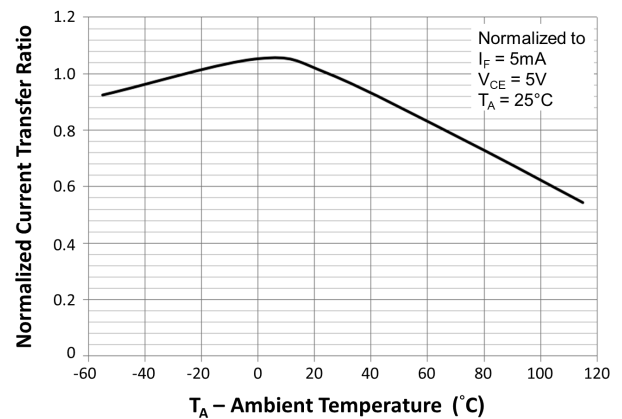
**Fig 3 Collector Current vs Collector-Emitter Voltage (1)**



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

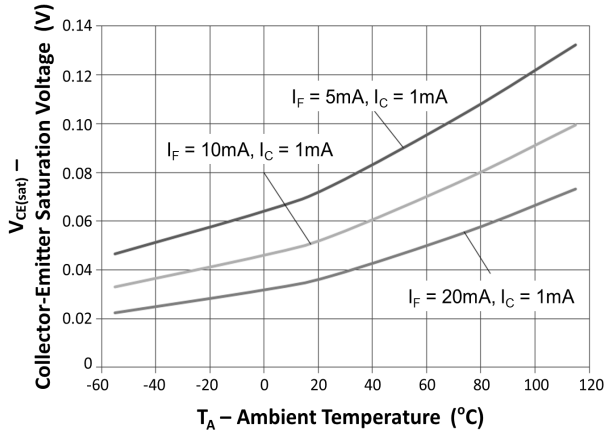


**Fig 5 Normalized Current Transfer Ratio vs Forward Current**

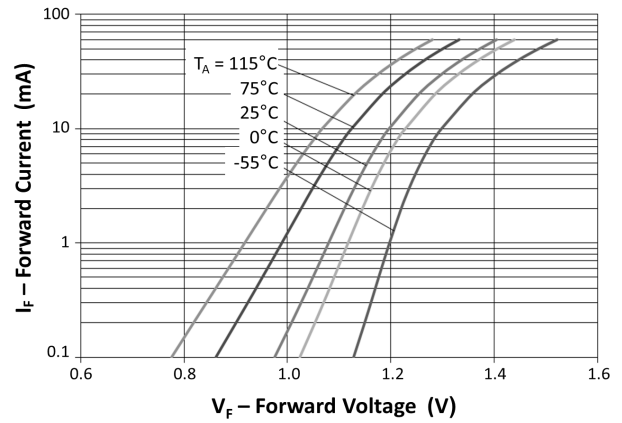


**Fig 6 Normalized Current Transfer Ratio vs Ambient Temperature**

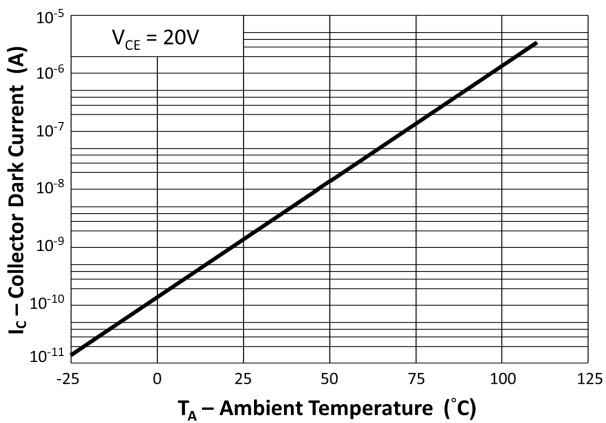
## ISP817, ISP827, ISP847



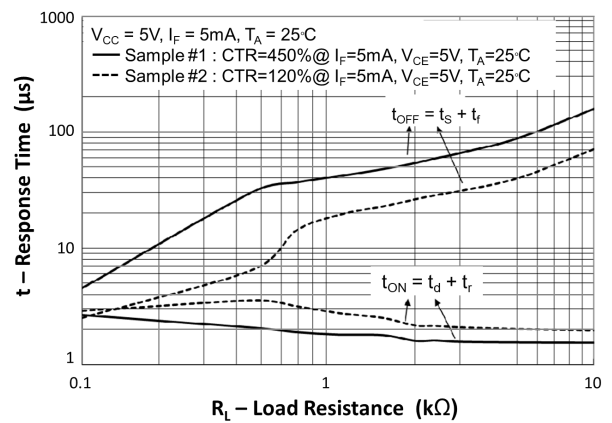
**Fig 7 Collector-Emitter Saturation Voltage vs Ambient Temperature**



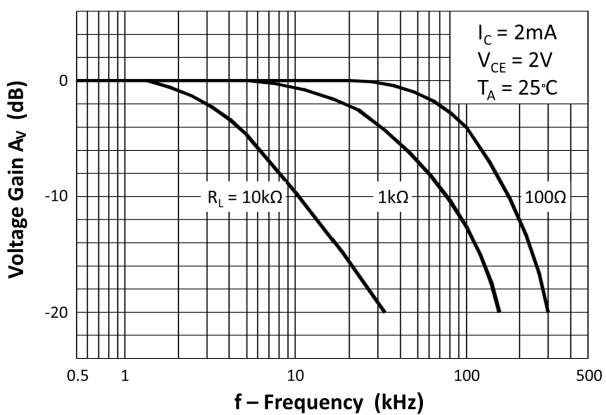
**Fig 8 Forward Current vs Forward Voltage**



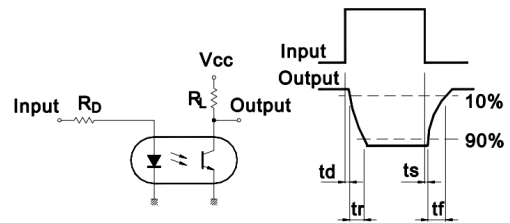
**Fig 9 Collector Dark Current vs Ambient Temperature**



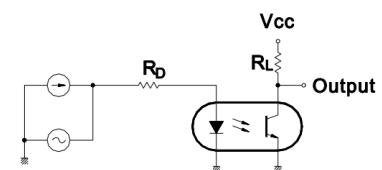
**Fig 10 Switching Time vs Load Resistance**



**Fig 11 Frequency Response**



**Response Time Test Circuit**



**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 ISP817GR, ISP817A, ISP817B ISP817C, ISP817D	Standard DIP4	100 pcs per tube
G	ISP817G, ISP817GBG, ISP817BLG ISP817GRG, ISP817AG, ISP817BG ISP817CG, ISP817DG	10mm Lead Spacing	100 pcs per tube
SM	ISP817SM, ISP817GBSM, ISP817BLSM ISP817GRSM, ISP817ASM, ISP817BSM ISP817CSM, ISP817DSM	Surface Mount	100 pcs per tube
SMT&R	ISP817SMT&R, ISP817GBSMT&R ISP817GRSMT&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, ISP827GR, ISP827A, ISP827B, ISP827C, ISP827D	Standard DIP8	50 pcs per tube
G	ISP827G, ISP827GBG, ISP827BLG, ISP827GRG, ISP827AG, ISP827BG, ISP827CG, ISP827DG	10mm Lead Spacing	50 pcs per tube
SM	ISP827SM, ISP827GBSM, ISP827BLSM, ISP827GRSM, ISP827ASM, ISP827BSM, ISP827CSM, ISP827DSM	Surface Mount	50 pcs per tube
SMT&R	ISP827SMT&R, ISP827GBSMT&R, ISP827GRSMT&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, ISP847GR, ISP847A, ISP847B, ISP847C, ISP847D	Standard DIP16	25 pcs per tube
G	ISP847G, ISP847GBG, ISP847BLG, ISP847GRG, ISP847AG, ISP847BG, ISP847CG, ISP847DG	10mm Lead Spacing	25 pcs per tube
SM	ISP847SM, ISP847GBSM, ISP847BLSM, ISP847GRSM, ISP847ASM, ISP847BSM, ISP847CSM, ISP847DSM	Surface Mount	25 pcs per tube



**ISP817, ISP827, ISP847**

**ORDER INFORMATION**

**Note: grade-xX-VDE = VDE-Xx-grade (e.g. AX = XA, BX = XB,etc )**

<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, ISP817XGR, ISP817XA, ISP817XB, ISP817XC, ISP817XD	Standard DIP4	100 pcs per tube
G	ISP817XG, ISP817XGBG, ISP817XBLG, ISP817XGRG, ISP817XAG, ISP817XBG, ISP817XCG, ISP817XDG	10mm Lead Spacing	100 pcs per tube
SM	ISP817XSM, ISP817XGBSM, ISP817XGRSM, ISP817XBLSM, ISP817XASM, ISP817XBBSM, ISP817XCSM, ISP817XDMSM	Surface Mount	100 pcs per tube
SMT&R	ISP817XSMT&R, ISP817XGBSMT&R, ISP817XGRSMT&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, ISP827XGR, ISP827XA, ISP827XB, ISP827XC, ISP827XD	Standard DIP8	50 pcs per tube
G	ISP827XG, ISP827XGBG, ISP827XBLG, ISP827XGRG, ISP827XAG, ISP827XBG, ISP827XCG, ISP827XDG	10mm Lead Spacing	50 pcs per tube
SM	ISP827XSM, ISP827XGBSM, ISP827XGRSM, ISP827XBLSM, ISP827XASM, ISP827XBBSM, ISP827XCSM, ISP827XDMSM	Surface Mount	50 pcs per tube
SMT&R	ISP827XSMT&R, ISP827XGBSMT&R, ISP827XGRSMT&R, ISP827XBLSMT&R, ISP827XASMT&R, ISP827XBSMT&R, ISP827XCSMT&R, ISP827XDSMT&R	Surface Mount Tape & Reel	1000 pcs per reel

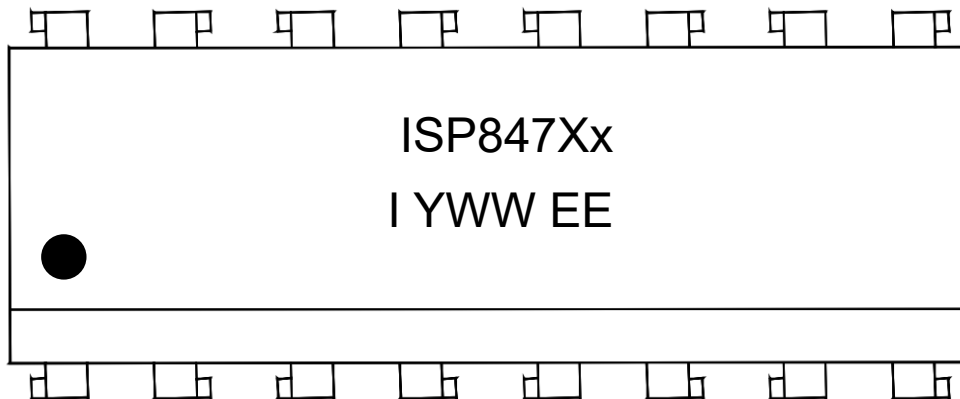
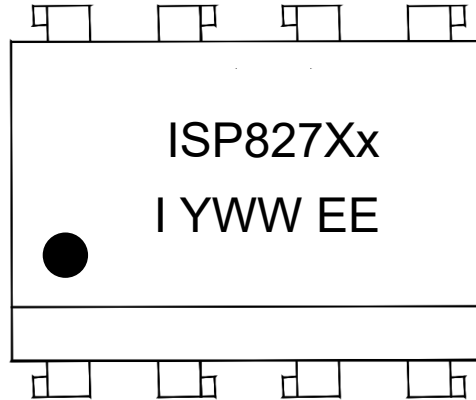
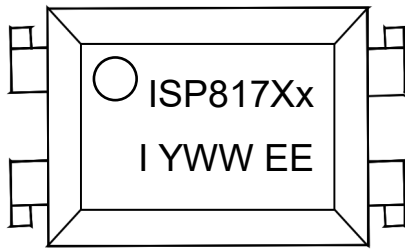
<b>ISP847 (UL and VDE Approvals)</b>			
<b>After PN</b>	<b>PN</b>	<b>Description</b>	<b>Packing quantity</b>
None	ISP847X, ISP847XGBL, ISP847XBL, ISP847XGR, ISP847XA, ISP847XB, ISP847XC, ISP847XD	Standard DIP16	25 pcs per tube
G	ISP847XG, ISP847XGBG, ISP847XBLG, ISP847XGRG, ISP847XAG, ISP847XBG, ISP847XCG, ISP847XDG	10mm Lead Spacing	25 pcs per tube
SM	ISP847XSM, ISP847XGBSM, ISP847XGRSM, ISP847XBLSM, ISP847XASM, ISP847XBBSM, ISP847XCSM, ISP847XDMSM	Surface Mount	25 pcs per tube





**ISP817, ISP827, ISP847**

**DEVICE MARKING**



ISP817            Part Number for Single Channel

ISP827            Part Number for Dual Channel

ISP847            Part Number for Quad Channel

X                 VDE Option

x                 CTR Grade, e.g. A, B, C, etc.

Note : Alternate Marking xX (e.g. AX, BX, etc.)

I                 Isocom

Y                 Year code (can be single or double digit)

WW              2 digit Week code

EE              UL Model

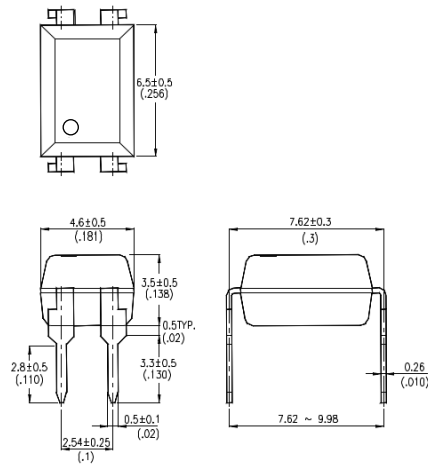


**ISP817, ISP827, ISP847**

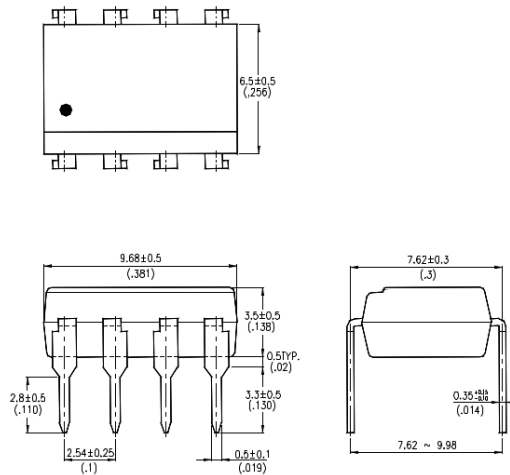
**PACKAGE DIMENSIONS in mm (inch)**

**DIP**

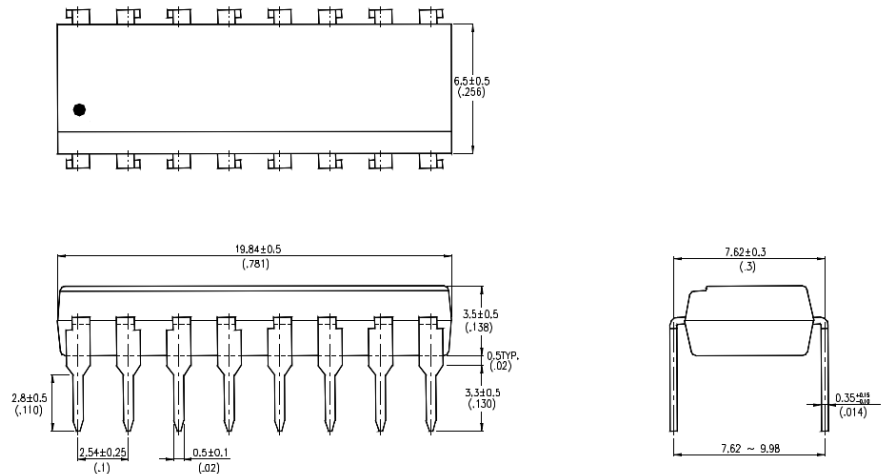
**ISP817**



**ISP827**



**ISP847**



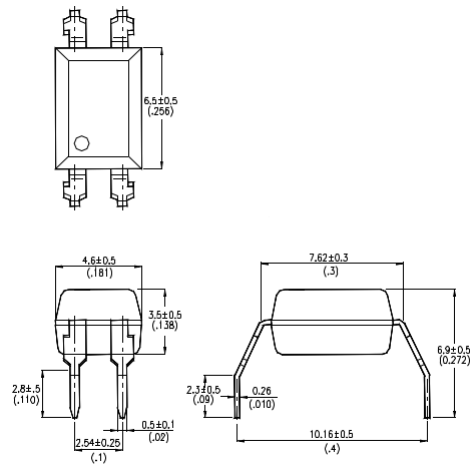


**ISP817, ISP827, ISP847**

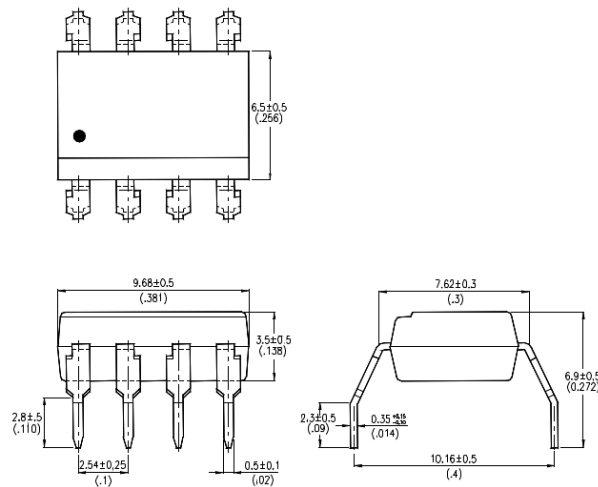
**PACKAGE DIMENSIONS in mm (inch)**

**G Form**

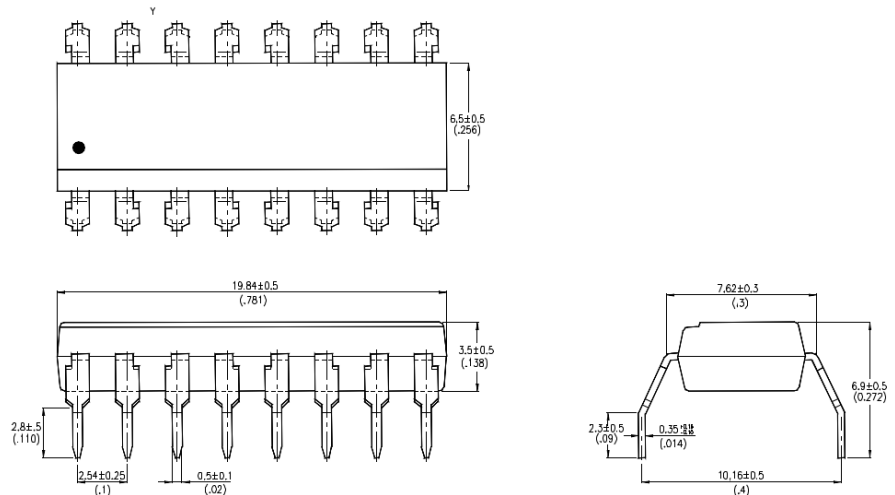
**ISP817G**



**ISP827G**



**ISP847G**



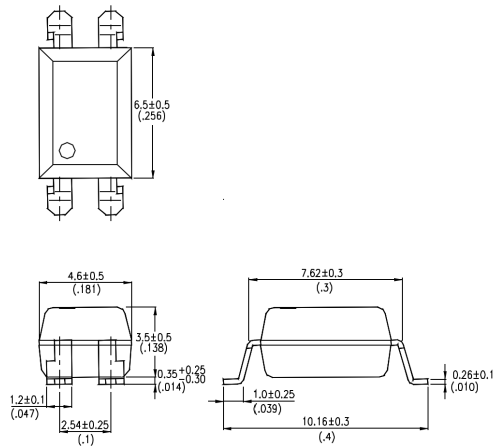


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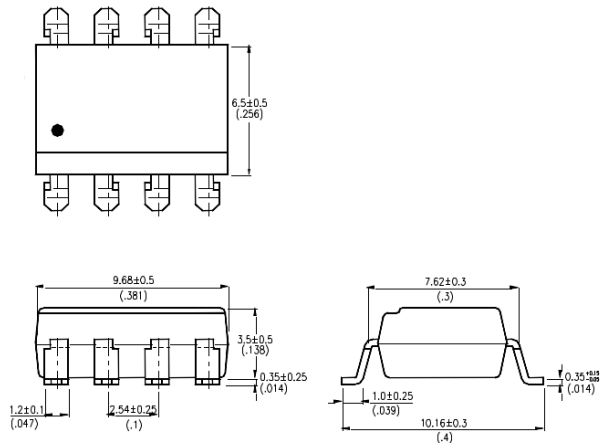
**PACKAGE DIMENSIONS in mm (inch)**

**SMD**

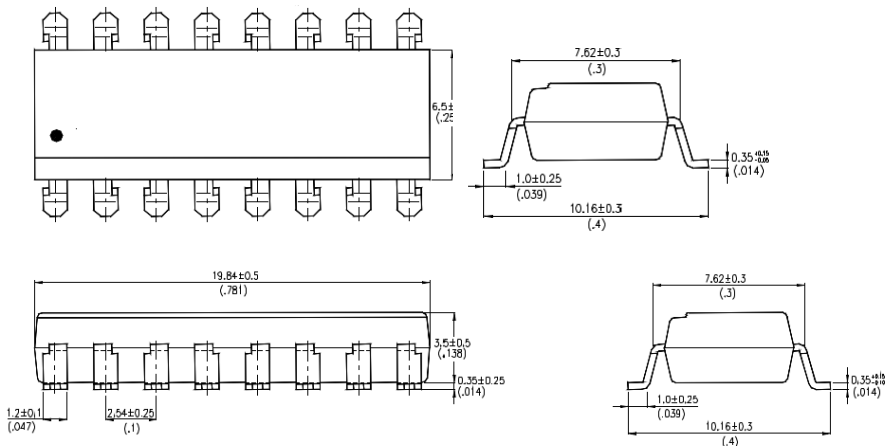
**ISP817SM**



**ISP827SM**



**ISP847SM**

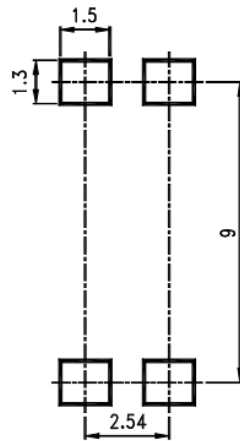




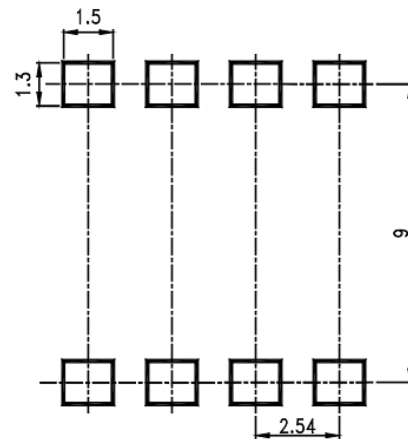
**ISP817, ISP827, ISP847**

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

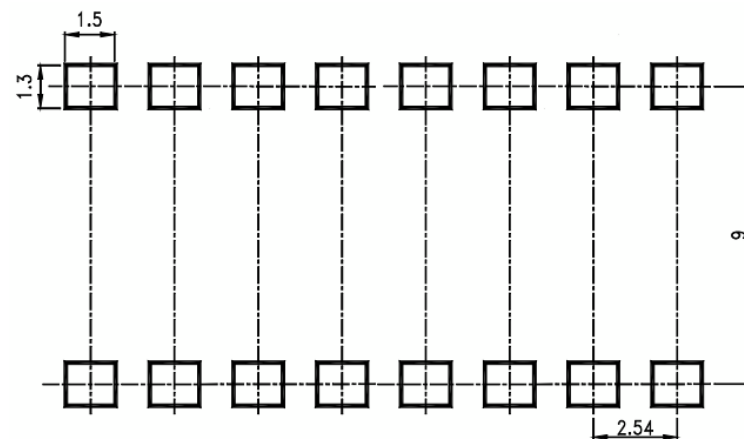
**ISP817SM**



**ISP827SM**



**ISP847SM**

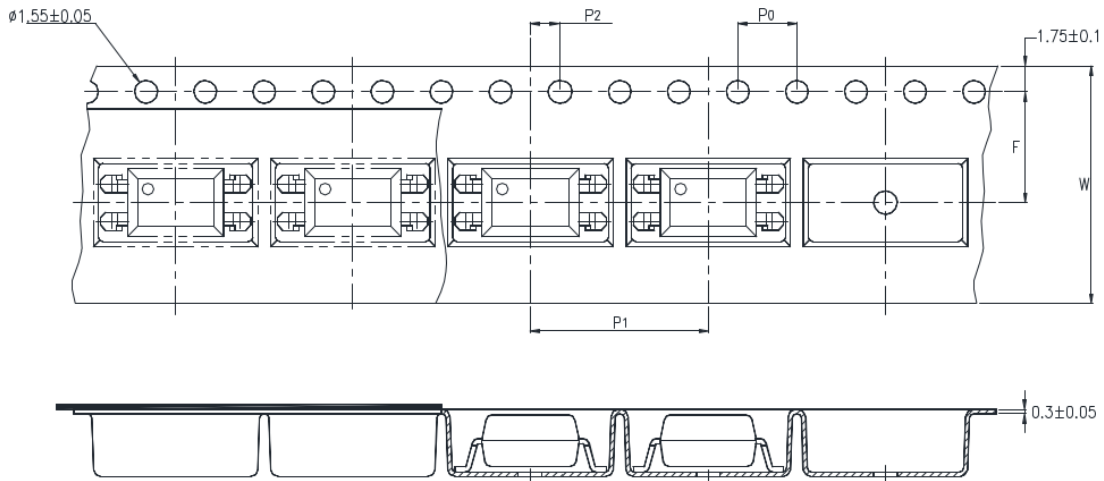




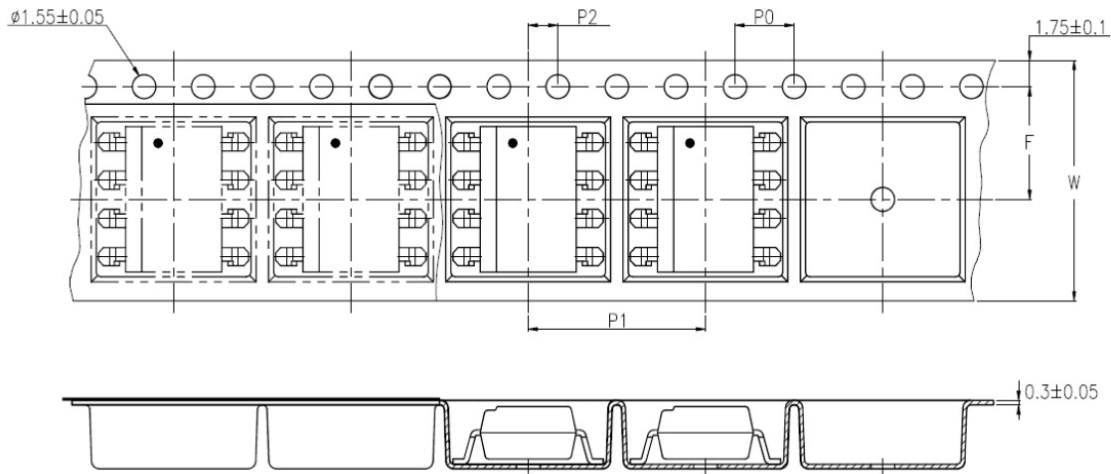
**ISP817, ISP827, ISP847**

**TAPE AND REEL PACKAGING**

**ISP817SMT&R**



**ISP827SMT&R**

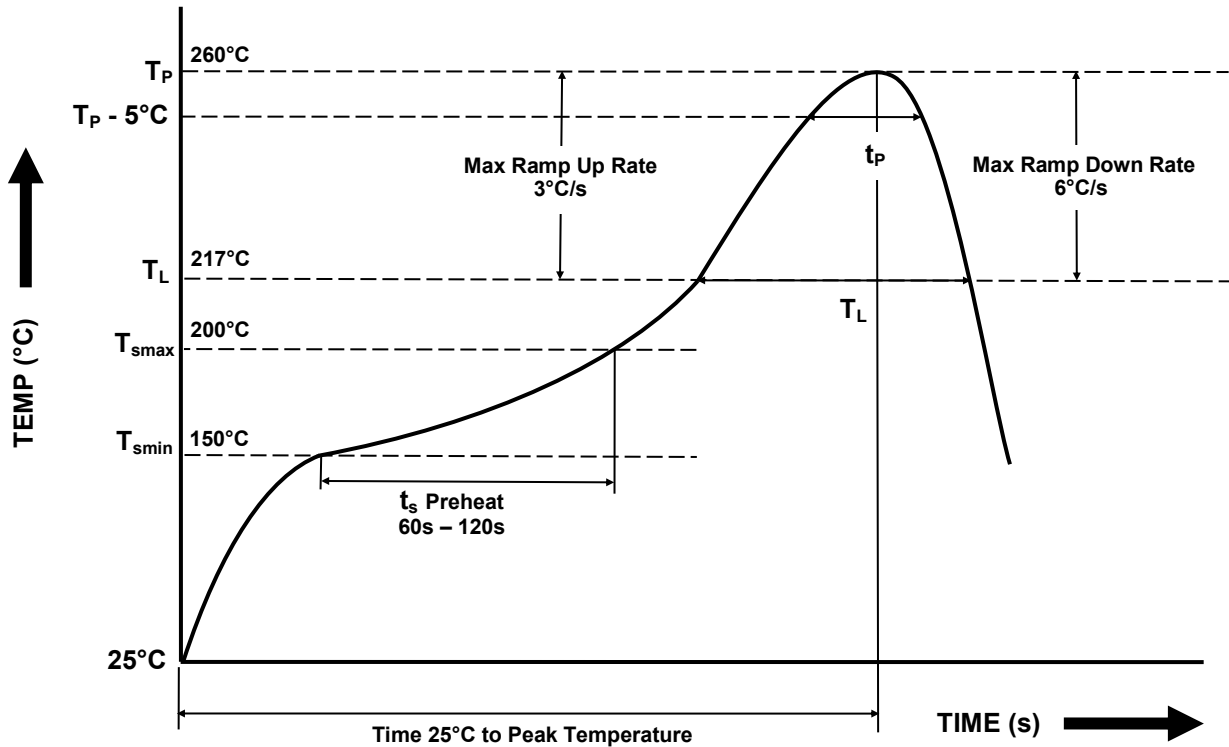


Description	Symbol	Dimension mm (inch)
Tape Width	W	$16 \pm 0.3$ (0.63)
Pitch of Sprocket Holes	$P_0$	$4 \pm 0.1$ (0.15)
Distance of Compartment to Sprocket Holes	F	$7.5 \pm 0.1$ (0.295)
	$P_2$	$2 \pm 0.1$ (0.079)
Distance of Compartment to Compartment	$P_1$	$12 \pm 0.1$ (0.472)



**ISP817, ISP827, ISP847**

**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 ( $T_{SMIN}$ ) - 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 ( $T_P - 5^\circ\text{C}$ ) - 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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