

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_{RMS}
- 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

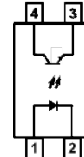
APPLICATIONS

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

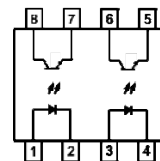
ORDER INFORMATION

- 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

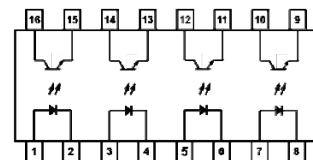
ISP817



ISP827



ISP847



ABSOLUTE MAXIMUM RATINGS (T_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 |
| Peak Forward Current | 1A |
| Pulse 100µs, Frequency 100Hz | |
| Reverse Voltage | 6V |
| Power dissipation | 70mW |

Output

| | | |
|---|-----------------|-------|
| Collector to Emitter Voltage V _{CEO} | ISP817 | 80V |
| | ISP827 / ISP847 | 35V |
| Emitter to Collector Voltage V _{ECO} | | 6V |
| Collector Current | | 50mA |
| Power Dissipation | | 150mW |

Total Package

| | | |
|----------------------------------|-----------------|----------------------|
| Isolation Voltage | | 5300V _{RMS} |
| 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 |

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

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 | 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} | $I_C = 0.1\text{mA}, I_F = 0\text{mA}$ | | | | 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 |



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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 | μs |
| 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 | 5×10^{10} | 1×10^{11} | | Ω |

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

ISP817, ISP827, ISP847

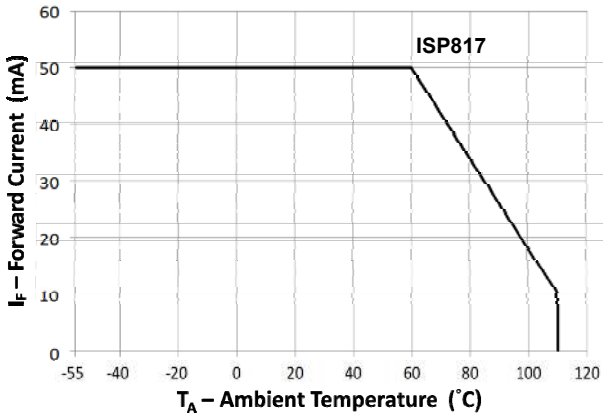


Fig 1 Forward Current vs Ambient Temperature (1)

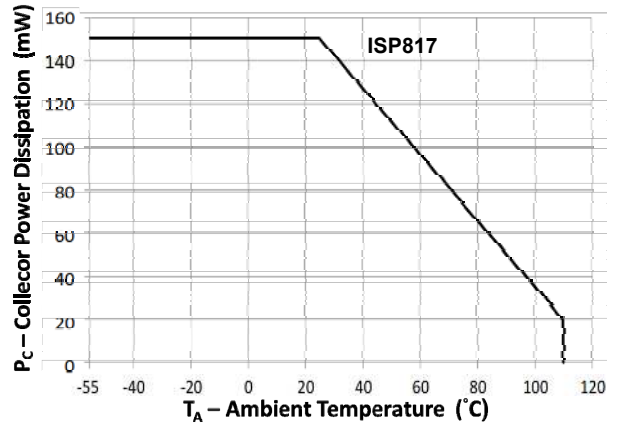


Fig 2 Collector Power Dissipation vs Ambient Temperature (1)

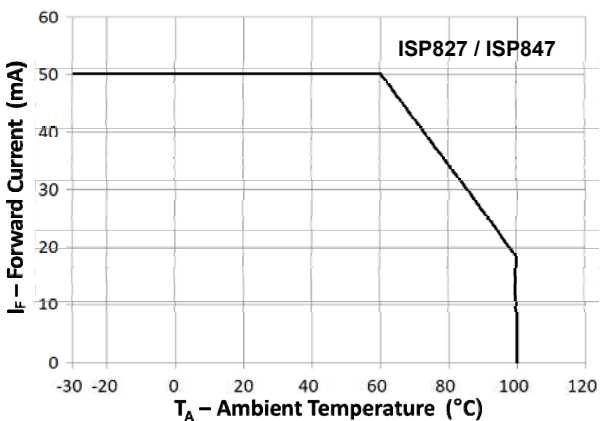


Fig 3 Forward Current vs Ambient Temperature (2)

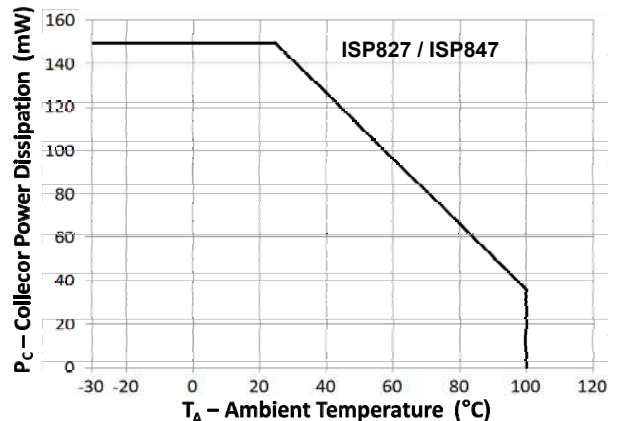


Fig 4 Collector Power Dissipation vs Ambient Temperature (2)

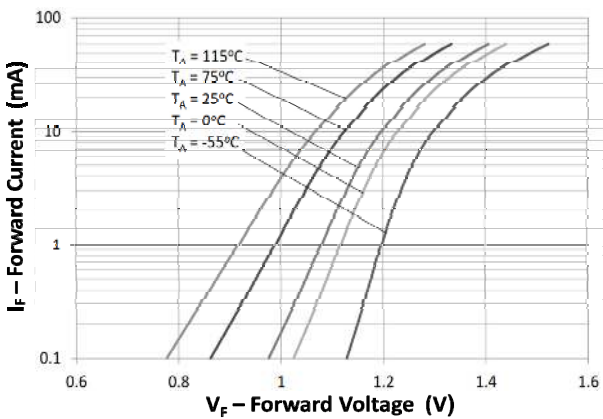


Fig 5 Forward Current vs Forward Voltage

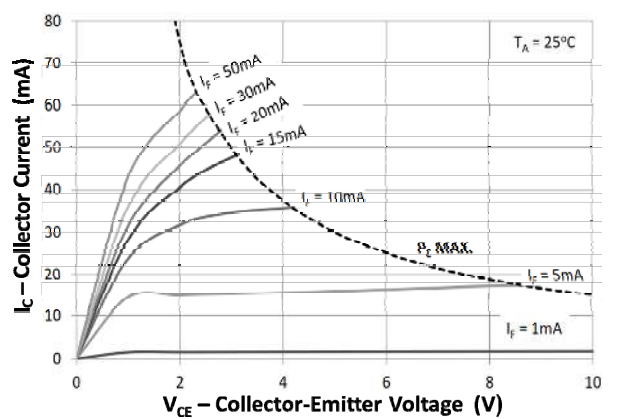


Fig 6 Collector Current vs Collector-Emitter Voltage

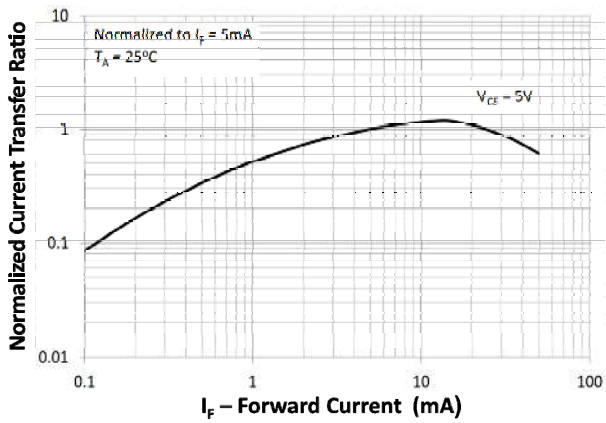


Fig 7 Normalized Current Transfer Ratio vs Forward Current

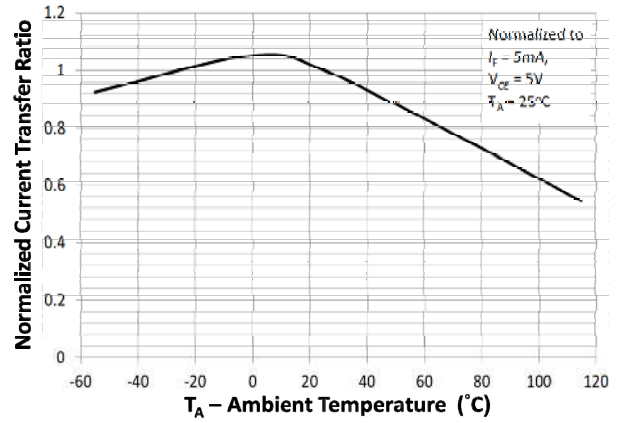


Fig 8 Normalized Current Transfer Ratio vs Ambient Temperature

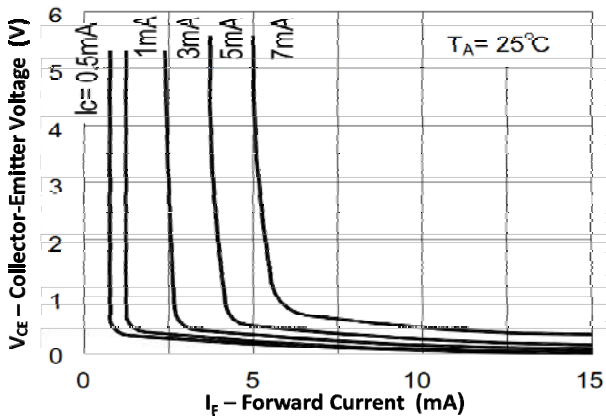


Fig 9 Collector-Emitter Voltage vs Forward Current

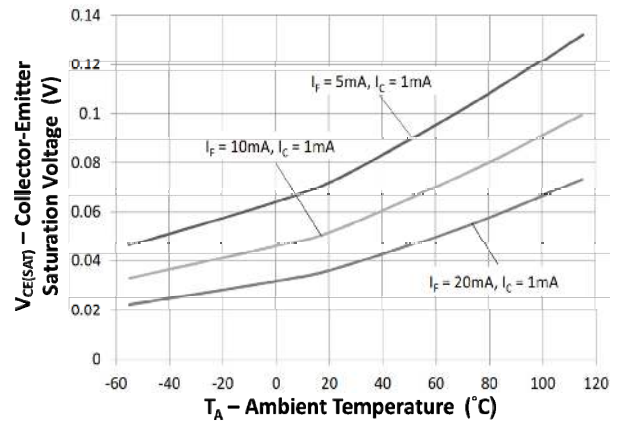


Fig 10 Collector-Emitter Saturation Voltage vs Ambient Temperature

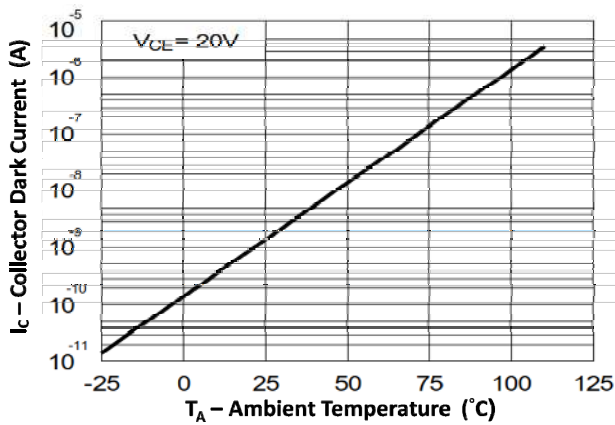


Fig 11 Collector Dark Current vs Ambient Temperature

ISP817, ISP827, ISP847

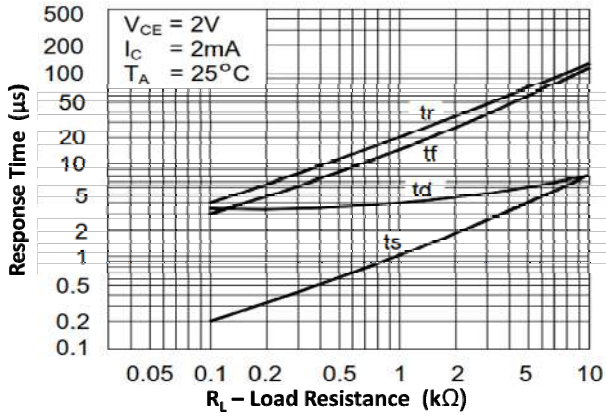
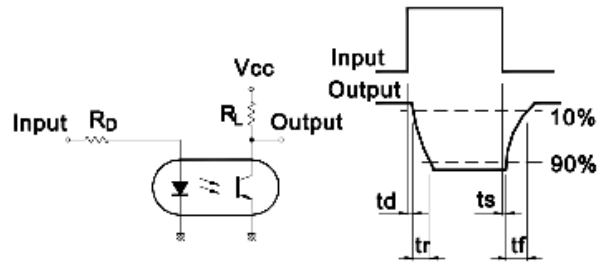


Fig 12 Response Time vs Load Resistance



Response Time Test Circuit

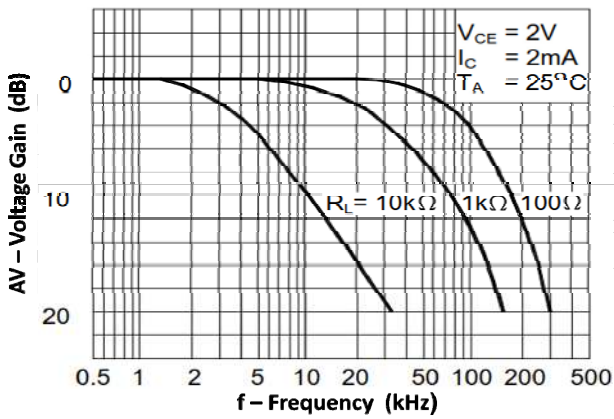
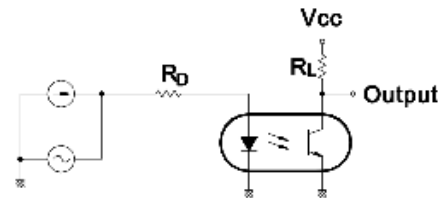


Fig 13 Frequency Response



Frequency Response Test Circuit



ISP817, ISP827, ISP847

ORDER INFORMATION

| ISP817 (UL Approval) | | | |
|-----------------------------|--|---------------------------|-------------------------|
| After PN | PN | Description | Packing quantity |
| 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 |

| ISP827 (UL Approval) | | | |
|-----------------------------|--|---------------------------|-------------------------|
| After PN | PN | Description | Packing quantity |
| 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 |

| ISP847 (UL Approval) | | | |
|-----------------------------|--|--------------------|-------------------------|
| After PN | PN | Description | Packing quantity |
| 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

| ISP817X (UL and VDE Approvals) | | | |
|---------------------------------------|---|---------------------------|-------------------------|
| After PN | PN | Description | Packing quantity |
| 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 |

| ISP827X (UL and VDE Approvals) | | | |
|---------------------------------------|---|---------------------------|-------------------------|
| After PN | PN | Description | Packing quantity |
| 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 |

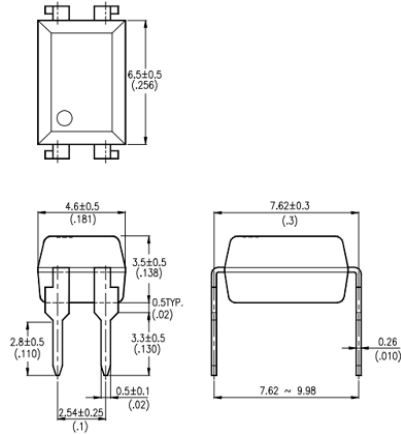
| ISP847 (UL and VDE Approvals) | | | |
|--------------------------------------|--|--------------------|-------------------------|
| After PN | PN | Description | Packing quantity |
| None | ISP847X, ISP847XGBL, ISP847XBL, ISP847XA, ISP847XB, ISP847XC, ISP847XD | Standard DIP16 | 25 pcs per tube |
| 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

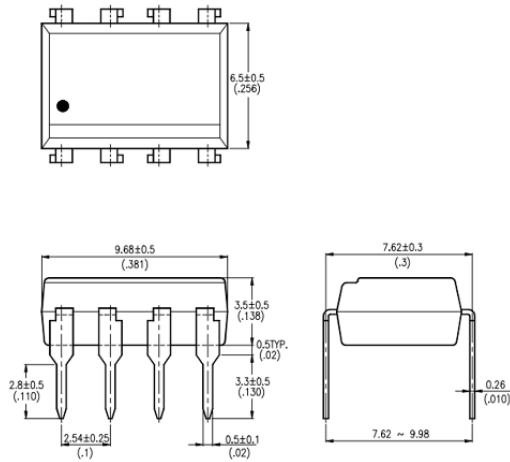
PACKAGE DIMENSIONS in mm (inch)

DIP

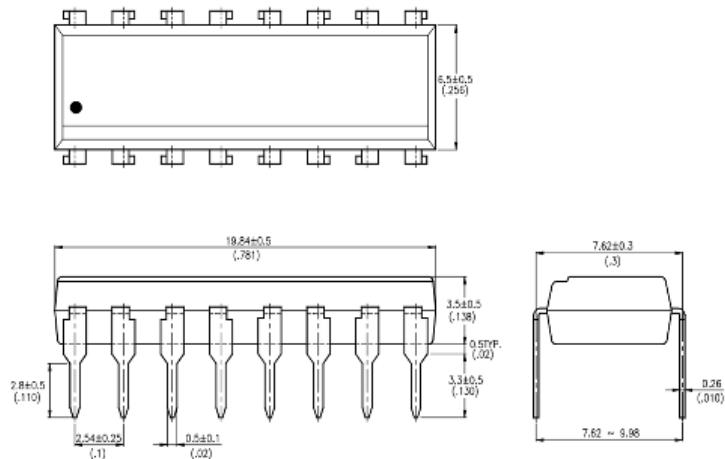
ISP817



ISP827



ISP847

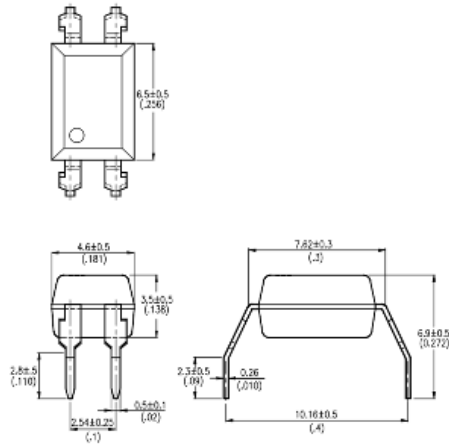


ISP817, ISP827, ISP847

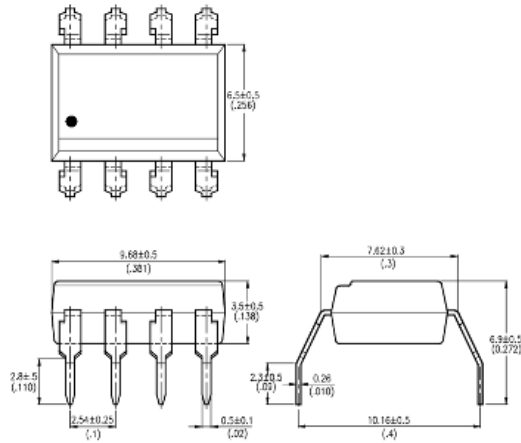
PACKAGE DIMENSIONS in mm (inch)

G Form

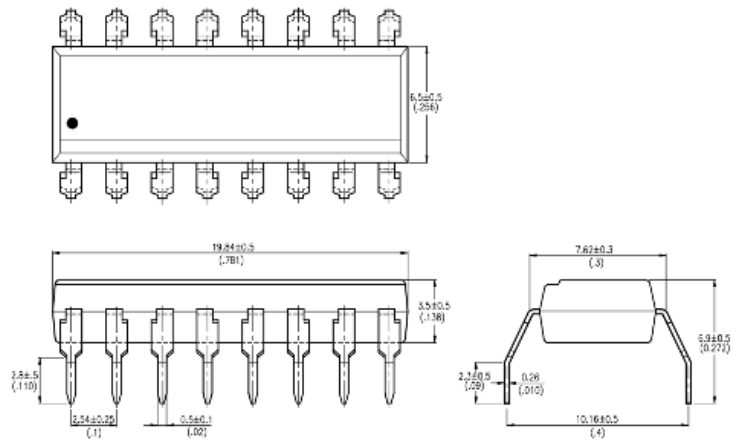
ISP817



ISP827



ISP847

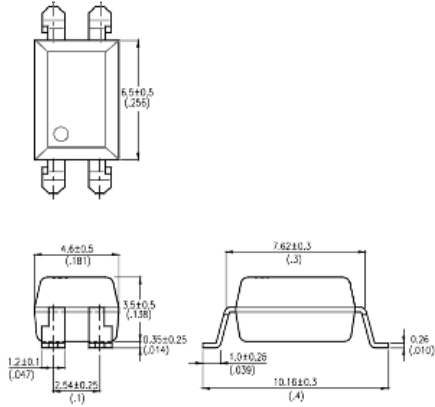


ISP817, ISP827, ISP847

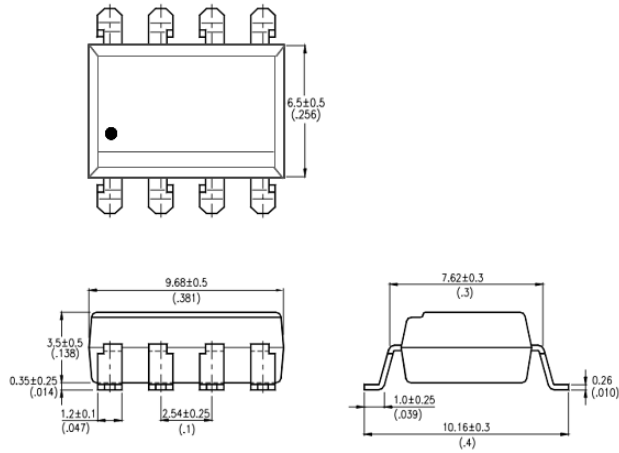
PACKAGE DIMENSIONS in mm (inch)

SMD

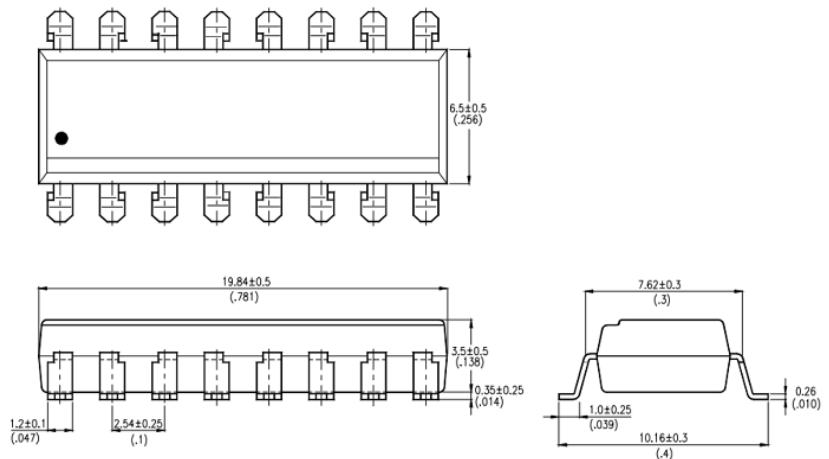
ISP817



ISP827

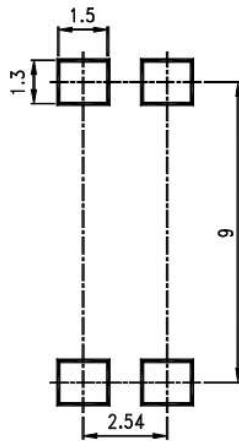


ISP847

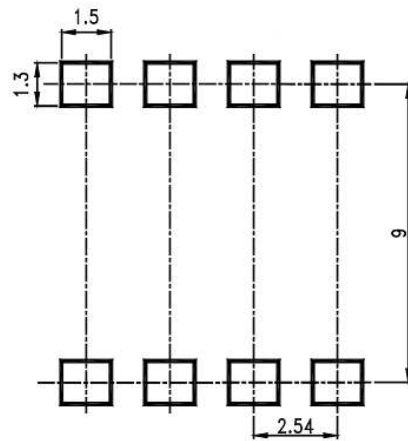


RECOMMENDED PAD LAYOUT FOR SMD (mm)

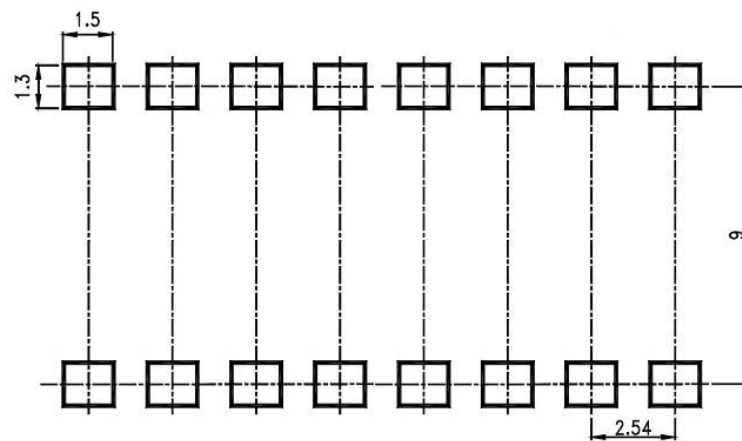
ISP817SM



ISP827SM



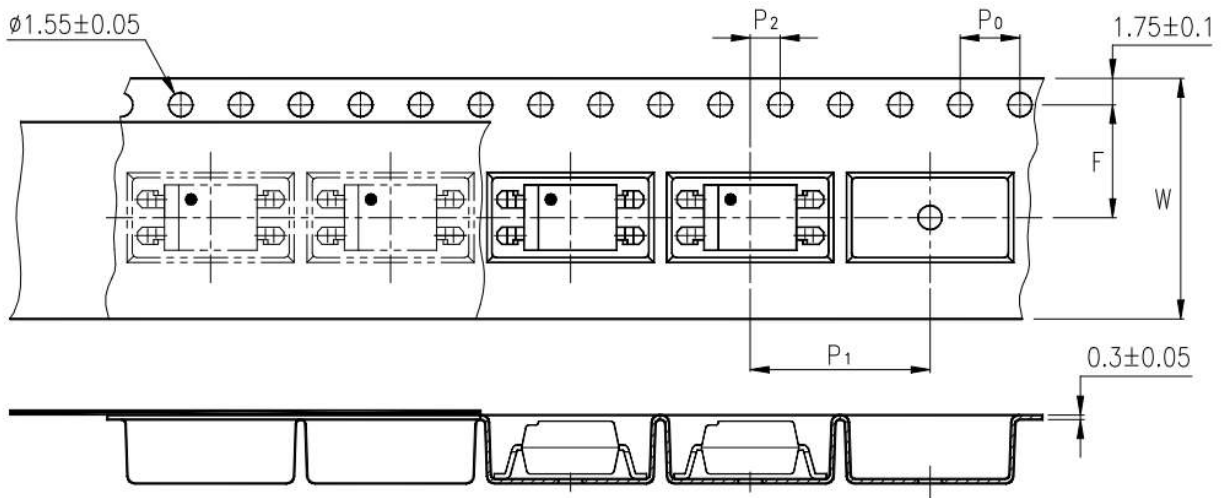
ISP847SM



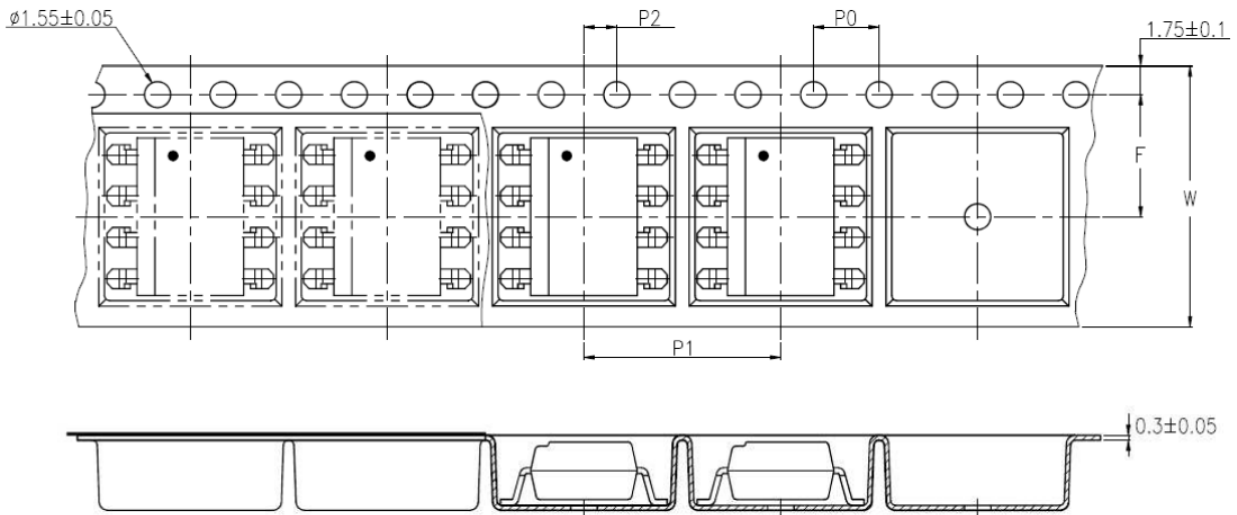
ISP817, ISP827, ISP847

TAPE AND REEL PACKAGING

ISP817SMT&R

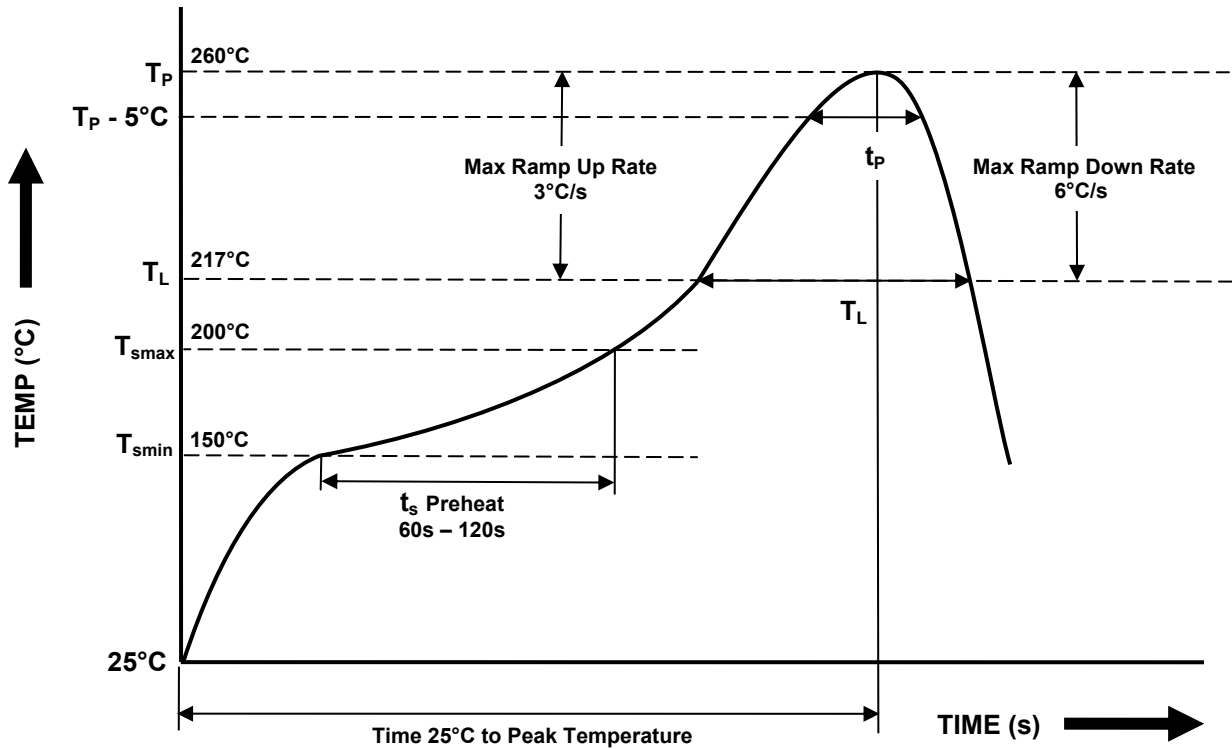


ISP827SMT&R



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