



## 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

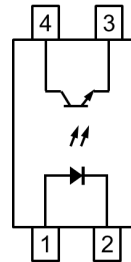
### APPLICATIONS

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

### ORDER INFORMATION

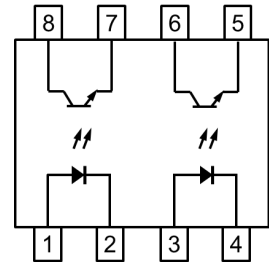
- Add X after PN for VDE Approval
- Add G after PN for 10mm lead spacing
- Add SM after PN for Surface Mount
- Add SMT&R after PN for Surface Mount Tape & Reel  
(Available for ISP817SM and ISP827SM)
- Consult Factory for Tape and Reel version of ISP847SM

#### ISP817



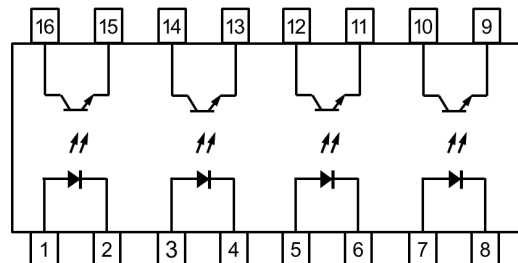
- 1 Anode
- 2 Cathode
- 3 Emitter
- 4 Collector

#### 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  
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<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 $\mu\text{s}$ , 100Hz) | 1A     |
| Reverse Voltage                                  | 6V     |
| Power dissipation                                | 70mW   |
| Junction Temperature                             | 125 °C |

#### Output

|   |                     |
|---|---------------------|
| Collector to Emitter Voltage $V_{\text{CEO}}$ |                     |
|   | ISP817 80V          |
|   | ISP827 / ISP847 35V |
| Emitter to Collector Voltage $V_{\text{ECO}}$ | 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<br>Breakdown Voltage | $BV_{CEO}$ | $I_C = 0.1\text{mA}, I_F = 0\text{mA}$  |     |      |     | V    |
|  |            | ISP817                                  | 80  |      |     |      |
|  |            | ISP827 / ISP847                         | 35  |      |     |      |
| Emitter–Collector<br>Breakdown Voltage | $BV_{ECO}$ | $I_E = 10\mu\text{A}, I_F = 0\text{mA}$ | 6   |      |     | V    |
| Collector–Emitter<br>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                    | $f_c$         | $V_{CE} = 5\text{V}, I_C = 2\text{mA}$<br>$R_L = 100\Omega$<br>-3dB |     | 80   |     | kHz           |
| Output Rise Time                     | $t_r$         | $V_{CC} = 5\text{V}$<br>$I_C = 2\text{mA}$<br>$R_L = 100\Omega$     |     | 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 | $R_{ISO}$ | $V_{IO} = 500\text{VDC}$<br>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

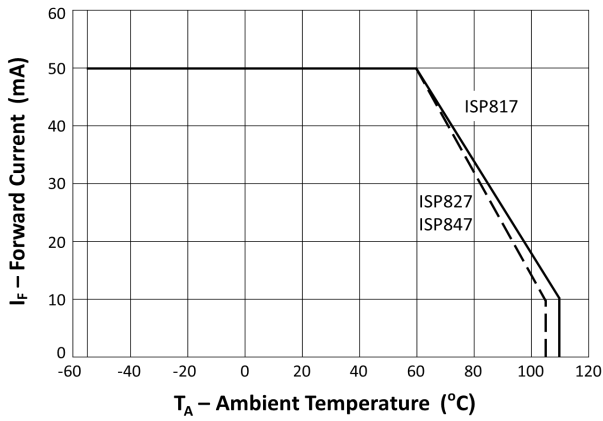


Fig 1 Forward Current vs Ambient Temperature

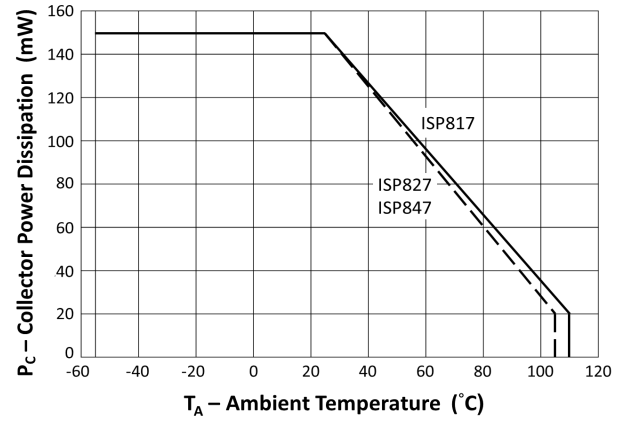


Fig 2 Collector Power Dissipation vs Ambient Temperature

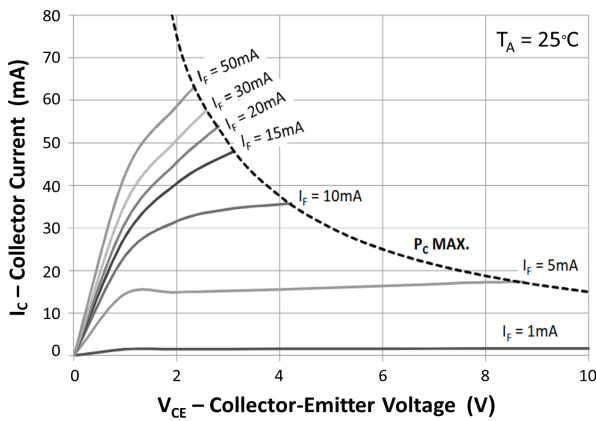


Fig 3 Collector Current vs Collector-Emitter Voltage (1)

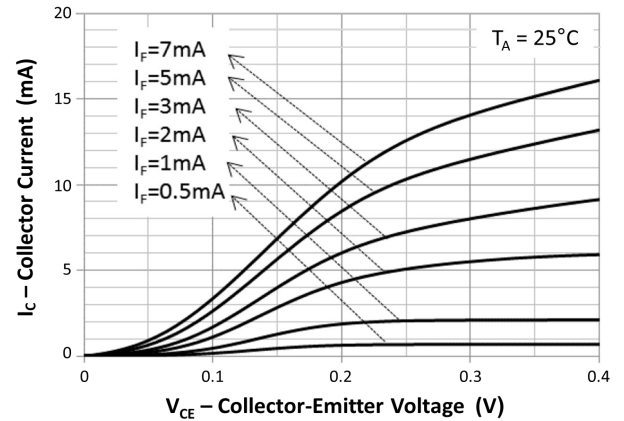


Fig 4 Collector Current vs Collector-Emitter Voltage (2)

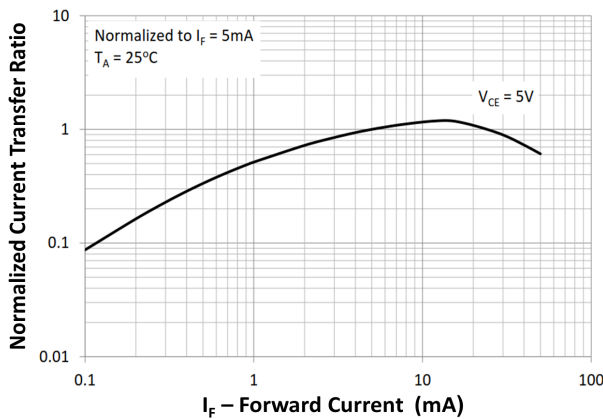


Fig 5 Normalized Current Transfer Ratio vs Forward Current

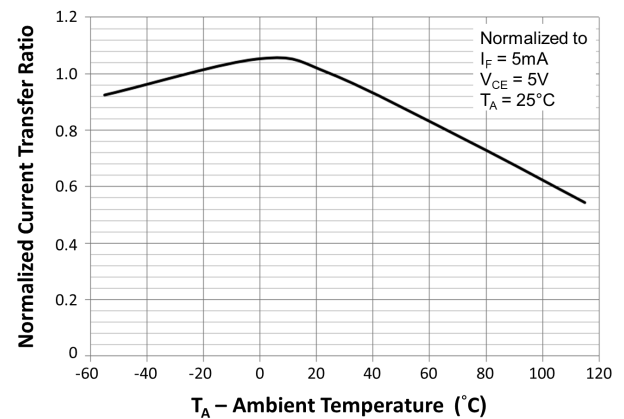
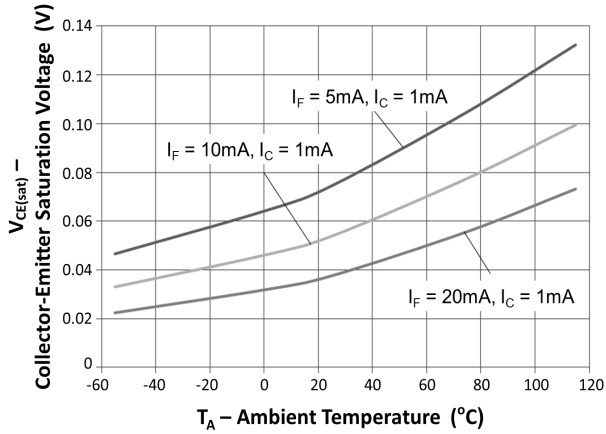


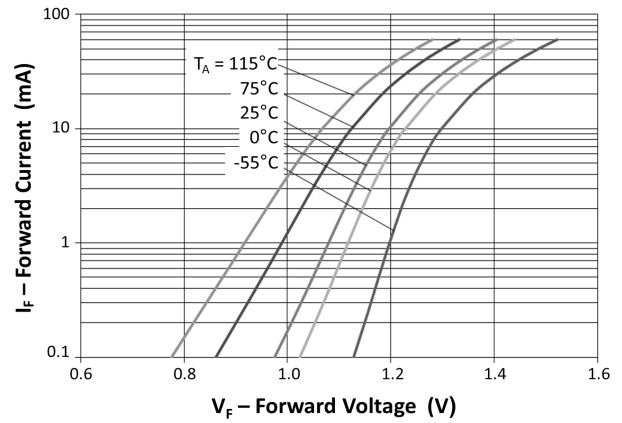
Fig 6 Normalized Current Transfer Ratio vs Ambient Temperature



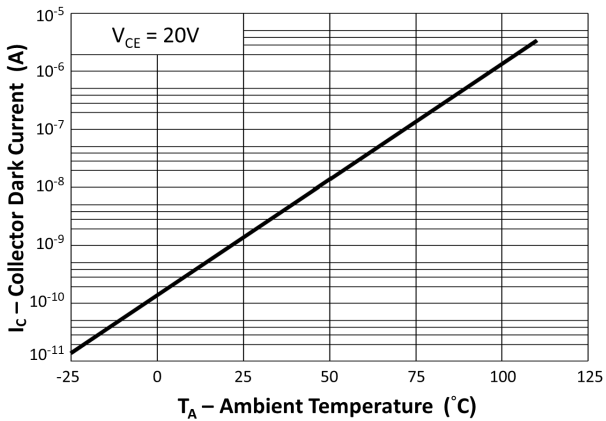
## ISP817, ISP827, ISP847



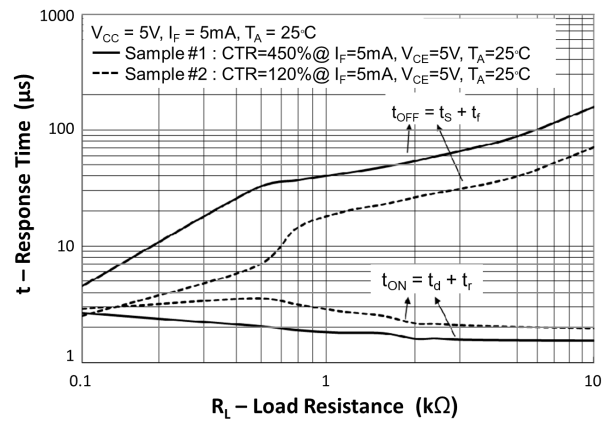
**Fig 7 Collector-Emitter Saturation Voltage vs Ambient Temperature**



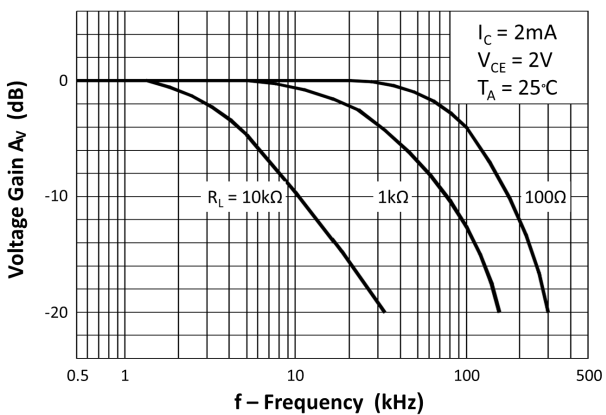
**Fig 8 Forward Current vs Forward Voltage**



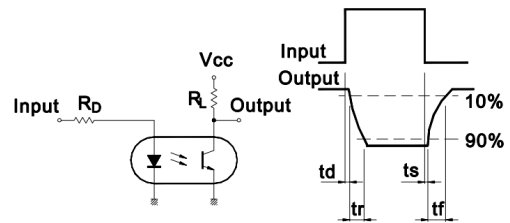
**Fig 9 Collector Dark Current vs Ambient Temperature**



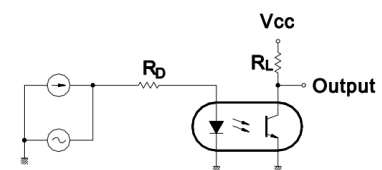
**Fig 10 Switching Time vs Load Resistance**



**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<br>ISP817GR, ISP817A, ISP817B<br>ISP817C, ISP817D   | Standard DIP4             | 100 pcs per tube        |
| G                           | ISP817G, ISP817GBG, ISP817BLG<br>ISP817GRG, ISP817AG, ISP817BG<br>ISP817CG, ISP817DG                                   | 10mm Lead Spacing         | 100 pcs per tube        |
| SM                          | ISP817SM, ISP817GBSM, ISP817BLSM<br>ISP817GRSM, ISP817ASM, ISP817BSM<br>ISP817CSM, ISP817DSM                           | Surface Mount             | 100 pcs per tube        |
| SMT&R                       | ISP817SMT&R, ISP817GBSMT&R<br>ISP817GRSMT&R, ISP817BLSMT&R<br>ISP817ASMT&R, ISP817BSMT&R<br>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,<br>ISP827GR, ISP827A, ISP827B,<br>ISP827C, ISP827D  | Standard DIP8             | 50 pcs per tube         |
| G                           | ISP827G, ISP827GBG, ISP827BLG,<br>ISP827GRG, ISP827AG, ISP827BG,<br>ISP827CG, ISP827DG                                    | 10mm Lead Spacing         | 50 pcs per tube         |
| SM                          | ISP827SM, ISP827GBSM, ISP827BLSM,<br>ISP827GRSM, ISP827ASM, ISP827BSM,<br>ISP827CSM, ISP827DSM                            | Surface Mount             | 50 pcs per tube         |
| SMT&R                       | ISP827SMT&R, ISP827GBSMT&R,<br>ISP827GRSMT&R, ISP827BLSMT&R,<br>ISP827ASMT&R, ISP827BSMT&R,<br>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,<br>ISP847GR, ISP847A, ISP847B,<br>ISP847C, ISP847D                 | Standard DIP16     | 25 pcs per tube         |
| G                           | ISP847G, ISP847GBG, ISP847BLG,<br>ISP847GRG, ISP847AG, ISP847BG,<br>ISP847CG, ISP847DG         | 10mm Lead Spacing  | 25 pcs per tube         |
| SM                          | ISP847SM, ISP847GBSM, ISP847BLSM,<br>ISP847GRSM, ISP847ASM, ISP847BSM,<br>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,<br>ISP817XGR, ISP817XA, ISP817XB,<br>ISP817XC, ISP817XD  | Standard DIP4             | 100 pcs per tube        |
| G                                     | ISP817XG, ISP817XGBG, ISP817XBLG,<br>ISP817XGRG, ISP817XAG, ISP817XBG,<br>ISP817XCG, ISP817XDG                                    | 10mm Lead Spacing         | 100 pcs per tube        |
| SM                                    | ISP817XSM, ISP817XGBSM,<br>ISP817XGRSM, ISP817XBLSM,<br>ISP817XASM, ISP817XBBSM,<br>ISP817XCSM, ISP817XDMSM                       | Surface Mount             | 100 pcs per tube        |
| SMT&R                                 | ISP817XSMT&R, ISP817XGBSMT&R,<br>ISP817XGRSMT&R, ISP817XBLSMT&R,<br>ISP817XASMT&R, ISP817XBSMT&R,<br>ISP817XCSMT&R, ISP817XDSMT&R | Surface Mount Tape & Reel | 1000 pcs per reel       |

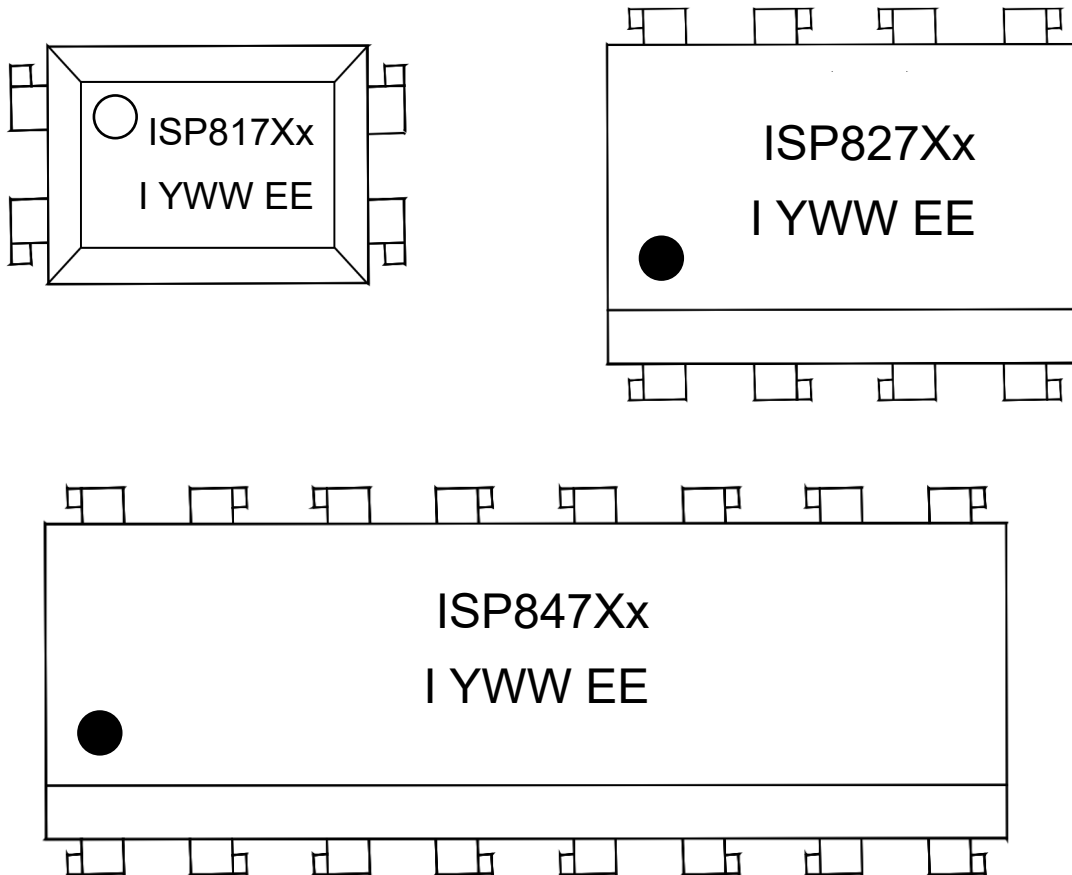
| <b>ISP827X (UL and VDE Approvals)</b> |   |                           |                         |
|---------------------------------------|---|---------------------------|-------------------------|
| <b>After PN</b>                       | <b>PN</b>   | <b>Description</b>        | <b>Packing quantity</b> |
| None                                  | ISP827X, ISP827XGB, ISP827XBL,<br>ISP827XGR, ISP827XA, ISP827XB,<br>ISP827XC, ISP827XD  | Standard DIP8             | 50 pcs per tube         |
| G                                     | ISP827XG, ISP827XGBG, ISP827XBLG,<br>ISP827XGRG, ISP827XAG, ISP827XBG,<br>ISP827XCG, ISP827XDG                                    | 10mm Lead Spacing         | 50 pcs per tube         |
| SM                                    | ISP827XSM, ISP827XGBSM,<br>ISP827XGRSM, ISP827XBLSM,<br>ISP827XASM, ISP827XBBSM,<br>ISP827XCSM, ISP827XDMSM                       | Surface Mount             | 50 pcs per tube         |
| SMT&R                                 | ISP827XSMT&R, ISP827XGBSMT&R,<br>ISP827XGRSMT&R, ISP827XBLSMT&R,<br>ISP827XASMT&R, ISP827XBSMT&R,<br>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,<br>ISP847XGR, ISP847XA, ISP847XB,<br>ISP847XC, ISP847XD                     | Standard DIP16     | 25 pcs per tube         |
| G                                    | ISP847XG, ISP847XGBG, ISP847XBLG,<br>ISP847XGRG, ISP847XAG, ISP847XBG,<br>ISP847XCG, ISP847XDG              | 10mm Lead Spacing  | 25 pcs per tube         |
| SM                                   | ISP847XSM, ISP847XGBSM,<br>ISP847XGRSM, ISP847XBLSM,<br>ISP847XASM, ISP847XBBSM,<br>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

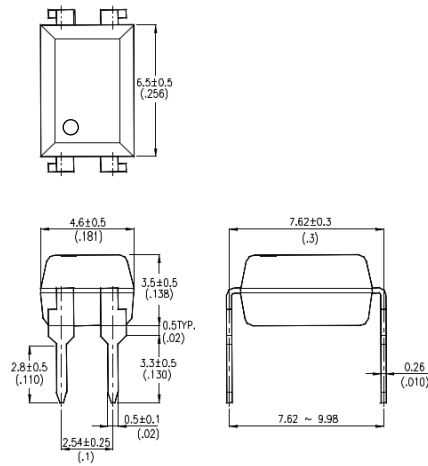


## ISP817, ISP827, ISP847

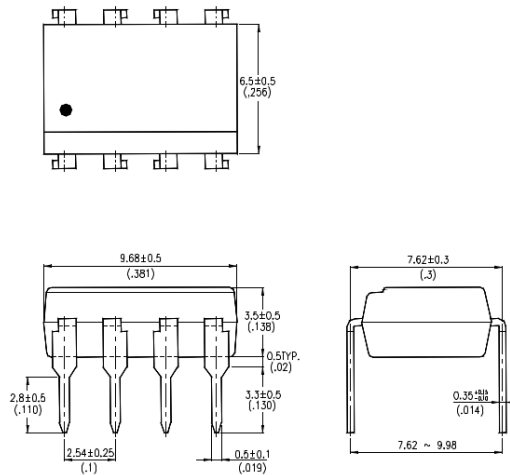
### PACKAGE DIMENSIONS in mm (inch)

#### DIP

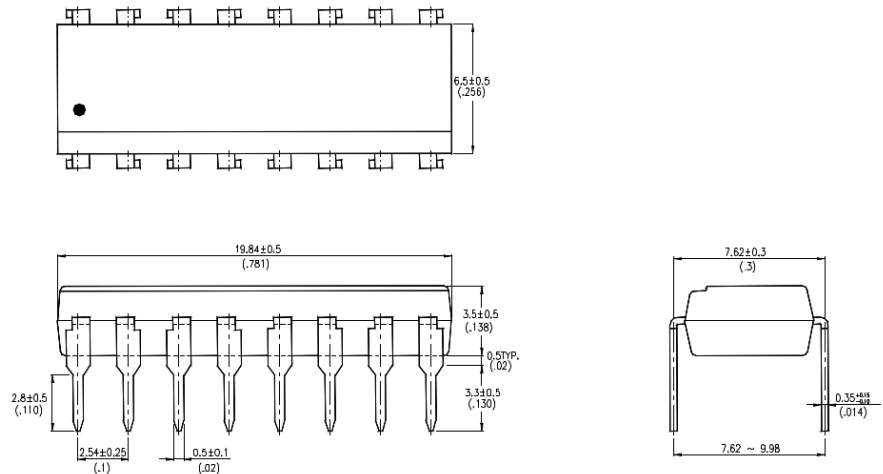
#### ISP817



#### ISP827



#### ISP847



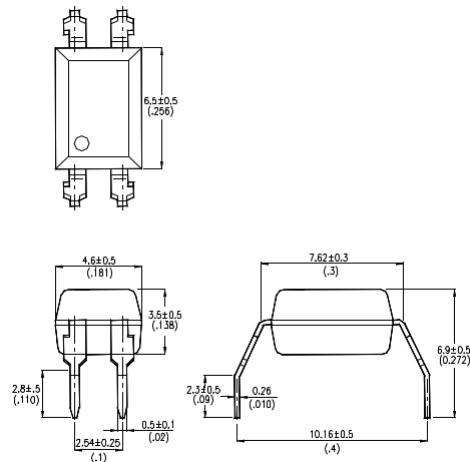


**ISP817, ISP827, ISP847**

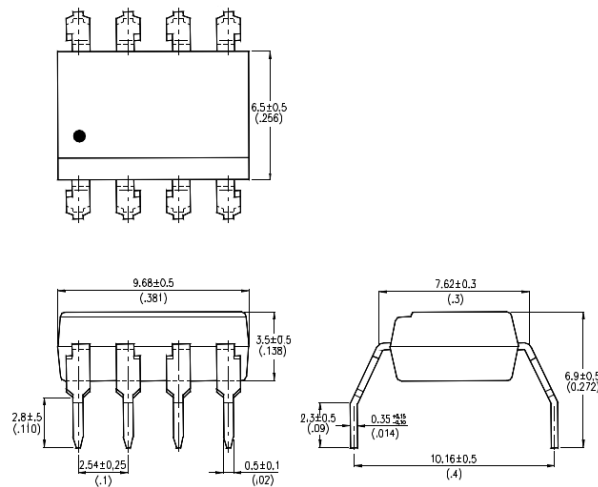
**PACKAGE DIMENSIONS in mm (inch)**

**G Form**

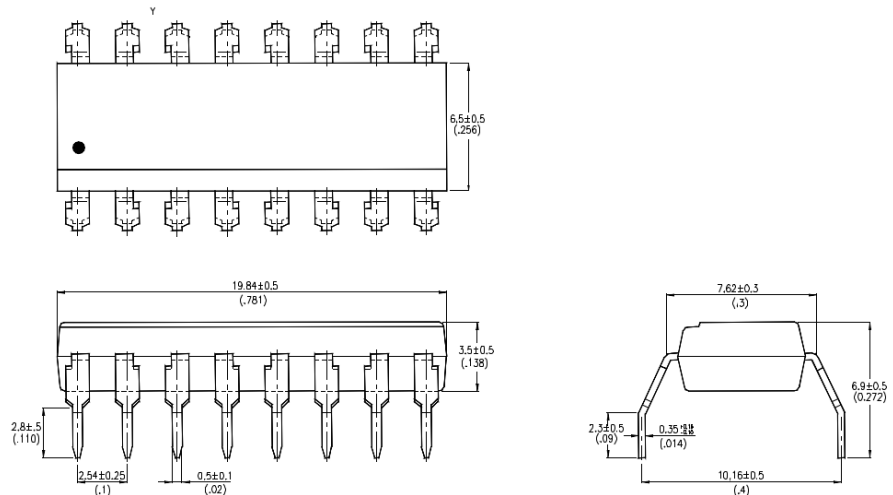
**ISP817G**



**ISP827G**



**ISP847G**



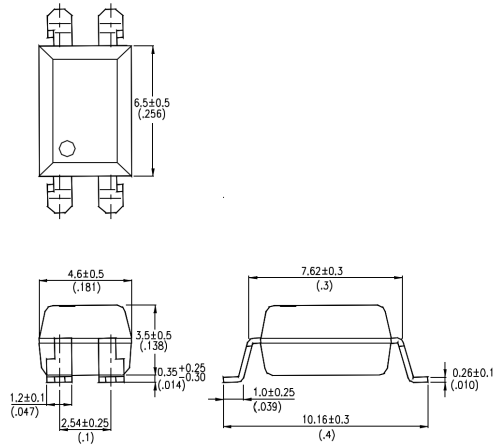


**ISP817, ISP827, ISP847**

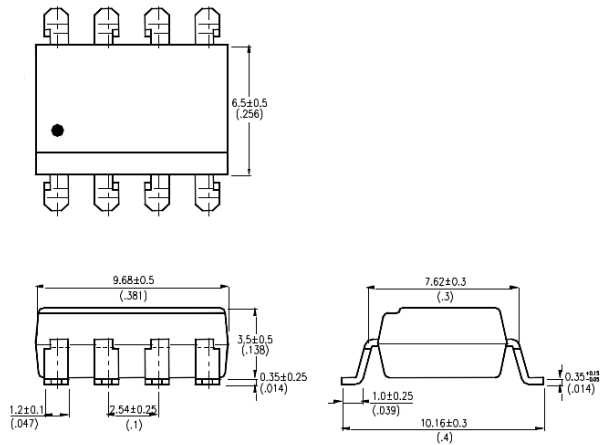
**PACKAGE DIMENSIONS in mm (inch)**

**SMD**

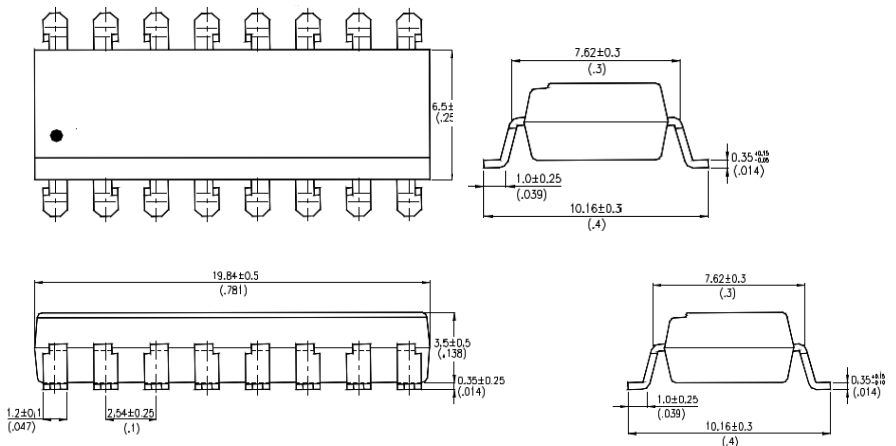
**ISP817SM**



**ISP827SM**



**ISP847SM**

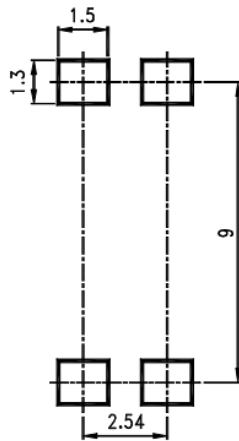




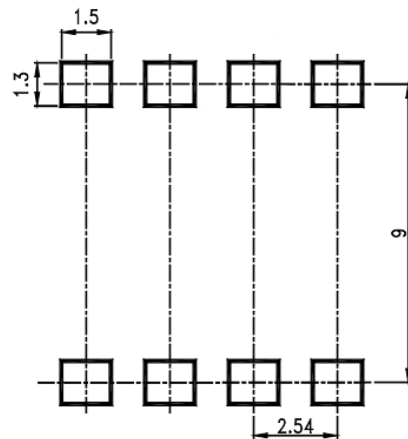
**ISP817, ISP827, ISP847**

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

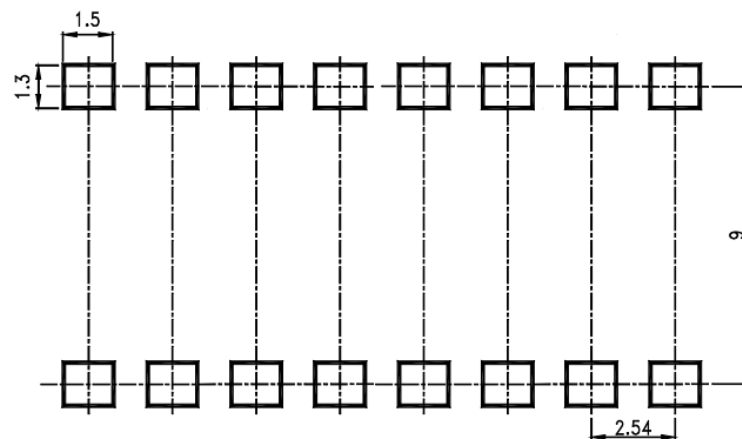
**ISP817SM**



**ISP827SM**



**ISP847SM**

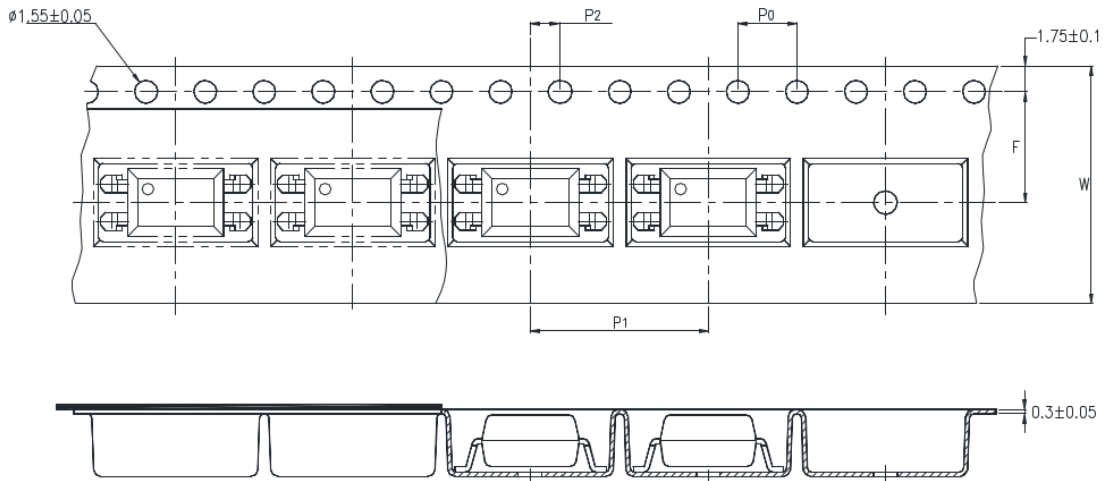




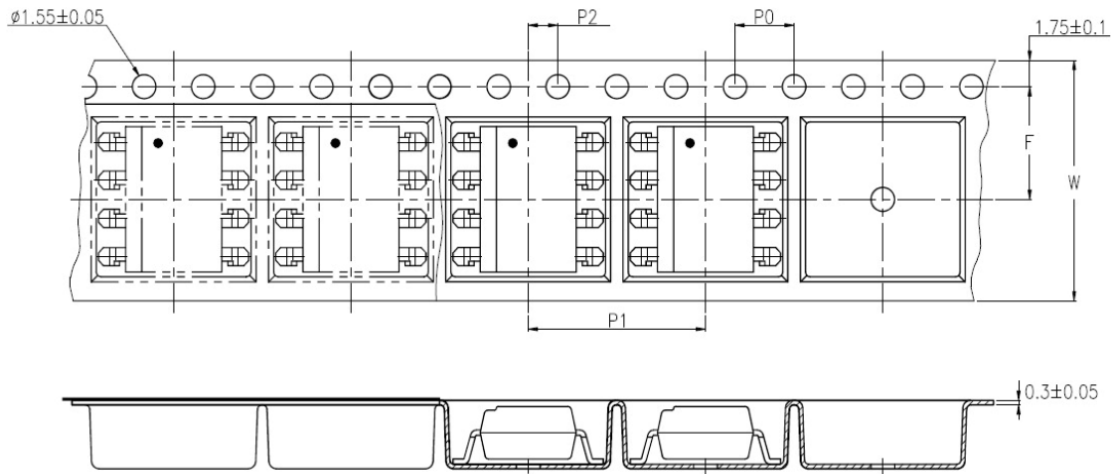
**ISP817, ISP827, ISP847**

**TAPE AND REEL PACKAGING**

**ISP817SMT&R**



**ISP827SMT&R**

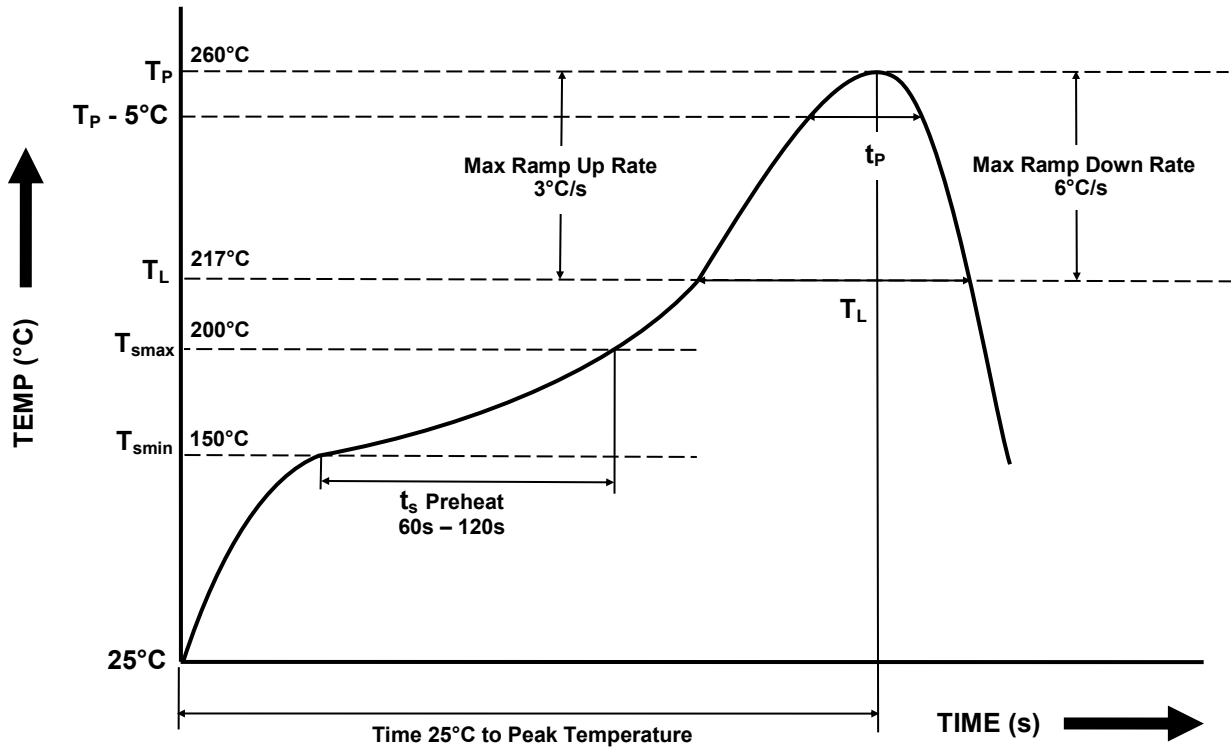


| Description                               | Symbol | Dimension<br>mm (inch) |
|---|--------|------------------------|
| Tape Width                                | W      | $16 \pm 0.3$ (0.63)    |
| Pitch of Sprocket Holes                   | $P_0$  | $4 \pm 0.1$ (0.15)     |
| Distance of Compartment 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><br>- Min Temperature ( $T_{SMIN}$ )<br>- Max Temperature ( $T_{SMAX}$ )<br>- Time $T_{SMIN}$ to $T_{SMAX}$ ( $t_s$ )   | 150°C<br>200°C<br>60s - 120s   |
| <b>Soldering Zone</b><br>- Peak Temperature ( $T_P$ )<br>- Time at Peak Temperature<br>- Liquidous Temperature ( $T_L$ )<br>- Time within 5°C of Actual Peak Temperature ( $T_P - 5^\circ C$ )<br>- Time maintained above $T_L$ ( $t_L$ )<br>- Ramp Up Rate ( $T_L$ to $T_P$ )<br>- Ramp Down Rate ( $T_P$ to $T_L$ ) | 260°C<br>10s max<br>217°C<br>30s max<br>60s - 100s<br>3°C/s max<br>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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In developing your designs, please ensure that Isocom Components products are used within specified operating ranges as set forth in the most recent Isocom Components products specifications.

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