# 4N25, 4N26, 4N27, 4N28

## DESCRIPTION

The 4N25, 4N26, 4N27 and 4N28 optocouplers each consists of an infrared emitting diode optically coupled to an NPN silicon photo transistor in a standard 6 pin dual in line plastic package.

## FEATURES

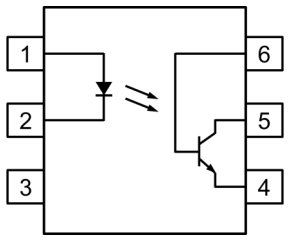
- High AC Isolation Voltage 5000$V_{RMS}$
- Wide Operating Temperature Range −55°C to 100°C
- RoHS Compliant
- UL Approval E91231 Model “GG”
- VDE Approval 40028086

## APPLICATIONS

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

## ORDER INFORMATION

- Add Suffix “X” 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




1 Anode
2 Cathode
3 NC
4 Emitter
5 Collector
6 Base

## 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 | 60mA |
| Reverse Voltage | 6V |
| Power Dissipation | 105mW |
| Junction Temperature | 125°C |

### Output

| | |
|---|---|
| Collector Current | 50mA |
| Collector to Emitter Voltage $V_{CEO}$ | 70V |
| Collector to Emitter Voltage $V_{CBO}$ | 70V |
| Emitter to Collector Voltage $V_{ECO}$ | 6V |
| Emitter to Base Voltage $V_{EBO}$ | 6V |
| Power Dissipation | 160mW |

### Total Package

| | |
|---|---|
| Total Power Dissipation | 200mW |
| Isolation Voltage | 5000$V_{RMS}$ |
| Operating Temperature | −55 to 100°C |
| Storage Temperature | −55 to 150°C |
| Lead Soldering Temperature (10s) | 260°C |

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## ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C unless otherwise specified)

### INPUT

| Parameter | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Forward Voltage | $V_F$ | $I_F$ = 60mA | | 1.4 | 1.7 | V |
| Reverse Current | $I_R$ | $V_R$ = 6V | | | 10 | µA |
| Terminal Capacitance | $C_t$ | $V_F$ = 0V, f = 1kHz | | 30 | 250 | pF |

### OUTPUT

| Parameter | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Collector-Emitter Breakdown Voltage | $BV_{CEO}$ | $I_C$ = 0.1mA, $I_F$ = 0mA | 70 | | | V |
| Emitter-Collector Breakdown Voltage | $BV_{ECO}$ | $I_E$ = 10µA, $I_F$ = 0mA | 6 | | | V |
| Collector Dark Current | $I_{CEO}$ | $V_{CE}$ = 10V, $I_F$ = 0mA | | | 50 | nA |

### COUPLED

| Parameter | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Current transfer ratio | CTR | $I_F$ =10mA, $V_{CE}$ = 5V | | | | % |
| | | 4N25, 4N26 | 40 | | 80 | |
| | | 4N27, 4N28 | 63 | | 125 | |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_F$ = 10mA, $I_C$ = 2.5mA | | 0.25 | 0.4 | V |
| Floating Capacitance | $C_f$ | $V_{IO}$ = 0V, f = 1MHz | | 0.6 | 1 | pF |
| Cut-Off Frequency | $f_C$ | $V_{CC}$ = 5V, $I_F$ = 10mA<br>$R_L$ = 75Ω, −3dB | | 150 | | kHz |
| Output Rise Time | $t_r$ | $V_{CC}$ = 5V, $I_F$ = 10mA<br>$R_L$ = 75Ω | | 2 | 7 | µs |
| Output Fall Time | $t_f$ | | | 2 | 8 | µs |

### ISOLATION

| Parameter | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Isolation Voltage | $V_{ISO}$ | R.H. = 40% to 60%, t = 1 min | 5000 | | | $V_{RMS}$ |
| Isolation Resistance | $R_{ISO}$ | $V_{I-O}$ = 500VDC<br>R.H. = 40% to 60% | $5x10^{10}$ | $1x10^{11}$ | | Ω |

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

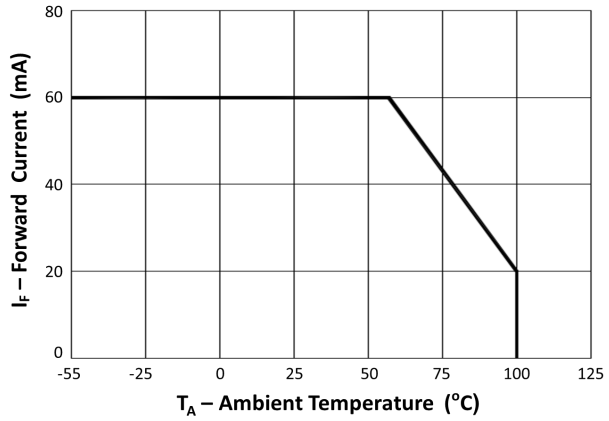



Fig 1 Forward Current vs Ambient Temperature

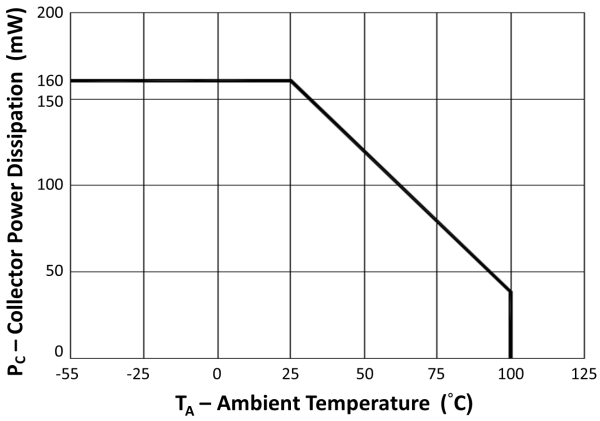



Fig 2 Collector Power Dissipation vs Ambient Temperature

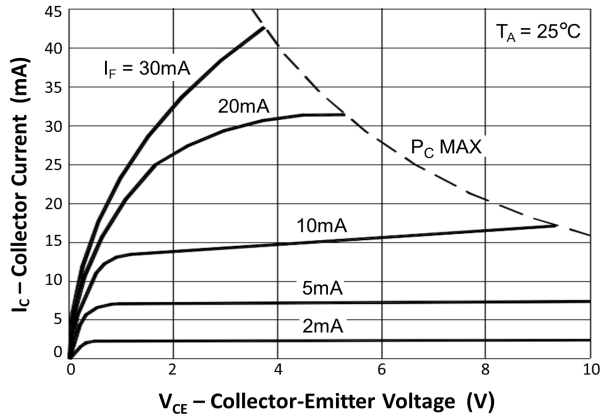



Fig 3 Collector Current vs Collector-Emitter Voltage

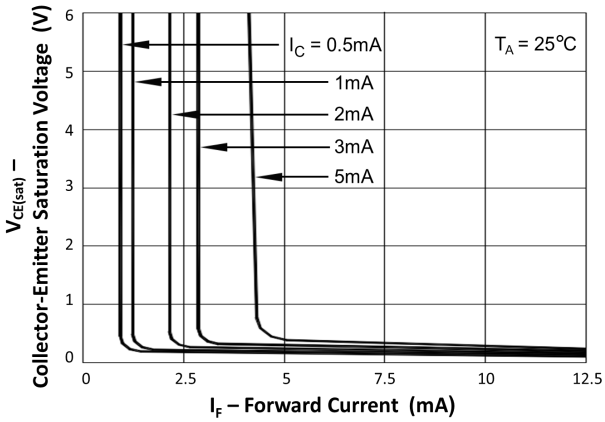



Fig 4 Collector-Emitter Saturation Voltage vs Forward Current

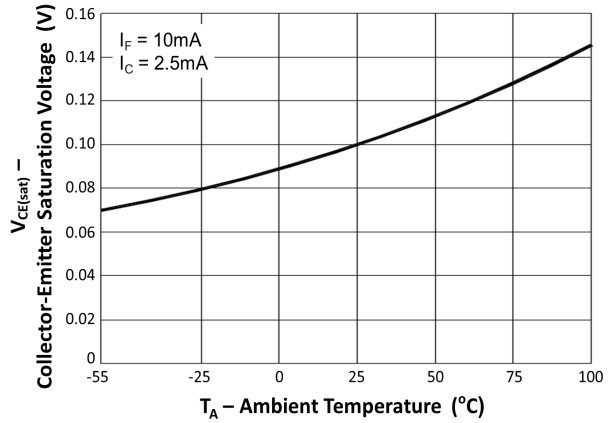



Fig 5 Collector-Emitter Saturation Voltage vs Ambient Temperature

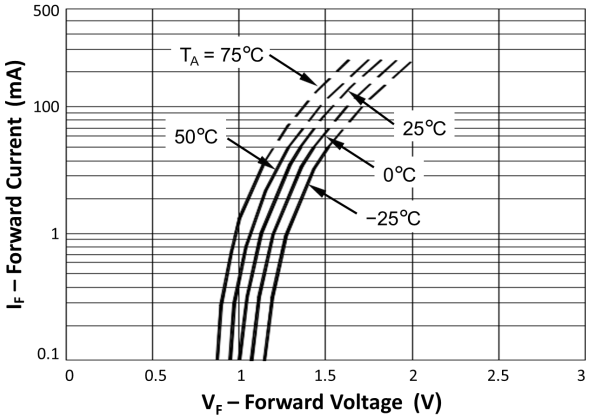



Fig 6 Forward Current vs Forward Voltage

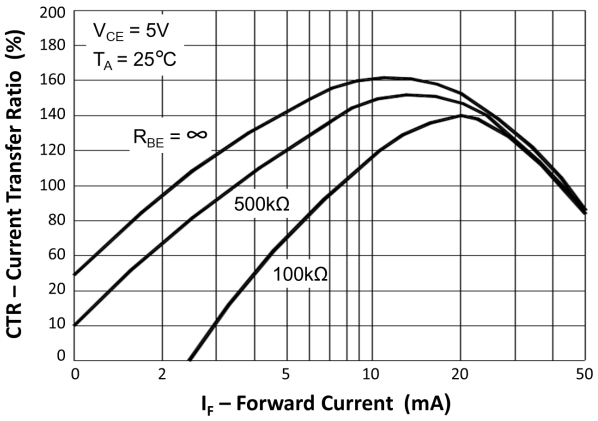



Fig 7 Current Transfer Ratio vs Forward Current

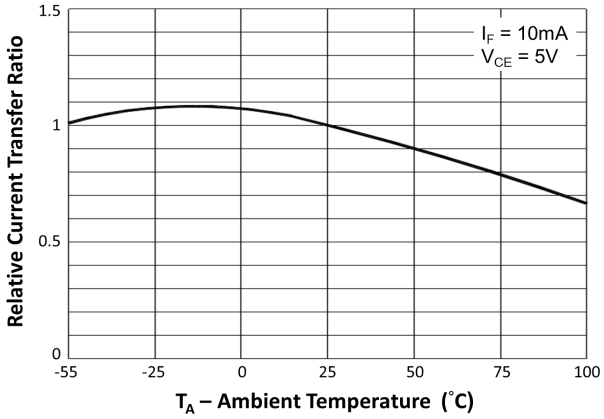



Fig 8 Relative Current Transfer Ratio vs Ambient Temperature

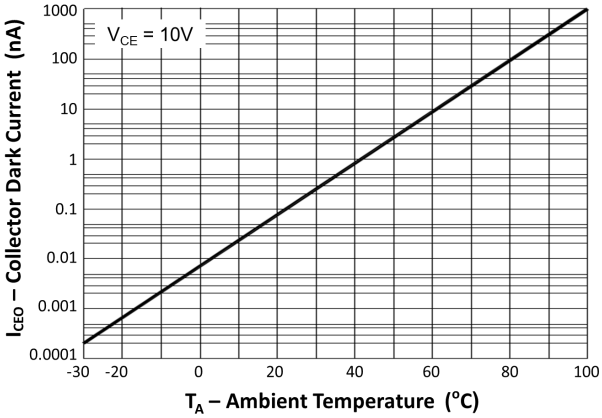



Fig 9 Collector Dark Current vs Ambient Temperature

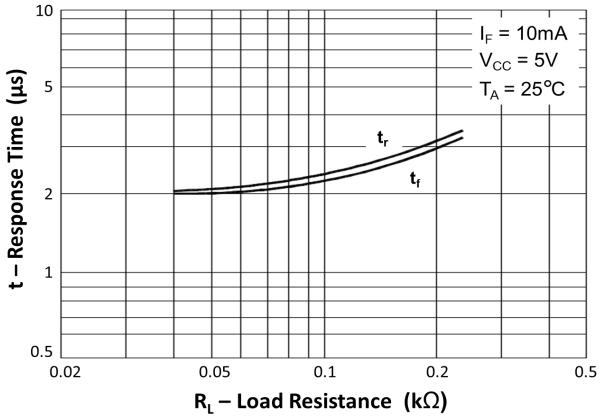



Fig 10 Response Time vs Load Resistance

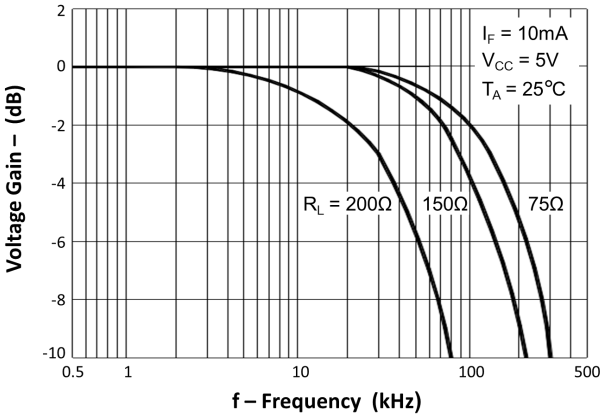
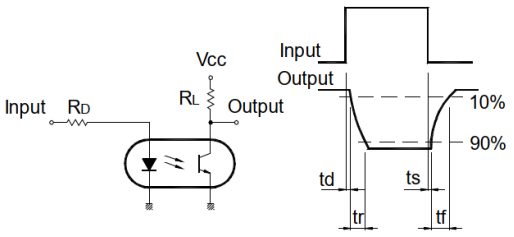
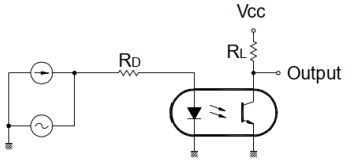



Fig 11 Frequency Response




Response Time Test Circuit



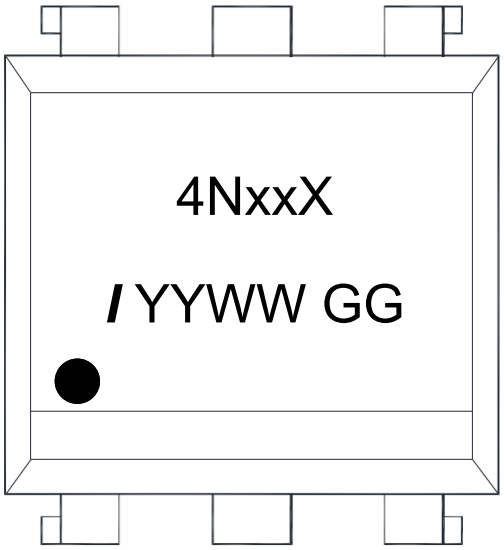

Frequency Response Test Circuit

## ORDER INFORMATION

| 4N25, 4N26, 4N27, 4N28 (UL Approval) | | | |
|---|---|---|---|
| **After PN** | **PN** | **Description** | **Packing quantity** |
| None | 4N25, 4N26, 4N27, 4N28 | Standard DIP6 | 65 pcs per tube |
| G | 4N25G, 4N26G, 4N27G, 4N28G | 10mm Lead Spacing | 65 pcs per tube |
| SM | 4N25SM, 4N26SM, 4N27SM, 4N28SM | Surface Mount | 65 pcs per tube |
| SMT&R | 4N25SMT&R, 4N26SMT&R<br>4N27SMT&R, 4N28SMT&R | Surface Mount<br>Tape and Reel | 1000 pcs per reel |

| 4N25X, 4N26X, 4N27X, 4N28X (UL and VDE Approvals) | | | |
|---|---|---|---|
| **After PN** | **PN** | **Description** | **Packing quantity** |
| None | 4N25X, 4N26X, 4N27X, 4N28X | Standard DIP6 | 65 pcs per tube |
| G | 4N25XG, 4N26XG, 4N27XG, 4N28XG | 10mm Lead Spacing | 65 pcs per tube |
| SM | 4N25XSM, 4N26XSM<br>4N27XSM, 4N28XSM | Surface Mount | 65 pcs per tube |
| SMT&R | 4N25XSMT&R, 4N26XSMT&R<br>4N27XSMT&R, 4N28XSMT&R | Surface Mount<br>Tape and Reel | 1000 pcs per reel |

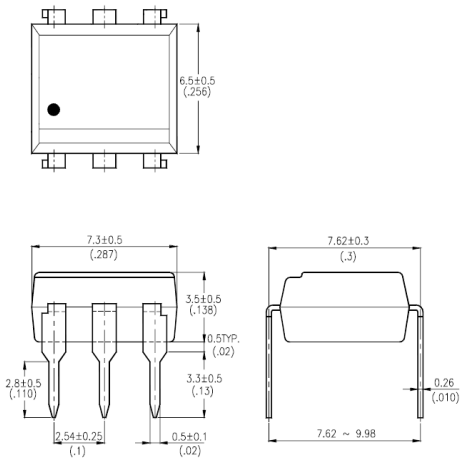
## DEVICE MARKING



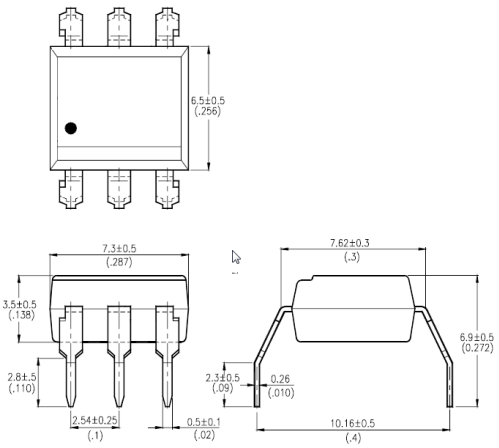

| | |
|---|---|
| xx | Device Grade (25, 26, 27, 28) |
| X | VDE Option |
| *I* | Isocom Components 2004 Ltd. |
| YY | Year Code (24=2024) |
| WW | Week Code (01 to 52) |
| GG | UL Model |

## PACKAGE DIMENSIONS in mm (inch)

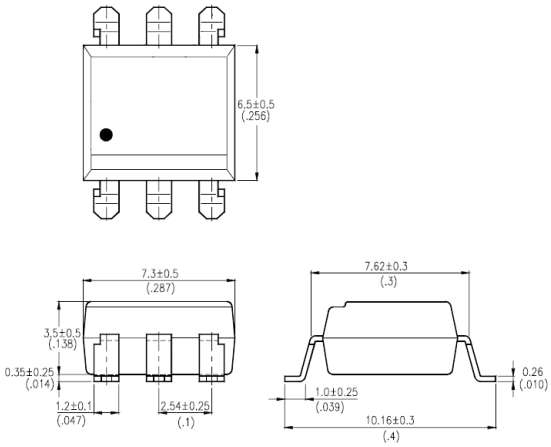
### DIP



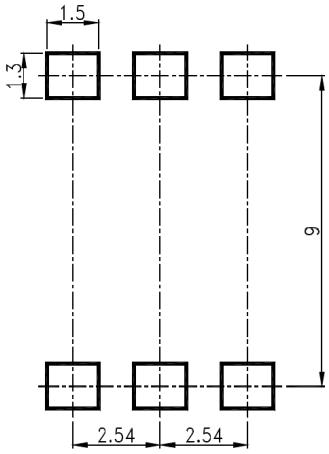

### G Form



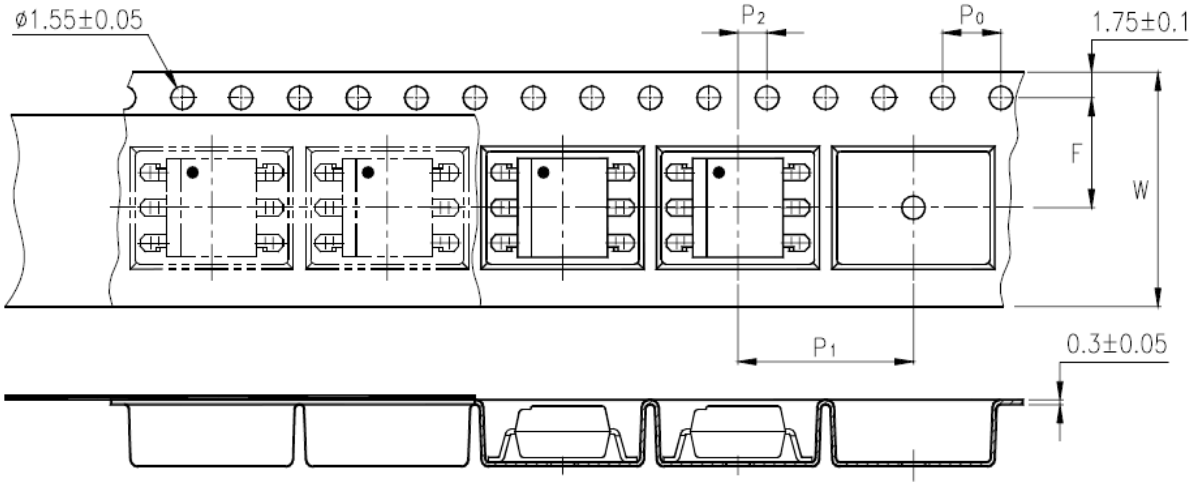

### Surface Mount



## RECOMMENDED SOLDER PAD LAYOUT (mm)



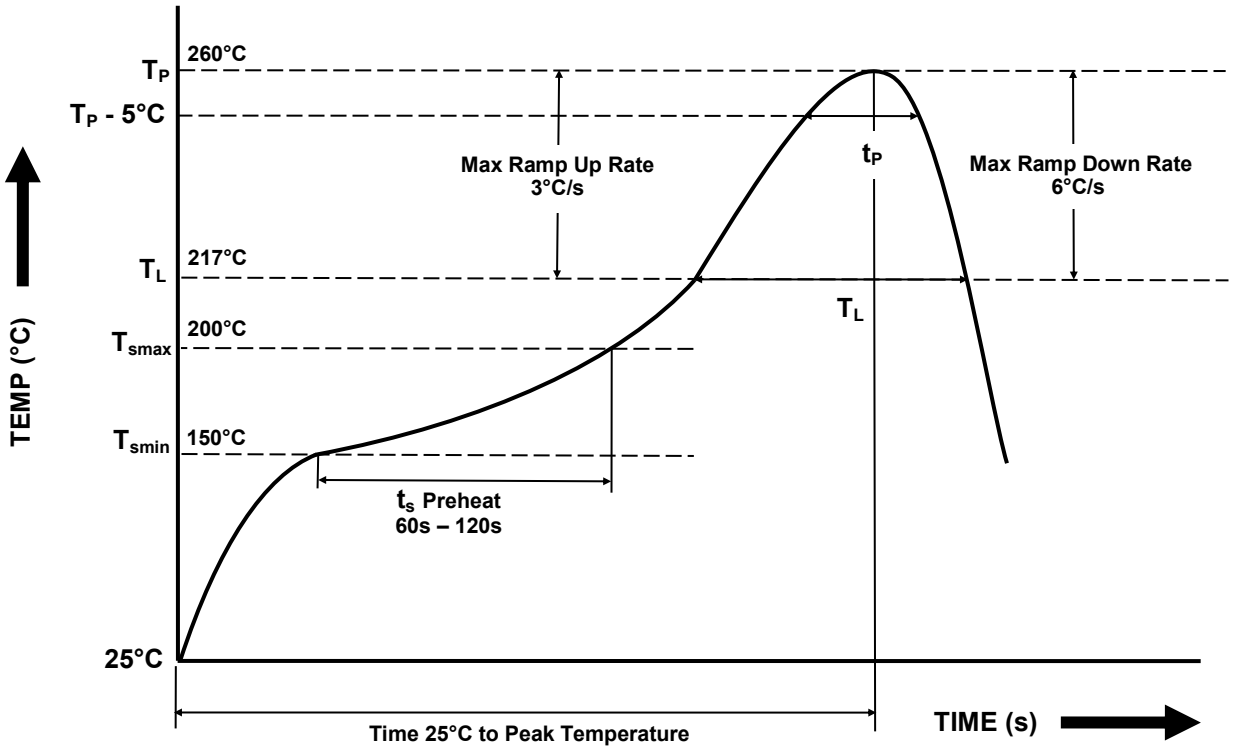

## TAPE AND REEL PACKAGING




| 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

**One Time Reflow Soldering is Recommended.**
**Do not immerse device body in solder paste.**




| Profile Details | Conditions |
|---|---|
| **Preheat**<br>- Min Temperature ($T_{SMIN}$)<br>- Max Temperature ($T_{SMAX}$)<br>- Time $T_{SMIN}$ to $T_{SMAX}$ ($t_s$) | <br>150°C<br>200°C<br>60s - 120s |
| **Soldering Zone**<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°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 $T_L$) | <br>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 |

ISOCOM COMPONENTS

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