

ILD, ILQ Series



DESCRIPTION

The ILD dual channel and ILQ quad channel optically coupled isolators consist of an infrared light emitting diode and an NPN silicon photo transistor mounted in a space efficient Dual In Line Plastic Package.

FEATURES

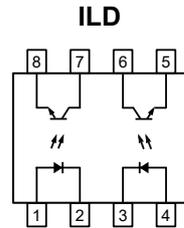
- AC Isolation Voltage 5000V_{RMS}
- BV_{CEO} 70V min - ILD2, ILQ2, ILD5, ILQ5
50V min - ILD1, ILQ1, ILD74, ILQ74
- Wide Operating Temperature Range
-40°C to +105°C
- RoHS Compliant
- UL File E91231 Model "FF"
- VDE Approval 40028086

APPLICATIONS

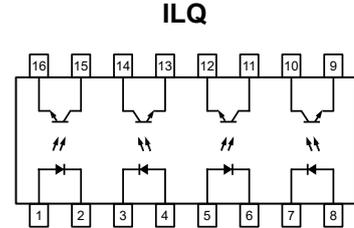
- Programmable Controllers
- Hybrid substrates require high density mounting.

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



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



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

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 |
| Pulse Forward Current (Pulse 100µs Frequency 100Hz) | 1A |
| Reverse Voltage | 6V |
| Power Dissipation | 70mW |

Output

| | |
|---|-------|
| Collector to Emitter Voltage V _{CEO} | |
| ILD2, ILQ2, ILD5, ILQ5 | 70V |
| ILD1, ILQ1, ILD74, ILQ74 | 50V |
| Emitter to Collector Voltage V _{ECO} | 6V |
| Collector Current | 50mA |
| Power Dissipation | 150mW |

Total Package

| | |
|----------------------------------|----------------------|
| Isolation Voltage | 5000V _{RMS} |
| Total Power Dissipation | 200mW |
| Operating Temperature | -40 to +105°C |
| Storage Temperature | -55 to +125°C |
| Junction Temperature | 125°C |
| Lead Soldering Temperature (10s) | 260°C |

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ILD, ILQ Series

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 Current | 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} | $I_C = 1\text{mA}$ | | | | V |
| | | ILD2, ILQ2, ILD5, ILQ5 ILD1, ILQ1, ILD74, ILQ74 | 70 50 | | | |
| Emitter-Collector Breakdown Voltage | BV_{ECO} | $I_E = 10\mu\text{A}$ | 6 | | | V |
| Collector-Emitter Dark Current | I_{CEO} | $V_{CE} = 20\text{V}$ | | | 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 | $I_F = 10\text{mA}, V_{CE} = 10\text{V}$ | | | | % |
| | | ILD1, ILQ1 | 20 | | 300 | |
| | | ILD2, ILQ2 | 100 | | 500 | |
| | | ILD5, ILQ5 | 50 | | 400 | |
| | Saturated CTR | $I_F = 16\text{mA}, V_{CE} = 5\text{V}$ | 12.5 | | | |
| | | ILD74, ILQ74 | | | | |
| | | $I_F = 10\text{mA}, V_{CE} = 0.4\text{V}$ | | 75 | | |
| | | ILD1, ILQ1 | | 170 | | |
| | | ILD2, ILQ2 | | 100 | | |
| | | ILD5, ILQ5 | | | | |
| | | $I_F = 16\text{mA}, V_{CE} = 0.5\text{V}$ | 12.5 | | | |
| | | ILD74, ILQ74 | | | | |
| 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 | $V_{CE} = 2\text{V}$ $I_C = 2\text{mA}$ $R_L = 100\Omega$ | | 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 | 5000 | | | 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.

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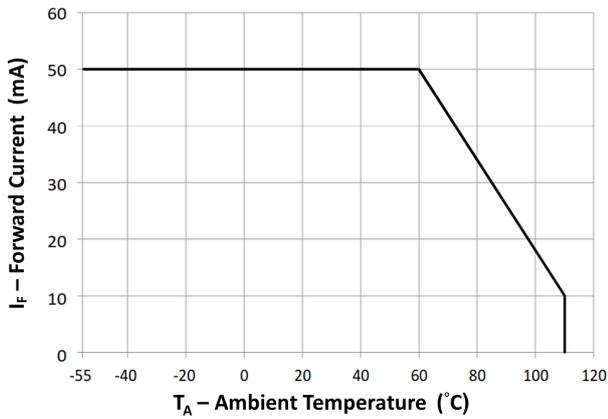


Fig 1 Forward Current vs Ambient Temperature

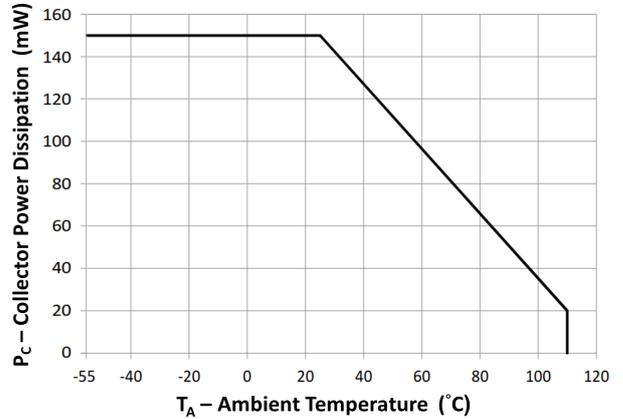


Fig 2 Collector Power Dissipation vs Ambient Temperature

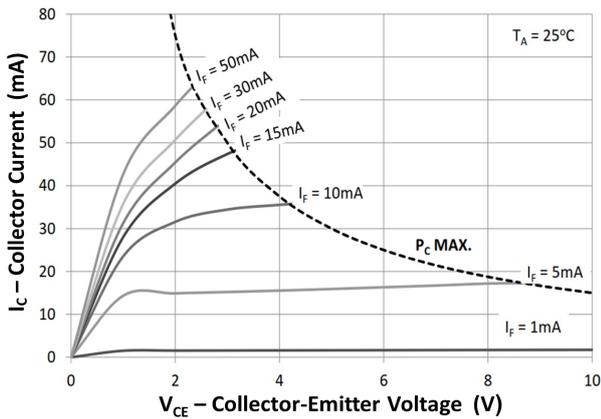


Fig 3 Collector Current vs Collector-Emitter Voltage (1)

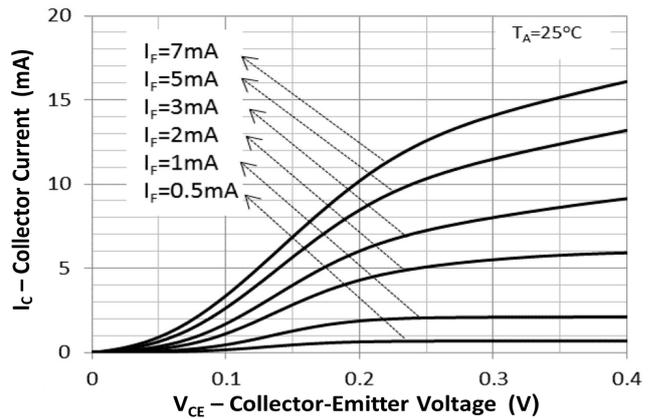


Fig 4 Collector Current vs Collector-Emitter Voltage (2)

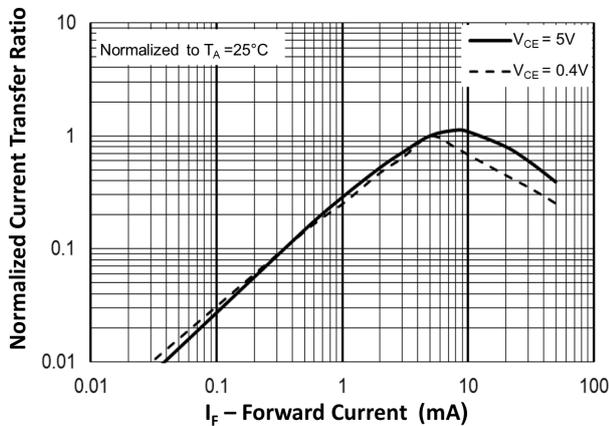


Fig 5 Current Transfer Ratio vs Forward Current

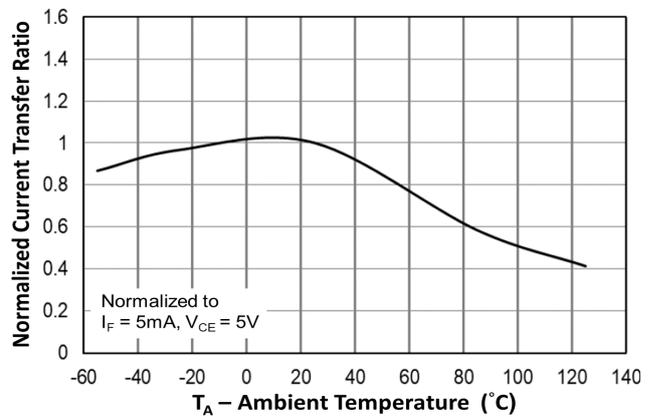


Fig 6 Normalized Current Transfer Ratio vs Ambient Temperature

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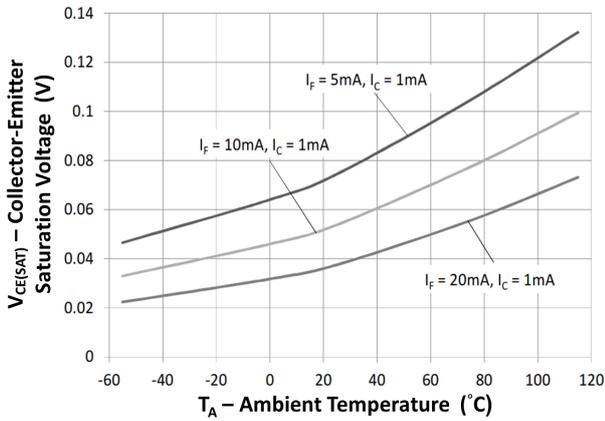


Fig 7 Collector-Emitter Saturation Voltage vs Ambient Temperature

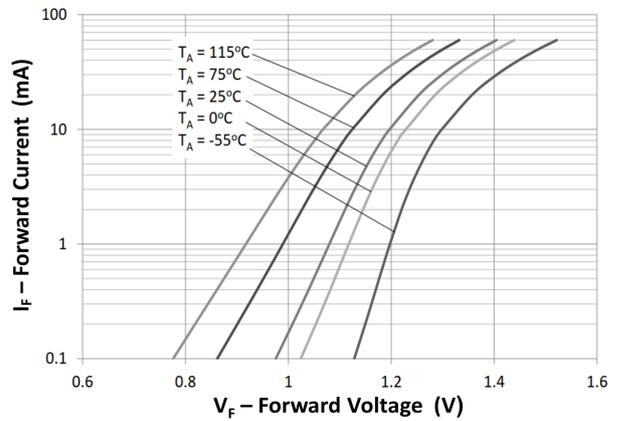


Fig 8 Forward Current vs Forward Voltage

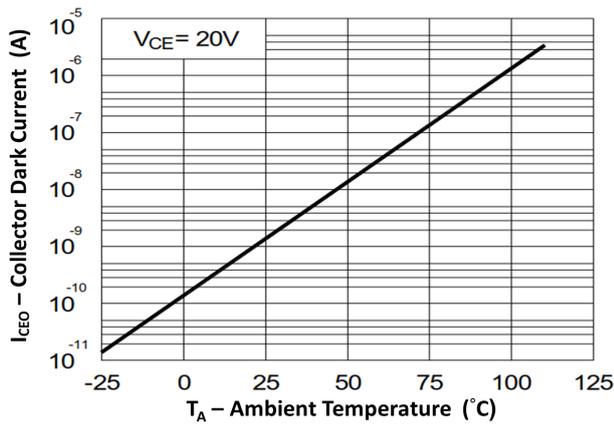


Fig 9 Collector Dark Current vs Ambient Temperature

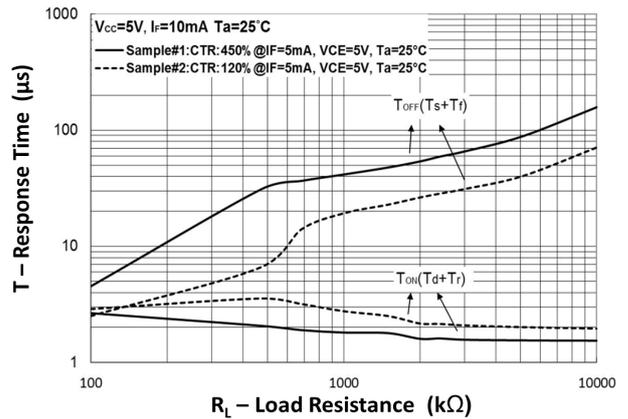


Fig 10 Response Time vs Load Resistance

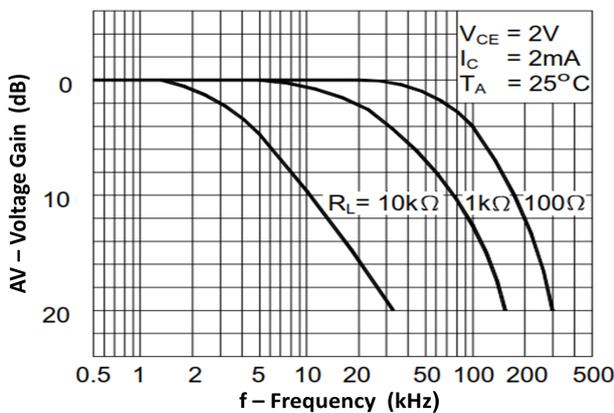
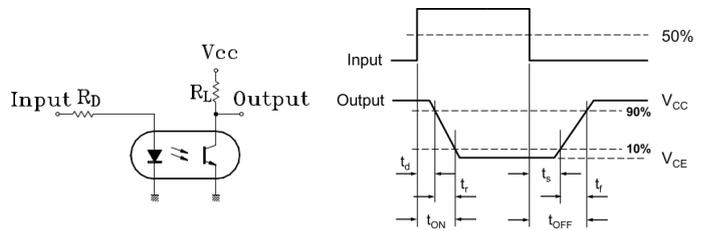
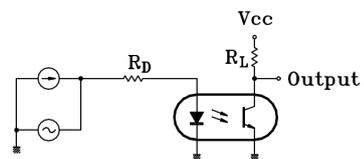


Fig 11 Frequency Response



Response Time Test Circuit



Frequency Response Test Circuit

ILD, ILQ Series

ORDER INFORMATION

| ILD Series (UL Approval) | | | |
|--------------------------|---|---------------------------|-------------------|
| After PN | PN | Description | Packing quantity |
| None | ILD1, ILD2, ILD5, ILD74 | Standard DIP8 | 50 pcs per tube |
| G | ILD1G, ILD2G, ILD5G, ILD74G | 10mm Lead Spacing | 50 pcs per tube |
| SM | ILD1SM, ILD2SM, ILD5SM, ILD74SM | Surface Mount | 50 pcs per tube |
| SMT&R | ILD1SMT&R, ILD2SMT&R ILD5SMT&R, ILD74SMT&R | Surface Mount Tape & Reel | 1000 pcs per reel |

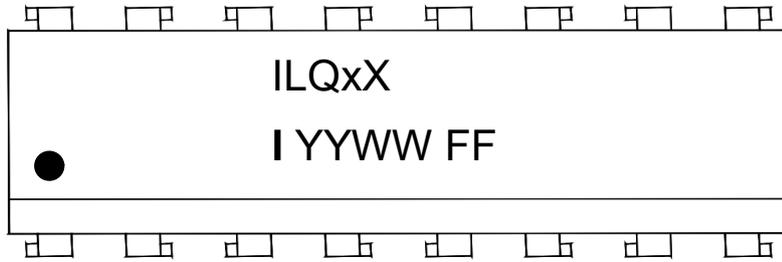
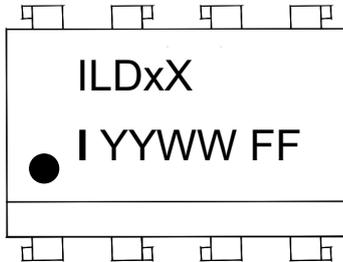
| ILD Series (UL and VDE Approvals) | | | |
|-----------------------------------|---|---------------------------|-------------------|
| After PN | PN | Description | Packing quantity |
| None | ILD1X, ILD2X, ILD5X, ILD74X | Standard DIP8 | 50 pcs per tube |
| G | ILD1XG, ILD2XG, ILD5XG, ILD74XG | 10mm Lead Spacing | 50 pcs per tube |
| SM | ILD1XSM, ILD2XSM ILD5XSM, ILD74XSM | Surface Mount | 50 pcs per tube |
| SMT&R | ILD1XSMT&R, ILD2XSMT&R ILD5XSMT&R, ILD74XSMT&R | Surface Mount Tape & Reel | 1000 pcs per reel |

| ILQ Series (UL Approval) | | | |
|--------------------------|--|---------------------------|------------------|
| After PN | PN | Description | Packing quantity |
| None | ILQ1, ILQ2, ILQ5, ILQ74 | Standard DIP8 | 25pcs per tube |
| G | ILQ1G, ILQ2G, ILQ5G, ILQ74G | 10mm Lead Spacing | 25 pcs per tube |
| SM | ILQ1SM, ILQ2SM, ILQ5SM, ILQ74SM | Surface Mount | 25 pcs per tube |
| SMT&R | ILQ1SMT&R, ILQ2SMT&R, ILQ5SMT&R, ILQ74SMT&R | Surface Mount Tape & Reel | 750 pcs per reel |

| ILQ Series (UL and VDE Approvals) | | | |
|-----------------------------------|--|---------------------------|------------------|
| After PN | PN | Description | Packing quantity |
| None | ILQ1X, ILQ2X, ILQ5X, ILQ74X | Standard DIP8 | 25pcs per tube |
| G | ILQ1G, ILQ2G, ILQ5G, ILQ74G | 10mm Lead Spacing | 25 pcs per tube |
| SM | ILQ1XSM, ILQ2XSM ILQ5XSM, ILQ74XSM | Surface Mount | 25 pcs per tube |
| SMT&R | ILQ1XSMT&R, ILQ2XSMT&R, ILQ5XSMT&R, ILQ74XSMT&R | Surface Mount Tape & Reel | 750 pcs per reel |

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DEVICE MARKING



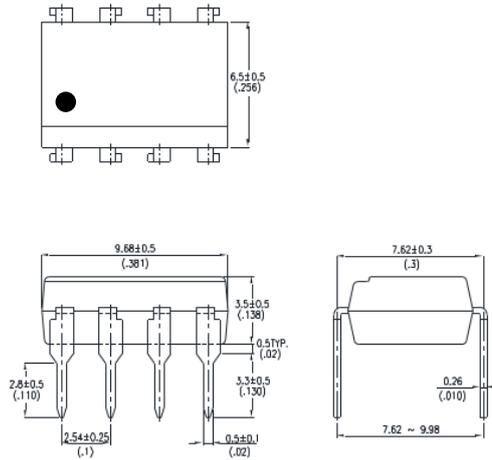
| | |
|-------------|---|
| ILDx / ILQx | Device Part Number where x is "1", "2", "5" or "74" |
| X | VDE version |
| I | Isocom |
| YY | Year code |
| WW | Week code |
| FF | UL Model |

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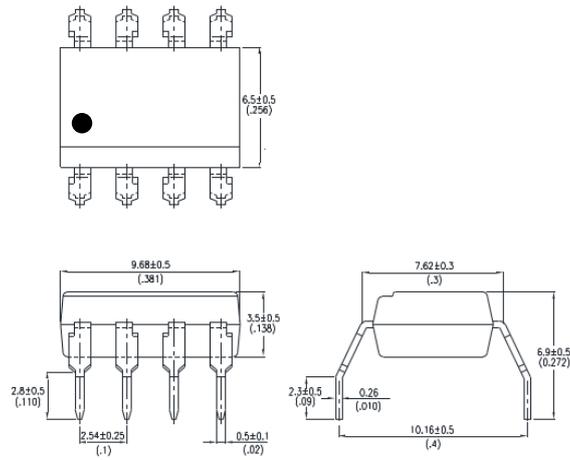
PACKAGE DIMENSIONS in mm (inch)

ILDx

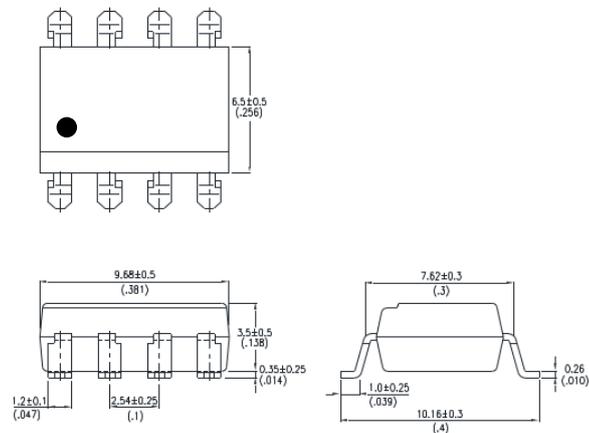
ILDx



ILDxG



ILDxSM

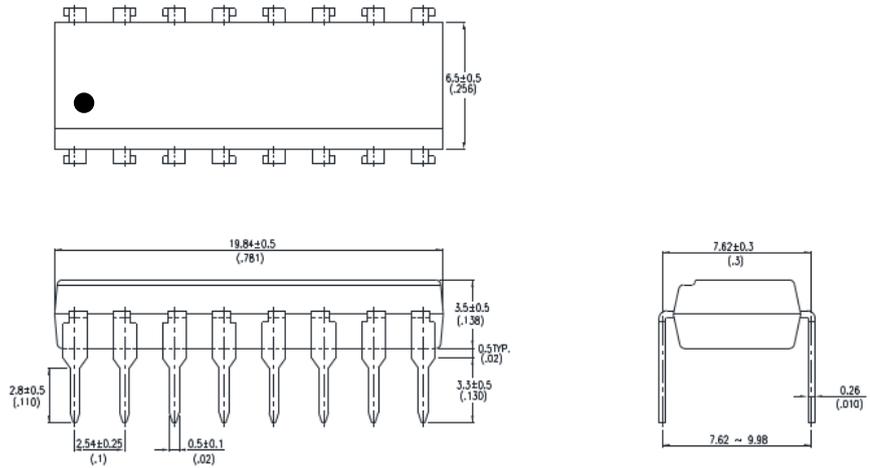


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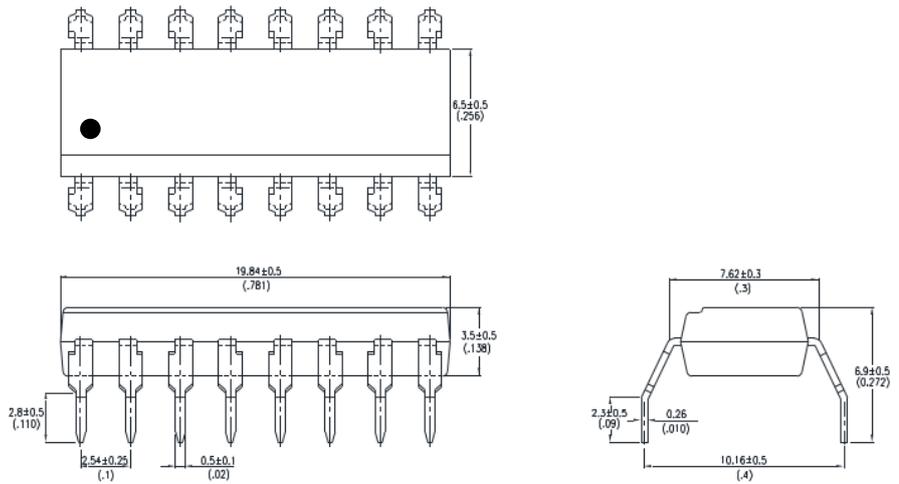
PACKAGE DIMENSIONS in mm (inch)

ILQx

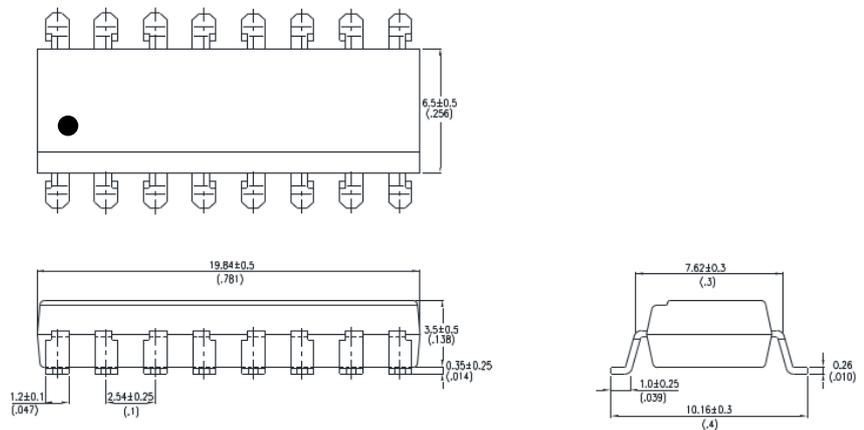
ILQx



ILQxG



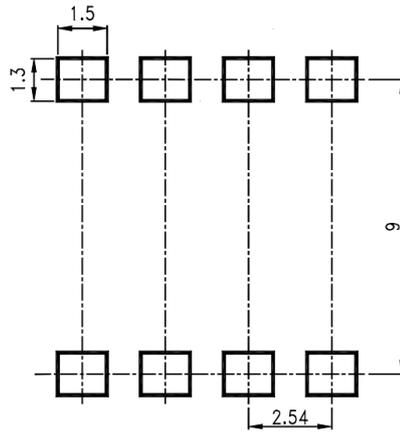
ILQxSM



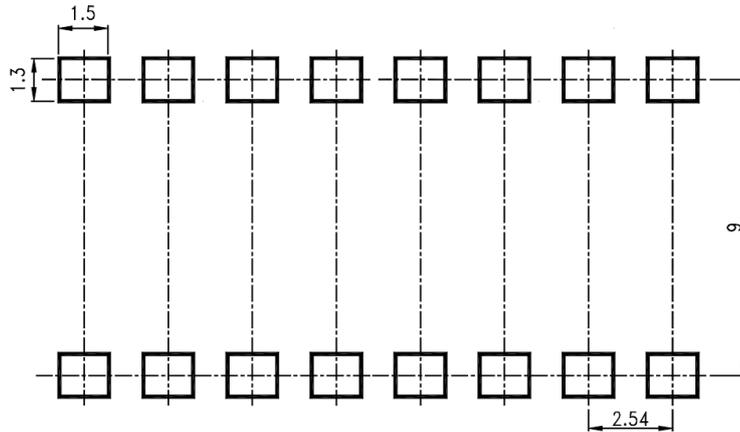
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RECOMMENDED PAD LAYOUT FOR SMD (mm)

ILDxSM



ILQxSM

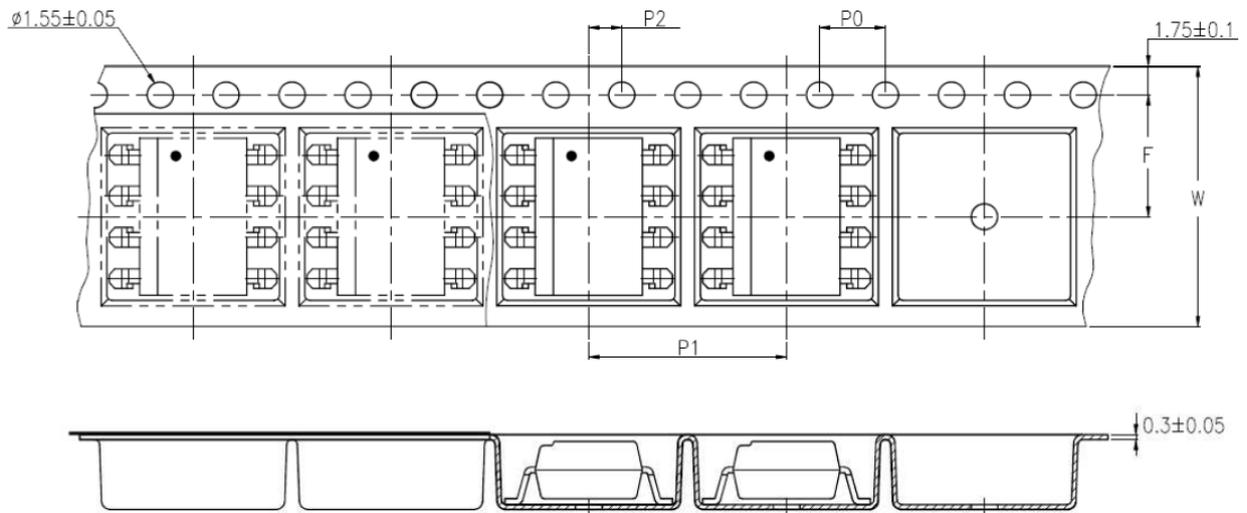




ILD, ILQ Series

TAPE AND REEL PACKAGING

ILDxSMT&R

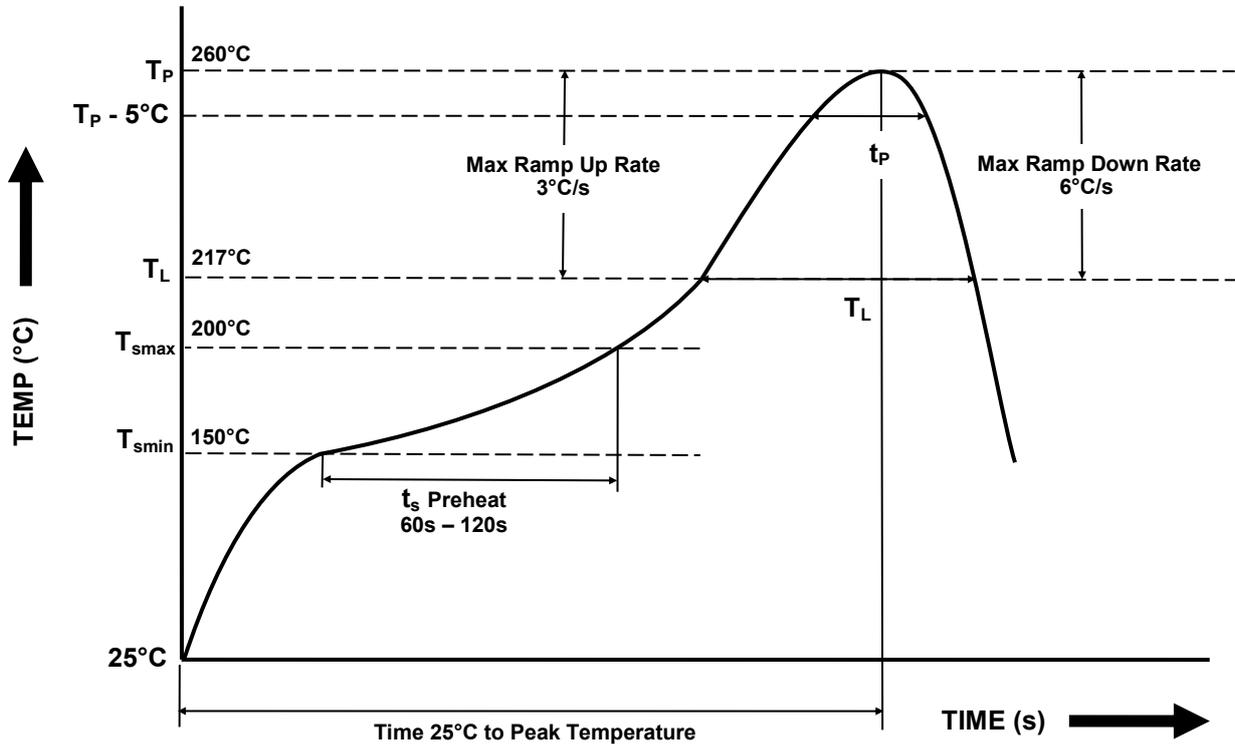


| Description | Symbol | Dimension mm (inch) |
|---|--------|------------------------|
| Tape Width | W | 16 ± 0.3 (0.63) |
| Pitch of Sprocket Holes | P_0 | 4 ± 0.1 (0.15) |
| Distance of Compartment to Sprocket Holes | F | 7.5 ± 0.1 (0.295) |
| | P_2 | 2 ± 0.1 (0.079) |
| Distance of Compartment to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



ILD, ILQ Series

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 ($T_P - 5^\circ C$) - 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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