

ISO7830x High-Performance, 8000V_{PK} Reinforced Triple Digital Isolators

1 Features

- Signaling Rate: Up to 100Mbps
- Wide Supply Range: 2.25V to 5.5V
- 2.25V to 5.5V Level Translation
- Wide Temperature Range: -55°C to 125°C
- Low Power Consumption, Typical 1.6mA per Channel at 1Mbps
- Low Propagation Delay: 11ns Typical (5V Supplies)
- Industry leading CMTI (min): ±100kV/µs
- Robust Electromagnetic Compatibility (EMC)
- System-Level ESD, EFT, and Surge Immunity
- Low Emissions
- Isolation Barrier Life: > 40 Years
- SOIC-16 Wide Body (DW) and Extra-Wide Body (DWW) Package Options
- Safety-Related Certifications:
 - 8000V_{PK} Reinforced Isolation per DIN EN IEC 60747-17 (VDE 0884-17)
 - 5.7kV_{RMS} Isolation for 1 Minute per UL 1577
 - IEC 61010-1, IEC 62368-1, IEC 60601-1, and GB 4943.1 certifications

2 Applications

- **Industrial Automation**
- **Motor Control**
- **Power Supplies**
- Solar Inverters
- Medical Equipment
- Hybrid Electric Vehicles

3 Description

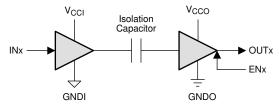
The ISO7830x device is a high-performance, 3channel digital isolator with 8000V_{PK} isolation voltage. This device has reinforced isolation certifications according to VDE, CSA, TUV and CQC. The isolator provides high electromagnetic immunity and low emissions at low power consumption, while isolating CMOS or LVCMOS digital I/Os.

Each isolation channel has a logic input and output buffer separated by silicon dioxide (SiO2) insulation barrier. This device comes with enable pins which can be used to put the respective outputs in high impedance for multi-master driving applications and to reduce power consumption. The ISO7830x device has three forward and no reverse-direction channels. If the input power or signal is lost, the default output is high for the ISO7830 device and low for the ISO7830F device. See Section 7.4 for further details.

Used in conjunction with isolated power supplies, this device helps prevent noise currents on a data bus or other circuits from entering the local ground and interfering with or damaging sensitive circuitry. Through remarkable chip design and layout techniques, electromagnetic compatibility of ISO7830x has been significantly enhanced to ease system-level ESD, EFT, surge, and emissions compliance. ISO7830x is available in a 16-pin SOIC wide-body (DW) and extra-wide body (DWW) packages.

Package Information

| PART NUMBER | PACKAGE | PACKAGE SIZE | | |
|-------------|----------------|------------------|--|--|
| ISO7830 | DW (16, SOIC) | 10.30mm × 7.50mm | | |
| ISO7830F | DWW (16, SOIC) | 10.30mm × 14.0mm | | |



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V_{CCI} and GNDI are supply and ground connections respectively for the input channels.

V_{CCO} and GNDO are supply and ground connections respectively for the output channels.

Simplified Schematic



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4 Pin Configuration and Functions

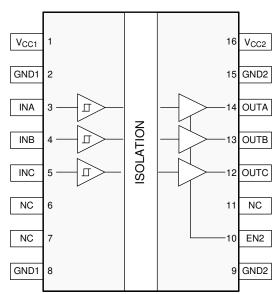


Figure 4-1. DW and DWW Packages 16-Pin SOIC Top View

Pin Functions

| PIN | ١ | Type ⁽¹⁾ | DESCRIPTION |
|------------------|----------|---------------------|--|
| NAME | NO. | Type | DESCRIPTION |
| EN2 | 10 | I | Output enable 2. Output pins on side 2 are enabled when EN2 is high or open and in high-impedance state when EN2 is low. |
| GND1 | 2, 8 | _ | Ground connection for V _{CC1} |
| GND2 | 9, 15 | _ | Ground connection for V _{CC2} |
| INA | 3 | I | Input, channel A |
| INB | 4 | I | Input, channel B |
| INC | 5 | I | Input, channel C |
| OUTA | 14 | 0 | Output, channel A |
| OUTB | 13 | 0 | Output, channel B |
| OUTC | 12 | 0 | Output, channel C |
| NC | 6, 7, 11 | _ | Not connected |
| V _{CC1} | 1 | _ | Power supply, side 1 |
| V _{CC2} | 16 | _ | Power supply, side 2 |

(1) I = Input, O = Output



5 Specifications

5.1 Absolute Maximum Ratings

See (1)

| | | MIN | MAX | UNIT |
|--------------------------------------|-------------------------------|------|-----------------------|------|
| V _{CC1} V _{CC2} | Supply voltage ⁽²⁾ | -0.5 | 6 | V |
| V | Voltage at INx, OUTx, or EN2x | -0.5 | $V_{CCx} + 0.5^{(3)}$ | V |
| Io | Output current | -15 | 15 | mA |
| TJ | Junction temperature | -55 | 150 | °C |
| T _{stg} | Storage temperature | -65 | 150 | °C |

- (1) Operation outside the Absolute Maximum Ratings may cause permanent device damage. Absolute Maximum Ratings do not imply functional operation of the device at these or any other conditions beyond those listed under Recommended Operating Conditions. If used outside the Recommended Operating Conditions but within the Absolute Maximum Ratings, the device may not be fully functional, and this may affect device reliability, functionality, performance, and shorten the device lifetime.
- (2) All voltage values except differential I/O bus voltages are with respect to the local ground terminal (GND1 or GND2) and are peak voltage values.
- (3) Maximum voltage must not exceed 6V

5.2 ESD Ratings

| | | | | VALUE | UNIT |
|----|--|--|--|-------|------|
| , | , | | Human body model (HBM), per ANSI/ESDA/JEDEC JS-001 ⁽¹⁾ | ±6000 | V |
| Ι, | V _(ESD) Electrostatic discharge | | Charged device model (CDM), per JEDEC specification JESD22-C101 ⁽²⁾ | ±1500 | V |

- (1) JEDEC document JEP155 states that 500V HBM allows safe manufacturing with a standard ESD control process.
- (2) JEDEC document JEP157 states that 250V CDM allows safe manufacturing with a standard ESD control process.

5.3 Recommended Operating Conditions

| | | | MIN | NOM | MAX | UNIT |
|--|---------------------------|--------------------------------------|---------------------------------------|-----|---------------------------------------|-----------|
| V _{CC1} , V _{CC2} | Supply voltage | | 2.25 | | 5.5 | V |
| | | V _{CCO} ⁽¹⁾ = 5V | -4 | | | |
| I _{OH} | High-level output current | $V_{CCO}^{(1)} = 3.3V$ | -2 | | | mA |
| | | $V_{CCO}^{(1)} = 2.5V$ | -1 | | | |
| | | V _{CCO} ⁽¹⁾ = 5V | | | 4 | 4 2 mA |
| I _{OL} | Low-level output current | $V_{CCO}^{(1)} = 3.3V$ | | | 2 | |
| | | $V_{CCO}^{(1)} = 2.5V$ | | | 1 | |
| V _{IH} | High-level input voltage | ' | 0.7 × V _{CCI} ⁽¹⁾ | | V _{CCI} (1) | V |
| V _{IL} | Low-level input voltage | | 0 | | 0.3 × V _{CCI} ⁽¹⁾ | V |
| DR | Signaling rate | | 0 | | 100 | Mbps |
| T _A | Ambient temperature | | -55 | 25 | 125 | °C |

(1) V_{CCI} = Input-side V_{CC} ; V_{CCO} = Output-side V_{CC} .



5.4 Thermal Information

| | | ISO7 | | |
|---------------------------|--|-----------|------------|------|
| | THERMAL METRIC ⁽¹⁾ | DW (SOIC) | DWW (SOIC) | UNIT |
| | | 16 PINS | 16 PINS | |
| $R_{\theta JA}$ | Junction-to-ambient thermal resistance | 81.1 | 83.4 | °C/W |
| R _{0JC(top)} | Junction-to-case(top) thermal resistance | 43.8 | 45.2 | °C/W |
| R _{θJB} | Junction-to-board thermal resistance | 45.7 | 54.1 | °C/W |
| ΨЈТ | Junction-to-top characterization parameter | 17.0 | 17.6 | °C/W |
| Ψ_{JB} | Junction-to-board characterization parameter | 45.2 | 53.3 | °C/W |
| R ₀ JC(bottom) | Junction-to-case(bottom) thermal resistance | _ | _ | °C/W |

For more information about traditional and new thermal metrics, see the Semiconductor and IC Package Thermal Metrics application

5.5 Power Rating

| | PARAMETER | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|-----------------|-------------------------------------|---|-----|-----|-----|------|
| P_{D} | Maximum power dissipation | V _{CC1} = V _{CC2} = 5.5V, T _J = 150°C, | | | 150 | mW |
| P _{D1} | | C _L = 15pF, input a 50MHz 50% duty cycle | | | 25 | mW |
| P _{D2} | Maximum power dissipation by side-2 | square wave | | | 125 | mW |



5.6 Insulation Specifications

| | | TEST COMPLETIONS | SPECIF | ICATION | UNIT | |
|-------------------|---|--|-------------------|-------------------|------------------|--|
| | PARAMETER | TEST CONDITIONS | DW | DWW | 1 | |
| 01.0 | E | Shortest terminal-to-terminal distance through air | >8 | >14.5 | mm | |
| CLR | External clearance ⁽¹⁾ | Shortest terminal-to-terminal distance through air (typical) | | 15.0 | mm | |
| ODC. | - (1) | Shortest terminal-to-terminal distance across the package surface | | >14.5 | mm | |
| CPG | External creepage ⁽¹⁾ | Shortest terminal-to-terminal distance across the package surface (typical) | | 15.0 | mm | |
| OTI | Distance through the insulation | Minimum internal gap (internal clearance) | >21 | >21 | μm | |
| CTI | Comparative tracking index | DIN EN 60112 (VDE 0303-11); IEC 60112; UL 746A | >600 | >600 | V | |
| | Material group | | I | I | | |
| | 0 | Rated mains voltage ≤ 600V _{RMS} | I–IV | I–IV | | |
| | Overvoltage category per IEC 60664-1 | Rated mains voltage ≤ 1000V _{RMS} | I–III | I–IV | | |
| DIN EN | IEC 60747-17 (VDE 0884-17) (2) | | | | | |
| V _{IORM} | Maximum repetitive peak isolation voltage | | 2121 | 2828 | V _{PK} | |
| V _{IOWM} | Maximum isolation working voltage | AC voltage (sine wave); Time dependent dielectric breakdown (TDDB) Test, see Figure 5-1 and Figure 5-2 | 1500 | 2000 | V _{RMS} | |
| IOWINI | 0 0 | DC voltage | 2121 | 2828 | V _{DC} | |
| √ _{IOTM} | Maximum transient isolation voltage | V _{TEST} = V _{IOTM} , t = 60s (qualification) V _{TEST} = 1.2 x V _{IOTM} , t= 1s (100% production) | 8000 | 8000 | V _{PK} | |
| V _{IMP} | Maximum impulse voltage (3) | Tested in air, 1.2/50µs waveform per IEC 62368-1 | 9800 | 9800 | V _{PK} | |
| V _{IOSM} | Maximum surge isolation voltage (4) | V _{IOSM} ≥ 1.3 x V _{IMP} ; Tested in oil (qualification test), 1.2/50-µs waveform per IEC 62368-1 | 12800 | 12800 | V _{PK} | |
| 100111 | Apparent charge ⁽⁵⁾ | Method a: After I/O safety test subgroup 2/3, $V_{ini} = V_{IOTM}, t_{ini} = 60s; \\ V_{pd(m)} = 1.2 \times V_{IOTM} = 2545V_{PK} (DW) \text{ and } 3394V_{PK} (DWW), t_m = 10s$ | ≤5 | ≤5 | | |
| q _{pd} | | Method a: After environmental tests subgroup 1, $V_{ini} = V_{IOTM}$, $t_{ini} = 60s$; $V_{pd(m)} = 1.6 \times V_{IORM} = 3394 V_{PK}$ (DW) and 4525 V_{PK} (DWW), $t_m = 10s$ | ≤5 | ≤5 | pC | |
| | | Method b: At routine test (100% production); $V_{ini} = 1.2 \times V_{IOTM}, t_{ini} = 1s;$ $V_{pd(m)} = 1.875 \times V_{IORM}, t_m = 1s \text{ (method b1) or }$ $V_{pd(m)} = V_{ini}, t_m = t_{ini} \text{ (method b2)}$ | ≤5 | ≤5 | | |
| C _{IO} | Barrier capacitance, input to output ⁽⁶⁾ | $V_{IO} = 0.4 \times \sin(2\pi ft)$, f = 1MHz | 2 | 2 | pF | |
| | | V _{IO} = 500V, T _A = 25°C | >1012 | >1012 | | |
| R _{IO} | Isolation resistance, input to output (6) | V _{IO} = 500V, 100°C ≤ T _A ≤ 125°C | >10 ¹¹ | >10 ¹¹ | Ω | |
| | | V _{IO} = 500V at T _S = 150°C | >10 ⁹ | >109 | 1 | |
| | Pollution degree | | 2 | 2 | | |
| | Climatic category | | 55/125/21 | 55/125/21 | | |
| JL 1577 | | 1 | | 1 | | |
| V _{ISO} | Withstand isolation voltage | V_{TEST} = V_{ISO} = 5700 V_{RMS} , t = 60s (qualification), V_{TEST} = 1.2 × V_{ISO} = 6840 V_{RMS} , t = 1s (100% production) | 5700 | 5700 | V _{RMS} | |
| | | | | | | |

- (1) Creepage and clearance requirements should be applied according to the specific equipment isolation standards of an application. Care should be taken to maintain the creepage and clearance distance of a board design to ensure that the mounting pads of the isolator on the printed-circuit board do not reduce this distance. Creepage and clearance on a printed-circuit board become equal in certain cases. Techniques such as inserting grooves, ribs, or both on a printed circuit board are used to help increase these specifications.
- (2) This coupler is suitable for *safe electrical insulation* only within the safety ratings. Compliance with the safety ratings shall be ensured by means of suitable protective circuits.
- (3) Testing is carried out in air to determine the surge immunity of the package.
- (4) Testing is carried out in oil to determine the intrinsic surge immunity of the isolation barrier.
- (5) Apparent charge is electrical discharge caused by a partial discharge (pd).
- 6) All pins on each side of the barrier tied together creating a two-terminal device.



5.7 Safety-Related Certifications

| VDE | CSA | UL | CQC | TUV |
|--|--|--|---------------------------------------|--|
| Certified according to DIN EN IEC 60747-17 (VDE 0884-17) | Certified according to IEC 62368-1 and IEC 60601-1 | Certified according to UL 1577 Component Recognition Program | Certified according to GB 4943.1 | Certified according to EN 61010-1 and EN 62368-1 |
| Certificate number: 40040142 | Master contract number: 220991 | File number: E181974 | Certificate number: CQC15001121716 | Client ID number: 77311 |

5.8 Safety Limiting Values

Safety limiting intends to minimize potential damage to the isolation barrier upon failure of input or output circuitry. A failure of the I/O can allow low resistance to ground or the supply and, without current limiting, dissipate sufficient power to overheat the die and damage the isolation barrier potentially leading to secondary system failures.

| | PARAMETER | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|----|---|---|-----|-----|------|------|
| DW | PACKAGE | | | | 1 | |
| | | R _{0JA} = 81.1°C/W, V _I = 5.5V, T _J = 150°C, T _A = 25°C, see Figure 5-3 | | | 280 | |
| Is | Safety input, output, or supply current | $R_{\theta JA} = 81.1^{\circ}\text{C/W}, V_I = 3.6\text{V}, T_J = 150^{\circ}\text{C}, T_A = 25^{\circ}\text{C}, \text{ see Figure 5-3}$ | | | 428 | mA |
| | cappi) callent | $R_{\theta JA} = 81.1^{\circ}\text{C/W}, V_I = 2.75\text{V}, T_J = 150^{\circ}\text{C}, T_A = 25^{\circ}\text{C}, \text{ see Figure 5-3}$ | | | 560 | |
| Ps | Safety input, output, or total power | $R_{\theta JA} = 81.1^{\circ}\text{C/W}, T_J = 150^{\circ}\text{C}, T_A = 25^{\circ}\text{C}, \text{ see Figure 5-5}$ | | | 1541 | mW |
| Ts | Maximum safety temperature | | | | 150 | °C |
| DW | W PACKAGE | | | | | |
| | 0.6.1.1.1.1.1 | R _{0JA} = 83.4°C/W, V _I = 5.5V, T _J = 150°C, T _A = 25°C, see Figure 5-4 | | | 273 | |
| Is | Safety input, output, or supply current | R _{0JA} = 83.4°C/W, V _I = 3.6V, T _J = 150°C, T _A = 25°C, see Figure 5-4 | | | 416 | mA |
| | cappi) callent | $R_{\theta JA} = 83.4$ °C/W, $V_I = 2.75$ V, $T_J = 150$ °C, $T_A = 25$ °C, see Figure 5-4 | 54 | | 545 | |
| Ps | Safety input, output, or total power | R _{0JA} = 83.4°C/W, T _J = 150°C, T _A = 25°C, see Figure 5-6 | | | 1499 | mW |
| Ts | Maximum safety temperature | | | | 150 | °C |

The maximum safety temperature is the maximum junction temperature specified for the device. The power dissipation and junction-to-air thermal impedance of the device installed in the application hardware determines the junction temperature. The assumed junction-to-air thermal resistance in the Section 5.4 is that of a device installed on a high-K test board for leaded surface mount packages. The power is the recommended maximum input voltage times the current. The junction temperature is then the ambient temperature plus the power times the junction-to-air thermal resistance.



5.9 Electrical Characteristics—5V Supply

V_{CC1} = V_{CC2} = 5V ±10% (over recommended operating conditions unless otherwise noted)

| | PARAMETER | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---------------------|------------------------------------|--|---------------------------------------|-----------------|-----|-------|
| V _{OH} | High-level output voltage | I _{OH} = -4mA; see Figure 6-1 | $V_{CCO}^{(1)} - 0.4$ | $V_{CCO} - 0.2$ | | V |
| V _{OL} | Low-level output voltage | I _{OL} = 4mA; see Figure 6-1 | | 0.2 | 0.4 | V |
| V _{I(HYS)} | Input threshold voltage hysteresis | | 0.1 × V _{CCI} ⁽¹⁾ | | | V |
| I _{IH} | High-level input current | V _{IH} = V _{CCI} at INx or EN2 | | | 10 | μA |
| I _{IL} | Low-level input current | V _{IL} = 0V at INx or EN2 | -10 | | | μA |
| СМТІ | Common-mode transient immunity | V _I = V _{CCI} or 0V, V _{CM} = 1500V; see Figure 6-4 | 100 | | | kV/μs |
| Cı | Input capacitance (2) | $V_I = V_{CC} / 2 + 0.4 \times \sin(2\pi ft)$, f = 1MHz, V_{CC} = 5V | | 2 | | pF |

- (1) V_{CCI} = Input-side V_{CC}; V_{CCO} = Output-side V_{CC}.
 (2) Measured from input pin to ground.

5.10 Supply Current Characteristics—5V Supply

 $V_{CC1} = V_{CC2} = 5V \pm 10\%$ (over recommended operating conditions unless otherwise noted)

| PARAMETER | TEST CONDITIONS | | SUPPLY CURRENT | MIN | TYP | MAX | UNIT |
|----------------------------|--|-----------|-------------------|-----|------|------|------|
| | EN2 = 0V, V _I = 0V (Devices with suff | fix F), | I _{CC1} | | 1.1 | 1.8 | |
| Supply current - disable | $V_I = V_{CCI}$ (Devices without suffix F) | | I _{CC2} | | 0.4 | 0.6 | |
| Supply current - disable | EN2 = 0V, V _I = V _{CCI} (Devices with su | uffix F), | I _{CC1} | | 4.6 | 6.6 | |
| | V _I = 0V (Devices without suffix F) | | | | 0.4 | 0.6 | |
| | V _I = 0V (Devices with suffix F), | | I _{CC1} | | 1.1 | 2 | |
| Supply current - DC | V _I = V _{CCI} (Devices without suffix F) | | I _{CC2} | | 1.7 | 2.7 | |
| signal | V _I = V _{CCI} (Devices with suffix F), V _I = 0V (Devices without suffix F) | | I _{CC1} | | 4.6 | 6.8 | mA |
| | | | I _{CC2} | | 1.9 | 2.8 | IIIA |
| | | 1Mbps | I _{CC1} | | 2.8 | 4.4 | |
| | | TIVIDPS | I _{CC2} | | 1.9 | 3 | |
| Supply current - AC signal | All channels switching with square | 10Mbpa | I _{CC1} | | 2.9 | 4.4 | |
| | wave clock input; C ₁ = 15pF | 10Mbps | I _{CC2} | | 3.3 | 4.6 | |
| | | 100Mbpa | I _{CC1} | | 3.9 | 4.9 | |
| | | 100Mbps | | | 17.5 | 20.8 | |

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5.11 Electrical Characteristics—3.3V Supply

 $V_{CC1} = V_{CC2} = 3.3V \pm 10\%$ (over recommended operating conditions unless otherwise noted)

| | PARAMETER | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---------------------|------------------------------------|--|---------------------------------------|------------------------|-----|-------|
| V _{OH} | High-level output voltage | I _{OH} = -2mA; see Figure 6-1 | V _{CCO} ⁽¹⁾ – 0.4 | V _{CCO} - 0.2 | | V |
| V _{OL} | Low-level output voltage | I _{OL} = 2mA; see Figure 6-1 | | 0.2 | 0.4 | V |
| V _{I(HYS)} | Input threshold voltage hysteresis | | 0.1 × V _{CCI} ⁽¹⁾ | | | V |
| I _{IH} | High-level input current | V _{IH} = V _{CCI} at INx or EN2 | | | 10 | μΑ |
| I _{IL} | Low-level input current | V _{IL} = 0V at INx or EN2 | -10 | | | μΑ |
| СМТІ | Common-mode transient immunity | V _I = V _{CCI} or 0V, V _{CM} = 1500V; see Figure 6-4 | 100 | | | kV/μs |

⁽¹⁾ V_{CCI} = Input-side V_{CC} ; V_{CCO} = Output-side V_{CC} .

5.12 Supply Current Characteristics—3.3V Supply

 $V_{CC1} = V_{CC2} = 3.3V \pm 10\%$ (over recommended operating conditions unless otherwise noted)

| PARAMETER | TEST CONDITIONS | | SUPPLY CURRENT | MIN | TYP | MAX | UNIT |
|----------------------------|--|-----------|-------------------|-----|------|-----|------|
| | EN2 = 0V, V _I = 0V (Devices with sur | ffix F), | I _{CC1} | | 1.1 | 1.8 | |
| Supply current - disable | $V_I = V_{CCI}$ (Devices without suffix F) | | I _{CC2} | | 0.3 | 0.6 | |
| Supply current - disable | EN2 = 0V, V _I = V _{CCI} (Devices with s | uffix F), | I _{CC1} | | 4.6 | 6.6 | |
| | V _I = 0V (Devices without suffix F) | | I _{CC2} | | 0.3 | 0.6 | |
| Supply current - DC | V _I = 0V (Devices with suffix F), V _I = V _{CCI} (Devices without suffix F) | | I _{CC1} | | 1.1 | 2 | |
| | | | I _{CC2} | | 1.7 | 2.6 | |
| signal | $V_I = V_{CCI}$ (Devices with suffix F), $V_I = 0V$ (Devices without suffix F) | | I _{CC1} | | 4.6 | 6.8 | mA |
| | | | I _{CC2} | | 1.9 | 2.8 | IIIA |
| | | 1Mbno | I _{CC1} | | 2.8 | 4.4 | |
| | | 1Mbps | I _{CC2} | | 1.9 | 2.9 | |
| Supply current - AC signal | All channels switching with square | 10Mbpa | I _{CC1} | | 2.9 | 4.4 | |
| | C _L = 15pF | 10Mbps | I _{CC2} | | 2.9 | 4.1 | |
| | | 100Mbpa | I _{CC1} | | 3.5 | 4.8 | |
| | 100Mbps | | I _{CC2} | | 13.2 | 16 | |



5.13 Electrical Characteristics—2.5V Supply

V_{CC1} = V_{CC2} = 2.5V ±10% (over recommended operating conditions unless otherwise noted)

| | PARAMETER | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---------------------|------------------------------------|--|---------------------------------------|---------------------|-----|-------|
| V _{OH} | High-level output voltage | I _{OH} = -1mA; see Figure 6-1 | V _{CCO} (1) – 0.4 | $V_{\rm CCO} - 0.2$ | | V |
| V _{OL} | Low-level output voltage | I _{OL} = 1mA; see Figure 6-1 | | 0.2 | 0.4 | V |
| V _{I(HYS)} | Input threshold voltage hysteresis | | 0.1 × V _{CCI} ⁽¹⁾ | | | V |
| I _{IH} | High-level input current | V _{IH} = V _{CCI} at INx or EN2 | | | 10 | μΑ |
| I _{IL} | Low-level input current | V _{IL} = 0V at INx or EN2 | -10 | | | μΑ |
| CMTI | Common-mode transient immunity | V _I = V _{CCI} or 0V, V _{CM} = 1500V; see Figure 6-4 | 100 | | | kV/μs |

⁽¹⁾ V_{CCI} = Input-side V_{CC} ; V_{CCO} = Output-side V_{CC} .

5.14 Supply Current Characteristics—2.5V Supply

 $V_{CC1} = V_{CC2} = 2.5V \pm 10\%$ (over recommended operating conditions unless otherwise noted)

| PARAMETER | TEST CONDITIONS | | SUPPLY CURRENT | MIN | TYP | MAX | UNIT |
|----------------------------|--|-----------|-------------------|-----|------|------|------|
| | EN2 = 0V, V _I = 0V (Devices with suf | fix F), | I _{CC1} | | 1.1 | 1.8 | |
| Commission and disable | $V_I = V_{CCI}$ (Devices without suffix F) | | I _{CC2} | | 0.3 | 0.6 | |
| Supply current - disable | EN2 = 0V, V _I = V _{CCI} (Devices with s | uffix F), | I _{CC1} | | 4.6 | 6.6 | |
| | V _I = 0V (Devices without suffix F) | | I _{CC2} | | 0.3 | 0.6 | |
| Supply current - DC | V _I = 0V (Devices with suffix F), V _I = V _{CCI} (Devices without suffix F) | | I _{CC1} | | 1.1 | 2 | |
| | | | I _{CC2} | | 1.7 | 2.6 | |
| signal | V _I = V _{CCI} (Devices with suffix F), V _I = 0V (Devices without suffix F) | | I _{CC1} | | 4.6 | 6.8 | mA |
| | | | I _{CC2} | | 1.8 | 2.8 | IIIA |
| | | 1Mbna | I _{CC1} | | 2.8 | 4.4 | |
| | | 1Mbps | I _{CC2} | | 1.8 | 2.9 | |
| Supply current - AC signal | All channels switching with square | 10Mhna | I _{CC1} | | 2.9 | 4.4 | |
| | wave clock input; C _L = 15pF | 10Mbps | I _{CC2} | | 2.6 | 3.7 | |
| | - ' | 100Mhna | I _{CC1} | | 3.4 | 4.7 | |
| | | 100Mbps | I _{CC2} | | 10.3 | 12.7 | |

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5.15 Switching Characteristics—5V Supply

V_{CC1} = V_{CC2} = 5V ±10% (over recommended operating conditions unless otherwise noted)

| | PARAMETER | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|-------------------------------------|--|--|-----|------|-----|------|
| t _{PLH} , t _{PHL} | Propagation delay time | See Figure 6-1 | 6 | 11 | 16 | ns |
| PWD | Pulse width distortion ⁽¹⁾ t _{PHL} - t _{PLH} | See Figure 6-1 | | 0.55 | 4.1 | ns |
| t _{sk(o)} | Channel-to-channel output skew time ⁽²⁾ | Same-direction channels | | | 2.5 | ns |
| t _{sk(pp)} | Part-to-part skew time ⁽³⁾ | | | | 4.5 | ns |
| t _r | Output signal rise time | See Figure 6-1 | | 1.7 | 3.9 | ns |
| t _f | Output signal fall time | See Figure 0-1 | | 1.9 | 3.9 | ns |
| t _{PHZ} | Disable propagation delay, high-to-high impedance output | | | 12 | 20 | ns |
| t _{PLZ} | Disable propagation delay, low-to-high impedance output | | | 12 | 20 | ns |
| | Enable propagation delay, high impedance-to-high output for ISO7830 | Can Figure 6 2 | | 10 | 20 | ns |
| t _{PZH} | Enable propagation delay, high impedance-to-high output for ISO7830F | See Figure 6-2 | | 2 | 2.5 | μs |
| | Enable propagation delay, high impedance-to-low output for ISO7830 | | | 2 | 2.5 | μs |
| t _{PZL} | Enable propagation delay, high impedance-to-low output for ISO7830F | | | 10 | 20 | ns |
| t _{DO} | Default output delay time from input power loss | Measured from the time V _{CC} goes below 1.7V. See Figure 6-3 | | 0.2 | 9 | μs |
| t _{ie} | Time interval error | 2 ¹⁶ – 1 PRBS data at 100Mbps | | 0.90 | | ns |

⁽¹⁾ Also known as pulse skew.

5.16 Switching Characteristics—3.3V Supply

 $V_{CC1} = V_{CC2} = 3.3V \pm 10\%$ (over recommended operating conditions unless otherwise noted)

| | PARAMETER | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|-------------------------------------|--|--|-----|------|-----|------|
| t _{PLH} , t _{PHL} | Propagation delay time | Soc Eiguro 6 1 | 6 | 10.8 | 16 | ns |
| PWD | Pulse width distortion ⁽¹⁾ t _{PHL} - t _{PLH} | See Figure 6-1 | | 0.7 | 4.2 | ns |
| t _{sk(o)} | Channel-to-channel output skew time ⁽²⁾ | Same-direction channels | | | 2.2 | ns |
| t _{sk(pp)} | Part-to-part skew time ⁽³⁾ | | | | 4.5 | ns |
| t _r | Output signal rise time | See Figure 6-1 | | 0.8 | 3 | ns |
| t _f | Output signal fall time | - See Figure 6-1 | | 0.8 | 3 | ns |
| t _{PHZ} | Disable propagation delay, high-to-high impedance output | | | 17 | 32 | ns |
| t _{PLZ} | Disable propagation delay, low-to-high impedance output | | | 17 | 32 | ns |
| | Enable propagation delay, high impedance-to-high output for ISO7830 | See Figure 6.2 | | 17 | 32 | ns |
| t _{PZH} | Enable propagation delay, high impedance-to-high output forISO7830F | See Figure 6-2 | | 2 | 2.5 | μs |
| | Enable propagation delay, high impedance-to-low output for ISO7830 | | | 2 | 2.5 | μs |
| t _{PZL} | Enable propagation delay, high impedance-to-low output for ISO7830F | | | 17 | 32 | ns |
| t _{DO} | Default output delay time from input power loss | Measured from the time V _{CC} goes below 1.7V. See Figure 6-3 | | 0.2 | 9 | μs |
| t _{ie} | Time interval error | 2 ¹⁶ – 1 PRBS data at 100Mbps | | 0.91 | | ns |

Also known as pulse skew.

⁽²⁾ t_{sk(o)} is the skew between outputs of a single device with all driving inputs connected together and the outputs switching in the same direction while driving identical loads.

⁽³⁾ t_{sk(pp)} is the magnitude of the difference in propagation delay times between any terminals of different devices switching in the same direction while operating at identical supply voltages, temperature, input signals and loads.



- (2) t_{sk(o)} is the skew between outputs of a single device with all driving inputs connected together and the outputs switching in the same direction while driving identical loads.
- (3) $t_{sk(pp)}$ is the magnitude of the difference in propagation delay times between any terminals of different devices switching in the same direction while operating at identical supply voltages, temperature, input signals and loads.

5.17 Switching Characteristics—2.5V Supply

V_{CC1} = V_{CC2} = 2.5V ±10% (over recommended operating conditions unless otherwise noted)

| | PARAMETER | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|-------------------------------------|--|--|-----|------|------|------|
| t _{PLH} , t _{PHL} | Propagation delay time | See Figure 6-1 | 7.5 | 11.7 | 17.5 | ns |
| PWD | Pulse width distortion ⁽¹⁾ t _{PHL} - t _{PLH} | See Figure 0-1 | | 0.66 | 4.2 | ns |
| t _{sk(o)} | Channel-to-channel output skew time ⁽²⁾ | Same-direction Channels | | | 2.2 | ns |
| t _{sk(pp)} | Part-to-part skew time ⁽³⁾ | | | | 4.5 | ns |
| t _r | Output signal rise time | See Figure 6-1 | | 1 | 3.5 | ns |
| t _f | Output signal fall time | - See Figure 0-1 | | 1.2 | 3.5 | ns |
| t _{PHZ} | Disable propagation delay, high-to-high impedance output | | | 22 | 45 | ns |
| t _{PLZ} | Disable propagation delay, low-to-high impedance output | | | 22 | 45 | ns |
| | Enable propagation delay, high impedance-to-high output for ISO7830 | See Figure 6-2 | | 18 | 45 | ns |
| t _{PZH} | Enable propagation delay, high impedance-to-high output for ISO7830F | - See rigule 0-2 | | 2 | 2.5 | μs |
| | Enable propagation delay, high impedance-to-low output for ISO7830 | - | | 2 | 2.5 | μs |
| t _{PZL} | Enable propagation delay, high impedance-to-low output for ISO7830F | | | 18 | 45 | ns |
| t _{DO} | Default output delay time from input power loss | Measured from the time V _{CC} goes below 1.7V. See Figure 6-3 | | 0.2 | 9 | μs |
| t _{ie} | Time interval error | 2 ¹⁶ – 1 PRBS data at 100Mbps | | 0.91 | | ns |

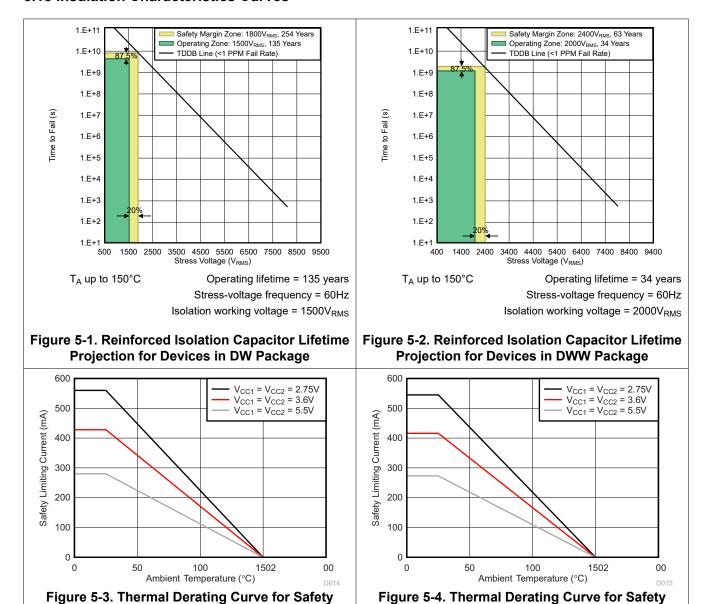
- (1) Also known as pulse skew.
- (2) t_{sk(o)} is the skew between outputs of a single device with all driving inputs connected together and the outputs switching in the same direction while driving identical loads.
- (3) t_{sk(pp)} is the magnitude of the difference in propagation delay times between any terminals of different devices switching in the same direction while operating at identical supply voltages, temperature, input signals and loads.

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5.18 Insulation Characteristics Curves



Limiting Current for DW Package

Limiting Current for DWW Package



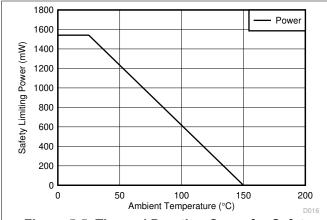


Figure 5-5. Thermal Derating Curve for Safety Limiting Power for DW Package

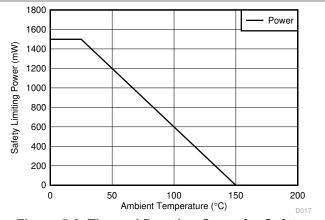
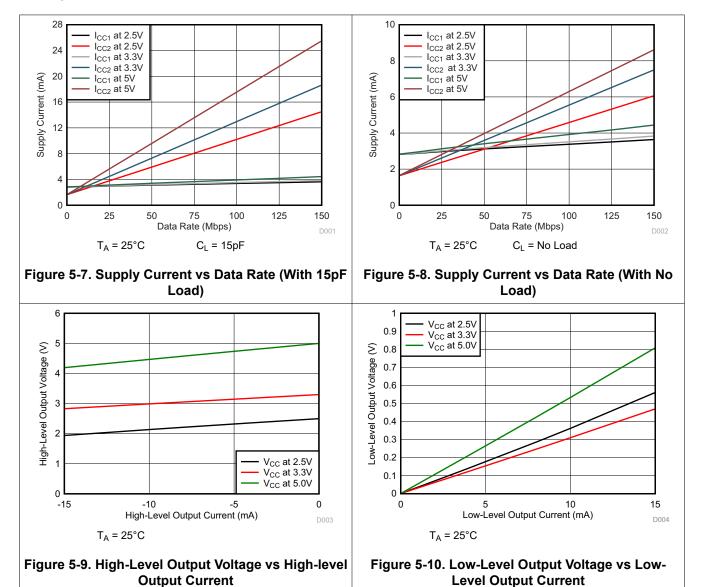


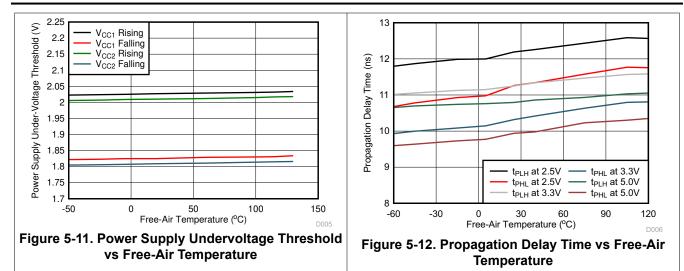
Figure 5-6. Thermal Derating Curve for Safety Limiting Power for DWW Package



5.19 Typical Characteristics



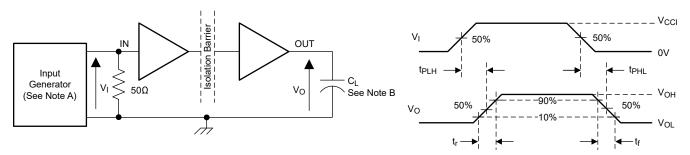






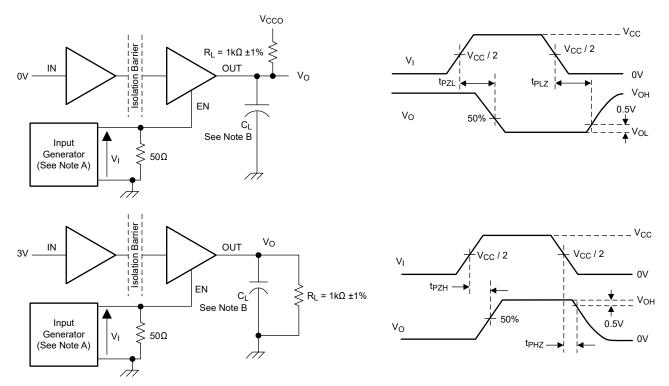
6 Parameter Measurement Information

6.1 Parameter Measurement Information



- A. The input pulse is supplied by a generator having the following characteristics: PRR \leq 50kHz, 50% duty cycle, $t_r \leq$ 3ns, $t_f \leq$ 3ns, $Z_O = 50\Omega$. At the input, $S_D = S_D = S_D$
- B. $C_L = 15pF$ and includes instrumentation and fixture capacitance within $\pm 20\%$.

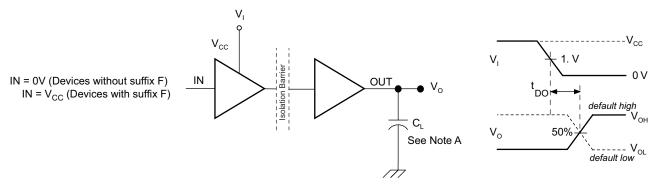
Figure 6-1. Switching Characteristics Test Circuit and Voltage Waveforms



- A. The input pulse is supplied by a generator having the following characteristics: PRR \leq 10kHz, 50% duty cycle, $t_r \leq$ 3ns, $t_f \leq$ 3ns, $Z_O = 50\Omega$.
- B. $C_L = 15pF$ and includes instrumentation and fixture capacitance within $\pm 20\%$.

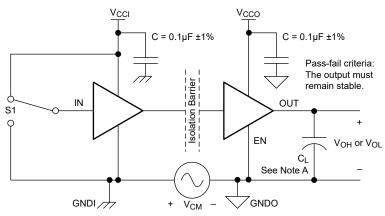
Figure 6-2. Enable/Disable Propagation Delay Time Test Circuit and Waveform





A. $C_L = 15pF$ and includes instrumentation and fixture capacitance within $\pm 20\%$.

Figure 6-3. Default Output Delay Time Test Circuit and Voltage Waveforms



A. $C_L = 15pF$ and includes instrumentation and fixture capacitance within $\pm 20\%$.

Figure 6-4. Common-Mode Transient Immunity Test Circuit

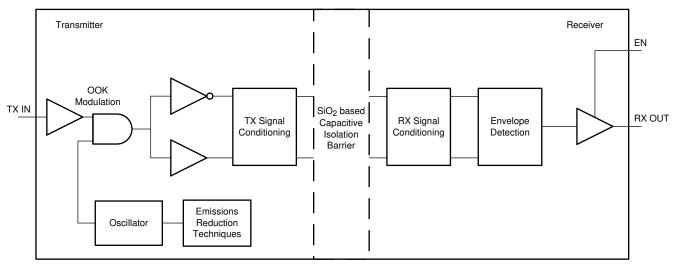


7 Detailed Description

7.1 Overview

The ISO7830x device has an ON-OFF keying (OOK) modulation scheme to transmit the digital data across a silicon dioxide based isolation barrier. The transmitter sends a high frequency carrier across the barrier to represent one digital state and sends no signal to represent the other digital state. The receiver demodulates the signal after advanced signal conditioning and produces the output through a buffer stage. If the EN pin is low then the output goes to high impedance. The ISO7830x device also incorporates advanced circuit techniques to maximize the CMTI performance and minimize the radiated emissions because of the high frequency carrier and IO buffer switching. The conceptual block diagram of a digital capacitive isolator, Figure 7-1, shows a functional block diagram of a typical channel.

7.2 Functional Block Diagram



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Figure 7-1. Conceptual Block Diagram of a Digital Capacitive Isolator

Figure 7-2 shows a conceptual detail of how the ON-OFF keying scheme works.

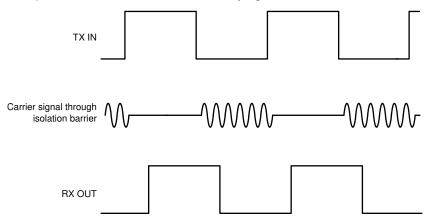


Figure 7-2. On-Off Keying (OOK) Based Modulation Scheme



7.3 Feature Description

Table 7-1 provides an overview of the device features.

Table 7-1. Device Features

| PART NUMBER | CHANNEL DIRECTION | RATED ISOLATION | MAXIMUM DATA RATE | DEFAULT OUTPUT |
|-------------|----------------------|---|-------------------|----------------|
| ISO7830 | 3 Forward, 0 Reverse | 5700V _{RMS} / 8000V _{PK} ⁽¹⁾ | 100Mbps | High |
| ISO7830F | 3 Forward, 0 Reverse | 5700V _{RMS} / 8000V _{PK} ⁽¹⁾ | 100Mbps | Low |

⁽¹⁾ See the Section 5.7 section for detailed isolation ratings.

7.3.1 Electromagnetic Compatibility (EMC) Considerations

Many applications in harsh industrial environment are sensitive to disturbances such as electrostatic discharge (ESD), electrical fast transient (EFT), surge and electromagnetic emissions. These electromagnetic disturbances are regulated by international standards such as IEC 61000-4-x and CISPR 22. Although system-level performance and reliability depends, to a large extent, on the application board design and layout, the ISO7830x device incorporates many chip-level design improvements for overall system robustness. Some of these improvements include:

- Robust ESD protection cells for input and output signal pins and inter-chip bond pads.
- Low-resistance connectivity of ESD cells to supply and ground pins.
- Enhanced performance of high voltage isolation capacitor for better tolerance of ESD, EFT and surge events.
- Bigger on-chip decoupling capacitors to bypass undesirable high energy signals through a low impedance path.
- PMOS and NMOS devices isolated from each other by using guard rings to avoid triggering of parasitic SCRs.
- Reduced common mode currents across the isolation barrier by providing purely differential internal operation.

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7.4 Device Functional Modes

Table 7-2 lists the ISO7830x functional modes.

Table 7-2. Function Table

| | Table 7 E. I diletton Table | | | | | | | |
|------------------|-----------------------------|-------------------------------|---------------------------|------------------|--|--|--|--|
| V _{CCI} | V _{cco} | INPUT (INx) ⁽²⁾ | OUTPUT ENABLE (EN2) | OUTPUT (OUTx) | COMMENTS | | | |
| | | Н | H or open | Н | Normal Operation: | | | |
| PU | PU | L | H or open | L | A channel output assumes the logic state of the input. | | | |
| | | Open | H or open | Default | Default mode: When INx is open, the corresponding channel output goes to the default logic state. Default is High for ISO7830 and Low for ISO7830F | | | |
| Х | PU | X | L | Z | A low value of output enable causes the outputs to be high-impedance | | | |
| PD | PU | X | H or open | Default | Default mode: When $V_{\rm CCI}$ is unpowered, a channel output assumes the logic state based on the selected default option. Default is High for ISO7830 and Low for ISO7830F When $V_{\rm CCI}$ transitions from unpowered to powered-up, a channel output assumes the logic state of the input. When $V_{\rm CCI}$ transitions from powered-up to unpowered, channel output assumes the selected default state. | | | |
| Х | PD | Х | x | Undetermined | When V _{CCO} is unpowered, a channel output state is undetermined ⁽¹⁾ . When V _{CCO} transitions from unpowered to powered-up, a channel output assumes the logic state of the input | | | |

- The outputs are in undetermined state when 1.7V < V_{CCI} , V_{CCO} < 2.25V. A strongly driven input signal can weakly power the floating V_{CC} using an internal protection diode and cause undetermined output.

7.4.1 Device I/O Schematics

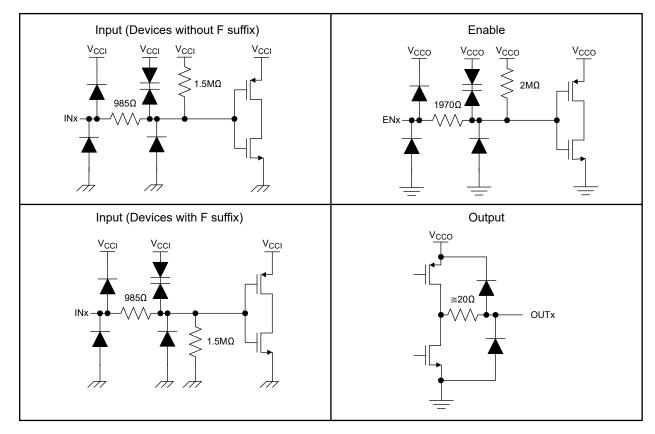


Figure 7-3. Device I/O Schematics

8 Application and Implementation

Note

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

8.1 Application Information

The ISO7830x device is a high-performance, triple-channel digital isolator with $5.7 \text{kV}_{\text{RMS}}$ isolation voltage. The device comes with enable pin which can be used to put the outputs in high impedance for multi-master driving applications and reduce power consumption. The ISO7830x device uses single-ended CMOS-logic switching technology. The supply voltage range is from 2.25 V to 5.5 V for both supplies, V_{CC1} and V_{CC2} . When designing with digital isolators, keep in mind that because of the single-ended design structure, digital isolators do not conform to any specific interface standard and are only intended for isolating single-ended CMOS or TTL digital signal lines. The isolator is typically placed between the data controller (that is, μ C or UART), and a data converter or a line transceiver, regardless of the interface type or standard.

8.2 Typical Application

ISO7830F can be used with Texas Instruments' mixed signal micro-controller, gate driver, transformer driver and voltage regulator to create an isolated MOSFET/ IGBT drive circuit. Figure 8-1 shows an implementation of isolated dual channel gate driver

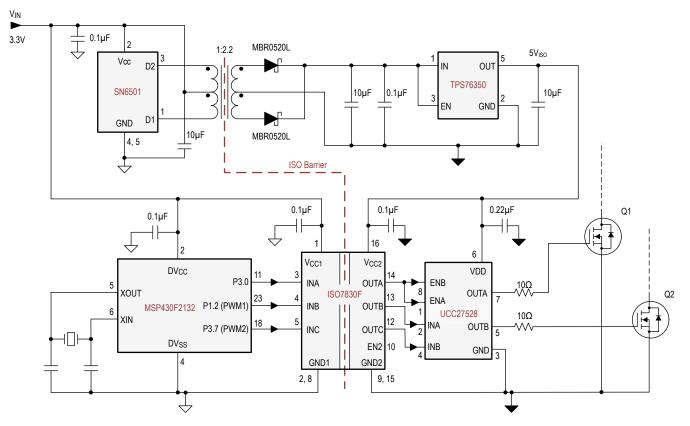


Figure 8-1. Isolated Dual MOSFET / IGBT Gate Drive Circuit



8.2.1 Design Requirements

For this design example, use the parameters listed in Table 8-1.

Table 8-1. Design Parameters

| PARAMETER | VALUE |
|--|---------------|
| Supply voltage | 2.25V to 5.5V |
| Decoupling capacitor between V _{CC1} and GND1 | 0.1µF |
| Decoupling capacitor from V _{CC2} and GND2 | 0.1µF |

8.2.2 Detailed Design Procedure

Unlike optocouplers, which require external components to improve performance, provide bias, or limit current, ISO7830x only requires two external bypass capacitors to operate.

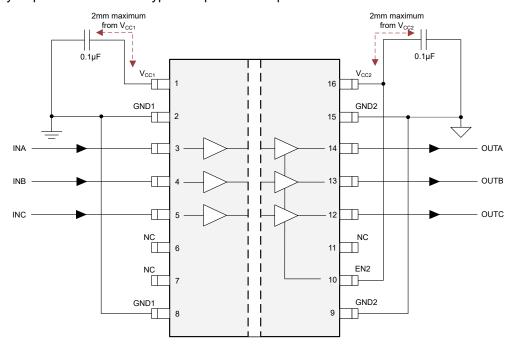


Figure 8-2. Typical ISO7830 Circuit Hook-up



8.2.3 Application Curve

The following typical eye diagram of the ISO7830x device indicates low jitter and wide open eye at the maximum data rate of 100Mbps.

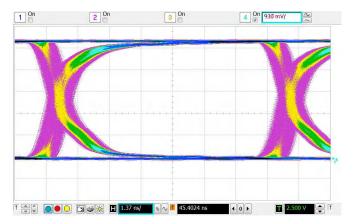


Figure 8-3. Eye Diagram at 100Mbps PRBS, 5V and 25°C

8.3 Power Supply Recommendations

To help provide reliable operation at data rates and supply voltages, a $0.1\mu F$ bypass capacitor is recommended at input and output supply pins (V_{CC1} and V_{CC2}). The capacitors must be placed as close to the supply pins as possible. If only a single primary-side power supply is available in an application, isolated power can be generated for the secondary-side with the help of a transformer driver such as Texas Instruments' SN6501. For such applications, detailed power supply design and transformer selection recommendations are available in SN6501 data sheet (SLLSEA0).

8.4 Layout

8.4.1 Layout Guidelines

A minimum of four layers is required to accomplish a low EMI PCB design (see Figure 8-4). Layer stacking must be in the following order (top-to-bottom): high-speed signal layer, ground plane, power plane and low-frequency signal layer.

- Routing the high-speed traces on the top layer avoids the use of vias (and the introduction of the
 inductances) and allows for clean interconnects between the isolator and the transmitter and receiver circuits
 of the data link.
- Placing a solid ground plane next to the high-speed signal layer establishes controlled impedance for transmission line interconnects and provides an excellent low-inductance path for the return current flow.
- Placing the power plane next to the ground plane creates additional high-frequency bypass capacitance of approximately 100pF/inch².
- Routing the slower speed control signals on the bottom layer allows for greater flexibility as these signal links typically have margin to tolerate discontinuities such as vias.

If an additional supply voltage plane or signal layer is needed, add a second power or ground plane system to the stack to keep the planes symmetrical. This makes the stack mechanically stable and prevents warping. Also the power and ground plane of each power system can be placed closer together, thus increasing the high-frequency bypass capacitance significantly.

For detailed layout recommendations, see the application note, Digital Isolator Design Guide (SLLA284).

8.4.1.1 PCB Material

For digital circuit boards operating at less than 150Mbps (or rise and fall times greater than 1ns) and trace lengths of up to 10 inches, use standard FR-4 UL94V-0 printed circuit board. This PCB is preferred over cheaper



alternatives because of lower dielectric losses at high frequencies, less moisture absorption, greater strength and stiffness, and the self-extinguishing flammability-characteristics.

8.4.2 Layout Example

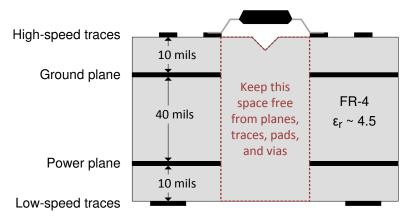


Figure 8-4. Layout Example Schematic

9 Device and Documentation Support

9.1 Documentation Support

9.1.1 Related Documentation

For related documentation see the following:

- 1. Texas Instruments, *Digital Isolator Design Guide*, application note
- 2. Texas Instruments, Isolation Glossary, application note
- 3. Texas Instruments, SN6501Transformer Driver for Isolated Power Supplies, data sheet
- 4. Texas Instruments, UCC27528 Dual 5-A High-Speed Low-Side Gate Driver Based on CMOS Input Threshold LogicCMOS Input Threshold Logic, data sheet
- 5. Texas Instruments, TPS76350 Low-Power 150-mA Low-Dropout Linear Regulators, data sheet
- 6. Texas Instruments, MSP430F2132 Mixed Signal Microcontroller, data sheet

9.1.1.1 Related Links

The table below lists quick access links. Categories include technical documents, support and community resources, tools and software, and quick access to sample or buy.

Table 9-1. Related Links

| PARTS | PRODUCT FOLDER | SAMPLE & BUY | TECHNICAL DOCUMENTS | TOOLS & SOFTWARE | SUPPORT & COMMUNITY | |
|----------|----------------|--------------|---------------------|---------------------|---------------------|--|
| ISO7830 | Click here | Click here | Click here | Click here | Click here | |
| ISO7830F | Click here | Click here | Click here | Click here | Click here | |

9.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. Click on *Notifications* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

9.3 Support Resources

TI E2E[™] support forums are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

Linked content is provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's Terms of Use.

9.4 Trademarks

TI E2E™ is a trademark of Texas Instruments.

All trademarks are the property of their respective owners.

9.5 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

9.6 Glossary

TI Glossary This glossary lists and explains terms, acronyms, and definitions.

10 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

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| ان | nanges from Revision B (June 2016) to Revision C (July 2025) | Page |
|----------|---|----------------|
| • | Updated the number format for tables, figures, and cross-references throughout the document | 1 |
| | Added 15mm(typ) creepage/clearance to Insulation Specifications table | 6 |
| | | |
| ŀ | nanges from Revision A (September 2015) to Revision B (June 2016) | Page |
| | Changed Section 1 From: Low Power Consumption, Typical 2.4mA per Channel at 1Mbps To: Low Power | |
| | Consumption, Typical 1.6 mA per Channel at 1Mbps | |
| | Changed the isolation barrier life from > 25 years to > 40 years in the Section 1 section | |
| | Changed Section 1 From: Safety and Regulatory Approvals To: Safety-Related Certifications | |
| | Updated the status of the certifications throughout the document | |
| | Added the extra-wide body package (16 pin SOIC [DWW]) option | |
| | Deleted EN1 from the pin out drawing in the <i>Pin Configuration and Functions</i> section. Replaced reference ENx with EN2 | 3 |
| | Changed pin V_{CC1} description From: Power supply, V_{CC1} To: Power supply, side 1 in the <i>PIN Functions</i> to | |
| | Changed pin V_{CC2} description From: Power supply, V_{CC2} To: Power supply, side 2 in the <i>PIN Functions</i> to | |
| | Moved Junction temperature From Section 5.3 To Section 5.1 | |
| | Changed the values for the DW package in the <i>Thermal Information</i> table | 5 |
| | Changed the maximum power dissipation values for side 1 (40 to 25) and side 2 (110 to 125) in the <i>Power Rating</i> table | <mark>5</mark> |
| | Moved Insulation Characteristics to the Specifications section | |
| | Changed C _{IO} Specification From: 2pF To: ≅1 pF | |
| | Added the climatic category parameter to the Insulation Characteristics table | 6 |
| | Moved Section 5.7 to the Section 5 section | <mark>7</mark> |
| | Moved Section 5.8 to the Section 5 section | <mark>7</mark> |
| | Changed the test conditions and values for the DW package in the <i>Safety Limiting Values</i> tableChanged V_{CCO} to V_{CCI} in the minimum value for the input threshold voltage hysteresis parameter in the | |
| | electrical characteristics tables | |
| | Added the V_{CM} test condition to the CMTI parameter in the electrical characteristics tables. Also updated | |
| | minimum value from 70 to 100 and deleted the maximum value of 100 | |
| | Changed t _{fs} To: t _{DO} in Section 5.15 | |
| | Changed t _{fs} To: t _{DO} in Section 5.16 | |
| | Changed t _{fs} To: t _{DO} in Section 5.17 | |
| | Added the lifetime projection graphs for DW and DWW packages to the Insulation Characteristics Curves | |
| | section | |
| | Changed the thermal derating curves in the Safety Limiting Values section | |
| | Changed 2.7V To: 1.7V, fs high To: default high, and fs low To: default low in Figure 6-3 | |
| | Changed Figure 8-1 | 22 |
| | | |
| ; | nanges from Revision * (July 2015) to Revision A (September 2015) | Page |
| _ | Changed From: 1-page Product Preview To: Production data sheet | <u>1</u> |
| | | |

11 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

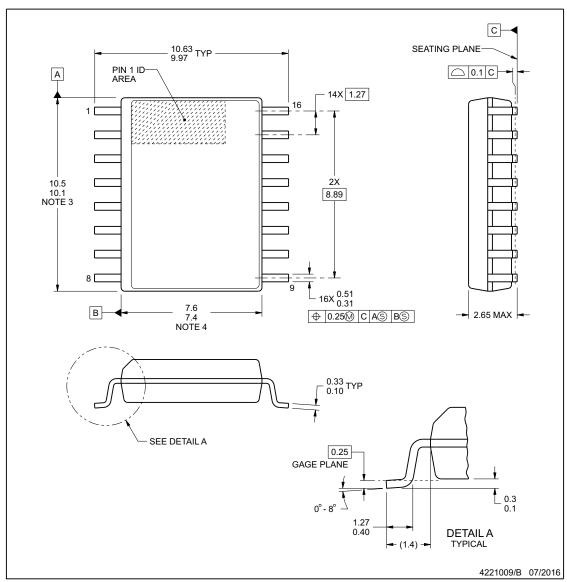




PACKAGE OUTLINE

SOIC - 2.65 mm max height

DW0016B



NOTES:

- 1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.

 2. This drawing is subject to change without notice.
- 3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.

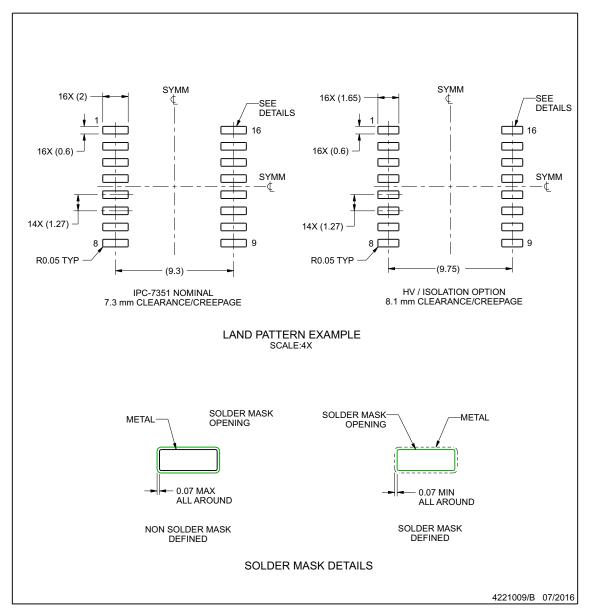
 4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm, per side.
- 5. Reference JEDEC registration MS-013.



EXAMPLE BOARD LAYOUT

DW0016B

SOIC - 2.65 mm max height



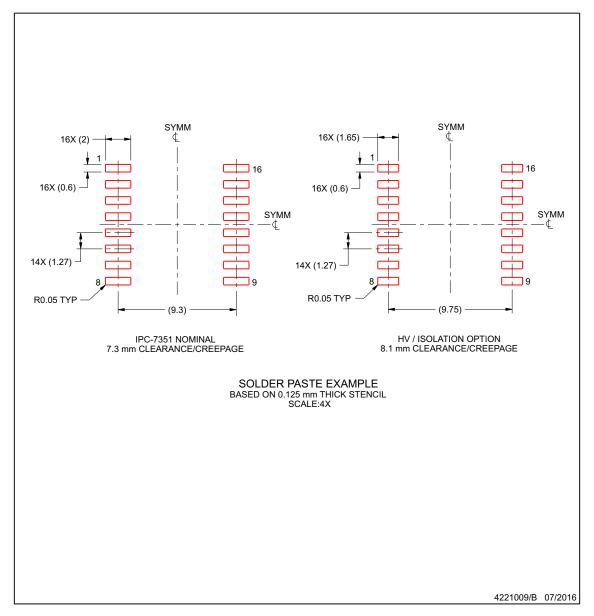
NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DW0016B

SOIC - 2.65 mm max height



NOTES: (continued)

- 8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.

 9. Board assembly site may have different recommendations for stencil design.



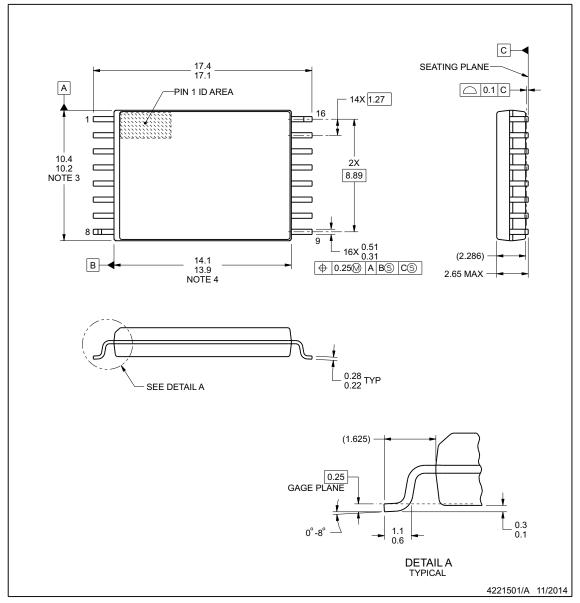
DWW0016A



PACKAGE OUTLINE

SOIC - 2.65 mm max height

PLASTIC SMALL OUTLINE



NOTES:

- 1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing
- per ASME Y14.5M.

 2. This drawing is subject to change without notice.

 3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 mm per side.

 4. This dimension does not include interlead flash.

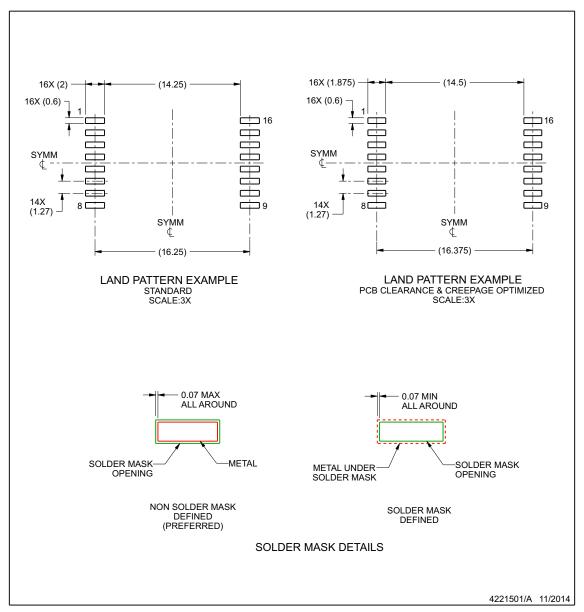


EXAMPLE BOARD LAYOUT

DWW0016A

SOIC - 2.65 mm max height

PLASTIC SMALL OUTLINE



NOTES: (continued)

- 5. Publication IPC-7351 may have alternate designs.6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

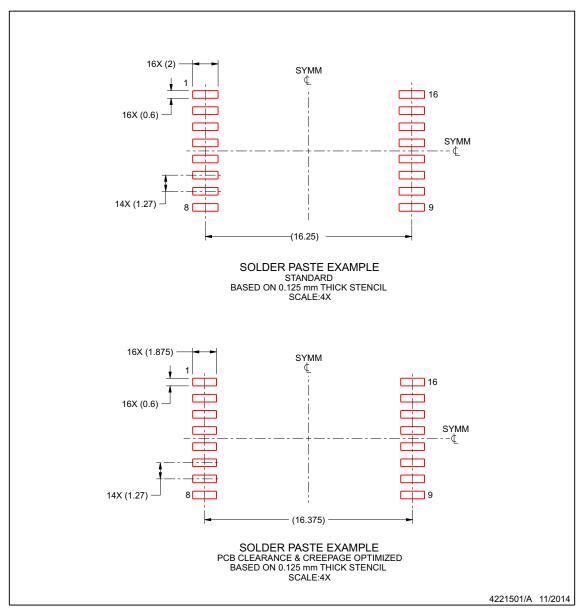


EXAMPLE STENCIL DESIGN

DWW0016A

SOIC - 2.65 mm max height

PLASTIC SMALL OUTLINE



NOTES: (continued)

- 7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.8. Board assembly site may have different recommendations for stencil design.

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PACKAGING INFORMATION

| Orderable part number | Status (1) | Material type | Package Pins | Package qty Carrier | RoHS (3) | Lead finish/ Ball material | MSL rating/ Peak reflow | Op temp (°C) | Part marking (6) |
|-----------------------|------------|---------------|-----------------|-----------------------|-----------------|-------------------------------|----------------------------|--------------|------------------|
| ISO7830DW | Active | Production | SOIC (DW) 16 | 40 TUBE | Yes | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7830 |
| ISO7830DW.A | Active | Production | SOIC (DW) 16 | 40 TUBE | Yes | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7830 |
| ISO7830DW.B | Active | Production | SOIC (DW) 16 | 40 TUBE | - | Call TI | Call TI | -55 to 125 | |
| ISO7830DWR | Active | Production | SOIC (DW) 16 | 2000 LARGE T&R | Yes | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7830 |
| ISO7830DWR.A | Active | Production | SOIC (DW) 16 | 2000 LARGE T&R | Yes | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7830 |
| ISO7830DWR.B | Active | Production | SOIC (DW) 16 | 2000 LARGE T&R | - | Call TI | Call TI | -55 to 125 | |
| ISO7830DWW | Active | Production | SOIC (DWW) 16 | 45 TUBE | Yes | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7830 |
| ISO7830DWW.A | Active | Production | SOIC (DWW) 16 | 45 TUBE | Yes | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7830 |
| ISO7830DWW.B | Active | Production | SOIC (DWW) 16 | 45 TUBE | - | Call TI | Call TI | -55 to 125 | |
| ISO7830DWWR | Active | Production | SOIC (DWW) 16 | 1000 LARGE T&R | Yes | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7830 |
| ISO7830DWWR.A | Active | Production | SOIC (DWW) 16 | 1000 LARGE T&R | Yes | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7830 |
| ISO7830DWWR.B | Active | Production | SOIC (DWW) 16 | 1000 LARGE T&R | - | Call TI | Call TI | -55 to 125 | |
| ISO7830FDW | Active | Production | SOIC (DW) 16 | 40 TUBE | Yes | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7830F |
| ISO7830FDW.A | Active | Production | SOIC (DW) 16 | 40 TUBE | Yes | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7830F |
| ISO7830FDW.B | Active | Production | SOIC (DW) 16 | 40 TUBE | - | Call TI | Call TI | -55 to 125 | |
| ISO7830FDWR | Active | Production | SOIC (DW) 16 | 2000 LARGE T&R | Yes | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7830F |
| ISO7830FDWR.A | Active | Production | SOIC (DW) 16 | 2000 LARGE T&R | Yes | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7830F |
| ISO7830FDWR.B | Active | Production | SOIC (DW) 16 | 2000 LARGE T&R | - | Call TI | Call TI | -55 to 125 | |
| ISO7830FDWW | Active | Production | SOIC (DWW) 16 | 45 TUBE | Yes | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7830F |
| ISO7830FDWW.A | Active | Production | SOIC (DWW) 16 | 45 TUBE | Yes | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7830F |
| ISO7830FDWW.B | Active | Production | SOIC (DWW) 16 | 45 TUBE | - | Call TI | Call TI | -55 to 125 | |
| ISO7830FDWWR | Active | Production | SOIC (DWW) 16 | 1000 LARGE T&R | Yes | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7830F |
| ISO7830FDWWR.A | Active | Production | SOIC (DWW) 16 | 1000 LARGE T&R | Yes | NIPDAU | Level-2-260C-1 YEAR | -55 to 125 | ISO7830F |
| ISO7830FDWWR.B | Active | Production | SOIC (DWW) 16 | 1000 LARGE T&R | - | Call TI | Call TI | -55 to 125 | |

⁽¹⁾ Status: For more details on status, see our product life cycle.

⁽²⁾ Material type: When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.



PACKAGE OPTION ADDENDUM

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- (3) RoHS values: Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.
- (4) Lead finish/Ball material: Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.
- (5) MSL rating/Peak reflow: The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.
- (6) Part marking: There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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PACKAGE MATERIALS INFORMATION

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TAPE AND REEL INFORMATION



TAPE DIMENSIONS + K0 - P1 - B0 W Cavity - A0 -

| A0 | Dimension designed to accommodate the component width |
|----|---|
| В0 | Dimension designed to accommodate the component length |
| K0 | Dimension designed to accommodate the component thickness |
| W | Overall width of the carrier tape |
| P1 | Pitch between successive cavity centers |

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

| Device | Package Type | Package Drawing | | SPQ | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|--------------|-----------------|--------------------|----|------|--------------------------|--------------------------|------------|------------|------------|------------|-----------|------------------|
| ISO7830DWR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.75 | 10.7 | 2.7 | 12.0 | 16.0 | Q1 |
| ISO7830DWWR | SOIC | DWW | 16 | 1000 | 330.0 | 24.4 | 18.0 | 10.0 | 3.0 | 20.0 | 24.0 | Q1 |
| ISO7830FDWR | SOIC | DW | 16 | 2000 | 330.0 | 16.4 | 10.75 | 10.7 | 2.7 | 12.0 | 16.0 | Q1 |
| ISO7830FDWWR | SOIC | DWW | 16 | 1000 | 330.0 | 24.4 | 18.0 | 10.0 | 3.0 | 20.0 | 24.0 | Q1 |

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*All dimensions are nominal

| 7 111 41111011010110 41 0 11011111141 | | | | | | | |
|---------------------------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
| ISO7830DWR | SOIC | DW | 16 | 2000 | 350.0 | 350.0 | 43.0 |
| ISO7830DWWR | SOIC | DWW | 16 | 1000 | 350.0 | 350.0 | 43.0 |
| ISO7830FDWR | SOIC | DW | 16 | 2000 | 350.0 | 350.0 | 43.0 |
| ISO7830FDWWR | SOIC | DWW | 16 | 1000 | 350.0 | 350.0 | 43.0 |

PACKAGE MATERIALS INFORMATION

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TUBE



*All dimensions are nominal

| Device | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (µm) | B (mm) |
|---------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| ISO7830DW | DW | SOIC | 16 | 40 | 506.98 | 12.7 | 4826 | 6.6 |
| ISO7830DW.A | DW | SOIC | 16 | 40 | 506.98 | 12.7 | 4826 | 6.6 |
| ISO7830DWW | DWW | SOIC | 16 | 45 | 507 | 20 | 5000 | 9 |
| ISO7830DWW.A | DWW | SOIC | 16 | 45 | 507 | 20 | 5000 | 9 |
| ISO7830FDW | DW | SOIC | 16 | 40 | 506.98 | 12.7 | 4826 | 6.6 |
| ISO7830FDW.A | DW | SOIC | 16 | 40 | 506.98 | 12.7 | 4826 | 6.6 |
| ISO7830FDWW | DWW | SOIC | 16 | 45 | 507 | 20 | 5000 | 9 |
| ISO7830FDWW.A | DWW | SOIC | 16 | 45 | 507 | 20 | 5000 | 9 |

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