High-Speed Four Channel Digital Isolators

UMISO7740 ***WSOP16***
UMISO7741 ***WSOP16***
UMISO7742 ***WSOP16***

1 Description

The UMISO774x series are high-performance quad-channel, unidirectional digital isolators with $5kV_{RMS}$ wide-body package isolation rating and DC to 150Mbps ultra-fast data rate. The devices offer high electromagnetic immunity and low emissions at low power consumption while isolating different ground domains and block high-voltage/high-current transients from sensitive or human interface circuitry. Each isolation channel has a logic input and output buffer separated by capacitive silicon dioxide (SiO_2) insulation barrier, the integrated Schmitt trigger on each input provide excellent noise immunity in automotive applications.

The UMISO774x series offers all possible unidirectional channel configurations to accommodate any four channels design. The UMISO7740 series feature four channels transferring signals in one direction. The UMISO7741 series have three-forward and one-reverse direction channels, making it ideal for applications such as isolated SPI, RS-485 communication. The UMISO7742 series provide further design flexibility with two channels in each direction. Both UMISO7741 and UMISO7742 series come with individual enable control pins for each side of the isolator which can be used to put the outputs in high impedance for multi-master driving applications to reduce power consumption.

The UMISO774x series feature default outputs. When the input is either not powered or is open-circuit, the default output is low for devices with suffix L and high for devices with suffix H, see the Ordering Information table for suffixes associated with each option.

The UMISO774x series are available in WSOP16 wide body package. The devices are characterized over ambient free-air temperatures from –40 ℃ to 125 ℃.

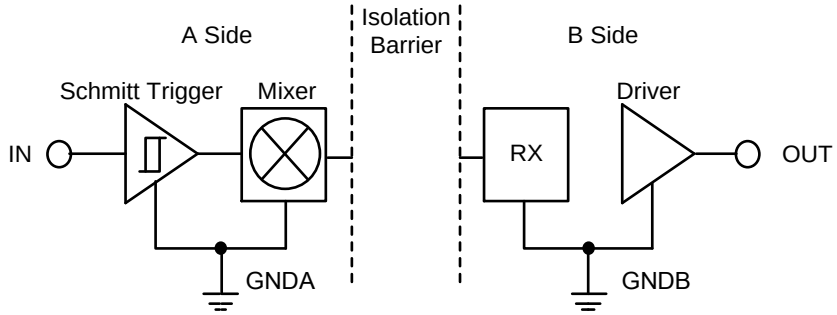
2 Features

- Data rate: DC to 150Mbps
- Robust galvanic isolation of digital signals
  - High lifetime: >40 years
  - Up to 5000 V_{RMS} isolation rating
  - ±200 kV/μs typical CMTI
- Wide supply range: 2.375V to 5.5V
- Extended ambient temperature range: –40 ℃ to 125 ℃
- Enable control input with tri-state output function
- Available in WSOP16 package
- Default output high (UMISO774xH) and low (UMISO774xL) options
- High Electromagnetic Immunity
- No start-up initialization required
- Excellent propagation delay and skew
  - Propagation delay: < 15ns
  - Pulse width distortion: < 2.6ns
- Compliant with safety regulatory
  - DIN EN IEC 60747-17 (VDE 0884-17)
  - UL according to UL1577
  - IEC 61010-1 and GB 4943.1-2022

3 Applications

- Industrial Automation
- Medical Systems
- Solar Inverter
- Motor Control
- Isolated Power Supplies
- Isolated ADC,DAC

4 Simplified Channel Structure

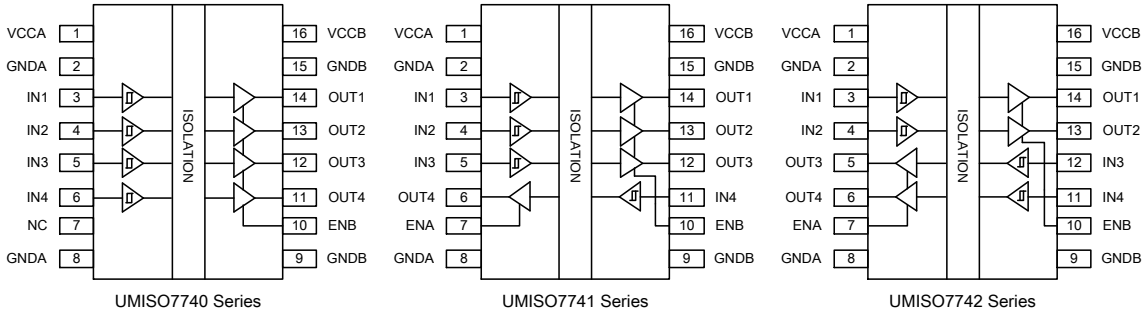


GNDA and GNDB are the isolated grounds for A side and B side respectively.

5 Selection Guide

Part Number	A Side Inputs	B Side Inputs	Default Output	Isolation Rating (V_{RMS})	Package
UMISO7740LWSG	4	0	Low	5000	WSOP16
UMISO7740HWSG	4	0	High	5000	WSOP16
UMISO7741LWSG	3	1	Low	5000	WSOP16
UMISO7741HWSG	3	1	High	5000	WSOP16
UMISO7742LWSG	2	2	Low	5000	WSOP16
UMISO7742HWSG	2	2	High	5000	WSOP16

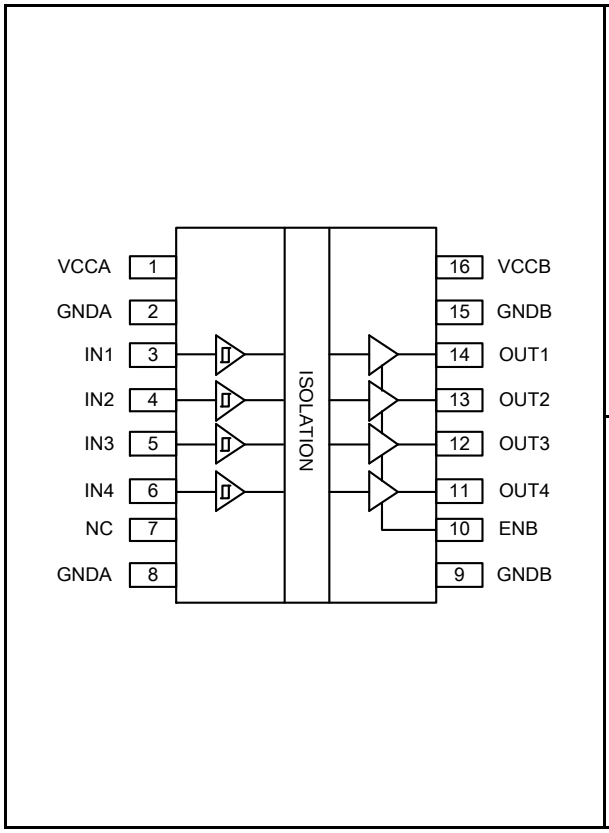
6 Functional Block Diagrams

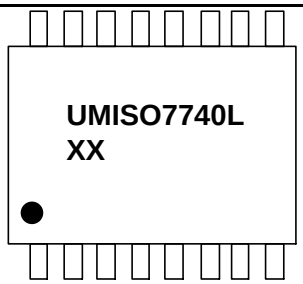


7 Ordering Information

Part Number	Mark Code	Package Type	Shipping Qty
UMISO7740LWSG	UMISO7740L	WSOP16	1500pcs/13Inch Tape & Reel
UMISO7740HWSG	UMISO7740H	WSOP16	1500pcs/13Inch Tape & Reel
UMISO7741LWSG	UMISO7741L	WSOP16	1500pcs/13Inch Tape & Reel
UMISO7741HWSG	UMISO7741H	WSOP16	1500pcs/13Inch Tape & Reel
UMISO7742LWSG	UMISO7742L	WSOP16	1500pcs/13Inch Tape & Reel
UMISO7742HWSG	UMISO7742H	WSOP16	1500pcs/13Inch Tape & Reel

8 Pin Configuration and Function





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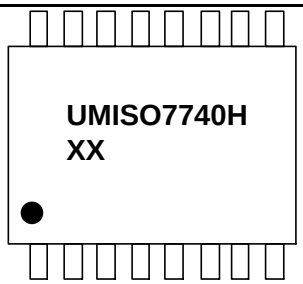
UMISO7740LWSG
WSOP16



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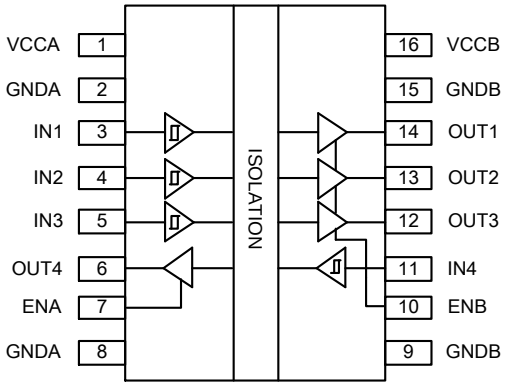
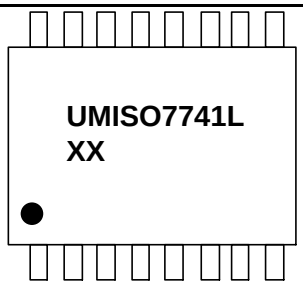
8 Pin Configuration and Function (continued)





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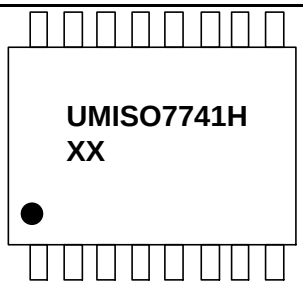

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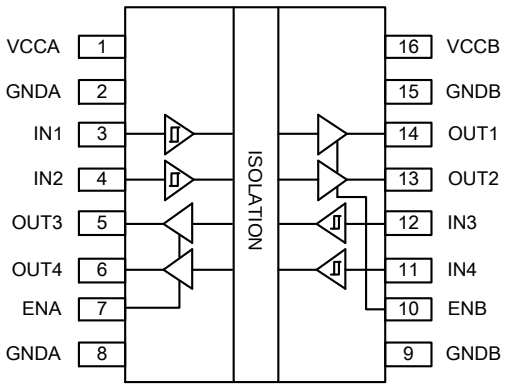

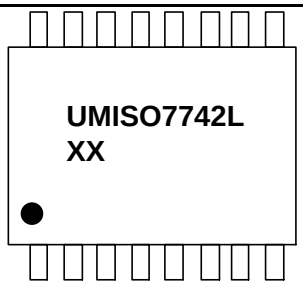

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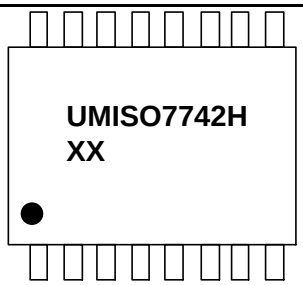

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WSOP16

8 Pin Configuration and Function (continued)

Table 8-1. Pin Functions

Pin Name	Function
VCCA	Power supply for isolator side A.
GNDA	Ground reference for isolator side A.
IN1	Logic input 1, corresponds to logic output 1.
IN2	Logic input 2, corresponds to logic output 2.
IN3	Logic input 3, corresponds to logic output 3.
IN4	Logic input 4, corresponds to logic output4.
NC	Not connected.
ENA	Output enable A. Output pin on side A is enabled when ENA is high or floating; Output pin on side A is open and in high-impedance state when ENA is low.
GNDA	Ground reference for isolator side A.
GNDB	Ground reference for isolator side B.
ENB	Output enable B. Output pin on side B is enabled when ENB is high or floating; Output pin on side B is open and in high−impedance state when ENB is low.
OUT4	Logic output 4, OUT4 is the logic output for the IN4 input.
OUT3	Logic output 3, OUT3 is the logic output for the IN3 input.
OUT 2	Logic output 2, OUT2 is the logic output for the IN2 input.
OUT 1	Logic output 1, OUT1 is the logic output for the IN1 input.
GNDB	Ground reference for isolator side B.
VCCB	Power supply for isolator side B.

9 Specifications

9.1 Absolute Maximum Ratings (Note 1)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CCA}	Supply voltage for isolator side A	Note 2	-0.5		6	V
V_{CCB}	Supply voltage for isolator side B	Note 2	-0.5		6	V
V_I	Voltage on INx, OUTx, ENx	Note 3	-0.5		V_{CCX} +0.5	V
V_{ESD}	Human body model (HBM),per ANSI/ESDA/JEDEC JS-001	All pins		±8		kV
I_{LU}	Latch up, per JEDEC JESD78			200		mA
I_O	Output current		-15		15	mA
T_J	Junction temperature				150	℃
T_{STG}	Storage temperature		-65		150	℃

Note 1: Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
Note 2: All voltage values are with respect to the local ground terminal (GNDA or GNDB) and are peak voltage values.
Note 3: Maximum voltage must not exceed 6 V.

9.2 Recommended Operating Conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CCA}	Supply voltage for isolator side A		2.375	3.3/5.0	5.5	V
V_{CCB}	Supply voltage for isolator side B		2.375	3.3/5.0	5.5	V
$V_{CC(UVLO+)}$	V_{CC} undervoltage-lockout threshold when supply voltage is rising		2	2.2	2.35	V
$V_{CC(UVLO-)}$	V_{CC} undervoltage-lockout threshold when supply voltage is falling		1.98	2.1	2.21	V
$V_{HYS(UVLO)}$	V_{CC} undervoltage-lockout threshold hysteresis		100	120	160	mV
I_{OH}	High-level output current	V_{CCO} = 5V (Note 1)	-4			mA
		V_{CCO} = 3.3V	-2			
		V_{CCO} = 2.5V	-1			
I_{OL}	Low-level output current	V_{CCO} = 5V			4	mA
		V_{CCO} = 3.3V			2	
		V_{CCO} = 2.5V			1	

9.2 Recommended Operating Conditions (continued)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{IH}	INx Input High Voltage		2			V
V_{IL}	INx Input Low Voltage				0.8	V
V_{IH}	ENx Input High Voltage		0.7× V_{CCO}			V
V_{IL}	ENx Input Low Voltage				0.3× V_{CCO}	V
DR	Data rate				150	Mbps
T_A	Ambient temperature		-40	25	125	℃

Note 1: V_{CCO} = Output-side supply V_{CC}.

9.3 Thermal Information

Symbol	Parameter		Value	Unit
$R_{\theta JA}$	Junction to ambient thermal	WSOP16	70.5	°C/W

9.4 Power Rating

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
UMISO7740						
P_D	Maximum power dissipation	V_{CCA} = V_{CCB} = 5.5 V, C_L = 15 pF, T_J = 150°C, Input a 75 MHz, 50% duty cycle square wave.			315	mW
P_{DA}	Maximum power dissipation on A side				38	mW
P_{DB}	Maximum power dissipation on B side				277	mW
UMISO7741						
P_D	Maximum power dissipation	V_{CCA} = V_{CCB} = 5.5 V, C_L = 15 pF, T_J = 150°C, Input a 75 MHz, 50% duty cycle square wave.			318	mW
P_{DA}	Maximum power dissipation on A side				98	mW
P_{DB}	Maximum power dissipation on B side				220	mW
UMISO7742						
P_D	Maximum power dissipation	V_{CCA} = V_{CCB} = 5.5 V, C_L = 15 pF, T_J = 150°C, Input a 75 MHz, 50% duty cycle square wave.			312	mW
P_{DA}	Maximum power dissipation on A side				156	mW
P_{DB}	Maximum power dissipation on B side				156	mW

9.5 Insulation Specifications

Symbol	Parameter	Conditions	Value	Unit
			WSOP16	
CLR	External clearance	Shortest terminal-to-terminal distance through air	8	mm
CPG	External creepage	Shortest terminal-to-terminal distance across the package surface	8	mm
DTI	Distance through the insulation	Minimum internal gap (internal clearance)	16	μm
CTI	Comparative tracking index	DIN EN 60112 (VDE 0303-11); IEC 60112	>600	V
	Material group	Per IEC 60664-1	I	
	Overvoltage category per IEC 60664-1	Rated mains voltage ≤ 150 V_{RMS}	I-IV	
		Rated mains voltage ≤ 300 V_{RMS}	I-IV	
		Rated mains voltage ≤ 600 V_{RMS}	I-IV	
		Rated mains voltage ≤ 1000 V_{RMS}	I-II	
DIN EN IEC 60747-17 (VDE 0884-17) (Note 1)				
V_{IORM}	Maximum repetitive peak isolation voltage	AC voltage (bipolar)	1414	V_{PK}
V_{IOWM}	Maximum operating isolation voltage	AC voltage; time-dependent dielectric breakdown (TDDB) test	1000	V_{RMS}
		DC voltage	1414	V_{DC}
V_{IOTM}	Maximum transient isolation voltage	$V_{TEST} = V_{IOTM}$, t = 60 s (certified); $V_{TEST} = 1.2 \times V_{IOTM}$, t = 1 s (100% product test)	7070	V_{PK}
V_{IMP}	Maximum impulse voltage	Tested in air, 1.2/50 μs waveform per IEC 62368-1,	6000	V_{PK}
V_{IOSM}	Maximum surge isolation voltage	$V_{IOSM} \geq 1.3 \times V_{IMP}$; Tested in oil (qualification test), 1.2/50 μs waveform per IEC 62368-1	8000	V_{PK}

9.5 Insulation Specifications (continued)

Symbol	Parameter	Conditions	Value	Unit
			WSOP16	
q_{pd}	Apparent charge (Note 2)	Method a, after input/output safety test of the subgroup 2/3, $V_{ini} = V_{IOTM}$, $t_{ini} = 60$ s; $V_{pd(m)} = 1.2 \times V_{IORM}$, $t_m = 10$ s	≤5	pC
		Method a, after environmental test of the subgroup 1, $V_{ini} = V_{IOTM}$, $t_{ini} = 60$ s; $V_{pd(m)} = 1.3 \times V_{IORM}$, $t_m = 10$ s	≤5	pC
		Method b, at routine test (100% production test) and preconditioning (type test) $V_{ini} = 1.2 \times V_{IOTM}$, $t_{ini} = 1$ s; $V_{pd(m)} = 1.5 \times V_{IORM}$, $t_m = 1$ s (method b1) or $V_{pd(m)} = V_{ini}$, $t_m = t_{ini}$ (method b2)	≤5	pC
C_{IO}	Barrier capacitance, input to output (Note 3)	$V_{IO} = 0.4 \times \sin(2\pi ft)$, f = 1 MHz	~1.0	pF
R_{IO}	Isolation resistance (Note 3)	V_{IO} = 500 V, T_A = 25 ℃	$>10^{12}$	Ω
		V_{IO} = 500 V, 100 ℃ ≤ T_A ≤ 125 ℃	$>10^{11}$	
		V_{IO} = 500 V at T_s = 150 ℃	$>10^{9}$	
	Pollution degree		2	
UL 1577				
V_{ISO}	Maximum withstanding isolation voltage	$V_{TEST} = V_{ISO}$, t = 60 s(qualification) $V_{TEST} = 1.2 \times V_{ISO}$, t = 1 s (100% production test)	5000	V_{RMS}

Note 1: 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.
Note 2: The characterization charge is discharging charge (pd) caused by partial discharge.
Note 3: Capacitance and resistance are measured with all pins on field-side and logic-side tied together.

9.6 Electrical Characteristics

9.6.1 Electrical Characteristics (V_{CCA} = V_{CCB} = 5 V ± 10%)

T_A = -40 to 125°C (over recommended operating conditions, unless otherwise specified).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OH}	Output high voltage	I_{OH} = -4 mA, see Figure 10-2 (Note 1)	V_{CCO}-0.4	4.8		V
V_{OL}	Output low voltage	I_{OL} = 4 mA, see Figure 10-2		0.2	0.4	V
V_{IH}	INx input high		2.0			V
V_{IL}	INx input low				0.8	V
V_{IH}	ENx input high		0.7V_{CCO}			V
V_{IL}	ENx input low				0.3V_{CCO}	V
I_{IH}	High-level input leakage current	V_{IH} = V_{CCA} at INx or ENx			20	μA
I_{IL}	Low-level input leakage current	V_{IL} = 0V at INx	-20			μA
Z_O	Output impedance			50		Ω
CMTI Immunity	Common-mode transient	V_I = V_{CCI} or 0 V, V_{CM} = 1200 V, see Figure 10-4 (Note 1)	150	200		kV/μs
C_I	Input capacitance (Note 2)	V_I = V_{CC} / 2 + 0.4×sin(2πft), f = 1 MHz, V_{CC} = 5 V		2		pF

9.6.2 Electrical Characteristics (V_{CCA} = V_{CCB} = 3.3 V ± 10%)

T_A = -40 to 125°C (over recommended operating conditions, unless otherwise specified).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OH}	Output high voltage	I_{OH} = -2 mA, see Figure 10-2 (Note 1)	V_{CCO}-0.4	3.2		V
V_{OL}	Output low voltage	I_{OL} = 2 mA, see Figure 10-2		0.1	0.4	V
V_{IH}	INx input high		2.0			V
V_{IL}	INx input low				0.8	V
V_{IH}	ENx input high		0.7V_{CCO}			V
V_{IL}	ENx input low				0.3V_{CCO}	V
I_{IH}	High-level input leakage current	V_{IH} = V_{CCA} at INx or ENx			20	μA
I_{IL}	Low-level input leakage current	V_{IL} = 0V at INx	-20			μA
Z_O	Output impedance			50		Ω
CMTI Immunity	Common-mode transient	V_I = V_{CCI} or 0 V, V_{CM} = 1200 V, see Figure 10-4 (Note 1)	150	200		kV/μs
C_I	Input capacitance (Note 2)	V_I = V_{CC} / 2 + 0.4×sin(2πft), f = 1 MHz, V_{CC} = 3.3V		2		pF

9.6.3 Electrical Characteristics (V_{CCA} = V_{CCB} = 2.5 V ± 5%)

T_A = -40 to 125°C (over recommended operating conditions, unless otherwise specified).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OH}	Output high voltage	I_{OH} = -1 mA, see Figure 10-2 (Note 1)	V_{CCO}-0.4	2.45		V
V_{OL}	Output low voltage	I_{OL} = 1 mA, see Figure 10-2		0.05	0.4	V
V_{IH}	INx input high		2.0			V
V_{IL}	INx input low				0.8	V
V_{IH}	ENx input high		0.7V_{CCO}			V
V_{IL}	ENx input low				0.3V_{CCO}	V
I_{IH}	High-level input leakage current	V_{IH} = V_{CCA} at INx or ENx			20	μA
I_{IL}	Low-level input leakage current	V_{IL} = 0V at INx	-20			μA
Z_O	Output impedance			50		Ω
CMTI Immunity	Common-mode transient	V_I = V_{CCI} or 0 V, V_{CM} = 1200 V, see Figure 10-4 (Note 1)	150	200		kV/μs
C_I	Input capacitance (Note 2)	V_I = V_{CC} / 2 + 0.4×sin(2πft), f = 1 MHz, V_{CC} = 2.5V		2		pF

Note 1: V_{CCI} = Input-side supply V_{CC}, V_{CCO} = Output-side supply V_{CC}.
Note 2: Measured from pin to Ground.

9.7 Supply Current Characteristics

9.7.1 Supply Current Characteristics (V_{CCA} = V_{CCB} = 5 V ± 10%)

T_A = -40 to 125°C (over recommended operating conditions, unless otherwise specified).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
UMISO7740						
I_{CCA}	Supply Current - Outputs disabled	ENB = 0 V; V_{IN} = 0V (UMISO7740L); V_{IN} = V_{CCA} (UMISO7740H)		1.4	2.0	mA
I_{CCB}				3.6	5.5	
I_{CCA}		ENB = 0 V; V_{IN} = V_{CCA} (UMISO7740L); V_{IN} = 0V (UMISO7740H)		10.5	13.8	
I_{CCB}				3.7	5.5	

9.7.1 Supply Current Characteristics (V_{CCA} = V_{CCB} = 5 V ± 10%)

V_{CCA} = V_{CCB} = 5 V ± 10%, T_A = -40 to 125°C (over recommended operating conditions, unless otherwise specified).

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CCA}	Supply Current - DC signal	ENB = V_{CCB}; V_{IN} = 0V (UMISO7740L); V_{IN} = V_{CCA} (UMISO7740H)			1.4	2.0	mA
I_{CCB}					3.8	5.6	
I_{CCA}		ENB = V_{CCB}; V_{IN} = V_{CCA} (UMISO7740L); V_{IN} = 0V (UMISO7740H)			10.5	13.8	
I_{CCB}					3.9	5.5	
I_{CCA}	Supply Current - AC signal	ENB = V_{CCB}, all channels switching with 50% duty cycle square wave clock input with 5V amplitude; C_L = 15 pF for each channel.	1Mbps		5.9	6.6	
I_{CCB}					4.2	5.6	
I_{CCA}			10Mbps		6.0	6.8	
I_{CCB}					7.0	9.6	
I_{CCA}			100Mbps		7.8	8.4	
I_{CCB}					33.8	40.1	
UMISO7741							
I_{CCA}	Supply Current - Outputs disabled	ENA = ENB = 0 V; V_{IN} = 0V (UMISO7741L); V_{IN} = V_{CCI} (UMISO7741H) (Note 1)			2.2	3.1	mA
I_{CCB}					3.6	5.6	
I_{CCA}		ENA = ENB = 0 V; V_{IN} = V_{CCI} (UMISO7741L); V_{IN} = 0V (UMISO7741H)			9.1	12.8	
I_{CCB}					6.0	9.7	

9.7.1 Supply Current Characteristics (V_{CCA} = V_{CCB} = 5 V ± 10%)

V_{CCA} = V_{CCB} = 5 V ± 10%, T_A = -40 to 125°C (over recommended operating conditions, unless otherwise specified).

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CCA}	Supply Current - DC signal	ENA = ENB = V_{CCI}; V_{IN} = 0V (UMISO7741L); V_{IN} = V_{CCI} (UMISO7741H)			2.2	3.1	mA
I_{CCB}					3.7	5.6	
I_{CCA}		ENA = ENB = V_{CCI}; V_{IN} = V_{CCI} (UMISO7741L); V_{IN} = 0V (UMISO7741H)			9.2	12.8	
I_{CCB}					6.1	9.7	
I_{CCA}	Supply Current - AC signal	ENA = ENB = V_{CCI}, all channels switching with 50% duty cycle square wave clock input with 5V amplitude; C_L = 15 pF for each channel.	1Mbps		5.7	7.6	
I_{CCB}					4.9	7.3	
I_{CCA}			10Mbps		6.3	8.2	
I_{CCB}					6.8	9.5	
I_{CCA}			100Mbps		12.7	15.8	
I_{CCB}					25.2	32.1	
UMISO7742							
I_{CCA}	Supply Current - Outputs disabled	ENA = ENB = 0 V; V_{IN} = 0V (UMISO7742L); V_{IN} = V_{CCI} (UMISO7742H) (Note 1)			2.9	4.7	mA
I_{CCB}					2.9	4.7	
I_{CCA}		ENA = ENB = 0 V; V_{IN} = V_{CCI} (UMISO7742L); V_{IN} = 0V (UMISO7742H)			7.5	11.6	
I_{CCB}					7.5	11.6	

9.7.1 Supply Current Characteristics (V_{CCA} = V_{CCB} = 5 V ± 10%)

V_{CCA} = V_{CCB} = 5 V ± 10%, T_A = -40 to 125°C (over recommended operating conditions, unless otherwise specified).

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CCA}	Supply Current - DC signal	ENA = ENB = V_{CCI}; V_{IN} = 0V (UMISO7742L); V_{IN} = V_{CCI} (UMISO7742H)			3.0	4.7	mA
I_{CCB}					3.0	4.7	
I_{CCA}		ENA = ENB = V_{CCI}; V_{IN} = V_{CCI} (UMISO7742L); V_{IN} = 0V (UMISO7742H)			7.6	11.6	
I_{CCB}					7.6	11.6	
I_{CCA}	Supply Current - AC signal	ENA = ENB = V_{CCI}, all channels switching with 50% duty cycle square wave clock input with 5V amplitude; C_L = 15 pF for each channel.	1Mbps		5.5	8.6	
I_{CCB}					5.5	8.6	
I_{CCA}			10Mbps		6.5	9.4	
I_{CCB}					6.5	9.4	
I_{CCA}			100Mbps		17.6	23.1	
I_{CCB}					16.6	23.1	

9.7.2 Supply Current Characteristics (V_{CCA} = V_{CCB} = 3.3 V ± 10%)

V_{CCA} = V_{CCB} = 3.3 V ± 10%, T_A = -40 to 125°C (over recommended operating conditions, unless otherwise specified).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
UMISO7740						
I_{CCA}	Supply Current - Outputs disabled	ENB = 0 V; V_{IN} = 0 V (UMISO7740L); V_{IN} = V_{CCA} (UMISO7740H)		1.4	1.9	mA
I_{CCB}				3.6	5.2	
I_{CCA}		ENB = 0 V; V_{IN} = V_{CCA} (UMISO7740L); V_{IN} = 0V (UMISO7740H)		10.5	13.8	
I_{CCB}				3.7	5.2	

9.7.2 Supply Current Characteristics (V_{CCA} = V_{CCB} = 3.3 V ± 10%)

V_{CCA} = V_{CCB} = 3.3 V ± 10%, T_A = -40 to 125°C (over recommended operating conditions, unless otherwise specified).

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CCA}	Supply Current - DC signal	ENB = V_{CCB}; V_{IN} = 0V (UMISO7740L); V_{IN} = V_{CCA} (UMISO7740H)			1.4	2.0	mA
I_{CCB}					3.7	5.6	
I_{CCA}		ENB = V_{CCB}; V_{IN} = V_{CCA} (UMISO7740L); V_{IN} = 0V (UMISO7740H)			10.5	13.8	
I_{CCB}					3.8	5.5	
I_{CCA}	Supply Current - AC signal	ENB = V_{CCB}, all channels switching with 50% duty cycle square wave clock input with 3.3V amplitude; C_L = 15 pF for each channel.	1Mbps		5.9	6.6	
I_{CCB}					3.9	5.6	
I_{CCA}			10Mbps		5.9	6.6	
I_{CCB}					5.8	7.6	
I_{CCA}			100Mbps		7.3	7.8	
I_{CCB}					23.4	29.1	
UMISO7741							
I_{CCA}	Supply Current - Outputs disabled	ENA = ENB = 0 V; V_{IN} = 0V (UMISO7741L); V_{IN} = V_{CCI} (UMISO7741H) (Note 1)			2.1	3.1	mA
I_{CCB}					3.5	5.6	
I_{CCA}		ENA = ENB = 0 V; V_{IN} = V_{CCI} (UMISO7741L); V_{IN} = 0 V (UMISO7741H)			9.1	12.8	
I_{CCB}					5.9	9.7	

9.7.2 Supply Current Characteristics (V_{CCA} = V_{CCB} = 3.3 V ± 10%)

V_{CCA} = V_{CCB} = 3.3 V ± 10%, T_A = -40 to 125°C (over recommended operating conditions, unless otherwise specified).

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CCA}	Supply Current - DC signal	ENA = ENB = V_{CCI}; V_{IN} = 0 V (UMISO7741L); V_{IN} = V_{CCI} (UMISO7741H)			2.1	3.1	mA
I_{CCB}					3.6	5.6	
I_{CCA}		ENA = ENB = V_{CCI}; V_{IN} = V_{CCI} (UMISO7741L); V_{IN} = 0 V (UMISO7741H)			9.1	12.8	
I_{CCB}					6.0	9.7	
I_{CCA}	Supply Current - AC signal	ENA = ENB = V_{CCI}, all channels switching with 50% duty cycle square wave clock input with 3.3V amplitude; C_L = 15 pF for each channel.	1Mbps		5.6	7.4	
I_{CCB}					4.7	7.1	
I_{CCA}			10Mbps		6.0	8.8	
I_{CCB}					5.9	8.6	
I_{CCA}			100Mbps		10.3	13.2	
I_{CCB}					18.5	23.5	
UMISO7742							
I_{CCA}	Supply Current - Outputs disabled	ENA = ENB = 0 V; V_{IN} = 0 V (UMISO7742L); V_{IN} = V_{CCI} (UMISO7742H) (Note 1)			2.8	4.7	mA
I_{CCB}					2.8	4.7	
I_{CCA}		ENA = ENB = 0 V; V_{IN} = V_{CCI} (UMISO7742L); V_{IN} = 0 V (UMISO7742H)			7.5	11.6	
I_{CCB}					7.5	11.6	

9.7.2 Supply Current Characteristics (V_{CCA} = V_{CCB} = 3.3 V ± 10%)

V_{CCA} = V_{CCB} = 3.3 V ± 10%, T_A = -40 to 125°C (over recommended operating conditions, unless otherwise specified).

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CCA}	Supply Current - DC signal	ENA = ENB = V_{CCI}; V_{IN} = 0V (UMISO7742L); V_{IN} = V_{CCI} (UMISO7742H)			2.9	4.7	mA
I_{CCB}					2.9	4.7	
I_{CCA}		ENA = ENB = V_{CCI}; V_{IN} = V_{CCI} (UMISO7742L); V_{IN} = 0V (UMISO7742H)			7.6	11.6	
I_{CCB}					7.6	11.6	
I_{CCA}	Supply Current - AC signal	ENA = ENB = V_{CCI}, all channels switching with 50% duty cycle square wave clock input with 3.3V amplitude; C_L = 15 pF for each channel.	1Mbps		5.4	8.6	
I_{CCB}					5.4	8.6	
I_{CCA}			10Mbps		6.0	9.4	
I_{CCB}					6.0	9.4	
I_{CCA}			100Mbps		13.3	18.0	
I_{CCB}					12.8	18.0	

9.7.3 Supply Current Characteristics (V_{CCA} = V_{CCB} = 2.5 V ± 5%)

V_{CCA} = V_{CCB} = 2.5 V ± 5%, T_A = -40 to 125°C (over recommended operating conditions, unless otherwise specified).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
UMISO7740						
I_{CCA}	Supply Current - Outputs disabled	ENB = 0 V; V_{IN} = 0V (UMISO7740L); V_{IN} = V_{CCA} (UMISO7740H)		1.4	1.9	mA
I_{CCB}				3.6	5.2	
I_{CCA}		ENB = 0 V; V_{IN} = V_{CCA} (UMISO7740L); V_{IN} = 0V (UMISO7740H)		10.5	13.8	
I_{CCB}				3.7	5.2	

9.7.3 Supply Current Characteristics (V_{CCA} = V_{CCB} = 2.5 V ± 5%)

V_{CCA} = V_{CCB} = 2.5 V ± 5%, T_A = -40 to 125°C (over recommended operating conditions, unless otherwise specified).

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CCA}	Supply Current - DC signal	ENB = V_{CCB}; V_{IN} = 0V (UMISO7740L); V_{IN} = V_{CCA} (UMISO7740H)			1.4	2.0	mA
I_{CCB}					3.7	5.6	
I_{CCA}		ENB = V_{CCB}; V_{IN} = V_{CCA} (UMISO7740L); V_{IN} = 0V (UMISO7740H)			10.5	13.8	
I_{CCB}					3.8	5.5	
I_{CCA}	Supply Current - AC signal	ENB = V_{CCB}, all channels switching with 50% duty cycle square wave clock input with 2.5V amplitude; C_L = 15 pF for each channel.	1Mbps		5.9	6.6	
I_{CCB}					3.9	5.6	
I_{CCA}			10Mbps		5.9	6.6	
I_{CCB}					5.3	7.0	
I_{CCA}			100Mbps		7.1	7.8	
I_{CCB}					18.6	22.5	
UMISO7741							
I_{CCA}	Supply Current - Outputs disabled	ENA = ENB = 0 V; V_{IN} = 0V (UMISO7741L); V_{IN} = V_{CCI} (UMISO7741H) (Note 1)			2.3	3.1	mA
I_{CCB}					3.5	5.6	
I_{CCA}		ENA = ENB = 0 V; V_{IN} = V_{CCI} (UMISO7741L); V_{IN} = 0V (UMISO7741H)			9.1	12.8	
I_{CCB}					5.9	9.7	

9.7.3 Supply Current Characteristics (V_{CCA} = V_{CCB} = 2.5 V ± 5%)

V_{CCA} = V_{CCB} = 2.5 V ± 5%, T_A = -40 to 125°C (over recommended operating conditions, unless otherwise specified).

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CCA}	Supply Current - DC signal	ENA = ENB = V_{CCI}; V_{IN} = 0V (UMISO7741L); V_{IN} = V_{CCI} (UMISO7741H)			2.1	3.1	mA
I_{CCB}					3.6	5.6	
I_{CCA}		ENA = ENB = V_{CCI}; V_{IN} = V_{CCI} (UMISO7741L); V_{IN} = 0V (UMISO7741H)			9.2	12.8	
I_{CCB}					6.1	9.7	
I_{CCA}	Supply Current - AC signal	ENA = ENB = V_{CCI}, all channels switching with 50% duty cycle square wave clock input with 2.5V amplitude; C_L = 15 pF for each channel.	1Mbps		5.6	7.6	
I_{CCB}					4.6	7.1	
I_{CCA}			10Mbps		5.8	8.8	
I_{CCB}					5.5	8.2	
I_{CCA}			100Mbps		9.1	12.2	
I_{CCB}					14.8	19.5	
UMISO7742							
I_{CCA}	Supply Current - Outputs disabled	ENA = ENB = 0 V; V_{IN} = 0V (UMISO7742L); V_{IN} = V_{CCI} (UMISO7742H) (Note 1)			2.8	4.7	mA
I_{CCB}					2.8	4.7	
I_{CCA}		ENA = ENB = 0 V; V_{IN} = V_{CCI} (UMISO7742L); V_{IN} = 0V (UMISO7742H)			7.5	11.6	
I_{CCB}					7.5	11.6	

9.7.3 Supply Current Characteristics (V_{CCA} = V_{CCB} = 2.5 V ± 5%)

V_{CCA} = V_{CCB} = 2.5 V ± 5%, T_A = -40 to 125°C (over recommended operating conditions, unless otherwise specified).

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CCA}	Supply Current - DC signal	ENA = ENB = V_{CCI}; V_{IN} = 0V (UMISO7742L); V_{IN} = V_{CCI} (UMISO7742H)			2.8	4.7	mA
I_{CCB}					2.8	4.7	
I_{CCA}		ENA = ENB = V_{CCI}; V_{IN} = V_{CCI} (UMISO7742L); V_{IN} = 0V (UMISO7742H)			7.5	11.6	
I_{CCB}					7.5	11.6	
I_{CCA}	Supply Current - AC signal	ENA = ENB = V_{CCI}, all channels switching with 50% duty cycle square wave clock input with 2.5V amplitude; C_L = 15 pF for each channel.	1Mbps		5.3	8.6	
I_{CCB}					5.3	8.6	
I_{CCA}			10Mbps		5.7	9.4	
I_{CCB}					5.7	9.4	
I_{CCA}			100Mbps		11.0	16.6	
I_{CCB}					11.0	16.6	

Note 1: V_{CCI} = Intput-side supply V_{CC}.

9.8 Electrical Characteristics (Dynamic)

9.8.1 Electrical Characteristics (Dynamic) (V_{CCA} = V_{CCB} = 5 V ± 10%)

V_{CCA} = V_{CCB} = 5 V ± 10%, T_A = -40 to 125°C (over recommended operating conditions, unless otherwise specified).

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
DR	Data rate					150	Mbps
PWM_{MIN}	Minimum pulse width					5	ns
t_{PLH}	Propagation delay time	see Figure 10-1		4.5	10	16	ns
t_{PHL}		see Figure 10-1		4.5	10	16	ns
PWD	Pulse width distortion, $\lvert t_{PLH} - t_{PHL} \rvert$	see Figure 10-1				2.6	ns
$t_{SK(O)}$	Channel-to-Channel output skew time (Note 1)	Same-direction channels				2.6	ns
$t_{SK(PP)}$	Part-to-Part output skew time (Note 2)				2.2	5	ns
t_R	Output signal rise time	see Figure 10-1			2	3	ns
t_F	Output signal fall time	see Figure 10-1			1	3	ns
t_{PHZ}	Disable propagation delay, high output to high impedance	see Figure 10-2		10.9	12.8	16.1	ns
t_{PLZ}	Disable propagation delay, low output to high impedance	see Figure 10-2		11.6	13.9	16.6	ns
t_{PZH}	Enable propagation delay, high impedance to high output	UMISO774xL	see Figure 10-2		7.7	12	ns
		UMISO774xH			7.7	12	
t_{PZL}	Enable propagation delay, high impedance to low output	UMISO774xL	see Figure 10-2		7.7	12	ns
		UMISO774xH			7.7	12	
t_{DO}	Default output delay time from input power loss	see Figure 10-3			60	70	μs
t_{SU}	Start-up time				12	20	μs

9.8.2 Electrical Characteristics (Dynamic) (V_{CCA} = V_{CCB} = 3.3 V ± 10%)

V_{CCA} = V_{CCB} = 3.3 V ± 10%, T_A = -40 to 125°C (over recommended operating conditions, unless otherwise specified).

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
DR	Data rate					150	Mbps
PWM_{MIN}	Minimum pulse width					5	ns
t_{PLH}	Propagation delay time	see Figure 10-1		4.5	10.6	16	ns
t_{PHL}		see Figure 10-1		4.5	10.6	16	ns
PWD	Pulse width distortion, $\lvert t_{PLH} - t_{PHL} \rvert$	see Figure 10-1				2.6	ns
$t_{SK(O)}$	Channel-to-Channel output skew time (Note 1)	Same-direction channels				2.6	ns
$t_{SK(PP)}$	Part-to-Part output skew time (Note 2)				2.2	5	ns
t_R	Output signal rise time	see Figure 10-1			2.4	3.5	ns
t_F	Output signal fall time	see Figure 10-1			2.3	3.5	ns
t_{PHZ}	Disable propagation delay, high output to high impedance	see Figure 10-2			14.2	18.8	ns
t_{PLZ}	Disable propagation delay, low output to high impedance	see Figure 10-2			18.2	21.6	ns
t_{PZH}	Enable propagation delay, high impedance to high output	UMISO774xL	see Figure 10-2		8.6	14	ns
		UMISO774xH			8.6	14	
t_{PZL}	Enable propagation delay, high impedance to low output	UMISO774xL	see Figure 10-2		8.6	14	ns
		UMISO774xH			8.6	14	
t_{DO}	Default output delay time from input power loss	see Figure 10-3			60	70	μs
t_{SU}	Start-up time				12	20	μs

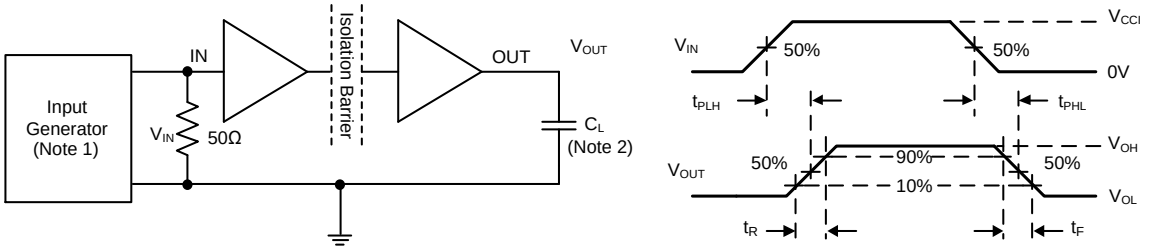
9.8.3 Electrical Characteristics (Dynamic) (V_{CCA} = V_{CCB} = 2.5 V ± 5%)

V_{CCA} = V_{CCB} = 2.5 V ± 5%, T_A = -40 to 125°C (over recommended operating conditions, unless otherwise specified).

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
DR	Data rate					150	Mbps
PWM_{MIN}	Minimum pulse width					5	ns
t_{PLH}	Propagation delay time	see Figure 10-1		5	11.8	18	ns
t_{PHL}		see Figure 10-1		5	11	18	ns
PWD	Pulse width distortion, $\lvert t_{PLH} - t_{PHL} \rvert$	see Figure 0-1				2.6	ns
$t_{SK(O)}$	Channel-to-Channel output skew time (Note 1)	Same-direction channels				2.6	ns
$t_{SK(PP)}$	Part-to-Part output skew time (Note 2)				2.2	5	ns
t_R	Output signal rise time	see Figure 10-1			2.7	4	ns
t_F	Output signal fall time	see Figure 10-1			2.6	4	ns
t_{PHZ}	Disable propagation delay, high output to high impedance	see Figure 10-2			17.2	25.1	ns
t_{PLZ}	Disable propagation delay, low output to high impedance	see Figure 10-2			23.1	27.5	ns
t_{PZH}	Enable propagation delay, high impedance to high output	UMISO774xL	see Figure 10-2		10.5	17	ns
		UMISO774xH			10.5	17	
t_{PZL}	Enable propagation delay, high impedance to low output	UMISO774xL	see Figure 10-2		10.5	17	ns
		UMISO774xH			10.5	17	
t_{DO}	Default output delay time from input power loss	see Figure 10-3			60	70	μs
t_{SU}	Start-up time				12	20	μs

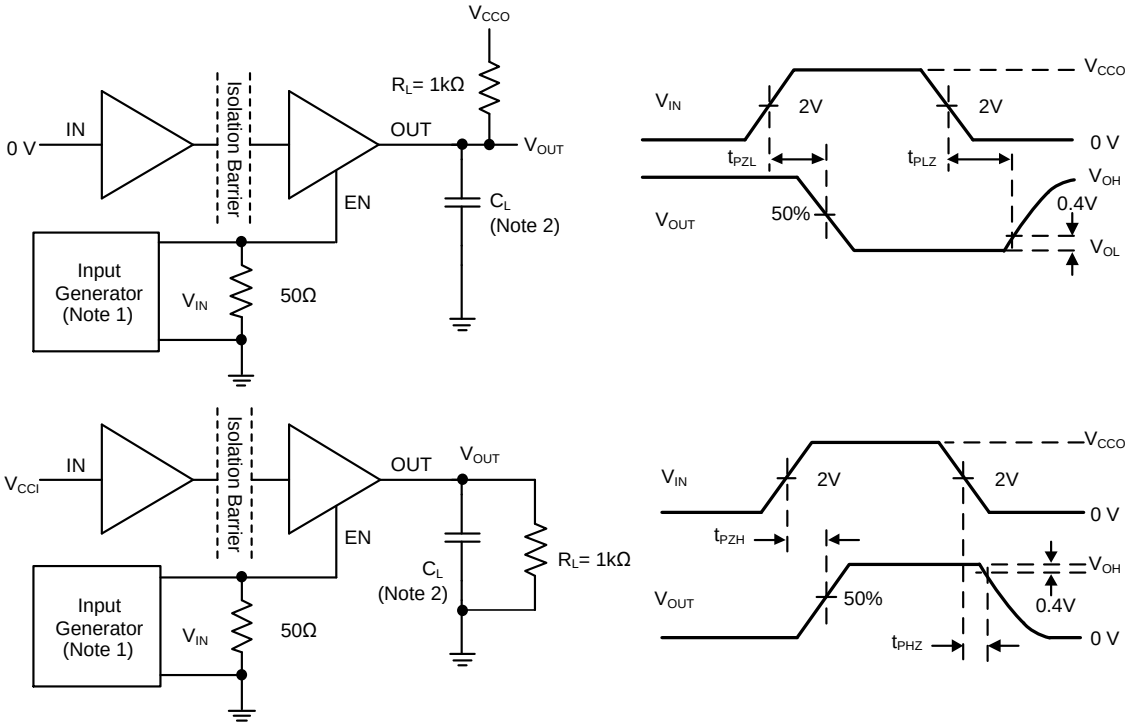
Note 1: $t_{SK(O)}$ is the skew between outputs of a single device with all driving inputs connected together and the outputs switching in the same direction while driving identical loads.
Note 2: $t_{SK(PP)}$ is the magnitude of the difference in propagation delay times between any terminals of different devices switching in the same direction while operating at identical supply voltages, temperature, input signals and loads.

10 Parameter Measurement Information



Note 1: A square wave generator provides V_{IN} input signal with characteristics: frequency≤ 100kHz, 50% duty cycle, $t_R \leq 3ns$, $t_F \leq 3ns$, $Z_{OUT} = 50\Omega$. At the input, 50 Ω resistor is required to terminate input generator signal. It is not needed in actual application.
Note 2: $C_L = 15pF$ and includes external circuit (instrumentation and fixture etc.) capacitance. Since the load capacitance influence the output rising time, it's a key factor in the timing characteristic measurement.

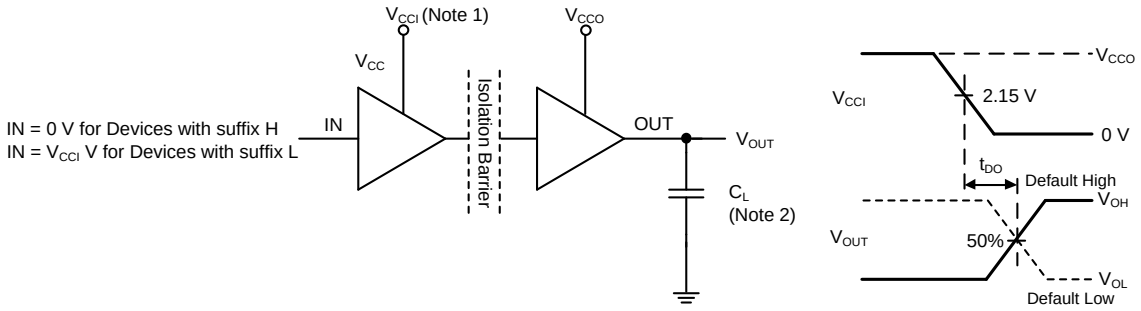
Figure 10-1. Switching Characteristics Test Circuit and Voltage Waveforms



Note 1: A square wave generator provides V_{IN} input signal with characteristics: frequency≤10kHz, 50% duty cycle, $t_R \leq 3ns$, $t_F \leq 3ns$, $Z_{OUT} = 50\Omega$. At the input, 50Ω resistor is required to terminate input generator signal. It is not needed in actual application.
Note 2: $C_L = 15pF$ and includes external circuit (instrumentation and fixture etc.) capacitance. Since the load capacitance influence the output rising time, it's a key factor in the timing characteristic measurement.

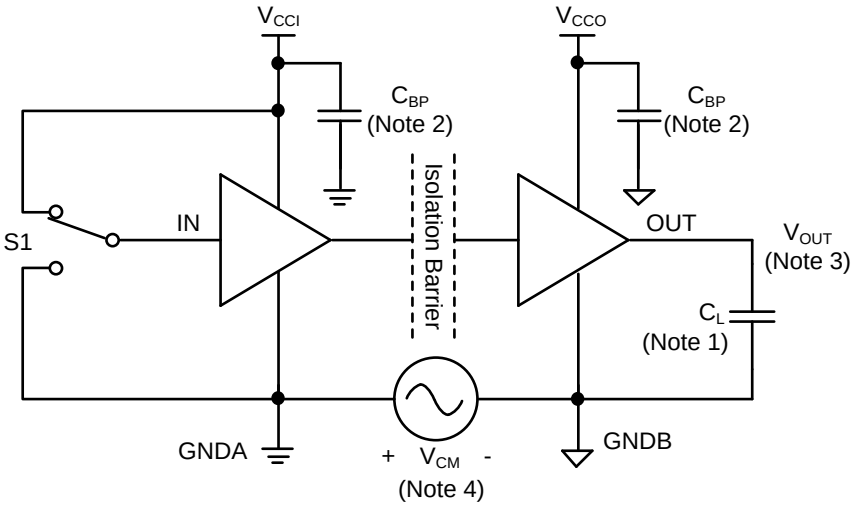
Figure 10-2. Enable/Disable Propagation Delay Time Test Circuit and Waveform

10 Parameter Measurement Information (continued)



Note 1: Power Supply Ramp Rate = 10 mV/ns. V_{CCI} should ramp over 2.375V, and less than 5.5V.
Note 2: C_L = 15pF and includes external circuit (instrumentation and fixture etc.) capacitance. Since the load capacitance influence the output rising time, it's a key factor in the timing characteristic measurement.

Figure 10-3. Default Output Delay Time Test Circuit and Voltage Waveforms



Note 1: C_L = 15pF and includes external circuit (instrumentation and fixture etc.) capacitance.
Note 2: C_{BP} (0.1 ~ 1uF) is bypass capacitance.
Note 3: Pass−fail criteria: the output must remain stable.
Note 4: The High Voltage Surge Generator generates repetitive high voltage surges with >1kV amplitude, rise time <10ns and fall time <10ns, to reach common−mode transient noise with >150kV/μs slew rate.

Figure 10-4. Common-Mode Transient Immunity Test Circuit

11 Detailed Description

11.1 Overview

The UMISO774x devices are a family of automotive, four-channel digital galvanic isolators using Union's full differential capacitive isolation technology. These devices have an ON-OFF keying (OOK) modulation scheme to transfer digital signals across the SiO_2 based isolation barrier between circuits with different power domains. 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 and recovers input signal at output through a buffer stage. With this OOK architecture, the UMISO774x devices build a robust data transmission path between different power domains, without any special start-up initialization requirement.
These devices also incorporate advanced full differential techniques to maximize the CMTI performance and minimize the radiated emissions due the high frequency carrier and I/O buffer switching.

11.2 Functional Block Diagram

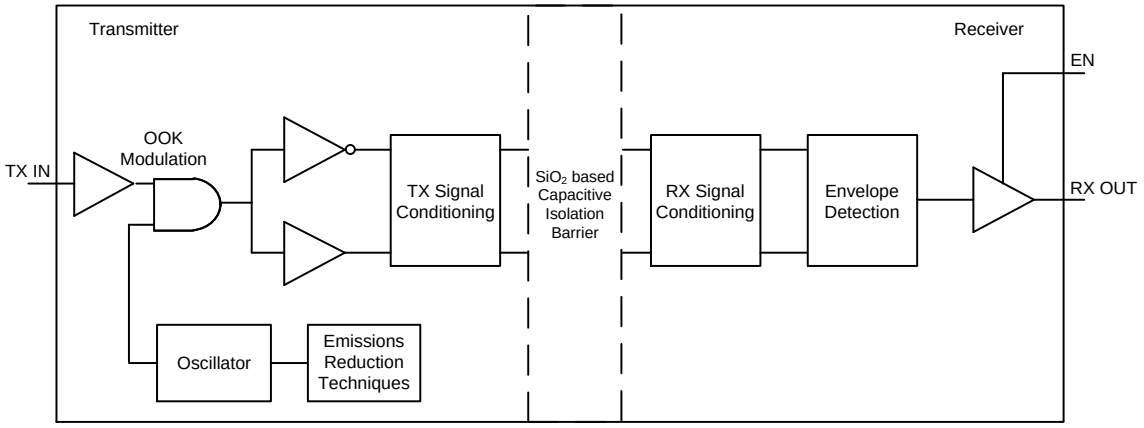


Figure 11-1. Functional Block Diagram of a Single Channel

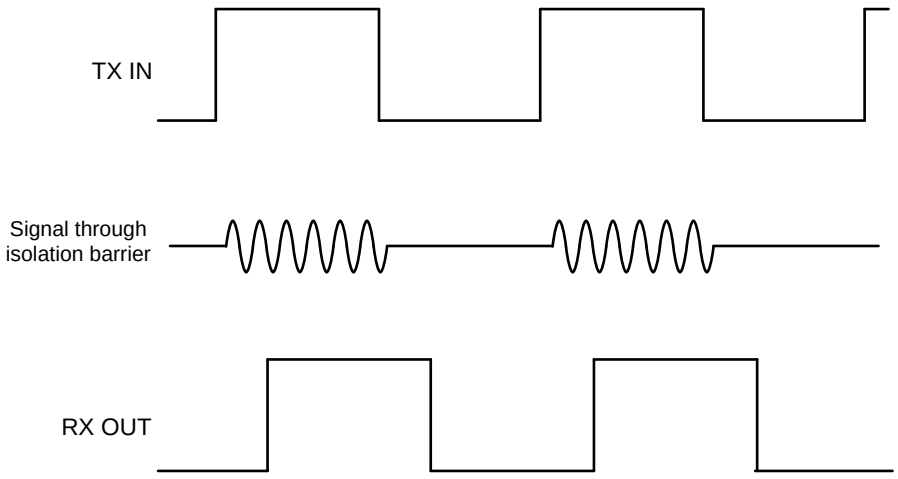


Figure 11-2. Conceptual Operation Waveforms of a Single Channel

11.3 Device Operation Modes (Note 1, 2, 3)

Table 11-1 lists the operation modes for the UMISO774x devices.

Table 11-1. Operation Mode Table (Note 1, 2, 3)

V_{CCI}	V_{CCO}	Enable (ENx)	Input (INx)	Output (OUTx)	Operation
X	PD	X	X	Undetermined	If the output side V_{CCO} is unpowered, a channel output is undetermined. (Note 4)
X	PU	L	X	Z	High impedance mode: A low level of Enable pin causes the output to be high impedance.
PD	PU	H or Open	X	Default	Default output mode: When V_{CCI} is unpowered, a channel output assumes the logic state based on its default option. Default is High for UMISO774xH and Low for UMISO774xL.
PU	PU	H or Open	H	H	Normal operation mode: A channel output follows the logic state of its input.
		H or Open	L	L	
		H or Open	Open	Default	Default output mode: When input is open, the corresponding channel output goes to its default logic state. Default is High for UMISO774xH and Low for UMISO774xL.

Note 1: V_{CCI} = Input−side V_{CC}; V_{CCO} = Output−side V_{CC}; PU = Powered up ($V_{CC} \geq V_{CC\,(UVLO+)}$); PD = Powered down ($V_{CC} \leq V_{CC\,(UVLO-)}$); X = Irrelevant; H = High level; L = Low level; Z = High Impedance.

Note 2: A strongly driven input signal can weakly power the floating V_{CC} through an internal protection diode and cause undetermined output.

Note 3: It is recommended to connect the enable inputs to external logic high or low level when the UMISO774x devices operate in noisy environments.

Note 4: The outputs are in undetermined state when $V_{CC\,(UVLO+)} < V_{CCI}$, $V_{CCO} < V_{CC\,(UVLO-)}$.

12 Application and Implementation

12.1 Application Information

The UMISO774x isolation ICs provide complete galvanic isolation between two power domains, protecting circuits from high common-mode transients and faults, and eliminating ground loops. In many applications, digital isolators are replacing optocouplers because they can reduce the power requirements and take up less board space while offering the same isolation capability. The UMISO774x devices are the high-performance, four-channel digital isolators. These devices come with enable pins on each side which can be used to put the respective outputs in high impedance for multi-master driving applications. Unlike optocouplers, which require external components to improve performance, provide bias, or limit current, the UMISO774x devices only require two external bypass capacitors to operate. To reduce ripple and the chance of introducing data errors, bypass V_{CCA} and V_{CCB} pins with 0.1μF to 1μF low-ESR ceramic capacitors to GNDA and GNDB respectively. Place the bypass capacitors as close to the power supply input pins as possible.

12.2 Typical Application

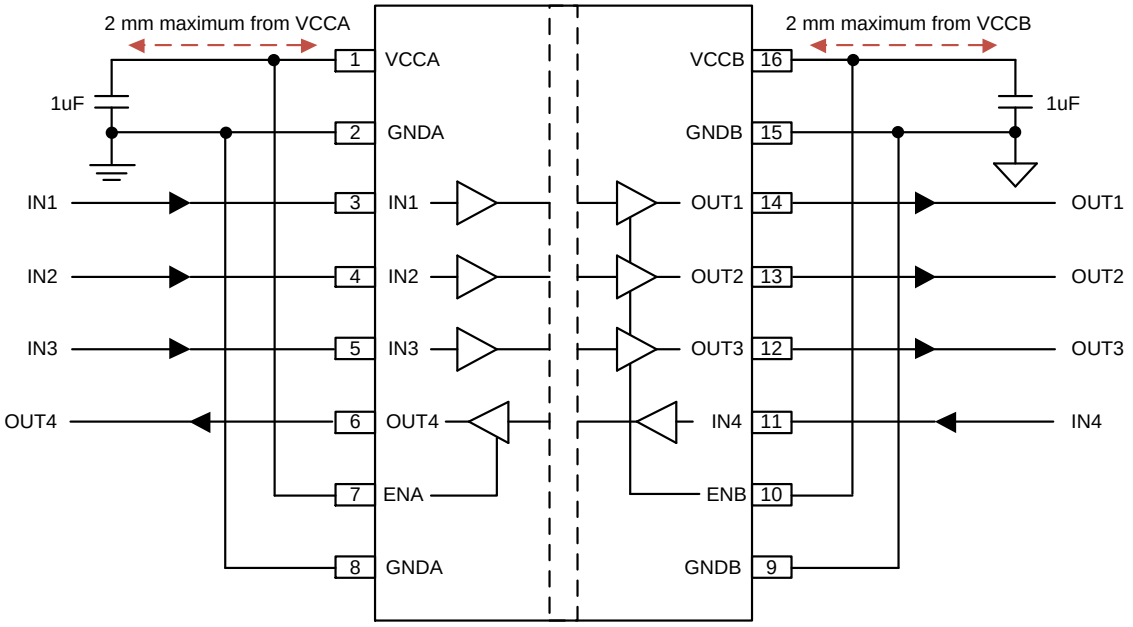
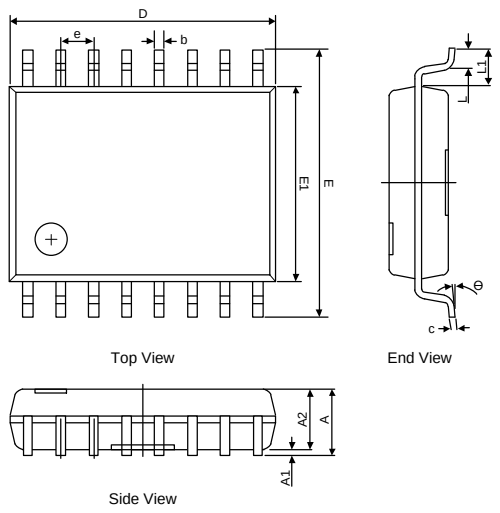


Figure 12-1. UMISO7741 Typical Application

Package Information

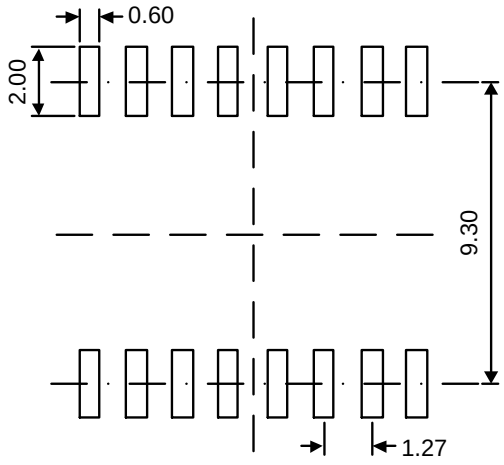
WSOP16

Outline Drawing



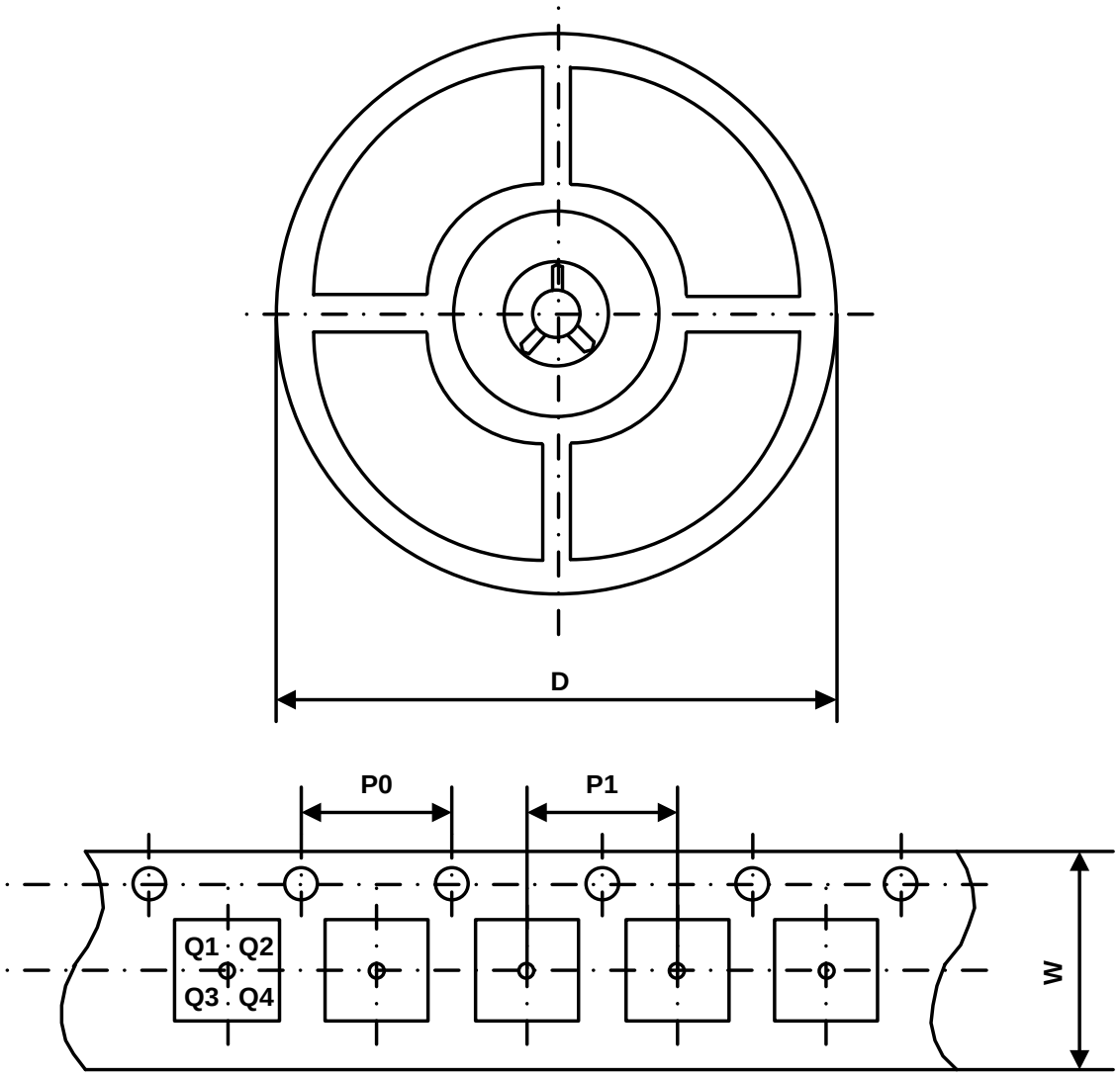
Symbol	DIMENSIONS					
	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	-	-	2.65	-	-	0.104
A1	0.10	-	0.30	0.004	-	0.012
A2	2.25	-	2.35	0.089	-	0.093
b	0.35	-	0.43	0.014	-	0.017
c	0.24	-	0.29	0.009	-	0.011
D	10.2	10.3	10.4	0.402	0.406	0.409
E	10.1	10.3	10.5	0.398	0.406	0.413
E1	7.4	7.5	7.6	0.291	0.295	0.299
e	1.27BSC			0.050 BSC		
L	0.55	-	0.85	0.022	-	0.033
L1	1.40REF			0.060REF		
θ	0 °	-	8 °	0 °	-	8 °

Land Pattern



NOTES:
1. Compound dimension: 10.30×7.50;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

Packing Information



Part Number	Package Type	Carrier Width (W)	Pitch (P0)	Pitch (P1)	Reel Size (D)	PIN 1 Quadrant
UMISO7740LWSG	WSOP16	16 mm	4 mm	12 mm	330 mm	Q1
UMISO7740HWSG	WSOP16	16 mm	4 mm	12 mm	330 mm	Q1
UMISO7741LWSG	WSOP16	16 mm	4 mm	12 mm	330 mm	Q1
UMISO7741HWSG	WSOP16	16 mm	4 mm	12 mm	330 mm	Q1
UMISO7742LWSG	WSOP16	16 mm	4 mm	12 mm	330 mm	Q1
UMISO7742HWSG	WSOP16	16 mm	4 mm	12 mm	330 mm	Q1

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https://www.union-ic.com/Quality.html

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