High-Speed Four Channel Digital Isolators

UMISO7740A ***SSOP16(0.635)/SOP16/WSOP16/WWSOP16***
UMISO7741A ***SSOP16(0.635)/SOP16/WSOP16/WWSOP16***
UMISO7742A ***SSOP16(0.635)/SOP16/WSOP16/WWSOP16***

1 Description

The UMISO774xA series are high-performance quad-channel, unidirectional digital isolators with $3kV_{RMS}$ (SSOP16(0.635) package), $3.75kV_{RMS}$ (SOP16 package), $5.7kV_{RMS}$ (WSOP16 package) and $7.5kV_{RMS}$ (WWSOP16 package) isolation rating and up to 20Mbps 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 UMISO774xA series offers all possible unidirectional channel configurations to accommodate any four channels design. The UMISO7740A series feature four channels transferring signals in one direction. The UMISO7741A series have three-forward and one-reverse direction channels, making it ideal for applications such as isolated SPI, RS-485 communication. The UMISO7742A series provide further design flexibility with two channels in each direction. Both the UMISO7741A and UMISO7742A 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 UMISO774xA 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 UMISO774xA series are available in SSOP16(0.635) and SOP16 narrow body package, WSOP16 wide body package and WWSOP16 extra wide body package. The devices are characterized over ambient free-air temperatures from –40 ℃ to 125 ℃.

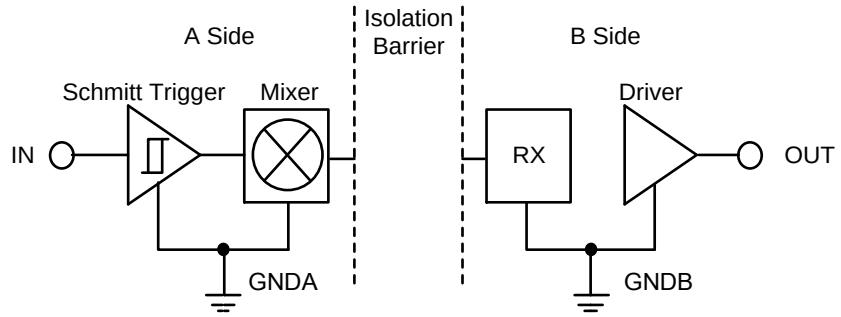
2 Features

- Data rate: up to 20Mbps
- Robust galvanic isolation of digital signals
  - High lifetime: >40 years
  - Up to 3000 V_{RMS} isolation rating (SSOP16(0.635) package)
  - Up to 3750 V_{RMS} isolation rating (SOP16 package)
  - Up to 5700 V_{RMS} isolation rating (WSOP16 package)
  - Up to 7500 V_{RMS} isolation rating (WWSOP16 package)
  - ±200 kV/μs typical CMTI
- Wide supply range: 3.0 V to 5.5V
- Extended ambient temperature range: –40 ℃ to 125 ℃
- Enable control input with tri-state output function
- Default output high (UMISO774xAH) and low (UMISO774xAL) options
- High Electromagnetic Immunity
- No start-up initialization required
- Available in SSOP16(0.635), SOP16, WSOP16 and WWSOP16 packages
- Excellent propagation delay and skew
  - Propagation delay: ≤ 70 ns
  - Pulse width distortion: ≤ 10 ns
- 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

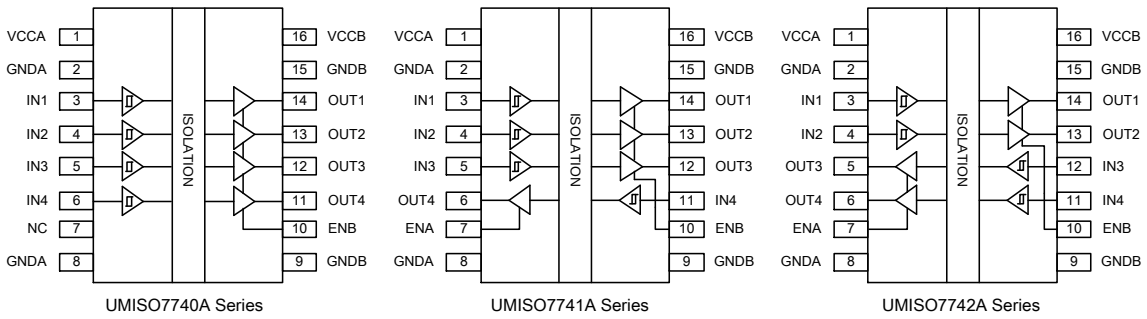


GNDA and GNDB are the isolated grounds for A side and B side respectively.

5 Selection Guide

Part Number	A Side Inputs	B Side Inputs	Default Output
UMISO7740AL	4	0	Low
UMISO7740AH	4	0	High
UMISO7741AL	3	1	Low
UMISO7741AH	3	1	High
UMISO7742AL	2	2	Low
UMISO7742AH	2	2	High

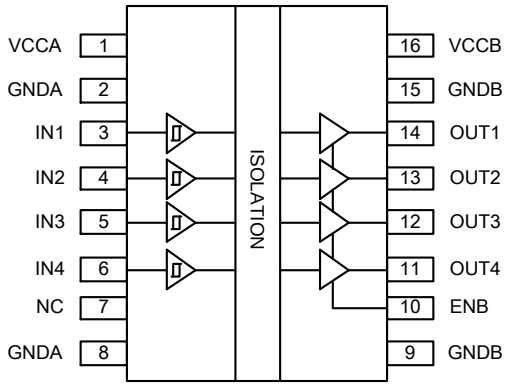
6 Functional Block Diagrams



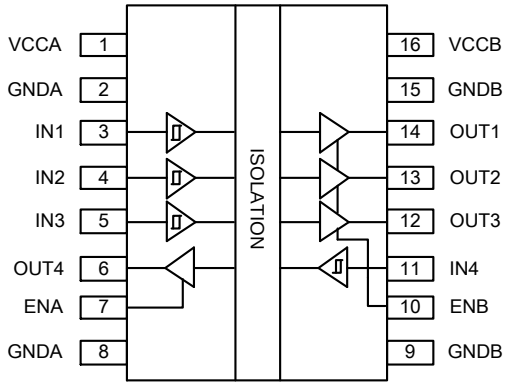
7 Ordering Information

Part Number	A Side Inputs	B Side Inputs	Default Output	Isolation Rating (V_{RMS})	Mark Code	Package	Shipping Qty
UMISO7740ALSAG	4	0	Low	3000	ISO7740AL	SSOP16(0.635)	4000pcs/13Inch Tape & Reel
UMISO7740ALSG				3750	ISO7740AL	SOP16	3000pcs/13Inch Tape & Reel
UMISO7740ALWSG				5700	ISO7740AL	WSOP16	1500pcs/13Inch Tape & Reel
UMISO7740ALWWSG				7500	ISO7740AL	WWSOP16	1000pcs/13Inch Tape & Reel
UMISO7740AHSAG			High	3000	ISO7740AH	SSOP16(0.635)	4000pcs/13Inch Tape & Reel
UMISO7740AHSG				3750	ISO7740AH	SOP16	3000pcs/13Inch Tape & Reel
UMISO7740AHWSG				5700	ISO7740AH	WSOP16	1500pcs/13Inch Tape & Reel
UMISO7740AHWWSG				7500	ISO7740AH	WWSOP16	1000pcs/13Inch Tape & Reel
UMISO7741ALSAG	3	1	Low	3000	ISO7741AL	SSOP16(0.635)	4000pcs/13Inch Tape & Reel
UMISO7741ALSG				3750	ISO7741AL	SOP16	3000pcs/13Inch Tape & Reel
UMISO7741ALWSG				5700	ISO7741AL	WSOP16	1500pcs/13Inch Tape & Reel
UMISO7741ALWWSG				7500	ISO7741AL	WWSOP16	1000pcs/13Inch Tape & Reel
UMISO7741AHSAG			High	3000	ISO7741AH	SSOP16(0.635)	4000pcs/13Inch Tape & Reel
UMISO7741AHSG				3750	ISO7741AH	SOP16	3000pcs/13Inch Tape & Reel
UMISO7741AHWSG				5700	ISO7741AH	WSOP16	1500pcs/13Inch Tape & Reel
UMISO7741AHWWSG				7500	ISO7741AH	WWSOP16	1000pcs/13Inch Tape & Reel
UMISO7742ALSAG	2	2	Low	3000	ISO7742AL	SSOP16(0.635)	4000pcs/13Inch Tape & Reel
UMISO7742ALSG				3750	ISO7742AL	SOP16	3000pcs/13Inch Tape & Reel
UMISO7742ALWSG				5700	ISO7742AL	WSOP16	1500pcs/13Inch Tape & Reel
UMISO7742ALWWSG				7500	ISO7742AL	WWSOP16	1000pcs/13Inch Tape & Reel
UMISO7742AHSAG			High	3000	ISO7742AH	SSOP16(0.635)	4000pcs/13Inch Tape & Reel
UMISO7742AHSG				3750	ISO7742AH	SOP16	3000pcs/13Inch Tape & Reel
UMISO7742AHWSG				5700	ISO7742AH	WSOP16	1500pcs/13Inch Tape & Reel
UMISO7742AHWWSG				7500	ISO7742AH	WWSOP16	1000pcs/13Inch Tape & Reel

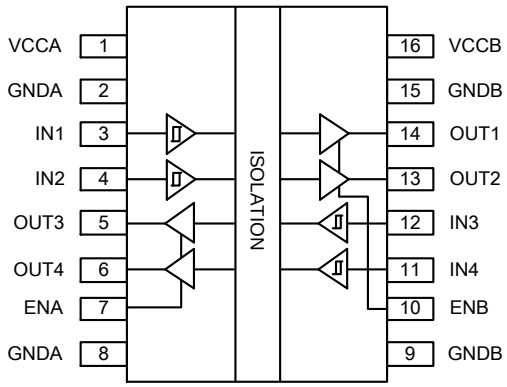
8 Pin Configuration and Function



UMISO7740A
SSOP16(0.635) / SOP16 / WSOP16 / WWSOP16



UMISO7741A
SSOP16(0.635) / SOP16 / WSOP16 / WWSOP16



UMISO7742A
SSOP16(0.635) / SOP16 / WSOP16 / WWSOP16

8 Pin Configuration and Function (continued)

Table 8-1. Pin Functions

Pin No.			Pin Name	Function
UMISO7740A	UMISO7741A	UMISO7742A		
1	1	1	VCCA	Power supply for isolator side A.
2, 8	2, 8	2, 8	GNDA	Ground reference for isolator side A.
3	3	3	IN1	Logic input 1, corresponds to logic output 1.
4	4	4	IN2	Logic input 2, corresponds to logic output 2.
5	5	12	IN3	Logic input 3, corresponds to logic output 3.
6	11	11	IN4	Logic input 4, corresponds to logic output 4.
7	-	-	NC	Not connected internally. Can be connected to supply, ground or left open on PCB.
-	7	7	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.
10	10	10	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.
11	6	6	OUT4	Logic output 4, OUT4 is the logic output for the IN4 input.
12	12	5	OUT3	Logic output 3, OUT3 is the logic output for the IN3 input.
13	13	13	OUT2	Logic output 2, OUT2 is the logic output for the IN2 input.
14	14	14	OUT1	Logic output 1, OUT1 is the logic output for the IN1 input.
9, 15	9, 15	9, 15	GNDB	Ground reference for isolator side B.
16	16	16	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		6.5	V
V_{CCB}	Supply voltage for isolator side B	Note 2	-0.5		6.5	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		-40		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 6.5 V.

9.2 Recommended Operating Conditions (Note 1)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CCA}	Supply voltage for isolator side A		3.0	3.3/5.0	5.5	V
V_{CCB}	Supply voltage for isolator side B		3.0	3.3/5.0	5.5	V
$V_{CC(UVLO+)}$	V_{CC} undervoltage-lockout threshold when supply voltage is rising		2.6	2.7	2.9	V
$V_{CC(UVLO-)}$	V_{CC} undervoltage-lockout threshold when supply voltage is falling		2.4	2.6	2.7	V
$V_{HYS(UVLO)}$	V_{CC} undervoltage-lockout threshold hysteresis			100		mV
I_{OH}	High-level output current	V_{CCO} = 5V	-4			mA
		V_{CCO} = 3.3V	-2			
I_{OL}	Low-level output current	V_{CCO} = 5V			4	mA
		V_{CCO} = 3.3V			2	

9.2 Recommended Operating Conditions (continued)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{IH}	INx Input High Voltage		$0.7V_{CCI}$		V_{CCI}	V
V_{IL}	INx Input Low Voltage		0		$0.3V_{CCI}$	V
V_{IH}	ENx Input High Voltage		$0.7V_{CCO}$		V_{CCO}	V
V_{IL}	ENx Input Low Voltage		0		$0.3V_{CCO}$	V
DR	Data rate				20	Mbps
T_A	Ambient temperature		-40	25	125	℃

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

9.3 Thermal Information

Symbol	Parameter		Value	Unit
$R_{\theta JA}$	Junction to ambient thermal resistance	SSOP16(0.635)	140	°C/W
		SOP16	78.9	
		WSOP16	78.9	
		WWSOP16	78.9	

9.4 Power Rating

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
UMISO7740A						
P_D	Maximum power dissipation	V_{CCA} = V_{CCB} = 5.5 V, C_L = 15 pF, T_J = 150°C, Input a 10 MHz, 50% duty cycle square wave.			200	mW
P_{DA}	Maximum power dissipation on A side				80	mW
P_{DB}	Maximum power dissipation on B side				120	mW
UMISO7741A						
P_D	Maximum power dissipation	V_{CCA} = V_{CCB} = 5.5 V, C_L = 15 pF, T_J = 150°C, Input a 10 MHz, 50% duty cycle square wave.			200	mW
P_{DA}	Maximum power dissipation on A side				90	mW
P_{DB}	Maximum power dissipation on B side				110	mW
UMISO7742A						
P_D	Maximum power dissipation	V_{CCA} = V_{CCB} = 5.5 V, C_L = 15 pF, T_J = 150°C, Input a 10 MHz, 50% duty cycle square wave.			200	mW
P_{DA}	Maximum power dissipation on A side				100	mW
P_{DB}	Maximum power dissipation on B side				100	mW

9.5 Insulation Specifications

Symbol	Parameter	Conditions	Value				Unit
			SSOP16 (0.635)	SOP16	WSOP16	WWSOP16	
CLR	External clearance	Shortest terminal-to-terminal distance through air	4	4	8	15	mm
CPG	External creepage	Shortest terminal-to-terminal distance across the package surface	4	4	8	15	mm
DTI	Distance through the insulation	Minimum internal gap (internal clearance)	>20	>20	>20	>20	μm
CTI	Comparative tracking index	DIN EN 60112 (VDE 0303-11); IEC 60112	>600	>600	>600	>600	V
	Material group	Per IEC 60664-1	I	I	I	I	
	Overvoltage category per IEC 60664-1	Rated mains voltage ≤ 150 V_{RMS}	I-IV	I-IV	I-IV	I-IV	
		Rated mains voltage ≤ 300 V_{RMS}	I-III	I-III	I-IV	I-IV	
		Rated mains voltage ≤ 600 V_{RMS}	N/A	N/A	I-IV	I-IV	
		Rated mains voltage ≤ 1000 V_{RMS}	N/A	N/A	I-II	I-II	
DIN V VDE V 0884-17:2021-10 (Note 1)							
V_{IORM}	Maximum repetitive peak isolation voltage	AC voltage (bipolar)	637	637	1414	1414	V_{PK}
V_{IOWM}	Maximum operating isolation voltage	AC voltage; time-dependent dielectric breakdown (TDDB) test	450	450	1000	1000	V_{RMS}
		DC voltage	637	637	1414	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)	4242	5300	8060	10605	V_{PK}
V_{IMP}	Maximum impulse voltage	Tested in air, 1.2/50 μs waveform per IEC 62368-1,	5000	5000	7500	7500	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	6500	6500	10000	10000	V_{PK}

9.5 Insulation Specifications (continued)

Symbol	Parameter	Conditions	Value				Unit
			SSOP16 (0.635)	SOP16	WSOP16	WWSOP16	
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	≤5	≤5	≤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	≤5	≤5	≤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; $V_{pd(m)} = 1.875 \times V_{IORM}$ (for reinforced devices) or $V_{pd(m)} = 1.5 \times V_{IORM}$ (for basic devices), t_m = 1 s (method b1) or $V_{pd(m)} = V_{ini}$, $t_m = t_{ini}$ (method b2)	≤5	≤5	≤5	≤5	pC
C_{IO}	Barrier capacitance, input to output (Note 3)	V_{IO} = 0.4 × sin (2πft), f = 1 MHz	1.0	1.0	1.0	1.0	pF
R_{IO}	Isolation resistance (Note 3)	V_{IO} = 500 V, T_A = 25 ℃	$>10^{12}$	$>10^{12}$	$>10^{12}$	$>10^{12}$	Ω
		V_{IO} = 500 V, 100 ℃ ≤ T_A ≤ 125 ℃	$>10^{11}$	$>10^{11}$	$>10^{11}$	$>10^{11}$	
		V_{IO} = 500 V at T_s = 150 ℃	$>10^{9}$	$>10^{9}$	$>10^{9}$	$>10^{9}$	
	Pollution degree		2	2	2	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)	3000	3750	5700	7500	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 (Note 1)

9.6.1 Electrical 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). All typical values are at 25°C.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OH}	Output high voltage	I_{OH} = -4 mA	V_{CCO}-0.4	4.8		V
V_{OL}	Output low voltage	I_{OL} = 4 mA		0.2	0.4	V
V_{IH}	INx input high				0.7V_{CCI}	V
V_{IL}	INx input low		0.3V_{CCI}			V
V_{IH}	ENx input high				0.7V_{CCO}	V
V_{IL}	ENx input low		0.3V_{CCO}			V
I_{IN}	INx and ENx input current	0 V ≤V_{IN}≤ V_{CCX}	-10		10	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	±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%)

V_{CCA} = V_{CCB} = 3.3 V ± 10%, T_A = -40 to 125°C (over recommended operating conditions, unless otherwise specified). All typical values are at 25°C.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OH}	Output high voltage	I_{OH} = -2 mA	V_{CCO}-0.4	3.2		V
V_{OL}	Output low voltage	I_{OL} = 2 mA		0.1	0.4	V
V_{IH}	INx input high				0.7V_{CCI}	V
V_{IL}	INx input low		0.3V_{CCI}			V
V_{IH}	ENx input high				0.7V_{CCO}	V
V_{IL}	ENx input low		0.3V_{CCO}			V
I_{IN}	INx and ENx input current	0 V ≤V_{IN}≤ V_{CCX}	-10		10	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	±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

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%)

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
UMISO7740A							
I_{CCA}	Supply Current - Outputs disabled	ENB = 0 V; V_{IN} = 0V (UMISO7740AL); V_{IN} =V_{CCA}(UMISO7740AH)			1.31	2.8	mA
I_{CCB}					3.83	5.9	
I_{CCA}		ENB = 0 V; V_{IN} = V_{CCA} (UMISO7740AL); V_{IN} = 0V (UMISO7740AH)			5.22	8.6	
I_{CCB}					3.91	6.2	
I_{CCA}	Supply Current - DC signal	ENB = V_{CCB}; V_{IN} = 0V (UMISO7740AL); V_{IN} = V_{CCA} (UMISO7740AH)			1.31	2.8	mA
I_{CCB}					3.88	5.9	
I_{CCA}		ENB = V_{CCB}; V_{IN} = V_{CCA} (UMISO7740AL); V_{IN} = 0V(UMISO7740AH)			5.23	8.6	
I_{CCB}					3.92	6.2	
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			4.9	
I_{CCB}						6.0	
I_{CCA}			10Mbps			5.6	
I_{CCB}						7.5	
I_{CCA}			20Mbps			7.0	
I_{CCB}						9.5	
UMISO7741A							
I_{CCA}	Supply Current - Outputs disabled	ENA = ENB = 0 V; V_{IN} = 0V (UMISO7741AL); V_{IN} = V_{CCI}(UMISO7741AH) (Note 1)			1.92	3.5	mA
I_{CCB}					3.2	5.8	
I_{CCA}		ENA = ENB = 0 V; V_{IN} =V_{CCI}(UMISO7741AL); V_{IN} = 0V (UMISO7741AH)			4.84	7.8	
I_{CCB}					4.24	6.9	

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

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 (UMISO7741AL); V_{IN} = V_{CCI} (UMISO7741AH)			1.93	3.5	mA
I_{CCB}					3.2	5.8	
I_{CCA}		ENA = ENB = V_{CCI}; V_{IN} = V_{CCI} (UMISO7741AL); V_{IN} = 0V (UMISO7741AH)			4.85	7.8	
I_{CCB}					4.24	6.9	
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			4.9	
I_{CCB}						5.7	
I_{CCA}			10Mbps			5.5	
I_{CCB}						7.2	
I_{CCA}			20Mbps			7.1	
I_{CCB}						8.7	
UMISO7742A							
I_{CCA}	Supply Current - Outputs disabled	ENA = ENB = 0 V; V_{IN} = 0V (UMISO7742AL); V_{IN} = V_{CCI} (UMISO7742AH) (Note 1)			2.55	5.1	mA
I_{CCB}					2.55	5.1	
I_{CCA}		ENA = ENB = 0 V; V_{IN} = V_{CCI} (UMISO7742AL); V_{IN} = 0V (UMISO7742AH)			4.54	8.0	
I_{CCB}					4.54	8.0	

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

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 (UMISO7742AL); V_{IN} = V_{CCI} (UMISO7742AH)			2.55	5.1	mA
I_{CCB}					2.55	5.1	
I_{CCA}		ENA = ENB = V_{CCI}; V_{IN} = V_{CCI} (UMISO7742AL); V_{IN} = 0V (UMISO7742AH)			4.54	8.0	
I_{CCB}					4.54	8.0	
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			5.4	
I_{CCB}						5.4	
I_{CCA}			10Mbps			6.5	
I_{CCB}						6.5	
I_{CCA}			20Mbps			8.5	
I_{CCB}						8.5	

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

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
UMISO7740A							
I_{CCA}	Supply Current - Outputs disabled	ENB = 0 V; V_{IN} = 0 V (UMISO7740AL); V_{IN} =V_{CCA}(UMISO7740AH)			1.24	2.8	mA
I_{CCB}					3.72	5.9	
I_{CCA}		ENB = 0 V; V_{IN} = V_{CCA} (UMISO7740AL); V_{IN} = 0V(UMISO7740AH)			5.14	8.6	
I_{CCB}					3.81	6.2	
I_{CCA}	Supply Current - DC signal	ENB = V_{CCB}; V_{IN} = 0V (UMISO7740AL); V_{IN} =V_{CCA}(UMISO7740AH)			1.24	2.8	mA
I_{CCB}					3.73	5.9	
I_{CCA}		ENB = V_{CCB}; V_{IN} = V_{CCA} (UMISO7740AL); V_{IN} = 0V (UMISO7740AH)			5.15	8.6	
I_{CCB}					3.82	6.2	
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			4.9	
I_{CCB}						6.0	
I_{CCA}			10Mbps			5.6	
I_{CCB}						7.5	
I_{CCA}			20Mbps			7.0	
I_{CCB}						9.5	
UMISO7741A							
I_{CCA}	Supply Current - Outputs disabled	ENA = ENB = 0 V; V_{IN} = 0V(UMISO7741AL); V_{IN} = V_{CCI}(UMISO7741AH) (Note 1)			1.85	3.5	mA
I_{CCB}					3.1	5.8	
I_{CCA}		ENA = ENB = 0 V; V_{IN} =V_{CCI}(UMISO7741AL); V_{IN} = 0 V(UMISO7741AH)			4.77	7.8	
I_{CCB}					4.14	6.9	

9.7.2 Supply Current Characteristics (V_{CCA} = V_{CCB} = 3.3 V ± 10%) (continued)
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 (UMISO7741AL); V_{IN} = V_{CCI} (UMISO7741AH)			1.85	3.5	mA
I_{CCB}					3.1	5.8	
I_{CCA}		ENA = ENB = V_{CCI}; V_{IN} = V_{CCI} (UMISO7741AL); V_{IN} = 0 V (UMISO7741AH)			4.77	7.8	
I_{CCB}					4.14	6.9	
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			4.9	
I_{CCB}						5.7	
I_{CCA}			10Mbps			5.5	
I_{CCB}						7.2	
I_{CCA}			20Mbps			7.1	
I_{CCB}						8.7	
UMISO7742A							
I_{CCA}	Supply Current - Outputs disabled	ENA = ENB = 0 V; V_{IN} = 0 V (UMISO7742L); V_{IN} = V_{CCI} (UMISO7742H) (Note 1)			2.47	5.1	mA
I_{CCB}					2.47	5.1	
I_{CCA}		ENA = ENB = 0 V; V_{IN} = V_{CCI} (UMISO7742L); V_{IN} = 0 V (UMISO7742H)			4.45	8.0	
I_{CCB}					4.45	8.0	

9.7.2 Supply Current Characteristics (V_{CCA} = V_{CCB} = 3.3 V ± 10%) (continued)
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)			2.48	5.1	mA
I_{CCB}					2.48	5.1	
I_{CCA}		ENA = ENB = V_{CCI}; V_{IN} = V_{CCI} (UMISO7742L); V_{IN} = 0V (UMISO7742H)			4.45	8.0	
I_{CCB}					4.45	8.0	
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	
I_{CCB}						5.4	
I_{CCA}			10Mbps			6.5	
I_{CCB}						6.5	
I_{CCA}			20Mbps			8.5	
I_{CCB}						8.5	

Note 1: V_{CCI} = Input-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				20	Mbps
PWM_{MIN}	Minimum pulse width				25	ns
t_{PLH}	Propagation delay time	see Figure 10-1		34	70	ns
t_{PHL}		see Figure 10-1		34	70	ns
PWD	Pulse width distortion, $\lvert t_{PLH} - t_{PHL} \rvert$	see Figure 10-1		1	10	ns
$t_{SK(O)}$	Channel-to-Channel output skew time (Note 1)	Same-direction channels		0.5	2	ns
$t_{SK(PP)}$	Part-to-Part output skew time (Note 2)				4	ns
t_R	Output signal rise time	see Figure 10-1		2.5		ns
t_F	Output signal fall time	see Figure 10-1		2.5		ns
t_{PHZ}	Disable propagation delay, high output to high impedance	see Figure 10-2		16.5	50	ns
t_{PLZ}	Disable propagation delay, low output to high impedance	see Figure 10-2		16.8	50	ns
t_{PZH}	Enable propagation delay, high impedance to high output	see Figure 10-2		10.0	30	ns
t_{PZL}	Enable propagation delay, high impedance to low output	see Figure 10-2		9.5	30	ns
t_{DO}	Default output delay time from input power loss	see Figure 10-3		0.2	70	μs
t_{SU}	Start-up time			18	300	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.

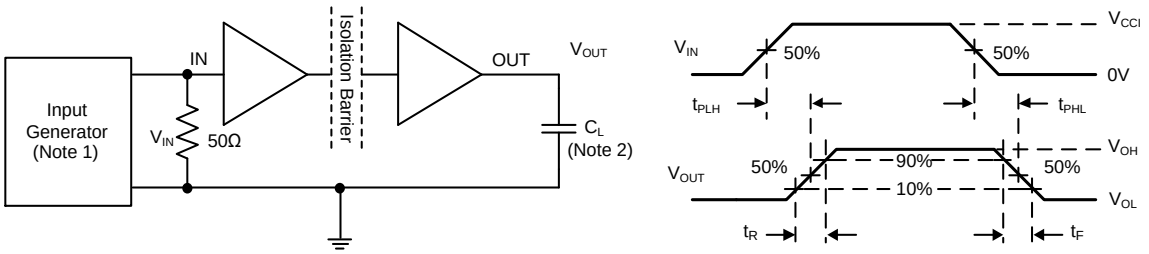
9.8.2 Electrical Characteristics (Dynamic) (V_{CCA} = V_{CCB} = 3.3 V ± 10%)

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				20	Mbps
PWM_{MIN}	Minimum pulse width				25	ns
t_{PLH}	Propagation delay time	see Figure 10-1		35	70	ns
t_{PHL}		see Figure 10-1		35	70	ns
PWD	Pulse width distortion, $\lvert t_{PLH} - t_{PHL} \rvert$	see Figure 10-1		1	10	ns
$t_{SK(O)}$	Channel-to-Channel output skew time (Note 1)	Same-direction channels		0.3	2	ns
$t_{SK(PP)}$	Part-to-Part output skew time (Note 2)				4.5	ns
t_R	Output signal rise time	see Figure 10-1		2.5		ns
t_F	Output signal fall time	see Figure 10-1		2.5		ns
t_{PHZ}	Disable propagation delay, high output to high impedance	see Figure 10-2		20.0	50	ns
t_{PLZ}	Disable propagation delay, low output to high impedance	see Figure 10-2		20.0	50	ns
t_{PZH}	Enable propagation delay, high impedance to high output	see Figure 10-2		11.6	30	ns
t_{PZL}	Enable propagation delay, high impedance to low output	see Figure 10-2		11.1	30	ns
t_{DO}	Default output delay time from input power loss	see Figure 10-3		0.2	70	μs
t_{SU}	Start-up time			18	300	μs

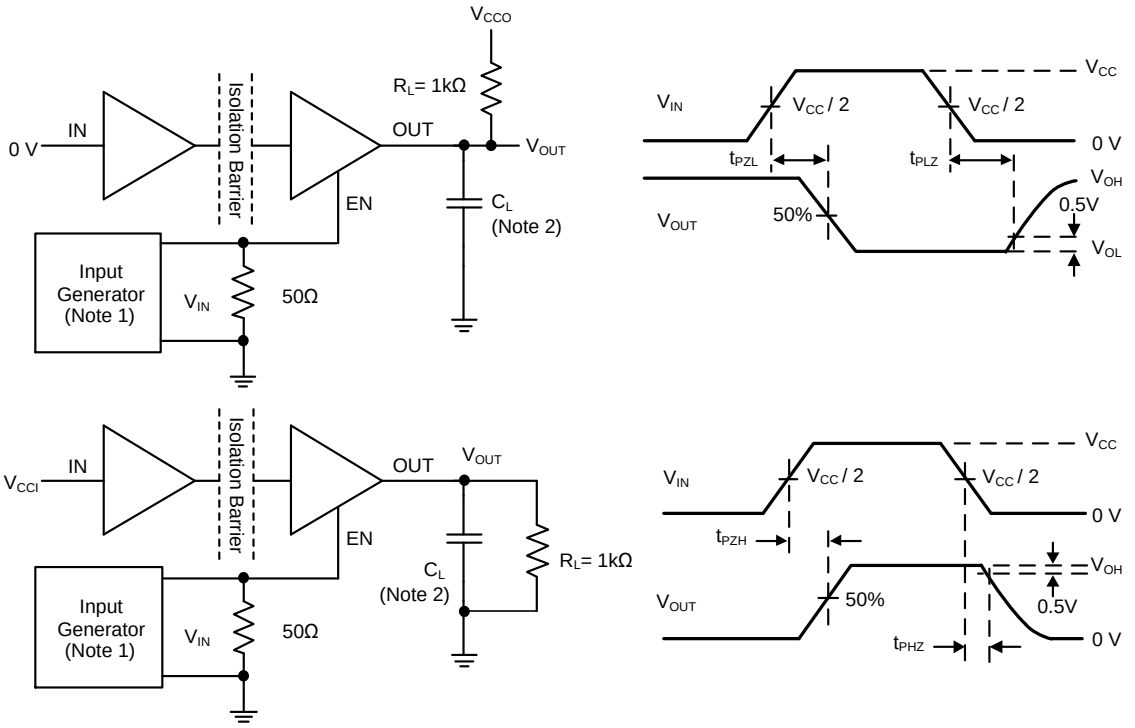
Note 1: $t_{SK(O)}$ is the skew between outputs of a single device with all driving inputs connected together and the outputs switching in the same direction while driving identical loads.
Note 2: $t_{SK(PP)}$ is the magnitude of the difference in propagation delay times between any terminals of different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

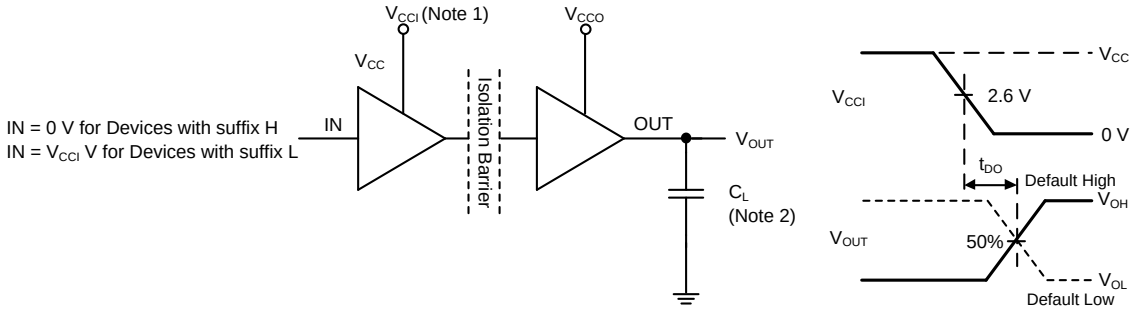
Figure 10-1. Switching Characteristics Test Circuit and Voltage Waveforms



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.

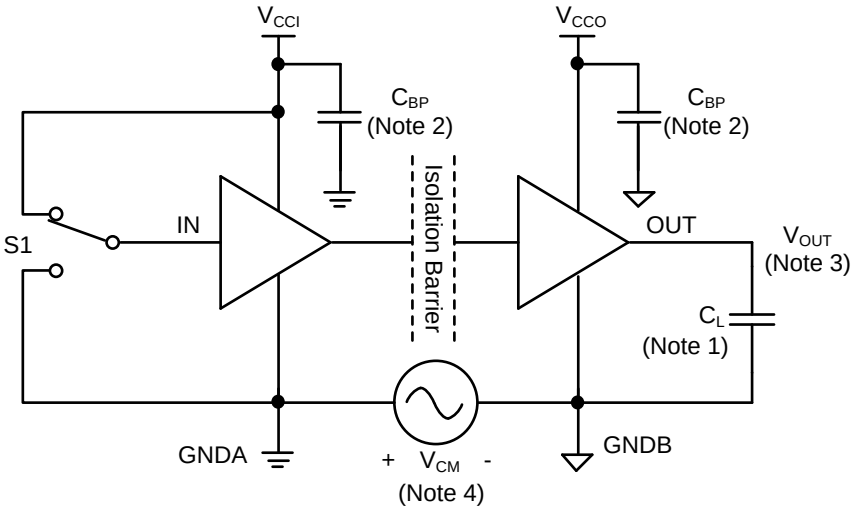
Figure 10-2. Enable/Disable Propagation Delay Time Test Circuit and Waveform

10 Parameter Measurement Information (continued)



Note 1: Power Supply Ramp Rate = 10 mV/ns. V_{CCI} should ramp over $V_{CC\,(UVLO+)}$, 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 UMISO774xA 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 UMISO774xA 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

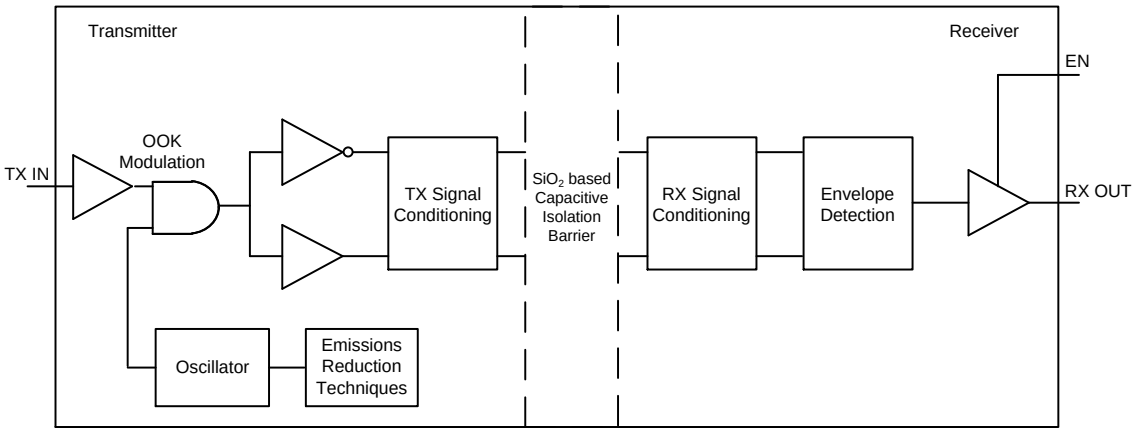


Figure 11-1. Functional Block Diagram of a Single Channel

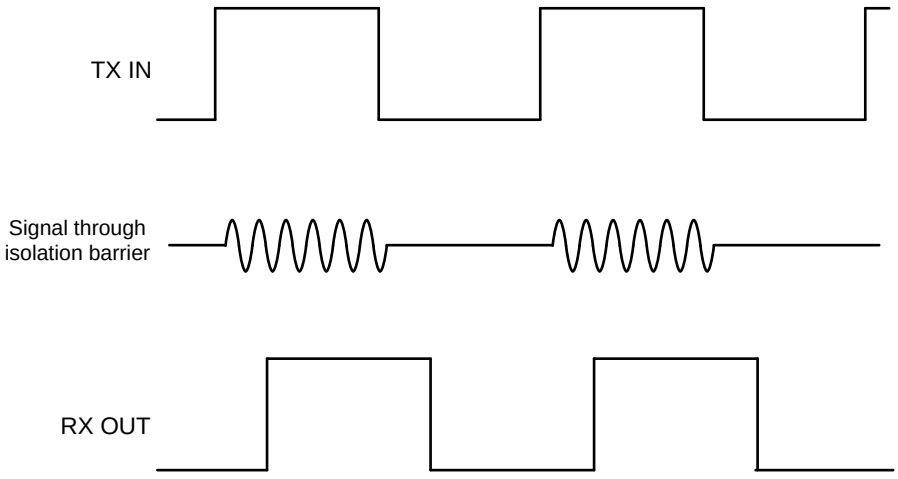


Figure 11-2. Conceptual Operation Waveforms of a Single Channel

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

Table 11-1 lists the operation modes for the UMISO774xA 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 UMISO774xAH and Low for UMISO774xAL.
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 UMISO774xAH and Low for UMISO774xAL.

Note 1: V_{CCI} = Input−side V_{CC}; V_{CCO} = Output−side V_{CC}; PU = Powered up ($V_{CC} > V_{CC\,(UVLO+)}$); PD = Powered down ($V_{CC} < V_{CC\,(UVLO-)}$); 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 UMISO774xA devices operate in noisy environments.

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

12 Application and Implementation

12.1 Application Information

The UMISO774xA 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 UMISO774xA 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 UMISO774xA 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

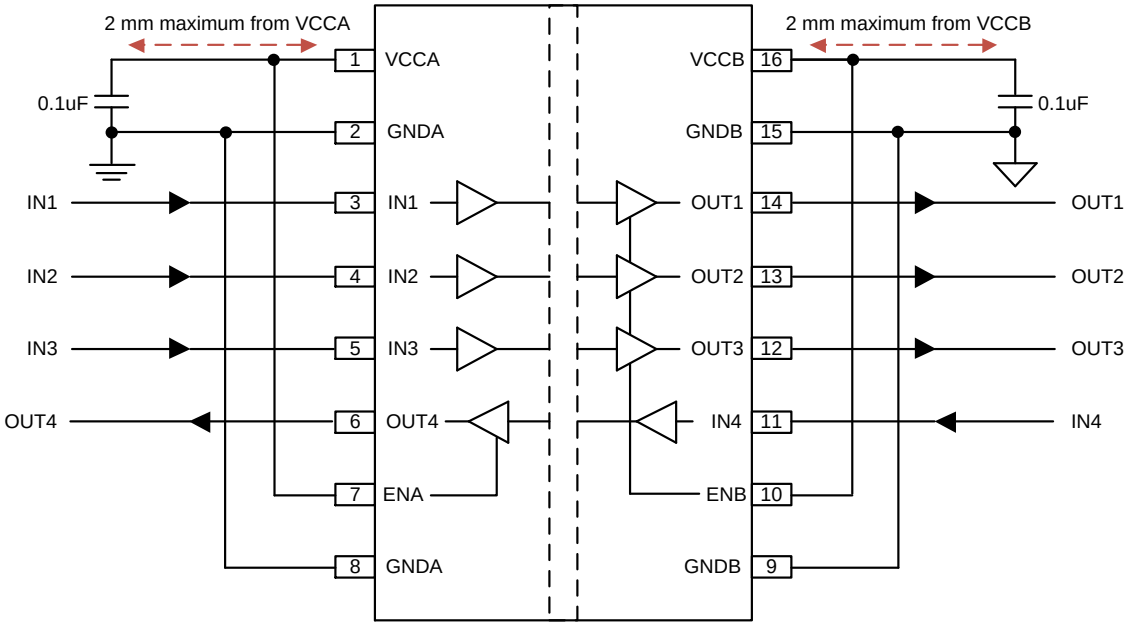
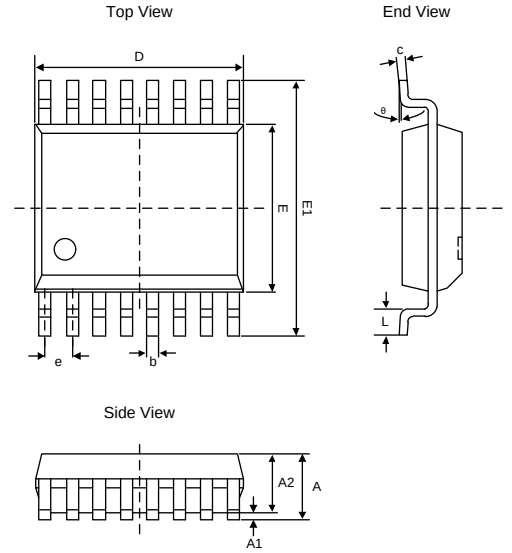


Figure 12-1. UMISO7741A Typical Application

13 Package Information

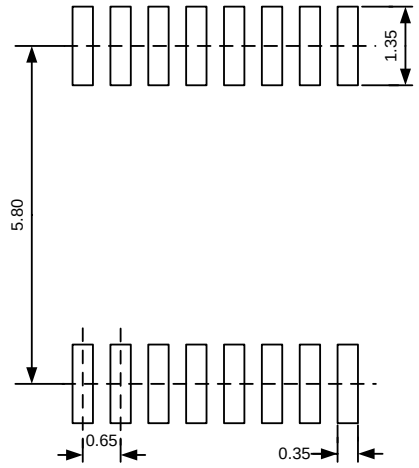
SSOP16(0.635)

Outline Drawing



Symbol	DIMENSIONS					
	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	-	-	1.75	-	-	0.070
A1	0.10	-	0.25	0.004	-	0.010
A2	1.30	-	1.55	0.052	-	0.062
b	0.20	-	0.31	0.008	-	0.012
c	0.17	-	0.25	0.007	-	0.010
D	4.70	4.90	5.10	0.188	0.196	0.204
E	3.80	3.90	4.00	0.152	0.156	0.160
E1	5.80	6.00	6.20	0.232	0.24	0.248
e	0.635BSC			0.025BSC		
L	0.40	-	1.27	0.016	-	0.051
θ	0 °	-	8°	0°	-	8°

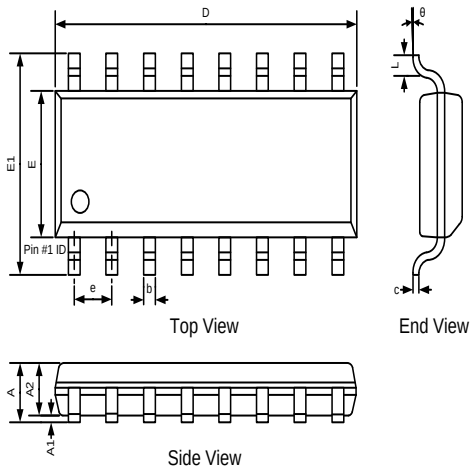
Land Pattern



NOTES:
1. Unit: mm.
2. General tolerance ±0.05mm unless otherwise specified.
3. The layout is just for reference.

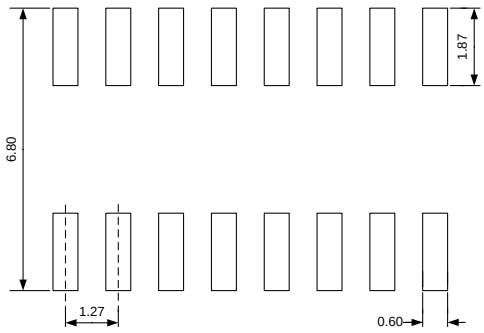
SOP16

Outline Drawing



DIMENSIONS						
Symbol	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	-	-	1.75	-	-	0.069
A1	0.10	-	0.25	0.004	-	0.010
A2	1.25	-	1.65	0.049	-	0.065
b	0.33	-	0.51	0.013	-	0.020
c	0.17	-	0.25	0.007	-	0.010
D	9.80	-	10.20	0.386	-	0.402
E	3.80	3.90	4.00	0.150	0.154	0.157
E1	5.80	6.00	6.20	0.228	0.236	0.244
e	1.27BSC			0.050BSC		
L	0.40	-	1.27	0.016	-	0.050
θ	0 °	-	8 °	0 °	-	8 °

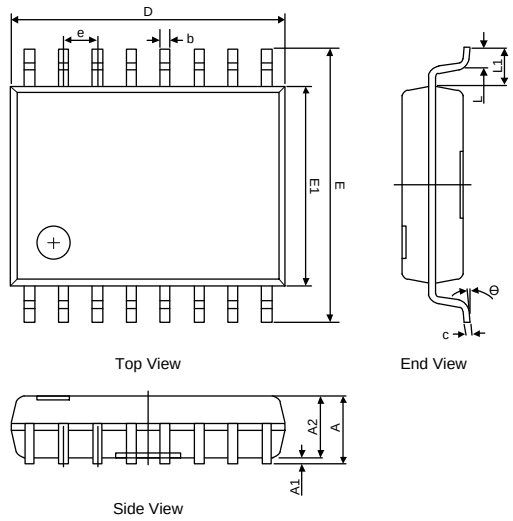
Land Pattern



NOTES:
1. Unit: mm;
2. General tolerance ±0.05mm unless otherwise specified;
3. The layout is just for reference.

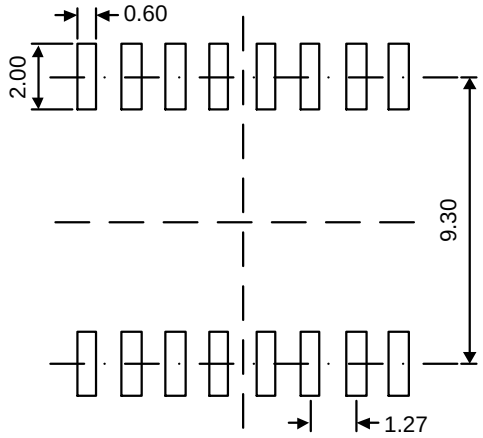
WSOP16

Outline Drawing



DIMENSIONS						
Symbol	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 °

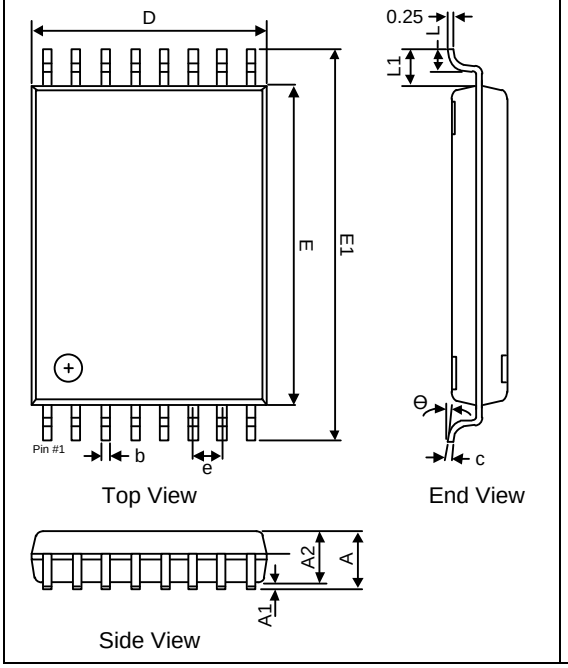
Land Pattern



NOTES:
1. Unit: mm;
2. General tolerance ±0.05mm unless otherwise specified;
3. The layout is just for reference.

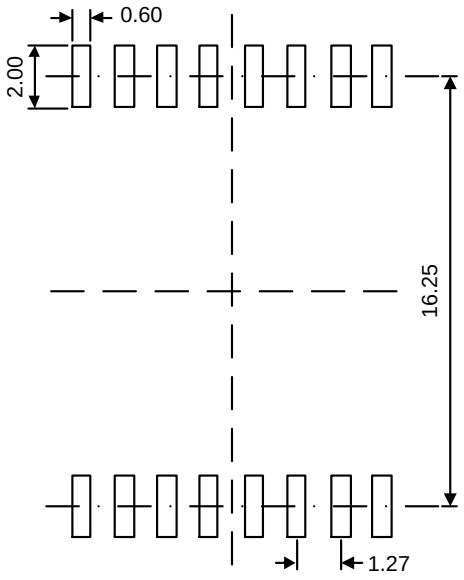
WWSOP16

Outline Drawing



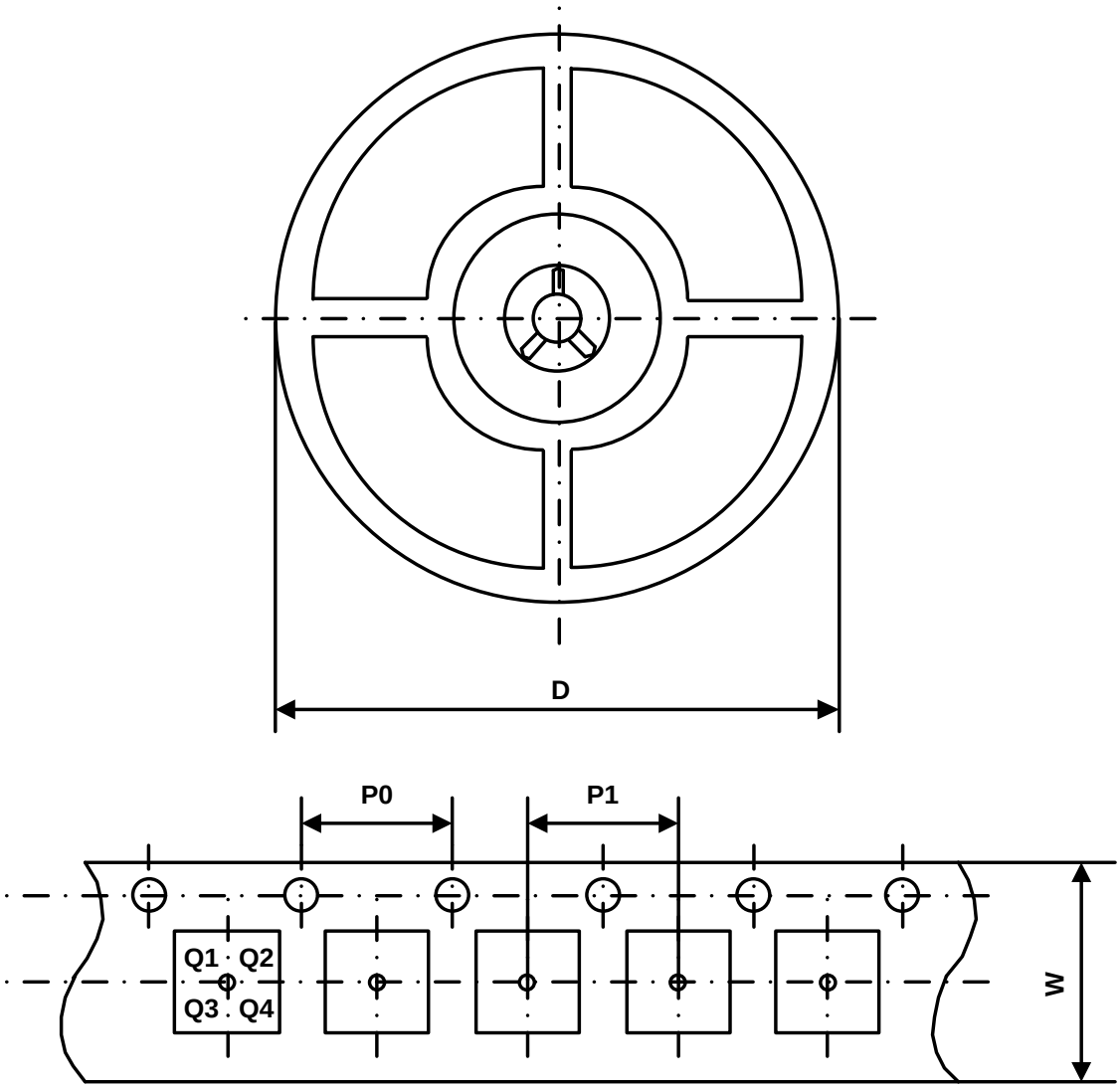
DIMENSIONS						
Symbol	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	-	-	2.65	-	-	0.104
A1	0.10	-	0.30	0.004	-	0.012
A2	2.236	-	2.336	0.088	-	0.092
b	0.31	-	0.51	0.012	-	0.020
c	0.22	-	0.28	0.009	-	0.011
D	10.20	-	10.40	0.402	-	0.409
E	13.90	-	14.10	0.547	-	0.555
E1	17.10	-	17.40	0.673	-	0.685
e	1.27BSC			0.050 BSC		
L	0.60	-	1.10	0.024	-	0.043
L1	1.625REF			0.064REF		
θ	0°	-	8°	0°	-	8°

Land Pattern



NOTES:
1. Unit: mm;
2. General tolerance ±0.05mm unless otherwise specified;
3. The layout is just for reference.

14 Packing Information



Part Number	Package Type	Carrier Width (W)	Pitch (P0)	Pitch (P1)	Reel Size (D)	PIN 1 Quadrant
UMISO7740ALSAG	SSOP16(0.635)	12 mm	4 mm	8 mm	330 mm	Q1
UMISO7740AHSAG	SSOP16(0.635)	12 mm	4 mm	8 mm	330 mm	Q1
UMISO7741ALSAG	SSOP16(0.635)	12 mm	4 mm	8 mm	330 mm	Q1
UMISO7741AHSAG	SSOP16(0.635)	12 mm	4 mm	8 mm	330 mm	Q1
UMISO7742ALSAG	SSOP16(0.635)	12 mm	4 mm	8 mm	330 mm	Q1
UMISO7742AHSAG	SSOP16(0.635)	12 mm	4 mm	8 mm	330 mm	Q1

Part Number	Package Type	Carrier Width (W)	Pitch (P0)	Pitch (P1)	Reel Size (D)	PIN 1 Quadrant
UMISO7740ALSG	SOP16	16 mm	4 mm	8 mm	330 mm	Q1
UMISO7740AHSG	SOP16	16 mm	4 mm	8 mm	330 mm	Q1
UMISO7741ALSG	SOP16	16 mm	4 mm	8 mm	330 mm	Q1
UMISO7741AHSG	SOP16	16 mm	4 mm	8 mm	330 mm	Q1
UMISO7742ALSG	SOP16	16 mm	4 mm	8 mm	330 mm	Q1
UMISO7742AHSG	SOP16	16 mm	4 mm	8 mm	330 mm	Q1
UMISO7740ALWSG	WSOP16	16 mm	4 mm	12 mm	330 mm	Q1
UMISO7740AHWSG	WSOP16	16 mm	4 mm	12 mm	330 mm	Q1
UMISO7741ALWSG	WSOP16	16 mm	4 mm	12 mm	330 mm	Q1
UMISO7741AHWSG	WSOP16	16 mm	4 mm	12 mm	330 mm	Q1
UMISO7742ALWSG	WSOP16	16 mm	4 mm	12 mm	330 mm	Q1
UMISO7742AHWSG	WSOP16	16 mm	4 mm	12 mm	330 mm	Q1
UMISO7740ALWWSG	WWSOP16	24 mm	4 mm	20 mm	330 mm	Q1
UMISO7740AHWWSG	WWSOP16	24 mm	4 mm	20 mm	330 mm	Q1
UMISO7741ALWWSG	WWSOP16	24 mm	4 mm	20 mm	330 mm	Q1
UMISO7741AHWWSG	WWSOP16	24 mm	4 mm	20 mm	330 mm	Q1
UMISO7742ALWWSG	WWSOP16	24 mm	4 mm	20 mm	330 mm	Q1
UMISO7742AHWWSG	WWSOP16	24 mm	4 mm	20 mm	330 mm	Q1

GREEN COMPLIANCE

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