High-Speed Triple Channel Digital Isolators

UMISO7730A ***SSOP16(0.635)/SOP16/WSOP16/WWSOP16***
UMISO7731A ***SSOP16(0.635)/SOP16/WSOP16/WWSOP16***

1 Description

The UMISO773xA series are high-performance triple-channel, unidirectional digital isolators with $3kV_{RMS}$ (SSOP16(0.635) package), $3.75kV_{RMS}$ (SOP16 package), $5kV_{RMS}$ (WSOP16 package) and $7.5kV_{RMS}$ (WWSOP16 package) isolation rating and up to 20Mbps 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 UMISO7730A series feature three channels transferring signals in one direction. The UMISO7731A series have two-forward and one-reverse direction channels, making it ideal for applications such as isolated CAN, RS-485 communication. The UMISO773xA series features 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 UMISO773xA 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 ℃.

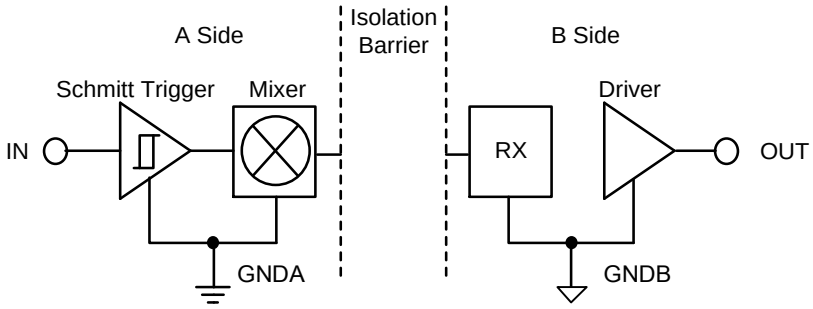
2 Features

- Max 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 5000 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 ℃
- Default output high (UMISO773xAH) and low (UMISO773xAL) options
- High Electromagnetic Immunity
- No start-up initialization required
- Excellent propagation delay and skew
  - Propagation delay: ≤ 100 ns
  - Pulse width distortion: ≤ 10 ns
- Available in SSOP16(0.635), SOP16, WSOP16 and WWSOP16 packages
- 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

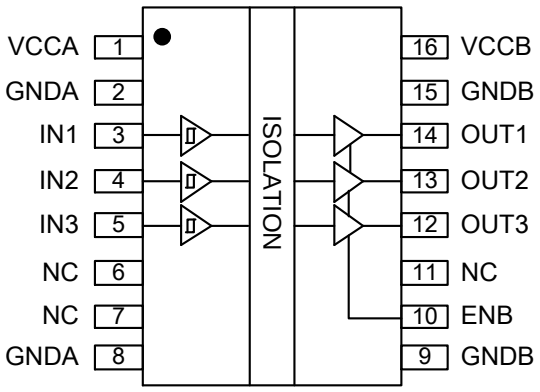
- Industrial Automation
- Medical Equipment
- Solar Inverter
- Motor Control
- Isolated Power Supplies
- Isolated RS-485, CAN

4 Simplified Channel Structure

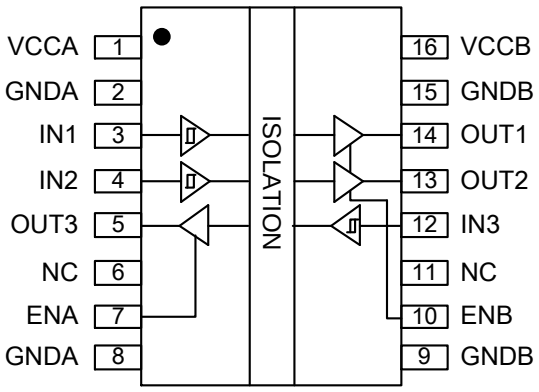


GNDA and GNDB are the isolated grounds for A side and B side respectively.

5 Functional Block Diagrams



UMISO7730A Series

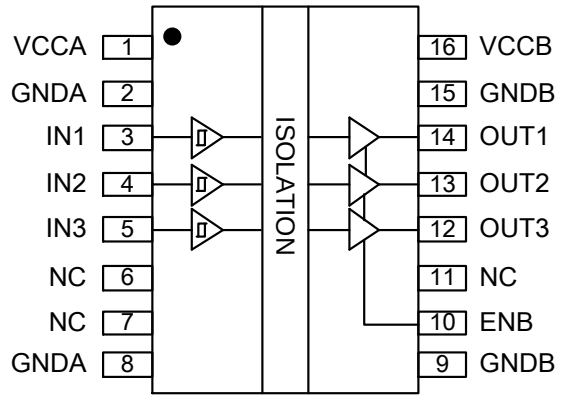


UMISO7731A Series

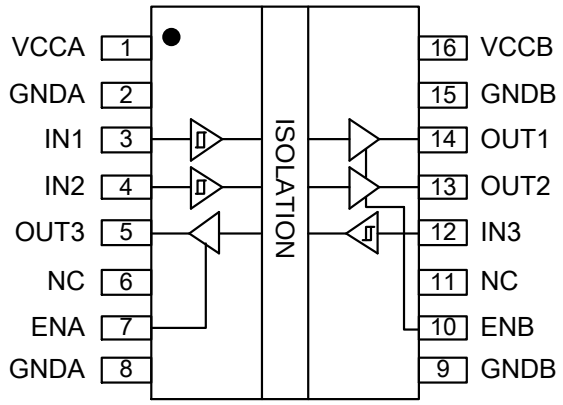
6 Ordering Information

Part Number	A Side Inputs	B Side Inputs	Default Output	Isolation Rating (V_{RMS})	Mark Code	Package	Shipping Qty
UMISO7730ALSAG	3	0	Low	3000	ISO7730AL	SSOP16(0.635)	4000pcs/13Inch Tape & Reel
UMISO7730ALSG				3750	ISO7730AL	SOP16	3000pcs/13Inch Tape & Reel
UMISO7730ALWSG				5000	ISO7730AL	WSOP16	1500pcs/13Inch Tape & Reel
UMISO7730ALWWSG				7500	ISO7730AL	WWSOP16	1000pcs/13Inch Tape & Reel
UMISO7730AHSAG			High	3000	ISO7730AH	SSOP16(0.635)	4000pcs/13Inch Tape & Reel
UMISO7730AHSG				3750	ISO7730AH	SOP16	3000pcs/13Inch Tape & Reel
UMISO7730AHWSG				5000	ISO7730AH	WSOP16	1500pcs/13Inch Tape & Reel
UMISO7730AHWWSG				7500	ISO7730AH	WWSOP16	1000pcs/13Inch Tape & Reel
UMISO7731ALSAG	2	1	Low	3000	ISO7731AL	SSOP16(0.635)	4000pcs/13Inch Tape & Reel
UMISO7731ALSG				3750	ISO7731AL	SOP16	3000pcs/13Inch Tape & Reel
UMISO7731ALWSG				5000	ISO7731AL	WSOP16	1500pcs/13Inch Tape & Reel
UMISO7731ALWWSG				7500	ISO7731AL	WWSOP16	1000pcs/13Inch Tape & Reel
UMISO7731AHSAG			High	3000	ISO7731AH	SSOP16(0.635)	4000pcs/13Inch Tape & Reel
UMISO7731AHSG				3750	ISO7731AH	SOP16	3000pcs/13Inch Tape & Reel
UMISO7731AHWSG				5000	ISO7731AH	WSOP16	1500pcs/13Inch Tape & Reel
UMISO7731AHWWSG				7500	ISO7731AH	WWSOP16	1000pcs/13Inch Tape & Reel

7 Pin Configuration and Function



UMISO7730A
SSOP16(0.635) / SOP16 / WSOP16 / WWSOP16



UMISO7731A
SSOP16(0.635) / SOP16 / WSOP16 / WWSOP16

Table 7-1. Pin functions

Pin No.		Pin Name	Function
UMISO7730A	UMISO7731A		
1	1	VCCA	Power supply for isolator side A.
3	3	IN1	Logic input 1, corresponds to logic output 1.
4	4	IN2	Logic input 2, corresponds to logic output 2.
5	12	IN3	Logic input 3, corresponds to logic output 3.
-	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.
6, 7, 11	6, 11	NC	Not connected internally. Can be connected to supply, ground or left open on PCB.
2, 8	2, 8	GNDA	Ground reference for isolator side A.
9, 15	9, 15	GNDB	Ground reference for isolator side B.
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.
12	5	OUT3	Logic output 3, OUT1 is the logic output for the IN3 input.
13	13	OUT2	Logic output 2, OUT2 is the logic output for the IN2 input.
14	14	OUT1	Logic output 1, OUT1 is the logic output for the IN1 input.
16	16	VCCB	Power supply for isolator side B.

8 Specifications

8.1 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.

8.2 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	

8.2 Recommended Operating Conditions (continued)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{IH}	Input High Voltage		$0.7V_{CCI}$		V_{CCI}	V
V_{IL}	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}.

8.3 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	

8.4 Power Rating

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
UMISO7730A						
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.			130	mW
P_{DA}	Maximum power dissipation on A side				50	mW
P_{DB}	Maximum power dissipation on B side				80	mW
UMISO7731A						
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.			130	mW
P_{DA}	Maximum power dissipation on A side				55	mW
P_{DB}	Maximum power dissipation on B side				75	mW

8.5 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}

8.5 Insulation Specifications (continued)

Symbol	Parameter	Conditions	Value				Unit
			SSOP16 (0.635)	SOP16	WSOP8/ 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	5000	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.

8.6 Electrical Characteristics (Note 1)

8.6.1 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 9-4	±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

8.6.2 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 9-4	±150	±200		kV/μs
C_I	Input capacitance (Note 2)	V_I = V_{CC} / 2 + 0.4×sin(2πft), f = 1 MHz, V_{CC} = 3.3 V		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.

8.7 Supply Current Characteristics

8.7.1 Supply Current Characteristics (V_{CCA} = V_{CCB} = 5 V ± 10%) (Note 1)

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
UMISO7730A							
I_{CCA}	Supply Current - DC signal	ENB = 0 V; V_{IN} = 0V (UMISO7730AL); V_{IN} = V_{CCI} (UMISO7730AH)			0.6	2.2	mA
I_{CCB}					2.4	4.9	
I_{CCA}		ENB = 0 V; V_{IN} = V_{CCI} (UMISO7730AL); V_{IN} = 0V (UMISO7730AH)			3.4	6.2	
I_{CCB}					2.5	4.6	
I_{CCA}		ENB = V_{CCB}; V_{IN} = 0V (UMISO7730AL); V_{IN} = V_{CCI} (UMISO7730AH)			0.7	2.2	
I_{CCB}					2.5	4.9	
I_{CCA}		ENB = V_{CCB}; V_{IN} = V_{CCI} (UMISO7730AL); V_{IN} = 0V (UMISO7730AH)			3.5	6.2	
I_{CCB}					2.6	4.6	
I_{CCA}	Supply Current - AC signal	All channels switching with 50% duty cycle square wave clock input with 5V amplitude; C_L = 15 pF for each channel.	1Mbps			3.3	
I_{CCB}						4.0	
I_{CCA}			10Mbps			3.7	
I_{CCB}						5.0	
I_{CCA}			20Mbps			4.7	
I_{CCB}						6.5	
UMISO7731A							
I_{CCA}	Supply Current - DC signal	ENA = ENB = 0 V; V_{IN} = 0V (UMISO7731AL); V_{IN} = V_{CCI} (UMISO7731AH)			1.2	2.3	mA
I_{CCB}					1.8	3.1	
I_{CCA}		ENA = ENB = 0 V; V_{IN} = V_{CCI} (UMISO7731AL); V_{IN} = 0V (UMISO7731AH)			3.1	5.3	
I_{CCB}					2.8	4.6	
I_{CCA}		ENA = ENB = V_{CCI}; V_{IN} = 0V (UMISO7731AL); V_{IN} = V_{CCI} (UMISO7731AH)			1.3	2.3	
I_{CCB}					1.9	3.1	
I_{CCA}		ENA = ENB = V_{CCI}; V_{IN} = V_{CCI} (UMISO7731AL); V_{IN} = 0V (UMISO7731AH)			3.2	5.3	
I_{CCB}					2.9	4.6	
I_{CCA}	Supply Current - AC signal	All channels switching with 50% duty cycle square wave clock input with 5V amplitude; C_L = 15 pF for each channel.	1Mbps			3.3	
I_{CCB}						3.8	
I_{CCA}			10Mbps			3.7	
I_{CCB}						4.8	
I_{CCA}			20Mbps			4.7	
I_{CCB}						5.8	

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

8.7.2 Supply Current Characteristics (V_{CCA} = V_{CCB} = 3.3 V ± 10%) (Note 1)

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
UMISO7730A							
I_{CCA}	Supply Current - DC signal	ENB = 0 V; V_{IN} = 0V (UMISO7730AL); V_{IN} = V_{CCI} (UMISO7730AH)			0.55	2.2	mA
I_{CCB}					2.35	4.9	
I_{CCA}		ENB = 0 V; V_{IN} = V_{CCI} (UMISO7730AL); V_{IN} = 0V (UMISO7730AH)			3.35	6.2	
I_{CCB}					2.4	4.6	
I_{CCA}		ENB = V_{CCB}; V_{IN} = 0V (UMISO7730AL); V_{IN} = V_{CCI} (UMISO7730AH)			0.65	2.2	
I_{CCB}					2.45	4.9	
I_{CCA}		ENB = V_{CCB}; V_{IN} = V_{CCI} (UMISO7730AL); V_{IN} = 0V (UMISO7730AH)			3.45	6.2	
I_{CCB}					2.55	4.6	
I_{CCA}	Supply Current - AC signal	All channels switching with 50% duty cycle square wave clock input with 3.3V amplitude; C_L = 15 pF for each channel.	1Mbps			3.3	
I_{CCB}						4.0	
I_{CCA}			10Mbps			3.7	
I_{CCB}						5.0	
I_{CCA}			20Mbps			4.7	
I_{CCB}						6.5	
UMISO7731A							
I_{CCA}	Supply Current - DC signal	ENA = ENB = 0 V; V_{IN} = 0V (UMISO7731AL); V_{IN} = V_{CCI} (UMISO7731AH)			1.15	2.3	mA
I_{CCB}					1.75	3.1	
I_{CCA}		ENA = ENB = 0 V; V_{IN} = V_{CCI} (UMISO7731AL); V_{IN} = 0V (UMISO7731AH)			3.05	5.3	
I_{CCB}					2.75	4.6	
I_{CCA}		ENA = ENB = V_{CCI}; V_{IN} = 0V (UMISO7731AL); V_{IN} = V_{CCI} (UMISO7731AH)			1.2	2.3	
I_{CCB}					1.85	3.1	
I_{CCA}		ENA = ENB = V_{CCI}; V_{IN} = V_{CCI} (UMISO7731AL); V_{IN} = 0V (UMISO7731AH)			3.1	5.3	
I_{CCB}					2.8	4.6	
I_{CCA}	Supply Current - AC signal	All channels switching with 50% duty cycle square wave clock input with 3.3V amplitude; C_L = 15 pF for each channel.	1Mbps			3.3	
I_{CCB}						3.8	
I_{CCA}			10Mbps			3.7	
I_{CCB}						4.8	
I_{CCA}			20Mbps			4.7	
I_{CCB}						5.8	

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

8.8 Switching Characteristics

8.8.1 Switching 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
DR	Data rate				20	Mbps
PWM_{MIN}	Minimum pulse width				25	ns
t_{PLH}	Propagation delay time	see Figure 9-1		34	100	ns
t_{PHL}		see Figure 9-1		34	100	ns
PWD	Pulse width distortion, $\lvert t_{PLH} - t_{PHL} \rvert$	see Figure 9-1		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 9-1		2.5		ns
t_F	Output signal fall time	see Figure 9-1		2.5		ns
t_{PHZ}	Disable propagation delay, high output to high impedance	see Figure 9-2		16.5	50	ns
t_{PLZ}	Disable propagation delay, low output to high impedance	see Figure 9-2		16.8	50	ns
t_{PZH}	Enable propagation delay, high impedance to high output	see Figure 9-2		10.0	30	ns
t_{PZL}	Enable propagation delay, high impedance to low output	see Figure 9-2		9.5	30	ns
t_{DO}	Default output delay time from input power loss	see Figure 9-3		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.

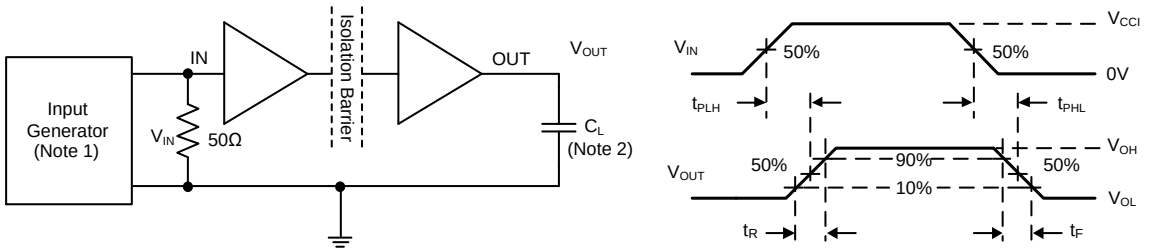
8.8.2 Switching Characteristics (V_{CCA} = V_{CCB} = 3.3 V ± 10%)

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
DR	Data rate				20	Mbps
PWM_{MIN}	Minimum pulse width				25	ns
t_{PLH}	Propagation delay time	see Figure 9-1		35	100	ns
t_{PHL}		see Figure 9-1		35	100	ns
PWD	Pulse width distortion, $\lvert t_{PLH} - t_{PHL} \rvert$	see Figure 9-1		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 9-1		2.5		ns
t_F	Output signal fall time	see Figure 9-1		2.5		ns
t_{PHZ}	Disable propagation delay, high output to high impedance	see Figure 9-2		20.0	50	ns
t_{PLZ}	Disable propagation delay, low output to high impedance	see Figure 9-2		20.0	50	ns
t_{PZH}	Enable propagation delay, high impedance to high output	see Figure 9-2		11.6	30	ns
t_{PZL}	Enable propagation delay, high impedance to low output	see Figure 9-2		11.1	30	ns
t_{DO}	Default output delay time from input power loss	see Figure 9-3		0.2	70	μs
t_{SU}	Start-up time			18	300	μs

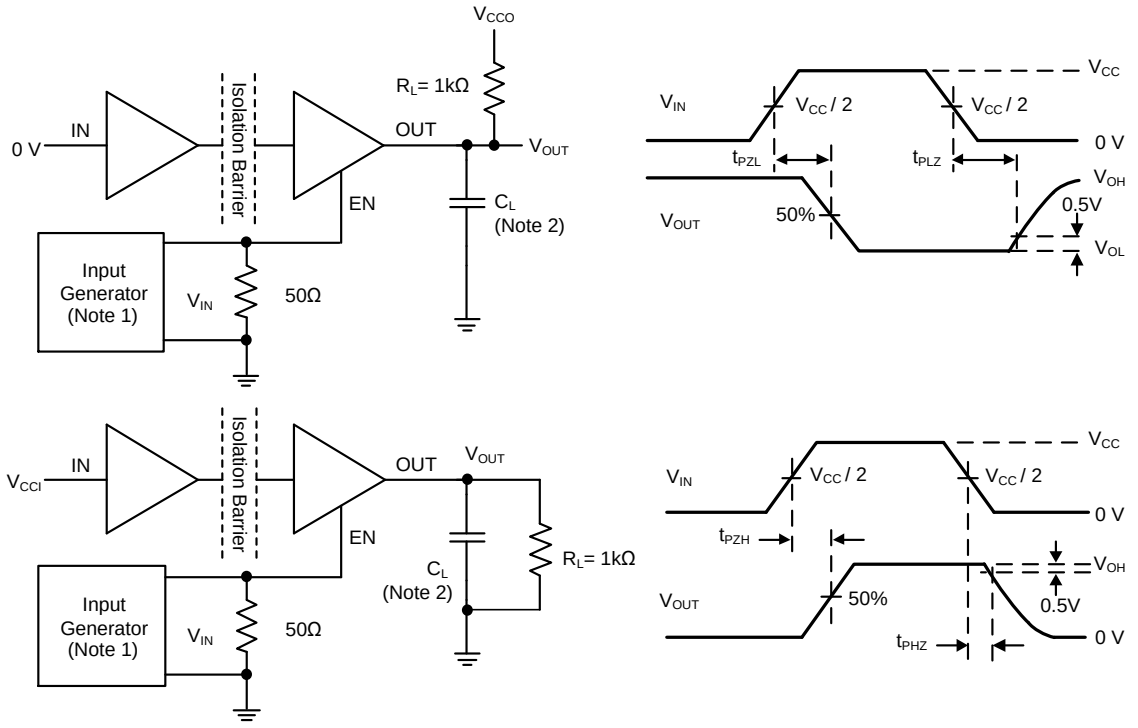
Note 1: $t_{SK(O)}$ is the skew between outputs of a single device with all driving inputs connected together and the outputs switching in the same direction while driving identical loads.
Note 2: $t_{SK(PP)}$ is the magnitude of the difference in propagation delay times between any terminals of different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

9 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.

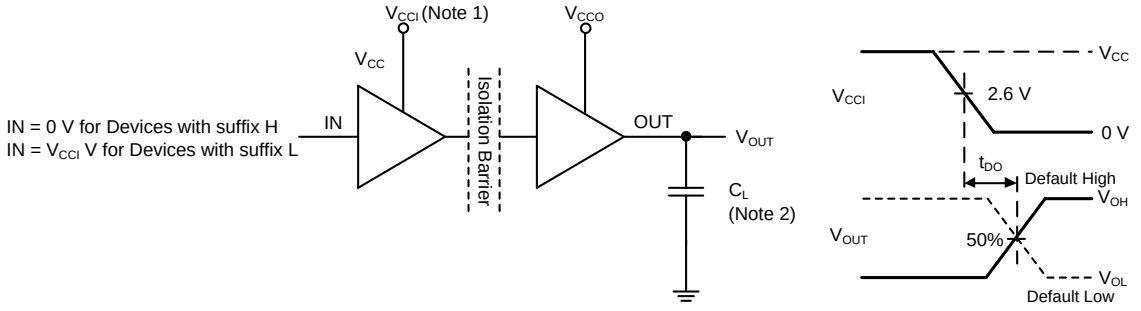
Figure 9-1. Switching Characteristics Test Circuit and Voltage Waveforms



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.

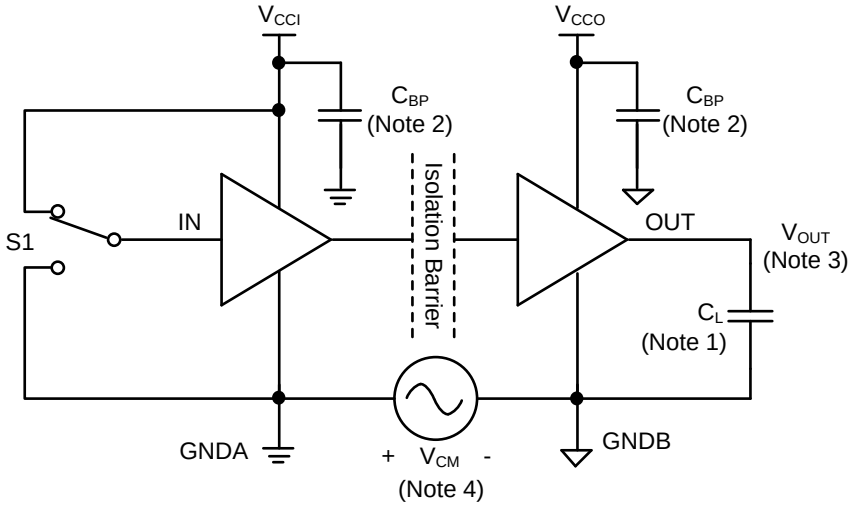
Figure 9-2. Enable/Disable Propagation Delay Time Test Circuit and Waveform

9 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 9-3. 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 9-4. Common-Mode Transient Immunity Test Circuit

10 Detailed Description

10.1 Overview

The UMISO773xA devices are a family of automotive, 2-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, UMISO773xA 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.

10.2 Functional Block Diagram

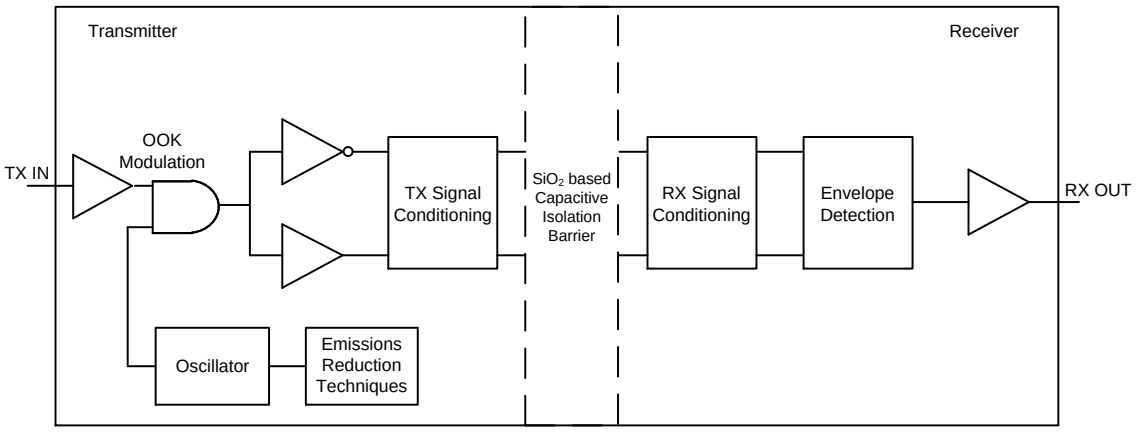


Figure 10-1. Functional Block Diagram of a Single Channel

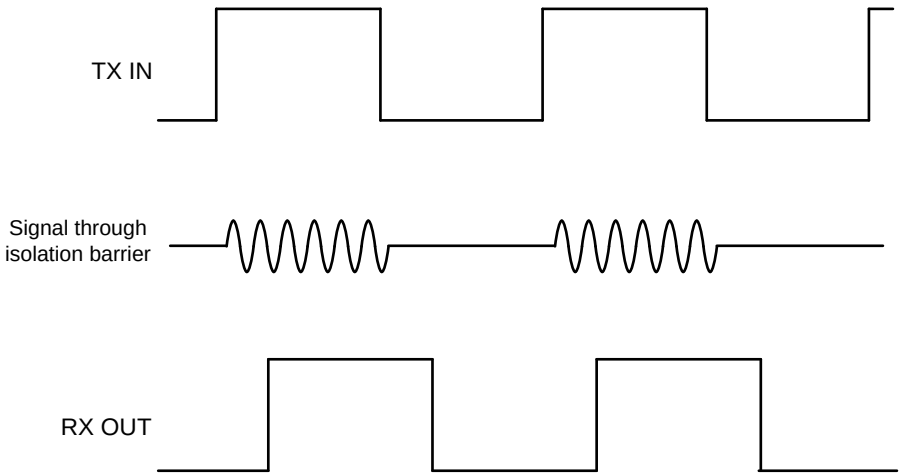


Figure 10-2. Conceptual Operation Waveforms of a Single Channel

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

Table 10-1 lists the operation modes for the UMISO773xA devices.

Table 10-1. 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 UMISO773xAH and Low for UMISO773xAL.
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 UMISO773xAH and Low for UMISO773xAL.

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 UMISO773xA devices operate in noisy environments.

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

11 Application and Implementation

11.1 Application Information

The UMISO773xA 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 UMISO773xA devices are the high-performance, 2-channel digital isolators. Unlike optocouplers, which require external components to improve performance, provide bias, or limit current, the UMISO773xA 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.

11.2 Typical Application

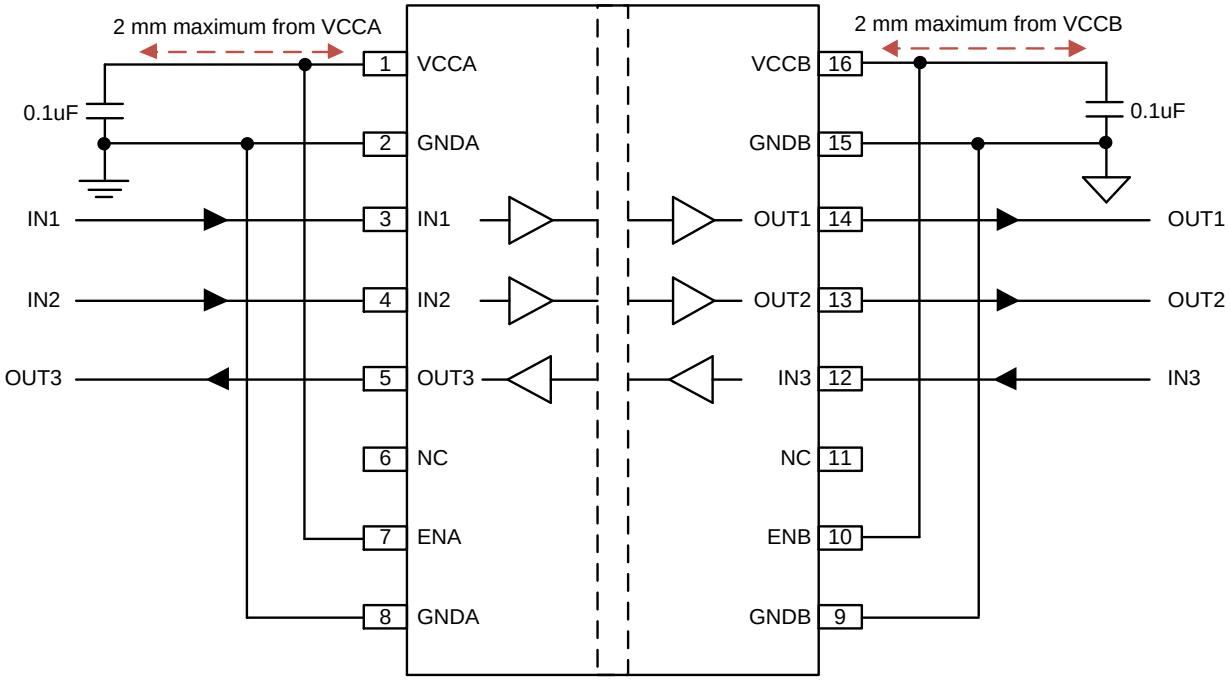
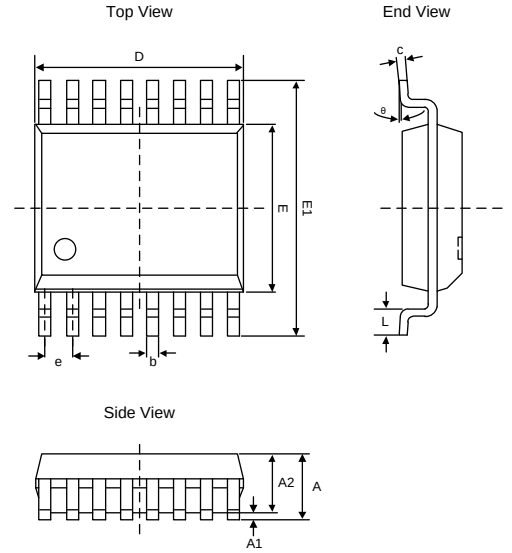


Figure 11-1. UMISO7731A Typical Application

12 Package Information

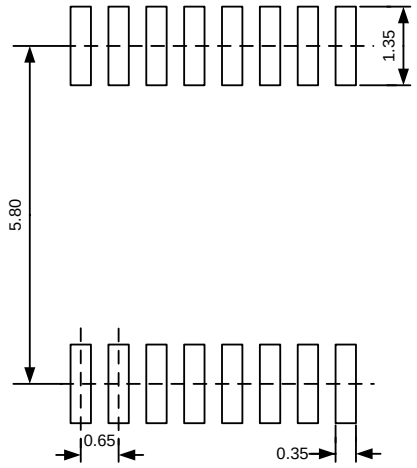
SSOP16(0.635)

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°

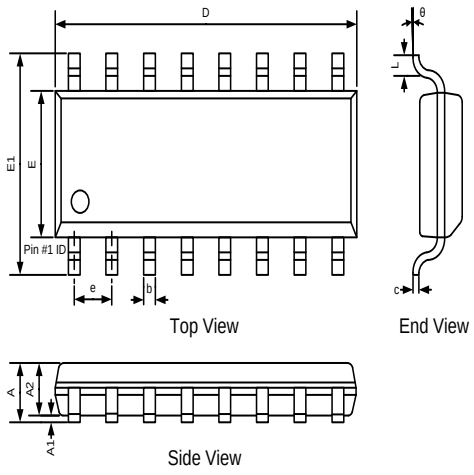
Land Pattern



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

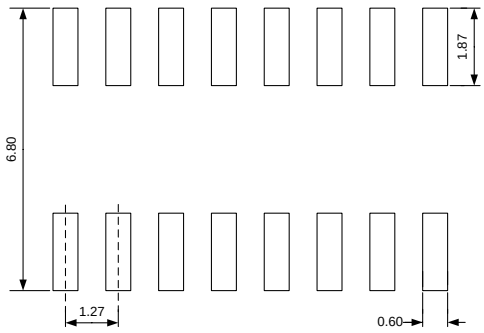
SOP16

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 °

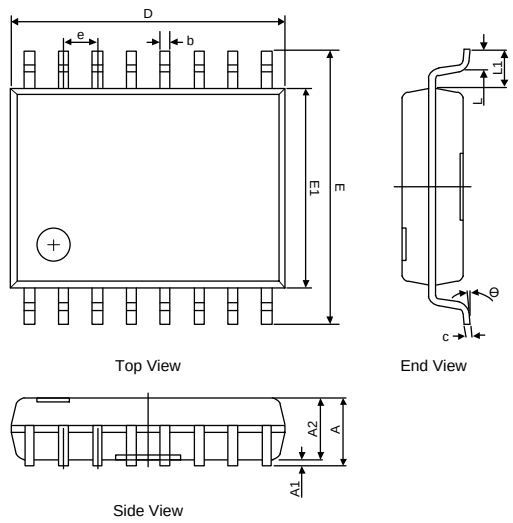
Land Pattern



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

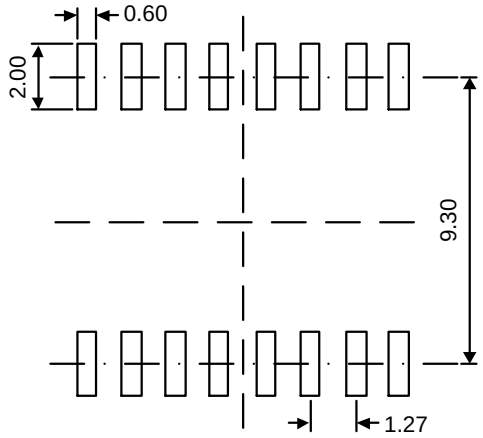
WSOP16

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 °

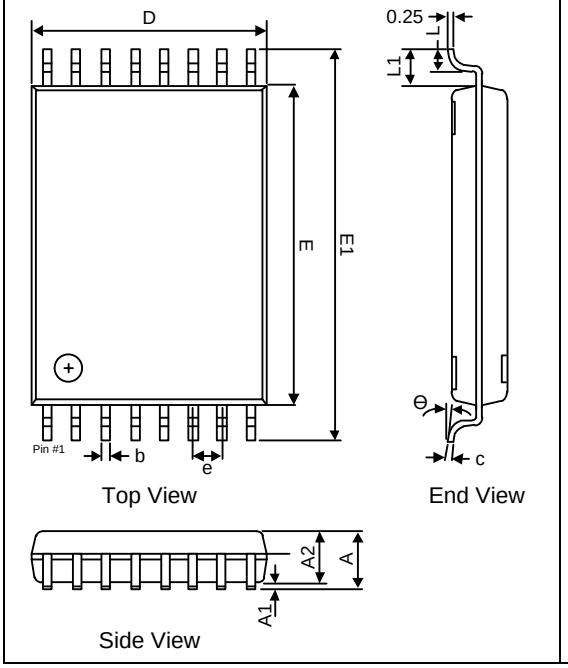
Land Pattern



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

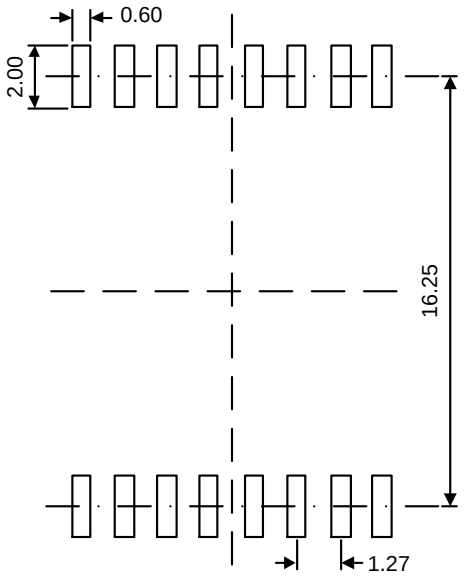
WWSOP16

Outline Drawing



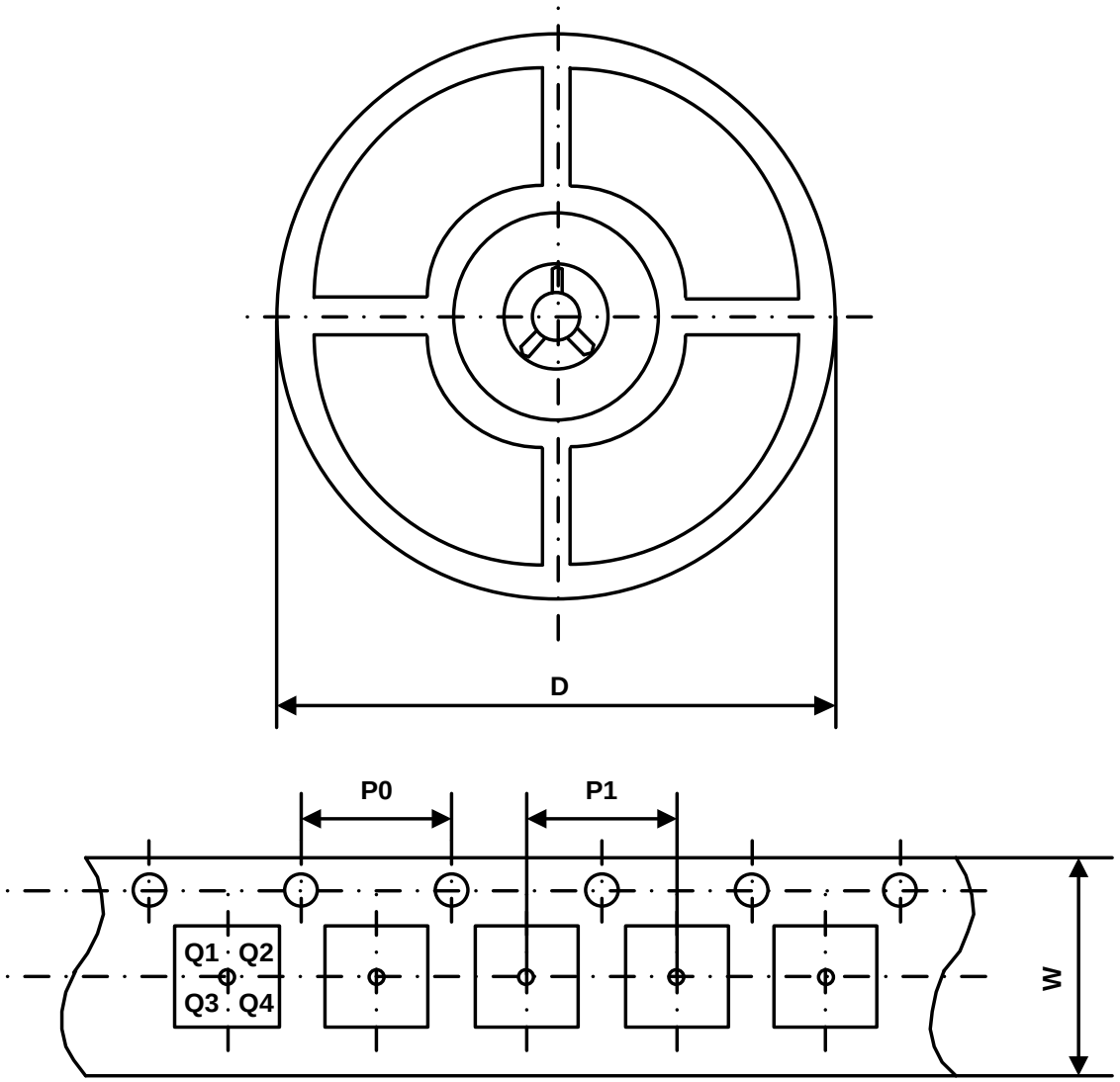
DIMENSIONS						
Symbol	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	-	-	2.65	-	-	0.104
A1	0.10	-	0.30	0.004	-	0.012
A2	2.236	-	2.336	0.088	-	0.092
b	0.31	-	0.51	0.012	-	0.020
c	0.22	-	0.28	0.009	-	0.011
D	10.20	-	10.40	0.402	-	0.409
E	13.90	-	14.10	0.547	-	0.555
E1	17.10	-	17.40	0.673	-	0.685
e	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.

13 Packing Information



Part Number	Package Type	Carrier Width (W)	Pitch (P0)	Pitch (P1)	Reel Size (D)	PIN 1 Quadrant
UMISO7730ALSAG	SSOP16(0.635)	12 mm	4 mm	8 mm	330 mm	Q1
UMISO7730AHSAG	SSOP16(0.635)	12 mm	4 mm	8 mm	330 mm	Q1
UMISO7731ALSAG	SSOP16(0.635)	12 mm	4 mm	8 mm	330 mm	Q1
UMISO7731AHSAG	SSOP16(0.635)	12 mm	4 mm	8 mm	330 mm	Q1
UMISO7730ALSG	SOP16	16 mm	4 mm	8 mm	330 mm	Q1
UMISO7730AHSG	SOP16	16mm	4 mm	8 mm	330 mm	Q1
UMISO7731ALSG	SOP16	16 mm	4 mm	8 mm	330 mm	Q1
UMISO7731AHSG	SOP16	16 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
UMISO7730ALWSG	WSOP16	16 mm	4 mm	12 mm	330 mm	Q1
UMISO7730AHWSG	WSOP16	16 mm	4 mm	12 mm	330 mm	Q1
UMISO7731ALWSG	WSOP16	16 mm	4 mm	12 mm	330 mm	Q1
UMISO7731AHWSG	WSOP16	16 mm	4 mm	12 mm	330 mm	Q1
UMISO7730ALWWSG	WWSOP16	24 mm	4 mm	20 mm	330 mm	Q1
UMISO7730AHWWSG	WWSOP16	24 mm	4 mm	20 mm	330 mm	Q1
UMISO7731ALWWSG	WWSOP16	24 mm	4 mm	20 mm	330 mm	Q1
UMISO7731AHWWSG	WWSOP16	24 mm	4 mm	20 mm	330 mm	Q1

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