Features

- Hermetic 16-pin SOIC package
- High-speed operation: up to 150Mbps
- No start-up initialization required
- Wide Operating Supply Voltage：2.5V-5.5V
- 60-year life at rated working voltage
- High electromagnetic immunity
- Ultra low power (typical)：
  - 5V Operation, 1.6mA per channel at 1Mbps
  - 5V Operation, 5.5mA per channel at 100Mbps
  - 2.5V Operation, 1.5mA per channel at 1Mbps
  - 2.5V Operation, 3.5mA per channel at 100Mbps
- Schmitt trigger inputs
- Transient Immunity 50 kV/μs
- 1000Vdc isolation voltage
- Wide temperature range：–55°C to +125 °C

Applications

- Industrial automation systems
- Medical electronics
- Hybrid electric vehicles
- Isolated ADC, DAC
- Motor control
- Power inverters
- Communications systems

Schematic Diagram

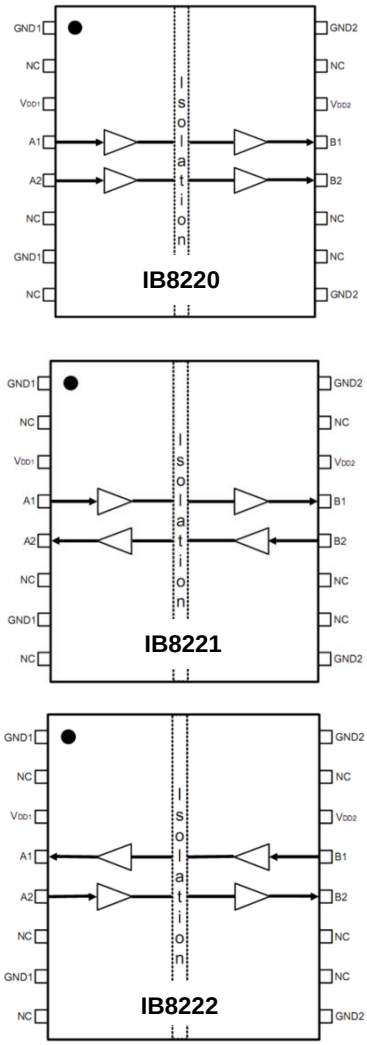

Figure 1. IB822X Schematic Diagram

Absolute Maximum Rating at 25°C (Note 1)

Parameter	*Symbol*	*Min*	*Typ*	*Max*	*Unit*
Storage temperature	T_{STG}	-65	-	150	°C
Operating temperature	T_A	-55	-	125	°C
Maximum Junction Temperature	T_J	-	-	150	°C
Supply Voltage	V_{DD1}, V_{DD2}	-0.50	-	7	V
Input Voltage	V_I	-0.5	-	V_{DD}+0.5	V
Output Voltage	V_O	-0.5	-	V_{DD}+0.5	V
Output Current Drive Channel	I_O	-	-	22	mA
Device Power Dissipation	P_D	-	-	150	mW

Notes
1. When using this product, please observe the absolute maximum ratings. Only one parameter may be set at the limit to ensure no damage to the device. Exceeding any of the limits listed here may damage the device.

ESD Precaution
Please be advised that normal static precautions should be taken in the handling and assembly of this device to prevent damage or degradation which may be induced by electrostatic discharge (ESD).

Recommended Operating Conditions

Parameter	*Symbol*	*Min*	*Typ*	*Max*	*Unit*
Ambient Operating Temperature	T_A	-55	25	125	℃
Supply Voltage	V_{DD}	2.5	-	5.5	V

Electrical Characteristics

Parameter	*Symbol*	*Test Condition*	*Min*	*Typ*	*Max*	*Unit*
Vdd Undervoltage Threshold	VDDUV+	V_{DD1}, V_{DD2} rising	1.95	2.24	2.375	V
Vdd Undervoltage Threshold	VDDUV–	V_{DD1}, V_{DD2} falling	1.88	2.16	2.325	V
Vdd Undervoltage Hysteresis	VDD_{HYS}		50	70	95	mV
Positive-Going Input	VT+	All inputs rising	1.4	1.67	1.9	V
Negative-Going Input	VT–	All inputs falling	1.0	1.23	1.4	V
Input Hysteresis	V_{HYS}		0.38	0.44	0.5	V
High Level Input Voltage	V_{IH}		2.0	-	-	V
Low Level Input Voltage	V_{IL}		-	-	0.8	V
High Level Output Voltage	V_{OH}	I_{OH} = – 4 mA	V_{DD1},V_{DD2} –0.4	V_{DD1},V_{DD2} –0.2	-	V
Low Level Output Voltage	V_{OL}	I_{OH} = 4 mA	-	0.2	0.4	V
Input Leakage Current	I_L		-	-	±10	uA
Output Impedance	Z_O		-	50	-	Ω

Timing Characteristics

Maximum Data Rate			0	-	150	Mbps
Minimum Pulse Width			-	-	5.0	ns
Propagation Delay	t_{PHL}, t_{PLH}	See Figure 2	-	-	13	ns
Pulse Width Distortion $\lvert t_{PLH} – t_{PHL} \rvert$	PWD	See Figure 2	-	-	4.5	ns
Propagation Delay Skew	$t_{PSK(P-P)}$		-	-	4.5	ns
Channel-Channel Skew	t_{PSK}		-	-	2.5	ns
Output Rise Time	tr	C_L = 15 pF, See Figure 2	-	2.5	4.0	ns
Output Fall Time	tf	C_L = 15 pF, See Figure 2	-	2.5	4.0	ns
Peak Eye Diagram Jitter	$t_{JIT(PK)}$		-	350	-	ps
Common Mode Transient	CMTI	V_I = V_{DD} or 0 V, V_{CM} = 1500 V, See Figure 3	35	50	-	kV/μs
Startup Time	t_{SU}		-	15	40	us

DC Supply Current

- Operating at V_{DD1} = 5 V±10%, V_{DD2} = 5 V±10%, T_A = –55 to 125 °C

Parameter	*Symbol*	*Test Condition*	*Min*	*Typ*	*Max*	*Unit*
DC Supply Current (All inputs 0 V or at Supply)						
IB8220						
V_{DD1}	I_{DD1}	V_I=0	-	0.8	1.4	mA
V_{DD2}	I_{DD2}	V_I=0	-	1.4	2.2	mA
V_{DD1}	I_{DD1}	V_I=1	-	3.3	5.3	mA
V_{DD2}	I_{DD2}	V_I=1	-	1.4	2.2	mA
IB8221						
V_{DD1}	I_{DD1}	V_I=0	-	1.2	1.9	mA
V_{DD2}	I_{DD2}	V_I=0	-	1.2	1.9	mA
V_{DD1}	I_{DD1}	V_I=1	-	2.4	3.8	mA
V_{DD2}	I_{DD2}	V_I=1	-	2.4	3.8	mA
IB8222						
V_{DD1}	I_{DD1}	V_I=0	-	2.6	4.2	mA
V_{DD2}	I_{DD2}	V_I=0	-	3.3	5.3	mA
V_{DD1}	I_{DD1}	V_I=1	-	4.0	6.4	mA
V_{DD2}	I_{DD2}	V_I=1	-	4.8	7.7	mA
1 Mbps Supply Current (All inputs = 500 kHz square wave, CI = 15 pF on all outputs)						
IB8220						
V_{DD1}	I_{DD1}	V_I=0	-	2.1	3.1	mA
V_{DD2}	I_{DD2}	V_I=0	-	1.6	2.4	mA
IB8221						
V_{DD1}	I_{DD1}	V_I=0	-	1.9	2.9	mA
V_{DD2}	I_{DD2}	V_I=0	-	1.9	2.9	mA
IB8222						
V_{DD1}	I_{DD1}	V_I=0	-	3.4	5.1	mA
V_{DD2}	I_{DD2}	V_I=0	-	4.2	6.2	mA
10 Mbps Supply Current (All inputs = 5 MHz square wave, CI = 15 pF on all outputs)						
IB8220						
V_{DD1}	I_{DD1}	V_I=0	-	1.2	2.0	mA
V_{DD2}	I_{DD2}	V_I=0	-	1.2	2.0	mA
IB8221						
V_{DD1}	I_{DD1}	V_I=0	-	2.2	3.3	mA
V_{DD2}	I_{DD2}	V_I=0	-	2.2	3.3	mA
IB8222						
V_{DD1}	I_{DD1}	V_I=0	-	3.7	5.5	mA
V_{DD2}	I_{DD2}	V_I=0	-	4.4	6.7	mA
100 Mbps Supply Current (All inputs = 50 MHz square wave, CI = 15 pF on all outputs)						
IB8220						
V_{DD1}	I_{DD1}	V_I=0	-	2.1	3.1	mA
V_{DD2}	I_{DD2}	V_I=0	-	8.9	12.5	mA
IB8221						
V_{DD1}	I_{DD1}	V_I=0	-	5.8	8.1	mA
V_{DD2}	I_{DD2}	V_I=0	-	5.8	8.1	mA
IB8222						
V_{DD1}	I_{DD1}	V_I=0	-	7.6	10.6	mA
V_{DD2}	I_{DD2}	V_I=0	-	8.2	11.4	mA

- Operating at V_{DD1} = 3.3 V±10%, V_{DD2} = 3.3 V±10% , T_A = –55 to 125 °C

Parameter	*Symbol*	*Test Condition*	*Min*	*Typ*	*Max*	*Unit*
DC Supply Current (All inputs 0 V or at Supply)						
IB8220						
V_{DD1}	I_{DD1}	V_I=0	-	0.8	1.4	mA
V_{DD2}	I_{DD2}	V_I=0	-	1.4	2.2	mA
V_{DD1}	I_{DD1}	V_I=1	-	3.3	5.3	mA
V_{DD2}	I_{DD2}	V_I=1	-	1.4	2.2	mA
IB8221						
V_{DD1}	I_{DD1}	V_I=0	-	1.2	1.9	mA
V_{DD2}	I_{DD2}	V_I=0	-	1.2	1.9	mA
V_{DD1}	I_{DD1}	V_I=1	-	2.4	3.8	mA
V_{DD2}	I_{DD2}	V_I=1	-	2.4	3.8	mA
IB8222						
V_{DD1}	I_{DD1}	V_I=0	-	2.6	4.2	mA
V_{DD2}	I_{DD2}	V_I=0	-	3.3	5.3	mA
V_{DD1}	I_{DD1}	V_I=1	-	4.0	6.4	mA
V_{DD2}	I_{DD2}	V_I=1	-	4.8	7.7	mA
1 Mbps Supply Current (All inputs = 500 kHz square wave, Cl = 15 pF on all outputs)						
IB8220						
V_{DD1}	I_{DD1}	V_I=0	-	2.1	3.1	mA
V_{DD2}	I_{DD2}	V_I=0	-	1.6	2.4	mA
IB8221						
V_{DD1}	I_{DD1}	V_I=0	-	1.9	2.9	mA
V_{DD2}	I_{DD2}	V_I=0	-	1.9	2.9	mA
IB8222						
V_{DD1}	I_{DD1}	V_I=0	-	3.4	5.1	mA
V_{DD2}	I_{DD2}	V_I=0	-	4.2	6.2	mA
10 Mbps Supply Current (All inputs = 5 MHz square wave, Cl = 15 pF on all outputs)						
IB8220						
V_{DD1}	I_{DD1}	V_I=0	-	2.1	3.1	mA
V_{DD2}	I_{DD2}	V_I=0	-	1.9	2.8	mA
IB8221						
V_{DD1}	I_{DD1}	V_I=0	-	2.0	3.0	mA
V_{DD2}	I_{DD2}	V_I=0	-	2.0	3.0	mA
IB8222						
V_{DD1}	I_{DD1}	V_I=0	-	3.5	5.3	mA
V_{DD2}	I_{DD2}	V_I=0	-	4.3	6.4	mA
100 Mbps Supply Current (All inputs = 50 MHz square wave, Cl = 15 pF on all outputs)						
IB8220						
V_{DD1}	I_{DD1}	V_I=0	-	2.1	3.1	mA
V_{DD2}	I_{DD2}	V_I=0	-	6.3	8.8	mA
IB8221						
V_{DD1}	I_{DD1}	V_I=0	-	4.4	6.1	mA
V_{DD2}	I_{DD2}	V_I=0	-	4.4	6.1	mA
IB8222						
V_{DD1}	I_{DD1}	V_I=0	-	5.9	8.2	mA
V_{DD2}	I_{DD2}	V_I=0	-	6.6	9.3	mA

- V_{DD1} = 2.5 V±10%, V_{DD2} = 2.5 V±10%, T_A = –55 to 125 °C

Parameter	*Symbol*	*Test Condition*	*Min*	*Typ*	*Max*	*Unit*
DC Supply Current (All inputs 0 V or at Supply)						
IB8220						
V_{DD1}	I_{DD1}	V_I=0	-	0.8	1.4	mA
V_{DD2}	I_{DD2}	V_I=0	-	1.4	2.2	mA
V_{DD1}	I_{DD1}	V_I=1	-	3.3	5.3	mA
V_{DD2}	I_{DD2}	V_I=1	-	1.4	2.2	mA
IB8221						
V_{DD1}	I_{DD1}	V_I=0	-	1.2	1.9	mA
V_{DD2}	I_{DD2}	V_I=0	-	1.2	1.9	mA
V_{DD1}	I_{DD1}	V_I=1	-	2.4	3.8	mA
V_{DD2}	I_{DD2}	V_I=1	-	2.4	3.8	mA
IB8222						
V_{DD1}	I_{DD1}	V_I=0	-	2.6	4.2	mA
V_{DD2}	I_{DD2}	V_I=0	-	3.3	5.3	mA
V_{DD1}	I_{DD1}	V_I=1	-	4.0	6.4	mA
V_{DD2}	I_{DD2}	V_I=1	-	4.8	7.7	mA
1 Mbps Supply Current (All inputs = 500 kHz square wave, CI = 15 pF on all outputs)						
IB8220						
V_{DD1}	I_{DD1}	V_I=0	-	2.1	3.1	mA
V_{DD2}	I_{DD2}	V_I=0	-	1.6	2.4	mA
IB8221						
V_{DD1}	I_{DD1}	V_I=0	-	1.9	2.9	mA
V_{DD2}	I_{DD2}	V_I=0	-	1.9	2.9	mA
IB8222						
V_{DD1}	I_{DD1}	V_I=0	-	3.4	5.1	mA
V_{DD2}	I_{DD2}	V_I=0	-	4.2	6.2	mA
10 Mbps Supply Current (All inputs = 5 MHz square wave, CI = 15 pF on all outputs)						
IB8220						
V_{DD1}	I_{DD1}	V_I=0	-	2.1	3.1	mA
V_{DD2}	I_{DD2}	V_I=0	-	1.7	2.6	mA
IB8221						
V_{DD1}	I_{DD1}	V_I=0	-	2.0	2.9	mA
V_{DD2}	I_{DD2}	V_I=0	-	2.0	2.9	mA
IB8222						
V_{DD1}	I_{DD1}	V_I=0	-	3.5	5.2	mA
V_{DD2}	I_{DD2}	V_I=0	-	4.2	6.3	mA
100 Mbps Supply Current (All inputs = 50 MHz square wave, CI = 15 pF on all outputs)						
IB8220						
V_{DD1}	I_{DD1}	V_I=0	-	2.1	3.1	mA
V_{DD2}	I_{DD2}	V_I=0	-	5.1	7.1	mA
IB8221						
V_{DD1}	I_{DD1}	V_I=0	-	3.7	5.2	mA
V_{DD2}	I_{DD2}	V_I=0	-	3.7	5.2	mA
IB8222						
V_{DD1}	I_{DD1}	V_I=0	-	5.2	7.3	mA
V_{DD2}	I_{DD2}	V_I=0	-	6.0	8.4	mA

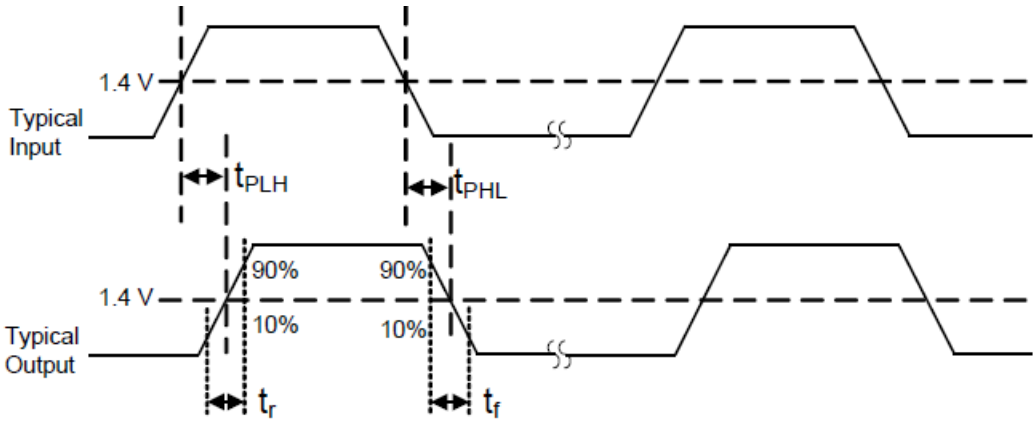

Figure 2. Propagation Delay Timing

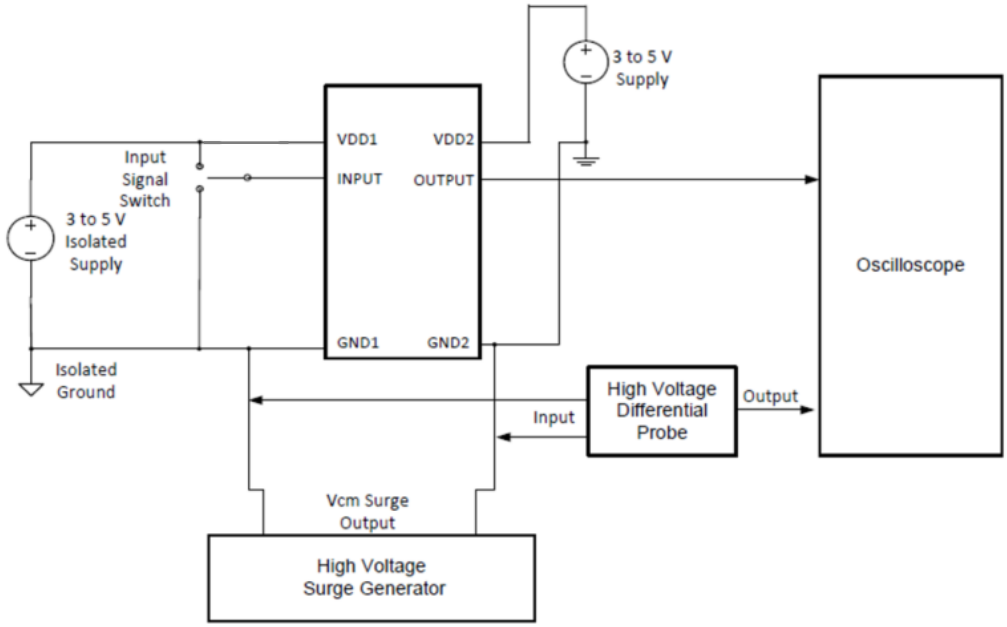

Figure 3. Common Mode Transient Immunity Test Circuit

Logic Operation

V_I Input	***VDDI State***	***VDDO State***	***VO Output***
H	P	P	H
L	P	P	L

Notes :
1. VDDI and VDDO are the input and output power supplies. VI and VO are the respective input and output terminals.
2. H = Logic High; L = Logic Low; Hi-Z = High Impedance
3. “Powered” state (P) is defined as 2.5 V < VDD < 5.5 V.

Undervoltage Lockout :

Undervoltage Lockout (UVLO) is provided to prevent erroneous operation during device startup and shutdown or when VDD is below its specified operating circuits range. Both Side A and Side B each have their own undervoltage lockout monitors. Each side can enter or exit UVLO independently. For example, Side A unconditionally enters UVLO when VDD1 falls below VDD1(UVLO–) and exits UVLO when VDD1 rises above VDD1(UVLO+). Side B operates the same as Side A with respect to its VDD2 supply.

Reference proposal :

The IB8220 family requires a 0.1 µF bypass capacitor between VDD1 and GND1 and VDD2 and GND2. The capacitor should be placed as close as possible to the package. To enhance the robustness of a design, the user may also include resistors (50–300Ω) in series with the inputs and outputs if the system is excessively noisy.

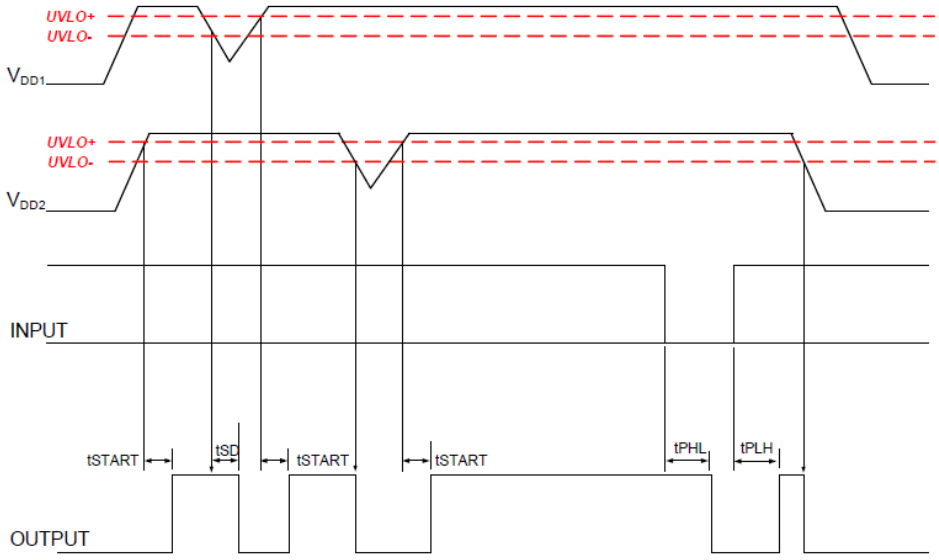

Figure 4. Device Behavior during Normal Operation

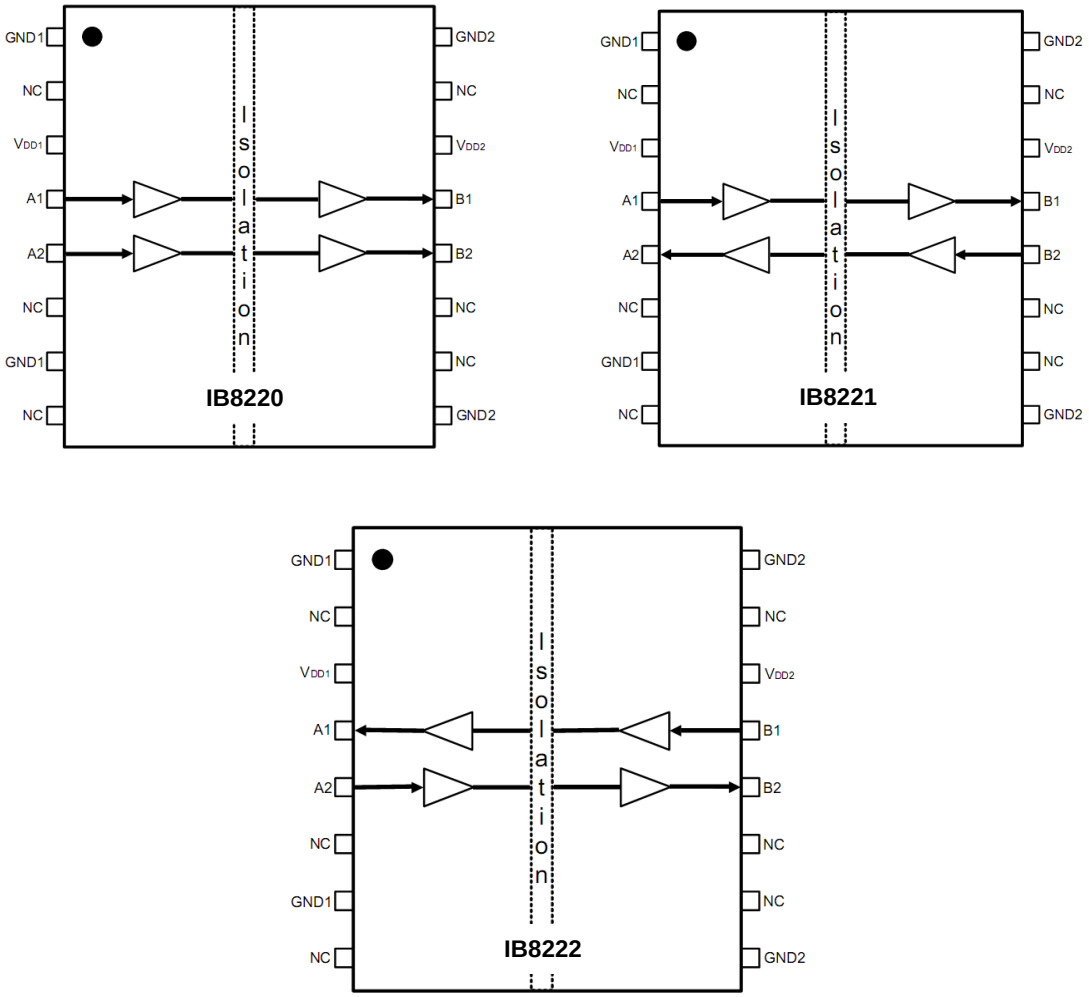

Figure 5. IB822X Connection Diagrams

Pin Configuration

Name	*Pin #*	*Type*	*Description*
VDD1/NC	3	Supply	Side 1 Power Supply
GND1	1, 7	Ground	Side 1 Ground
A1	4	Digital I/O	Side 1 Digital Input or Output
A2	5	Digital I/O	Side 1 Digital Input or Output
B1	13	Digital I/O	Side 2 Digital Input or Output
B2	12	Digital I/O	Side 2 Digital Input or Output
VDD2	14	Supply	Side 2 Power Supply
GND2/NC	9, 16	Ground	Side 2 Ground

Package Dimensions in inches (mm)

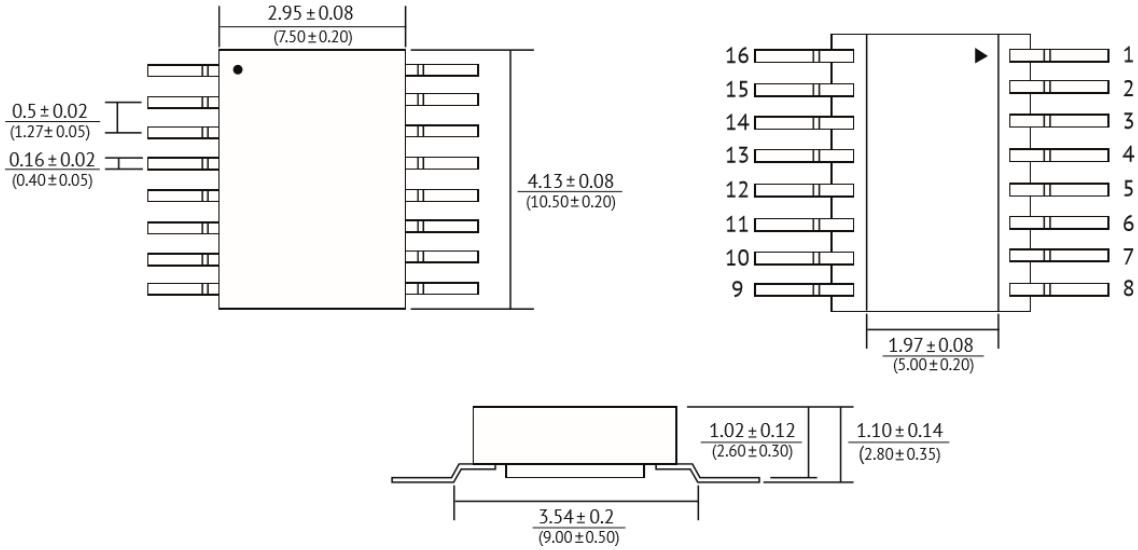

Figure 6. IB822X Package Dimensions

Ordering Information

Manufacturing Part Number	***Part Description***
IB8220	Hermetic Magnetic Digital Isolator Dual Channel 16-pin SOIC Package
IB8221	Hermetic Magnetic Digital Isolator Dual Channel 16-pin SOIC Package
IB8222	Hermetic Magnetic Digital Isolator Dual Channel 16-pin SOIC Package

DISCLAIMER