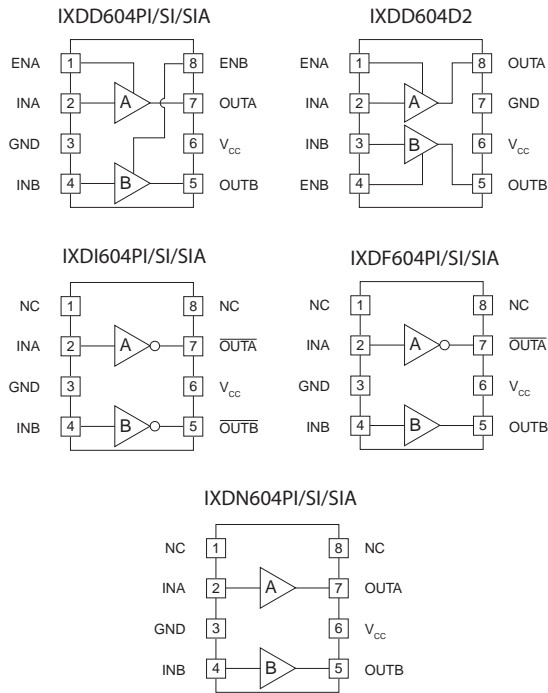


1. Specifications	3
1.1 Pin Configurations	3
1.2 Pin Definitions	3
1.3 Absolute Maximum Ratings	3
1.4 Recommended Operating Conditions	3
1.5 Electrical Characteristics: $T_A = 25^\circ\text{C}$	4
1.6 Electrical Characteristics: $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$	4
1.7 Thermal Characteristics	5
2. IXD_604 Performance	5
2.1 Timing Diagrams	5
2.2 Characteristics Test Diagram	5
3. Block Diagrams & Truth Tables	6
3.1 IXDD604	6
3.2 IXDI604	6
3.3 IXDF604	6
3.4 IXDN604	6
4. Typical Performance Characteristics	7
5. Manufacturing Information	10
5.1 Moisture Sensitivity	10
5.2 ESD Sensitivity	10
5.3 Soldering Profile	10
5.4 Board Wash	10
5.5 Mechanical Dimensions	11

1 Specifications

1.1 Pin Configurations



1.2 Pin Definitions

Pin Name	Description
INA	Channel A Logic Input
INB	Channel B Logic Input
ENA	Channel A Enable Input - Drive pin low to disable Channel A and force Channel A Output to a high impedance state
ENB	Channel B Enable Input - Drive pin low to disable Channel B and force Channel B Output to a high impedance state
OUTA OUTA	Channel A Output - Sources or sinks current to turn-on or turn-off a discrete MOSFET or IGBT
OUTB OUTB	Channel B Output - Sources or sinks current to turn-on or turn-off a discrete MOSFET or IGBT
V _{CC}	Supply Voltage - Provides power to the device
GND	Ground - Common ground reference for the device

1.3 Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Supply Voltage	V _{CC}	-0.3	40	V
Input Voltage	V _{INx} , V _{ENx}	-5	V _{CC} +0.3	V
Output Current	I _{OUT}	-	±4	A
Output Pulsed Current (0.5μs)	I _{out_pulsed}	-	±5	A
Junction Temperature	T _J	-55	+150	°C
Storage Temperature	T _{STG}	-65	+150	°C

Absolute maximum electrical ratings are at 25°C

Absolute maximum ratings are stress ratings. Stresses in excess of these ratings can cause permanent damage to the device. Functional operation of the device at conditions beyond those indicated in the operational sections of this data sheet is not implied.

1.4 Recommended Operating Conditions

Parameter	Symbol	Range	Units
Supply Voltage	V _{CC}	4.5 to 35	V
Operating Temperature Range	T _A	-40 to +125	°C

1.5 Electrical Characteristics: $T_A = 25^\circ\text{C}$

 Test Conditions: $4.5\text{V} \leq V_{CC} \leq 35\text{V}$, one channel (unless otherwise noted).

Parameter	Conditions	Symbol	Minimum	Typical	Maximum	Units	
Input Voltage, High	$4.5\text{V} \leq V_{CC} \leq 18\text{V}$	V_{IH}	3.0	-	-	V	
Input Voltage, Low	$4.5\text{V} \leq V_{CC} \leq 18\text{V}$	V_{IL}	-	-	0.8		
Input Current	$0\text{V} \leq V_{IN} \leq V_{CC}$	I_{IN}	-	-	± 10	μA	
High EN Input Voltage	IXDD604 only	V_{ENH}	$2/3V_{CC}$	-	-	V	
Low EN Input Voltage	IXDD604 only	V_{ENL}	-	-	$1/3V_{CC}$		
Output Voltage, High	-	V_{OH}	$V_{CC}-0.025$	-	-	V	
Output Voltage, Low	-	V_{OL}	-	-	0.025		
Output Resistance, High State	$V_{CC}=18\text{V}, I_{OUT}=-10\text{mA}$	R_{OH}	-	1.3	2.5	Ω	
Output Resistance, Low State	$V_{CC}=18\text{V}, I_{OUT}=10\text{mA}$	R_{OL}	-	1.1	2		
Output Current, Continuous	Limited by package power dissipation	I_{DC}	-	-	± 1	A	
Rise Time	$V_{CC}=18\text{V}, C_{LOAD}=1000\text{pF}$	t_r	-	9	16	ns	
Fall Time	$V_{CC}=18\text{V}, C_{LOAD}=1000\text{pF}$	t_f	-	8	14		
On-Time Propagation Delay	$V_{CC}=18\text{V}, C_{LOAD}=1000\text{pF}$	t_{ondly}	-	29	50		
Off-Time Propagation Delay	$V_{CC}=18\text{V}, C_{LOAD}=1000\text{pF}$	t_{offdly}	-	35	50		
Enable to Output-High Delay Time	IXDD604 only, $V_{CC}=18\text{V}$	t_{ENOH}	-	35	55		
Disable to High Impedance State Delay Time	IXDD604 only, $V_{CC}=18\text{V}$	t_{DOLD}	-	40	55		
Enable Pull-Up Resistor	-	R_{EN}	-	200	-		$\text{k}\Omega$
Power Supply Current	$V_{CC}=18\text{V}, V_{IN}=3.5\text{V}$	I_{CC}	-	1	3		mA
	$V_{CC}=18\text{V}, V_{IN}=0\text{V}$		-	<1	10		
	$V_{CC}=18\text{V}, V_{IN}=V_{CC}$		-	<1	10	μA	

1.6 Electrical Characteristics: $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$

 Test Conditions: $4.5\text{V} \leq V_{CC} \leq 35\text{V}$, one channel (unless otherwise noted).

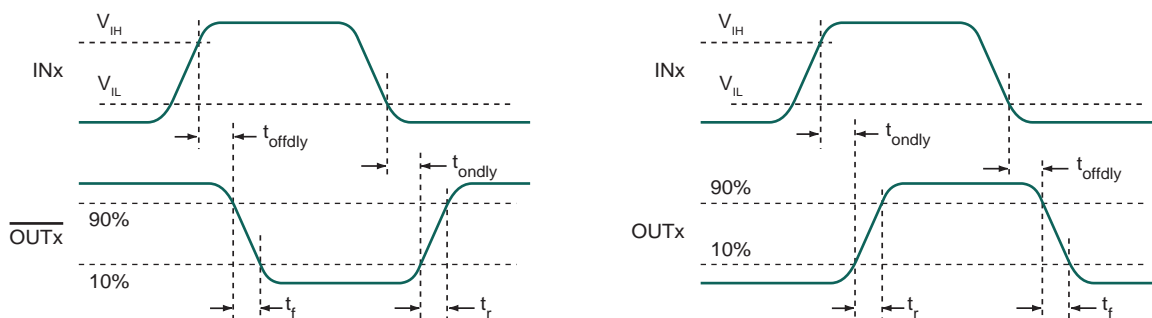
Parameter	Conditions	Symbol	Minimum	Maximum	Units	
Input Voltage, High	$4.5\text{V} \leq V_{CC} \leq 18\text{V}$	V_{IH}	3.3	-	V	
Input Voltage, Low	$4.5\text{V} \leq V_{CC} \leq 18\text{V}$	V_{IL}	-	0.65		
Input Current	$0\text{V} \leq V_{IN} \leq V_{CC}$	I_{IN}	-10	10	μA	
Output Voltage, High	-	V_{OH}	$V_{CC}-0.025$	-	V	
Output Voltage, Low	-	V_{OL}	-	0.025		
Output Resistance, High State	$V_{CC}=18\text{V}, I_{OUT}=-10\text{mA}$	R_{OH}	-	3	Ω	
Output Resistance, Low State	$V_{CC}=18\text{V}, I_{OUT}=10\text{mA}$	R_{OL}	-	2.5		
Output Current, Continuous	Limited by package power dissipation	I_{DC}	-	± 1	A	
Rise Time	$V_{CC}=18\text{V}, C_{LOAD}=1000\text{pF}$	t_r	-	16	ns	
Fall Time	$V_{CC}=18\text{V}, C_{LOAD}=1000\text{pF}$	t_f	-	14		
On-Time Propagation Delay	$V_{CC}=18\text{V}, C_{LOAD}=1000\text{pF}$	t_{ondly}	-	65		
Off-Time Propagation Delay	$V_{CC}=18\text{V}, C_{LOAD}=1000\text{pF}$	t_{offdly}	-	65		
Enable to Output-High Delay Time	IXDD604 only, $V_{CC}=18\text{V}$	t_{ENOH}	-	65		
Disable to High Impedance State Delay Time	IXDD604 only, $V_{CC}=18\text{V}$	t_{DOLD}	-	65		
Power Supply Current	$V_{CC}=18\text{V}, V_{IN}=3.5\text{V}$	I_{CC}	-	3.5		mA
	$V_{CC}=18\text{V}, V_{IN}=0\text{V}$		-	150		
	$V_{CC}=18\text{V}, V_{IN}=V_{CC}$		-	150	μA	

1.7 Thermal Characteristics

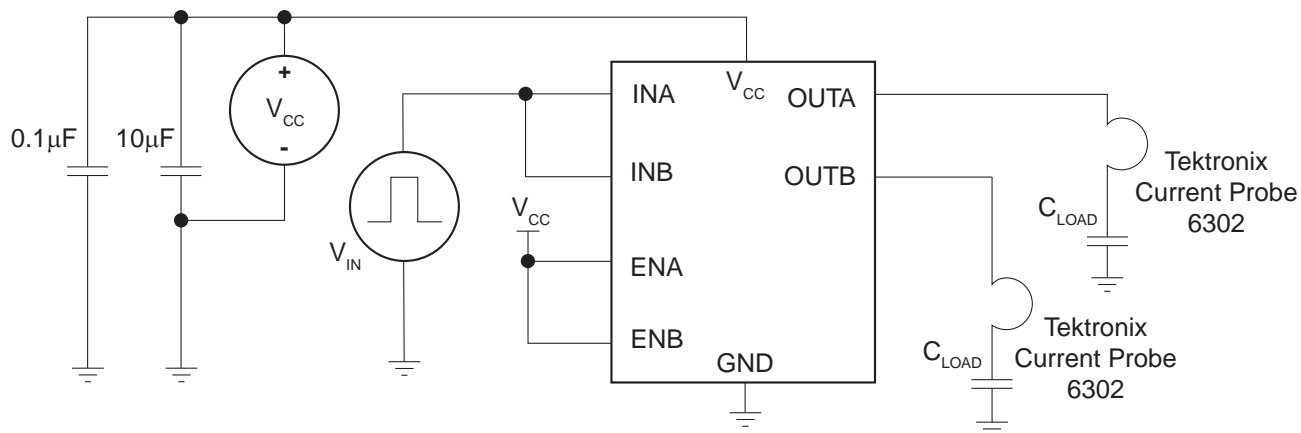
Package	Parameter	Symbol	Rating	Units
D2 (8-Pin DFN)	Thermal Resistance, Junction-to-Ambient	θ_{JA}	35	°C/W
PI (8-Pin DIP)			125	
SI (8-Pin Power SOIC)			85	
SIA (8-Pin SOIC)			120	
SI (8-Pin Power SOIC)	Thermal Resistance, Junction-to-Case	θ_{JC}	10	°C/W

2 IXD_604 Performance

2.1 Timing Diagrams

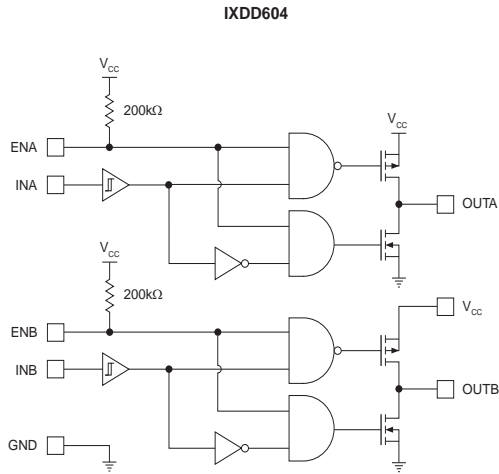


2.2 Characteristics Test Diagram



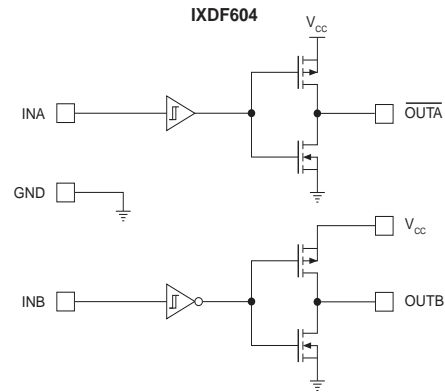
3 Block Diagrams & Truth Tables

3.1 IXDD604



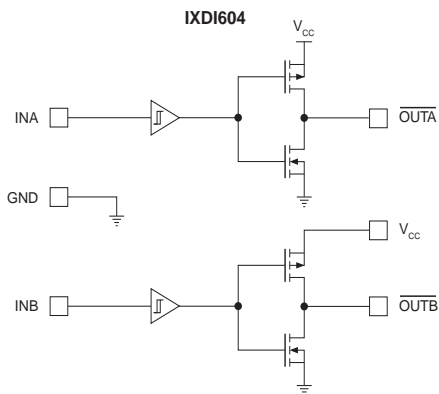
IN _x	EN _x	OUT _x
0	1 or open	0
1	1 or open	1
0	0	Z
1	0	Z

3.3 IXDF604



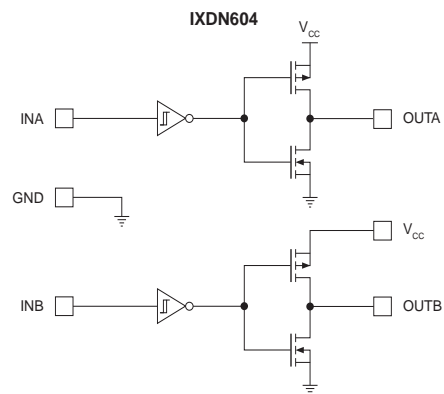
INA	\overline{OUTA}
0	1
1	0
INB	OUTB
0	0
1	1

3.2 IXDI604



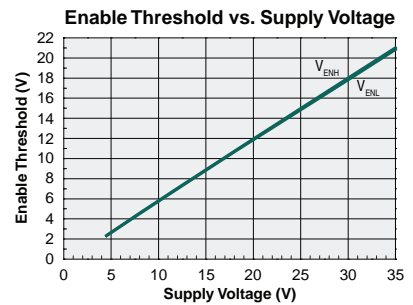
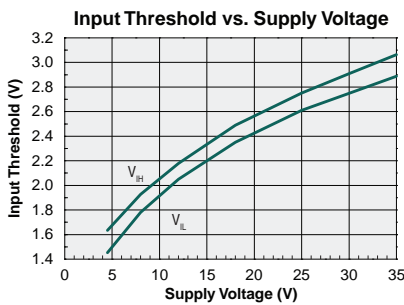
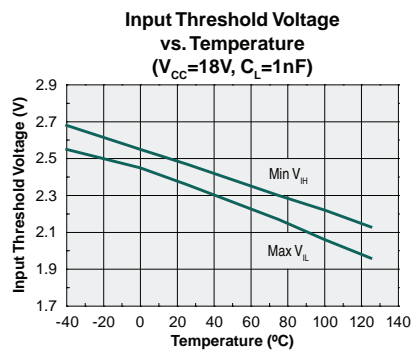
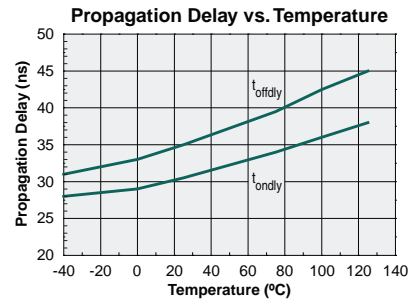
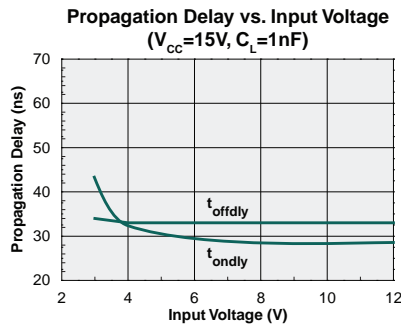
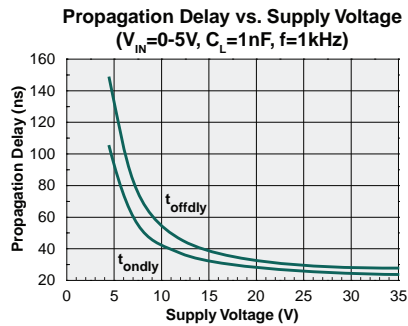
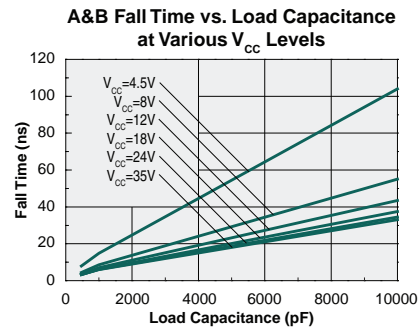
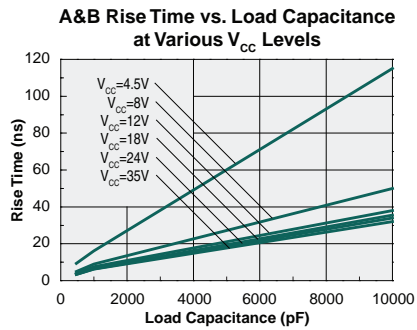
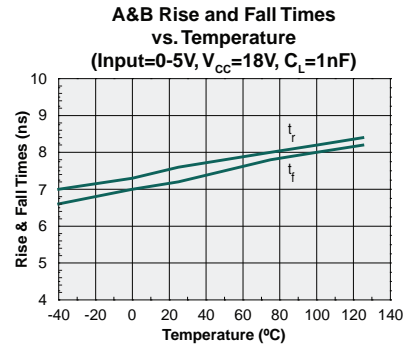
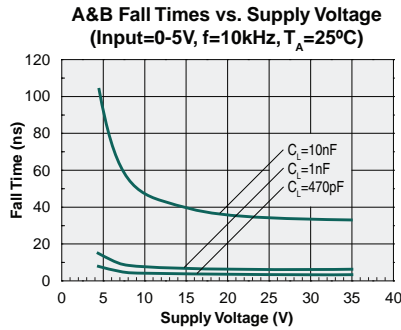
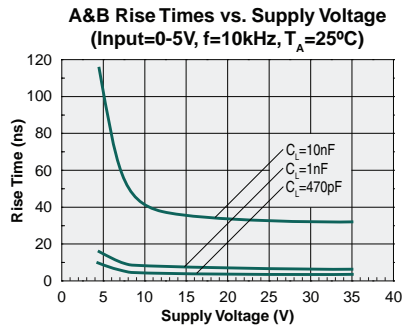
IN _x	$\overline{OUT_x}$
0	1
1	0

3.4 IXDN604

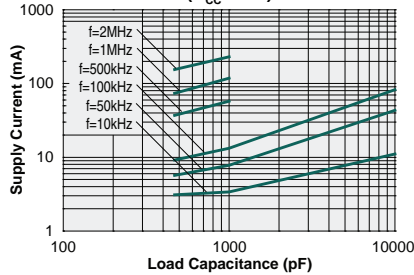


IN _x	OUT _x
0	0
1	1

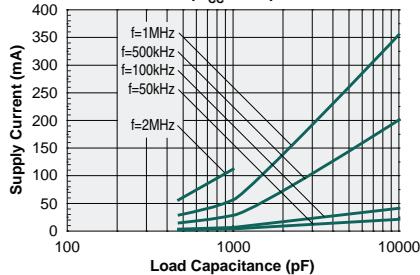
4 Typical Performance Characteristics



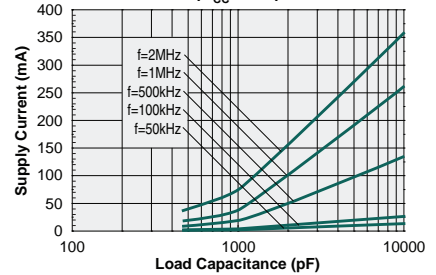
**Supply Current vs. Load Capacitance
Both Outputs Active
($V_{CC}=35V$)**



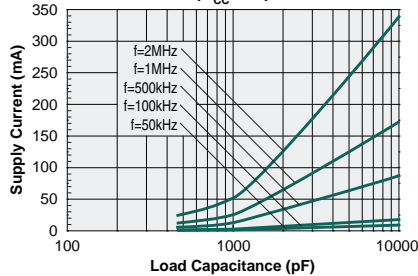
**Supply Current vs. Load Capacitance
Both Outputs Active
($V_{CC}=18V$)**



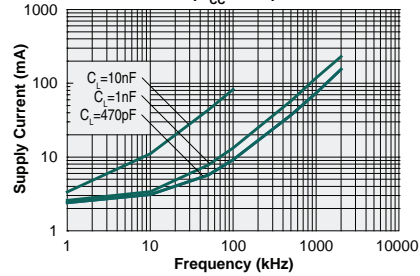
**Supply Current vs. Load Capacitance
Both Outputs Active
($V_{CC}=12V$)**



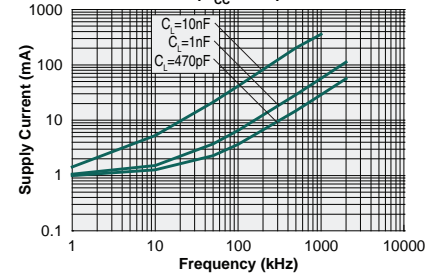
**Supply Current vs. Load Capacitance
Both Outputs Active
($V_{CC}=8V$)**



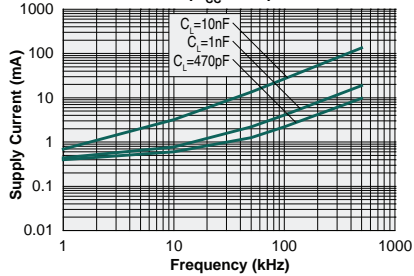
**Supply Current vs. Frequency
Both Outputs Active
($V_{CC}=35V$)**



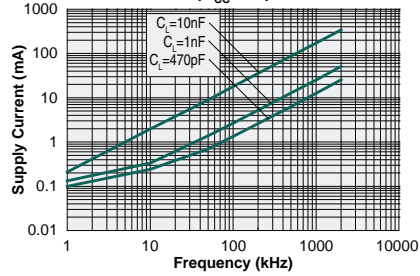
**Supply Current vs. Frequency
Both Outputs Active
($V_{CC}=18V$)**



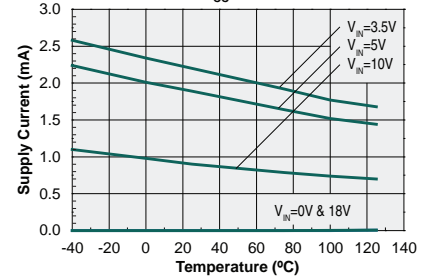
**Supply Current vs. Frequency
Both Outputs Active
($V_{CC}=12V$)**



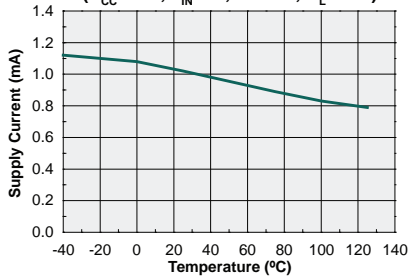
**Supply Current vs. Frequency
Both Outputs Active
($V_{CC}=8V$)**



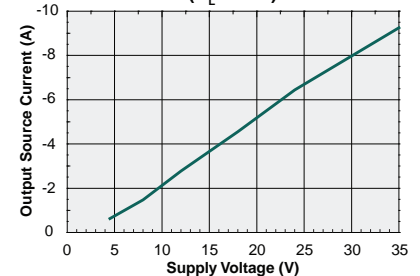
**Quiescent Supply Current
vs. Temperature
($V_{CC}=18V$)**



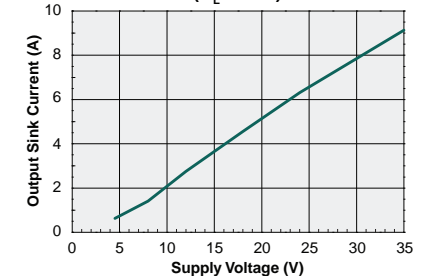
**Dynamic Supply Current
vs. Temperature
($V_{CC}=18V, V_{IN}=5V, f=1kHz, C_L=1nF$)**

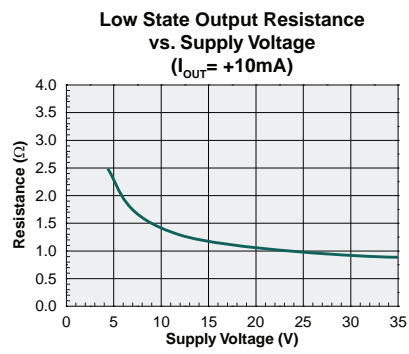
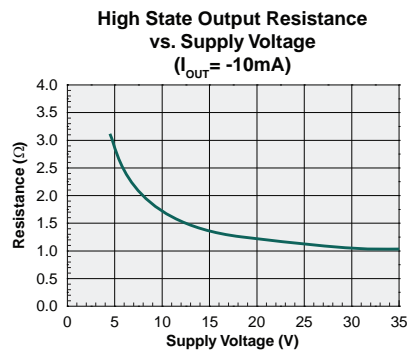
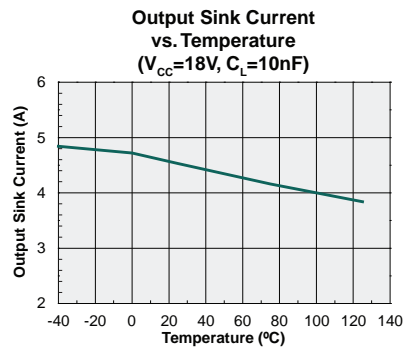
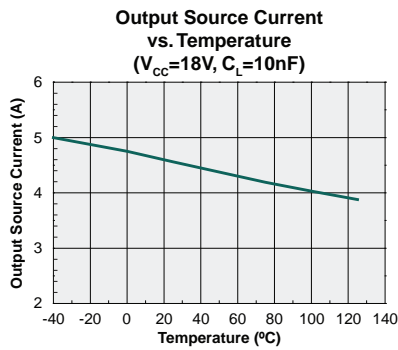


**Output Source Current
vs. Supply Voltage
($C_L=10nF$)**



**Output Sink Current
vs. Supply Voltage
($C_L=10nF$)**





5 Manufacturing Information

5.1 Moisture Sensitivity



All plastic encapsulated semiconductor packages are susceptible to moisture ingress. IXYS Integrated Circuits Division classifies its plastic encapsulated devices for moisture sensitivity according to the latest version of the joint industry standard, **IPC/JEDEC J-STD-020**, in force at the time of product evaluation.

We test all of our products to the maximum conditions set forth in the standard, and guarantee proper operation of our devices when handled according to the limitations and information in that standard as well as to any limitations set forth in the information or standards referenced below.

Failure to adhere to the warnings or limitations as established by the listed specifications could result in reduced product performance, reduction of operable life, and/or reduction of overall reliability.

This product carries a **Moisture Sensitivity Level (MSL)** classification as shown below, and should be handled according to the requirements of the latest version of the joint industry standard **IPC/JEDEC J-STD-033**.

Device	Moisture Sensitivity Level (MSL) Classification
IXD_604 All Versions	MSL 1

5.2 ESD Sensitivity



This product is **ESD Sensitive**, and should be handled according to the industry standard **JESD-625**.

5.3 Soldering Profile

Provided in the table below is the Classification Temperature (T_C) of this product and the maximum dwell time the body temperature of this device may be ($T_C - 5$)°C or greater. The classification temperature sets the Maximum Body Temperature allowed for this device during lead-free reflow processes. For through-hole devices, and any other processes, the guidelines of J-STD-020 must be observed.

Device	Classification Temperature (T_C)	Dwell Time (t_p)	Max Reflow Cycles
IXD_604SI / IXD_604SIA / IXD_604D2	260°C	30 seconds	3
IXD_604PI	250°C	30 seconds	-

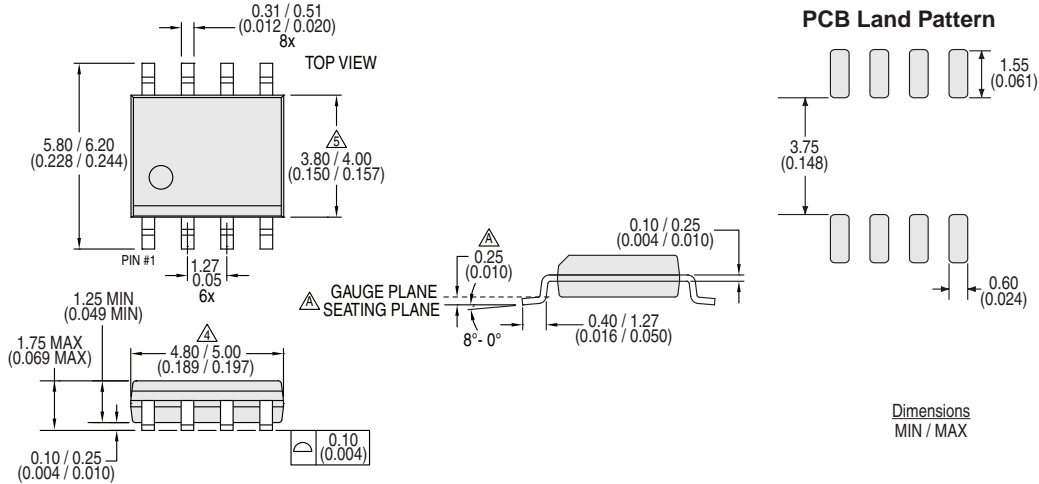
5.4 Board Wash

IXYS Integrated Circuits Division recommends the use of no-clean flux formulations. Board washing to reduce or remove flux residue following the solder reflow process is acceptable provided proper precautions are taken to prevent damage to the device. These precautions include but are not limited to: using a low pressure wash and providing a follow up bake cycle sufficient to remove any moisture trapped within the device due to the washing process. Due to the variability of the wash parameters used to clean the board, determination of the bake temperature and duration necessary to remove the moisture trapped within the package is the responsibility of the user (assembler). Cleaning or drying methods that employ ultrasonic energy may damage the device and should not be used. Additionally, the device must not be exposed to flux or solvents that are Chlorine- or Fluorine-based



5.5 Mechanical Dimensions

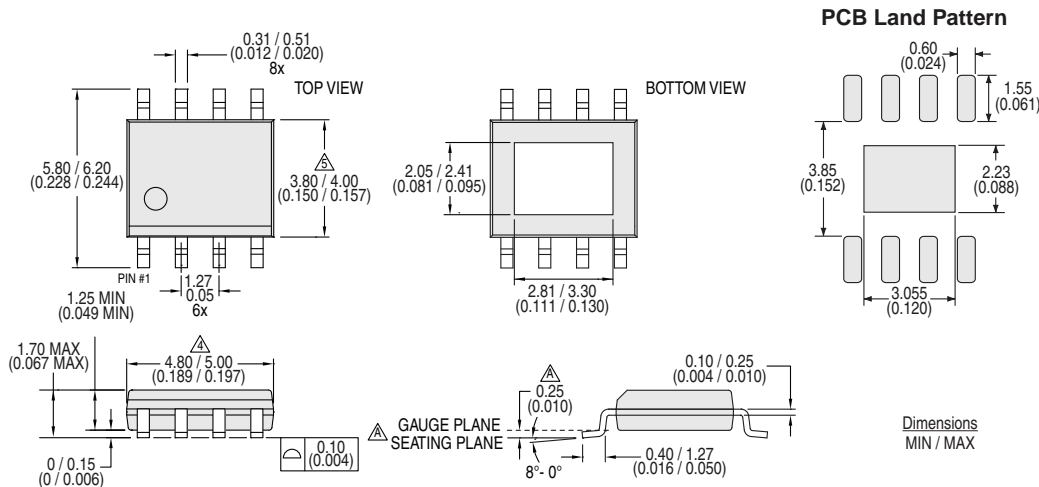
5.5.1 SIA (8-Pin SOIC)



Notes:

1. Controlling dimension: millimeters.
2. All dimensions are in mm (inches).
3. This package conforms to JEDEC Standard MS-012, variation AA, Rev. F.
- △ Dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15mm per end.
- △ Dimension does not include interlead flash or protrusion. Interlead flash or protrusion shall not exceed 0.25mm per side.
6. Lead thickness includes plating.

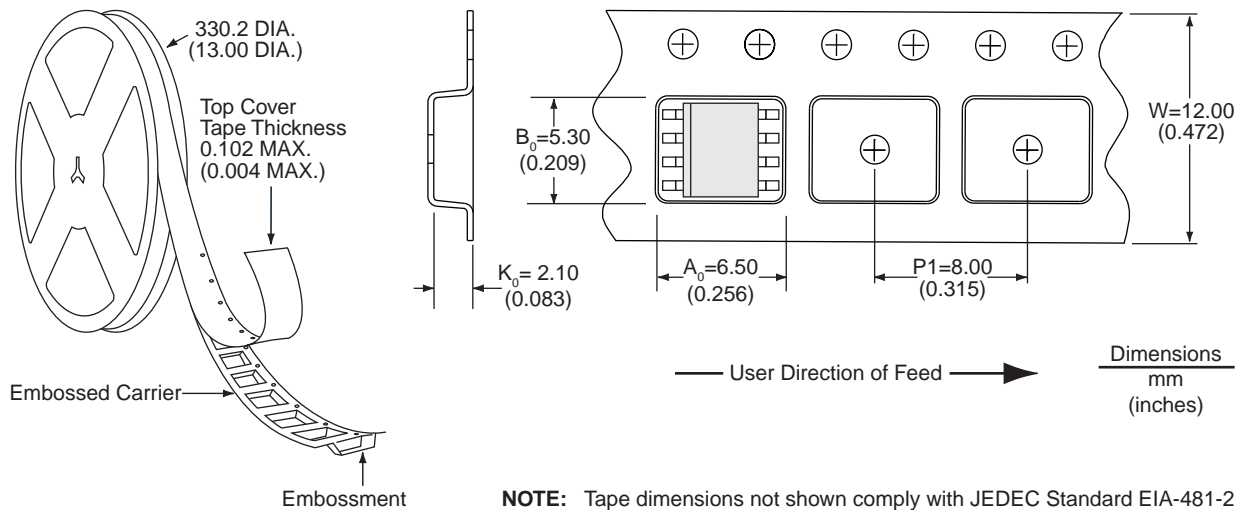
5.5.2 SI (8-Pin Power SOIC with Exposed Metal Back)



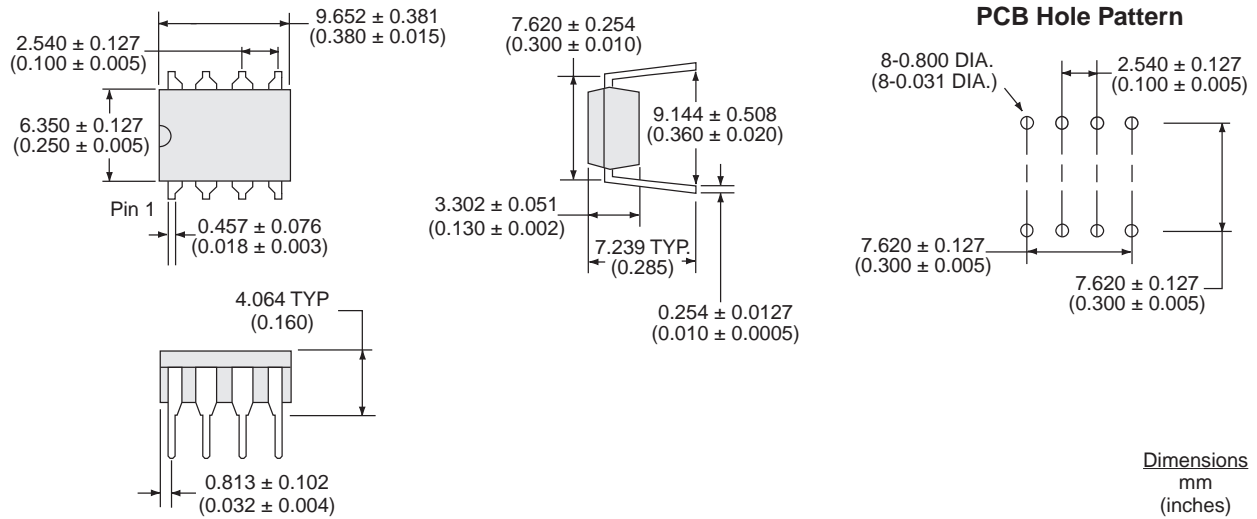
Notes:

1. Controlling dimension: millimeters.
2. All dimensions are in mm (inches).
3. This package conforms to JEDEC Standard MS-012, variation BA, Rev. F.
- △ Dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15mm per end.
- △ Dimension does not include interlead flash or protrusion. Interlead flash or protrusion shall not exceed 0.25mm per side.
6. The exposed metal pad on the back of the package should be connected to GND. It is not suitable for carrying current.
7. Lead thickness includes plating.

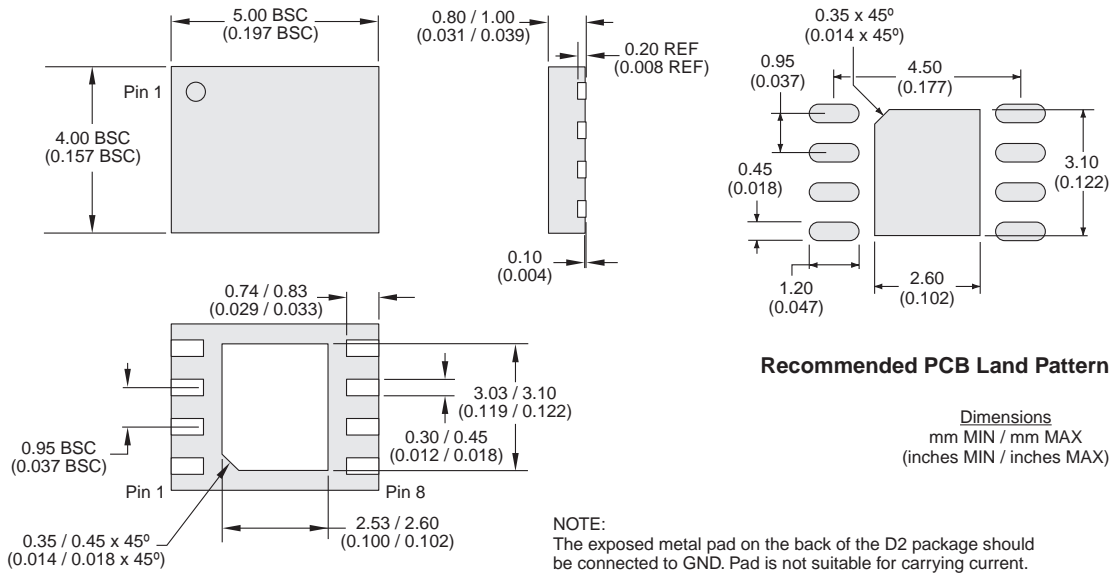
5.5.3 Tape & Reel Information for SI and SIA Packages



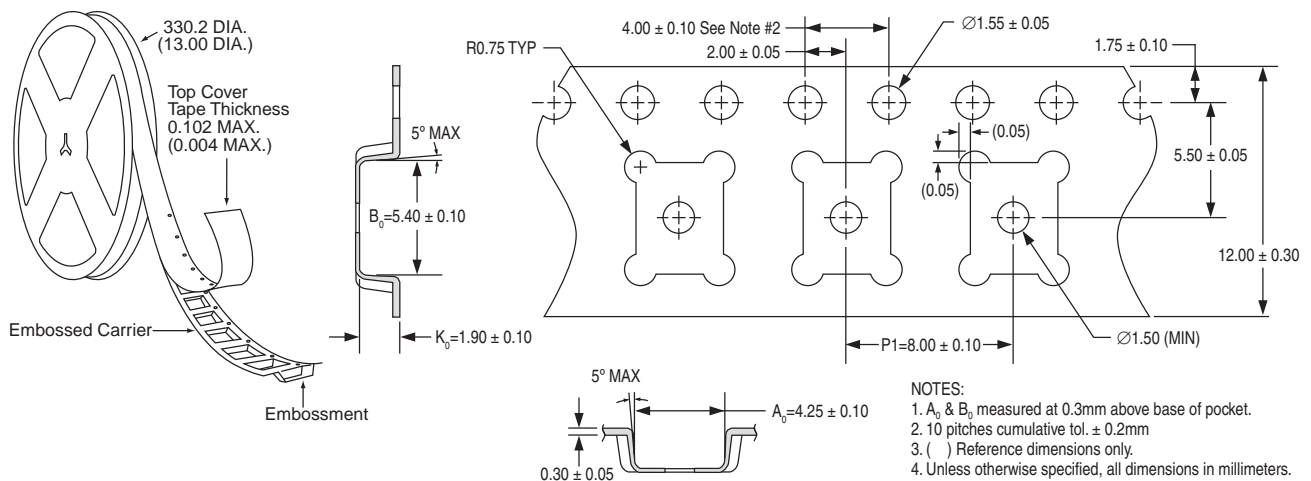
5.5.4 PI (8-Pin DIP)



5.5.5 D2 (8-Pin DFN)



5.5.6 Tape & Reel Information for D2 Package



For additional information please visit our website at: www.ixysic.com

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Specification: DS-IXD_604-R09
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