



Features

- 9A Peak Source/Sink Drive Current
- Wide Operating Voltage Range: 4.5V to 35V
- -40°C to +125°C Extended Operating Temperature Range
- Logic Input Withstands Negative Swing of up to 5V
- Matched Rise and Fall Times
- Low Propagation Delay Time
- Low, 10µA Supply Current
- Low Output Impedance

Applications

- Efficient Power MOSFET and IGBT Switching
- Switch Mode Power Supplies
- Motor Controls
- DC to DC Converters
- Class-D Switching Amplifiers
- Pulse Transformer Driver



Description

The IXDD609/IXDI609/IXDN609 high-speed gate drivers are especially well suited for driving the latest IXYS MOSFETs and IGBTs. The IXD_609 high-current output can source and sink 9A of peak current while producing voltage rise and fall times of less than 25ns. The input is CMOS compatible, and is virtually immune to latch up. Proprietary circuitry eliminates cross-conduction and current “shoot-through.” Low propagation delay and fast, matched rise and fall times make the IXD_609 family ideal for high-frequency and high-power applications.

The IXDD609 is configured as a non-inverting driver with an enable, the IXDN609 is configured as a non-inverting driver, and the IXDI609 is configured as an inverting driver.

The IXD_609 family is available in a standard 8-lead DIP (PI); an 8-lead SOIC (SIA); an 8-lead SOIC with an exposed, grounded metal back (SI); an 8-lead DFN (D2); a 5-lead TO-263 (YI); and a 5-lead TO-220 (CI).

Ordering Information

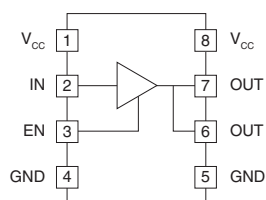
Part Number	Logic Configuration	Package Type	Packing Method	Quantity
IXDD609D2TR		8-Lead DFN	Tape & Reel	2000
IXDD609SI		8-Lead SOIC with Exposed Grounded Metal Back	Tube	100
IXDD609SITR		8-Lead SOIC with Exposed Grounded Metal Back	Tape & Reel	2000
IXDD609SIA		8-Lead SOIC	Tube	100
IXDD609SIATR		8-Lead SOIC	Tape & Reel	2000
IXDD609PI		8-Lead DIP	Tube	50
IXDD609CI		5-Lead TO-220	Tube	50
IXDD609YI		5-Lead TO-263	Tube	50
IXDI609SI		8-Lead SOIC with Exposed Grounded Metal Back	Tube	100
IXDI609SITR		8-Lead SOIC with Exposed Grounded Metal Back	Tape & Reel	2000
IXDI609SIA		8-Lead SOIC	Tube	100
IXDI609SIATR		8-Lead SOIC	Tape & Reel	2000
IXDI609PI		8-Lead DIP	Tube	50
IXDI609CI		5-Lead TO-220	Tube	50
IXDI609YI		5-Lead TO-263	Tube	50
IXDN609SI		8-Lead SOIC with Exposed Grounded Metal Back	Tube	100
IXDN609SITR		8-Lead SOIC with Exposed Grounded Metal Back	Tape & Reel	2000
IXDN609SIA		8-Lead SOIC	Tube	100
IXDN609SIATR		8-Lead SOIC	Tape & Reel	2000
IXDN609PI		8-Lead DIP	Tube	50
IXDN609CI		5-Lead TO-220	Tube	50
IXDN609YI		5-Lead TO-263	Tube	50

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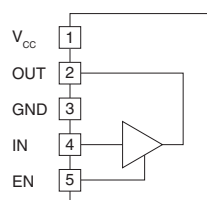
1 Specifications

1.1 Lead Configurations

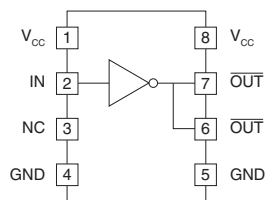
IXDD609 D2 / PI / SI / SIA



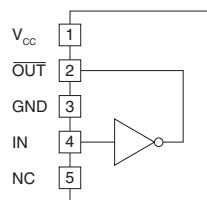
IXDD609 CI / YI



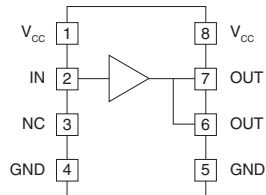
IXDI609 PI / SI / SIA



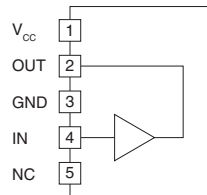
IXDI609 CI / YI



IXDN609 PI / SI / SIA



IXDN609 CI / YI



1.2 Lead Definitions

Lead Name	Description
IN	Logic Input
EN	Output Enable - Drive lead low to disable output, and force output to a high impedance state
OUT	Output - Sources or sinks current to turn-on or turn-off a discrete MOSFET or IGBT
$\overline{\text{OUT}}$	Inverted 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
NC	Not connected

1.3 Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Supply Voltage	V_{CC}	-	40	V
All Other Leads	-	-0.3	$V_{CC}+0.3$	V
Output Current	I_{OUT}	-	± 9	A
Junction Temperature	T_J	-55	+150	$^{\circ}\text{C}$
Storage Temperature	T_{STG}	-65	+150	$^{\circ}\text{C}$

Unless stated otherwise, absolute maximum electrical ratings are at 25 $^{\circ}\text{C}$

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	Minimum	Maximum	Units
Supply Voltage	V_{CC}	4.5	35	V
Operating Temperature Range	T_A	-40	+125	°C

1.5 Electrical Characteristics

Test Conditions: $T_A=25^{\circ}\text{C}$, $4.5\text{V} \leq V_{CC} \leq 35\text{V}$ (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 Voltage Range	-	V_{IN}	-5	-	$V_{CC}+0.3$	
Input Current	$0\text{V} \leq V_{IN} \leq V_{CC}$	I_{IN}	-10	-	10	μA
EN Input Voltage, High	IXDD609 only	V_{ENH}	$2/3V_{CC}$	-	-	V
EN Input Voltage, Low	IXDD609 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}	-	0.6	1	Ω
Output Resistance, Low State	$V_{CC}=18\text{V}$, $I_{OUT}=10\text{mA}$	R_{OL}	-	0.4	0.8	
Output Current, Continuous	Limited by package power dissipation	I_{DC}	-	-	± 2	A
Rise Time	$C_{LOAD}=10\text{nF}$, $V_{CC}=18\text{V}$	t_R	-	22	35	ns
Fall Time	$C_{LOAD}=10\text{nF}$, $V_{CC}=18\text{V}$	t_F	-	15	25	
On-Time Propagation Delay	$C_{LOAD}=10\text{nF}$, $V_{CC}=18\text{V}$	t_{ONDLY}	-	40	60	
Off-Time Propagation Delay	$C_{LOAD}=10\text{nF}$, $V_{CC}=18\text{V}$	t_{OFFDLY}	-	42	60	
Enable to Output-High Delay Time (IXDD609 Only)	$V_{CC}=18\text{V}$	t_{ENOH}	-	25	60	
Disable to High Impedance State Delay Time (IXDD609 Only)	$V_{CC}=18\text{V}$	t_{DOLD}	-	35	60	
Enable Pull-Up Resistor	-	R_{EN}	-	200	-	
Power Supply Current	$V_{CC}=18\text{V}$, $V_{IN}=3.5\text{V}$	I_{CC}	-	1	2	mA
	$V_{CC}=18\text{V}$, $V_{IN}=0\text{V}$		-	-	10	
	$V_{CC}=18\text{V}$, $V_{IN}=V_{CC}$		-	-	10	μA

1.6 Electrical Characteristics

Test Conditions: $T_A = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, $4.5\text{V} \leq V_{CC} \leq 35\text{V}$, $T_J < 150^{\circ}\text{C}$ (unless otherwise noted).

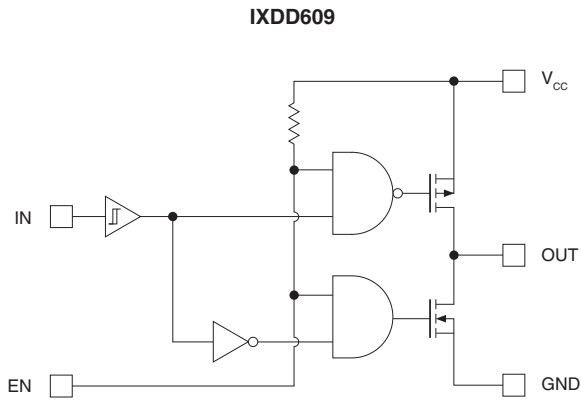
Parameter	Conditions	Symbol	Minimum	Typical	Maximum	Units
Input Voltage, High	$4.5\text{V} \leq V_{CC} \leq 18\text{V}$	V_{IH}	3.3	-	-	V
Input Voltage, Low	$4.5\text{V} \leq V_{CC} \leq 18\text{V}$	V_{IL}	-	-	0.65	
Input Voltage Range	-	V_{IN}	-5	-	$V_{CC} + 0.3$	
Input Current	$0\text{V} \leq V_{IN} \leq V_{CC}$	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}	-	-	2	Ω
Output Resistance, Low State	$V_{CC} = 18\text{V}$, $I_{OUT} = 10\text{mA}$	R_{OL}	-	-	1.5	
Output Current, Continuous	Limited by package power dissipation	I_{DC}	-	-	± 1	A
Rise Time	$C_{LOAD} = 10\text{nF}$, $V_{CC} = 18\text{V}$	t_R	-	-	40	ns
Fall Time	$C_{LOAD} = 10\text{nF}$, $V_{CC} = 18\text{V}$	t_F	-	-	30	
On-Time Propagation Delay	$C_{LOAD} = 10\text{nF}$, $V_{CC} = 18\text{V}$	t_{ONDLY}	-	-	75	
Off-Time Propagation Delay	$C_{LOAD} = 10\text{nF}$, $V_{CC} = 18\text{V}$	t_{OFFDLY}	-	-	75	
Enable to Output-High Delay Time	IXDD609 only	t_{ENOH}	-	-	75	
Disable to High Impedance State Delay Time	IXDD609 only	t_{DOLD}	-	-	75	
Power Supply Current	$V_{CC} = 18\text{V}$, $V_{IN} = 3.5\text{V}$	I_{CC}	-	1	2.5	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	Rating	Units
IXDD609D2 (8-Lead DFN)	θ_{JA}	35	$^{\circ}\text{C/W}$
IXD_609CI (5-Lead TO-220)		3	
IXD_609PI (8-Lead DIP)		125	
IXD_609SI (8-Lead SOIC with Exposed, Grounded Metal Back)		10	
IXD_609SIA (8-Lead SOIC)		120	
IXD_609YI (5-Lead TO-263)		2	

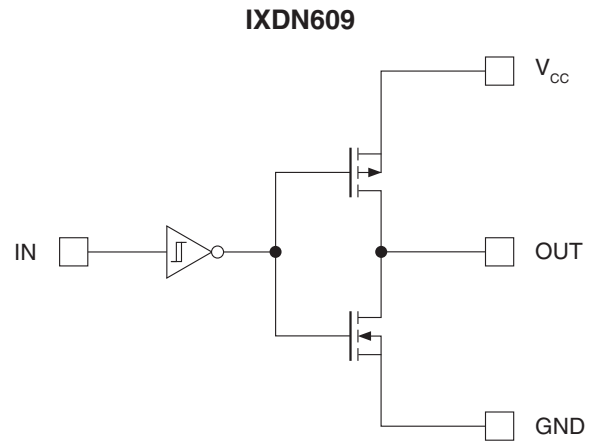
2 Functional Description

2.1 IXDD609 Functional Block Diagram



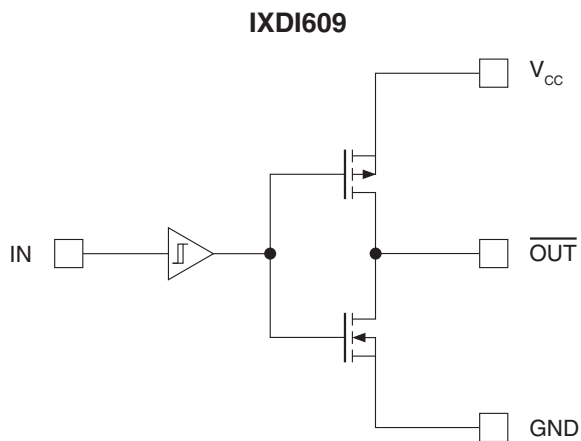
IN	EN	OUT
0	1 or open	0
1	1 or open	1
0	0	Z
1	0	Z

2.3 IXDN609 Functional Block Diagram



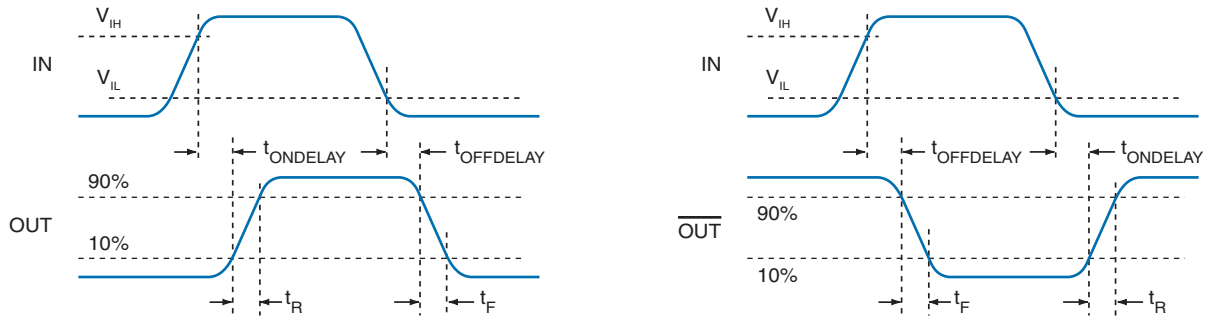
IN	OUT
0	0
1	1

2.2 IXDI609 Functional Block Diagram

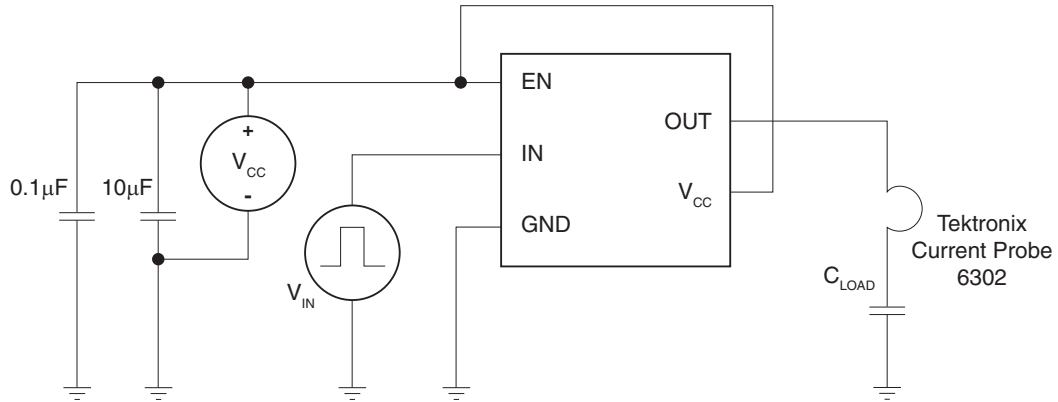


IN	$\overline{\text{OUT}}$
0	1
1	0

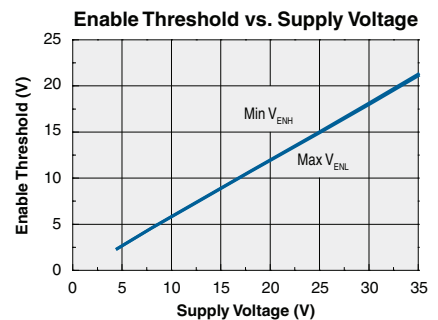
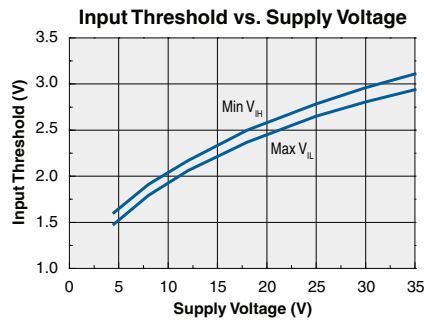
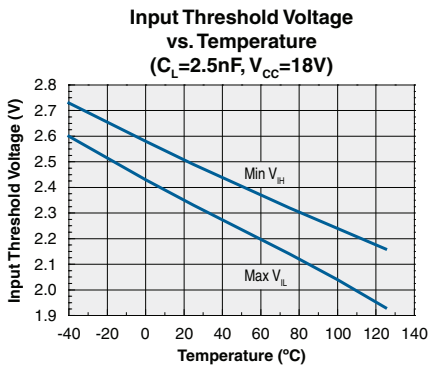
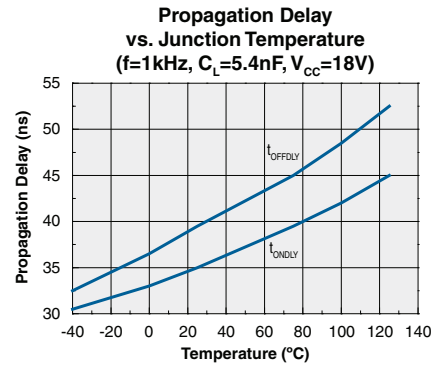
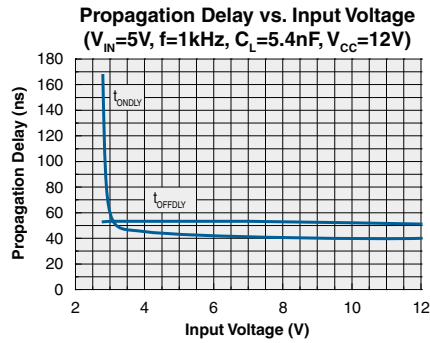
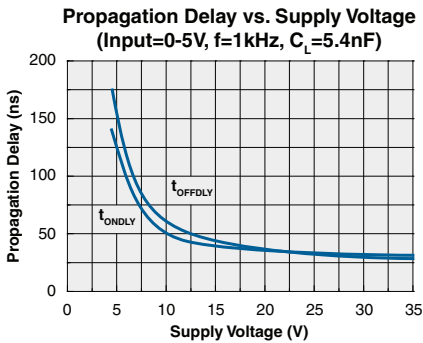
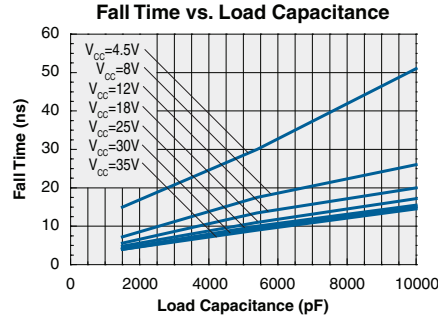
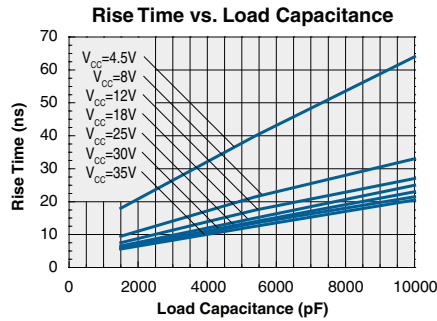
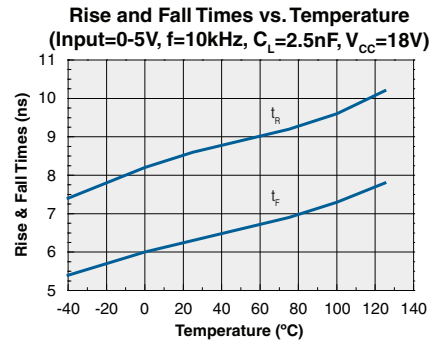
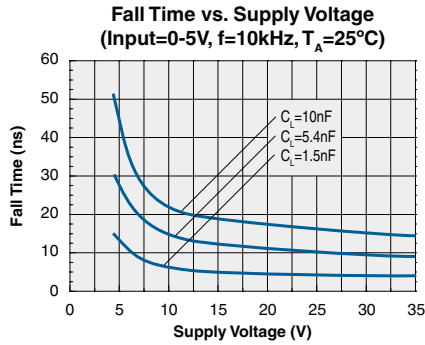
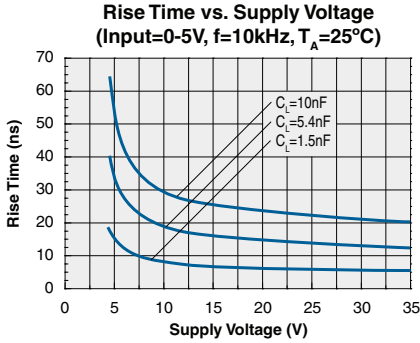
2.4 Timing Diagrams

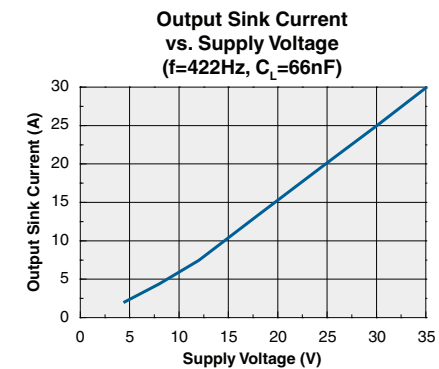
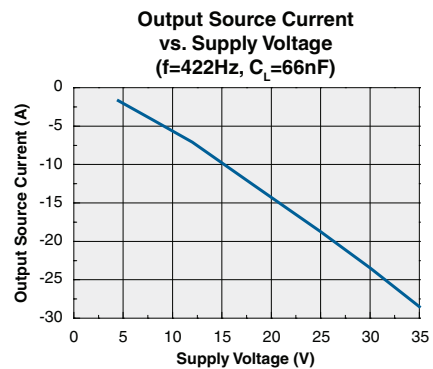
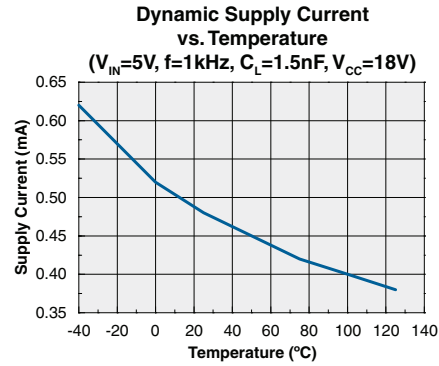
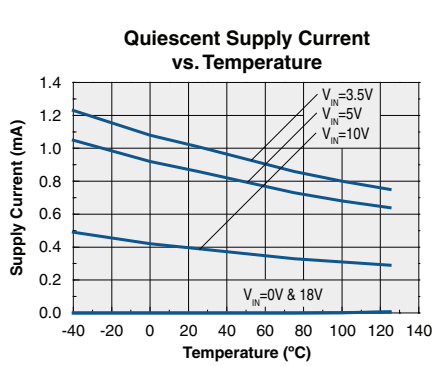
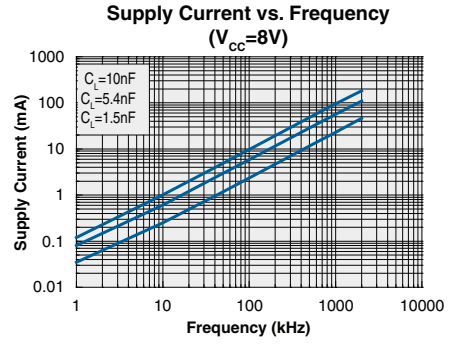
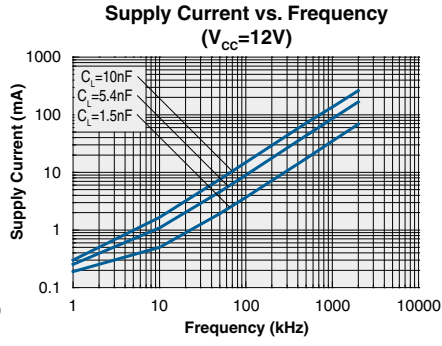
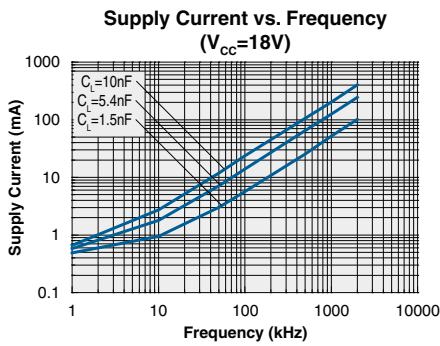
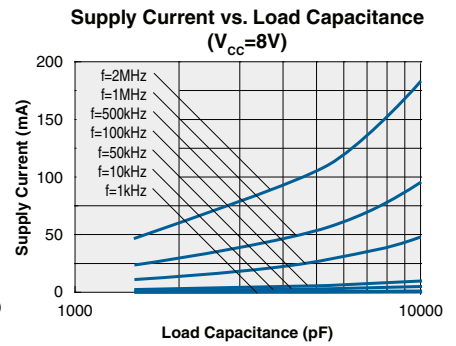
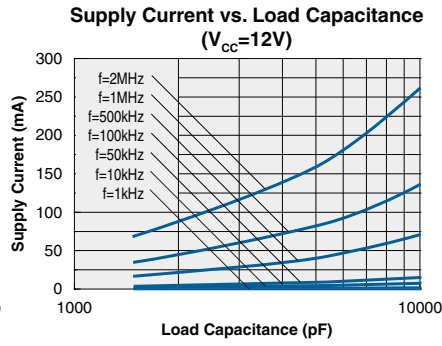
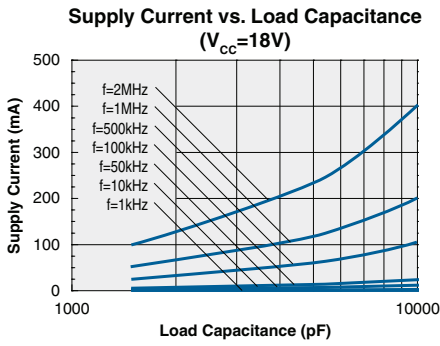


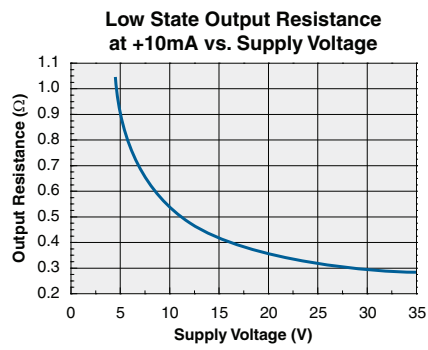
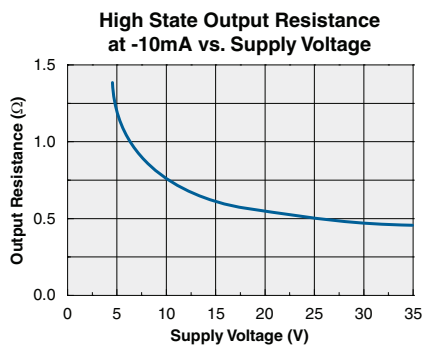
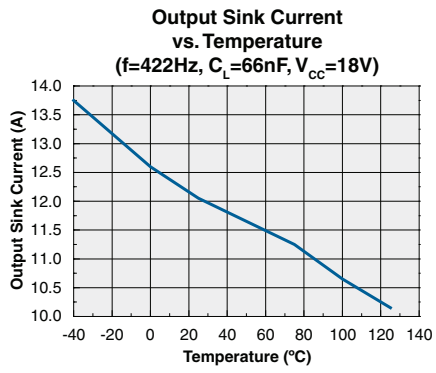
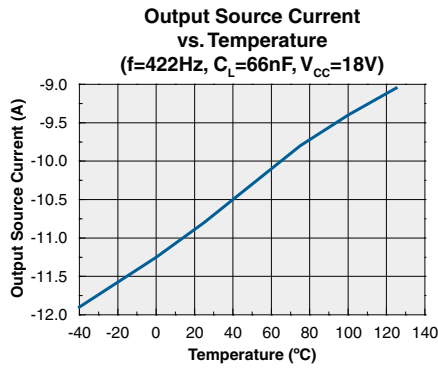
2.5 Characteristics Test Diagram



3 Performance Data



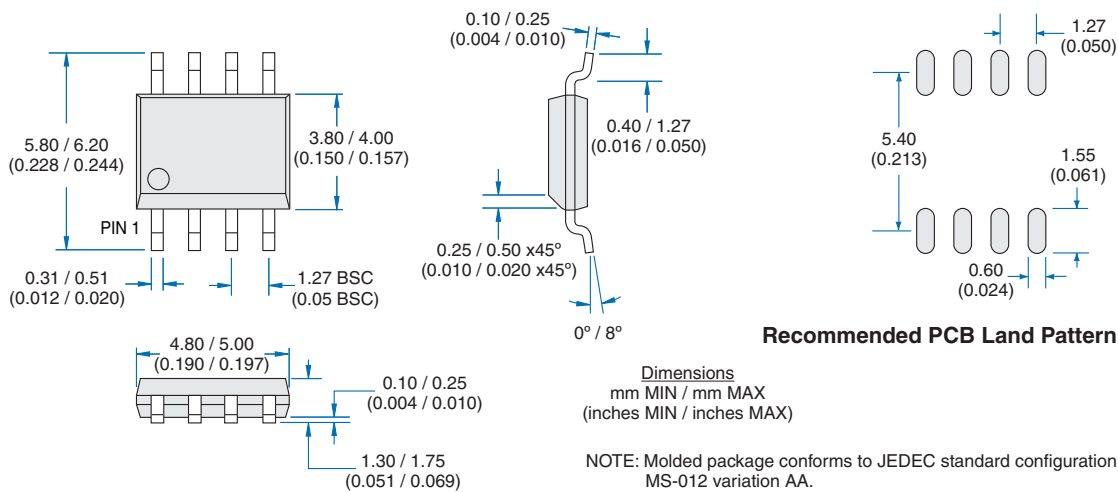




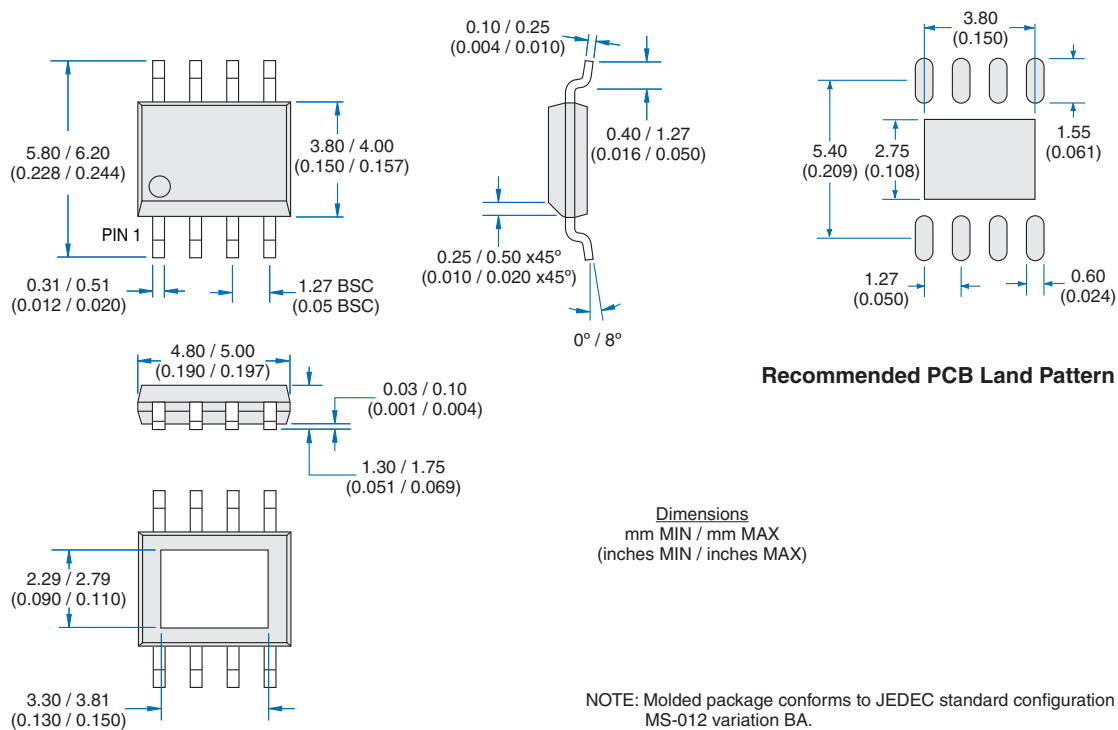
4 Manufacturing Information

4.1 Mechanical Dimensions

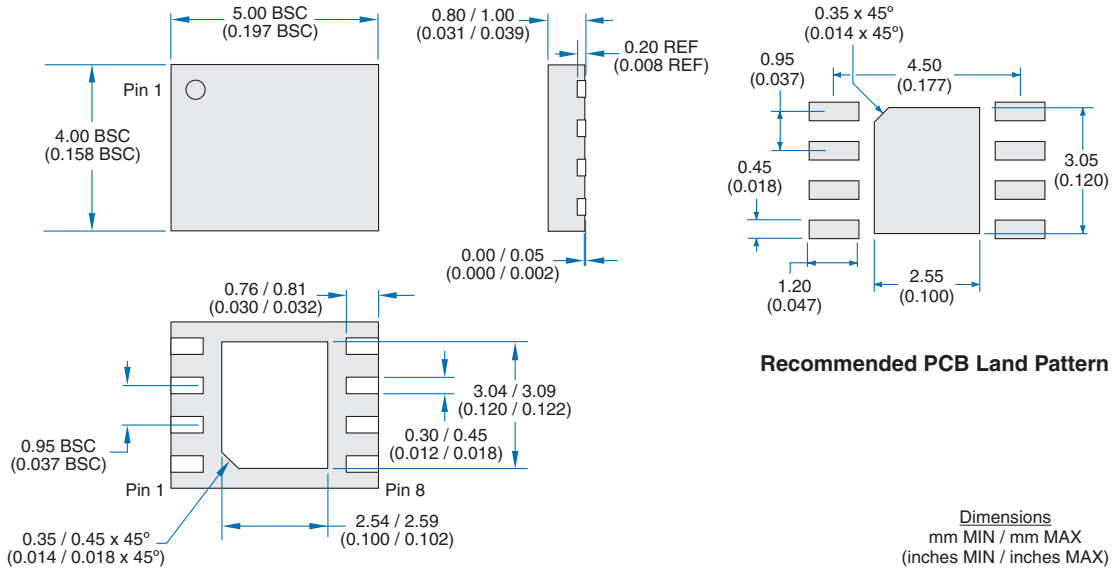
4.1.1 IXD_609SIA (8-Lead SOIC)



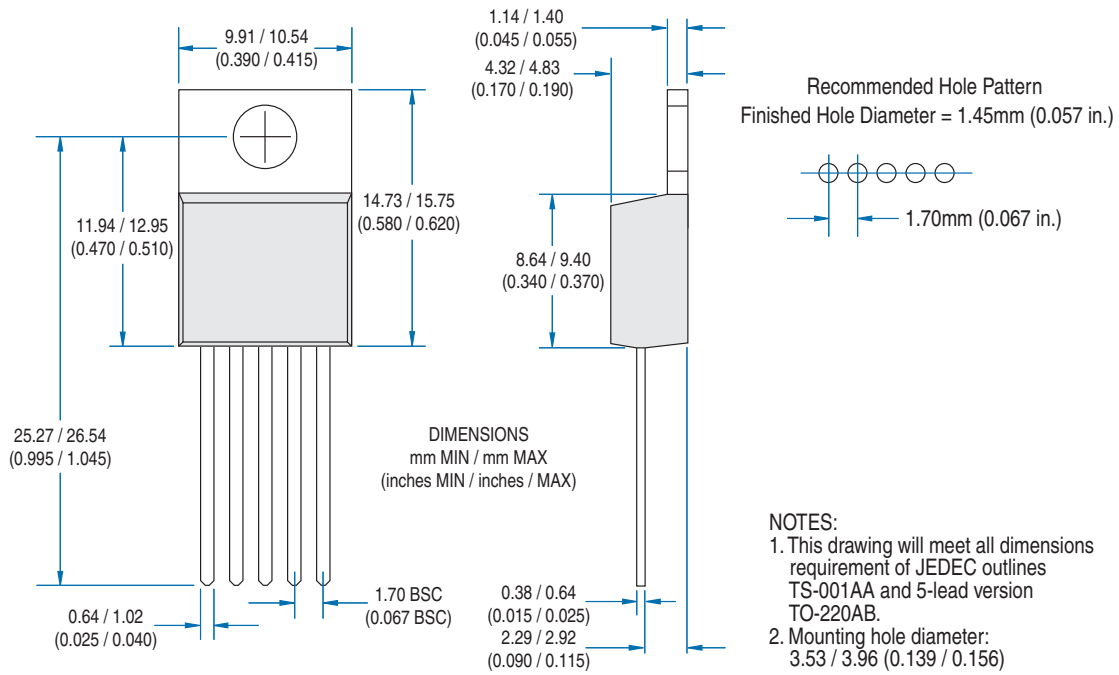
4.1.2 IXD_609SI (8-Lead SOIC with Exposed, Grounded Metal Back)



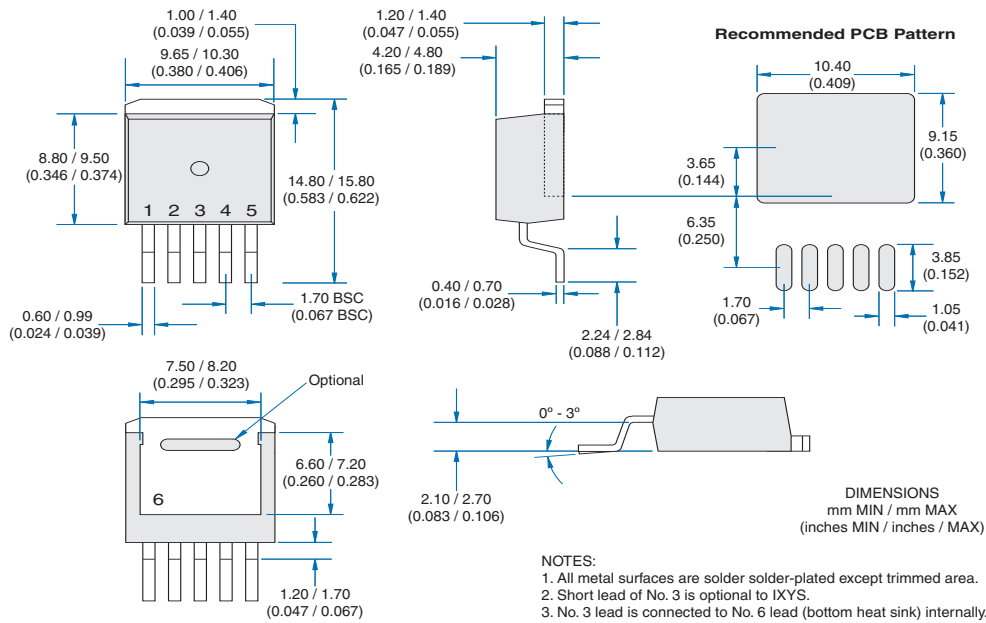
4.1.3 IXDD609D2 (8-Lead DFN)



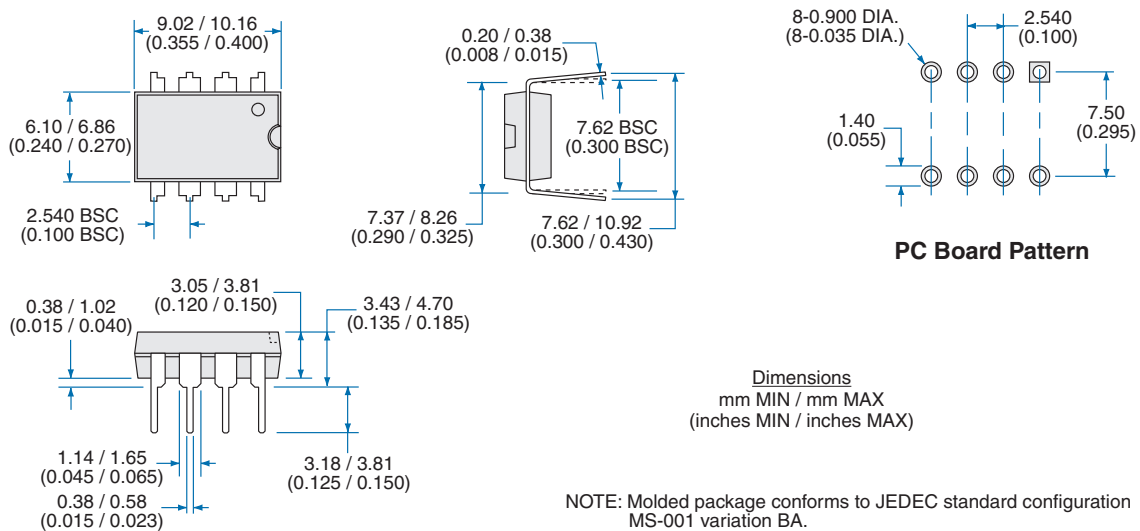
4.1.4 IXD_609CI (5-Lead TO-220)



4.1.5 IXD_609YI (5-LeadTO-263)



4.1.6 IXD_609PI (8-Lead DIP)



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Specification: DS-IXD_609-R00E
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