IXD_614
14-Ampere Low-Side Ultrafast MOSFET Drivers

Features

- 14A 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
- Low Propagation Delay Time: 30ns
- 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

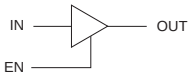
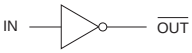
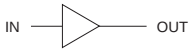
Description

The IXDD614 / IXDI614 / IXDN614 high-speed gate drivers are especially well suited for driving the latest IXYS MOSFETs and IGBTs. Each output can source and sink 14A of peak current while producing voltage rise and fall times of less than 30ns. Internal circuitry eliminates cross-conduction and current "shoot-through," and the driver is virtually immune to latch up. Low propagation delay and fast rise and fall times make the IXD_614 family ideal for high-frequency and high-power applications.

The IXDD614 is configured as a non-inverting driver with an enable. The IXDN614 is configured as a non-inverting driver, and the IXDI614 is configured as an inverting driver.

The IXD_614 family is available in an 8-pin DIP (PI), an 8-lead Power SOIC with an exposed metal back (SI), a 5-pin TO-220 (CI), and a 5-lead TO-263 (YI) package.

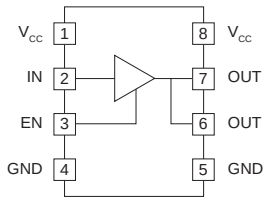
Ordering Information

Part Number	Logic Configuration	Package Type	Packing Method	Quantity
IXDD614PI		8-Pin DIP	Tube	50
IXDD614SI		8-Lead Power SOIC with Exposed Metal Back	Tube	100
IXDD614SITR		8-Lead Power SOIC with Exposed Metal Back	Tape & Reel	2000
IXDD614CI		5-Pin TO-220	Tube	50
IXDD614YI		5-Lead TO-263	Tube	50
IXDI614PI		8-Pin DIP	Tube	50
IXDI614SI		8-Lead Power SOIC with Exposed Metal Back	Tube	100
IXDI614SITR		8-Lead Power SOIC with Exposed Metal Back	Tape & Reel	2000
IXDI614CI		5-Pin TO-220	Tube	50
IXDI614YI		5-Lead TO-263	Tube	50
IXDN614PI		8-Pin DIP	Tube	50
IXDN614SI		8-Lead Power SOIC with Exposed Metal Back	Tube	100
IXDN614SITR		8-Lead Power SOIC with Exposed Metal Back	Tape & Reel	2000
IXDN614CI		5-Pin TO-220	Tube	50
IXDN614YI		5-Lead TO-263	Tube	50

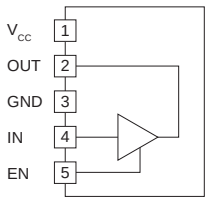
1 Specifications

1.1 Lead Configurations

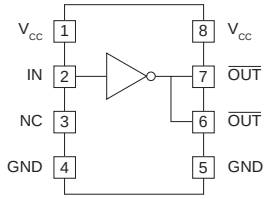
IXDD614 D2 / PI / SI



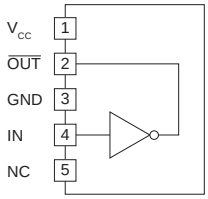
IXDD614 CI / YI



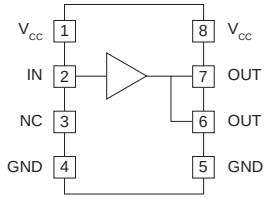
IXDI614 PI / SI



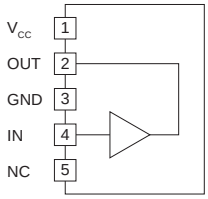
IXDI614 CI / YI



IXDN614 PI / SI



IXDN614 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
$\overline{OUT}$	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}	-0.3	40	V
Input Voltage	V_{IN} , V_{EN}	-5	V_{CC}+0.3	V
Output Current	I_{OUT}	-	±14	A
Junction Temperature	T_J	-55	+150	°C
Storage Temperature	T_{STG}	-65	+150	°C

Unless stated otherwise, 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 Electrical Characteristics: T_A = 25°C

Test Conditions: 4.5V ≤ V_{CC} ≤ 35V (unless otherwise noted).

Parameter	Conditions	Symbol	Minimum	Typical	Maximum	Units
Input Voltage, High	4.5V ≤ V_{CC} ≤ 18V	V_{IH}	3.0	-	-	V
Input Voltage, Low	4.5V ≤ V_{CC} ≤ 18V	V_{IL}	-	-	0.8	
Input Current	0V ≤ V_{IN} ≤ V_{CC}	I_{IN}	-10	-	10	µA
EN Input Voltage, High	IXDD614 only	V_{ENH}	2/3V_{CC}	-	-	V
EN Input Voltage, Low	IXDD614 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}=18V, I_{OUT}=-10mA	R_{OH}	-	0.4	0.8	Ω
Output Resistance, Low State	V_{CC}=18V, I_{OUT}=10mA	R_{OL}	-	0.3	0.6	
Output Current, Continuous	Limited by package power dissipation	I_{DC}	-	-	±4	A
Rise Time	C_{LOAD}=15nF, V_{CC}=18V	t_R	-	25	35	ns
Fall Time	C_{LOAD}=15nF, V_{CC}=18V	t_F	-	18	25	
On-Time Propagation Delay	C_{LOAD}=15nF, V_{CC}=18V	t_{ONDLY}	-	50	70	
Off-Time Propagation Delay	C_{LOAD}=15nF, V_{CC}=18V	t_{OFFDLY}	-	50	70	
Enable to Output-High Delay Time	IXDD614 only	t_{ENOH}	-	31	60	
Disable to High Impedance State Delay Time	IXDD614 only	t_{DOLD}	-	44	70	
Enable Pull-Up Resistor	IXDD614 only	R_{EN}	-	200	-	kΩ
Power Supply Current	V_{CC}=18V, V_{IN}=3.5V	I_{CC}	-	1	2	mA
	V_{CC}=18V, V_{IN}=0V		-	-	10	µA
	V_{CC}=18V, V_{IN}=V_{CC}		-	-	10	

1.5 Electrical Characteristics: T_A = - 40°C to +125°C

Test Conditions: 4.5V ≤ V_{CC} ≤ 35V.

Parameter	Conditions	Symbol	Minimum	Typical	Maximum	Units
Input Voltage, High	4.5V ≤ V_{CC} ≤ 18V	V_{IH}	3.3	-	-	V
Input Voltage, Low	4.5V ≤ V_{CC} ≤ 18V	V_{IL}	-	-	0.65	
Input Voltage Range	-	V_{IN}	-5	-	V_{CC}+0.3	
Input Current	0V ≤ V_{IN} ≤ 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}=18V, I_{OUT}=-10mA	R_{OH}	-	-	1.5	Ω
Output Resistance, Low State	V_{CC}=18V, I_{OUT}=10mA	R_{OL}	-	-	1.2	
Output Current, Continuous	Limited by package power dissipation	I_{DC}	-	-	±1	A
Rise Time	C_{LOAD}=15nF, V_{CC}=18V	t_R	-	-	50	ns
Fall Time	C_{LOAD}=15nF, V_{CC}=18V	t_F	-	-	40	
On-Time Propagation Delay	C_{LOAD}=15nF, V_{CC}=18V	t_{ONDLY}	-	-	90	
Off-Time Propagation Delay	C_{LOAD}=15nF, V_{CC}=18V	t_{OFFDLY}	-	-	90	
Enable to Output-High Delay Time	IXDD614 only	t_{ENOH}	-	-	75	
Disable to High Impedance State Delay Time	IXDD614 only	t_{DOLD}	-	-	85	
Power Supply Current	V_{CC}=18V, V_{IN}=3.5V	I_{CC}	-	1.5	3	mA
	V_{CC}=18V, V_{IN}=0V		-	-	150	µA
	V_{CC}=18V, V_{IN}=V_{CC}		-	-	150	

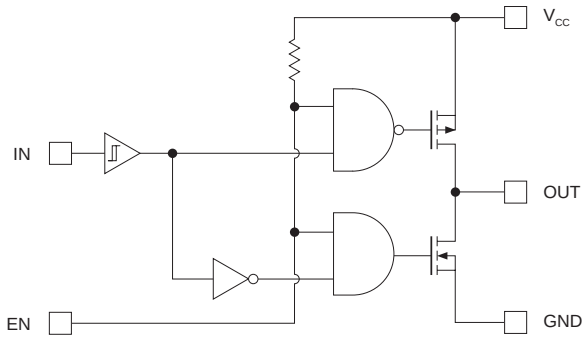
1.6 Thermal Characteristics

Package	Parameter	Symbol	Rating	Units
CI (5-Pin TO-220)	Thermal Resistance, Junction-to-Ambient	θ_{JA}	36	°C/W
PI (8-Pin DIP)			125	
SI (8-Lead Power SOIC)			85	
YI (5-Lead TO-263)			46	
CI (5-Pin TO-220)	Thermal Resistance, Junction-to-Case	θ_{JC}	3	°C/W
SI (8-Lead Power SOIC)			10	
YI (5-Lead TO-263)			2	

2 Functional Description

2.1 IXDD614 Block Diagram & Truth Table

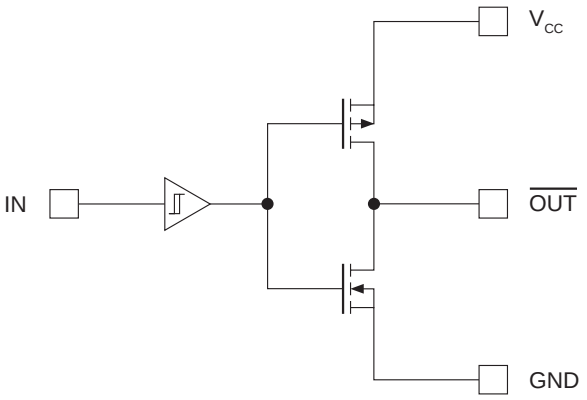
IXDD614



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

2.2 IXDI614 Block Diagram & Truth Table

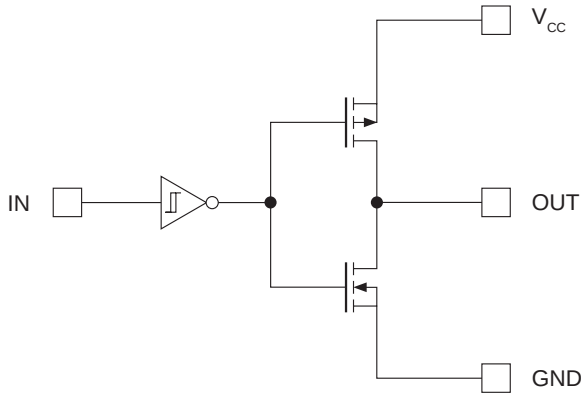
IXDI614



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

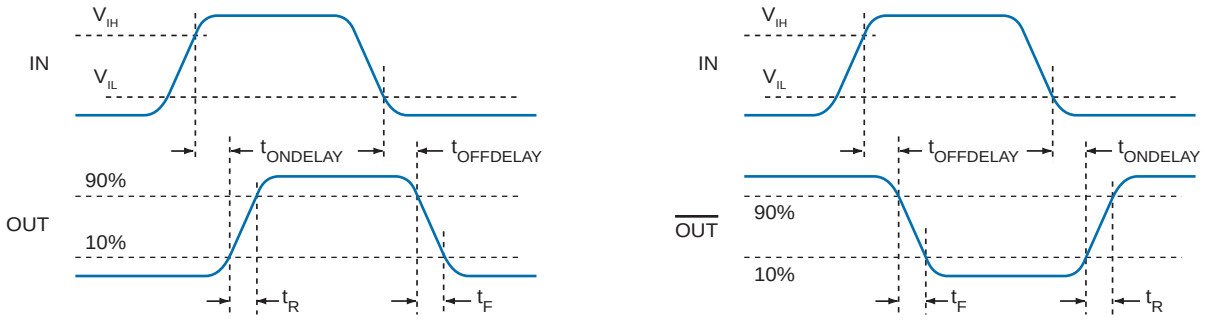
2.3 IXDN614 Block Diagram & Truth Table

IXDN614

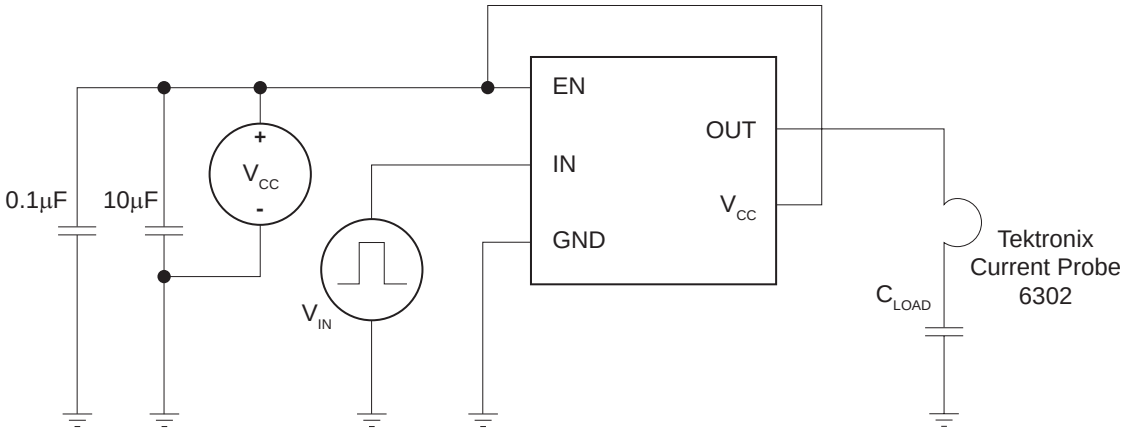


IN	OUT
0	0
1	1

2.4 Timing Diagrams

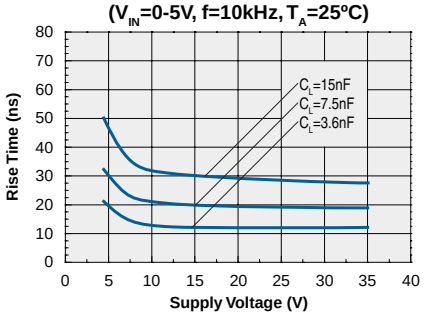


2.5 Characteristics Test Diagram

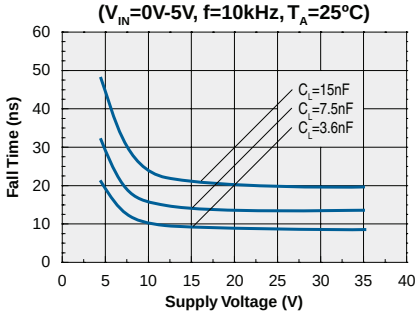


3 Performance Data

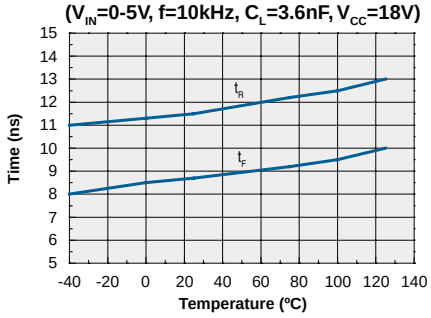
Rise Time vs. Supply Voltage
(V_{IN}=0-5V, f=10kHz, T_A=25ºC)



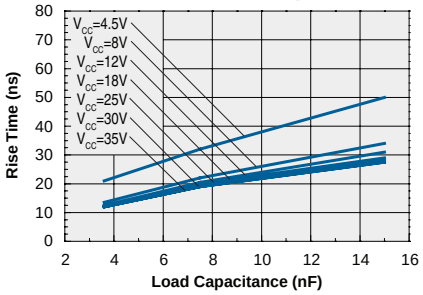
Fall Time vs. Supply Voltage
(V_{IN}=0V-5V, f=10kHz, T_A=25ºC)



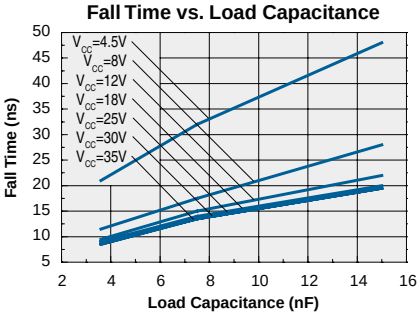
Rise & Fall Time vs. Temperature
(V_{IN}=0-5V, f=10kHz, C_L=3.6nF, V_{CC}=18V)



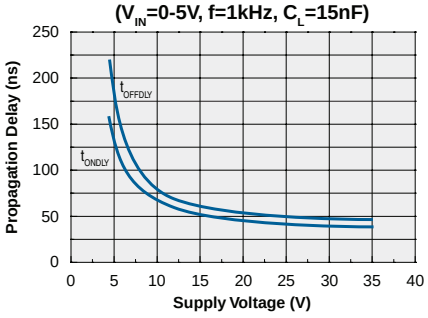
Rise Time vs. Load Capacitance



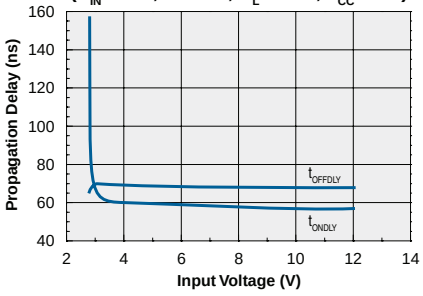
Fall Time vs. Load Capacitance



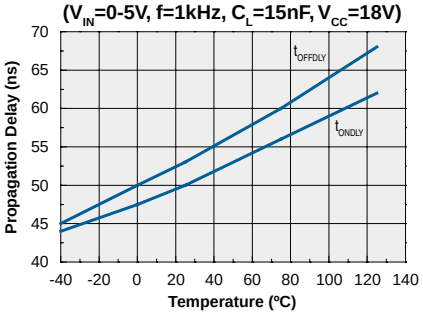
Propagation Delay vs. Supply Voltage
(V_{IN}=0-5V, f=1kHz, C_L=15nF)



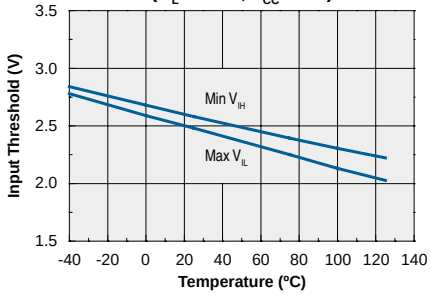
Propagation Delay vs. Input Voltage
(V_{IN}=0-5V, f=1kHz, C_L=15nF, V_{CC}=12V)



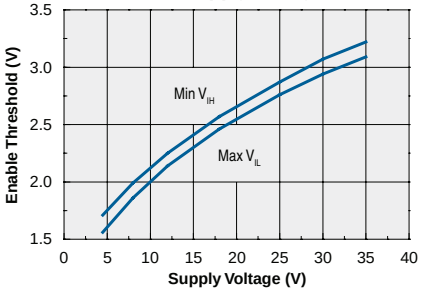
Propogation Delay
vs. Junction Temperature
(V_{IN}=0-5V, f=1kHz, C_L=15nF, V_{CC}=18V)



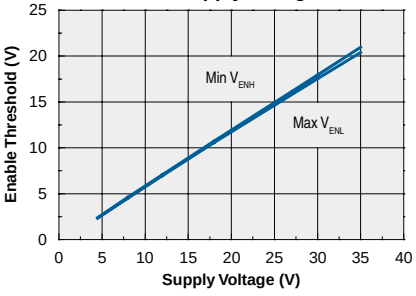
Input Threshold
vs. Temperature
(C_L=3.6nF, V_{CC}=18V)



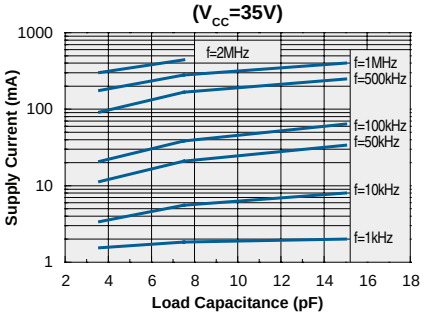
Input Threshold
vs. Supply Voltage



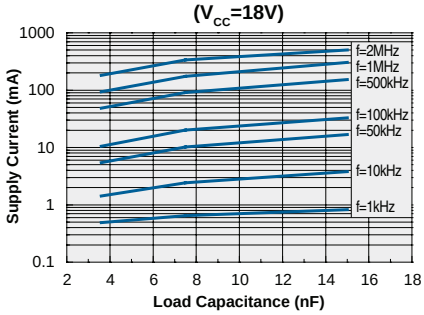
Enable Threshold
vs. Supply Voltage



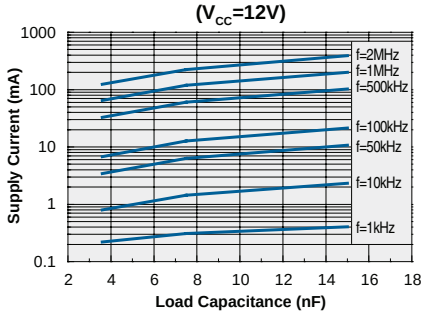
Supply Current vs. Load Capacitance (V_{CC}=35V)



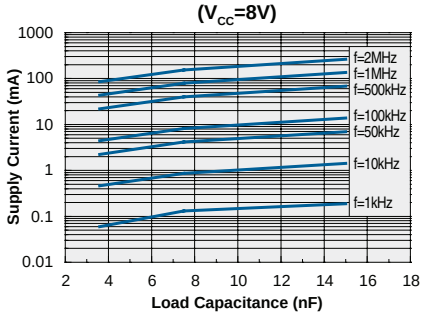
Supply Current vs. Load Capacitance (V_{CC}=18V)



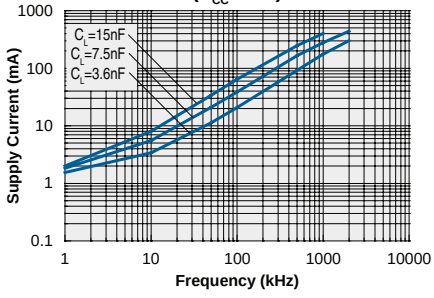
Supply Current vs. Load Capacitance (V_{CC}=12V)



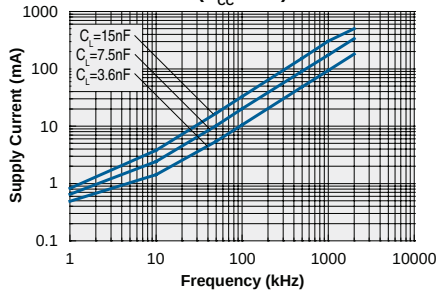
Supply Current vs. Load Capacitance (V_{CC}=8V)



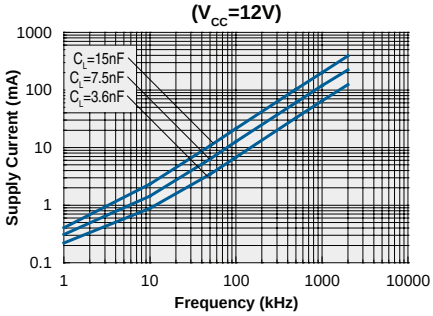
Supply Current vs. Frequency (V_{CC}=35V)



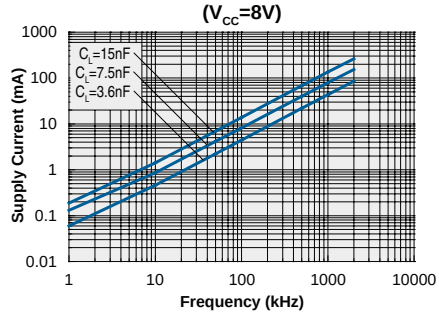
Supply Current vs. Frequency (V_{CC}=18V)



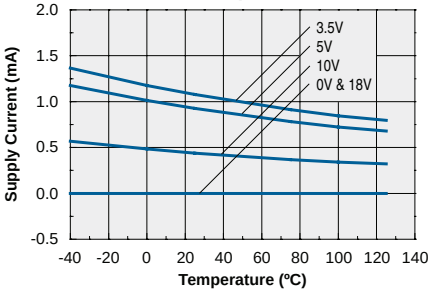
Supply Current vs. Frequency (V_{CC}=12V)



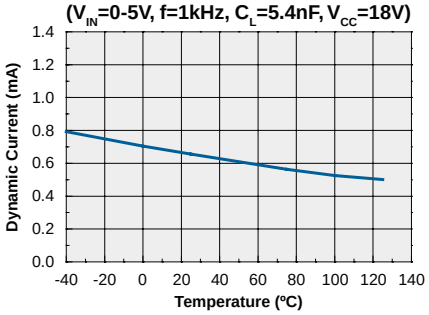
Supply Current vs. Frequency (V_{CC}=8V)



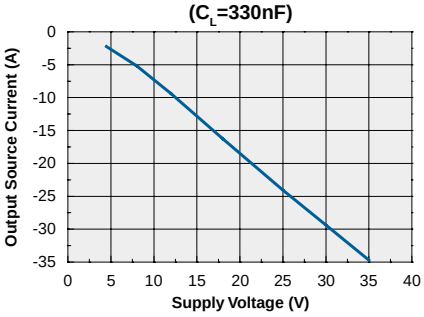
Quiescent Supply Current vs. Temperature



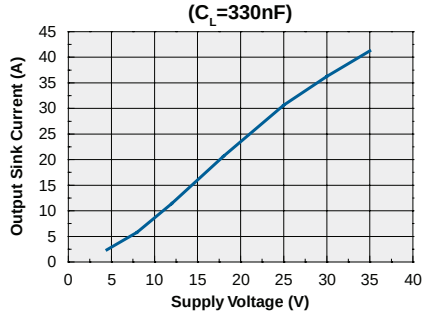
Dynamic Supply Current vs. Temperature (V_{IN}=0-5V, f=1kHz, C_L=5.4nF, V_{CC}=18V)



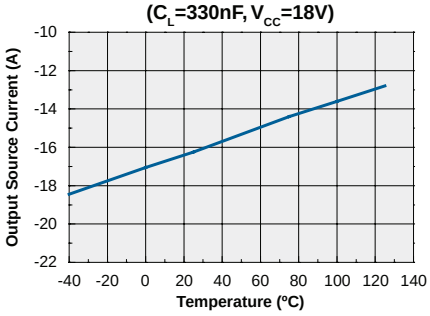
Output Source Current vs. Supply Voltage (C_L=330nF)



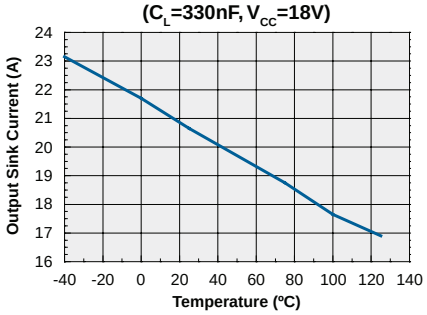
Output Sink Current vs. Supply Voltage (C_L=330nF)



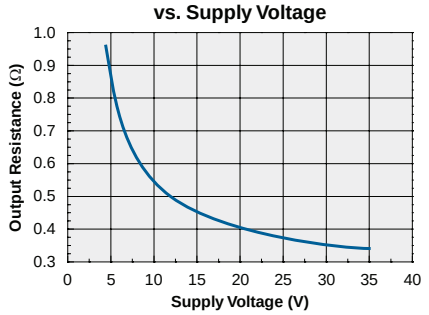
Output Source Current vs. Temperature (C_L=330nF, V_{CC}=18V)



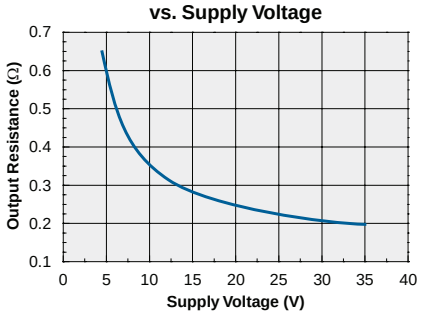
Output Sink Current vs. Temperature (C_L=330nF, V_{CC}=18V)



High-State Output Resistance @ -10mA vs. Supply Voltage



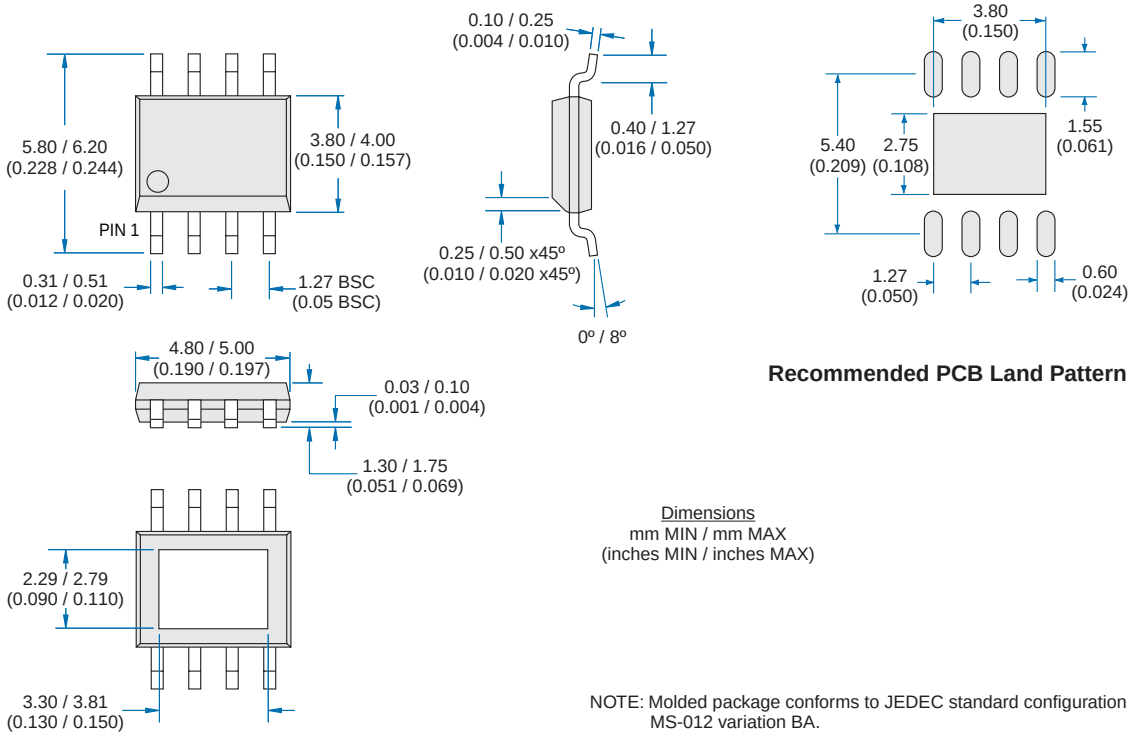
Low-State Output Resistance @ +10mA vs. Supply Voltage



4 Manufacturing Information

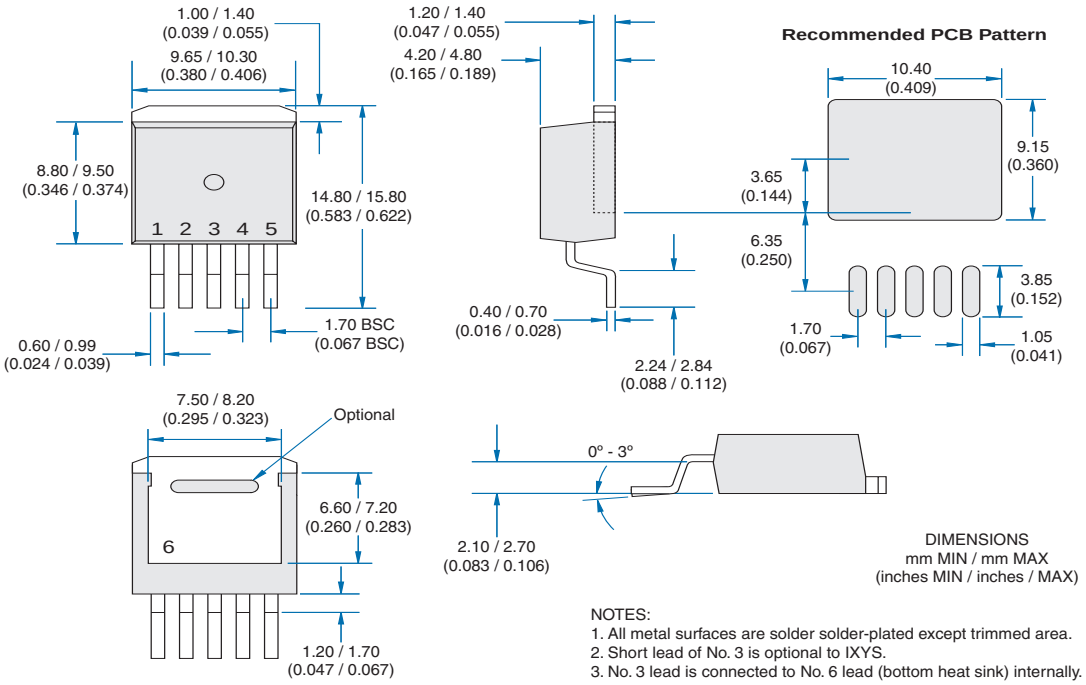
4.1 Mechanical Dimensions

4.1.1 SI (8-Lead Power SOIC with Exposed Metal Back)



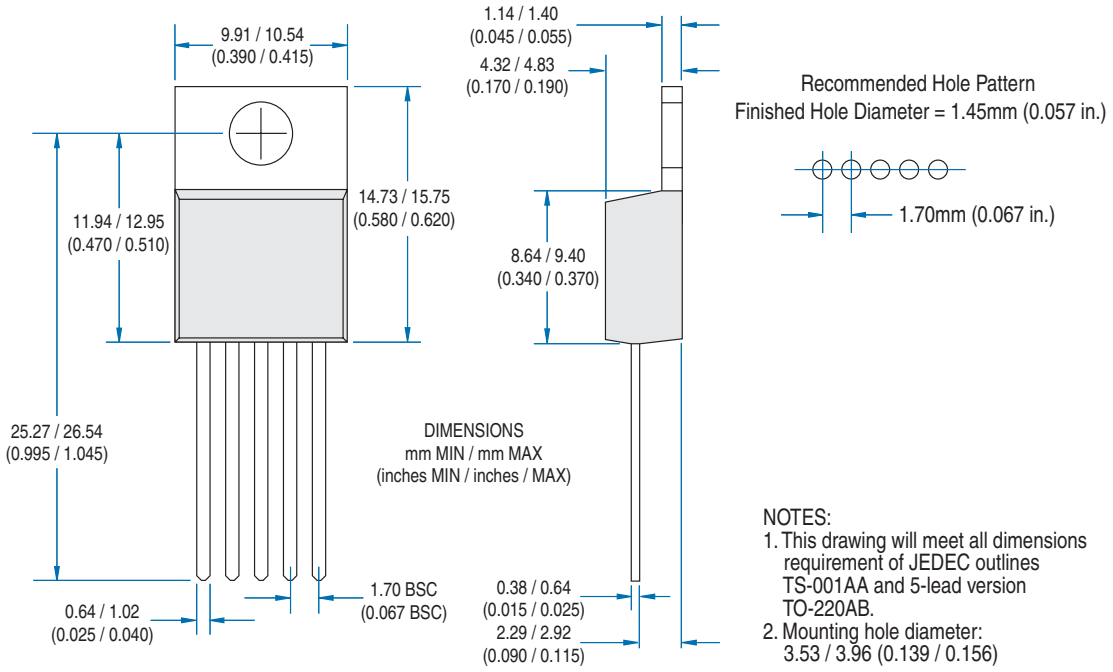
NOTE: Molded package conforms to JEDEC standard configuration MS-012 variation BA.

4.1.2 YI (5-Lead TO-263)

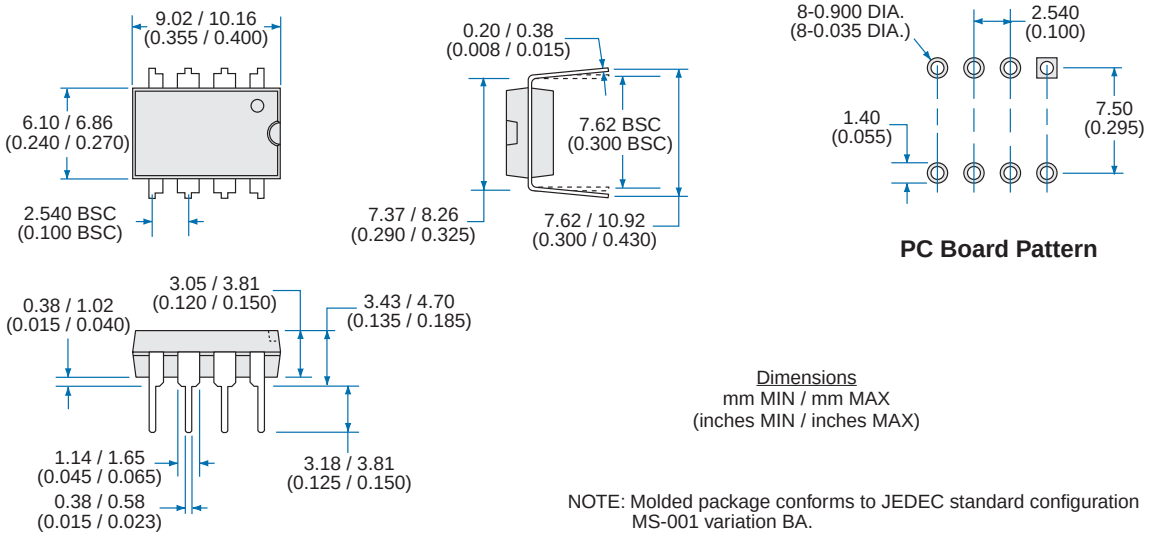


NOTES:
1. All metal surfaces are solder solder-plated except trimmed area.
2. Short lead of No. 3 is optional to IXYS.
3. No. 3 lead is connected to No. 6 lead (bottom heat sink) internally.

4.1.3 CI (5-Pin TO-220)



4.1.4 PI (8-Pin DIP)



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

Specification: DS-IXD_614-R00J

9/20/2010