

### Features

- 3A Peak Output Current
- Wide Operating Voltage Range: 4.5V to 35V
- -40°C to +125°C Operating Temperature Range
- Latch-up Protected to 3A
- Fast Rise and Fall Times
- Low Power Consumption

### Applications

- MOSFET Driver
- Switching Power Supplies
- Motor Controls
- DC to DC Converters
- Pulse Transformer Driver

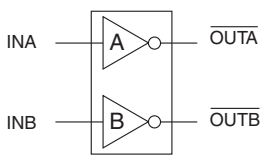
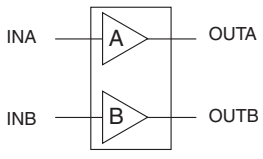
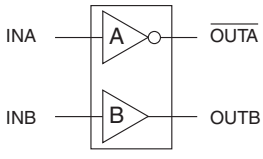
### Description

The IX4423, IX4424, and IX4425 are dual high-speed, low-side gate drivers. Each of the two outputs can source and sink 3A of peak current with rise and fall times of less than 10ns. The inputs of each driver are TTL and CMOS compatible, and are virtually immune to latch-up. Low propagation delay times and fast, matched rise and fall times make the IX4423, IX4424, and IX4425 ideal for high-frequency and high-power applications.

The IX4423 is configured as a dual inverting driver; the IX4424 is configured as a dual non-inverting driver; and the IX4425 is configured with one inverting driver and one non-inverting driver. All three devices are available in a standard 8-pin SOIC package.



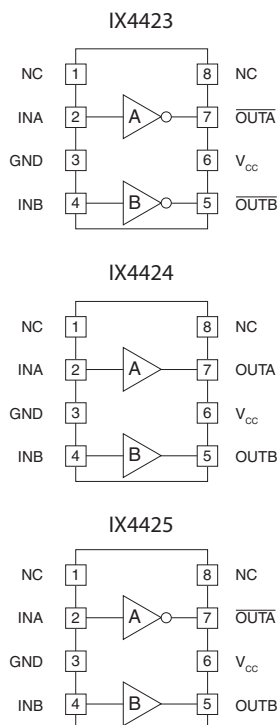
### Ordering Information

| Logic Configuration                                                                 | Part Number | Package Type | Packing Method | Quantity |
|-------------------------------------------------------------------------------------|-------------|--------------|----------------|----------|
|  | IX4423N     | 8-Pin SOIC   | Tube           | 100      |
|                                                                                     | IX4423NTR   | 8-Pin SOIC   | Tape & Reel    | 2000     |
|  | IX4424N     | 8-Pin SOIC   | Tube           | 100      |
|                                                                                     | IX4424NTR   | 8-Pin SOIC   | Tape & Reel    | 2000     |
|  | IX4425N     | 8-Pin SOIC   | Tube           | 100      |
|                                                                                     | IX4425NTR   | 8-Pin SOIC   | Tape & Reel    | 2000     |

|                                                                                   |           |
|-----------------------------------------------------------------------------------|-----------|
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## 1 Specifications

### 1.1 Pin Configurations



### 1.2 Pin Definitions

| Pin Name                 | Description                                                                                  |
|--------------------------|----------------------------------------------------------------------------------------------|
| INA                      | Channel A Logic Input                                                                        |
| INB                      | Channel B Logic Input                                                                        |
| $\overline{\text{OUTA}}$ | Channel A Output - Sources or sinks current to turn-on or turn-off a discrete MOSFET or IGBT |
| $\overline{\text{OUTB}}$ | 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                                              |
| NC                       | No Connection                                                                                |

### 1.3 Absolute Maximum Ratings

| Parameter            | Symbol    | Minimum | Maximum      | Units |
|----------------------|-----------|---------|--------------|-------|
| Supply Voltage       | $V_{CC}$  | -0.3    | 35           | V     |
| Input Voltage        | $V_{IN}$  | -5.0    | $V_{CC}+0.3$ | V     |
| Output Current       | $I_{OUT}$ | -       | $\pm 3$      | A     |
| Junction Temperature | $T_J$     | -55     | +150         | °C    |
| Storage Temperature  | $T_{STG}$ | -65     | +150         | °C    |

Unless otherwise specified, 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   | Minimum | Maximum | Units |
|-----------------------------|----------|---------|---------|-------|
| Supply Voltage              | $V_{CC}$ | 4.5     | 30      | V     |
| Operating Temperature Range | $T_A$    | -40     | +125    | °C    |

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

Test Conditions:  $4.5\text{V} \leq V_{CC} \leq 18\text{V}$ .

| Parameter                     | Conditions                                  | Symbol    | Minimum        | Typical | Maximum  | Units         |
|-------------------------------|---------------------------------------------|-----------|----------------|---------|----------|---------------|
| Input Voltage, High           | -                                           | $V_{IH}$  | 3              | -       | -        | V             |
| Input Voltage, Low            | -                                           | $V_{IL}$  | -              | -       | 0.8      |               |
| Input Current                 | $0\text{V} \leq V_{IN} \leq V_{CC}$         | $I_{IN}$  | -              | -       | $\pm 10$ | $\mu\text{A}$ |
| Output Voltage, High          | -                                           | $V_{OH}$  | $V_{CC}-0.025$ | -       | -        | V             |
| Output Voltage, Low           | -                                           | $V_{OL}$  | -              | -       | 0.025    |               |
| Output Resistance, High State | $V_{CC}=18\text{V}, I_{OUT}=-100\text{mA}$  | $R_{OH}$  | -              | 2.5     | 4        | $\Omega$      |
| Output Resistance, Low State  | $V_{CC}=18\text{V}, I_{OUT}=100\text{mA}$   | $R_{OL}$  | -              | 1.5     | 3        |               |
| Rise Time                     | $V_{CC}=18\text{V}, C_{LOAD}=1000\text{pF}$ | $t_R$     | -              | 18      | 35       | ns            |
| Fall Time                     | $V_{CC}=18\text{V}, C_{LOAD}=1000\text{pF}$ | $t_F$     | -              | 18      | 35       |               |
| On-Time Propagation Delay     | $V_{CC}=18\text{V}, C_{LOAD}=1000\text{pF}$ | $t_{on}$  | -              | 35      | 75       |               |
| Off-Time Propagation Delay    | $V_{CC}=18\text{V}, C_{LOAD}=1000\text{pF}$ | $t_{off}$ | -              | 38      | 75       |               |
| Power Supply Current          | $V_{INA}=V_{INB}=3.5\text{V}$               | $I_{CC}$  | -              | 1       | 3        | mA            |
|                               | $V_{INA}=V_{INB}=0\text{V}$                 |           | -              | 0.001   | 0.01     |               |

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

Test Conditions:  $4.5\text{V} \leq V_{CC} \leq 18\text{V}$ .

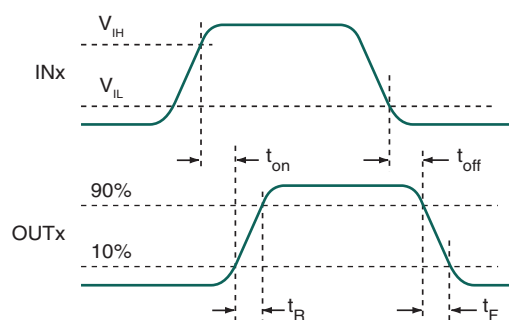
| Parameter                     | Conditions                                  | Symbol    | Minimum        | Maximum  | Units         |
|-------------------------------|---------------------------------------------|-----------|----------------|----------|---------------|
| Input Voltage, High           | -                                           | $V_{IH}$  | 3.3            | -        | V             |
| Input Voltage, Low            | -                                           | $V_{IL}$  | -              | 0.65     |               |
| Input Current                 | $0\text{V} \leq V_{IN} \leq V_{CC}$         | $I_{IN}$  | -              | $\pm 10$ | $\mu\text{A}$ |
| Output Voltage, High          | -                                           | $V_{OH}$  | $V_{CC}-0.025$ | -        | V             |
| Output Voltage, Low           | -                                           | $V_{OL}$  | -              | 0.025    |               |
| Output Resistance, High State | $V_{CC}=18\text{V}, I_{OUT}=-100\text{mA}$  | $R_{OH}$  | -              | 6        | $\Omega$      |
| Output Resistance, Low State  | $V_{CC}=18\text{V}, I_{OUT}=100\text{mA}$   | $R_{OL}$  | -              | 5        |               |
| Rise Time                     | $V_{CC}=18\text{V}, C_{LOAD}=1000\text{pF}$ | $t_R$     | -              | 60       | ns            |
| Fall Time                     | $V_{CC}=18\text{V}, C_{LOAD}=1000\text{pF}$ | $t_F$     | -              | 60       |               |
| On-Time Propagation Delay     | $V_{CC}=18\text{V}, C_{LOAD}=1000\text{pF}$ | $t_{on}$  | -              | 100      |               |
| Off-Time Propagation Delay    | $V_{CC}=18\text{V}, C_{LOAD}=1000\text{pF}$ | $t_{off}$ | -              | 100      |               |
| Power Supply Current          | $V_{INA}=V_{INB}=3.5\text{V}$               | $I_{CC}$  | -              | 3.5      | mA            |
|                               | $V_{INA}=V_{INB}=0\text{V}$                 |           | -              | 0.15     |               |

## 1.7 Thermal Characteristics

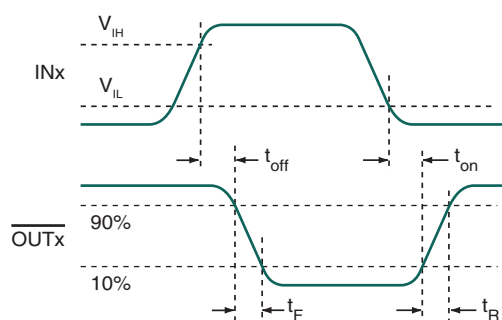
| Package    | Parameter                               | Symbol        | Rating | Units                |
|------------|-----------------------------------------|---------------|--------|----------------------|
| 8-Pin SOIC | Thermal Resistance, Junction-to-Ambient | $\theta_{JA}$ | 120    | $^{\circ}\text{C/W}$ |

## 2 IX4423-24-25 Performance

### 2.1 Timing Diagrams

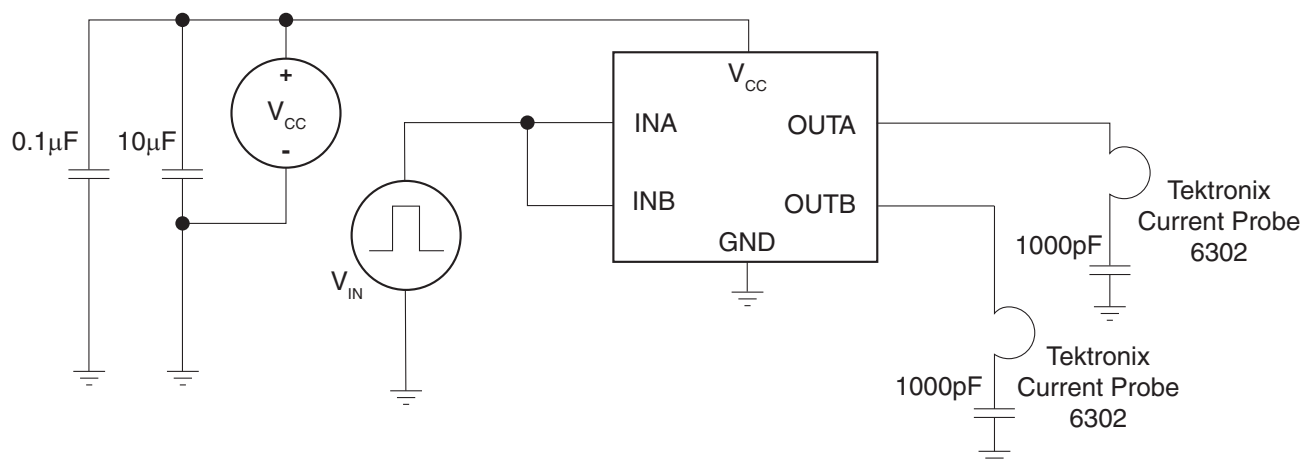


**Non-Inverting Driver Waveforms**



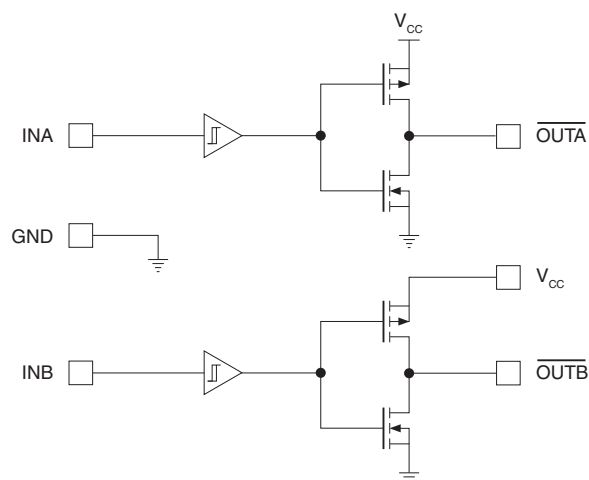
**Inverting Driver Waveforms**

### 2.2 Characteristics Test Diagram



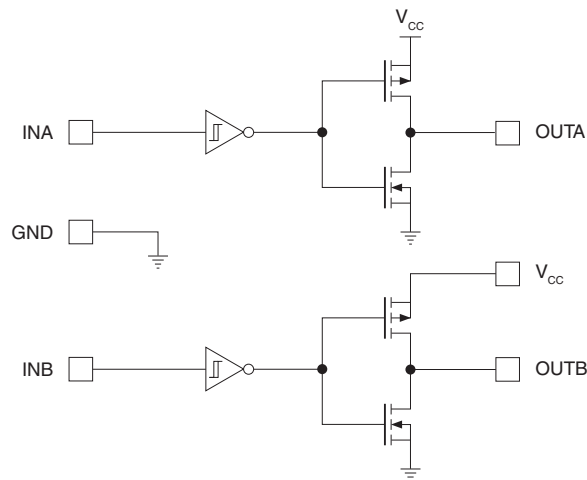
### 3 Block Diagrams & Truth Tables

#### 3.1 IX4423



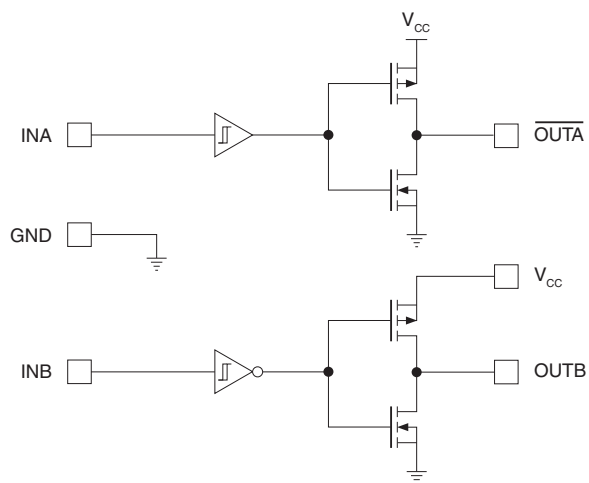
| IN <sub>x</sub> | OUT <sub>x</sub> |
|-----------------|------------------|
| 0               | 1                |
| 1               | 0                |

#### 3.3 IX4424



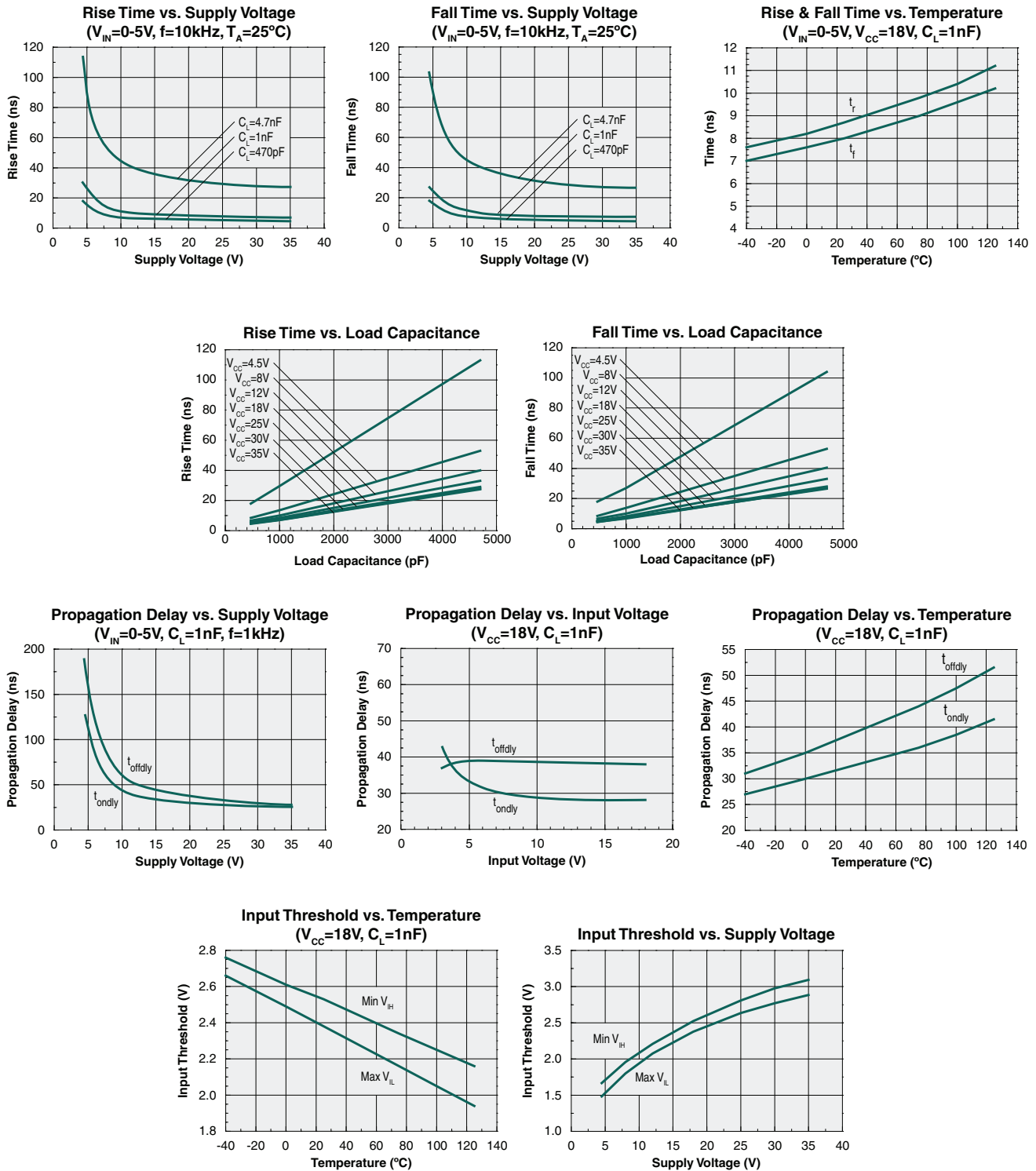
| IN <sub>x</sub> | OUT <sub>x</sub> |
|-----------------|------------------|
| 0               | 0                |
| 1               | 1                |

#### 3.2 IX4425

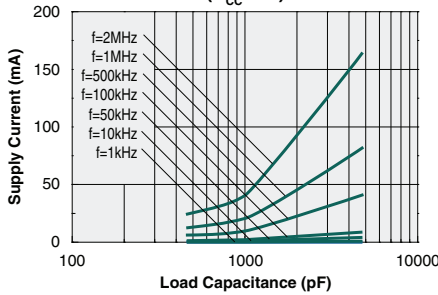


| INA | OUTA |
|-----|------|
| 0   | 1    |
| 1   | 0    |
| INB | OUTB |
| 0   | 0    |
| 1   | 1    |

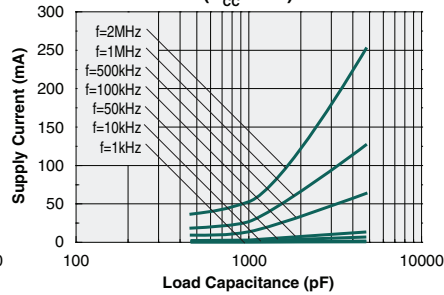
## 4 Typical Performance Characteristics



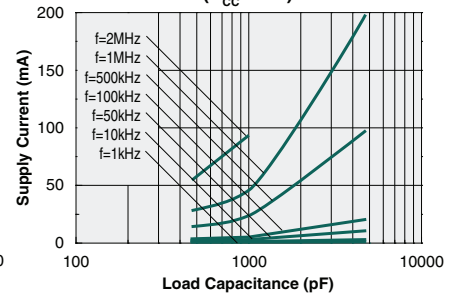
**Supply Current vs. Load Capacitance**  
Both Outputs Active  
( $V_{CC}=8V$ )



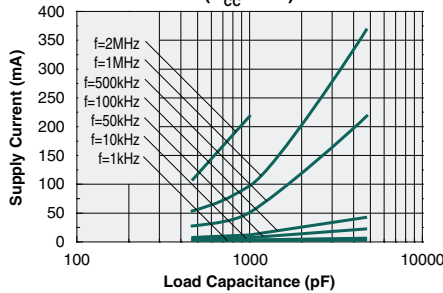
**Supply Current vs. Load Capacitance**  
Both Outputs Active  
( $V_{CC}=12V$ )



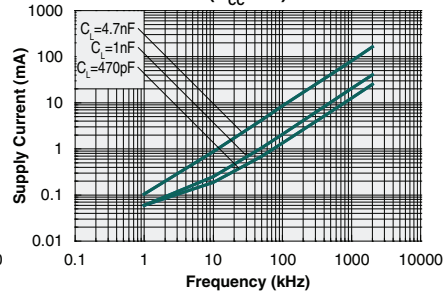
**Supply Current vs. Load Capacitance**  
Both Outputs Active  
( $V_{CC}=18V$ )



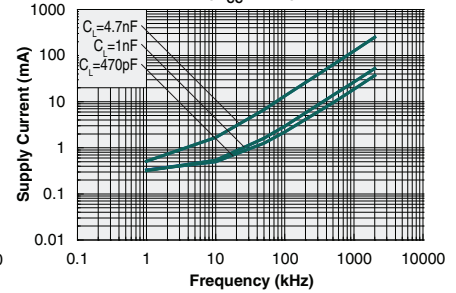
**Supply Current vs. Load Capacitance**  
Both Outputs Active  
( $V_{CC}=35V$ )



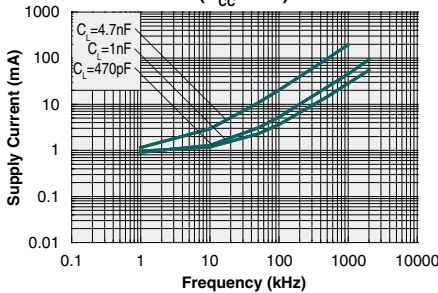
**Supply Current vs. Frequency**  
Both Outputs Active  
( $V_{CC}=8V$ )



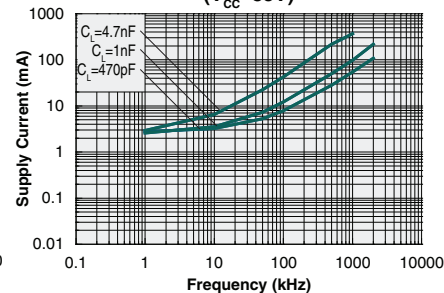
**Supply Current vs. Frequency**  
Both Outputs Active  
( $V_{CC}=12V$ )



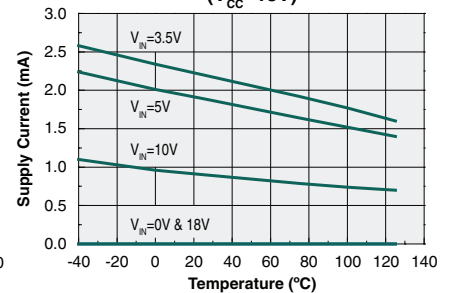
**Supply Current vs. Frequency**  
Both Outputs Active  
( $V_{CC}=18V$ )



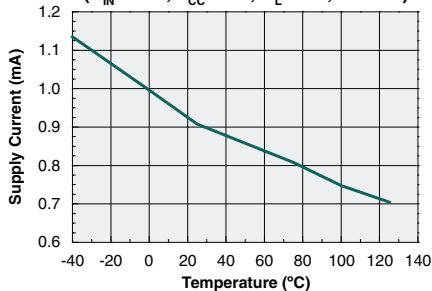
**Supply Current vs. Frequency**  
Both Outputs Active  
( $V_{CC}=35V$ )



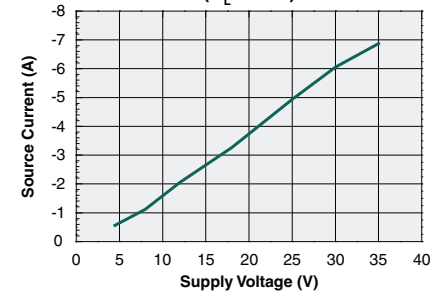
**Quiescent Supply Current**  
vs. Temperature  
( $V_{CC}=18V$ )



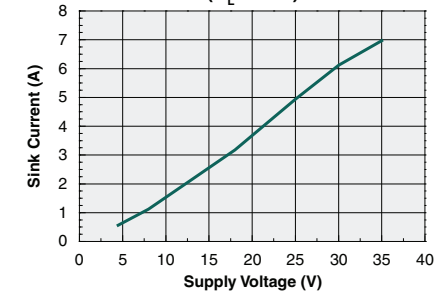
**Dynamic Supply Current**  
vs. Temperature  
( $V_{IN}=0-5V$ ,  $V_{CC}=18V$ ,  $C_L=1nF$ ,  $f=1kHz$ )

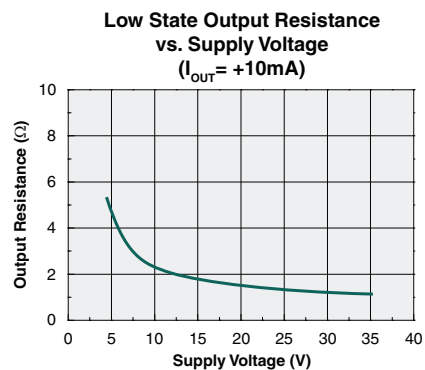
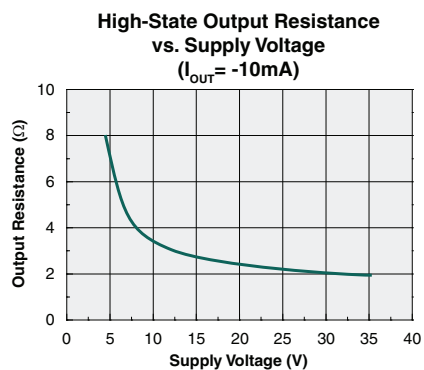
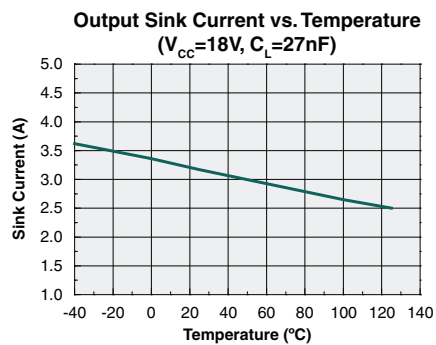
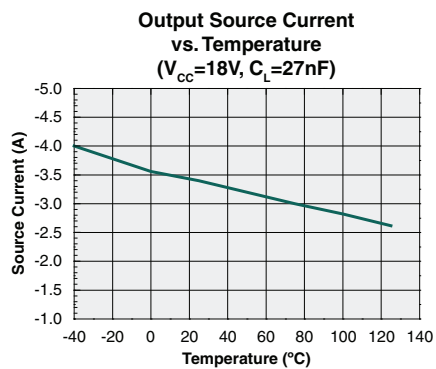


**Output Source Current**  
vs. Supply Voltage  
( $C_L=27nF$ )



**Output Sink Current**  
vs. Supply Voltage  
( $C_L=27nF$ )





## 5 Manufacturing Information

### 5.1 Moisture Sensitivity



All plastic encapsulated semiconductor packages are susceptible to moisture ingress. IXYS Integrated Circuits Division classified all of 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) rating** 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) Rating |
|-----------------------------|-----------------------------------------|
| IX4423N / IX4424N / IX4425N | MSL 1                                   |

### 5.2 ESD Sensitivity



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

### 5.3 Reflow Profile

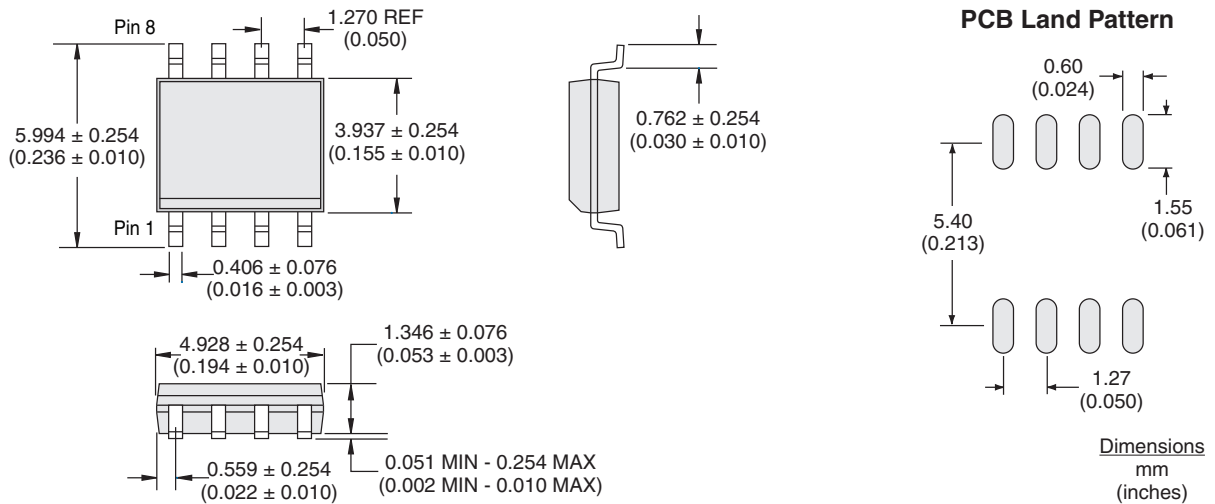
This product has a maximum body temperature and time rating as shown below. All other guidelines of **J-STD-020** must be observed.

| Device                      | Maximum Temperature x Time |
|-----------------------------|----------------------------|
| IX4423N / IX4424N / IX4425N | 260°C for 30 seconds       |

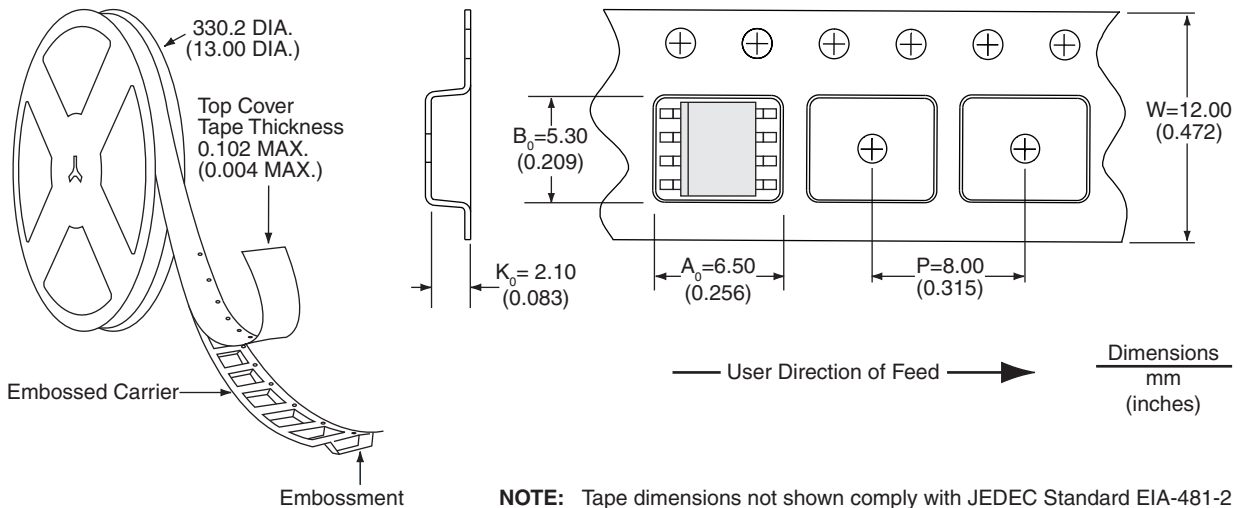


## 5.4 Mechanical Dimensions

### 5.4.1 "N" Package (8-Pin SOIC)



### 5.4.2 "N" Package Tape & Reel



For additional information please visit our website at: [www.ixysic.com](http://www.ixysic.com)

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