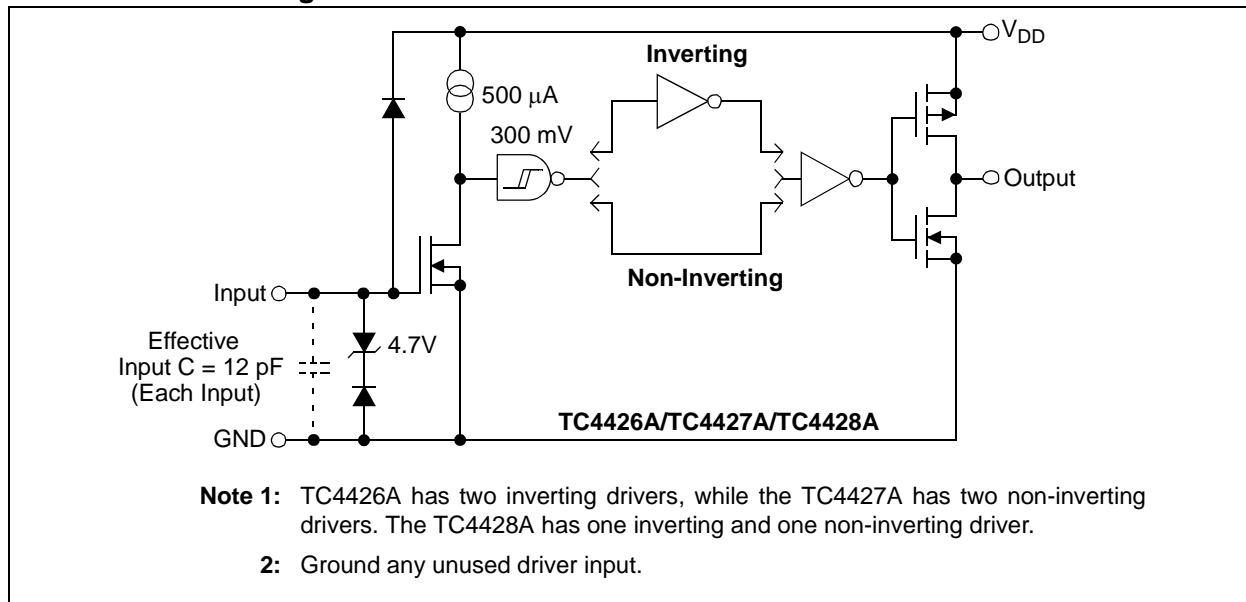


TC4426A/TC4427A/TC4428A

Functional Block Diagram



TC4426A/TC4427A/TC4428A

1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings†

Supply Voltage	+22V
Input Voltage, IN A or IN B	(V _{DD} + 0.3V) to (GND – 5V)
Package Power Dissipation (T _A ≤ +70°C)	
DFN-S	Note 2
MSOP	340 mW
PDIP	730 mW
SOIC	470 mW

† **Notice:** Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions above those indicated in the operation sections of the specifications is not implied. Exposure to Absolute Maximum Rating conditions for extended periods may affect device reliability.

DC CHARACTERISTICS

Electrical Specifications: Unless otherwise noted, over operating temperature range with 4.5V ≤ V _{DD} ≤ 18V.						
Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Input						
Logic ‘1’, High Input Voltage	V _{IH}	2.4	—	—	V	
Logic ‘0’, Low Input Voltage	V _{IL}	—	—	0.8	V	
Input Current	I _{IN}	-1.0 -10	—	+1.0 +10	μA	0V ≤ V _{IN} ≤ V _{DD}
Output						
High Output Voltage	V _{OH}	V _{DD} – 0.025	—	—	V	DC Test
Low Output Voltage	V _{OL}	—	—	0.025	V	DC Test
Output Resistance	R _O	—	7	9	Ω	I _{OUT} = 10 mA, V _{DD} = 18V, T _A = +25°C
		—	7	10		0°C ≤ T _A ≤ +70°C
		—	8	11		-40°C ≤ T _A ≤ +85°C
		—	8	12		-40°C ≤ T _A ≤ +125°C
Peak Output Current	I _{PK}	—	1.5	—	A	V _{DD} = 18V
Latch-Up Protection Withstand Reverse Current	I _{REV}	—	> 0.5	—	A	Duty cycle ≤ 2%, t ≤ 300 μs V _{DD} = 18V
Switching Time (Note 1)						
Rise Time	t _R	—	25	35	ns	T _A = +25°C
		—	27	40		0°C ≤ T _A ≤ +70°C
		—	29	40		-40°C ≤ T _A ≤ +85°C
		—	30	40		-40°C ≤ T _A ≤ +125°C, Figure 4-1
Fall Time	t _F	—	25	35	ns	T _A = +25°C
		—	27	40		0°C ≤ T _A ≤ +70°C
		—	29	40		-40°C ≤ T _A ≤ +85°C
		—	30	40		-40°C ≤ T _A ≤ +125°C, Figure 4-1
Delay Time	t _{D1}	—	30	35	ns	T _A = +25°C
		—	33	40		0°C ≤ T _A ≤ +70°C
		—	35	45		-40°C ≤ T _A ≤ +85°C
		—	38	50		-40°C ≤ T _A ≤ +125°C, Figure 4-1

Note 1: Switching times ensured by design.

2: Package power dissipation is dependent on the copper pad area on the PCB.

TC4426A/TC4427A/TC4428A

DC CHARACTERISTICS (CONTINUED)

Electrical Specifications: Unless otherwise noted, over operating temperature range with $4.5V \leq V_{DD} \leq 18V$.						
Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Delay Time	t_{D2}	—	30	35	ns	$T_A = +25^\circ\text{C}$
		—	33	40		$0^\circ\text{C} \leq T_A \leq +70^\circ\text{C}$
		—	35	45		$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$
		—	38	50		$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$, Figure 4-1
Power Supply						
Power Supply Current	I_S	—	1.0	2.0	mA	$V_{IN} = 3V$ (Both inputs)
		—	0.1	0.2		$V_{IN} = 0V$ (Both inputs), $V_{DD} = 18V$

Note 1: Switching times ensured by design.

Note 2: Package power dissipation is dependent on the copper pad area on the PCB.

TEMPERATURE CHARACTERISTICS

Electrical Specifications: Unless otherwise noted, all parameters apply with $4.5V \leq V_{DD} \leq 18V$.						
Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Temperature Ranges						
Specified Temperature Range (C)	T_A	0	—	+70	$^\circ\text{C}$	
Specified Temperature Range (E)	T_A	-40	—	+85	$^\circ\text{C}$	
Specified Temperature Range (V)	T_A	-40	—	+125	$^\circ\text{C}$	
Maximum Junction Temperature	T_J	—	—	+150	$^\circ\text{C}$	
Storage Temperature Range	T_A	-65	—	+150	$^\circ\text{C}$	
Package Thermal Resistances						
Thermal Resistance, 8L-6x5 DFN-S	θ_{JA}	—	35.7	—	$^\circ\text{C/W}$	
Thermal Resistance, 8L-MSOP	θ_{JA}	—	211	—	$^\circ\text{C/W}$	
Thermal Resistance, 8L-PDIP	θ_{JA}	—	89.3	—	$^\circ\text{C/W}$	
Thermal Resistance, 8L-SOIC	θ_{JA}	—	149.5	—	$^\circ\text{C/W}$	

TC4426A/TC4427A/TC4428A

2.0 TYPICAL PERFORMANCE CURVES

Note: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside the specified operating range (e.g., outside specified power supply range) and therefore outside the warranted range.

Note: Unless otherwise indicated, over operating temperature range with $4.5V \leq V_{DD} \leq 18V$.

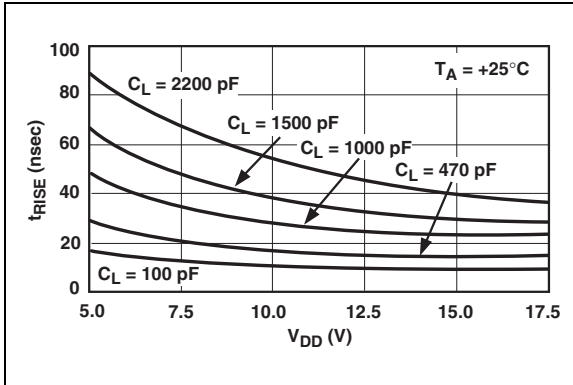


FIGURE 2-1: Rise Time vs. Supply Voltage.

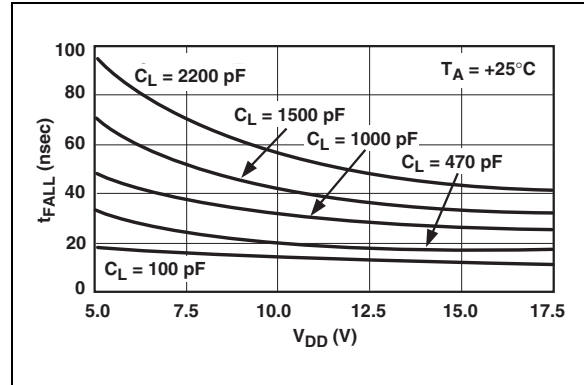


FIGURE 2-4: Fall Time vs. Supply Voltage.

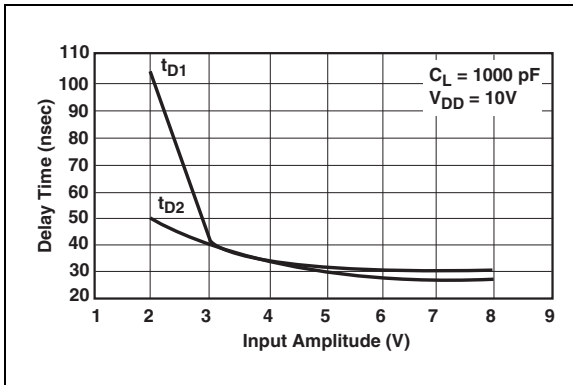


FIGURE 2-2: Delay Time vs. Input Amplitude.

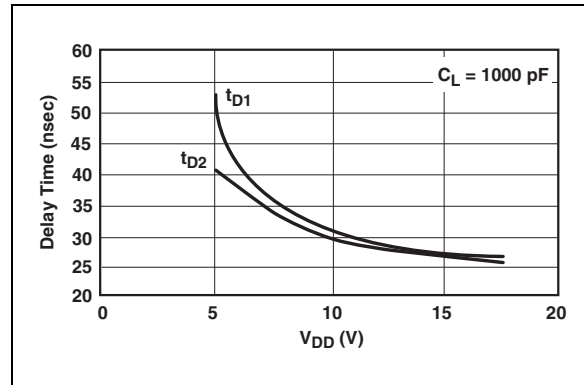


FIGURE 2-5: Propagation Delay Time vs. Supply Voltage.

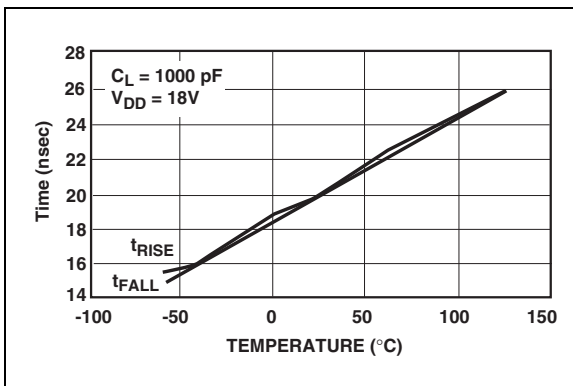


FIGURE 2-3: Rise and Fall Times vs. Temperature.

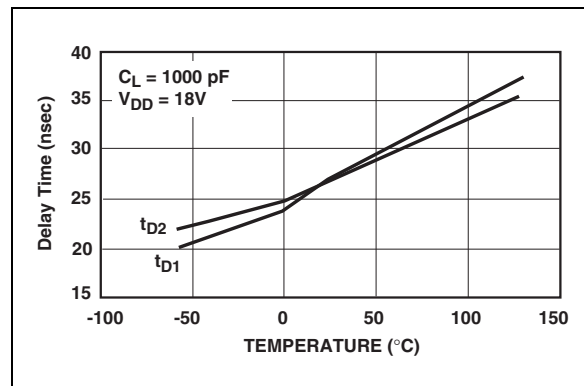


FIGURE 2-6: Propagation Delay Time vs. Temperature.

TC4426A/TC4427A/TC4428A

Note: Unless otherwise indicated, over operating temperature range with $4.5V \leq V_{DD} \leq 18V$.

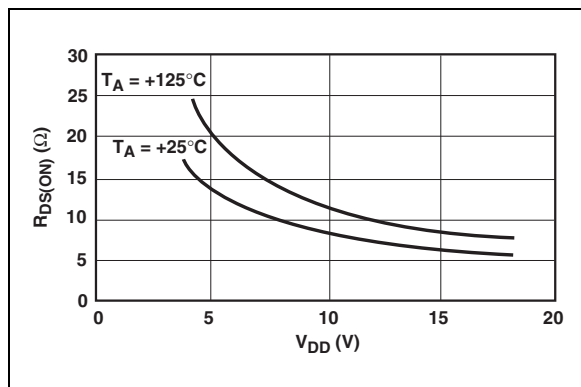


FIGURE 2-7: High-State Output Resistance.

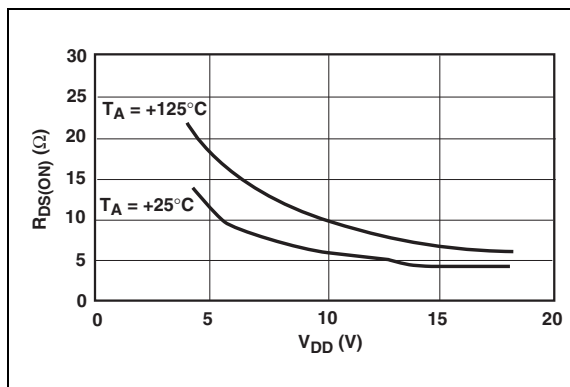


FIGURE 2-10: Low-State Output Resistance.

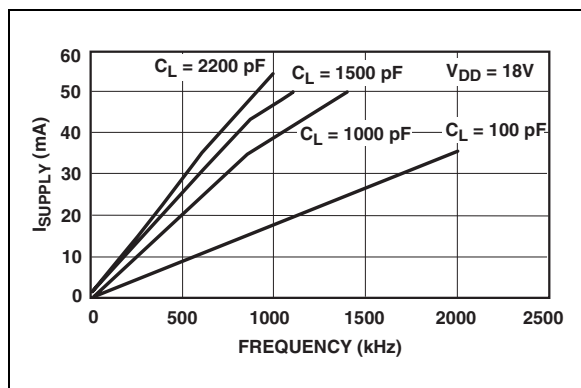


FIGURE 2-8: Supply Current vs. Frequency.

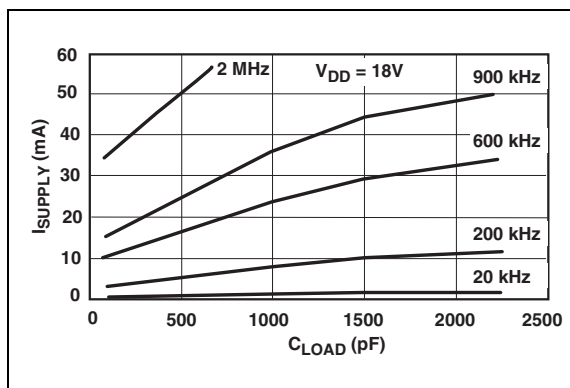


FIGURE 2-11: Supply Current vs. Capacitive Load.

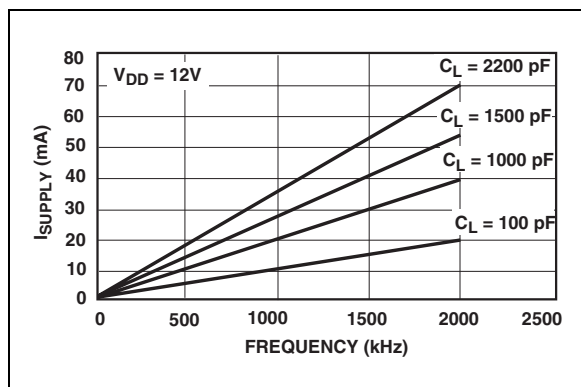


FIGURE 2-9: Supply Current vs. Frequency.

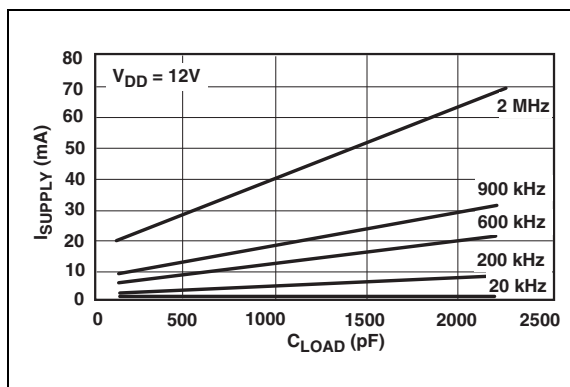


FIGURE 2-12: Supply Current vs. Capacitive Load.

TC4426A/TC4427A/TC4428A

Note: Unless otherwise indicated, over operating temperature range with $4.5V \leq V_{DD} \leq 18V$.

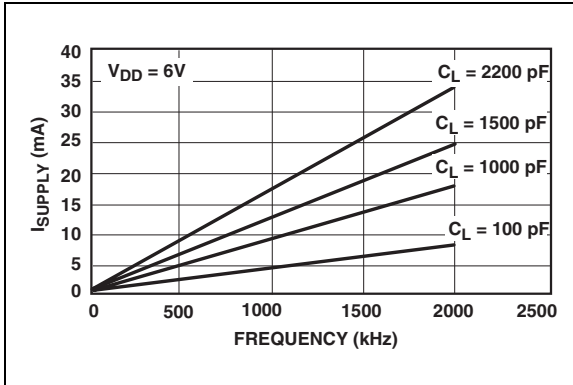


FIGURE 2-13: Supply Current vs. Frequency.

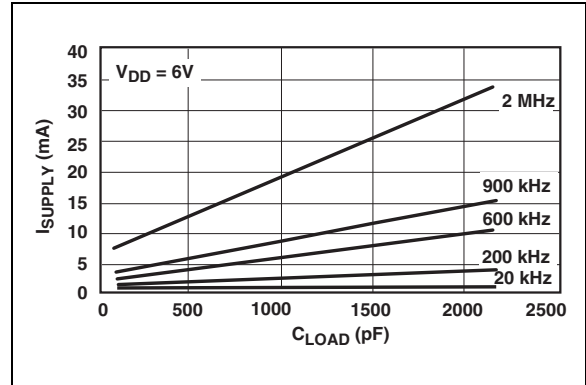


FIGURE 2-15: Supply Current vs. Capacitive Load.

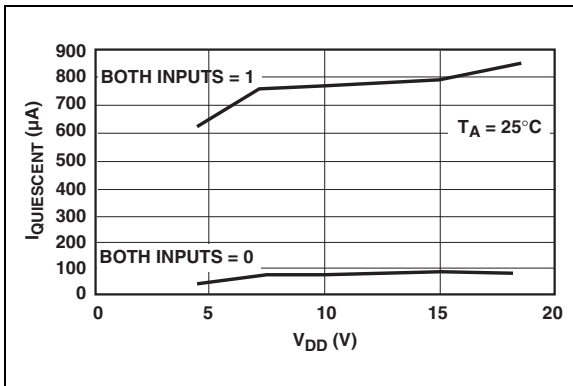


FIGURE 2-14: Quiescent Supply Current vs. Voltage.

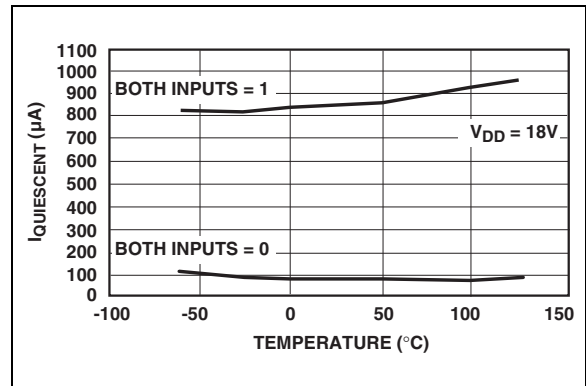


FIGURE 2-16: Quiescent Supply Current vs. Temperature.

TC4426A/TC4427A/TC4428A

3.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in [Table 3-1](#).

TABLE 3-1: PIN FUNCTION TABLE (Note 1)

PDIP, MSOP, SOIC	6x5 DFN-S	Symbol	Description
1	1	NC	No connection
2	2	IN A	Input A
3	3	GND	Ground
4	4	IN B	Input B
5	5	OUT B	Output B
6	6	V _{DD}	Supply input
7	7	OUT A	Output A
8	8	NC	No connection
—	9	EP	Exposed Metal Pad

Note 1: Duplicate pins must be connected for proper operation.

3.1 Inputs A and B (IN A, IN B)

MOSFET driver inputs A and B are high-impedance, TTL/CMOS compatible inputs. These inputs also have 300 mV of hysteresis between the high and low thresholds that prevents output glitching, even when the rise and fall time of the input signal is very slow.

3.2 Ground (GND)

The Ground pin is the return path for both the bias current and the high-peak current that discharges the external load capacitance. The Ground pin should be tied into a ground plane or have a very short trace to the bias supply source return.

3.3 Output A and B (OUT A, OUT B)

MOSFET driver outputs A and B are low-impedance, CMOS push-pull style outputs. The pull-down and pull-up devices are of equal strength, making the rise and fall times equivalent.

3.4 Supply Input (V_{DD})

The V_{DD} input is the bias supply for the MOSFET driver and is rated for 4.5V to 18V, with respect to the ground pin. The V_{DD} input should be bypassed with local ceramic capacitors. The value of these capacitors should be chosen based on the capacitive load that is being driven.

3.5 Exposed Metal Pad (EP)

The exposed metal pad of the 6x5 DFN-S package is not internally connected to any potential. Therefore, this pad can be connected to a ground plane or other copper plane on a printed circuit board, to aid in heat removal from the package.

TC4426A/TC4427A/TC4428A

4.0 APPLICATIONS INFORMATION

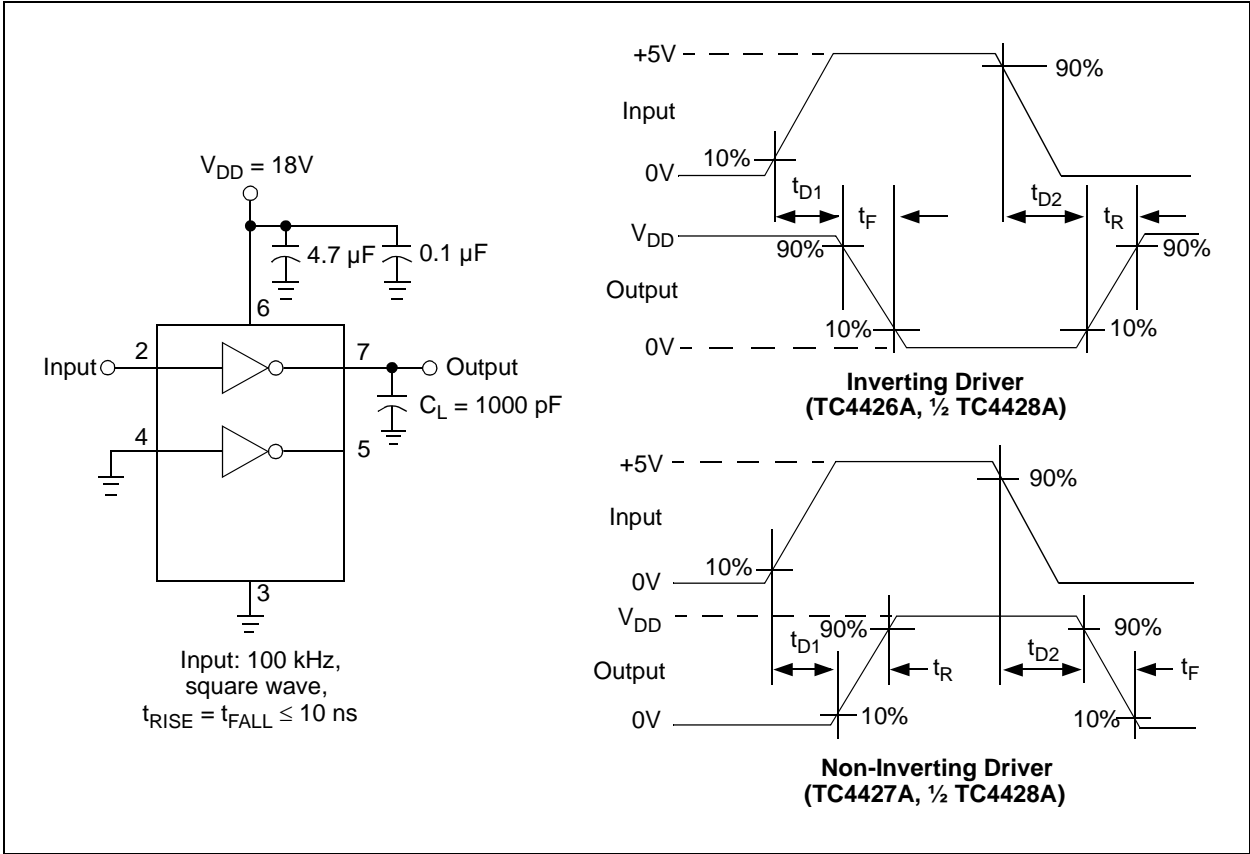


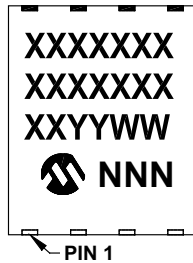
FIGURE 4-1: Switching Time Test Circuit.

TC4426A/TC4427A/TC4428A

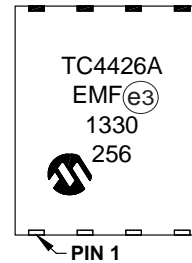
5.0 PACKAGING INFORMATION

5.1 Package Marking Information

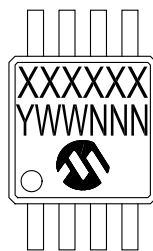
8-Lead DFN-S (6x5x0.9 mm)



Example



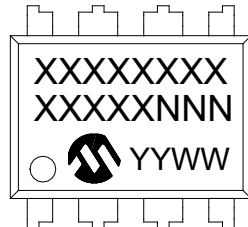
8-Lead MSOP (3x3 mm)



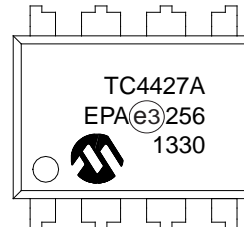
Example



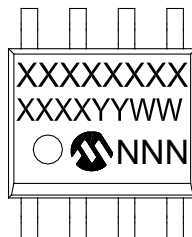
8-Lead PDIP (300 mil)



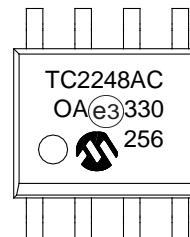
Example



8-Lead SOIC (3.90 mm)



Example



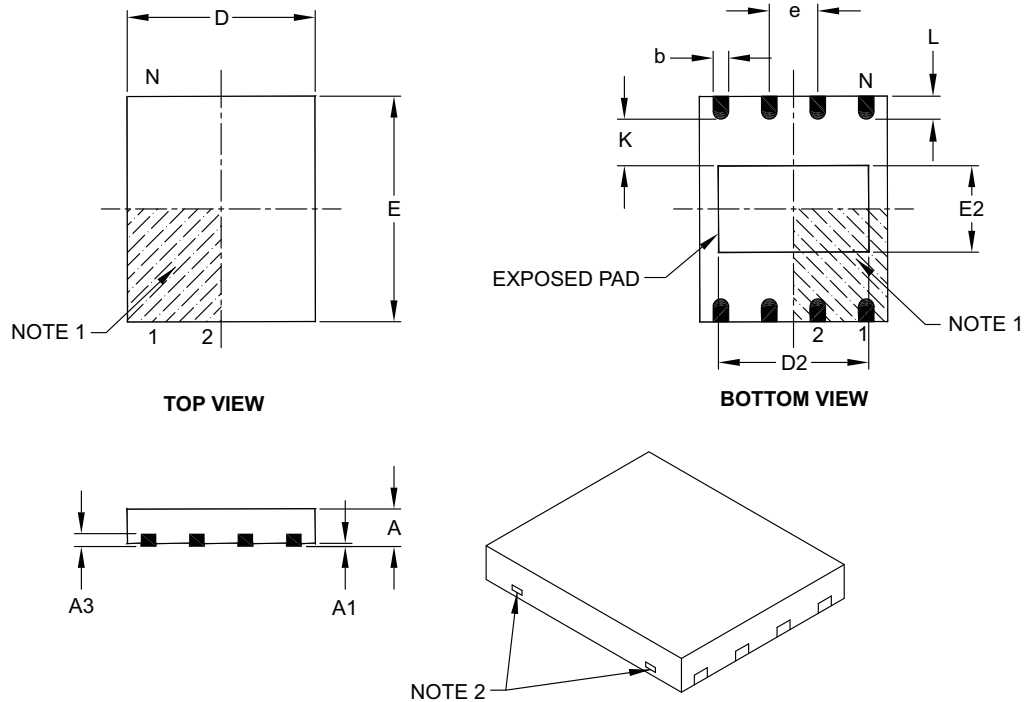
Legend:	XX...X	Customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week '01')
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator (e3) can be found on the outer packaging for this package.

Note: In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information.

TC4426A/TC4427A/TC4428A

8-Lead Plastic Dual Flat, No Lead Package (MF) – 6x5 mm Body [DFN-S]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension Limits	Units	MILLIMETERS		
		MIN	NOM	MAX
Number of Pins	N	8		
Pitch	e	1.27 BSC		
Overall Height	A	0.80	0.85	1.00
Standoff	A1	0.00	0.01	0.05
Contact Thickness	A3	0.20 REF		
Overall Length	D	5.00 BSC		
Overall Width	E	6.00 BSC		
Exposed Pad Length	D2	3.90	4.00	4.10
Exposed Pad Width	E2	2.20	2.30	2.40
Contact Width	b	0.35	0.40	0.48
Contact Length	L	0.50	0.60	0.75
Contact-to-Exposed Pad	K	0.20	–	–

Notes:

- Pin 1 visual index feature may vary, but must be located within the hatched area.
- Package may have one or more exposed tie bars at ends.
- Package is saw singulated.
- Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

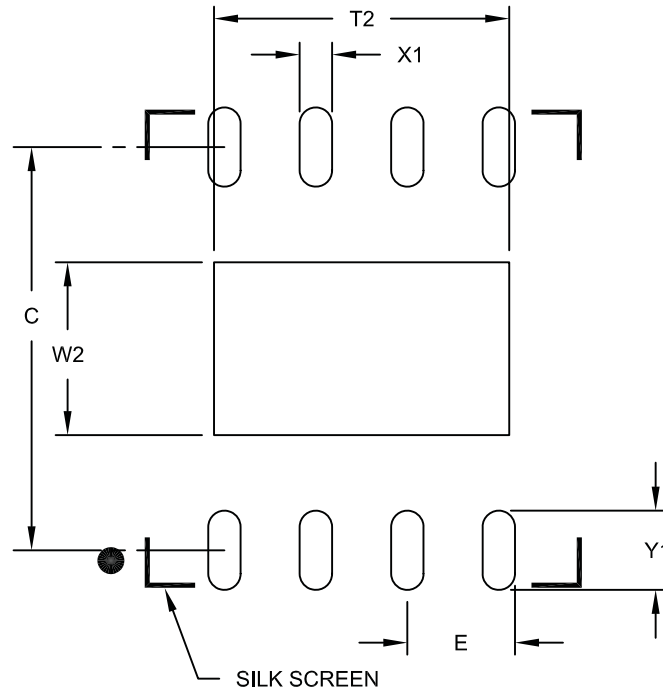
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-122B

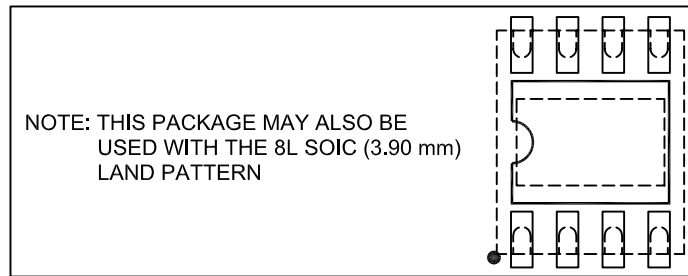
TC4426A/TC4427A/TC4428A

8-Lead Plastic Dual Flat, No Lead Package (MF) - 6x5 mm Body [DFN-S]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN



Dimension Limits	Units	MILLIMETERS		
		MIN	NOM	MAX
Contact Pitch	E	1.27 BSC		
Optional Center Pad Width	W2			2.40
Optional Center Pad Length	T2			4.10
Contact Pad Spacing	C		5.60	
Contact Pad Width (X8)	X1			0.45
Contact Pad Length (X8)	Y1			1.10

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

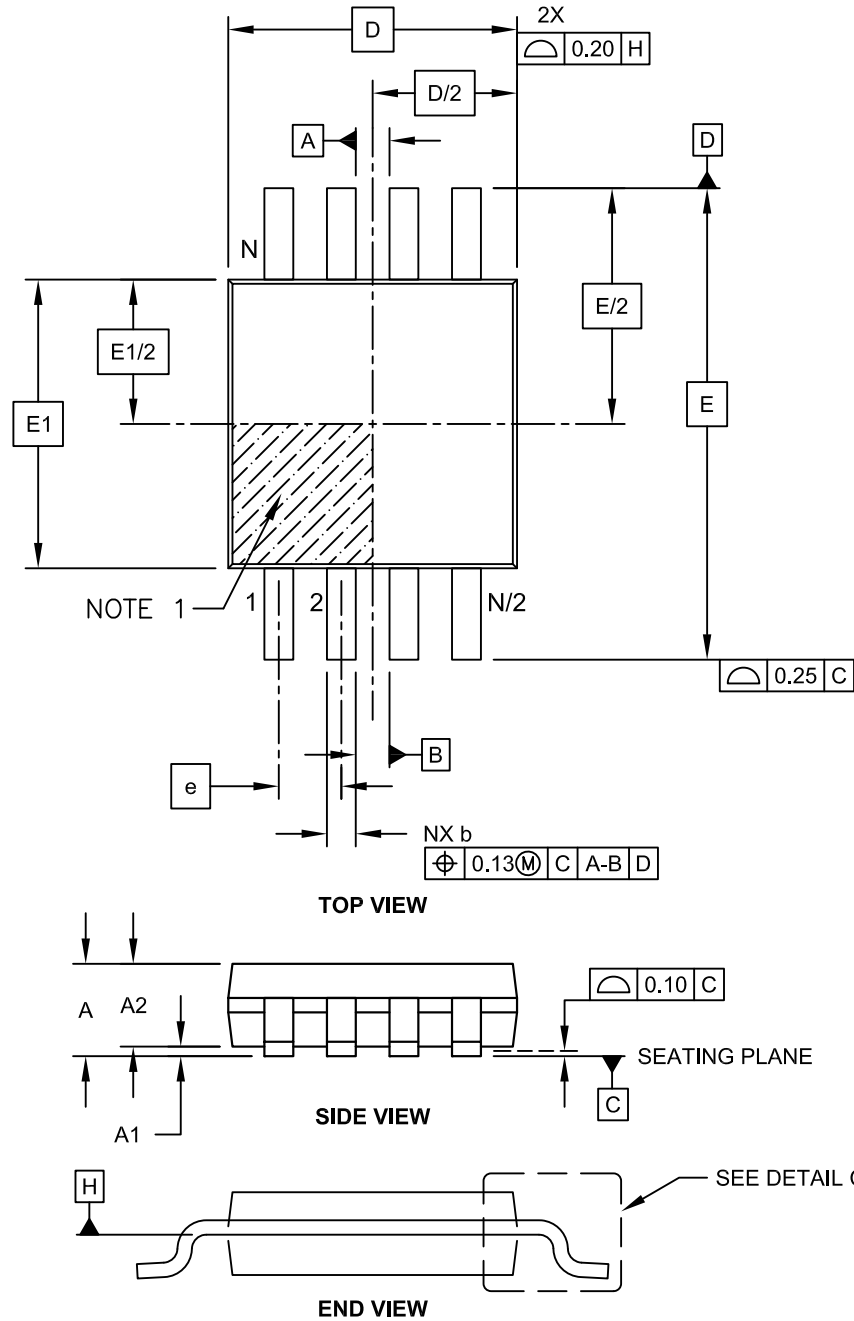
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2122A

TC4426A/TC4427A/TC4428A

8-Lead Plastic Micro Small Outline Package (UA) [MSOP]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

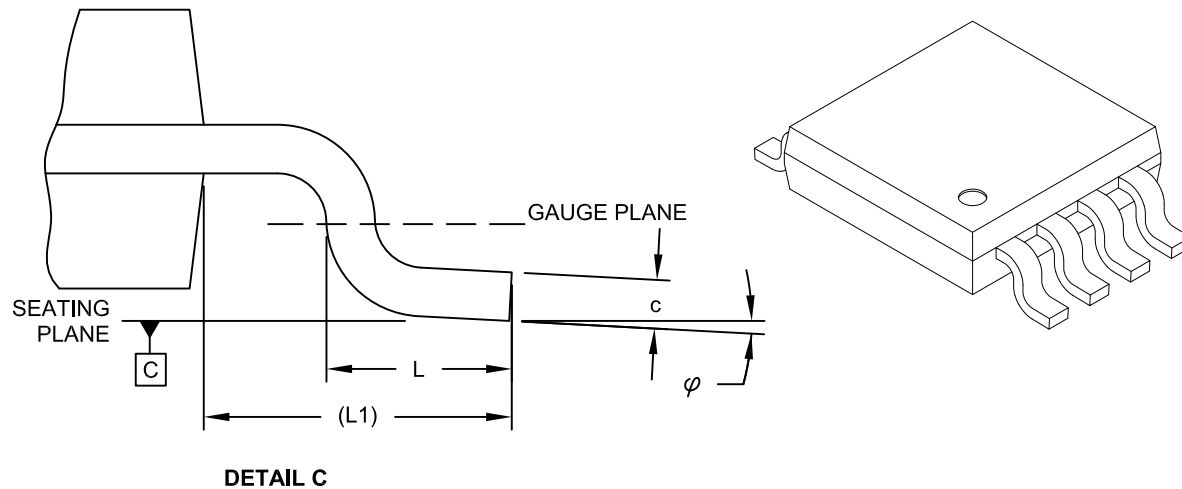


Microchip Technology Drawing C04-111C Sheet 1 of 2

TC4426A/TC4427A/TC4428A

8-Lead Plastic Micro Small Outline Package (UA) [MSOP]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension Limits	Units	MILLIMETERS		
		MIN	NOM	MAX
Number of Pins	N		8	
Pitch	e	0.65 BSC		
Overall Height	A	-	-	1.10
Molded Package Thickness	A2	0.75	0.85	0.95
Standoff	A1	0.00	-	0.15
Overall Width	E	4.90 BSC		
Molded Package Width	E1	3.00 BSC		
Overall Length	D	3.00 BSC		
Foot Length	L	0.40	0.60	0.80
Footprint	L1	0.95 REF		
Foot Angle	ϕ	0°	-	8°
Lead Thickness	c	0.08	-	0.23
Lead Width	b	0.22	-	0.40

Notes:

- Pin 1 visual index feature may vary, but must be located within the hatched area.
- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm per side.
- Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

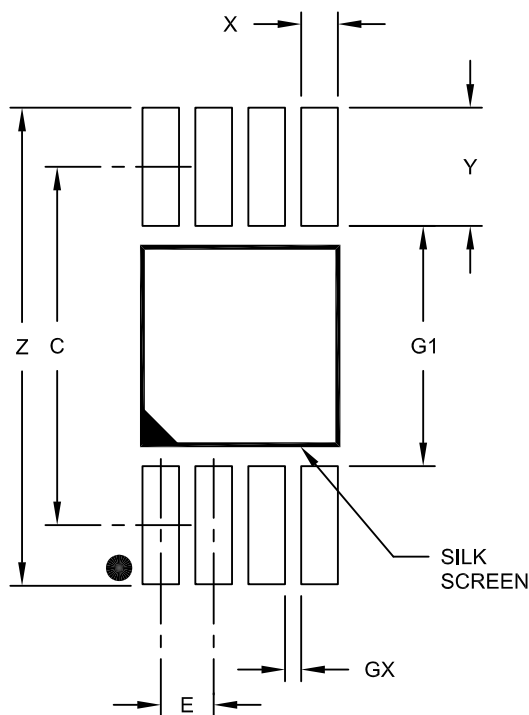
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-111C Sheet 2 of 2

TC4426A/TC4427A/TC4428A

8-Lead Plastic Micro Small Outline Package (UA) [MSOP]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Dimension Limits	Units	MILLIMETERS		
		MIN	NOM	MAX
Contact Pitch	E	0.65 BSC		
Contact Pad Spacing	C		4.40	
Overall Width	Z			5.85
Contact Pad Width (X8)	X1			0.45
Contact Pad Length (X8)	Y1			1.45
Distance Between Pads	G1	2.95		
Distance Between Pads	GX	0.20		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

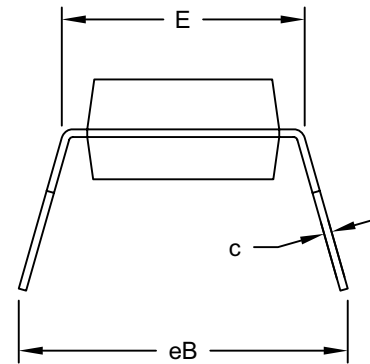
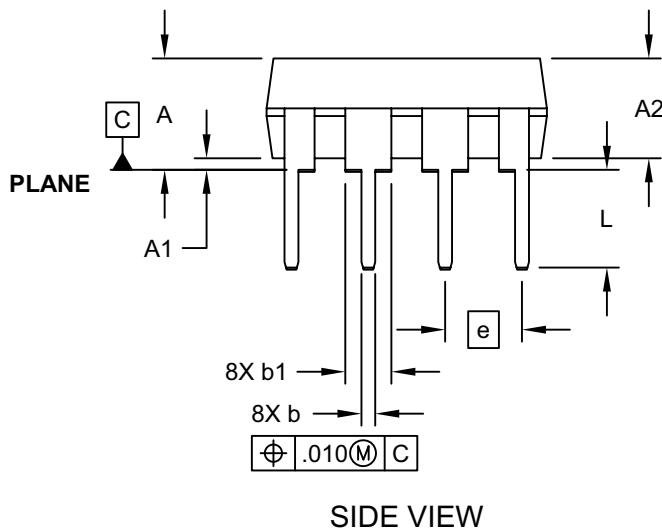
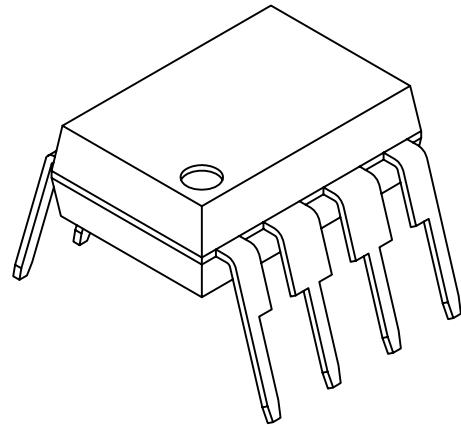
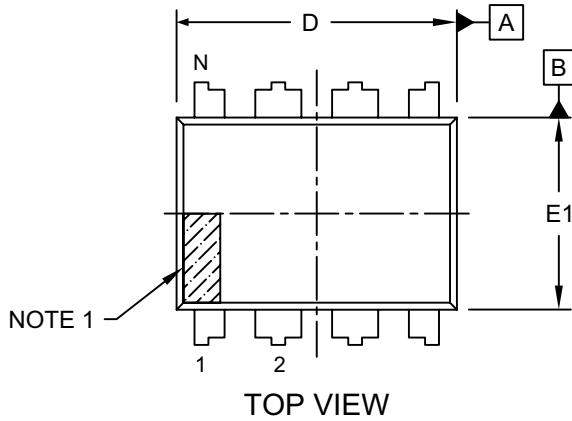
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2111A

TC4426A/TC4427A/TC4428A

8-Lead Plastic Dual In-Line (PA) - 300 mil Body [PDIP]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

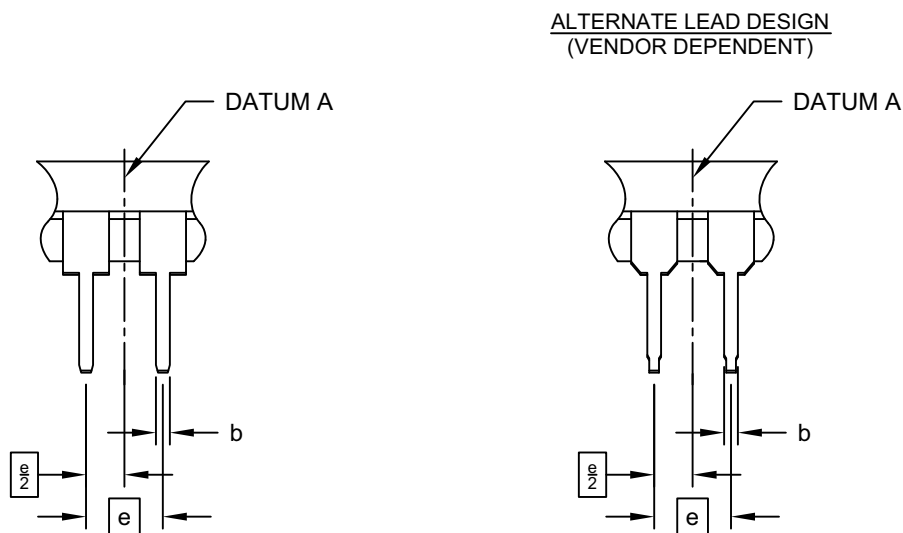


Microchip Technology Drawing No. C04-018D Sheet 1 of 2

TC4426A/TC4427A/TC4428A

8-Lead Plastic Dual In-Line (PA) - 300 mil Body [PDIP]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	INCHES		
Dimension Limits			MIN	NOM	MAX
Number of Pins	N		8		
Pitch	e		.100 BSC		
Top to Seating Plane	A	-	-	-	.210
Molded Package Thickness	A2	.115	.130	.195	
Base to Seating Plane	A1	.015	-	-	
Shoulder to Shoulder Width	E	.290	.310	.325	
Molded Package Width	E1	.240	.250	.280	
Overall Length	D	.348	.365	.400	
Tip to Seating Plane	L	.115	.130	.150	
Lead Thickness	c	.008	.010	.015	
Upper Lead Width	b1	.040	.060	.070	
Lower Lead Width	b	.014	.018	.022	
Overall Row Spacing	§	eB	-	-	.430

Notes:

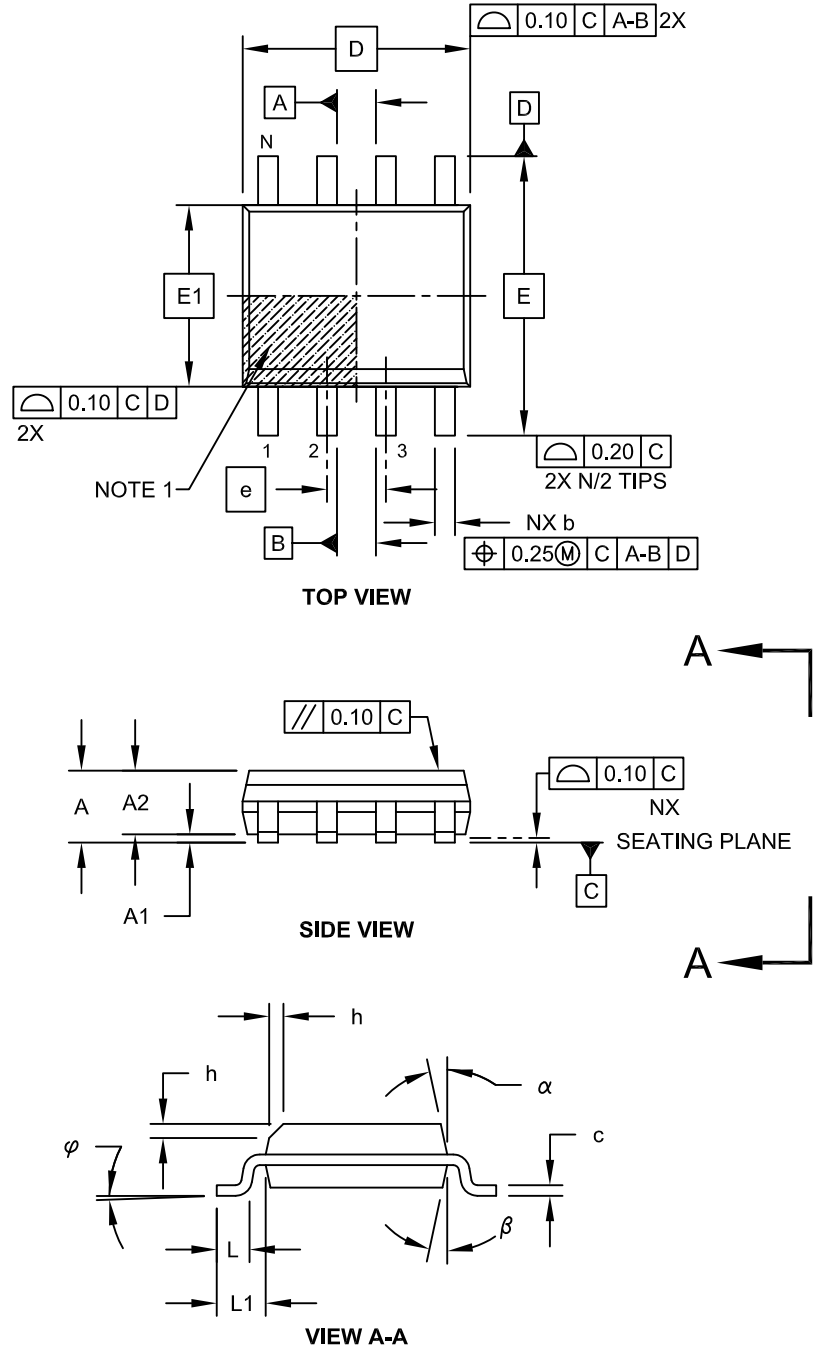
- Pin 1 visual index feature may vary, but must be located within the hatched area.
- § Significant Characteristic
- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
- Dimensioning and tolerancing per ASME Y14.5M
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-018D Sheet 2 of 2

TC4426A/TC4427A/TC4428A

8-Lead Plastic Small Outline (OA) - Narrow, 3.90 mm Body [SOIC]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

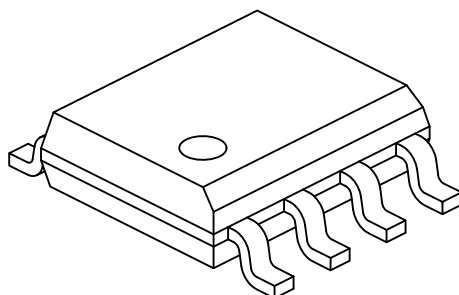


Microchip Technology Drawing No. C04-057C Sheet 1 of 2

TC4426A/TC4427A/TC4428A

8-Lead Plastic Small Outline (OA) - Narrow, 3.90 mm Body [SOIC]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension Limits	Units	MILLIMETERS		
		MIN	NOM	MAX
Number of Pins	N	8		
Pitch	e	1.27 BSC		
Overall Height	A	-	-	1.75
Molded Package Thickness	A2	1.25	-	-
Standoff §	A1	0.10	-	0.25
Overall Width	E	6.00 BSC		
Molded Package Width	E1	3.90 BSC		
Overall Length	D	4.90 BSC		
Chamfer (Optional)	h	0.25	-	0.50
Foot Length	L	0.40	-	1.27
Footprint	L1	1.04 REF		
Foot Angle	φ	0°	-	8°
Lead Thickness	c	0.17	-	0.25
Lead Width	b	0.31	-	0.51
Mold Draft Angle Top	α	5°	-	15°
Mold Draft Angle Bottom	β	5°	-	15°

Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

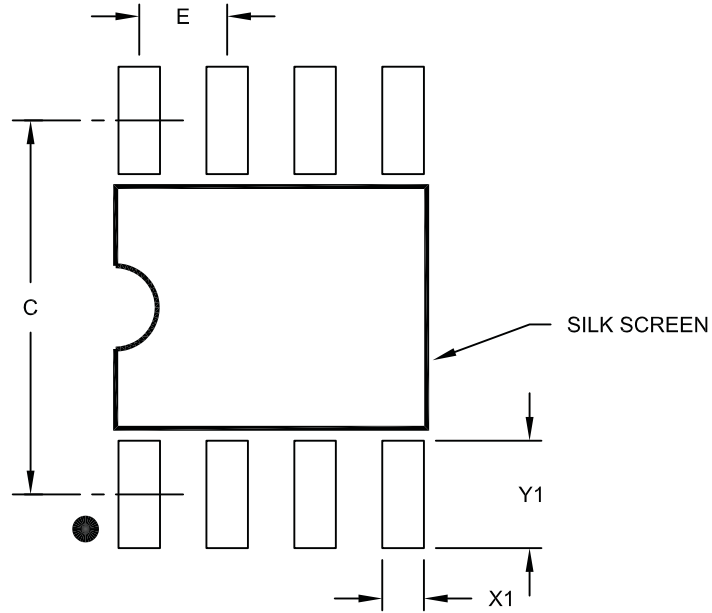
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing No. C04-057C Sheet 2 of 2

TC4426A/TC4427A/TC4428A

8-Lead Plastic Small Outline (OA) – Narrow, 3.90 mm Body [SOIC]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Dimension Limits	Units	MILLIMETERS		
		MIN	NOM	MAX
Contact Pitch	E		1.27 BSC	
Contact Pad Spacing	C		5.40	
Contact Pad Width (X8)	X1			0.60
Contact Pad Length (X8)	Y1			1.55

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-2057A

APPENDIX A: REVISION HISTORY

Revision J (July 2014)

The following is the list of modifications:

1. Updated [Figure 4-1](#).

Revision H (September 2013)

The following is the list of modifications:

1. Changed ESD protection value to 2 kV on the [Features](#) page.
2. Updated the package specification drawings in **Section 5.0 “Packaging Information”**, to show all views available.
3. Minor typographical corrections.

TC4426A/TC4427A/TC4428A

NOTES:

TC4426A/TC4427A/TC4428A

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, refer to the factory or the listed sales office.

<u>PART NO.</u>	<u>X</u>	<u>XX</u>	<u>XXX</u>	<u>X</u>
Device	Temperature Range	Package	Tape & Reel	PB Free
<p>Device: TC4426A: 1.5A Dual MOSFET Driver, Inverting TC4427A: 1.5A Dual MOSFET Driver, Non-Inverting TC4428A: 1.5A Dual MOSFET Driver, Complementary</p> <p>Temperature Range: C = 0°C to +70°C (PDIP & SOIC Only) E = -40°C to +85°C V = -40°C to +125°C</p> <p>Package: MF = Dual, Flat, No-Lead (6X5 mm Body), 8-lead MF713 = Dual, Flat, No-Lead (6X5 mm Body), 8-lead (Tape and Reel) OA = Plastic SOIC, (150 mil Body), 8-lead OA713 = Plastic SOIC, (150 mil Body), 8-lead (Tape and Reel) PA = Plastic DIP (300 mil Body), 8-lead UA = Plastic Micro Small Outline (MSOP), 8-lead UA713 = Plastic Micro Small Outline (MSOP), 8-lead (Tape and Reel)</p>				
<p>Examples:</p> <p>a) TC4426ACOA: 1.5A Dual Inverting MOSFET driver, 0°C to +70°C, 8LD SOIC package.</p> <p>b) TC4426AEOA: 1.5A Dual Inverting MOSFET driver, -40°C to +85°C, 8LD SOIC package.</p> <p>c) TC4426AEMF: 1.5A Dual Inverting MOSFET driver, -40°C to +85°C, 8LD DFN-S package.</p> <p>a) TC4427ACPA: 1.5A Dual Non-Inverting MOSFET driver, 0°C to +70°C, 8LD PDIP package.</p> <p>b) TC4427AEPA: 1.5A Dual Non-Inverting MOSFET driver, -40°C to +85°C, 8LD PDIP package.</p> <p>c) TC4427AVMF713: 1.5A Dual Non-Inverting MOSFET driver, -40°C to +125°C, 8LD DFN-S package, Tape and Reel.</p> <p>a) TC4428AEPA: 1.5A Dual Complementary MOSFET driver, -40°C to +85°C, 8LD PDIP package.</p> <p>b) TC4428ACOA713: 1.5A Dual Complementary MOSFET driver, 0°C to +70°C, 8LD SOIC package, Tape and Reel.</p> <p>c) TC4428AVMF: 1.5A Dual Complementary MOSFET driver, -40°C to +125°C, 8LD DFN-S package.</p>				

TC4426A/TC4427A/TC4428A

NOTES:

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as “unbreakable.”

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