MICROCHIP TC4423/TC4424/TC4425

3A Dual High-Speed Power MOSFET Drivers

Features

- High Peak Output Current: 3A
- Wide Input Supply Voltage Operating Range:
 - 4.5V to 18V
- High Capacitive Load Drive Capability:
 - 1800 pF in 25 ns
- Short Delay Times: <40 ns (typ)
- · Matched Rise/Fall Times
- Low Supply Current:
 - With Logic '1' Input 3.5 mA (Max)
 - With Logic '0' Input 350 μA (Max)
- Low Output Impedance: 3.5Ω (typ)
- Latch-Up Protected: Will Withstand 1.5A Reverse Current
- Logic Input Will Withstand Negative Swing Up To 5V
- · ESD Protected: 4 kV
- Pin compatible with the TC1426/TC1427/TC1428, TC4426/TC4427/TC4428 and TC4426A/ TC4427A/TC4428A devices.
- Space-saving 8-Pin 6x5 DFN Package

Applications

- Switch Mode Power Supplies
- · Pulse Transformer Drive
- Line Drivers

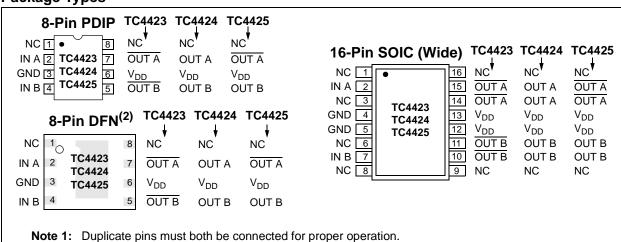
General Description

The TC4423/TC4424/TC4425 devices are a family of 3A, dual-output buffers/MOSFET drivers. Pin compatible with the TC1426/27/28, TC4426/27/28 and TC4426A/27A/28A dual 1.5A driver families, the TC4423/24/25 family has an increased latch-up current rating of 1.5A, making them even more robust for operation in harsh electrical environments.

As MOSFET drivers, the TC4423/TC4424/TC4425 can easily charge 1800 pF gate capacitance in under 35 nsec, providing low enough impedances in both the on and off states to ensure the MOSFET's intended state will not be affected, even by large transients.

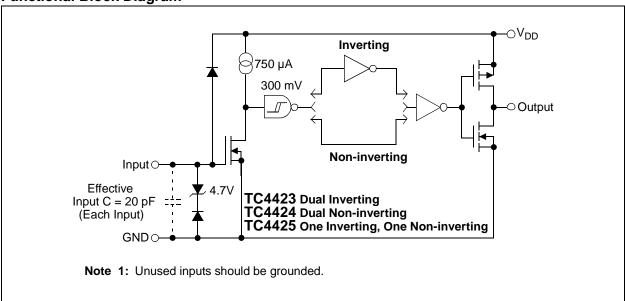
The TC4423/TC4424/TC4425 inputs may be driven directly from either TTL or CMOS (2.4V to 18V). In addition, the 300 mV of built-in hysteresis provides noise immunity and allows the device to be driven from slowly rising or falling waveforms.

Package Types⁽¹⁾



2: Exposed pad of the DFN package is electrically isolated.

Functional Block Diagram⁽¹⁾



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings †

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

[†] **Notice:** Stresses above those listed under "Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability.

DC CHARACTERISTICS

Electrical Specifications: Unless otherwise indicated, $T_A = +25^{\circ}C$, with 4.5V $\leq V_{DD} \leq 18V$.								
Parameters	Sym	Min	Тур	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	_	1	μΑ	$0V \le V_{IN} \le V_{DD}$		
Output								
High Output Voltage	V _{OH}	V _{DD} – 0.025	_	_	V			
Low Output Voltage	V_{OL}	_	_	0.025	V			
Output Resistance, High	R _{OH}	_	2.8	5	Ω	I _{OUT} = 10 mA, V _{DD} = 18V		
Output Resistance, Low	R _{OL}	_	3.5	5	Ω	I _{OUT} = 10 mA, V _{DD} = 18V		
Peak Output Current	I _{PK}	_	3	_	Α			
Latch-Up Protection With- stand Reverse Current	I _{REV}	_	>1.5	_	Α	Duty cycle \leq 2%, t \leq 300 µsec.		
Switching Time (Note 1)					•			
Rise Time	t _R	_	23	35	ns	Figure 4-1 , Figure 4-2 , C _L = 1800 pF		
Fall Time	t _F	_	25	35	ns	Figure 4-1 , Figure 4-2 , C _L = 1800 pF		
Delay Time	t _{D1}	_	33	75	ns	Figure 4-1 , Figure 4-2 , C _L = 1800 pF		
Delay Time	t _{D2}	_	38	75	ns	Figure 4-1 , Figure 4-2 , C _L = 1800 pF		
Power Supply								
Power Supply Current	I _S	_ _	1.5 0.15	2.5 0.25	mA	V _{IN} = 3V (Both inputs) V _{IN} = 0V (Both inputs)		

Note 1: Switching times ensured by design.

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

DC CHARACTERISTICS (OVER OPERATING TEMPERATURE RANGE)

Electrical Specifications: Unless otherwise indicated, operating temperature range with $4.5V \le V_{DD} \le 18V$.										
Parameters	Sym	Min	Тур	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}	-10	_	+10	μΑ	$0V \le V_{IN} \le V_{DD}$				
Output										
High Output Voltage	V _{OH}	V _{DD} – 0.025	_	_	V					
Low Output Voltage	V _{OL}	_	_	0.025	V					
Output Resistance, High	R _{OH}	_	3.7	8	Ω	I _{OUT} = 10 mA, V _{DD} = 18V				
Output Resistance, Low	R _{OL}	_	4.3	8	Ω	I _{OUT} = 10 mA, V _{DD} = 18V				
Peak Output Current	I _{PK}	_	3.0	_	Α					
Latch-Up Protection Withstand Reverse Current	I _{REV}	_	>1.5	_	Α	Duty cycle ≤2%, t ≤300 µsec				
Switching Time (Note 1)				•	•					
Rise Time	t _R	_	28	60	ns	Figure 4-1 , Figure 4-2 , C _L = 1800 pF				
Fall Time	t _F	_	32	60	ns	Figure 4-1 , Figure 4-2 , C _L = 1800 pF				
Delay Time	t _{D1}	_	32	100	ns	Figure 4-1 , Figure 4-2 , C _L = 1800 pF				
Delay Time	t _{D2}	_	38	100	ns	Figure 4-1 , Figure 4-2 , C _L = 1800 pF				
Power Supply										
Power Supply Current	I _S		2.0 0.2	3.5 0.3	mA	V _{IN} = 3V (Both inputs) V _{IN} = 0V (Both inputs)				

Note 1: Switching times ensured by design.

TEMPERATURE CHARACTERISTICS

Electrical Specifications: Unless otherwise noted, all parameters apply with $4.5V \le V_{DD} \le 18V$.								
Parameters	Sym	Min	Тур	Max	Units	Conditions		
Temperature Ranges								
Specified Temperature Range (C)	T _A	0	_	+70	°C			
Specified Temperature Range (E)	T _A	-40	_	+85	°C			
Specified Temperature Range (V)	T _A	-40	_	+125	°C			
Maximum Junction Temperature	TJ	_	_	+150	°C			
Storage Temperature Range	T _A	-65	_	+150	°C			
Package Thermal Resistances								
Thermal Resistance, 8L-6x5 DFN	θ_{JA}	_	33.2	_	°C/W	Typical four-layer board with vias to ground plane		
Thermal Resistance, 8L-PDIP	$\theta_{\sf JA}$	_	125	_	°C/W			
Thermal Resistance, 16L-SOIC	θ_{JA}	_	155	_	°C/W			

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.

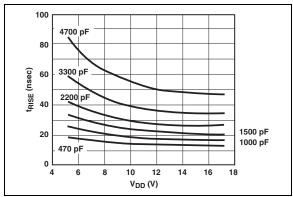


FIGURE 2-1: Rise Time vs. Supply Voltage.

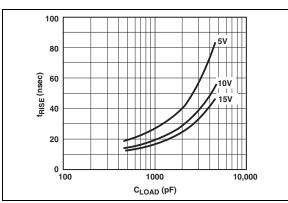


FIGURE 2-2: Rise Time vs. Capacitive Load.

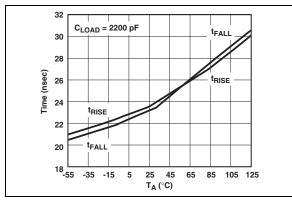


FIGURE 2-3: Rise and Fall Times vs. Temperature.

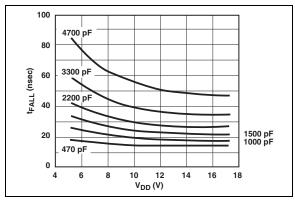


FIGURE 2-4: Fall Time vs. Supply Voltage.

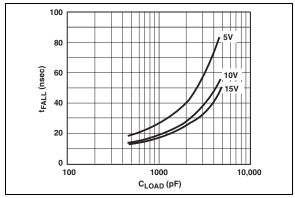


FIGURE 2-5: Fall Time vs. Capacitive Load.

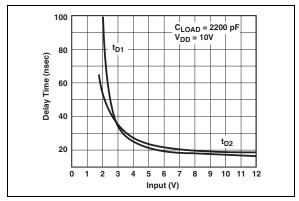


FIGURE 2-6: Propagation Delay vs. Input Amplitude.

Typical Performance Curves (Continued)

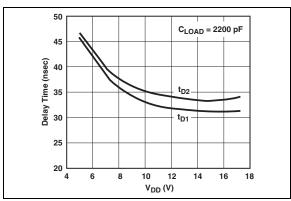


FIGURE 2-7: Propagation Delay Time vs. Supply Voltage.

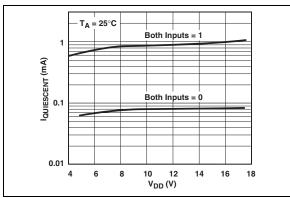


FIGURE 2-8: Quiescent Current vs. Supply Voltage.

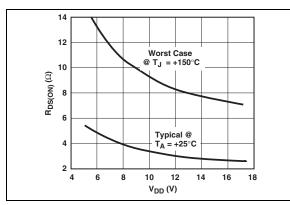


FIGURE 2-9: Output Resistance (Output High) vs. Supply Voltage.

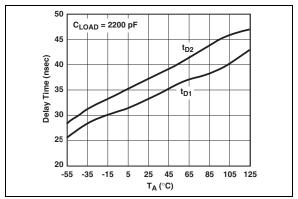


FIGURE 2-10: Propagation Delay Time vs. Temperature.

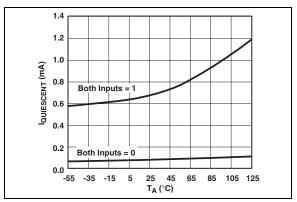


FIGURE 2-11: Quiescent Current vs. Temperature.

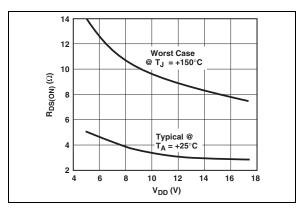


FIGURE 2-12: Output Resistance (Output Low) vs. Supply Voltage.

Typical Performance Curves (Continued)

Note: Load on single output only

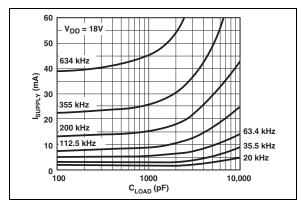


FIGURE 2-13: Capacitive Load.

Supply Current vs.

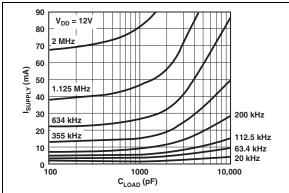


FIGURE 2-14: Supply Current vs. Capacitive Load.

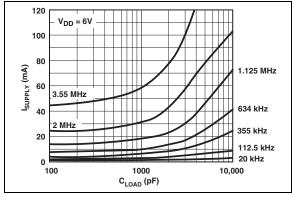


FIGURE 2-15: Capacitive Load.

Supply Current vs.

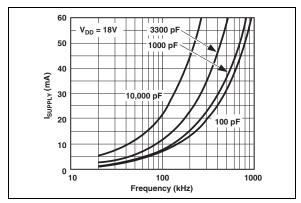


FIGURE 2-16: Frequency.

Supply Current vs.

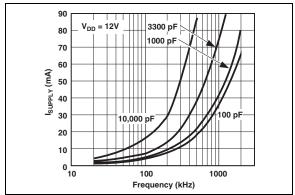


FIGURE 2-17: Frequency.

Supply Current vs.

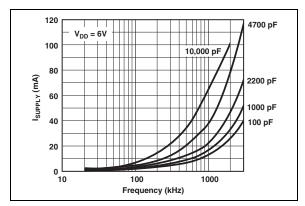


FIGURE 2-18: Frequency.

Supply Current vs.

Typical Performance Curves (Continued)

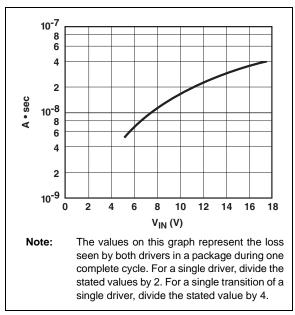


FIGURE 2-19: TC4423 Crossover Energy.

3.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in Table 3-1.

TABLE 3-1: PIN FUNCTION TABLE (1)

8-Pin PDIP	8-Pin DFN	16-Pin SOIC (Wide)	Symbol	Description
1	1	1	NC	No connection
2	2	2	IN A	Input A
_	_	3	NC	No connection
3	3	4	GND	Ground
_	_	5	GND	Ground
_	_	6	NC	No connection
4	4	7	IN B	Input B
_	_	8	NC	No connection
_	_	9	NC	No connection
5	5	10	OUT B	Output B
_	_	11	OUT B	Output B
6	6	12	V_{DD}	Supply input
_	_	13	V_{DD}	Supply input
7	7	14	OUT A	Output A
_	_	15	OUT A	Output A
8	8	16	NC	No connection
_	PAD	_	NC	Exposed Metal Pad

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

3.1 Inputs A and B

Inputs A and B are TTL/CMOS compatible inputs that control outputs A and B, respectively. These inputs have 300 mV of hysteresis between the high and low input levels, allowing them to be driven from slow rising and falling signals, and to provide noise immunity.

3.2 Outputs A and B

Outputs A and B are CMOS push-pull outputs that are capable of sourcing and sinking 3A peaks of current ($V_{DD} = 18V$). The low output impedance ensures the gate of the external MOSFET will stay in the intended state even during large transients. These outputs also have a reverse current latch-up rating of 1.5A.

3.3 Supply Input (V_{DD})

 V_{DD} is the bias supply input for the MOSFET driver and has a voltage range of 4.5V to 18V. This input must be decoupled to ground with a local ceramic capacitor. This bypass capacitor provides a localized low-impedance path for the peak currents that are to be provided to the load.

3.4 Ground (GND)

Ground is the device return pin. The ground pin(s) should have a low-impedance connection to the bias supply source return. High peak currents will flow out the ground pin(s) when the capacitive load is being discharged.

3.5 Exposed Metal Pad

The exposed metal pad of the 6x5 DFN 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.

4.0 APPLICATIONS INFORMATION

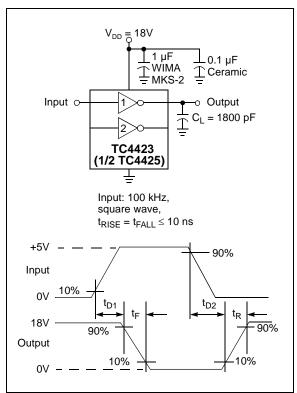


FIGURE 4-1: Inverting Driver Switching Time.

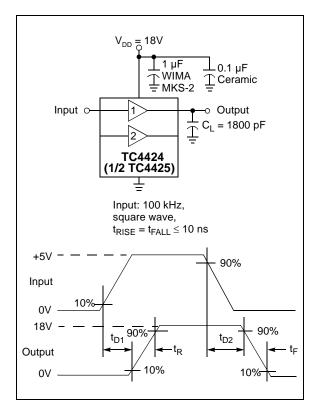


FIGURE 4-2: Non-inverting Driver Switching Time.

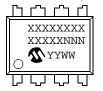
5.0 PACKAGING INFORMATION

5.1 Package Marking Information

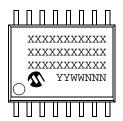
8-Lead DFN



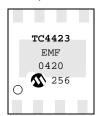
8-Lead PDIP (300 mil)



16-Lead SOIC (300 mil)

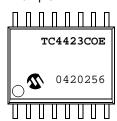


Example:





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)

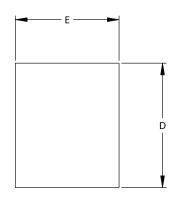
This package is Pb-free. The Pb-free JEDEC designator (e3)

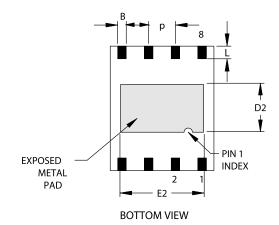
can be found on the outer packaging for this package.

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.

8-Lead Plastic Dual Flat No Lead Package (MF) 6x5 mm Body (DFN-S) - Saw Singulated

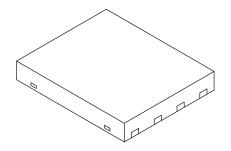
For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging







TOP VIEW



	Units	INCHES			MILLIMETERS*		
Dimension Lim	Dimension Limits			MAX	MIN	NOM	MAX
Number of Pins	n		8			8	
Pitch	р		.050 BSC			1.27 BSC	
Overall Height	Α	.033	.035	.037	0.85	0.90	0.95
Package Thickness	A2	.031	.035	.037	0.80	0.89	0.95
Standoff	A1	.000	.0004	.002	0.00	0.01	0.05
Base Thickness	A3	.007	.008	.009	0.17	0.20	0.23
Overall Length	E	.195	.197	.199	4.95	5.00	5.05
Exposed Pad Length	E2	.152	.157	.163	3.85	4.00	4.15
Overall Width	D	.234	.236	.238	5.95	6.00	6.05
Exposed Pad Width	D2	.089	.091	.093	2.25	2.30	2.35
Lead Width	В	.014	.016	.019	0.35	0.40	0.47
Lead Length	L	.024		.026	0.60		0.65

Notes:

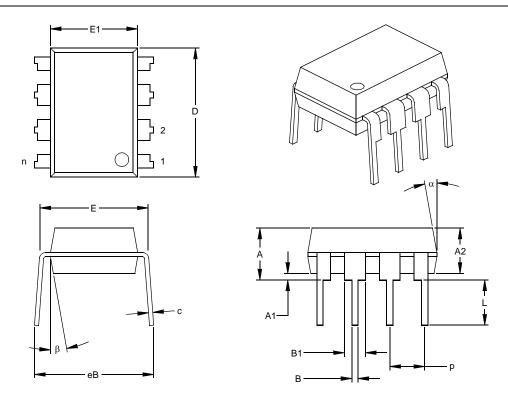
JEDEC equivalent: MO-220

Drawing No. C04-122

Revised 11/3/03

8-Lead Plastic Dual In-line (P) - 300 mil (PDIP)

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



	Units		INCHES*		MILLIMETERS		
Dimensi	on Limits	MIN	NOM	MAX	MIN	NOM	MAX
Number of Pins	n		8			8	
Pitch	р		.100			2.54	
Top to Seating Plane	Α	.140	.155	.170	3.56	3.94	4.32
Molded Package Thickness	A2	.115	.130	.145	2.92	3.30	3.68
Base to Seating Plane	A1	.015			0.38		
Shoulder to Shoulder Width	Е	.300	.313	.325	7.62	7.94	8.26
Molded Package Width	E1	.240	.250	.260	6.10	6.35	6.60
Overall Length	D	.360	.373	.385	9.14	9.46	9.78
Tip to Seating Plane	L	.125	.130	.135	3.18	3.30	3.43
Lead Thickness	С	.008	.012	.015	0.20	0.29	0.38
Upper Lead Width	B1	.045	.058	.070	1.14	1.46	1.78
Lower Lead Width	В	.014	.018	.022	0.36	0.46	0.56
Overall Row Spacing	§ eB	.310	.370	.430	7.87	9.40	10.92
Mold Draft Angle Top	α	5	10	15	5	10	15
Mold Draft Angle Bottom	β	5	10	15	5	10	15

Notes:

Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed

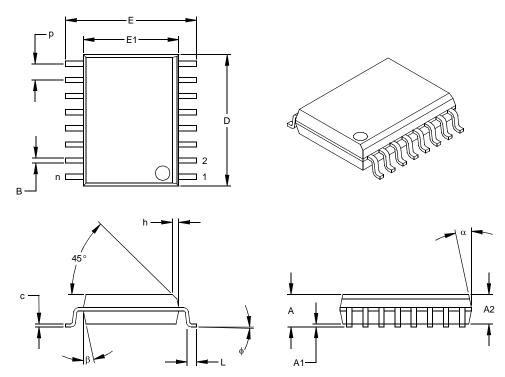
.010" (0.254mm) per side. JEDEC Equivalent: MS-001

Drawing No. C04-018

^{*} Controlling Parameter § Significant Characteristic

16-Lead Plastic Small Outline (SO) - Wide, 300 mil (SOIC)

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



	Units		INCHES*		I.	MILLIMETERS		
Dimension	n Limits	MIN	NOM	MAX	MIN	NOM	MAX	
Number of Pins	n		16			16		
Pitch	р		.050			1.27		
Overall Height	Α	.093	.099	.104	2.36	2.50	2.64	
Molded Package Thickness	A2	.088	.091	.094	2.24	2.31	2.39	
Standoff §	A1	.004	.008	.012	0.10	0.20	0.30	
Overall Width	Е	.394	.407	.420	10.01	10.34	10.67	
Molded Package Width	E1	.291	.295	.299	7.39	7.49	7.59	
Overall Length	D	.398	.406	.413	10.10	10.30	10.49	
Chamfer Distance	h	.010	.020	.029	0.25	0.50	0.74	
Foot Length	L	.016	.033	.050	0.41	0.84	1.27	
Foot Angle	ф	0	4	8	0	4	8	
Lead Thickness	С	.009	.011	.013	0.23	0.28	0.33	
Lead Width	В	.014	.017	.020	0.36	0.42	0.51	
Mold Draft Angle Top	α	0	12	15	0	12	15	
Mold Draft Angle Bottom	β	0	12	15	0	12	15	

^{*} Controlling Parameter

Notes:

Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed

.010" (0.254mm) per side.

JEDEC Equivalent: MS-013

Drawing No. C04-102

[§] Significant Characteristic

6.0 REVISION HISTORY

Revision E (December 2012)

Added a note to each package outline drawing.



PRODUCT IDENTIFICATION SYSTEM

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

PART NO. X	<u>xx</u>	<u>xxx</u>	¥	Exa	amples:	
Device Tempe Rar	•	Tape & Reel	PB Free	a)	TC4423COE:	3A Dual Inverting MOSFET Driver, 0°C to +70°C, 16LD SOIC package.
Device:	TC4424: 3A Dual M	OSFET Driver, Ir OSFET Driver, N OSFET Driver, C	lon-Inverting	b)	TC4423CPA:	3A Dual Inverting MOSFET Driver, 0°C to +70°C, 8LD PDIP package.
Temperature Range:	C = 0°C to +70° E = -40°C to +8 V = -40°C to +1		C Only)	c)	TC4423VMF:	3A Dual Inverting MOSFET Driver, -40°C to +125°C, 8LD DFN package.
Package:	MF713 = Dual, Flat, I (Tape and I OE = SOIC (Wide OE713 = SOIC (Wide	Reel) e), 16-pin	n Body), 8-lead and Reel)	a)	TC4424COE713:	3A Dual Non-Inverting, MOSFET Driver, 0°C to +70°C, 16LD SOIC package, Tape and Reel.
PB Free:	G = Lead-Free = Blank * Available on selected		ract your local calco	b)	TC4424EPA:	3A Dual Non-Inverting, MOSFET Driver, -40°C to +85°C, 8LD PDIP package.
	representative for ava		act your local sales	a)	TC4425EOE:	3A Dual Complementary, MOSFET Driver, -40°C to +85°C, 16LD SOIC package.
				b)	TC4425CPA:	3A Dual Complementary, MOSFET Driver, 0°C to +70°C, PDIP package.

Sales and Support

Data Sheets

Products supported by a preliminary Data Sheet may have an errata sheet describing minor operational differences and recommended workarounds. To determine if an errata sheet exists for a particular device, please contact one of the following:

- 1. Your local Microchip sales office
- 2. The Microchip Worldwide Site (www.microchip.com)

Please specify which device, revision of silicon and Data Sheet (include Literature #) you are using.

Customer Notification System

Register on our web site (www.microchip.com/cn) to receive the most current information on our products.

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."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights.

QUALITY MANAGEMENT SYSTEM CERTIFIED BY DNV = ISO/TS 16949=

Trademarks

The Microchip name and logo, the Microchip logo, dsPIC, FlashFlex, KEELOQ, KEELOQ logo, MPLAB, PIC, PICmicro, PICSTART, PIC³² logo, rfPIC, SST, SST Logo, SuperFlash and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

FilterLab, Hampshire, HI-TECH C, Linear Active Thermistor, MTP, SEEVAL and The Embedded Control Solutions Company are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Silicon Storage Technology is a registered trademark of Microchip Technology Inc. in other countries.

Analog-for-the-Digital Age, Application Maestro, BodyCom, chipKIT, chipKIT logo, CodeGuard, dsPICDEM, dsPICDEM.net, dsPICworks, dsSPEAK, ECAN, ECONOMONITOR, FanSense, HI-TIDE, In-Circuit Serial Programming, ICSP, Mindi, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, mTouch, Omniscient Code Generation, PICC, PICC-18, PICDEM, PICDEM.net, PICkit, PICtail, REAL ICE, rfLAB, Select Mode, SQI, Serial Quad I/O, Total Endurance, TSHARC, UniWinDriver, WiperLock, ZENA and Z-Scale are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

GestIC and ULPP are registered trademarks of Microchip Technology Germany II GmbH & Co. & KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2002-2012, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

Printed on recycled paper.

ISBN: 9781620767962

Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC® MCUs and dsPIC® DSCs, KEELOQ® code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.



Worldwide Sales and Service

AMERICAS

Corporate Office

2355 West Chandler Blvd. Chandler, AZ 85224-6199 Tel: 480-792-7200 Fax: 480-792-7277

Technical Support: http://www.microchip.com/

support

Web Address: www.microchip.com

Atlanta

Duluth, GA Tel: 678-957-9614 Fax: 678-957-1455

Boston

Westborough, MA Tel: 774-760-0087 Fax: 774-760-0088

Chicago Itasca, IL

Tel: 630-285-0071 Fax: 630-285-0075

Cleveland

Independence, OH Tel: 216-447-0464 Fax: 216-447-0643

Dallas

Addison, TX Tel: 972-818-7423 Fax: 972-818-2924

Detroit

Farmington Hills, MI Tel: 248-538-2250 Fax: 248-538-2260

Indianapolis

Noblesville, IN Tel: 317-773-8323 Fax: 317-773-5453

Los Angeles

Mission Viejo, CA Tel: 949-462-9523 Fax: 949-462-9608

Santa Clara

Santa Clara, CA Tel: 408-961-6444 Fax: 408-961-6445

Toronto

Mississauga, Ontario,

Canada

Tel: 905-673-0699 Fax: 905-673-6509

ASIA/PACIFIC

Asia Pacific Office

Suites 3707-14, 37th Floor Tower 6, The Gateway Harbour City, Kowloon Hong Kong

Tel: 852-2401-1200 Fax: 852-2401-3431

Australia - Sydney Tel: 61-2-9868-6733

Fax: 61-2-9868-6755

China - Beijing

Tel: 86-10-8569-7000 Fax: 86-10-8528-2104

China - Chengdu

Tel: 86-28-8665-5511 Fax: 86-28-8665-7889

China - Chongqing

Tel: 86-23-8980-9588 Fax: 86-23-8980-9500

China - Hangzhou

Tel: 86-571-2819-3187 Fax: 86-571-2819-3189

China - Hong Kong SAR

Tel: 852-2943-5100 Fax: 852-2401-3431

China - Nanjing

Tel: 86-25-8473-2460 Fax: 86-25-8473-2470

China - Qingdao

Tel: 86-532-8502-7355 Fax: 86-532-8502-7205

China - Shanghai

Tel: 86-21-5407-5533 Fax: 86-21-5407-5066

China - Shenyang

Tel: 86-24-2334-2829 Fax: 86-24-2334-2393

China - Shenzhen

Tel: 86-755-8864-2200 Fax: 86-755-8203-1760

China - Wuhan

Tel: 86-27-5980-5300 Fax: 86-27-5980-5118

China - Xian

Tel: 86-29-8833-7252 Fax: 86-29-8833-7256

China - Xiamen

Tel: 86-592-2388138 Fax: 86-592-2388130

China - Zhuhai

Tel: 86-756-3210040 Fax: 86-756-3210049

ASIA/PACIFIC

India - Bangalore

Tel: 91-80-3090-4444 Fax: 91-80-3090-4123

India - New Delhi

Tel: 91-11-4160-8631 Fax: 91-11-4160-8632

India - Pune

Tel: 91-20-2566-1512 Fax: 91-20-2566-1513

Japan - Osaka

Tel: 81-66-152-7160 Fax: 81-66-152-9310

Japan - Yokohama

Tel: 81-45-471- 6166 Fax: 81-45-471-6122

Korea - Daegu

Tel: 82-53-744-4301 Fax: 82-53-744-4302

Korea - Seoul

Tel: 82-2-554-7200 Fax: 82-2-558-5932 or 82-2-558-5934

Malaysia - Kuala Lumpur

Tel: 60-3-6201-9857 Fax: 60-3-6201-9859

Malaysia - Penang

Tel: 60-4-227-8870 Fax: 60-4-227-4068

Philippines - Manila

Tel: 63-2-634-9065 Fax: 63-2-634-9069

Singapore

Tel: 65-6334-8870 Fax: 65-6334-8850

Taiwan - Hsin Chu

Tel: 886-3-5778-366 Fax: 886-3-5770-955

Taiwan - Kaohsiung

Tel: 886-7-213-7828 Fax: 886-7-330-9305

Taiwan - Taipei

Tel: 886-2-2508-8600 Fax: 886-2-2508-0102

Thailand - Bangkok

Tel: 66-2-694-1351 Fax: 66-2-694-1350

EUROPE

Austria - Wels

Tel: 43-7242-2244-39 Fax: 43-7242-2244-393 Denmark - Copenhagen

Tel: 45-4450-2828 Fax: 45-4485-2829

France - Paris

Tel: 33-1-69-53-63-20 Fax: 33-1-69-30-90-79

Germany - Munich

Tel: 49-89-627-144-0 Fax: 49-89-627-144-44

Italy - Milan

Tel: 39-0331-742611 Fax: 39-0331-466781

Netherlands - Drunen

Tel: 31-416-690399 Fax: 31-416-690340

Spain - Madrid

Tel: 34-91-708-08-90 Fax: 34-91-708-08-91

UK - Wokingham Tel: 44-118-921-5869 Fax: 44-118-921-5820

11/27/12