



September 2005

FAN8024ED 4-Channel Motor Driver

Features

- 2-Channel BTL driver with current feedback
- 2-Channel BTL DC motor driver
- Built-in thermal shutdown circuit
- Built-in mute circuit
- Operating supply voltage: 4.5~13.2V

Typical Applications

- Compact disk ROM (CD-ROM)
- Compact disk RW (CD-RW)
- Digital video disk ROM (DVD-ROM)
- Digital video disk RAM (DVD-RAM)
- Digital video disk player (DVDP)
- Other compact disk media

Description

The FAN8024ED is a monolithic IC, suitable for 2-ch BTL DC motor drivers and 2-ch motor drivers with current feedback which drive the focus and tracking actuators of a CD media system.

28-SSOPH-375



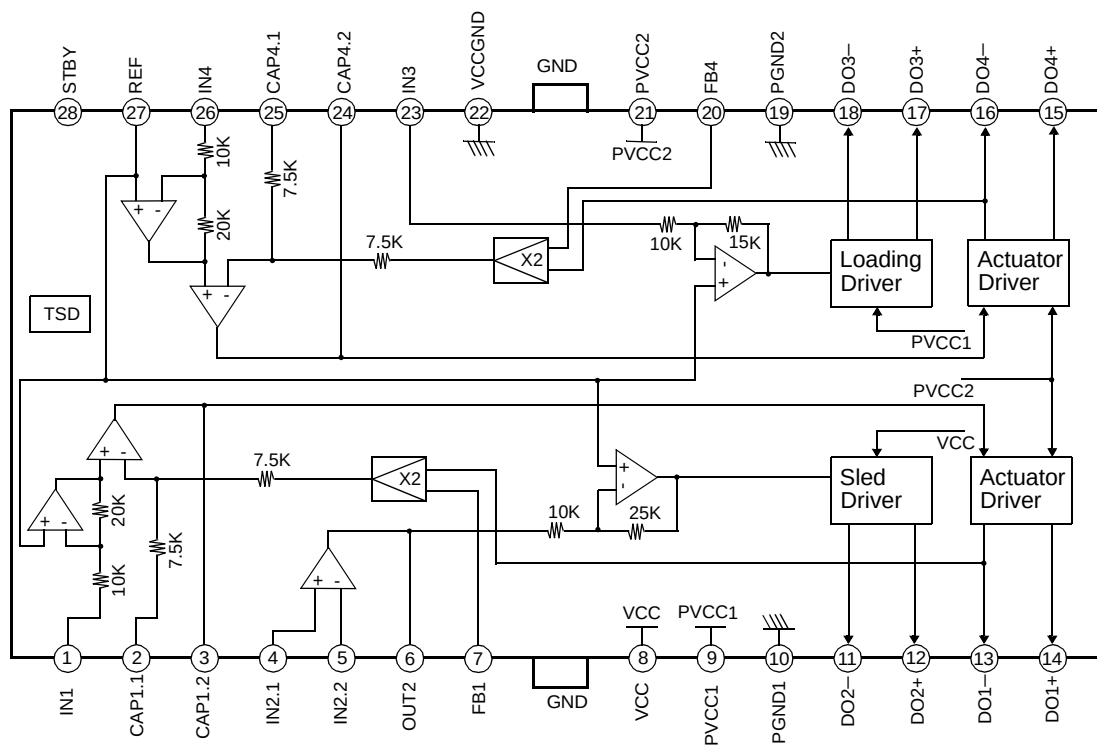
Ordering Information

Device	Package	Operating Temp.
FAN8024ED	28-SSOPH-375	-25 °C ~ 85 °C
FAN8024EDTF	28-SSOPH-375	-25 °C ~ 85 °C

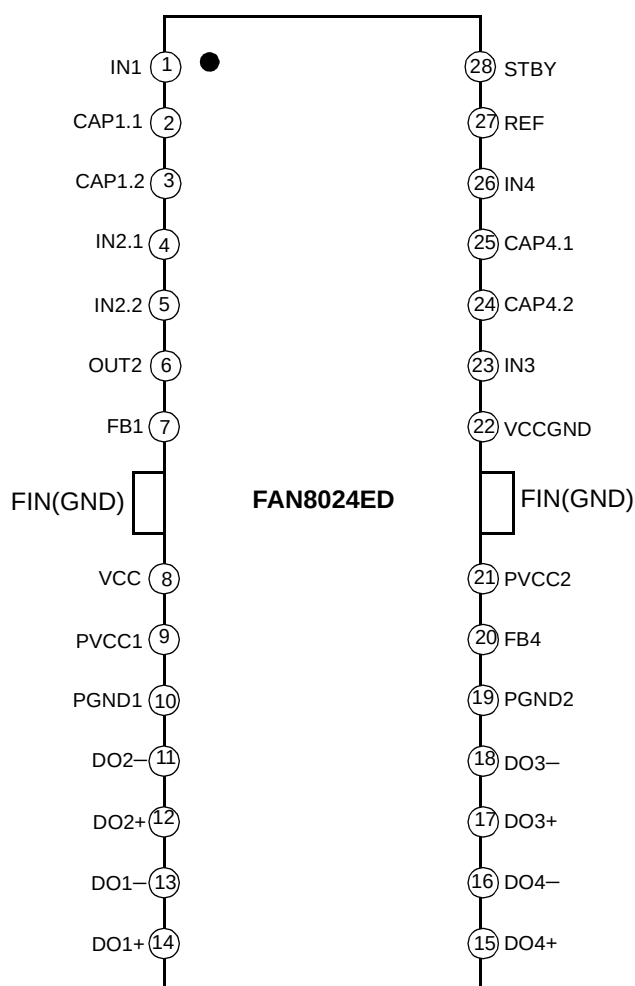
TF: Tape & Reel type



Block Diagrams



Pin Assignments



Pin Definitions

Pine Number	Pin Name	I/O	Pin Function Description
1	IN1	I	CH1 input
2	CAP1.1	-	Connection with capacitor for CH1
3	CAP1.2	-	
4	IN2.1	I	OP-AMP CH2 input(+)
5	IN2.2	I	OP-AMP CH2 input(-)
6	OUT2	O	OP-AMP CH2 output
7	FB1	I	Feedback for CH1
8	VCC	-	Signal Vcc
9	PVCC1	-	Power Supply 1
10	PGND1	-	Power Ground 1
11	DO2-	O	Drive2 Output (-)
12	DO2+	O	Drive2 Output (+)
13	DO1-	O	Drive1 Output (-)
14	DO1+	O	Drive1 Output (+)
15	DO4+	O	Drive4 Output (+)
16	DO4-	O	Drive4 Output (-)
17	DO3+	O	Drive3 Output (+)
18	DO3-	O	Drive3 Output (-)
19	PGND2	-	Power Ground 2
20	FB4	-	Feedback for CH4
21	PVCC2	-	Power Supply 2
22	VCCGND	-	Vcc ground
23	IN3	I	CH3 input
24	CAP4.2	-	Connection with capacitor for CH4
25	CAP4.1	-	
26	IN4	I	CH4 input
27	REF	I	Bias voltage input
28	STBY	I	Stand-by input

Equivalent Circuits

ERROR AMP INPUT

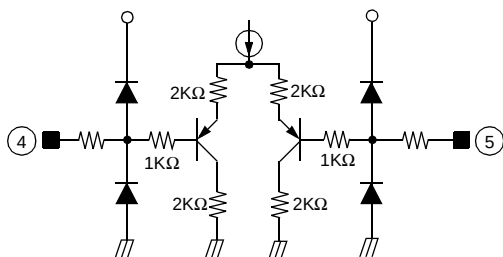


Figure 1. Error Amp Input

STAND-BY INPUT

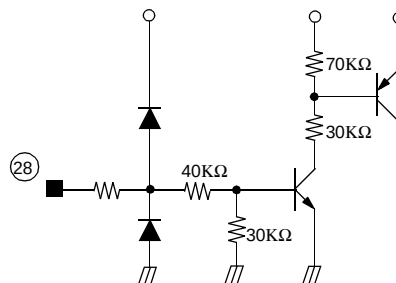


Figure 4. Stand-By Input

ERROR AMP OUTPUT

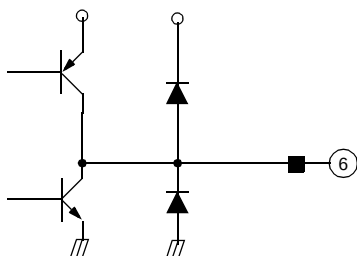


Figure 2. Error Amp Output

SIGNAL REFERENCE INPUT

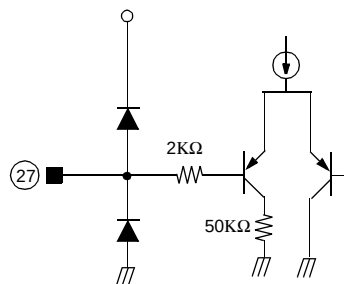


Figure 5. Signal Reference Input

POWER AMP OUTPUT

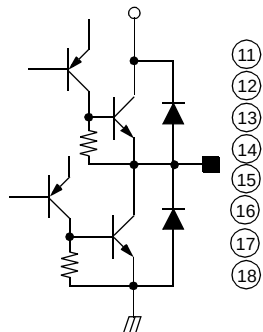


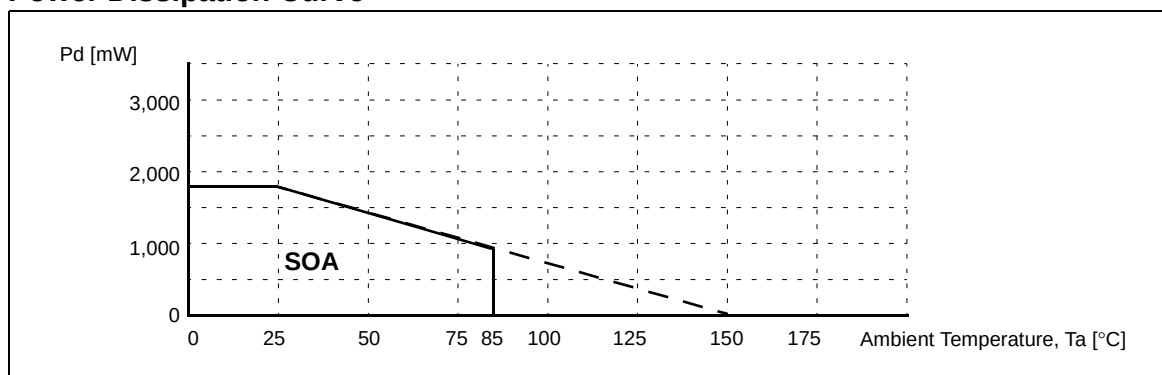
Figure 3. Power Amp Output

Absolute Maximum Ratings (Ta = 25°C)

Parameter	Symbol	Value	Unit
Maximum supply voltage	V_{CCmax}	15	V
Power dissipation	P_D	1.7 ^{note}	W
Operating temperature range	T_{OPR}	-25 ~ +85	°C
Storage temperature range	T_{STG}	-55 ~ +150	°C

Note:

1. When mounted on a 50mm × 50mm × 1mm PCB (Phenolic Resin Material).
2. Power dissipation derating rate: -13.6mW/°C ($T_a \geq 25^\circ\text{C}$).
3. Must not exceed P_D (Power dissipation) and SOA (Safe operating area).

Power Dissipation Curve**Recommended Operating Conditions (Ta = 25°C)**

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}	4.5	-	13.2	V
Supply Voltage	PV_{CC1}, PV_{CC2}	-	V_{CC}	-	V

Electrical Characteristics

(Unless otherwise specified, Ta = 25 °C, V_{CC} = 12V, PV_{CC}1,2 = 5V)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Quiescent Current1	I _{CC1}	Stand-by off	-	18	27	mA
Quiescent Current2	I _{CC2}	Stand-by on	-	-	0.5	mA
Stand-by On Voltage	V _{STon}	-	-	-	0.5	V
Stand-by Off Voltage	V _{SToff}	-	2.0	-	-	V
ACTUATOR DRIVE CIRCUIT						
Output Offset Current	I _{OO1,4}	-	-6	0	+6	mA
Maximum Output Voltage1	V _{OM1,4}	-	3.6	4.0	-	V
Transconductance	G _{M1,4}	V _{IN} = 100mVp-p, f=1kHz	1.5	1.7	1.9	A/V
PRE OP AMP (SLED DRIVER)						
Common mode Input Range*	V _{OOM}	-	0	-	11.0	V
Input Bias Current	I _B	-	-300	-30	-	nA
Low Level Output Voltage	V _{OL}	-	-	0.1	0.3	V
High Level Output Voltage	V _{OH}	-	10	10.9	-	V
Output Source Current	I _{SOURCE}	-	1	4	-	mA
Output Sink Current	I _{SINK}	-	5	10	-	mA
SLED DRIVE CIRCUIT						
Output Offset voltage2	V _{OF2}	-	-100	0	+100	mV
Maximum Output Voltage2	V _{OM2}	-	10.0	10.9	-	V
Closed loop Voltage Gain2	G _{VLO2}	V _{IN} = 100mVp-p, f=1kHz	18.0	20.0	22.0	dB
Loading DRIVE CIRCUIT						
Output Offset Voltage3	V _{OF3}	-	-50	0	50	mV
Maximum Output Voltage 3	V _{OM3}	-	3.6	4.0	-	V
Closed loop Voltage Gain 3	G _{VLO3}	V _{IN} = 100mVp-p, f=1kHz	13.5	15.5	17.5	dB

*: Guaranteed design value

Application Information

1. Reference Input & Stand-by Function

- Reference input (PIN 27)
The applied voltage at the reference input pin must be between 0.8V and 6.5V_r when $V_{CC}=8.5V$.
- Stand-by input (PIN 28)
The following input conditions must be satisfied for the stand-by function.

Stand-by input voltage	OPERATION
Below 0.5V or open	The stand-by function is activated so the bias block and power block are disabled
Above 2.0V	Recover the normal operation

2. Protection Function

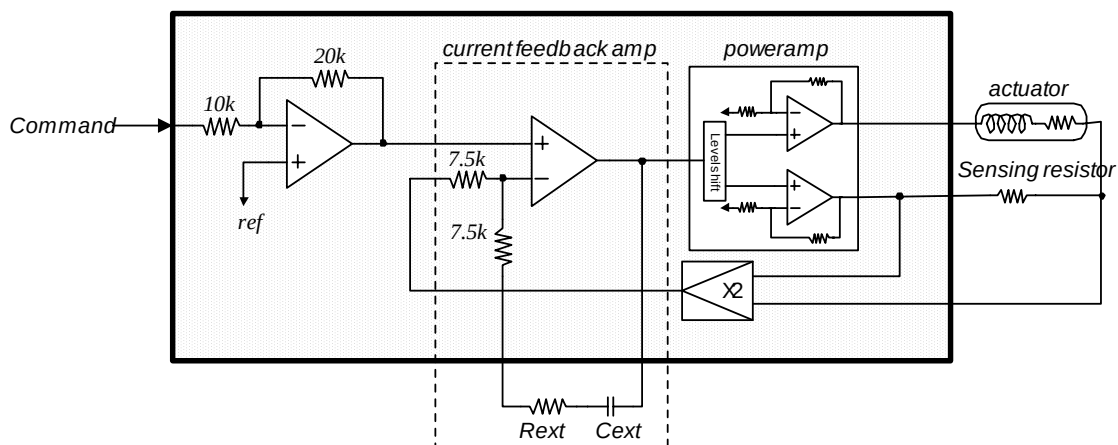
Thermal shutdown (TSD)

If the chip temperature rises above 175°C, the thermal shutdown (TSD) circuit is activated and the output circuit enters the mute state, which is off state. The TSD circuit has a temperature hysteresis of 25°C.

3. Separation of Power Supply

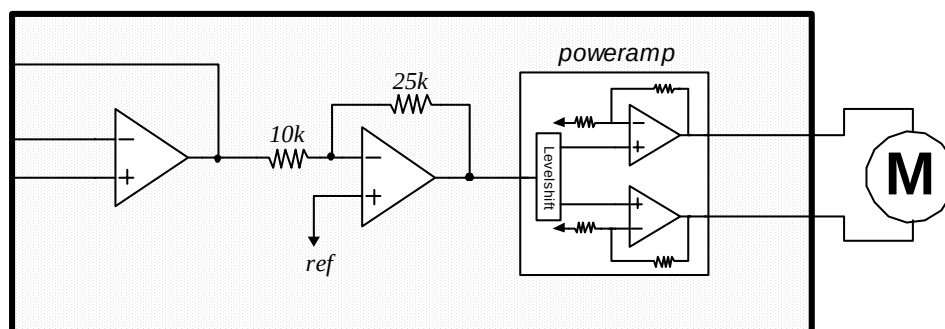
- PV_{CC1} (PIN 9)
 PV_{CC1} is the power supply for the loading driver. The range is between 5V~12V.
- PV_{CC2} (PIN 21)
 PV_{CC2} is the power supply for the actuator drivers that include focus and tracking actuators. The range is between 5V~12V
- V_{CC} (PIN 8)
 V_{CC} pin supplies power for the sled driver and the signal logic part. $V_{CC} \geq PV_{CC1}(PV_{CC2})$.

4. Current feedback channels (channel 1 & 4)



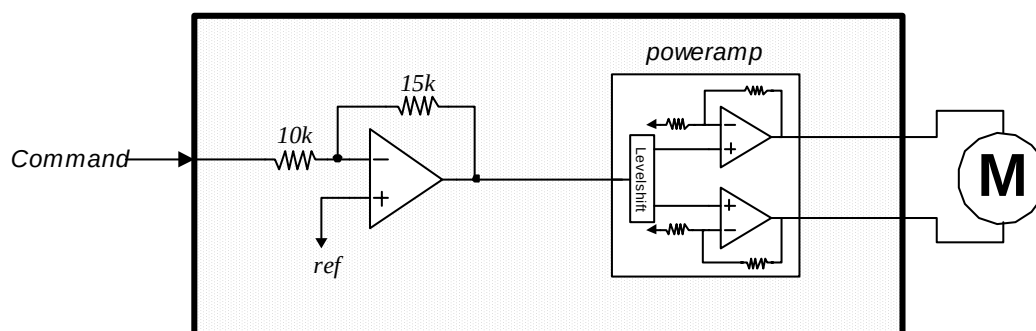
- The reference voltage(ref) is supplied externally through pin 27.
- The input OP-amp output signal is amplified by (20K/10K) times and then fed to the current feedback amplifier.
- The current feedback amplifier compares the output current sensed input and command input and then makes the controlled output to eliminate delay effect of the load. Please refer to the Application Note 4109 for additional information about current feedback theory (<http://www.fairchildsemi.com/an/AN/AN-4109.pdf>).
- The DC gain of current feedback amplifier and power amplifier is unity, which is 1 [A/V]. Users can change the gain by adding external resistor at the command input.

5. Channel 2 Schematic

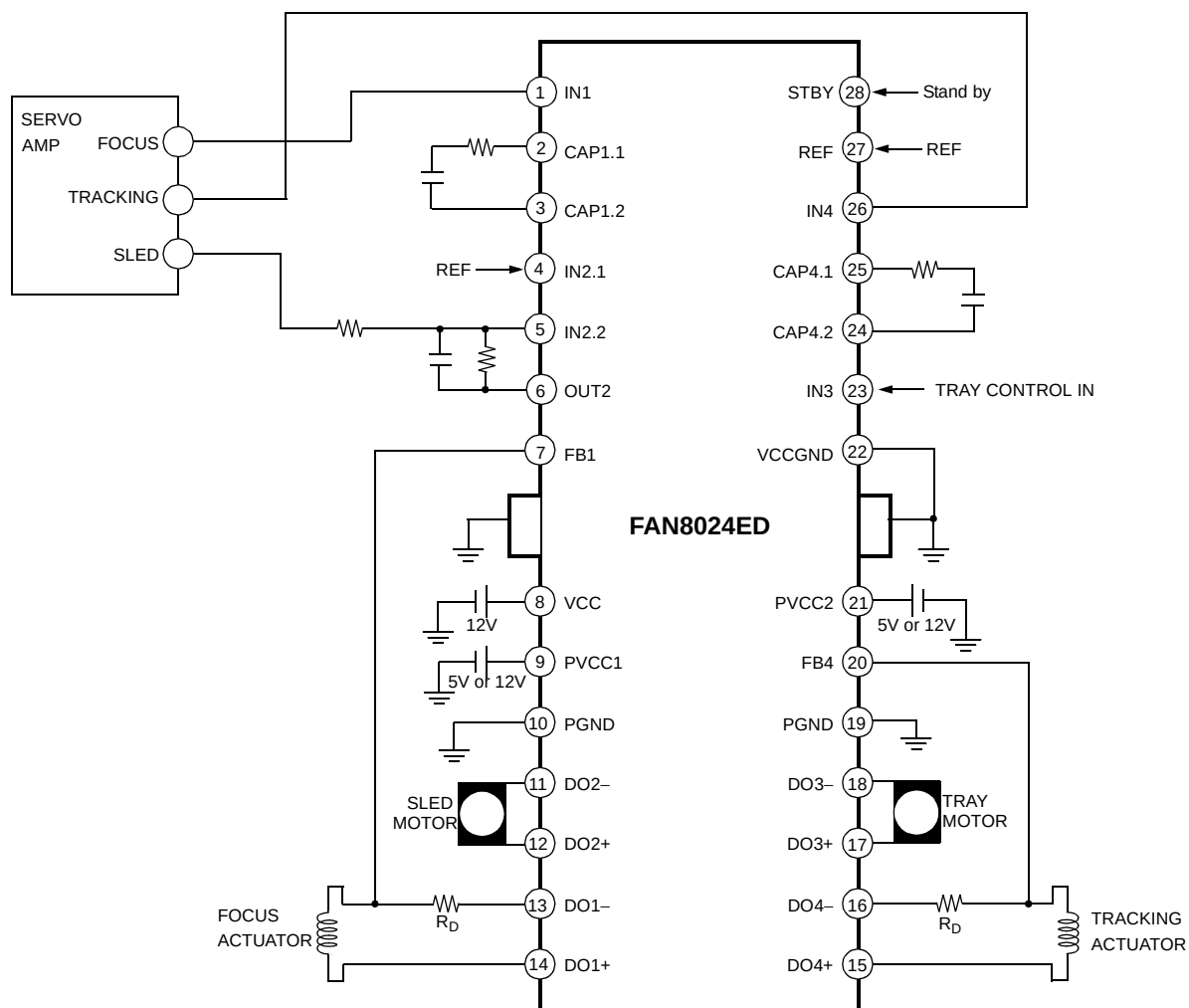


- The reference voltage(ref) is given externally through pin 27.
- The input OP-amp can be used for several purposes, for example low pass filter, differential input coordinator, gain scaler and so on.

6. Channel 3 Schematic

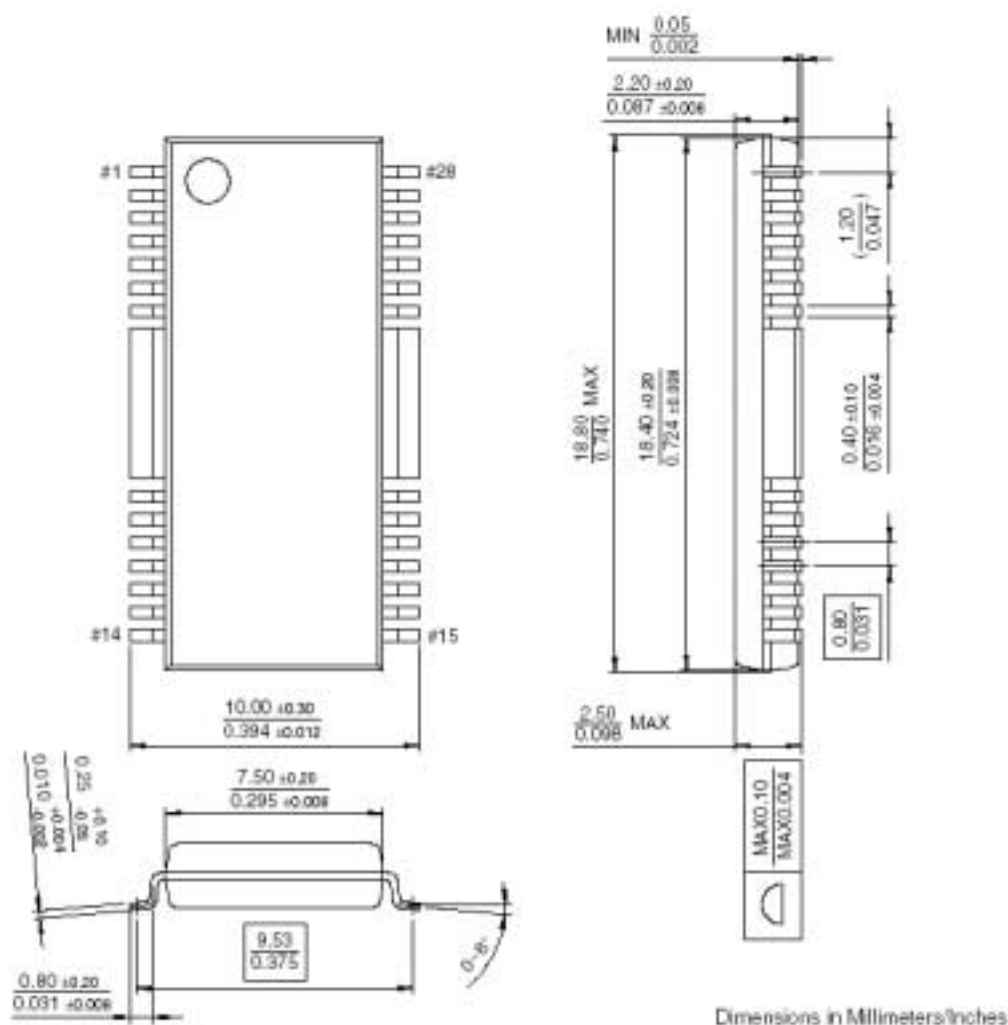


- The reference voltage(ref) is given externally through pin 27.
- The input OP-amp output signal is amplified by (15K/10K) times and then fed to the power amplifier. The gain of power amplifier is 4; therefore, the total max gain of channel 3 is 6.
- Users must check input command range to use max output voltage because the total gain is relatively smaller than other channels.



Package Dimensions

28-SSOPH-375



TRADEMARKS

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

ACEx™	FACT Quiet Series™	ISOPLANAR™	POP™	SuperFET™
ActiveArray™	FAST®	LittleFET™	Power247™	SuperSOT™-3
Bottomless™	FASTr™	MICROCOUPLER™	PowerTrench®	SuperSOT™-6
CoolFET™	FPST™	MicroFET™	QFET®	SuperSOT™-8
CROSSVOLT™	FRFET™	MicroPak™	QS™	SyncFET™
DOME™	GlobalOptoisolator™	MICROWIRE™	QT Optoelectronics™	TinyLogic®
EcoSPARK™	GTO™	MSX™	Quiet Series™	TINYOPTO™
E ² CMOS™	HiSeC™	MSXPro™	RapidConfigure™	TruTranslation™
EnSigna™	I ² C™	OCX™	RapidConnect™	UHC™
FACT™	ImpliedDisconnect™	OCXPro™	SILENT SWITCHER®	UltraFET®
Across the board. Around the world.™		OPTOLOGIC®	SMART START™	VCX™
The Power Franchise™		OPTOPLANAR™	SPM™	
Programmable Active Droop™		PACMAN™	Stealth™	

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.

2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.

Rev. 17