

# FAN7023

## 1W CMOS Mono Power Amplifier

### Features

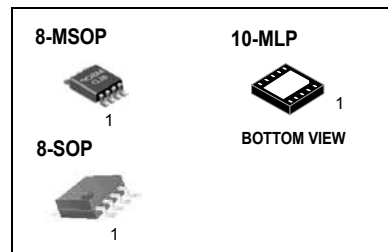
- Continuous Average Power is 1.0W (8Ω)
- Low THD: Typical 0.2% @ 1kHz (5V)
- Do Not Need Output Coupling Capacitor or Bootstrap Capacitor
- Low Shutdown Current: Typical 0.01μA
- Shutdown: High Active
- Built in TSD Circuit

### Typical Applications

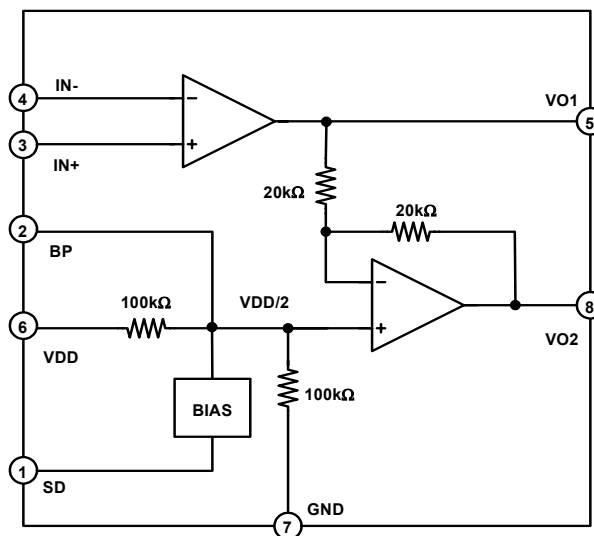
- Cellular Phone
- PDA
- Portable Audio Systems

### Description

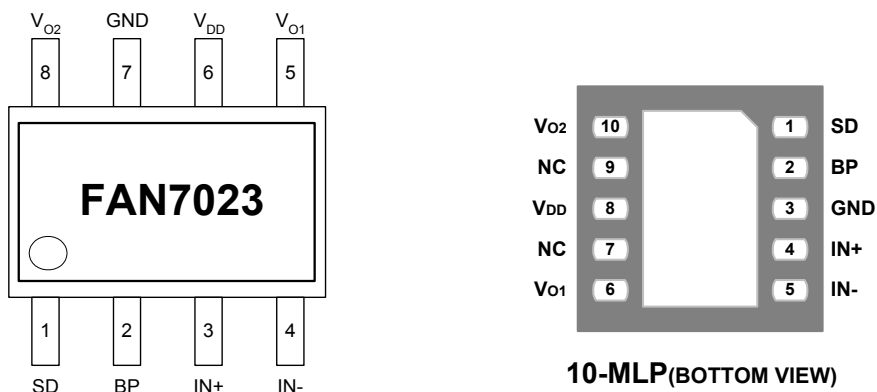
The FAN7023 is a bridge connected audio power amplifier capable of delivering 1W of continuous average power to an 8Ω load with less than 0.2%(THD) from a 5V power supply. The FAN7023 requires few external components and operates on low supply voltage from 2.2V to 5.5V. Since the FAN7023 does not require output coupling capacitors, bootstrap capacitors, or snubber networks, it is ideally suited for low power portable systems that require minimum volume and weight. The FAN7023 features an externally controlled gain, low power consumption shutdown mode (0.01uA,typ.). Additional FAN7023 features include thermal shutdown protection, unity gain stability, and external gain set.



### Internal Block Diagram



## Pin Assignments



## Pin Definitions

( ): 10MLP

Pin Number	Pin Name	Pin Function Description
1(1)	SD	Shutdown
2(2)	BP	Bypass
3(4)	IN+	Input+
4(5)	IN-	Input-
5(6)	VO1	Power AMP Output1
6(8)	VDD	Supply Voltage
7(3)	GND	Ground
8(10)	VO2	Power AMP Output2

## Absolute Maximum Ratings (Ta = 25°C)

Parameter	Symbol	Value	Unit	Remark
Maximum Supply Voltage	VDD	6.0	V	
Power Dissipation	PD	Internally Limited	W	
Operating Temperature	TOPR	-40 ~ +85	°C	
Storage Temperature	TSTG	-65 ~ +150	°C	
Junction Temperature	TJ	150	°C	
Thermal Resistance (Junction to Ambient)	Rthja	190	°C/W	8MSOP
		166		10MLP, Single-Layer
		50		10MLP, Multi-Layer

## Recommended Operating Conditions (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Operating Supply Voltage	VDD	2.2	-	5.5	V

## Electrical Characteristics

( $R_L = 8\Omega$ ,  $T_a = 25^\circ\text{C}$ , unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>V<sub>DD</sub> = 5.0V, UNLESS OTHERWISE SPECIFIED</b>						
Quiescent Power Supply Current	I <sub>DD</sub>	V <sub>IN</sub> = 0V, I <sub>O</sub> = 0A	-	1.8	6	mA
Shutdown Current	I <sub>SD</sub>	V <sub>SD</sub> = V <sub>DD</sub>	-	0.01	2.0	μA
Output Offset Voltage	V <sub>OS</sub>	V <sub>IN</sub> = 0V	-	5	50	mV
Output Power	P <sub>O</sub>	THD = 1% (Max.); f = 1kHz	-	1	-	W
Total Harmonic Distortion+Noise	THD+N	P <sub>O</sub> = 0.25W <sub>rms</sub> , gain = 2, f = 1kHz	-	0.1	-	%
Power Supply Rejection Ratio	PSRR	V <sub>DD</sub> ±250mV <sub>p</sub> , f = 1kHz	-	65	-	dB
<b>V<sub>DD</sub> = 3.3V, UNLESS OTHERWISE SPECIFIED</b>						
Quiescent Power Supply Current	I <sub>DD</sub>	V <sub>IN</sub> = 0V, I <sub>O</sub> = 0A	-	1.5	-	mA
Shutdown Current	I <sub>SD</sub>	V <sub>SD</sub> = V <sub>DD</sub>	-	0.01	-	μA
Output Offset Voltage	V <sub>OS</sub>	V <sub>IN</sub> = 0V	-	5	-	mV
Output Power	P <sub>O</sub>	THD = 1% (Max.); f = 1kHz	-	0.45	-	W
Total Harmonic Distortion+Noise	THD+N	P <sub>O</sub> = 0.25W <sub>rms</sub> , gain = 2, f = 1kHz	-	0.15	-	%
Power Supply Rejection Ratio	PSRR	V <sub>DD</sub> ±250mV <sub>p</sub> , f = 1kHz	-	65	-	dB
<b>V<sub>DD</sub> = 2.6V, UNLESS OTHERWISE SPECIFIED</b>						
Quiescent Power Supply Current	I <sub>DD</sub>	V <sub>IN</sub> = 0V, I <sub>O</sub> = 0A	-	1.3	-	mA
Shutdown Current	I <sub>SD</sub>	V <sub>SD</sub> = V <sub>DD</sub>	-	0.01	-	μA
Output Offset Voltage	V <sub>OS</sub>	V <sub>IN</sub> = 0V	-	5	-	mV
Output Power	P <sub>O</sub>	THD = 1% (Max.); f = 1kHz	-	0.2	-	W
Total Harmonic Distortion+Noise	THD+N	P <sub>O</sub> = 0.2W <sub>rms</sub> , gain = 2, f = 1kHz	-	0.25	-	%
Power Supply Rejection Ratio	PSRR	V <sub>DD</sub> ±250mV <sub>p</sub> , f = 1kHz	-	65	-	dB

## Performance Characteristics

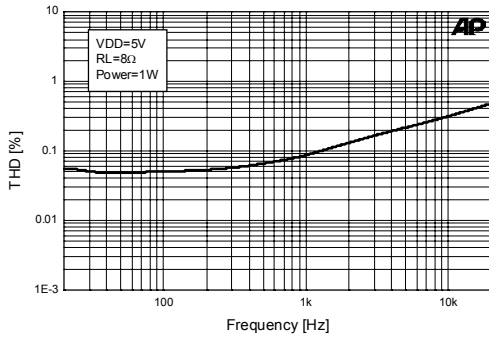


Figure 1. THD+N vs. Frequency,  $V_{DD} = 5V$

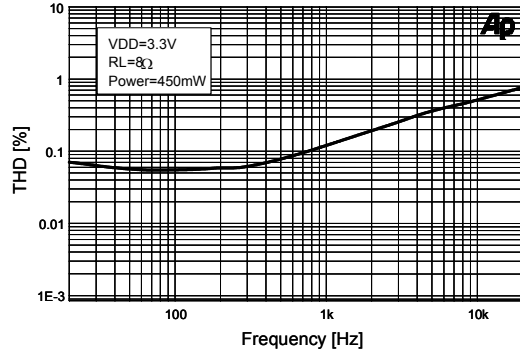


Figure 2. THD+N vs. Frequency,  $V_{DD} = 3.3V$

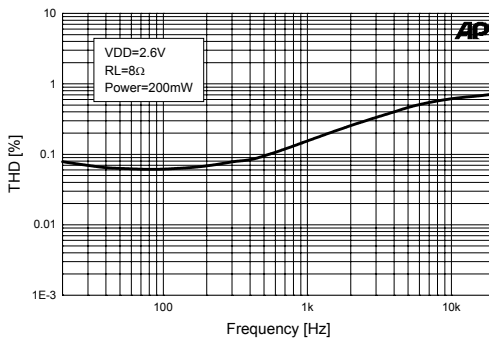


Figure 3. THD+N vs. Frequency,  $V_{DD} = 2.6V$

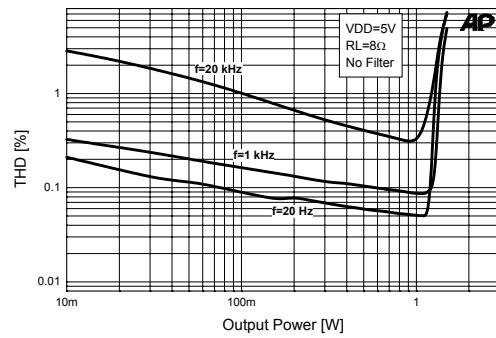


Figure 4. THD+N vs. Output Power,  $V_{DD} = 5V$

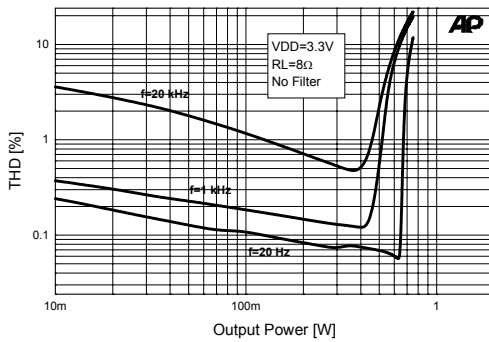


Figure 5. THD+N vs. Output Power,  $V_{DD} = 3.3V$

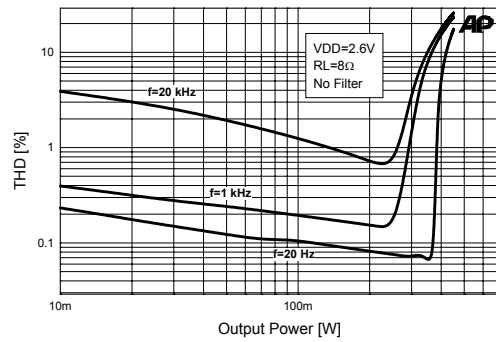


Figure 6. THD+N vs. Output Power,  $V_{DD} = 2.6V$

Performance Characteristics (Continued)

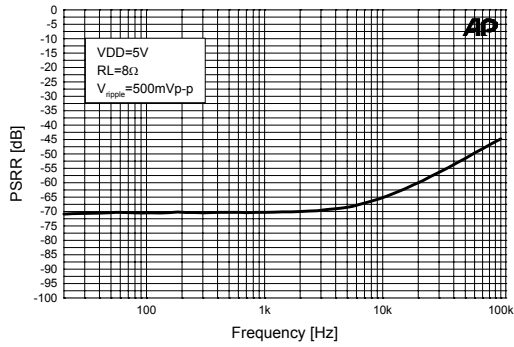


Figure 7. Power Supply Rejection Ratio, VDD =5V Input Floating

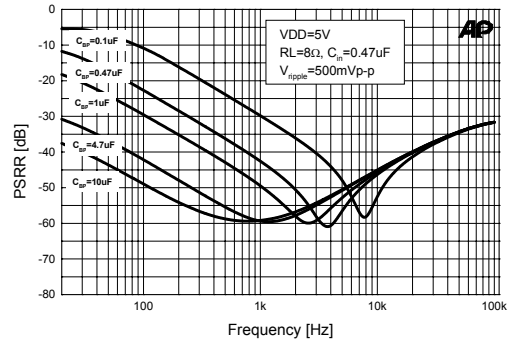


Figure 8. Power Supply Rejection Ratio with Capacitor, VDD =5V Input Terminated to GND

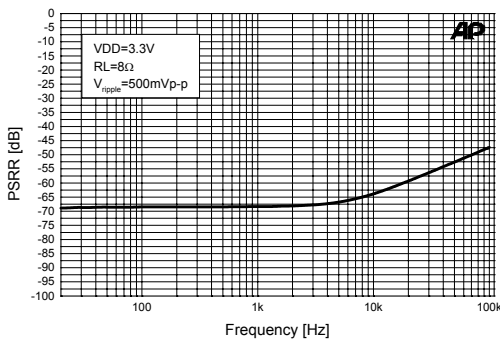


Figure 9. Power Supply Rejection Ratio, VDD =3.3V Input Floating

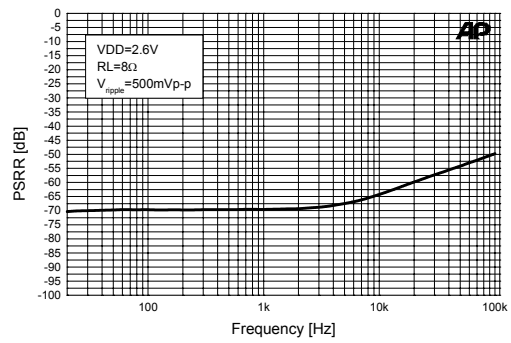


Figure 10. Power Supply Rejection Ratio, VDD =2.6V Input Floating

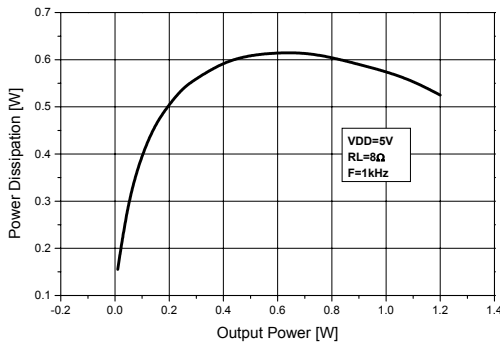


Figure 11. Power Dissipation vs. Output Power, VDD =5V @ THD ≤ 1% (No Filter)

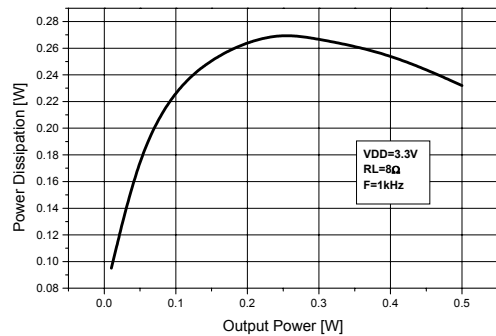


Figure 12. Power Dissipation vs. Output Power, VDD =3.3V @ THD ≤ 1% (No Filter)

Performance Characteristics (Continued)

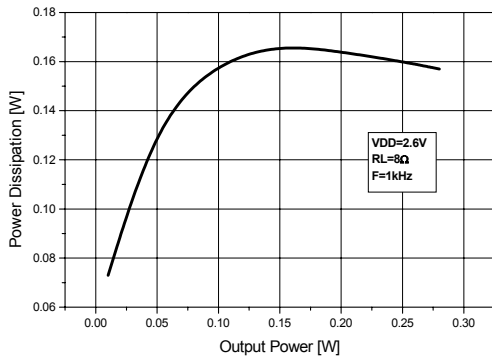


Figure 13. Power Dissipation vs. Output Power, VDD =2.6V @ THD ≤ 1% (No Filter)

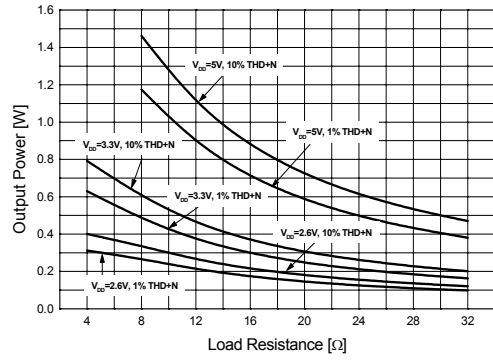


Figure 14. Output Power vs. Load Resistance

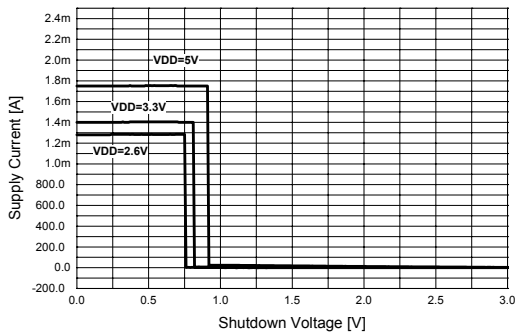


Figure 15. Supply Current vs. Shutdown Voltage

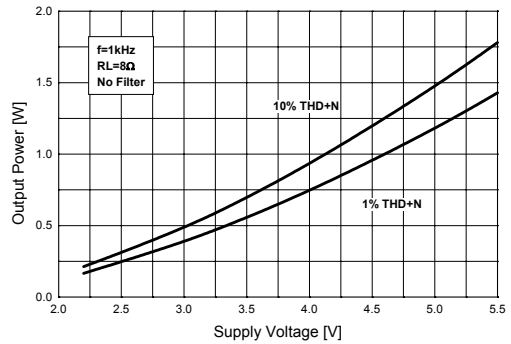


Figure 16. Output Power vs. Supply Voltage

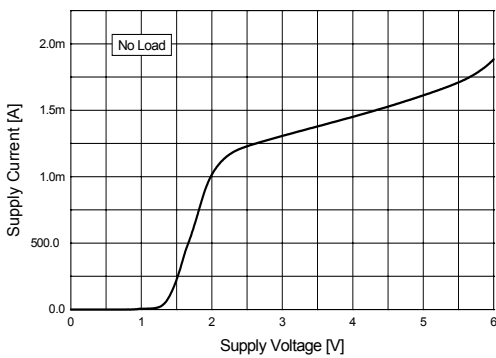


Figure 17. Supply Current vs. Supply Voltage

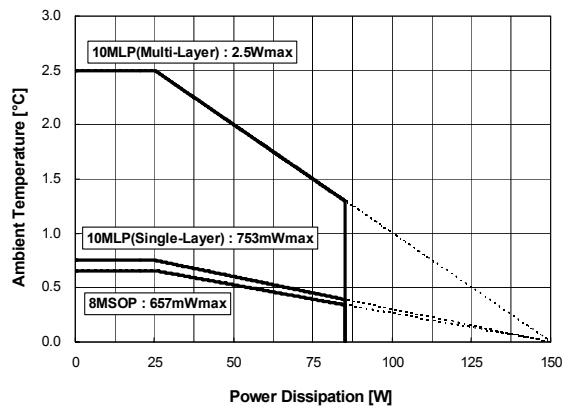
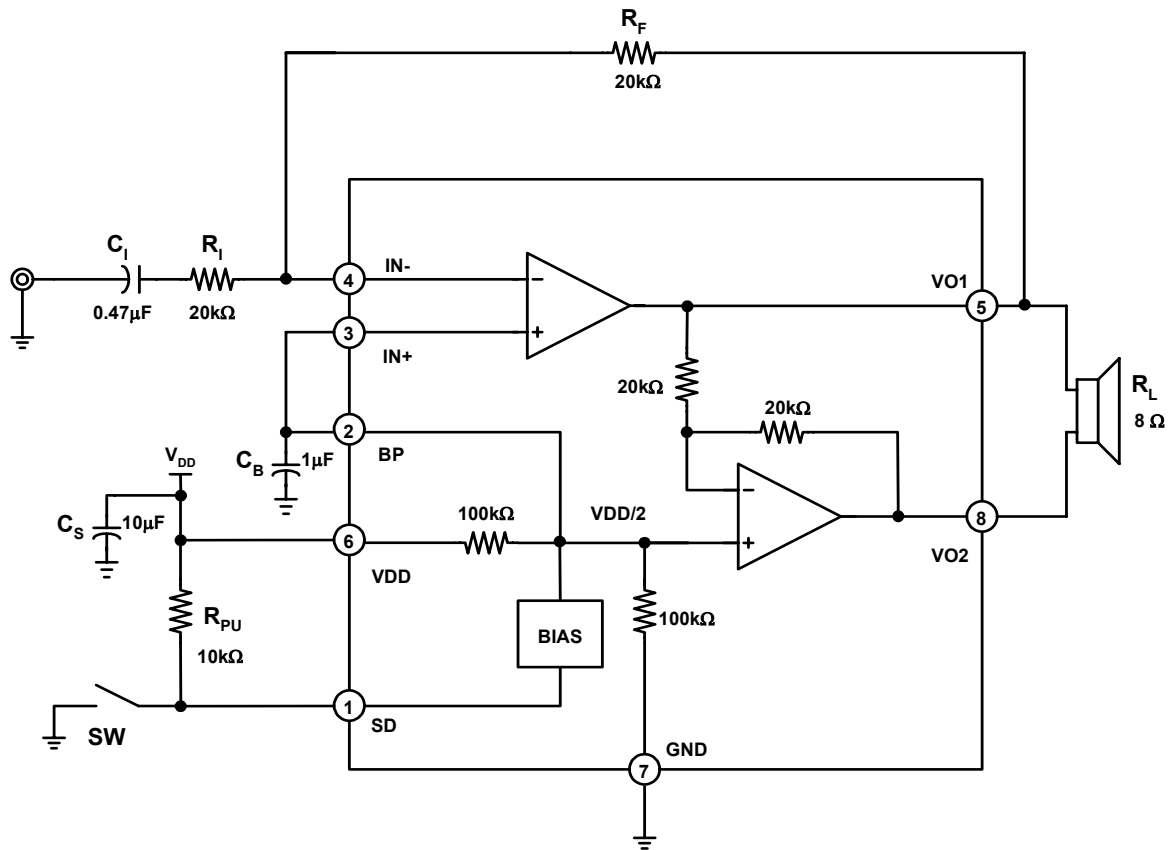


Figure 18. Power Derating Curve

## Typical Application Circuit

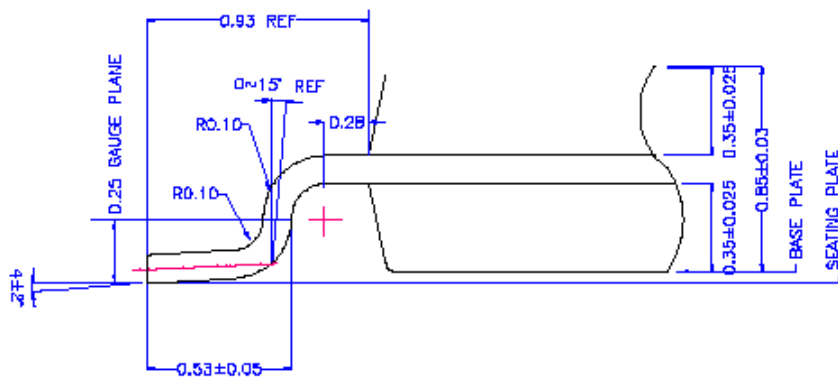
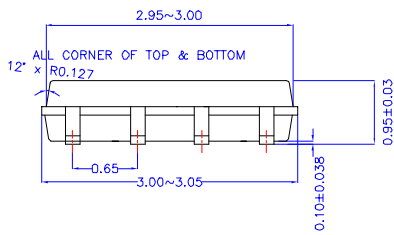
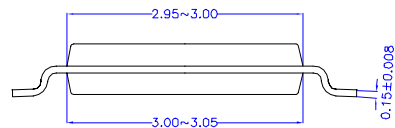
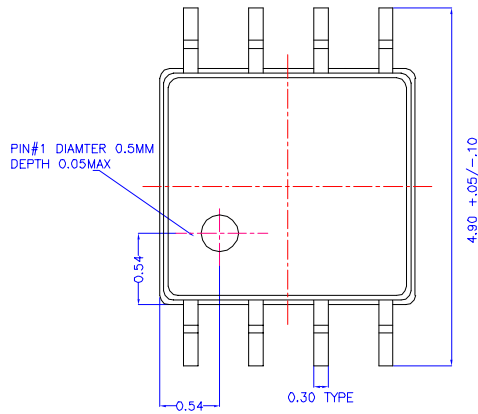


# Mechanical Dimensions

## Package

Dimensions in millimeters

### 8-MSOP



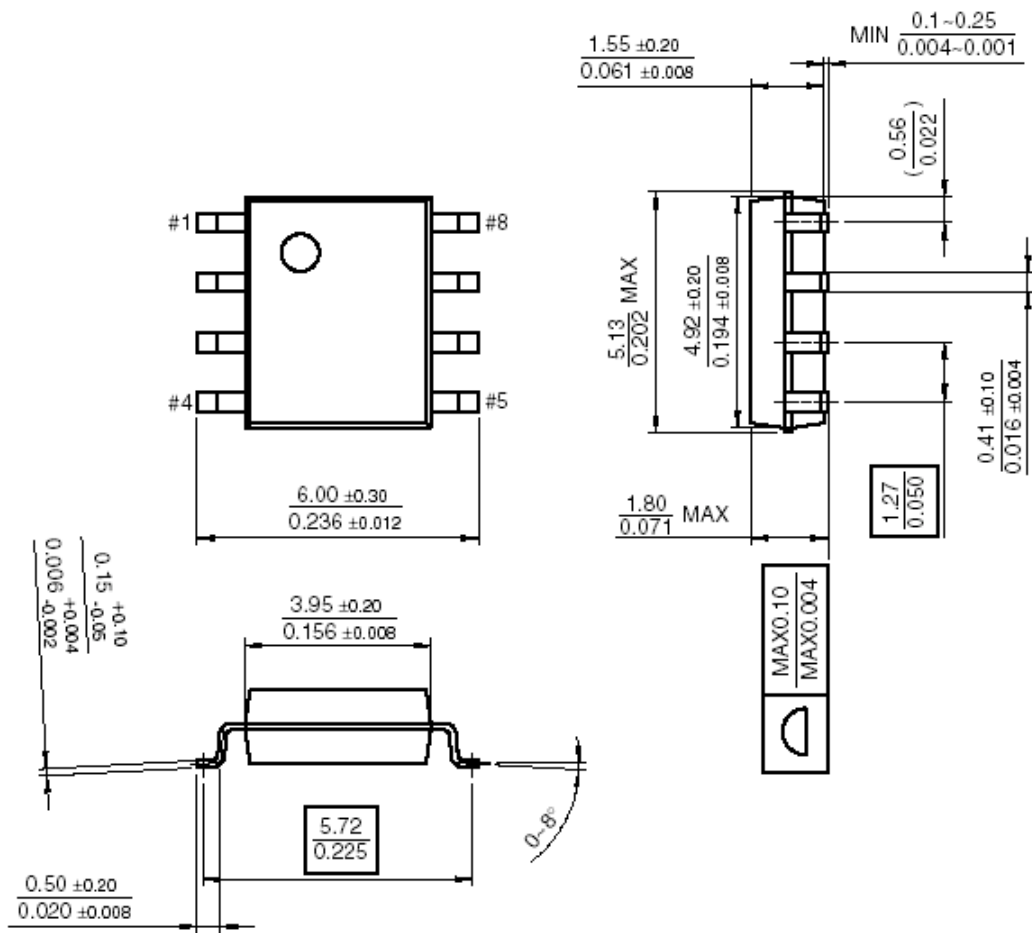


**Mechanical Dimensions** (Continued)

Package

Dimensions in millimeters/inches

**8-SOP**

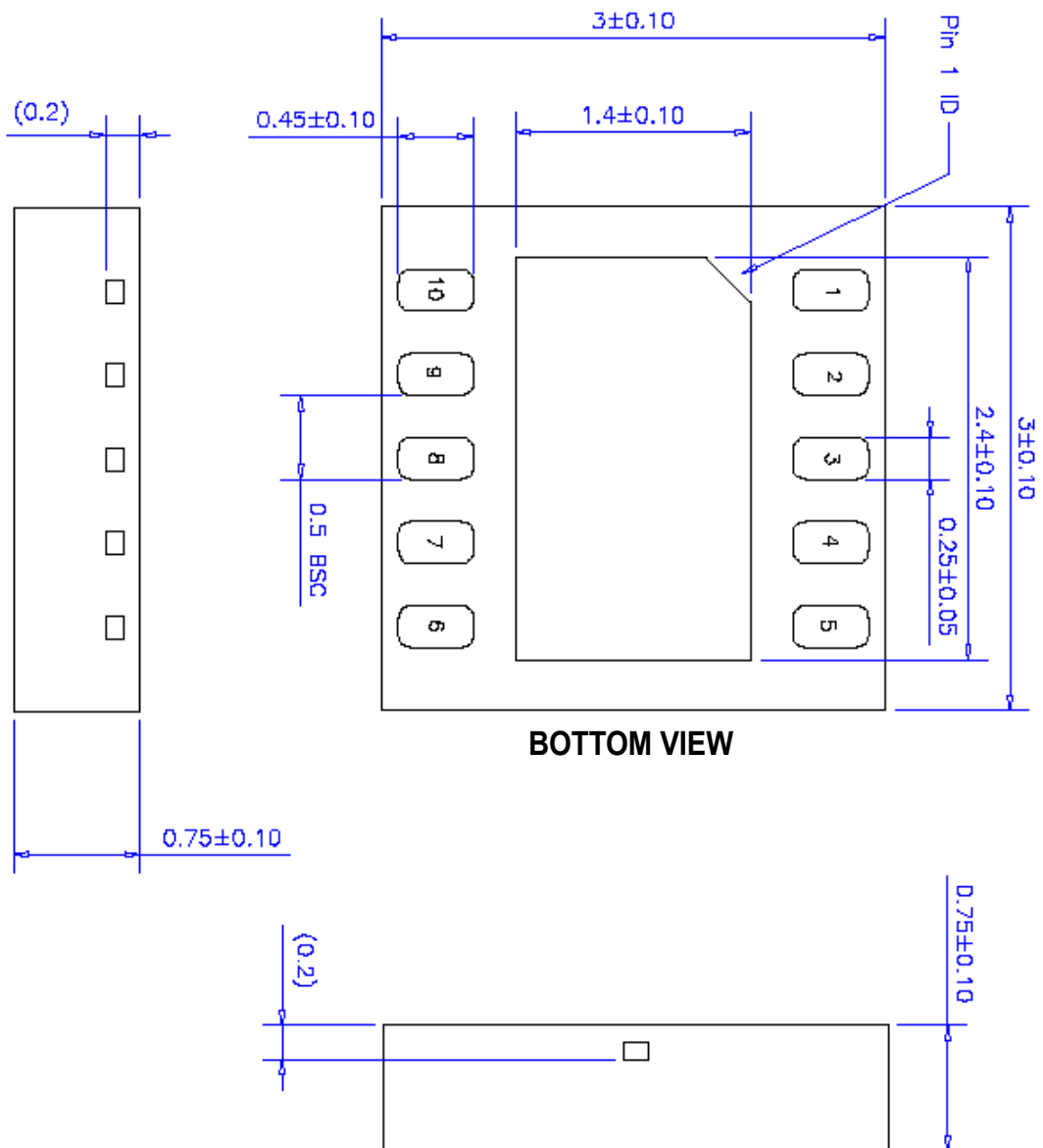


**Mechanical Dimensions** (Continued)

**Package**

**Dimensions in millimeters**

**10-MLP**



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**Ordering Information**

Device	Package	Operating Temperature	Packing
FAN7023MU	8-MSOP	-40°C ~ +85°C	Tube
FAN7023M	8-SOP		
FAN7023MUX	8-MSOP		Tape& Reel
FAN7023MX	8-SOP		
FAN7023MPX	10-MLP		

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2. A critical component in 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.