DESCRIPTION

The A2203A is an audio power amplifier primarily designed for demanding applications in mobile phones and other portable communication device applications. It is capable of delivering 1 watt of continuous average power to an 8Ω BTL load with less than 1% distortion (THD+N) from a 5V DC power supply. Boomer audio power amplifiers were designed specifically to provide high quality output power with a minimal amount of external components. The A2203A does not require output coupling capacitors or bootstrap capacitors, and therefore is ideally suited for mobile phone and other low voltage applications where minimal power consumption is a primary requirement.

The A2203A features a low-power consumption shutdown mode, which is achieved by driving the shutdown pin with logic low. Additionally, the A2203A features an internal thermal shutdown protection mechanism. The A2203A contains advanced pop & click circuitry which eliminates noises which would otherwise occur during turn-on and turn-off transitions. The A2203A is unity-gain stable and can be configured by external gain-setting resistors.

The A2203A is available in MSOP8 and SOP8 packages

ORDERING INFORMATION

Package Type	Part Number	
MSOP8 SPQ : 4,000pcs/Reel	MS8	A2203AMS8R
		A2203AMS8VR
SOP8 SPQ : 4,000pcs/Reel	M8	A2203AM8R
		A2203AM8VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

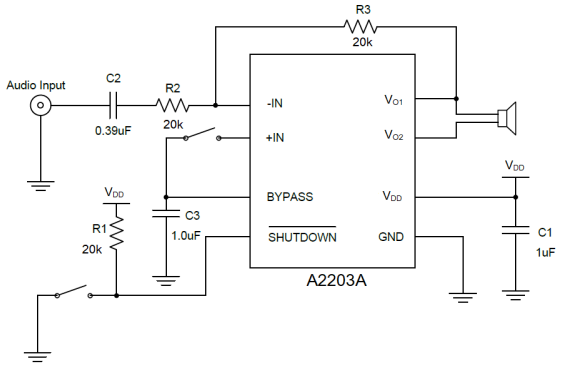
FEATURES

- Ultra low current shutdown mode
  -Shutdown Current 0.1μA(typ.)
- BTL output can drive capacitive loads
  -Power Output @V_{DD}= 5.0V &1% THD 1W(typ.)
  -Power Output @V_{DD}=3.3V &1% THD 400mW (typ.)
- Improved pop & click circuitry eliminates noises during turn-on and turn-off transitions
  -PSRR @f_{IN} =217Hz, V_{DD} = 5V 62dB(typ.)
- 2.2 - 5.0V operation
- No output coupling capacitors, snubber networks or bootstrap capacitors required
- Thermal shutdown protection
- Unity-gain stable
- External gain configuration capability
- Available in MSOP8 and SOP8 packages

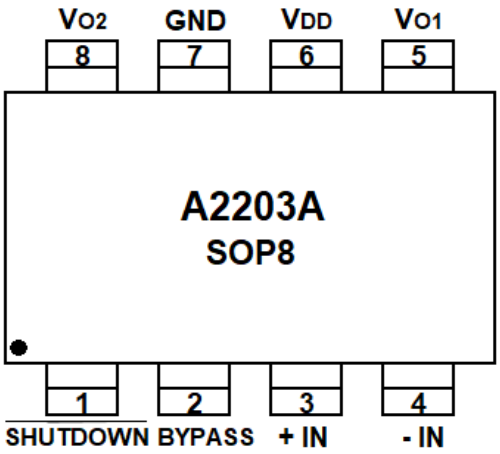
APPLICATION

- Mobile Phones
- PDAs
- Portable electronic devices

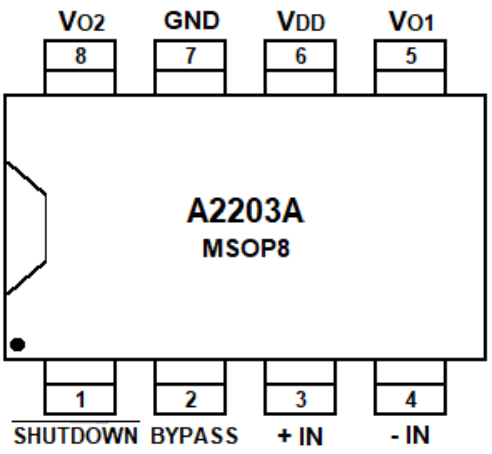
TYPICAL APPLICATION



PIN DESCRIPTION



Top View



Top View

Pin #	Symbol	Functions
1	$\overline{\text{SHUTDOWN}}$	Chip Enable (Low Effective)
2	BYPASS	Bypass Capacitance Input Pin
3	+IN	Positive Input Terminal (Differential +)
4	-IN	Negative Input Terminal (Differential -)
5	V_{O1}	Negative Output Terminal (Differential -)
6	V_{DD}	Power Supply
7	GND	Ground Pin
8	V_{O2}	Positive Output Terminal (Differential +)

ABSOLUTE MAXIMUM RATINGS

V_{DD}, Supply Voltage	-0.3V~5.2V
-IN, Input Voltage	-0.3V~V_{DD}+0.3V
T_{OPR}, Operation Temperature	-40℃~+85℃
T_{STG}, Storage Temperature	-65℃~+150℃
ESD Susceptibility	2kV

Stress beyond above listed “Absolute Maximum Ratings” may lead permanent damage to the device. These are stress ratings only and operations of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

OPERATING RATINGS

Parameter	Value	Unit
Temperature Range		
$T_{MIN} \le T_A \le T_{MAX}$	$-40 \le T_A \le 85$	°C
Supply Voltage	$2.2 \le V_{DD} \le 5.0$	V

ELECTRICAL CHARACTERISTICS

V_{DD} = 2.6V, unless otherwise specified. Limits apply for T_A = 25°C.

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Quiescent Power Supply Current	I_{DD}	-IN = 0V, Io = 0A, No Load		-	2.6	5.5	mA
	I_{SD}	$V_{SHUTDOWN}$ = 0V		-	0.1	2	μA
Output Power (8Ω)	P_O	THD = 1% (max); f = 1 kHz	8Ω Load	-	0.2	-	W
			4Ω Load	-	0.22	-	
Total Harmonic Distortion+Noise	THD+N	Po = 0.1 Wrms; f = 1kHz		-	0.08	-	%
Power Supply Rejection Ratio	PSRR	V_{ripple} = 200mV $_{sine\ p\text{-}p}$ f=217Hz		-	44	-	dB
		V_{ripple} = 200mV $_{sine\ p\text{-}p}$ f=1kHz		-	44	-	

ELECTRICAL CHARACTERISTICS

V_{DD} = 5V, unless otherwise specified. Limits apply for T_A = 25°C.

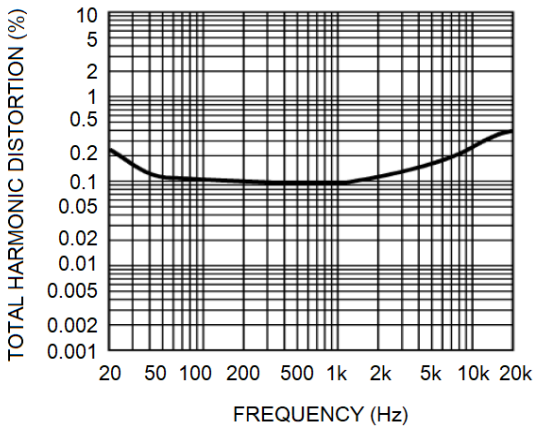
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Quiescent Power Supply Current	I_{DD}	-IN = 0V, Io = 0A, No Load	-	4	8	mA
		-IN = 0V, Io = 0A, 8Ω Load	-	5	10	mA
Shutdown Current	I_{SD}	$V_{SHUTDOWN}$ = 0V	-	0.1	2	μA
Shutdown Voltage Input High	V_{SDIH}		1.2	-	-	V
Shutdown Voltage Input Low	V_{SDIL}		-	-	0.4	V
Output Offset Voltage	V_{OS}		-	7	50	mV
Resistor Output to GND	$R_{OUT-GND}$		7.0	8.5	9.7	kΩ
Output Power (8Ω)	P_O	THD = 2% (max); f = 1kHz 8Ω Load	0.8	1.0	-	W
Wake-up Time	t_{WU}		-	50		ms
Thermal Shutdown Temperature	T_{SD}		150	170	190	℃
Total Harmonic Distortion+Noise	THD+N	Po = 0.4 Wrms; f = 1kHz	-	0.1	-	%
Power Supply Rejection Ratio	PSRR	V_{ripple} = 200mV $_{sine\ p-p}$ f=217Hz	55	62	-	dB
		V_{ripple} = 200mV $_{sine\ p-p}$ f=1kHz		66	-	
Shut Down Time	T_{SDT}	8Ω Load	-	1.0	-	ms

V_{DD} = 3V, unless otherwise specified. Limits apply for T_A = 25°C.

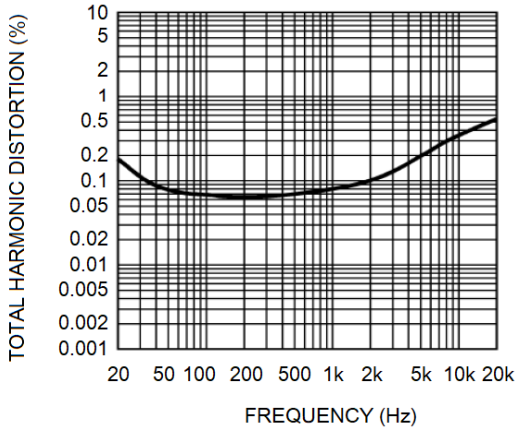
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Quiescent Power Supply Current	I_{DD}	-IN = 0V, Io = 0A, No Load	-	3.5	7	mA
		-IN = 0V, Io = 0A, 8Ω Load	-	4.5	9	mA
Shutdown Current	I_{SD}	$V_{SHUTDOWN}$ = 0V	-	0.1	2	μA
Shutdown Voltage Input High	V_{SDIH}		1.2	-	-	V
Shutdown Voltage Input Low	V_{SDIL}		-	-	0.4	V
Output Offset Voltage	V_{OS}		-	7	50	mV
Resistor Output to GND	$R_{OUT-GND}$		7.0	8.5	9.7	kΩ
Output Power (8Ω)	P_O	THD = 2% (max); f = 1kHz 8Ω Load	0.28	0.31	-	W
Wake-up Time	t_{WU}		-	50		ms
Thermal Shutdown Temperature	T_{SD}		150	170	190	℃
Total Harmonic Distortion+Noise	THD+N	Po = 0.4 Wrms; f = 1kHz	-	0.1	-	%
Power Supply Rejection Ratio	PSRR	V_{ripple} = 200mV $_{sine\ p-p}$ f=217Hz	45	56	-	dB
		V_{ripple} = 200mV $_{sine\ p-p}$ f=1kHz		62	-	

TYPICAL PERFORMANCE CHARACTERISTICS

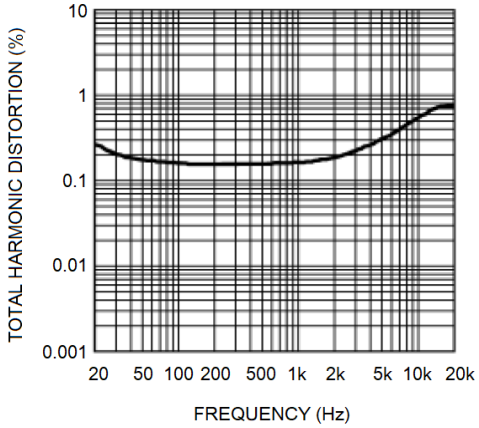
1. THD+N vs. Frequency
at V_{DD}=5V, R_L=8Ω and PWR=250mW, A_V=2



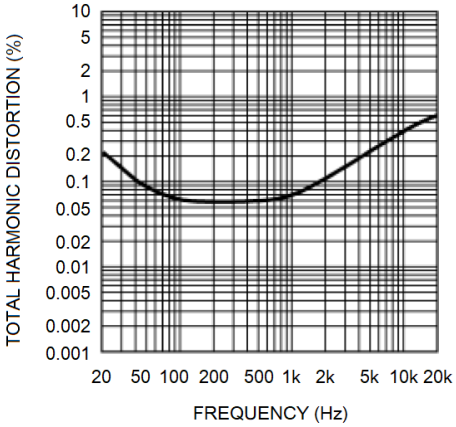
2. THD+N vs. Frequency
at V_{DD}=3.3V, R_L=8Ω and PWR=150mW, A_V=2



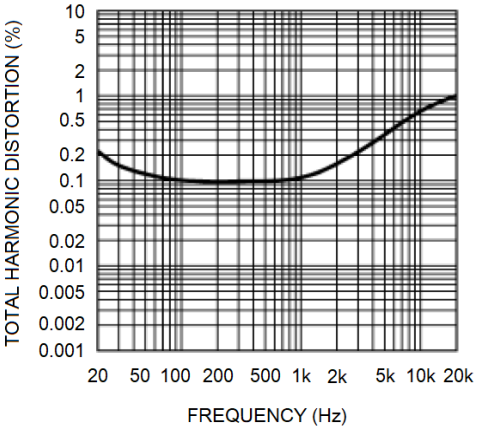
3. THD+N vs. Frequency
at V_{DD}=3V, R_L=8Ω and PWR=250mW, A_V=2



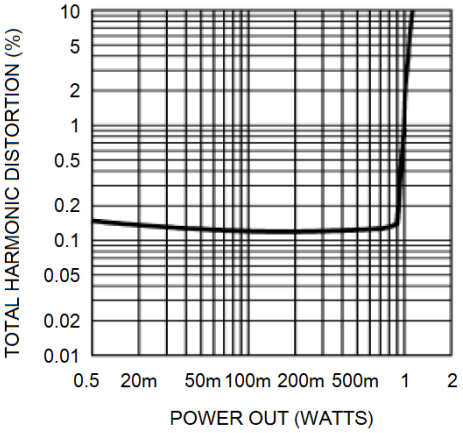
4. THD+N vs. Frequency
at V_{DD}=2.6V, R_L=8Ω and PWR=100mW, A_V=2



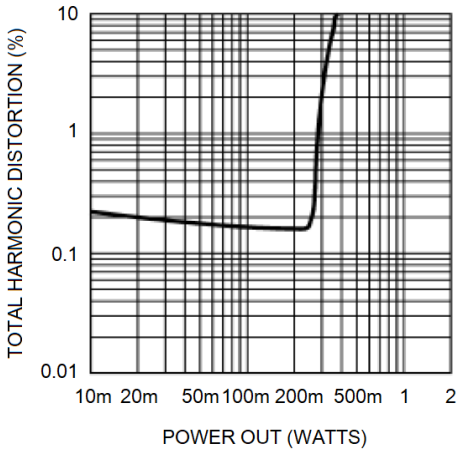
5. THD+N vs. Frequency
at V_{DD}=2.6V, R_L=4Ω and PWR=100mW, A_V=2



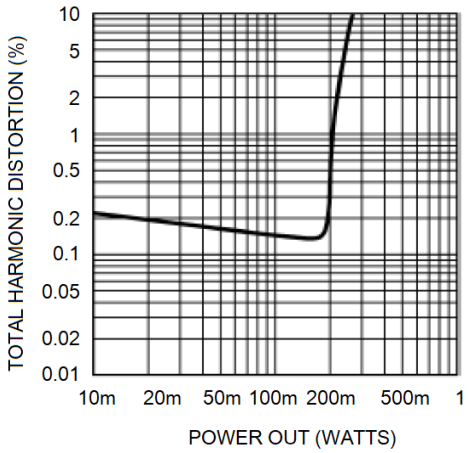
6. THD+N vs. Output Power
at V_{DD}=5V, R_L=8Ω, 1kHz, A_V=2



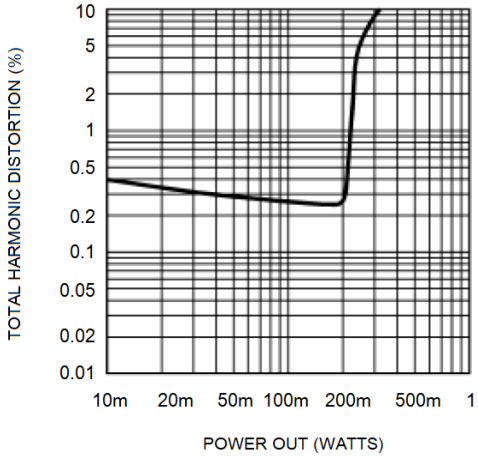
7. THD+N vs. Output Power
at V_{DD}=3V, R_L=8Ω, 1kHz, A_V=2



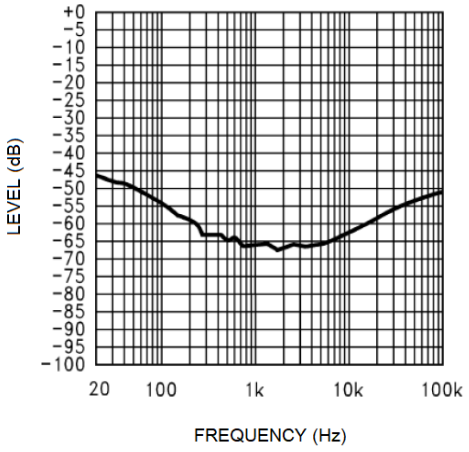
8. THD+N vs. Output Power
at V_{DD}=2.6V, R_L=8Ω, 1kHz, A_V=2



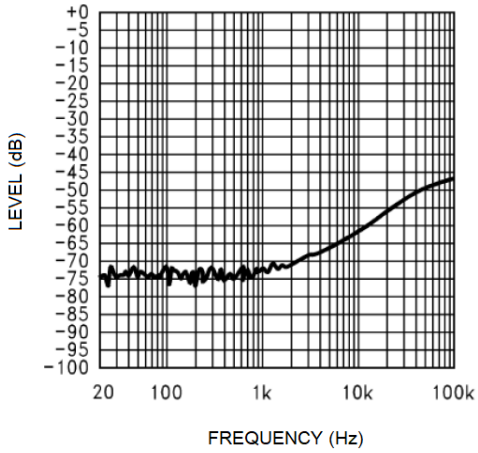
9. THD+N vs. Output Power
at V_{DD}=2.6V, R_L=4Ω, 1kHz, A_V=2



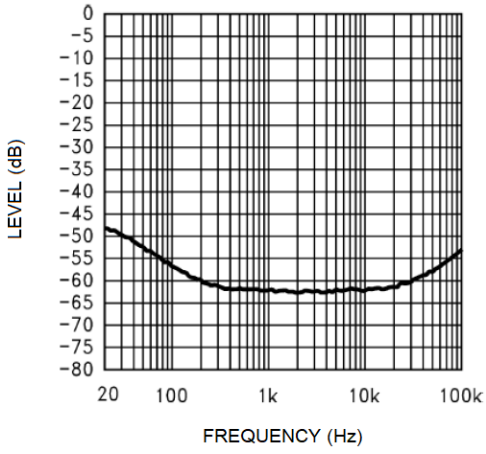
10. Power Supply Rejection Ratio (PSRR) @A_V=2,
V_{DD}=5V, V_{ripple}=200mVp-p, R_L=8Ω, R_{IN}=10Ω



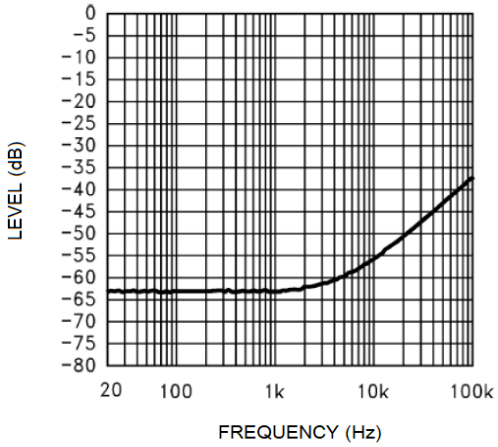
11. Power Supply Rejection Ratio (PSRR) @A_V=2,
V_{DD}=5V, V_{ripple}=200mVp-p, R_L=8Ω, R_{IN}=Float



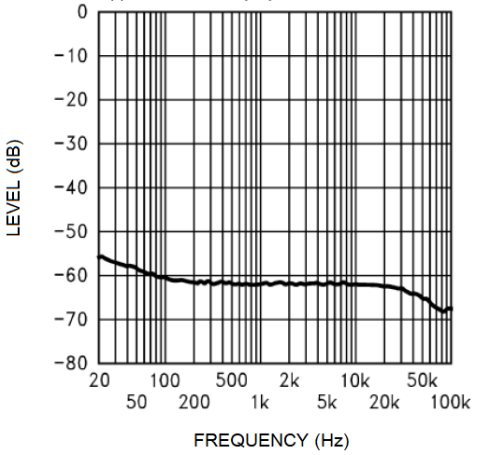
12. Power Supply Rejection Ratio (PSRR) @A_V=4,
V_{DD}=5V, V_{ripple}=200mVp-p, R_L=8Ω, R_{IN}=10Ω



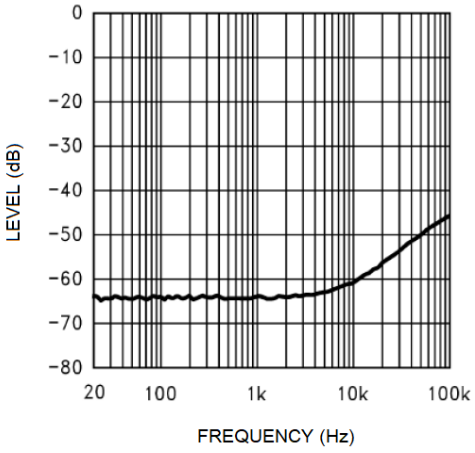
13. Power Supply Rejection Ratio (PSRR) @A_V=4, V_{DD}=5V, V_{ripple}=200mVp-p, R_L=8Ω, R_{IN}= Float



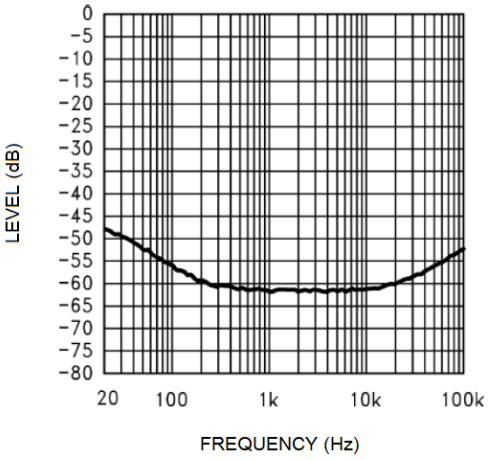
14. Power Supply Rejection Ratio (PSRR) @A_V=2, V_{DD}=3V, V_{ripple}=200mVp-p, R_L=8Ω, R_{IN}=10Ω



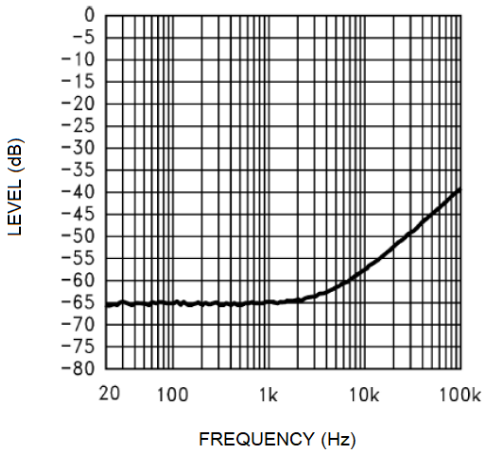
15. Power Supply Rejection Ratio (PSRR) @A_V=2, V_{DD}=3V, V_{ripple}=200mVp-p, R_L=8Ω, R_{IN}= Float



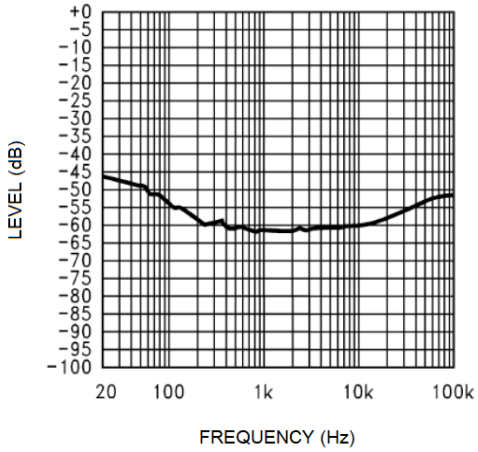
16. Power Supply Rejection Ratio (PSRR) @A_V=4, V_{DD}=3V, V_{ripple}=200mVp-p, R_L=8Ω, R_{IN}= 10Ω



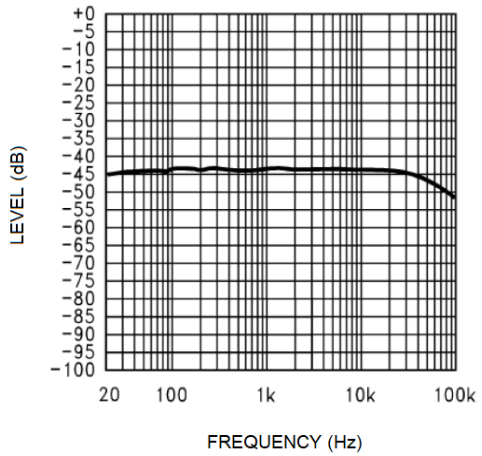
17. Power Supply Rejection Ratio (PSRR) @ A_V=4, V_{DD}=3V, V_{ripple}=200mVp-p, R_L=8Ω, R_{IN}= Float



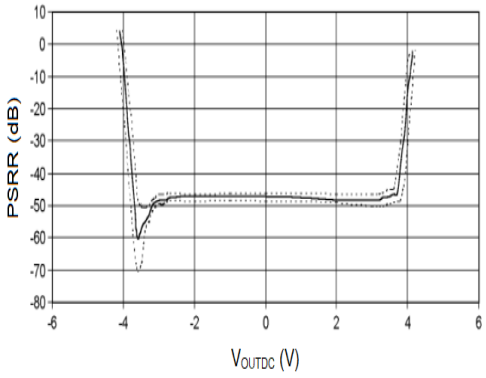
18. Power Supply Rejection Ratio (PSRR) @A_V=2, V_{DD}=3.3V, V_{ripple}=200mVp-p, R_L=8Ω, R_{IN}= 10Ω



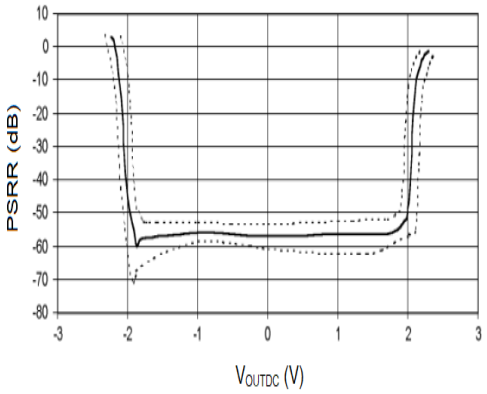
19. Power Supply Rejection Ratio (PSRR) @A_V=2, V_{DD}=2.6V, V_{ripple}=200mVp-p, R_L=8Ω, R_{IN}= 10Ω



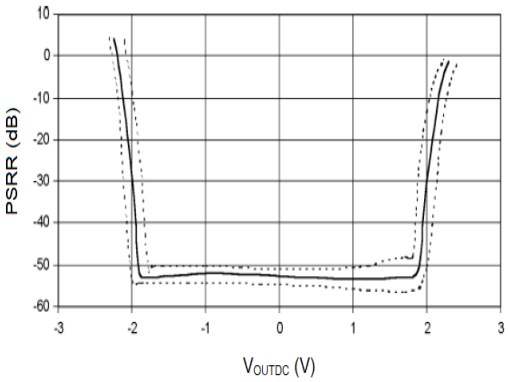
20. PSRR vs. DC Output Voltage
V_{DD}=5V, A_V=10



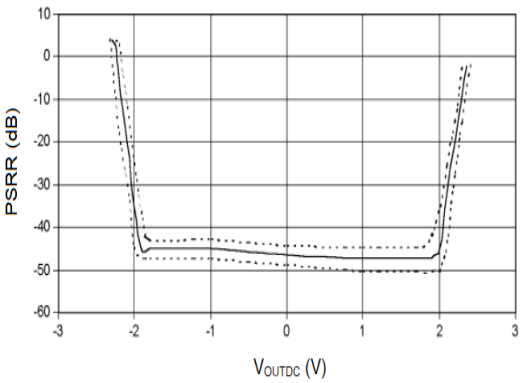
21. PSRR vs. DC Output Voltage
V_{DD}=3V, A_V=2



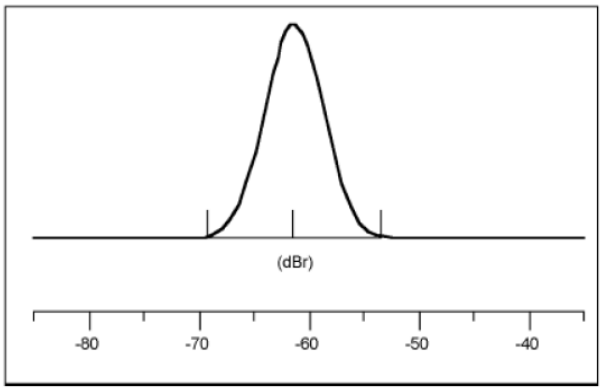
22. PSRR vs. DC Output Voltage
V_{DD}=3V, A_V=4



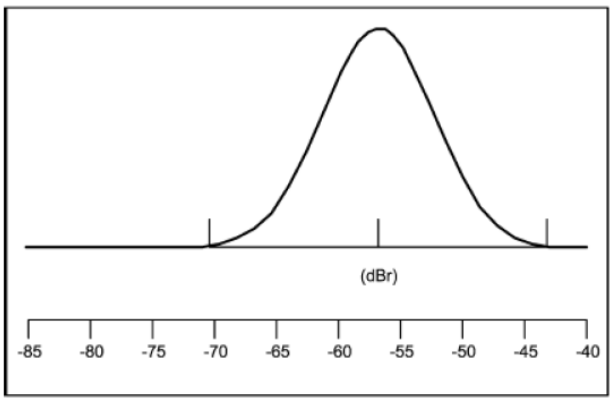
23. PSRR vs. DC Output Voltage
V_{DD}=3V, A_V=10



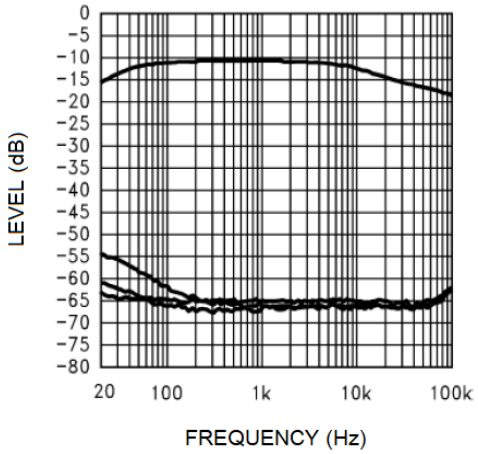
24. PSRR Distribution V_{DD}=5V, 217Hz, 200mVp-p, -30, +25, and +80℃



25. PSRR Distribution V_{DD}=3V, 217Hz, 200mVp-p, -30, +25, and +80℃

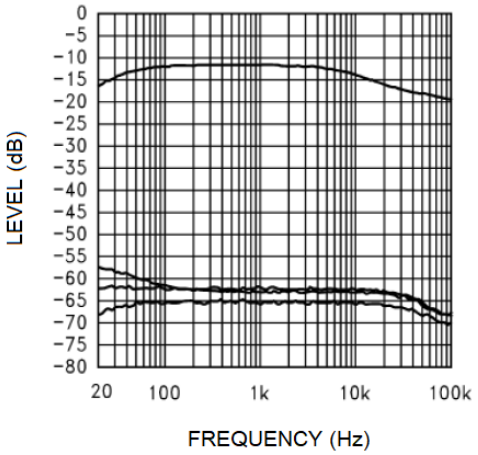


26. Power Supply Rejection Ration vs. Bypass Capacitor Size V_{DD}=5V, Input Grounded=10Ω, Output Load=8Ω



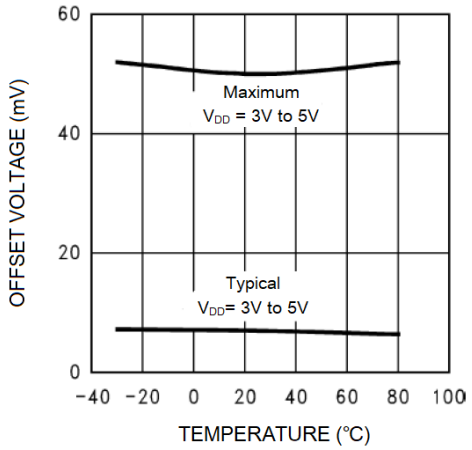
Top Trace= No Cap, Next Trace Down = 1uF
Next Trace Down = 2uF, Bottom Trace =4.7uF.

27. Power Supply Rejection Ration vs. Bypass Capacitor Size V_{DD}=3V, Input Grounded=10Ω, Output Load=8Ω

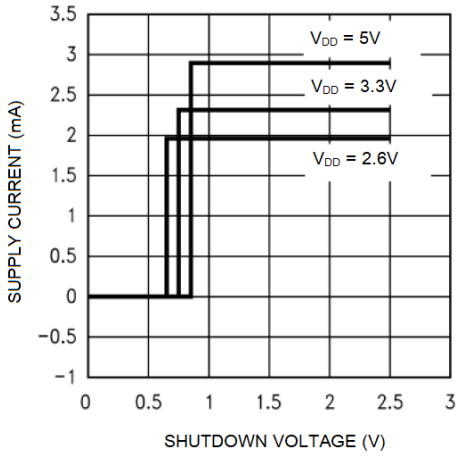


Top Trace= No Cap, Next Trace Down = 1uF
Next Trace Down = 2uF, Bottom Trace =4.7uF.

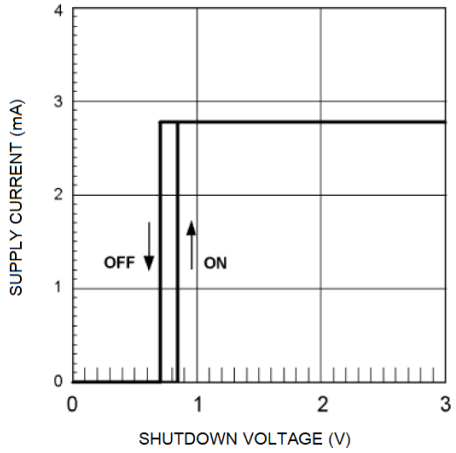
28. Output Offset Voltage



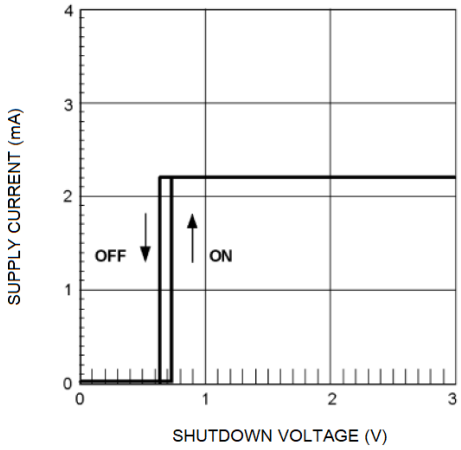
29. Supply Current vs. Shutdown Voltage



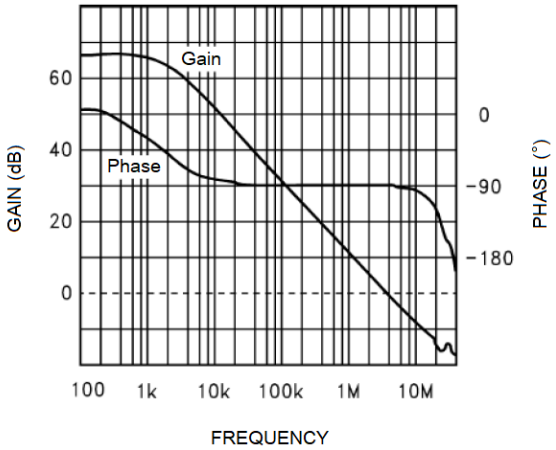
30. Shutdown Hysteresis Voltage V_{DD}=5V



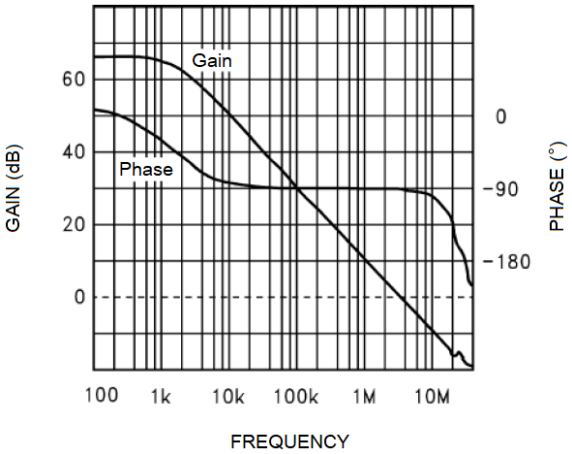
31. Shutdown Hysteresis Voltage V_{DD}=3V



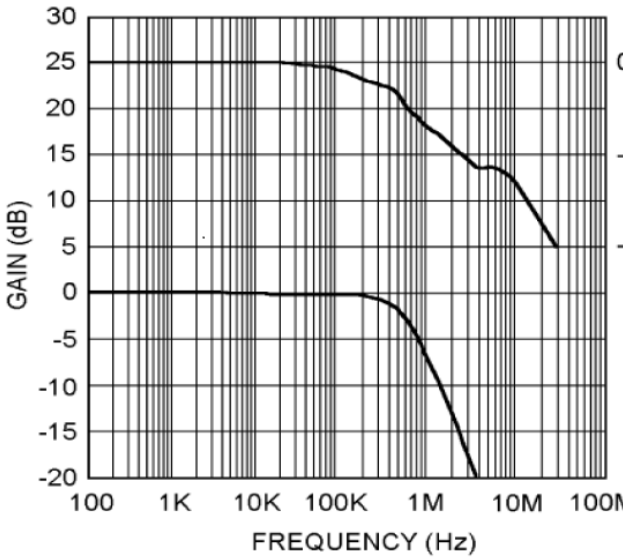
32. Open Loop Frequency Response
V_{DD}=5V, No Load



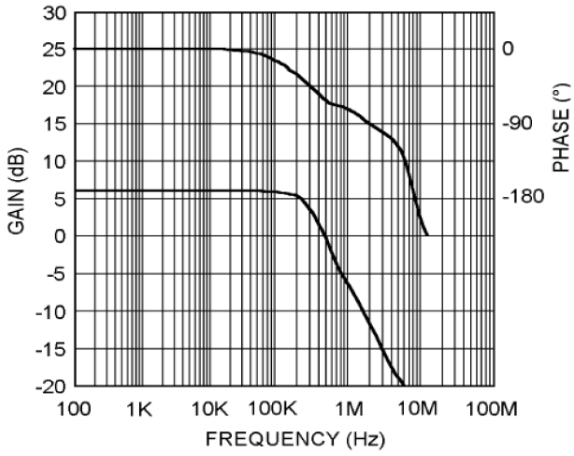
33. Open Loop Frequency Response
V_{DD}=3V, No Load



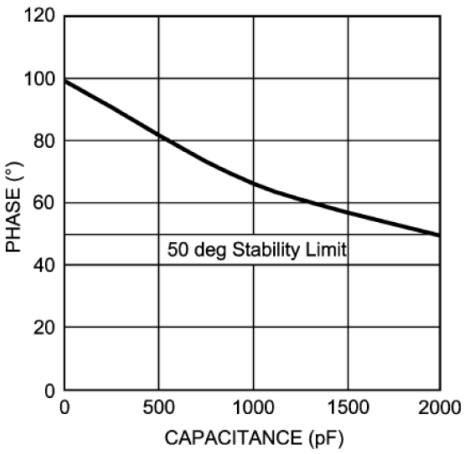
34. Gain/ Phase Response,
A_V=2 V_{DD}=5V, 8Ω Load, C_{LOAD}=500pF



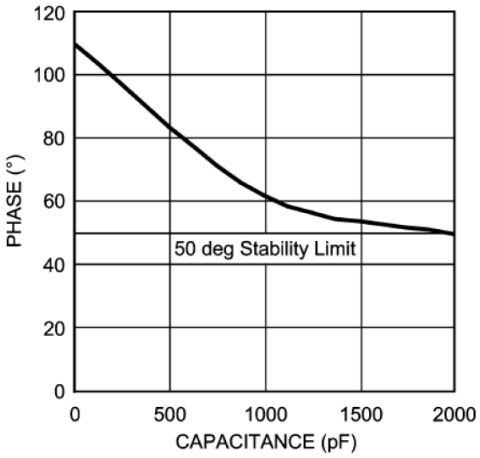
35. Gain/ Phase Response,
A_V=4 V_{DD}=5V, 8Ω Load, C_{LOAD}=500pF



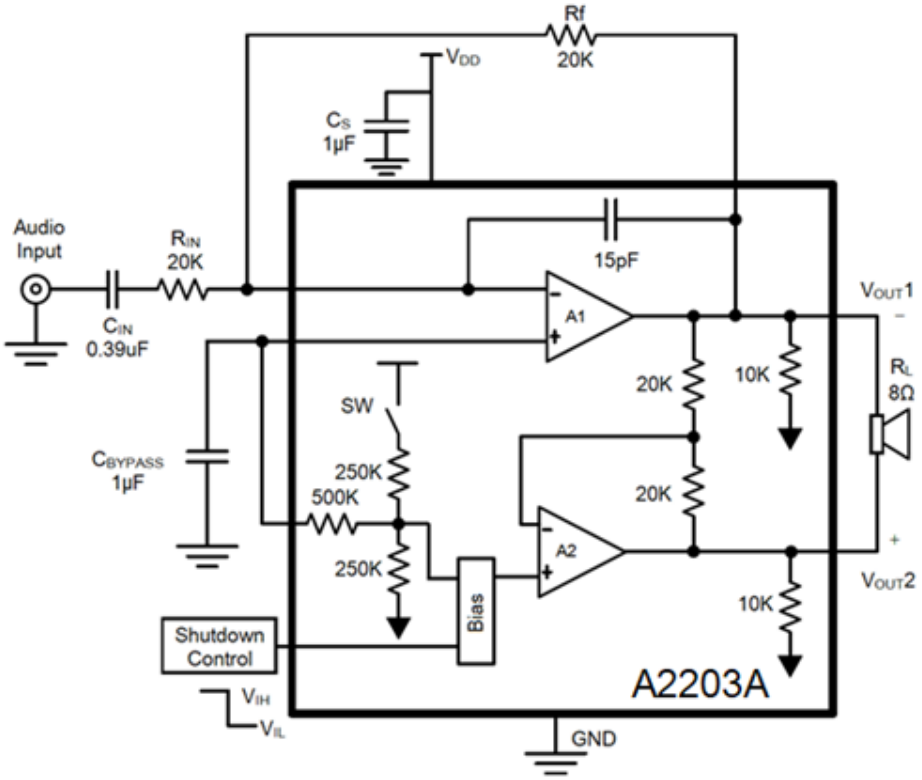
36. Phase Margin vs. C_{LOAD}, A_V=2, V_{DD}=5V, 8Ω Load Capacitance to GND on each output



37. Phase Margin vs. C_{LOAD}, A_V=4 V_{DD}=5V, 8Ω Load Capacitance to GND on each output

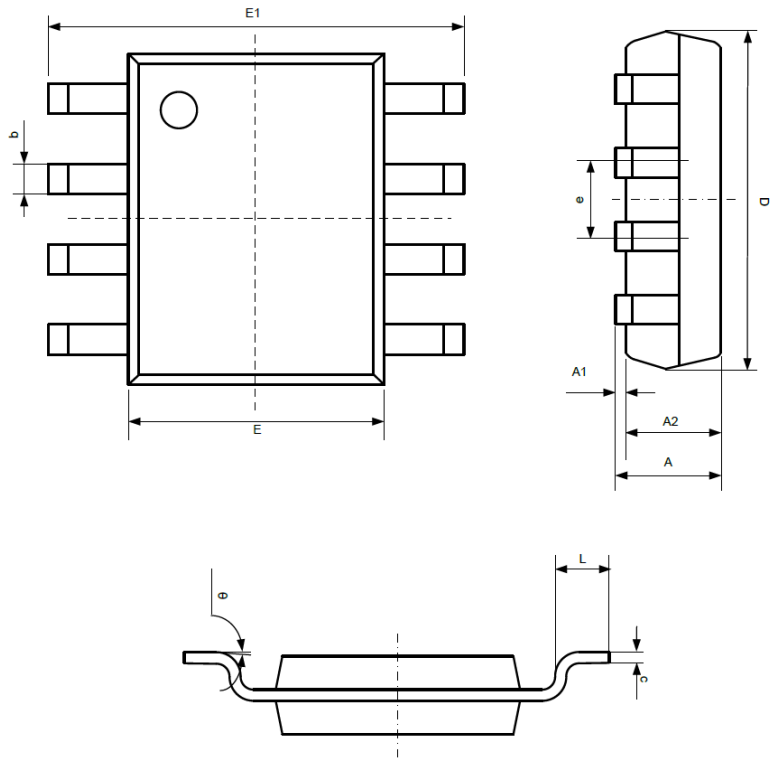


BLOCK DIAGRAM



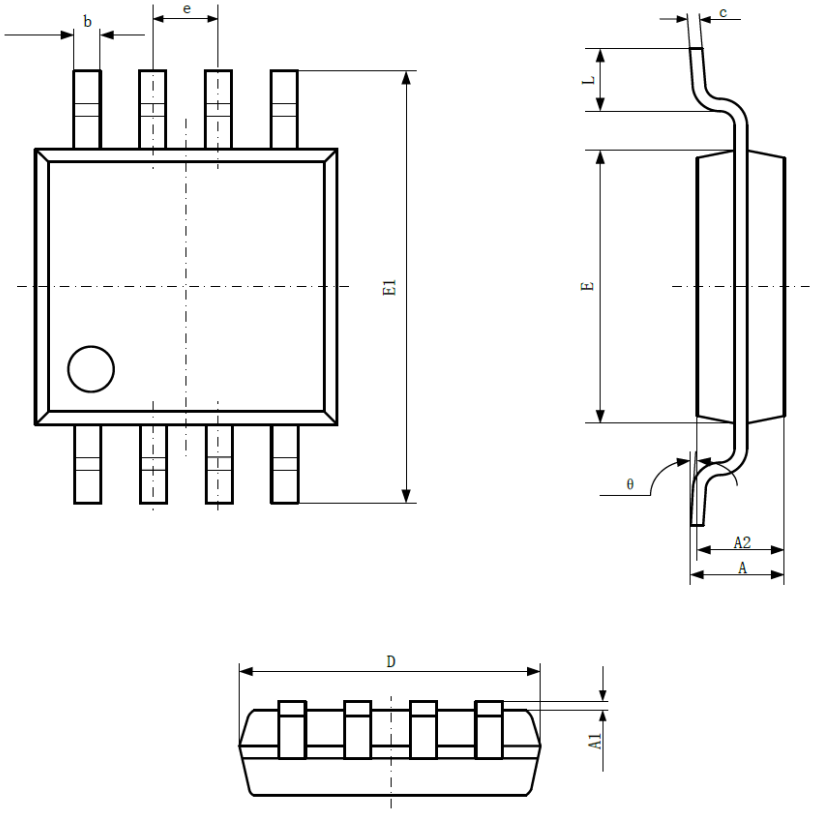
PACKAGE INFORMATION

Dimension in SOP8 (Unit: mm)



Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 BSC		0.050 BSC	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

Dimension in MSOP8 (Unit: mm)



Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.250	0.380	0.010	0.015
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
e	0.650 BSC		0.026 BSC	
E	2.900	3.100	0.144	0.122
E1	4.750	5.050	0.187	0.199
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

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