General Description

The ELN4890 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 ELN4890 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 ELN4890 features a low-power consumption shutdown mode, which is achieved by driving the shutdown pin with logic low. Additionally, the ELN4890 features an internal thermal shutdown protection mechanism. The ELN4890 contains advanced pop & click circuitry which eliminates noises which would otherwise occur during turn-on and turn-off transitions. The ELN4890 is unity-gain stable and can be configured by external gain-setting resistors.

Features

◆Available in space-saving packages
◆Ultra low current shutdown mode
◆BTL output can drive capacitive loads
◆Improved pop & click circuitry eliminates noises during turn-on and turn-off transitions
◆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

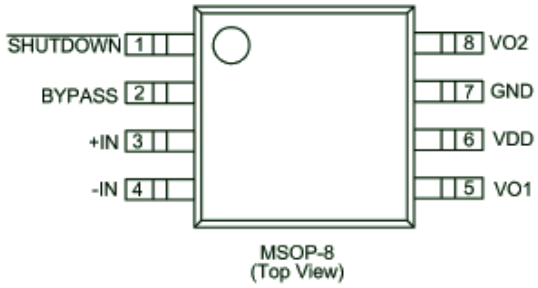
Applications

◆Mobile Phones
◆PDAs
◆Portable electronic devices

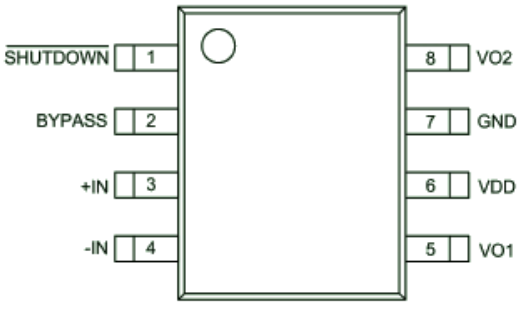
Key Specifications

◆PSRR @f_{IN} =217Hz, VDD = 5V 62dB(typ.)
◆Power Output @V_{DD}= 5.0V &1% THD 1W(typ.)

Pin Configuration



MSOP-8
(Top View)



SOP-8
(Top View)

Ordering/ Marking Information

ECL4890 N XX R

R：Tape & Reel

Package Type：
M1：SOP8
R1：MSOP8

N	A	When the input is greater than 5.2V IC will automatically shut down
	C	No high voltage automatic closing function
	D	No high voltage automatic closing function, and under the high pressure, the gain will be automatically reduced to 1 times

Part No.	Marking	information
ECL4890NM1R	LN4890 XXXX	XXXX：Date Code
ECL4890NR1R		

Operating Ratings

Temperature Range

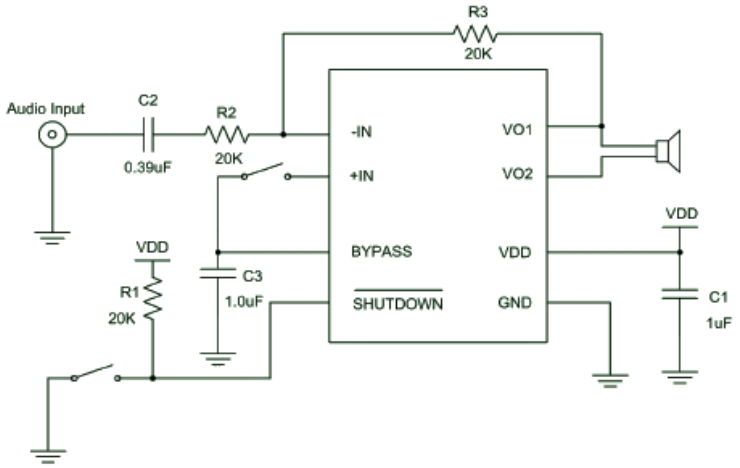
◆TMIN ≤ TA ≤ TMAX---------- -40°C ≤ TA ≤ 85°C

◆Supply Voltage ---------- 2.2V ≤ VDD ≤ 5.0V

Pin Function Description

Pin Number	Pin Name	Function Description
1	SHUTDOWN	Chip Enable (Low Effective)
2	BYPASS	Bypass Capacitance Input Pin
3	+IN	Positive Input Terminal (Differential +)
4	-IN	Negative Input Terminal (Differential -)
5	VO1	Negative Output Terminal (Differential -)
6	VDD	Power Supply
7	GND	Ground Pin
8	VO2	Positive Output Terminal (Differential +)

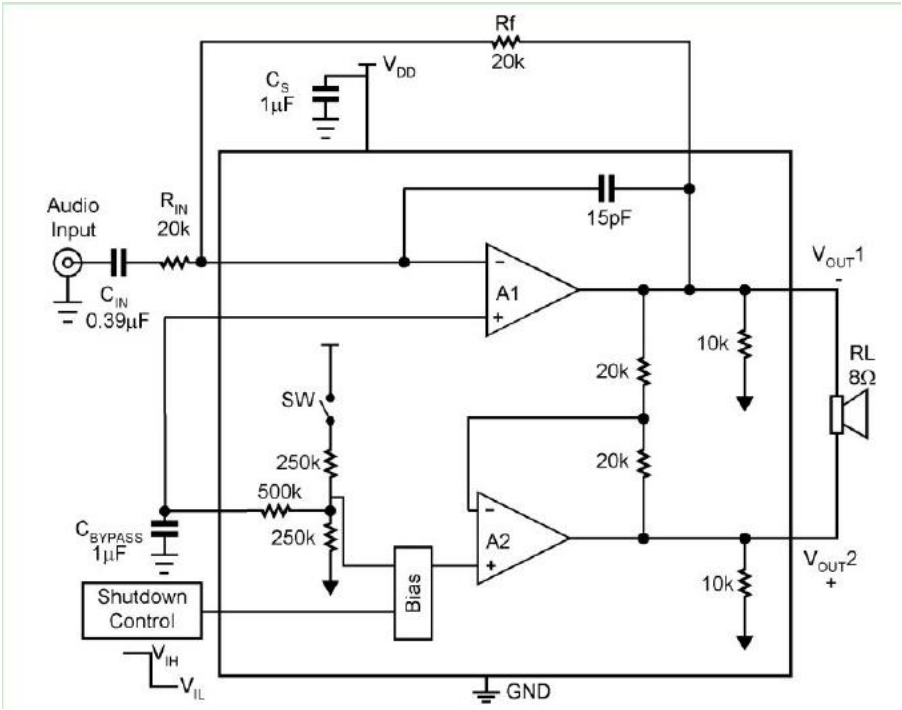
Typical Application Circuit



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage	VDD	-0.3—5.0	V
Input Voltage	VIN	-0.3—VDD+0.3	V
Operation Temperature	Topr	-40—85	℃
Storage Temperature	Tstg	-65—150	℃
ESD Susceptibility	-	2000	V

Function Block Diagram



Electrical Characteristics

(VDD = 5V Unless otherwise specified. Limits apply for TA = 25°C.)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
IDD	Quiescent Power Supply Current	VIN = 0V, Io = 0A, No Load	—	4	8	mA
		VIN = 0V, Io = 0A, 8Ω Load	—	5	10	mA
ISD	Shutdown Current	VSHUTDOWN = 0V	—	0.1	2	μA
VSDIH	Shutdown Voltage Input High		1.2	—	—	V
VSDIL	Shutdown Voltage Input Low		—	—	0.4	V
VOS	Output Offset Volta		—	7	50	mV
ROUT-GND	Resistor Output to GND		7.0	8.5	9.7	kΩ
PO	Output Power (8Ω)	THD = 2% (max); f = 1 kHz 8Ω Load	0.8	1.0	—	W
TWU	Wake-up time		—	170	220	ms
TSD	Thermal Shutdown Temperature		150	170	190	℃
THD+N	Total Harmonic Distortion+Noise	Po = 0.4 Wrms; f = 1kHz	—	0.1	—	%
PSRR	Power Supply Rejection Ratio	Vripple = 200mV sine p-p f=217Hz	55	62	—	dB
		Vripple = 200mV sine p-p f=1kHz		66		
TSDT	Shut Down Time	8Ω Load	—	1.0	—	ms

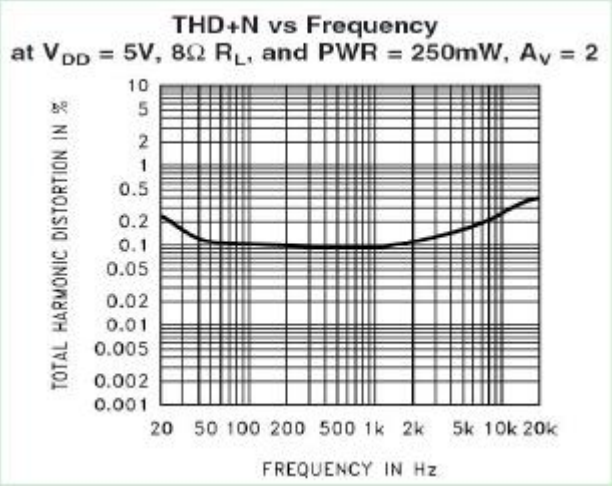
(VDD = 3V Unless otherwise specified. Limits apply for TA = 25°C.)

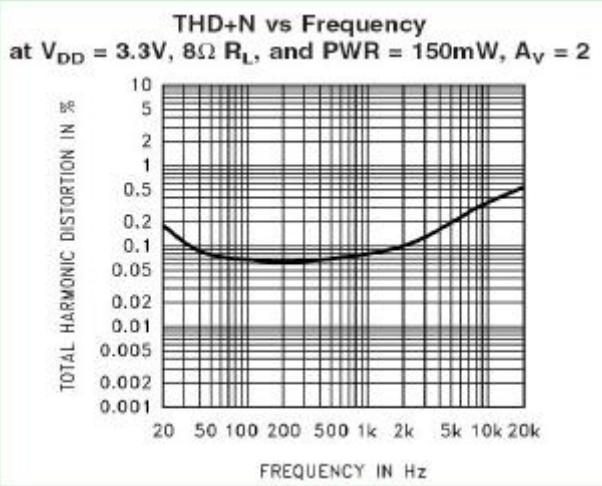
Parameter	Symbol	Condition	Min	Typ	Max	Unit
IDD	Quiescent Power Supply Current	VIN = 0V, Io = 0A, No Load	—	3.5	7	mA
		VIN = 0V, Io = 0A, 8Ω Load	—	4.5	9	mA
ISD	Shutdown Current	VSHUTDOWN = 0V	—	0.1	2	μA
VSDIH	Shutdown Voltage Input High		1.2	—	—	V
VSDIL	Shutdown Voltage Input Low		—	—	0.4	V
VOS	Output Ofsett Voltage		—	7	50	mV
ROUT-GND	Resistor Output to GND		7.0	8.5	9.7	kΩ
PO	Output Power (8Ω)	THD = 2% (max); f = 1 kHz 8Ω Load	0.28	0.31	—	W
TWU	Wake-up time		—	170	220	ms
TSD	Thermal Shutdown Temperature		150	170	190	℃
THD+N	Total Harmonic Distortion+Noise	Po = 0.4 Wrms; f = 1kHz	—	0.1	—	%
PSRR	Power Supply Rejection Ratio	Vripple = 200mV sine p-p f=217Hz	45	56	—	dB
		Vripple = 200mV sine p-p f=1kHz		62		

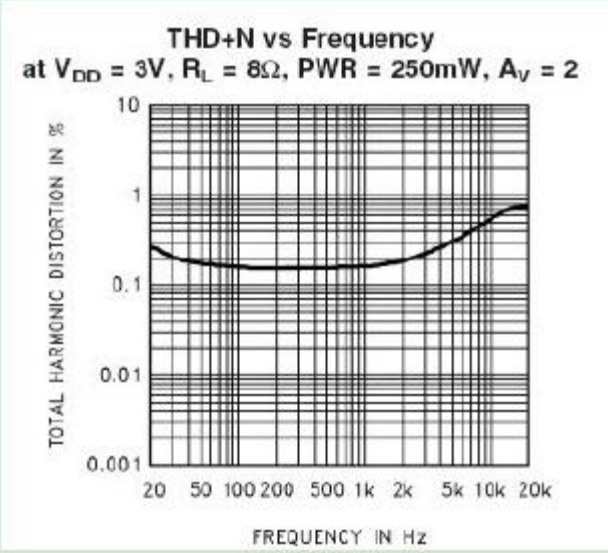
(VDD = 2.6V Unless otherwise specified. Limits apply for TA = 25°C.)

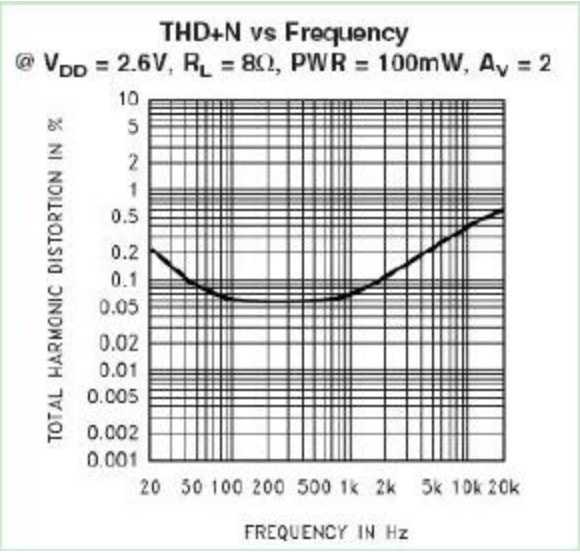
Parameter	Symbol	Condition		Min	Typ	Max	Unit
IDD	Quiescent Power Supply Current	VIN = 0V, Io = 0A, No Load		—	2.6	5.5	mA
ISD		VSHUTDOWN = 0V		—	0.1	2	μA
PO	Output Power (8Ω)	THD = 1% (max) ;f = 1 kHz	8Ω Load		0.2	—	W
			4Ω Load		0.22		
THD+N	Total Harmonic Distortion+Noise	Po = 0.1 Wrms; f = 1kHz		—	0.08	—	%
PSRR	Power Supply Rejection Ratio	Vripple = 200mV sine p-p f=217Hz		—	44	—	dB
		Vripple = 200mV sine p-p f=1kHz			44		

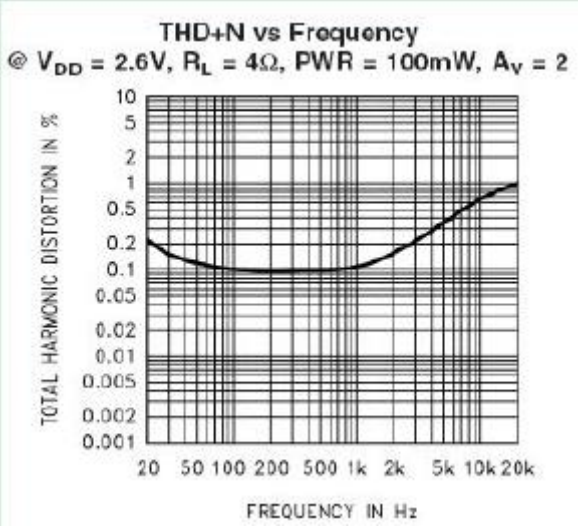
Typical Performance Characteristics

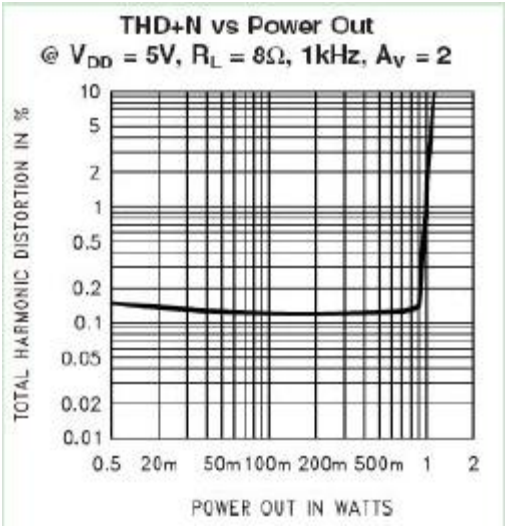




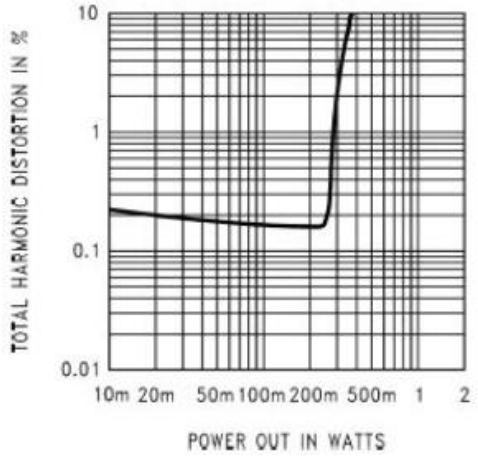




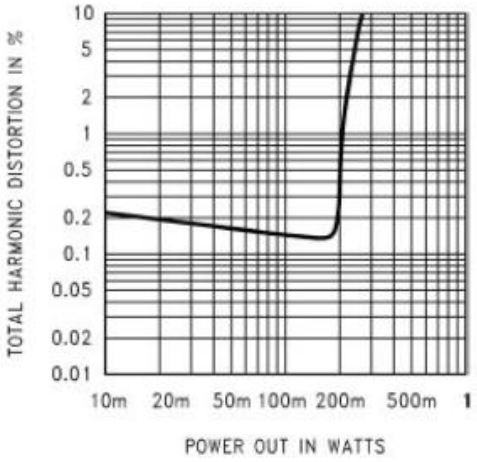




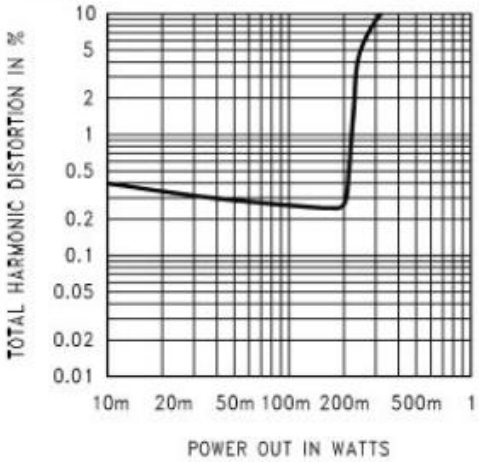
THD+N vs Power Out
@ V_{DD} = 3V, R_L = 8Ω, 1kHz, A_V = 2



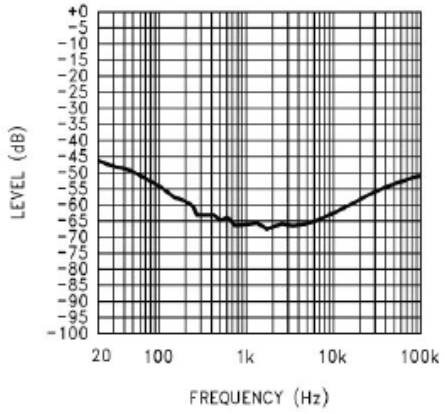
THD+N vs Power Out
@ V_{DD} = 2.6V, R_L = 8Ω, 1kHz, A_V = 2



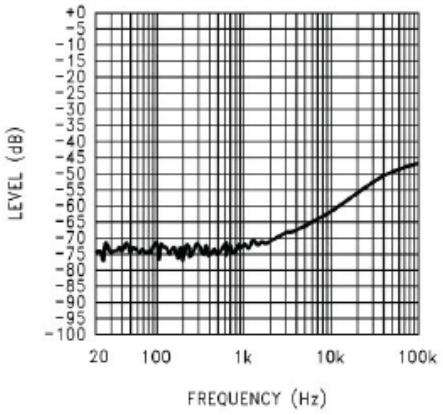
THD+N vs Power Out
@ V_{DD} = 2.6V, R_L = 4Ω, 1kHz, A_V = 2



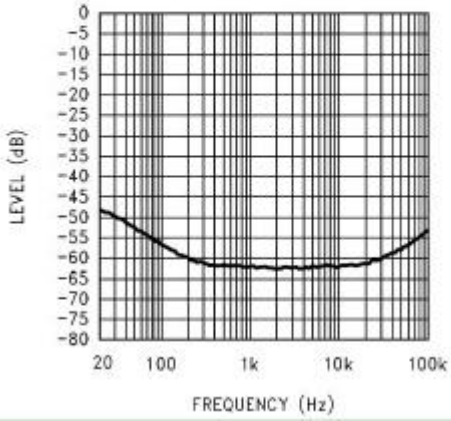
Power Supply Rejection Ratio (PSRR) @ A_V = 2
V_{DD} = 5V, V_{ripple} = 200mvp-p
R_L = 8Ω, R_{IN} = 10Ω



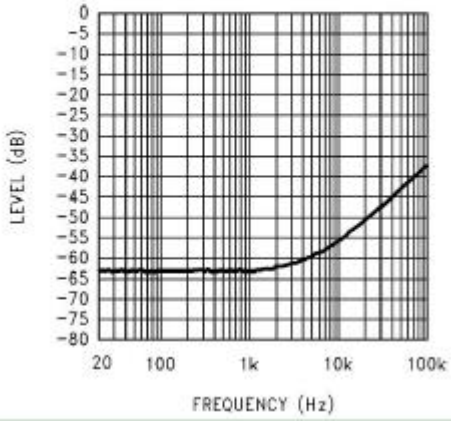
Power Supply Rejection Ratio (PSRR) @ A_V = 2
V_{DD} = 5V, V_{ripple} = 200mvp-p
R_L = 8Ω, R_{IN} = Float



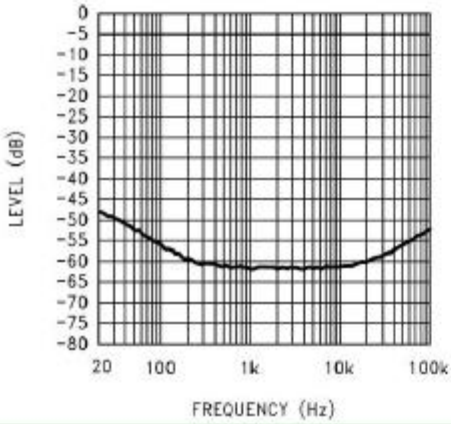
Power Supply Rejection Ratio (PSRR) @ A_V = 4
V_{DD} = 5V, V_{ripple} = 200mvp-p
R_L = 8Ω, R_{IN} = 10Ω



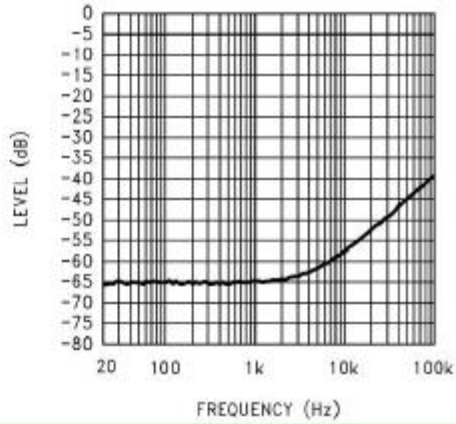
Power Supply Rejection Ratio (PSRR) @ A_V = 4
V_{DD} = 5V, V_{ripple} = 200mvp-p
R_L = 8Ω, R_{IN} = Float



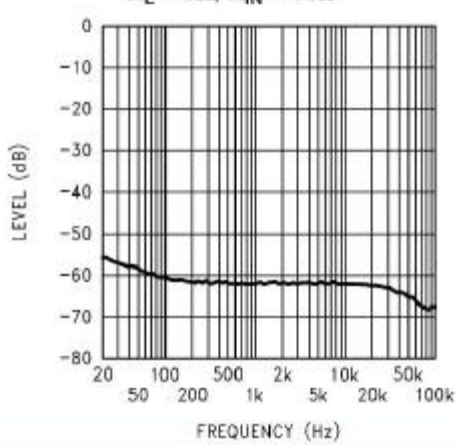
Power Supply Rejection Ratio (PSRR) @ A_V = 4
V_{DD} = 3V, V_{ripple} = 200mvp-p,
R_L = 8Ω, R_{IN} = 10Ω



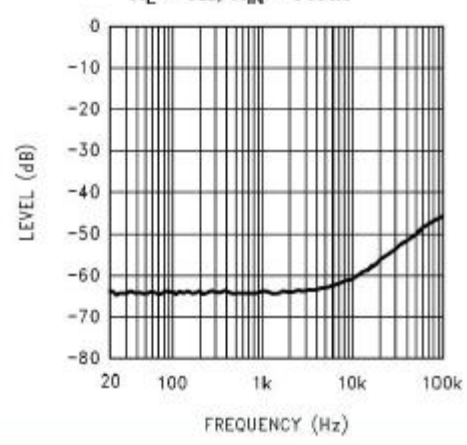
Power Supply Rejection Ratio (PSRR) @ A_V = 4
V_{DD} = 3V, V_{ripple} = 200mvp-p,
R_L = 8Ω, R_{IN} = Float



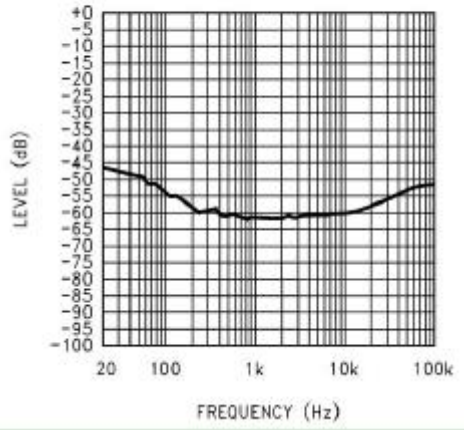
Power Supply Rejection Ratio (PSRR) @ A_V = 2
V_{DD} = 3V, V_{ripple} = 200mvp-p,
R_L = 8Ω, R_{IN} = 10Ω



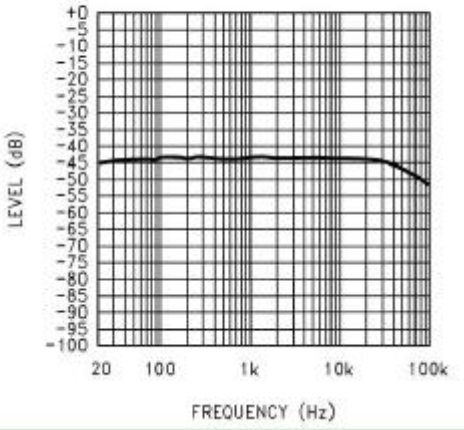
Power Supply Rejection Ratio (PSRR) @ A_V = 2
V_{DD} = 3V, V_{ripple} = 200mvp-p,
R_L = 8Ω, R_{IN} = Float



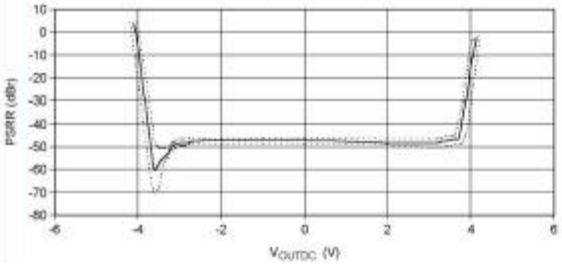
Power Supply Rejection Ratio (PSRR) @ A_V = 2
V_{DD} = 3.3V, V_{ripple} = 200mvp-p,
R_L = 8Ω, R_{IN} = 10Ω



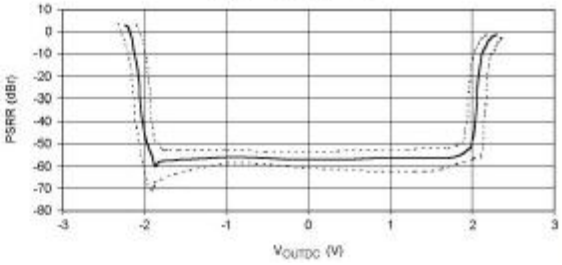
Power Supply Rejection Ratio (PSRR) @ A_V = 2
V_{DD} = 2.6V, V_{ripple} = 200mvp-p,
R_L = 8Ω, R_{IN} = 10Ω



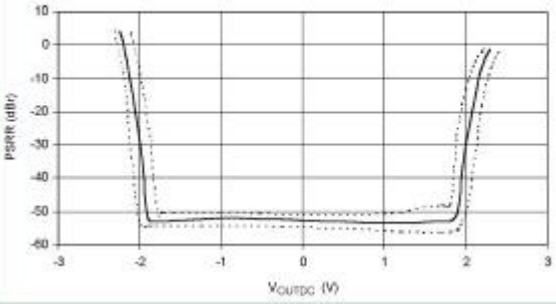
PSRR vs DC Output Voltage
V_{DD} = 5V, A_V = 10



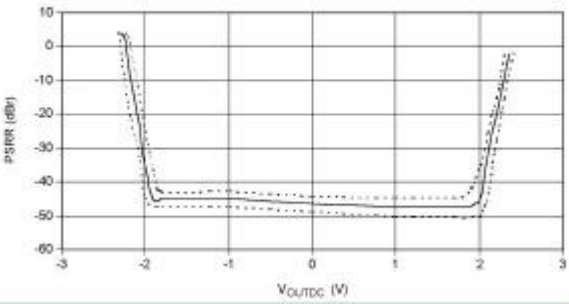
PSRR vs DC Output Voltage
V_{DD} = 3V, A_V = 2



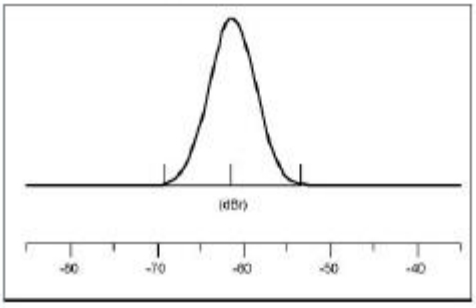
PSRR vs DC Output Voltage
V_{DD} = 3V, A_V = 4



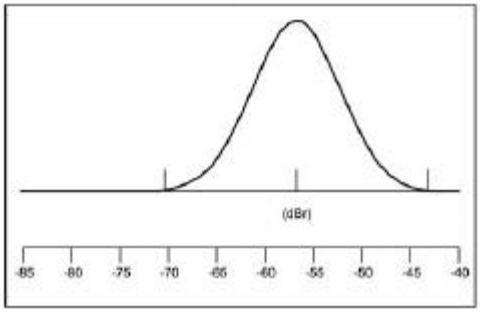
PSRR vs DC Output Voltage
V_{DD} = 3V, A_V = 10



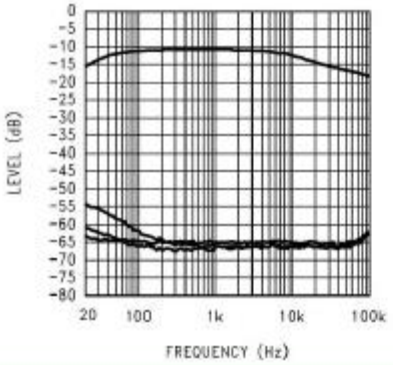
PSRR Distribution V_{DD} = 5V
217Hz, 200mvp-p,
-30, +25, and +80˚C



PSRR Distribution V_{DD} = 3V
217Hz, 200mvp-p,
-30, +25, and +80˚C

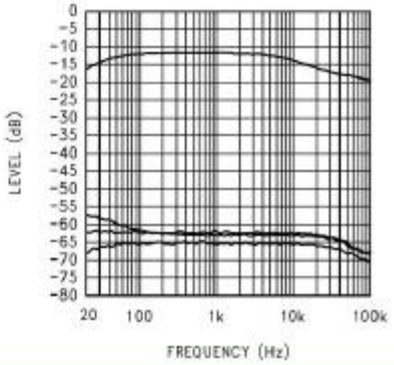


Power Supply Rejection Ration vs Bypass Capacitor Size
V_{DD} = 5V, Input Grounded = 10Ω, Output Load = 8Ω



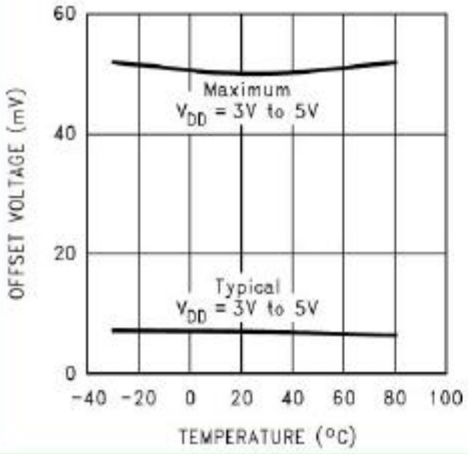
Top Trace = No Cap, Next Trace Down = 1µf
Next Trace Down = 2µf, Bottom Trace = 4.7µf

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

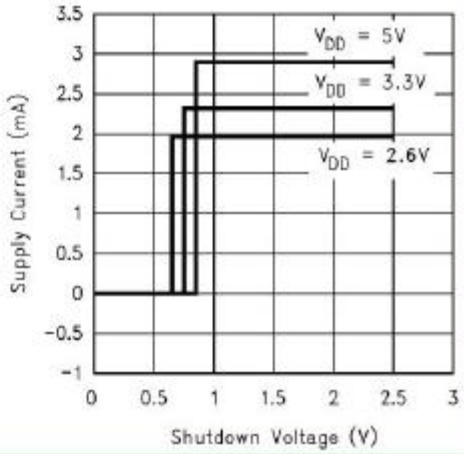


Top Trace = No Cap, Next Trace Down = 1µf
Next Trace Down = 2µf, Bottom Trace = 4.7µf

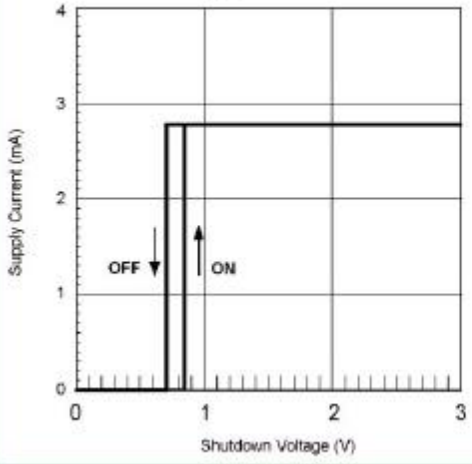
Output Offset Voltage



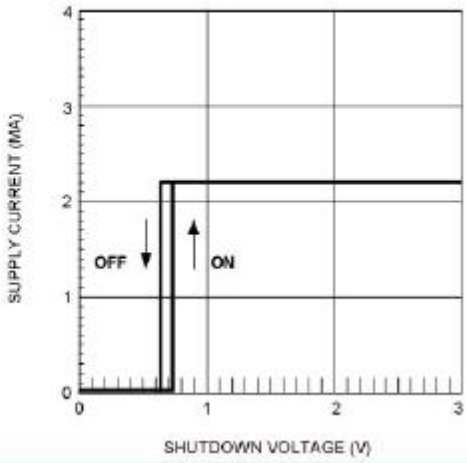
Supply Current vs Shutdown Voltage



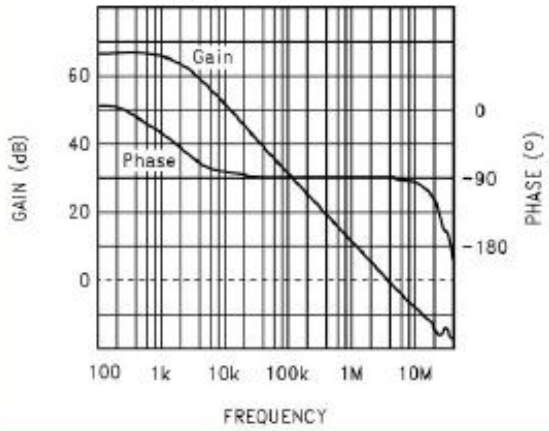
Shutdown Hysterisis Voltage
V_{DD} = 5V



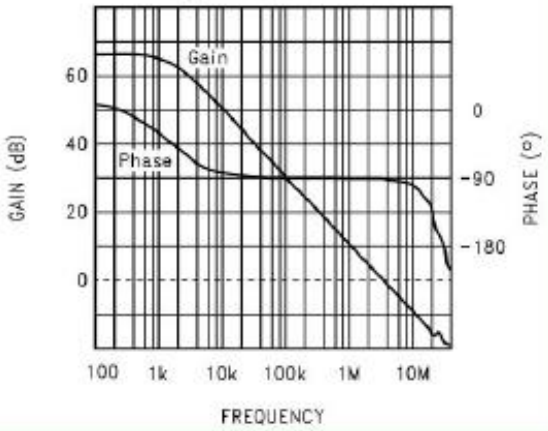
Shutdown Hysterisis Voltage
V_{DD} = 3V



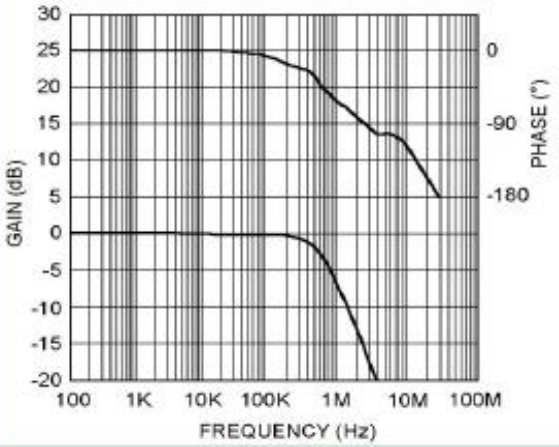
Open Loop Frequency Response
V_{DD} = 5V, No Load



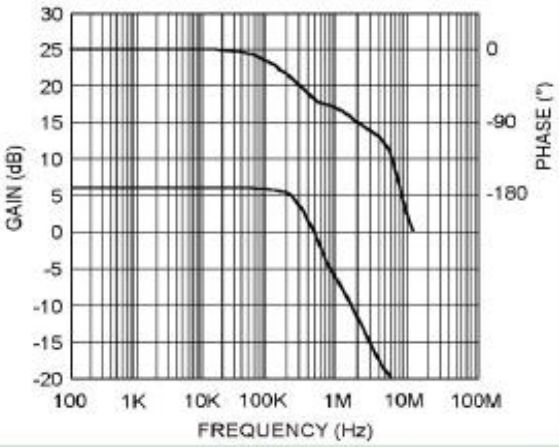
Open Loop Frequency Response
V_{DD} = 3V, No Load



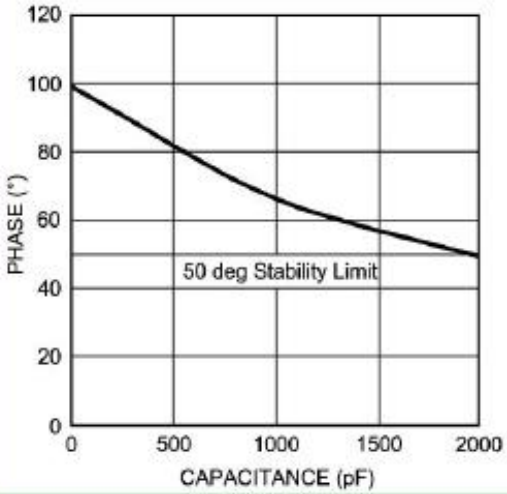
Gain / Phase Response, A_V = 2
V_{DD} = 5V, 8Ω Load, C_{LOAD} = 500pF



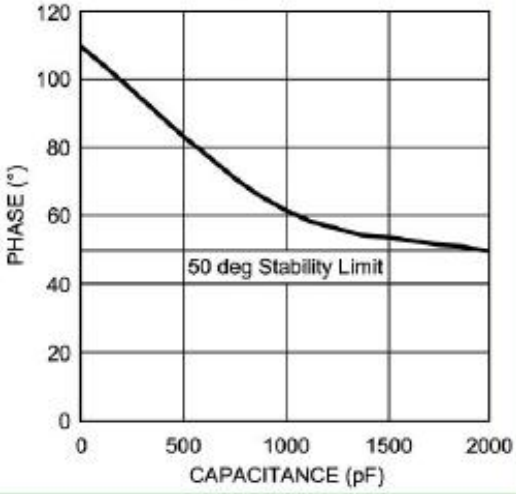
Gain / Phase Response, A_V = 4
V_{DD} = 5V, 8Ω Load, C_{LOAD} = 500pF



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

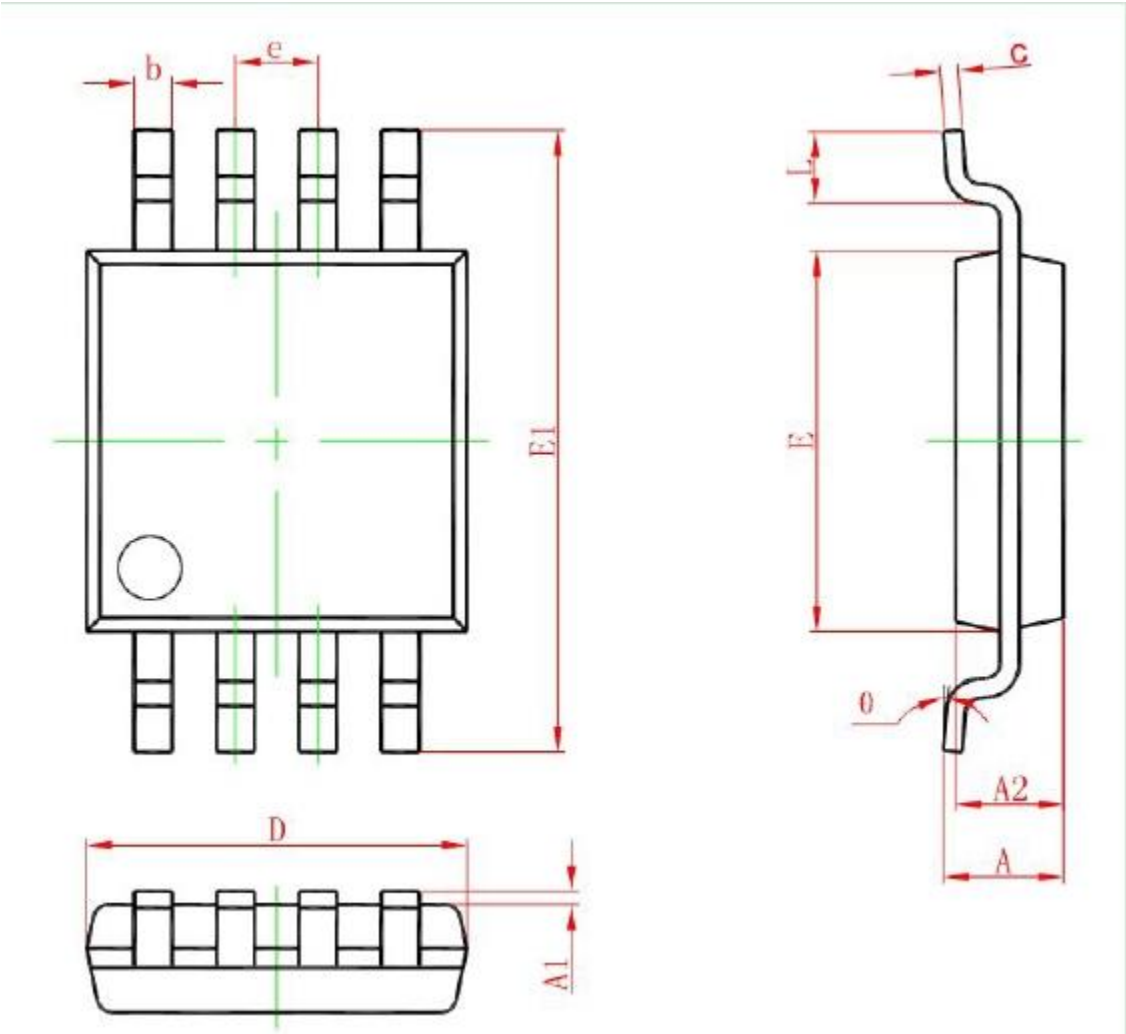


Phase Margin vs C_{LOAD}, A_V = 4
V_{DD} = 5V, 8Ω Load
Capacitance to gnd on each output



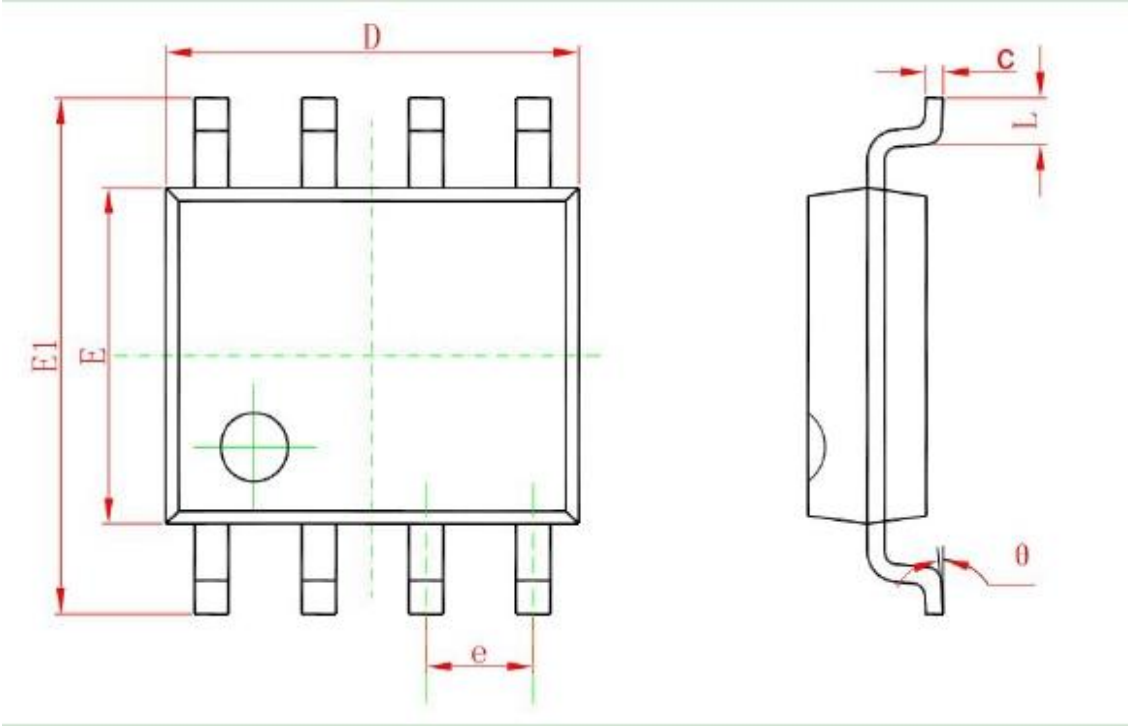
Package Information

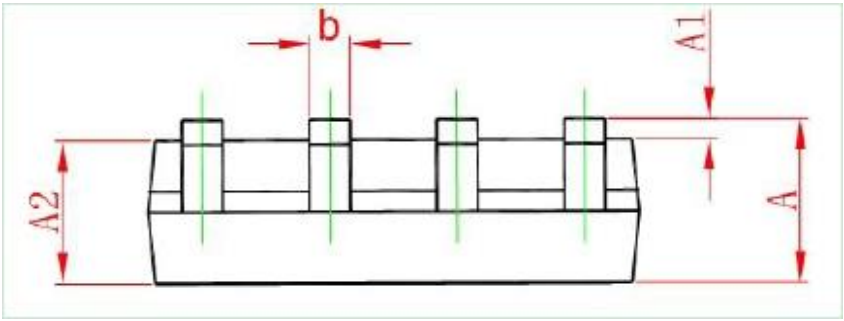
MSOP8



Symbol	Dimensions In Millimeters		Dimensions In 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	0.114	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°

SOP8





Symbol	Dimensions In Millimeters		Dimensions In 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	0.006	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°