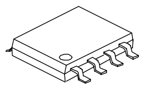
DUAL 100mW AUDIO POWER AMPLIFIER WITH STANDBY MODE



SOP-8

*Pb-free plating product number: S486L

■ DESCRIPTION

The UTC **S486** is a dual power amplifier capable of delivering typically 100mW per channel of continuous average power to an 8Ω load with 0.1% THD+N using a 5V power supply.

The UTC **S486** features an externally controlled, low-power consumption shutdown mode. The UTC **S486** exhibit a low quiescent current of typically 1.8mA, allowing usage in portable applications.

The unity-gain stable UTC S486 can be configured by external gain-setting resistors.

■ FEATURES

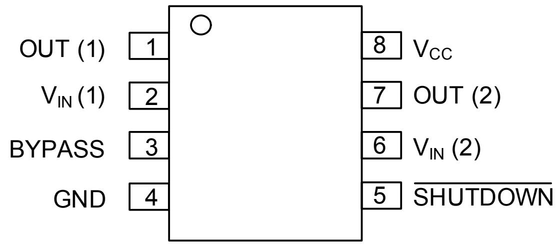
* Operating voltage range V_{CC}=2V ~ 5.5V
* Output power:
  - 102mW @5V into 16Ω with 0.1% THD+N max (1kHz)
* Shutdown mode available
* Low current consumption: 2.5mA max
* Click and pop reduction circuitry
* Unity-gain stable
* Short circuit protected

■ ORDERING INFORMATION

Order Number		Package	Packing
Normal	Lead Free Plating		
S486-S08-R	S486L-S08-R	SOP-8	Tape Reel
S486-S08-T	S486L-S08-T	SOP-8	Tube

S486L-S08-R (1)Packing Type (2)Package Type (3)Lead Plating	(1) R: Tape Reel, T: Tube (2) S08: SOP-8 (3) L: Lead Free Plating, Blank: Pb/Sn

■ PIN CONFIGURATION



■ ABSOLUTE MAXIMUM RATING (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply voltage (Note 2)	V_{CC}	6	V
Input Voltage	V_{IN}	-0.3V ~ V_{CC}+0.3V	V
Output Short-Circuit to V_{CC} or GND		Continuous(Note 3)	
Power Dissipation (T_J=150°C)	P_D	0.71	W
Junction Temperature	T_J	+150	°C
Operating Temperature	T_{OPR}	-40 ~ +85	°C
Storage Temperature	T_{STG}	-65 ~ +150	°C

Note: 1.Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2.All voltage values are measured with respect to the ground pin.
3.Attention must be paid to continuous power dissipation (V_{DD} x 300mA). Exposure of the I_C to a short circuit for an extended time period is dramatically reducing product life expectancy.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Thermal Resistance Junction to Ambient	θ_{JA}	175	°C/W

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage		V_{CC}	2 ~ 5.5	V
Shutdown Voltage Input	ACTIVE	V_{ST-BY}	1.5≤V_{SHDN}≤V_{CC}	V
	SHUTDOWN		GND≤V_{SHDN}≤0.4(Note)	
Load Resistor		R_L	≥16	Ω
Load Capacitor	R_L = 16 ~ 100Ω	C_L	400	pF
	R_L > 100Ω		100	
Thermal Resistance Junction to Ambient		θ_{JA}	150	°C/W

Note: The minimum current consumption (I_{SHDN}) is guaranteed at GND for the whole temperature range.

■ ELECTRICAL CHARACTERISTICS (Ta = 25℃, GND = 0V, unless otherwise specified)

For V_{CC} = +5V

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Swing	V_{OUT}	V_{OL} : R_L = 32Ω		0.45	0.5	V
Output Swing	V_{OUT}	V_{OH} : R_L = 32Ω	4.45	4.52		V
Output Swing	V_{OUT}	V_{OL} : R_L = 16Ω		0.6	0.7	V
Output Swing	V_{OUT}	V_{OH} : R_L = 16Ω	4.2	4.35		V
Input Offset Voltage	$V_{I(OFF)}$	V_{ICM} = V_{CC}/2		1		mV
Supply Current	I_{CC}	No input signal, no load		1.8	2.5	mA
Shutdown Current	I_{SHDN}	No input signal, V_{SHDN}=GND, R_L=32Ω		10	1000	nA
Input Bias Current	$I_{I(BIAS)}$	V_{ICM} = V_{CC}/2		90	200	nA
Max Output Current	I_{OUT}	THD+N≤1%, R_L=16Ω connected between out and V_{CC}/2	106	115		mA
Output Power	P_{OUT}	THD+N = 0.1% Max, F= 1kHz, R_L = 16Ω		102		mW
Output Power	P_{OUT}	THD+N = 0.1% Max, F= 1kHz, R_L = 32Ω		64		mW
Output Power	P_{OUT}	THD+N = 1% Max, F= 1kHz, R_L = 16Ω	95	108		mW
Output Power	P_{OUT}	THD+N = 1% Max, F= 1kHz, R_L = 32Ω	60	65		mW
Total Harmonic Distortion + Noise (Gv=-1)	THD+N	R_L = 32Ω, P_{OUT}= 60mW, 20Hz≤F≤20kHz		0.3		%
Total Harmonic Distortion + Noise (Gv=-1)	THD+N	R_L = 16Ω, P_{OUT}= 90mW, 20Hz≤F≤20kHz		0.3		%
Power Supply Rejection Ratio	PSRR	inputs grounded(G_V=-1)(Note), R_L≧16Ω, C_B=1mF, F = 1kHz, V_{RIPPLE} = 200mV_{PP}	53	58		dB
Signal-to-Noise Ratio	SNR	(A weighted, G_V=-1)(Note), R_L = 32Ω, THD +N < 0.4%, 20Hz≤F≤20kHz	80	103		dB
Crosstalk	CT	Channel Separation, G_V=-1, F = 1kHz, R_L = 16Ω		80		dB
Crosstalk	CT	Channel Separation, G_V=-1, F = 1kHz, R_L = 32Ω		83		dB
Crosstalk	CT	Channel Separation, G_V=-1, F = 20Hz ~ 20kHz, R_L = 16Ω		72		dB
Crosstalk	CT	Channel Separation, G_V=-1, F = 20Hz ~ 20kHz, R_L = 32Ω		79		dB
Input Capacitance	C_{IN}			1		pF
Gain Bandwidth Product	GB_W	R_L = 32Ω		1.1		MHz
Slew Rate	SR	Unity Gain Inverting(R_L = 16Ω)		0.4		V/μs

Note: Guaranteed by design and evaluation.

■ ELECTRICAL CHARACTERISTICS(Cont.) (Ta = 25°C, GND = 0V, unless otherwise specified)

For V_{CC} = +3.3V

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Output Swing	V_{OUT}	V_{OL} : R_L = 32Ω			0.3	0.38	V
		V_{OH} : R_L = 32Ω		2.85	3		
		V_{OL} : R_L = 16Ω			0.45	0.52	
		V_{OH} : R_L = 16Ω		2.68	2.85		
Input Offset Voltage	$V_{I(OFF)}$	V_{ICM} = V_{CC}/2			1		mV
Supply Current	I_{CC}	No input signal, no load			1.8	2.5	mA
Shutdown Current	I_{SHDN}	No input signal, V_{SHDN}=GND, R_L=32Ω			10	1000	nA
Input Bias Current	$I_{I(BIAS)}$	V_{ICM} = V_{CC}/2			90	200	nA
Max Output Current	I_{OUT}	THD +N≤1%, R_L = 16Ω connected between out and V_{CC}/2		64	75		mA
Output Power	P_{OUT}	THD+N = 0.1% Max, F= 1kHz	R_L = 16Ω		38		mW
			R_L = 32Ω		26		
		THD+N = 1% Max, F= 1kHz	R_L = 16Ω	36	42		
			R_L = 32Ω	23	28		
Total Harmonic Distortion + Noise (Gv=-1)	THD+N	R_L = 32Ω, P_{OUT}= 60mW, 20Hz≤F≤20kHz			0.3		%
		R_L = 16Ω, P_{OUT}= 90mW, 20Hz≤F≤20kHz			0.3		
Power Supply Rejection Ratio	PSRR	inputs grounded (G_V=-1)(Note 2), R_L≧16Ω, C_B=1mF, F = 1kHz, V_{RIPPLE} = 200mV_{PP}		53	58		dB
Signal-to-Noise Ratio	SNR	(A weighted, G_V=-1)(Note 2), R_L = 32Ω, THD +N < 0.4%, 20Hz≤F≤20kHz		80	98		dB
Crosstalk	CT	Channel Separation, G_V=-1, F = 1kHz	R_L = 16Ω		77		dB
			R_L = 32Ω		80		
		Channel Separation, G_V=-1, F = 20Hz ~ 20kHz	R_L = 16Ω		69		
			R_L = 32Ω		76		
Input Capacitance	C_{IN}				1		pF
Gain Bandwidth Product	GBw	R_L = 32Ω			1.1		MHz
Slew Rate	SR	Unity Gain Inverting(R_L = 16Ω)			0.4		V/μs

Note 1. All electrical values are guaranteed with correlation measurements at 2V and 5V.

2. Guaranteed by design and evaluation.

■ ELECTRICAL CHARACTERISTICS(Cont.) (Ta = 25℃, GND = 0V, unless otherwise specified)

For V_{CC} = +2.5V

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Output Swing	V_{OUT}	V_{OL} : R_L = 32Ω			0.25	0.32	V
		V_{OH} : R_L = 32Ω		2.14	0.25		
		V_{OL} : R_L = 16Ω			0.35	0.45	
		V_{OH} : R_L = 16Ω		1.97	2.15		
Input Offset Voltage	$V_{I(OFF)}$	V_{ICM} = V_{CC}/2			1		mV
Supply Current	I_{CC}	No input signal, no load			1.7	2.5	mA
Shutdown Current	I_{SHDN}	No input signal, V_{SHDN}=GND, R_L=32Ω			10	1000	nA
Input Bias Current	$I_{I(BIAS)}$	V_{ICM} = V_{CC}/2			90	200	nA
Max Output Current	I_{OUT}	THD +N≤1%, R_L = 16Ω connected between out and V_{CC}/2		45	56		mA
Output Power	P_{OUT}	THD+N = 0.1% Max, F= 1kHz	R_L = 16Ω		21		mW
			R_L = 32Ω		13		
		THD+N = 1% Max, F= 1kHz	R_L = 16Ω	17.5	22		
			R_L = 32Ω	12.5	14		
Total Harmonic Distortion + Noise (Gv=-1)	THD+N	R_L = 32Ω,P_{OUT} = 60mW, 20Hz≤F≤20kHz			0.3		%
		R_L = 16Ω, P_{OUT} = 90mW, 20Hz≤F≤20kHz			0.3		
Power Supply Rejection Ratio	PSRR	inputs grounded(G_V=-1)(Note 2), R_L≧16Ω, C_B=1mF, F = 1kHz, V_{RIPPLE} = 200mV_{PP}		53	58		dB
Signal-to-Noise Ratio	SNR	(A weighted, A_V=-1)(Note 2), R_L = 32Ω, THD +N < 0.4%, 20Hz≤F≤20kHz		80	95		dB
Crosstalk	CT	Channel Separation, G_V=-1, F = 1kHz	R_L = 16Ω		77		dB
			R_L = 32Ω		80		
		Channel Separation, G_V=-1, F = 20Hz ~ 20kHz	R_L = 16Ω		69		
			R_L = 32Ω		76		
Input Capacitance	C_{IN}				1		pF
Gain Bandwidth Product	GBP	R_L = 32Ω			1.1		MHz
Slew Rate	SR	Unity Gain Inverting (R_L = 16Ω)			0.4		V/μs

Note 1. All electrical values are guaranteed with correlation measurements at 2V and 5V.

2. Guaranteed by design and evaluation.

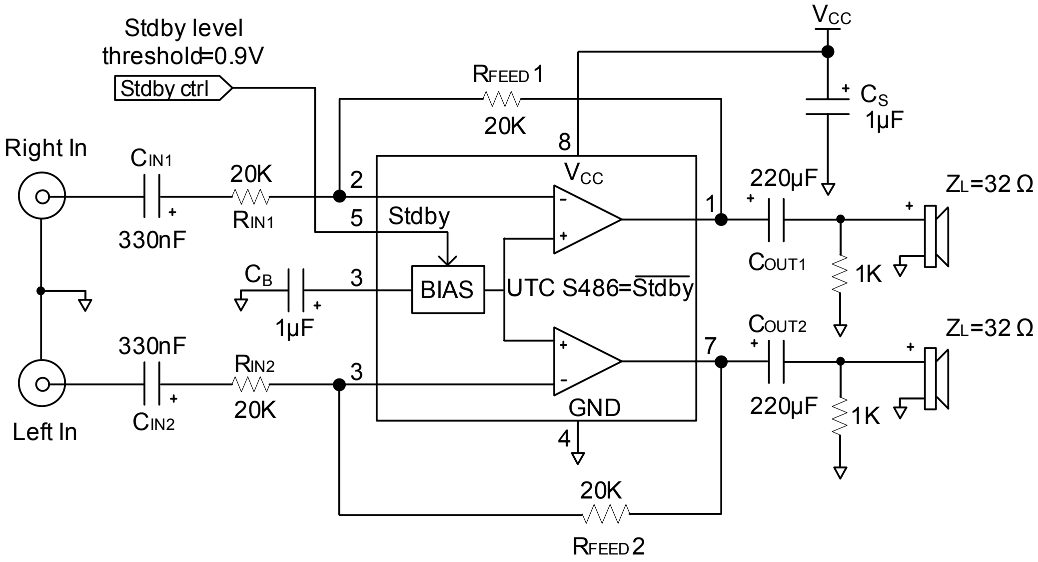
■ ELECTRICAL CHARACTERIST(Cont.) (Ta = 25°C, GND = 0V, unless otherwise specified)

For V_{CC} = +2V

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Output Swing	V_{OUT}	V_{OL} : R_L = 32Ω			0.24	0.29	V
		V_{OH} : R_L = 32Ω		1.67	1.73		
		V_{OL} : R_L = 16Ω			0.33	0.41	
		V_{OH} : R_L = 16Ω		1.53	1.63		
Input Offset Voltage	$V_{I(OFF)}$	V_{ICM} = V_{CC}/2			1		mV
Supply Current	I_{CC}	No input signal, no load			1.7	2.5	mA
Shutdown Current	I_{SHDN}	No input signal, V_{SHDN}=GND, R_L=32Ω			10	1000	nA
Input Bias Current	$I_{I(BIAS)}$	V_{ICM} = V_{CC}/2			90	200	nA
Max Output Current	I_{OUT}	THD +N≤1%, R_L=16Ω connected between out and V_{CC}/2		33	41		mA
Output Power	P_{OUT}	THD+N = 0.1% Max, F= 1kHz	R_L = 16Ω		12		mW
			R_L = 32Ω		8		
		THD+N = 1% Max, F= 1kHz	R_L = 16Ω	9.5	13		
			R_L = 32Ω	7	9		
Total Harmonic Distortion + Noise (Gv=-1)	THD+N	R_L = 32Ω, P_{OUT}= 60mW, 20Hz≤F≤20kHz			0.3		%
		R_L = 16Ω, P_{OUT}= 90mW, 20Hz≤F≤20kHz			0.3		
Power Supply Rejection Ratio	PSRR	inputs grounded (G_V=-1)(Note) ,R_L≧16Ω, C_B=1mF, F = 1kHz, V_{RIPPLE} = 200mV_{PP}		52	57		dB
Signal-to-Noise Ratio	SNR	(A weighted, G_V=-1)(Note), R_L = 32Ω, THD +N < 0.4%, 20Hz≤F≤20kHz		80	93		dB
Crosstalk	CT	Channel Separation, G_V=-1, F = 1kHz	R_L = 16Ω		77		dB
			R_L = 32Ω		80		
		Channel Separation, G_V=-1, F = 20Hz ~ 20kHz	R_L = 16Ω		69		
			R_L = 32Ω		76		
Input Capacitance	C_{IN}				1		pF
Gain Bandwidth Product	GBP	R_L = 32Ω			1.1		MHz
Slew Rate	SR	Unity Gain Inverting (R_L = 16Ω)			0.4		V/μs

Note: Guaranteed by design and evaluation.

■ TYPICAL APPLICATION CIRCUIT



COMPONENTS INFORMATION

Components	Functional Description
$R_{IN1, 2}$	Inverting input resistor which sets the closed loop gain in conjunction with R_{FEED}. This resistor also forms a high pass filter with C_{IN} (fc = 1 / (2 x π x R_{IN} x C_{IN}) .
$C_{IN1, 2}$	Input coupling capacitor which blocks the DC voltage at the amplifier's input terminal.
$R_{FEED1, 2}$	Feedback resistor which sets the closed loop gain in conjunction with R_{IN}. A_V= Closed Loop Gain= $-R_{FEED}/R_{IN}$.
C_S	Supply Bypass capacitor which provides power supply filtering.
C_B	Bypass capacitor which provides half supply filtering.
$C_{OUT1, 2}$	Output coupling capacitor which blocks the DC voltage at the load input terminal. This capacitor also forms a high pass filter with R_L (fc = 1 / (2 x π x R_L x C_{OUT})).

■ TYPICAL CHARACTERISTICS

Fig1. THD + N vs Frequency

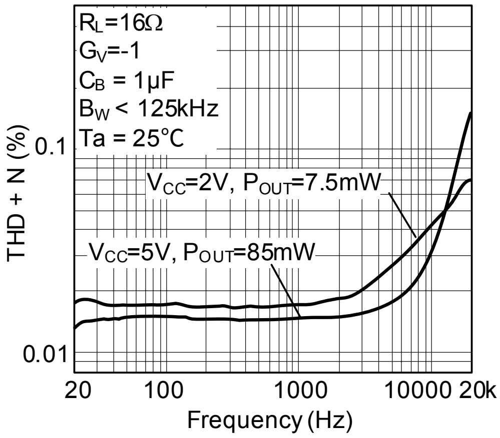


Fig 2. THD + N vs Frequency

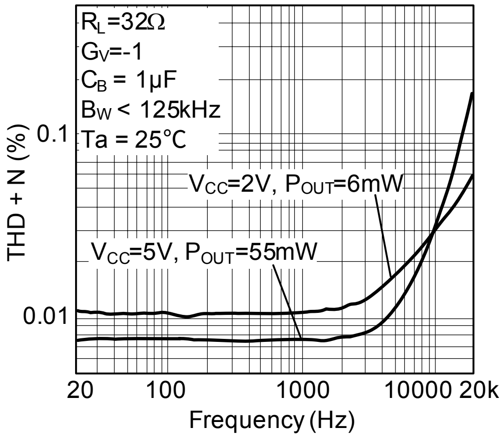


Fig 3. THD + N vs Output Power

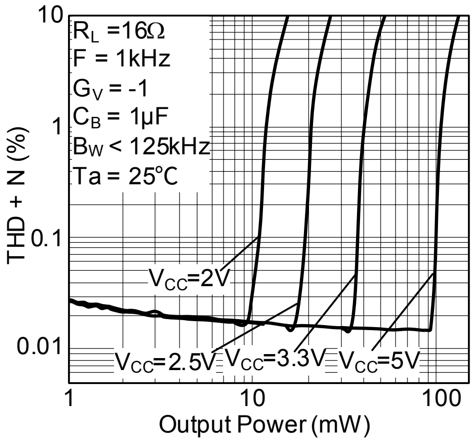


Fig 4. THD + N vs Output Power

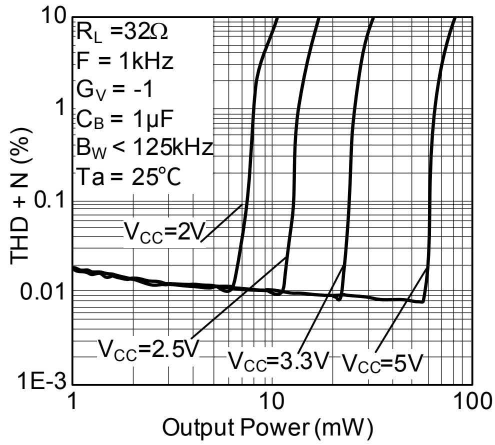


Fig 5. THD + N vs Output Power

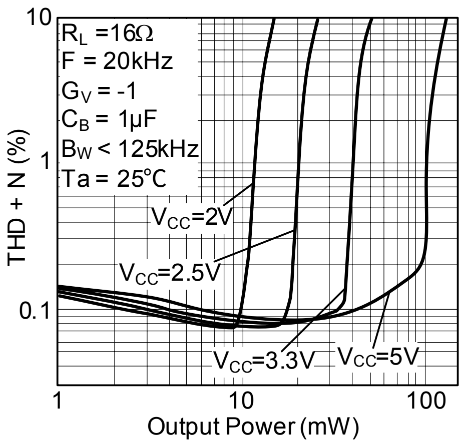
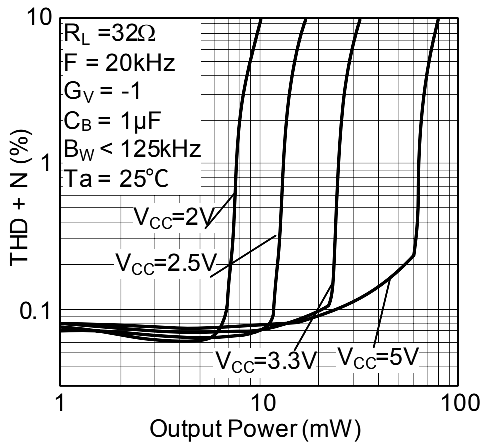


Fig 6. THD + N vs Output Power



■ TYPICAL CHARACTERISTICS(Cont.)

Fig 7. Open Loop Gain and Phase vs Frequency

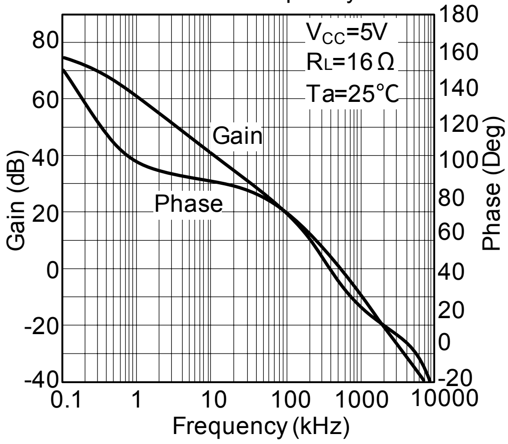


Fig 8. Open Loop Gain and Phase vs Frequency

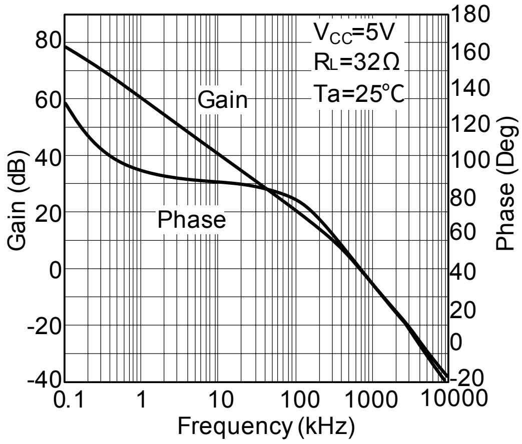


Fig 9. Open Loop Gain and Phase vs Frequency

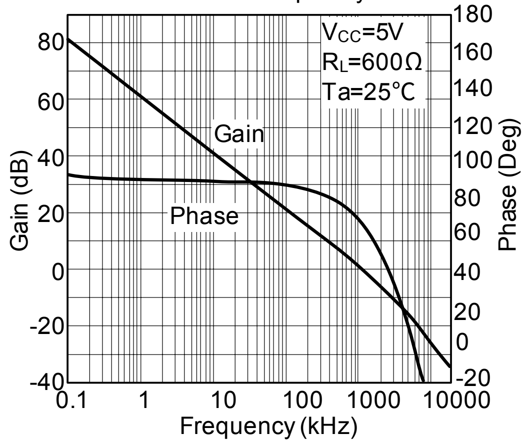


Fig 10. Output Power vs Power Supply Voltage

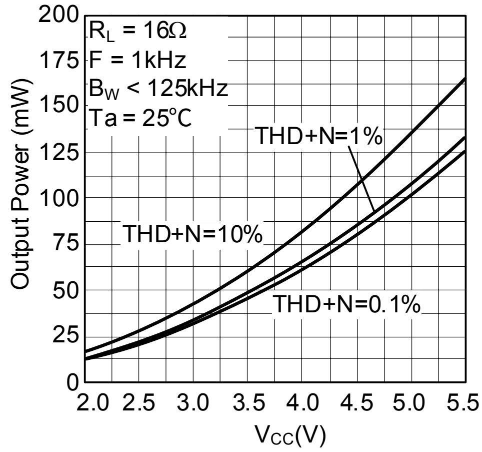


Fig 11. Output Power vs Power Supply Voltage

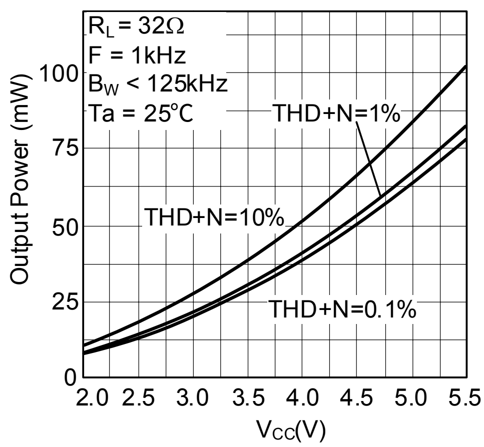
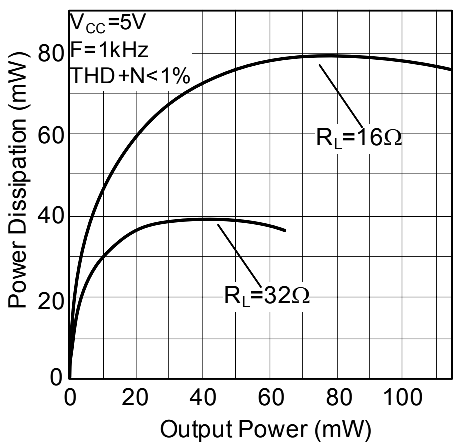


Fig 12. Power Dissipation vs Output Power



■ TYPICAL CHARACTERISTICS(Cont.)

Fig 13. Power Dissipation vs Output Power

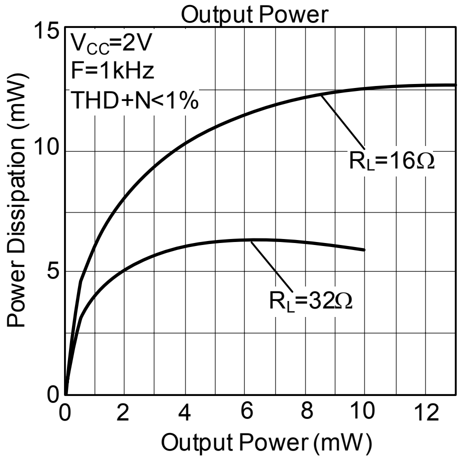


Fig 14. Power Derating vs Ambiant Temperature

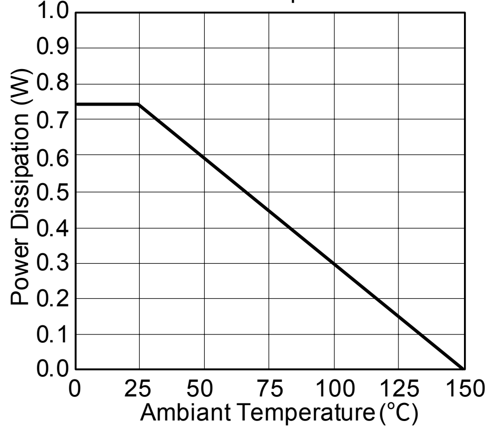


Fig 15. Current Consumption vs Power Supply Voltage

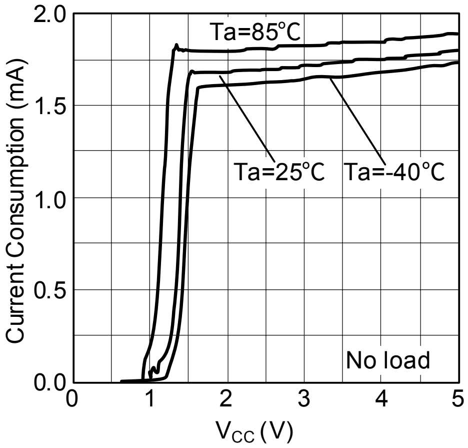


Fig 16. Current Consumption vs Standby Voltage

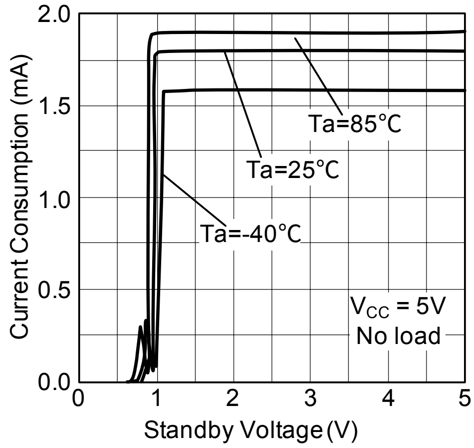


Fig 17. Output Voltage Swing vs Power Supply Voltage