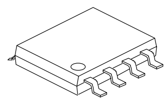
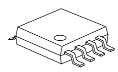
S486

CMOS IC

DUAL 100mW AUDIO POWER AMPLIFIER WITH STANDBY MODE



SOP-8



MSOP-8

■ 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 stand by mode. The UTC **S486** exhibit a low quiescent current of typically 1.8mA, allowing usage in portable applications.

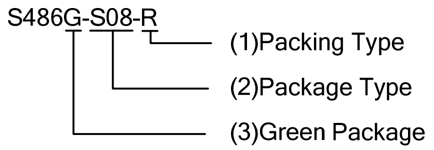
The unity-gain stable UTC **S486** can be configured by external gain-setting resistors.

■ FEATURES

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

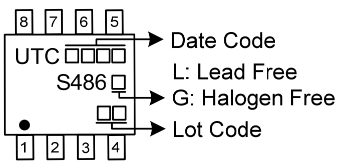
■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
S486L-S08-R	S486G-S08-R	SOP-8	Tape Reel
S486L-SM1-R	S486G-SM1-R	MSOP-8	Tape Reel

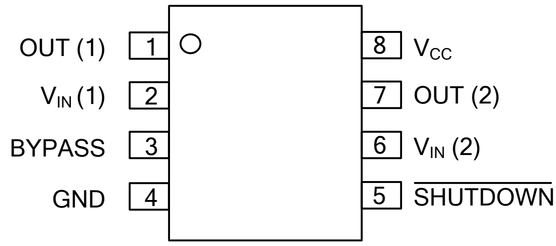


(1) R: Tape Reel
(2) S08: SOP-8, SM1: MSOP-8
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



■ PIN CONFIGURATION



■ ABSOLUTE MAXIMUM RATING (T_A=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)	SOP-8	P_D	0.71	W
	MSOP-8		0.58	W
Junction Temperature		T_J	+150	°C
Operating Temperature		T_{OPR}	-40 ~ +85	°C
Storage Temperature		T_{STG}	-65 ~ +150	°C

Notes: 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
Junction to Ambient	SOP-8	θ_{JA}	175	°C/W
	MSOP-8		215	°C/W

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage		V_{CC}	2 ~ 5.5	V
Standby Voltage Input	ACTIVE	V_{STB}	1.5≤V_{STB}≤V_{CC}	V
	STANDBY		GND≤V_{STB}≤0.4(Note)	V
Load Resistor		R_L	≥16	Ω
Load Capacitor	R_L = 16 ~ 100Ω	C_L	400	pF
	R_L > 100Ω		100	pF
Junction to Ambient		θ_{JA}	150	℃/W

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

■ ELECTRICAL CHARACTERISTICS (T_A = 25°C, 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
		V_{OH}: R_L=32Ω		4.45	4.52		
		V_{OL}: R_L=16Ω			0.6	0.7	
		V_{OH}: R_L=16Ω		4.2	4.35		
Input Offset Voltage	$V_{I(OFF)}$	V_{ICM}=V_{CC}/2			1		mV
Supply Current	I_{CC}	Noinputsignal, noload			1.8	2.5	mA
Stand By Current	I_{STB}	Noinputsignal, V_{STB}=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=16ΩconnectedbetweenoutandV$_{CC}$/2		106	115		mA
Output Power	P_{OUT}	THD+N=0.1% Max, F=1kHz	R_L=16Ω		102		mW
			R_L=32Ω		64		
		THD+N=1% Max, F=1kHz	R_L=16Ω	95	108		
			R_L=32Ω	60	65		
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	inputsgrounded (G_V=-1)(Note), R_L≧16Ω, C_B=1mF, F=1kHz, V_{RIPPLE}=200mV_{PP}		53	58		dB
Signal-to-Noise Ratio	SNR	(Aweighted, G_V=-1)(Note), R_L=32Ω, THD+N<0.4%, 20Hz≤F≤20kHz		80	103		dB
Crosstalk	CT	ChannelSeparation, G_V=-1, F=1kHz	R_L=16Ω		80		dB
			R_L=32Ω		83		
		ChannelSeparation, G_V=-1, F=20Hz~20kHz	R_L=16Ω		72		
			R_L=32Ω		79		
Input Capacitance	C_{IN}				1		pF
Gain Bandwidth Product	GB_W	R_L=32Ω			1.1		MHz
Slew Rate	SR	UnityGainInverting (R_L=16Ω)			0.4		V/μs

Note: Guaranteed by design and evaluation.

■ ELECTRICAL CHARACTERISTICS(Cont.) (T_A = 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}	Noinputsignal, noload			1.8	2.5	mA
Stand By Current	I_{STB}	Noinputsignal, V_{STB}=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=16ΩconnectedbetweenoutandV_{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	inputsgrounded(G_V=-1)(Note2), R_L≧16Ω, C_B=1mF, F=1kHz, V_{RIPPLE}=200mV_{PP}		53	58		dB
Signal-to-Noise Ratio	SNR	(Aweighted, G_V=-1)(Note2), R_L=32Ω, THD+N<0.4%, 20Hz≤F≤20kHz		80	98		dB
Crosstalk	CT	ChannelSeparation, G_V=-1, F=1kHz	R_L=16Ω		77		dB
			R_L=32Ω		80		
		ChannelSeparation, 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	UnityGainInverting (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.) (T_A = 25°C, 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	2.25		
		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}	Noinputsignal, noload		1.7	2.5	mA
Stand By Current	I_{STB}	Noinputsignal, V_{STB}=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=16ΩconnectedbetweenoutandV_{CC}/2	45	56		mA
Output Power	P_{OUT}	THD+N=0.1% Max, F=1kHz, R_L=16Ω		21		mW
		THD+N=0.1% Max, F=1kHz, R_L=32Ω		13		
		THD+N=1% Max, F=1kHz, R_L=16Ω	17.5	22		
		THD+N=1% Max, F=1kHz, 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	inputsgrounded(G_V=-1)(Note2), R_L≧16Ω, C_B=1mF, F=1kHz,V_{RIPPLE}=200mV_{PP}	53	58		dB
Signal-to-Noise Ratio	SNR	(Aweighted,A_V=-1)(Note2), R_L=32Ω, THD+N<0.4%, 20Hz≤F≤20kHz	80	95		dB
Crosstalk	CT	ChannelSeparation, G_V=-1, F=1kHz, R_L=16Ω		77		dB
		ChannelSeparation, G_V=-1, F=1kHz, R_L=32Ω		80		
		ChannelSeparation, G_V=-1, F=20Hz~20kHz, R_L=16Ω		69		
		ChannelSeparation, G_V=-1, F=20Hz~20kHz, R_L=32Ω		76		
Input Capacitance	C_{IN}			1		pF
Gain Bandwidth Product	GBP	R_L=32Ω		1.1		MHz
Slew Rate	SR	UnityGainInverting (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.

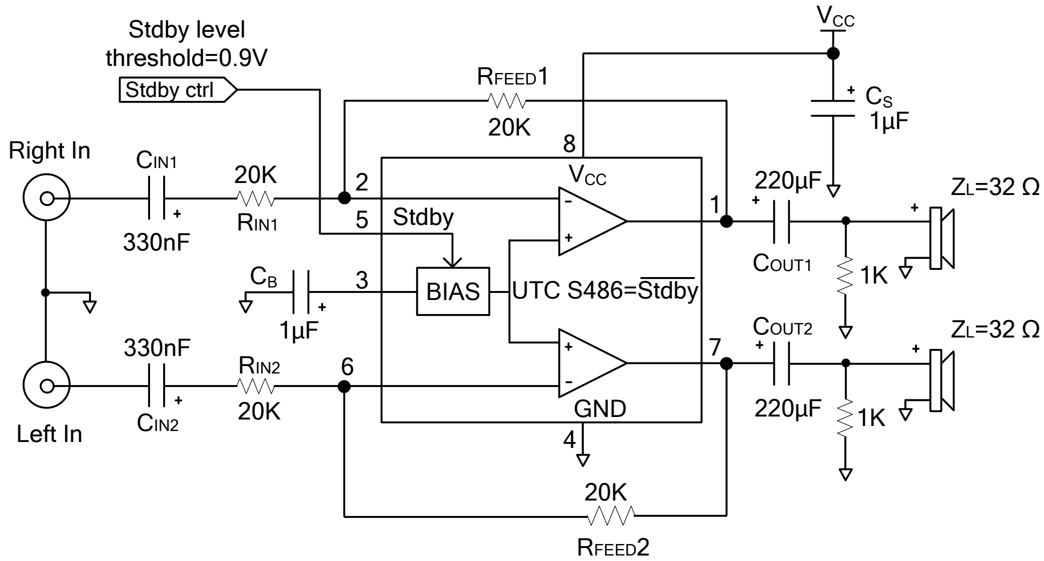
■ ELECTRICAL CHARACTERIST(Cont.) (T_A = 25°C, GND = 0V, unless otherwise specified)

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}	Noinputsignal, noload			1.7	2.5	mA
Stand By Current	I_{STB}	Noinputsignal, V_{STB}=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=16ΩconnectedbetweenoutandVcc/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	inputsgrounded (G_V=-1)(Note), R_L≧16Ω, C_B=1mF, F=1kHz,V_{RIPPLE}=200mV_{PP}		52	57		dB
Signal-to-Noise Ratio	SNR	(Aweighted,G_V=-1)(Note), R_L=32Ω, THD+N<0.4%, 20Hz≤F≤20kHz		80	93		dB
Crosstalk	CT	ChannelSeparation, G_V=-1, F=1kHz	R_L=16Ω		77		dB
			R_L=32Ω		80		
		ChannelSeparation, 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	UnityGainInverting (R_L=16Ω)			0.4		V/μs

Note: Guaranteed by design and evaluation.

■ TYPICAL APPLICATION CIRCUIT

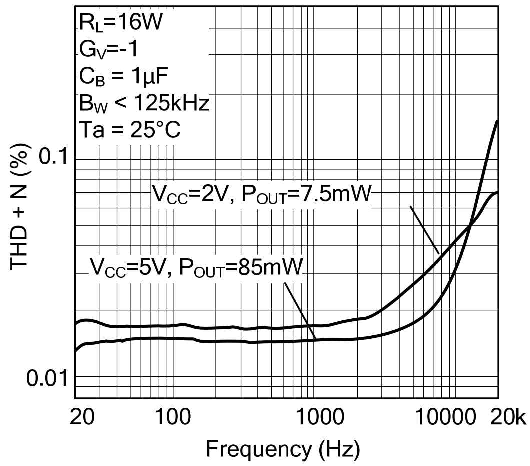


COMPONENTS INFORMATION

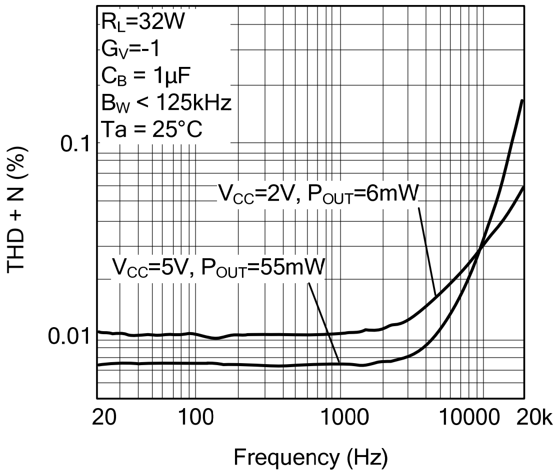
Components	Functional Description
$R_{IN1,\ 2}$	Inverting input resistor which sets the closed loop gain in conjunction with R_{FEED}. This resistor also forms a high pass filter with C_{IN} (fc = 1 / (2 xπx R_{IN} x C_{IN}) .
$C_{IN1,\ 2}$	Input coupling capacitor which blocks the DC voltage at the 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 xπx R_L x C_{OUT})).

■ TYPICAL CHARACTERISTICS

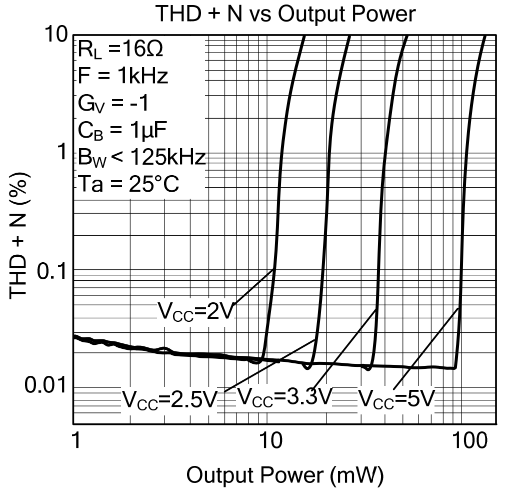
THD + N vs Frequency



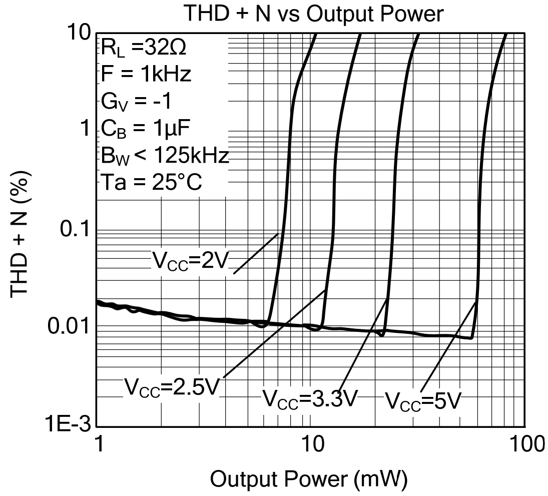
THD + N vs Frequency



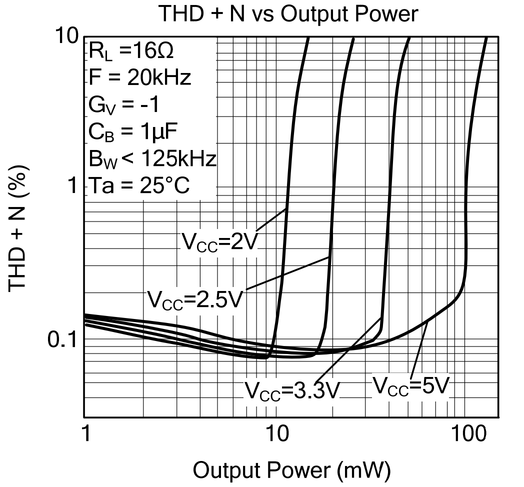
THD + N vs Output Power



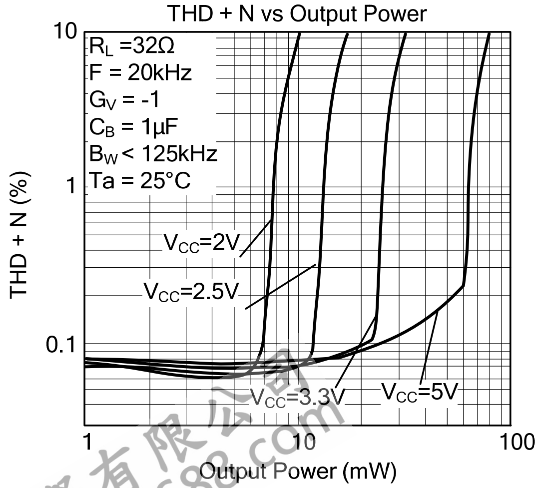
THD + N vs Output Power



THD + N vs Output Power

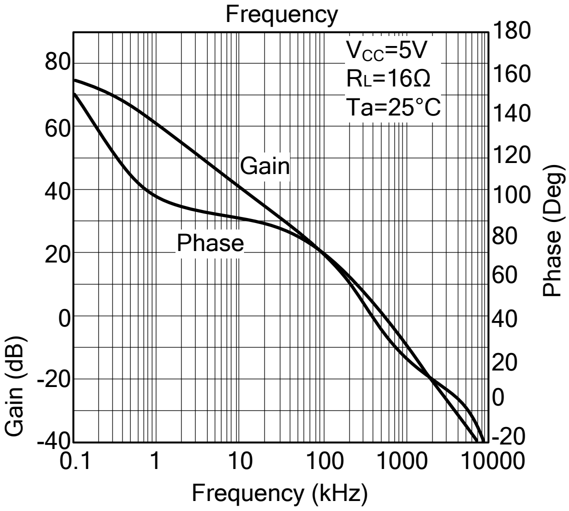


THD + N vs Output Power

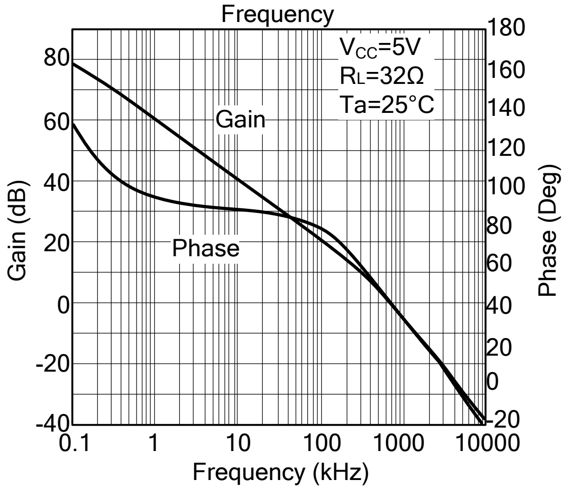


■ TYPICAL CHARACTERISTICS(Cont.)

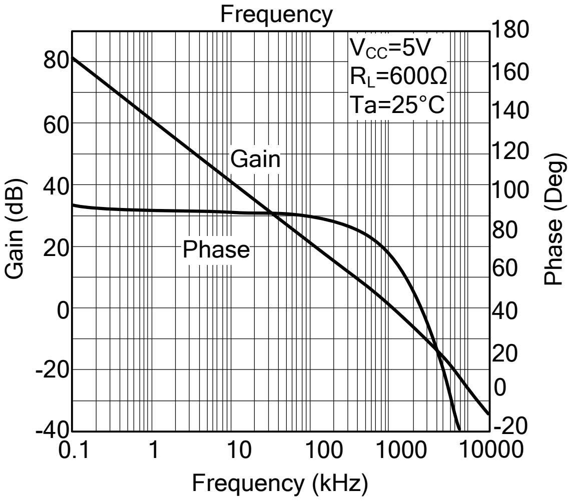
Open Loop Gain and Phase vs Frequency



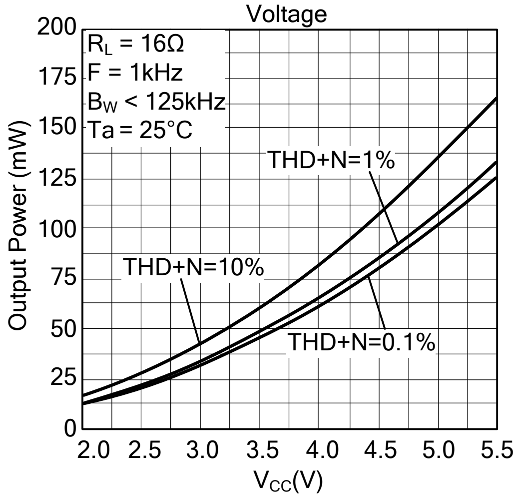
Open Loop Gain and Phase vs Frequency



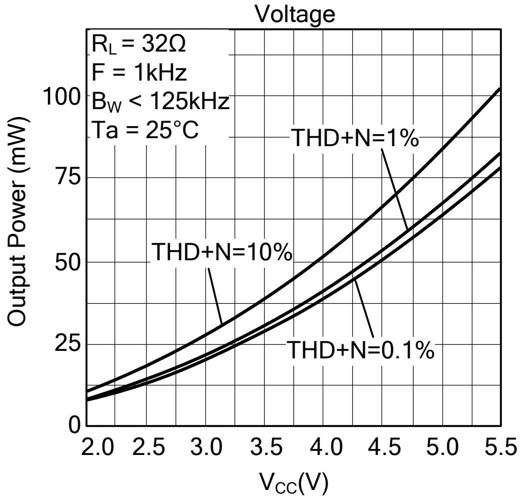
Open Loop Gain and Phase vs Frequency



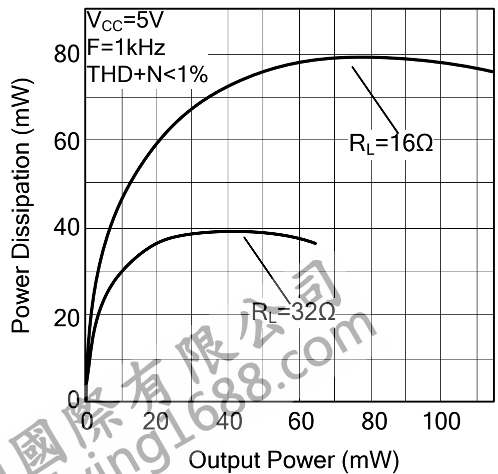
Output Power vs Power Supply Voltage



Output Power vs Power Supply Voltage

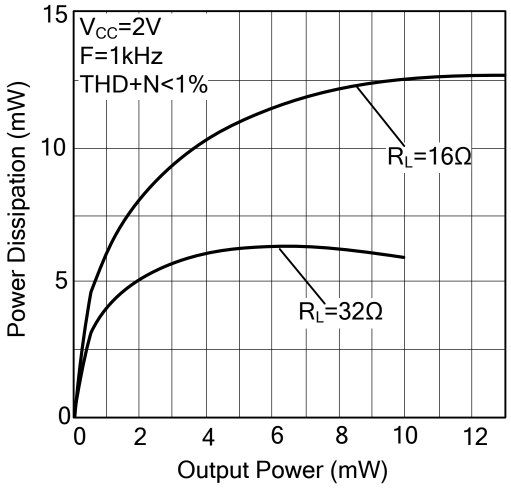


Power Dissipation vs Output Power

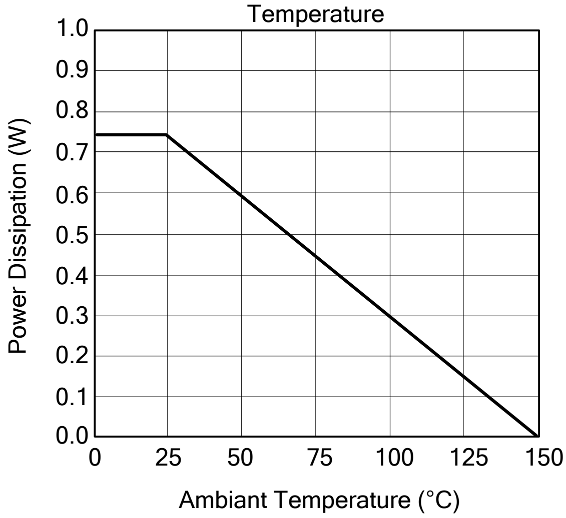


■ TYPICAL CHARACTERISTICS(Cont.)

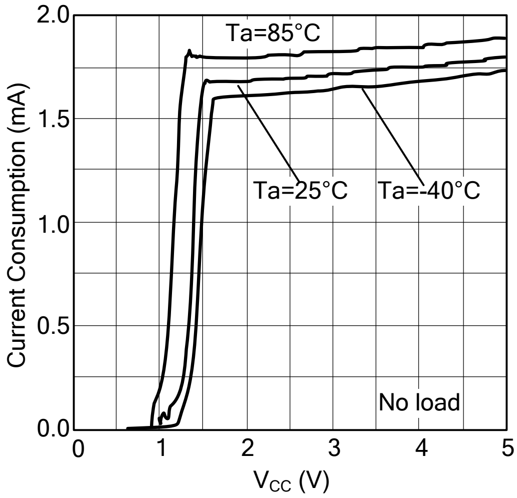
Power Dissipation vs Output Power



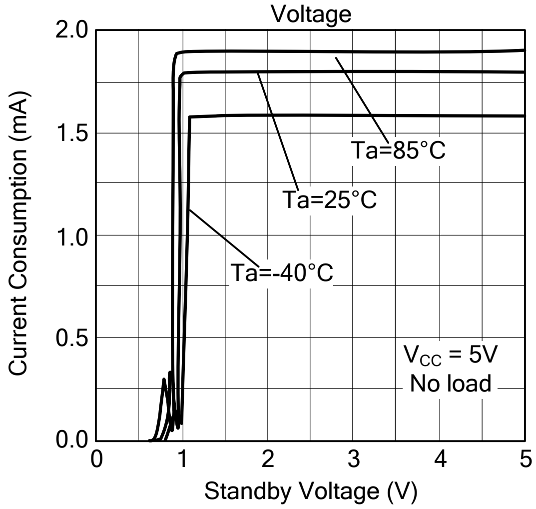
Power Derating vs Ambiant Temperature



Current Consumption vs Power Supply Voltage



Current Consumption vs Standby Voltage



Output Voltage Swing vs Power Supply Voltage