

Low Supply Voltage Single Operational Amplifier with Full Swing Input and Output

■ GENERAL DESCRIPTION

NJM2730 is a single supply single operational amplifier with full swing input and output, operates from 1.8V.

Input and Output Full Swing provides wide dynamic range, is from ground to power supply level. In addition to ground sensing applications, NJM2730 enable to be applied to Hi-side sensing applications.

The features are low noise and high phase margin for battery management, portable audio applications, and others. Furthermore NJM2730 is packaged with small size package MTP-5.

■ PACKAGE OUTLINE



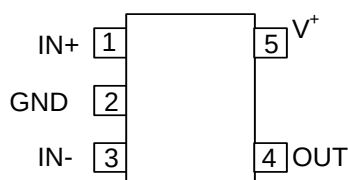
NJM2730F

■ FEATURES

- Single Supply 1.8 to 5.0V
- Operating Voltage $V_{ICM} = 0$ to 5.0V at $V^+ = 5V$
- Input Full-Swing $V_{OH} \geq 4.9V$ / $V_{OL} \leq 0.1V$ at $V^+ = 5V, R_L = 20k\Omega$
- Output Full-Swing $V_{OH} \geq 4.75V$ / $V_{OL} \leq 0.25V$ at $V^+ = 5V, R_L = 2k\Omega$
- Load Drivability 5mV max
- Offset Voltage 0.4V/ μ s typ.
- Slew Rate 10nV/ $\sqrt{Hz}$ typ.
- Low Input Voltage Noise $\Phi_M = 75deg.$ typ. at $R_L = 2k\Omega$, voltage follower
- Adequate phase margin
- Bipolar Technology
- Package Outline MTP5

■ PIN CONFIGURATION

(Top View)



NJM2730

■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+	7.0	V
Differential Input Voltage	V_{ID}	± 1.0	V
Input Common Mode Voltage Range	V_{ICM}	0 to 7.0	V
Power Dissipation	P_D	200	mW
Operating Temperature Range	T_{opr}	-40 to +85	°C
Storage Temperature Range	T_{stg}	-40 to +125	°C

(Note1)

If the supply voltage (V^+) is less than 7V, the input voltage must not over the V^+ level through 7V is limit specified.

■ RECOMMENDED OPERATING CONDITION

(Ta=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V^+	1.8 to 5.0	V

■ ELECTRICAL CHARACTERISTICS

● DC CHARACTERISTICS

($V^+=5V$, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Operating Current	I_{CC}	No Signal	-	320	550	μA
Input Offset Voltage	V_{IO}		-	1	5	mV
Input Bias Current	I_B		-	50	250	nA
Input Offset Current	I_{IO}		-	5	100	nA
Voltage Gain	A_V	$R_L=2k\Omega$	60	85	-	dB
Common Mode Rejection Ratio	CMR	CMR+: $2.5V \leq V_{CM} \leq 5.0V$, CMR-: $0 \leq V_{CM} \leq 2.5V$ (Note2)	55	70	-	dB
Supply Voltage Rejection Ratio	SVR		70	85	-	dB
Maximum Output Voltage1	V_{OH1}	$R_L=20k\Omega$	4.9	4.95	-	V
	V_{OL1}	$R_L=20k\Omega$	-	0.05	0.1	
Maximum Output Voltage 2	V_{OH2}	$R_L=2k\Omega$	4.75	4.85	-	V
	V_{OL2}	$R_L=2k\Omega$	-	0.15	0.25	
Input Common Mode Voltage Range	V_{ICM}	CMR>55dB	0	-	5	V

(Note2) CMR is represented by either CMR+ or CMR- which has lower value.

CMR+ is measured with $2.5V \leq V_{CM} \leq 5V$ and CMR- is measured with $0V \leq V_{CM} \leq 2.5V$.

● AC CHARACTERISTICS

($V^+=5V$, Ta=25°C)

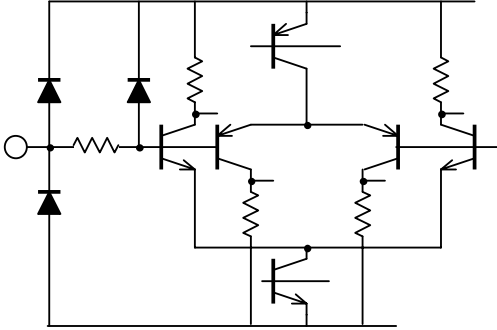
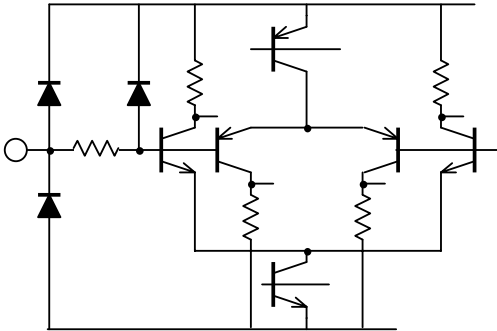
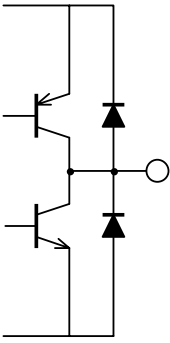
PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Unity Gain Bandwidth	f_T	$R_L=2k\Omega$	-	1	-	MHz
Phase Margin	Φ_M	$R_L=2k\Omega$	-	75	-	Deg
Equivalent Input Noise Voltage	V_N	$f=1kHz$	-	10	-	nV/ $\sqrt{Hz}$

● TRANSIENT CHARACTERISTICS

($V^+=5V$, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Slew Rate	SR	$R_L=2k\Omega$	-	0.4	-	V/ μs

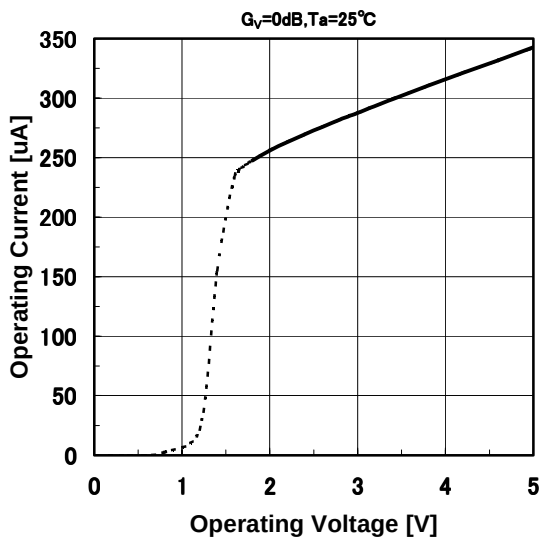
■ TERMINAL CHARACTERISTICS

No.	Symbol	Equivalent Circuit	Typ.DC Voltage(V)	Function
1	+INPUT			non-inverting input
3	-INPUT			inverting input
4	VOUT			output

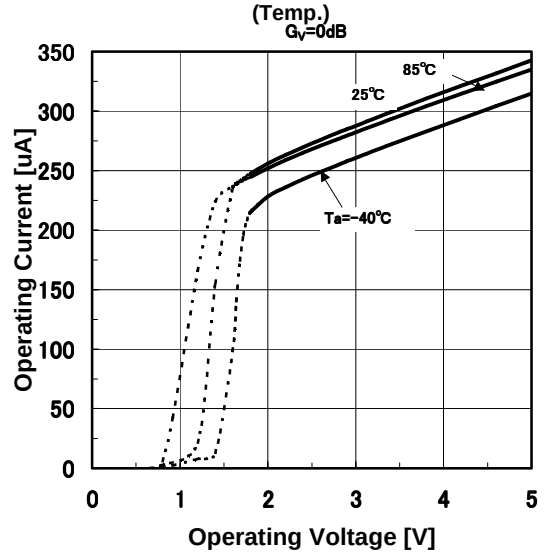
■ TYPICAL CHARACTERISTICS

(Note: R_s, R_g, R_L and C_L are connected to $V^+/2$ when single supply.)

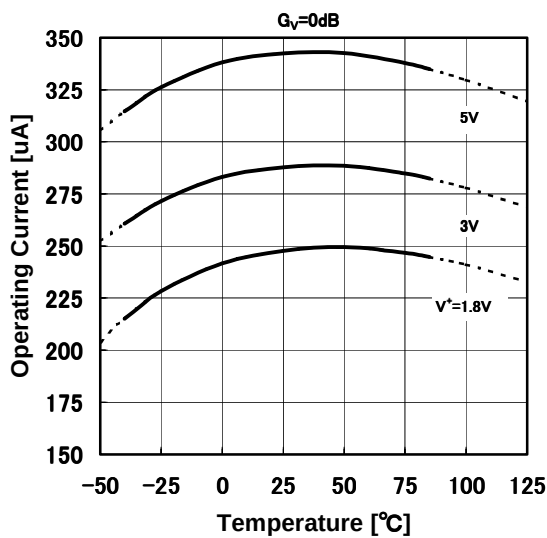
Operating Current vs. Operating Voltage



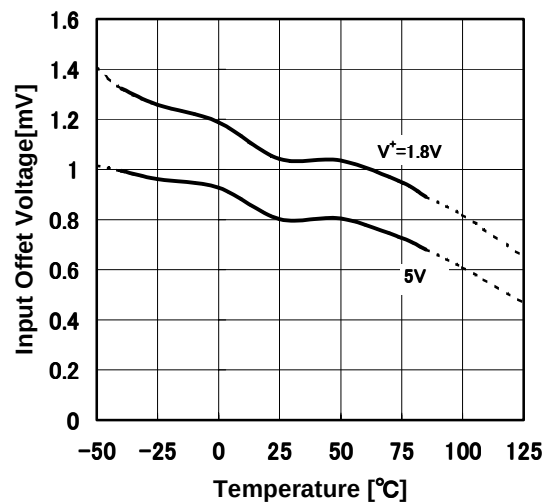
Operating Current vs. Operating Voltage



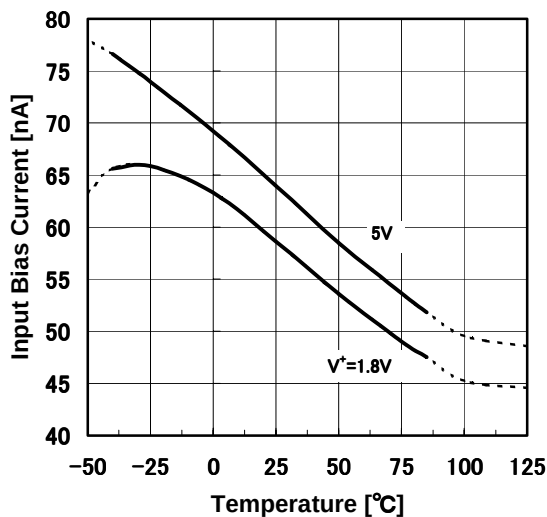
Operating Current vs. Temperature



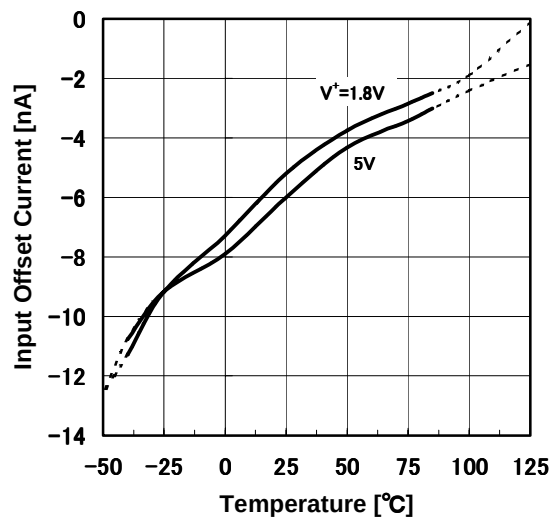
Input Offset Voltage vs. Temperature



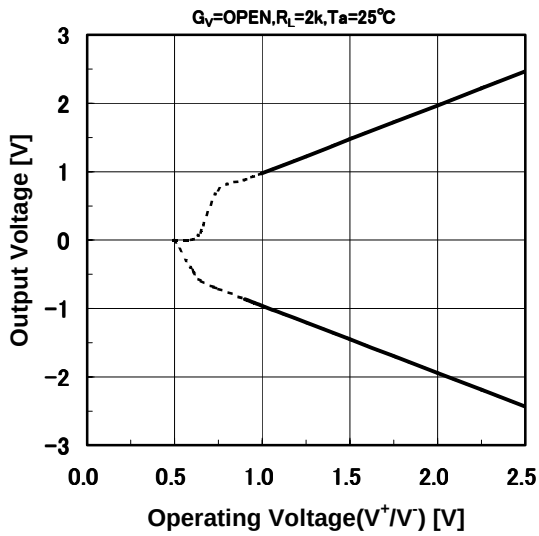
Input Bias Current vs. Temperature



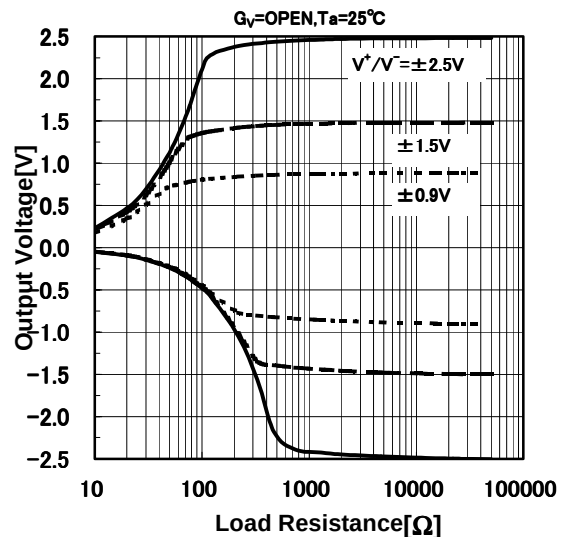
Input Offset Current vs. Temperature



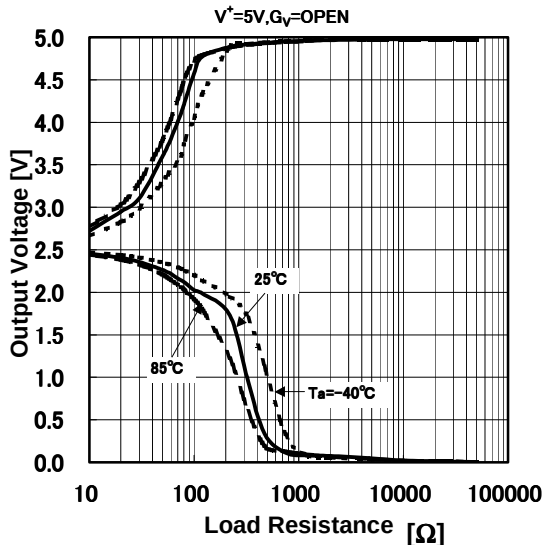
Output Voltage vs. Operating Voltage



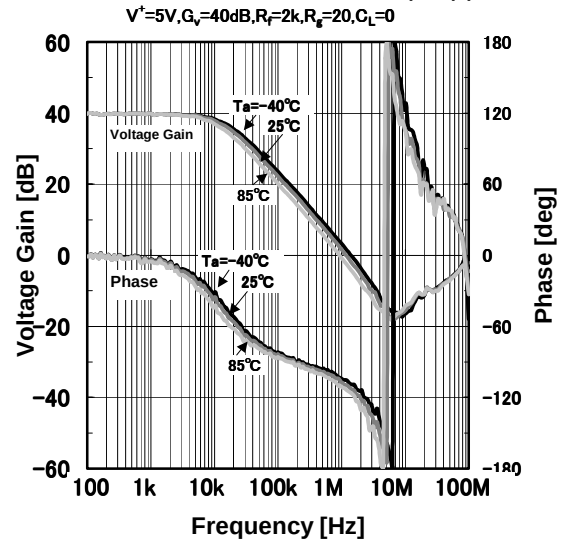
Output Voltage vs. Load Resistance (V^+/IV)



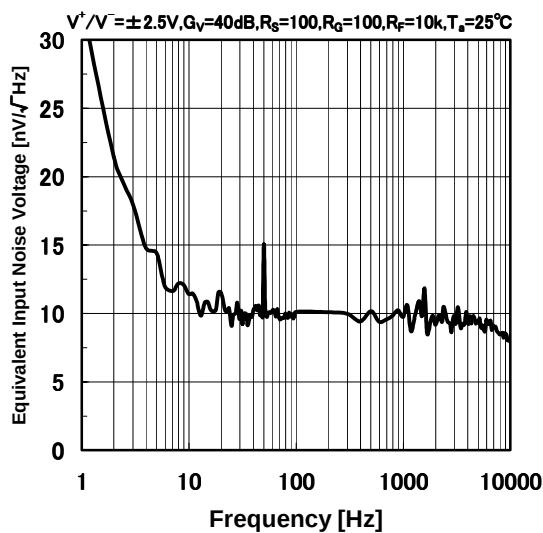
Output Voltage vs. Load Resistance (Temp.)



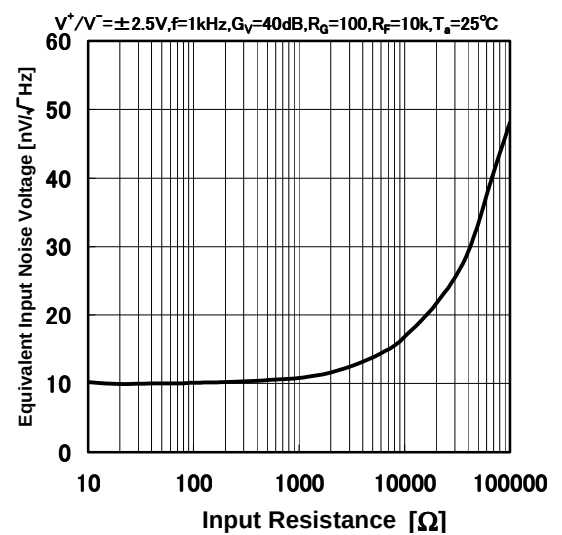
Voltage Gain, Phase vs. Frequency (Temp.)

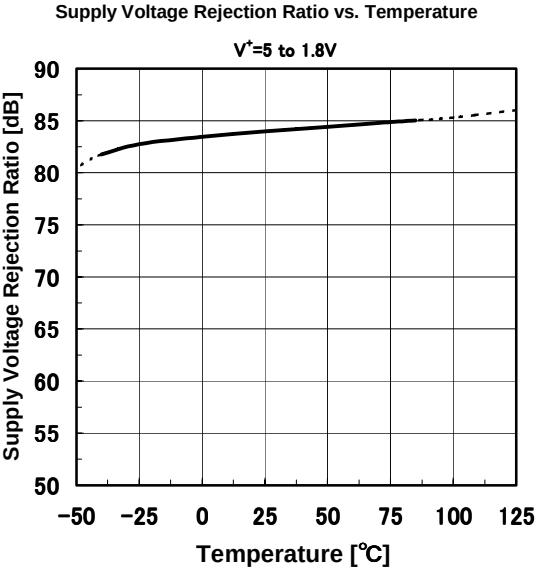
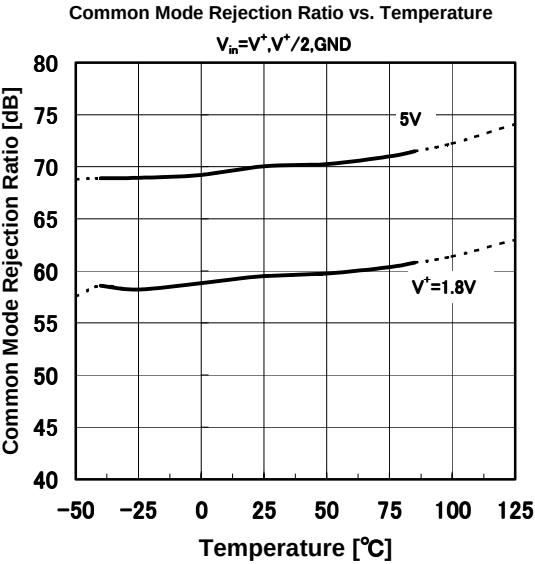
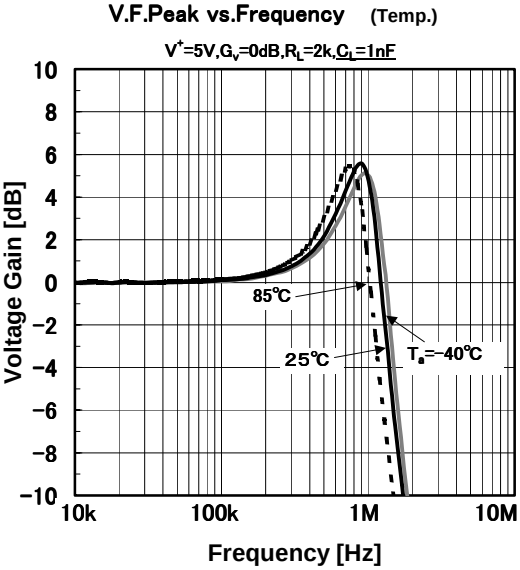
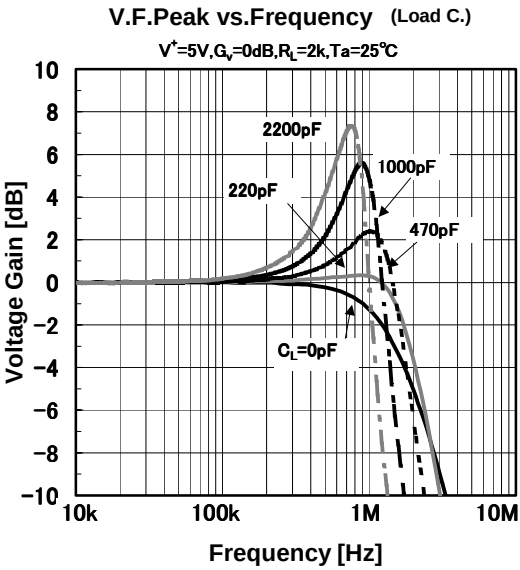


Equivalent Input Noise Voltage vs. Frequency



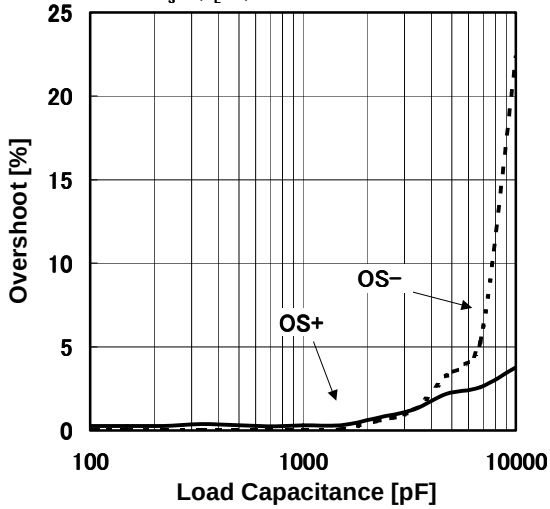
Equivalent Input Noise Voltage vs. Input Resistance





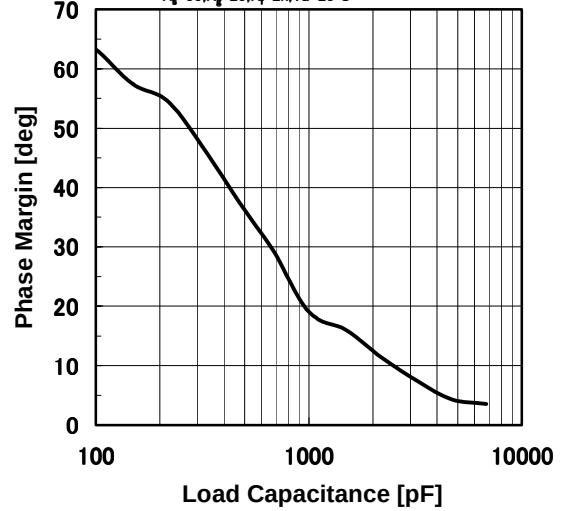
Overshoot vs. Load Capacitance

$V^+=5V, V_{in}=1V_{p-p}, f=10kHz, G_v=0dB$
 $R_s=50, R_L=2k, T_a=25^\circ C$



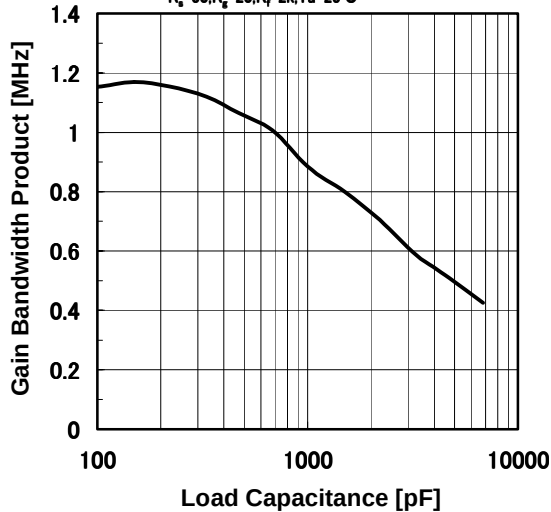
Phase Margin vs. Load Capacitance

$V^+=5V, G_v=40dB, V_{in}=-30dBm$,
 $R_s=50, R_g=20, R_L=2k, T_a=25^\circ C$



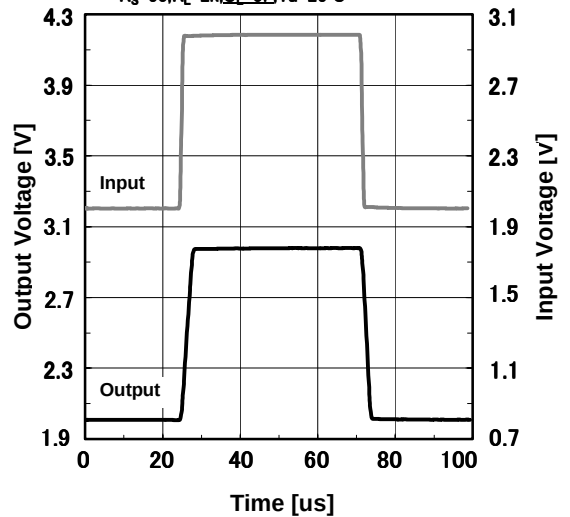
Gain Bandwidth Product vs. Load Capacitance

$V^+=5V, G_v=40dB, V_{in}=-30dBm$,
 $R_s=50, R_g=20, R_L=2k, T_a=25^\circ C$



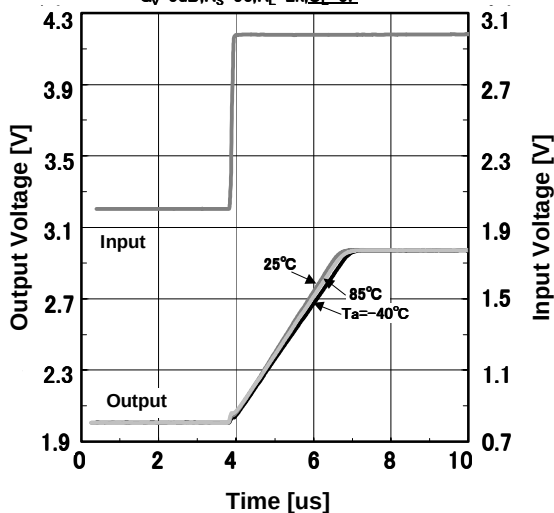
Pulse Response

$V^+=5V, V_{in}=1V_{p-p}, f=10kHz, G_v=0dB$
 $R_s=50, R_L=2k, C_L=0F, T_a=25^\circ C$



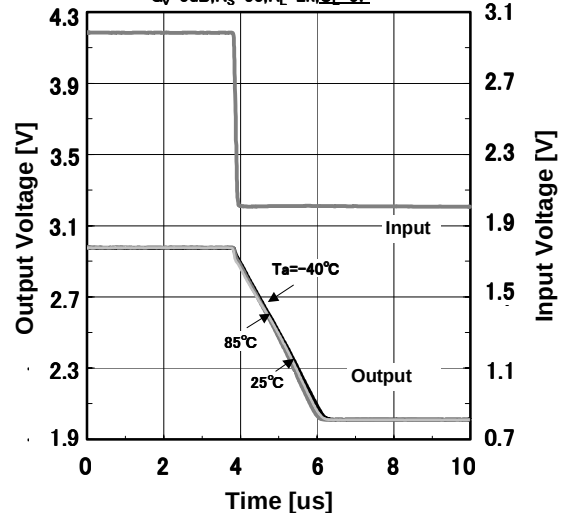
Pulse Response(Rise) (Temp.)

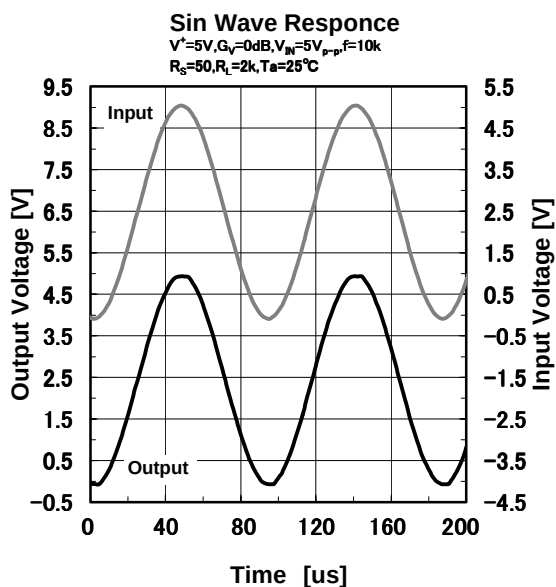
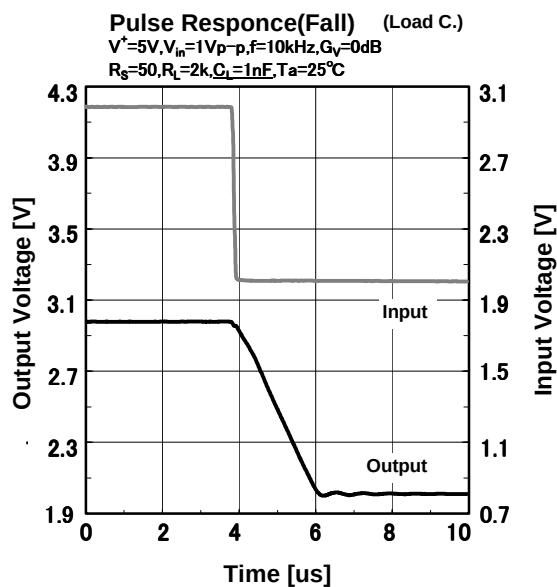
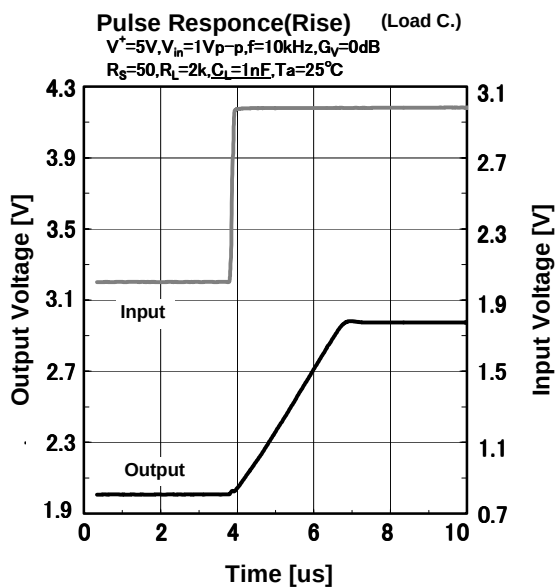
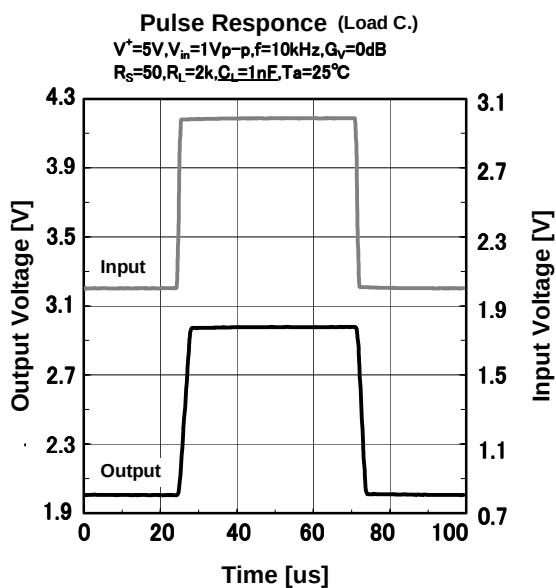
$V^+=5V, V_{in}=1V_{p-p}, f=10kHz$,
 $G_v=0dB, R_s=50, R_L=2k, C_L=0F$



Pulse Response(Fall) (Temp.)

$V^+=5V, V_{in}=1V_{p-p}, f=10kHz$,
 $G_v=0dB, R_s=50, R_L=2k, C_L=0F$





■ MEMO

[CAUTION]

The specifications on this databook are only given for information , without any guarantee as regards either mistakes or omissions. The application circuits in this databook are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial rights.