ULTRA HIGH SPEED SINGLE OPERATIONAL AMPLIFIER

■ GENERAL DESCRIPTION

The **NJM2726** is a high speed voltage feedback amplifier.

It provides a very high slew rate at 500V/µs. On a single 5V supply the output swings from 0.3V to 3.8V with a 500Ω load connect to 2.5V reference.

It is suitable for high speed differential signal processing.

■ PACKAGE OUTLINE

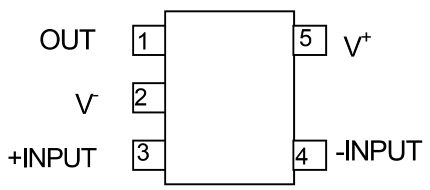
NJM2726F

■ FEATURES

● Operating Voltage	(±2.25 to ±2.75V)
● Operating Current	(16mA typ. at V^+/V^-=±2.5V)
● High Slew Rate	(500V/µs typ.)
● Unity Gain Bandwidth	(150MHz typ.)
● Input Offset Voltage	(2mV typ.)
● Output Voltage	(V_{OH} : +1.3V typ. at V^+/V^-=±2.5V, R_L=500Ω)
	(V_{OL} : -2.2V typ. at V^+/V^-=±2.5V, R_L=500Ω)
● Bipolar Technology	
● Package Outline	SOT−23−5

■ PIN CONFIGURATION

NJM2726F
(Top View)



PIN FUNCTION
1.OUTPUT
2.V^-
3.+INPUT
4.-INPUT
5. V^+

■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+/V^-	±3	V
Differential Input Voltage	V_{ID}	±3	V
Input Voltage	V_{IC}	±3	V
Power Dissipation	P_D	480(Note)	mW
Operating Temperature Range	Topr	-40 to +85	°C
Storage Temperature Range	Tstg	-50 to +150	°C

(Note) On glass epoxy board (76.2×114.3×1.6mm)

■ RECOMMENDED OPERATING CONDITION

(Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Operating Voltage Range	V^+/V^-		2.25	2.5	2.75	V

■ DC CHARACTERISTICS

(V^+/V^-=±2.5V, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Operating Current	I_{CC}	No Signal	-	16	24	mA
Input Offset Voltage	V_{IO}		-	2	16	mV
Input Bias Current	I_B		-	15	50	µA
Input Offset Current	I_{IO}		-	200	950	nA
Open Loop Voltage Gain	Av	R_L=2kΩ	40	50	-	dB
Input Common Mode Voltage Range	V_{ICM}		1.6	1.8	-	V
			-1.2	-1.3	-	
Common Mode Rejection	CMR	-1V≤V_{CM}≤+1V	60	80	-	dB
Supply Voltage Rejection	SVR	±2.25V≤V^+/V^-≤±2.75V	50	60	-	dB
Output Voltage	V_{OH}	R_L=500Ω	1.1	1.3	-	V
	V_{OL}	R_L=500Ω	-2	-2.2	-	

■ AC CHARACTERISTICS

(V^+/V^-=±2.5V, Ta=25°C)

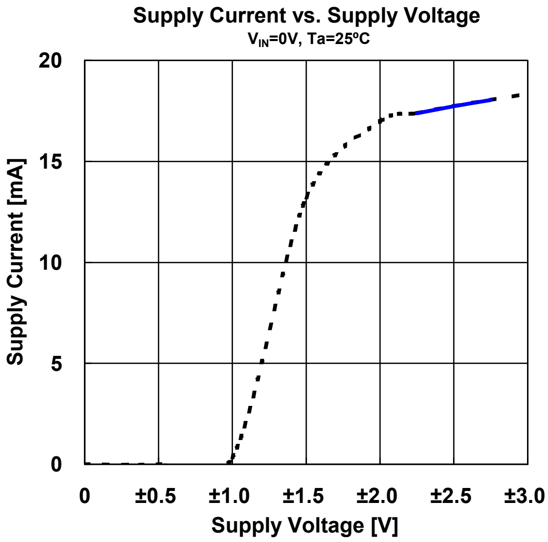
PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Unity Gain Bandwidth	f_T	Av=40dB,Rg=20Ω,R_f=1.98kΩR_L =∞,C_L=5pF	-	150	-	MHz
Phase Margin	ϕ_M	Av=40dB,Rg=20Ω,R_f=1.98kΩR_L =∞,C_L=5pF	-	60	-	deg

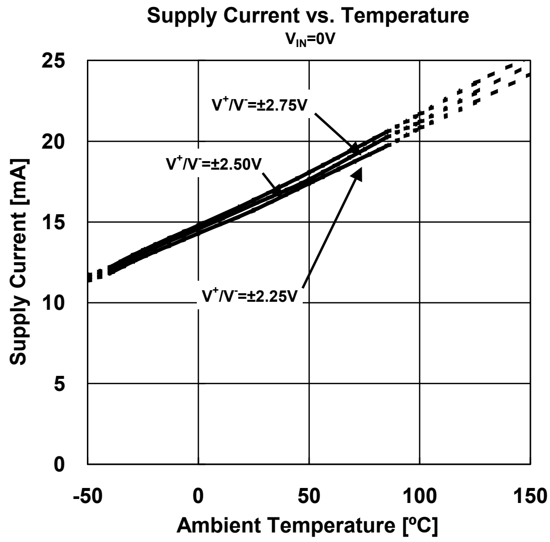
■ TRANSIENT CHARACTERISTICS

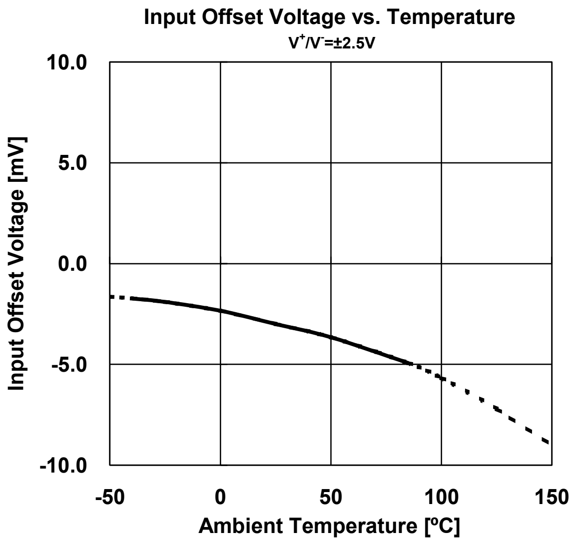
(V^+/V^-=±2.5V, Ta=25°C)

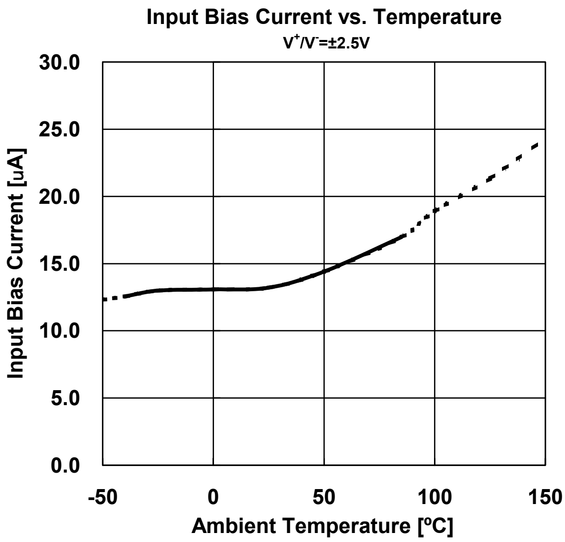
PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Slew Rate	SR	Av=0dB,R_f=0Ω,Rg=∞Ω R_L=500Ω,CL=1.5pF	-	500	-	V/µs

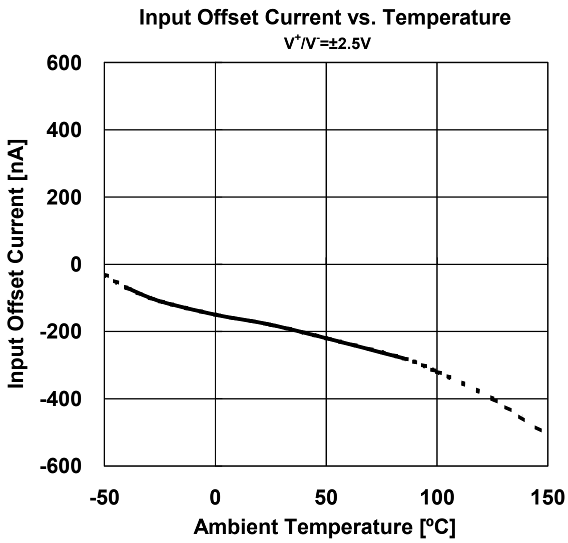
■TYPICAL CHARACTERISTICS

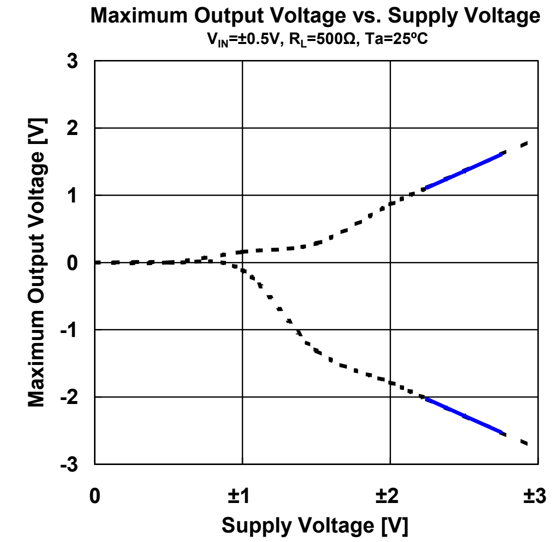


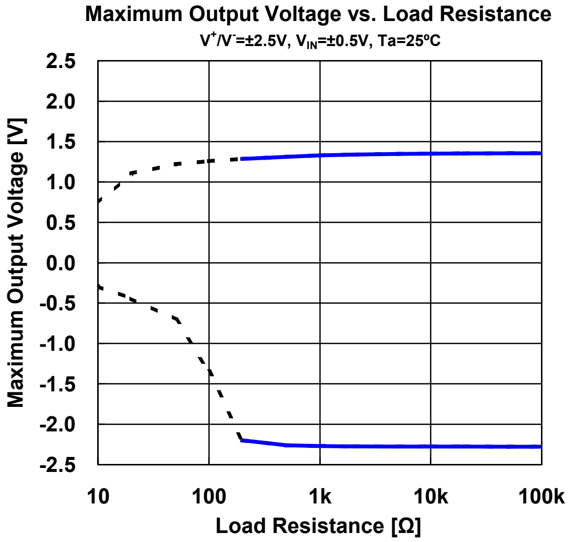


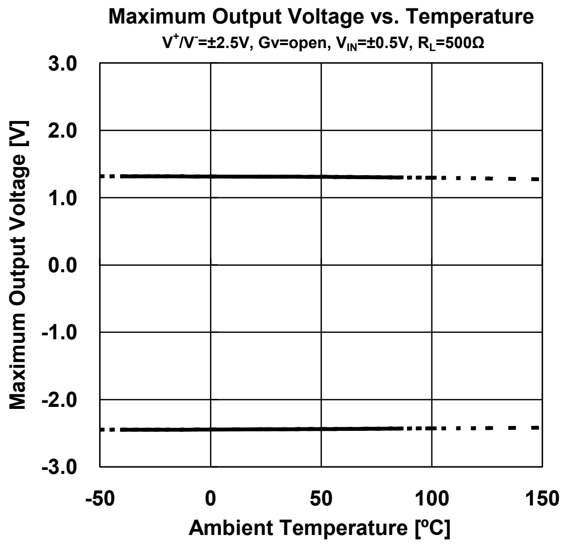


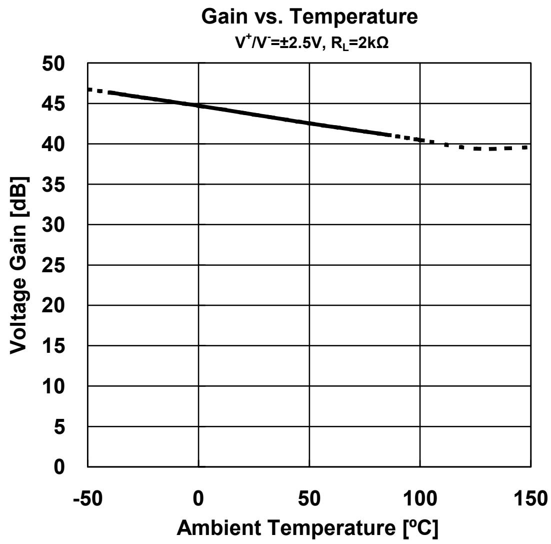


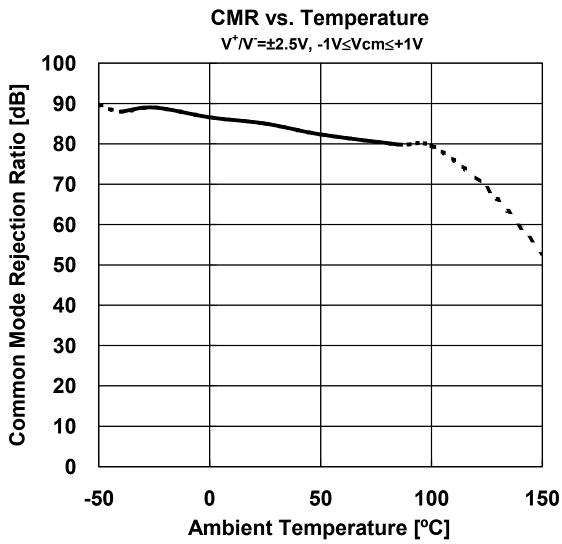


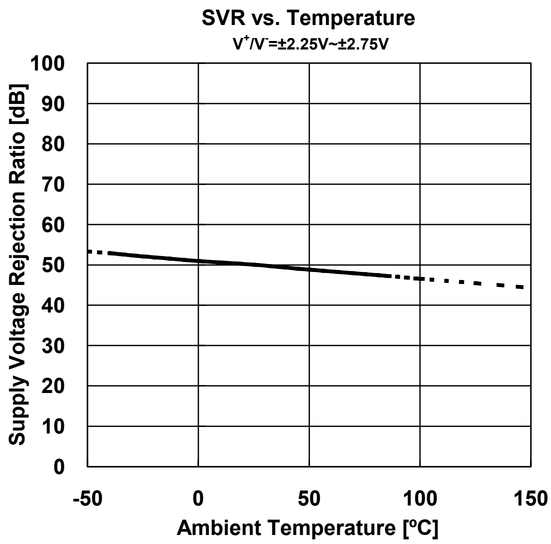

Maximum Output Voltage vs. Supply Voltage
VIN=±0.5V, RL=500Ω, Ta=25ºC
Maximum Output Voltage [V]
3
2
1
0
-1
-2
-3
0
±1
±2
±3
Supply Voltage [V]


Maximum Output Voltage vs. Load Resistance
V+/V-=±2.5V, VIN=±0.5V, Ta=25ºC
Maximum Output Voltage [V]
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
10
100
1k
10k
100k
Load Resistance [Ω]

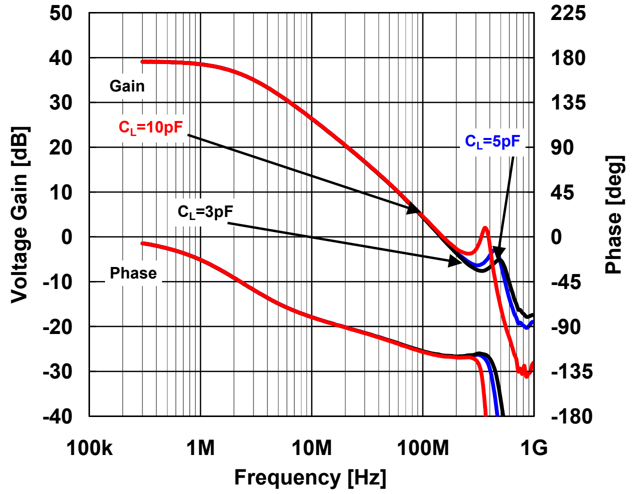

Maximum Output Voltage vs. Temperature
V+/V-=±2.5V, Gv=open, VIN=±0.5V, RL=500Ω
Maximum Output Voltage [V]
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
-50
0
50
100
150
Ambient Temperature [ºC]


Gain vs. Temperature
V+/V-=±2.5V, RL=2kΩ
Voltage Gain [dB]
50
45
40
35
30
25
20
15
10
5
0
-50
0
50
100
150
Ambient Temperature [ºC]

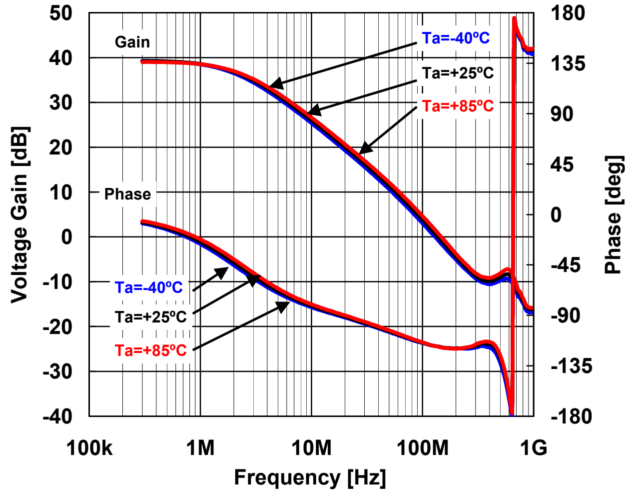

CMR vs. Temperature
V+/V-=±2.5V, -1V≤Vcm≤+1V
Common Mode Rejection Ratio [dB]
100
90
80
70
60
50
40
30
20
10
0
-50
0
50
100
150
Ambient Temperature [ºC]


SVR vs. Temperature
V+/V-=±2.25V~±2.75V
Supply Voltage Rejection Ratio [dB]
100
90
80
70
60
50
40
30
20
10
0
-50
0
50
100
150
Ambient Temperature [ºC]

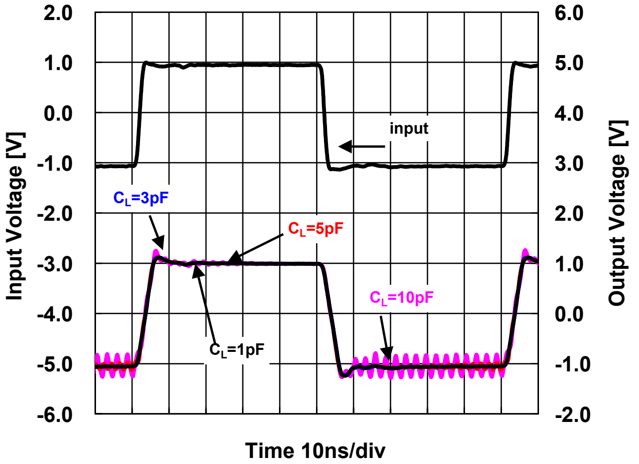
40dBGain&Phase vs. Frequency (Load Capacitance)
V^{+}/V^{-}=±2.5V, V_{IN}=0.02Vpp, G_V=40dB, R_T=50Ω,
R_F=1.98kΩ, R_G=20Ω, C_F=0F, R_L=500Ω, Ta=+25ºC



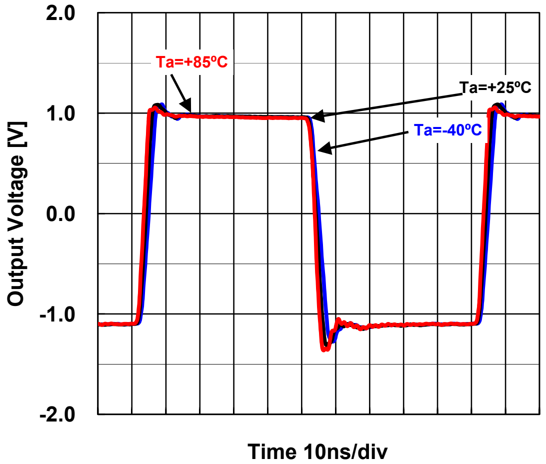
40dBGain&Phase vs. Frequency (Temperature)
V^{+}/V^{-}=±2.5V, V_{IN}=0.02Vpp, G_V=40dB, R_T=50Ω, R_F=1.98kΩ, R_G=20Ω,
C_F=0, R_L=150Ω, C_L=5pF



Pulse Response (Load Capacitance,Buffer)
V^{+}/V^{-}=±2.5V, f=10MHz, V_O=2V_{PP}, G_V=0dB,
R_T=50Ω, R_F=0Ω, C_F=0pF, R_L=500Ω, Ta=+25ºC



Pulse Response (Temperature)
V^{+}/V^{-}=±2.5V, f=10MHz, V_O=2V_{PP}, G_V=0dB,
R_T=50Ω, R_F=0Ω, C_F=0, R_G=∞Ω, C_L=3pF, R_L=500Ω



■ Note:

Non-inverting amplifier
1.Unity gain follower application may cause the oscillation.
Recommended the total load capacitance is less than 3pF.
2.When the closed gain is lower than 20dB, place a compensation capacitor (CF: recommended from 1pF to 5pF), in parallel with the feedback resistor RF to avoid oscillation.
3.Recommended feedback resistor is less than 2k-ohom to keep the flatness of the frequency response.
4.Minimize the load capacitor for the better performance.
A large load capacitor CL reduces the frequency response and causes oscillation or ringing.

Inverting amplifier
1.When the closed gain is lower than 20dB, place a compensation capacitor (CF; recommended more than 1pF), in parallel with the feedback resistor RF to avoid oscillation.
2.Minimize the feedback resistor to keep the frequency response and the slew rate. (Recommended about 2k-ohom)
The proper compensation capacitor CF can counteract oscillation even with a large feedback resistor RF.
3.Total load capacitance should be not more than 10pF.
The oscillation margin may be affected by the total load capacitance.