

## Precision, single supply, Rail-to-Rail Output Dual Operational Amplifier

### ■ FEATURES

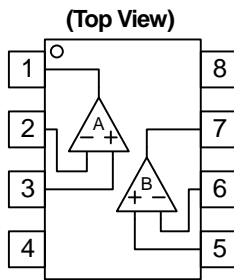
- Enhanced RF noise immunity
- Operating Temperature  $T_a = -40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Operation Voltage  $+4\text{V}$  to  $+35\text{V}$
- Input Voltage Protection  $V_{IN} = V^+ + 20\text{V}$  @  $V^+ = 16\text{V}$
- Input Offset Voltage Drift  $2\mu\text{V}/^{\circ}\text{C}$  (typ.)
- Rail-to-Rail Output
- Input Offset Voltage  $200\mu\text{V}$  typ ( $T_a = 25^{\circ}\text{C}$ )  
 $1\text{mV}$  max ( $T_a = -40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ )
- Slew Rate  $0.15\text{V}/\mu\text{s}$  typ.
- GBW  $300\text{kHz}$
- Supply Current  $3\text{mA}$  max ( $T_a = -40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ )
- Package DMP8

### ■ PACKAGE OUTLINE



NJM8207M-Z

### ■ Pin CONFIGURATION



#### PIN FUNCTION

- 1: A OUTPUT
- 2: A -INPUT
- 3: A +INPUT
- 4:  $V^-$
- 5: B +INPUT
- 6: B -INPUT
- 7: B OUTPUT
- 8:  $V^+$

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## ■ABSOLUTE MAXIMUM RATINGS (Ta=25°C, unless otherwise noted.)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V <sup>+</sup> (V <sup>+/N</sup> )	+36 (±18)	V
Input Voltage Range	VICM	-0.3 to +36 (Note1)	V
Differential Input Voltage Range	VID	±36	V
Power Dissipation	PD	530 (Note2)	mW
Operating Temperature Range	Topr	-40 to +125	°C
Storage Temperature Range	Tstg	-50 to +150	°C

(Note1) The input voltage range should be allowed to input without damage or destruction independent of the magnitude of V<sup>+</sup>.

The normal operation will establish when the both inputs are within the Common Mode Input Voltage Range of electrical characteristics.

(Note2) On the PCB "EIA/JEDEC (76.2×114.3×1.6mm, 2 layers, FR-4)"

Do not exceed "Power dissipation: PD" in which power dissipation in IC is shown by the absolute maximum rating.

Refer to following Figure 1 for a permissible loss when ambient temperature (Ta) is Ta≥25°C.

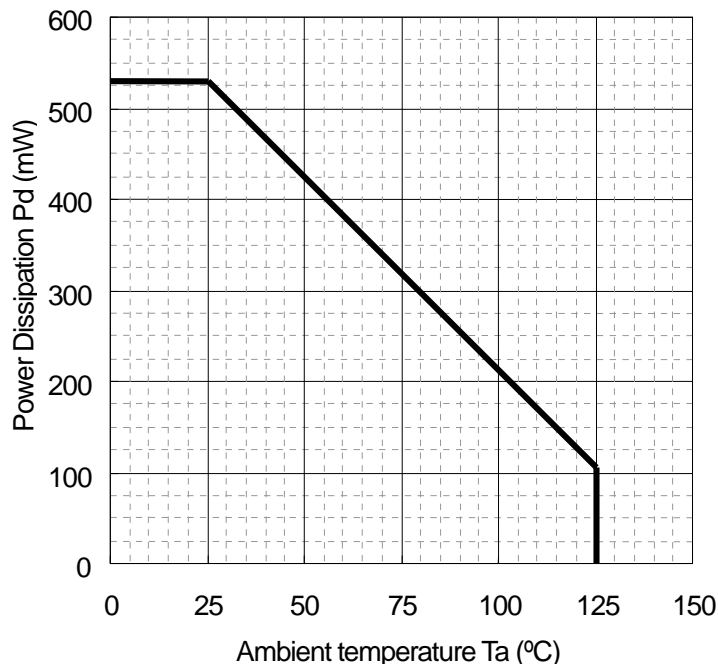


Figure1: P<sub>D</sub> – Temperature

## ■RECOMMENDED OPERATING CONDITIONS (Ta = -40°C to +125°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V <sup>+</sup>		4	-	35	V

## ■ ELECTRICAL CHARACTERISTICS

**DC CHARACTERISTICS** ( $V^+ = 5V, T_a = 25^\circ C$ , unless otherwise noted.)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	$V_{IO}$	$R_S = 50\Omega, R_F = 50k\Omega$	-	200	450	$\mu V$
		$R_S = 10k\Omega, R_F = 50k\Omega, T_a = -40^\circ C$ to $+125^\circ C$	-	-	1000	
Input Offset Voltage Drift	$V_{IO}/\Delta T$	$T_a = -40^\circ C$ to $+125^\circ C$	-	2	-	$\mu V/^\circ C$
Input Bias Current	$I_B$		-	120	500	nA
		$T_a = -40^\circ C$ to $+125^\circ C$	-	-	500	
Input Offset Current	$I_{IO}$		-	5	20	nA
		$T_a = -40^\circ C$ to $+125^\circ C$	-	-	20	
Supply Current	$I_{CC}$	No Signal	-	1.4	2	mA
		No Signal, $T_a = -40^\circ C$ to $+125^\circ C$	-	-	3	
Output Voltage1	$V_{OH1}$	$R_L = 2k\Omega$ to 2.5V	4.85	4.95	-	V
		$R_L = 2k\Omega$ to 2.5V, $T_a = -40^\circ C$ to $+125^\circ C$	4.8	-	-	
	$V_{OL1}$	$R_L = 2k\Omega$ to 2.5V	-	0.05	0.15	V
		$R_L = 2k\Omega$ to 2.5V, $T_a = -40^\circ C$ to $+125^\circ C$	-	-	0.2	
Output Voltage2	$V_{OH2}$	$R_L = 2k\Omega$ to GND	4.85	4.95	-	V
		$R_L = 2k\Omega$ to GND, $T_a = -40^\circ C$ to $+125^\circ C$	4.8	-	-	
	$V_{OL2}$	$R_L = 2k\Omega$ to GND	-	0.05	0.15	V
		$R_L = 2k\Omega$ to GND, $T_a = -40^\circ C$ to $+125^\circ C$	-	-	0.2	
Output Current	$I_{OUT}$	$V_{OH} = 4.75V, V_{OL} = 0.25V$	2	10	-	mA
		$V_{OH} = 4.75V, V_{OL} = 0.25V, T_a = -40^\circ C$ to $+125^\circ C$	2	-	-	
Common Mode Input Voltage Range	$V_{ICM}$	CMR 80dB	0	-	3.5	V
		CMR 70dB, $T_a = -40^\circ C$ to $+125^\circ C$	0	-	3.5	
Common Mode Rejection Ratio1	CMR	$V_{CM} = -0.2V$ to 3.5V	80	110	-	dB
		$V_{CM} = -0.2V$ to 3.5V, $T_a = -40^\circ C$ to $+125^\circ C$	70	-	-	
Supply Voltage Rejection Ratio	SVR	$V^+/V^- = \pm 2V$ to $\pm 10V$	80	110	-	dB
		$V^+/V^- = \pm 2V$ to $\pm 10V, T_a = -40^\circ C$ to $+125^\circ C$	70	-	-	
Voltage Gain	$A_V$	$R_L = 10k\Omega$ to 2.5V, $V_O = 2.5V \pm 2V$	70	90	-	dB
		$R_L = 10k\Omega$ to 2.5V, $V_O = 2.5V \pm 2V, T_a = -40^\circ C$ to $+125^\circ C$	60	-	-	

**AC CHARACTERISTICS** ( $V^+ = 5V, T_a = 25^\circ C$ , unless otherwise noted.)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Unity Gain Frequency	fT	$G_V = 40dB, R_L = 10k\Omega, C_L = 15pF$	-	300	-	kHz
Phase Margin	$\phi_m$	$G_V = 40dB, R_L = 10k\Omega, C_L = 15pF$	-	50	-	deg
Gain Margin	Gm	$G_V = 40dB, R_L = 10k\Omega, C_L = 15pF$	-	12	-	dB
Channel Separation	CS	$f = 1kHz, G_V = 40dB, R_L = 10k\Omega$ to 2.5V	-	120	-	dB

**TRANSIENT CHARACTERISTICS** ( $V^+ = 5V, T_a = 25^\circ C$ , unless otherwise noted.)

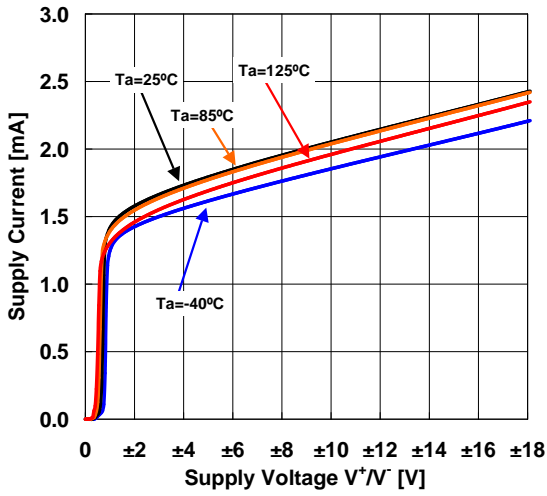
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Slew Rate	SR	(Note3), $A_V = 1, V_{IN} = 2V_{pp}, R_L = 10k\Omega$ to 2.5V, $C_L = 10pF$	-	0.15	-	V/ $\mu s$

(Note3) Specified number is the slower of positive and negative slew rates.

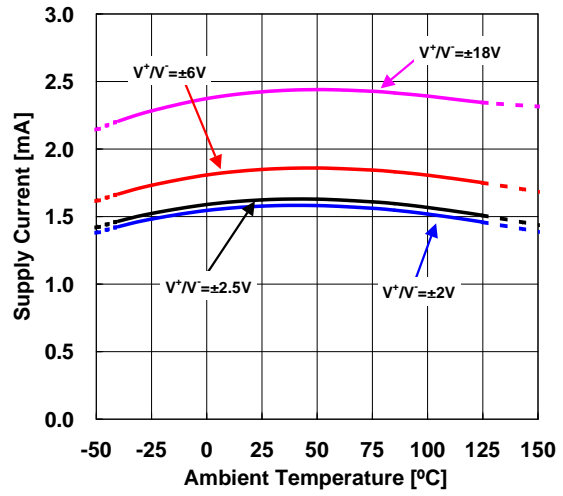
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## ■ TYPICAL CHARACTERISTICS

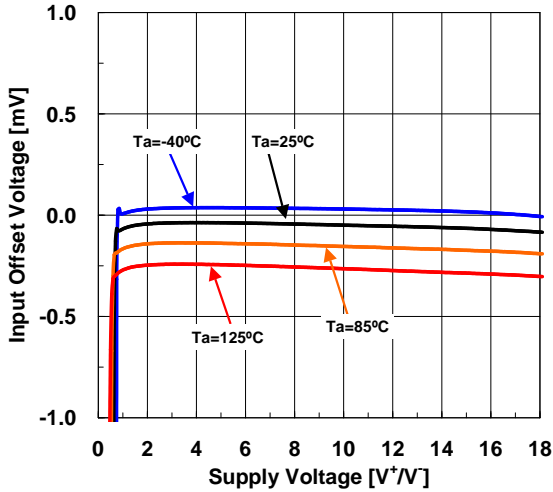
Supply Current vs. Supply Voltage (Temperature)  
 $A_v=0dB$



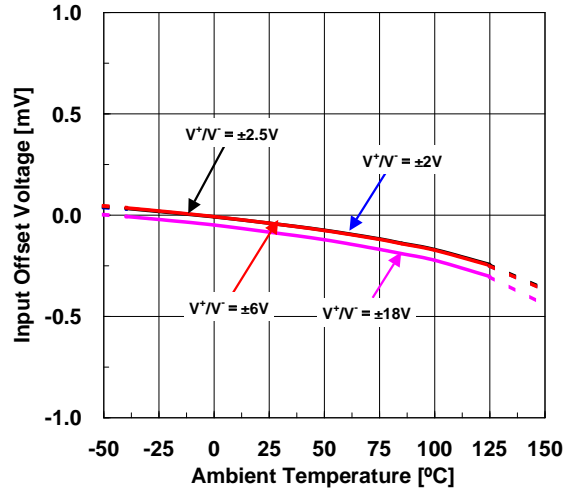
Supply Current vs. Temperature (Supply Voltage)  
 $A_v=0dB$



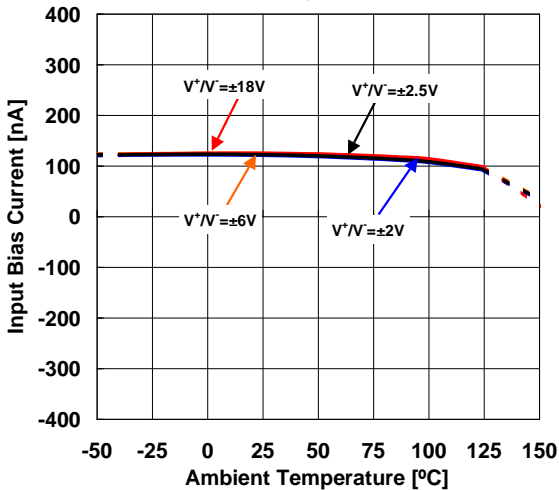
Input Offset Voltage vs. Supply Voltage (Temperature)  
 $V_{ICM}=0V, V_{IN}=0V$



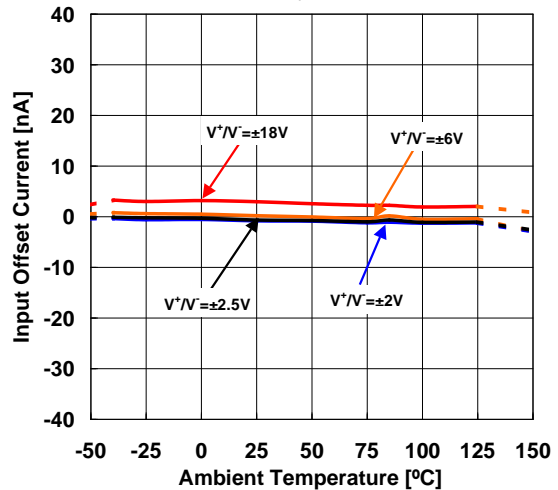
Input Offset Voltage vs. Temperature (Supply Voltage)  
 $V_{ICM}=0V, V_{IN}=0V$



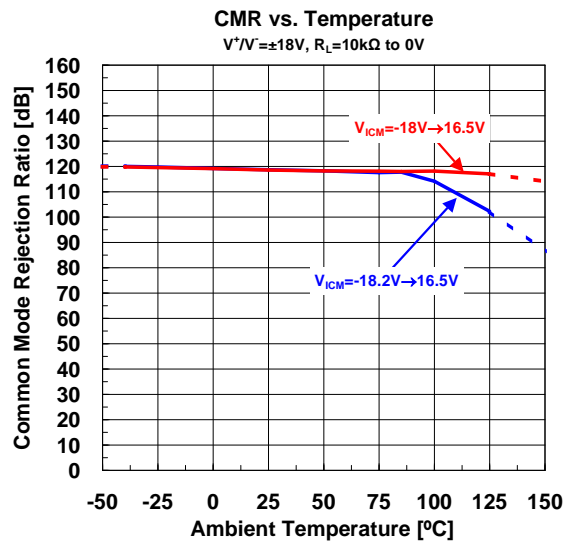
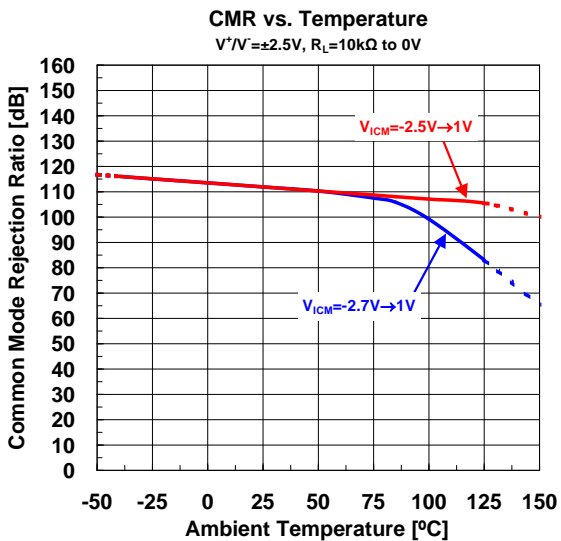
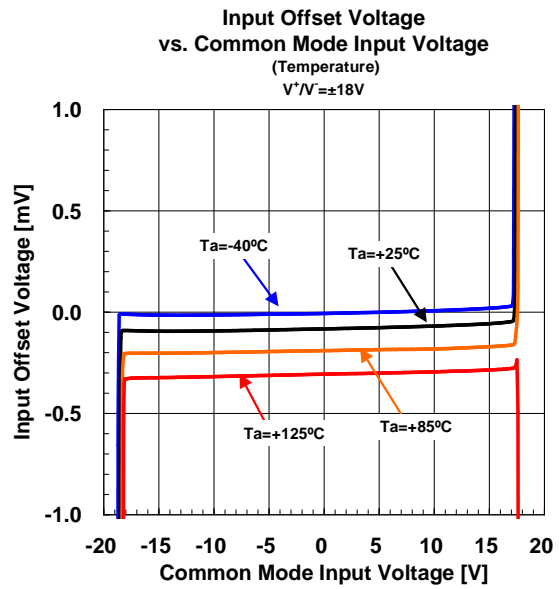
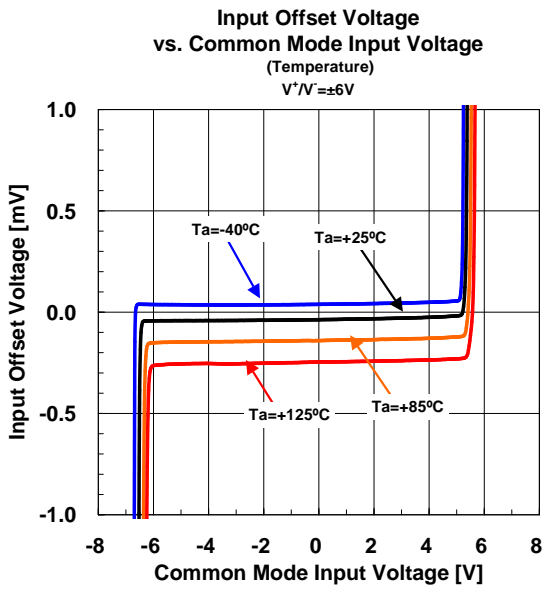
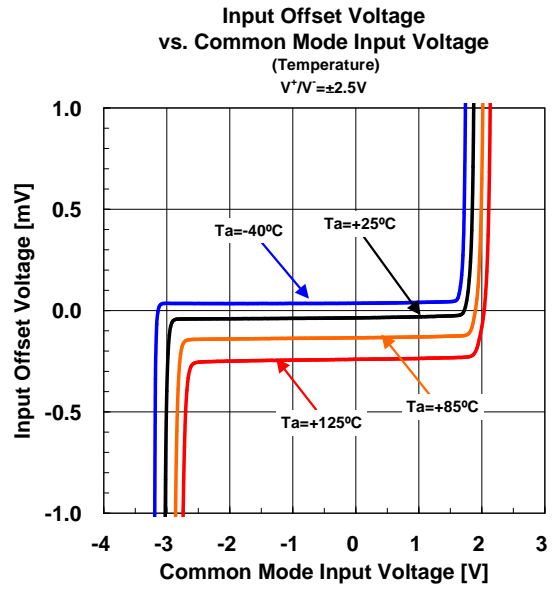
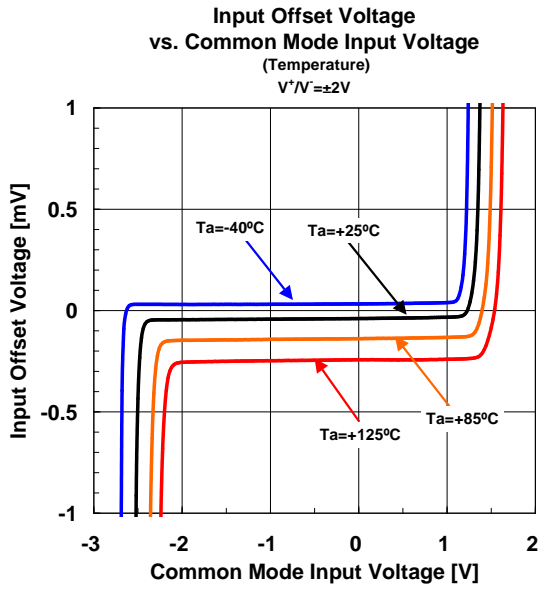
Input Bias Current vs. Temperature (Supply Voltage)  
 $V_{ICM}=0V$



Input Offset Current vs. Temperature (Supply Voltage)  
 $V_{ICM}=0V$

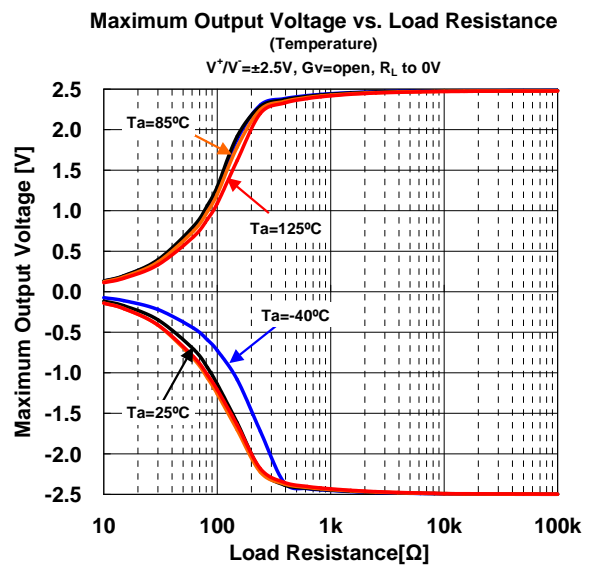
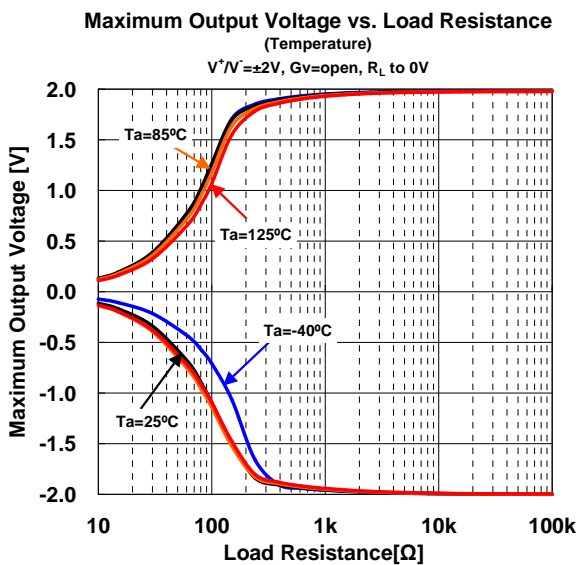
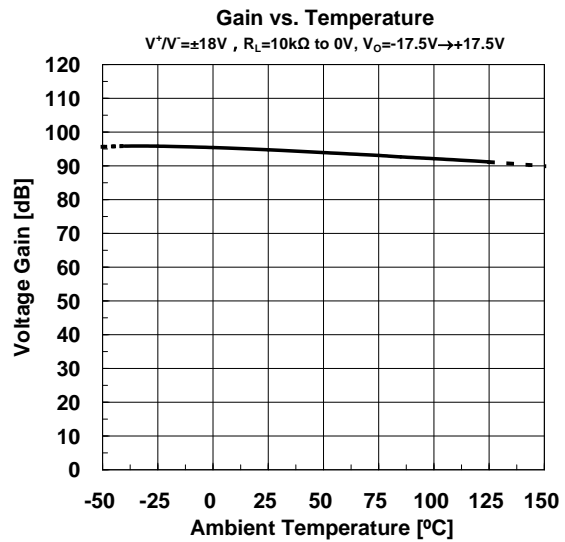
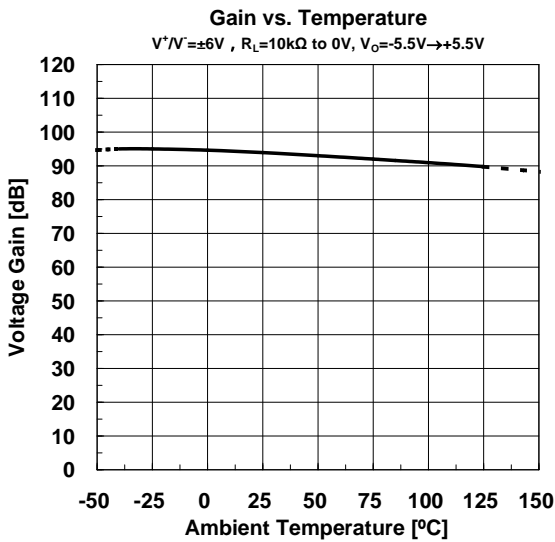
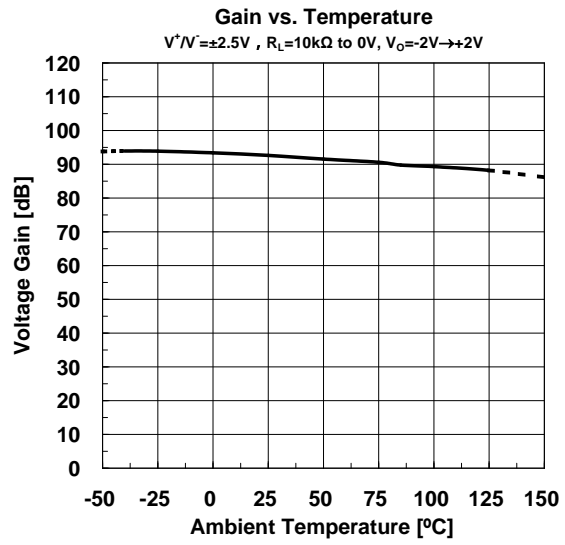
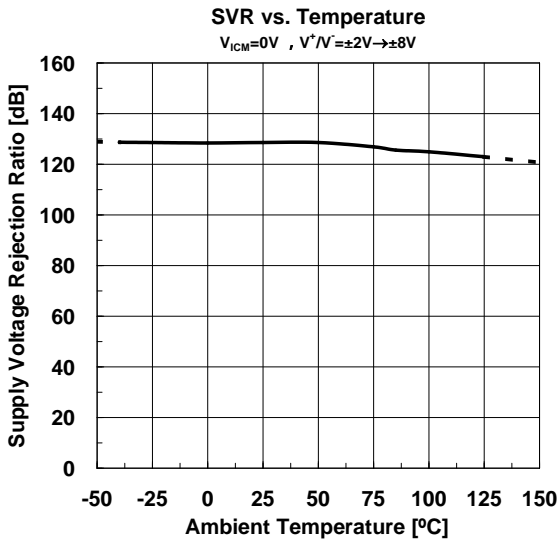


## ■ TYPICAL CHARACTERISTICS



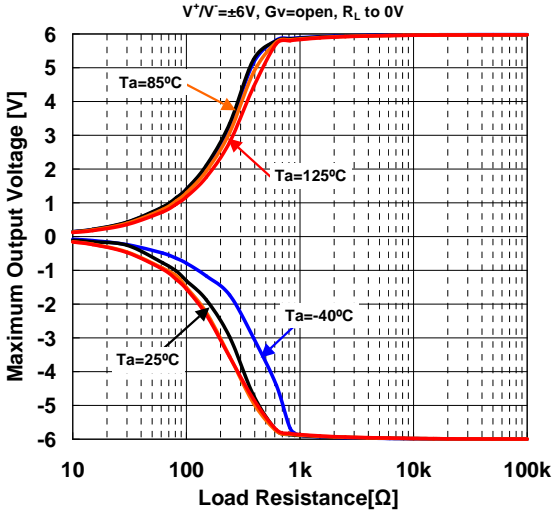
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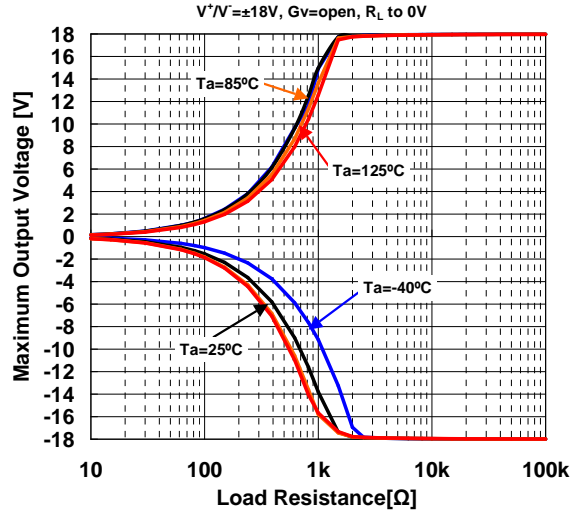


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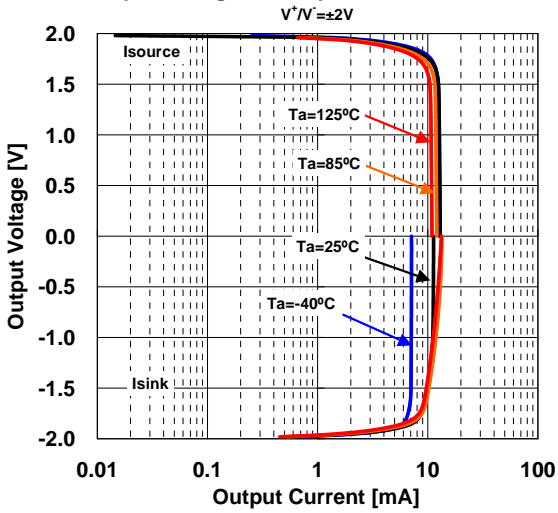
Maximum Output Voltage vs. Load Resistance (Temperature)



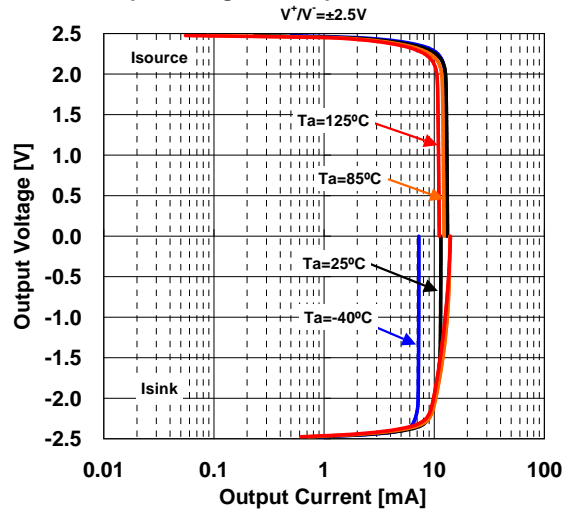
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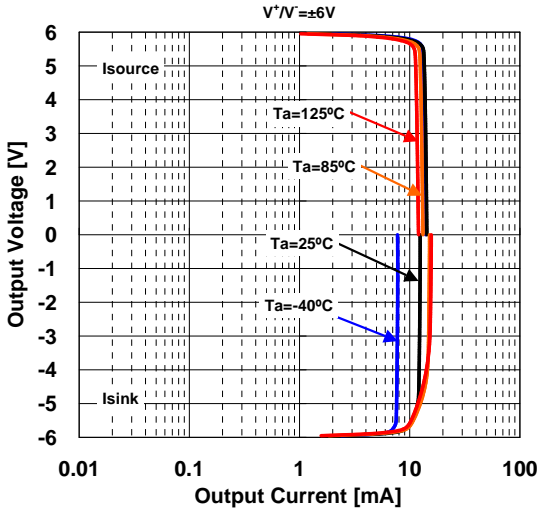
Output Voltage vs. Output Current (Temperature)



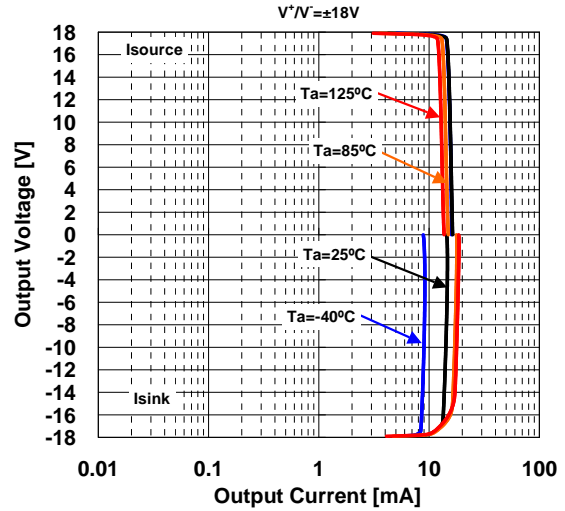
Output Voltage vs. Output Current (Temperature)



Output Voltage vs. Output Current (Temperature)



Output Voltage vs. Output Current (Temperature)

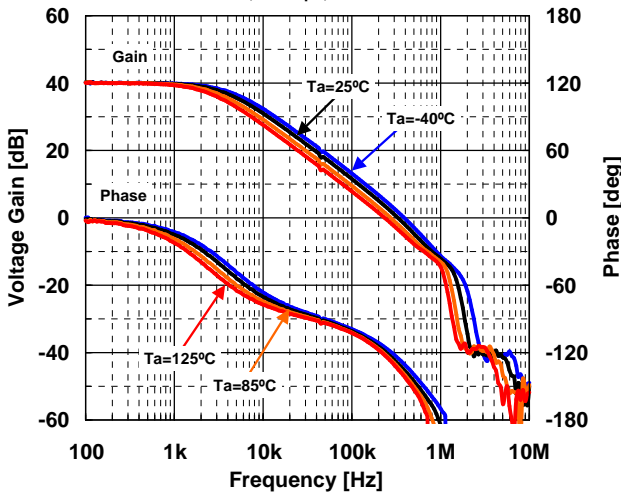


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## ■ TYPICAL CHARACTERISTICS

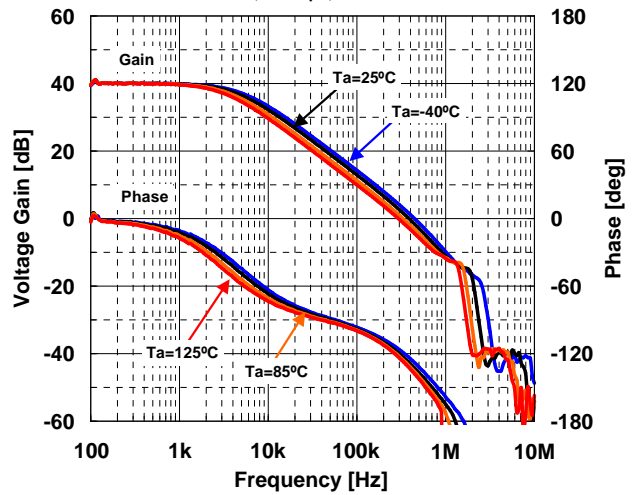
Gain vs. Frequency (Temperature)

$V^+ / V^- = \pm 2.5V$ ,  $A_V = +100$ ,  $R_S = 100\Omega$ ,  $R_I = 50\Omega$ ,  
 $R_L = 2k\Omega$ ,  $C_L = 15pF$ ,  $V_{IN} = -30dBm$



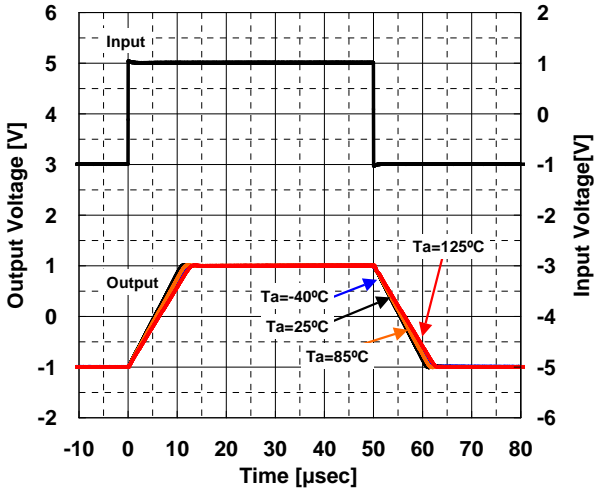
Gain vs. Frequency (Temperature)

$V^+ / V^- = \pm 18V$ ,  $A_V = +100$ ,  $R_S = 100\Omega$ ,  $R_I = 50\Omega$ ,  
 $R_L = 2k\Omega$ ,  $C_L = 15pF$ ,  $V_{IN} = -30dBm$



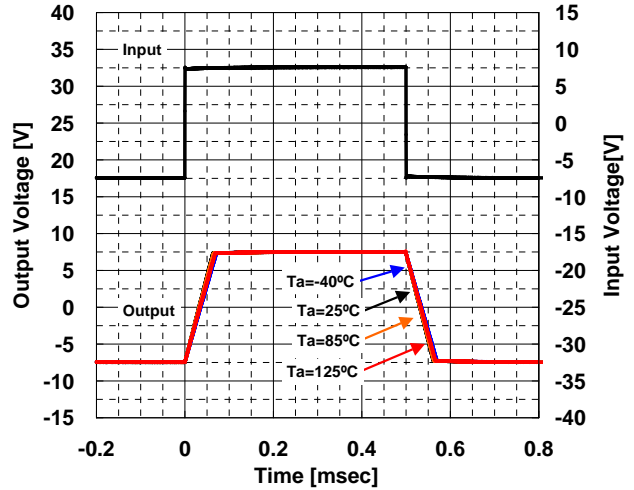
Pulse Response (Temperature)

$V^+ / V^- = \pm 2.5V$ ,  $V_{IN} = 2V_{p-p}$ ,  $f = 10kHz$ ,  
 PulseEdge=10nsec,  $G_v = 0dB$ ,  $R_L = 2k\Omega$ ,  $C_L = 15pF$



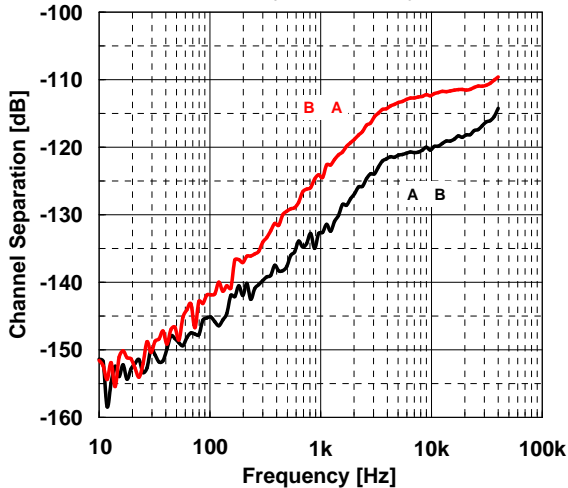
Pulse Response (Temperature)

$V^+ / V^- = \pm 18V$ ,  $V_{IN} = 15V_{p-p}$ ,  $f = 1kHz$ ,  
 PulseEdge=10nsec,  $G_v = 0dB$ ,  $R_L = 2k\Omega$ ,  $C_L = 15pF$



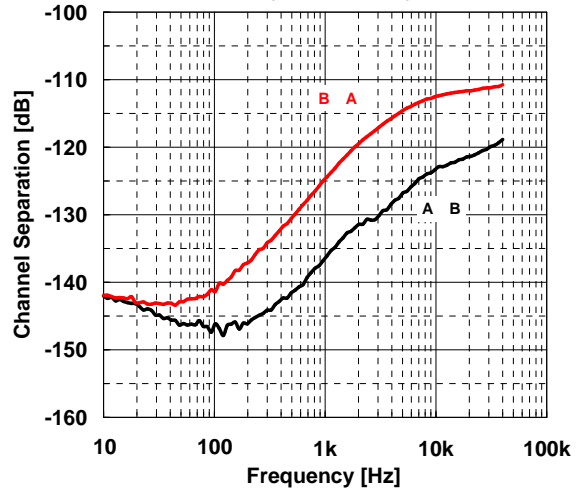
Channel Separation vs. Frequency

$V^+ / V^- = \pm 2.5V$ ,  $A_V = -100$ ,  $R_S = 1k\Omega$ ,  $R_L = 2k\Omega$ ,  $V_O = 1V_{rms}$ ,  $T_a = 25^\circ C$



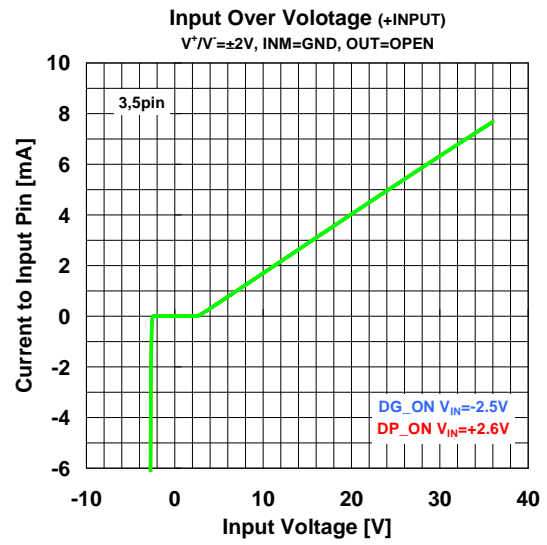
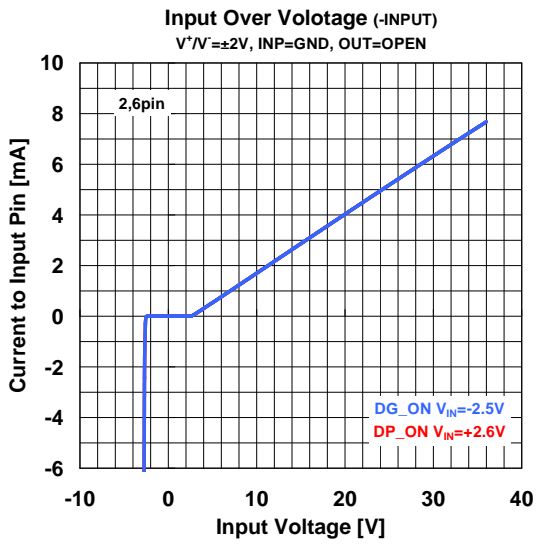
Channel Separation vs. Frequency

$V^+ / V^- = \pm 18V$ ,  $A_V = -100$ ,  $R_S = 1k\Omega$ ,  $R_L = 2k\Omega$ ,  $V_O = 15V_{rms}$ ,  $T_a = 25^\circ C$





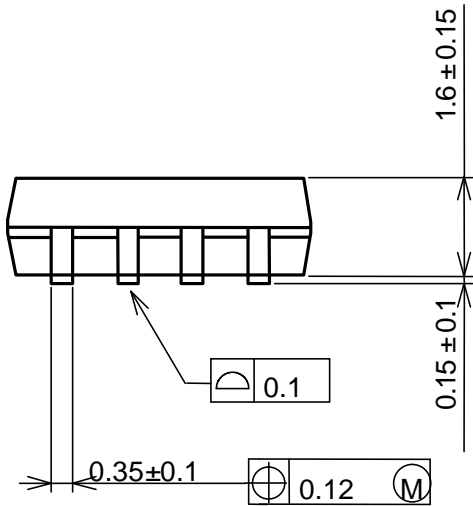
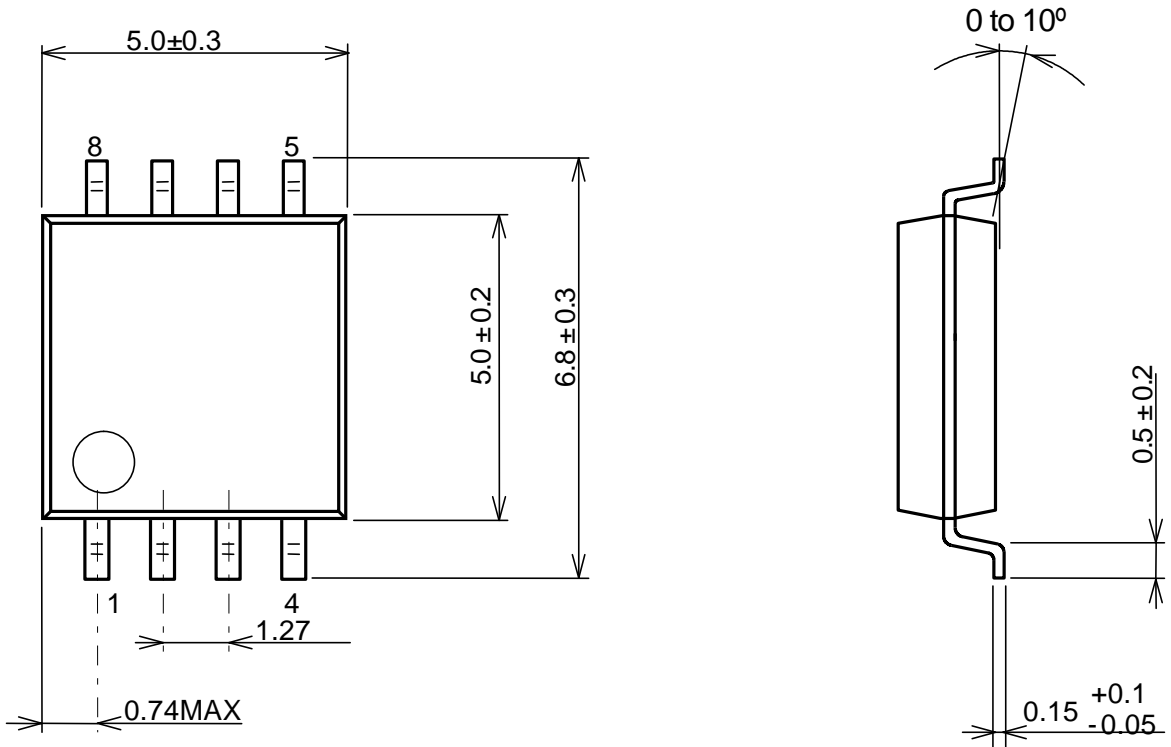
## ■ TYPICAL CHARACTERISTICS



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## ■ PACKAGE DIMENSIONS

### DMP8



Unit :mm

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