



# SGM8429C-4

## Quad Rail-to-Rail Output Operational Amplifier

### GENERAL DESCRIPTION

The SGM8429C-4 is a quad, high-gain frequency-compensated operational amplifier, which can operate from 3V to 32V single supply or from  $\pm 1.5V$  to  $\pm 16V$  dual supplies while consuming only 860 $\mu A$  quiescent current.

The SGM8429C-4 features low power, low offset voltage and low bias current. It is well suited for a wide range of applications.

The SGM8429C-4 is available in a Green TQFN-3 $\times$ 3-16L package. It is specified over the  $-40^{\circ}C$  to  $+125^{\circ}C$  temperature range.

### APPLICATIONS

Wearable Products  
Temperature Measurements  
Battery-Powered Systems  
Sensors  
Audio  
Active Filters  
Communications  
Test Equipment

### FEATURES

- **Wide Supply Ranges:**
  - **Single Supply: 3V to 32V**
  - **Dual Supplies:  $\pm 1.5V$  to  $\pm 16V$**
- **Low Supply Current: 860 $\mu A$  (TYP)**
- **Low Input Offset Voltage: 6mV (MAX)**
- **Low Input Offset Current: 10pA (TYP)**
- **Low Input Bias Current: 10pA (TYP)**
- **Minimum Input Common Mode Voltage:  $(-V_S) - 0.1V$**
- **Maximum Differential Input Voltage:  $+32V/-32V$**
- **Gain-Bandwidth Product: 1.1MHz**
- **Open-Loop Differential Voltage Gain: 111dB (TYP)**
- **Internal Frequency Compensation**
- **$-40^{\circ}C$  to  $+125^{\circ}C$  Operating Temperature Range**
- **Available in a Green TQFN-3 $\times$ 3-16L Package**

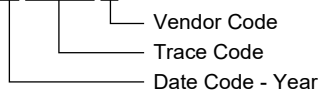
**PACKAGE/ORDERING INFORMATION**

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM8429C-4	TQFN-3x3-16L	-40°C to +125°C	SGM8429C-4XTQ16G/TR	CIFTQ XXXXX	Tape and Reel, 4000

**MARKING INFORMATION**

NOTE: XXXXX = Date Code, Trace Code and Vendor Code.

**XXXXX**



Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

**ABSOLUTE MAXIMUM RATINGS**

Supply Voltage Range, $V_s$ .....	-0.3V to 32V
Differential Input Voltage Range, $V_{ID}^{(1)}$ .....	-32V to 32V
Input Voltage (Either Input) Range.....	-0.3V to 32V
Junction Temperature.....	+150°C
Storage Temperature Range.....	-65°C to +150°C
Lead Temperature (Soldering, 10s).....	+260°C
ESD Susceptibility	
HBM.....	6000V
CDM .....	1000V

**RECOMMENDED OPERATING CONDITIONS**

Input Common Mode Voltage Range.....	-0.1V to $V_s - 1.5V$
Operating Temperature Range.....	-40°C to +125°C

NOTE:

1. Differential voltage is between +IN and -IN.

**OVERSTRESS CAUTION**

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

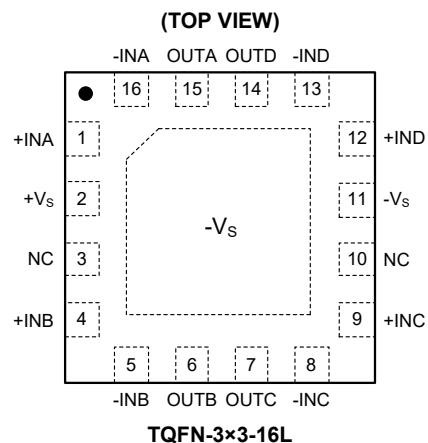
**ESD SENSITIVITY CAUTION**

This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because even small parametric changes could cause the device not to meet the published specifications.

**DISCLAIMER**

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

**PIN CONFIGURATION**



NOTE: Exposed pad can be connected to -Vs or left floating.

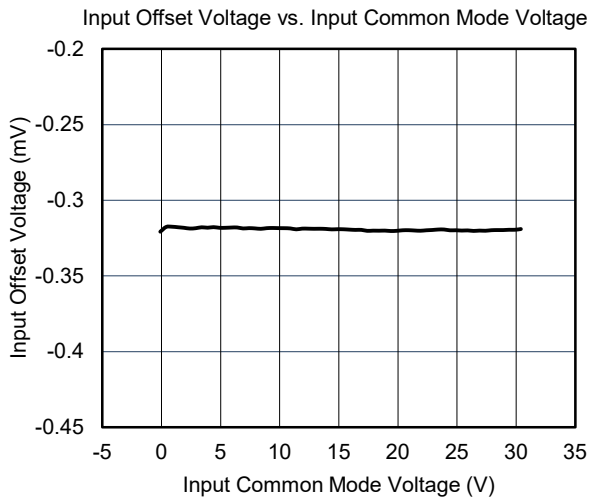
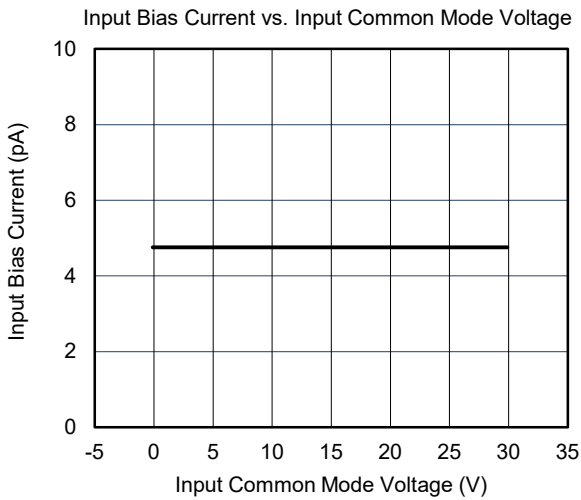
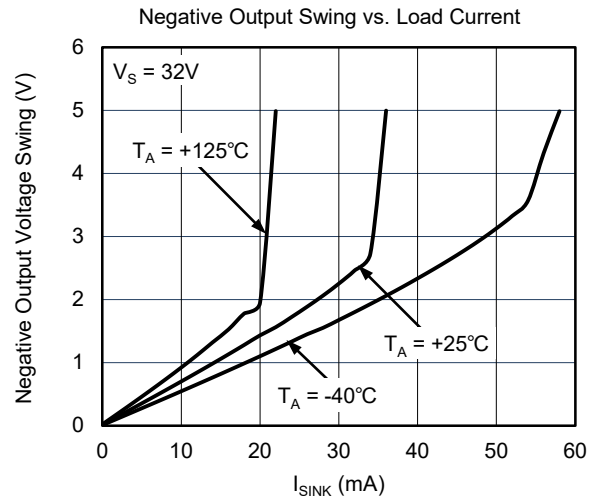
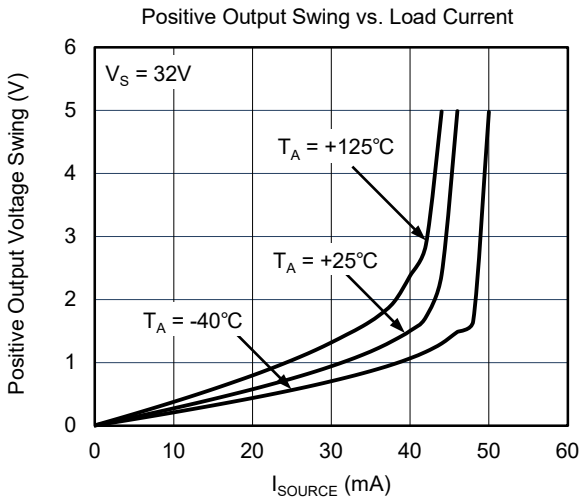
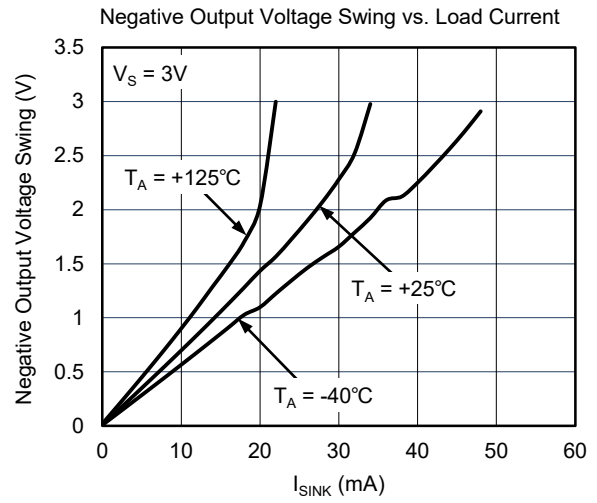
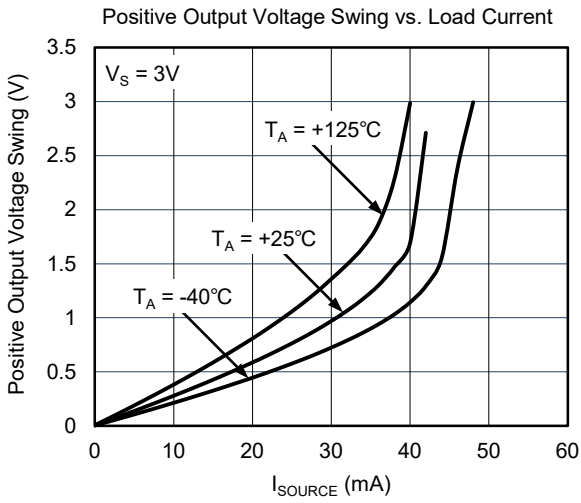
**ELECTRICAL CHARACTERISTICS**

(At  $T_A = +25^\circ\text{C}$ ,  $V_S = 3\text{V}$  to  $32\text{V}$ ,  $R_L = 10\text{k}\Omega$  connected to  $V_S/2$ ,  $-0.1\text{V} < V_{\text{CM}} < V_S - 1.5\text{V}$ , Full =  $-40^\circ\text{C}$  to  $+125^\circ\text{C}$ , unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
<b>Input Characteristics</b>							
Input Offset Voltage	$V_{\text{OS}}$		+25°C		1.2	6	mV
			Full			7	
Input Bias Current	$I_{\text{B}}$	$V_{\text{CM}} = V_S/2$	+25°C		10	200	pA
Input Offset Current	$I_{\text{OS}}$	$V_{\text{CM}} = V_S/2$	+25°C		10	200	pA
Input Common Mode Voltage Range	$V_{\text{CM}}$		Full	-0.1		$V_S - 1.5$	V
Common Mode Rejection Ratio	CMRR	$-0.1\text{V} < V_{\text{CM}} < V_S - 1.5\text{V}$	+25°C	82	100		dB
			Full	72			
Open-Loop Voltage Gain	$A_{\text{OL}}$	$R_L = 10\text{k}\Omega$ to $V_S/2$	+25°C	92	111		dB
			Full	83			
<b>Output Characteristics</b>							
Output Voltage Swing from Rail	$V_{\text{OH}}$	$R_L = 10\text{k}\Omega$	+25°C		42	60	mV
			Full			80	
	+25°C			110	190		
	Full				240		
Output Short-Circuit Current	$I_{\text{SC}}$		+25°C	12	18		mA
<b>Power Supply</b>							
Operating Voltage Range	$V_S$		Full	3		32	V
Quiescent Current	$I_{\text{Q}}$	$I_{\text{OUT}} = 0\text{A}$	+25°C		860	1250	$\mu\text{A}$
			Full			1900	
Power Supply Rejection Ratio	PSRR		+25°C	102	122		dB
			Full	98			
<b>Dynamic Performance (<math>C_L = 100\text{pF}</math>)</b>							
Gain-Bandwidth Product	GBP		+25°C		1.1		MHz
Slew Rate	SR	$G = +1$	+25°C		0.35		V/ $\mu\text{s}$
Overload Recovery Time		$V_{\text{IN}} \times G > V_S$	+25°C		2.3		$\mu\text{s}$
Turn-On Time		$G = +1$	+25°C		42		$\mu\text{s}$
Phase Margin	$\phi_0$		+25°C		60		°
<b>NOISE</b>							
Input Voltage Noise		$f = 0.1\text{Hz}$ to $10\text{Hz}$	+25°C		9		$\mu\text{V}_{\text{P-P}}$
Input Voltage Noise Density	$e_n$	$f = 1\text{kHz}$	+25°C		36		nV/ $\sqrt{\text{Hz}}$

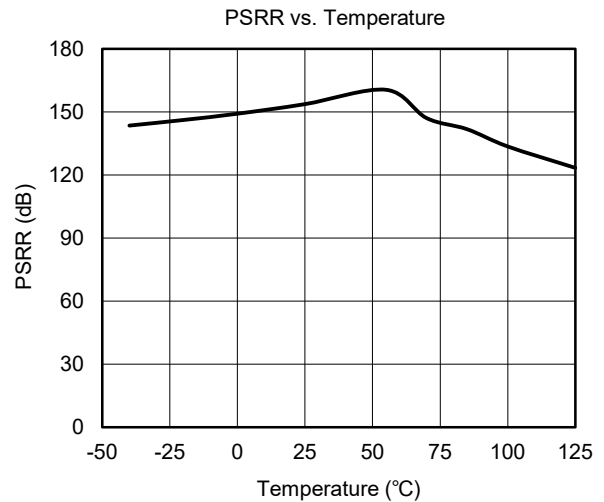
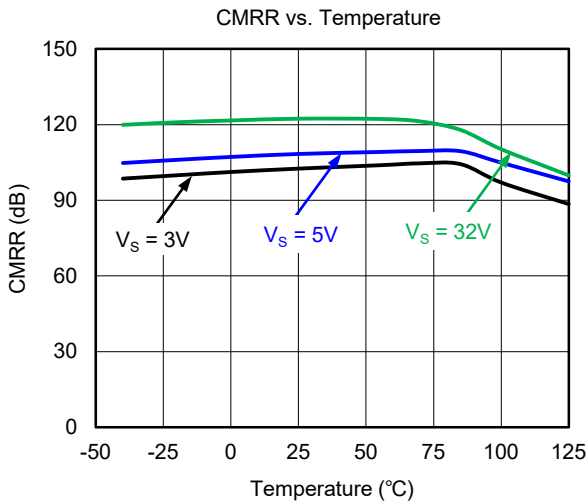
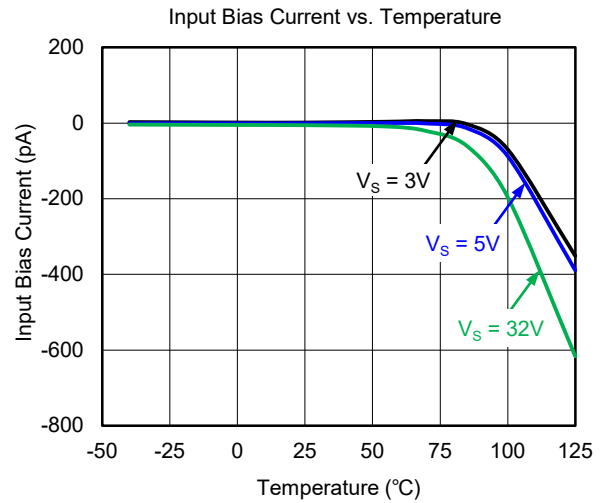
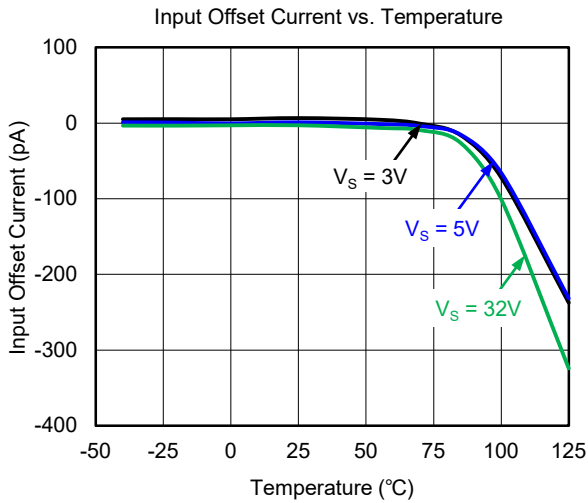
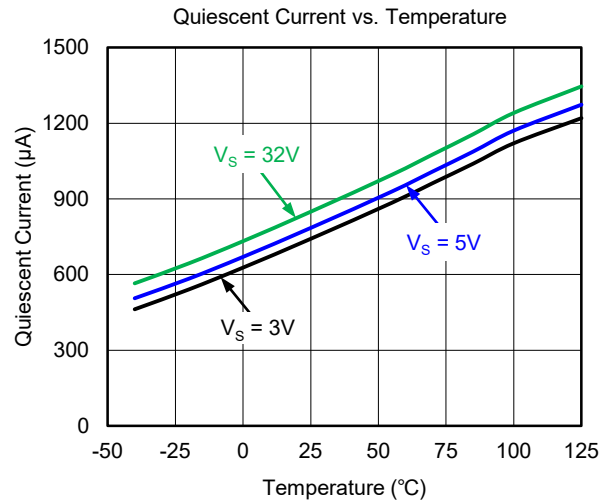
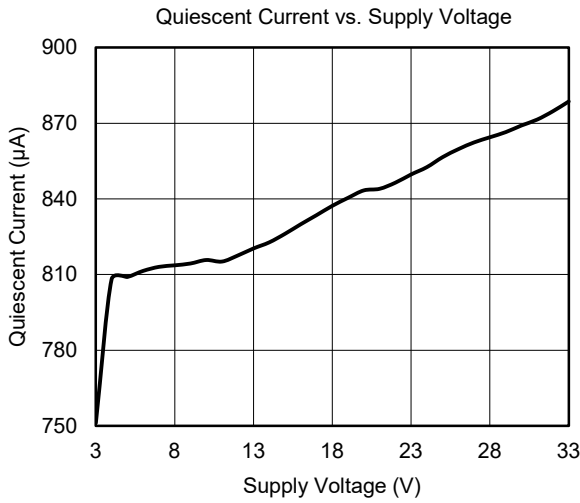
TYPICAL PERFORMANCE CHARACTERISTICS

At  $T_A = +25^\circ\text{C}$ ,  $V_{CM} = V_S/2$ , unless otherwise noted.



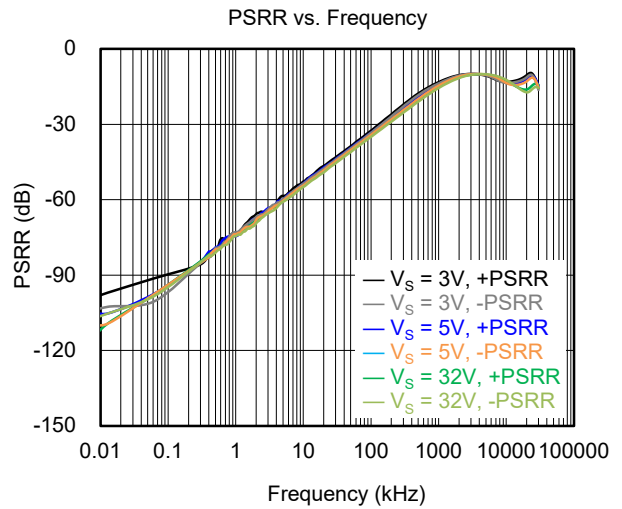
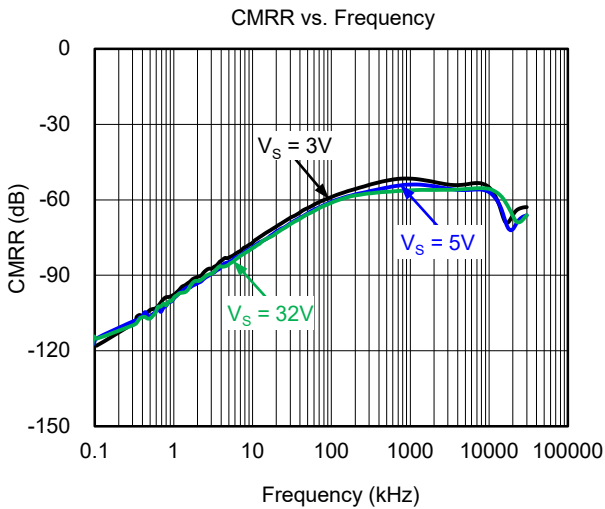
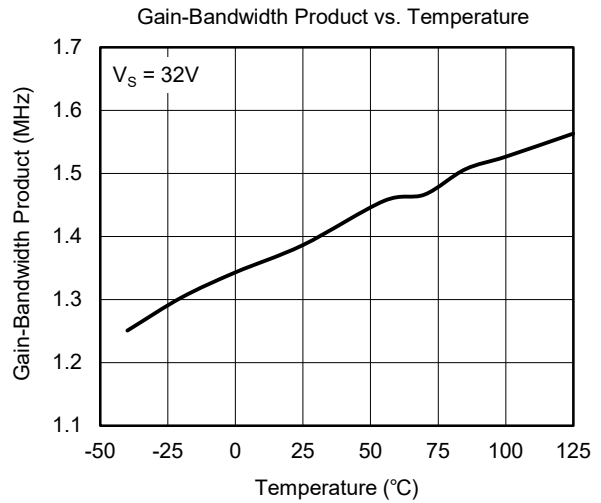
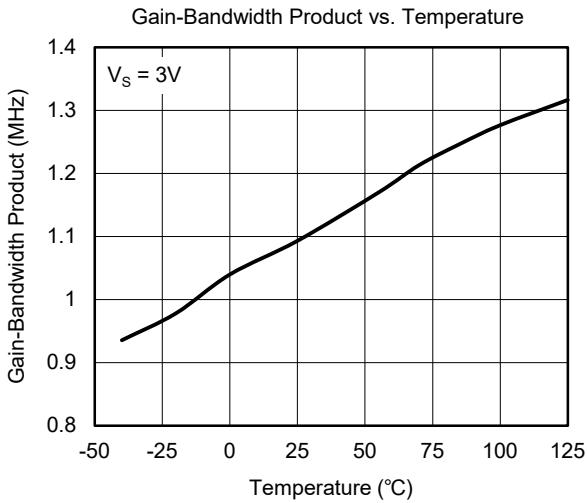
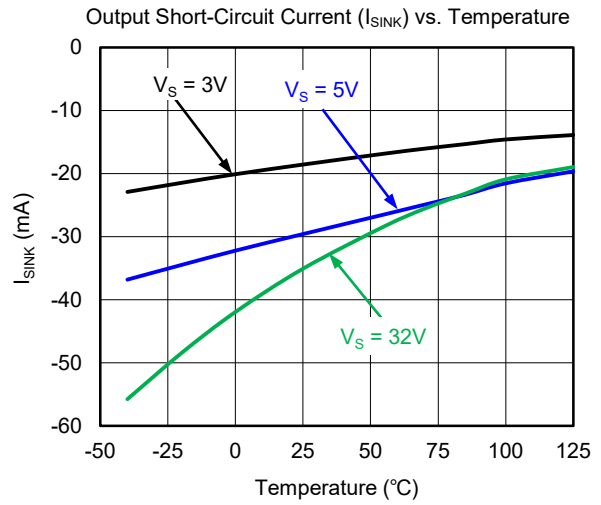
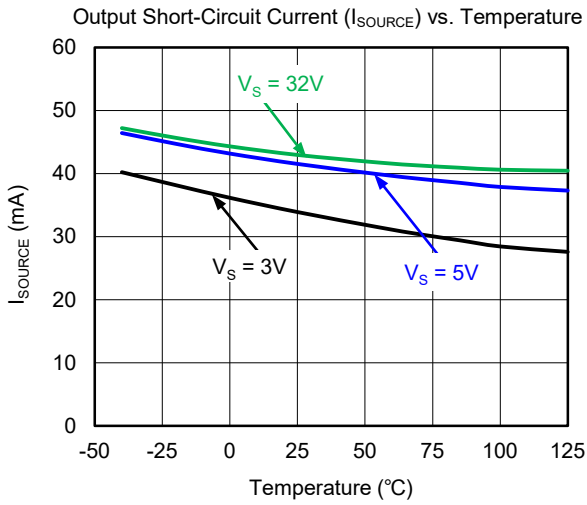
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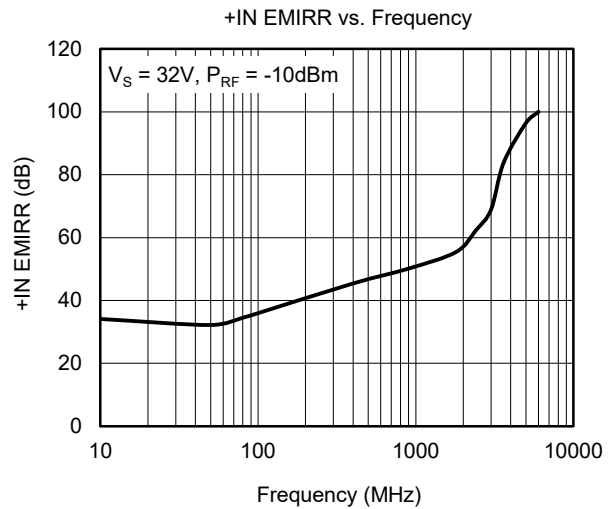
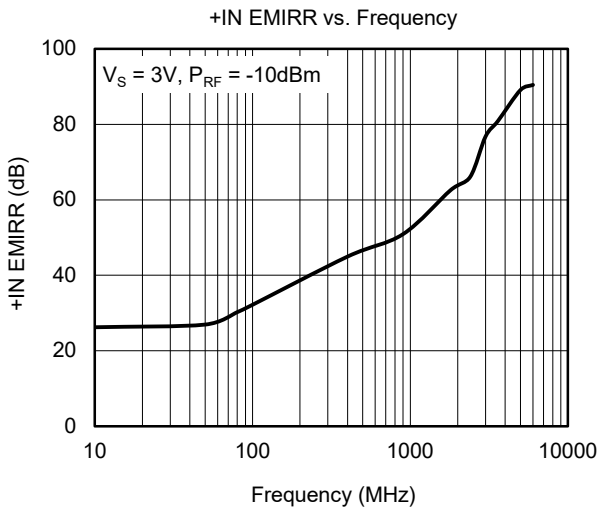
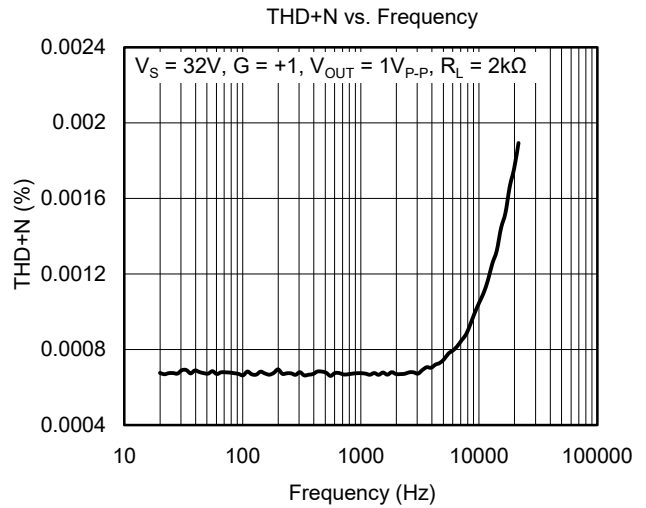
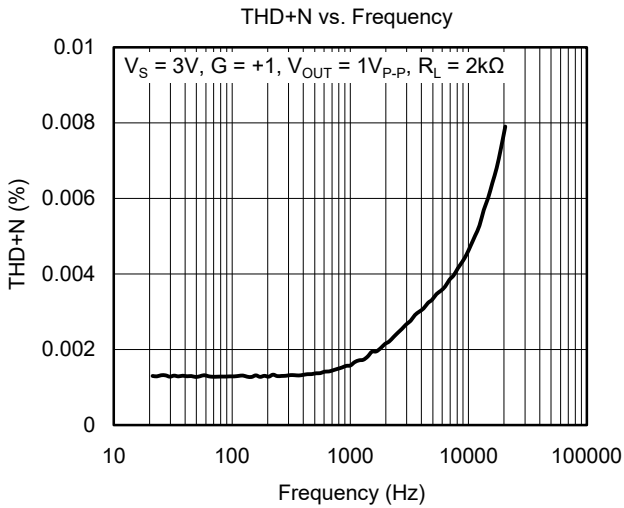
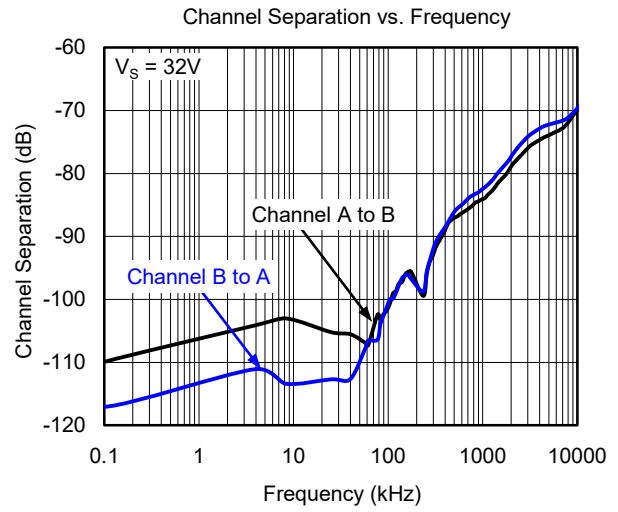
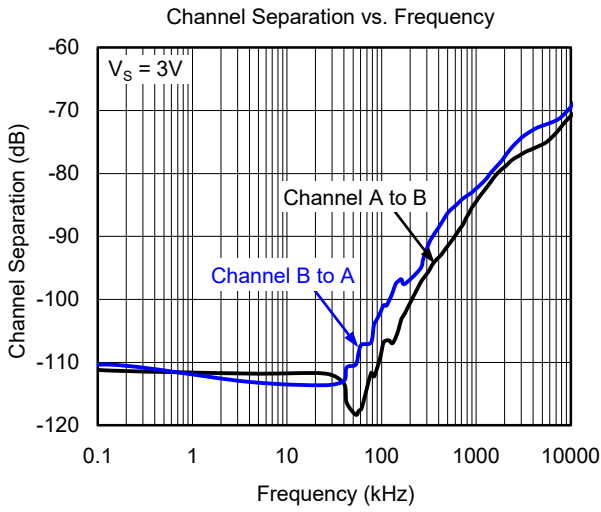
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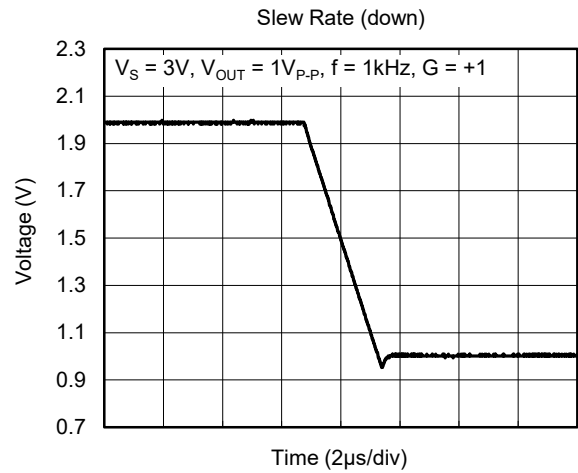
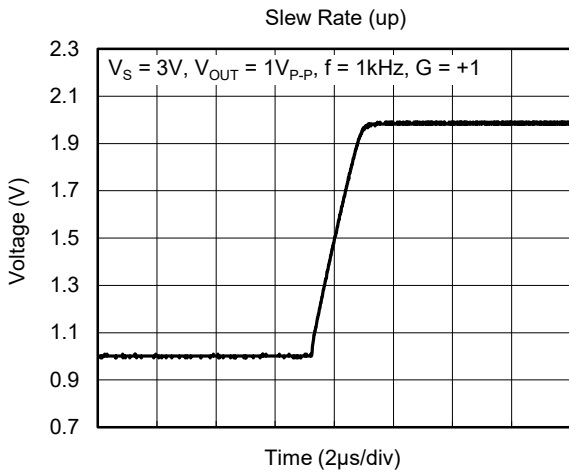
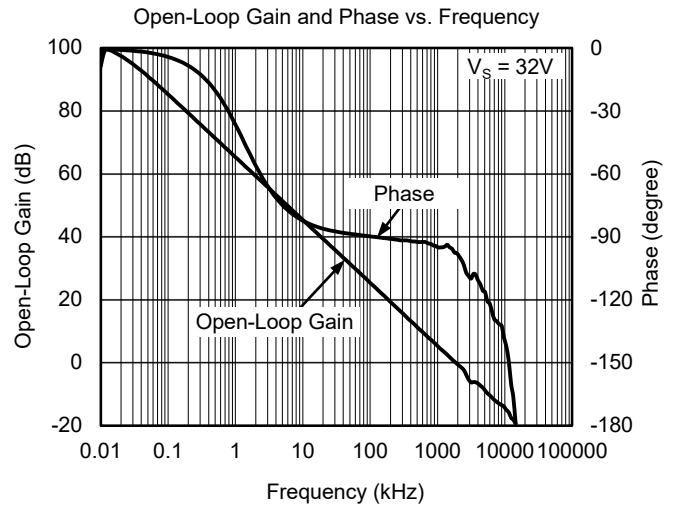
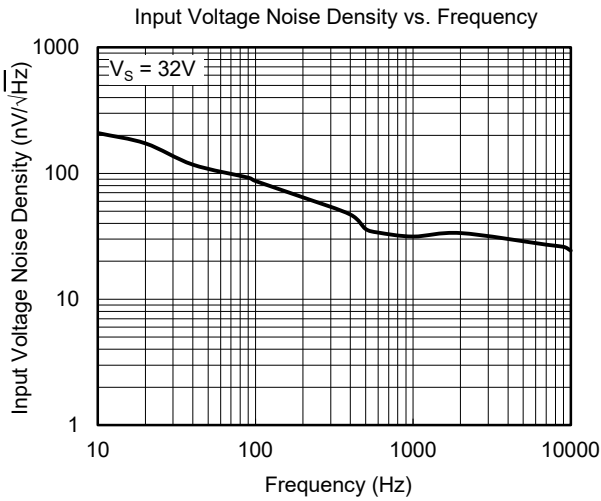
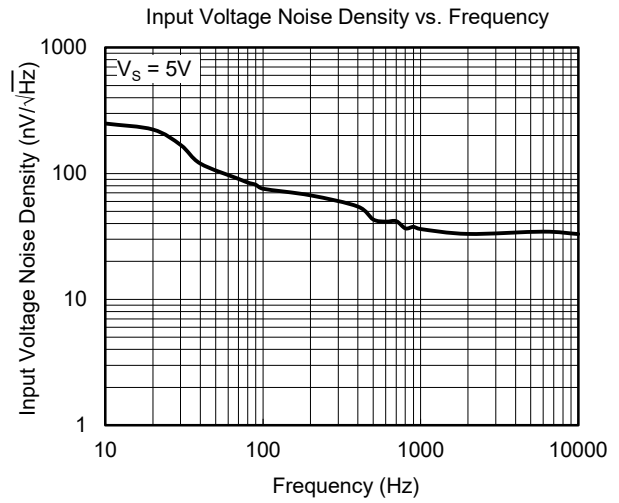
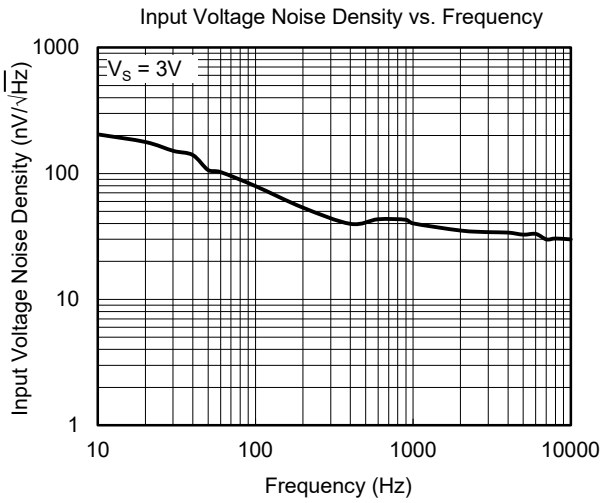
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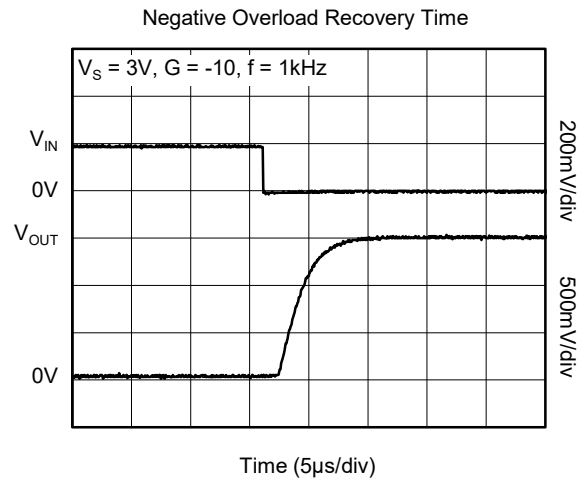
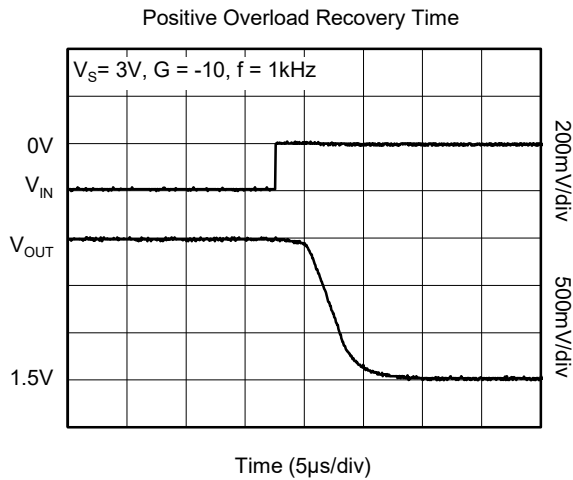
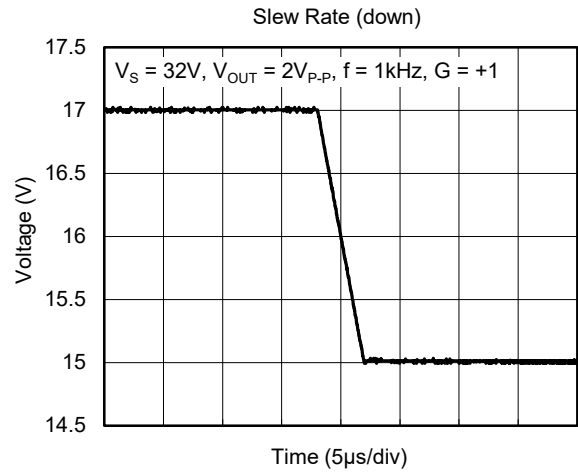
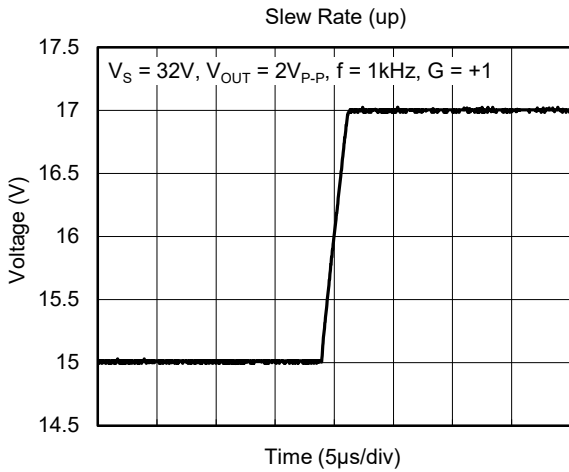
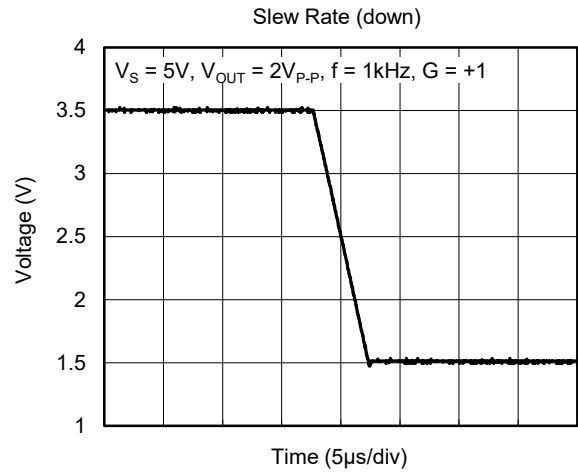
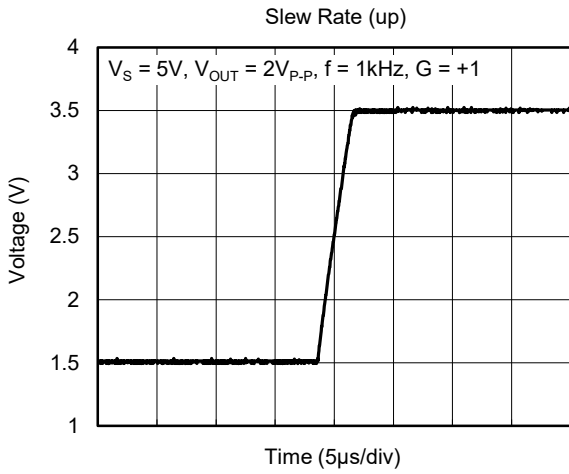
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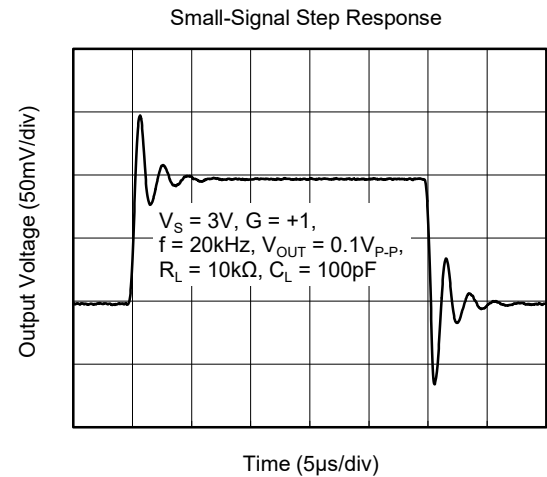
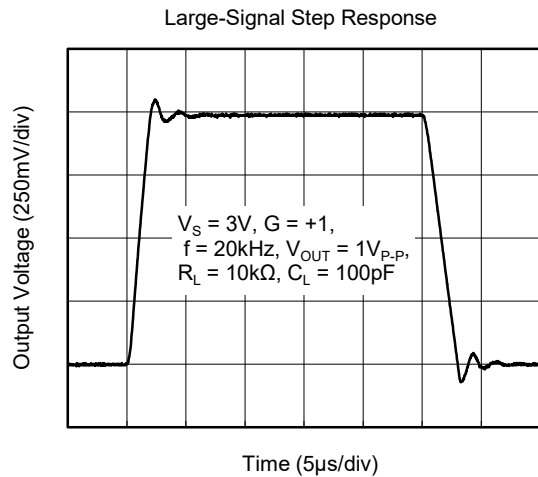
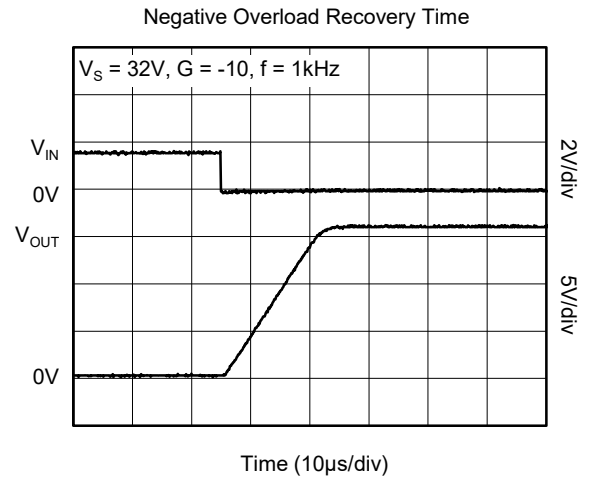
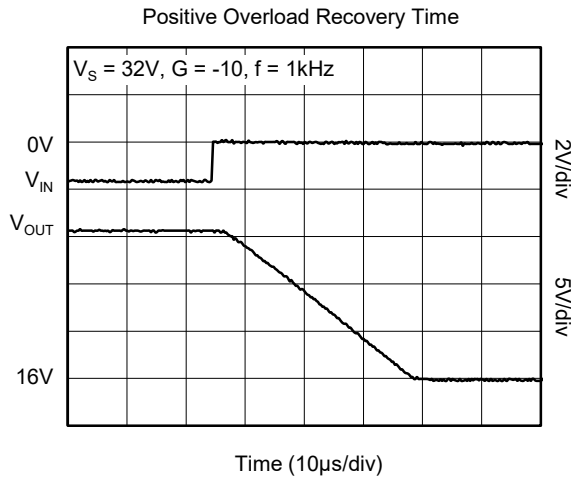
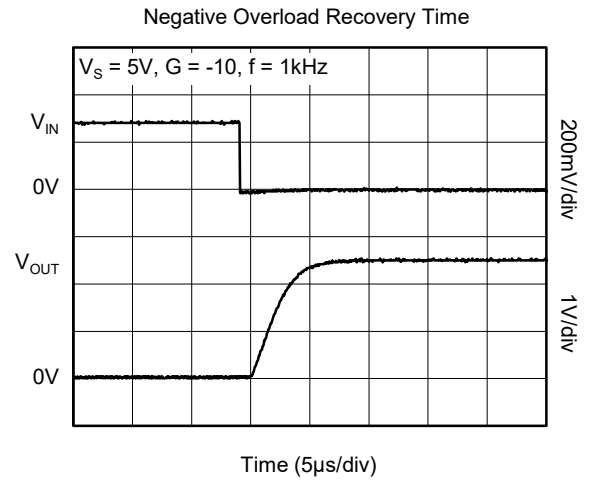
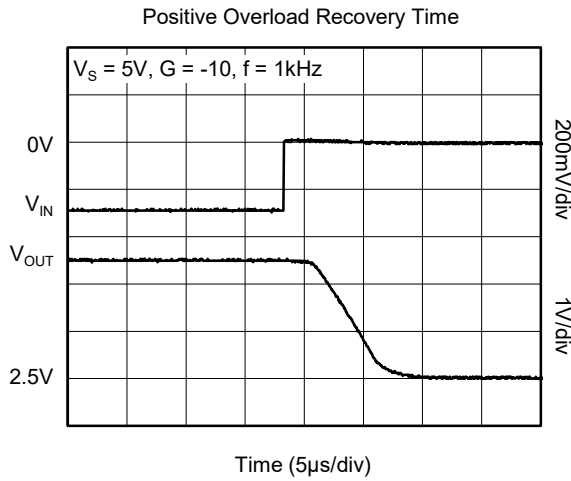
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TYPICAL PERFORMANCE CHARACTERISTICS (continued)

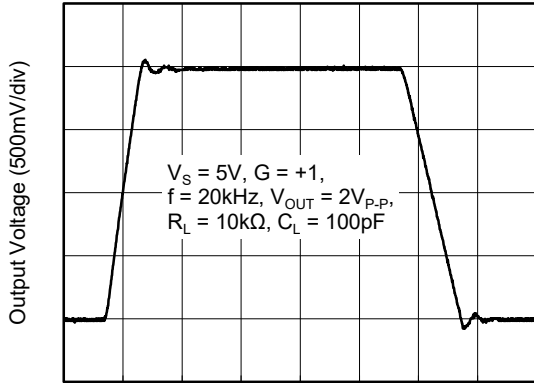
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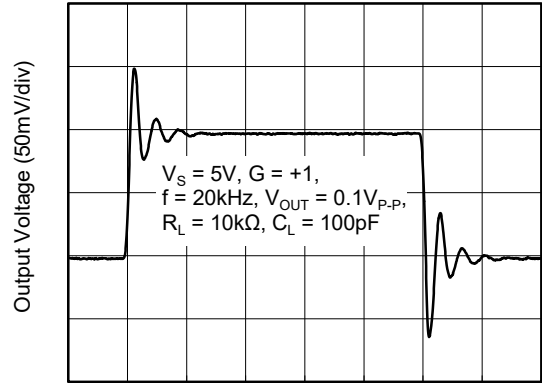
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Large-Signal Step Response



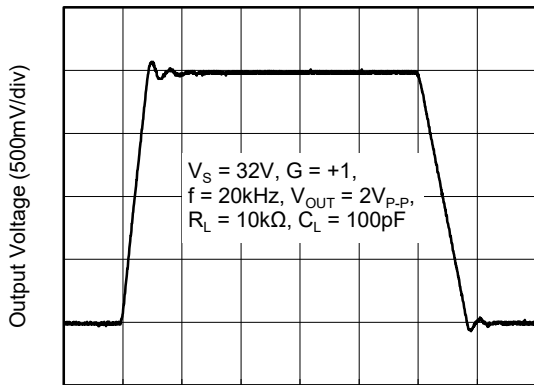
Time (5µs/div)

Small-Signal Step Response



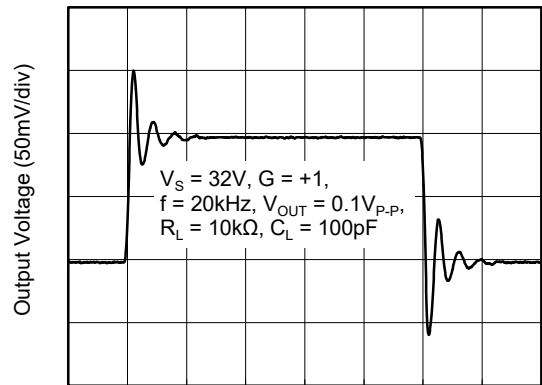
Time (5µs/div)

Large-Signal Step Response



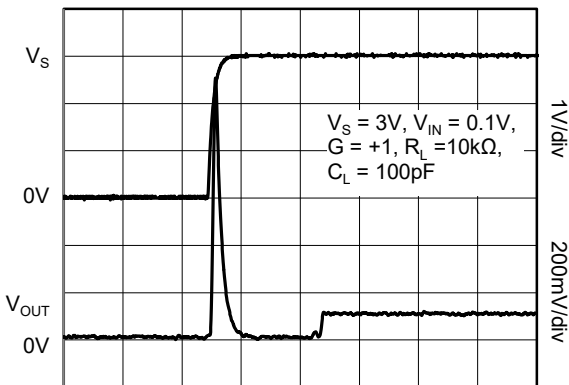
Time (5µs/div)

Small-Signal Step Response



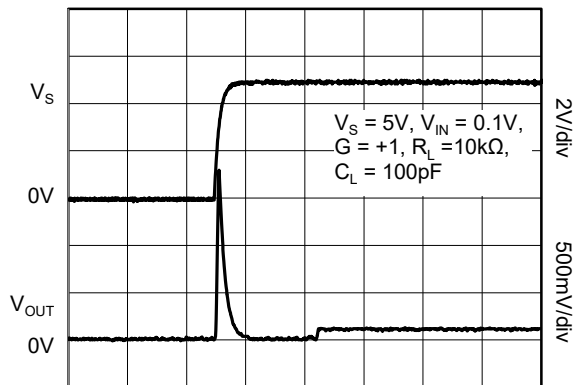
Time (5µs/div)

Turn-On Time



Time (20µs/div)

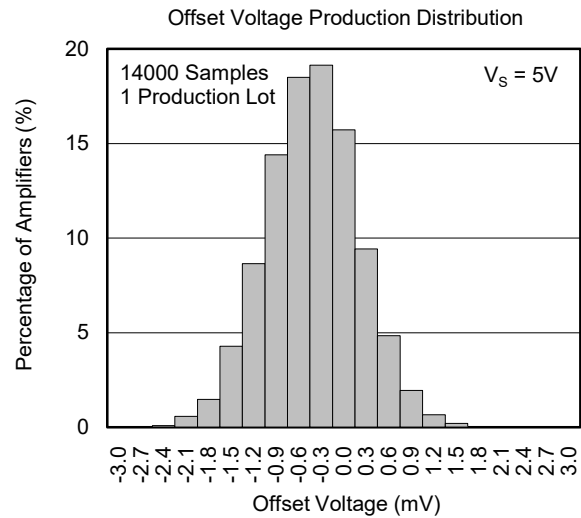
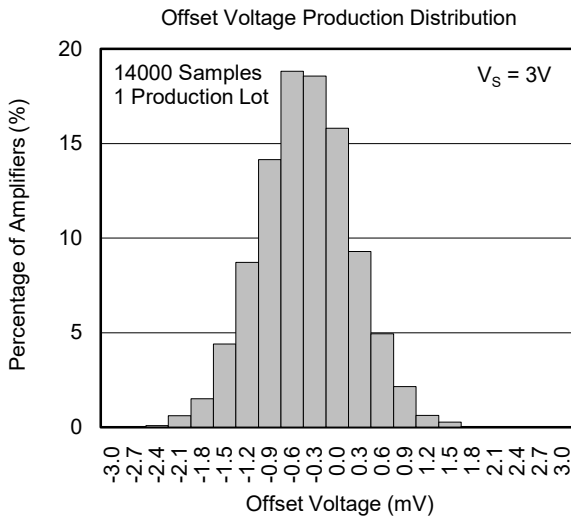
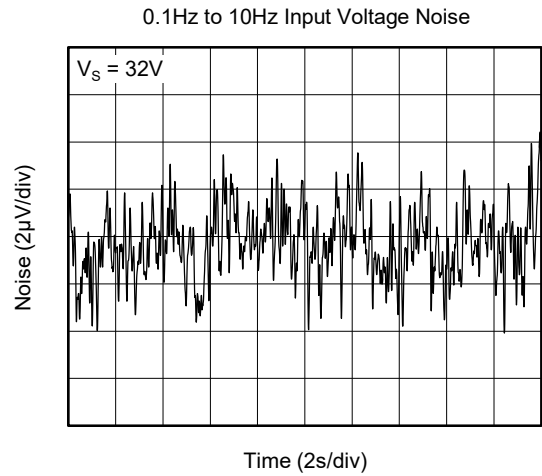
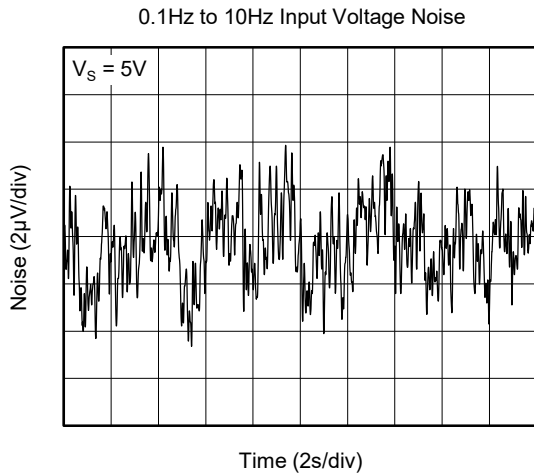
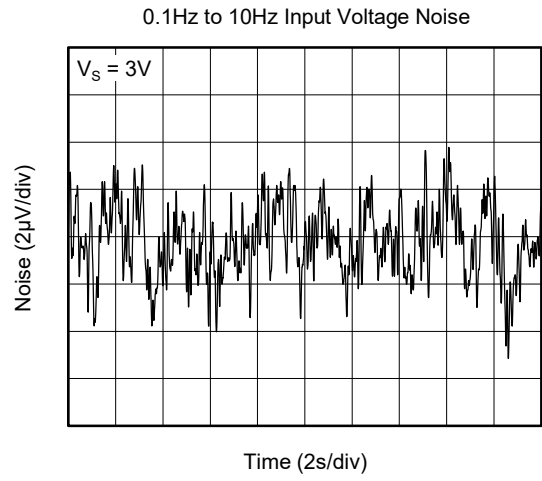
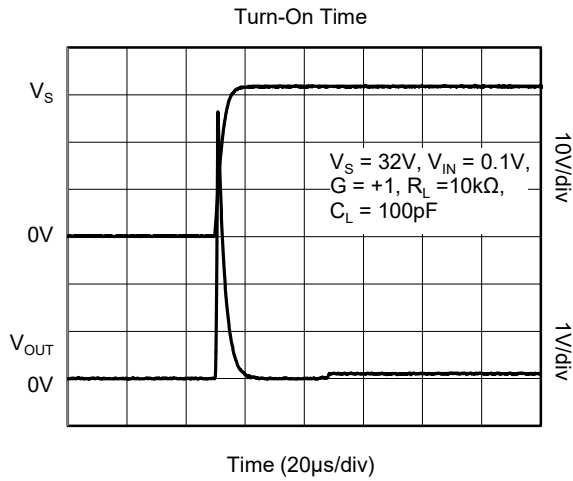
Turn-On Time



Time (20µs/div)

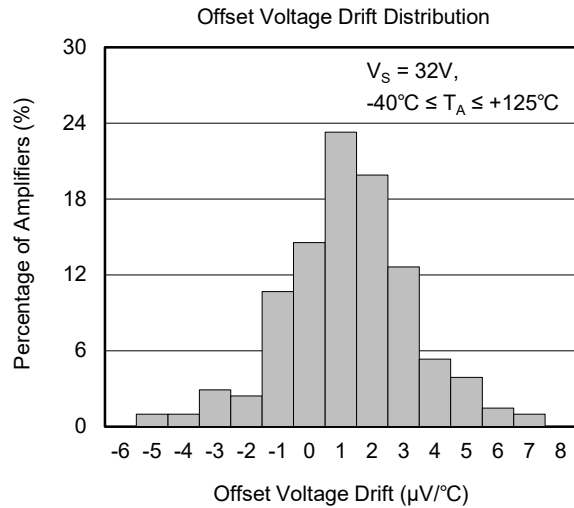
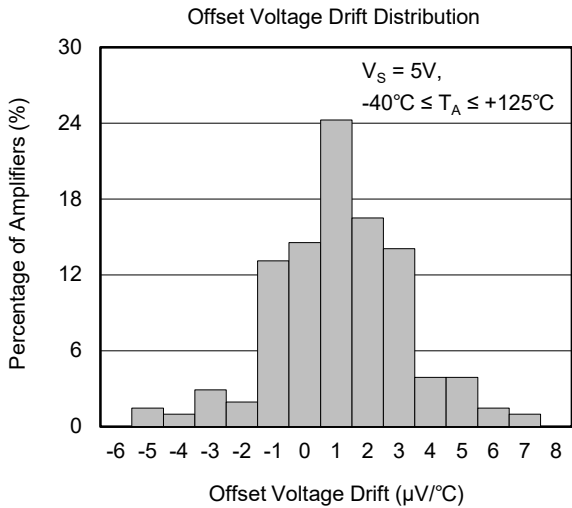
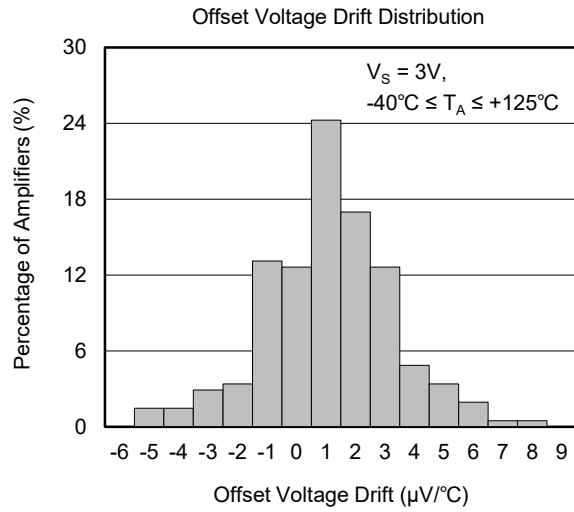
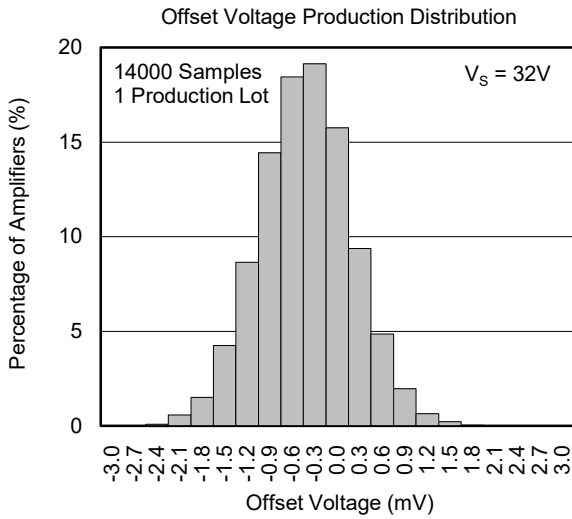
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

At  $T_A = +25^\circ\text{C}$ ,  $V_{CM} = V_S/2$ , unless otherwise noted.



**TYPICAL PERFORMANCE CHARACTERISTICS (continued)**

At  $T_A = +25^\circ\text{C}$ ,  $V_{CM} = V_S/2$ , unless otherwise noted.



**REVISION HISTORY**

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

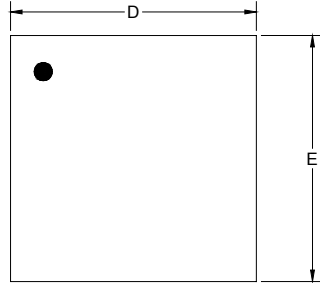
<b>Changes from Original (AUGUST 2020) to REV.A</b>	<b>Page</b>
Changed from product preview to production data.....	All

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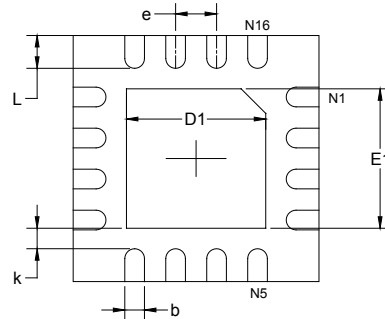
# PACKAGE INFORMATION

## PACKAGE OUTLINE DIMENSIONS

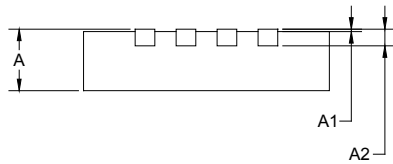
### TQFN-3×3-16L



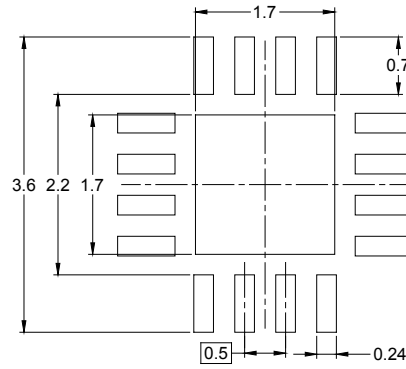
TOP VIEW



BOTTOM VIEW



SIDE VIEW



RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.203 REF		0.008 REF	
D	2.900	3.100	0.114	0.122
D1	1.600	1.800	0.063	0.071
E	2.900	3.100	0.114	0.122
E1	1.600	1.800	0.063	0.071
k	0.200 MIN		0.008 MIN	
b	0.180	0.300	0.007	0.012
e	0.500 TYP		0.020 TYP	
L	0.300	0.500	0.012	0.020

# PACKAGE INFORMATION

## TAPE AND REEL INFORMATION

### REEL DIMENSIONS



### TAPE DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

### KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
TQFN-3×3-16L	13"	12.4	3.35	3.35	1.13	4.0	8.0	2.0	12.0	Q2

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# PACKAGE INFORMATION

## CARTON BOX DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

## KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
13"	386	280	370	5

DD0002