



LV358

LINEAR INTEGRATED CIRCUIT

GENERAL PURPOSE, LOW VOLTAGE, RAIL-TO-RAIL OUTPUT OPERATIONAL AMPLIFIERS

DESCRIPTION

The UTC **LV358** is a dual op amp with low supply current and low voltage (2.7-5.5V). It brings nice performance to low voltage and low power systems. With a 3MHz unity-gain frequency. The UTC **LV358** has a guaranteed 0.9V/ μ s slew rate and low supply current. It provides heavy rail-to-rail (R-to-R) output swing loads and the input common-mode voltage range including ground. Besides, it is also capable for comfortably driving large capacitive loads.

The UTC **LV358** has bipolar input and CMOS output for improved noise performance and higher output current drive. It's the most cost effective solution for the applications where low voltage operation, space saving and low price are required.

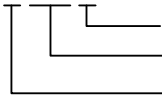
FEATURES

- * Supply Voltage: 2.7 ~ 5.5V
- * Supply current: 115 μ A / amplifier (Typ.)
- * Input Offset Voltage: 7mV (Max.)
- * Rail-to-Rail outputs
- * Slew Rate 0.9V/ μ s (Typ.)

ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
LV358L-S08-R	LV358G-S08-R	SOP-8	Tape Reel
LV358L-SM1-R	LV358G-SM1-R	MSOP-8	Tape Reel
LV358L-P08-R	LV358G-P08-R	TSSOP-8	Tape Reel
LV358L-K08-2030-R	LV358G-K08-2030-R	DFN2030-8	Tape Reel

LV358G-S08-R



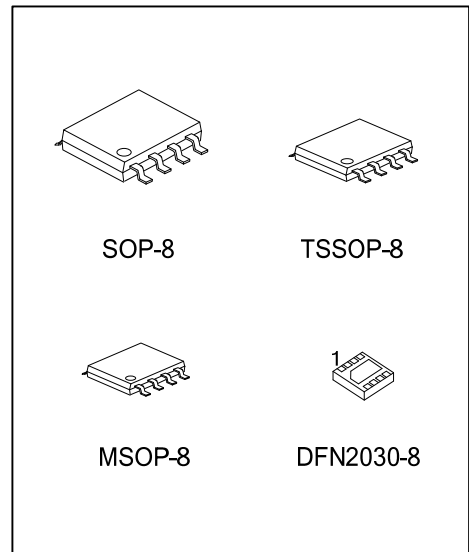
- (1) Packing Type
- (2) Package Type
- (3) Green Package

(1) R: Tape Reel

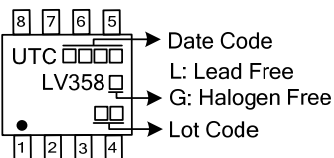
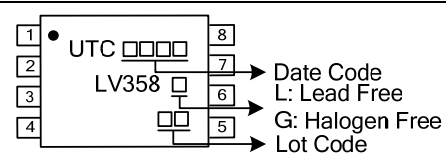
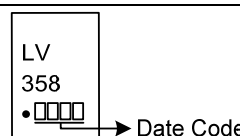
(2) S08: SOP-8, P08: TSSOP-8, SM1: MSOP-8

K08-2030: DFN2030-8

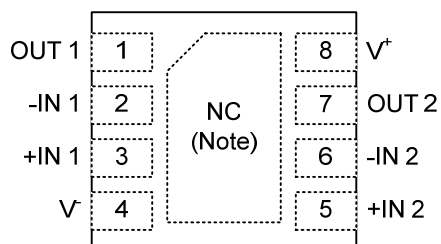
(3) G: Halogen Free and Lead Free, L: Lead Free



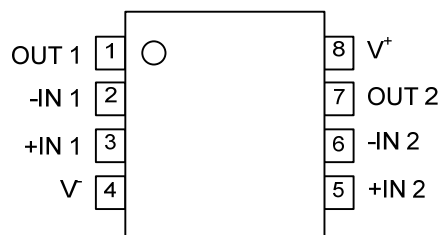
MARKING

PACKAGE	MARKING
SOP-8 MSOP-8	
TSSOP-8	
DFN2030-8	

PIN CONFIGURATION



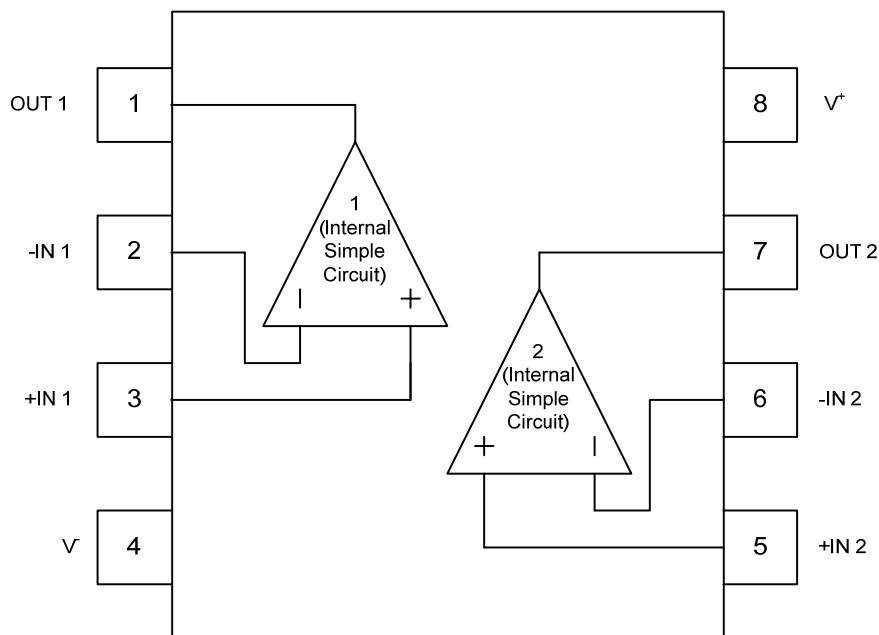
DFN2030-8 Top View



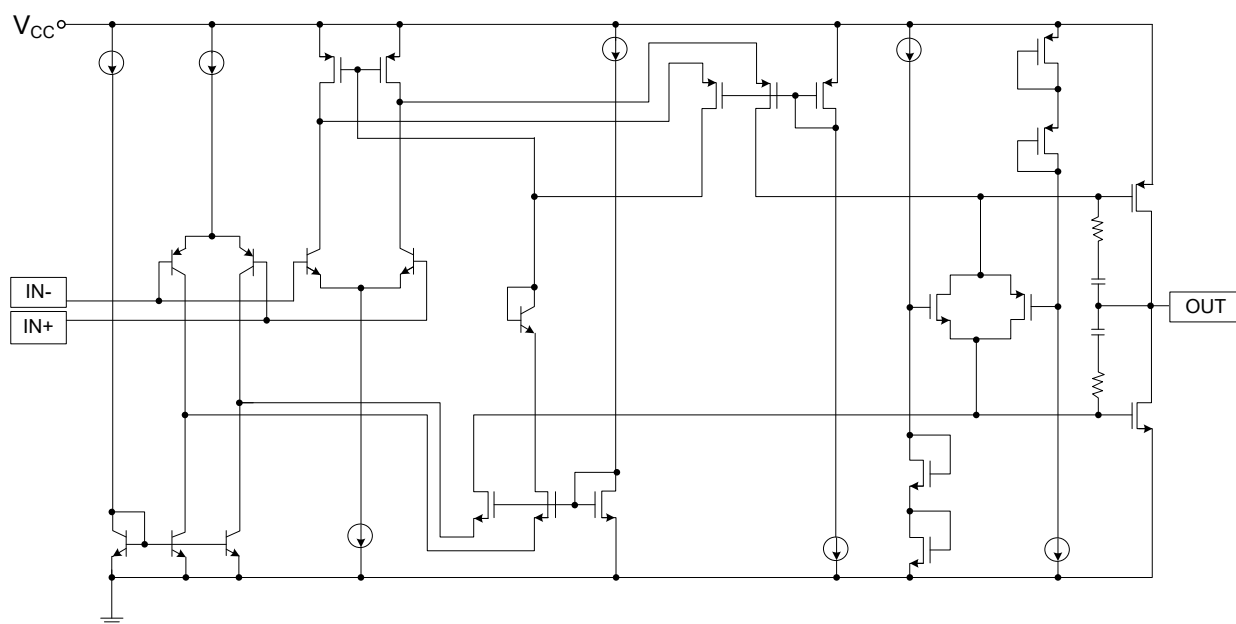
SOP-8 / TSSOP-8 / MSOP-8

Note: No connect.

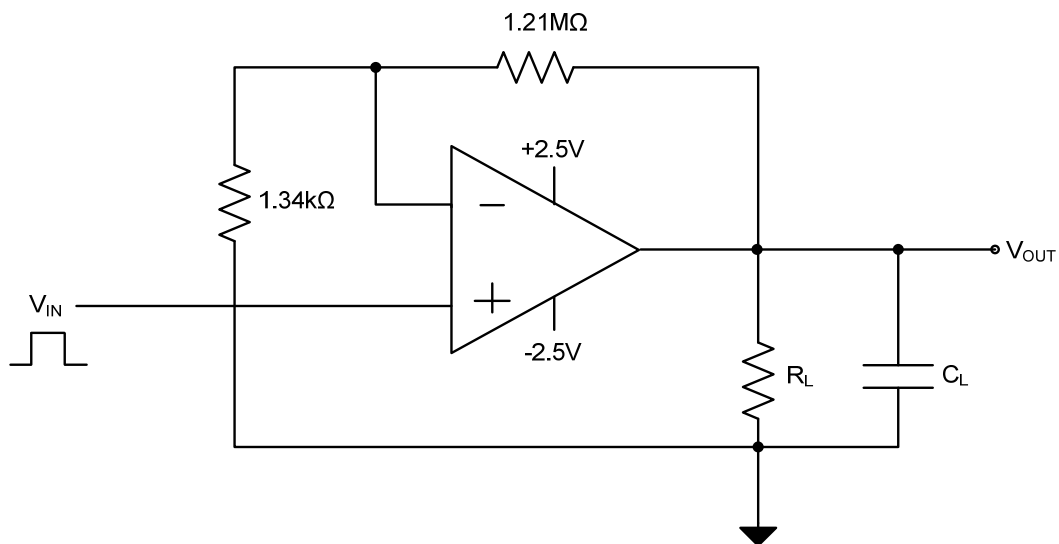
BLOCK DIAGRAM



INTERNAL SIMPLE CIRCUIT



TEST CIRCUIT FOR STABILITY VS CAPACITIVE LOAD



■ ABSOLUTE MAXIMUM RATINGS (Note1)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V^+ - V^-$	2.7 ~ 5.5	V
Supply Voltage ($V^+ - V^-$)	$V^+ - V^-$	5.5	V
Differential Input Voltage		$\pm$ Supply Voltage	
Junction Temperature	T_J	+150	°C
Operation 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. Shorting output to V^+ will adversely affect reliability.

3. Shorting output to V^- will adversely affect reliability.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Thermal Resistance (Note 1)	SOP-8	160	°C/W
	MSOP-8	205	°C/W
	TSSOP-8	210	°C/W
	DFN2030-8	59	°C/W

Note: All numbers are typical, and apply for packages soldered directly note a PC board is still air.

■ 2.7V ELECTRICAL CHARACTERISTICS

($T_A=25^\circ\text{C}$, $V^+ = 2.7\text{V}$, $V^- = 0\text{V}$, $V_{CM} = 1.0\text{V}$ and $R_L > 1\text{M}\Omega$, unless otherwise specified)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
DC CHARACTERISTICS						
Supply Current/Amplifier	I _Q			95	170	μA
Power Supply Rejection Ratio	PSRR	2.7V ≤ V ⁺ ≤ 5V, V _{OUT} =1V	50	72		dB
Input Offset Voltage	V _{OS}			0.4	7	mV
Input Offset Voltage Average Drift				5		μV/°C
Input Bias Current	I _B			11		nA
Input Offset Current	I _{OS}			5		nA
Input Common Mode Voltage Range	V _{CM}	For CMRR ≥ 50dB	0	-0.2		V
				1.9	1.7	V
Common Mode Rejection Ratio	CMRR	0V ≤ V _{CM} ≤ 1.7V	50	75		dB
Output Swing	V _O	R _L =10kΩ to 1.35V	V ⁺ -100	V ⁺ -10		mV
				60	180	mV
AC CHARACTERISTICS						
Gain Bandwidth Product	GBW	C _L =200pF		3		MHz
Phase Margin	Φ _M			50		Deg
Gain Margin	G _m			5		dB
Input Referred Voltage Noise	e _n	F=1KHz		46		$\frac{nV}{\sqrt{Hz}}$
Input Referred Current Noise	i _n	F=1KHz		0.17		$\frac{pA}{\sqrt{Hz}}$

5V ELECTRICAL CHARACTERISTICS

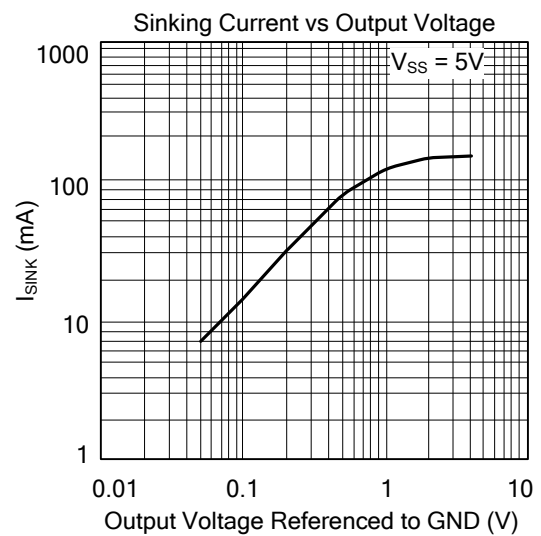
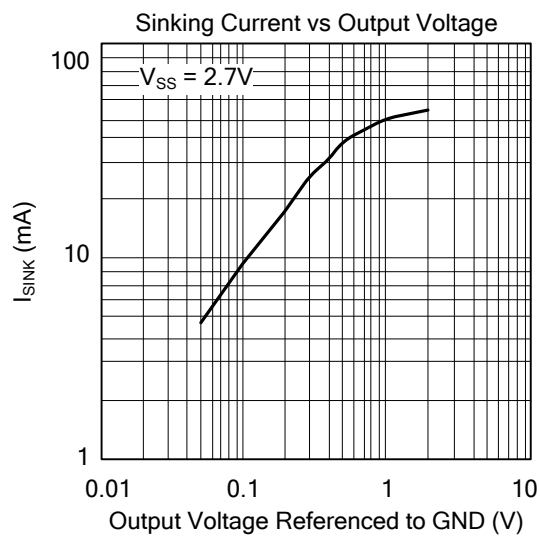
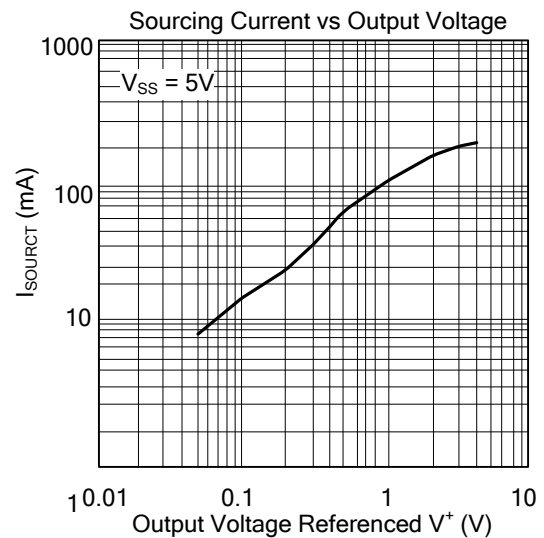
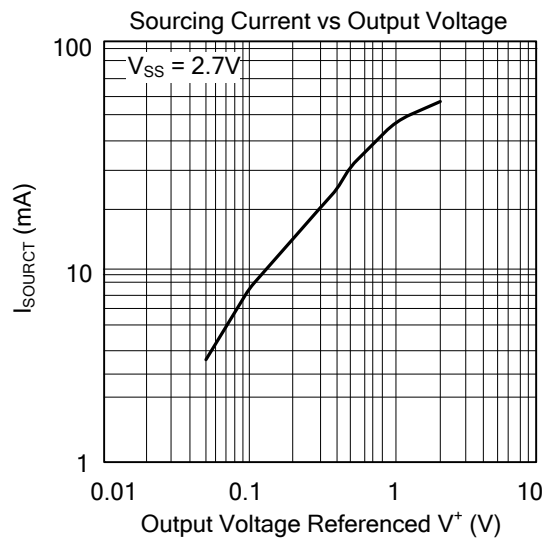
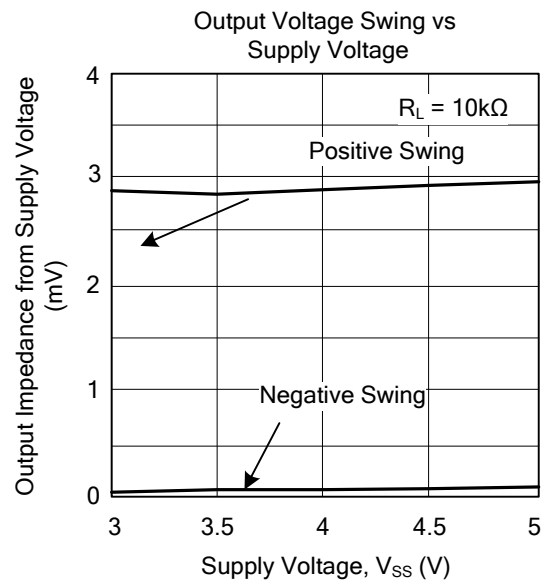
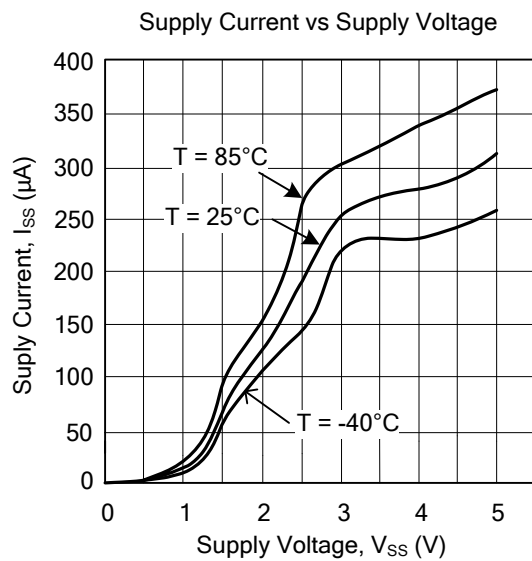
($T_A=25^{\circ}\text{C}$, $V^+ = 5.0\text{V}$, $V^- = 0\text{V}$, $V_{CM} = 1.0\text{V}$ and $R_L > 1\text{M}\Omega$, unless otherwise specified)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNIT
DC CHARACTERISTICS							
Supply Current/Amplifier	I _Q				115	220	μA
Power Supply Rejection Ratio	PSRR	2.7V ≤ V ⁺ ≤ 5V V _{OUT} =1V, V _{CM} =1V		50	72		dB
Input Offset Voltage	V _{OS}				0.4	7	mV
Input Offset Voltage Average Drift					5		μV/°C
Input Bias Current	I _B				15		nA
Input Offset Current	I _{OS}				5		nA
Input Common-Mode Voltage Range	V _{CM}	For CMRR ≥ 50dB		0	-0.2		V
					4.2	4	V
Common Mode Rejection Ratio	CMRR	0V ≤ V _{CM} ≤ 4V		50	75		dB
Large Signal Voltage Gain (Note 1)	A _V	R _L =2KΩ		80	90		dB
Output Swing	V _{OUT}	R _L =2KΩ to 2.5V	V _{OH}	V ⁺ -300	V ⁺ -40		mV
			V _{OL}		120	300	mV
		R _L =10KΩ to 2.5V	V _{OH}	V ⁺ -100	V ⁺ -10		mV
			V _{OL}		65	180	mV
Output Short Circuit Current	I _{SC}	Sourcing, V _{OUT} =0V		5	230		mA
		Sinking, V _{OUT} =5V		10	160		mA
AC CHARACTERISTICS							
Slew Rate	SR	(Note 2)			0.9		V/μs
Gain Bandwidth Product	GBW	C _L =200pF			3		MHz
Phase Margin	Φ _M				50		Deg
Gain Margin	G _m				5		dB
Input Referred Voltage Noise	e _n	f=1KHz			39		$\frac{nV}{\sqrt{Hz}}$
Input Referred Current Noise	i _n	f=1KHz			0.21		$\frac{pA}{\sqrt{Hz}}$

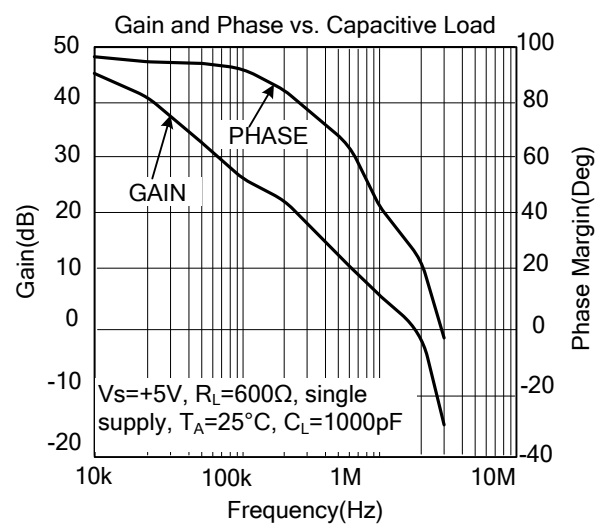
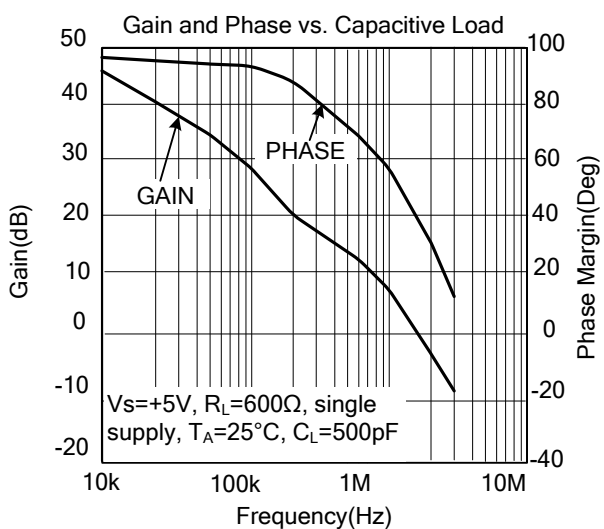
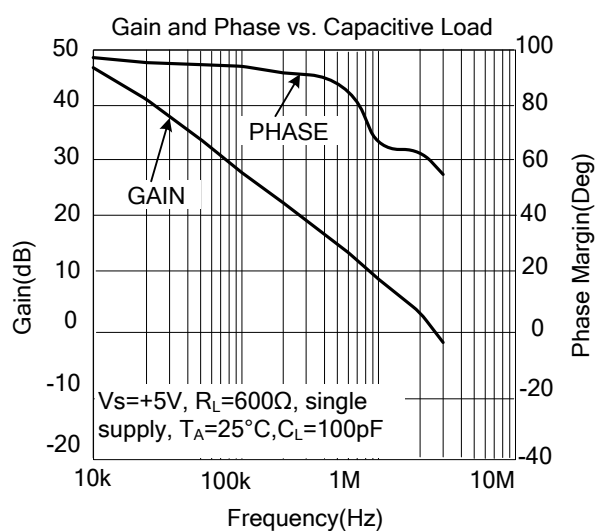
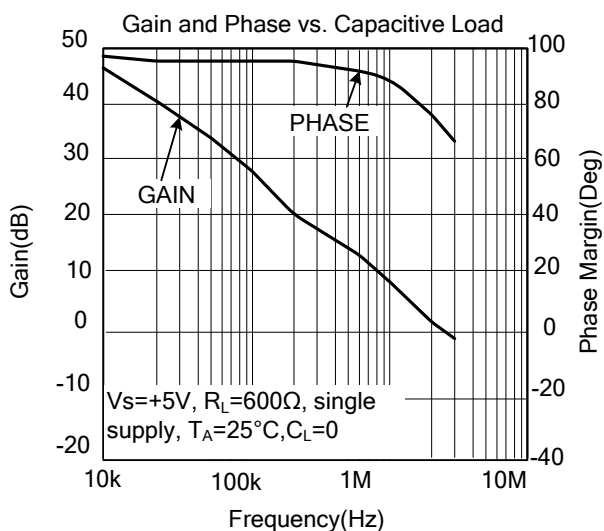
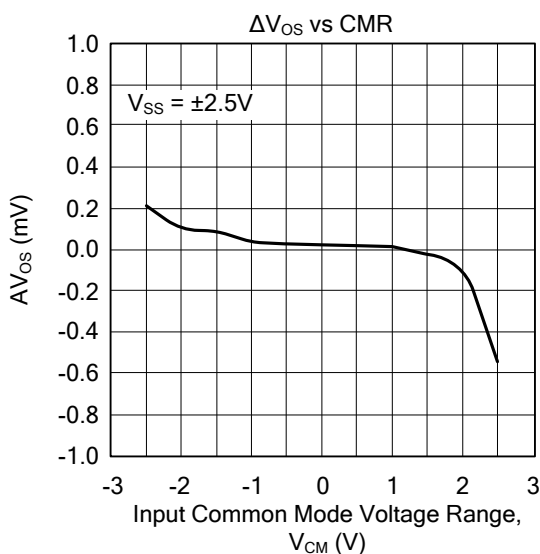
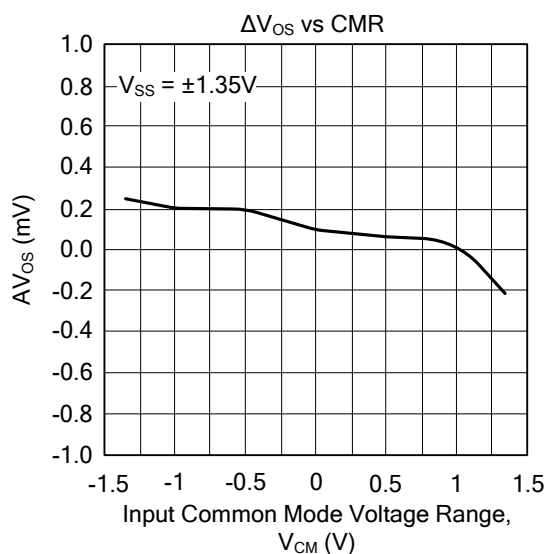
Notes: 1. R_L is connected to V^- . The output voltage is $0.5\text{V} \leq V_{OUT} \leq 4.5\text{V}$.

2. Connected as voltage follower with 3V step input. Number specified is these lower of the positive and negative slew rates.

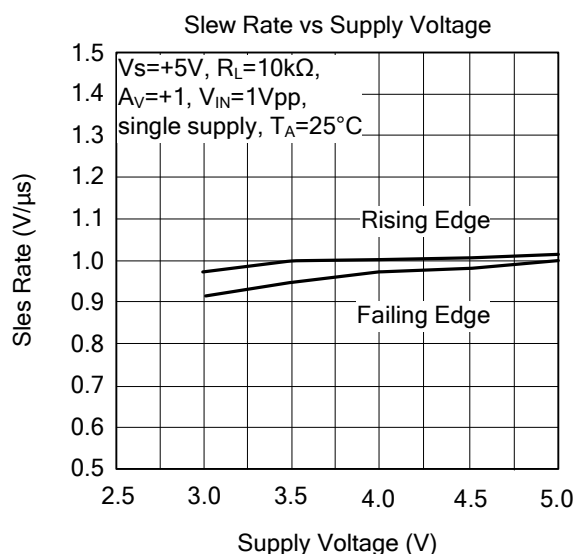
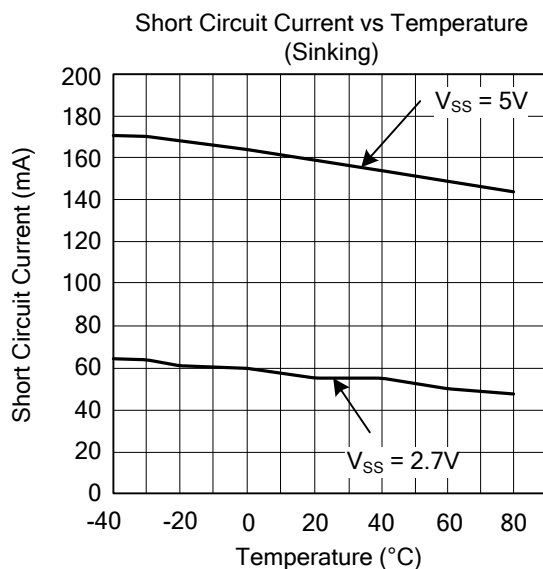
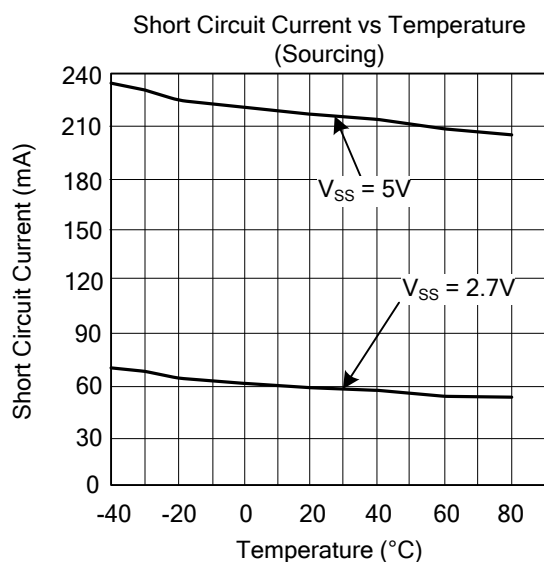
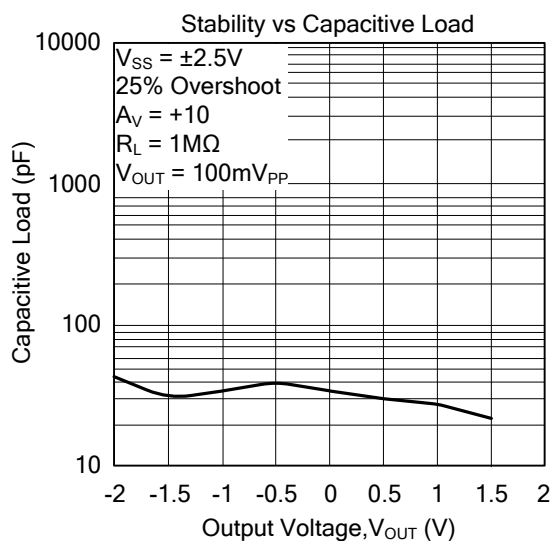
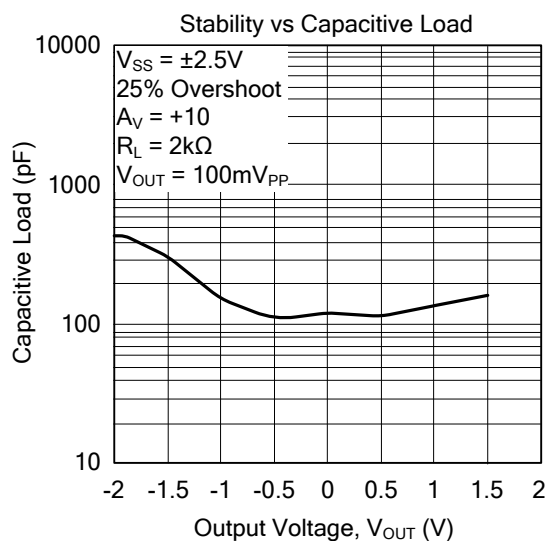
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)

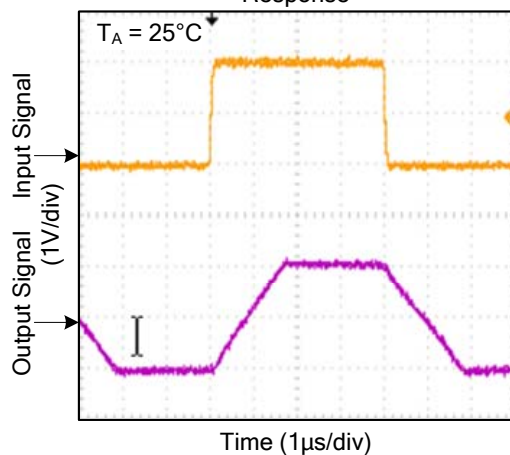


■ TYPICAL CHARACTERISTICS (Cont.)

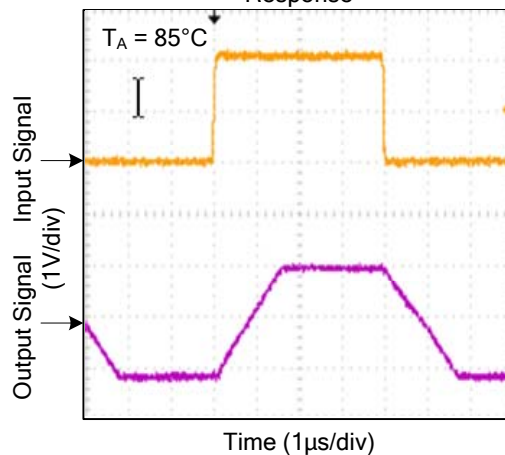


■ TYPICAL CHARACTERISTICS (Cont.)

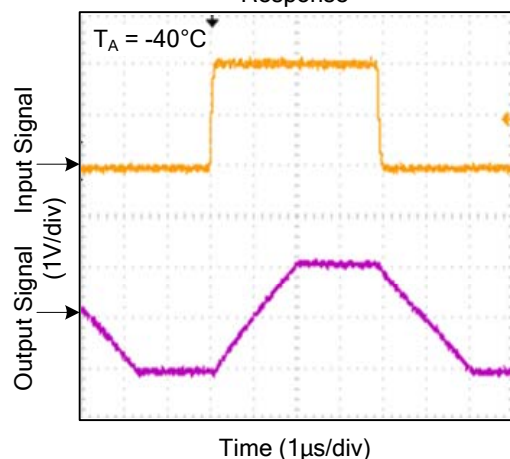
Non-Inverting Large Signal Pulse Response



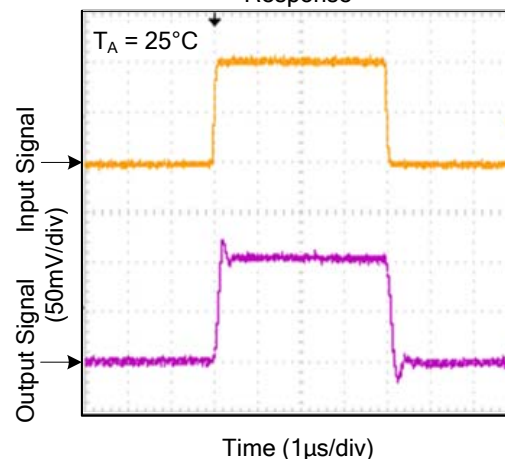
Non-Inverting Large Signal Pulse Response



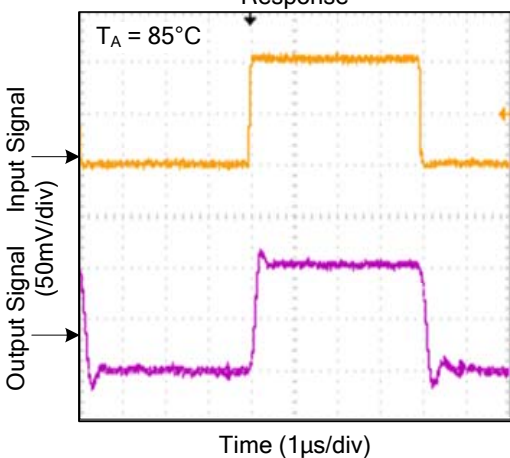
Non-Inverting Large Signal Pulse Response



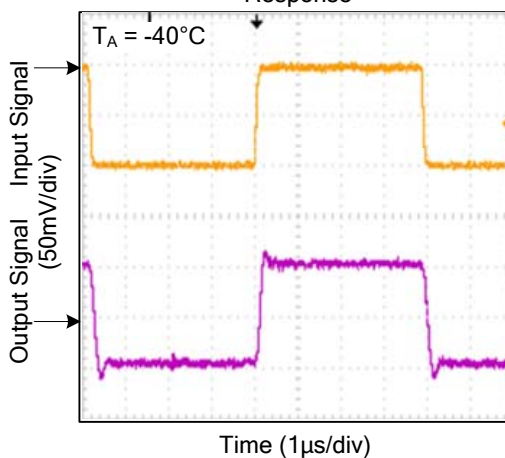
Non-Inverting Small Signal Pulse Response



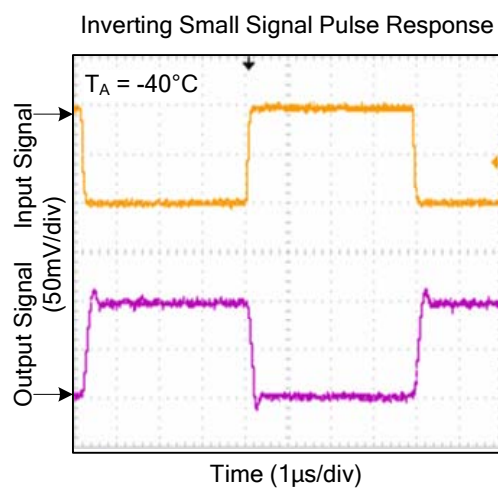
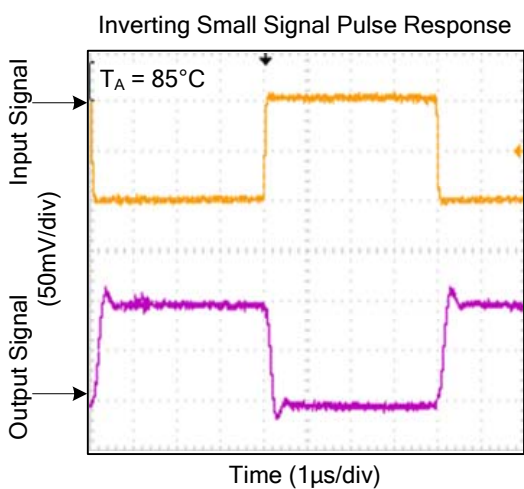
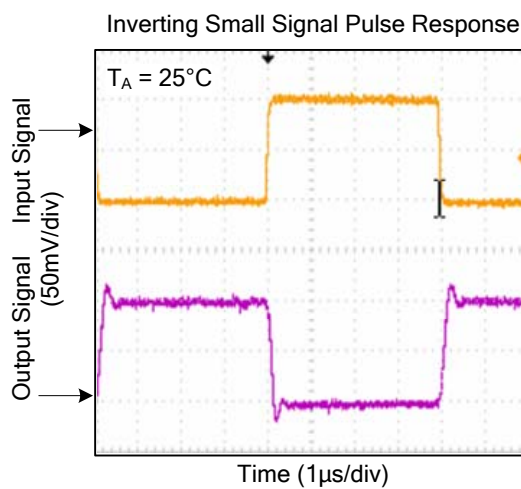
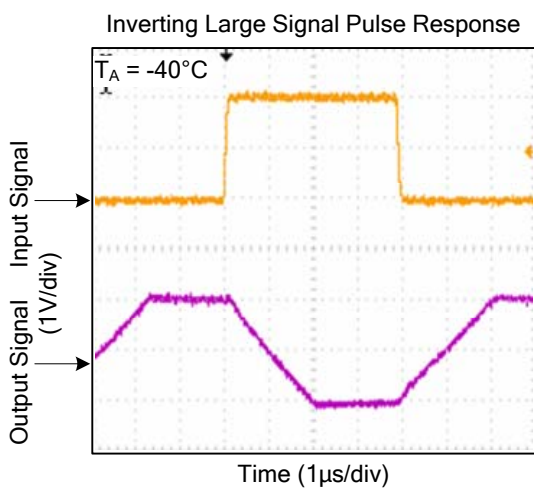
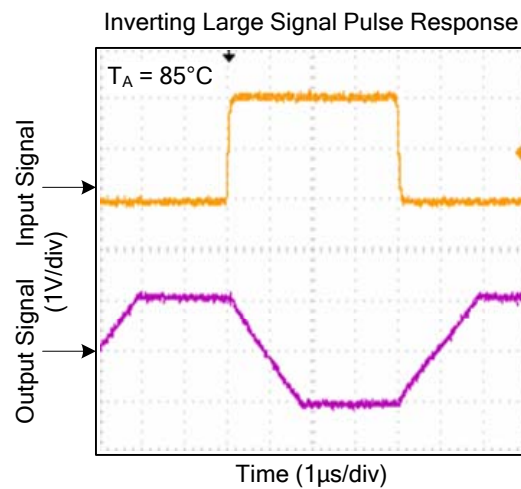
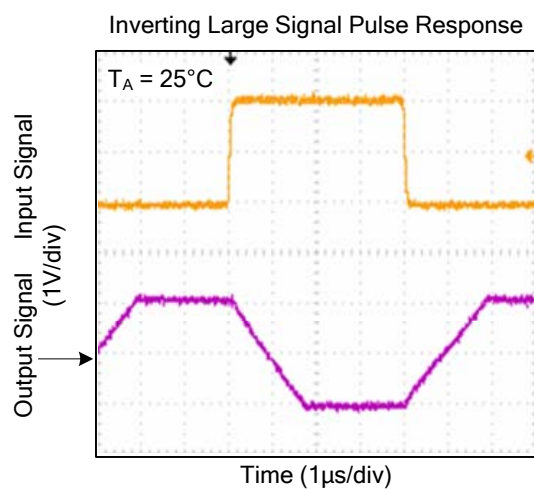
Non-Inverting Small Signal Pulse Response



Non-Inverting Small Signal Pulse Response



■ TYPICAL CHARACTERISTICS (Cont.)



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