

TLV2442-Q1, TLV2442A-Q1, TLV2444-Q1, TLV2444A-Q1

Advanced LinCMOS™ RAIL-TO-RAIL OUTPUT WIDE-INPUT-VOLTAGE OPERATIONAL AMPLIFIERS

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- Qualification in Accordance With AEC-Q100†
- Qualified for Automotive Applications
- Customer-Specific Configuration Control Can Be Supported Along With Major-Change Approval
- ESD Protection Exceeds 2000 V Per MIL-STD-883, Method 3015; Exceeds 200 V Using Machine Model (C = 200 pF, R = 0)
- Output Swing Includes Both Supply Rails
- Extended Common-Mode Input Voltage Range . . . 0 V to 4.25 V (Min) at 5-V Single Supply
- No Phase Inversion
- Low Noise . . . 16 nV/√Hz Typ at f = 1 kHz
- Low Input Offset Voltage
950 μV Max at T_A = 25°C (TLV244xA)
- Low Input Bias Current . . . 1 pA Typ
- 600-Ω Output Drive
- High-Gain Bandwidth . . . 1.8 MHz Typ
- Low Supply Current . . . 750 μA Per Channel Typ
- Macromodel Included

† Contact factory for details. Q100 qualification data available on request.

description

The TLV244x and TLV244xA are low-voltage operational amplifiers from Texas Instruments. The common-mode input voltage range of these devices has been extended over typical standard CMOS amplifiers, making them suitable for a wide range of applications. In addition, these devices do not phase invert when the common-mode input is driven to the supply rails. This satisfies most design requirements without paying a premium for rail-to-rail input performance. They also exhibit rail-to-rail output performance for increased dynamic range in single- or split-supply applications. This family is fully characterized at 3-V and 5-V supplies and is optimized for low-voltage operation. Both devices offer comparable ac performance while having lower noise, input offset voltage, and power dissipation than existing CMOS operational amplifiers. The TLV244x has increased output drive over previous rail-to-rail operational amplifiers and can drive 600-Ω loads for telecommunications applications.

The other members in the TLV244x family are the low-power, TLV243x, and micro-power, TLV2422, versions.

The TLV244x, exhibiting high input impedance and low noise, is excellent for small-signal conditioning for high-impedance sources, such as piezoelectric transducers. Because of the micropower dissipation levels and low-voltage operation, these devices work well in hand-held monitoring and remote-sensing applications. In addition, the rail-to-rail output feature with single- or split-supplies makes this family a great choice when interfacing with analog-to-digital converters (ADCs). For precision applications, the TLV244xA is available with a maximum input offset voltage of 950 μV.

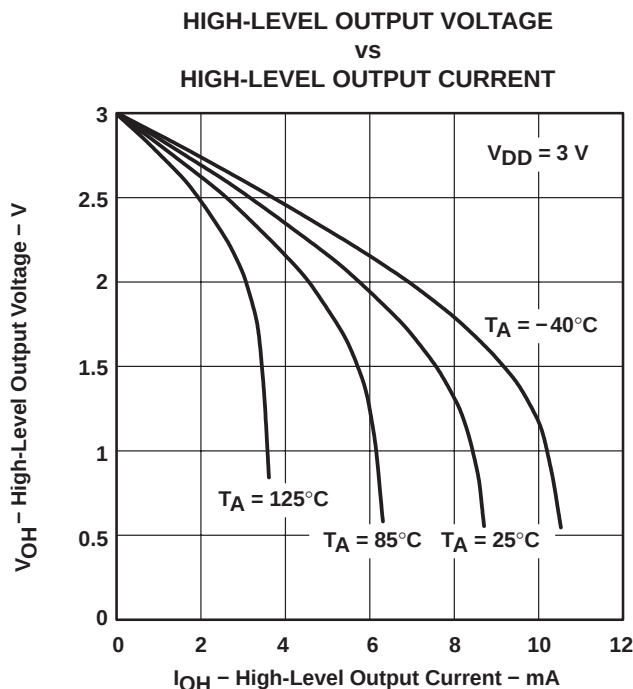


Figure 1



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

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description (continued)

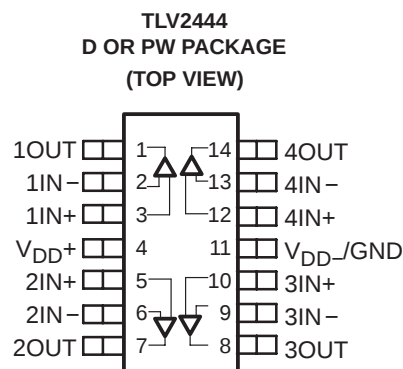
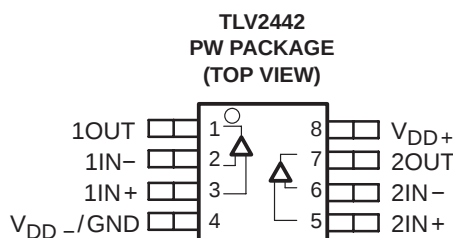
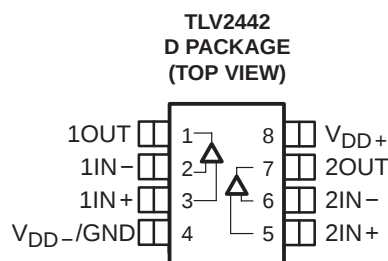
If the design requires single operational amplifiers, see the TI TLV2211/21/31. This is a family of rail-to-rail output operational amplifiers in the SOT-23 package. Their small size and low power consumption make them ideal for high density, battery-powered equipment.

ORDERING INFORMATION†

T _A	V _{IO} max AT 25°C	PACKAGE		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 125°C	950 µV	SOIC (D)	Tape and reel	TLV2442AQDRQ1	2442AQ
		TSSOP (PW)	Tape and reel	TLV2442AQPWRQ1	2442AQ
	2.5 mV	SOIC (D)	Tape and reel	TLV2442QDRQ1	2442Q1
		TSSOP (PW)	Tape and reel	TLV2442QPWRQ1	2442Q1
–40°C to 125°C	950 µV	SOIC (D)	Tape and reel	TLV2444AQDRQ1‡	
		TSSOP (PW)	Tape and reel	TLV2444AQPWRQ1‡	
	2.5 mV	SOIC (D)	Tape and reel	TLV2444QDRQ1‡	
		TSSOP (PW)	Tape and reel	TLV2444QPWRQ1‡	

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

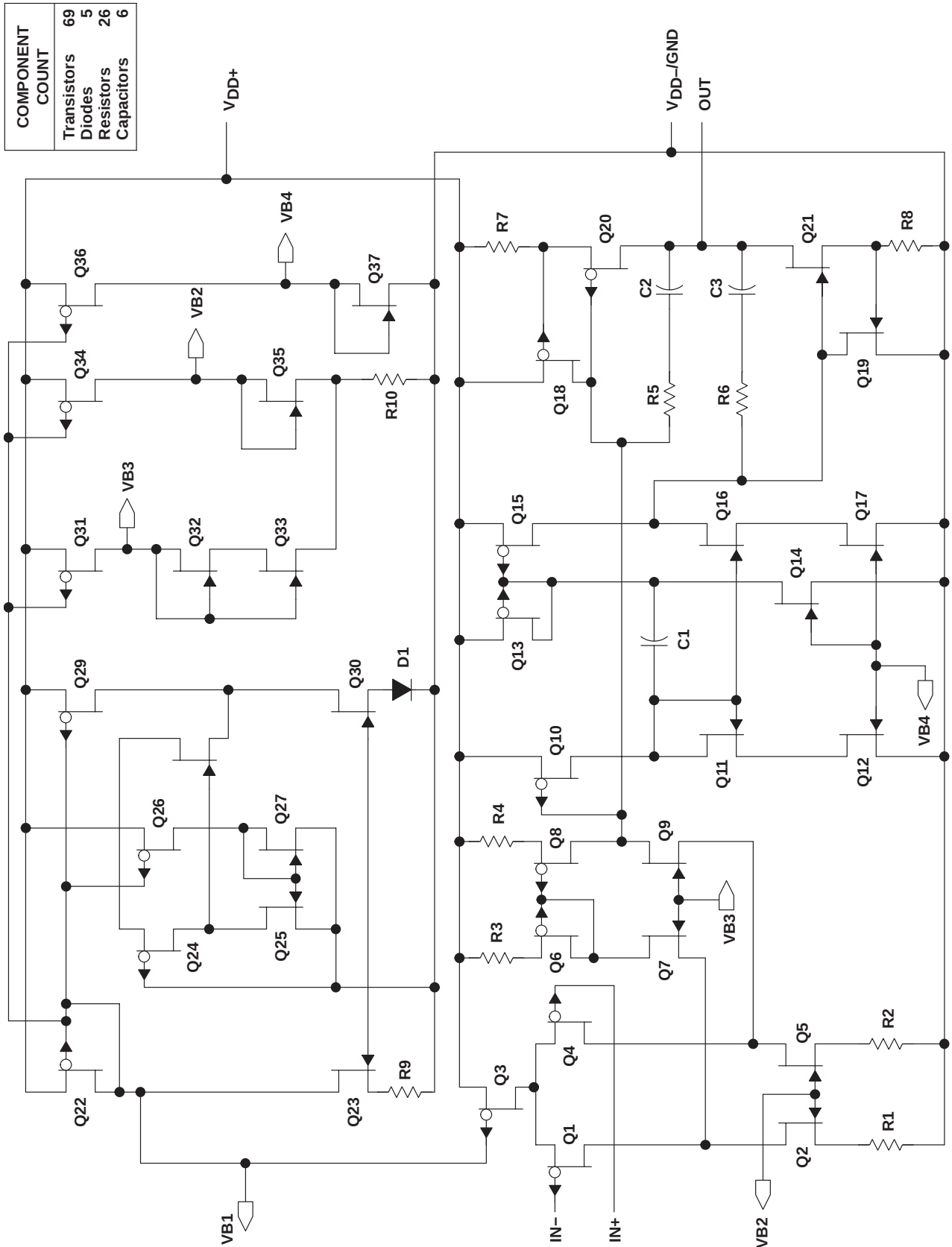
‡ Product Preview.



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equivalent schematic (each amplifier)



COMPONENT COUNT	
Transistors	69
Diodes	5
Resistors	26
Capacitors	6

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absolute maximum ratings over operating free-air temperature range (unless otherwise noted)[†]

Supply voltage, V_{DD} (see Note 1)	12 V
Differential input voltage, V_{ID} (see Note 2)	$\pm V_{DD}$
Input voltage, V_I (any input, see Note 1)	-0.3 V to V_{DD}
Input current, I_I (any input)	± 5 mA
Output current, I_O	± 50 mA
Total current into V_{DD+}	± 50 mA
Total current out of V_{DD-}	± 50 mA
Duration of short-circuit current at (or below) 25°C (see Note 3)	unlimited
Continuous total dissipation	See Dissipation Rating Table
Operating free-air temperature range, T_A : Q suffix	-40°C to 125°C
Storage temperature range, T_{stg}	-65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C

[†] Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES: 1. All voltage values, except differential voltages, are with respect to the midpoint between V_{DD+} and V_{DD-} .
2. Differential voltages are at $IN+$ with respect to $IN-$. Excessive current will flow if input is brought below $V_{DD-} - 0.3$ V.
3. The output may be shorted to either supply. Temperature and/or supply voltages must be limited to ensure that the maximum dissipation rating is not exceeded.

DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25^\circ\text{C}$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25^\circ\text{C}$	$T_A = 70^\circ\text{C}$ POWER RATING	$T_A = 85^\circ\text{C}$ POWER RATING	$T_A = 125^\circ\text{C}$ POWER RATING
D (8)	725 mW	5.8 mW/°C	464 mW	377 mW	145 mW
D (14)	1022 mW	7.6 mW/°C	900 mW	777 mW	450 mW
PW (8)	525 mW	4.2 mW/°C	336 mW	273 mW	105 mW
PW (14)	720 mW	5.6 mW/°C	634 mW	547 mW	317 mW

recommended operating conditions

	MIN	MAX	UNIT
Supply voltage, V_{DD}	2.7	10	V
Input voltage range, V_I	V_{DD-}	$V_{DD+} - 1$	V
Common-mode input voltage, V_{IC}	V_{DD-}	$V_{DD+} - 1$	V
Operating free-air temperature, T_A	-40	125	°C



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electrical characteristics at specified free-air temperature, $V_{DD} = 3\text{ V}$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS		$T_A^\dagger$	TLV2442-Q1			UNIT
				MIN	TYP	MAX	
V_{IO} Input offset voltage	$V_{IC} = 1.5\text{ V}$, $V_O = 1.5\text{ V}$, $R_S = 50\ \Omega$	TLV244x	25°C	300	2000		μV
			Full range		2500		
		TLV244xA	25°C	300	950		
			Full range		1600		
α_{VIO} Temperature coefficient of input offset voltage			25°C to 85°C	2			$\mu\text{V}/^\circ\text{C}$
Input offset voltage long-term drift (see Note 4)			25°C	0.002			$\mu\text{V}/\text{mo}$
I_{IO} Input offset current			25°C	0.5			pA
			Full range		150		
I_{IB} Input bias current			25°C	1			pA
			Full range		260		
V_{ICR} Common-mode input voltage range	$ V_{IO} \leq 8\text{ mV}$, $R_S = 50\ \Omega$	25°C	0 to 2.25	-0.25 to 2.5			V
		Full range	0.2 to 2				
V_{OH} High-level output voltage	$I_O = -100\ \mu\text{A}$	25°C	2.98				V
	$I_O = -3\text{ mA}$	25°C	2.5				
		Full range	2.25				
V_{OL} Low-level output voltage	$V_{IC} = 1.5\text{ V}$, $I_O = 100\ \mu\text{A}$	25°C	0.02				V
	$V_{IC} = 1.5\text{ V}$, $I_O = 3\text{ mA}$	25°C	0.63				
		Full range	1				
A_{VD} Large-signal differential voltage amplification	$V_O = 1\text{ V to } 2\text{ V}$	$R_L = 600\ \Omega$	25°C	0.7	1		V/mV
			Full range	0.4			
		$R_L = 1\text{ M}\Omega$	25°C	750			
r_{id} Differential input resistance		25°C	1000				$\text{G}\Omega$
r_i Common-mode input resistance		25°C	1000				$\text{G}\Omega$
c_i Common-mode input capacitance	$f = 10\text{ kHz}$	25°C	8				pF
z_o Closed-loop output impedance	$f = 1\text{ MHz}$, $A_V = 10$	25°C	130				Ω
CMRR Common-mode rejection ratio	$V_{IC} = V_{ICR\text{ MIN}}$, $V_O = V_{DD}/2$, $R_S = 50\ \Omega$	25°C	65	75			dB
		Full range	50				
k_{SVR} Supply-voltage rejection ratio ($\Delta V_{DD} \pm / \Delta V_{IO}$)	$V_{DD} = 2.7\text{ V to } 8\text{ V}$, $V_{IC} = V_{DD}/2$, No load	25°C	80	95			dB
		Full range	80				
I_{DD} Supply current (per channel)	$V_O = 1.5\text{ V}$, No load	25°C	725	1100			μA
		Full range		1100			

† Full range for the Q suffix is -40°C to 125°C .

NOTE 4: Typical values are based on the input offset voltage shift observed through 168 hours of operating life test at $T_A = 150^\circ\text{C}$ extrapolated to $T_A = 25^\circ\text{C}$ using the Arrhenius equation and assuming an activation energy of 0.96 eV.

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operating characteristics at specified free-air temperature, $V_{DD} = 3\text{ V}$

PARAMETER		TEST CONDITIONS		T _A [†]	TLV244x-Q1			UNIT
					MIN	TYP	MAX	
SR	Slew rate at unity gain	V _O = 1 V to 2 V, R _L = 600 Ω, C _L = 100 pF		25°C	0.65	1.3	V/μs	
				Full range	0.4			
V _n	Equivalent input noise voltage	f = 10 Hz		25°C	170		nV/√Hz	
		f = 1 kHz		25°C	18			
V _{N(PP)}	Peak-to-peak equivalent input noise voltage	f = 0.1 Hz to 1 Hz		25°C	2.6		μV	
		f = 0.1 Hz to 10 Hz		25°C	5.1			
I _n	Equivalent input noise current			25°C	0.6		fA/√Hz	
THD + N	Total harmonic distortion plus noise	V _O = 0.5 V to 2.5 V, R _L = 600 Ω, f = 1 kHz	A _V = 1	25°C	0.08%			
			A _V = 10		0.3%			
			A _V = 100		2%			
Gain-bandwidth product		f = 10 kHz, R _L = 600 Ω, C _L = 100 pF		25°C	1.75		MHz	
B _{OM}	Maximum output-swing bandwidth	V _{O(PP)} = 1 V, A _V = 1, R _L = 600 Ω, C _L = 100 pF		25°C	0.9		MHz	
t _S	Settling time	A _V = −1, Step = −2.3 V to 2.3 V, R _L = 600 Ω, C _L = 100 pF	To 0.1%	25°C	1.5		μs	
			To 0.01%		3.2			
φ _m	Phase margin at unity gain	R _L = 600 Ω, C _L = 100 pF		25°C	65°			
Gain margin				25°C	9		dB	

[†] Full range for the Q suffix is -40°C to 125°C .

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electrical characteristics at specified free-air temperature, $V_{DD} = 5\text{ V}$ (unless otherwise noted)

PARAMETER		TEST CONDITIONS		T _A [†]	TLV244x-Q1			UNIT
					MIN	TYP	MAX	
V _{IO}	Input offset voltage		TLV244x	25°C	300	2000	μV	
				Full range	2500			
			TLV244xA	25°C	300	950		
				Full range	1600			
αV _{IO}	Temperature coefficient of input offset voltage	V _{DD±} = ±2.5 V, V _O = 0, V _{IC} = 0, R _S = 50 Ω		25°C to 85°C	2		μV/°C	
	Input offset voltage long-term drift (see Note 4)			25°C	0.002		μV/mo	
I _{IO}	Input offset current			25°C	0.5		pA	
				Full range	150			
I _{IB}	Input bias current			25°C	1		pA	
				Full range	260			
V _{ICR}	Common-mode input voltage range	V _{IO} ≤ 5 mV, R _S = 50 Ω		25°C	0 to 4.25, -0.25 to 4.5		V	
				Full range	0 to 4			
V _{OH}	High-level output voltage	I _{OH} = −100 μA		25°C	4.97		V	
		I _{OH} = −5 mA		25°C	4	4.35		
				Full range	4			
V _{OL}	Low-level output voltage	V _{IC} = 2.5 V, I _{OL} = 100 μA		25°C	0.01		V	
		V _{IC} = 2.5 V, I _{OL} = 5 mA		25°C	0.8			
				Full range	1.25			
A _{VD}	Large-signal differential voltage amplification	V _{IC} = 2.5 V, V _O = 1 V to 4 V	R _L = 600 Ω [‡]		25°C	0.9	1.3	V/mV
					Full range	0.5		
			R _L = 1 MΩ [‡]		25°C	950		
r _{id}	Differential input resistance			25°C	1000		GΩ	
r _i	Common-mode input resistance			25°C	1000		GΩ	
c _i	Common-mode input capacitance	f = 10 kHz		25°C	8		pF	
z _O	Closed-loop output impedance	f = 1 MHz, A _V = 10		25°C	140		Ω	
CMRR	Common-mode rejection ratio	V _{IC} = V _{ICR} MIN, V _O = V _{DD} /2, R _S = 50 Ω		25°C	70	75	dB	
				Full range	70			
k _{SVR}	Supply-voltage rejection ratio (ΔV _{DD} /ΔV _{IO})	V _{DD} = 4.4 V to 8 V, V _{IC} = V _{DD} /2, No load		25°C	80	95	dB	
				Full range	80			
I _{DD}	Supply current (per channel)	V _O = 2.5 V, No load		25°C	750	1100	μA	
				Full range	1100			

† Full range for the Q suffix is -40°C to 125°C .

‡ Referenced to 2.5 V

NOTE 4: Typical values are based on the input offset voltage shift observed through 168 hours of operating life test at $T_A = 150^\circ\text{C}$ extrapolated to $T_A = 25^\circ\text{C}$ using the Arrhenius equation and assuming an activation energy of 0.96 eV.

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operating characteristics at specified free-air temperature, $V_{DD} = 5\text{ V}$

PARAMETER		TEST CONDITIONS		T _A [†]	TLV244x-Q1			UNIT
					MIN	TYP	MAX	
SR	Slew rate at unity gain	V _O = 0.5 V to 2.5 V, R _L = 600 Ω [‡] , C _L = 100 pF [‡]		25°C	0.75	1.4	V/μs	
				Full range	0.5			
V _n	Equivalent input noise voltage	f = 10 Hz		25°C	130		nV/√Hz	
		f = 1 kHz		25°C	16			
V _{N(PP)}	Peak-to-peak equivalent input noise voltage	f = 0.1 Hz to 1 Hz		25°C	1.8		μV	
		f = 0.1 Hz to 10 Hz		25°C	3.6			
I _n	Equivalent input noise current			25°C	0.6		fA/√Hz	
THD + N	Total harmonic distortion plus noise	V _O = 1.5 V to 3.5 V, f = 1 kHz, R _L = 600 Ω [‡]	A _V = 1	25°C	0.017%			
			A _V = 10		0.17%			
			A _V = 100		1.5%			
Gain-bandwidth product		f =10 kHz, R _L = 600 Ω [‡] , C _L = 100 pF [‡]		25°C	1.81		MHz	
B _{OM}	Maximum output-swing bandwidth	V _{O(PP)} = 2 V, A _V = 1, R _L = 600 Ω [‡] , C _L = 100 pF [‡]		25°C	0.5		MHz	
t _s	Settling time	A _V = −1, Step = 0.5 V to 2.5 V, R _L = 600 Ω [‡] , C _L = 100 pF [‡]	To 0.1%	25°C	1.5		μs	
			To 0.01%		2.6			
φ _m	Phase margin at unity gain	R _L = 600 Ω [‡] , C _L = 100 pF [‡]		25°C	68°			
	Gain margin			25°C	8		dB	

† Full range for the Q suffix is $-40^\circ\text{C to }125^\circ\text{C}$.

‡ Referenced to 2.5 V

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TYPICAL CHARACTERISTICS

Table of Graphs[†]

			FIGURE
V_{IO}	Input offset voltage	Distribution vs Common-mode input voltage	2, 3 4, 5
α_{VIO}	Input offset voltage temperature coefficient	Distribution	6, 7
I_{IB}/I_{IO}	Input bias and input offset currents	vs Free-air temperature	8
V_{OH}	High-level output voltage	vs High-level output current	9, 10
V_{OL}	Low-level output voltage	vs Low-level output current	11, 12
$V_{O(PP)}$	Maximum peak-to-peak output voltage	vs Frequency	13
I_{OS}	Short-circuit output current	vs Supply voltage vs Free-air temperature	14 15
V_O	Output voltage	vs Differential Input voltage	16, 17
A_{VD}	Differential voltage amplification	vs Load resistance	18
A_{VD}	Large-signal differential voltage amplification and phase margin	vs Frequency	19, 20
	Large-signal differential voltage amplification	vs Free-air temperature	21, 22
z_o	Output impedance	vs Frequency	23, 24
CMRR	Common-mode rejection ratio	vs Frequency	25
		vs Free-air temperature	26
k_{SVR}	Supply-voltage rejection ratio	vs Frequency	27, 28
		vs Free-air temperature	29
I_{DD}	Supply current	vs Supply voltage	30
SR	Slew rate	vs Load capacitance	31
		vs Free-air temperature	32
V_O	Inverting large-signal pulse response		33, 34
	Voltage-follower large-signal pulse response		35, 36
	Inverting small-signal pulse response		37, 38
	Voltage-follower small-signal pulse response		39, 40
V_n	Equivalent input noise voltage	vs Frequency	41, 42
	Noise voltage	Over a 10-second period	43
THD + N	Total harmonic distortion plus noise	vs Frequency	44, 45
	Gain-bandwidth product	vs Free-air temperature	46
		vs Supply voltage	47
ϕ_m	Phase margin	vs Frequency vs Load capacitance	19, 20 48
	Gain margin	vs Load capacitance	49
B_1	Unity-gain bandwidth	vs Load capacitance	50

[†] For all graphs where $V_{DD} = 5$ V, all loads are referenced to 2.5 V.

TYPICAL CHARACTERISTICS

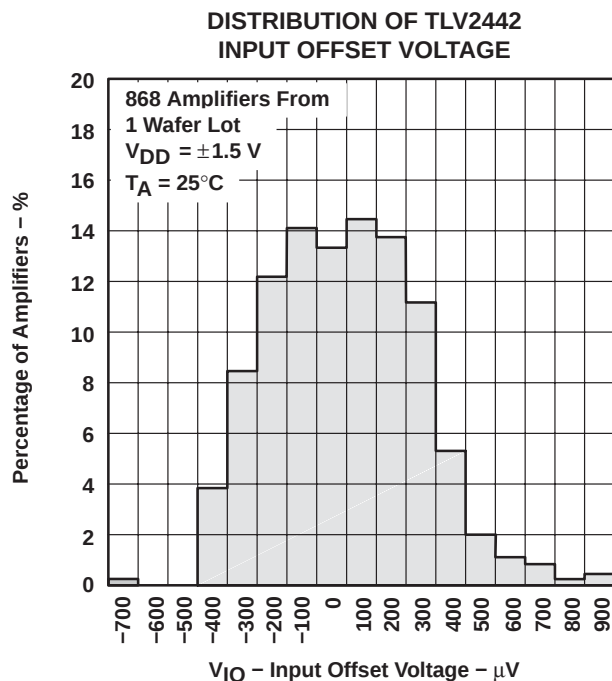


Figure 2

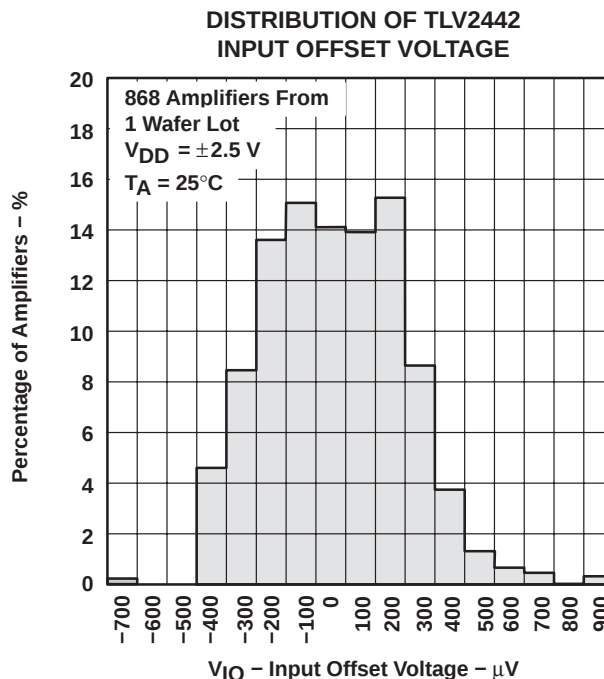


Figure 3

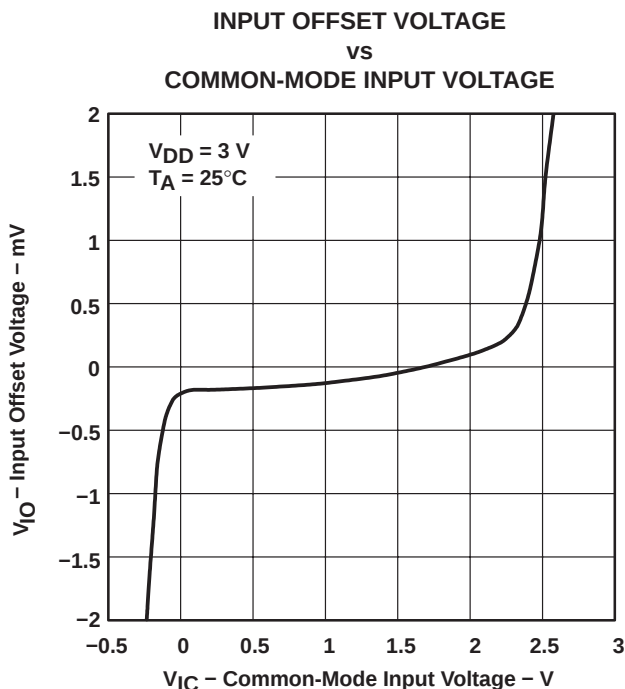


Figure 4

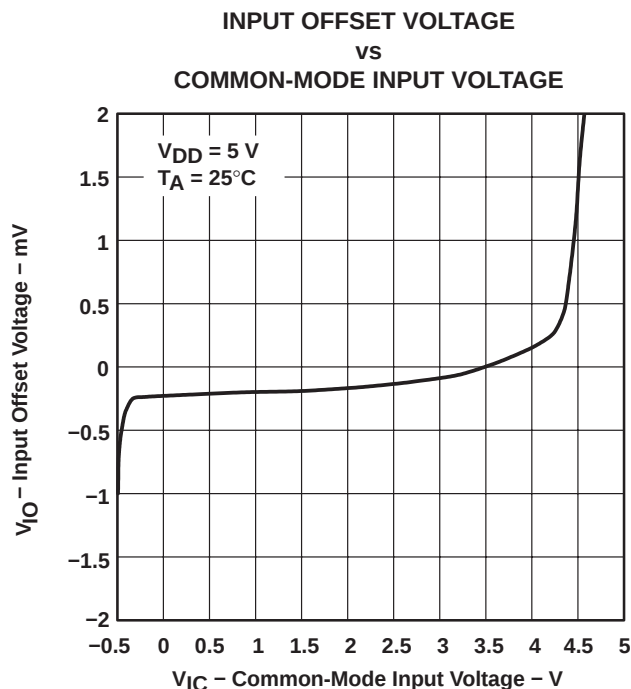


Figure 5

TLV2442-Q1, TLV2442A-Q1, TLV2444-Q1, TLV2444A-Q1

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TYPICAL CHARACTERISTICS

DISTRIBUTION OF TLV2442 INPUT OFFSET VOLTAGE TEMPERATURE COEFFICIENT

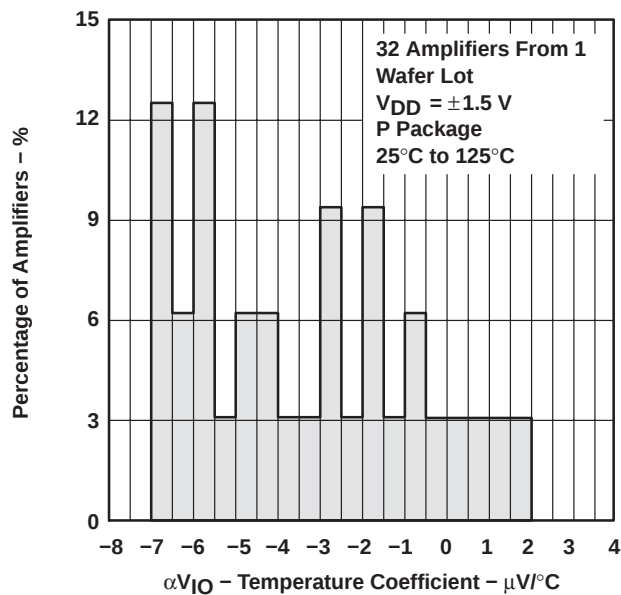


Figure 6

DISTRIBUTION OF TLV2442 INPUT OFFSET VOLTAGE TEMPERATURE COEFFICIENT

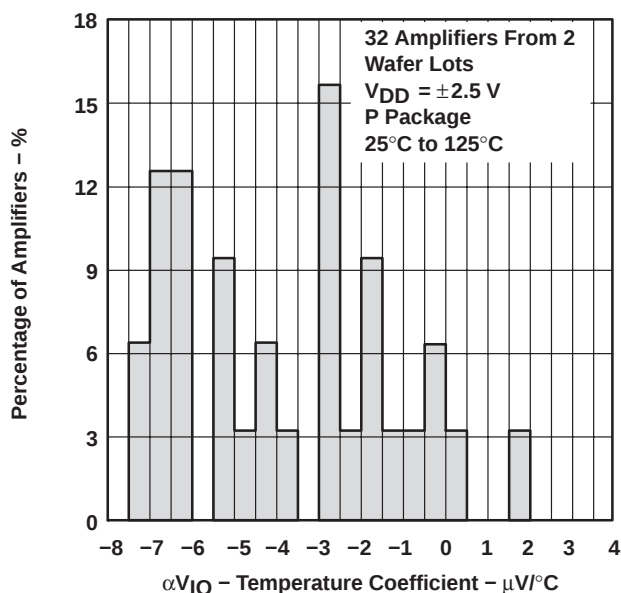


Figure 7

INPUT BIAS AND INPUT OFFSET CURRENTS
 VS
 FREE-AIR TEMPERATURE

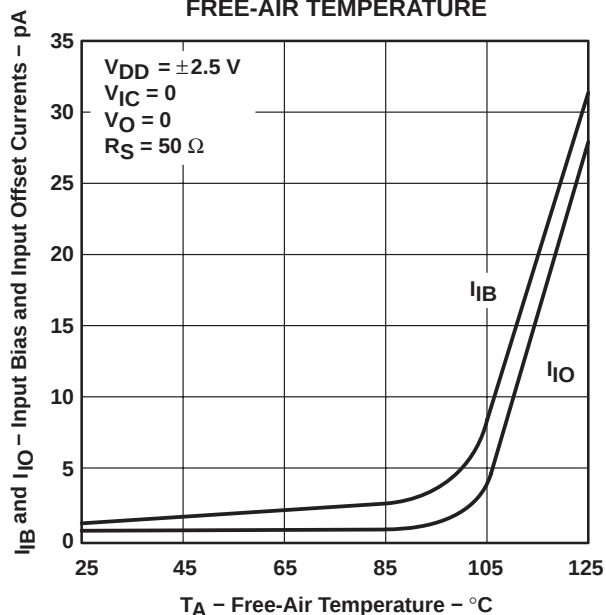


Figure 8

HIGH-LEVEL OUTPUT VOLTAGE
 VS
 HIGH-LEVEL OUTPUT CURRENT

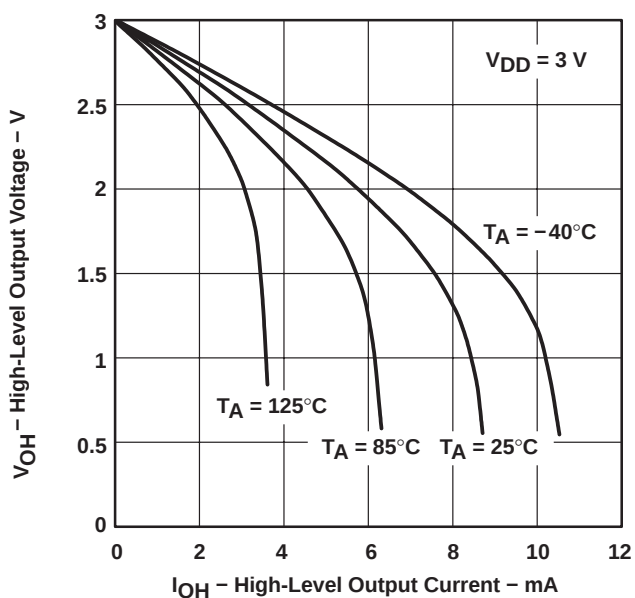


Figure 9

TYPICAL CHARACTERISTICS

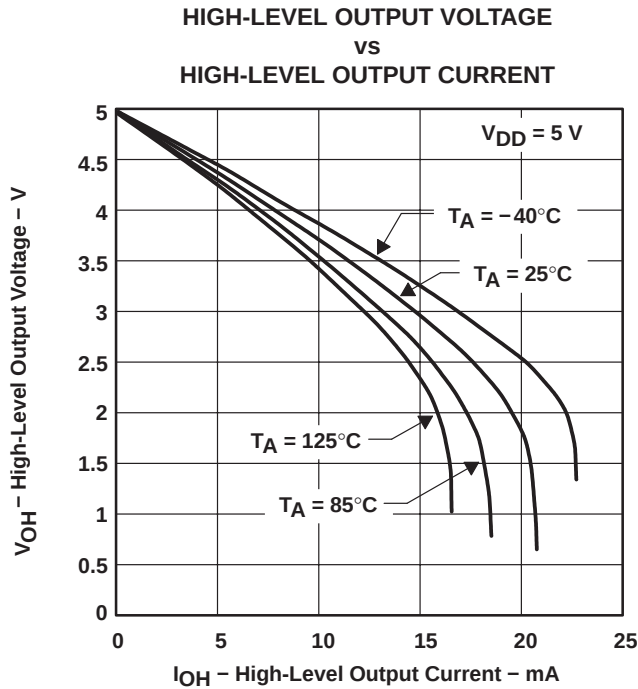


Figure 10

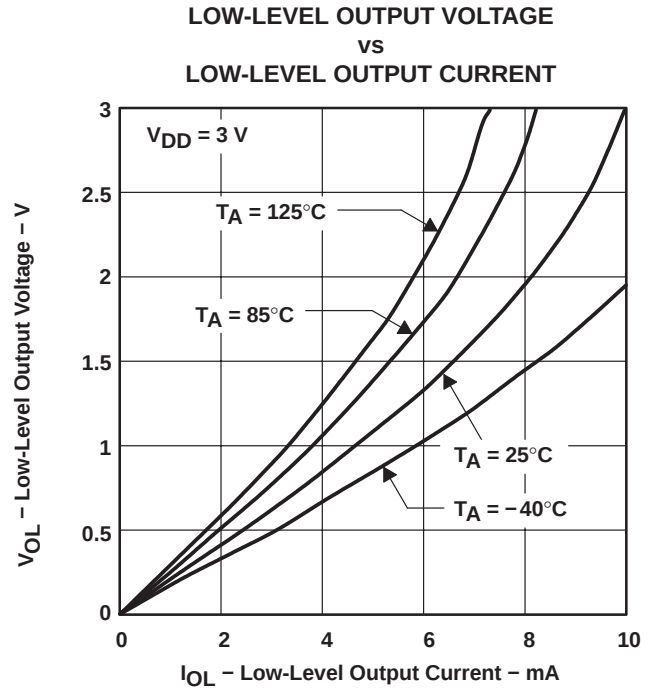


Figure 11

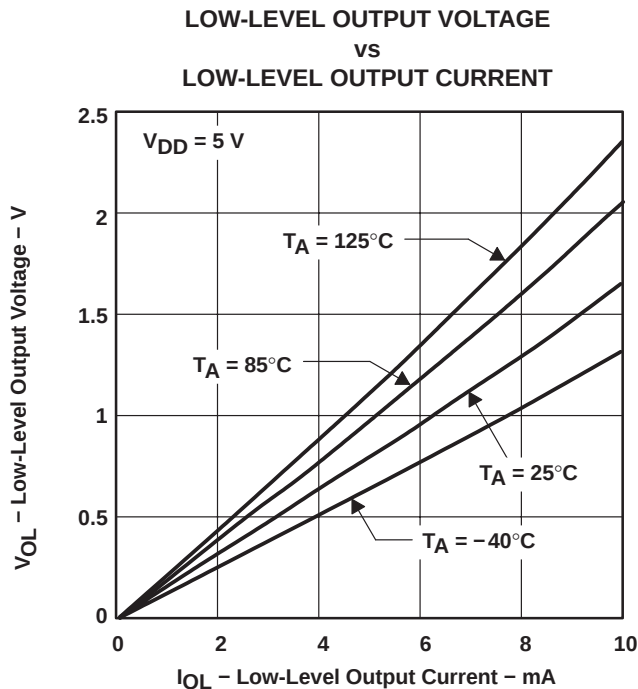


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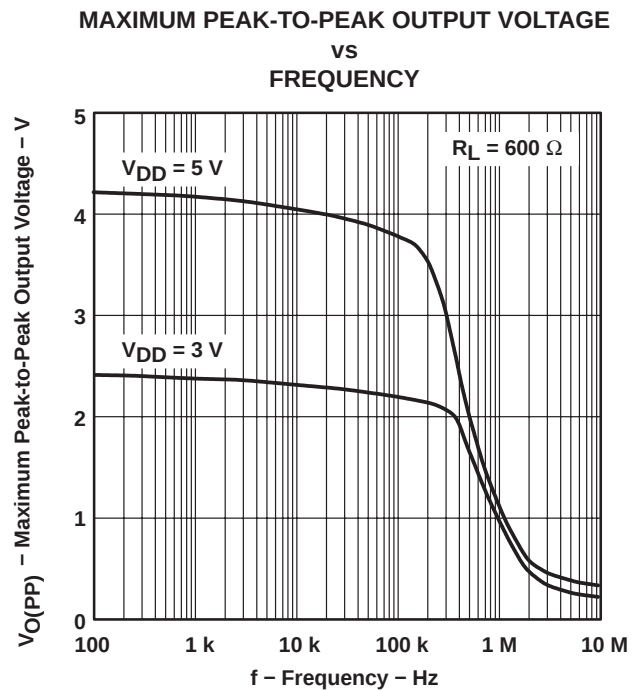


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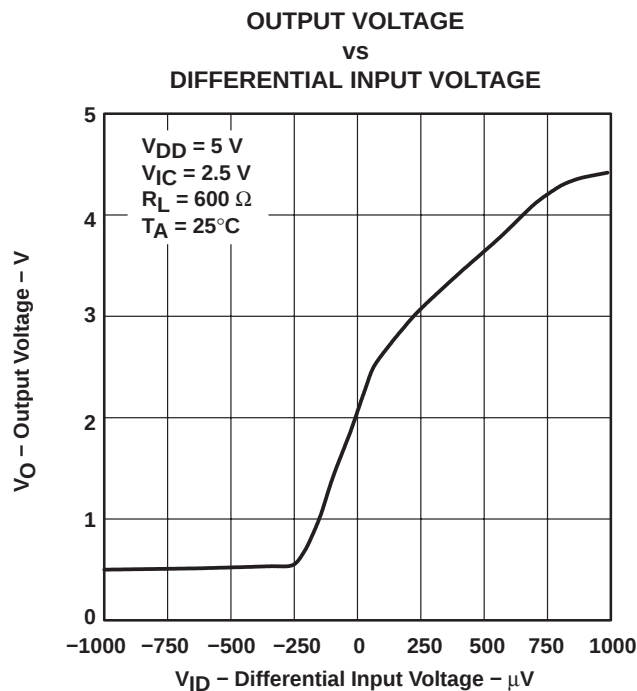
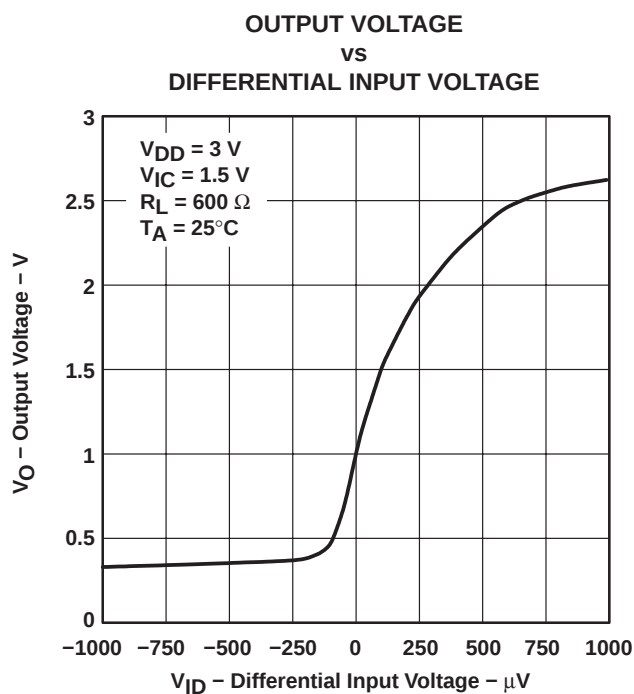
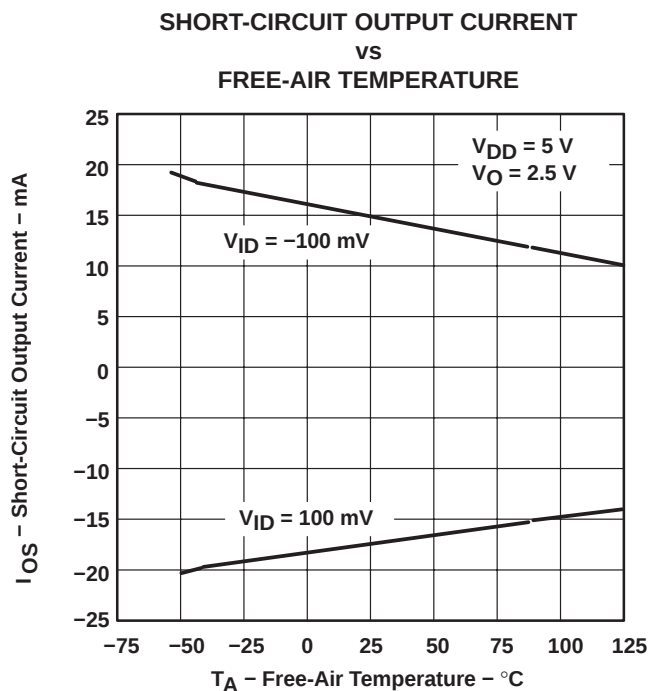
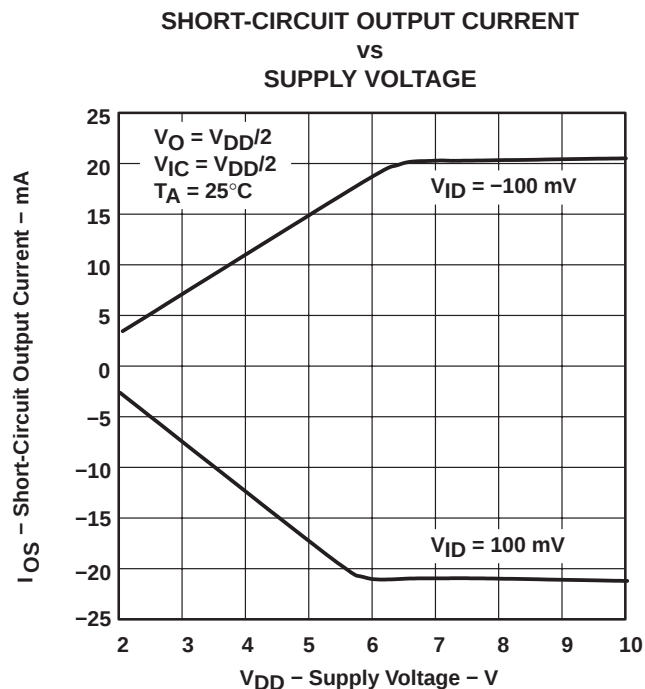
TLV2442-Q1, TLV2442A-Q1, TLV2444-Q1, TLV2444A-Q1

Advanced LinCMOS™ RAIL-TO-RAIL OUTPUT

WIDE-INPUT-VOLTAGE OPERATIONAL AMPLIFIERS

SGLS181 – SEPTEMBER 2003

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS

DIFFERENTIAL VOLTAGE AMPLIFICATION VS LOAD RESISTANCE

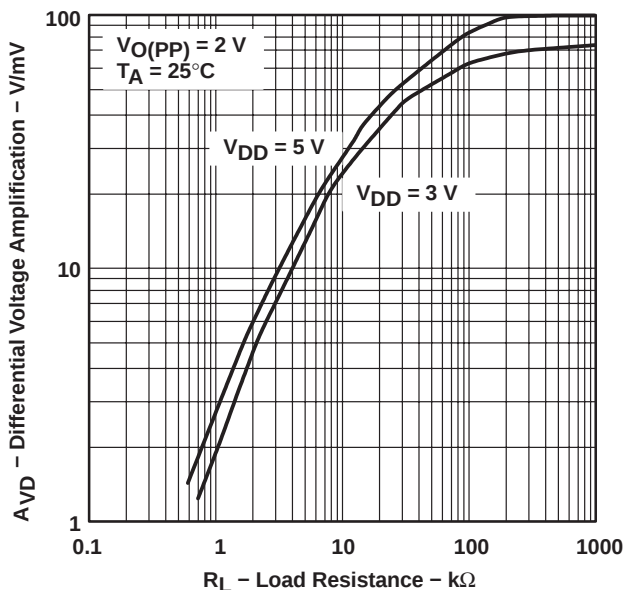


Figure 18

LARGE-SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION AND PHASE MARGIN VS FREQUENCY

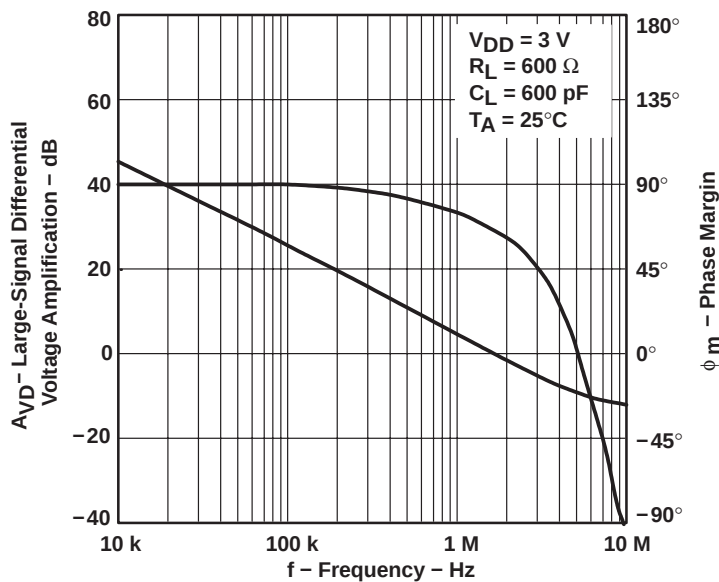


Figure 19

TLV2442-Q1, TLV2442A-Q1, TLV2444-Q1, TLV2444A-Q1

Advanced LinCMOS™ RAIL-TO-RAIL OUTPUT

WIDE-INPUT-VOLTAGE OPERATIONAL AMPLIFIERS

SGLS181 – SEPTEMBER 2003

TYPICAL CHARACTERISTICS

LARGE-SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION AND PHASE MARGIN

VS
FREQUENCY

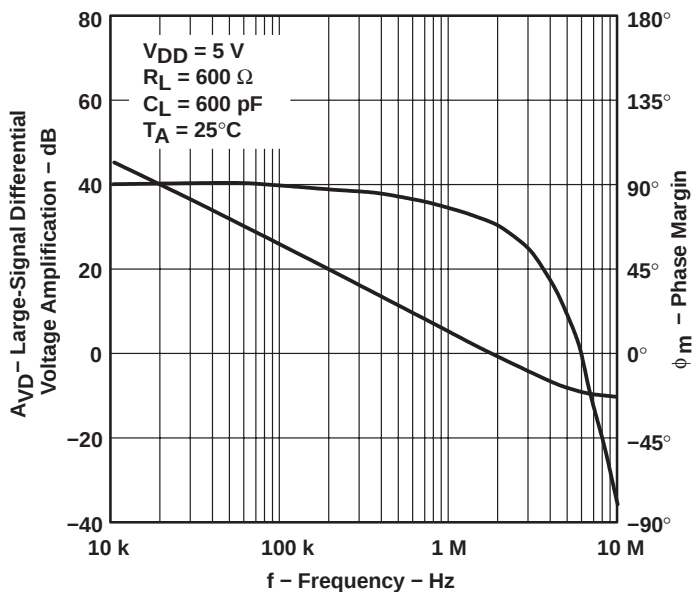


Figure 20

LARGE-SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION VS FREE-AIR TEMPERATURE

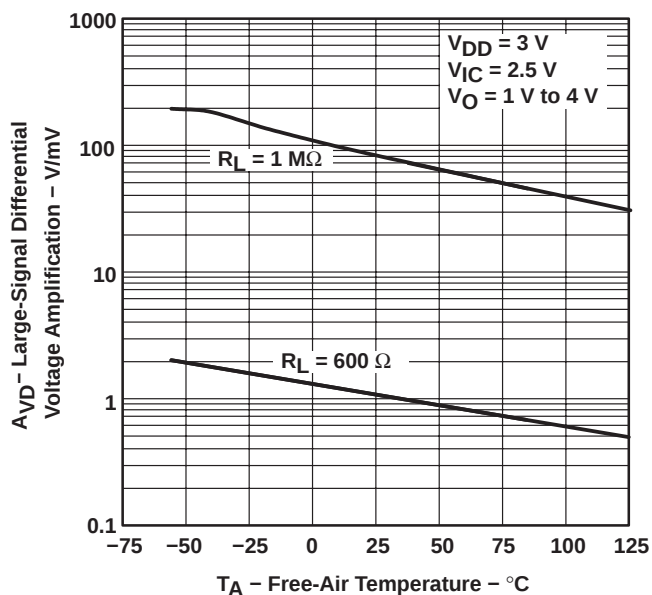


Figure 21

LARGE-SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION VS FREE-AIR TEMPERATURE

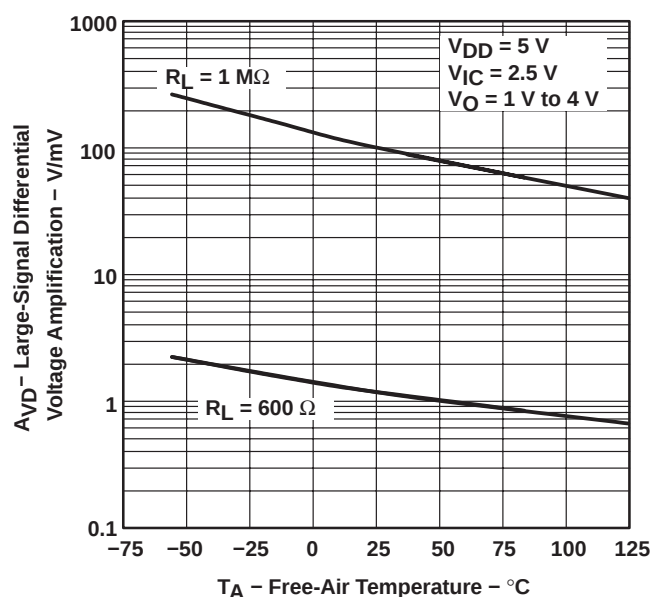


Figure 22



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TYPICAL CHARACTERISTICS

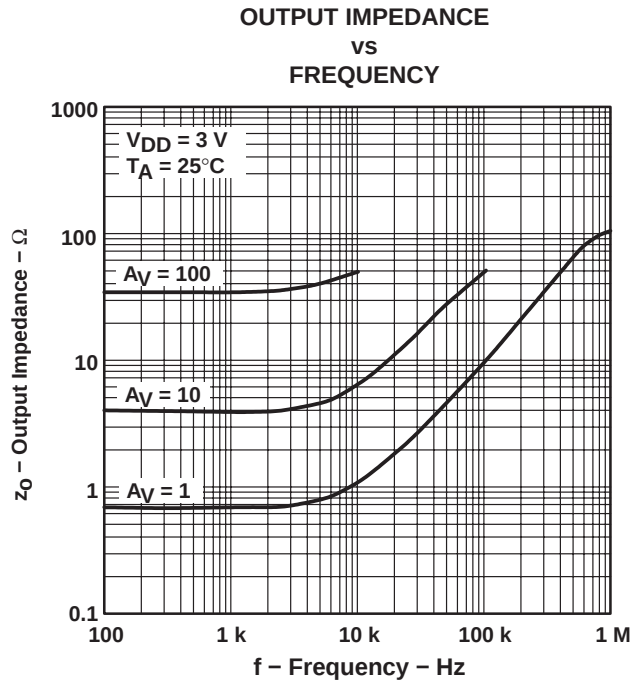


Figure 23

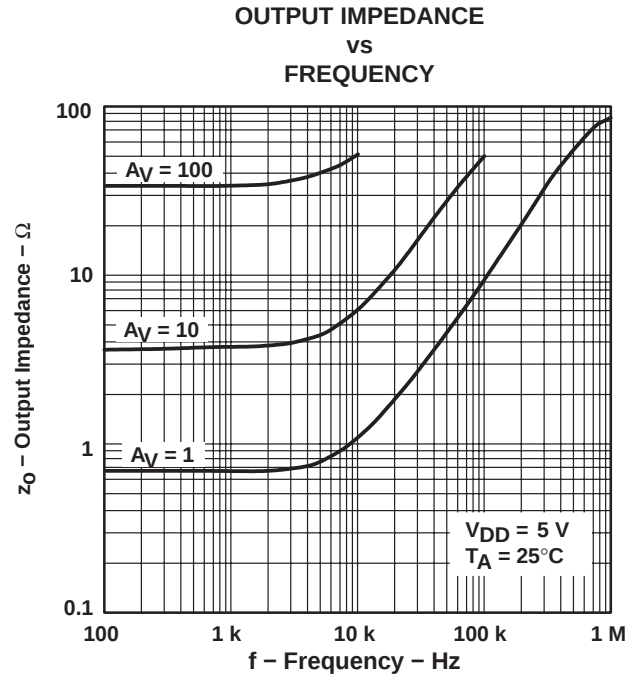


Figure 24

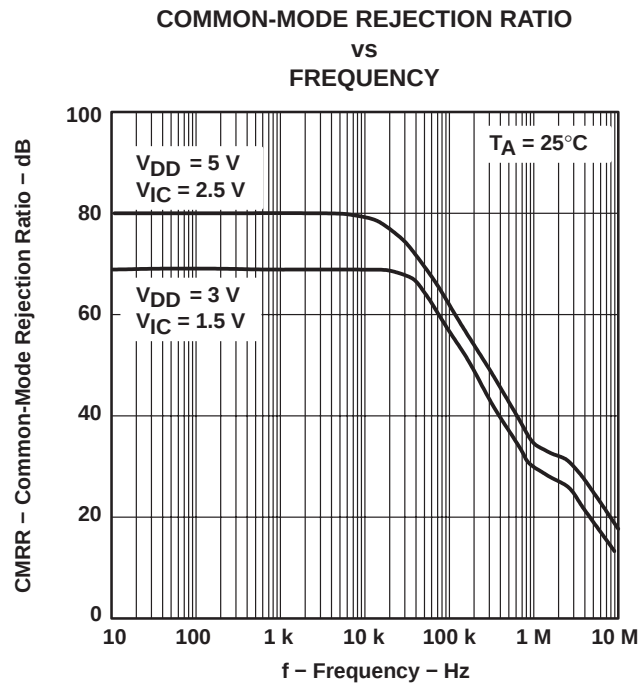


Figure 25

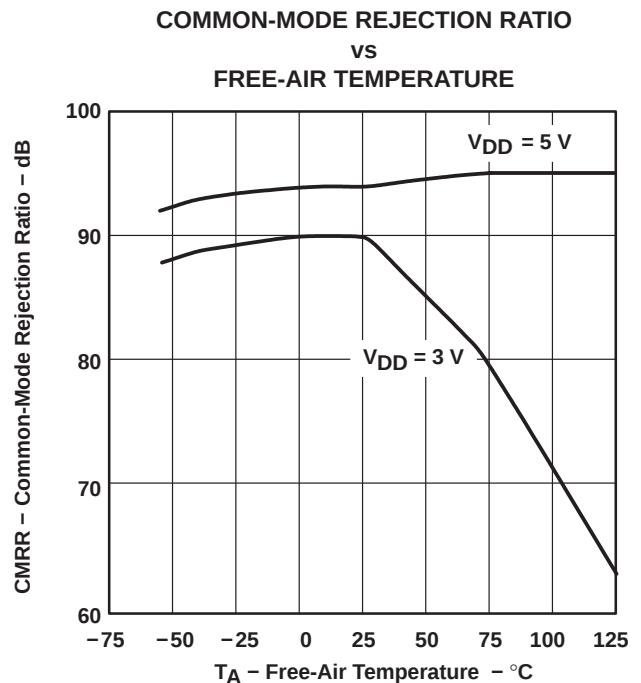


Figure 26

TYPICAL CHARACTERISTICS

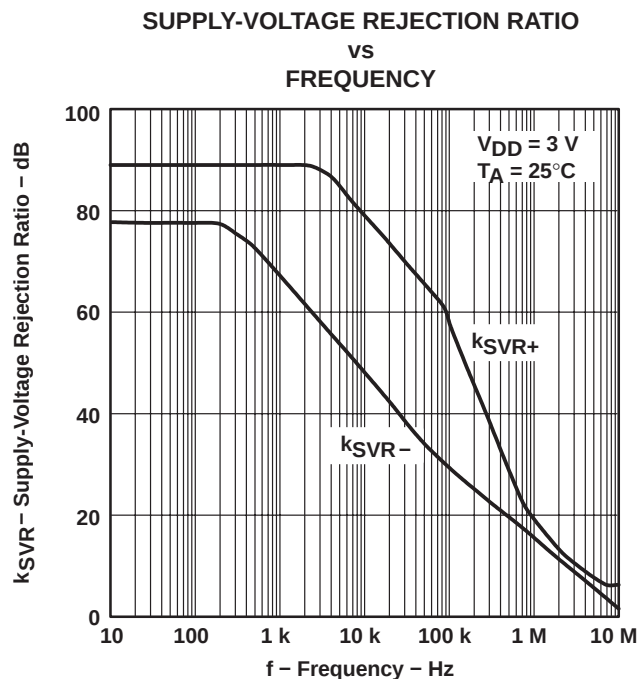


Figure 27

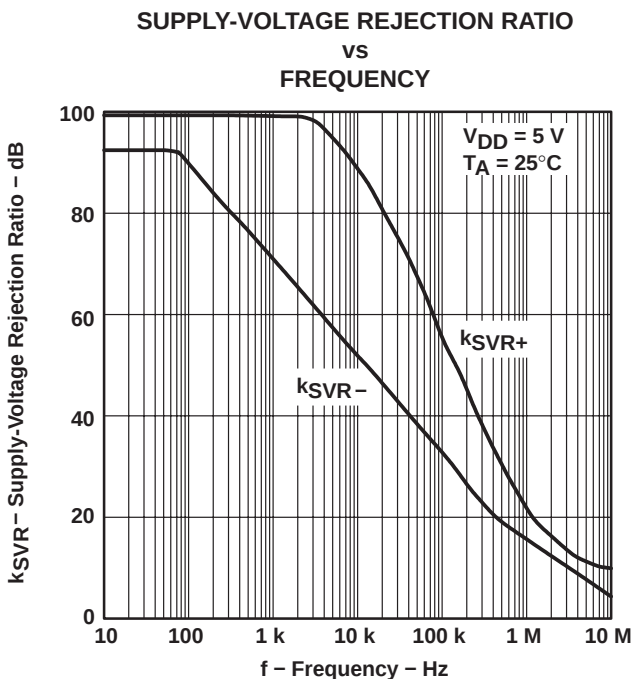


Figure 28

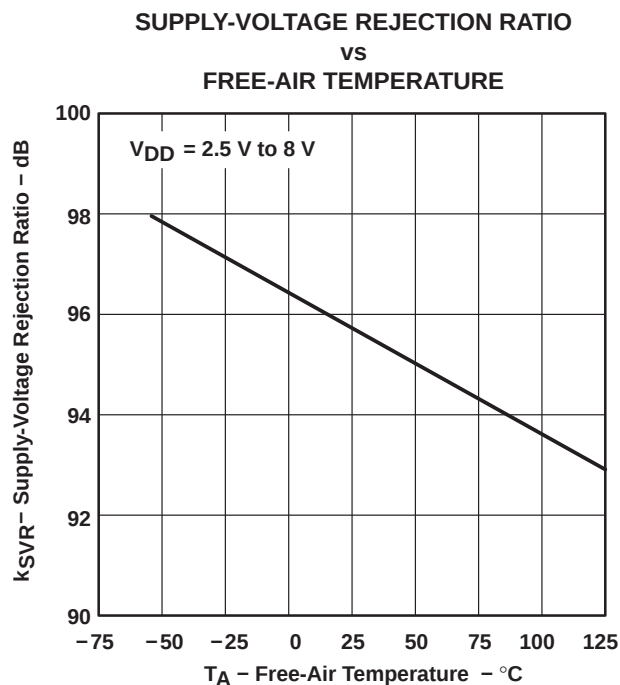


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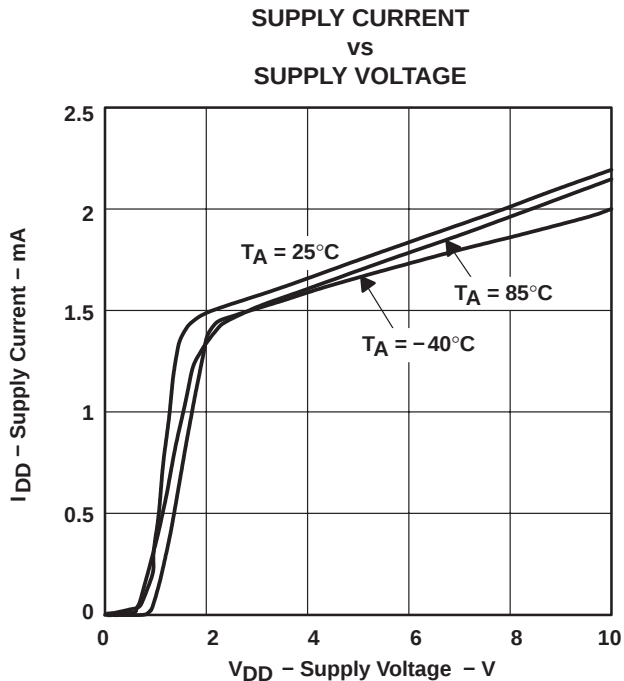


Figure 30

TYPICAL CHARACTERISTICS

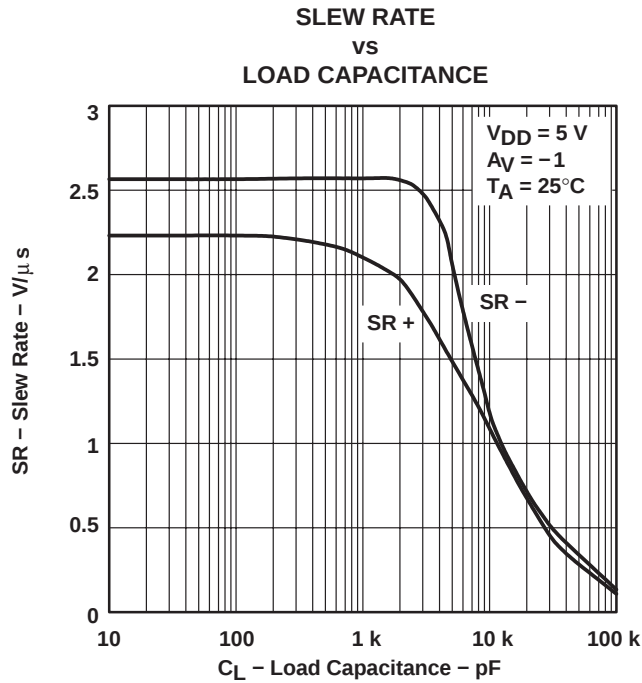


Figure 31

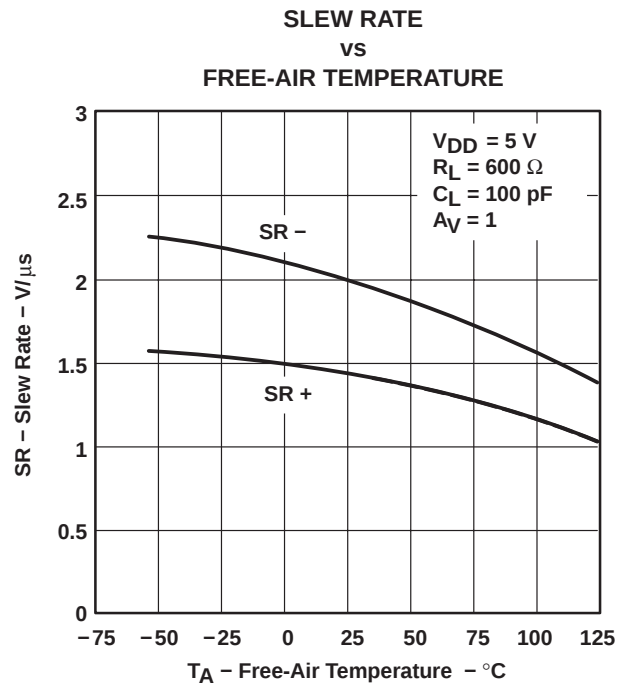


Figure 32

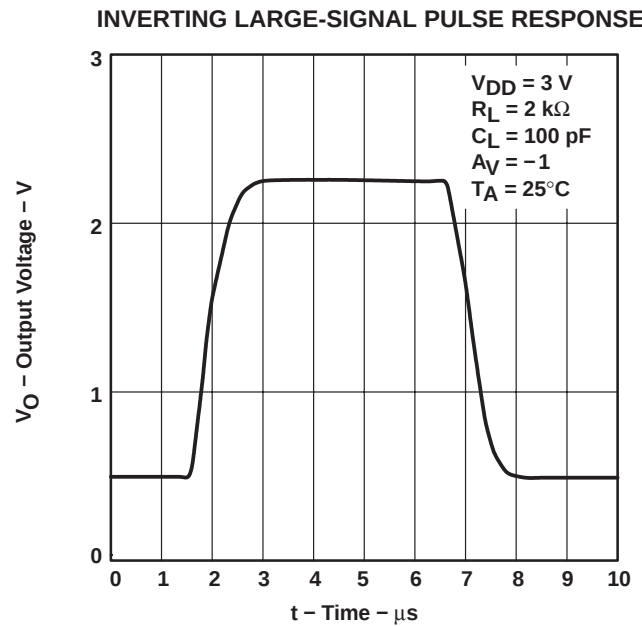


Figure 33

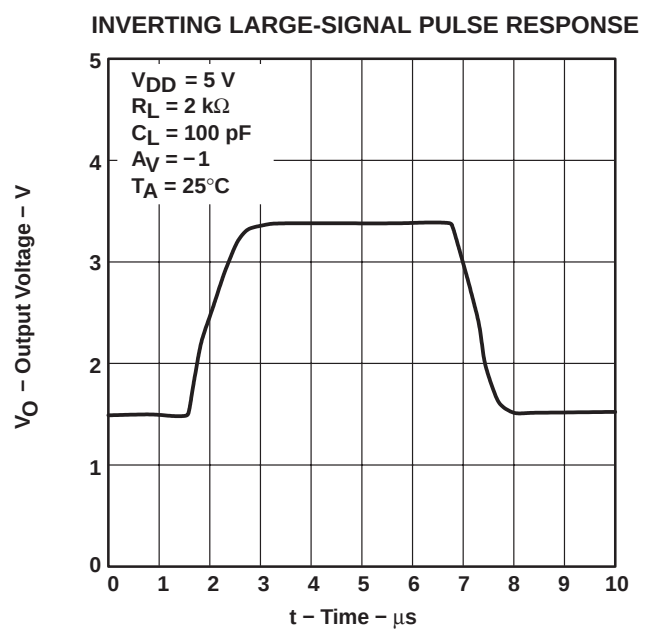


Figure 34

TLV2442-Q1, TLV2442A-Q1, TLV2444-Q1, TLV2444A-Q1

Advanced LinCMOS™ RAIL-TO-RAIL OUTPUT

WIDE-INPUT-VOLTAGE OPERATIONAL AMPLIFIERS

SGLS181 – SEPTEMBER 2003

TYPICAL CHARACTERISTICS

VOLTAGE-FOLLOWER
LARGE-SIGNAL PULSE RESPONSE

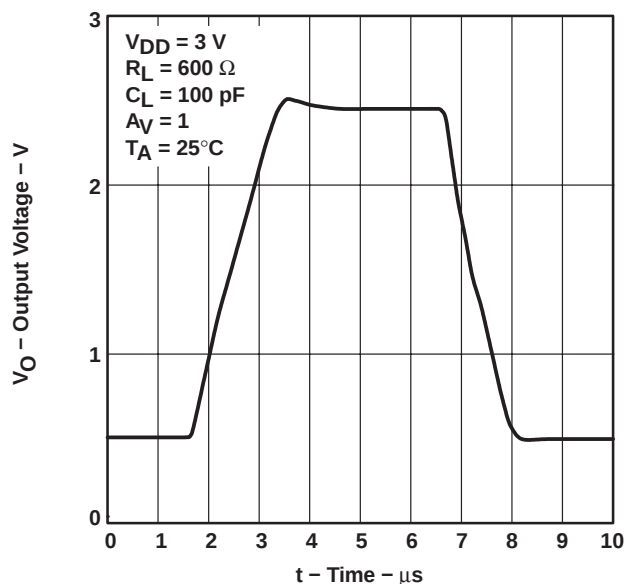


Figure 35

VOLTAGE-FOLLOWER
LARGE-SIGNAL PULSE RESPONSE

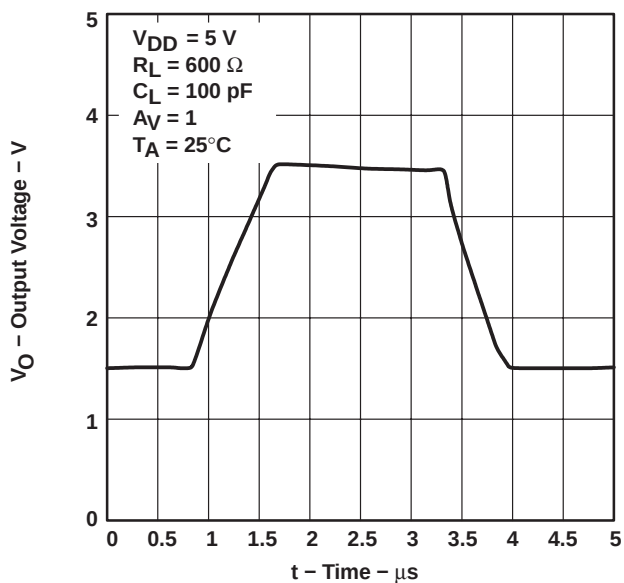


Figure 36

INVERTING SMALL-SIGNAL PULSE RESPONSE

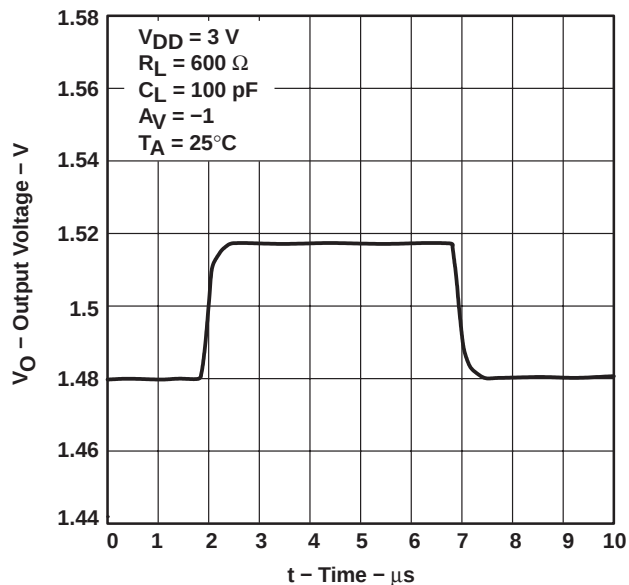


Figure 37

INVERTING SMALL-SIGNAL PULSE RESPONSE

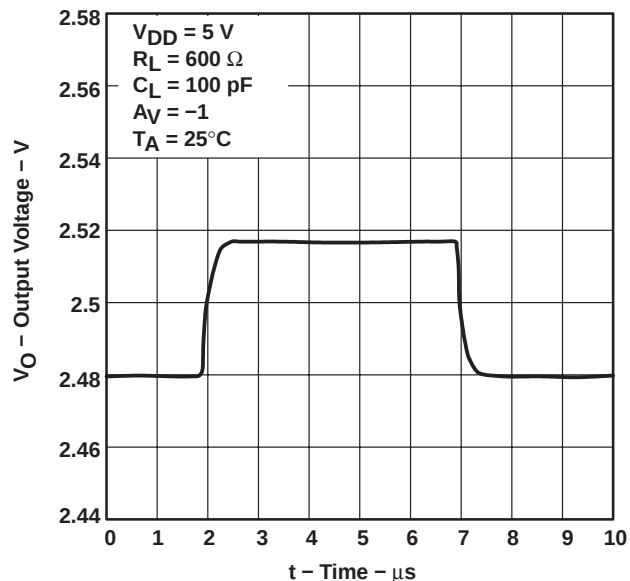


Figure 38

TYPICAL CHARACTERISTICS

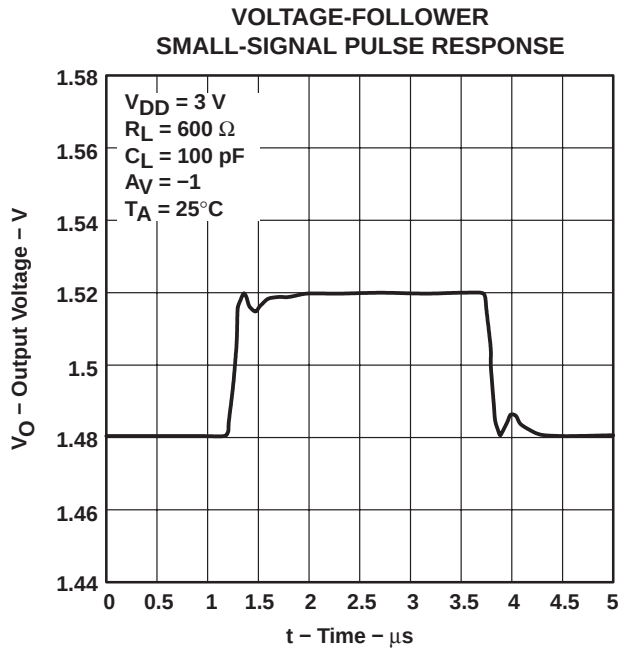


Figure 39

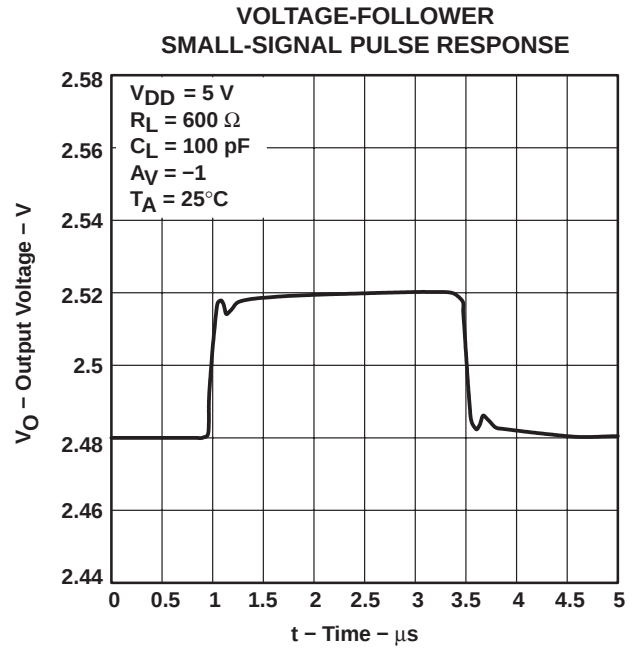


Figure 40

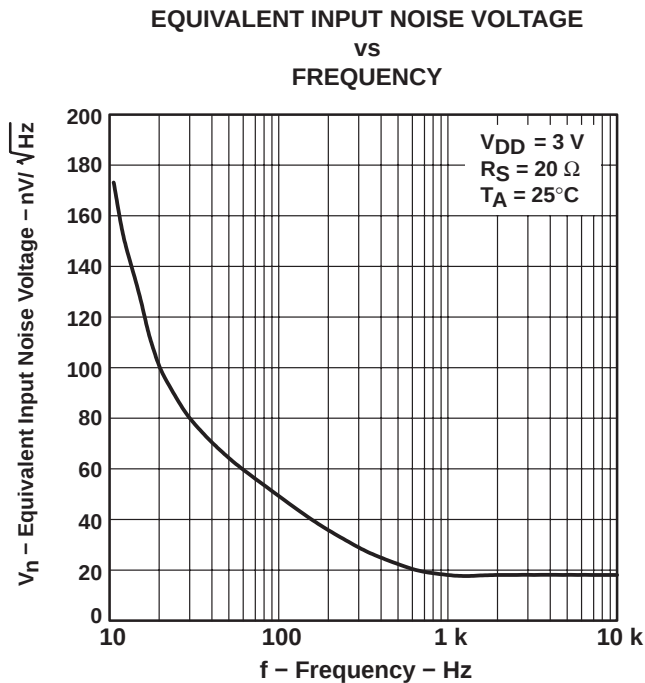


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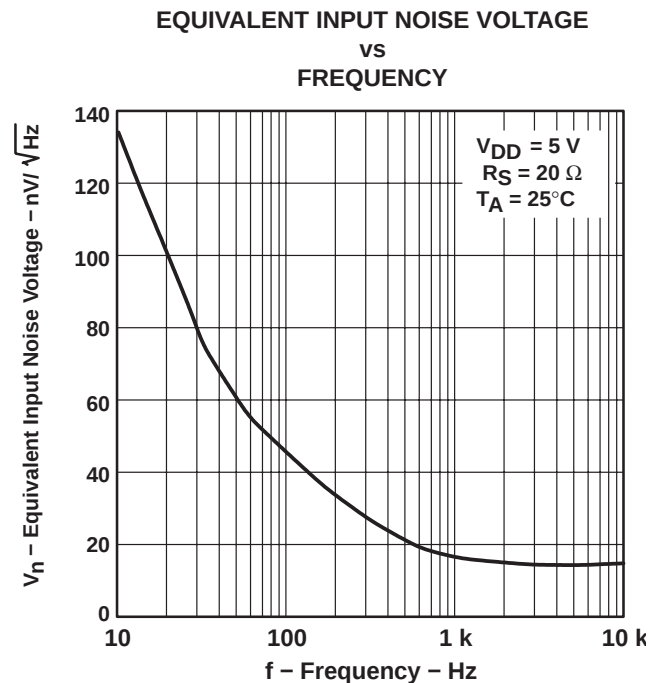


Figure 42

TYPICAL CHARACTERISTICS

**NOISE VOLTAGE
OVER A 10-SECOND PERIOD**

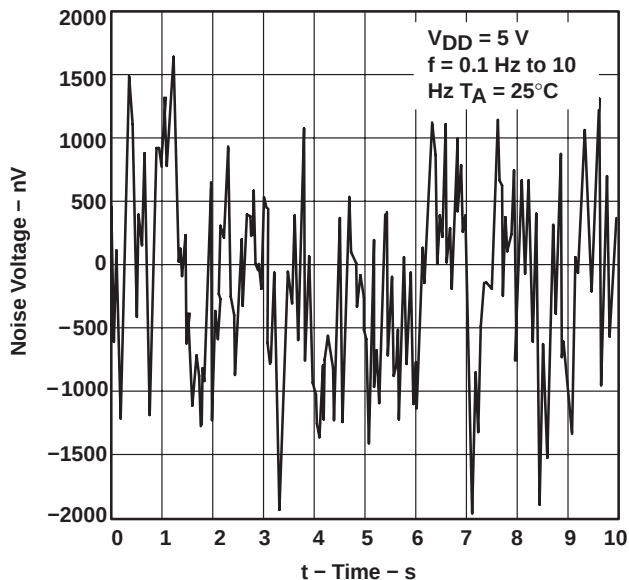


Figure 43

**TOTAL HARMONIC DISTORTION PLUS NOISE
VS
FREQUENCY**

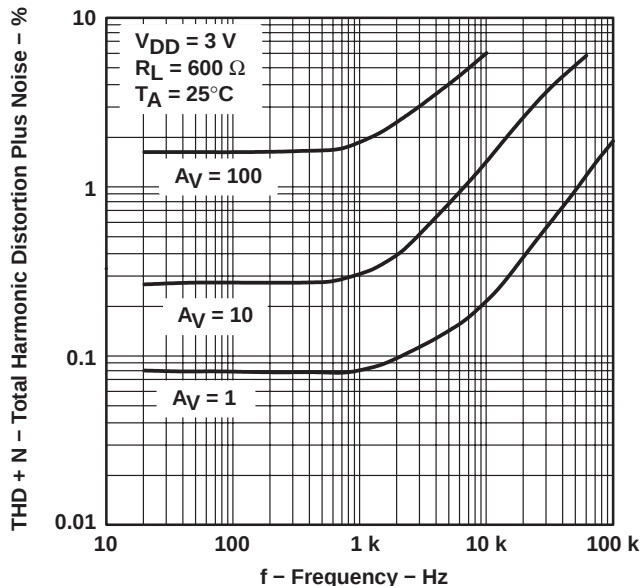


Figure 44

**TOTAL HARMONIC DISTORTION PLUS NOISE
VS
FREQUENCY**

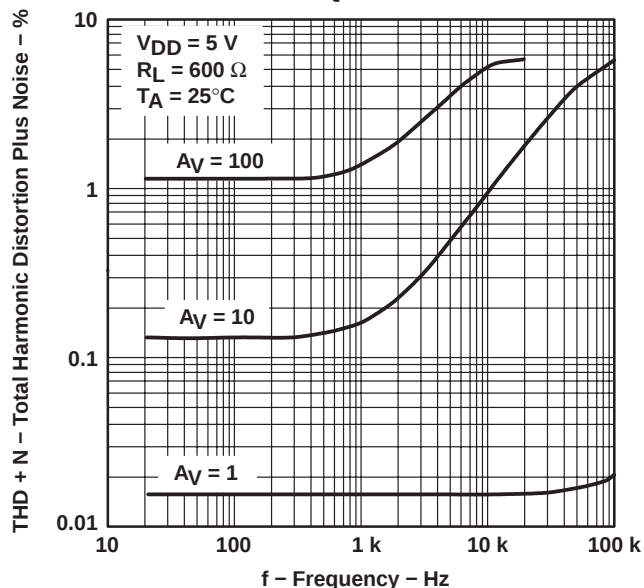


Figure 45

**GAIN-BANDWIDTH PRODUCT
VS
FREE-AIR TEMPERATURE**

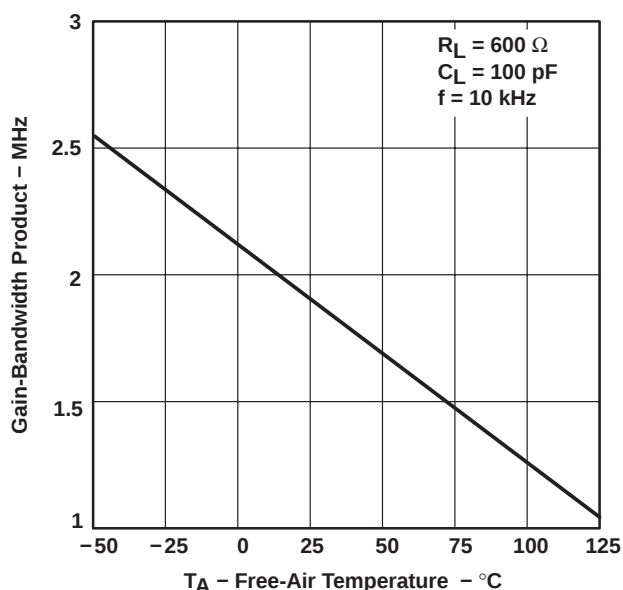


Figure 46

TYPICAL CHARACTERISTICS

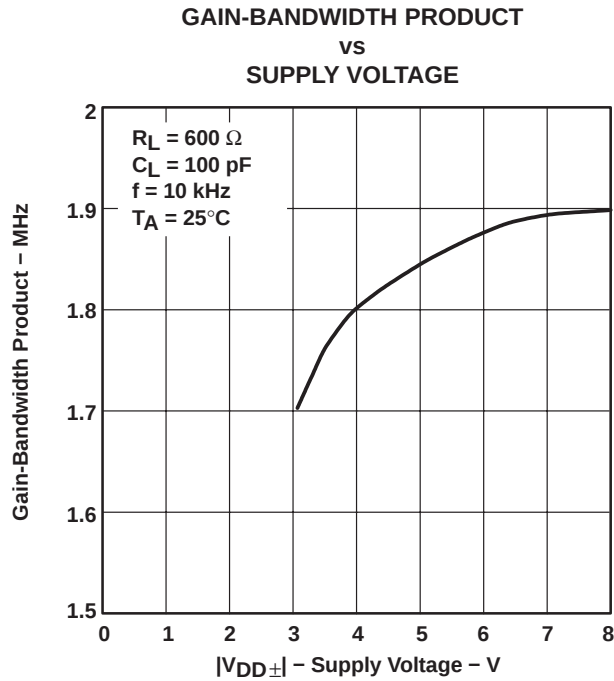


Figure 47

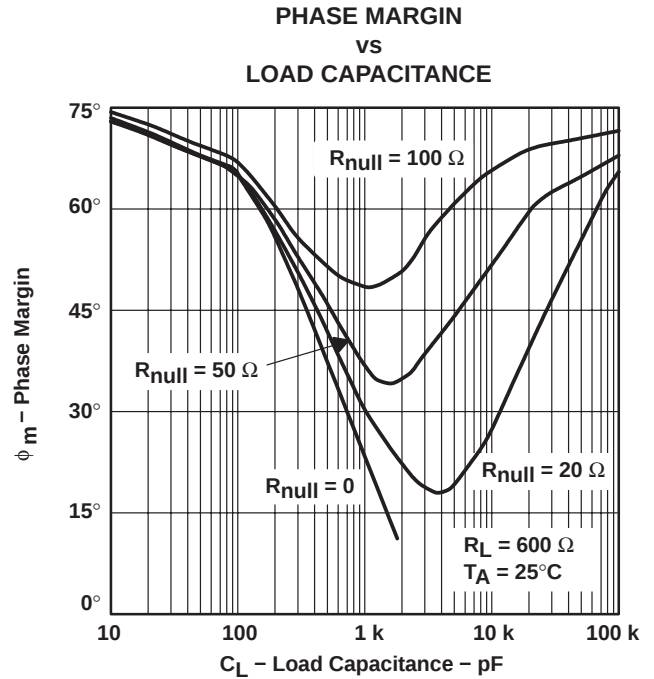


Figure 48

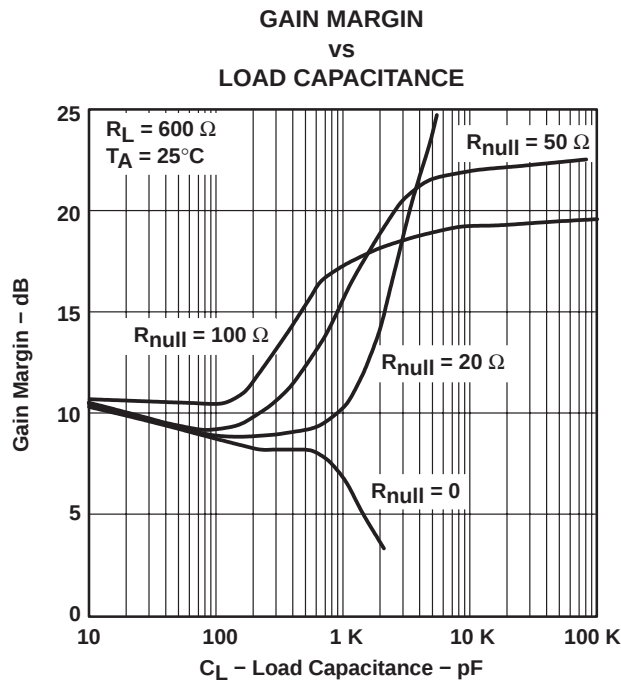


Figure 49

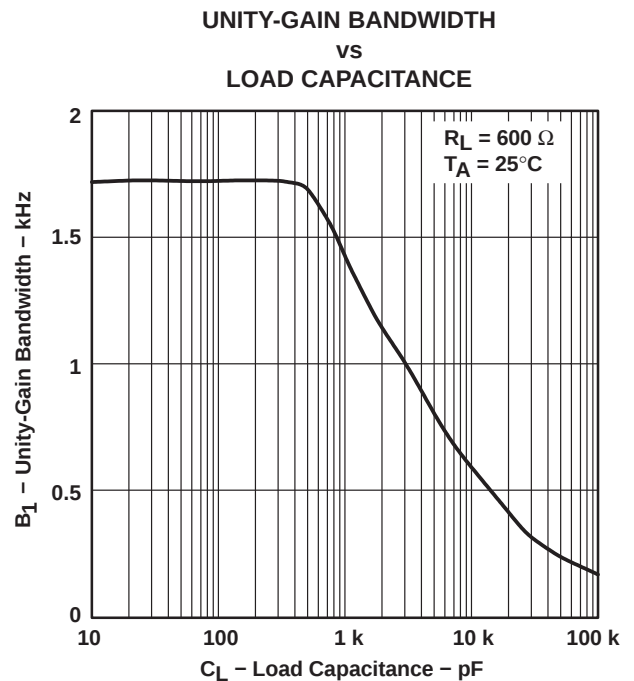


Figure 50

SGLS181 – SEPTEMBER 2003

macromodel information

- Maximum positive output voltage swing
- Maximum negative output voltage swing
- Slew rate
- Quiescent power dissipation
- Input bias current
- Open-loop voltage amplification
- Unity gain frequency
- Common-mode rejection ratio
- Phase margin
- DC output resistance
- AC output resistance
- Short-circuit output current limit

```

.SUBCKT TLV2442 1 2 3 4 5
C1      11      12      14E-12
C2      6        7      60.00E-12
DC      5        53     DX
DE      54      5       DX
DLP     90      91     DX
DLN     92      90     DX
DP      4        3     DX
EGND    99      0      POLY (2) (3,0) (4,) 0.5 5
FB      7        99     POLY (5) VB VC VE VLP VLN 0
+ 984.9E3 -1E6 1E6 1E6 -1E6
GA      6        0      11      12 377.0E-6
GCM     0        6      10      99 134E-9
ISS     3        10     DC 216.0E-6
HLIM    90      0      VLIM 1K
J1      11      2      10 JX
J2      12      1      10 JX
R2      6        9      100.OE3

```

RD1	60	11	2.653E3
RD2	60	12	2.653E3
R01	8	5	50
R02	7	99	50
RP	3	4	4.310E3
RSS	10	99	925.9E3
VAD	60	4	-.5
VB	9	0	DC 0
VC	3	53	DC .78
VE	54	4	DC .78
VLIM	7	8	DC 0
VLP	91	0	DC 1.9
VLN	0	92	DC 9.4
.MODEL DX D (IS=800.0E-18)			
.MODEL JX PJF (IS=1.500E-12BETA=1.316E-3			
+ VTO=-.270)			
.ENDS			

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PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
TLV2442AQDRQ1	ACTIVE	SOIC	D	8	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-250C-1 YEAR/ Level-1-235C-UNLIM
TLV2442AQPWRQ1	ACTIVE	TSSOP	PW	8	2000	None	CU NIPDAU	Level-1-220C-UNLIM
TLV2442QDRQ1	ACTIVE	SOIC	D	8	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-250C-1 YEAR/ Level-1-235C-UNLIM
TLV2442QPWRQ1	ACTIVE	TSSOP	PW	8	2000	None	CU NIPDAU	Level-1-220C-UNLIM

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - May not be currently available - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

None: Not yet available Lead (Pb-Free).

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Green (RoHS & no Sb/Br): TI defines "Green" to mean "Pb-Free" and in addition, uses package materials that do not contain halogens, including bromine (Br) or antimony (Sb) above 0.1% of total product weight.

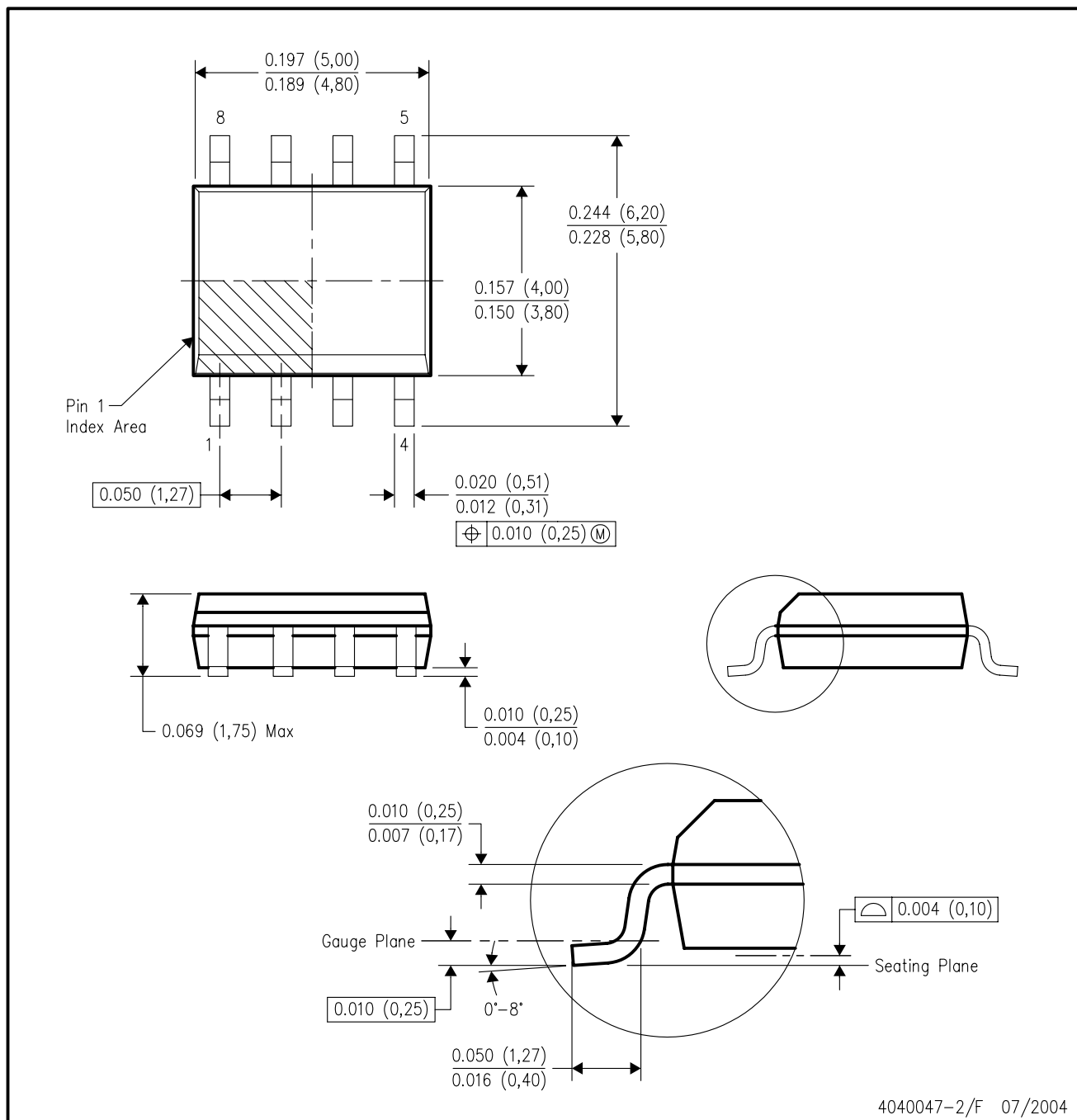
⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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D (R-PDSO-G8)

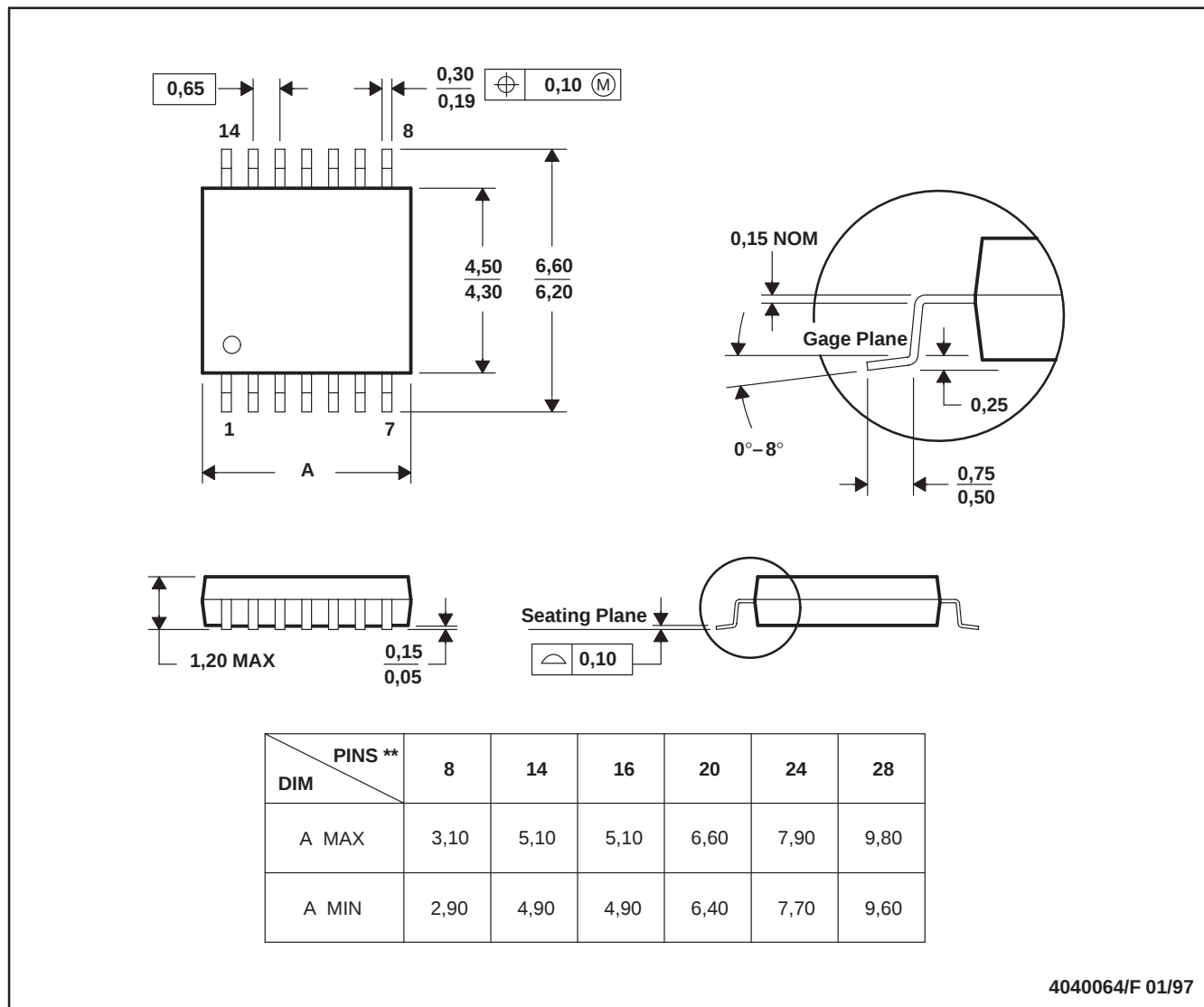
PLASTIC SMALL-OUTLINE PACKAGE



PW (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
 D. Falls within JEDEC MO-153

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