

FEATURES

- 2.7-V and 5-V Performance
- Rail-to-Rail Output Swing
- Input Bias Current...1 pA Typ
- Input Offset Voltage...0.25 mV Typ
- Low Supply Current...100 μ A Typ
- Low Shutdown Current...45 pA Typ
- Gain Bandwidth of 1 MHz Typ
- Slew Rate...1 V/ μ s Typ
- Turn-On Time From Shutdown...5 μ s Typ
- Input Referred Voltage Noise (at 10 kHz)...
20 nV/ $\sqrt{\text{Hz}}$
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)

APPLICATIONS

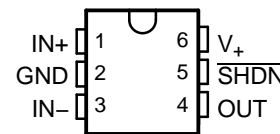
- Cordless/Cellular Phones
- Consumer Electronics (Laptops, PDAs)
- Audio Pre-Amps for Voice
- Portable/Battery-Powered Electronic Equipment
- Supply-Current Monitoring
- Battery Monitoring
- Buffers
- Filters
- Drivers

DESCRIPTION/ORDERING INFORMATION

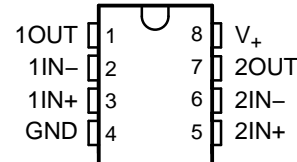
The LMV341, LMV342, LMV344 devices are single, dual, and quad CMOS operational amplifiers, respectively, with low voltage, low power, and rail-to-rail output swing capabilities. The PMOS input stage offers an ultra-low input bias current of 1 pA (typ) and an offset voltage of 0.25 mV (typ). The single supply amplifier is designed specifically for low-voltage (2.7 V to 5 V) operation, with a wide common-mode input voltage range that typically extends from -0.2 V to 0.8 V from the positive supply rail. The LMV341 (single) also offers a shutdown (SHDN) pin that can be used to disable the device. In shutdown mode, the supply current is reduced to 33 nA (typ). Additional features of the family are a 20-nV/ $\sqrt{\text{Hz}}$ voltage noise at 10 kHz, 1-MHz unity-gain bandwidth, 1-V/ μ s slew rate, and 100- μ A current consumption per channel.

Offered in both the SOT-23 and smaller SC-70 packages, the LMV341 is suitable for the most space-constraint applications. The LMV342 dual device is offered in the standard SOIC and MSOP packages. An extended industrial temperature range from -40°C to 125°C makes these devices suitable in a wide variety of commercial and industrial environments.

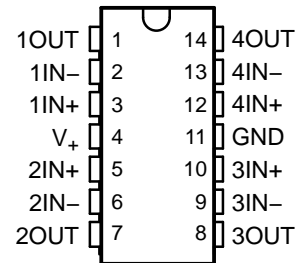
LMV341 . . . DBV (SOT-23) OR DCK (SC-70) PACKAGE
(TOP VIEW)



LMV342 . . . D (SOIC) OR DGK (MSOP) PACKAGE
(TOP VIEW)



LMV344 . . . D (SOIC) OR PW (TSSOP) PACKAGE
(TOP VIEW)



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.

LMV341, LMV342, LMV344 RAIL-TO-RAIL OUTPUT CMOS OPERATIONAL AMPLIFIERS WITH SHUTDOWN

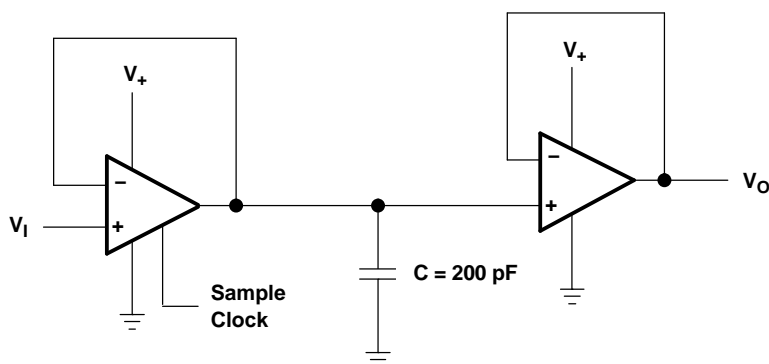
SLOS447G—SEPTEMBER 2004—REVISED FEBRUARY 2006

ORDERING INFORMATION

T_A	PACKAGE ⁽¹⁾		ORDERABLE PART NUMBER	TOP-SIDE MARKING ⁽²⁾	
-40°C to 125°C	Single	SOT-23 – DBV	Reel of 3000	LMV341IDBVR	RC9_
			Reel of 250	LMV341IDBVT	PREVIEW
		SC-70 – DCK	Reel of 3000	LMV341IDCKR	R4_
			Reel of 250	LMV341ICKVT	PREVIEW
	Dual	SOIC – D	Tube of 75	LMV342ID	MV342I
			Reel of 2500	LMV342IDR	
		MSOP/VSSOP – DGK	Reel of 250	LMV342IDGK	RP_
			Reel of 2500	LMV342IDGKR	
	Quad	SOIC – D	Tube of 50	LMV344ID	LMV344I
			Reel of 2500	LMV344IDR	
		TSSOP – PW	Tube of 90	LMV344IPW	MV344I
			Reel of 2000	LMV344IPWR	

- (1) Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.
- (2) DBV/DCK/DGK: The actual top-side marking has one additional character that designates the assembly/test site.

APPLICATION CIRCUIT: SAMPLE-AND-HOLD CIRCUIT



Absolute Maximum Ratings⁽¹⁾

over operating free-air temperature range (unless otherwise noted)

		MIN	MAX	UNIT	
V ₊	Supply voltage ⁽²⁾		5.5	V	
V _{ID}	Differential input voltage ⁽³⁾		±5.5	V	
V _I	Input voltage range (either input)	0	5.5	V	
θ _{JA}	Package thermal impedance ⁽⁴⁾⁽⁵⁾	D package	8 pin	97	°C/W
			14 pin	86	
		DBV package		165	
		DCK package		259	
		DGK package		172	
PW package		113			
T _J	Operating virtual junction temperature		150	°C	
T _{stg}	Storage temperature range	−65	150	°C	

- (1) 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.
- (2) All voltage values (except differential voltages and V₊ specified for the measurement of I_{OS}) are with respect to the network GND.
- (3) Differential voltages are at IN+ with respect to IN−.
- (4) Maximum power dissipation is a function of T_{J(max)}, θ_{JA}, and T_A. The maximum allowable power dissipation at any allowable ambient temperature is P_D = (T_{J(max)} − T_A)/θ_{JA}. Operating at the absolute maximum T_J of 150°C can affect reliability.
- (5) The package thermal impedance is calculated in accordance with JESD 51-7.

Recommended Operating Conditions

		MIN	MAX	UNIT
V ₊	Supply voltage (single-supply operation)	2.5	5.5	V
T _A	Operating free-air temperature	−40	125	°C

ESD Protection

TEST CONDITIONS	TYP	UNIT
Human-Body Model	2000	V
Machine Model	200	V

LMV341, LMV342, LMV344 RAIL-TO-RAIL OUTPUT CMOS OPERATIONAL AMPLIFIERS WITH SHUTDOWN

SLOS447G—SEPTEMBER 2004—REVISED FEBRUARY 2006

Electrical Characteristics

$V_+ = 2.7\text{ V}$, $GND = 0\text{ V}$, $V_{IC} = V_O = V_+/2$, $R_L > 1\text{ M}\Omega$ (unless otherwise noted)

PARAMETER		TEST CONDITIONS		T_A	MIN	TYP ⁽¹⁾	MAX	UNIT
V_{IO}	Input offset voltage			25°C		0.25	4	mV
				Full range			4.5	
α_{VIO}	Average temperature coefficient of input offset voltage			Full range		1.7		$\mu\text{V}/^\circ\text{C}$
I_{IB}	Input bias current			25°C		1	120	pA
				-40°C to 85°C			250	
				-40°C to 125°C				3
I_{IO}	Input offset current			25°C		6.6		fA
CMRR	Common-mode rejection ratio	$0 \leq V_{ICR} \leq 1.7\text{ V}$		25°C	56	80		dB
		$0 \leq V_{ICR} \leq 1.6\text{ V}$		Full range	50			
k_{SVR}	Supply-voltage rejection ratio	$2.7\text{ V} \leq V_+ \leq 5\text{ V}$		25°C	65	82		dB
				Full range	60			
V_{ICR}	Common-mode input voltage range	CMRR $\geq 50\text{ dB}$		25°C	0	-0.2 to 1.9	1.7	V
A_V	Large-signal voltage gain ⁽²⁾	$R_L = 10\text{ k}\Omega$ to 1.35 V		25°C	78	113		dB
				Full range		70		
		$R_L = 2\text{ k}\Omega$ to 1.35 V		25°C	72	103		
				Full range		64		
V_O	Output swing (delta from supply rails)	$R_L = 2\text{ k}\Omega$ to 1.35 V	Low level	25°C		24	60	mV
				Full range				
			High level	25°C		26	60	
				Full range				
		$R_L = 10\text{ k}\Omega$ to 1.35 V	Low level	25°C		5	30	
				Full range				
			High level	25°C		5.3	30	
				Full range				
I_{CC}	Supply current (per channel)			25°C		100	170	μA
				Full range			230	
I_{OS}	Output short-circuit current	Sourcing	LMV341, LMV342	25°C		20	32	mA
			LMV344			18	24	
		Sinking				15	24	
SR	Slew rate	$R_L = 10\text{ k}\Omega$ ⁽³⁾		25°C		1		V/ μs
GBM	Unity-gain bandwidth	$R_L = 10\text{ k}\Omega$, $C_L = 200\text{ pF}$		25°C		1		MHz
Φ_m	Phase margin	$R_L = 100\text{ k}\Omega$		25°C		72		deg
G_m	Gain margin	$R_L = 100\text{ k}\Omega$		25°C		20		dB
V_n	Equivalent input noise voltage	$f = 1\text{ kHz}$		25°C		40		$\text{nV}/\sqrt{\text{Hz}}$
I_n	Equivalent input noise current	$f = 1\text{ kHz}$		25°C		0.001		$\text{pA}/\sqrt{\text{Hz}}$
THD	Total harmonic distortion	$f = 1\text{ kHz}$, $A_V = 1$, $R_L = 600\ \Omega$, $V_I = 1\text{ V}_{PP}$		25°C		0.017		%

(1) Typical values represent the most likely parametric norm.

(2) $GND + 0.2\text{ V} \leq V_O \leq V_+ - 0.2\text{ V}$

(3) Connected as voltage follower with 2- V_{PP} step input. Number specified is the slower of the positive and negative slew rates.

Shutdown Characteristics
 $V_+ = 2.7\text{ V}$, $GND = 0\text{ V}$, $V_{IC} = V_O = V_+/2$, $R_L > 1\text{ M}\Omega$ (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A	MIN	TYP	MAX	UNIT
$I_{CC(SHDN)}$	Supply current in shutdown mode	$V_{SD} = 0\text{ V}$	25°C		0.045	1000	nA
			Full range			1.5	μA
$t_{(on)}$	Amplifier turn-on time		25°C		5		μs
V_{SD}	Shutdown pin voltage range	ON mode	25°C	1.7 to 2.7	2.4 to 2.7		V
		Shutdown mode		0 to 1	0 to 0.8		

LMV341, LMV342, LMV344 RAIL-TO-RAIL OUTPUT CMOS OPERATIONAL AMPLIFIERS WITH SHUTDOWN

SLOS447G—SEPTEMBER 2004—REVISED FEBRUARY 2006

Electrical Characteristics

$V_+ = 5\text{ V}$, $\text{GND} = 0\text{ V}$, $V_{\text{IC}} = V_{\text{O}} = V_+/2$, $R_L > 1\text{ M}\Omega$ (unless otherwise noted)

PARAMETER		TEST CONDITIONS		T_A	MIN	TYP ⁽¹⁾	MAX	UNIT
V_{IO}	Input offset voltage			25°C		0.25	4	mV
				Full range			4.5	
$\alpha_{V_{\text{IO}}}$	Average temperature coefficient of input offset voltage			Full range		1.9		$\mu\text{V}/^\circ\text{C}$
I_{IB}	Input bias current			25°C		1	200	pA
				-40°C to 85°C			375	
				-40°C to 125°C				5
I_{IO}	Input offset current			25°C		6.6		fA
CMRR	Common-mode rejection ratio	$0 \leq V_{\text{ICR}} \leq 4\text{ V}$		25°C	56	86		dB
		$0 \leq V_{\text{ICR}} \leq 3.9\text{ V}$		Full range	50			
k_{SVR}	Supply-voltage rejection ratio	$2.7\text{ V} \leq V_+ \leq 5\text{ V}$		25°C	65	82		dB
				Full range	60			
V_{ICR}	Common-mode input voltage range	CMRR $\geq 50\text{ dB}$		25°C	0	-0.2 to 4.2	4	V
A_V	Large-signal voltage gain ⁽²⁾	$R_L = 10\text{ k}\Omega$ to 2.5 V		25°C	78	116		dB
				Full range	70			
		$R_L = 2\text{ k}\Omega$ to 2.5 V		25°C	72	107		
				Full range	64			
V_{O}	Output swing (delta from supply rails)	$R_L = 2\text{ k}\Omega$ to 2.5 V	Low level	25°C		32	60	mV
				Full range			95	
			High level	25°C		34	60	
				Full range			95	
		$R_L = 10\text{ k}\Omega$ to 2.5 V	Low level	25°C		7	30	
				Full range			40	
			High level	25°C		7	30	
				Full range			40	
I_{CC}	Supply current (per channel)			25°C		107	200	μA
				Full range			260	
I_{OS}	Output short-circuit current	Sourcing	LMV341, LMV342	25°C	85	113		mA
			LMV344		TBD	TBD		
		Sinking			50	75		
SR	Slew rate	$R_L = 10\text{ k}\Omega$ ⁽³⁾		25°C		1		V/ μs
GBM	Unity-gain bandwidth	$R_L = 10\text{ k}\Omega$, $C_L = 200\text{ pF}$		25°C		1		MHz
Φ_m	Phase margin	$R_L = 100\text{ k}\Omega$		25°C		70		deg
G_m	Gain margin	$R_L = 100\text{ k}\Omega$		25°C		20		dB
V_n	Equivalent input noise voltage	$f = 1\text{ kHz}$		25°C		39		$\text{nV}/\sqrt{\text{Hz}}$
I_n	Equivalent input noise current	$f = 1\text{ kHz}$		25°C		0.001		$\text{pA}/\sqrt{\text{Hz}}$
THD	Total harmonic distortion	$f = 1\text{ kHz}$, $A_V = 1$, $R_L = 600\ \Omega$, $V_I = 1\text{ V}_{\text{PP}}$		25°C		0.012		%

(1) Typical values represent the most likely parametric norm.

(2) $\text{GND} + 0.2\text{ V} \leq V_{\text{O}} \leq V_+ - 0.2\text{ V}$

(3) Connected as voltage follower with 2- V_{PP} step input. Number specified is the slower of the positive and negative slew rates.

Shutdown Characteristics
 $V_+ = 5\text{ V}$, $\text{GND} = 0\text{ V}$, $V_{IC} = V_O = V_+/2$, $R_L > 1\text{ M}\Omega$ (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A	MIN	TYP	MAX	UNIT
$I_{CC(\text{SHDN})}$	Supply current in shutdown mode	$V_{SD} = 0\text{ V}$	25°C		0.033	1	μA
			Full range			1.5	
$t_{(\text{on})}$	Amplifier turn-on time		25°C		5		μs
V_{SD}	Shutdown pin voltage range	ON mode	25°C		3.1 to 5	4.5 to 5	V
		Shutdown mode			0 to 1	0 to 0.8	

TYPICAL CHARACTERISTICS

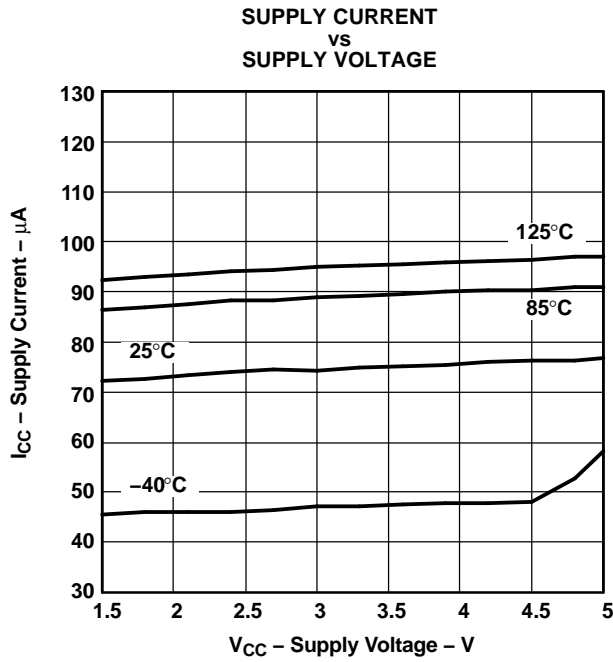


Figure 1.

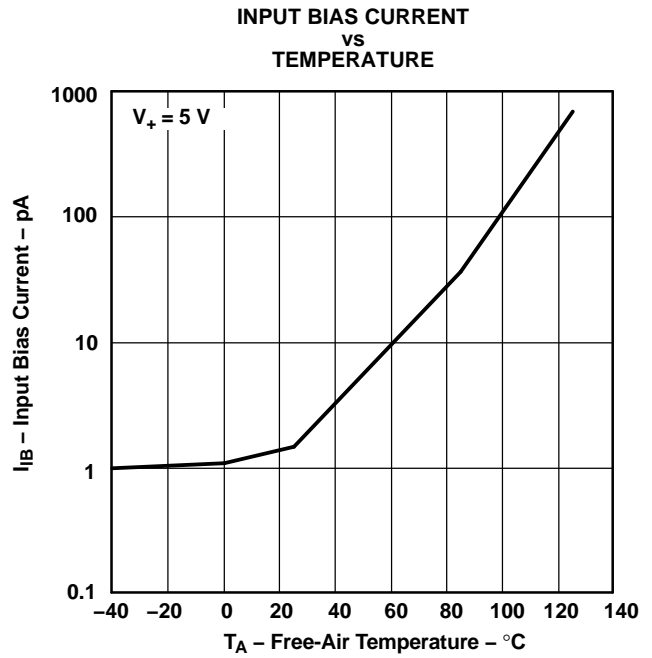


Figure 2.

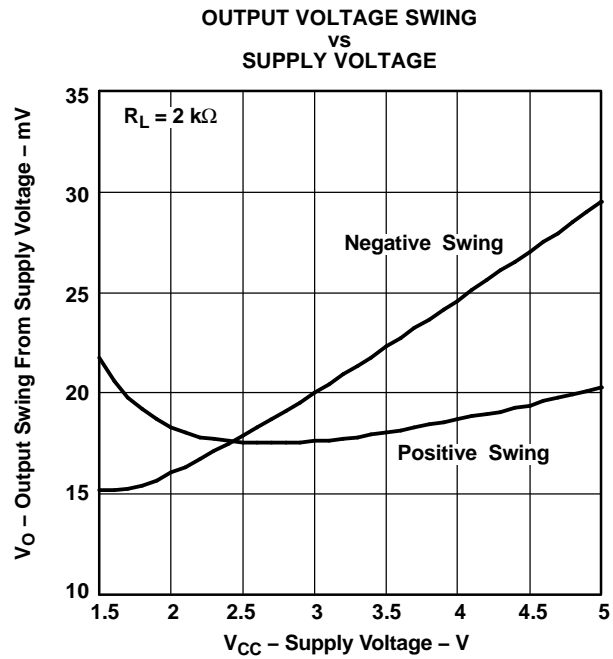


Figure 3.

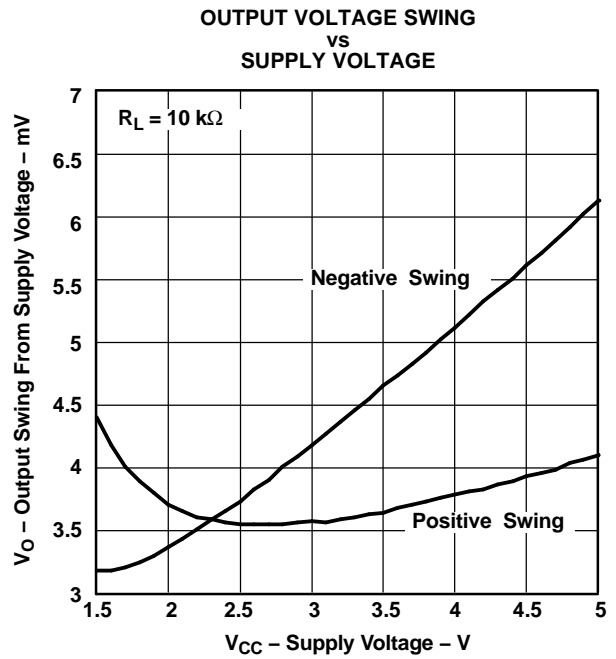


Figure 4.

TYPICAL CHARACTERISTICS (continued)

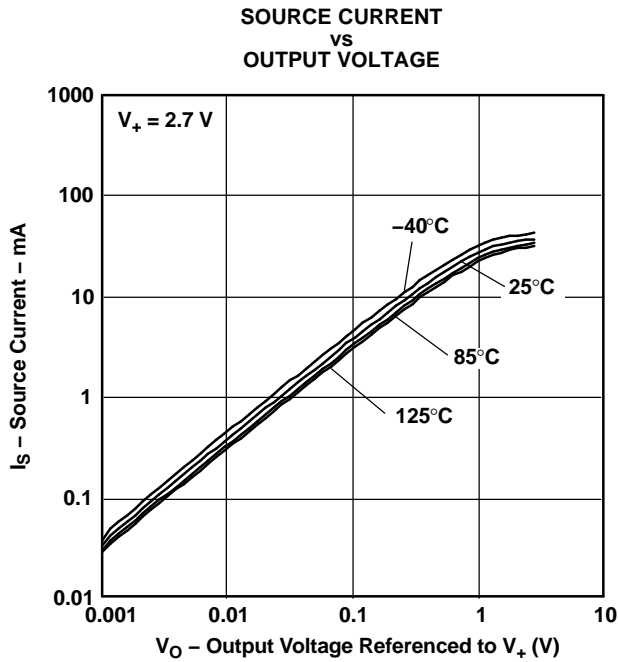


Figure 5.

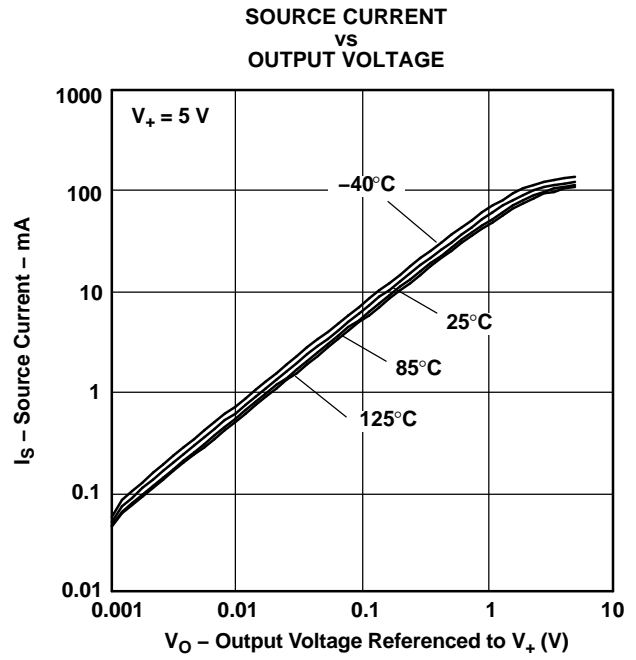


Figure 6.

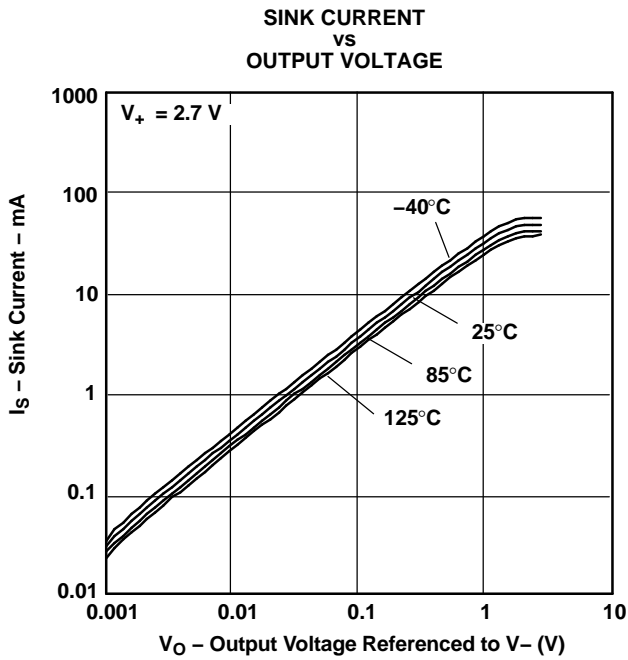


Figure 7.

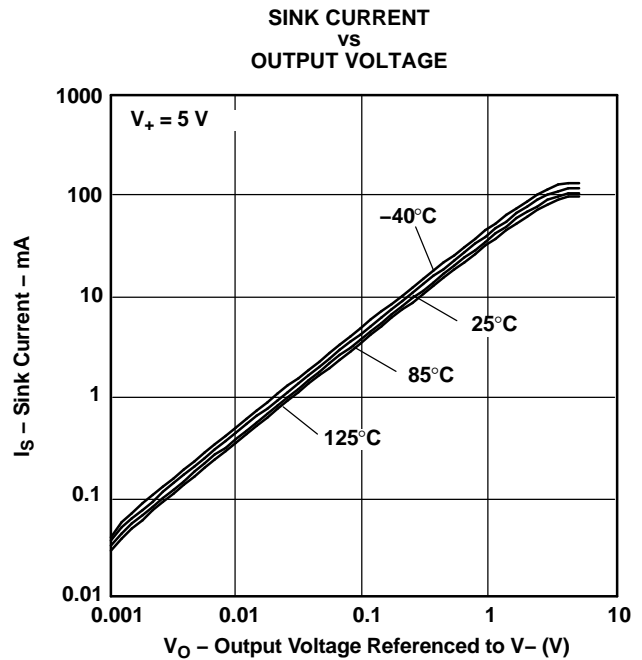


Figure 8.

TYPICAL CHARACTERISTICS (continued)

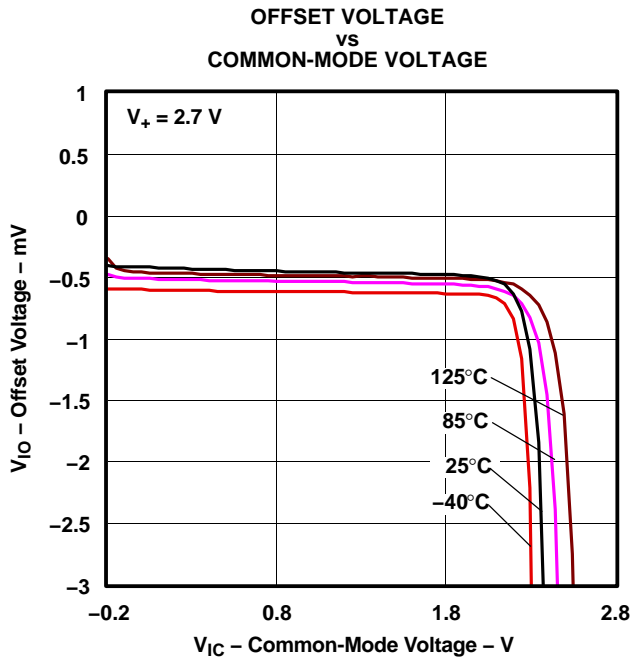


Figure 9.

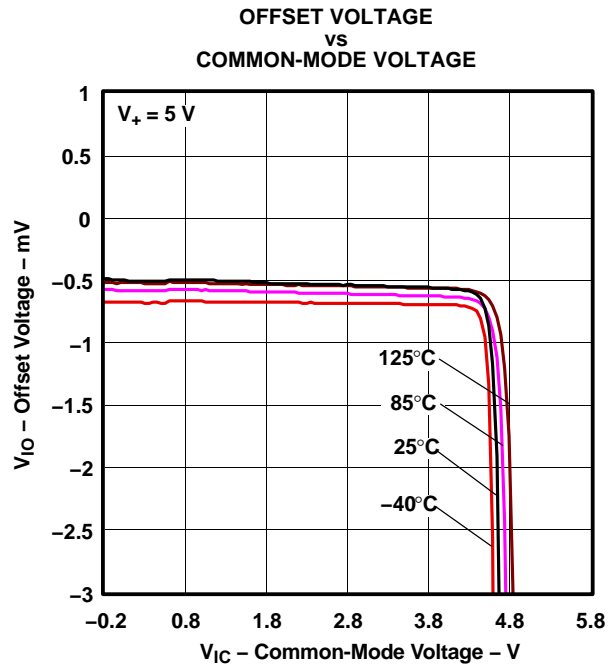


Figure 10.

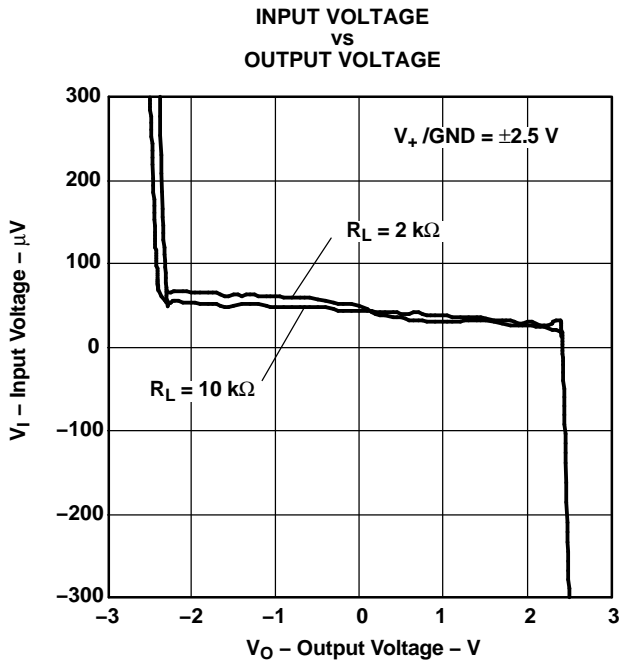


Figure 11.

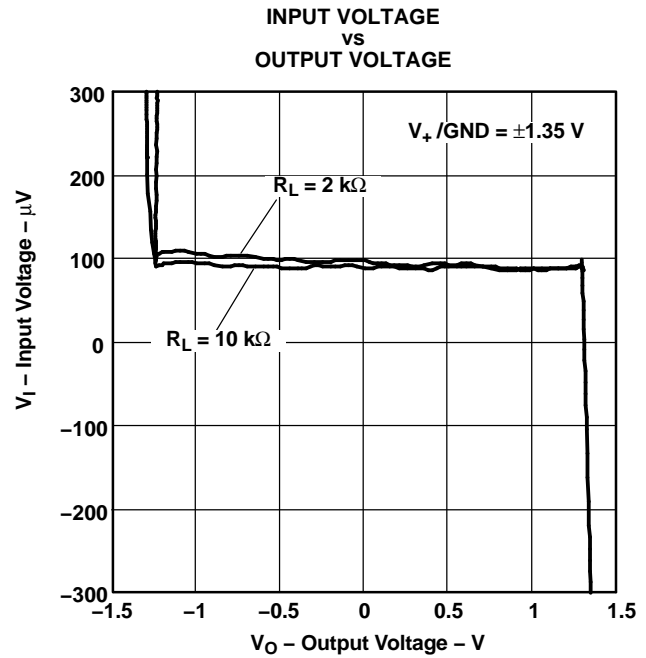


Figure 12.

TYPICAL CHARACTERISTICS (continued)

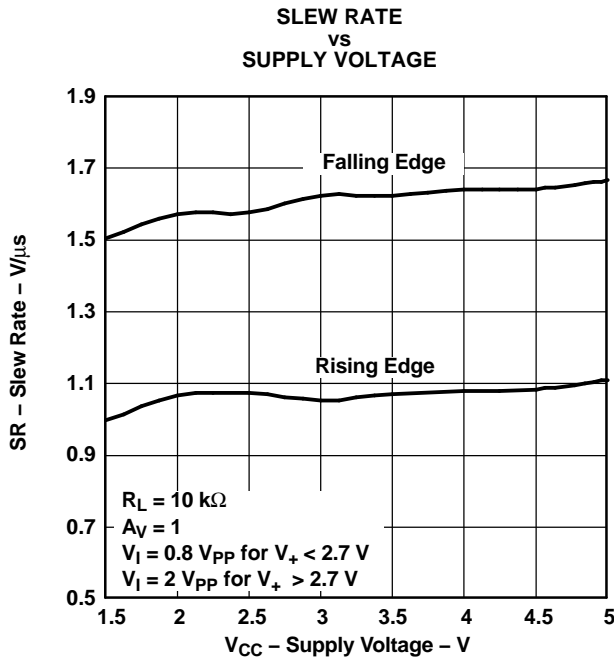


Figure 13.

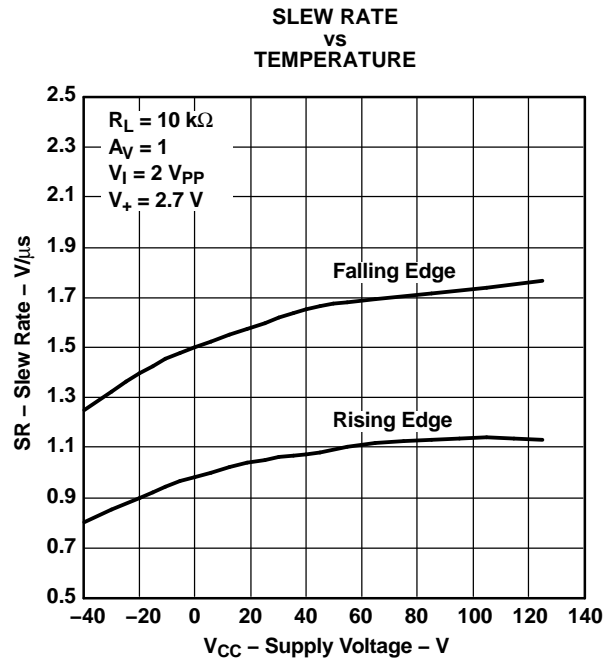


Figure 14.

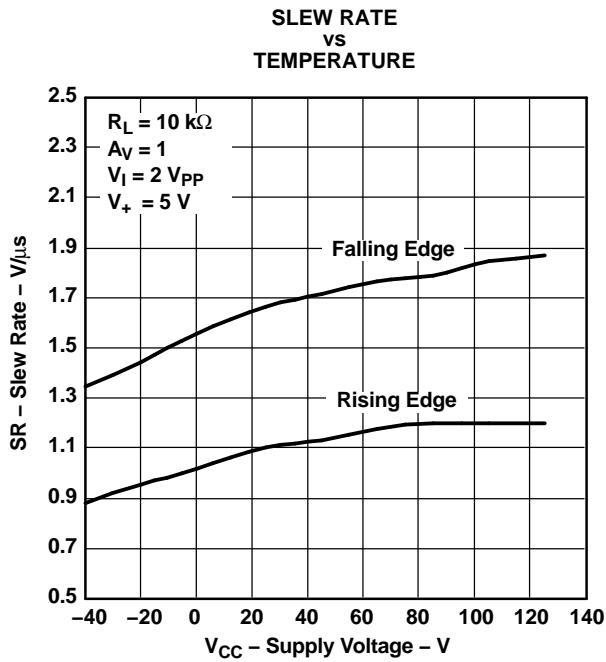


Figure 15.

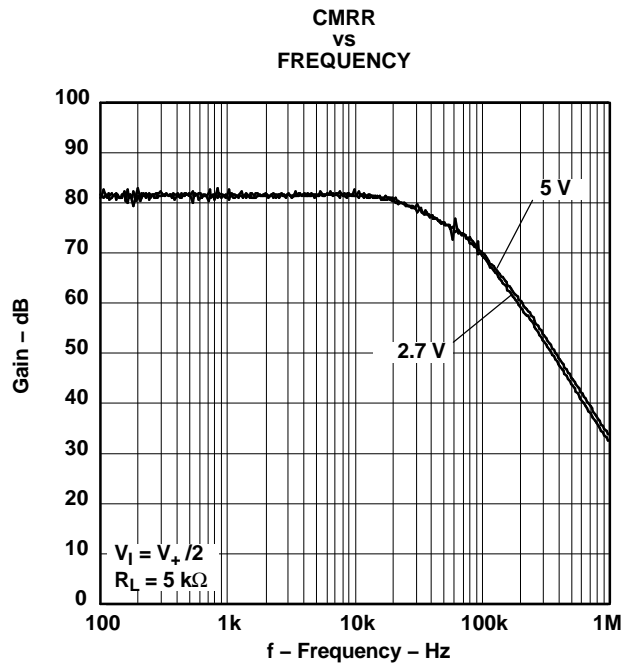


Figure 16.

TYPICAL CHARACTERISTICS (continued)

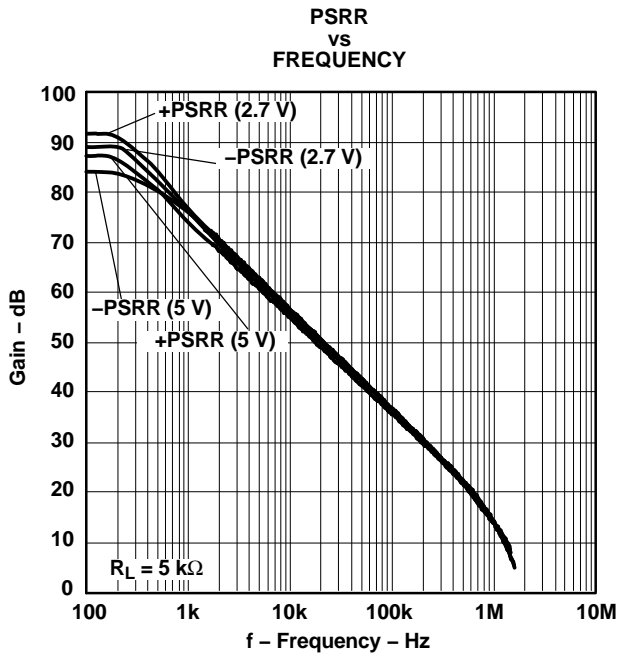


Figure 17.

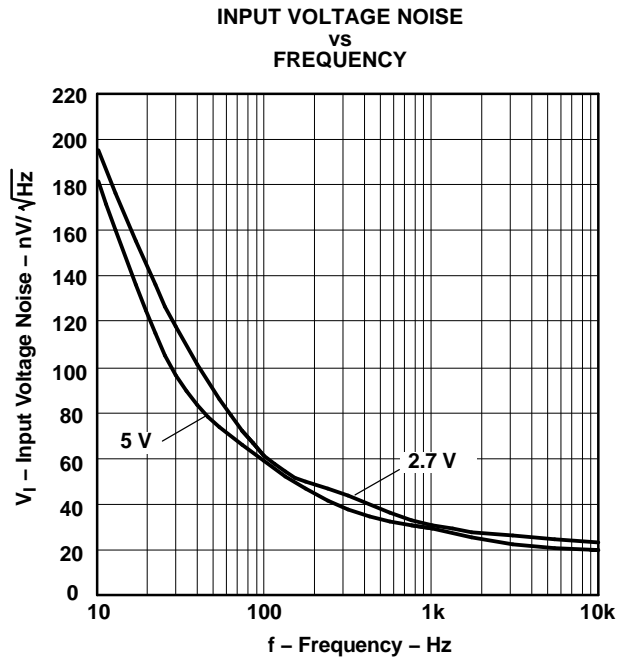


Figure 18.

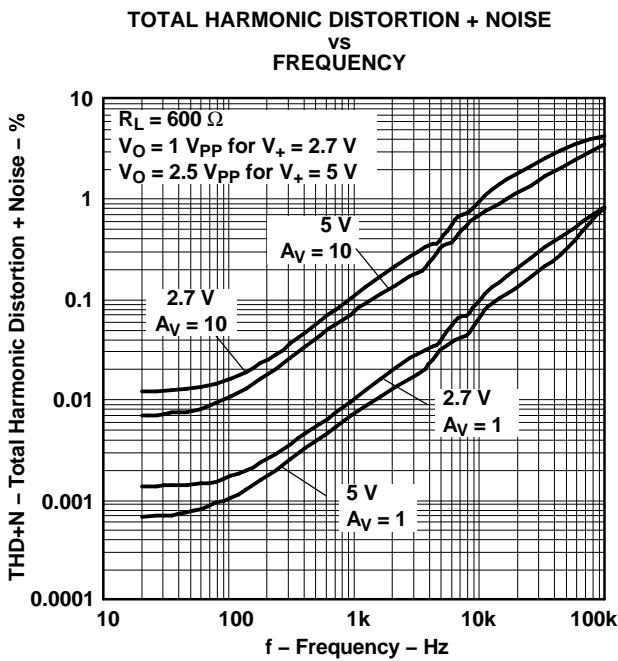


Figure 19.

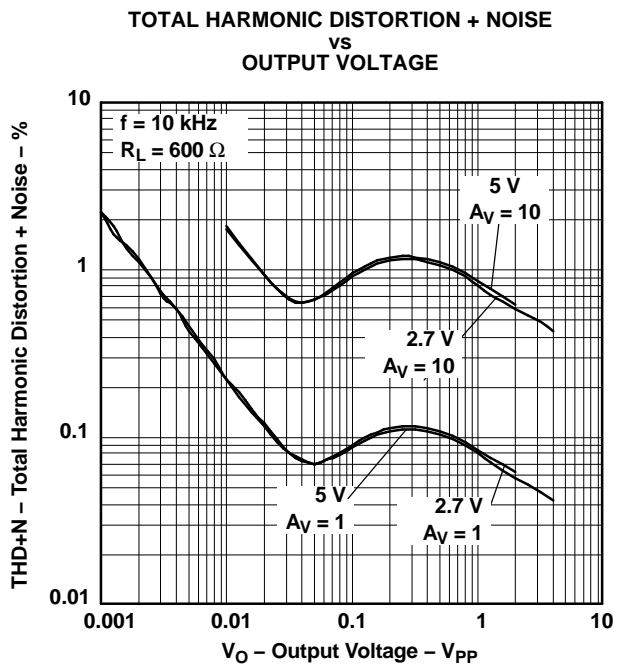
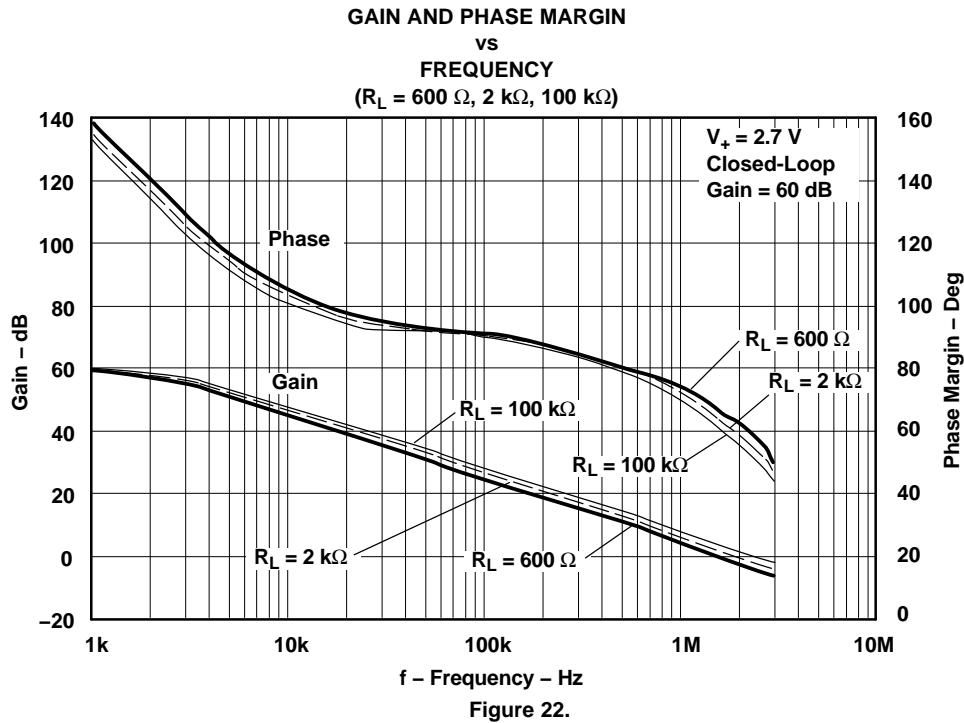
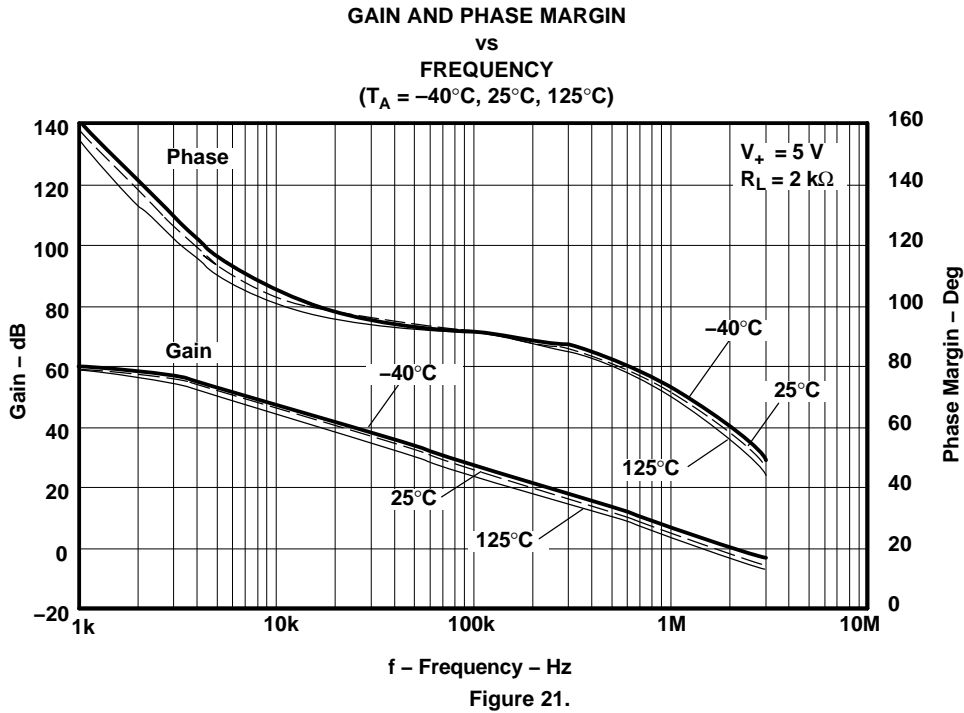


Figure 20.

TYPICAL CHARACTERISTICS (continued)



TYPICAL CHARACTERISTICS (continued)

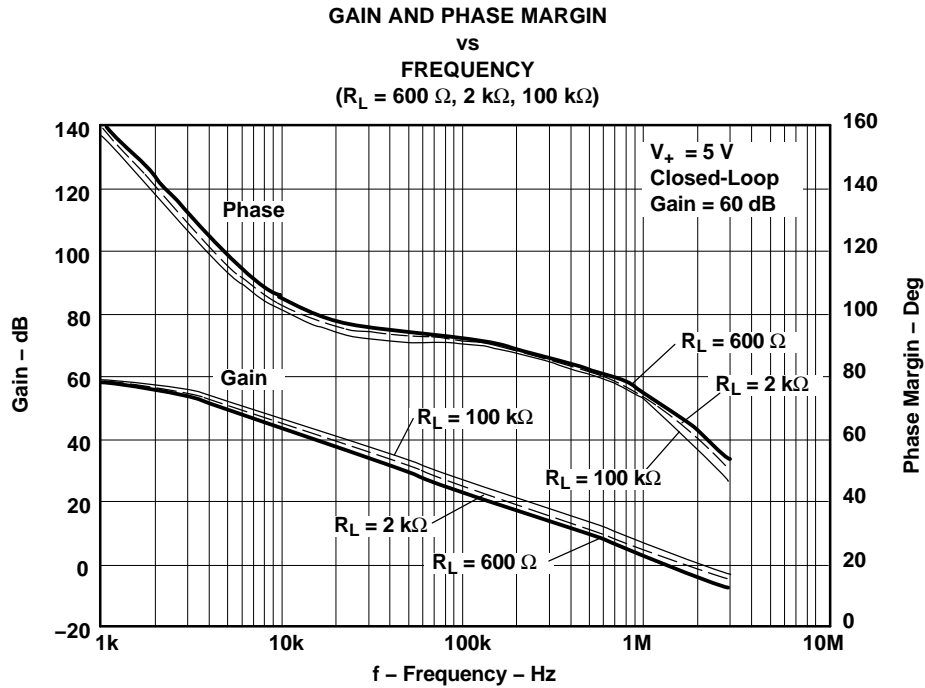


Figure 23.

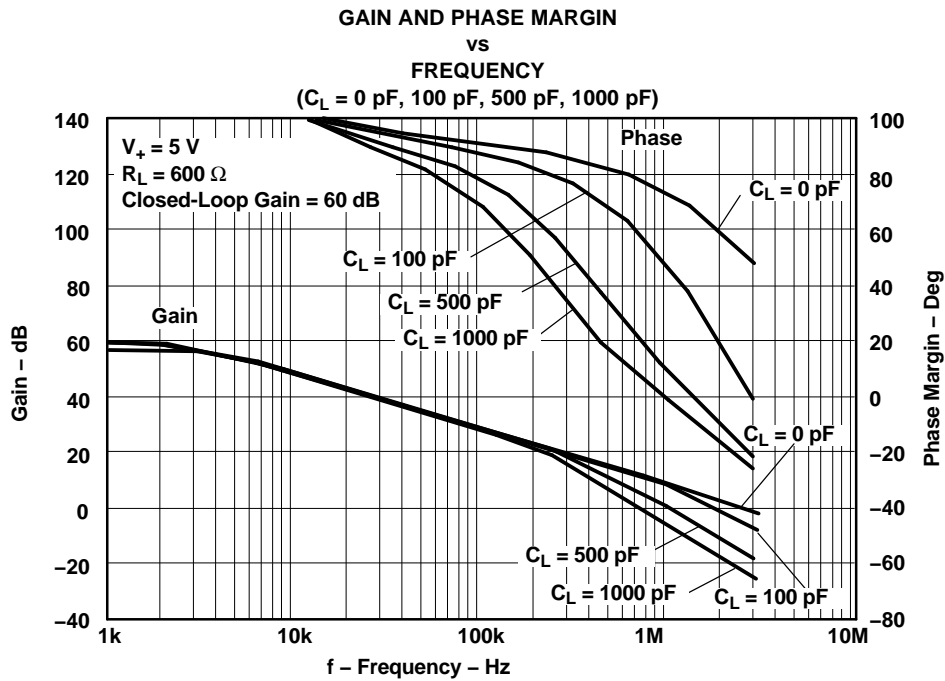


Figure 24.

TYPICAL CHARACTERISTICS (continued)

SMALL-SIGNAL NONINVERTING RESPONSE

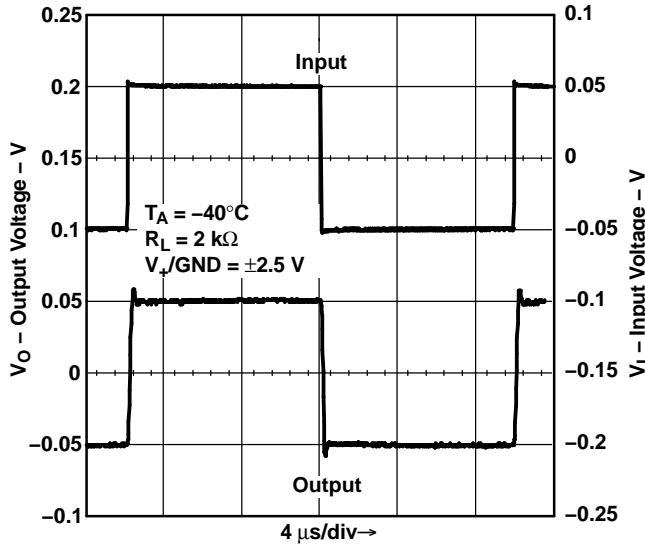


Figure 25.

LARGE-SIGNAL NONINVERTING RESPONSE

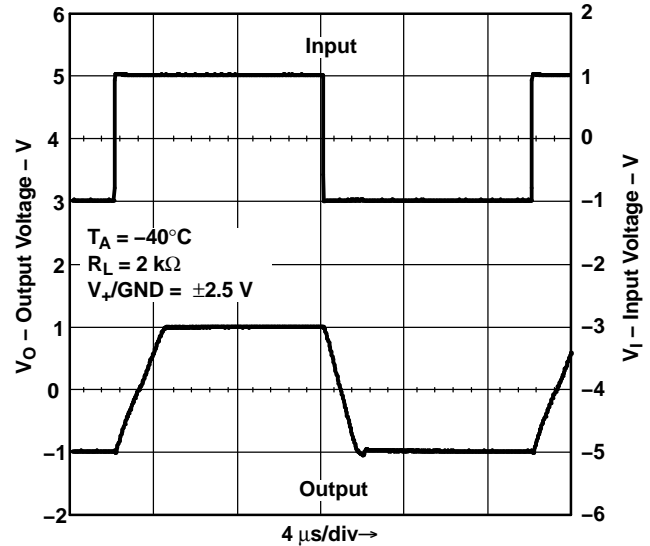


Figure 26.

SMALL-SIGNAL NONINVERTING RESPONSE

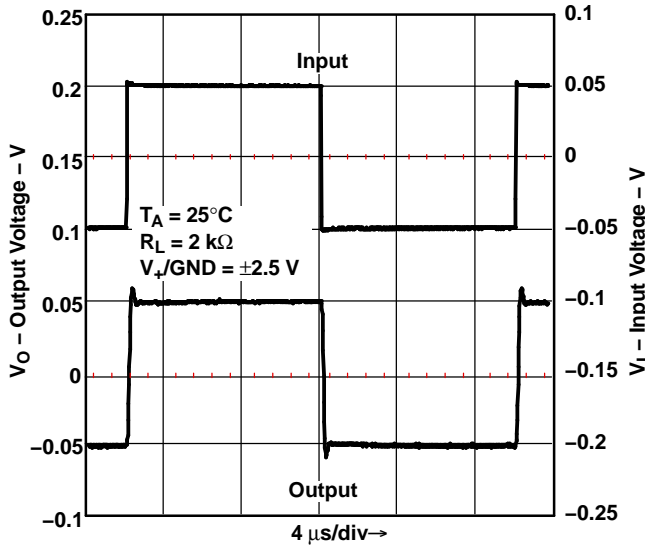


Figure 27.

LARGE-SIGNAL NONINVERTING RESPONSE

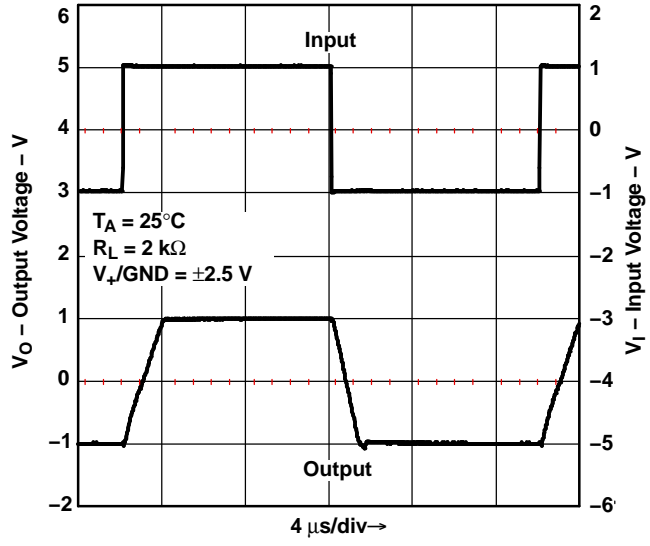


Figure 28.

TYPICAL CHARACTERISTICS (continued)

SMALL-SIGNAL NONINVERTING RESPONSE

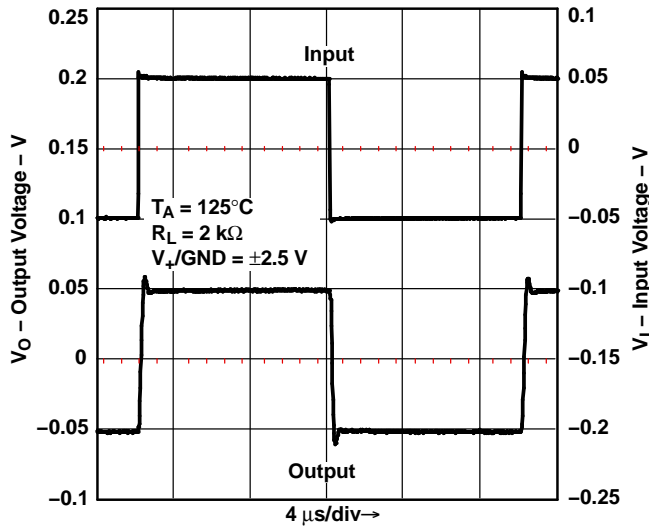


Figure 29.

LARGE-SIGNAL NONINVERTING RESPONSE

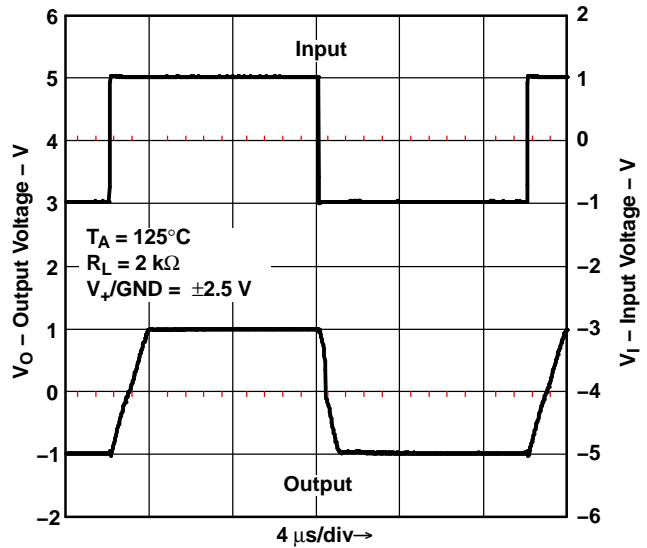


Figure 30.

SMALL-SIGNAL INVERTING RESPONSE

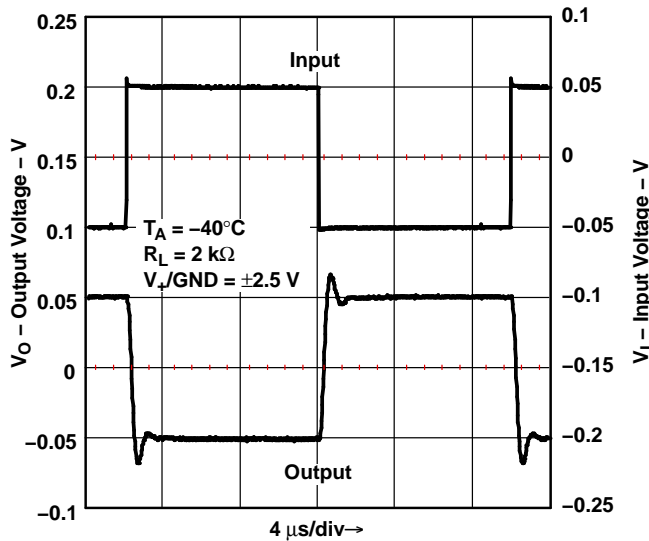


Figure 31.

LARGE-SIGNAL INVERTING RESPONSE

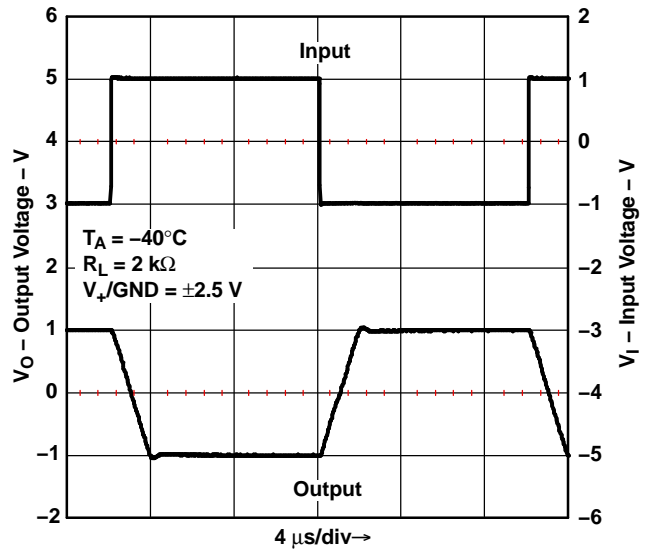


Figure 32.

TYPICAL CHARACTERISTICS (continued)

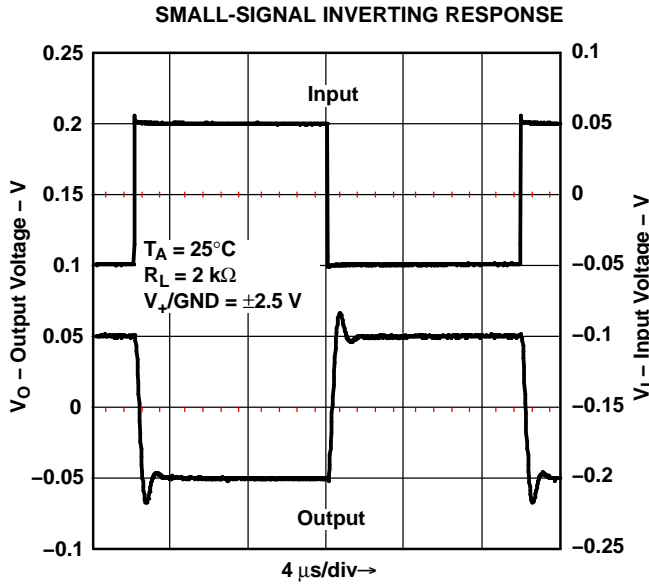


Figure 33.

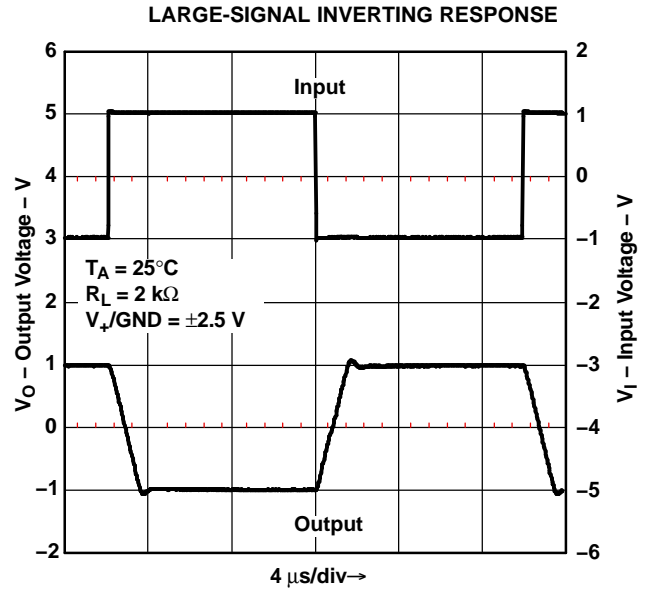


Figure 34.

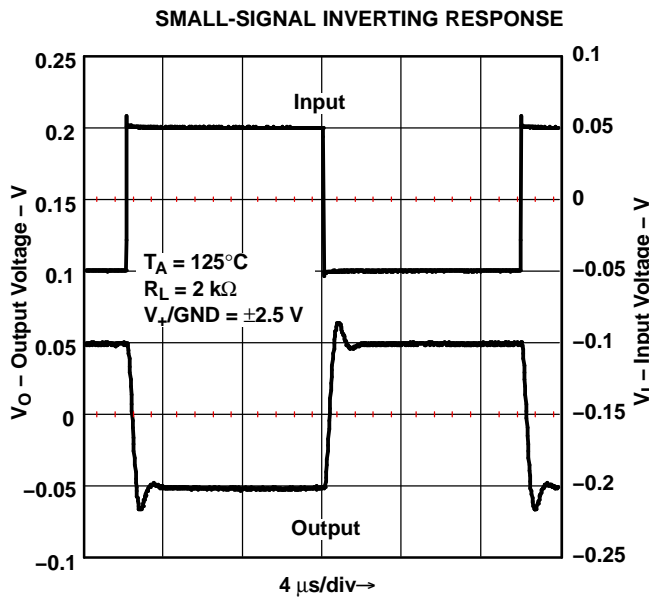


Figure 35.

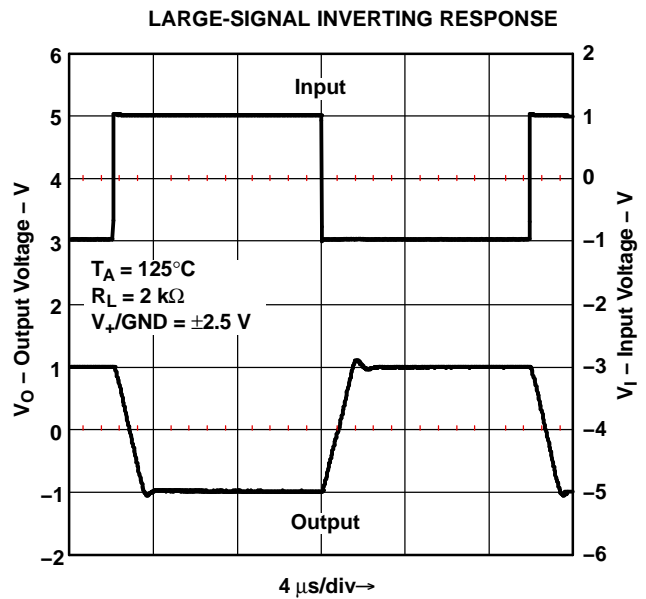


Figure 36.

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
LMV341IDBVR	ACTIVE	SOT-23	DBV	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV341IDBVRE4	ACTIVE	SOT-23	DBV	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV341IDCKR	ACTIVE	SC70	DCK	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV341IDCKRE4	ACTIVE	SC70	DCK	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV341IDCKRG4	ACTIVE	SC70	DCK	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV342ID	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV342IDDUR	PREVIEW	VSSOP	DDU	8	3000	TBD	Call TI	Call TI
LMV342IDE4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV342IDG4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV342IDGKR	ACTIVE	MSOP	DGK	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV342IDGKRG4	ACTIVE	MSOP	DGK	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV342IDGKT	PREVIEW	MSOP	DGK	8	250	TBD	Call TI	Call TI
LMV342IDR	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV342IDRE4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV342IDRG4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV344ID	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV344IDE4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV344IDG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV344IDR	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV344IDRE4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV344IDRG4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV344IPW	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV344IPWE4	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV344IPWG4	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV344IPWR	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
LMV344IPWRE4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
						no Sb/Br)		
LMV344IPWRG4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-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 - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

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.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

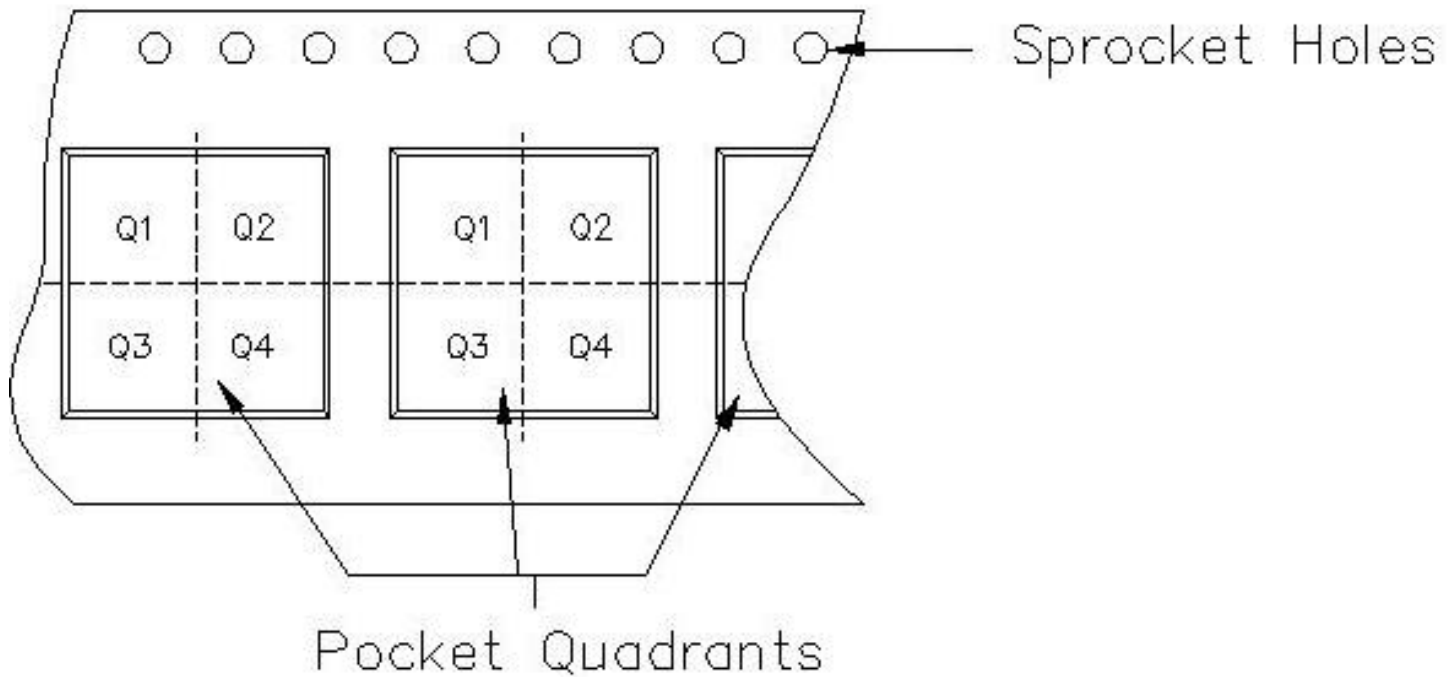
Important Information and Disclaimer:The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.



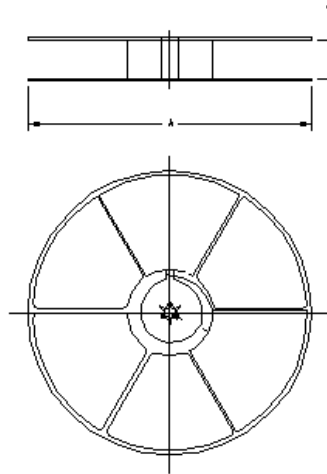
Carrier tape design is defined largely by the component length, width, and thickness.

A_o = Dimension designed to accommodate the component width.
B_o = Dimension designed to accommodate the component length.
K_o = Dimension designed to accommodate the component thickness.
W = Overall width of the carrier tape.
P = Pitch between successive cavity centers.



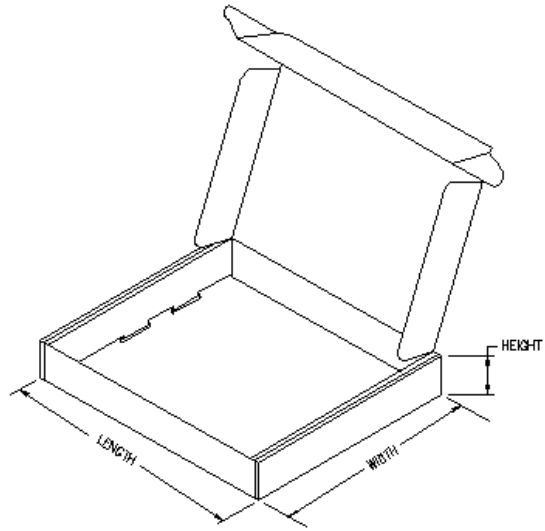
TAPE AND REEL INFORMATION

Device	Package	Pins	Site	Reel Diameter (mm)	Reel Width (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
LMV341IDBVR	DBV	6	NSE	179	8	3.2	3.2	1.4	4	8	Q3
LMV341IDCKR	DCK	6	HNT	180	9	2.24	2.34	1.22	4	8	Q3
LMV342IDGKR	DGK	8	HNT	180	13	5.3	3.4	1.4	8	12	Q1
LMV342IDR	D	8	FMX	330	12	6.4	5.2	2.1	8	12	Q1
LMV344IDR	D	14	MLA	330	16	6.5	9.0	2.1	8	16	Q1
LMV344IPWR	PW	14	MLA	330	12	7.0	5.6	1.6	8	12	Q1



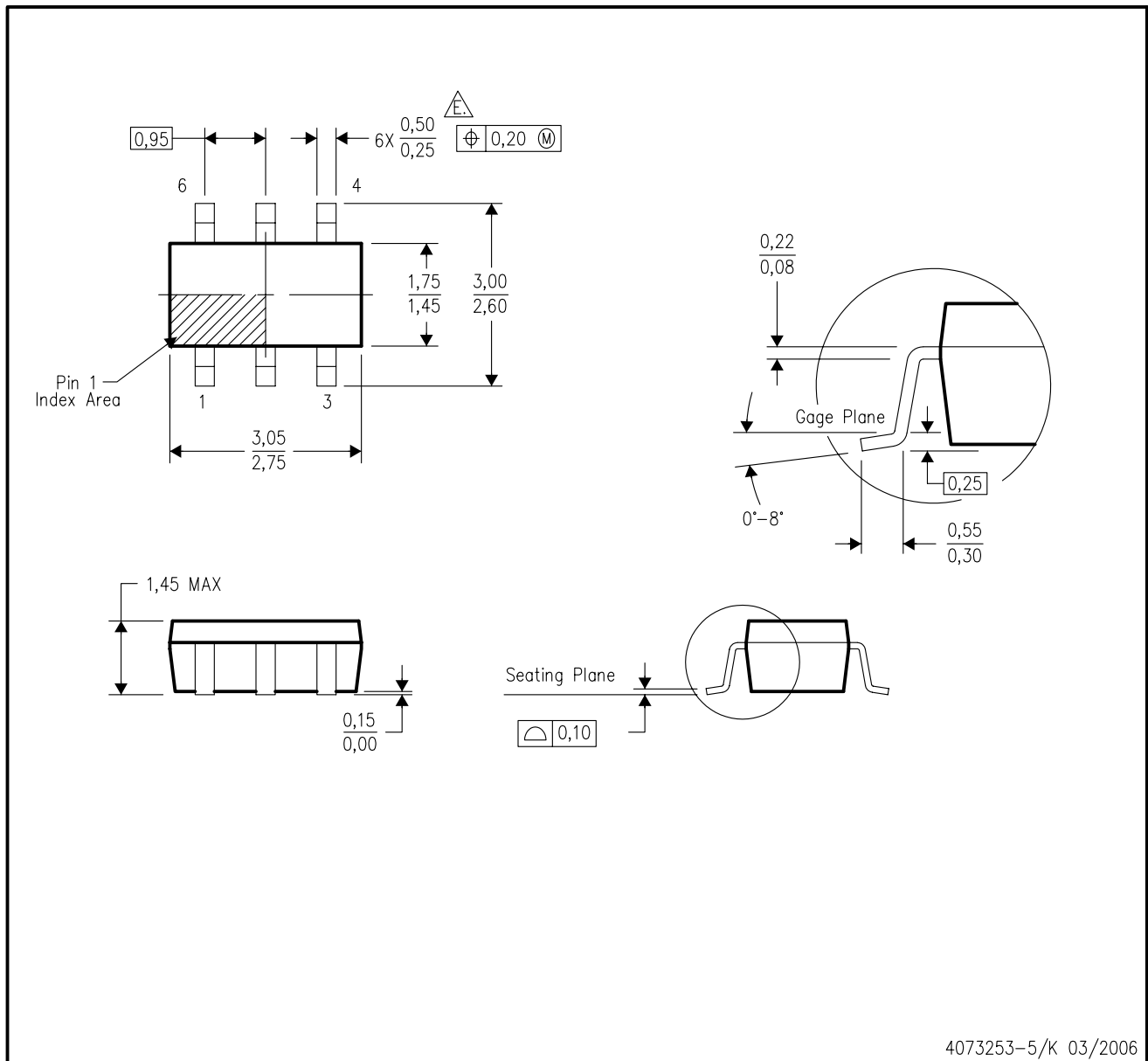
TAPE AND REEL BOX INFORMATION

Device	Package	Pins	Site	Length (mm)	Width (mm)	Height (mm)
LMV341IDBVR	DBV	6	NSE	220.0	205.0	50.0
LMV341IDCKR	DCK	6	HNT	202.0	201.0	28.0
LMV342IDGKR	DGK	8	HNT	0.0	0.0	0.0
LMV342IDR	D	8	FMX	342.9	336.6	20.64
LMV344IDR	D	14	MLA	346.0	346.0	33.0
LMV344IPWR	PW	14	MLA	346.0	346.0	29.0



DBV (R-PDSO-G6)

PLASTIC SMALL-OUTLINE PACKAGE



- 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. Mold flash and protrusion shall not exceed 0.15 per side.
 - D. Leads 1,2,3 may be wider than leads 4,5,6 for package orientation.
- $\triangle E$ Falls within JEDEC MO-178 Variation AB, except minimum lead width.

DGK (S-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 per end.
 - Body width does not include interlead flash. Interlead flash shall not exceed 0.50 per side.
 - Falls within JEDEC MO-187 variation AA, except interlead flash.

DCK (R-PDSO-G6)

PLASTIC SMALL-OUTLINE PACKAGE



- 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. Mold flash and protrusion shall not exceed 0.15 per side.
 - D. Falls within JEDEC MO-203 variation AB.

D (R-PDSO-G14)

PLASTIC SMALL-OUTLINE PACKAGE

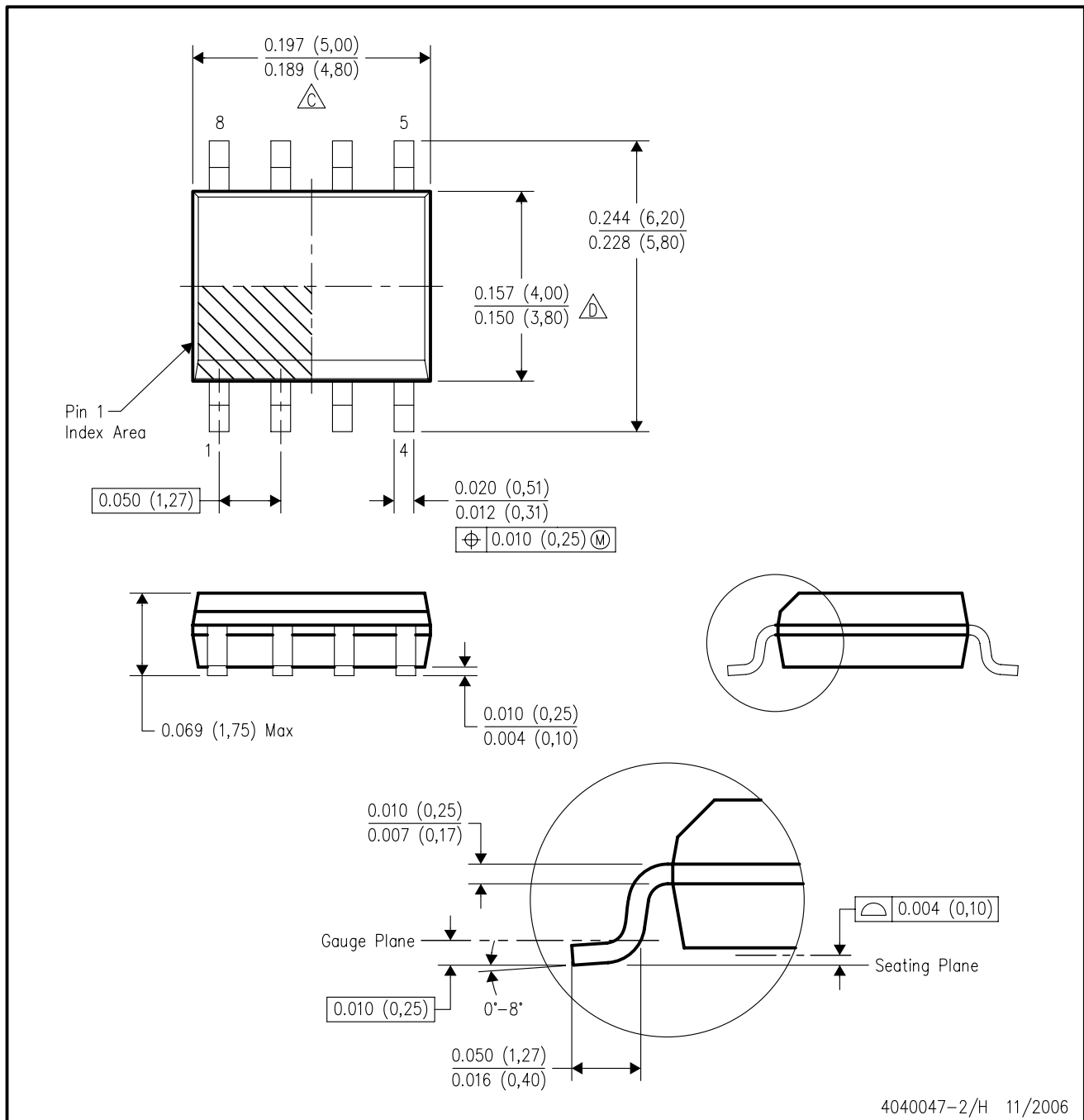


4040047-3/H 11/2006

- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - $\triangle C$ Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 (0,15) per end.
 - $\triangle D$ Body width does not include interlead flash. Interlead flash shall not exceed .017 (0,43) per side.
 - E. Reference JEDEC MS-012 variation AB.

D (R-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 (0,15) per end.
 - D. Body width does not include interlead flash. Interlead flash shall not exceed .017 (0,43) per side.
 - E. Reference JEDEC MS-012 variation AA.

PW (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



4040064/F 01/97

- 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

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products		Applications	
Amplifiers	amplifier.ti.com	Audio	www.ti.com/audio
Data Converters	dataconverter.ti.com	Automotive	www.ti.com/automotive
DSP	dsp.ti.com	Broadband	www.ti.com/broadband
Interface	interface.ti.com	Digital Control	www.ti.com/digitalcontrol
Logic	logic.ti.com	Military	www.ti.com/military
Power Mgmt	power.ti.com	Optical Networking	www.ti.com/opticalnetwork
Microcontrollers	microcontroller.ti.com	Security	www.ti.com/security
RFID	www.ti-rfid.com	Telephony	www.ti.com/telephony
Low Power Wireless	www.ti.com/lpw	Video & Imaging	www.ti.com/video
		Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2007, Texas Instruments Incorporated