

## FEATURES

- **Power-Supply Voltage Range:** 2.2 V to 5 V
- **Low Supply Current:** 930  $\mu$ A/Amplifier at 2.2 V
- **High Unity-Gain Bandwidth:** 10 MHz
- **Rail-to-Rail Output Swing**
  - 600- $\Omega$  Load: 120 mV From Either Rail at 2.2 V
  - 2-k $\Omega$  Load: 50 mV From Either Rail at 2.2 V
- **Input Common-Mode Voltage Range Includes Ground**
- **Input Voltage Noise:** 9 nV/ $\sqrt{\text{Hz}}$  at f = 1 kHz

## APPLICATIONS

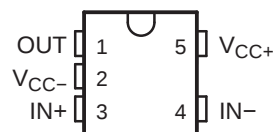
- Cellular and Cordless Phones
- Active Filter and Buffers
- Laptops and PDAs
- Battery Powered Electronics

## DESCRIPTION/ORDERING INFORMATION

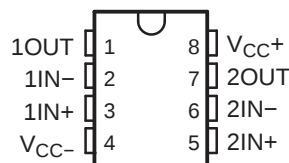
The LMV721 (single) and LMV722 (dual) are low-noise low-voltage low-power operational amplifiers that can be designed into a wide range of applications. The LMV721 and LMV722 have a unity-gain bandwidth of 10 MHz, a slew rate of 5 V/ $\mu$ s, and a quiescent current of 930  $\mu$ A/amplifier at 2.2 V.

The LMV721 and LMV722 are designed to provide optimal performance in low-voltage and low-noise systems. They provide rail-to-rail output swing into heavy loads. The input common-mode voltage range includes ground, and the maximum input offset voltage are 3.5 mV (over recommended temperature range) for the devices. Their capacitive load capability is also good at low supply voltages. The operating range is from 2.2 V to 5.5 V.

LMV721...DBV or DCK PACKAGE  
(TOP VIEW)



LMV722...D, DGK, OR DRG PACKAGE  
(TOP VIEW)



## ORDERING INFORMATION

| T <sub>A</sub> | PACKAGE <sup>(1)</sup> |              |              | ORDERABLE PART NUMBER | TOP-SIDE MARKING <sup>(2)</sup> |
|----------------|------------------------|--------------|--------------|-----------------------|---------------------------------|
| –40°C to 85°C  | Single                 | SC-70 – DCK  | Reel of 3000 | LMV721IDCKR           | RK_                             |
|                |                        |              | Reel of 250  | LMV721IDCKT           |                                 |
|                |                        | SOT-23 – DBV | Reel of 3000 | LMV721IDBVR           | RBF_                            |
|                | Dual                   | SOIC – D     | Reel of 2500 | LMV722IDR             | MV722I                          |
|                |                        |              | Tube of 75   | LMV722ID              |                                 |
|                |                        | VSSOP – DGK  | Reel of 2500 | LMV722IDGKR           | R6_                             |
|                |                        | QFN – DRG    | Reel of 2500 | LMV722IDRGR           | ZYY                             |

(1) Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).

(2) DBV/DCK/DGK: The actual top-side marking has one additional character that designates the assembly/test site.



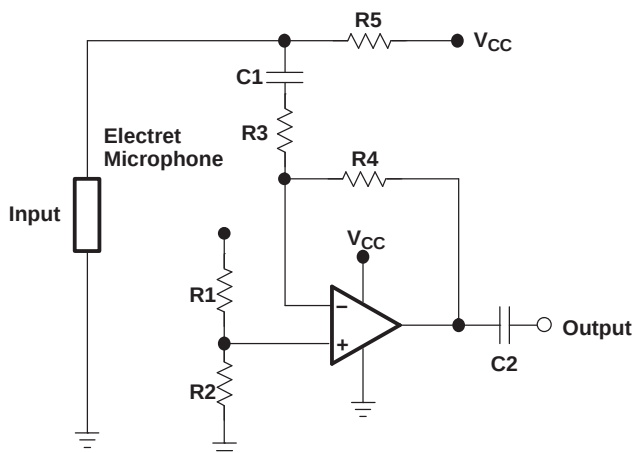
Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

# LMV721, LMV722

## 10-MHz LOW-NOISE LOW-VOLTAGE LOW-POWER OPERATIONAL AMPLIFIERS

SLOS470A – JUNE 2005 – REVISED AUGUST 2006

### Typical Application



### Absolute Maximum Ratings<sup>(1)</sup>

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

|                     |                                           | MIN                        | MAX             | UNIT |
|---------------------|-------------------------------------------|----------------------------|-----------------|------|
| $V_{CC+} - V_{CC-}$ | Supply voltage <sup>(2)</sup>             |                            | 5.5             | V    |
| $V_{ID}$            | Differential input voltage <sup>(3)</sup> |                            | ±Supply voltage | V    |
| $\theta_{JA}$       | Package thermal impedance <sup>(4)</sup>  | D package <sup>(5)</sup>   | 97              | °C/W |
|                     |                                           | DBV package <sup>(5)</sup> | 206             |      |
|                     |                                           | DCK package <sup>(5)</sup> | 252             |      |
|                     |                                           | DGK package <sup>(5)</sup> | 172             |      |
|                     |                                           | DRG package <sup>(6)</sup> | 50.7            |      |
| $T_J$               | 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  $V_{CC}$  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  $T_J(max)$ ,  $\theta_{JA}$ , and  $T_A$ . The maximum allowable power dissipation at any allowable ambient temperature is  $P_D = (T_J(max) - T_A)/\theta_{JA}$ . 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.
- (6) The package thermal impedance is calculated in accordance with JESD 51-5.

### Recommended Operating Conditions

|                     |                                        | MIN | MAX | UNIT |
|---------------------|----------------------------------------|-----|-----|------|
| $V_{CC+} - V_{CC-}$ | Supply voltage                         | 2.2 | 5   | V    |
| $T_J$               | Operating virtual-junction temperature | –40 | 85  | °C   |

### ESD Protection

|                  | TYP  | UNIT |
|------------------|------|------|
| Human-Body Model | 2000 | V    |
| Machine Model    | 100  | V    |

## Electrical Characteristics

 $V_{CC+} = 2.2\text{ V}$ ,  $V_{CC-} = \text{GND}$ ,  $V_{ICR} = V_{CC+}/2$ ,  $V_O = V_{CC+}/2$ , and  $R_L > 1\text{ M}\Omega$  (unless otherwise noted)

| PARAMETER  |                                    | TEST CONDITIONS                                                                     | $T_J$         | MIN   | TYP   | MAX   | UNIT                         |
|------------|------------------------------------|-------------------------------------------------------------------------------------|---------------|-------|-------|-------|------------------------------|
| $V_{IO}$   | Input offset voltage               |                                                                                     | 25°C          |       | 0.02  | 3     | mV                           |
|            |                                    |                                                                                     | –40°C to 85°C |       |       | 3.5   |                              |
| $TCV_{IO}$ | Input offset voltage average drift |                                                                                     | 25°C          |       | 0.6   |       | $\mu\text{V}/^\circ\text{C}$ |
| $I_{IB}$   | Input bias current                 |                                                                                     | 25°C          |       | 260   |       | nA                           |
| $I_{IO}$   | Input offset current               |                                                                                     | 25°C          |       | 25    |       | nA                           |
| CMMR       | Common-mode rejection ratio        | $V_{ICR} = 0\text{ V to }1.3\text{ V}$                                              | 25°C          | 70    | 88    |       | dB                           |
|            |                                    |                                                                                     | –40°C to 85°C | 64    |       |       |                              |
| PSRR       | Power-supply rejection ratio       | $V_{CC+} = 2.2\text{ V to }5\text{ V}$ ,<br>$V_O = 0$ , $V_{ICR} = 0$               | 25°C          | 80    | 90    |       | dB                           |
|            |                                    |                                                                                     | –40°C to 85°C | 70    |       |       |                              |
| $V_{ICR}$  | Input common-mode voltage          | CMRR $\geq 50\text{ dB}$                                                            | 25°C          |       | –0.3  |       | V                            |
|            |                                    |                                                                                     |               |       | 0.3   |       |                              |
| $A_{VD}$   | Large-signal voltage gain          | $R_L = 600\ \Omega$ ,<br>$V_O = 0.75\text{ V to }2\text{ V}$                        | 25°C          | 75    | 81    |       | dB                           |
|            |                                    |                                                                                     | –40°C to 85°C | 70    |       |       |                              |
|            |                                    | $R_L = 2\text{ k}\Omega$ ,<br>$V_O = 0.5\text{ V to }2.1\text{ V}$                  | 25°C          | 75    | 84    |       |                              |
|            |                                    |                                                                                     | –40°C to 85°C | 70    |       |       |                              |
| $V_O$      | Output swing                       | $R_L = 600\ \Omega\text{ to }V_{CC+}/2$                                             | 25°C          | 2.090 | 2.125 |       | V                            |
|            |                                    |                                                                                     | –40°C to 85°C | 2.065 |       |       |                              |
|            |                                    |                                                                                     | 25°C          |       | 0.071 | 0.120 |                              |
|            |                                    |                                                                                     | –40°C to 85°C |       |       | 0.145 |                              |
|            |                                    | $R_L = 2\text{ k}\Omega\text{ to }V_{CC+}/2$                                        | 25°C          | 2.150 | 2.177 |       |                              |
|            |                                    |                                                                                     | –40°C to 85°C | 2.125 |       |       |                              |
| $I_O$      | Output current                     | Sourcing, $V_O = 0\text{ V}$ ,<br>$V_{IN(\text{diff})} = \pm 0.5\text{ V}$          | 25°C          | 10    | 14.9  |       | mA                           |
|            |                                    |                                                                                     | –40°C to 85°C | 5     |       |       |                              |
|            |                                    | Sinking, $V_O = 2.2\text{ V}$ ,<br>$V_{IN(\text{diff})} = \pm 0.5\text{ V}$         | 25°C          | 10    | 17.6  |       |                              |
|            |                                    |                                                                                     | –40°C to 85°C | 5     |       |       |                              |
| $I_{CC}$   | Supply current                     | LMV721                                                                              | 25°C          |       | 0.93  | 1.3   | mA                           |
|            |                                    |                                                                                     | –40°C to 85°C |       |       | 1.5   |                              |
|            |                                    | LMV722                                                                              | 25°C          |       | 1.81  | 2.4   |                              |
|            |                                    |                                                                                     | –40°C to 85°C |       |       | 2.6   |                              |
| SR         | Slew rate <sup>(1)</sup>           |                                                                                     | 25°C          |       | 4.9   |       | V/ $\mu\text{s}$             |
| GBW        | Gain bandwidth product             |                                                                                     | 25°C          |       | 10    |       | MHz                          |
| $\Phi_m$   | Phase margin                       |                                                                                     | 25°C          |       | 67.4  |       | °                            |
| $G_m$      | Gain margin                        |                                                                                     | 25°C          |       | –9.8  |       | dB                           |
| $V_n$      | Input-referred voltage noise       | $f = 1\text{ kHz}$                                                                  | 25°C          |       | 9     |       | $\text{nV}/\sqrt{\text{Hz}}$ |
| $I_n$      | Input-referred current noise       | $f = 1\text{ kHz}$                                                                  | 25°C          |       | 0.3   |       | $\text{pA}/\sqrt{\text{Hz}}$ |
| THD        | Total harmonic distortion          | $f = 1\text{ kHz}$ , $AV = 1$ ,<br>$R_L = 600\ \Omega$ , $V_O = 500\text{ mV}_{pp}$ | 25°C          |       | 0.004 |       | %                            |

(1) Connected as voltage follower with 1-V step input. Number specified is the slower of the positive and negative slew rate.

# LMV721, LMV722

## 10-MHz LOW-NOISE LOW-VOLTAGE LOW-POWER OPERATIONAL AMPLIFIERS

SLOS470A – JUNE 2005 – REVISED AUGUST 2006

### Electrical Characteristics

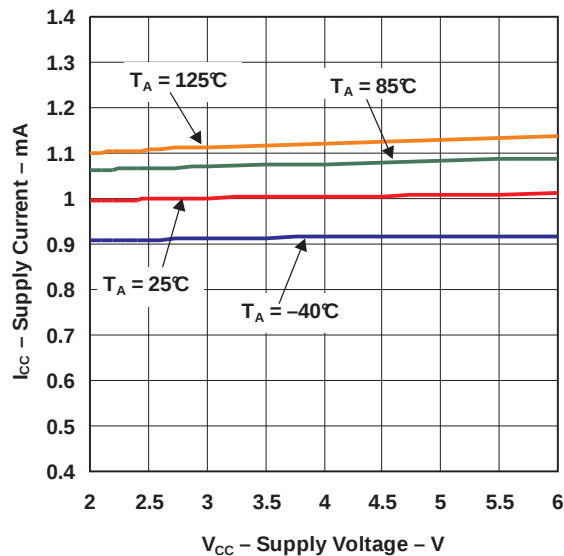
$V_{CC+} = 5\text{ V}$ ,  $V_{CC-} = \text{GND}$ ,  $V_{ICR} = V_{CC+}/2$ ,  $V_O = V_{CC+}/2$ , and  $R_L > 1\text{ M}\Omega$  (unless otherwise noted)

| PARAMETER  |                                    | TEST CONDITIONS                                                                      | $T_J$         | MIN   | TYP   | MAX   | UNIT                         |
|------------|------------------------------------|--------------------------------------------------------------------------------------|---------------|-------|-------|-------|------------------------------|
| $V_{IO}$   | Input offset voltage               |                                                                                      | 25°C          |       | –0.08 | 3     | mV                           |
|            |                                    |                                                                                      | –40°C to 85°C |       |       | 3.5   |                              |
| $TCV_{IO}$ | Input offset voltage average drift |                                                                                      | 25°C          |       | 0.6   |       | $\mu\text{V}/^\circ\text{C}$ |
| $I_{IB}$   | Input bias current                 |                                                                                      | 25°C          |       | 260   |       | nA                           |
| $I_{IO}$   | Input offset current               |                                                                                      | 25°C          |       | 25    |       | nA                           |
| CMMR       | Common-mode rejection ratio        | $V_{ICR} = 0\text{ V to }1.3\text{ V}$                                               | 25°C          | 80    | 89    |       | dB                           |
|            |                                    |                                                                                      | –40°C to 85°C | 75    |       |       |                              |
| PSRR       | Power-supply rejection ratio       | $V_{CC+} = 2.2\text{ V to }5\text{ V}$ ,<br>$V_O = 0$ , $V_{ICR} = 0$                | 25°C          | 70    | 90    |       | dB                           |
|            |                                    |                                                                                      | –40°C to 85°C | 64    |       |       |                              |
| $V_{ICR}$  | Input common-mode voltage          | CMRR $\geq 50\text{ dB}$                                                             | 25°C          |       | –0.3  |       | V                            |
|            |                                    |                                                                                      |               |       | 4.1   |       |                              |
| $A_{VD}$   | Large-signal voltage gain          | $R_L = 600\ \Omega$ ,<br>$V_O = 0.75\text{ V to }4.8\text{ V}$                       | 25°C          | 80    | 87    |       | dB                           |
|            |                                    |                                                                                      | –40°C to 85°C | 70    |       |       |                              |
|            |                                    | $R_L = 2\text{ k}\Omega$ ,<br>$V_O = 0.7\text{ V to }4.9\text{ V}$                   | 25°C          | 80    | 94    |       |                              |
|            |                                    |                                                                                      | –40°C to 85°C | 70    |       |       |                              |
| $V_O$      | Output swing                       | $R_L = 600\ \Omega\text{ to }V_{CC+}/2$                                              | 25°C          | 4.84  | 4.882 |       | V                            |
|            |                                    |                                                                                      | –40°C to 85°C | 4.815 |       |       |                              |
|            |                                    |                                                                                      | 25°C          |       | 0.134 | 0.19  |                              |
|            |                                    |                                                                                      | –40°C to 85°C |       |       | 0.215 |                              |
|            |                                    | $R_L = 2\text{ k}\Omega\text{ to }V_{CC+}/2$                                         | 25°C          | 4.93  | 4.952 |       |                              |
|            |                                    |                                                                                      | –40°C to 85°C | 4.905 |       |       |                              |
| $I_O$      | Output current                     | Sourcing, $V_O = 0\text{ V}$ ,<br>$V_{IN(\text{diff})} = \pm 0.5\text{ V}$           | 25°C          | 20    | 52.6  |       | mA                           |
|            |                                    |                                                                                      | –40°C to 85°C | 12    |       |       |                              |
|            |                                    | Sinking, $V_O = 2.2\text{ V}$ ,<br>$V_{IN(\text{diff})} = \pm 0.5\text{ V}$          | 25°C          | 15    | 23.7  |       |                              |
|            |                                    |                                                                                      | –40°C to 85°C | 8.5   |       |       |                              |
| $I_{CC}$   | Supply current                     | LMV721                                                                               | 25°C          |       | 1.03  | 1.4   | mA                           |
|            |                                    |                                                                                      | –40°C to 85°C |       |       | 1.7   |                              |
|            |                                    | LMV722                                                                               | 25°C          |       | 2.01  | 2.4   |                              |
|            |                                    |                                                                                      | –40°C to 85°C |       |       | 2.8   |                              |
| SR         | Slew rate <sup>(1)</sup>           |                                                                                      | 25°C          |       | 5.25  |       | V/ $\mu\text{s}$             |
| GBW        | Gain bandwidth product             |                                                                                      | 25°C          |       | 10    |       | MHz                          |
| $\Phi_m$   | Phase margin                       |                                                                                      | 25°C          |       | 72    |       | °                            |
| $G_m$      | Gain margin                        |                                                                                      | 25°C          |       | –11   |       | dB                           |
| $V_n$      | Input-referred voltage noise       | $f = 1\text{ kHz}$                                                                   | 25°C          |       | 8.5   |       | $\text{nV}/\sqrt{\text{Hz}}$ |
| $I_n$      | Input-referred current noise       | $f = 1\text{ kHz}$                                                                   | 25°C          |       | 0.2   |       | $\text{pA}/\sqrt{\text{Hz}}$ |
| THD        | Total harmonic distortion          | $f = 1\text{ kHz}$ , $A_V = 1$ ,<br>$R_L = 600\ \Omega$ , $V_O = 500\text{ mV}_{pp}$ | 25°C          |       | 0.001 |       | %                            |

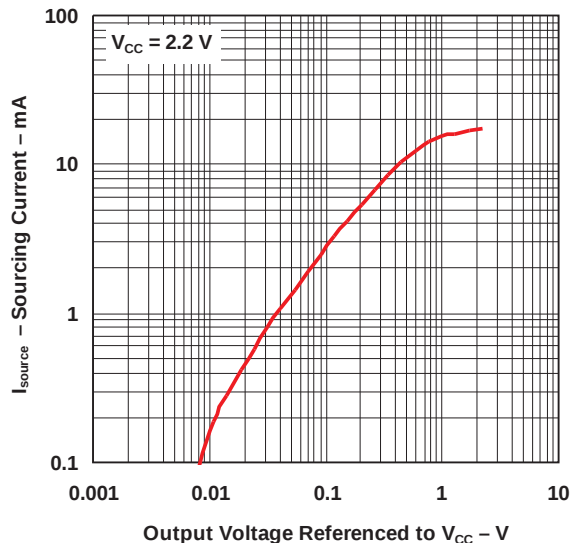
(1) Connected as voltage follower with 1-V step input. Number specified is the slower of the positive and negative slew rate.

## TYPICAL CHARACTERISTICS

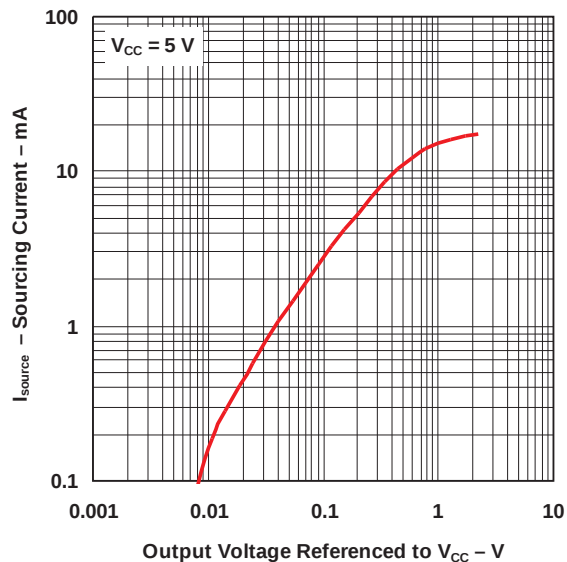
SUPPLY CURRENT  
 vs  
 SUPPLY VOLTAGE



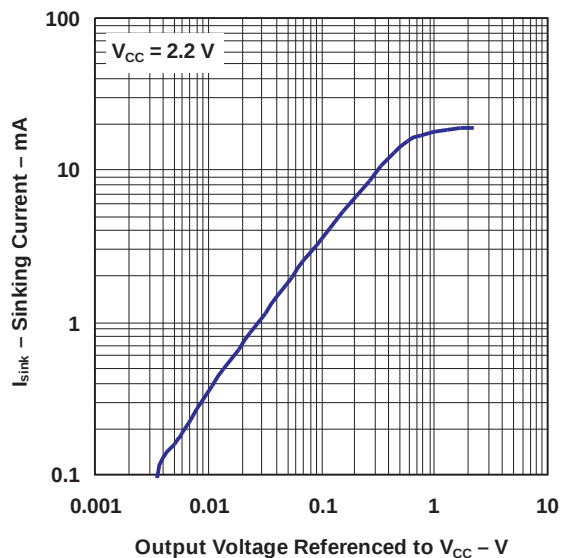
SOURCING CURRENT  
 vs  
 OUTPUT VOLTAGE



SOURCING CURRENT  
 vs  
 OUTPUT VOLTAGE

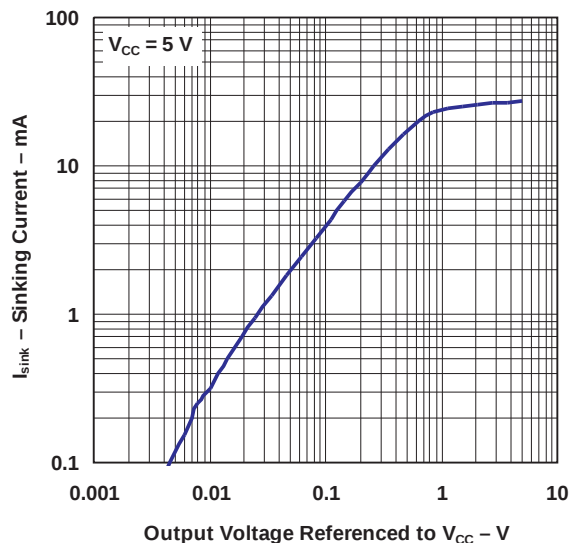


SINKING CURRENT  
 vs  
 OUTPUT VOLTAGE

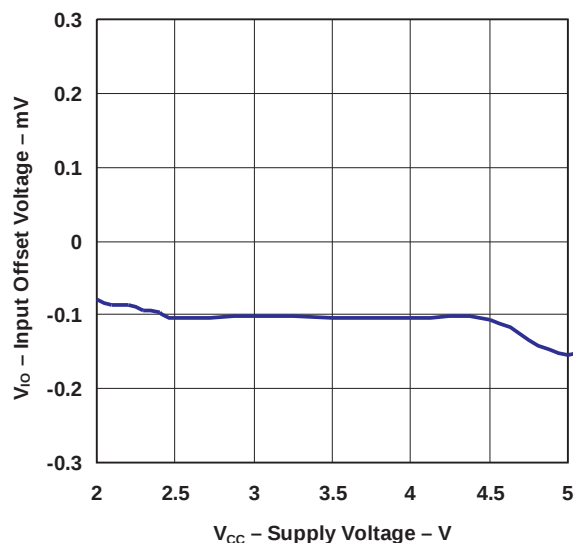


## TYPICAL CHARACTERISTICS (continued)

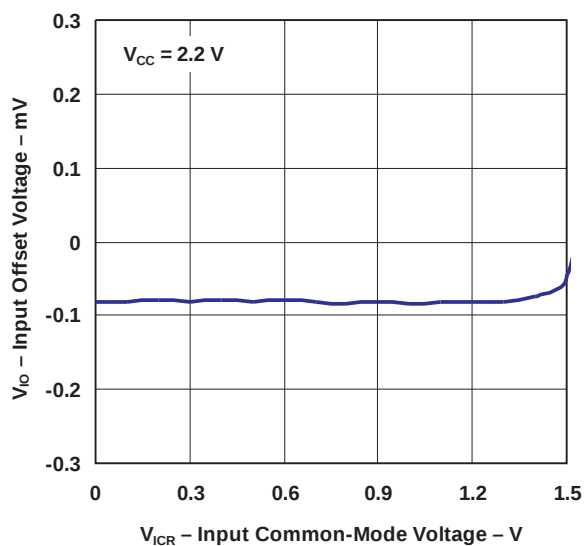
SINKING CURRENT  
vs  
OUTPUT VOLTAGE



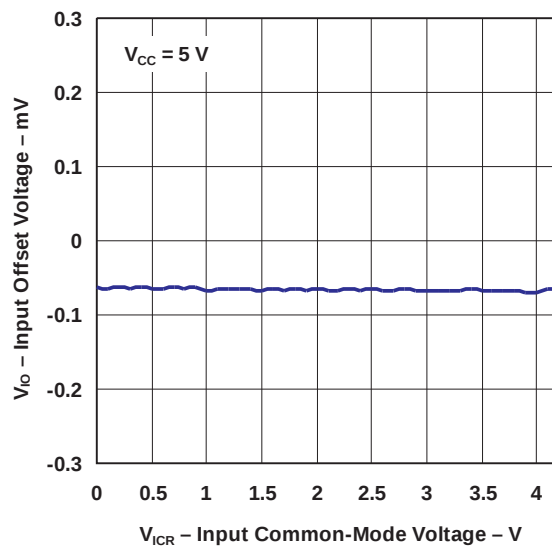
OUTPUT VOLTAGE SWING  
vs  
SUPPLY VOLTAGE



INPUT OFFSET VOLTAGE  
vs  
INPUT COMMON-MODE VOLTAGE

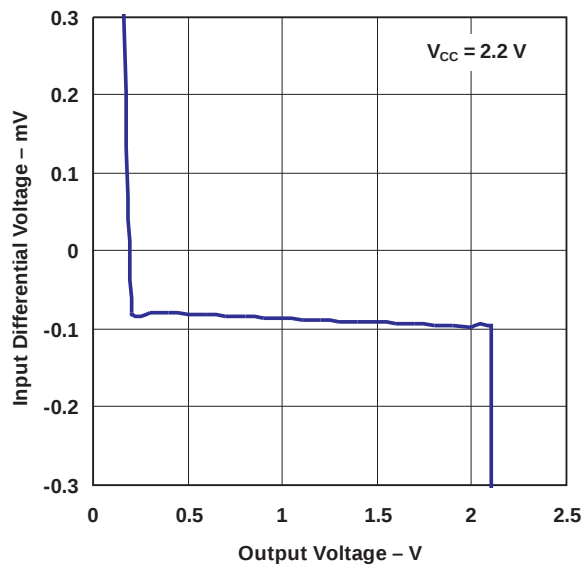


INPUT OFFSET VOLTAGE  
vs  
INPUT COMMON-MODE VOLTAGE

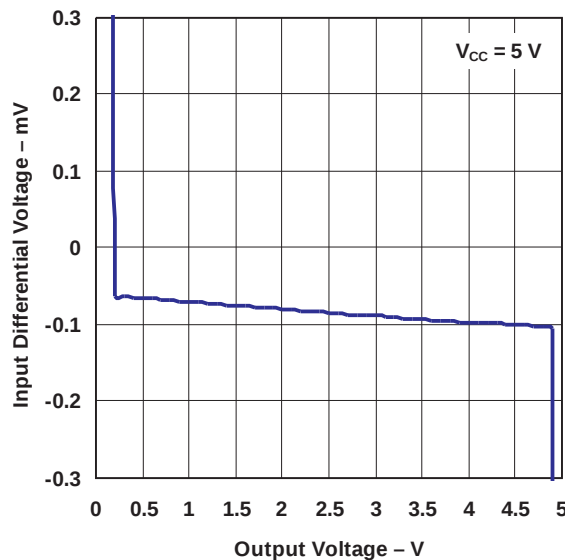


TYPICAL CHARACTERISTICS (continued)

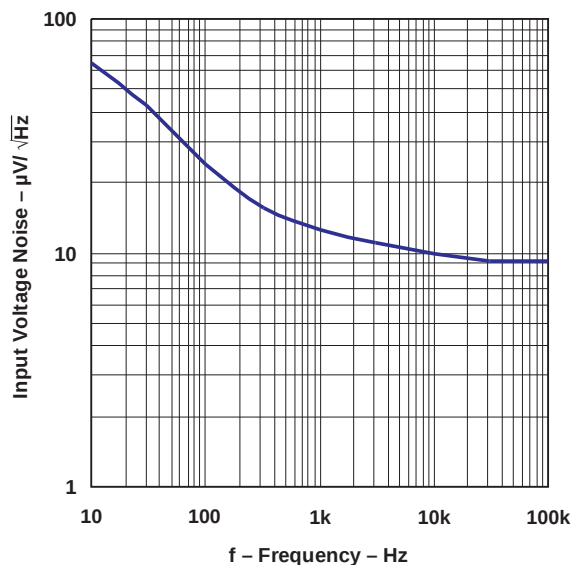
INPUT VOLTAGE  
vs  
OUTPUT VOLTAGE



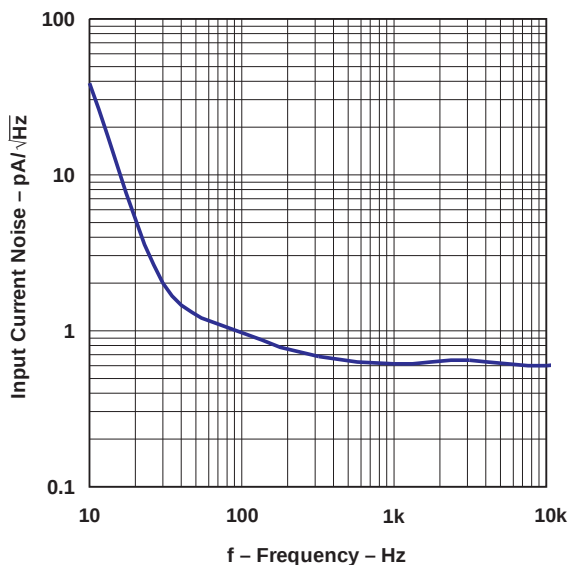
INPUT VOLTAGE  
vs  
OUTPUT VOLTAGE



INPUT VOLTAGE NOISE  
vs  
FREQUENCY

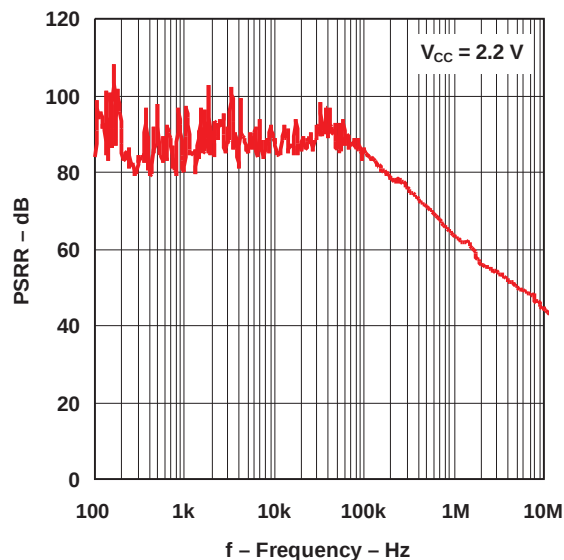


INPUT CURRENT NOISE  
vs  
FREQUENCY

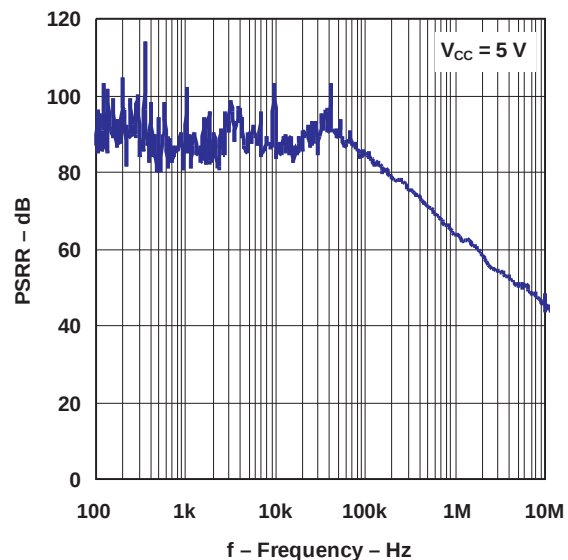


## TYPICAL CHARACTERISTICS (continued)

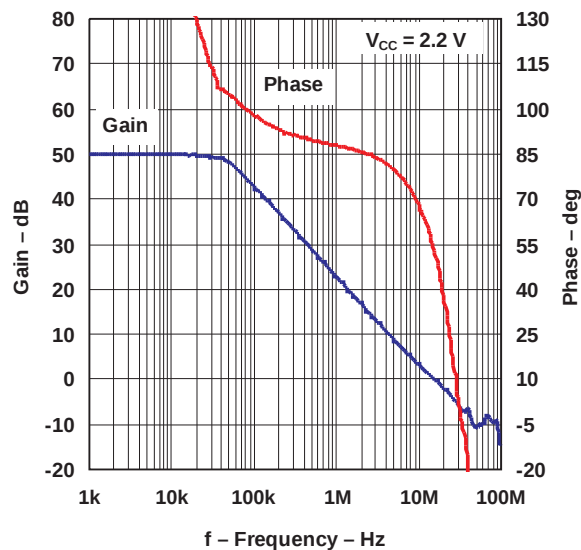
PSRR  
vs  
FREQUENCY



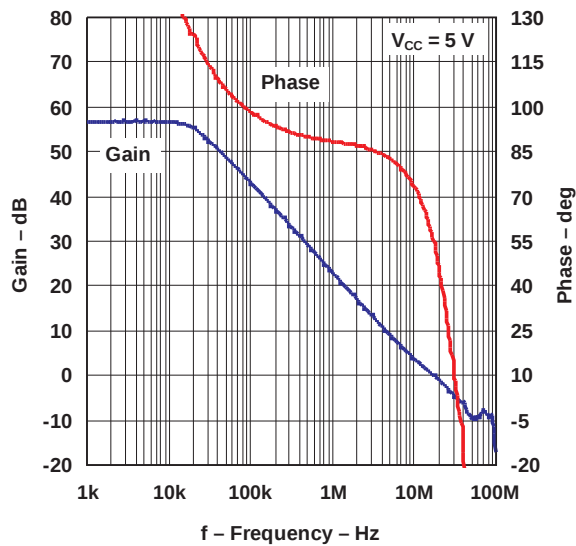
PSRR  
vs  
FREQUENCY



GAIN AND PHASE  
vs  
FREQUENCY

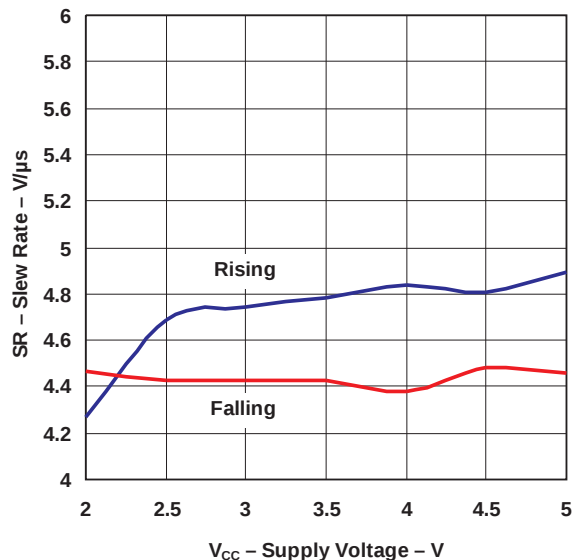


GAIN AND PHASE  
vs  
FREQUENCY

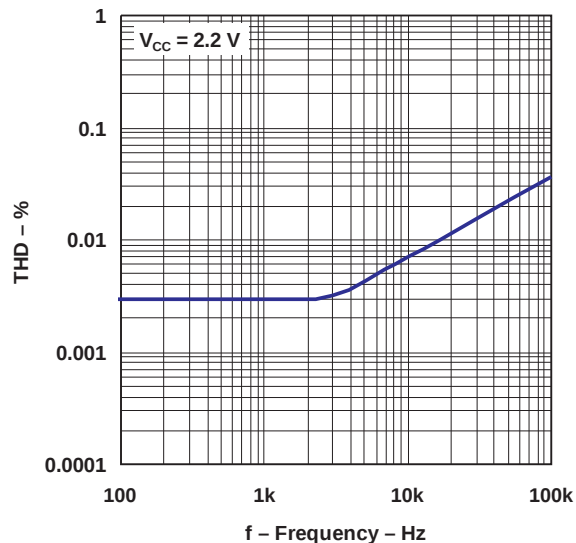


## TYPICAL CHARACTERISTICS (continued)

SLEW RATE  
vs  
SUPPLY VOLTAGE

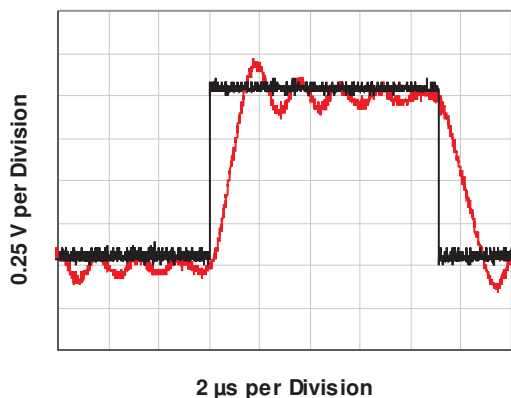


THD  
vs  
FREQUENCY



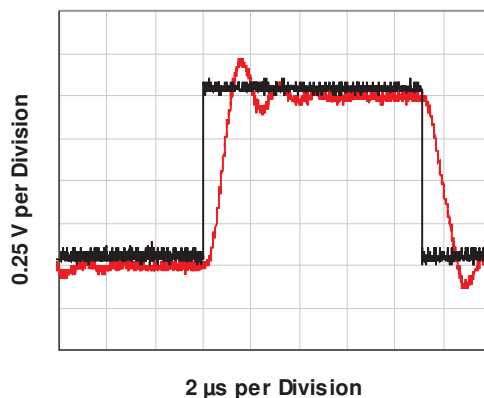
PULSE RESPONSE

$V_{CC} = 5 \text{ V}$ ,  $R_L = 2 \text{ k}\Omega$ ,  $C_L = 21.2 \text{ nF}$ ,  $R_o = 0 \Omega$



PULSE RESPONSE

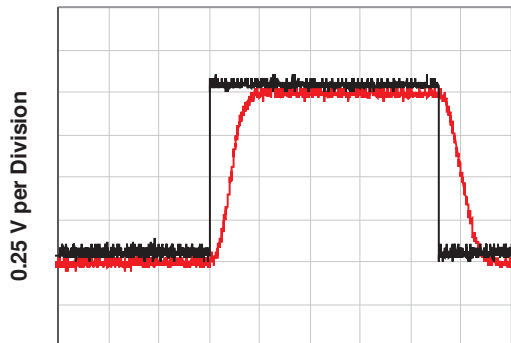
$V_{CC} = 5 \text{ V}$ ,  $R_L = 2 \text{ k}\Omega$ ,  $C_L = 21.2 \text{ nF}$ ,  $R_o = 2.1 \Omega$



## TYPICAL CHARACTERISTICS (continued)

PULSE RESPONSE

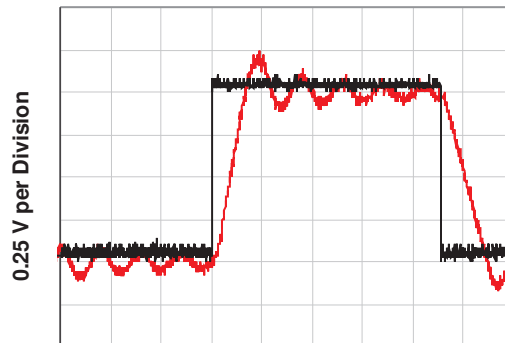
$V_{CC} = 5\text{ V}$ ,  $R_L = 2\text{ k}\Omega$ ,  $C_L = 21.2\text{ nF}$ ,  $R_o = 9.5\text{ }\Omega$



2  $\mu\text{s}$  per Division

PULSE RESPONSE

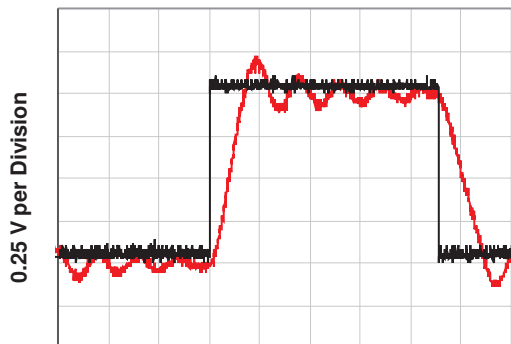
$V_{CC} = 5\text{ V}$ ,  $R_L = 10\text{ k}\Omega$ ,  $C_L = 21.2\text{ nF}$ ,  $R_o = 0\text{ }\Omega$



2  $\mu\text{s}$  per Division

PULSE RESPONSE

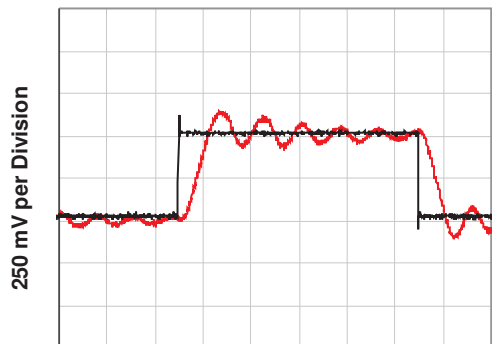
$V_{CC} = 5\text{ V}$ ,  $R_L = 600\text{ }\Omega$ ,  $C_L = 21.2\text{ nF}$ ,  $R_o = 0\text{ }\Omega$



2  $\mu\text{s}$  per Division

PULSE RESPONSE

$V_{CC} = 2.2\text{ V}$ ,  $R_L = 2\text{ }\Omega$ ,  $C_L = 2.12\text{ nF}$ ,  $R_o = 0\text{ }\Omega$

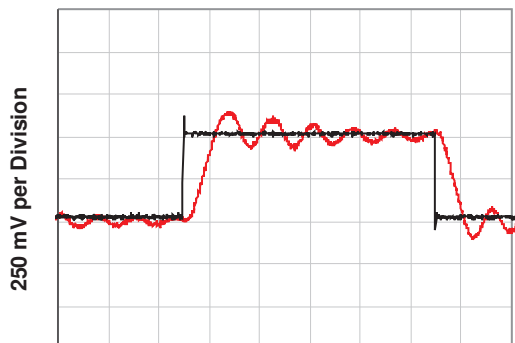


1  $\mu\text{s}$  per Division

## TYPICAL CHARACTERISTICS (continued)

PULSE RESPONSE

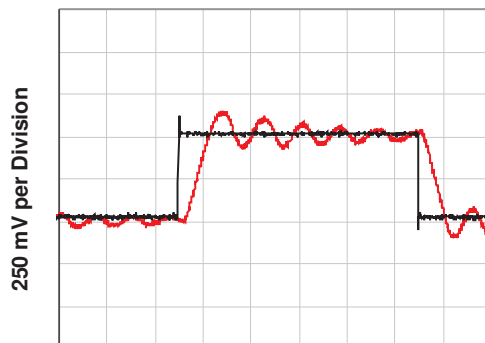
$V_{CC} = 2.2\text{ V}$ ,  $R_L = 2\text{ k}\Omega$ ,  $C_L = 2.12\text{ nF}$ ,  $R_o = 0\ \Omega$



1  $\mu\text{s}$  per Division

PULSE RESPONSE

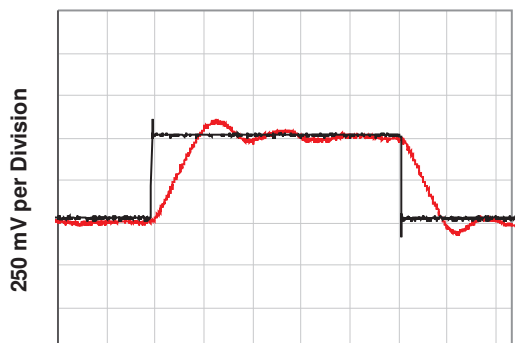
$V_{CC} = 2.2\text{ V}$ ,  $R_L = 10\text{ k}\Omega$ ,  $C_L = 2.12\text{ nF}$ ,  $R_o = 0\ \Omega$



1  $\mu\text{s}$  per Division

PULSE RESPONSE

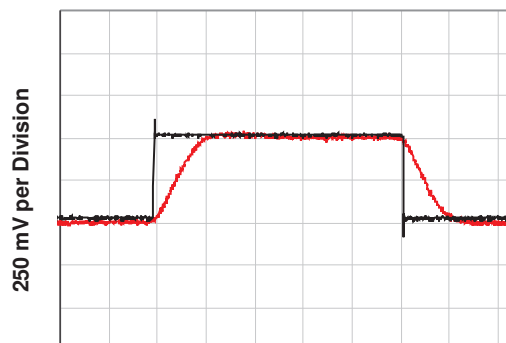
$V_{CC} = 2.2\text{ V}$ ,  $R_L = 10\text{ k}\Omega$ ,  $C_L = 2.12\text{ nF}$ ,  $R_o = 2.2\ \Omega$



1  $\mu\text{s}$  per Division

PULSE RESPONSE

$V_{CC} = 2.2\text{ V}$ ,  $R_L = 10\text{ k}\Omega$ ,  $C_L = 2.12\text{ nF}$ ,  $R_o = 11.5\ \Omega$

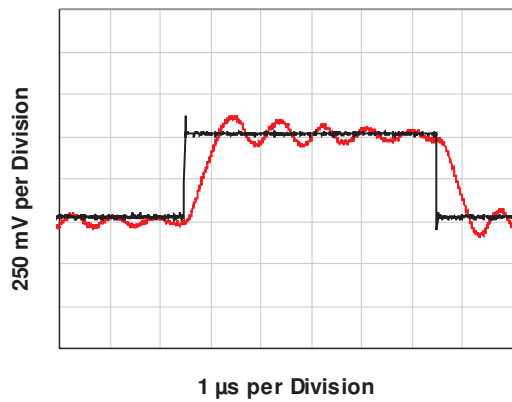


1  $\mu\text{s}$  per Division

## TYPICAL CHARACTERISTICS (continued)

### PULSE RESPONSE

$$V_{CC} = 2.2 \text{ V}, R_L = 600 \, \Omega, C_L = 1.89 \text{ nF}, R_o = 0 \, \Omega$$



**PACKAGING INFORMATION**

| Orderable Device | Status <sup>(1)</sup> | Package Type | Package Drawing | Pins | Package Qty | Eco Plan <sup>(2)</sup> | Lead/Ball Finish | MSL Peak Temp <sup>(3)</sup> |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| LMV721IDBVR      | ACTIVE                | SOT-23       | DBV             | 5    | 3000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| LMV721IDBVRG4    | ACTIVE                | SOT-23       | DBV             | 5    | 3000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| LMV721IDCKR      | ACTIVE                | SC70         | DCK             | 5    | 3000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| LMV721IDCKRG4    | ACTIVE                | SC70         | DCK             | 5    | 3000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| LMV721IDCKT      | ACTIVE                | SC70         | DCK             | 5    | 250         | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| LMV721IDCKTG4    | ACTIVE                | SC70         | DCK             | 5    | 250         | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| LMV722ID         | ACTIVE                | SOIC         | D               | 8    | 75          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| LMV722IDG4       | ACTIVE                | SOIC         | D               | 8    | 75          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| LMV722IDGKR      | ACTIVE                | MSOP         | DGK             | 8    | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| LMV722IDGKRG4    | ACTIVE                | MSOP         | DGK             | 8    | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| LMV722IDR        | ACTIVE                | SOIC         | D               | 8    | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| LMV722IDRG4      | ACTIVE                | SOIC         | D               | 8    | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |

<sup>(1)</sup> 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.

<sup>(2)</sup> 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.

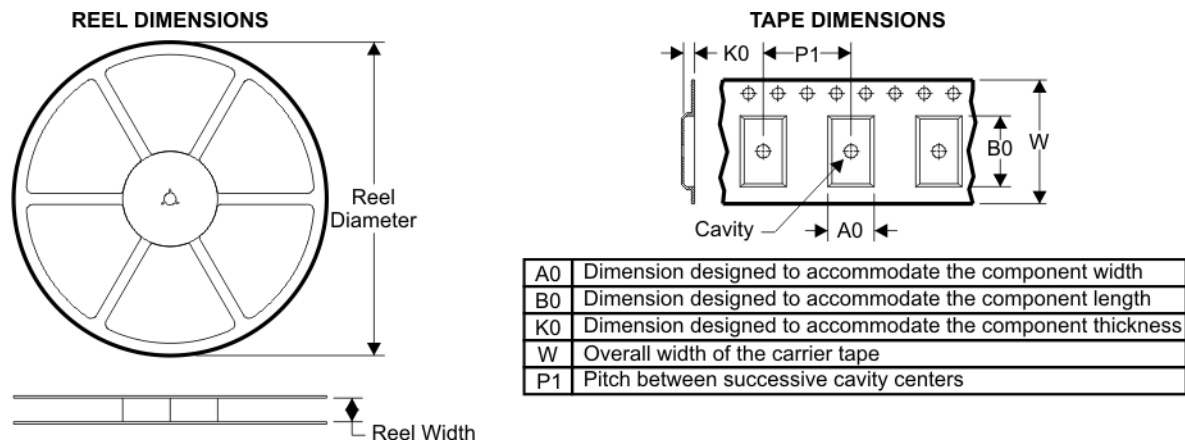
**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

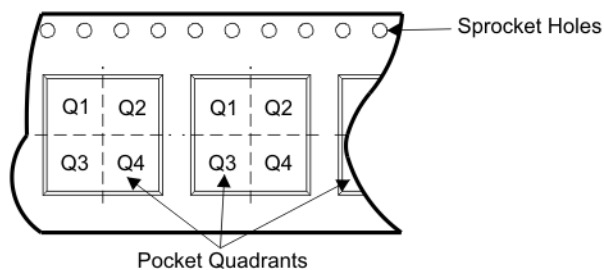
**Important Information and Disclaimer:** The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. 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.

**TAPE AND REEL BOX INFORMATION**

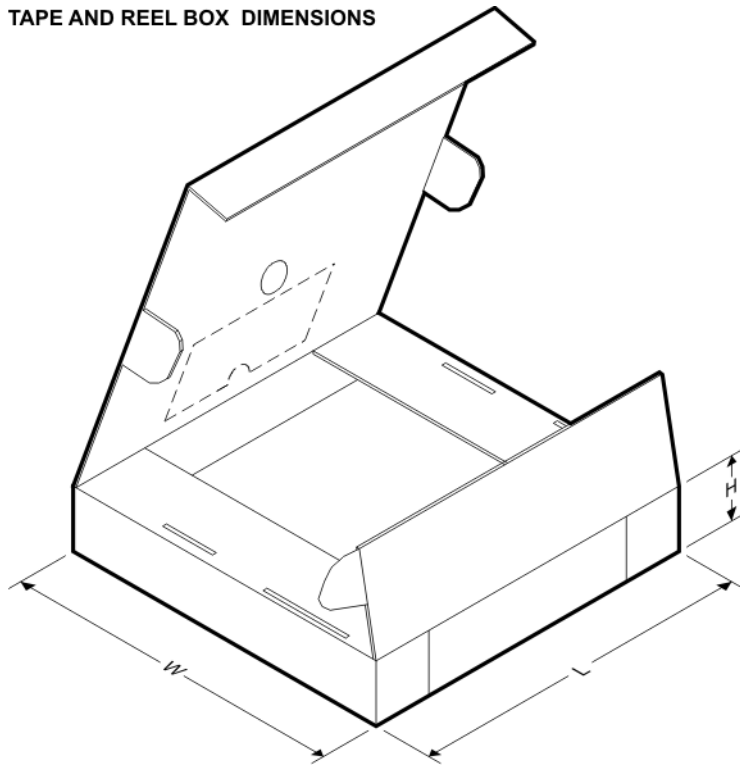


**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**



| Device      | Package | Pins | Site    | Reel Diameter (mm) | Reel Width (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|-------------|---------|------|---------|--------------------|-----------------|---------|---------|---------|---------|--------|---------------|
| LMV721IDBVR | DBV     | 5    | SITE 35 | 180                | 9               | 3.23    | 3.17    | 1.37    | 4       | 8      | Q3            |
| LMV721IDBVR | DBV     | 5    | SITE 45 | 0                  | 0               | 3.23    | 3.17    | 1.37    | 4       | 8      | Q3            |
| LMV721IDCKR | DCK     | 5    | SITE 35 | 180                | 9               | 2.24    | 2.34    | 1.22    | 4       | 8      | Q3            |
| LMV721IDCKR | DCK     | 5    | SITE 45 | 0                  | 0               | 2.4     | 2.5     | 1.2     | 4       | 8      | Q3            |
| LMV721IDCKT | DCK     | 5    | SITE 35 | 180                | 9               | 2.24    | 2.34    | 1.22    | 4       | 8      | Q3            |
| LMV721IDCKT | DCK     | 5    | SITE 45 | 0                  | 0               | 2.4     | 2.5     | 1.2     | 4       | 8      | Q3            |
| LMV722IDGKR | DGK     | 8    | SITE 47 | 330                | 12              | 5.3     | 3.3     | 1.3     | 8       | 12     | Q1            |
| LMV722IDR   | D       | 8    | SITE 27 | 330                | 12              | 6.4     | 5.2     | 2.1     | 8       | 12     | Q1            |

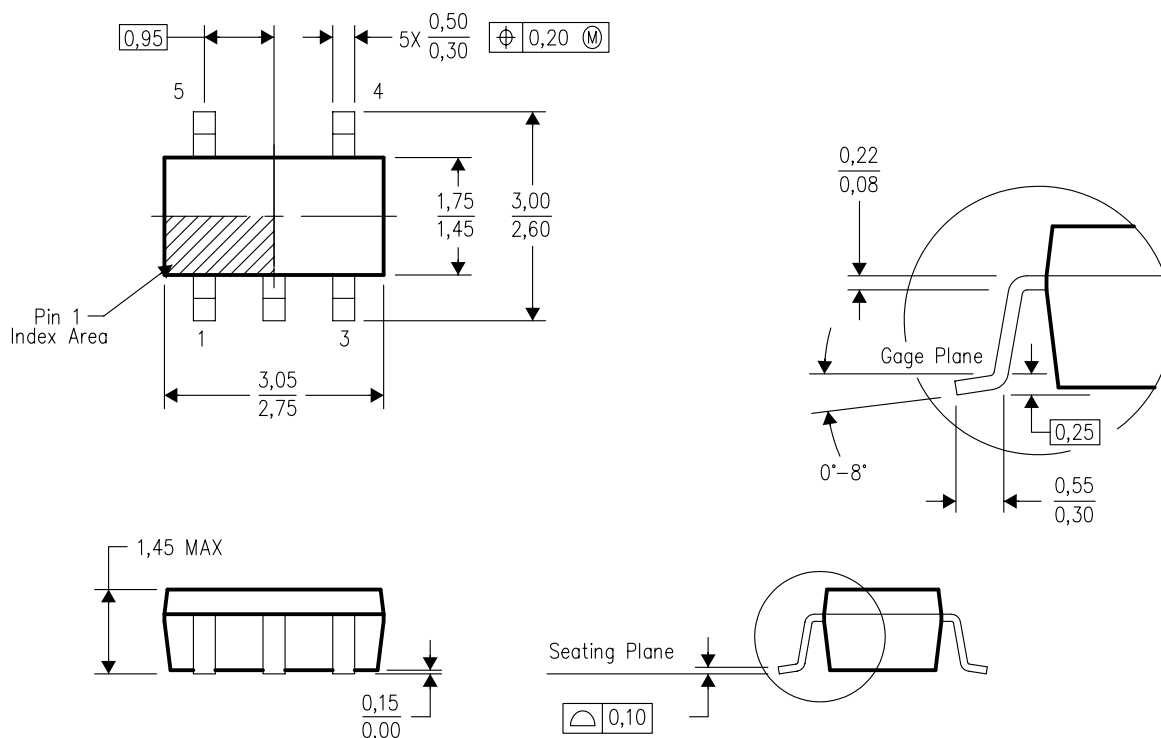
**TAPE AND REEL BOX DIMENSIONS**



| Device      | Package | Pins | Site    | Length (mm) | Width (mm) | Height (mm) |
|-------------|---------|------|---------|-------------|------------|-------------|
| LMV721IDBVR | DBV     | 5    | SITE 35 | 202.0       | 201.0      | 28.0        |
| LMV721IDBVR | DBV     | 5    | SITE 45 | 0.0         | 185.0      | 220.0       |
| LMV721IDCKR | DCK     | 5    | SITE 35 | 202.0       | 201.0      | 28.0        |
| LMV721IDCKR | DCK     | 5    | SITE 45 | 0.0         | 185.0      | 220.0       |
| LMV721IDCKT | DCK     | 5    | SITE 35 | 202.0       | 201.0      | 28.0        |
| LMV721IDCKT | DCK     | 5    | SITE 45 | 0.0         | 185.0      | 220.0       |
| LMV722IDGKR | DGK     | 8    | SITE 47 | 370.0       | 355.0      | 55.0        |
| LMV722IDR   | D       | 8    | SITE 27 | 342.9       | 336.6      | 20.64       |

## DBV (R-PDSO-G5)

## PLASTIC SMALL-OUTLINE PACKAGE



4073253-4/K 03/2006

- 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-178 Variation AA.

## DCK (R-PDSO-G5)

## PLASTIC SMALL-OUTLINE PACKAGE



4093553-3/G 01/2007

- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
  - Falls within JEDEC MO-203 variation AA.

DGK (S-PDSO-G8)

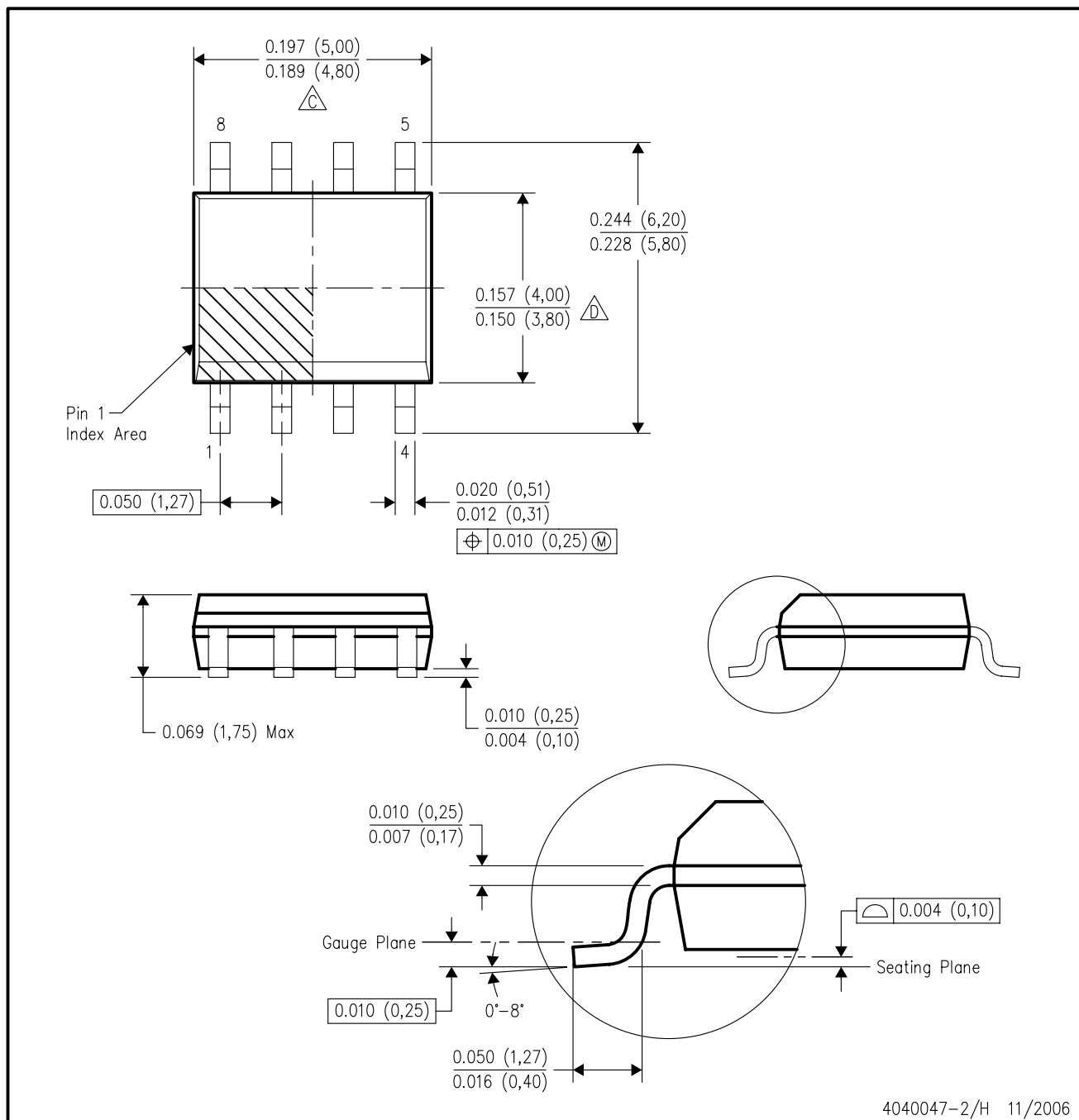
PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in 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 0.15 per end.
  - D. Body width does not include interlead flash. Interlead flash shall not exceed 0.50 per side.
  - E. Falls within JEDEC MO-187 variation AA, except interlead flash.

## 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.

## 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       | <a href="http://amplifier.ti.com">amplifier.ti.com</a>             | Audio              | <a href="http://www.ti.com/audio">www.ti.com/audio</a>                   |
| Data Converters  | <a href="http://dataconverter.ti.com">dataconverter.ti.com</a>     | Automotive         | <a href="http://www.ti.com/automotive">www.ti.com/automotive</a>         |
| DSP              | <a href="http://dsp.ti.com">dsp.ti.com</a>                         | Broadband          | <a href="http://www.ti.com/broadband">www.ti.com/broadband</a>           |
| Interface        | <a href="http://interface.ti.com">interface.ti.com</a>             | Digital Control    | <a href="http://www.ti.com/digitalcontrol">www.ti.com/digitalcontrol</a> |
| Logic            | <a href="http://logic.ti.com">logic.ti.com</a>                     | Military           | <a href="http://www.ti.com/military">www.ti.com/military</a>             |
| Power Mgmt       | <a href="http://power.ti.com">power.ti.com</a>                     | Optical Networking | <a href="http://www.ti.com/opticalnetwork">www.ti.com/opticalnetwork</a> |
| Microcontrollers | <a href="http://microcontroller.ti.com">microcontroller.ti.com</a> | Security           | <a href="http://www.ti.com/security">www.ti.com/security</a>             |
| RFID             | <a href="http://www.ti-rfid.com">www.ti-rfid.com</a>               | Telephony          | <a href="http://www.ti.com/telephony">www.ti.com/telephony</a>           |
| Low Power        | <a href="http://www.ti.com/lpw">www.ti.com/lpw</a>                 | Video & Imaging    | <a href="http://www.ti.com/video">www.ti.com/video</a>                   |
| Wireless         |                                                                    | Wireless           | <a href="http://www.ti.com/wireless">www.ti.com/wireless</a>             |

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