

**OPA137**  
**OPA2137**  
**OPA4137**

## LOW COST FET-INPUT OPERATIONAL AMPLIFIERS

### *MicroAmplifier™* Series

#### FEATURES

- FET INPUT:  $I_B = 5\text{pA}$
- LOW OFFSET VOLTAGE:  $1.5\text{mV}$
- WIDE SUPPLY RANGE:  $\pm 2.25\text{V}$  to  $\pm 18\text{V}$
- LOW QUIESCENT CURRENT:  $220\mu\text{A}/\text{channel}$
- EXCELLENT SPEED/POWER:  $1\text{MHz}$
- INPUT TO POSITIVE SUPPLY
- *MicroSIZE* PACKAGES: SOT-23-5, MSOP-8
- SINGLE, DUAL, AND QUAD

#### APPLICATIONS

- STRAIN GAGE AMPLIFIER
- PHOTODETECTOR AMPLIFIER
- PRECISION INTEGRATOR
- BATTERY-POWERED INSTRUMENTS
- TEST EQUIPMENT
- ACTIVE FILTERS

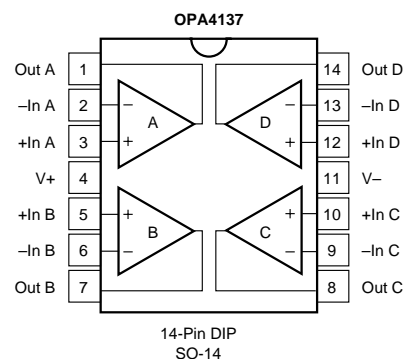
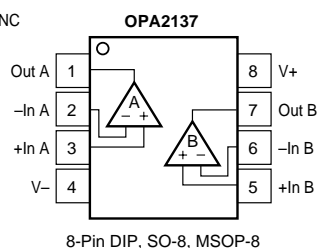
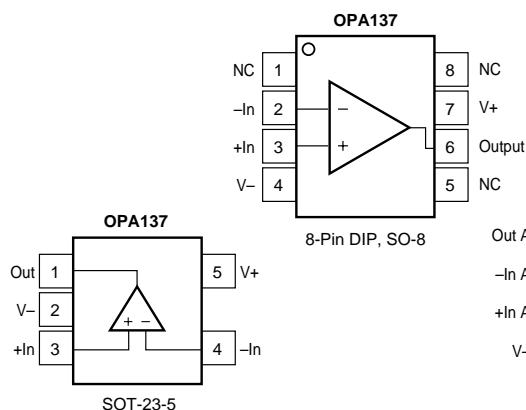
#### DESCRIPTION

OPA137 series FET-input operational amplifiers are designed for low cost and miniature applications. In addition to small size (SOT-23-5 and MSOP-8 packages), they provide low input bias current ( $5\text{pA}$ ), low quiescent current ( $220\mu\text{A}/\text{channel}$ ), and high open-loop gain ( $94\text{dB}$ ).

Either single ( $+4.5\text{V}$  to  $+36\text{V}$ ) or dual ( $\pm 2.25$  to  $\pm 18\text{V}$ ) supplies can be used. The input common-mode voltage range includes the positive supply—suitable for many single-supply applications. Single, dual, and quad versions have identical specifications for maximum design flexibility.

OPA137 op amps are easy to use and free from phase inversion and overload problems found in some FET-input amplifiers. High performance, including linearity, is maintained as the amplifiers swing to their specified limits. In addition, the combination of high slew rate ( $3.5\text{V}/\mu\text{s}$ ) and wide bandwidth ( $1\text{MHz}$ ) provide fast settling time assuring good dynamic response. Dual and quad designs feature completely independent circuitry for lowest crosstalk and freedom from interaction.

The single (OPA137) packages are the tiny 5-lead SOT-23-5 surface mount, SO-8 surface mount, and 8-pin DIP. The dual (OPA2137) comes in the miniature MSOP-8 surface mount, SO-8 surface mount, and 8-pin DIP packages. The quad (OPA4137) packages are the SO-14 surface mount and the 14-pin DIP. All are specified from  $-40^\circ\text{C}$  to  $+85^\circ\text{C}$  and operate from  $-55^\circ\text{C}$  to  $+125^\circ\text{C}$ . A SPICE macromodel is available for design analysis.



# SPECIFICATIONS: $V_S = \pm 15V$

At  $T_A = +25^\circ C$ ,  $R_L = 10k\Omega$  connected to ground, unless otherwise noted.

**Boldface** limits apply over the specified temperature range,  $T_A = -40^\circ C$  to  $+85^\circ C$ .

PARAMETER	CONDITION	OPA137N, U, P OPA2137E, U, P OPA4137U, P			OPA137NA, UA, PA OPA2137EA, UA, PA OPA4137UA, PA			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
<b>OFFSET VOLTAGE</b> Input Offset Voltage $V_{OS}$ $T_A = -40^\circ C$ to $+85^\circ C$ vs Temperature $dV_{OS}/dT$ vs Power Supply PSRR $T_A = -40^\circ C$ to $+85^\circ C$ Channel Separation (dual, quad) dc	$T_A = -40^\circ C$ to $+85^\circ C$ $V_S = \pm 3V$ to $\pm 18V$		$\pm 1.5$ $\pm 2.5$ $\pm 15$ $\pm 90$ 0.6	$\pm 3$ $\pm 7$ $\pm 250$ <b><math>\pm 250</math></b>		$\pm 2.5$ $\pm 3.5$ * * *	$\pm 10$ <b><math>\pm 15</math></b> * * *	mV mV $\mu V/^\circ C$ $\mu V/V$ $\mu V/V$
<b>INPUT BIAS CURRENT</b> Input Bias Current $I_B$ vs Temperature Input Offset Current $I_{OS}$	$V_{CM} = 0V$		$\pm 5$ See Typical Curve $\pm 2$	$\pm 100$ $\pm 50$		* * *	* * *	pA pA
<b>NOISE</b> Input Voltage Noise, $f = 0.1$ to $10Hz$ Input Voltage Noise Density, $f = 1kHz$ $e_n$ Current Noise Density, $f = 1kHz$ $i_n$			2 45 1.2			* * *		$\mu Vp-p$ $nV/\sqrt{Hz}$ $fA/\sqrt{Hz}$
<b>INPUT VOLTAGE RANGE</b> Common-Mode Voltage Range $V_{CM}$ Common-Mode Rejection Ratio CMRR OPA137, OPA2137 OPA4137 $T_A = -40^\circ C$ to $+85^\circ C$ OPA137, OPA2137 OPA4137	$V_{CM} = -12V$ to $15V$  $V_{CM} = -12V$ to $15V$	(V-) + 3  76 74 <b>72</b> <b>70</b>	  84 84	(V+)    	*  70 70 <b>70</b> <b>70</b>	  * *	*   	V dB dB dB
<b>INPUT IMPEDANCE</b> Differential Common-Mode			$10^{10} \parallel 1$ $10^{12} \parallel 2$			* *		$\Omega \parallel pF$ $\Omega \parallel pF$
<b>OPEN-LOOP GAIN</b> Open-Loop Voltage Gain $A_{OL}$ $T_A = -40^\circ C$ to $+85^\circ C$	$V_O = -13.8V$ to $13.9V$ $V_O = -13.8V$ to $13.9V$	86 <b>86</b>	94		* *	* 		dB dB
<b>FREQUENCY RESPONSE</b> Gain-Bandwidth Product GBW Slew Rate SR Settling Time, 0.1% 0.01% Overload Recovery Time Total Harmonic Distortion + Noise THD+N	$G = 1$ $G = 1$ , 10V Step, $C_L = 100pF$ $G = 1$ , 10V Step, $C_L = 100pF$ $V_{IN} \cdot G = V_S$ $G = 1$ , $f = 1kHz$ , 3.5Vrms		1 3.5 8 10 1 0.05			* * * * * *		MHz V/ $\mu s$ $\mu s$ $\mu s$ $\mu s$ %
<b>OUTPUT</b> Voltage Output $V_{OUT}$ $T_A = -40^\circ C$ to $+85^\circ C$ Short-Circuit Current $I_{SC}$ Capacitive Load Drive $C_{LOAD}$		(V-) + 1.2 (V-) + 1.2	 -25/+60 1000	(V+) - 1.1 (V+) - 1.1	* *	 * *	* *	V V mA pF
<b>POWER SUPPLY</b> Specified Operating Range $V_S$ Operating Voltage Range Dual Supplies Single Supply Quiescent Current $I_Q$ $T_A = -40^\circ C$ to $+85^\circ C$	$I_O = 0$ $I_O = 0$	$\pm 2.25^{(1)}$ +4.5	$\pm 15$  $\pm 220$	$\pm 18$ +36 $\pm 270$ <b><math>\pm 375</math></b>	* *	* *	* * *	V V V $\mu A$ $\mu A$
<b>TEMPERATURE RANGE</b> Specified Range Operating Range Storage Range Thermal Resistance $\theta_{JA}$ SOT-23-5 Surface Mount MSOP-8 Surface Mount SO-8 Surface Mount 8-Pin DIP SO-14 Surface Mount 14-Pin DIP		-40 -55 -55	   200 150 150 100 100 80	+85 +125 +125	* * *	   * * * * * *	* * *	$^\circ C$ $^\circ C$ $^\circ C$ $^\circ C/W$ $^\circ C/W$ $^\circ C/W$ $^\circ C/W$ $^\circ C/W$ $^\circ C/W$

\* Specifications the same as OPA137N, U, P.

NOTE: (1) At minimum power supply voltage inputs must be biased above ground in accordance with common-mode voltage range restrictions—see “Operating Voltage” discussion.

## ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>

Supply Voltage, V+ to V– .....	36V
Input Voltage .....	(V–) –0.7V to (V+) +0.7V
Input Current .....	2mA
Output Short-Circuit <sup>(2)</sup> .....	Continuous
Operating Temperature .....	–55°C to +125°C
Storage Temperature .....	–55°C to +125°C
Junction Temperature .....	+150°C
Lead Temperature (soldering, 10s) .....	300°C

NOTE: (1) Stresses above these ratings may cause permanent damage. Exposure to absolute maximum ratings for extended periods may affect device reliability. (2) Short circuit to ground, one amplifier per package.



## ELECTROSTATIC DISCHARGE SENSITIVITY

This integrated circuit can be damaged by ESD. Burr-Brown recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

## PACKAGE/ORDERING INFORMATION

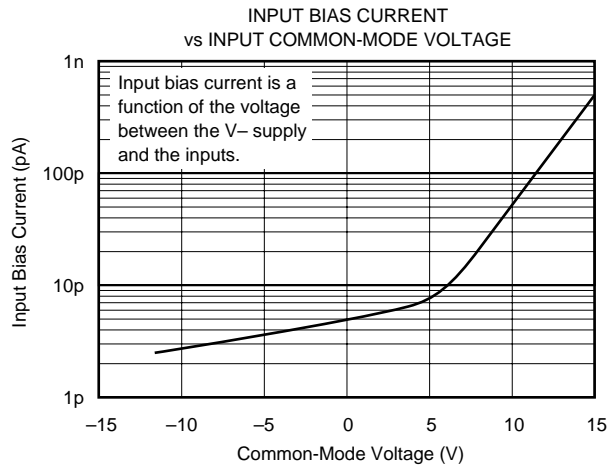
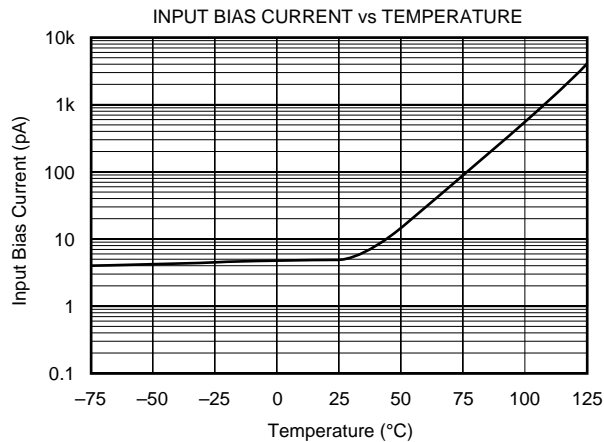
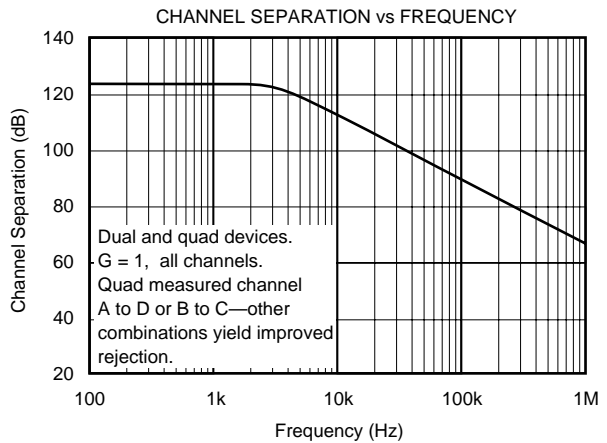
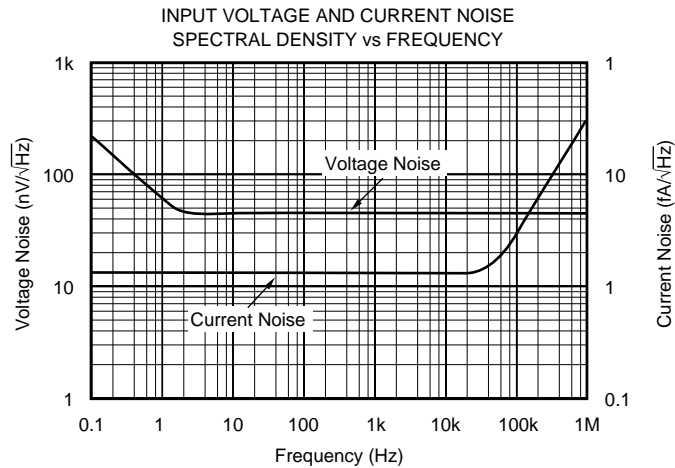
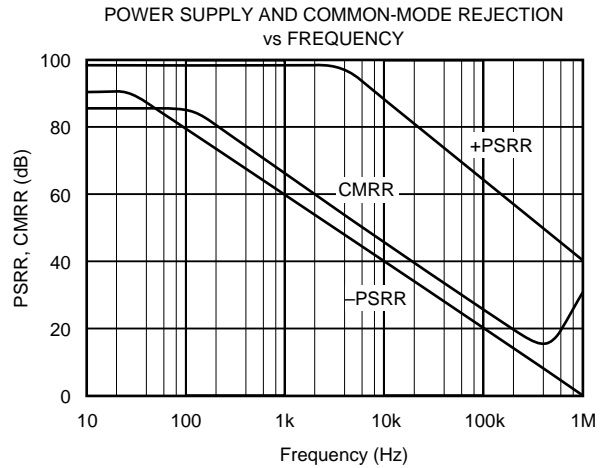
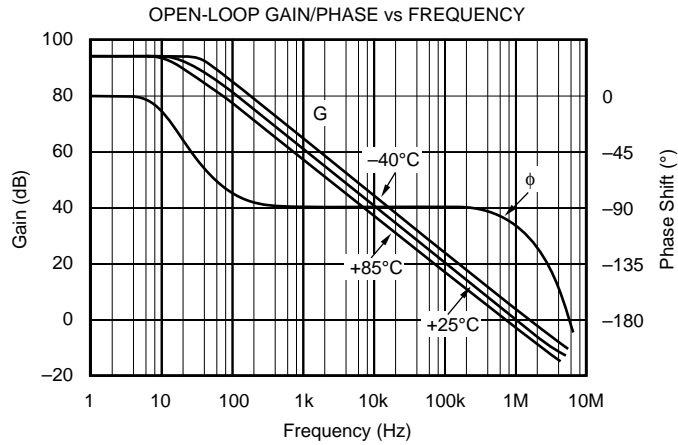
PRODUCT	PACKAGE	PACKAGE DRAWING NUMBER <sup>(1)</sup>	SPECIFIED TEMPERATURE RANGE	PACKAGE MARKING	ORDERING NUMBER <sup>(2)</sup>	TRANSPORT MEDIA
<b>Single</b>						
OPA137N	5-Lead SOT-23-5 Surface Mount	331	–40°C to +85°C	E37 <sup>(3)</sup>	OPA137N/250	Tape and Reel
OPA137NA	5-Lead SOT-23-5 Surface Mount	331	–40°C to +85°C	E37 <sup>(3)</sup>	OPA137N/3K	Tape and Reel
OPA137U	SO-8 Surface Mount	182	–40°C to +85°C	OPA137U	OPA137NA/250	Tape and Reel
OPA137UA	SO-8 Surface Mount	182	–40°C to +85°C	OPA137UA	OPA137NA/3K	Tape and Reel
OPA137P	8-Pin DIP	006	–40°C to +85°C	OPA137P	OPA137U	Rails
OPA137PA	8-Pin DIP	006	–40°C to +85°C	OPA137PA	OPA137U/2K5	Tape and Reel
					OPA137UA	Rails
					OPA137UA/2K5	Tape and Reel
					OPA137P	Rails
					OPA137PA	Rails
<b>Dual</b>						
OPA2137E	MSOP-8 Surface Mount	337	–40°C to +85°C	E37 <sup>(3)</sup>	OPA2137E/250	Tape and Reel
OPA2137EA	MSOP-8 Surface Mount	337	–40°C to +85°C	E37 <sup>(3)</sup>	OPA2137E/2K5	Tape and Reel
OPA2137U	SO-8 Surface Mount	182	–40°C to +85°C	OPA2137U	OPA2137EA/250	Tape and Reel
OPA2137UA	SO-8 Surface Mount	182	–40°C to +85°C	OPA2137UA	OPA2137EA/2K5	Tape and Reel
OPA2137P	8-Pin DIP	006	–40°C to +85°C	OPA2137P	OPA2137U	Rails
OPA2137PA	8-Pin DIP	006	–40°C to +85°C	OPA2137PA	OPA2137U/2K5	Tape and Reel
					OPA2137UA	Rails
					OPA2137UA/2K5	Tape and Reel
					OPA2137P	Rails
					OPA2137PA	Rails
<b>Quad</b>						
OPA4137U	SO-14 Surface Mount	235	–40°C to +85°C	OPA4137U	OPA4137U	Rails
OPA4137UA	SO-14 Surface Mount	235	–40°C to +85°C	OPA4137UA	OPA4137U/2K5	Tape and Reel
OPA4137P	14-Pin DIP	010	–40°C to +85°C	OPA4137P	OPA4137UA	Rails
OPA4137PA	14-Pin DIP	010	–40°C to +85°C	OPA4137PA	OPA4137UA/2K5	Tape and Reel
					OPA4137P	Rails
					OPA4137PA	Rails

NOTES: (1) For detailed drawing and dimension table, please see end of data sheet, or Appendix C of Burr-Brown IC Data Book. (2) Models with a slash (/) are available only in Tape and Reel in the quantities indicated (e.g., /2K5 indicates 2500 devices per reel). Ordering 3000 pieces of “OPA137NA/3K” will get a single 3000-piece Tape and Reel. For detailed Tape and Reel mechanical information, refer to Appendix B of Burr-Brown IC Data Book. (3) Grade information is marked on the reel.

The information provided herein is believed to be reliable; however, BURR-BROWN assumes no responsibility for inaccuracies or omissions. BURR-BROWN assumes no responsibility for the use of this information, and all use of such information shall be entirely at the user's own risk. Prices and specifications are subject to change without notice. No patent rights or licenses to any of the circuits described herein are implied or granted to any third party. BURR-BROWN does not authorize or warrant any BURR-BROWN product for use in life support devices and/or systems.

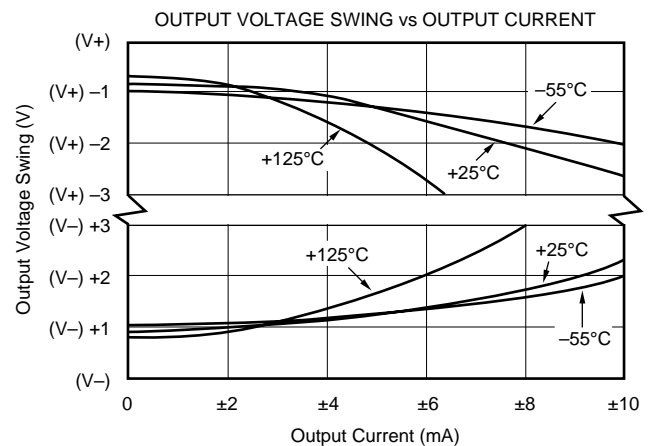
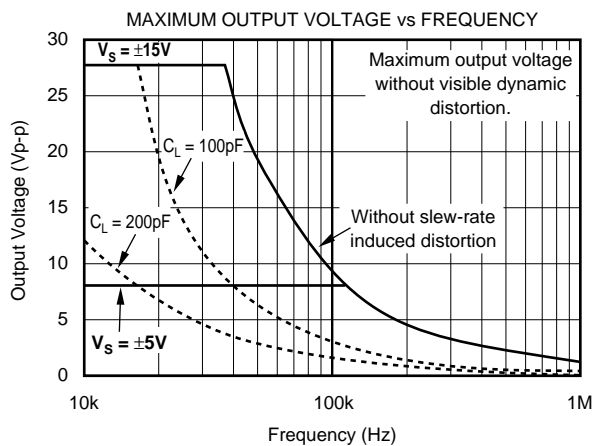
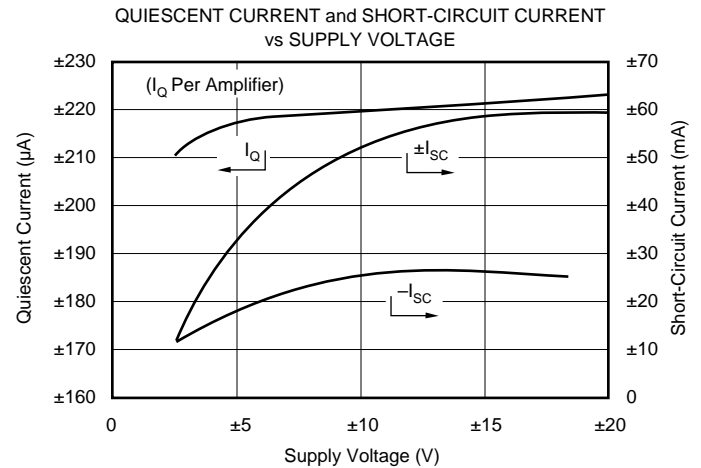
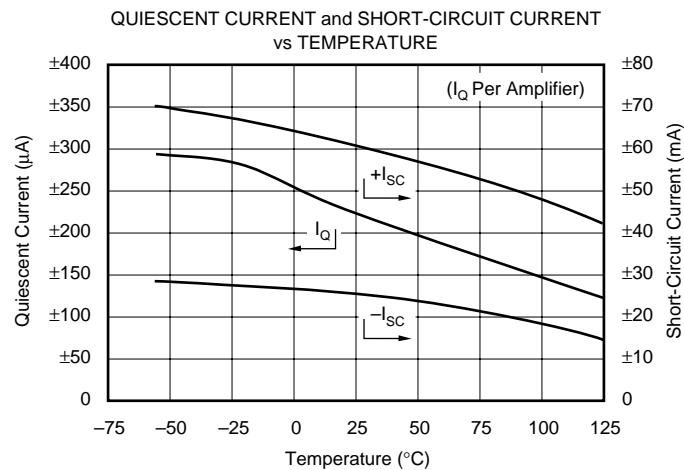
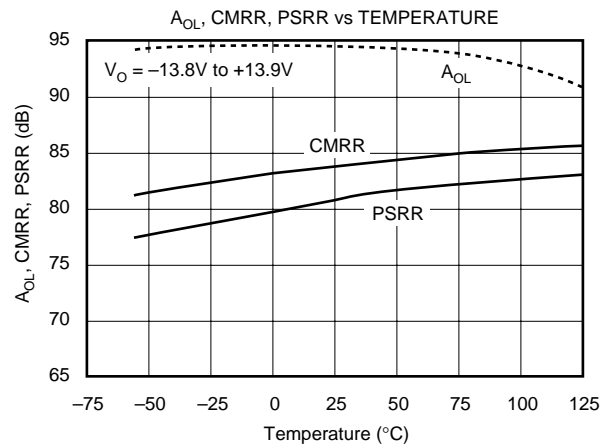
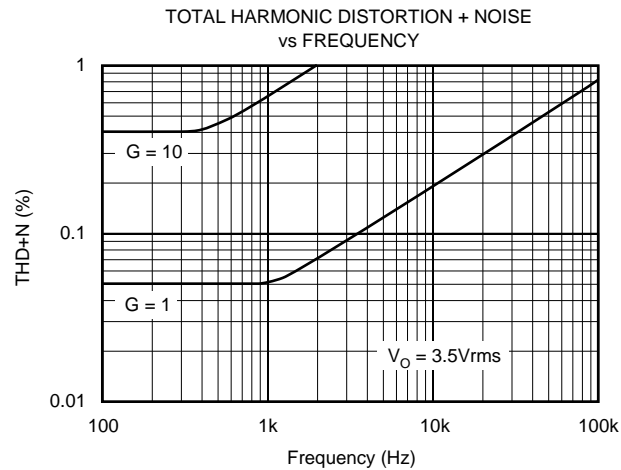
# TYPICAL PERFORMANCE CURVES

At  $T_A = +25^\circ\text{C}$ ,  $V_S = \pm 15\text{V}$ ,  $R_L = 10\text{k}\Omega$ , connected to ground, unless otherwise noted.



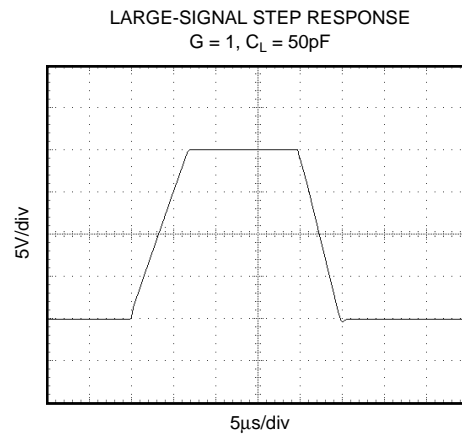
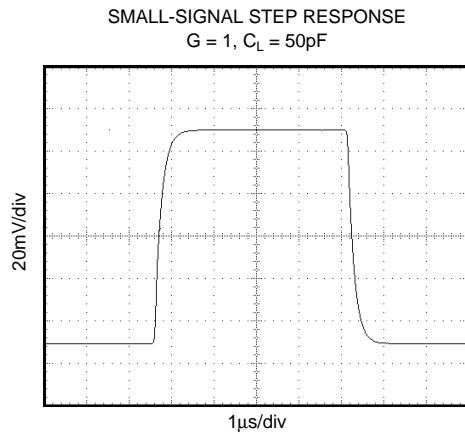
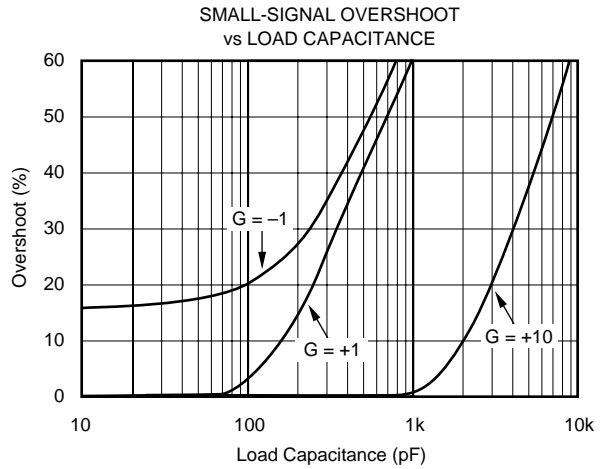
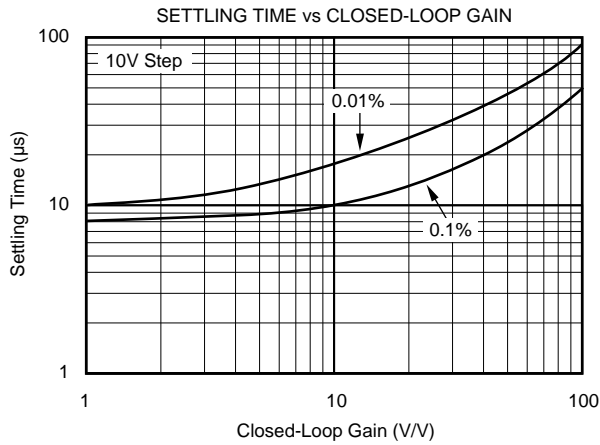
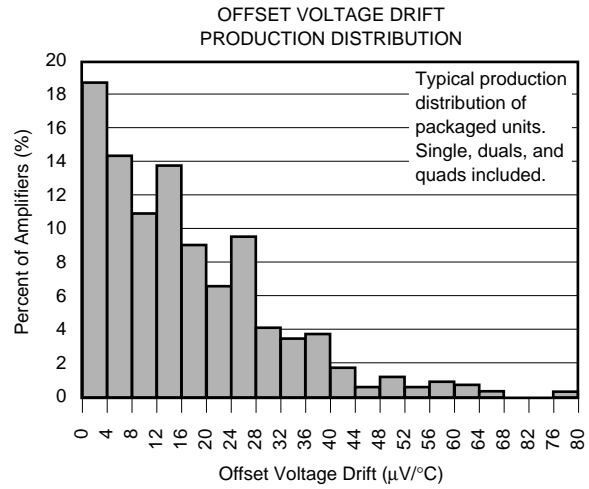
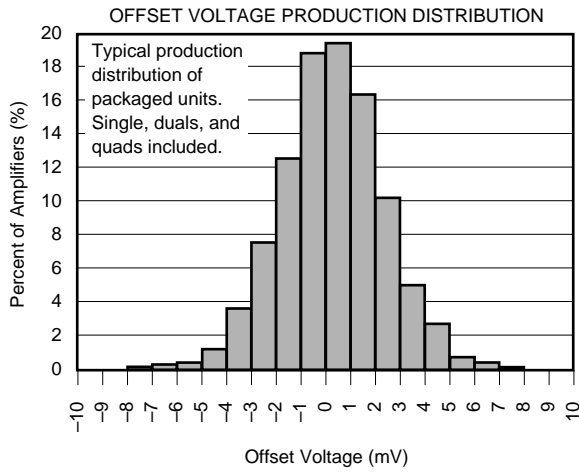
# TYPICAL PERFORMANCE CURVES (CONT)

At  $T_A = +25^\circ\text{C}$ ,  $V_S = \pm 15\text{V}$ ,  $R_L = 10\text{k}\Omega$ , connected to ground, unless otherwise noted.



# TYPICAL PERFORMANCE CURVES (CONT)

At  $T_A = +25^\circ\text{C}$ ,  $V_S = \pm 15\text{V}$ ,  $R_L = 10\text{k}\Omega$ , connected to ground, unless otherwise noted.



## APPLICATIONS INFORMATION

OPA137 series op amps are unity-gain stable and suitable for a wide range of general-purpose applications. Power supply pins should be bypassed with 10nF ceramic capacitors or larger. All circuitry is completely independent in dual and quad versions, assuring normal performance when one amplifier in a package is overdriven or short circuited. Many key parameters are guaranteed over the specified temperature range,  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ .

### OPERATING VOLTAGE

OPA137 op amps can be operated on power supplies as low as  $\pm 2.25\text{V}$ . Performance remains excellent with power supplies ranging from  $\pm 2.25\text{V}$  to  $\pm 18\text{V}$  ( $+4.5\text{V}$  to  $+36\text{V}$  single supply). Most parameters vary only slightly throughout this supply voltage range. Quiescent current and short-circuit current vs supply voltage are shown in Typical Performance Curves.

Operation at very low supply voltage ( $V_S \leq \pm 3\text{V}$ ) requires careful attention to ensure that the common-mode voltage remains within the linear range,  $V_{CM} = (V-) + 3\text{V}$  to  $(V+)$ . Inputs may need to be biased above ground in accordance with the common-mode voltage range restrictions for linear operation.

### INPUT VOLTAGE

The input common-mode voltage range of OPA137 series op amps extends from  $(V-) + 3\text{V}$  to the positive rail,  $V+$ . For normal operation, inputs should be limited to this range. The inputs may go beyond the power supplies without output phase-reversal. Many FET-input op amps (such as TL061 types) exhibit phase-reversal of the output when the input common-mode range is exceeded. This can occur in voltage-follower circuits, causing serious problems in control loop applications.

Input terminals are diode-clamped to the power supply rails for ESD protection. If the input voltage can exceed the negative supply by 500mV, input current should be limited to 2mA (or less). If the input current is not adequately limited, you may see unpredictable behavior in the other amplifiers in the package. This is easily accomplished with an input resistor as shown in Figure 1. Many input signals are inherently current-limited, therefore, a limiting resistor may not be required.

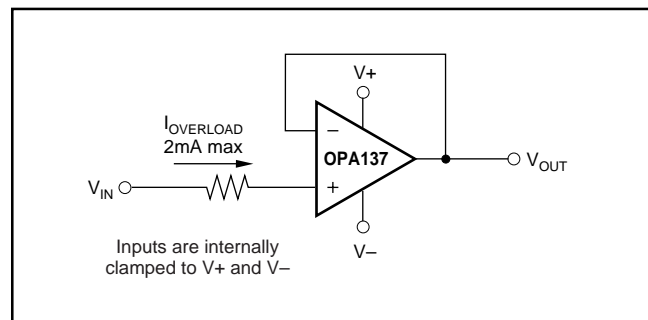


FIGURE 1. Input Current Protection for Voltages Exceeding the Supply Voltage.

## HIGH-SIDE CURRENT SENSING

Many applications require the sensing of signals near the positive supply. The common-mode input range of OPA137 op amps includes the positive rail, enabling them to be used to sense power supply currents as shown in Figure 2.

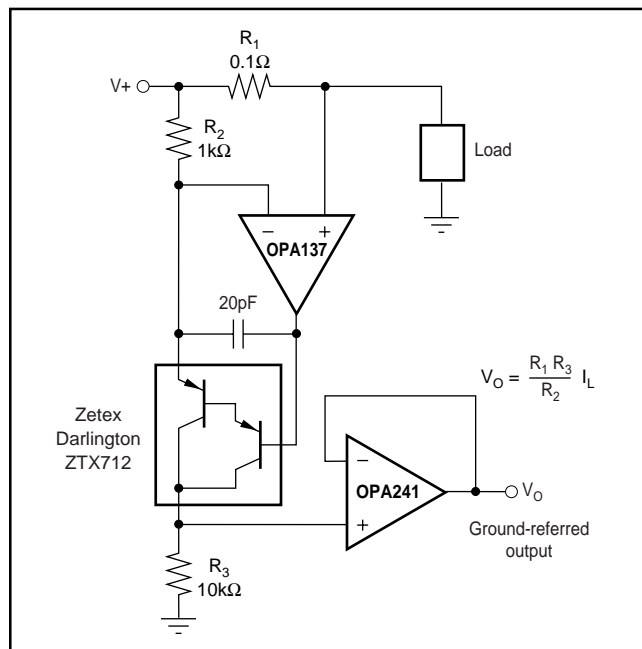


FIGURE 2. High-Side Current Monitor.

### INPUT BIAS CURRENT

The input bias current is approximately 5pA at room temperature and increases with temperature as shown in the typical performance curve "Input Bias Current vs Temperature."

Input Bias current also varies with common-mode voltage and power supply voltage. This variation is dependent on the voltage between the negative power supply and the common-mode input voltage. The effect is shown in the typical performance curve "Input Bias Current vs Common-Mode Voltage."

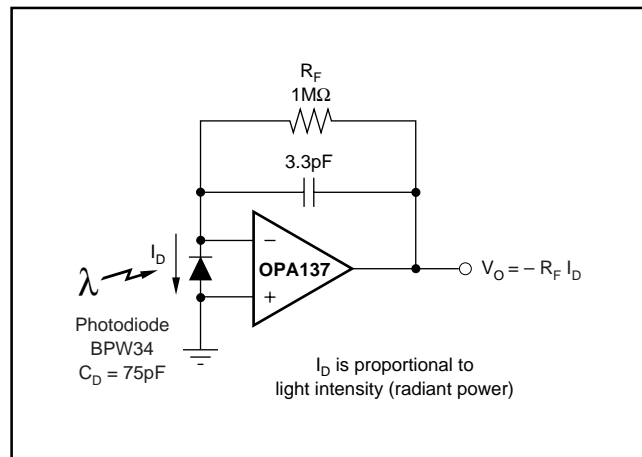
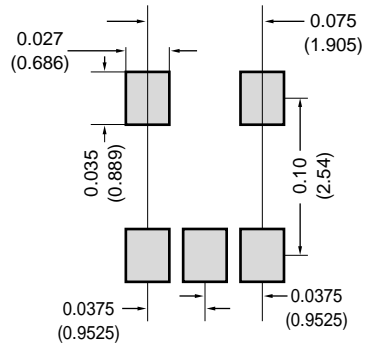
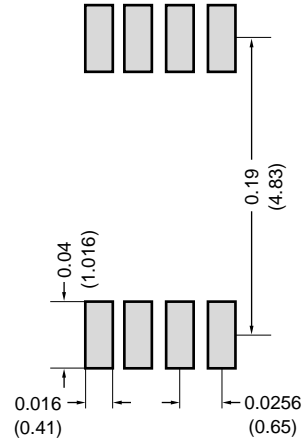


FIGURE 3. Photodetector Amplifier.

**SOT-23-5**  
(Package Drawing #331)



**MSOP-8**  
(Package Drawing #337)



Refer to end of data sheet or Appendix C of Burr-Brown  
Data Book for tolerances and detailed package drawing.  
For further information on solder pads for surface-mount  
devices consult Application Bulletin AB-132.

FIGURE 4. Recommended SOT-23-5 and MSOP-8 Solder Footprints.



**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
OPA137N/250	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	E37	<a href="#">Samples</a>
OPA137N/250E4	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	E37	<a href="#">Samples</a>
OPA137N/3K	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	E37	<a href="#">Samples</a>
OPA137N/3KE4	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	E37	<a href="#">Samples</a>
OPA137NA/250	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	E37	<a href="#">Samples</a>
OPA137NA/250E4	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	E37	<a href="#">Samples</a>
OPA137NA/3K	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 85	E37	<a href="#">Samples</a>
OPA137U	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	-40 to 85	OPA 137U	<a href="#">Samples</a>
OPA137UA	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	-40 to 85	OPA 137U A	<a href="#">Samples</a>
OPA137UA/2K5	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	-40 to 85	OPA 137U A	<a href="#">Samples</a>
OPA137UA/2K5G4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	-40 to 85	OPA 137U A	<a href="#">Samples</a>
OPA137UAG4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	-40 to 85	OPA 137U A	<a href="#">Samples</a>
OPA137UE4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	-40 to 85	OPA 137U	<a href="#">Samples</a>
OPA2137E/250	ACTIVE	VSSOP	DGK	8	250	Green (RoHS & no Sb/Br)	CU NIPDAU   Call TI	Level-3-260C-168 HR	-40 to 85	E37	<a href="#">Samples</a>
OPA2137E/250G4	ACTIVE	VSSOP	DGK	8	250	Green (RoHS & no Sb/Br)	Call TI	Level-3-260C-168 HR	-40 to 85	E37	<a href="#">Samples</a>

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
OPA2137E/2K5	ACTIVE	VSSOP	DGK	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU   Call TI	Level-3-260C-168 HR	-40 to 85	E37	<a href="#">Samples</a>
OPA2137E/2K5G4	ACTIVE	VSSOP	DGK	8	2500	Green (RoHS & no Sb/Br)	Call TI	Level-3-260C-168 HR	-40 to 85	E37	<a href="#">Samples</a>
OPA2137EA/250	ACTIVE	VSSOP	DGK	8	250	Green (RoHS & no Sb/Br)	CU NIPDAU   Call TI	Level-3-260C-168 HR		E37	<a href="#">Samples</a>
OPA2137EA/250G4	ACTIVE	VSSOP	DGK	8	250	Green (RoHS & no Sb/Br)	Call TI	Level-3-260C-168 HR		E37	<a href="#">Samples</a>
OPA2137EA/2K5	ACTIVE	VSSOP	DGK	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU   Call TI	Level-3-260C-168 HR		E37	<a href="#">Samples</a>
OPA2137P	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type		OPA2137P	<a href="#">Samples</a>
OPA2137PA	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type		OPA2137P A	<a href="#">Samples</a>
OPA2137PAG4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type		OPA2137P A	<a href="#">Samples</a>
OPA2137PG4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type		OPA2137P	<a href="#">Samples</a>
OPA2137U	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR		OPA 2137U	<a href="#">Samples</a>
OPA2137U/2K5	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR		OPA 2137U	<a href="#">Samples</a>
OPA2137UA	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	-40 to 85	OPA 2137U A	<a href="#">Samples</a>
OPA2137UA/2K5	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	-40 to 85	OPA 2137U A	<a href="#">Samples</a>
OPA2137UAE4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	-40 to 85	OPA 2137U A	<a href="#">Samples</a>
OPA2137UE4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR		OPA 2137U	<a href="#">Samples</a>
OPA4137P	ACTIVE	PDIP	N	14	25	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type		OPA4137P	<a href="#">Samples</a>
OPA4137PA	ACTIVE	PDIP	N	14	25	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type		OPA4137P A	<a href="#">Samples</a>

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
OPA4137PAG4	ACTIVE	PDIP	N	14	25	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type		OPA4137P A	<a href="#">Samples</a>
OPA4137U	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	-40 to 85	OPA4137U	<a href="#">Samples</a>
OPA4137U/2K5	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	-40 to 85	OPA4137U	<a href="#">Samples</a>
OPA4137UA	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	-40 to 85	OPA4137U A	<a href="#">Samples</a>
OPA4137UA/2K5	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	-40 to 85	OPA4137U A	<a href="#">Samples</a>
OPA4137UAE4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	-40 to 85	OPA4137U A	<a href="#">Samples</a>
OPA4137UAG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	-40 to 85	OPA4137U A	<a href="#">Samples</a>

(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) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

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

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

<sup>(6)</sup> Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

**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 INFORMATION**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
OPA137N/250	SOT-23	DBV	5	250	178.0	8.4	3.3	3.2	1.4	4.0	8.0	Q3
OPA137N/3K	SOT-23	DBV	5	3000	178.0	8.4	3.3	3.2	1.4	4.0	8.0	Q3
OPA137NA/250	SOT-23	DBV	5	250	178.0	8.4	3.23	3.17	1.37	4.0	8.0	Q3
OPA137NA/3K	SOT-23	DBV	5	3000	178.0	8.4	3.3	3.2	1.4	4.0	8.0	Q3
OPA137UA/2K5	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
OPA2137E/250	VSSOP	DGK	8	250	180.0	12.4	5.3	3.4	1.4	8.0	12.0	Q1
OPA2137E/2K5	VSSOP	DGK	8	2500	330.0	12.4	5.3	3.4	1.4	8.0	12.0	Q1
OPA2137EA/250	VSSOP	DGK	8	250	180.0	12.4	5.3	3.4	1.4	8.0	12.0	Q1
OPA2137EA/2K5	VSSOP	DGK	8	2500	330.0	12.4	5.3	3.4	1.4	8.0	12.0	Q1
OPA2137U/2K5	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
OPA2137UA/2K5	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
OPA4137U/2K5	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
OPA4137UA/2K5	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
OPA137N/250	SOT-23	DBV	5	250	565.0	140.0	75.0
OPA137N/3K	SOT-23	DBV	5	3000	565.0	140.0	75.0
OPA137NA/250	SOT-23	DBV	5	250	565.0	140.0	75.0
OPA137NA/3K	SOT-23	DBV	5	3000	565.0	140.0	75.0
OPA137UA/2K5	SOIC	D	8	2500	367.0	367.0	35.0
OPA2137E/250	VSSOP	DGK	8	250	210.0	185.0	35.0
OPA2137E/2K5	VSSOP	DGK	8	2500	367.0	367.0	35.0
OPA2137EA/250	VSSOP	DGK	8	250	210.0	185.0	35.0
OPA2137EA/2K5	VSSOP	DGK	8	2500	367.0	367.0	35.0
OPA2137U/2K5	SOIC	D	8	2500	367.0	367.0	35.0
OPA2137UA/2K5	SOIC	D	8	2500	367.0	367.0	35.0
OPA4137U/2K5	SOIC	D	14	2500	367.0	367.0	38.0
OPA4137UA/2K5	SOIC	D	14	2500	367.0	367.0	38.0

## IMPORTANT NOTICE

Texas Instruments Incorporated (TI) reserves the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete.

TI's published terms of sale for semiconductor products (<http://www.ti.com/sc/docs/stdterms.htm>) apply to the sale of packaged integrated circuit products that TI has qualified and released to market. Additional terms may apply to the use or sale of other types of TI products and services.

Reproduction of significant portions of TI information in TI data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such reproduced 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.

Buyers and others who are developing systems that incorporate TI products (collectively, "Designers") understand and agree that Designers remain responsible for using their independent analysis, evaluation and judgment in designing their applications and that Designers have full and exclusive responsibility to assure the safety of Designers' applications and compliance of their applications (and of all TI products used in or for Designers' applications) with all applicable regulations, laws and other applicable requirements. Designer represents that, with respect to their applications, Designer has all the necessary expertise to create and implement safeguards that (1) anticipate dangerous consequences of failures, (2) monitor failures and their consequences, and (3) lessen the likelihood of failures that might cause harm and take appropriate actions. Designer agrees that prior to using or distributing any applications that include TI products, Designer will thoroughly test such applications and the functionality of such TI products as used in such applications.

TI's provision of technical, application or other design advice, quality characterization, reliability data or other services or information, including, but not limited to, reference designs and materials relating to evaluation modules, (collectively, "TI Resources") are intended to assist designers who are developing applications that incorporate TI products; by downloading, accessing or using TI Resources in any way, Designer (individually or, if Designer is acting on behalf of a company, Designer's company) agrees to use any particular TI Resource solely for this purpose and subject to the terms of this Notice.

TI's provision of TI Resources does not expand or otherwise alter TI's applicable published warranties or warranty disclaimers for TI products, and no additional obligations or liabilities arise from TI providing such TI Resources. TI reserves the right to make corrections, enhancements, improvements and other changes to its TI Resources. TI has not conducted any testing other than that specifically described in the published documentation for a particular TI Resource.

Designer is authorized to use, copy and modify any individual TI Resource only in connection with the development of applications that include the TI product(s) identified in such TI Resource. NO OTHER LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE TO ANY OTHER TI INTELLECTUAL PROPERTY RIGHT, AND NO LICENSE TO ANY TECHNOLOGY OR INTELLECTUAL PROPERTY RIGHT OF TI OR ANY THIRD PARTY IS GRANTED HEREIN, including but not limited to any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information regarding or referencing third-party products or services does not constitute a license to use such products or services, or a warranty or endorsement thereof. Use of TI Resources 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.

TI RESOURCES ARE PROVIDED "AS IS" AND WITH ALL FAULTS. TI DISCLAIMS ALL OTHER WARRANTIES OR REPRESENTATIONS, EXPRESS OR IMPLIED, REGARDING RESOURCES OR USE THEREOF, INCLUDING BUT NOT LIMITED TO ACCURACY OR COMPLETENESS, TITLE, ANY EPIDEMIC FAILURE WARRANTY AND ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT OF ANY THIRD PARTY INTELLECTUAL PROPERTY RIGHTS. TI SHALL NOT BE LIABLE FOR AND SHALL NOT DEFEND OR INDEMNIFY DESIGNER AGAINST ANY CLAIM, INCLUDING BUT NOT LIMITED TO ANY INFRINGEMENT CLAIM THAT RELATES TO OR IS BASED ON ANY COMBINATION OF PRODUCTS EVEN IF DESCRIBED IN TI RESOURCES OR OTHERWISE. IN NO EVENT SHALL TI BE LIABLE FOR ANY ACTUAL, DIRECT, SPECIAL, COLLATERAL, INDIRECT, PUNITIVE, INCIDENTAL, CONSEQUENTIAL OR EXEMPLARY DAMAGES IN CONNECTION WITH OR ARISING OUT OF TI RESOURCES OR USE THEREOF, AND REGARDLESS OF WHETHER TI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Unless TI has explicitly designated an individual product as meeting the requirements of a particular industry standard (e.g., ISO/TS 16949 and ISO 26262), TI is not responsible for any failure to meet such industry standard requirements.

Where TI specifically promotes products as facilitating functional safety or as compliant with industry functional safety standards, such products are intended to help enable customers to design and create their own applications that meet applicable functional safety standards and requirements. Using products in an application does not by itself establish any safety features in the application. Designers must ensure compliance with safety-related requirements and standards applicable to their applications. Designer may not use any TI products in life-critical medical equipment unless authorized officers of the parties have executed a special contract specifically governing such use. Life-critical medical equipment is medical equipment where failure of such equipment would cause serious bodily injury or death (e.g., life support, pacemakers, defibrillators, heart pumps, neurostimulators, and implantables). Such equipment includes, without limitation, all medical devices identified by the U.S. Food and Drug Administration as Class III devices and equivalent classifications outside the U.S.

TI may expressly designate certain products as completing a particular qualification (e.g., Q100, Military Grade, or Enhanced Product). Designers agree that it has the necessary expertise to select the product with the appropriate qualification designation for their applications and that proper product selection is at Designers' own risk. Designers are solely responsible for compliance with all legal and regulatory requirements in connection with such selection.

Designer will fully indemnify TI and its representatives against any damages, costs, losses, and/or liabilities arising out of Designer's non-compliance with the terms and provisions of this Notice.