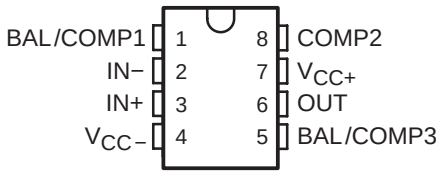
LM218-Q1
FAST GENERAL-PURPOSE OPERATIONAL AMPLIFIER

SLOS450A − NOVEMBER 2004 − REVISED APRIL 2008

- **Qualified for Automotive Applications**
- **Small-Signal Bandwidth . . . 15 MHz Typ**
- **Slew Rate . . . 20 V/μs Min**
- **Bias Current . . . 250 nA Max**
- **Supply-Voltage Range . . . ±5 V to ±20 V**
- **Internal Frequency Compensation**
- **Input and Output Overload Protection**
- **Same Pin Assignments as General-Purpose Operational Amplifiers**

D PACKAGE
(TOP VIEW)



description/ordering information

The LM218 is a precision, fast operational amplifier designed for applications requiring wide bandwidth and high slew rate. It features a factor-of-ten increase in speed over general-purpose devices without sacrificing dc performance.

This operational amplifier has internal unity-gain frequency compensation. This considerably simplifies its application because no external components are necessary for operation. However, unlike most internally compensated amplifiers, external frequency compensation may be added for optimum performance. For inverting applications, feed-forward compensation boosts the slew rate to over 150 V/μs and almost double the bandwidth. Overcompensation can be used with the amplifier for greater stability when maximum bandwidth is not needed. Further, a single capacitor can be added to reduce the settling time for 0.1% error band to under 1 μs.

The high speed and fast settling time of this operational amplifier makes it useful in A/D converters, oscillators, active filters, sample-and-hold circuits, and general-purpose amplifiers.

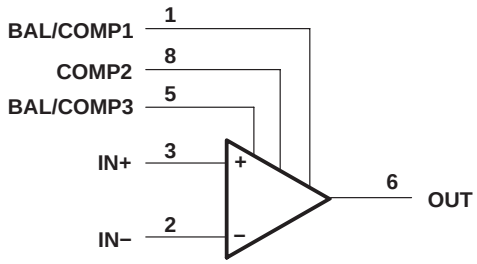
ORDERING INFORMATION†

T_A	V_{IO}max AT 25°C	PACKAGE‡		ORDERABLE PART NUMBER	TOP-SIDE MARKING
−40°C to 85°C	10 mV	SOIC (D)	Reel of 2500	LM218IDRQ1	LM218I

† For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI web site at http://www.ti.com.

‡ Package drawings, thermal data, and symbolization are available at http://www.ti.com/packaging.

symbol



PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

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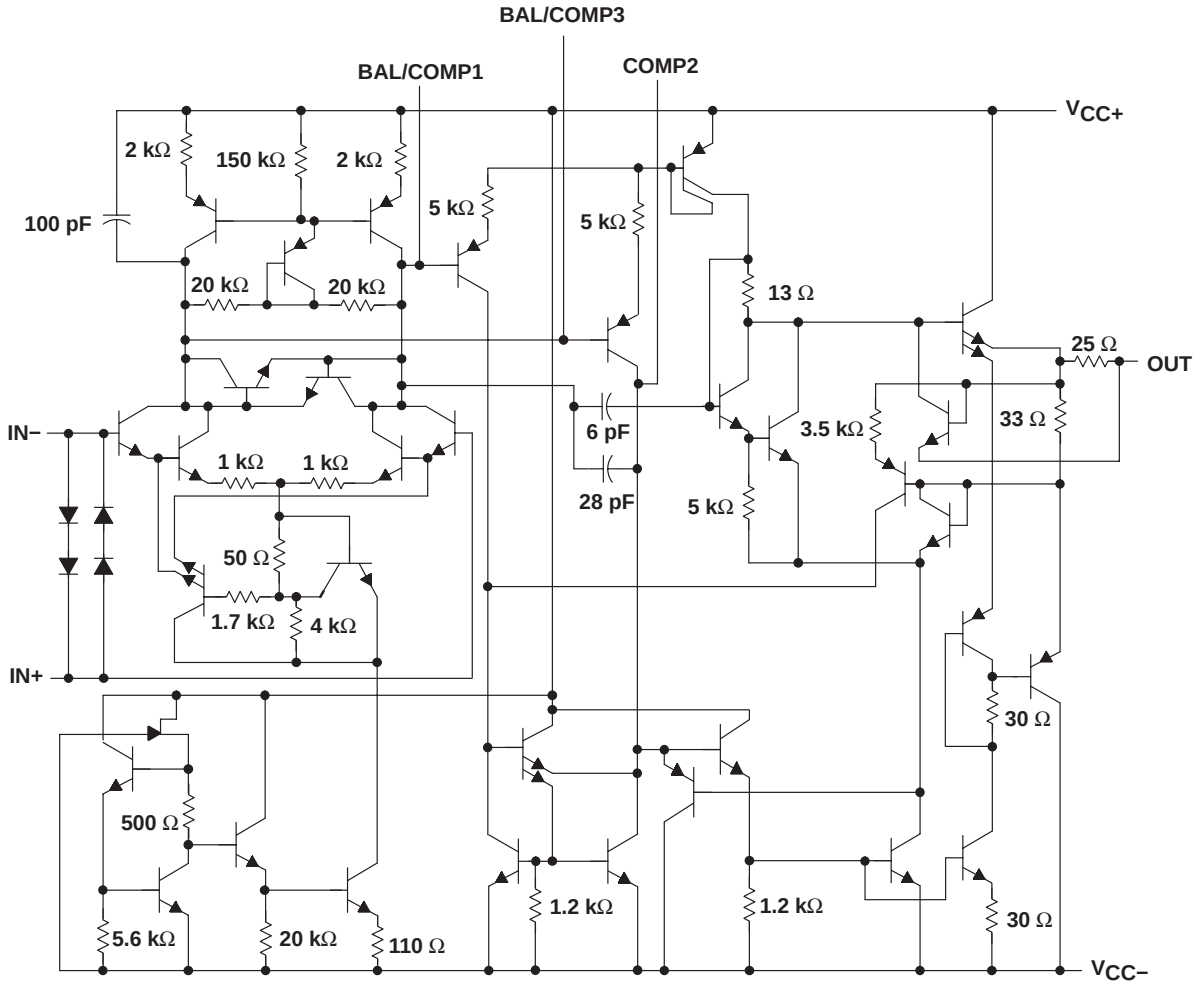
schematic



Component values shown are nominal.

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

Supply voltage: V_{CC+} (see Note 1) . . . . . 20 V
V_{CC-} (see Note 1) . . . . . −20 V
Input voltage, V_I (either input, see Notes 1 and 2) . . . . . ±15 V
Differential input current, V_{ID} (see Note 3) . . . . . ±10 V
Duration of output short circuit (see Note 4) . . . . . Unlimited
Operating virtual junction temperature, T_J . . . . . 150°C
Package thermal impedance, θ_{JA} (see Notes 5 and 6) . . . . . 126°C/W
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds . . . . . 260°C
Storage temperature range, T_{stg} . . . . . −65°C to 150°C

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

NOTES:
1. All voltage values, unless otherwise noted, are with respect to the midpoint between V_{CC+} and V_{CC-}.
2. The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 V, whichever is less.
3. The inputs are shunted with two opposite-facing base-emitter diodes for overvoltage protection. Therefore, excessive current flows if a different input voltage in excess of approximately 1 V is applied between the inputs, unless some limiting resistance is used.
4. The output can be shorted to ground for either power supply. For the LM218, the unlimited duration of the short circuit applies at (or below) 85°C case temperature or 75°C free-air temperature.
5. Maximum power dissipation is a function of $T_J(max)$, θ_{JA}, and T_A. The maximum allowable power dissipation at any allowable ambient temperautre is $P_D = (T_J(max) - T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of 150°C can affect reliability.
6. The package thermal impedance is calculated in accordance with JESD 51-7.

electrical characteristics at specified free-air temperature (see Note 7)

PARAMETER		TEST CONDITIONS‡	T_A§	MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage	V_O = 0	25°C		2	10	mV
			Full range			15	
I_{IO}	Input offset current	V_O = 0	25°C		6	50	nA
			Full range			100	
I_{IB}	Input bias current	V_O = 0	25°C		120	250	nA
			Full range			500	
V_{ICR}	Common-mode input voltage range	$V_{CC\pm}$ = ±15 V	Full range	± 11.5			V
V_{OM}	Maximum peak output voltage swing	$V_{CC\pm}$ = ±15 V, R_L = 2 kΩ	Full range	±12	±13		V
A_{VD}	Large-signal differential voltage amplification	$V_{CC\pm}$ = ±15 V, V_O = ±10 V, $R_L \geq$ 2 kΩ	25°C	50	200		V/mV
			Full range	25			
B_1	Unity-gain bandwidth	$V_{CC\pm}$ = ±15 V	25°C		15		MHz
r_i	Input resistance		25°C		3		MΩ
CMRR	Common-mode rejection ratio	$V_{IC} = V_{ICR}$min	Full range	80	100		dB
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{CC}/\Delta V_{IO}$)		Full range	70	80		dB
I_{CC}	Supply current	V_O = 0, No load	25°C		5	8	mA

‡ All characteristics are measured under open-loop conditions with common-mode input voltage, unless otherwise specified.
§ Full range for LM218I is −40°C to 85°C.
NOTE 7: Unless otherwise noted, V_{CC} = ±5 V to ±20 V. All typical values are at $V_{CC\pm}$ = ± 15 V and T_A = 25°C.

operating characteristics, $V_{CC\pm}$ = ±15 V, T_A = 25°C

PARAMETER		TEST CONDITIONS			MIN	TYP	MAX	UNIT
SR	Slew rate at unity gain	ΔV_I = 10 V,	C_L = 100 pF,	See Figure 1	20	70		V/μs

PARAMETER MEASUREMENT INFORMATION

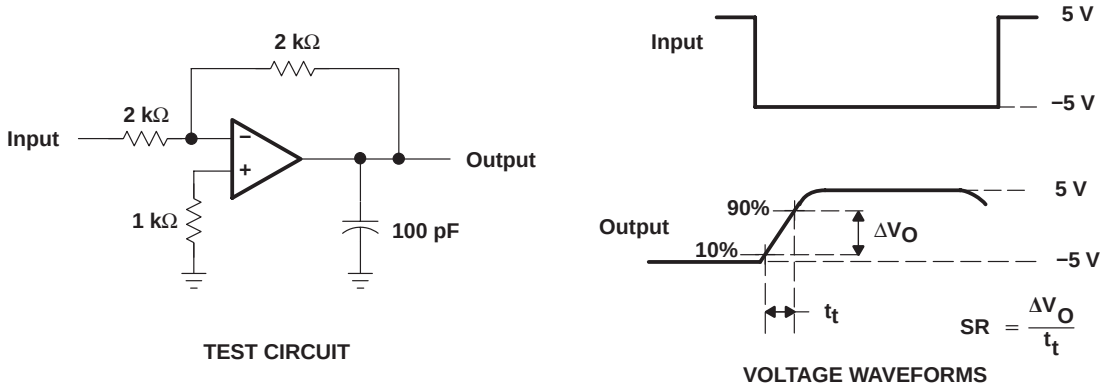


Figure 1. Slew Rate

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Samples (Requires Login)
LM218IDRG4Q1	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
LM218IDRQ1	OBSOLETE	SOIC	D	8		TBD	Call TI	Call TI	

(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.

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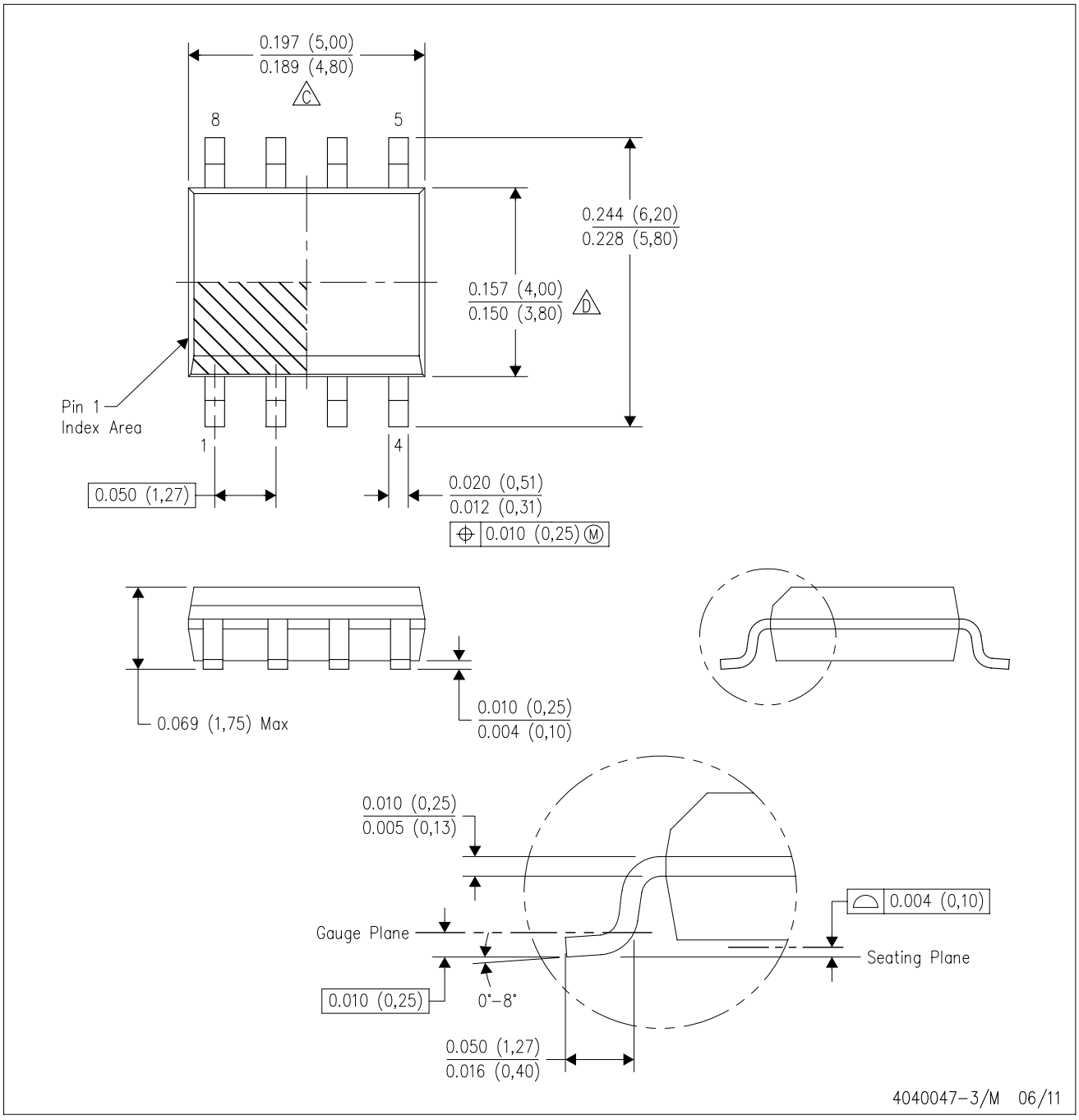
D (R–PDSO–G8) PLASTIC SMALL OUTLINE



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 0.006 (0,15) each side.
D. Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
E. Reference JEDEC MS–012 variation AA.

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