

LM8262 Dual RRIO, High Output Current and Unlimited Cap Load Op Amp in VSSOP

1 Features

- GBWP: 24MHz
- Wide supply voltage range: 2.7V to 32V
- Slew rate: 35V/ μ s
- Supply current: 1.35mA
- Unlimited cap load drive
- Output short circuit current: ± 125 mA
- Rail-to-rail input and output: 3V
- Input voltage noise: 12nV/ $\sqrt{\text{Hz}}$
- Input current noise: 1pA/ $\sqrt{\text{Hz}}$
- THD+N <0.00022%

2 Applications

- TFT-LCD flat panel V_{COM} driver
- A/D converter buffer
- High side/low side sensing
- Headphone amplifier

3 Description

The LM8262 is a rail-to-rail input and output op amp which can operate with a wide supply voltage range. This device has high output current drive, greater than rail-to-rail input common mode voltage range, unlimited capacitive load drive capability, and provides tested high speed and slew rate. The device is designed to handle the requirements of flat panel TFT panel V_{COM} driver applications as well as being designed for other low power and medium speed applications which require ease of use and enhanced performance over existing devices.

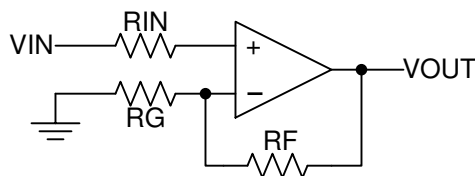
Greater than rail-to-rail input common mode voltage range with 90dB of common mode rejection allows high side and low side sensing for many applications without concern for exceeding the range and with no compromise in accuracy. In addition, most device parameters are insensitive to power supply variations. This design enhancement is yet another step in simplifying the usage. The output stage has low distortion (0.00022% THD+N) and has a high short-circuit output current of 125mA/channel.

The LM8262 is offered in the space-saving VSSOP package.

Package Information

PART NUMBER	PACKAGE ⁽¹⁾	PACKAGE SIZE ⁽²⁾
LM8262	DGK (VSSOP, 8)	3.00mm × 4.90mm

- (1) For more information, see [Mechanical, Packaging, and Orderable Information](#).
- (2) The package size (length × width) is a nominal value and includes pins, where applicable.



Simplified Schematic



Table of Contents

1 Features	1	6.2 Output Short Circuit Current and Dissipation Issues.....	11
2 Applications	1	6.3 Other Application Hints.....	12
3 Description	1	6.4 Power Supply Recommendations.....	12
4 Pin Configuration and Functions	3	6.5 Layout.....	12
5 Specifications	4	7 Device and Documentation Support	13
5.1 Absolute Maximum Ratings	4	7.1 Device Support.....	13
5.2 ESD Ratings.....	4	7.2 Receiving Notification of Documentation Updates...	13
5.3 Recommended Operating Conditions.....	4	7.3 Support Resources.....	13
5.4 Thermal Information.....	4	7.4 Trademarks.....	13
5.5 Electrical Characteristics.....	5	7.5 Electrostatic Discharge Caution.....	13
5.6 Typical Characteristics.....	6	7.6 Glossary.....	13
5.7 Old Versus New Die Comparison.....	10	8 Revision History	13
6 Application and Implementation	11	9 Mechanical, Packaging, and Orderable Information..	14
6.1 Driving Capacitive Loads.....	11		

4 Pin Configuration and Functions

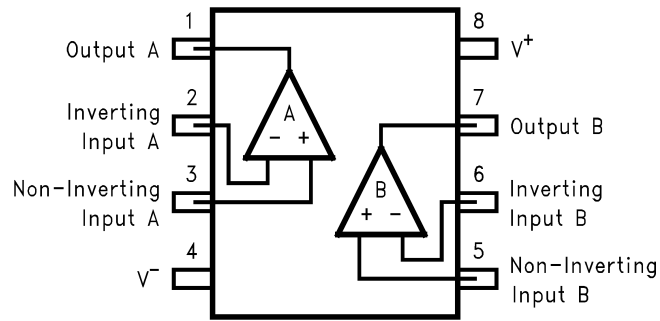


Figure 4-1. 8-Pin VSSOP Top View

Table 4-1. Pin Functions

PIN		TYPE ⁽¹⁾	DESCRIPTION
NO.	NAME		
1	OUT A	O	Output A
2	-IN A	I	Inverting input A
3	+IN A	I	Non-inverting input A
4	V-	I	Negative supply
5	+IN B	I	Non-inverting input B
6	-IN B	I	Inverting input B
7	OUT B	O	Output B
8	V+	I	Positive supply

(1) I = input and O = output

5 Specifications

5.1 Absolute Maximum Ratings

over operating ambient temperature range (unless otherwise noted)⁽¹⁾

		MIN	MAX	UNIT
Supply voltage, $V_S = (V+) - (V-)$		0	33	V
Signal input pins	Common-mode voltage ⁽³⁾	$(V-) - 0.5$	$(V+) + 0.5$	V
	Differential voltage ⁽⁴⁾		± 10	V
	Current ⁽³⁾		± 10	mA
Output short-circuit ⁽²⁾		Continuous		
Junction temperature, T_J			150	°C
Storage temperature, T_{stg}		-65	150	°C
Soldering Information:	Infrared or Convection (20 sec.)		235	°C
	Wave Soldering (10 sec.)		260	°C

- Operating the device beyond the ratings listed under *Absolute Maximum Ratings* will cause permanent damage to the device. These are stress ratings only, based on process and design limitations, and this device has not been designed to function outside the conditions indicated under *Recommended Operating Conditions*. Exposure to any condition outside *Recommended Operating Conditions* for extended periods, including absolute-maximum-rated conditions, may affect device reliability and performance.
- Short-circuit to ground, one amplifier per package. Extended short-circuit current, especially with higher supply voltage, can cause excessive heating and eventual destruction.
- Input pins are diode-clamped to the power-supply rails. Input signals that may swing more than 0.5V beyond the supply rails must be current limited to 10mA or less.
- Input pins are connected by back-to-back diodes for input protection. If the differential input voltage may exceed 0.5V, limit the input current to 10mA or less.

5.2 ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge ⁽¹⁾	Human Body Model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins ⁽²⁾	± 2000	V
		Charged-device model (CDM), per ANSI/ESDA/JEDEC JS-002 ⁽³⁾	± 1500	
		Machine Model (MM) ⁽²⁾	± 200	

- Human Body Model, 1.5k Ω in series with 100pF. Machine Model, 0 Ω in series with 200pF.
- JEDEC document JEP155 states that 2000V HBM allows safe manufacturing with a standard ESD control process.
- JEDEC document JEP157 states that 250V CDM allows safe manufacturing with a standard ESD control process.

5.3 Recommended Operating Conditions

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

	MIN	MAX	UNIT
Supply Voltage ($V^+ - V^-$)	2.7	32	V
Operating Temperature Range ⁽²⁾	-40	+85	°C

5.4 Thermal Information

THERMAL METRIC ⁽¹⁾		DGK	UNIT
		8 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance ⁽²⁾	169.6	°C/W

- For more information about traditional and new thermal metrics, see the [IC Package Thermal Metrics](#) application note.
- The maximum power dissipation is a function of $T_J(\max)$, $R_{\theta JA}$, and T_A . The maximum allowable power dissipation at any ambient temperature is $P_D = (T_J(\max) - T_A)/R_{\theta JA}$. All numbers apply for packages soldered directly onto a PC board.

5.5 Electrical Characteristics

For $V_S = (V+) - (V-) = 2.7V$ to $32V$ ($\pm 1.35V$ to $\pm 16V$) at $T_A = 25^\circ C$, $R_L = 10k\Omega$ connected to $V_S / 2$, $V_{CM} = V_S / 2$, and $V_{OUT} = V_S / 2$, unless otherwise noted.⁽¹⁾

PARAMETER		TEST CONDITIONS		MIN	TYP ⁽²⁾	MAX ⁽³⁾	UNIT
V_{OS}	Input Offset Voltage	$V_{CM} = V-$			± 0.7	± 7	mV
			$-40^\circ C \leq T_A \leq +125^\circ C$				
TC V_{OS}	Input Offset Average Drift	$V_{CM} = V-$	$-40^\circ C \leq T_A \leq +125^\circ C$		± 2		$\mu V/^\circ C$
I_B	Input Bias Current				± 0.4	± 2	μA
			$-40^\circ C \leq T_A \leq +125^\circ C$				
I_{OS}	Input Offset Current				30	275	nA
V_{CM}	Input Common-Mode Voltage Range			V-		V+	V
CMRR	Common Mode Rejection Ratio	$V- < V_{CM} < (V+) - 2V$	$-40^\circ C \leq T_A \leq +125^\circ C$	80	100		dB
PSRR	Power Supply Rejection Ratio	$V_{CM} = V-, V_S = 5V$ to $32V$	$-40^\circ C \leq T_A \leq +125^\circ C$		± 3.5	± 22	$\mu V/V$
A_{OL}	Open Loop Voltage Gain	$V_S = 32V, V_{CM} = V_S / 2,$ $(V-) + 1V < V_O < (V+) - 1V$	$-40^\circ C \leq T_A \leq +125^\circ C$		85		dB
	Voltage Output Swing from Rail	Positive and negative rail headroom	$V_S = 32V, R_L = 10K\Omega$		15.94		V
			$V_S = 32V, R_L = 2K\Omega$		15.8		
			$V_S = 32V, R_L = 10K\Omega$		-15.94		V
			$V_S = 32V, R_L = 2K\Omega$		-15.8		
I_{SC}	Output Short Circuit Current	$V_S = 32V$		± 62	± 125		mA
		$V_S = 5V^{(4)}$		± 50	± 85		
		$V_S = 2.7V^{(4)}$		± 30	± 60		
I_S	Supply Current	$V_{CM} = V-, I_O = 0A$			1.30	1.93	mA
			$-40^\circ C \leq T_A \leq +125^\circ C$				
SR	Slew Rate	$V_S = 32V, V_{STEP} = 10V, G = +1, C_L = 20pF$			35		V/ μs
GBW	Gain-Bandwidth Product				24		MHz
Φ_{im}	Phase Margin	$G = +1, R_L = 10k\Omega, C_L = 20pF$			50		$^\circ$
e_n	Input Voltage Noise Density	$f = 1kHz$			12		nV/ \sqrt{Hz}
i_n	Input Current Noise Density	$f = 1kHz$			1		pA/ \sqrt{Hz}
t_s	Settling Time	$T_O 0.1\%, V_S = 32V, V_{STEP} = 10V, G = +1, C_L = 50pF$			430		ns
THD+N	Total Harmonic Distortion +Noise	$V_S = 32V, V_O = 3V_{RMS}, G = 1, f = 1kHz, R_L = 10k\Omega$			113		dB

- (1) Electrical Table values apply only for factory testing conditions at the temperature indicated.
- (2) Typical Values represent the most likely parametric norm.
- (3) All limits are specified by testing or statistical analysis.
- (4) Specified by characterization only.

5.6 Typical Characteristics

$T_A = 25^\circ\text{C}$, $V_S = \pm 16\text{V}$, $V_{CM} = V_S/2$, Unless Otherwise Noted

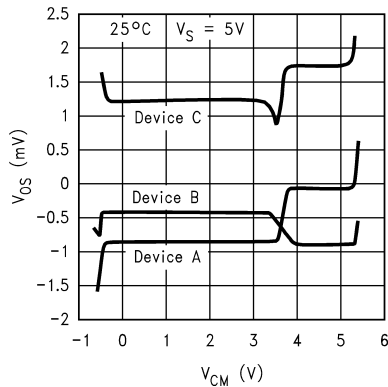


Figure 5-1. V_{OS} vs. V_{CM} for 3 Representative Units of the Old Die

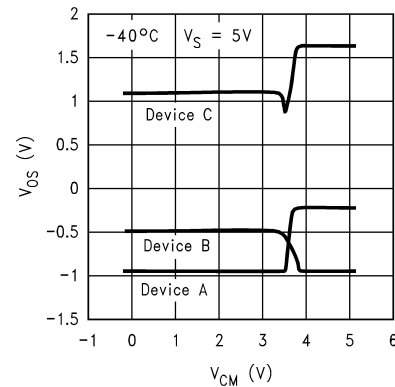


Figure 5-2. V_{OS} vs. V_{CM} for 3 Representative Units of the Old Die

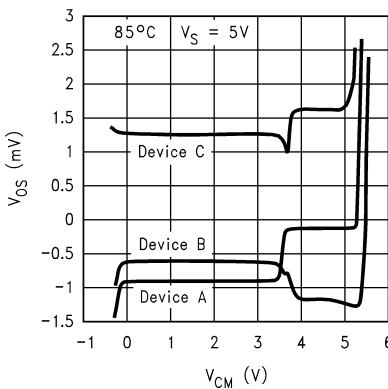


Figure 5-3. V_{OS} vs. V_{CM} for 3 Representative Units of the Old Die

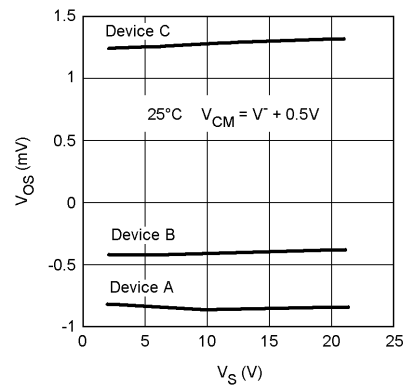


Figure 5-4. V_{OS} vs. V_S for 3 Representative Units of the Old Die

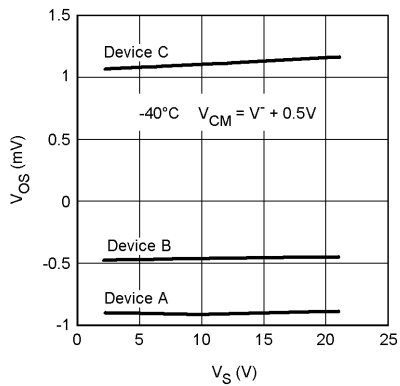


Figure 5-5. V_{OS} vs. V_S for 3 Representative Units of the Old Die

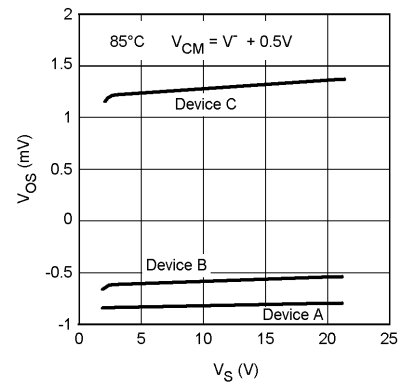


Figure 5-6. V_{OS} vs. V_S for 3 Representative Units of the Old Die

5.6 Typical Characteristics (continued)

$T_A = 25^\circ\text{C}$, $V_S = \pm 16\text{V}$, $V_{CM} = V_S/2$, Unless Otherwise Noted

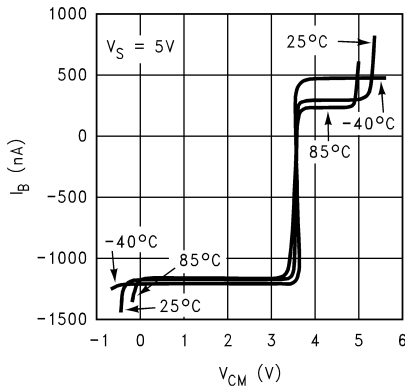


Figure 5-7. I_B vs. V_{CM} of the Old Die

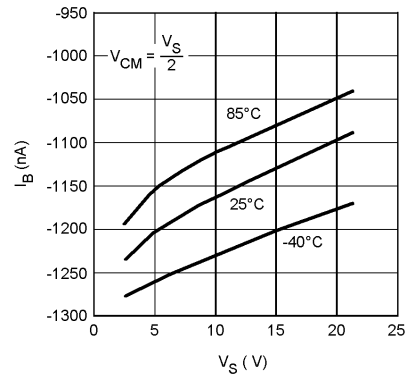


Figure 5-8. I_B vs. V_S of the Old Die

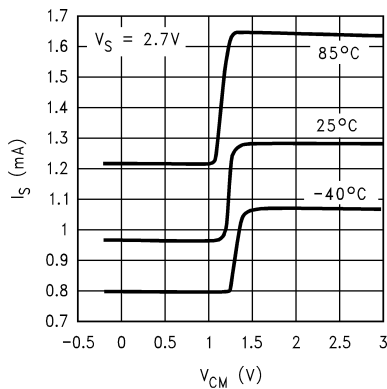


Figure 5-9. I_S vs. V_{CM} of the Old Die

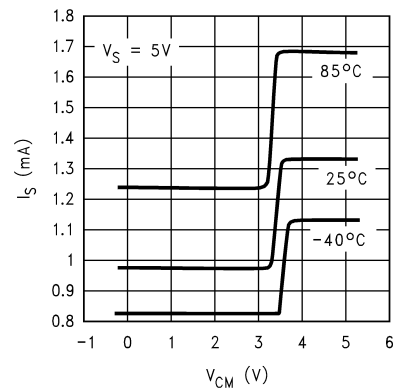


Figure 5-10. I_S vs. V_{CM} of the Old Die

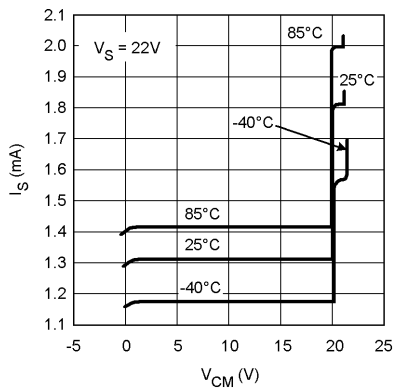


Figure 5-11. I_S vs. V_{CM} of the Old Die

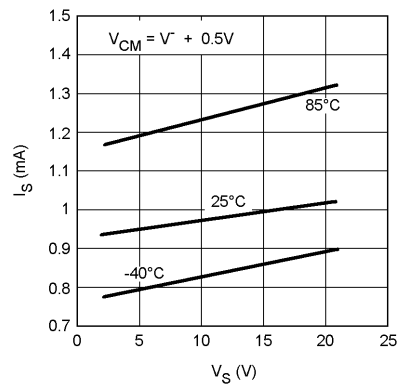


Figure 5-12. I_S vs. V_S (PNP side) of the Old Die

5.6 Typical Characteristics (continued)

$T_A = 25^\circ\text{C}$, $V_S = \pm 16\text{V}$, $V_{CM} = V_S/2$, Unless Otherwise Noted

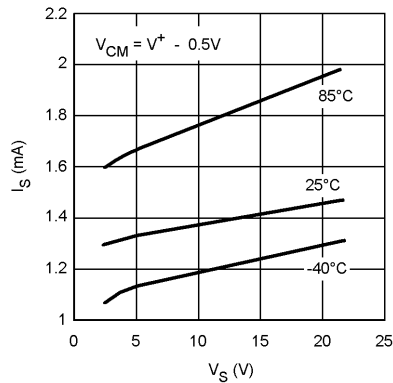


Figure 5-13. I_S vs. V_S (NPN side) of the Old Die

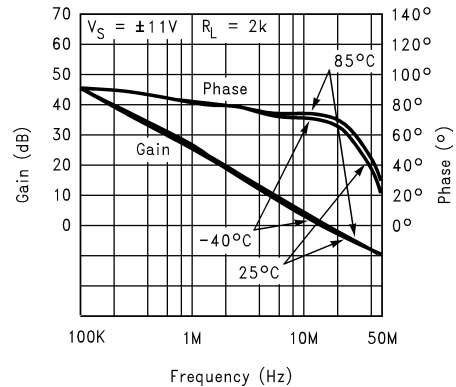


Figure 5-14. Gain/Phase vs. Frequency of the Old Die

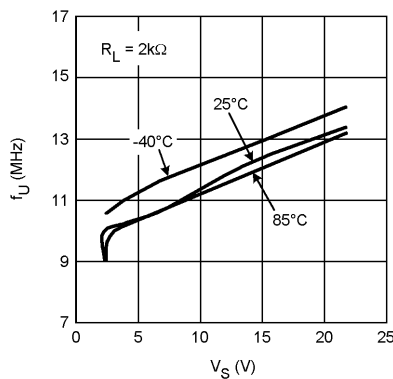


Figure 5-15. Unity Gain Frequency vs. V_S of the Old Die

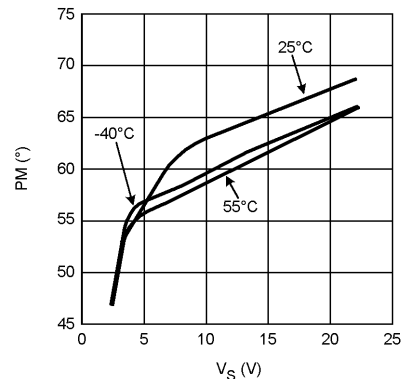


Figure 5-16. Phase Margin vs. V_S of the Old Die

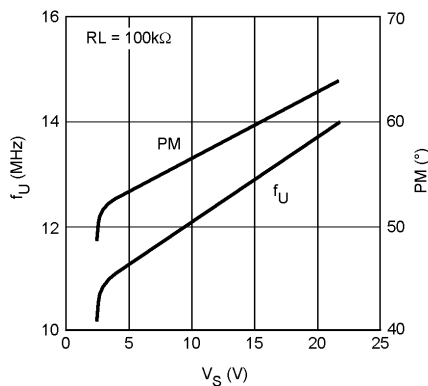


Figure 5-17. Unity Gain Frequency and Phase Margin vs. V_S of the Old Die

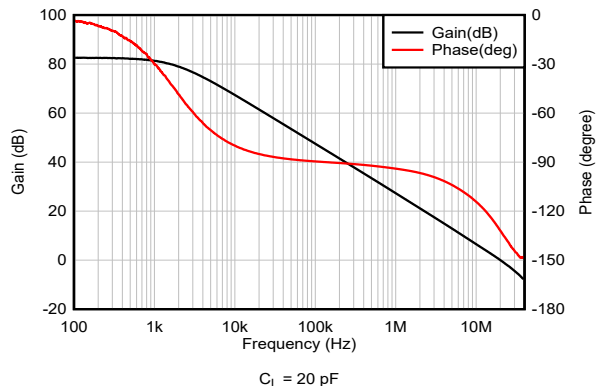


Figure 5-18. Open-Loop Gain and Phase vs Frequency, New Die

5.6 Typical Characteristics (continued)

$T_A = 25^\circ\text{C}$, $V_S = \pm 16\text{V}$, $V_{CM} = V_S/2$, Unless Otherwise Noted

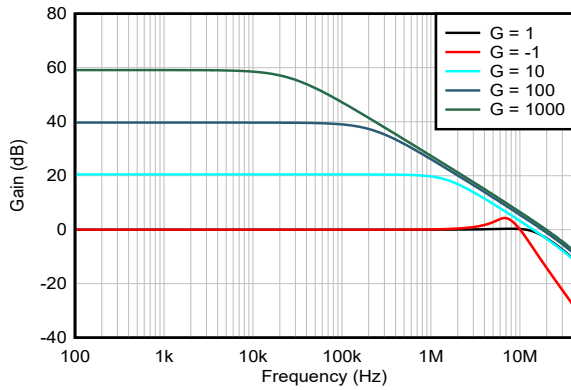


Figure 5-19. Closed-Loop Gain vs Frequency, New Die

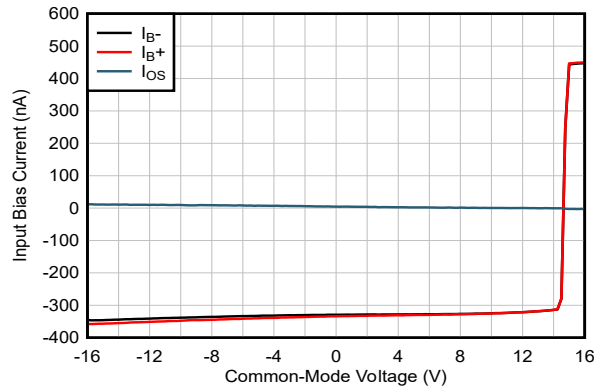


Figure 5-20. Input Bias Current and Offset Current vs Common-Mode Voltage, New Die

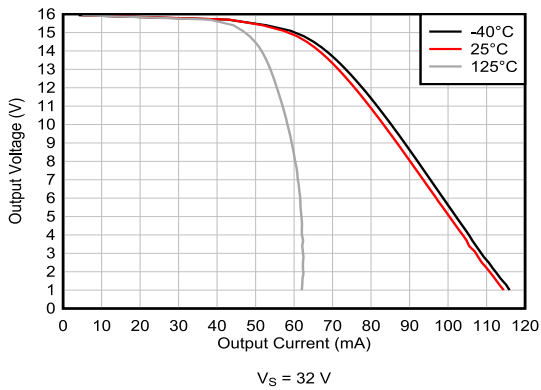


Figure 5-21. Output Voltage Swing vs Output Current (Sourcing), New Die

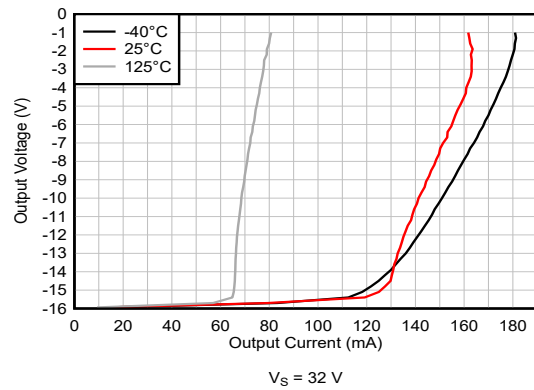


Figure 5-22. Output Voltage Swing vs Output Current (Sinking), New Die

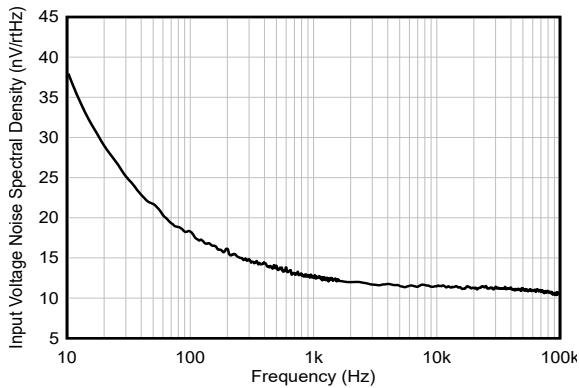


Figure 5-23. Input Voltage Noise Spectral Density vs Frequency, New Die

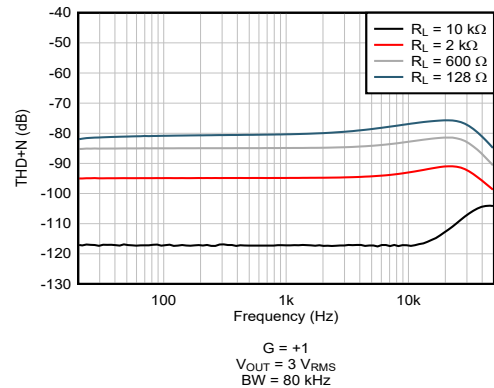


Figure 5-24. THD+N Ratio vs Frequency, New Die

5.6 Typical Characteristics (continued)

$T_A = 25^\circ\text{C}$, $V_S = \pm 16\text{V}$, $V_{CM} = V_S/2$, Unless Otherwise Noted

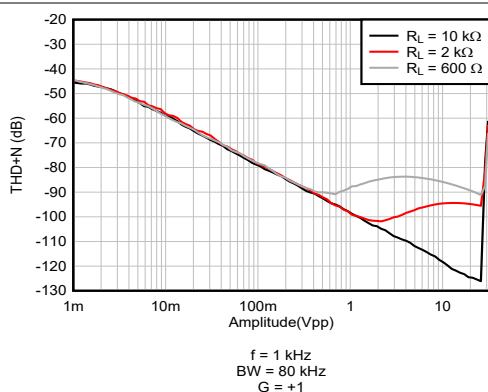


Figure 5-25. THD+N vs Output Amplitude, New Die

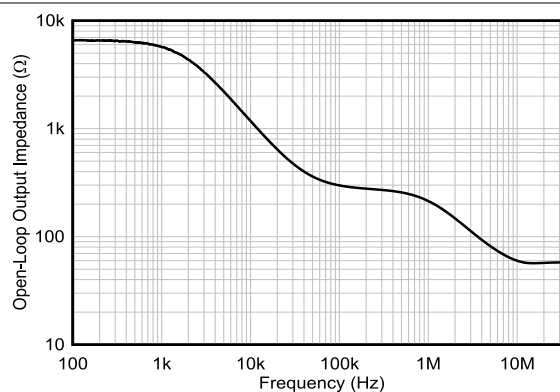


Figure 5-26. Open-Loop Output Impedance vs Frequency, New Die

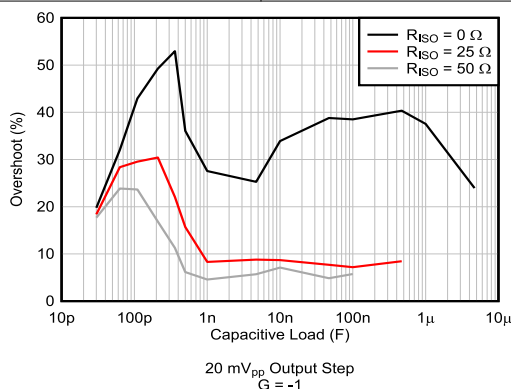


Figure 5-27. Small-Signal Overshoot vs Capacitive Load, New Die

5.7 Old Versus New Die Comparison

As of the publication of revision H of this datasheet, Texas Instruments has moved manufacturing of the die for LM8262 to a modern fabrication site. The two different die are referred to in this document as “old” (previous fabrication site) and “new” die. The die origin can be separated from the “Chip Source Origin” (CSO) parameter in the shipping information. The old die CSO is “GF6”, for the new die the CSO is “RFB”. The old die information is in the shipping information. The old die CSO is “GF6”, for the new die the CSO is “RFB”. The old die information is maintained in this datasheet for comparison purposes, but all new manufacturing has moved to the new die.

6 Application and Implementation

Note

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes, as well as validating and testing their design implementation to confirm system functionality.

6.1 Driving Capacitive Loads

The LM8262 is specifically designed to drive unlimited capacitive loads without oscillations. In addition, the output current handling capability of the device allows for good slewing characteristics even with large capacitive loads. The combination of these features is designed for applications such as TFT flat panel buffers, A/D converter input amplifiers, and so forth.

However, as in most op amps, addition of a series isolation resistor between the op amp and the capacitive load improves the settling and overshoot performance.

6.2 Output Short Circuit Current and Dissipation Issues

The LM8262 output stage is designed for maximum output current capability. Even though momentary output shorts to ground and either supply can be tolerated at all operating voltages, longer lasting short conditions can cause the junction temperature to rise beyond the absolute maximum rating of the device, especially at higher supply voltage conditions.

With the op amp tied to a load, the device power dissipation consists of the quiescent power due to the supply current flow into the device, in addition to power dissipation due to the load current. The load portion of the power can include an average value (due to a DC load current) and an AC component. DC load current flows if there is an output voltage offset, or the output AC average current is non-zero, or if the op amp operates in a single supply application where the output is maintained somewhere in the range of linear operation. Therefore:

$$P_{TOTAL} = P_Q + P_{DC} + P_{AC} \quad (1)$$

op amp Quiescent Power Dissipation:

$$P_Q = I_S \times V_S \quad (2)$$

DC Load Power:

$$P_{DC} = I_O \times [V_R - V_O] \quad (3)$$

Table 6-1 shows AC Load Power (P_{AC}).

where

- I_S is the supply current
- V_S is the total supply voltage (V_+ - V_-)
- I_O is the average load current
- V_O is the average output voltage
- V_R is V_+ for sourcing and V_- for sinking current

Table 6-1 shows the maximum AC component of the load power dissipated by the op amp for standard sinusoidal, triangular, and square waveforms.

Table 6-1. Normalized AC Power Dissipated in the Output Stage for Standard Waveforms

P_{AC} (W.Ω/V ²)		
Sinusoidal	Triangular	Square
50.7×10^{-3}	46.9×10^{-3}	62.5×10^{-3}

The table entries are normalized to V_S^2 / R_L . To calculate the AC load current component of power dissipation, simply multiply the table entry corresponding to the output waveform by the factor V_S^2 / R_L . For example, with $\pm 15V$ supplies, a 600Ω load, and triangular waveform power dissipation in the output stage is calculated as:

$$P_{AC} = 46.9 \times 10^{-3} \times \frac{30^2}{600} = 70.4\text{mW} \quad (4)$$

6.3 Other Application Hints

The use of supply decoupling is mandatory in most applications. As with most relatively high speed/high output current op amps, best results are achieved when each supply line is decoupled with two capacitors; a small value ceramic capacitor (approximately $0.01\mu\text{F}$) placed very close to the supply lead in addition to a large value Tantalum or Aluminum ($> 4.7\mu\text{F}$). The large capacitor can be shared by more than one device if necessary. The small ceramic capacitor maintains low supply impedance at high frequencies while the large capacitor acts as the charge "bucket" for fast load current spikes at the Op Amp output. The combination of these capacitors provides supply decoupling and helps keep the op amp oscillation free under any load.

6.4 Power Supply Recommendations

The LM8262 can operate off a single supply or with dual supplies. The input CM capability of the parts (CMVR) extends covers the entire supply voltage range for maximum flexibility. Decouple supplies with low inductance, often ceramic, capacitors to ground less than 0.5 inches from the device pins. The use of ground plane is recommended, and as in most high speed devices, remove the ground plane close to device sensitive pins such as the inputs.

6.5 Layout

6.5.1 Layout Guidelines

Generally, a good high frequency layout keeps power supply and ground traces away from the inverting input and output pins. Parasitic capacitances on these nodes to ground causes frequency response peaking and possible circuit oscillations. General high-speed, signal-path layout suggestions include:

- Continuous ground planes are preferred for signal routing with matched impedance traces for longer runs. However, open up both ground and power planes around the capacitive sensitive input and output device pins. After the signal is sent into a resistor, parasitic capacitance becomes more of a band-limiting issue and less of a stability issue.
- Use good, high-frequency decoupling capacitors ($0.1\mu\text{F}$) on the ground plane at the device power pins. For best high-frequency decoupling, consider X2Y supply-decoupling capacitors that offer a much higher self-resonance frequency over standard capacitors.
- When using differential signal routing over any appreciable distance, use microstrip layout techniques with matched impedance traces.
- The input summing junction is very sensitive to parasitic capacitance. Connect any R_f , and R_g elements into the summing junction with minimal trace length to the device pin side of the resistor. The other side of these elements can have more trace length if needed to the source or to ground.

7 Device and Documentation Support

7.1 Device Support

7.1.1 Third-Party Products Disclaimer

TI'S PUBLICATION OF INFORMATION REGARDING THIRD-PARTY PRODUCTS OR SERVICES DOES NOT CONSTITUTE AN ENDORSEMENT REGARDING THE SUITABILITY OF SUCH PRODUCTS OR SERVICES OR A WARRANTY, REPRESENTATION OR ENDORSEMENT OF SUCH PRODUCTS OR SERVICES, EITHER ALONE OR IN COMBINATION WITH ANY TI PRODUCT OR SERVICE.

7.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. Click on *Notifications* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

7.3 Support Resources

[TI E2E™ support forums](#) are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

Linked content is provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's [Terms of Use](#).

7.4 Trademarks

TI E2E™ is a trademark of Texas Instruments.
All trademarks are the property of their respective owners.

7.5 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments 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.

7.6 Glossary

[TI Glossary](#) This glossary lists and explains terms, acronyms, and definitions.

8 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision G (August 2015) to Revision H (June 2026)	Page
• Updated the numbering format for tables, figures, and cross-references throughout the document.....	1
• Updated <i>Features</i> section per new die specifications.....	1
• Updated the format for tables, specs, and description as per new die characteristics.....	1
• Updated Absolute Maximum Ratings table and footnotes per new die specifications.....	4
• Added charge device model information to ESD Ratings	4
• Updated table footnotes.....	4
• Changed Recommended Operating Conditions supply voltage minimum value from 2.5V to 2.7V and maximum value from 22V to 32V.....	4
• Changed Junction-to-ambient thermal resistance from 235°C/W to 169.6°C/W.....	4
• Updated <i>Electrical Characteristics</i> table per new die characteristics	5
• Deleted the <i>5V Electrical Characteristics</i> and <i>+/-11V Electrical Characteristics</i> sections.....	5
• Updated <i>Typical Characteristics</i> plots as per New Die specifications.....	6
• Added Figure 5-18 to Figure 5-27	6

• Added Old Versus New Die Comparison	10
• Added the <i>Application and Implementation</i> section.....	11

Changes from Revision F (August 2014) to Revision G (August 2015)	Page
• Changed pin 5 From: -IN B To: +IN B Non-Inverting Input B in the <i>Pin Functions</i> table.....	3
• Changed pin 6 From: +IN B To: -IN B Inverting Input B in the <i>Pin Functions</i> table.....	3
• Moved "Storage temperature range" to the Section 5.1	4
• Changed <i>Handling Ratings</i> To: Section 5.2	4

Changes from Revision E (April 2013) to Revision F (August 2014)	Page
• Changed datasheet structure and organization. Added, updated, or renamed the following sections: Device and Documentation Support; Mechanical, Packaging, and Ordering Information.....	1
• Changed from "Junction Temperature Range" to "Operating Temperature Range".....	4
• Deleted $T_J = 25^{\circ}\text{C}$,	5

9 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this datasheet, refer to the left-hand navigation.

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you fully indemnify TI and its representatives against any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#), [TI's General Quality Guidelines](#), or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products. Unless TI explicitly designates a product as custom or customer-specified, TI products are standard, catalog, general purpose devices.

TI objects to and rejects any additional or different terms you may propose.

Copyright © 2026, Texas Instruments Incorporated

Last updated 10/2025