

100
CMOS

FEATURES

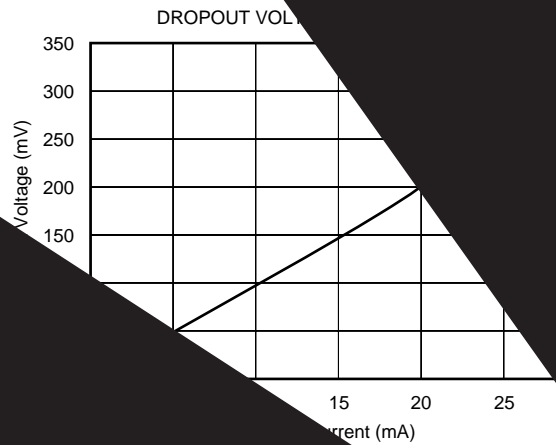
- **MicroSIZ** PACKAGE: SOT23-3
- **LOW DROPOUT:** 1mV
- **HIGH OUTPUT CURRENT:** 25mA
- **LOW TEMPERATURE DRIFT:** 100ppm/°C max
- **HIGH ACCURACY:** 2%
- **LOW I_q:** 10µA max

APPLICATIONS

- **PORTABLE BATTERY-POWERED EQUIPMENT**
- **DATA ACQUISITION SYSTEMS**
- **TESTING EQUIPMENT**
- **HAND-HELD TEST EQUIPMENT**

1mV
temp

REF2912
REF2920
REF2925
REF2930
REF2933
REF2940



Please
Texas

All trademarks are

PRODUCTION DATA informs
products conform to specific
standard warranty. Production
testing of all parameters.

tical applications of

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

Supply Voltage, V+ to V-	7.0V
Output Short-Circuit ⁽²⁾	Continuous
Operating Temperature	-40°C to +125°C
Storage Temperature	-65°C to +125°C
Junction Temperature	+150°C
Lead Temperature (soldering, 10s)	+300°C

NOTES: (1) Stresses above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability. These are stress ratings only, and functional operation of the device at these, or any other conditions beyond those specified, is not implied.
(2) Short-circuit to ground.



ELECTROSTATIC DISCHARGE SENSITIVITY

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.

PACKAGE/ORDERING INFORMATION⁽¹⁾

PRODUCT	PACKAGE-LEAD	PACKAGE DESIGNATOR ⁽¹⁾	SPECIFIED TEMPERATURE RANGE	PACKAGE MARKING	ORDERING NUMBER	TRANSPORT MEDIA, QUANTITY
REF2912	SOT23-3	DBZ	-40°C to +125°C	R29A	REF2912AIDBZT	Tape and Reel, 250
"	"	"	"	"	REF2912AIDBZR	Tape and Reel, 3000
REF2920	SOT23-3	DBZ	-40°C to +125°C	R29B	REF2920AIDBZT	Tape and Reel, 250
"	"	"	"	"	REF2920AIDBZR	Tape and Reel, 3000
REF2925	SOT23-3	DBZ	-40°C to +125°C	R29C	REF2925AIDBZT	Tape and Reel, 250
"	"	"	"	"	REF2925AIDBZR	Tape and Reel, 3000
REF2930	SOT23-3	DBZ	-40°C to +125°C	R29D	REF2930AIDBZT	Tape and Reel, 250
"	"	"	"	"	REF2930AIDBZR	Tape and Reel, 3000
REF2933	SOT23-3	DBZ	-40°C to +125°C	R29E	REF2933AIDBZT	Tape and Reel, 250
"	"	"	"	"	REF2933AIDBZR	Tape and Reel, 3000
REF2940	SOT23-3	DBZ	-40°C to +125°C	R29F	REF2940AIDBZT	Tape and Reel, 250
"	"	"	"	"	REF2940AIDBZR	Tape and Reel, 3000

NOTE: (1) For the most current package and ordering information, see the Package Option Addendum at the end of this data sheet, or see the TI web site at www.ti.com.

ELECTRICAL CHARACTERISTICS

Boldface limits apply over the specified temperature range, $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$.

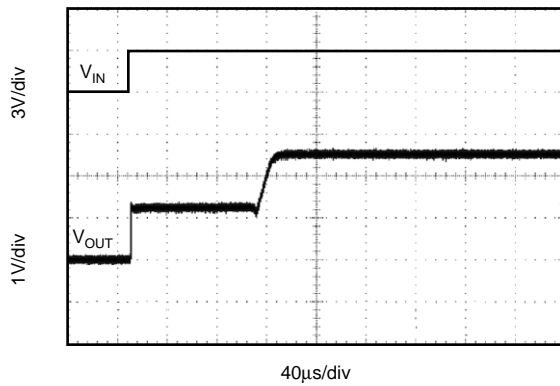
At $T_A = +25^\circ\text{C}$, $I_{\text{LOAD}} = 0\text{mA}$, $V_{\text{IN}} = 5\text{V}$, unless otherwise noted.

PARAMETER	CONDITIONS	REF29xx			UNITS
		MIN	TYP	MAX	
REF2912-1.25V					
OUTPUT VOLTAGE Initial Accuracy	V_{OUT}	1.225	1.25	1.275 2	V %
NOISE Output Voltage Noise Voltage Noise	$f = 0.1\text{Hz to }10\text{Hz}$ $f = 10\text{Hz to }10\text{kHz}$		14 42		μV_{PP} μV_{RMS}
LINE REGULATION	$1.8\text{V} \leq V_{\text{IN}} \leq 5.5\text{V}$		60	190	$\mu\text{V/V}$
REF2920					
OUTPUT VOLTAGE Initial Accuracy	V_{OUT}	2.007	2.048	2.089 2	V %
NOISE Output Voltage Noise Voltage Noise	$f = 0.1\text{Hz to }10\text{Hz}$ $f = 10\text{Hz to }10\text{kHz}$		23 65		μV_{PP} μV_{RMS}
LINE REGULATION	$V_{\text{REF}} + 50\text{mV} \leq V_{\text{IN}} \leq 5.5\text{V}$		110	290	$\mu\text{V/V}$
REF2925					
OUTPUT VOLTAGE Initial Accuracy	V_{OUT}	2.450	2.50	2.550 2	V %
NOISE Output Voltage Noise Voltage Noise	$f = 0.1\text{Hz to }10\text{Hz}$ $f = 10\text{Hz to }10\text{kHz}$		28 80		μV_{PP} μV_{RMS}
LINE REGULATION	$V_{\text{REF}} + 50\text{mV} \leq V_{\text{IN}} \leq 5.5\text{V}$		120	325	$\mu\text{V/V}$

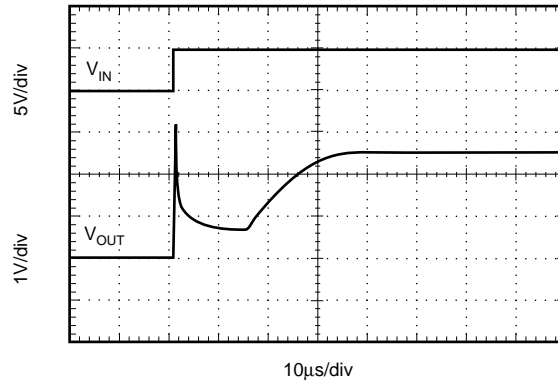
TYPICAL CHARACTERISTICS (Cont.)

At $T_A = +25^\circ\text{C}$, $V_{IN} = +5\text{V}$ power supply, REF2925 is used for typical characteristics, unless otherwise noted.

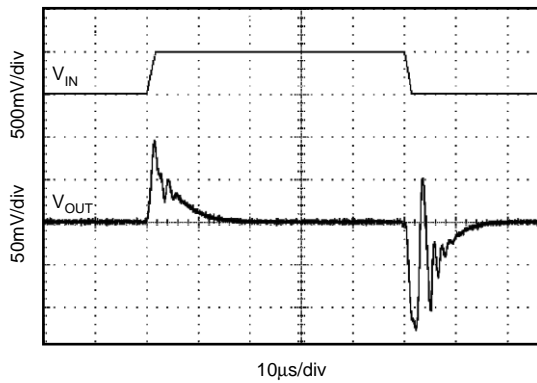
STEP RESPONSE, $C_L = 0$, 3V START-UP



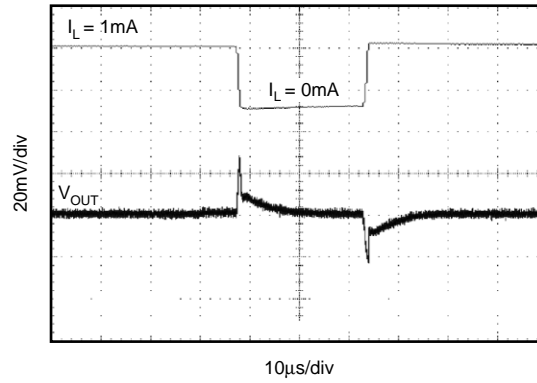
STEP RESPONSE, $C_L = 0$, 5V START-UP



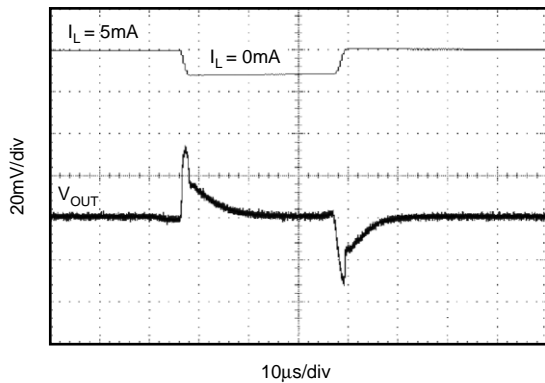
LINE TRANSIENT RESPONSE



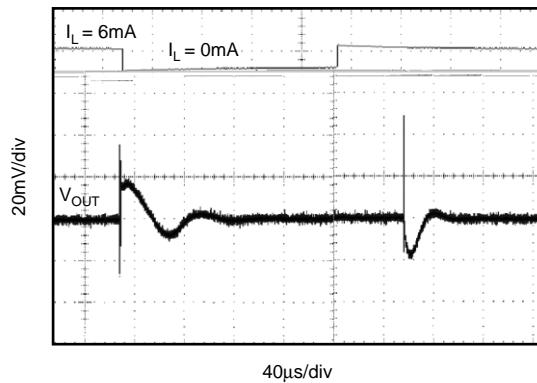
0-1mA LOAD TRANSIENT ($C_L = 0$)



0-5mA LOAD TRANSIENT ($C_L = 0$)



1-6mA LOAD TRANSIENT ($C_L = 1\mu\text{F}$)



PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
REF2912AIDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2912AIDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2912AIDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2912AIDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2920AIDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2920AIDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2920AIDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2920AIDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2925AIDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2925AIDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2925AIDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2925AIDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2930AIDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2930AIDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2930AIDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2930AIDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2933AIDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2933AIDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2933AIDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2933AIDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2940AIDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2940AIDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2940AIDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REF2940AIDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

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

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

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

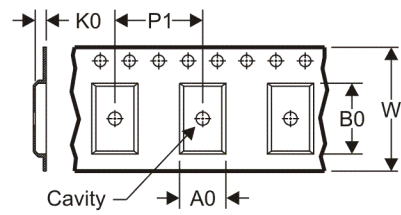
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

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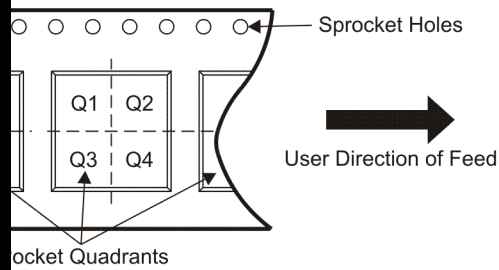
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TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

NOTES FOR PIN 1 ORIENTATION IN TAPE



SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
REF2912AIDBZR	SOT-23	DBZ	3	3000	195.0	200.0	45.0
REF2912AIDBZT	SOT-23	DBZ	3	250	195.0	200.0	45.0
REF2920AIDBZR	SOT-23	DBZ	3	3000	195.0	200.0	45.0
REF2920AIDBZT	SOT-23	DBZ	3	250	195.0	200.0	45.0
REF2925AIDBZR	SOT-23	DBZ	3	3000	195.0	200.0	45.0
REF2925AIDBZT	SOT-23	DBZ	3	250	195.0	200.0	45.0
REF2930AIDBZR	SOT-23	DBZ	3	3000	195.0	200.0	45.0
REF2930AIDBZT	SOT-23	DBZ	3	250	195.0	200.0	45.0
REF2933AIDBZR	SOT-23	DBZ	3	3000	195.0	200.0	45.0
REF2933AIDBZT	SOT-23	DBZ	3	250	195.0	200.0	45.0
REF2940AIDBZR	SOT-23	DBZ	3	3000	195.0	200.0	45.0
REF2940AIDBZT	SOT-23	DBZ	3	250	195.0	200.0	45.0

DBZ (R-PDSO-G3)

PLASTIC SMALL-OUTLINE



4203227/B 04/2005

- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
 - B. This drawing is subject to change without notice.
 - C. Lead dimensions are inclusive of plating.
 - D. Body dimensions are exclusive of mold flash and protrusion. Mold flash and protrusion not to exceed 0.25 per side.
 - $\triangle E$ Falls within JEDEC TO-236 variation AB, except minimum foot length.

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