LM4132/LM4132-Q1 SOT-23 Precision Low Dropout Voltage Reference

1 Features

- Output Initial Voltage Accuracy 0.05%
- Low Temperature Coefficient 10 ppm/°C
- Low Supply Current, 60 µA
- Enable Pin Allowing a 3 µA Shutdown Mode
- 20 mA Output Current
- Voltage Options 1.8V, 2.048 V, 2.5 V, 3.0 V, 3.3 V, 4.096 V
- Custom Voltage Options Available (1.8V to 4.096V)
- V_{IN} Range of V_{REF} + 400 mV to 5.5 V @ 10 mA
- Stable with Low ESR Ceramic Capacitors
- SOT23-5 Package
- LM4132AQ1/BQ1/CQ1/DQ1/EQ1 are AEC Q-100 grade 1 qualified and are manufactured on an Automotive Grade flow

2 Applications

- Instrumentation & Process Control
- Test Equipment
- Data Acquisition Systems
- Base Stations
- Servo Systems
- Portable, Battery Powered Equipment
- Automotive & Industrial
- Precision Regulators
- Battery Chargers
- Communications
- Medical Equipment

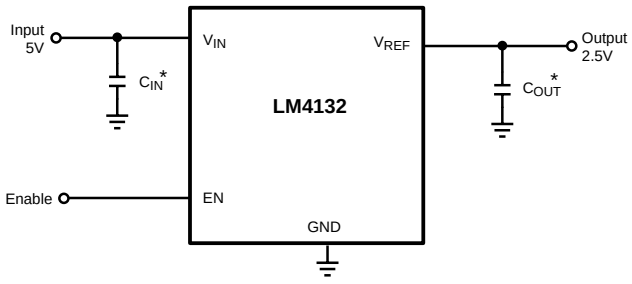
3 Description

The LM4132 family of precision voltage references performs comparable to the best laser-trimmed bipolar references, but in cost effective CMOS technology. The key to this break through is the use of EEPROM registers for correction of curvature, tempco, and accuracy on a CMOS bandgap architecture that allows package level programming to overcome assembly shift. The shifts in voltage accuracy and tempco during assembly of die into plastic packages limit the accuracy of references trimmed with laser techniques.

Unlike other LDO references, the LM4132 is capable of delivering up to 20mA and does not require an output capacitor or buffer amplifier. These advantages and the SOT23 packaging are important for space-critical applications.

Series references provide lower power consumption than shunt references, since they do not have to idle the maximum possible load current under no load conditions. This advantage, the low quiescent current (60µA), and the low dropout voltage (400mV) make the LM4132 ideal for battery-powered solutions.

The LM4132 is available in five grades (A, B, C, D and E) for greater flexibility. The best grade devices (A) have an initial accuracy of 0.05% with a specified temperature coefficient of 10ppm/°C or less, while the lowest grade parts (E) have an initial accuracy of 0.5% and a tempco of 30ppm/°C.



*Note: The capacitor C_{IN} is required and the capacitor C_{OUT} is optional.

An IMPORTANT NOTICE at the end of this data sheet addresses availability, warranty, changes, use in safety-critical applications, intellectual property matters and other important disclaimers. PRODUCTION DATA.

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4 Revision History

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

Changes from Revision C (April 2013) to Revision D **Page**

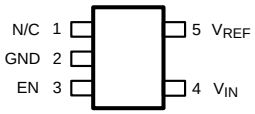
- Added some of the latest inclusions from new TI formatting and made available of the automotive grade for the SOT-23 package ... 1

Changes from Revision B (August 2005) to Revision C **Page**

- Changed layout of National Data Sheet to TI format ... 22

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5 Pin Configuration and Functions



(Top View)
See Package Number DBV0005A

Pin Functions

Pin #	Name	Function
1	N/C	No connect pin, leave floating
2	GND	Ground
3	EN	Enable pin
4	V_{IN}	Input supply
5	V_{REF}	Reference output

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6 Specifications

6.1 Absolute Maximum Ratings[1][2]

Maximum Voltage on any input		-0.3 to 6V
Output short circuit duration		Indefinite
Power Dissipation (T_A = 25°C)[3]		350mW
Storage Temperature Range		−65°C to 150°C
Lead Temperature (soldering, 10sec)		260°C
Vapor Phase (60 sec)		215°C
Infrared (15sec)		220°C
ESD Susceptibility[4]	Human Body Model	2kV

(1) Absolute Maximum Ratings indicate limits beyond which damage may occur to the device. Operating Ratings indicate conditions for which the device is intended to be functional. For specifications, see Electrical Characteristics.
(2) If Military/Aerospace specified devices are required, please contact the Texas Instruments Sales Office/Distributors for availability and specifications.
(3) Without PCB copper enhancements. The maximum power dissipation must be de-rated at elevated temperatures and is limited by T_{JMAX} (maximum junction temperature), θ_{J-A} (junction to ambient thermal resistance) and T_A (ambient temperature). The maximum power dissipation at any temperature is: $P_{DissMAX} = (T_{JMAX} - T_A) / \theta_{J-A}$ up to the value listed in the Absolute Maximum Ratings. θ_{J-A} for SOT23-5 is 220°C/W, T_{JMAX} = 125°C.
(4) The human body model is a 100 pF capacitor discharged through a 1.5 kΩ resistor into each pin.

6.2 Operating Ratings

Maximum Input Supply Voltage	5.5V
Maximum Enable Input Voltage	V_{IN}
Maximum Load Current	20mA
Junction Temperature Range (T_J)	−40°C to +125°C

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6.3 Electrical Characteristics
LM4132-1.8 (V_{OUT} = 1.8V)

Limits in standard type are for T_J = 25°C only, and limits in boldface type apply over the junction temperature (T_J) range of -40°C to +125°C unless otherwise specified. Minimum and Maximum limits are specified through test, design, or statistical correlation. Typical values represent the most likely parametric norm at T_J = 25°C, and are provided for reference purposes only. Unless otherwise specified V_{IN} = 5V and I_{LOAD} = 0

Symbol	Parameter	Conditions	Min (1)	Typ (2)	Max (1)	Unit
V_{REF}	Output Voltage Initial Accuracy					
	LM4132A-1.8	(A Grade - 0.05%)	-0.05		0.05	%
	LM4132B-1.8	(B Grade - 0.1%)	-0.1		0.1	
	LM4132C-1.8	(C Grade - 0.2%)	-0.2		0.2	
	LM4132D-1.8	(D Grade - 0.4%)	-0.4		0.4	
	LM4132E-1.8	(E Grade - 0.5%)	-0.5		0.5	
TCV_{REF} / °C (Note 6)	Temperature Coefficient					
	LM4132A-1.8	0°C ≤ T_J ≤ + 85°C			**10**	ppm / °C
		-40°C ≤ T_J ≤ +125°C			**20**	
	LM4132B-1.8	-40°C ≤ T_J ≤ +125°C			**20**	
	LM4132C-1.8				**20**	
	LM4132D-1.8				**20**	
	LM4132E-1.8				**30**	
I_Q	Supply Current			60	**100**	µA
I_{Q_SD}	Supply Current in Shutdown	EN = 0V		3	**7**	µA
$\Delta V_{REF}/\Delta V_{IN}$	Line Regulation	V_{REF} + 400mV ≤ V_{IN} ≤ 5.5V		30		ppm / V
$\Delta V_{REF}/\Delta I_{LOAD}$	Load Regulation	0mA ≤ I_{LOAD} ≤ 20mA		25	**120**	ppm / mA
ΔV_{REF}	Long Term Stability (3)	1000 Hrs		50		ppm
	Thermal Hysteresis (4)	-40°C ≤ T_J ≤ +125°C		75		
V_{IN} - V_{REF}	Dropout Voltage (5)	I_{LOAD} = 10mA		230	**400**	mV
V_N	Output Noise Voltage	0.1 Hz to 10 Hz		170		μV_{PP}
I_{SC}	Short Circuit Current				**75**	mA
V_{IL}	Enable Pin Maximum Low Input Level				**35**	$\%V_{IN}$
V_{IH}	Enable Pin Minimum High Input Level		**65**			$\%V_{IN}$

(1) Limits are 100% production tested at 25°C. Limits over the operating temperature range are specified through correlation using Statistical Quality Control.
(2) Typical numbers are at 25°C and represent the most likely parametric norm.
(3) Long term stability is V_{REF} @25°C measured during 1000 hrs.
(4) Thermal hysteresis is defined as the change in +25°C output voltage before and after cycling the device from (-40°C to 125°C).
(5) Dropout voltage is defined as the minimum input to output differential at which the output voltage drops by 0.5% below the value measured with a 5V input.

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6.4 Electrical Characteristics
LM4132-2.0 (V_{OUT} = 2.048V)

Limits in standard type are for T_J = 25°C only, and limits in boldface type apply over the junction temperature (T_J) range of -40°C to +125°C unless otherwise specified. Minimum and Maximum limits are specified through test, design, or statistical correlation. Typical values represent the most likely parametric norm at T_J = 25°C, and are provided for reference purposes only. Unless otherwise specified V_{IN} = 5V and I_{LOAD} = 0

Symbol	Parameter	Conditions	Min (1)	Typ (2)	Max (1)	Unit
V_{REF}	Output Voltage Initial Accuracy					
	LM4132A-2.0	(A Grade - 0.05%)	-0.05		0.05	%
	LM4132B-2.0	(B Grade - 0.1%)	-0.1		0.1	
	LM4132C-2.0	(C Grade - 0.2%)	-0.2		0.2	
	LM4132D-2.0	(D Grade - 0.4%)	-0.4		0.4	
	LM4132E-2.0	(E Grade - 0.5%)	-0.5		0.5	
TCV_{REF} / °C (Note 6)	Temperature Coefficient					
	LM4132A-2.0	0°C ≤ T_J ≤ + 85°C			**10**	ppm / °C
		-40°C ≤ T_J ≤ +125°C			**20**	
	LM4132B-2.0	-40°C ≤ T_J ≤ +125°C			**20**	
	LM4132C-2.0				**20**	
	LM4132D-2.0				**20**	
	LM4132E-2.0				**30**	
I_Q	Supply Current			60	**100**	µA
I_{Q_SD}	Supply Current in Shutdown	EN = 0V		3	**7**	µA
$\Delta V_{REF}/\Delta V_{IN}$	Line Regulation	V_{REF} + 400mV ≤ V_{IN} ≤ 5.5V		30		ppm / V
$\Delta V_{REF}/\Delta I_{LOAD}$	Load Regulation	0mA ≤ I_{LOAD} ≤ 20mA		25	**120**	ppm / mA
ΔV_{REF}	Long Term Stability (3)	1000 Hrs		50		ppm
	Thermal Hysteresis (4)	-40°C ≤ T_J ≤ +125°C		75		
V_{IN} - V_{REF}	Dropout Voltage (5)	I_{LOAD} = 10mA		175	**400**	mV
V_N	Output Noise Voltage	0.1 Hz to 10 Hz		190		μV_{PP}
I_{SC}	Short Circuit Current				**75**	mA
V_{IL}	Enable Pin Maximum Low Input Level				**35**	$\%V_{IN}$
V_{IH}	Enable Pin Minimum High Input Level		**65**			$\%V_{IN}$

(1) Limits are 100% production tested at 25°C. Limits over the operating temperature range are specified through correlation using Statistical Quality Control.
(2) Typical numbers are at 25°C and represent the most likely parametric norm.
(3) Long term stability is V_{REF} @25°C measured during 1000 hrs.
(4) Thermal hysteresis is defined as the change in +25°C output voltage before and after cycling the device from (-40°C to 125°C).
(5) Dropout voltage is defined as the minimum input to output differential at which the output voltage drops by 0.5% below the value measured with a 5V input.

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6.5 Electrical Characteristics
LM4132-2.5 (V_{OUT} = 2.5V)

Limits in standard type are for T_J = 25°C only, and limits in boldface type apply over the junction temperature (T_J) range of -40°C to +125°C unless otherwise specified. Minimum and Maximum limits are specified through test, design, or statistical correlation. Typical values represent the most likely parametric norm at T_J = 25°C, and are provided for reference purposes only. Unless otherwise specified V_{IN} = 5V and I_{LOAD} = 0

Symbol	Parameter	Conditions	Min (1)	Typ (2)	Max (1)	Unit
V_{REF}	Output Voltage Initial Accuracy					
	LM4132A-2.5	(A Grade - 0.05%)	-0.05		0.05	%
	LM4132B-2.5	(B Grade - 0.1%)	-0.1		0.1	
	LM4132C-2.5	(C Grade - 0.2%)	-0.2		0.2	
	LM4132D-2.5	(D Grade - 0.4%)	-0.4		0.4	
	LM4132E-2.5	(E Grade - 0.5%)	-0.5		0.5	
TCV_{REF} / °C (Note 6)	Temperature Coefficient					
	LM4132A-2.5	0°C ≤ T_J ≤ + 85°C			**10**	ppm / °C
		-40°C ≤ T_J ≤ +125°C			**20**	
	LM4132B-2.5	-40°C ≤ T_J ≤ +125°C			**20**	
	LM4132C-2.5				**20**	
	LM4132D-2.5				**20**	
	LM4132E-2.5				**30**	
I_Q	Supply Current			60	**100**	µA
I_{Q_SD}	Supply Current in Shutdown	EN = 0V		3	**7**	µA
$\Delta V_{REF}/\Delta V_{IN}$	Line Regulation	V_{REF} + 400mV ≤ V_{IN} ≤ 5.5V		50		ppm / V
$\Delta V_{REF}/\Delta I_{LOAD}$	Load Regulation	0mA ≤ I_{LOAD} ≤ 20mA		25	**120**	ppm / mA
ΔV_{REF}	Long Term Stability (3)	1000 Hrs		50		ppm
	Thermal Hysteresis (4)	-40°C ≤ T_J ≤ +125°C		75		
V_{IN} - V_{REF}	Dropout Voltage (5)	I_{LOAD} = 10mA		175	**400**	mV
V_N	Output Noise Voltage	0.1 Hz to 10 Hz		240		μV_{PP}
I_{SC}	Short Circuit Current				**75**	mA
V_{IL}	Enable Pin Maximum Low Input Level				**35**	$\%V_{IN}$
V_{IH}	Enable Pin Minimum High Input Level		**65**			$\%V_{IN}$

(1) Limits are 100% production tested at 25°C. Limits over the operating temperature range are specified through correlation using Statistical Quality Control.
(2) Typical numbers are at 25°C and represent the most likely parametric norm.
(3) Long term stability is V_{REF} @25°C measured during 1000 hrs.
(4) Thermal hysteresis is defined as the change in +25°C output voltage before and after cycling the device from (-40°C to 125°C).
(5) Dropout voltage is defined as the minimum input to output differential at which the output voltage drops by 0.5% below the value measured with a 5V input.

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6.6 Electrical Characteristics
LM4132-3.0 (V_{OUT} = 3.0V)

Limits in standard type are for T_J = 25°C only, and limits in boldface type apply over the junction temperature (T_J) range of -40°C to +125°C unless otherwise specified. Minimum and Maximum limits are specified through test, design, or statistical correlation. Typical values represent the most likely parametric norm at T_J = 25°C, and are provided for reference purposes only. Unless otherwise specified V_{IN} = 5V and I_{LOAD} = 0

Symbol	Parameter	Conditions	Min (1)	Typ (2)	Max (1)	Unit
V_{REF}	Output Voltage Initial Accuracy					
	LM4132A-3.0	(A Grade - 0.05%)	-0.05		0.05	%
	LM4132B-3.0	(B Grade - 0.1%)	-0.1		0.1	
	LM4132C-3.0	(C Grade - 0.2%)	-0.2		0.2	
	LM4132D-3.0	(D Grade - 0.4%)	-0.4		0.4	
	LM4132E-3.0	(E Grade - 0.5%)	-0.5		0.5	
TCV_{REF} / °C (Note 6)	Temperature Coefficient					
	LM4132A-3.0	0°C ≤ T_J ≤ + 85°C			**10**	ppm / °C
		-40°C ≤ T_J ≤ +125°C			**20**	
	LM4132B-3.0	-40°C ≤ T_J ≤ +125°C			**20**	
	LM4132C-3.0				**20**	
	LM4132D-3.0				**20**	
	LM4132E-3.0				**30**	
I_Q	Supply Current			60	**100**	µA
I_{Q_SD}	Supply Current in Shutdown	EN = 0V		3	**7**	µA
$\Delta V_{REF}/\Delta V_{IN}$	Line Regulation	V_{REF} + 400mV ≤ V_{IN} ≤ 5.5V		70		ppm / V
$\Delta V_{REF}/\Delta I_{LOAD}$	Load Regulation	0mA ≤ I_{LOAD} ≤ 20mA		25	**120**	ppm / mA
ΔV_{REF}	Long Term Stability (3)	1000 Hrs		50		ppm
	Thermal Hysteresis (4)	-40°C ≤ T_J ≤ +125°C		75		
V_{IN} - V_{REF}	Dropout Voltage (5)	I_{LOAD} = 10mA		175	**400**	mV
V_N	Output Noise Voltage	0.1 Hz to 10 Hz		285		μV_{PP}
I_{SC}	Short Circuit Current				**75**	mA
V_{IL}	Enable Pin Maximum Low Input Level				**35**	$\%V_{IN}$
V_{IH}	Enable Pin Minimum High Input Level		**65**			$\%V_{IN}$

(1) Limits are 100% production tested at 25°C. Limits over the operating temperature range are specified through correlation using Statistical Quality Control.
(2) Typical numbers are at 25°C and represent the most likely parametric norm.
(3) Long term stability is V_{REF} @25°C measured during 1000 hrs.
(4) Thermal hysteresis is defined as the change in +25°C output voltage before and after cycling the device from (-40°C to 125°C).
(5) Dropout voltage is defined as the minimum input to output differential at which the output voltage drops by 0.5% below the value measured with a 5V input.

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6.7 Electrical Characteristics
LM4132-3.3 (V_{OUT} = 3.3V)

Limits in standard type are for T_J = 25°C only, and limits in boldface type apply over the junction temperature (T_J) range of -40°C to +125°C unless otherwise specified. Minimum and Maximum limits are specified through test, design, or statistical correlation. Typical values represent the most likely parametric norm at T_J = 25°C, and are provided for reference purposes only. Unless otherwise specified V_{IN} = 5V and I_{LOAD} = 0

Symbol	Parameter	Conditions	Min (1)	Typ (2)	Max (1)	Unit
V_{REF}	Output Voltage Initial Accuracy					
	LM4132A-3.3	(A Grade - 0.05%)	-0.05		0.05	%
	LM4132B-3.3	(B Grade - 0.1%)	-0.1		0.1	
	LM4132C-3.3	(C Grade - 0.2%)	-0.2		0.2	
	LM4132D-3.3	(D Grade - 0.4%)	-0.4		0.4	
	LM4132E-3.3	(E Grade - 0.5%)	-0.5		0.5	
TCV_{REF} / °C (Note 6)	Temperature Coefficient					
	LM4132A-3.3	0°C ≤ T_J ≤ + 85°C			**10**	ppm / °C
		-40°C ≤ T_J ≤ +125°C			**20**	
	LM4132B-3.3	-40°C ≤ T_J ≤ +125°C			**20**	
	LM4132C-3.3				**20**	
	LM4132D-3.3				**20**	
	LM4132E-3.3				**30**	
I_Q	Supply Current			60	**100**	µA
I_{Q_SD}	Supply Current in Shutdown	EN = 0V		3	**7**	µA
$\Delta V_{REF}/\Delta V_{IN}$	Line Regulation	V_{REF} + 400mV ≤ V_{IN} ≤ 5.5V		85		ppm / V
$\Delta V_{REF}/\Delta I_{LOAD}$	Load Regulation	0mA ≤ I_{LOAD} ≤ 20mA		25	**120**	ppm / mA
ΔV_{REF}	Long Term Stability (3)	1000 Hrs		50		ppm
	Thermal Hysteresis (4)	-40°C ≤ T_J ≤ +125°C		75		
V_{IN} - V_{REF}	Dropout Voltage (5)	I_{LOAD} = 10mA		175	**400**	mV
V_N	Output Noise Voltage	0.1 Hz to 10 Hz		310		μV_{PP}
I_{SC}	Short Circuit Current				**75**	mA
V_{IL}	Enable Pin Maximum Low Input Level				**35**	$\%V_{IN}$
V_{IH}	Enable Pin Minimum High Input Level		**65**			$\%V_{IN}$

(1) Limits are 100% production tested at 25°C. Limits over the operating temperature range are specified through correlation using Statistical Quality Control.
(2) Typical numbers are at 25°C and represent the most likely parametric norm.
(3) Long term stability is V_{REF} @25°C measured during 1000 hrs.
(4) Thermal hysteresis is defined as the change in +25°C output voltage before and after cycling the device from (-40°C to 125°C).
(5) Dropout voltage is defined as the minimum input to output differential at which the output voltage drops by 0.5% below the value measured with a 5V input.

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6.8 Electrical Characteristics
LM4132-4.1 (V_{OUT} = 4.096V)

Limits in standard type are for T_J = 25°C only, and limits in boldface type apply over the junction temperature (T_J) range of -40°C to +125°C unless otherwise specified. Minimum and Maximum limits are specified through test, design, or statistical correlation. Typical values represent the most likely parametric norm at T_J = 25°C, and are provided for reference purposes only. Unless otherwise specified V_{IN} = 5V and I_{LOAD} = 0

Symbol	Parameter	Conditions	Min (1)	Typ (2)	Max (1)	Unit
V_{REF}	Output Voltage Initial Accuracy					
	LM4132A-4.1	(A Grade - 0.05%)	-0.05		0.05	%
	LM4132B-4.1	(B Grade - 0.1%)	-0.1		0.1	
	LM4132C-4.1	(C Grade - 0.2%)	-0.2		0.2	
	LM4132D-4.1	(D Grade - 0.4%)	-0.4		0.4	
	LM4132E-4.1	(E Grade - 0.5%)	-0.5		0.5	
TCV_{REF} / °C (Note 6)	Temperature Coefficient					
	LM4132A-4.1	0°C ≤ T_J ≤ + 85°C			**10**	ppm / °C
		-40°C ≤ T_J ≤ +125°C			**20**	
	LM4132B-4.1	-40°C ≤ T_J ≤ +125°C			**20**	
	LM4132C-4.1				**20**	
	LM4132D-4.1				**20**	
	LM4132E-4.1				**30**	
I_Q	Supply Current			60	**100**	µA
I_{Q_SD}	Supply Current in Shutdown	EN = 0V		3	**7**	µA
$\Delta V_{REF}/\Delta V_{IN}$	Line Regulation	V_{REF} + 400mV ≤ V_{IN} ≤ 5.5V		100		ppm / V
$\Delta V_{REF}/\Delta I_{LOAD}$	Load Regulation	0mA ≤ I_{LOAD} ≤ 20mA		25	**120**	ppm / mA
ΔV_{REF}	Long Term Stability (3)	1000 Hrs		50		ppm
	Thermal Hysteresis (4)	-40°C ≤ T_J ≤ +125°C		75		
V_{IN} - V_{REF}	Dropout Voltage (5)	I_{LOAD} = 10mA		175	**400**	mV
V_N	Output Noise Voltage	0.1 Hz to 10 Hz		350		μV_{PP}
I_{SC}	Short Circuit Current				**75**	mA
V_{IL}	Enable Pin Maximum Low Input Level				**35**	$\%V_{IN}$
V_{IH}	Enable Pin Minimum High Input Level		**65**			$\%V_{IN}$

(1) Limits are 100% production tested at 25°C. Limits over the operating temperature range are specified through correlation using Statistical Quality Control.
(2) Typical numbers are at 25°C and represent the most likely parametric norm.
(3) Long term stability is V_{REF} @25°C measured during 1000 hrs.
(4) Thermal hysteresis is defined as the change in +25°C output voltage before and after cycling the device from (-40°C to 125°C).
(5) Dropout voltage is defined as the minimum input to output differential at which the output voltage drops by 0.5% below the value measured with a 5V input.

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6.9 Typical Performance Characteristics For 1.8V

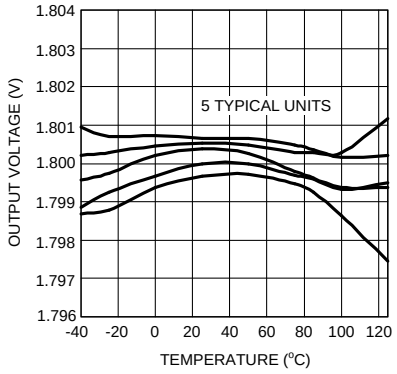


Figure 1. Output Voltage vs Temperature

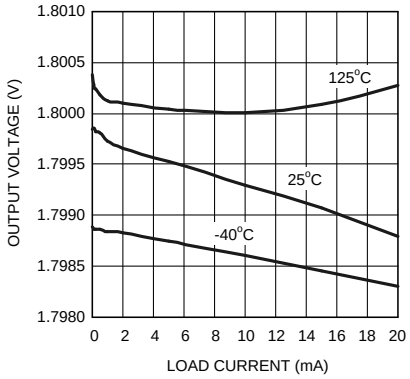


Figure 2. Load Regulation

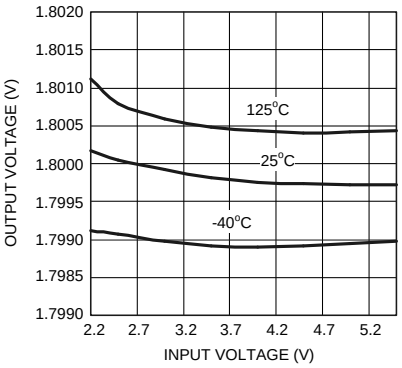


Figure 3. Line Regulation

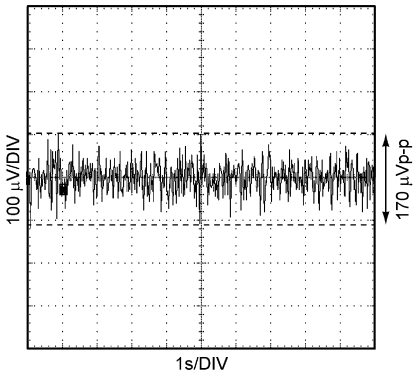


Figure 4. 0.1-10Hz Noise

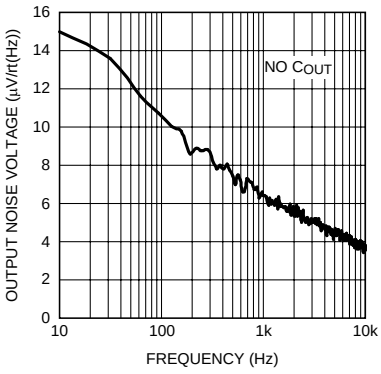


Figure 5. Output Voltage Noise Spectrum

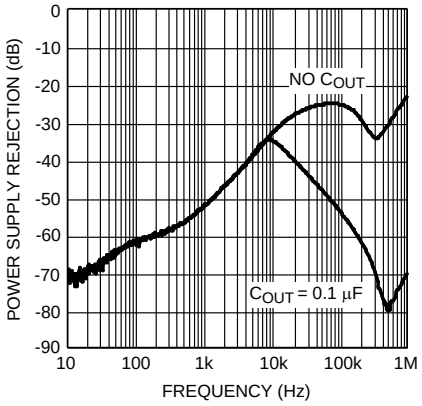


Figure 6. Power Supply Rejection vs Frequency

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6.10 Typical Performance Characteristics For 2.048V

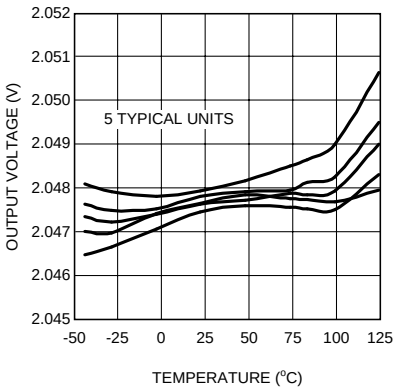


Figure 7. Output Voltage vs Temperature

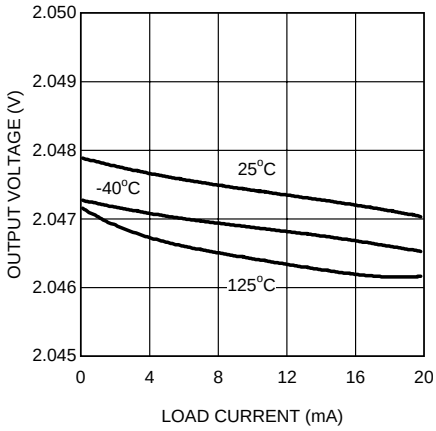


Figure 8. Load Regulation

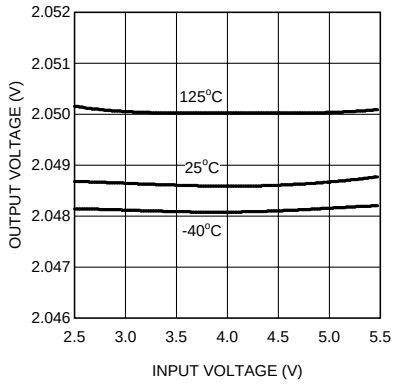


Figure 9. Line Regulation

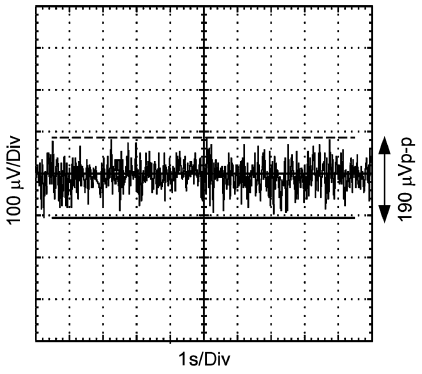


Figure 10. 0.1 - 10 Hz Noise

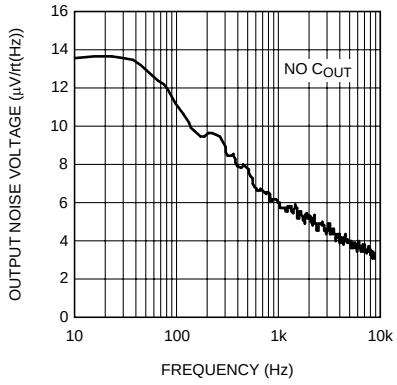


Figure 11. Output Voltage Noise Spectrum

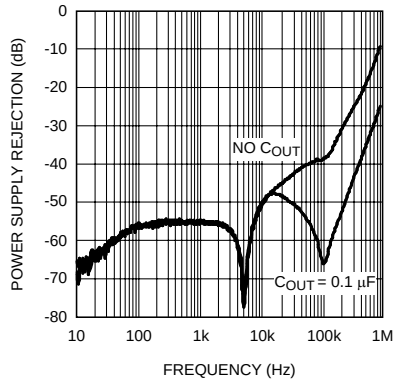


Figure 12. Power Supply Rejection vs Frequency

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6.11 Typical Performance Characteristics For 2.5V

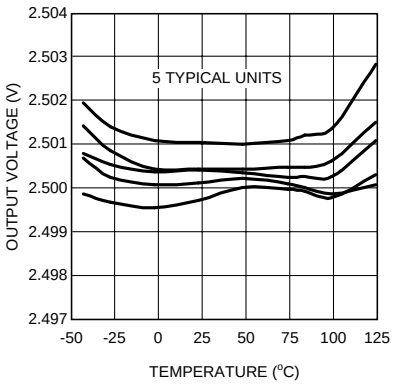


Figure 13. Output Voltage vs Temperature

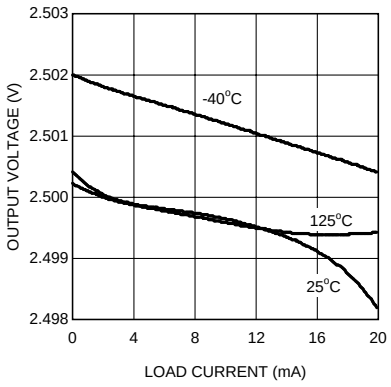


Figure 14. Load Regulation

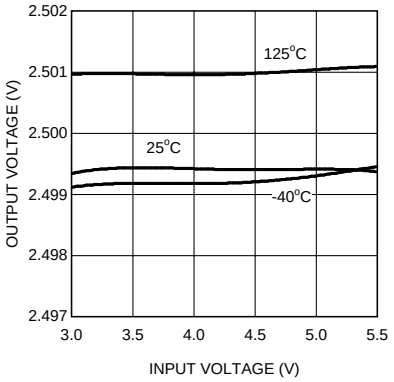


Figure 15. Line Regulation

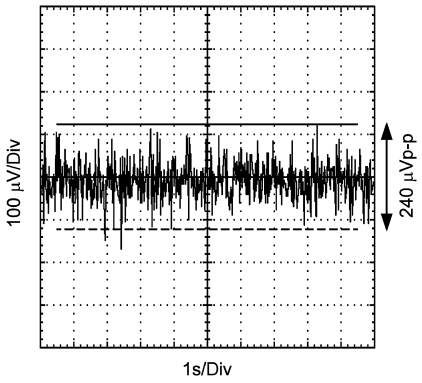


Figure 16. 0.1 - 10 Hz Noise

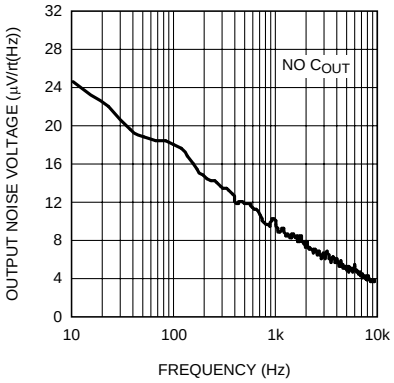


Figure 17. Output Voltage Noise Spectrum

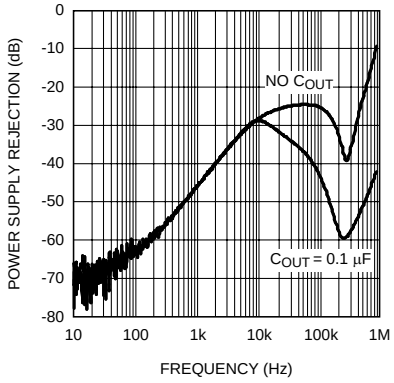


Figure 18. Power Supply Rejection vs Frequency

6.12 Typical Performance Characteristics For 3.0v

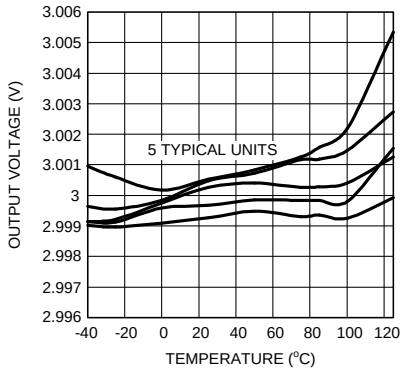


Figure 19. Output Voltage vs Temperature

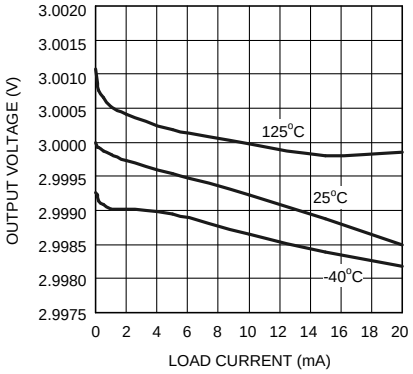


Figure 20. Load Regulation

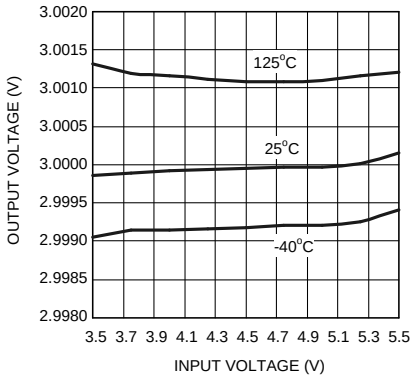


Figure 21. Line Regulation

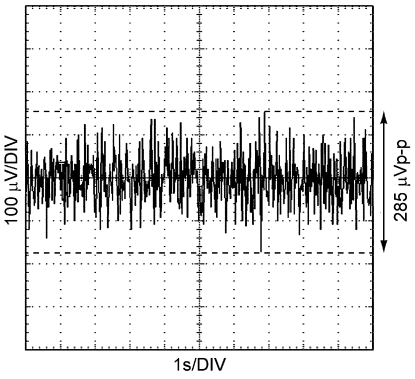


Figure 22. 0.1-10 Hz Noise

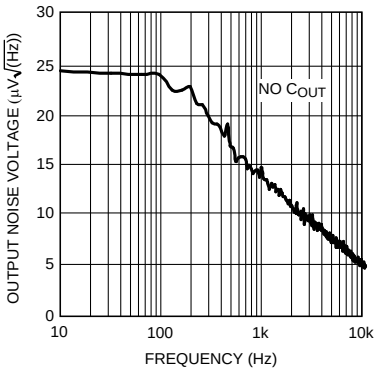


Figure 23. Output Voltage Noise Spectrum

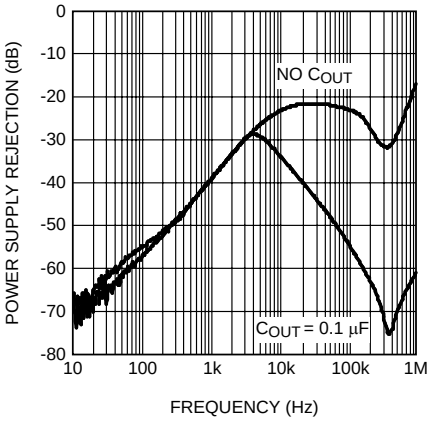


Figure 24. Power Supply Rejection vs Frequency

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6.13 Typical Performance Characteristics For 3.3V

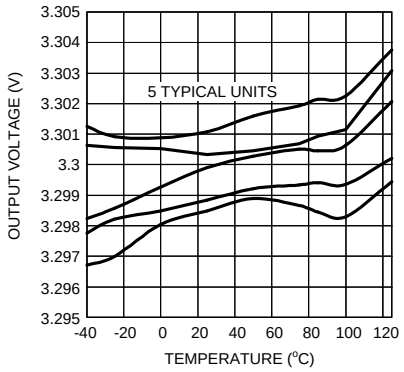


Figure 25. Output Voltage vs Temperature

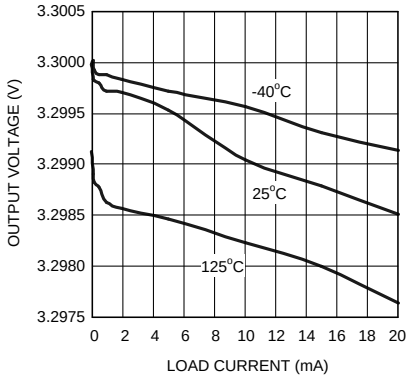


Figure 26. Load Regulation

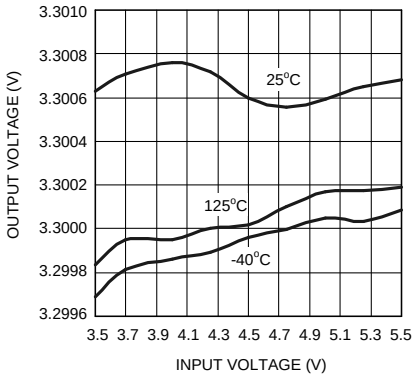


Figure 27. Line Regulation

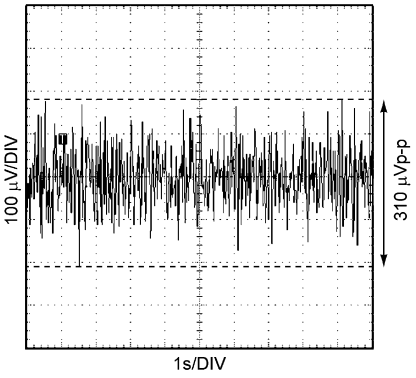


Figure 28. 0.1-10 Hz Noise

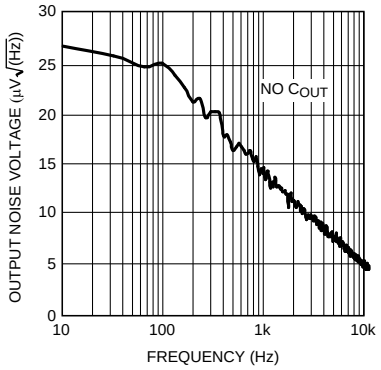


Figure 29. Output Voltage Noise Spectrum

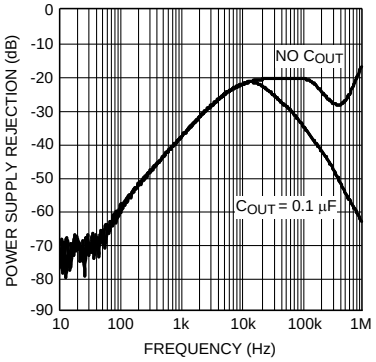


Figure 30. Power Supply Rejection vs Frequency

6.14 Typical Performance Characteristics For 4.096V

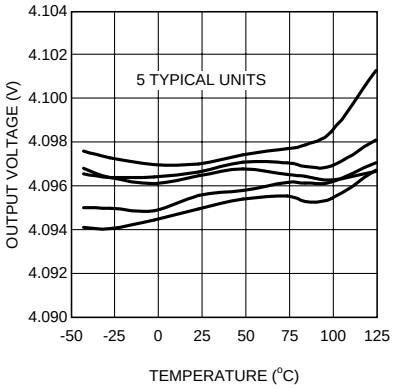


Figure 31. Output Voltage vs Temperature

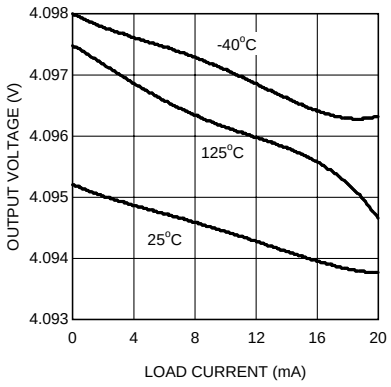


Figure 32. Load Regulation

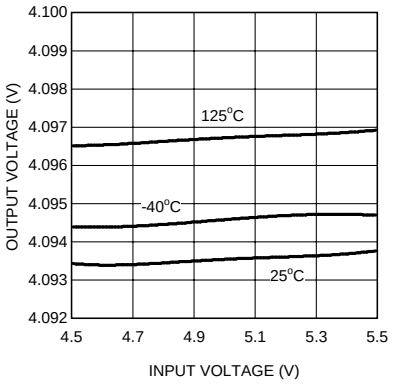


Figure 33. Line Regulation

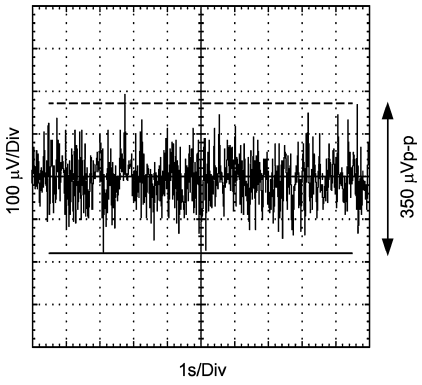


Figure 34. 0.1 - 10 Hz Noise

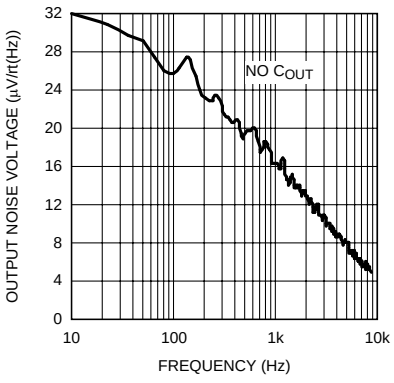


Figure 35. Output Voltage Noise Spectrum

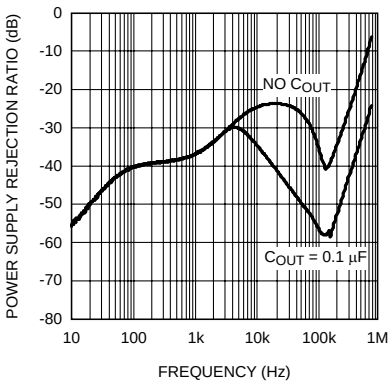


Figure 36. Power Supply Rejection vs Frequency

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6.15 Typical Performance Characteristics

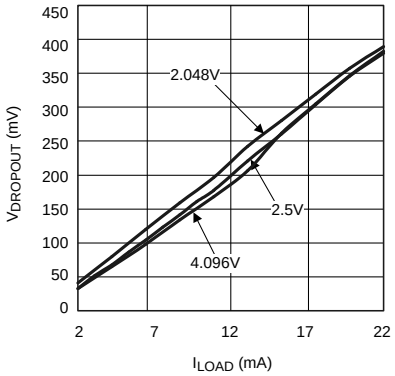


Figure 37. Dropout vs Load To 0.5% Accuracy

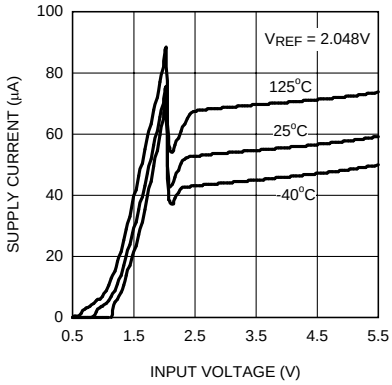


Figure 38. Supply Current vs Input Voltage

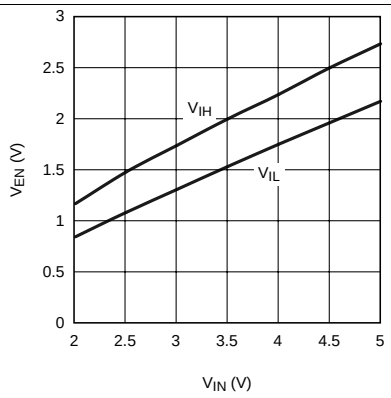


Figure 39. Enable Threshold Voltage And Hysteresis

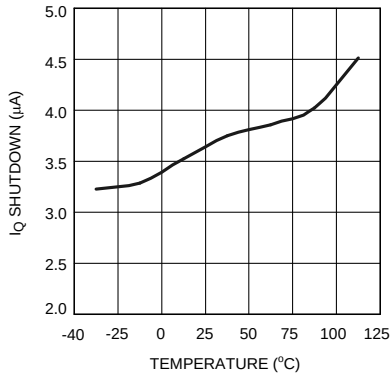


Figure 40. Shutdown I_Q vs Temperature

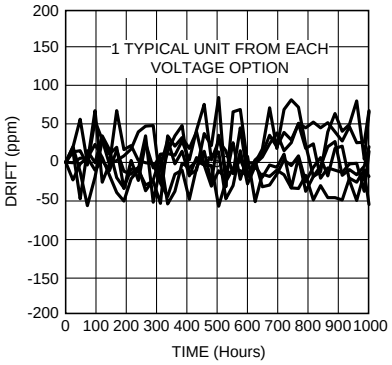


Figure 41. Typical Long Term Stability

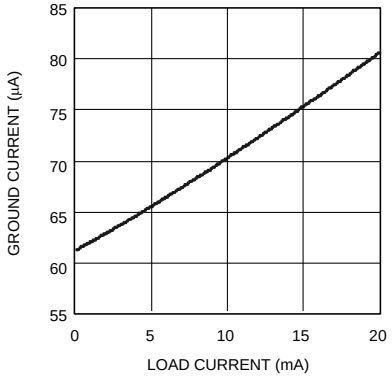


Figure 42. Ground Current vs Load Current

Typical Performance Characteristics (continued)

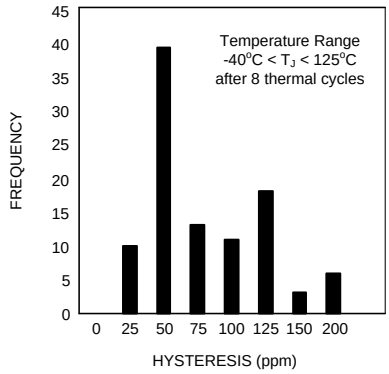


Figure 43. Typical Thermal Hysteresis

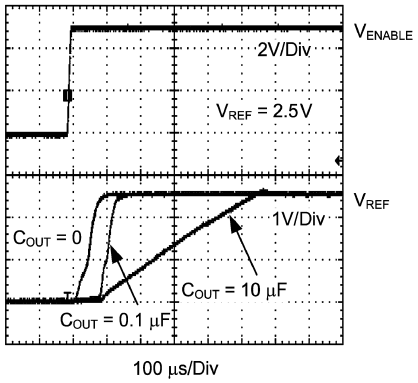


Figure 44. Turn-On Transient Response

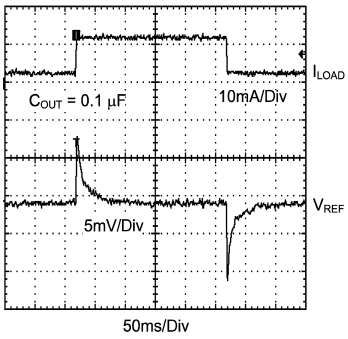


Figure 45. Load Transient Response I_{LOAD} = 0 To 10mA

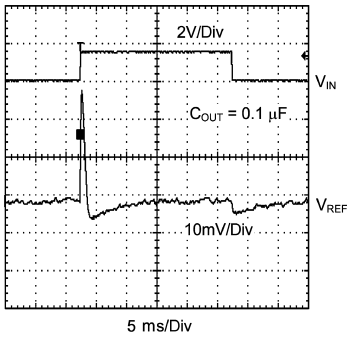


Figure 46. Line Transient Response V_{IN} = 4V To 5.5V

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7 Application Information

7.1 Theory Of Operation

The foundation of any voltage reference is the band-gap circuit. While the reference in the LM4132 is developed from the gate-source voltage of transistors in the IC, principles of the band-gap circuit are easily understood using a bipolar example. For a detailed analysis of the bipolar band-gap circuit, please refer to Application Note AN-56.

7.2 Supply And Enable Voltages

To ensure proper operation, V_{EN} and V_{IN} must be within a specified range. An acceptable range of input voltages is:

$$V_{IN} > V_{REF} + 400mV \ (I_{LOAD} \leq 10mA) \quad (1)$$

The enable pin uses an internal pull-up current source ($I_{PULL_UP} \cong 2\mu A$) that may be left floating or triggered by an external source. If the part is not enabled by an external source, it may be connected to V_{IN}. An acceptable range of enable voltages is given by the enable transfer characteristics. See the Electrical Characteristics section and Enable Transfer Characteristics figure for more detail. Note, the part will not operate correctly for $V_{EN} > V_{IN}$.

7.3 Component Selection

A small ceramic (X5R or X7R) capacitor on the input must be used to ensure stable operation. The value of C_{IN} must be sized according to the output capacitor value. The value of C_{IN} must satisfy the relationship $C_{IN} \geq C_{OUT}$. When no output capacitor is used, C_{IN} must have a minimum value of 0.1µF. Noise on the power-supply input may affect the output noise. Larger input capacitor values (typically 4.7µF to 22µF) may help reduce noise on the output and significantly reduce overshoot during startup. Use of an additional optional bypass capacitor between the input and ground may help further reduce noise on the output. With an input capacitor, the LM4132 will drive any combination of resistance and capacitance up to V_{REF}/20mA and 10µF respectively.

The LM4132 is designed to operate with or without an output capacitor and is stable with capacitive loads up to 10µF. Connecting a capacitor between the output and ground will significantly improve the load transient response when switching from a light load to a heavy load. The output capacitor should not be made arbitrarily large because it will effect the turn-on time as well as line and load transients.

While a variety of capacitor chemistry types may be used, it is typically advisable to use low esr ceramic capacitors. Such capacitors provide a low impedance to high frequency signals, effectively bypassing them to ground. Bypass capacitors should be mounted close to the part. Mounting bypass capacitors close to the part will help reduce the parasitic trace components thereby improving performance.

7.4 Short Circuited Output

The LM4132 features indefinite short circuit protection. This protection limits the output current to 75mA when the output is shorted to ground.

7.5 Turn On Time

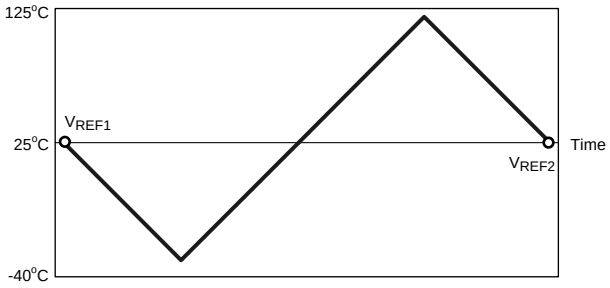
Turn on time is defined as the time taken for the output voltage to rise to 90% of the preset value. The turn on time depends on the load. The turn on time is typically 33.2µs when driving a 1µF load and 78.8µs when driving a 10µF load. Some users may experience an extended turn on time (up to 10ms) under brown out conditions and low temperatures (-40°C).

7.6 Thermal Hysteresis

Thermal hysteresis is defined as the change in output voltage at 25ºC after some deviation from 25ºC. This is to say that thermal hysteresis is the difference in output voltage between two points in a given temperature profile. An illustrative temperature profile is shown in .

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Thermal Hysteresis (continued)



Illustrative Temperature Profile

This may be expressed analytically as the following:

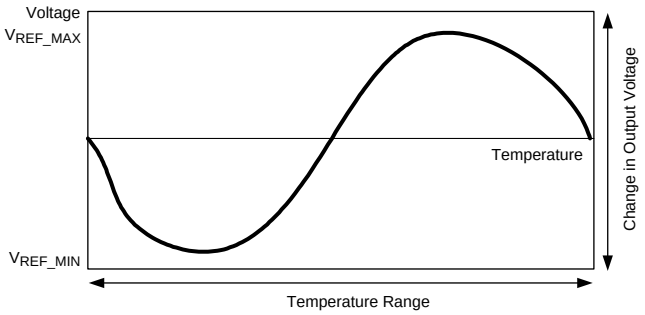
$$V_{HYS} = \frac{|V_{REF1} - V_{REF2}|}{V_{REF}} \times 10^6 \text{ ppm}$$

Where

- V_{HYS} = Thermal hysteresis expressed in ppm
- V_{REF} = Nominal preset output voltage
- V_{REF1} = V_{REF} before temperature fluctuation
- V_{REF2} = V_{REF} after temperature fluctuation.
- The LM4132 features a low thermal hysteresis of 75 ppm (typical) from -40°C to 125°C after 8 temperature cycles. (2)

7.7 Temperature Coefficient

Temperature drift is defined as the maximum deviation in output voltage over the operating temperature range. This deviation over temperature may be illustrated as shown in .



Illustrative V_{REF} vs Temperature Profile

Temperature coefficient may be expressed analytically as the following:

$$T_D = \frac{(V_{REF_MAX} - V_{REF_MIN})}{V_{REF} \times \Delta T} \times 10^6 \text{ ppm} \quad (3)$$

T_D = Temperature drift

V_{REF} = Nominal preset output voltage

V_{REF_MIN} = Minimum output voltage over operating temperature range

V_{REF_MAX} = Maximum output voltage over operating temperature range

ΔT = Operating temperature range.

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Temperature Coefficient (continued)

The LM4132 features a low temperature drift of 10ppm (max) to 30ppm (max), depending on the grade.

7.8 Long Term Stability

Long-term stability refers to the fluctuation in output voltage over a long period of time (1000 hours). The LM4132 features a typical long-term stability of 50ppm over 1000 hours. The measurements are made using 5 units of each voltage option, at a nominal input voltage (5V), with no load, at room temperature.

7.9 Expression Of Electrical Characteristics

Electrical characteristics are typically expressed in mV, ppm, or a percentage of the nominal value. Depending on the application, one expression may be more useful than the other. To convert one quantity to the other one may apply the following:

ppm to mV error in output voltage:

$$\frac{V_{REF} \times ppm_{ERROR}}{10^3} = V_{ERROR} \quad (4)$$

Where

- V_{REF} is in volts (V) and V_{ERROR} is in milli-volts (mV).

Bit error (1 bit) to voltage error (mV):

$$\frac{V_{REF}}{2^n} \times 10^3 = V_{ERROR} \quad (5)$$

V_{REF} is in volts (V), V_{ERROR} is in milli-volts (mV), and n is the number of bits.

mV to ppm error in output voltage:

$$\frac{V_{ERROR}}{V_{REF}} \times 10^3 = ppm_{ERROR} \quad (6)$$

Where

- V_{REF} is in volts (V) and V_{ERROR} is in milli-volts (mV).

Voltage error (mV) to percentage error (percent):

$$\frac{V_{ERROR}}{V_{REF}} \times 0.1 = Percent_Error \quad (7)$$

Where

- V_{REF} is in volts (V) and V_{ERROR} is in milli-volts (mV).

7.10 Printed Circuit Board And Layout Considerations

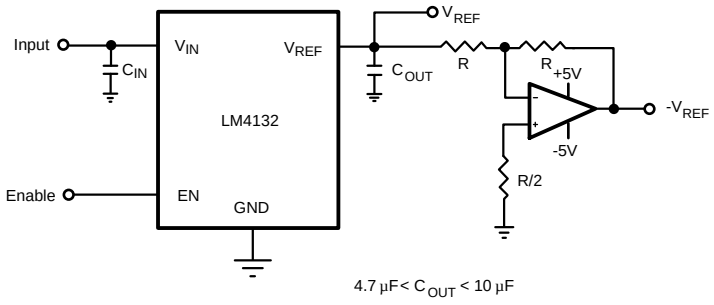
References in SOT packages are generally less prone to PC board mounting than devices in Small Outline (SOIC) packages. To minimize the mechanical stress due to PC board mounting that can cause the output voltage to shift from its initial value, mount the reference on a low flex area of the PC board, such as near the edge or a corner.

The part may be isolated mechanically by cutting a U shape slot on the PCB for mounting the device. This approach also provides some thermal isolation from the rest of the circuit.

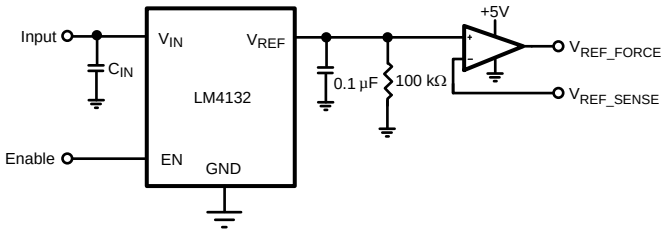
Bypass capacitors must be mounted close to the part. Mounting bypass capacitors close to the part will reduce the parasitic trace components thereby improving performance.

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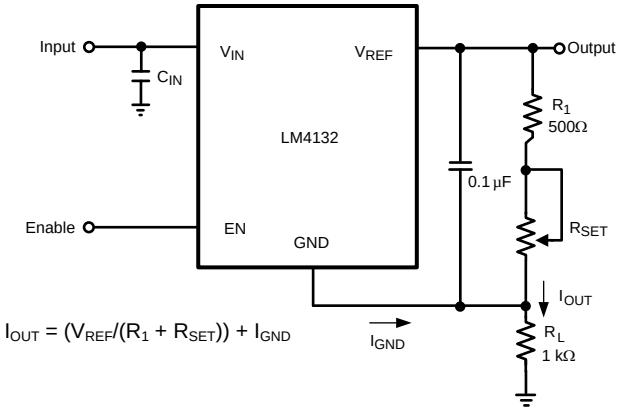
7.11 Typical Application Circuits



Voltage Reference With Complimentary Output



Precision Voltage Reference With Force And Sense Output



Programmable Current Source

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8 Device and Documentation Support

8.1 Trademarks

All trademarks are the property of their respective owners.

8.2 Electrostatic Discharge Caution



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

8.3 Glossary

SLYZ022 — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

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 data sheet, refer to the left-hand navigation.

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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
LM4132AMF-1.8/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4AA	Samples
LM4132AMF-2.0/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4BA	Samples
LM4132AMF-2.5/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4CA	Samples
LM4132AMF-3.0/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4DA	Samples
LM4132AMF-3.3/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4EA	Samples
LM4132AMF-4.1	NRND	SOT-23	DBV	5	1000	TBD	Call TI	Call TI	-40 to 125	R4FA	
LM4132AMF-4.1/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4FA	Samples
LM4132AMFX-1.8/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4AA	Samples
LM4132AMFX-2.0/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4BA	Samples
LM4132AMFX-2.5/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4CA	Samples
LM4132AMFX-3.0/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4DA	Samples
LM4132AMFX-3.3/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4EA	Samples
LM4132AMFX-4.1/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4FA	Samples
LM4132AQ1MFR2.5	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	ZECX	Samples
LM4132AQ1MFR3.0	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	ZEIX	Samples
LM4132AQ1MFT2.5	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	ZECX	Samples
LM4132AQ1MFT3.0	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	ZEIX	Samples

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
LM4132BMF-1.8/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4AB	Samples
LM4132BMF-2.0/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4BB	Samples
LM4132BMF-2.5/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4CB	Samples
LM4132BMF-3.0/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4DB	Samples
LM4132BMF-3.3/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4EB	Samples
LM4132BMF-4.1	NRND	SOT-23	DBV	5	1000	TBD	Call TI	Call TI	-40 to 125	R4FB	
LM4132BMF-4.1/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4FB	Samples
LM4132BMFX-1.8/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4AB	Samples
LM4132BMFX-2.0/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4BB	Samples
LM4132BMFX-2.5/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4CB	Samples
LM4132BMFX-3.0/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4DB	Samples
LM4132BMFX-3.3/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4EB	Samples
LM4132BMFX-4.1/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4FB	Samples
LM4132BQ1MFR2.5	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	ZDYX	Samples
LM4132BQ1MFR3.0	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	ZEJX	Samples
LM4132BQ1MFT2.5	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	ZDYX	Samples
LM4132BQ1MFT3.0	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	ZEJX	Samples
LM4132CMF-1.8/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4AC	Samples

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
LM4132CMF-2.0/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4BC	Samples
LM4132CMF-2.5/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4CC	Samples
LM4132CMF-3.0/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4DC	Samples
LM4132CMF-3.3/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4EC	Samples
LM4132CMF-4.1	NRND	SOT-23	DBV	5	1000	TBD	Call TI	Call TI	-40 to 125	R4FC	
LM4132CMF-4.1/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4FC	Samples
LM4132CMFX-1.8/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4AC	Samples
LM4132CMFX-2.0/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4BC	Samples
LM4132CMFX-2.5/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4CC	Samples
LM4132CMFX-3.0/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4DC	Samples
LM4132CMFX-3.3/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4EC	Samples
LM4132CMFX-4.1/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4FC	Samples
LM4132CQ1MFR2.5	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	ZDZX	Samples
LM4132CQ1MFR3.0	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	ZEKX	Samples
LM4132CQ1MFT2.5	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	ZDZX	Samples
LM4132CQ1MFT3.0	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	ZEKX	Samples
LM4132DMF-1.8/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4AD	Samples
LM4132DMF-2.0/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4BD	Samples

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
LM4132DMF-2.5/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4CD	Samples
LM4132DMF-3.0/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4DD	Samples
LM4132DMF-3.3/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4ED	Samples
LM4132DMF-4.1/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4FD	Samples
LM4132DMFX-1.8/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4AD	Samples
LM4132DMFX-2.0/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4BD	Samples
LM4132DMFX-2.5/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4CD	Samples
LM4132DMFX-3.0/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4DD	Samples
LM4132DMFX-3.3/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4ED	Samples
LM4132DMFX-4.1/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4FD	Samples
LM4132DQ1MFR2.5	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	ZEAX	Samples
LM4132DQ1MFR3.0	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	ZELX	Samples
LM4132DQ1MFT2.5	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	ZEAX	Samples
LM4132DQ1MFT3.0	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	ZELX	Samples
LM4132EMF-1.8/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4AE	Samples
LM4132EMF-2.0/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4BE	Samples
LM4132EMF-2.5/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4CE	Samples
LM4132EMF-3.0/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4DE	Samples

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
LM4132EMF-3.3/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4EE	Samples
LM4132EMF-4.1/NOPB	ACTIVE	SOT-23	DBV	5	1000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4FE	Samples
LM4132EMFX-1.8/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4AE	Samples
LM4132EMFX-2.0/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4BE	Samples
LM4132EMFX-2.5/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4CE	Samples
LM4132EMFX-3.0/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4DE	Samples
LM4132EMFX-3.3/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4EE	Samples
LM4132EMFX-4.1/NOPB	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-40 to 125	R4FE	Samples

(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.

(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.

(6) 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.

OTHER QUALIFIED VERSIONS OF LM4132, LM4132-Q1 :

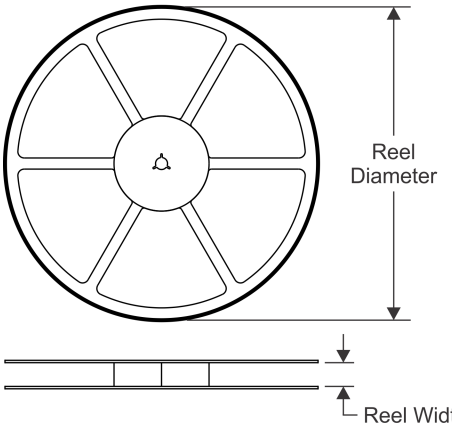
- Catalog: LM4132
- Automotive: LM4132-Q1

NOTE: Qualified Version Definitions:

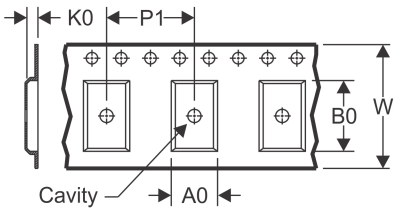
- Catalog - TI's standard catalog product
- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects

TAPE AND REEL INFORMATION

REEL DIMENSIONS

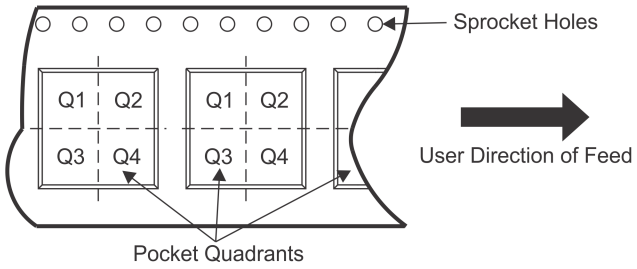


TAPE DIMENSIONS



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

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



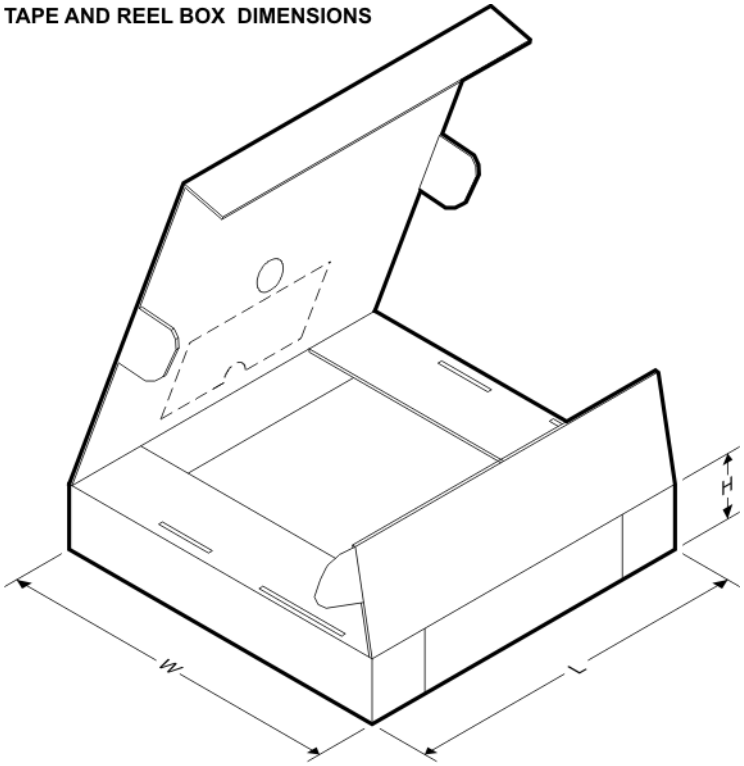
*All dimensions are nominal

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
LM4132AMF-1.8/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132AMF-2.0/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132AMF-2.5/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132AMF-3.0/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132AMF-3.3/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132AMF-4.1	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132AMF-4.1/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132AMFX-1.8/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132AMFX-2.0/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132AMFX-2.5/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132AMFX-3.0/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132AMFX-3.3/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132AMFX-4.1/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132AQ1MFR3.0	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132AQ1MFT3.0	SOT-23	DBV	5	250	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132BMF-1.8/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132BMF-2.0/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132BMF-2.5/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3

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
LM4132BMF-3.0/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132BMF-3.3/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132BMF-4.1	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132BMF-4.1/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132BMFX-1.8/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132BMFX-2.0/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132BMFX-2.5/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132BMFX-3.0/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132BMFX-3.3/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132BMFX-4.1/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132BQ1MFR3.0	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132BQ1MFT3.0	SOT-23	DBV	5	250	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132CMF-1.8/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132CMF-2.0/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132CMF-2.5/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132CMF-3.0/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132CMF-3.3/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132CMF-4.1	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132CMF-4.1/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132CMFX-1.8/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132CMFX-2.0/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132CMFX-2.5/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132CMFX-3.0/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132CMFX-3.3/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132CMFX-4.1/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132CQ1MFR2.5	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132CQ1MFR3.0	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132CQ1MFT3.0	SOT-23	DBV	5	250	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132DMF-1.8/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132DMF-2.0/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132DMF-2.5/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132DMF-3.0/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132DMF-3.3/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132DMF-4.1/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132DMFX-1.8/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132DMFX-2.0/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132DMFX-2.5/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132DMFX-3.0/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132DMFX-3.3/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132DMFX-4.1/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132DQ1MFR3.0	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132DQ1MFT3.0	SOT-23	DBV	5	250	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132EMF-1.8/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3

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
LM4132EMF-2.0/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132EMF-2.5/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132EMF-3.0/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132EMF-3.3/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132EMF-4.1/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132EMFX-1.8/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132EMFX-2.0/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132EMFX-2.5/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132EMFX-3.0/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132EMFX-3.3/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LM4132EMFX-4.1/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3

TAPE AND REEL BOX DIMENSIONS



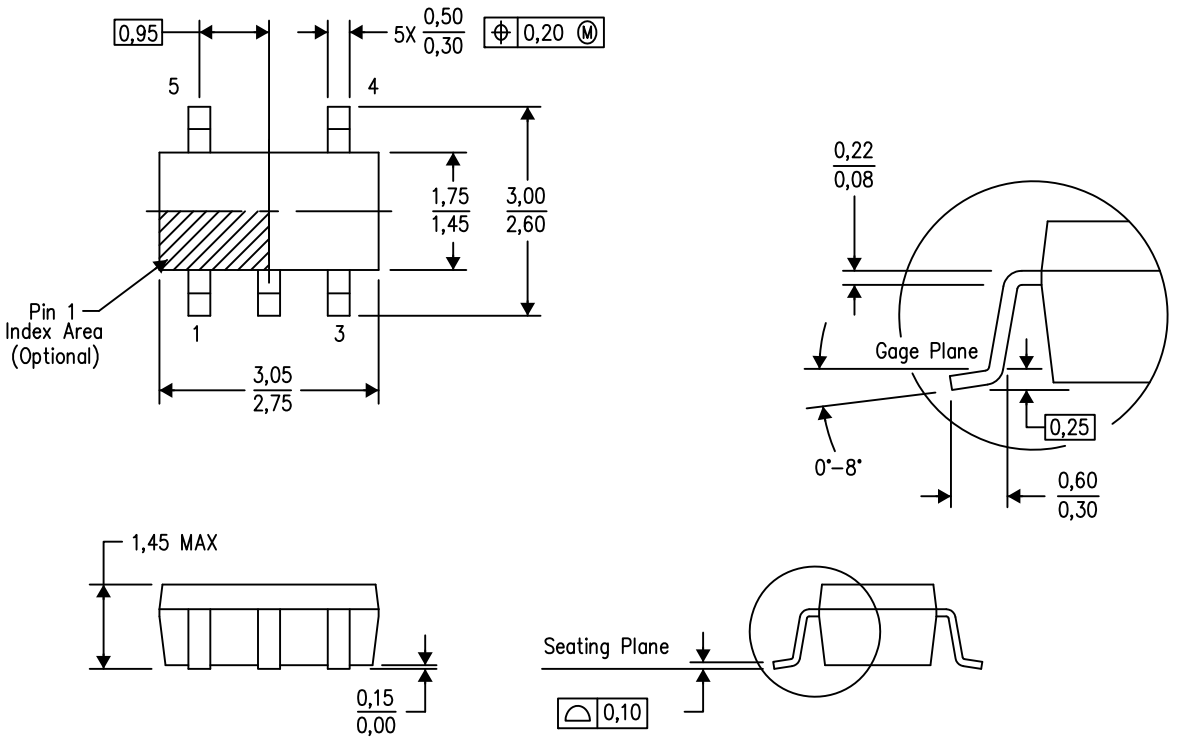
*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
LM4132AMF-1.8/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132AMF-2.0/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132AMF-2.5/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132AMF-3.0/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132AMF-3.3/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132AMF-4.1	SOT-23	DBV	5	1000	210.0	185.0	35.0

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
LM4132AMF-4.1/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132AMFX-1.8/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132AMFX-2.0/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132AMFX-2.5/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132AMFX-3.0/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132AMFX-3.3/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132AMFX-4.1/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132AQ1MFR3.0	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132AQ1MFT3.0	SOT-23	DBV	5	250	210.0	185.0	35.0
LM4132BMF-1.8/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132BMF-2.0/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132BMF-2.5/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132BMF-3.0/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132BMF-3.3/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132BMF-4.1	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132BMF-4.1/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132BMFX-1.8/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132BMFX-2.0/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132BMFX-2.5/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132BMFX-3.0/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132BMFX-3.3/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132BMFX-4.1/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132BQ1MFR3.0	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132BQ1MFT3.0	SOT-23	DBV	5	250	210.0	185.0	35.0
LM4132CMF-1.8/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132CMF-2.0/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132CMF-2.5/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132CMF-3.0/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132CMF-3.3/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132CMF-4.1	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132CMF-4.1/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132CMFX-1.8/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132CMFX-2.0/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132CMFX-2.5/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132CMFX-3.0/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132CMFX-3.3/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132CMFX-4.1/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132CQ1MFR2.5	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132CQ1MFR3.0	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132CQ1MFT3.0	SOT-23	DBV	5	250	210.0	185.0	35.0
LM4132DMF-1.8/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132DMF-2.0/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132DMF-2.5/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132DMF-3.0/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
LM4132DMF-3.3/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132DMF-4.1/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132DMFX-1.8/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132DMFX-2.0/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132DMFX-2.5/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132DMFX-3.0/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132DMFX-3.3/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132DMFX-4.1/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132DQ1MFR3.0	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132DQ1MFT3.0	SOT-23	DBV	5	250	210.0	185.0	35.0
LM4132EMF-1.8/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132EMF-2.0/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132EMF-2.5/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132EMF-3.0/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132EMF-3.3/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132EMF-4.1/NOPB	SOT-23	DBV	5	1000	210.0	185.0	35.0
LM4132EMFX-1.8/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132EMFX-2.0/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132EMFX-2.5/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132EMFX-3.0/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132EMFX-3.3/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0
LM4132EMFX-4.1/NOPB	SOT-23	DBV	5	3000	210.0	185.0	35.0

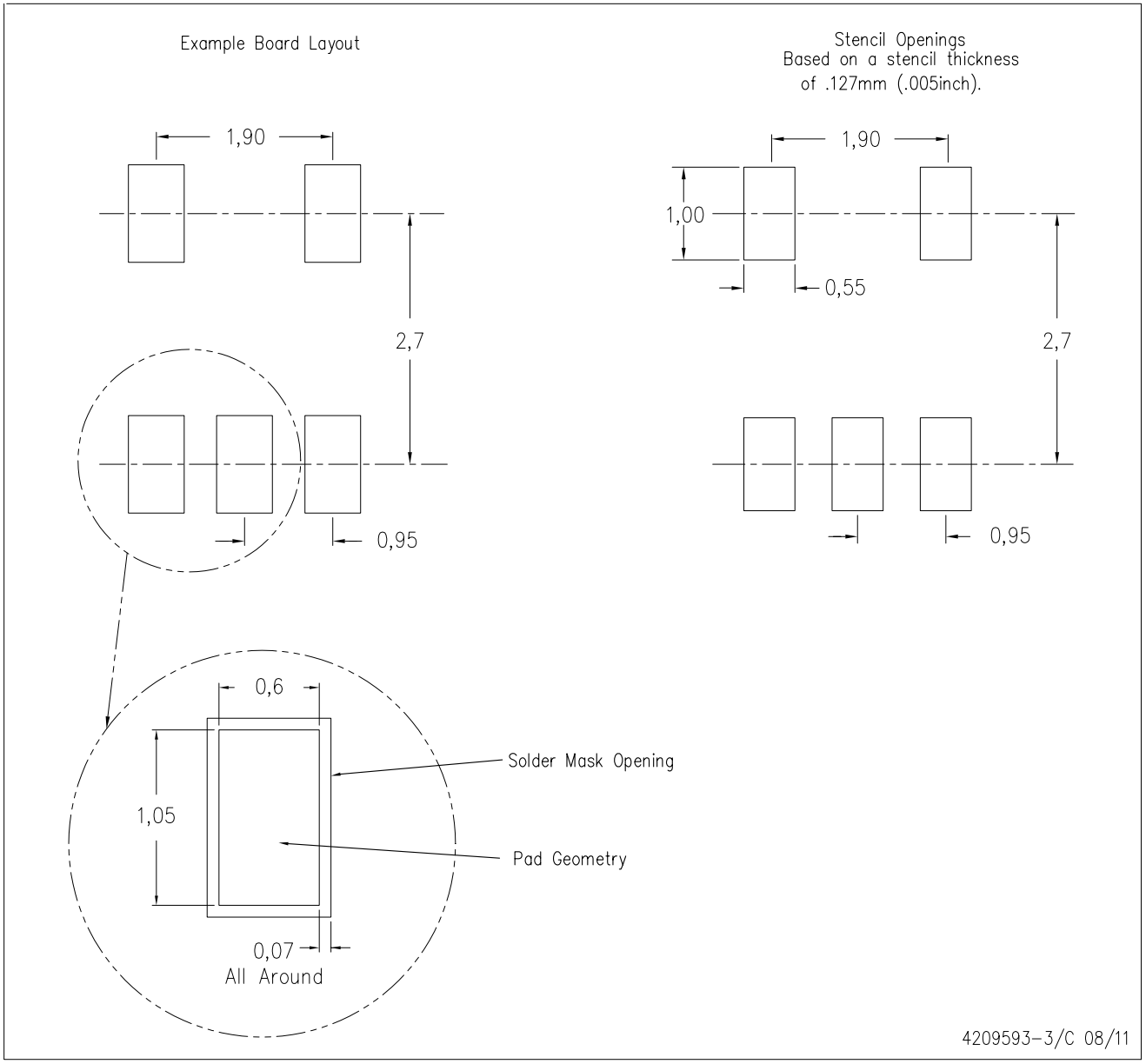
DBV (R–PDSO–G5) PLASTIC SMALL–OUTLINE PACKAGE



4073253–4/N 12/14

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.

DBV (R–PDSO–G5) PLASTIC SMALL OUTLINE



NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
D. Publication IPC–7351 is recommended for alternate designs.
E. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC–7525 for other stencil recommendations.

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