Product/Process Change Notice - PCN 22_0082 Rev. -

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This notice is to inform you of a change that will be made to certain ADI products (see Appendix A) that you may have purchased in the last 2 years. **Any inquiries or requests with this PCN (additional data or samples) must be sent to ADI within 30 days of publication date.** ADI contact information is listed below.

PCN Title: LTC2977 Datasheet Limit Change

Publication Date: 02-May-2022

Effectivity Date: 04-Aug-2022 *(the earliest date that a customer could expect to receive changed material)*

Revision Description:
Initial Release

Description Of Change:

Please be advised that Analog Devices has made changes to the LTC2977 product datasheet to facilitate improvement in manufacturing capability. The changes are shown on the attached pages of the marked-up datasheet.

Electrical Characteristics table changes (pages 5 and 7 of datasheet):
1. Offset Error at condition: Current Sense Mode, Odd Numbered Channels Only maximum spec limit changed from +/-35uV to +/-100uV.
2. Output Sinking Current at condition: Weak Pull-Down Enabled minimum spec limit changed from 33uA to 28uA. Typical value changed from 50uA to 43uA.
3. Output Sinking Current at condition: Strong Pulldown Enabled temperature condition changed from Tri-temperature to Room temperature only. Also, remove the minimum and maximum specification.

Reason For Change:

To facilitate improvement in manufacturing capability.

Impact of the change (positive or negative) on fit, form, function & reliability:

This datasheet change does not impact the fit, form, function, or reliability of the LTC2977.

Product Identification *(this section will describe how to identify the changed material)*

Product shipped after effectivity date will be tested to the new limits.
Can be identified with date code and lot traceability identification.

Summary of Supporting Information:

Changes will be reflected on the new product datasheet. See changes on Electrical Characteristics table on page 5 and 7.

Supporting Documents

Attachment 1: Type: Datasheet Specification Comparison

ADI_PCN_22_0082_Rev_-_LTC2977_Datasheet Marked-up_Pages.pdf

Attachment 2: Type: Delta Qualification Matrix

ADI_PCN_22_0082_Rev_-_LTC2977_Datasheet_Limit_Changes_PCN-Delta-Qualification-Matrix-ZVEI-5_0_9.xlsm

For questions on this PCN, please send an email to the regional contacts below or contact your local ADI sales representatives.			
Americas: PCN_Americas@analog.com	**Europe:** PCN_Europe@analog.com	**Japan:** PCN_Japan@analog.com	**Rest of Asia:** PCN_ROA@analog.com

Appendix A - Affected ADI Models				
Added Parts On This Revision - Product Family / Model Number (8)				
LTC2977 / LTC2977CUP#PBF	LTC2977 / LTC2977CUP#TRMPBF	LTC2977 / LTC2977CUP#TRPBF	LTC2977 / LTC2977IUP#PBF	LTC2977 / LTC2977IUP#TRMPBF
LTC2977 / LTC2977IUP#TRPBF	LTC2977 / LTC2977IUP#WPBF	LTC2977 / LTC2977IUP#WTRPBF		

Appendix B - Revision History			
Rev	**Publish Date**	**Effectivity Date**	**Rev Description**
Rev. -	02-May-2022	04-Aug-2022	Initial Release

ELECTRICAL CHARACTERISTICS

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at T_J = 25°C. V_{PWR} = V_{IN_SNS} = 12V, V_{DD33}, V_{DD25}, REFP and REFM pins floating, unless otherwise indicated. C_{VDD33} = 100nF, C_{VDD25} = 100nF and C_{REF} = 100nF. (Note 2)

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
Power Supply Characteristics							
V_{PWR}	V_{PWR} Supply Input Operating Range		●	4.5		15	V
I_{PWR}	V_{PWR} Supply Current	4.5V ≤ V_{PWR} ≤ 15V, V_{DD33} Floating	●		10	13	mA
I_{VDD33}	V_{DD33} Supply Current	3.13V ≤ V_{DD33} ≤ 3.47V, V_{PWR} = V_{DD33}	●		10	13	mA
V_{UVLO_VDD33}	V_{DD33} Undervoltage Lockout	V_{DD33} Ramping Up, V_{PWR} = V_{DD33}	●	2.35	2.55	2.8	V
	V_{DD33} Undervoltage Lockout Hysteresis				120		mV
V_{DD33}	Supply Input Operating Range	V_{PWR} = V_{DD33}	●	3.13		3.47	V
	Regulator Output Voltage	4.5V ≤ V_{PWR} ≤ 15V	●	3.13	3.26	3.47	V
	Regulator Output Short-Circuit Current	V_{PWR} = 4.5V, V_{DD33} = 0V	●	75	90	140	mA
V_{DD25}	Regulator Output Voltage	3.13V ≤ V_{DD33} ≤ 3.47V	●	2.35	2.5	2.6	V
	Regulator Output Short-Circuit Current	V_{PWR} = V_{DD33} = 3.47V, V_{DD25} = 0V	●	30	55	80	mA
t_{INIT}	Initialization Time	Time from V_{IN} Applied Until the TON_DELAY Timer Starts			30		ms
Voltage Reference Characteristics							
V_{REF}	Output Voltage (Note 3)	V_{REF} = V_{REFP} – V_{REFM}, 0 < I_{REFP} < 100µA			1.232		V
	Temperature Coefficient				3		ppm/°C
	Hysteresis	(Note 4)			100		ppm
ADC Characteristics							
V_{IN_ADC}	Voltage Sense Input Range	Differential Voltage: V_{IN_ADC} = ($V_{SENSEPn}$ – $V_{SENSEMn}$)	●	0		6	V
		Single-Ended Voltage: $V_{SENSEMn}$	●	–0.1		0.1	V
	Current Sense Input Range (Odd Numbered Channels Only)	Single-Ended Voltage: $V_{SENSEPn}$, $V_{SENSEMn}$	●	–0.1		6	V
		Differential Voltage: V_{IN_ADC}	●	–170		170	mV
N_ADC	Voltage Sense Resolution Uses L16 Format	0V ≤ V_{IN_ADC} ≤ 6V Mfr_config_adc_hires = 0			122		µV/LSB
	Current Sense Resolution (Odd Numbered Channels Only)	0mV ≤ |V_{IN_ADC}| < 16mV (Note 12) 16mV ≤ |V_{IN_ADC}| < 32mV 32mV ≤ |V_{IN_ADC}| < 63.9mV 63.9mV ≤ |V_{IN_ADC}| < 127.9mV 127.9mV ≤ |V_{IN_ADC}| Mfr_config_adc_hires = 1			15.625 31.25 62.5 125 250		µV/LSB µV/LSB µV/LSB µV/LSB µV/LSB
TUE_ADC_VOLT_SNS	Total Unadjusted Error (Note 3)	Voltage Sense Mode V_{IN_ADC} ≥ 1V	●			±0.25	% of Reading
		Voltage Sense Mode 0 ≤ V_{IN_ADC} ≤ 1V	●			±2.5	mV
TUE_ADC_CURR_SNS	Total Unadjusted Error (Note 3)	Current Sense Mode, Odd Numbered Channels Only, 20mV ≤ V_{IN_ADC} ≤ 170mV	●			±0.7	% of Reading
		Current Sense Mode, Odd Numbered Channels Only, V_{IN_ADC} ≤ 20mV	●			100 ±140	µV
V_{OS_ADC}	Offset Error	Current Sense Mode, Odd Numbered Channels Only	●			±~~35~~	µV
t_{CONV_ADC}	Conversion Time	Voltage Sense Mode (Note 5)			6.15		ms
		Current Sense Mode (Note 5)			24.6		ms
		Temperature Input (Note 5)			24.6		ms

ELECTRICAL CHARACTERISTICS

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at T_J = 25°C. V_{PWR} = V_{IN_SNS} = 12V; V_{DD33}, V_{DD25}, REFP and REFM pins floating, unless otherwise indicated. C_{VDD33} = 100nF, C_{VDD25} = 100nF and C_{REF} = 100nF. (Note 2)

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
TUE_{VIN_SNS}	VIN_ON, VIN_OFF Threshold Total Unadjusted Error	3V ≤ V_{VIN_SNS} ≤ 8V	●			±2.0	% of Reading
		V_{VIN_SNS} > 8V	●			±1.0	
	READ_VIN Total Unadjusted Error	3V ≤ V_{VIN_SNS} ≤ 8V	●			±1.5	% of Reading
		V_{VIN_SNS} > 8V	●			±1.0	
DAC Soft-Connect Comparator Characteristics							
V_{OS_CMP}	Offset Voltage	V_{DACP}*n* = 0.2V	●		±1	±18	mV
		V_{DACP}*n* = 1.3V	●		±2	±26	mV
		V_{DACP}*n* = 2.65V	●		±3	±52	mV
Temperature Sensor Characteristics							
TUE_TS	Total Unadjusted Error				±1		°C
V_{OUT} Enable Output (V_{OUT_EN} [3:0]) Characteristics							
V_{VOUT_EN}*n*	Output High Voltage (Note 11)	I_{VOUT_EN}*n* = –5µA, V_{DD33} = 3.3V	●	10	12.5	14.7	V
I_{VOUT_EN}*n*	Output Sourcing Current	V_{VOUT_EN}*n* Pull-Up Enabled, V_{VOUT_EN}*n* = 1V	●	–5	–6	–8	µA
	Output Sinking Current	Strong Pull-Down Enabled, V_{VOUT_EN}*n* = 0.4V	●	3	5	8	mA
		Weak Pull-Down Enabled, V_{VOUT_EN}*n* = 0.4V	●	~~33~~ 28	~~50~~ 43	60	µA
	Output Leakage Current	Internal Pull-Up Disabled, 0V ≤ V_{VOUT_ENn} ≤ 15V	●			±1	µA
V_{VOUT_VALID}	Minimum V_{DD33} when V_{VOUT_EN}*n* Valid	V_{VOUT_EN}*n* ≤ 0.4V	●			1.1	V
V_{OUT} Enable Output (V_{OUT_EN} [7:4]) Characteristics							
I_{VOUT_EN}*n*	Output Sinking Current	Strong Pull-Down Enabled, V_{OUT_EN}*n* = 0.1V	~~●~~	~~3~~	6	~~9~~	mA
	Output Leakage Current	0V ≤ V_{VOUT_ENn} ≤ 6V	●			±1	µA
V_{VOUT_VALID}	Minimum V_{DD33} when V_{VOUT_EN}*n* Valid	V_{VOUT_EN}*n* ≤ 0.4V	●			1.1	V
V_{IN} Enable Output (V_{IN_EN}) Characteristics							
V_{VIN_EN}	Output High Voltage	I_{VIN_EN} = –5µA, V_{DD33} = 3.3V	●	10	12.5	14.7	V
I_{VIN_EN}	Output Sourcing Current	V_{IN_EN} Pull-Up Enabled, V_{VIN_EN} = 1V	●	–5	–6	–8	µA
	Output Sinking Current	V_{VIN_EN} = 0.4V	●	3	5	8	mA
	Leakage Current	Internal Pull-Up Disabled, 0V ≤ V_{VIN_EN} ≤ 15V	●			±1	µA
EEPROM Characteristics							
Endurance	(Notes 7, 10)	0°C < T_J < 85°C During EEPROM Write Operations	●	10,000			Cycles
Retention	(Notes 7, 10)	T_J < 105°C	●	20			Years
t_{MASS_WRITE}	Mass Write Operation Time (Note 8)	STORE_USER_ALL, 0°C < T_J < 85°C During EEPROM Write Operations	●		440	4100	ms