CHANGE NOTIFICATION

Linear Technology Corporation
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May 05, 2016

Dear Sir/Madam: PCN# 050516

Subject: **Notification of Change to LTC2380-24 Datasheet**

Please be advised that Linear Technology Corporation has made a minor change to the LTC2380-24 product datasheet to facilitate improvement in our manufacturing yield. The change is shown on the attached pages of the marked up datasheet. There was no change in form, fit, function, quality or reliability of the product. The product shipped after July 5, 2016 will be tested to the new limits.

Should you have any further questions, please feel free to contact your local Linear Technology sales person or you may contact me at 408-432-1900 ext. 2077, or by E-mail JASON.HU@LINEAR.COM. If I do not hear from you by July 5, 2016, we will consider this change approved by your company.

Sincerely,

Jason Hu
Quality Assurance Engineer

ELECTRICAL CHARACTERISTICS

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at T_A = 25°C. (Note 4)

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
V_{IN}^+	Absolute Input Range (IN+)	(Note 5)	●	–0.1		V_{REF} + 0.1	V
V_{IN}^-	Absolute Input Range (IN–)	(Note 5)	●	–0.1		V_{REF} + 0.1	V
$V_{IN}^+ – V_{IN}^-$	Input Differential Voltage Range	$V_{IN} = V_{IN}^+ – V_{IN}^-$	●	$–V_{REF}$		V_{REF}	V
V_{CM}	Common Mode Input Range		●	$–V_{REF}/2 – 0.1$	$V_{REF}/2$	$V_{REF}/2 + 0.1$	V
I_{IN}	Analog Input Leakage Current				0.01		µA
C_{IN}	Analog Input Capacitance	Sample Mode Hold Mode			45 5		pF pF
CMRR	Input Common Mode Rejection Ratio	f_{IN} = 1MHz			86		dB

CONVERTER CHARACTERISTICS

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at T_A = 25°C. (Note 4)

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
	Resolution		●	24			Bits
	No Missing Codes		●	24			Bits
N	Number of Averages		●	1		65536	
	Transition Noise	N = 1, f_{SMPL} = 1.5Msps N = 16, f_{SMPL} = 2Msps N = 1024, f_{SMPL} = 2Msps N = 16384, f_{SMPL} = 2Msps	✖ ✖ ✖ ✖		55.7 13.6 1.75 0.55		LSB_{RMS} LSB_{RMS} LSB_{RMS} LSB_{RMS}
INL	Integral Linearity Error	N = 1, f_{SMPL} = 1.5Msps (Note 6) N = 1, f_{SMPL} = 1.5Msps REF/DGC = GND (Note 6) N = 4, f_{SMPL} = 2Msps (Note 6)	● ● ●	–3.5 –3.5 –3.5	±0.5 ±0.5 ±0.5	3.5 3.5 3.5	ppm ppm ppm
DNL	Differential Linearity Error	(Note 7)	●	–0.5	±0.2	0.5	LSB
ZSE	Zero-Scale Error	(Note 8)	●	–10	0	10	ppm
	Zero-Scale Error Drift				±7		ppb/°C
FSE	Full-Scale Error	(Note 8)	●	–100	±10	100	ppm
	Full-Scale Error Drift				±0.05		ppm/°C

DYNAMIC ACCURACY

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at T_A = 25°C and A_{IN} = –1dBFS. (Notes 4, 9)

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
DR	Dynamic Range	$IN^+ = IN^- = V_{CM}$, V_{REF} = 5V, N = 1, f_{SMPL} = 1.5Msps $IN^+ = IN^- = V_{CM}$, V_{REF} = 5V, N = 16, f_{SMPL} = 2Msps $IN^+ = IN^- = V_{CM}$, V_{REF} = 5V, N = 1024, f_{SMPL} = 2Msps $IN^+ = IN^- = V_{CM}$, V_{REF} = 5V, N = 16384, f_{SMPL} = 2Msps $IN^+ = IN^- = V_{CM}$, V_{REF} = 5V, N = 65536, f_{SMPL} = 2Msps			101 113 131 141 145		dB dB dB dB dB
SINAD	Signal-to-(Noise + Distortion) Ratio	f_{IN} = 2kHz, V_{REF} = 5V	●	97.5	100		dB
SNR	Signal-to-Noise Ratio	f_{IN} = 2kHz, V_{REF} = 5V, N = 1, f_{SMPL} = 1.5Msps f_{IN} = 2kHz, V_{REF} = 5V, REF/DGC = GND, N = 1, f_{SMPL} = 1.5Msps f_{IN} = 2kHz, V_{REF} = 2.5V, N = 1, f_{SMPL} = 1.5Msps f_{IN} = 2kHz, V_{REF} = 5V, N = 16, A_{IN} = –20dBFS, f_{SMPL} = 2Msps f_{IN} = 100Hz, V_{REF} = 5V, N = 1024, A_{IN} = –20dBFS, f_{SMPL} = 2Msps	● ● ● 	97.5 95.5 92.5 	100 98 95 112 130		dB dB dB dB dB
THD	Total Harmonic Distortion	f_{IN} = 2kHz, V_{REF} = 5V, N = 1, f_{SMPL} = 1.5Msps f_{IN} = 2kHz, V_{REF} = 5V, REF/DGC = GND, N = 1, f_{SMPL} = 1.5Msps f_{IN} = 2kHz, V_{REF} = 2.5V, N = 1, f_{SMPL} = 1.5Msps f_{IN} = 2kHz, V_{REF} = 5V, N = 16, A_{IN} = –20dBFS, f_{SMPL} = 2Msps f_{IN} = 100Hz, V_{REF} = 5V, N = 1024, A_{IN} = –20dBFS, f_{SMPL} = 2Msps	● ● ● 		–117 –119 –117 ~~–140~~ -120 ~~–140~~ -120	–114 –114 –113 	dB dB dB dB dB

DYNAMIC ACCURACY

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at T_A = 25°C and A_{IN} = –1dBFS. (Notes 4, 9)

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
SFDR	Spurious Free Dynamic Range	f_{IN} = 2kHz, V_{REF} = 5V	●	114	120		dB
	–3dB Input Linear Bandwidth				34		MHz
	Aperture Delay				500		ps
	Aperture Jitter				4		ps_{RMS}
	Transient Response	Full-Scale Step			~~115~~ 95		ns

REFERENCE INPUT

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at T_A = 25°C. (Note 4)

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
V_{REF}	Reference Voltage	(Note 5)	●	2.5		5.1	V
I_{REF}	Reference Input Current	(Note 10)	●		1.9	2.1	mA
V_{IHDGC}	High Level Input Voltage REF/$\overline{DGC}$ Pin		●	$0.8V_{REF}$			V
V_{ILDGC}	Low Level Input Voltage REF/$\overline{DGC}$ Pin		●			$0.2V_{REF}$	V

DIGITAL INPUTS AND DIGITAL OUTPUTS

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at T_A = 25°C. (Note 4)

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
V_{IH}	High Level Input Voltage		●	$0.8 • OV_{DD}$			V
V_{IL}	Low Level Input Voltage		●			$0.2 • OV_{DD}$	V
I_{IN}	Digital Input Current	V_{IN} = 0V to OV_{DD}	●	–10		10	µA
C_{IN}	Digital Input Capacitance				5		pF
V_{OH}	High Level Output Voltage	I_O = –500µA	●	OV_{DD} – 0.2			V
V_{OL}	Low Level Output Voltage	I_O = 500µA	●			0.2	V
I_{OZ}	Hi-Z Output Leakage Current	V_{OUT} = 0V to OV_{DD}	●	–10		10	µA
I_{SOURCE}	Output Source Current	V_{OUT} = 0V			–10		mA
I_{SINK}	Output Sink Current	V_{OUT} = OV_{DD}			10		mA

POWER REQUIREMENTS

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at T_A = 25°C. (Note 4)

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
V_{DD}	Supply Voltage		●	2.375	2.5	2.625	V
OV_{DD}	Supply Voltage		●	1.71		5.25	V
I_{VDD}	Supply Current	N = 4, f_{SMPL} = 2Msps	●		11.2	13	mA
I_{OVDD}	Supply Current	N = 4, f_{SMPL} = 2Msps (C_L = 20pF)			0.4		mA
I_{PD}	Power Down Mode	Conversion Done (I_{VDD} + I_{OVDD} + I_{REF})	●		1	90	µA
P_D	Power Dissipation	N = 4, f_{SMPL} = 2Msps			28	32.5	mW
	Power Down Mode	Conversion Done (I_{VDD} + I_{OVDD} + I_{REF})			2.5	225	µW

ADC TIMING CHARACTERISTICS

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at T_A = 25°C. (Note 4)

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
f_{SMPL}	Maximum Sampling Frequency	N ≥ 4	●			2	Msps
f_{ODR}	Output Data Rate		●			1.5	Msps

ADC TIMING CHARACTERISTICS

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at T_A = 25°C. (Note 4)

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
t_{CONV}	Conversion Time		●	343		392	ns
t_{ACQ}	Acquisition Time	$t_{ACQ} = t_{CYC} - t_{CONV} - t_{BUSYLH}$ (Note 7)	●	~~115~~ 95			ns
t_{CYC}	Time Between Conversions		●	500			ns
t_{CNVH}	CNV High Time		●	20			ns
t_{CNVL}	Minimum Low Time for CNV	(Note 11)	●	20			ns
t_{BUSYLH}	CNV↑ to BUSY↑ Delay	C_L = 20pF	●			13	ns
t_{QUIET}	SCK Quiet Time from CNV↑	(Note 7)	●	10			ns
t_{SCK}	SCK Period	(Notes 11, 12)	●	10			ns
t_{SCKH}	SCK High Time		●	4			ns
t_{SCKL}	SCK Low Time		●	4			ns
$t_{SSDISCK}$	SDI Setup Time From SCK↑	(Note 11)	●	4			ns
$t_{HSDISCK}$	SDI Hold Time From SCK↑	(Note 11)	●	1			ns
t_{SCKCH}	SCK Period in Chain Mode	$t_{SCKCH} = t_{SSDISCK} + t_{DSDO}$ (Note 11)	●	13.5			ns
t_{DSDO}	SDO Data Valid Delay from SCK↑	C_L = 20pF, OV_{DD} = 5.25V C_L = 20pF, OV_{DD} = 2.5V C_L = 20pF, OV_{DD} = 1.71V	● ● ●			7.5 8 9.5	ns ns ns
t_{HSDO}	SDO Data Remains Valid Delay from SCK↑	C_L = 20pF (Note 7)	●	1			ns
$t_{DSDOBUSYL}$	SDO Data Valid Delay from BUSY↓	C_L = 20pF (Note 7)	●			5	ns
t_{EN}	Bus Enable Time After RDL↓	(Note 11)	●			16	ns
t_{DIS}	Bus Relinquish Time After RDL↑	(Note 11)	●			13	ns

Note 1: Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. Exposure to any Absolute Maximum Rating condition for extended periods may affect device reliability and lifetime.

Note 2: All voltage values are with respect to ground.

Note 3: When these pin voltages are taken below ground or above REF or OV_{DD}, they will be clamped by internal diodes. This product can handle input currents up to 100mA below ground or above REF or OV_{DD} without latchup.

Note 4: V_{DD} = 2.5V, OV_{DD} = 2.5V, REF = 5V, V_{CM} = 2.5V, f_{SMPL} = 1.5MHz, REF/$\overline{DGC}$ = V_{REF}, N = 1.

Note 5: Recommended operating conditions.

Note 6: Integral nonlinearity is defined as the deviation of a code from a straight line passing through the actual endpoints of the transfer curve. The deviation is measured from the center of the quantization band.

Note 7: Guaranteed by design, not subject to test.

Note 8: Bipolar zero-scale error is the offset voltage measured from –0.5LSB when the output code flickers between 0000 0000 0000 0000 0000 0000 and 1111 1111 1111 1111 1111 1111. Full-scale bipolar error is the worst-case of –FS or +FS untrimmed deviation from ideal first and last code transitions and includes the effect of offset error.

Note 9: All specifications in dB are referred to a full-scale ±5V input with a 5V reference voltage.

Note 10: f_{SMPL} = 2MHz, I_{REF} varies proportionally with sample rate.

Note 11: Parameter tested and guaranteed at OV_{DD} = 1.71V, OV_{DD} = 2.5V and OV_{DD} = 5.25V.

Note 12: t_{SCK} of 10ns maximum allows a shift clock frequency up to 100MHz for rising edge capture.

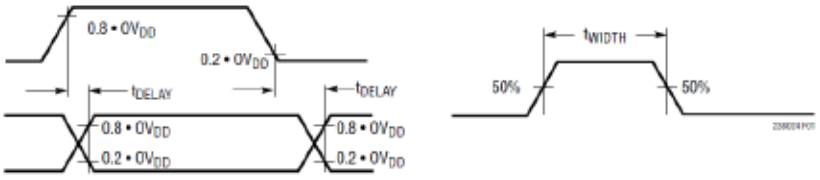

Figure 1. Voltage Levels for Timing Specifications