PRODUCT CHANGE NOTICE

Data Sheet Specification Change for Intersil Product ISL78600ANZ*

Refer to:
PCN13051

Date: September 24, 2013

September 24, 2013

To: Our Valued Intersil Customer

Subject: **Data Sheet Specification Change for Intersil Product ISL78600ANZ and ISL78600ANZ-T**

This notice is to inform you that Intersil has changed the data sheet specification for the ISL78600ANZ* product. The changes align the data sheet with the product characteristics and consist of the following:

a. Updated Theta JA from 42 to 49 (C/W).
b. Added note 11 to the following parameters in the electrical table: Initial Cell Monitor Voltage Error (Delta V_{CELL}) and VBAT Monitor Voltage Error (Delta V_{BAT})
c. Modified electrical performance for V_{REF} Reference Accuracy Test (V_{RACC}), Cell Input Current (I_{VCELL}), Open Wire Current (I_{OW}) and Cell Balance Output Leakage in Shutdown (I_{CBSD})
d. Added Typical Performance Curve (figure 4B): Maximum Cell Reading Error from 114 Evaluations Boards At 3.3V, +25°C.
e. Updated Definitions for Shutdown Mode in “Power Modes” on page 24 and “Reset” on page 44.
f. Updated recommendation for C1 with respect to Daisy Chain Clock Rates (Table 50)
g. Replaced “Measurement and Communication Timing” Section with new sections on “Communication and Measurement Diagrams”, “Communication and Measurement Timing Tables” with new figures and tables to offer more clarity and flexibility in communication and measurement timing calculations.

Details regarding the changes to the electrical tables (a – c above) are contained on the following pages. The updated data sheet is under NDA control for individual customers only, please contact Intersil Product Line for a copy of the updated datasheet. Product Line contacts are:

Niall Lyne nlyne@intersil.com
Gary MacDonald gmacdonald@intersil.com

There will be no change in the external marking of the packaged parts.

Intersil will take all necessary actions to conform to agreed upon customer requirements and to ensure the continued high quality and reliability of Intersil products being supplied. Customers may expect to receive product as outlined in the revised data sheet beginning ninety days from the date of this notice or earlier with approval.

If you have concerns with this notice, Intersil must hear from you promptly. Please contact the nearest Intersil Sales Office or call the Intersil Corporate line at 1-888-468-3774, in the United States, or 1-321-724-7143 outside of the United States.

Regards,

Jeffrey Touvell

Jeffrey Touvell
Intersil Corporation

PCN13051

CC: W. Choroco N. Lyne G. MacDonald C. Lister

PCN13051 – New Data Sheet

ISL78600

Absolute Maximum Ratings

Unless otherwise specified. With respect to VSS.

DIN, SCLK, $\overline{CS}$, DOUT, $\overline{Data\ Ready}$, Comms Select n, ExTn, TEMPREG, REF, V3P3, VCC, $\overline{Fault}$, Comms Rate n, Base, EN, VDDEXT ..... -0.2V to 4.1V
V2P5 ..... -0.2V to 2.9V
VBAT ..... -0.5V to 63V
Dhi1, DLo1, DHi2, DLo2 ..... -0.5V to (VBAT + 0.5V)
VC0 ..... -0.5V to + 9.0V
VC1 ..... -0.5V to + 18V
VC2 ..... -0.5V to + 18V
VC3 ..... -0.5V to + 27V
VC4 ..... -0.5V to + 27V
VC5 ..... -0.5V to + 36V
VC6 ..... -0.5V to + 36V
VC7 ..... -0.5V to + 45V
VC8 ..... -0.5V to + 45V
VC9 ..... -0.5V to + 54V
VC10 ..... -0.5V to + 63V
VC11 ..... -0.5V to + 63V
VC12 ..... -0.5V to + 63V
VCn (for n = 0 to 12) ..... -0.5 to VBAT + 0.5V
CBn (for n = 1 to 12) ..... -0.5 to VBAT + 0.5V
CBn (for n = 1 to 9) ..... V(VCn-1)-0.5V to V(VCn-1) + 9V
CBn (for n = 10 to 12) ..... V(VCn) -9V to V(VCn) + 0.5V
Current into VCn, VBAT, VSS (Latch up Test) ..... ±100mA
ESD Rating
  Human Body Model (Tested per JESD22-A114F) 2kV
  Machine Model (Tested per JESD22A115-A) 200V
  Capacitive Discharge Model (Tested per JESD22-C101D) 750V
Latch Up (Tested per JESD-78B; Class 2, Level A) 100mA

NOTE: DOUT, $\overline{Data\ Ready}$, and $\overline{Fault}$ are digital outputs and should not be driven from external sources. V2P5, REF, TEMPREG and BASE are analog outputs and should not be driven from external sources.

Thermal Information

Thermal Resistance (Typical)	θ_{JA}(C/W)	θ_{JC}(C/W)
64 Ld TQFP Package (Notes 5, 6)	49	9

Max Continuous Package Power Dissipation 400mW
Storage Temperature ..... -55°C to +125°C
Max Operating Junction Temperature ..... +125°C
Pb-Free Reflow Profile (*) ..... Refer to JEDEC J STD 020D

Recommended Operating Conditions

T_A, Ambient Temperature Range ..... -40°C to +105°C
V_{BAT} ..... 6V to 60V
V_{BAT} (Daisy Chain Operation) ..... 10V to 60V
VCn (for n = 1 to 12) ..... V(VCn-1) to V(VCn-1) + 5V
VC0 ..... -0.1V to 0.1V
CBn (for n = 1 to 9) ..... V(VCn-1) to V(VCn-1) + 9V
CBn (for n = 10 to 12) ..... V(VCn) -9V to V(VCn)
DIN, SCLK, $\overline{CS}$, DOUT, $\overline{Data\ Ready}$, Comms Select 1, Comms Select 2, ExT1, ExT2, ExT3, ExT4, TEMPREG, REF, V3P3, VCC, $\overline{Fault}$, Comms Rate 0, Comms Rate 1, EN, VDDEXT ..... 0V to 3.6V

Note: Changed items are shaded in yellow

PCN13051 – Current Data Sheet

ISL78600

Absolute Maximum Ratings

Unless otherwise specified. With respect to VSS.

DIN, SCLK, $\overline{CS}$, DOUT, $\overline{Data\ Ready}$, Comms Select n, ExTn, TEMPREG, REF, V3P3, VCC, $\overline{Fault}$, Comms Rate n, Base, EN, VDDEXT ..... -0.2V to 4.1V
V2P5 ..... -0.2V to 2.9V
VBAT ..... -0.5V to 63V
Dhi1, DLo1, DHi2, DLo2 ..... -0.5V to (VBAT + 0.5V)
VC0 ..... -0.5V to + 9.0V
VC1 ..... -0.5V to + 18V
VC2 ..... -0.5V to + 18V
VC3 ..... -0.5V to + 27V
VC4 ..... -0.5V to + 27V
VC5 ..... -0.5V to + 36V
VC6 ..... -0.5V to + 36V
VC7 ..... -0.5V to + 45V
VC8 ..... -0.5V to + 45V
VC9 ..... -0.5V to + 54V
VC10 ..... -0.5V to + 63V
VC11 ..... -0.5V to + 63V
VC12 ..... -0.5V to + 63V
VCn (for n = 0 to 12) ..... -0.5 to VBAT + 0.5V
CBn (for n = 1 to 12) ..... -0.5 to VBAT + 0.5V
CBn (for n = 1 to 9) ..... V(VCn-1)-0.5V to V(VCn-1) + 9V
CBn (for n = 10 to 12) ..... V(VCn) -9V to V(VCn) + 0.5V
Current into VCn, VBAT, VSS (Latch up Test) ..... ±100mA
ESD Rating
  Human Body Model (Tested per JESD22-A114F) 2kV
  Machine Model (Tested per JESD22A115-A) 200V
  Capacitive Discharge Model (Tested per JESD22-C101D) 750V
Latch Up (Tested per JESD-78B; Class 2, Level A) 100mA

NOTE: DOUT, $\overline{Data\ Ready}$, and $\overline{Fault}$ are digital outputs and should not be driven from external sources. V2P5, REF, TEMPREG and BASE are analog outputs and should not be driven from external sources.

Thermal Information

Thermal Resistance (Typical)	θ_{JA}(C/W)	θ_{JC}(C/W)
64 Ld TQFP Package (Notes 5, 6)	42	9

Max Continuous Package Power Dissipation 400mW
Storage Temperature ..... -55°C to +125°C
Max Operating Junction Temperature ..... +125°C
Pb-Free Reflow Profile (*) ..... Refer to JEDEC J STD 020D

Recommended Operating Conditions

T_A, Ambient Temperature Range ..... -40°C to +105°C
V_{BAT} ..... 6V to 60V
V_{BAT} (Daisy Chain Operation) ..... 10V to 60V
VCn (for n = 1 to 12) ..... V(VCn-1) to V(VCn-1) + 5V
VC0 ..... -0.1V to 0.1V
CBn (for n = 1 to 9) ..... V(VCn-1) to V(VCn-1) + 9V
CBn (for n = 10 to 12) ..... V(VCn) -9V to V(VCn)
DIN, SCLK, $\overline{CS}$, DOUT, $\overline{Data\ Ready}$, Comms Select 1, Comms Select 2, ExT1, ExT2, ExT3, ExT4, TEMPREG, REF, V3P3, VCC, $\overline{Fault}$, Comms Rate 0, Comms Rate 1, EN, VDDEXT ..... 0V to 3.6V

Note: Changed items are shaded in yellow

PCN13051 – New Data Sheet

Electrical Specifications V_{BAT} = 6 to 60V, T_A = -20°C to +60°C, unless otherwise specified. **(Continued)**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN (Note 7)	TYP	MAX (Note 7)	UNIT
ISL78600 Initial Cell Monitor Voltage Error (Note 11) V_{NOM} = nominal calibration voltage. Note: Cell measurement accuracy figures assume a fixed 1kΩ resistor is placed in series with each VCn pin (n = 0 to 12).	ΔV_{CELL}	$V_{CELL} = V_{NOM} - 0.3V < V_{CELL} < V_{NOM} + 0.3V$	-2.5		2.5	mV
		$V_{CELL} = V_{NOM} - 0.7V < V_{CELL} < V_{NOM} + 0.7V$	-3.5		3.5	mV
		V_{CELL} = 4.95	-10		10	mV
		V_{CELL} = 0.5	-15		15	mV
		$V_{CELL} = V_{NOM} - 0.7V < V_{CELL} < V_{NOM} + 0.7V$ -40°C to +85°C (Note 9)	-9.5		9.0	mV
		-40°C to +105°C (Note 9)	-26.5		26.5	mV
		V_{CELL} = 4.95 -40°C to +85°C (Note 9)	-11		11	mV
		-40°C to +105°C (Note 9)	-26.5		26.5	mV
		V_{CELL} = 0.5 -40°C to +85°C (Note 9)	-18		18	mV
		-40°C to +105°C (Note 9)	-37		37	mV

PARAMETER	SYMBOL	TEST CONDITIONS	MIN (Note 7)	TYP	MAX (Note 7)	UNIT
Initial V_{BAT} monitor Voltage Error (Note 11)	ΔV_{BAT}	Measured at V_{BAT} = 36V to 43.2V	-100		100	mV
		Measured at V_{BAT} = 31.2V to 48V	-125		125	mV
		Measured at V_{BAT} = 31.2V to 59.4V	-250		250	mV
		Measured at V_{BAT} = 6V to 59.4V	-300		300	mV
		Measured at V_{BAT} = 6V to 59.4V -40°C to +105°C (Note 9)	-490		490	mV

NOTES:

7. Compliance to datasheet limits is assured by one or more methods: production test, characterization and/or design.
8. Scan and Measurement start times are synchronised by the receiver to the falling edge of the 24th clock pulse (Daisy Chain systems) or to the falling edge of the 16th clock pulse (non-Daisy Chain, single device systems) of the Scan or *Measure* command. Clock pulses are at the SCLK pin for Master and Stand-alone devices, and at the DHi/DLo1 pins for middle and Top Daisy Chain devices. Max values are based on characterization of the internal clock and are not 100% tested.
9. These MIN and/or MAX values are based on characterization data and are not 100% tested.
10. Biasing setup as in Figure 55 on page 84 or equivalent.
11. Initial accuracy does not include drift due to solder or heat effect.

CONFIDENTIAL

Note: Changed items are shaded in yellow

PCN13051 – Current Data Sheet

Electrical Specifications V_{BAT} = 6 to 60V, T_A = -20°C to +60°C, unless otherwise specified. **(Continued)**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN (Note 7)	TYP	MAX (Note 7)	UNIT
ISL78600 Cell Monitor Voltage Error V_{NOM} = nominal calibration voltage. Note: Cell measurement accuracy figures assume a fixed 1kΩ resistor is placed in series with each VCn pin (n = 0 to 12).	ΔV_{CELL}	$V_{CELL} = V_{NOM} - 0.3V < V_{CELL} < V_{NOM} + 0.3V$	-2.5		2.5	mV
		$V_{CELL} = V_{NOM} - 0.7V < V_{CELL} < V_{NOM} + 0.7V$	-3.5		3.5	mV
		V_{CELL} = 4.95	-10		10	mV
		V_{CELL} = 0.5	-15		15	mV
		$V_{CELL} = V_{NOM} - 0.7V < V_{CELL} < V_{NOM} + 0.7V$ -40°C to +85°C (Note 9)	-9.5		9.0	mV
		-40°C to +105°C (Note 9)	-26.5		26.5	mV
		V_{CELL} = 4.95 -40°C to +85°C (Note 9)	-11		11	mV
		-40°C to +105°C (Note 9)	-26.5		26.5	mV
		V_{CELL} = 0.5 -40°C to +85°C (Note 9)	-18		18	mV
		-40°C to +105°C (Note 9)	-37		37	mV

PARAMETER	SYMBOL	TEST CONDITIONS	MIN (Note 7)	TYP	MAX (Note 7)	UNIT
V_{BAT} Monitor Voltage Error	ΔV_{BAT}	Measured at V_{BAT} = 36V to 43.2V	-100		100	mV
		Measured at V_{BAT} = 31.2V to 48V	-125		125	mV
		Measured at V_{BAT} = 31.2V to 59.4V	-250		250	mV
		Measured at V_{BAT} = 6V to 59.4V	-300		300	mV
		Measured at V_{BAT} = 6V to 59.4V -40°C to +105°C (Note 9)	-490		490	mV

PCN13051 – New Data Sheet

Electrical Specifications V_{BAT} = 6 to 60V, T_A = -20°C to +60°C, unless otherwise specified. **(Continued)**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN (Note 7)	TYP	MAX (Note 7)	UNIT
V_{REF} Reference Accuracy Test	V_{RACC}	V_{REF} value calculated using stored coefficients. V_{BAT} = 39.6V (See "Voltage Reference Check Calculation" on page 88.)	2.488	2.500	2.512	V
		V_{BAT} = 39.6V; -40°C (Note 9)	2.488		2.512	V
		V_{BAT} = 39.6V; +85°C (Note 9)	2.4849		2.5172	V
		V_{BAT} = 39.6V; +105°C (Note 9)	2.4692		2.5273	V
Cell Input Current. Note: Cell accuracy figures assume a fixed 1kΩ resistor is placed in series with each VCn pin (n = 0 to 12)	I_{VCELL}	VC0 input VC0 ≥ 0.5 and VC0 ≤ 4.0V	-1.5	-1	-0.5	µA
		VC0 > 4.0V	-1.75		-0.5	µA
		-40°C to +105°C (Note 9)	-2.0	-1	-0.5	µA
		VC1, VC2, VC3 inputs VCn - VC(n-1) ≥ 0.5 and VCn-VC(n-1) ≤ 4.0V	-2.7	-2	-1.3	µA
		VCn - VC(n-1) > 4.0V	-2.85		-1.0	µA
		-40°C to +105°C (Note 9)	-3.0	-2	-1.0	µA
		VC4 input VCn - VC(n-1) ≥ 0.5 and VCn-VC(n-1) ≤ 4.0V	-0.6	0	0.6	µA
		VCn - VC(n-1) > 4.0V	-0.7		0.85	µA
		-40°C to +105°C (Note 9)	- 0.8	0	0.95	µA
		VC5, VC6, VC7, VC8, VC9, VC10, VC11 inputs VCn - VC(n-1) < 2.6V	0.5	2	2.7	µA
		VCn - VC(n-1) ≥ 2.6V and VCn-VC(n-1) ≤ 4.0V	1.5	2	2.7	µA
		VCn - VC(n-1) > 4.0V	1.5	2	3.1	µA
		-40°C to +105°C (Note 9)	0.5	2	3.25	µA
		VC12 input VC12 - VC11 ≥ 0.5 and VC12-VC11 ≤ 4.0V	0.6	1	1.7	µA
		VC12 - VC11 > 4.0V	0.6		2.05	µA
		-40°C to +105°C (Note 9)	0.6	1	2.3	µA
Cell Balance Output Leakage in Shutdown	I_{CBSD}	EN = GND. V_{BAT} = 39.6V.	-500	10	700	nA
CELL OPEN WIRE DETECTION (See Sections "Scan Wires" on page 25, "ISCN, PIN37, PIN39" on page 33, and "Open Wire Test" on page 47.)						
Open Wire Current	I_{OW}	ISCN bit = 0; V_{BAT} = 39.6V	0.125	0.15	0.185	mA
		ISCN bit = 1; V_{BAT} = 39.6V	0.85	1.0	1.15	mA

Note: Changed items are shaded in yellow

PCN13051 – Current Data Sheet

Electrical Specifications V_{BAT} = 6 to 60V, T_A = -20°C to +60°C, unless otherwise specified. **(Continued)**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN (Note 7)	TYP	MAX (Note 7)	UNIT
V_{REF} Reference Accuracy Test	V_{RACC}	V_{REF} value calculated using stored coefficients. V_{BAT} = 39.6V (See "Voltage Reference Check Calculation" on page 84.)	2.488	2.500	2.512	V
Cell Input Current. Note: Cell accuracy figures assume a fixed 1kΩ resistor is placed in series with each VCn pin (n = 0 to 12)	I_{VCELL}	VC0 input VC0 ≥ 0.5 and VC0 ≤ 4.0V	-1.5	-1	-0.5	µA
		VC0 > 4.0V	-1.75		-0.5	µA
		-40°C to +105°C (Note 9)	-2.0	-1	-0.5	µA
		VC1, VC2, VC3 inputs VCn - VC(n-1) ≥ 0.5 and VCn-VC(n-1) ≤ 4.0V	-2.7	-2	-1.3	µA
		VCn - VC(n-1) > 4.0V	-2.85		-1.0	µA
		-40°C to +105°C (Note 9)	-3.0	-2	-1.0	µA
		VC4 input VCn - VC(n-1) ≥ 0.5 and VCn-VC(n-1) ≤ 4.0V	-0.6	0	0.6	µA
		VCn - VC(n-1) > 4.0V	-0.7		0.7	µA
		-40°C to +105°C (Note 9)	- 0.8	0	0.8	µA
		VC5, VC6, VC7, VC8, VC9, VC10, VC11 inputs VCn - VC(n-1) < 2.6V	0.5	2	2.7	µA
		VCn - VC(n-1) ≥ 2.6V and VCn-VC(n-1) ≤ 4.0V	1.5	2	2.7	µA
		VCn - VC(n-1) > 4.0V	1.5	2	2.85	µA
		-40°C to +105°C (Note 9)	0.5	2	3.0	µA
		VC12 input VC12 - VC11 ≥ 0.5 and VC12-VC11 ≤ 4.0V	0.6	1	1.7	µA
		VC12 - VC11 > 4.0V	0.6		1.75	µA
		-40°C to +105°C (Note 9)	0.6	1	2.0	µA
Cell Balance Output Leakage in Shutdown	I_{CBSD}	EN = GND. V_{BAT} = 39.6V.	-250	10	250	nA
CELL OPEN WIRE DETECTION (See Sections "Scan Wires" on page 25, "ISCN, PIN37, PIN39" on page 33, and "Open Wire Test" on page 47.)						
Open Wire Current	I_{OW}	ISCN bit = 0; V_{BAT} = 39.6V	0.125	0.15	0.175	mA
		ISCN bit = 1; V_{BAT} = 39.6V	0.85	1.0	1.15	mA

Note: Changed items are shaded in yellow