

**ELECTRICAL CHARACTERISTICS** The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at  $T_J = 25^\circ\text{C}$ .  $V_{PWR} = V_{IN\_SNS} = 12\text{V}$ ,  $V_{DD33}$ ,  $V_{DD25}$ , REFP and REFM pins floating, unless otherwise indicated.  $C_{VDD33} = 100\text{nF}$ ,  $C_{VDD25} = 100\text{nF}$  and  $C_{REF} = 100\text{nF}$ . (Note 2)

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS	
<b>Power Supply Characteristics</b>							
$V_{PWR}$	$V_{PWR}$ Supply Input Operating Range		● 4.5		15	V	
$I_{PWR}$	$V_{PWR}$ Supply Current	$4.5\text{V} \leq V_{PWR} \leq 15\text{V}$ , $V_{DD33}$ Floating	●	10	13	mA	
$I_{VDD33}$	$V_{DD33}$ Supply Current	$3.13\text{V} \leq V_{DD33} \leq 3.47\text{V}$ , $V_{PWR} = V_{DD33}$	●	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	$4.5\text{V} \leq V_{PWR} \leq 15\text{V}$	●	3.13	3.26	3.47	V
	Regulator Output Short-Circuit Current	$V_{PWR} = 4.5\text{V}$ , $V_{DD33} = 0\text{V}$	●	75	90	140	mA
$V_{DD25}$	Regulator Output Voltage	$3.13\text{V} \leq V_{DD33} \leq 3.47\text{V}$	●	2.35	2.5	2.6	V
	Regulator Output Short-Circuit Current	$V_{PWR} = V_{DD33} = 3.47\text{V}$ , $V_{DD25} = 0\text{V}$	●	30	55	80	mA
$t_{INIT}$	Initialization Time	Time from $V_{IN}$ Applied Until the $T_{ON\_DELAY}$ Timer Starts		30		ms	
<b>Voltage Reference Characteristics</b>							
$V_{REF}$	Output Voltage (Note 3)	$V_{REF} = V_{REFP} - V_{REFM}$ , $0 < I_{REFP} < 100\mu\text{A}$		1.232		V	
	Temperature Coefficient			3		ppm/ $^\circ\text{C}$	
	Hysteresis	(Note 4)		100		ppm	
<b>ADC Characteristics</b>							
$V_{IN\_ADC}$	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	$0\text{V} \leq V_{IN\_ADC} \leq 6\text{V}$ $Mfr\_config\_adc\_hires = 0$		122		$\mu\text{V}/\text{LSB}$	
	Current Sense Resolution (Odd Numbered Channels Only)	$0\text{mV} \leq  V_{IN\_ADC}  < 16\text{mV}$ (Note 12) $16\text{mV} \leq  V_{IN\_ADC}  < 32\text{mV}$ $32\text{mV} \leq  V_{IN\_ADC}  < 63.9\text{mV}$ $63.9\text{mV} \leq  V_{IN\_ADC}  < 127.9\text{mV}$ $127.9\text{mV} \leq  V_{IN\_ADC} $ $Mfr\_config\_adc\_hires = 1$		15.625 31.25 62.5 125 250		$\mu\text{V}/\text{LSB}$ $\mu\text{V}/\text{LSB}$ $\mu\text{V}/\text{LSB}$ $\mu\text{V}/\text{LSB}$ $\mu\text{V}/\text{LSB}$	
$TUE\_ADC\_VOLT\_SNS$	Total Unadjusted Error (Note 3)	Voltage Sense Mode $V_{IN\_ADC} \geq 1\text{V}$	●		$\pm 0.25$	% of Reading	
		Voltage Sense Mode $0 \leq V_{IN\_ADC} \leq 1\text{V}$	●		$\pm 2.5$	mV	
$TUE\_ADC\_CURR\_SNS$	Total Unadjusted Error (Note 3)	Current Sense Mode, Odd Numbered Channels Only, $20\text{mV} \leq V_{IN\_ADC} \leq 170\text{mV}$	●		$\pm 0.7$	% of Reading	
		Current Sense Mode, Odd Numbered Channels Only, $V_{IN\_ADC} \leq 20\text{mV}$	●		$\pm 140$	$\mu\text{V}$	
$V_{OS\_ADC}$	Offset Error	Current Sense Mode, Odd Numbered Channels Only	●		$\pm 35$	$\mu\text{V}$	
$t_{CONV\_ADC}$	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	

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SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
TUE <sub>VIN_SNS</sub>	VIN_ON, VIN_OFF Threshold Total Unadjusted Error	$3\text{V} \leq V_{VIN\_SNS} \leq 8\text{V}$	●			±2.0	% of Reading
		$V_{VIN\_SNS} > 8\text{V}$	●			±1.0	
	READ_VIN Total Unadjusted Error	$3\text{V} \leq V_{VIN\_SNS} \leq 8\text{V}$	●			±1.5	% of Reading
		$V_{VIN\_SNS} > 8\text{V}$	●			±1.0	
<b>DAC Soft-Connect Comparator Characteristics</b>							
V <sub>OS_CMP</sub>	Offset Voltage	$V_{DACPn} = 0.2\text{V}$	●		±1	±18	mV
		$V_{DACPn} = 1.3\text{V}$	●		±2	±26	mV
		$V_{DACPn} = 2.65\text{V}$	●		±3	±52	mV
<b>Temperature Sensor Characteristics</b>							
TUE <sub>TS</sub>	Total Unadjusted Error				±1		°C
<b>V<sub>OUT_ENABLE</sub> (V<sub>OUT_EN</sub> [3:0]) Characteristics</b>							
V <sub>VOUT_ENn</sub>	Output High Voltage (Note 11)	$I_{VOUT\_ENn} = -5\mu\text{A}$ , $V_{DD33} = 3.3\text{V}$	●	10	12.5	14.7	V
I <sub>VOUT_ENn</sub>	Output Sourcing Current	$V_{VOUT\_ENn}$ Pull-Up Enabled, $V_{VOUT\_ENn} = 1\text{V}$	●	-5	-6	-8	μA
	Output Sinking Current	Strong Pull-Down Enabled, $V_{VOUT\_ENn} = 0.4\text{V}$	●	3	5	8	mA
		Weak Pull-Down Enabled, $V_{VOUT\_ENn} = 0.4\text{V}$	●	<del>33</del>	<del>50</del>	60	μA
	Output Leakage Current	Internal Pull-Up Disabled, $0\text{V} \leq V_{VOUT\_ENn} \leq 15\text{V}$	●			±1	μA
V <sub>VOUT_VALID</sub>	Minimum $V_{DD33}$ when $V_{VOUT\_ENn}$ Valid	$V_{VOUT\_ENn} \leq 0.4\text{V}$	●			1.1	V
<b>V<sub>OUT_ENABLE</sub> (V<sub>OUT_EN</sub> [7:4]) Characteristics</b>							
I <sub>VOUT_ENn</sub>	Output Sinking Current	Strong Pull-Down Enabled, $V_{VOUT\_ENn} = 0.1\text{V}$	●	<del>3</del>	6	<del>9</del>	mA
	Output Leakage Current	$0\text{V} \leq V_{VOUT\_ENn} \leq 6\text{V}$	●			±1	μA
V <sub>VOUT_VALID</sub>	Minimum $V_{DD33}$ when $V_{VOUT\_ENn}$ Valid	$V_{VOUT\_ENn} \leq 0.4\text{V}$	●			1.1	V
<b>V<sub>IN_ENABLE</sub> (V<sub>IN_EN</sub>) Characteristics</b>							
V <sub>VIN_EN</sub>	Output High Voltage	$I_{VIN\_EN} = -5\mu\text{A}$ , $V_{DD33} = 3.3\text{V}$	●	10	12.5	14.7	V
I <sub>VIN_EN</sub>	Output Sourcing Current	$V_{VIN\_EN}$ Pull-Up Enabled, $V_{VIN\_EN} = 1\text{V}$	●	-5	-6	-8	μA
	Output Sinking Current	$V_{VIN\_EN} = 0.4\text{V}$	●	3	5	8	mA
	Leakage Current	Internal Pull-Up Disabled, $0\text{V} \leq V_{VIN\_EN} \leq 15\text{V}$	●			±1	μA
<b>EEPROM Characteristics</b>							
Endurance	(Notes 7, 10)	$0^\circ\text{C} < T_J < 85^\circ\text{C}$ During EEPROM Write Operations	●	10,000			Cycles
Retention	(Notes 7, 10)	$T_J < 105^\circ\text{C}$	●	20			Years
t <sub>MASS_WRITE</sub>	Mass Write Operation Time (Note 8)	STORE_USER_ALL, $0^\circ\text{C} < T_J < 85^\circ\text{C}$ During EEPROM Write Operations	●		440	4100	ms