

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} , REFP and REFM pins floating, unless otherwise indicated. (Notes 2, 3)

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	$4.5\text{V} \leq V_{PWR} \leq 15\text{V}$, 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 TON_DELAY Timer Starts		30		ms	
Voltage Reference Characteristics							
V_{REF}	Output Voltage	(Note 4)		1.232		V	
	Temperature Coefficient			3		ppm/ $^\circ\text{C}$	
	Hysteresis	(Note 5)		100		ppm	
ADC Characteristics							
V_{IN_ADC}	Voltage Sense Input Range	Differential Voltage: $V_{IN_ADC} = (V_{SENSEPN} - V_{SENSEPN})$	●	0	6	V	
		Single-Ended Voltage: $V_{SENSEPN}$	●	-0.1	0.1	V	
	Current Sense Input Range (Odd Numbered Channels Only)	Single-Ended Voltage: $V_{SENSEPN}$, $V_{SENSEPN}$	●	-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 6)		15.625		$\mu\text{V}/\text{LSB}$	
		$16\text{mV} \leq V_{IN_ADC} < 32\text{mV}$		31.25		$\mu\text{V}/\text{LSB}$	
		$32\text{mV} \leq V_{IN_ADC} < 63.9\text{mV}$		62.5		$\mu\text{V}/\text{LSB}$	
		$63.9\text{mV} \leq V_{IN_ADC} < 127.9\text{mV}$		125		$\mu\text{V}/\text{LSB}$	
		$127.9\text{mV} \leq V_{IN_ADC} $		250		$\mu\text{V}/\text{LSB}$	
		$Mfr_config_adc_hires = 1$					
$TUE_ADC_VOLT_SNS$	Total Unadjusted Error (Note 4)	Voltage Sense Mode $V_{IN_ADC} \geq 1\text{V}$	●		± 0.25	% of Reading	
		Voltage Sense Mode $0 \leq V_{IN_ADC} \leq 1\text{V}$	●		± 2.5	mV	
$TUE_ADC_CURR_SNS$	Total Unadjusted Error (Note 4)	Current Sense Mode, Odd Numbered Channels Only, $20\text{mV} \leq V_{IN_ADC} \leq 170\text{mV}$	●		± 0.7	% of Reading	
		Current Sense Mode, Odd Numbered Channels Only, $V_{IN_ADC} \leq 20\text{mV}$	●		± 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 7)		6.15		ms	
		Current Sense Mode (Note 7)		24.6		ms	
		Temperature Input (Note 7)		24.6		ms	

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SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
V_{IN_SNS} Input Characteristics							
V_{IN_SNS}	V_{IN_SNS} Input Voltage Range		●	0		15	V
R_{VIN_SNS}	V_{IN_SNS} Input Resistance		●	70	90	110	k Ω
TUE_{VIN_SNS}	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	% of Reading
	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	% of Reading
Temperature Sensor Characteristics							
TUE_{TS}	Total Unadjusted Error				± 1		$^\circ\text{C}$
V_{OUT_ENn} Output (V_{OUT_EN} [3:0]) Characteristics							
V_{VOUT_ENn}	Output High Voltage (Note 9)	$I_{VOUT_ENn} = -5\mu\text{A}$, $V_{DD33} = 3.3\text{V}$	●	10	12.5	14.7	V
I_{VOUT_ENn}	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, $V_{VOUT_ENn} = 0.4\text{V}$	●	33	50	60	μA
	Output Leakage Current	Internal Pull-Up Disabled, $0\text{V} \leq V_{VOUT_ENn} \leq 15\text{V}$	●			± 1	μA
V_{OUT_ENn} Output (V_{OUT_EN} [7:4]) Characteristics							
I_{VOUT_ENn}	Output Sinking Current	Strong Pull-Down Enabled, $V_{OUT_ENn} = 0.1\text{V}$	✗	✗	6	✗	mA
	Output Leakage Current	$0\text{V} \leq V_{VOUT_ENn} \leq 6\text{V}$	●			± 1	μA
V_{IN_EN} Enable Output (V_{IN_EN}) Characteristics							
V_{VIN_EN}	Output High Voltage	$I_{VIN_EN} = -5\mu\text{A}$, $V_{DD33} = 3.3\text{V}$	●	10	12.5	14.7	V
I_{VIN_EN}	Output Sourcing Current	V_{IN_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
EEPROM Characteristics							
Endurance	(Notes 10, 11)	$0^\circ\text{C} < T_J < 85^\circ\text{C}$ During EEPROM Write Operations	●	10,000			Cycles
Retention	(Notes 10, 11)	$T_J < 105^\circ\text{C}$	●	20			Years
t_{MASS_WRITE}	Mass Write Operation Time (Note 12)	STORE_USER_ALL, $0^\circ\text{C} < T_J < 85^\circ\text{C}$ During EEPROM Write Operations	●		440	4100	ms
General Purpose Pull-Up Resistors							
R_{PU}	Pull-Up Resistance				10		k Ω
Digital Inputs SCL, SDA, CONTROL0, CONTROL1, WDI/RESETB, FAULTB00, FAULTB01, FAULTB10, FAULTB11, WP							
V_{IH}	High Level Input Voltage		●	2.1			V
V_{IL}	Low Level Input Voltage		●			1.5	V
V_{HYST}	Input Hysteresis				20		mV