Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

Document Number: SC900841
Rev. 2.0, 2/2011

RoHS

Ultra-Mobile Platform PMIC

900841

POWER MANAGEMENT

98ASA10841D

11 mm x 11 mm

The 900841 is a high-efficiency, Power Management Integrated Circuit (PMIC), capable of providing all operating voltages for ultra-mobile platforms through its 29 voltage rails. It has nine switching power supplies running at frequencies from 1.0 to 4.0 MHz,17 highly-efficient LDOs and three, 3.3 V power switches. It incorporates a switching mode Li-Ion battery charger, advanced audio path, signaling and backlight LED drivers, 22-channel ADC, real time clock, 8 GPIO, 8 GPO, and 4 GPOSW for specific platform switches control.

The SC900841 is fully configurable and controllable through its SPI and Mini SPI interfaces. Along with companion chip SC900842, it provides an optimized power management solution for ultra-mobile platforms used on Mobile Internet Devices (MID), netbooks, tablets, slates, smart phones and other high-tech portable devices.

Optimum partitioning, high feature integration, and state-of-the-art technology allow Freescale to effectively serve this growing market segment.

ORDERING INFORMATION

Device	Temperature Range (T_A)	Package
SC900841JVK/R2	-40°C to 85°C	338-MAPBGA

Features

- Complete system power management, battery charging and audio support integrated in a single chip
- Advanced audio path
- Fully programmable DC/DC switching, low drop-out regulators, and load switches
- Power path management & switching mode Li-Ion/Li-Polymer battery charger
- LCD backlight and system lighting support
- SPI interface (up to 25 MHz operation)
- 22-channel (32 capable) 10-bit ADC for internal and external sensing with touch screen interface
- Real time clock (RTC)
- 8 Interrupt capable GPIOs and 8 GPOs
- 4 GPOs for controlling platform switches
- I/O interrupt and reset controller

Applications

- Mobile Internet Devices (MID)
- Tablet PC
- Netbooks

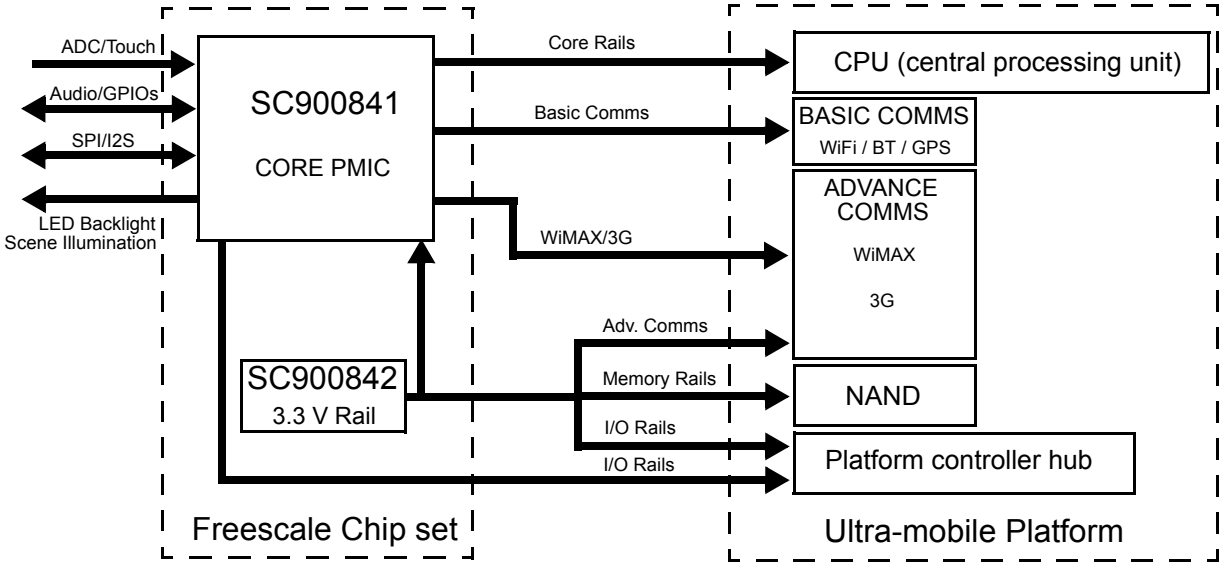

Figure 1. 900841 Simplified Application Diagram

freescale™ semiconductor

ELECTRICAL CHARACTERISTICS

MAXIMUM RATINGS

Table 1. Maximum Ratings

All voltages are with respect to ground, unless otherwise noted. Exceeding these ratings may cause malfunction or permanent damage to the device. The detailed maximum voltage rating per pin can be found in the pin list section.

Ratings	Symbol	Value	Unit
ELECTRICAL RATINGS			
Charger Input Voltage	-	-0.3 to +20	V
LCD Backlight Circuitry Voltage	-	-0.3 to +28	V
Battery Voltage	-	-0.3 to +4.4	V
Coin Cell Voltage	-	-0.3 to +3.6	V
ESD Rating, All Pins, Human Body Model (HBM)[3]	V_{ESDHBM}	±2000	V
ESD Rating, All Pins, Charge Device Model (CDM) [3], [4]	V_{ESDCDM}	±450	V
THERMAL RATINGS			
Ambient Operating Temperature Range	T_A	-40 to +85	°C
Operating Junction Temperature Range	T_J	-30 to +125	°C
Storage Temperature Range	T_{ST}	-65 to +150	°C
Peak Package Reflow Temperature[1], [2]	T_{PPRT}	260	°C

Notes

1. Pin soldering temperature limit is for 10 seconds maximum duration. Not designed for immersion soldering. Exceeding these limits may cause a malfunction or permanent damage to the device.
2. Freescale's Package Reflow capability meets the Pb-free requirements for JEDEC standard J-STD-020C, for Peak Package Reflow Temperature and Moisture Sensitivity Levels (MSL)
3. ESD testing is performed in accordance with the Human Body Model (HBM) (CZAP = 100 pF, RZAP = 1500 Ω), and the Charge Device Model (CDM), Robotic (CZAP = 4.0 pF).
4. All pins meet 500 V CDM except VCOREREF.

POWER DISSIPATION

During operation, the temperature of the die must not exceed the maximum junction temperature. Depending on the operating ambient temperature and the total internal dissipation this limit can be exceeded.

To optimize the thermal management scheme and avoid overheating, the 900841 provides a thermal management system that protects against overheating. This protection should be considered as a fail-safe mechanism, and the application design should initiate thermal shutdown under normal conditions. Reference Thermal Management for more details.

POWER CONSUMPTION

Table 2 defines the maximum power consumption specifications in the various system and device states. For each entry in the table, the component is assumed to be configured for driving purely capacitive loads, and the voltages listed in each entry are nominal output voltages.

Note that the “Soft Mechanical Off” state is a transitional state. The device will spend less than 150 µs in this state before V15 starts to turn on, upon detection of a valid USB device or valid battery.

Table 2. Power Rating

Condition	Description	Logic	Maximum Power Consumption
Hard Mechanical Off	There is no Valid USB device or valid battery connected to SC900841	USBDET = 0 BATDET = 0	0 mW
Soft Mechanical Off	SC900841 has input power from either a USB device or a battery. All VRs are programmed “OFF”	USBDET = 1 BATDET = 0	50 mW
		USBDET = 0 BATDET = 1	5 mW
Power On	SC900841 has input power from either a USB device or a battery. The cold-boot rails are “ON”. V21 = 2.1 V V15 = 1.5 V VAON = 1.2 V VCCPAOAC = 1.05 V VPMIC = 1.8 V All VR outputs are set in PFM or APS mode driving purely capacitive loads.	USBDET = 0 BATDET = 1	100 mW
		USBDET = 1 BATDET = 0	10 mW

STATIC ELECTRICAL CHARACTERISTICS

Table 3. Static Electrical Characteristics

T_A = -40 °C to 85 °C, V_{PWR} = 3.0 to 4.4 V, typical external component values, and full load current range, unless otherwise noted. Typical values are characterized at V_{PWR} = 3.6 V and 25 °C.

Characteristic	Symbol	Min	Typ	Max	Unit
SYSTEM CONTROL INTERFACE					
Input Low Voltage	V_{IL}				V
VYMXGPSEN, VYMXPAEN, VYMX3GEN, SDATA, SCK, CS		0	-	$0.3*V_{PMIC}$	
EXITSTBY, VID[6:0]		0	-	$0.3*V_{CCP}$	
THRMTRIPB, VIDEN[1:0]		0	-	$0.3*V_{CCPAOAC}$	
V33STTS, V3GPASTTS		0	-	$0.3*V_{PMIC}$	
Input High Voltage	V_{IH}				V
VYMXGPSEN, VYMXPAEN, VYMX3GEN, SDATA, SCK, CS		$0.7*V_{PMIC}$	-	V_{PMIC}	
EXITSTBY, VID[6:0]		$0.7*V_{CCP}$	-	V_{CCP}	
THRMTRIPB, VIDEN[1:0]		$0.7*V_{CCPAOAC}$	-	$V_{CCPAOAC}$	
V33STTS, V3GPASTTS		$0.7*V_{PMIC}$	-	V_{PMIC}	
Output Low Voltage PMICINT, VRCOMP, RESETB, PWRGD, V33EN, V3GPAEN	V_{OL}	0	-	0.1	V
Output High Voltage PMICINT, VRCOMP, RESETB, PWRGD, V33EN, V3GPAEN	V_{OH}	V_{PMIC} - 0.1	-	V_{PMIC}	V
SPI INTERFACE LOGIC IO					
Operating Voltage Range (SPIVCC Pin)	V_{SPIVCC}	1.74	1.8	3.1	V
Input High SPICSB, MOSI, SPICLK	-	$0.7*V_{SPIVCC}$	-	V_{SPIVCC} +0.3	V
Input Low SPICSB, MOSI, SPICLK	-	0	-	$0.3*V_{SPIVCC}$	V
Output Low MISO (Output sink 100 µA)	-	0	-	0.1	V
Output High MISO (Output source 100 µA)	-	V_{SPIVCC} -0.1	-	V_{SPIVCC}	V
OSCILLATOR AND CLOCK OUTPUTS MAIN CHARACTERISTICS					
Operating Voltage	-	1.2	-	1.5	V
RTC OSC Consumption Current (RTC Mode: All blocks disabled, no main battery attached, coin cell is attached to COINCELL)	-	-	1.0	2.0	µA
26 MHz OSC Consumption Current	-	-	-	500	µA
Output Low CLK32K & CLK26M (Output sink 100 µA)	-	0	-	0.1	V
Output High CLK32K & CLK26M (Output source 100 µA)	-	V_{SPIVCC} - 0.1	-	V_{SPIVCC}	V
CLK32K & CLK26M Output Duty Cycle	-	40	50	60	%

Table 3. Static Electrical Characteristics

T_A = -40 °C to 85 °C, V_{PWR} = 3.0 to 4.4 V, typical external component values, and full load current range, unless otherwise noted. Typical values are characterized at V_{PWR} = 3.6 V and 25 °C.

Characteristic	Symbol	Min	Typ	Max	Unit
RTC					
Input Voltage Range	-	1.2	-	1.5	V
Consumption Current	-	-	15	25	µA
Crystal OSC Frequency Tolerance	-	-30	-	+30	ppm
Crystal OSC Peak Temperature Frequency (Turn Over Temperature)	-	20	25	30	°C
Crystal OSC Maximum Series Resistance	-	-	80	-	KΩ
Crystal OSC Maximum Drive Level	-	-	0.5	-	µW
Crystal OSC Operating Drive Level	-	0.25	-	0.5	µW
Crystal OSC Nominal Lead Capacitance	-	-	9.0	-	pF
Crystal OSC Aging	-	-	-	3	ppm/ year
COIN CELL CHARGER					
Coin cell Charge Voltage (Selectable through VCOIN[2:0] bits)	$V_{COINCELL}$	2.5	-	3.3	V
Coin cell Charge Voltage Accuracy	-	-100	-	100	mV
Coin cell Charge Current	I_{COIN}	-	60	-	µA
Coin cell Charge Current Accuracy	-	-15	-	15	%
POWER STATES DETECTION THRESHOLDS					
Input Voltage Rising Detection Threshold	$V_{RAWCHGDET}$	-	-	4.50	V
Input Voltage Rising Detection Threshold Hysteresis	$V_{RAWCHGDETHYS}$	-	100	-	mV
Battery Cutoff Threshold (Depending on Battery Model)	V_{BATOFF}	2.2	-	2.4	V
Coin Cell Disconnect Threshold	$V_{COINOFF}$	1.8	-	2.0	V
Low Battery Threshold	V_{LOWBAT}	3.2	-	-	V
Valid Battery Threshold	V_{TRKL}	-	3.0	-	V
VPWR Rising Under-voltage Threshold	V_{PWRUVR}	-	3.1	-	V
VPWR Falling Under-voltage Threshold	V_{PWRUVF}	-	2.55	-	V
VCC ELECTRICAL CHARACTERISTICS					
Input Voltage Range	V_{PWR}	3.0	3.6	4.4	V
Extended Input Voltage Range	V_{PWR}	2.8	3.6	4.7	V
Output Voltage Programmability Range Low Power Mode Active Mode	V_{CC}	 0.3 0.65	 - -	 0.7 1.2	V
Output Voltage Programmability Step Size	-	-	12.5	-	mV
Output Voltage Accuracy 0.6 V < V_{CC} < 12 V, 1.5 A < I_{CC} < 3.5 A 0.6 V < V_{CC} < 12 V, I_{CC} < 1.5 A 0.3 V < V_{CC} < 0.6 V	-	 -5.0 -4.0 -7.0	 - - -	 5.0 4.0 7.0	%
Output Voltage Overshoot Maximum overshoot voltage above VID setting voltage. Maximum overshoot time is 10-30 s, output voltage = 0.9 V at 50 mA	V_{OS}	-	-	50	mV

Table 3. Static Electrical Characteristics

T_A = -40 °C to 85 °C, V_{PWR} = 3.0 to 4.4 V, typical external component values, and full load current range, unless otherwise noted. Typical values are characterized at V_{PWR} = 3.6 V and 25 °C.

Characteristic	Symbol	Min	Typ	Max	Unit
Continuous Output Load Current					A
Low Power mode	I_{CC}	-	-	0.2	
Active Mode		0.2	-	3.5	
Peak Current Limit	I_{LIMCC}	-	5.0	-	A
Output Current Limit Accuracy	-		±15	-	%
Transient Load Change	ΔI_{CC}				A
Low Power Mode		-	-	0.2	
Active Mode		-	-	1.2	
VNN ELECTRICAL CHARACTERISTICS					
Input Voltage Range	V_{PWR}	3.0	3.6	4.4	V
Extended Input Voltage Range	V_{PWR}	2.8	3.6	4.7	V
Output Voltage Programmability Range (Set by VID Control Signals)	V_{NN}	0.65	-	1.2	V
Output Voltage Programmability Step Size	-	-	12.5	-	mV
Output Voltage Accuracy	-	-5.0	-	5.0	%
Output Voltage Overshoot Maximum overshoot voltage above VID setting voltage. Maximum overshoot time is 10 s, output voltage = 0.9 V at 50 mA	V_{OS}	-	-	50	mV
Continuous Output Load Current	I_{NN}				A
Low Power Mode		-	-	0.2	
Active Mode		0.2	-	1.6	
Peak Current Limit	I_{LIMNN}	-	2.5	-	A
Output Current Limit Accuracy	-	-	±20	-	%
Transient Load Change	ΔI_{NN}	-	-	0.5	A
VDDQ ELECTRICAL CHARACTERISTICS					
Input Voltage Range	V_{PWR}	3.0	3.6	4.4	V
Extended Input Voltage Range	V_{PWR}	2.8	3.6	4.7	V
Output Voltage Setting	V_{DDQ}	-	1.8	-	V
Output Voltage Accuracy	-	-5.0	-	5.0	%
Continuous Output Load Current	I_{DDQ}	-	-	1.3	A
Peak Current Limit	I_{LIMDDQ}	-	1.78	-	A
Output Current Limit Accuracy	-				%
0.5 A < I_{DDQ} < 1.3 A		-15	-	+15	
I_{DDQ} < 0.5 A		-20	-	+20	
Transient Load Change	I_{DDQ}	-	-	0.5	A
Effective Quiescent Current Consumption (PWM, No Load)	I_{QDDQ}	-	30	-	µA
V21 ELECTRICAL CHARACTERISTICS					
Input Voltage Range	V_{PWR}	3.0	3.6	4.4	V
Extended Input Voltage Range	V_{PWR}	2.8	3.6	4.7	V
Output Voltage Setting	V_{21}	-	2.1	-	V
Output Voltage Accuracy	-	-5.0	-	5.0	%

Table 3. Static Electrical Characteristics

T_A = -40 °C to 85 °C, V_{PWR} = 3.0 to 4.4 V, typical external component values, and full load current range, unless otherwise noted. Typical values are characterized at V_{PWR} = 3.6 V and 25 °C.

Characteristic	Symbol	Min	Typ	Max	Unit
Continuous Output Load Current	I_{21}	-	-	1.0	A
Peak Current Limit	I_{LIM21}	-	1.42	-	A
Output Current Limit Accuracy	-	-20	-	+20	%
Transient Load Change	I_{21}	-	-	0.5	A
Effective Quiescent Current Consumption (PWM, No Load)	I_{Q21}	-	30	-	µA
V15 ELECTRICAL CHARACTERISTICS					
Input Voltage Range	V_{PWR}	3.0	3.6	4.4	V
Extended Input Voltage Range	V_{PWR}	2.8	3.6	4.7	V
Output Voltage Setting (Also programmable to 1.6 V typical)	V_{15}	-	1.5	-	V
Output Voltage Accuracy	-	-5.0	-	5.0	%
Continuous Output Load Current	I_{15}	0	0.75	1.5	A
Peak Current Limit	I_{LIM15}	-	1.6	-	A
Output Current Limit Accuracy	-	-20	-	+20	%
Transient Load Change	I_{15}	-	-	0.5	A
Effective Quiescent Current Consumption (PWM, No Load)	I_{Q15}	-	30	-	µA
VYMX3G ELECTRICAL CHARACTERISTICS					
Input Voltage Range	V_{PWR}	3.0	3.6	4.4	V
Extended Input Voltage Range	V_{PWR}	2.8	3.6	4.7	V
Output Voltage Setting YMX 3G (Programmable through Mini-SPI)	V_{YMX3G}	 - 0.6	 1.25 -	 - 1.375	V
Output Voltage Accuracy	-	-5.0	-	5.0	%
Output Voltage Ripple (PWM mode)	ΔI_{YMX3G}	-10	-	+10	mV
Continuous Output Load Current	I_{YMX3G}	0	-	0.8	A
Peak Current Limit	$I_{LIMYMX3G}$	-	1.46	-	A
Output Current Limit Accuracy	-	-20	-	+20	%
Transient Load Change	ΔI_{YMX3G}	-	-	0.2	A
Effective Quiescent Current Consumption (PWM, No Load)	I_{QYMX3G}	-	30	-	µA
VYMXPA ELECTRICAL CHARACTERISTICS					
Input Voltage Range	V_{PWR}	3.0	3.6	4.4	V
Extended Input Voltage Range	V_{PWR}	2.8	3.6	4.7	V
Typical Output Voltage Range	V_{OYMXPA}	(Selectable, see Table 37)			V
Output Accuracy	-	-5.0	-	+5.0	%
Output Voltage Ripple	ΔV_{YMXPA}	-10	-	10	mV
Continuous Output Load Current V_{YMXPA} = 4.2 V V_{YMXPA} = 5.0 V	I_{OYMXPA}	 - -	 - -	 0.70 0.50	A
Under-voltage Protection Threshold	$V_{UVYMXPA}$	-	3.7	-	V
Under-voltage Protection Threshold Hysteresis	$V_{UVYMXPAHYS}$	-	0.2	-	V

Table 3. Static Electrical Characteristics

T_A = -40 °C to 85 °C, V_{PWR} = 3.0 to 4.4 V, typical external component values, and full load current range, unless otherwise noted. Typical values are characterized at V_{PWR} = 3.6 V and 25 °C.

Characteristic	Symbol	Min	Typ	Max	Unit
Over-voltage Protection Threshold	$V_{OVYMXPA}$	-	5.75	-	V
Over-voltage Protection Threshold Hysteresis	$V_{OVYMXPAHYS}$	-	0.16	-	V
Over-current limit threshold	$I_{LIMYMXPA}$	-	1.9	-	A
Over-current limit threshold Accuracy	-	-20	-	20	%
Short-circuit Protection Threshold (Measured at the output voltage)	$V_{SCYMXPA}$	-	3.0	-	V
Short-circuit Protection Threshold Accuracy (Measured at the output voltage)	-	-20	-	20	%
Transient Load Change (I_{OYMXPA} from 1.0 to 201 mA)	ΔI_{YMXPA}	-	-	0.2	A
FBYMXPA Leakage Current	$I_{FBYMXPALKG}$	-	0.1	-	µA
YMXPAGTIN Leakage Current	$I_{YMXPAGTINLKG}$	-	-	5.0	µA
YMXPAGT Leakage Current V_{OL}=100 mV, V_{OH}=V_{YMXPA} - 100 mV	$I_{YMXPAGTLKG}$	-25	-	25	µA
Discharge FET Resistance	$R_{DSCHYMXPA}$	-	45	-	Ω
Effective Quiescent Current Consumption (No Load)	I_{QYMXPA}	-	125	-	µA
VOTG ELECTRICAL CHARACTERISTICS					
Input Voltage Range	V_{PWR}	3.0	3.6	4.4	V
Extended Input Voltage Range	V_{PWR}	2.8	3.6	4.7	V
Typical Output Voltage Range	V_{OTG}	-	5.0	-	V
Output Accuracy	-	-4.0	-	+4.0	%
Continuous Output Load Current	I_{OOTG}	0	-	0.35	A
Under-voltage Protection Threshold	V_{UVOTG}	-	4.5	-	V
Under-voltage Protection Threshold Hysteresis	$V_{UVOTGHYS}$	-	0.2	-	V
Over-voltage Protection Threshold	V_{OVOTG}	-	5.76	-	V
Over-voltage Protection Threshold Hysteresis	$V_{OVOTGHYS}$	-	0.16	-	V
Over-current limit threshold	I_{LIMOTG}	-	1.5	-	A
Over-current limit threshold Accuracy	-	-20	-	20	%
Short-circuit Protection Threshold (Measured at the output voltage)	V_{SCOTG}	-	3.5	-	V
Short-circuit Protection Threshold Accuracy (Measured at the output voltage)	-	-20	-	20	%
Transient Load Change (I_{OOTG} from 1.0 mA to 201 mA)	I_{OTG}	-	-	0.2	A
FBOTG Leakage Current	$I_{FBOTGLKG}$	-	0.1	-	µA
OTGGTIN Leakage Current	$I_{OTGGTINLKG}$	-	-	5.0	µA
OTGGT Leakage Current	$I_{OTGGTLKG}$	-25	-	25	µA
Discharge FET Resistance	$R_{DSCHOTG}$	-	100	-	Ω
Effective Quiescent Current Consumption (No Load)	I_{QOTG}	-	100	-	µA

Table 3. Static Electrical Characteristics

T_A = -40 °C to 85 °C, V_{PWR} = 3.0 to 4.4 V, typical external component values, and full load current range, unless otherwise noted. Typical values are characterized at V_{PWR} = 3.6 V and 25 °C.

Characteristic	Symbol	Min	Typ	Max	Unit
VBKLT ELECTRICAL CHARACTERISTICS					
Input Voltage Range	V_{PWR}	3.0	3.6	4.4	V
Extended Input Voltage Range	V_{PWR}	2.8	3.6	4.7	V
Typical Output Voltage Range LCD Backlight Active Only Camera Scene	V_{BKLT}	 6.0 21	 - 22	 23 23	V
Maximum Output Load Current	$I_{BKLTMAX}$	-	-	120	mA
LED Forward Voltage Range	V_F	-	-	4.0	V
Under-voltage Detection Threshold	V_{UVBKLT}	-	20	-	V
Under-voltage Detection Threshold Hysteresis	$V_{UVBKLTHYS}$	-	1.0	-	V
Over-voltage Protection Threshold	V_{OVBKLT}	-	24	-	V
Over-voltage Protection Threshold Hysteresis	$V_{OVBKLTHYS}$	-	1.0	-	V
Over-current limit threshold	$I_{LIMBKLT}$	-	1.9	-	A
Over-current limit threshold Accuracy	-	-20	-	20	%
Short-circuit Protection Threshold (Measured at the output voltage)	V_{SCBKLT}	-	4.0	-	V
Short-circuit Protection Threshold Accuracy (Measured at the output voltage)	-	-20	-	20	%
LED Current Sink Headroom	-	0.4	0.5	0.6	mV
FBBKLT Leakage Current	$I_{FBBKLTLKG}$	-	0.1	-	µA
WLEDx and LEDSCN Leakage Current (VBKLT is disabled and current sink is OFF)	-	-	-	1.0	µA
Effective Quiescent Current Consumption (No Load)	I_{QBKLT}	-	500	-	µA
VBG ELECTRICAL CHARACTERISTICS					
Input Voltage Range	V_{DDQ}	1.71	1.80	1.89	V
Output Voltage Setting	V_{BG}	-	1.25	-	V
Output Voltage Accuracy	-	-2.0	-	2.0	%
Under-voltage Detection Threshold (With respect to the output voltage)	V_{BGUV}	-	-12	-	%
Under-voltage Detection Threshold Hysteresis	V_{BGUVH}	-	1.0	-	%
Continuous Output Load Current Active Mode Low Power Mode	I_{BG}	 - -	 - -	 2.0 40	 mA µA
Current Limit	I_{LIMBG}	-	94	-	mA
Transient Load Change	ΔI_{BG}	-	-	1.0	mA
Power Supply Rejection Ratio (PSRR) (20 to 100 kHz, I_{BG} = 1.5 mA, V_{DDQ} = 1.8 V)	$PSRR_{BG}$	50	60	-	dB
Effective Quiescent Current Consumption Active Mode Low Power Mode	I_{QBG}	 - -	 - -	 18 10	µA

Table 3. Static Electrical Characteristics

T_A = -40 °C to 85 °C, V_{PWR} = 3.0 to 4.4 V, typical external component values, and full load current range, unless otherwise noted. Typical values are characterized at V_{PWR} = 3.6 V and 25 °C.

Characteristic	Symbol	Min	Typ	Max	Unit
VCCA ELECTRICAL CHARACTERISTICS					
Input Voltage Range	V_{DDQ}	1.71	1.80	1.89	V
Output Voltage Setting	V_{CCA}	-	1.5	-	V
Output Voltage Accuracy	-	-2.0	-	2.0	%
Under Voltage Detection Threshold (With respect to the output voltage)	V_{CCAUV}	-	-12	-	%
Under Voltage Detection Threshold Hysteresis	V_{CCAUVH}	-	1.0	-	%
Continuous Output Load Current	I_{CCA}				
Active Mode		-	-	150	mA
Low Power Mode		-	-	3.0	mA
Current Limit	I_{LIMCCA}	-	225	-	mA
Transient Load Change	ΔI_{CCA}	-	-	50	mA
Power Supply Rejection Ratio (PSRR) (20 to 100 kHz, I_{CCA} = 112.5 mA, V_{DDQ} = 1.8 V)	$PSRR_{CCA}$	50	60	-	dB
Effective Quiescent Current Consumption	I_{QCCA}				µA
Active Mode		-	-	18	
Low Power Mode		-	-	10	
VCC180 ELECTRICAL CHARACTERISTICS					
Input Voltage Range	V_{21}	1.995	2.1	2.205	V
Output Voltage Setting	V_{CC180}	-	1.8	-	V
Output Voltage Accuracy	-	-5.0	-	5.0	%
Under-voltage Detection Threshold (With respect to the output voltage)	$V_{CC180UV}$	-	-12	-	%
Under-voltage Detection Threshold Hysteresis	$V_{CC180UVH}$	-	1.0	-	%
Continuous Output Load Current	I_{CC180}				
Active Mode		-	-	390	mA
Low Power Mode		-	-	7.8	mA
Current Limit	$I_{LIMCC180}$	-	585	-	mA
Transient Load Change	ΔI_{CC180}	-	-	350	mA
Power Supply Rejection Ratio (PSRR) (20 to 100 kHz, I_{CC180} = 292.5 mA, V_{21} = 2.1 V)	$PSRR_{CC180}$	50	60	-	dB
Effective Quiescent Current Consumption	I_{QCC180}				µA
Active Mode		-	-	18	
Low Power Mode		-	-	10	
VPNL18 ELECTRICAL CHARACTERISTICS SPECIFICATION					
Input Voltage Range	V_{21}	1.995	2.1	2.205	V
Output Voltage Setting	V_{PNL18}	-	1.8	-	V
Output Voltage Accuracy	-	-5.0	-	5.0	%
Under-voltage Detection Threshold (With respect to the output voltage)	$V_{PNL18UV}$	-	-12	-	%
Under-voltage Detection Threshold Hysteresis	$V_{PNL18UVH}$	-	1.0	-	%

Table 3. Static Electrical Characteristics

T_A = -40 °C to 85 °C, V_{PWR} = 3.0 to 4.4 V, typical external component values, and full load current range, unless otherwise noted. Typical values are characterized at V_{PWR} = 3.6 V and 25 °C.

Characteristic	Symbol	Min	Typ	Max	Unit
Continuous Output Load Current					mA
Active Mode	I_{PNL18}	-	-	210	
Low Power Mode		-	-	4.2	
Current Limit	$I_{LIMPNL18}$	-	315	-	mA
Transient Load Change	ΔI_{PNL18}	-	-	100	mA
Power Supply Rejection Ratio (PSRR) (20 to 100 kHz, I_{PNL18} = 157.5 mA, V_{21} = 2.1 V)	$PSRR_{PNL18}$	50	60	-	dB
Effective Quiescent Current Consumption	I_{QPNL18}				µA
Active Mode		-	-	18	
Low Power Mode		-	-	10	
VPMIC ELECTRICAL CHARACTERISTICS					
Input Voltage Range	V_{21}	1.995	2.1	2.205	V
Output Voltage Setting	V_{PMIC}	-	1.8	-	V
Output Voltage Accuracy	-	-5.0	-	5.0	%
Under-voltage Detection Threshold (With respect to the output voltage)	V_{PMICUV}	-	-12	-	%
Under Voltage Detection Threshold Hysteresis	$V_{PMICUVH}$	-	1.0	-	%
Continuous Output Load Current	I_{PMIC}				mA
Active Mode		-	-	100	
Low Power Mode		-	-	2.0	
Current Limit	$I_{LIMPMIC}$	-	150	-	mA
Transient Load Change	ΔI_{PMIC}	-	-	20	mA
Power Supply Rejection Ratio (PSRR) (20 to 100 kHz, I_{PMIC} = 75 mA, V_{21} = 2.1 V)	$PSRR_{PMIC}$	50	60	-	dB
Effective Quiescent Current Consumption					µA
Active Mode	I_{QPMIC}	-	-	18	
Low Power Mode		-	-	10	
VYMXYFI18 ELECTRICAL CHARACTERISTICS					
Input Voltage Range					V
Supplied by V_{21} DC/DC	V_{21}	1.995	2.1	2.205	
Supplied by V_{PWR}	V_{PWR}	3.0	3.6	4.4	
Output Voltage Setting	$V_{YMXYFI18}$	-	1.8	-	V
Output Voltage Accuracy	-	-5.0	-	5.0	%
Under-voltage Detection Threshold (With respect to the output voltage)	$V_{YMXYFI18UV}$	-	-12	-	%
Under-voltage Detection Threshold Hysteresis	$V_{YMXYFI18UVH}$	-	1.0	-	%
Continuous Output Load Current	$I_{YMXYFI18}$				mA
Active Mode		-	-	200	
Low Power Mode		-	-	4.0	
Current Limit	$I_{LIMYMXYFI18}$	-	300	-	mA
Transient Load Change	$\Delta I_{YMXYFI18}$	-	-	100	mA
Power Supply Rejection Ratio (PSRR) (20 to 100 kHz, $I_{YMXYFI18}$ = 150 mA), (V_{21} = 2.1 V or V_{PWR} = 3.6 V)	$PSRR_{YMXYFI18}$	40	-	-	dB

Table 3. Static Electrical Characteristics

T_A = -40 °C to 85 °C, V_{PWR} = 3.0 to 4.4 V, typical external component values, and full load current range, unless otherwise noted. Typical values are characterized at V_{PWR} = 3.6 V and 25 °C.

Characteristic	Symbol	Min	Typ	Max	Unit
Output Noise (10 Hz to 100 kHz, $I_{YMXYFI18}$ = 200 mA), (V_{21} = 2.1 V or V_{PWR} = 3.6 V)	$V_{NOISEYMXYFI18}$	-	-	40	μV_{RMS}
Effective Quiescent Current Consumption	$I_{QYMXYFI18}$				µA
Active Mode		-	-	18	
Low Power Mode		-	-	10	
VYMXYFI ELECTRICAL CHARACTERISTICS					
Input Voltage Range					V
Supplied by V_{15} DC/DC (WiFiBT Applications)	V_{15}	1.425	1.5	1.575	
Supplied by V_{33} DC/DC (WiMAX Applications)	V_{33}	3.168	3.3	3.432	
Supplied by V_{PWR} (WiMAX Applications)	V_{PWR}	3.0	3.6	4.4	
Output Voltage Setting	V_{YMXYFI}				V
WiFiBT Applications		-	1.2	-	
WiMAX Applications		-	2.5	-	
Output Voltage Accuracy	-	-5.0	-	5.0	%
Under-voltage Detection Threshold (With respect to the output voltage)	$V_{YMXYFIUV}$	-	-12	-	%
Under Voltage Detection Threshold Hysteresis	$V_{YMXYFIUVH}$	-	1.0	-	%
Continuous Output Load Current	I_{YMXYFI}				mA
Active Mode (WiFiBT Applications)		-	-	60	
Active Mode (WiMAX Applications)		-	-	150	
Low Power Mode		-	-	1.2	
Current Limit	$I_{LIMYMXYFI}$	-	225	-	mA
Transient Load Change	ΔI_{YMXYFI}				mA
WiFiBT Applications		-	-	32	
WiMAX Applications		-	-	130	
Power Supply Rejection Ratio (PSRR) (20 kHz, I_{YMXYFI} = 45 mA), (V_{15} = 1.5) (WiFiBT Applications)	$PSRR_{YMXYFI}$	50	60	-	dB
Power Supply Rejection Ratio (PSRR) (100 kHz, I_{YMXYFI} = 112.5 mA), (V_{33} = 3.3 V or V_{PWR} = 3.6 V) (WiMAX Applications)	$PSRR_{YMXYFI}$	40	-	-	dB
Output Noise (10 Hz to 100 kHz, I_{YMXYFI} = 60 mA), (V_{15} = 1.5 V) (WiFiBT Applications)	$V_{NOISEYMXYFI}$	-	-	40	μV_{RMS}
Output Noise (10 Hz to 100 kHz, I_{YMXYFI} = 150 mA), (V_{33} = 3.3 V or V_{PWR} = 3.6 V) (WiMAX Applications)	$V_{NOISEYMXYFI}$	-	-	40	μV_{RMS}
Effective Quiescent Current Consumption	$I_{QYMXYFI}$				µA
Active Mode		-	-	18	
Low Power Mode		-	-	10	

Table 3. Static Electrical Characteristics

T_A = -40 °C to 85 °C, V_{PWR} = 3.0 to 4.4 V, typical external component values, and full load current range, unless otherwise noted. Typical values are characterized at V_{PWR} = 3.6 V and 25 °C.

Characteristic	Symbol	Min	Typ	Max	Unit
VYMXGPS ELECTRICAL CHARACTERISTICS					
Input Voltage Range					V
Supplied by V_{15} DC/DC (WiMAX Applications)	V_{15}	1.52	1.6	1.68	
Supplied by V_{21} DC/DC (GPS Applications)	V_{21}	1.995	2.1	2.205	
Supplied by V_{PWR} (GPS Applications)	V_{PWR}	3.0	3.6	4.4	
Output Voltage Setting	V_{YMXGPS}				V
WiMAX Applications		-	1.3	-	
GPS Applications		-	1.8	-	
Output Voltage Accuracy	-	-5.0	-	5.0	%
Under-voltage Detection Threshold (With respect to the output voltage)	$V_{YMXGPSUV}$	-	-12	-	%
Under-voltage Detection Threshold Hysteresis	$V_{YMXGPSUVH}$	-	1.0	-	%
Continuous Output Load Current	I_{YMXGPS}				mA
Active Mode (WIMAX Applications)		-	-	350	
Active Mode (GPS Applications)		-	-	170	
Low Power Mode		-	-	3.4	
Current Limit	$I_{LIMYMXGPS}$	-	525	-	mA
Transient Load Change	ΔI_{YMXGPS}				mA
WiMAX Applications		-	-	200	
GPS Applications		-	-	130	
Power Supply Rejection Ratio (PSRR) (20 kHz, I_{YMXGPS} = 262.5 mA), (V_{15} = 1.6 V) (WiMAX Applications)	$PSRR_{YMXGPS}$	50	60	-	dB
Power Supply Rejection Ratio (PSRR), (20 to 100 kHz, I_{YMXGPS} = 127.5 mA), (V_{21} = 2.1 V or V_{PWR} = 3.6 V) (GPS Applications)	$PSRR_{YMXGPS}$	40	-	-	dB
Output Noise (10 Hz to 100 kHz, I_{YMXGPS} = 350 mA), (V_{15} = 1.6 V) (WiMAX Applications)	$V_{NOISEYMXGPS}$	-	-	40	μV_{RMS}
Output Noise (10 Hz to 100 kHz, I_{YMXGPS} = 170 mA), (V_{21} = 2.1 V or V_{PWR} = 3.6 V) (GPS Applications)	$V_{NOISEYMXGPS}$	-	-	40	μV_{RMS}
Effective Quiescent Current Consumption	$I_{QYMXGPS}$				µA
Active Mode		-	-	18	
Low Power Mode		-	-	10	
VCCPAOAC ELECTRICAL CHARACTERISTICS					
Input Voltage Range	V_{15}	1.425	1.5	1.680	V
Output Voltage Setting	$V_{CCPAOAC}$	-	1.05	-	V
Output Voltage Accuracy	-	-5.0	-	5.0	%
Under-voltage Detection Threshold (With respect to the output voltage)	$V_{CCPAOACUV}$	-	-12	-	%
Under-voltage Detection Threshold Hysteresis	$V_{CCPAOACUVH}$	-	1.0	-	%
Continuous Output Load Current	$I_{CCPAOAC}$				mA
Active Mode		-	-	155	
Low Power Mode		-	-	3.1	
Current Limit	$I_{LIMCCPAOAC}$	-	232.5	-	mA

Table 3. Static Electrical Characteristics

T_A = -40 °C to 85 °C, V_{PWR} = 3.0 to 4.4 V, typical external component values, and full load current range, unless otherwise noted. Typical values are characterized at V_{PWR} = 3.6 V and 25 °C.

Characteristic	Symbol	Min	Typ	Max	Unit
Transient Load Change	$\Delta I_{CCPAOAC}$	-	-	50	mA
Power Supply Rejection Ratio (PSRR) (20 to 100 kHz, $I_{CCPAOAC}$ = 116 mA, V_{15} = 1.5 V)	$PSRR_{CCPAOAC}$	50	60	-	dB
Effective Quiescent Current Consumption	$I_{QCCPAOAC}$				µA
Active Mode		-	-	18	
Low Power Mode		-	-	10	
VCCPDDR ELECTRICAL CHARACTERISTICS					
Input Voltage Range	V_{15}	1.425	1.5	1.680	V
Output Voltage Setting	V_{CCPDDR}	-	1.05	-	V
Output Voltage Accuracy	-	-2.0	-	2.0	%
Under-voltage Detection Threshold (With respect to the output voltage)	$V_{CCPDDRUV}$	-	-12	-	%
Under-voltage Detection Threshold Hysteresis	$V_{CCPDDRUVH}$	-	1.0	-	%
Continuous Output Load Current	I_{CCPDDR}				mA
Active Mode		-	-	60	
Low Power Mode		-	-	1.2	
Current Limit	$I_{LIMCCPDDR}$	-	90	-	mA
Transient Load Change	ΔI_{CCPDDR}	-	-	10	mA
Power Supply Rejection Ratio (PSRR) (20 to 100 kHz, I_{CCPDDR} = 45 mA, V_{15} = 1.5 V)	$PSRR_{CCPDDR}$	50	60	-	dB
Effective Quiescent Current Consumption	$I_{QCCPDDR}$				µA
Active Mode		-	-	18	
Low Power Mode		-	-	10	
VAON ELECTRICAL CHARACTERISTICS					
Input Voltage Range	V_{15}	1.425	1.5	1.680	V
Output Voltage Setting	V_{AON}	-	1.2	-	V
Output Voltage Accuracy	-	-5.0	-	5.0	%
Under-voltage Detection Threshold (With respect to the output voltage)	V_{AONUV}	-	-12	-	%
Under-voltage Detection Threshold Hysteresis	V_{AONUVH}	-	1.0	-	%
Continuous Output Load Current	I_{AON}				mA
Active Mode		-	-	250	
Low Power Mode		-	-	5	
Current Limit	I_{LIMAON}	-	375	-	mA
Transient Load Change	ΔI_{AON}	-	-	100	mA
Power Supply Rejection Ratio (PSRR) (20 to 100 kHz, I_{AON} = 187.5 mA, V_{15} = 1.5 V)	$PSRR_{AON}$	50	60	-	dB
Effective Quiescent Current Consumption	I_{QAON}				µA
Active Mode		-	-	18	
Low Power Mode		-	-	10	

Table 3. Static Electrical Characteristics

T_A = -40 °C to 85 °C, V_{PWR} = 3.0 to 4.4 V, typical external component values, and full load current range, unless otherwise noted. Typical values are characterized at V_{PWR} = 3.6 V and 25 °C.

Characteristic	Symbol	Min	Typ	Max	Unit
VMM ELECTRICAL CHARACTERISTICS					
Input Voltage Range	V_{15}	1.425	1.5	1.680	V
Output Voltage Setting	V_{MM}	-	1.2	-	V
Output Voltage Accuracy	-	-5.0	-	5.0	%
Under-voltage Detection Threshold (With respect to the output voltage)	V_{MMUV}	-	-12	-	%
Under-voltage Detection Threshold Hysteresis	V_{MMUVH}	-	1.0	-	%
Continuous Output Load Current	I_{MM}				mA
Active Mode		-	-	5.0	
Low Power Mode		-	-	0.1	
Current Limit	I_{LIMMM}	-	25	-	mA
Transient Load Change	ΔI_{MM}	-	-	3.0	mA
Power Supply Rejection Ratio (PSRR) (20 to 100 kHz, I_{MM} = 4.0 mA, V_{15} = 1.5 V)	$PSRR_{MM}$	50	60	-	dB
Effective Quiescent Current Consumption	I_{QMM}				µA
Active Mode		-	-	18	
Low Power Mode		-	-	10	
VCCP ELECTRICAL CHARACTERISTICS					
Input Voltage Range	V_{15}	1.425	1.5	1.680	V
Output Voltage Setting	V_{CCP}	-	1.05	-	V
Output Voltage Accuracy	-	-5	-	5.0	%
Under-voltage Detection Threshold (With respect to the output voltage)	V_{CCPUV}	-	-12	-	%
Under-voltage Detection Threshold Hysteresis	V_{CCPUVH}	-	1.0	-	%
Continuous Output Load Current	I_{CCP}				mA
Active Mode		-	-	445	
Low Power Mode		-	-	8.9	
Current Limit	I_{LIMCCP}	-	667.5	-	mA
Transient Load Change	ΔI_{CCP}	-	-	100	mA
Power Supply Rejection Ratio (PSRR) (20 to 100 kHz, I_{CCP} = 334 mA, V_{15} = 1.5 V)	$PSRR_{CCP}$	50	60	-	dB
Effective Quiescent Current Consumption	I_{QCCP}				µA
Active Mode		-	-	18	
Low Power Mode		-	-	10	
VIMG25 ELECTRICAL CHARACTERISTICS					
Input Voltage Range					V
Supplied by V_{33} DC/DC	V_{33}	3.168	3.3	3.432	
Supplied by V_{PWR}	V_{PWR}	3.0	3.6	4.4	
Output Voltage Setting	V_{IMG25}	-	2.5	-	V
Output Voltage Accuracy	-	-5.0	-	5.0	%
Under-voltage Detection Threshold (With respect to the output voltage)	$V_{IMG25UV}$	-	-12	-	%
Under-voltage Detection Threshold Hysteresis	$V_{IMG25UVH}$	-	1.0	-	%

Table 3. Static Electrical Characteristics

T_A = -40 °C to 85 °C, V_{PWR} = 3.0 to 4.4 V, typical external component values, and full load current range, unless otherwise noted. Typical values are characterized at V_{PWR} = 3.6 V and 25 °C.

Characteristic	Symbol	Min	Typ	Max	Unit
Continuous Output Load Current	I_{IMG25}				mA
Active Mode		-	-	80	
Low Power Mode		-	-	1.6	
Current Limit	$I_{LIMIMG25}$	-	120	-	mA
Transient Load Change	ΔI_{IMG25}	-	-	10	mA
Power Supply Rejection Ratio (PSRR) (20 to 100 kHz, I_{IMG25} = 60 mA, V_{33} = 3.3 V)	$PSRR_{IMG25}$	50	60	-	dB
Effective Quiescent Current Consumption	I_{QIMG25}				µA
Active Mode		-	-	18	
Low Power Mode		-	-	10	
VIMG28 ELECTRICAL CHARACTERISTICS					
Input Voltage Range					V
Supplied by V_{33} DC/DC	V_{33}	3.168	3.3	3.432	
Supplied by V_{PWR}	V_{PWR}	3.0	3.6	4.4	
Output Voltage Setting	V_{IMG28}	(Selectable, see Table 58)			V
Output Voltage Accuracy	-	-5.0	-	5.0	%
Under-voltage Detection Threshold (With respect to the output voltage)	$V_{IMG28UV}$	-	-12	-	%
Under-voltage Detection Threshold Hysteresis	$V_{IMG28UVH}$	-	1.0	-	%
Continuous Output Load Current	I_{IMG28}				mA
Active Mode		-	-	225	
Low Power Mode		-	-	4.5	
Current Limit	$I_{LIMIMG28}$	-	337.5	-	mA
Transient Load Change	ΔI_{IMG28}	-	-	100	mA
Power Supply Rejection Ratio (PSRR) (20 to 100 kHz, I_{IMG28} = 169 mA, V_{33} = 3.3 V)	$PSRR_{IMG28}$	50	60	-	dB
Effective Quiescent Current Consumption	I_{QIMG28}				µA
Active Mode		-	-	18	
Low Power Mode		-	-	10	

Table 3. Static Electrical Characteristics

T_A = -40 °C to 85 °C, V_{PWR} = 3.0 to 4.4 V, typical external component values, and full load current range, unless otherwise noted. Typical values are characterized at V_{PWR} = 3.6 V and 25 °C.

Characteristic	Symbol	Min	Typ	Max	Unit
VVIB ELECTRICAL CHARACTERISTICS					
Input Voltage Range[5]	V_{PWR}	3.0	3.6	4.4	V
Output Voltage Setting	V_{VIB}	(Selectable, see Table 59)			V
Output Voltage Accuracy	-	-5.0	-	5.0	%
Under-voltage Detection Threshold (With respect to the output voltage)	V_{VIBUV}	-	-12	-	%
Under-voltage Detection Threshold Hysteresis	V_{VIBUVH}	-	1	-	%
Continuous Output Load Current	I_{VIB}				mA
Active Mode		-	-	200	
Low Power Mode		-	-	4.0	
Current Limit	I_{LIMVIB}	-	300	-	mA
Transient Load Change	ΔI_{VIB}	-	-	100	mA
Power Supply Rejection Ratio (PSRR) (20 to 100 kHz, I_{VIB} = 150 mA, V_{PWR} = 3.6 V)	$PSRR_{VIB}$	50	60	-	dB
Effective Quiescent Current Consumption	I_{QVIB}				µA
Active Mode		-	-	18	
Low Power Mode		-	-	10	
VSDIO ELECTRICAL CHARACTERISTICS					
Input Voltage Range	V_{33}	3.168	3.3	3.432	V
Output Voltage Setting	V_{SDIO}	(Selectable, see Table 60)			V
Output Voltage Accuracy	-	-5.0	-	5.0	%
Under-voltage Detection Threshold (With respect to the output voltage)	V_{SDIOUV}	-	-12	-	%
Under-voltage Detection Threshold Hysteresis	$V_{SDIOUVH}$	-	1.0	-	%
Continuous Output Load Current	I_{SDIO}				mA
Active Mode		-	-	215	
Low Power Mode		-	-	4.3	
Current Limit	$I_{LIMSDIO}$	-	322.5	-	mA
Transient Load Change	ΔI_{SDIO}	-	-	100	mA
Power Supply Rejection Ratio (PSRR) (20 to 100 kHz, I_{SDIO} = 161 mA, V_{33} = 3.3 V)	$PSRR_{SDIO}$	50	60	-	dB
Effective Quiescent Current Consumption	I_{QSDIO}				µA
Active Mode		-	-	18	
Low Power Mode		-	-	10	

Notes

5. PVINVIB pin has to always be connected to VPWR node, even if the vibrator is not used.

Table 3. Static Electrical Characteristics

T_A = -40 °C to 85 °C, V_{PWR} = 3.0 to 4.4 V, typical external component values, and full load current range, unless otherwise noted. Typical values are characterized at V_{PWR} = 3.6 V and 25 °C.

Characteristic	Symbol	Min	Typ	Max	Unit
POWER SWITCHES ELECTRICAL CHARACTERISTICS					
Input Voltage Range	V_{33}	3.168	3.3	3.432	V
Drop Across Switch with reference to V_{33} VGPS33, VYMXGPS33, and VPNL33	-	-	-	3.0	%
Continuous Output Load Current VPNL33 VGP33 VYMXGPS33	 I_{PNL33} I_{GP33} $I_{YMXGPS33}$	 - - -	 - - -	 100 60 60	mA
LCD BACKLIGHT DRIVERS (WLED) ELECTRICAL CHARACTERISTICS					
Current Sink Capability per string	I_{SINK}	-	-	30	mA
LED Forward Voltage Range	V_F	-	-	4.0	V
LED Current Accuracy (I_{SINK} = 10 mA) T = 25°C	-	-3.0	-	3.0	%
LED Current Matching Accuracy T = 25°C	-	-2.0	-	2.0	%
CAMERA SCENE ILLUMINATION DRIVERS ELECTRICAL CHARACTERISTICS					
Current Sink Capability	I_{SINK}	-	-	30	mA
LED Forward Voltage Range	V_F	-	-	4.0	V
LED Current Accuracy (I_{SINK} = 10 mA) T = 25°C	-	-3.0	-	3.0	%
LED Current Matching Accuracy (When used as backlight 4^{th} string) T = 25°C	-	-2.0	-	2.0	%
SIGNALING/STATUS LED DRIVERS ELECTRICAL CHARACTERISTICS					
LED Absolute Current Tolerance	-	-	0	15	%
LED Current Sink capability (Selectable)	-	0	-	28	mA
LED Current Matching Within Banks (With Respect to Average Current in the Bank, V_{DRIVER} = 400 mV, I_{LED} = 20 mA)	-	-	-	5.0	%
LED Channel Off Current (LED Disabled)	-	-	0	1.0	µA
Quiescent Consumption (Duty Cycle set to 000000, Current Levels set to 00)	-	-	10	-	µA
LED Current Sink Headroom	-	0.3	0.4	-	mV
Driver Pin Voltage Range	-	0	-	6.0	V
POWER PATH MANAGER PLUS LI-ION CHARGER ELECTRICAL CHARACTERISTICS					
Input voltage Range (Normal Operation)	V_{RAWCHG}	4.75	5.00	5.25	V
Input Voltage Rising Detection Threshold	$V_{RAWCHGDET}$	-	-	4.5	V
Input Voltage Rising Detection Threshold Hysteresis	$V_{RAWCHGDETHYS}$	-	100	-	mV
Input Over-voltage Protection Threshold	$V_{RAWCHOVP}$	5.50	5.75	6.00	V
Input Over-voltage Protection Threshold Hysteresis	$V_{RAWCHOVPHYS}$	-	75	-	mV

Table 3. Static Electrical Characteristics

T_A = -40 °C to 85 °C, V_{PWR} = 3.0 to 4.4 V, typical external component values, and full load current range, unless otherwise noted. Typical values are characterized at V_{PWR} = 3.6 V and 25 °C.

Characteristic	Symbol	Min	Typ	Max	Unit
V_{PWR} Output Voltage Range $V_{BAT} < V_{TRKL}$	V_{PWR}	- -	 4.2	 -	V
V_{PWR} Output Voltage Range 100% Duty-cycle mode	V_{PWR}	- -	 -	 4.7	V
Constant Charge Voltage (V_{CHRGCV}) Accuracy Initial Accuracy at 25°C -20°C to 70°C -40°C to 85°C	-	 -0.2 -0.8 -1.0	 - - -	 +0.2 +0.8 +1.0	%
Battery Charge Voltage	V_{CHGCV}	Selectable, CHRGCV Register on Table 79			V
Battery Charge Voltage Over-voltage Threshold (V_{CHGCV} + Setting)	$V_{OVRVOLT}$	Selectable, see CHRGPROT Register on Table 79			mV
Maximum Continuous Input Average Current	-	Selectable, see CHRGPROT Register on Table 79			mA
Maximum Continuous Input Average Current Accuracy	-	-5.0	-	5.0	%
Trickle Charge Threshold Voltage	V_{TRKL}	-	3.0	-	V
Trickle Charge Threshold Accuracy	-	-3.0	-	+3.0	%
Constant Charge Current Range	I_{CHGCC}	Selectable, see CHRGCNTL Register on Table 79			mA
Discharge Current Over-current Threshold	I_{BATOC}	Selectable, see BATOCP Register on Table 67			A
Constant Charge Current Accuracy I_{CC} < 400 mA I_{CC} > 400 mA	-	 -15 -10	 - -	 +15 +10	%
Trickle Charge Current Value	I_{TRKL}	Selectable, see Table 81			mA
Trickle Charge Current Accuracy	-	-30	-	+30	%
EOC Detect Threshold	$I_{CHGCOMP}$	Selectable, see CHRGCNTL Register on Table 79			mA
EOC Detect Threshold Accuracy	-	-12	-	+12	%
Discharge Indication Threshold (Used to turn on M_{CHGBYP})	$V_{BAT} - V_{PWR}$	100	-	-	mV
NTC Bias Voltage	V_{NTC}	-	V_{CORE}	-	V
NTC Low Temperature Threshold (As a ratio of V_{NTC}, 3500 B factor) During Charging (0°C) During Discharging (-10°C)	V_{COLD}	 - -	 0.746 0.825	 - -	 - -
NTC Low Temperature Hysteresis	$V_{COLDHYS}$	-	0.06	-	-
NTC High Temperature Threshold (As a ratio of V_{NTC}, 3500 B factor) During Charging (45°C) During Discharging (60°C)	V_{HOT}	 - -	 0.324 0.227	 - -	 - -
NTC High Temperature Hysteresis	V_{HOTHYS}	-	0.06	-	-

Table 3. Static Electrical Characteristics

T_A = -40 °C to 85 °C, V_{PWR} = 3.0 to 4.4 V, typical external component values, and full load current range, unless otherwise noted. Typical values are characterized at V_{PWR} = 3.6 V and 25 °C.

Characteristic	Symbol	Min	Typ	Max	Unit
ADC ELECTRICAL CHARACTERISTICS					
Conversion Current	-	-	-	1.2	mA
OFF Supply Current	-	-	-	1.0	µA
Converter Reference Voltage	-	-	2.4	-	V
Integral Nonlinearity (Rs = 5.0 kΩ maximum) (6)	-	-	-	±3.0	LSB
Differential Nonlinearity (Rs = 5.0 kΩ maximum) (6)	-	-	-	±1.0	LSB
Zero Scale Error (Offset) (Rs = 5.0 kΩ maximum) (6)	-	-	-	10	LSB
Full Scale Error (Gain) (Rs = 5.0 kΩ maximum) (6), (10)	-	-	-	11	LSB
Drift Over Temperature				±2.0	LSB
Source Impedance					
No Bypass Capacitor at Input	-	-	-	5.0	kΩ
Bypass Capacitor at Input of (10 nF)	-	-	-	30	kΩ
Input Buffer Input Range(7)	-	0.02	-	2.4	V
BATTERY CURRENT READING					
Amplifier (8) Gain	-	19	20	21	-
Amplifier Offset	-	-2.0	-	2.0	mV
Sense Resistor	-	-	20	-	mΩ
BATTERY THERMISTOR INTERFACE TARGET					
Thermistor Input Range	-	2.0	-	100	k
Internal Current Source	-	-	20	-	µA
Absolute Resistance Measurement Inaccuracy Over Temperature	-	-	10	-	%
Battery Removal Detection Threshold (9)	-	-	31/32* V_{NTC}	-	V
COULOMB COUNTER					
Sense Resistor R_{CC}	-	-	20	-	mΩ
Sense Current though R_{CC}	-	+/-1.0	-	+/-3000	mA
Quiescent Current Consumption	-	-	10	20	µA
Resolution (1LSB Increment in CCOUT with ONEC=1)	-	-	366.2	-	µC

Notes
6. Rs represents a possible external series resistor between the voltage source and the ADIN input.
7. Refer to Table 96 for analog valid input range and input buffer range characteristics for each ADC Channel
8. Amplifier bias current accounted for in overall ADC current drain
9. This is equivalent to a 10 kΩ pull-up and a 10 kΩ thermistor at -35°C
10. At room temperature

Table 3. Static Electrical Characteristics

T_A = -40 °C to 85 °C, V_{PWR} = 3.0 to 4.4 V, typical external component values, and full load current range, unless otherwise noted. Typical values are characterized at V_{PWR} = 3.6 V and 25 °C.

Characteristic	Symbol	Min	Typ	Max	Unit
GPIOS ELECTRICAL CHARACTERISTICS					
GPIO Voltage Level (This is wired externally though GPIOVCC pin)	$V_{GPIOVCC}$	-	1.8V, 2.5V, 3.3V	-	V
GPOSW Voltage Level (This is wired externally though GPOSWVCC pin)	$V_{GPOSWVCC}$	-	V_{BAT}	-	V
GPO Voltage Level (This is wired externally though GPOVCC pin)	V_{GPOVCC}	-	1.8V, 2.5V, 3.3V	-	V
Accuracy for GPIOVCC, GPOVCC	-	-5.0	-	5.0	%
GPIO Output Drive Capability	-	-	20	-	Ω
GPOSW Typical Drive Capacitance	Look at the Si8407DB PFET as an example for maximum drive capability				
Input Low Voltage	V_{IL}	0	-	0.3*V_{CC}	V
Input High Voltage	V_{IH}	0.7*V_{CC}	-	V_{CC}	V
Output Low Voltage (V_{CC} = V_{CC_MIN}, I_{OL} = 4.0 mA)	V_{OL}	-	-	0.1	V
Output High Voltage (V_{CC} = V_{CC_MIN}, I_{OH} = -4.0 mA)	V_{OL}	V_{CC}-0.1	-	-	V

DYNAMIC ELECTRICAL CHARACTERISTICS

Table 4. Dynamic Electrical Characteristics

T_A = -40 °C to 85 °C, V_{PWR} = 3.0 to 4.4 V, typical external component values, and full load current range, unless otherwise noted. Typical values are characterized at V_{PWR} = 3.6 V and 25 °C.

Characteristic	Symbol	Min	Typ	Max	Unit
SPI INTERFACE TIMING AND LOGIC IO					
Time SPICSB has to be low before the first rising edge of SPICLK	t_{SELSU}	20	-	-	ns
Time SPICSB has to remain low after the last falling edge of SPICLK	t_{SELHLD}	20	-	-	ns
Time SPICSB has to remain high between two transfers	$t_{SELHIGH}$	20	-	-	ns
Clock period of SPICLK (Equivalent to a maximum clock frequency of 25 MHz)	t_{CLKPER}	40	-	-	ns
Part of the clock period where SPICLK has to remain high	$t_{CLKHIGH}$	18	-	-	ns
Part of the clock period where SPICLK has to remain low	t_{CLKLOW}	18	-	-	ns
Time MOSI has to be stable before the next falling edge of SPICLK	t_{WRTSU}	5.0	-	-	ns
Time MOSI has to remain stable after the falling edge of SPICLK	t_{WRTHLD}	5.0	-	-	ns
Time MISO will be stable before the next falling edge of SPICLK	t_{RDSU}	5.0	-	-	ns
Time MISO will remain stable after the falling edge of SPICLK	t_{RDHLD}	5.0	-	-	ns
Time MISO needs to become active after the falling edge of SPICSB	t_{RDEN}	Refer to Figure 5 for more details			
Time MISO needs to become inactive after the rising edge of SPICSB	t_{RDDIS}	5.0	-	-	ns
VIDEN/VID TIMING SPECIFICATION					
VIDEN/VID Debounce time	t_{DB}	100	-	400	ns
VIDEN Invalid State Hold Time	t_{HOLD}	1.0	-	-	µs
OSCILLATOR AND CLOCK OUTPUTS MAIN CHARACTERISTICS					
RTC OSC Startup Time (Upon Application of Power)	-	-	-	500	ms
26 MHz OSC Startup Time	-	-	-	1.0	ms
RTC					
RTC Clock Frequency, Crystal OSC Nominal Frequency	-	-	32.768	-	KHz
VCC ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{CC}/t	-	-	1	A/ns
Soft Start Time (Enable to output voltage ramp up from 0 to 1.0 V (25 mV/s))	t_{SSCC}	-	-	0.06	ms
Turn Off Time (OFF to output voltage ramp down to 0 V)	t_{CCOFF}	-	-	1	ms
DAC Slew Rate	-	-	25	-	mV/µs
Switching Frequency	f_{SW}	-	1.0	-	MHz
VNN ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{NN}/t	-	-	1.0	A/ns
Soft Start Time (Enable to output voltage ramp up from 0 V to 1.0 V (25 mV/s))	t_{SSNN}	-	-	0.06	ms
Turn Off Time (OFF to output voltage ramp down to 0 V)	t_{NNOFF}	-	-	1.0	ms
DAC Slew Rate	-	-	25	-	mV/µs
Switching Frequency	f_{SW}	-	1.0	-	MHz

Table 4. Dynamic Electrical Characteristics

T_A = -40 °C to 85 °C, V_{PWR} = 3.0 to 4.4 V, typical external component values, and full load current range, unless otherwise noted. Typical values are characterized at V_{PWR} = 3.6 V and 25 °C.

Characteristic	Symbol	Min	Typ	Max	Unit
VDDQ ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{DDQ}/t	-	-	1.0	A/µs
Soft Start Time (Enable to output voltage ramp up from 0 to 1.8 V)	t_{SSDDQ}	-	-	200	µs
Turn Off Time (OFF to output voltage ramp down to 0 V)	t_{DDQOFF}	-	-	1.0	ms
Switching Frequency	f_{SW}	-	4.0	-	MHz
V21 ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{21}/t	-	-	0.1	A/µs
Soft Start Time (Enable to output voltage ramp up from 0 V to 2.1 V)	t_{SS21}	-	-	84	µs
Turn Off Time (OFF to output voltage ramp down to 0 V)	t_{21OFF}	-	-	1.0	ms
Switching Frequency	f_{SW}	-	4.0	-	MHz
V15 ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{15}/t	-	-	0.1	A/µs
Soft Start Time (Enable to output voltage ramp up from 0 to 2.1 V)	t_{SS15}	-	-	100	µs
Turn Off Time (OFF to output voltage ramp down to 0 V)	t_{15OFF}	-	-	1.0	ms
Switching Frequency	f_{SW}	-	4.0	-	MHz
VYMX3G ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{YMX3G}/t	-	-	0.1	A/µs
Soft Start Time (Enable to output voltage ramp up from 0 to 2.1 V)	$t_{SSYMX3G}$	-	-	0.5	ms
Turn Off Time (OFF to output voltage ramp down to 0 V)	$t_{YMX3GOFF}$	-	-	1.0	ms
Transition Time (3G mode), VOUT delta = ±0.3 V with 100 mA load current	$t_{YMX3GTRAN}$	-	-	100	µs
Switching Frequency	f_{SW}	-	4.0	-	MHz
VYMXPA ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{YMXPA}/t	-	-	0.03	A/µs
Soft Start Time	$t_{SSYMXPA}$				ms
No Load		-	0.5	-	
Full Load		-	2.0	-	
Turn Off Time	$t_{YMXPAOFF}$	-	1.0	-	ms
Switching Frequency	$f_{SWYMXPA}$	-	2.0	-	MHz
VOTG ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{OTG}/t	-	-	0.03	A/µs
Soft Start Time	t_{SSOTG}				ms
No Load		-	0.5	-	
Full Load		-	2.0	-	
Turn Off Time	t_{OTGOFF}	-	1.0	-	ms
Switching Frequency	f_{SWOTG}	-	2.0	-	MHz
VBKLT ELECTRICAL CHARACTERISTICS					
Soft Start Time	t_{SSBKLT}	-	2.0	-	ms
Switching Frequency	f_{SWBKLT}	-	2.0	-	MHz

Table 4. Dynamic Electrical Characteristics

T_A = -40 °C to 85 °C, V_{PWR} = 3.0 to 4.4 V, typical external component values, and full load current range, unless otherwise noted. Typical values are characterized at V_{PWR} = 3.6 V and 25 °C.

Characteristic	Symbol	Min	Typ	Max	Unit
VBG ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{BG}/t	-	-	0.001	A/µs
Soft Start Time (Enable to output voltage ramp up from 0 to 1.0 V)	t_{SSBG}	-	-	20	µs
Turn Off Time (OFF to output voltage ramp down to 0 V)	t_{BGOFF}	-	-	5.0	ms
VCCA ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{CCA}/t	-	-	0.01	A/µs
Soft Start Time (Enable to output voltage ramp up from 0 to 1.5 V)	t_{SSCCA}	-	-	30	µs
Turn Off Time (OFF to output voltage ramp down to 0 V)	t_{CCAOFF}	-	-	5.0	ms
VCC180 ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{CC180}/t	-	-	1	A/µs
Soft Start Time (Enable to output voltage ramp up from 0 to 1.8 V)	$t_{SSCC180}$	-	-	30	µs
Turn Off Time (OFF to output voltage ramp down to 0 V)	$t_{CC180OFF}$	-	-	5.0	ms
VPNL18 ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{PNL18}/t	-	-	0.1	A/µs
Soft Start Time (Enable to output voltage ramp up from 0 to 1.8 V)	$t_{SSPNL18}$	-	-	140	µs
Turn Off Time (OFF to output voltage ramp down to 0 V)	$t_{PNL18OFF}$	-	-	5.0	ms
VPMIC ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{PMIC}/t	-	-	0.01	A/µs
Soft Start Time (Enable to output voltage ramp up from 0 to 1.8 V)	t_{SSPMIC}	-	-	700	µs
Turn Off Time (OFF to output voltage ramp down to 0 V)	$t_{PMICOFF}$	-	-	5.0	ms
VYMXYFI18 ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	$I_{YMXYFI18}/t$	-	-	0.1	A/µs
Soft Start Time (Enable to output voltage ramp up from 0 to 1.8 V)	$t_{SSYMXYFI18}$	-	-	200	µs
Turn Off Time (OFF to output voltage ramp down to 0 V)	$t_{YMXYFI18OFF}$	-	-	5.0	ms
VYMXYFI ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{YMXYFI}/t	-	-	0.01	A/µs
Soft Start Time (Enable to output voltage ramp up from 0 to 1.0 V for WiFiBT applications and 0 to 1.8 V for WiMAX applications) WiFiBT Applications WiMAX Applications	$t_{SSYMXYFI}$	 - -	 - -	 20 35	µs
Turn Off Time (OFF to output voltage ramp down to 0 V)	$t_{YMXYFIOFF}$	-	-	5.0	ms
VYMXGPS ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{YMXGPS}/t	-	-	0.01	A/µs
Soft Start Time (Enable to output voltage ramp up from 0 to 1.0 V for WiMAX applications and 0 to 1.8 V for GPS applications) WiMAX Applications GPS Applications	$t_{SSYMXGPS}$	 - -	 - -	 15 15	µs
Turn Off Time (OFF to output voltage ramp down to 0 V)	$t_{YMXYFIGPSOFF}$	-	-	5.0	ms

Table 4. Dynamic Electrical Characteristics

T_A = -40 °C to 85 °C, V_{PWR} = 3.0 to 4.4 V, typical external component values, and full load current range, unless otherwise noted. Typical values are characterized at V_{PWR} = 3.6 V and 25 °C.

Characteristic	Symbol	Min	Typ	Max	Unit
VCCPAOAC ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	$I_{CCPAOAC}/t$	-	-	0.1	A/µs
Soft Start Time (Enable to output voltage ramp up from 0 to 1.0 V)	$t_{SSCCPAOAC}$	-	-	30	µs
Turn Off Time (OFF to output voltage ramp down to 0 V)	$t_{CCPAOACOFF}$	-	-	5.0	ms
VCCPDDR ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{CCPDDR}/t	-	-	0.1	A/µs
Soft Start Time (Enable to output voltage ramp up from 0 to 1.0 V)	$t_{SSCCPDDR}$	-	-	35	µs
Turn Off Time (OFF to output voltage ramp down to 0 V)	$t_{CCPDDROFF}$	-	-	5.0	ms
VAON ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{AON}/t	-	-	0.1	A/µs
Soft Start Time (Enable to output voltage ramp up from 0 to 1.0 V)	t_{SSAON}	-	-	25	µs
Turn Off Time (OFF to output voltage ramp down to 0 V)	t_{AONOFF}	-	-	5.0	ms
VMM ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{MM}/t	-	-	0.01	A/µs
Soft Start Time (Enable to output voltage ramp up from 0 to 1.2 V)	t_{SSMM}	-	-	125	µs
Turn Off Time (OFF to output voltage ramp down to 0 V)	t_{MMOFF}	-	-	5.0	ms
VCCP ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{CCP}/t	-	-	0.1	A/µs
Soft Start Time (Enable to output voltage ramp up from 0 to 1.0 V)	t_{SSCCP}	-	-	26	µs
Turn Off Time (OFF to output voltage ramp down to 0 V)	t_{CCPOFF}	-	-	5.0	ms
VIMG25 ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{IMG25}/t	-	-	0.01	A/µs
Soft Start Time (Enable to output voltage ramp up from 0 to 2.5 V)	$t_{SSIMG25}$	-	-	200	µs
Turn Off Time (OFF to output voltage ramp down to 0 V)	$t_{IMG25OFF}$	-	-	5.0	ms
VIMG28 ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{IMG28}/t	-	-	0.1	A/µs
Soft Start Time (Enable to output voltage ramp up from 0 to 2.9 V)	$t_{SSIMG28}$	-	-	200	µs
Turn Off Time (OFF to output voltage ramp down to 0 V)	$t_{IMG28OFF}$	-	-	5.0	ms
VVIB ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{VIB}/t	-	-	0.1	A/µs
Soft Start Time (Enable to output voltage ramp up from 0 to 2.7 V)	t_{SSVIB}	-	-	200	µs
Turn Off Time (OFF to output voltage ramp down to 0 V)	t_{VIBOFF}	-	-	5.0	ms
VSDIO ELECTRICAL CHARACTERISTICS					
Transient Load Speed of Change	I_{SDIO}/t	-	-	0.01	A/µs
Soft Start Time (Enable to output voltage ramp up from 0 to 1.8 V)	t_{SSSDIO}	-	-	100	µs
Turn Off Time (OFF to output voltage ramp down to 0 V)	$t_{SDIOOFF}$	-	-	5.0	ms