Preliminary Data

EVALUATION KIT AVAILABLE

µPMIC for Microprocessors or DSPs in Portable Equipment

General Description

The MAX8620Y micro-power-management integrated circuit (µPMIC) powers low-voltage microprocessors or DSPs in portable devices. The µPMIC includes a high-efficiency step-down DC-DC converter, two low-dropout linear regulators (LDOs), a microprocessor reset output, and power-on/off control logic. This device maintains high efficiency at light loads with a low 115µA supply current, and its miniature TDFN package makes it ideal for portable devices.

The MAX8620Y's step-down DC-DC converter utilizes a proprietary 4MHz hysteretic-PWM control scheme that allows for ultra-small external components. Internal synchronous rectification improves efficiency and eliminates the external Schottky diode that is required in conventional step-down converters. The output voltage is adjustable from 0.6V to 3.3V, with guaranteed output current up to 500mA.

The MAX8620Y's two LDOs offer low 45µV_{RMS} output noise and a low dropout of only 200mV at 200mA. Each LDO delivers at least 300mA of continuous output current. The output voltages are pin selectable from 1.8V to 3.3V for flexibility.

A microprocessor reset output ($\overline{RESET}$) monitors OUT1 and warns the system of impending power loss allowing safe shutdown. $\overline{RESET}$ asserts during power-up, power-down, shutdown, and fault conditions where V_{OUT1} is below its regulation voltage.

Applications

Cellular Handsets

Smart Phones/PDA Phones

PDAs

Wireless LAN

Microprocessor and DSP Solutions including MSM™, XScale™, ARM™, and OMAP™

Pin Configuration appears at end of data sheet.

MSM is a trademark of QUALCOMM, Inc.
XScale is a trademark of Intel Corp.
ARM is a trademark of ARM Limited.
OMAP is a trademark of Texas Instruments, Inc.

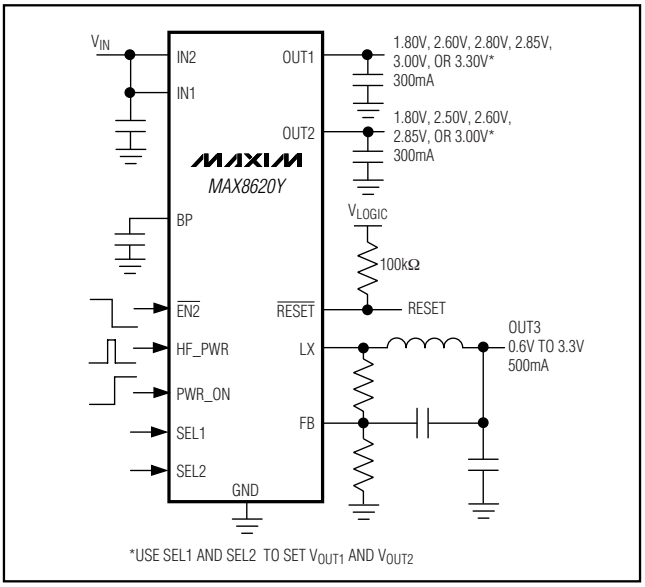
Features

- **Three Regulators and a Reset in One Package**
- **High-Efficiency Step-Down Converter**
  - **Up to 4MHz Fixed Switching Frequency**
  - **500mA Guaranteed Output Current**
  - **0.6V to 3.3V Adjustable Output Voltage**
  - **±2% Initial Accuracy**
  - **Fast Voltage-Positioning Transient Response**
  - **Internal Synchronous Rectifier**
- **Two 300mA LDO Regulators**
  - **200mV Dropout at 200mA Load**
  - **Low 45µV_{RMS} Output Noise**
  - **3% Accuracy over Line, Load, and Temperature**
  - **Overcurrent Protection**
  - **Nine Pin-Selectable Output-Voltage Settings**
- **30ms (min) $\overline{RESET}$ Output Flag**
- **2.7V to 5.5V Input**
- **115µA (typ) Supply Current at No Load**
- **Thermal-Overload Protection**
- **Tiny 3mm x 3mm x 0.8mm TDFN Package**

Ordering Information

PART	TEMP RANGE	PIN-PACKAGE	TOP MARK
MAX8620YETD	-40°C to +85°C	14 TDFN-EP (T1433-2)	AAB

Typical Operating Circuit



µPMIC for Microprocessors or DSPs in Portable Equipment

ABSOLUTE MAXIMUM RATINGS

IN1, IN2, PWR_ON, $\overline{RESET}$, $\overline{EN2}$, SEL1, SEL2, HF_PWR, FB, BP to GND .....-0.3V to +6.0V
OUT1, OUT2 to GND .....-0.3V to (V_{IN1} + 0.3V)
LX Current .....1.5A_{RMS}
Continuous Power Dissipation (T_A = +70°C)
14-Pin TDFN (derate 18.2mW/°C above +70°C) 1454mW
Operating Temperature Range .....-40°C to +85°C
Junction Temperature.....+150°C
Storage Temperature Range.....-65°C to +150°C
Lead Temperature (soldering, 10s).....+300°C

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

(V_{IN1} = V_{IN2} = +3.7V, C_{IN} = 10µF, C_{BP} = 0.01µF, T_A = -40°C to +85°C, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 1)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Supply Voltage Range	V_{IN1}			2.7		5.5	V
Shutdown Supply Current	I_{SHDN}	V_{IN1} = V_{IN2} = 4.2V, PWR_ON = HF_PWR = GND			5.5	10	µA
Supply Current	I_{IN1} + I_{IN2}	All outputs enabled, no load			115	140	µA
		V_{OUT1} = V_{OUT3} = 1.8V, I_{OUT1} = I_{OUT3} = 500µA, OUT2 disabled			430		
UNDERVOLTAGE LOCKOUT							
UVLO Threshold	V_{UVLO}	V_{IN1} = V_{IN2} rising		2.70	2.85	3.05	V
		V_{IN1} = V_{IN2} falling			2.35		
THERMAL PROTECTION							
Thermal-Shutdown Threshold		Temperature rising			+160		°C
Thermal-Shutdown Hysteresis					15		°C
REFERENCE (BP)							
Reference Bypass Output Voltage	V_{BP}	0 ≤ I_{BP} ≤ 1µA		1.231	1.250	1.269	V
LOGIC AND CONTROL INPUTS (PWR_ON, HF_PWR, $\overline{EN2}$)							
PWR_ON, HF_PWR, $\overline{EN2}$ Input Low Voltage	V_{IL}	V_{IN1} = V_{IN2} = 2.7V to 4.2V (Note 2)				0.4	V
PWR_ON, HF_PWR, $\overline{EN2}$ Input High Voltage	V_{IH}	V_{IN1} = V_{IN2} = 2.7V to 4.2V (Note 2)		1.44			V
Input Bias Current	I_{INB}	V_{PWR_ON} = V_{HF_PWR} = $V_{\overline{EN2}}$ = 0V or 5.5V		-1		+1	µA
HF_PWR Timer	t_{HF}	From the rising edge of HF_PWR until the one-shot timer expires (Figure 4)		1.05	1.31	1.46	s
LINEAR REGULATORS (OUT1, OUT2)							
OUT1, OUT2 Output-Voltage Accuracy	V_{OUT1}, V_{OUT2}	I_{LOAD} = 1mA, 3.7V ≤ V_{IN} ≤ 5.5V	0°C to +85°C	-1.3		+1.8	%
			-40°C to +85°C	-1.5		+1.8	
		1mA ≤ I_{LOAD} ≤ 300mA			-1.2		
		I_{LOAD} = 150mA			0		
OUT1, OUT2 Output Current	$I_{OUT\_}$			300			mA
OUT1, OUT2 Output Current Limit	$I_{LIM\_}$	$V_{OUT\_}$ = 0V		310	550	940	mA
OUT1, OUT2 Dropout Voltage	V_{DO}	I_{LOAD} = 200mA, T_A = +85°C (Note 3)			200	380	mV

ELECTRICAL CHARACTERISTICS (continued)

(V_{IN1} = V_{IN2} = +3.7V, C_{IN} = 10µF, C_{BP} = 0.01µF, T_A = -40°C to +85°C, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 1)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
OUT1, OUT2 Power-Supply Rejection Ratio		f = 10Hz to 10kHz, $C_{OUT\_}$ = 4.7µF, $I_{LOAD\_}$ = 30mA			60		dB
Output Noise Voltage		f = 100Hz to 100kHz, $C_{OUT\_}$ = 4.7µF, $I_{LOAD\_}$ = 30mA			45		μV_{RMS}
		f = 100Hz to 100kHz, $C_{OUT\_}$ = 4.7µF, $I_{LOAD\_}$ = 30mA, C_{BP} open			100		
STEP-DOWN CONVERTER (OUT3)							
Output Voltage Range	V_{OUT3}			0.6		3.3	V
FB Threshold Voltage	V_{TH}	V_{FB} falling			0.6		V
FB Threshold Line Regulation		V_{IN1} = V_{IN2} = 2.7V to 5.5V (Note 2)			0.08		%/V
FB Threshold Voltage Accuracy (Falling) (% of V_{TH})		I_{OUT3} = 0mA	T_A = +25°C	-2		+2	%
			T_A = -40°C to +85°C	-3		+3	
FB Threshold Voltage Hysteresis (% of V_{TH})	V_{HYS}				2		%
FB Bias Current	I_{FB}	OUT3 disabled			10		µA
		V_{FB} = 0.5V			10		
Current Limit	I_{LIM3P}	pFET switch		675	950	1200	mA
	I_{LIM3N}	nFET rectifier		875	1000	1200	
On-Resistance	R_{ONP}	pFET switch, I_{LX} = -200mA			0.65	1.5	Ω
	R_{ONN}	nFET rectifier, I_{LX} = +200mA			0.35	0.8	
Rectifier-Off Current Threshold	I_{LXOFF}				30	60	mA
Minimum On- and Off-Times	t_{ON}				107		ns
	t_{OFF}				95		
OPEN-DRAIN, ACTIVE-LOW RESET OUTPUT ($\overline{RESET}$)							
$\overline{RESET}$ Output-Voltage Low	V_{OL}	I_{SINK} = 500µA				0.3	V
$\overline{RESET}$ Output Leakage Current		$V_{\overline{RESET}}$ = 5.5V				100	nA
$\overline{RESET}$ Threshold Voltage	V_{THR}	Percent of the OUT1 regulation voltage (Note 4)		84	87	90	%
$\overline{RESET}$ Timeout Period	t_{RP}	Figure 4		30	60		ms
LDO OUTPUT-VOLTAGE SELECT INPUTS (SEL1, SEL2)							
SEL_ Input Low Threshold						1	V
SEL_ Input High Threshold				$V_{IN\_}$ - 0.2V			V
SEL_ Input Bias Current		V_{IN1} = V_{IN2} = 4.2V, V_{SEL1} = 0V or V_{IN1}, V_{SEL2} = 0V or V_{IN1}			±0.1		µA

Note 1: Specifications are 100% production tested at T_A = +25°C. Maximum and minimum limits over temperature are guaranteed by design and characterization.

Note 2: After startup.

Note 3: Guaranteed by design.

Note 4: $\overline{RESET}$ asserts low when V_{OUT1} drops below the specified percent of the OUT1 regulation voltage.