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

MP2637

2.5A Single Cell Switch Mode Battery Charger with Power Path Management (PPM) and 2.4A Boost Current with Trickle Timer

The Future of Analog IC Technology

DESCRIPTION

The MP2637 is a highly-integrated, flexible, switch-mode battery charger with system power path management, designed for single-cell Li-ion or Li-Polymer batteries used in a wide range of applications.

The MP2637 can operate in both charge mode and boost mode to allow full system and battery power management.

When input power is present, the device operates in charge mode. It automatically detects the battery voltage and charges the battery in three phases: trickle current, constant current and constant voltage. Other features include charge termination and auto-recharge. This device also integrates both input current limit and input voltage regulation in order to manage input power and meet the priority of the system power demand.

In the absence of an input source, the MP2637 switches to boost mode through the MODE pin to power the SYS pins from the battery. The OLIM pin programs the output current limit in boost mode. The MP2637 also allows for output short circuit protection to completely disconnect the battery from the load in the event of a short circuit fault. Normal operation will recover as soon as the short circuit fault is removed. The MP2637 provides full operating status indication to distinguish charge mode from boost mode.

To guarantee safe operation, the MP2637 limits the die temperature to a preset value of 120°C. Other safety features include input over-voltage protection, battery over-voltage protection, thermal shutdown, battery temperature monitoring, and a programmable timer to prevent prolonged charging of a dead battery.

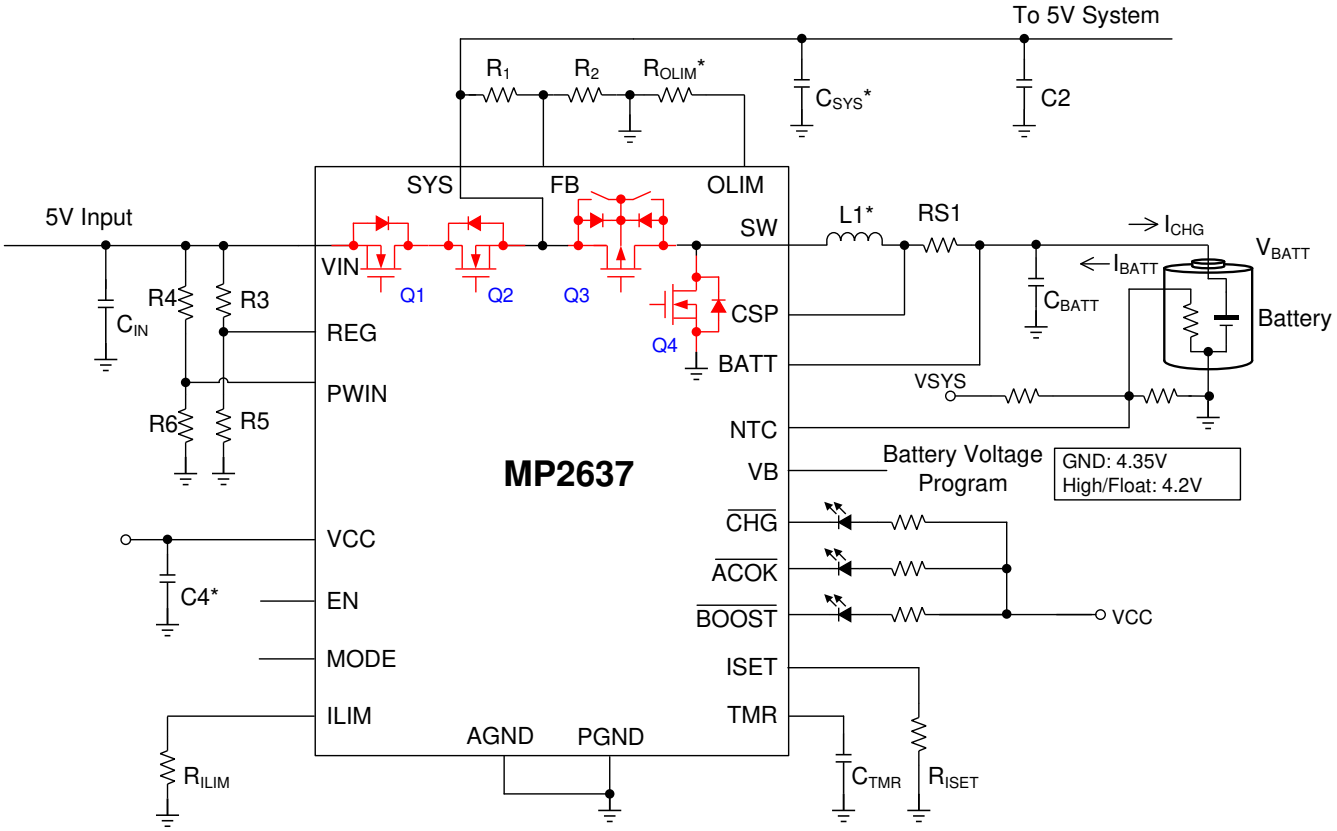
FEATURES

- Up to 16V Sustainable Input Voltage
- 4.5V-to-6V Operating Input Voltage Range
- Power Management function, Integrated Input-Current Limit, Input Voltage Regulation
- Up to 2.5A Programmable Charge Current
- Trickle-Charge Function
- Selectable 4.2V/ 4.35V Charge Voltage with 0.5% Accuracy
- Negative Temperature Coefficient Pin for Battery Temperature Monitoring
- Programmable Timer Back-Up Protection
- Thermal Regulation and Thermal Shutdown
- Internal Battery Reverse Leakage Blocking
- Integrated Over Voltage Protection and Over Current Protection for Pass-Through Path
- Reverse Boost Operation Mode for System Power
- Up to 2.4A Programmable Output Current Limit for Boost Mode
- Integrated Short Circuit Protection and Output Over Voltage Protection for Boost Mode

APPLICATIONS

- Sub-Battery Applications
- Power-Bank Applications for Smart-Phone Tablet and Other Portable Devices

TYPICAL APPLICATION



***Note:**

1. R_{OLIM} **CANNOT** be lower than 47.5kΩ. R_{OLIM} is for the boost output current loop setting, and please refer to the **APPLICATION INFORMATION** section for details.
2. C_{SYS} should be put as close to the SYS pin and PGND as possible. At least 22μF is recommended, and C_{SYS}+C2 should not be less than 44μF, the ceramic is preferred and E-cap is not recommended.
3. VCC cap should not exceed 100nF. Recommend 47nF or 100nF.
4. Inductor should not exceed 2.2μH. Recommend 1.5μH or 2.2μH.

Table 1: Operation Mode

Power Source		MODE	EN	Operating Mode	$\overline{ACOK}$	Q1,Q2	Q3	Q4
VIN	PWIN							
V_{IN}> V_{BATT}+300mV	0.8V<PWIN<1.15V	X	Low	Only Pass Through Mode	Low	On	Off	Off
			High	Charging Mode		On	SW	SW
X	PWIN<0.8V or PWIN >1.15V	High	X	Boost Discharge Mode	High	Off	SW	SW
V_{IN} <V_{BATT}+300mV	X							
X	PWIN<0.8V or PWIN >1.15V	Low	X	SYS Force-off Mode	High	Off	Off	Off
V_{IN}<2V	X	Low	X	Sleep Mode	High	Off	Off	Off

X=Don't Care.

On = Fully Turn On

Off = Fully Off

SW = Switching

ORDERING INFORMATION

Part Number*	Package	Top Marking
MP2637GR	QFN-24 (4mm×4mm)	See Below

* For Tape & Reel, add suffix –Z (e.g. MP2637GR–Z);

TOP MARKING

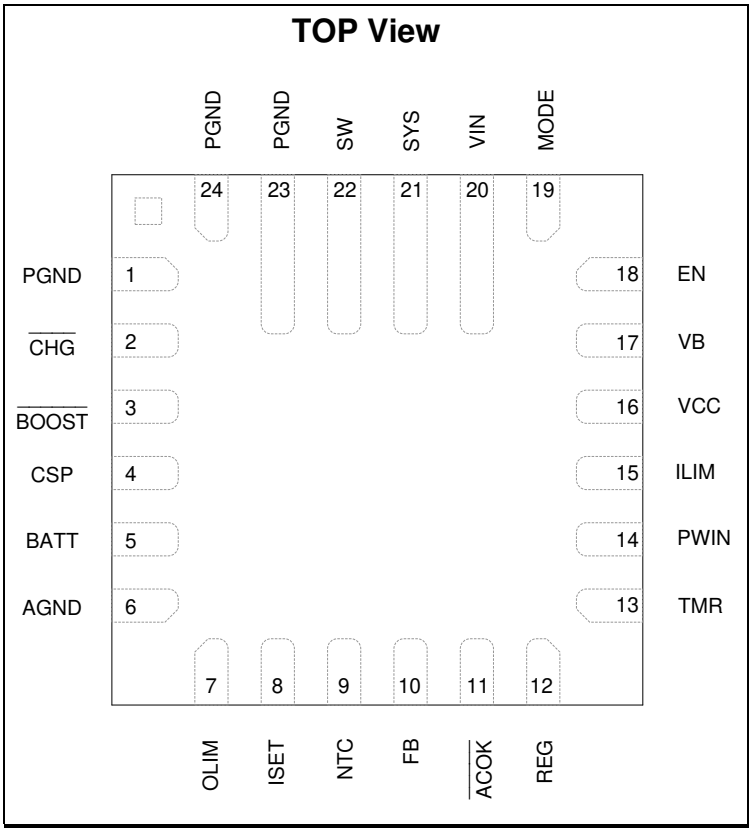
MPSYWW

MP2637

LLLLLL

MPS: MPS prefix;
Y: year code;
WW: week code:
MP2637: first six digits of the part number;
LLLLLL: lot number;

PACKAGE REFERENCE



ABSOLUTE MAXIMUM RATINGS (1)

VIN .....–0.3V to 20V
SYS.....–0.3V to 6.5V
SW…….. .....
–0.3V (-2V for <20ns) to 6.5V (8.5V for <20ns)
BATT.....–0.3V to 6.5V
ACOK, CHG, BOOST .....–0.3V to 6.5V
All Other Pins .....–0.3V to 6.5V
Junction Temperature .....150°C
Lead Temperature .....260°C
Continuous Power Dissipation (T_A = +25°C) **(2)**
..... 2.97W
Junction Temperature .....150°C
Storage Temperature..... –65°C to +150°C

Recommended Operating Conditions (3)

Supply Voltage V_{VIN}.....4.5V to 6V
Battery Voltage V_{BATT} .....2.5V to 4.35V
Operating Junction Temp. (T_J).−40°C to +125°C

Thermal Resistance (4) θ_{JA} θ_{JC}

QFN-24 (4mm×4mm)	42	9	°C/W

Notes:

1) Exceeding these ratings may damage the device.
2) The maximum allowable power dissipation is a function of the maximum junction temperature T_J (MAX), the junction-to-ambient thermal resistance θ_{JA}, and the ambient temperature T_A. The maximum allowable continuous power dissipation at any ambient temperature is calculated by P_D (MAX) = (T_J (MAX)-T_A)/θ_{JA}. Exceeding the maximum allowable power dissipation will cause excessive die temperature, and the regulator will go into thermal shutdown. Internal thermal shutdown circuitry protects the device from permanent damage.
3) The device is not guaranteed to function outside of its operating conditions.
4) Measured on JESD51-7, 4-layer PCB.

ELECTRICAL CHARACTERISTICS

V_{IN} = 5.0V, T_A = 25°C, unless otherwise noted.

Parameter	Symbol	Condition	Min	Typ	Max	Units
IN to SYS NMOS ON Resistance	$R_{IN\ to\ SYS}$	VCC=5V,		65		mΩ
High-side PMOS ON Resistance	R_{H_DS}	VCC=5V,		30		mΩ
Low-side NMOS ON Resistance	R_{L_DS}	VCC=5V,		30		mΩ
High-Side PMOS Peak Current Limit	I_{PEAK_HS}	CC Charge Mode/ Boost Mode		6.5		A
		TC Charge Mode		3.2		A
Low-Side NMOS Peak Current Limit	I_{PEAK_LS}			6.3		A
Switching Frequency*	f_{sw}		490	600	700	kHz
VCC UVLO	V_{CC_UVLO}		2	2.2	2.4	V
VCC UVLO Hysteresis				100		mV
PWIN Lower Threshold	V_{PWIN_L}		0.75	0.8	0.85	V
Lower Threshold Hysteresis				50		mV
PWIN Upper Threshold	V_{PWIN_H}		1.1	1.15	1.2	V
Upper Threshold Hysteresis				50		mV
Charge Mode						
Input Quiescent Current	I_{IN}	EN = 5V, Battery Float			2.5	mA
		EN = 0			1.5	mA
Input Current Limit	I_{IN_LIMIT}	R_{ILIM} = 100k	400	450	500	mA
		R_{ILIM} = 56k	720	810	900	
		R_{ILIM} = 16.5k	2400	2700	3000	
Input Over-Current Threshold	$I_{IN(OCP)}$			4.2		A
Input Over-Current Blanking Time(5)	$T_{INOCBLK}$			120		µs
Input Over-Current Recover Time(5)	$T_{INRECVR}$			100		ms
Terminal Battery Voltage	V_{BATT_FULL}	Connect VB to GND	4.328	4.35	4.372	V
		Leave VB floating or connect to logic HIGH	4.179	4.2	4.221	
Recharge Threshold	V_{RECH}	Connect to VB to GND	4.09	4.15	4.21	V
		Leave VB floating or connect to logic HIGH	3.95	4.01	4.07	
Recharge Threshold Hysteresis				200		mV
Battery Over Voltage Threshold		As percentage of the V_{BATT_FULL}		103.3%		V_{BATT_FULL}
Constant Charge (CC) Current	I_{CC}	RS1 = 20mΩ, R_{ISET} = 120k	850	1000	1150	mA
		RS1 = 20mΩ, R_{ISET} = 60.4k	1725	1987	2250	
		RS1 = 20mΩ, R_{ISET} = 47.5k	2225	2525	2825	
Trickle Charge Current	I_{TC}		125	250		mA

* Reserve 1200kHz Option

ELECTRICAL CHARACTERISTICS *(continued)*

V_{IN} = 5.0V, T_A = 25°C, unless otherwise noted.

Parameter	Symbol	Condition	Min	Typ	Max	Units
Trickle Charge Voltage Threshold	V_{BATT_TC}	Connect to VB to GND	3.0	3.1	3.2	V
		Leave VB floating or connect to high logic	2.9	3	3.1	
Trickle Charge Hysteresis				200		mV
Termination Charge Current	I_{BF}	RS1 = 20mΩ, R_{ISET}=60.4k	2.5%	10%	17.5%	I_{CC}
		RS1 = 20mΩ, R_{ISET}=47.5k	2.5%	10%	17.5%	I_{CC}
Input-Voltage-Regulation Reference	V_{REG}		1.18	1.2	1.22	V
Boost Mode						
SYS Voltage Range			4.2		6	V
Feedback Voltage			1.18	1.2	1.22	V
Feedback Input Current		V_{FB}=1V			200	nA
Boost SYS Over-Voltage Protection Threshold	$V_{SYS(OVP)}$	Threshold over V_{SYS} to turn off the converter during boost mode	5.6	5.75	5.9	V
SYS Over Voltage Protection Threshold Hysteresis		V_{SYS} falling from $V_{SYS(OVP)}$		125		mV
Boost Quiescent Current		I_{SYS} = 0, MODE = 5V			1.4	mA
Programmable Boost Output Current Limit Accuracy	I_{OLIM}	RS1 = 20mΩ, R_{OLIM} = 57.6k	1.875	2.083	2.290	A
		RS1 = 20mΩ, R_{OLIM} = 51k	2.1			
SYS Over-Current Blanking Time[5]	$\tau_{SYSOCBLK}$			120		µs
SYS Over-Current Recover Time[5]	$\tau_{SYSRECVR}$			1		ms
Weak-Battery Threshold	$V_{BATT(LOW)}$	During boosting		2.5		V
		Before Boost starts		2.9	3.05	V
Sleep Mode						
Battery Leakage Current	$I_{LEAKAGE}$	V_{BATT} = 4.2V, SYS Float, V_{IN} = 0V, MODE = 0V		15	30	µA
Indication and Logic						
$\overline{ACOK}$, $\overline{CHG}$, $\overline{BOOST}$ pin output low voltage		Sinking 1.5mA			400	mV
$\overline{ACOK}$, $\overline{CHG}$, $\overline{BOOST}$ pin leakage current		Connected to 5V			1	µA
NTC and Time-out Fault Blinking Frequency[5]		C_{TMR} = 0.1µF, I_{CHG} = 1A		12.5		Hz
EN Input Logic Low Voltage					0.4	V
EN Input High Voltage			1.4			V
Mode Input Logic Low Voltage					0.4	V
Mode Input Logic High Voltage			1.4			V

ELECTRICAL CHARACTERISTICS *(continued)*

V_{IN} = 5.0V, T_A = 25°C, unless otherwise noted.

Parameter	Symbol	Condition	Min	Typ	Max	Units
Protection						
Trickle Charge Time		C_{TMR}=0.1µF, remains in TC Mode, I_{TC}= 100mA test mode		26		Min
Total Charge Time		C_{TMR}=0.1µF, I_{CHG}= 1A		336		Min
NTC Low Temp, Rising Threshold		R_{NTC}=NCP18XH103(0ºC)	65.6%	66.6%	67.6%	V_{SYS}
NTC Low Temp, Rising Threshold Hysteresis				1%		
NTC High Temp, Rising Threshold		R_{NTC}=NCP18XH103(50ºC)	34%	35%	36%	
NTC High Temp, Rising Threshold Hysteresis				1%		
Charging Current Foldback Threshold(5)		Charge Mode		120		°C
Thermal Shutdown Threshold(5)				150		°C

Notes:

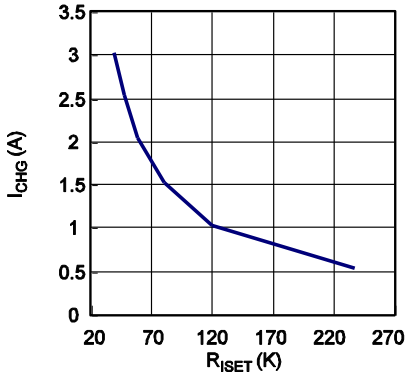
5) Guaranteed by design.

TYPICAL CHARACTERISTICS

C_{IN} = C_{BATT} = C_{SYS} = C2 = 22µF, L1 = 2.2µH, RS1 = 20mΩ, C4 = C_{TMR} = 0.1µF, Battery Simulator, unless otherwise noted.

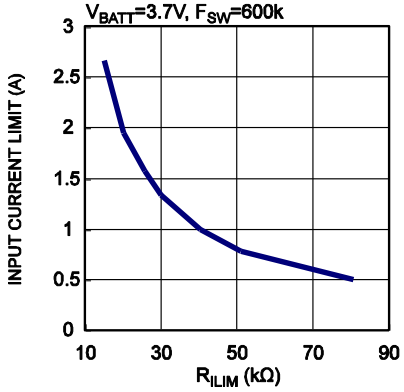
Programmable Charge Current, Charge Mode

V_{IN}=5V, V_{BATT_FULL}=4.2V, V_{BATT}=3.7V, F_{SW}=600k



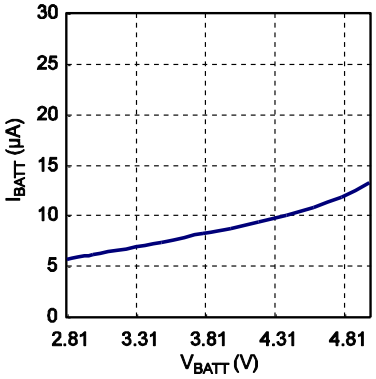
Programmable Input Current Limit, Charge Mode

V_{IN}=5V, V_{BATT_FULL}=4.2V, V_{BATT}=3.7V, F_{SW}=600k



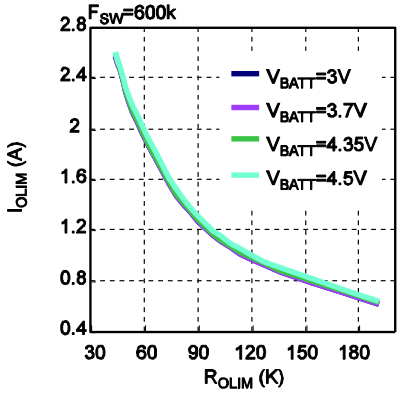
Battery Leakage Current, Sleep Mode

MODE=low

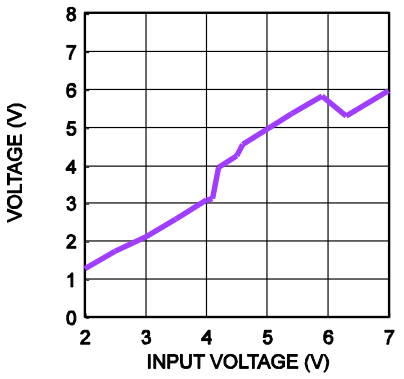


Programmable Output Current Limit, Boost Mode

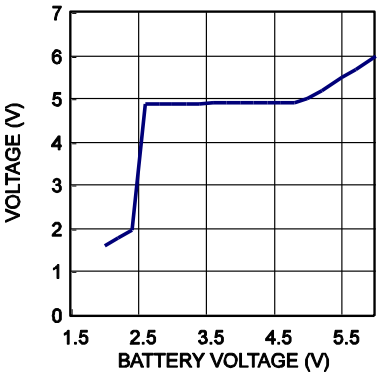
F_{SW}=600k



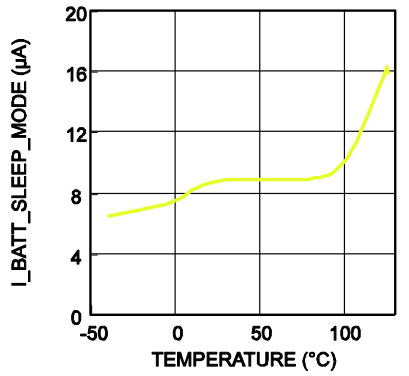
VCC @ Charge Mode



VCC @ Boost Mode

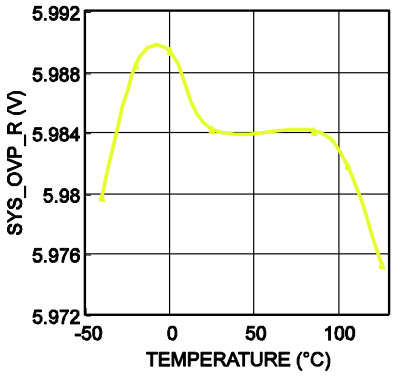


Battery Current in Sleep Mode vs. Temperature



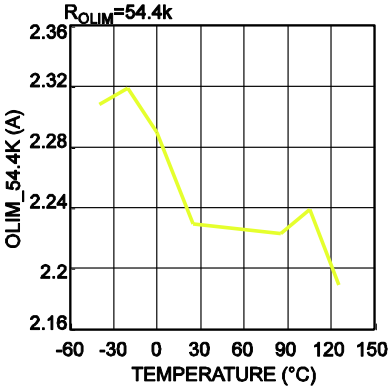
SYS_OVP vs. Temperature

SYS_OVP=6V



Output Current Limit 2.2A vs. Temperature

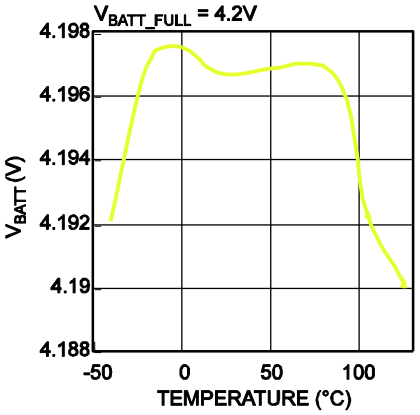
R_{OLIM}=54.4k



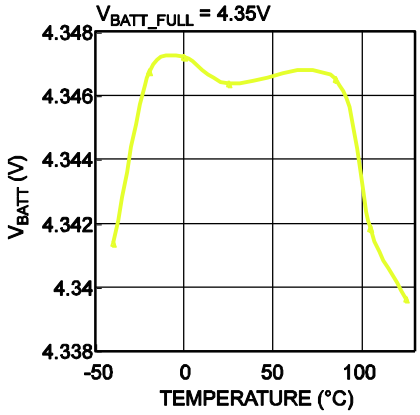
TYPICAL CHARACTERISTICS *(continued)*

C_{IN} = C_{BATT} = C_{SYS} = C2 = 22µF, L1 = 2.2µH, RS1 = 20mΩ, C4 = C_{TMR} = 0.1µF, Battery Simulator, unless otherwise noted.

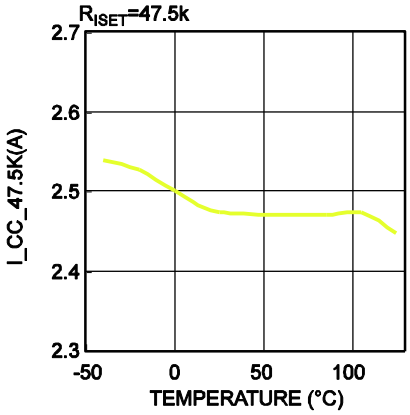
Battery Full Voltage vs. Temperature



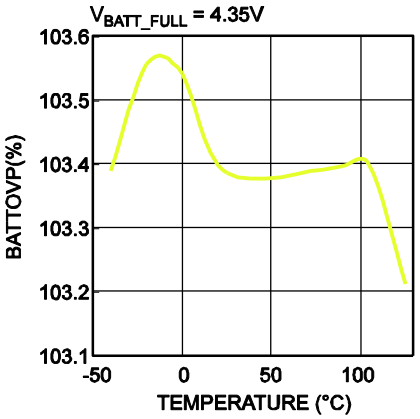
Battery Full Voltage vs. Temperature



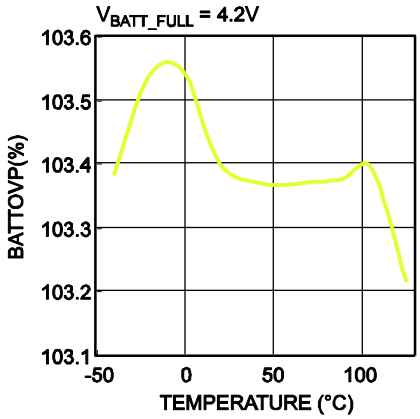
CC Chagre Current vs. Temperature



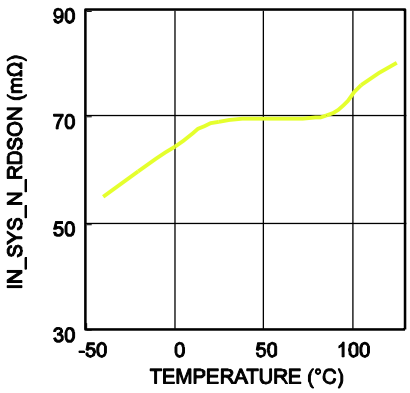
Battery OVP Threshold vs.Temperature



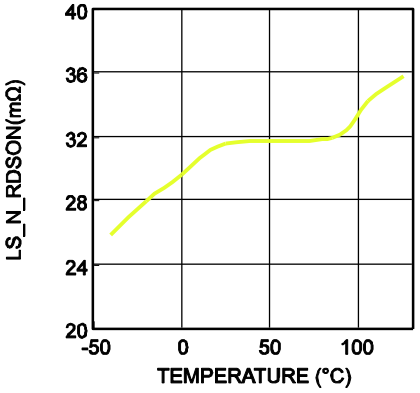
Battery OVP Threshold vs.Temperature



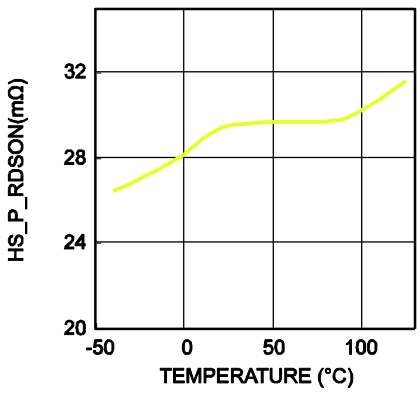
IN_SYS_N_Rdson vs. Temperature



LS_Rdson vs. Temperature



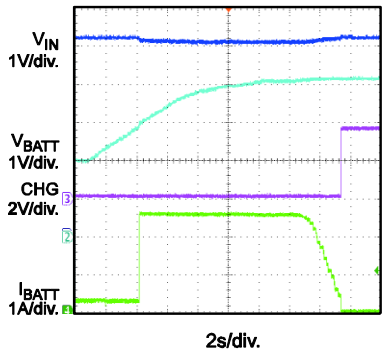
HS_Rdson vs. Temperature



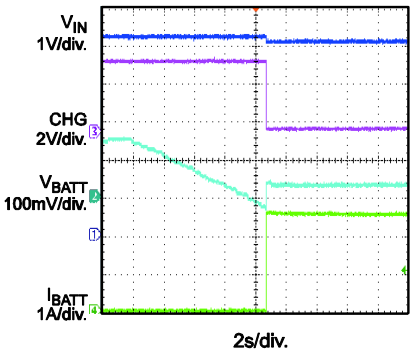
TYPICAL PERFORMANCE CHARACTERISTICS

For Charge Mode: V_{IN} = 5V, I_{CHG} = 2.5A, L_{IN_LIM} = 2.7A, I_{SYS} = 0A
For Boost Mode: V_{BATT} = 3.7V, V_{SYS_SET} = 5V, I_{OLIM} = 2.1A
C_{IN} = C_{BATT} = C_{SYS} = C2 = 22µF, L1 = 2.2µH, RS1 = 20mΩ, C4 = C_{TMR} = 0.1µF, Battery Simulator, unless otherwise noted.

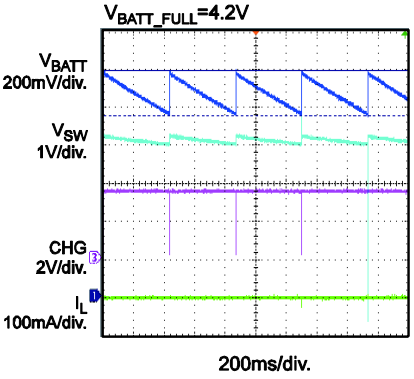
Battery Charge Curve
V_{BATT_FULL}=4.2V



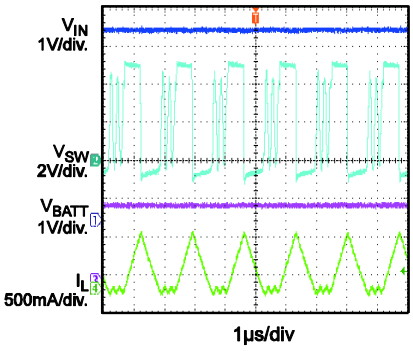
Auto Recharge
V_{BATT_FULL}=4.2V



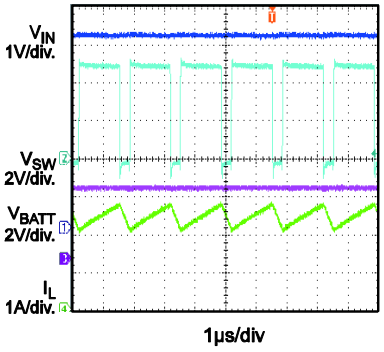
Battery Float Steady State
V_{BATT_FULL}=4.2V



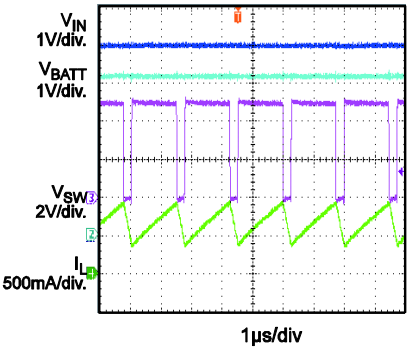
TC Charge Steady State
V_{BATT_FULL}=4.2V, V_{BATT} =2V, f_{SW}=600KHz



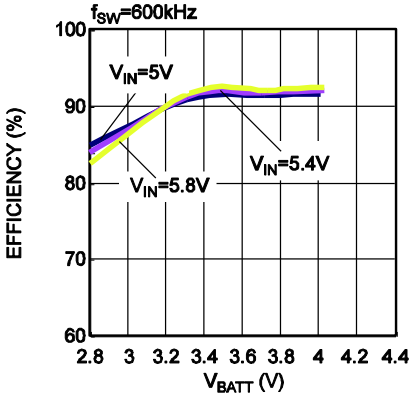
CC Charge Steady State
V_{BATT_FULL}=4.2V, V_{BATT} =3.7V, f_{SW}=600KHz



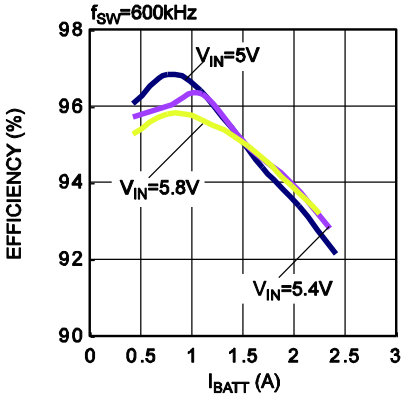
CV Charge Steady State
V_{BATT_FULL}=4.2V, V_{BATT} =4.2V, f_{SW}=600KHz



Constant Current Charge Efficiency
V_{BATT_FULL}=4.2V, V_{BATT} =0.5-4.2V, f_{SW}=600kHz



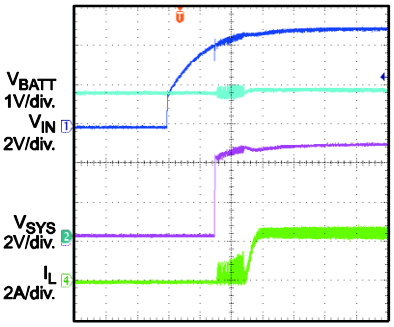
Constant Voltage Charge Efficiency
V_{BATT_FULL}=4.2V, V_{BATT} =4.2V, f_{SW}=600kHz



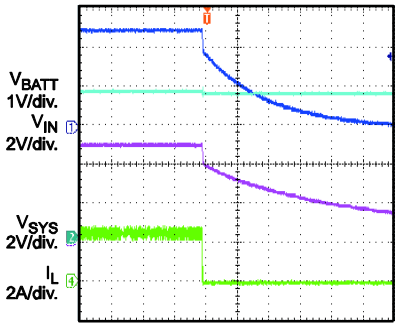
TYPICAL PERFORMANCE CHARACTERISTICS *(continued)*

For Charge Mode: V_{IN} = 5V, I_{CHG} = 2.5A, L_{IN_LIM} = 2.7A, I_{SYS} = 0A
For Boost Mode: V_{BATT} = 3.7V, V_{SYS_SET} = 5V, I_{OLIM} = 2.1A
C_{IN} = C_{BATT} = C_{SYS} = C2 = 22µF, L1 = 2.2µH, RS1 = 20mΩ, C4 = C_{TMR} = 0.1µF, Battery Simulator, unless otherwise noted.

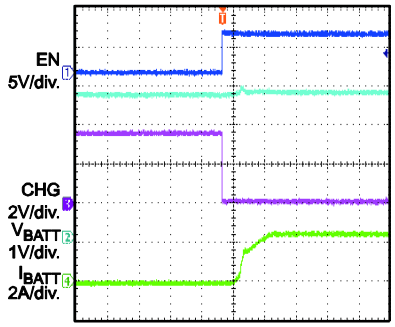
Power On, Charger Mode
V_{BATT_FULL}=4.2V, V_{BATT}=3.7V, I_{CHG}=2.5A



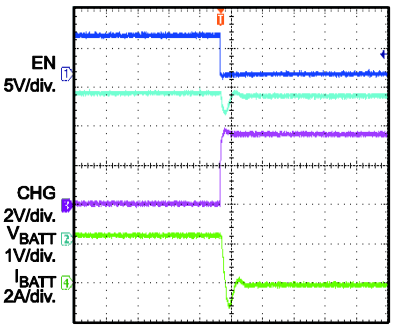
Power Off, Charger Mode
V_{BATT_FULL}=4.2V, V_{BATT}=3.7V, I_{CHG}=2.5A



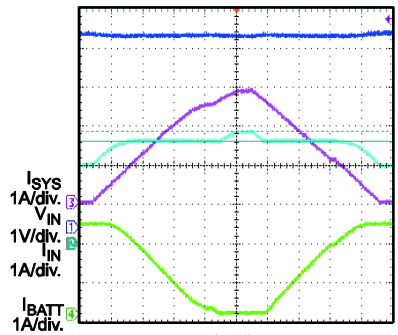
EN On, Charge Mode
V_{BATT_FULL}=4.2V, V_{BATT}=3.7V, I_{CHG}=2.5A



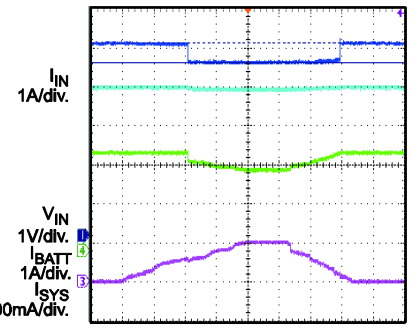
En Off, Charge Mode
V_{BATT_FULL}=4.2V, V_{BATT}=3.7V, I_{CHG}=2.5A



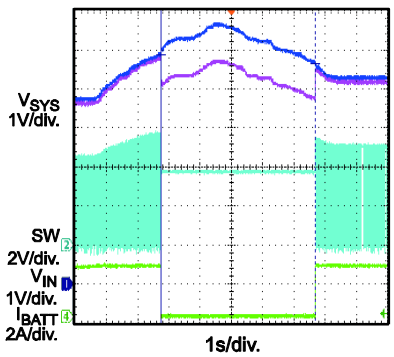
Input Current Limit, Charge Mode
V_{BATT_FULL}=4.2V, V_{BATT}=3.7V



Input Voltage Clamp, Charge Mode
V_{BATT_FULL}=4.2V, V_{BATT}=3.7V



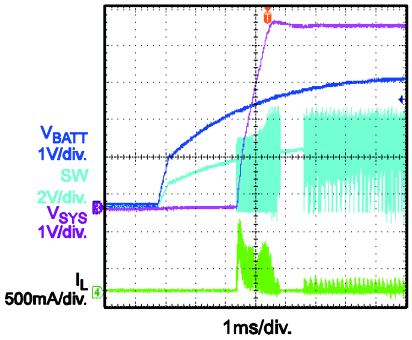
Input Over Votalge Protection, Charge Mode
V_{IN}=5V to 6.5V, V_{BATT}=3.7V, Enabled Charger



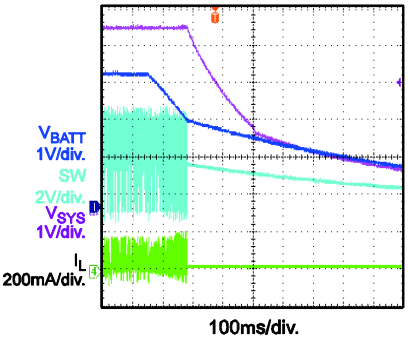
TYPICAL PERFORMANCE CHARACTERISTICS *(continued)*

For Charge Mode: V_{IN} = 5V, I_{CHG} = 2.5A, L_{IN_LIM} = 2.7A, I_{SYS} = 0A
For Boost Mode: V_{BATT} = 3.7V, V_{SYS_SET} = 5V, I_{OLIM} = 2.1A
C_{IN} = C_{BATT} = C_{SYS} = C2 = 22µF, L1 = 2.2µH, RS1 = 20mΩ, C4 = C_{TMR} = 0.1µF, Battery Simulator, unless otherwise noted.

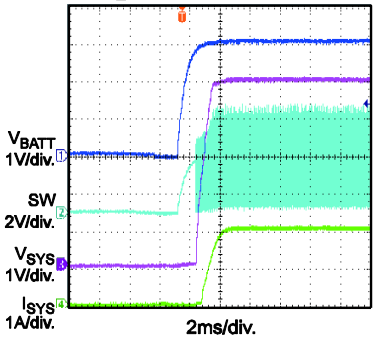
Power On, Boost Mode
V_{SYS_SET}=5V, V_{BATT}=3.7V,
No SYS Load



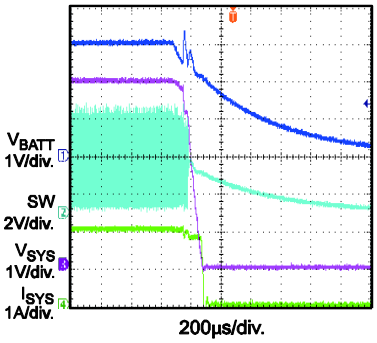
Power Off, Boost Mode
V_{SYS_SET}=5V, V_{BATT}=3.7V,
No SYS Load



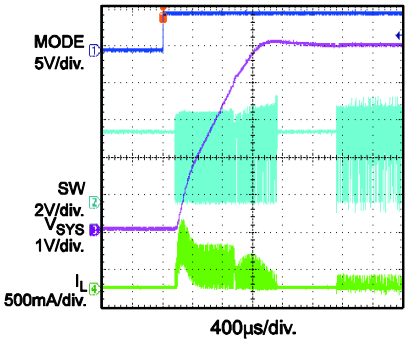
Power On, Boost Mode
V_{SYS_SET}=5V, V_{BATT}=3V,
R_{SYS_LOAD}=2.5Ω



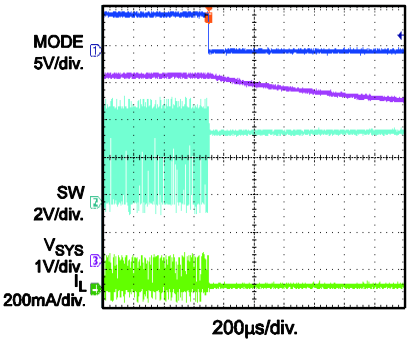
Power Off, Boost Mode
V_{SYS_SET}=5V, V_{BATT}=3V,
R_{SYS_LOAD}=2.5Ω



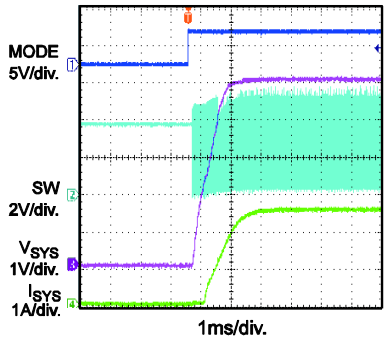
Mode On, Boost Mode
V_{SYS_SET}=5V, V_{BATT}=3.7V,
No SYS Load



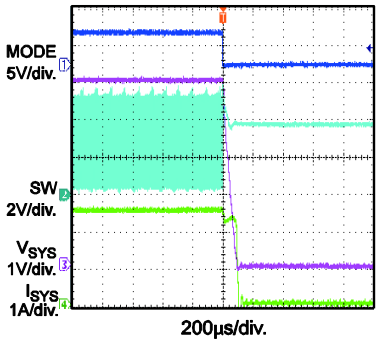
Mode Off, Boost Mode
V_{SYS_SET}=5V, V_{BATT}=3.7V,
No SYS Load



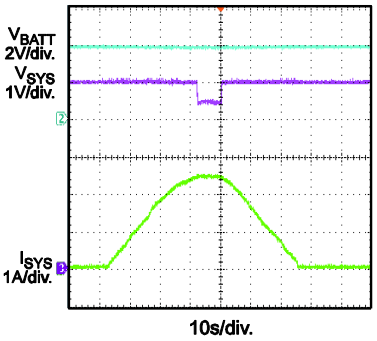
Mode On, Boost Mode
V_{SYS_SET}=5V, V_{BATT}=3.7V,
R_{SYS_LOAD}=2Ω



Mode Off, Boost Mode
V_{SYS_SET}=5V, V_{BATT}=3.7V,
R_{SYS_LOAD}=2Ω



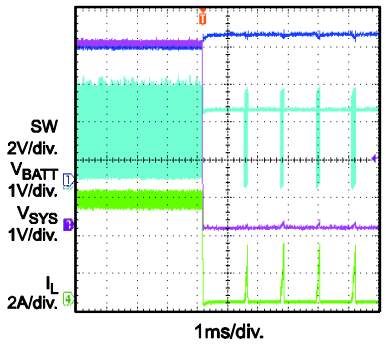
SYS Output Current Limit
V_{SYS_SET}=5V, V_{BATT}=3.7V,
I_{OLIM_SET}=2.5A



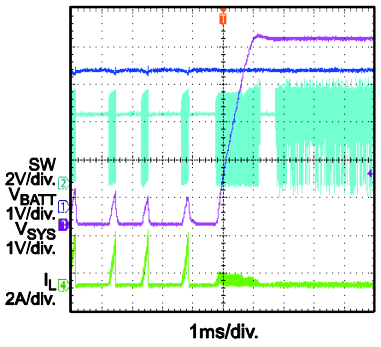
TYPICAL PERFORMANCE CHARACTERISTICS *(continued)*

For Charge Mode: V_{IN} = 5V, I_{CHG} = 2.5A, L_{IN_LIM} = 2.7A, I_{SYS} = 0A
For Boost Mode: V_{BATT} = 3.7V, V_{SYS_SET} = 5V, I_{OLIM} = 2.1A
C_{IN} = C_{BATT} = C_{SYS} = C2 = 22µF, L1 = 2.2µH, RS1 = 20mΩ, C4 = C_{TMR} = 0.1µF, Battery Simulator, unless otherwise noted.

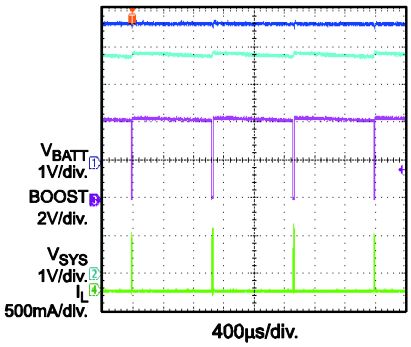
SYS Short Circuit Entry
V_{SYS_SET}=5V, V_{BATT}=3.7V



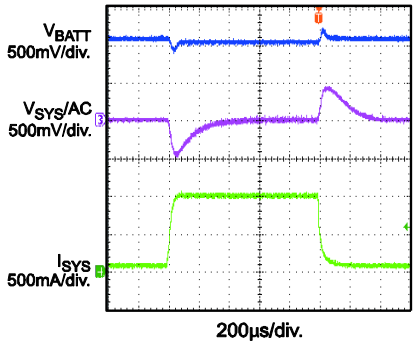
SYS Short Circuit Recovery
V_{SYS_SET}=5V, V_{BATT}=3.7V,



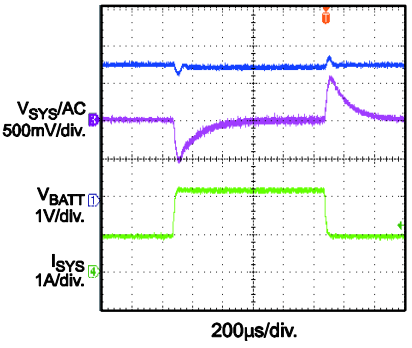
SYS Over Voltage Protection
V_{SYS_SET}=6.5V, V_{BATT}=3.7V



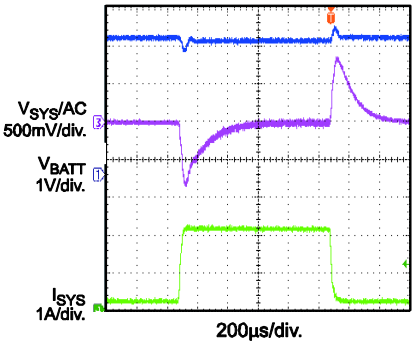
SYS Load Transient
V_{SYS_SET}=5V, V_{BATT}=3V,
I_{SYS}= 80mA to 1A



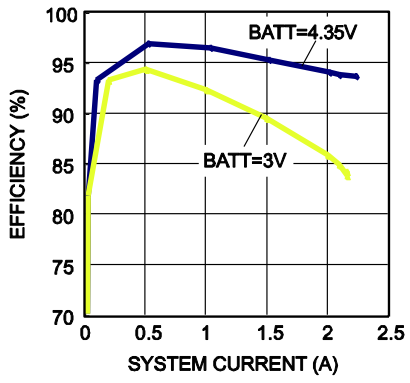
SYS Load Transient
V_{SYS_SET}=5V, V_{BATT}=3.7V,
I_{SYS}= 1A to 2.2A



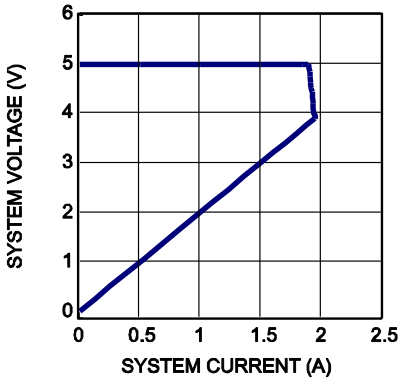
SYS Load Transient
V_{SYS_SET}=5V, V_{BATT}=3.7V,
I_{SYS}= 0.3A to 2.2A



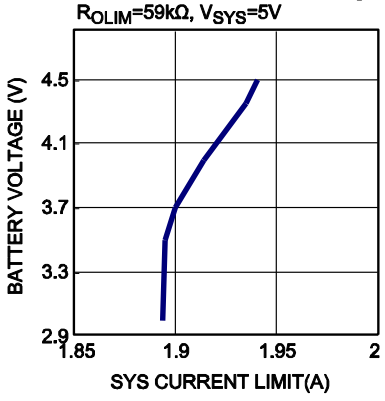
Efficiency
V_{SYS_SET}=5V, V_{SYS}=5V, F_S=600kHz



Boost Output V-I Curve
V_{BATT}=3.7V, V_{SYS}=5V



Programmable Output Currentlimit vs. Battery
R_{OLIM}=59kΩ, V_{SYS}=5V



PIN FUCTIONS

Pin #	Name	Description
1, 23, 24	PGND	Power Ground.
2	$\overline{\text{CHG}}$	Charge Completion Indicator. Logic LOW indicates charge mode. This is an open drain pin during charge complete or suspended
3	$\overline{\text{BOOST}}$	Boost Mode indicator. Logic LOW indicates boost mode in operation. This is an open drain pin during charge mode or sleep mode operation.
4	CSP	Battery Charge Current Sense Positive Input.
5	BATT	Positive Battery Terminal / Battery Charge Current Sense Negative Input.
6	AGND	Analog Ground
7	OLIM	Programmable Output-Current Limit for boost mode. Connect an external resistor to GND to program the system current in boost mode. The R_{OLIM} **CANNOT** be lower than 47.5kΩ.
8	ISET	Programmable Charge Current Pin. Connect an external resistor to GND to program the charge current.
9	NTC	Negative Temperature Coefficient (NTC) Thermistor.
10	FB	System voltage feedback input.
11	$\overline{\text{ACOK}}$	Valid Input Supply Indicator. Logic LOW on this pin indicates the presence of a valid power supply.
12	REG	Input Voltage Feedback for input voltage regulation loop. Connect to tap of an external resistor divider from VIN to GND to program the input voltage regulation. Once the voltage at REG pin drops to the inner threshold, the charge current is reduced to maintain the input voltage at the regulation value.
13	TMR	Oscillator Period Timer. Connect a timing capacitor between this pin and GND to set the oscillator period. Short to GND to disable the Timer function.
14	PWIN	Input pin to detect the presence of valid input power. Pulling this pin to GND will turn off the IN-to-SYS pass through MOSFET
15	ILIM	Input Current Set. Connect to GND with an external resistor to program input current limit in charge mode.
16	VCC	Internal Circuit Power Supply. Bypass this pin to GND with a ceramic capacitor not higher than 100nF. This pin **CANNOT** carry external load higher than 5mA.
17	VB	Programmable Battery-Full Voltage. Leave floating or connect to logic HIGH for 4.2V, while connect to GND for 4.35V.
18	EN	Charge Control Input. Logic HIGH enables charging. Logic LOW disables charging. Active only when $\overline{\text{ACOK}}$ is low (input power is OK).
19	MODE	Mode Select. Logic HIGH→boost mode. Logic LOW→sleep mode. Active only when $\overline{\text{ACOK}}$ is HIGH (input power is not available).
20	VIN	Adapter Input. Place a bypass capacitor close to this pin to prevent large input voltage spikes.
21	SYS	System Output. A minimum of 22uF ceramic cap is required to be placed as close as possible to the SYS and PGND pins. Total capacitance should not be lower than 44uF
22	SW	Switch Output Node. It is recommended not to place Via's on the SW plane during PCB layout

BLOCK DIAGRAM

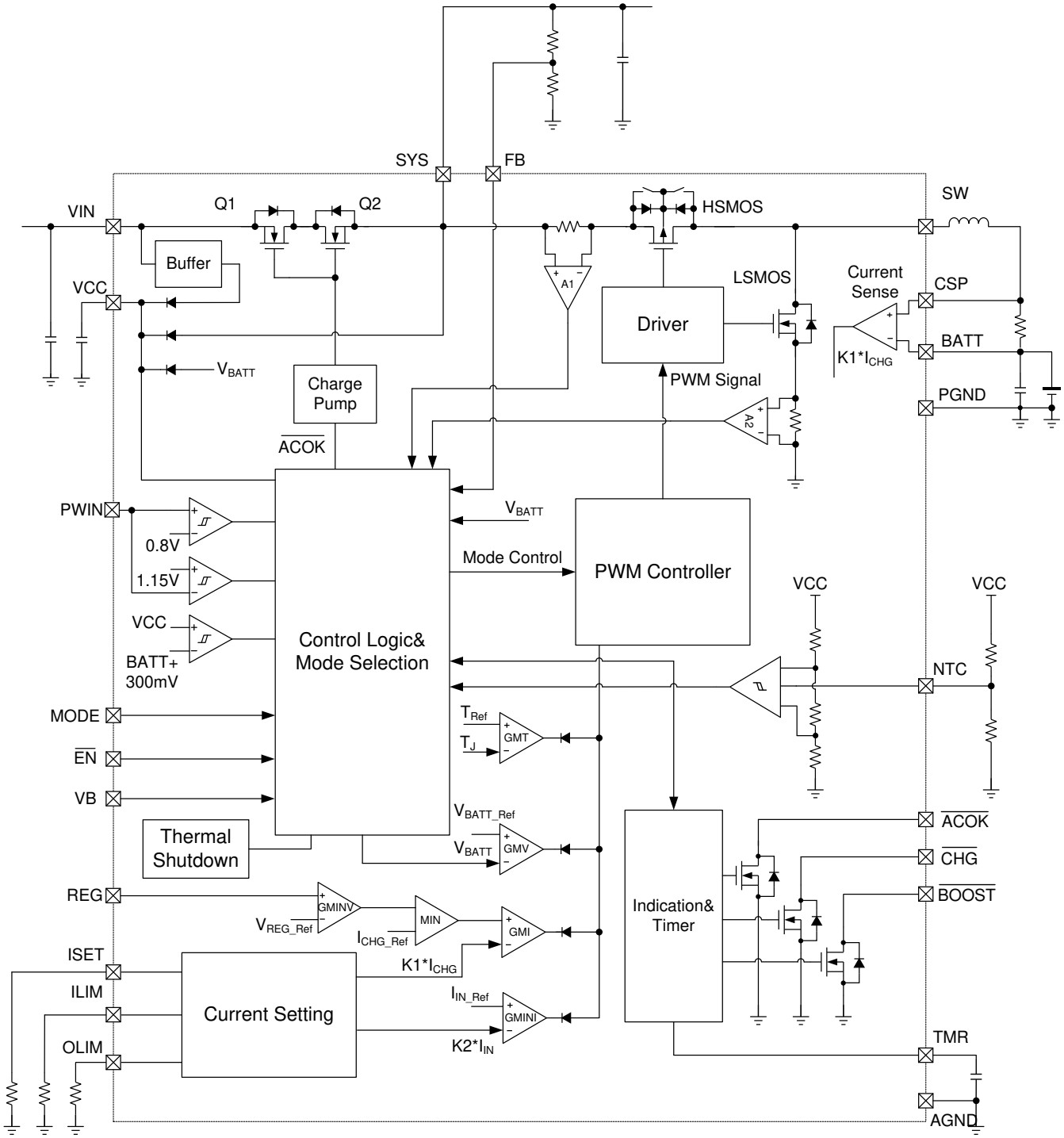


Figure 1: Functional Block Diagram in Charge Mode

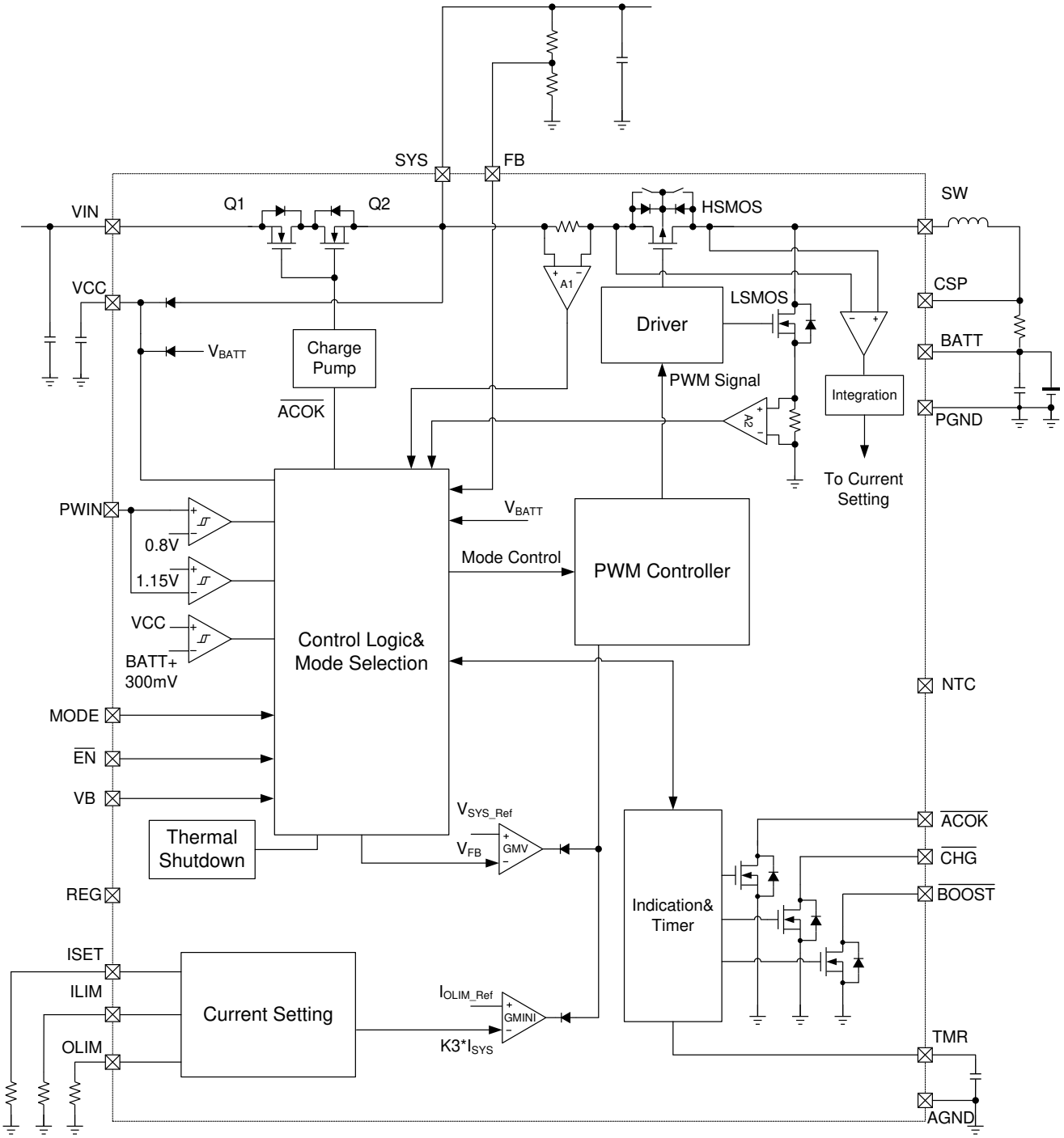


Figure 2: Functional Block Diagram in Boost Mode

OPERATION FLOW CHART

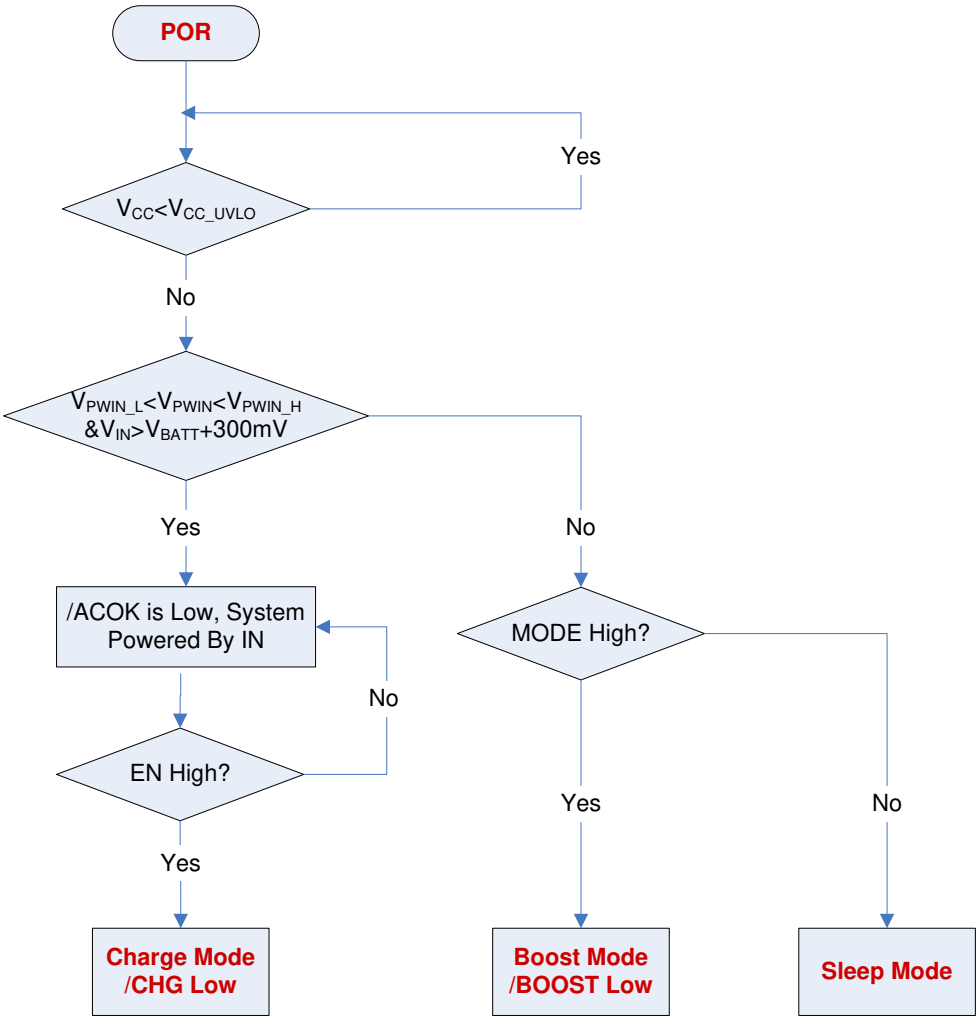


Figure 3: Mode Selection Flow Chart

OPERATION FLOW CHART *(continued)*

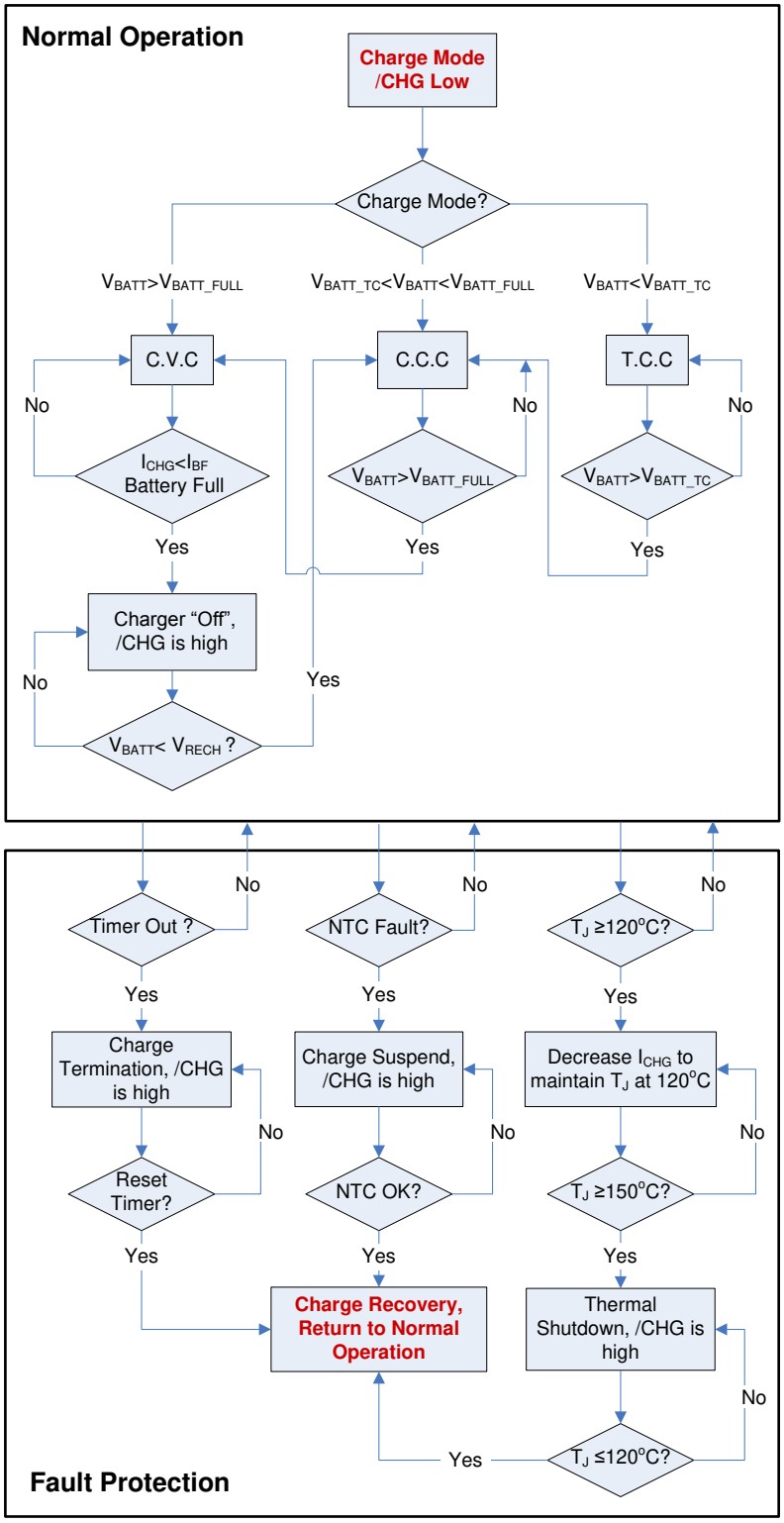


Figure 4: Normal Operation and Fault Protection in Charge Mode

OPERATION FLOW CHART *(continued)*

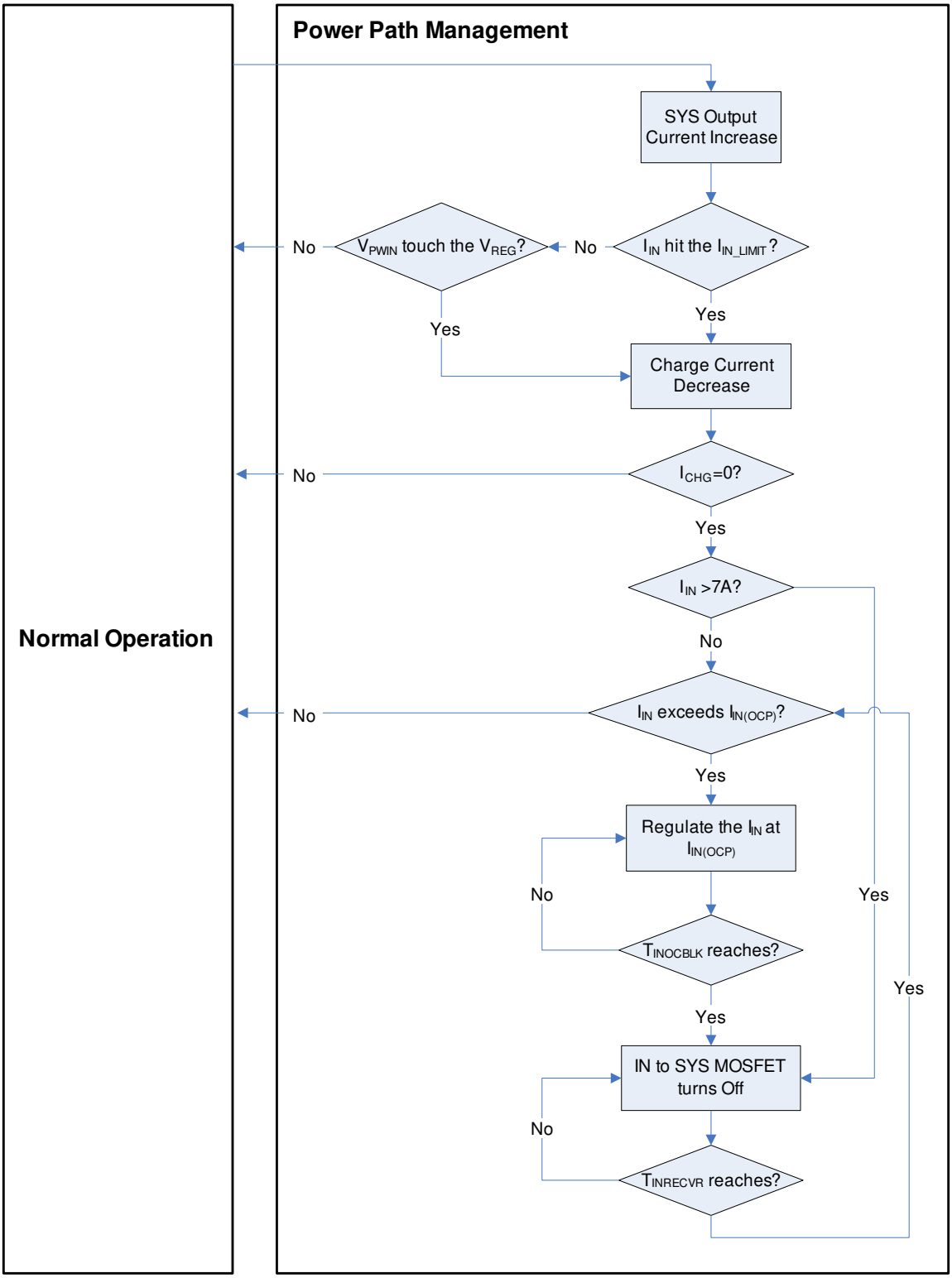


Figure 5: Power-path Management in Charge Mode

OPERATION FLOW CHART *(continued)*

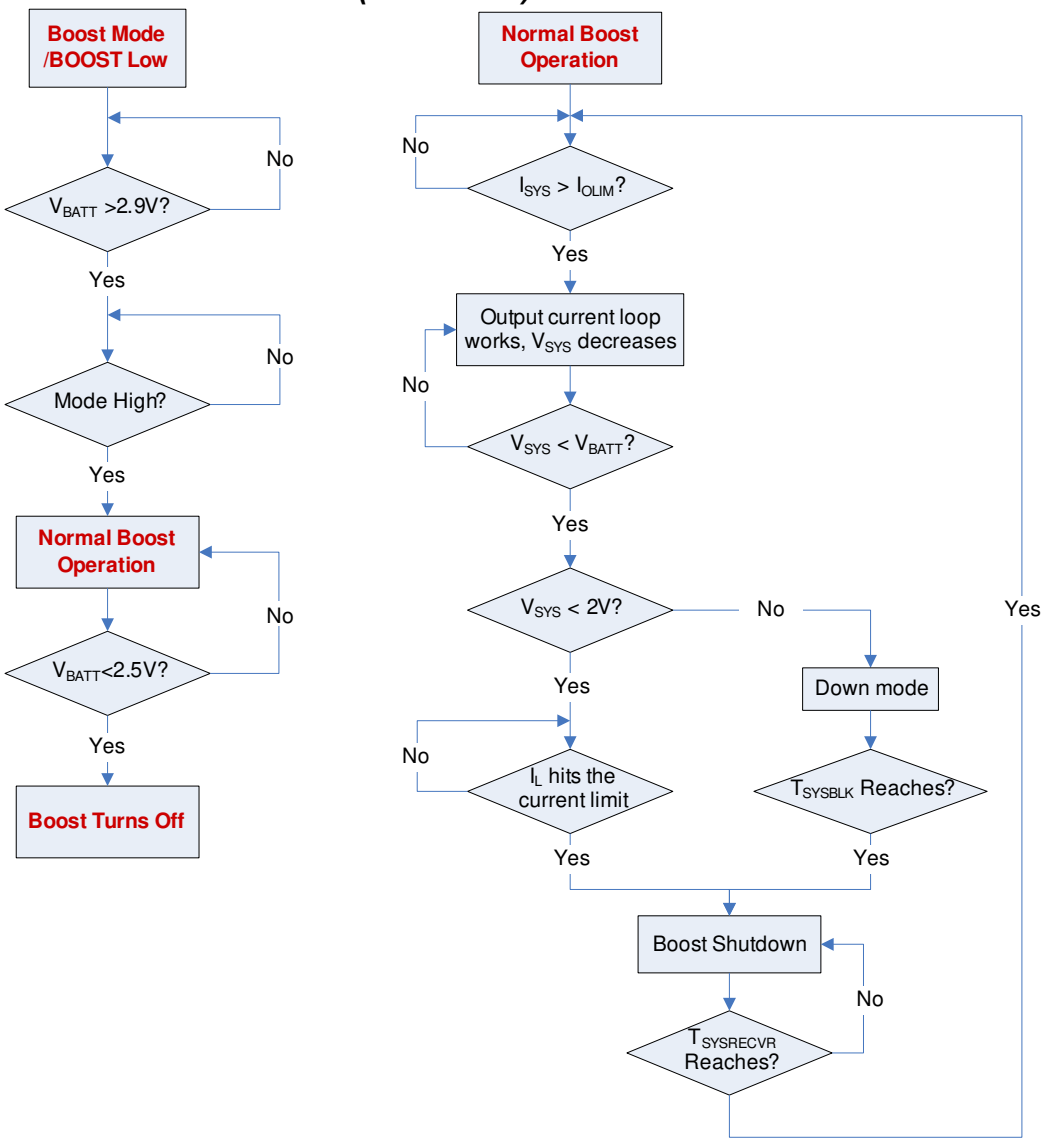


Figure 6: Operation Flow Chart in Boost Mode

START UP TIME FLOW IN CHARGE MODE

Condition: EN = 5V, Mode = 0V, /ACOK and /CHG are always pulled up to an external 5V.

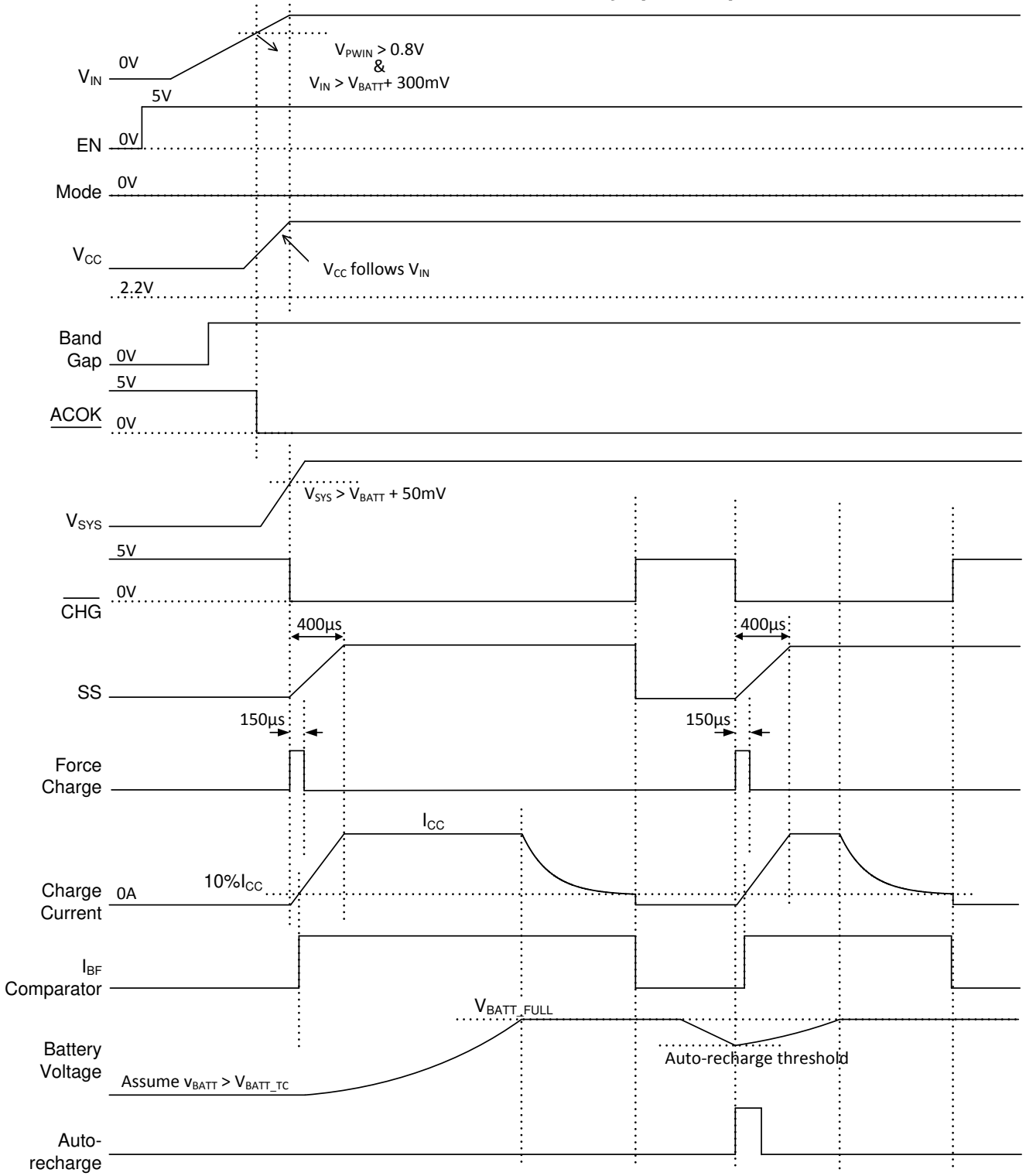


Figure 7: Input Power Start-Up Time Flow in Charge Mode

START UP TIME FLOW IN CHARGE MODE

Condition: EN = 5V, Mode = 0V, /ACOK and /CHG are always pulled up to an external 5V.

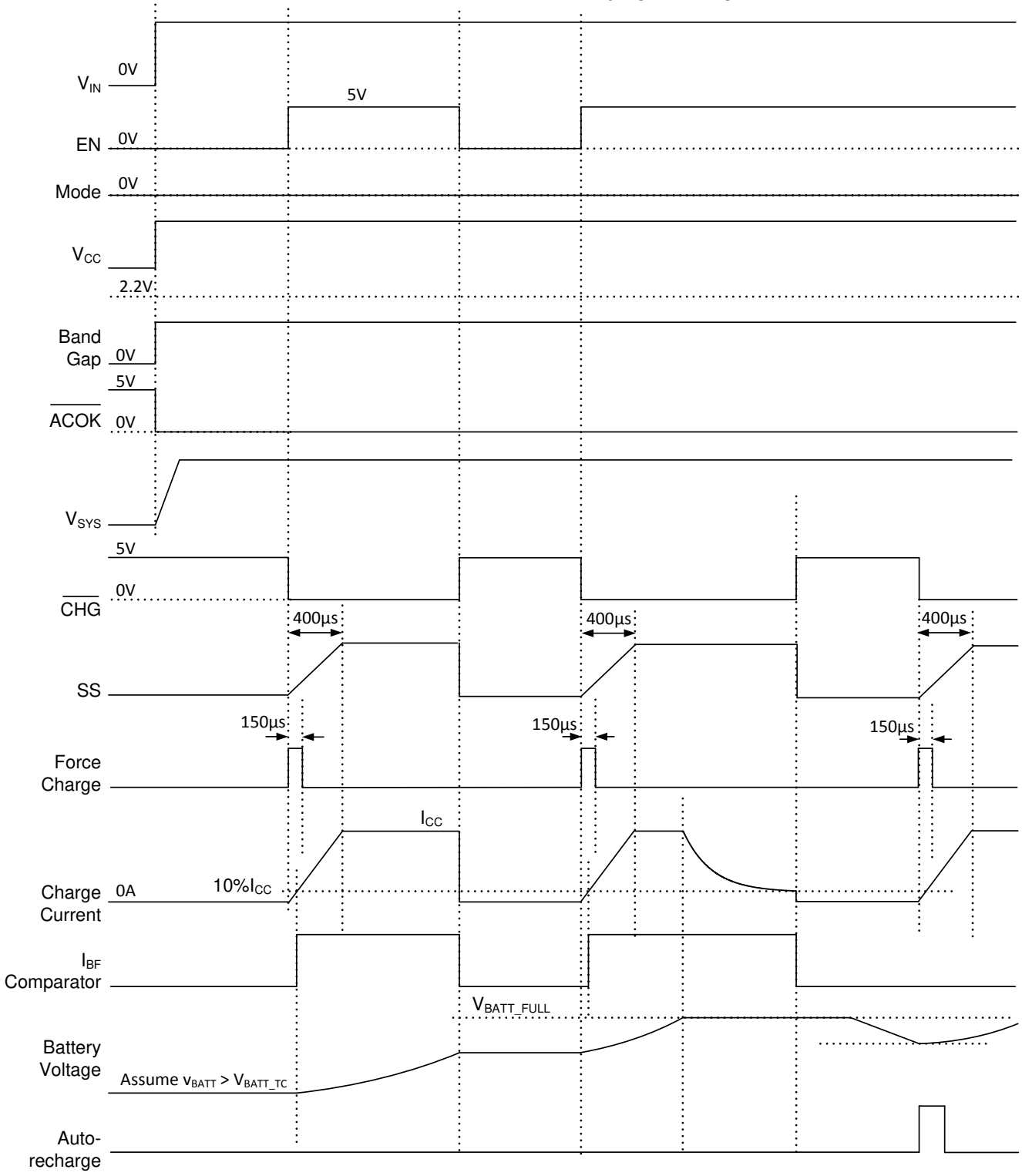


Figure 8: EN Start-Up Time Flow in Charge Mode

START UP TIME FLOW IN BOOST MODE

Condition: V_{IN} = 0V, Mode = 5V, /Boost is always pulled up to an external constant 5V.

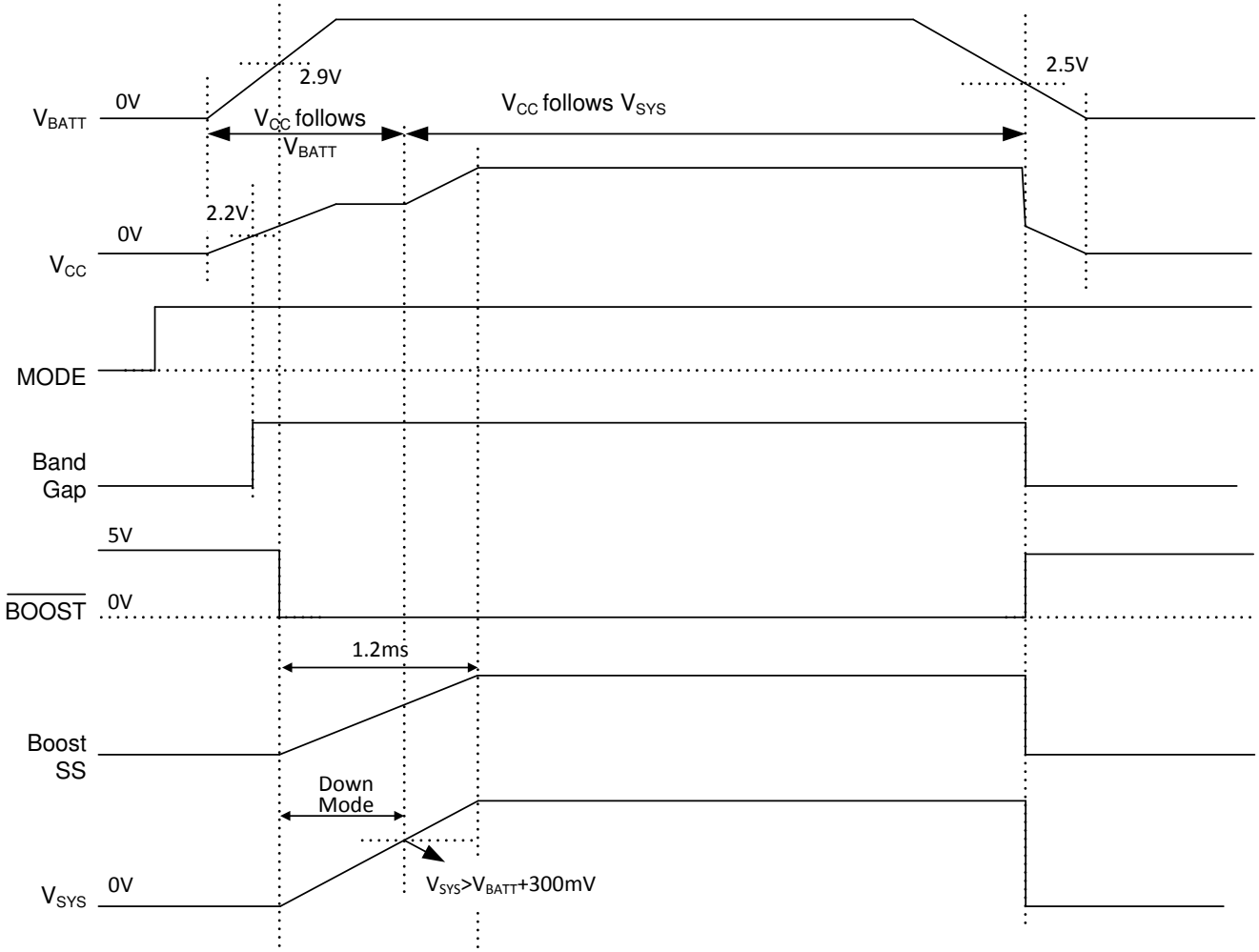


Figure 9: Battery Power Start-Up Time Flow in Boost Mode

START UP TIME FLOW IN BOOST MODE

Condition: V_{IN} = 0V, /Boost is always pulled up to an external constant 5V.

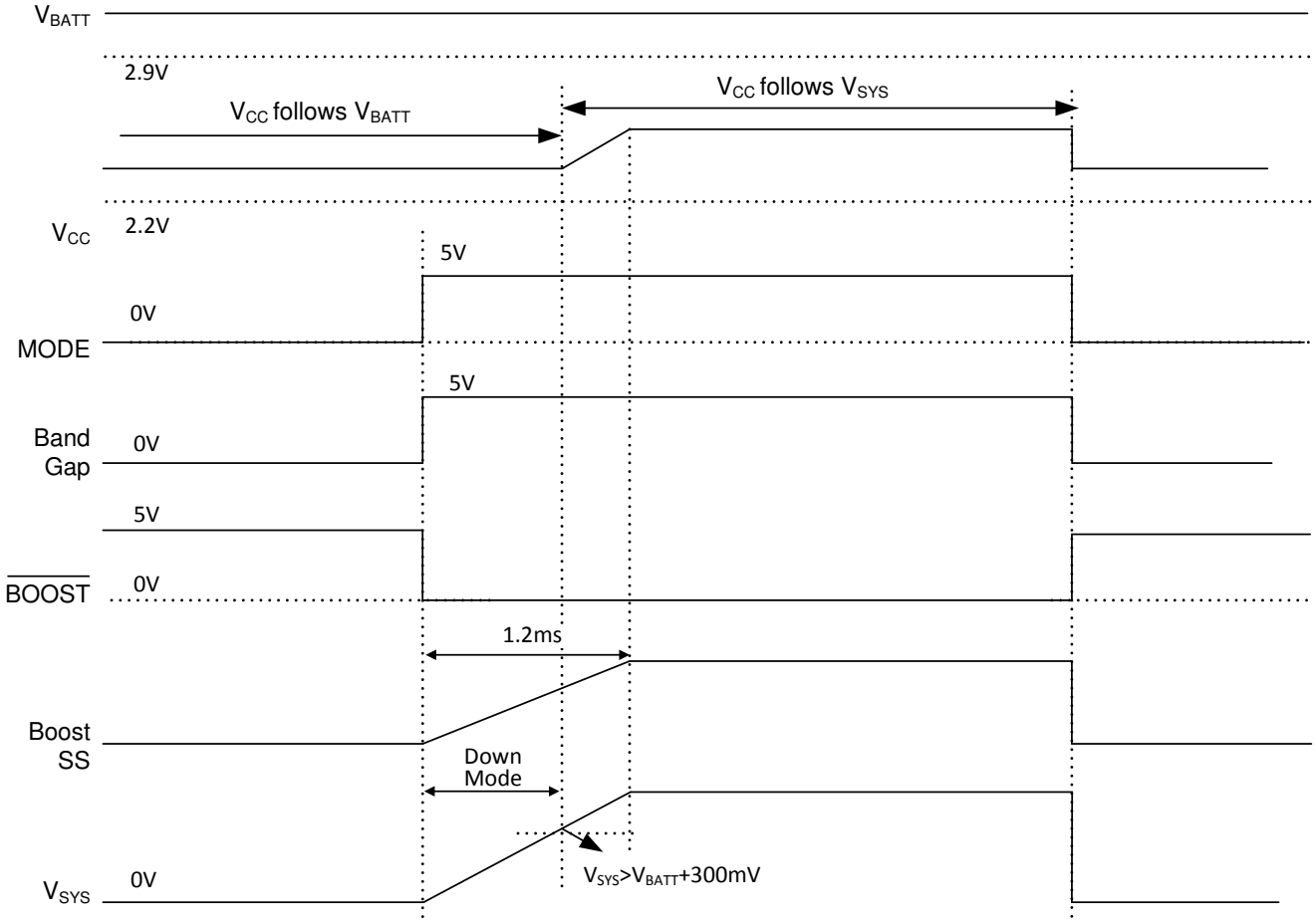


Figure 10: Mode Start-Up Time Flow in Boost Mode