Ordering number :ENN5673

Monolithic linear IC

LA5619M

Lead Battery Charger IC with Battery Voltage Detection Function

Overview

The LA5619M is a single-chip IC that integrates a battery voltage detection function and a lead battery charger to support compact sets.

Functions

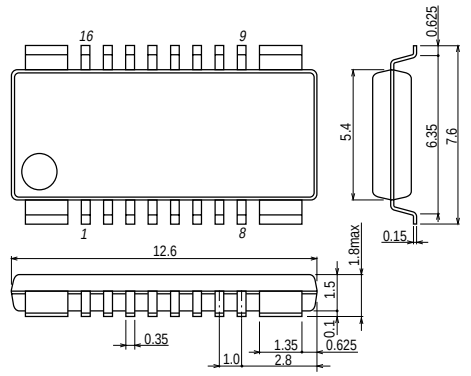
- Charge voltage can be switched between cycle voltage and trickle voltage (4.9 V typ. → 4.6 V typ.).
- Charge current limit can be set with an external resistor (125 mA typ.).
- Built-in charge current detection circuit
- Built-in battery voltage detection circuit

Package Dimensions

unit: mm

3097-MFP16FS

[LA5619M]



SANYO: MFP16FS

Specifications

Maximum Rating at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC} max		15	V
Battery pin voltage	$V_{Battery}$ max		6	V
Allowable power dissipation	Pd max		0.7	W
Operating temperature	Topr		–20 to +80	°C
Storage temperature	Tstg		–30 to +125	°C

Operating Conditions at Ta = 25°C

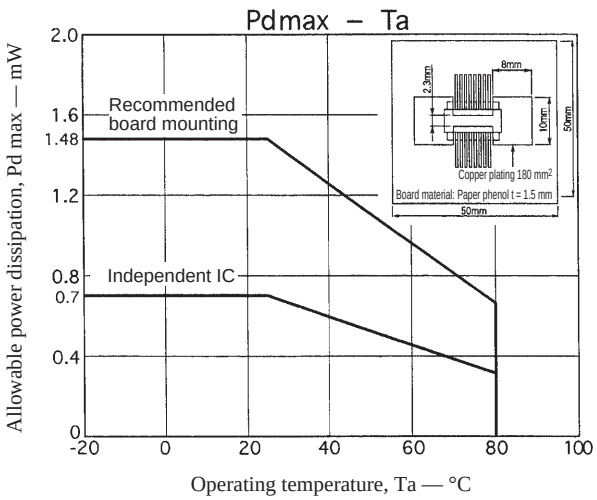
Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC}		5.5 to 14.5	V
Battery pin voltage	$V_{Battery}$ IN		0 to 5.5	V
CHARGE LED sink current	$I_{CHG-LED}$		0 to 40	mA
DET.LED sink current	$I_{DET-LED}$		0 to 40	mA
V_{BAT} sink current	$I_{BAT-LED}$		0 to 40	mA

SANYO Electric Co.,Ltd. Semiconductor Company

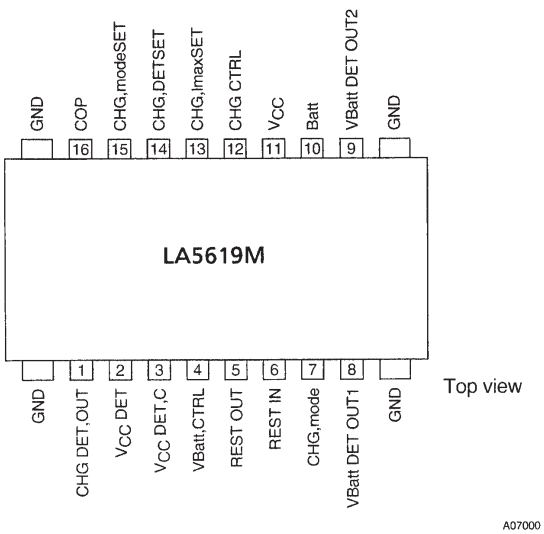
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

Operating Characteristics at Ta = 25°C, V_{CC} = 9 V, Batt. IN = 4 V

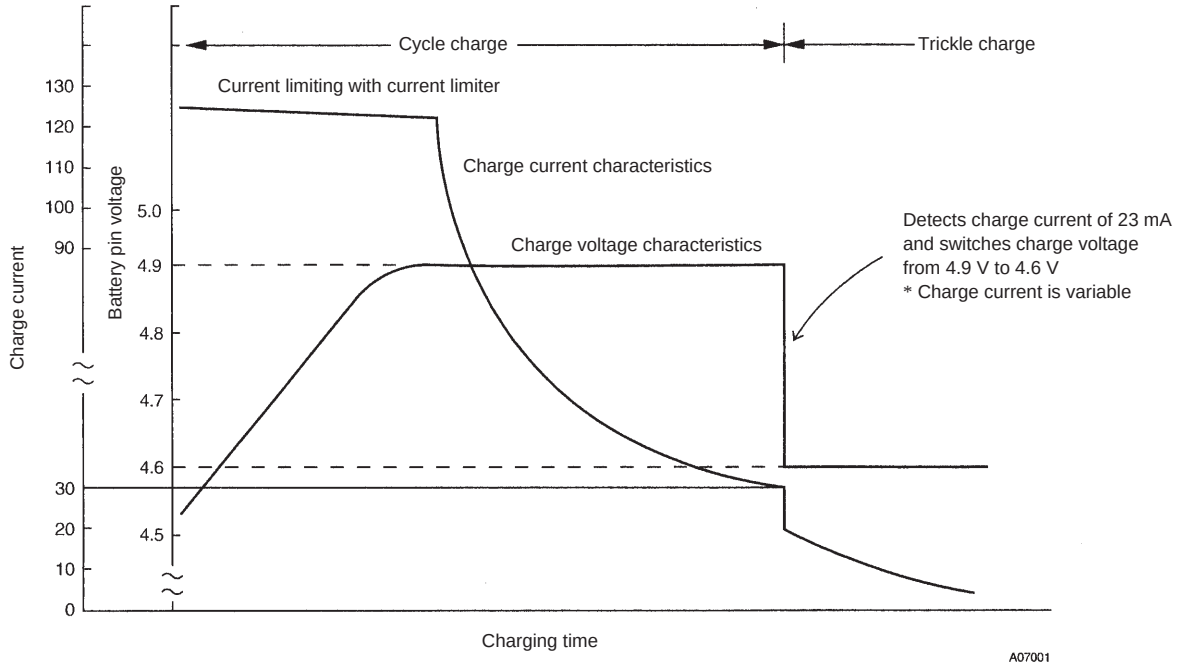
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[Charge System]						
Charge voltage (when trickle is selected)	V_O1	I_O = 10 mA	4.4	4.6	4.7	V
Charge voltage (when cycle is selected)	V_O2	I_O = 50 mA	4.7	4.9	5.0	V
Differential charge voltage	Vdif	$\Delta V_O = V_{O2} - V_{O1}$	0.2	0.3	0.4	V
Cycle → trickle switching current	I_{CT1}		20	23	26	mA
Trickle → cycle switching current	I_{CT2}		35	41	47	mA
Output peak current	I_{OP}	R_L = 33 Ω	112.5	125	137.5	mA
Line regulation (when trickle is selected)	V_{OLN1}	V_{CC} = 8 to 14.5 V, I_O = 10 mA		50	100	mV
Line regulation (when cycle is selected)	V_{OLN2}	V_{CC} = 8 to 14.5 V, I_O = 50 mA		100	150	mV
Load regulation (when trickle is selected)	V_{OLD1}	I_O = 0.5 to 30 mA		50	100	mV
Load regulation (when cycle is selected)	V_{OLD2}	I_O = 50 to 60 mA		100	150	mV
Current drain	I_{CC1}	I_O = 0 mA		6	10	mV
	I_{CC2}	I_O = 50 mA (I_{CC2} includes I_O)		65	73	mA
	I_{CC3}	R_L = 33 Ω (I_{CC3} includes I_O)		155	175	mA
CHG DET, OUT remaining voltage	$V_{CHG-LED}$	I_{IN} = 40 mA		1.1	1.3	V
CHG DET, OUT leak voltage	$I_{CHG-LED}$	V_{IN} = 9 V			200	nA
CHARGE detection current	$I_{CHG-DET1}$	on → off	0.15	0.25	0.35	mA
	$I_{CHG-DET2}$	off → on	0.8	1.0	1.2	mA
VCC DET remaining voltage	V_{DET}	I_{IN} = 40 mA		1.1	1.3	V
VCC DET leak voltage	I_{DET}	V_{IN} = 9 V			200	nA
VCC DET detection voltage	V_{CC-DET}		4.95	5.2	5.3	V
VCC DET hysteresis width	$V_{CC-DET, HYS}$		0.05	0.1	0.2	V
[Battery System]						
Battery detection voltage	V_{Batt}		3.17	3.3	3.43	V
$V_{Batt\ DET\ OUT1}$ pin's remaining voltage	$V_{BAT-OUT1}$	I_{IN} = 40 mA		0.3	0.5	V
$V_{Batt\ DET\ OUT1}$ pin's leak current	$I_{BAT-OUT1}$	V_{IN} = 5 V			200	nA
Current drain when detection circuit is off	I_{OFF}	batt = 2.5 V		5	6	µA
Current drain when detection circuit is on	I_{ON}	No load		350	500	µA
Current drain during Battery SAVE	I_{SAVE}	$V_{Batt\ CTRL}$ = 4 V		20	30	µA
$V_{Batt\ DET\ OUT2}$ pin's remaining voltage	$V_{BAT-OUT2}$	I_{IN} = 40 mA		1.1	1.3	V
[Internal Transistors for Reset]						
REST OUT remaining voltage	V_{REST}	REST.IN = 2 µA, I_{IN} = 50 µA		0.3	0.5	V
REST OUT leak current	I_{REST}	V_{IN} = 5 V			200	nA
[$V_{Batt\ CTRL}$ Pin]						
Threshold voltage	$V_{Batt-CTRL}$		1.10	1.27	1.50	V
$V_{Batt\ CTRL}$ pin input current	$I_{Batt-CTRL}$	V_{IN} = 4 V		17	24	µA



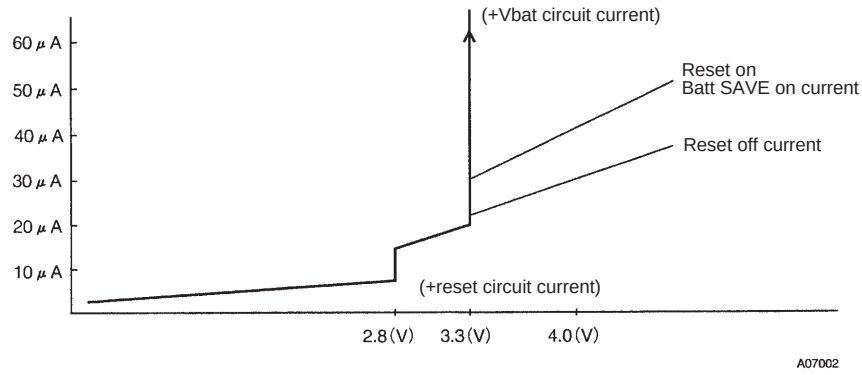
Pin Assignment



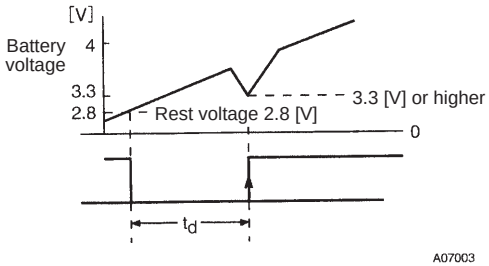
Battery Charger Charging Characteristics



Current Drain Characteristics

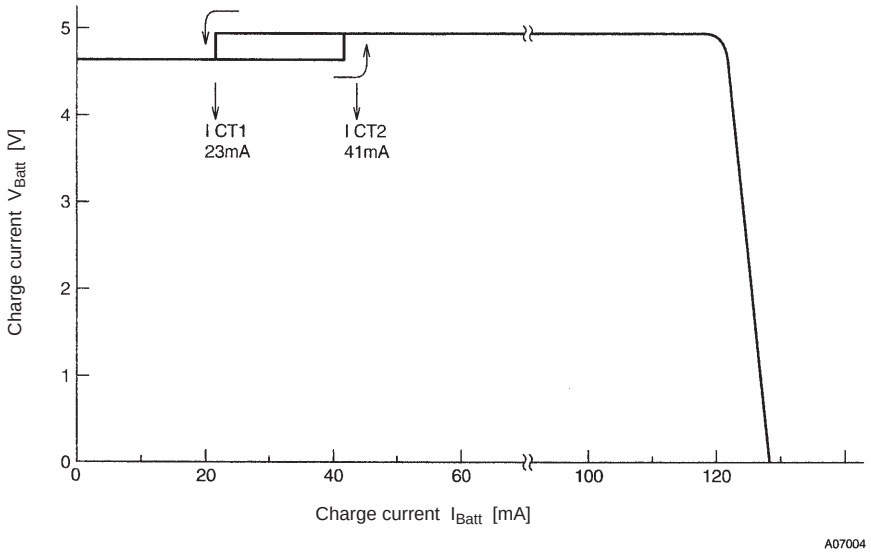


Relationship between Reset and Battery Circuit

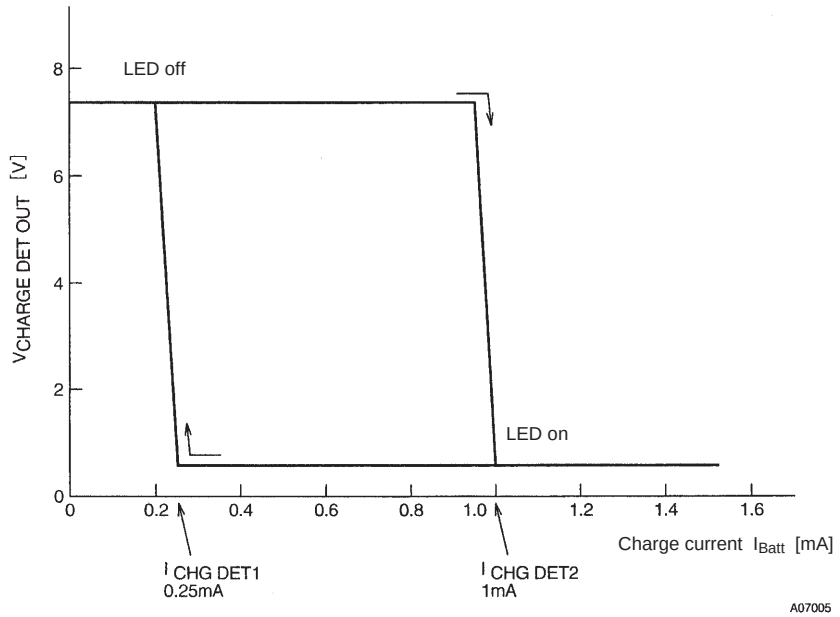


The V_{Batt} circuit operates at the edge where the reset voltage becomes Hi. (At this time, the output transistors are set on and the load is put on; If this voltage is 3.3 [V] or higher, the V_{Batt} circuit operates, and if it is lower than 3.3 [V], it does not start up.

Cycle ↔ Trickle Switching Hysteresis

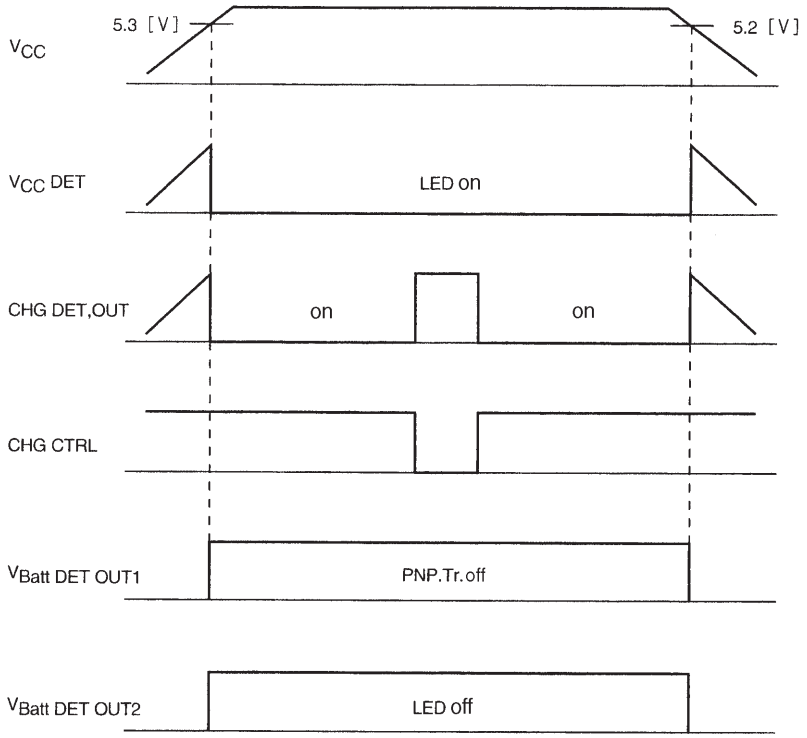


Charge Detection Hysteresis

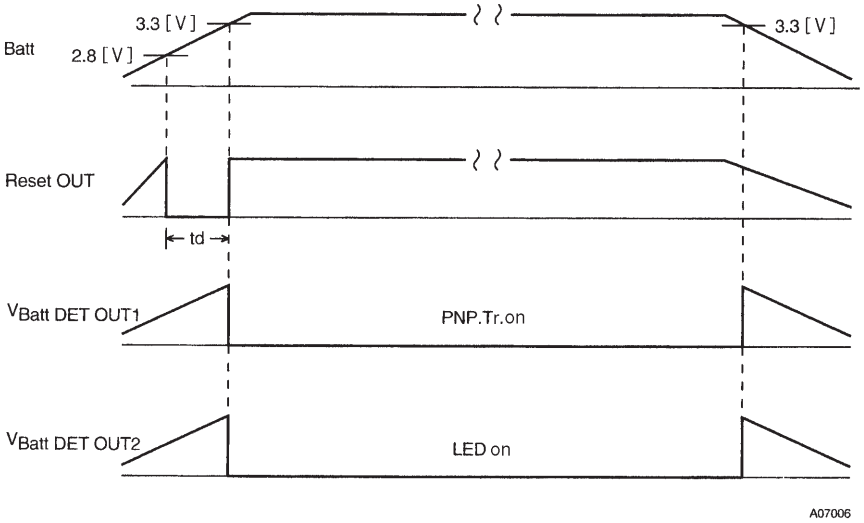


Timing Charts

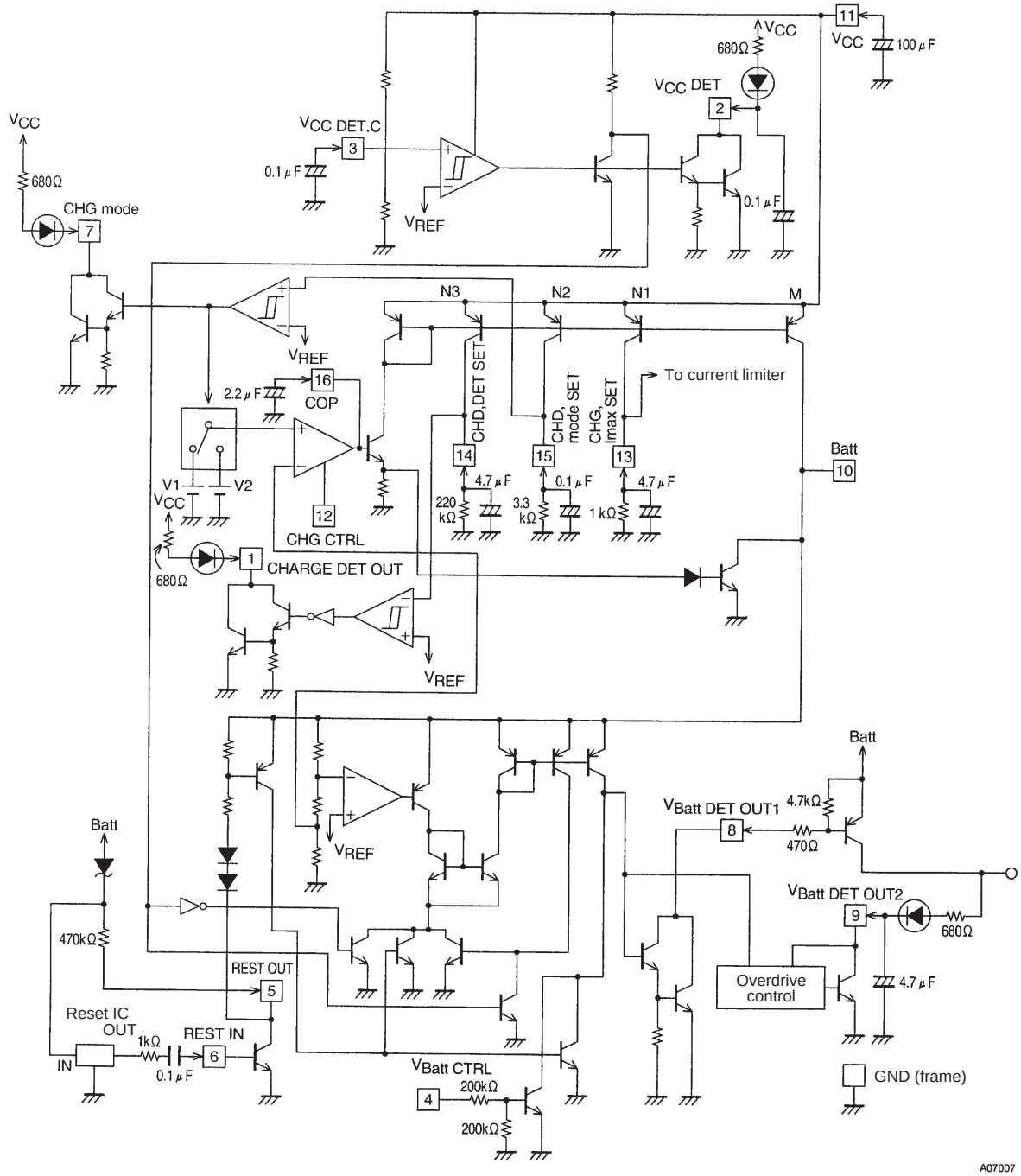
(Battery provided)



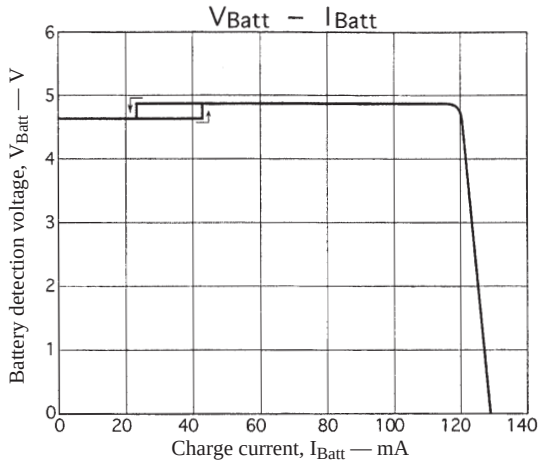
(Battery only)

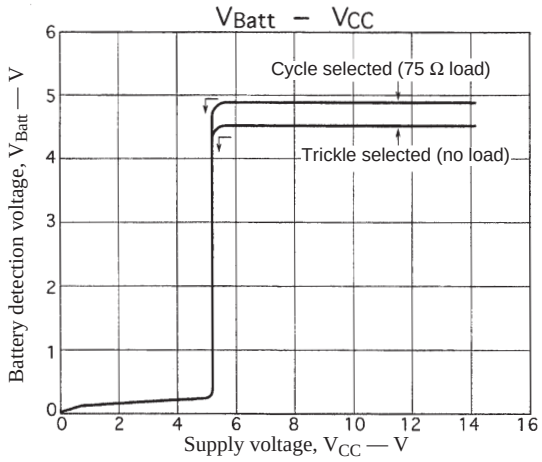


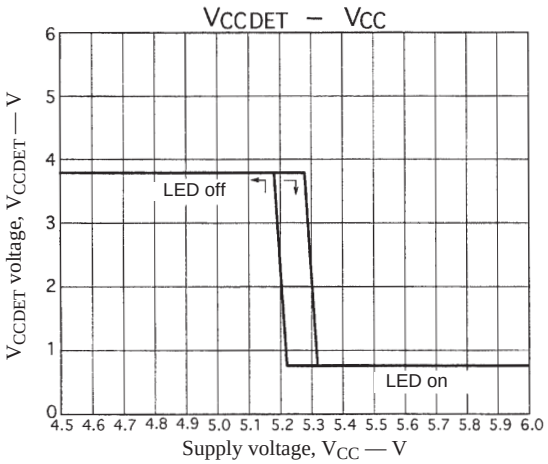
Block Diagram

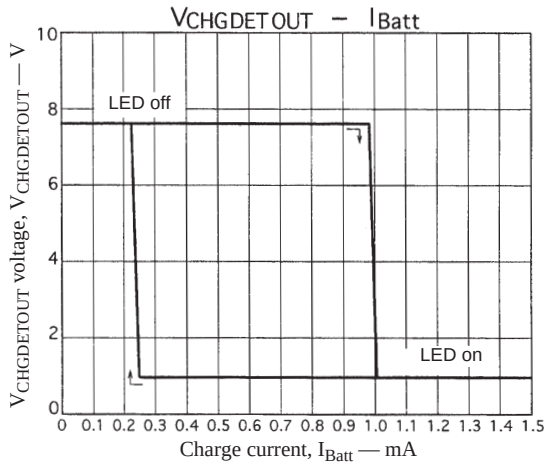


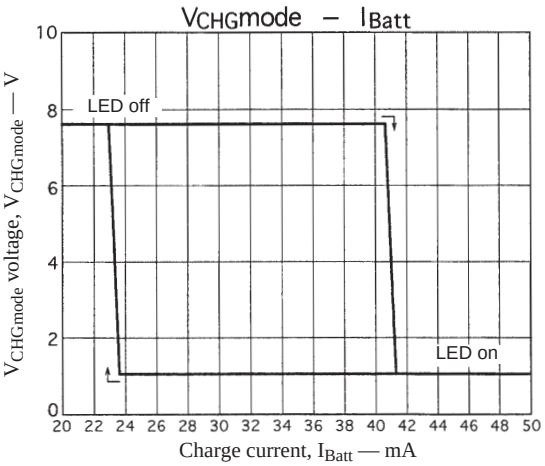
Notes: 1. Use capacitors with little temperature-related capacitance fluctuation.
2. Do not provide capacitors to the Batt pin (Pin 10)
3. The reset IC must be provided externally.

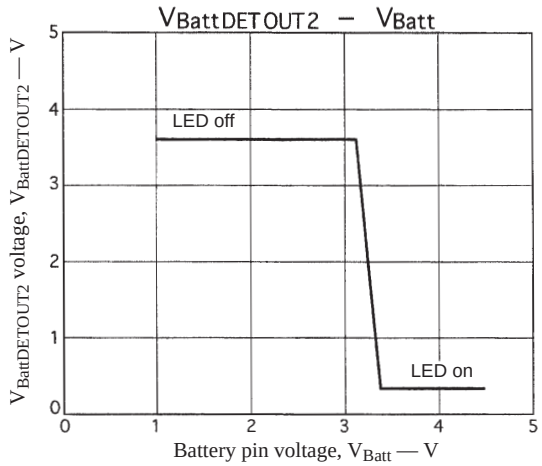

VBatt – IBatt
Battery detection voltage, VBatt — V
Charge current, IBatt — mA

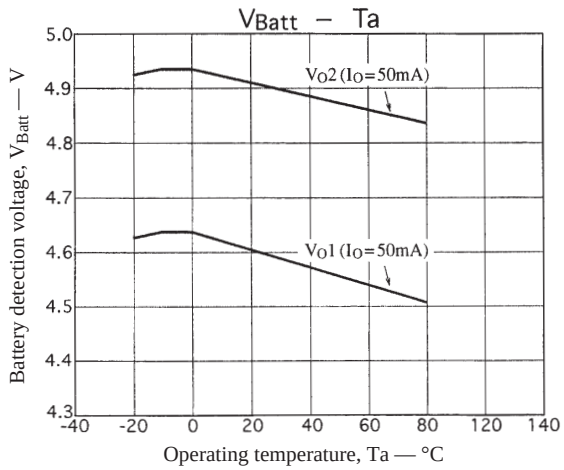

VBatt – VCC
Cycle selected (75 Ω load)
Trickle selected (no load)
Battery detection voltage, VBatt — V
Supply voltage, VCC — V

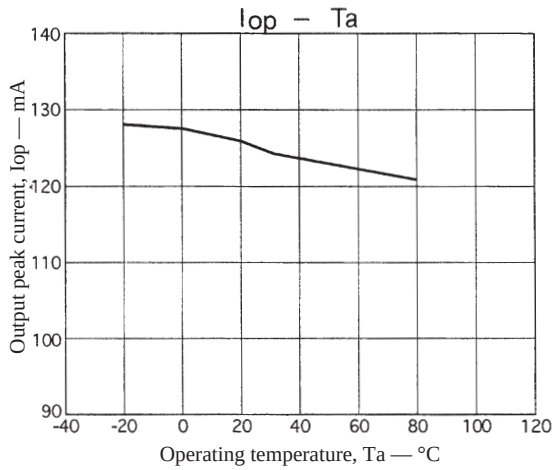

VCCDET – VCC
LED off
LED on
VCCDET voltage, VCCDET — V
Supply voltage, VCC — V


VCHGDETOUT – IBatt
LED off
LED on
VCHGDETOUT voltage, VCHGDETOUT — V
Charge current, IBatt — mA


VCHGmode – IBatt
LED off
LED on
VCHGmode voltage, VCHGmode — V
Charge current, IBatt — mA


VBattDETOUT2 – VBatt
LED off
LED on
VBattDETOUT2 voltage, VBattDETOUT2 — V
Battery pin voltage, VBatt — V


VBatt – Ta
VO2 (IO=50mA)
VO1 (IO=50mA)
Battery detection voltage, VBatt — V
Operating temperature, Ta — °C


Iop – Ta
Output peak current, Iop — mA
Operating temperature, Ta — °C