



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.

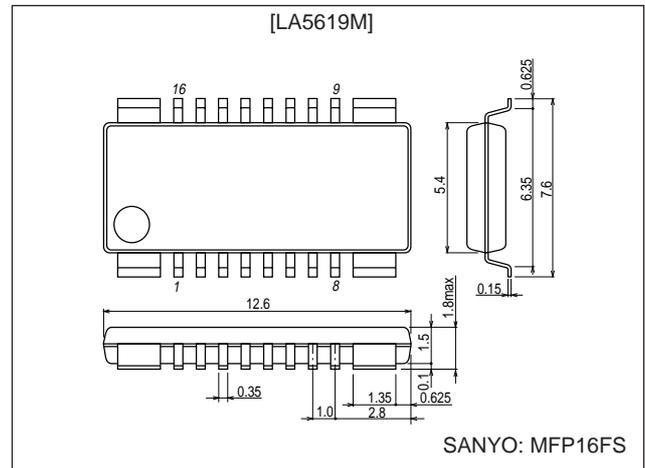
Functions

- 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



Specifications

Maximum Rating at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC} max		15	V
Battery pin voltage	$V_{\text{Battery max}}$		6	V
Allowable power dissipation	P_d max		0.7	W
Operating temperature	T_{opr}		-20 to +80	$^\circ\text{C}$
Storage temperature	T_{stg}		-30 to +125	$^\circ\text{C}$

Operating Conditions at $T_a = 25^\circ\text{C}$

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

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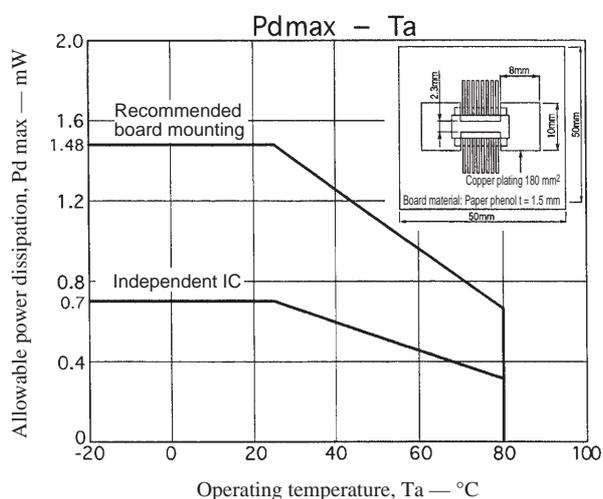
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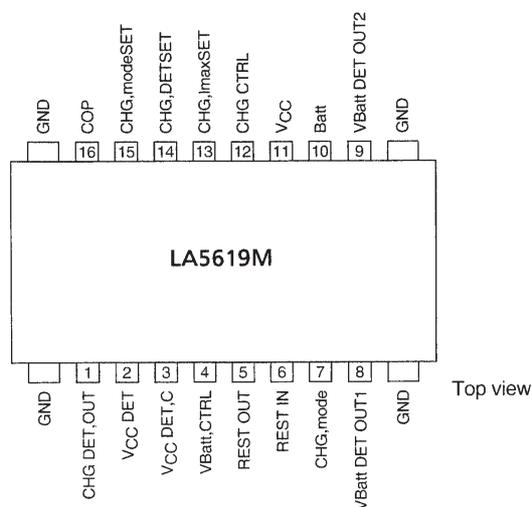
LA5619M

Operating Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 9\text{ V}$, Batt. IN = 4 V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[Charge System]						
Charge voltage (when trickle is selected)	V_{O1}	$I_O = 10\text{ mA}$	4.4	4.6	4.7	V
Charge voltage (when cycle is selected)	V_{O2}	$I_O = 50\text{ mA}$	4.7	4.9	5.0	V
Differential charge voltage	V_{dif}	$\Delta V_O = V_{O2} - V_{O1}$	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}	$R_L = 33\ \Omega$	112.5	125	137.5	mA
Line regulation (when trickle is selected)	V_{OLN1}	$V_{CC} = 8\text{ to }14.5\text{ V}$, $I_O = 10\text{ mA}$		50	100	mV
Line regulation (when cycle is selected)	V_{OLN2}	$V_{CC} = 8\text{ to }14.5\text{ V}$, $I_O = 50\text{ mA}$		100	150	mV
Load regulation (when trickle is selected)	V_{OLD1}	$I_O = 0.5\text{ to }30\text{ mA}$		50	100	mV
Load regulation (when cycle is selected)	V_{OLD2}	$I_O = 50\text{ to }60\text{ mA}$		100	150	mV
Current drain	I_{CC1}	$I_O = 0\text{ mA}$		6	10	mV
	I_{CC2}	$I_O = 50\text{ mA}$ (I_{CC2} includes I_O)		65	73	mA
	I_{CC3}	$R_L = 33\ \Omega$ (I_{CC3} includes I_O)		155	175	mA
CHG DET, OUT remaining voltage	$V_{CHG-LED}$	$I_{IN} = 40\text{ mA}$		1.1	1.3	V
CHG DET, OUT leak voltage	$I_{CHG-LED}$	$V_{IN} = 9\text{ V}$			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}	$I_{IN} = 40\text{ mA}$		1.1	1.3	V
VCC DET leak voltage	I_{DET}	$V_{IN} = 9\text{ V}$			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	$V_{BAT-OUT1}$	$I_{IN} = 40\text{ mA}$		0.3	0.5	V
V_{Batt} DET OUT1 pin's leak current	$I_{BAT-OUT1}$	$V_{IN} = 5\text{ V}$			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}	$V_{Batt\ CTRL} = 4\text{ V}$		20	30	μA
V_{Batt} DET OUT2 pin's remaining voltage	$V_{BAT-OUT2}$	$I_{IN} = 40\text{ mA}$		1.1	1.3	V
[Internal Transistors for Reset]						
REST OUT remaining voltage	V_{REST}	$REST.IN = 2\ \mu\text{A}$, $I_{IN} = 50\ \mu\text{A}$		0.3	0.5	V
REST OUT leak current	I_{REST}	$V_{IN} = 5\text{ V}$			200	nA
[$V_{Batt\ CTRL}$ Pin]						
Threshold voltage	$V_{Batt-CTRL}$		1.10	1.27	1.50	V
$V_{Batt\ CTRL}$ pin input current	$I_{Batt-CTRL}$	$V_{IN} = 4\text{ V}$		17	24	μA

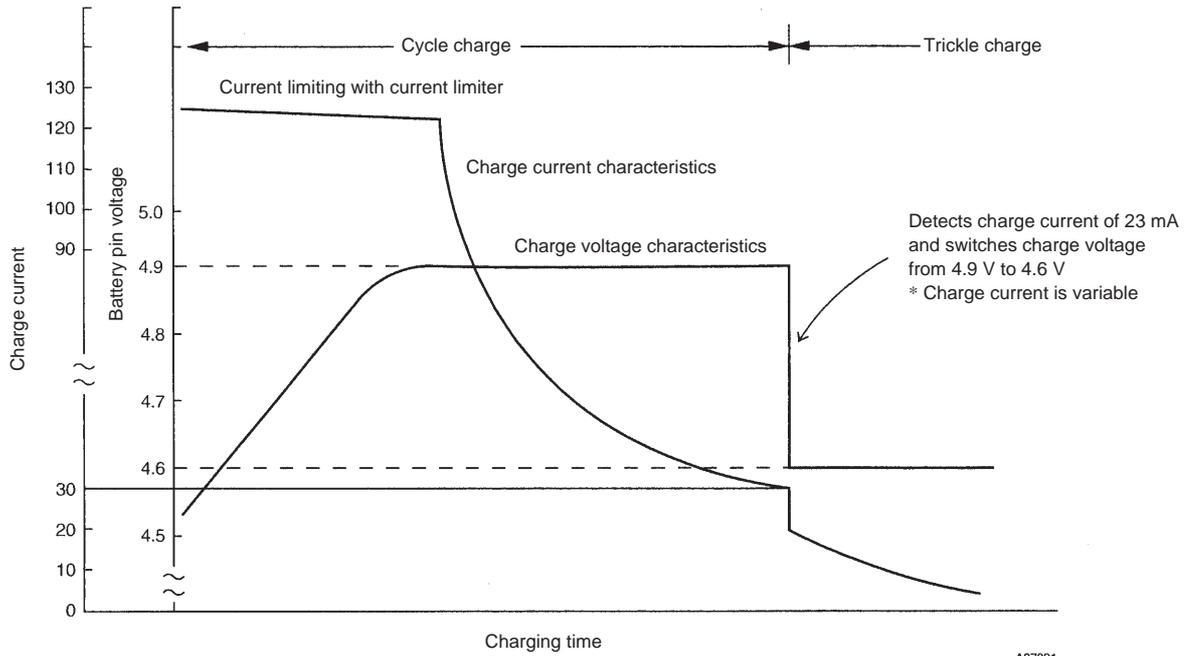


Pin Assignment



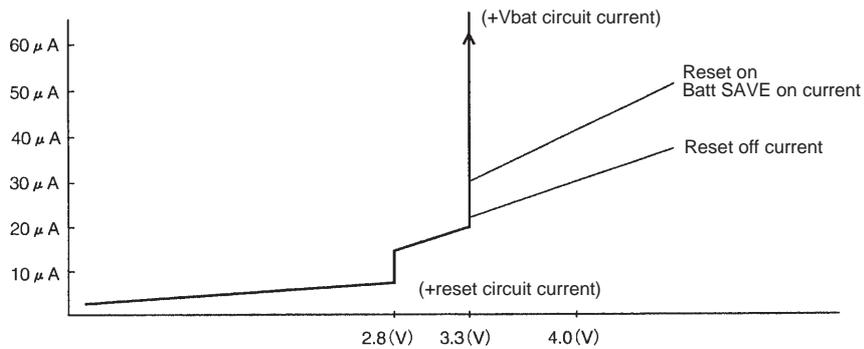
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Battery Charger Charging Characteristics



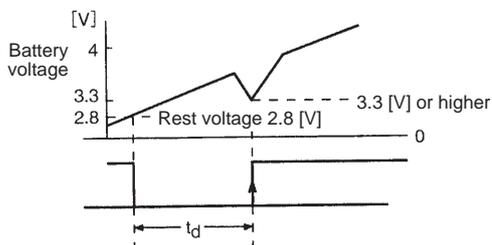
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Current Drain Characteristics



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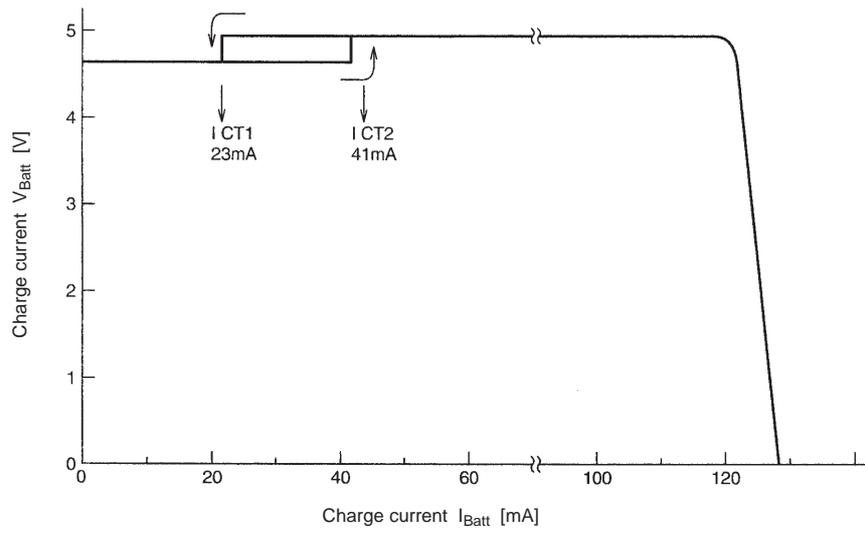
Relationship between Reset and Battery Circuit



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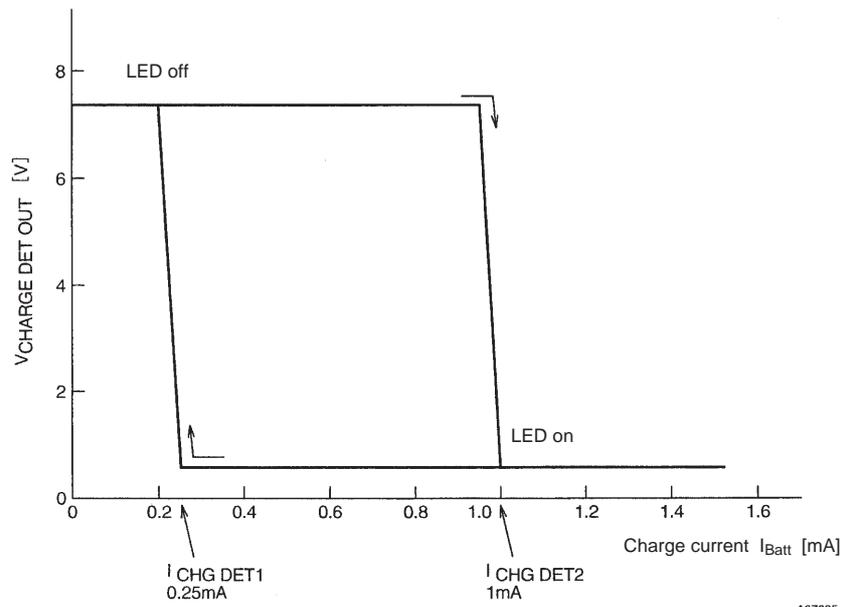
The V_{Batt} circuit operates at the edge where the reset voltage becomes Hi. (At this time, the output transistors are set on and the load is put on; If this voltage is 3.3 [V] or higher, the V_{Batt} circuit operates, and if it is lower than 3.3 [V], it does not start up.

Cycle ↔ Trickle Switching Hysteresis



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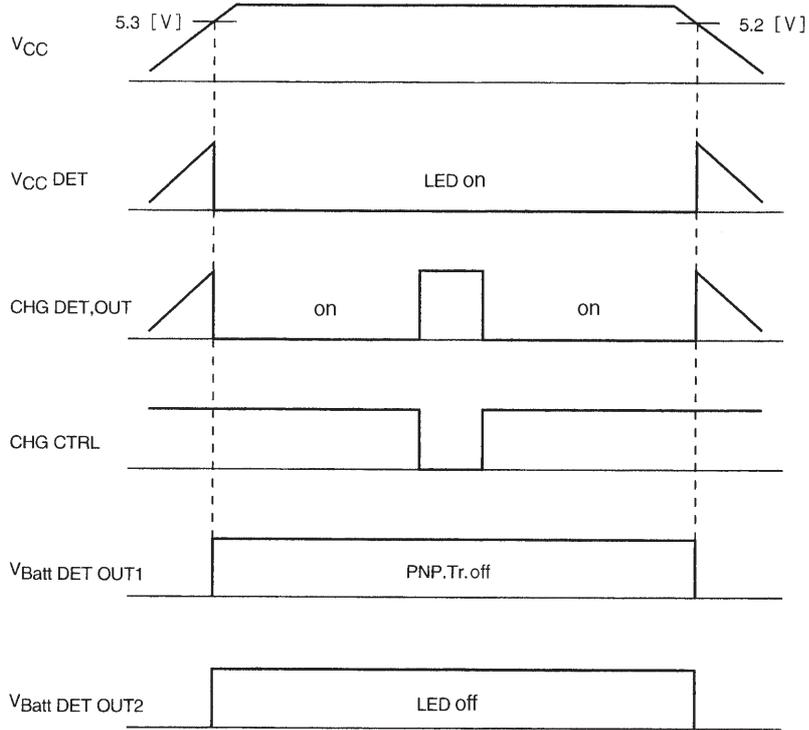
Charge Detection Hysteresis



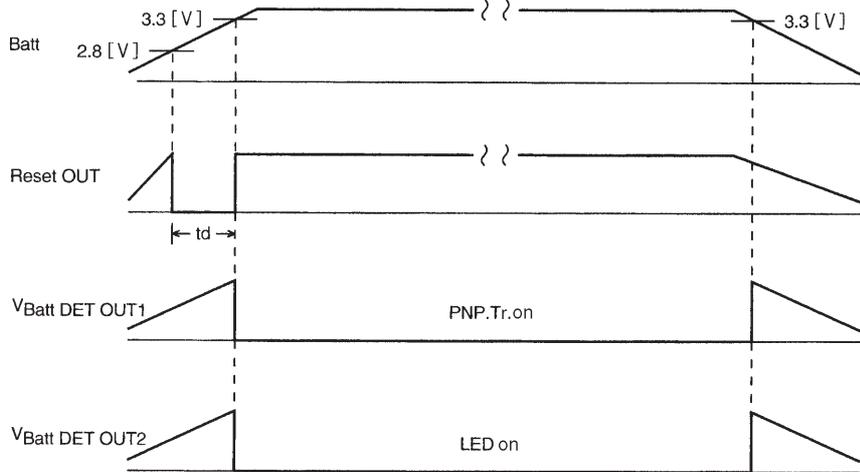
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Timing Charts

(Battery provided)

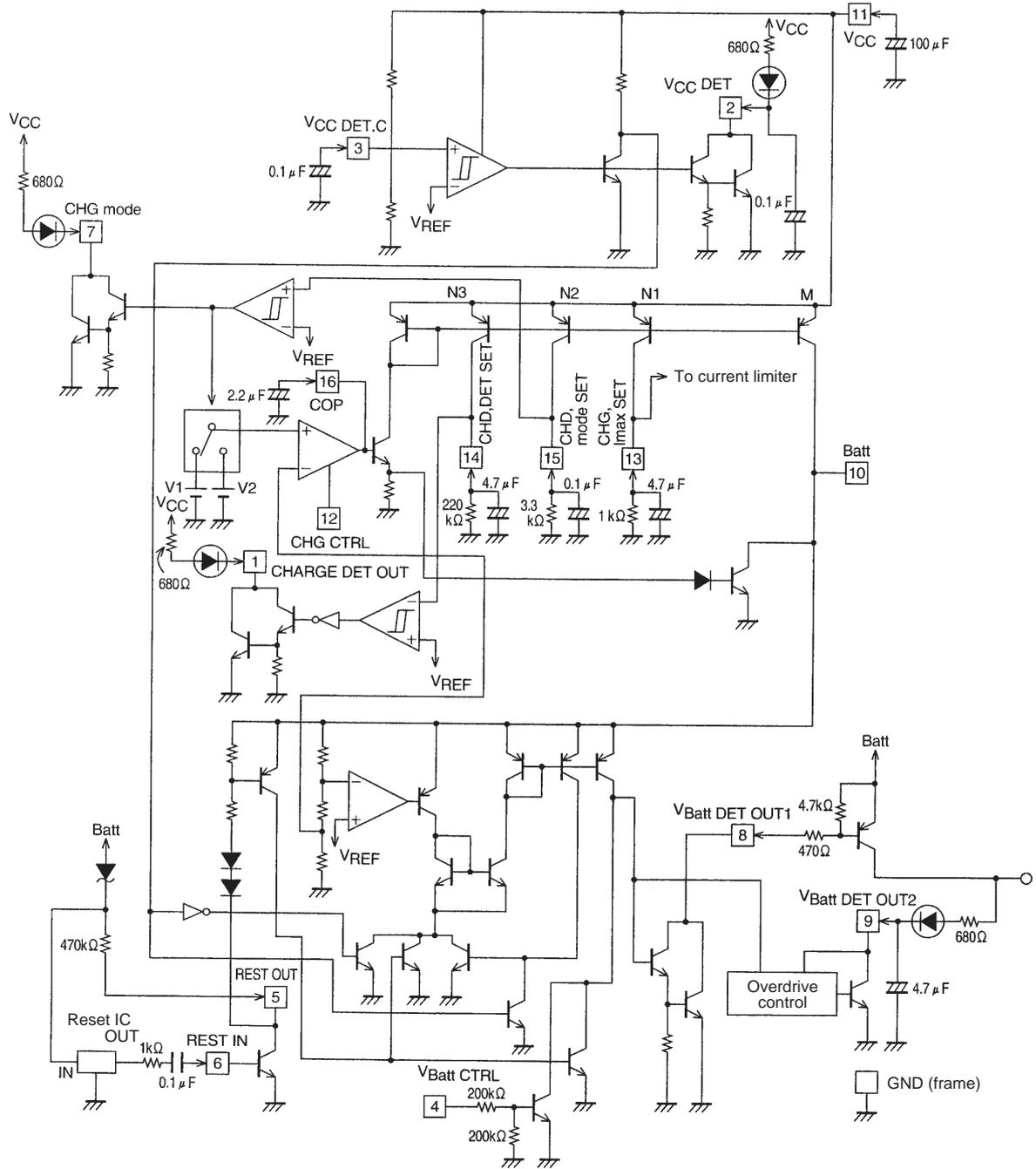


(Battery only)



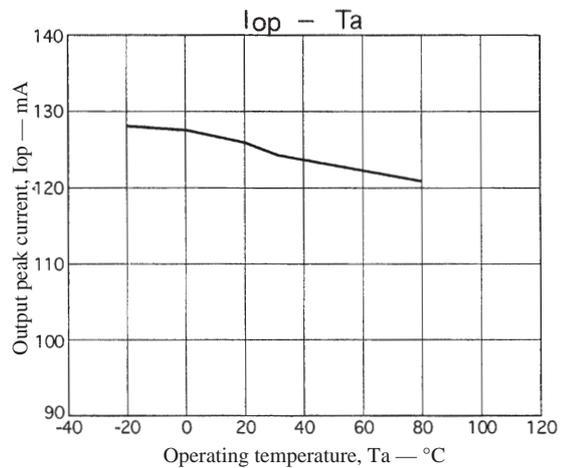
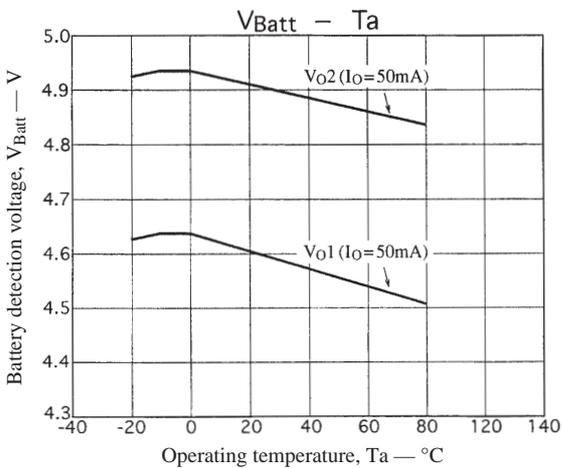
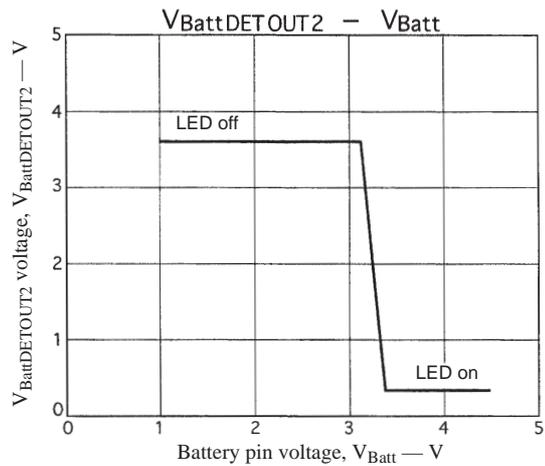
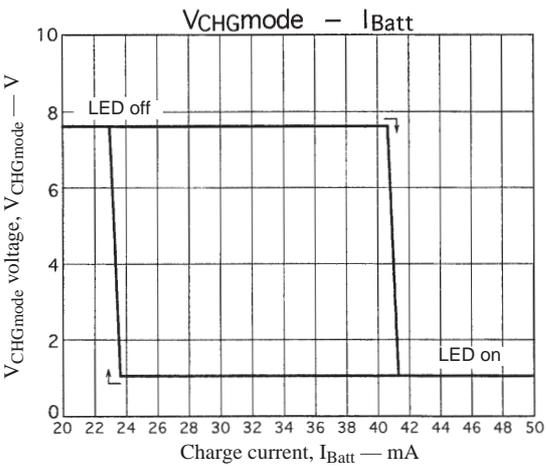
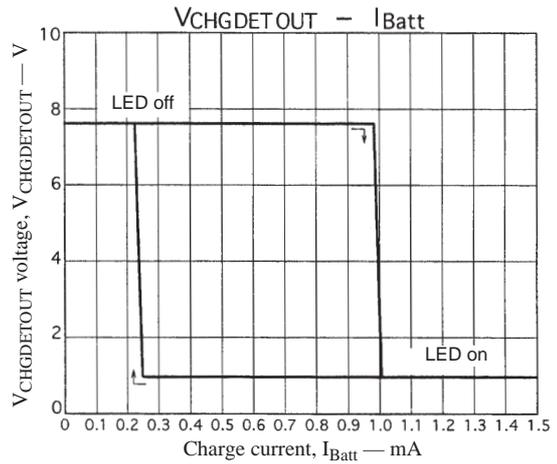
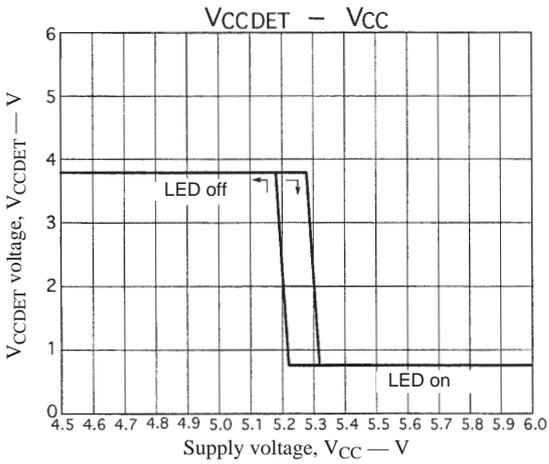
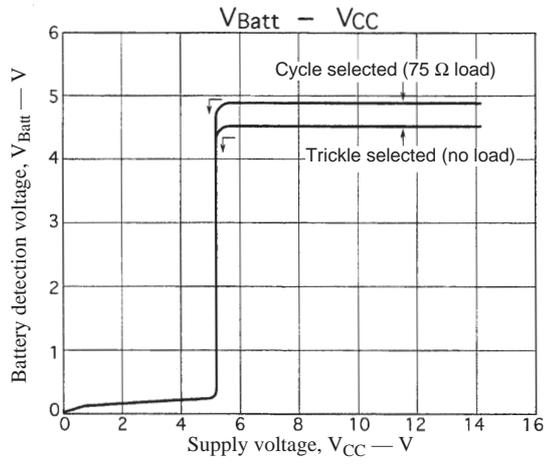
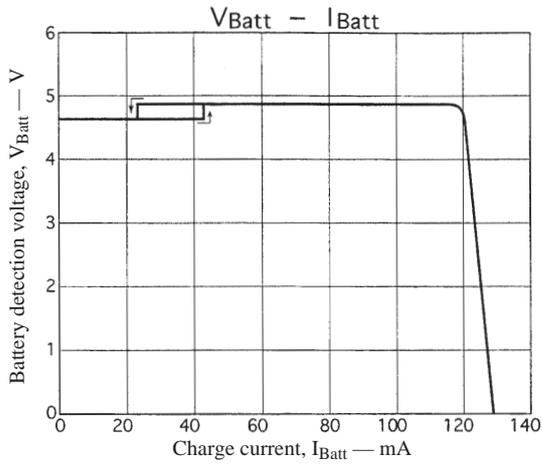
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Block Diagram



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- 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.



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