



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.

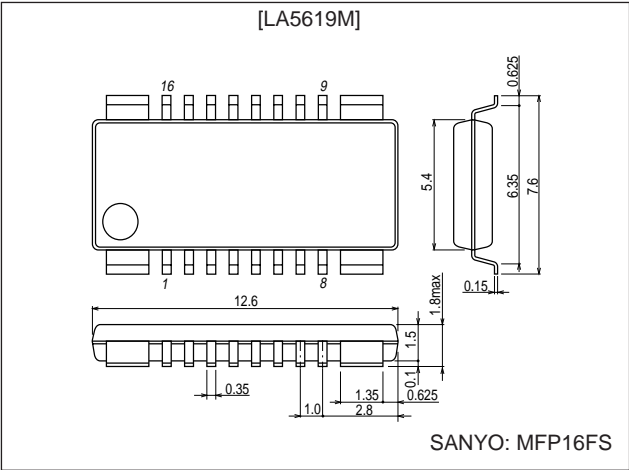
Functions

- 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 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	P _d max		0.7	W
Operating temperature	T _{opr}		–20 to +80	°C
Storage temperature	T _{stg}		–30 to +125	°C

Operating Conditions at Ta = 25°C

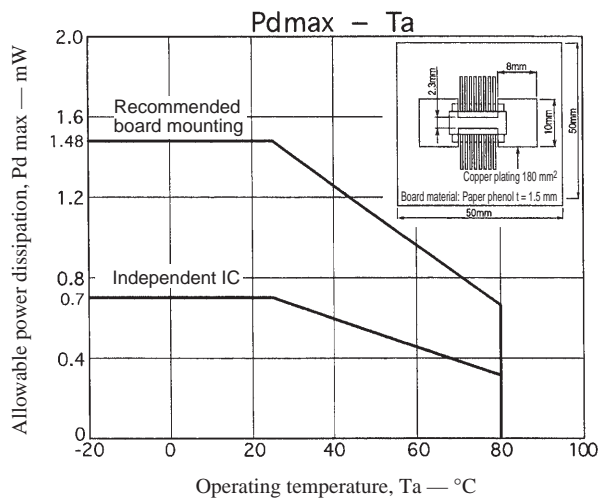
Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V _{CC}		5.5 to 14.5	V
Battery pin voltage	V _{Battery} IN		0 to 5.5	V
CHARGE LED sink current	I _{CHG-LED}		0 to 40	mA
DET.LED sink current	I _{DET-LED}		0 to 40	mA
V _{BAT} sink current	I _{BAT-LED}		0 to 40	mA

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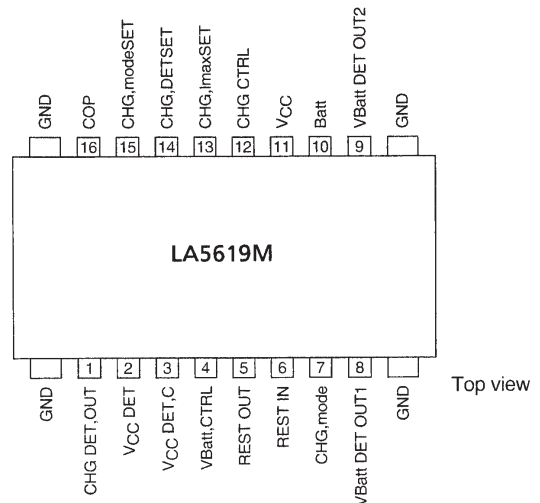
LA5619M

Operating Characteristics at Ta = 25°C, VCC = 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	V _{dif}	ΔV _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

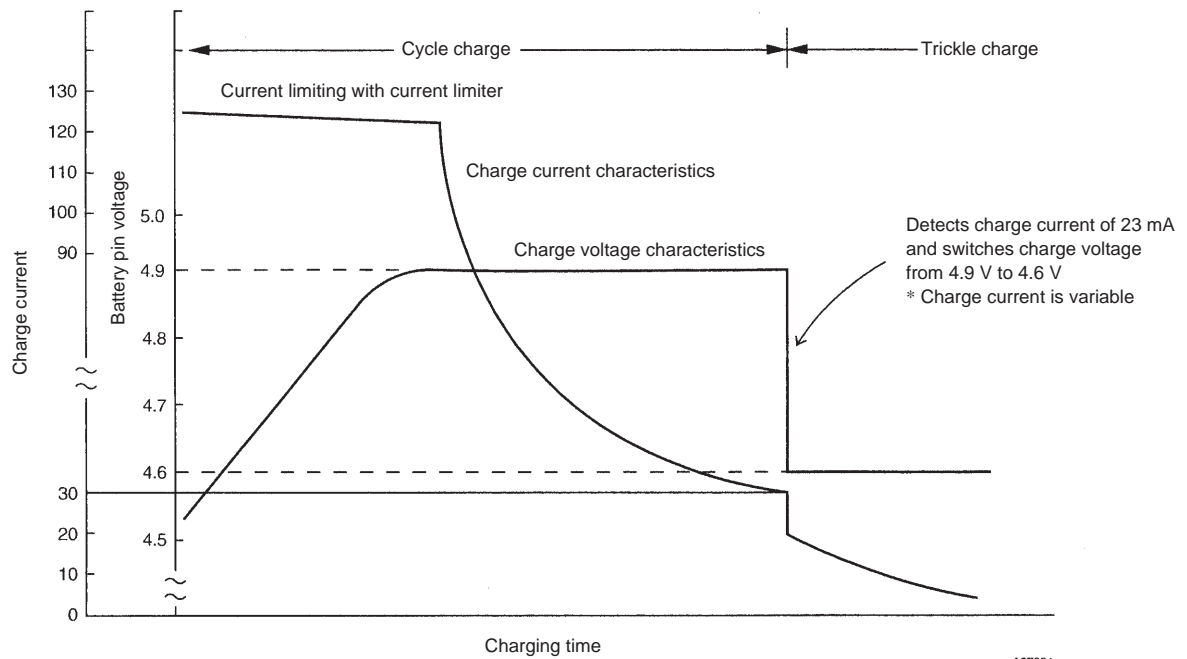


Pin Assignment



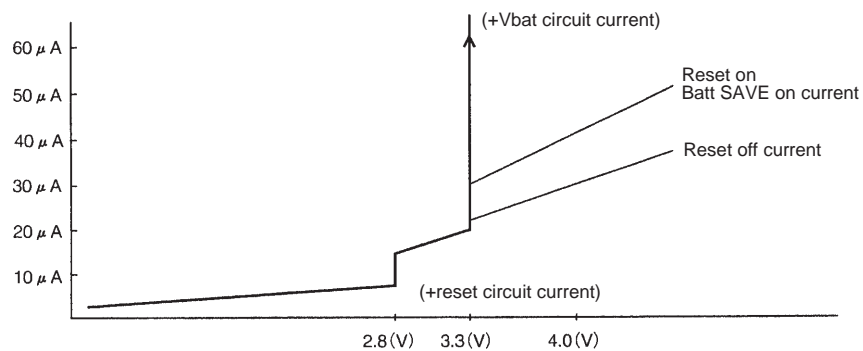
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Battery Charger Charging Characteristics



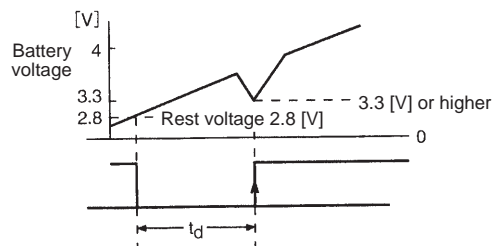
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Current Drain Characteristics



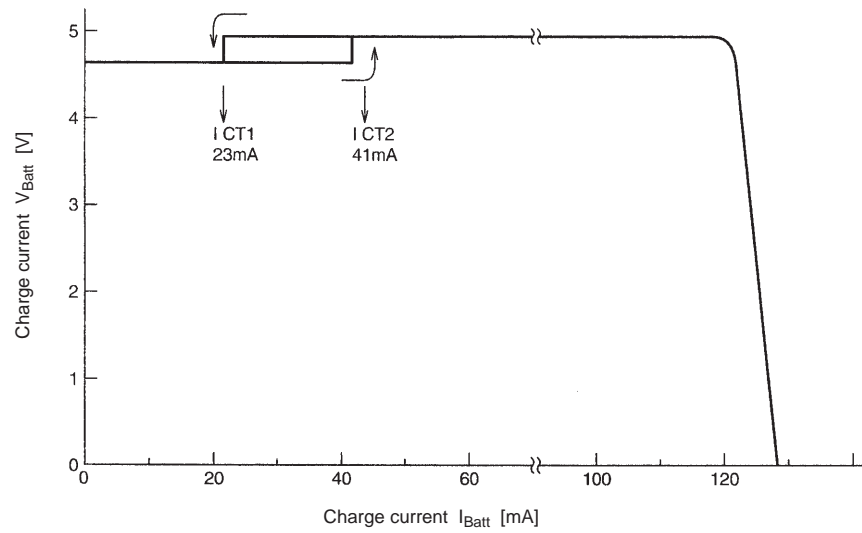
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Relationship between Reset and Battery Circuit

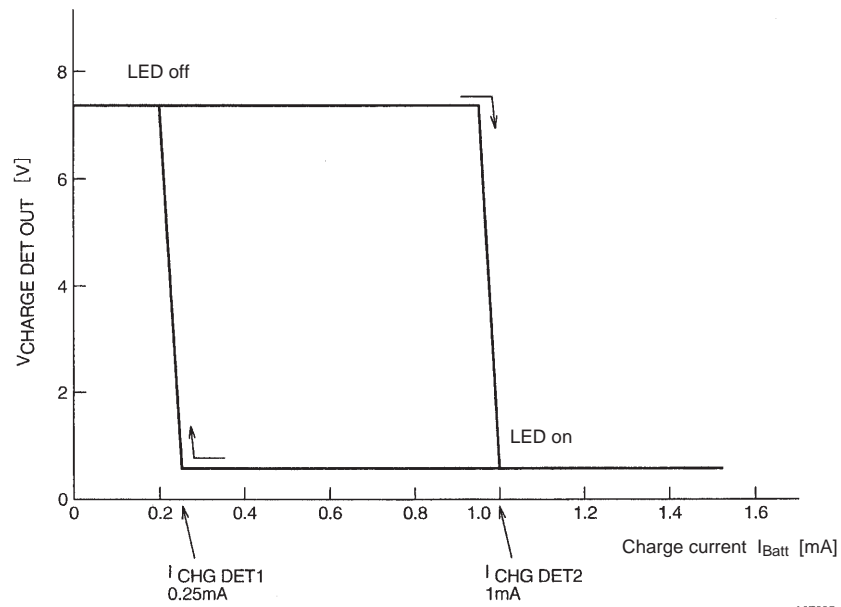


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The V_{Batt} circuit operates at the edge where the reset voltage becomes Hi. (At this time, the output transistors are set on and the load is put on; If this voltage is 3.3 [V] or higher, the V_{Batt} circuit operates, and if it is lower than 3.3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

Cycle ↔ Trickle Switching Hysteresis

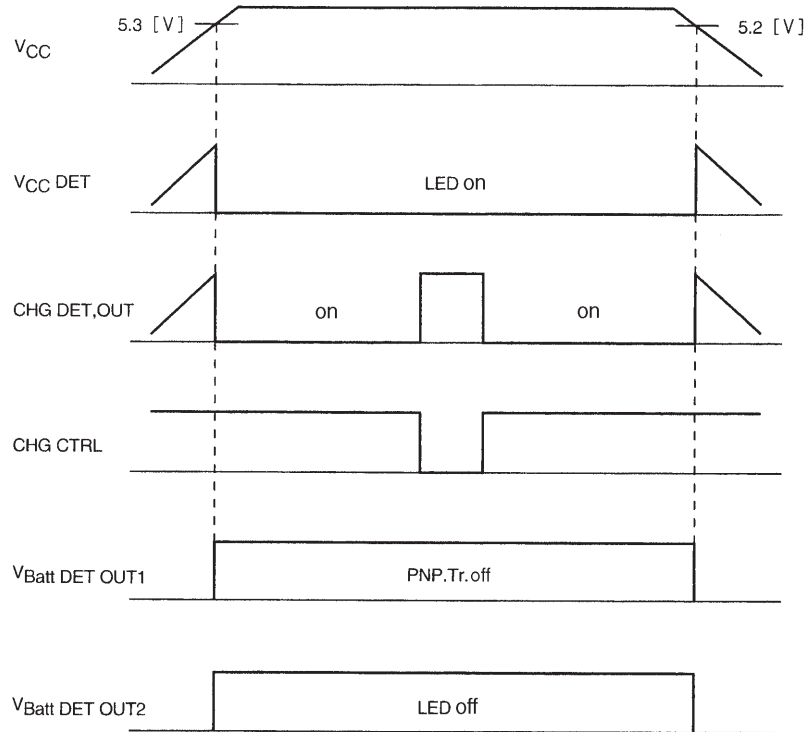
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Charge Detection Hysteresis

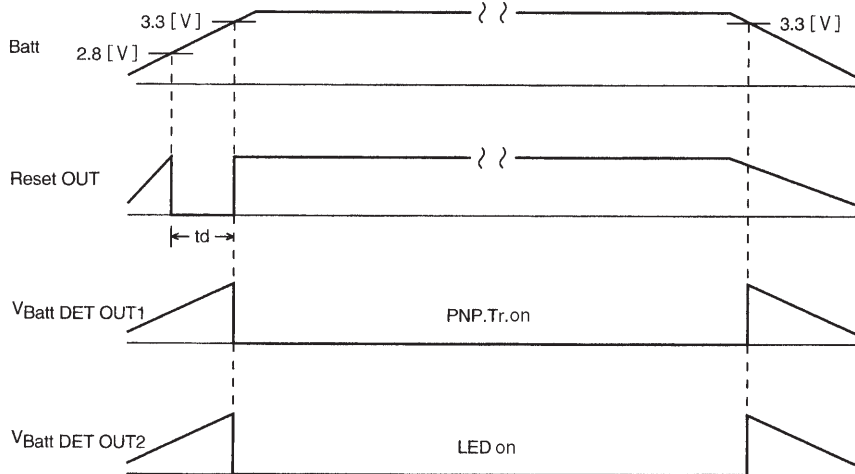
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Timing Charts

(Battery provided)

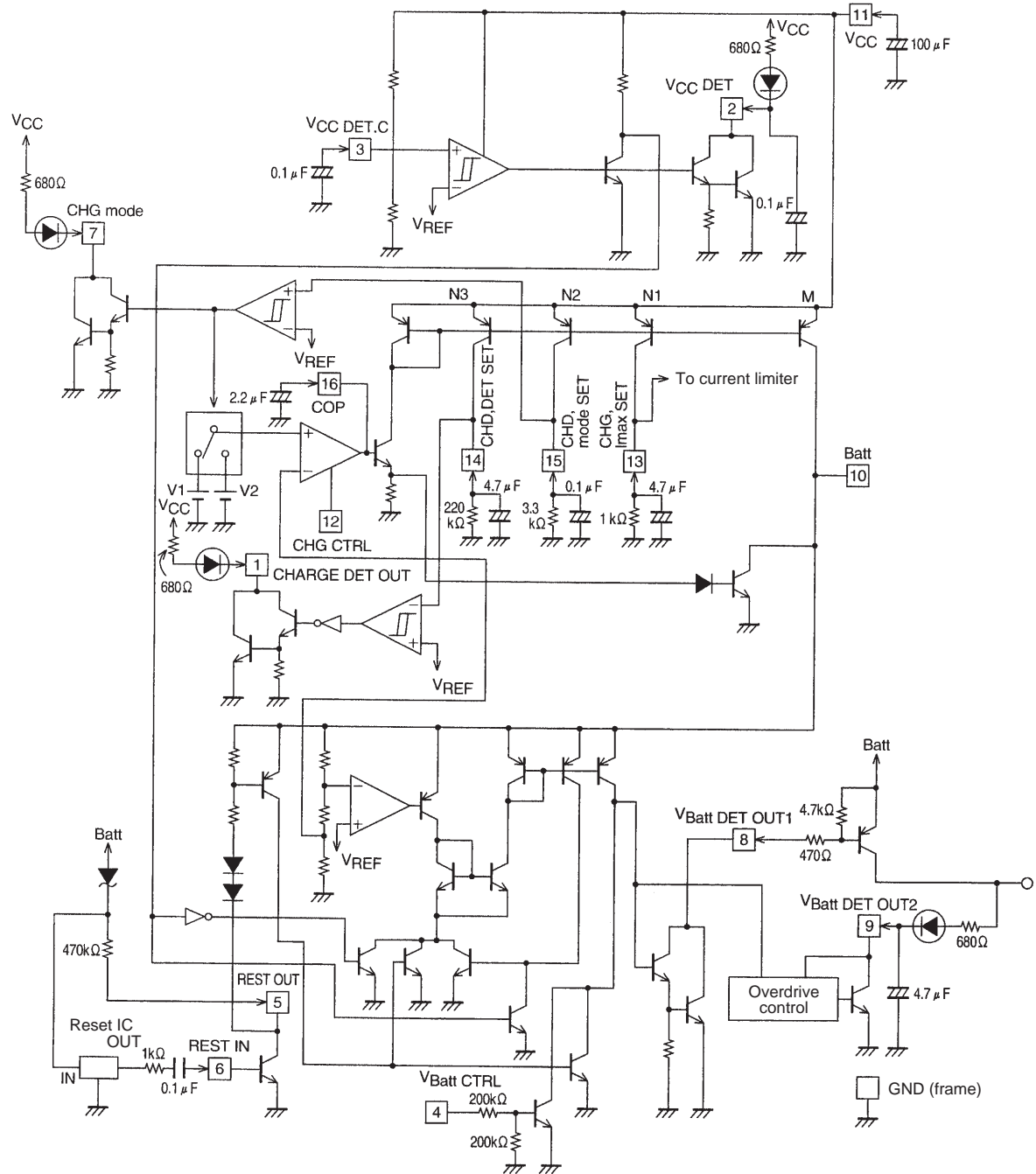


(Battery only)



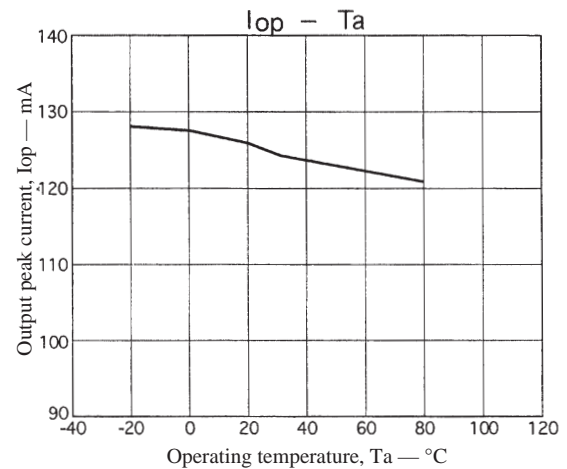
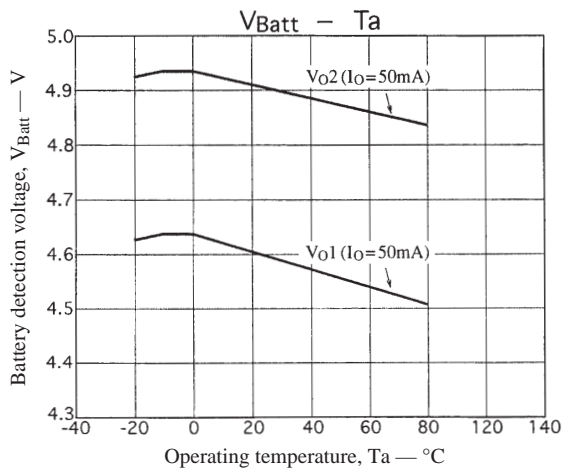
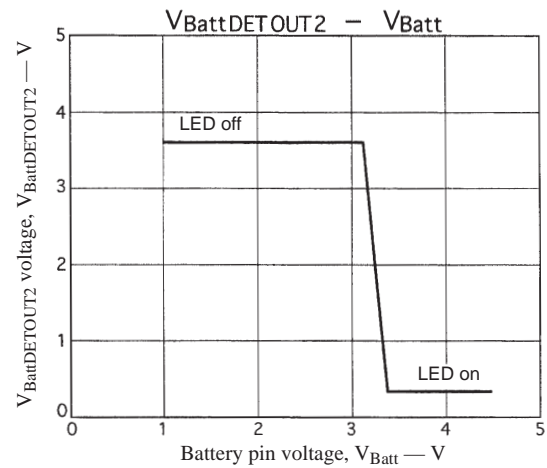
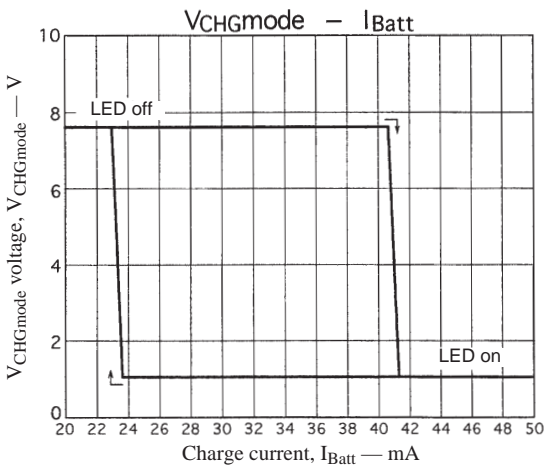
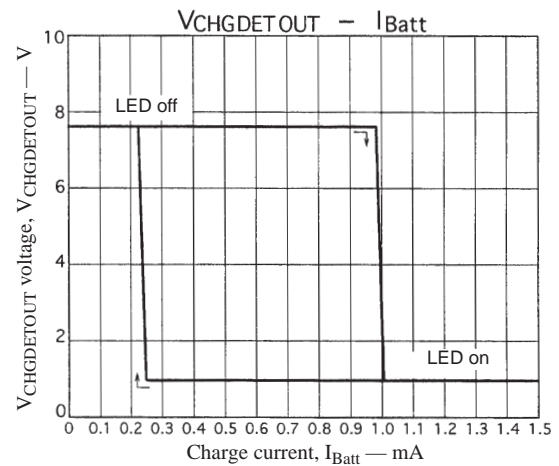
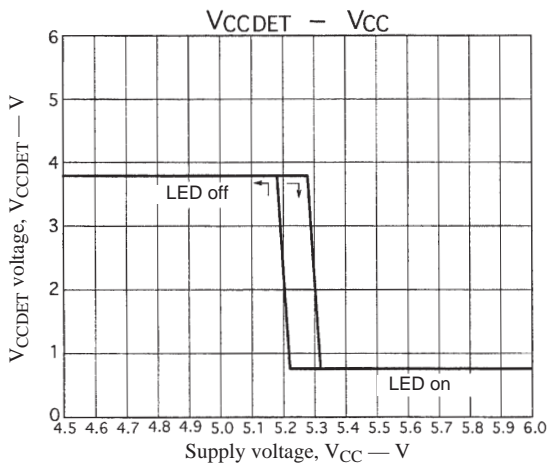
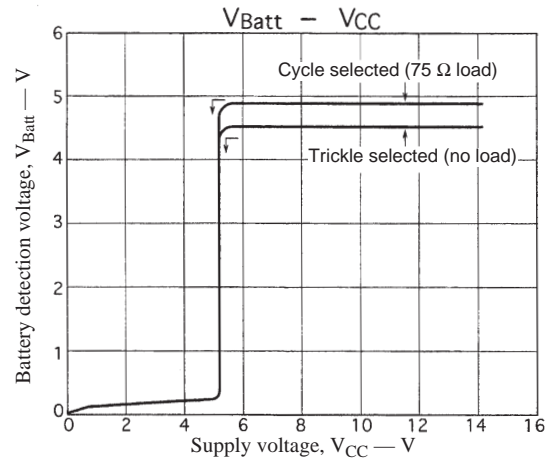
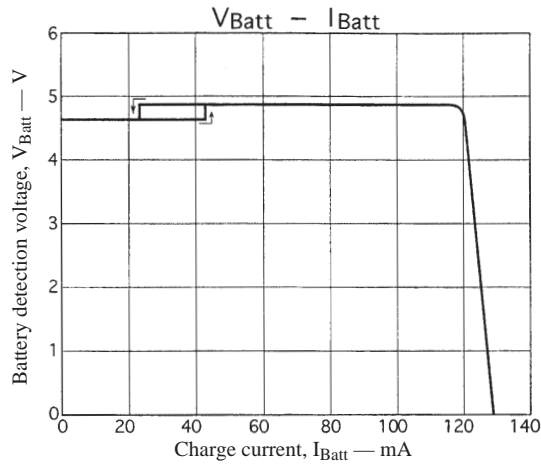
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Block Diagram



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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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