



# LA5615M

## Lead Battery Charger IC with Battery Voltage Detection Function

### Overview

The LA5615M is an IC that integrates a battery voltage detection and lead battery charger on a single chip that supports compact sets.

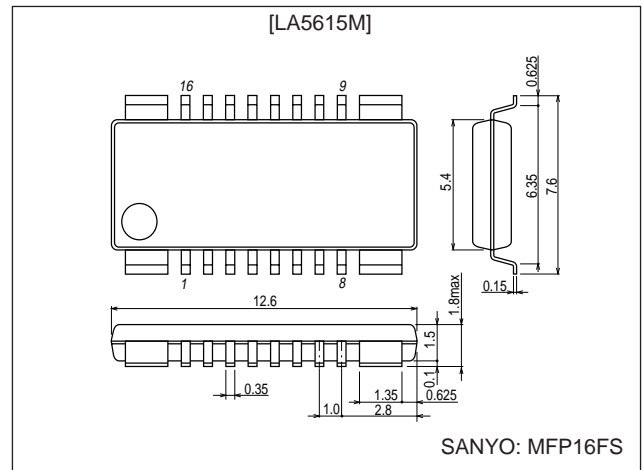
### Functions and Features

- Charge voltage can be switched between cycle charge and trickle charge (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	$V_{Batt}$ max		6	V
Allowable power dissipation	$P_d$ max		0.7	mW
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	$V_{CC}$		6.15 to 14.5	V
Battery pin voltage	$V_{Batt IN}$		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
$V_{Batt}$ sink current	$I_{Batt-LED}$		0 to 40	mA

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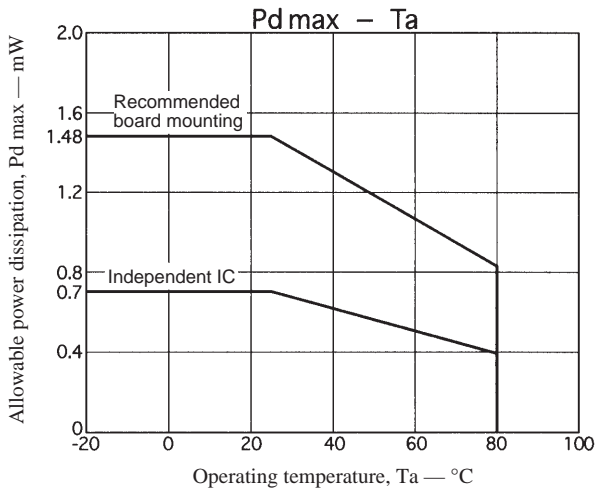
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## LA5615M

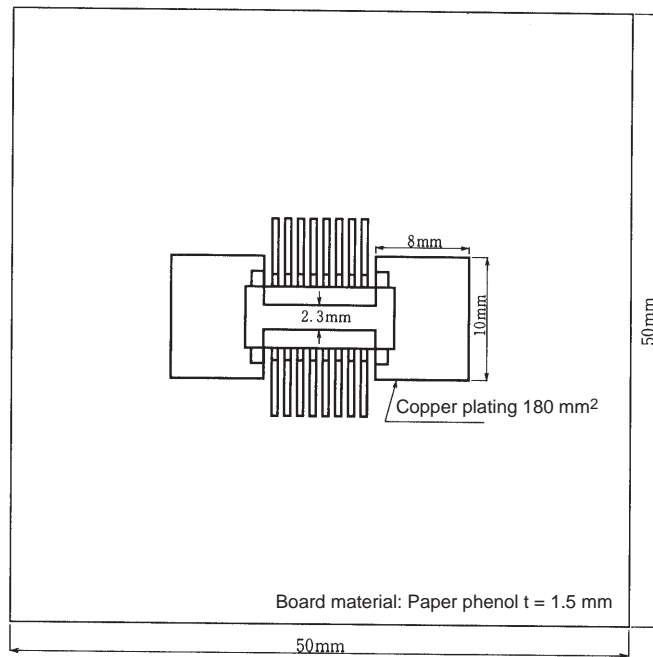
### Electrical Characteristics at $T_a = 25^\circ\text{C}$ , $V_{CC} = 9\text{ V} = V_{\text{Batt}}$ $I_N = 4\text{ V}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[Charge System]						
Charge voltage (when trickle is selected)	$V_{O1}$	$I_O = 10\text{ mA}$	4.45	4.6	4.75	V
Charge voltage (when cycle is selected)	$V_{O2}$	$I_O = 50\text{ mA}$	4.75	4.9	5.05	V
Differential voltage of $V_{O2}$ and $V_{O1}$	$\Delta V_O$	$\Delta V_O = V_{O2} - V_{O1}$	0.2	0.3	0.4	V
Cycle trickle switching current	$I_{CT}$		34	40	46	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	$I_{Q1}$	$I_O = 0\text{ mA}$		6	10	mV
	$I_{Q2}$	$I_O = 50\text{ mA}$		13	21	mA
CHARGE LED residual voltage	$V_{\text{CHG-LED}}$	$I_{IN} = 40\text{ mA}$		1.1	1.3	V
CHARGE LED leak current	$I_{\text{CHG-LED}}$	$V_{IN} = 9\text{ V}$			200	nA
CHARGE detection current	$I_{\text{CHARGED}}$		0.8	1	1.2	mA
DET LED residual voltage	$V_{\text{DET}}$	$I_{IN} = 40\text{ mA}$		1.1	1.3	V
DET LED leak current	$I_{\text{DET}}$	$V_{IN} = 9\text{ V}$			200	nA
POWER DET detection voltage	$V_{\text{DET-IN}}$		5.85	6.05	6.15	V
POWER DET hysteresis width	$V_{\text{DET-HYS}}$		0.1	0.2	0.3	V
[Battery Detection System]						
Battery detection voltage	$V_{\text{Batt}}$		3.17	3.3	3.43	V
$V_{\text{BAT}}$ pin residual voltage	$V_{\text{BAT}}$	$I_{IN} = 40\text{ mA}$		0.3	0.5	V
$V_{\text{BAT}}$ pin leak current	$I_{\text{BAT}}$	$V_{IN} = 5\text{ V}$			200	nA
Current drain when detection circuit is OFF	$I_{\text{OFF}}$	$V_{\text{Batt}} = 2.5\text{ V}$		5	6	$\mu\text{A}$
Current drain when detection circuit is ON	$I_{\text{ON}}$	No load		350	500	$\mu\text{A}$
Current drain during Battery SAVE	$I_{\text{SAVE}}$	$V_{\text{Batt. SAVE}} = 4\text{ V}$		20	30	$\mu\text{A}$
Battery B residual voltage	$V_{\text{BAT-B}}$	$I_{IN} = 40\text{ mA}$		1.1	1.3	V
[Internal transistors for reset]						
REST residual voltage	$V_{\text{REST}}$	$\text{REST.IN} = 2\ \mu\text{A}$ , $I_{IN} = 50\ \mu\text{A}$		0.3	0.5	V
REST leak current	$I_{\text{REST}}$	$V_{IN} = 5\text{ V}$			200	nA
[Internal transistors for reset]						
Threshold voltage	$V_{\text{SAVE-TH.}}$		1.1	1.27	1.5	V
SAVE pin input current	$I_{\text{SAVE-IN}}$	$V_{IN} = 4\text{ V}$		17	24	$\mu\text{A}$

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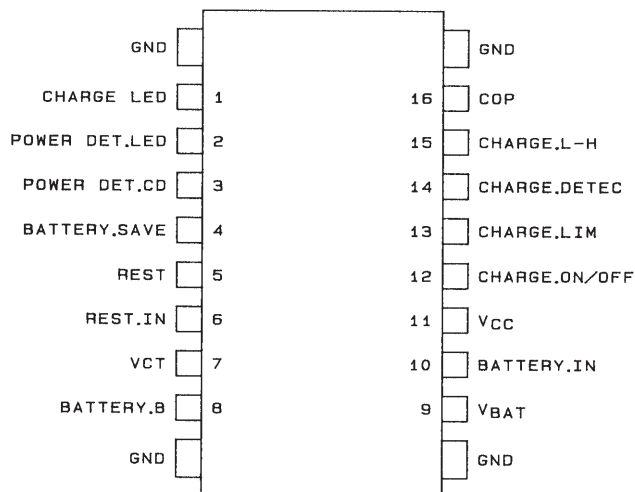


## Recommended Board



T00004

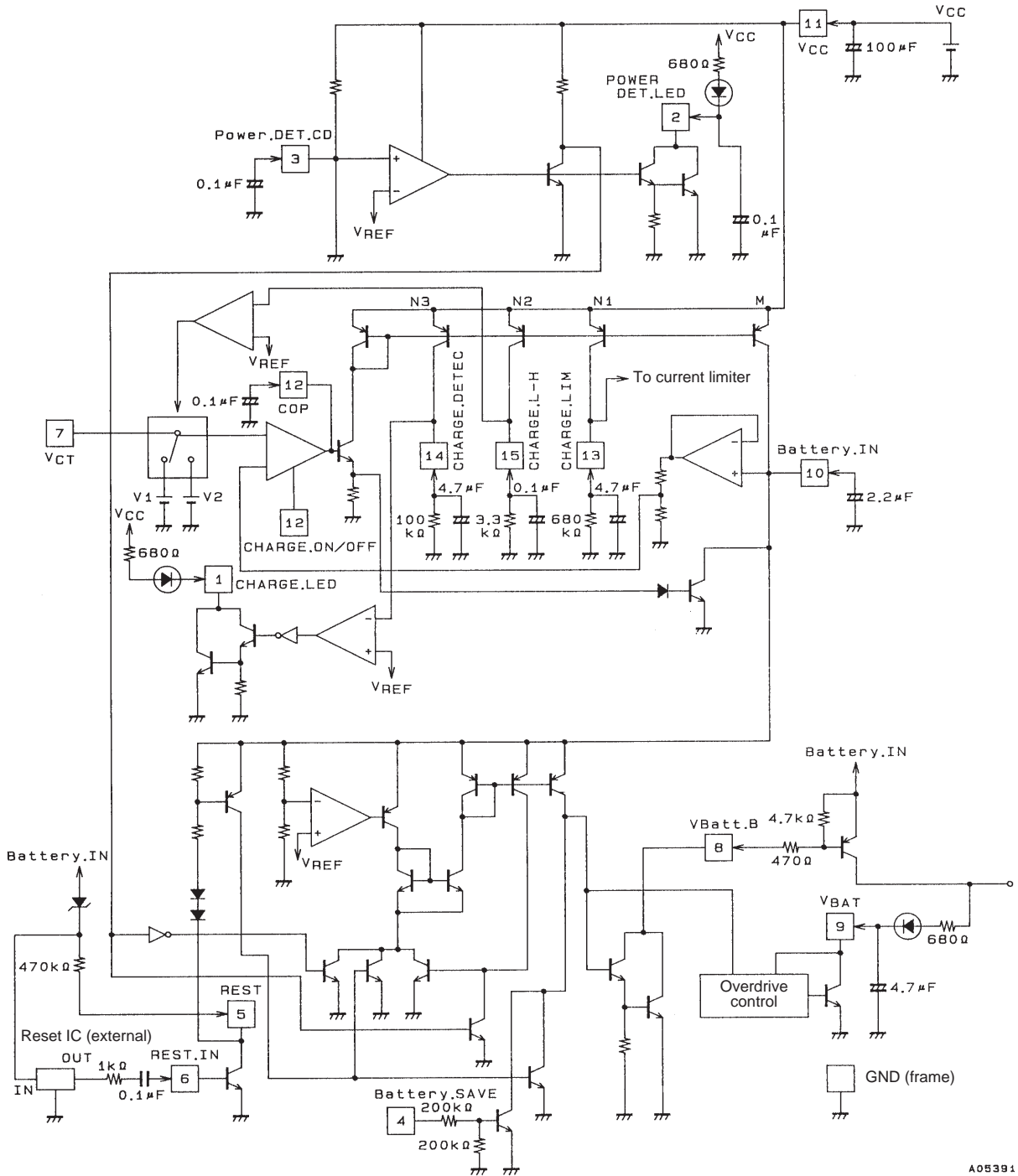
## Pin Assignment



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# LA5615M

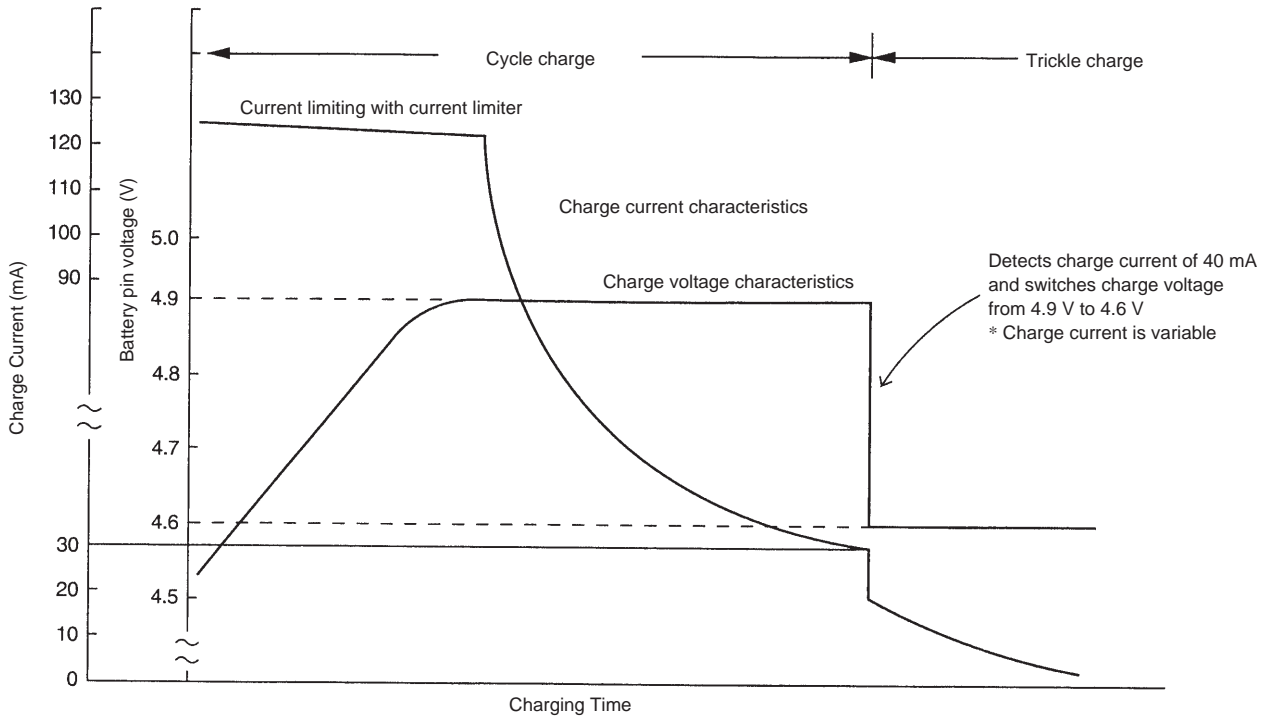
## Sample Application Circuit



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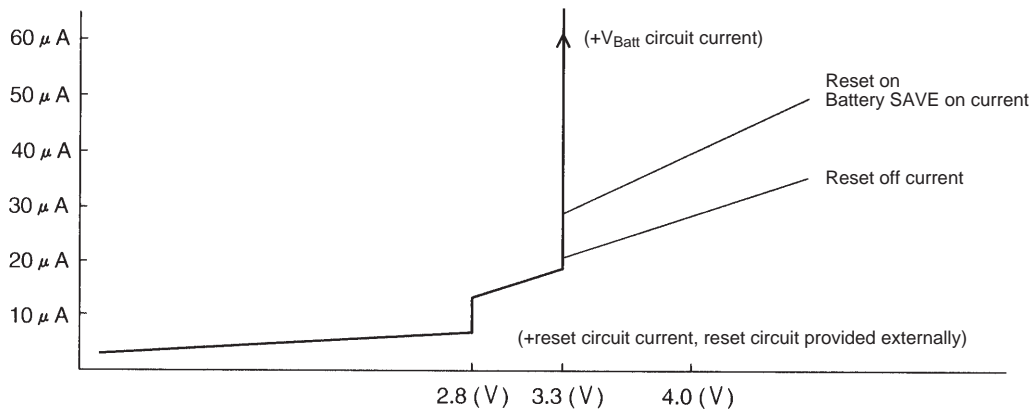
- Notes: 1. Use capacitors with little temperature-related capacitance fluctuation (Sanyo capacitors, etc.).  
 2. The reset IC must be provided externally.

Battery Charger Charging Characteristics



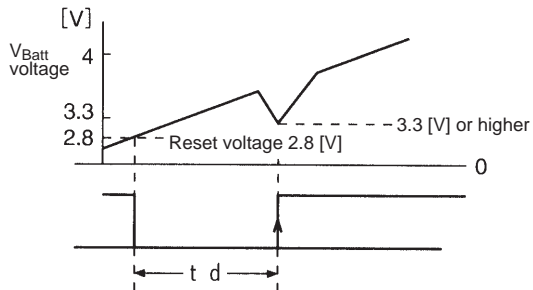
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Current Drain Characteristics



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Relationship between Reset and  $V_{Batt}$  Circuit

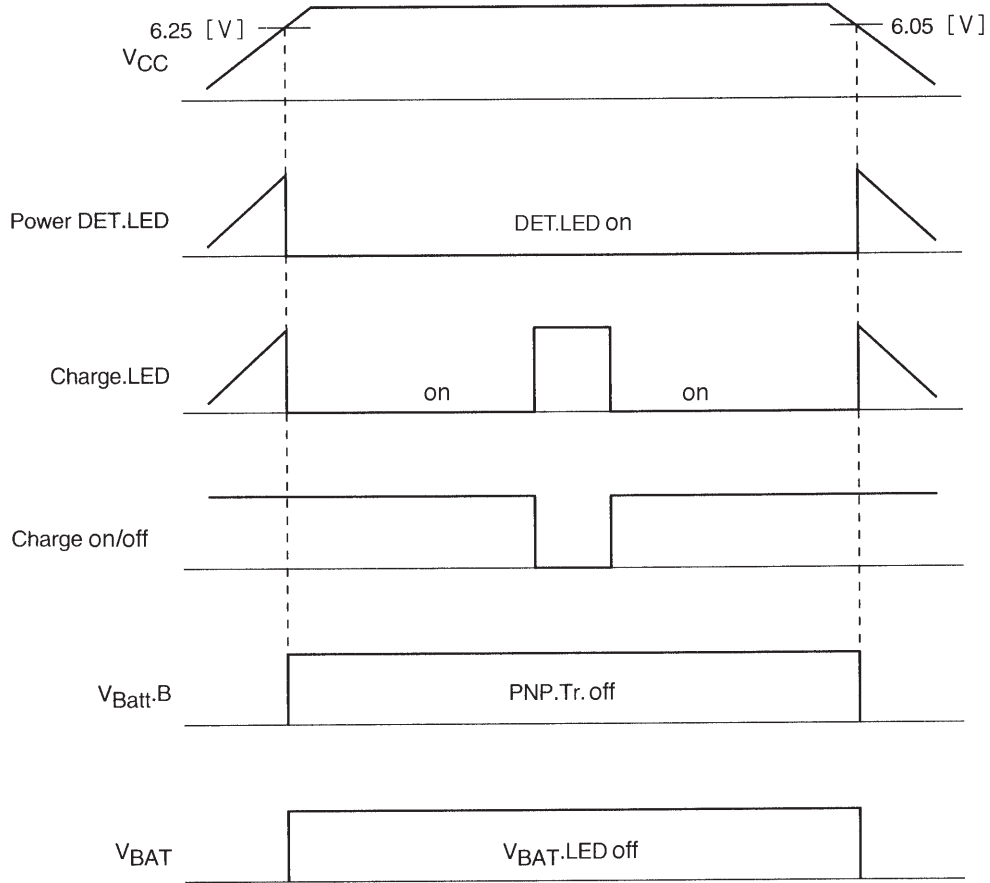


The  $V_{Batt}$  circuit operates at the edge where the reset voltage becomes Hi. (At this time, the output transistors are set on and the load put on; If this voltage is 3.3 [V] or higher, the  $V_{Batt}$  circuit operates, and if it is lower than 3.3 [V], it does not start up.)

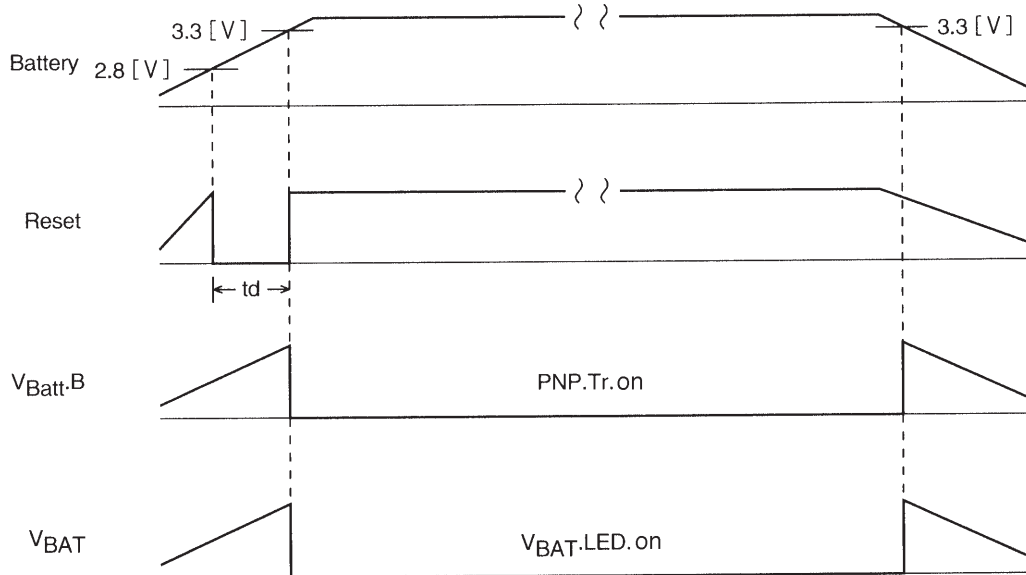
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Timing Charts

(Battery provided)



(Battery only)



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