

Ordering number :ENN5285

Monolithic linear IC



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.

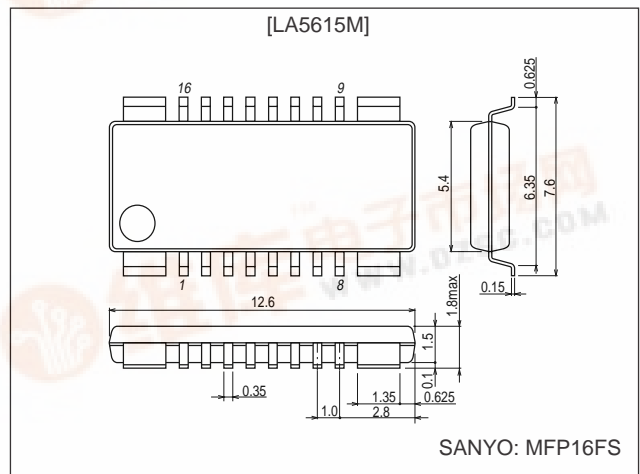
Functions and Features

- 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 Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|-----------------------------|-----------------------|------------|-------------|------|
| Supply voltage | V _{CC} max | | 15 | V |
| Battery pin voltage | V _{Batt} max | | 6 | V |
| Allowable power dissipation | Pd max | | 0.7 | mW |
| 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} | | 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 |

- Any and all SANYO products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your SANYO representative nearest you before using any SANYO products described or contained herein in such applications.
- SANYO assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all SANYO products described or contained herein.

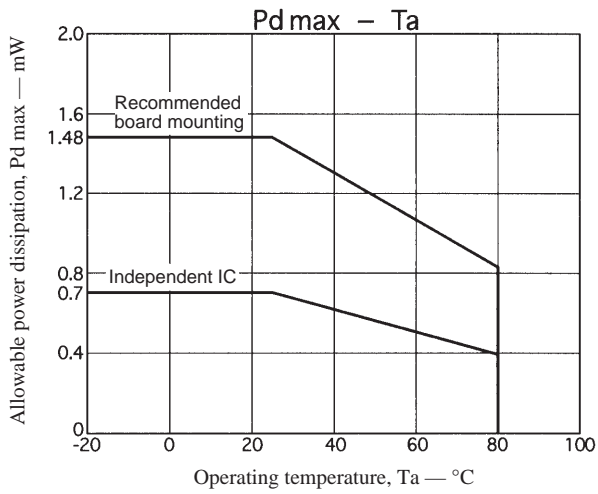


LA5615M

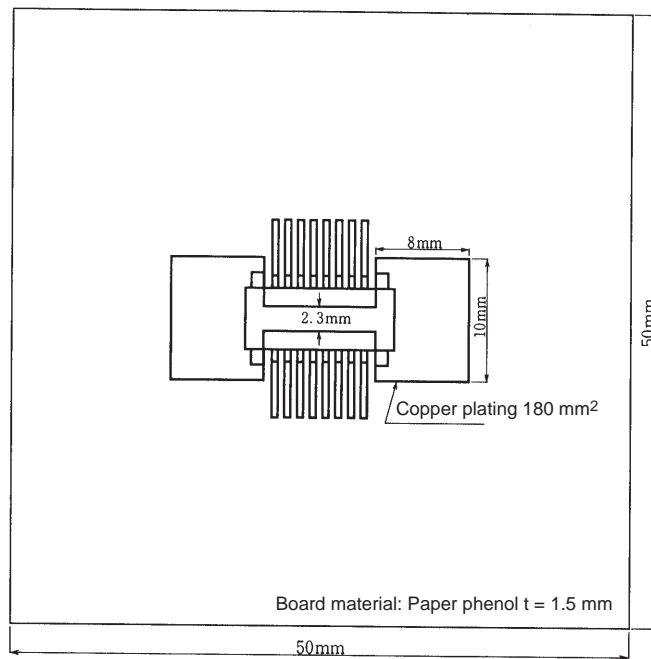
Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 9\text{ V} = V_{\text{Batt}}$ $I_{\text{IN}} = 4\text{ V}$

| 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} | ΔV_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 | $V_{\text{CHG-LED}}$ | $I_{\text{IN}} = 40\text{ mA}$ | | 1.1 | 1.3 | V |
| CHARGE LED leak current | $I_{\text{CHG-LED}}$ | $V_{\text{IN}} = 9\text{ V}$ | | | 200 | nA |
| CHARGE detection current | I_{CHARGED} | | 0.8 | 1 | 1.2 | mA |
| DET LED residual voltage | V_{DET} | $I_{\text{IN}} = 40\text{ mA}$ | | 1.1 | 1.3 | V |
| DET LED leak current | I_{DET} | $V_{\text{IN}} = 9\text{ V}$ | | | 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_{Batt} | | 3.17 | 3.3 | 3.43 | V |
| V_{BAT} pin residual voltage | V_{BAT} | $I_{\text{IN}} = 40\text{ mA}$ | | 0.3 | 0.5 | V |
| V_{BAT} pin leak current | I_{BAT} | $V_{\text{IN}} = 5\text{ V}$ | | | 200 | nA |
| Current drain when detection circuit is OFF | I_{OFF} | $V_{\text{Batt}} = 2.5\text{ V}$ | | 5 | 6 | μA |
| Current drain when detection circuit is ON | I_{ON} | No load | | 350 | 500 | μA |
| Current drain during Battery SAVE | I_{SAVE} | $V_{\text{Batt. SAVE}} = 4\text{ V}$ | | 20 | 30 | μA |
| Battery B residual voltage | $V_{\text{BAT-B}}$ | $I_{\text{IN}} = 40\text{ mA}$ | | 1.1 | 1.3 | V |
| [Internal transistors for reset] | | | | | | |
| REST residual voltage | V_{REST} | $\text{REST.IN} = 2\ \mu\text{A}$, $I_{\text{IN}} = 50\ \mu\text{A}$ | | 0.3 | 0.5 | V |
| REST leak current | I_{REST} | $V_{\text{IN}} = 5\text{ V}$ | | | 200 | nA |
| [Internal transistors for reset] | | | | | | |
| Threshold voltage | $V_{\text{SAVE-TH.}}$ | | 1.1 | 1.27 | 1.5 | V |
| SAVE pin input current | $I_{\text{SAVE-IN}}$ | $V_{\text{IN}} = 4\text{ V}$ | | 17 | 24 | μA |

LA5615M

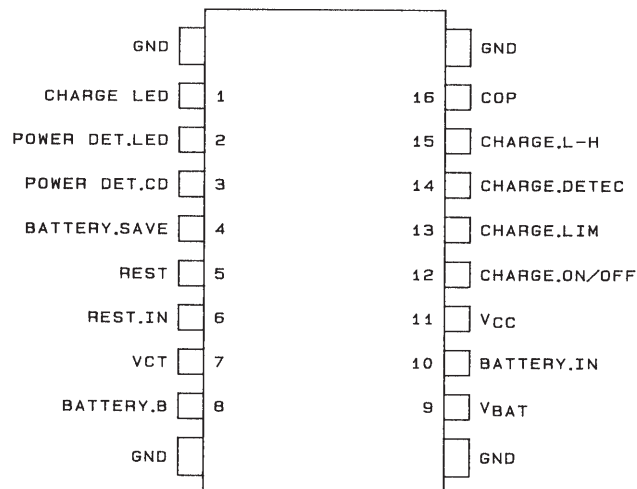


Recommended Board



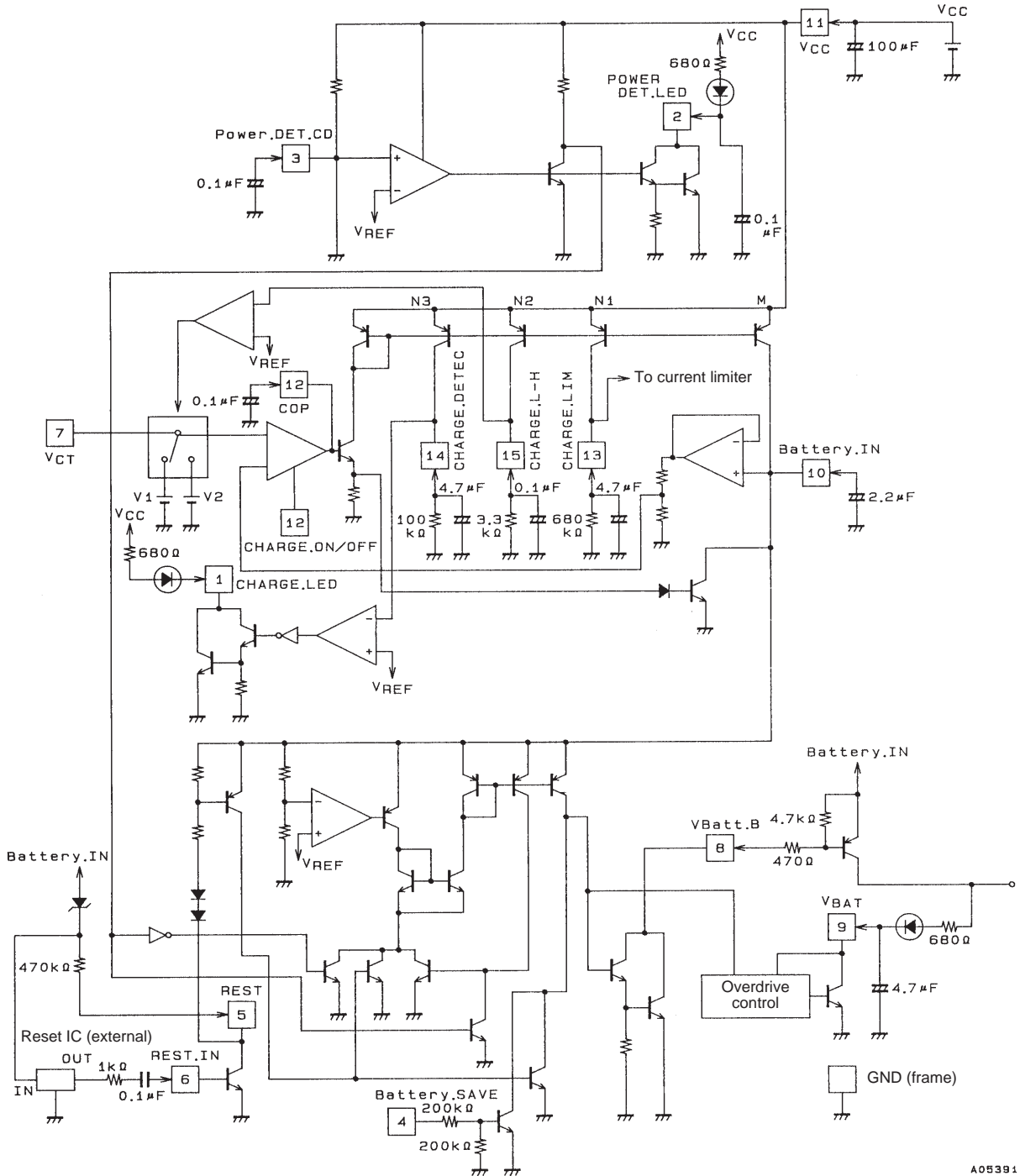
T00004

Pin Assignment



LA5615M

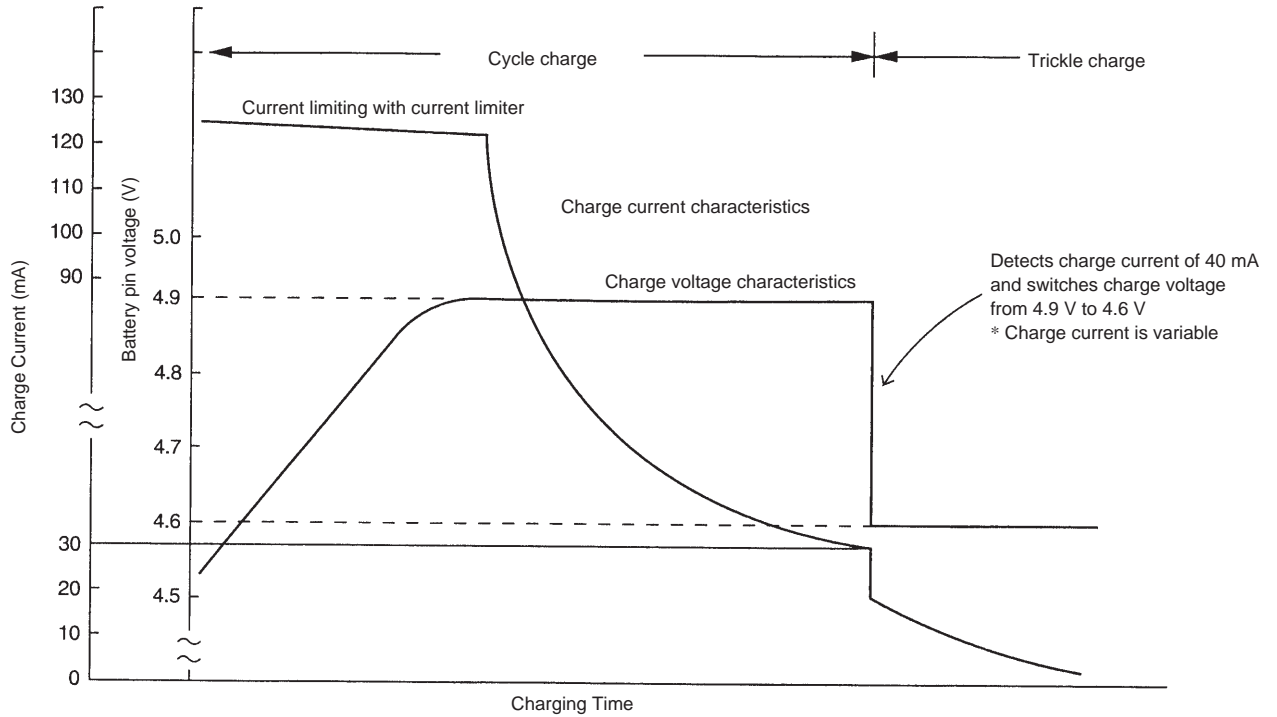
Sample Application Circuit



A05391

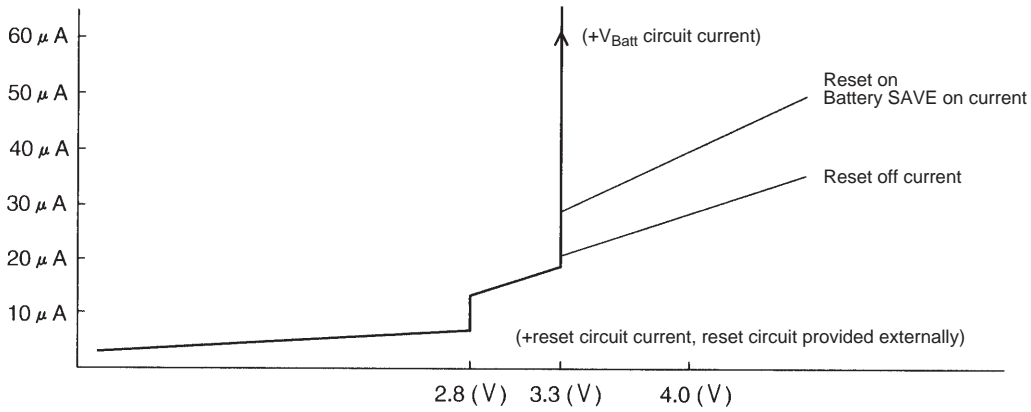
- Notes: 1. Use capacitors with little temperature-related capacitance fluctuation (Sanyo capacitors, etc.).
 2. The reset IC must be provided externally.

Battery Charger Charging Characteristics



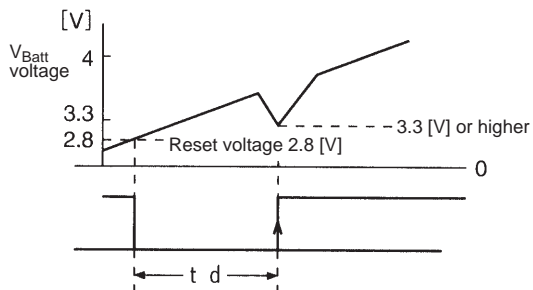
A05392

Current Drain Characteristics



A05393

Relationship between Reset and V_{Batt} Circuit



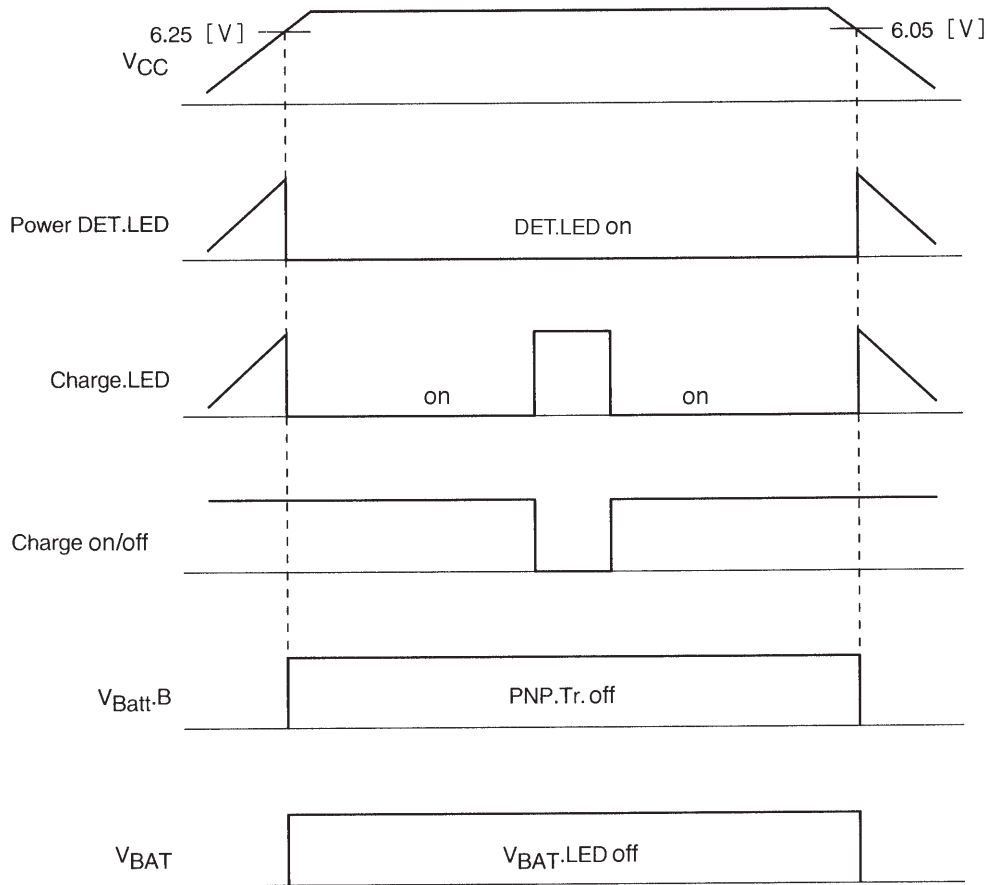
The V_{Batt} circuit operates at the edge where the reset voltage becomes Hi. (At this time, the output transistors are set on and the load put on; If this voltage is 3.3 [V] or higher, the V_{Batt} circuit operates, and if it is lower than 3.3 [V], it does not start up.)

A05394

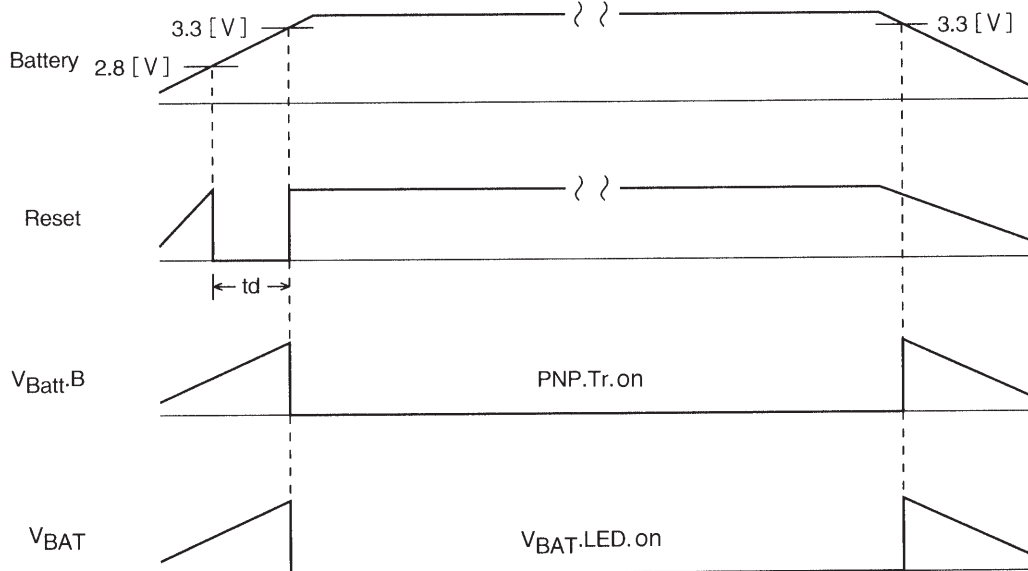
LA5615M

Timing Charts

(Battery provided)



(Battery only)



- Specifications of any and all SANYO products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
- SANYO Electric Co., Ltd. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all SANYO products (including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of SANYO Electric Co., Ltd.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the SANYO product that you intend to use.
- Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. SANYO believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.