Structure   Silicon Monolithic Integrated Circuit

Product Name   Synchronous rectification step-up DC/DC converter for mobile phone

Type   **BD6069GUT**

Features   Synchronous rectification step-up DC/DC converter

No external schottky diode required

○Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Rating	Unit	Condition
Maximum applied voltage1	VMAX1	7(*1)	V	VIN , EN , VFB , TEST
Maximum applied voltage2	VMAX2	20(*1)	V	SW , VOUT
Power dissipation	Pd	800(*2)	mW	
Operating temperature range	Topr	-30 to +85	°C	
Storage temperature range	Tstg	-55 to +150	°C	

(*1) These values are based on GND and GNDA pins.

(*2) This value is the measurement value that was mounted on the PCB by ROHM.

(50mm × 58mm × 1.75mm glass epoxy Board)

Temperature deleting: 6.4mW/ °C from Ta>25°C
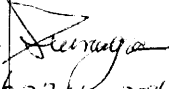
○Recommended operating conditions (Ta=-30 to +85°C)

Parameter	Symbol	Rating			Unit	Condition
		Min.	Typ.	Max.		
Supply voltage	Vin	2.7	3.6	5.5	V	

This product isn't designed to protect itself against radioactive rays.

Status of this document

The English version of this document is the formal specification.

A customer may use this translation version only for a reference to help reading the formal version.

If there are any differences in translation version of this document,formal version takes priority.

Application example

· ROHM cannot provide adequate confirmation of patents.

· The product described in this specification is designed to be used with ordinary electronic equipment or devices (such as audio-visual equipment, office-automation equipment, communications devices, electrical appliances, and electronic toys). Should you intend to use this product with equipment or devices which require an extremely high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.

· ROHM assumes no responsibility for use of any circuits described herein, conveys no license under any patent or other right, and makes no representations that the circuits are free from patent infringement.

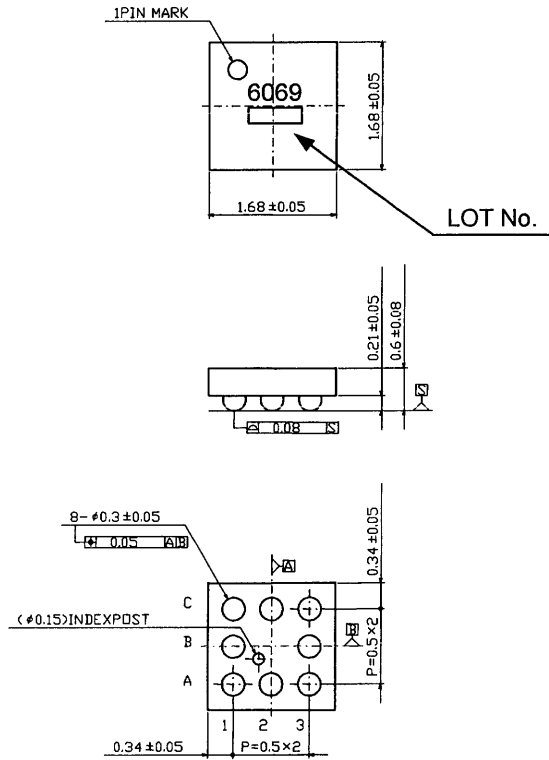| DESIGN	CHECK	APPROVAL			
Masaki Omi 27. Mar. 2006	Koji Taniuchi 27. Mar. 2006	27 Mar. 2006	DATE : 27/Mar/2006	SPECIFICATION No. : TSZ02201-BD6069GUT-1-2	
			REV. B	**ROHM CO., LTD.**	

○Electrical Characteristics

(Unless otherwise noted, Ta = -30 to +85°C, Vin=3.6V)

Parameter	Symbol	Spec			Unit	Condition
		Min.	Typ.	Max.		
EN Terminal						
EN Low threshold voltage	VthL	-	-	0.4	V	
EN High threshold voltage	VthH	1.4	-	-	V	
EN Input current	Iin	-	18.3	30.0	µA	EN=5.5V
EN Output current	Iout	-2.0	-0.1	-	µA	EN=0
Switching Regulator						
Input voltage range	Vin	3.1	-	5.5	V	
Quiescent Current	Iq	-	0.1	2.0	µA	EN=0V
Current Consumption	Idd	-	1.1	1.5	mA	EN=2.6V,VFB=1.0V,VIN=3.6V
Feedback voltage	Vfb	0.47	0.50	0.53	V	
Inductor current limit	Icoil	270	350	430	mA	Vin=3.6V (*1)
SW saturation voltage	Vsat	-	0.14	0.28	V	Isw=200mA,Vin=3.6V
SW on resistance P	Ronp	-	2.1	3.2	Ω	Ipch=200mA,Vout=13V
Switching frequency	fSW	0.8	1.0	1.2	MHz	
Duty cycle limit	Duty	82.7	85.0	-	%	VFB=0V
Output voltage range	Vo	-	-	18.0	V	
Over voltage limit	Ovl	18.0	18.5	19.0	V	VFB=0V
Start up time	Ts	-	0.5	1.0	ms	

*1. This parameter is tested with dc measurement.

○External dimensions

1PIN MARK

6069

LOT No.

1.68 ±0.05

1.68 ±0.05

0.21 ±0.05

0.6 ±0.08

0.08

8- ⌀0.3 ±0.05

⌀ 0.05

(⌀0.15)INDEXPOST

C

B

A

1   2   3

P=0.5×2

0.34 ±0.05

0.34 ±0.05

P=0.5×2

VCSP60N1(8Pin)   (Unit : mm)

○Terminals

BALL	BALL Name
A1	GNDA
A2	EN
A3	TEST
B1	VIN
B3	VFB
C1	VOUT
C2	SW
C3	GND

○Block diagram

VIN SW

over voltage protect

Vout

Thermal Shutdown

TSD

short protect

ERRAMP

PWMcomp

V_{FB}

Q̄ S

Control

Q R

Current Sence

OSC

GND GNDA

EN TEST
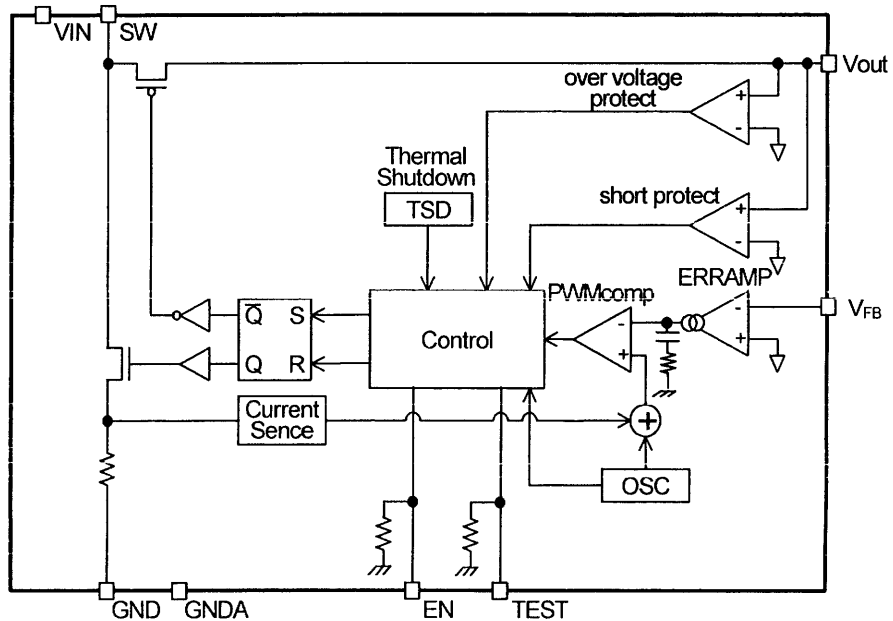
○ Cautions on use

(1) Absolute Maximum Ratings

An excess in the absolute maximum ratings, such as supply voltage, temperature range of operating conditions, etc., can break down devices, thus making impossible to identify breaking mode such as a short circuit or an open circuit. If any special mode exceeding the absolute maximum ratings is assumed, consideration should be given to take physical safety measures including the use of fuses, etc.

(2) Power supply and GND line

Design PCB pattern to provide low impedance for the wiring between the power supply and the GND lines. Pay attention to the interference by common impedance of layout pattern when there are plural power supplies and GND lines. Especially, when there are GND pattern for small signal and GND pattern for large current included the external circuits, please separate each GND pattern. Furthermore, for all power supply terminals to ICs, mount a capacitor between the power supply and the GND terminal. At the same time, in order to use a capacitor, thoroughly check to be sure the characteristics of the capacitor to be used present no problem including the occurrence of capacity dropout at a low temperature, thus determining the constant.

(3) GND voltage

Make setting of the potential of the GND terminal so that it will be maintained at the minimum in any operating state. Furthermore, check to be sure no terminals are at a potential lower than the GND voltage including an actual electric transient.

(4) Short circuit between terminals and erroneous mounting

In order to mount ICs on a set PCB, pay thorough attention to the direction and offset of the ICs. Erroneous mounting can break down the ICs. Furthermore, if a short circuit occurs due to foreign matters entering between terminals or between the terminal and the power supply or the GND terminal, the ICs can break down.

(5) Operation in strong electromagnetic field

Be noted that using ICs in the strong electromagnetic field can malfunction them.

(6) Input terminals

In terms of the construction of IC, parasitic elements are inevitably formed in relation to potential. The operation of the parasitic element can cause interference with circuit operation, thus resulting in a malfunction and then breakdown of the input terminal. Therefore, pay thorough attention not to handle the input terminals, such as to apply to the input terminals a voltage lower than the GND respectively, so that any parasitic element will operate. Furthermore, do not apply a voltage to the input terminals when no power supply voltage is applied to the IC. In addition, even if the power supply voltage is applied, apply to the input terminals a voltage lower than the power supply voltage or within the guaranteed value of electrical characteristics.

(7) External capacitor

In order to use a ceramic capacitor as the external capacitor, determine the constant with consideration given to a degradation in the nominal capacitance due to DC bias and changes in the capacitance due to temperature, etc.

(8) Thermal shutdown circuit (TSD)

When junction temperatures become 175°C (typ) or higher, the thermal shutdown circuit operates and turns a switch OFF. The thermal shutdown circuit, which is aimed at isolating the LSI from thermal runaway as much as possible, is not aimed at the protection or guarantee of the LSI. Therefore, do not continuously use the LSI with this circuit operating or use the LSI assuming its operation.

(9) Thermal design

Perform thermal design in which there are adequate margins by taking into account the permissible dissipation (Pd) in actual states of use.

(10) DC/DC converter

Please select the low DCR inductors to decrease power loss for DC/DC converter.

— Jisso Information —

Package : VCSP60N1

1. Structure and materials

Fig. 1   Structure

No.	Item	Materials
①	Die	Silicon
②	Cu Layer	Cu
③	Cu Post	Cu
④	Encapsulation	Epoxy Resin
⑤	Ext. terminal	Sn-3Ag-0.5Cu Solder
⑥	Encapsulation	Polyamide-imide Resin
⑦	Marking	Laser Marking

Dehydrated weight : 0.003g

2. Tape and Reel information

2. 1. Packing specification

Tape	Embossed carrier tape
Quantity	3,000pcs/Reel
Direction of feed	E2 (See Fig. 2)
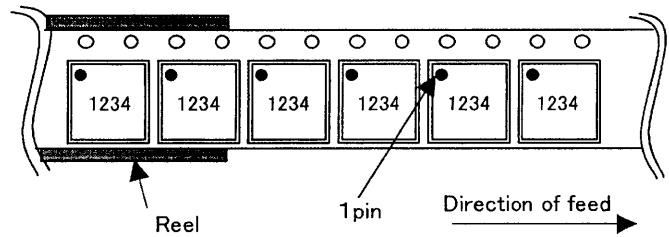
Fig. 2   Typical Tape and Reel configuration

2. 2.   Tape and Reel specification
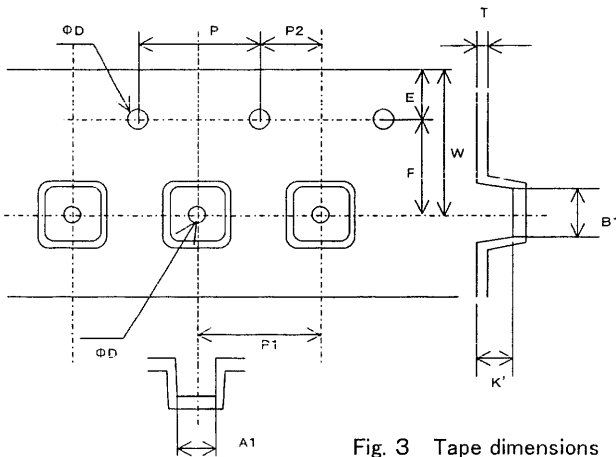2. 2. 1.   Tape and reel dimensions (See the table on page 2/4)
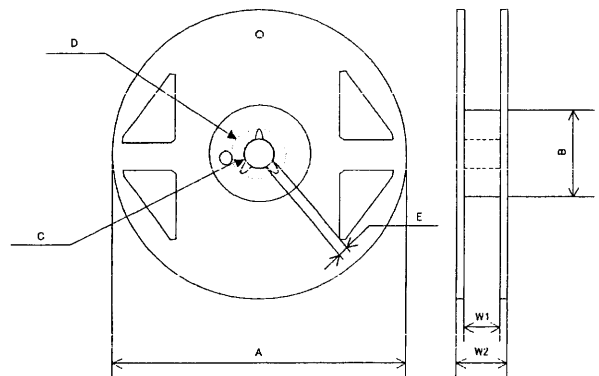

Fig. 3   Tape dimensions

Fig. 4   Reel dimensions

DESIGN	CHECK	APPROVAL	DATE: 27/Mar/2006	SPECIFICATION No. : TSZ02201-BD6069GUT-1-2
Masaki Omi 27.Mar.2006	Koji Taniuchi 27.Mar.2006	27 Mar 2006	REV. B	ROHM CO.,LTD.

TSZ22111·03

(Tape dimensions)

A1	B1	D0	D1	E	F	K'	P0	P1	P2	T	W
2.0 ±0.1	2.0 ±0.1	Φ1.5 +0.1 −0	Φ1.0 ±0.1	1.75 ±0.1	3.5 ±0.1	0.8 ±0.1	4.0 ±0.1	4.0 ±0.1	2.0 ±0.1	0.25 ±0.05	8.0 ±0.3

(Reel dimensions)

A	B	C	D	E	W1	W2
Φ180	50 MIN	13.0 ±0.2	20.2 MIN	1.5 MIN	9.4 ±1.0	13.4 ±1.0

2. 3. Leader and Trailer

2. 3. 1. Leader

No component pockets are 40 pockets or more.

2. 3. 2. Trailer

No component pockets are 10 pockets or more.
Tape is free from reel.
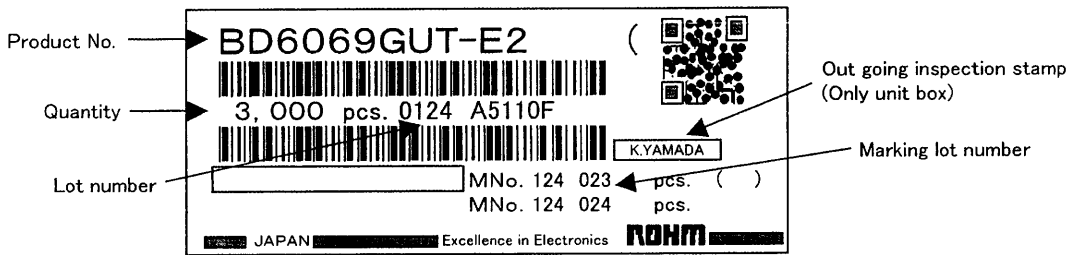
2. 4. Label for Reel and Box

Product No. → BD6069GUT-E2

Quantity → 3, OOO pcs. 0124 A5110F

Lot number

Out going inspection stamp (Only unit box)

K.YAMADA

Marking lot number

MNo. 124 023 pcs. ( )
MNo. 124 024 pcs.

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Fig. 5 Label example

2. 5. Packing style

4 reels or less per inner box.

Label   Reel

Joint tape
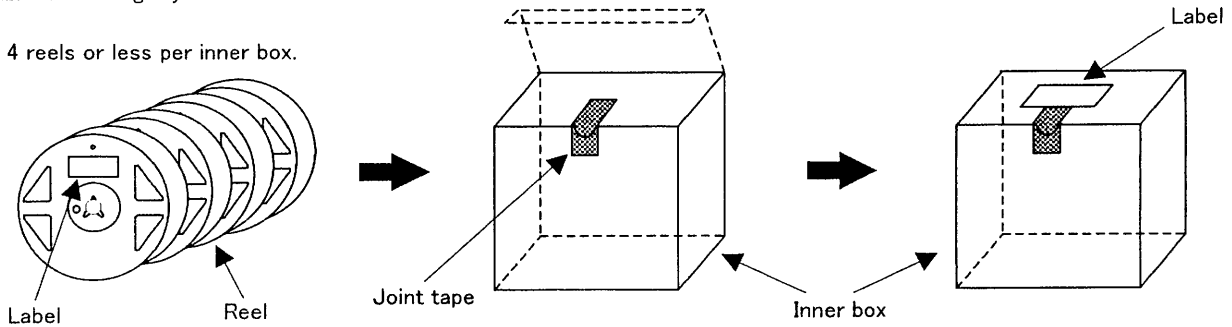
Fig. 6 Packing style

Inner box

Label

2. 6. Shipping style

4 unit boxes or less per shipping box.

255

190

193

Shipping label
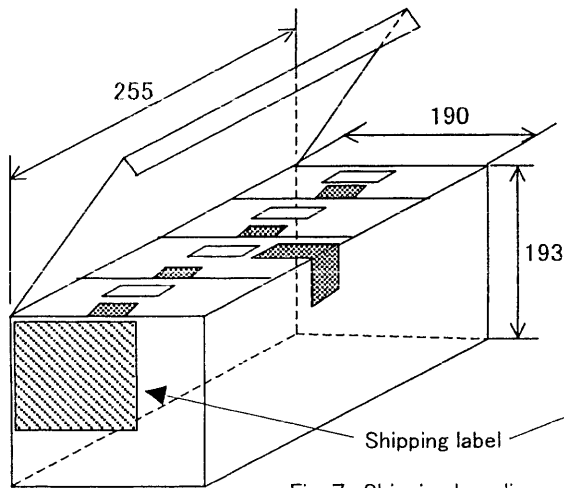
Fig. 7 Shipping box dimensions and shipping style

(Unit:mm)

2. 7. Packing materials

Item	Material
Embossed carrier tape	PS
Cover tape	PET + PE
Reel	PS
Unit box	Cardboard
Shipping box	Cardboard

<Ex.>

PACKING SLIP
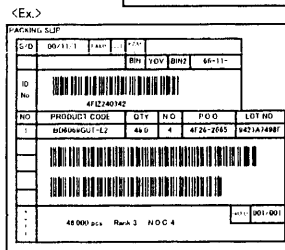
2. 8. Others
2. 8. 1. Peelback strength
  Cover tape peelback strength is 0.2~0.7N.

Peelback
Peelback speed
300±10mm/min
165~180°
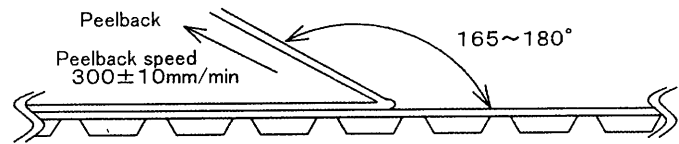
Fig. 8   Test method

2. 8. 2. Dropouts
  (1)No consecutive dropouts.
  (2)A maximun 0.1% of specified number of products in each packing may be missing.

3. Storage conditions
  3. 1. Storage environment
    Recommended storage conditions are as follows :
      —Temperature   : 5~30℃
   —Humidity   : 40~70% RH
  3. 2. Storage period
      —Specified storage period : 1year
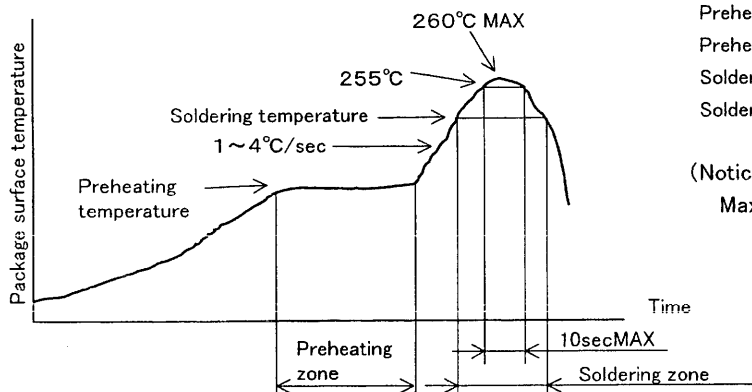 3. 3. Specified storage period until soldering
    This package dose not require additional drying treatment as long as the moisture condition at
    the mounting process is within our recommended mounting condition.

4. Marking lot number

Production lot number
Production month code
Production year code
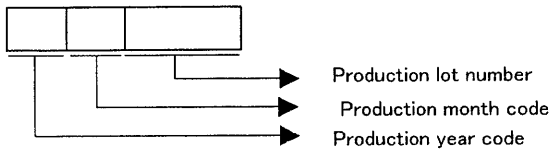
5. Soldering conditions
  5. 1. Recommended temperature profile for reflow

260℃ MAX
255℃
Soldering temperature
1~4℃/sec
Preheating
temperature
Package surface temperature
Time
Preheating
zone
10secMAX
Soldering zone

Preheating temperature ;   130℃~190℃
Preheating zone   ; 120sec MAX
Soldering temperature   ;   220℃~230℃
Soldering zone   ;   60sec MAX

(Notice)
    Maximum 2-times soldering

  5. 2.   About mounting with Sn-Pb solder paste.
      Mounting with Sn-Pb solder paste is not recommended because it has a possibility of reducing reliability
    to connect with Sn-3.0Ag-0.5Cu solder balls.

  5. 3.   The wave soldering method is not supported.

  5. 4.   Partical heat supply method (by soldering iron) is not supported.

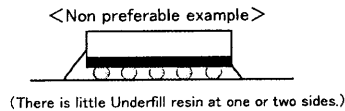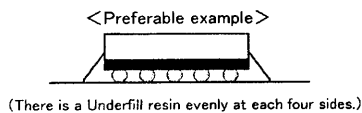## 6. Footprint dimensions (Optimize footprint dimensions to the board design and soldering condition)
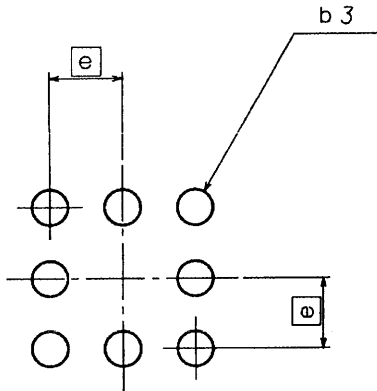
Symbol	Reference Value
e	0.50
b3	0.25

(Unit:mm)

7. Regarding the underfill material

There are some cases that the underfill material is applied as purpose to reinforce the soldered junction of the package.

Since the mount reliability depends on the resin material or coating condition , it may deteriorate on the contrary.

Therefore , it is necessary to evaluate it sufficiently for its application.

In term of the coating condition , it is preferable that there is an enough material beyond the each four sides of a packeage.

<Preferable example>

(There is a Underfill resin evenly at each four sides.)

<Non preferable example>

(There is little Underfill resin at one or two sides.)

8. External dimentions

1PIN MARK

6069

LOT No.

1.68±0.05

1.68±0.05

0.21±0.05

0.6±0.08

0.08

8-φ0.3±0.05

0.05 |A|B|

(φ0.15)INDEXPOST

C

B

A

1 2 3

0.34±0.05

P=0.5×2

0.34±0.05

P=0.5×2

(Unit:mm)