LCD Segment Drivers

Standard Segment Drivers

BU9795AKV/FV/GUW,BU9794AKV,BU97950FUV/KS2

No.11044EBT06

●Description

ROHM standard function segment driver series achieve “Ultra-Low power consumption”. Also these drivers need not external components. And this driver series is very simple that only has segment driver function. So, these driver series are very suitable to add in LCD display function for various applications.

●Features (BU9795AKV/FV/GUW, BU9794AKV)

1) 3wire serial interface
2) Integrated RAM for display data (DDRAM)
3) Power supply circuit for LCD driving
   1/2, 1/3Bias selectable
   1/4Duty
   Integrated Buffer AMP
4) Integrated Oscillation circuit
5) Integrated Power-on Reset circuit
6) No external components
7) Support blink function
8) Support standby mode
9) Low voltage / Ultra low power consumption design
10) Support unity voltage supply (BU9795AKV/FV/GUW)
11) Support Independent power supply circuit for LCD driving (BU9794AKV)

●Features (BU97950FUV/KS2)

1) 2wire serial interface
2) Integrated RAM for display data (DDRAM)
3) Integrated Power supply circuit for LCD driving
   1/4 Bias 1/8 Duty
   Integrated Buffer AMP
4) Integrated Oscillation circuit
5) Integrated Power-on Reset circuit
6) No external components
7) Support standby mode
8) Low voltage / Ultra low power consumption design
9) Integrated Electrical volume register (EVR) function
10) Support Register Read function
11) Support Independent power supply circuit for LCD driving

●Applications

Telephone, FAX, Portable equipment (POS, ECR, PDA etc.),
DSC, Digital video camera, Home electrical appliance, Meter equipment, Healthcare equipment etc.

●Line up matrix

Parameter	BU9795A			BU9794AKV	BU97950	
	KV	FV	GUW		FUV	KS2
Segment output	35	27	31	50	35	35
Common output	4	4	4	4	8	8
Total display dot number	140	108	124	200	280	280
Adjustable contrast function	-	-	-	-	Yes	Yes
Support split voltage supply	-	-	-	Yes	Yes	Yes
Interface	3wire	3wire	3wire	3wire	2wire	2wire
Package	VQFP48C	SSOP-B40	VBGA48W040	VQFP64	TSSOP-C48V	SQFP-T52

●Absolute maximum ratings (VSS=0V)

Parameter	BU9795AKV /FV/GUW	BU9794AKV	BU97950FUV /KS2	Unit	Remarks
Power Supply Voltage 1 (VDD)	-0.5～+7.0			V	Power supply
Power Supply Voltage 2 (VLCD)	-0.5～VDD	-0.5～+7.0	-0.5～+7.0	V	LCD drive Voltage
Allowable Loss (Pd)	0.6*1 0.7*2 0.27*3	0.75*4	0.64*5 0.85*6	W	Allowable loss at package only
Input Voltage Range (VIN)	-0.5～VDD+0.5			V	
Operational Temperature Range (Topr)	-40～+85			℃	
Storage Temperature Range (Tstg)	-55～+125			℃	

*1 When use more than Ta=25°C, subtract 6.0mW per degree (BU9795AKV)
*2 When use more than Ta=25°C, subtract 7.0mW per degree (BU9795AFV)
*3 When use more than Ta=25°C, subtract 2.7mW per degree (BU9795AGUW)
*4 When use more than Ta=25°C, subtract 7.5mW per degree (BU9794AKV)
*5 When use more than Ta=25°C, subtract 6.4mW per degree (BU97950FUV)
*6 When use more than Ta=25°C, subtract 8.5mW per degree (BU97950FUV)

●Recommend operating conditions (Ta=-40~85°C, VSS=0V)

Parameter	BU9795AKV /FV/GUW *7			BU9794AKV			BU97950KV/KS2			Unit	Remarks
	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX		
Power Supply Voltage 1 (VDD)	2.5	-	5.5	2.5	-	5.5	2.5	-	5.5	V	Power supply
Power Supply Voltage 2 (VLCD)	0	-	VDD -2.4	2.5	-	5.5	2.5	-	5.5	V	LCD drive Voltage

*7 Please use VDD-VLCD ≥ 2.4V condition.

●Electrical characteristics

<BU9795AKV/FV/GUW>

DC Characteristics (VDD=2.5~5.5V, VSS=0V, Ta=-40~85°C, unless otherwise specified)

Parameter		Symbol	Limits			Unit	Condition
			MIN	TYP	MAX		
“H” level input voltage		VIH	0.7VDD	-	VDD	V	SD, SCL, CSB
“L” level input voltage		VIL	VSS	-	0.3VDD	V	SD, SCL, CSB
“H” level input current		IIH	-	-	1	µA	SD, SCL, CSB
“L” level input current		IIL	-1	-	-	µA	SD, SCL, CSB
LCD Driver on resistance	SEG	RON	-	3.5	-	kΩ	Iload=±10µA
	COM	RON	-	3.5	-	kΩ	
VLCD supply voltage		VLCD	0	-	VDD -2.4	V	VDD-VLCD ≥ 2.4V
Standby current		Ist	-	-	5	µA	Display off, Oscillator off
Power consumption 1		IDD1	-	12.5	30	µA	VDD=3.3[V], Ta=25°C, Power save mode1, FR=70Hz 1/3 bias, Frame inverse
Power consumption 2		IDD2	-	20	40	µA	VDD=3.3[V], Ta=25°C, Normal mode, FR=80Hz 1/3 bias, Line inverse

Oscillation Characteristics (VDD=2.5~5.5V, VSS=0V, Ta=-40~85°C)

Parameter	Symbol	Limits			Unit	Condition
		MIN	TYP	MAX		
Frame frequency	fCLK	56	80	104	Hz	FR = 80Hz setting
Frame frequency1	fCLK1	70	80	90	Hz	VDD=3.5V, 25°C

MPU interface Characteristics(VDD=2.5V~5.5V, VSS=0V, Ta=-40~85°C)

Parameter	Symbol	Limits			Unit	Condition
		MIN	TYP	MAX		
Input rise time	tr	-	-	80	ns	
Input fall time	tf	-	-	80	ns	
SCL cycle time	tSCYC	400	-	-	ns	
“H” SCL pulse width	tSHW	100	-	-	ns	
“L” SCL pulse width	tSLW	100	-	-	ns	
SD setup time	tSDS	20	-	-	ns	
SD hold time	tSDH	50	-	-	ns	
CSB setup time	tCSS	50	-	-	ns	
CSB hold time	tCSH	50	-	-	ns	
“H” CSB pulse width	tCHW	50	-	-	ns	

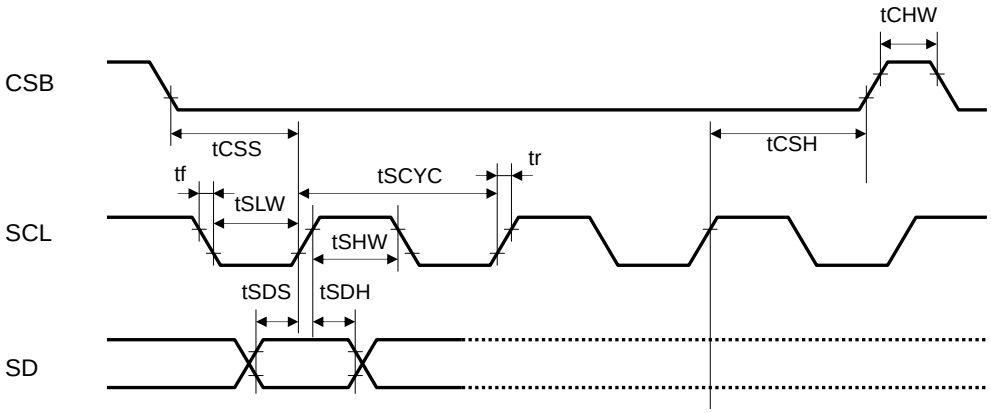


Fig.1 Interface Timing (BU9795AKV/FV/GUW)

<BU9794AKV>

DC Characteristics (VDD=2.5~5.5V, VLCD=2.5~5.5V, VSS=0V, Ta=-40~85°C, unless otherwise specified)

Parameter		Symbol	Limits			Unit	Condition
			MIN	TYP	MAX		
“H” level input voltage		VIH	0.8VDD	-	VDD	V	SD,SCL,CSB
“L” level input voltage		VIL	VSS	-	0.2VDD	V	SD,SCL,CSB
“H” level input current		IIH	-	-	1	µA	SD,SCL,CSB
“L” level input current		IIL	-1	-	-	µA	SD,SCL,CSB
LCD Driver on resistance	SEG	RON	-	3.5	-	kΩ	Iload=±10µA
	COM	RON	-	3.5	-	kΩ	
Standby current		Ist	-	-	5	µA	Display off, Oscillation off
Power consumption 1		IDD	-	5	15	µA	VDD=3.3V, VLCD=5V, Ta=25°C Power save mode1, FR=70Hz 1/3 bias, Frame inverse
Power consumption 2		ILCD	-	10	20	µA	VDD=3.3V, VLCD=5V, Ta=25°C Power save mode1, FR=70Hz 1/3 bias, Frame inverse

Oscillation Characteristics (VDD=2.5~5.5V, VLCD=2.5~5.5V, VSS=0V, Ta=-40~85°C, unless otherwise specified)

Parameter	Symbol	Limits			Unit	Condition
		MIN	TYP	MAX		
Frame frequency	fCLK	68	80	92	Hz	FR = 80Hz setting, VDD=3.3V

MPU interface Characteristics (VDD=2.5~5.5V, VLCD=2.5~5.5V, VSS=0V, Ta=-40~85°C, unless otherwise specified)

Parameter	Symbol	Limits			Unit	Condition
		MIN.	TYP.	MAX.		
Input rise time	tr	-	-	80	ns	
Input fall time	tf	-	-	80	ns	
SCL cycle time	tSCYC	400	-	-	ns	
“H” SCL pulse width	tSHW	100	-	-	ns	
“L” SCL pulse width	tSLW	100	-	-	ns	
SD setup time	tSDS	20	-	-	ns	
SD hold time	tSDH	50	-	-	ns	
CSB setup time	tCSS	50	-	-	ns	
CSB hold time	tCSH	50	-	-	ns	
“H” CSB pulse time	tCHW	50	-	-	ns	

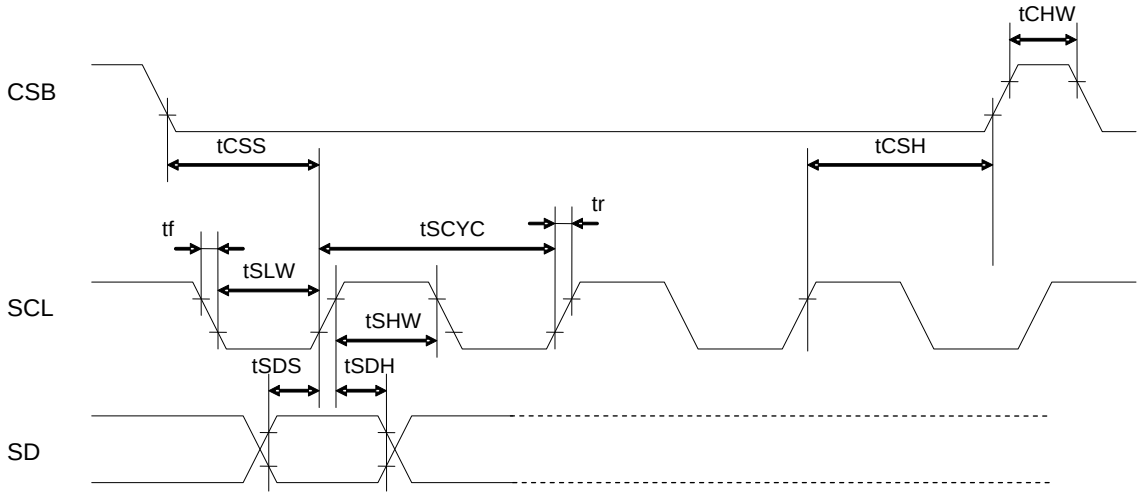


Fig.2 Interface Timing (BU9794AKV)

<BU97950FUV/KS2>
DC Characteristics (VDD=2.5~5.5V, VLCD=2.5~5.5V, VSS=0V, Ta=-40~85 ºC, unless otherwise specified)

Parameter		Symbol	Limits			Unit	Conditions
			MIN	TYP	MAX		
“H” level input voltage		VIH	0.7VDD	-	VDD	V	SDA,SCL
“L” level input voltage		VIL	VSS	-	0.3VDD	V	SDA,SCL
“H” level input current		IIH	-	-	1	µA	SDA,SCL
“L” level input current		IIL	-1	-	-	µA	SDA,SCL
LCD Driver on resistance	SEG	RON	-	3.5	-	kΩ	Iload=±10µA
	COM	RON	-	3.5	-	kΩ	
Standby current		Ist	-	-	5	µA	Display off, Oscillation off
Power consumption 1		IDD	-	2.5	15	µA	VDD=3.3V, VLCD=5V, Ta=25 ºC Power save mode1, FR=80Hz 1/4 bias, Frame inverse
Power consumption 2		ILCD	-	10	20	µA	VDD=3.3V, VLCD=5V, Ta=25 ºC Power save mode1, FR=80Hz 1/4 bias, Frame inverse

Oscillation Characteristics (VDD=2.5~5.5V, VSS=0V, Ta=-40~85°C, unless otherwise specified)

Parameter	Symbol	Limits			Unit	Condition
		MIN	TYP	MAX		
Frame frequency	fCLK	56	80	104	Hz	Power save mode FR = Normal mode

MPU interface Characteristics (VDD=2.5~5.5V, VLCD=0V, VSS=0V, Ta=-40~85°C, unless otherwise specified)

Parameter	Symbol	Limits			Unit	Condition
		MIN.	TYP.	MAX.		
Input rise time	tr	-	-	0.3	µs	
Input fall time	tf	-	-	0.3	µs	
SCL cycle time	tSCYC	2.5	-	-	µs	
“H” SCL pulse width	tSHW	0.6	-	-	µs	
“L” SCL pulse width	tSLW	1.3	-	-	µs	
SDA setup time	tSDS	100	-	-	ns	
SDA hold time	tSDH	100	-	-	ns	
Bus free time	tBUF	1.3	-	-	µs	
START condition hold time	tHD;STA	0.6	-	-	µs	
START condition setup time	tSU;STA	0.6	-	-	µs	
STOP condition setup time	tSU;STO	0.6	-	-	µs	

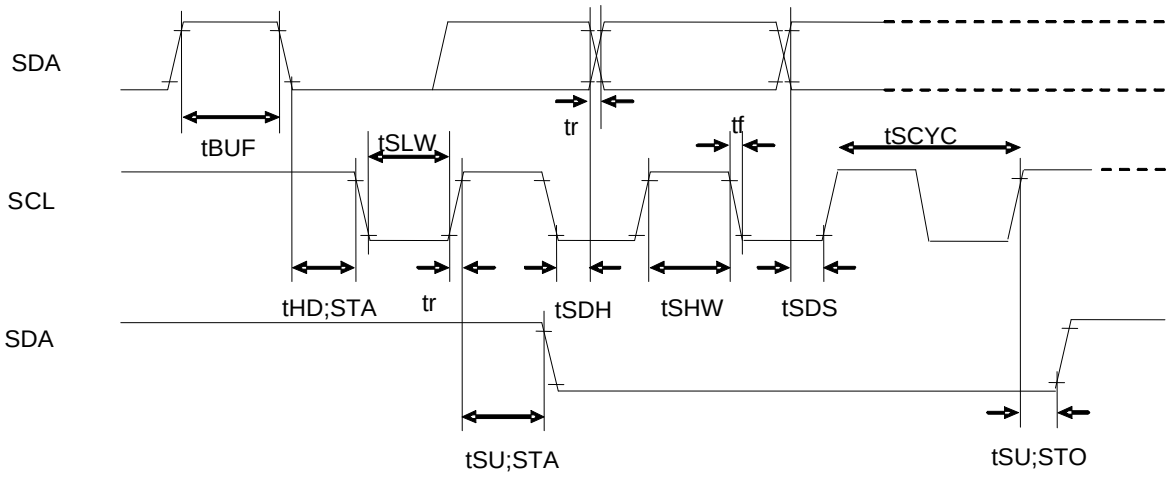


Fig.3 interface timing (BU97950FUV)

●Block Diagram / Pin Arrangement / Terminal Description

<BU9795AKV>

●Block Diagram

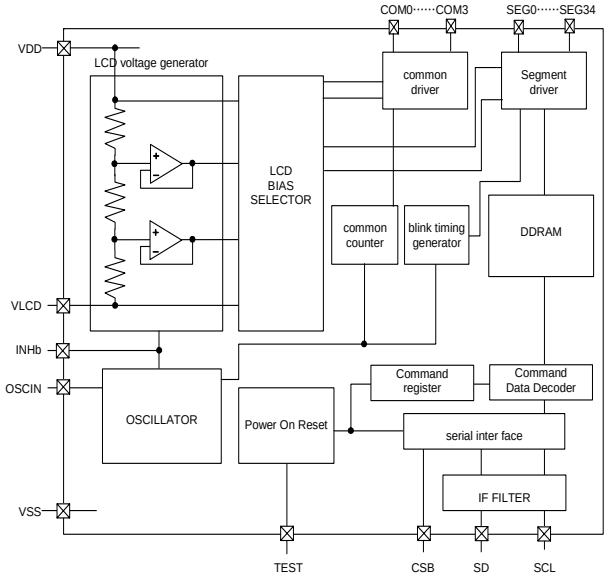


Fig.4 Block Diagram (BU9795AKV)

●Pin Arrangement

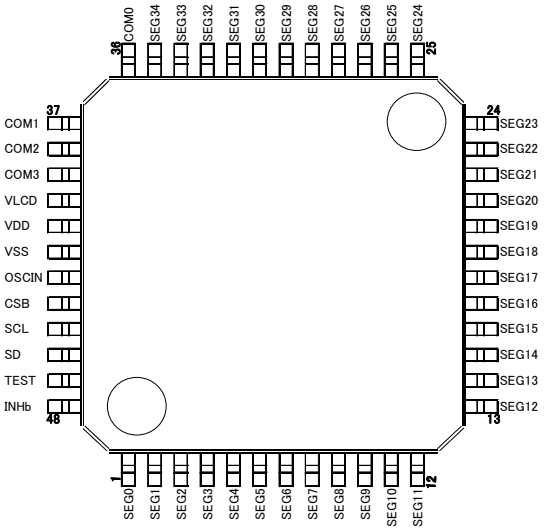


Fig.5 Pin Arrangement (BU9795AKV)

●Terminal Description

Terminal	Terminal No.	I/O	Function
INHb	48	I	Input terminal for turn off display H: turn on display L: turn off display
TEST	47	I	Test input (ROHM use only) Must be connect to VSS
OSCIN	43	I	External clock input Ext clock and Int clock can be changed by command. Must be connect to VSS when use internal oscillation circuit.
SD	46	I	serial data input
SCL	45	I	serial data transfer clock
CSB	44	I	Chip select : “L” active
VSS	42		GND
VDD	41		Power supply
VLCD	40		Power supply for LCD driving
SEG0-34	1-35	O	SEGMENT output for LCD driving
COM0-3	36-39	O	COMMON output for LCD driving

<BU9795AFV>

●Block Diagram

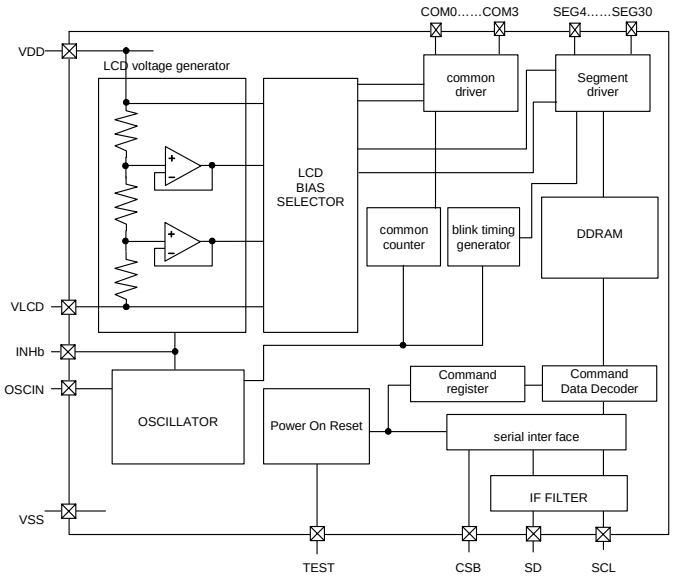


Fig.6 Block Diagram (BU9795AFV)

●Pin Arrangement

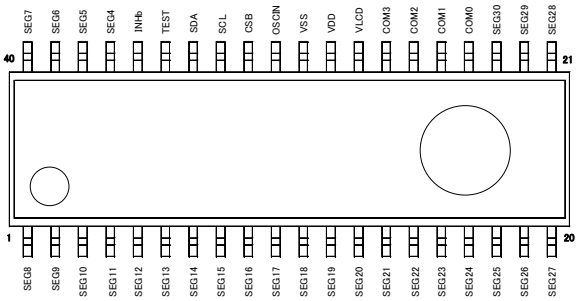


Fig.7 Pin Arrangement (BU9795AFV)

●Terminal Description

Terminal	Terminal No.	I/O	Function
INHb	36	I	Input terminal for turn off display H: turn on display L: turn off display
TEST	35	I	Test input (ROHM use only) Must be connect to VSS
OSCIN	31	I	External clock input Ex clock and Int clock can be changed by command. Must be connect to VSS when use internal oscillation circuit.
SD	34	I	serial data input
SCL	33	I	serial data transfer clock
CSB	32	I	Chip select : “L” active
VSS	30		GND
VDD	29		Power supply
VLCD	28	I	Power supply for LCD driving
SEG4-30	1-23, 37-40	O	SEGMENT output for LCD driving
COM0-3	24-27	O	COMMON output for LCD driving

<BU9795AGUW>

●Block Diagram

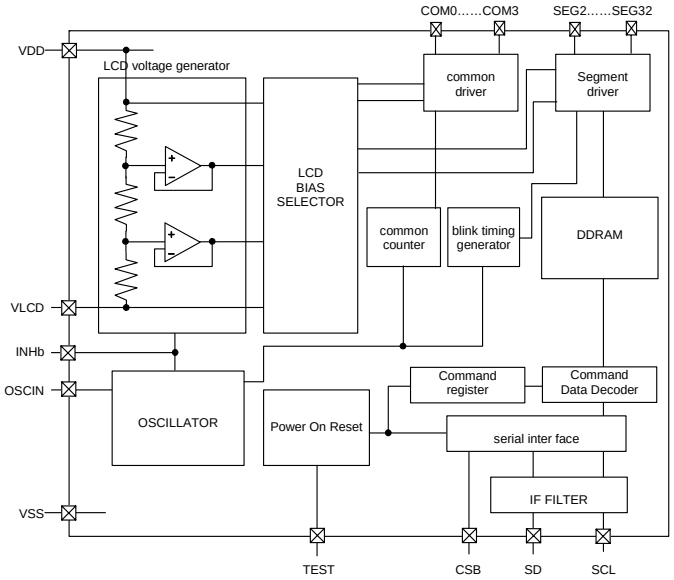


Fig.8 Block Diagram (BU9795AGUW)

●Pin Arrangement

	1	2	3	4	5	6	7
G	(NC)	SEG13	SEG15	SEG18	SEG20	SEG22	(NC)
F	SEG11	SEG12	SEG16	SEG17	SEG21	SEG23	SEG24
E	SEG9	SEG10	SEG14	SEG19	SEG25	SEG27	SEG26
D	SEG7	SEG6	SEG8	SEG5	SEG30	SEG28	SEG29
C	SEG4	SEG3	SEG2	CSB	COM3	SEG32	SEG31
B		INHb	SD	VSS	VDD	COM1	COM0
A	(NC)	TEST2	SCL	OSCIN	VLCD	COM2	(NC)

Fig.9 Pin Arrangement (BU9795AGUW)

●Terminal Description

Terminal	I/O	Function
INHb	I	Input terminal for turn off display H: turn on display L: turn off display
TEST	I	Test input (ROHM use only) Must be connect to VSS
OSCIN	I	External clock input Ex clock and Int clock can be changed by command. Must be connect to VSS when use internal oscillation circuit.
SD	I	serial data input
SCL	I	serial data transfer clock
CSB	I	Chip select : “L” active
VSS		GND
VDD		Power supply
VLCD	I	Power supply for LCD driving
SEG2-32	O	SEGMENT output for LCD driving
COM0-3	O	COMMON output for LCD driving

(Caution) About terminal number, please refer to above pin arrangement

<BU9794AKV>

●Block Diagram

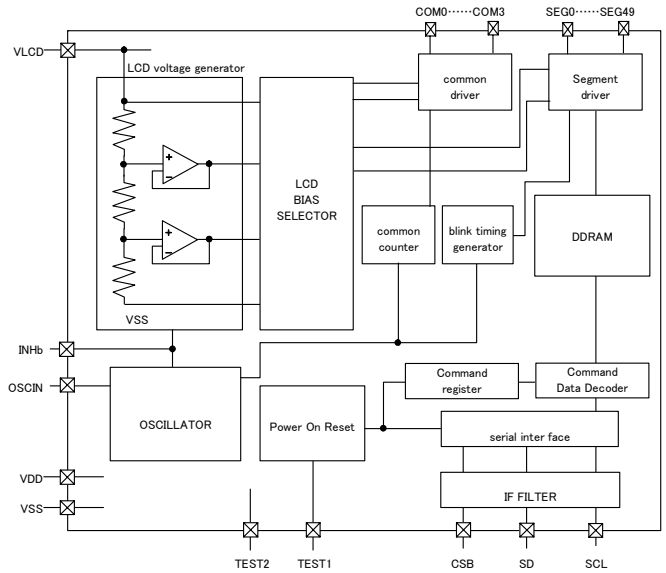


Fig.10 Block Diagram (BU9794AKV)

●Pin Arrangement

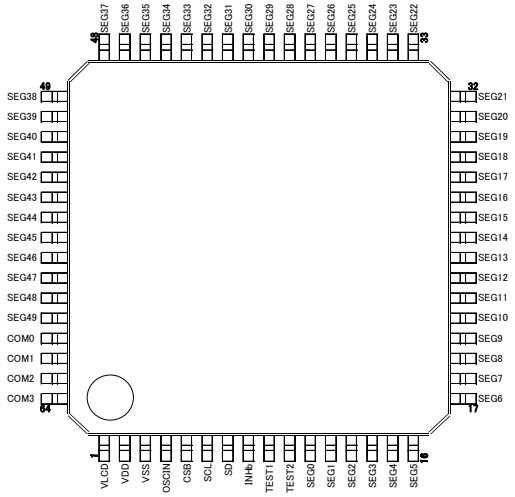


Fig.11 Pin Arrangement (BU9794AKV)

●Terminal Description

Terminal	Terminal No.	I/O	Function
INHb	8	I	Input terminal for turn off display H: turn on display, L: turn off display
TEST1	9	I	Test input (ROHM use only) Must be connect to VSS
TEST2	10	I	Test input (ROHM use only) Must be connect to VSS
OSCIN	4	I	External clock input Ex clock and Int clock can be changed by command. Must be connect to VSS when use internal oscillation circuit.
SD	7	I	serial data input
SCL	6	I	serial data transfer clock
CSB	5	I	Chip select : “L” active
VSS	3		GND
VDD	2		Power supply
VLCD	1		Power supply for LCD driving
SEG0-49	11-60	O	SEGMENT output for LCD driving
COM0-3	61-64	O	COMMON output for LCD driving

<BU97950FUV>

●Block Diagram

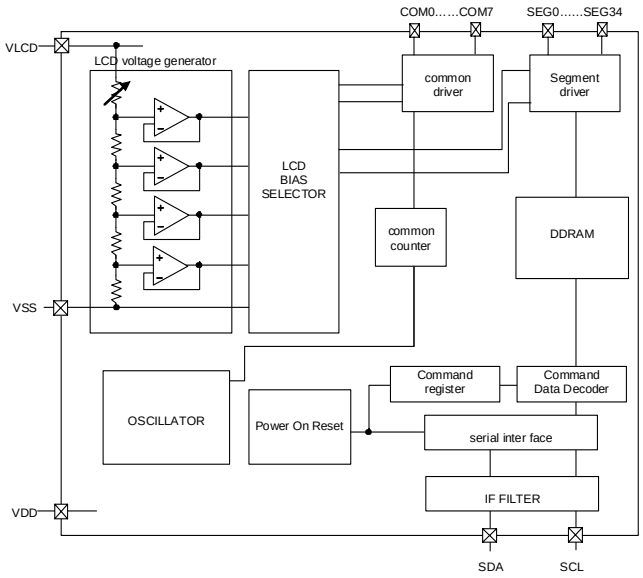


Fig.12 Block Diagram (BU97950FUV)

●Pin Arrangement

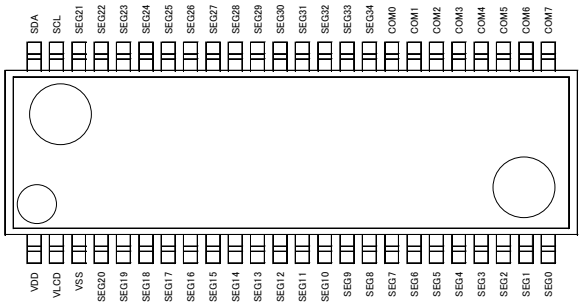


Fig.13 Pin Arrangement (BU97950FUV)

●Terminal Description

Terminal	Terminal No.	I/O	Function
SDA	48	I/O	serial data input register read data output port
SCL	47	I	serial data transfer clock
VSS	3	I	GND
VDD	1	I	Power supply
VLCD	2	I	Power supply for LCD driving
SEG0-35	4-24 33-46	O	SEGMENT output for LCD driving
COM0-7	25-32	O	COMMON output for LCD driving

<BU97950KS2>

●Block Diagram

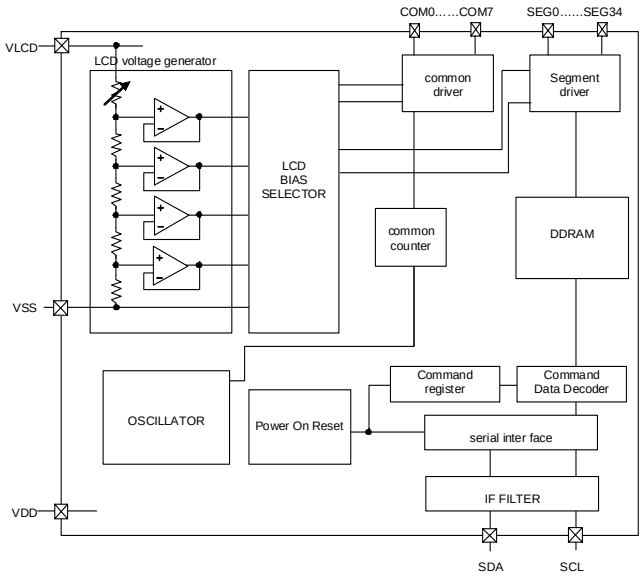


Fig.14 Block Diagram (BU97950KS2)

●Pin Arrangement

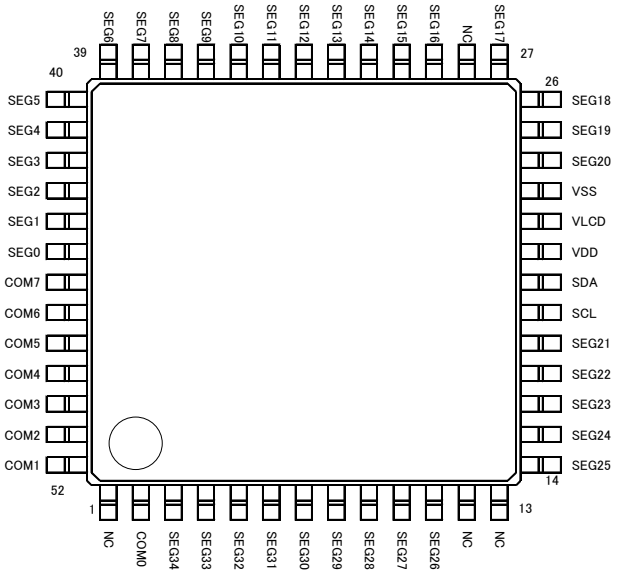


Fig.15 Pin Arrangement (BU97950KS2)

●Terminal Description

Terminal	Terminal No.	I/O	Function
SDA	20	I/O	serial data input
SCL	19	I	serial data transfer clock
VSS	23	I	GND
VDD	21	I	Power supply
VLCD	22	I	Power supply for LCD driving
SEG0-35	3-11 24-27 29-45	O	SEGMENT output for LCD driving
COM0-7	2 46-52	O	COMMON output for LCD driving
NC	1,12,13,28	-	No connected

●IO Equivalent Circuit

<BU9795AKV/FV/GUW>

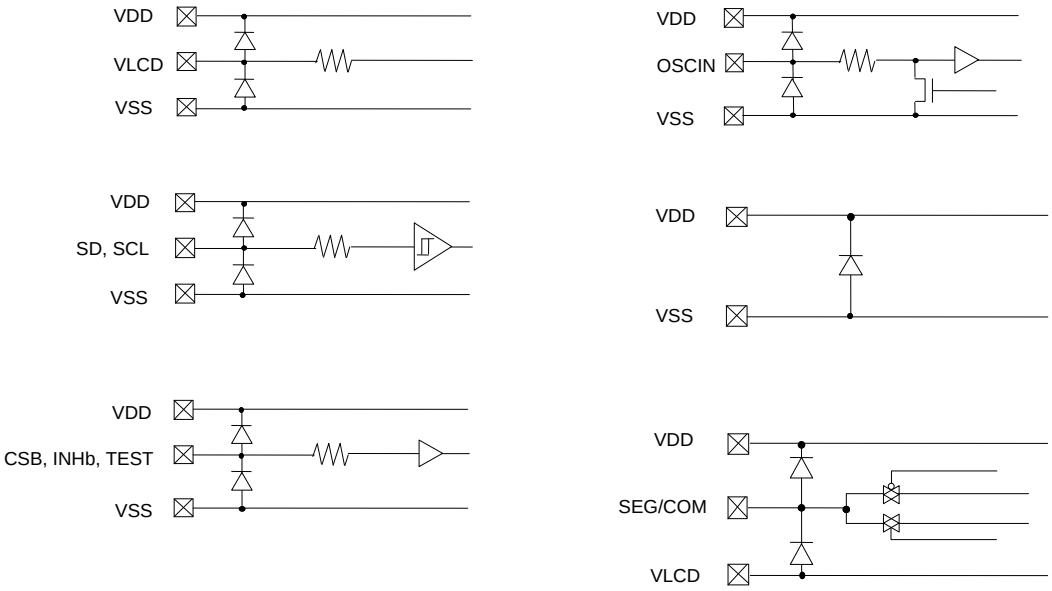


Fig.16 I/O equivalent circuit (BU9795AKV/FV/GUW)

<BU9794AKV>

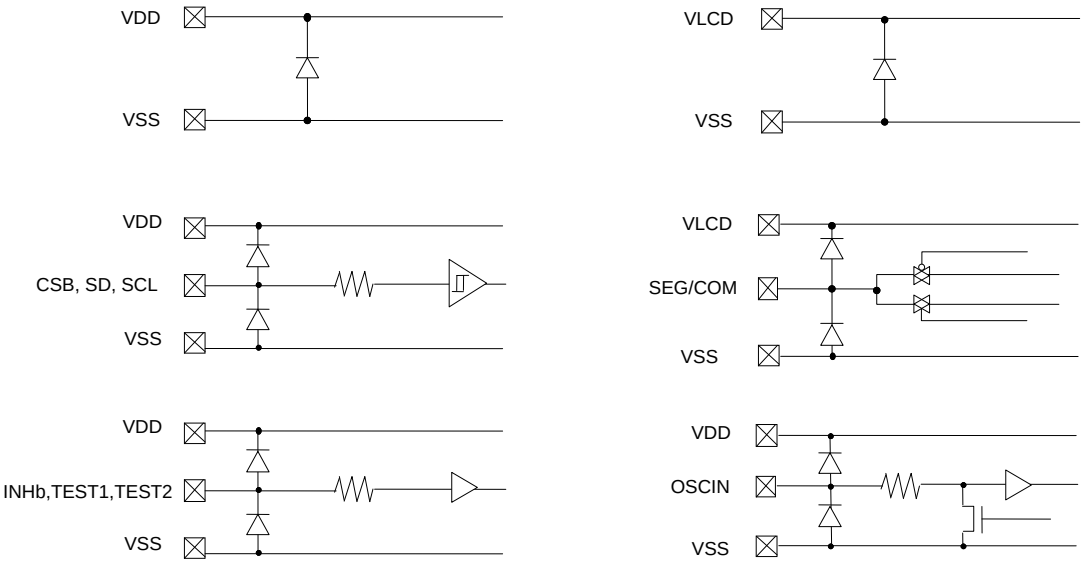


Fig.17 I/O equivalent circuit (BU9794AKV)

<BU97950FUV>

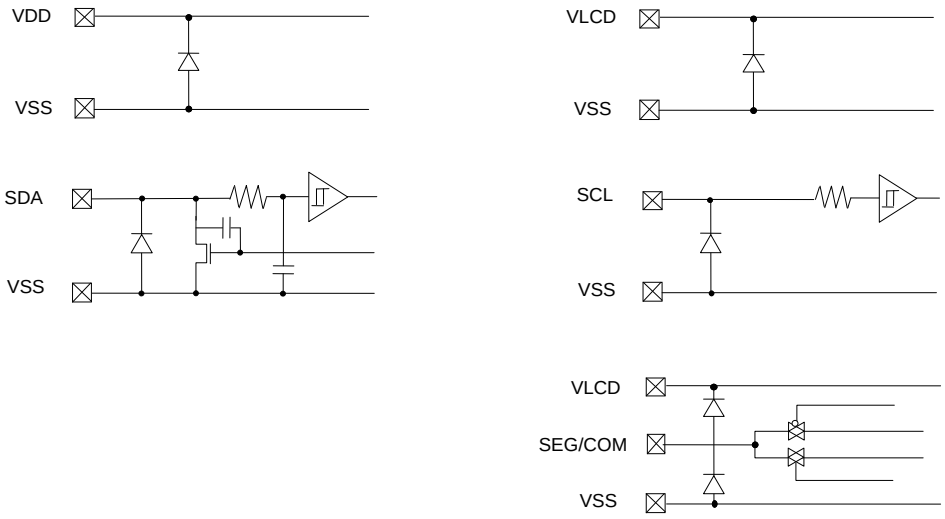
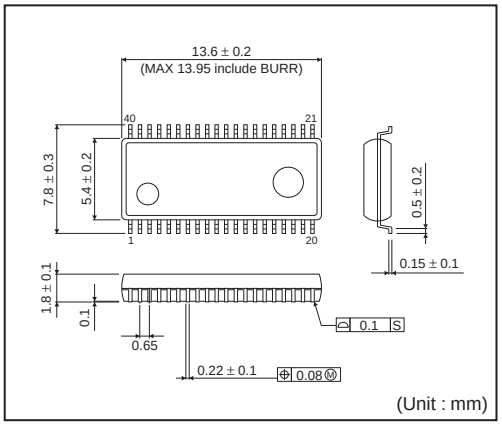


Fig.18 I/O equivalent circuit (BU97950FUV/KS2)

●**Ordering part number**

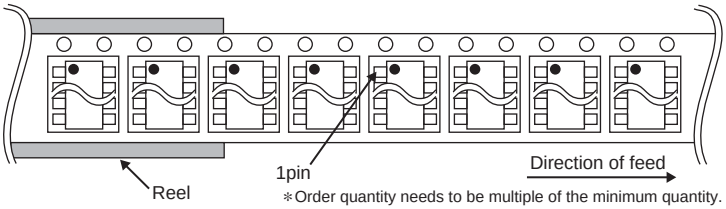
B U	9 7 9 4 A	K V	-	E 2
Part No.	Part No. BU9794A BU9795A BU97950	Package FV : SSOP-B40 GUW : VBGA048W040 KV : VQFP48C KV : VQFP64 FUV : TSSOP-C48V KS2 : SQFP-T52		Packaging and forming specification E2: Embossed tape and reel

SSOP-B40



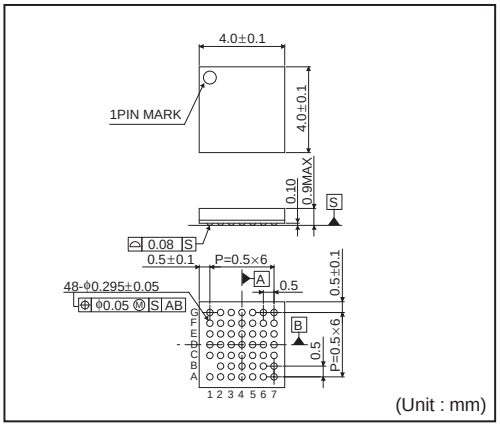
<Tape and Reel information>

Tape	Embossed carrier tape
Quantity	2000pcs
Direction of feed	E2 (The direction is the 1pin of product is at the upper left when you hold reel on the left hand and you pull out the tape on the right hand)



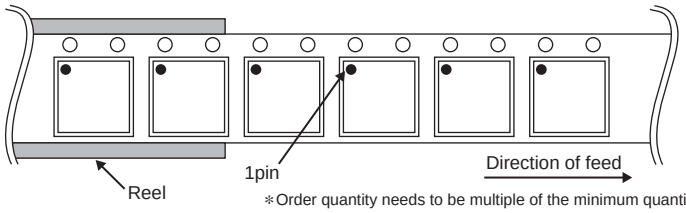
∗Order quantity needs to be multiple of the minimum quantity.

VBGA048W040



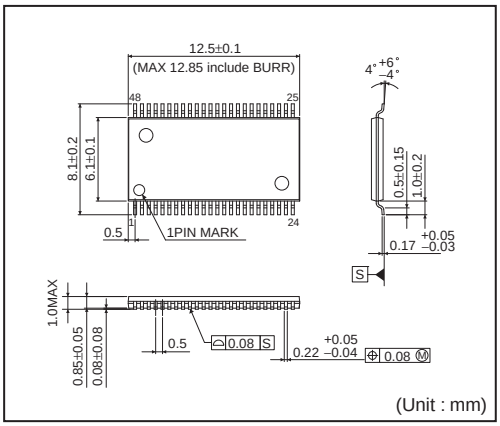
<Tape and Reel information>

Tape	Embossed carrier tape (with dry pack)
Quantity	2500pcs
Direction of feed	E2 (The direction is the 1pin of product is at the upper left when you hold reel on the left hand and you pull out the tape on the right hand)



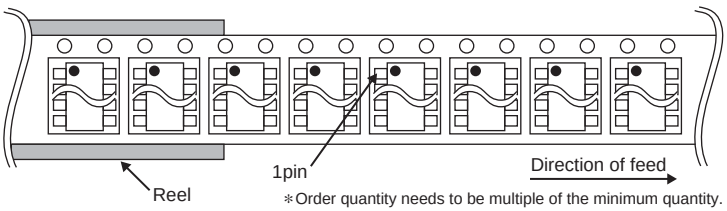
∗Order quantity needs to be multiple of the minimum quantity.

TSSOP-C48V



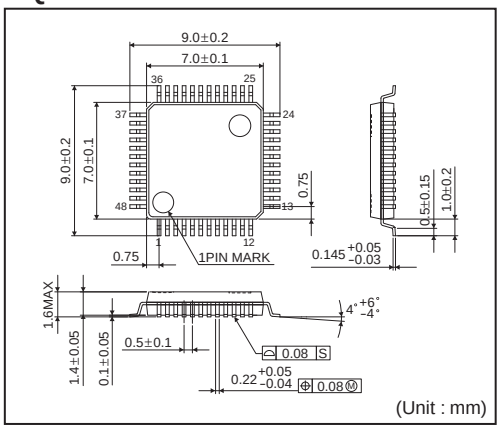
<Tape and Reel information>

Tape	Embossed carrier tape (with dry pack)
Quantity	2000pcs
Direction of feed	E2 (The direction is the 1pin of product is at the upper left when you hold reel on the left hand and you pull out the tape on the right hand)



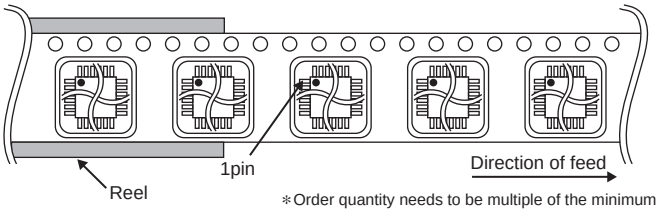
∗Order quantity needs to be multiple of the minimum quantity.

VQFP48C



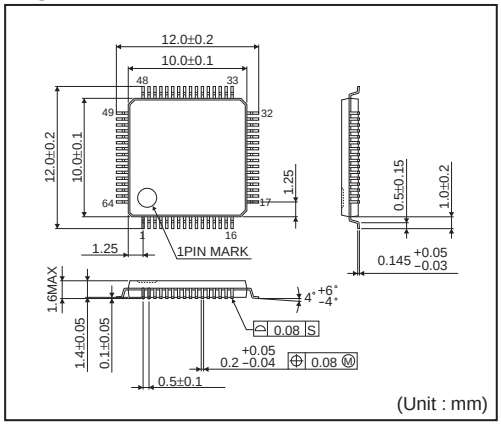
<Tape and Reel information>

Tape	Embossed carrier tape
Quantity	1500pcs
Direction of feed	E2 (The direction is the 1pin of product is at the upper left when you hold reel on the left hand and you pull out the tape on the right hand)



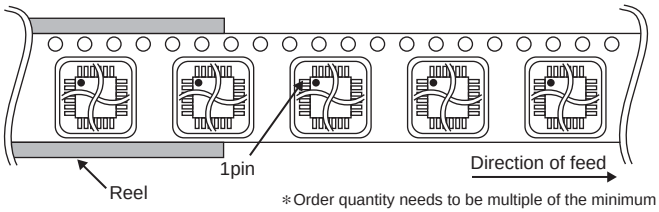
∗Order quantity needs to be multiple of the minimum quantity.

VQFP64



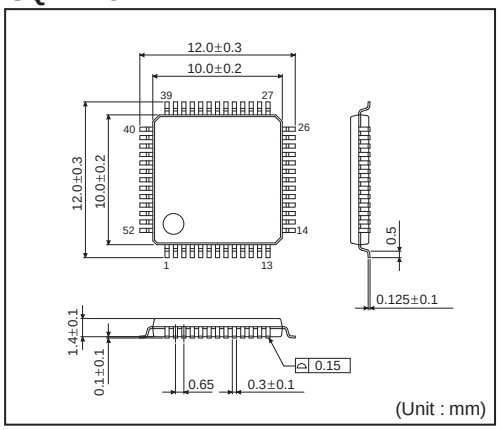
<Tape and Reel information>

Tape	Embossed carrier tape (with dry pack)
Quantity	1000pcs
Direction of feed	E2 (The direction is the 1pin of product is at the upper left when you hold reel on the left hand and you pull out the tape on the right hand)



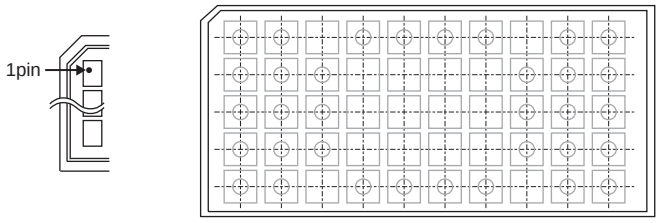
∗Order quantity needs to be multiple of the minimum quantity.

SQFP-T52



<Tape and Reel information>

Container	Tray (with dry pack)
Quantity	1000pcs
Direction of feed	Direction of product is fixed in a tray



∗Order quantity needs to be multiple of the minimum quantity.

Notice

Precaution on using ROHM Products

1. Our Products are designed and manufactured for application in ordinary electronic equipments (such as AV equipment, OA equipment, telecommunication equipment, home electronic appliances, amusement equipment, etc.). If you intend to use our Products in devices requiring extremely high reliability (such as medical equipment (Note 1), transport equipment, traffic equipment, aircraft/spacecraft, nuclear power controllers, fuel controllers, car equipment including car accessories, safety devices, etc.) and whose malfunction or failure may cause loss of human life, bodily injury or serious damage to property ("Specific Applications"), please consult with the ROHM sales representative in advance. Unless otherwise agreed in writing by ROHM in advance, ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of any ROHM's Products for Specific Applications.

(Note1) Medical Equipment Classification of the Specific Applications

JAPAN	USA	EU	CHINA
CLASSⅢ	CLASSⅢ	CLASSⅡb	CLASSⅢ
CLASSⅣ		CLASSⅢ	

2. ROHM designs and manufactures its Products subject to strict quality control system. However, semiconductor products can fail or malfunction at a certain rate. Please be sure to implement, at your own responsibilities, adequate safety measures including but not limited to fail-safe design against the physical injury, damage to any property, which a failure or malfunction of our Products may cause. The following are examples of safety measures:
   [a] Installation of protection circuits or other protective devices to improve system safety
   [b] Installation of redundant circuits to reduce the impact of single or multiple circuit failure

3. Our Products are designed and manufactured for use under standard conditions and not under any special or extraordinary environments or conditions, as exemplified below. Accordingly, ROHM shall not be in any way responsible or liable for any damages, expenses or losses arising from the use of any ROHM's Products under any special or extraordinary environments or conditions. If you intend to use our Products under any special or extraordinary environments or conditions (as exemplified below), your independent verification and confirmation of product performance, reliability, etc, prior to use, must be necessary:
   [a] Use of our Products in any types of liquid, including water, oils, chemicals, and organic solvents
   [b] Use of our Products outdoors or in places where the Products are exposed to direct sunlight or dust
   [c] Use of our Products in places where the Products are exposed to sea wind or corrosive gases, including Cl_2, H_2S, NH_3, SO_2, and NO_2
   [d] Use of our Products in places where the Products are exposed to static electricity or electromagnetic waves
   [e] Use of our Products in proximity to heat-producing components, plastic cords, or other flammable items
   [f] Sealing or coating our Products with resin or other coating materials
   [g] Use of our Products without cleaning residue of flux (even if you use no-clean type fluxes, cleaning residue of flux is recommended); or Washing our Products by using water or water-soluble cleaning agents for cleaning residue after soldering
   [h] Use of the Products in places subject to dew condensation

4. The Products are not subject to radiation-proof design.

5. Please verify and confirm characteristics of the final or mounted products in using the Products.

6. In particular, if a transient load (a large amount of load applied in a short period of time, such as pulse. is applied, confirmation of performance characteristics after on-board mounting is strongly recommended. Avoid applying power exceeding normal rated power; exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.

7. De-rate Power Dissipation (Pd) depending on Ambient temperature (Ta). When used in sealed area, confirm the actual ambient temperature.

8. Confirm that operation temperature is within the specified range described in the product specification.

9. ROHM shall not be in any way responsible or liable for failure induced under deviant condition from what is defined in this document.

Precaution for Mounting / Circuit board design

1. When a highly active halogenous (chlorine, bromine, etc.) flux is used, the residue of flux may negatively affect product performance and reliability.

2. In principle, the reflow soldering method must be used; if flow soldering method is preferred, please consult with the ROHM representative in advance.

For details, please refer to ROHM Mounting specification

Precautions Regarding Application Examples and External Circuits

1. If change is made to the constant of an external circuit, please allow a sufficient margin considering variations of the characteristics of the Products and external components, including transient characteristics, as well as static characteristics.

2. You agree that application notes, reference designs, and associated data and information contained in this document are presented only as guidance for Products use. Therefore, in case you use such information, you are solely responsible for it and you must exercise your own independent verification and judgment in the use of such information contained in this document. ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of such information.

Precaution for Electrostatic

This Product is electrostatic sensitive product, which may be damaged due to electrostatic discharge. Please take proper caution in your manufacturing process and storage so that voltage exceeding the Products maximum rating will not be applied to Products. Please take special care under dry condition (e.g. Grounding of human body / equipment / solder iron, isolation from charged objects, setting of Ionizer, friction prevention and temperature / humidity control).

Precaution for Storage / Transportation

1. Product performance and soldered connections may deteriorate if the Products are stored in the places where:
   [a] the Products are exposed to sea winds or corrosive gases, including Cl2, H2S, NH3, SO2, and NO2
   [b] the temperature or humidity exceeds those recommended by ROHM
   [c] the Products are exposed to direct sunshine or condensation
   [d] the Products are exposed to high Electrostatic

2. Even under ROHM recommended storage condition, solderability of products out of recommended storage time period may be degraded. It is strongly recommended to confirm solderability before using Products of which storage time is exceeding the recommended storage time period.

3. Store / transport cartons in the correct direction, which is indicated on a carton with a symbol. Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.

4. Use Products within the specified time after opening a humidity barrier bag. Baking is required before using Products of which storage time is exceeding the recommended storage time period.

Precaution for Product Label

QR code printed on ROHM Products label is for ROHM's internal use only.

Precaution for Disposition

When disposing Products please dispose them properly using an authorized industry waste company.

Precaution for Foreign Exchange and Foreign Trade act

Since our Products might fall under controlled goods prescribed by the applicable foreign exchange and foreign trade act, please consult with ROHM representative in case of export.

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