

Clock Generator for Audio/Video Equipment BU2363FV

General Description

BU2363FV is a clock generator IC capable of generating three types of clocks - VIDEO, AUDIO and SYSTEM clocks that are necessary for DVD player systems. It is a single chip solution that uses PLL technology. Particularly, the VIDEO clock is a DVD-Audio reference and yet achieves high C/N characteristics necessary to provide high definition images.

Features

- Connecting a crystal oscillator generates multiple clock signals from a built-in PLL circuit.
- The AUDIO clock provides switching selection outputs
- The VIDEO clock achieves high C/N characteristics.
- Single power supply of 3.3 V

Applications

DVD players

Key Specifications

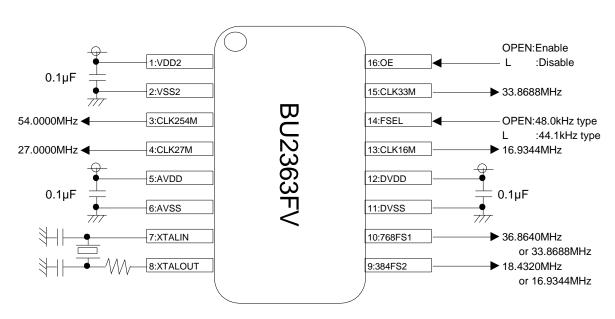
	Part Name	BU2363FV		
Supply Volta	Supply Voltage Range [V]			
Reference F	requency [MHz	ː]	36.8640	
	DVD VIDEO	2	54.0000	
		1	27.0000	
Output	DVD / CD AUDIO (Switching Outputs)	768fs	36.8640	
Frequency		10010	33.8688	
		00.44	18.4320	
[MHz]		384fs	16.9344	
	SYSTEM	768fs	33.8688	
	STOTEN	384fs	16.9344	
Jitter 1σ [psec] C/N [dB] (VIDEO) Operating Temperature Range [°C]		50		
		-80		
		-10 to +70		

Package

W(Typ) x D(Typ) x H(Max)



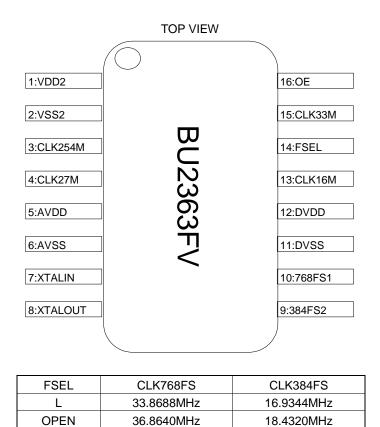
Typical Application Circuit



(Note) We believe that this circuit is to be recommended. However, to use it, make further thorough check for the characteristics.

OProduct structure : Silicon monolithic integrated circuit OThis product has no designed protection against radioactive rays

Pin Configuration



Pin Descriptions

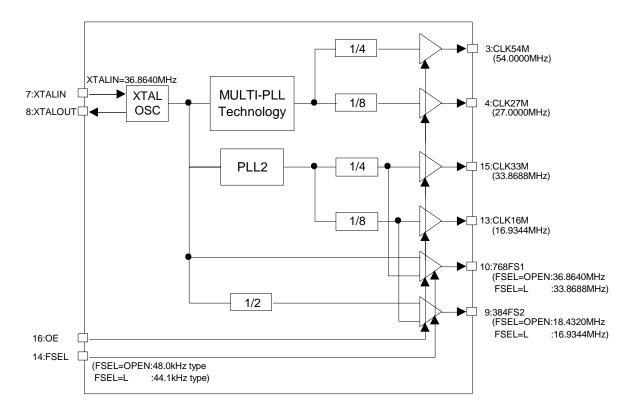
Pin No.	Pin Name	Pin Function
1	VDD2	27MHz, 54MHz power supply
2	VSS2	27MHz, 54MHzGND
3	CLK54M	54.0000MHz output
4	CLK27M	27.0000MHz output
5	AVDD	Analog power supply
6	AVSS	Analog GND
7	XTALIN	Crystal input terminal
8	XTALOUT	Crystal output terminal
9	384FS2	FSEL=OPEN:18.4320MHz, FSEL=L:16.9344MHz
10	768FS1	FSEL=OPEN:36.8640MHz, FSEL=L:33.8688MHz
11	DVSS	Digital GND
12	DVDD	Digital power supply
13	CLK16M	16.9344MHz output
14	FSEL	PIN 9, 10 output selection(with pull-up) OPEN:18.4320MHz(PIN 9), 36.8640MHz(PIN 10) L:16.9344MHz(PIN 9), 33.8688MHz(PIN 10)
15	CLK33M	33.8688MHz output
16	OE	Output enable (with pull-up), OPEN: enable, L: disable

(Note) Basically, mount ICs to the printed circuit board for use. (If the ICs are not mounted to the printed circuit board, the characteristics of ICs may not be fully demonstrated.)

Mount 0.1µF capacitors in the vicinity of the IC PINs between PIN 1 (VDD2) and PIN 2 (VSS2), PIN 5 (AVDD) and PIN 6 (AVSS), PIN 11 (DVSS) and PIN 12 (DVDD), respectively. Depending on the conditions of the printed circuit board, mount an additional electrolytic capacitor between the power supply and GND terminal.

Depending on the conditions of the printed circuit board, mount an additional electrolytic capacitor between the power supply and GND terminal. For EMI protection, it is effective to put ferrite beads in the origin of power to be supplied to the BU2363FV from the board or to insert a capacitor (of not more than 1Ω), which bypasses high frequency desired, between the power supply and the GND.

Block Diagram



Absolute Maximum Ratings (Ta=25°C)

	1 /		
Parameter	Symbol	Rating	Unit
Supply Voltage	V_{DD}	-0.5 to +7.0	V
Input Voltage	V _{IN}	-0.5 to V _{DD} + 0.5	V
Storage Temperature Range	Tstg	-30 to +125	°C
Power Dissipation	Pd	0.45 (Note 1)	W
Power Dissipation		0.10	W

(Note 1) In the case of exceeding at Ta = 25°C, 4.5mW should be reduced per 1°C

(Note) Operating is not guaranteed.

(Note) Power dissipation is measured when the IC is mounted to the printed circuit board.

Caution: Operating the IC over the absolute maximum ratings may damage the IC. The damage can either be a short circuit between pins or an open circuit between pins and the internal circuitry. Therefore, it is important to consider circuit protection measures, such as adding a fuse, in case the IC is operated over the absolute maximum ratings.

Recommended Operating Conditions

Parameter	Symbol	Limit	Unit
Supply Voltage	V _{DD}	3.0 to 3.6	V
Input H Voltage	VIH	0.8Vpd to Vpd	V
Input L Voltage	VIL	0.0 to 0.2V _{DD}	V
Operating Temperature	Topr	-10 to +70	°C
Maximum Output Load	C∟	15	pF

Electrical Characteristics

(V_{DD}=3.3V, Ta=25°C, Crystal frequency 36.8640MHz, unless otherwise specified.)

(v _{DD} =3.3v, 1a=25 ⁻ C, Cr	ysial nequency	y 30.00401VINZ,	uniess otherw	ise specified.)		
Parameter	Symbol	Min	Тур	Max	Unit	Conditions
Output L Voltage	V _{OL}	-	-	0.4	V	I _{OL} =4.0mA
Output H Voltage	Vон	2.4	-	-	V	I _{ОН} =-4.0mА
Consumption Current	I _{DD}	-	30	50	mA	At no load
CLK54M	CLK54M	-	54.0000	-	MHz	XTAL x 375 / 64 / 4
CLK27M	CLK27M	-	27.0000	-	MHz	XTAL x 375 / 64 / 8
CLK33M	CLK33M	-	33.8688	-	MHz	XTAL x 147 / 40 / 4
CLK16M	CLK16M	-	16.9344	-	MHz	XTAL x 147 / 40 / 8
CLK768FS1	CLK768_H	-	36.8640	-	MHz	At FSEL=OPEN, XTAL output
CERTOFST	CLK768_L	-	33.8688	-	MHz	At FSEL=L, XTAL x 147 / 40 / 4
CLK384FS2	CLK384_H	-	18.4320	-	MHz	At FSEL=OPEN, XTAL / 2 output
GEN304F32	CLK384_L	-	16.9344	-	MHz	At FSEL=L, XTAL x 147 / 40 / 8
Duty	Duty	45	50	55	%	Measured at a voltage of 1/2 VDD
Period-Jitter 1o	P-J 1σ	-	50	-	psec	(Note 1)
Period-Jitter MIN-MAX	P-J MIN-MAX	-	300	-	psec	(Note 2)
Rise Time	t _R	-	2.5	-	nsec	Period of transition time required for the clock output to reach 80% from 20% of VDD
Fall Time	t⊧	-	2.5	-	nsec	Period of transition time required for the clock output to reach 20% from 80% of VDD
Output Lock-Time	t _{LOCK}	-	-	1	msec	(Note 3)
C/N 54M	C/N 54M	-65	-80	-	dB	(Note 4) (At a maximum load)
C/N 33M	C/N 33M	-50	-60	-	dB	(Note 4) (At a maximum load)

(Note) The output frequency is determined by the arithmetic (frequency division) expression of a frequency input to XTALIN.

If the input frequency is set to 36.8640MHz, the output frequency will be as listed above.

(Note 1) Period-Jitter 1σ

This parameter represents standard deviation (=1 σ) on cycle distribution data at the time when the output clock cycles are sampled 1000 times consecutively with the TDS7104 Digital Phosphor Oscilloscope of Tektronix Japan, Ltd.

(Note 2) Period-Jitter MIN-MAX

This parameter represents a maximum distribution width on cycle distribution data at the time when the output clock cycles are sampled 1000 times consecutively with the TDS7104 Digital Phosphor Oscilloscope of Tektronix Japan, Ltd.

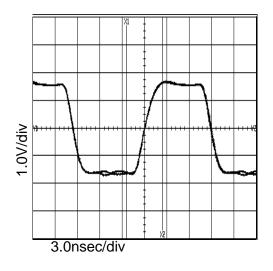
(Note 3) Output Lock-Time

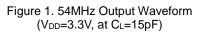
The Lock-Time represents elapsed time after power supply turns ON to reach a 3.0V voltage, after the system is switched from Power-Down state to normal operation state, or after the output frequency is switched, until it is stabilized at a specified frequency, respectively.

(Note 4) Make measurements with settings of SPAN to 100kHz, RBW to 1kHz, and VBW to 100Hz taking the middle point between (54.0000MHz±20kHz) and (33.8688MHz±20kHz) as a measurement point.

Typical Performance Curves

(Basic Data)





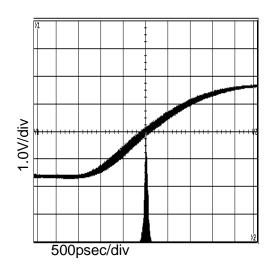


Figure 2. 54MHz Period-Jitter (V_{DD}=3.3V, at C_L=15pF)

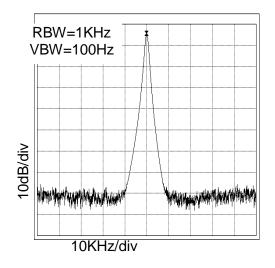


Figure 3. 54MHz Spectrum (V_{DD} =3.3V, at CL=15pF)

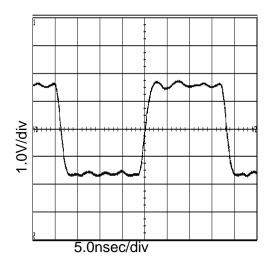
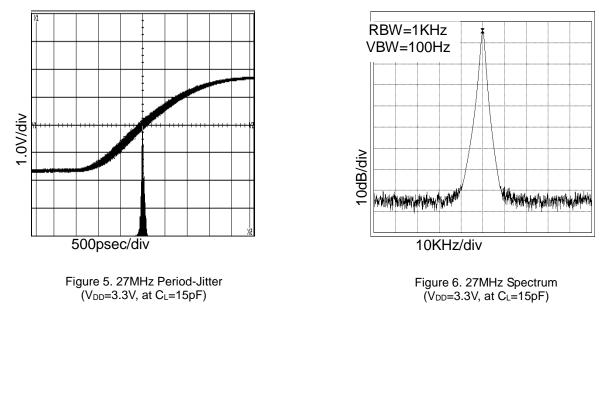
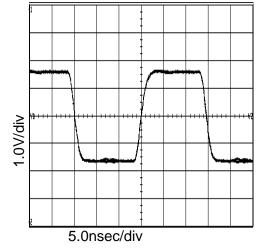
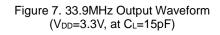


Figure 4. 27MHz Output Waveform (V_DD=3.3V, at C_=15pF)







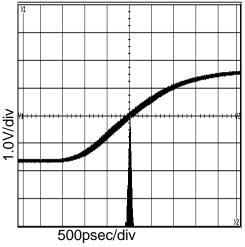


Figure 8. 33.9MHz Period-Jitter (V_{DD} =3.3V, at CL=15pF)

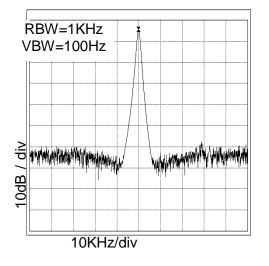


Figure 9. 33.9MHz Spectrum (V_{DD}=3.3V, at C_L=15pF)

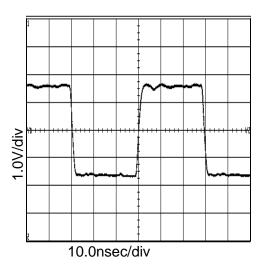


Figure 10. 16.9MHz Output Waveform (V_{DD} =3.3V, at CL=15pF)

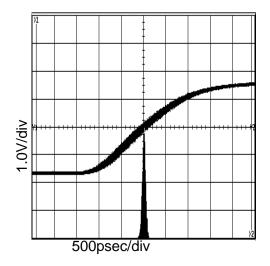


Figure 11. 16.9MHz Period-Jitter (V_{DD} =3.3V, at CL=15pF)

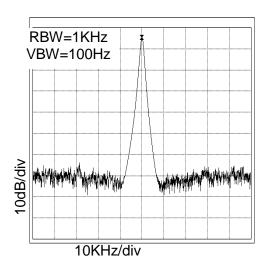
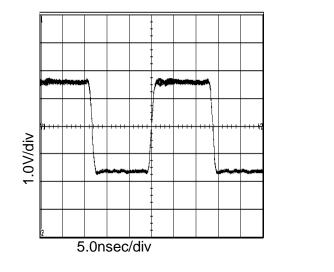
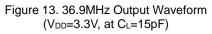


Figure 12. 16.9MHz Spectrum (V_{DD} =3.3V, at CL=15pF)





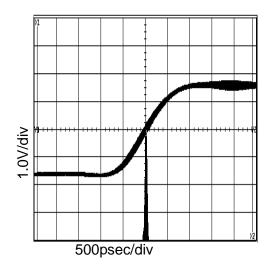


Figure 14. 36.9MHz Period-Jitter (V_{DD} =3.3V, at CL=15pF)

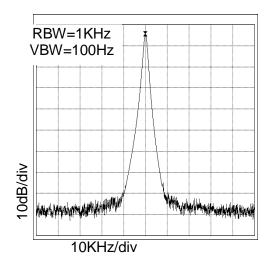


Figure 15. 36.9MHz Spectrum (V_{DD} =3.3V, at CL=15pF)

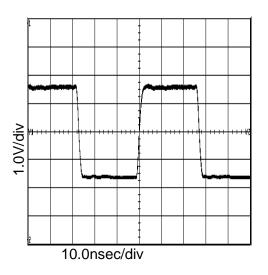
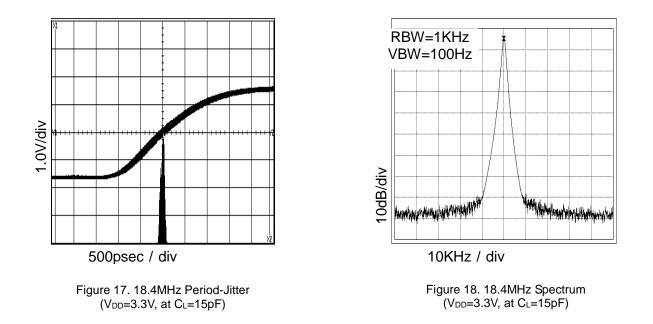


Figure 16. 18.4MHz Output Waveform $(V_{DD}=3.3V, \text{ at } C_L=15pF)$



(Temperature and Supply Voltage Variations Data)

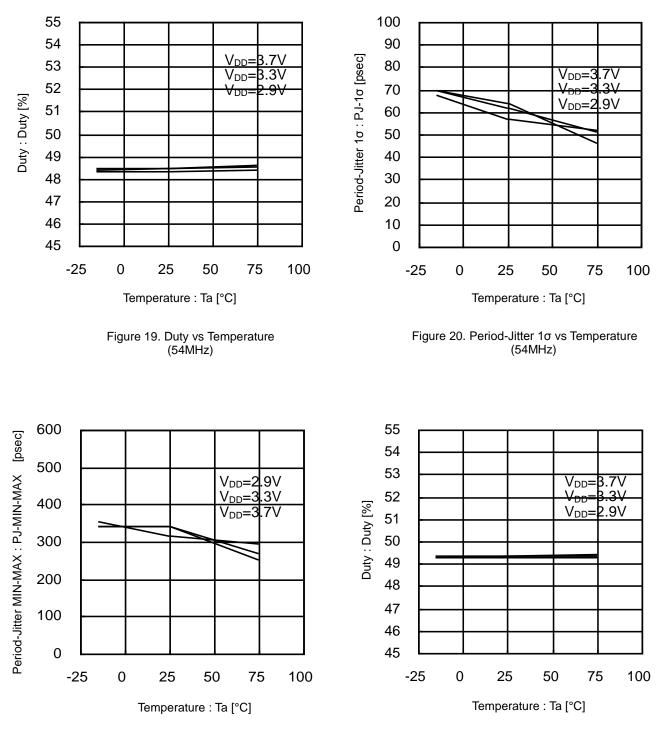
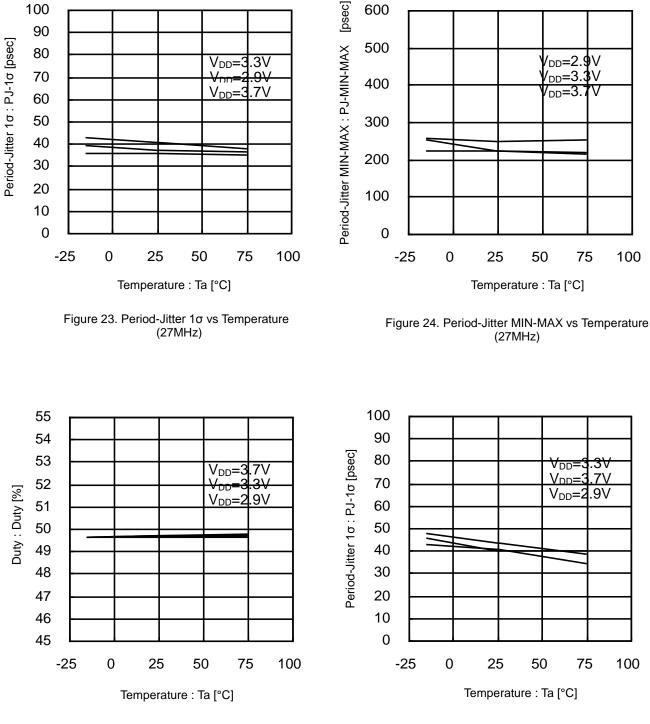
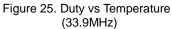


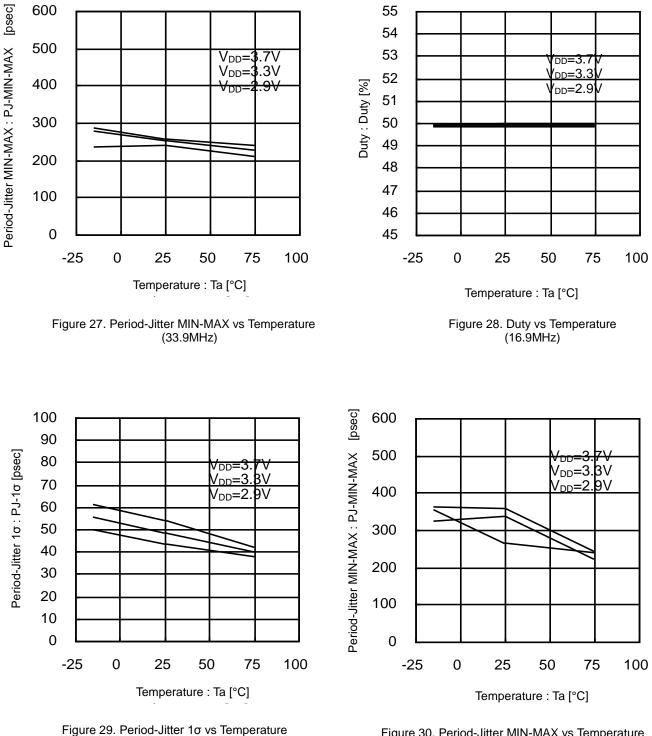
Figure 21. Period-Jitter MIN-MAX vs Temperature (54MHz)

Figure 22. Duty vs Temperature (27MHz)









(16.9MHz)

Figure 30. Period-Jitter MIN-MAX vs Temperature (16.9MHz)

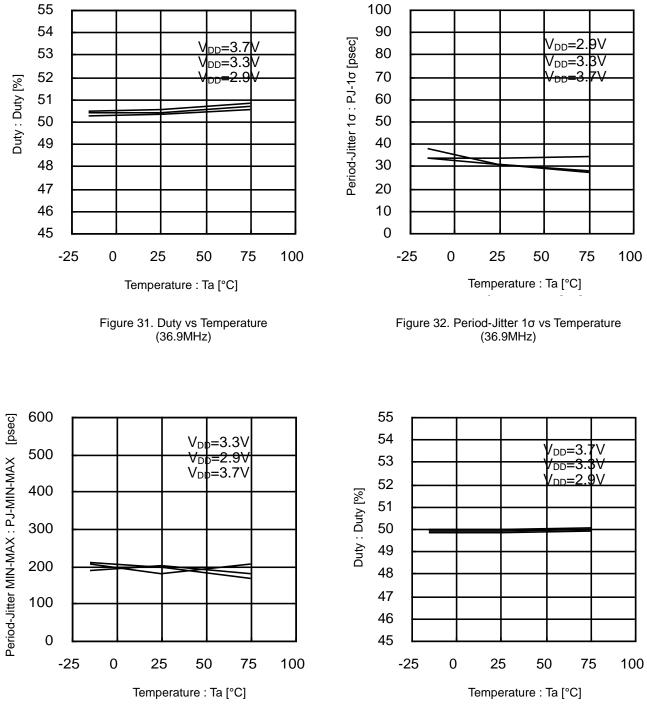


Figure 33. Period-Jitter MIN-MAX vs Temperature (36.9MHz)

Figure 34. Duty vs Temperature (18.4MHz)

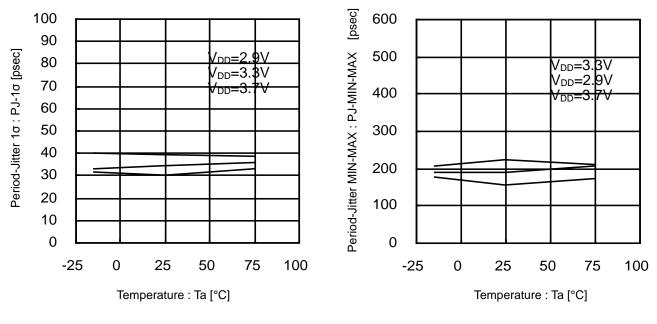
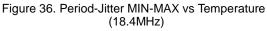
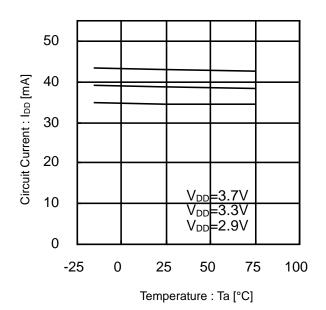
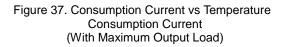


Figure 35. Period-Jitter 1o vs Temperature (18.4MHz)







Operational Notes

1. Reverse Connection of Power Supply

Connecting the power supply in reverse polarity can damage the IC. Take precautions against reverse polarity when connecting the power supply, such as mounting an external diode between the power supply and the IC's power supply pins.

2. Power Supply Lines

Design the PCB layout pattern to provide low impedance supply lines. Separate the ground and supply lines of the digital and analog blocks to prevent noise in the ground and supply lines of the digital block from affecting the analog block. Furthermore, connect a capacitor to ground at all power supply pins. Consider the effect of temperature and aging on the capacitance value when using electrolytic capacitors.

3. Ground Voltage

Ensure that no pins are at a voltage below that of the ground pin at any time, even during transient condition.

4. Ground Wiring Pattern

When using both small-signal and large-current ground traces, the two ground traces should be routed separately but connected to a single ground at the reference point of the application board to avoid fluctuations in the small-signal ground caused by large currents. Also ensure that the ground traces of external components do not cause variations on the ground voltage. The ground lines must be as short and thick as possible to reduce line impedance.

5. Thermal Consideration

Should by any chance the power dissipation rating be exceeded the rise in temperature of the chip may result in deterioration of the properties of the chip. In case of exceeding this absolute maximum rating, increase the board size and copper area to prevent exceeding the Pd rating.

6. Recommended Operating Conditions

These conditions represent a range within which the expected characteristics of the IC can be approximately obtained. The electrical characteristics are guaranteed under the conditions of each parameter.

7. Inrush Current

When power is first supplied to the IC, it is possible that the internal logic may be unstable and inrush current may flow instantaneously due to the internal powering sequence and delays, especially if the IC has more than one power supply. Therefore, give special consideration to power coupling capacitance, power wiring, width of ground wiring, and routing of connections.

8. Operation Under Strong Electromagnetic Field

Operating the IC in the presence of a strong electromagnetic field may cause the IC to malfunction.

9. Testing on Application Boards

When testing the IC on an application board, connecting a capacitor directly to a low-impedance output pin may subject the IC to stress. Always discharge capacitors completely after each process or step. The IC's power supply should always be turned off completely before connecting or removing it from the test setup during the inspection process. To prevent damage from static discharge, ground the IC during assembly and use similar precautions during transport and storage.

10. Inter-pin Short and Mounting Errors

Ensure that the direction and position are correct when mounting the IC on the PCB. Incorrect mounting may result in damaging the IC. Avoid nearby pins being shorted to each other especially to ground, power supply and output pin. Inter-pin shorts could be due to many reasons such as metal particles, water droplets (in very humid environment) and unintentional solder bridge deposited in between pins during assembly to name a few.

11. Unused Input Pins

Input pins of an IC are often connected to the gate of a MOS transistor. The gate has extremely high impedance and extremely low capacitance. If left unconnected, the electric field from the outside can easily charge it. The small charge acquired in this way is enough to produce a significant effect on the conduction through the transistor and cause unexpected operation of the IC. So unless otherwise specified, unused input pins should be connected to the power supply or ground line.

Operational Notes – continued

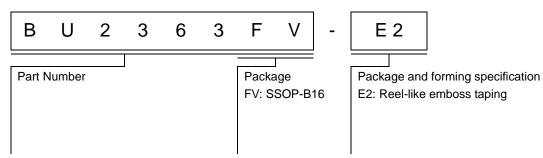
12. Regarding the Input Pin of the IC

In the construction of this IC, P-N junctions are inevitably formed creating parasitic diodes or transistors. The operation of these parasitic elements can result in mutual interference among circuits, operational faults, or physical damage. Therefore, conditions which cause these parasitic elements to operate, such as applying a voltage to an input pin lower than the ground voltage should be avoided. Furthermore, do not apply a voltage to the input pins when no power supply voltage is applied to the IC. Even if the power supply voltage is applied, make sure that the input pins have voltages within the values specified in the electrical characteristics of this IC.

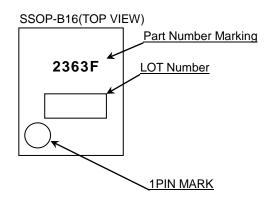
13. Ceramic Capacitor

When using a ceramic capacitor, determine the dielectric constant considering the change of capacitance with temperature and the decrease in nominal capacitance due to DC bias and others.

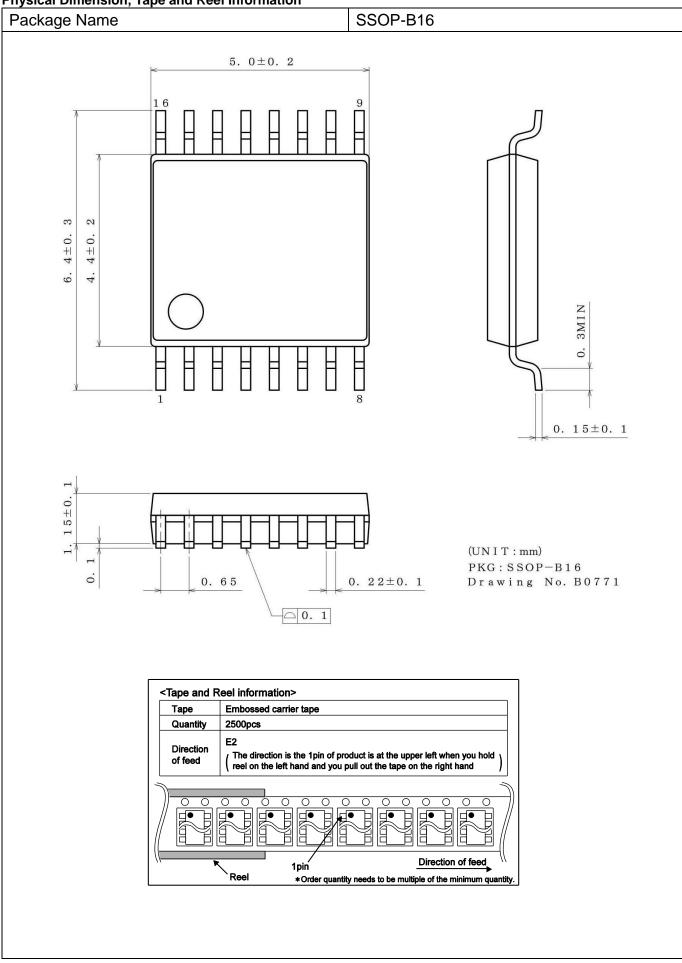
Ordering Information



Marking Diagram



Physical Dimension, Tape and Reel Information



18/19

Revision History

Date	Revision	Changes
04.Nov.2015	001	New Release

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	CLASS II b	
CLASSⅣ	CLASSII	CLASSⅢ	CLASSII

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 - [b] Installation of redundant circuits to reduce the impact of single or multiple circuit failure
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 - [c] Use of our Products in places where the Products are exposed to sea wind or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂
 - [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 depending on ambient temperature. When used in sealed area, confirm that it is the use in the range that does not exceed the maximum junction 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 on a surface-mount products, the flow soldering method must be used on a through hole mount products. If the flow soldering method is preferred on a surface-mount products, 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 lonizer, 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.

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

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Part Number	BU2363FV
Package	SSOP-B16
Unit Quantity	2500
Minimum Package Quantity	2500
Packing Type	Taping
Constitution Materials List	inquiry
RoHS	Yes