High-performance Clock Generator Series

DVD-audio Reference Clock Generators for A/V Equipments

Pb Free ROHM Electronic Components   RoHS Directive Compliance

BU2285FV,BU2363FV

No.09005EAT03

●Description

These clock generators are an IC generating three types of clocks - VIDEO, AUIDIO and SYSTEM clocks – necessary for DVD player systems, with a single chip through making use of the 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

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

●Applications

DVD players

●Line up matrix

Part name			BU2285FV	BU2363FV
Supply voltage [V]			3.0 ~ 3.6	3.0 ~ 3.6
Reference frequency [MHz]			36.8640	36.8640
Output frequency[MHz]	DVD VIDEO	2	54.0000	54.0000
		1	27.0000	27.0000
		1/2	13.5000	—
	DVD / CD AUDIO (Switching outputs)	768fs	36.8640 / 33.8688	36.8640 / 33.8688
		512fs	—	—
		384fs	18.4320 / 16.9344	18.4320 / 16.9344
		256fs	—	—
	SYSTEM	768fs	33.8688	33.8688
		384fs	16.9344	16.9344
Jitter 1σ [psec]			50	50
C/N [dB] (VIDEO)			-60	-80
Package			SSOP-B24	SSOP-B16

●Absolute Maximum Ratings (Ta=25℃)

Parameter	Symbol	BU2285FV	BU2363FV	Unit
Supply voltage	VDD	-0.5 ~ +7.0	-0.5 ~ +7.0	V
Input voltage	VIN	-0.5 ~ VDD+0.5	-0.5 ~ VDD+0.5	V
Storage temperature range	Tstg	-30 ~ +125	-30 ~ +125	℃
Power dissipation	PD	630 *1	450 *2	mW

*1 In the case of exceeding at Ta = 25℃, 6.3mW should be reduced per 1℃
*2 In the case of exceeding at Ta = 25℃, 4.5mW should be reduced per 1℃
*Operating is not guaranteed.
*The radiation-resistance design is not carried out.
*Power dissipation is measured when the IC is mounted to the printed circuit board.

●Recommended Operating Range

Parameter	Symbol	BU2285FV	BU2363FV	Unit
Supply voltage	VDD	3.0 ~ 3.6	3.0 ~ 3.6	V
Input H voltage	VIH	0.8VDD ~ VDD	0.8VDD ~ VDD	V
Input L voltage	VIL	0.0 ~ 0.2VDD	0.0 ~ 0.2VDD	V
Operating temperature	Topr	-5 ~ +70	-10 ~ +70	℃
Maximum output load	CL	15	15	pF

●Electrical characteristics

◎BU2285FV(VDD=3.3V, Ta=25℃, Crystal frequency 36.8640MHz, unless otherwise specified.)

Parameter	Symbol	Limits			Unit	Conditions
		Min.	Typ.	Max.		
Output L voltage	VOL	－	－	0.4	V	IOL=4.0mA
Output H voltage	VOH	2.4	－	－	V	IOH=-4.0mA
Consumption current	IDD	－	30	50	mA	At no load
CLK54M	CLK54M	－	54.0000	－	MHz	XTAL×375 / 128 / 2
CLK27M	CLK27M	－	27.0000	－	MHz	XTAL×375 / 128 / 4
CLKDAC	CLKDAC_H	－	27.0000	－	MHz	At CTRLB=OPEN, XTAL×375 / 128 / 4
	CLKDAC_L	－	13.5000	－	MHz	At CTRLB=L, XTAL×375 / 128 / 8
CLK33M	CLK33M	－	33.8688	－	MHz	XTAL×147 / 40 / 4
CLK16M	CLK16M	－	16.9344	－	MHz	XTAL×147 / 40 / 8
CLKA	CLKA_H	－	36.8640	－	MHz	At CTRLA=OPEN, XTAL output
	CLKA_L	－	33.8688	－	MHz	At CTRLA=L, XTAL×147 / 40 / 4
CLKB	CLKB_H	－	18.4320	－	MHz	At CTRLA=OPEN, XTAL / 2 output
	CLKB_L	－	16.9344	－	MHz	At CTRLA=L, XTAL×147 / 40 / 8
Duty	Duty	45	50	55	%	Measured at a voltage of 1/2VDD
Period-Jitter 1σ	P-J 1σ	－	50	－	psec	*1
Period-Jitter MIN-MAX	P-J MIN-MAX	－	300	－	psec	*2
Rise Time	Tr	－	2.5	－	nsec	Period of transition time required for the clock output to reach 80% from 20% of VDD
Fall Time	Tf	－	2.5	－	nsec	Period of transition time required for the clock output to reach 20% from 80% of VDD
Output Lock-Time	Tlock	－	－	1	msec	*3

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.

◎BU2363FV(VDD=3.3V, Ta=25℃, Crystal frequency 36.8640MHz, unless otherwise specified.)

Parameter	Symbol	Limits			Unit	Conditions
		Min.	Typ.	Max.		
Output L voltage	VOL	—	—	0.4	V	IOL=4.0mA
Output H voltage	VOH	2.4	—	—	V	IOH=−4.0mA
Consumption current	IDD	—	30	50	mA	At no load
CLK54M	CLK54M	—	54.0000	—	MHz	XTAL × 375 / 64 / 4
CLK27M	CLK27M	—	27.0000	—	MHz	XTAL × 375 / 64 / 8
CLK33M	CLK33M	—	33.8688	—	MHz	XTAL × 147 / 40 / 4
CLK16M	CLK16M	—	16.9344	—	MHz	XTAL × 147 / 40 / 8
CLK768FS1	CLK768_H	—	36.8640	—	MHz	At FSEL=OPEN, XTAL output
	CLK768_L	—	33.8688	—	MHz	At FSEL=L, XTAL × 147 / 40 / 4
CLK384FS2	CLK384_H	—	18.4320	—	MHz	At FSEL=OPEN, XTAL / 2 output
	CLK384_L	—	16.9344	—	MHz	At FSEL=L, XTAL × 147 / 40 / 8
Duty	Duty	45	50	55	%	Measured at a voltage of 1/2VDD
Period-Jitter 1σ	P-J 1σ	—	50	—	psec	*1
Period-Jitter MIN-MAX	P-J MIN-MAX	—	300	—	psec	*2
Rise Time	Tr	—	2.5	—	nsec	Period of transition time required for the clock output to reach 80% from 20% of VDD
Fall Time	Tf	—	2.5	—	nsec	Period of transition time required for the clock output to reach 20% from 80% of VDD
Output Lock-Time	Tlock	—	—	1	msec	*3
C/N 54M	C/N 54M	-65	-80	—	dB	*4 (At a maximum load)
C/N 33M	C/N 33M	-50	-60	—	dB	*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.

Common to BU2285FV and BU2363FV:

*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.

*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.

*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.

BU2363FV

*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.

●Reference data (BU2285FV basic data)

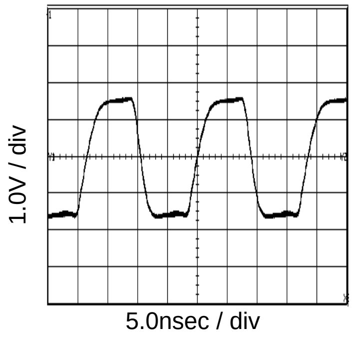


Fig.1 54MHz output waveform
VDD=3.3V, at CL=15pF

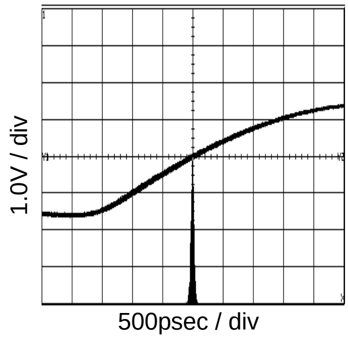


Fig.2 54MHz Period-Jitter
VDD=3.3V, at CL=15pF

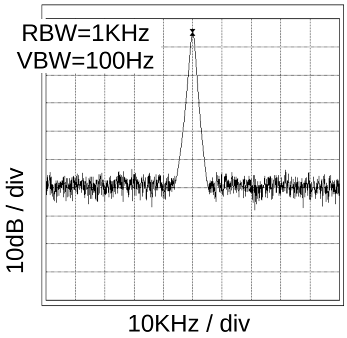


Fig.3 54MHz Spectrum
VDD=3.3V, at CL=15pF

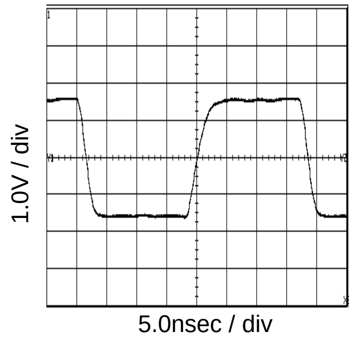


Fig.4 27MHz output waveform
VDD=3.3V, at CL=15pF

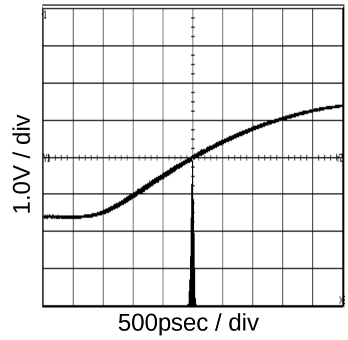


Fig.5 27MHz Period-Jitter
VDD=3.3V, at CL=15pF

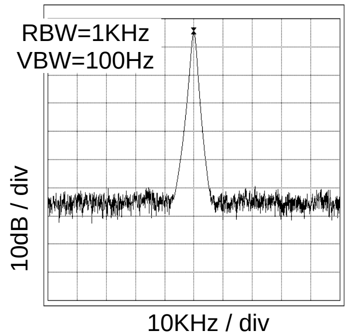


Fig.6 27MHz Spectrum
VDD=3.3V at CL=15pF

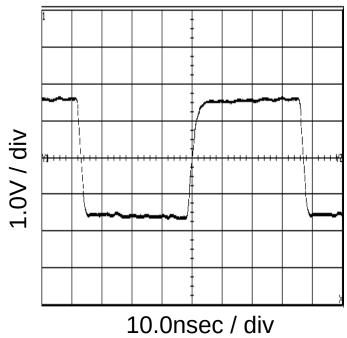


Fig.7 13.5MHz output waveform
VDD=3.3V, at CL=15pF

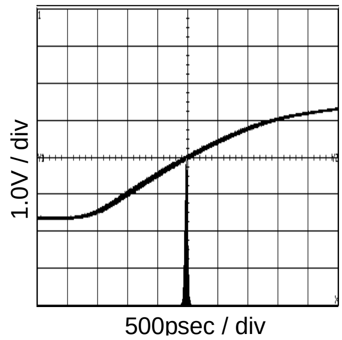


Fig.8 13.5MHz Period-Jitter
VDD=3.3V, at CL=15pF

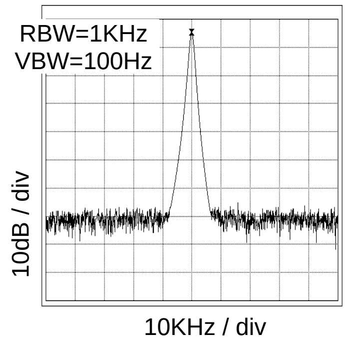


Fig.9 13.5MHz Spectrum
VDD=3.3V, at CL=15pF

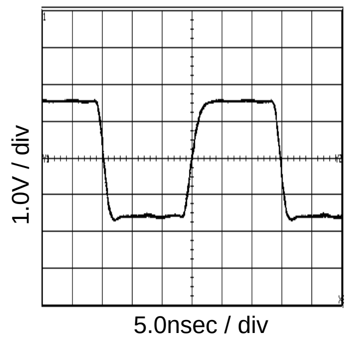


Fig.10 33.9MHz output waveform
VDD=3.3V, at CL=15pF

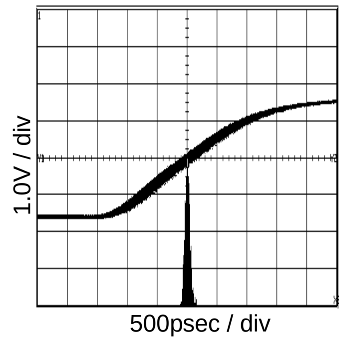


Fig.11 33.9MHz Period-Jitter
VDD=3.3V, at CL=15pF

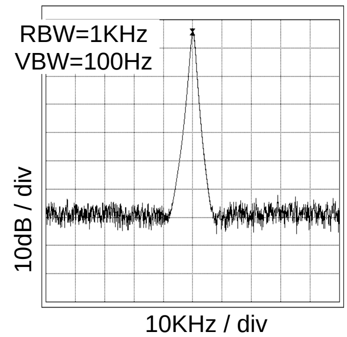


Fig.12 33.9MHz Spectrum
VDD=3.3V, at CL=15pF

●Reference data (BU2285FV basic data)

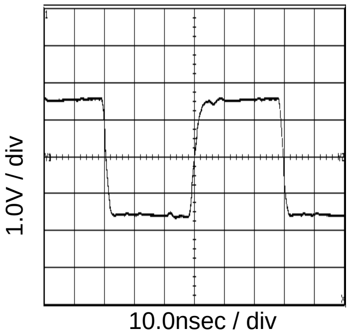


Fig.13 16.9MHz output waveform
VDD=3.3V, at CL=15pF

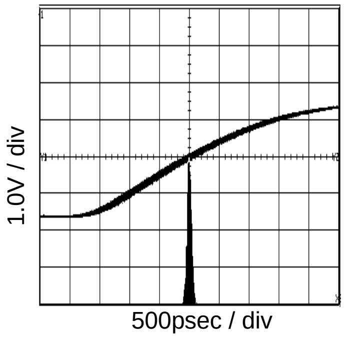


Fig.14 16.9MHz Period-Jitter
VDD=3.3V, at CL=15pF

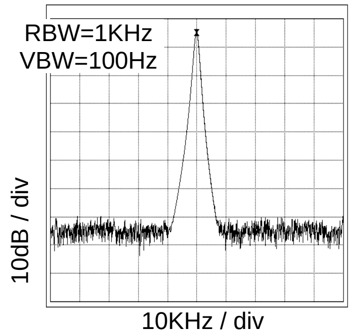


Fig.15 16.9MHz Spectrum
VDD=3.3V, at CL=15pF

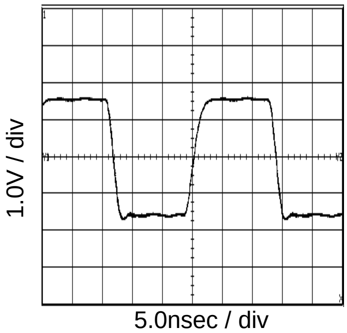


Fig.16 36.9MHz output waveform
VDD=3.3V, at CL=15pF

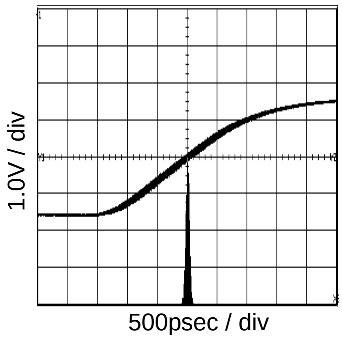


Fig.17 36.9MHz Period-Jitter
VDD=3.3V, at CL=15pF

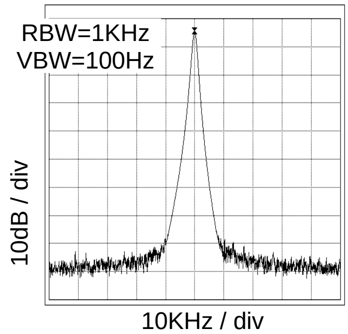


Fig.18 36.9MHz Spectrum
VDD=3.3V, at CL=15pF

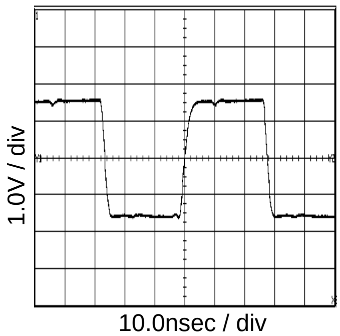


Fig.19 18.4MHz output waveform
VDD=3.3V, at CL=15pF

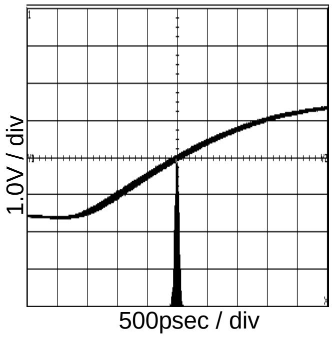


Fig.20 18.4MHz Period-Jitter
VDD=3.3V, at CL=15pF

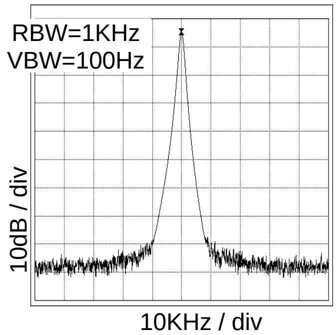


Fig.21 18.4MHz Spectrum
VDD=3.3V, at CL=15pF

●Reference data (BU2285FV Temperature and Supply voltage variations data)

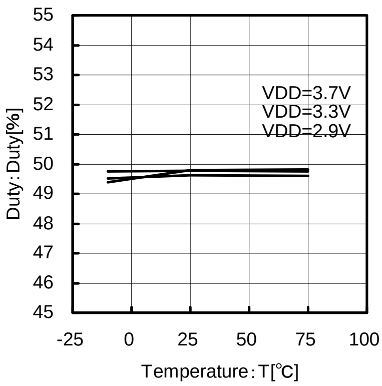


Fig.22 54MHz
Temperature－Duty

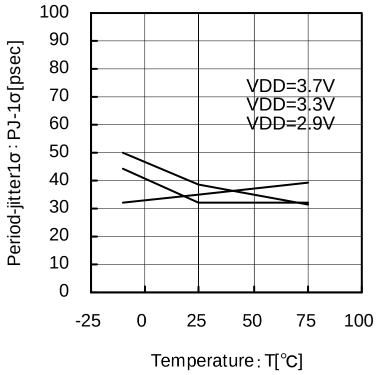


Fig.23 54MHz
Temperature－Period-Jitter 1σ

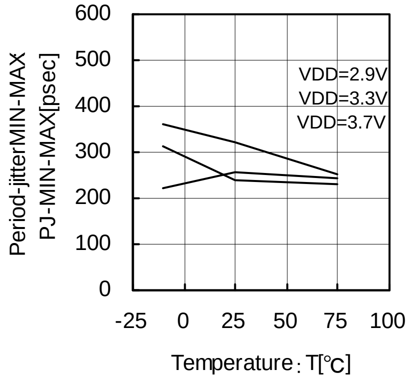


Fig.24 54MHz
Temperature－Period-Jitter MIN-MAX

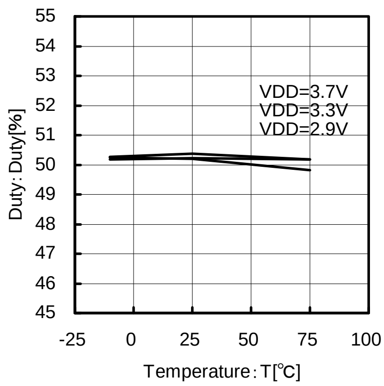


Fig.25 27MHz
Temperature－Duty

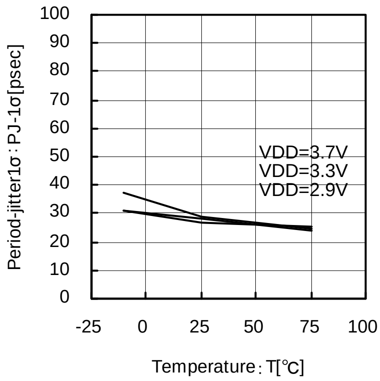


Fig.26 27MHz
Temperature－Period-Jitter 1σ

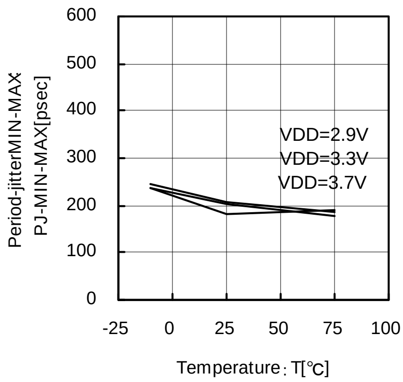


Fig.27 27MHz
Temperature－Period-Jitter MIN-MAX

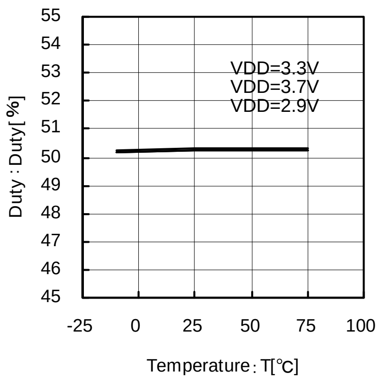


Fig.28 13.5MHz
Temperature－Duty

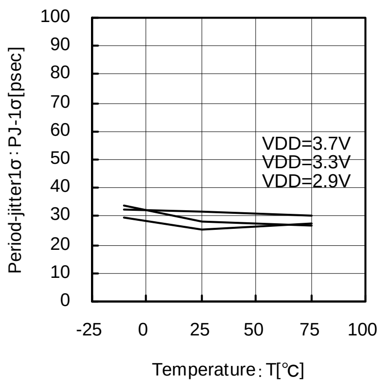


Fig.29 13.5MHz
Temperature－Period-Jitter 1σ

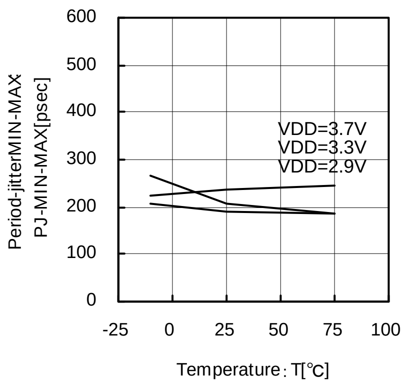


Fig.30 13.5MHz
Temperature－Period-Jitter MIN-MAX

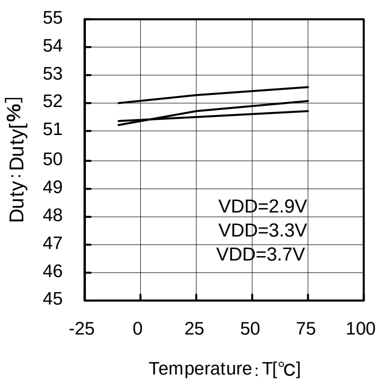


Fig.31 33.9MHz
Temperature－Duty

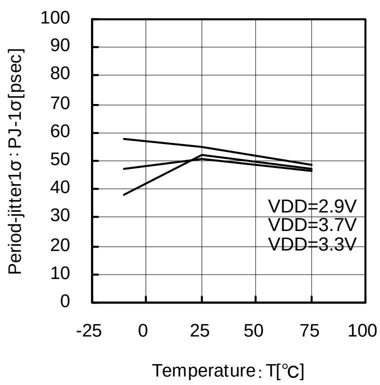


Fig.32 33.9MHz
Temperature－Period-Jitter 1σ

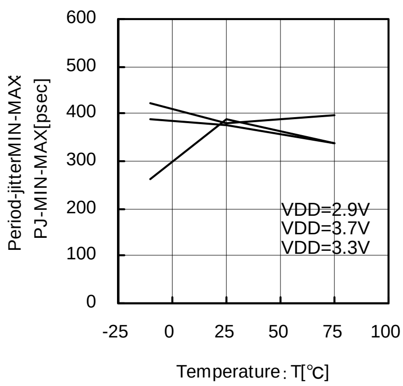


Fig.33 33.9MHz
Temperature－Period-Jitter MIN-MAX

●Reference data (BU2285FV Temperature and Supply voltage variations data)

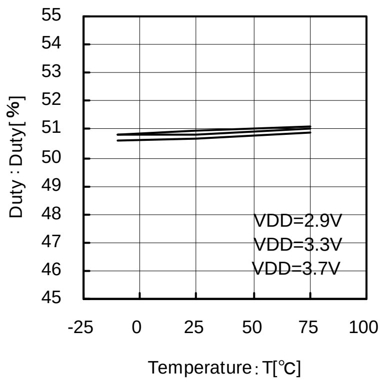


Fig.34 16.9MHz
Temperature－Duty

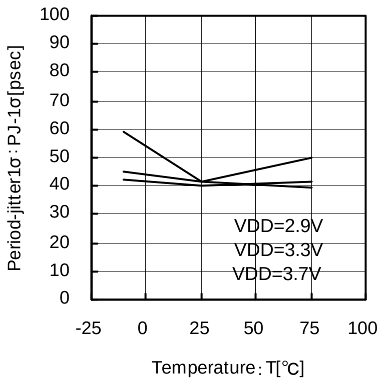


Fig.35 16.9MHz
Temperature－Period-Jitter 1σ

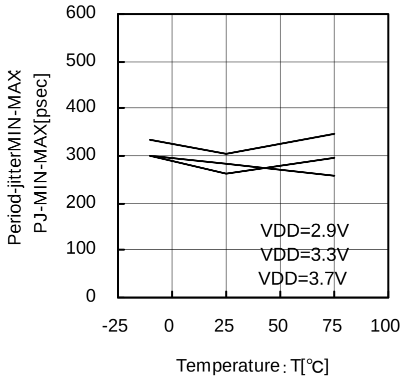


Fig.36 16.9MHz
Temperature－Period-Jitter MIN-MAX

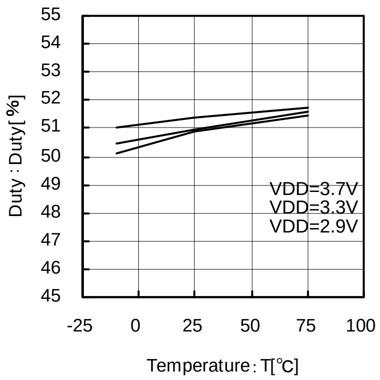


Fig.37 36.9MHz
Temperature－Duty

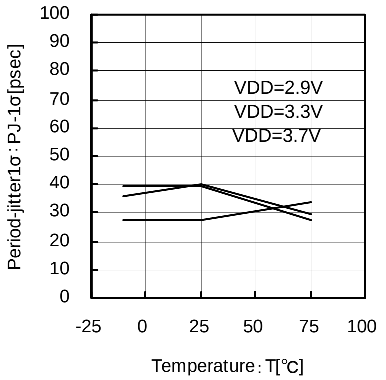


Fig.38 36.9MHz
Temperature－Period-Jitter 1σ

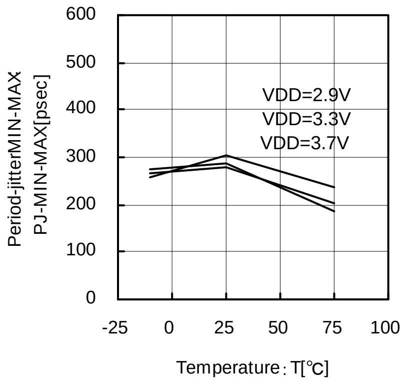


Fig.39 36.9MHz
Temperature－Period-Jitter MIN-MAX

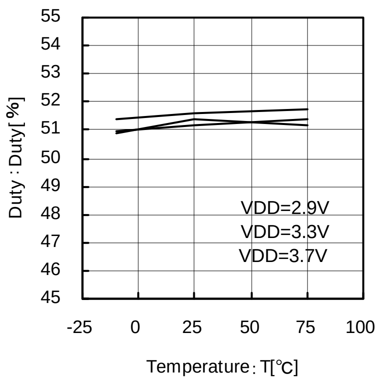


Fig.40 18.4MHz
Temperature－Duty

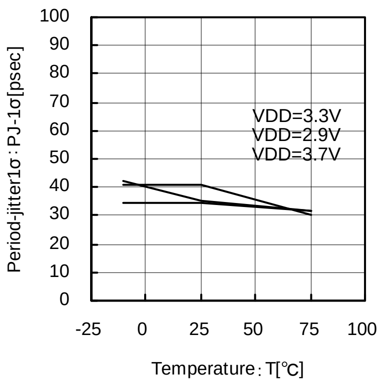


Fig.41 18.4MHz
Temperature－Period-Jitter 1σ

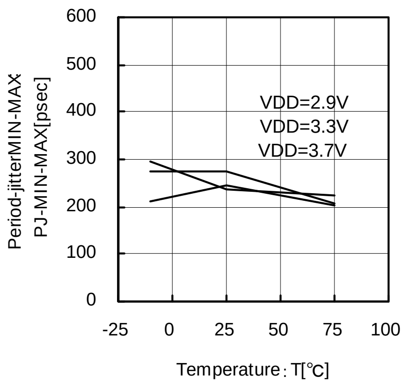


Fig.42 18.4MHz
Temperature－Period-Jitter MIN-MAX

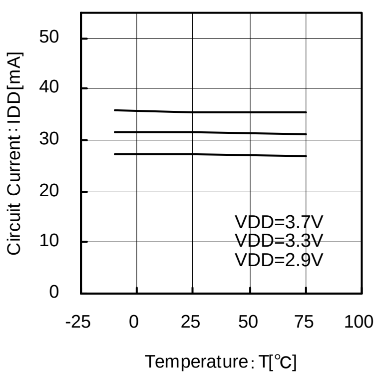


Fig.43 Consumption current
(with maximum output load)
Temperature－Consumption current

●**Reference data (BU2363FV basic data)**

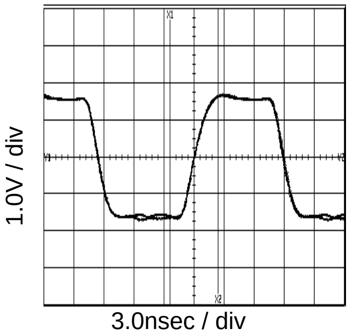


Fig.44 54MHz output waveform
VDD=3.3V, at CL=15pF

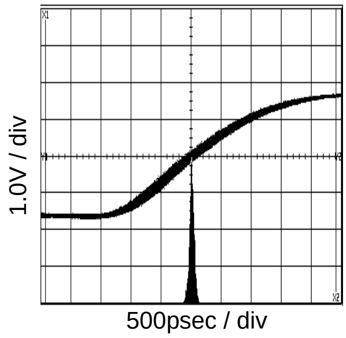


Fig.45 54MHz Period-Jitter
VDD=3.3V, at CL=15pF

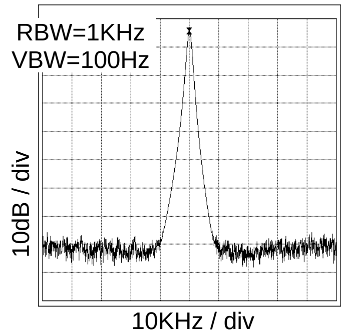


Fig.46 54MHz Spectrum
VDD=3.3V, at CL=15pF

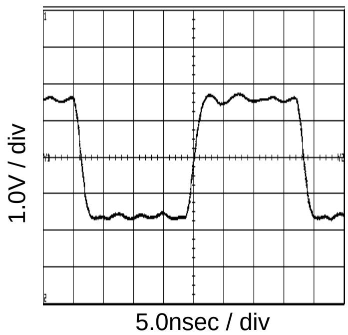


Fig.47 27MHz output waveform
VDD=3.3V, at CL=15pF

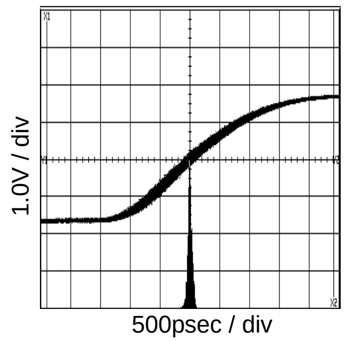


Fig.48 27MHz Period-Jitter
VDD=3.3V, at CL=15pF

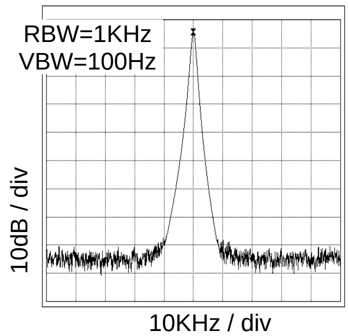


Fig.49 27MHz Spectrum
VDD=3.3V, at CL=15pF

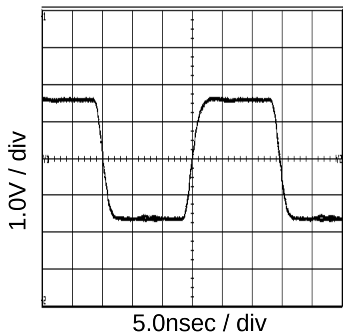


Fig.50 33.9MHz output waveform
VDD=3.3V, at CL=15pF

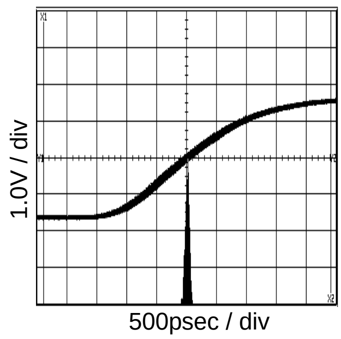


Fig.51 33.9MHz Period-Jitter
VDD=3.3V, at CL=15pF

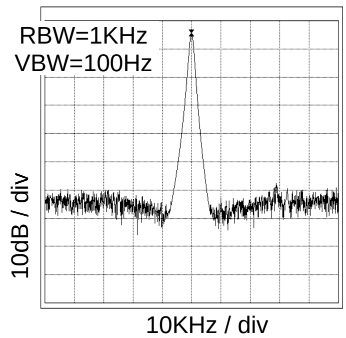


Fig.52 33.9MHz Spectrum
VDD=3.3V, at CL=15pF

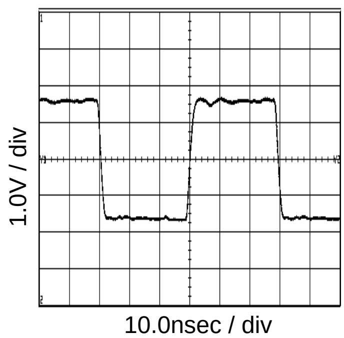


Fig.53 16.9MHz output waveform
VDD=3.3V, at CL=15pF

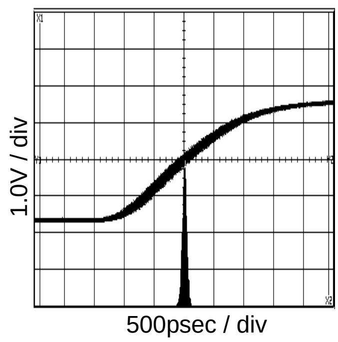


Fig.54 16.9MHz Period-Jitter
VDD=3.3V, at CL=15pF

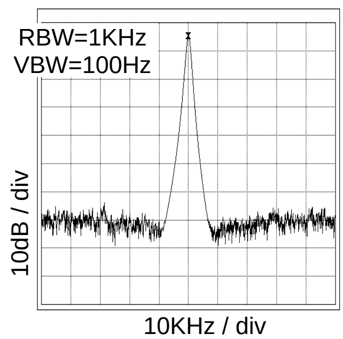


Fig.55 16.9MHz Spectrum
VDD=3.3V, at CL=15pF

●Reference data (BU2363FV basic data)

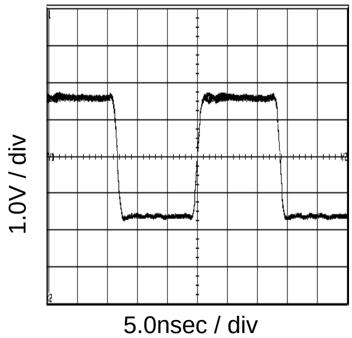


Fig.56 36.9MHz output waveform
VDD=3.3V, at CL=15pF

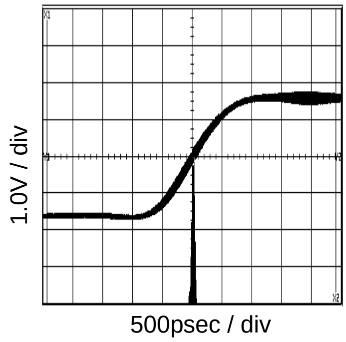


Fig.57 36.9MHz Period-Jitter
VDD=3.3V, at CL=15pF

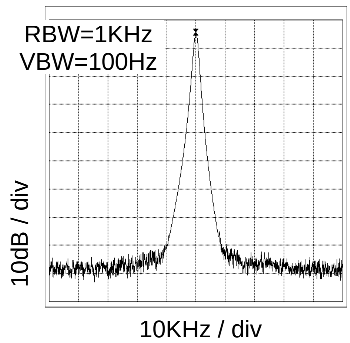


Fig.58 36.9MHz Spectrum
VDD=3.3V, at CL=15pF

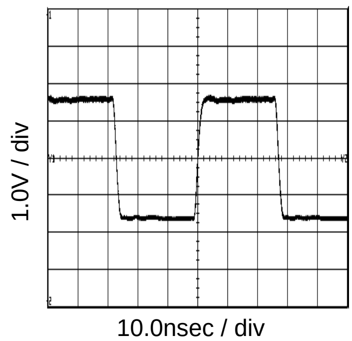


Fig.59 18.4MHz output waveform
VDD=3.3V, at CL=15pF

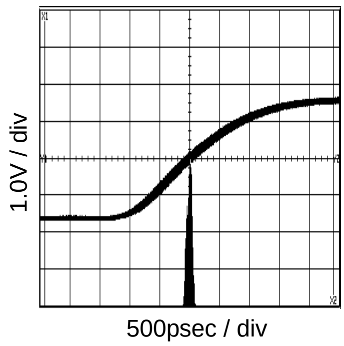


Fig.60 18.4MHz Period-Jitter
VDD=3.3V, at CL=15pF

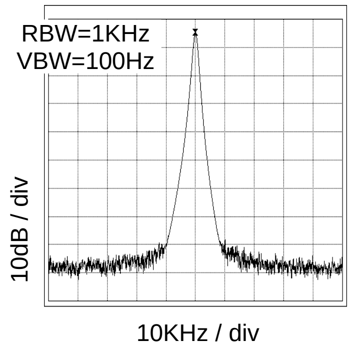


Fig.61 18.4MHz Spectrum
VDD=3.3V, at CL=15pF

●Reference data (BU2363FV Temperature and Supply voltage variations data)

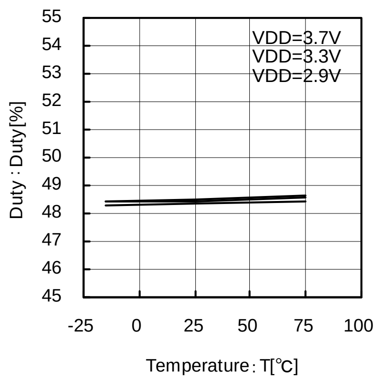


Fig.62 54MHz
Temperature－Duty

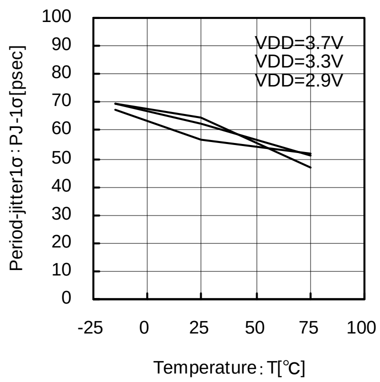


Fig.63 54MHz
Temperature－Period-Jitter 1σ

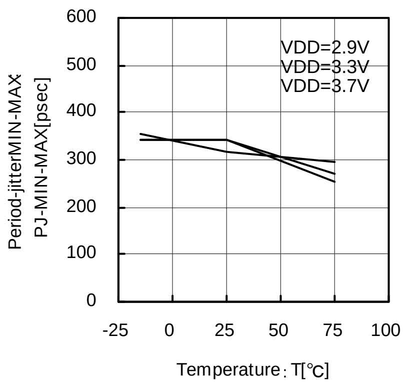


Fig.64 54MHz
Temperature－Period-Jitter MIN-MAX

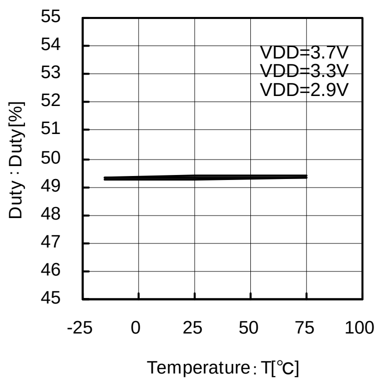


Fig.65 27MHz
Temperature－Duty

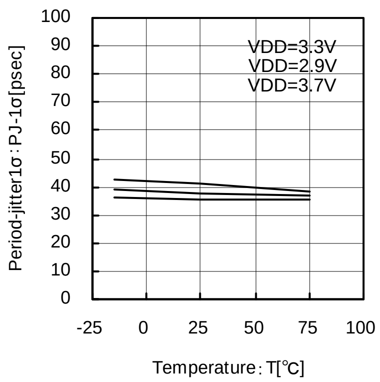


Fig.66 27MHz
Temperature－Period-Jitter 1σ

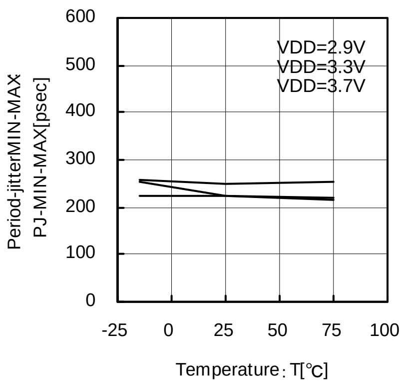


Fig.67 27MHz
Temperature－Period-Jitter MIN-MAX

●**Reference data (BU2363FV Temperature and Supply voltage variations data)**

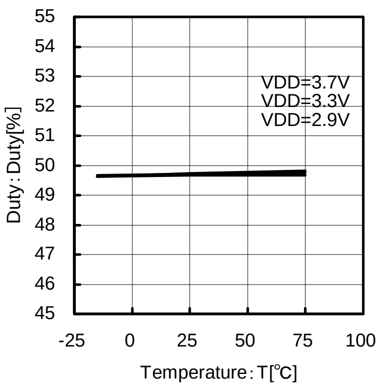


Fig.68 33.9MHz
Temperature－Duty

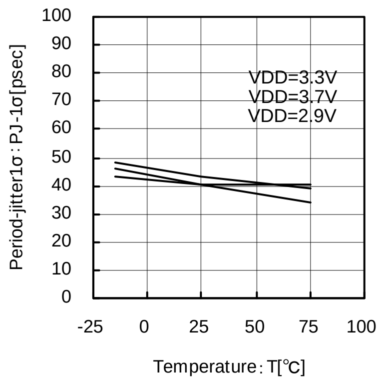


Fig.69 33.9MHz
Temperature－Period-Jitter 1σ

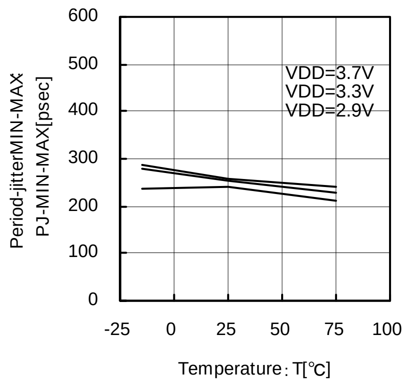


Fig.70 33.9MHz
Temperature－Period-Jitter MIN-MAX

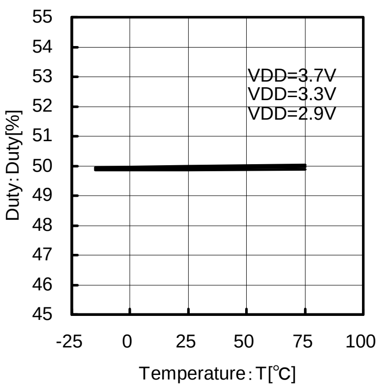


Fig.71 16.9MHz
Temperature－Duty

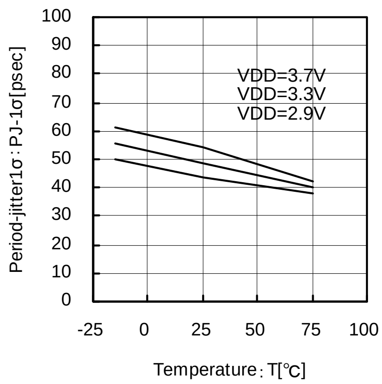


Fig.72 16.9MHz
Temperature－Period-Jitter 1σ

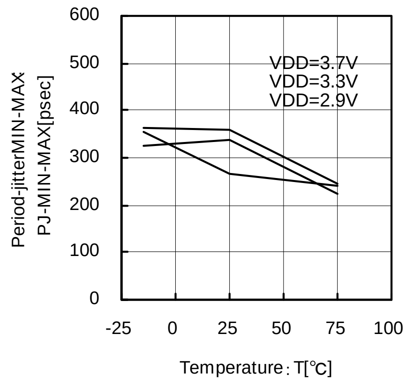


Fig.73 16.9MHz
Temperature－Period-Jitter

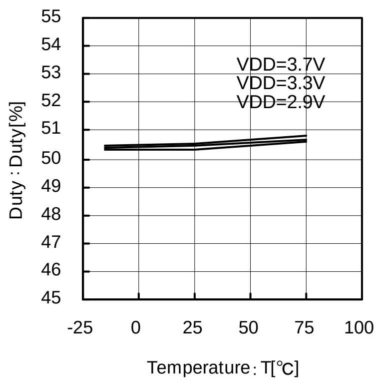


Fig.74 36.9MHz
Temperature－Duty

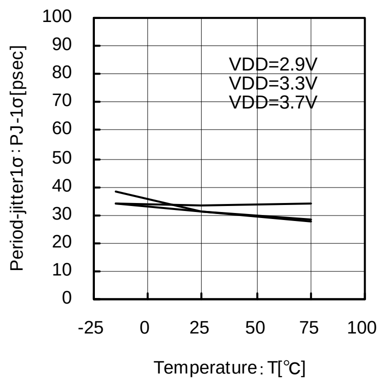


Fig.75 36.9MHz
Temperature－Period-Jitter 1σ

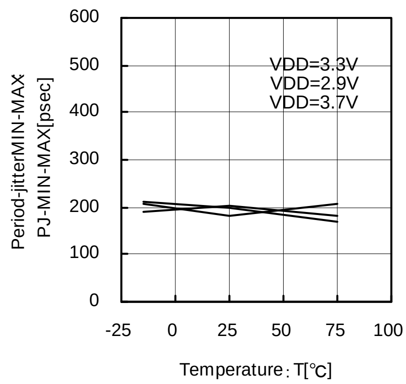


Fig.76 36.9MHz
Temperature－Period-Jitter MIN-MAX

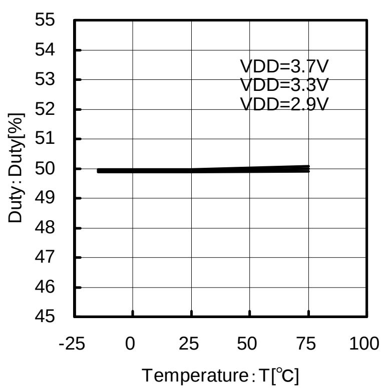


Fig.77 18.4MHz
Temperature－Duty

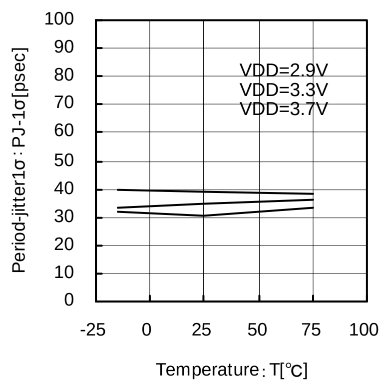


Fig.78 18.4MHz
Temperature－Period-Jitter 1σ

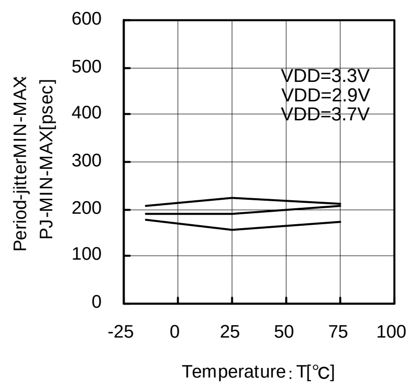


Fig.79 18.4MHz
Temperature－Period-Jitter

●Reference data (BU2363FV Temperature and Supply voltage variations data)

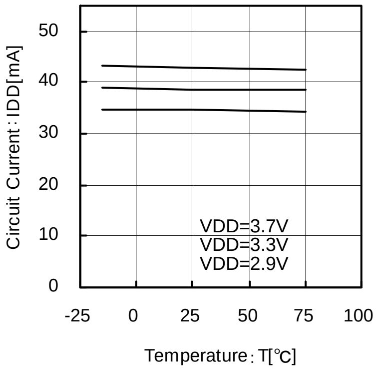


Fig.80 Consumption current
(with maximum output load)
Temperature－Consumption current

●Block diagram, Pin assignment

◎BU2285FV

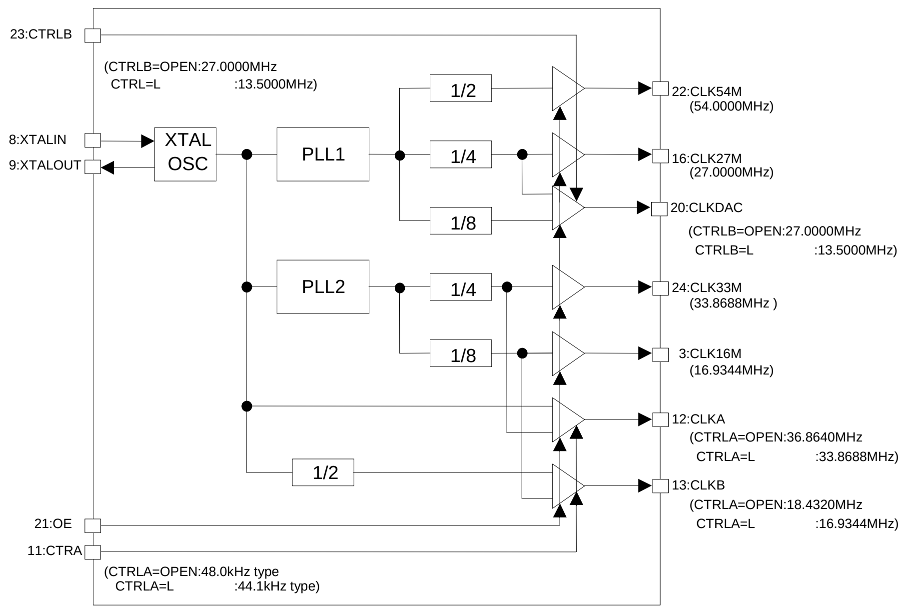


Fig.81

Fig.82

CTRLA	CLKA	CLKB
L	33.8688MHz	16.9344MHz
OPEN	36.8640MHz	18.4320MHz

CTRLB	CLKDAC
L	13.5000MHz
OPEN	27.0000MHz

●**Block diagram, Pin assignment**

◎BU2363FV

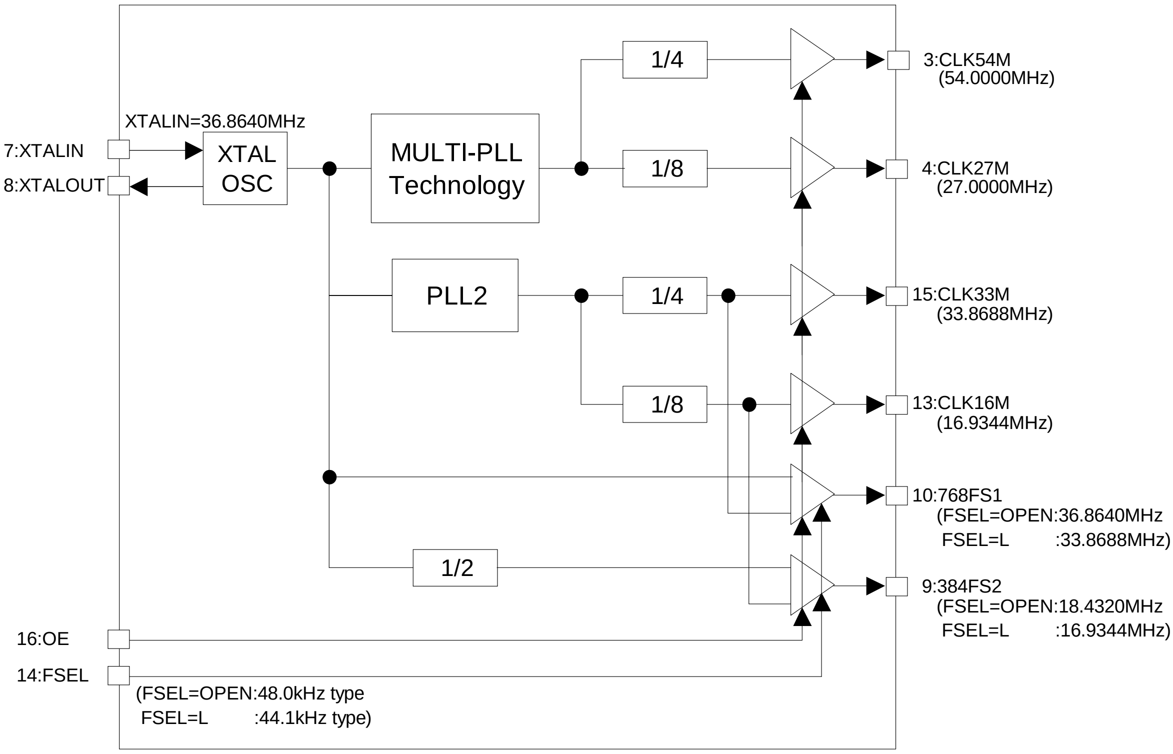


Fig.83

Fig.84

FSEL	CLK768FS	CLK384FS
L	33.8688MHz	16.9344MHz
OPEN	36.8640MHz	18.4320MHz

●Example of application circuit

◎BU2285FV

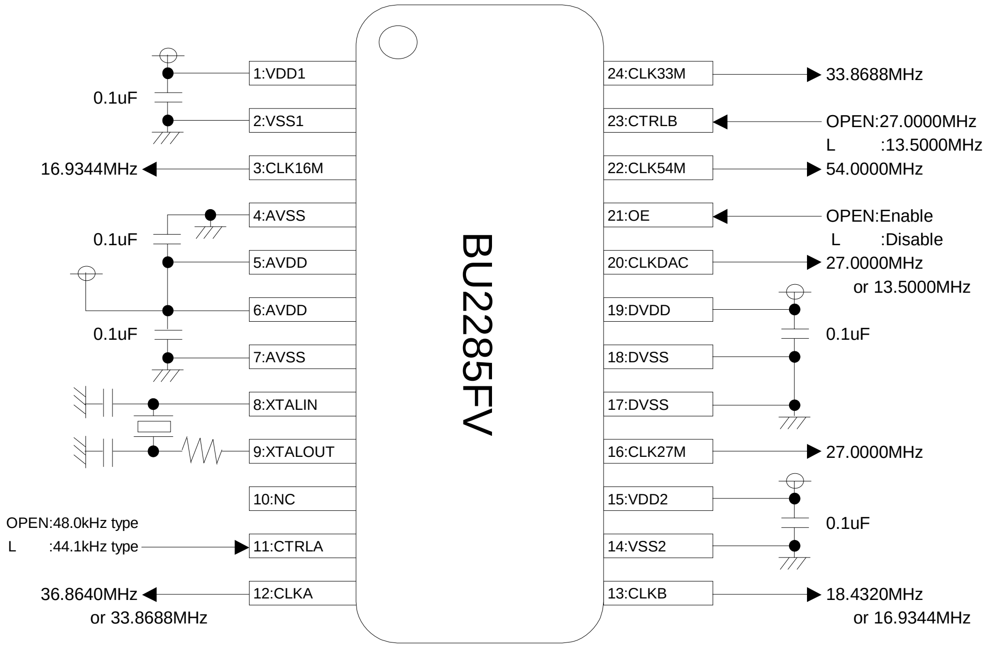


Fig.85

Pin Function

PIN No.	PIN Name	PIN Function
1	VDD1	33MHz system power supply
2	VSS1	33MHz system GND
3	CLK16M	16.9344MHz output
4	AVSS	Analog GND
5	AVDD	Analog power supply
6	AVDD	Analog power supply
7	AVSS	Analog GND
8	XTALIN	Crystal input terminal
9	XTALOUT	Crystal output terminal
10	NC	NC
11	CTRLA	CLKA or B output selection (with pull-up)
12	CLKA	CTRLA=OPEN:36.8640MHz, CTRLA=L:33.8688MHz
13	CLKB	CTRLA=OPEN:18.4320MHz, CTRLA=L:16.9344MHz
14	VSS2	CLKA, B GND
15	VDD2	CLKA, B power supply
16	CLK27M	27.0000MHz output
17	DVSS	Digital GND
18	DVSS	Digital GND
19	DVDD	Digital power supply
20	CLKDAC	CTRLB=OPEN:27.0000MHz, CTRLB=L:13.5000MHz
21	OE	Output enable (with pull-up), OPEN:enable, L:disable
22	CLK54M	54.0000MHz output
23	CTRLB	CLKDAC output selection(with pull-up)
24	CLK33M	33.8688MHz output

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 1PIN (VDD1) and 2PIN (VSS1), 4PIN (AVSS) and 5PIN (AVDD), 6PIN (AVDD) and 7PIN (AVSS), 14PIN (VSS2) and 15PIN (VDD2), and 17PIN/18PIN (DVSS) and 19PIN (DVDD), respectively.
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 supply to be fed to BU2285FV from the printed circuit board or to insert a capacitor (of 1Ω or less), which bypasses high frequency desired, between the power supply and the GND terminal.

●Example of application circuit

◎BU2363FV

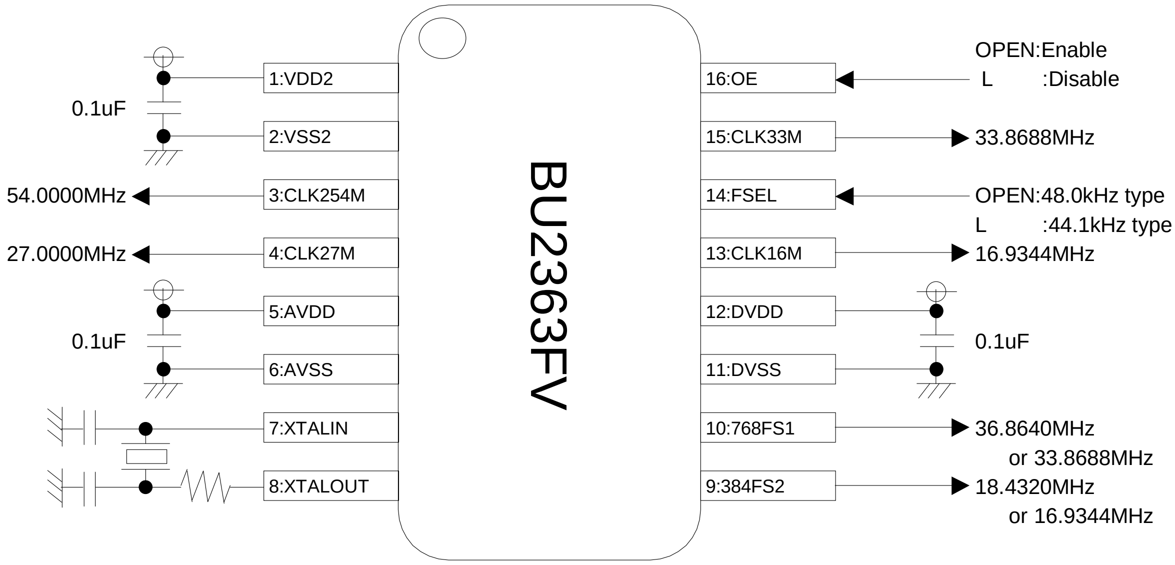


Fig.86

Pin Function

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	9, 10PIN output selection(with pull-up) OPEN:18.4320MHz(9PIN), 36.8640MHz(10PIN) L:16.9344MHz(9PIN), 33.8688MHz(10PIN)
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 1PIN (VDD2) and 2PIN (VSS2), 5PIN (AVDD) and 6PIN (AVSS), 11PIN (DVSS) and 12PIN (DVDD), respectively.
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 supply to be fed to BU2363FV from the printed circuit board or to insert a capacitor (of 1Ω or less), which bypasses high frequency desired, between the power supply and the GND terminal.
Even though we believe that the example of recommended circuit is worth of a recommendation, please be sure to thoroughly recheck the characteristics before use.

●**Notes for use**

(1) Absolute Maximum Ratings
An excess in the absolute maximum ratings, such as applied voltage (VDD or VIN), operating temperature range (Topr), 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) Recommended operating conditions
These conditions represent a range within which characteristics can be provided approximately as expected. The electrical characteristics are guaranteed under the conditions of each parameter.

(3) Reverse connection of power supply connector
The reverse connection of power supply connector can break down ICs. Take protective measures against the breakdown due to the reverse connection, such as mounting an external diode between the power supply and the IC's power supply terminal.

(4) Power supply line
Design PCB pattern to provide low impedance for the wiring between the power supply and the GND lines.
In this regard, for the digital block power supply and the analog block power supply, even though these power supplies has the same level of potential, separate the power supply pattern for the digital block from that for the analog block, thus suppressing the diffraction of digital noises to the analog block power supply resulting from impedance common to the wiring patterns. For the GND line, give consideration to design the patterns in a similar manner.
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 an electrolytic 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.

(5) 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.

(6) 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.

(7) Operation in strong electromagnetic field
Be noted that using ICs in the strong electromagnetic field can malfunction them.

(8) Inspection with set PCB
On the inspection with the set PCB, if a capacitor is connected to a low-impedance IC terminal, the IC can suffer stress. Therefore, be sure to discharge from the set PCB by each process. Furthermore, in order to mount or dismount the set PCB to/from the jig for the inspection process, be sure to turn OFF the power supply and then mount the set PCB to the jig. After the completion of the inspection, be sure to turn OFF the power supply and then dismount it from the jig. In addition, for protection against static electricity, establish a ground for the assembly process and pay thorough attention to the transportation and the storage of the set PCB.

(9) 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.

(10) Ground wiring pattern
If small-signal GND and large-current GND are provided, It will be recommended to separate the large-current GND pattern from the small-signal GND pattern and establish a single ground at the reference point of the set PCB so that resistance to the wiring pattern and voltage fluctuations due to a large current will cause no fluctuations in voltages of the small-signal GND. Pay attention not to cause fluctuations in the GND wiring pattern of external parts as well.

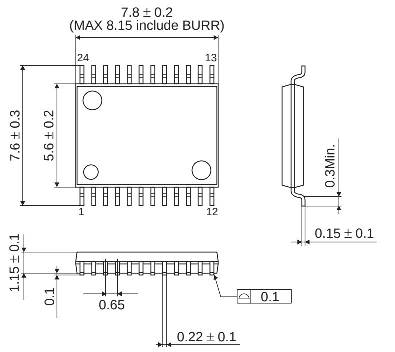
(11) External capacitor
In order to use a ceramic capacitor as the external capacitor, determine the constant with consideration given to a degradation in the nominal capacitance due to DC bias and changes in the capacitance due to temperature, etc.

●Ordering part number

B	U		2	2	8	5		F	V	-	E	2

- Part No.
- Part No. 2285, 2363
- Package FV:SSOP-B24, FV:SSOP-B16
- Packaging and forming specification E2: Embossed tape and reel

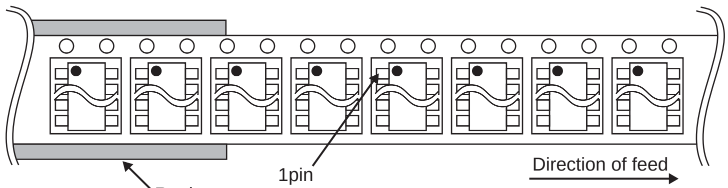
SSOP-B24



(Unit : mm)

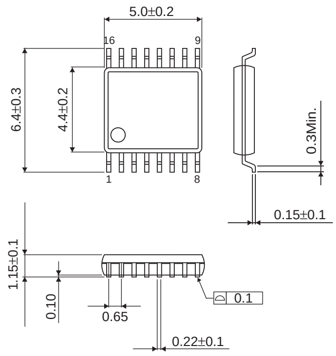
<Tape and Reel information>

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.

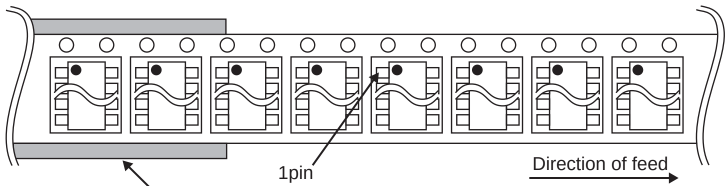
SSOP-B16



(Unit : mm)

<Tape and Reel information>

Tape	Embossed carrier tape
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.

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.

Precaution Regarding Intellectual Property Rights

1. All information and data including but not limited to application example contained in this document is for reference only. ROHM does not warrant that foregoing information or data will not infringe any intellectual property rights or any other rights of any third party regarding such information or data. ROHM shall not be in any way responsible or liable for infringement of any intellectual property rights or other damages arising from use of such information or data.:

2. No license, expressly or implied, is granted hereby under any intellectual property rights or other rights of ROHM or any third parties with respect to the information contained in this document.

Other Precaution

1. This document may not be reprinted or reproduced, in whole or in part, without prior written consent of ROHM.

2. The Products may not be disassembled, converted, modified, reproduced or otherwise changed without prior written consent of ROHM.

3. In no event shall you use in any way whatsoever the Products and the related technical information contained in the Products or this document for any military purposes, including but not limited to, the development of mass-destruction weapons.

4. The proper names of companies or products described in this document are trademarks or registered trademarks of ROHM, its affiliated companies or third parties.

General Precaution

1. Before you use our Products, you are requested to carefully read this document and fully understand its contents. ROHM shall not be in any way responsible or liable for failure, malfunction or accident arising from the use of any ROHM's Products against warning, caution or note contained in this document.

2. All information contained in this document is current as of the issuing date and subject to change without any prior notice. Before purchasing or using ROHM's Products, please confirm the latest information with a ROHM sales representative.

3. The information contained in this document is provided on an "as is" basis and ROHM does not warrant that all information contained in this document is accurate and/or error-free. ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties resulting from inaccuracy or errors of or concerning such information.