3ch Programmable Clock Generator

Generate 3 application clocks

BU7331EKN

No.09004EAT01

●Description

The BU7331EKN integrates a 3ch PLL.The frequency of each PLL can be set via serial interface control, making it compatible with a wide range of digital applications.
In addition, sudden frequency changes are handled via rewriting through the register, and BU7331EKN is suitable for sets with different frequencies, resulting in more efficient parts management and shorter development time.

●Features

1) To generate clocks by connecting reference 5.0MHz ～ 48.0MHz.
2) 5.0MHz～75.0MHz output frequency range.
3) All settings and operation controlled via 2-wire serial interface
4) Individual level shifter attached to each output
5) HQFN20V package

●Application

General digital product of mobile phone, DSC, DVD-player etc.

●Absolute Maximum ratings (Ta=25℃)

Parameter	Symbol	Limits	Unit
Supply voltage (Core)	VDD_CORE	-0.2 ~ 2.2	V
Supply voltage (I/O)	VDD_IO	-0.2 ~ 4.0	V
Input Voltage	VIN	-0.2 ~ VDD+0.2	V
Storage Temperature range	Tstg	-55 ~ 125	℃
Power dissipation	PD	599.8 *1	mW

*1 A measure value at mounting on 70 x 70 x 1.6mm glass epoxy substrate.
In the case of exceeding Ta=25℃, 6.0mW should be reduced per 1℃.
* The radiation-resistance design is not carried out.
* Operation is not guaranteed.

●Operating Conditions

Parameter	Symbol	Limits	Unit
Supply voltage (Core)	VDD_CORE	1.65 ~ 1.80 ~ 1.95	V
Supply voltage (VDD_CLK)	VDD_CLK	1.40 ~ 3.60	V
Supply voltage (VDD_SIF)	VDD_SIF	1.40 ~ 3.60 *1	V
Input ”H” Voltage	VIH	0.8VDD ~ VDD	V
Input ”L” Voltage	VIL	0.0 ~ 0.2VDD	V
Operating Temperature	topr	-20 ~ 75	℃
Input frequency (xtal use) *2	Ref_xtal	5.0 ~ 27.0	MHz
Input frequency (Not xtal use) *3	Ref_clk	5.0 ~ 48.0	MHz
5~48MHz Output Load1 (VDD_CLK=1.40~1.65V)	CL1	10 (MAX)	pF
5~48MHz Output Load 2 (VDD_CLK=1.65~3.60V)	CL2	15 (MAX)	pF
5~75MHz Output Load (VDD_CLK=2.70~3.60V)	CL3	15 (MAX)	pF

*1 When setting it as VDD_SIF=1.40V～1.45V, standby current may flow by VDD_CORE=1.90V～1.95V.
Use by VDD_CORE=1.80V is recommended.
*2 Need a resister for bias between 6PIN and 7PIN.
*3 The input amplitude level range is 0.6Vp-p ～ VDD_COREp-p.
Refer to application note about input form details.

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●Electrical Characteristics

(Unless otherwise specified, VDD_CORE=1.8V, VDD_CLK=VDD_SIF=3.3V, Ta=25℃ , at no output loads.)

Parameter	Symbol	Limit			Unit	Conditions
		Min.	Min.	Min.		
Input H current	IupH	0.0	-	3.0	μA	VIH=3.3V
Input L current	IupL	-3.0	-	0.0	μA	VIL=0.0V
Output H voltage1	VOH1	3.1	3.2	-	V	IOH=4.5mA (VDD_CLK=3.3V)
Output L voltage1	VOL1	-	0.1	0.2	V	IOL=4.0mA (VDD_CLK=3.3V)
Output H voltage2	VOH2	1.2	1.3	-	V	IOH=2.5mA (VDD_CLK=1.4V)
Output L voltage2	VOL2	-	0.1	0.2	V	IOL=2.5mA (VDD_CLK=1.4V)
Operating circuit current (CORE)	IDD1	-	7.5	10.0	mA	3ch PLL “ON” mode
Output frequency	CLK	5.000000	-	48.000000	MHz	VDD_CLK=1.40~1.65V Output Load=10pF (MAX)
		5.000000	-	48.000000	MHz	VDD_CLK=1.65~3.60V Output Load =15pF (MAX)
		5.000000	-	75.000000	MHz	VDD_CLK=2.70~3.60V Output Load =15pF (MAX)

* The circuit current at I/O is depending on output frequency, output load and the voltage of VDD_CLK.

●Block diagram

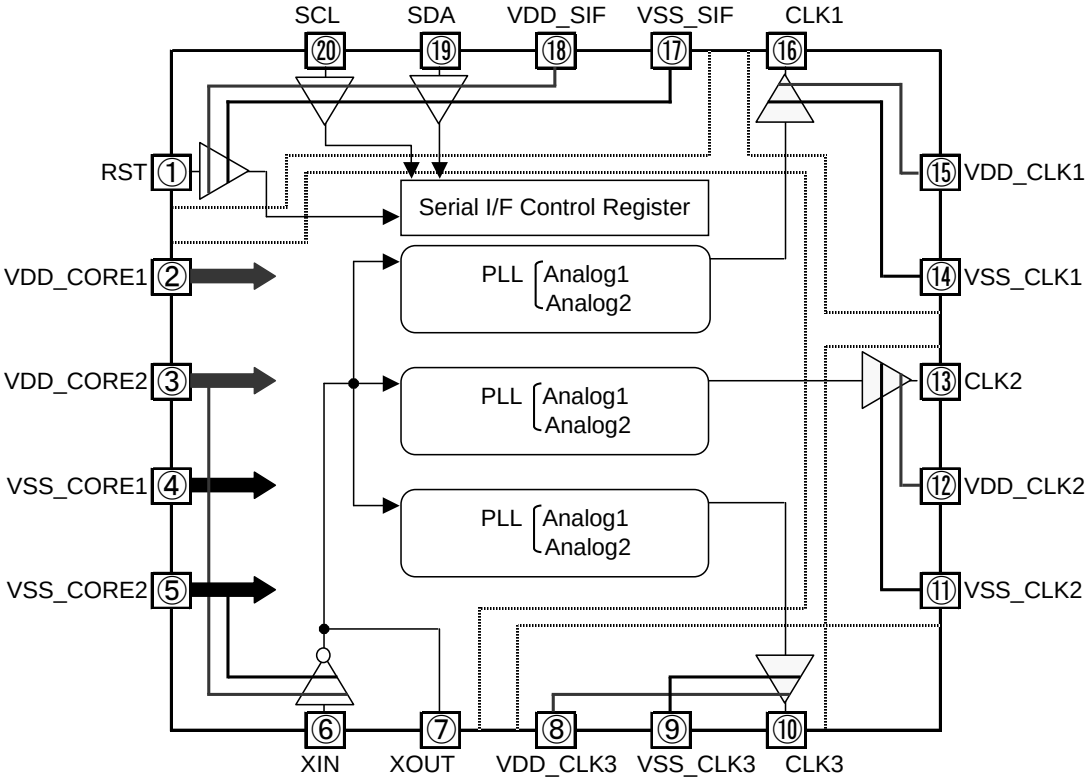


Fig.1 BU7331EKN Block diagram

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●Package Outline, Appearance of Marker

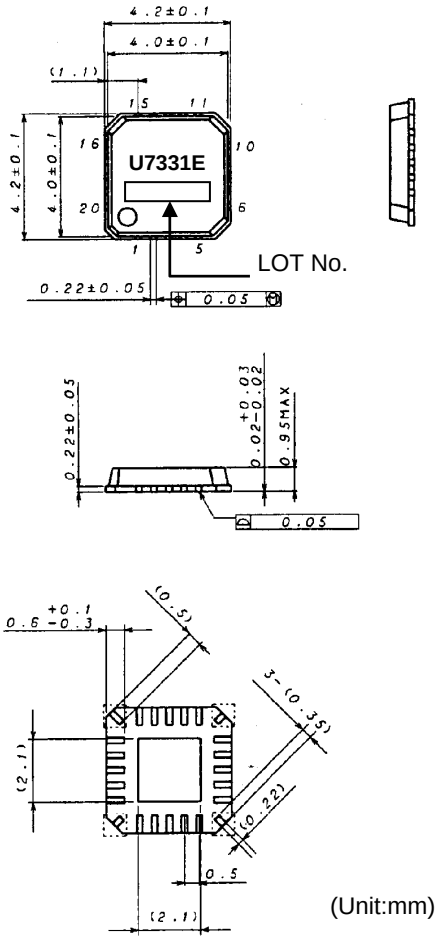


Fig.2 Package Outline, Appearance of Marker

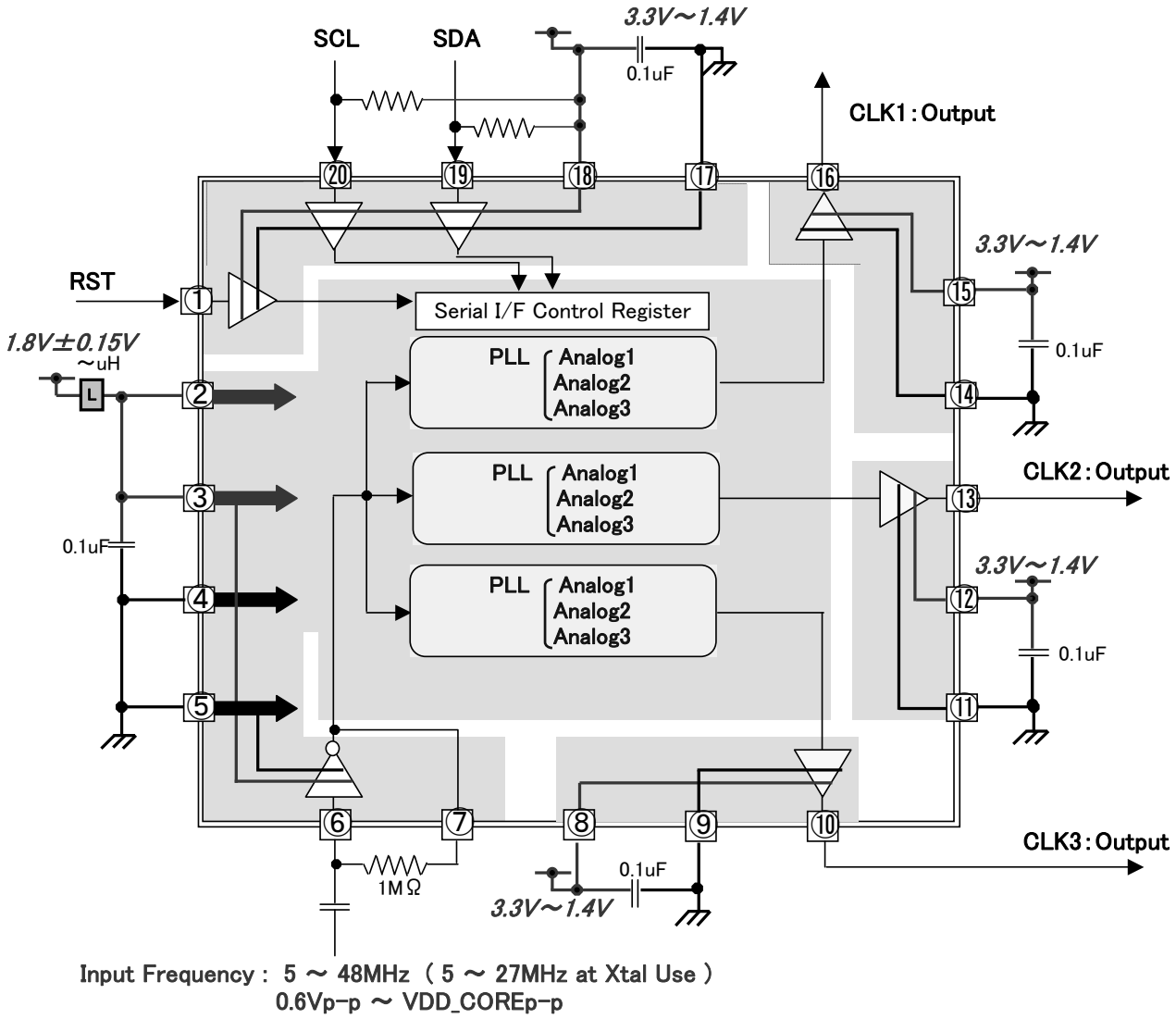
●Pin Function

Pin No.	PIN NAME	Function
1	RST	Reset
2	VDD_CORE1	Power Supply for core
3	VDD_CORE2	Power Supply for core
4	VSS_CORE1	GND for core
5	VSS_CORE2	GND for core
6	XIN	Crystal input terminal
7	XOUT	Crystal output terminal
8	VDD_CLK3	Power Supply for CLK3
9	VSS_CLK3	GND for CLK3
10	CLK3	CLK3 output terminal
11	VSS_CLK2	GND for CLK2
12	VDD_CLK2	Power Supply for CLK2
13	CLK2	CLK2 output terminal
14	VSS_CLK1	GND for CLK1
15	VDD_CLK1	Power Supply for CLK1
16	CLK1	CLK1 output terminal
17	VSS_SIF	GND for Serial IF
18	VDD_SIF	Power Supply for Serial IF
19	SDA	Serial Data Line
20	SCL	Serial Clock Line

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●Typical Application Circuit



Notes)

- Basically, mount the BU7331EKN on the board and use it.
  (Unless it is mounted on the board, it may not demonstrate the full characteristics.)
- Mount a 0.1-μF capacitor in the vicinity of BU7331EKN PIN between PIN 2 - 3 (VDD_CORE) and PIN 4 - 5 (VSS_CORE), PIN 8 (VDD_CLK3) and PIN 9 (VSS_CLK3), PIN 11 (VSS_CLK2) and PIN 12 (VDD_CLK2), PIN 14 (VSS_CLK1) and PIN 15 (VDD_CLK1), and PIN 17 (VSS_SIF) and PIN 18 (VDD_SIF), respectively.
- Depending on the conditions of the board, mount an additional electrolytic capacitor between the power supply and GND.
- For EMI protection, it is effective to put ferrite beads in the origin of power to be supplied to the BU7331EKN 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.
- We believe that this typical application circuit is to be recommended. However, to use it, make further thorough check for the characteristics.
- For ICs with more than two power supplies, instantaneous rush currents may flow due to the order in which the power supplies turn ON or delay in turning ON them. To avoid that, pay careful attention to power supply coupling capacitance, and the width and routing of power supply wirings and GND pattern wirings.

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●Reference data

◎XIN=19.200MHz, OUTPUT=48.000MHz (VDD_CORE=1.8V, VDD_SIF=2.6V)

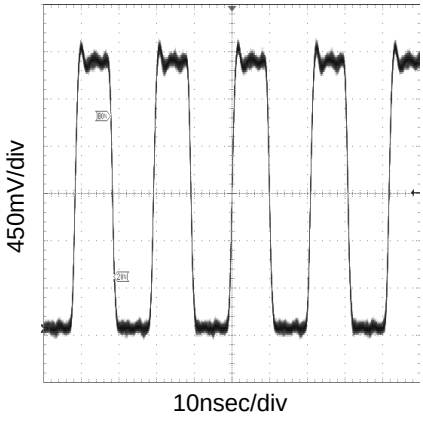


Fig.3 48.000MHz output waveform
VDD_CLK=2.6V, at CL=15pF

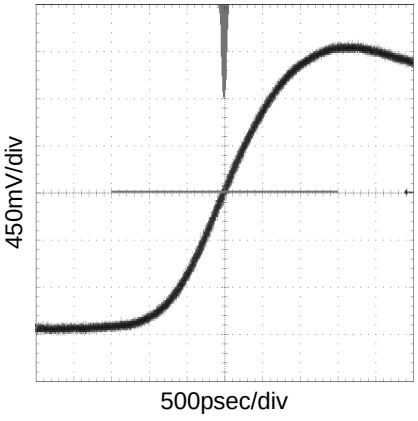


Fig.4 48.000MHz Period-Jitter
VDD_CLK=2.6V, at CL=15pF

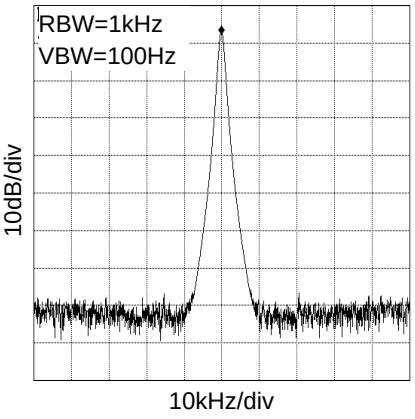


Fig.5 48.000MHz Spectrum
VDD_CLK=2.6V, at CL=15pF

◎XIN=26.000MHz, OUTPUT=24.576MHZ (VDD_CORE=1.8V, VDD_SIF=1.8V)

(Notes) Generates in MULTI-PLL technology.

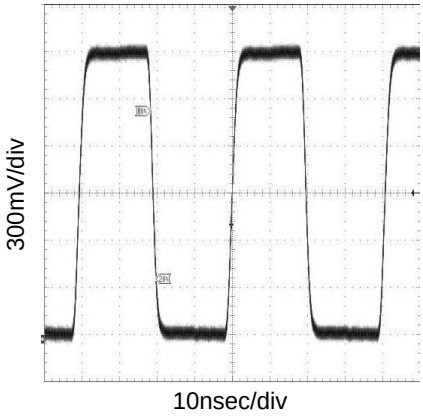


Fig.6 24.576MHz output waveform
VDD_CLK=1.8V, at CL=15pF

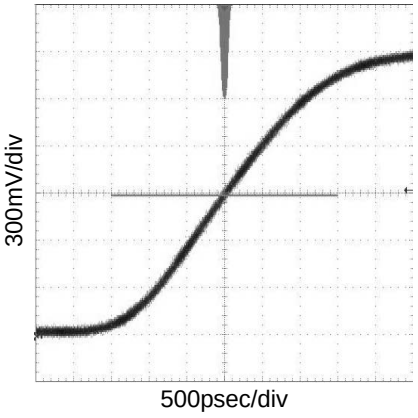


Fig.7 24.576MHz Period-Jitter
VDD_CLK=1.8V, at CL=15pF

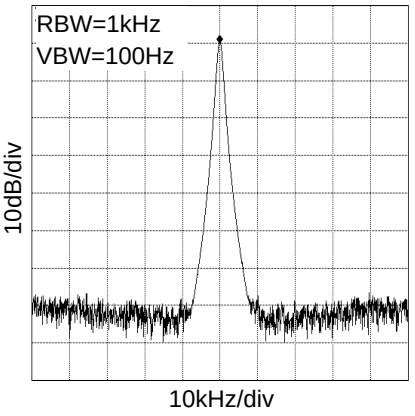


Fig.8 24.576MHz Spectrum
VDD_CLK=1.8V, at CL=15pF

◎XIN=24.576MHz, OUTPUT=27.000MHZ (VDD_CORE=1.8V, VDD_SIF=3.3V)

(Notes) Generates in MULTI-PLL technology.

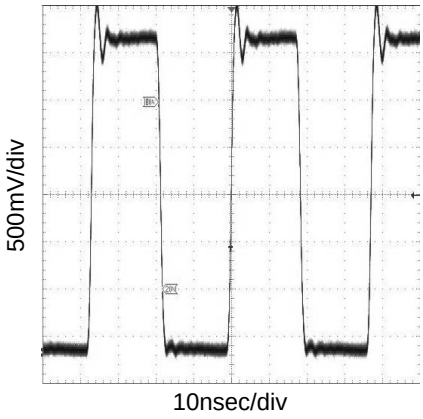


Fig.9 27.000MHz output waveform
VDD_CLK=3.3V, at CL=15pF

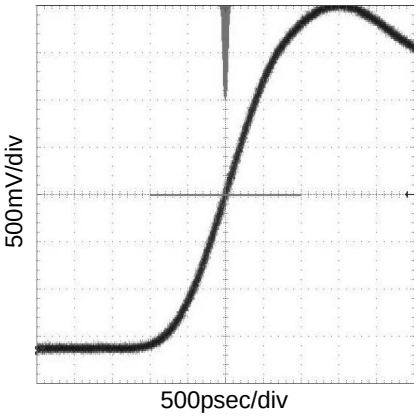


Fig.10 27.000MHz Period-Jitter
VDD_CLK=3.3V, at CL=15pF

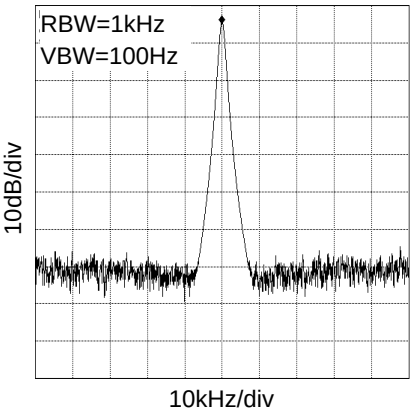


Fig.11 27.000MHz Spectrum
VDD_CLK=3.3V, at CL=15pF

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●Examples of Frequency Matrices

Frequency Matrix (Analog1-1)

XIN=19.200MHz & P1×P2=2 [P1×P2 is selectable from (1, 5, 10, or 20) ×(2, 4, 6, or 8).]

The white areas represent areas in which output is enabled. The blue areas represent areas in which output is enabled under the condition of VDD_CLK=2.7 to 3.6V.

The other areas (i.e., gray areas) represent areas in which output is disabled.

P1×P2=2		N												
		3	4	5	6	7	8	9	10	11	12	13	14	15
M	3	9.6000	7.2000	5.7600	4.8000	4.1143	3.6000	3.2000	2.8800	2.6182	2.4000	2.2154	2.0571	1.9200
	4	12.8000	9.6000	7.6800	6.4000	5.4857	4.8000	4.2667	3.8400	3.4909	3.2000	2.9538	2.7429	2.5600
	5	16.0000	12.0000	9.6000	8.0000	6.8571	6.0000	5.3333	4.8000	4.3636	4.0000	3.6923	3.4286	3.2000
	6	19.2000	14.4000	11.5200	9.6000	8.2286	7.2000	6.4000	5.7600	5.2364	4.8000	4.4308	4.1143	3.8400
	7	22.4000	16.8000	13.4400	11.2000	9.6000	8.4000	7.4667	6.7200	6.1091	5.6000	5.1692	4.8000	4.4800
	8	25.6000	19.2000	15.3600	12.8000	10.9714	9.6000	8.5333	7.6800	6.9818	6.4000	5.9077	5.4857	5.1200
	9	28.8000	21.6000	17.2800	14.4000	12.3429	10.8000	9.6000	8.6400	7.8545	7.2000	6.6462	6.1714	5.7600
	10	32.0000	24.0000	19.2000	16.0000	13.7143	12.0000	10.6667	9.6000	8.7273	8.0000	7.3846	6.8571	6.4000
	11	35.2000	26.4000	21.1200	17.6000	15.0857	13.2000	11.7333	10.5600	9.6000	8.8000	8.1231	7.5429	7.0400
	12	38.4000	28.8000	23.0400	19.2000	16.4571	14.4000	12.8000	11.5200	10.4727	9.6000	8.8615	8.2286	7.6800
	13	41.6000	31.2000	24.9600	20.8000	17.8286	15.6000	13.8667	12.4800	11.3455	10.4000	9.6000	8.9143	8.3200
	14	44.8000	33.6000	26.8800	22.4000	19.2000	16.8000	14.9333	13.4400	12.2182	11.2000	10.3385	9.6000	8.9600
	15	48.0000	36.0000	28.8000	24.0000	20.5714	18.0000	16.0000	14.4000	13.0909	12.0000	11.0769	10.2857	9.6000
	16	51.2000	38.4000	30.7200	25.6000	21.9429	19.2000	17.0667	15.3600	13.9636	12.8000	11.8154	10.9714	10.2400
	17	54.4000	40.8000	32.6400	27.2000	23.3143	20.4000	18.1333	16.3200	14.8364	13.6000	12.5538	11.6571	10.8800
	18	57.6000	43.2000	34.5600	28.8000	24.6857	21.6000	19.2000	17.2800	15.7091	14.4000	13.2923	12.3429	11.5200
	19	60.8000	45.6000	36.4800	30.4000	26.0571	22.8000	20.2667	18.2400	16.5818	15.2000	14.0308	13.0286	12.1600
	20	64.0000	48.0000	38.4000	32.0000	27.4286	24.0000	21.3333	19.2000	17.4545	16.0000	14.7692	13.7143	12.8000
	21	67.2000	50.4000	40.3200	33.6000	28.8000	25.2000	22.4000	20.1600	18.3273	16.8000	15.5077	14.4000	13.4400
	22	70.4000	52.8000	42.2400	35.2000	30.1714	26.4000	23.4667	21.1200	19.2000	17.6000	16.2462	15.0857	14.0800
	23	73.6000	55.2000	44.1600	36.8000	31.5429	27.6000	24.5333	22.0800	20.0727	18.4000	16.9846	15.7714	14.7200
	24	76.8000	57.6000	46.0800	38.4000	32.9143	28.8000	25.6000	23.0400	20.9455	19.2000	17.7231	16.4571	15.3600
	25	80.0000	60.0000	48.0000	40.0000	34.2857	30.0000	26.6667	24.0000	21.8182	20.0000	18.4615	17.1429	16.0000
	26	83.2000	62.4000	49.9200	41.6000	35.6571	31.2000	27.7333	24.9600	22.6909	20.8000	19.2000	17.8286	16.6400
	27	86.4000	64.8000	51.8400	43.2000	37.0286	32.4000	28.8000	25.9200	23.5636	21.6000	19.9385	18.5143	17.2800
	28	89.6000	67.2000	53.7600	44.8000	38.4000	33.6000	29.8667	26.8800	24.4364	22.4000	20.6769	19.2000	17.9200
	29	92.8000	69.6000	55.6800	46.4000	39.7714	34.8000	30.9333	27.8400	25.3091	23.2000	21.4154	19.8857	18.5600
	30	96.0000	72.0000	57.6000	48.0000	41.1429	36.0000	32.0000	28.8000	26.1818	24.0000	22.1538	20.5714	19.2000
	31	99.2000	74.4000	59.5200	49.6000	42.5143	37.2000	33.0667	29.7600	27.0545	24.8000	22.8923	21.2571	19.8400
	32	102.4000	76.8000	61.4400	51.2000	43.8857	38.4000	34.1333	30.7200	27.9273	25.6000	23.6308	21.9429	20.4800
	33	105.6000	79.2000	63.3600	52.8000	45.2571	39.6000	35.2000	31.6800	28.8000	26.4000	24.3692	22.6286	21.1200
	34	108.8000	81.6000	65.2800	54.4000	46.6286	40.8000	36.2667	32.6400	29.6727	27.2000	25.1077	23.3143	21.7600
	35	112.0000	84.0000	67.2000	56.0000	48.0000	42.0000	37.3333	33.6000	30.5455	28.0000	25.8462	24.0000	22.4000

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Frequency Matrix (Analog1-2)

XIN=19.200MHz & P1×P2=2 [P1×P2 is selectable from (1, 5, 10, or 20) ×(2, 4, 6, or 8).]

The white areas represent areas in which output is enabled. The blue areas represent areas in which output is enabled under the condition of VDD_CLK=2.7 to 3.6V.

The other areas (i.e., gray areas) represent areas in which output is disabled.

P1×P2=2		N												
		6	7	8	9	10	11	12	13	14	15	16	17	18
	28	44.8000	38.4000	33.6000	29.8667	26.8800	24.4364	22.4000	20.6769	19.2000	17.9200	16.8000	15.8118	14.9333
	29	46.4000	39.7714	34.8000	30.9333	27.8400	25.3091	23.2000	21.4154	19.8857	18.5600	17.4000	16.3765	15.4667
	30	48.0000	41.1429	36.0000	32.0000	28.8000	26.1818	24.0000	22.1538	20.5714	19.2000	18.0000	16.9412	16.0000
	31	49.6000	42.5143	37.2000	33.0667	29.7600	27.0545	24.8000	22.8923	21.2571	19.8400	18.6000	17.5059	16.5333
	32	51.2000	43.8857	38.4000	34.1333	30.7200	27.9273	25.6000	23.6308	21.9429	20.4800	19.2000	18.0706	17.0667
	33	52.8000	45.2571	39.6000	35.2000	31.6800	28.8000	26.4000	24.3692	22.6286	21.1200	19.8000	18.6353	17.6000
	34	54.4000	46.6286	40.8000	36.2667	32.6400	29.6727	27.2000	25.1077	23.3143	21.7600	20.4000	19.2000	18.1333
	35	56.0000	48.0000	42.0000	37.3333	33.6000	30.5455	28.0000	25.8462	24.0000	22.4000	21.0000	19.7647	18.6667
	36	57.6000	49.3714	43.2000	38.4000	34.5600	31.4182	28.8000	26.5846	24.6857	23.0400	21.6000	20.3294	19.2000
	37	59.2000	50.7429	44.4000	39.4667	35.5200	32.2909	29.6000	27.3231	25.3714	23.6800	22.2000	20.8941	19.7333
	38	60.8000	52.1143	45.6000	40.5333	36.4800	33.1636	30.4000	28.0615	26.0571	24.3200	22.8000	21.4588	20.2667
	39	62.4000	53.4857	46.8000	41.6000	37.4400	34.0364	31.2000	28.8000	26.7429	24.9600	23.4000	22.0235	20.8000
	40	64.0000	54.8571	48.0000	42.6667	38.4000	34.9091	32.0000	29.5385	27.4286	25.6000	24.0000	22.5882	21.3333
	41	65.6000	56.2286	49.2000	43.7333	39.3600	35.7818	32.8000	30.2769	28.1143	26.2400	24.6000	23.1529	21.8667
	42	67.2000	57.6000	50.4000	44.8000	40.3200	36.6545	33.6000	31.0154	28.8000	26.8800	25.2000	23.7176	22.4000
	43	68.8000	58.9714	51.6000	45.8667	41.2800	37.5273	34.4000	31.7538	29.4857	27.5200	25.8000	24.2824	22.9333
M	44	70.4000	60.3429	52.8000	46.9333	42.2400	38.4000	35.2000	32.4923	30.1714	28.1600	26.4000	24.8471	23.4667
	45	72.0000	61.7143	54.0000	48.0000	43.2000	39.2727	36.0000	33.2308	30.8571	28.8000	27.0000	25.4118	24.0000
	46	73.6000	63.0857	55.2000	49.0667	44.1600	40.1455	36.8000	33.9692	31.5429	29.4400	27.6000	25.9765	24.5333
	47	75.2000	64.4571	56.4000	50.1333	45.1200	41.0182	37.6000	34.7077	32.2286	30.0800	28.2000	26.5412	25.0667
	48	76.8000	65.8286	57.6000	51.2000	46.0800	41.8909	38.4000	35.4462	32.9143	30.7200	28.8000	27.1059	25.6000
	49	78.4000	67.2000	58.8000	52.2667	47.0400	42.7636	39.2000	36.1846	33.6000	31.3600	29.4000	27.6706	26.1333
	50	80.0000	68.5714	60.0000	53.3333	48.0000	43.6364	40.0000	36.9231	34.2857	32.0000	30.0000	28.2353	26.6667
	51	81.6000	69.9429	61.2000	54.4000	48.9600	44.5091	40.8000	37.6615	34.9714	32.6400	30.6000	28.8000	27.2000
	52	83.2000	71.3143	62.4000	55.4667	49.9200	45.3818	41.6000	38.4000	35.6571	33.2800	31.2000	29.3647	27.7333
	53	84.8000	72.6857	63.6000	56.5333	50.8800	46.2545	42.4000	39.1385	36.3429	33.9200	31.8000	29.9294	28.2667
	54	86.4000	74.0571	64.8000	57.6000	51.8400	47.1273	43.2000	39.8769	37.0286	34.5600	32.4000	30.4941	28.8000
	55	88.0000	75.4286	66.0000	58.6667	52.8000	48.0000	44.0000	40.6154	37.7143	35.2000	33.0000	31.0588	29.3333
	56	89.6000	76.8000	67.2000	59.7333	53.7600	48.8727	44.8000	41.3538	38.4000	35.8400	33.6000	31.6235	29.8667
	57	91.2000	78.1714	68.4000	60.8000	54.7200	49.7455	45.6000	42.0923	39.0857	36.4800	34.2000	32.1882	30.4000
	58	92.8000	79.5429	69.6000	61.8667	55.6800	50.6182	46.4000	42.8308	39.7714	37.1200	34.8000	32.7529	30.9333
	59	94.4000	80.9143	70.8000	62.9333	56.6400	51.4909	47.2000	43.5692	40.4571	37.7600	35.4000	33.3176	31.4667
	60	96.0000	82.2857	72.0000	64.0000	57.6000	52.3636	48.0000	44.3077	41.1429	38.4000	36.0000	33.8824	32.0000

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Frequency Matrix (Analog1-3)

XIN=19.200MHz & P1×P2=2 [P1×P2 is selectable from (1, 5, 10, or 20) ×(2, 4, 6, or 8).]

The white areas represent areas in which output is enabled. The blue areas represent areas in which output is enabled under the condition of VDD_CLK=2.7 to 3.6V.

The other areas (i.e., gray areas) represent areas in which output is disabled.

P1×P2=2		N													
		11	12	13	14	15	16	17	18	19	20	21	22	23	24
M	36	31.4182	28.8000	26.5846	24.6857	23.0400	21.6000	20.3294	19.2000	18.1895	17.2800	16.4571	15.7091	15.0261	14.4000
	37	32.2909	29.6000	27.3231	25.3714	23.6800	22.2000	20.8941	19.7333	18.6947	17.7600	16.9143	16.1455	15.4435	14.8000
	38	33.1636	30.4000	28.0615	26.0571	24.3200	22.8000	21.4588	20.2667	19.2000	18.2400	17.3714	16.5818	15.8609	15.2000
	39	34.0364	31.2000	28.8000	26.7429	24.9600	23.4000	22.0235	20.8000	19.7053	18.7200	17.8286	17.0182	16.2783	15.6000
	40	34.9091	32.0000	29.5385	27.4286	25.6000	24.0000	22.5882	21.3333	20.2105	19.2000	18.2857	17.4545	16.6957	16.0000
	41	35.7818	32.8000	30.2769	28.1143	26.2400	24.6000	23.1529	21.8667	20.7158	19.6800	18.7429	17.8909	17.1130	16.4000
	42	36.6545	33.6000	31.0154	28.8000	26.8800	25.2000	23.7176	22.4000	21.2211	20.1600	19.2000	18.3273	17.5304	16.8000
	43	37.5273	34.4000	31.7538	29.4857	27.5200	25.8000	24.2824	22.9333	21.7263	20.6400	19.6571	18.7636	17.9478	17.2000
	44	38.4000	35.2000	32.4923	30.1714	28.1600	26.4000	24.8471	23.4667	22.2316	21.1200	20.1143	19.2000	18.3652	17.6000
	45	39.2727	36.0000	33.2308	30.8571	28.8000	27.0000	25.4118	24.0000	22.7368	21.6000	20.5714	19.6364	18.7826	18.0000
	46	40.1455	36.8000	33.9692	31.5429	29.4400	27.6000	25.9765	24.5333	23.2421	22.0800	21.0286	20.0727	19.2000	18.4000
	47	41.0182	37.6000	34.7077	32.2286	30.0800	28.2000	26.5412	25.0667	23.7474	22.5600	21.4857	20.5091	19.6174	18.8000
	48	41.8909	38.4000	35.4462	32.9143	30.7200	28.8000	27.1059	25.6000	24.2526	23.0400	21.9429	20.9455	20.0348	19.2000
	49	42.7636	39.2000	36.1846	33.6000	31.3600	29.4000	27.6706	26.1333	24.7579	23.5200	22.4000	21.3818	20.4522	19.6000
	50	43.6364	40.0000	36.9231	34.2857	32.0000	30.0000	28.2353	26.6667	25.2632	24.0000	22.8571	21.8182	20.8696	20.0000
	51	44.5091	40.8000	37.6615	34.9714	32.6400	30.6000	28.8000	27.2000	25.7684	24.4800	23.3143	22.2545	21.2870	20.4000
	52	45.3818	41.6000	38.4000	35.6571	33.2800	31.2000	29.3647	27.7333	26.2737	24.9600	23.7714	22.6909	21.7043	20.8000
	53	46.2545	42.4000	39.1385	36.3429	33.9200	31.8000	29.9294	28.2667	26.7789	25.4400	24.2286	23.1273	22.1217	21.2000
	54	47.1273	43.2000	39.8769	37.0286	34.5600	32.4000	30.4941	28.8000	27.2842	25.9200	24.6857	23.5636	22.5391	21.6000
	55	48.0000	44.0000	40.6154	37.7143	35.2000	33.0000	31.0588	29.3333	27.7895	26.4000	25.1429	24.0000	22.9565	22.0000
	56	48.8727	44.8000	41.3538	38.4000	35.8400	33.6000	31.6235	29.8667	28.2947	26.8800	25.6000	24.4364	23.3739	22.4000
	57	49.7455	45.6000	42.0923	39.0857	36.4800	34.2000	32.1882	30.4000	28.8000	27.3600	26.0571	24.8727	23.7913	22.8000
	58	50.6182	46.4000	42.8308	39.7714	37.1200	34.8000	32.7529	30.9333	29.3053	27.8400	26.5143	25.3091	24.2087	23.2000
	59	51.4909	47.2000	43.5692	40.4571	37.7600	35.4000	33.3176	31.4667	29.8105	28.3200	26.9714	25.7455	24.6261	23.6000
	60	52.3636	48.0000	44.3077	41.1429	38.4000	36.0000	33.8824	32.0000	30.3158	28.8000	27.4286	26.1818	25.0435	24.0000
	61	53.2364	48.8000	45.0462	41.8286	39.0400	36.6000	34.4471	32.5333	30.8211	29.2800	27.8857	26.6182	25.4609	24.4000
	62	54.1091	49.6000	45.7846	42.5143	39.6800	37.2000	35.0118	33.0667	31.3263	29.7600	28.3429	27.0545	25.8783	24.8000
	63	54.9818	50.4000	46.5231	43.2000	40.3200	37.8000	35.5765	33.6000	31.8316	30.2400	28.8000	27.4909	26.2957	25.2000
	64	55.8545	51.2000	47.2615	43.8857	40.9600	38.4000	36.1412	34.1333	32.3368	30.7200	29.2571	27.9273	26.7130	25.6000
	65	56.7273	52.0000	48.0000	44.5714	41.6000	39.0000	36.7059	34.6667	32.8421	31.2000	29.7143	28.3636	27.1304	26.0000

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Frequency Matrix (Analog2-1)

XIN=19.200MHz & P1×P2=8 [P1×P2 is selectable from (1, 5, 10, or 20) ×(2, 4, 6, or 8).]

The white areas represent areas in which output is enabled. The other areas (i.e., gray areas) represent areas in which output is disabled.

P1×P2=8		N												
		3	4	5	6	7	8	9	10	11	12	13	14	15
M	62	49.6000	37.2000	29.7600	24.8000	21.2571	18.6000	16.5333	14.8800	13.5273	12.4000	11.4462	10.6286	9.9200
	63	50.4000	37.8000	30.2400	25.2000	21.6000	18.9000	16.8000	15.1200	13.7455	12.6000	11.6308	10.8000	10.0800
	64	51.2000	38.4000	30.7200	25.6000	21.9429	19.2000	17.0667	15.3600	13.9636	12.8000	11.8154	10.9714	10.2400
	65	52.0000	39.0000	31.2000	26.0000	22.2857	19.5000	17.3333	15.6000	14.1818	13.0000	12.0000	11.1429	10.4000
	66	52.8000	39.6000	31.6800	26.4000	22.6286	19.8000	17.6000	15.8400	14.4000	13.2000	12.1846	11.3143	10.5600
	67	53.6000	40.2000	32.1600	26.8000	22.9714	20.1000	17.8667	16.0800	14.6182	13.4000	12.3692	11.4857	10.7200
	68	54.4000	40.8000	32.6400	27.2000	23.3143	20.4000	18.1333	16.3200	14.8364	13.6000	12.5538	11.6571	10.8800
	69	55.2000	41.4000	33.1200	27.6000	23.6571	20.7000	18.4000	16.5600	15.0545	13.8000	12.7385	11.8286	11.0400
	70	56.0000	42.0000	33.6000	28.0000	24.0000	21.0000	18.6667	16.8000	15.2727	14.0000	12.9231	12.0000	11.2000
	71	56.8000	42.6000	34.0800	28.4000	24.3429	21.3000	18.9333	17.0400	15.4909	14.2000	13.1077	12.1714	11.3600
	72	57.6000	43.2000	34.5600	28.8000	24.6857	21.6000	19.2000	17.2800	15.7091	14.4000	13.2923	12.3429	11.5200
	73	58.4000	43.8000	35.0400	29.2000	25.0286	21.9000	19.4667	17.5200	15.9273	14.6000	13.4769	12.5143	11.6800
	74	59.2000	44.4000	35.5200	29.6000	25.3714	22.2000	19.7333	17.7600	16.1455	14.8000	13.6615	12.6857	11.8400
	75	60.0000	45.0000	36.0000	30.0000	25.7143	22.5000	20.0000	18.0000	16.3636	15.0000	13.8462	12.8571	12.0000
	76	60.8000	45.6000	36.4800	30.4000	26.0571	22.8000	20.2667	18.2400	16.5818	15.2000	14.0308	13.0286	12.1600
	77	61.6000	46.2000	36.9600	30.8000	26.4000	23.1000	20.5333	18.4800	16.8000	15.4000	14.2154	13.2000	12.3200
	78	62.4000	46.8000	37.4400	31.2000	26.7429	23.4000	20.8000	18.7200	17.0182	15.6000	14.4000	13.3714	12.4800
	79	63.2000	47.4000	37.9200	31.6000	27.0857	23.7000	21.0667	18.9600	17.2364	15.8000	14.5846	13.5429	12.6400
	80	64.0000	48.0000	38.4000	32.0000	27.4286	24.0000	21.3333	19.2000	17.4545	16.0000	14.7692	13.7143	12.8000
	81	64.8000	48.6000	38.8800	32.4000	27.7714	24.3000	21.6000	19.4400	17.6727	16.2000	14.9538	13.8857	12.9600
	82	65.6000	49.2000	39.3600	32.8000	28.1143	24.6000	21.8667	19.6800	17.8909	16.4000	15.1385	14.0571	13.1200
	83	66.4000	49.8000	39.8400	33.2000	28.4571	24.9000	22.1333	19.9200	18.1091	16.6000	15.3231	14.2286	13.2800
	84	67.2000	50.4000	40.3200	33.6000	28.8000	25.2000	22.4000	20.1600	18.3273	16.8000	15.5077	14.4000	13.4400
	85	68.0000	51.0000	40.8000	34.0000	29.1429	25.5000	22.6667	20.4000	18.5455	17.0000	15.6923	14.5714	13.6000
	86	68.8000	51.6000	41.2800	34.4000	29.4857	25.8000	22.9333	20.6400	18.7636	17.2000	15.8769	14.7429	13.7600
	87	69.6000	52.2000	41.7600	34.8000	29.8286	26.1000	23.2000	20.8800	18.9818	17.4000	16.0615	14.9143	13.9200
	88	70.4000	52.8000	42.2400	35.2000	30.1714	26.4000	23.4667	21.1200	19.2000	17.6000	16.2462	15.0857	14.0800
	89	71.2000	53.4000	42.7200	35.6000	30.5143	26.7000	23.7333	21.3600	19.4182	17.8000	16.4308	15.2571	14.2400
	90	72.0000	54.0000	43.2000	36.0000	30.8571	27.0000	24.0000	21.6000	19.6364	18.0000	16.6154	15.4286	14.4000
	91	72.8000	54.6000	43.6800	36.4000	31.2000	27.3000	24.2667	21.8400	19.8545	18.2000	16.8000	15.6000	14.5600
	92	73.6000	55.2000	44.1600	36.8000	31.5429	27.6000	24.5333	22.0800	20.0727	18.4000	16.9846	15.7714	14.7200
	93	74.4000	55.8000	44.6400	37.2000	31.8857	27.9000	24.8000	22.3200	20.2909	18.6000	17.1692	15.9429	14.8800

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Frequency Matrix (Analog2-2)

XIN=19.200MHz & P1×P2=8 [P1×P2 is selectable from (1, 5, 10, or 20) ×(2, 4, 6, or 8).]

The white areas represent areas in which output is enabled. The other areas (i.e., gray areas) represent areas in which output is disabled.

P1×P2=8		N												
		6	7	8	9	10	11	12	13	14	15	16	17	18
M	93	37.2000	31.8857	27.9000	24.8000	22.3200	20.2909	18.6000	17.1692	15.9429	14.8800	13.9500	13.1294	12.4000
	94	37.6000	32.2286	28.2000	25.0667	22.5600	20.5091	18.8000	17.3538	16.1143	15.0400	14.1000	13.2706	12.5333
	95	38.0000	32.5714	28.5000	25.3333	22.8000	20.7273	19.0000	17.5385	16.2857	15.2000	14.2500	13.4118	12.6667
	96	38.4000	32.9143	28.8000	25.6000	23.0400	20.9455	19.2000	17.7231	16.4571	15.3600	14.4000	13.5529	12.8000
	97	38.8000	33.2571	29.1000	25.8667	23.2800	21.1636	19.4000	17.9077	16.6286	15.5200	14.5500	13.6941	12.9333
	98	39.2000	33.6000	29.4000	26.1333	23.5200	21.3818	19.6000	18.0923	16.8000	15.6800	14.7000	13.8353	13.0667
	99	39.6000	33.9429	29.7000	26.4000	23.7600	21.6000	19.8000	18.2769	16.9714	15.8400	14.8500	13.9765	13.2000
	100	40.0000	34.2857	30.0000	26.6667	24.0000	21.8182	20.0000	18.4615	17.1429	16.0000	15.0000	14.1176	13.3333
	101	40.4000	34.6286	30.3000	26.9333	24.2400	22.0364	20.2000	18.6462	17.3143	16.1600	15.1500	14.2588	13.4667
	102	40.8000	34.9714	30.6000	27.2000	24.4800	22.2545	20.4000	18.8308	17.4857	16.3200	15.3000	14.4000	13.6000
	103	41.2000	35.3143	30.9000	27.4667	24.7200	22.4727	20.6000	19.0154	17.6571	16.4800	15.4500	14.5412	13.7333
	104	41.6000	35.6571	31.2000	27.7333	24.9600	22.6909	20.8000	19.2000	17.8286	16.6400	15.6000	14.6824	13.8667
	105	42.0000	36.0000	31.5000	28.0000	25.2000	22.9091	21.0000	19.3846	18.0000	16.8000	15.7500	14.8235	14.0000
	106	42.4000	36.3429	31.8000	28.2667	25.4400	23.1273	21.2000	19.5692	18.1714	16.9600	15.9000	14.9647	14.1333
	107	42.8000	36.6857	32.1000	28.5333	25.6800	23.3455	21.4000	19.7538	18.3429	17.1200	16.0500	15.1059	14.2667
	108	43.2000	37.0286	32.4000	28.8000	25.9200	23.5636	21.6000	19.9385	18.5143	17.2800	16.2000	15.2471	14.4000
	109	43.6000	37.3714	32.7000	29.0667	26.1600	23.7818	21.8000	20.1231	18.6857	17.4400	16.3500	15.3882	14.5333
	110	44.0000	37.7143	33.0000	29.3333	26.4000	24.0000	22.0000	20.3077	18.8571	17.6000	16.5000	15.5294	14.6667
	111	44.4000	38.0571	33.3000	29.6000	26.6400	24.2182	22.2000	20.4923	19.0286	17.7600	16.6500	15.6706	14.8000
	112	44.8000	38.4000	33.6000	29.8667	26.8800	24.4364	22.4000	20.6769	19.2000	17.9200	16.8000	15.8118	14.9333
	113	45.2000	38.7429	33.9000	30.1333	27.1200	24.6545	22.6000	20.8615	19.3714	18.0800	16.9500	15.9529	15.0667
	114	45.6000	39.0857	34.2000	30.4000	27.3600	24.8727	22.8000	21.0462	19.5429	18.2400	17.1000	16.0941	15.2000
	115	46.0000	39.4286	34.5000	30.6667	27.6000	25.0909	23.0000	21.2308	19.7143	18.4000	17.2500	16.2353	15.3333
	116	46.4000	39.7714	34.8000	30.9333	27.8400	25.3091	23.2000	21.4154	19.8857	18.5600	17.4000	16.3765	15.4667
	117	46.8000	40.1143	35.1000	31.2000	28.0800	25.5273	23.4000	21.6000	20.0571	18.7200	17.5500	16.5176	15.6000
	118	47.2000	40.4571	35.4000	31.4667	28.3200	25.7455	23.6000	21.7846	20.2286	18.8800	17.7000	16.6588	15.7333
	119	47.6000	40.8000	35.7000	31.7333	28.5600	25.9636	23.8000	21.9692	20.4000	19.0400	17.8500	16.8000	15.8667
	120	48.0000	41.1429	36.0000	32.0000	28.8000	26.1818	24.0000	22.1538	20.5714	19.2000	18.0000	16.9412	16.0000
	121	48.4000	41.4857	36.3000	32.2667	29.0400	26.4000	24.2000	22.3385	20.7429	19.3600	18.1500	17.0824	16.1333
	122	48.8000	41.8286	36.6000	32.5333	29.2800	26.6182	24.4000	22.5231	20.9143	19.5200	18.3000	17.2235	16.2667
	123	49.2000	42.1714	36.9000	32.8000	29.5200	26.8364	24.6000	22.7077	21.0857	19.6800	18.4500	17.3647	16.4000
	124	49.6000	42.5143	37.2000	33.0667	29.7600	27.0545	24.8000	22.8923	21.2571	19.8400	18.6000	17.5059	16.5333

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Frequency Matrix (Analog2-3)

XIN=19.200MHz & P1×P2=8 [P1×P2 is selectable from (1, 5, 10, or 20) ×(2, 4, 6, or 8).]

The white areas represent areas in which output is enabled. The other areas (i.e., gray areas) represent areas in which output is disabled.

P1×P2=8		N												
		9	10	11	12	13	14	15	16	17	18	19	20	21
M	124	33.0667	29.7600	27.0545	24.8000	22.8923	21.2571	19.8400	18.6000	17.5059	16.5333	15.6632	14.8800	14.1714
	125	33.3333	30.0000	27.2727	25.0000	23.0769	21.4286	20.0000	18.7500	17.6471	16.6667	15.7895	15.0000	14.2857
	126	33.6000	30.2400	27.4909	25.2000	23.2615	21.6000	20.1600	18.9000	17.7882	16.8000	15.9158	15.1200	14.4000
	127	33.8667	30.4800	27.7091	25.4000	23.4462	21.7714	20.3200	19.0500	17.9294	16.9333	16.0421	15.2400	14.5143
	128	34.1333	30.7200	27.9273	25.6000	23.6308	21.9429	20.4800	19.2000	18.0706	17.0667	16.1684	15.3600	14.6286
	129	34.4000	30.9600	28.1455	25.8000	23.8154	22.1143	20.6400	19.3500	18.2118	17.2000	16.2947	15.4800	14.7429
	130	34.6667	31.2000	28.3636	26.0000	24.0000	22.2857	20.8000	19.5000	18.3529	17.3333	16.4211	15.6000	14.8571
	131	34.9333	31.4400	28.5818	26.2000	24.1846	22.4571	20.9600	19.6500	18.4941	17.4667	16.5474	15.7200	14.9714
	132	35.2000	31.6800	28.8000	26.4000	24.3692	22.6286	21.1200	19.8000	18.6353	17.6000	16.6737	15.8400	15.0857
	133	35.4667	31.9200	29.0182	26.6000	24.5538	22.8000	21.2800	19.9500	18.7765	17.7333	16.8000	15.9600	15.2000
	134	35.7333	32.1600	29.2364	26.8000	24.7385	22.9714	21.4400	20.1000	18.9176	17.8667	16.9263	16.0800	15.3143
	135	36.0000	32.4000	29.4545	27.0000	24.9231	23.1429	21.6000	20.2500	19.0588	18.0000	17.0526	16.2000	15.4286
	136	36.2667	32.6400	29.6727	27.2000	25.1077	23.3143	21.7600	20.4000	19.2000	18.1333	17.1789	16.3200	15.5429
	137	36.5333	32.8800	29.8909	27.4000	25.2923	23.4857	21.9200	20.5500	19.3412	18.2667	17.3053	16.4400	15.6571
	138	36.8000	33.1200	30.1091	27.6000	25.4769	23.6571	22.0800	20.7000	19.4824	18.4000	17.4316	16.5600	15.7714
	139	37.0667	33.3600	30.3273	27.8000	25.6615	23.8286	22.2400	20.8500	19.6235	18.5333	17.5579	16.6800	15.8857
	140	37.3333	33.6000	30.5455	28.0000	25.8462	24.0000	22.4000	21.0000	19.7647	18.6667	17.6842	16.8000	16.0000
	141	37.6000	33.8400	30.7636	28.2000	26.0308	24.1714	22.5600	21.1500	19.9059	18.8000	17.8105	16.9200	16.1143
	142	37.8667	34.0800	30.9818	28.4000	26.2154	24.3429	22.7200	21.3000	20.0471	18.9333	17.9368	17.0400	16.2286
	143	38.1333	34.3200	31.2000	28.6000	26.4000	24.5143	22.8800	21.4500	20.1882	19.0667	18.0632	17.1600	16.3429
	144	38.4000	34.5600	31.4182	28.8000	26.5846	24.6857	23.0400	21.6000	20.3294	19.2000	18.1895	17.2800	16.4571
	145	38.6667	34.8000	31.6364	29.0000	26.7692	24.8571	23.2000	21.7500	20.4706	19.3333	18.3158	17.4000	16.5714
	146	38.9333	35.0400	31.8545	29.2000	26.9538	25.0286	23.3600	21.9000	20.6118	19.4667	18.4421	17.5200	16.6857
	147	39.2000	35.2800	32.0727	29.4000	27.1385	25.2000	23.5200	22.0500	20.7529	19.6000	18.5684	17.6400	16.8000
	148	39.4667	35.5200	32.2909	29.6000	27.3231	25.3714	23.6800	22.2000	20.8941	19.7333	18.6947	17.7600	16.9143
	149	39.7333	35.7600	32.5091	29.8000	27.5077	25.5429	23.8400	22.3500	21.0353	19.8667	18.8211	17.8800	17.0286
	150	40.0000	36.0000	32.7273	30.0000	27.6923	25.7143	24.0000	22.5000	21.1765	20.0000	18.9474	18.0000	17.1429
	151	40.2667	36.2400	32.9455	30.2000	27.8769	25.8857	24.1600	22.6500	21.3176	20.1333	19.0737	18.1200	17.2571
	152	40.5333	36.4800	33.1636	30.4000	28.0615	26.0571	24.3200	22.8000	21.4588	20.2667	19.2000	18.2400	17.3714
	153	40.8000	36.7200	33.3818	30.6000	28.2462	26.2286	24.4800	22.9500	21.6000	20.4000	19.3263	18.3600	17.4857
	154	41.0667	36.9600	33.6000	30.8000	28.4308	26.4000	24.6400	23.1000	21.7412	20.5333	19.4526	18.4800	17.6000
	155	41.3333	37.2000	33.8182	31.0000	28.6154	26.5714	24.8000	23.2500	21.8824	20.6667	19.5789	18.6000	17.7143

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Frequency Matrix (Analog2-4)

XIN=19.200MHz & P1×P2=8 [P1×P2 is selectable from (1, 5, 10, or 20) ×(2, 4, 6, or 8).]

The white areas represent areas in which output is enabled. The other areas (i.e., gray areas) represent areas in which output is disabled.

P1×P2=8		N												
		12	13	14	15	16	17	18	19	20	21	22	23	24
M	155	31.0000	28.6154	26.5714	24.8000	23.2500	21.8824	20.6667	19.5789	18.6000	17.7143	16.9091	16.1739	15.5000
	156	31.2000	28.8000	26.7429	24.9600	23.4000	22.0235	20.8000	19.7053	18.7200	17.8286	17.0182	16.2783	15.6000
	157	31.4000	28.9846	26.9143	25.1200	23.5500	22.1647	20.9333	19.8316	18.8400	17.9429	17.1273	16.3826	15.7000
	158	31.6000	29.1692	27.0857	25.2800	23.7000	22.3059	21.0667	19.9579	18.9600	18.0571	17.2364	16.4870	15.8000
	159	31.8000	29.3538	27.2571	25.4400	23.8500	22.4471	21.2000	20.0842	19.0800	18.1714	17.3455	16.5913	15.9000
	160	32.0000	29.5385	27.4286	25.6000	24.0000	22.5882	21.3333	20.2105	19.2000	18.2857	17.4545	16.6957	16.0000
	161	32.2000	29.7231	27.6000	25.7600	24.1500	22.7294	21.4667	20.3368	19.3200	18.4000	17.5636	16.8000	16.1000
	162	32.4000	29.9077	27.7714	25.9200	24.3000	22.8706	21.6000	20.4632	19.4400	18.5143	17.6727	16.9043	16.2000
	163	32.6000	30.0923	27.9429	26.0800	24.4500	23.0118	21.7333	20.5895	19.5600	18.6286	17.7818	17.0087	16.3000
	164	32.8000	30.2769	28.1143	26.2400	24.6000	23.1529	21.8667	20.7158	19.6800	18.7429	17.8909	17.1130	16.4000
	165	33.0000	30.4615	28.2857	26.4000	24.7500	23.2941	22.0000	20.8421	19.8000	18.8571	18.0000	17.2174	16.5000
	166	33.2000	30.6462	28.4571	26.5600	24.9000	23.4353	22.1333	20.9684	19.9200	18.9714	18.1091	17.3217	16.6000
	167	33.4000	30.8308	28.6286	26.7200	25.0500	23.5765	22.2667	21.0947	20.0400	19.0857	18.2182	17.4261	16.7000
	168	33.6000	31.0154	28.8000	26.8800	25.2000	23.7176	22.4000	21.2211	20.1600	19.2000	18.3273	17.5304	16.8000
	169	33.8000	31.2000	28.9714	27.0400	25.3500	23.8588	22.5333	21.3474	20.2800	19.3143	18.4364	17.6348	16.9000
	170	34.0000	31.3846	29.1429	27.2000	25.5000	24.0000	22.6667	21.4737	20.4000	19.4286	18.5455	17.7391	17.0000
	171	34.2000	31.5692	29.3143	27.3600	25.6500	24.1412	22.8000	21.6000	20.5200	19.5429	18.6545	17.8435	17.1000
	172	34.4000	31.7538	29.4857	27.5200	25.8000	24.2824	22.9333	21.7263	20.6400	19.6571	18.7636	17.9478	17.2000
	173	34.6000	31.9385	29.6571	27.6800	25.9500	24.4235	23.0667	21.8526	20.7600	19.7714	18.8727	18.0522	17.3000
	174	34.8000	32.1231	29.8286	27.8400	26.1000	24.5647	23.2000	21.9789	20.8800	19.8857	18.9818	18.1565	17.4000
	175	35.0000	32.3077	30.0000	28.0000	26.2500	24.7059	23.3333	22.1053	21.0000	20.0000	19.0909	18.2609	17.5000
	176	35.2000	32.4923	30.1714	28.1600	26.4000	24.8471	23.4667	22.2316	21.1200	20.1143	19.2000	18.3652	17.6000
	177	35.4000	32.6769	30.3429	28.3200	26.5500	24.9882	23.6000	22.3579	21.2400	20.2286	19.3091	18.4696	17.7000
	178	35.6000	32.8615	30.5143	28.4800	26.7000	25.1294	23.7333	22.4842	21.3600	20.3429	19.4182	18.5739	17.8000
	179	35.8000	33.0462	30.6857	28.6400	26.8500	25.2706	23.8667	22.6105	21.4800	20.4571	19.5273	18.6783	17.9000
	180	36.0000	33.2308	30.8571	28.8000	27.0000	25.4118	24.0000	22.7368	21.6000	20.5714	19.6364	18.7826	18.0000
	181	36.2000	33.4154	31.0286	28.9600	27.1500	25.5529	24.1333	22.8632	21.7200	20.6857	19.7455	18.8870	18.1000
	182	36.4000	33.6000	31.2000	29.1200	27.3000	25.6941	24.2667	22.9895	21.8400	20.8000	19.8545	18.9913	18.2000
	183	36.6000	33.7846	31.3714	29.2800	27.4500	25.8353	24.4000	23.1158	21.9600	20.9143	19.9636	19.0957	18.3000
	184	36.8000	33.9692	31.5429	29.4400	27.6000	25.9765	24.5333	23.2421	22.0800	21.0286	20.0727	19.2000	18.4000
	185	37.0000	34.1538	31.7143	29.6000	27.7500	26.1176	24.6667	23.3684	22.2000	21.1429	20.1818	19.3043	18.5000
	186	37.2000	34.3385	31.8857	29.7600	27.9000	26.2588	24.8000	23.4947	22.3200	21.2571	20.2909	19.4087	18.6000

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Frequency Matrix (Analog2-5)

XIN=19.200MHz & P1×P2=8 [P1×P2 is selectable from (1, 5, 10, or 20) ×(2, 4, 6, or 8).]

The white areas represent areas in which output is enabled. The other areas (i.e., gray areas) represent areas in which output is disabled.

P1×P2=8		N												
		14	15	16	17	18	19	20	21	22	23	24	25	26
M	186	31.8857	29.7600	27.9000	26.2588	24.8000	23.4947	22.3200	21.2571	20.2909	19.4087	18.6000	17.8560	17.1692
	187	32.0571	29.9200	28.0500	26.4000	24.9333	23.6211	22.4400	21.3714	20.4000	19.5130	18.7000	17.9520	17.2615
	188	32.2286	30.0800	28.2000	26.5412	25.0667	23.7474	22.5600	21.4857	20.5091	19.6174	18.8000	18.0480	17.3538
	189	32.4000	30.2400	28.3500	26.6824	25.2000	23.8737	22.6800	21.6000	20.6182	19.7217	18.9000	18.1440	17.4462
	190	32.5714	30.4000	28.5000	26.8235	25.3333	24.0000	22.8000	21.7143	20.7273	19.8261	19.0000	18.2400	17.5385
	191	32.7429	30.5600	28.6500	26.9647	25.4667	24.1263	22.9200	21.8286	20.8364	19.9304	19.1000	18.3360	17.6308
	192	32.9143	30.7200	28.8000	27.1059	25.6000	24.2526	23.0400	21.9429	20.9455	20.0348	19.2000	18.4320	17.7231
	193	33.0857	30.8800	28.9500	27.2471	25.7333	24.3789	23.1600	22.0571	21.0545	20.1391	19.3000	18.5280	17.8154
	194	33.2571	31.0400	29.1000	27.3882	25.8667	24.5053	23.2800	22.1714	21.1636	20.2435	19.4000	18.6240	17.9077
	195	33.4286	31.2000	29.2500	27.5294	26.0000	24.6316	23.4000	22.2857	21.2727	20.3478	19.5000	18.7200	18.0000
	196	33.6000	31.3600	29.4000	27.6706	26.1333	24.7579	23.5200	22.4000	21.3818	20.4522	19.6000	18.8160	18.0923
	197	33.7714	31.5200	29.5500	27.8118	26.2667	24.8842	23.6400	22.5143	21.4909	20.5565	19.7000	18.9120	18.1846
	198	33.9429	31.6800	29.7000	27.9529	26.4000	25.0105	23.7600	22.6286	21.6000	20.6609	19.8000	19.0080	18.2769
	199	34.1143	31.8400	29.8500	28.0941	26.5333	25.1368	23.8800	22.7429	21.7091	20.7652	19.9000	19.1040	18.3692
	200	34.2857	32.0000	30.0000	28.2353	26.6667	25.2632	24.0000	22.8571	21.8182	20.8696	20.0000	19.2000	18.4615
	201	34.4571	32.1600	30.1500	28.3765	26.8000	25.3895	24.1200	22.9714	21.9273	20.9739	20.1000	19.2960	18.5538
	202	34.6286	32.3200	30.3000	28.5176	26.9333	25.5158	24.2400	23.0857	22.0364	21.0783	20.2000	19.3920	18.6462
	203	34.8000	32.4800	30.4500	28.6588	27.0667	25.6421	24.3600	23.2000	22.1455	21.1826	20.3000	19.4880	18.7385
	204	34.9714	32.6400	30.6000	28.8000	27.2000	25.7684	24.4800	23.3143	22.2545	21.2870	20.4000	19.5840	18.8308
	205	35.1429	32.8000	30.7500	28.9412	27.3333	25.8947	24.6000	23.4286	22.3636	21.3913	20.5000	19.6800	18.9231
	206	35.3143	32.9600	30.9000	29.0824	27.4667	26.0211	24.7200	23.5429	22.4727	21.4957	20.6000	19.7760	19.0154
	207	35.4857	33.1200	31.0500	29.2235	27.6000	26.1474	24.8400	23.6571	22.5818	21.6000	20.7000	19.8720	19.1077
	208	35.6571	33.2800	31.2000	29.3647	27.7333	26.2737	24.9600	23.7714	22.6909	21.7043	20.8000	19.9680	19.2000
	209	35.8286	33.4400	31.3500	29.5059	27.8667	26.4000	25.0800	23.8857	22.8000	21.8087	20.9000	20.0640	19.2923
	210	36.0000	33.6000	31.5000	29.6471	28.0000	26.5263	25.2000	24.0000	22.9091	21.9130	21.0000	20.1600	19.3846
	211	36.1714	33.7600	31.6500	29.7882	28.1333	26.6526	25.3200	24.1143	23.0182	22.0174	21.1000	20.2560	19.4769
	212	36.3429	33.9200	31.8000	29.9294	28.2667	26.7789	25.4400	24.2286	23.1273	22.1217	21.2000	20.3520	19.5692
	213	36.5143	34.0800	31.9500	30.0706	28.4000	26.9053	25.5600	24.3429	23.2364	22.2261	21.3000	20.4480	19.6615
	214	36.6857	34.2400	32.1000	30.2118	28.5333	27.0316	25.6800	24.4571	23.3455	22.3304	21.4000	20.5440	19.7538
	215	36.8571	34.4000	32.2500	30.3529	28.6667	27.1579	25.8000	24.5714	23.4545	22.4348	21.5000	20.6400	19.8462
	216	37.0286	34.5600	32.4000	30.4941	28.8000	27.2842	25.9200	24.6857	23.5636	22.5391	21.6000	20.7360	19.9385
	217	37.2000	34.7200	32.5500	30.6353	28.9333	27.4105	26.0400	24.8000	23.6727	22.6435	21.7000	20.8320	20.0308

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Frequency Matrix (Analog2-6)

XIN=19.200MHz & P1×P2=8 [P1×P2 is selectable from (1, 5, 10, or 20) ×(2, 4, 6, or 8).]

The white areas represent areas in which output is enabled. The other areas (i.e., gray areas) represent areas in which output is disabled.

P1×P2=8		N												
		16	17	18	19	20	21	22	23	24	25	26	27	28
M	214	32.1000	30.2118	28.5333	27.0316	25.6800	24.4571	23.3455	22.3304	21.4000	20.5440	19.7538	19.0222	18.3429
	215	32.2500	30.3529	28.6667	27.1579	25.8000	24.5714	23.4545	22.4348	21.5000	20.6400	19.8462	19.1111	18.4286
	216	32.4000	30.4941	28.8000	27.2842	25.9200	24.6857	23.5636	22.5391	21.6000	20.7360	19.9385	19.2000	18.5143
	217	32.5500	30.6353	28.9333	27.4105	26.0400	24.8000	23.6727	22.6435	21.7000	20.8320	20.0308	19.2889	18.6000
	218	32.7000	30.7765	29.0667	27.5368	26.1600	24.9143	23.7818	22.7478	21.8000	20.9280	20.1231	19.3778	18.6857
	219	32.8500	30.9176	29.2000	27.6632	26.2800	25.0286	23.8909	22.8522	21.9000	21.0240	20.2154	19.4667	18.7714
	220	33.0000	31.0588	29.3333	27.7895	26.4000	25.1429	24.0000	22.9565	22.0000	21.1200	20.3077	19.5556	18.8571
	221	33.1500	31.2000	29.4667	27.9158	26.5200	25.2571	24.1091	23.0609	22.1000	21.2160	20.4000	19.6444	18.9429
	222	33.3000	31.3412	29.6000	28.0421	26.6400	25.3714	24.2182	23.1652	22.2000	21.3120	20.4923	19.7333	19.0286
	223	33.4500	31.4824	29.7333	28.1684	26.7600	25.4857	24.3273	23.2696	22.3000	21.4080	20.5846	19.8222	19.1143
	224	33.6000	31.6235	29.8667	28.2947	26.8800	25.6000	24.4364	23.3739	22.4000	21.5040	20.6769	19.9111	19.2000
	225	33.7500	31.7647	30.0000	28.4211	27.0000	25.7143	24.5455	23.4783	22.5000	21.6000	20.7692	20.0000	19.2857
	226	33.9000	31.9059	30.1333	28.5474	27.1200	25.8286	24.6545	23.5826	22.6000	21.6960	20.8615	20.0889	19.3714
	227	34.0500	32.0471	30.2667	28.6737	27.2400	25.9429	24.7636	23.6870	22.7000	21.7920	20.9538	20.1778	19.4571
	228	34.2000	32.1882	30.4000	28.8000	27.3600	26.0571	24.8727	23.7913	22.8000	21.8880	21.0462	20.2667	19.5429
	229	34.3500	32.3294	30.5333	28.9263	27.4800	26.1714	24.9818	23.8957	22.9000	21.9840	21.1385	20.3556	19.6286
	230	34.5000	32.4706	30.6667	29.0526	27.6000	26.2857	25.0909	24.0000	23.0000	22.0800	21.2308	20.4444	19.7143
	231	34.6500	32.6118	30.8000	29.1789	27.7200	26.4000	25.2000	24.1043	23.1000	22.1760	21.3231	20.5333	19.8000
	232	34.8000	32.7529	30.9333	29.3053	27.8400	26.5143	25.3091	24.2087	23.2000	22.2720	21.4154	20.6222	19.8857
	233	34.9500	32.8941	31.0667	29.4316	27.9600	26.6286	25.4182	24.3130	23.3000	22.3680	21.5077	20.7111	19.9714
	234	35.1000	33.0353	31.2000	29.5579	28.0800	26.7429	25.5273	24.4174	23.4000	22.4640	21.6000	20.8000	20.0571
	235	35.2500	33.1765	31.3333	29.6842	28.2000	26.8571	25.6364	24.5217	23.5000	22.5600	21.6923	20.8889	20.1429
	236	35.4000	33.3176	31.4667	29.8105	28.3200	26.9714	25.7455	24.6261	23.6000	22.6560	21.7846	20.9778	20.2286
	237	35.5500	33.4588	31.6000	29.9368	28.4400	27.0857	25.8545	24.7304	23.7000	22.7520	21.8769	21.0667	20.3143
	238	35.7000	33.6000	31.7333	30.0632	28.5600	27.2000	25.9636	24.8348	23.8000	22.8480	21.9692	21.1556	20.4000
	239	35.8500	33.7412	31.8667	30.1895	28.6800	27.3143	26.0727	24.9391	23.9000	22.9440	22.0615	21.2444	20.4857
	240	36.0000	33.8824	32.0000	30.3158	28.8000	27.4286	26.1818	25.0435	24.0000	23.0400	22.1538	21.3333	20.5714
	241	36.1500	34.0235	32.1333	30.4421	28.9200	27.5429	26.2909	25.1478	24.1000	23.1360	22.2462	21.4222	20.6571
	242	36.3000	34.1647	32.2667	30.5684	29.0400	27.6571	26.4000	25.2522	24.2000	23.2320	22.3385	21.5111	20.7429
	243	36.4500	34.3059	32.4000	30.6947	29.1600	27.7714	26.5091	25.3565	24.3000	23.3280	22.4308	21.6000	20.8286
	244	36.6000	34.4471	32.5333	30.8211	29.2800	27.8857	26.6182	25.4609	24.4000	23.4240	22.5231	21.6889	20.9143
	245	36.7500	34.5882	32.6667	30.9474	29.4000	28.0000	26.7273	25.5652	24.5000	23.5200	22.6154	21.7778	21.0000

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Frequency Matrix (Analog2-7)

XIN=19.200MHz & P1×P2=8 [P1×P2 is selectable from (1, 5, 10, or 20) ×(2, 4, 6, or 8).]

The white areas represent areas in which output is enabled. The other areas (i.e., gray areas) represent areas in which output is disabled.

P1×P2=8		N													
		19	20	21	22	23	24	25	26	27	28	29	30	31	32
M	225	28.4211	27.0000	25.7143	24.5455	23.4783	22.5000	21.6000	20.7692	20.0000	19.2857	18.6207	18.0000	17.4194	16.8750
	226	28.5474	27.1200	25.8286	24.6545	23.5826	22.6000	21.6960	20.8615	20.0889	19.3714	18.7034	18.0800	17.4968	16.9500
	227	28.6737	27.2400	25.9429	24.7636	23.6870	22.7000	21.7920	20.9538	20.1778	19.4571	18.7862	18.1600	17.5742	17.0250
	228	28.8000	27.3600	26.0571	24.8727	23.7913	22.8000	21.8880	21.0462	20.2667	19.5429	18.8690	18.2400	17.6516	17.1000
	229	28.9263	27.4800	26.1714	24.9818	23.8957	22.9000	21.9840	21.1385	20.3556	19.6286	18.9517	18.3200	17.7290	17.1750
	230	29.0526	27.6000	26.2857	25.0909	24.0000	23.0000	22.0800	21.2308	20.4444	19.7143	19.0345	18.4000	17.8065	17.2500
	231	29.1789	27.7200	26.4000	25.2000	24.1043	23.1000	22.1760	21.3231	20.5333	19.8000	19.1172	18.4800	17.8839	17.3250
	232	29.3053	27.8400	26.5143	25.3091	24.2087	23.2000	22.2720	21.4154	20.6222	19.8857	19.2000	18.5600	17.9613	17.4000
	233	29.4316	27.9600	26.6286	25.4182	24.3130	23.3000	22.3680	21.5077	20.7111	19.9714	19.2828	18.6400	18.0387	17.4750
	234	29.5579	28.0800	26.7429	25.5273	24.4174	23.4000	22.4640	21.6000	20.8000	20.0571	19.3655	18.7200	18.1161	17.5500
	235	29.6842	28.2000	26.8571	25.6364	24.5217	23.5000	22.5600	21.6923	20.8889	20.1429	19.4483	18.8000	18.1935	17.6250
	236	29.8105	28.3200	26.9714	25.7455	24.6261	23.6000	22.6560	21.7846	20.9778	20.2286	19.5310	18.8800	18.2710	17.7000
	237	29.9368	28.4400	27.0857	25.8545	24.7304	23.7000	22.7520	21.8769	21.0667	20.3143	19.6138	18.9600	18.3484	17.7750
	238	30.0632	28.5600	27.2000	25.9636	24.8348	23.8000	22.8480	21.9692	21.1556	20.4000	19.6966	19.0400	18.4258	17.8500
	239	30.1895	28.6800	27.3143	26.0727	24.9391	23.9000	22.9440	22.0615	21.2444	20.4857	19.7793	19.1200	18.5032	17.9250
	240	30.3158	28.8000	27.4286	26.1818	25.0435	24.0000	23.0400	22.1538	21.3333	20.5714	19.8621	19.2000	18.5806	18.0000
	241	30.4421	28.9200	27.5429	26.2909	25.1478	24.1000	23.1360	22.2462	21.4222	20.6571	19.9448	19.2800	18.6581	18.0750
	242	30.5684	29.0400	27.6571	26.4000	25.2522	24.2000	23.2320	22.3385	21.5111	20.7429	20.0276	19.3600	18.7355	18.1500
	243	30.6947	29.1600	27.7714	26.5091	25.3565	24.3000	23.3280	22.4308	21.6000	20.8286	20.1103	19.4400	18.8129	18.2250
	244	30.8211	29.2800	27.8857	26.6182	25.4609	24.4000	23.4240	22.5231	21.6889	20.9143	20.1931	19.5200	18.8903	18.3000
	245	30.9474	29.4000	28.0000	26.7273	25.5652	24.5000	23.5200	22.6154	21.7778	21.0000	20.2759	19.6000	18.9677	18.3750
	246	31.0737	29.5200	28.1143	26.8364	25.6696	24.6000	23.6160	22.7077	21.8667	21.0857	20.3586	19.6800	19.0452	18.4500
	247	31.2000	29.6400	28.2286	26.9455	25.7739	24.7000	23.7120	22.8000	21.9556	21.1714	20.4414	19.7600	19.1226	18.5250
	248	31.3263	29.7600	28.3429	27.0545	25.8783	24.8000	23.8080	22.8923	22.0444	21.2571	20.5241	19.8400	19.2000	18.6000
	249	31.4526	29.8800	28.4571	27.1636	25.9826	24.9000	23.9040	22.9846	22.1333	21.3429	20.6069	19.9200	19.2774	18.6750
	250	31.5789	30.0000	28.5714	27.2727	26.0870	25.0000	24.0000	23.0769	22.2222	21.4286	20.6897	20.0000	19.3548	18.7500
	251	31.7053	30.1200	28.6857	27.3818	26.1913	25.1000	24.0960	23.1692	22.3111	21.5143	20.7724	20.0800	19.4323	18.8250
	252	31.8316	30.2400	28.8000	27.4909	26.2957	25.2000	24.1920	23.2615	22.4000	21.6000	20.8552	20.1600	19.5097	18.9000
	253	31.9579	30.3600	28.9143	27.6000	26.4000	25.3000	24.2880	23.3538	22.4889	21.6857	20.9379	20.2400	19.5871	18.9750
	254	32.0842	30.4800	29.0286	27.7091	26.5043	25.4000	24.3840	23.4462	22.5778	21.7714	21.0207	20.3200	19.6645	19.0500
	255	32.2105	30.6000	29.1429	27.8182	26.6087	25.5000	24.4800	23.5385	22.6667	21.8571	21.1034	20.4000	19.7419	19.1250
	256	32.3368	30.7200	29.2571	27.9273	26.7130	25.6000	24.5760	23.6308	22.7556	21.9429	21.1862	20.4800	19.8194	19.2000

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When reference frequency = 27MHz and if Analog1 is used:

The reference frequency can be input not only at 19.200MHz but also in the range of 5 to 48MHz (or 5 to 27MHz to use an xtal).

For example, the following section shows a frequency matrix when a 27-MHz frequency is input.

If you want to use any other reference frequency, contact your ROHM representative.

XIN=27.000MHz & P1×P2=2 [P1×P2 is selectable from (1, 5, 10, or 20) ×(2, 4, 6, or 8).]

The white areas represent areas in which output is enabled. The blue areas represent areas in which output is enabled under the condition of VDD_CLK=2.7 to 3.6V.

The other areas (i.e., gray areas) represent areas in which output is disabled.

P1×P2=2		N												
		4	5	6	7	8	9	10	11	12	13	14	15	16
M	13	43.8750	35.1000	29.2500	25.0714	21.9375	19.5000	17.5500	15.9545	14.6250	13.5000	12.5357	11.7000	10.9688
	14	47.2500	37.8000	31.5000	27.0000	23.6250	21.0000	18.9000	17.1818	15.7500	14.5385	13.5000	12.6000	11.8125
	15	50.6250	40.5000	33.7500	28.9286	25.3125	22.5000	20.2500	18.4091	16.8750	15.5769	14.4643	13.5000	12.6563
	16	54.0000	43.2000	36.0000	30.8571	27.0000	24.0000	21.6000	19.6364	18.0000	16.6154	15.4286	14.4000	13.5000
	17	57.3750	45.9000	38.2500	32.7857	28.6875	25.5000	22.9500	20.8636	19.1250	17.6538	16.3929	15.3000	14.3438
	18	60.7500	48.6000	40.5000	34.7143	30.3750	27.0000	24.3000	22.0909	20.2500	18.6923	17.3571	16.2000	15.1875
	19	64.1250	51.3000	42.7500	36.6429	32.0625	28.5000	25.6500	23.3182	21.3750	19.7308	18.3214	17.1000	16.0313
	20	67.5000	54.0000	45.0000	38.5714	33.7500	30.0000	27.0000	24.5455	22.5000	20.7692	19.2857	18.0000	16.8750
	21	70.8750	56.7000	47.2500	40.5000	35.4375	31.5000	28.3500	25.7727	23.6250	21.8077	20.2500	18.9000	17.7188
	22	74.2500	59.4000	49.5000	42.4286	37.1250	33.0000	29.7000	27.0000	24.7500	22.8462	21.2143	19.8000	18.5625
	23	77.6250	62.1000	51.7500	44.3571	38.8125	34.5000	31.0500	28.2273	25.8750	23.8846	22.1786	20.7000	19.4063
	24	81.0000	64.8000	54.0000	46.2857	40.5000	36.0000	32.4000	29.4545	27.0000	24.9231	23.1429	21.6000	20.2500
	25	84.3750	67.5000	56.2500	48.2143	42.1875	37.5000	33.7500	30.6818	28.1250	25.9615	24.1071	22.5000	21.0938
	26	87.7500	70.2000	58.5000	50.1429	43.8750	39.0000	35.1000	31.9091	29.2500	27.0000	25.0714	23.4000	21.9375
	27	91.1250	72.9000	60.7500	52.0714	45.5625	40.5000	36.4500	33.1364	30.3750	28.0385	26.0357	24.3000	22.7813
	28	94.5000	75.6000	63.0000	54.0000	47.2500	42.0000	37.8000	34.3636	31.5000	29.0769	27.0000	25.2000	23.6250
	29	97.8750	78.3000	65.2500	55.9286	48.9375	43.5000	39.1500	35.5909	32.6250	30.1154	27.9643	26.1000	24.4688
	30	101.2500	81.0000	67.5000	57.8571	50.6250	45.0000	40.5000	36.8182	33.7500	31.1538	28.9286	27.0000	25.3125
	31	104.6250	83.7000	69.7500	59.7857	52.3125	46.5000	41.8500	38.0455	34.8750	32.1923	29.8929	27.9000	26.1563
	32	108.0000	86.4000	72.0000	61.7143	54.0000	48.0000	43.2000	39.2727	36.0000	33.2308	30.8571	28.8000	27.0000
	33	111.3750	89.1000	74.2500	63.6429	55.6875	49.5000	44.5500	40.5000	37.1250	34.2692	31.8214	29.7000	27.8438
	34	114.7500	91.8000	76.5000	65.5714	57.3750	51.0000	45.9000	41.7273	38.2500	35.3077	32.7857	30.6000	28.6875
	35	118.1250	94.5000	78.7500	67.5000	59.0625	52.5000	47.2500	42.9545	39.3750	36.3462	33.7500	31.5000	29.5313
	36	121.5000	97.2000	81.0000	69.4286	60.7500	54.0000	48.6000	44.1818	40.5000	37.3846	34.7143	32.4000	30.3750
	37	124.8750	99.9000	83.2500	71.3571	62.4375	55.5000	49.9500	45.4091	41.6250	38.4231	35.6786	33.3000	31.2188
	38	128.2500	102.6000	85.5000	73.2857	64.1250	57.0000	51.3000	46.6364	42.7500	39.4615	36.6429	34.2000	32.0625
	39	131.6250	105.3000	87.7500	75.2143	65.8125	58.5000	52.6500	47.8636	43.8750	40.5000	37.6071	35.1000	32.9063
	40	135.0000	108.0000	90.0000	77.1429	67.5000	60.0000	54.0000	49.0909	45.0000	41.5385	38.5714	36.0000	33.7500
	41	138.3750	110.7000	92.2500	79.0714	69.1875	61.5000	55.3500	50.3182	46.1250	42.5769	39.5357	36.9000	34.5938
	42	141.7500	113.4000	94.5000	81.0000	70.8750	63.0000	56.7000	51.5455	47.2500	43.6154	40.5000	37.8000	35.4375
	43	145.1250	116.1000	96.7500	82.9286	72.5625	64.5000	58.0500	52.7727	48.3750	44.6538	41.4643	38.7000	36.2813
	44	148.5000	118.8000	99.0000	84.8571	74.2500	66.0000	59.4000	54.0000	49.5000	45.6923	42.4286	39.6000	37.1250
	45	151.8750	121.5000	101.2500	86.7857	75.9375	67.5000	60.7500	55.2273	50.6250	46.7308	43.3929	40.5000	37.9688

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When reference frequency = 13MHz and if Analog1 is used:

The reference frequency can be input not only at 19.200MHz but also in the range of 5 to 48MHz (or 5 to 27MHz to use an xtal).

For example, the following section shows a frequency matrix when a 13-MHz frequency is input.

If you want to use any other reference frequency, contact your ROHM representative.

XIN=13.000MHz & P1×P2=2 [P1×P2 is selectable from (1, 5, 10, or 20) ×(2, 4, 6, or 8).]

The white areas represent areas in which output is enabled. The blue areas represent areas in which output is enabled under the condition of VDD_CLK=2.7 to 3.6V.

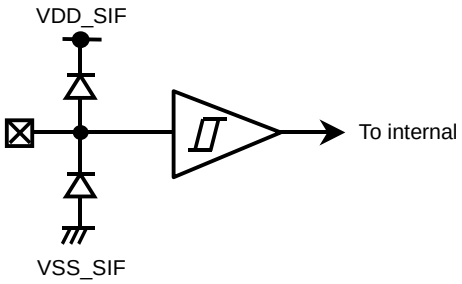
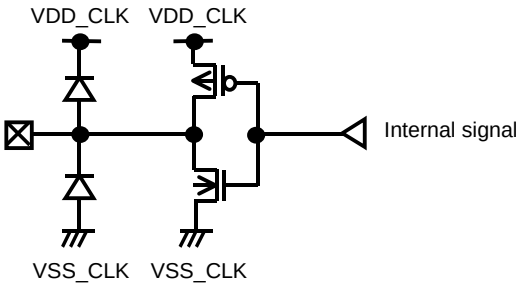
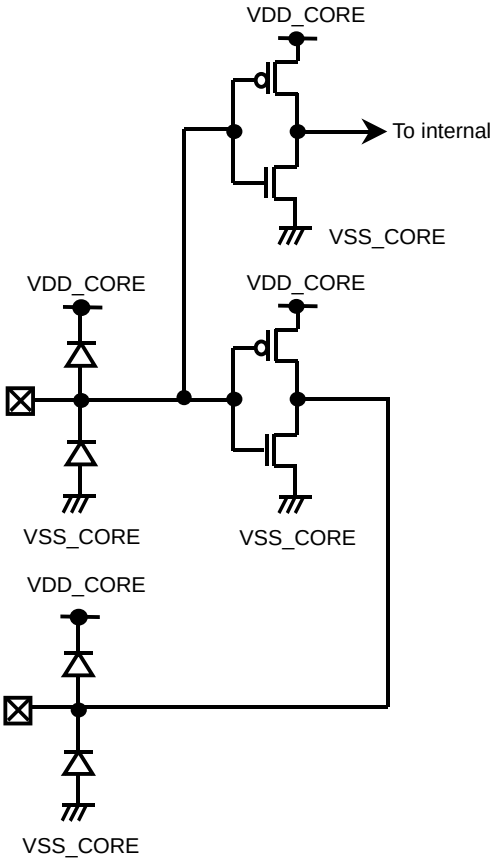
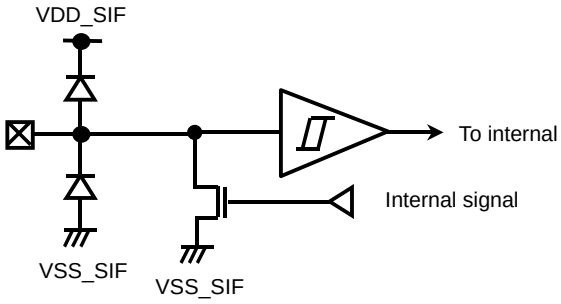
The other areas (i.e., gray areas) represent areas in which output is disabled.

P1×P2=2		N												
		3	4	5	6	7	8	9	10	11	12	13	14	15
	13	28.1667	21.1250	16.9000	14.0833	12.0714	10.5625	9.3889	8.4500	7.6818	7.0417	6.5000	6.0357	5.6333
	14	30.3333	22.7500	18.2000	15.1667	13.0000	11.3750	10.1111	9.1000	8.2727	7.5833	7.0000	6.5000	6.0667
	15	32.5000	24.3750	19.5000	16.2500	13.9286	12.1875	10.8333	9.7500	8.8636	8.1250	7.5000	6.9643	6.5000
	16	34.6667	26.0000	20.8000	17.3333	14.8571	13.0000	11.5556	10.4000	9.4545	8.6667	8.0000	7.4286	6.9333
	17	36.8333	27.6250	22.1000	18.4167	15.7857	13.8125	12.2778	11.0500	10.0455	9.2083	8.5000	7.8929	7.3667
	18	39.0000	29.2500	23.4000	19.5000	16.7143	14.6250	13.0000	11.7000	10.6364	9.7500	9.0000	8.3571	7.8000
	19	41.1667	30.8750	24.7000	20.5833	17.6429	15.4375	13.7222	12.3500	11.2273	10.2917	9.5000	8.8214	8.2333
	20	43.3333	32.5000	26.0000	21.6667	18.5714	16.2500	14.4444	13.0000	11.8182	10.8333	10.0000	9.2857	8.6667
	21	45.5000	34.1250	27.3000	22.7500	19.5000	17.0625	15.1667	13.6500	12.4091	11.3750	10.5000	9.7500	9.1000
	22	47.6667	35.7500	28.6000	23.8333	20.4286	17.8750	15.8889	14.3000	13.0000	11.9167	11.0000	10.2143	9.5333
	23	49.8333	37.3750	29.9000	24.9167	21.3571	18.6875	16.6111	14.9500	13.5909	12.4583	11.5000	10.6786	9.9667
	24	52.0000	39.0000	31.2000	26.0000	22.2857	19.5000	17.3333	15.6000	14.1818	13.0000	12.0000	11.1429	10.4000
	25	54.1667	40.6250	32.5000	27.0833	23.2143	20.3125	18.0556	16.2500	14.7727	13.5417	12.5000	11.6071	10.8333
	26	56.3333	42.2500	33.8000	28.1667	24.1429	21.1250	18.7778	16.9000	15.3636	14.0833	13.0000	12.0714	11.2667
	27	58.5000	43.8750	35.1000	29.2500	25.0714	21.9375	19.5000	17.5500	15.9545	14.6250	13.5000	12.5357	11.7000
	28	60.6667	45.5000	36.4000	30.3333	26.0000	22.7500	20.2222	18.2000	16.5455	15.1667	14.0000	13.0000	12.1333
M	29	62.8333	47.1250	37.7000	31.4167	26.9286	23.5625	20.9444	18.8500	17.1364	15.7083	14.5000	13.4643	12.5667
	30	65.0000	48.7500	39.0000	32.5000	27.8571	24.3750	21.6667	19.5000	17.7273	16.2500	15.0000	13.9286	13.0000
	31	67.1667	50.3750	40.3000	33.5833	28.7857	25.1875	22.3889	20.1500	18.3182	16.7917	15.5000	14.3929	13.4333
	32	69.3333	52.0000	41.6000	34.6667	29.7143	26.0000	23.1111	20.8000	18.9091	17.3333	16.0000	14.8571	13.8667
	33	71.5000	53.6250	42.9000	35.7500	30.6429	26.8125	23.8333	21.4500	19.5000	17.8750	16.5000	15.3214	14.3000
	34	73.6667	55.2500	44.2000	36.8333	31.5714	27.6250	24.5556	22.1000	20.0909	18.4167	17.0000	15.7857	14.7333
	35	75.8333	56.8750	45.5000	37.9167	32.5000	28.4375	25.2778	22.7500	20.6818	18.9583	17.5000	16.2500	15.1667
	36	78.0000	58.5000	46.8000	39.0000	33.4286	29.2500	26.0000	23.4000	21.2727	19.5000	18.0000	16.7143	15.6000
	37	80.1667	60.1250	48.1000	40.0833	34.3571	30.0625	26.7222	24.0500	21.8636	20.0417	18.5000	17.1786	16.0333
	38	82.3333	61.7500	49.4000	41.1667	35.2857	30.8750	27.4444	24.7000	22.4545	20.5833	19.0000	17.6429	16.4667
	39	84.5000	63.3750	50.7000	42.2500	36.2143	31.6875	28.1667	25.3500	23.0455	21.1250	19.5000	18.1071	16.9000
	40	86.6667	65.0000	52.0000	43.3333	37.1429	32.5000	28.8889	26.0000	23.6364	21.6667	20.0000	18.5714	17.3333
	41	88.8333	66.6250	53.3000	44.4167	38.0714	33.3125	29.6111	26.6500	24.2273	22.2083	20.5000	19.0357	17.7667
	42	91.0000	68.2500	54.6000	45.5000	39.0000	34.1250	30.3333	27.3000	24.8182	22.7500	21.0000	19.5000	18.2000
	43	93.1667	69.8750	55.9000	46.5833	39.9286	34.9375	31.0556	27.9500	25.4091	23.2917	21.5000	19.9643	18.6333
	44	95.3333	71.5000	57.2000	47.6667	40.8571	35.7500	31.7778	28.6000	26.0000	23.8333	22.0000	20.4286	19.0667
	45	97.5000	73.1250	58.5000	48.7500	41.7857	36.5625	32.5000	29.2500	26.5909	24.3750	22.5000	20.8929	19.5000

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●I/O PIN Equivalent Circuit

Pin No.	Equipment circuit	Pin No.	Equipment circuit
1, 20		10, 13, 16	
6 7		19	

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●Notes for use

(1) Absolute Maximum Ratings

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

(2) 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 BU7331EKN'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 BU7331EKN. Erroneous mounting can break down BU7331EKN. 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, BU7331EKN 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, BU7331EKN 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 BU7331EKN. 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.

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●Ordering part number

B	U	7	3	3	1	E	K	N	-	E	2

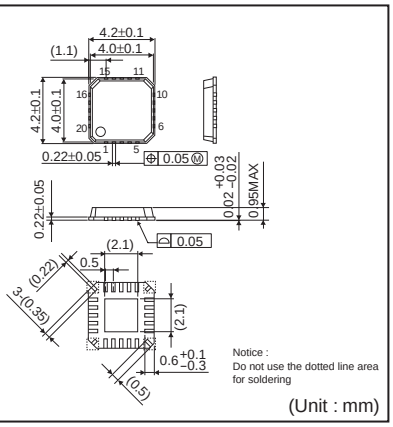
Part No. (BU)

Part No. (7331)

Package
EKN:HQFN20V

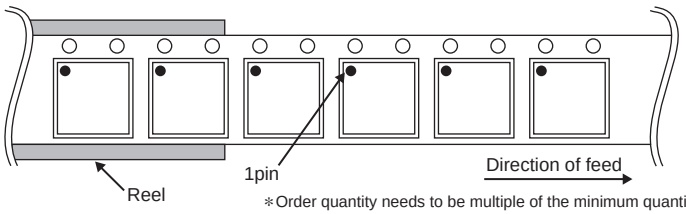
Packaging and forming specification
E2: Embossed tape and reel

HQFN20V



<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.

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(Note1) Medical Equipment Classification of the Specific Applications

JAPAN	USA	EU	CHINA
CLASSⅢ	CLASSⅢ	CLASSⅡb	CLASSⅢ
CLASSⅣ		CLASSⅢ	

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   [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

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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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