

3 for input 1 output switch with Termination sense correspondence (Sync with HPD_SINK)

BU16018KV



●Description

BU16018KV is 3 for input 1 output HDMI/DVI switch LSI. Each port supports 2.25Gbps. (HDMI 1.3a).

This device control is simple. It requires only 3.3V source and a few GPIO controls.

Terminated resistors(50Ω) are integrated at each input port. When channel is not selected, termination resistors are turned off. TMDS inputs are high impedance.

This device is integrated equalization function and DDC buffer function, so It can adapt long cable.

●Features

- Supports 2.25 Gbps signaling rate for 480i/p, 720i/p, and 1080i/p resolution to 12-bit color depth
- Compatible with HDMI 1.3a
- Each port supports HDMI or DVI inputs
- 5V tolerance to all DDC and HPD_SINK inputs
- Integrated DDC buffer
- Integrated switchable 50Ω receiver termination
- Integrated equalizer circuit to adapt long cable
- High impedance outputs when disabled
- HBM ESD Protection exceeds 10kV
- 3.3V supply operation
- VQFP80 package
- ROHS compatible

●Applications

- Digital TV
- DVD Player
- Set-Top-Box
- Audio Video Receiver
- Digital Projector
- DVI or HDMI Switch Box

●OUTSIDE DIMENSION CHART

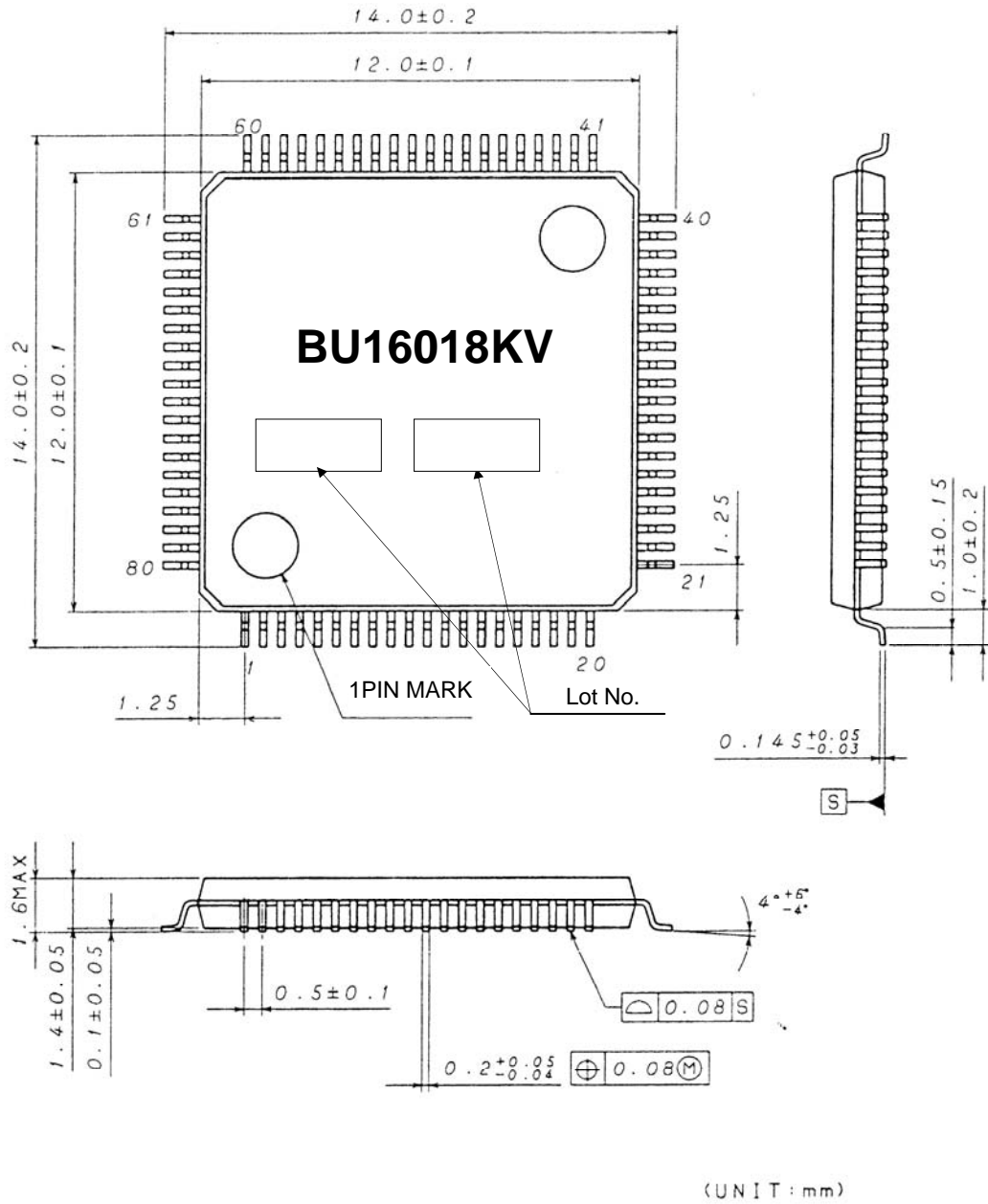


Fig. 1-1 . Outside dimension chart

● BLOCK DIAGRAM

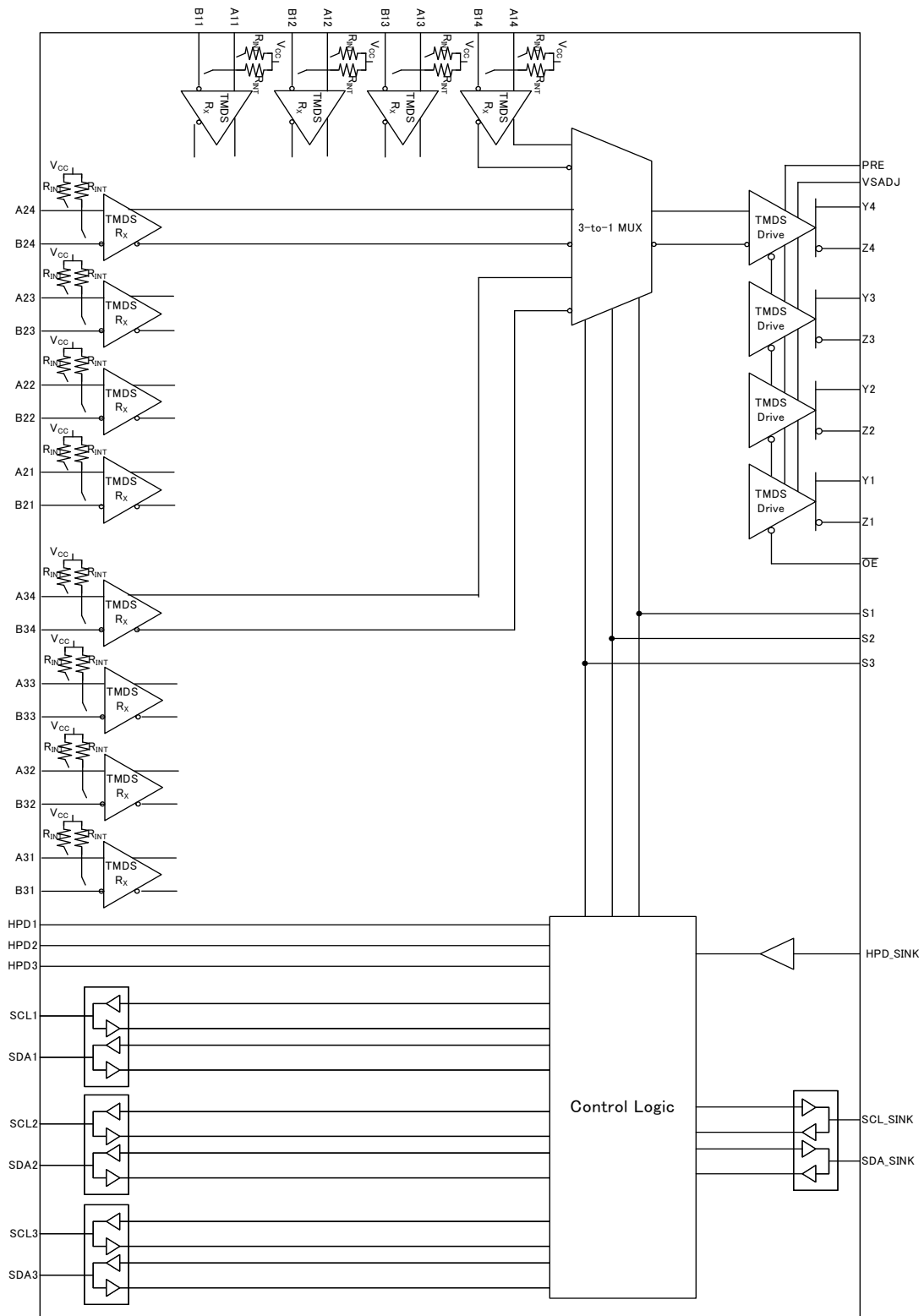


Fig. 2-1. Block Diagram

● PIN EXPLANATION

1). PIN ASSIGNMENT

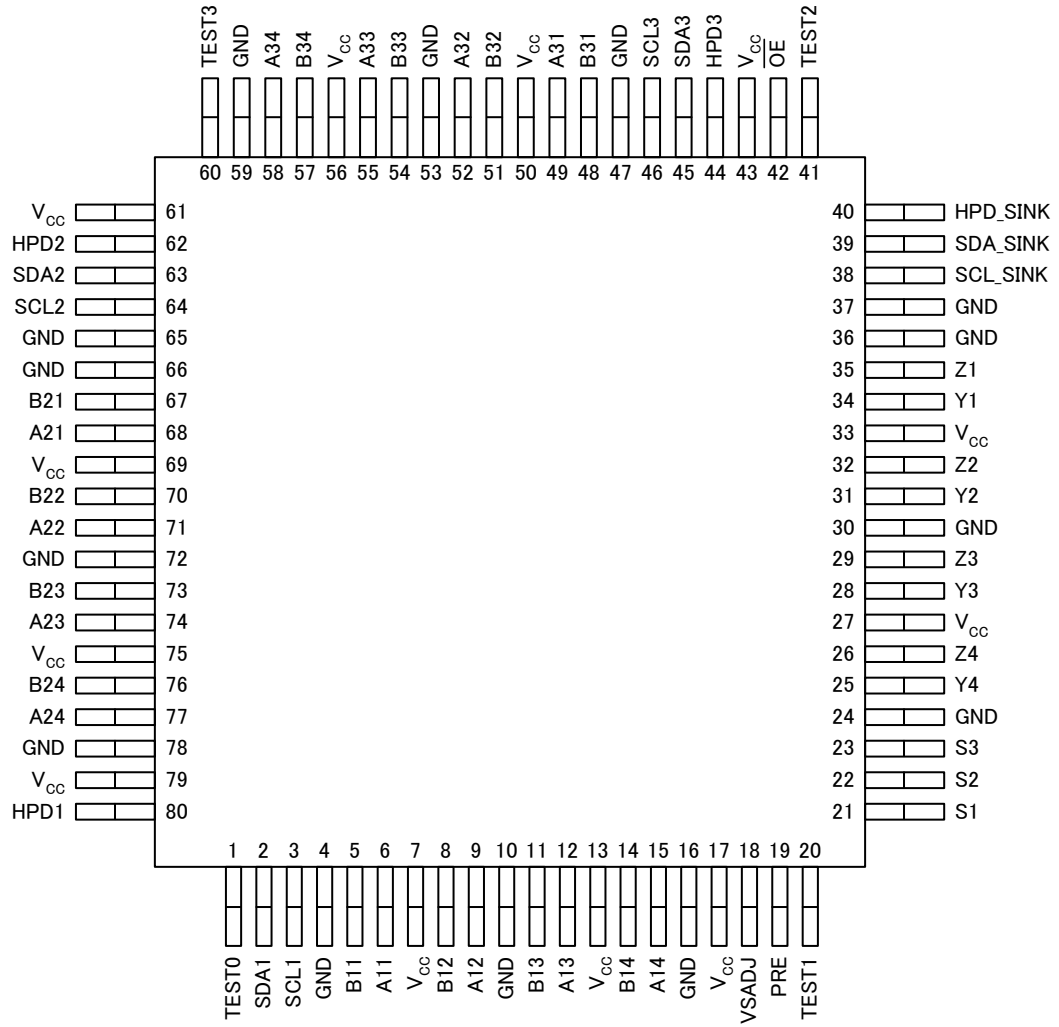


Fig3-1. Pin Location

2). PIN LIST

TERMINAL		I/O	DESCRIPTION
NAME	No.		
A11, A12, A13, A14	6, 9, 12, 15	I	Port 1 TMDS positive inputs
A21, A22, A23, A24	68, 71, 74, 77	I	Port 2 TMDS positive inputs
A31, A32, A33, A34	49, 52, 55, 58	I	Port 3 TMDS positive inputs
B11, B12, B13, B14	5, 8, 11, 14	I	Port 1 TMDS negative inputs
B21, B22, B23, B24	67, 70, 73, 76	I	Port 2 TMDS negative inputs
B31, B32, B33, B34	48, 51, 54, 57	I	Port 3 TMDS negative inputs
GND	4, 10, 16, 24, 30, 36, 37, 47, 53, 59, 65, 66, 72, 78		Ground
HPD1	80	O	Port 1 hot plug detector output
HPD2	62	O	Port 2 hot plug detector output
HPD3	44	O	Port 3 hot plug detector output
HPD_SINK	40	I	Sink side hot plug detector input High : 5-V power signal asserted from source to sink and EDID is ready Low : No 5-V power signal asserted from source to sink or EDID is not ready
TEST0,1,2,3	1, 20, 41, 60		Open or GND connect (recommend)
OE	42	I	Output enable, active low
PRE	19	I	Output de-emphasis adjustment High : ON, Low : OFF
SCL1	3	I/O	Port 1 DDC bus clock line
SCL2	64	I/O	Port 2 DDC bus clock line
SCL3	46	I/O	Port 3 DDC bus clock line
SCL_SINK	38	I/O	Sink side DDC bus clock line
SDA1	2	I/O	Port 1 DDC bus data line
SDA2	63	I/O	Port 2 DDC bus data line
SDA3	45	I/O	Port 3 DDC bus data line
SDA_SINK	39	I/O	Sink side DDC bus data line
S1, S2, S3	21, 22, 23	I	Source selector input
Vcc	7, 13, 17, 27, 33, 43, 50, 56, 61, 69, 75, 79		Power supply
VSADJ	18	I	TMDS compliant voltage swing control. Connect to GND via 4.64K Ω
Y1, Y2, Y3, Y4	34, 31, 28, 25	O	TMDS positive outputs
Z1, Z2, Z3, Z4	35, 32, 29, 26	O	TMDS negative outputs

●EQUIVALENT INPUT AND OUTPUT SCHEMATIC DIAGRAMS

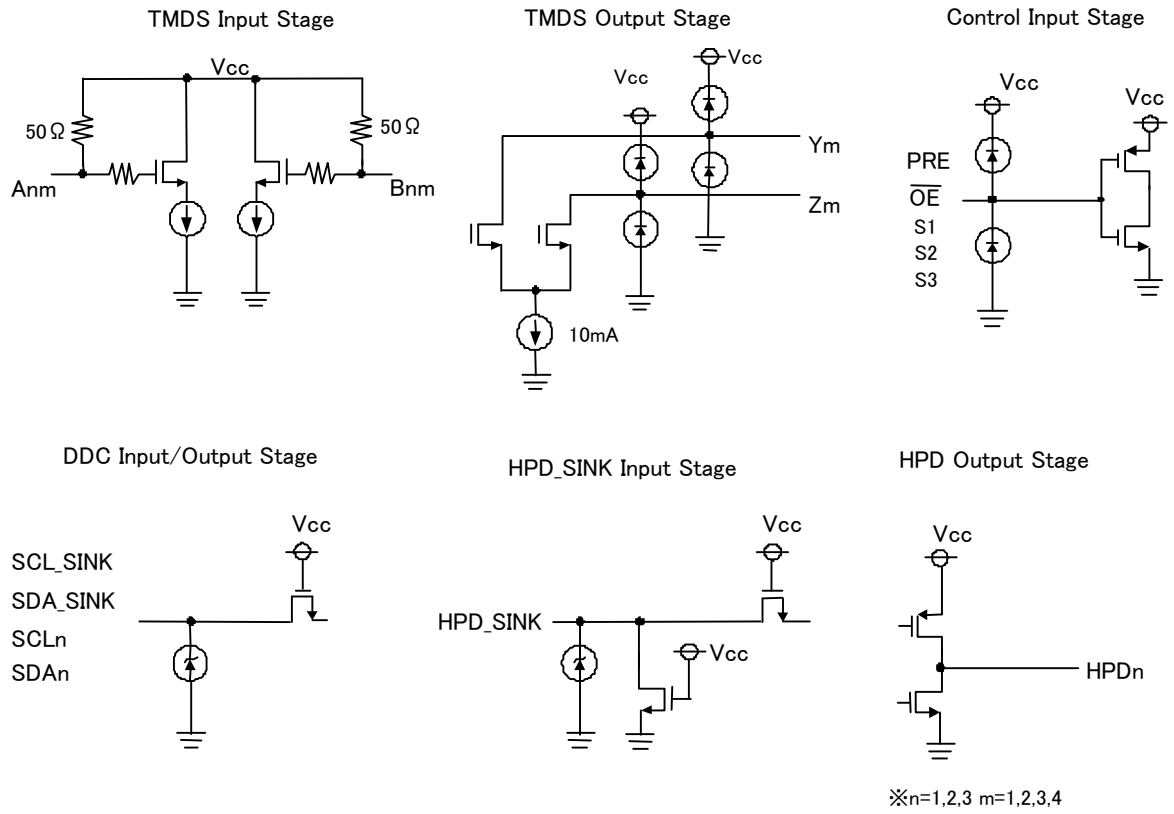


Fig4-1 I/O pin schematic diagram

● SOURCE SELECTION LOOKUP TABLE

CONTROL PINS				I/O SELECTED	HOT PLUG DETECT STATUS			
HPD_SINK	S1	S2	S3	Y/Z	SCL_SINK SDA_SINK	HPD1	HPD2	HPD3
H	H	X	X	A1/B1 Terminations of A2/B2 and A3/B3 are disconnected	SCL1 SDA1	H	L	L
H	L	H	X	A2/B2 Terminations of A1/B1 and A3/B3 are disconnected	SCL2 SDA2	L	H	L
H	L	L	H	A3/B3 Terminations of A1/B1 and A2/B2 are disconnected	SCL3 SDA3	L	L	H
H	L	L	L	None (Z) All terminations are disconnected	None (Z) Are pulled HIGH by external pull-up termination	H	H	H
L	H	X	X	Disallowed (indeterminate)State All terminations are disconnected	SCL1 SDA1	L	L	L
L	L	H	X	Disallowed (indeterminate)State All terminations are disconnected	SCL2 SDA2	L	L	L
L	L	L	H	Disallowed (indeterminate)State All terminations are disconnected	SCL3 SDA3	L	L	L
L	L	L	L	None (Z) All terminations are disconnected	None (Z) Are pulled HIGH by external pull-up termination	L	L	L

(1) H: Logic high; L: Logic low; X: Don't care; Z: High impedance

● ELECTRICAL SPECIFICATIONS

1.) ABSOLUTE MAXIMUM RATINGS

Over operating free-air temperature range (unless otherwise noted)⁽¹⁾

ITEM	MIN.	TYP.	MAX.	UNIT
Power supply voltage (V _{CC})	-0.3	-	4.0	V
DDC,HPD_SINK input voltage	-0.3	-	6.0	V
Differential input voltage	2.5	-	4.0	V
PRE, S1, S2, S3, OE input voltage	-0.3	-	4.0	V
Power dissipation	-	-	1200 ※1	mW
Storage temperature range	-55	-	125	°C

※70mm×70mm×1.6mm glass epoxy board mount. (Reverse Cu occupation rate: 15mm×15mm)

When it's used by than Ta=25°C, it's reduced by 12mW/°C.

2.) RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
V _{CC}	Supply voltage	3.0	3.3	3.6	V
T _A	Operating free-air temperature	0	-	70	°C
TMDS DIFFERENTIAL PINS (A/B)					
V _{ID}	Receiver peak-to-peak differential input voltage	150	-	1560	mVp-p
V _{IC}	Input common mode voltage	V _{CC} -0.6	-	V _{CC} +0.01	V
R _{V_SADJ}	Resistor for TMDS compliant voltage swing range	4.6	4.64	4.68	KΩ
A _{V_{CC}}	TMDS output termination voltage	3.0	3.3	3.6	V
R _T	Termination resistance	45	50	55	Ω
Signaling rate		0	-	2.25	Gbps
CONTROL PINS (PRE, S1, S2, S3, OE)					
V _{IH}	LVTTL High-level input voltage	2.0	-	V _{CC}	V
V _{IL}	LVTTL Low-level input voltage	GND	-	0.8	V
DDC I/O PINS Tx (SCL_SINK, SDA_SINK)					
V _{IH}	High-level input voltage	2.1	-	5.5	V
V _{IL}	Low-level input voltage	-0.3	-	0.35	V
DDC I/O PINS Rx (SCLn, SDA_n) n = 1, 2, 3					
V _{IH}	High-level input voltage	2.4	-	5.5	V
V _{IL}	Low-level input voltage	-0.3	-	0.8	V
STATUS PINS (HPD_SINK)					
V _{IH}	High-level input voltage	2.4	-	5.5	V
V _{IL}	Low-level input voltage	GND	-	0.8	V

3.) ELECTRICAL CHARACTERISTICS

Over recommended operating conditions (unless otherwise noted)

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			MIN.	TYP. ⁽¹⁾	MAX.	
I _{CC}	Supply current	V _{IH} =V _{CC} , V _{IL} =V _{CC} -0.4V,R _{VSADJ} = 4.64kΩ R _T = 50Ω ,AV _{CC} = 3.3V Anm/Bnm=2.25Gbps HDMI data pattern n = 1 or 2 or 3, m = 2, 3, 4 An1/Bn1 = 225 MHz clock	-	120	150	mA
P _D	Power dissipation	V _{IH} =V _{CC} , V _{IL} =V _{CC} -0.4V,R _{VSADJ} = 4.64kΩ R _T = 50Ω ,AV _{CC} = 3.3V Anm/Bnm=2.25Gbps HDMI data pattern, n = 1 or 2 or 3, m = 2, 3, 4 An1/Bn1 = 225 MHz clock	-	450	600	mW
TMDS DIFFERENTIAL PINS (A/B; Y/Z)						
V _{OH}	Single-ended high-level output voltage	AV _{CC} = 3.3V, R _T = 50Ω ,PRE = 0V	AV _{CC} -10	-	AV _{CC} +10	mV
V _{OL}	Single-ended low-level output voltage		AV _{CC} -60 0	-	AV _{CC} -40 0	mV
V _{SWING}	Single-ended low-level swing voltage		400	-	600	mV
V _{OD(O)}	Overshoot of output differential voltage		-	6%	15%	2xV _{swing}
V _{OD(U)}	Undershoot of output differential voltage		-	12%	25%	2xV _{swing}
V _{ODE(SS)}	Steady state output differential voltage with de-emphasis	PRE = V _{CC} Anm/Bnm = 250 Mbps HDMI data pattern , n = 1 or 2 or 3, m = 2, 3, 4 An1/Bn1 = 25 MHz clock	600	-	920	mVp-p
R _{INT}	Input termination resistance	V _{IN} = 2.9V	45	50	55	Ω
ΔV _{OC(SS)}	Change in steady-state common-mode output voltage between logic states		-	5	-	mV

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			MIN.	TYP. ⁽¹⁾	MAX.	
DDC Input and output						
Tx : SCL_SINK , SDA_SINK						
I _{IKT} ①	Input leak current	V _I = 5.5V	-10	-	10	uA
I _{IKT} ②	Input leak current	V _I = V _{CC}	-10	-	10	uA
I _{OHT}	High-level output current	V _O = 3.6V	-10	-	10	uA
I _{ILT}	Low-level input current	V _{IL} = GND	-10	-	10	uA
V _{OLT}	Low-level output voltage	RL= 4.7kΩ	0.43	0.5	0.57	V
V _{OLT} - V _{IL}	Low-level input voltage below output low-level voltage		20	100	190	mV
V _{OLT}	Low-level output voltage	RL=4.7kΩ	0.43	0.5	0.57	V
V _{OLT} -V _{IL}	Low-level input voltage below output low-level voltage		20	100	190	mV
Rx : SCLn , SDAn (n = 1, 2, 3)						
I _{IKR} ①	Input leak current	V _I = 5.5V	-10	-	10	uA
I _{IKR} ②	Input leak current	V _I = V _{CC}	-10	-	10	uA
I _{OHR}	High-level output current	V _O = 3.6V	-10	-	10	uA
I _{ILR}	Low-level input current	V _{IL} = GND	-10	-	10	uA
V _{OLR}	Low-level output voltage	I _{OUT} = 4mA	-	-	0.2	V
CONTROL PINS (PRE, S1, S2, S3, OE)						
I _{IH}	High-level digital input current	V _{IH} = V _{CC}	-10	-	10	uA
I _{IL}	Low-level digital input current	V _{IL} = GND	-10	-	10	uA
STATUS PINS (HPD_SINK)						
I _{IH}	High-level digital input current	V _{IH} = 5.5V	10	50	100	uA
		V _{IH} = V _{CC}	5	30	80	uA
I _{IL}	Low-level digital input current	V _{IL} = GND	-10	-	10	uA
STATUS PINS (HPD1, 2, 3)						
V _{OH(TTL)}	TTL High-level output voltage	I _{OH} = - 8mA	2.4	-	V _{CC}	V
V _{OL(TTL)}	TTL Low-level output voltage	I _{OL} = 8mA	0	-	0.4	V

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			MIN.	TYP. ⁽¹⁾	MAX.	
TMDS DIFFERENTIAL PINS (Y/Z)						
t _{PLH}	Propagation delay time low-high-level output	See Figure 5-2, AV _{CC} = 3.3V, R _T = 50 Ω, PRE=0V	-	480	-	ps
t _{PHL}	Propagation delay time high-low level output		-	500	-	ps
t _r	Differential output signal rise time (20%-80%)		-	160	-	ps
t _f	Differential output signal fall time (20%-80%)		-	160	-	ps
t _{sk(p)}	Pulse skew (t _{PHL} - t _{PLH})		-	20	-	ps
t _{sk(D)}	Intra-pair differential skew, see Figure 5-3.		-	35	-	ps
t _{sk(o)}	Inter-pair channel-to-channel output skew		-	50	-	ps
t _{sk(pp)}	Part to part skew		-	400	-	ps
t _{sx}	Select to switch output		-	8	-	ns
t _{dis}	Disable time		-	5	-	ns
t _{en}	Enable time	-	7	-	ns	
DDC I/O PINS (SCLn, SCL_SINK, SDA,n SDA_SINK) (n = 1, 2, 3)						
t _{pdLHTR(DDC)}	Propagation delay time, low-to-high-level output Tx to Rx	R _L = 4.7KΩ C _L = 100pF	-	650	-	ns
t _{pdHLTR(DDC)}	Propagation delay time, high-to-low-level output Tx to Rx		-	200	-	ns
t _{pdLHRT(DDC)}	Propagation delay time, low-to-high-level output Rx to Tx	R _L = 1.67KΩ C _L = 400pF	-	500	-	ns
t _{pdHLRT(DDC)}	Propagation delay time, high-to-low-level output Rx to Tx		-	350	-	ns
t _r TX(DDC)	Tx output Rise time	R _L = 4.7KΩ C _L = 100pF	-	800	-	ns
t _f TX(DDC)	Tx output Fall time		-	150	-	ns
t _r RX(DDC)	Rx output Rise time	R _L = 1.67KΩ C _L = 400pF	-	950	-	ns
t _f RX(DDC)	Rx output Fall time		-	50	-	ns
t _{sx(DDC)}	Switch time from SCLn to SCL_SINK	C _L =10pF	-	800	-	ns
STATUS PINS(HPD1, 2, 3)						
t _{pdLH(HPD)}	Propagation delay time, low-to-high-level output from HPD_SINK to HPDn(n=1,2,3)	C _L =10pF	-	5	-	ns
t _{pdHL(HPD)}	Propagation delay time, high-to-low-level output from HPD_SINK to HPDn(n=1,2,3)	C _L =10pF	-	5	-	ns
t _{sx(HPD)}	Switch time from port select to the latest valid status of HPD	C _L =10pF	-	8	-	ns

Note:

1. All typical values are at 25°C and with a 3.3V supply.

● MEASUREMENT SYMBOL AND CIRCUIT

PARAMETER MEASUREMENT INFORMATION

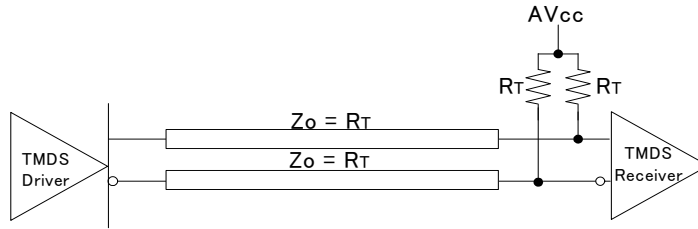


Figure 5-1. Termination for TMSD Output Driver

PARAMETER MEASUREMENT INFORMATION (continued)

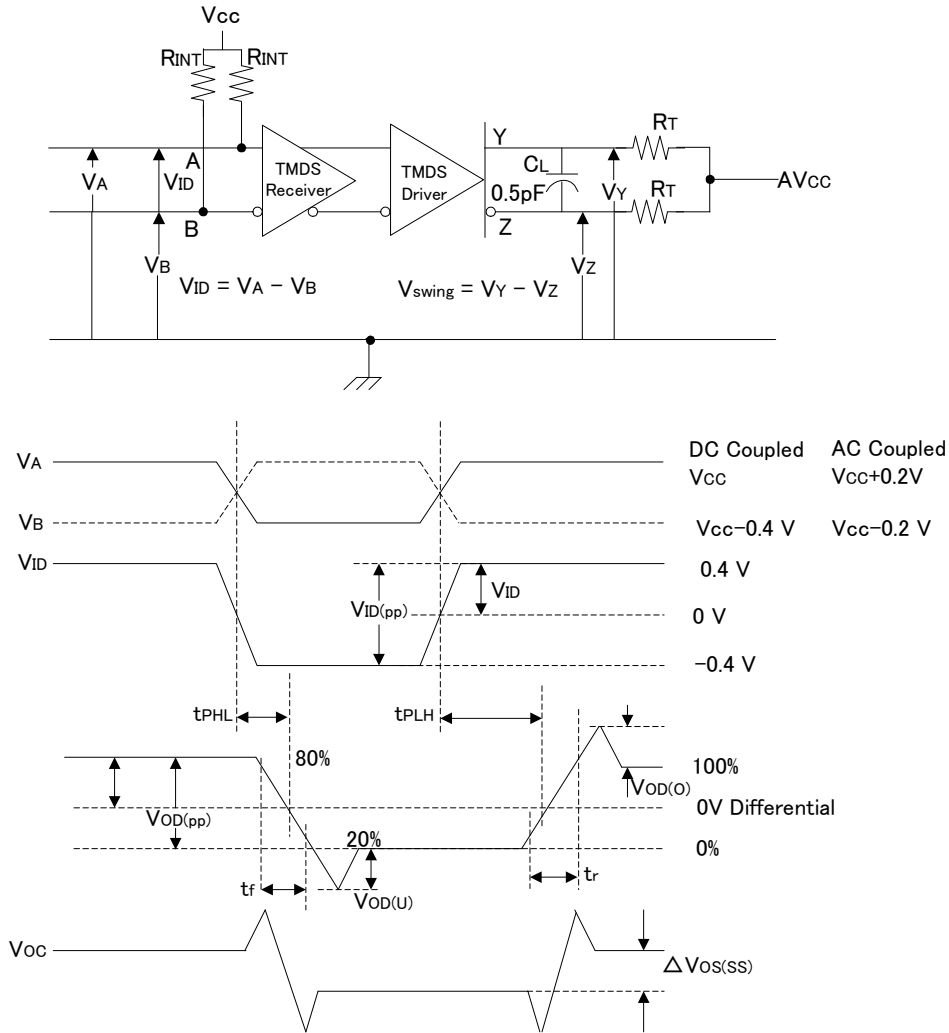


Figure 5-2. Timing Test Circuit and Definitions

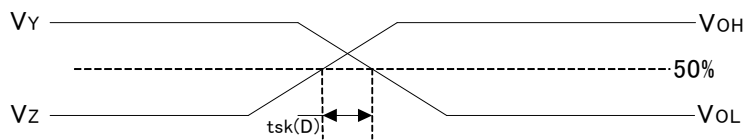


Figure 5-3. Definition of Intra-Pair Differential Skew

PARAMETER MEASUREMENT INFORMATION (continued)

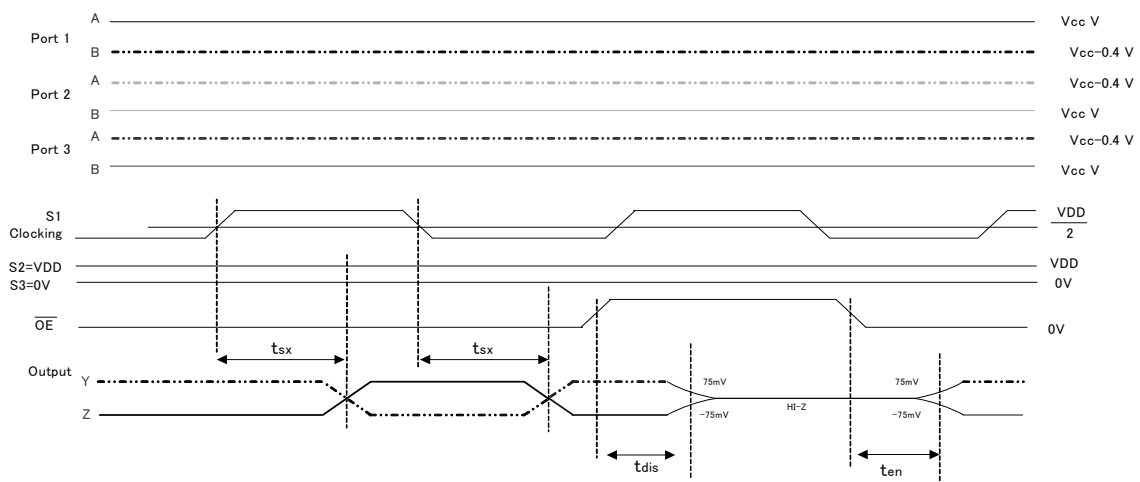


Figure 5-4. TMDs Outputs Control Timing Definitions

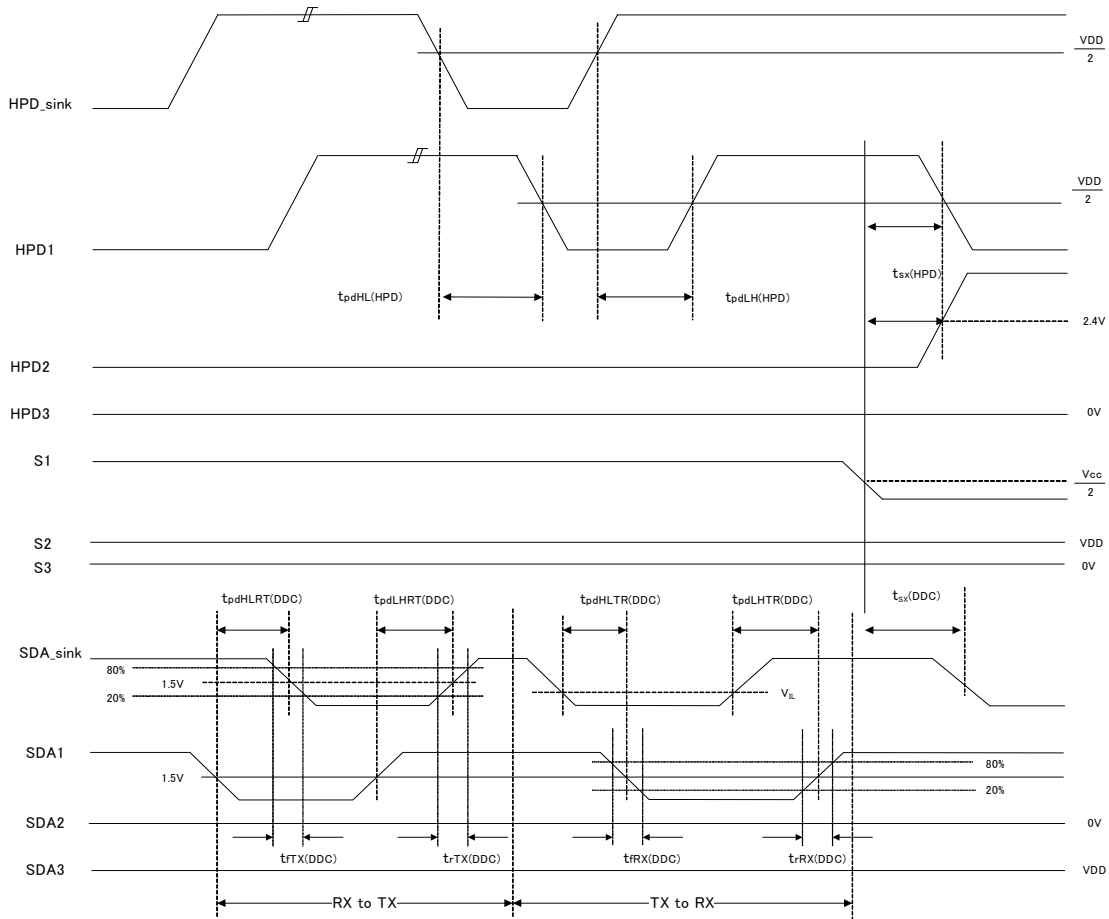


Figure 5-5. DDC and HPD Timing Definitions

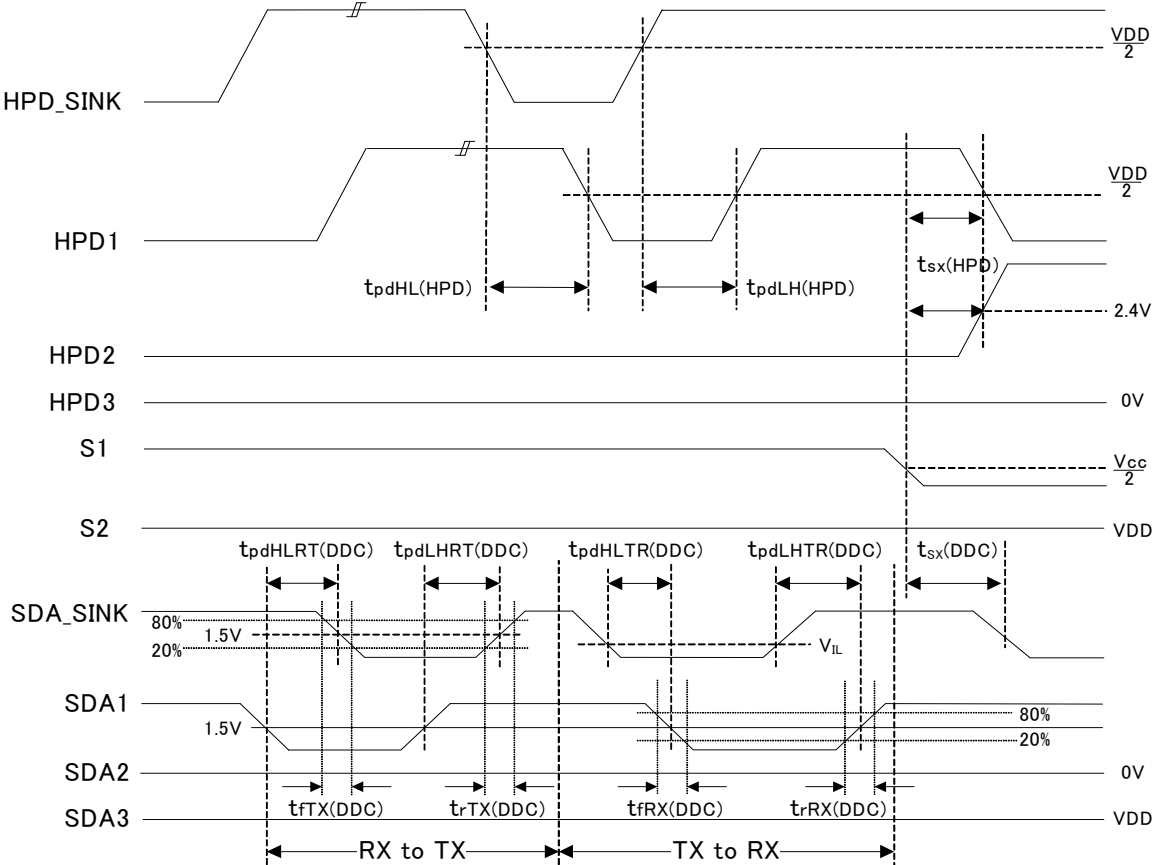


Figure 5-5. DDC and HPD Timing Definitions

1). Y and Z terminal ESD diode notice.

Y and Z terminals are connected ESD diode.
 When $VCC + 0.4 < AVCC$.
 BU16018KV flow leak current from AVCC to VCC.
 In order to minimize leak current.
 Please use following application.
 If you use "Repeater" or "output Buffer"

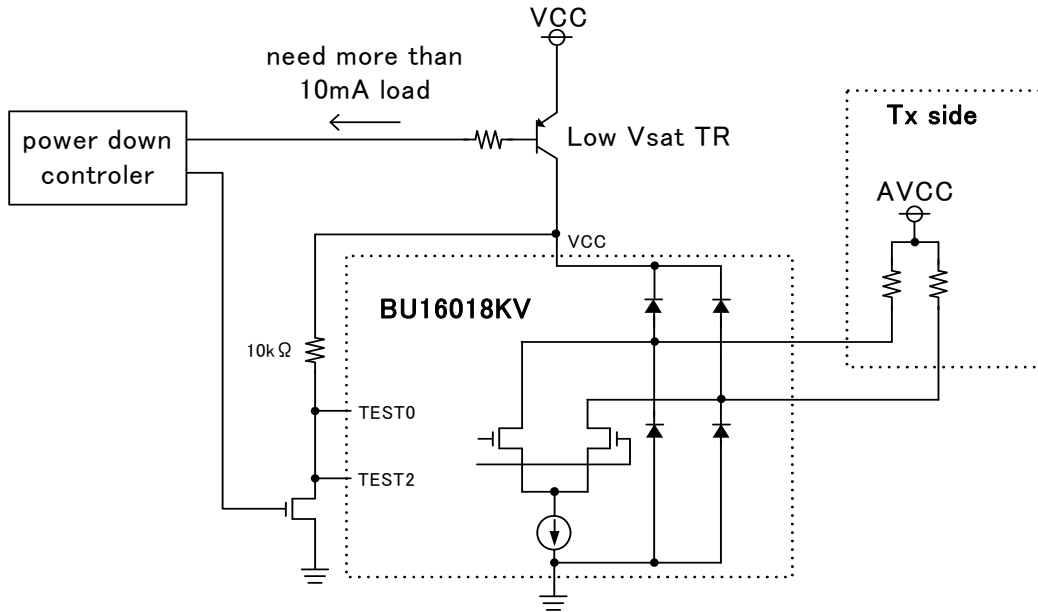


Fig6-1 1st mode application

2). HPD_SINK Pull down resistance.

HPD_SINK is a 5V tolerant structure shown in Fig6-2.
 It needs some drive current to pull down HPD_SINK "H" to "L"(max10uA@HPD_SINK=2V).
 So to pull down HPD_SINK, please use 10kΩ (or under 10kΩ) resistor.

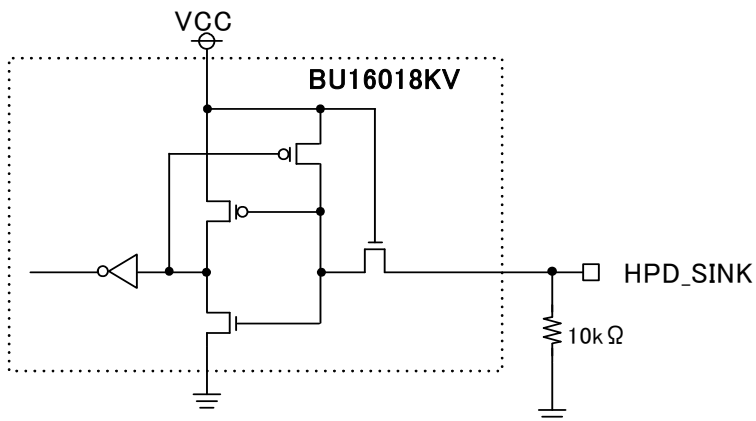


Fig6-2 HPD_SINK I/O schematic

3). About don't use terminal.

Unused TMDS input channel can be opened.

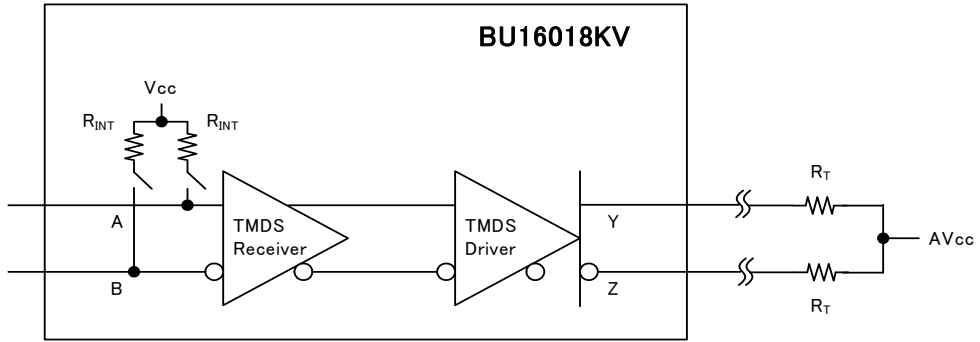


Fig6-3 TMDS Input Fail-Safe Recommendation

Unused DDC Buffers of R side pulled up to Vdd

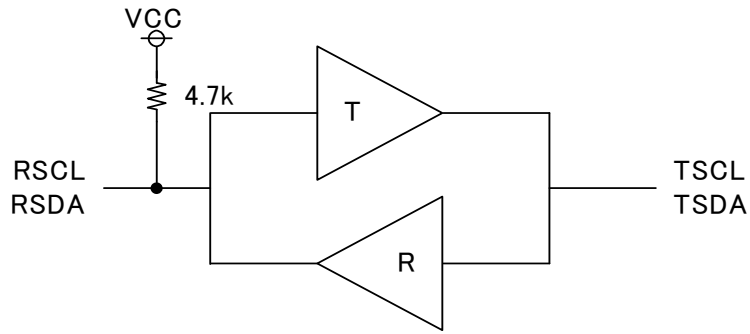


Fig6-4 DDC Buffers in BU16018KV

4). About serial connect notice.

When HDMI sw output connect to other HDMI sw input like following application.

There is possibility that. 1080p(12bit) image isn't displayed. It's depend on receiver IC characteristic.

When system is required 1080p (12bit) , Rohm doesn't recommend serial connect application.

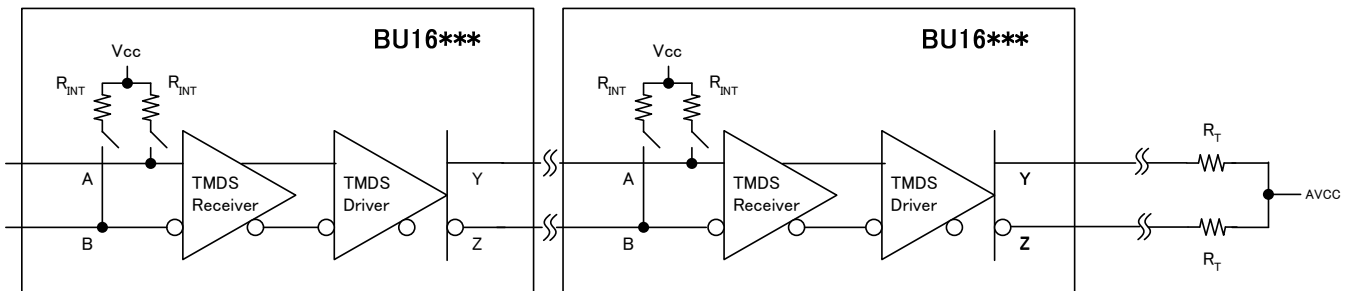
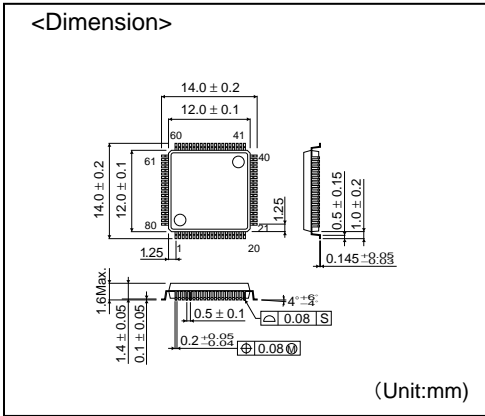


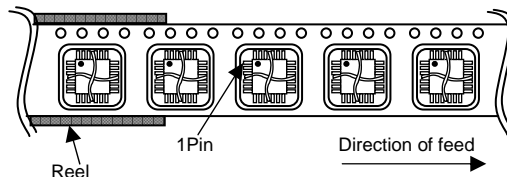
Fig6-5 serial connect notice

VQFP80



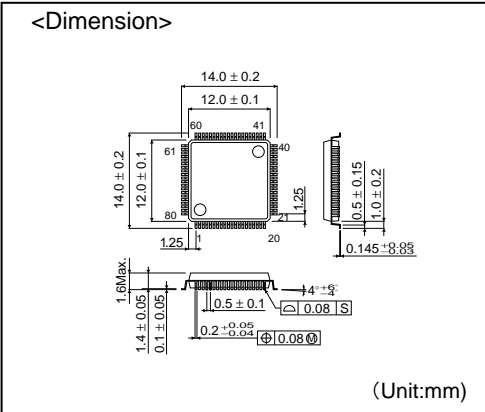
<Packing information>

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



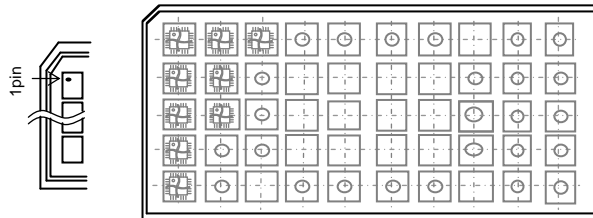
※When you order , please order in times the amount of package quantity.

VQFP80



<Packing information>

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



※When you order , please order in times the amount of package quantity.

- The contents described herein are correct as of September, 2008
- The contents described herein are subject to change without notice. For updates of the latest information, please contact and confirm with ROHM CO.,LTD.
- Any part of this application note must not be duplicated or copied without our permission.
- Application circuit diagrams and circuit constants contained herein are shown as examples of standard use and operation. Please pay careful attention to the peripheral conditions when designing circuits and deciding upon circuit constants in the set.
- Any data, including, but not limited to application circuit diagrams and information, described herein are intended only as illustrations of such devices and not as the specifications for such devices. ROHM CO.,LTD. disclaims any warranty that any use of such devices shall be free from infringement of any third party's intellectual property rights or other proprietary rights, and further, assumes no liability of whatsoever nature in the event of any such infringement, or arising from or connected with or related to the use of such devices.
- Upon the sale of any such devices, other than for buyer's right to use such devices itself, resell or otherwise dispose of the same, implied right or license to practice or commercially exploit any intellectual property rights or other proprietary rights owned or controlled by ROHM CO., LTD. is granted to any such buyer.
- The products described herein utilize silicon as the main material.
- The products described herein are not designed to be X ray proof.

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

Contact us for further information about the products.

San Diego	TEL: +1-858-625-3630	FAX: +1-858-625-3670	Tianjin	TEL: +86-22-3029181	FAX: +86-22-3029183
Atlanta	TEL: +1-770-754-5972	FAX: +1-770-754-0691	Shanghai	TEL: +86-21-6279-2727	FAX: +86-21-6247-2066
Boston	TEL: +1-978-371-0382	FAX: +1-928-438-7164	Hangzhou	TEL: +86-571-87658072	FAX: +86-571-87658071
Chicago	TEL: +1-847-368-1006	FAX: +1-847-368-1008	Nanjing	TEL: +86-25-8689-0015	FAX: +86-25-8689-0393
Dallas	TEL: +1-469-287-5366	FAX: +1-469-362-7973	Ningbo	TEL: +86-574-87654201	FAX: +86-574-87654208
Denver	TEL: +1-303-708-0908	FAX: +1-303-708-0858	Qingdao	TEL: +86-532-5779-312	FAX: +86-532-5779-653
Detroit	TEL: +1-248-348-9920	FAX: +1-248-348-9942	Suzhou	TEL: +86-512-6807-1300	FAX: +86-512-6807-2300
Nashville	TEL: +1-615-620-6700	FAX: +1-615-620-6702	Wuxi	TEL: +86-510-82702693	FAX: +86-510-82702992
Mexico	TEL: +52-33-3123-2001	FAX: +52-33-3123-2002	Shenzhen	TEL: +86-755-8307-3008	FAX: +86-755-8307-3003
Düsseldorf	TEL: +49-2154-9210	FAX: +49-2154-921400	Dongguan	TEL: +86-769-8393-3320	FAX: +86-769-8398-4140
Munich	TEL: +49-8999-216168	FAX: +49-8999-216176	Fuzhou	TEL: +86-591-8801-8698	FAX: +86-591-8801-8690
Stuttgart	TEL: +49-711-7272-370	FAX: +49-711-7272-3720	Guangzhou	TEL: +86-20-3878-8100	FAX: +86-20-3825-5965
France	TEL: +33-1-5697-3060	FAX: +33-1-5697-3080	Hzhou	TEL: +86-752-205-1054	FAX: +86-752-205-1059
United Kingdom	TEL: +44-1-908-306700	FAX: +44-1-908-235788	Xiamen	TEL: +86-592-238-5705	FAX: +86-592-239-8380
Denmark	TEL: +45-3694-4739	FAX: +45-3694-4789	Zhuhai	TEL: +86-756-3232-480	FAX: +86-756-3232-460
Espoo	TEL: +358-9725-54491	FAX: +358-9-7255-4499	Hong Kong	TEL: +852-2-740-6262	FAX: +852-2-375-8971
Salò	TEL: +358-2-7332234	FAX: +358-2-7332237	Taipei	TEL: +886-2-2500-6956	FAX: +886-2-2503-2869
Oulu	TEL: +358-9-5372930	FAX: +358-8-5372931	Kaohsiung	TEL: +886-7-237-0881	FAX: +886-7-238-7332
Barcelona	TEL: +34-9375-24320	FAX: +34-9375-24410	Singapore	TEL: +65-6332-2322	FAX: +65-6332-5662
Hungary	TEL: +36-1-4719338	FAX: +36-1-4719339	Philippines	TEL: +63-2-807-6872	FAX: +63-2-809-1422
Poland	TEL: +48-22-5757213	FAX: +48-22-5757001	Thailand	TEL: +66-2-254-4890	FAX: +66-2-256-6334
Russia	TEL: +7-495-739-41-74	FAX: +7-495-739-41-74	Kuala Lumpur	TEL: +60-3-7958-8355	FAX: +60-3-7958-8377
Seoul	TEL: +82-2-8182-700	FAX: +82-2-8182-715	Penang	TEL: +60-4-2286453	FAX: +60-4-2286452
Masan	TEL: +82-55-240-6234	FAX: +82-55-240-6236	Kyoto	TEL: +81-75-365-1218	FAX: +81-75-365-1228
Dalian	TEL: +86-411-8230-8549	FAX: +86-411-8230-8537	Yokohama	TEL: +81-45-476-2290	FAX: +81-45-476-2295
Beijing	TEL: +86-10-8525-2483	FAX: +86-10-8525-2489			

Excellence in Electronics

ROHM

ROHM CO., LTD.

21 Saiin Mizosaki-cho, Ukyo-ku, Kyoto
615-8585, Japan
TEL: +81-75-311-2121 FAX: +81-75-315-0172
URL: <http://www.rohm.com>

Published by
KTC LSI Development Headquarters
LSI Business Promotion Group

Notes

- No technical content pages of this document may be reproduced in any form or transmitted by any means without prior permission of ROHM CO.,LTD.
- The contents described herein are subject to change without notice. The specifications for the product described in this document are for reference only. Upon actual use, therefore, please request that specifications to be separately delivered.
- Application circuit diagrams and circuit constants contained herein are shown as examples of standard use and operation. Please pay careful attention to the peripheral conditions when designing circuits and deciding upon circuit constants in the set.
- Any data, including, but not limited to application circuit diagrams information, described herein are intended only as illustrations of such devices and not as the specifications for such devices. ROHM CO.,LTD. disclaims any warranty that any use of such devices shall be free from infringement of any third party's intellectual property rights or other proprietary rights, and further, assumes no liability of whatsoever nature in the event of any such infringement, or arising from or connected with or related to the use of such devices.
- Upon the sale of any such devices, other than for buyer's right to use such devices itself, resell or otherwise dispose of the same, no express or implied right or license to practice or commercially exploit any intellectual property rights or other proprietary rights owned or controlled by
- ROHM CO., LTD. is granted to any such buyer.
- Products listed in this document are no antiradiation design.

The products listed in this document are designed to be used with ordinary electronic equipment or devices (such as audio visual equipment, office-automation equipment, communications devices, electrical appliances and electronic toys).

Should you intend to use these products with equipment or devices which require an extremely high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.

It is our top priority to supply products with the utmost quality and reliability. However, there is always a chance of failure due to unexpected factors. Therefore, please take into account the derating characteristics and allow for sufficient safety features, such as extra margin, anti-flammability, and fail-safe measures when designing in order to prevent possible accidents that may result in bodily harm or fire caused by component failure. ROHM cannot be held responsible for any damages arising from the use of the products under conditions out of the range of the specifications or due to non-compliance with the NOTES specified in this catalog.

Thank you for your accessing to ROHM product informations.

More detail product informations and catalogs are available, please contact your nearest sales office.

ROHM Customer Support System

THE AMERICAS / EUROPE / ASIA / JAPAN

www.rohm.com

Contact us : webmaster@rohm.co.jp