A Product Line of
Diodes Incorporated

PI2DDR3212

1.35V/1.5V/1.8V 14 bit 2:1 DDR3/DDR4 Switch

Features

- 14 bit 2:1 switch that supports DDR3 800 2133Mbps, DDR4 1600~4266 Mbps
- VDD 1.35V/ 1.5V/ 1.8V
- Flow through pinout option for easy layout
- SEL and Global Enable
- 110 µA typ. operating current at 1.35V VDD.
- High impedance and low Coff channel output when disabled or deselected
- Low R_{ON}: 8Ω typical
- 3dB Bandwidth: 3.3GHz
- Low insertion loss: -0.7dB (0 ≤ f ≤ 1 GHz)
- Low return loss: -23dB (0 ≤ f ≤ 1 GHz)
- Low cross-talk for high speed channels: -25dB typ. (0<f<2GHz)
- Low off-isolation: -28dB (0 ≤ f ≤ 1 GHz)
- Low bit-to-bit skew 20ps Max
- ESD: 2KV HBM
- POD_12, SSTL_12, SSTL_135, SSTL_15 or SSTL_18 signaling
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative.
  https://www.diodes.com/quality/product-definitions/
- Packaging (Pb-free and Green)
  - 52-pin, 3.5x9mm TQFN (ZL)
  - 48-pin, 4.5x4.5mm TFBGA (NC) pin compatible with CBTW28DD14

Application

- DDR3/DDR4 Memory Bus System
- NVDIMM Module
- Flash Memory Array sub system
- High Speed multiplexing

Description

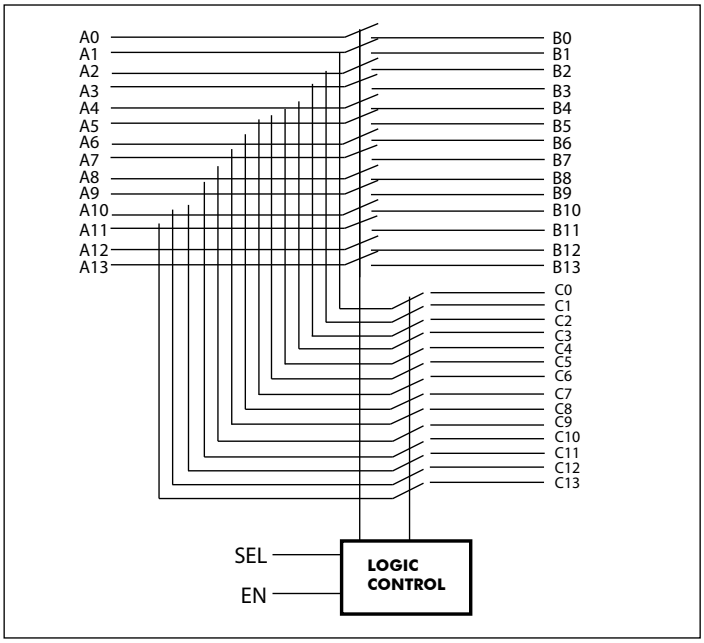
This 14-bit DDR3/DDR4 switch is designed for 1.35V/1.5V/1.8V supply voltage, POD_12, SSTL_135, SSTL_15 or SSTL_18 signaling and CMOS select input signals. It is designed for DDR3 or DDR4 memory bus with speed up to 5Gbps. It supports DDR3 800 2133Mbps and DDR4 1600~4266 Mbps.

PI2DDR3212 has a 1:2 demux or 2:1 mux topology. All 14-bit channels can be switched to one of the two ports simultaneously with the SEL input. This device also allows all ports to be disconnected.

PI2DDR3212 uses Diodes' proprietary high speed switch technology providing consistent high bandwidth across all channels, with very little insertion loss, cross-talk, and bit to bit skew.

It is available in a 52-pin TQFN 3.5x9mm package and 48-pin TFBGA 4.5x4.5mm package. The 48-pin version is pin compatible with CBTW28DD14.

Block Diagram



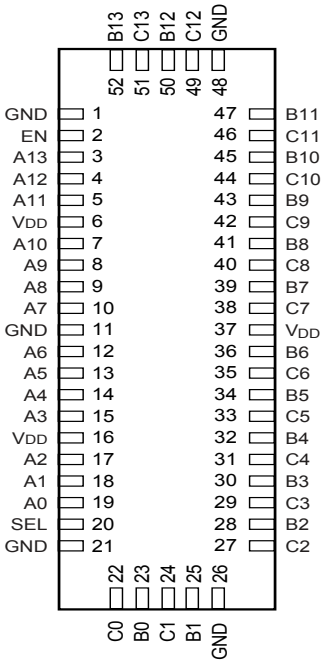
Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

Pin Configuration (48-TFBGA)

	1	2	3	4	5	6	7	8
A	B9	B8	B7	C7	C6	B6	B5	B4
B	B10	C9	C8	GND	V_{DD}	C5	C4	B3
C	B11	C10					C3	B2
D	C11	EN					SEL	C2
E	B12	C12					C1	B1
F	B13	C13					C0	B0
G	A13	A11	A9	GND	V_{DD}	A4	A2	A0
H	A12	A10	A8	A7	A6	A5	A3	A1

Pin Configuration (52-TQFN)



Pin Description

Pin Name	IO Type	Descriptions
V_{DD}	Power	1.35V, 1.5V or 1.8V power supply.
GND	Ground	1.35V, Ground connection
A[0:13]	I/O	14-bit wide input/output, port A
B[0:13]	I/O	14-bit wide input/output, port B
C[0:13]	I/O	14-bit wide input/output, port C
SEL	I	CMOS input for channel selection
EN	I	CMOS input When HIGH, connection is set using the SEL input signal When LOW, all ports are mutually isolated

Truth Table (SEL)

SEL	Function
0	Output B is selected
1	Output C is selected

Truth Table (EN)

EN	Function
1	Global Enable
0	Global Disable

Maximum Ratings

(Above which useful life may be impaired. For user guidelines, not tested.)

Supply Voltage to Ground Potential ..... -0.3V to 2.5V
All Inputs..... -0.3V to V_{DD}+0.3V
Ambient Operating Temperature ..... -10 to +85°C
Storage Temperature..... -65 to +150°C
Junction Temperature ..... 150°C
Soldering Temperature..... 260°C

Note:

Stresses greater than those listed under MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Recommended Operation Conditions

Parameter	Min.	Typ.	Max.	Unit
Ambient Operating Temperature	-10		+85	°C
Power Supply Voltage (measured in respect to GND)	+1.28	1.8	+2.0	V

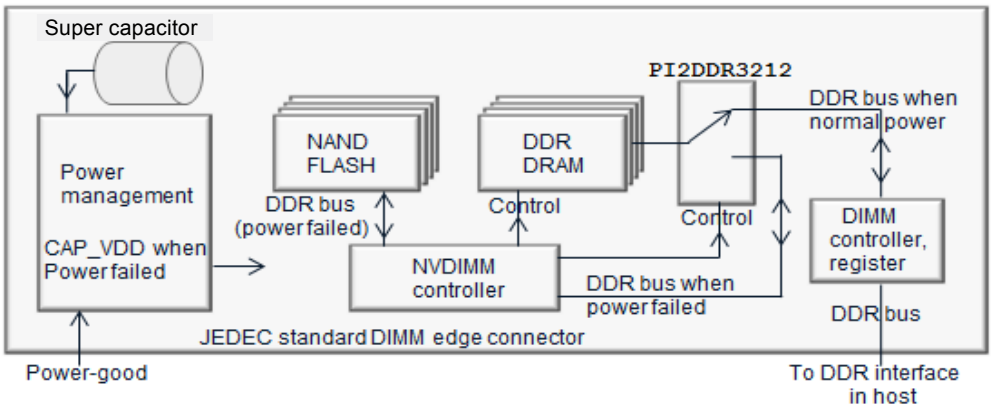
Static Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{DD}	Supply Voltage		1.28	1.35/ 1.5/1.8	2	V
I_{DD}	V_{DD} Supply Current	EN= HIGH; V_{DD}=1.8V		220	350	µA
		EN= LOW; V_{DD}=1.8V		0.1	10	µA
I_{DD}	V_{DD} Supply Current	EN= HIGH; V_{DD}=1.35V		110	200	µA
		EN= LOW; V_{DD}=1.35V		0.05	2	µA
Control Pin (SEL, EN)						
I_{IH}	High level digital input current	V_{IH}=V_{DD}, V_{DD}=2.0V			5	µA
I_{IL}	Low level digital input current	V_{IL} = GND, V_{DD}=2.0V			5	µA
V_{IH}	High level digital input voltage		0.8 *V_{DD}			V
V_{IL}	Low level digital input voltage				0.2*V_{DD}	V
I/O Pin (A, B ,C)						
C_{OFF}	Switch OFF capacitance	f = 1MHz; $V_{I/O}$ = 0V		1.1		pF
C_{ON}	Switch ON capacitance	f = 1MHz; $V_{I/O}$ = 0V		2.1		pF

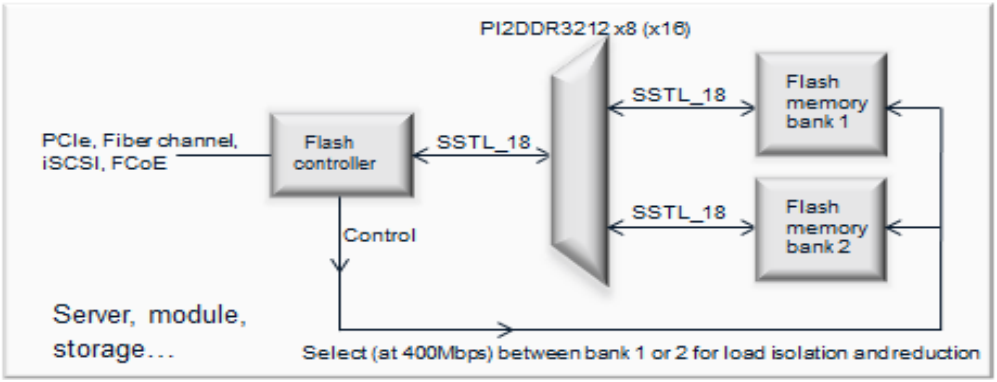
Dynamic Characteristics (over recommended operating conditions unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.(1)	Max.	Units
tstartup	Startup time	Supply voltage valid or EN going HIGH to channels specified characteristics		5	10	µs
trcfg	Reconfiguration time	SEL state change to channel specified operating characteristics		0.02	0.04	
tpd	Propagation delay	From A port to B port or C port or vice versa		60		ps
tsk	Skew time	From any output to any output		18	20	ps
V_I	Input Voltage		-0.3		Vdd+0.3	V
B	Bandwidth	-3dB intercept		3.3		GHz
C	Crosstalk attenuation	Adjacent channels are on; 0 ≤ f ≤ 1GHz		-26		dB
I_L	Insertion Loss	0 ≤ f ≤ 1GHz		-0.7		dB
		f = 2.5GHz		-2.5		dB
R_L	Input Return Loss	0 ≤ f ≤ 1GHz		-23		dB
OI	Off Isolation	0 ≤ f ≤ 1 GHz		-28		dB

Application Diagram



NVDIMM Application using PI2DDR3212



SSD, Flash Storage Application using PI2DDR3212

Part Marking

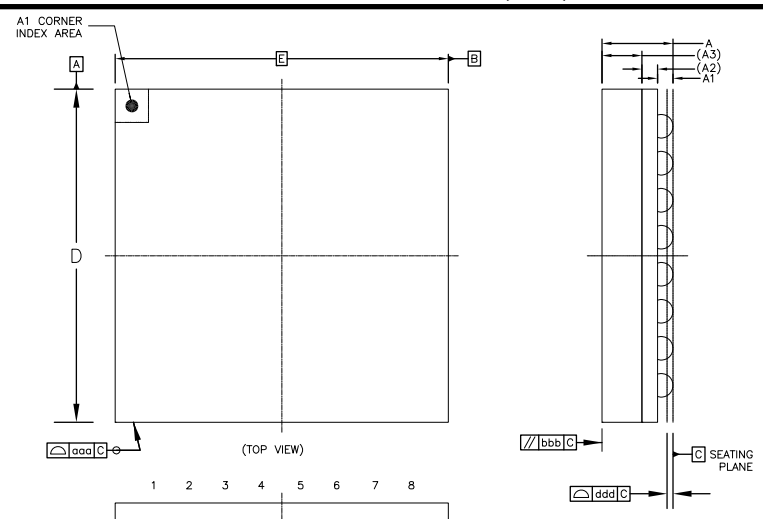
ZL Package

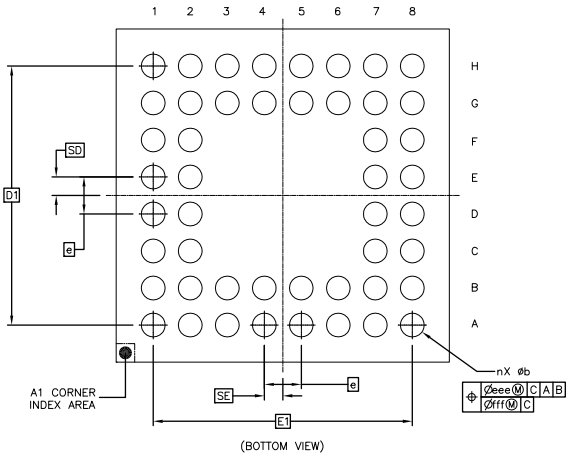
YY: Year
WW: Workweek
1st X: Assembly Code
2nd X: Fab Code

NC Package

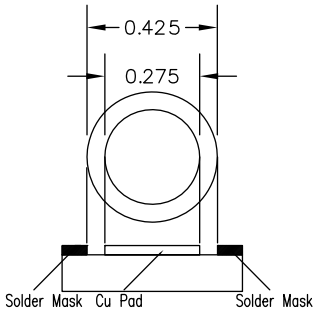
YY: Year
WW: Workweek
1st X: Assembly Code
2nd X: Fab Code
Bar above fab code means Cu wire

Packaging Mechanical: 48-TFBGA (NC)





	SYMBOL	COMMON DIMENSIONS		
		MIN.	NOR.	MAX.
TOTAL THICKNESS	A	---	---	1.10
STAND OFF	A1	0.16	---	0.26
SUBSTRATE THICKNESS	A2		0.21	REF
MOLD THICKNESS	A3		0.54	REF
BODY SIZE	D	4.40	4.50	4.60
	E	4.40	4.50	4.60
BALL DIAMETER			0.30	
BALL OPENING			0.275	
BALL WIDTH	b	0.27	---	0.37
BALL PITCH	e		0.50	BSC
BALL COUNT	n		48	
EDGE BALL CENTER TO CENTER	D1		3.50	BSC
	E1		3.50	BSC
BODY CENTER TO CONTACT BALL	SD		0.25	BSC
	SE		0.25	BSC
PACKAGE EDGE TOLERANCE	aaa		0.1	
MOLD FLATNESS	bbb		0.1	
COPLANARITY	ddd		0.08	
BALL OFFSET (PACKAGE)	eee		0.15	
BALL OFFSET (BALL)	fff		0.08	



RECOMMENDED LAND PATTERN (not to scale)

NOTE :
1. ALL DIMENSIONS ARE IN mm. ANGLES IN DEGREES.
2. REFER JEDEC MO-195.
3. RECOMMENDED LAND PATTERN IS FOR REFERENCE ONLY.

PERICOM Enabling Serial Connectivity

DATE: 04/25/14

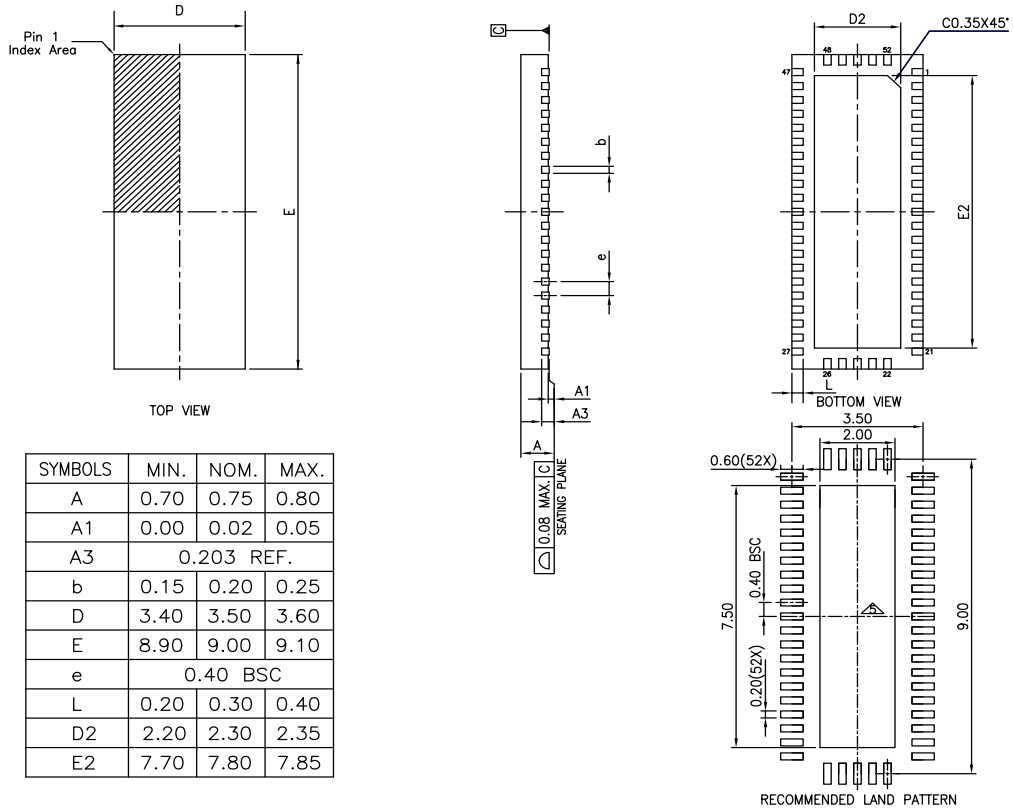
DESCRIPTION: 48-Ball, Thin Fine Pitch Ball Grid Array, TFBGA

PACKAGE CODE: NC (NC48)

DOCUMENT CONTROL #: PD-2103 REVISION: A

14-0123

Packaging Mechanical: 52-TQFN (ZL)



SYMBOLS	MIN.	NOM.	MAX.
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A3		0.203 REF.	
b	0.15	0.20	0.25
D	3.40	3.50	3.60
E	8.90	9.00	9.10
e		0.40 BSC	
L	0.20	0.30	0.40
D2	2.20	2.30	2.35
E2	7.70	7.80	7.85

NOTE :
1. ALL DIMENSIONS ARE IN mm. ANGLES IN DEGREES.
2. COPLANARITY APPLIES TO THE EXPOSED THERMAL PAD AS WELL AS THE TERMINALS.
3. REFER JEDEC MO-220.
4. RECOMMENDED LAND PATTERN IS FOR REFERENCE ONLY.
5. THERMAL PAD SOLDERING AREA (MESH STENCIL DESIGN IS RECOMMENDED).

DATE: 11/05/18

DESCRIPTION: 52-Pin, TQFN 3.5X9.0mm

PACKAGE CODE: ZL (ZL52)

DOCUMENT CONTROL #: PD-2102 REVISION: B

For latest package info.

please check: http://www.diodes.com/design/support/packaging/pericom-packaging/packaging-mechanicals-and-thermal-characteristics/

Ordering Information

Ordering Code	Packaging Code	Package Description
PI2DDR3212ZLEX	ZL	52-Pin, Thin Quad Flat No-Lead (TQFN)
PI2DDR3212NCEX	NC	48-Pin, Thin Fine Pitch Ball Grid Array (TFBGA)

Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. E = Pb-free and Green
5. X suffix = Tape/Reel

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