A Product Line of
Diodes Incorporated

PSMUX136

High Speed 1:2 Mux/DeMux

Features

- Differential Bi-directional 2:1 Mux/DeMux
- Wide Input Voltage Range: 0 to 3.6V
- High Performance Switch Characteristics:
  - Bandwidth (-3dB): 5.5GHz (A Port); 5.3GHz (B Port)
  - R_{ON} (Typical): 4.6Ω (A Port); 5.7Ω (B Port)
  - C_{ON} (Typical): 1.5pF @ 240MHz
- Low Propagation Delay, 0.1ns typ
- Low Off-Isolation: -34dB @ 240MHz
- Low Crosstalk: -37dB @ 240MHz,
- Low Power Consumption: 35µA typical
- Wide Supply Voltage: 1.8 to 5.5V
- Support 1.8V Logic on Control Pins
- Wide Temperature Range: -40°C to 125°C
- 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-Q100/101/104/200, 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 & Green):
  - 10-contact, UQFN (ZUA), 1.5x2mm, 0.5mm(H), 0.6mm pitch

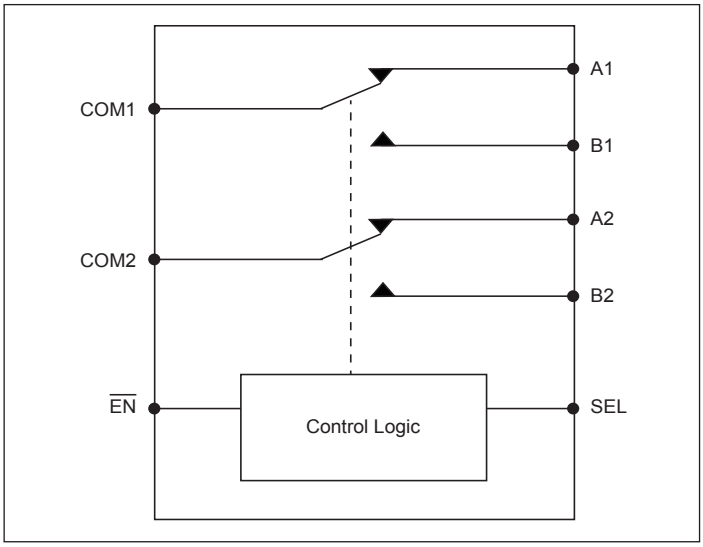
Description

The DIODES™ PSMUX136 is a 2-to-1 differential channel multiplexer/demultiplexer switch. The PSMUX136 can pass high speed signals with a bandwidth of 5.5GHz to provide excellent signal integrity and the eye diagram opening.

Application(s)

- Smart Phones
- Tablets
- NBs
- PCs

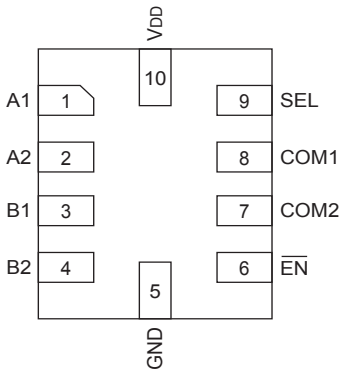
Block Diagram



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

Top View



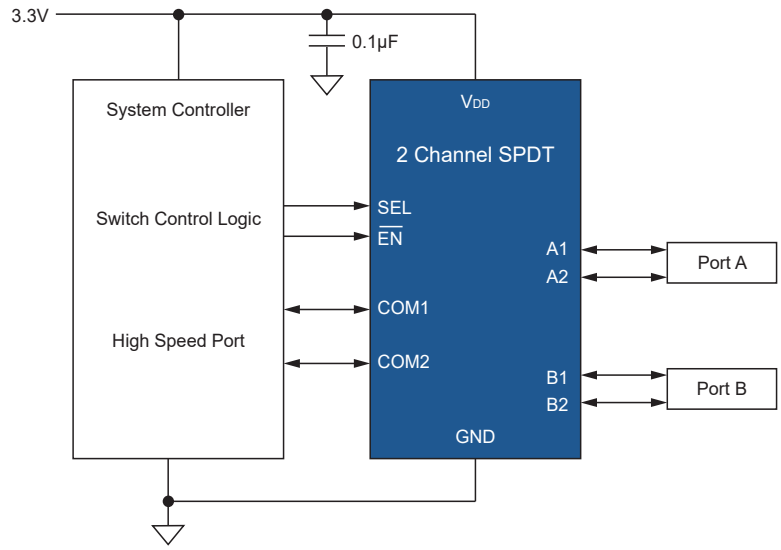
Pin Description

Pin#	Pin Name	Signal Type	Description
8, 7	COM1, COM2	I/O	Signal I/O, Common Port
3, 4	B1, B2	I/O	Signal I/O, B Port Channel
1, 2	A1, A2	I/O	Signal I/O, A Port Channel
9	SEL	I	Operation mode Select (when SEL=L: COM→A Port, when SEL=H: COM→B Port)
10	V_{DD}	PWR	Positive Supply Voltage
5	GND	PWR	Power ground
6	$\overline{EN}$	I	$\overline{EN}$ = 1, Chip is Power Down. $\overline{EN}$ = 0, Chip is Enabled. Please see Truth Table.

Truth Table

Function	SEL	$\overline{EN}$
COM to A Port	L	L
COM to B Port	H	L
All Switches Hi-Z	X	H

Typical Application Diagram



Maximum Ratings

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

Storage Temperature ..... –65°C to +150°C
Supply Voltage (VDD) to Ground Potential ..... –0.3V to +6V
Channel Input/Output Voltage (A Port/B Port) ..... –0.3V to +5.5V
Channel Input/Output Voltage (COM Port) ..... –0.3V to +5.5V
Control Pins Input Voltage ($\overline{EN}$/SEL) ..... –0.3V to +6V
ESD (All Pins) ..... 3.5KV (HBM) and 1KV (CDM)
Channel Input/Output Current
(COM Port→A Port, COM Port→B Port) ..... ±10mA
Junction Temperature ..... 125°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 Operating Conditions

Symbol	Description	Test Conditions	Min.	Typ.	Max.	Units
V_{DD}	Power Supply		1.8	3.3	5.5	V
$V_{I/O}$	Analog Voltage Range		0		3.6	V
V_I	Voltage Range for Control Pins		0		5.5	V
I_{DD}	Current Consumption in Normal Operation	V_{IO} = 0V, SEL = GND or V_{DD}, chip enabled		35	55	µA
		V_{IO} = 0V, SEL = GND or V_{DD}, chip enabled T_A = -40°C to 125°C			75	
I_{DDQ}	Chip Disabled Current Consumption	V_{IO} = 0V, SEL = GND or V_{DD}, $\overline{EN}$ = High		1	2	µA
		V_{IO} = 0V, SEL = GND or V_{DD}, $\overline{EN}$ = High T_A = -40°C to 125°C			10	
T_A	Operating Temperature Range		-40		125	°C

DC Electrical Characteristics for Switching over Operating Range

T_A = -40°C to 125°C, Typical values are at V_{DD} = 3.3V, T_A = 25°C, $\overline{EN}$=0V (unless otherwise noted)

Parameter	Description	Test Conditions	Min.	Typ.	Max.	Units
Control Pins – $\overline{EN}$/SEL						
V_{IH} - cntrl signals	Input HIGH Voltage for SEL and $\overline{EN}$	V_{DD} = 1.8-5.5V	1.3			V
V_{IL} - cntrl signals	Input LOW Voltage for SEL and $\overline{EN}$	V_{DD} = 1.8-5.5V			0.6	V
I_{IH}	Input HIGH Current for SEL and $\overline{EN}$	V_I = 5.5V	-1		1	µA
I_{IL}	Input LOW Current for SEL and $\overline{EN}$	V_I = 0V	-1		1	µA

Parameter	Description	Test Conditions		Min.	Typ.	Max.	Units
B Port Switch							
R_{ON}	ON-state Resistance	V_{DD} = 2.7V	$V_{I/O}$ = 1.65V, I_{ON} = -8mA		5.7	9	Ω
		V_{DD} = 1.8V	$V_{I/O}$ = 1.65V, I_{ON} = -8mA		5.7	9.5	
		V_{DD} = 2.7V	$V_{I/O}$ = 1.65V, I_{ON} = -8mA, T_A = -40°C to 125°C			13	
		V_{DD} = 1.8V	$V_{I/O}$ = 1.65V, I_{ON} = -8mA, T_A = -40°C to 125°C			13	
ΔR_{ON}	ON-state Resistance match between + and - paths	V_{DD} = 1.8V	$V_{I/O}$ = 1.65V, I_{ON} = -8mA		0.1		Ω
$R_{ON(FLAT)}$	ON-state Resistance Flatness	V_{DD} = 1.8V	$V_{I/O}$ = 1.65V to 3.45V, I_{ON} = -8mA		1		Ω
I_{OZ}	OFF Leakage Current	V_{DD} = 4.8V	Switch OFF, $V_{B\ Port}$ = 1.65V to 3.45V, $V_{COM\ Port}$ = 0V	-2		2	µA
			Switch OFF, $V_{B\ Port}$ = 1.65V to 3.45V, $V_{COM\ Port}$ = 0V, T_A = -40°C to 125°C	-10		10	
I_{OFF}	Power-off Leakage Current	V_{DD} = 0V	Switch ON or OFF, $V_{B\ Port}$ = 1.65V to 3.45V, $V_{COM\ Port}$ = NC	-10		10	µA
			Switch ON or OFF, $V_{B\ Port}$ = 1.65V to 3.45V, $V_{COM\ Port}$ = NC, T_A = -40°C to 125°C	-50		50	
I_{ON}	ON Leakage Current	V_{DD} = 4.8V	Switch ON, $V_{B\ Port}$ = 1.65V to 3.45V, $V_{COM\ Port}$ = NC	-2		2	µA
			Switch ON, $V_{B\ Port}$ = 1.65V to 3.45V, $V_{COM\ Port}$ = NC, T_A = -40°C to 125°C	-10		10	
		V_{DD} = 1.8V	Switch ON, $V_{B\ Port}$ = 1.65V to 3.45V, $V_{COM\ Port}$ = NC	-2		2	
			Switch ON, $V_{B\ Port}$ = 1.65V to 3.45V, $V_{COM\ Port}$ = NC, T_A = -40°C to 125°C	-10		10	
A Port Switch							
R_{ON}	ON-state Resistance	V_{DD} = 1.8V	$V_{I/O}$ = 0.4V, I_{ON} = -8mA		4.6	7.5	Ω
			$V_{I/O}$ = 0.4V, I_{ON} = -8mA, T_A = -40°C to 125°C			12	
ΔR_{ON}	ON-state Resistance match between + and - paths	V_{DD} = 1.8V	$V_{I/O}$ = 0.4V, I_{ON} = -8mA		0.1		Ω
$R_{ON(FLAT)}$	ON-state Resistance Flatness	V_{DD} = 1.8V	$V_{I/O}$ = 0V or 0.4V, I_{ON} = -8mA		0.2		Ω

Parameter	Description	Test Conditions		Min.	Typ.	Max.	Units
I_{OZ}	OFF Leakage Current	V_{DD} = 4.8V	Switch OFF, $V_{A\ Port}$ = 0V to 3.6V, $V_{COM\ Port}$ = 0V	-2		2	µA
			Switch OFF, $V_{A\ Port}$ = 0V to 3.6V, $V_{COM\ Port}$ = 0V, T_A = -40°C to 125°C	-10		10	
I_{OFF}	Power-off Leakage Current	V_{DD} = 0V	Switch ON or OFF, $V_{A\ Port}$ = 0V to 3.6V, $V_{COM\ Port}$ = NC	-10		10	µA
			Switch ON or OFF, $V_{A\ Port}$ = 0V to 3.6V, $V_{COM\ Port}$ = NC, T_A = -40°C to 125°C	-50		50	
I_{ON}	ON Leakage Current	V_{DD} = 4.8V	Switch ON, $V_{A\ Port}$ = 0V to 3.6V, $V_{COM\ Port}$ = NC	-2		2	µA
			Switch ON, $V_{A\ Port}$ = 0V to 3.6V, $V_{COM\ Port}$ = NC, T_A = -40°C to 125°C	-10		10	
		V_{DD} = 1.8V	Switch ON, $V_{A\ Port}$ = 0V to 3.6V, $V_{COM\ Port}$ = NC	-2		2	
			Switch ON, $V_{A\ Port}$ = 0V to 3.6V, $V_{COM\ Port}$ = NC, T_A = -40°C to 125°C	-10		10	

Dynamic Electrical Characteristics

T_A = -40°C to 125°C, Typical values are at V_{DD} = 3.3V, T_A = 25°C, (unless otherwise noted)

Parameter	Description	Test Conditions		Min.	Typ.	Max.	Units
$C_{ON(B\ Port)}$	B Port path ON Capacitance	Switch ON	V_{DD} = 3.3V, $V_{I/O}$ = 0 or 3.3V, f = 240MHz		1.5	2	pF
$C_{ON(A\ Port)}$	A Port path ON Capacitance	Switch ON	V_{DD} = 3.3V, $V_{I/O}$ = 0 or 3.3V, f = 240MHz		1.5	2	pF
$C_{OFF(B\ Port)}$	B Port path OFF Capacitance	Switch OFF	V_{DD} = 3.3V, $V_{I/O}$ = 0 or 3.3V, f = 240MHz		1.5	2	pF
$C_{OFF(A\ Port)}$	A Port path OFF Capacitance	Switch OFF	V_{DD} = 3.3V, $V_{I/O}$ = 0 or 3.3V, f = 240MHz		1.5	2	pF
C_I	Digital Input Capacitance		V_{DD} = 3.3V, V_I = 0 or 2V		2.2		pF
O_{IOS}	OFF Isolation	Switch OFF	R_L = 50Ω, f = 240MHz		-34		dB
X_{TALK}	Crosstalk	Switch ON	R_L = 50Ω, f = 240MHz		-37		dB
$B_{W(B\ Port)}$	B Port path -3dB Bandwidth	Switch ON	R_L = 50Ω		5.3		GHz
$B_{W(A\ Port)}$	A Port path -3dB Bandwidth	Switch ON	R_L = 50Ω		5.5		GHz

Switching Characteristics(1)

T_A = -40°C to 125°C, Typical values are at V_{DD} = 3.3V, T_A = 25°C, (unless otherwise noted)

Parameter	Description	Test Conditions	Min.	Typ.	Max.	Units
t_{PZH}, t_{PZL}	Line Enable Time (SEL to Output)	See Test Circuit for Electrical Characteristics			600	ns
t_{PHZ}, t_{PLZ}	Line Disable Time			50		ns
t_{Pd}	Propagation Delay			100		ps
t_{b-b}	Bit-to-bit Skew Within the Same Differential Pair(1)			8	20	ps
T_{on}	Device Enable Time			100		µs
T_{off}	Device Disable Time			50		ns

Note:
1. Guaranteed by design.

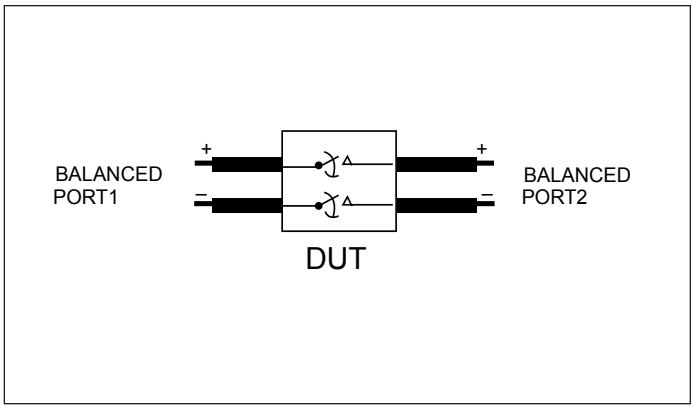


Figure 1. Differential Insertion Loss Setup

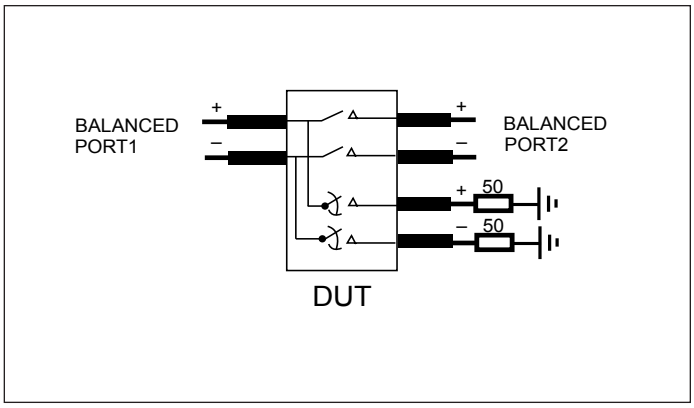


Figure 2. Off-isolation Setup

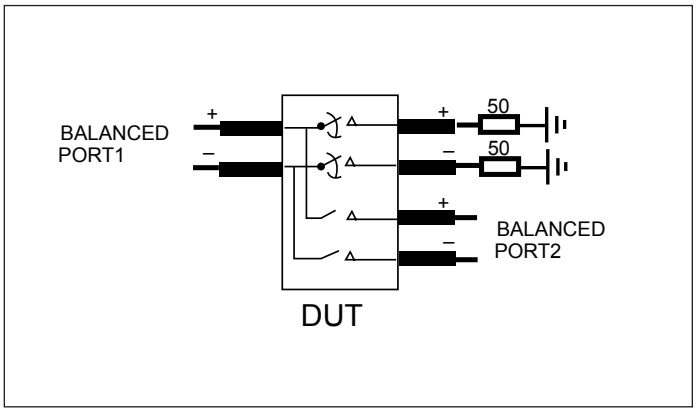


Figure 3. Crosstalk Setup

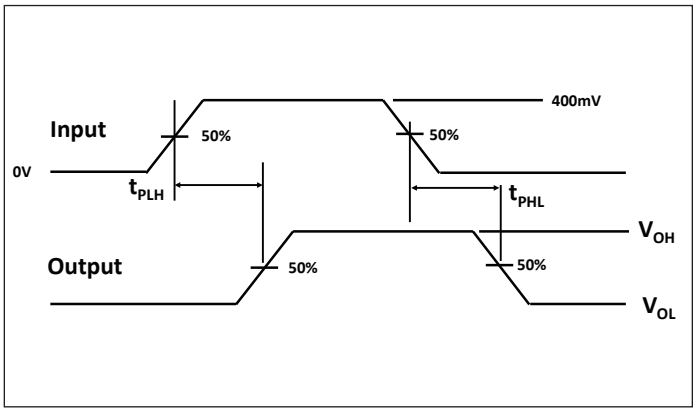


Figure 4. Propagation Delay

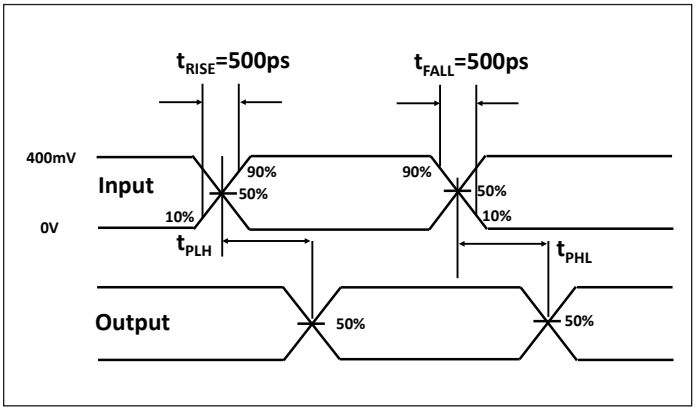


Figure 5. Skew Test

Switching Waveforms

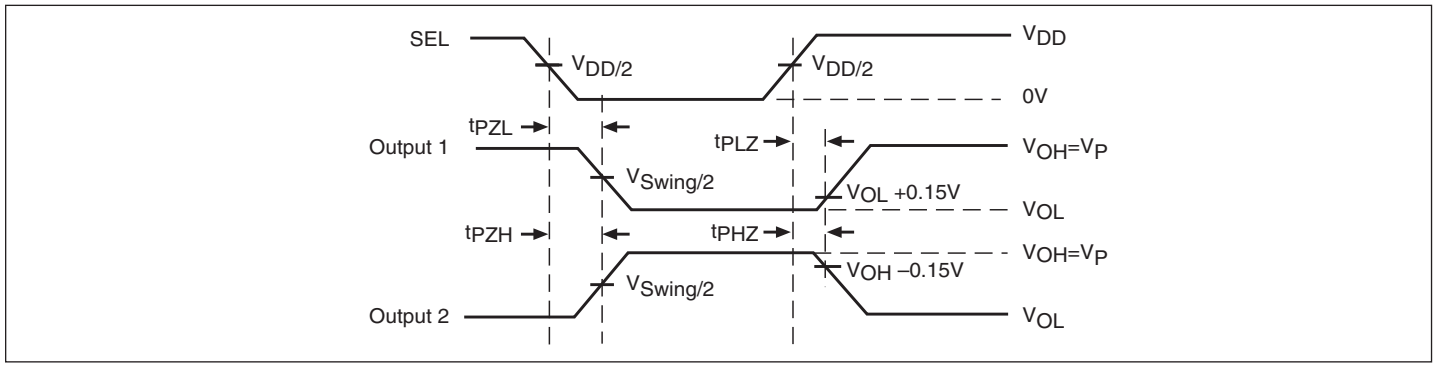


Figure 6. Voltage Waveforms Enable and Disable Times

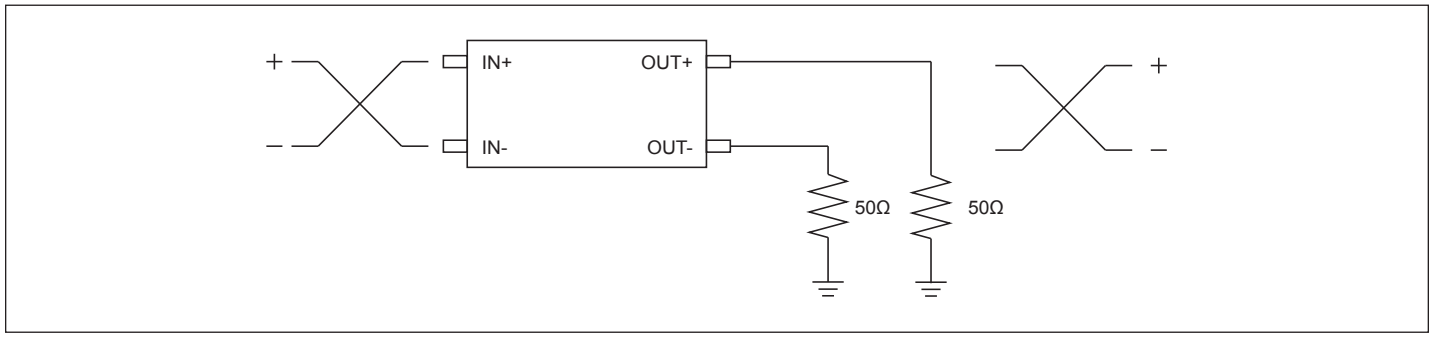
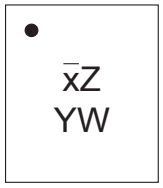


Figure 7. Test Circuit for Propagation Delay

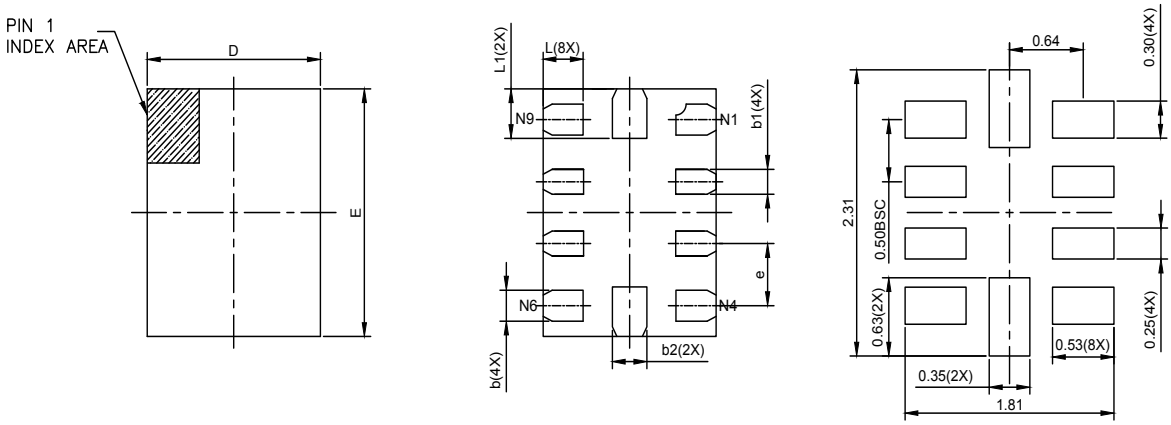
Part Marking

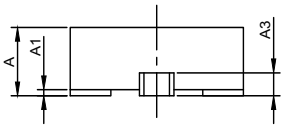


Y: Date Code (Year)
W: Date Code (Workweek)

Packaging Mechanical

10-UQFN (ZUA)





PKG. DIMENSIONS(MM)			
SYMBOL	Min	NOM	Max
A	0.50	0.60	0.65
A1	0.00	0.02	0.05
A3		0.15 REF	
D	1.45	1.50	1.55
E	1.95	2.00	2.05
b	0.20	0.25	0.30
b1	0.15	0.20	0.25
b2	0.25	0.30	0.35
e		0.50 BSC	
L	0.25	0.35	0.45
L1	0.30	0.40	0.50

Notes:
1. Ref: JEDEC MO-288B.

DATE: 01/06/17

DESCRIPTION: 10-Pin, UQFN, 1.5X2.0

PACKAGE CODE: ZUA(ZUA10)

DOCUMENT CONTROL#: PD-2220 **REVISION: --**

17-0002

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

Ordering Information

Ordering Code	Package Code	Package Description
PSMUX136ZUAEX	ZUA	10-Pin, 1.5x2.0 (UQFN)

Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
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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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