High Bandwidth Potato Chip

FEATURES:

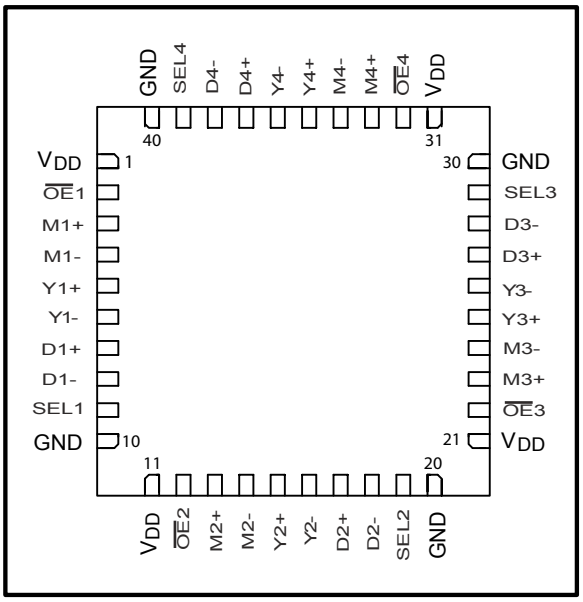
- Patented technology
- High signal -3db passing bandwidth at 1GHz
- Near-Zero propagation delay
- VCC = 1.65V to 3.6V
- Ultra-Low Quiescent Power: 0.1µA typical
- Ideally suited for low power applications
- Industrial operating temperature: -40°C to +85°C
- Available in 40pin 5mm x 5mm QFN package

DESCRIPTION:

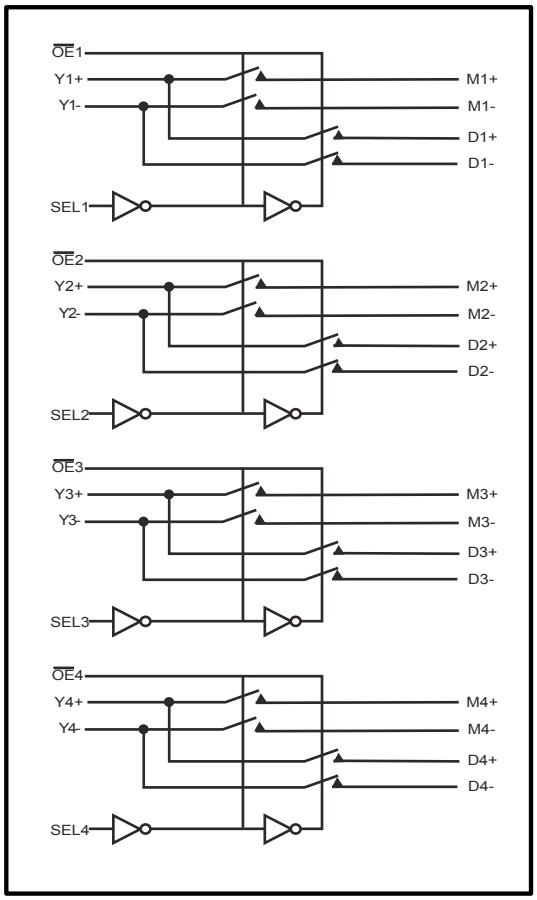
Potato Semiconductor's PO3B402A is designed for world top performance using submicron CMOS technology to achieve GHz high bandwidth.

The PO3B402A is a 4-Port 2-channel, 2:1 Multiplexer /Demultiplexer with 3-state outputs. The switch introduces no additional ground bounce noise or propagation delay.

Pin Configuration



Block Diagram



Truth Table

SELn	$\overline{OE}$n	Yn+	Yn-
X	H	Hi-Z	Hi-Z
L	L	Mn+	Mn-
H	L	Dn+	Dn-

Maximum Ratings

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

Storage Temperature	–65°C to +150°C
Ambient Temperature with Power Applied	–40°C to +85°C
Supply Voltage to Ground Potential	–0.5V to +4.6V
DC Input Voltage	–0.5V to +Vcc
DC Output Current	120mA
Power Dissipation	0.5W

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.

DC Electrical Characteristics, 3.3V Supply

(Over the Operating Range, T_A = –40°C to +85°C, V_{CC} = 3.3V ±10%)

Parameters	Description	Test Conditions	Min.	Typ.	Max.	Units
V_{IH}	Input HIGH Voltage	Guaranteed Logic HIGH Level	2.0			V
V_{IL}	Input LOW Voltage	Guaranteed Logic LOW Level			0.8	
I_{IH}	Input HIGH Current	V_{CC} = Max., V_{IN} = V_{CC}			±1	µA
I_{IL}	Input LOW Current	V_{CC} = Max., V_{IN} = GND			±1	
I_{OZH}	High Impedance Output Current	0 ≤ Y, In ≤ V_{CC}			±1	
R_{ON}	Switch On-Resistance	V_{CC} = Min., V_{IN} = 0.0V, I_{ON} = -48 mA or -64mA		14	18	Ω
		V_{CC} = Min., V_{IN} = Vcc , I_{ON} = -15 mA		16	20	

DC Electrical Characteristics, 2.5V Supply

(Over Operating Range, T_A = –40°C to +85°C, V_{CC} = 2.5V ± 10%)

Parameters	Description	Test Conditions	Min.	Typ.	Max.	Units
V_{IH}	Input HIGH Voltage	Guaranteed Logic HIGH Level	1.8		V_{CC} + 0.3	V
V_{IL}	Inout LOW Voltage	Guaranteed Logic LOW Level	–0.3		0.8	
I_{IH}	Input HIGH Current	V_{CC} = Max., V_{IN} = V_{CC}			±1	µA
I_{IL}	Input LOW Current	V_{CC} = Max., V_{IN} = GND			±1	
I_{OZH}	High Impedance Current	0 ≤ Y, In ≤ V_{CC}			±1	
R_{ON}	Switch On Resistance	V_{CC} = Min., V_{IN} = 0.0V, I_{ON} = –48mA		18	22	Ω
		V_{CC} = Min., V_{IN} = Vcc, I_{ON} = -15mA		18	22	

Power Supply Characteristics

Symbol	Description	Test Conditions (1)	Min	Typ	Max	Unit
Icc	Quiescent Power Supply Current	Vcc=Max, Vin=Vcc or GND	**-**	**0.1**	**3**	**uA**

Notes:
1. For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at Vcc = 3.3V, 25°C ambient.
3. This parameter is guaranteed but not tested.
4. Not more than one output should be shorted at one time. Duration of the test should not exceed one second.
5. VoH = Vcc – 0.6V at rated current

Capacitance (T_A = 25°C f = 1 MHz)

Parameters	Description	Test Conditions	Typ.	Units
C_{IN}	Input Capacitance	V_{IN} = 0V	3.0	pF
C_{OFF}	Port I Capacitance, Switch OFF		5.0	
C_{ON}	Switch Capacitance, Switch ON		10.0	

Dynamic Electrical Characteristics Over the Operating Range

(T_A = -40º to +85º, V_{CC} = 3.3V ± 10%)

Parameter	Description	Test Condition	Typ.	Units
X_{TALK}	Crosstalk	R_L = 100Ω	-60	dB
O_{IRR}	Off-Isolation	R_L = 100Ω	-60	
BW	-3dB Bandwidth	R_L = 100Ω	1	GHz

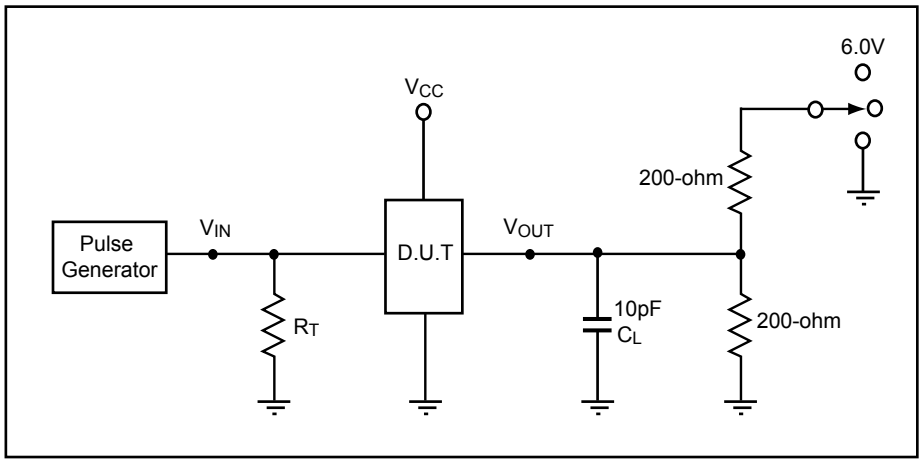
Switching Characteristics over 3.3V Operating Range

Parameters	Description	Conditions	Max.	Units
t_{PLH} t_{PHL}	Propogation Delay	See Test Diagram	0.3	ns
t_{PZH} t_{PZL}	Bus Enable Time	See Test Diagram	2.0	
t_{PHZ} t_{PLZ}	Bus Disable Time		3.0	

Switching Characteristics over 2.5V Operating Range

Parameters	Description	Conditions	Max.	Units
t_{PLH} t_{PHL}	Propogation Delay	See Test Diagram	0.3	ns
t_{PZH} t_{PZL}	Bus Enable Time	See Test Diagram	2.0	
t_{PHZ} t_{PLZ}	Bus Disable Time	See Test Diagram	3.0	

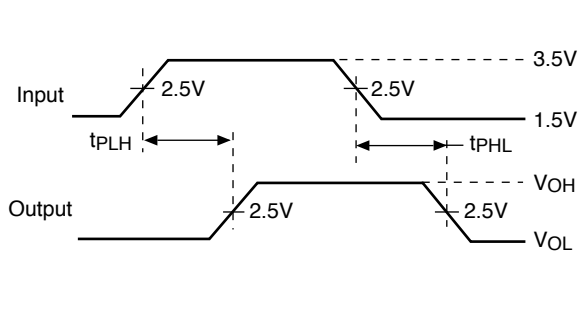
Test Circuit for Electrical Characteristics



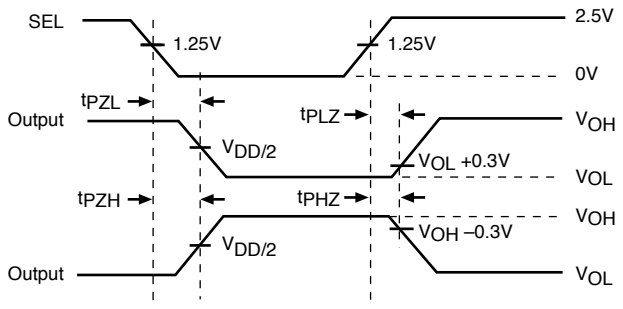
Switch Positions

Test	Switch
t_{PLZ}, t_{PZL}	6.0V
t_{PHZ}, t_{PZH}	GND
Prop Delay	Open

Switching Waveforms

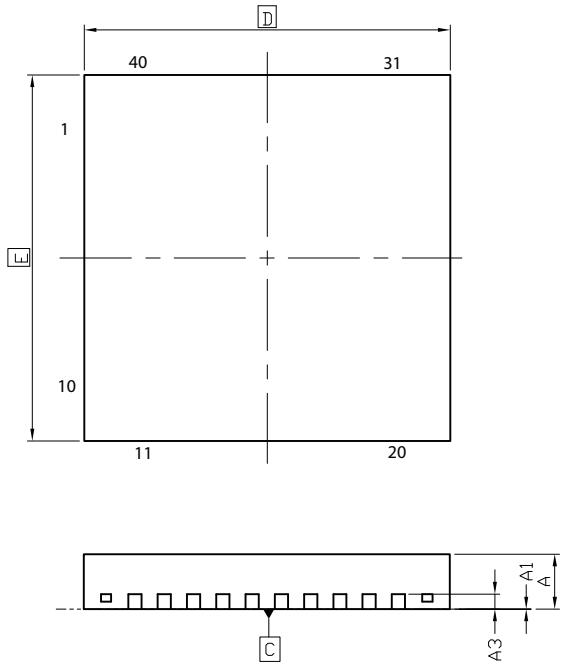


Voltage Waveforms Propagation Delay Times



Voltage Waveforms Enable and Disable Times

Packaging Mechanical Drawing: 40 pin QFN



SYMBOL	DIMENSION (MM)			DIMENSION (MIL)		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	28	30	32
A1	0	0.02	0.05	0	0.8	2.0
A3		0.203 REF			8 REF	
b	0.15	0.20	0.25	6	8	10
D		5.00 BSC			197 BSC	
D2	3.20	3.30	3.40	126	130	134
E		5.00 BSC			197 BSC	
E2	3.20	3.30	3.40	126	130	134
e		0.40 BSC			16 BSC	
L	0.35	0.40	0.45	12	14	16
y			0.08			3

Ordering Information

Ordering Code	Package			Top-Marking	T_A
PO3B402AQFR	40-pin QFN	Tape and reel	Pb-free & Green	PO3B402AQF	-40°C to 85°C