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TPG4735YJ

Dual 4:1 High-Speed USB2.0 (480Mbps) SPQT Analog Switch

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Features

- Low On-resistance, Ron=3Ω when VCC =5V
- 1.8V Logic Compatible Control Pin
- D+/- Overrides VCC to Achieve True Isolation Even When Supply Is Dead
- High Off-Isolation: -100dB @ 100KHz
- High Bandwidth (-3dB @800MHz) Suitable for USB2.0 High-Speed Routing
- Wide Supply Range (1.5V ~ 5.5V)

Applications

- Mobile Phones, Tablets and Notebooks
- Anywhere a USB Type-C™ or Micro-B Connector is Used
- Audio and Video Signal Routing

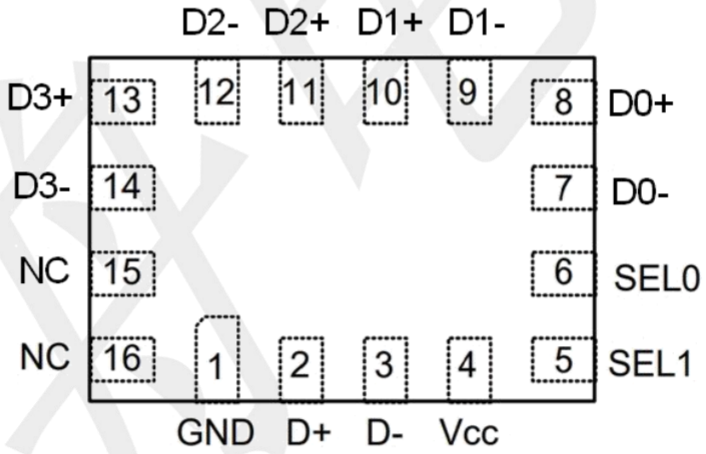
General Description

The is a bidirectional low-power dual port, high-speed, USB 2.0 analog switch with integrated protection for USB Type-C™ systems. The device is configured as a dual 4:1 or 1:4 switch. It is optimized for use with the USB 2.0 DP/DM lines in a USB Type-C™ system.

The has low bit-to-bit skew and high channel-to-channel noise isolation, and is compatible with various standards, such as high-speed USB 2.0 (480Mbps). Each switch is bidirectional and offers little or no attenuation of the high-speed signals at the outputs. Its bandwidth is wide enough to pass high-speed USB 2.0 differential signals (480 Mb/s) with good signal integrity.

PIN CONFIGURATIONS

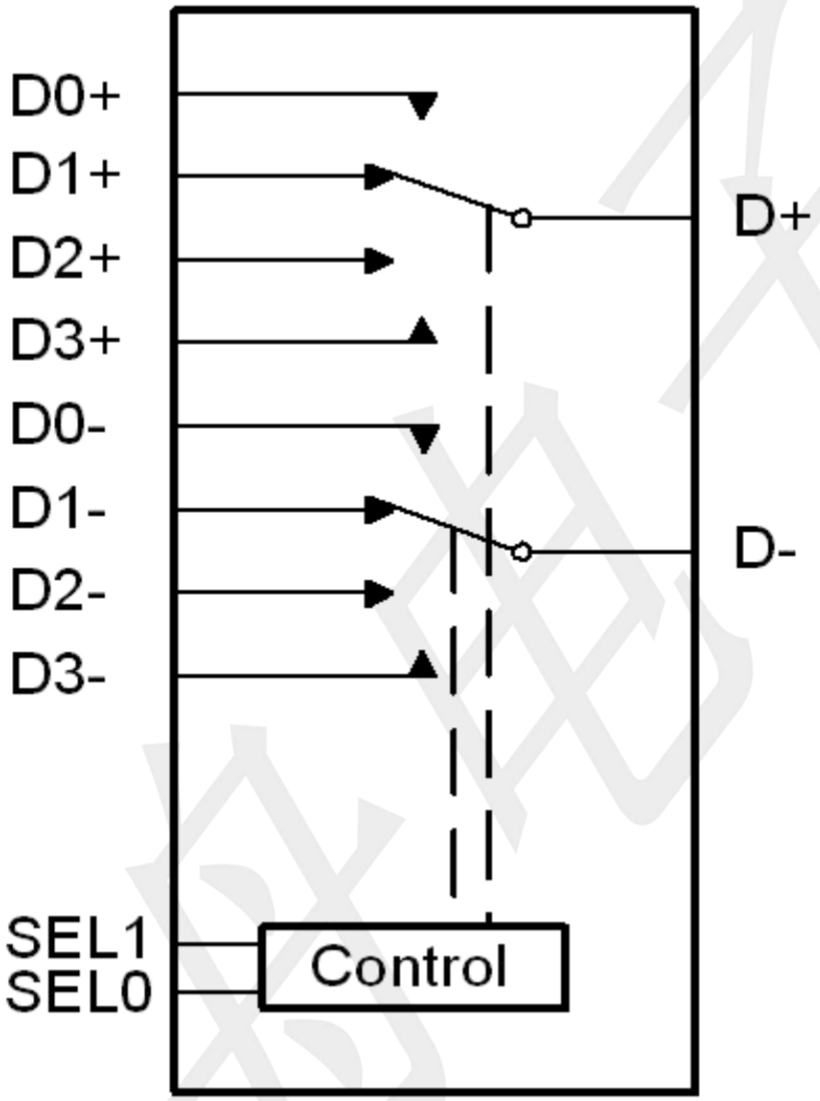
QFN 2X2.55-16L (TOP VIEW)



PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION	PIN NO.	PIN NAME	DESCRIPTION
1	GND	Ground	9	D1-	D- From the 2st Source Path
2	D+	D+ Common Data Port	10	D1+	D+From the 2st Source Path
3	D-	D- Common Data Port	11	D2+	D+From the 3st Source Path
4	VCC	Positive Power Supply	12	D2-	D- From the 3st Source Path
5	SEL1	Logic Input Control	13	D3+	D+From the 4st Source Path
6	SEL0	Logic Input Control	14	D3-	D- From the 4st Source Path
7	D0-	D- From the 1st Source Path	15	NC	No Connect
8	D0+	D+ From the 1st Source Path	16	NC	No Connect

BLOCK DIAGRAM



Function Table

SEL1	SEL0	Function
0	0	D+ = D0+, D- = D0-
0	1	D+ = D1+, D- = D1-
1	0	D+ = D2+, D- = D2-
1	1	D+ = D3+, D- = D3-

Absolute Maximum Ratings

(Unless otherwise specified)

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	-0.3 ~ 6.5	V
Control Input Voltage	V_{IN}	-0.3 ~ 6.5	V
Continuous Current Through Dx +/- and D+/-		±100	mA
Peak Current Through Dx +/- and D+/- (pulsed at 1ms 50% duty cycle)		±200	mA
Storage Temperature Range	T_{STG}	-55 ~ 150	°C
Junction Temperature under Bias	T_J	150	°C
Lead Temperature (Soldering, 10 seconds)	T_L	260	°C
Power Dissipation	P_D	250	mW

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

Recommend operating ratings

(Control input must be held high or Low, it must not float)

Parameter	Symbol	Value	Unit
Supply Voltage Operating	V_{CC}	1.5 ~ 5.5	V
Control Input Voltage	V_{IN}	-0.3 ~ 5.5	V
Input Signal Voltage	V_{SW}	-0.3 ~ 5.5	V
Operating Temperature	T_A	-40 ~ 85	°C
Thermal Resistance	$R_{\theta JA}$	360	°C/W

DC Electrical Characteristics

(TA =25°C，VCC=3.3V,unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input logic high level	V_{IH}	VCC: 3.3 ~ 5.5V	1.6	--	--	V
		VCC: 1.5 ~ 3.3V	1.4	--	--	V
Input logic low level	V_{IL}	VCC: 3.3 ~ 5.5V	--	--	0.6	V
		VCC: 1.5 ~ 3.3V	--	--	0.4	V
Supply quiescent current	I_{CC}	I_{COM}=0, V_{IN} =0 or V_{IN} =VCC	--	--	1.0	uA
Increase in I_{CC} per input	I_{CCT}	I_{COM}=0, VCC=4.5V V_{IN}>1.8 or V_{IN}<0.5	--	--	1.0	uA
Off state leakage from COM_X to NC_X (or NO_X)	I_{COMx}	V_{COM} = 5.5V , $V_{NC(or\ NO)}$ = 0V	--	--	±2.0	uA
On-Resistance	R_{ON1}	V_{COM}=0 ~ 0.5V, I_{COM}=30mA	--	6.2	7.2	Ω
	R_{ON2}	V_{COM}=0.5 ~ 2.0V, I_{COM}=30mA	--	7.2	7.9	Ω
	R_{ON3}	V_{COM}=2.0 ~ 4.0V, I_{COM}=30mA	--	5.2	7.2	Ω
	R_{ON4}	V_{COM}=4.0 ~ 5.5V, I_{COM}=30mA	--	3.3	3.8	Ω
On-Resistance Flatness	R_{FLAT1}	V_{COM}=0 ~ 0.5V, I_{COM}=30mA	--	1.4	--	Ω
	R_{FLAT2}	V_{COM}=0.5 ~ 2.0V, I_{COM}=30mA	--	1.0	--	Ω
	R_{FLAT3}	V_{COM}=2.0 ~ 4.0V, I_{COM}=30mA	--	3.2	--	Ω
	R_{FLAT4}	V_{COM}=4.0 ~ 5.5V, I_{COM}=30mA	--	0.6	--	Ω
On-Resistance Matching Between Channels	ΔR_{ON}	V_{COM}=0~5.5V, I_{COM}=30mA,	--	0.2	0.4	Ω

AC Electronics Characteristics

(Ta=25°C, VCC=3.3V, unless otherwise noted)

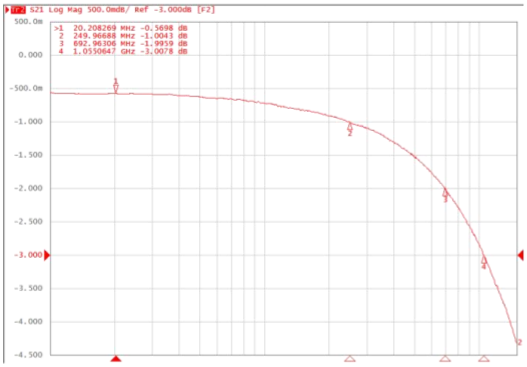
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-On Time	T_{ON}	V_{COM}=1.5V, C_L=35pF, R_L=50Ω	--	200	--	ns
Turn-Off Time	T_{OFF}	V_{COM}=1.5V, C_L=35pF, R_L=50Ω	--	200	--	ns
Break-Before-Make time	T_{BBM}	V_{COM}=1.5V, C_L=35pF, R_L=50Ω	--	500	--	ns
-3dB Bandwidth	BW	R_L=50Ω, C_L=0pF	--	800	--	MHz
Off isolation	OIRR	F=1KHz, R_L=50Ω	--	-81	--	dB
		F=10KHz, R_L=50Ω	--	-80	--	dB
Crosstalk	Xtalk	F=1KHz, R_L=50Ω	--	-83	--	dB
		F=10KHz, R_L=50Ω	--	-82	--	dB
Total Harmonic Distortion	THD	F=20Hz to 20KHz V_{COM}=600mVp-p @R_L=32Ω,	--	-80	--	dB

Capacitance

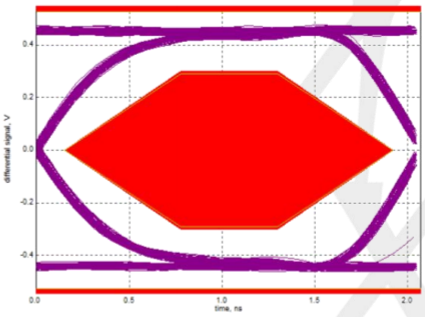
(Ta=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off capacitance	C_{OFF}	F=100KHz	--	5	--	pF
On capacitance	C_{ON}	F=100KHz	--	7	--	pF

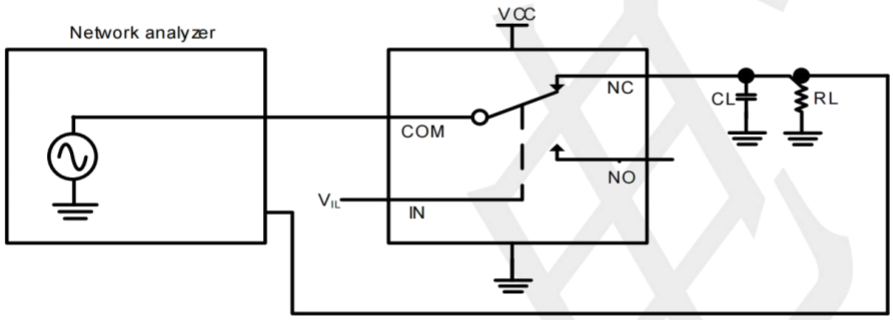
Typical Characteristics (Ta=25℃, VCC=3.3V, unless otherwise noted)



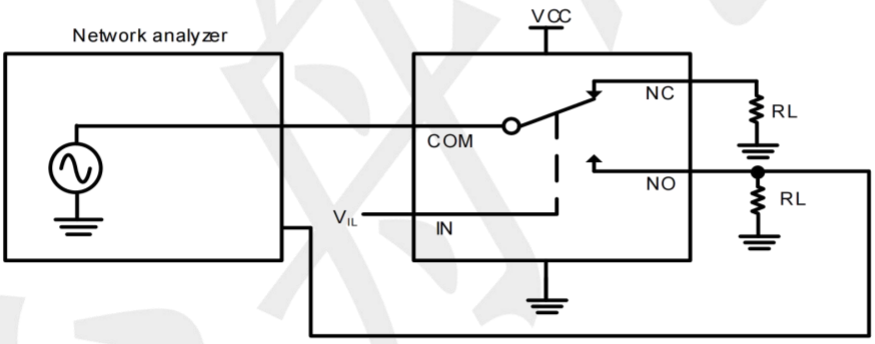
Bandwidth



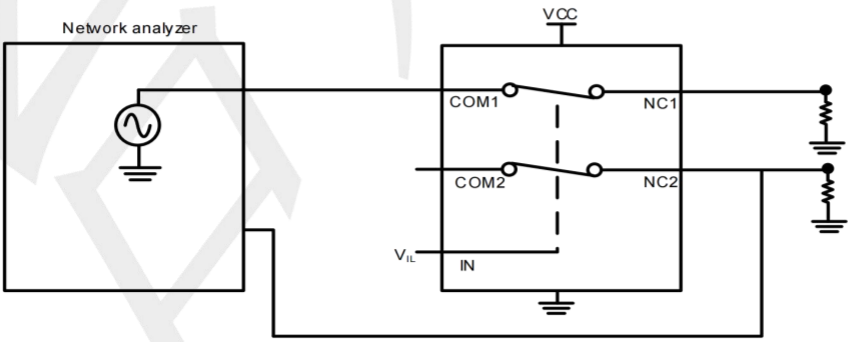
Eye Diagram (480Mbps)



Bandwidth



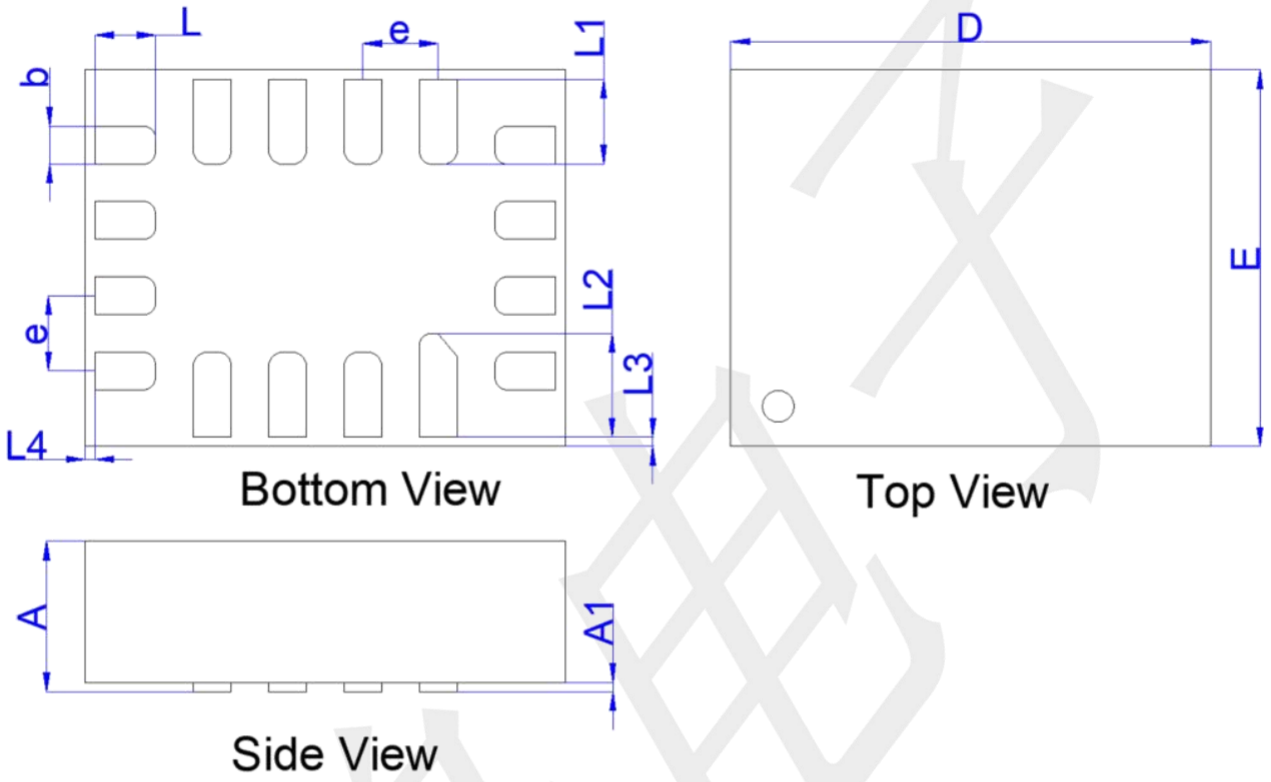
Off isolation



Crosstalk

Package information

QFN 2X2.55-16L (Unit: mm)



Symbol	Dimension in Millimeters		
	Min.	Typ.	Max.
A	0.700	-	0.800
A1	0.025	-	0.075
D	2.500	2.550	2.600
E	1.950	2.000	2.050
b	0.150	0.200	0.250
L	0.275	0.325	0.375
L1	0.400	0.450	0.500
L2	0.500	0.550	0.600
L3	0.010	0.050	0.090
L4	0.010	0.050	0.090
e	0.400BSC		