



USB Solutions



*Covering protection, filtering and switching
devices from ON Semiconductor.*



Integrated Solutions for USB Line Protection and Termination

ON Semiconductor provides a selection of integrated solutions for USB line protection and termination. Integrated IC solutions combine diodes with resistive and capacitive elements into a single package, providing:

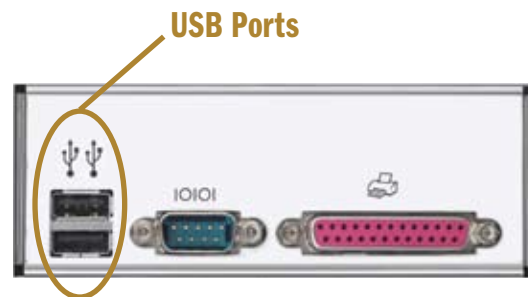
- improved parametric stability
- reduced parasitic inductance
- component count reduction
- board space reduction
- simplified supply chain
- lower overall system cost

Related Application Notes (download from www.onsemi.com)

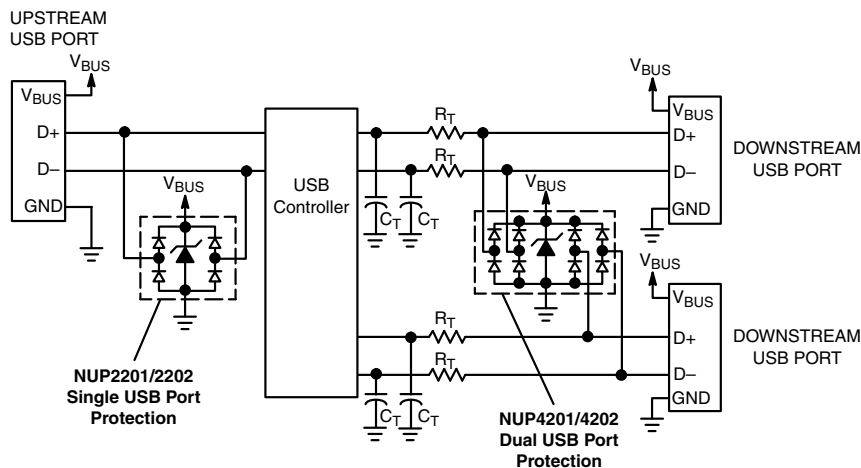
- ESD Protection for Dual USB 2.0 Port Using the Low Capacitance TVS Diode Array, NUP4201DR2 Device – download AND8082/D
- EMI Filtering, USB Upstream Line Termination and ESD Protection Using the STF202 Device – download AND8074/D
- MicroIntegration Technology Solutions for Protection in High Speed I/O Data Lines – download AND8104/D
- Design Considerations for ESD/EMI Filters: (Almost Everything You Wanted to Know About EMI Filters and Were Afraid to Ask) – download AND8200/D
- Solving EMI and ESD Problems with Integrated Passive Device Low Pass Pi Filters - download AND8026/D

Speed of Data Transport

Port	Speed
Serial Port	0.115 Mbit/s
Standard Parallel Port	0.92 Mbit/s
USB 1.1	
Low Speed	1.5 Mbit/s
High Speed	12 Mbit/s
USB 2.0	
Low Speed	1.5 Mbit/s
Full Speed	12 Mbit/s
High Speed	480 Mbit/s

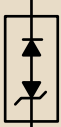



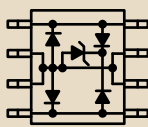

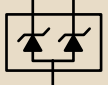

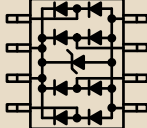

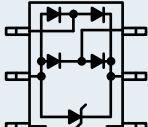

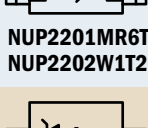

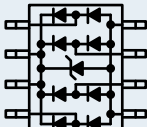

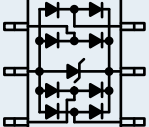

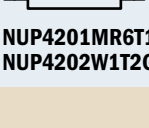

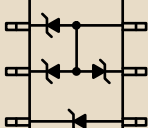

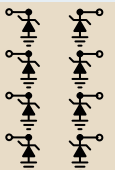

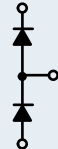

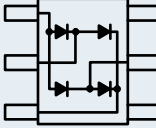

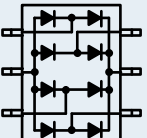



Typical USB Line Protection Application



USB Line Protection Devices

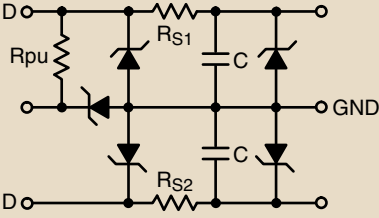
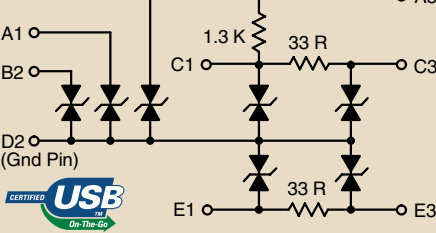
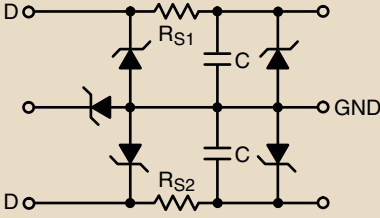





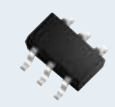
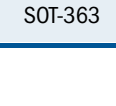
Integrated protection devices for USB from ON Semiconductor can replace up to 9 discrete devices, minimize board space and simplify board layouts. Our portfolio includes Low-, Full- and High-Speed USB solutions. All of our devices are IEC61000-4-2 compliant.

	1-Line (1/2 Port)	2-Lines (1 Port)	4-Lines (2 Ports)
Low & Full Speed I/O Lines + VBUS	  <p>SL05T1G [Ⓜ] SOT-23</p>   <p>ESD9A5.0ST5G [Ⓜ] SOD-923</p>	  <p>LC03-6R2 S0-8</p>   <p>ESD7A5.0DT5G* [Ⓜ] SOT-723</p>	  <p>SRDA05-4R2 S0-8</p>
Low, Full & High Speed I/O Lines + VBUS	—	  <p>NUP2201MR6T1G [Ⓜ] TSOP-6</p>   <p>NUP2202W1T2G [Ⓜ] SC-88</p>	  <p>NUP4201DR2 S0-8</p>   <p>NUP4201MR6T1G [Ⓜ] TSOP-6</p>   <p>NUP4202W1T2G [Ⓜ] SC-88</p>
Low, Full & High Speed I/O Lines	—	  <p>NUP4060AXV6T1G [Ⓜ] SOT-563</p>	  <p>NUP8010MNT1G [Ⓜ] DFN-8</p>
Low, Full & High Speed I/O Lines	  <p>NUP1301ML3T1G [Ⓜ] SOT-23</p>	  <p>NUP2301MW6T1G [Ⓜ] SC-88</p>	  <p>NUP4301MR6T1G [Ⓜ] TSOP-6</p> <p>NUP4304MR6T1G [Ⓜ]</p>

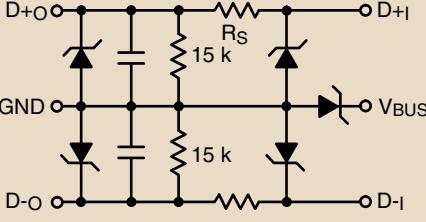

[Ⓜ] = Symbol denotes 2nd level interconnect Pb-Free (lead) content.
* = Coming soon.

USB Filter Devices

Integrated protection and termination devices for USB from ON Semiconductor can replace up to 11 devices by combining TVS diodes with resistive and capacitive elements. They are suitable for Low- and Full-Speed USB solutions. All of our devices are IEC61000-4-2 Level 4 compliant.

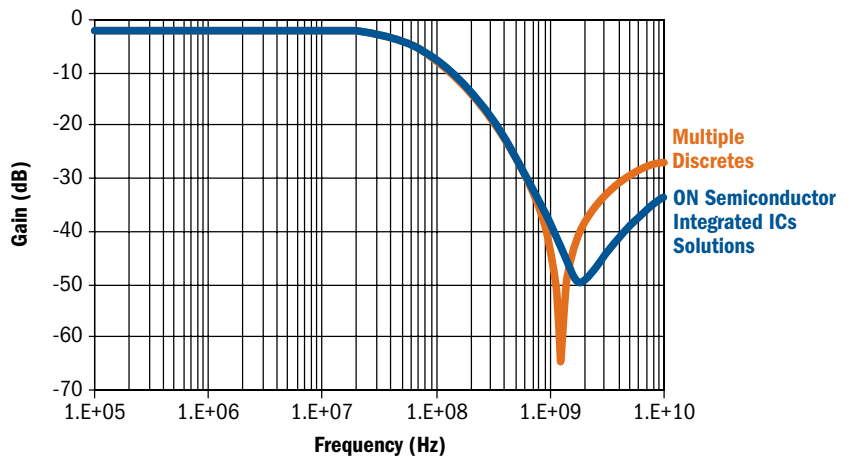
Upstream Filters	OTG (On-The-Go)	Upstream/Downstream Filters
		
 <p>STF202-22T1G [Ⓜ]</p> <p>TSOP-6</p>  <p>NUF2221W1T2G [Ⓜ]</p>  <p>SC-88 SOT-363</p> <p>NUF2015W1T2G [Ⓜ]</p>	 <p>Flip-Chip</p> <p>NUF2222FCT1G [Ⓜ]</p>	 <p>NUF2030XV6T1G [Ⓜ]</p> <p>30 pF (typ) @ 2.5 V</p>  <p>NUF2042XV6T1G [Ⓜ]</p> <p>42 pF (typ) @ 2.5 V</p>  <p>SC-88 SOT-363</p> <p>NUF2240W1T1G [Ⓜ]</p> <p>17 pF (typ) @ 2.5 V</p>

[Ⓜ] = Symbol denotes 2nd level interconnect Pb-Free (lead) content.

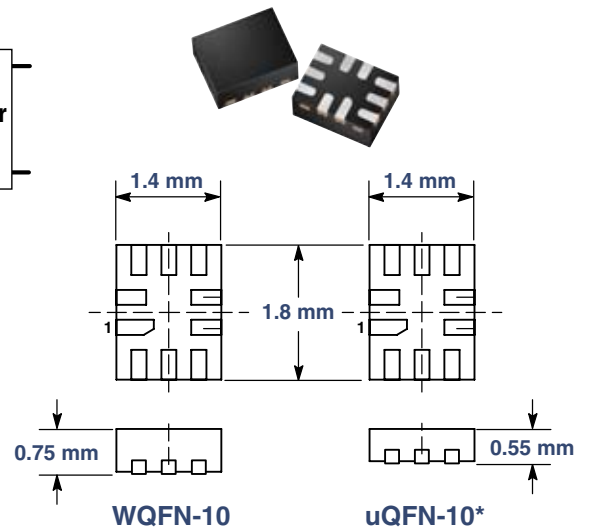
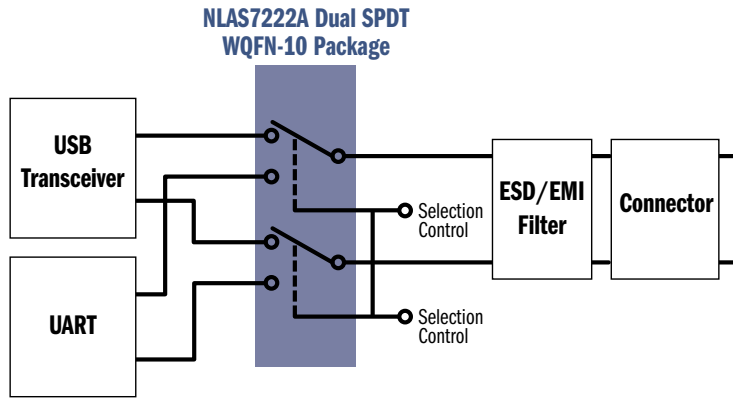
Downstream Filter

 <p>NUF2101MT1G [Ⓜ]</p> <p>55 pF (typ) @ 0 V</p> <p>TSOP-6</p>

[Ⓜ] = Symbol denotes 2nd level interconnect Pb-Free (lead) content.

The integrated solution from ON Semiconductor delivers improved insertion losses since there are lower parasitics compared to discrete solutions which use multiple packages.



NLAS7222A Dual SPDT Switch <7 pF On Switch Capacitance



Key Performance Characteristics

- Passes USB 2.0 High Speed Signals
- 6.5 Ω Typical R_{DSon} @ 3.0 V
- 500 MHz Bandwidth
- Low Crosstalk: -45 dB @ 250 MHz
- Smallest Package in the Industry

Device	Configuration	R_{ON} Max (Ω)	C Typ (pF)	Package
NLAS7222A	Dual SPDT	9	6.5	WQFN-10, uDFN-10*
NLAS4717EP	Dual SPDT	4.5	38	Flip-Chip 10

* Coming Soon



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