Switches & Multiplexers – Cheat Sheet Document
ADI’s analog switches pass analog signals such as audio data, ultrasonic imaging data.

- The switches are available in low and high voltage ranges.
- Have low on-resistance, low capacitance, low leakage current.
- Useful in applications for low-pass filter and amplifier gain adjustment selection.

ADI’s specialty switches provide solutions for LAN, PCI Express® (PCIe) & USB systems.

- Supports Beyond-The-Rails system design applications.
- Have high BW from DC to 34 GHz (MEMS).

The ADI switch portfolio assist system designers’ applications in achieving

- Decreased signal distortion & insertion loss.
- Excellent isolation & low crosstalk.

Supported temp range

- -40°C to +85°C / +125°C
- -55°C to +210°C
# Analog Switch Family

<table>
<thead>
<tr>
<th>Low Voltage (&lt;5 V, ±2.5 V)</th>
<th>Medium Voltage (5 V, ±5 V)</th>
<th>High Voltage (12 V, ±15 V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADG8xx&lt;sup&gt;(21G, 31P)&lt;/sup&gt;</td>
<td>ADG14xx&lt;sup&gt;(22G, 42P)&lt;/sup&gt;</td>
<td>ADG12xx&lt;sup&gt;(18G, 29P)&lt;/sup&gt;</td>
</tr>
<tr>
<td>ADGS14xx&lt;sup&gt;(3G, 3P)&lt;/sup&gt;</td>
<td>ADG16xx&lt;sup&gt;(12G, 23P)&lt;/sup&gt;</td>
<td>ADG6xx&lt;sup&gt;(13G, 27P)&lt;/sup&gt;</td>
</tr>
<tr>
<td>ADGSx1414D&lt;sup&gt;(2G, 2P)&lt;/sup&gt;</td>
<td>ADG24xx&lt;sup&gt;(1G, 1P)&lt;/sup&gt;</td>
<td>ADG12xx&lt;sup&gt;(18G, 29P)&lt;/sup&gt;</td>
</tr>
<tr>
<td>1:1 SPST</td>
<td>1:1 SPST</td>
<td>1:1 SPST</td>
</tr>
<tr>
<td>2:1 SPDT</td>
<td>2:1 SPDT</td>
<td>2:1 SPDT</td>
</tr>
<tr>
<td>TSSOP/LFCSP/SC70</td>
<td>Mini-SO/LFCSP/SC70</td>
<td>TSSOP/LFCSP/SC70</td>
</tr>
<tr>
<td>Low Leakage: &lt;0.1 nA</td>
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<td>Low Leakage: &lt;0.1 nA</td>
</tr>
</tbody>
</table>

Legend: ADG8xx<sup>(21G, 31P)</sup> means 21 generics & 31 package options available in the family. Slide shows 499 pkg options available.
### Analog Switch Family – Contd...

<table>
<thead>
<tr>
<th>Low RON: (&lt;(0.5-15)\Omega)</th>
<th>Low Leakage: (&lt;0.1,\text{nA})</th>
<th>Low Capacitance: (&lt;35,\text{pF})</th>
</tr>
</thead>
</table>
| **ADG54xx**
  12G, 24P
  ADGS54xx
  1G, 2P |
| **ADG52xx**
  10G, 22P |
| **ADG52xx**
  10G, 22P |

| High Voltage + Robust (36 V, \(\pm22\,\text{V}\)) |
|---------------------|---------------------|---------------------|
| **CONFIG/PKG** |
| SPST/ Dual-SPST/SPDT |
| Quad -SPST/SPDT |
| TSSOP/LFCSP/MSOP |
| **ADG54xxF/BF**
  8G, 14P |
| **MAX45xx**
  17G, 26P |
| **ADG52xxF**
  6G, 10P |
| **MAX3xxF**
  3G, 4P |
| **ADG52xxF**
  6G, 10P |
| **MAX3xxF**
  3G, 4P |

| **Package Options** |
|---------------------|---------------------|---------------------|
| TSSOP/LFCSP |
| Latch Up Immune |

- **ADG54xx** and **ADGS54xx** are available as SPST, Dual-SPDT, or Quad-SPST/SPDT options with TSSOP/LFCSP/MSOP packaging.
- **ADG52xx** and **ADG52xxF** are available as SPST/SPDT options with TSSOP/LFCSP packaging.
- **MAX45xx** and **MAX3xxF** are available as 1:1 SPST, 2:1 SPDT, or 2/4/8:1 MUX options with N-SOIC/PDIP packaging.
- **ADG54xxF/BF** and **ADG52xxF** are available with 1:1 SPST, 2:1 SPDT, or 2/4/8:1 MUX options with TSSOP/LFCSP packaging.

- Slide shows 102 pkg options available.
Specialty Switch Family

**Beyond-The-Rails (BTR)**
MAX147xx (16pkg)
- Switches analog signals up to ±25 V with a single 3.0 V to 5.5 V supply
- Low Ron 1.5 Ω

**USB 1.1, 2.0/LAN**
MAX49xx, MAX47xx (6 Generics - USB)
ADG772, ADG787
MAX48xx (5 Generics - USB)
- Up to ±15 kV ESD
- Single +3.0 V to +3.6 V Supply
- On-Capacitance (C_{on}): 8pF (typ)
- Bandwidth (650MHz – 1GHz)

**PCIE**
MAX4928A/B
MAX4888A/B
MAX4889A/B
- 2.5/5.0/8.0 Gbps data rates
- Superior return loss -10dB (typ.) at 5.0 GHz
- 3.0 V to 3.6 V Supply

**MEMS**
ADGM10xx
ADGM11xx
ADGM13xx (7 Generics)
- Lowest loss switching
- 20x Smaller, 30x Faster
- 100x longer Cycle Lifetime

Switches considered shows 58 pkg options available.
### Enhanced Products (EP)
- ADG6xx, ADG7xx (5 V, ±5 V)
- ADG4xx, ADG4xxF
- ADG54xx, ADG54xxF
- ADG52xx, ADG333A

#### Level Translators
- ADG32xx (12 pkg)
- ADG33xx (5 Generics)

- 3.3 V to 2.5 V, 2.5 V to 1.8 V Voltage translation
- 4.5 Ω RON typ. value
- High data rates of 1.2 Gbps available
- High switching speeds, low power dissipation

### Automotive (AEC - Q100)
- ADG708, ADG711, ADG728, ADG736, ADG738, ADG658/9, ADG5412, ADG5433, ADG1411

- USB 2.0 switching in vehicles
- KL30/KL15 vehicle switching applications
- Low capacitance
- Low RON – less signal distortion

### Crosspoint
- ADG21xx (3 pkg)
- MAX14xxx (4 pkg)

- SPI / I2C controlled
- 1 Ω RON, 5 V or ±2.5 V operation for MAX14724
- 35 Ω RON, 12 V or ±5 V operation for ADG21xx

Switches considered shows **30 pkg options available.**
Analog Switches & Multiplexers – Naming Convention

4 → Low On Resistance
2 → Low Capacitance, Q_INJ, and Leakage
5 → Latch-Up Proof
7 → Low Voltage
8 → Low Voltage, Sub-1 Ω On Resistance
EP → Enhanced Product (Mil-Aero)

ADG1412
ADG1212
ADGS5412
ADG5412F
ADG712
ADG812
ADG918
ADG1634L
ADG1436-EP
ADGM144

S → SPI Interface
F → Overvoltage Fault Protection
9 → RF Switches
L → Low Logic Control (1.2 V/1.8 V logic)
M → MEMS Switch (DC – 18 GHz) Operation
## Switch Benchmark Parameters – Leading Switch

<table>
<thead>
<tr>
<th>Benchmark Parameter</th>
<th>&lt; 5.5 V Single Supply</th>
<th>± 5 V Dual Supply</th>
<th>±15 V Dual Supply</th>
<th>± 22 V Dual Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>RON - OnResistance</td>
<td>ADG801 0.25 Ω</td>
<td>ADG1611 1.0 Ω</td>
<td>ADG2412 0.5 Ω</td>
<td>ADG6412 0.5 Ω</td>
</tr>
<tr>
<td>Leakage @ +85° C</td>
<td>ADG778A 250 pA</td>
<td>ADG636 250 pA</td>
<td>ADG5212 250 pA</td>
<td>ADG5212 250 pA</td>
</tr>
<tr>
<td>Charge Injection - 0iNJ</td>
<td>ADG772 0.5 pC</td>
<td>ADG611 -0.5 pC</td>
<td>ADG5212 0.07 pC</td>
<td>ADG5212 0.07 pC</td>
</tr>
<tr>
<td>RON x COFF Product</td>
<td>ADG774A 1.98 pF. Ω</td>
<td>ADG1611 5 pF. Ω</td>
<td>ADG1401 1.6 pF. Ω</td>
<td>ADG5412F 5 pF. Ω</td>
</tr>
<tr>
<td>Fast Speed</td>
<td>ADG774A 6 ns</td>
<td>ADG611 45 ns</td>
<td>ADG1204 70 ns</td>
<td>ADG5209 120 ns</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>ADG772 630 MHz</td>
<td>ADG611 680 MHz</td>
<td>ADG1212 1 GHz</td>
<td>ADG5212 460 MHz</td>
</tr>
<tr>
<td>Off -Isolation</td>
<td>ADG779 -87 dB</td>
<td>ADG633 -90 dB</td>
<td>ADG508F -93 dB</td>
<td>ADG65206 -90 dB</td>
</tr>
<tr>
<td>Continuous Current – 1 Ch. @ +25°C</td>
<td>ADG801 400 mA</td>
<td>ADGS1612 566 mA</td>
<td>ADG2412 847 mA</td>
<td>ADG6412 847 mA</td>
</tr>
<tr>
<td>Lowest Power Supply</td>
<td>ADG841 1.65 V</td>
<td>ADG611 2.7 V</td>
<td>ADG14xx 10.8 V</td>
<td>ADG54xxF 12 V</td>
</tr>
<tr>
<td>Widest Power Supply</td>
<td>ADG7xx 5.5 V ±2.5 V</td>
<td>ADG16xx 13.2 V ±5.5 V</td>
<td>ADG54xxF 39.6 V ±22 V</td>
<td>ADG54xxF 39.6 V ±22 V</td>
</tr>
<tr>
<td>Power Consumption - IDD</td>
<td>ADG7xx 1 nA typ</td>
<td>ADG16xx 1 nA</td>
<td>ADG413 100 pA</td>
<td>ADG54xxF 50 uA</td>
</tr>
<tr>
<td>Absolute Footprint</td>
<td>ADG772 1.33 mm x 1.6 mm (LFCSP)</td>
<td>ADG619 1.33 mm x 1.6 mm (SOT-23)</td>
<td>ADG1201 2.9 mm x 2.8 mm (SOT-23)</td>
<td>ADG5401 2.9 mm x 3.0 mm (LFCSP)</td>
</tr>
<tr>
<td>Density – Switch Area/Channel</td>
<td>ADG888 (Dual DPDT) 4 mm²/8 (WLCSP)</td>
<td>ADG1608 (8:1 Mux) 9 mm²/8 (LFCSP)</td>
<td>ADG5206 (16:1 Mux) 25 mm²/16 (LFCSP)</td>
<td>ADG5206 (16:1 Mux) 25 mm²/16 (LFCSP)</td>
</tr>
</tbody>
</table>
AHEAD OF WHAT’S POSSIBLE

analog.com