



## NXP analog switches product family

# Low power, low ohmic switches for analog and digital switching

NXP offers best in class low  $R_{ON}$  analog switches that are suitable for a variety of analog and digital switching needs including audio, USB, power, video, data, camera signal switching, baseband data switching, GPIO extension, data sample and hold circuits, and sensor data multiplexing.

### Key features and benefits

- ▶ Low  $R_{ON}$  (NX3L family = 0.75  $\Omega$ ) results in low-loss switching and reduced signal attenuation
- ▶ Wide supply range (1.4 to 4.3 V) and  $R_{ON}$  flatness (0.1  $\Omega$  typ) for reduced total harmonic distortion in high-quality audio switching
- ▶ High current handling (up to 350 mA continuous) for use in various applications and conditions
- ▶ Low leakage (< 50 nA at 85 °C) for longer battery life
- ▶ Break-before-make switching eliminates risk of momentary short between channels
- ▶ Over voltage-tolerant control inputs and low-threshold input variants eliminate extra level translators
- ▶ Excellent ESD performance (7.5 kV HBM) for robust designs
- ▶ Fully specified (-40 to +85 °C and -40 to +125 °C)
- ▶ AEC-Q100, grade 1 variants available (-Q100 suffix)
- ▶ Pb-free, RoHS and Dark Green compliant for environmentally friendly systems
- ▶ Ultra-small packages for easier placement in tight layouts

### Applications

- ▶ Cellular handsets and smart phones
- ▶ MP3 players and mobile video players
- ▶ IoT, smart home
- ▶ DSCs and digital camcorders
- ▶ Portable handhelds (PDAs, GPS devices, notebook PCs)
- ▶ Consumer entertainment (LCD TVs, STBs)
- ▶ Personal computing (USB 2.0)
- ▶ Portable instrumentation

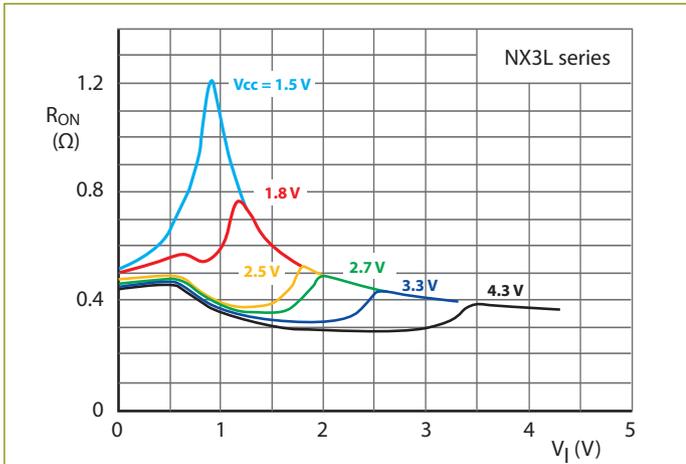
For applications that require high-quality switching, the NXP NX3 and NX5 families provide industry-leading performance in a compact footprint. The portfolio includes high-performance, low power analog switches that can be used to pass or isolate the signals when signal buffering or current drive is not required.

NX3/NX5 switches are available in a range of voltages (1.4 to 5.5 V), support fast data throughput (bandwidth up to 1 GHz), and offer low ON resistance and input capacitance. The result is better signal integrity, less distortion, and lower insertion loss.



### NX3L and NX5L low ohmic switches

The combination of low ON resistance and low  $R_{ON}$  flatness of the NX3L devices greatly reduces switched signal attenuation and distortion, thus eliminating the need for buffer amplifiers in many applications.



NX3L typical ON resistance v switch input voltage

When switching 2 V audio signals to a 32  $\Omega$  speaker at a supply voltage of 2.7 V, the NX3L series has a typical attenuation of 0.13 dB and a typical distortion of 0.024%.

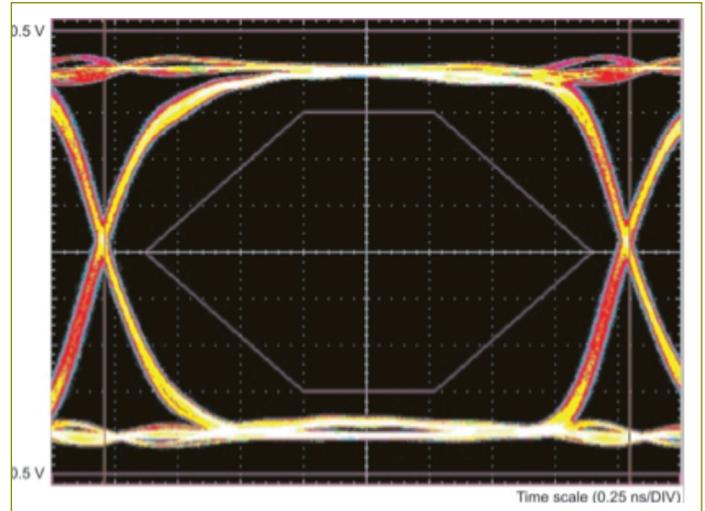
NX3L switches are fabricated in a 0.35  $\mu\text{m}$  CMOS technology that delivers a wide supply range (1.4 to 4.3 V), low leakage and very low static and dynamic power dissipation. This makes the NX3L devices especially well suited for portable applications. Very low switch leakage (< 50 nA) also makes them an excellent choice for data monitoring and analog sensing applications.

### NX3DV & NX5DV data/video switches

NX3DV and NX5DV are higher bandwidth data video switches. They are well suited for applications that switch analog VGA signals between a graphics controller and multiple displays or that multiplex audio, USB, and UART signals via a single connector.

The NX5DV715 is a dual supply 1-of-2 VGA switch which integrates high-bandwidth SPDT switches with level-translating buffers and level translating switches to provide switching of input RGB, H-Sync, V-Sync and DDC signals to either of two output channels.

The NX3DV221 (see eye diagram below) and NX3DV42 are designed for the switching of USB 2.0 signals in handset and consumer applications.



NX3DV221 USB2.0 eye diagram

All NX3 and NX5 products have control inputs with Schmitt-trigger action making them tolerant to slower input rise and fall times (up to 200 ns/V). To support mixed-voltage applications, the NX3LnT and NX3DV products have low threshold control inputs. This allows a 1.8 V controller to drive a 3.3 V switch without any external translator devices.

To improve placement and routing these switches are offered in small footprint PicoGate, MicroPak and leadless QFN packages, making them a solution for applications where board space and headroom are at a premium.

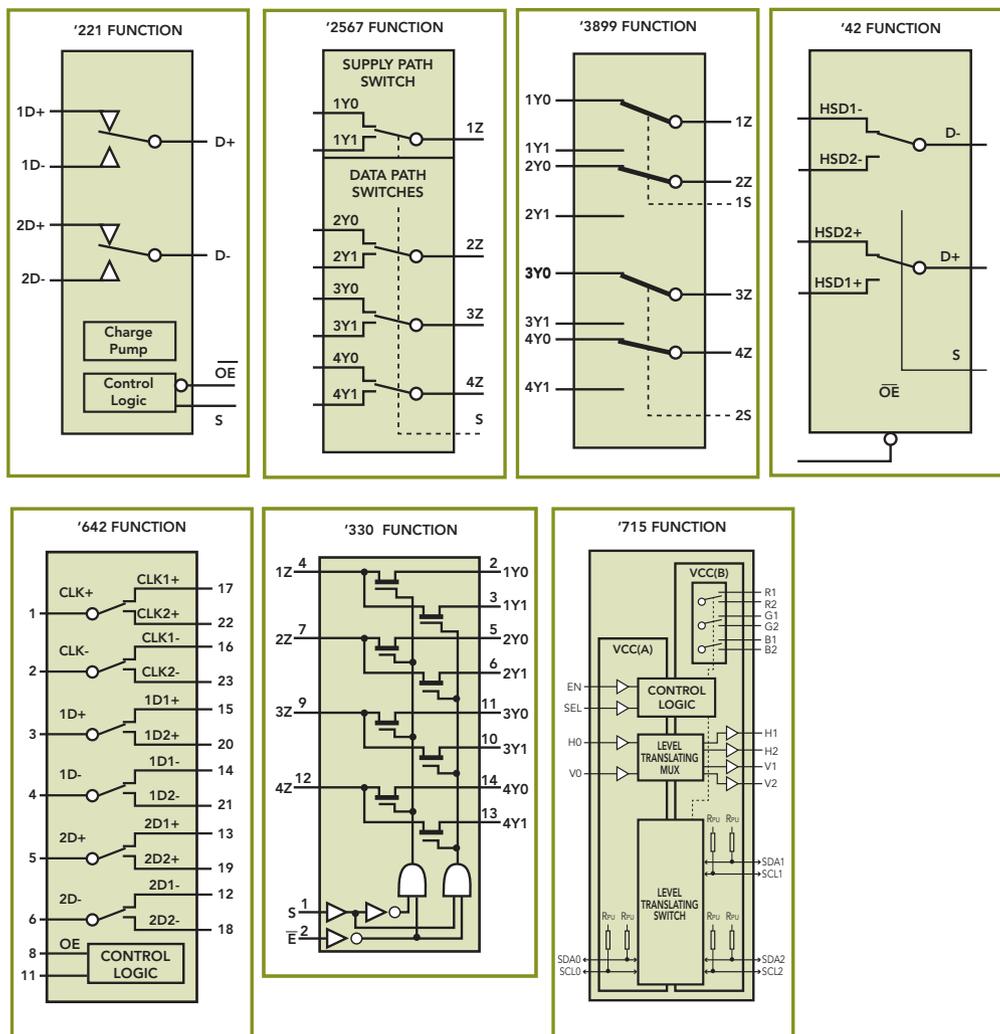
The NX3 and NX5 range also includes devices that are automotive qualified per AEC-Q100 grade 1.

## NX3DV and NX5DV data/video switches

Type number	Description	Configuration	V <sub>CC</sub> (V)	R <sub>ON</sub> (Ω)	R <sub>ON(FLAT)</sub> (Ω)	f <sub>(-3dB)</sub> (MHz)	THD (%)	Xtalk (dB)	Tamb (°C)	Package type	Package drawing
NX3DV221GM	USB2.0 switch with enable	DPDT-Z	2.3 - 3.6	7	0.7	1000		-40	-40~85	XQFN10	SOT1049-2
NX3DV221TK	USB 2.0 switch with enable	DPDT-Z	2.3 - 3.6	7	1000			-40	-40~85	HVSON10	SOT650-2
NX3DV2567GU	four-pole, double-throw switch	4PDT	1.4 - 4.3	10.5		330		-60	-40~125	XQFN16	SOT1161-1
NX3DV2567HR*	four-pole, double-throw switch	4PDT	1.4 - 4.3	10.5		330		-60	-40~125	HXQFN16	SOT1039-2
NX3DV3899GU	dual double-pole, double-throw with low threshold inputs	DPDT	1.4 - 4.3	4.2	1	200	0.01	-90	-40~125	XQFN16	SOT1161-1
NX3DV3899HR	dual double-pole, double-throw with low threshold inputs	DPDT	1.4 - 4.3	4.2	1	200	0.01	-90	-40~125	HXQFN16	SOT1039-1
NX3DV42GU	USB2.0 double pole, double throw	DPDT	3.0 - 4.3	6.5		950		-30	-40~85	XQFN10	SOT1160-1
NX3DV42GU10	Dual high-speed USB 2.0 double-pole double-throw analog switch	DPDT	3.0 - 4.3	6.5				-30	-40~85	XQFN10	SOT1337-1
NX3DV642GU	3-lane high-speed MIPI compatible switch	6PDT-Z	2.65 - 4.3	9.5		950		-55	-40~85	XQFN24	SOT1310-1
NX5DV330DS	four-pole, double-throw switch	4PDT-Z	4.0 - 5.5	7		400		-63	-40~85	SSOP16	SOT519-1
NX5DV715HF	dual supply 1 of 2 VGA switch		2.0 - 5.5	4	0.5	600		-50	-40~85	HWQFN32	SOT1180-1

\*Also available in AEC-Q100 qualified version.

## Logic diagrams of NX3DV and NX5DV data/video switches



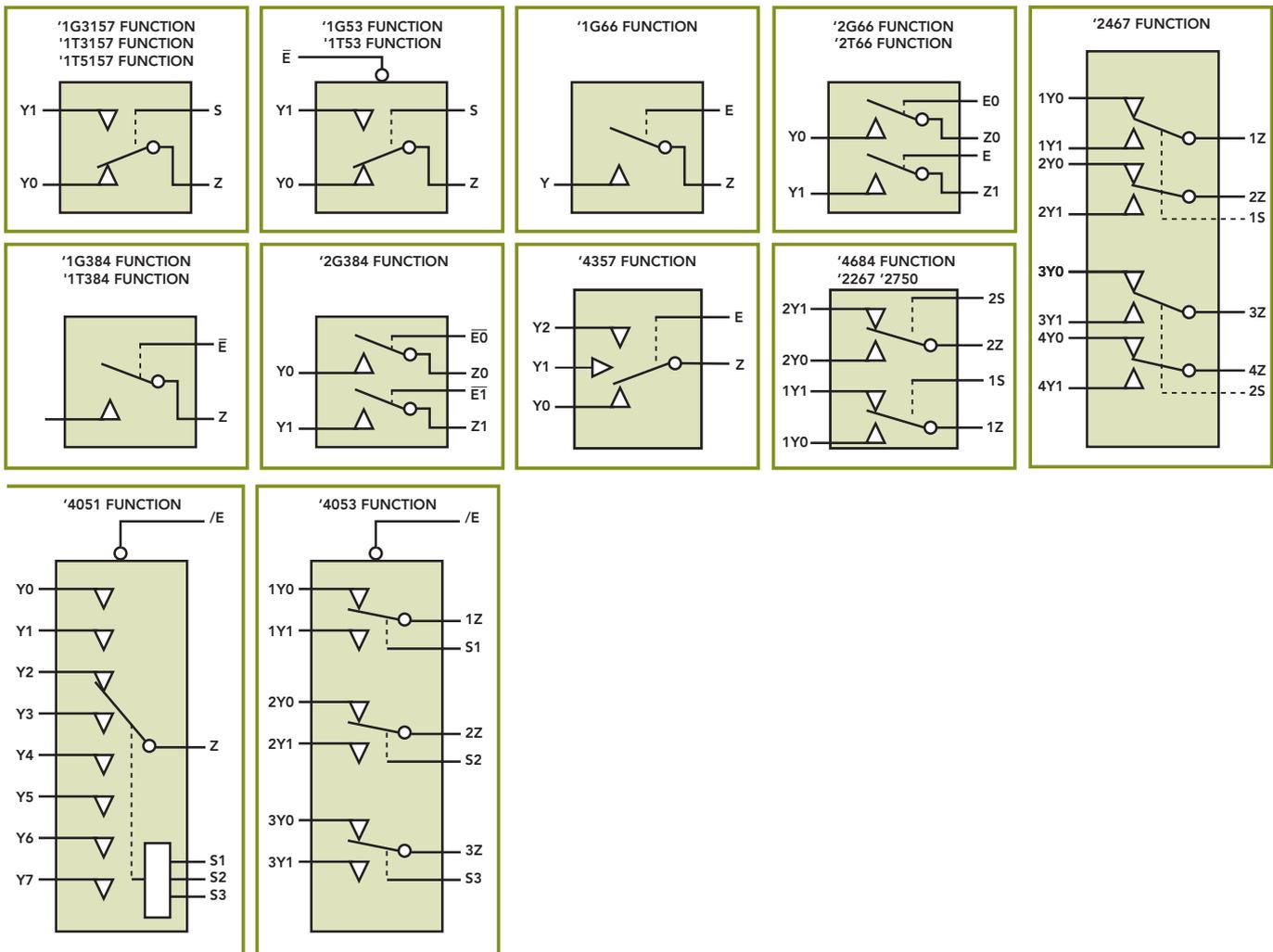
NX3DV products have low threshold control inputs. This allows a 1.8 V controller to drive a 3.3 V switch without any external translator devices.

## NX3L and NX5L low-ohmic analog switches

Type number	Description	Configuration	V <sub>CC</sub> (V)	R <sub>ON</sub> (Ω)	R <sub>ON(FLAT)</sub> (Ω)	f <sub>(-3dB)</sub> (MHz)	THD (%)	Xtalk (dB)	Tamb (°C)	Package type	Package drawing
NX3L1G3157GM	single-pole, double-throw	SPDT-Z	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XSON6	SOT886
NX3L1G384GM	single-pole, single-throw	SPST-NC	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XSON6	SOT886
NX3L1G53GM	single-pole, double-throw	SPDT-Z	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XQFN8	SOT902-1
NX3L1G53GT	single-pole, double-throw	SPDT-Z	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XSON8	SOT833-1
NX3L1G66GM	single-pole, single-throw	SPST-NO	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XSON6	SOT886
NX3L1T3157GM	single-pole, double-throw with low threshold inputs	SPDT	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XSON6	SOT886
NX3L1T384GM	single-pole, single-throw with low threshold inputs	SPST-NC	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XSON6	SOT886
NX3L1T5157GM	single-pole, double-throw with low threshold inputs	SPDT	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XSON6	SOT886
NX3L1T53GM	single-pole, double-throw with low threshold inputs	SPDT-Z	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XQFN8	SOT902-1
NX3L1T53GT	single-pole, double-throw with low threshold inputs	SPDT-Z	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XSON8	SOT833-1
NX3L2267GM	dual single-pole double-throw with low threshold inputs	SPDT	1.4 - 4.3	0.75	0.3	60	0.02	-90	-40~125	XQFN10	SOT1049-3
NX3L2267GU	dual single-pole double-throw with low threshold inputs	SPDT	1.4 - 4.3	0.75	0.3	60	0.02	-90	-40~125	XQFN10	SOT1160-1
NX3L2267SGU	dual single-pole double-throw with low threshold inputs	SPDT	1.4 - 4.3	0.75	0.3	60	0.02	-90	-40~125	XQFN10	SOT1160-1
NX3L2467GU	dual double-pole, double-throw with low threshold inputs	DPDT	1.4 - 4.3	0.75	0.3	60	0.01	-90	-40~125	XQFN16	SOT1161-1
NX3L2467HR	dual double-pole, double-throw with low threshold inputs	DPDT	1.4 - 4.3	0.75	0.3	60	0.01	-90	-40~125	HXQFN16	SOT1039-1
NX3L2467PW	dual double-pole, double-throw with low threshold inputs	DPDT	1.4 - 4.3	0.75	0.3	60	0.01	-90	-40~125	TSSOP16	SOT403-1
NX3L2G384GM	dual single-pole, single-throw	SPST-NC	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XQFN8	SOT902-1
NX3L2G384GT	dual single-pole, single-throw	SPST-NC	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XSON8	SOT833-1
NX3L2G66GT	dual single-pole, single-throw	SPST-NO	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XSON8	SOT833-1
NX3L2T66GM	dual single-pole, single-throw with low threshold inputs	SPST-NO	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XQFN8	SOT902-1
NX3L2T66GT	dual single-pole, single-throw with low threshold inputs	SPST-NO	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XSON8	SOT833-1
NX3L4051HR*	single-pole, octal-throw	SP8T-Z	1.4 - 4.3	0.75	0.3	15	0.02	-90	-40~125	HXQFN16	SOT1039-1
NX3L4051PW*	single-pole, octal-throw	SP8T-Z	1.4 - 4.3	0.75	0.3	15	0.02	-90	-40~125	TSSOP16	SOT403-1
NX3L4053HR*	triple single-pole, double-throw	SPDT-Z	1.4 - 4.3	0.8	0.3	60	0.02	-90	-40~125	HXQFN16	SOT1039-1
NX3L4053PW*	triple single-pole, double-throw	SPDT-Z	1.4 - 4.3	0.8	0.3	60	0.02	-90	-40~125	TSSOP16	SOT403-1
NX3L4357GM	single-pole, triple-throw with low threshold inputs	SP3T-Z	1.4 - 4.3	0.75	0.35	30	0.02	-90	-40~125	XQFN10	SOT1049-2
NX3L4684GM	dual single-pole double-throw with low threshold inputs	SPDT	1.4 - 4.3	0.8	0.3	25	0.01	-90	-40~125	XQFN10	SOT1049-3
NX3L4684TK	dual single-pole double-throw with low threshold inputs	SPDT	1.4 - 4.3	0.8	0.3	25	0.01	-90	-40~125	HVSON10	SOT650-2
NX5L2750CGU	single-pole double-throw audio, negative swing	SPDT	1.8 - 5.0	0.8	0.3	100	0.03	-60	-40~85	XQFN10	SOT1160-1

\*Also available in AEC-Q100 qualified version.

## Logic diagrams of NX3L and NX5L low-ohmic analog switches



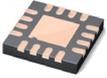
NX3LnT products have low threshold control inputs. This allows a 1.8 V controller to drive a 3.3 V switch without any external translator devices.

For more information about our NX switch portfolio visit <http://www.nxp.com/products/logic/family/NX/>

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## Packages

Package suffix	GM	GT	GM	TK	GM	GU	GU
							
	SOT886	SOT833	SOT902	SOT650	SOT1049	SOT1160	SOT1161
	6-pin	8-pin	8-pin	10-pin	10-pin	10-pin	16-pin
Width (mm)	1.00	1.00	1.60	3.00	2.00	1.4	1.8
Length (mm)	1.45	1.95	1.60	3.00	1.55	1.8	2.6
Pitch (mm)	0.50	0.50	0.50	0.50	0.50	0.4	0.4

Package suffix	HR	PW	DS	HF	GU	GU10
						
	SOT1039	SOT403	SOT519	SOT1180	SOT1310	SOT1337
	16-pin	16-pin	16-pin	32-pin	24-pin	10-pin
Width (mm)	3	6.4	5	3	2.5	1.3
Length (mm)	3	5	6	6	3.4	1.6
Pitch (mm)	0.5	0.65	0.635	0.4	0.4	0.4

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