NXP analog switches NX3 & NX5 families

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 Ω, NX3V family = 0.45 Ω) results in low-loss switching and reduced signal attenuation

▸ Wide supply range (1.4 to 4.3 V) and R_{ON} flatness (0.1 Ω typ) for reduced total harmonic distortion in high-quality audio switching

▸ High current handling (up to 350 mA continuous) for use in varous 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 PicoGate and MicroPak™ packages for easier placement in tight layouts

Applications

▸ Cellular handsets and smart phones

▸ MP3 players and mobile video players

▸ 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.
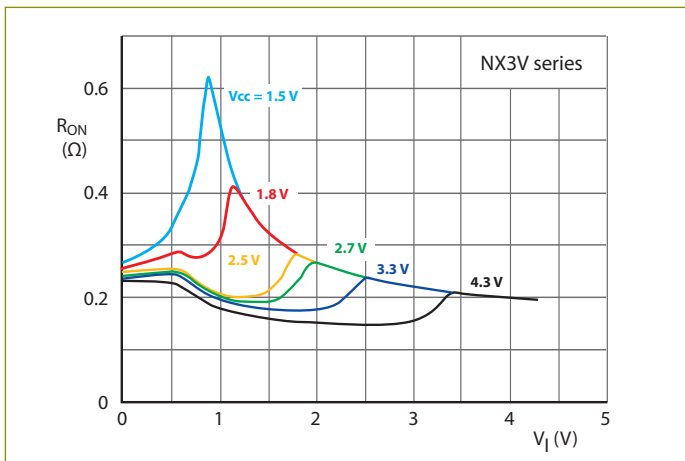
NX3L & NX3V low ohmic switches

The combination of low ON resistance and low R_{ON} flatness of the NX3L & NX3V devices (see curves below) greatly reduces switched signal attenuation and distortion, thus eliminating the need for buffer amplifiers in many applications.
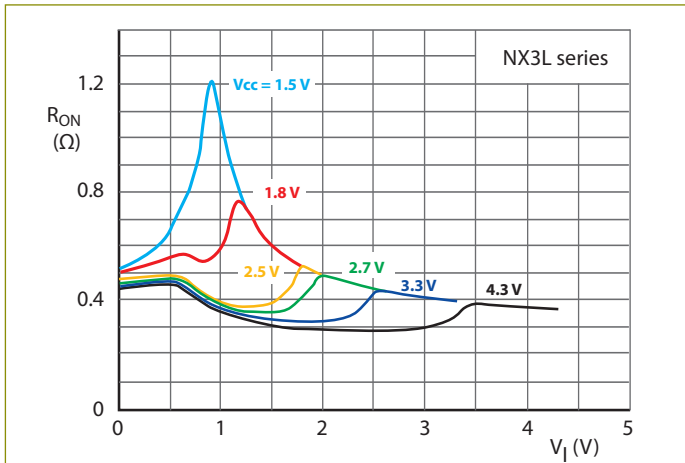
NX3L typical ON resistance v switch input voltage


NX3V typical ON resistance v switch input voltage

When switching 2 V audio signals to a 32 Ω 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%. Under the same conditions, the NX3V series has a typical attenuation of 0.07 dB and distortion of 0.01%. The NX3V series, due to its lower R_{ON} and relatively high continuous current capability (350 mA), is also suitable for use in power management applications. NX3L & NX3V switches are fabricated in a 0.35 µm 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 & NX3V 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, 713 and 4885E are dual supply 1-of-2 VGA switches which integrate 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.
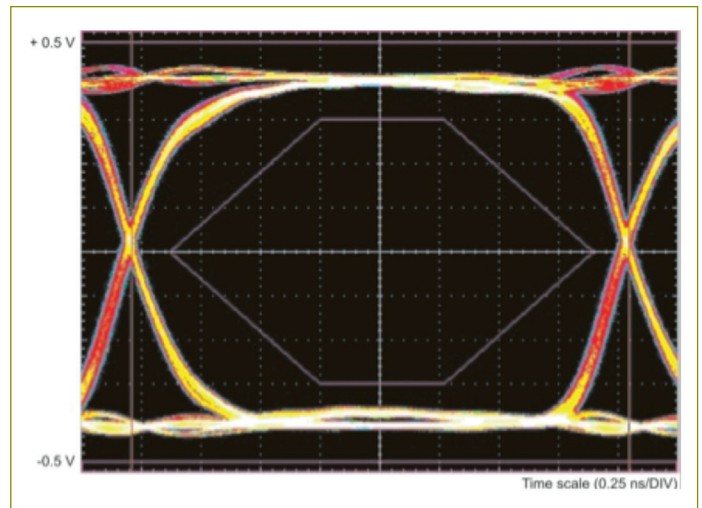
NX3DV221 USB2.0 eye diagram

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, NX3Vnt 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

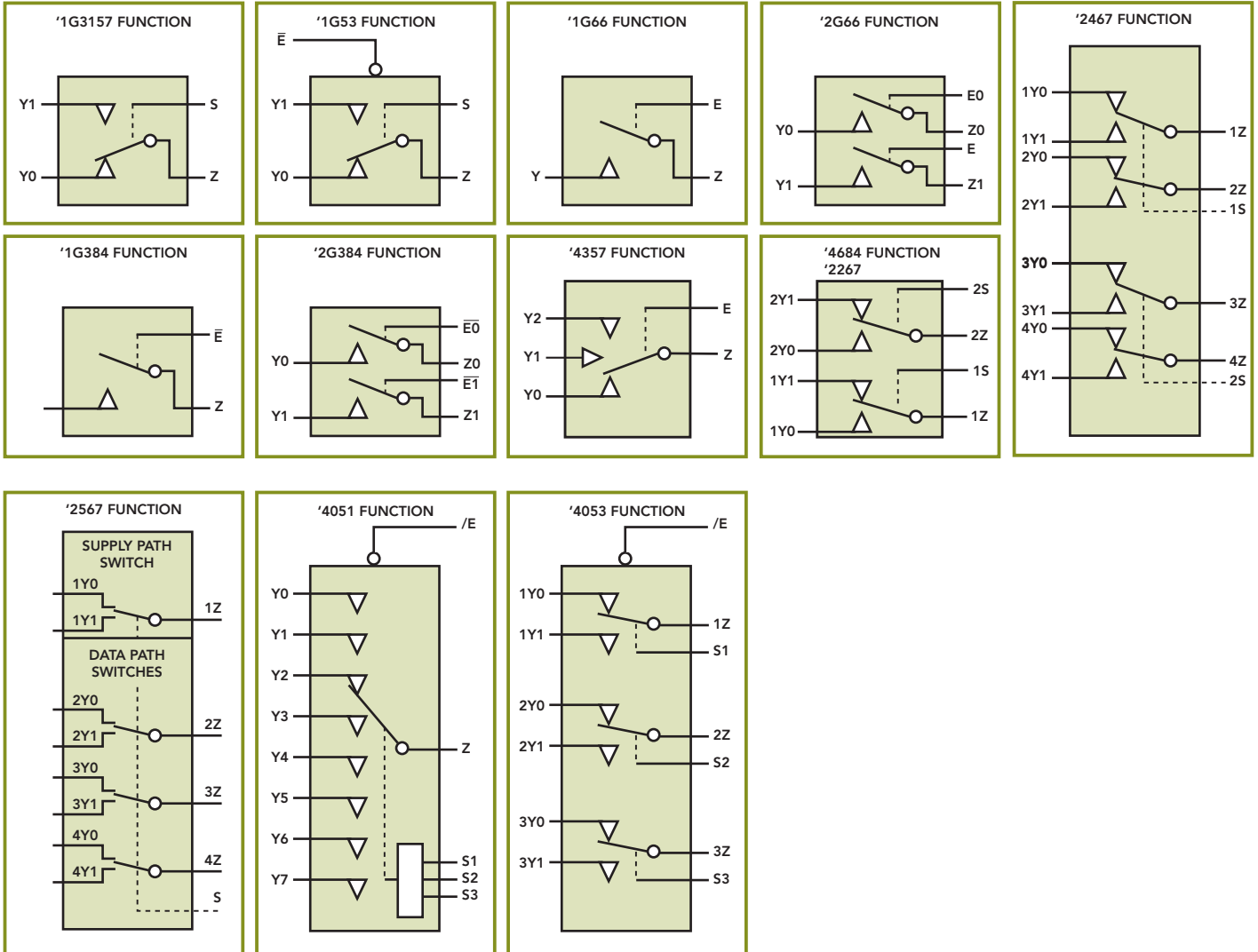| Type number	Description	Configuration	V_{CC} (V)	R_{ON} (Ω)	$R_{ON(FLAT)}$ (Ω)	$f_{(-3dB)}$ (MHz)	THD (%)	Xtalk (dB)	Tamb (°C)	Package type	Package drawing
NX3DV221GM	USB2.0 switch with enable	DPDT-Z	2.3 - 3.6	7	0.7	1000		-40	-40~85	XQFN10	SOT1049-2
NX3DV2567GU	four-pole, double-throw switch	4PDT	1.4 - 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
NX3DV42GM	USB2.0 double pole, double throw	DPDT	3.0 - 4.3	6.5		950		-30	-40~85	XQFN10	SOT1049-3
NX3DV42GU	USB2.0 double pole, double throw	DPDT	3.0 - 4.3	6.5		950		-30	-40~85	XQFN10	SOT1160-1
NX3DV642GU	3-lane high-speed MIPI compatible switch	6PDT-Z	2.65 - 4.3	9.5		950		-55	-40~85	XQFN24	SOT1310-1
NX5DV330BQ	four-pole, double-throw switch	4PDT-Z	4.0 - 5.5	7		400		-63	-40~85	DHVQFN16	SOT763-1
NX5DV330D	four-pole, double-throw switch	4PDT-Z	4.0 - 5.5	7		400		-63	-40~85	SO16	SOT109-1
NX5DV330DS	four-pole, double-throw switch	4PDT-Z	4.0 - 5.5	7		400		-63	-40~85	SSOP16	SOT519-1
NX5DV330PW	four-pole, double-throw switch	4PDT-Z	4.0 - 5.5	7		400		-63	-40~85	TSSOP16	SOT403-1
NX5DV4885EHF	dual supply 1 of 2 VGA switch		2.0 - 5.5	4	0.5	600		-50	-40~85	HVQFN24	SOT616-3
NX5DV713EHF	dual supply 1 of 2 VGA switch		2.0 - 5.5	4	0.5	600		-50	-40~85	HWQFN32	SOT1180-1
NX5DV713HF	dual supply 1 of 2 VGA switch		2.0 - 5.5	4	0.5	600		-50	-40~85	HWQFN32	SOT1180-1
NX5DV715HF	dual supply 1 of 2 VGA switch		2.0 - 5.5	4	0.5	600		-50	-40~85	HWQFN32	SOT1180-1

Logic diagrams of NX3DV and NX5DV data/video switches
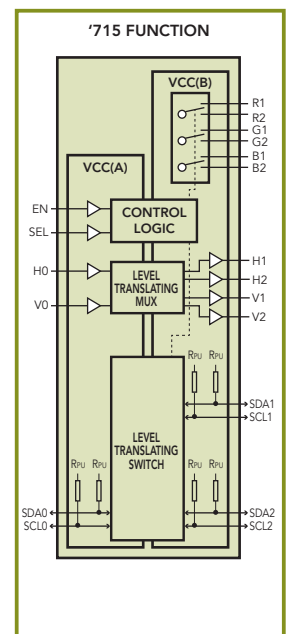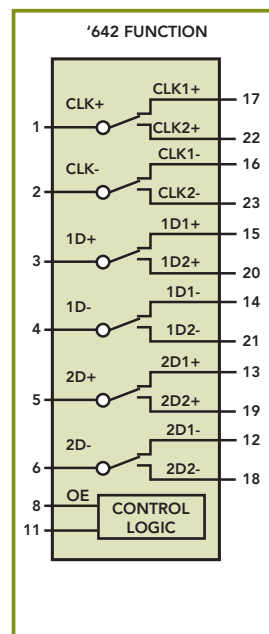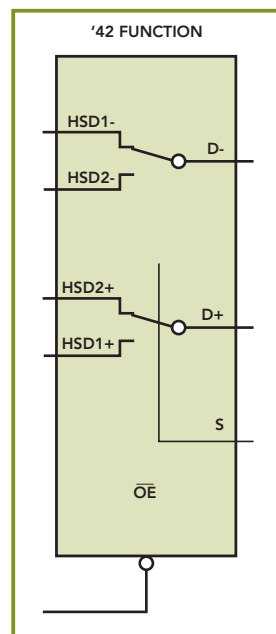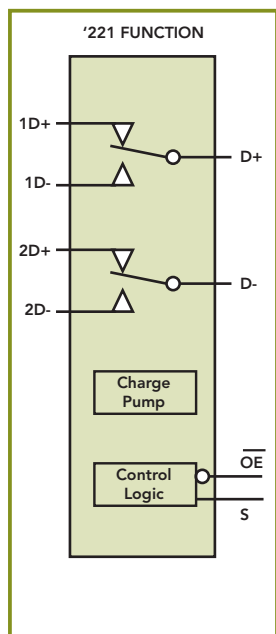
'221 FUNCTION

'42 FUNCTION

'642 FUNCTION

'715 FUNCTION

NX3L and NX3V low-ohmic analog switches

Type number	Description	Configuration	V$_{CC}$ (V)	R$_{ON}$ (Ω)	R$_{ON(FLAT)}$ (Ω)	f$_{(-3dB)}$ (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
NX3L1G3157GW	single-pole, double-throw	SPDT-Z	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	TSSOP6	SOT363
NX3L1G384GM	single-pole, single-throw	SPST-NC	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XSON6	SOT886
NX3L1G384GW	single-pole, single-throw	SPST-NC	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	TSSOP5	SOT353
NX3L1G53GD	single-pole, double-throw	SPDT-Z	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XSON8	SOT996-2
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
NX3L1G66GW	single-pole, single-throw	SPST-NO	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	TSSOP5	SOT353
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
NX3L1T3157GW	single-pole, double-throw with low threshold inputs	SPDT	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	TSSOP6	SOT363
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
NX3L1T384GW	single-pole, single-throw with low threshold inputs	SPST-NC	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	TSSOP5	SOT353
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
NX3L1T53GD	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	SOT996-2
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
NX3L1T66GM	single-pole, single-throw	SPST-NO	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XSON6	SOT886
NX3L1T66GW	single-pole, single-throw	SPST-NO	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	TSSOP5	SOT353
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
NX3L2G384GD	dual single-pole, single-throw	SPST-NC	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XSON8	SOT996-2
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

NX3L and NX3V low-ohmic analog switches

Type number	Description	Configuration	V_{CC} (V)	R_{ON} (Ω)	$R_{ON(FLAT)}$ (Ω)	$f_{(-3dB)}$ (MHz)	THD (%)	Xtalk (dB)	Tamb (°C)	Package type	Package drawing
NX3L2G66GD	dual single-pole, single-throw	SPST-NO	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XSON8	SOT996-2
NX3L2G66GM	dual single-pole, single-throw	SPST-NO	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XQFN8	SOT902-1
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
NX3L2T384GD	dual single-pole, single-throw with low threshold inputs	SPST-NC	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XSON8	SOT996-2
NX3L2T384GM	dual single-pole, single-throw with low threshold inputs	SPST-NC	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XQFN8	SOT902-1
NX3L2T384GT	dual single-pole, single-throw with low threshold inputs	SPST-NC	1.4 - 4.3	0.75	0.3	60	0.0024	-90	-40~125	XSON8	SOT833-1
NX3L2T66GD	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	SOT996-2
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
NX3V1G384GM	single-pole, single-throw	SPST-NC	1.4 - 4.3	0.45	0.2	25	0.01	-90	-40~125	XSON6	SOT886
NX3V1G384GW	single-pole, single-throw	SPST-NC	1.4 - 4.3	0.45	0.2	25	0.01	-90	-40~125	TSSOP5	SOT353
NX3V1G66GM	single-pole, single-throw	SPST-NO	1.4 - 4.3	0.45	0.2	25	0.01	-90	-40~125	XSON6	SOT886
NX3V1G66GW	single-pole, single-throw	SPST-NO	1.4 - 4.3	0.45	0.2	25	0.01	-90	-40~125	TSSOP5	SOT353
NX3V1T384GM	single-pole, single-throw with low threshold inputs	SPST-NC	1.4 - 4.3	0.45	0.2	25	0.01	-90	-40~125	XSON6	SOT886
NX3V1T384GW	single-pole, single-throw with low threshold inputs	SPST-NC	1.4 - 4.3	0.45	0.2	25	0.01	-90	-40~125	TSSOP5	SOT353
NX3V1T66GM	single-pole, single-throw	SPST-NO	1.4 - 4.3	0.45	0.2	25	0.01	-90	-40~125	XSON6	SOT886
NX3V1T66GW	single-pole, single-throw	SPST-NO	1.4 - 4.3	0.45	0.2	25	0.01	-90	-40~125	TSSOP5	SOT353

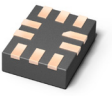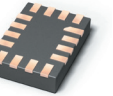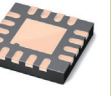## Logic diagrams of NX3L and NX3V low-ohmic analog switches

'1G3157 FUNCTION

Y1 — S
Y0 — Z

'1G53 FUNCTION

$\overline{E}$

Y1 — S
Y0 — Z

'1G66 FUNCTION

E
Y — Z

'2G66 FUNCTION

E0
Y0 — Z0
E
Y1 — Z1

'2467 FUNCTION

1Y0
1Y1 — 1Z
2Y0
2Y1 — 2Z
- - - 1S

3Y0
3Y1 — 3Z
4Y0
4Y1 — 4Z
- - - 2S

'1G384 FUNCTION

$\overline{E}$
Z

'2G384 FUNCTION

$\overline{E0}$
Y0 — Z0
$\overline{E1}$
Y1 — Z1

'4357 FUNCTION

Y2 — E
Y1 — Z
Y0

'4684 FUNCTION '2267

2Y1 — 2S
2Y0 — 2Z
1Y1 — 1S
1Y0 — 1Z

'2567 FUNCTION

SUPPLY PATH SWITCH
1Y0
1Y1 — 1Z

DATA PATH SWITCHES
2Y0
2Y1 — 2Z
3Y0
3Y1 — 3Z
4Y0
4Y1 — 4Z
S

'4051 FUNCTION

/E
Y0
Y1
Y2
Y3
Y4 — Z
Y5
Y6
Y7 — S1
S2
S3

'4053 FUNCTION

/E
1Y0
1Y1 — 1Z
S1
2Y0
2Y1 — 2Z
S2
3Y0
3Y1 — 3Z
S3

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

For information about our comprehensive analog switch portfolio visit
http://www.nxp.com/products/logic/analog_switches/

Packages

Package suffix	GW	GW	GM	GT	GM	GD	TK	GM
	5-pin	6-pin	6-pin	8-pin	8-pin	8-pin	10-pin	10-pin
	SOT353	SOT363	SOT886	SOT833	SOT902	SOT996	SOT650	SOT1049
	5-pin	6-pin	6-pin	8-pin	8-pin	8-pin	10-pin	10-pin
Width (mm)	2.1	2.1	1.00	1.00	1.60	3.00	3.00	2.00
Length (mm)	2.0	2.0	1.45	1.95	1.60	2.00	3.00	1.55
Pitch (mm)	0.65	0.65	0.50	0.50	0.50	0.50	0.50	0.50

Package suffix	GU	GM	GU	HR	PW	DS	BQ	HF
	10-pin	10-pin	16-pin	16-pin	16-pin	16-pin	24-pin	32-pin
	SOT1160	SOT1049	SOT1161	SOT1039	SOT403	SOT519	SOT616	SOT1180
	10-pin	10-pin	16-pin	16-pin	16-pin	16-pin	24-pin	32-pin
Width (mm)	1.4	2.0	1.8	3	6.4	5	4	3
Length (mm)	1.8	1.55	2.6	3	5	6	4	6
Pitch (mm)	0.4	0.5	0.4	0.5	0.65	0.635	0.5	0.4