Enhanced Unidirectional Direction Translator Portfolio
Streamlining implementation beyond alternatives

Optimized fixed direction level translation enabling lower power high performance use cases

› Supports higher current drive requirements that cannot be fulfilled by auto-direction translation
› Built-in Schmitt-trigger inputs provide enhanced noise immunity
› Low current consumption suitable for power sensitive and battery-operated applications

Features and benefits

› Wide dual supply voltage range supporting 0.9 V to 5.5 V operation
› Low static current of 5 µA maximum reduces the power consumption
› Schmitt-trigger inputs with integrated static high ohmic pull-down resistor on the input
› Solution to noisy immunity and slow input signal transmission having Schmitt-trigger inputs
› Integrated high impedance pull-down resistors reduces BoM size and input pins may be disconnected or floating
› Hi-Z isolation of the outputs when one of the supply voltages is below 100mV or disconnected (floating)
› I_{OFF} circuitry enables partial power-down mode operation
› Glitch-free power supply sequencing
› Output enable (OE) allows connection to V_{CCA} or V_{CCB} domain
› High output drive 12 mA at 5 V
› Maximum data rate of ≥ 250 Mbps for translation ≥ 1.8 V to 5 V
› Maximum Output skew ≤ 2.5 ns

› Latch-up performance exceeds 100 mA per JESD 78 Class II
› ESD protection exceeds 2.5 kV HBM and 1.5 kV CDM
› Specified from -40 °C to +85 °C and -40 °C to +125 °C
› Automotive product qualification in accordance with AEC-Q100 (Grade 1)
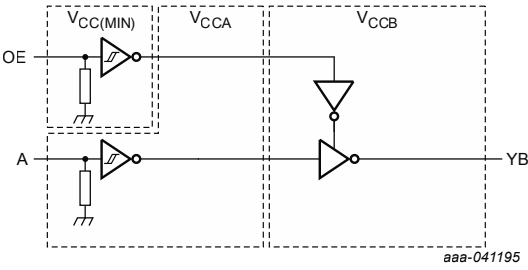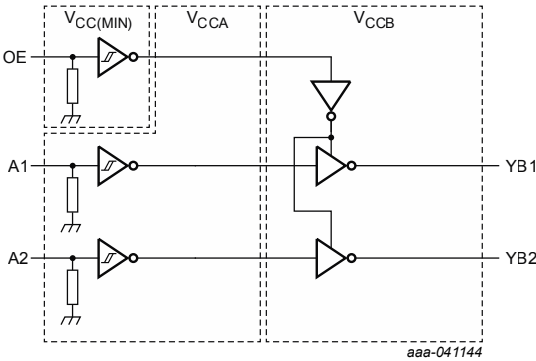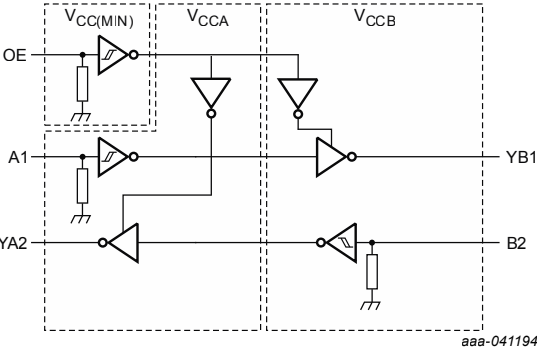› DHVQFN package with Side-Wettable Flanks enabling Automotive Optical Inspection (AOI) of solder joints
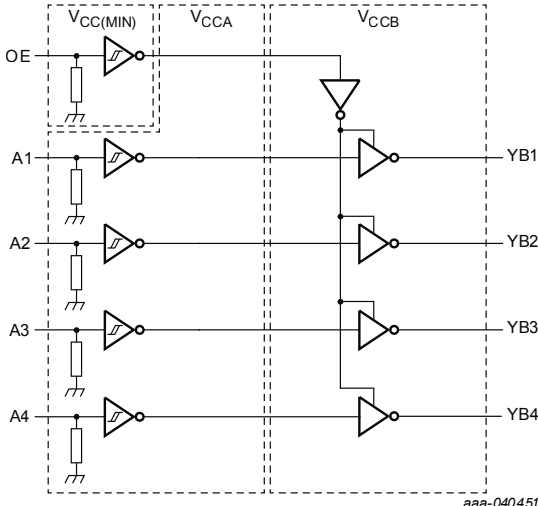
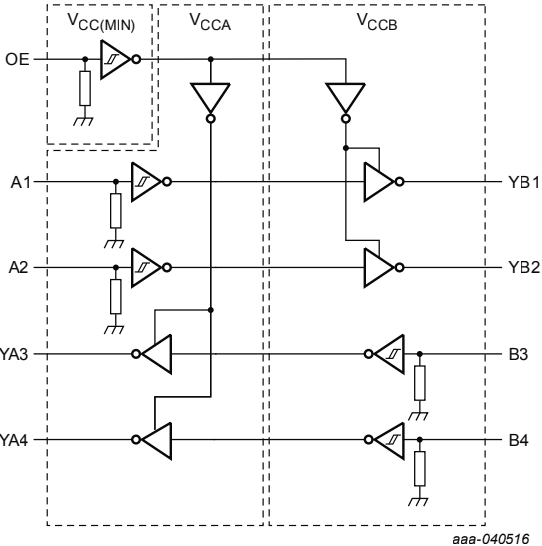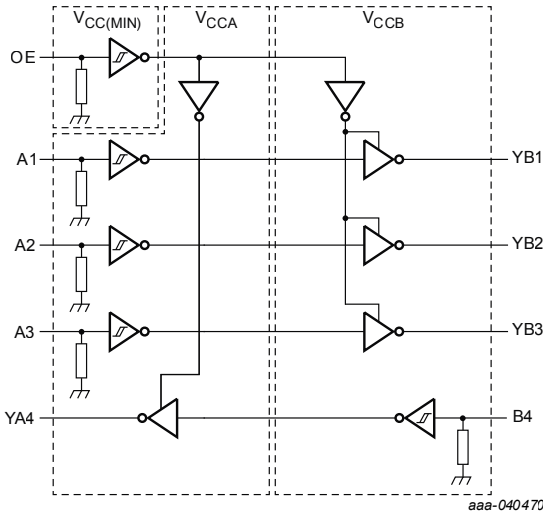### Applications

› General purpose I/O level translation
› Noisy environments or slow input signals
› Supports push-pull voltage translation for clock signaling, UART, SPI and JTAG protocols

End equipment

› Automotive ZCU
› Automotive infotainment
› Smart meters
› Smoke detectors
› White goods

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EFFICIENCY WINS.

Block Diagram

NXU0101	NXU0102

NXU0101

$V_{CC(MIN)}$ V_{CCA} V_{CCB}

OE

A

YB

aaa-041195

* Recommended for GPIO applications

NXU0102

$V_{CC(MIN)}$ V_{CCA} V_{CCB}

OE

A1

A2

YB1

YB2

aaa-041144

NXU0202

$V_{CC(MIN)}$ V_{CCA} V_{CCB}

OE

A1

YA2

YB1

B2

aaa-041194

* Recommended for 2-wire UART applications

NXU0104

$V_{CC(MIN)}$ V_{CCA} V_{CCB}

OE

A1

A2

A3

A4

YB1

YB2

YB3

YB4

aaa-040451

NXU0204

$V_{CC(MIN)}$ V_{CCA} V_{CCB}

OE

A1

A2

YA3

YA4

YB1

YB2

B3

B4

aaa-040516

NXU0304

$V_{CC(MIN)}$ V_{CCA} V_{CCB}

OE

A1

A2

A3

YA4

YB1

YB2

YB3

B4

aaa-040470

* Recommended for SPI applications

Device characteristics

VCC Range (V_{CCA}, V_{CCB})	Temperature Range (T_{AMB})	Output Drive (I_O ±12mA, V_O 4.5V)	Maximum Current (I_{CCA} + I_{CCB} combined)	Propagation Delay (1.8V to 3.3V)
0.9 V to 5.5 V	-40 °C to + 125 °C	V_{OL} 0.8 V / V_{OH} 4.1 V	5µA	7.4 ns

Available Product Types

Product Type	Function	Description	VCC(A) (V)	VCC(B) (V)	Tamb (°C)	Package name
NXU0101GW, NXU0101GW-Q100	NXU0101	1-bit; Fixed Direction dual supply translating buffer with Schmitt-trigger inputs and 3-state outputs	0.9 - 5.5	0.9 - 5.5	-40 to +125	TSSOP6
NXU0101GM, NXU0101GM-Q100						XSON6
NXU0101GS, NXU0101GS-Q100						XSON6
NXU0101GX						X2SON6
NXU0102DC, NXU0102DC-Q100	NXU0102	2-bit; Fixed Direction dual supply translating buffer with Schmitt-trigger inputs and 3-state outputs	0.9 - 5.5	0.9 - 5.5	-40 to +125	VSSOP8
NXU0102GT, NXU0102GT-Q100						XSON8
NXU0102GX						X2SON8
NXU0202DC, NXU0202DC-Q100	NXU0202		0.9 - 5.5	0.9 - 5.5	-40 to +125	VSSOP8
NXU0202GT, NXU0202GT-Q100						XSON8
NXU0202GX						X2SON8
NXU0104PW, NXU0104PW-Q100	NXU0104	4-bit; Fixed Direction dual supply translating buffer with Schmitt-trigger inputs and 3-state outputs	0.9 - 5.5	0.9 - 5.5	-40 to +125	TSSOP14
NXU0104BQ, NXU0104BQ-Q100						DHVQFN14
NXU0104BZ						DHXQFN14
NXU0104GU12, NXU0104GU12-Q100						XQFN12
NXU0204PW, NXU0204PW-Q100	NXU0204		0.9 - 5.5	0.9 - 5.5	-40 to +125	TSSOP14
NXU0204BQ, NXU0204BQ-Q100						DHVQFN14
NXU0204BZ						DHXQFN14
NXU0204GU12, NXU0204GU12-Q100						XQFN12
NXU0304PW, NXU0304PW-Q100	NXU0304		0.9 - 5.5	0.9 - 5.5	-40 to +125	TSSOP14
NXU0304BQ, NXU0304BQ-Q100						DHVQFN14
NXU0304BZ						DHXQFN14
NXU0304GU12, NXU0304GU12-Q100						XQFN12

Available Packages

Package name	Package suffix	SOT#	Package outer dimensions l x b x h [mm]	Pitch [mm]	Package image
TSSOP6	GW	SOT363-2	2.1 x 2 x 0.95	0.65	
XSON6	GM	SOT886	1.45 x 1.0 x 0.5	0.5	
XSON6	GS	SOT1202	1.0 x 1.0 x 0.35	0.35	
X2SON6	GX	SOT1255-2	1.0 x 0.8 x 0.35	0.4	
VSSOP8	DC	SOT765-1	3.1 x 2 x 1.0	0.5	
XSON8	GT	SOT833-1	1.95 x 1.0 x 0.5	0.5	
X2SON8	GX	SOT1233-2	1.35 x 0.8 x0.35	0.5	
TSSOP14	PW	SOT402-1	5.0 x 4.4 x 1.1	0.65	
DHVQFN14	BQ	SOT762-1	3.0 x 2.5 x 1.0	0.5	
DHXQFN14	BZ	SOT8014-1	2.0 x 2.0 x 0.48	0.4	
XQFN12	GU12	SOT1174-1	2.0 x 1.7 x 0.5	0.4	

Input(s)

The inputs have integrated pull-down resistors of 6.5 MΩ (typical) which prevent an undefined state at the Schmitt-trigger input and the output. If an external pull-up is required, it should be no larger than 1 MΩ to avoid contention with the 6.5 MΩ internal pull-down.

Additionally, the inputs are provided with a through Schmitt-trigger which makes this device tolerant for slow and noisy input signals. Prolonged input slopes at a slow rate may lead to increased dynamic current consumption.

The output-enable input (OE) can be referenced to VCCA and VCCB domain by making use of the developed VCC(MIN) circuitry. When the OE pin is set LOW, the output(s) is disabled and enters high-impedance OFF-state which isolates the output. The OE pin can be left floating or externally pulled down to ground to ensure outputs remain in the high-impedance state during power up or power down.

The input signals can be safely driven above the supply voltage, as long as the maximum input voltage value specified in the Recommended Operating Conditions is not exceeded.
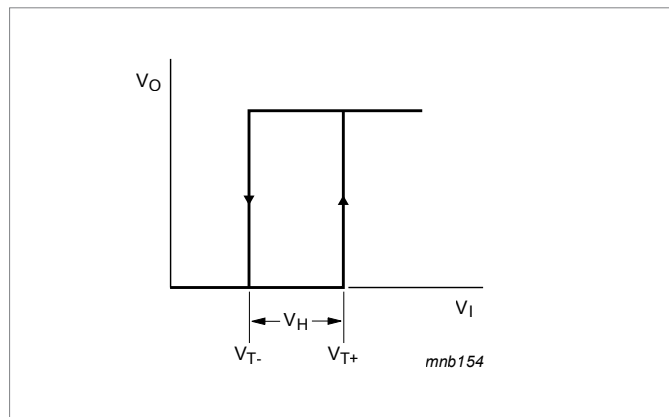
Input transfer characteristics
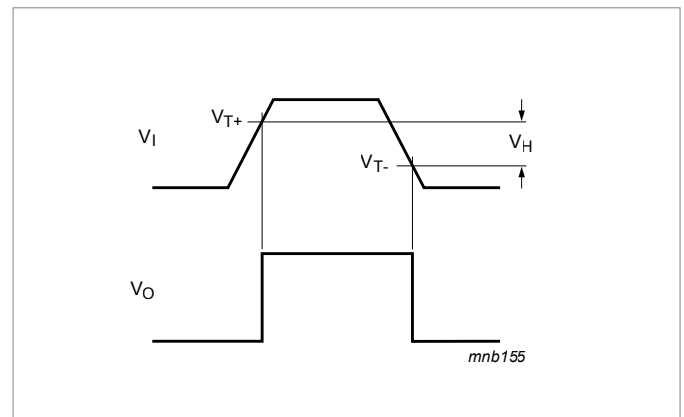

Fig 1. Transfer characteristics

Fig 2. The definitions of V_{T+}, V_{T-} and V_H

T_{amb} = 25 °C
(1) Vcc = 1.2 V
(2) Vcc = 1.5 V
(3) Vcc = 1.8 V

T_{amb} = 25 °C
(1) Vcc = 2.5 V
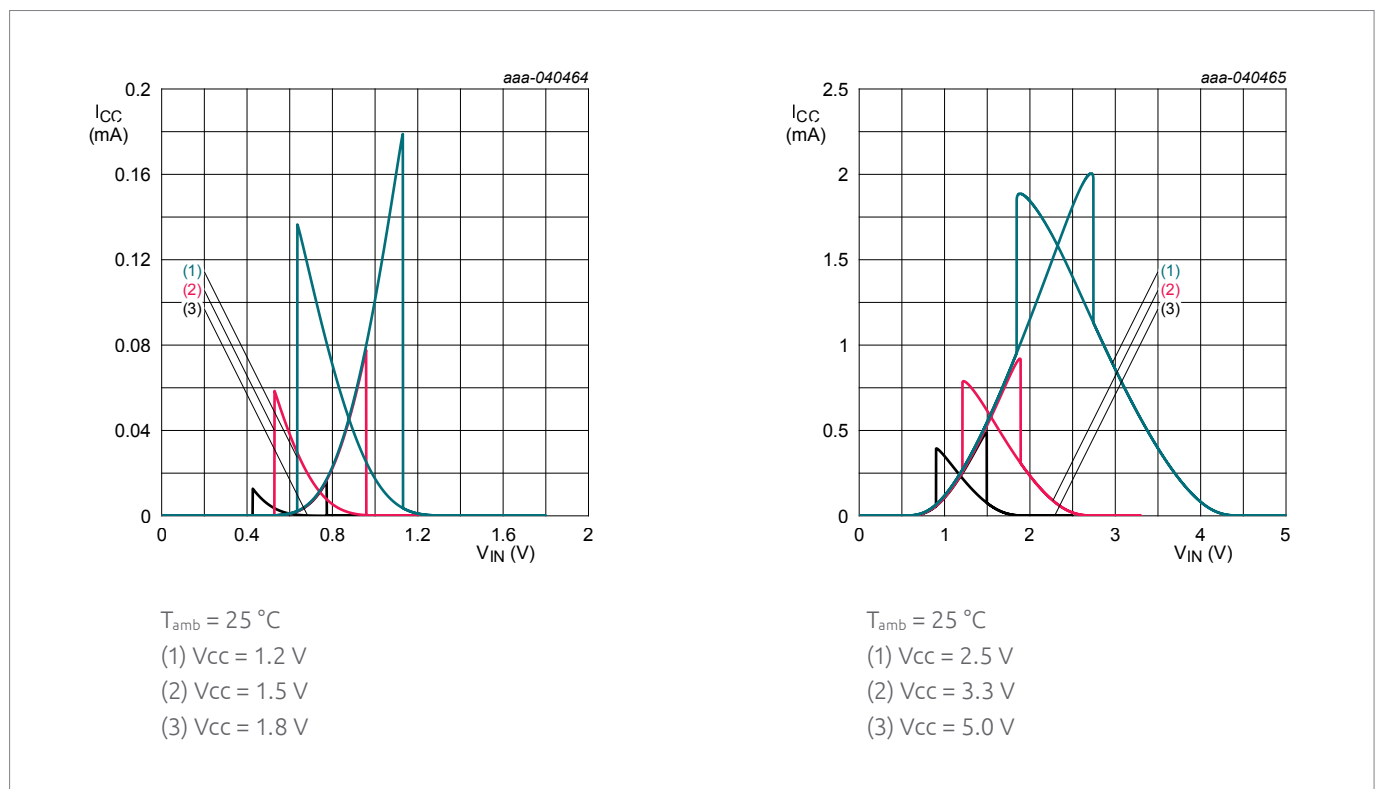(2) Vcc = 3.3 V
(3) Vcc = 5.0 V

Fig 3. Typical transfer characterisitics for data input(s)

Output(s)

Balanced output enables the device to both sink and source similar currents. The high drive capability of this device creates fast edges and capable of driving larger currents.
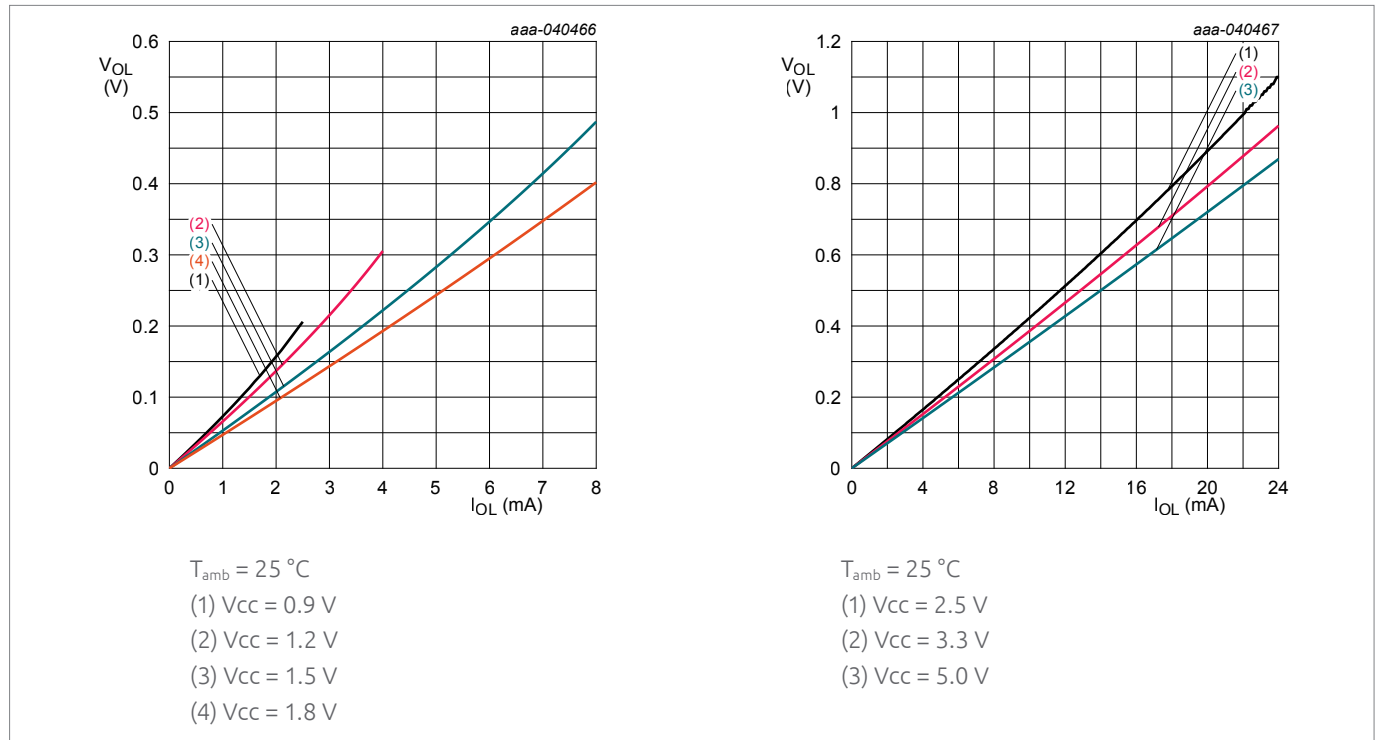
Output transfer characteristics

T_{amb} = 25 °C
(1) Vcc = 0.9 V
(2) Vcc = 1.2 V
(3) Vcc = 1.5 V
(4) Vcc = 1.8 V

T_{amb} = 25 °C
(1) Vcc = 2.5 V
(2) Vcc = 3.3 V
(3) Vcc = 5.0 V

Fig 4. Typical LOW-level output voltage (V_{OL}) versus LOW-level output current (I_{OL})

T_{amb} = 25 °C
(1) Vcc = 0.9 V
(2) Vcc = 1.2 V
(3) Vcc = 1.5 V
(4) Vcc = 1.8 V

T_{amb} = 25 °C
(1) Vcc = 2.5 V
(2) Vcc = 3.3 V
(3) Vcc = 5.0 V
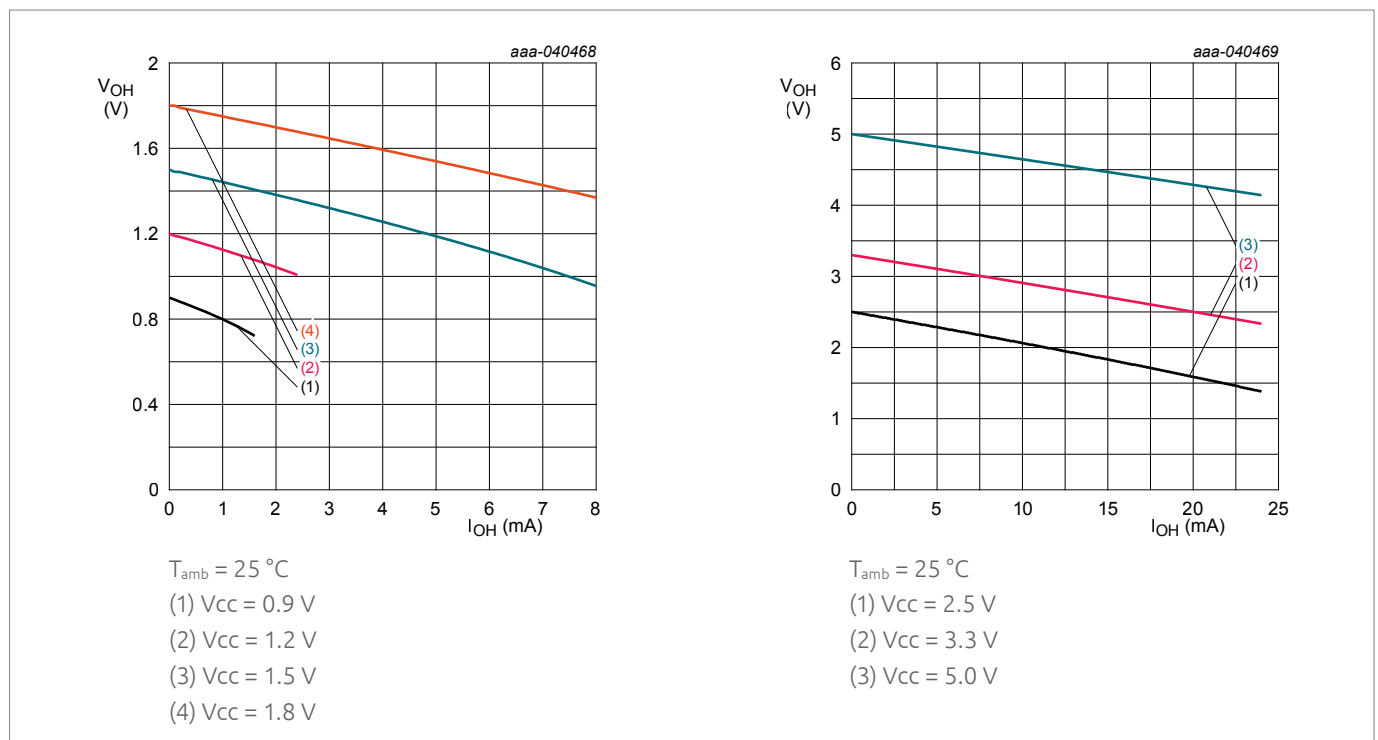
Fig 5. Typical HIGH-level output voltage (V_{OH}) versus HIGH-level output current (I_{OH})

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