



## Descriptions

The NX3DV42GU is a bidirectional low-power dual port, high-speed, USB 2.0 analog switch with integrated protection for USB Type-C™ systems. The device is configured as a dual 2:1 or 1:2 switch. It is optimized for use with the USB 2.0 DP/DM lines in a USB Type-C™ system. The device is capable of true isolation. Even when COM+/- overrides VCC, very little current will flow back to the supply.

The NX3DV42GU has low bit-to-bit skew and high channel-to-channel noise isolation, and is compatible with various standards, such as high-speed USB 2.0 (480Mbps). Each switch is bidirectional and offers little or no attenuation of the high-speed signals at the outputs. Its bandwidth is wide enough to pass high-speed USB 2.0 differential signals (480 Mb/s) with good signal integrity.

GPIO control of SEL 1.8V logic compatible. The NX3DV42GU is available in QFN1418(X-QFN-10(1.4x1.8)) with Pb-free and Halogen-free making it a perfect candidate for mobile and space constrained applications.

## Order Information

| Package                    |               | Part Number | Top-Side Marking |
|----------------------------|---------------|-------------|------------------|
| QFN1418(X-QFN-10(1.4x1.8)) | Tape and Reel | NX3DV42GU   | A26 /GYW         |

## Features

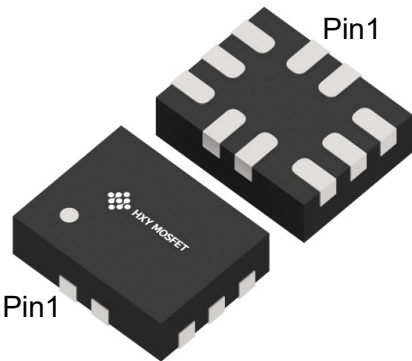
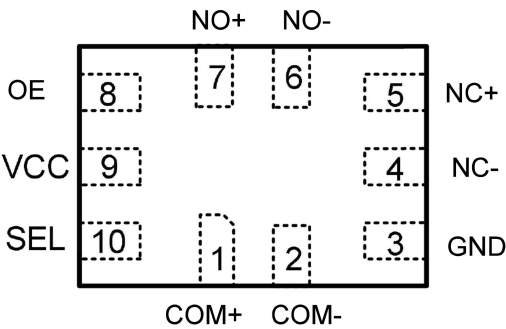
- Pin-to-Pin FSUSB42, NX3DV42, WAS7227, SGM7227, RS2228, BL1532
- Low On-resistance, Ron=1.5Ω when VCC =5V
- 1.8V Logic Compatible Control Pin
- COM+/- Overrides VCC to Achieve True Isolation Even When Supply Is Dead
- High Off-Isolation: -100dB @ 100KHz
- Low Channel-to-Channel Crosstalk: -97dB @ 100KHz
- High Bandwidth ( -3dB @800MHz) Suitable for USB2.0 High-Speed Routing
- Low Quiescent Current (<2uA) With Very Wide Supply Range (1.5V ~ 5.5V)

## Applications

- Anywhere a USB Type-C™ or Micro-B Connector is Used
- Mobile Phones, Tablets and Notebooks



Pin Configuration



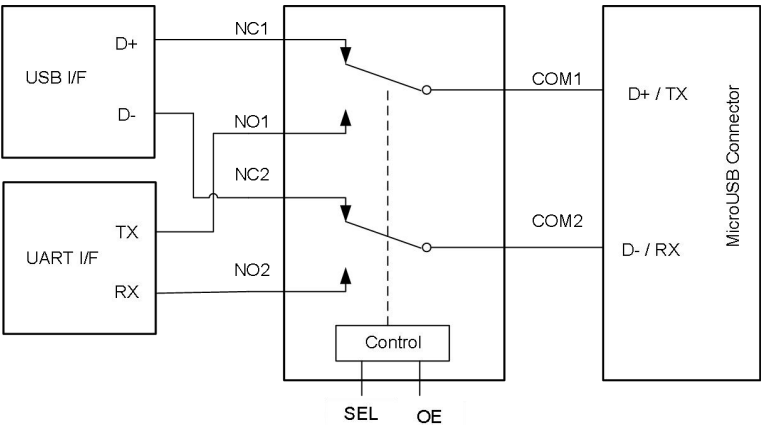
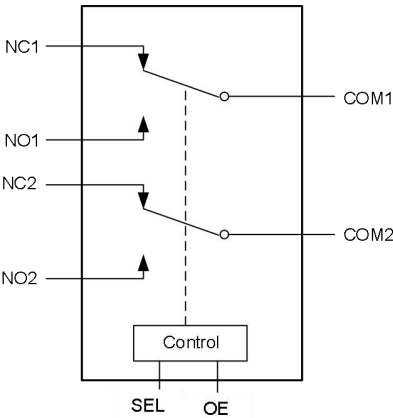
QFN1418(X-QFN-10(1.4x1.8))

Functions and Pin Configuration

| Pin Number | Symbol           | Descriptions                                  |
|------------|------------------|-----------------------------------------------|
| 1,2        | COM <sub>x</sub> | Common Signal Ports                           |
| 3          | OE               | Active Low                                    |
| 8          | GND              | Ground                                        |
| 4,5        | NC <sub>x</sub>  | Analog/Digital Signal Ports (Normally closed) |
| 6,7        | NO <sub>x</sub>  | Analog/Digital Signal Ports (Normally open)   |
| 9          | VCC              | Single Power Supply                           |
| 10         | SEL              | Logic Input Selection                         |

Function Descriptions

| Input SEL | Function              |
|-----------|-----------------------|
| 0         | NC1=COM1 and NC2=COM2 |
| 1         | NO1=COM1 and NO2=COM2 |





### Absolute Maximum Ratings <sup>(1)</sup>

| Parameter                                                       | Symbol           | Value      | Unit |
|-----------------------------------------------------------------|------------------|------------|------|
| Supply Voltage                                                  | V <sub>CC</sub>  | -0.3 ~ 6.5 | V    |
| Control Input Voltage                                           | V <sub>IN</sub>  | -0.3 ~ 6.5 | V    |
| Continuous Current Through NO, NC, COM                          |                  | ±100       | mA   |
| Peak Current Through NO, NC, COM (pulsed at 1ms 50% duty cycle) |                  | ±200       | mA   |
| Storage Temperature Range                                       | T <sub>STG</sub> | -55 ~ 150  | °C   |
| Junction Temperature under Bias                                 | T <sub>J</sub>   | 150        | °C   |
| Lead Temperature (Soldering, 10 seconds)                        | T <sub>L</sub>   | 260        | °C   |
| Power Dissipation                                               | P <sub>D</sub>   | 250        | mW   |

### Recommend operating ratings <sup>(2)</sup>

| Parameter                | Symbol           | Value      | Unit |
|--------------------------|------------------|------------|------|
| Supply Voltage Operating | V <sub>CC</sub>  | 1.5 ~ 5.5  | V    |
| Control Input Voltage    | V <sub>IN</sub>  | -0.3 ~ 5.5 | V    |
| Input Signal Voltage     | V <sub>COM</sub> | -0.3 ~ 5.5 | V    |
| Operating Temperature    | T <sub>A</sub>   | -40 ~ 85   | °C   |
| Thermal Resistance       | R <sub>θJA</sub> | 360        | °C/W |

#### Note:

1. “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied.

### Capacitance (Ta=25°C, VCC=3.3V, unless otherwise noted)

| Parameter       | Symbol           | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|------------------|------------|------|------|------|------|
| Off capacitance | C <sub>OFF</sub> | F=100KHz   |      | 5    |      | pF   |
| On capacitance  | C <sub>ON</sub>  | F=100KHz   |      | 7    |      | pF   |



**DC Electronics Characteristics (Ta=25°C, VCC=3.3V, unless otherwise noted)**

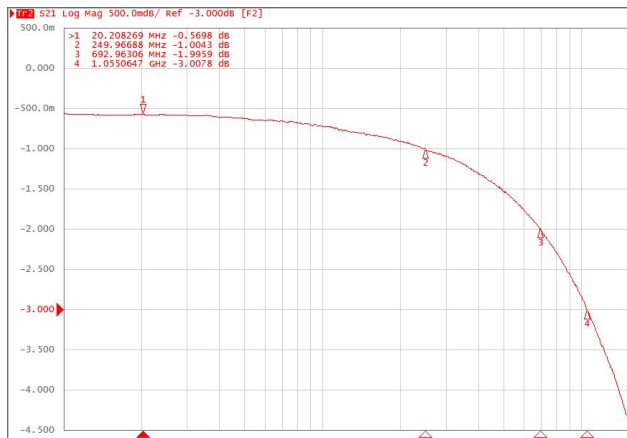
| Parameter                                                                        | Symbol             | Conditions                                                                    | Min. | Typ. | Max. | Unit |
|----------------------------------------------------------------------------------|--------------------|-------------------------------------------------------------------------------|------|------|------|------|
| Input logic high level                                                           | V <sub>IH</sub>    | VCC: 3.3 ~ 5.5V                                                               | 1.6  |      |      | V    |
|                                                                                  |                    | VCC: 1.5 ~ 3.3V                                                               | 1.4  |      |      | V    |
| Input logic low level                                                            | V <sub>IL</sub>    | VCC: 3.3 ~ 5.5V                                                               |      |      | 0.6  | V    |
|                                                                                  |                    | VCC: 1.5 ~ 3.3V                                                               |      |      | 0.4  | V    |
| Supply quiescent current                                                         | I <sub>CC</sub>    | I <sub>COM</sub> =0, V <sub>IN</sub> =0 or V <sub>IN</sub> =VCC               |      |      | 1.0  | uA   |
| Increase in I <sub>CC</sub> per input                                            | I <sub>CCT</sub>   | I <sub>COM</sub> =0, VCC=4.5V<br>V <sub>IN</sub> >1.8 or V <sub>IN</sub> <0.5 |      |      | 1.0  | uA   |
| Off state leakage from COM <sub>x</sub> to NC <sub>x</sub> (or NO <sub>x</sub> ) | I <sub>COMx</sub>  | V <sub>COM</sub> = 5.5V, V <sub>NC(or NO)</sub> = 0V                          |      |      | ±2.0 | uA   |
| On-Resistance                                                                    | R <sub>ON1</sub>   | V <sub>COM</sub> =0 ~ 0.5V, I <sub>COM</sub> =30mA                            |      | 3.0  | 3.5  | Ω    |
|                                                                                  | R <sub>ON2</sub>   | V <sub>COM</sub> =0.5 ~ 2.0V,<br>I <sub>COM</sub> =30mA                       |      | 3.6  | 3.9  | Ω    |
|                                                                                  | R <sub>ON3</sub>   | V <sub>COM</sub> =2.0 ~ 4.0V,<br>I <sub>COM</sub> =30mA                       |      | 2.5  | 3.5  | Ω    |
|                                                                                  | R <sub>ON4</sub>   | V <sub>COM</sub> =4.0 ~ 5.5V,<br>I <sub>COM</sub> =30mA                       |      | 1.5  | 1.8  | Ω    |
| On-Resistance Flatness                                                           | R <sub>FLAT1</sub> | V <sub>COM</sub> =0 ~ 0.5V, I <sub>COM</sub> =30mA                            |      | 0.7  |      | Ω    |
|                                                                                  | R <sub>FLAT2</sub> | V <sub>COM</sub> =0.5 ~ 2.0V,<br>I <sub>COM</sub> =30mA                       |      | 0.5  |      | Ω    |
|                                                                                  | R <sub>FLAT3</sub> | V <sub>COM</sub> =2.0 ~ 4.0V,<br>I <sub>COM</sub> =30mA                       |      | 1.6  |      | Ω    |
|                                                                                  | R <sub>FLAT4</sub> | V <sub>COM</sub> =4.0 ~ 5.5V,<br>I <sub>COM</sub> =30mA                       |      | 0.3  |      | Ω    |
| On-Resistance Matching Between Channels                                          | Δ R <sub>ON</sub>  | V <sub>COM</sub> =0~5.5V, I <sub>COM</sub> =30mA,                             |      | 0.1  | 0.2  | Ω    |

**AC Electronics Characteristics (Ta=25°C, VCC=3.3V, unless otherwise noted)**

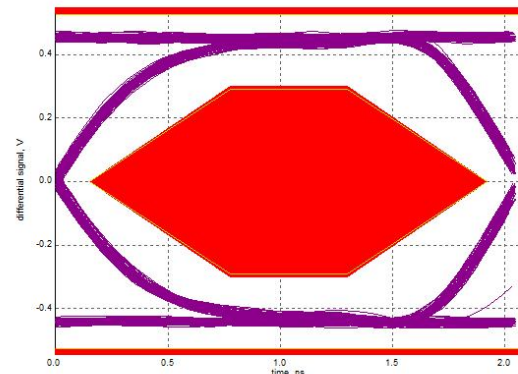
| Parameter                 | Symbol           | Conditions                                                          | Min. | Typ. | Max. | Unit |
|---------------------------|------------------|---------------------------------------------------------------------|------|------|------|------|
| Turn-On Time              | T <sub>ON</sub>  | V <sub>COM</sub> =1.5V, C <sub>L</sub> =35pF, R <sub>L</sub> =50Ω   |      | 200  |      | ns   |
| Turn-Off Time             | T <sub>OFF</sub> | V <sub>COM</sub> =1.5V, C <sub>L</sub> =35pF, R <sub>L</sub> =50Ω   |      | 200  |      | ns   |
| Break-Before-Make time    | T <sub>BBM</sub> | V <sub>COM</sub> =1.5V, C <sub>L</sub> =35pF, R <sub>L</sub> =50Ω   |      | 500  |      | ns   |
| -3dB Bandwidth            | BW               | R <sub>L</sub> =50Ω, C <sub>L</sub> =0pF                            |      | 800  |      | MHz  |
| Off isolation             | OIRR             | F=1KHz, R <sub>L</sub> =50Ω                                         |      | -81  |      | dB   |
|                           |                  | F=10KHz, R <sub>L</sub> =50Ω                                        |      | -80  |      | dB   |
| Crosstalk                 | Xtalk            | F=1KHz, R <sub>L</sub> =50Ω                                         |      | -83  |      | dB   |
|                           |                  | F=10KHz, R <sub>L</sub> =50Ω                                        |      | -82  |      | dB   |
| Total Harmonic Distortion | THD              | F=20Hz to 20KHz<br>V <sub>COM</sub> =600mVp-p @R <sub>L</sub> =32Ω, |      | -80  |      | dB   |



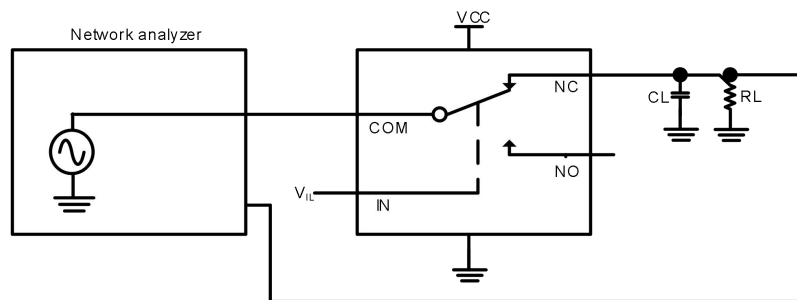
Typical Characteristics (Ta=25°C, VCC=3.3V, unless otherwise noted)



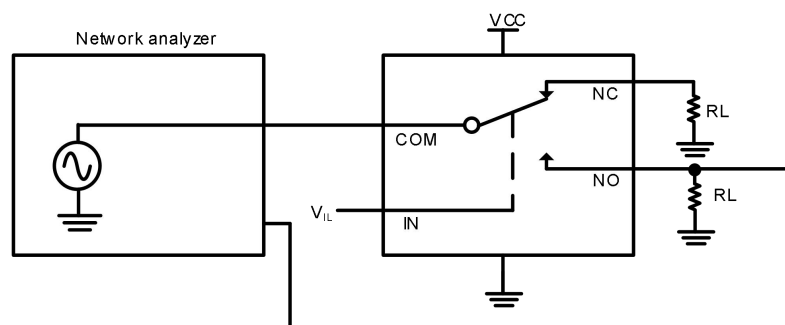
Bandwidth



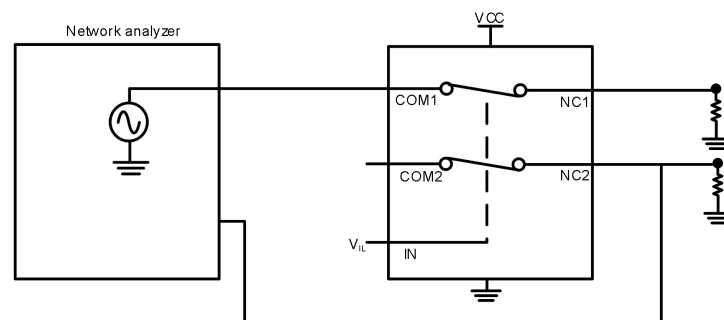
Eye Diagram (480Mbps)



Bandwidth



Off isolation

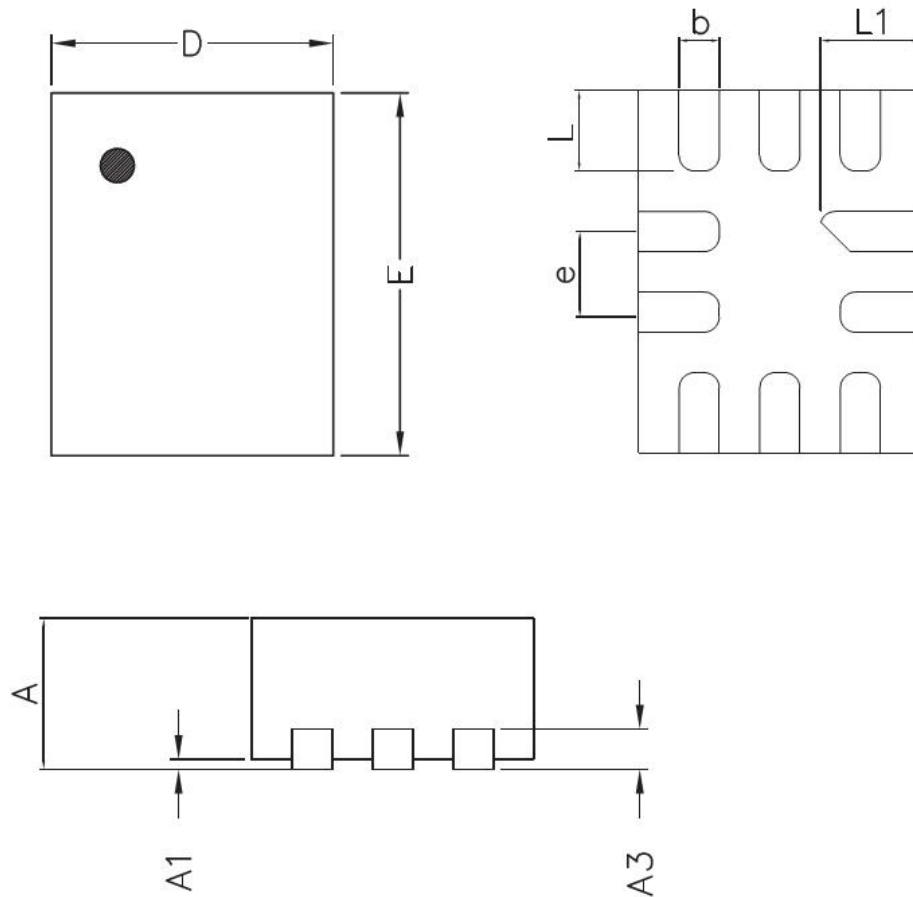


Crosstalk



## Package Outline Dimensions

### QFN1418(X-QFN-10(1.4x1.8))



| Symbol | Dimension in Millimeters |       |
|--------|--------------------------|-------|
|        | Min.                     | Max.  |
| A      | 0.450                    | 0.550 |
| A1     | 0.000                    | 0.050 |
| A3     | 0.152 Ref.               |       |
| D      | 1.350                    | 1.450 |
| E      | 1.750                    | 1.850 |
| b      | 0.150                    | 0.250 |
| e      | 0.400 Typ.               |       |
| L      | 0.350                    | 0.450 |
| L1     | 0.450                    | 0.550 |



### **Attention**

- Any and all HUA XUAN YANG ELECTRONICS products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your HUA XUAN YANG ELECTRONICS representative nearest you before using any HUA XUAN YANG ELECTRONICS products described or contained herein in such applications.
- HUA XUAN YANG ELECTRONICS assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all HUA XUAN YANG ELECTRONICS products described or contained herein.
- Specifications of any and all HUA XUAN YANG ELECTRONICS products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
- HUA XUAN YANG ELECTRONICS CO.,LTD. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all HUA XUAN YANG ELECTRONICS products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of HUA XUAN YANG ELECTRONICS CO.,LTD.
- Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. HUA XUAN YANG ELECTRONICS believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the HUA XUAN YANG ELECTRONICS product that you intend to use.