

## NXP NPIC shift register based LED drivers

# High-voltage serial-in, parallel-out shift register devices

Designed for I/O expansion, these shift register based LED drivers allow the use of lower pin-count (and lower-cost) controllers. Serial outputs support cascading, so just three controller I/Os can control the states of 16, 24 or more LEDs.

### KEY FEATURES

- ▶ 33 V, 100 mA open-drain outputs
- ▶ Simple control interface
- ▶ 5.0 and 3.3 V supply options
- ▶ Cascadable
- ▶ Overvoltage-tolerant inputs
- ▶ Inherent current limiting and thermal protection
- ▶ Integrated voltage clamps
- ▶ Fully specified (-40 to +125 °C)
- ▶ AEC-Q100 options
- ▶ Pb-free, RoHS-compliant and Dark Green

### KEY BENEFITS

- ▶ Reduced component count and footprint
- ▶ Self-protecting outputs (overcurrent)
- ▶ Suitable for driving inductive loads
- ▶ Low power consumption

### APPLICATIONS

- ▶ GPIO expansion
- ▶ LED drivers
- ▶ Displays
- ▶ Industrial
- ▶ Automotive

The NXP NPIC family of shift register based LED drivers integrates the MOSFET drivers used in traditional low-power shift register applications. This integration greatly reduces the component count, layout complexity, and footprint of LED driving applications.

Integrated voltage clamps in the outputs provide protection against inductive transients. This protection makes the NPIC devices suitable for power driver applications such as relay, solenoids, and other low-current, medium-voltage loads.

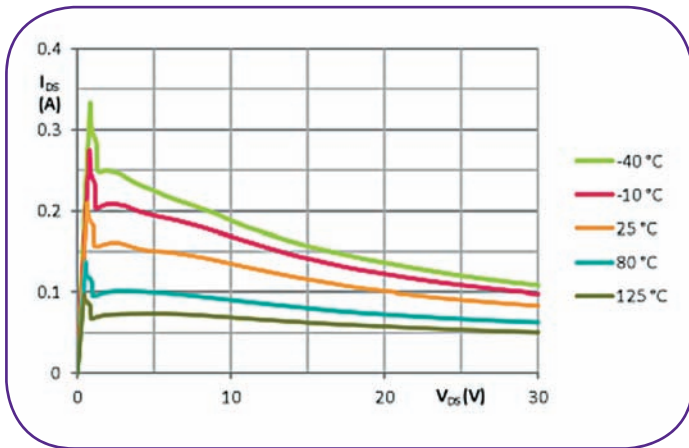
8-bit and 12-bit shift registers are available in the NPIC family. These are made available in the industry's standard and smallest packages.



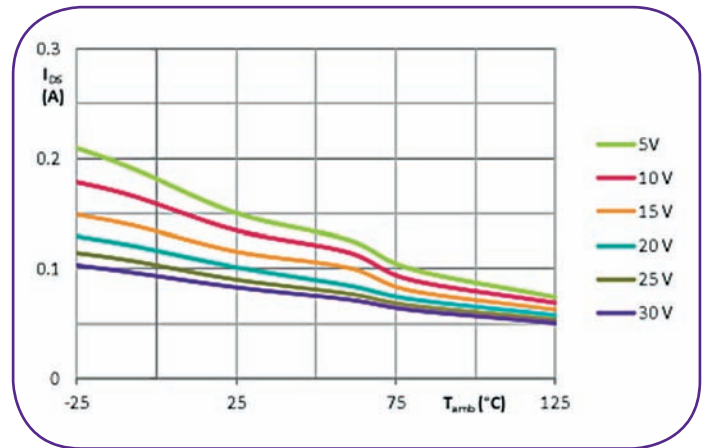
## INHERENT PROTECTION FEATURES

The open-drain outputs include circuitry that limits the maximum current each output can sink. As the drain voltage increases, the drain source current decreases. This feature protects the outputs and the components they are driving. At 25 °C, the output clamp is typically activated when the drain source current is 250 mA.

Thermal protection is also included in the open-drain outputs. As the temperature increases, so does the output resistance. This limits drain source current and prevents damage to the output and the components it is driving. At 25°C, the output typically limits the drain source current to 120 mA.



Output current limiting as a function of drain source voltage



Output current limiting as a function of temperature

## NPIC portfolio

Type number	Description	Features					Packages				
		5 V supply	3.3 V supply	Overvoltage-tolerant I/Os	Open-drain output	Master reset	SOT109 (D)	SOT163 (D)	SOT403 (PW)	SOT360 (PW)	SOT763 (BQ)
NPIC6C595	Power logic 8-bit shift register; open-drain outputs	•		•	•	•	•		•		•
NPIC6C596	Power logic 8-bit shift register; open-drain outputs	•		•	•	•	•		•		•
NPIC6C596A	Power logic 8-bit shift register; open-drain outputs	•	•	•	•	•	•		•		•
NPIC6C4894	Power logic 12-bit shift register; open-drain outputs	•		•	•			•		•	

## Packages

Package suffix	D	D	PW	PW	BQ
	16-pin	20-pin	16-pin	20-pin	16-pin
Package	SOT109	SOT163	SOT403	SOT360	SOT763
Width (mm)	6.00	10.30	6.40	6.40	2.50
Length (mm)	9.90	12.80	5.00	6.50	3.50
Height (mm)	1.75	2.65	1.10	1.10	1.00
Pitch (mm)	1.27	1.27	0.65	0.65	0.50

NPIC devices are available in industry standard SO and TSSOP packages, as well as the innovative leadless DQFN packages.

The smaller footprint leadless DQFN provides a 76% footprint reduction compared to TSSOP. This enables NPIC solutions to provide considerable footprint reduction compared to traditional solutions with external MOSFET drivers.

## NPIC family

[www.nxp.com/products/logic/family/NPIC/](http://www.nxp.com/products/logic/family/NPIC/)

## AEC-Q100 compliant shift registers

[www.nxp.com/products/automotive/logic/shift\\_registers/](http://www.nxp.com/products/automotive/logic/shift_registers/)

[www.nxp.com](http://www.nxp.com)

© 2015 NXP Semiconductors N.V.

All rights reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use. Publication thereof does not convey nor imply any license under patent- or other industrial or intellectual property rights.

Date of release: April 2015

Document order number: 9397 750 17648

Printed in the Netherlands