

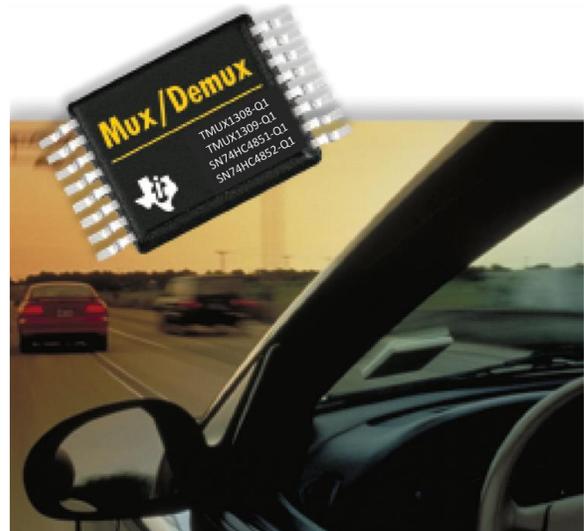
# TMUX13xx-Q1 and SN74HC485x-Q1 Analog Multiplexer and Demultiplexer with Injection Current Control



## 1 Overview

Texas Instruments' TMUX13xx-Q1 (TMUX1308-Q1 and TMUX1309-Q1) and SN74HC485x-Q1 (SN74HC4851-Q1 and SN74HC4852-Q1) analog multiplexer and demultiplexer parts are pin to pin compatible with the 4051 and 4052 function. The TMUX13xx-Q1 and SN74HC485x-Q1 also offer injection current protection (See [Switches and muxes: Prevent crosstalk with injection current control](#)) for more details, which makes it an ideal solution in harsh environments such as automotive, where voltage spikes excess of normal logic voltage levels are common. The injection current effect control circuitry eliminates the need for external diode and resistor networks, which are typically used to keep the analog channel signals within the supply voltage range. TI offers the TMUX13xx-Q1 and SN74HC485x-Q1 in a variety of package options: The TMUX13xx-Q1 comes in TSSOP, QFN and SOT-23 (thin DYY) packages.

The DYY package is **50% smaller** than industry standard leaded package (13.6 mm<sup>2</sup>) and is the **smallest 16 pin leaded package** in the industry. The SN74HC485x-Q1 is available in the PDIP, SOIC, TSSOP, and TVSOP packages.



## 2 TMUX13xx-Q1 Benefits and Features

The TMUX13xx-Q1 devices include the features and benefits shown in [Table 1](#):

**Table 1. TMUX13xx-Q1 Benefits and Features<sup>(1)</sup>**

Benefits	Features
<p>The TMUX13xx-Q1 devices includes the following benefits:</p> <ul style="list-style-type: none"> <li>Injection current protection for use in harsh environments such as Automotive</li> <li>Extended temperature range: -40°C to 125°C</li> <li><b>Back-powering protection</b> eliminates diode to supply which prevents supply voltage from rising with injection currents when reverse blocking diode is used in system. See <a href="#">Eliminate power Sequencing with powered-off protection signal switches</a> for more details</li> <li><b>1.8 V Control Logic</b> enables forward compatibility with low voltage processors and MCUs See <a href="#">1.8 V Logic for Muxes and Signal</a> for more details</li> <li><b>Fail safe logic:</b> Ensures the switch stays off and the logic pin does not back-power VDD when the voltage on the signal pin is greater than VDD. See <a href="#">Switches and muxes: What is fail-safe logic?</a> for more details.</li> <li>AEC-Q100 Qualified for automotive applications</li> </ul>	<p>The TMUX13xx-Q1 devices include the following features:</p> <ul style="list-style-type: none"> <li>Wide voltage range ideal for 1.8-V, 3.3-V, and 5-V applications</li> <li>Low capacitance of 15 pF</li> <li>Break-before-make switching</li> <li>ESD protection per ANSI/ESDA/JEDEC JS-001 specification <ul style="list-style-type: none"> <li>2000-V human-body model (AEC Q100-002)</li> <li>750-V charged-device model (AEC Q100-011)</li> </ul> </li> </ul>

<sup>(1)</sup> The TMUX1308-Q1 is pin compatible with SN74HC4851-Q1, SN74LV4051A-Q1, CD74HCT4051-Q1, CD74HC4051-Q1 and CD4051B-Q1 and is direct second source to NXP 74HC4851/4051, 74LV4051, 74HCT4051; ST MC74HC4851/4051, MC74LVX4051, MC14051; ON M74HC4851/4851, HCF4051BM1; FC 74VHC4051MTC, CD4051BCMTC and the TMUX1309-Q1 pin is compatible with SN74LV4852-Q1, SN74LV4052A-Q1 and TS3A5017-Q1 and direct second source to ST M74HC4858TTR; ON MC74HC4852A and FC 74VHC4052MTCX.

### 3 SN74HC485x-Q1 Benefits and Features

The SN74HC485x-Q1 devices include the features and benefits shown in [Table 2](#):

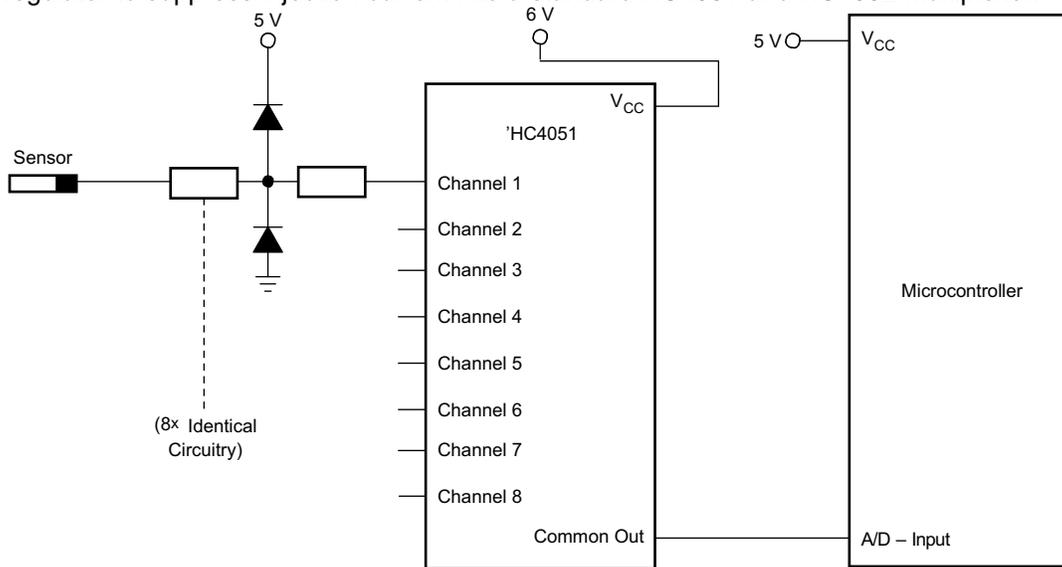
**Table 2. SN74HC485x-Q1 Benefits and Features<sup>(1)</sup>**

Benefits	Features
<p>The SN74HC485x-Q1 devices includes the following benefits:</p> <ul style="list-style-type: none"> <li>• Injection current protection for use in harsh environments such as Automotive</li> <li>• Low current cross between switches</li> <li>• Extended temperature range: -40°C to 125°C</li> <li>• Qualifies in accordance with AEC-Q100 (Q1) (HC4851 only)</li> </ul>	<p>The SN74HC485x-Q1 analog mux and demux devices includes the following features:</p> <ul style="list-style-type: none"> <li>• 2-V to 6-V <math>V_{CC}</math> operation</li> <li>• <math>T_{pd}</math> = 8.6 ns (typical) at <math>T_A</math> = 25°C and <math>V_{CC}</math> = 4.5 V</li> <li>• Latch-up performance exceeds 100 mA per JESD 78, Class II</li> <li>• ESD protection that exceeds JESD 22               <ul style="list-style-type: none"> <li>– 2000-V human-body model (A114-A)</li> <li>– 200-V machine model (A115-A)</li> <li>– 1000-V charged-device model (C101)</li> </ul> </li> </ul>

<sup>(1)</sup> The SN74HC485x-Q1 devices are pin compatible with CD74HC4051/4052, SN74LV4051A/4052A and CD4051B/4052B and direct second source to ST M74HC4851/4852 and HC4852A; and ON M74HC4851A/4852A.

### 4 Alternate Solution

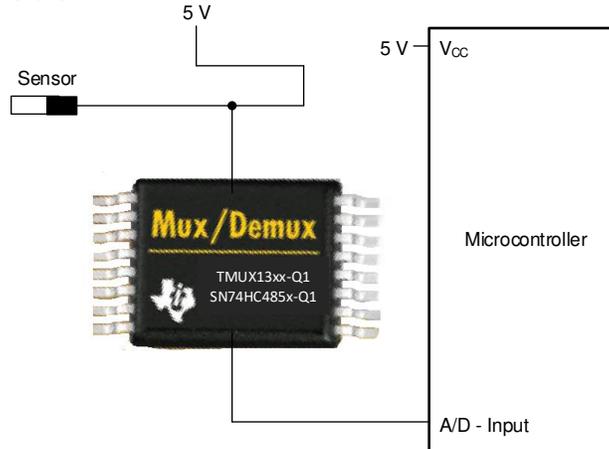
The alternate solution without injection current control needs external passive components and one extra 6-V regulator to suppress injection current into a standard HC4051 and HC4052 multiplexer.



**Figure 1. Application BCM**

## 5 Single-Chip Solution

TI's TMUX1308-Q1, TMUX1309-Q1, HC4851, and HC4852 single-chip solution eliminates the need for external diodes and resistors.



## 6 Ordering Information for TMUX13xx-Q1 and SN74HC485x-Q1

Table 3. Ordering Information for TMUX1308-Q1, HC4851 and HC4852

Part Number	T <sub>A</sub>	Package <sup>†</sup>	Orderable Part Number
TMUX1308-Q1	-40°C to 125°C	SOT-23-THN DYY	TMUX1308QDYRQ1
		TSSOP - PW	TMUX1308QPWRQ1
		QFN - DQB	TMUX1308QDQBQ1
SN74HC4851-Q1	-40°C to 125°C	PDIP - N	SN74HC4851N
		SOIC - D	SN74HC4851D
			SN74HC4851DR
			SN74HC4851DRQ1
		TSSOP - PW	SN74HC4851QPWRV
		SN74HC4851QPWRQ1	
TVSOP - DGV	SN74HC4851DGVR		
SN74HC4852-Q1	-40°C to 125°C	PDIP - N	SN74HC4852N
		SOIC - D	SN74HC4852D
			SN74HC4852DR
		TSSOP - PW	SN74HC4852PW
		TVSOP - DGV	SN74HC4852PW
SN74HC4852DGVR			

## 7 References

- Texas Instruments, [Simplifying Design with 1.8 V logic Muxes and Switches](#).
- Texas Instruments, [Eliminate power Sequencing with powered-off protection signal switches](#).
- Texas Instruments, [TI Precision Labs - Switches and Multiplexers - Switches and muxes: Prevent crosstalk with injection current control](#).
- Texas Instruments, [TI Precision Labs - Switches and muxes: What is fail-safe logic?](#)
- Texas Instruments, [QFN/SON PCB Attachment](#).
- Texas Instruments, [Quad Flatpack No-Lead Logic Packages](#).

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### Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from C Revision (March 2020) to D Revision	Page
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- |  |   |
|--|---|
| • Updated link to TI Precision Labs -Switches and muxes: Prevent crosstalk with injection current control..... | 1 |
|--|---|

Changes from B Revision (August, 2011) to C Revision	Page
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- |   |   |
|---|---|
| • Added details on new <i>TMUX13xx-Q1</i> devices ..... | 1 |
|---|---|

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