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In complex industrial and automotive systems, DC ground offsets and AC ground noise are common due to long cable runs, high-current loads, and separate power supplies that introduce different ground references across subsystems. These conditions lead to ground potential differences; disrupting communication and degrading signal integrity. As an example, in automotive systems, multiple components—such as, electronic control units (ECUs), sensors, and actuators—share a common chassis ground, but varying current paths and voltage drops can introduce ground offsets. This shift in ground can interfere with sensitive circuits, such as sensors and communication lines; leading to performance issues.

Texas Instruments' latest family of ground-level translator devices features patented technology and addresses static and dynamic ground offset issues, in systems spanning millivolts to $\pm 80V$, to achieve robust communication across subsystems. The new ground-level translator portfolio delivers compactness, at 1/7th the size of existing methods, and scalability across multiple channel counts and configurations. This new family offers a more targeted device for a growing system-level design problem.

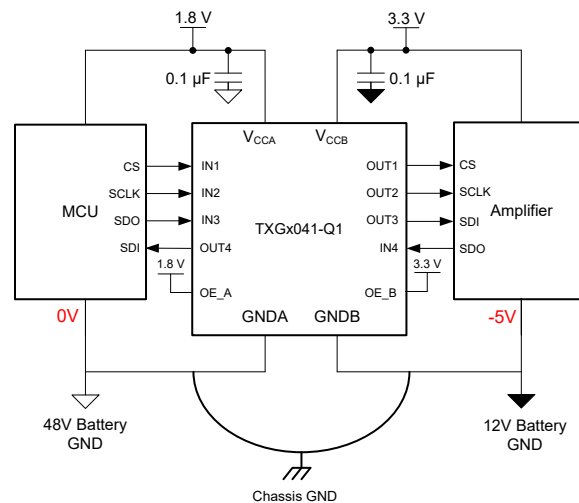


Figure 1. The TXGx041 Used in an Automotive Application to Address Ground Offset

The TXG product family offers these features to resolve the design challenges of customers:

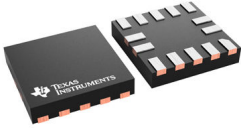
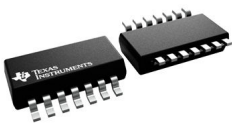
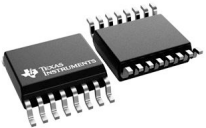
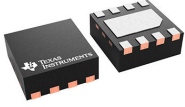


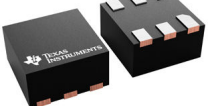
- Ground voltage DC shift up to $\pm 80V$
- AC noise rejection up to $130V_{PP}$ at 1MHz
- CMTI of $1kV/\mu s$ at 40V
- Up to 250Mbps data rate
- Low prop delay ($< 5ns$)
- Low Ch-Ch skew ($0.35ns$)
- Voltage level translation from 1.8V to 5V
- Low power consumption ($0.65mA/Ch$)
- Wide temperature range ($-40^{\circ}C$ to $+125^{\circ}C$)

The TXG family has a comprehensive portfolio to support a variety of application needs. [Table 1](#) shows the different part numbers based on the ground offset, channel count, and signal direction. [Table 2](#) displays each channel count with the respective package and package area.

Table 1. Ground-Level Translator Product Portfolio

Signal Type	Number of Channels	Channel Direction	Ground DC Offset Voltage		
			± 80V	± 40V	± 10V
Push-Pull	4 Ch	3 forward 1 reverse	TXG8041	TXG4041	TXG1041
			TXG8041-Q1	TXG4041-Q1	TXG1041-Q1
		2 forward 2 reverse	TXG8042	TXG4042	TXG1042
			TXG8042-Q1	TXG4042-Q1	TXG1042-Q1
	2 Ch	1 forward 1 reverse	TXG8021	TXG4021	TXG1021
			TXG8021-Q1	TXG4021-Q1	TXG1021-Q1
		2 forward 0 reverse	TXG8020	TXG4020	TXG1020
			TXG8020-Q1	TXG4020-Q1	TXG1020-Q1
	1 Ch	1 forward	TXG1010	TXG4010	TXG8010
			TXG1010-Q1	TXG4010-Q1	TXG8010-Q1

Table 2. Ground-Level Translator Package Information

Number of Channels	Package Size		
4 Ch	RUC X2SON-14  (4mm ²)	DYY SOT-14  (13.69mm ²)	DBQ QSOP-16  (29.4mm ²)
2 Ch	DSG WSON-8  (4mm ²)	DDF SOT-23-8  (8.12mm ²)	D SOIC-8  (29.4mm ²)
1 Ch	DSE WSON-6  (2.25mm ²)		

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