



TIDA-00152

Automotive Acoustic Knock Sensor Interface - Test Data

This document shares the tests results of the TPIC8101-Q1 EVM. A function generator with amplitude modulation functionality was used to simulate a knock signal input. The higher amplitudes in the modulated signal simulate engine knock.

The data is structured into three main categories:

1. Output with unmodulated input
2. Output with varying degrees of modulation

Equipment used to create this data:

1. Function generator with amplitude modulation functionality
2. TPIC8101-Q1 EVM + microcontroller board
3. PC with the TPIC8101-Q1 EVM GUI installed
4. 5V power supply

To re-create the data, open up the EVM GUI and enter the following settings: (Theory behind settings can be found in the TPIC8101-Q1 EVM user's guide, Application Example, and Quick Start Guide.)

The screenshot shows the 'Knock Sensor' GUI interface. The status bar at the top indicates 'Status: Connected to HID' and includes a 'DISCONNECT FROM Tiger' button. Below this is an 'Enter Advanced mode' button. The main configuration area is divided into several sections:

- Prescaler and SDO status:** Set to '6 MHZ' and 'SDO active'.
- Channel selection:** Set to 'Channel 1'.
- Band-pass center frequency:** Set to '42'.
- Gain:** Set to '34'.
- Integration time constant:** Set to '10'.

On the right side, there is a 'BASE CONVERTER' section with a 'CALCULATOR' button and a display showing 'FF', '255', and '11111111111111111111'. Below this is a table for SPI communication:

SPI to send	Send SPI	SPI response
44	Send SPI	44
E0	Send SPI	E0
2A	Send SPI	2A
A2	Send SPI	A2
CA	Send SPI	CA

At the bottom, there are checkboxes for 'EVM external clock frequency' (checked) and 'Integration window setting 0000-FFFF (fastest-slowest)' (checked). The clock frequency is set to '6 MHz' with an 'Update Osc' button. The integration window setting is set to '012A'. A note at the bottom provides approximate values: 'Approximate value : 2.5ms->0095 5ms->012A 7.5ms->01BF 15ms->037E'.

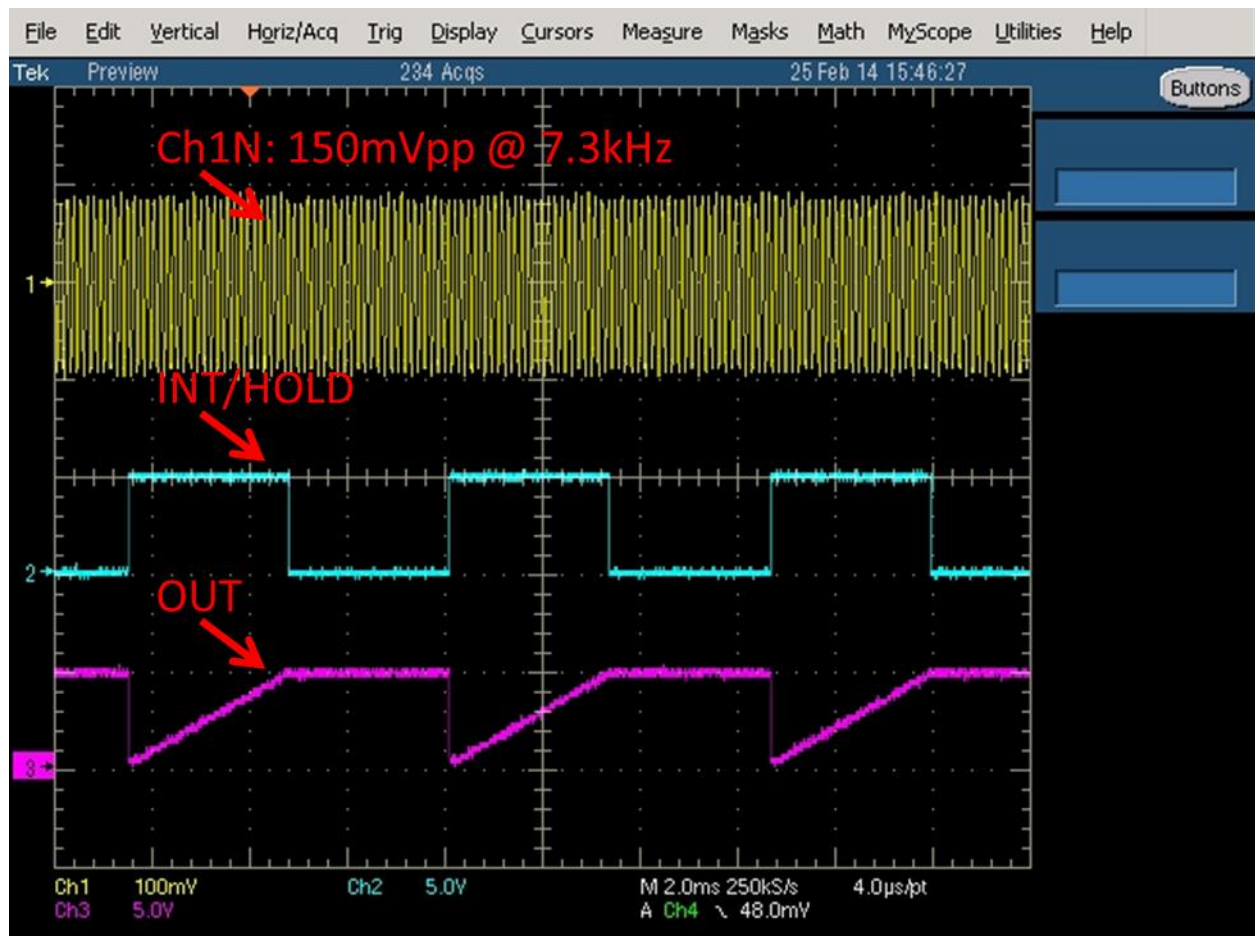
Section 1:

Ch1N on TPIC8101-Q1 EVM is connected to function generator. Function generator settings are: 150mVpp @ 7.3kHz sine wave; no amplitude modulation.

INT/HOLD is the integration window and is set for 3ms (through the GUI).

OUT is the integration of the input signal's amplitude. OUT is integrated while INT/HOLD is high. OUT is then held while INT/HOLD is low and is reset when INT/HOLD goes high again.

In the figure below, the OUT signal is periodic because the amplitude of the input is constant.



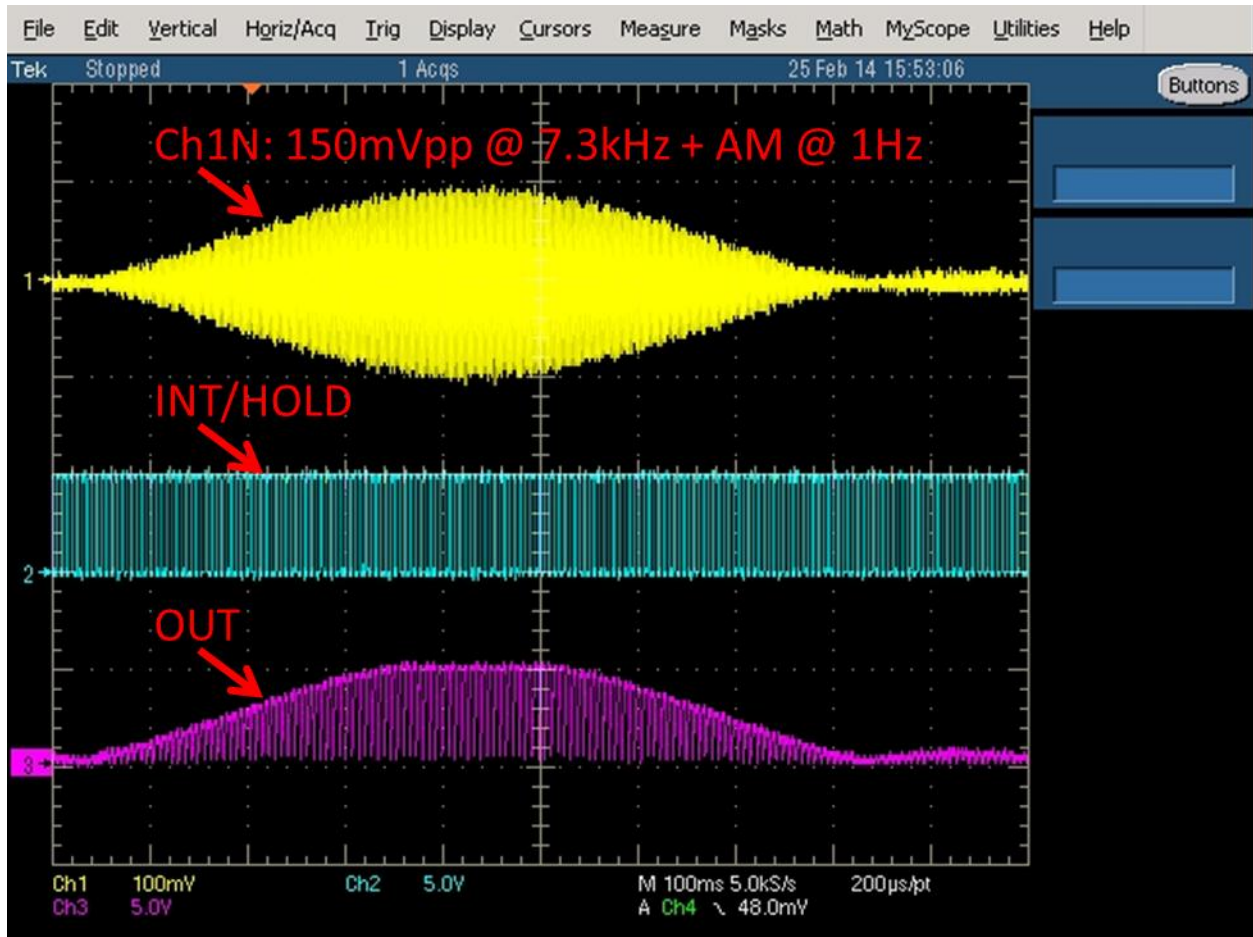
Section 2:

Ch1N on TPIC8101-Q1 EVM is connected to function generator. Function generator settings are: 150mVpp @ 7.3kHz sine wave; amplitude modulation @ 1Hz.

INT/HOLD is the integration window and is set for 3ms (through the GUI).

OUT is the integration of the input signal's amplitude. OUT is integrated while INT/HOLD is high. OUT is then held while INT/HOLD is low and is reset when INT/HOLD goes high again.

In the figure below, the input amplitude is not constant because the signal is amplitude modulated. As a result, the OUT signal's amplitude also varies. Note: The scope shot is zoomed out relative to the scope shot in Section 1.



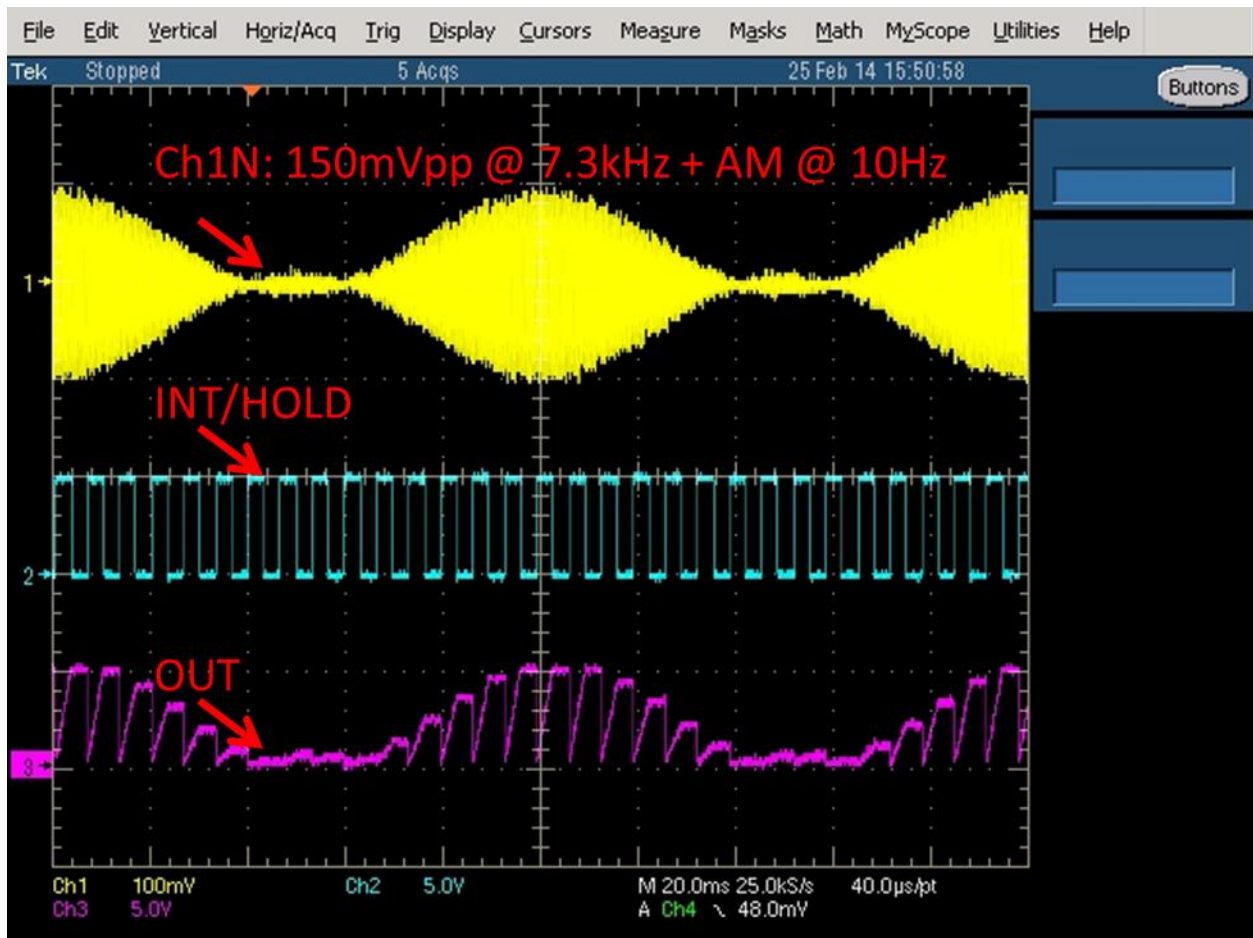


Ch1N on TPIC8101-Q1 EVM is connected to function generator. Function generator settings are: 150mVpp @ 7.3kHz sine wave; amplitude modulation @ 10 Hz.

INT/HOLD is the integration window and is set for 3ms (through the GUI).

OUT is the integration of the input signal's amplitude. OUT is integrated while INT/HOLD is high. OUT is then held while INT/HOLD is low and is reset when INT/HOLD goes high again.

In the figure below, the input amplitude is not constant because the signal is amplitude modulated. As a result, the OUT signal's amplitude also varies. Note: The scope shot is zoomed out relative to the scope shot in Section 1.



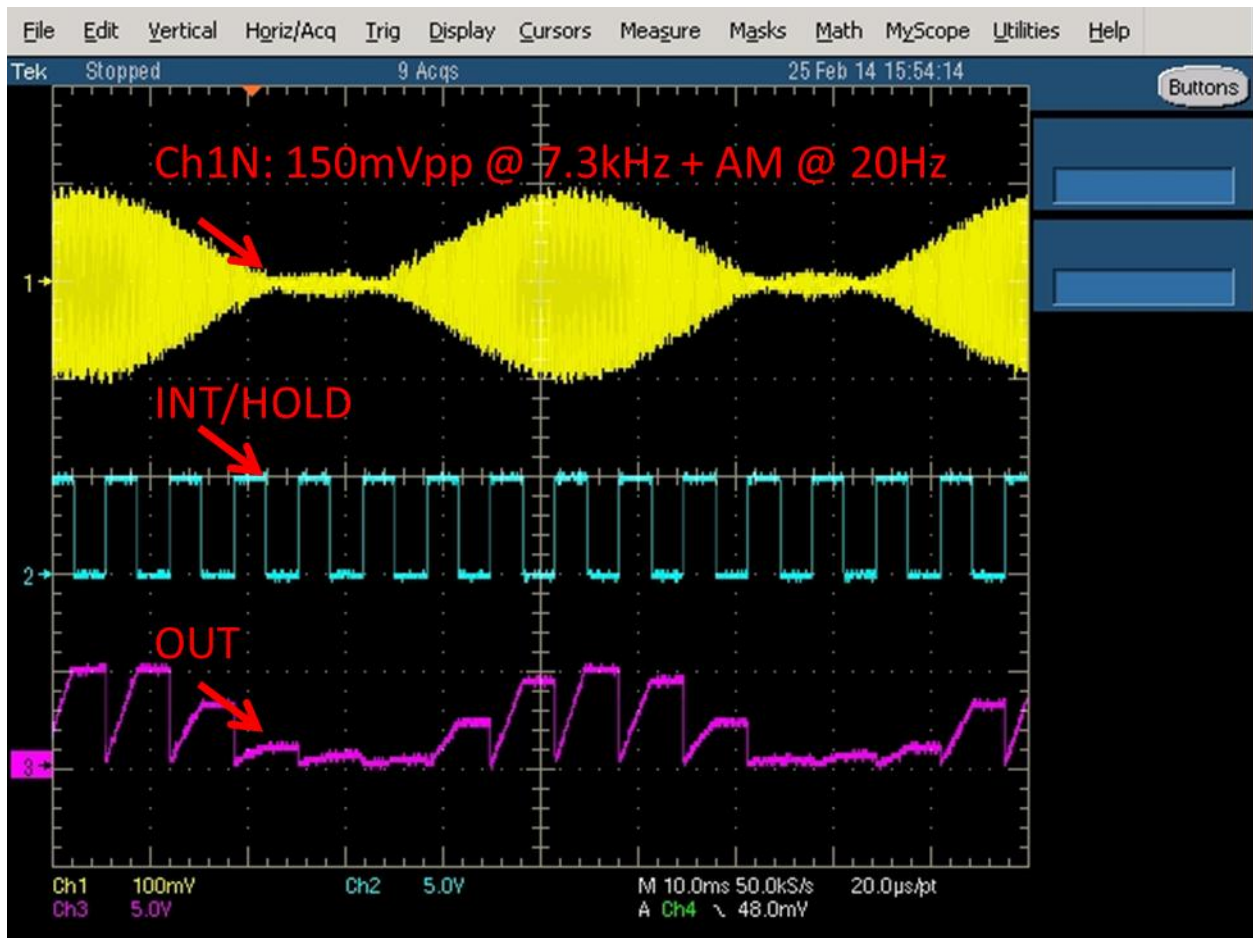


Ch1N on TPIC8101-Q1 EVM is connected to function generator. Function generator settings are: 150mVpp @ 7.3kHz sine wave; amplitude modulation @ 20 Hz.

INT/HOLD is the integration window and is set for 3ms (through the GUI).

OUT is the integration of the input signal's amplitude. OUT is integrated while INT/HOLD is high. OUT is then held while INT/HOLD is low and is reset when INT/HOLD goes high again.

In the figure below, the input amplitude is not constant because the signal is amplitude modulated. As a result, the OUT signal's amplitude also varies. Note: The scope shot is zoomed out relative to the scope shot in Section 1.



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