# CL-103 Product Family Specification

PFS-CL103-A1

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INTELLIGENT VEHICLE CONTROLS HED

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## USING THIS DOCUMENT

The specifications contained herein represent all possible configurations for this product family. The actual configurations available on each module may be a subset of this specification. Please refer to the module-specific datasheet for the connector pinout and configurations that are available.

## USER LIABILITY

The OEM of a machine or vehicle in which HED® electronic controls are installed is fully responsible for all consequences that might occur. HED®, and any authorized distributor, has no responsibility for any consequences, direct or indirect, caused by failures or malfunctions. Failure or improper selection or improper use of HED® products can cause death, personal injury and property damage.

The OEM must analyze all aspects of their application and review the information concerning product or system in the current product documentation. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by HED® at any time without notice.

# INPUT STG (B11, B12)

Pull-up Resistance
- 470Ω (typical)

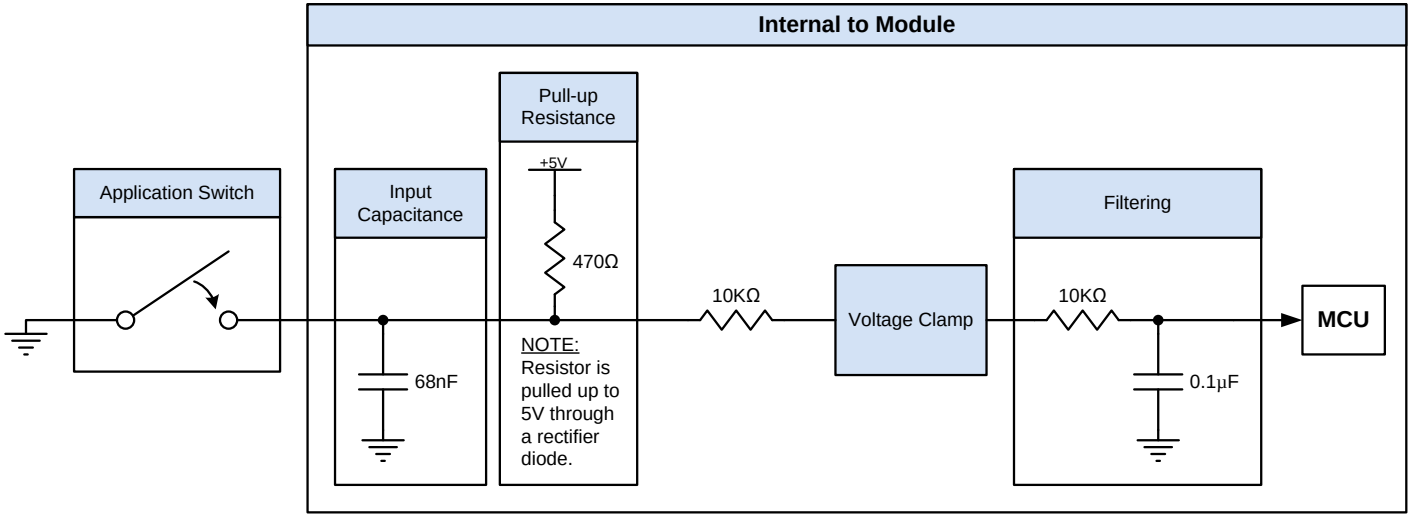
Input Current
- 9.0mA at 0V (typical)

Positive Going Threshold
- > 3.25V

Negative Going Threshold
- < 1.75V

Parallel Resistance
- 2KΩ at 0V (minimum)

Series Resistance
- 220Ω (maximum)



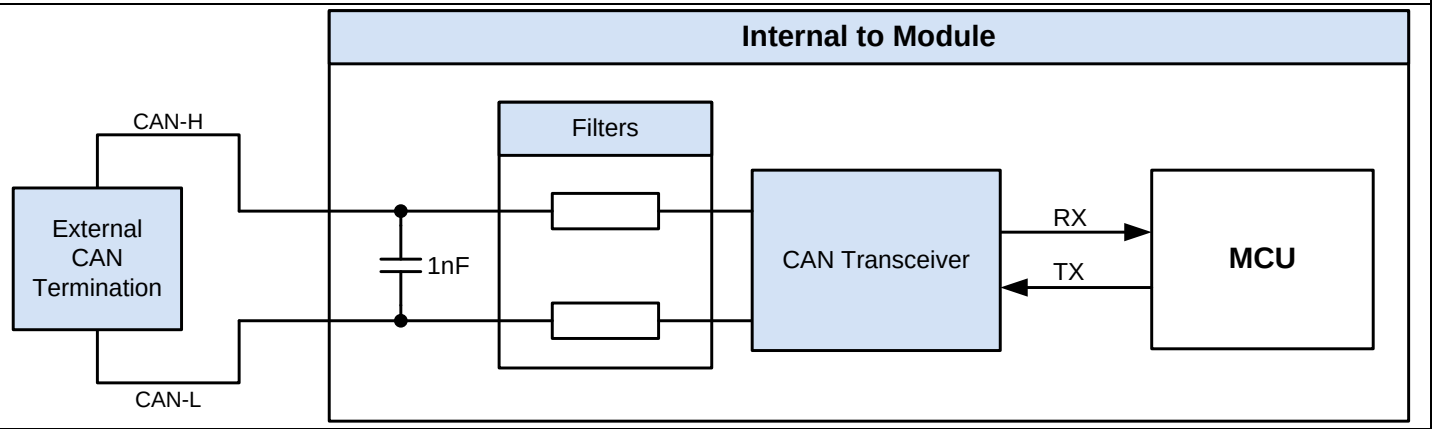

# CAN COMMUNICATION (PINS A07/A08, A09/A10, B09/B10)

Baud Rate
- 40 Kbps to 500 Kbps

Maximum Allowable Voltage[1]
- -27V to +40V

Input Capacitance (maximum)
- 20pF (Single-ended)
- 1nF (differential)

No Internal Termination




[1] Maximum allowable voltage defines the voltage extremes that the transceiver can tolerate. Exposure to these voltages for extended periods may affect device reliability.

# J1708 COMMUNICATION (PINS B07/B08)

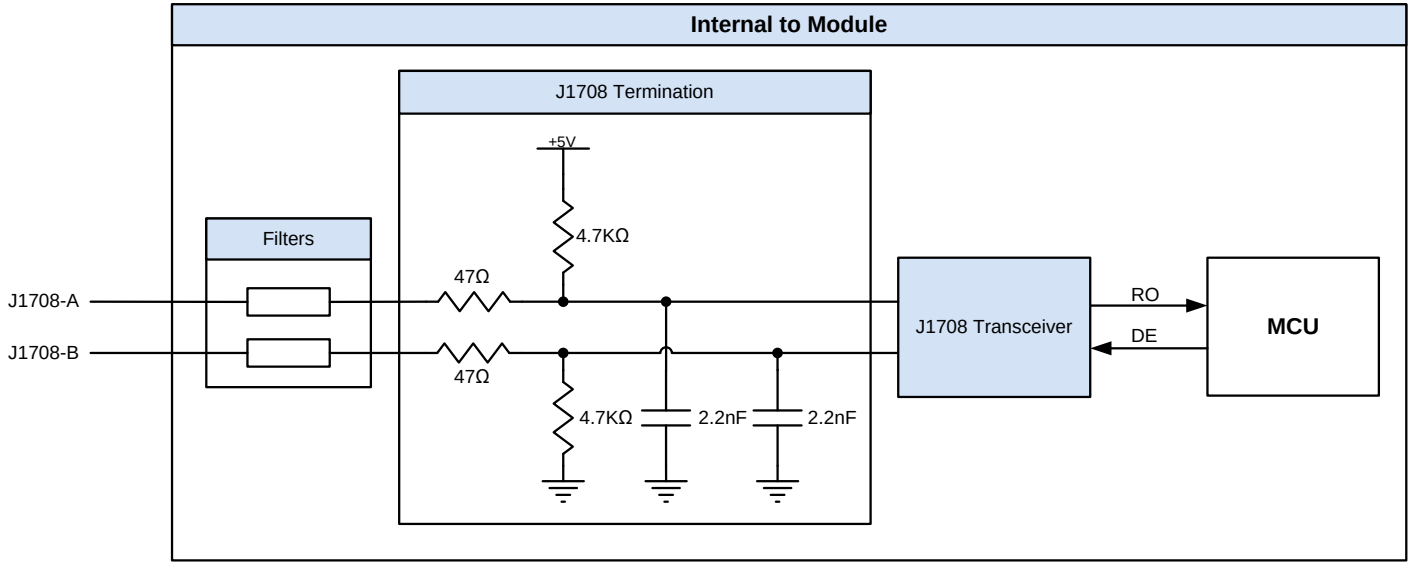
Baud Rate
- Up to 9600 bps

Maximum Allowable Voltage[1]
- -9V to +14V

Bus Common-Mode Voltage Range
- -7V to +12V

Driver Differential Output Voltage
- 1.5V to 5.0V

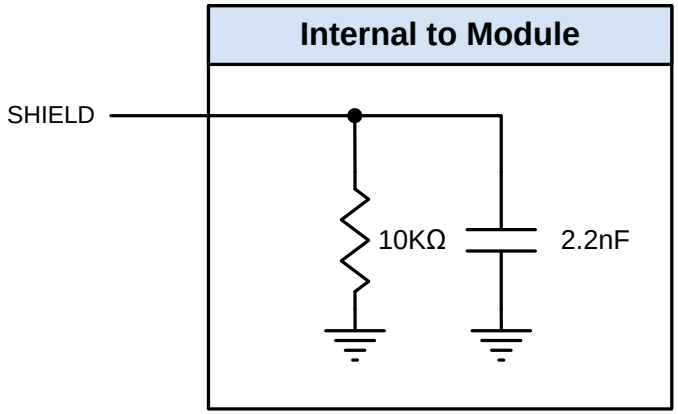
Receiver Differential Input Threshold Voltage
- -0.2V to +0.2V




[1] Maximum allowable voltage defines the voltage extremes that the transceiver can tolerate. Exposure to these voltages for extended periods may affect device reliability.

# CAN / J1708 SHIELD (PIN B03)

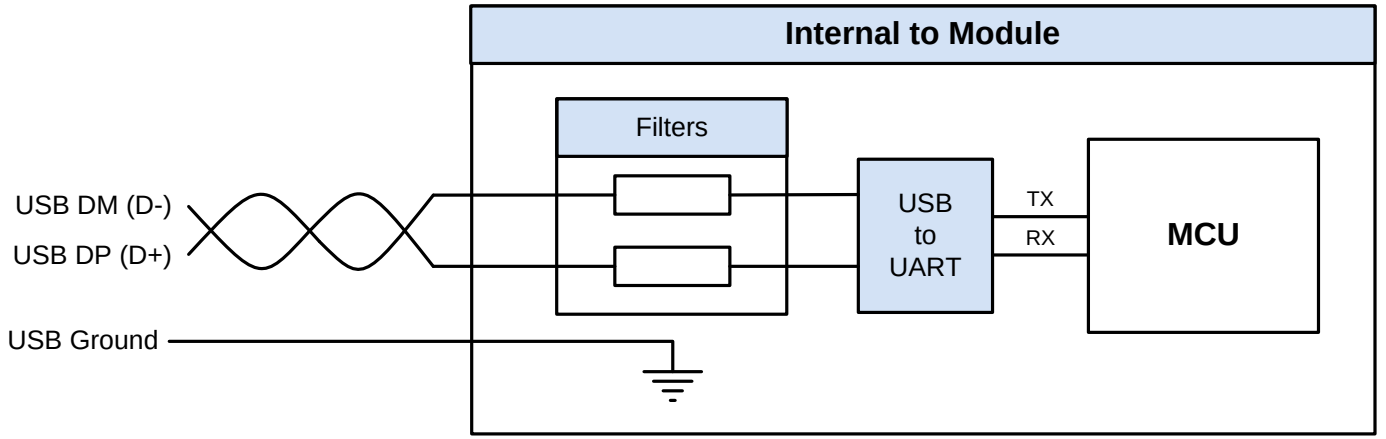
Configuration
- 10KΩ in parallel with 2.2nF



# USB-TO-UART SERIAL COMMUNICATION (PINS A02/A03, A04)

USB Standard
- USB 2.0

Serial Baud Rate
- Up to 115.2 Kbps




# RS232 COMMUNICATION (PINS A05/A06, A04 AND B04/B05, B06)

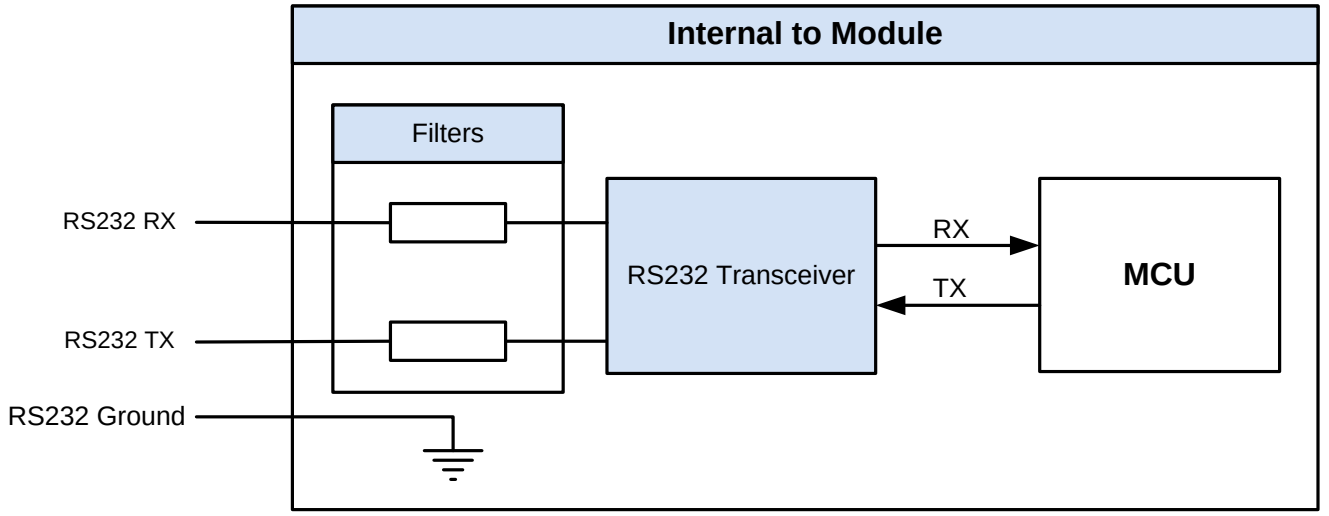
Baud Rate
- Up to 115.2 Kbps

Maximum Allowable Voltage[1]
- -30V to +30V (RS232 RX)
- -15V to +15V (RS232 TX)

Input Threshold Low
- < 0.4V

Input Threshold High
- > 2.4V

Output Voltage Swing
- ± 5.0V (min)
- ± 9.0V (typ)




[1] Maximum allowable voltage defines the voltage extremes that the transceiver can tolerate. Exposure to these voltages for extended periods may affect device reliability.

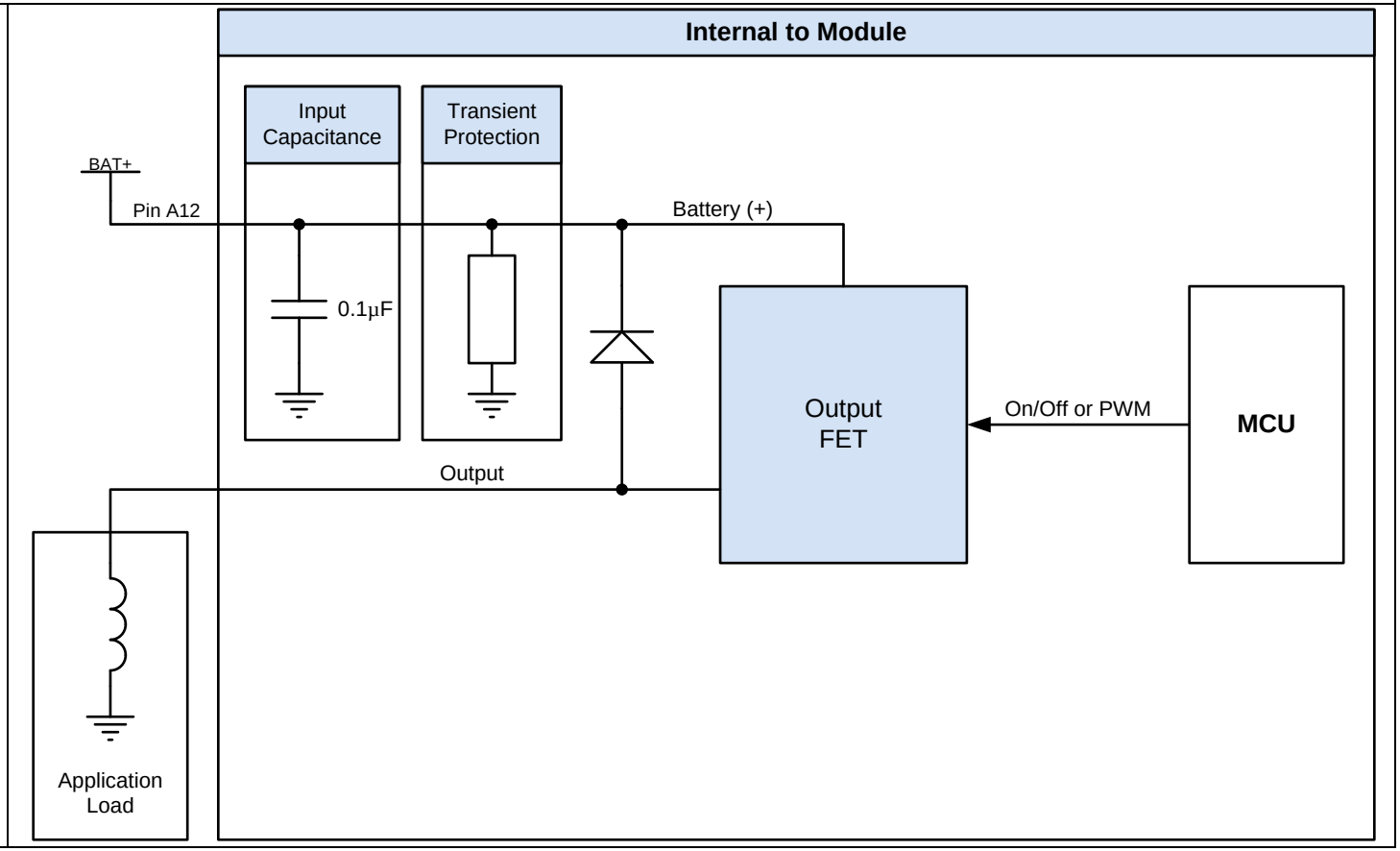
# OUTPUT DOUT(+)/PWM(+) (PIN B02)[1]

Output Current
- Digital Mode = 0.5A (max)
- PWM Mode = 0.5A (max)

PWM Frequency[2]
- > 38 Hz (minimum)
- < 300 Hz (typical)
- < 1 KHz (maximum)

Current Limit
- 0.7A (minimum)
- 1.5A (typical)
- 2.4A (maximum)

Output Diagnostics
- None




[1] Output circuitry may be damaged by a reverse battery condition. Application should ensure a reverse battery condition does not occur at the module.

[2] The output driver is best suited for PWM frequencies of 300 Hz or less. PWM frequencies of up to 1 KHz are possible, but at reduced output current and duty cycle range.

# BATTERY (+) MODULE (PIN A12) AND UNSWITCHED BATTERY (+) (PIN B01)[1]

## Battery (+)

Operating Voltage Range
- 8VDC – 32VDC

Maximum Continuous Voltage[2]
- 36VDC

Module Current Draw[3]
- 74mA at 8.0V (typ)
- 46mA at 13.8V (typ)
- 27mA at 28.0V (typ)
- 25mA at 32.0V (typ)

Maximum Total Output Current
- See Output Section for output current constraints

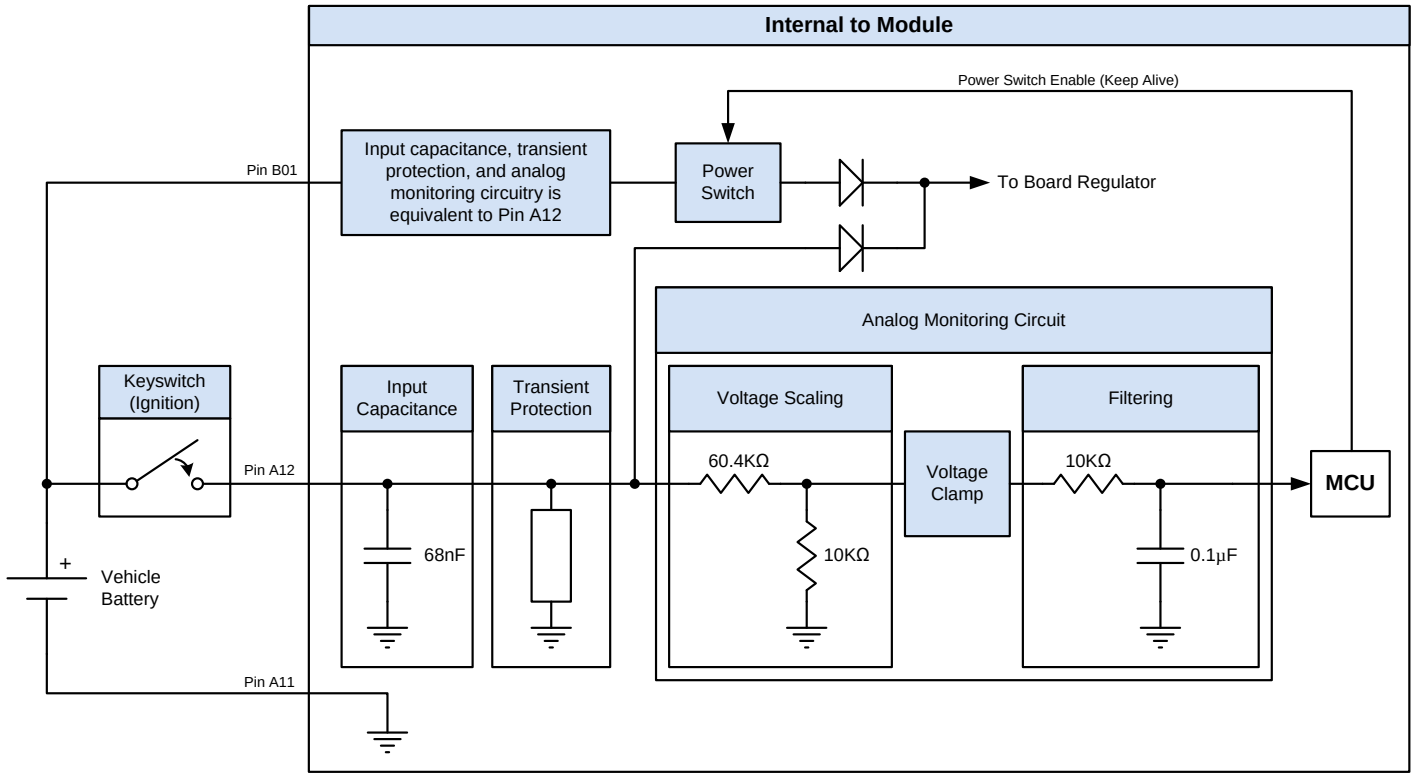
## Analog Monitoring Circuit

Input Voltage Range
- 0V to 33.98V (minimum)
- 0V to 35.20V (typical)

Input Resistance
- 70.4KΩ (typical)

Resolution
- 10 Bits
- 34.38mV / count (typical)

Accuracy[4]
- ±3.0% and ±70mV ($T_A$ = 25°C)
- ±5.0% and ±450mV ($T_A$ = Full)




[1] The block diagram shown represents one possible implementation in the system. Other implementations may be used based on system requirements.
[2] Exposure to maximum voltages for extended periods may affect device reliability.
[3] Module current draw is measured with I/O inactive and no CAN, USB, J1708, or RS232 communication.
[4] VTD accuracy is estimated using datasheet maximums and a weighted average of worst-case and root-sum-square (RSS) methods. It is considered as a percentage of the input voltage combined with an additional offset.

| REVISION HISTORY | | | |
|---|---|---|---|
| **Revision** | **Date** | **EC #** | **Changes** |
| A1 | 7/23/15 | 315-245 | Initial Release |
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