Freescale Semiconductor, Inc.
Application Note

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Using MC33788 and MC33SA0104 in the Airbag Evaluation Platform

1 Introduction

This application note explains how to use Freescale's entry-level airbag products (the MC33788 and the MC33SA0104) in the Airbag Evaluation Platform. It highlights the differences between the entry-level chips and their fully-featured counterparts (MC33789 and MC33797.) It also details the software and hardware features not present in the entry-level products as compared to the fully-featured products used in the board.

The MC33788 is a SMARTMOS solution for entry-level airbag safety applications used in cars and other vehicles.

The MC33SA0104 four-channel squib driver IC is a complete squib diagnostic and deployment interface for use in automotive airbag modules.

The Airbag Evaluation Platform is an application demonstrator system. It provides a simulated implementation of an airbag electronic control unit (ECU) that uses Freescale standard products aimed at the growing automotive safety segment.

Freescale analog ICs are manufactured using the SMARTMOS process, a combinational BiCMOS manufacturing flow that integrates precision analog, power functions and dense CMOS logic together on a single cost-effective die.

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2 Product Description

The proliferation of international standards and regulations has resulted in a rapid increase in the number of vehicles that incorporate airbag systems. Emerging markets require flexible, cost-effective solutions that provide both enhanced safety features and system reliability.

To support these requirements, Freescale's Airbag Reference Platform offers a cost-effective, scalable and ready-to-use turnkey solution for automotive airbag applications. The Airbag Reference Platform is pin-to-pin compatible with the MC33788 and MC33SA0104 devices. Both devices are ideally suited for entry-level systems.

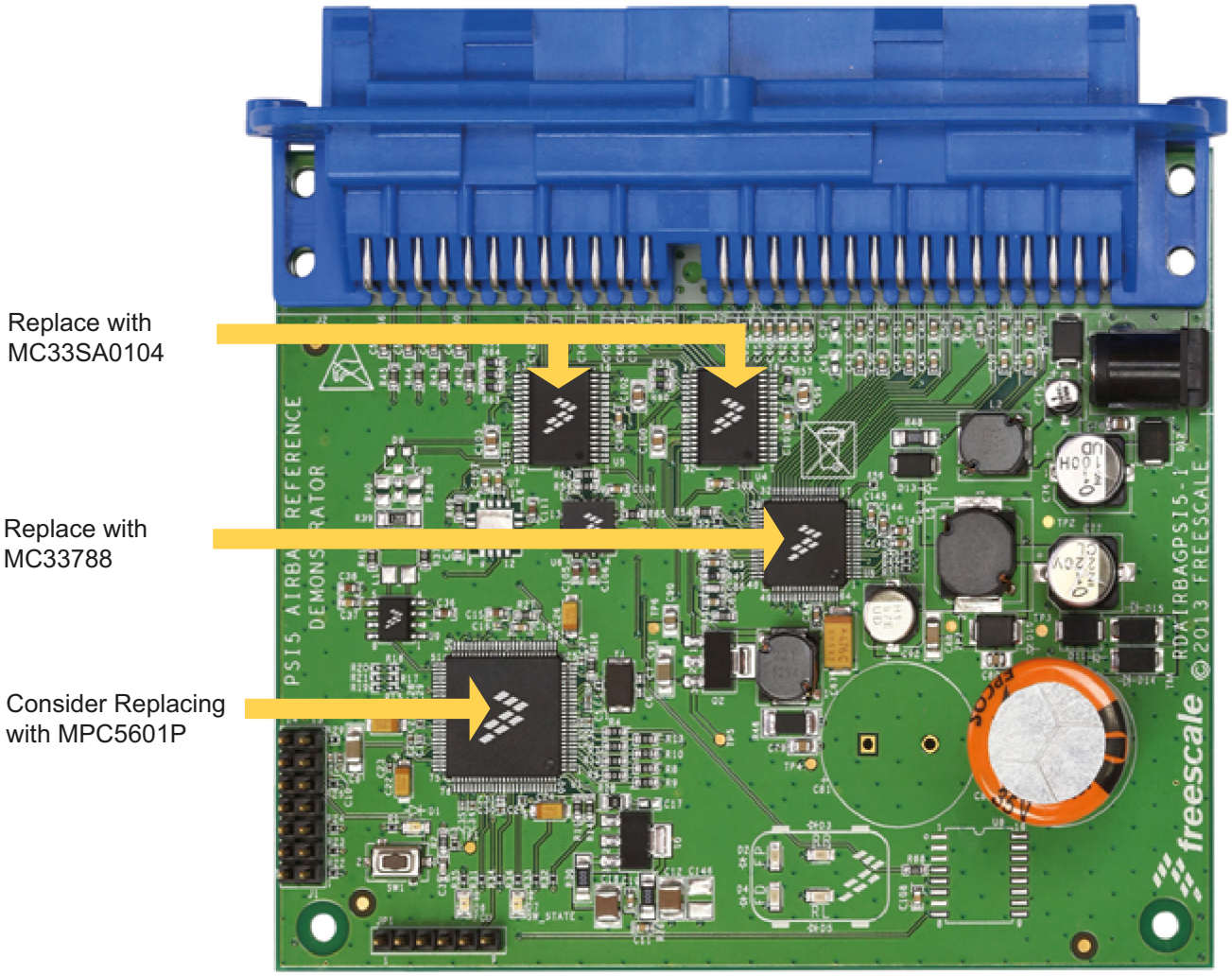

Figure 1. Airbag Reference Platform Referred Products

2.1 Feature Differences

The table below summarizes the main differences between the entry-level products, the MC33788 and the MC33SA0104, and their fully-featured counterparts, the MC33789 and the MC33797.

Each pair of products are pin-to-pin compatible, and thus fully hardware/software compatible.

Table 1. Entry-level and Fully-featured Device Differences

Type	MC33789 (Fully-featured)	MC33788 (Entry-level)	MC33797 (Fully-featured)	MC33SA0104 (Entry-level)
Function	Airbag SBC, PSI5	Airbag SBC, PSI5	4x Squib drivers	4x Squib drivers
Package	10 x10 mm LQFP-64ep	10 x 10 mm LQFP-64ep	11 x 7.5 mm 32SOICW	11 x 7.5 mm 32SOICW
Squib Drivers	NA	NA	x4, current profiles 0.8 A~2 A	x4, current profiles 1.2 A~2 A
Satellite Sensors	4x PSI5 V1.3	2x PSI5 V1.3	NA	NA
SatSync	Y	Y	NA	NA
DC Sensor	9	4	NA	NA
HV I/O's	2	2	NA	NA
Analog sensor input	1	1	NA	NA
Comm	LIN / ISO9141 ACL	LIN / ISO9141 ACL	NA	NA
SPI, Safing…	1*SPI Safing logic (With 3x CS)	1*SPI Safing logic (With 1x CS)	1*SPI	1*SPI
HS driver expansion compatibility	NA	NA	Cross-coupling	Cross-coupling

3 Using the MC33788 and the MC33SA0104

The Airbag Reference Platform offers full compatibility between entry-level devices and fully-featured devices. Therefore, to replace the fully featured devices on the board with an entry level counterpart, simply un-solder the existing chips and replace them with the entry level versions. The board will continue to function with the same MCU and PC software. (However, some fully-featured functions may be unavailable with entry-level solutions.)

3.1 MCU Code Limitations

The following firmware calls have limited functionality:

Asbc_SetDcsMuxSource	MC33788 only supports DC sensors 1 to 4. IN5 up to IN9 are not available
Asbc_SetPsi5Mode	MC33788 only supports PSI5 interfaces 1 and 2. Chann3 and Chann4 are not available
Asbc_GetPsi5Status	MC33788 only supports PSI5 interfaces Chann1 and Chann2
Asbc_ReadSensor	MC33788 only supports PSI5 interfaces Chann1 and Chann2

3.2 PC GUI Limitations

The FreeMASTER GUI supports both fully-featured and entry-level devices. A blue asterisk beside an item on the screen indicates that the item is applicable only to fully-featured configurations (configurations using MC33789 and MC33797.) Figure 2 and Figure 3 indicate where these limitations apply.

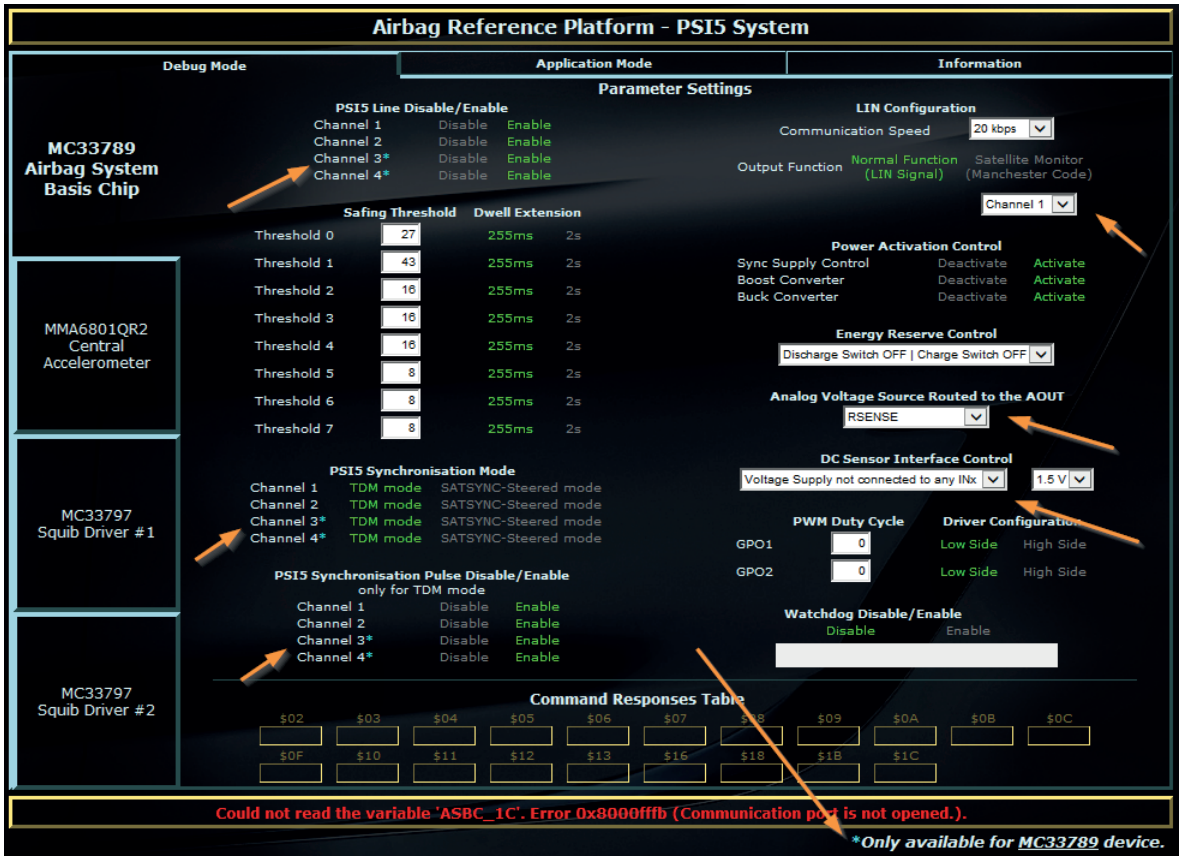

Figure 2. Fully-featured Items Only (1)

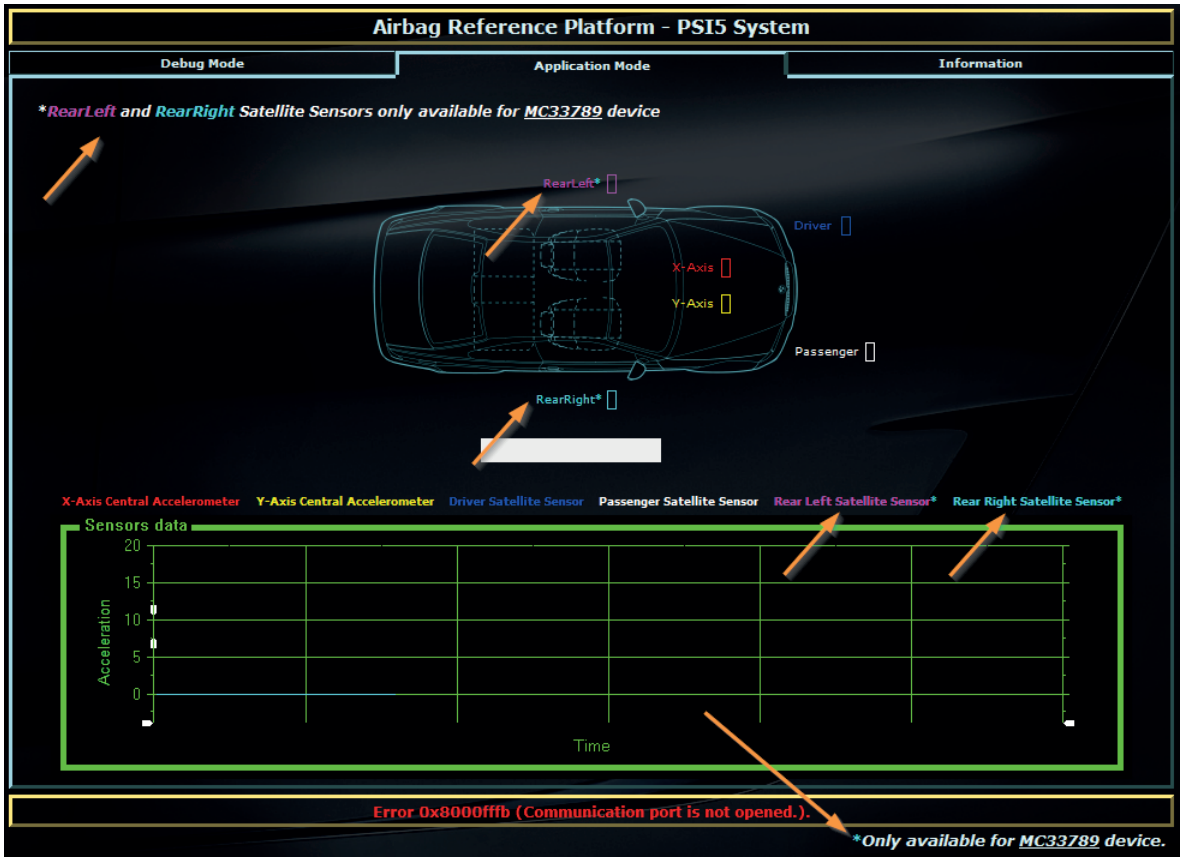

Figure 3. Fully-featured Items Only (2)

4 References

Following are URLs where you can obtain information on related Freescale products and application solutions:

Support Pages	Description	URL
MC33788	Data Sheet	http://www.freescale.com/files/analog/doc/data_sheet/MC33788.pdf
MC33789	Data Sheet	http://www.freescale.com/files/analog/doc/data_sheet/MC33789.pdf
MC33797	Data Sheet	http://www.freescale.com/files/analog/doc/data_sheet/MC33797.pdf
MC33SA0104	Data Sheet	http://www.freescale.com/files/analog/doc/data_sheet/MC33SA0104.pdf
RDAIRBAGPSI5UG	User Guide	http://www.freescale.com/files/analog/doc/user_guide/RDAIRBAGPSI5UG.pdf
AEPFS	Fact sheet	http://www.freescale.com/files/automotive/doc/fact_sheet/AEPFS.pdf
Airbag Evaluation Platform (PSI5)	Product Summary Page	http://www.freescale.com/arp
SafeAssure Functional Safety Program	SafeAssure Home Page	http://www.freescale.com/webapp/sps/site/homepage.jsp?code=SAFETYPRGRM
Analog and Power Management Home Page	Analog Home Page	http://www.freescale.com/analog

4.1 Support

Visit www.freescale.com/support for a list of phone numbers within your region.

4.2 Warranty

Visit www.freescale.com/warranty for a list of phone numbers within your region.

5 Revision History

Revision	Date	Description of Changes
1.0	3/2015	• Initial release

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