



Application Note 4

Title:

Supported Sensor Devices

Product Family:

EM7180

Part Number:

EM7180

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Document History

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1.0	1.1	EM – Milos Becvar	January 15 th , 2014	Initial Release
1.1	1.1	EM – Milos Becvar	January 20 th , 2014	LSM9DS0 gyro driver is the LSM330 Gyro driver
1.2	1.1	EM – Milos Becvar	January 27 th , 2014	LSM9DS0 name corrected
1.3	1.2	EM – Evan Lojewski	February 21 st , 2014	Merge AK8975 and AK8963 driver
1.4	1.3	EM – Evan Lojewski	February 27 th , 2014	Add TMP112 driver. Update driver table to contain driver type and SDK version it first appears in.
1.5	1.3	EM – Milos Becvar	March 7 th , 2014	Added PNI M&M Boards, added GS0 + sensor configurations
1.6	1.2	EM – Milos Becvar	April 1 st , 2014	Corrected PNI Yellow M&M GPIO pin for Mag
1.7	1.4	EM – Milos Becvar	May 21 st , 2014	AK09911 device added

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References

- [1] EM7180 Datasheet
- [2] EM Sensor Fusion Platform Datasheet

1 Introduction

This document lists all supported Sensor Devices by current release of Sentral code. It contains information about allocated Driver_ID numbers and specific information for each particular sensor driver.

2 Supported Sensor Devices

Table 1: Supported Sensor Devices and Associated Drivers

Sensor Type	Sensor Mfg	Driver Name	Supported Sensor Commercial Names	Driver ID	Included in Release
Accelerometer	ST	LSM330Accel	LSM330	0x07	1.0
Gyroscope	ST	LSM330Gyro	LSM330, LSM330DLC, LSM9DS0	0x06	1.0
Accelerometer	ST	LSM330DLCAccel	LSM330DLC	0x05	1.0
Accelerometer	ST	LSM9DS0Accel	LSM9SD0	0x0C	1.1
Magnetometer	ST	LSM9DS0Mag	LSM9SD0	0x0D	1.1
Magnetometer	AKM	AK8963Mag	AK8963, AK8975	0x03	1.0
Accelerometer	InvenSense	MPU6500Accel	MPU6500	0x0F	1.1
Gyroscope	InvenSense	MPU6500Gyro	MPU6500	0x10	1.1
Accelerometer	InvenSense	MPU9250Accel	MPU9250	0x11	Unavailable
Gyroscope	InvenSense	MPU9250Gyro	MPU9250	0x12	Unavailable
Magnetometer	InvenSense	MPU9250Mag	MPU9250	0x13	Unavailable
Accelerometer	Bosch	BMX055Accel	BMX055, BMI055, BMA255, BMA355	0x09	1.1
Gyroscope	Bosch	BMX055Gyro	BMX055, BMI055, BMG160	0x0A	1.1
Magnetometer	Bosch	BMX055Mag	BMX055, BMM150	0x08	1.1
Magnetometer	PNI	RM3100Mag	RM3100	0x02	1.0
Magnetometer	AKM	AK09911Mag	AK09911	0x14	1.4
Thermometer	TI	TMP112Temp	TMP112	0x80	1.3

Table 2: Supported Sensor Boards

Sensor Board Name	Magnetometer	Accelerometer	Gyroscope
EM Sensor Fusion Platform	BMX055	BMX055	BMX055
PNI DevKit GS0 Board + AKM/BMI	AK8963	BMI055	BMI055
PNI DevKit GS0 Board + BMM/BMI	BMM150	BMI055	BMI055
PNI DevKit GS0 Board + AKM9911/BMI	AK09911	BMI055	BMI055
PNI DevKit GS1 Board	AK8963	MPU6500	MPU6500
PNI DevKit GS3 Board	AK8963	LSM330	LSM330
PNI Blue M&M Board	RM3100	LSM330	LSM330
PNI Green M&M Board	AK8963	LSM330	LSM330
PNI Orange M&M Board	AK8963	BMI055	BMI055
PNI Red M&M Board	AK8963	MPU6500	MPU6500
PNI Yellow M&M Board	LSM9SD0	LSM9SD0	LSM330

3. Sensor Board Specific Settings

3.1 EM Sensor Fusion Platform

EM Sensor Fusion platform (SFP) [2] is a castellated module containing Sentral, Bosch BMX055 9-DOF sensor and EEPROM.

Table 3: Sensor Fusion Platform Settings

Table 3: Sensor Fusion Platform Settings							
Parameter		Value					
Magnetometer		BMX055					
GPIO pin		4		I2C Address		16	
Calibration Matrix	0		-1		0		
	-1		0		0		
	0		0		-1		
Calibration Offsets		0		0		0	
Accelerometer		BMX055					
GPIO pin		2		I2C Address		24	
Calibration Matrix	-1		0		0		
	0		1		0		
	0		0		1		
Calibration Offsets		0		0		0	
Gyroscope		BMX055					
GPIO pin		0		I2C Address		104	
Calibration Matrix	1		0		0		
	0		-1		0		
	0		0		-1		
Calibration Offsets		0		0		0	
Upload Speed		400 Kbit/s					
Host IRQ pin		6					
GPIO pull settings	6	5	4	3	2	1	0
	Def	Def	Def	Def	Def	Def	Def

3.2 PNI DevKit Boards

GS1 Board is GEN7 compatible board containing Sentral, AK8963 and MPU6500. It is compatible with PNI DevKit.

Table 4: PNI DevKit GS1 Board Settings

Parameter	Value						
Magnetometer	AK8963						
GPIO pin	0	I2C Address					12
Calibration Matrix	-1	0					0
	0	1					0
	0	0					-1
Calibration Offsets	0	0					0
Accelerometer	MPU6500						
GPIO pin	1	I2C Address					104
Calibration Matrix	0	-1					0
	-1	0					0
	0	0					1
Calibration Offsets	0	0					0
Gyroscope	MPU6500						
GPIO pin	1	I2C Address					104
Calibration Matrix	0	1					0
	1	0					0
	0	0					-1
Calibration Offsets	0	0					0
Upload Speed	400 Kbit/s						
Host IRQ pin	6						
GPIO pull settings	6	5	4	3	2	1	0
	Def	Def	Def	Def	Def	Def	Def



GS3 Board is GEN7 compatible board containing Sentral, AK8963 and LSM330. It is compatible with PNI DevKit.

Table 5: PNI DevKit GS3 Board Settings

Table 3: PIN DevKit G55 Board Settings							
Parameter		Value					
Magnetometer		AK8963					
GPIO pin	0	I2C Address				12	
Calibration Matrix	-1	0				0	
	0	1				0	
	0	0				-1	
Calibration Offsets	0	0				0	
Accelerometer		LSM330					
GPIO pin	1	I2C Address				30	
Calibration Matrix	0	-1				0	
	-1	0				0	
	0	0				1	
Calibration Offsets	0	0				0	
Gyroscope		LSM330					
GPIO pin	2	I2C Address				106	
Calibration Matrix	0	1				0	
	1	0				0	
	0	0				-1	
Calibration Offsets	0	0				0	
Upload Speed		400 Kbit/s					
Host IRQ pin		6					
GPIO pull settings	6	5	4	3	2	1	0
	Def	Def	Def	Def	Def	Def	Def



GS0 Board is GEN7 compatible board containing just Sentral motion processor. Additional connectors on the devkit can be populated by GEN7 compatible boards containing sensor devices – AK8963 magnetometer, BMI055 Accelerometer/Gyro and BMM150 magnetometer.

Table 6: PNI DevKit GS0 + AK8963 + BMI055 Settings

Table 6: I2C Device CS0 - AK8963 - Address Settings							
Parameter		Value					
Magnetometer		AK8963					
GPIO pin	0	I2C Address				12	
Calibration Matrix	0	-1				0	
	-1	0				0	
	0	0				-1	
Calibration Offsets	0	0				0	
Accelerometer		BMI055					
GPIO pin	1	I2C Address				25	
Calibration Matrix	0	-1				0	
	-1	0				0	
	0	0				1	
Calibration Offsets	0	0				0	
Gyroscope		BMI055					
GPIO pin	2	I2C Address				105	
Calibration Matrix	0	1				0	
	1	0				0	
	0	0				-1	
Calibration Offsets	0	0				0	
Upload Speed		400 Kbit/s					
Host IRQ pin		6					
GPIO pull settings	6	5	4	3	2	1	0
	Def	Def	Def	Def	Def	Def	Def

Table 7: PNI DevKit GS0 + BMM150 + BMI055 Settings

Table 7: I2C Device IDs + BMM150 + BMI055 Settings							
Parameter	Value						
Magnetometer	BMM150						
GPIO pin	0	I2C Address					19
Calibration Matrix	0	1					0
	-1	0					0
	0	0					1
Calibration Offsets	0	0					0
Accelerometer	BMI055						
GPIO pin	1	I2C Address					25
Calibration Matrix	0	-1					0
	-1	0					0
	0	0					1
Calibration Offsets	0	0					0
Gyroscope	BMI055						
GPIO pin	2	I2C Address					105
Calibration Matrix	0	1					0
	1	0					0
	0	0					-1
Calibration Offsets	0	0					0
Upload Speed	400 Kbit/s						
Host IRQ pin	6						
GPIO pull settings	6	5	4	3	2	1	0
	Def	Def	Def	Def	Def	Def	Def

Table 8: PNI DevKit GS0 + AK09911 + BMI055 Settings

Table 8: I2C Device IDs + AK09911 + BMI055 Settings							
Parameter	Value						
Magnetometer	AK09911						
GPIO pin	0	I2C Address					12
Calibration Matrix	0	-1					0
	-1	0					0
	0	0					-1
Calibration Offsets	0	0					0
Accelerometer	BMI055						
GPIO pin	1	I2C Address					25
Calibration Matrix	0	-1					0
	-1	0					0
	0	0					1
Calibration Offsets	0	0					0
Gyroscope	BMI055						
GPIO pin	2	I2C Address					105
Calibration Matrix	0	1					0
	1	0					0
	0	0					-1
Calibration Offsets	0	0					0
Upload Speed	400 Kbit/s						
Host IRQ pin	6						
GPIO pull settings	6	5	4	3	2	1	0
	Def	Def	Def	Def	Def	Def	Def

Note: Although AKM09911 sensor does not have an interrupt wire, GPIO pin is reserved for obtaining timestamps.

3.3 PNI M&M Boards

Table 9: PNI Blue M&M Board Settings

Parameter								Value								
Magnetometer				RM3100												
GPIO pin				0		I2C Address				32						
Calibration Matrix				1		0				0						
				0		1				0						
				0		0				1						
Calibration Offsets				0		0				0						
Accelerometer				LSM330												
GPIO pin				1		I2C Address				30						
Calibration Matrix				-1		0				0						
				0		1				0						
				0		0				1						
Calibration Offsets				0		0				0						
Gyroscope				LSM330												
GPIO pin				2		I2C Address				106						
Calibration Matrix				1		0				0						
				0		-1				0						
				0		0				-1						
Calibration Offsets				0		0				0						
Upload Speed				400 Kbit/s												
Host IRQ pin				6												
GPIO pull settings				6	5	4	3	2	1	0						
				Def	Def	Def	Def	Def	Def	Def	Def					

Table 10: PNI Green M&M Board Settings

Table 10: PM Green MCM Board Settings							
Parameter	Value						
Magnetometer	AK8963						
GPIO pin	0	I2C Address					12
Calibration Matrix	-1	0					0
	0	1					0
	0	0					-1
Calibration Offsets	0	0					0
Accelerometer	LSM330						
GPIO pin	1	I2C Address					30
Calibration Matrix	0	-1					0
	-1	0					0
	0	0					1
Calibration Offsets	0	0					0
Gyroscope	LSM330						
GPIO pin	2	I2C Address					106
Calibration Matrix	0	1					0
	1	0					0
	0	0					-1
Calibration Offsets	0	0					0
Upload Speed	400 Kbit/s						
Host IRQ pin	6						
GPIO pull settings	6	5	4	3	2	1	0
	Def	Def	Def	Def	Def	Def	Def

Table 11: PNI Orange M&M Board Settings

Parameter		Value					
Magnetometer	AK8963						
GPIO pin	0	I2C Address				12	
Calibration Matrix	-1	0				0	
	0	1				0	
	0	0				-1	
Calibration Offsets	0	0				0	
Accelerometer	BMI055						
GPIO pin	1	I2C Address				24	
Calibration Matrix	-1	0				0	
	0	1				0	
	0	0				1	
Calibration Offsets	0	0				0	
Gyroscope	BMI055						
GPIO pin	2	I2C Address				104	
Calibration Matrix	1	0				0	
	0	-1				0	
	0	0				-1	
Calibration Offsets	0	0				0	
Upload Speed	400 Kbit/s						
Host IRQ pin	6						
GPIO pull settings	6	5	4	3	2	1	0
	Def	Def	Def	Def	Def	Def	Def

Table 12: PNI Red M&M Board Settings

Table 12: F101 Red M&M Board Settings							
Parameter		Value					
Magnetometer		AK8963					
GPIO pin		0		I2C Address		12	
Calibration Matrix	-1		0		0		
	0		1		0		
	0		0		-1		
Calibration Offsets		0		0		0	
Accelerometer		MPU6500					
GPIO pin		1		I2C Address		104	
Calibration Matrix	0		-1		0		
	-1		0		0		
	0		0		1		
Calibration Offsets		0		0		0	
Gyroscope		MPU6500					
GPIO pin		1		I2C Address		104	
Calibration Matrix	0		1		0		
	1		0		0		
	0		0		-1		
Calibration Offsets		0		0		0	
Upload Speed		400 Kbit/s					
Host IRQ pin		6					
GPIO pull settings	6	5	4	3	2	1	0
	Def	Def	Def	Def	Def	Def	Def

Table 13: PNI Yellow M&M Board Settings

Parameter	Value						
Magnetometer	LSM9SD0						
GPIO pin	0	I2C Address					30
Calibration Matrix	1	0					0
	0	-1					0
	0	0					1
Calibration Offsets	0	0					0
Accelerometer	LSM9SD0						
GPIO pin	1	I2C Address					30
Calibration Matrix	-1	0					0
	0	1					0
	0	0					1
Calibration Offsets	0	0					0
Gyroscope	LSM9SD0						
GPIO pin	2	I2C Address					106
Calibration Matrix	1	0					0
	0	-1					0
	0	0					-1
Calibration Offsets	0	0					0
Upload Speed	400 Kbit/s						
Host IRQ pin	6						
GPIO pull settings	6	5	4	3	2	1	0
	Def	Def	Def	Def	Def	Def	Def

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