

## DPM1211 – C868/C915

### 868 and 915 MHz Drop-In RF Transceiver Modules with $\mu$ -Controller on Board

### Combine Small Form Factor with High Performance

#### GENERAL DESCRIPTION

The DPM1211 are complete Radio Transceiver Modules with a  $\mu$ -Controller on Board operating in the 868 and 915 MHz license free ISM (Industrial Scientific and Medical) frequency bands. Based on the SX1211 transceiver from Semtech and the ATmega88PA  $\mu$ -Controller from Atmel, the DPM1211 offers the unique advantage of wide-band communication. The radio module is suitable for applications seeking to satisfy the European (ETSI EN300-220-1) or the North American (FCC part 15) regulatory standards.

The DPM1211 is suitable for operation in the European social alarm bands (25 kHz channel spacing). Its built-in 64-byte FIFO and full SPI simplify interfacing to the host controller.

#### APPLICATIONS

- Wide-band security systems
- Voice and data over an RF link
- Process and building control
- Access control
- Home automation

- Home appliance interconnections
- Wireless Measuring solutions

#### KEY PRODUCT FEATURES

- No RF knowledge required to use
- Direct Contact to  $\mu$ -Controller
- Fully assembled and tested
- Surface mount
- 55 mm x 24 mm
- Supply voltage 2.4 V – 3.6 V
- Frequency synthesizer steps 2 kHz
- Output power is programmable up to 12.5 dBm
- Data rate up to 200 kbit/s

#### DEVICE OPTIONS

Part	Frequency band	Pin Package
DPM1211C868LF	863 - 870MHz	Board
DPM1211C915LF	902 - 928MHz	Board

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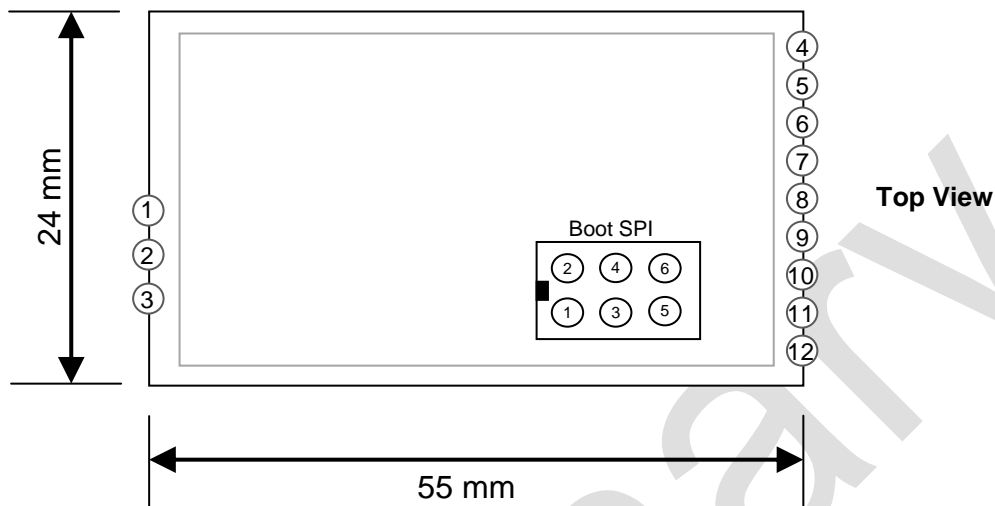
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## 1. PIN DESCRIPTION

### 1.1 Main Board



PIN	NAME	I/O	DESCRIPTION
1	GND		Ground
2	RF_IN_OUT	IN/OUT	RF Input / Output Terminal
3	GND		Ground
4	INT#		Interrupt
5	SDA		I <sup>2</sup> C
6	SCL		I <sup>2</sup> C
7	TxD		UART or SPI
8	RxD		UART or SPI
9	XCK		UART or SPI
10	SHDN		Shutdown
11	GND		Ground
12	VCC	IN	Supply Voltage

### 1.2 Boot SPI:

PIN	Description
1	+ VCC
2	GND
3	SCK
4	DI
5	RDY
6	SHDN

## 2. ELECTRICAL CHARACTERISTICS

### 2.1. ABSOLUTE MAXIMUM OPERATING RANGES

Description	Min	Max	Unit
Supply voltage	2.4	3.6	V
Operating temperature	-40	+85	°C
Storage Temperature	-55	+125	°C
Soldering Temperature (max 15 sec)		+260	°C



CAUTION: ESD sensitive device.  
Precaution should be taken when handling the device in order to prevent permanent damage



#### Life Support Policy and Use in Safety Critical Applications

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### WIRELESS PRODUCTS

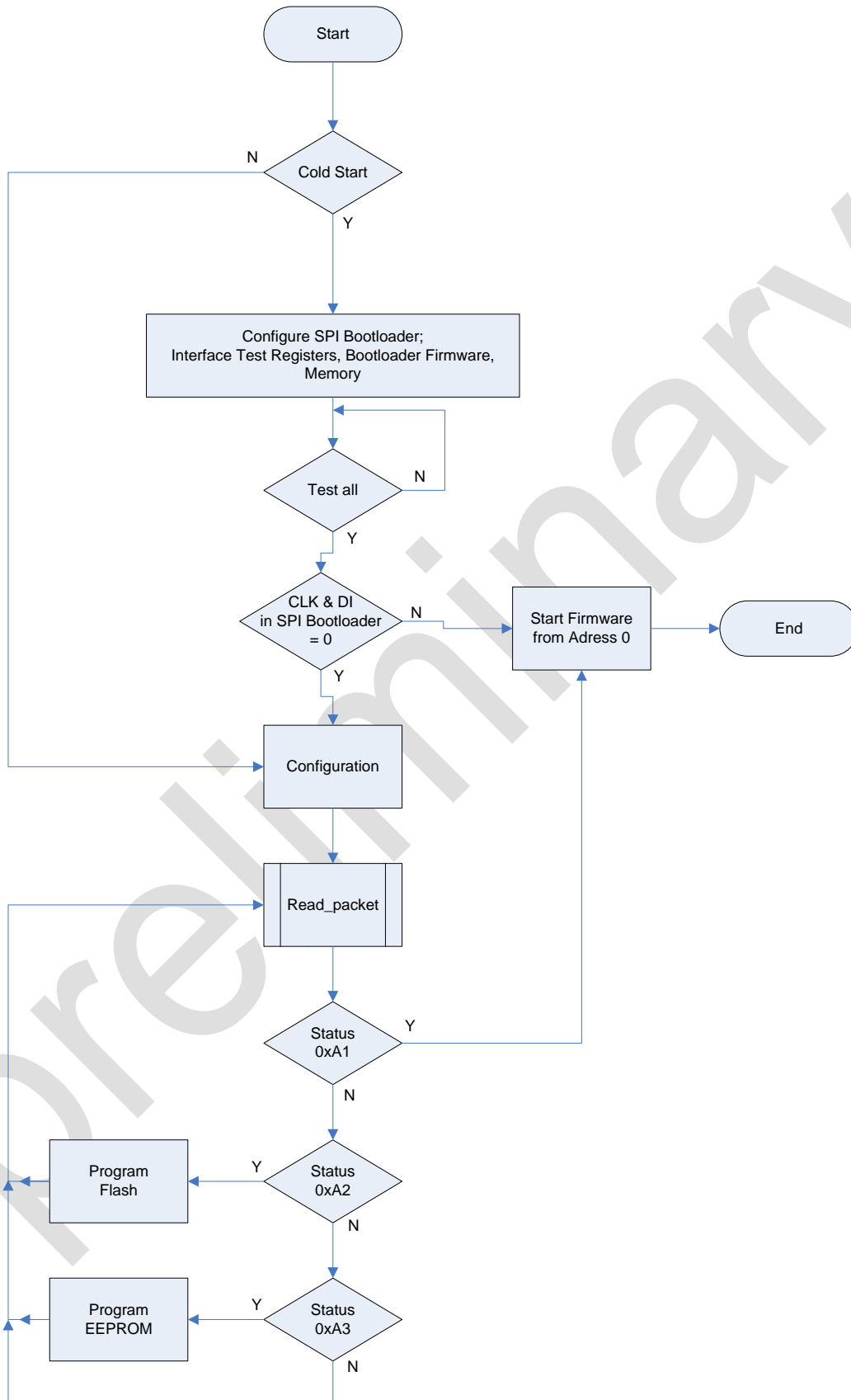
#### 2.2. SPECIFICATION

The table below gives the specifications of the DPM1205 modules under the following conditions:  
 Supply Voltage = 3.3V, Temperature = 25 °C, 2-level FSK without pre-filtering,  $f_c = 915$  MHz,  $\Delta f = 5$  kHz,  
 Bit rate = 4.8 kbit/s,  $BW_{SSB} = 10$  kHz, BER = 0.1% (at the output of the bit synchronizer), matched impedances.  
 For additional information check Datasheet of Semtech XE1205 or Atmel ATMega.

Symbol	Parameter	Conditions	Min	Typ	Max	Units
FR	Synthesizer Frequency Range	DP1211-C868	863	-	870	MHz
		DP1211-C915	902	-	928	MHz
IDDSL	Sleep mode supply current	WTD disabled	-	0.2	4	$\mu$ A
IDDST	Standby mode supply current		-	66	81	$\mu$ A
IDDR	RX mode supply current			5,4	8	mA
IDDT	TX mode supply current	PRF = 1 dBm		18,4	26	mA
		PRF = 10dBm		27,4	35	mA
RFS_F	RF Sensitivity (FSK)*	BR=25 kbps / 869 MHz BR=25 kbps / 915 MHz		-107 -105	-	dBm dBm
RFS_O	RF Sensitivity (OOK)*	BR=2 kbps / 869 MHz BR=2 kbps / 915 MHz		-113 -111	-	dBm dBm
FDA	Frequency Deviation	Programmable	33	50	200	kHz
BR_F	Bit rate (FSK)	Programmable	1.56	-	200	Kb/s
BR_O	Bit rate (OOK)		1.56	-	32	Kb/s
RFOP	RF output power, programmable with 8 steps of typ. 3dB	Programmable.	-8,5		+12,5	dBm
TS_TR	Transmitter wake-up time	From FS to Tx ready.	-	120	500	$\mu$ s
TS_RE	Receiver wake up time	From FS to Rx ready.	-	280	500	$\mu$ s
TS_OSC	Quartz oscillator wake up time	From sleep mode.	-	1.5	5	ms
XTAL	Quartz oscillator frequency		9	12.8	15	MHz

\*All sensitivities are measured receiving a PN15 sequence, for a BER of 0.1%

### 3. Flowchart

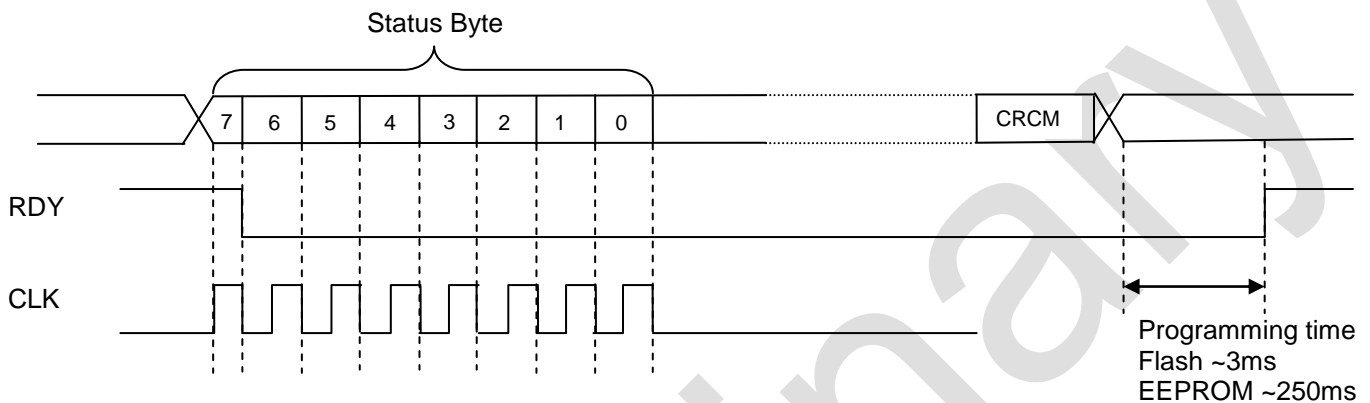


## 4. Technical Data

The DPM1211 Module uses the following Frame:

Status	Page Nr.	Page 64B	CRCL0	CRCHI
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### 4.1. Boot Loader Programming:



If programming was successful RDY will change from "0" to "1"

To reset SPI hold CLK at "1" for ~100ms after RDY changed to "1"

### 4.2. CRC Procedure in C

SPI Clock should be within a range of 10 kHz to 200 kHz

Polynomial is 0x11021, bits should be moved left.

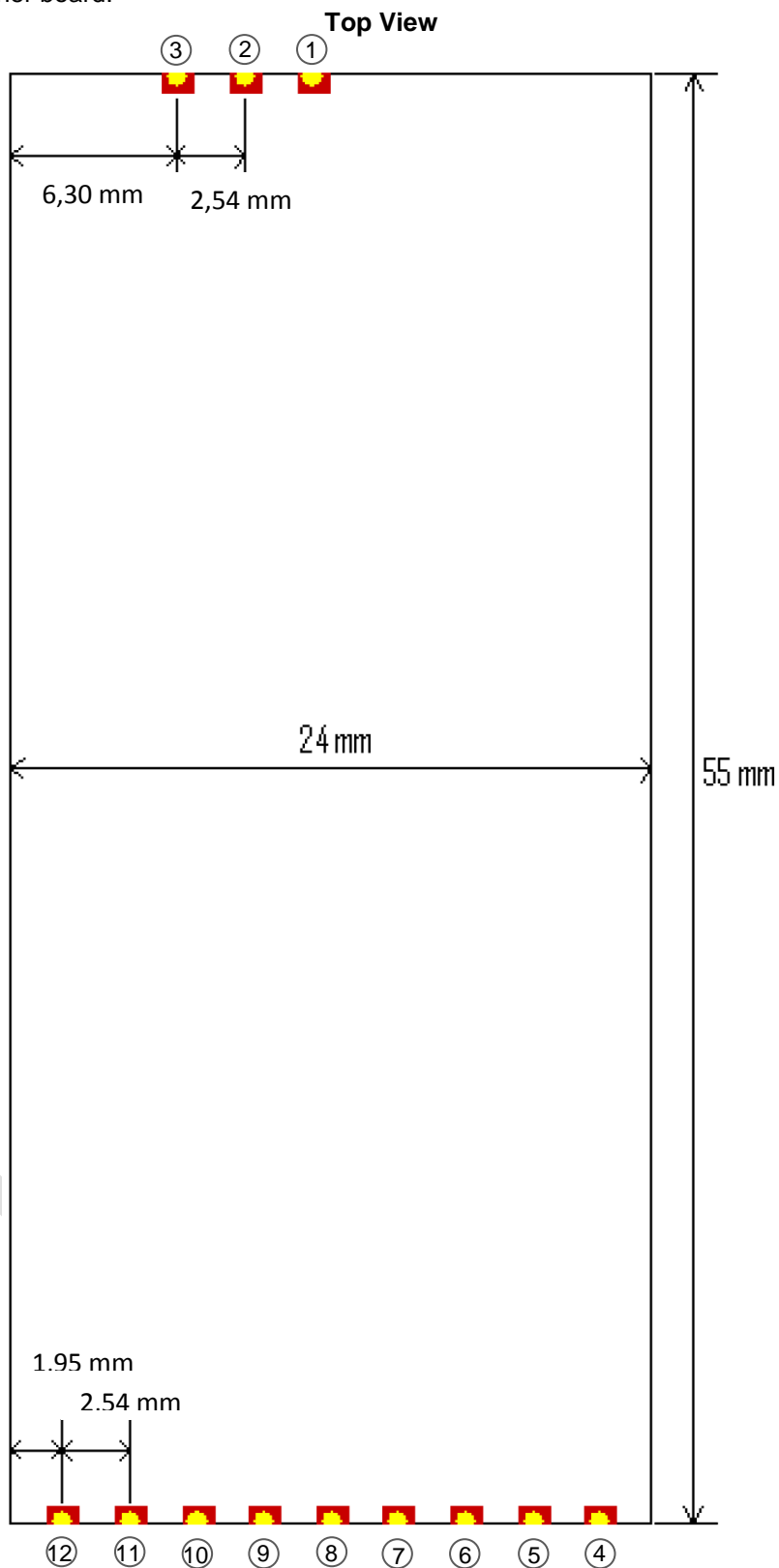
```

unsigned short CRC_check(LPBYTE buffer, DWORD buffer_length)
{
    unsigned long crc = 0;

    for(DWORD i = 0; i < buffer_length ; i++)
    {
        crc ^= buffer[i];
        for(int j=0; j < 8 ;j++)
        {
            crc <<= 1;
            if(crc & 0x01000000) crc ^= 0x102100;
            crc &= 0xFFFFFFFF;
        }
    }
    return (unsigned short) (crc >> 8);
}
    
```

### 5. MECHANICAL DIMENSIONS

The following diagram shows the physical footprint and dimensions of the DPM1211 drop-in module, which should be implemented into the mother board.



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Version	Create Date:	Creator	Changes
Preliminary	3.11.10	Hermann	Create new Datasheet

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