



PWFSA3 User Manual

Model Name : PWSAF3 (Voice Recognition)

Table of Contents

1. Introduction.....	2
1.1 Introduction.....	2
1.2 Features.....	2
2. Block Diagram.....	2
3. Operating Test Conditions.....	3
4. Electrical Characteristics.....	4
4.1 DC/RF Characteristics for IEEE802.11b.....	4
4.2 DC/RF Characteristics for IEEE802.11g.....	5
4.3 DC/RF Characteristics for IEEE802.11n.....	6
4.4 DC/RF Characteristics for Bluetooth (LE).....	7
5. PIN MAP.....	8
5.1 PCB View.....	8
5.2 CN101.....	8
5.3 CN102.....	9
5.4 CN103.....	9

1. Introduction

1.1 Introduction

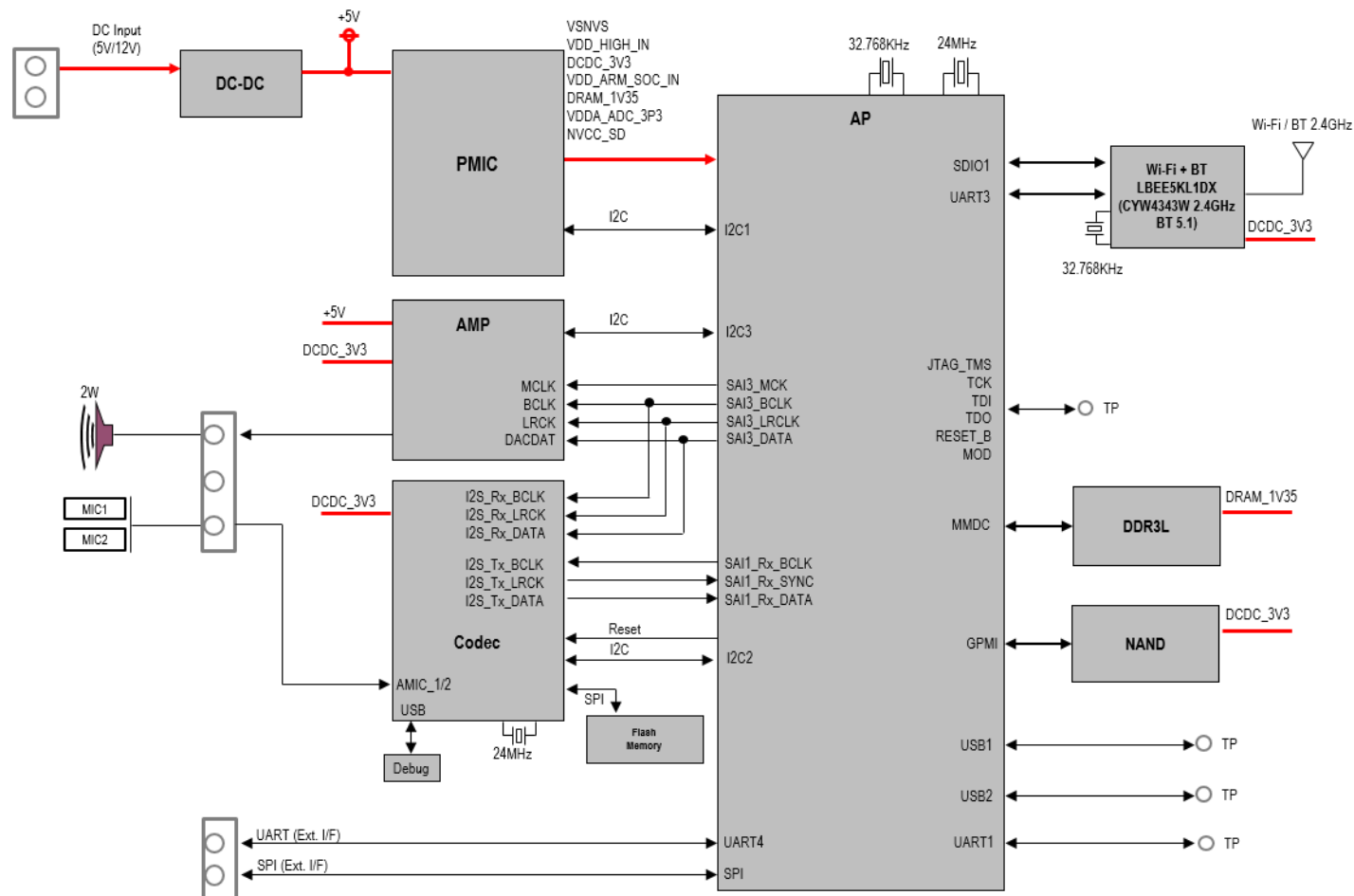
PWFSA3 is a Wi-Fi / BLE Combo module compliant with IEEE802.11b/g/n.

The RF Module is from Murata, part number Type 1DX. (Core chipset : Cypress CYW4343W)

1.2 Features

- ARM Cortex-A7 32bit RISC Processor
- IEEE 802.11b/g/n 1X1 2.4GHz (up to 65Mbps)
- Bluetooth 5.1 LE
- Security : WEP, WPA, WPA2, WMM, WMM-PS, WMM-SA, WAPI, AES, TKIP, CKIP
- UART / SPI Interface
- Application : Home Appliance
- Supply Voltage : DC 5 V or DC 12 V
- MIC Spec. : 2Ch. Analog MEMS MIC
- SPK. Spec. : 2.0W / 4Ω
- PCB Size : 60mm x 40mm

2. Block Diagram



3. Operating Test Conditions

Rating	Min.	Typ.	Max.	Unit
Supply Voltage	4.5	5.0	5.5	V
	10.8	12.0	13.2	
Operating Temperature	0	+25	+70	°C

4. Electrical Characteristics

4.1 DC/RF Characteristics for IEEE802.11b (11Mbps mode)

Specification	IEEE802.11b			
Mode	DSSS / CCK			
Frequency	2400 ~ 2483.5MHz			
Data rate	1,2,5.5,11Mbps			
Tx Characteristics	Min.	Typ.	Max.	Unit
DC current				
1) Tx mode		320	370	mA
2) Rx mode		47	60	mA
Output Power	16	17	18	dBm
Spectrum Mask				
1) 1st side lobes	-	-43	-30	dBr
2) 2nd side lobes	-	-54	-50	dBr
Power on and down ramp	-		2.0	usec
RF Carrier Suppression	15		-	dB
Modulation Accuracy (EVM)	-	15	35	%
Rx Characteristics	Min.	Typ.	Max.	Unit
Minimum Input Level (FER≤8%)	-	-89	-76	dBm
Maximum Input Level (FER≤8%)	-10	-	-	dBm
Adjacent Channel Rejection (FER≤8%)	35	-	-	dB

4.2 DC/RF Characteristics for IEEE802.11g (54Mbps mode)

Specification	IEEE802.11g			
Mode	OFDM			
Frequency	2400 ~ 2483.5MHz			
Data rate	6,9,12,18,24,36,48,54Mbps			
Tx Characteristics	Min.	Typ.	Max.	Unit
DC current				
1) Tx mode		270	310	mA
2) Rx mode		47	60	mA
Output Power	12	13	14	dBm
Spectrum Mask				
1) 9MHz to 11MHz (0dB ~ -20dB)		-33	-20	dBr
2) 11MHz to 20MHz (-20dB ~ -28dB)		-41	-28	dBr
3) 20MHz to 30MHz (-28dB ~ -40dB)		-53	-40	dBr
4) 30MHz to 33MHz (-40dB)		-53	-40	dBr
Constellation Error (EVM)	-	-30	-25	dB
Rx Characteristics	Min.	Typ.	Max.	Unit
Minimum Input Level (PER≤10%)	-	-75	-65	dBm
Maximum Input Level (PER≤10%)	-20	-	-	dBm
Adjacent Channel Rejection (PER≤10%)	-1	-	-	dB

4.3 DC/RF Characteristics for IEEE802.11n (65Mbps mode)

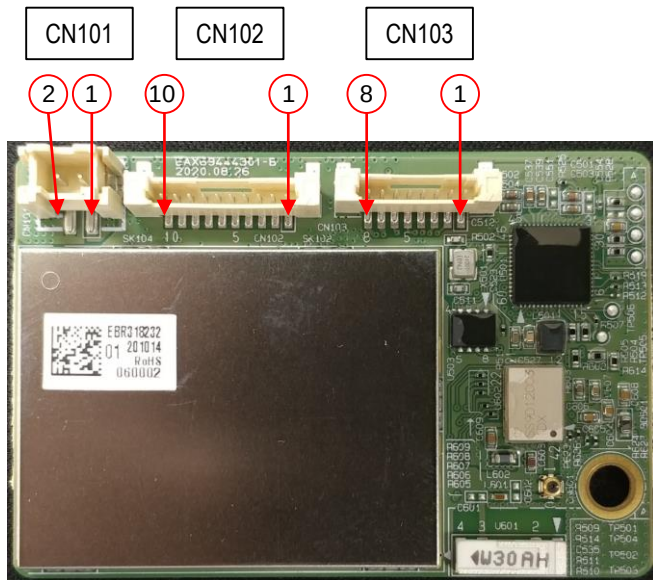
Specification	IEEE802.11n			
Mode	OFDM			
Frequency	2400 ~ 2483.5MHz			
Data rate	6.5,13,19.5,26,39,52,58.5,65Mbps			
Tx Characteristics	Min.	Typ.	Max.	Unit
DC current				
1) Tx mode		260	300	mA
2) Rx mode		47	60	mA
Output Power	12	13	14	dBm
Spectrum Mask				
1) 9MHz to 11MHz (0dB ~ -20dB)		-33	-20	dBr
2) 11MHz to 20MHz (-20dB ~ -28dB)		-41	-28	dBr
3) 20MHz to 30MHz (-28dB ~ -40dB)		-53	-45	dBr
4) 30MHz to 33MHz (-40dB)		-53	-45	dBr
Constellation Error (EVM)	-	-31	-27	dB
Rx Characteristics	Min.	Typ.	Max.	Unit
Minimum Input Level (PER≤10%)	-	-73	-64	dBm
Maximum Input Level (PER≤10%)	-20	-	-	dBm
Adjacent Channel Rejection (PER≤10%)	-2	-	-	dB

4.4 DC/RF Characteristics for Bluetooth (LE)

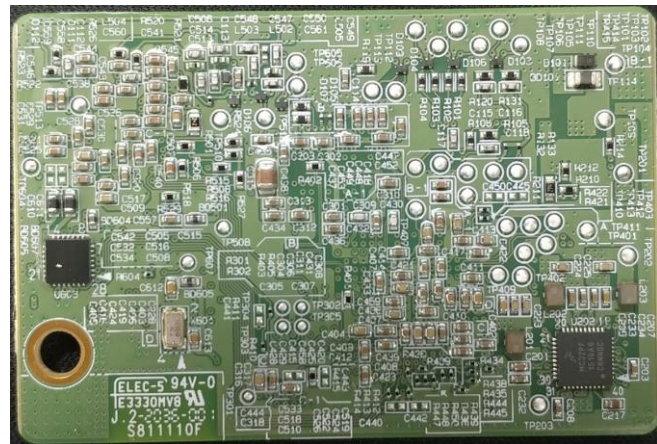
Bluetooth specification (Power class)	Version 5.1 (LE)			
Channel frequency (Spacing)	2402 ~ 2480MHz (2MHz)			
Number of RF Channel	40			
Item / Condition	Min.	Typ.	Max.	Unit
Center Frequency	2402	-	2480	MHz
Channel Spacing	-	2	-	MHz
Number of RF Channel	-	40	-	-
Output power	7	8	9	dBm
Modulation Characteristics				
1) Δf_{1avg}	225	-	275	kHz
2) Δf_{2max} (at 99.9%)	185	-	-	kHz
3) $\Delta f_{2avg} / \Delta f_{1avg}$	0.8	-	-	-
Carrier frequency offset and drift				
1) Frequency offset	-	-	150	kHz
2) Frequency frift	-	-	50	kHz
3) Drift rate	-	-	20	kHz
Receiver sensitivity (PER < 30.8%)	-	-95	-70	dBm
Maximum input signal level (PER < 30.8%)	-10	-	-	dBm
PER Report Integrity	50	-	65.4	%

5. PIN MAP

5.1 PCB View



< Top View >



< Bottom View >

5.2 CN101

Pin No.	Name	I/O	Description
1	VDD	I	VDD 5.0V, 12V
2	GND	-	Ground

5.3 CN102

Pin No.	Name	I/O	Description
1	GND	-	Ground
2	EXT_SPI_WAKE UP	O	SPI Slave wake up
3	EXT_SPI_STATUS	I	Request data transaction in Slave device
4	EXT_SPI_CS	O	SPI Slave Chip Select
5	EXT_SPI_CLK	O	SPI Clock
6	EXT_SPI_MOSI	O	SPI Master Output Slave Input
7	EXT_SPI_MISO	I	SPI Master Input Slave Output
8	GND	-	Ground
9	UART_TX	O	UART Communication signal line
10	UART_RX	I	UART Communication signal line

5.4 CN103

Pin No.	Name	I/O	Description
1	MIC2_BIAS	O	MIC2 bias output
2	MIC2_N	I	MIC2 negative input
3	MIC2_P	I	MIC2 positive input
4	MIC1_BIAS	O	MIC1 bias output
5	MIC1_N	I	MIC1 negative input
6	MIC1_P	I	MIC1 positive input
7	SPK_N	O	Negative speaker output
8	SPK_P	O	Positive speaker output

6. FCC, ISED Statement

FCC Part 15.19

This device complies with part 15 of the FCC Rules.
Operation is subject to the following two conditions: (1) This device may not cause harmful interference,
and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Part 15.21

Any changes or modifications (including the antennas) to this device that are not expressly approved
by the manufacturer may void the user's authority to operate the equipment.

FCC Part 15.247

This device complies with part 15.247 of the FCC Rules.

FCC RF Radiation Exposure Statement: This equipment complies with FCC RF Radiation exposure limits set forth for an uncontrolled environment.
This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.
This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

Please notice that if the FCC identification number is not visible when the module is installed inside another device,
then the outside of the device into which the module is installed must also display a label referring to the enclosed module.
This exterior label can use wording such as the following: "Contains FCC ID:BEJ-PWFSA3" any similar wording that expresses the same meaning may be used.

Manual Information to the End User

The module is limited to OEM installation ONLY.
The OEM integrator is responsible for ensuring that the end-user has no manual instruction to remove or install module.
The module is limited to installation in fixed application;
A separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and difference antenna configurations.
There is requirement that the grantee provide guidance to the host manufacturer for compliance with Part 15B requirements.

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s).
Operation is subject to the following two conditions:
(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique
Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :
(1) L'appareil ne doit pas produire de brouillage;
(2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

IC RF Radiation Exposure Statement : This equipment complies with IC RF Radiation exposure limits set forth for an uncontrolled environment. This device and
its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.
This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

RF du IC d'exposition aux radiations: Cet équipement est conforme à l'exposition de la IC rayonnements RF limites établies pour un environnement non contrôlé.
L'antenne pour ce transmetteur ne doit pas être même endroit avec d'autres émetteur sauf conformément à la IC procédures de produits Multi-émetteur.
Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps.

Please notice that if the IC identification number is not visible when the module is installed inside another device,
then the outside of the device into which the module is installed must also display a label referring to the enclosed module.
This exterior label can use wording such as the following: "Contains IC:2703N-PWFSA3" any similar wording that expresses the same meaning may be used.

L'étiquette d'homologation d'un module d'Innovation, Sciences et Développement économique Canada devra être posée sur le produit hôte à un endroit bien en vue, en tout temps.
En l'absence d'étiquette, le produit hôte doit porter une étiquette sur laquelle figure le numéro d'homologation du module d'Innovation, Sciences et Développement économique Canada,
précédé du mot « contient », ou d'une formulation similaire allant dans le même sens et qui va comme suit :
Contient IC : 2703N-PWFSA3 est le numéro d'homologation du module

Intergration instruction

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this
module. The end user manual shall include all required regulatory information/warning as shown in this manual.
For mobile and fixed operation configurations the antenna gain, including cable loss will be registered under the following identifiers:
FCC Identifier: BEJ-PWFSA3
Industry Canada Certification Number: 2703N-PWFSA3
Granted to LG Electronics USA / LG Electronics Inc.

The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed
Le produit hôte final nécessite toujours des tests de conformité de la partie 15, sous-partie B avec le transmetteur modulaire installé.