

## 802.11a/b/g/n dual-band RF Front-End Module

### Introduction

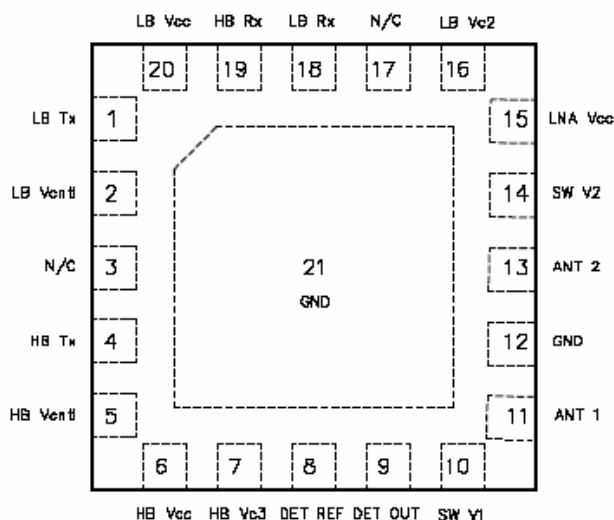
The FM7705 is a fully integrated RF front-end module designed for dual-band tri-mode 802.11 a/b/g WLAN applications. The device includes a T/R switch, a broad band LNA, a receive Band Pass diplexer, a transmit High Pass/Low Pass diplexer, 2.4GHz and 5 GHz high power linearized power amplifiers, and a built-in transmit power detector. Biasing and matching circuitry are integrated to minimize the external components required.

The device is sold in a RoHS compliant miniature 5 x 5 x 0.8 mm 20-pin QFN package to make automated assembly simple.

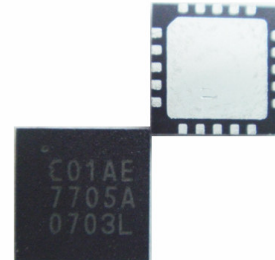
### Applications

- IEEE 802.11a / b / g / n 1T1R
- IEEE 802.11a / b / g WLAN

### Pin Assignment



< Top View >



### Features

- Meets all 802.11a/b/g RF front-end module performance requirements.
- Transmit path filters eliminate unwanted harmonics to meet FCC requirements.
- Works with most transceiver RFIC architectures.
- Replaces over 50 discrete and IC components with one single front-end module.
- Eliminates major yield loss for card module sub-system, system, and motherboard by providing pre-screened and guaranteed performance spec at module level.
- Receive Path
  - Broadband LNA and Rx diplexer
  - Noise Figure < 3dB
- LB (2.4 to 2.5 GHz) Transmit Path
  - 27 dB Gain, P1dB=+22 dBm (Typical)
  - 802.11b/g ACPR compliant to 20 dBm
- HB (4.9 to 6.0 GHz) Transmit Path
  - 22 dB Gain, P1dB=+21 dBm (Typical)
  - 802.11a ACPR compliant to 20 dBm
- On-chip power detector
- +3.3V Power Supply
- 5 x 5 x 0.8 mm 20-pin QFN Package
- RoHS compliant product



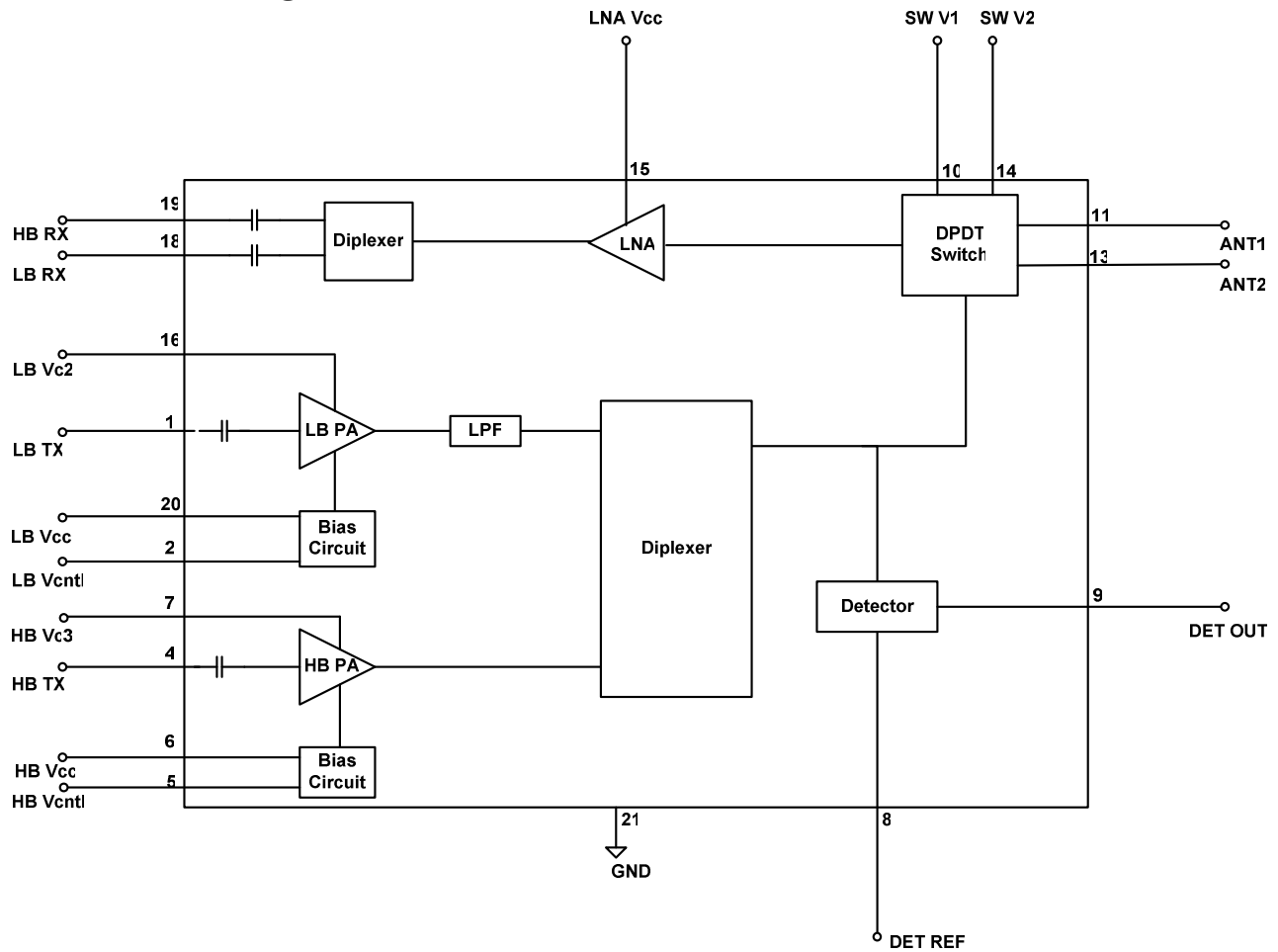
Caution!  
ESD sensitive device



## Pin Description

Pin	Pin Name	Pin Description
1	LB TX	2.4 GHz Tx input
2	LB Vcntl	2.4 GHz PA control voltage
3	N/C	No connection
4	HB Tx	5 GHz Tx input
5	HB Vcntl	5 GHz PA control volatge
6	HB Vcc	5 GHz PA bias circuit Vcc
7	HB Vc3	5 GHz PA Vcc
8	DET REF	Detector reference bias voltage
9	DET OUT	Detector output voltage
10	SW V1	SW control voltage 1
11	ANT 1	RF output Ant 1
12	GND	Ground
13	ANT 2	RF output Ant 2
14	SW V2	SW control voltage 2
15	LNA Vcc	Dual band LNA Vcc and Von/off
16	LB Vc2	2.4 GHz PA Vcc
17	N/C	No Connection
18	LB RX	2.4 GHz Rx output
19	HB RX	5 GHz Rx output
20	LB Vcc	2.4 GHz PA bias circuit Vcc
21	GND	Package backside ground slug

### Functional Diagram



### Truth Table

State	SW V1	SW V2	ANT1	ANT2
1	"0"	"1"	TX	RX
2	"1"	"0"	RX	TX

SW V1, SW V2 : "0" = 0 to +0.2V, "1" = +3 to +5V

## Specifications

### Absolute Maximum Ratings

PARAMETER	RATING
Vcc, SW V1, SW V2	+4.5V
Vcntl	+4.5V
Operating Temperature Range	-20°C to +85°C
Storage Temperature Range	-65°C to +125°C
Soldering Conditions	260°C peak for 20 seconds

### DC Electrical Characteristics (Temp.=25°C)

PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>Supply Voltages</b>					
Vcc (LNA, HB, LB)		3.0	3.3	3.6	Volts
Vcntl (LB, HB)			2.8		Volts
DET REF			3.0		
<b>Supply Currents</b>					
LB Icc	Quiescent (no RF)		100		mA
	Pout = +17 dBm		160		
	Pout = +19 dBm		200		
HB Icc	Quiescent (no RF)		100		mA
	Pout = +15 dBm		185		
	Pout = +18 dBm		230		
LNA Icc			14		mA
Icntl (LB, HB)			4		mA

### Receive Path Electrical Characteristics (Temp.=25°C)

PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>LB (2.4 GHz)</b>	<b>Vcc = 3.3V</b>				
RF Frequency Range		2.4		2.5	GHz
Gain		10	12		dB
Input Return Loss			-10		dB
Output Return Loss			-10		dB
Noise Figure			3		dB
P1dB			-7		dBm
<b>HB (5-6 GHz)</b>	<b>Vcc = 3.3V</b>				
RF Frequency Range		4.9		6	GHz
Gain		10	12		dB
Input Return Loss			-10		dB
Output Return Loss			-10		dB
Noise Figure			3		dB
P1dB			-11		dBm

## Transmit Path Electrical Characteristics ( Vcc=3.3V, Vcntl=2.8V, Temp.=25°C )

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
<b>LB (2.4 GHz) PA</b>		<b>Vcc = 3.3V, Vcntl = 2.8V</b>			
Frequency Range		2.4		2.5	GHZ
Power Gain	Vcc = 3.3V, Vcntl = 2.8V Pout = +20 dBm		27		dB
Input Return Loss			-10		dB
Output Return Loss			-10		dB
P1dB	2450MHz, Vcc=3.3V		22		dBm
Bias current @3.3V	Quiescent		100		mA
	64QAM/54Mbps, Pout=17dBm		160		
	64QAM/54Mbps, Pout=19dBm		200		
Sleep Mode current	Vcc = 3.3V, Vcntl = 0V		2		uA
1 <sup>st</sup> side lobe @ Pout=20dBm	1Mbps CCK		-38		dBc
2 <sup>nd</sup> side lobe @ Pout=20dBm	1Mbps CCK		-52		dBc
2 <sup>nd</sup> Harmonics @ Pout=18dBm			-72		dBc
EVM at Pout=17dBm	64QAM/54Mbps		3.5		%
Detector voltage range	Pout=10dBm@2437MHz		290		mV
	Pout=15dBm@2437MHz		500		
	Pout=18dBm@2437MHz		700		
<b>HB (5-6 GHz) PA</b>		<b>Vcc = 3.3V, Vcntl = 2.8V</b>			
Frequency Range		4.9		6	GHZ
Power Gain	Vcc = 3.3V, Vcntl = 2.8 V Pout = +20 dBm		22		dB
Input Return Loss			-10		dB
Output Return Loss			-10		dB
P1dB	5450MHz, Vcc=3.3V		21		dBm
Bias current @3.3V	Quiescent		100		mA
	64QAM/54Mbps, Pout=15dBm		185		
	64QAM/54Mbps, Pout=18dBm		230		
Sleep Mode current	Vcc = 3.3V, Vcntl = 0V		2		uA
2 <sup>nd</sup> Harmonics @ Pout= 18dBm			-36		dBc
EVM at Pout=15dBm	64QAM/54Mbps		4		%
Detector voltage range	Pout=10dBm@4920MHz		200		mV
	Pout=15dBm@4920MHz		450		
	Pout=18dBm@4920MHz		700		
	Pout=10dBm@5825MHz		280		
	Pout=15dBm@5825MHz		550		
	Pout=18dBm@5825MHz		850		

## Ordering Information

Ordering Number	Component Packing
FM7705	1000pcs / Tape & Reel
FM7705-EVB	FM7705 Evaluation Kit

**For additional product information, please contact  
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