

D7119D

QUAD-BAND Tx/DUAL-BAND Rx FRONT END MODULE
for GSM/GPRS (824-915MHz and 1710-1910MHz)

PRELIMINARY DATA SHEET

Version 0.3

Features

- Ultra-Small 6mm×6mm Package Size
- Low Profile
- Complete Power Control Solution
- No External Components or Routing

Typical Applications

- 3V Dual-Band GSM/3G Handsets
- Commercial and Consumer Systems
- Portable Battery-Powered Equipments

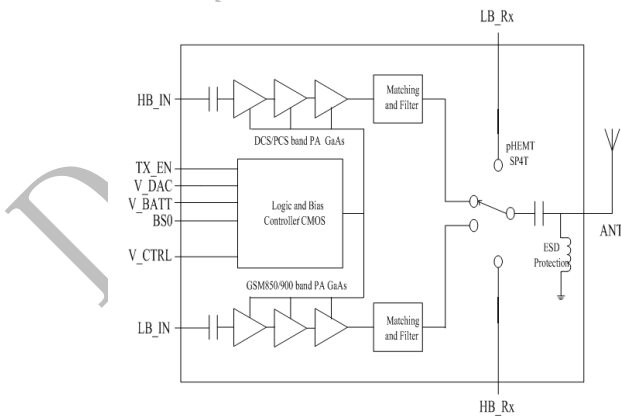
Product Description

The D7119D is a high-power, high-efficiency quad-band Tx/dual-band Rx FEM for GSM/GPRS module. The module is a self-contained 6mm×6mm module with 50Ω input and output terminals. The module consists of quad-band power amplifiers and dual-band GSM Rx antenna switch. The module is designed for use as the final portion of the transmitter section in a GSM/GPRS handheld digital cellular equipment and other applications in the 824MHz to 849MHz, 880MHz to 915MHz, 1710MHz to 1785MHz, 1850MHz to 1910MHz bands and eliminates the need for antenna switch and matching network. The D7119D requires no external routing or external components, simplifying layout and reducing board space.

Optimum Process Technology Applied

- √GaAs HBT
- √GaAs pHEMT
- √Si CMOS

Functional Block Diagram



Pin Assignment

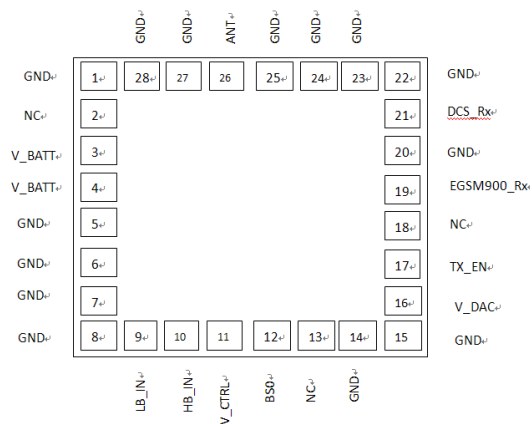


Table 1: Pin Description

Pin No	Definition	Description
10	HB_IN	High band RF input,1710-1910MHz,50Ω input
9	L B_IN	Low band RF input,824-915MHz,50Ω input
3、4	V_BATT	Battery input voltage , 3.2-4.5V,Trace should be as wide as possible.
11	V_CTRL	Control logic level selection/Standby control.
16	V_DAC	Analog power control voltage input, A RC filter outside is preferred.
17	TX_EN	Tx/Rx mode control. Enables the PA module for Tx mode with a logic high.
2,13,18	NC	Not available
12	BS0	Band select
21	DCS_Rx	High band receive RF Output,1805-1880MHz,50Ω output
19	EGSM900_Rx	Low band receive RF Output,925-960MHz,50Ω output
26	ANT	RF IN/OUT to Antenna,50Ω
1,5-8,14-15, 20,22-24,27,28	GND	RF and DC Ground
GROUND GRID		GND PAD, must be connected to main GND

Table2: Control Logic Tables

MODE	V_CTRL	TX_EN	BS0
Power Down(Standby)	0	0	0
EGSM900_Rx	1	0	0
DCS_Rx	1	0	1
LB_Tx	1	1	0
HB_Tx	1	1	1

Table 3: Absolute Maximum Ratings

PARAMETER	MIN	MAX	UNIT
Supply Voltage	-0.3	+5.0	V
Power Control Voltage (V_DAC)	-0.3	+1.65	V
RF Input Power		+10	dBm
Max Duty Cycle		50	%
Output Load VSWR		20:1	
Operating Case Temperature	-20	+85	°C
Storage Temperature	-55	+150	°C

Table 4: Electrical Characteristics

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall Power Control V_DAC					
Power Control "ON"			1.65	V	
Power Control "OFF"		0.27		V	
V_DAC Input Capacitance		2	20	pF	DC to 2MHz
V_DAC Input Current			30	μA	V_DAC=1.65V
Power Control Range		50		dB	V_DAC=0.27V to 1.65V
Overall Power Supply					
Power Supply Voltage		3.5		V	Specifications
	3.2		4.5	V	Nominal operating limits
Power Supply Current		1		μA	PIN<-30dBm, TX_EN =Low,
					Temp=-20°C to +85°C
			15	mA	V_DAC=0.27V, TX_EN =High
Overall Control Signals					
BS0/BS1 /V_CTRL "Low"	0	0	0.5	V	
BS0/BS1 /V_CTRL "High"	1.6	2.0	3.0	V	
BS0/BS1 /V_CTRL "High" Current		10	20	μA	
TX_EN "Low"	0	0	0.5	V	
TX_EN "High"	1.6	2.0	3.0	V	
TX_EN "High" Current		10	20	μA	

Table 5: Electrical Specification for GSM850 Tx

PARAMETER	SPECIFICATION			UNIT	CONDITION
	MIN	TYP	MAX		
Overall					Temp=+25°C, V_BATT=3.5V, V_DAC=1.65V, LB_IN=3dBm, Freq=824MHz to 849MHz, 25%Duty Cycle, Pulse Width=1154us
Operating Frequency Range	824		849	MHz	
Maximum Output Power 1		33.2		dBm	Temp=+25°C, V_BATT=3.5V, V_DAC=1.65V
Maximum Output Power 2	30.5			dBm	Temp=+85°C, V_BATT=3.5V, V_DAC=1.65V
Total Efficiency		36		%	At P _{OUT MAX}
Input Power Range	0	+3	+6	dBm	
Output Noise Power			-82	dBm	RBW=100kHz, 869 MHz to 894MHz, P _{OUT} ≤ +33dBm
			-74	dBm	RBW=100kHz, 1930 MHz to 1990MHz, P _{OUT} ≤ +33dBm
Forward Isolation 1		-60	-40	dBm	TX_EN=Low, LB_IN=+5dBm
Forward Isolation 2		-40	-15	dBm	TX_EN=High, LB_IN=+5dBm, V_DAC=0.27V
Second Harmonic		-40	-30	dBm	V_DAC=0.27V to 1.65V
Third Harmonic		-40	-35	dBm	V_DAC=0.27V to 1.65V
All other Non-Harmonic Spurious			-36	dBm	V_DAC=0.27V to 1.65V
Input Impedance		50		Ω	
Input VSWR			2.5:1		
Output Load VSWR stability (Spurious emission)			-36	dBm	VSWR=12:1
Output Load VSWR Ruggedness	No damage or permanent degradation				VSWR=20:1
Output Load impedance		50		Ω	Load impedance presented at RF OUT pad
Switch Leakage Pout at Rx Port GSM850, ANT-GSM850_Rx		3		dBm	LB_Tx Mode, Freq=824 to 849MHz Pout=33dBm at ANT Port.

Table 6: Electrical Specification for EGSM900 Tx

PARAMETER	SPECIFICATION			UNIT	CONDITION
	MIN	TYP	MAX		
Overall					Temp=+25°C, V_BATT=3.5V, V_DAC=1.65V, LB_IN=3dBm, Freq=880MHz to 915MHz, 25%Duty Cycle, Pulse Width=1154us
Operating Frequency Range	880		915	MHz	
Maximum Output Power 1		33.2		dBm	Temp=+25°C, V_BATT=3.5V, V_DAC=1.65V
Maximum Output Power 2	30.5			dBm	Temp=+85°C, V_BATT=3.5V, V_DAC=1.65V
Total Efficiency		36		%	At P _{OUT MAX}
Input Power Range	0	+3	+6	dBm	
Output Noise Power			-77	dBm	RBW=100kHz, 925 MHz to 935MHz, P _{OUT} ≤ +33dBm
			-80	dBm	RBW=100kHz, 935 MHz to 960MHz, P _{OUT} ≤ +33dBm
			-84	dBm	RBW=100kHz, 1805 MHz to 1880MHz, P _{OUT} ≤ +33dBm
Forward Isolation 1		-60	-40	dBm	TX_EN=Low, LB_IN=+5dBm
Forward Isolation 2		-40	-15	dBm	TX_EN=High, LB_IN=+5dBm, V_DAC=0.27V
Second Harmonic		-40	-30	dBm	V_DAC=0.27V to 1.65V
Third Harmonic		-40	-35	dBm	V_DAC=0.27V to 1.65V
All other Non-Harmonic Spurious			-36	dBm	V_DAC=0.27V to 1.65V
Input Impedance		50		Ω	
Input VSWR			2.5:1		
Output Load VSWR stability (Spurious emission)			-36	dBm	VSWR=12:1
Output Load VSWR Ruggedness	No damage or permanent degradation				VSWR=20:1
Output Load impedance		50		Ω	Load impedance presented at RF OUT pad
Switch Leakage P _{out} at Rx Port EGSM900, ANT-EGSM900_Rx		3		dBm	LB_Tx Mode, Freq=880 to 915MHz P _{out} =33dBm at ANT Port.

Table 7: Electrical Specification for DCS Tx

PARAMETER	SPECIFICATION			UNIT	CONDITION
	MIN	TYP	MAX		
Overall					Temp=+25°C,V_BATT=3.5V, V_DAC=1.65V,HB_IN=3dBm, Freq=1710MHz to1785MHz, 25%Duty Cycle, Pulse Width=1154us
Operating Frequency Range	1710		1785	MHz	
Maximum Output Power 1		30.5		dBm	Temp=+25°C,V_BATT=3.5V, V_DAC=1.65V
Maximum Output Power 2	28.0			dBm	Temp=+85°C,V_BATT=3.0V, V_DAC=1.65V
Total Efficiency		35		%	At P _{OUT MAX}
Input Power Range	0	+3	+6	dBm	
Output Noise Power		-85	-77	dBm	RBW=100kHz, 925MHz to 935MHz, P _{OUT} ≤+30dBm
			-83	dBm	RBW=100kHz, 935 MHz to 960MHz, P _{OUT} ≤+30dBm
			-79	dBm	RBW=100kHz,1805 MHz to 1880MHz, P _{OUT} ≤+30dBm
Forward Isolation 1		-60	-53	dBm	TX_EN=Low, HB_IN=+5dBm
Forward Isolation 2		-45	-15	dBm	TX_EN=High, HB_IN=+5dBm, V_DAC=0.27V
Second Harmonic		-40	-33	dBm	V_DAC=0.27V to 1.65V
Third Harmonic		-40	-35	dBm	V_DAC=0.27V to 1.65V
All other Non-Harmonic Spurious			-36	dBm	V_DAC=0.27V to 1.65V
Input Impedance		50		Ω	
Input VSWR			2.5:1		
Output Load VSWR Stability (Spurious emission)			-36	dBm	VSWR=12:1
Output Load VSWR Ruggedness	No damage or permanent degradation				VSWR=20:1
Output Load impedance		50		Ω	Load impedance presented at RF OUT pad
Switch Leakage Pout at Rx Port DCS1800,ANT-DCS_Rx		5		dBm	HB_Tx Mode, Freq=1710 to 1785MHz Pout=30dBm at ANT Port.

Table8: Electrical Specification for PCS Tx

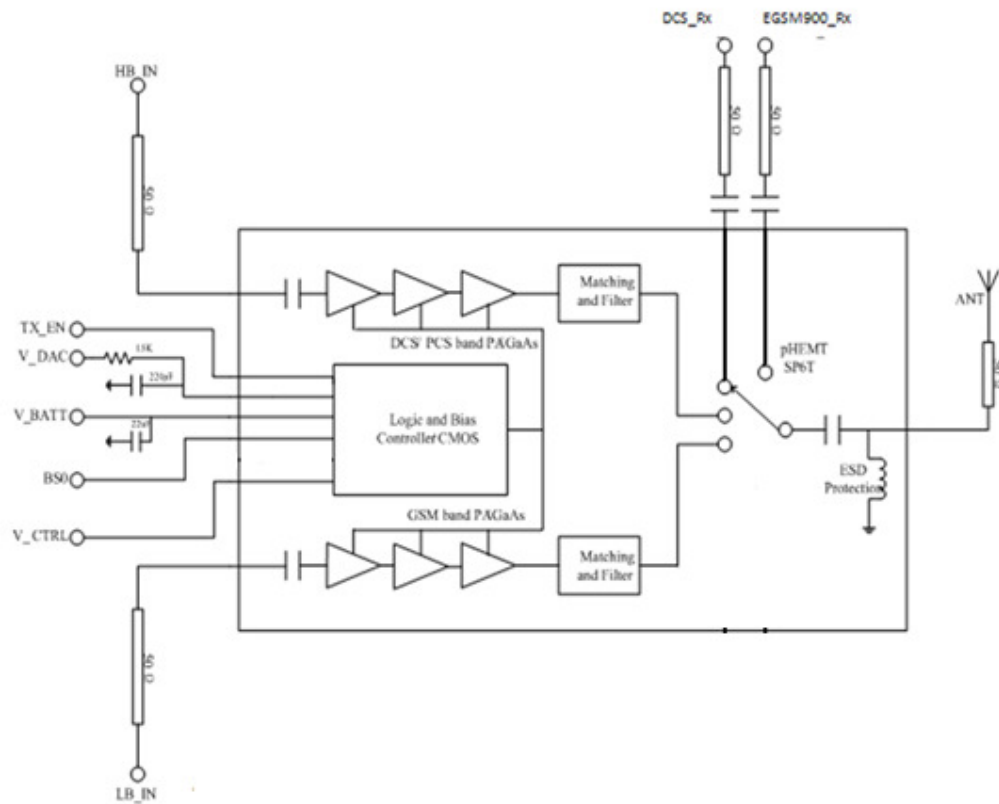
PARAMETER	SPECIFICATION			UNIT	CONDITION
	MIN	TYP	MAX		
Overall					Temp=+25°C,V_BATT=3.5V, V_DAC=1.65V,HB_IN=3dBm, Freq=1850MHz to1910MHz, 25%Duty Cycle, Pulse Width=1154us
Operating Frequency Range	1850		1910	MHz	
Maximum Output Power 1		30.2		dBm	Temp=+25°C,V_BATT=3.5V, V_DAC=1.65V
Maximum Output Power 2	28.0			dBm	Temp=+85°C,V_BATT=3.0V, V_DAC=1.65V
Total Efficiency		33		%	At P _{OUT MAX}
Input Power Range	+1	+3	+6	dBm	
Output Noise Power		-85	-80	dBm	RBW=100kHz,869 MHz to 894MHz, P _{OUT} ≤ +30dBm
			-74	dBm	RBW=100kHz,1930 MHz to1990MHz, P _{OUT} ≤ +30dBm
Forward Isolation 1		-60	-53	dBm	TX_EN=Low, HB_IN=+5dBm
Forward Isolation 2		-45	-15	dBm	TX_EN=High, HB_IN=+5dBm, V_DAC=0.27V
Second Harmonic		-40	-33	dBm	V_DAC=0.27V to 1.65V
Third Harmonic		-40	-35	dBm	V_DAC=0.27V to 1.65V
All other Non-Harmonic Spurious			-36	dBm	V_DAC=0.27V to 1.65V
Input Impedance		50		Ω	
Input VSWR			2.5:1		
Output Load VSWR Stability (Spurious emission)			-36	dBm	VSWR=12:1
Output Load VSWR Ruggedness	No damage or permanent degradation				VSWR=20:1
Output Load impedance		50		Ω	Load impedance presented at RF OUT pad
Switch Leakage Pout at Rx Port PCS1900,ANT-PCS_Rx		5		dBm	HB_Tx Mode, Freq=1850 to 1910MHz Pout=30dBm at ANT Port.

Table 9: Electrical Specification for EGSM900/DCS

PARAMETER	SPECIFICATION			UNIT	CONDITION
	MIN	TYP	MAX		
Overall					Temp=+25°C,V_BATT=3.5V, V_DAC=1.65V,HB_IN=3dBm, TX_EN=0, EGSM900_Rx Freq=925MHz to 960MHz DCS_Rx Freq=1805MHz to 1880MHz
Insertion Loss, EGSM900 ANT- EGSM900_Rx			1.0	dB	
In-Band Ripple, EGSM900 ANT- EGSM900_Rx		0.2		dB	
Input VSWR, EGSM900 ANT- EGSM900_Rx		1.5:1			
Insertion Loss, DCS1800 ANT-DCS_Rx			1.5	dB	
In-Band Ripple, DCS1800 ANT-DCS_Rx		0.2		dB	
Input VSWR, DCS1800 ANT-DCS_Rx		1.8:1			

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Application Schematic



Please pay attention to the following notes before your new design.

- 1) A RC filter is preferred at V_DAC and a 22uF bypass capacitor at V_BATT maybe changed on application.
- 2) RF ports are all 50Ω, including HB_IN, LB_IN, EGSM900_Rx, DCS_Rx and antenna port.
- 3) DC-blocking capacitors are necessary in all Rx ports, DC-blocking capacitors are inside in HB_IN&LB_IN ports, the ESD protector is inside in antenna port.

ORDERING INFORMATION

ORDER NUMBER	TEMPERATURE RANGE	PACKAGE DESCRIPTION	COMPONENT PACKAGING
<u>D7119D</u>	-20°C to +85°C	6mm×6mm×1.0mm LGA	Tape and Reel, <u>3000</u> per reel

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