PAISM05WSH. 500mW, RF Power Amplifier + TX/RX Double Switch for 800 - 1000Mhz

FEATURES

500mW Amplifier:

Frequency 800Mhz to 1000Mhz
High Output Power at 869Mhz
+27.5dBm at +5V @+4dBm input
+26.8dBm at +3.6V @+4dBm input
+3.6V to +5.5V Single Supply Operation
Automatic Power-Up/Power-Down Ramp

Direct On/Off Keying (OOK) without intersymbol interference
Or VCO Pulling
47% efficiency
<15uA Supply Current in Shutdown Mode
Automatic Shutdown in RX Mode

Switch TX/RX:

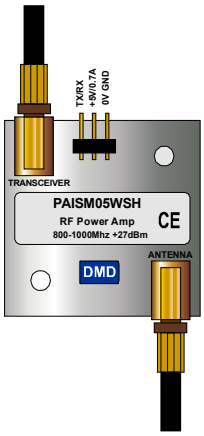
Transmit / Receive GaAs MESFET Switch
1.4dB insertion Loss at 869Mhz
24dB Crosstalk Isolation at 869 Mhz
+27dBm Output P1dB
Dual Switch for single port TX/RX transceiver

General:

Protection for Reverse Polarity
High quality MCX50 RF connectors
Small dimensions: 28x29x5mm

TYPICAL APPLICATIONS

868 – 900Mhz ISM-Band Applications
Wireless Data Network
Wireless Computer Peripherals
Wireless Security Systems
Radio Control Peripherals
Radio Control RC, FPV & UAV airplane Systems
Commercial and Consumer Systems



Digital Micro Devices

Wireless Systems

PAISM05WSH

27.7 x 28.6 x 5mm

The PAISM05WSH low-voltage, silicon RF power amplifier (PA) is designed for use in the 700-1000MHz frequency band. It operates directly from a single +3.0V to +5.5V supply, making it suitable for use with 3-cell NiCd or 1-cell Li-Ion batteries. The device delivers +27.5dBm typical output power from a +5V supply or +26.8dBm from a +3V supply with +4dBm in RF input.

This last stage delivers 28dBm to a 50Ω load. It operates in Class E to achieve a high power-added efficiency (PAE). 50 Ω antenna or proper output matching, is required for optimal output power

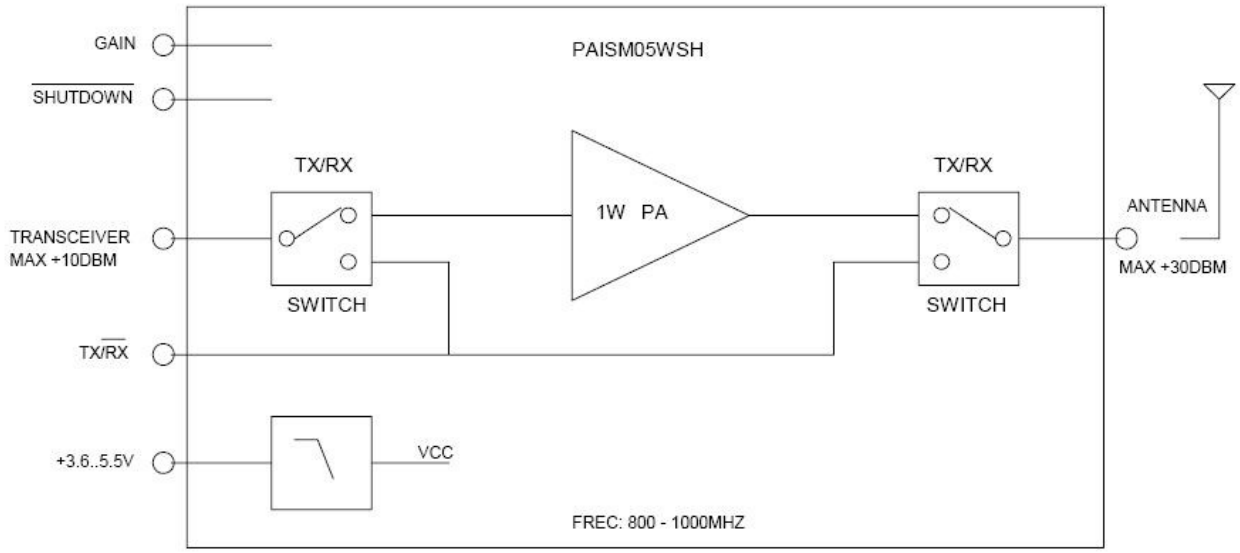
The PAISM05WSH's is bi directional. At +28dBm output power, efficiency is typically 46%. An additional power-saving feature is a auto shutdown in RX mode, that typically reduces supply current below 1µA.

A key feature of this PA is its autoramping capability. During turn-on and turn-off periods, the RF envelope is controlled to approximate a raised cosine on the rising and falling edge, thereby minimizing transient noise and spectral splatter.

The PAISM05WSH is intended for use in constant envelope applications such as AMPS, two-way paging, FSKbased communications or Radio Control FPV / UAV airplane systems in the 868Mhz for Europe and 902-928MHz for EEUU, ISM bands.

The PAISM05WSH is designed for use with single port transceivers with a dual Transmit / Receive GaAs MESFET Switch with a CMOS logic driver for the control input.

Signal input and output use MCX50 connectors to facilitate the connection of RF equipment.



Quick Start

The PAISM05WSH is fully assembled and factory tested. Follow the instructions in the *Connections and Setup* section for proper module evaluation.

Test Equipment Required

This section lists the recommended test equipment to verify operation of the PAISM05WSH. It is intended as a guide only, and some substitutions are possible.

• One RF signal generator capable of delivering at least +4dBm of output power at the operating frequency

• One RF power sensor capable of handling at least +30dBm of output power at the operating frequency

• One RF power meter capable of measuring up to +30dBm of output power at the operating frequency

• An RF spectrum analyzer that covers the operating frequency range to 3Ghz as well as a few harmonics

• A power supply capable of up to 1A at +2.7V to +5.5V

• An optional ammeter for measuring the supply current

• Two 50Ω MCX50 cables

• One SMA 20dB pad

• Network Analyzer to measure small-signal return loss and gain (optional)

Connections and Setup

This section provides a step-by-step guide to operating the PA and testing the device's function. **Do not turn on the DC power or RF signal generators until all connections are made.**

1) Connect a DC supply set to +3.6V (through an ammeter if desired) to the VCC and GND terminals on the PA module. **Do not turn on the supply.**

2) Connect one RF signal generator to the RFIN MCX50 connector; do not turn on the generator's output. Set the generator for an output frequency of 869MHz at a power level of +4dBm.

3) Connect a 20dB pad to the RFOUT MCX50 connector on the PA. This is to prevent overloading of the power sensor and the power meter.

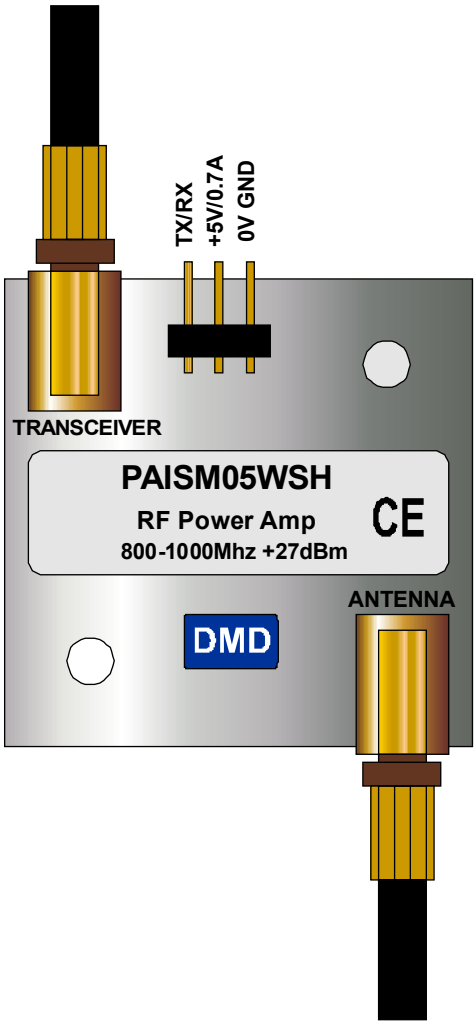
4) Connect a power sensor to the 20dB pad.

5) Connect the power sensor to a power meter. Set the power meter offset to 20dB and frequency to 869MHz.

6) Turn on the DC supply. The supply current should read approximately 69mA.

7) Activate the RF generator's output. The power meter should read approximately +27dBm. The supply-current should increase to approximately 330mA.

8) Another method for determining gain is by using a Network Analyzer (optional). This has the advantage of displaying gain versus a swept-frequency band, in addition to displaying input and output return loss. Refer to the Network Analyzer manufacturer's user manual for setup details.


TX/RX
+5V/0.7A
0V GND
TRANSCEIVER
PAISM05WSH
RF Power Amp
800-1000Mhz +27dBm
CE
ANTENNA
DMD

TECHNICAL SPECIFICATIONS PAISM05WSH

ABSOLUTE MAXIMUM RATINGS

Supply Voltage (Vcc to GND).....	-0.3V to +6.5 V	Storage temperature.....	-20 to +80º C
Voltage on inputs…….....	-0.3V to Vcc+0.3V	Operating temperature.....	-20 to +70º C
Input RF level…….....	+13dBm (20mW)	Continuous Power Dissipation (TA = +70°C)…….	6.4W
Maximum Load Mismatch without Damage, VCC = +2.7V to +3.4V, Any Load Phase Angle, Any Duration.....	20:1	Maximum Load Mismatch without Damage, VCC = +3.4V to +5.5V, Any Load Phase Angle, Any Duration.....	8:1

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

VCC = 5V, TA = 25ºC, unless otherwise noted.

	SPECIFICATION				
PARAMETER	**MIN**	**TYPICAL**	**MAX**	**UNITS**	**CONDITION / NOTE**
DC Electrical Characteristics					
Supply Voltage	2.9	3.6 to 5.0	5.5	V	
Supply Current TX. NO PRFIN.	64	69	71	mA	TX/RX=ON, NO RF INPUT.
Supply Current TX. PRFIN=+3dBm	340	350	370	mA	TX/RX=ON, RF OUTPUT +27dBm
Supply Current RX.	10	12	15	uA	TX/RX=OFF (RX active)
Time TX On	100	200	250	uS	
TX/RX Logic High	2.0		Vcc	V	State = TX. PA active
TX/RX Logic Low	0	0	0.2	V	State = RX. PA=Shutdown
TX/RX impedance		10		KΩ	
AC Electrical Characterictics					
Antenna Port Impedance		50		Ω	
Switch Insertion Loss	1.2	1.4	1.6	dBm	
Operational Frequency Range	700		1000	Mhz	
Minimum Output Power	26	27	28	dBm	VCC=5V. PRFIN=+4dBm
Power Added Efficiency		47		%	
Power Gain	22	24	26	dB	
Auto Power Ramping-Up		1.6		mW/uS	Maximum slope
Auto Power Ramping-Down		-1.3		mW/uS	Minimum slope
Input VSWR		1.5:1			Relative to input impedance in oper. mode
Maximum Nonharmonic Spurius		-60		dBc	Output Due to load mismatch 6:1 VSWR
Noise Power		-90		dBm	30Khz BW at offset = 45Mhz
Harmonic Supression.	30	38		dBc	PRFIN=+7dBm
Off-isolation	40	48		dBc	PRFIN= 0dBm. TX/RX=0V.

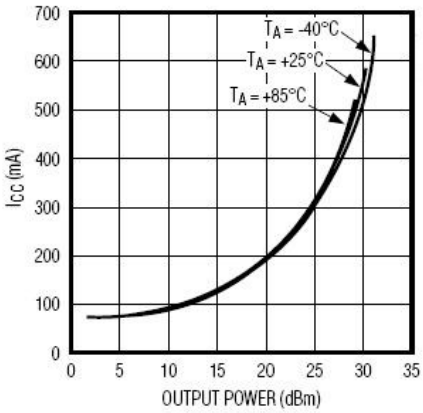
NOTES

1. Unlicensed radio devices in the European Community Countries are expected to operate in compliance with standards proposed by the European Telecommunications Standard I-ETS 300 220.

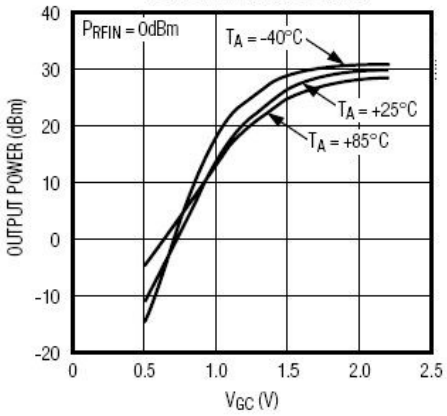
TYPICAL OPERATING CHARACTERISTICS
INTERNAL AMPLIFIER WITHOUT SWITCH

Note: Typical Insertion Loss Switch =2 x 0.7 =1.4dBm

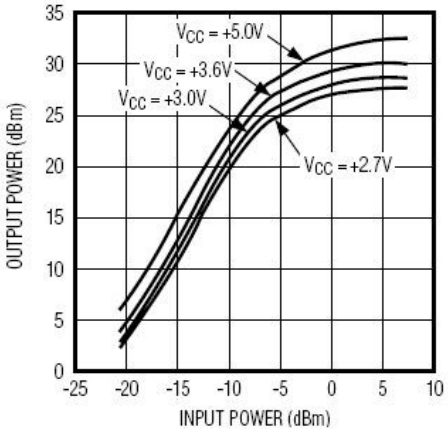
SUPPLY CURRENT vs. OUTPUT POWER



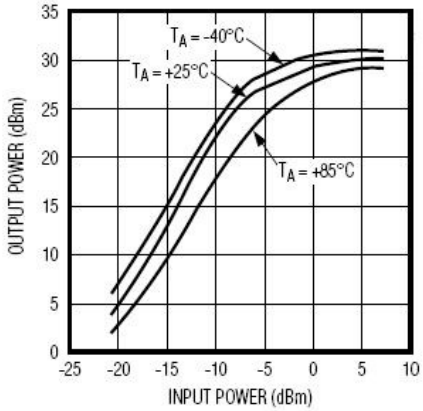
OUTPUT POWER vs. VOLTAGE AT GC PIN



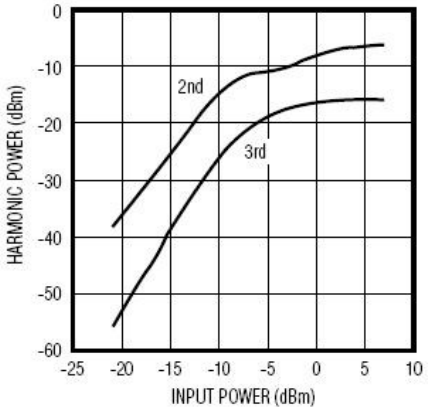
OUTPUT POWER vs. INPUT POWER



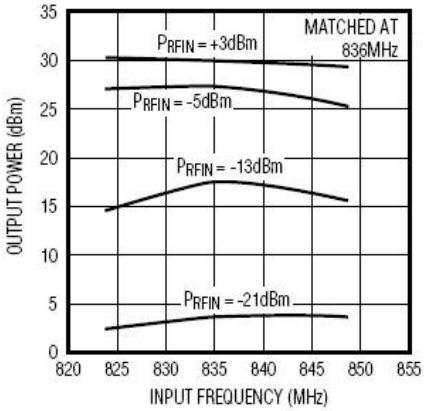
OUTPUT POWER vs. INPUT POWER AND TEMPERATURE



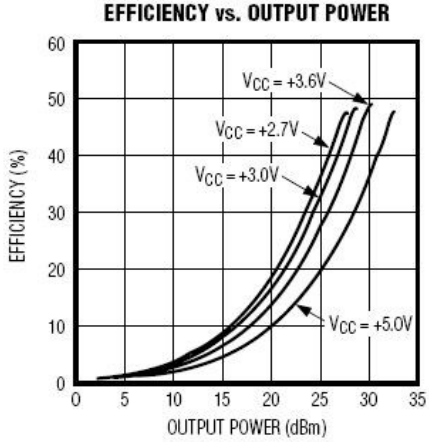
SECOND AND THIRD HARMONICS vs. INPUT POWER



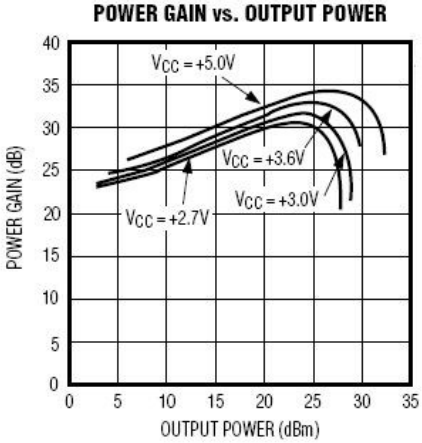
OUTPUT POWER vs. FREQUENCY



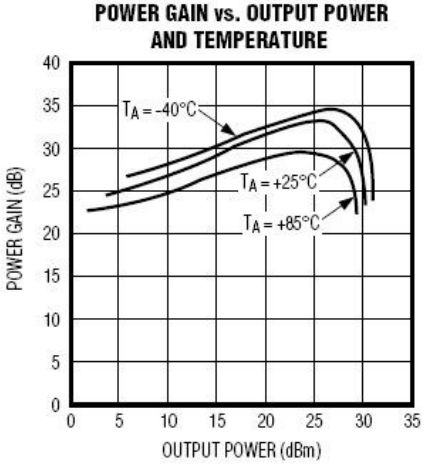
EFFICIENCY vs. OUTPUT POWER



POWER GAIN vs. OUTPUT POWER



POWER GAIN vs. OUTPUT POWER AND TEMPERATURE



30-9-2009: rev. 1.1: Change and update features, various steps and signal levels in the test procedure.

Digital Micro Devices

Wireless Systems

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