MO-CC1100+PA+LNA

FSK TRANSCEIVER MODULE

434 MHz FSK Transceiver

Description

MO-CC1100+PA+LNA is an FSK Transceiver module. The MO-CC1100+PA+LNA is a true single-chip UHF transceiver, It is based on 3 wire digital serial interface and an entire Phase-Locked Loop (PLL) for precise local oscillator generation .so the frequency could be setting. It can use in UART / NRZ / Manchester encoding / decoding. MO-CC1100PA had a high performance and low cost. It could easily to design your product.

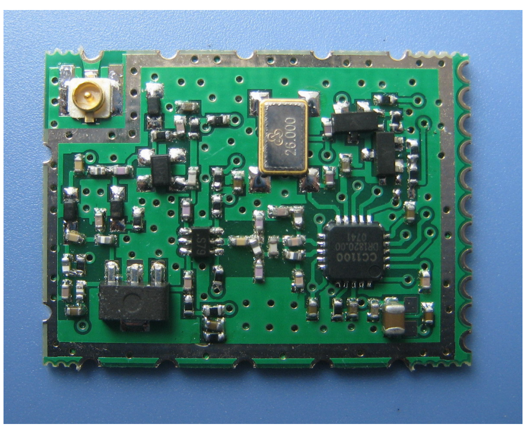
It can be used on wireless security system or specific remote-control function and others wireless system

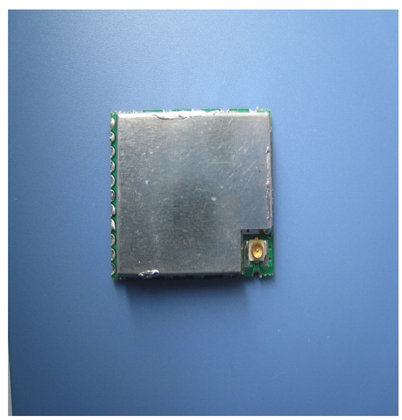
Applications

- Car security system
- Remote keyless entry
- Garage door controller
- Home security
- Wireless mouse
- Automation system

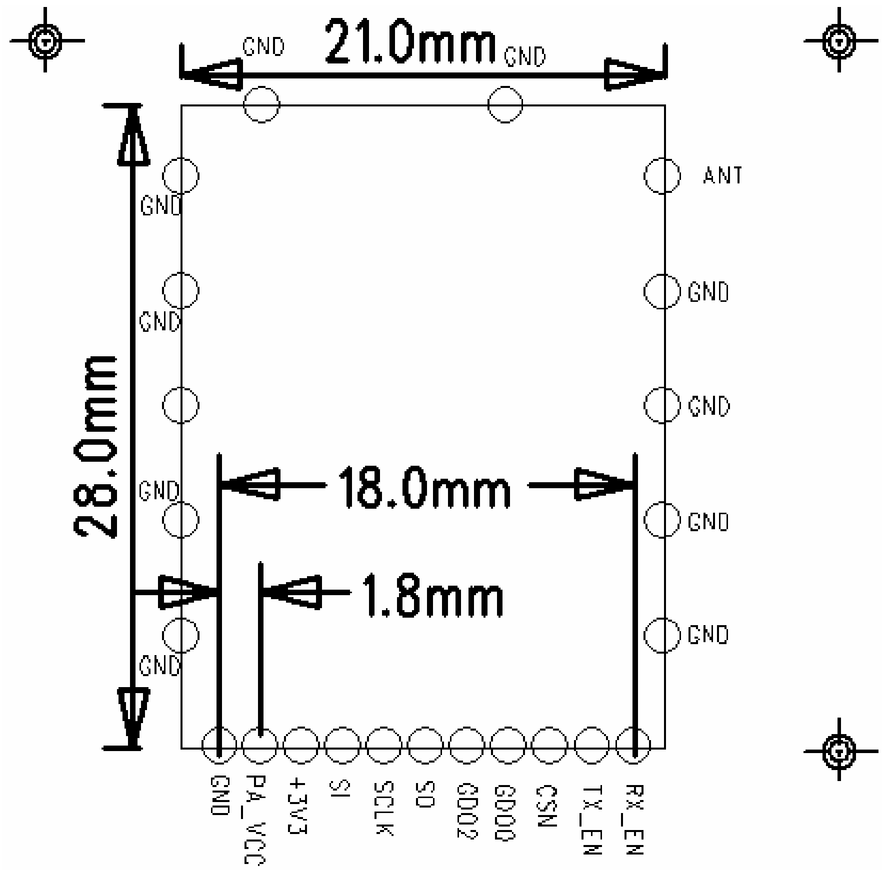
Features

- Integrated bit synchronizer.
- Integrated IF and data filters.
- High sensitivity (type -115dBm at 2.4kbps)
- Programmable output power -20dBm~30dBm
- Operation temperature range : -40℃～+85℃
- Operation voltage: 5Volts.
- Available frequency at : 408~464 MHz
- Digital RSSI
- Digital function for package format





Pin Dimension



CC1100+PA+LNA

PIN#	Pin name	Pin type	Description
1	GND	Ground	GND
2	PA_VCC	PA power	3.3-9V PA power
3	+3V3	power	3.3V
4	SI	Digital input	Serial configuration interface, data input
5	SCLK	Digital input	Serial configuration interface, clock input
6	SO	Digital Output	Serial configuration interface, clock input Optional general output pin when CSN is hight
7	CSN	Digital input	Serial configuration interface ,chip select
8	GND		GND
9	TX-EN	TX_EN	TX enable
10	RX-EN	RX-EN	RX enable

Electrical Specifications

Tc = 25°C, VDD = 5.0V

Parameter	Min	Typ	Max	Unit	Condition
Current consumption, TX	300	350	380	mA	Transmit mode, +30dBm output power 9V PA_VCC
Current consumption, TX	100	150	180	mA	Transmit mode, +20dBm output power 3.3V PA_VCC
Current consumption, RX	15	20	30		receiver
Current consumption,STB		TAB			Stand by

CC1100+PA+LNA

General Characteristics

Parameter	Min	Typ	Max	Unit	Condition/Note
Frequency range	408	433	464	MHz	
Data rate	1.2	----	500	kbps	Modulation formats supported: (Shaped) MSK (also known as differential offset QPSK) up to 500kbps 2-FSK up to 500kbps GFSK and OOK/ASK (up to 250kbps) Optional Manchester encoding (halves the data rate).

CC1100 RF Receive Section

Tc = 25°C, VDD = 3.0V

Parameter	Min	Typ	Max	Unit	Condition/Note
Differential input impedance		TBD		Ω	Follow CC1100EM reference design
Receiver sensitivity 315/433/868/915MHz	110	–115		dBm	2-FSK, 1.2kbps, 5.2kHz deviation, 1% packet error rate, 62 bytes packet length, 58kHz digital channel filter bandwidth
	100	–105		dBm	2-FSK, 38.4kbps, 20kHz deviation, 1% packet error rate, 62 bytes packet length, 100kHz digital channel filter bandwidth
	89	-92		dBm	2-FSK, 250kbps, 127kHz deviation, 1% packet error rate, 62 bytes packet length, 540kHz digital channel filter bandwidth
	89	-92		dBm	OOK, 250kbps OOK, 1% packet error rate, 62 bytes packet length, 540kHz digital channel filter bandwidth
Saturation		–15		dBm	
Digital channel filter bandwidth	58		650	kHz	User programmable. The bandwidth limits are proportional to crystal frequency (given values assume a 26.0MHz crystal).
Adjacent channel rejection, 868MHz		23		dB	2-FSK, 38.4kbps, 20kHz deviation, 1% packet error rate, 62 bytes packet length, 100kHz digital channel filter, 150kHz channel spacing Desired channel 3dB above the sensitivity limit.
Alternate channel rejection, 868MHz		33		dB	2-FSK, 38.4kbps, 20kHz deviation, 1% packet error rate, 62 bytes packet length, 100kHz digital channel filter, 150kHz channel spacing Desired channel 3dB above the sensitivity limit.
Image channel rejection, 868MHz		29		dB	2-FSK, 38.4kbps, 20kHz deviation, 1% packet error rate, 62 bytes packet length, 100kHz digital channel filter, 150kHz channel spacing, IF frequency 305kHz Desired channel 3dB above the sensitivity limit.
Blocking at 1MHz offset, 868MHz		52		dB	Desired channel 3dB above the sensitivity limit. Compliant to ETSI EN 300 220 class 2 receiver requirement.
Blocking at 2MHz offset, 868MHz		54		dB	Desired channel 3dB above the sensitivity limit. Compliant to ETSI EN 300 220 class 2 receiver requirement.
Blocking at 5MHz offset, 868MHz		61		dB	Desired channel 3dB above the sensitivity limit. Compliant to ETSI EN 300 220 class 2 receiver requirement.
Blocking at 10MHz offset, 868MHz		64		dB	Desired channel 3dB above the sensitivity limit. Compliant to ETSI EN 300 220 class 2 receiver requirement.
Spurious emissions			–57 –47	dBm dBm	25MHz – 1GHz Above 1GHz

CC1100 RF Transmit Section

Tc = 25°C, VDD = 3.0V, +10dBm if nothing else stated. Measured on Chipcon's CC1100EM reference design.

Parameter	Min	Typ	Max	Unit	Condition/Note
Differential load impedance		TBD		Ω	Follow CC1100EM reference design
Output power, highest setting		10		dBm	Output power is programmable, and full range is available in all frequency bands. Delivered to a 50Ω single-ended load via Chipcon reference RF matching network.
Output power, lowest setting		–30		dBm	Output power is programmable, and full range is available in all frequency bands. Delivered to a 50Ω single-ended load via Chipcon reference RF matching network.
Spurious emissions and harmonics, 433/868MHz			–36 –54 –47 –30	dBm dBm dBm dBm	25MHz – 1GHz 47-74, 87.5-118, 174-230, 470-862MHz 1800MHz-1900MHz (restricted band in Europe), when the operating frequency is below 900MHz (2nd harmonic can not fall within this band when used in Europe) Otherwise above 1GHz
Spurious emissions, 315/915MHz			-49.2 -41.2	dBm EIRP dBm EIRP	<200µV/m at 3m below 960MHz. <500µV/m at 3m above 960MHz.
Harmonics 315MHz			-20 -41.2	dBc dBm	2nd, 3rd and 4th harmonic when the output power is maximum 6mV/m at 3m. (-19.6dBm EIRP) 5th harmonic
Harmonics 915MHz			-20 -41.2	dBc dBm	2nd harmonic 3rd, 4th and 5th harmonic

Crystal Oscillator

A crystal in the frequency range 26MHz-27MHz must be connected between the XOSC_Q1 and XOSC_Q2 pins. The oscillator is designed for parallel mode operation of the crystal. In addition, loading capacitors (C81 and C101) for the crystal are required. The loading capacitor values depend on the total load capacitance, C_L, specified for the crystal. The total load capacitance seen between the crystal terminals should equal C_L for the crystal to oscillate at the specified frequency.

$$C_L = \frac{1}{\frac{1}{C_{81}} + \frac{1}{C_{101}}} + C_{parasitic}$$

The parasitic capacitance is constituted by pin input capacitance and PCB stray capacitance. Total parasitic capacitance is typically 2.5pF.

The crystal oscillator circuit is shown in Figure 16. Typical component values for different values of C_L are given in Table 26.

The crystal oscillator is amplitude regulated. This means that a high current is used to start up the oscillations. When the amplitude builds up, the current is reduced to what is necessary to maintain approximately 0.4Vpp signal swing. This ensures a fast start-up, and keeps the drive level to a minimum. The ESR of the crystal should be within the specification in order to ensure a reliable start-up (see section 7 on page 9).

The initial tolerance, temperature drift, aging and load pulling should be carefully specified in order to meet the required frequency accuracy in a certain application. By specifying the *total* expected frequency accuracy in SmartRF® Studio together with data rate and frequency deviation, the software calculates the total bandwidth and compares this to the chosen receiver channel filter bandwidth. The software reports any contradictions, and a more accurate crystal is recommended if required.

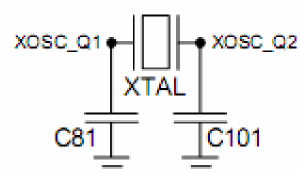
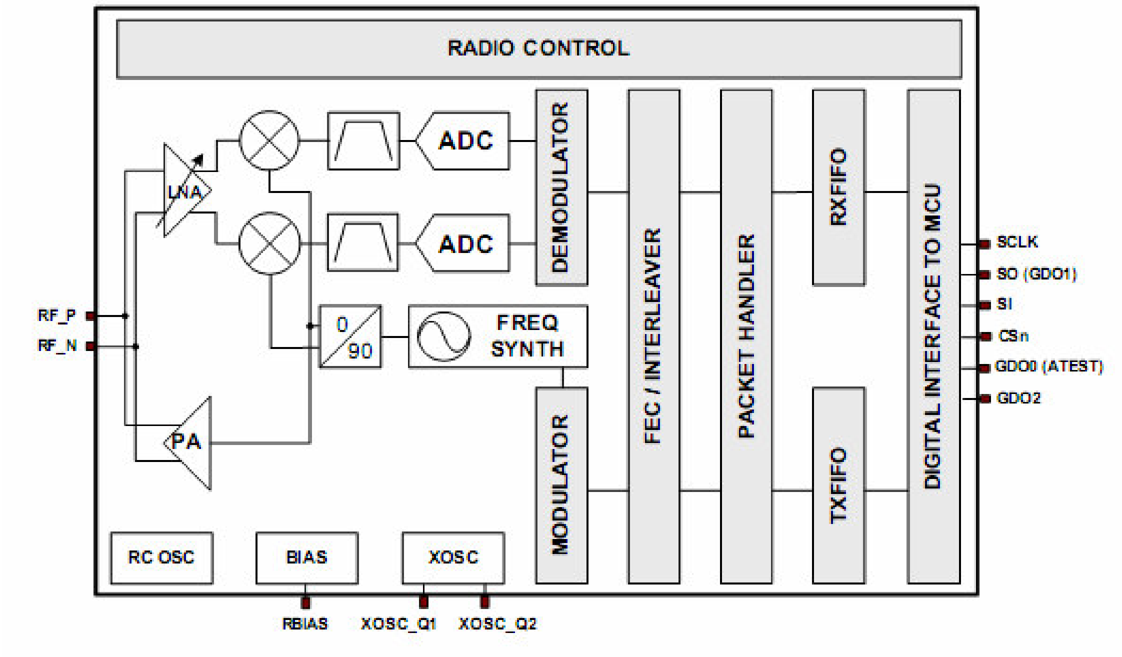


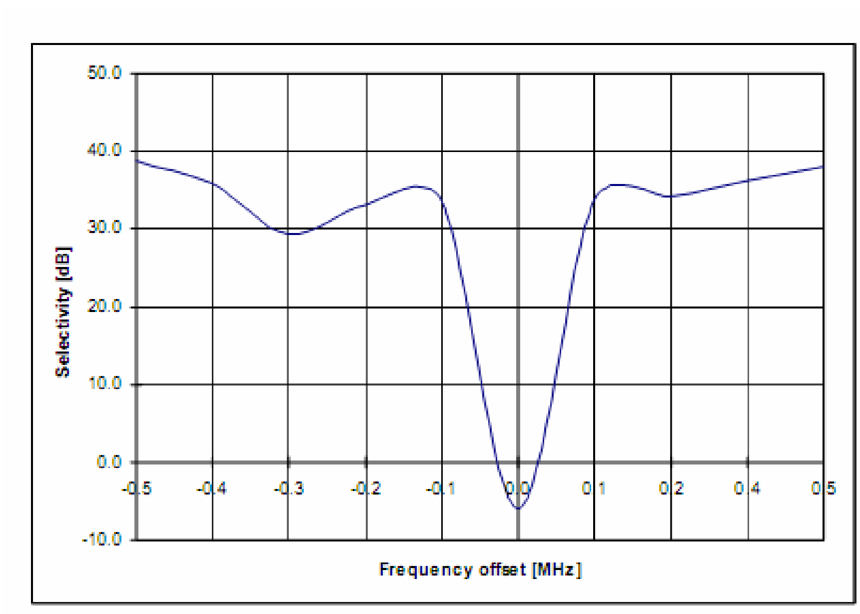
Figure 16: Crystal oscillator circuit

Component	C_L= 10pF	C_L=13pF	C_L=16pF
C81	15pF	22pF	27pF
C101	15pF	22pF	27pF

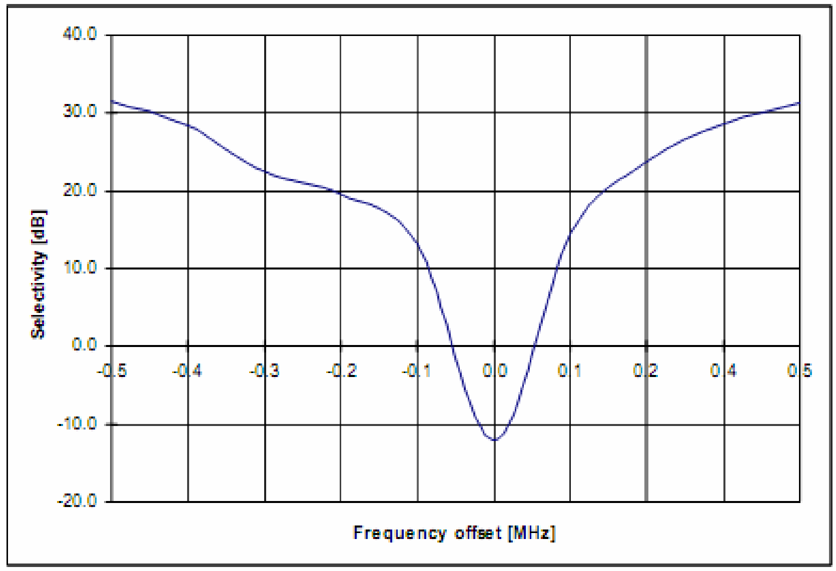
CC1100 Simplified Block Diagram



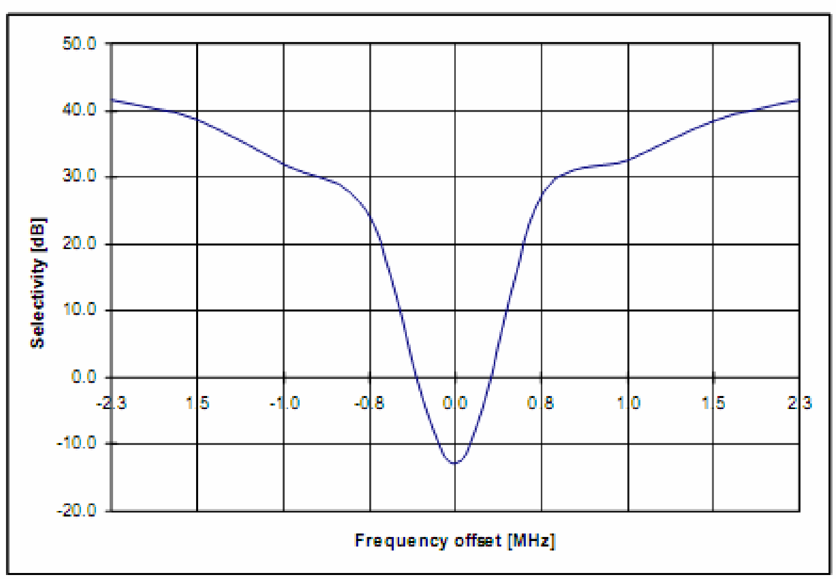
CC1100 Selectivity



Selectivity at 1.2K Baud Data Rate



Selectivity at 38.4K Baud Data Rate



Selectivity at 250K Baud Data Rate

Remarks:

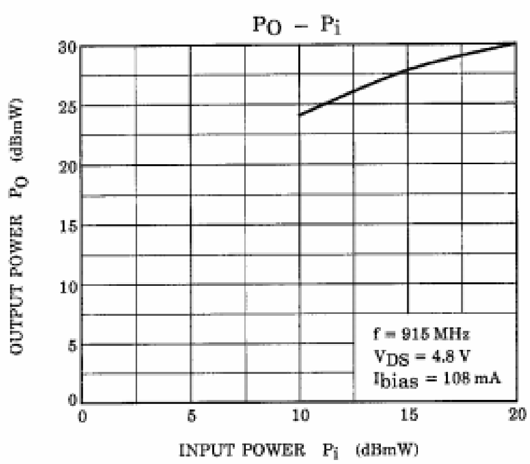
1. About detailed Specifications , Please see CC1100 Data sheet .
   http://focus.ti.com/lit/ds/symlink/cc1100.pdf
   www.ti.com

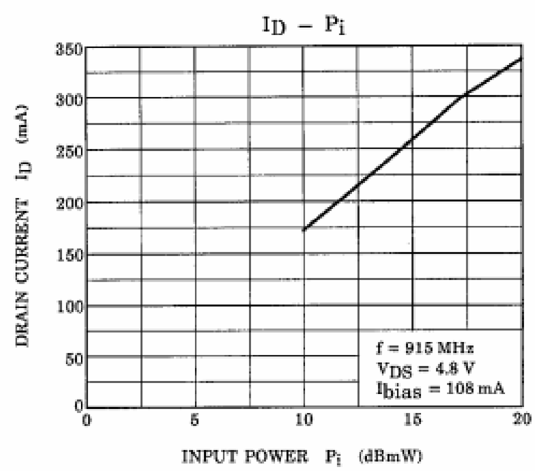
2SK3078

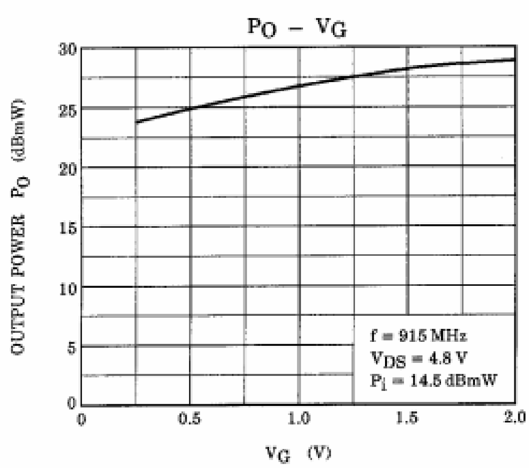
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

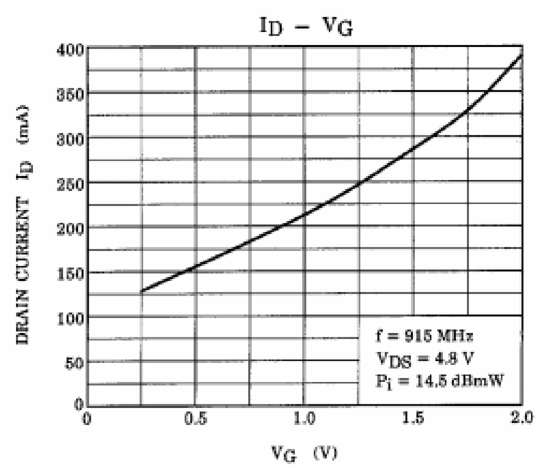
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Output Power	P_O	V_{DS} = 4.8 V Iidle = 108 mA (V_{GS} = adjust) f = 915 MHz, P_i = 14.5 dBmW	27.0	—	—	dBmW
Drain Efficiency	η_D		—	46.0	—	%
Power Gain	G_P		12.5	—	—	dB
Threshold Voltage	V_{th}	V_{DS} = 4.8 V, I_D = 0.5 mA	0.20	—	1.20	V
Drain Cut-off Current	I_{DSS}	V_{DS} = 10 V, V_{GS} = 0 V	—	—	10	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS} = 5 V, V_{DS} = 0 V	—	—	5	μA

2SK3078 Charcteristic





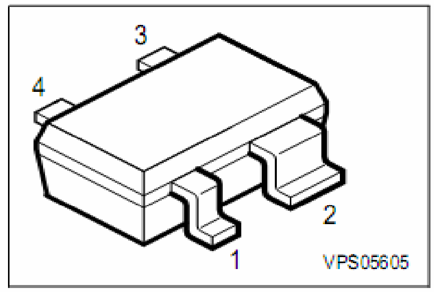




BFP520

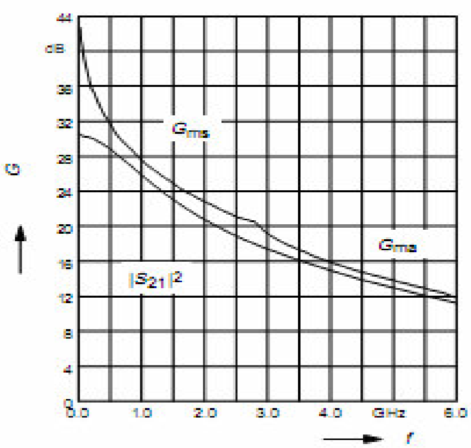
NPN Silicon RF Transistor

Preliminary data

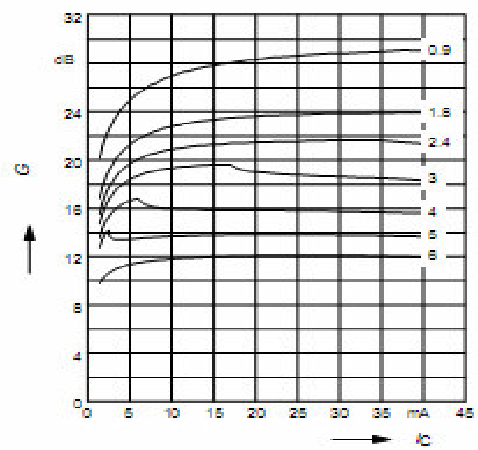


- For highest gain low noise amplifier at 1.8 GHz and 2 mA / 2 V
  Outstanding G_a = 20 dB
  Noise Figure F = 0.95 dB
- For oscillators up to 15 GHz
- Transition frequency f_T = 45 GHz
- Gold metalization for high reliability
- **SIEGET ® 45 - Line**
  Siemens **G**rounded **E**mitter **T**ransistor
  45 GHz f_T - **Line**

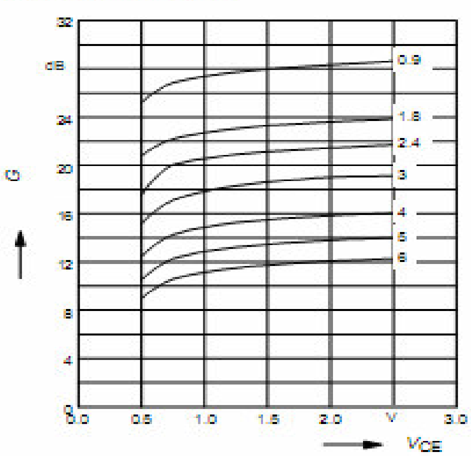
Power gain G_{ma}, G_{ms}, $|S_{21}|^2 = f(f)$
V_{CE} = 2V, I_C = 20 mA



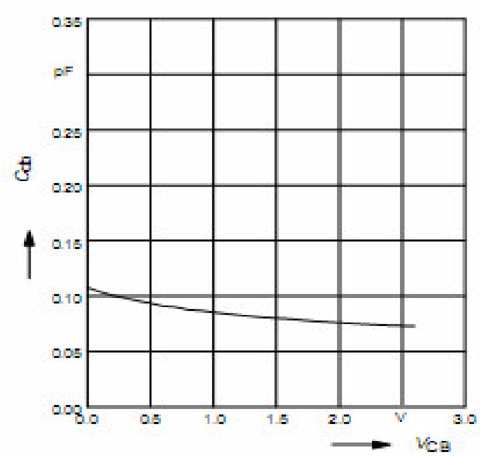
Power gain G_{ma}, $G_{ms} = f(I_C)$
V_{CE} = 2V
f = parameter in GHz



Power gain G_{ma}, $G_{ms} = f(V_{CE})$
I_C = 20 mA
f = parameter in GHz

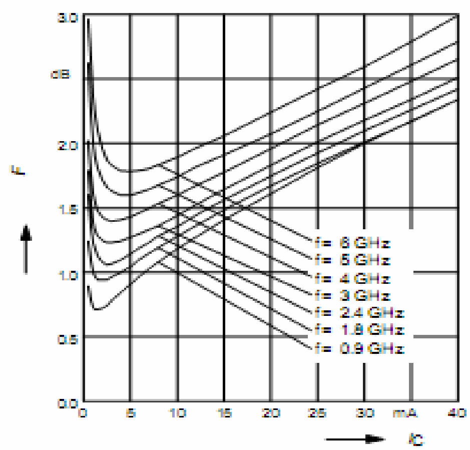


Collector-base capacitance $C_{cb} = f(V_{CB})$
V_{BE} = 0, f = 1MHz



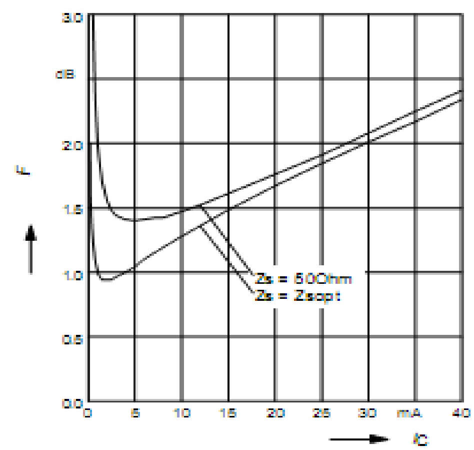
Noise figure $F = f(I_C)$

$V_{CE} = 2$ V, $Z_S = Z_{Sopt}$



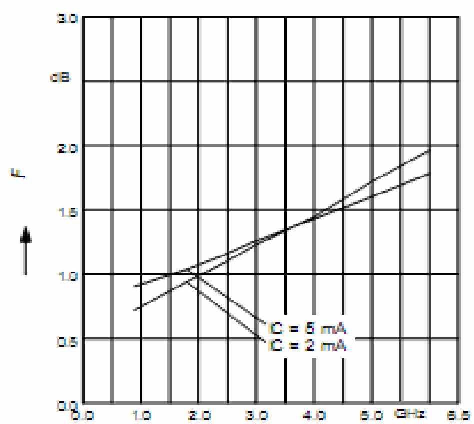
Noise figure $F = f(I_C)$

$V_{CE} = 2$ V, $f = 1.8$ GHz



Noise figure $F = f(f)$

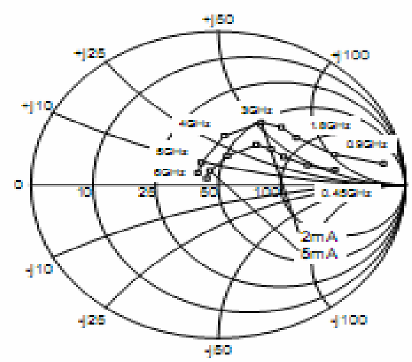
$V_{CE} = 2$ V, $Z_S = Z_{Sopt}$



Source impedance for min.

Noise Figuren vers. Frequency

$V_{CE} = 2$ V, $I_C = 2$ mA / 5 mA



AS179 RF Switch

AS179-92, AS179-92LF: PHEMT GaAs IC SPDT Switch DC–3 GHz

Applications

- General purpose medium power switches in telecommunication applications
- T/R switches in 802.11b, g WLAN Bluetooth™ systems

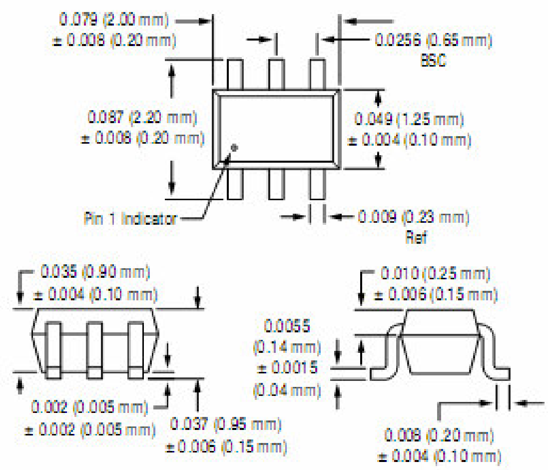
Features

- $P_{1\ dB}$ +30 dBm typical @ +3 V
- IP3 43 dBm typical @ +3 V
- Low insertion loss (0.3 dB @ 0.9 GHz)
- Low DC power consumption
- Ultra miniature SC-70 6 lead package
- PHEMT process
- Available lead (Pb)-free MSL-1 @ 250 °C per JEDEC J-STD-020

Description

The AS179-92 is an IC FET SPDT switch in a low cost miniature SC-70 6 lead plastic package. The AS179-92 features low insertion loss and positive voltage operation with very low DC power consumption. This general purpose switch can be used in a variety of telecommunications applications.

SC-70 6 Lead

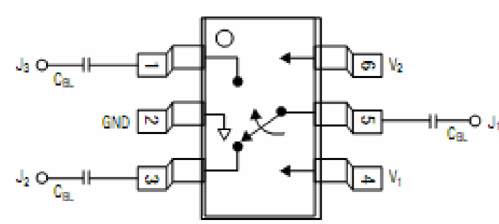


Truth Table

V_1	V_2	J_1–J_2	J_1–J_3
V_{HIGH}	0	Isolation	Insertion loss
0	V_{HIGH}	Insertion loss	Isolation

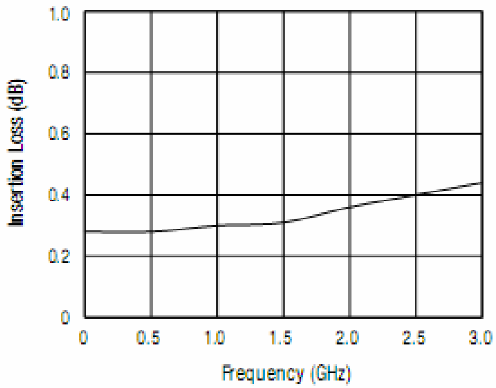
V_{HIGH} = +3 to +5 V.

Pin Out

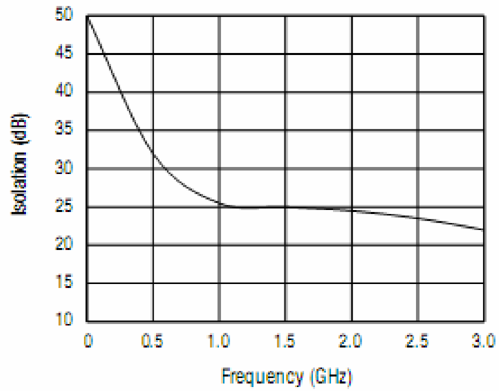


DC blocking capacitors (C_{BL}) must be supplied externally for positive voltage operation. C_{BL} = 100 pF for operation >500 MHz.

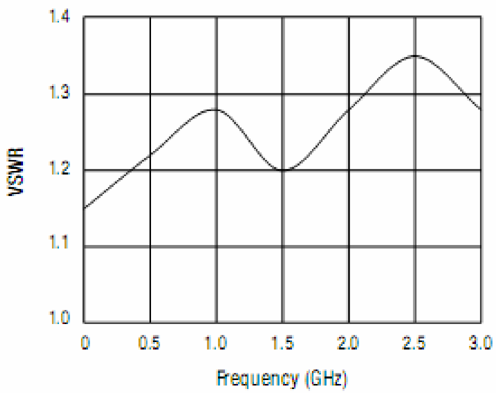
Typical Performance Data (0, +3 V)



Insertion Loss vs. Frequency



Isolation vs. Frequency



VSWR vs. Frequency

Absolute Maximum Ratings

Characteristic	Value
RF input power	6 W > 500 MHz 0/+7 V control
Control voltage	-0.2 V, +8 V
Operating temperature	-40 °C to +85 °C
Storage temperature	-65 °C to +150 °C
Θ_{JC}	25 °C/W

Performance is guaranteed only under the conditions listed in the specifications table and is not guaranteed under the full range(s) described by the Absolute Maximum specifications. Exceeding any of the absolute maximum/minimum specifications may result in permanent damage to the device and will void the warranty.

CAUTION: *Although this device is designed to be as robust as possible, Electrostatic Discharge (ESD) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions must be employed*