

Power control and temperature sense

Supply Outputs

-BIAS
-1.175V

+9V

+5V

+9VSW

TEMPERATURE
SENSOR

J3

J3/13

J3/15

+9V IN

C138

C110

J3/14

GND

J3/16

J3/14

J3/5

IN OUT
U5 78M05
COM

U6
LM50

U13
IRF7413
POWER
SWITCH

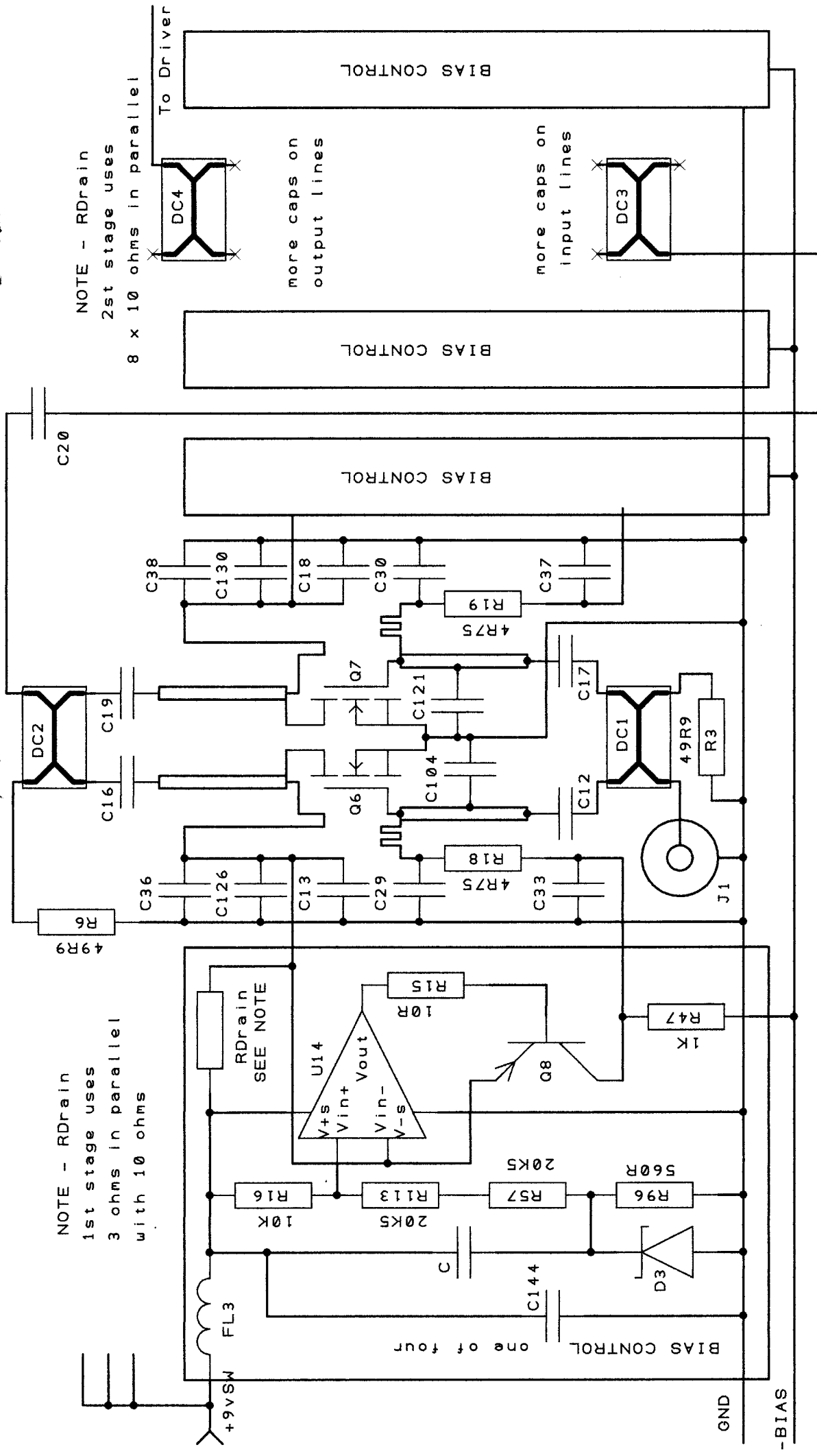
LMV321
U7
V+ S
V in +
V out
V in -
V - S

U12 OUT
MAX840
NEGOUT FB
/SHDN
GND

-BIAS
-1.175V

FP11
FO19-1

ISA
S2L



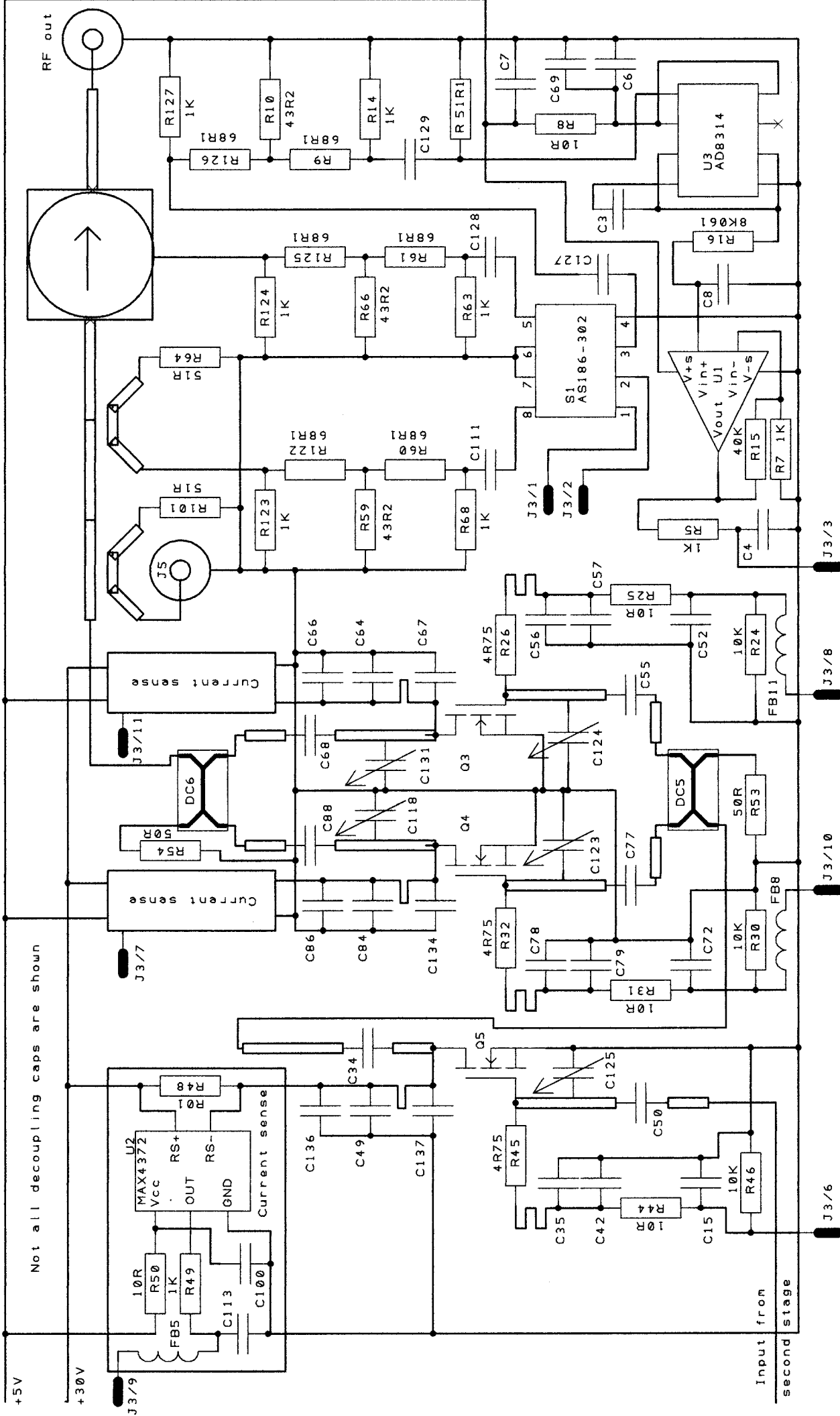
NOTE - RDrain
1st stage uses
3 ohms in parallel
with 10 ohms

NOTE - RDrain
2st stage uses
8 x 10 ohms in parallel

more caps on
output lines

more caps on
input lines

1st and 2nd amplifier stages



Driver, Output and SWR monitor

Not all decoupling caps are shown

U6

Voltages on J3 @ 1240MHz 11watts out

1	+5V	2	0V
3	3.5V		
5	1.37v @ 21C	6	3.8V
7	0.47V - 2.35A	8	3.74
9	0.27V - 1.35A	10	3.8V
11	0.5v - 2.5A		
13	8.96V		

Temp - pin 5 20mV/degC 2.11v @ 60degC
7.9.11 200mV/A

U16

U9

U2

U11

Q13

D4

Q9

Q6

Q7

Q8

D3

U14

D3

Q4

Q3

U13

Q14

U7

Q12

D1

Q2

Q1

Q5

U4

U1

Q12

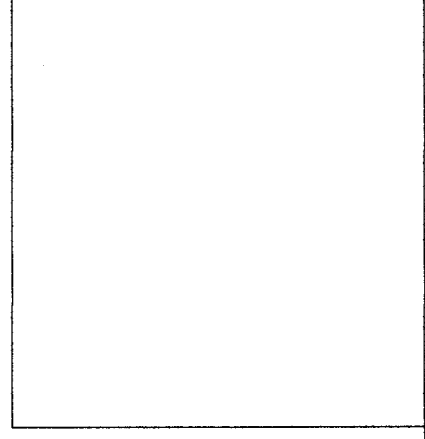
U5

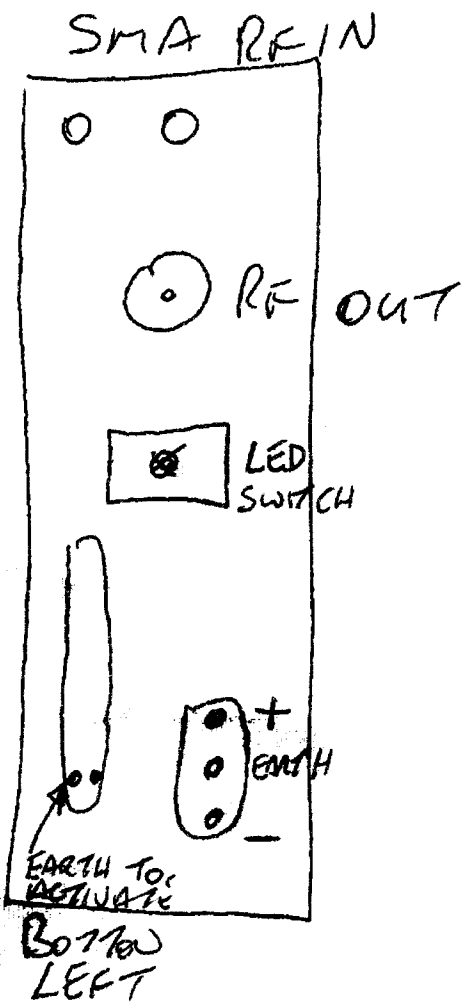
U3

S1

RF Switch Enable(s)	1	2	RF Switch Enable(s)
SWR	3	4	Ground
Temperature	5	6	Bias Q5
Current Q4	7	8	Bias Q3
Current Q5	9	10	Bias Q4
Current Q3	11	12	Ground
+9v supply	13	14	Ground
+9v supply	15	16	Bias supply enable

Socket J3





13 cm PA

RED LED = POWER ON / FAULT.
GREEN = ACTIVE

Put EARTH ON D TYPE
PIN AS MARKED. RED LED
GOES TO GREEN. UNIT
NOW ACTIVE.

Apply LESS THAN 0 dBm
to SMA START AT -5 dBm
UNITS WILL GIVE OVER 100 Wm
AND MORE ~~IS~~ IS POSSIBLE IF
UNIT IS TUNED. TESTS DONE
ON 2.320 GHz.

UNIT HAS 50 dBs OF GAIN.
WITH NO TUNING.

GaAs IC High Isolation Positive Control SPDT Non-Reflective Switch DC–4.0 GHz



AS186-302

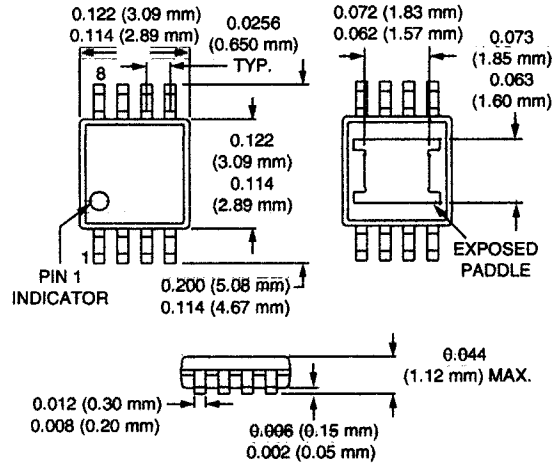
Features

- Positive Voltage Control (0/+3 to 0/+5 V)
- High Isolation (55 dB @ 0.9 GHz and 1.9 GHz)
- Miniature MSOP-8 Exposed Pad Package
- Three Switch Solution for Base Station Synthesizer Switch
- Non-Reflective
- Operation to 6 GHz

Description

The AS186-302 is a GaAs FET IC SPDT non-reflective switch packaged in a MSOP-8 exposed pad plastic package for low cost, high isolation commercial applications. Ideal building block for base station applications where synthesizer isolation is critical. Typical applications include GSM, PCS, WCDMA, 2.4 GHz ISM and 3.5 GHz wireless local loop.

MSOP-8 Exposed Pad



Electrical Specifications (0, +5 V), -40 to +85°C

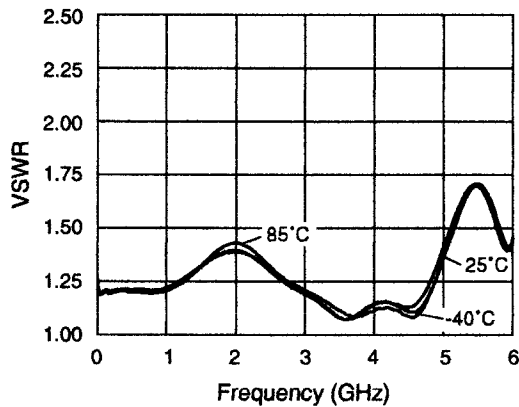
Parameter ¹	Condition	Frequency	Min.	Typ.	Max.	Unit
Insertion Loss		DC–2.0 GHz		0.8	1.05	dB
		DC–3.0 GHz		0.9	1.15	dB
		DC–4.0 GHz		1.0	1.25	dB
Isolation ²		DC–2.0 GHz	50	55		dB
		DC–3.0 GHz	45	50		dB
		DC–4.0 GHz	35	40		dB
VSWR (On State)		DC–2.0 GHz DC–4.0 GHz		1.3:1 1.3:1	1.5:1 1.6:1	
VSWR (Off State)		0.5–4.0 GHz		1.35:1	1.7:1	
Switching Characteristics ³	Rise, Fall (10/90% or 90/10% RF) On, Off (50% CTL to 90/10% RF) Video Feedthru			30		ns
				50		ns
				25		mV
Input Power for 1 dB Compression	0/+3 V	0.9–4.0 GHz	17	21		dBm
	0/+5 V	0.9–4.0 GHz	24	27		dBm
Intermodulation Intercept Point (IIP3)	For Two-tone Input Power +8 dBm 0/+3 V 0/+5 V	0.9–4.0 GHz	27	38		dBm
		0.9–4.0 GHz	42	46		dBm
Control Voltages	V _{Low} = 0 to 0.2 V @ 20 µA Max. V _{High} = +3 V @ 100 µA Max. to +5 V @ 200 µA Max.					

1. All measurements made in a 50 Ω system, unless otherwise specified.

2. Backside of exposed pad must be connected to RF ground to obtain specified isolation.

3. Video feedthru measured with 3 ns risetime pulse.

Typical Performance Data (0, +5 V)



VSWR vs Frequency
-40, 25, 85°C (S₁₁ On)

IP3 vs. Voltage and Temperature

Control Voltage (V)	Temperature (°C)	IP3 @ +8 dBm Each Tone (dBm)
3	-40	44.0
3	25	38.0
3	85	29.5
5	-40	47.5
5	25	46.5
5	85	45.5

Tone frequencies: 900 and 901 MHz.

Truth Table

V ₁	V ₂	J ₁ -J ₂	J ₁ -J ₃
0	V _{High}	Isolation	Insertion Loss
V _{High}	0	Insertion Loss	Isolation

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

Compression Point vs. Voltage and Temperature

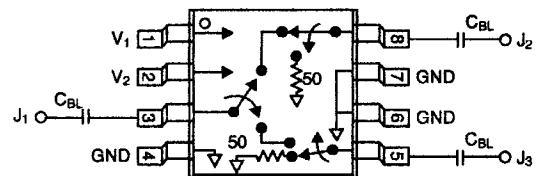
Control Voltage (V)	Temperature (°C)	Input Power @ 1 dB Compression (dBm)	Input power @ 0.1 dB Compression (dBm)
3	-40	20.5	16.5
3	25	20.0	15.3
3	85	19.0	14.0
5	-40	28.5	23.0
5	25	28.0	23.0
5	85	27.5	23.0

Frequency: 900 MHz.

Absolute Maximum Ratings

Characteristic	Value
RF Input Power	1 W Max. > 500 MHz 0/+8 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

Pin Out



C_{BL} = 47 pF for operation > 500 MHz.

PIN CONFIGURATIONS AND FUNCTION DESCRIPTIONS



Figure 2. RM-8 Pin Configuration

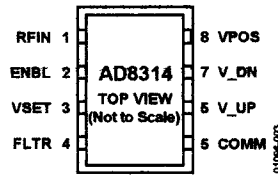


Figure 3. CP-8-1 Pin Configuration

Table 3. Pin Function Descriptions

Pin No.	Mnemonic	Description
1	RFIN	RF Input.
2	ENBL	Connect Pin to V_S for Normal Operation. Connect pin to ground for disable mode.
3	VSET	Setpoint Input for Operation in Controller Mode. To operate in detector mode connect VSET to V_{UP} .
4	FLTR	Connection for an External Capacitor to Slow the Response of the Output. Capacitor is connected between FLTR and V_{UP} .
5	COMM	Device Common (Ground)
6	V_{UP}	Logarithmic Output. Output voltage increases with increasing input amplitude.
7	V_{DN}	Inversion of V_{UP} , Governed by: $V_{DN} = 2.25V - 2 \times V_{UP}$.
8	VPOS	Positive Supply Voltage (V_S), 2.7V to 5.5V.

CODE J5A

U3

100MHz - 2.7 GHz

45dB RF DETECTOR

Application Notes (Continued)

4.9 COMPARATOR WITH HYSTERESIS

The LMV321/358/324 can be used as a low power comparator. Figure 24 shows a comparator with hysteresis. The hysteresis is determined by the ratio of the two resistors.

$$V_{TH+} = V_{REF}/(1+R_1/R_2) + V_{OH}/(1+R_2/R_1)$$

$$V_{TH-} = V_{REF}/(1+R_1/R_2) + V_{OL}/(1+R_2/R_1)$$

$$V_H = (V_{OH} - V_{OL}) / (1 + R_2/R_1)$$

where

V_{TH+} : Positive Threshold Voltage

V_{TH-} : Negative Threshold Voltage

V_{OH} : Output Voltage at High

V_{OL} : Output Voltage at Low

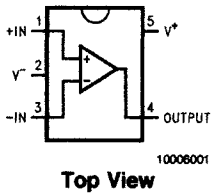
V_H : Hysteresis Voltage

Since LMV321/358/324 have rail-to-rail output, the $(V_{OH} - V_{OL})$ equals to V_S , which is the supply voltage.

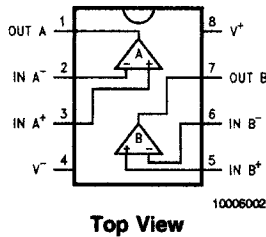
$$V_H = V_S / (1 + R_2/R_1)$$

Connection Diagrams

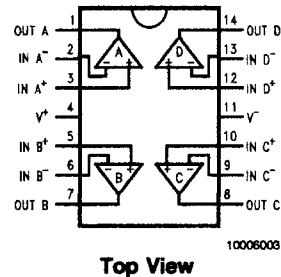
5-Pin SC70-5/SOT23-5



8-Pin SO/MSOP



14-Pin SO/TSSOP



The differential voltage at the input of the op amp should not exceed the specified absolute maximum ratings. For real comparators that are much faster, we recommend you to use National's LMV331/393/339, which are single, dual and quad general purpose comparators for low voltage operation.

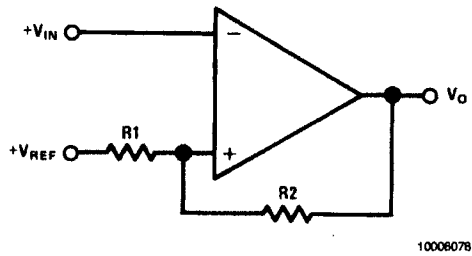


FIGURE 24. Comparator with Hysteresis

Ordering Information

Package	Temperature Range	Packaging Marking	Transport Media	NSC Drawing
	Industrial -40°C to +85°C			
5-Pin SC70-5	LMV321M7	A12	1k Units Tape and Reel	MAA05
	LMV321M7X	A12	3k Units Tape and Reel	
5-Pin SOT23-5	LMV321M5	A13	1k Units Tape and Reel	MA05B
	LMV321M5X	A13	3k Units Tape and Reel	
8-Pin Small Outline	LMV358M	LMV358M	Rails	M08A
	LMV358MX	LMV358M	2.5k Units Tape and Reel	
8-Pin MSOP	LMV358MM	LMV358	1k Units Tape and Reel	MUA08A
	LMV358MMX	LMV358	3.5k Units Tape and Reel	
14-Pin Small Outline	LMV324M	LMV324M	Rails	M14A
	LMV324MX	LMV324M	2.5k Units Tape and Reel	
14-Pin TSSOP	LMV324MT	LMV324MT	Rails	MTC14
	LMV324MTX	LMV324MT	2.5k Units Tape and Reel	



Low-Cost, UCSP/SOT23, Micropower, High-Side Current-Sense Amplifier with Voltage Output

MAX4372T/F/H

General Description

The MAX4372 low-cost, precision, high-side current-sense amplifier is available in a tiny, space-saving SOT23-5-pin package. Offered in three gain versions (T = 20V/V, F = 50V/V, and H = 100V/V), this device operates from a single 2.7V to 28V supply and consumes only 30µA. It features a voltage output that eliminates the need for gain-setting resistors and is ideal for today's notebook computers, cell phones, and other systems where battery/DC current monitoring is critical.

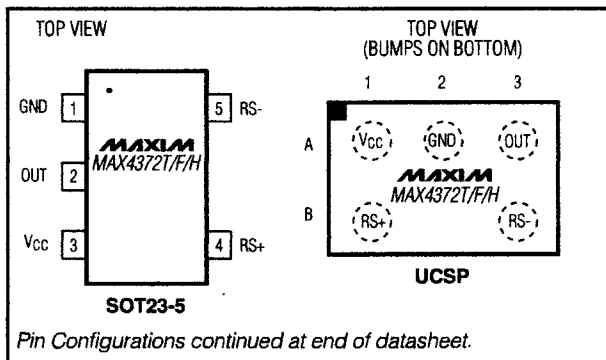
High-side current monitoring is especially useful in battery-powered systems since it does not interfere with the ground path of the battery charger. The input common-mode range of 0 to 28V is independent of the supply voltage and ensures that the current-sense feedback remains viable even when connected to a 2-cell battery pack in deep discharge.

The user can set the full-scale current reading by choosing the device (T, F, or H) with the desired voltage gain and selecting the appropriate external sense resistor. This capability offers a high level of integration and flexibility, resulting in a simple and compact current-sense solution. For higher bandwidth applications, refer to the MAX4173T/F/H data sheet.

Applications

- Power-Management Systems
- General-System/Board-Level Current Monitoring
- Notebook Computers
- Portable/Battery-Powered Systems
- Smart-Battery Packs/Chargers
- Cell Phones
- Precision-Current Sources

Pin Configurations



Features

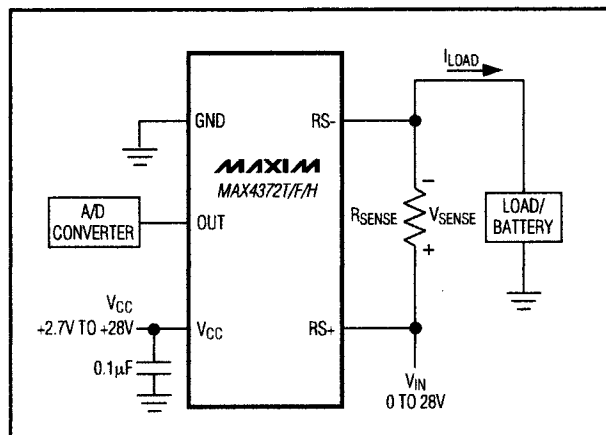
- ◆ Low-Cost, Compact Current-Sense Solution
- ◆ 30µA Supply Current
- ◆ 2.7V to 28V Operating Supply
- ◆ 0.18% Full-Scale Accuracy
- ◆ 0.3mV Input Offset Voltage
- ◆ Low 1.5Ω Output Impedance
- ◆ Three Gain Versions Available
 - 20V/V (MAX4372T)
 - 50V/V (MAX4372F)
 - 100V/V (MAX4372H)
- ◆ High Accuracy +2V to +28V Common-Mode Range, Functional Down to 0V, Independent of Supply Voltage
- ◆ Available in a Space-Saving 5-Pin SOT23 Package and 3 x 2 UCSP™ (1mm x 1.5mm) Package

Ordering Information

PART	TEMP RANGE	PIN-PACKAGE	TOP MARK
MAX4372TEUK-T	-40°C to +85°C	5 SOT23-5	ADIU
MAX4372TESA	-40°C to +85°C	8 SO	—
MAX4372TEBT-T	-40°C to +85°C	3 x 2 UCSP	ACX

Note: Gain values are as follows: 20V/V for the T version, 50V/V for the F version, and 100V/V for the H version.
Ordering information continued at end of datasheet.

Typical Operating Circuit



UCSP is a trademark of Maxim Integrated Products, Inc.



For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim's website at www.maxim-ic.com.

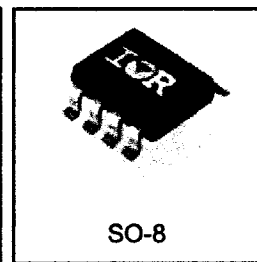
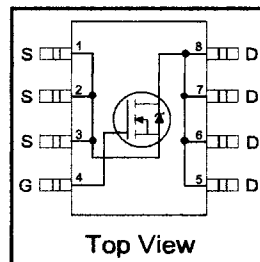
Applications

- High frequency DC-DC converters

V_{DSS}	R_{DS(on)} max(mΩ)	I_D
30V	11@V_{GS} = 10V	12A

Benefits

- Low Gate to Drain Charge to Reduce Switching Losses
- Fully Characterized Capacitance Including Effective C_{oss} to Simplify Design, (See App. Note AN1001)
- Fully Characterized Avalanche Voltage and Current



Absolute Maximum Ratings

	Parameter	Max.	Units
I _D @ T _A = 25°C	Continuous Drain Current, V _{GS} @ 10V	12	A
I _D @ T _A = 70°C	Continuous Drain Current, V _{GS} @ 10V	9.6	
I _{DM}	Pulsed Drain Current ①	96	
P _D @ T _A = 25°C	Power Dissipation ②	2.5	W
	Linear Derating Factor	0.02	W/°C
V _{GS}	Gate-to-Source Voltage	± 20	V
dv/dt	Peak Diode Recovery dv/dt ③	1.0	V/ns
T _J	Operating Junction and	-55 to + 150	°C
T _{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
R _{θJL}	Junction-to-Drain Lead	—	20	°C/W
R _{θJA}	Junction-to-Ambient ④	—	50	

Notes ① through ④ are on page 8

www.irf.com

Handwritten notes:
 1. 2000 03 17 - 01000000

LM50 SOT-23 Single-Supply Centigrade Temperature Sensor

General Description

The LM50 is a precision integrated-circuit temperature sensor that can sense a -40°C to $+125^{\circ}\text{C}$ temperature range using a single positive supply. The LM50's output voltage is linearly proportional to Celsius (Centigrade) temperature ($+10\text{ mV}/^{\circ}\text{C}$) and has a DC offset of $+500\text{ mV}$. The offset allows reading negative temperatures without the need for a negative supply. The ideal output voltage of the LM50 ranges from $+100\text{ mV}$ to $+1.75\text{V}$ for a -40°C to $+125^{\circ}\text{C}$ temperature range. The LM50 does not require any external calibration or trimming to provide accuracies of $\pm 3^{\circ}\text{C}$ at room temperature and $\pm 4^{\circ}\text{C}$ over the full -40°C to $+125^{\circ}\text{C}$ temperature range. Trimming and calibration of the LM50 at the wafer level assure low cost and high accuracy. The LM50's linear output, $+500\text{ mV}$ offset, and factory calibration simplify circuitry required in a single supply environment where reading negative temperatures is required. Because the LM50's quiescent current is less than $130\text{ }\mu\text{A}$, self-heating is limited to a very low 0.2°C in still air.

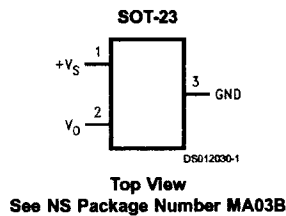
Applications

- Computers
- Disk Drives
- Battery Management
- Automotive
- FAX Machines
- Printers
- Portable Medical Instruments
- HVAC
- Power Supply Modules

Features

- Calibrated directly in degree Celsius (Centigrade)
- Linear $+10.0\text{ mV}/^{\circ}\text{C}$ scale factor
- $\pm 2^{\circ}\text{C}$ accuracy guaranteed at $+25^{\circ}\text{C}$
- Specified for full -40° to $+125^{\circ}\text{C}$ range
- Suitable for remote applications
- Low cost due to wafer-level trimming
- Operates from 4.5V to 10V
- Less than $130\text{ }\mu\text{A}$ current drain
- Low self-heating, less than 0.2°C in still air
- Nonlinearity less than 0.8°C over temp

Connection Diagram



Order Number	SOT-23 Device Marking	Supplied As
LM50BIM3	T5B	1000 Units on Tape and Reel
LM50CIM3	T5C	1000 Units on Tape and Reel
LM50BIM3X	T5B	3000 Units on Tape and Reel
LM50CIM3X	T5C	3000 Units on Tape and Reel

Typical Application

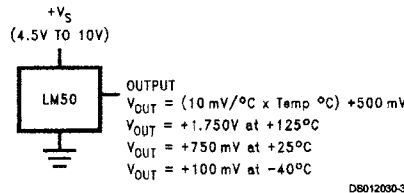


FIGURE 1. Full-Range Centigrade Temperature Sensor (-40°C to $+125^{\circ}\text{C}$)



Precision Rail-to-Rail Input and Output Operational Amplifiers

OP184/OP284/OP484

FEATURES

- Single-supply operation
- Wide bandwidth: 4 MHz
- Low offset voltage: 65 μV
- Unity-gain stable
- High slew rate: 4.0 V/ μs
- Low noise: 3.9 nV/ $\sqrt{\text{Hz}}$

APPLICATIONS

- Battery-powered instrumentation
- Power supply control and protection
- Telecommunications
- DAC output amplifier
- ADC input buffer

GENERAL DESCRIPTION

The OP184/OP284/OP484 are single, dual, and quad single-supply, 4 MHz bandwidth amplifiers featuring rail-to-rail inputs and outputs. They are guaranteed to operate from 3 V to 36 V (or ± 1.5 V to ± 18 V).

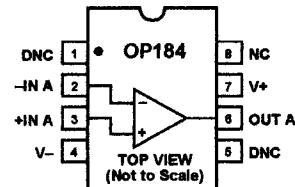
These amplifiers are superb for single-supply applications requiring both ac and precision dc performance. The combination of wide bandwidth, low noise, and precision makes the OP184/OP284/OP484 useful in a wide variety of applications, including filters and instrumentation.

Other applications for these amplifiers include portable telecommunications equipment, power supply control and protection, and use as amplifiers or buffers for transducers with wide output ranges. Sensors requiring a rail-to-rail input amplifier include Hall effect, piezoelectric, and resistive transducers.

The ability to swing rail-to-rail at both the input and output enables designers to build multistage filters in single-supply systems and to maintain high signal-to-noise ratios.

The OP184/OP284/OP484 are specified over the hot extended industrial temperature range of -40°C to $+125^{\circ}\text{C}$. The single OP184 is available in 8-lead SOIC surface mount packages. The dual OP284 is available in 8-lead PDIP and SOIC surface mount packages. The quad OP484 is available in 14-lead PDIP and 14-lead, narrow-body SOIC packages.

PIN CONFIGURATIONS



- NOTES
1. NC = NO CONNECT
2. DNC = DO NOT CONNECT

Figure 1. 8-Lead SOIC (S-Suffix)

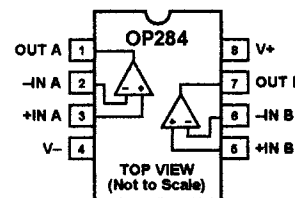


Figure 2. 8-Lead PDIP (P-Suffix)
8-Lead SOIC (S-Suffix)

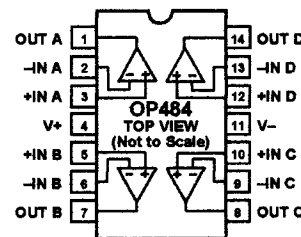


Figure 3. 14-Lead PDIP (P-Suffix)
14-Lead Narrow-Body SOIC (S-Suffix)

Rev. G

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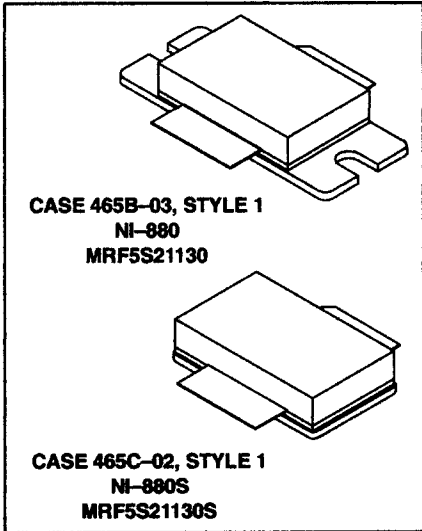
The RF MOSFET Line
RF Power Field Effect Transistors
N-Channel Enhancement-Mode Lateral MOSFETs

Designed for W-CDMA base station applications at frequencies from 2110 to 2170 MHz. Suitable for TDMA, CDMA and multicarrier amplifier applications. To be used in Class AB for PCN-PCS/cellular radio and WLL applications.

- Typical 2-carrier W-CDMA Performance for $V_{DD} = 28$ Volts, $I_{DQ} = 1200$ mA, $f_1 = 2135$ MHz, $f_2 = 2145$ MHz, Channel Bandwidth = 3.84 MHz, Adjacent Channels Measured over 3.84 MHz BW @ $f_1 -5$ MHz and $f_2 +5$ MHz, Distortion Products Measured over a 3.84 MHz BW @ $f_1 -10$ MHz and $f_2 +10$ MHz, Peak/Avg. = 8.5 dB @ 0.01% Probability on CCDF.
 - Output Power — 28 Watts Avg.
 - Power Gain — 13.5 dB
 - Efficiency — 26%
 - IM3 — -37 dBc
 - ACPR — -39 dBc
- Internally Matched, Controlled Q, for Ease of Use
- High Gain, High Efficiency and High Linearity
- Integrated ESD Protection
- Designed for Maximum Gain and Insertion Phase Flatness
- Capable of Handling 10:1 VSWR, @ 28 Vdc, 2140 MHz, 92 Watts CW Output Power
- Excellent Thermal Stability
- Characterized with Series Equivalent Large-Signal Impedance Parameters
- Qualified Up to a Maximum of 32 V_{DD} Operation
- Available in Tape and Reel. R3 Suffix = 250 Units per 56 mm, 13 inch Reel.

MRF5S21130
MRF5S21130R3
MRF5S21130S
MRF5S21130SR3

2170 MHz, 28 W AVG.,
2 x W-CDMA, 28 V
LATERAL N-CHANNEL
RF POWER MOSFETs



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	Vdc
Gate-Source Voltage	V_{GS}	-0.5, +15	Vdc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	315 2	Watts W/°C
Storage Temperature Range	T_{stg}	-65 to +150	°C
Operating Junction Temperature	T_J	200	°C
CW Operation	CW	92	Watts

NOTE - CAUTION - MOS devices are susceptible to damage from electrostatic charge. Reasonable precautions in handling and packaging MOS devices should be observed.

The RF MOSFET Line
RF Power Field Effect Transistors
N-Channel Enhancement-Mode Lateral MOSFETs

Designed for W-CDMA base station applications with frequencies from 2110 to 2170 MHz. Suitable for TDMA, CDMA and multicarrier amplifier applications. To be used in Class AB for PCN - PCS/cellular radio and WLL applications.

- Typical 2-carrier W-CDMA Performance for $V_{DD} = 28$ Volts, $I_{DQ} = 1000$ mA, $f_1 = 2135$ MHz, $f_2 = 2145$ MHz, Channel Bandwidth = 3.84 MHz, Adjacent Channels Measured over 3.84 MHz BW @ $f_1 - 5$ MHz and $f_2 + 5$ MHz, Distortion Products Measured over a 3.84 MHz BW @ $f_1 - 10$ MHz and $f_2 + 10$ MHz, Peak/Avg. = 8.3 dB @ 0.01% Probability on CCDF.
 - Output Power — 19 Watts Avg.
 - Power Gain — 13.6 dB
 - Efficiency — 23%
 - IM3 — -37.5 dBc
 - ACPR — -41 dBc
- Internally Matched, Controlled Q, for Ease of Use
- High Gain, High Efficiency and High Linearity
- Integrated ESD Protection
- Designed for Maximum Gain and Insertion Phase Flatness
- Capable of Handling 5:1 VSWR, @ 28 Vdc, 2170 MHz, 90 Watts CW Output Power
- Excellent Thermal Stability
- Characterized with Series Equivalent Large-Signal Impedance Parameters
- Available with Low Gold Plating Thickness on Leads. L Suffix Indicates 40 μ Nominal.
- In Tape and Reel. R3 Suffix = 250 Units per 56 mm, 13 inch Reel.

MRF21085R3
MRF21085SR3
MRF21085LSR3

2170 MHz, 90 W, 28 V
LATERAL N-CHANNEL
RF POWER MOSFETs

CASE 465-06, STYLE 1
NI-780
MRF21085R3

CASE 465A-06, STYLE 1
NI-780S
MRF21085SR3, MRF21085LSR3

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	Vdc
Gate-Source Voltage	V_{GS}	-0.5, +15	Vdc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25 $^\circ\text{C}$	P_D	224 1.28	Watts W/ $^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +150	$^\circ\text{C}$
Operating Junction Temperature	T_J	200	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Value (1)	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.78	$^\circ\text{C}/\text{W}$

ESD PROTECTION CHARACTERISTICS

Test Conditions	Class
Human Body Model	1 (Minimum)
Machine Model	M3 (Minimum)

(1) Refer to AN1955/D, *Thermal Measurement Methodology of RF Power Amplifiers*. Go to <http://www.motorola.com/semiconductors/rf>. Select Documentation/Application Notes - AN1955.

NOTE - CAUTION - MOS devices are susceptible to damage from electrostatic charge. Reasonable precautions in handling and packaging MOS devices should be observed.


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MAX840, MAX843, MAX844

Low-Noise, Regulated, -2V GaAsFET Bias

Operates with Small Capacitors, as Low as 0.22 μ F

- [QuickView](#)
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Status

Active: In Production.

Description

The MAX840/MAX843/MAX844 low-noise, inverting charge-pump power supplies are ideal for biasing GaAsFETs in cellular telephone transmitter amplifiers. They operate with inputs down to 2.5V.

FULL DATA SHEET (PDF, 176kB)

[Download](#)

[E-Mail](#)

The MAX840 offers both a -2V preset output and a -0.5V to -9.4V adjustable output. The MAX843/MAX844 use an external positive control voltage to set the negative output voltage. Input voltage range for all the devices is 2.5V to 10V, and output current is 4mA with $V_{IN} > 2.7V$. These circuits can operate with small capacitors, as low as 0.22 μ F.

An internal linear regulator reduces the MAX840's output voltage ripple to 1mVp-p. With a well-filtered control voltage (V_{CTRL}), the MAX843/MAX844 also achieve less than 1mVp-p typical output ripple. Supply current is 750 μ A, and reduces to less than 1 μ A in shutdown (MAX840/MAX843). The MAX844's unregulated output is active in shutdown, with the charge pump switching at 20kHz. It provides a low-power LCD supply.

An evaluation kit is available: MAX840EVKIT, MAX843EVKIT, MAX844EVKIT

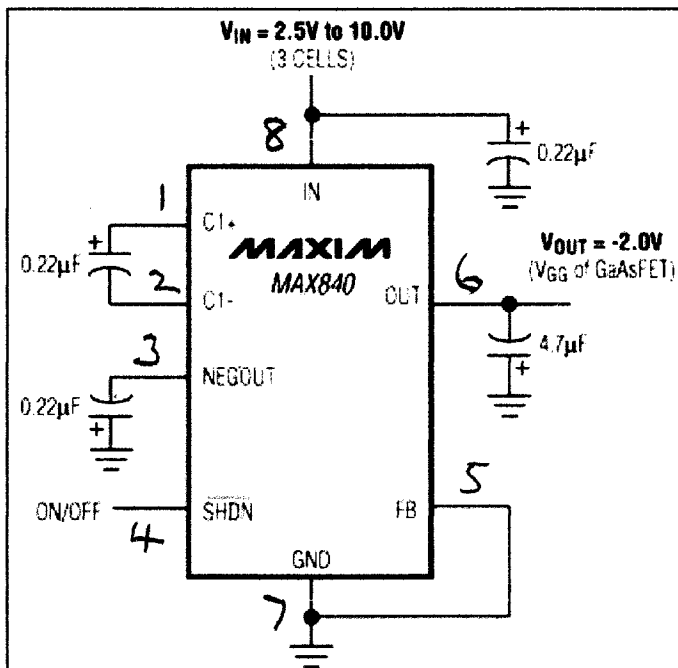
Key Features

- Fixed -2V or Adjustable -0.5V to -9.4V Output at 4mA (MAX840)
- 2.5V to 10V Input Voltage Range
- Operate with Small Capacitors (as low as 0.22 μ F)
- 1mVp-p Output Voltage Ripple
- Charge-Pump Switching Frequency:
 - 100kHz in Normal Operation
 - 20kHz in Shutdown Mode (MAX844)
- 1 μ A Max Logic-Level Shutdown Over Temp. (MAX840/MAX843)
- Small 8-Pin SO Package

Applications/Uses

- Cell Phones
- Continuously Adjustable GaAsFET Bias
- GaAsFET Power Amplifier Modules
- LCD-Bias Contrast Control
- Personal Communicators, PDAs
- Regulated Negative Power Supplies
- Wireless Data Loggers

Diagram



Typical Operating Circuit



Hybrid Couplers 3 dB, 90°

Description

The JP503 Pico Xinger is a low profile, miniature 3dB hybrid coupler in an easy to use surface mount package designed for W-CDMA and other 3G applications. The JP503 is designed for balanced amplifiers, variable phase shifters and attenuators, LNAs, signal distribution and is an ideal solution for the ever-increasing demands of the wireless industry for smaller printed circuit boards and high performance. Parts have been subjected to rigorous qualification testing and units are 100% tested. They are manufactured using materials with x and y thermal expansion coefficients compatible with common substrates. Available in both 5 of 6 tin lead (JP503) and 6 of 6 RoHS compliant tin immersion (JP503S).



Features:

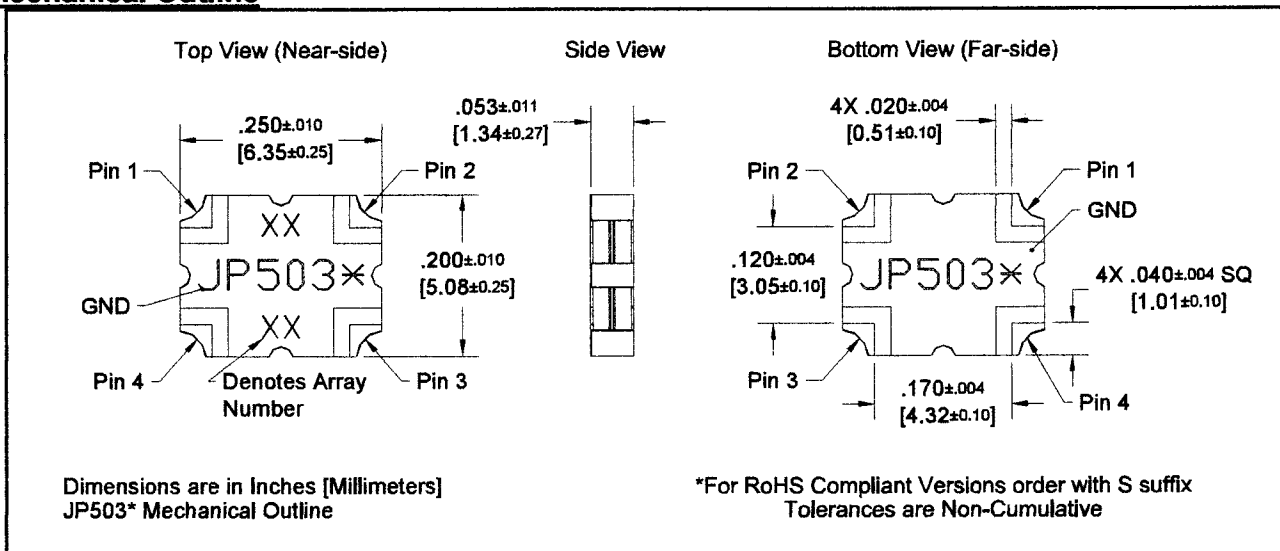
- 2.0 – 2.3 GHz.
- 3G Frequencies
- Low Loss
- High Isolation
- 90° Quadrature
- Surface Mountable
- Tape And Reel
- Available in Lead-Free (as illustrated) or Tin-Lead

ELECTRICAL SPECIFICATIONS**

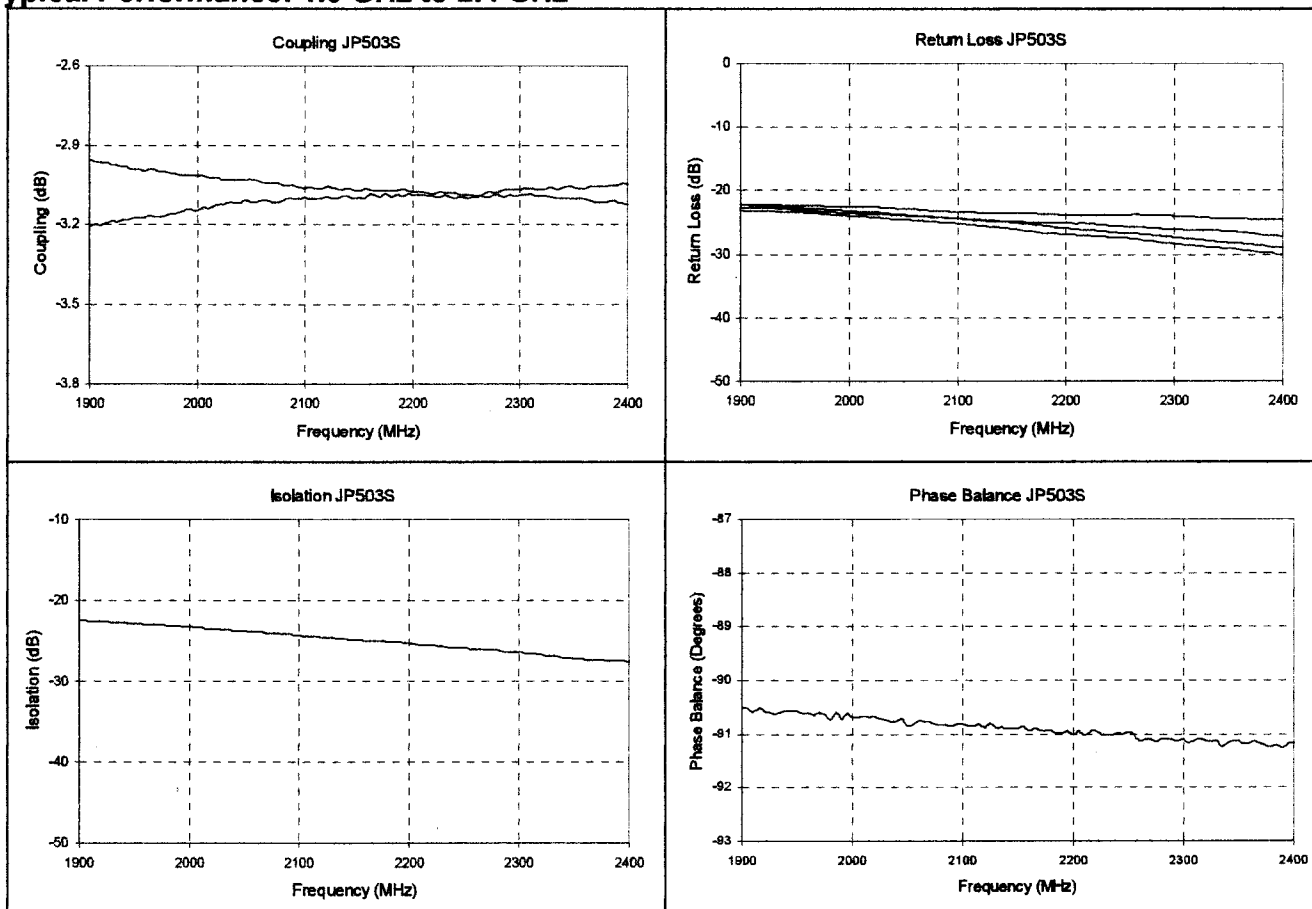
Frequency	Isolation	Insertion Loss	VSWR		
GHz	dB Min	dB Max	Max:1		
2.0 – 2.3	20	0.30	1.20		
Amplitude Balance	Phase Balance	Power	θJC	Operating Temp.	
dB Max	Degrees	Ave. CW Watts	°C/Watt	°C	
± 0.25	± 3	25	27.5	-55 to +85	

**Specification based on performance of unit properly installed on microstrip printed circuit boards with 50 Ω nominal impedance. Specifications subject to change without notice.

Mechanical Outline



Typical Performance: 1.9 GHz to 2.4 GHz



AMPLITUDE BALANCE

3dB hybrids are a type of backward wave coupler. In the design of these couplers, the even mode impedance was chosen to 'critically couple' or slightly 'over couple' at mid band to maximize performance and bandwidth. The amplitude balance specification is defined as the difference (in dB) of the signals at the COUPLED port output and the DC port output, when compared to the average output level.

PHASE BALANCE

In theory, output ports of a backward wave hybrid coupler remain in perfect phase quadrature independent of frequency. In practice, factors associated with the manufacturing processes slightly degrade performance. The specification is typical two to three degrees maximum although in practice, phase balance is statistically better than specified (<math><1^\circ</math>).

VSWR & ISOLATION

Similar to phase balance, the VSWR and isolation of a coupler are theoretically perfect; where the input and output ports are perfectly matched and no power is coupled to the isolated port. In practice, factors associated with the design and manufacturing processes limit VSWR and isolation. The significant limitations are associated with limitations of building perfect 50Ω transitions at the input and output ports of the device.

INSERTION LOSS

Coupler insertion loss is defined as the difference of the input power from the sum of the output power. In practice, loss is typically 0.20 dB. Specification limits are somewhat higher due to imperfect test conditions; as the couplers must be tested in fixtures which negatively affect results.

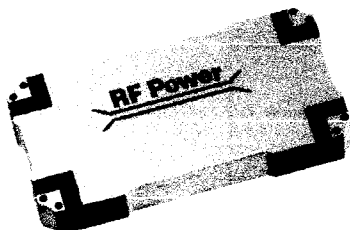
USA/Canada: (315) 432-8909
 Toll Free: (800) 544-2414
 Europe: +44 2392-232392

Available on Tape and Reel For Pick and Place Manufacturing.



RF Power

Hybrid Couplers 3 dB, 90°



Description

The S03B2150N3 is a low profile 3 dB hybrid coupler in an easy to use surface mount package for UMTS and other 3G applications. The S03B2150N3 is ideal for balanced amplifiers and signal distribution and can be used in very high power designs. Parts have been run through rigorous qualifications and units are 100% tested. They are manufactured using materials with X and Y thermal expansion coefficients compatible with common substrates.

Features

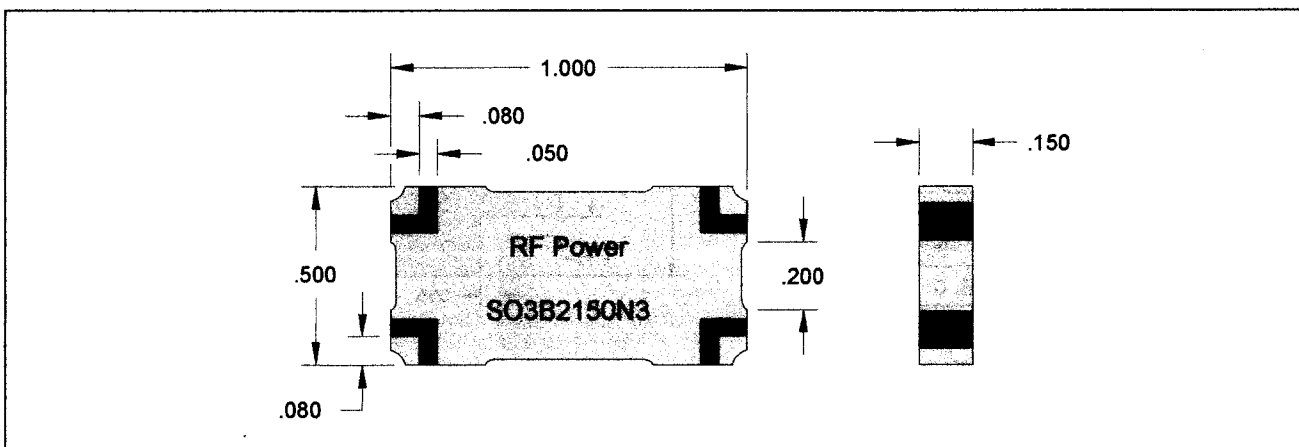
- 2.0 - 2.3 GHz
- 300 Watts
- Low Loss
- High Isolation
- 90° Quadrature
- Surface Mountable
- Tape and Reel
- Convenient Package
- 100% Tested

Electrical Specifications

Frequency GHz	Isolation dB Min	Insert. Loss dB Max	VSWR Max: 1
2.0 - 2.3	20	0.15	1.25
Amp. Bal. dB Max	Phase Bal. Degrees Max	Temp. °C	Power Avg. CW Watts
±0.20	4	-55 to +85	300

Specifications subject to change without notice.

Outline Drawing



VER. 3/13/02

Available on Tape and Reel for Pick and Place Manufacturing.

Sales Desk USA: Voice: (800) 544-2414 Fax: (315) 432-9121
Sales Desk Europe: Voice: (+44) 23 92 232392 Fax: (+44) 23 92 251369

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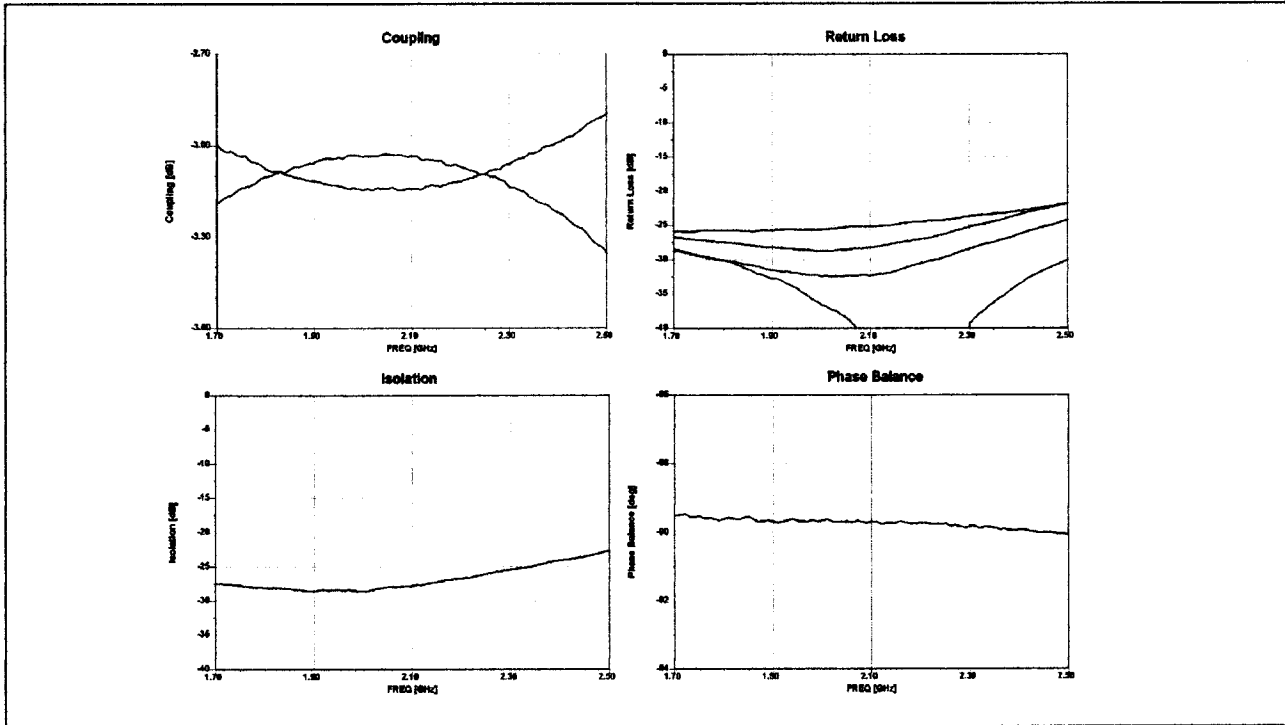
Model S03B2150N3



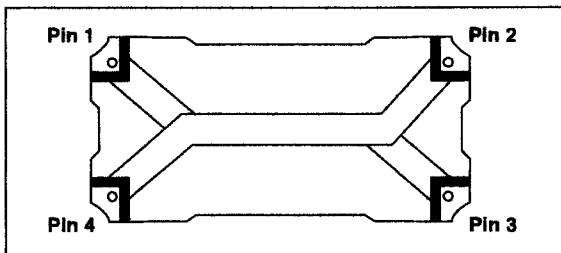
www.anaren.com

RF Power

Typical Performance

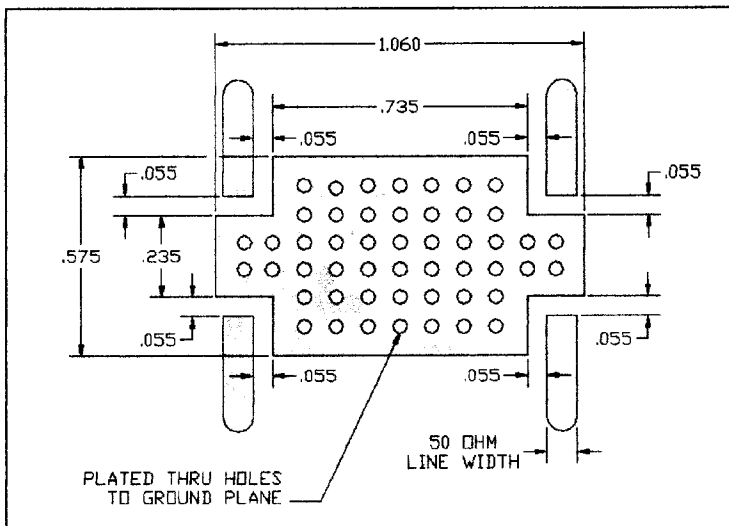


Pin Configuration



	Pin 1	Pin 2	Pin 3	Pin 4
#1	Input	Isolated	-3dB, -90°	-3dB, 0°
#2	Isolated	Input	-3dB, 0°	-3dB, -90°
#3	-3dB, -90°	-3dB, 0°	Input	Isolated
#4	-3dB, 0°	-3dB, -90°	Isolated	Input

Mounting Footprint



Available on Tape and Reel for Pick and Place Manufacturing.



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 Sales Desk Europe: Voice: (+44) 23 92 232392 Fax: (+44) 23 92 251369



Ferrite Product Line

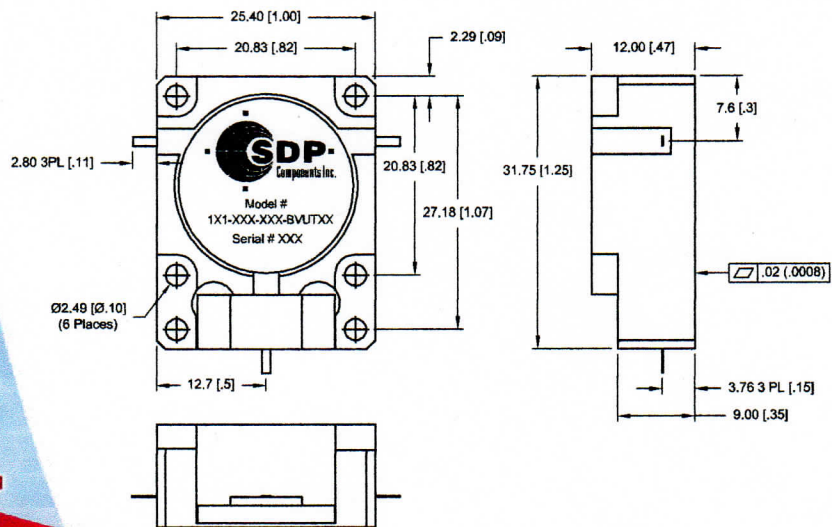


1.0" UMTS Low-Loss Drop-in Isolator

Standard Low-Loss Version

Part Number:	cw:	101-211-217-BVUT20
	ccw:	111-211-217-BVUT20
Frequency:		2110 to 2170 MHz
Insertion loss:		-0.15 dB max., over temperature
Isolation:		-23 dB min., over temperature
Return loss:		-23 dB min., over temperature
IMD (2x35w, 5MHz separation):		Better than -75 dBc
Third port attenuation:		-20 dB
Reverse Power handling :		To 100w CW
Standard Operating Temperature range:		-10°C to +80°C
Mechanical dimensions:		To be built within the generic outline drawing dimensions (1x1-xx-xx-BVUT20)

www.sdp.ca



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