

Product Features

- 50 – 4000 MHz
- Low Noise Figure
- 18 dB Gain
- +36 dBm OIP3
- +18 dBm P1dB
- Single or Dual Supply Operation
- Lead-free/Green/RoHS-compliant SOT-89 Package
- MTTF > 100 years

Applications

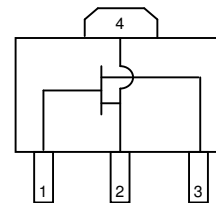
- Mobile Infrastructure
- CATV / DBS
- W-LAN / ISM
- Defense / Homeland Security

Product Description

The FH101 is a high dynamic range FET packaged in a low-cost surface-mount package. The combination of low noise figure and high output IP3 at the same bias point makes it ideal for receiver and transmitter applications. The device combines dependable performance with superb quality to maintain MTTF values exceeding 100 years at mounting temperatures of +85°C. The FH101 is available in the environmentally-friendly lead-free/green/RoHS-compliant SOT-89 package.

The device utilizes a high reliability GaAs MESFET technology and is targeted for applications where high linearity is required. It is well suited for various current and next generation wireless technologies such as GPRS, GSM, CDMA, and W-CDMA. In addition, the FH101 will work for other applications within the 50 to 4000 MHz frequency range such as fixed wireless.

Functional Diagram



Function	Pin No.
Gate	1
Drain	3
Source	2, 4

Specifications ⁽¹⁾

DC Electrical Parameter	Units	Min	Typ	Max
Saturated Drain Current, Idss ⁽²⁾	mA	100	140	170
Transconductance, Gm	mS		120	
Pinch-off Voltage, Vp ⁽³⁾	V	-3	-1.5	

RF Parameter	Units	Min	Typ	Max
Operational Bandwidth	MHz		50 – 4000	
Test Frequency	MHz		800	
Small-signal Gain, Gss	dB	17	18	
Max Stable Gain, Gmsg	dB		23	
Output IP3 ⁽⁴⁾	dBm	+32	+36	
P1dB	dBm		+18	
Minimum Noise Figure ⁽⁵⁾	dB		0.77	
Drain Bias	V		+5	
Gate Bias	V		0	

1. DC and RF parameters are measured under the following conditions unless otherwise noted:
25°C with Vds = 5V, Vgs = 0V, in a 50 Ω system.
2. Idss is measured with Vgs = 0V.
3. Pinch-off voltage is measured with Ids = 0.6 mA.
4. 3OIP measured with two tones at an output power of +5 dBm/line separated by 10 MHz. The suppression on the largest IM3 product is used to calculate the 3OIP using a 2:1 rule.
5. The minimum noise figure has $\Gamma_s = \Gamma_L = \Gamma_{OPT}$.

Typical Performance ⁽⁶⁾

Parameter	Units	Typical		
Frequency	MHz	900	1960	2140
S21	dB	19	16.5	16.5
S11	dB	-11	-20	-22
S22	dB	-10	-9	-9
Output P1dB	dBm	+18.8	+18.1	+19.1
Output IP3 ⁽⁴⁾	dBm	+36	+36	+36
Noise Figure	dB	2.7	3.1	3.0
Drain Bias		5V @ 140mA		
Gate Voltage	V	0		

6. The device requires appropriate matching to become unconditionally stable. Parameters reflect performance in an appropriate application circuit.

Absolute Maximum Rating

Parameter	Rating
Operating Case Temperature	-40 to +85 °C
Storage Temperature	-55 to +150 °C
Drain to Source Voltage	+7 V
Gate to Source Voltage	-6 V
Gate Current	4.5 mA
RF Input Power (continuous)	4 dB above Input P1dB
Junction Temperature	+220 °C

Operation of this device above any of these parameters may cause permanent damage.

Ordering Information

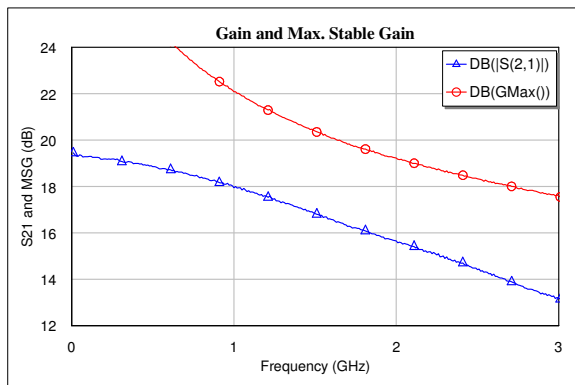
Part No.	Description
FH101-G	High Dynamic Range FET (lead-free/green/RoHS-compliant SOT-89 package)

Specifications and information are subject to change without notice.



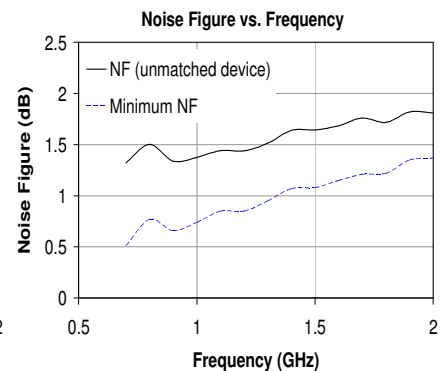
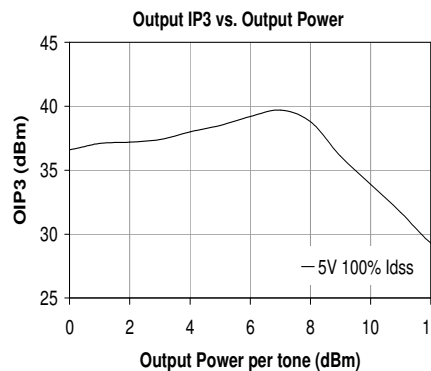
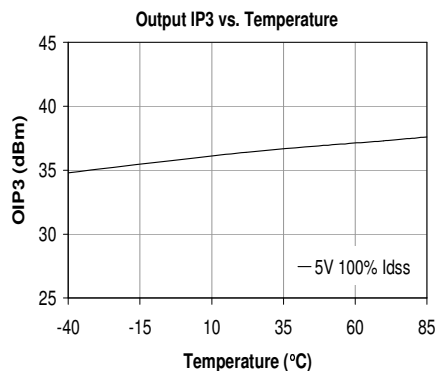
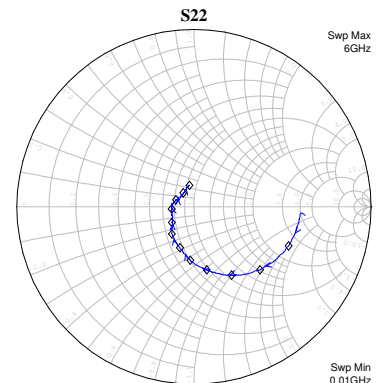
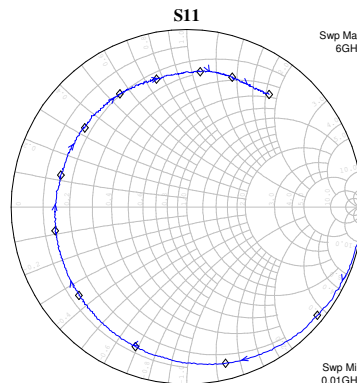
Typical Device Data

Data is shown at a biasing configuration of $V_{DS} = +5$ V, $I_{DS} = 140$ mA, 25°C for the unmatched device in a 50 ohm system)



Notes:

The gain for the unmatched device in 50 ohm system is shown as the trace in blue color. For a tuned circuit for a particular frequency, it is expected that actual gain will be higher, as high as the maximum stable gain. The maximum stable gain is shown in the red line. The impedance plots are shown from 10 – 6000 MHz, with markers placed at 0.5 – 6.0 GHz in 0.5 GHz increments.



S-Parameters ($V_D = +5$ V, $I_D = 140$ mA, $V_G = 0$ V, 25°C , calibrated to device leads)

Freq (MHz)	S11 (dB)	S11 (ang)	S21 (dB)	S21 (ang)	S12 (dB)	S12 (ang)	S22 (dB)	S22 (ang)
50	0.00	-4.08	19.36	176.06	-51.05	87.96	-4.38	-3.34
250	-0.13	-19.64	19.19	164.65	-37.15	78.37	-4.52	-11.51
500	-0.34	-39.41	18.85	150.19	-31.34	66.75	-4.77	-22.43
750	-0.55	-58.33	18.47	136.21	-28.24	55.74	-5.19	-33.05
1000	-0.83	-75.93	17.95	123.24	-26.22	45.25	-5.77	-43.46
1250	-1.16	-93.29	17.47	110.92	-24.88	35.22	-6.44	-53.09
1500	-1.50	-110.36	16.82	99.18	-23.95	26.69	-7.14	-61.08
1750	-1.80	-125.64	16.21	88.19	-23.27	18.17	-7.94	-69.92
2000	-2.03	-140.92	15.65	77.53	-22.81	9.87	-8.84	-78.43
2250	-2.25	-155.64	15.05	67.15	-22.39	2.11	-9.57	-86.41
2500	-2.37	-169.80	14.42	57.62	-22.25	-4.68	-10.43	-93.92
2750	-2.55	-177.26	13.74	48.11	-22.08	-11.35	-11.43	-101.88
3000	-2.62	-165.93	13.18	39.86	-22.01	-17.16	-12.30	-108.95

Noise Parameters ($V_D = +5$ V, $I_D = 140$ mA, $V_G = 0$ V, 25°C , calibrated to device leads)

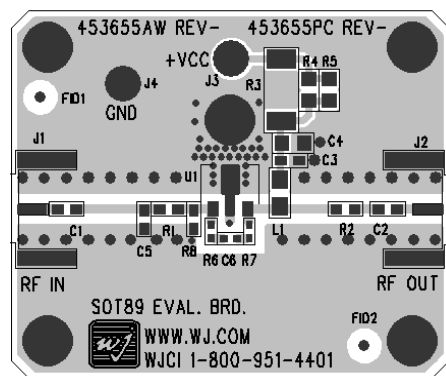
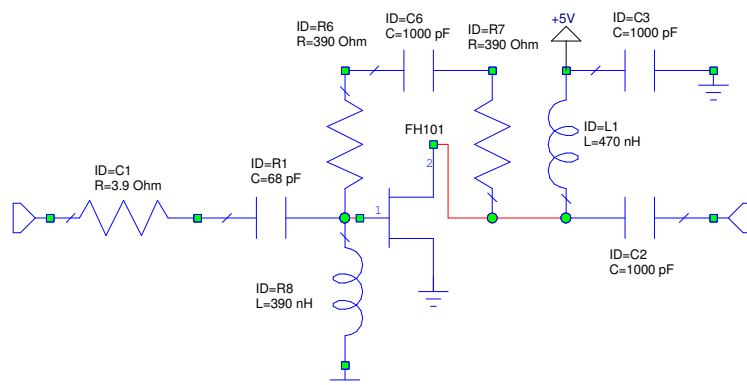
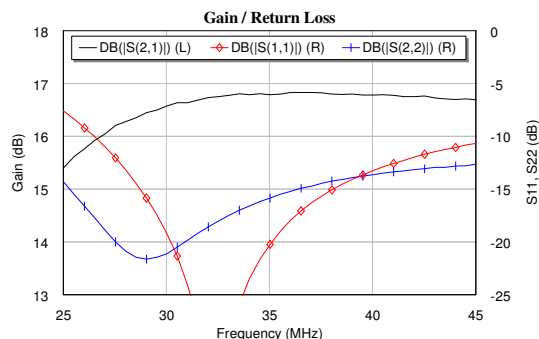
Freq (MHz)	NF_min (dB)	MagOpt (mag)	AngOpt (deg)	Rn
700	0.51	0.574	32.8	0.403
800	0.77	0.535	37.4	0.409
900	0.66	0.508	44.1	0.379
1000	0.74	0.488	50.4	0.365
1100	0.85	0.463	56.4	0.357
1200	0.85	0.458	62.0	0.345
1300	0.95	0.446	67.3	0.335
1400	1.07	0.450	73.3	0.323

Device S-parameters and noise are available for download off of the website at: <http://www.wj.com>

Specifications and information are subject to change without notice.

Reference Design: 35 MHz, 17 dB Gain

Frequency	MHz	30	35	40
Gain	dB	16.6	16.8	16.8
S11	dB	-19	-20	-13
S22	dB	-21	-16	-14
P1dB	dBm	+18		
OIP3	dBm	+34		
Noise Figure	dB	4.0	3.4	3.2
Supply Voltage	V	+5		
Supply Current	mA	140		

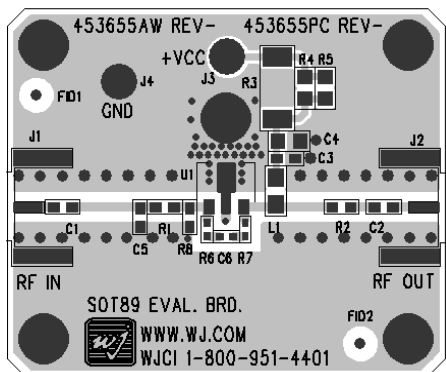
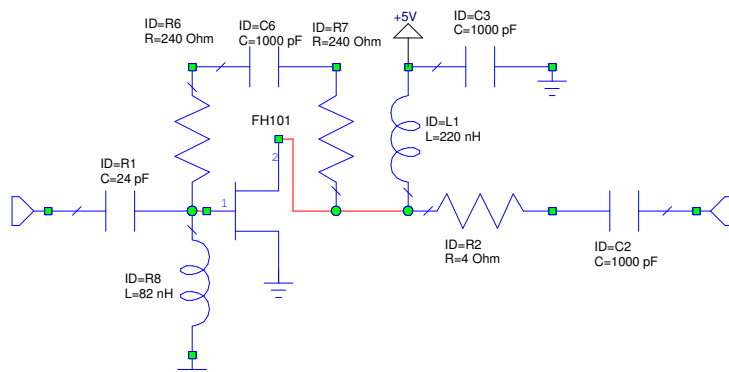
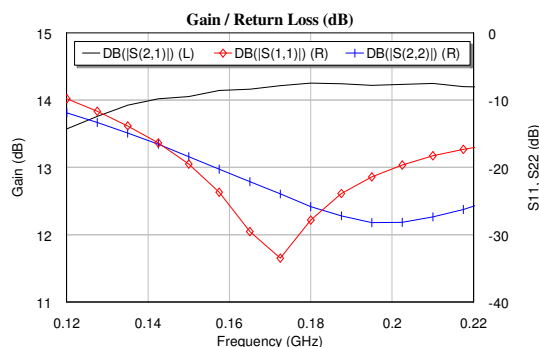


Notes:

1. Circuit Board Material: .014" Getek ML200DSS ($\epsilon_r = 4.2$), 1 oz copper. The main microstrip line has a line impedance of 50Ω .
2. Components not shown in the schematic are either not used or loaded with a thru. Gain for the circuit can be adjusted slightly with the modification of the feedback resistance.

Reference Design: 170 MHz, 14 dB Gain

Frequency	MHz	160	170	180
Gain	dB	14.1	14.2	14.3
S11	dB	-25	-33	-28
S22	dB	-21	-23	-26
P1dB	dBm	+18.6		
OIP3	dBm	+36		
Noise Figure	dB	2.7	2.7	2.7
Supply Voltage	V	+5		
Supply Current	mA	140		



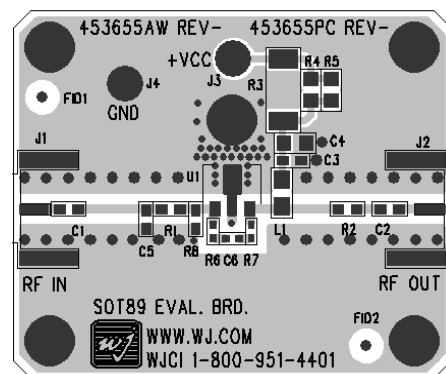
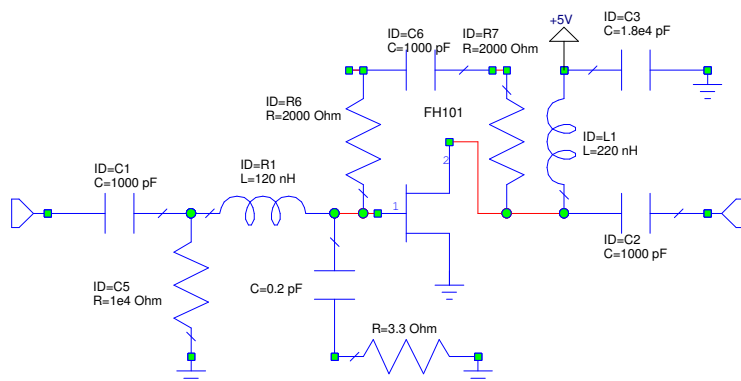
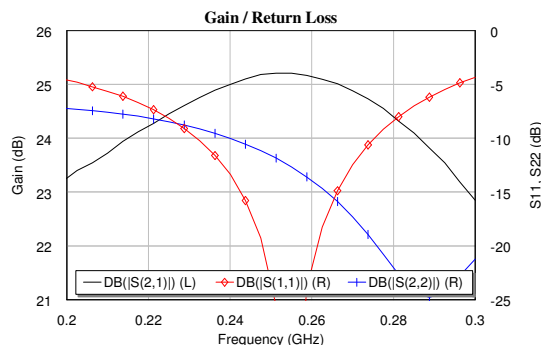
Notes:

1. Circuit Board Material: .014" Getek ML200DSS ($\epsilon_r = 4.2$), 1 oz copper. The main microstrip line has a line impedance of 50Ω .
2. Components not shown in the schematic are either not used or loaded with a thru. Gain for the circuit can be adjusted slightly with the modification of the feedback resistance.

Specifications and information are subject to change without notice.

Reference Design: 260 MHz, 25 dB Gain

Frequency	MHz	250	260	270
Gain	dB	25.2	25.1	24.9
S11	dB	-23	-22	-13
S22	dB	-12	-14	-17
P1dB	dBm	+19.4		
OIP3	dBm	+34.5		
Noise Figure	dB	1.8	1.9	2.1
Supply Voltage	V	+5		
Supply Current	mA	140		



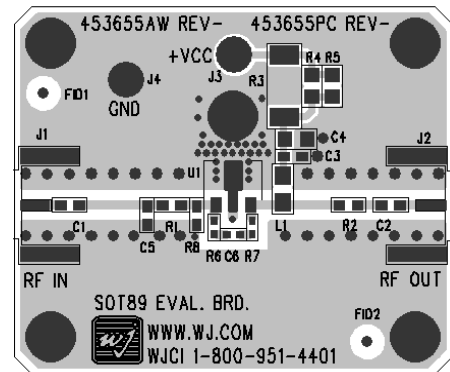
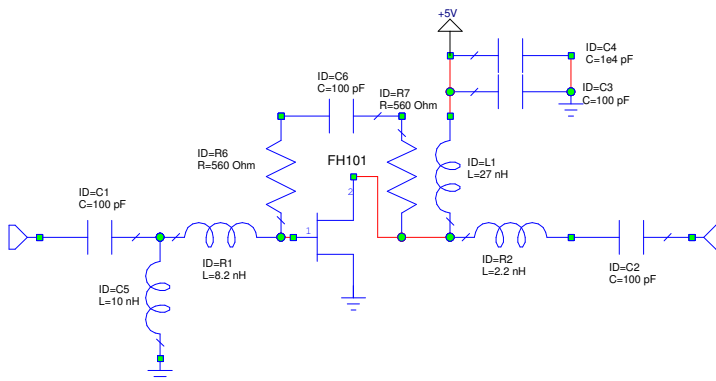
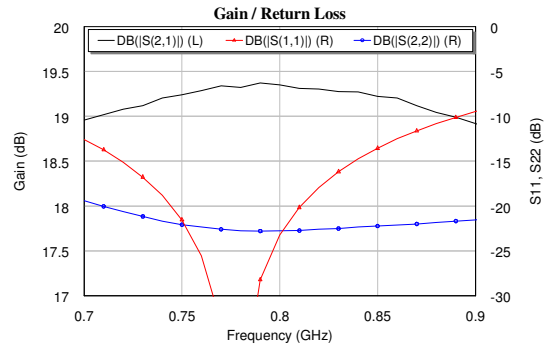


FH101

High Dynamic Range FET

Reference Design: 790 MHz, 19 dB Gain

Frequency	GHz	746	790	835
Gain	dB	19.2	19.4	19.3
S11	dB	-20	-28	-15
S22	dB	-22	-23	-22
P1dB	dBm	+19		
OIP3	dBm	+36		
Noise Figure	dB	2.3		
Supply Voltage	V	+5		
Supply Current	mA	140		

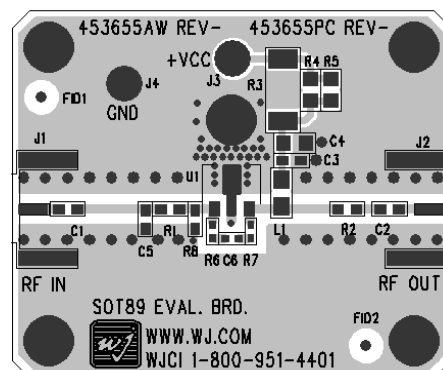
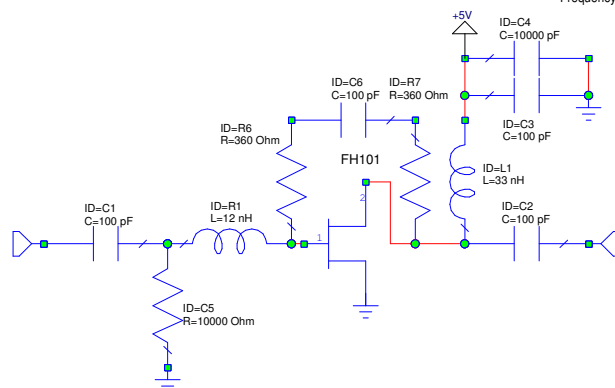
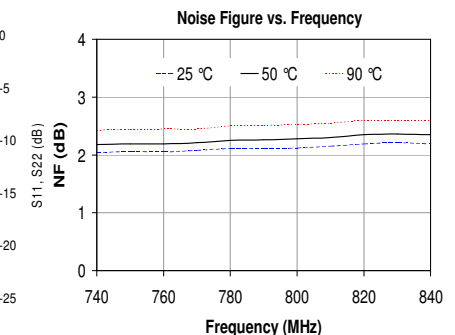
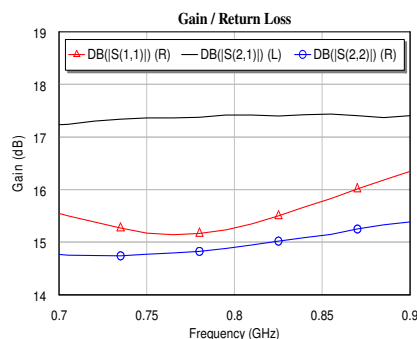


Notes:

1. Circuit Board Material: .014" Getek ML200DSS ($\epsilon_r = 4.2$), 1 oz copper. The main microstrip line has a line impedance of 50 Ω .
2. Components not shown in the schematic are either not used or loaded with a thru. Gain for the circuit can be adjusted slightly with the modification of the feedback resistance.

Reference Design: 790 MHz, 17 dB Gain

Frequency	GHz	746	790	835
Gain	dB	17.3	17.4	17.4
S11	dB	-19	-19	-16
S22	dB	-22	-22	-21
P1dB	dBm	+19		
OIP3	dBm	+36		
Noise Figure	dB	2.0	2.1	2.2
Voltage	V	+5		
Current	mA	140		

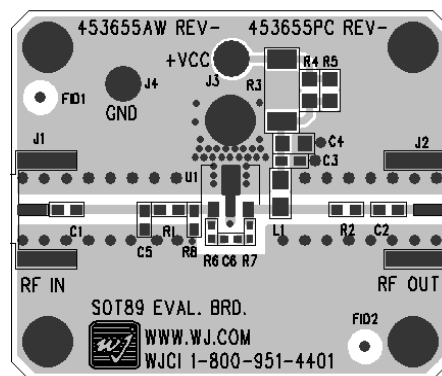
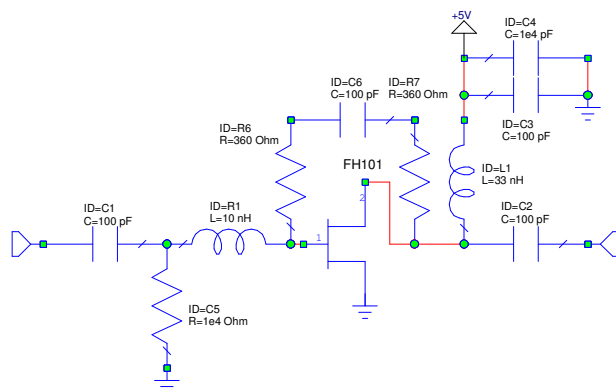
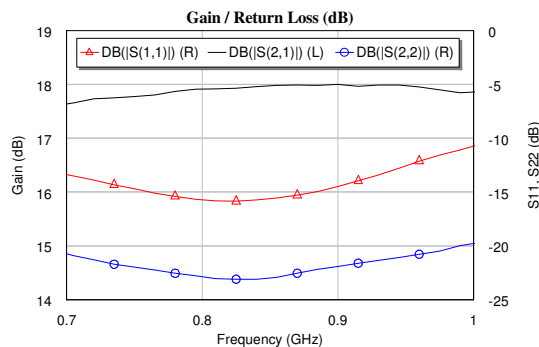
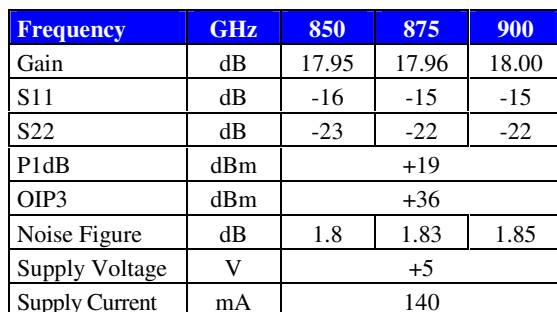


Notes:

1. Circuit Board Material: .014" Getek ML200DSS ($\epsilon_r = 4.2$), 1 oz copper. The main microstrip line has a line impedance of 50 Ω .
2. Components not shown in the schematic are either not used or loaded with a thru. Gain for the circuit can be adjusted slightly with the modification of the feedback resistance.

Specifications and information are subject to change without notice.

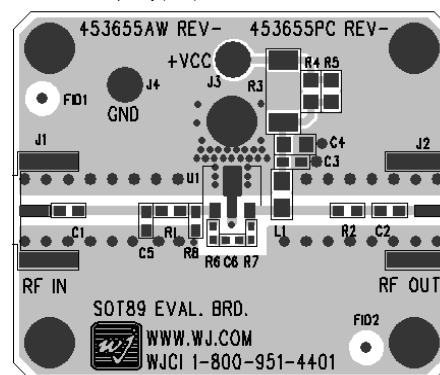
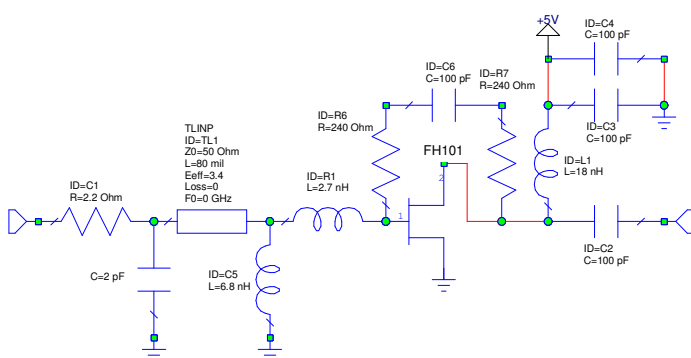
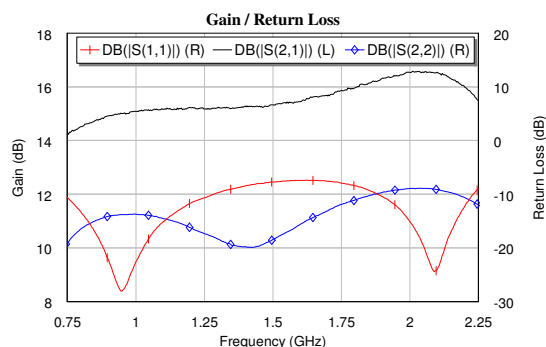
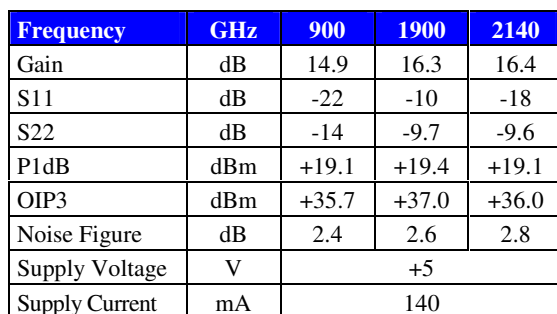
FH101



Notes:

1. Circuit Board Material: .014" Getek ML200DSS ($\epsilon_r = 4.2$), 1 oz copper. The main microstrip line has a line impedance of 50Ω .
2. Components not shown in the schematic are either not used or loaded with a thru. Gain for the circuit can be adjusted slightly with the modification of the feedback resistance.

Reference Design: 800 - 2200 MHz, 15 dB Gain



Notes:

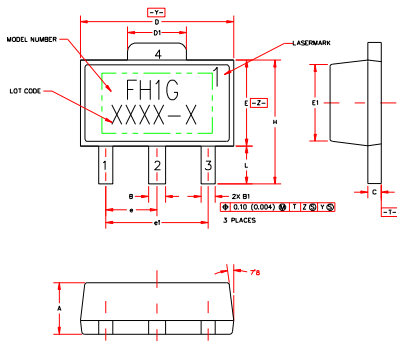
1. Circuit Board Material: .014" Getek ML200DSS ($\epsilon_r = 4.2$), 1 oz copper. The main microstrip line has a line impedance of 50 Ω .
2. Components not shown in the schematic are either not used or loaded with a thru. Gain for the circuit can be adjusted slightly with the modification of the feedback resistance.
3. A dc blocking capacitor needs to be placed before C1 if dc is present at the input of the circuit.

Specifications and information are subject to change without notice.

FH101

High Dynamic Range FET

Product Marking



SYMBOL	MIN	NOM	MAX
A	1.40	1.50	1.60
B	(0.05)	(0.06)	(0.07)
C	44	50	56
D	(0.07)	(0.00)	(0.23)
E	36	41	46
F	(0.04)	(0.05)	(0.07)
G	44	50	56
H	(0.04)	(0.05)	(0.07)
I	44	50	56
J	(0.04)	(0.05)	(0.07)
K	44	50	56
L	(0.04)	(0.05)	(0.07)
M	44	50	56
N	(0.04)	(0.05)	(0.07)
O	44	50	56
P	(0.04)	(0.05)	(0.07)
Q	44	50	56
R	(0.04)	(0.05)	(0.07)
S	44	50	56
T	(0.04)	(0.05)	(0.07)
U	44	50	56
V	(0.04)	(0.05)	(0.07)
W	44	50	56
X	(0.04)	(0.05)	(0.07)
Y	44	50	56
Z	(0.04)	(0.05)	(0.07)
AA	44	50	56
AB	(0.04)	(0.05)	(0.07)
AC	44	50	56
AD	(0.04)	(0.05)	(0.07)
AE	44	50	56
AF	(0.04)	(0.05)	(0.07)
AG	44	50	56
AH	(0.04)	(0.05)	(0.07)
AI	44	50	56
AJ	(0.04)	(0.05)	(0.07)
AK	44	50	56
AL	(0.04)	(0.05)	(0.07)
AM	44	50	56
AN	(0.04)	(0.05)	(0.07)
AO	44	50	56
AP	(0.04)	(0.05)	(0.07)
AQ	44	50	56
AR	(0.04)	(0.05)	(0.07)
AS	44	50	56
AT	(0.04)	(0.05)	(0.07)
AU	44	50	56
AV	(0.04)	(0.05)	(0.07)
AW	44	50	56
AX	(0.04)	(0.05)	(0.07)
AY	44	50	56
AZ	(0.04)	(0.05)	(0.07)
BA	44	50	56
BB	(0.04)	(0.05)	(0.07)
BC	44	50	56
BD	(0.04)	(0.05)	(0.07)
BE	44	50	56
BF	(0.04)	(0.05)	(0.07)
BG	44	50	56
BH	(0.04)	(0.05)	(0.07)
BI	44	50	56
BJ	(0.04)	(0.05)	(0.07)
BK	44	50	56
BL	(0.04)	(0.05)	(0.07)
BM	44	50	56
BN	(0.04)	(0.05)	(0.07)
BO	44	50	56
BP	(0.04)	(0.05)	(0.07)
BQ	44	50	56
BR	(0.04)	(0.05)	(0.07)
BS	44	50	56
BT	(0.04)	(0.05)	(0.07)
BU	44	50	56
BV	(0.04)	(0.05)	(0.07)
BW	44	50	56
BX	(0.04)	(0.05)	(0.07)
BY	44	50	56
BZ	(0.04)	(0.05)	(0.07)
CA	44	50	56
CB	(0.04)	(0.05)	(0.07)
CC	44	50	56
CD	(0.04)	(0.05)	(0.07)
CE	44	50	56
CF	(0.04)	(0.05)	(0.07)
CG	44	50	56
CH	(0.04)	(0.05)	(0.07)
CI	44	50	56
CJ	(0.04)	(0.05)	(0.07)
CK	44	50	56
CL	(0.04)	(0.05)	(0.07)
CM	44	50	56
CN	(0.04)	(0.05)	(0.07)
CO	44	50	56
CP	(0.04)	(0.05)	(0.07)
CQ	44	50	56
CR	(0.04)	(0.05)	(0.07)
CS	44	50	56
CT	(0.04)	(0.05)	(0.07)
CU	44	50	56
CV	(0.04)	(0.05)	(0.07)
CW	44	50	56
CX	(0.04)	(0.05)	(0.07)
CY	44	50	56
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DA	44	50	56
DB	(0.04)	(0.05)	(0.07)
DC	44	50	56
DD	(0.04)	(0.05)	(0.07)
DE	44	50	56
DF	(0.04)	(0.05)	(0.07)
DG	44	50	56
DH	(0.04)	(0.05)	(0.07)
DI	44	50	56
DJ	(0.04)	(0.05)	(0.07)
DK	44	50	56
DL	(0.04)	(0.05)	(0.07)
DM	44	50	56
DN	(0.04)	(0.05)	(0.07)
DO	44	50	56
DP	(0.04)	(0.05)	(0.07)
DQ	44	50	56
DR	(0.04)	(0.05)	(0.07)
DS	44	50	56
DT	(0.04)	(0.05)	(0.07)
DU	44	50	56
DV	(0.04)	(0.05)	(0.07)
DW	44	50	56
DX	(0.04)	(0.05)	(0.07)
DY	44	50	56
DZ	(0.04)	(0.05)	(0.07)
EA	44	50	56
EB	(0.04)	(0.05)	(0.07)
EC	44	50	56
ED	(0.04)	(0.05)	(0.07)
EE	44	50	56
EF	(0.04)	(0.05)	(0.07)
EG	44	50	56
EH	(0.04)	(0.05)	(0.07)
EI	44	50	56
EJ	(0.04)	(0.05)	(0.07)
EK	44	50	56
EL	(0.04)	(0.05)	(0.07)
EM	44	50	56
EN	(0.04)	(0.05)	(0.07)
EO	44	50	56
EP	(0.04)	(0.05)	(0.07)
EQ	44	50	56
ER	(0.04)	(0.05)	(0.07)
ES	44	50	56
ET	(0.04)	(0.05)	(0.07)
EU	44	50	56
EV	(0.04)	(0.05)	(0.07)
EW	44	50	56
EX	(0.04)	(0.05)	(0.07)
EY	44	50	56
EZ	(0.04)	(0.05)	(0.07)
FA	44	50	56
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FC	44	50	56
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NOTES:

1. DIMENSIONS CONFORM WITH JEDEC TO-243C EXCEPT WHERE INDICATED.
2. DIMENSIONS ARE EXPRESSED IN MILLIMETERS(INCHES).
3. DIMENSIONING AND TOLERANCING ARE IN ACCORDANCE WITH ASME Y14.5M-2018.

MSL / ESD Rating



ESD Rating:	Class IV
Value:	Passes $\geq 1000V$ to $<2000V$
Test:	Charged Device Model (CDM)
Standard:	JEDEC Standard JESD22-C101

Thermal Specifications

1. The thermal resistance is referenced from the hottest part of the junction to the ground tab (pin 4).
2. This corresponds to the typical biasing condition of +5V, 140 mA at an 85 °C case temperature. A minimum MTTF of 1 million hours is achieved for junction temperatures below 160 °C.



1. Ground / thermal vias are critical for the proper performance of this device. Vias should use a .35mm (#80 / .0135") diameter drill and have a final plated thru diameter of .25 mm (.010").
2. Add as much copper as possible to inner and outer layers near the part to ensure optimal thermal performance.
3. Mounting screws can be added near the part to fasten the board to a heatsink. Ensure that the ground / thermal via region contacts the heatsink.
4. Do not put solder mask on the backside of the PC board in the region where the board contacts the heatsink.
5. RF trace width depends upon the PC board material and construction.
6. Use 1 oz. Copper minimum.
7. All dimensions are in millimeters (inches). Angles are in degrees.

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: ocean@oceanchips.ru

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А