ALM-GP001

GPS Filter-LNA-Filter Front-End Module

Data Sheet

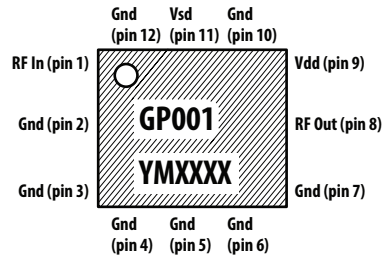
Description

Avago Technologies' ALM-GP001 is an ultra low-noise GPS front-end module that combines a low-noise amplifier (LNA) with GPS FBAR filters. The LNA uses Avago Technologies' proprietary GaAs Enhancement-mode pHEMT process to achieve high gain with very low noise figure and high linearity. Noise figure distribution is very tightly controlled. A CMOS-compatible shutdown pin is included either for turning the LNA on/off, or for current adjustment. The integrated filter utilizes an Avago Technologies' leading-edge FBAR filter for exceptional rejection at Cellular, DCS, PCS and WLAN band frequencies. Bypass functionality with an external RF switch is possible with separate RF switching.

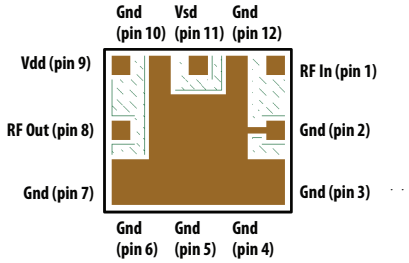
The low noise figure and high gain, coupled with low current consumption make it suitable for use in critical low-power GPS applications or during low-battery situations.

Component Image

Surface Mount (3.0 x 2.5 x 1) mm^3 12-lead MCOB



TOP VIEW



BOTTOM VIEW

Note:
Package marking provides orientation and identification
"GP001" = Product Code
"Y" = Year of manufacture
"M" = Month of manufacture
"XXXX" = Last 4 digit of lot number

Features

- Operating temperature range -40 to +85 °C
- Very Low Noise Figure: 1.26 dB typ.
- Exceptional Cell/DCS/PCS/WLAN-Band rejection
- Advanced GaAs E-pHEMT & FBAR Technology
- Low external component count.
- CMOS compatible shutdown pin (SD)
- ESD: > 3kV at RFin pin
- Adjustable bias current via single external resistor/ voltage
- Useable down to 1.8V supply voltage
- Small package dimension: 3.0(L)x2.5(W)x1(H) mm^3
- Meets MSL3, Lead-free and halogen free

Specifications (Typical performance @ 25°C)

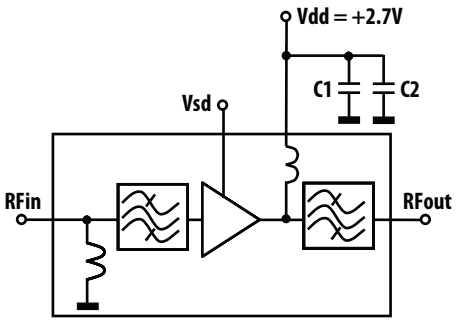
At 1.575GHz, Vdd = 2.7V, Idd = 7.5mA

- Gain = 14.2 dB
- NF = 1.26 dB
- IIP3 = +5 dBm, IP1dB = +2 dBm
- S11 = -9 dB, S22 =-12 dB
- Low-Band Rejection (824 – 928MHz): 89 dBc
- High-Band Rejection (1710 – 1980MHz): 80 dBc
- WLAN-Band Rejection (2400 – 2500MHz): 72 dBc

Application

- GPS Front-end Module

Application Circuit





Attention: Observe precautions for handling electrostatic sensitive devices.

RF In (Pin 1) to GND: ESD Human Body Model = 3 kV
All other Pins : ESD Machine Model = 50 V
: ESD Human Body Model = 300 V

Refer to Avago Application Note A004R: Electrostatic Discharge, Damage and Control.

Absolute Maximum Rating[1] T_A=25°C

Symbol	Parameter	Units	Absolute Max.
Vdd	Device Drain to Source Voltage[2]	V	3.6
Idd	Drain Current[2]	mA	20
$P_{in,max}$	CW RF Input Power (Vdd = 2.7V, Idd = 7.5mA)	dBm	15
P_{diss}	Total Power Dissipation[4]	mW	72
T_j	Junction Temperature	°C	150
T_{STG}	Storage Temperature	°C	-65 to 150

Thermal Resistance [3]
(Vdd = 2.7V, Idd = 7.5mA), θ_{jc} = 92°C/W

Notes:
1. Operation of this device in excess of any of these limits may cause permanent damage.
2. Assuming DC quiescent conditions.
3. Thermal resistance measured using Infra-Red measurement technique.
4. Board (module belly) temperature T_B is 25°C. Derate 10.87 mW/°C for T_B>143°C.

Electrical Specifications

T_A = 25°C, Freq = 1.575GHz, measured on demo board[1] unless otherwise specified – Typical Performance[1]

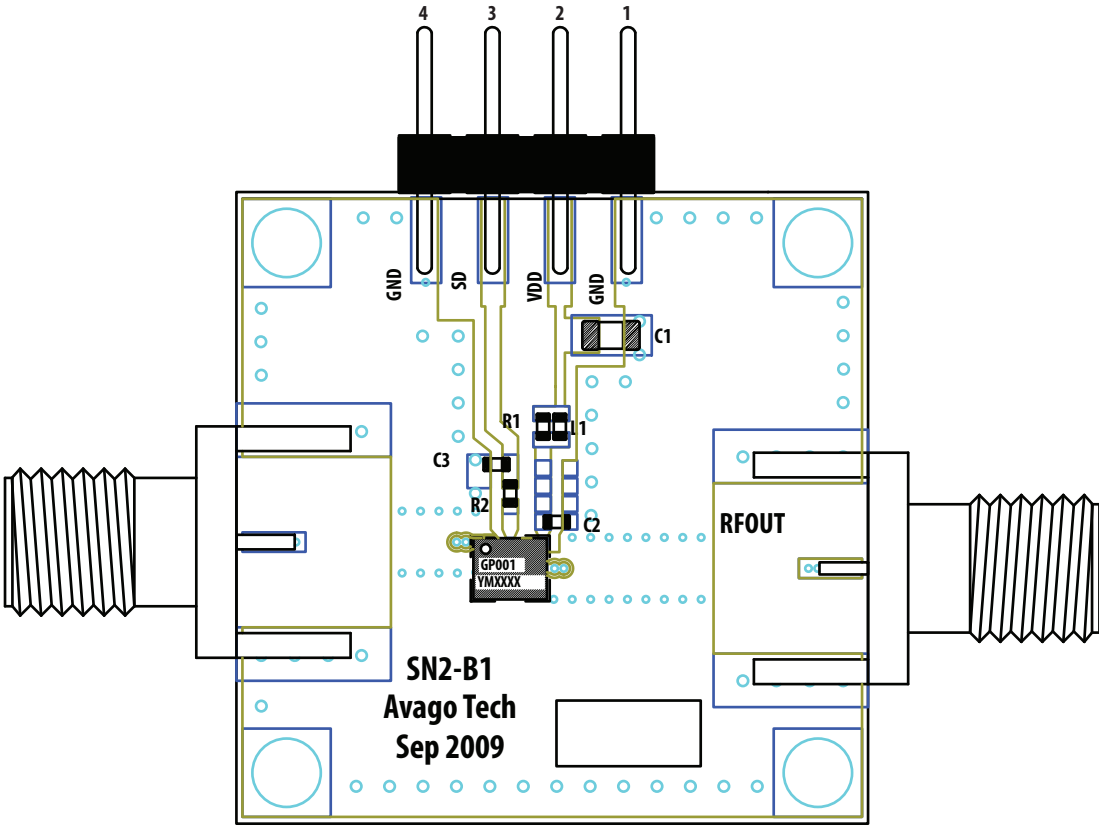
Table 1. Performance at Vdd = Vsd = 2.7V, Idd = 7.5mA (Rbias = 6.8k Ohm) nominal operating conditions

Symbol	Parameter and Test Condition	Units	Min.	Typ	Max.
G	Gain	dB	12	14.2	16.3
NF[2]	Noise Figure	dB	–	1.26	1.7
IP1dB	Input 1dB Compressed Power	dBm	–	+2	–
IIP3[3]	Input 3rd Order Intercept Point (2-tone @ Fc +/- 2.5MHz)	dBm	0	+5	–
S11	Input Return Loss	dB	–	-9	–
S22	Output Return Loss	dB	–	-12	–
S12	Reverse Isolation	dB	–	-22	–
Low Band Rejection	Worst-case relative to 1.575GHz within (827-928)MHz band, tested at 928MHz	dBc	79	89	–
High Band Rejection	Worst-case relative to 1.575GHz within (1710-1980)MHz band, tested at 1850MHz	dBc	74	80	–
WLAN Band Rejection	Worst-case relative to 1.575GHz within (2400-2500)MHz band, tested at 2500MHz	dBc	67	72	–
$IP1dB_{890MHz}$	Input 1dB gain compression interferer signal level at 890MHz	dBm	–	21	–
$IP1dB_{1710MHz}$	Input 1dB gain compression interferer signal level at 1710MHz	dBm	–	32	–
$IP1dB_{1885MHz}$	Input 1dB gain compression interferer signal level at 1885MHz	dBm	–	37	–
$IP1dB_{2500MHz}$	Input 1dB gain compression interferer signal level at 2500MHz	dBm	–	35	-
OOB IIP3[4]	Out of Band Input 3rd Order Intercept Point (2-tone @ 1712.7 MHz and 1850MHz)	dBm	–	62	–
Idd	Supply DC current at Shutdown (SD) voltage Vsd = 2.7V	mA	4	7.5	15
Ish	Shutdown Current @ VSD = 0V	uA	–	0.5	110

Table 2. Performance at Vdd = Vsd = 1.8V, Idd = 5mA (Rbias = 2.7k Ohm) nominal operating conditions

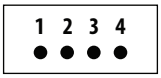
Symbol	Parameter and Test Condition	Units	Typ
G	Gain	dB	12.8
NF[2]	Noise Figure	dB	1.35
IP1dB	Input 1dB Compressed Power	dBm	0
IIP3[3]	Input 3rd Order Intercept Point (2-tone @ Fc +/- 2.5MHz)	dBm	3.5
S11	Input Return Loss	dB	-8
S22	Output Return Loss	dB	-11.5
S12	Reverse Isolation	dB	-21
Low Band Rejection	Worst-case relative to 1.575GHz within (827-928)MHz band, tested at 928MHz	dBc	89
High Band Rejection	Worst-case relative to 1.575GHz within (1710-1980)MHz band, tested at 1850MHz	dBc	79
WLAN Band Rejection	Worst-case relative to 1.575GHz within (2400-2500)MHz band, tested at 2500MHz	dBc	71
IP1dB890MHz	Input 1dB gain compression interferer signal level at 890MHz	dBm	20
IP1dB1710MHz	Input 1dB gain compression interferer signal level at 1710MHz	dBm	32
IP1dB1885MHz	Input 1dB gain compression interferer signal level at 1885MHz	dBm	37
IP1dB2500MHz	Input 1dB gain compression interferer signal level at 2500MHz	dBm	35
Idd	Supply DC current at Shutdown (SD) voltage Vsd = 1.8V	mA	5

Notes:
1. Measurements at 1.575GHz obtained using demo board
2. Losses from demoboard deembeded
3. 1.575GHz IIP3 test condition: F_{RF1} = 1572.5 MHz, F_{RF2} = 1577.5 MHz with input power of -20dBm per tone measured at the worst case side band
4. 1.575GHz IIP3 test condition: F_{RF1} = 1712.7 MHz, F_{RF2} = 1850 MHz with input power of 10dBm per tone measured at the worst case side band



DC Pin Configuration of 4-Pins connector

Pins pointing out of the page



Pins 1, 4 = GND
Pin 2 = Vdd Supply
Pin 3 = Shutdown (SD)

Circuit Symbol	Size	Description
L1	0402	22 nH Inductor (Taiyo Yuden HK100522NJ-T)
C1	0805	0.1 uF Capacitor (Murata GRM21BR71H104KA01L)
C2	0402	47 pF Capacitor (Kyocera CM05CH470J50AHF)
C3	0402	6.8 pF Capacitor (Kyocera CM05CG6R8C50AHF)
R1	0402	12 Ohms Resistor (RK73B1ETTP120J)
R2	0402	6.8 kohm Resistor (RK73B1ETTP6R8J)

Figure 1. Demoboard and application circuit components table

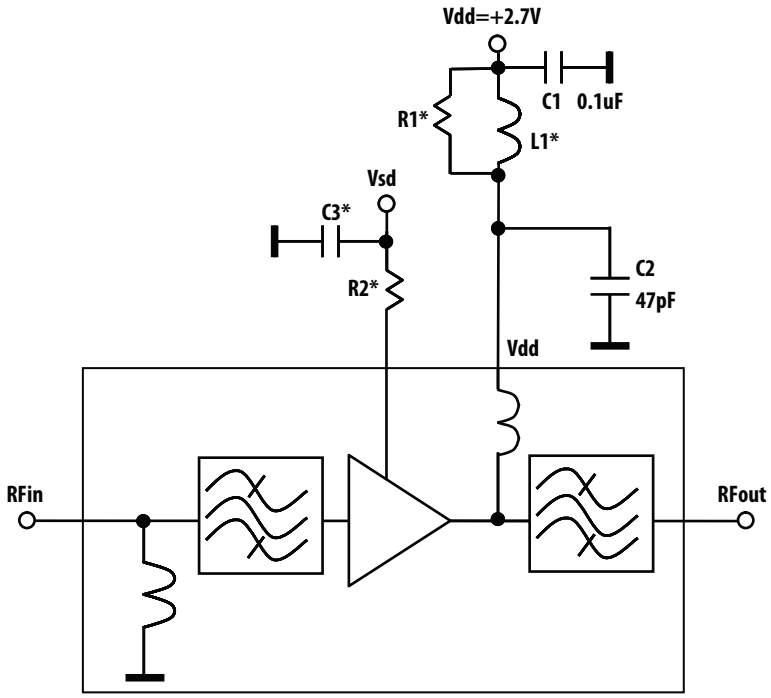


Figure 2. Application Circuit

* optional, see notes below

Notes:

- The ALM-GP001 can be operated with supply voltage (Vdd) from 1.5V to 2.85V. Vsd can operate from 1V to Vdd.
- The module is fully matched at the input and output RF pins. The RFinput pin is connected directly to a shunt inductor to ground. As such a DC blocking capacitor is required if DC voltages are present. The RFoutput pin is already DC-blocked by the internal filter inside the module.
- Best noise performance is obtained using high-Q wirewound inductors. This circuit demonstrates that low noise figures are obtainable with standard 0402 chip inductors.
- C1 and C2 are bypass capacitors for RF and low frequency stability and linearity .
- L1 and R1 isolates the demoboard from external disturbances during measurement. It is not needed in actual application. Likewise, C3 mitigate the effect of external noise pickup on the Vsd line. This component are not required in actual operation. Minimal component operation is as shown in the schematic on page 1.
- Bias control is achieved by either varying the Vsd voltage with/ without R2, or fixing the Vsd voltage to Vdd and adjusting R2 for the desired current.

ALM-GP001 Typical Performance Curves at 25°

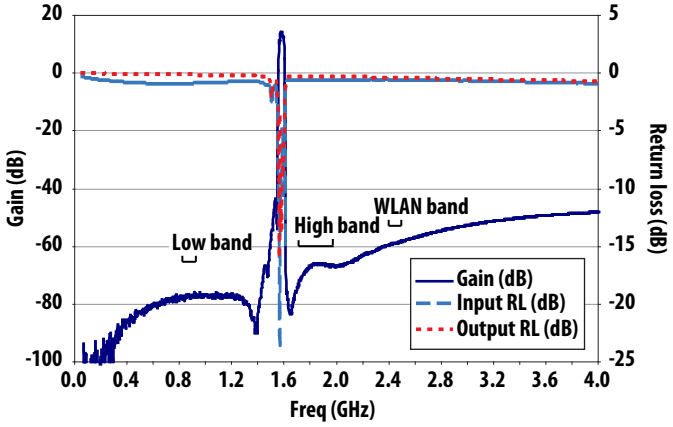


Figure 3a. Typical S-Parameter Plot @ Vdd = 2.7V, Idd = 7.5mA

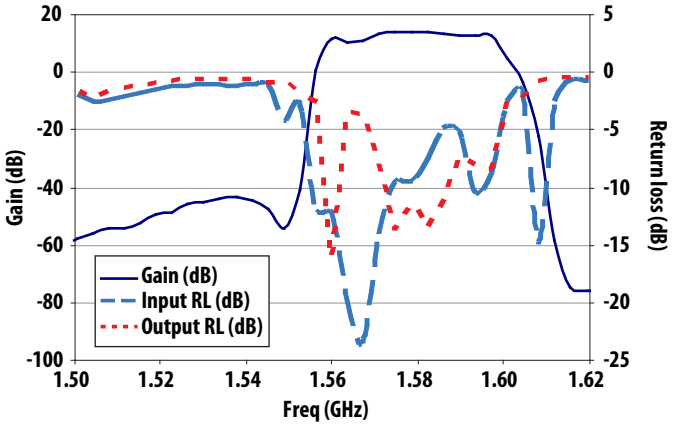


Figure 3b. Passband response of typical S-Parameter Plot @ Vdd = 2.7V, Idd = 7.5mA

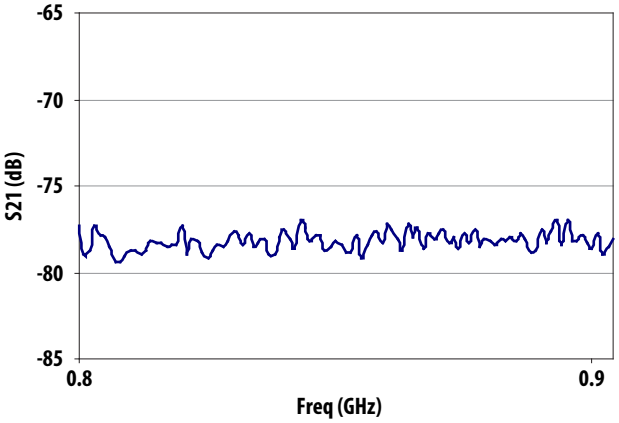


Figure 3c. Rejection plot for Low band @ Vdd = 2.7V, Idd = 7.5mA

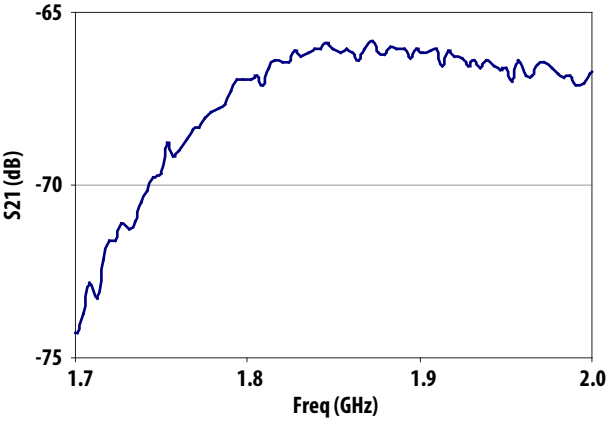


Figure 3d. Rejection plot for High band @ Vdd = 2.7V, Idd = 7.5mA

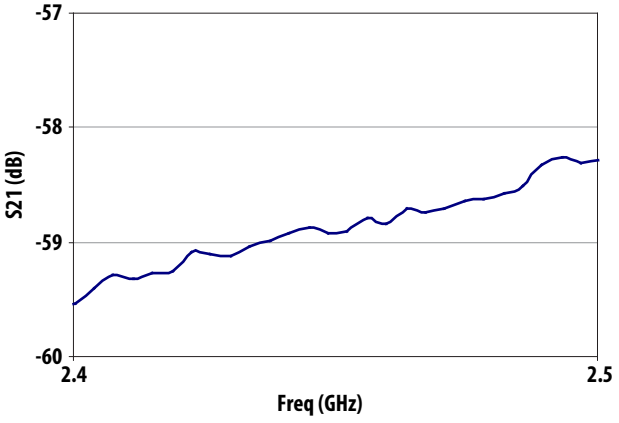


Figure 3e. Rejection plot for WLAN band @ Vdd = 2.7V, Idd = 7.5mA

ALM-GP001 Typical Performance Curves at 25°

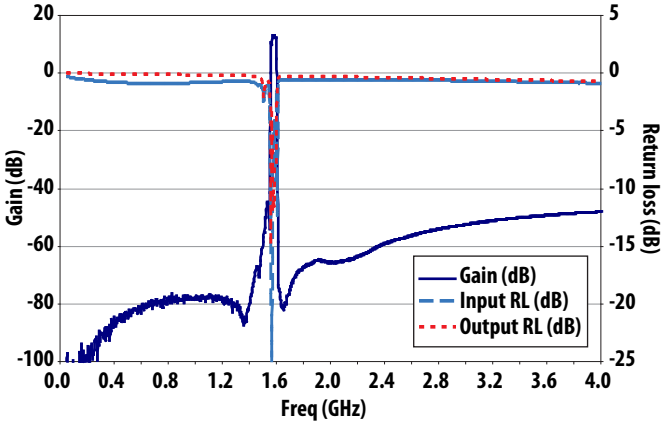


Figure 4a. Typical S-Parameter Plot @ Vdd = 1.8V, Idd = 5mA

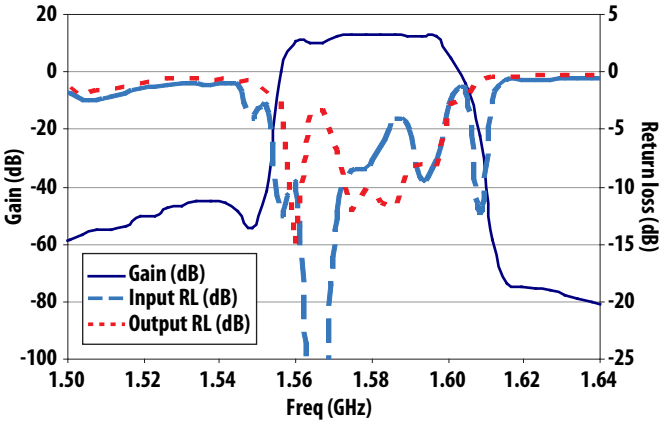


Figure 4b. Passband response of typical S-Parameter Plot @ Vdd = 1.8V, Idd = 5mA

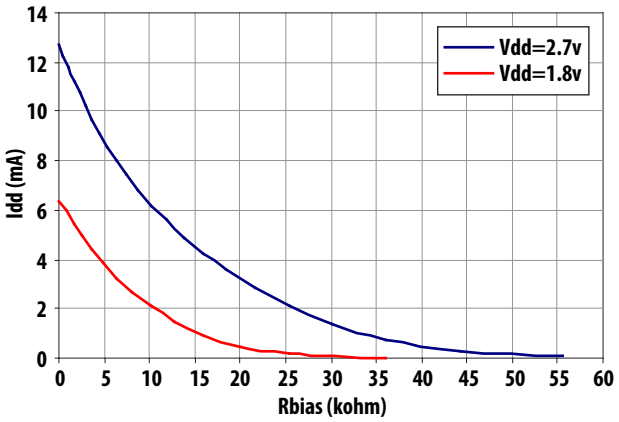


Figure 5. Idd vs Rbias at 25°C

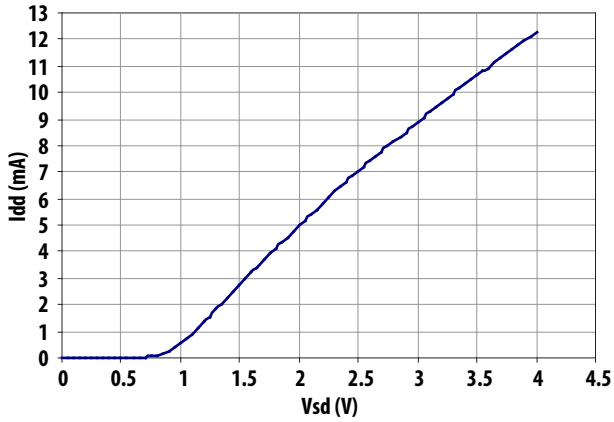


Figure 6. Idd vs Vsd for Vdd = 2.7V, R2 = 6.8k Ohm

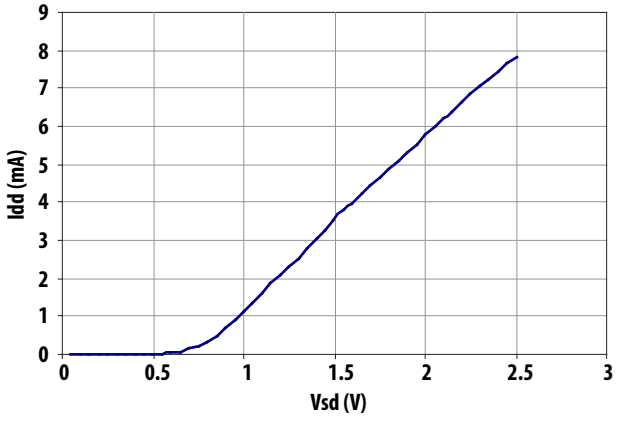


Figure 7. Idd vs Vsd for Vdd = 1.8V, R2 = 2.7k Ohm

ALM-GP001 Typical Performance Curves

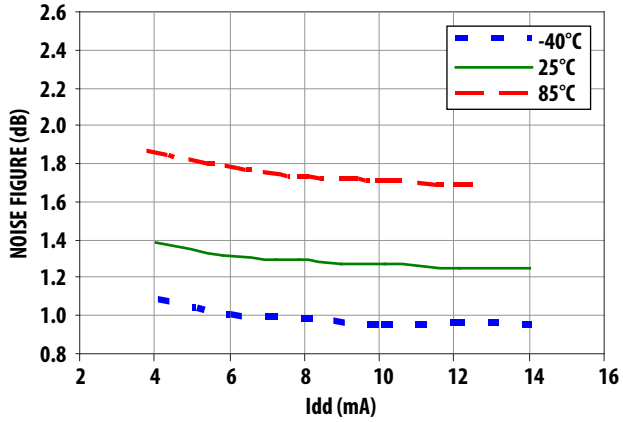


Figure 8. NF vs. Idd at Vdd = 2.7V

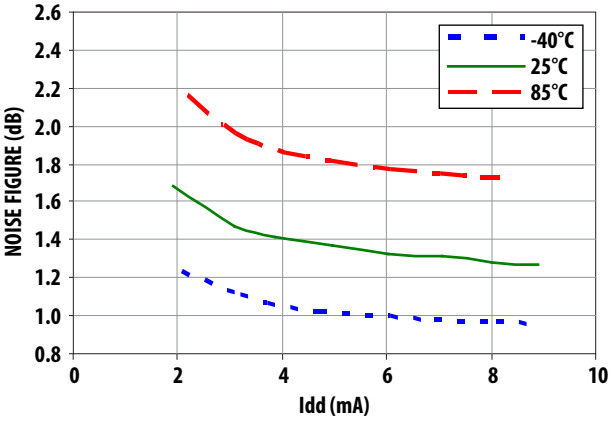


Figure 9. NF vs Idd at Vdd = 1.8V

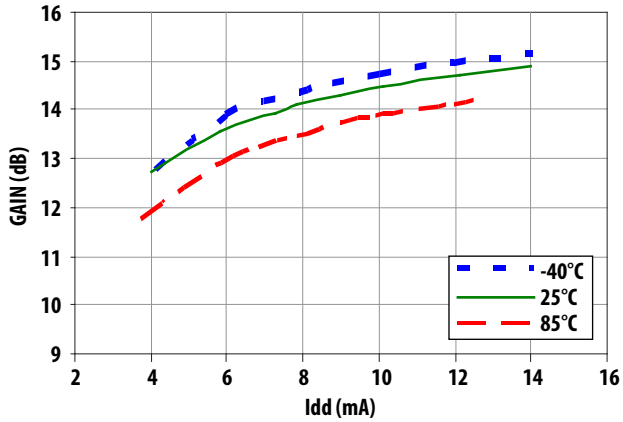


Figure 10. Gain vs. Idd at Vdd = 2.7V

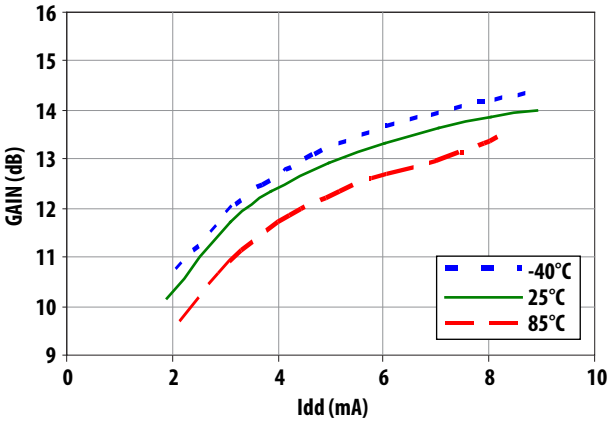


Figure 11. Gain vs. Idd at Vdd = 1.8V

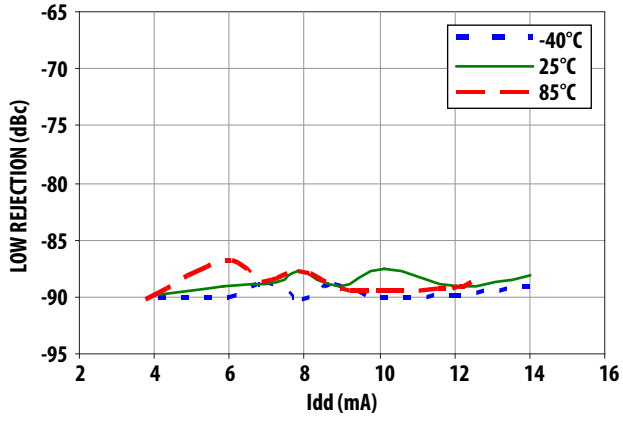


Figure 12. Low band rejection vs. Idd at Vdd = 2.7V

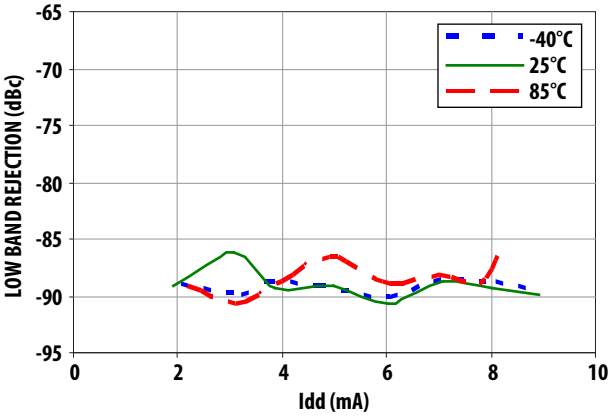


Figure 13. Low band rejection vs. Idd at Vdd = 1.8V

ALM-GP001 Typical Performance Curves

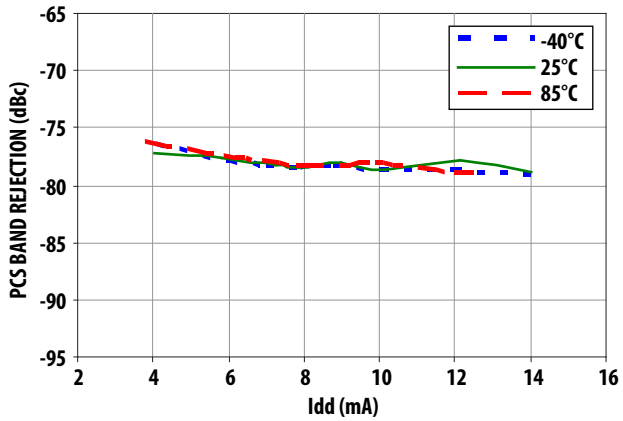


Figure 14. High band rejection vs. Idd at Vdd = 2.7V

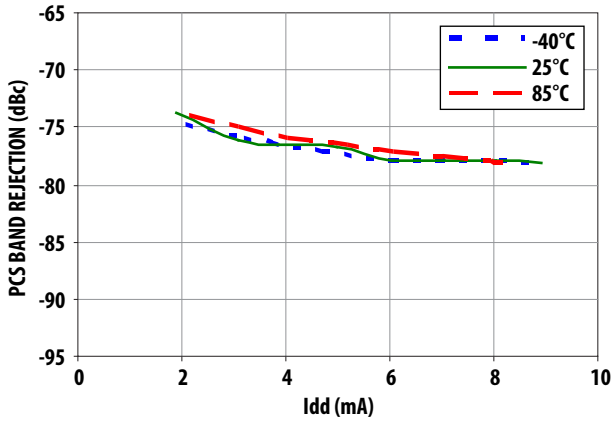


Figure 15. High band rejection vs. Idd at Vdd = 1.8V

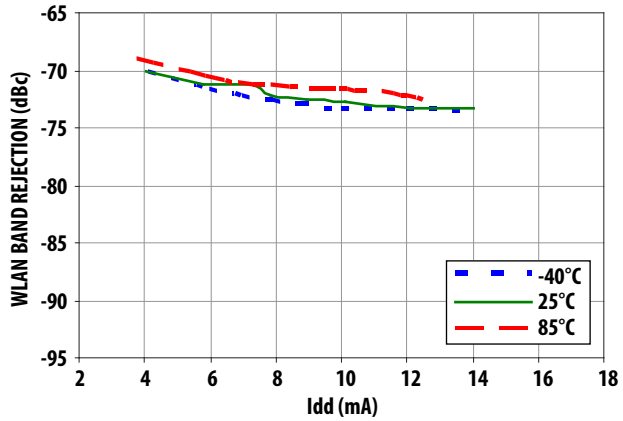


Figure 16. WLAN band rejection vs. Idd at Vdd = 2.7V

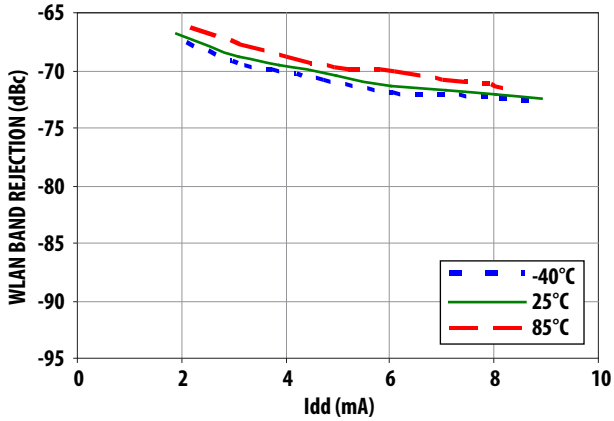


Figure 17. WLAN band rejection vs. Idd at Vdd = 1.8V

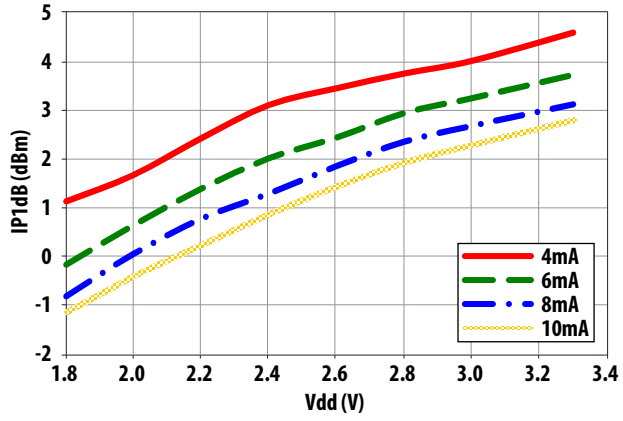


Figure 18. IP1dB vs. Vdd at 25°C

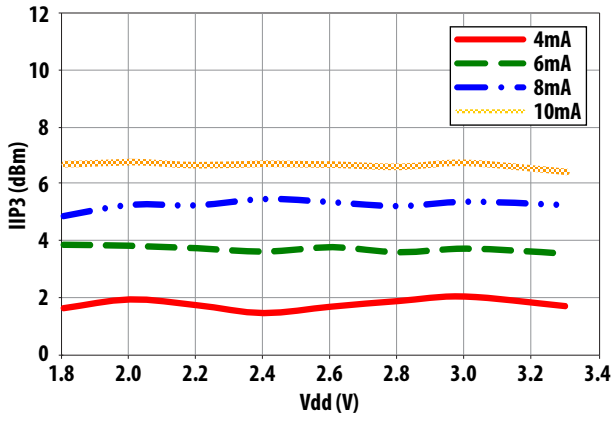


Figure 19. IIP3 vs. Vdd at 25°C

ALM-GP001 Typical Performance Curves at 25°

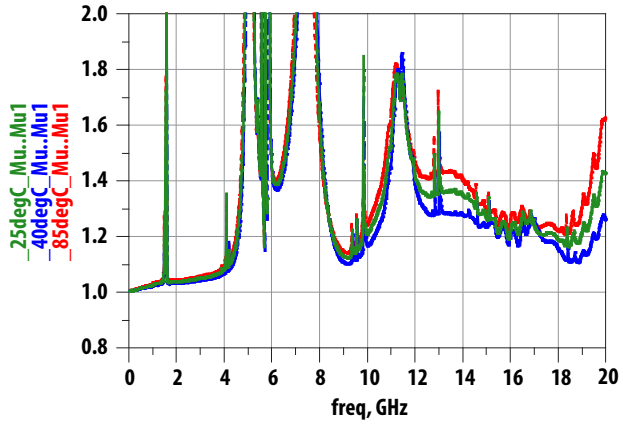


Figure 20. Edwards-Sinsky Output Stability Factor (Mu) at Vdd = 2.7V

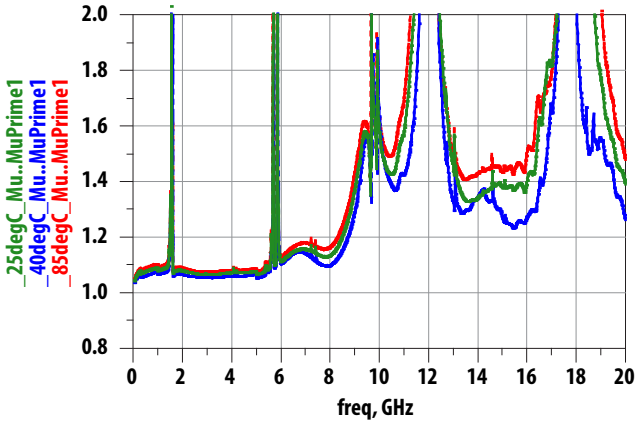


Figure 21. Edwards-Sinsky Input Stability Factor (Mu') at Vdd = 2.7V

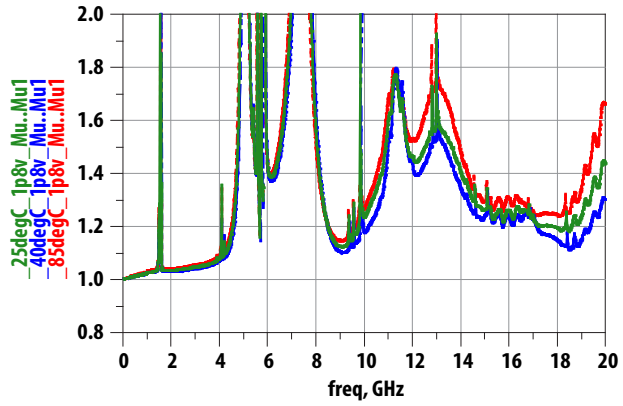


Figure 22. Edwards-Sinsky Output Stability Factor (Mu) at Vdd = 1.8V

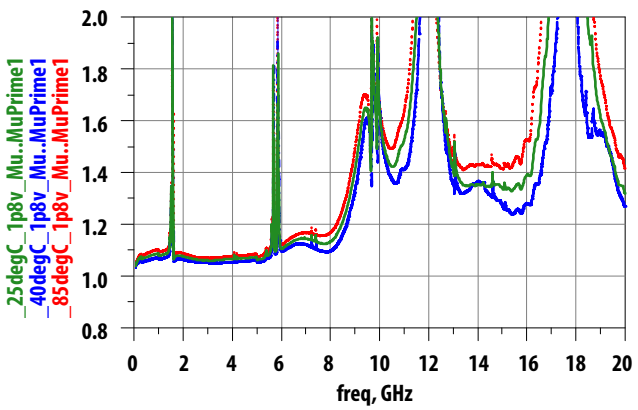


Figure 23. Edwards-Sinsky Input Stability Factor (Mu') at Vdd = 1.8V

ALM-GP001 module with differential output

A differential output can be implemented for the ALM-GP001 using the schematic shown below. Suggested component values are listed in Table 3. C1, C2 and L1, L2 are to convert the single-ended output to differential outputs while C3, C4 and L3 provide matching to 100 ohm differential impedance.

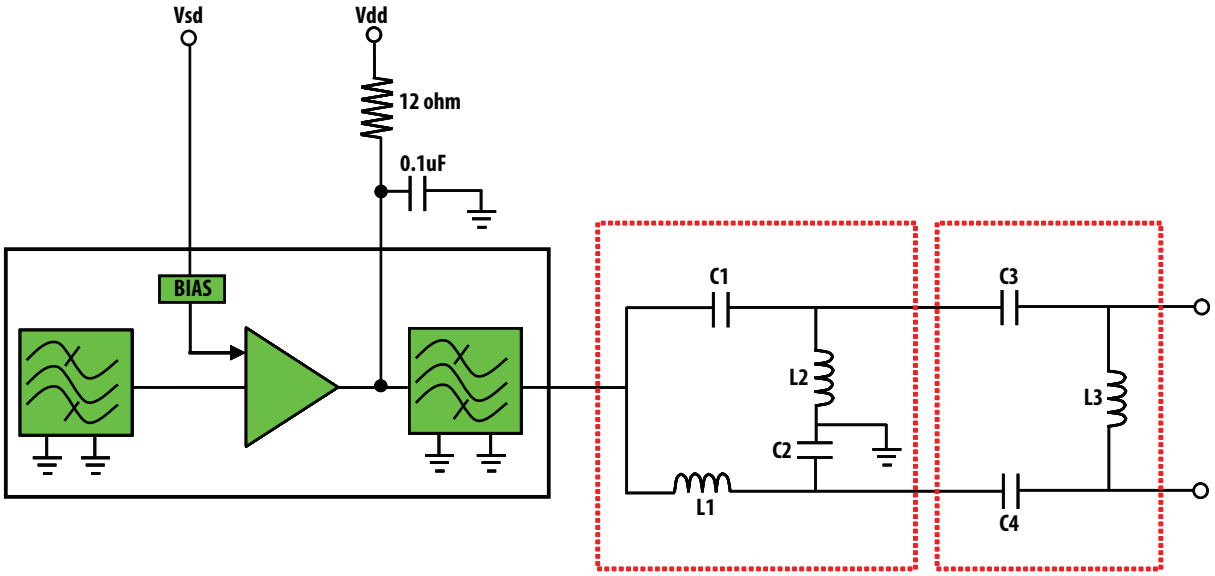


Figure 24. Proposed Balun design for ALM-GP001

Table 3. Components table for proposed balun design

Circuit Symbol	Size	Description
C1	0402	GRM1555C1H1R5CZ01 - 1.5pF (Murata)
C2	0402	GRM1555C1H1R5CZ01 - 1.5pF (Murata)
C3	0402	GRM1555C1H101JZ01 – 100pF (Murata)
C4	0402	GRM1555C1H101JZ01 – 100pF (Murata)
L1	0402	LQG15HN6N2S02B – 6.2nH (Murata)
L2	0402	LQG15HN6N2S02B – 6.2nH (Murata)
L3	0402	LQG15HN56NJ02 – 56nH (Murata)

ALM-GP001 Scattering Parameter and Measurement Reference Planes

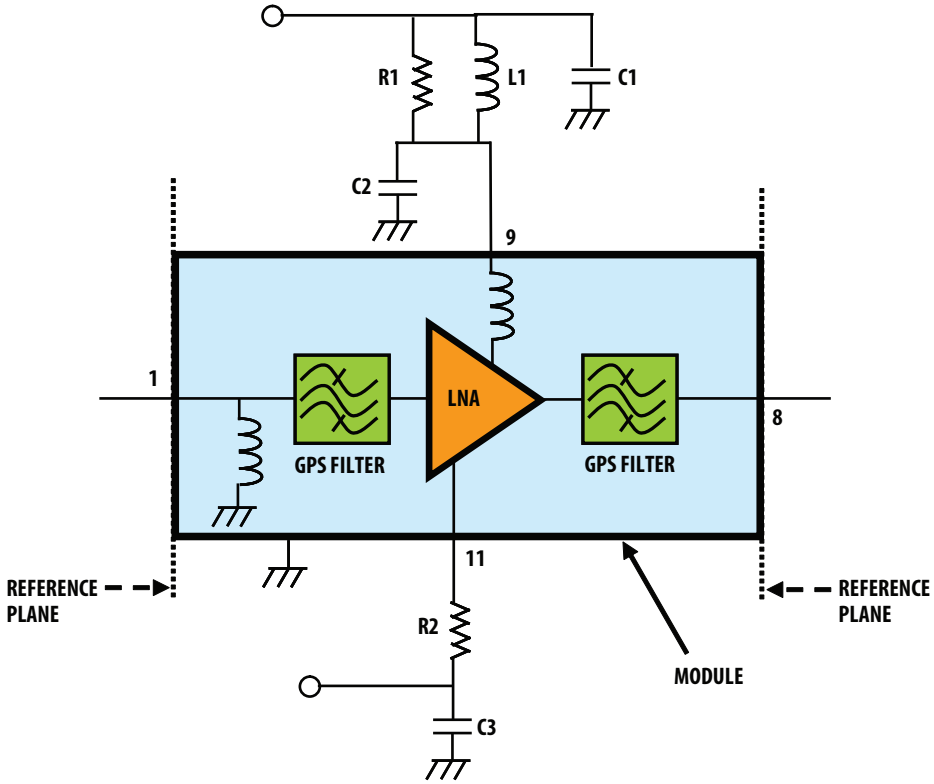


Figure 31. Scattering parameter measurement reference planes

ALM-GP001 Typical Scattering Parameters at 25°C, Vdd = 2.7V, Idd = 7.5mA

The S- and Noise Parameters are measured using a coplanar waveguide PCB with 10 mils Rogers® RO4350. Figure 31 shows the input and output reference planes. The circuit values are as indicated in Figure 1.

Freq (GHz)	S11 Mag.(dB)	S11 Ang.	S21 Mag.(dB)	S21 Ang.	S12 Mag.(dB)	S12 Ang.	S22 Mag.(dB)	S22 Ang.
0.05	-0.31	170.80	-83.03	-104.09	-82.07	44.11	-0.04	-2.10
0.1	-0.45	162.63	-91.19	-133.63	-87.29	-117.58	-0.04	-4.04
0.2	-0.61	146.95	-85.49	-158.63	-105.71	-138.14	-0.05	-8.05
0.3	-0.69	131.52	-86.12	-170.11	-84.75	173.60	-0.07	-12.05
0.4	-0.63	116.78	-80.42	172.45	-81.30	149.19	-0.09	-16.75
0.5	-0.65	101.23	-76.99	164.58	-79.54	129.05	-0.11	-20.80
0.6	-0.67	85.53	-74.18	152.43	-77.96	123.93	-0.12	-24.96
0.7	-0.70	69.54	-71.57	142.72	-77.13	115.74	-0.14	-28.91
0.8	-0.70	53.51	-69.94	134.56	-77.23	108.18	-0.15	-33.17
0.8275	-0.71	48.94	-69.50	132.51	-78.12	101.20	-0.16	-34.23
0.9	-0.73	37.09	-68.30	124.17	-79.59	98.55	-0.15	-37.27
1.0	-0.71	20.53	-67.39	115.43	-84.87	94.32	-0.18	-41.80
1.1	-0.64	3.58	-66.86	105.52	-86.38	-135.83	-0.26	-46.16
1.2	-0.64	-13.44	-67.13	94.85	-75.73	-136.45	-0.28	-51.10
1.3	-0.66	-31.46	-69.21	85.99	-69.32	-143.51	-0.29	-56.59
1.4	-0.72	-52.97	-70.77	155.40	-64.17	-155.77	-0.31	-63.87
1.5	-3.28	-87.10	-50.68	128.48	-60.23	163.10	-1.27	-81.99
1.575	-6.86	155.59	14.22	158.05	-24.45	109.55	-16.06	48.60
1.6	-1.40	75.37	2.56	-23.68	-35.92	-70.72	-2.87	7.77
1.7	-0.54	-42.34	-72.93	-43.73	-66.72	-157.70	-0.34	-56.92
1.8	-0.55	-64.37	-67.05	-140.19	-62.07	-159.89	-0.33	-65.96
1.885	-0.55	-76.05	-65.86	171.74	-59.97	-167.07	-0.33	-71.06
1.9	-0.54	-77.85	-66.28	167.55	-59.76	-167.56	-0.32	-71.84
2.0	-0.52	-88.32	-68.97	165.02	-57.77	-174.89	-0.30	-76.82
2.1	-0.48	-97.15	-67.77	-167.31	-56.38	179.56	-0.29	-81.40
2.2	-0.47	-104.75	-63.73	-159.31	-55.14	173.45	-0.29	-85.72
2.3	-0.45	-111.48	-60.55	-161.04	-53.94	168.47	-0.30	-89.76
2.4	-0.42	-117.48	-58.09	-167.11	-53.02	164.21	-0.28	-93.56
2.5	-0.42	-122.83	-56.14	-173.64	-52.16	159.82	-0.29	-97.37
3.0	-0.39	-143.61	-49.78	157.21	-48.64	141.38	-0.31	-113.86
3.5	-0.38	-159.85	-46.25	130.99	-45.99	125.86	-0.38	-129.21
4.0	-0.41	-175.25	-43.82	103.12	-43.47	110.17	-0.57	-147.20
4.5	-0.43	169.03	-42.02	66.73	-40.64	87.29	-1.49	179.88
5.0	-0.45	152.81	-43.25	13.11	-40.32	28.92	-13.91	-1.00
6.0	-0.74	133.10	-34.84	-41.55	-45.21	-18.94	-2.78	-127.80
7.0	-1.03	84.73	-23.30	-162.23	-33.21	-171.36	-5.31	166.63
8.0	-1.26	47.03	-17.99	69.49	-24.52	63.46	-3.22	-171.73
9.0	-4.34	-6.32	-23.93	-24.57	-27.17	-37.05	-0.92	131.53
10.0	-4.99	-41.52	-32.95	28.66	-39.02	-143.79	-1.74	86.44
11.0	-5.07	-81.98	-17.92	-12.54	-31.83	38.92	-4.49	21.14
12.0	-9.49	-60.36	-16.24	-131.21	-26.66	-90.81	-3.09	3.65
13.0	-2.31	-96.01	-16.02	172.58	-24.60	-156.01	-2.18	-31.75
14.0	-1.86	-143.41	-13.71	113.85	-20.54	140.40	-2.65	-52.46
15.0	-2.24	-164.69	-10.91	48.60	-16.10	71.01	-3.81	-53.45
16.0	-1.53	-179.61	-13.27	-10.99	-17.57	4.74	-2.11	-65.14
17.0	-3.24	149.33	-12.37	-32.48	-18.09	-15.22	-2.37	-95.58
18.0	-13.98	-109.52	-12.08	-53.35	-15.98	-30.05	-1.01	-123.66
19.0	-7.00	168.64	-6.40	-112.24	-9.24	-87.81	-1.72	-141.00
20.0	-10.28	172.65	-2.59	173.75	-4.38	-165.83	-20.74	95.73

ALM-GP001 Typical Scattering Parameters at 25°C, Vdd = 1.8V, Idd = 5mA

Freq (GHz)	S11 Mag.(dB)	S11 Ang.	S21 Mag.(dB)	S21 Ang.	S12 Mag.(dB)	S12 Ang.	S22 Mag.(dB)	S22 Ang.
0.05	-0.31	170.81	-77.61	-81.92	-80.55	-58.15	-0.04	-2.10
0.1	-0.45	162.64	-94.26	-167.43	-87.82	118.85	-0.04	-4.03
0.2	-0.61	146.96	-96.81	135.59	-94.38	-173.28	-0.05	-8.04
0.3	-0.69	131.53	-88.74	147.68	-84.55	166.83	-0.07	-12.05
0.4	-0.63	116.79	-84.40	166.61	-82.69	144.01	-0.09	-16.76
0.5	-0.65	101.24	-79.10	165.96	-80.74	125.53	-0.11	-20.81
0.6	-0.67	85.55	-74.78	146.65	-78.31	117.68	-0.12	-24.96
0.7	-0.69	69.56	-73.51	140.49	-78.18	118.80	-0.13	-28.92
0.8	-0.70	53.54	-71.44	134.00	-77.80	105.74	-0.15	-33.17
0.8275	-0.71	48.96	-71.30	131.37	-77.54	104.95	-0.15	-34.24
0.9	-0.72	37.11	-70.19	126.32	-78.57	93.95	-0.14	-37.27
1.0	-0.70	20.56	-69.21	120.45	-83.41	100.05	-0.18	-41.81
1.1	-0.64	3.61	-68.64	113.54	-86.60	-148.54	-0.26	-46.17
1.2	-0.64	-13.41	-68.93	104.86	-75.47	-136.57	-0.28	-51.12
1.3	-0.66	-31.42	-71.27	98.24	-69.48	-143.75	-0.29	-56.61
1.4	-0.71	-52.93	-69.91	167.28	-64.36	-154.58	-0.31	-63.89
1.5	-3.27	-87.09	-52.30	133.00	-60.25	168.15	-1.27	-82.00
1.575	-6.62	169.84	12.90	162.11	-21.82	100.95	-13.61	57.50
1.6	-1.21	76.66	1.31	-22.01	-33.19	-81.74	-2.99	7.65
1.7	-0.53	-42.32	-76.33	-67.22	-68.06	-133.30	-0.33	-56.94
1.8	-0.55	-64.34	-65.49	-150.00	-61.97	-160.04	-0.33	-65.97
1.885	-0.54	-76.02	-63.54	175.01	-59.86	-167.29	-0.33	-71.08
1.9	-0.53	-77.80	-63.44	171.11	-59.56	-167.56	-0.31	-71.85
2.0	-0.51	-88.30	-65.49	160.86	-57.74	-174.81	-0.30	-76.83
2.1	-0.48	-97.12	-65.69	-179.62	-56.42	178.84	-0.29	-81.41
2.2	-0.46	-104.71	-62.61	-167.76	-55.07	174.31	-0.29	-85.72
2.3	-0.44	-111.44	-59.59	-167.37	-54.02	169.37	-0.30	-89.76
2.4	-0.42	-117.46	-57.12	-171.77	-53.01	164.16	-0.28	-93.55
2.5	-0.41	-122.79	-55.34	-177.94	-52.13	159.89	-0.29	-97.36
3.0	-0.38	-143.57	-49.45	154.06	-48.61	141.44	-0.30	-113.86
3.5	-0.37	-159.81	-46.14	129.65	-45.96	125.97	-0.37	-129.26
4.0	-0.40	-175.18	-43.72	104.76	-43.49	110.10	-0.56	-147.34
4.5	-0.42	169.08	-41.69	71.59	-40.74	87.15	-1.47	179.69
5.0	-0.45	152.85	-43.01	17.04	-40.77	30.19	-13.70	-6.62
6.0	-0.72	133.14	-36.12	-33.98	-45.30	-12.03	-2.83	-129.05
7.0	-1.01	84.76	-24.40	-161.09	-33.57	-172.42	-5.84	168.64
8.0	-1.25	46.81	-18.71	73.57	-24.83	66.78	-3.27	-174.08
9.0	-4.36	-5.43	-24.36	-26.76	-26.84	-38.03	-0.89	131.47
10.0	-4.98	-41.21	-33.39	32.50	-40.93	-164.30	-1.84	85.82
11.0	-5.17	-82.21	-18.05	-12.05	-29.46	34.91	-4.45	21.32
12.0	-8.58	-58.62	-16.59	-134.08	-25.33	-93.88	-3.11	4.41
13.0	-2.24	-97.70	-16.73	171.51	-23.94	-154.79	-2.58	-28.58
14.0	-1.86	-144.22	-14.44	112.09	-20.14	142.24	-2.66	-50.63
15.0	-2.23	-166.30	-11.88	50.77	-15.99	77.15	-3.40	-55.52
16.0	-1.70	179.38	-13.55	-9.10	-16.80	11.54	-1.95	-64.65
17.0	-3.87	149.02	-12.86	-37.76	-16.33	-13.32	-1.96	-95.34
18.0	-13.35	-100.14	-13.12	-52.83	-15.15	-31.69	-1.02	-126.61
19.0	-5.76	179.34	-6.66	-106.45	-8.01	-87.53	-2.40	-146.31
20.0	-7.61	164.77	-3.09	174.03	-4.01	-170.19	-19.04	5.34

ALM-GP001 Typical Noise Parameters at 25°C, Freq = 1.575 GHz, Vdd = 2.7V, Idd = 7.5mA

Freq	Fmin	GAMMA OPT		
(GHz)	(dB)	Mag	Ang	Rn/50
1.575	1.14	0.084	44.1	0.1714

ALM-GP001 Typical Noise Parameters at 25°C, Freq = 1.575 GHz, Vdd = 1.8V, Idd = 5mA

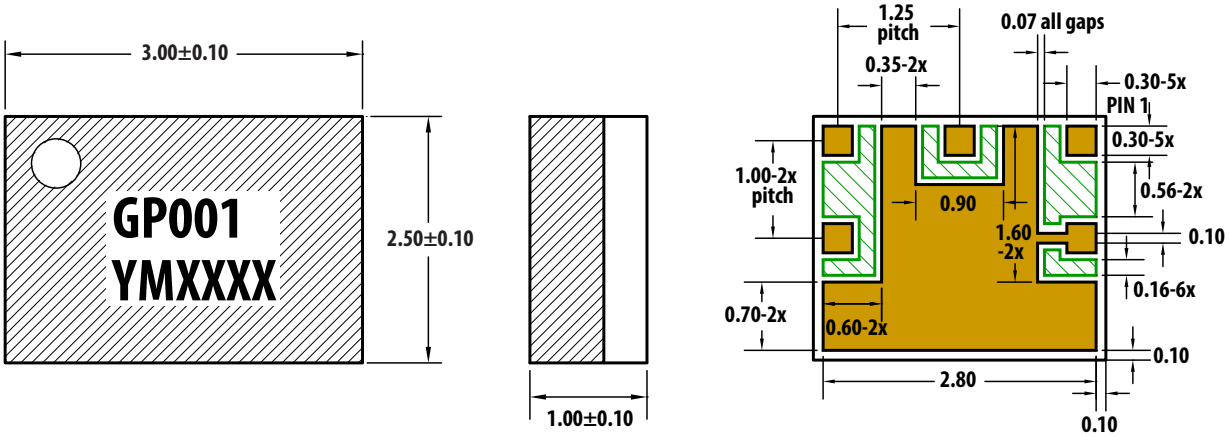
Freq	Fmin	GAMMA OPT		
(GHz)	(dB)	Mag	Ang	Rn/50
1.575	1.21	0.100	78.1	0.1780

Note:
The exceptional noise figure performance of the ALM-GP001 is due to its highly optimized design. In this regard, the F_{min} of the ALM-GP001 shown above is locked down by the internal input pre-match. This allows the use of relatively inexpensive chip inductors for external matching.

Part Number Ordering Information

Part Number	Qty	Container
ALM-GP001-BLKG	100	Antistatic bag
ALM-GP001-TR1G	3000	13" Reel

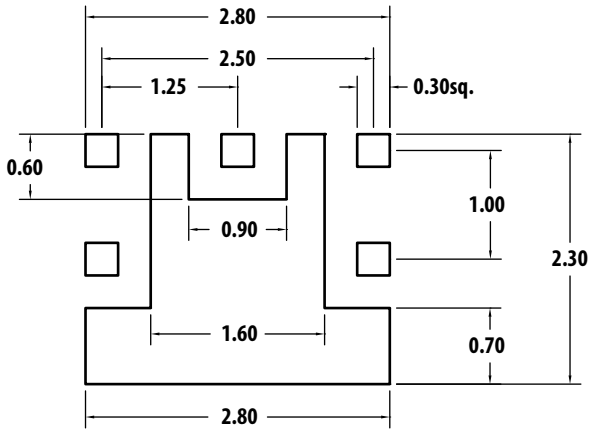
Package Dimensions



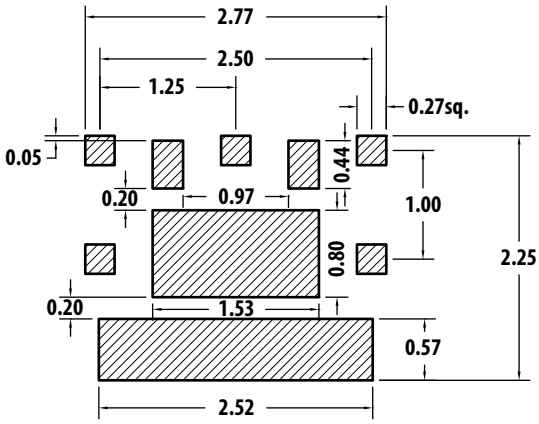
Top View **Side View** **Bottom View**

Notes:
1. All dimensions are in millimeters.
2. Dimensions are inclusive of plating.
3. Dimensions are exclusive of mold flash and metal burr.
4. Y refers to year, M refers to month & XXXX refers to last 4 digits of the lot number.

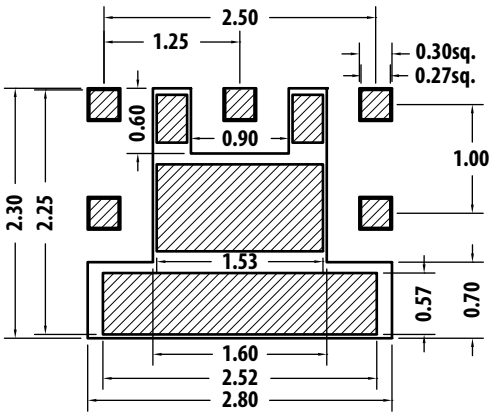
PCB Land Patterns and Stencil Design



Land Pattern



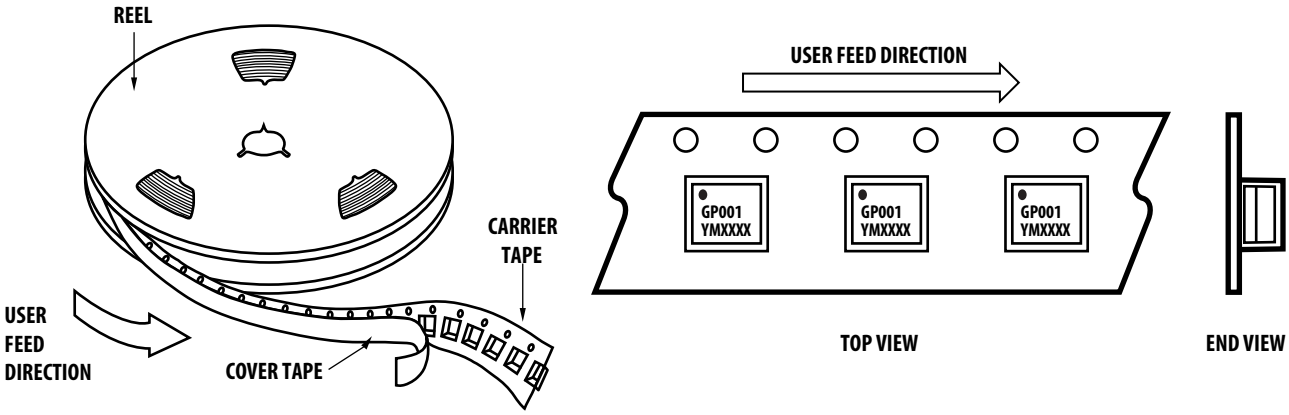
Stencil Opening



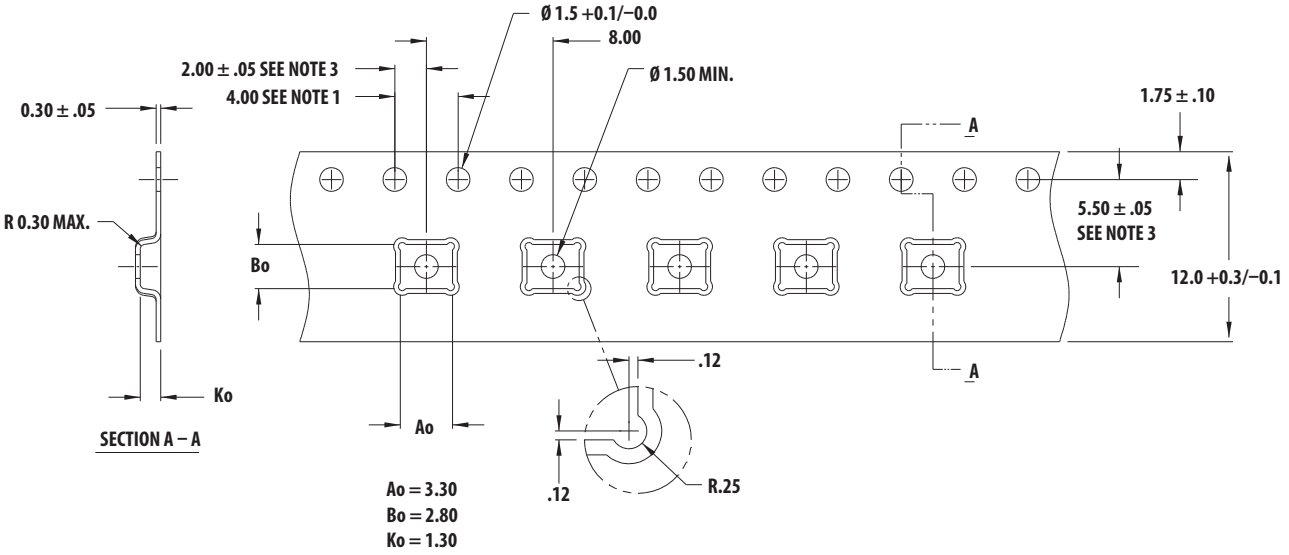
Combination of Land Pattern and Stencil Opening

Notes:
1. All dimensions are in milimeters
2. Recommended stencil thickness is 4mils

Device Orientation

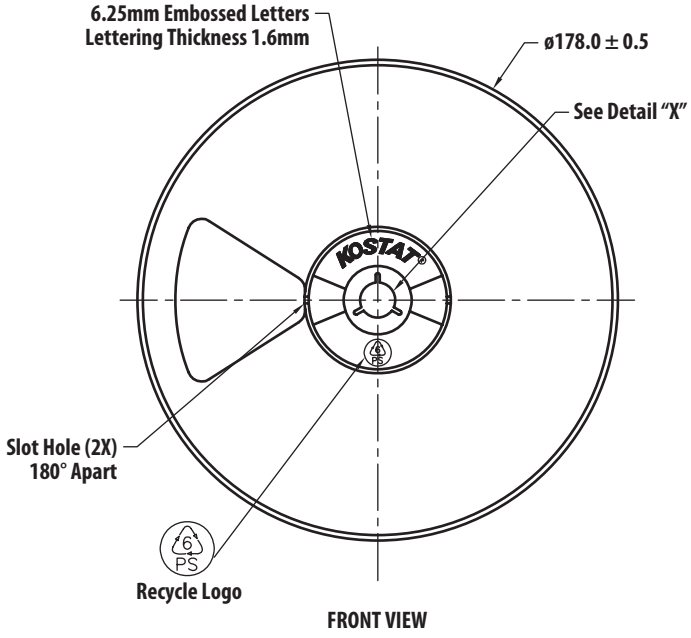


Tape Dimensions

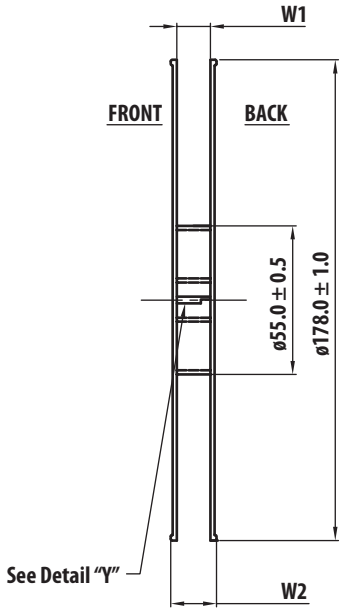


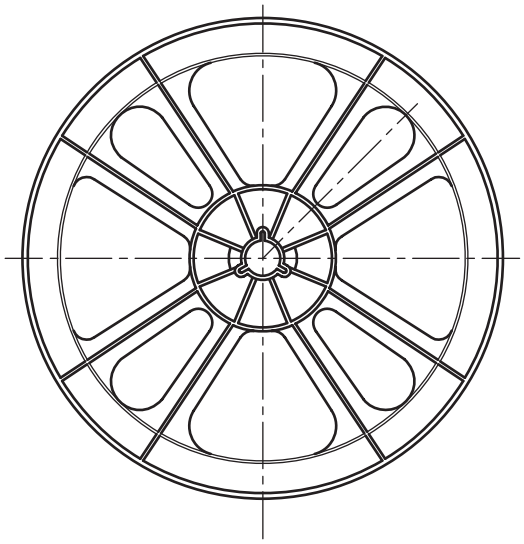
Notes:
1. All dimensions in mm
2. 10 sprocket hole pitch cumulative tolerance ±0.2
3. Camber in compliance with EIA 481
4. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole
5. Ao and Bo are calculated on a plane at a distance "R" above the bottom of the pocket.

Reel Dimensions (7″ reel)

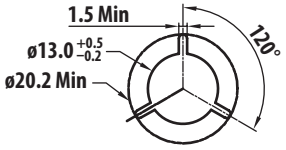


FRONT VIEW

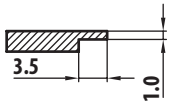




BACK VIEW

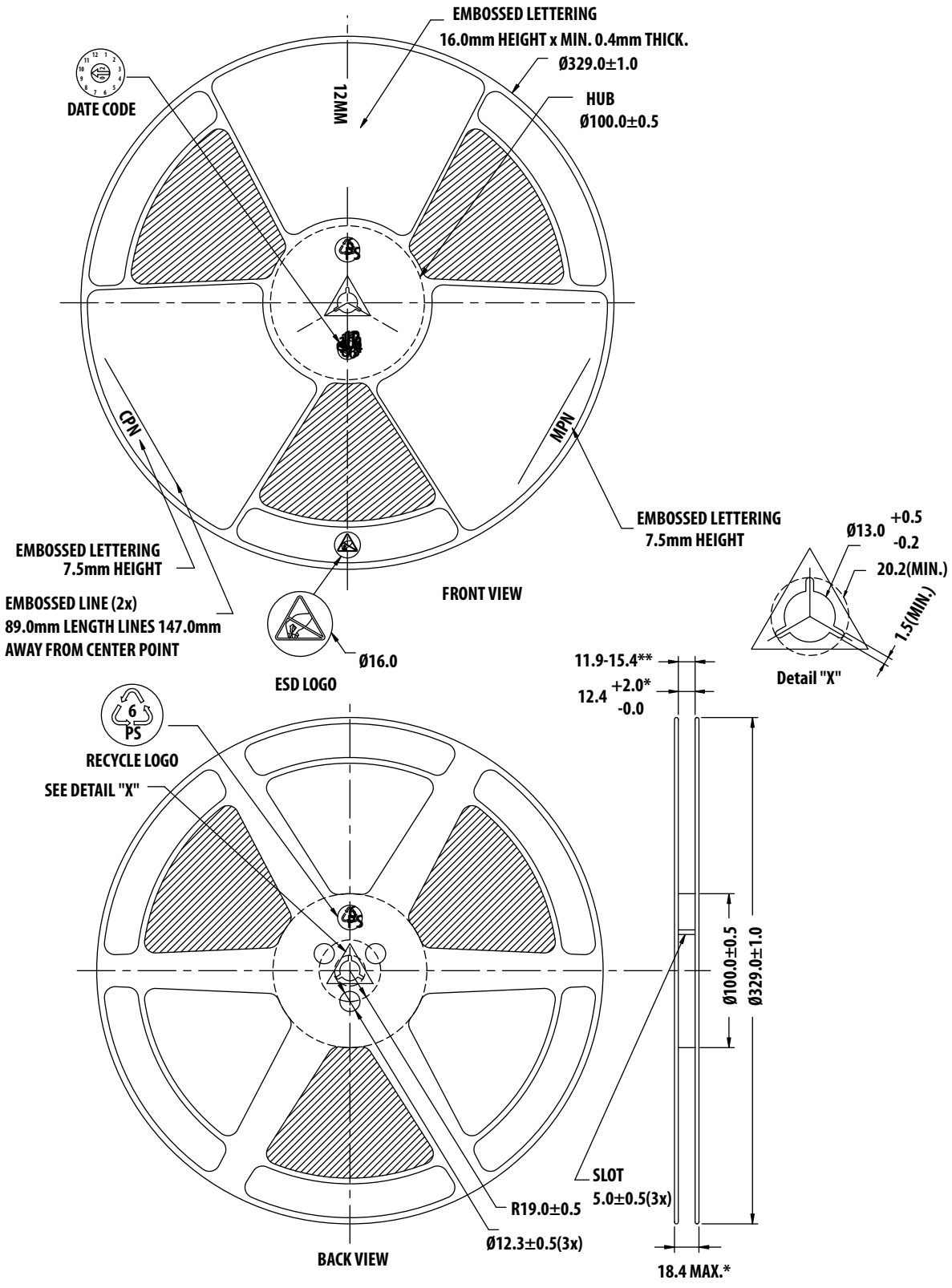


Detail "X"
Scale 1/2



Detail "Y"
Scale 1/3

Reel Dimensions (13″ reel)



For product information and a complete list of distributors, please go to our web site: **www.avagotech.com**

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AV02-4552EN - June 20, 2014

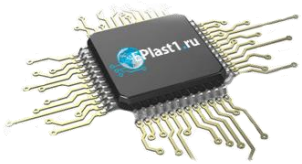
Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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