# Agilent ABA-52563
# 3.5 GHz Broadband Silicon RFIC Amplifier
Data Sheet

**Features**
- **Operating frequency: DC ~ 3.5 GHz**
- **21.5 dB gain**
- **VSWR < 2.0 throughout operating frequency**
- **9.8 dBm output P1dB**
- **3.3 dB noise figure**
- **Unconditionally stable**
- **Single 5V supply (Id = 35 mA)**
- **Lead-free option available**

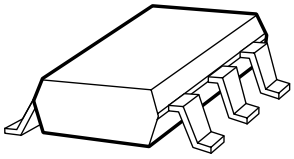
**Applications**
- **Amplifier for cellular, cordless, special mobile radio, PCS, ISM, wireless LAN, DBS, TVRO, and TV tuner applications**

**Description**
Agilent's ABA-52563 is an economical, easy-to-use, internally 50-ohm matched silicon monolithic amplifier that offers excellent gain and flat broadband response from DC to 3.5 GHz. Packaged in an ultraminiature industry-standard SOT-363 package, it requires half the board space of a SOT-143 package.

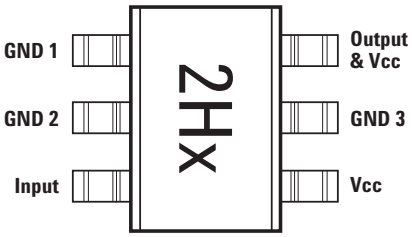
At 2 GHz, the ABA-52563 offers a small-signal gain of 21.5 dB, output P1dB of 9.8 dBm and 19.9 dBm output third order intercept point. It is suitable for use as buffer amplifiers for wideband applications. They are designed for low cost gain blocks in cellular applications, DBS tuners, LNB and other wireless communications systems.

ABA-52563 is fabricated using Agilent's HP25 silicon bipolar process, which employs a double-diffused single polysilicon process with self-aligned submicron emitter geometry. The process is capable of simultaneous high $f_T$ and high NPN breakdown (25 GHz $f_T$ at 6V BVCEO). The process utilizes industry standard device oxide isolation technologies and submicron aluminum multilayer interconnect to achieve superior performance, high uniformity, and proven reliability.

**Surface Mount Package**
**SOT-363 / SC70**

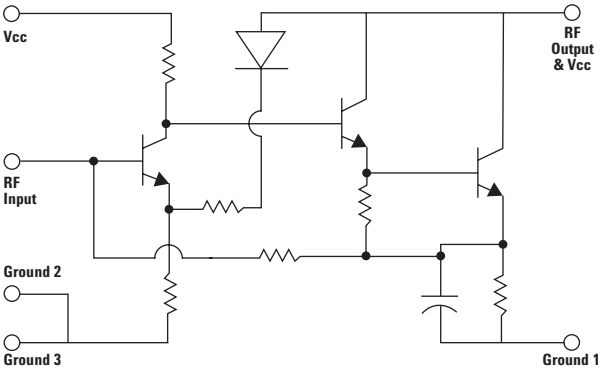


**Pin Connections and Package Marking**




**Note:**
Top View. Package marking provides orientation and identification. "x" is character to identify date code.

**Simplified Schematic**




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## ABA-52563 Absolute Maximum Ratings[1]

| Symbol | Parameter | Units | Absolute Max. |
|---|---|---|---|
| $V_{cc}$ | Device Voltage, RF output to ground (T = 25°C) | V | +7 |
| $P_{in}$ | CW RF Input Power (Vcc = 5V) | dBm | +20 |
| $P_{diss}$ | Total Power Dissipation[3] | W | 0.4 |
| $T_j$ | Junction Temperature | °C | 150 |
| $T_{STG}$ | Storage Temperature | °C | -65 to 150 |

**Thermal Resistance[2] (Vcc = 5V):**
**$\theta_{jc}$ = 106°C/W**

**Notes:**
1. Operation of this device in excess of any of these limits may cause permanent damage.
2. Thermal resistance measured using 150°C Liquid Crystal Measurement Technique.
3. Board (package belly) temperature, Tb, is 25°C. Derate 3.5 mW/°C for Tb > 109°C.

## Electrical Specifications

$T_c$ = +25°C, $Z_o$ = 50 Ω, $P_{in}$ = -30 dBm, $V_{cc}$ = 5V, Freq = 2 GHz, unless stated otherwise.

| Symbol | Parameter and Test Condition | Units | Min. | Typ. | Max. | Std Dev. |
|---|---|---|---|---|---|---|
| Gp[1] | Power Gain ($\|S_{21}\|^2$) | dB | 20 | 21.5 | | 0.2 |
| ΔGp | Power Gain Flatness, f = 0.1 ~ 2.5 GHz<br>f = 0.1 ~ 3.5 GHz | dB | | 0.5<br>2.1 | | |
| NF[1] | Noise Figure | dB | | 3.3 | 4 | 0.12 |
| P1dB[1] | Output Power at 1dB Gain Compression | dBm | | 9.8 | | 0.15 |
| OIP3[1] | Output Third Order Intercept Point | dBm | | 19.9 | | 0.18 |
| $VSWR_{in}$[1] | Input VSWR | | | 1.2 | | |
| $VSWR_{out}$[1] | Output VSWR | | | 1.4 | | |
| Icc[1] | Device Current | mA | | 35 | 43 | 0.5 |
| td[1] | Group Delay | ps | | 150 | | |

**Notes:**
1. Measurements taken on 50Ω test board shown on Figure 1. Excess circuit losses had been de-embedded from actual measurements. Standard deviation and typical data based on at least 500 parts sample size from 6 wafer lots. Future wafers allocated to this product may have nominal values anywhere within the upper and lower spec limits.

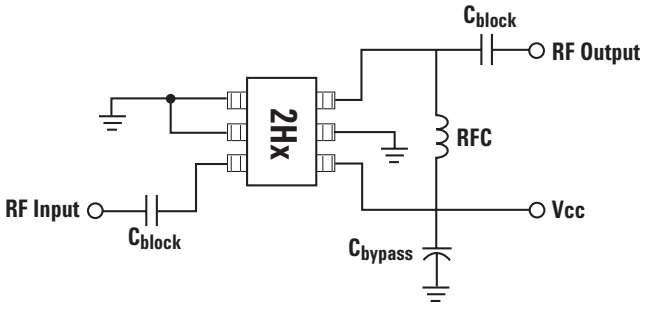



**Figure 1. ABA-52563 Production Test Circuit.**

## ABA-52563 Typical Performance

$T_c$ = +25°C, $Z_o$ = 50Ω, $V_{cc}$ = 5V unless stated otherwise.

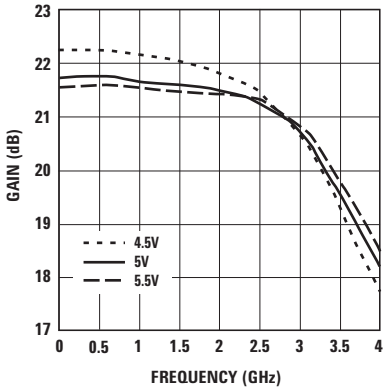



**Figure 2. Gain vs. Frequency and Voltage.**

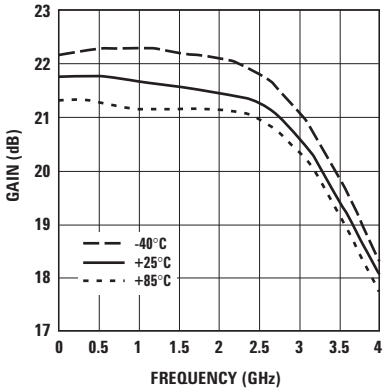



**Figure 3. Gain vs. Frequency and Temperature.**

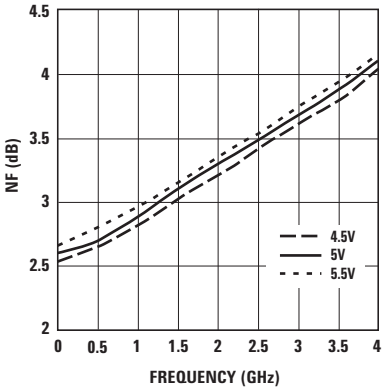



**Figure 4. Noise Figure vs. Frequency and Voltage.**

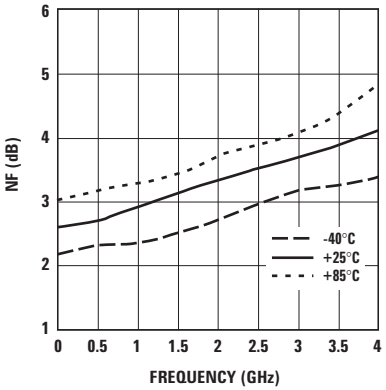



**Figure 5. Noise Figure vs. Frequency and Temperature.**

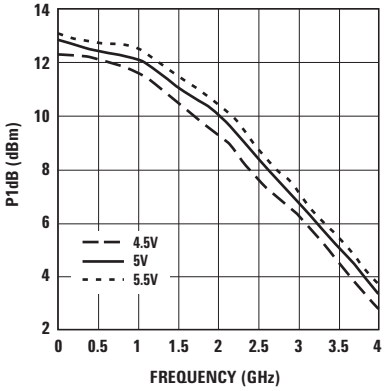



**Figure 6. Output Power for 1 dB Gain Compression vs. Frequency and Voltage.**

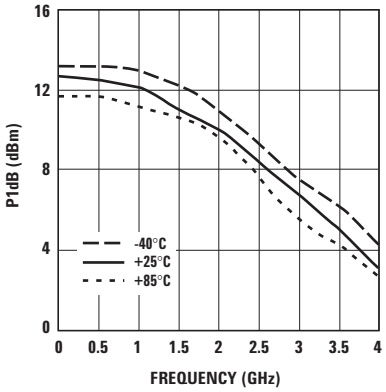



**Figure 7. Output Power for 1 dB Gain Compression vs. Frequency and Temperature.**

## ABA-52563 Typical Performance, continued

$T_c$ = +25°C, $Z_o$ = 50Ω, $V_{cc}$ = 5V unless stated otherwise.

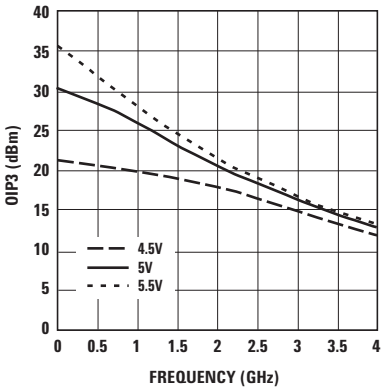



**Figure 8. Output IP3 vs. Frequency and Voltage.**

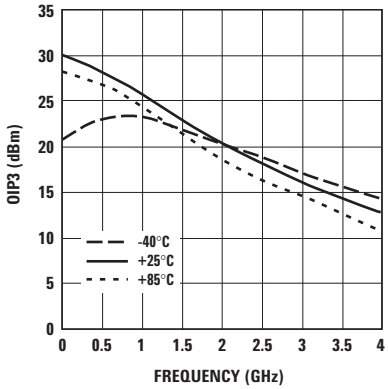



**Figure 9. Output IP3 vs. Frequency and Temperature.**

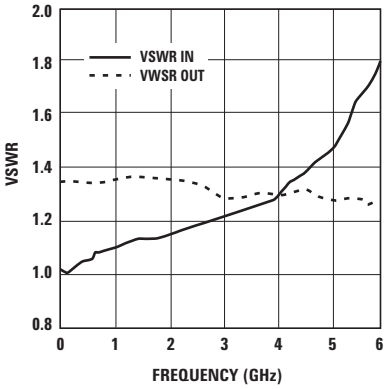



**Figure 10. Input and Output VSWR vs. Frequency.**

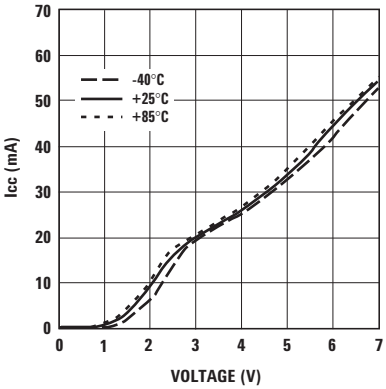



**Figure 11. Supply Current vs. Voltage and Temperature.**

### ABA-52563 Typical Scattering Parameters

$T_C$ = +25°C, $V_{CC}$ = 5V, $Z_O$ = 50 Ω, unless stated otherwise

| Freq (GHz) | $S_{11}$ Mag. | $S_{11}$ Ang. | $S_{21}$ dB | $S_{21}$ Mag. | $S_{21}$ Ang. | $S_{12}$ dB | $S_{12}$ Mag. | $S_{12}$ Ang. | $S_{22}$ Mag. | $S_{22}$ Ang. | K Factor |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.05 | 0.01 | 146.6 | 21.7 | 12.10 | -2.6 | -30.2 | 0.03 | 0.3 | 0.15 | -2.4 | 1.492 |
| 0.10 | 0.00 | 134.0 | 21.7 | 12.11 | -4.8 | -30.5 | 0.03 | -0.3 | 0.15 | -5.1 | 1.528 |
| 0.20 | 0.00 | -40.6 | 21.7 | 12.16 | -9.6 | -30.5 | 0.03 | 0.1 | 0.15 | -9.6 | 1.523 |
| 0.30 | 0.01 | -53.2 | 21.7 | 12.19 | -14.5 | -30.8 | 0.03 | 1.2 | 0.15 | -13.0 | 1.560 |
| 0.40 | 0.02 | -56.7 | 21.7 | 12.19 | -19.5 | -30.8 | 0.03 | 2.4 | 0.14 | -15.7 | 1.560 |
| 0.50 | 0.03 | -141.5 | 21.8 | 12.26 | -24.8 | -30.5 | 0.03 | 1.0 | 0.15 | -15.7 | 1.516 |
| 0.60 | 0.03 | -128.1 | 21.8 | 12.24 | -29.8 | -30.8 | 0.03 | 3.1 | 0.15 | -17.6 | 1.557 |
| 0.70 | 0.04 | -127.5 | 21.7 | 12.21 | -34.9 | -30.5 | 0.03 | 4.3 | 0.15 | -20.3 | 1.520 |
| 0.80 | 0.04 | -126.7 | 21.7 | 12.18 | -39.8 | -30.5 | 0.03 | 6.1 | 0.15 | -22.5 | 1.523 |
| 0.90 | 0.05 | -123.9 | 21.7 | 12.16 | -44.7 | -30.8 | 0.03 | 7.4 | 0.15 | -24.2 | 1.563 |
| 1.00 | 0.05 | -125.0 | 21.7 | 12.13 | -49.7 | -30.8 | 0.03 | 11.7 | 0.15 | -26.4 | 1.566 |
| 1.20 | 0.05 | -123.4 | 21.7 | 12.10 | -59.6 | -30.2 | 0.03 | 10.8 | 0.15 | -29.4 | 1.490 |
| 1.40 | 0.06 | -127.4 | 21.6 | 12.05 | -69.4 | -30.2 | 0.03 | 12.4 | 0.15 | -32.4 | 1.491 |
| 1.60 | 0.06 | -133.8 | 21.6 | 12.04 | -79.6 | -29.6 | 0.03 | 13.0 | 0.15 | -35.3 | 1.424 |
| 1.80 | 0.06 | -136.7 | 21.6 | 12.00 | -89.8 | -29.1 | 0.04 | 14.7 | 0.15 | -37.8 | 1.370 |
| 2.00 | 0.07 | -142.5 | 21.5 | 11.94 | -100.4 | -29.4 | 0.03 | 14.3 | 0.15 | -38.3 | 1.402 |
| 2.20 | 0.07 | -143.9 | 21.5 | 11.87 | -111.2 | -28.6 | 0.04 | 16.7 | 0.15 | -37.8 | 1.326 |
| 2.40 | 0.08 | -146.1 | 21.4 | 11.75 | -121.9 | -28.4 | 0.04 | 16.2 | 0.15 | -37.3 | 1.309 |
| 2.60 | 0.09 | -148.4 | 21.3 | 11.56 | -133.2 | -28.0 | 0.04 | 17.3 | 0.14 | -36.9 | 1.279 |
| 2.80 | 0.09 | -149.5 | 21.1 | 11.33 | -144.5 | -27.7 | 0.04 | 15.6 | 0.14 | -36.4 | 1.273 |
| 3.00 | 0.10 | -152.7 | 20.8 | 10.95 | -156.1 | -27.3 | 0.04 | 15.8 | 0.13 | -35.9 | 1.263 |
| 3.20 | 0.10 | -158.7 | 20.4 | 10.51 | -167.5 | -27.1 | 0.04 | 15.6 | 0.13 | -35.4 | 1.275 |
| 3.40 | 0.11 | -163.2 | 20.0 | 9.97 | -178.7 | -27.3 | 0.04 | 15.5 | 0.13 | -34.9 | 1.338 |
| 3.50 | 0.11 | -167.6 | 19.7 | 9.67 | 175.9 | -26.6 | 0.05 | 16.0 | 0.13 | -34.6 | 1.285 |
| 4.00 | 0.12 | 165.9 | 18.3 | 8.25 | 150.6 | -.26.2 | 0.05 | 12.0 | 0.13 | -33.4 | 1.386 |
| 4.50 | 0.16 | 138.3 | 16.9 | 6.98 | 126.3 | -25.5 | 0.05 | 12.7 | 0.14 | -37.1 | 1.462 |
| 5.00 | 0.19 | 122.8 | 15.1 | 5.71 | 105.0 | -24.7 | 0.06 | 9.5 | 0.12 | -48.4 | 1.585 |
| 5.50 | 0.25 | 112.3 | 13.7 | 4.85 | 86.7 | -23.5 | 0.07 | 6.0 | 0.12 | -63.0 | 1.565 |
| 6.00 | 0.30 | 99.3 | 12.3 | 4.14 | 70.4 | -23.1 | 0.07 | 1.0 | 0.11 | -83.5 | 1.680 |

### Device Models

Refer to Agilent's web site
www.agilent.com/view/rf

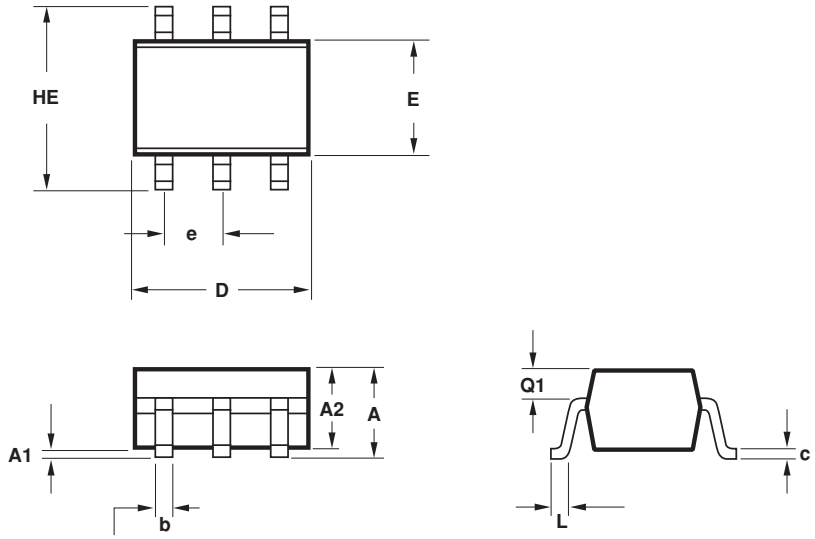
### Ordering Information

| Part Number | Devices per Container | Container |
|---|---|---|
| ABA-52563-TR1 | 3000 | 7" reel |
| ABA-52563-TR2 | 10000 | 13" reel |
| ABA-52563-BLK | 100 | antistatic bag |
| ABA-52563-TR1G | 3000 | 7" reel |
| ABA-52563-TR2G | 10000 | 13" reel |
| ABA-52563-BLKG | 100 | antistatic bag |

Note: For lead-free option,the part number will have the character "G" at the end.

### Package Dimensions

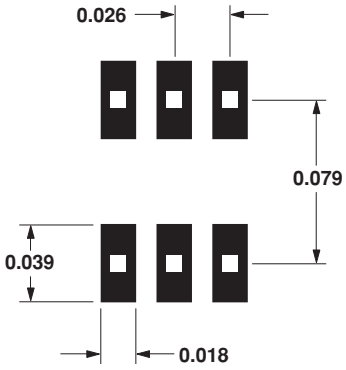
**Outline 63 (SOT-363/SC-70)**




| SYMBOL | DIMENSIONS (mm) MIN. | MAX. |
|---|---|---|
| E | 1.15 | 1.35 |
| D | 1.80 | 2.25 |
| HE | 1.80 | 2.40 |
| A | 0.80 | 1.10 |
| A2 | 0.80 | 1.00 |
| A1 | 0.00 | 0.10 |
| Q1 | 0.10 | 0.40 |
| e | 0.650 BCS | |
| b | 0.15 | 0.30 |
| c | 0.10 | 0.20 |
| L | 0.10 | 0.30 |

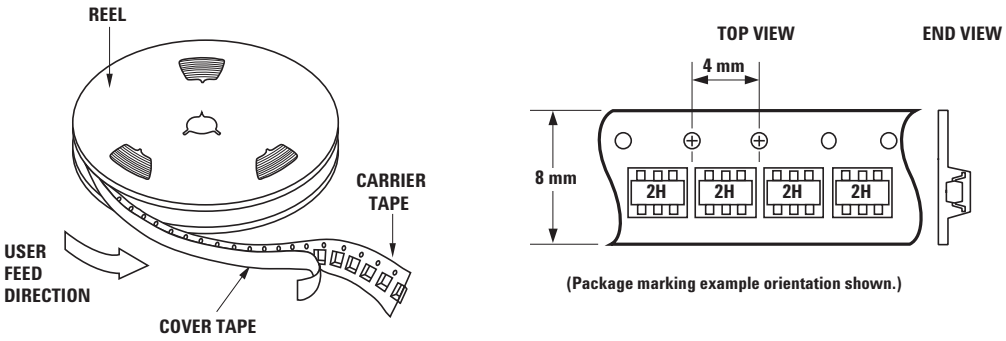
NOTES:
1. All dimensions are in mm.
2. Dimensions are inclusive of plating.
3. Dimensions are exclusive of mold flash & metal burr.
4. All specifications comply to EIAJ SC70.
5. Die is facing up for mold and facing down for trim/form, ie: reverse trim/form.
6. Package surface to be mirror finish.

### Recommended PCB Pad Layout for Agilent's SC70 6L/SOT-363 Products

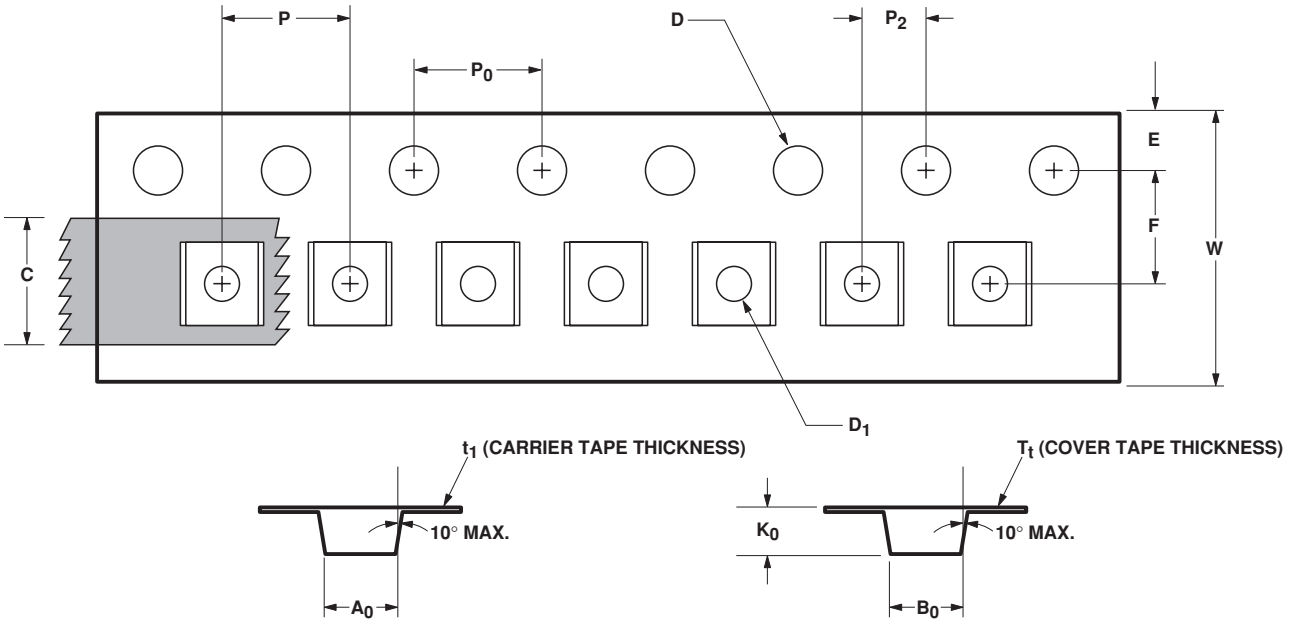



Dimensions in inches.

## Device Orientation




## Tape Dimensions and Product Orientation for Outline 63




| DESCRIPTION | | SYMBOL | SIZE (mm) | SIZE (INCHES) |
|---|---|---|---|---|
| CAVITY | LENGTH | $A_0$ | 2.40 ± 0.10 | 0.094 ± 0.004 |
| | WIDTH | $B_0$ | 2.40 ± 0.10 | 0.094 ± 0.004 |
| | DEPTH | $K_0$ | 1.20 ± 0.10 | 0.047 ± 0.004 |
| | PITCH | P | 4.00 ± 0.10 | 0.157 ± 0.004 |
| | BOTTOM HOLE DIAMETER | $D_1$ | 1.00 + 0.25 | 0.039 + 0.010 |
| PERFORATION | DIAMETER | D | 1.50 ± 0.10 | 0.061 + 0.002 |
| | PITCH | $P_0$ | 4.00 ± 0.10 | 0.157 ± 0.004 |
| | POSITION | E | 1.75 ± 0.10 | 0.069 ± 0.004 |
| CARRIER TAPE | WIDTH | W | 8.00 + 0.30 - 0.10 | 0.315 + 0.012 |
| | THICKNESS | $t_1$ | 0.254 ± 0.02 | 0.0100 ± 0.0008 |
| COVER TAPE | WIDTH | C | 5.40 ± 0.10 | 0.205 + 0.004 |
| | TAPE THICKNESS | $T_t$ | 0.062 ± 0.001 | 0.0025 ± 0.0004 |
| DISTANCE | CAVITY TO PERFORATION (WIDTH DIRECTION) | F | 3.50 ± 0.05 | 0.138 ± 0.002 |
| | CAVITY TO PERFORATION (LENGTH DIRECTION) | $P_2$ | 2.00 ± 0.05 | 0.079 ± 0.002 |

**www.agilent.com/semiconductors**

For product information and a complete list of distributors, please go to our web site.

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Data subject to change.

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Obsoletes 5989-0951EN
December 4, 2004
5989-1971EN



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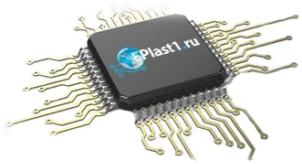
Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

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.




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**Факс:** 8 (812) 320-02-42
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