

ASML-5829

Schottky Assisted Low Power PIN Diode Limiter

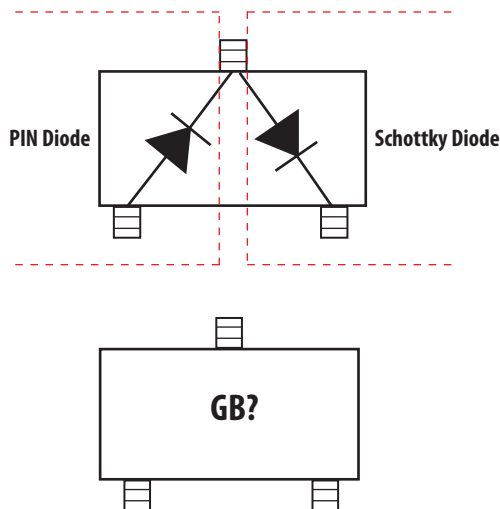


Data Sheet

Description

The ASML-5829 is specifically designed for low power limiter applications, where it can be used to protect the receiver system from being damaged by large input signals, and allow the receiver system to function normally with the absence of large signal. The Schottky enhanced limiter will have a lower limiting threshold compared to the more conventional self-biased PIN limiter. The PIN diode is placed at the input, to protect the Schottky from high RF power levels.

Pin Connections, Package Marking & Orientation, SOT-323



Notes:
GB = Device Code
? = Month code indicates the month of manufacture

Features

- Low Power Limiter with unique combination of PIN and Schottky Diode
- Low limiting threshold power (OP1dB: 6.05 dBm @900MHz)
- Semi integrated solution in Surface Mount SOT-323 Package
 - increase flexibility
 - save board space
 - reduce cost
- PIN Diode features:
 - Low Capacitance
 - Low Resistance at Low Current
 - Low Failure in Time (FIT) Rate^[1]
- Schottky Diode features:
 - Low Turn-On Voltage (As Low as 0.34 V at 1 mA)
 - Low FIT (Failure in Time) Rate^[1]

Note:

1. For more information see the Surface Mount PIN Reliability Data Sheet.

Table 1. Absolute Maximum Rating ^[1] $T_c = +25^\circ\text{C}$, PIN diode

| Symbol | Parameter | Units | Absolute Max. for PIN Diode | Absolute Max. for Schottky Diode |
|---------------|-----------------------------------|---------------------------|--------------------------------|-------------------------------------|
| I_F | Forward Current (1 μ s Pulse) | Amp | 1 | 1 |
| P_{IV} | Peak Inverse Voltage | V | 100 | 15 |
| T_J | Junction Temperature | $^\circ\text{C}$ | 150 | |
| T_{STG} | Storage Temperature | $^\circ\text{C}$ | -65 to 150 | |
| θ_{JC} | Thermal Resistance ^[2] | $^\circ\text{C}/\text{W}$ | 150 | |

Notes:

1. Operation in excess of anyone of these conditions may result in permanent damage to the device.
2. $T_c = 25^\circ\text{C}$, T_c where is defined to be the temperature at the package pins where contacts is made to the circuit board.

Table 2. Electrical Specifications, $T_c = +25^\circ\text{C}$, PIN diode

| Symbol | Parameter and Test Condition | Units | Min. | Typ | Max. |
|----------|----------------------------------------------------------------|-------|------|------|-------|
| V_{BR} | Breakdown Voltage @ $I_R \leq 10\mu\text{A}$ | V | 100 | 128 | – |
| V_F | Forward Voltage @ $I_F = 30\text{mA}$ | V | – | 0.90 | – |
| R_S | Typical Series Resistance @ Freq = 100MHz & $I_F = 1\text{mA}$ | Ohm | – | 4.00 | – |
| R_S | Typical Series Resistance @ Freq = 100MHz & $I_F = 5\text{mA}$ | Ohm | – | 1.90 | 2.5 |
| C_T | Typical Total Capacitance @ Freq = 1MHz & $V_R = 5\text{V}$ | pF | – | 0.28 | 0.375 |
| τ | Carrier Lifetime @ $I_F = 10\text{mA}$ & $I_R = 6\text{mA}$ | ns | – | 200 | – |

Table 3. Electrical Specifications, $T_c = +25^\circ\text{C}$, Schottky diode

| Symbol | Parameter and Test Condition | Units | Min. | Typ | Max. |
|----------|-------------------------------------------------------------|-------|------|------|------|
| V_{BR} | Breakdown Voltage @ $I_R \leq 100\mu\text{A}$ | V | 15 | 22 | – |
| I_R | Reverse Leakage Current @ $V_{BR} = 1\text{V}$ | nA | – | 40 | 100 |
| V_F | Forward Voltage @ $I_F = 1\text{mA}$ | V | – | 0.32 | 0.34 |
| V_F | Forward Voltage @ $I_F = 10\text{mA}$ | V | – | 0.45 | 0.50 |
| C_T | Typical Total Capacitance @ Freq = 1MHz & $V_R = 0\text{V}$ | pF | – | 0.7 | 1.0 |
| RD | Typical Dynamic Resistance, $I_F = 5\text{mA}$ | Ohm | – | 12 | – |

ASML-5829 Typical Performance, $T_c = +25^\circ\text{C}$

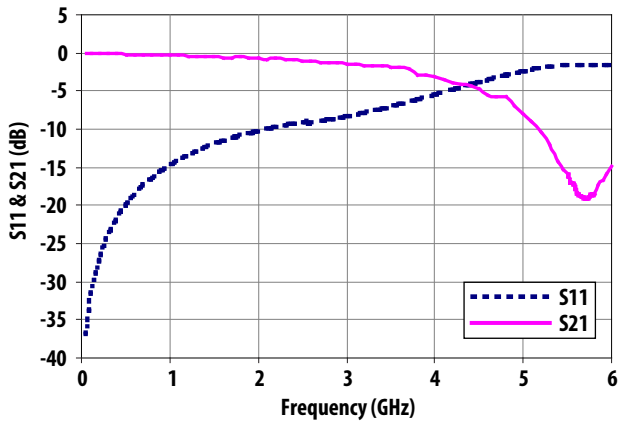


Figure 1. S11 & S21 vs Frequency at Input Power = 0dBm

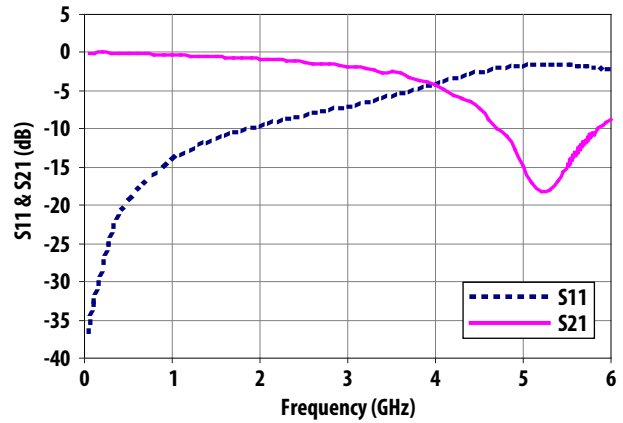


Figure 2. S11 & S21 vs Frequency at Input Power = -30dBm

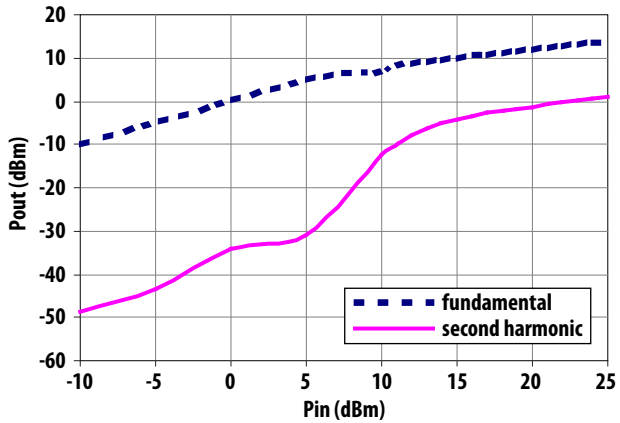


Figure 3. P_{out} fundamental & P_{out} second harmonic vs P_{in} at freq = 450MHz

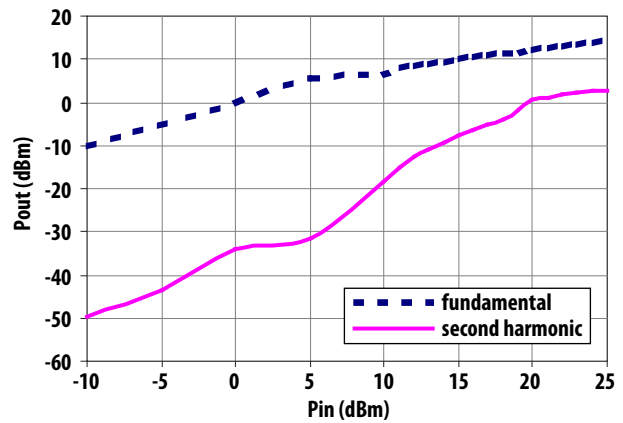


Figure 4. P_{out} fundamental & P_{out} second harmonic vs P_{in} at freq = 900MHz

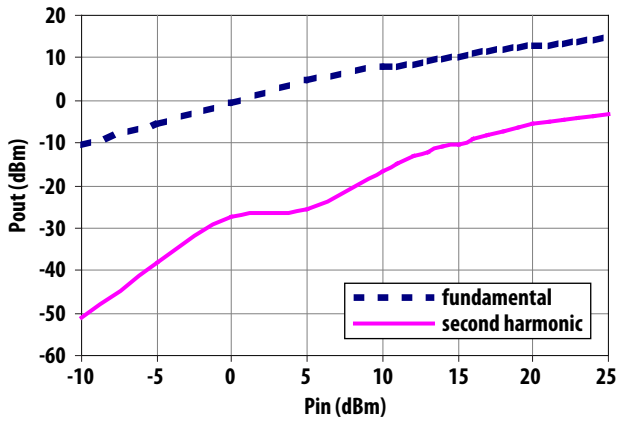


Figure 5. P_{out} fundamental & P_{out} second harmonic vs P_{in} at freq = 1.8GHz

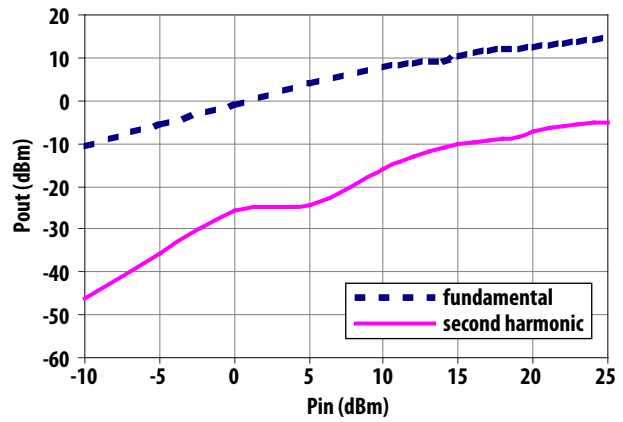


Figure 6. P_{out} fundamental & P_{out} second harmonic vs P_{in} at freq = 2.0GHz

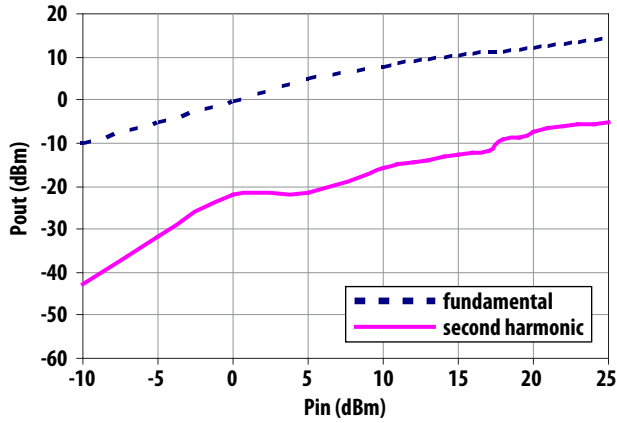


Figure 7. P_{out} fundamental & P_{out} second harmonic vs P_{in} at freq = 2.5GHz

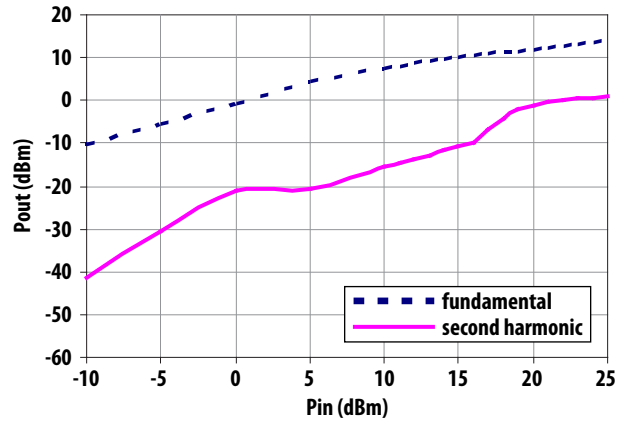
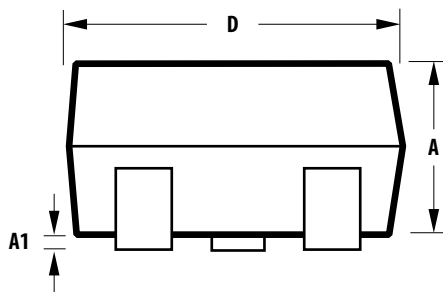
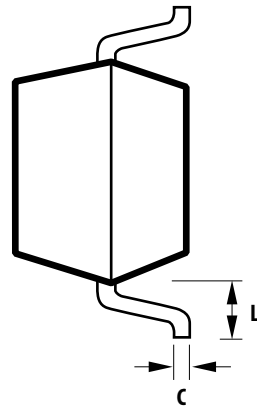
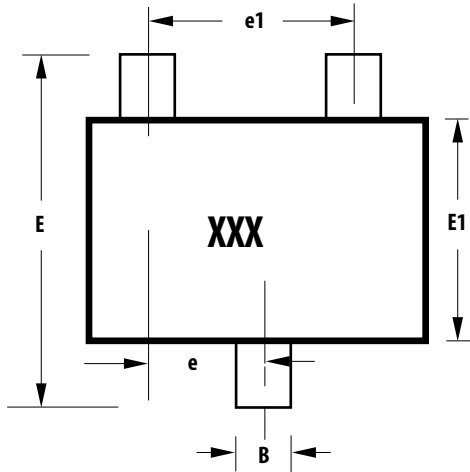


Figure 8. P_{out} fundamental & P_{out} second harmonic vs P_{in} at freq = 2.7GHz

SOT-323 Package Outline



Notes:
 XXX-package marking
 Drawings are not to scale

| SYMBOL | DIMENSIONS (mm) | |
|--------|-----------------|------|
| | MIN. | MAX. |
| A | 0.80 | 1.00 |
| A1 | 0.00 | 0.10 |
| B | 0.15 | 0.40 |
| C | 0.10 | 0.20 |
| D | 1.80 | 2.25 |
| E1 | 1.10 | 1.40 |
| e | 0.65 typical | |
| e1 | 1.30 typical | |
| E | 1.80 | 2.40 |
| L | 0.425 typical | |

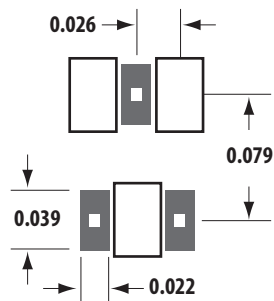
Part Number Ordering Information

| Part Number | No. of Devices | Container |
|---------------|----------------|---------------------------|
| ASML-5829-BLK | 100 | Bulk, per Antistatic bag |
| ASML-5829-TR1 | 3000 | Tape & Reel, per 7" Reel |
| ASML-5829-TR2 | 10000 | Tape & Reel, per 13" Reel |

Tape and Reeling conforms to Electronic Industries RS-481, "Taping of Surface Mounted Components for Automated Placement".

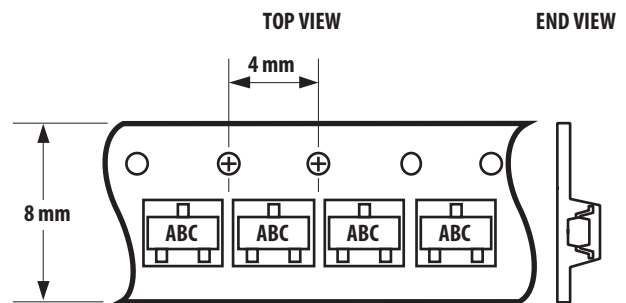
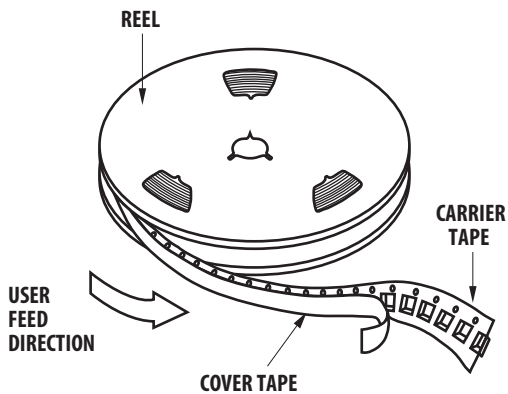
For lead-free option, the part number will have the character "G" at the end, eg. -TR2G for a 10K pc lead-free reel.

Recommended PCB Pad Layout for AVAGO's SOT-323 Products



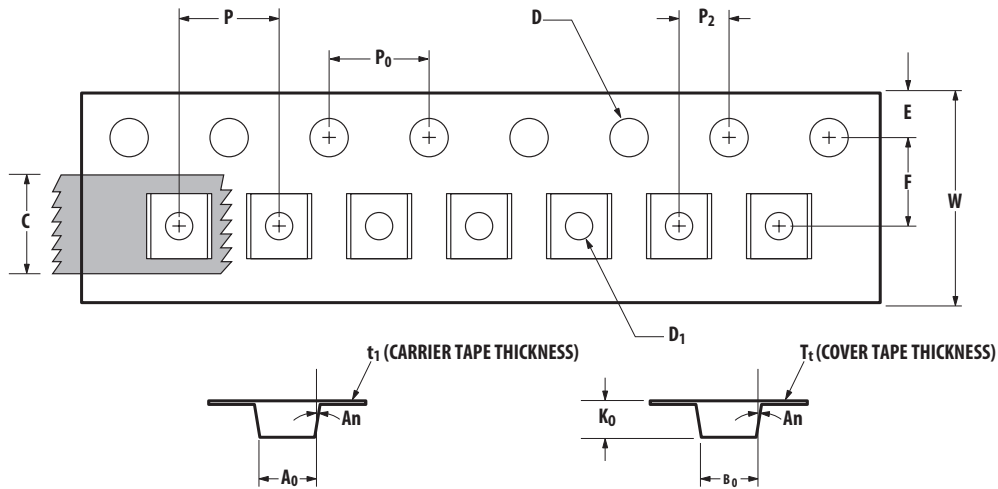
Dimensions in inches

Device Orientation



Note: "AB" represents package marking code.
"C" represents date code.

Tape Dimensions and Product Orientation



| | 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 | 1.55 ± 0.05 |
| PITCH | | P_0 | 4.00 ± 0.10 | 0.157 ± 0.004 |
| POSITION | | E | 1.75 ± 0.10 | 0.069 ± 0.004 |
| | | F | 3.50 ± 0.05 | 0.138 ± 0.002 |
| CARRIER TAPE | WIDTH | W | 8.00 ± 0.30 | 0.315 ± 0.012 |
| | THICKNESS | t_1 | 0.254 ± 0.02 | 0.0100 ± 0.0008 |
| COVER TAPE | WIDTH | C | 5.4 ± 0.10 | 0.205 ± 0.004 |
| | TAPE THICKNESS | T_t | 0.062 ± 0.001 | 0.0025 ± 0.00004 |
| 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 |
| ANGLE | FOR SOT-323 (SC70-3 LEAD) FOR SOT-363 (SC70-6 LEAD) | A_n | 8°C MAX 10°C MAX | |

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

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