

# N505AT36N1

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# N505AT36N1

## Surface Mount TVS Diode Array For 5 Lines I/O ESD Protection: 5.0V

### Features

- 250 Watts peak pulse power per line (tp=8/20μs)
- Protects five I/O lines
- Low clamping voltage
- Working voltages : 5V
- Low leakage current
- IEC61000-4-2 (ESD) ±30kV (air), ±30kV (contact)
- IEC61000-4-4 (EFT) 40A (5/50ns)
- IEC61000-4-5 (Lightning) 14A (8/20μs)
- Suffix "-H" indicates Halogen-free part, ex. N505AT36N1-H.

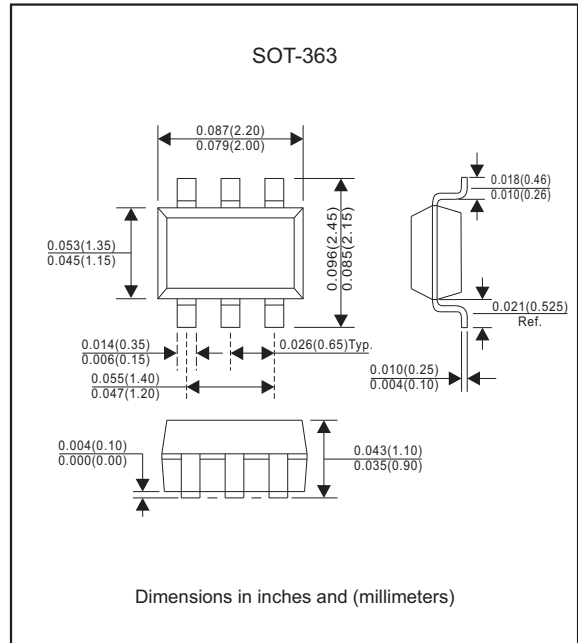
### Applications

- Cellular Handsets & Accessories.
- Personal Digital Assistants (PDAs).
- Notebooks & Handhelds.
- Portable Instrumentation.
- Digital Camers.
- Mp3 Player.

### Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, SOT-363
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Mounting Position : Any
- Weight : Approximated 0.006 gram

### Package outline



### Maximum ratings (at T<sub>A</sub>=25°C unless otherwise noted)

| Parameter                                                      | Symbol           | Value       | Unit |
|----------------------------------------------------------------|------------------|-------------|------|
| Peak Pulse Power (According to IEC 61000-4-5)                  | P <sub>PP</sub>  | 250         | W    |
| Peak Pulse Current (According to IEC 61000-4-5)                | I <sub>PP</sub>  | 14          | A    |
| ESD per IEC 61000-4-2 (Air)<br>ESD per IEC 61000-4-2 (Contact) | ESD              | ±30<br>±30  | KV   |
| Operating junction temperature range                           | T <sub>J</sub>   | -55 to +125 | °C   |
| Storage temperature range                                      | T <sub>STG</sub> | -55 to +150 | °C   |

### Electrical characteristics (at T<sub>A</sub>=25°C unless otherwise noted)

| Parameter                     | Condition                                                                                               | Symbol           | Min. | Typ.        | Max.     | Unit |
|-------------------------------|---------------------------------------------------------------------------------------------------------|------------------|------|-------------|----------|------|
| Reverse Stand-Off Voltage     |                                                                                                         | V <sub>RWM</sub> |      |             | 5        | V    |
| Reverse Breakdown Voltage     | I <sub>T</sub> =1mA                                                                                     | V <sub>BR</sub>  | 6    |             | 9        | V    |
| Reverse Leakage Current       | V <sub>RWM</sub> =5V                                                                                    | I <sub>R</sub>   |      |             | 500      | nA   |
| Clamping Voltage (Note 1)     | I <sub>PP</sub> =1.0A, T <sub>P</sub> =8/20μs<br>I <sub>PP</sub> =14.0A, T <sub>P</sub> =8/20μs         | V <sub>C</sub>   |      | 8<br>14     | 10<br>17 | V    |
| Clamping Voltage              | I <sub>PP</sub> =0.4A, T <sub>LP</sub> =0.2/100ns<br>I <sub>PP</sub> =16.0A, T <sub>LP</sub> =0.2/100ns | V <sub>C</sub>   |      | 8.0<br>11.6 |          | V    |
| Junction Capacitance          | Between I/O Pin and GND, V <sub>R</sub> =0V, f=1MHz                                                     | C <sub>J</sub>   |      | 90          | 120      | pF   |
| Dynamic Resistance (Note 2'3) | T <sub>LP</sub> = 0.2/100ns                                                                             | R <sub>D</sub>   |      | 0.28        |          | Ω    |

Note:

1. Non-repetitive current pulse 8/20 μs exponential decay waveform according to IEC 61000-4-5.
2. TLP Settings: tp = 100ns, tr = 0.2ns, I<sub>TLP</sub> and V<sub>TLP</sub> averaging window: t1= 70ns to t2 = 90ns.
3. Dynamic resistance calculated from I<sub>PP</sub> = 4A to I<sub>PP</sub> = 16A using "Best Fit"

## Rating and characteristic curves(N505AT36N1)

FIG.1 Peak Pulse Power vs. Pulse Time

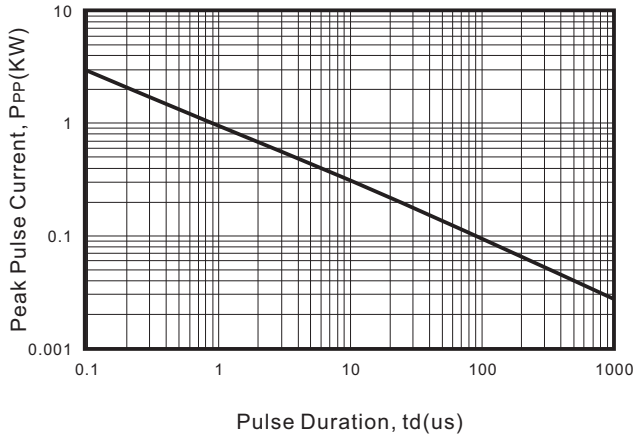


Fig.2 Power derating curve

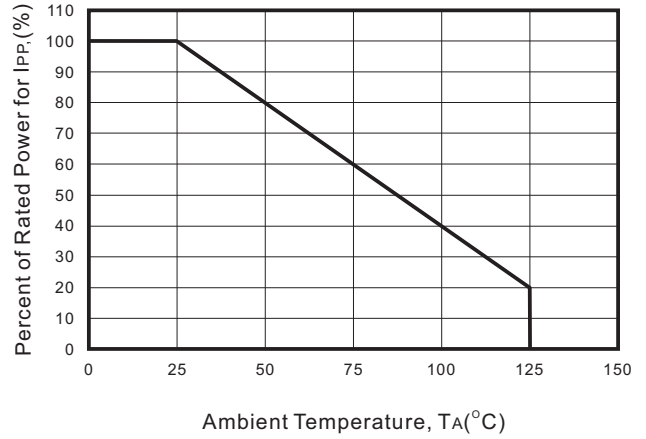


FIG.3 Clamping Voltage vs. Peak Pulse Current

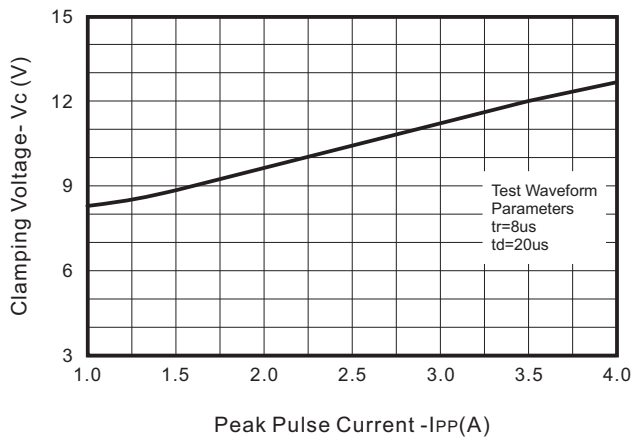


FIG.4 Capacitance between terminals characteristics

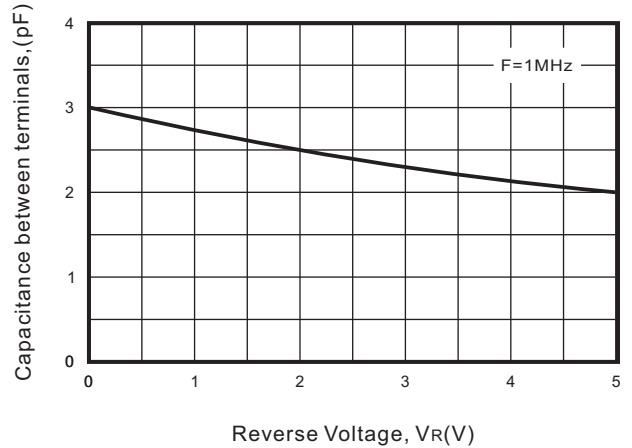


FIG.5 Pulse Waveform

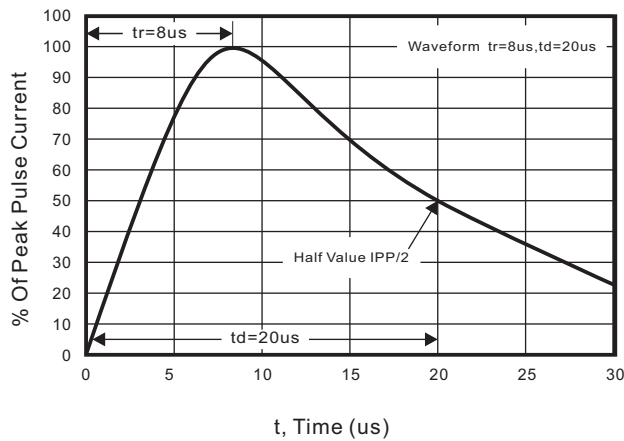
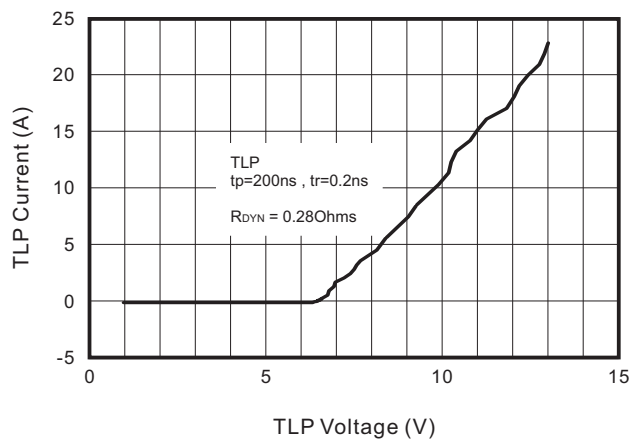
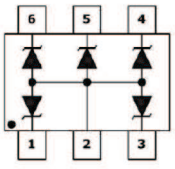


FIG.6 TLP Measurement



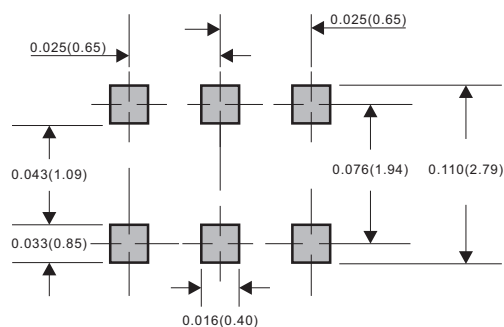
# N505AT36N1

## Pinning information

| Type number | Marking code | Symbol                                                                              |
|-------------|--------------|-------------------------------------------------------------------------------------|
| N505AT36N1  | 5FC          |  |

## Suggested solder pad layout

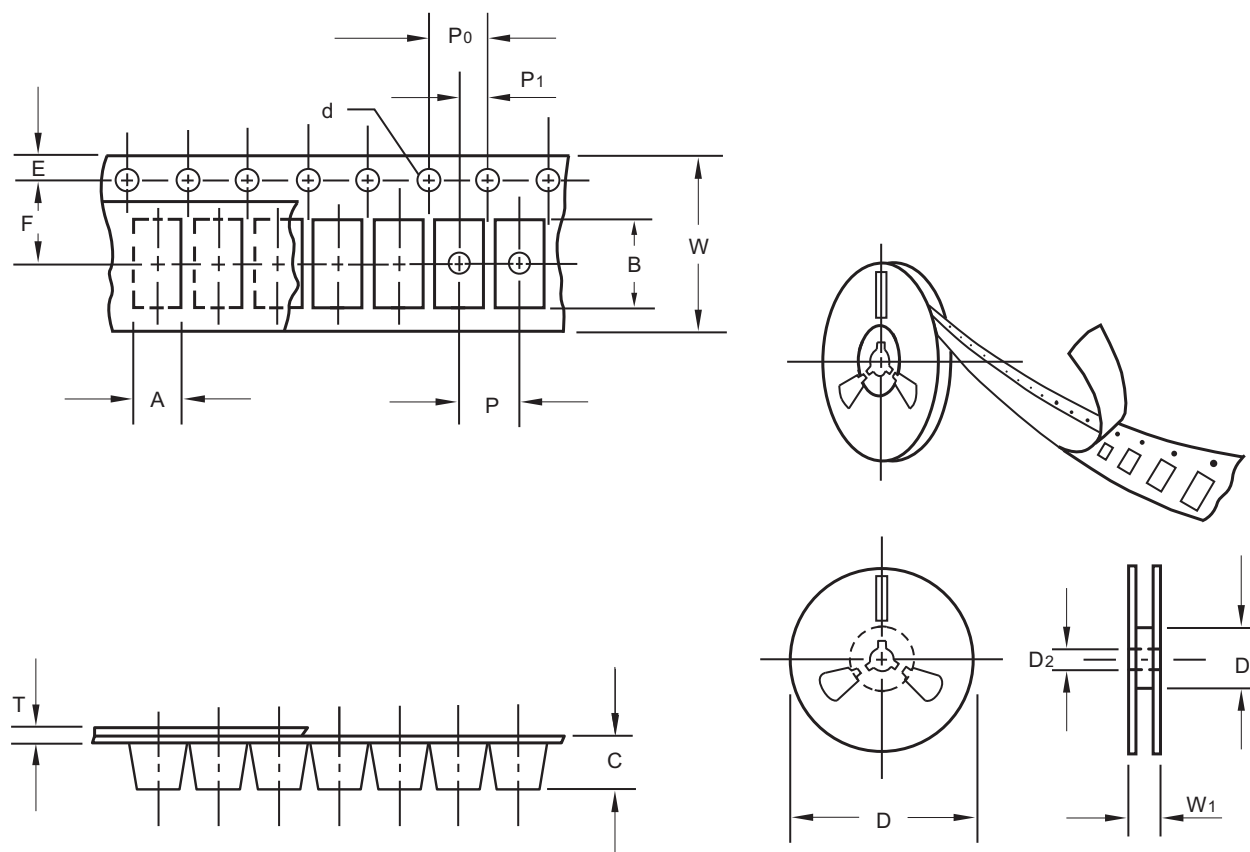
SOT-363



Dimensions in inches and (millimeters)

## N505AT36N1

## Packing information



unit:mm

| Item                      | Symbol | Tolerance | SOT-363 |
|---------------------------|--------|-----------|---------|
| Carrier width             | A      | 0.1       | 2.36    |
| Carrier length            | B      | 0.1       | 2.40    |
| Carrier depth             | C      | 0.1       | 1.20    |
| Sprocket hole             | d      | 0.1       | 1.50    |
| 13" Reel outside diameter | D      | 2.0       | -       |
| 13" Reel inner diameter   | D1     | min       | -       |
| 7" Reel outside diameter  | D      | 2.0       | 178.00  |
| 7" Reel inner diameter    | D1     | min       | 62.00   |
| Feed hole diameter        | D2     | 0.5       | 13.00   |
| Sprocket hole position    | E      | 0.1       | 1.75    |
| Punch hole position       | F      | 0.1       | 3.50    |
| Punch hole pitch          | P      | 0.1       | 4.00    |
| Sprocket hole pitch       | P0     | 0.1       | 4.00    |
| Embossment center         | P1     | 0.1       | 2.00    |
| Overall tape thickness    | T      | 0.1       | 0.23    |
| Tape width                | W      | 0.3       | 8.00    |
| Reel width                | W1     | 1.0       | 11.40   |

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

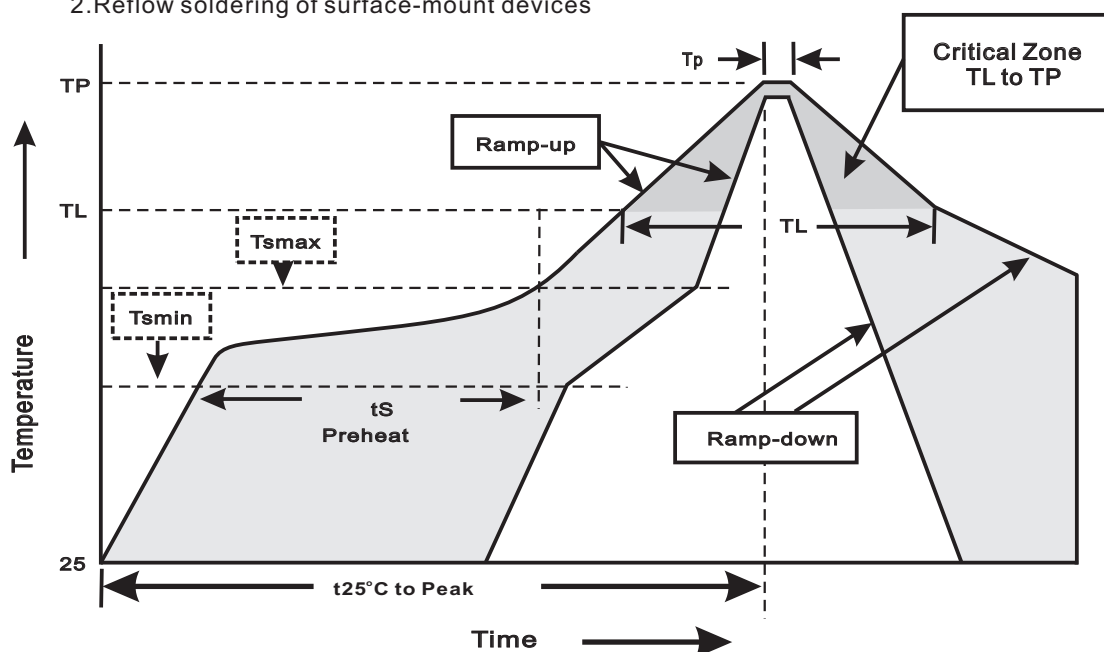
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## Reel packing

| PACKAGE | REEL SIZE | REEL (pcs) | COMPONENT SPACING (m/m) | BOX (pcs) | INNER BOX (m/m) | REEL DIA, (m/m) | CARTON SIZE (m/m) | CARTON (pcs) | APPROX. GROSS WEIGHT (kg) |
|---------|-----------|------------|-------------------------|-----------|-----------------|-----------------|-------------------|--------------|---------------------------|
| SOT-363 | 7"        | 3,000      | 4.0                     | 30,000    | 183*123*183     | 178             | 382*257*387       | 240,000      | 9.50                      |

## Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
- 2.Reflow soldering of surface-mount devices



### 3.Reflow soldering

| Profile Feature                                                                                                               | Soldering Condition         |
|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Average ramp-up rate(T <sub>L</sub> to T <sub>P</sub> )                                                                       | <3°C/sec                    |
| Preheat<br>-Temperature Min(T <sub>Smin</sub> )<br>-Temperature Max(T <sub>Smax</sub> )<br>-Time(min to max)(t <sub>S</sub> ) | 150°C<br>200°C<br>60~120sec |
| T <sub>Smax</sub> to T <sub>L</sub><br>-Ramp-upRate                                                                           | <3°C/sec                    |
| Time maintained above:<br>-Temperature(T <sub>L</sub> )<br>-Time(t <sub>L</sub> )                                             | 217°C<br>60~260sec          |
| Peak Temperature(T <sub>P</sub> )                                                                                             | 255°C-0/+5°C                |
| Time within 5°C of actual Peak Temperature(t <sub>P</sub> )                                                                   | 10~30sec                    |
| Ramp-down Rate                                                                                                                | <6°C/sec                    |
| Time 25°C to Peak Temperature                                                                                                 | <6minutes                   |

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## High reliability test capabilities

| Item Test                        | Conditions                                                                                                        | Reference                   |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------|-----------------------------|
| 1. Solder Resistance             | at $260 \pm 5^{\circ}\text{C}$ for $10 \pm 2\text{sec.}$                                                          | MIL-STD-750D<br>METHOD-2031 |
| 2. Solderability                 | at $245 \pm 5^{\circ}\text{C}$ for 5 sec.                                                                         | MIL-STD-202F<br>METHOD-208  |
| 3. High Temperature Reverse Bias | $V_{BR} = V_{BR\text{Min}} * 80\%$ at $T_J = 150^{\circ}\text{C}$ for 168 hrs.                                    | MIL-STD-750D<br>METHOD-1038 |
| 4. Pressure Cooker               | $15P_{SIG}$ at $T_A = 121^{\circ}\text{C}$ for 4 hrs.                                                             | JESD22-A102                 |
| 5. Temperature Cycling           | $-55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ dwelled for 30 min.<br>and transferred for 5min. total 10 cycles. | MIL-STD-750D<br>METHOD-1051 |
| 6. Humidity                      | at $T_A = 85^{\circ}\text{C}$ , RH=85% for 1000hrs.                                                               | MIL-STD-750D<br>METHOD-1021 |
| 7. High Temperature Storage Life | at $175^{\circ}\text{C}$ for 1000 hrs.                                                                            | MIL-STD-750D<br>METHOD-1031 |