

NP0080TA Series

Low Capacitance Protector

The NP series of low voltage/low capacitance overvoltage protection devices protect high speed xDSL line drivers and chipsets from both Lightning Surge and ESD events. The devices are designed with a low nominal capacitance as well as extremely low differential capacitance across frequency and voltage. The inherent low off-state leakage current provides superior performance in low voltage high speed applications. These characteristics allow protection of the system without distortion of the high speed data signal.

With its advanced silicon structure the NP product is able to clamp very fast ESD events, and crowbar high energy surge events to help protect sensitive IC's all in a small footprint. The convenient flow thru design minimizes trace routing while maximizing circuit performance.

The NP series of low voltage/low capacitance devices helps designers to comply with the various regulatory standards and recommendations including: GR-1089-CORE, IEC 61000-4-5, ITU K.20/K.21/K.45, IEC 60950,

TIA-968-A, FCC Part 68, EN 60950, UL 1950.

Features

- Low Nominal Capacitance
- Extremely Low Differential Capacitance
- Low Leakage (Transparent)
- High Surge Capability
- Precise Clamping Voltage
- Small Package Size
- Bi-directional Operation
- Flow Thru Layout
- IEC 61000-4-2 Level 4 ESD protection
- These are Pb-Free Devices

Typical Applications

- VDSL, ADSL, Access, Central Office, and Customer Premise modems and gateway IC side line driver chipset protection
- 10/100/1000 Ethernet Protection
- RS-232, RS-485 Transceiver Protection

ELECTRICAL CHARACTERISTICS

| Device | V_{RWM} | V_{BR} | $I_R@$ $V_R=V_{RWM}$ | $C@$ $V_R = 2 V$ | $\Delta^{\circ}C$ $0 V-V_{RWM}$ |
|-------------|-----------|----------|-------------------------|---------------------|------------------------------------|
| | (V) | (V) | (μA) | (pF) | (pF) |
| NP0080TAT1G | 8 | 9.5 | 0.5 | 13 | 4 |
| NP0120TAT1G | 12 | 12.5 | 0.5 | 11 | 3 |
| NP0160TAT1G | 16 | 18 | 0.5 | 11 | 3 |

SURGE/ESD RATINGS

| Waveform | 8x20 μA | ESD Air | ESD Contact |
|----------|--------------|---------|-------------|
| Value | 50 A | 15 kV | 8 kV |



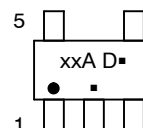
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<http://onsemi.com>



TSOP-5
SN SUFFIX
CASE 483

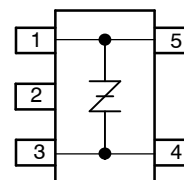
MARKING DIAGRAM



xxA = Specific Device Code
(NP0xx0TAT1G)
D = Date Code
▪ = Pb-Free Package

(Note: Microdot may be in either location)

PIN CONNECTIONS



(Top View)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

NP0080TA Series

ELECTRICAL CHARACTERISTICS TABLE ($T_A = 25^\circ\text{C}$ unless otherwise noted)

| Symbol | Rating | Min | Typ | Max | Unit |
|--------------|---|-------------|------|----------|------------------|
| V_{RWM} | Repetitive peak off-state voltage: Rated maximum (peak) continuous voltage that may be applied in the off-state condition | NP0080TAT1G | | ± 8 | V |
| | | NP0120TAT1G | | ± 12 | |
| | | NP0160TAT1G | | ± 16 | |
| V_{BR1} | Breakdown Voltage: The minimum voltage across the device in or at the breakdown region. Measured at $I_{BR} = 1 \text{ mA}$ | NP0080TAT1G | 9.5 | | V |
| | | NP0120TAT1G | 12.5 | | |
| | | NP0160TAT1G | 18 | | |
| $V_{(BO)}$ | Breakover Voltage: The maximum voltage across the device in or at the breakover region. Measured at $I_{(BO)} = 800 \text{ mA}$ | NP0080TAT1G | | 20 | V |
| | | NP0120TAT1G | | 30 | |
| | | NP0160TAT1G | | 40 | |
| I_R | Off-state Current: The dc value of current that results from the application of the off-state voltage | | | 0.5 | μA |
| I_H | Holding Current: The minimum current required to maintain the device in the on-state. | | 50 | | mA |
| C_o | Off-State Capacitance: $f = 1.0 \text{ MHz}$, $V_d = 1.0 \text{ Vrms}$, $V_D = -2 \text{ Vdc}$ | NP0080TAT1G | | 13 | pF |
| | | NP0120TAT1G | | 11 | |
| | | NP0160TAT1G | | 11 | |
| ΔC_1 | Δ Capacitance: $f = 1.0 \text{ MHz}$, $V_d = 1.0 \text{ Vrms}$, $V_D = 0 \text{ V} - V_{rwm} $ | NP0080TAT1G | | 4 | pF |
| | | NP0120TAT1G | | 3 | |
| | | NP0160TAT1G | | 3 | |
| IPPS | Peak Pulse Current: Rated maximum value of peak impulse pulse current that may be applied. $8 \times 20 \mu\text{s}$, IEC-61000-4-5 | | 50 | | A |
| ESD | Electrostatic Discharge: Rated maximum value of ESD per IEC-61000-4-2 | Contact | | 8 | kV |
| | | Air | | 15 | |
| T_{STG} | Storage Temperature Range | | -55 | +150 | $^\circ\text{C}$ |
| T_J | Operating Junction Temperature Range | | -40 | +125 | $^\circ\text{C}$ |

NP0080TA Series

| Symbol | Parameter |
|------------|-----------------------------------|
| V_{RWM} | Repetitive peak off-state voltage |
| V_{BR} | Breakdown voltage |
| $V_{(BO)}$ | Breakover voltage |
| I_R | Off-state current |
| I_H | Holding current |

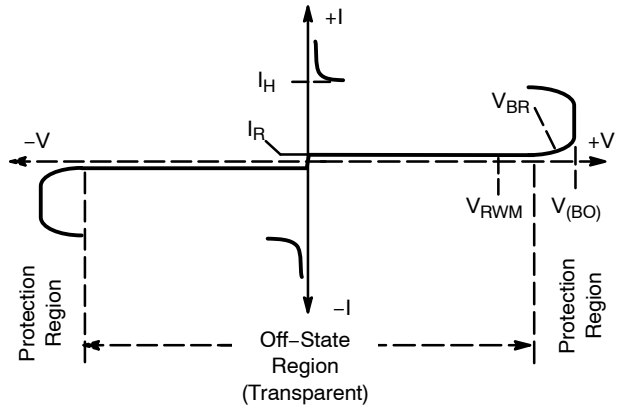


Figure 1.

Application Information

The NPXXXXTAT can be used after the isolation transformer as protection for the xDSL line driver. The devices can be configured to protect against both differential and common mode surges and ESD.

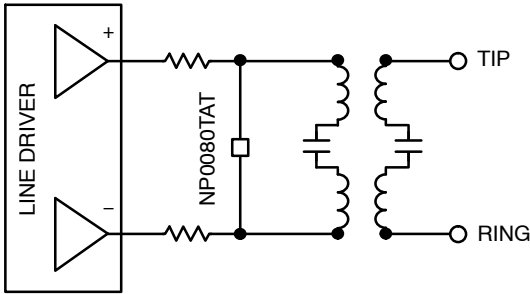


Figure 2.

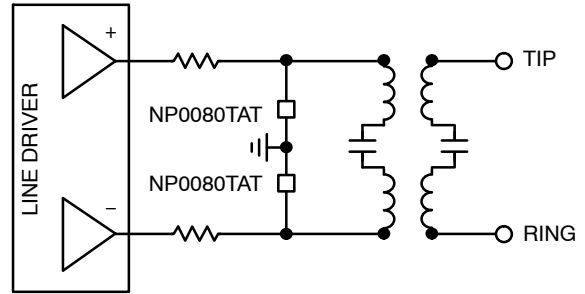


Figure 3.

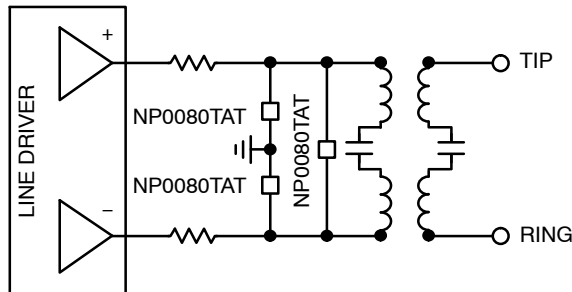
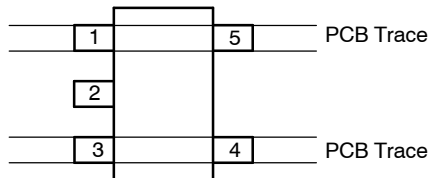


Figure 4.



1. Connect pin 1 to pin 5 on PCB
2. Connect pin 3 to pin 4 on PCB
3. Pin 2 is no connection

Figure 5. PCB Layout

NP0080TA Series

DEVICE ORDERING INFORMATION

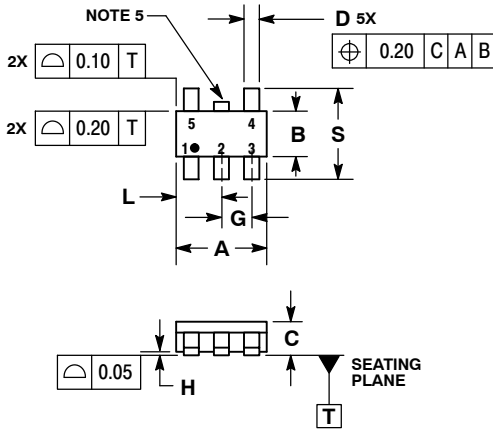
| Device | Package | Shipping† |
|-------------|---------------------|--------------------|
| NP0080TAT1G | TSOP-5 (Pb-Free) | 3000 / Tape & Reel |
| NP0120TAT1G | TSOP-5 (Pb-Free) | 3000 / Tape & Reel |
| NP0160TAT1G | TSOP-5 (Pb-Free) | 3000 / Tape & Reel |

†For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

NP0080TA Series

PACKAGE DIMENSIONS

TSOP-5 CASE 483-02 ISSUE H

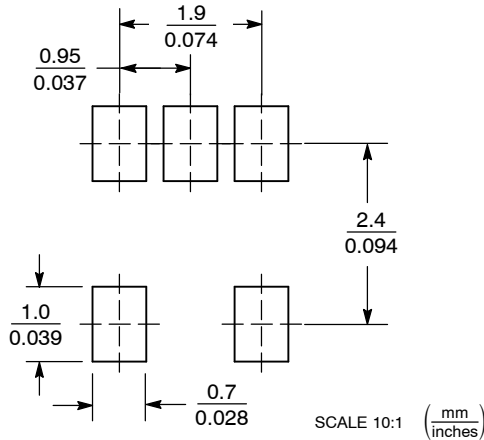


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
5. OPTIONAL CONSTRUCTION: AN ADDITIONAL TRIMMED LEAD IS ALLOWED IN THIS LOCATION. TRIMMED LEAD NOT TO EXTEND MORE THAN 0.2 FROM BODY.

| DIM | MILLIMETERS | |
|-----|-------------|------|
| | MIN | MAX |
| A | 3.00 BSC | |
| B | 1.50 BSC | |
| C | 0.90 | 1.10 |
| D | 0.25 | 0.50 |
| G | 0.95 BSC | |
| H | 0.01 | 0.10 |
| J | 0.10 | 0.26 |
| K | 0.20 | 0.60 |
| L | 1.25 | 1.55 |
| M | 0° | 10° |
| S | 2.50 | 3.00 |

SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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