# NZF220TT1

# EMI Filter with ESD Protection

**Features:**

- EMI/RFI Bi−directional “Pi” Low−Pass Filters
- ESD Protection Meets IEC61000−4−2
- Diode Capacitance: 7 – 10 pF
- Zener/Resistor Line Capacitance: 22 ± 20% pF
- Low Zener Diode Leakage: 1 μA Maximum
- Zener Breakdown Voltage; 6 – 8 Volts
- Pb−Free Package is Available

**Benefits:**

- Designed to Suppress EMI/RFI Noise in Systems Subjected to Electromagnetic Interference
- Small Package Size Minimizes Parasitic Inductance, Thus a More “Ideal” Low Pass Filtering Response

**Applications:**

- Cellular Phones
- Communication Systems
- Computers
- Portable Products with Input/Output Conductors

**MAXIMUM RATINGS**

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Peak Power Dissipation (Note 1) 8 × 20 μs Pulse | $P_{PK}$ | 14 | W |
| Maximum Junction Temperature | $T_J$ | 150 | °C |

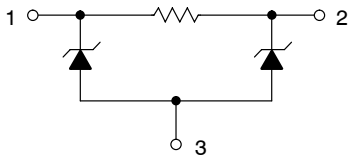
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

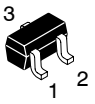
1. All diodes under power

**ON Semiconductor®**

**http://onsemi.com**

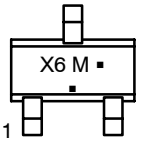
**CIRCUIT DESCRIPTION**




**SC−75**
**CASE 463**
**STYLE 4**

**MARKING DIAGRAM**




X6 = Device Code
M = Date Code*
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

**ORDERING INFORMATION**

| Device | Package | Shipping† |
|---|---|---|
| NZF220TT1 | SC−75 | 3000/Tape & Reel |
| NZF220TT1G | SC−75 (Pb−Free) | 3000/Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

© Semiconductor Components Industries, LLC, 2006

**ELECTRICAL CHARACTERISTICS**

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Zener Breakdown Voltage, @ $I_{ZT}$ = 1 mA | $V_Z$ | 6.0 | – | 8.0 | V |
| Zener Leakage Current, @ $V_R$ = 3 V | $I_r$ | N/A | – | 1.0 | μA |
| Zener Forward Voltage, @ $I_F$ = 50 mA | $V_F$ | N/A | – | 1.25 | V |
| Zener Internal Capacitance, @ 0 V Bias | C | 7.0 | – | 10 | pF |
| Zener/Resistor Array Line Capacitance | C | 17.6 | – | 26.4 | pF |
| Resistance | R | 90 | – | 110 | Ω |
| Cutoff Frequency | $F_C$ (Note 2) | – | 220 | – | MHz |

2. 50 Ω Source and 50 Ω Lead Termination per Figure 2

## Applications Information

### Suppressing Noise at the Source

- Filter all I/O signals leaving the noisy environment
- Locate I/O driver circuits close to the connector
- Use the longest rise/fall times possible for all digital signals

### Reducing Noise at the Receiver

- Filter all I/O signals entering the unit
- Locate the I/O filters as close as possible to the connector

### Minimizing Noise Coupling

- Use multilayer PCBs to minimize power and ground inductance
- Keep clock circuits away from the I/O connector
- Ground planes should be used whenever possible
- Minimize the loop area for all high speed signals
- Provide for adequate power decoupling

### ESD Protection

- Locate the suppression devices as close to the I/O connector as possible
- Minimize the PCB trace length to the suppression device
- Minimize the PCB trace length for the ground return for the suppression device

## Frequency Response Specification

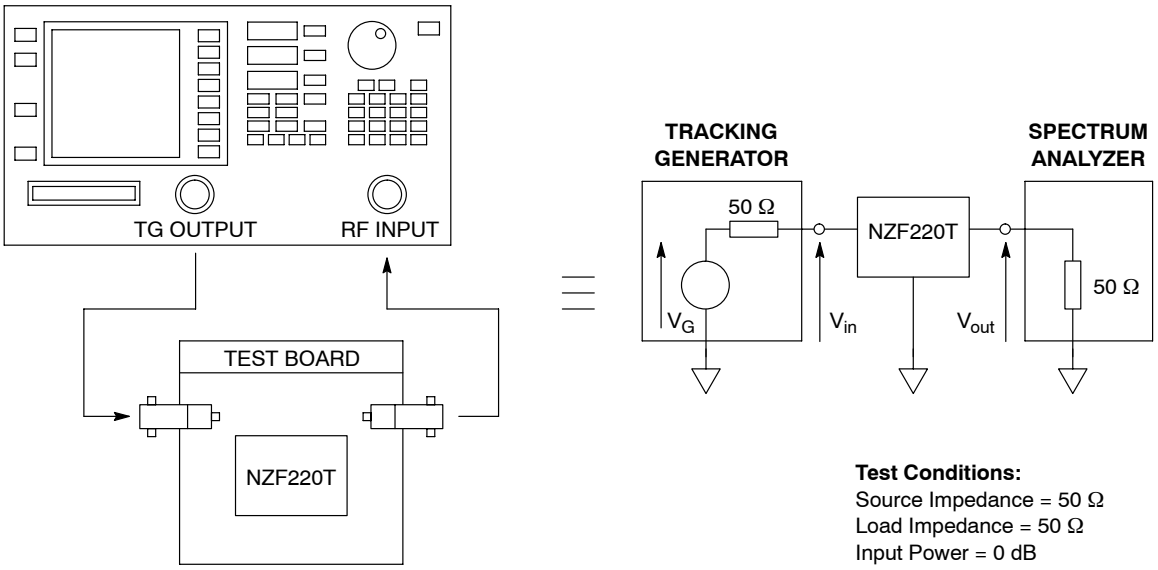



**Figure 1. Measurement Conditions**

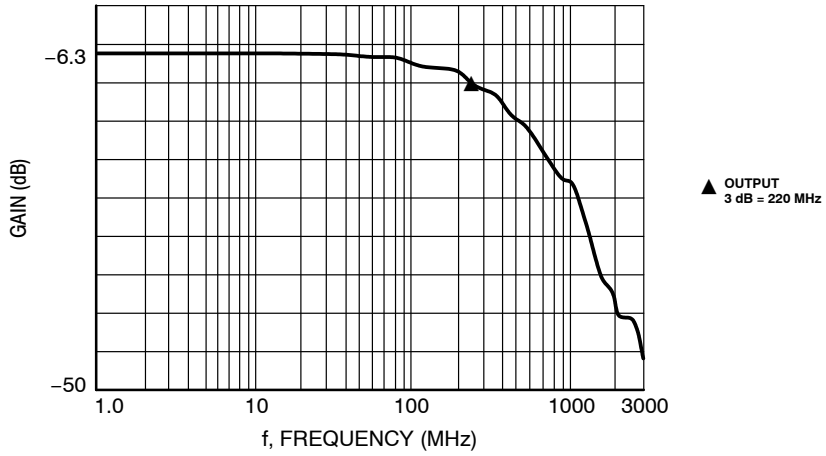
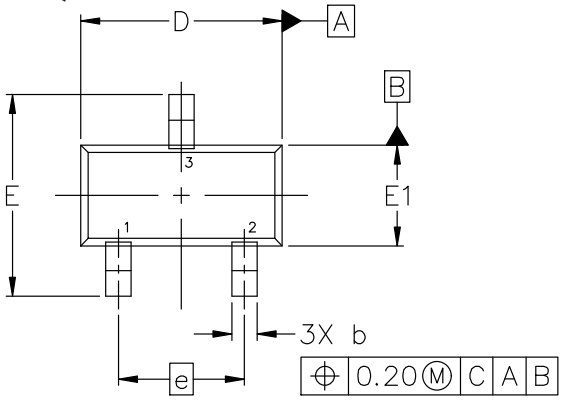



**Figure 2. Typical EMI Filter Response (50 Ω Source and 50 Ω Lead Termination)**

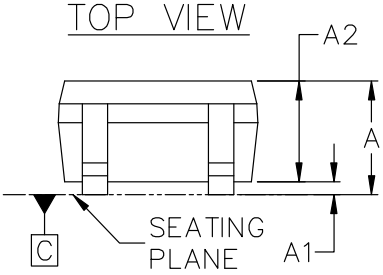
**SC75−3 1.60x0.80x0.80, 1.00P**
CASE 463
ISSUE H

DATE 01 FEB 2024

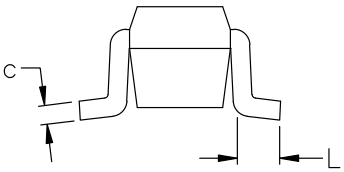





TOP VIEW




SIDE VIEW



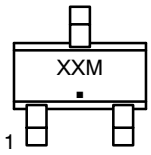

END VIEW

NOTES:

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5−2018.
2. ALL DIMENSION ARE IN MILLIMETERS.

| DIM | MILLIMETERS | | |
|---|---|---|---|
| | MIN. | NOM. | MAX. |
| A | 0.70 | 0.80 | 0.90 |
| A1 | 0.00 | 0.05 | 0.10 |
| A2 | | 0.80 REF. | |
| b | 0.15 | 0.20 | 0.30 |
| c | 0.10 | 0.15 | 0.25 |
| D | 1.55 | 1.60 | 1.65 |
| E | 1.50 | 1.60 | 1.70 |
| E1 | 0.70 | 0.80 | 0.90 |
| e | | 1.00 BSC | |
| L | 0.10 | 0.15 | 0.20 |

**GENERIC**
**MARKING DIAGRAM***




XX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

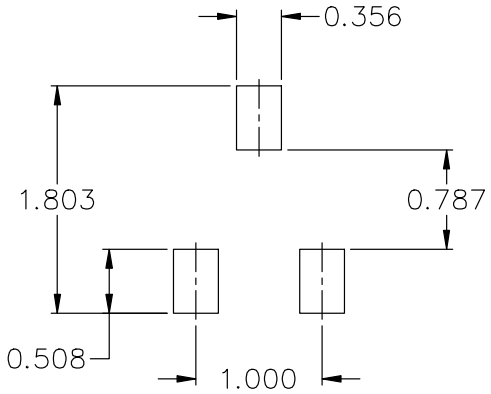
STYLE 1:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

STYLE 2:
PIN 1. ANODE
2. N/C
3. CATHODE

STYLE 3:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 4:
PIN 1. CATHODE
2. CATHODE
3. ANODE

STYLE 5:
PIN 1. GATE
2. SOURCE
3. DRAIN




RECOMMENDED MOUNTING 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.

| | | | |
|---|---|---|---|
| **DOCUMENT NUMBER:** | **98ASB15184C** | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red. | |
| **DESCRIPTION:** | **SC75−3 1.60x0.80x0.80, 1.00P** | | **PAGE 1 OF 1** |

**onsemi** and onsemi are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. **onsemi** does not convey any license under its patent rights nor the rights of others.

**onsemi**, , and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent−Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as−is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## ADDITIONAL INFORMATION

**TECHNICAL PUBLICATIONS**:
**Technical Library:** www.onsemi.com/design/resources/technical−documentation
**onsemi Website:** www.onsemi.com

**ONLINE SUPPORT**: www.onsemi.com/support
**For additional information, please contact your local Sales Representative at** www.onsemi.com/support/sales