

# NZF220DFT1

## EMI Filter with ESD Protection

### Features:

- 2 EMI/RFI Bi-directional “Pi” Low-Pass Filters
- ESD Protection Meets IEC61000-4-2
- Diode Capacitance: 7 – 10 pF
- Zener/Resistor Line Capacitance:  $22 \pm 20\%$  pF
- Low Zener Diode Leakage: 1  $\mu$ A Maximum
- Zener Breakdown Voltage; 6 – 8 Volts

### Benefits:

- Designed to suppress EMI/RFI Noise in Systems Subjected to Electromagnetic Interference
- Nominal Cutoff Frequency of 220 MHz (per Figure 2)
- Small Package Size Minimizes Parasitic Inductance, Thus a More “Ideal” Low Pass Filtering Response

### Typical 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 $\mu$ s Pulse	P <sub>PK</sub>	14	Watts
Maximum Junction Temperature	T <sub>J</sub>	150	°C

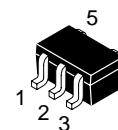
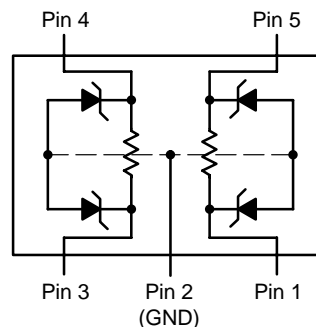
1. Between I/O Pins



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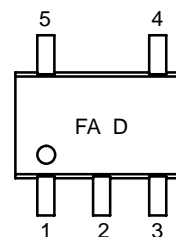
<http://onsemi.com>

### CIRCUIT DESCRIPTION



**SC-88A  
CASE 419A  
DF SUFFIX**

### MARKING DIAGRAM



FA = Specific Device Code  
D = Date Code

### ORDERING INFORMATION

Device	Package	Shipping
NZF220DFT1	SC-88A	3000/Tape & Reel

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## ELECTRICAL CHARACTERISTICS

Symbol	Characteristic	Min	Typ	Max	Unit
$V_Z$	Zener Breakdown Voltage, @ $I_{ZT} = 1 \text{ mA}$	6.0	–	8.0	V
$I_F$	Zener Leakage Current, @ $V_R = 3 \text{ V}$	N/A	–	1.0	$\mu\text{A}$
$V_F$	Zener Forward Voltage, @ $I_F = 50 \text{ mA}$	N/A	–	1.5	V
Capacitance	Zener Internal Capacitance, @ 0 V Bias	7.0	–	10	pF
Capacitance	Zener/Resistor Array Line Capacitance	17.6	–	26.4	pF
Resistor	Resistance	90	–	110	$\Omega$
$F_C$ (Note 2)	Cutoff Frequency	–	220	–	MHz

2. 50  $\Omega$  Source and 50  $\Omega$  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

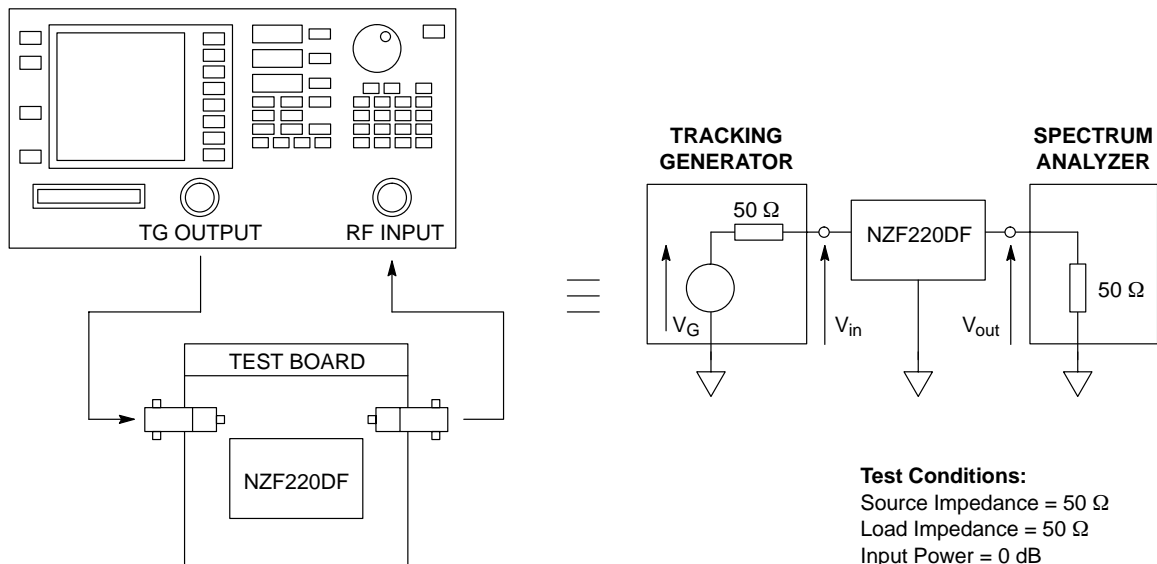
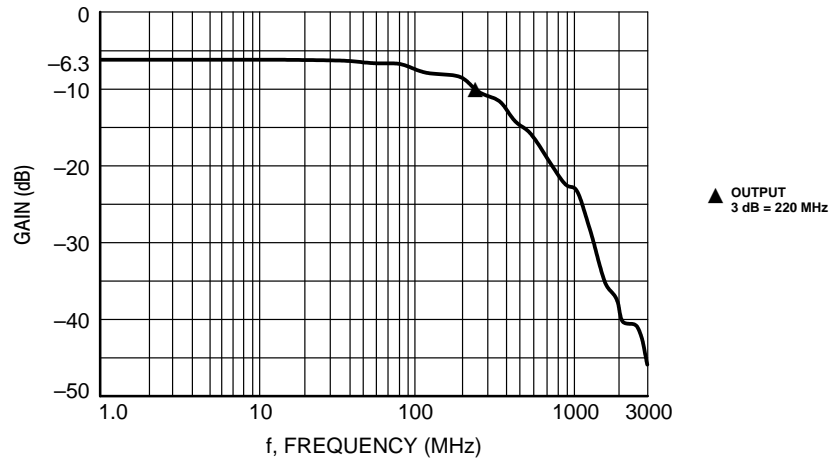


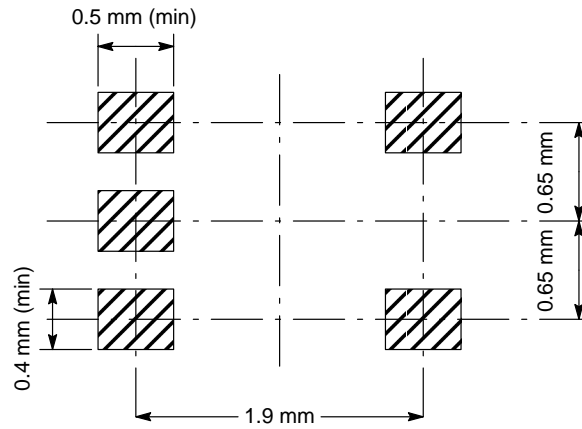
Figure 1. Measurement Conditions

# NZF220DFT1



**Figure 2. Typical EMI Filter Response  
(50  $\Omega$  Source and 50  $\Omega$  Lead Termination)**

## Footprint

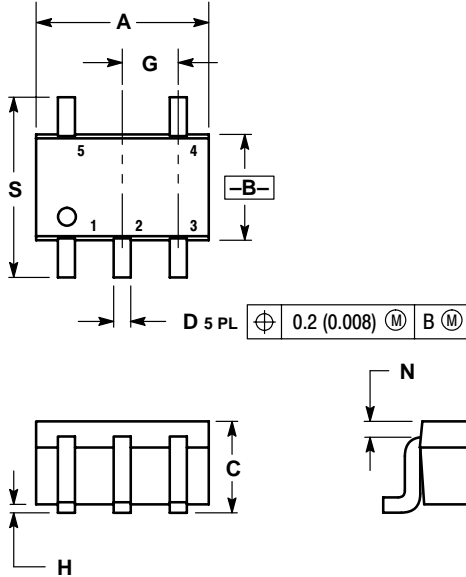


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## OUTLINE DIMENSIONS

# EMI Filter with ESD Protection


SC-88A/SOT-323  
CASE 419A-02  
ISSUE F



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. 419A-01 OBSOLETE. NEW STANDARD 419A-02.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	---	0.004	---	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20

- |                                                                                  |                                                                                 |                                                                                    |                                                                                      |                                                                                               |                                                                                     |                                                                                  |
|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| STYLE 1:<br>PIN 1. BASE<br>2. EMITTER<br>3. BASE<br>4. COLLECTOR<br>5. COLLECTOR | STYLE 2:<br>PIN 1. ANODE<br>2. EMITTER<br>3. BASE<br>4. COLLECTOR<br>5. CATHODE | STYLE 3:<br>PIN 1. ANODE 1<br>2. N/C<br>3. ANODE 2<br>4. CATHODE 2<br>5. CATHODE 1 | STYLE 4:<br>PIN 1. SOURCE 1<br>2. DRAIN 1/2<br>3. SOURCE 1<br>4. GATE 1<br>5. GATE 2 | STYLE 5:<br>PIN 1. CATHODE<br>2. COMMON ANODE<br>3. CATHODE 2<br>4. CATHODE 3<br>5. CATHODE 4 | STYLE 6:<br>PIN 1. EMITTER<br>2. BASE<br>3. EMITTER<br>4. COLLECTOR<br>5. COLLECTOR | STYLE 7:<br>PIN 1. BASE<br>2. EMITTER<br>3. BASE<br>4. COLLECTOR<br>5. COLLECTOR |
|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|

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