

# NDF10N62Z, NDP10N62Z

## N-Channel Power MOSFET 620 V, 0.65 $\Omega$

### Features

- Low ON Resistance
- Low Gate Charge
- Zener Diode-protected Gate
- 100% Avalanche Tested
- These Devices are Pb-Free and RoHS Compliant

### ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	NDF10N62Z	NDP10N62Z	Unit
Drain-to-Source Voltage	$V_{DSS}$	620 (Note 1)		V
Continuous Drain Current, $R_{\theta JC}$	$I_D$	10 (Note 2)		A
Continuous Drain Current $R_{\theta JC}, T_A = 100^\circ\text{C}$	$I_D$	5.7 (Note 2)		A
Pulsed Drain Current, $V_{GS} @ 10\text{ V}$	$I_{DM}$	36 (Note 2)		A
Power Dissipation, $R_{\theta JC}$ (Note 1)	$P_D$	36	125	W
Gate-to-Source Voltage	$V_{GS}$	$\pm 30$		V
Single Pulse Avalanche Energy, $I_D = 10\text{ A}$	$E_{AS}$	300		mJ
ESD (HBM) (JESD22-A114)	$V_{esd}$	3900		V
RMS Isolation Voltage ( $t = 0.3\text{ sec.}, R.H. \leq 30\%,$ $T_A = 25^\circ\text{C}$ ) (Figure 14)	$V_{ISO}$	4500		V
Peak Diode Recovery	$dv/dt$	4.5 (Note 3)		V/ns
Continuous Source Current (Body Diode)	$I_S$	10		A
Maximum Temperature for Soldering Leads	$T_L$	260		$^\circ\text{C}$
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 150		$^\circ\text{C}$

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.

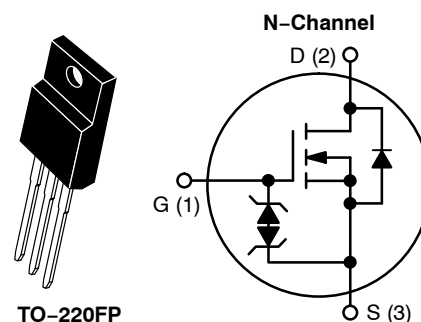
1. Surface mounted on FR4 board using 1" sq. pad size,  
(Cu area = 1.127 in sq [2 oz] including traces)
2. Limited by maximum junction temperature
3.  $I_S \leq 10\text{ A}$ ,  $di/dt \leq 200\text{ A}/\mu\text{s}$ ,  $V_{DD} = 80\% BV_{DSS}$



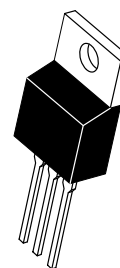
**ON Semiconductor®**

<http://onsemi.com>

$V_{DSS}$	$R_{DS(ON)}$ (TYP) @ 5 A
620 V	0.65 $\Omega$

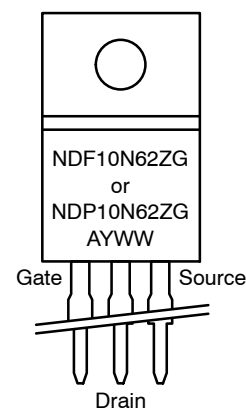


TO-220FP  
CASE 221D  
STYLE 1



TO-220AB  
CASE 221A  
STYLE 5

### MARKING DIAGRAM



- A = Location Code
- Y = Year
- WW = Work Week
- G = Pb-Free Package

### ORDERING INFORMATION

Device	Package	Shipping
NDF10N62ZG	TO-220FP	50 Units/Rail
NDP10N62ZG	TO-220AB	In Development

# NDF10N62Z, NDP10N62Z

## THERMAL RESISTANCE

Parameter	Symbol	NDF10N62Z	NDP10N62Z	Unit
Junction-to-Case (Drain)	$R_{\theta JC}$	3.4	1.0	°C/W
Junction-to-Ambient Steady State (Note 4)	$R_{\theta JA}$	50	50	

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

Characteristic	Test Conditions	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	$BV_{DSS}$	620			V
Breakdown Voltage Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D = 1\text{ mA}$	$\Delta BV_{DSS}/\Delta T_J$		0.6		V/°C
Drain-to-Source Leakage Current	$V_{DS} = 620\text{ V}, V_{GS} = 0\text{ V}$	$I_{DSS}$	25°C		1	μA
			125°C		50	
Gate-to-Source Forward Leakage	$V_{GS} = \pm 20\text{ V}$	$I_{GSS}$			±10	μA

### ON CHARACTERISTICS (Note 5)

Static Drain-to-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 5.0\text{ A}$	$R_{DS(on)}$		0.65	0.75	Ω
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 100\text{ }\mu\text{A}$	$V_{GS(th)}$	3.0		4.5	V
Forward Transconductance	$V_{DS} = 15\text{ V}, I_D = 10\text{ A}$	$g_{FS}$		7.9		S

### DYNAMIC CHARACTERISTICS

Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	$C_{iss}$		1425		pF
Output Capacitance		$C_{oss}$		150		
Reverse Transfer Capacitance		$C_{rss}$		35		
Total Gate Charge	$V_{DD} = 310\text{ V}, I_D = 10\text{ A},$ $V_{GS} = 10\text{ V}$	$Q_g$		47		nC
Gate-to-Source Charge		$Q_{gs}$		9.3		
Gate-to-Drain ("Miller") Charge		$Q_{gd}$		25		
Plateau Voltage		$V_{gp}$		6.4		V
Gate Resistance		$R_g$		1.5		Ω

### RESISTIVE SWITCHING CHARACTERISTICS

Turn-On Delay Time	$V_{DD} = 310\text{ V}, I_D = 10\text{ A},$ $V_{GS} = 10\text{ V}, R_G = 5\text{ }\Omega$	$t_{d(on)}$		15		ns
Rise Time		$t_r$		31		
Turn-Off Delay Time		$t_{d(off)}$		40		
Fall Time		$t_f$		21		

### SOURCE-DRAIN DIODE CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

Diode Forward Voltage	$I_S = 10\text{ A}, V_{GS} = 0\text{ V}$	$V_{SD}$			1.6	V
Reverse Recovery Time	$V_{GS} = 0\text{ V}, V_{DD} = 30\text{ V}$ $I_S = 10\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$	$t_{rr}$		395		ns
Reverse Recovery Charge		$Q_{rr}$		3.0		μC

4. Insertion mounted

5. Pulse Width  $\leq 380\text{ }\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

TYPICAL CHARACTERISTICS

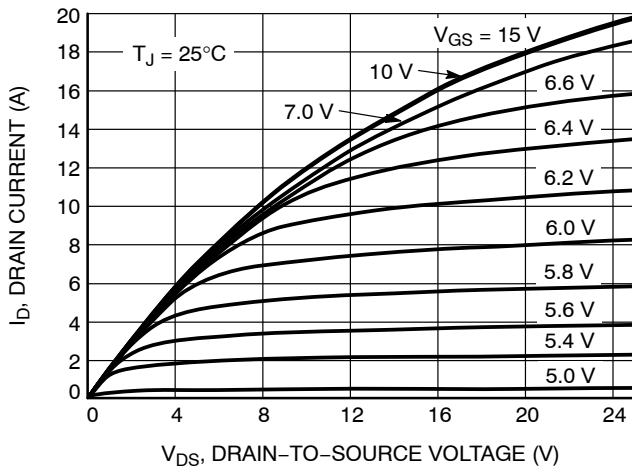


Figure 1. On-Region Characteristics

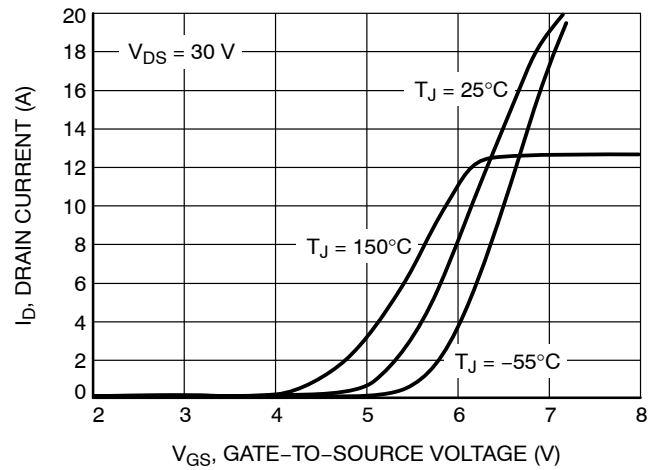


Figure 2. Transfer Characteristics

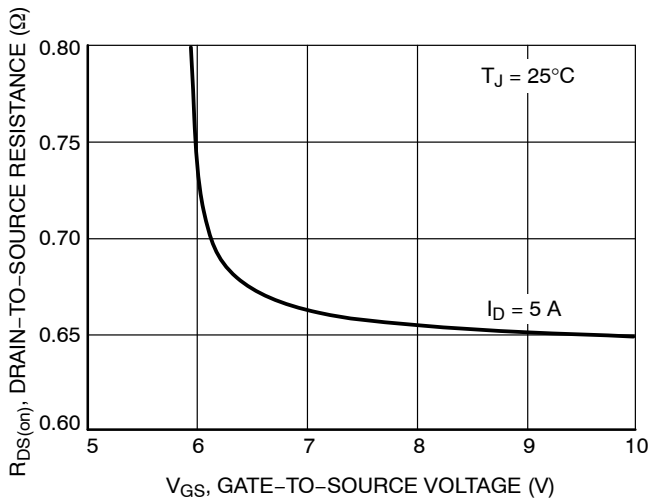


Figure 3. On-Resistance vs. Gate Voltage

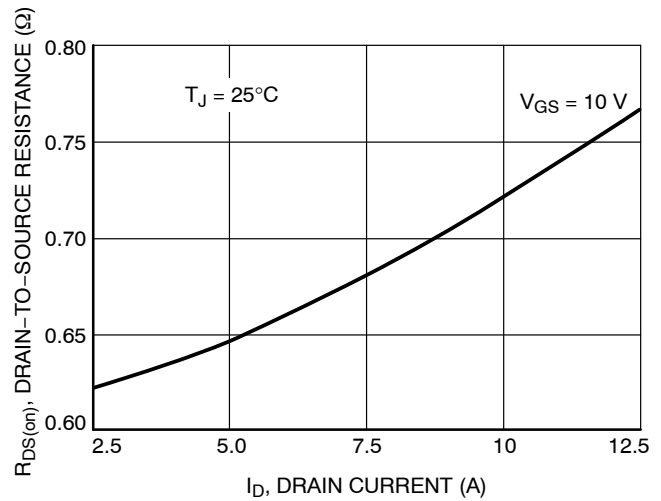


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

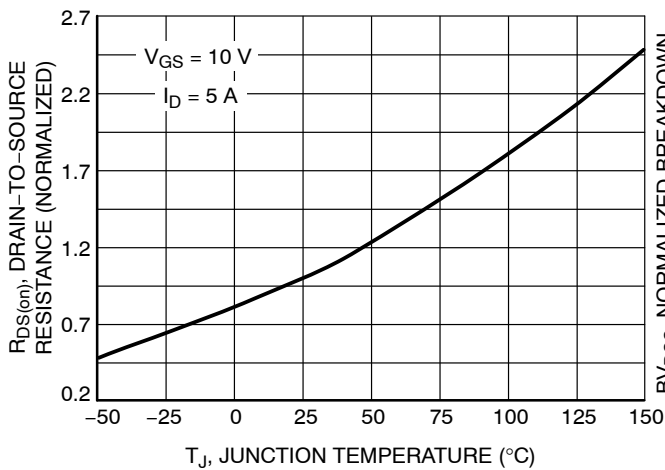


Figure 5. On-Resistance Variation with Temperature

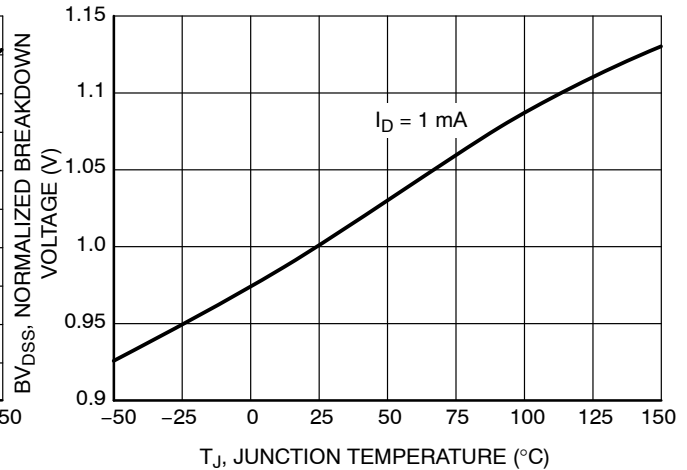


Figure 6. BVDS Variation with Temperature

TYPICAL CHARACTERISTICS

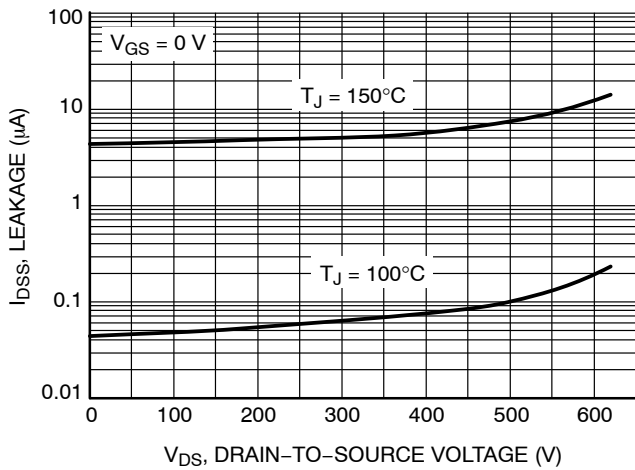


Figure 7. Drain-to-Source Leakage Current vs. Voltage

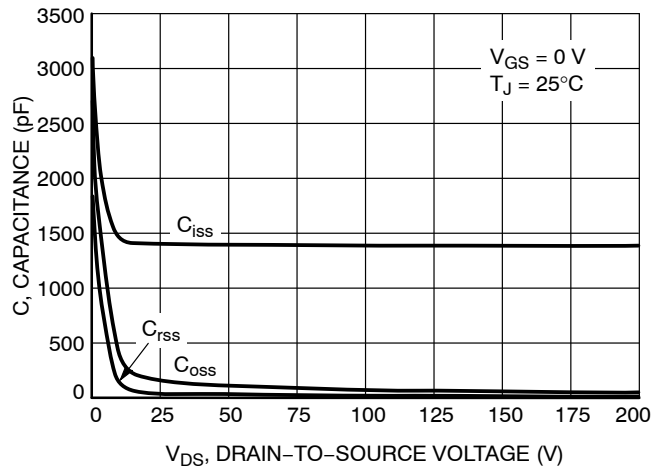


Figure 8. Capacitance Variation

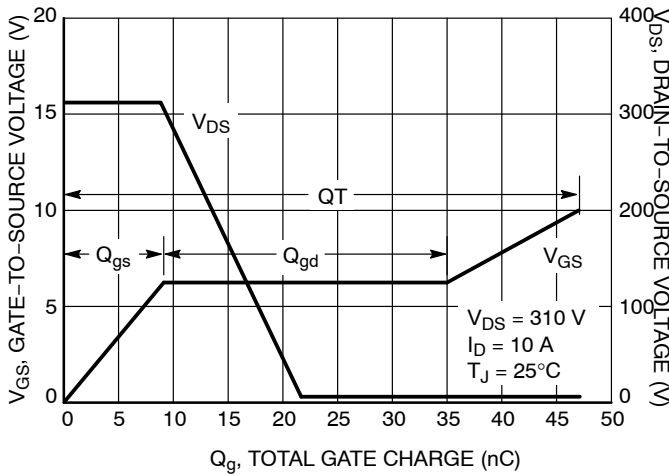


Figure 9. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

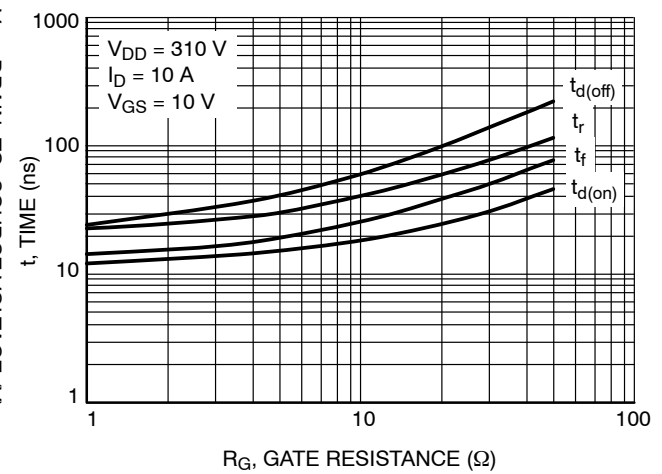


Figure 10. Resistive Switching Time Variation vs. Gate Resistance

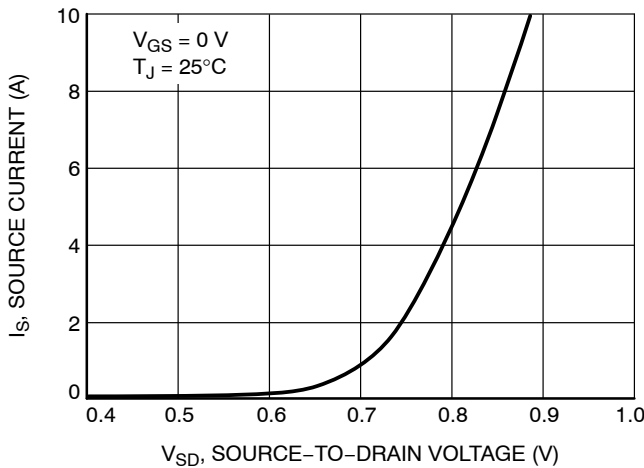


Figure 11. Diode Source Current vs. Forward Voltage

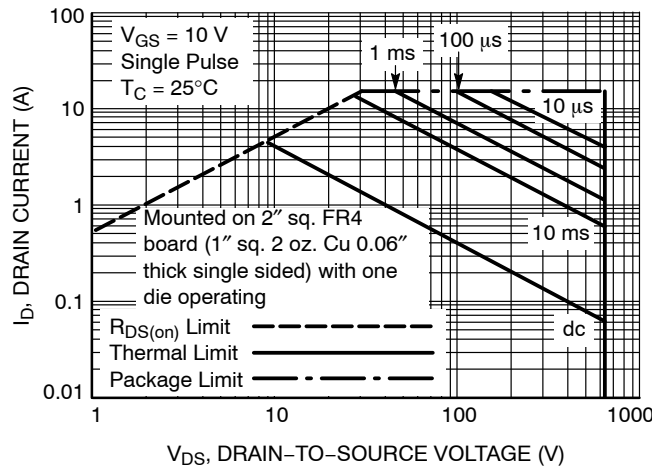


Figure 12. Maximum Rated Forward Biased Safe Operating Area for NDF10N62Z

TYPICAL CHARACTERISTICS

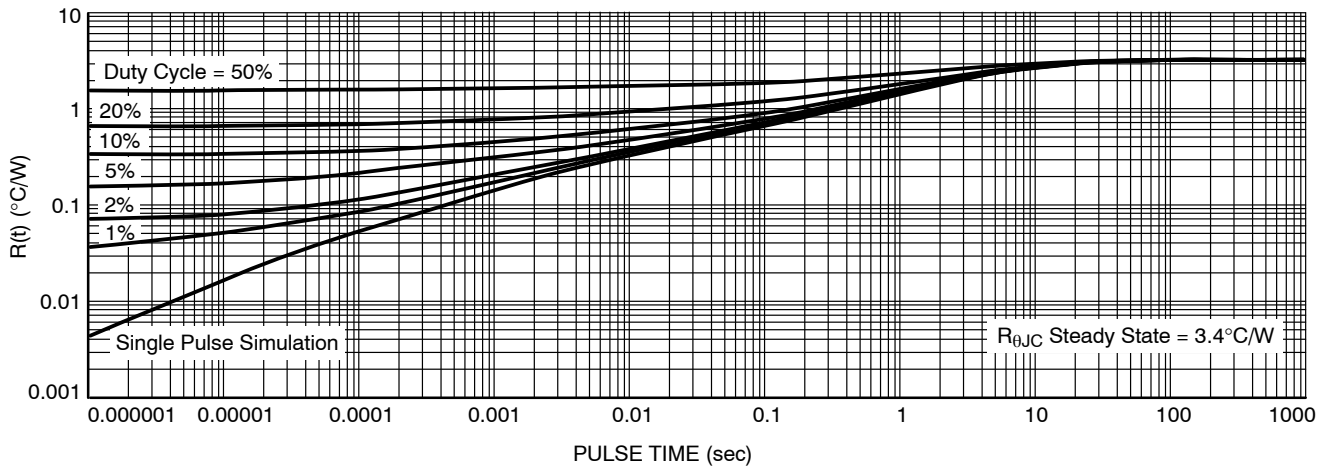


Figure 13. Thermal Impedance for NDF10N62Z

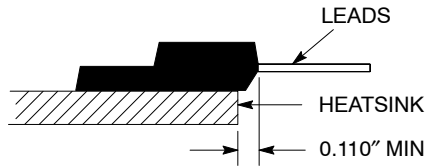


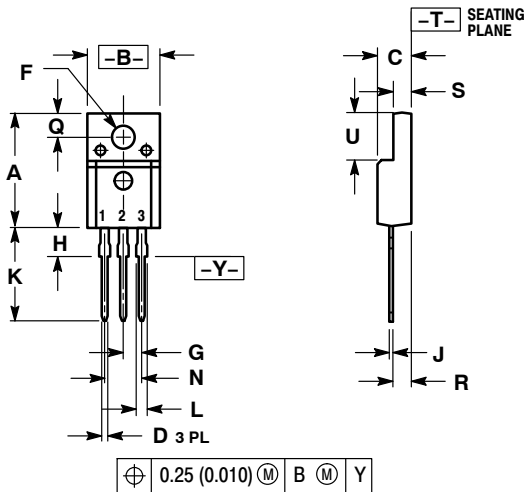
Figure 14. Isolation Test Diagram

Measurement made between leads and heatsink with all leads shorted together.

\*For additional mounting information, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

## PACKAGE DIMENSIONS

### TO-220FP CASE 221D-03 ISSUE K

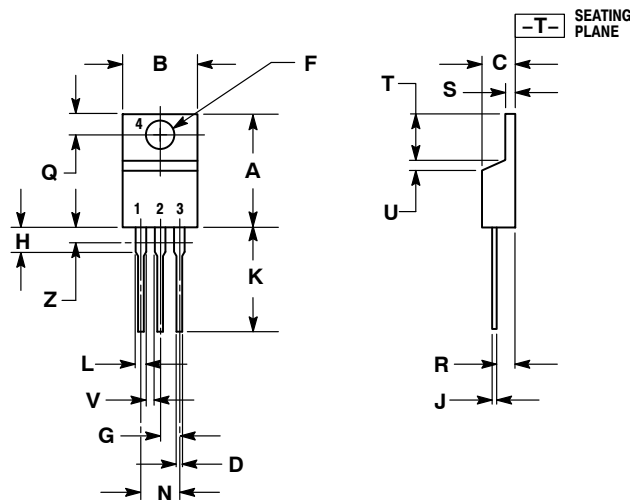


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH
  3. 221D-01 THRU 221D-02 OBSOLETE, NEW STANDARD 221D-03.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.617	0.635	15.67	16.12
B	0.392	0.419	9.96	10.63
C	0.177	0.193	4.50	4.90
D	0.024	0.039	0.60	1.00
F	0.116	0.129	2.95	3.28
G	0.100 BSC		2.54 BSC	
H	0.118	0.135	3.00	3.43
J	0.018	0.025	0.45	0.63
K	0.503	0.541	12.78	13.73
L	0.048	0.058	1.23	1.47
N	0.200 BSC		5.08 BSC	
Q	0.122	0.138	3.10	3.50
R	0.099	0.117	2.51	2.96
S	0.092	0.113	2.34	2.87
U	0.239	0.271	6.06	6.88

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

### TO-220AB CASE 221A-09 ISSUE AE



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.035	0.64	0.88
F	0.142	0.161	3.61	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.014	0.025	0.36	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	---	1.15	---
Z	---	0.080	---	2.04

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

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