NDF60N550U1, NDD60N550U1

Product Preview

N-Channel Power MOSFET 600 V, 550 mΩ

ON Semiconductor®

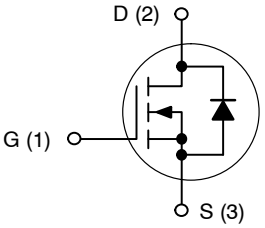
http://onsemi.com

$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX
600 V	550 mΩ @ 10 V

Features

- 100% Avalanche Tested
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

N−Channel MOSFET

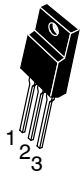


ABSOLUTE MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

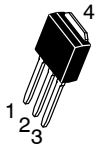
Parameter			Symbol	NDF	NDD	Unit
Drain−to−Source Voltage			V_{DSS}	600		V
Gate−to−Source Voltage			V_{GS}	±25		V
Continuous Drain Current $R_{\theta JC}$ (Note 1)	Steady State	T_C = 25°C	I_D	9.5	8.5	A
		T_C = 100°C		6	5.4	
Power Dissipation − $R_{\theta JC}$	Steady State	T_C = 25°C	P_D	28	96	W
Pulsed Drain Current	t_p = 10 μs		I_{DM}	38	34	A
Operating Junction and Storage Temperature			T_J, T_{STG}	−55 to +150		°C
Source Current (Body Diode)			I_S	9.5	8.5	A
Single Pulse Drain−to−Source Avalanche Energy			EAS	TBD		mJ
Lead Temperature for Soldering Leads			T_L	260		°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.

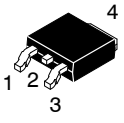
1. Limited by maximum junction temperature



TO−220FP
CASE 221AH



IPAK
CASE 369D



DPAK
CASE 369AA

MARKING AND ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 3 of this data sheet.

THERMAL RESISTANCE

Parameter		Symbol	Value	Unit
Junction−to−Case (Drain)	NDF60N550U1	$R_{\theta JC}$	4.4	°C/W
	NDD60N550U1		1.3	
Junction−to−Ambient Steady State		$R_{\theta JA}$		°C/W
	NDF60N550U1		50	
	NDD60N550U1		33	
	NDD60N550U1−1		96	

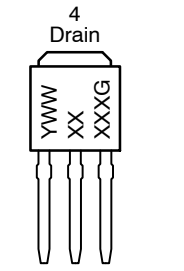
This document contains information on a product under development. ON Semiconductor reserves the right to change or discontinue this product without notice.

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

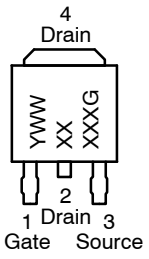
Characteristic	Symbol	Test Conditions		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 1 mA		600			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$				TBD		mV/°C
Drain−to−Source Leakage Current	I_{DSS}	V_{DS} = 600 V, V_{GS} = 0 V	T_J = 25°C			1	μA
			T_J = 125°C			50	
Gate−to−Source Leakage Current	I_{GSS}	V_{GS} = ±20 V				±100	nA
ON CHARACTERISTICS (Note 2)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS} = V_{GS}, I_D = 50 μA		2	TBD	4	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$	Reference to 25°C, I_D = 50 μA			TBD		mV/°C
Static Drain-to-Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 4.8 A			530	550	mΩ
Forward Transconductance	g_{FS}	V_{DS} = 15 V, I_D = 4.8 A			TBD		S
DYNAMIC CHARACTERISTICS							
Input Capacitance	C_{iss}	V_{DS} = 50 V, V_{GS} = 0 V, f = 1 MHz			540		pF
Output Capacitance	C_{oss}				45		
Reverse Transfer Capacitance	C_{rss}				1		
Total Gate Charge	Q_g	V_{DS} = 300 V, I_D = 9.5 A, V_{GS} = 10 V			20		nC
Gate-to-Source Charge	Q_{gs}				TBD		
Gate-to-Drain Charge	Q_{gd}				TBD		
Plateau Voltage	V_{GP}				TBD		V
Gate Resistance	R_g				TBD		Ω
RESISTIVE SWITCHING CHARACTERISTICS (Note 3)							
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 300 V, I_D = 9.5 A, V_{GS} = 10 V, R_G = 0 Ω			TBD		ns
Rise Time	t_r				TBD		
Turn-off Delay Time	$t_{d(off)}$				TBD		
Fall Time	t_f				TBD		
SOURCE−DRAIN DIODE CHARACTERISTICS							
Diode Forward Voltage	V_{SD}	I_S = 9.5 A, V_{GS} = 0 V	T_J = 25°C		TBD	1.6	V
			T_J = 100°C		TBD		
Reverse Recovery Time	t_{rr}	V_{GS} = 0 V, V_{DD} = 30 V, I_S = 9.5 A, d_i/d_t = 100 A/μs			TBD		ns
Charge Time	t_a				TBD		
Discharge Time	t_b				TBD		
Reverse Recovery Charge	Q_{rr}				TBD		nC

2. Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
3. Switching characteristics are independent of operating junction temperatures.

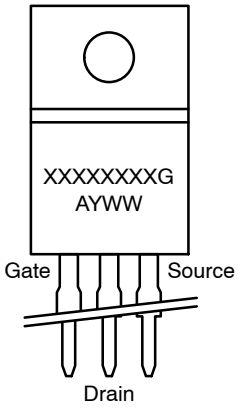
MARKING DIAGRAMS



IPAK



DPAK



TO−220FP

A = Assembly Location
Y = Year
WW = Work Week
G = Pb−Free Package

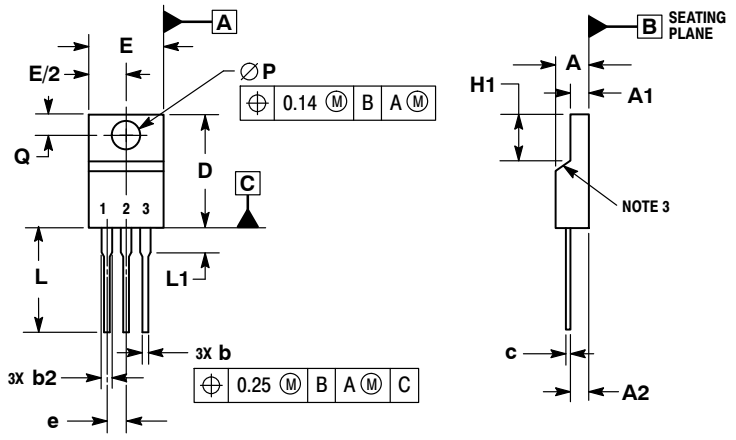
ORDERING INFORMATION

Device	Package	Shipping†
NDF60N550U1G	TO−220FP (Pb-Free, Halogen-Free)	50 Units / Rail
NDD60N550U1−1G	IPAK (Pb-Free, Halogen-Free)	75 Units / Rail
NDD60N550U1T4G	DPAK (Pb-Free, Halogen-Free)	2500 / Tape & Reel

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

PACKAGE DIMENSIONS

TO−220 FULLPACK, 3−LEAD
CASE 221AH
ISSUE C

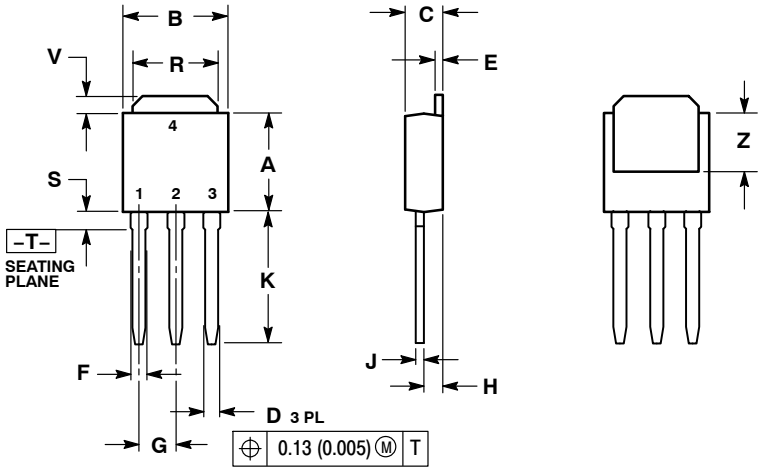


NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. CONTOUR UNCONTROLLED IN THIS AREA.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH AND GATE PROTRUSIONS. MOLD FLASH AND GATE PROTRUSIONS NOT TO EXCEED 0.13 PER SIDE. THESE DIMENSIONS ARE TO BE MEASURED AT OUTERMOST EXTREME OF THE PLASTIC BODY.
5. DIMENSION b2 DOES NOT INCLUDE DAMBAR PROTRUSION. LEAD WIDTH INCLUDING PROTRUSION SHALL NOT EXCEED 2.00.

	MILLIMETERS	
DIM	MIN	MAX
A	4.30	4.70
A1	2.50	2.90
A2	2.50	2.70
b	0.54	0.84
b2	1.10	1.40
c	0.49	0.79
D	14.70	15.30
E	9.70	10.30
e	2.54 BSC	
H1	6.70	7.10
L	12.70	14.73
L1	---	2.80
P	3.00	3.40
Q	2.80	3.20

PACKAGE DIMENSIONS

IPAK
CASE 369D−01
ISSUE C



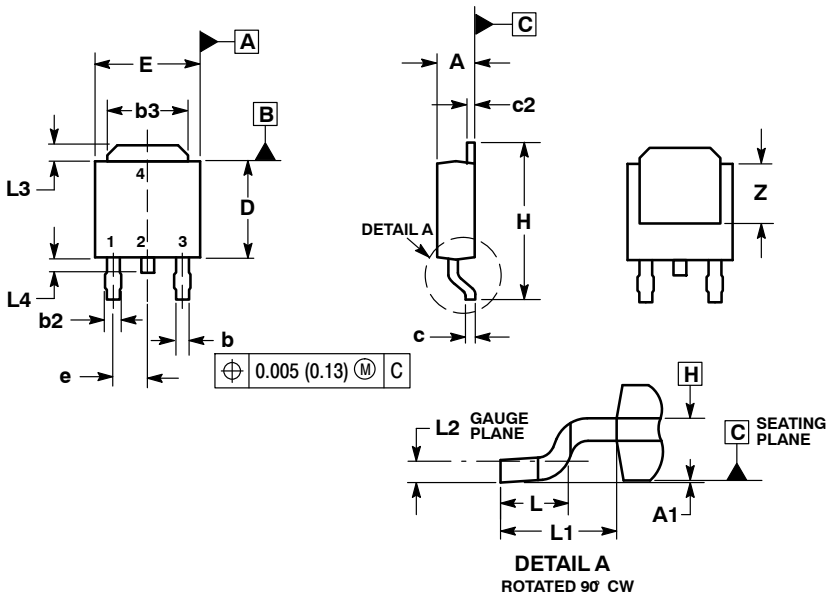
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.235	0.245	5.97	6.35
B	0.250	0.265	6.35	6.73
C	0.086	0.094	2.19	2.38
D	0.027	0.035	0.69	0.88
E	0.018	0.023	0.46	0.58
F	0.037	0.045	0.94	1.14
G	0.090 BSC		2.29 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.350	0.380	8.89	9.65
R	0.180	0.215	4.45	5.45
S	0.025	0.040	0.63	1.01
V	0.035	0.050	0.89	1.27
Z	0.155	−−−	3.93	−−−

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

PACKAGE DIMENSIONS

DPAK (SINGLE GUAGE)
CASE 369AA−01
ISSUE B

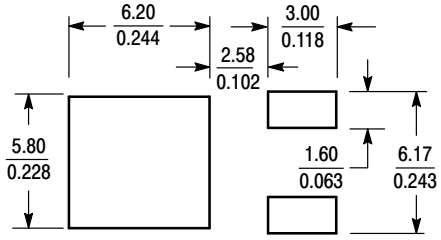


NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS b3, L3 and Z.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.006 INCHES PER SIDE.
5. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
6. DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.086	0.094	2.18	2.38
A1	0.000	0.005	0.00	0.13
b	0.025	0.035	0.63	0.89
b2	0.030	0.045	0.76	1.14
b3	0.180	0.215	4.57	5.46
c	0.018	0.024	0.46	0.61
c2	0.018	0.024	0.46	0.61
D	0.235	0.245	5.97	6.22
E	0.250	0.265	6.35	6.73
e	0.090 BSC		2.29 BSC	
H	0.370	0.410	9.40	10.41
L	0.055	0.070	1.40	1.78
L1	0.108 REF		2.74 REF	
L2	0.020 BSC		0.51 BSC	
L3	0.035	0.050	0.89	1.27
L4	−−−	0.040	−−−	1.01
Z	0.155	−−−	3.93	−−−

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

SOLDERING FOOTPRINT*



SCALE 3:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

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

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

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NDF60N550U1/D