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NTD6600N

Power MOSFET
100 V, 12 A, N−Channel, Logic Level DPAK

Features

- Source−to−Drain Diode Recovery Time Comparable to a Discrete Fast Recovery Diode
- Avalanche Energy Specified
- Logic Level
- Pb−Free Packages are Available

Typical Applications

- PWM Motor Controls
- Power Supplies
- Converters

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$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX
100 V	118 mΩ @ 5.0 V	12 A

N−Channel

MARKING DIAGRAMS

Y = Year
WW = Work Week
NT6600 = Device Code
G = Pb−Free Package

MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Drain−to−Source Voltage	V_{DSS}	100	Vdc
Drain−to−Source Voltage (R_{GS} = 1.0 MΩ)	V_{DGR}	100	Vdc
Gate−to−Source Voltage – Continuous	V_{GS}	± 20	Vdc

Drain Current – Continuous @ T_A = 25°C
  – Continuous @ T_A =100°C
  – Pulsed (Note 3)
	I_D
	I_D
	I_{DM}
		12
		9.0
		44
			Adc
			
			Apk

Total Power Dissipation Derate above 25°C Total Power Dissipation @ T_A = 25°C (Note 1) Total Power Dissipation @ T_A = 25°C (Note 2)	P_D	56.6 0.38 1.76 1.28	W W/°C W W
Operating and Storage Temperature Range	T_J, T_{stg}	−55 to +175	°C
Single Pulse Drain−to−Source Avalanche Energy – Starting T_J = 25°C (V_{DD} = 50 Vdc, V_{GS} = 5.0 Vdc, I_L = 12 Apk, L = 1.0 mH, R_G = 25 Ω)	E_{AS}	72	mJ

Thermal Resistance
  – Junction−to−Case
  – Junction−to−Ambient (Note 1)
  – Junction−to−Ambient (Note 2)
	$R_{\theta JC}$
	$R_{\theta JA}$
	$R_{\theta JA}$
		2.65
		85
		117
			°C/W

Maximum Temperature for Soldering Purposes, (1/8″ from case for 10 s)	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.
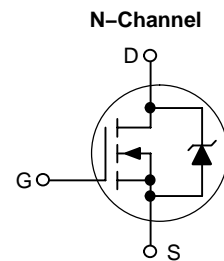
1. When surface mounted to an FR4 board using 0.5 sq in pad size.
2. When surface mounted to an FR4 board using the minimum recommended pad size.
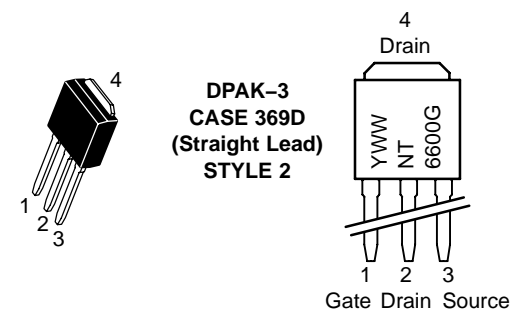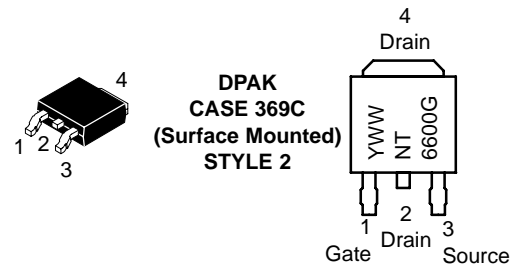3. Pulse Test: Pulse Width = 10 μs, Duty Cycle = 2%.

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

NTD6600N

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain–to–Source Breakdown Voltage (V_{GS} = 0 Vdc, I_D = 250 μAdc)	$V_{(BR)DSS}$	100	–	–	Vdc
Zero Gate Voltage Drain Current (V_{GS} = 0 Vdc, V_{DS} = 100 Vdc, T_J = 25°C) (V_{GS} = 0 Vdc, V_{DS} = 100 Vdc, T_J = 125°C)	I_{DSS}	– –	– –	1.0 10	μAdc
Gate–Body Leakage Current (V_{GS} = ±20 Vdc, V_{DS} = 0)	I_{GSS}	–	–	±100	nAdc
ON CHARACTERISTICS					
Gate Threshold Voltage V_{DS} = V_{GS}, I_D = 250 μAdc) Temperature Coefficient (Negative)	$V_{GS(th)}$	1.0 –	1.5 –4.4	2.0 –	Vdc mV/°C
Static Drain–to–Source On–State Resistance (V_{GS} = 5.0 Vdc, I_D = 6.0 Adc)	$R_{DS(on)}$	–	118	146	mΩ
Drain–to–Source On–Voltage (V_{GS} = 5.0 Vdc, I_D = 12 Adc)	$V_{DS(on)}$	–	1.5	2.2	Vdc
Forward Transconductance (V_{DS} = 10 Vdc, I_D = 6.0 Adc)	g_{FS}	–	10	–	mhos
DYNAMIC CHARACTERISTICS					
Input Capacitance	C_{iss}	–	463	700	pF
Output Capacitance (V_{DS} = 25 Vdc, V_{GS} = 0 Vdc, f = 1.0 MHz)	C_{oss}	–	116	225	
Reverse Transfer Capacitance	C_{rss}	–	36	75	
SWITCHING CHARACTERISTICS (Notes 4 & 5)					
Turn–On Delay Time	$t_{d(on)}$	–	10.5	20	ns
Rise Time (V_{DD} = 80 Vdc, I_D = 6.0 Adc,	t_r	–	75	140	
Turn–Off Delay Time V_{GS} = 5.0 Vdc, R_G = 9.1 Ω)	$t_{d(off)}$	–	26	40	
Fall Time	t_f	–	50	90	
Total Gate Charge	Q_{tot}	–	11.3	20	nC
Gate–to–Source Charge (V_{DS} = 80 Vdc, I_D = 6.0 Adc,	Q_{gs}	–	1.9	–	
Gate–to–Drain Charge V_{GS} = 5.0 Vdc)	Q_{gd}	–	7.4	–	
BODY–DRAIN DIODE RATINGS (Note 4)					
Diode Forward On–Voltage (I_S = 12 Adc, V_{GS} = 0 Vdc) (I_S = 12 Adc, V_{GS} = 0 Vdc, T_J = 125°C)	V_{SD}	– –	0.90 0.80	1.4 –	Vdc
Reverse Recovery Time	t_{rr}	–	80	–	ns
(I_S = 12 Adc, V_{GS} = 0 Vdc,	t_a	–	50	–	
dI_S/dt = 100 A/μs)	t_b	–	30	–	
Reverse Recovery Stored Charge	Q_{RR}	–	0.240	–	μC

4. Indicates Pulse Test: P.W. = 300 μs max, Duty Cycle = 2%.
5. Switching characteristics are independent of operating junction temperature.

ORDERING INFORMATION

Device	Package	Shipping[†]
NTD6600N	DPAK	75 Units/Rail
NTD6600N–1	DPAK–3	
NTD6600N–1G	DPAK–3 (Pb–Free)	
NTD6600NT4	DPAK	2500 Tape & Reel
NTD6600NT4G	DPAK (Pb–Free)	

†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.
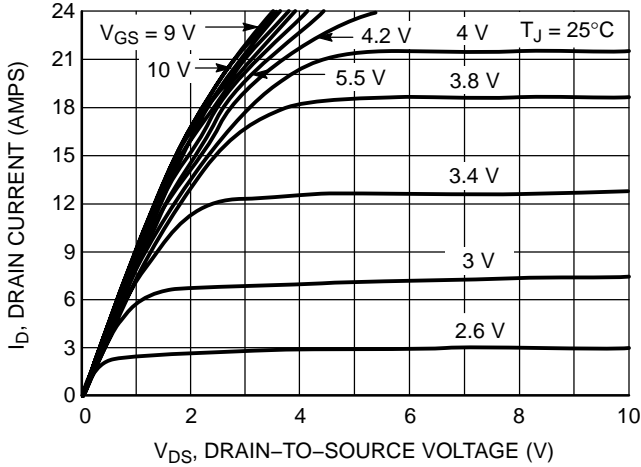
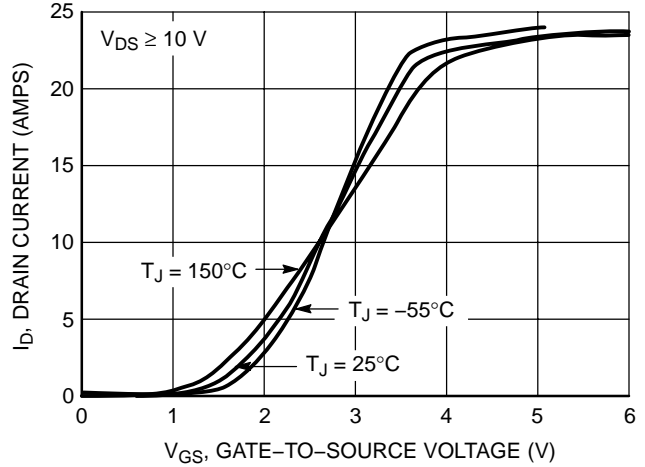## TYPICAL CHARACTERISTICS

Figure 1. On–Region Characteristics

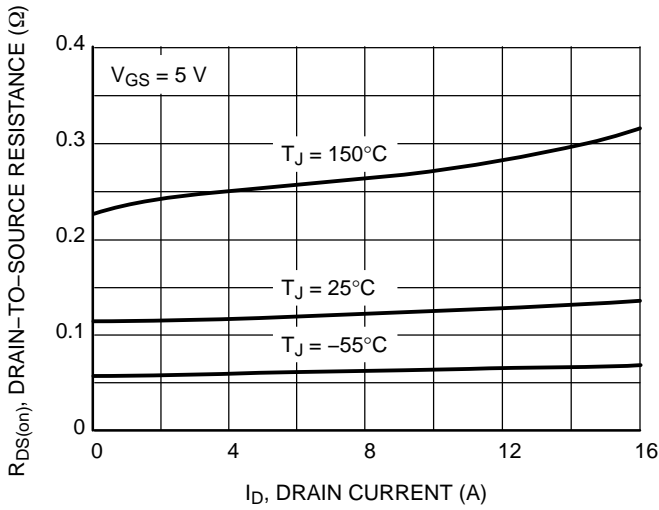

Figure 2. Transfer Characteristics

Figure 3. On–Resistance versus Drain Current and Temperature
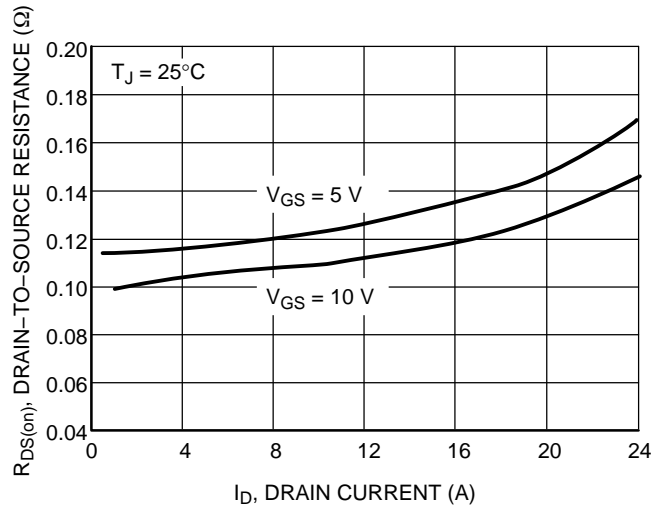

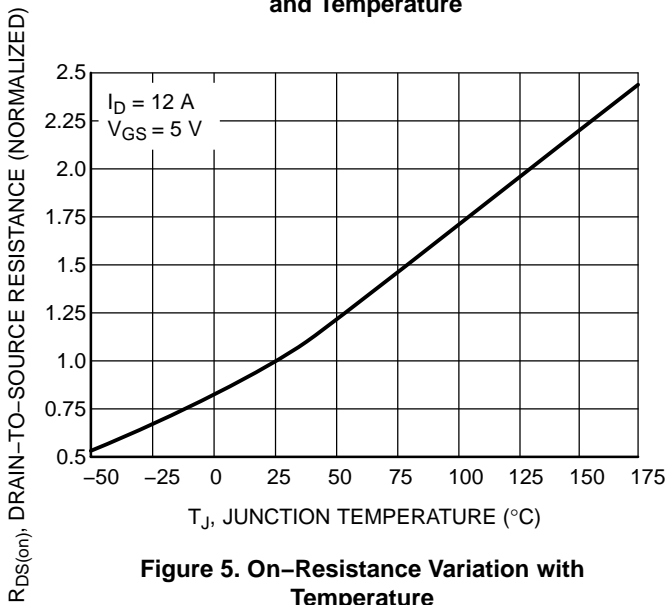**Figure 4. On–Resistance versus Drain Current and Temperature**

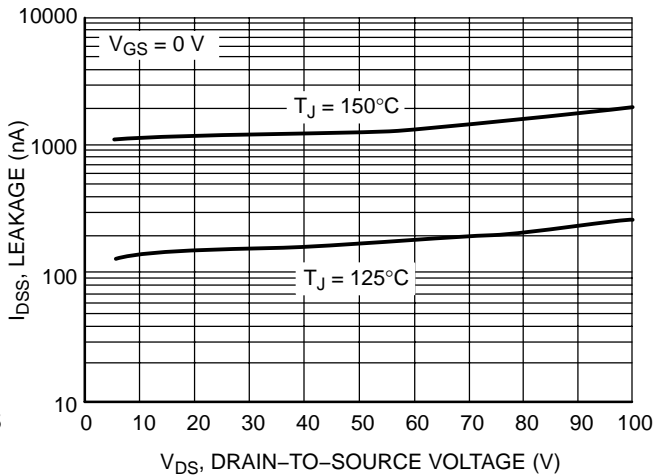**Figure 5. On–Resistance Variation with Temperature**

Figure 6. Drain–To–Source Leakage Current versus Voltage

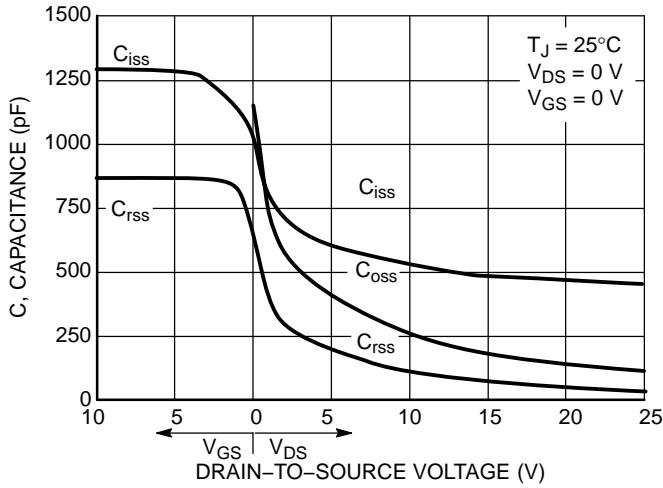# NTD6600N

TYPICAL CHARACTERISTICS
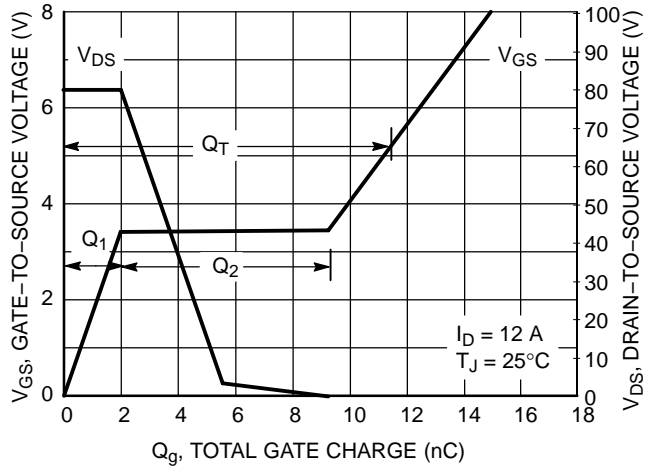

Figure 7. Capacitance Variation

Figure 8. Gate–to–Source and Drain–to–Source Voltage versus Total Charge
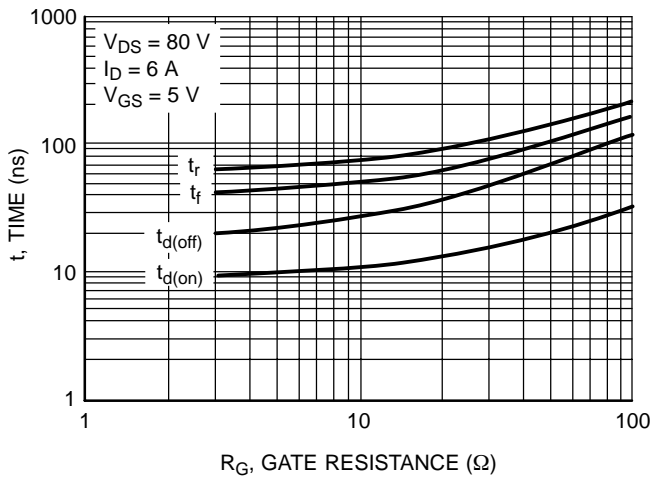
Figure 9. Resistive Switching Time Variation versus Gate Resistance
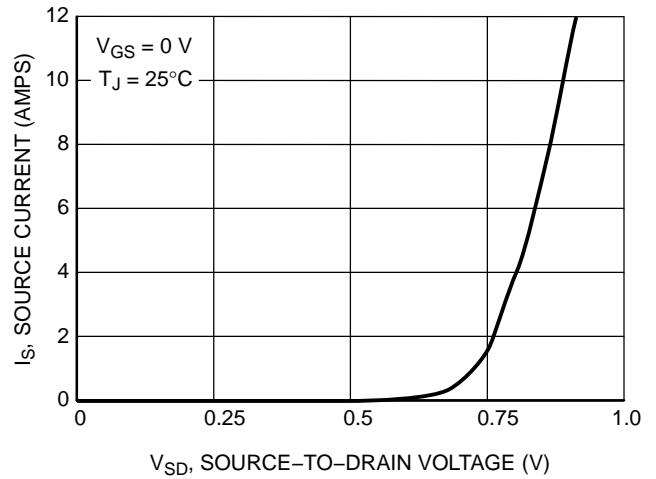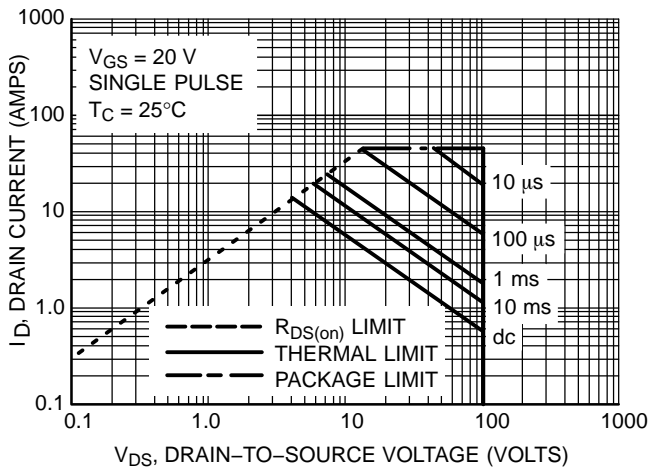

Figure 10. Diode Forward Voltage versus Current

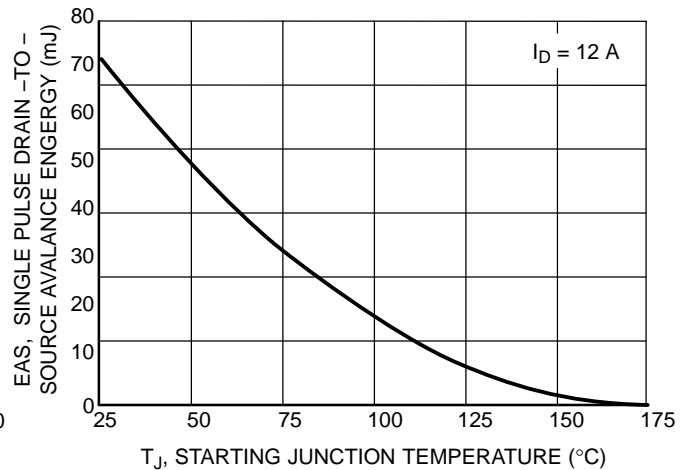**Figure 11. Maximum Rated Forward Biased Safe Operating Area**

Figure 12. Maximum Avalanche Energy versus Starting Junction Temperature

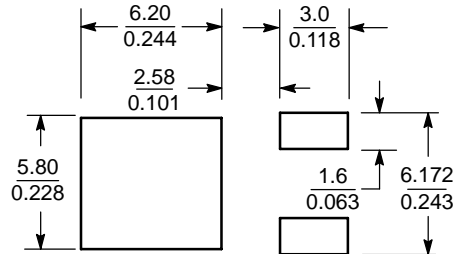# NTD6600N

PACKAGE DIMENSIONS

DPAK
CASE 369C−01
ISSUE O
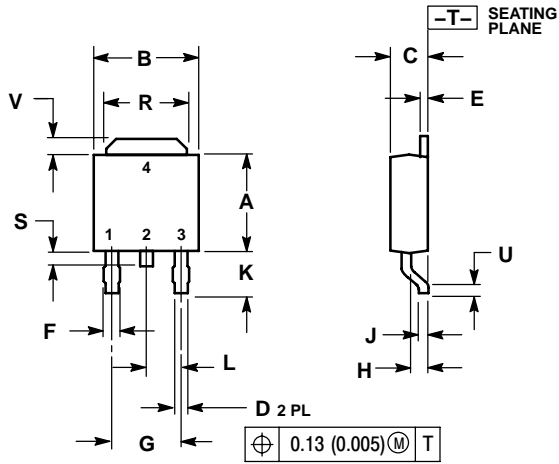
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.235	0.245	5.97	6.22
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	0.180 BSC		4.58 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.102	0.114	2.60	2.89
L	0.090 BSC		2.29 BSC	
R	0.180	0.215	4.57	5.45
S	0.025	0.040	0.63	1.01
U	0.020	–––	0.51	–––
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

⊕ | 0.13 (0.005) Ⓜ | T

SOLDERING FOOTPRINT*
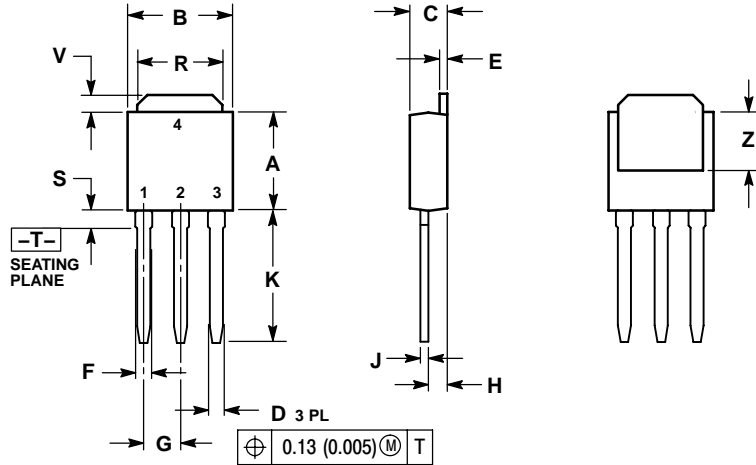
SCALE 3:1 $\left(\frac{mm}{inches}\right)$

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

NTD6600N

PACKAGE DIMENSIONS

DPAK–3
CASE 369D–01
ISSUE B

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

DIM	INCHES		MILLIMETERS	
	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