

# NTD20N03L27

## ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage (Note 2) (V <sub>GS</sub> = 0 Vdc, I <sub>D</sub> = 250 μAdc) Temperature Coefficient (Positive)	V <sub>(BR)DSS</sub>	30 –	– 43	– –	Vdc mV/°C
Zero Gate Voltage Drain Current (V <sub>DS</sub> = 30 Vdc, V <sub>GS</sub> = 0 Vdc) (V <sub>DS</sub> = 30 Vdc, V <sub>GS</sub> = 0 Vdc, T <sub>J</sub> = 150°C)	I <sub>DSS</sub>	– –	– –	10 100	μAdc
Gate-Body Leakage Current (V <sub>GS</sub> = ±20 Vdc, V <sub>DS</sub> = 0 Vdc)	I <sub>GSS</sub>	–	–	±100	nAdc

### ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage (Note 2) (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μAdc) Threshold Temperature Coefficient (Negative)	V <sub>GS(th)</sub>	1.0 –	1.6 5.0	2.0 –	Vdc mV/°C
Static Drain-to-Source On-Resistance (Note 2) (V <sub>GS</sub> = 4.0 Vdc, I <sub>D</sub> = 10 Adc) (V <sub>GS</sub> = 5.0 Vdc, I <sub>D</sub> = 10 Adc)	R <sub>DS(on)</sub>	– –	28 23	31 27	mΩ
Static Drain-to-Source On-Voltage (Note 2) (V <sub>GS</sub> = 5.0 Vdc, I <sub>D</sub> = 20 Adc) (V <sub>GS</sub> = 5.0 Vdc, I <sub>D</sub> = 10 Adc, T <sub>J</sub> = 150°C)	V <sub>DS(on)</sub>	– –	0.48 0.40	0.54 –	Vdc
Forward Transconductance (Note 2) (V <sub>DS</sub> = 5.0 Vdc, I <sub>D</sub> = 10 Adc)	g <sub>FS</sub>	–	21	–	mhos

### DYNAMIC CHARACTERISTICS

Input Capacitance	(V <sub>DS</sub> = 25 Vdc, V <sub>GS</sub> = 0 Vdc, f = 1.0 MHz)	C <sub>iss</sub>	–	1005	1260	pF
Output Capacitance		C <sub>oss</sub>	–	271	420	
Transfer Capacitance		C <sub>rss</sub>	–	87	112	

### SWITCHING CHARACTERISTICS (Note 3)

Turn-On Delay Time	(V <sub>DD</sub> = 20 Vdc, I <sub>D</sub> = 20 Adc, V <sub>GS</sub> = 5.0 Vdc, R <sub>G</sub> = 9.1 Ω) (Note 2)	t <sub>d(on)</sub>	–	17	25	ns
Rise Time		t <sub>r</sub>	–	137	160	
Turn-Off Delay Time		t <sub>d(off)</sub>	–	38	45	
Fall Time		t <sub>f</sub>	–	31	40	
Gate Charge	(V <sub>DS</sub> = 48 Vdc, I <sub>D</sub> = 15 Adc, V <sub>GS</sub> = 10 Vdc) (Note 2)	Q <sub>T</sub>	–	13.8	18.9	nC
		Q <sub>1</sub>	–	2.8	–	
		Q <sub>2</sub>	–	6.6	–	

### SOURCE-DrAIN DIODE CHARACTERISTICS

Forward On-Voltage	(I <sub>S</sub> = 20 Adc, V <sub>GS</sub> = 0 Vdc) (Note 2) (I <sub>S</sub> = 20 Adc, V <sub>GS</sub> = 0 Vdc, T <sub>J</sub> = 125°C)	V <sub>SD</sub>	– –	1.0 0.9	1.15 –	Vdc
Reverse Recovery Time	(I <sub>S</sub> = 15 Adc, V <sub>GS</sub> = 0 Vdc, dI <sub>S</sub> /dt = 100 A/μs) (Note 2)	t <sub>rr</sub>	–	23	–	ns
		t <sub>a</sub>	–	13	–	
		t <sub>b</sub>	–	10	–	
Reverse Recovery Stored Charge		Q <sub>RR</sub>	–	0.017	–	μC

2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

3. Switching characteristics are independent of operating junction temperature.

### ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
NTD20N03L27G	DPAK (Pb-Free)	75 Units/Rail
NTD20N03L27-1G	DPAK-3 (Pb-Free)	75 Units/Rail
NTD20N03L27T4G	DPAK (Pb-Free)	2500 Tape & Reel

<sup>†</sup>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.

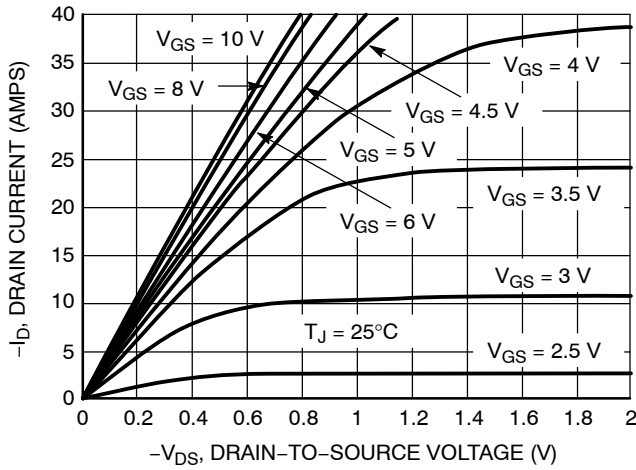


Figure 1. On-Region Characteristics

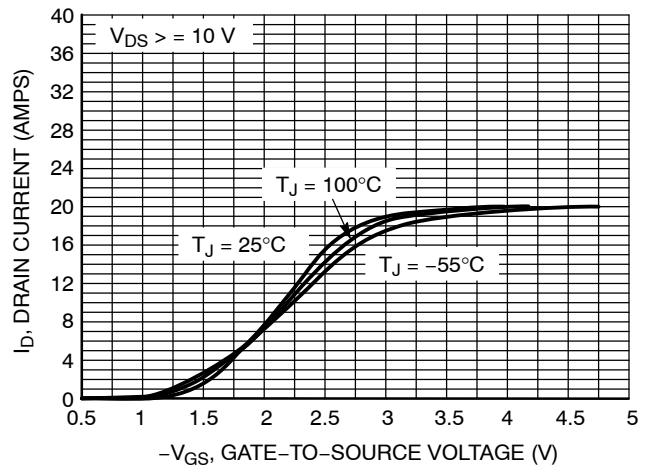


Figure 2. Transfer Characteristics

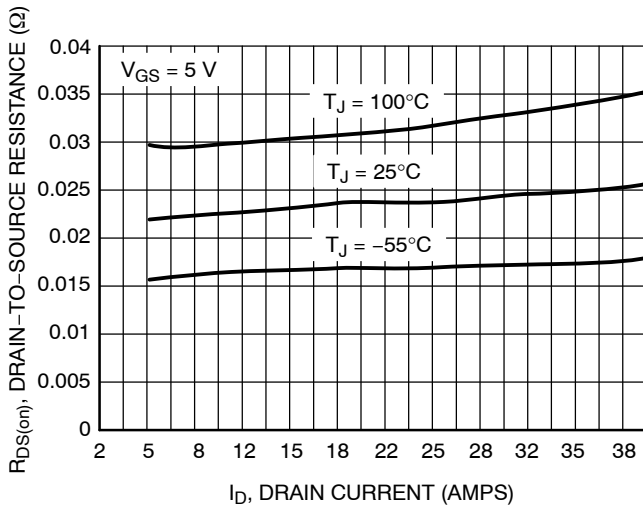


Figure 3. On-Resistance vs. Drain Current and Temperature

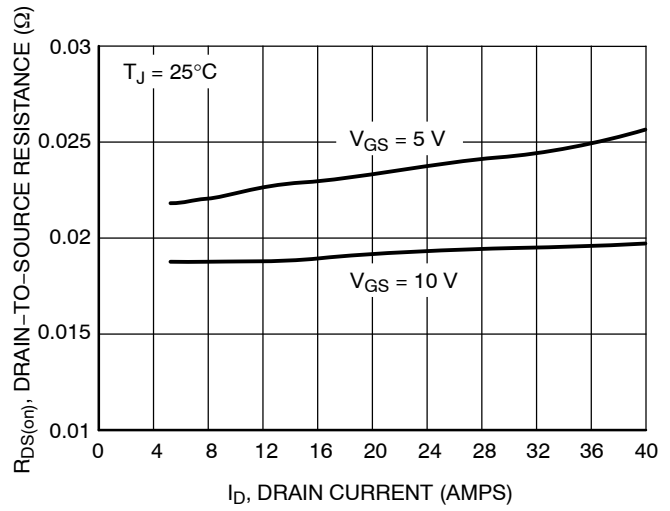


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

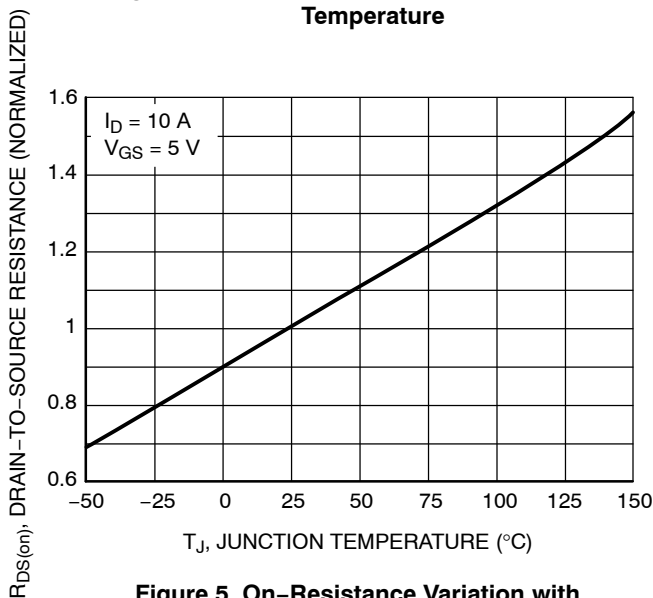


Figure 5. On-Resistance Variation with Temperature

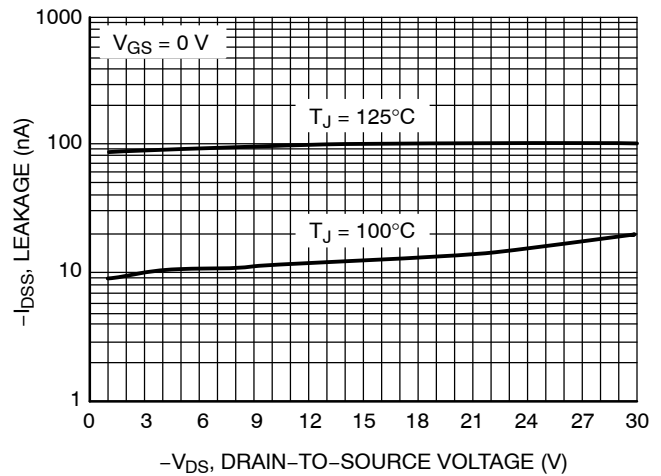


Figure 6. Drain-to-Source Leakage Current vs. Voltage

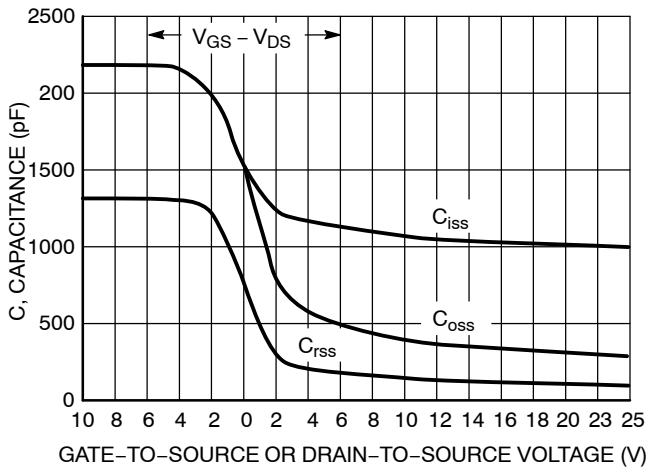


Figure 7. Capacitance Variation

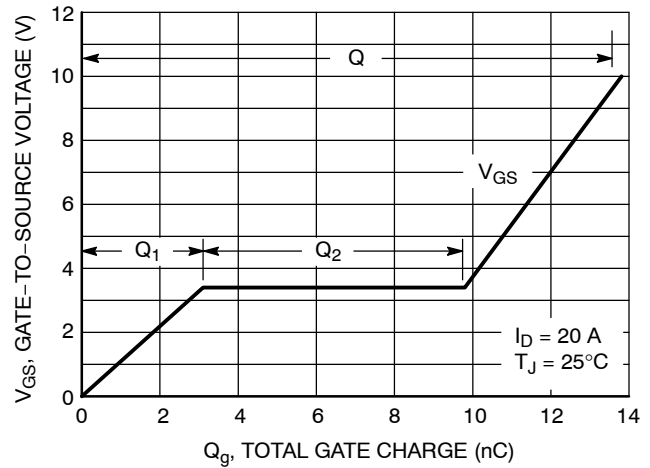


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

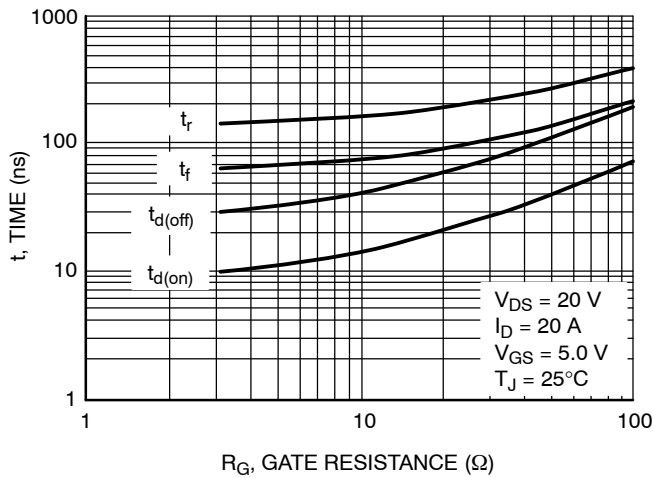


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

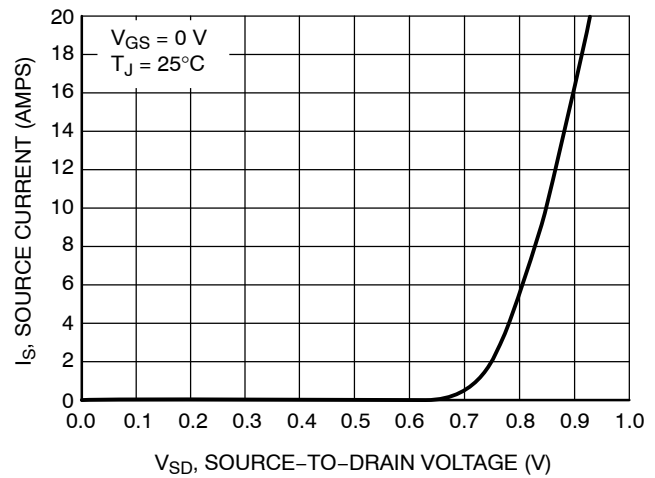


Figure 10. Diode Forward Voltage vs. Current

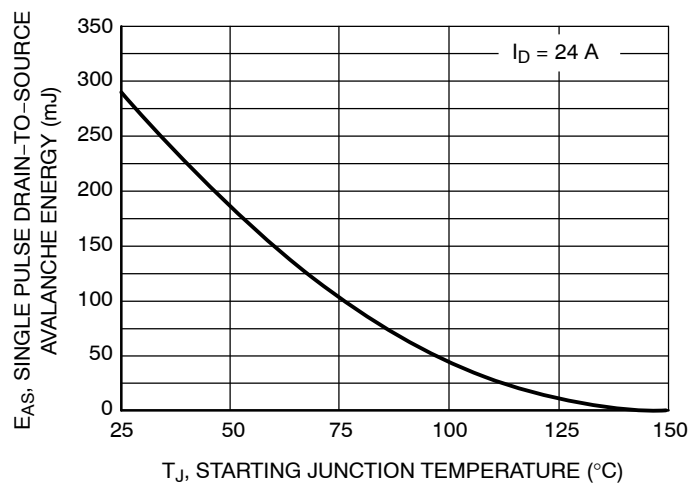
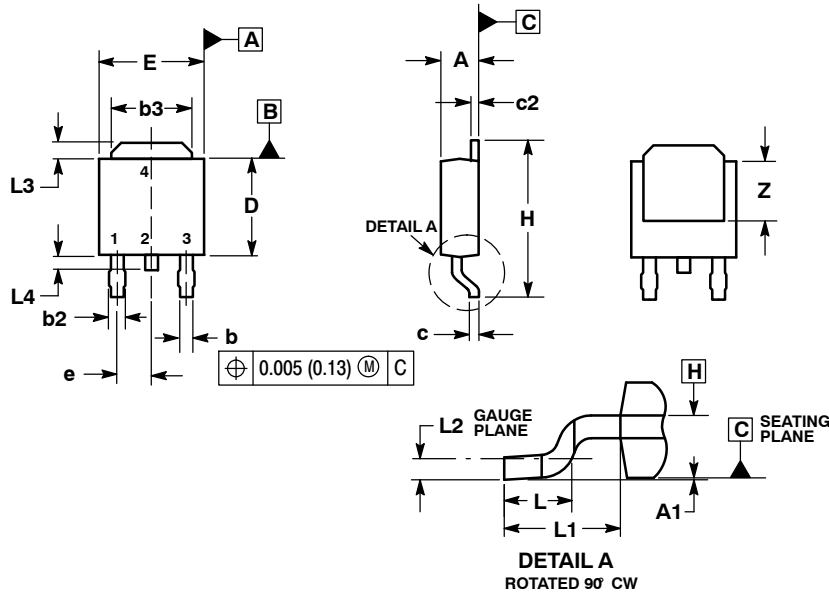


Figure 11. Maximum Avalanche Energy vs. Starting Junction Temperature

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## PACKAGE DIMENSIONS

### DPAK (SINGLE GAUGE) CASE 369C-01 ISSUE D

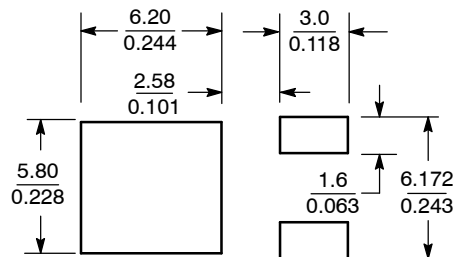


#### NOTES:

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.

DIM	INCHES		MILLIMETERS	
	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	---

### SOLDERING FOOTPRINT\*



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

#### STYLE 2:

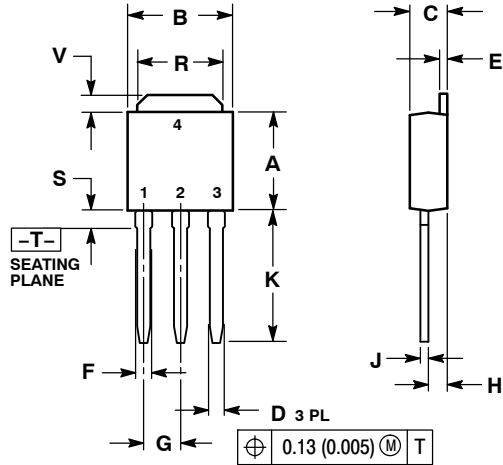
1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

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

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## PACKAGE DIMENSIONS

### DKAK-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:

1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

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