NTD30N02

Power MOSFET
30 Amps, 24 Volts

N−Channel DPAK

Designed for low voltage, high speed switching applications in power supplies, converters and power motor controls and bridge circuits.

Features

- Pb−Free Packages are Available

Typical Applications

- Power Supplies
- Converters
- Power Motor Controls
- Bridge Circuits

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

Rating	Symbol	Value	Unit
Drain−to−Source Voltage	V_{DSS}	24	Vdc
Gate−to−Source Voltage − Continuous	V_{GS}	±20	Vdc
Drain Current − Continuous @ T_A = 25°C − Single Pulse ($t_p \le 10$ μs)	 I_D I_{DM}	 30 100	Adc Apk
Total Power Dissipation @ T_A = 25°C	P_D	75	W
Operating and Storage Temperature Range	T_J, T_{stg}	−55 to 150	°C
Single Pulse Drain−to−Source Avalanche Energy − Starting T_J = 25°C (V_{DD} = 24 Vdc, V_{GS} = 10 Vdc, L = 1.0 mH, I_L(pk) = 10 A, R_G = 25 Ω)	E_{AS}	50	mJ
Thermal Resistance − Junction−to−Case − Junction−to−Ambient (Note 1) − Junction−to−Ambient (Note 2)	 $R_{\theta JC}$ $R_{\theta JA}$ $R_{\theta JA}$	 1.65 67 120	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8″ from case for 10 seconds	T_L	260	°C

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1. When surface mounted to an FR4 board using 1 in. pad size, (Cu Area 1.127 sq in).
2. When surface mounted to an FR4 board using minimum recommended pad size, (Cu Area 0.412 sq in).

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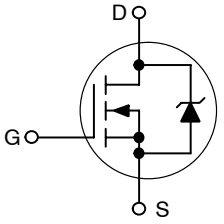
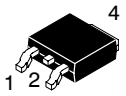
30 AMPERES
24 VOLTS
$R_{DS(on)}$ = 11.2 mΩ (Typ.)

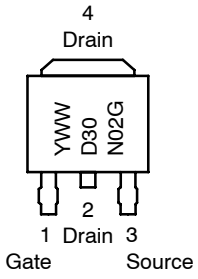
N−Channel





DPAK
CASE 369C
STYLE 2

MARKING DIAGRAM



D30N02 = Device Code
Y = Year
WW = Work Week
G = Pb−Free Device

ORDERING INFORMATION

Device	Package	Shipping†
NTD30N02	DPAK	75 Units/Rail
NTD30N02G	DPAK (Pb−Free)	75 Units/Rail
NTD30N02T4	DPAK	2500 Tape & Reel
NTD30N02T4G	DPAK (Pb−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 Specification Brochure, BRD8011/D.

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

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain−to−Source Breakdown Voltage (Note 3) (V_{GS} = 0 Vdc, I_D = 250 μAdc) Temperature Coefficient (Positive)		$V_{(BR)DSS}$	 24 –	 26.5 25.5	 – –	Vdc mV/°C
Zero Gate Voltage Drain Current (V_{DS} = 20 Vdc, V_{GS} = 0 Vdc) (V_{DS} = 24 Vdc, V_{GS} = 0 Vdc) (V_{DS} = 20 Vdc, V_{GS} = 0 Vdc, T_J = 125°C)		I_{DSS}	 – – –	 – – –	 0.8 1.0 10	μAdc
Gate−Body Leakage Current (V_{GS} = ±20 Vdc, V_{DS} = 0 Vdc)		I_{GSS}	–	–	±100	nAdc
ON CHARACTERISTICS (Note 3)						
Gate Threshold Voltage (Note 3) (V_{DS} = V_{GS}, I_D = 250 μAdc) Threshold Temperature Coefficient (Negative)		$V_{GS(th)}$	 1.0 –	 2.1 −4.1	 3.0 –	Vdc mV/°C
Static Drain−to−Source On−Resistance (Note 3) (V_{GS} = 10 Vdc, I_D = 30 Adc) (V_{GS} = 10 Vdc, I_D = 20 Adc) (V_{GS} = 4.5 Vdc, I_D = 15 Adc)		$R_{DS(on)}$	 – – –	 – 11.2 20	 14.5 14.5 24	mΩ
Forward Transconductance (Note 3) (V_{DS} = 10 Vdc, I_D = 15 Adc)		g_{FS}	–	20	–	mhos
DYNAMIC CHARACTERISTICS						
Input Capacitance	(V_{DS} = 20 Vdc, V_{GS} = 0 Vdc, f = 1.0 MHz)	C_{iss}	–	1000	–	pF
Output Capacitance		C_{oss}	–	425	–	
Transfer Capacitance		C_{rss}	–	175	–	
SWITCHING CHARACTERISTICS (Note 4)						
Turn−On Delay Time	(V_{DD} = 20 Vdc, I_D = 30 Adc, V_{GS} = 10 Vdc, R_G = 2.5 Ω)	$t_{d(on)}$	–	7.0	15	ns
Rise Time		t_r	–	28	55	
Turn−Off Delay Time		$t_{d(off)}$	–	22	35	
Fall Time		t_f	–	12	20	
Turn−On Delay Time	(V_{DD} = 20 Vdc, I_D = 15 Adc, V_{GS} = 4.5 Vdc, R_G = 2.5 Ω)	$t_{d(on)}$	–	12.5	–	ns
Rise Time		t_r	–	115	–	
Turn−Off Delay Time		$t_{d(off)}$	–	15	–	
Fall Time		t_f	–	17	–	
Gate Charge	(V_{DS} = 20 Vdc, I_D = 30 Adc, V_{GS} = 4.5 Vdc) (Note 3)	Q_T	–	14.4	20	nC
		Q_1	–	4.0	–	
		Q_2	–	8.5	–	
SOURCE−DRAIN DIODE CHARACTERISTICS						
Forward On−Voltage	(I_S = 15 Adc, V_{GS} = 0 Vdc) (I_S = 30 Adc, V_{GS} = 0 Vdc) (Note 3) (I_S = 15 Adc, V_{GS} = 0 Vdc, T_J = 125°C)	V_{SD}	 – –	 0.95 1.10 0.80	 1.2 – –	Vdc
Reverse Recovery Time	(I_S = 30 Adc, V_{GS} = 0 Vdc, dI_S/dt = 100 A/μs) (Note 3)	t_{rr}	–	30	–	ns
		t_a	–	14.5	–	
		t_b	–	15.5	–	
Reverse Recovery Stored Charge		Q_{RR}	–	0.013	–	μC

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

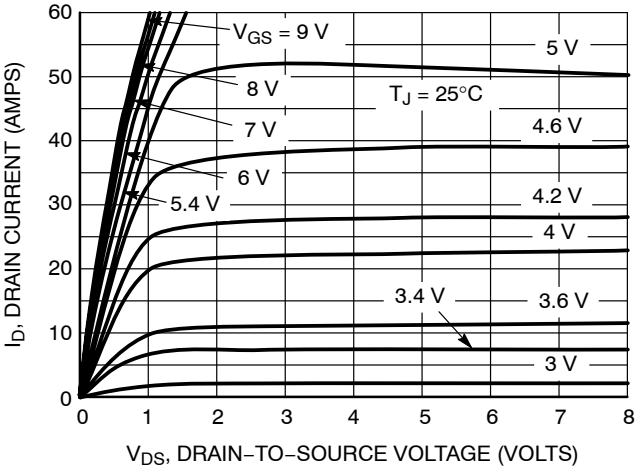


Figure 1. On−Region Characteristics

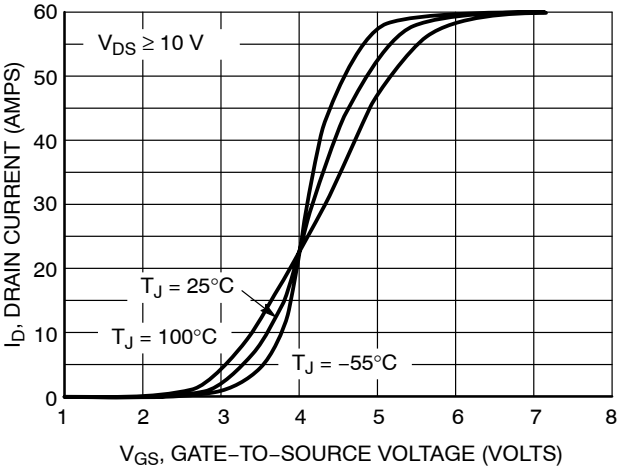


Figure 2. Transfer Characteristics

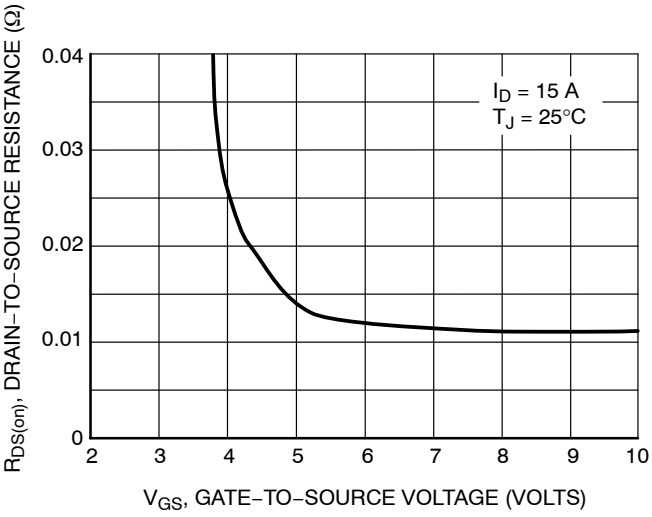


Figure 3. On−Resistance versus Gate−to−Source Voltage

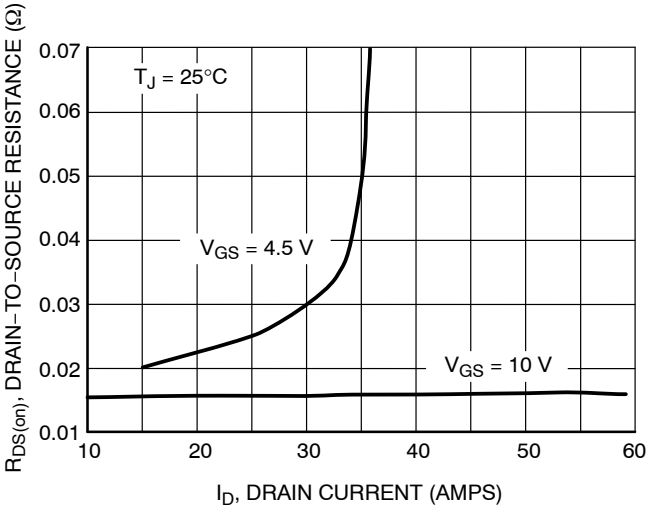


Figure 4. On−Resistance versus Drain Current and Gate Voltage

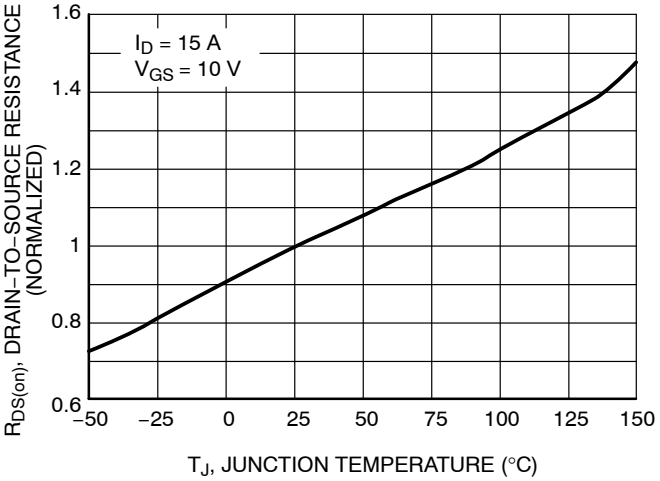


Figure 5. On−Resistance Variation with Temperature

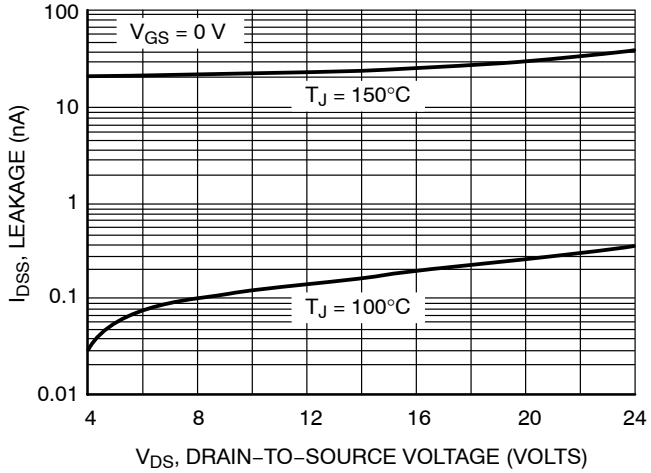


Figure 6. Drain−to−Source Leakage Current versus Voltage

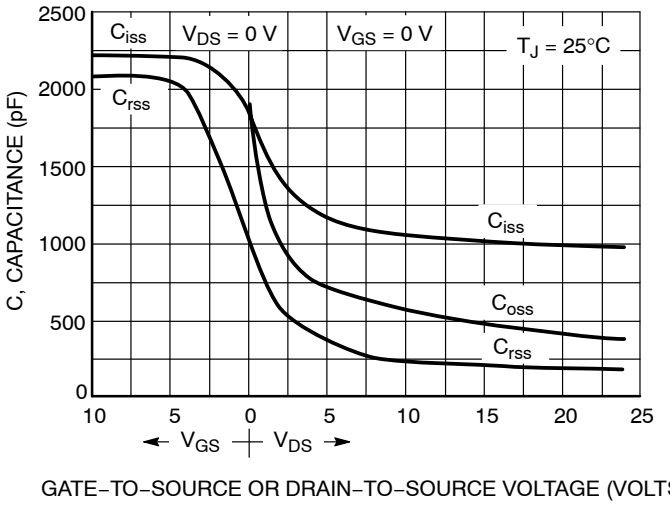


Figure 7. Capacitance Variation

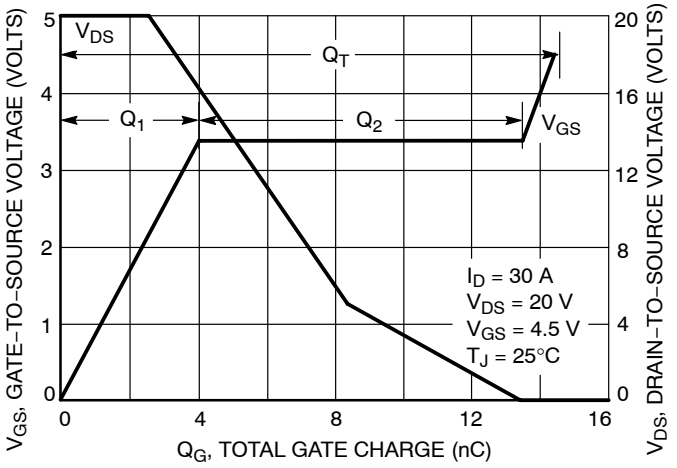


Figure 8. Gate−to−Source and Drain−to−Source Voltage versus Total Charge

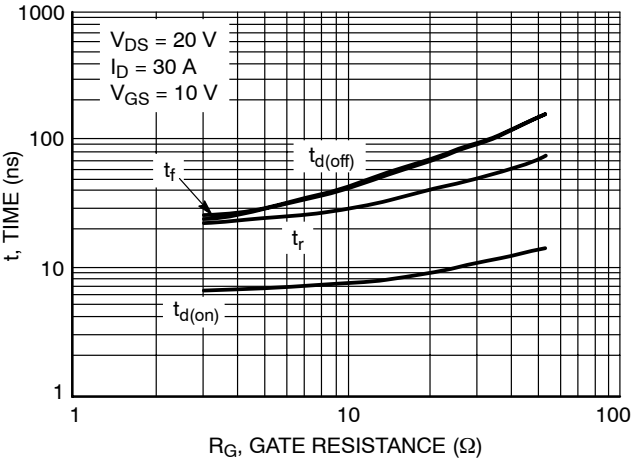


Figure 9. Resistive Switching Time Variation versus Gate Resistance

DRAIN−TO−SOURCE DIODE CHARACTERISTICS

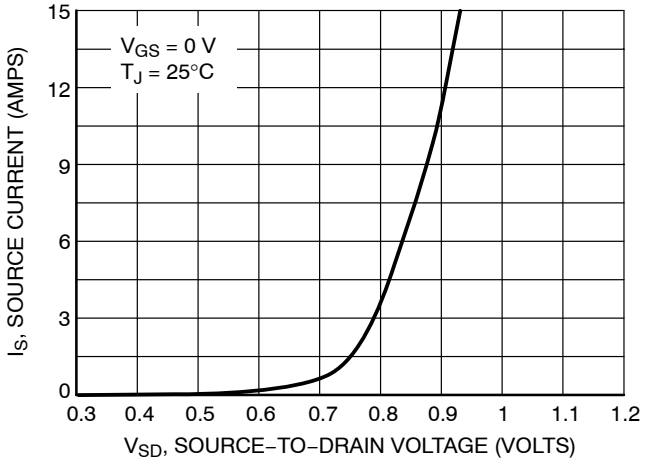
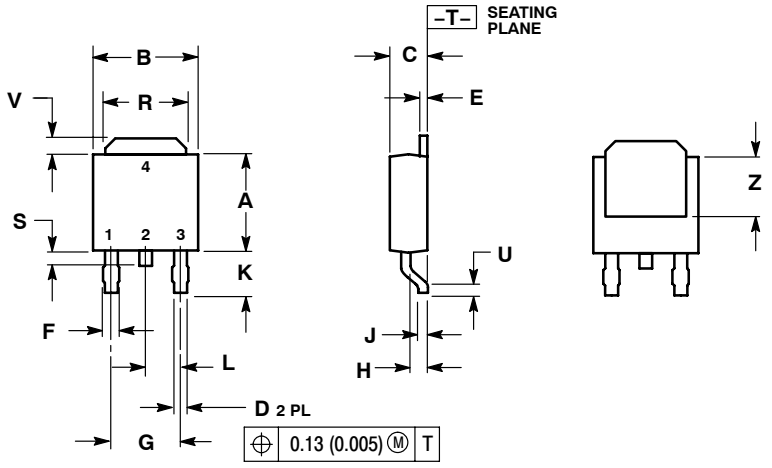


Figure 10. Diode Forward Voltage versus Current

PACKAGE DIMENSIONS

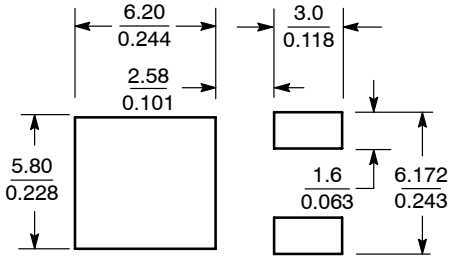
DPAK
CASE 369C−01
ISSUE O



DIM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS 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

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.

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