

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.

Typical Applications

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

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

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

1. When surface mounted to an FR4 board using 1" pad size, (Cu Area 1.127 in²).
2. When surface mounted to an FR4 board using minimum recommended pad size, (Cu Area 0.412 in²).



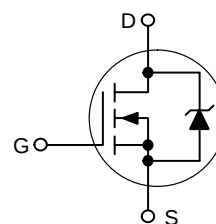
ON Semiconductor®

<http://onsemi.com>

**30 AMPERES
24 VOLTS**

$R_{DS(on)} = 11.2 \text{ m}\Omega$ (Typ.)

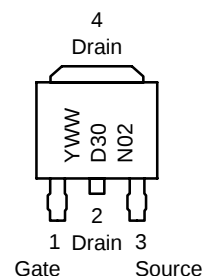
N-Channel



MARKING DIAGRAM



**DPAK
CASE 369C
(Surface Mount)
Style 2**



D30N02 = Device Code
Y = Year
WW = Work Week

ORDERING INFORMATION

Device	Package	Shipping†
NTD30N02	DPAK	75 Units/Rail
NTD30N02T4	DPAK	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.

NTD30N02

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

Characteristic	Symbol	Min	Typ	Max	Unit
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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.

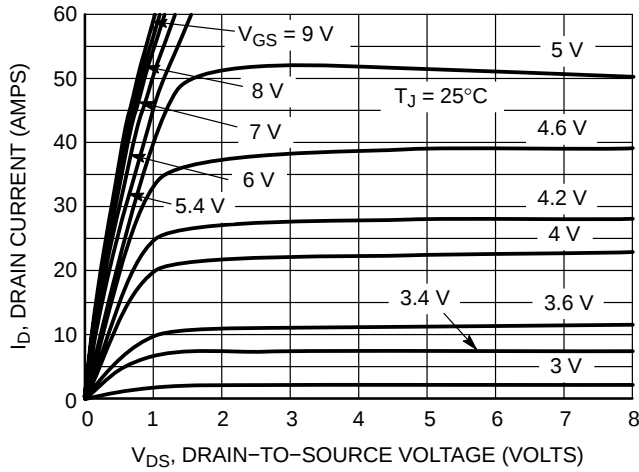


Figure 1. On-Region Characteristics

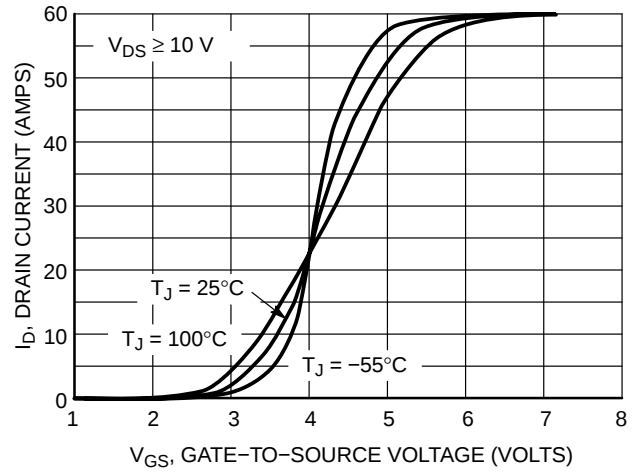


Figure 2. Transfer Characteristics

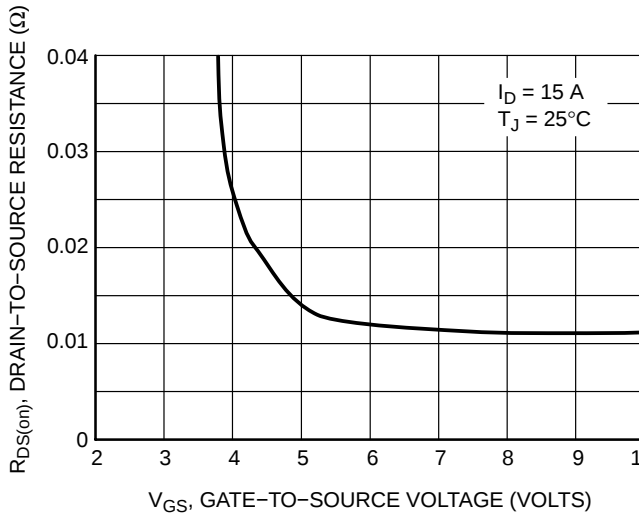


Figure 3. On-Resistance versus Gate-to-Source Voltage

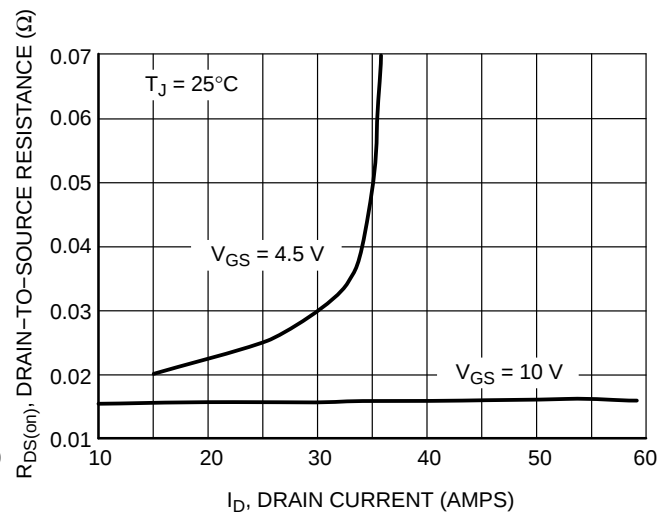


Figure 4. On-Resistance versus Drain Current and Gate Voltage

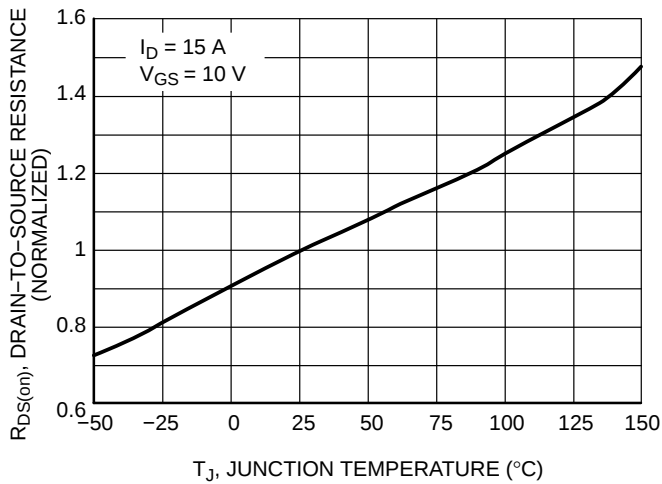


Figure 5. On-Resistance Variation with Temperature

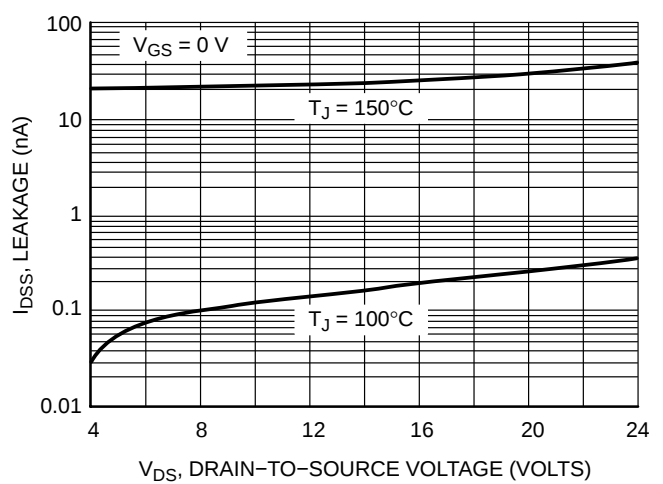


Figure 6. Drain-to-Source Leakage Current versus Voltage

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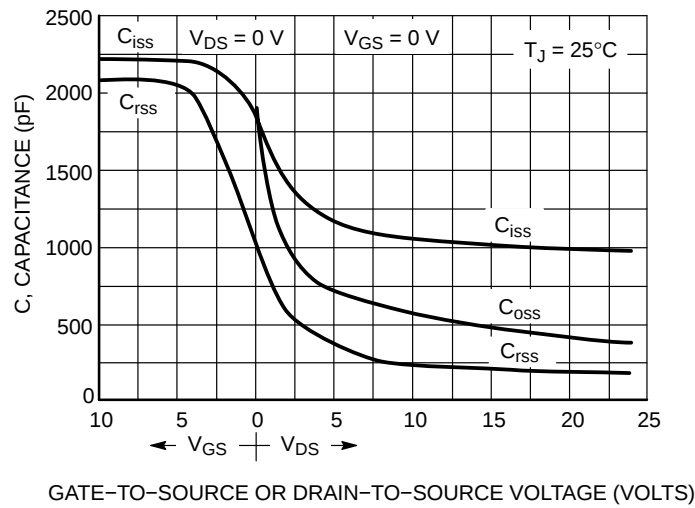


Figure 7. Capacitance Variation

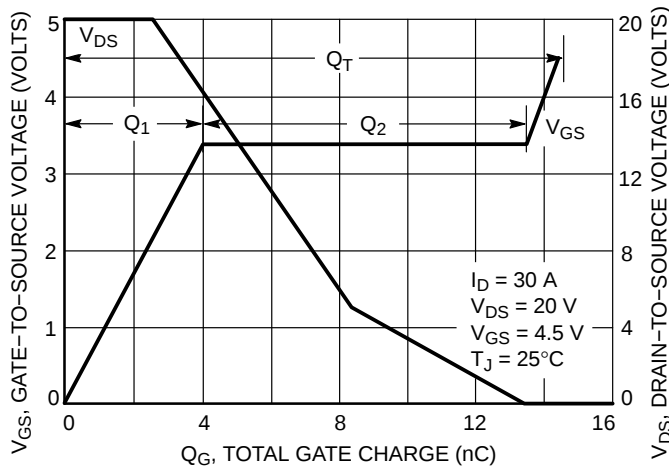


Figure 8. Gate-to-Source and Drain-to-Source Voltage versus Total Charge

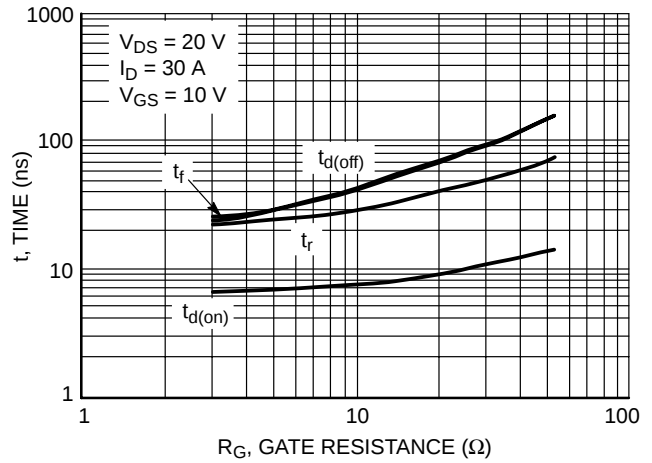


Figure 9. Resistive Switching Time Variation versus Gate Resistance

DRAIN-TO-SOURCE DIODE CHARACTERISTICS

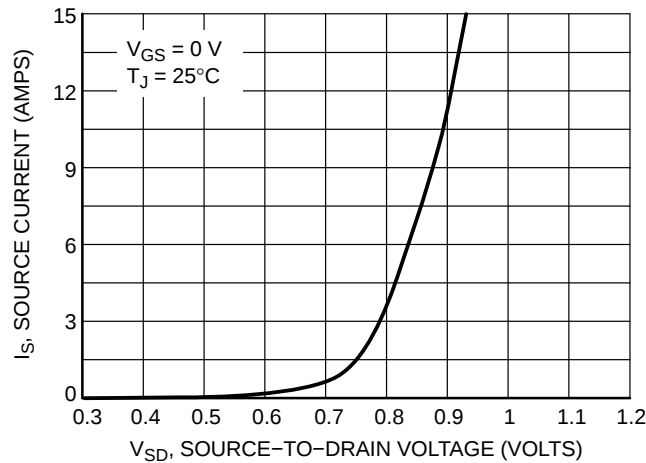
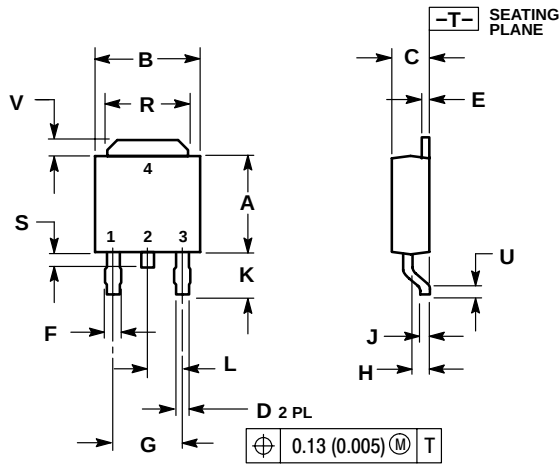


Figure 10. Diode Forward Voltage versus Current

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PACKAGE DIMENSIONS

DPAK
CASE 369C-01
ISSUE O

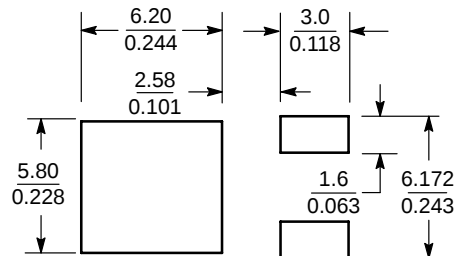


DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.235	0.245	5.97	6.22
B	0.250	0.265	6.35	6.73
C	0.086	0.094	2.19	2.38
D	0.027	0.035	0.69	0.88
E	0.018	0.023	0.46	0.58
F	0.037	0.045	0.94	1.14
G	0.180 BSC		4.58 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.102	0.114	2.60	2.89
L	0.090 BSC		2.29 BSC	
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

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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