NTD70N03R

Power MOSFET

72 A, 25 V, N−Channel DPAK

Features

- Planar HD3e Process for Fast Switching Performance
- Low $R_{DS(on)}$ to Minimize Conduction Loss
- Low C_{ISS} to Minimize Driver Loss
- Low Gate Charge
- Pb−Free Packages are Available

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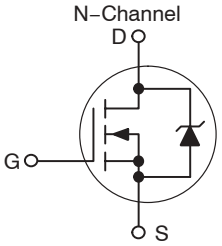
$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX
25 V	5.6 mΩ	72 A



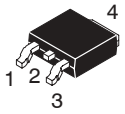
MAXIMUM RATINGS (T_J = 25°C Unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain−to−Source Voltage	V_{DSS}	25	V_{dc}
Gate−to−Source Voltage − Continuous	V_{GS}	±20	V_{dc}
Thermal Resistance − Junction−to−Case Total Power Dissipation @ T_C = 25°C Drain Current − Continuous @ T_C = 25°C, Chip − Continuous @ T_C = 25°C, Limited by Package − Continuous @ T_A = 25°C, Limited by Wires − Single Pulse (t_p = 10 μs)	$R_{\theta JC}$ P_D I_D I_D I_D I_{DM}	2.4 62.5 72.0 62.8 32 140	°C/W W A A A A
Thermal Resistance − Junction−to−Ambient (Note 1) Total Power Dissipation @ T_A = 25°C Drain Current − Continuous @ T_A = 25°C	$R_{\theta JA}$ P_D I_D	80 1.87 12.0	°C/W W A
Thermal Resistance − Junction−to−Ambient (Note 2) Total Power Dissipation @ T_A = 25°C Drain Current − Continuous @ T_A = 25°C	$R_{\theta JA}$ P_D I_D	110 1.36 10.0	°C/W W A
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} = 30 V_{dc}, V_{GS} = 10 V_{dc}, I_L = 12 A_{pk}, L = 1 mH, R_G = 25 Ω)	E_{AS}	71.7	mJ
Maximum Lead Temperature for Soldering Purposes, 1/8″ from Case for 10 s	T_L	260	°C

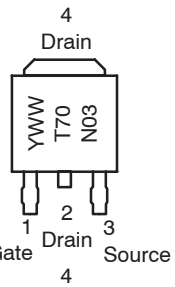
Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur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

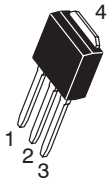
1. When surface mounted to an FR4 board using 0.5 sq. in. pad size.
2. When surface mounted to an FR4 board using minimum recommended pad size.

MARKING DIAGRAMS

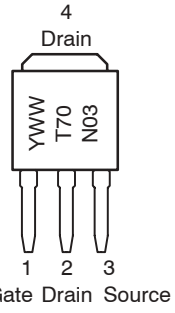


DPAK
CASE 369AA
Style 2





DPAK
CASE 369D
Style 2



70N03	Device Code
Y	= Year
WW	= Work Week

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 501 of this data sheet.

ELECTRICAL CHARACTERISTICS (T_J = 25°C Unless otherwise specified)

Characteristics	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain−to−Source Breakdown Voltage (Note 3) (V_{GS} = 0 V_{dc}, I_D = 250 μA_{dc}) Temperature Coefficient (Positive)	$V_{(br)DSS}$	25 –	28 20.5	– –	V_{dc} mV/°C
Zero Gate Voltage Drain Current (V_{DS} = 20 V_{dc}, V_{GS} = 0 V_{dc}) (V_{DS} = 20 V_{dc}, V_{GS} = 0 V_{dc}, T_J = 150°C)	I_{DSS}	– –	– –	1.5 10	μA_{dc}
Gate−Body Leakage Current (V_{GS} = ±20 V_{dc}, V_{DS} = 0 V_{dc})	I_{GSS}	–	–	±100	nA_{dc}
ON CHARACTERISTICS (Note 3)					
Gate Threshold Voltage (Note 3) (V_{DS} = V_{GS}, I_D = 250 μA_{dc}) Threshold Temperature Coefficient (Negative)	$V_{GS(th)}$	1.0 –	1.5 4.0	2.0 –	V_{dc} mV/°C
Static Drain−to−Source On−Resistance (Note 3) (V_{GS} = 4.5 V_{dc}, I_D = 20 A_{dc}) (V_{GS} = 10 V_{dc}, I_D = 20 A_{dc})	$R_{DS(on)}$	– –	8.1 5.6	13 8.0	mΩ
Forward Transconductance (Note 3) (V_{DS} = 10 V_{dc}, I_D = 15 A_{dc})	g_{FS}	–	27	–	Mhos
DYNAMIC CHARACTERISTICS					
Input Capacitance	(V_{DS} = 20 V_{dc}, V_{GS} = 0 V, f = 1 MHz)	C_{ISS}	–	1333	–	pF
Output Capacitance		C_{OSS}	–	600	–	
Transfer Capacitance		C_{RSS}	–	218	–	
SWITCHING CHARACTERISTICS (Note 4)						
Turn−On Delay Time	(V_{GS} = 10 V_{dc}, V_{DD} = 10 V_{dc}, I_D = 36 A_{dc}, R_G = 3 Ω)	$t_{d(on)}$	–	6.9	–	ns
Rise Time		t_r	–	1.3	–	
Turn−Off Delay Time		$t_{d(off)}$	–	18.4	–	
Fall Time		t_f	–	5.5	–	
Gate Charge	(V_{GS} = 5 V_{dc}, I_D = 36 A_{dc}, V_{DS} = 10 V_{dc}) (Note 3)	Q_T	–	13.2	–	nC
		Q_{GS}	–	3.3	–	
		Q_{DS}	–	6.5	–	
SOURCE−DRAIN DIODE CHARACTERISTICS						
Forward On−Voltage	(I_S = 20 A_{dc}, V_{GS} = 0 V_{dc}) (Note 3) (I_S = 20 A_{dc}, V_{GS} = 0 V_{dc}, T_J = 125°C)	V_{SD}	– –	0.86 0.73	1.2 –	V_{dc}
Reverse Recovery Time	(I_S = 36 A_{dc}, V_{GS} = 0 V_{dc}, dI_S/dt = 100 A/μs) (Note 3)	t_{rr}	–	15.6	–	ns
		t_a	–	13.8	–	
		t_b	–	1.78	–	
Reverse Recovery Stored Charge		Q_{RR}	–	0.004	–	μC

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

TYPICAL PERFORMANCE CURVES (T_J = 25°C unless otherwise noted)

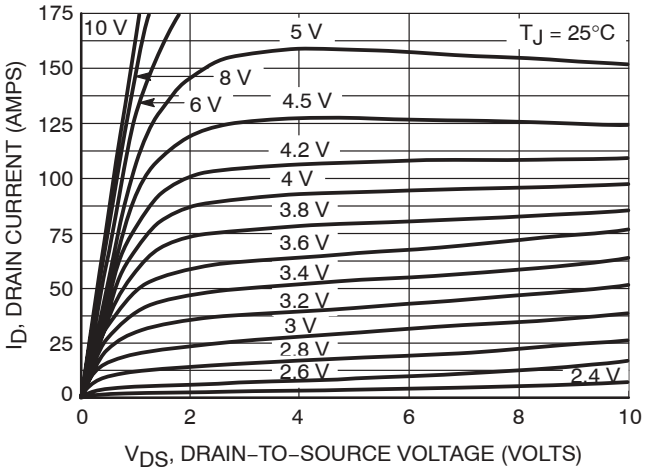


Figure 1. On−Region Characteristics

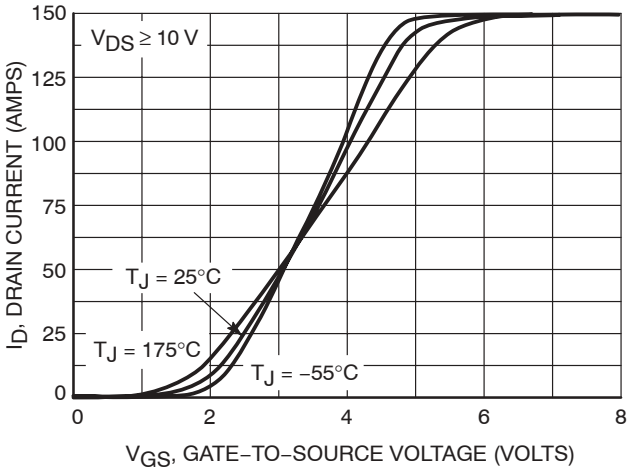


Figure 2. Transfer Characteristics

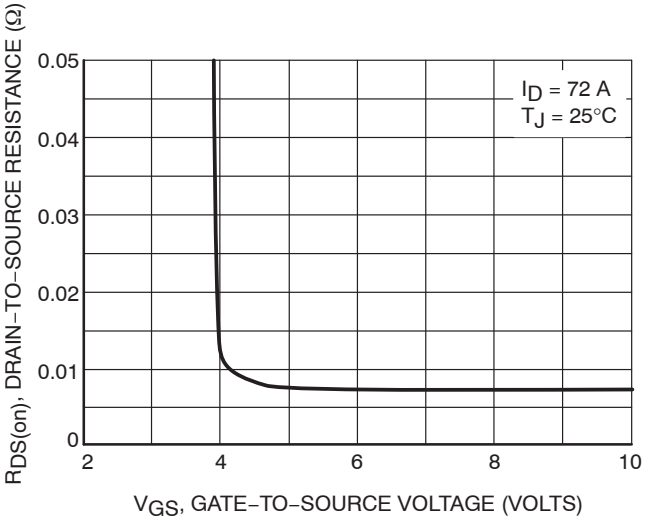


Figure 3. On−Resistance versus Gate−to−Source Voltage

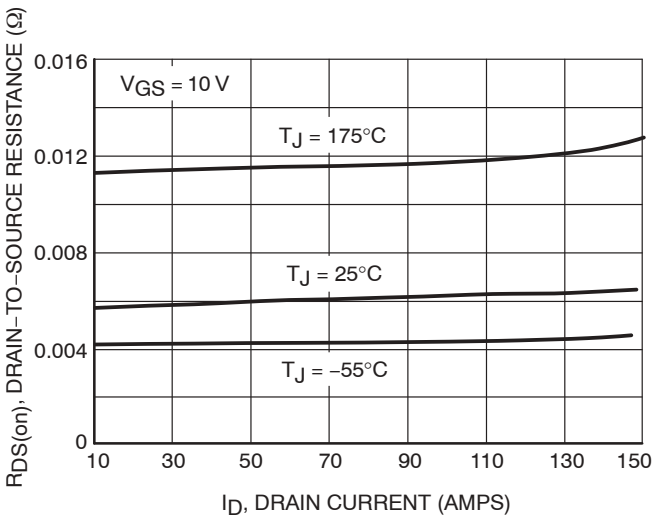


Figure 4. On−Resistance versus Drain Current and Gate Voltage

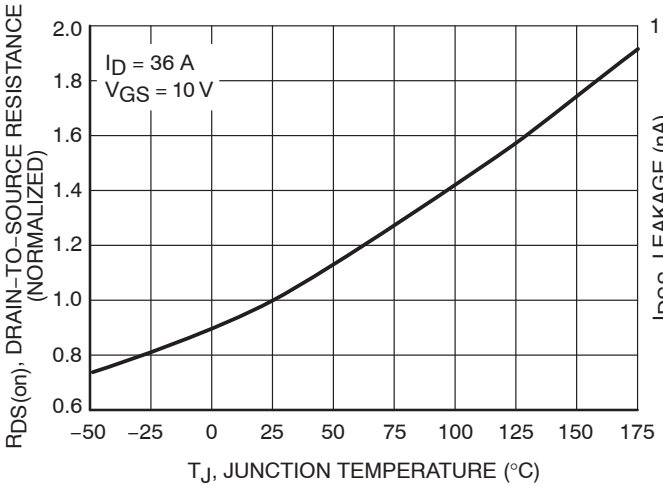


Figure 5. On−Resistance Variation with Temperature

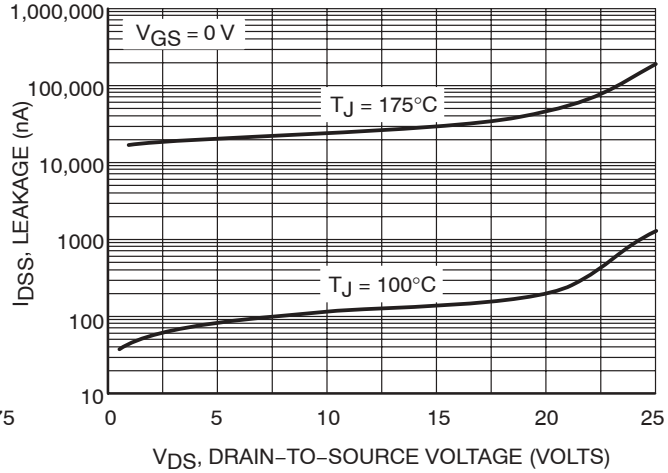


Figure 6. Drain−to−Source Leakage Current versus Voltage

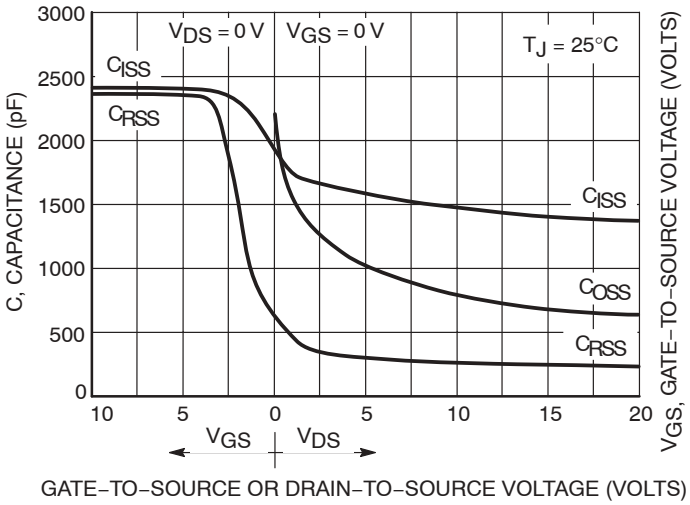


Figure 7. Capacitance Variation

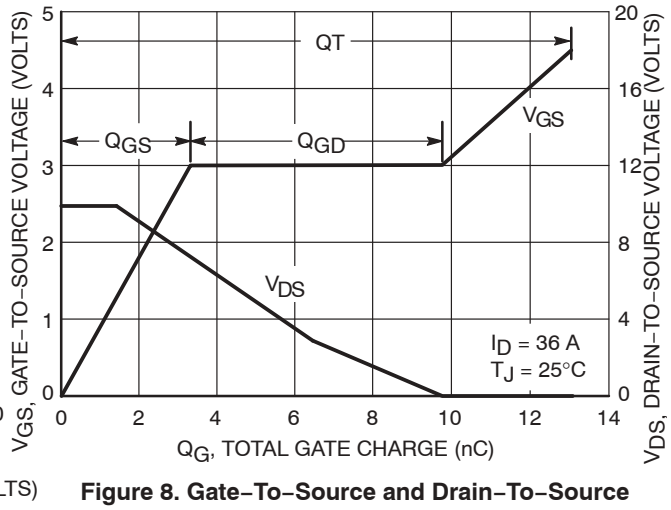


Figure 8. Gate−To−Source and Drain−To−Source Voltage versus Total Charge

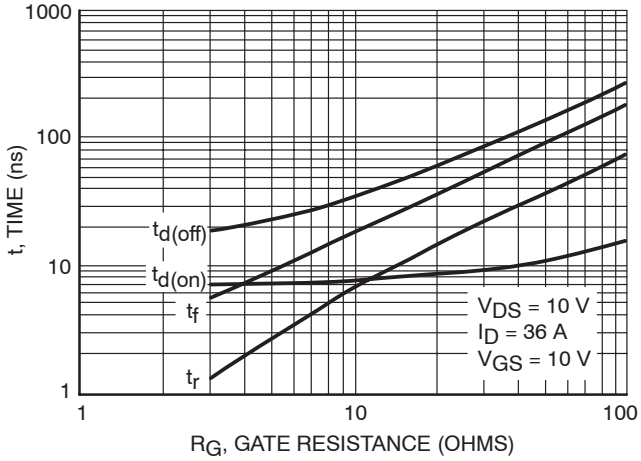


Figure 9. Resistive Switching Time Variation versus Gate Resistance

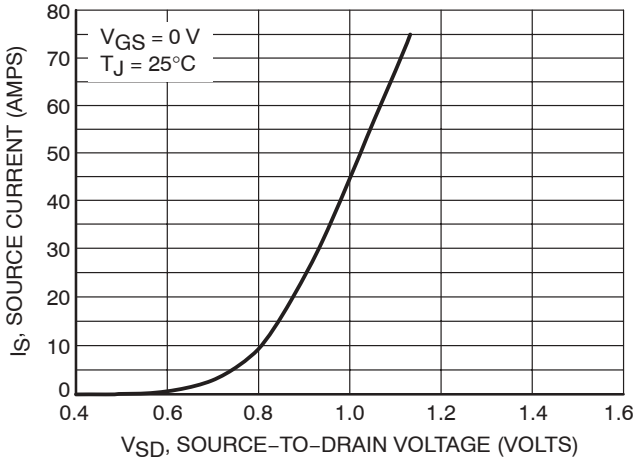


Figure 10. Diode Forward Voltage versus Current

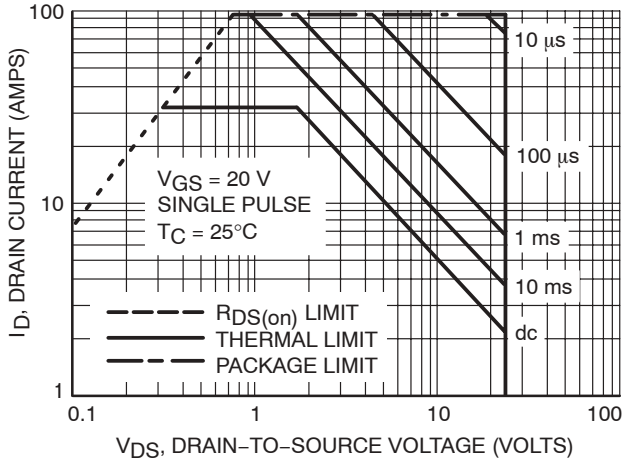


Figure 11. Maximum Rated Forward Biased Safe Operating Area

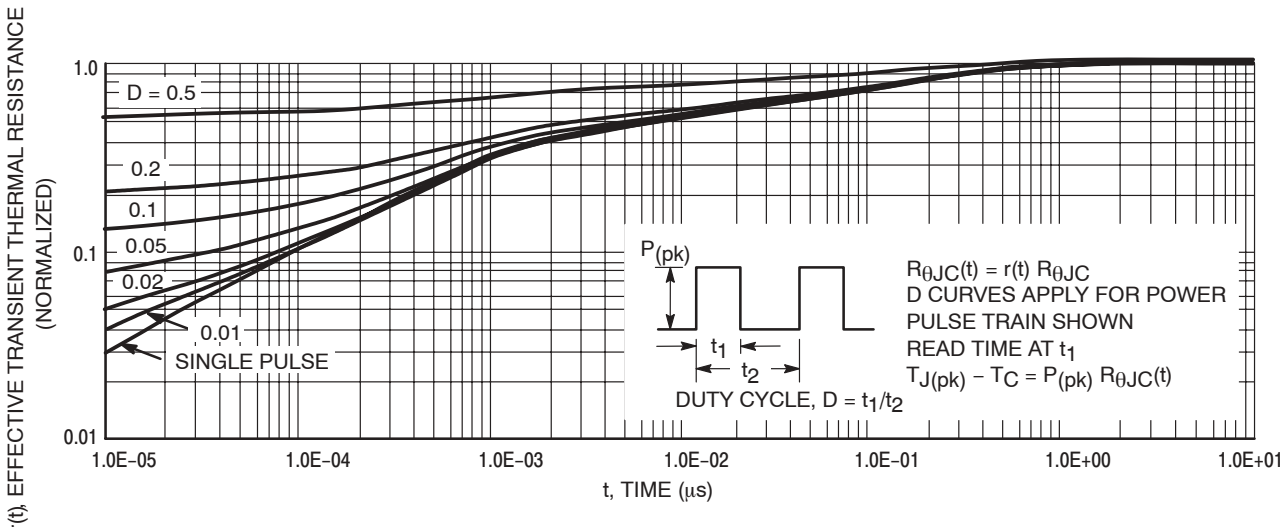


Figure 12. Thermal Response

ORDERING INFORMATION

Order Number	Package	Shipping†
NTD70N03R	DPAK−3	75 Units / Rail
NTD70N03RG	DPAK−3 (Pb−Free)	75 Units / Rail
NTD70N03RT4	DPAK−3	2500 / Tape & Reel
NTD70N03RT4G	DPAK−3 (Pb−Free)	2500 / Tape & Reel
NTD70N03R−1	DPAK−3 Straight Lead	75 Units / Rail
NTD70N03R−1G	DPAK−3 Straight Lead (Pb−Free)	75 Units / Rail
NTD70N03R−001	DPAK	75 Units / Rail
NTD70N03R−001G	DPAK (Pb−Free)	75 Units / Tubes

†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.