

# NTD5C632NL

## MOSFET – Single, N-Channel 60 V, 2.5 mΩ, 155 A

### Features

- Low  $R_{DS(on)}$  to Minimize Conduction Losses
- Low  $Q_G$  and Capacitance to Minimize Driver Losses
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

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

Parameter	Symbol	Value	Unit	
Drain-to-Source Voltage	$V_{DSS}$	60	V	
Gate-to-Source Voltage	$V_{GS}$	$\pm 20$	V	
Continuous Drain Current $R_{\theta JC}$ (Notes 1 & 3)	Steady State	$T_C = 25^\circ\text{C}$	155	A
		$T_C = 100^\circ\text{C}$	110	
Power Dissipation $R_{\theta JC}$ (Note 1)	Steady State	$T_C = 25^\circ\text{C}$	115	W
		$T_C = 100^\circ\text{C}$	58	
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2 & 3)	Steady State	$T_A = 25^\circ\text{C}$	29	A
		$T_A = 100^\circ\text{C}$	21	
Power Dissipation $R_{\theta JA}$ (Notes 1 & 2)	Steady State	$T_A = 25^\circ\text{C}$	4	W
		$T_A = 100^\circ\text{C}$	2	
Pulsed Drain Current	$T_A = 25^\circ\text{C}, t_p = 10 \mu\text{s}$	$I_{DM}$	900	A
Operating Junction and Storage Temperature	$T_J, T_{stg}$	-55 to 175	$^\circ\text{C}$	
Source Current (Body Diode)	$I_S$	96	A	
Single Pulse Drain-to-Source Avalanche Energy ( $I_{L(pk)} = 14.4 \text{ A}$ )	$E_{AS}$	363	mJ	
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	$T_L$	260	$^\circ\text{C}$	

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case (Drain) (Note 1)	$R_{\theta JC}$	1.3	$^\circ\text{C}/\text{W}$
Junction-to-Ambient - Steady State (Note 2)	$R_{\theta JA}$	37	

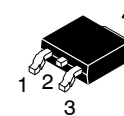
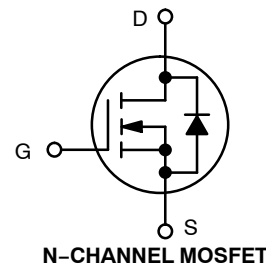
1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Surface-mounted on FR4 board using a 650 mm<sup>2</sup>, 2 oz. Cu pad.
3. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.



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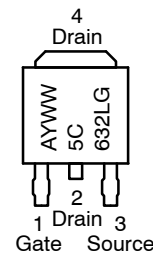
[www.onsemi.com](http://www.onsemi.com)

$V_{(BR)DSS}$	$R_{DS(on)}$	$I_D$
60 V	2.5 mΩ @ 10 V	155 A
	3.4 mΩ @ 4.5 V	



DPAK  
CASE 369C  
STYLE 2

### MARKING DIAGRAM & PIN ASSIGNMENT



- A = Assembly Location
- Y = Year
- WW = Work Week
- 5C632L = Device Code
- G = Pb-Free Package

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

# NTD5C632NL

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	60			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V <sub>(BR)DSS</sub> /T <sub>J</sub>			24		mV/°C
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 60 V	T <sub>J</sub> = 25°C		10	μA
			T <sub>J</sub> = 125°C		250	
Gate-to-Source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = 20 V			100	nA

### ON CHARACTERISTICS (Note 4)

Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250 μA	1.2		2.1	V
Negative Threshold Temperature Coefficient	V <sub>GS(TH)</sub> /T <sub>J</sub>			5.8		mV/°C
Drain-to-Source On Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 50 A		2.1	2.5	mΩ
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 50 A		2.7	3.4	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = 3 V, I <sub>D</sub> = 50 A		185		S

### CHARGES, CAPACITANCES AND GATE RESISTANCES

Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, f = 1.0 MHz, V <sub>DS</sub> = 25 V		5700		pF
Output Capacitance	C <sub>oss</sub>			2800		
Reverse Transfer Capacitance	C <sub>rss</sub>			36		
Total Gate Charge	Q <sub>G(TOT)</sub>	V <sub>DS</sub> = 30 V, I <sub>D</sub> = 50 A	V <sub>GS</sub> = 4.5 V	34		nC
			V <sub>GS</sub> = 10 V	78		
Total Gate Charge	Q <sub>G(TOT)</sub>	V <sub>GS</sub> = 4.5 V, V <sub>DS</sub> = 30 V, I <sub>D</sub> = 50 A		34.0		nC
Threshold Gate Charge	Q <sub>G(TH)</sub>			9.5		
Gate-to-Source Charge	Q <sub>GS</sub>			16.8		
Gate-to-Drain Charge	Q <sub>GD</sub>			6.1		
Plateau Voltage	V <sub>GP</sub>			3.1		
Gate Resistance	R <sub>G</sub>			0.7		Ω

### SWITCHING CHARACTERISTICS (Note 5)

Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>GS</sub> = 4.5 V, V <sub>DS</sub> = 30 V, I <sub>D</sub> = 50 A, R <sub>G</sub> = 2.5 Ω		20		ns
Rise Time	t <sub>r</sub>			126		
Turn-Off Delay Time	t <sub>d(off)</sub>			65		
Fall Time	t <sub>f</sub>			121		

### DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 50 A	T <sub>J</sub> = 25°C	0.8	1.2	V
			T <sub>J</sub> = 125°C	0.7		
Reverse Recovery Time	t <sub>RR</sub>	V <sub>GS</sub> = 0 V, dI <sub>S</sub> /dt = 100 A/μs, I <sub>S</sub> = 50 A		71		ns
Charge Time	t <sub>a</sub>			36		
Discharge Time	t <sub>b</sub>			36		
Reverse Recovery Charge	Q <sub>RR</sub>			110		

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

TYPICAL CHARACTERISTICS

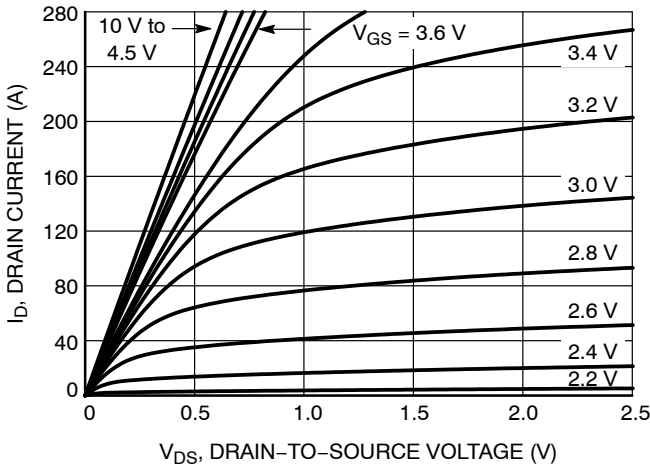


Figure 1. On-Region Characteristics

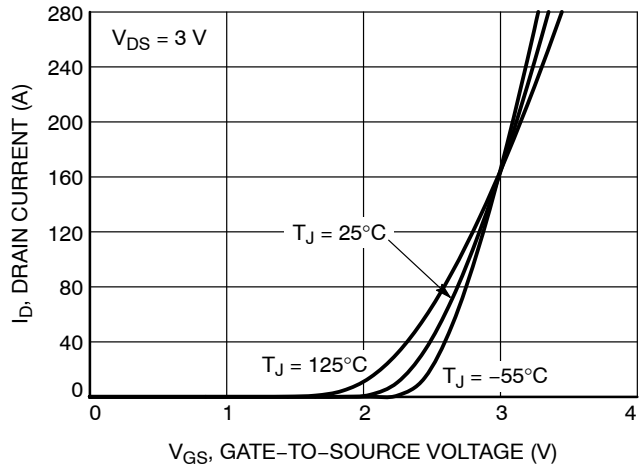


Figure 2. Transfer Characteristics

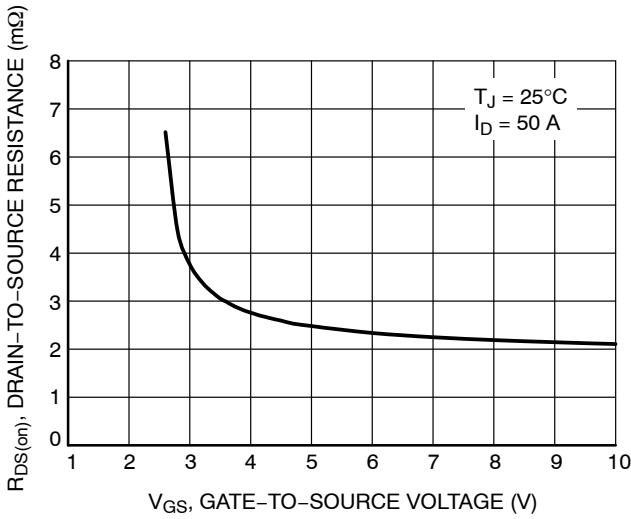


Figure 3. On-Resistance vs. Gate-to-Source Voltage

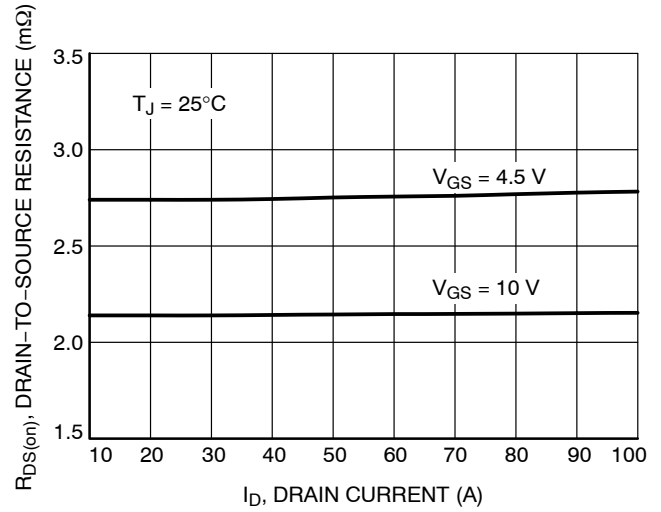


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

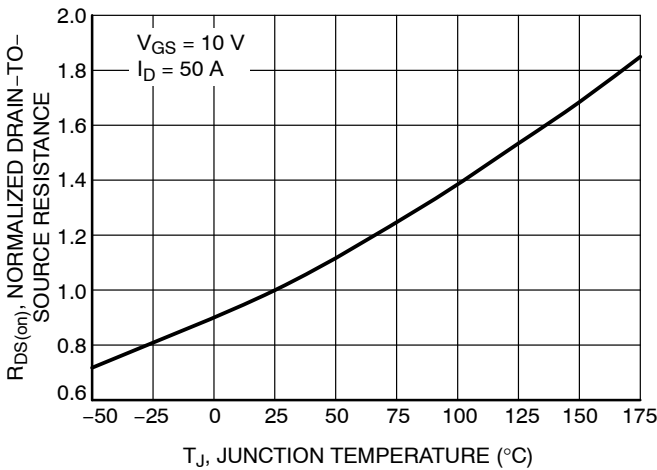


Figure 5. On-Resistance Variation with Temperature

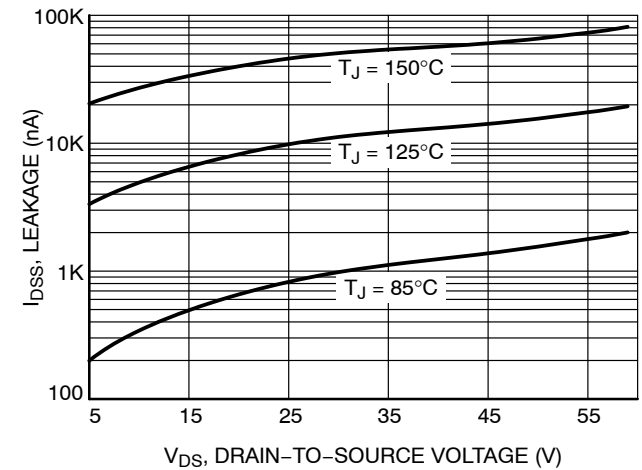
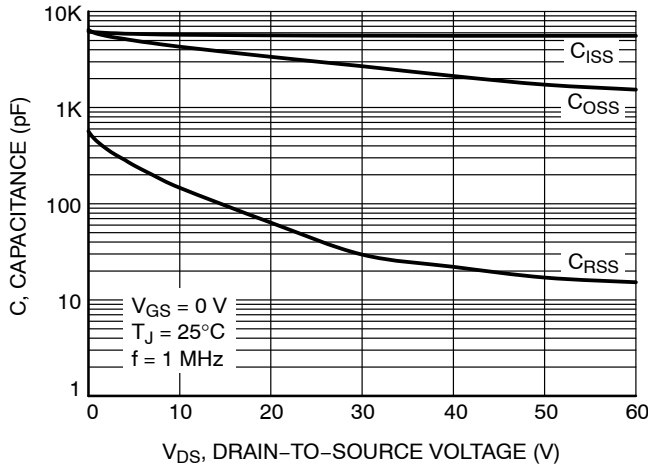


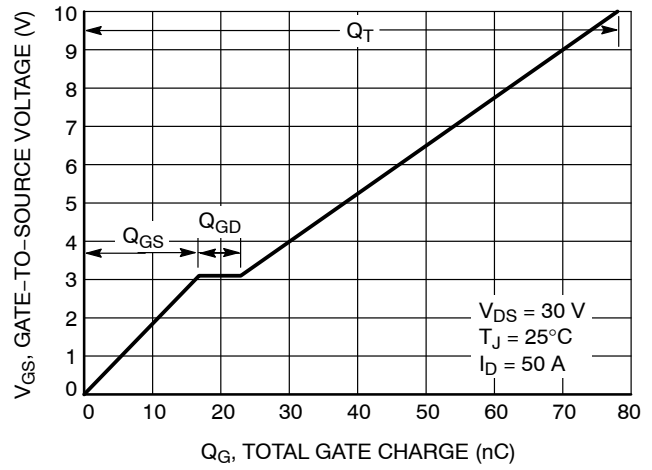
Figure 6. Drain-to-Source Leakage Current vs. Voltage

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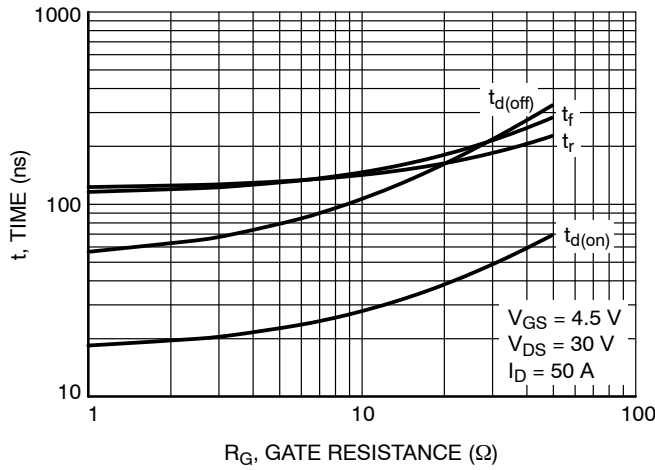
## TYPICAL CHARACTERISTICS



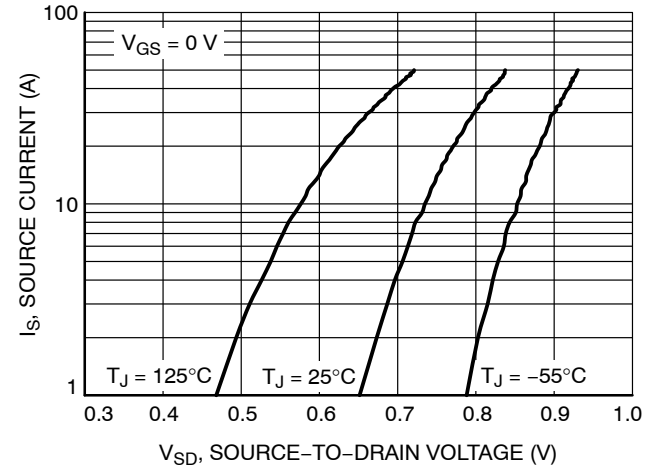
**Figure 7. Capacitance Variation**



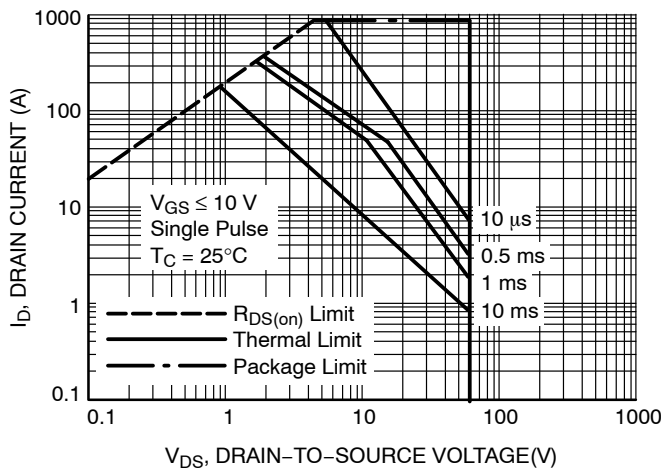
**Figure 8. Gate-to-Source Voltage vs. Total Charge**



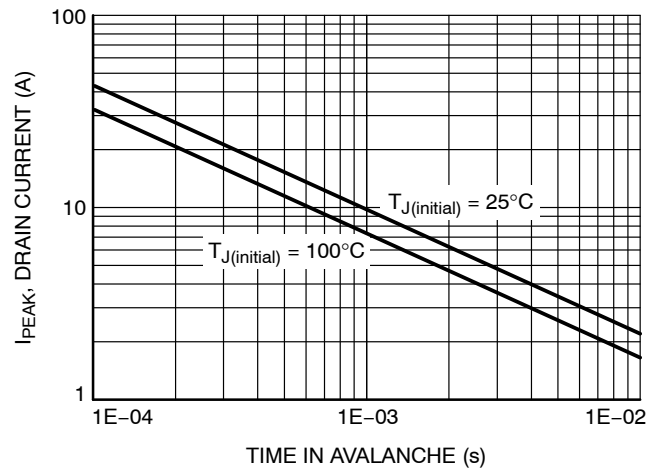
**Figure 9. Resistive Switching Time Variation vs. Gate Resistance**



**Figure 10. Diode Forward Voltage vs. Current**



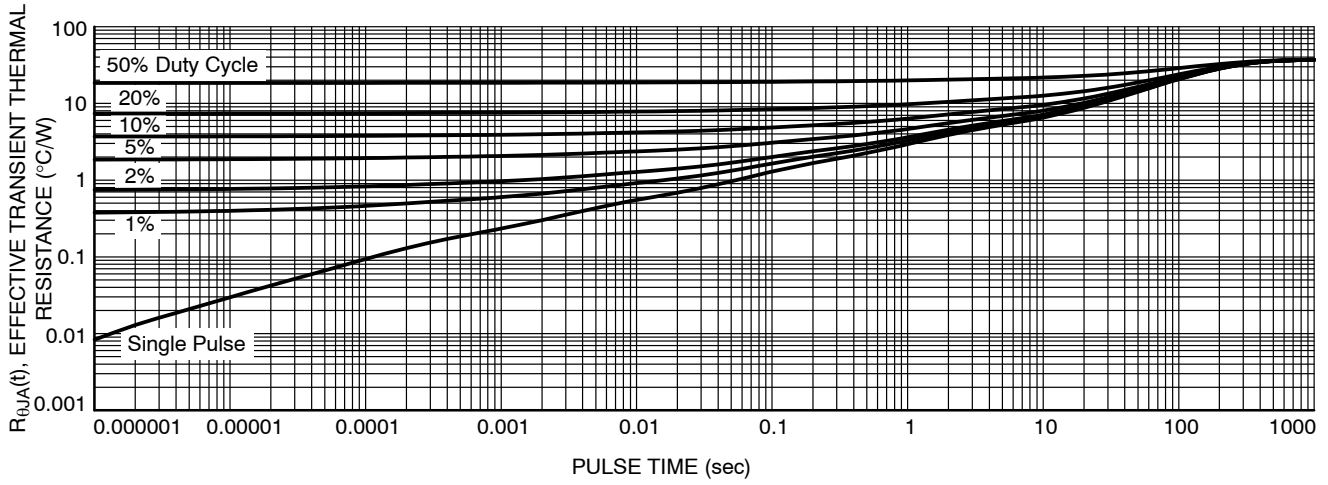
**Figure 11. Maximum Rated Forward Biased Safe Operating Area**



**Figure 12. Maximum Drain Current vs. Time in Avalanche**

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## TYPICAL CHARACTERISTICS



**Figure 13. Thermal Response**

### ORDERING INFORMATION

Order Number	Package	Shipping <sup>†</sup>
NTD5C632NLT4G	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.



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