

NTZD3155C

Small Signal MOSFET

Complementary 20 V, 540 mA / -430 mA,
with ESD protection, SOT-563 package.

Features

- Leading Trench Technology for Low $R_{DS(on)}$ Performance
- High Efficiency System Performance
- Low Threshold Voltage
- ESD Protected Gate
- Small Footprint 1.6 x 1.6 mm
- These are Pb-Free Devices

Applications

- DC-DC Conversion Circuits
- Load/Power Switching with Level Shift
- Single or Dual Cell Li-Ion Battery Operated Systems
- High Speed Circuits
- Cell Phones, MP3s, Digital Cameras, and PDAs

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

Parameter		Symbol	Value	Unit
Drain-to-Source Voltage		V_{DSS}	20	V
Gate-to-Source Voltage		V_{GS}	± 6	V
N-Channel Continuous Drain Current (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	540	mA
			390	
	$t \leq 5 \text{ s}$	$T_A = 25^\circ\text{C}$	570	
			-430	
P-Channel Continuous Drain Current (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	-310	mA
			-455	
	$t \leq 5 \text{ s}$	$T_A = 25^\circ\text{C}$	-455	
			-455	
Power Dissipation (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	250	mW
			280	
Pulsed Drain Current	N-Channel	$t_p = 10 \mu\text{s}$	1500	mA
	P-Channel		-750	
Operating Junction and Storage Temperature		T_J, T_{STG}	-55 to 150	$^\circ\text{C}$
Source Current (Body Diode)		I_S	350	mA
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		T_L	260	$^\circ\text{C}$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Surface-mounted on FR4 board using 1 in sq. pad size (Cu area = 1.127 in sq [1 oz] including traces).

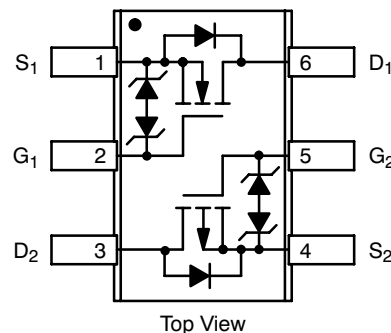
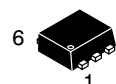


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$V_{(BR)DSS}$	$R_{DS(on)}$ Typ	I_D Max (Note 1)
N-Channel 20 V	0.4 Ω @ 4.5 V	540 mA
	0.5 Ω @ 2.5 V	
	0.7 Ω @ 1.8 V	
P-Channel -20 V	0.5 Ω @ -4.5 V	-430 mA
	0.6 Ω @ -2.5 V	
	1.0 Ω @ -1.8 V	

PINOUT: SOT-563



SOT-563-6
CASE 463A

MARKING DIAGRAM



TW = Specific Device Code
M = Date Code
■ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
NTZD3155CT1G	SOT-563 (Pb-Free)	4000 / Tape & Reel
NTZD3155CT2G	SOT-563 (Pb-Free)	4000 / Tape & Reel
NTZD3155CT5G	SOT-563 (Pb-Free)	8000 / Tape & Reel

†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.

NTZD3155C

Thermal Resistance Ratings

Parameter	Symbol	Max	Unit
Junction-to-Ambient – Steady State (Note 2)	$R_{\theta JA}$	500	$^{\circ}\text{C/W}$
Junction-to-Ambient – $t = 5 \text{ s}$ (Note 2)		447	

2. Surface mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces).

ELECTRICAL CHARACTERISTICS ($T_J = 25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	N/P	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	N	$V_{GS} = 0 \text{ V}$	$I_D = 250 \mu\text{A}$	20		V
		P		$I_D = -250 \mu\text{A}$	-20		
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$				18		mV/ $^{\circ}\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	N	$V_{GS} = 0 \text{ V}, V_{DS} = 16 \text{ V}$	$T_J = 25^{\circ}\text{C}$		1.0	μA
		P	$V_{GS} = 0 \text{ V}, V_{DS} = -16 \text{ V}$			-1.0	
		N	$V_{GS} = 0 \text{ V}, V_{DS} = 16 \text{ V}$	$T_J = 125^{\circ}\text{C}$		2.0	μA
		P	$V_{GS} = 0 \text{ V}, V_{DS} = -16 \text{ V}$			-5.0	
Gate-to-Source Leakage Current	I_{GSS}	P	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 4.5 \text{ V}$			± 2.0	μA
		N				± 5.0	

ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	$V_{GS(TH)}$	N	$V_{GS} = V_{DS}$	$I_D = 250 \mu\text{A}$	0.45	1.0	V
		P		$I_D = -250 \mu\text{A}$	-0.45	-1.0	
Gate Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				-1.9		-mV/ $^{\circ}\text{C}$
Drain-to-Source On Resistance	$R_{DS(on)}$	N	$V_{GS} = 4.5 \text{ V}, I_D = 540 \text{ mA}$		0.4	0.55	Ω
		P	$V_{GS} = -4.5 \text{ V}, I_D = -430 \text{ mA}$		0.5	0.9	
		N	$V_{GS} = 2.5 \text{ V}, I_D = 500 \text{ mA}$		0.5	0.7	
		P	$V_{GS} = -2.5 \text{ V}, I_D = -300 \text{ mA}$		0.6	1.2	
		N	$V_{GS} = 1.8 \text{ V}, I_D = 350 \text{ mA}$		0.7	0.9	
		P	$V_{GS} = -1.8 \text{ V}, I_D = -150 \text{ mA}$		1.0	2.0	
Forward Transconductance	g_{FS}	N	$V_{DS} = 10 \text{ V}, I_D = 540 \text{ mA}$		1.0		S
		P	$V_{DS} = -10 \text{ V}, I_D = -430 \text{ mA}$		1.0		

CHARGES, CAPACITANCES AND GATE RESISTANCE

Input Capacitance	C_{ISS}	N	$f = 1 \text{ MHz}, V_{GS} = 0 \text{ V}$ $V_{DS} = 16 \text{ V}$		80	150	pF
Output Capacitance	C_{OSS}				13	25	
Reverse Transfer Capacitance	C_{RSS}				10	20	
Input Capacitance	C_{ISS}	P	$f = 1 \text{ MHz}, V_{GS} = 0 \text{ V}$ $V_{DS} = -16 \text{ V}$		105	175	
Output Capacitance	C_{OSS}				15	30	
Reverse Transfer Capacitance	C_{RSS}				10	20	

3. Pulse Test: pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2\%$

NTZD3155C

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	N/P	Test Condition	Min	Typ	Max	Unit
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CHARGES, CAPACITANCES AND GATE RESISTANCE

Total Gate Charge	$Q_{G(TOT)}$	N	$V_{GS} = 4.5\text{ V}, V_{DS} = -10\text{ V}; I_D = 540\text{ mA}$		1.5	2.5	nC
Threshold Gate Charge	$Q_{G(TH)}$				0.1		
Gate-to-Source Charge	Q_{GS}				0.2		
Gate-to-Drain Charge	Q_{GD}				0.35		
Total Gate Charge	$Q_{G(TOT)}$	P	$V_{GS} = -4.5\text{ V}, V_{DS} = 10\text{ V}; I_D = -380\text{ mA}$		1.7	2.5	
Threshold Gate Charge	$Q_{G(TH)}$				0.1		
Gate-to-Source Charge	Q_{GS}				0.3		
Gate-to-Drain Charge	Q_{GD}				0.4		

SWITCHING CHARACTERISTICS ($V_{GS} = V$) (Note 4)

Turn-On Delay Time	$t_{d(ON)}$	N	$V_{GS} = 4.5\text{ V}, V_{DD} = -10\text{ V}, I_D = 540\text{ mA}, R_G = 10\ \Omega$		6.0		ns
Rise Time	t_r				4.0		
Turn-Off Delay Time	$t_{d(OFF)}$				16		
Fall Time	t_f				8.0		
Turn-On Delay Time	$t_{d(ON)}$	P	$V_{GS} = -4.5\text{ V}, V_{DD} = 10\text{ V}, I_D = -215\text{ mA}, R_G = 10\ \Omega$		10		
Rise Time	t_r				12		
Turn-Off Delay Time	$t_{d(OFF)}$				35		
Fall Time	t_f				19		

Drain-Source Diode Characteristics

Forward Diode Voltage	V_{SD}	N	$V_{GS} = 0\text{ V}, T_J = 25^\circ\text{C}$	$I_S = 350\text{ mA}$		0.7	1.2	V
		P		$I_S = -350\text{ mA}$		-0.8	-1.2	
Reverse Recovery Time	t_{RR}	N	$V_{GS} = 0\text{ V}, dI_S/dt = 100\text{ A}/\mu\text{s}$	$I_S = 350\text{ mA}$		6.5		ns
		P		$I_S = -350\text{ mA}$		13		

4. Switching characteristics are independent of operating junction temperatures

N-CHANNEL TYPICAL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

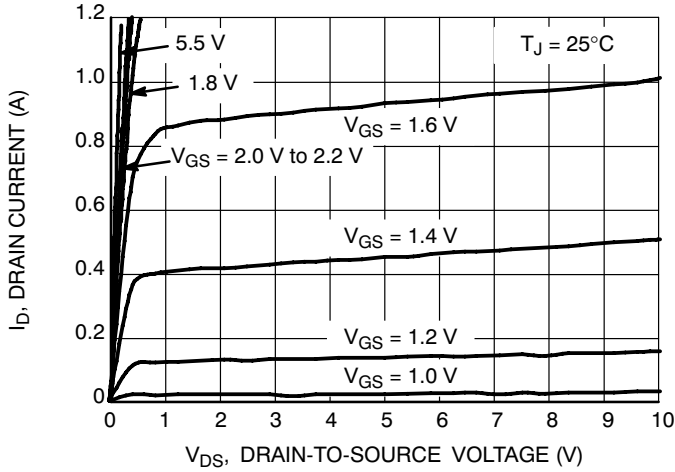


Figure 1. On-Region Characteristics

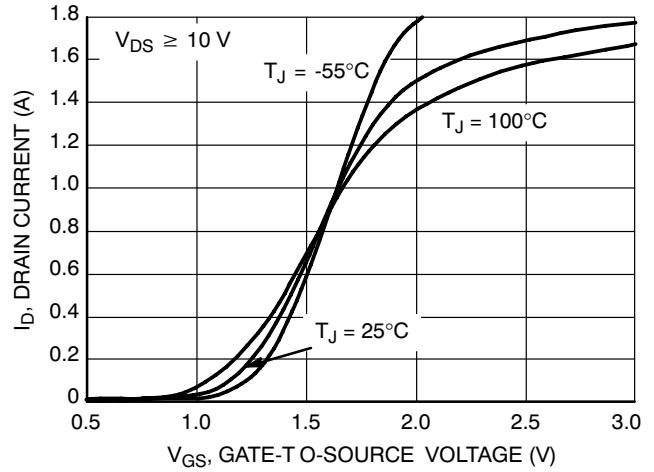


Figure 2. Transfer Characteristics

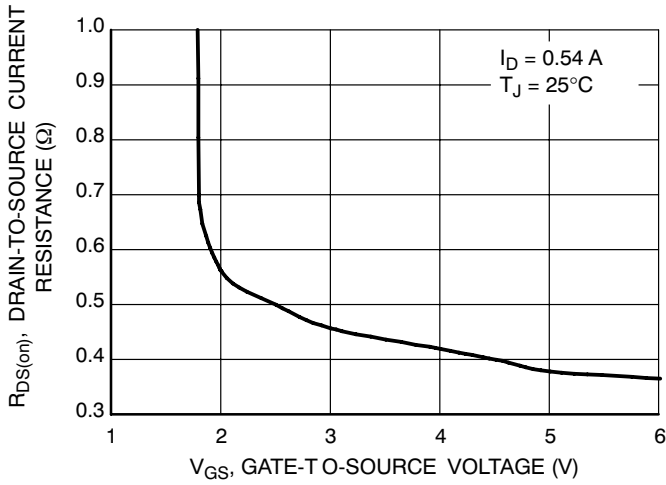


Figure 3. On-Resistance versus Gate-to-Source Voltage

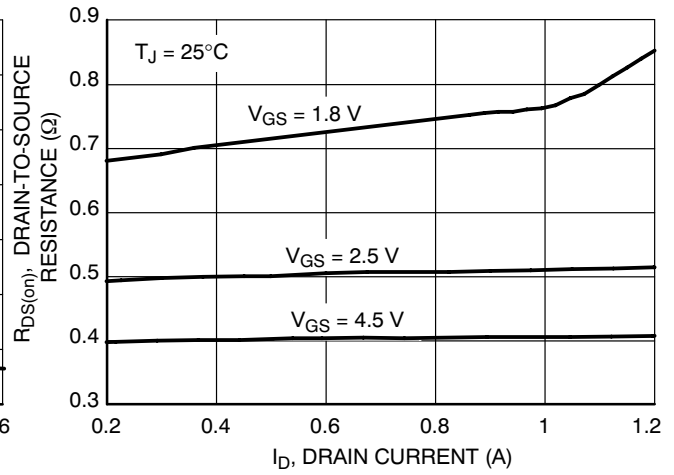


Figure 4. On-Resistance versus Drain Current and Gate Voltage

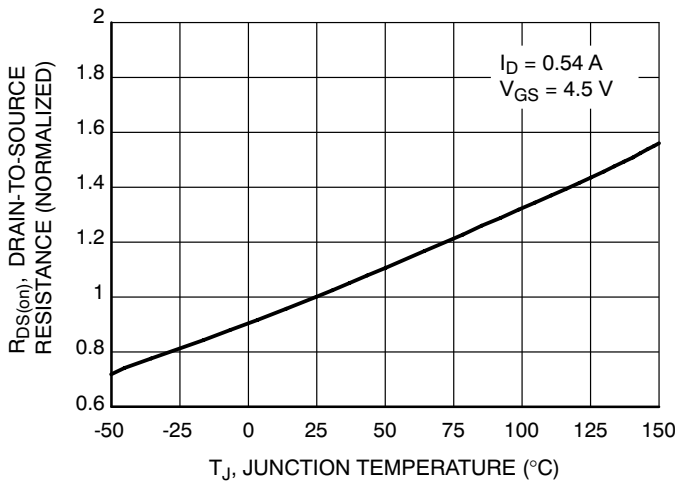


Figure 5. On-Resistance Variation with Temperature

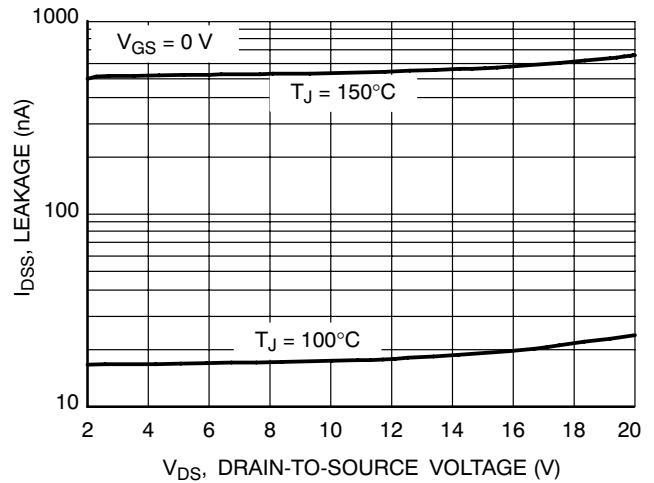


Figure 6. Drain-to-Source Leakage Current versus Voltage

N-CHANNEL TYPICAL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

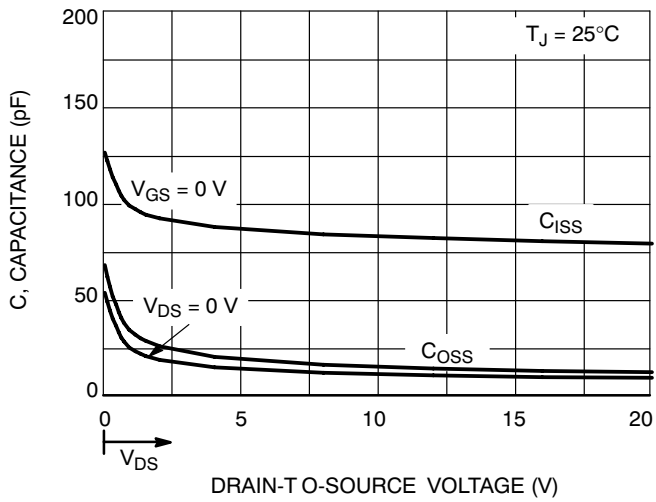


Figure 7. Capacitance Variation

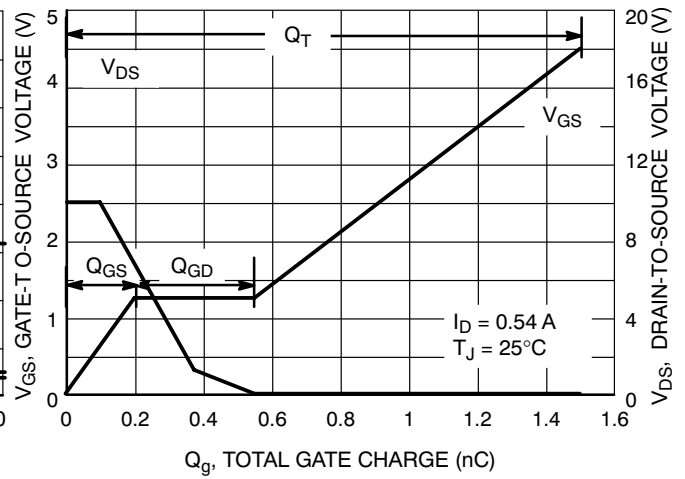


Figure 8. Gate-to-Source and Drain-to-Source Voltage versus Total Charge

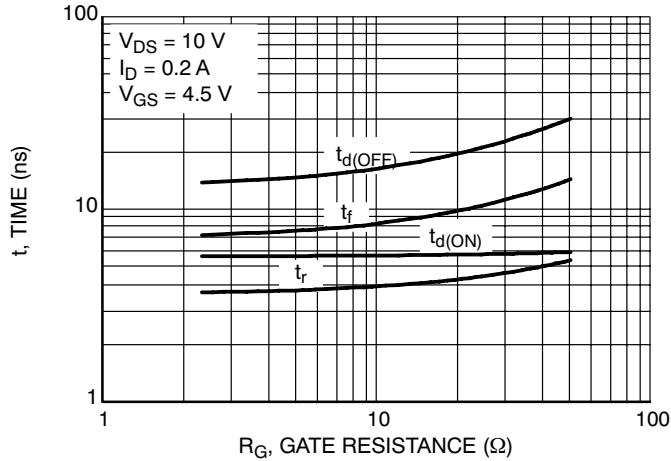


Figure 9. Resistive Switching Time Variation versus Gate Resistance

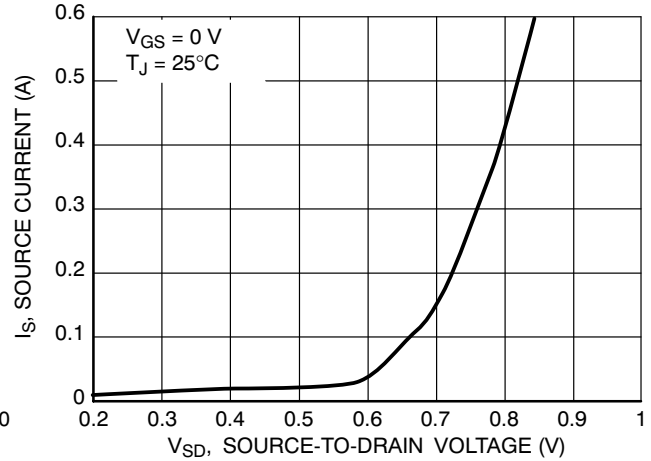


Figure 10. Diode Forward Voltage versus Current

P-CHANNEL TYPICAL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

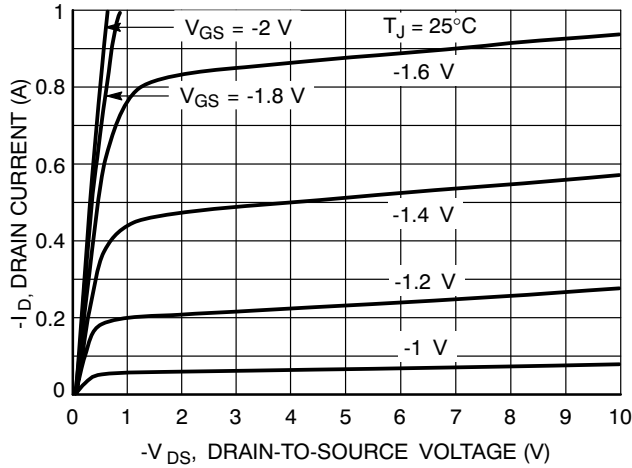


Figure 1. On-Region Characteristics

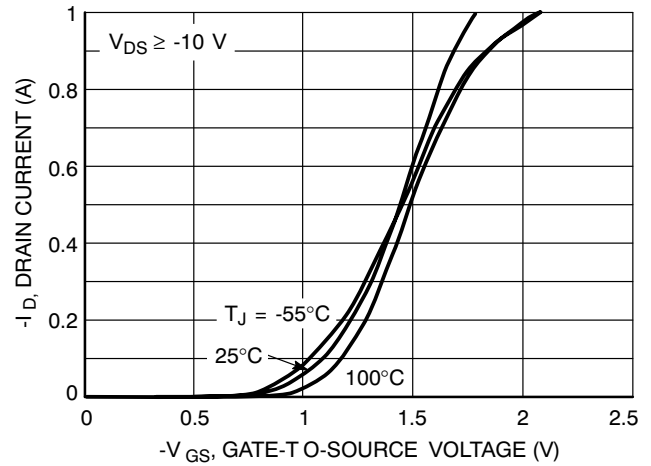


Figure 2. Transfer Characteristics

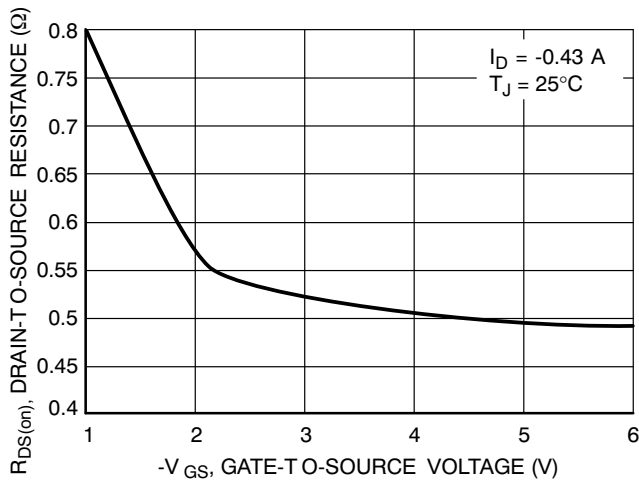


Figure 3. On-Resistance vs. Gate-to-Source Voltage

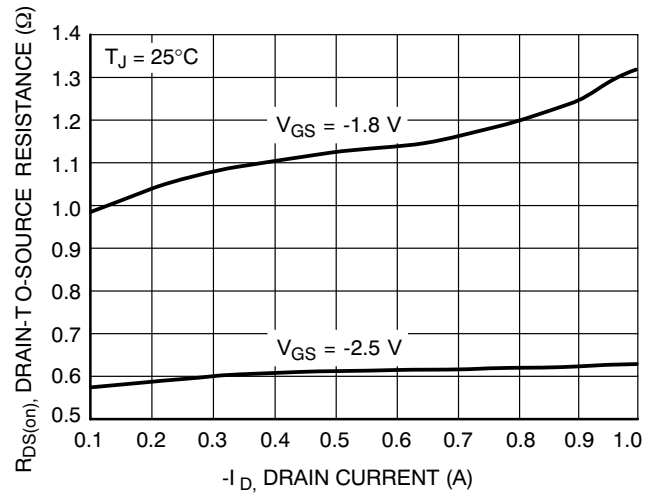


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

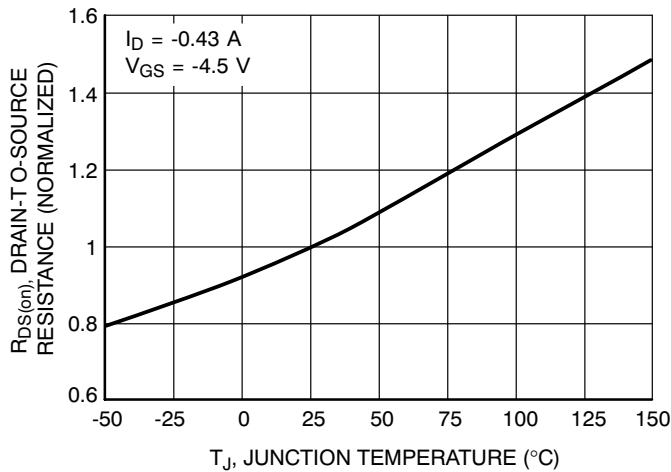


Figure 5. On-Resistance Variation with Temperature

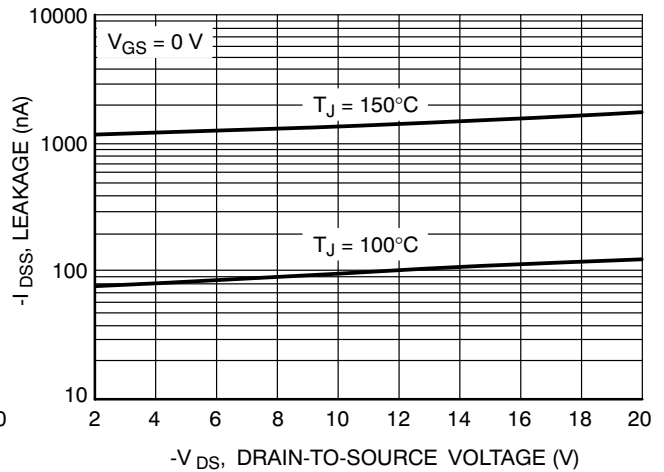
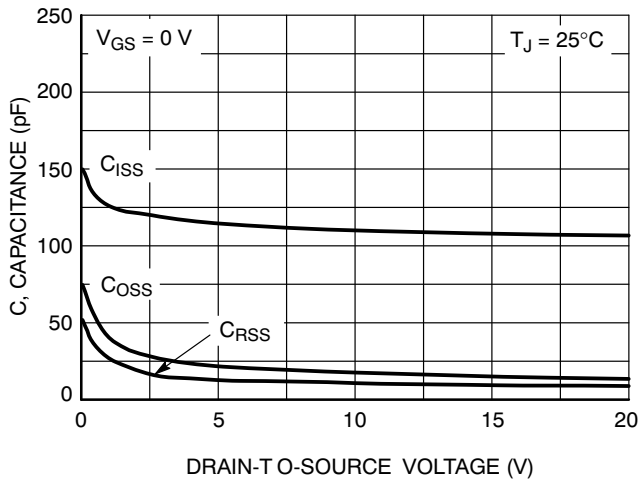
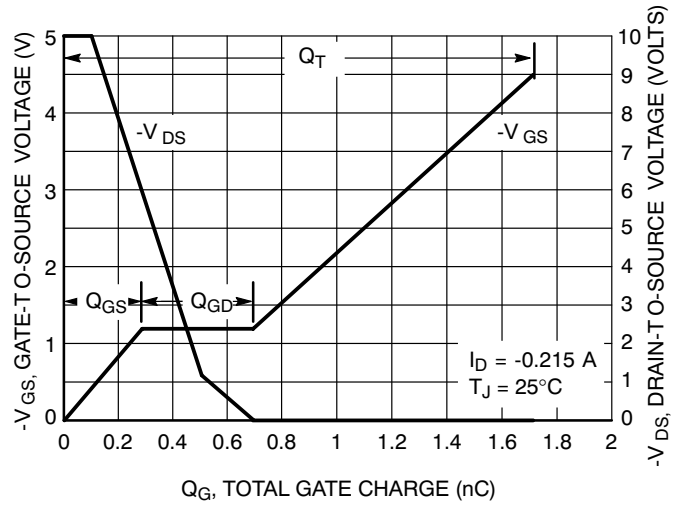
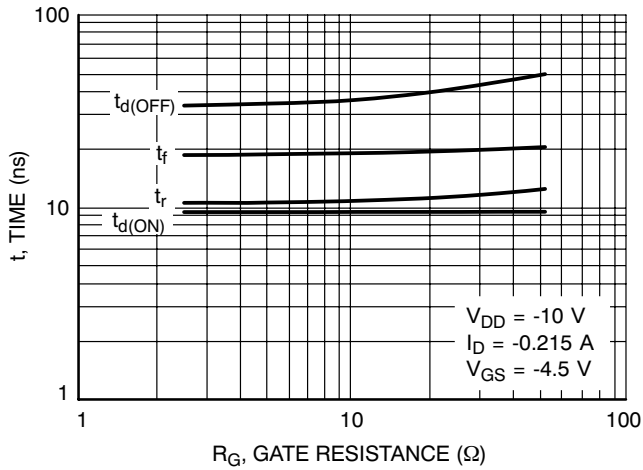
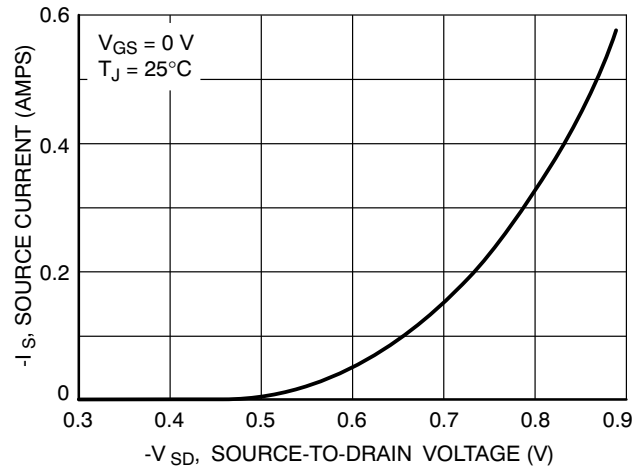


Figure 6. Drain-to-Source Leakage Current vs. Voltage

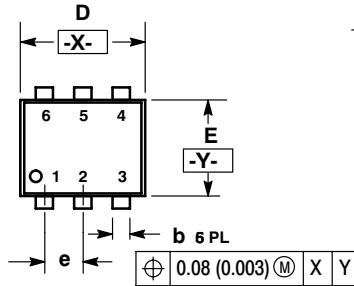
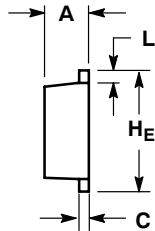
P-CHANNEL TYPICAL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)



NTZD3155C

PACKAGE DIMENSIONS

SOT-563, 6 LEAD
CASE 463A-01
ISSUE F

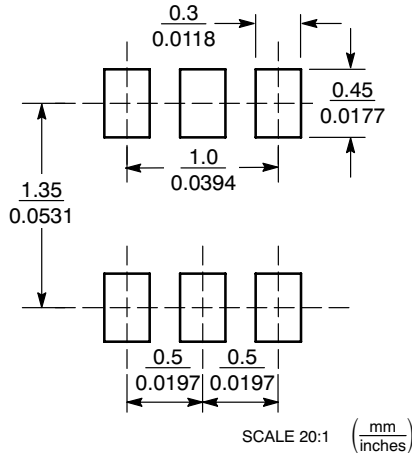


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.50	0.55	0.60	0.020	0.021	0.023
b	0.17	0.22	0.27	0.007	0.009	0.011
C	0.08	0.12	0.18	0.003	0.005	0.007
D	1.50	1.60	1.70	0.059	0.062	0.066
E	1.10	1.20	1.30	0.043	0.047	0.051
e	0.5 BSC			0.02 BSC		
L	0.10	0.20	0.30	0.004	0.008	0.012
H_E	1.50	1.60	1.70	0.059	0.062	0.066

SOLDERING FOOTPRINT*



*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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