

NTR4101P, NTRV4101P

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	170	°C/W
Junction-to-Ambient – $t < 10$ s (Note 1)	$R_{\theta JA}$	100	
Junction-to-Ambient – Steady State (Note 2)	$R_{\theta JA}$	300	

1. Surface-mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces)
2. Surface-mounted on FR4 board using the minimum recommended pad size.
3. ESD Rating Information: HBM Class 0

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

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage (Note 4) ($V_{GS} = 0$ V, $I_D = -250$ μA)	$V_{(BR)DSS}$	-20			V
Zero Gate Voltage Drain Current (Note 4) ($V_{GS} = 0$ V, $V_{DS} = -16$ V)	I_{DSS}			-1.0	μA
Gate-to-Source Leakage Current ($V_{GS} = \pm 8.0$ V, $V_{DS} = 0$ V)	I_{GSS}			± 100	nA

ON CHARACTERISTICS

Gate Threshold Voltage (Note 4) ($V_{GS} = V_{DS}$, $I_D = -250$ μA)	$V_{GS(th)}$	-0.4	-0.72	-1.2	V
Drain-to-Source On-Resistance ($V_{GS} = -4.5$ V, $I_D = -1.6$ A) ($V_{GS} = -2.5$ V, $I_D = -1.3$ A) ($V_{GS} = -1.8$ V, $I_D = -0.9$ A)	$R_{DS(on)}$		70 90 112	85 120 210	m Ω
Forward Transconductance ($V_{DS} = -5.0$ V, $I_D = -2.3$ A)	g_{FS}		7.5		S

CHARGES, CAPACITANCES & GATE RESISTANCE

Input Capacitance	(V _{GS} = 0 V, f = 1 MHz, V _{DS} = -10 V)	C_{iss}		675		pF
Output Capacitance		C_{oss}		100		
Reverse Transfer Capacitance		C_{rss}		75		
Total Gate Charge	(V _{GS} = -4.5 V, V _{DS} = -10 V, I _D = -1.6 A)	$Q_{G(tot)}$		7.5	8.5	nC
Gate-to-Source Gate Charge	(V _{DS} = -10 V, I _D = -1.6 A)	Q_{GS}		1.2		nC
Gate-to-Drain "Miller" Charge	(V _{DS} = -10 V, I _D = -1.6 A)	Q_{GD}		2.2		nC
Gate Resistance		R_G		6.5		Ω

SWITCHING CHARACTERISTICS (Note 5)

Turn-On Delay Time	(V _{GS} = -4.5 V, V _{DS} = -10 V, I _D = -1.6 A, R _G = 6.0 Ω)	$t_{d(on)}$		7.5		ns
Rise Time		t_r		12.6		
Turn-Off Delay Time		$t_{d(off)}$		30.2		
Fall Time		t_f		21.0		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	(V _{GS} = 0 V, I _S = -2.4 A)	V_{SD}		-0.82	-1.2	V
Reverse Recovery Time	(V _{GS} = 0 V, dI _{SD} /dt = 100 A/ μs , I _S = -1.6 A)	t_{rr}		12.8	15	ns
Charge Time		t_a		9.9		ns
Discharge Time		t_b		3.0		ns
Reverse Recovery Charge		Q_{rr}		1008		nC

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

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

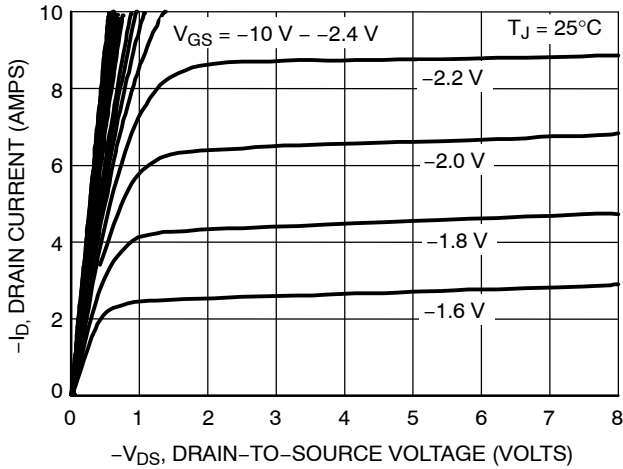


Figure 1. On-Region Characteristics

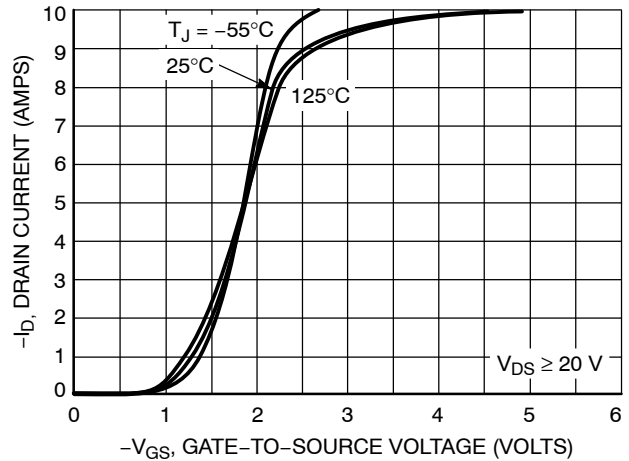


Figure 2. Transfer Characteristics

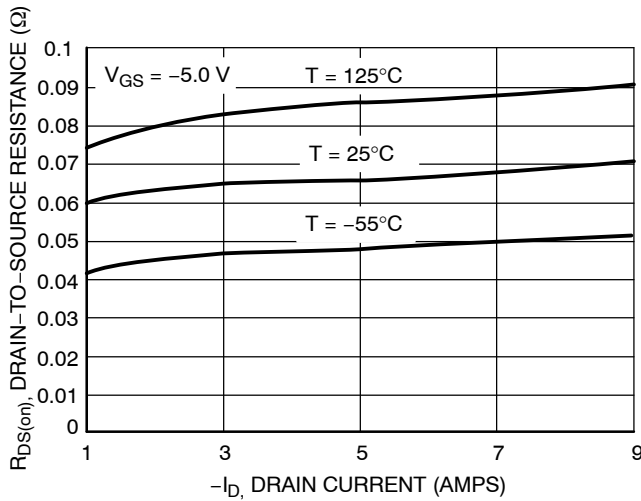


Figure 3. On-Resistance vs. Drain Current and Temperature

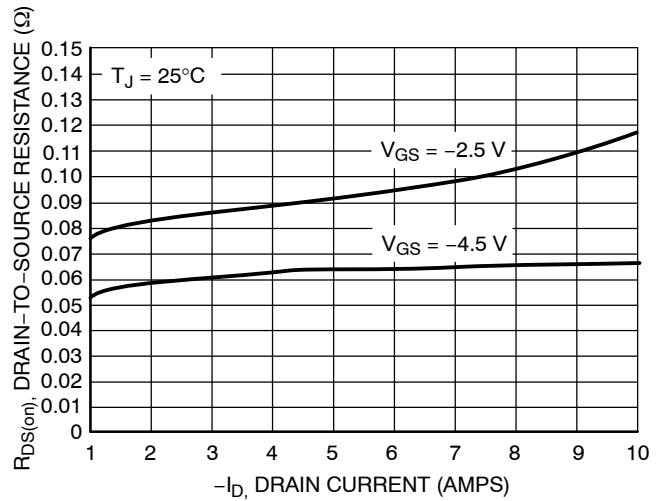


Figure 4. On-Resistance vs. Drain Current and Temperature

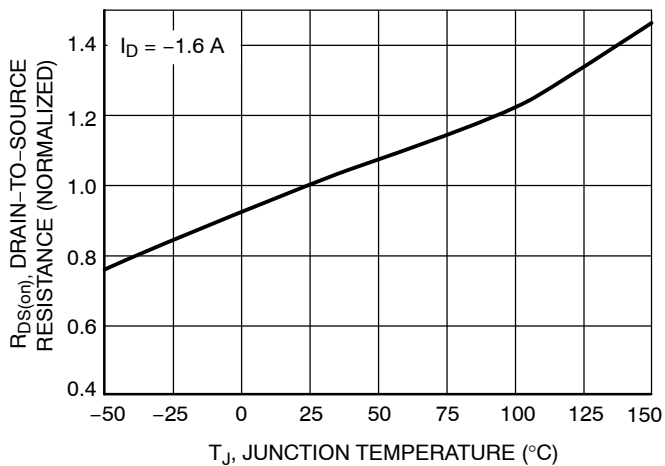


Figure 5. On-Resistance Variation with Temperature

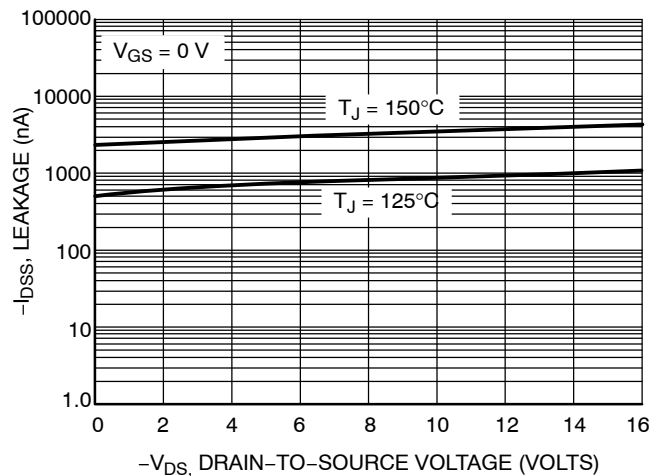


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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

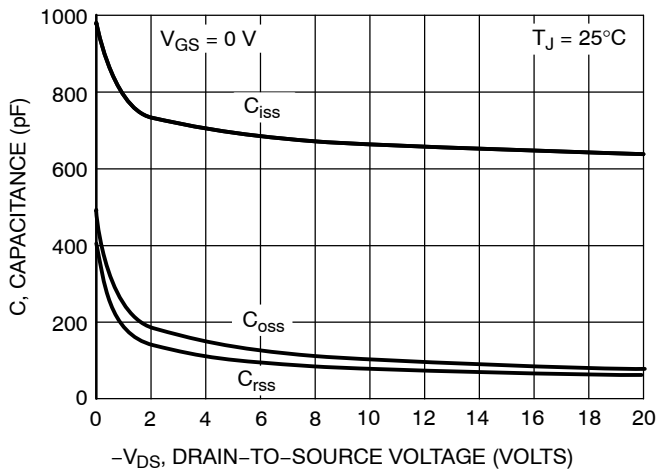


Figure 7. Capacitance Variation

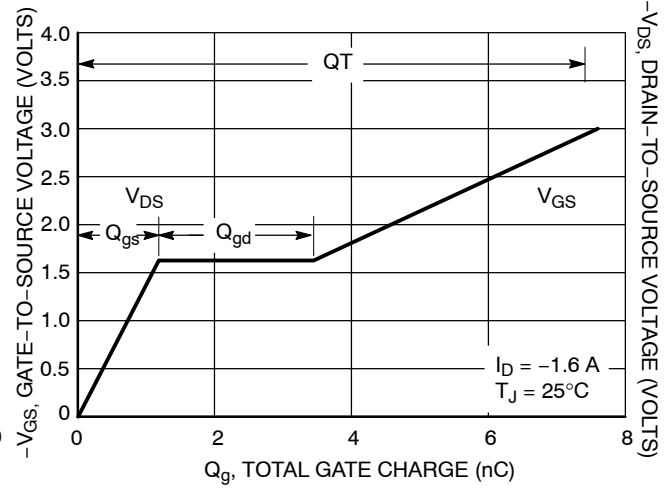


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Gate Charge

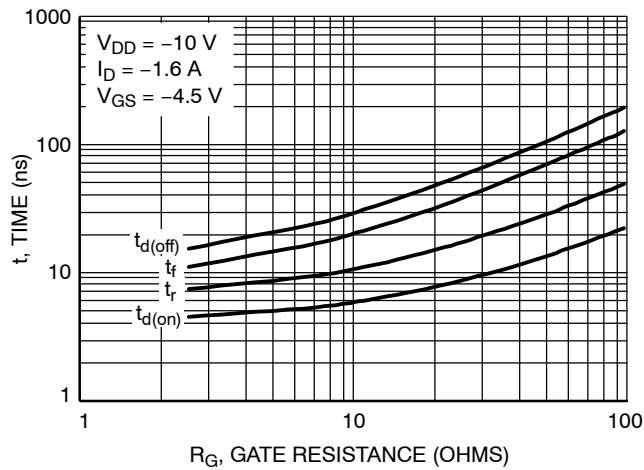


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

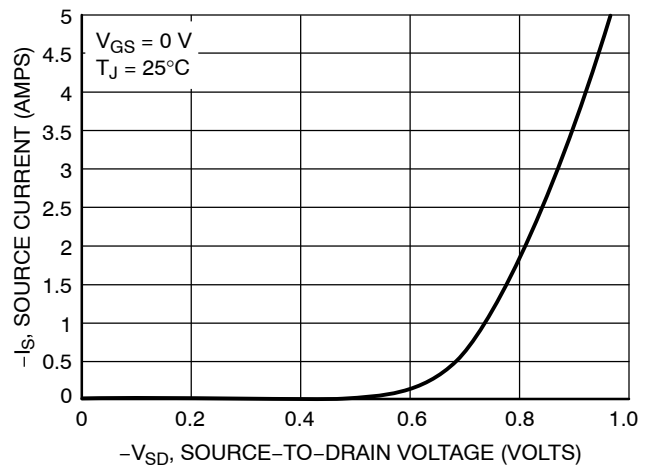


Figure 10. Diode Forward Voltage vs. Current

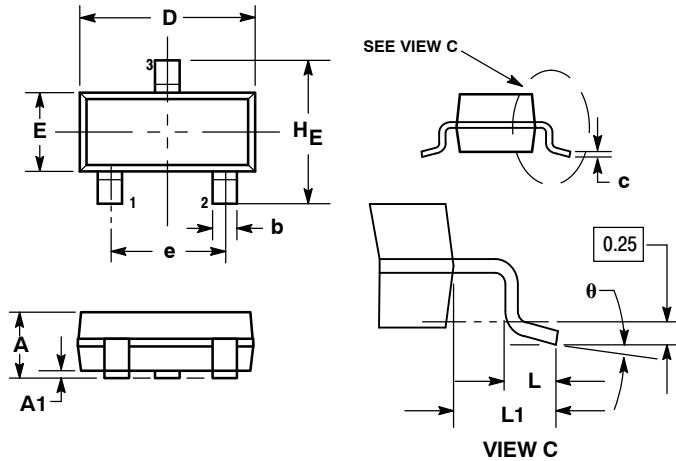
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PACKAGE DIMENSIONS

SOT-23 (TO-236)

CASE 318-08

ISSUE AP



NOTES:

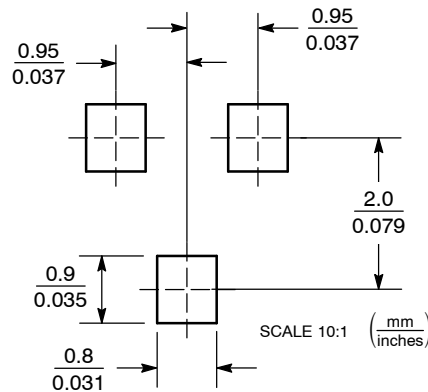
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.040	0.044
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.37	0.44	0.50	0.015	0.018	0.020
c	0.09	0.13	0.18	0.003	0.005	0.007
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.081
L	0.10	0.20	0.30	0.004	0.008	0.012
L1	0.35	0.54	0.69	0.014	0.021	0.029
H_E	2.10	2.40	2.64	0.083	0.094	0.104
theta	0°		10°	0°		10°

STYLE 12:

- PIN 1. CATHODE
- CATHODE
- ANODE

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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