

NTS4172N

Power MOSFET

30 V, 1.7 A, Single N-Channel, SC-70

Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Halide Free
- This is a Pb-Free Device

Applications

- Low Side Load Switch
- DC-DC Converters (Buck and Boost Circuits)
- Optimized for Battery and Load Management Applications in Portable Equipment like Cell Phones, PDA's, Media Players, etc.

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Parameter		Symbol	Value	Unit	
Drain-to-Source Voltage		V _{DSS}	30	V	
Gate-to-Source Voltage		V _{GS}	±12	V	
Continuous Drain Current (Note 1)	Steady State	I _D	T _A = 25°C	1.6	A
			T _A = 85°C	1.13	
	t ≤ 5 s	T _A = 25°C	1.70		
Power Dissipation (Note 1)	Steady State	P _D	T _A = 25°C	0.294	W
	t ≤ 5 s			0.350	
Pulsed Drain Current	t _p = 10 μs	I _{DM}	3.4	A	
Operating Junction and Storage Temperature		T _J , T _{stg}	-55 to 150	°C	
Source Current (Body Diode)		I _S	0.25	A	
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		T _L	260	°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.

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction-to-Ambient - Steady State (Note 1)	R _{θJA}	425	°C/W
Junction-to-Ambient - t ≤ 5 s (Note 1)	R _{θJA}	360	

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

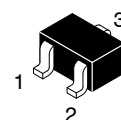
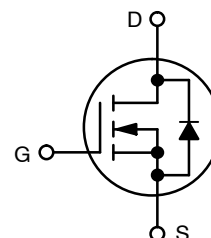


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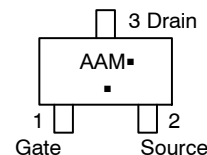
V _{(BR)DSS}	R _{DS(on)} MAX	I _D MAX
30 V	93 mΩ @ 10 V	1.7 A
	100 mΩ @ 4.5 V	1.5 A
	140 mΩ @ 2.5 V	1.0 A

SC-70/SOT-323 (3 LEADS)



SC-70/SOT-323
CASE 419
STYLE 8

MARKING DIAGRAM/ PIN ASSIGNMENT



- AA = Specific Device Code
- M = Date Code*
- = Pb-Free Package

(Note: Microdot may be in either location)

* Date code orientation may vary depending upon manufacturing location

ORDERING INFORMATION

Device	Package	Shipping†
NTS4172NT1G	SC-70 (Pb-Free)	3000/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.

NTS4172N

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	30			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	$I_D = 250\ \mu\text{A}$, Reference to 25°C		8.4		mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}, V_{DS} = 24\text{ V}, T_J = 25^\circ\text{C}$ $V_{GS} = 0\text{ V}, V_{DS} = 24\text{ V}, T_J = 125^\circ\text{C}$			1.0 5.0	μA
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$			± 100	nA

ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\ \mu\text{A}$	0.6	1.0	1.4	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			3.1		mV/ $^\circ\text{C}$
Drain-to-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 1.7\text{ A}$		58	93	m Ω
		$V_{GS} = 4.5\text{ V}, I_D = 1.5\text{ A}$		64	100	
		$V_{GS} = 2.5\text{ V}, I_D = 1.0\text{ A}$		79	140	
Forward Transconductance	g_{FS}	$V_{DS} = 5.0\text{ V}, I_D = 1.7\text{ A}$		4.2		S

CHARGES, CAPACITANCES AND GATE RESISTANCE

Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = 15\text{ V}$		381		pF
Output Capacitance	C_{oss}			39.6		
Reverse Transfer Capacitance	C_{rss}			32.6		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 15\text{ V}, I_D = 1.7\text{ A}$		4.38		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.40		
Gate-to-Source Charge	Q_{GS}			0.62		
Gate-to-Drain Charge	Q_{GD}			1.33		
Gate Resistance	R_G			4.5		Ω

SWITCHING CHARACTERISTICS (Note 4)

Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 4.5\text{ V}, V_{DD} = 15\text{ V}, I_D = 1.7\text{ A}, R_G = 3\ \Omega$		7.5		ns
Rise Time	t_r			4.4		
Turn-Off Delay Time	$t_{d(off)}$			16.1		
Fall Time	t_f			2.2		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_S = 1.0\text{ A}$		0.76	1.0	V
Reverse Recovery Time	t_{RR}	$V_{GS} = 0\text{ V}, I_S = 1.0\text{ A}, di_{SD}/dt = 100\text{ A}/\mu\text{s}$		7.9		ns
Charge Time	t_a			5.0		
Discharge Time	t_b			2.9		
Reverse Recovery Charge	Q_{RR}			2.0		nC

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

3. Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2\%$

4. Switching characteristics are independent of operating junction temperatures

TYPICAL CHARACTERISTICS

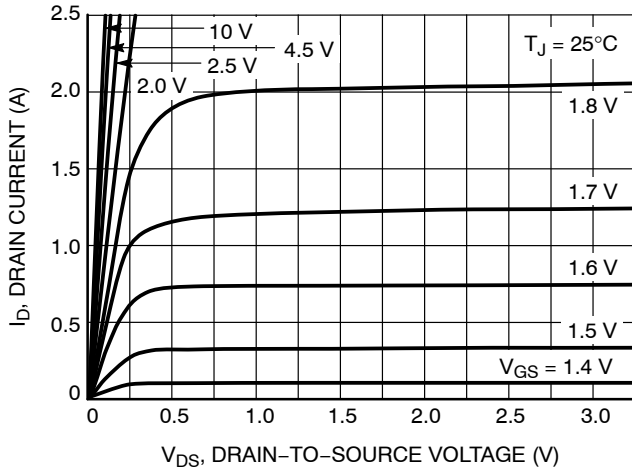


Figure 1. On-Region Characteristics

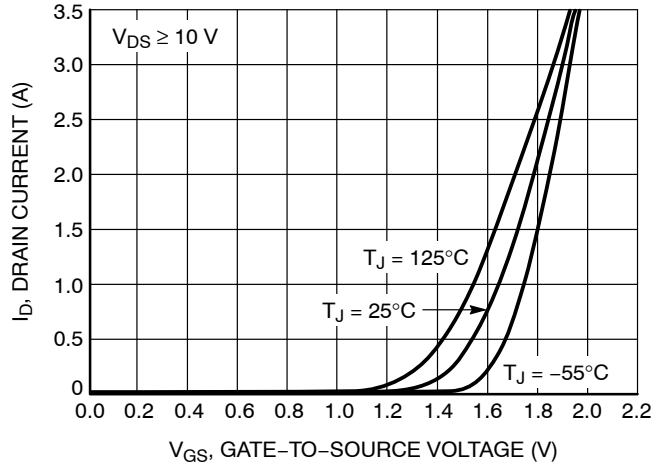


Figure 2. Transfer Characteristics

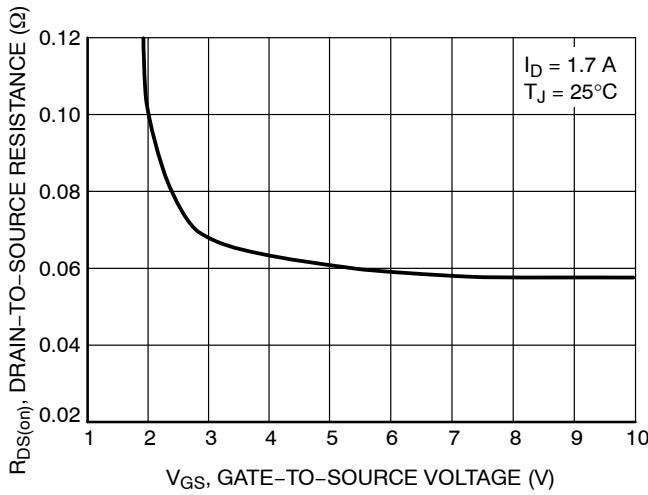


Figure 3. On-Resistance vs. Gate Voltage

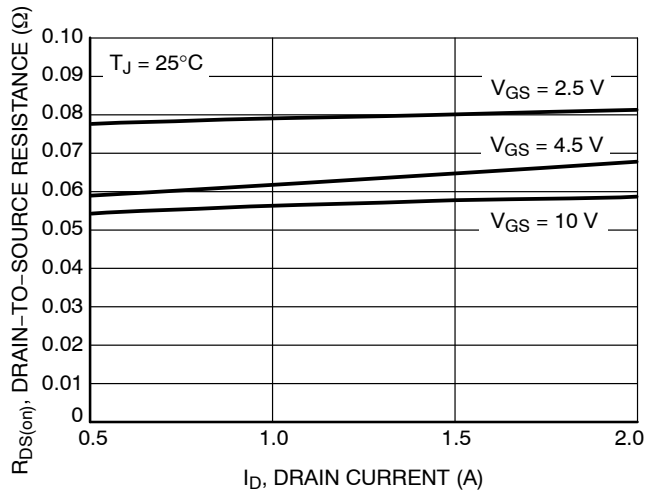


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

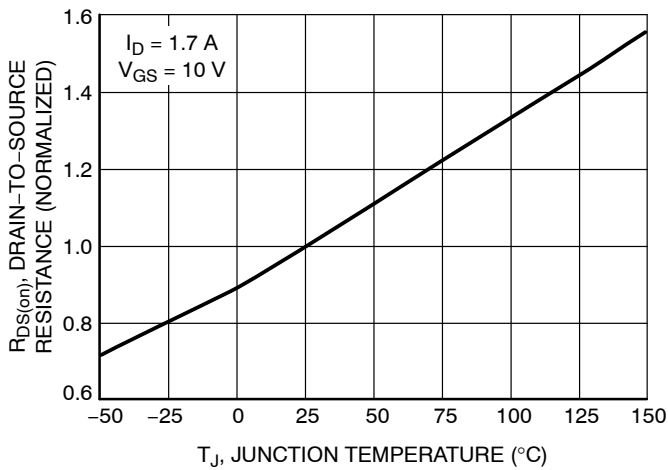


Figure 5. On-Resistance Variation with Temperature

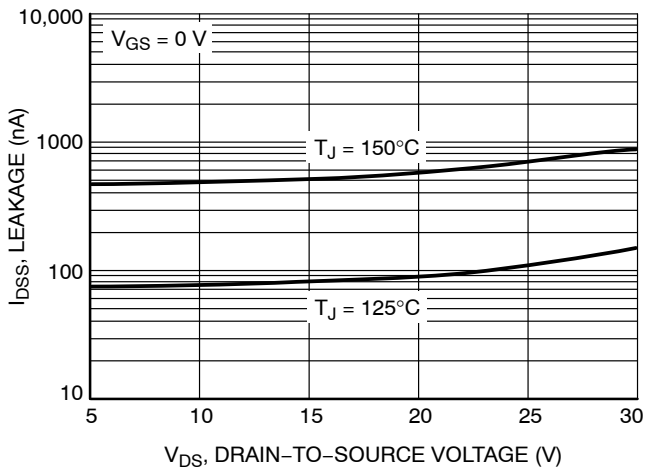


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

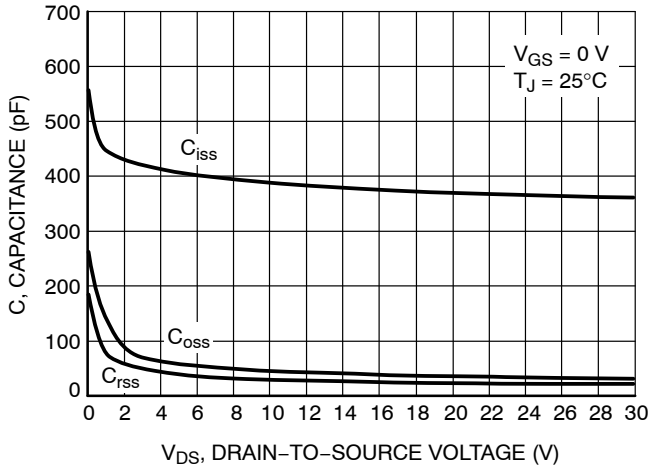


Figure 7. Capacitance Variation

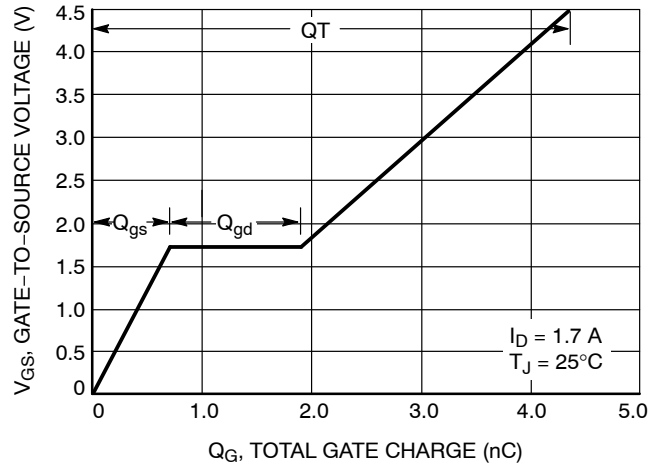


Figure 8. Gate-to-Source Voltage vs. Total Charge

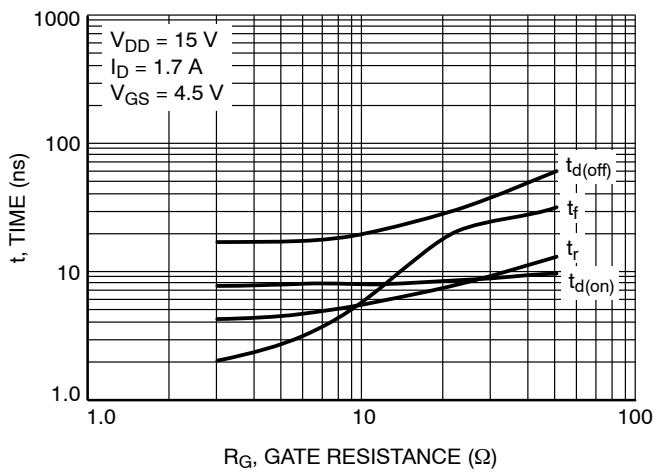


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

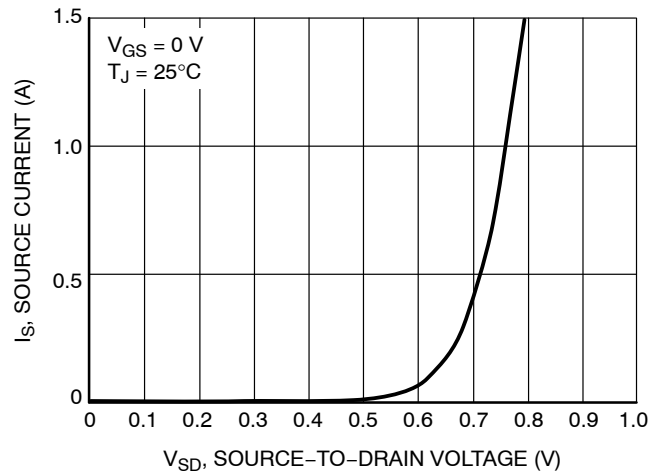


Figure 10. Diode Forward Voltage vs. Current

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SCALE 4:1

SC-70 (SOT-323) CASE 419 ISSUE R

DATE 11 OCT 2022



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH

DIM	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.80	0.90	1.00	0.032	0.035	0.040
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	0.70 REF			0.028 BSC		
b	0.30	0.35	0.40	0.012	0.014	0.016
c	0.10	0.18	0.25	0.004	0.007	0.010
D	1.80	2.00	2.20	0.071	0.080	0.087
E	1.15	1.24	1.35	0.045	0.049	0.053
e	1.20	1.30	1.40	0.047	0.051	0.055
e1	0.65 BSC			0.026 BSC		
L	0.20	0.38	0.56	0.008	0.015	0.022
H _E	2.00	2.10	2.40	0.079	0.083	0.095

GENERIC MARKING DIAGRAM



- XX = Specific Device Code
- M = Date Code
- = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present. Some products may not follow the Generic Marking.



* For additional information on our Pb-Free strategy and soldering details, please download the DN Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERM/D.

SOLDERING FOOTPRINT

STYLE 1: CANCELLED	STYLE 2: PIN 1. ANODE 2. N.C. 3. CATHODE	STYLE 3: PIN 1. BASE 2. EMITTER 3. COLLECTOR	STYLE 4: PIN 1. CATHODE 2. CATHODE 3. ANODE	STYLE 5: PIN 1. ANODE 2. ANODE 3. CATHODE
STYLE 6: PIN 1. EMITTER 2. BASE 3. COLLECTOR	STYLE 7: PIN 1. BASE 2. EMITTER 3. COLLECTOR	STYLE 8: PIN 1. GATE 2. SOURCE 3. DRAIN	STYLE 9: PIN 1. ANODE 2. CATHODE 3. CATHODE-ANODE	STYLE 10: PIN 1. CATHODE 2. ANODE 3. ANODE-CATHODE
				STYLE 11: PIN 1. CATHODE 2. CATHODE 3. CATHODE

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