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	T_A = 25°C	I_D	1.6	A
		T_A = 85°C		1.13	
	t ≤ 5 s	T_A = 25°C		1.70	
Power Dissipation (Note 1)	Steady State	T_A = 25°C	P_D	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)	$R_{\theta JA}$	425	°C/W
Junction−to−Ambient − t ≤ 5 s (Note 1)	$R_{\theta JA}$	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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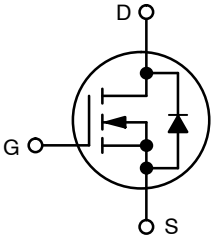
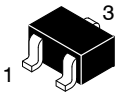
$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D MAX
30 V	93 mΩ @ 10 V	1.7 A
	100 mΩ @ 4.5 V	1.5 A
	140 mΩ @ 2.5 V	1.0 A

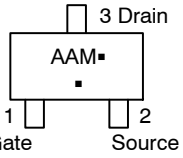
SC−70/SOT−323 (3 LEADS)





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.

MOSFET ELECTRICAL CHARACTERISTICS (T_J = 25°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 V, I_D = 250 μA	30			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}$ /T_J	I_D = 250 μA, Reference to 25°C		8.4		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 24 V, T_J = 25°C V_{GS} = 0 V, V_{DS} = 24 V, T_J = 125°C			1.0 5.0	μA
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±12 V			±100	nA
ON CHARACTERISTICS (Note 3)						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA	0.6	1.0	1.4	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}$ /T_J			3.1		mV/°C
Drain−to−Source On−Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 1.7 A		58	93	mΩ
		V_{GS} = 4.5 V, I_D = 1.5 A		64	100	
		V_{GS} = 2.5 V, I_D = 1.0 A		79	140	
Forward Transconductance	g_{FS}	V_{DS} = 5.0 V, I_D = 1.7 A		4.2		S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C_{iss}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = 15 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 V, V_{DS} = 15 V, I_D = 1.7 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 V, V_{DD} = 15 V, I_D = 1.7 A, R_G = 3 Ω		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 V, I_S = 1.0 A		0.76	1.0	V
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, I_S = 1.0 A, dI_{SD}/d_t = 100 A/μs		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 ≤ 300 μs, Duty Cycle ≤ 2%
4. Switching characteristics are independent of operating junction temperatures

TYPICAL CHARACTERISTICS

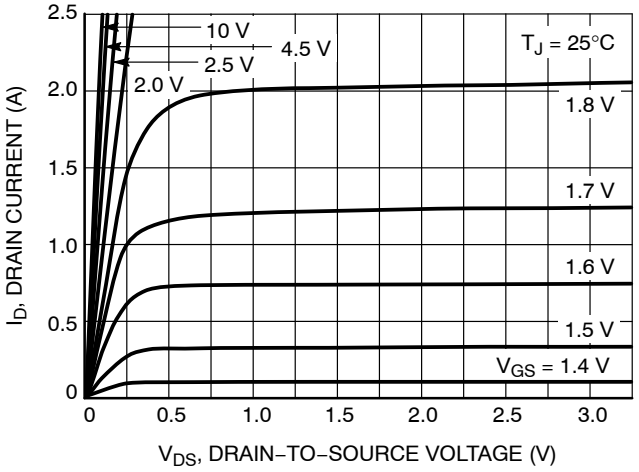


Figure 1. On−Region Characteristics

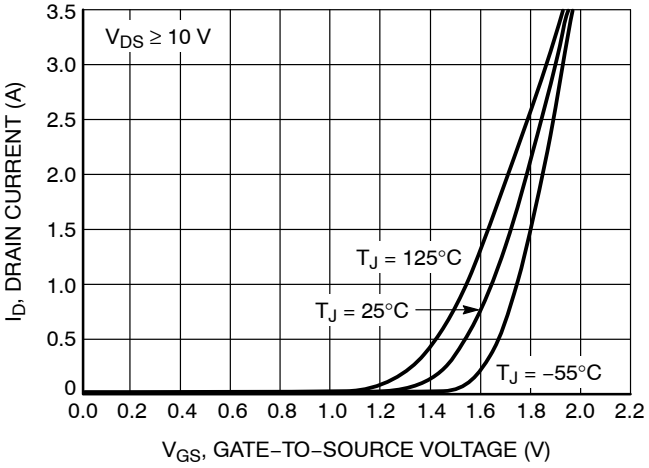


Figure 2. Transfer Characteristics

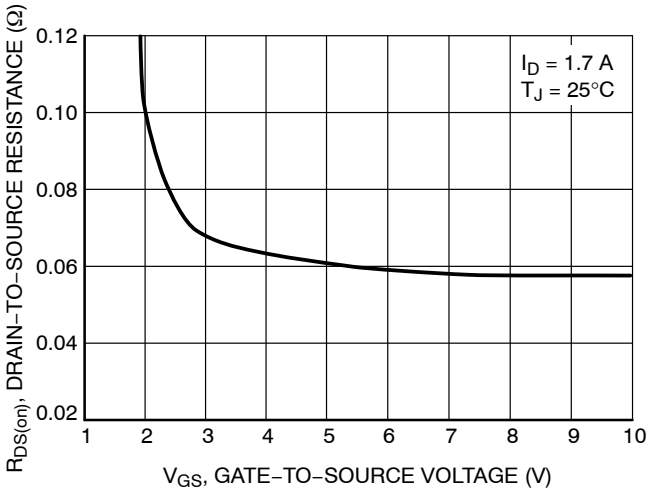


Figure 3. On−Resistance vs. Gate Voltage

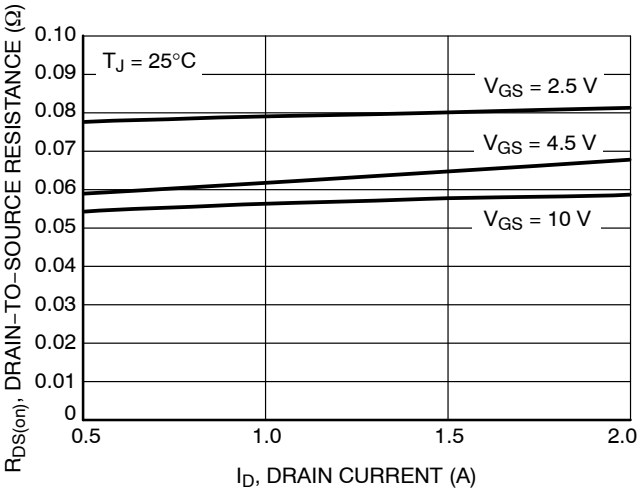


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

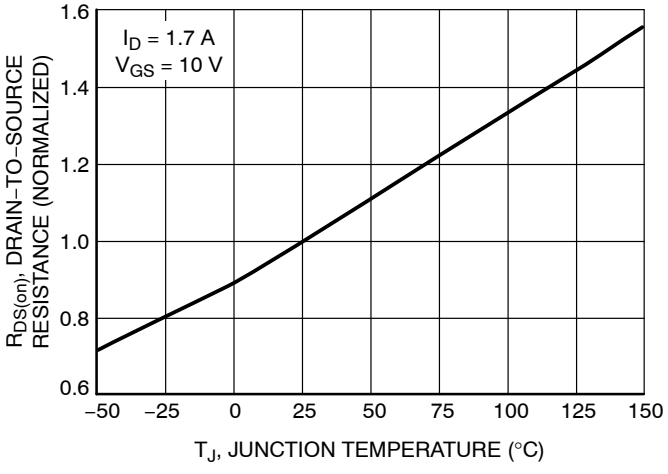


Figure 5. On−Resistance Variation with Temperature

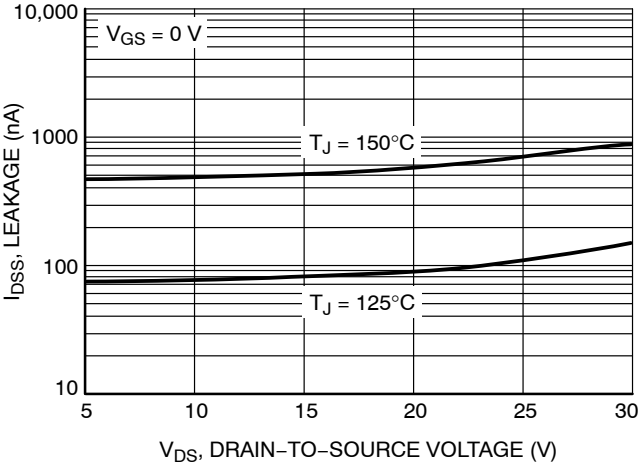


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

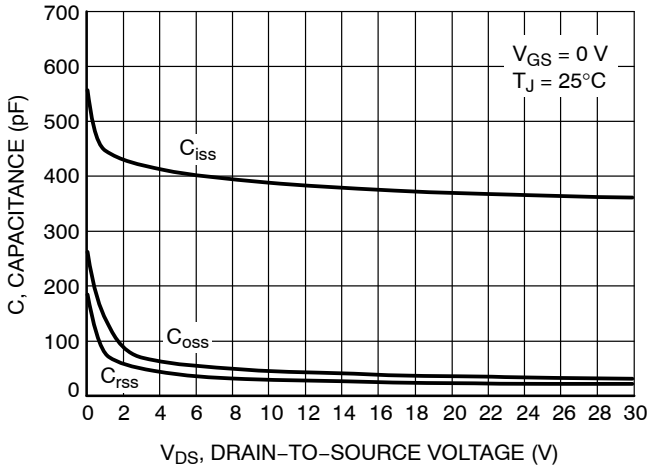


Figure 7. Capacitance Variation

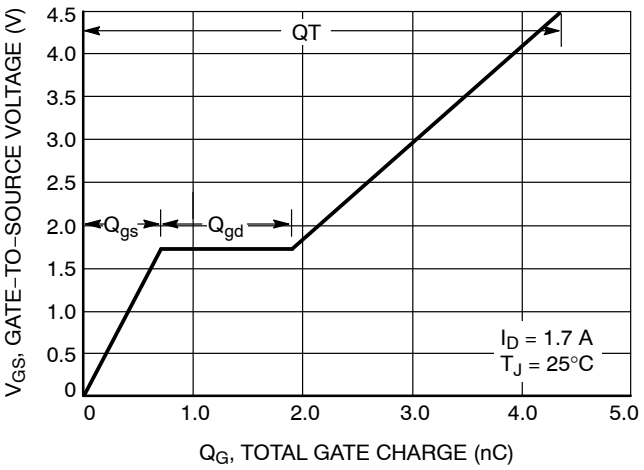


Figure 8. Gate−to−Source Voltage vs. Total Charge

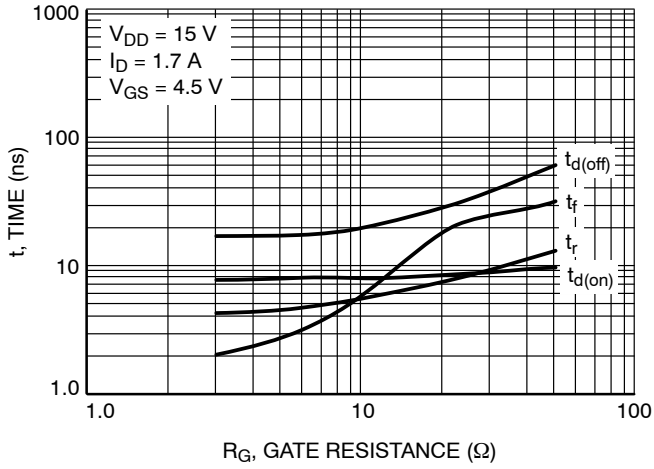


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

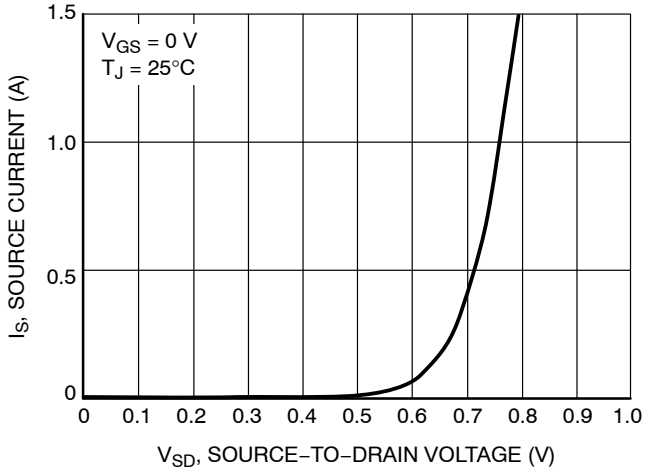
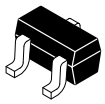


Figure 10. Diode Forward Voltage vs. Current

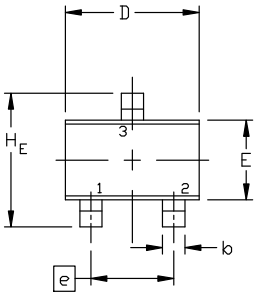
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

SC−70 (SOT−323)
CASE 419
ISSUE R

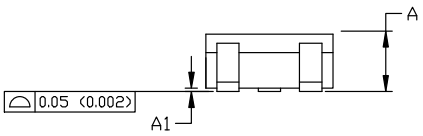
DATE 11 OCT 2022



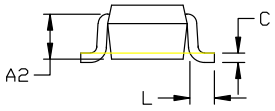
SCALE 4:1



TOP VIEW



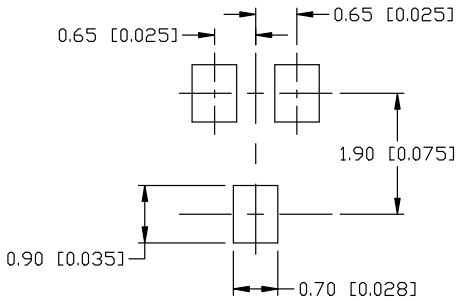
SIDE VIEW



END VIEW

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

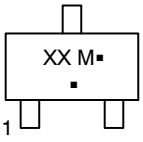
	MILLIMETERS			INCHES		
DIM	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.80	0.90	1.00	0.032	0.035	0.040
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	0.70 REF			0.028 BSC		
b	0.30	0.35	0.40	0.012	0.014	0.016
c	0.10	0.18	0.25	0.004	0.007	0.010
D	1.80	2.00	2.20	0.071	0.080	0.087
E	1.15	1.24	1.35	0.045	0.049	0.053
e	1.20	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



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

SOLDERING FOOTPRINT

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.

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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DESCRIPTION:	**SC−70 (SOT−323)**	**PAGE 1 OF 1**

PUBLICATION ORDERING INFORMATION

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