NTMS10P02R2

Power MOSFET
-10 Amps, -20 Volts
P−Channel Enhancement−Mode
Single SOIC−8 Package

Features

- Ultra Low $R_{DS(on)}$
- Higher Efficiency Extending Battery Life
- Logic Level Gate Drive
- Miniature SOIC−8 Surface Mount Package
- Diode Exhibits High Speed, Soft Recovery
- Avalanche Energy Specified
- SOIC−8 Mounting Information Provided
- Pb−Free Package is Available

Applications

- Power Management in Portable and Battery−Powered Products, i.e.: Cellular and Cordless Telephones and PCMCIA Cards

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain−to−Source Voltage	V_{DSS}	−20	Vdc
Gate−to−Source Voltage − Continuous	V_{GS}	±12	Vdc
Thermal Resistance − Junction−to−Ambient (Note 1) Total Power Dissipation @ T_A = 25°C Continuous Drain Current @ 25°C Continuous Drain Current @ 70°C Maximum Operating Power Dissipation Maximum Operating Drain Current Pulsed Drain Current (Note 3)	$R_{\theta JA}$ P_D I_D I_D P_D I_D I_{DM}	50 2.5 −10 −8.0 0.6 −5.5 −50	°C/W W A A W A A
Thermal Resistance − Junction−to−Ambient (Note 2) Total Power Dissipation @ T_A = 25°C Continuous Drain Current @ 25°C Continuous Drain Current @ 70°C Maximum Operating Power Dissipation Maximum Operating Drain Current Pulsed Drain Current (Note 3)	$R_{\theta JA}$ P_D I_D I_D P_D I_D I_{DM}	80 1.6 −8.8 −6.4 0.4 −4.5 −44	°C/W W A A W A A
Operating and Storage Temperature Range	T_J, T_{stg}	−55 to +150	°C
Single Pulse Drain−to−Source Avalanche Energy − Starting T_J = 25°C (V_{DD} = −20 Vdc, V_{GS} = −4.5 Vdc, Peak I_L = 5.0 Apk, L = 40 mH, R_G = 25 Ω)	E_{AS}	500	mJ
Maximum Lead Temperature for Soldering Purposes, 1/8″ from case for 10 seconds	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.

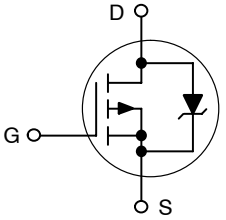
1. Mounted onto a 2″ square FR−4 Board (1 in sq, Cu 0.06″ thick single sided), t = 10 seconds.
2. Mounted onto a 2″ square FR−4 Board (1 in sq, Cu 0.06″ thick single sided), t = steady state.
3. Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2%.

ON Semiconductor®

http://onsemi.com

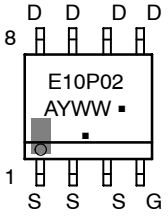
−10 AMPERES
−20 VOLTS
14 mΩ @ V_{GS} = −4.5 V

P−Channel



MARKING DIAGRAM & PIN ASSIGNMENT

SOIC−8
CASE 751
STYLE 12



E10P02 = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb−Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
NTMS10P02R2	SOIC−8	2500/Tape & Reel
NTMS10P02R2G	SOIC−8 (Pb−Free)	2500/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.

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted) (Note 4)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain−to−Source Breakdown Voltage (V_{GS} = 0 Vdc, I_D = −250 μAdc)	$V_{(BR)DSS}$	−20	–	–	Vdc
Temperature Coefficient (Positive)		–	−12.1	–	mV/°C
Zero Gate Voltage Drain Current (V_{DS} = −20 Vdc, V_{GS} = 0 Vdc, T_J = 25°C)	I_{DSS}	–	–	−1.0	μAdc
(V_{DS} = −20 Vdc, V_{GS} = 0 Vdc, T_J = 70°C)		–	–	−5.0	
Gate−Body Leakage Current (V_{GS} = −12 Vdc, V_{DS} = 0 Vdc)	I_{GSS}	–	–	−100	nAdc
Gate−Body Leakage Current (V_{GS} = +12 Vdc, V_{DS} = 0 Vdc)	I_{GSS}	–	–	100	nAdc
ON CHARACTERISTICS					
Gate Threshold Voltage (V_{DS} = V_{GS}, I_D = −250 μAdc)	$V_{GS(th)}$	−0.6	−0.88	−1.20	Vdc
Temperature Coefficient (Negative)		–	2.8	–	mV/°C
Static Drain−to−Source On−State Resistance (V_{GS} = −4.5 Vdc, I_D = −10 Adc)	$R_{DS(on)}$	–	0.012	0.014	Ω
(V_{GS} = −2.5 Vdc, I_D = −8.8 Adc)		–	0.017	0.020	
Forward Transconductance (V_{DS} = −10 Vdc, I_D = −10 Adc)	g_{FS}	–	30	–	Mhos
DYNAMIC CHARACTERISTICS					
Input Capacitance (V_{DS} = −16 Vdc, V_{GS} = 0 Vdc, f = 1.0 MHz)	C_{iss}	–	3100	3640	pF
Output Capacitance	C_{oss}	–	1100	1670	
Reverse Transfer Capacitance	C_{rss}	–	475	1010	
SWITCHING CHARACTERISTICS (Notes 5 & 6)					
Turn−On Delay Time (V_{DD} = −10 Vdc, I_D = −1.0 Adc, V_{GS} = −4.5 Vdc, R_G = 6.0 Ω)	$t_{d(on)}$	–	25	35	ns
Rise Time	t_r	–	40	65	
Turn−Off Delay Time	$t_{d(off)}$	–	110	190	
Fall Time	t_f	–	110	190	
Turn−On Delay Time (V_{DD} = −10 Vdc, I_D = −10 Adc, V_{GS} = −4.5 Vdc, R_G = 6.0 Ω)	$t_{d(on)}$	–	25	–	ns
Rise Time	t_r	–	100	–	
Turn−Off Delay Time	$t_{d(off)}$	–	100	–	
Fall Time	t_f	–	125	–	
Total Gate Charge (V_{DS} = −10 Vdc, V_{GS} = −4.5 Vdc, I_D = −10 Adc)	Q_{tot}	–	48	70	nC
Gate−Source Charge	Q_{gs}	–	6.5	–	
Gate−Drain Charge	Q_{gd}	–	17	–	
BODY−DRAIN DIODE RATINGS (Note 5)					
Diode Forward On−Voltage (I_S = −2.1 Adc, V_{GS} = 0 Vdc)	V_{SD}	–	−0.72	−1.2	Vdc
(I_S = −2.1 Adc, V_{GS} = 0 Vdc, T_J = 125°C)		–	−0.60	–	
Diode Forward On−Voltage (I_S = −10 Adc, V_{GS} = 0 Vdc)	V_{SD}	–	−0.90	–	Vdc
(I_S = −10 Adc, V_{GS} = 0 Vdc, T_J = 125°C)		–	−0.75	–	
Reverse Recovery Time (I_S = −2.1 Adc, V_{GS} = 0 Vdc, dI_S/dt = 100 A/μs)	t_{rr}	–	65	100	ns
	t_a	–	25	–	
	t_b	–	40	–	
Reverse Recovery Stored Charge	Q_{RR}	–	0.075	–	μC

4. Handling precautions to protect against electrostatic discharge is mandatory.
5. Indicates Pulse Test: Pulse Width = 300 μs max, Duty Cycle = 2%.
6. Switching characteristics are independent of operating junction temperature.

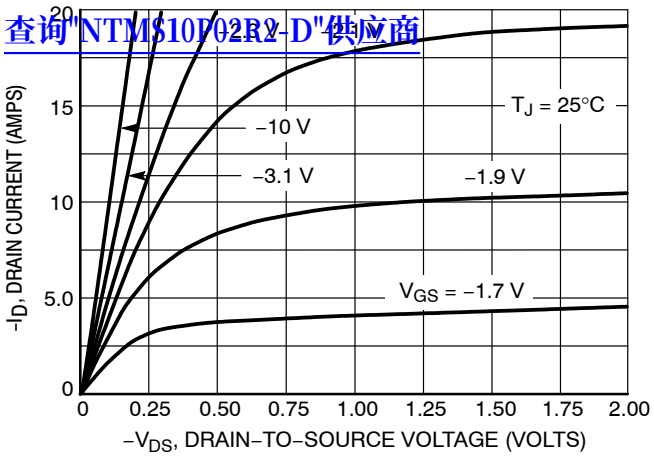


Figure 1. On−Region Characteristics

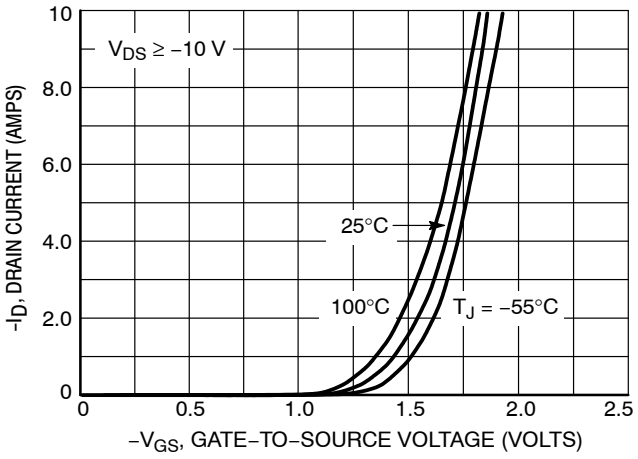


Figure 2. Transfer Characteristics

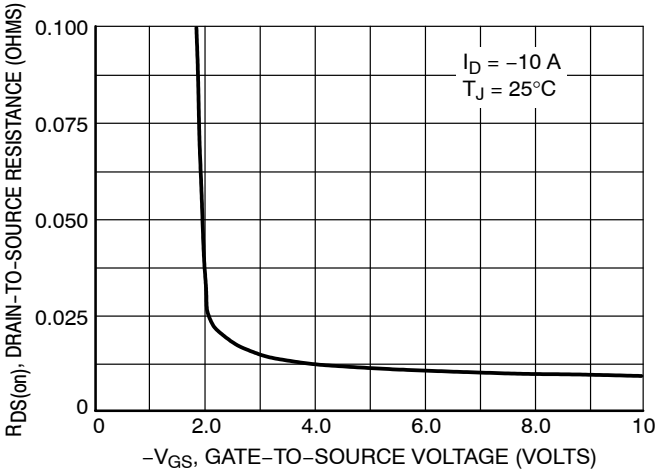


Figure 3. On−Resistance versus Gate−To−Source Voltage

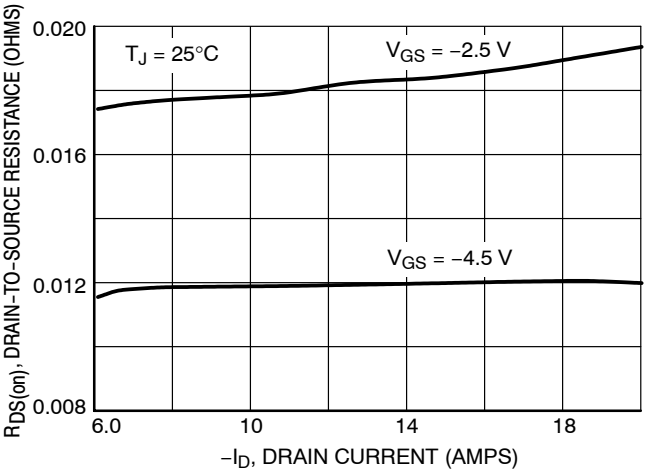


Figure 4. On-Resistance versus Drain Current and Gate Voltage

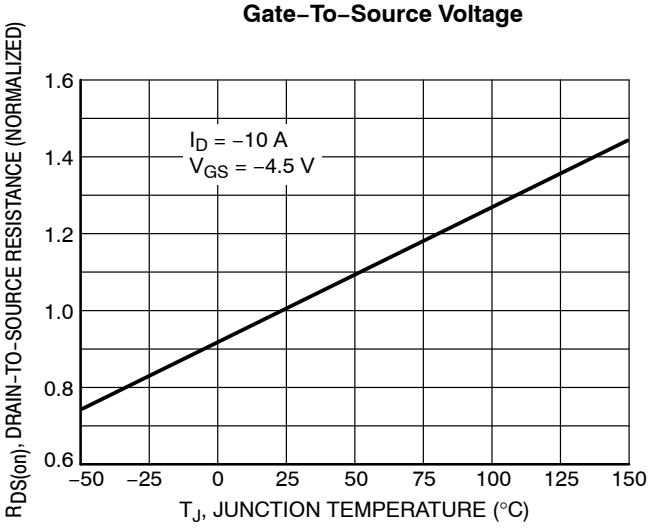


Figure 5. On−Resistance Variation with Temperature

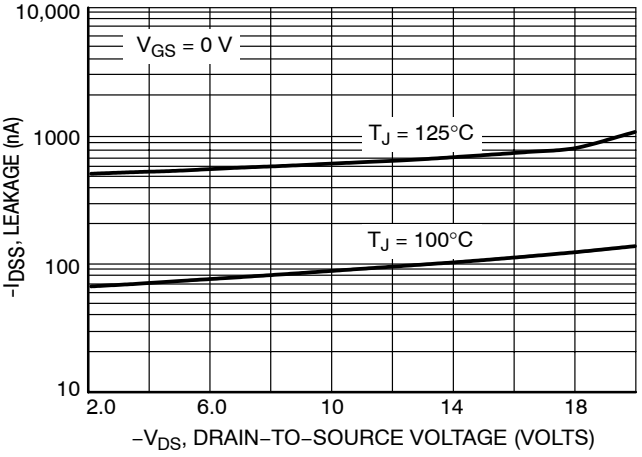


Figure 6. Drain−To−Source Leakage Current versus Voltage

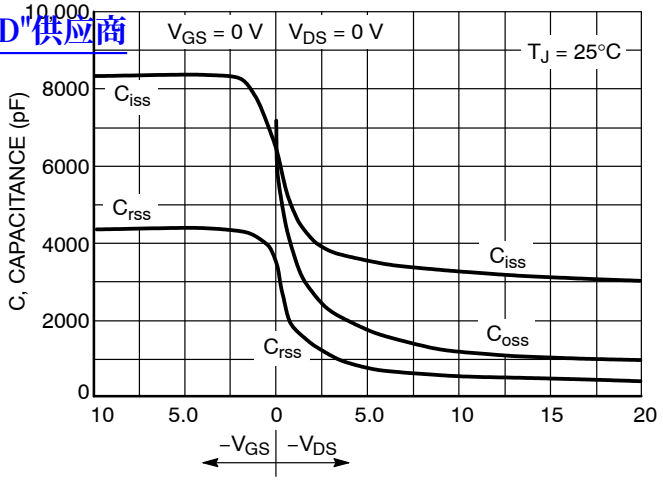


Figure 7. Capacitance Variation

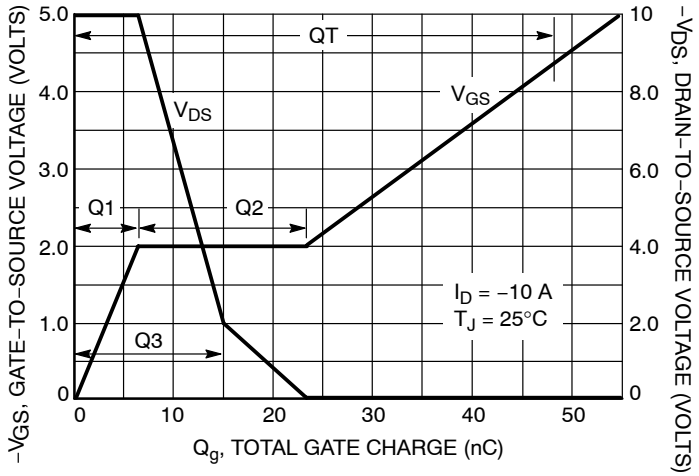


Figure 8. Gate−To−Source and Drain−To−Source Voltage versus Total Charge

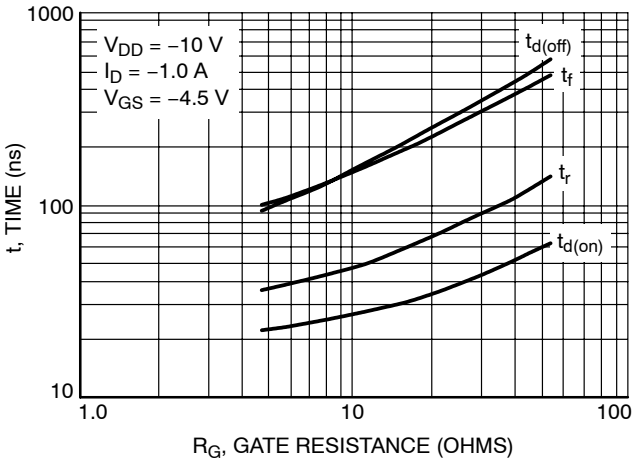


Figure 9. Resistive Switching Time Variation versus Gate Resistance

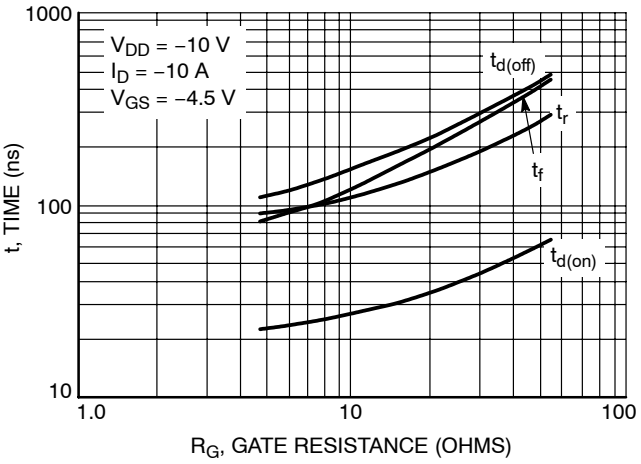


Figure 10. Resistive Switching Time Variation versus Gate Resistance

DRAIN−TO−SOURCE DIODE CHARACTERISTICS

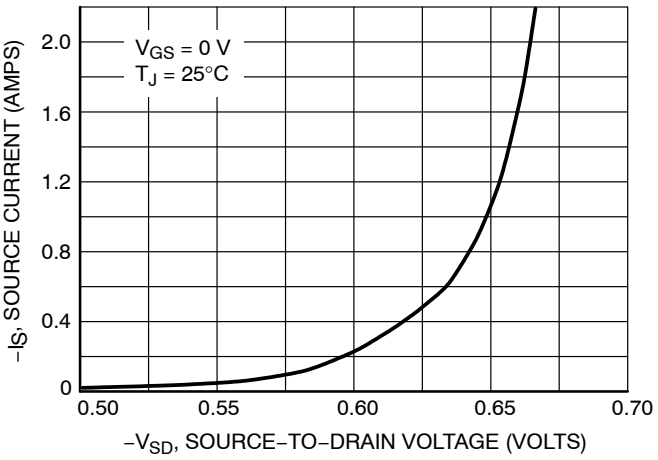


Figure 11. Diode Forward Voltage versus Current

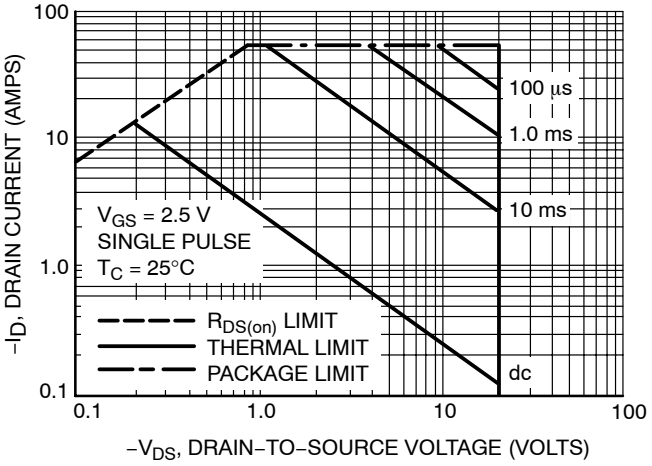


Figure 12. Maximum Rated Forward Biased Safe Operating Area

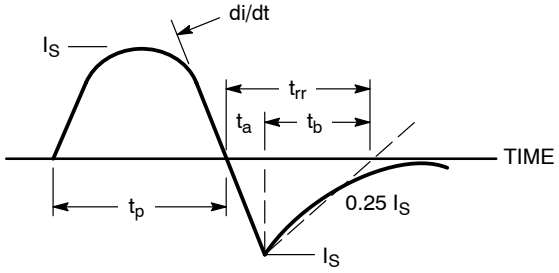


Figure 13. Diode Reverse Recovery Waveform

TYPICAL ELECTRICAL CHARACTERISTICS

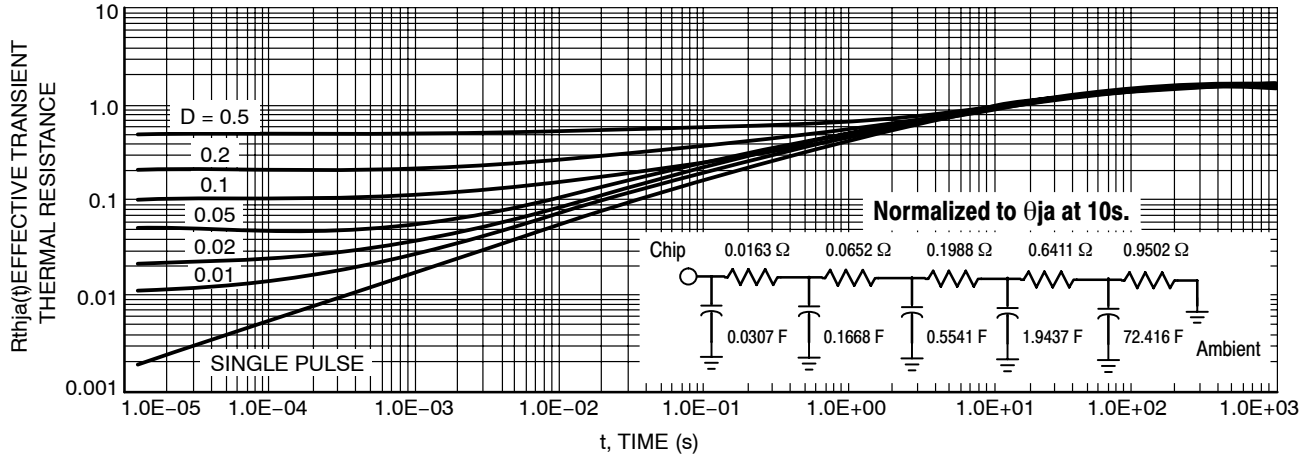
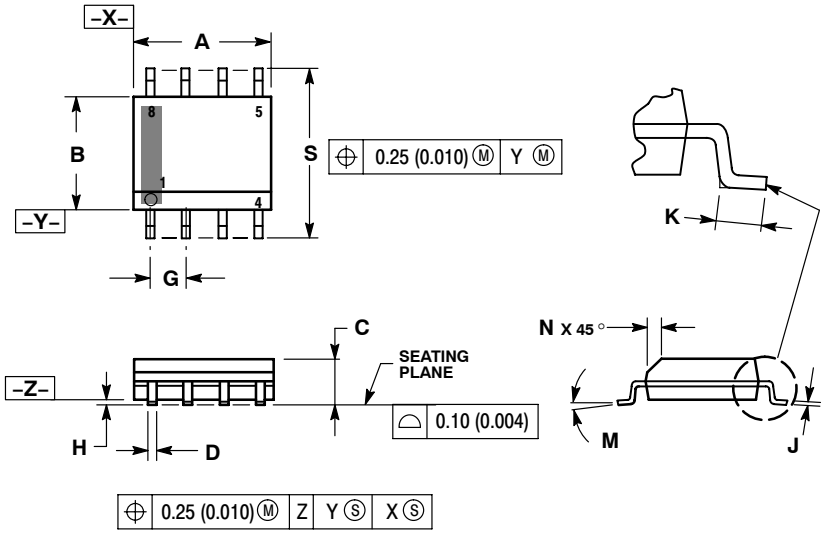


Figure 14. Thermal Response

PACKAGE DIMENSIONS

SOIC−8 NB
CASE 751−07
ISSUE AG

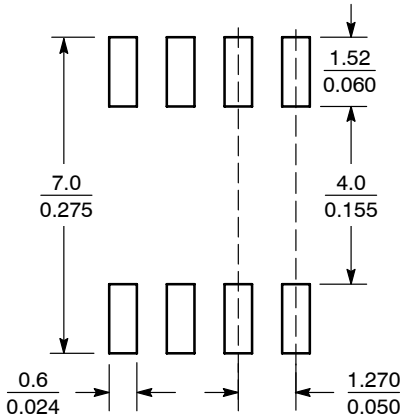


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. 751−01 THRU 751−06 ARE OBSOLETE. NEW STANDARD IS 751−07.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0°	8°	0°	8°
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

STYLE 12:
PIN 1. SOURCE
2. SOURCE
3. SOURCE
4. GATE
5. DRAIN
6. DRAIN
7. DRAIN
8. DRAIN

SOLDERING FOOTPRINT*



SCALE 6:1 (mm / inches)

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

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
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