

MOSFET – Power, Single, P-Channel, Enhancement Mode, SOIC-8

-10 A, -20 V

NTMS10P02R2

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

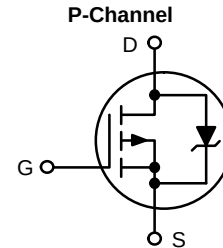
MAXIMUM RATINGS

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 2)	$R_{\theta JA}$	50	$^{\circ}C/W$
Total Power Dissipation @ $T_A = 25^{\circ}C$	P_D	2.5	W
Continuous Drain Current @ $25^{\circ}C$	I_D	-10	A
Continuous Drain Current @ $70^{\circ}C$	I_D	-8.0	A
Maximum Operating Power Dissipation	P_D	0.6	W
Maximum Operating Drain Current	I_D	-5.5	A
Pulsed Drain Current (Note 4)	I_{DM}	-50	A
Thermal Resistance – Junction-to-Ambient (Note 3)	$R_{\theta JA}$	80	$^{\circ}C/W$
Total Power Dissipation @ $T_A = 25^{\circ}C$	P_D	1.6	W
Continuous Drain Current @ $25^{\circ}C$	I_D	-8.8	A
Continuous Drain Current @ $70^{\circ}C$	I_D	-6.4	A
Maximum Operating Power Dissipation	P_D	0.4	W
Maximum Operating Drain Current	I_D	-4.5	A
Pulsed Drain Current (Note 4)	I_{DM}	-44	A
Operating and Storage Temperature Range	T_J, T_{stg}	-55 to +150	$^{\circ}C$
Single Pulse Drain-to-Source Avalanche Energy – Starting $T_J = 25^{\circ}C$ ($V_{DD} = -20$ 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	$^{\circ}C$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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%.

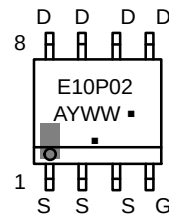
-10 AMPERES
-20 VOLTS
14 m Ω @ $V_{GS} = -4.5$ V



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 [†]
NTMS10P02R2G	SOIC-8 (Pb-Free)	2500/Tape & Reel

DISCONTINUED (Note 1)

NTMS10P02R2	SOIC-8	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](#).

1. **DISCONTINUED:** This device is not recommended for new design. Please contact your onsemi representative for information. The most current information on this device may be available on [www.onsemi.com](#).

NTMS10P02R2

ELECTRICAL CHARACTERISTICS (T_C = 25 °C unless otherwise noted) (Note 5)

Characteristic	Symbol	Min	Typ	Max	Unit
----------------	--------	-----	-----	-----	------

OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage (V _{GS} = 0 Vdc, I _D = -250 μ Adc) Temperature Coefficient (Positive)	V _{(BR)DSS}	-20 -	- -12.1	- -	Vdc mV/°C
Zero Gate Voltage Drain Current (V _{DS} = -20 Vdc, V _{GS} = 0 Vdc, T _J = 25 °C) (V _{DS} = -20 Vdc, V _{GS} = 0 Vdc, T _J = 70 °C)	I _{DSS}	- -	- -	-1.0 -5.0	μ Adc
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 μ Adc) Temperature Coefficient (Negative)	V _{GS(th)}	-0.6 -	-0.88 2.8	-1.20 -	Vdc mV/°C
Static Drain-to-Source On-State Resistance (V _{GS} = -4.5 Vdc, I _D = -10 Adc) (V _{GS} = -2.5 Vdc, I _D = -8.8 Adc)	R _{DS(on)}	- -	0.012 0.017	0.014 0.020	Ω
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 6 & 7)

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 6)

Diode Forward On-Voltage	(I _S = -2.1 Adc, V _{GS} = 0 Vdc) (I _S = -2.1 Adc, V _{GS} = 0 Vdc, T _J = 125 °C)	V _{SD}	- -	-0.72 -0.60	-1.2 -	Vdc
Diode Forward On-Voltage	(I _S = -10 Adc, V _{GS} = 0 Vdc) (I _S = -10 Adc, V _{GS} = 0 Vdc, T _J = 125 °C)	V _{SD}	- -	-0.90 -0.75	- -	Vdc
Reverse Recovery Time	(I _S = -2.1 Adc, V _{GS} = 0 Vdc, dI _S /dt = 100 A/ μ s)	t _{rr}	-	65	100	ns
		t _a	-	25	-	
		t _b	-	40	-	
Reverse Recovery Stored Charge		Q _{RR}	-	0.075	-	μ C

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

5. Handling precautions to protect against electrostatic discharge is mandatory.

6. Indicates Pulse Test: Pulse Width = 300 μ s max, Duty Cycle = 2%.

7. Switching characteristics are independent of operating junction temperature.



NTMS10P02R2

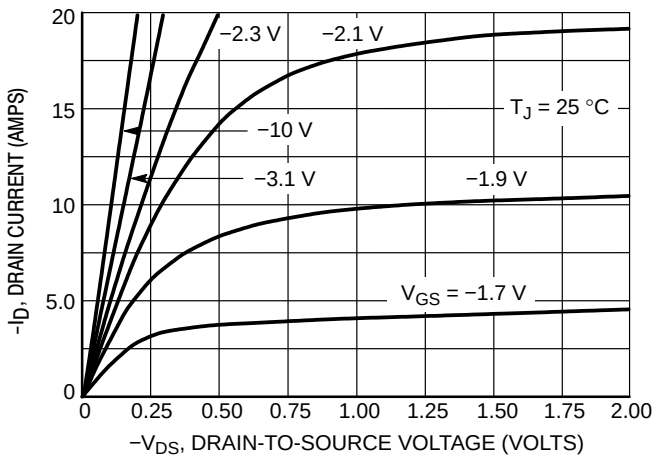


Figure 1. On-Region Characteristics

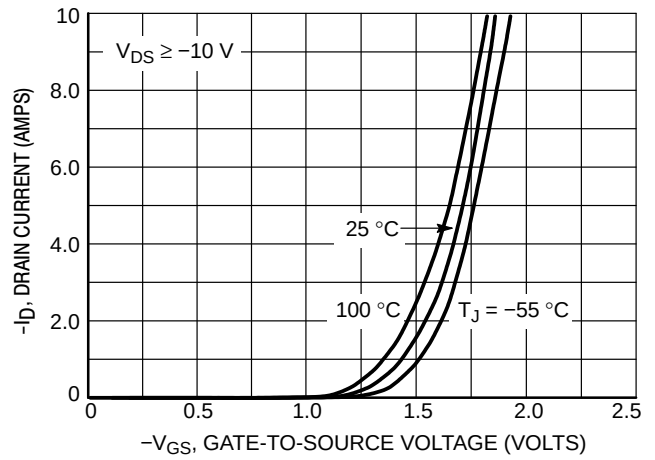


Figure 2. Transfer Characteristics

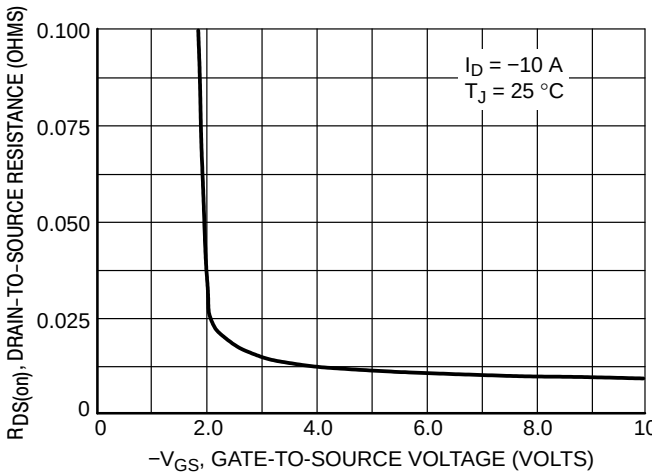


Figure 3. On-Resistance versus Gate-To-Source Voltage

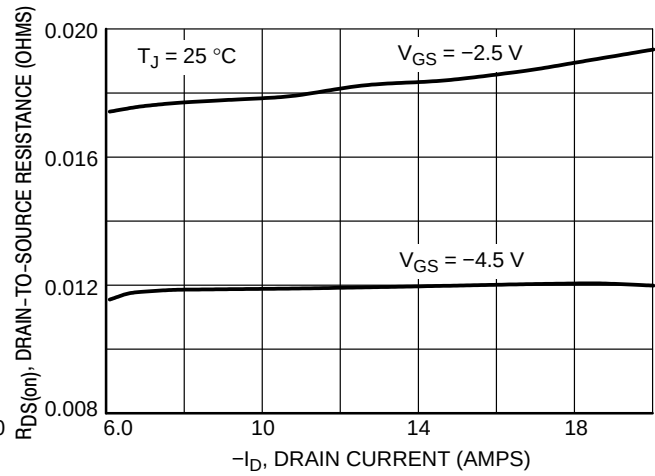


Figure 4. On-Resistance versus Drain Current and Gate Voltage

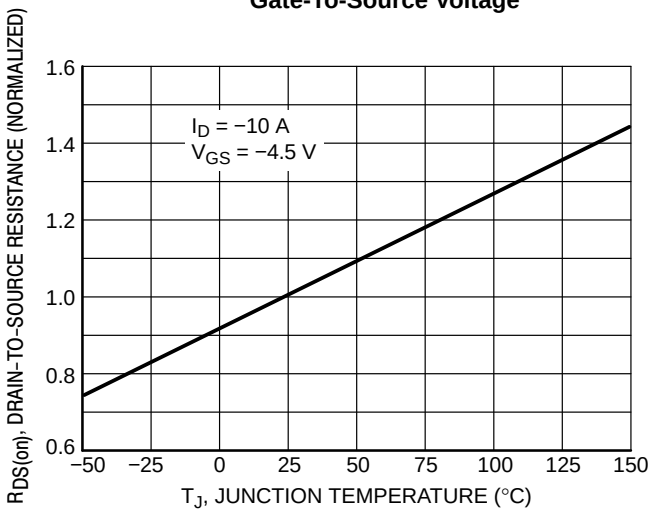


Figure 5. On-Resistance Variation with Temperature

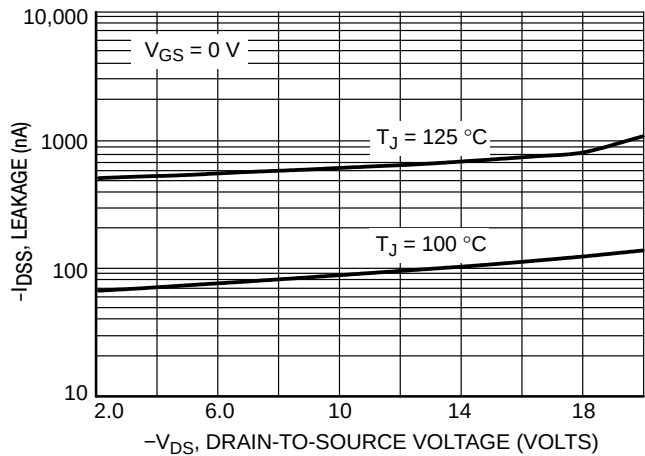


Figure 6. Drain-To-Source Leakage Current versus Voltage

NTMS10P02R2

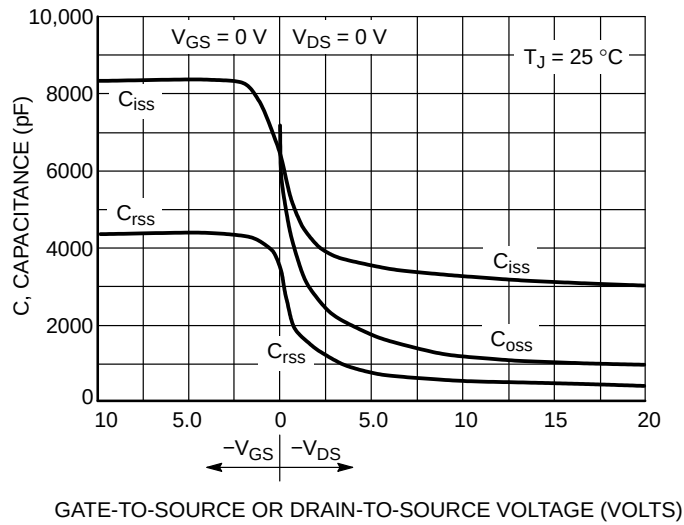


Figure 7. Capacitance Variation

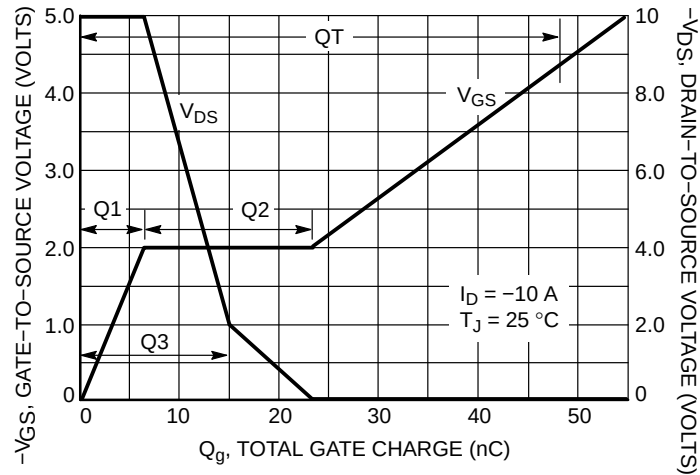


Figure 8. Gate-To-Source and Drain-To-Source Voltage versus Total Charge

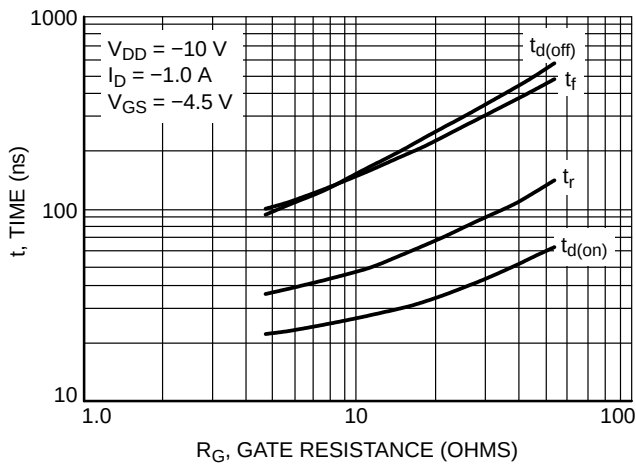


Figure 9. Resistive Switching Time Variation versus Gate Resistance

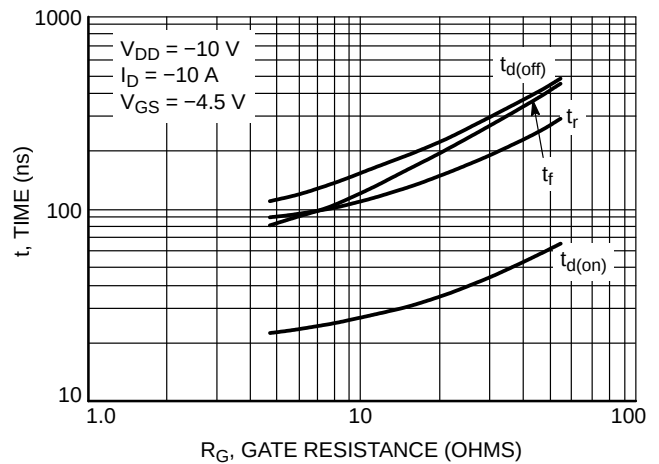


Figure 10. Resistive Switching Time Variation versus Gate Resistance

DRAIN-TO-SOURCE DIODE CHARACTERISTICS

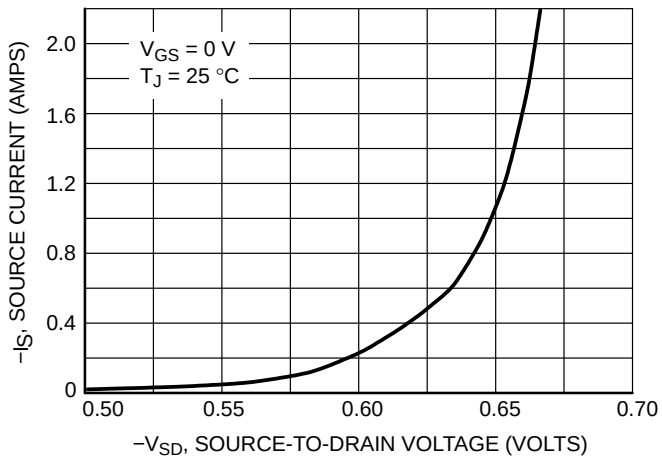


Figure 11. Diode Forward Voltage versus Current

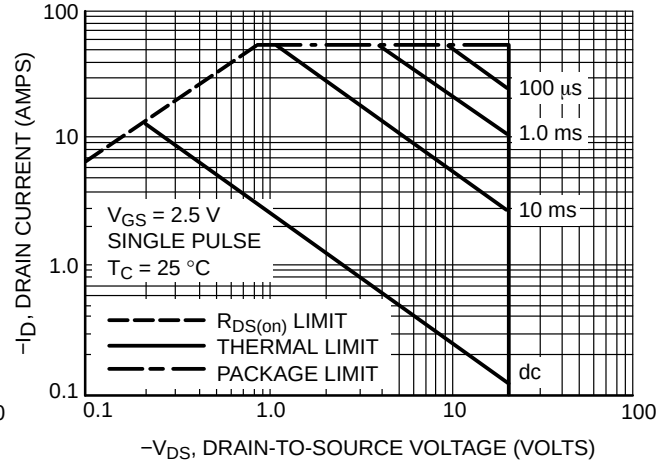


Figure 12. Maximum Rated Forward Biased Safe Operating Area

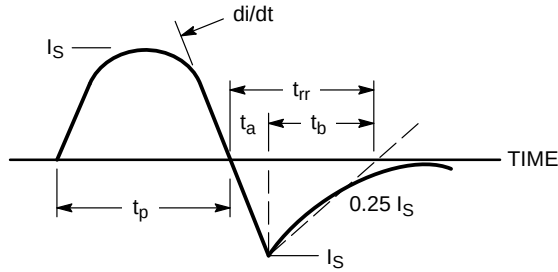


Figure 13. Diode Reverse Recovery Waveform

TYPICAL ELECTRICAL CHARACTERISTICS

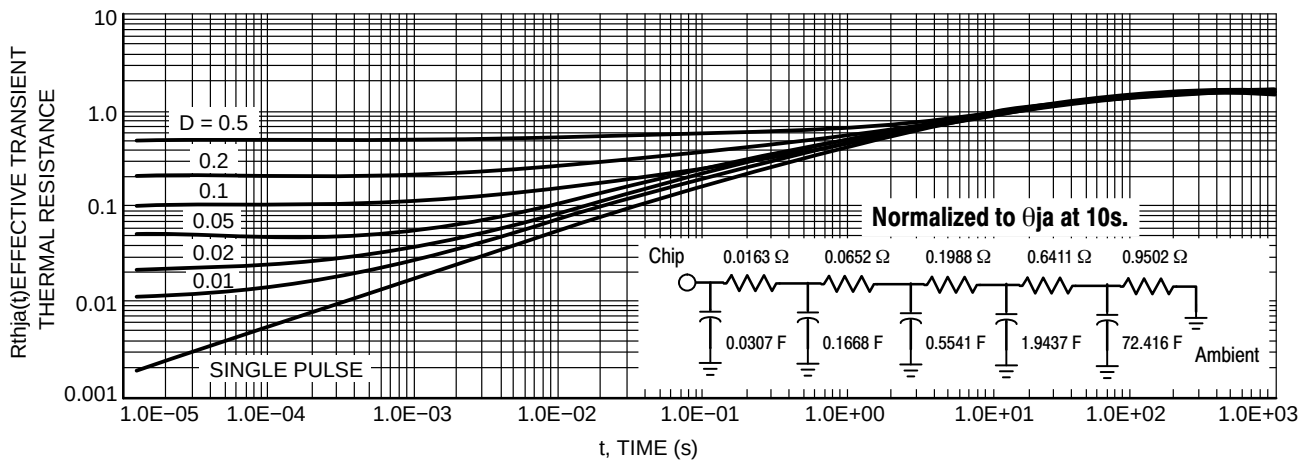


Figure 14. Thermal Response

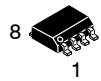
NTMS10P02R2

REVISION HISTORY

Revision	Description of Changes	Date
4	Rebranded the document to onsemi format. NTMS10P02R2 OPN marked as Discontinued.	2/5/2026

This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.

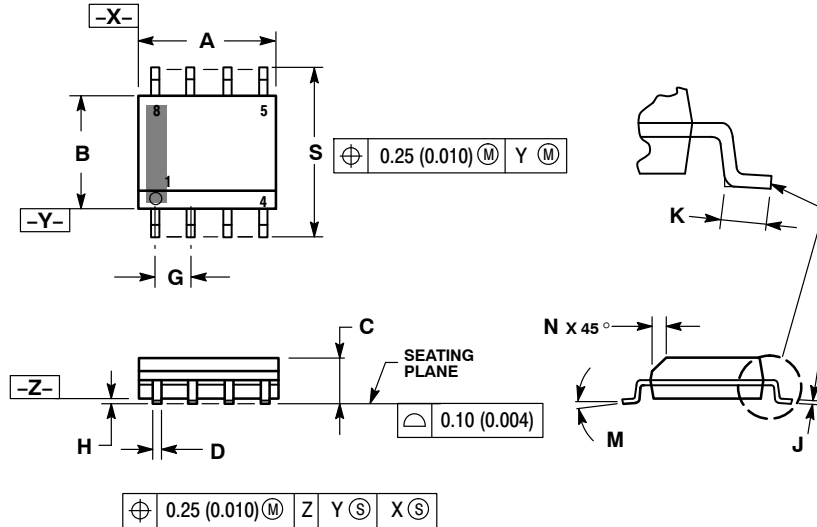




SCALE 1:1

SOIC-8 NB
CASE 751-07
ISSUE AK

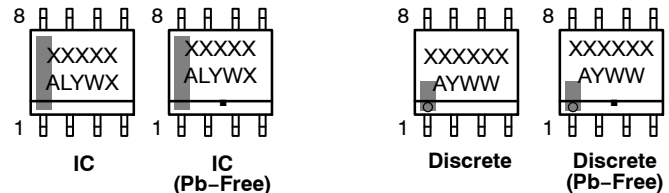
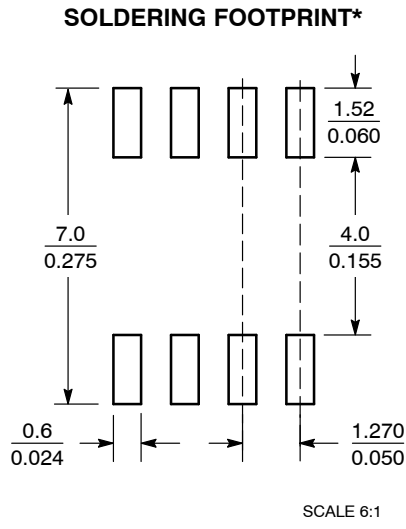
DATE 16 FEB 2011



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.

DIM	MILLIMETERS		INCHES	
	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

GENERIC
MARKING DIAGRAM*


XXXXXX = Specific Device Code
A = Assembly Location
L = Wafer Lot
Y = Year
W = Work Week
▪ = Pb-Free Package

XXXXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
▪ = 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 **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

STYLES ON PAGE 2

DOCUMENT NUMBER:	98ASB42564B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SOIC-8 NB	PAGE 1 OF 2

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

SOIC-8 NB
CASE 751-07
ISSUE AK

DATE 16 FEB 2011

STYLE 1: PIN 1. EMITTER 2. COLLECTOR 3. COLLECTOR 4. EMITTER 5. EMITTER 6. BASE 7. BASE 8. EMITTER	STYLE 2: PIN 1. COLLECTOR, DIE, #1 2. COLLECTOR, #1 3. COLLECTOR, #2 4. COLLECTOR, #2 5. BASE, #2 6. EMITTER, #2 7. BASE, #1 8. EMITTER, #1	STYLE 3: PIN 1. DRAIN, DIE #1 2. DRAIN, #1 3. DRAIN, #2 4. DRAIN, #2 5. GATE, #2 6. SOURCE, #2 7. GATE, #1 8. SOURCE, #1	STYLE 4: PIN 1. ANODE 2. ANODE 3. ANODE 4. ANODE 5. ANODE 6. ANODE 7. ANODE 8. COMMON CATHODE
STYLE 5: PIN 1. DRAIN 2. DRAIN 3. DRAIN 4. DRAIN 5. GATE 6. GATE 7. SOURCE 8. SOURCE	STYLE 6: PIN 1. SOURCE 2. DRAIN 3. DRAIN 4. SOURCE 5. SOURCE 6. GATE 7. GATE 8. SOURCE	STYLE 7: PIN 1. INPUT 2. EXTERNAL BYPASS 3. THIRD STAGE SOURCE 4. GROUND 5. DRAIN 6. GATE 3 7. SECOND STAGE Vd 8. FIRST STAGE Vd	STYLE 8: PIN 1. COLLECTOR, DIE #1 2. BASE, #1 3. BASE, #2 4. COLLECTOR, #2 5. COLLECTOR, #2 6. EMITTER, #2 7. EMITTER, #1 8. COLLECTOR, #1
STYLE 9: PIN 1. EMITTER, COMMON 2. COLLECTOR, DIE #1 3. COLLECTOR, DIE #2 4. EMITTER, COMMON 5. EMITTER, COMMON 6. BASE, DIE #2 7. BASE, DIE #1 8. EMITTER, COMMON	STYLE 10: PIN 1. GROUND 2. BIAS 1 3. OUTPUT 4. GROUND 5. GROUND 6. BIAS 2 7. INPUT 8. GROUND	STYLE 11: PIN 1. SOURCE 1 2. GATE 1 3. SOURCE 2 4. GATE 2 5. DRAIN 2 6. DRAIN 2 7. DRAIN 1 8. DRAIN 1	STYLE 12: PIN 1. SOURCE 2. SOURCE 3. SOURCE 4. GATE 5. DRAIN 6. DRAIN 7. DRAIN 8. DRAIN
STYLE 13: PIN 1. N.C. 2. SOURCE 3. SOURCE 4. GATE 5. DRAIN 6. DRAIN 7. DRAIN 8. DRAIN	STYLE 14: PIN 1. N-SOURCE 2. N-GATE 3. P-SOURCE 4. P-GATE 5. P-DRAIN 6. P-DRAIN 7. N-DRAIN 8. N-DRAIN	STYLE 15: PIN 1. ANODE 1 2. ANODE 1 3. ANODE 1 4. ANODE 1 5. CATHODE, COMMON 6. CATHODE, COMMON 7. CATHODE, COMMON 8. CATHODE, COMMON	STYLE 16: PIN 1. EMITTER, DIE #1 2. BASE, DIE #1 3. EMITTER, DIE #2 4. BASE, DIE #2 5. COLLECTOR, DIE #2 6. COLLECTOR, DIE #2 7. COLLECTOR, DIE #1 8. COLLECTOR, DIE #1
STYLE 17: PIN 1. VCC 2. V2OUT 3. V1OUT 4. TXE 5. RXE 6. VEE 7. GND 8. ACC	STYLE 18: PIN 1. ANODE 2. ANODE 3. SOURCE 4. GATE 5. DRAIN 6. DRAIN 7. CATHODE 8. CATHODE	STYLE 19: PIN 1. SOURCE 1 2. GATE 1 3. SOURCE 2 4. GATE 2 5. DRAIN 2 6. MIRROR 2 7. DRAIN 1 8. MIRROR 1	STYLE 20: PIN 1. SOURCE (N) 2. GATE (N) 3. SOURCE (P) 4. GATE (P) 5. DRAIN 6. DRAIN 7. DRAIN 8. DRAIN
STYLE 21: PIN 1. CATHODE 1 2. CATHODE 2 3. CATHODE 3 4. CATHODE 4 5. CATHODE 5 6. COMMON ANODE 7. COMMON ANODE 8. CATHODE 6	STYLE 22: PIN 1. I/O LINE 1 2. COMMON CATHODE/VCC 3. COMMON CATHODE/VCC 4. I/O LINE 3 5. COMMON ANODE/GND 6. I/O LINE 4 7. I/O LINE 5 8. COMMON ANODE/GND	STYLE 23: PIN 1. LINE 1 IN 2. COMMON ANODE/GND 3. COMMON ANODE/GND 4. LINE 2 IN 5. LINE 2 OUT 6. COMMON ANODE/GND 7. COMMON ANODE/GND 8. LINE 1 OUT	STYLE 24: PIN 1. BASE 2. EMITTER 3. COLLECTOR/ANODE 4. COLLECTOR/ANODE 5. CATHODE 6. CATHODE 7. COLLECTOR/ANODE 8. COLLECTOR/ANODE
STYLE 25: PIN 1. VIN 2. N/C 3. REXT 4. GND 5. IOUT 6. IOUT 7. IOUT 8. IOUT	STYLE 26: PIN 1. GND 2. dv/dt 3. ENABLE 4. ILIMIT 5. SOURCE 6. SOURCE 7. SOURCE 8. VCC	STYLE 27: PIN 1. ILIMIT 2. OVLO 3. UVLO 4. INPUT+ 5. SOURCE 6. SOURCE 7. SOURCE 8. DRAIN	STYLE 28: PIN 1. SW_TO_GND 2. DASIC_OFF 3. DASIC_SW_DET 4. GND 5. V_MON 6. VBULK 7. VBULK 8. VIN
STYLE 29: PIN 1. BASE, DIE #1 2. EMITTER, #1 3. BASE, #2 4. EMITTER, #2 5. COLLECTOR, #2 6. COLLECTOR, #2 7. COLLECTOR, #1 8. COLLECTOR, #1	STYLE 30: PIN 1. DRAIN 1 2. DRAIN 1 3. GATE 2 4. SOURCE 2 5. SOURCE 1/DRAIN 2 6. SOURCE 1/DRAIN 2 7. SOURCE 1/DRAIN 2 8. GATE 1		

DOCUMENT NUMBER:	98ASB42564B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SOIC-8 NB	PAGE 2 OF 2

onsemi and **onsemi** are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. **onsemi** does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales