

NTMS3P03R2

Power MOSFET -3.05 Amps, -30 Volts

P-Channel SOIC-8

Features

- High Efficiency Components in a Single SOIC-8 Package
- High Density Power MOSFET with Low $R_{DS(on)}$
- Miniature SOIC-8 Surface Mount Package - Saves Board Space
- Diode Exhibits High Speed with Soft Recovery
- I_{DSS} Specified at Elevated Temperature
- Avalanche Energy Specified
- Mounting Information for the SOIC-8 Package is Provided
- Pb-Free Package is Available

Applications

- DC-DC Converters
- Low Voltage Motor Control
- Power Management in Portable and Battery-Powered Products, i.e.: Computers, Printers, PCMCIA Cards, Cellular & Cordless Telephones



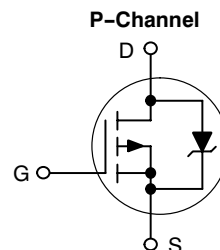
ON Semiconductor®

<http://onsemi.com>

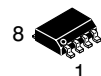
-3.05 AMPERES

-30 VOLTS

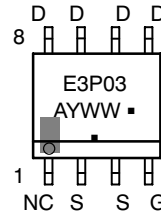
0.085 Ω @ $V_{GS} = -10$ V



MARKING DIAGRAM & PIN ASSIGNMENT



**SOIC-8
CASE 751
STYLE 13**



E3P03 = 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†
NTMS3P03R2	SOIC-8	2500/Tape & Reel
NTMS3P03R2G	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.

NTMS3P03R2

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	-30	V
Gate-to-Source Voltage - Continuous	V_{GS}	± 20	V
Thermal Resistance - Junction-to-Ambient (Note 1) Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Continuous Drain Current @ 25°C Continuous Drain Current @ 70°C Pulsed Drain Current (Note 4)	$R_{\theta JA}$ P_D I_D I_D I_{DM}	171 0.73 -2.34 -1.87 -8.0	$^\circ\text{C/W}$ W A A A
Thermal Resistance - Junction-to-Ambient (Note 2) Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Continuous Drain Current @ 25°C Continuous Drain Current @ 70°C Pulsed Drain Current (Note 4)	$R_{\theta JA}$ P_D I_D I_D I_{DM}	100 1.25 -3.05 -2.44 -12	$^\circ\text{C/W}$ W A A A
Thermal Resistance - Junction-to-Ambient (Note 3) Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Continuous Drain Current @ 25°C Continuous Drain Current @ 70°C Pulsed Drain Current (Note 4)	$R_{\theta JA}$ P_D I_D I_D I_{DM}	62.5 2.0 -3.86 -3.1 -15	$^\circ\text{C/W}$ W A A A
Operating and Storage Temperature Range	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$
Single Pulse Drain-to-Source Avalanche Energy - Starting $T_J = 25^\circ\text{C}$ ($V_{DD} = -30\text{ Vdc}$, $V_{GS} = -4.5\text{ Vdc}$, Peak $I_L = -7.5\text{ Apk}$, $L = 5\text{ mH}$, $R_G = 25\ \Omega$)	E_{AS}	140	mJ
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	$^\circ\text{C}$

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. Minimum FR-4 or G-10 PCB, t = steady state.
2. Mounted onto a 2" square FR-4 Board (1" sq. 2 oz Cu 0.06" thick single sided), t = steady state.
3. Mounted onto a 2" square FR-4 Board (1" sq. 2 oz Cu 0.06" thick single sided), $t \leq 10$ seconds.
4. Pulse Test: Pulse Width = 300 μs , Duty Cycle = 2%.

NTMS3P03R2

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

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage (V _{GS} = 0 Vdc, I _D = -250 µAdc) Temperature Coefficient (Positive)	V _{(BR)DSS}	-30 -	- -30	- -	Vdc mV/°C
Zero Gate Voltage Drain Current (V _{DS} = -30 Vdc, V _{GS} = 0 Vdc, T _J = 25°C) (V _{DS} = -30 Vdc, V _{GS} = 0 Vdc, T _J = 125°C)	I _{DSS}	- -	- -	-1.0 -10	µAdc
Gate-Body Leakage Current (V _{GS} = -20 Vdc, V _{DS} = 0 Vdc)	I _{GSS}	-	-	-100	nAdc
Gate-Body Leakage Current (V _{GS} = +20 Vdc, V _{DS} = 0 Vdc)	I _{GSS}	-	-	100	nAdc

ON CHARACTERISTICS

Gate Threshold Voltage (V _{DS} = V _{GS} , I _D = -250 µAdc) Temperature Coefficient (Negative)	V _{GS(th)}	-1.0 -	-1.7 3.6	-2.5 -	Vdc
Static Drain-to-Source On-State Resistance (V _{GS} = -10 Vdc, I _D = -3.05 Adc) (V _{GS} = -4.5 Vdc, I _D = -1.5 Adc)	R _{DS(on)}	- -	0.063 0.090	0.085 0.115	Ω
Forward Transconductance (V _{DS} = -15 Vdc, I _D = -3.05 Adc)	g _{FS}	-	5.0	-	Mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	(V _{DS} = -24 Vdc, V _{GS} = 0 Vdc, f = 1.0 MHz)	C _{iss}	-	520	750	pF
Output Capacitance		C _{oss}	-	170	325	
Reverse Transfer Capacitance		C _{rss}	-	70	135	

SWITCHING CHARACTERISTICS (Notes 6 & 7)

Turn-On Delay Time	(V _{DD} = -24 Vdc, I _D = -3.05 Adc, V _{GS} = -10 Vdc, R _G = 6.0 Ω)	t _{d(on)}	-	12	22	ns
Rise Time		t _r	-	16	30	
Turn-Off Delay Time		t _{d(off)}	-	45	80	
Fall Time		t _f	-	45	80	
Turn-On Delay Time	(V _{DD} = -24 Vdc, I _D = -1.5 Adc, V _{GS} = -4.5 Vdc, R _G = 6.0 Ω)	t _{d(on)}	-	16	-	ns
Rise Time		t _r	-	42	-	
Turn-Off Delay Time		t _{d(off)}	-	32	-	
Fall Time		t _f	-	35	-	
Total Gate Charge	(V _{DS} = -24 Vdc, V _{GS} = -10 Vdc, I _D = -3.05 Adc)	Q _{tot}	-	16	25	nC
Gate-Source Charge		Q _{gs}	-	2.0	-	
Gate-Drain Charge		Q _{gd}	-	4.5	-	

BODY-DRAIN DIODE RATINGS (Note 6)

Diode Forward On-Voltage	(I _S = -3.05 Adc, V _{GS} = 0 V) (I _S = -3.05 Adc, V _{GS} = 0 V, T _J = 125°C)	V _{SD}	- -	-0.96 -0.78	-1.25 -	Vdc
Reverse Recovery Time	(I _S = -3.05 Adc, V _{GS} = 0 Vdc, dI _S /dt = 100 A/µs)	t _{rr}	-	34	-	ns
		t _a	-	18	-	
		t _b	-	16	-	
Reverse Recovery Stored Charge		Q _{RR}	-	0.03	-	µC

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

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

7. Switching characteristics are independent of operating junction temperature.

TYPICAL ELECTRICAL CHARACTERISTICS

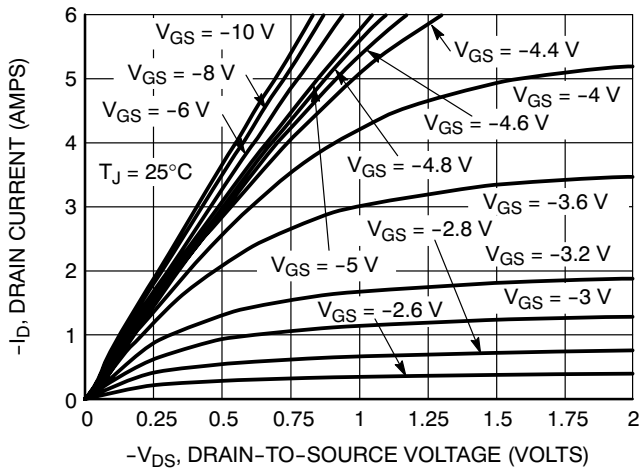


Figure 1. On-Region Characteristics

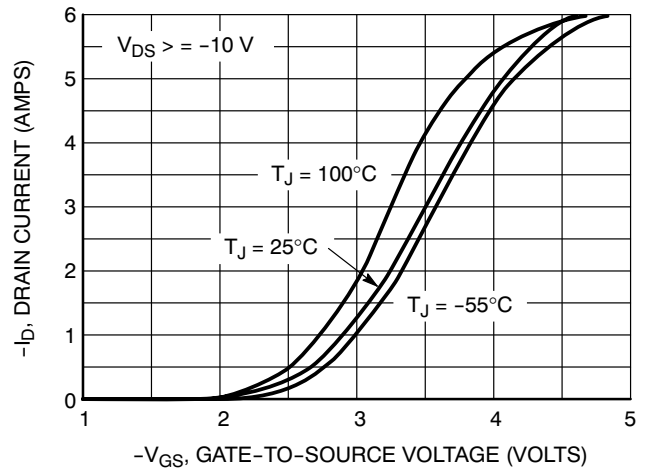


Figure 2. Transfer Characteristics

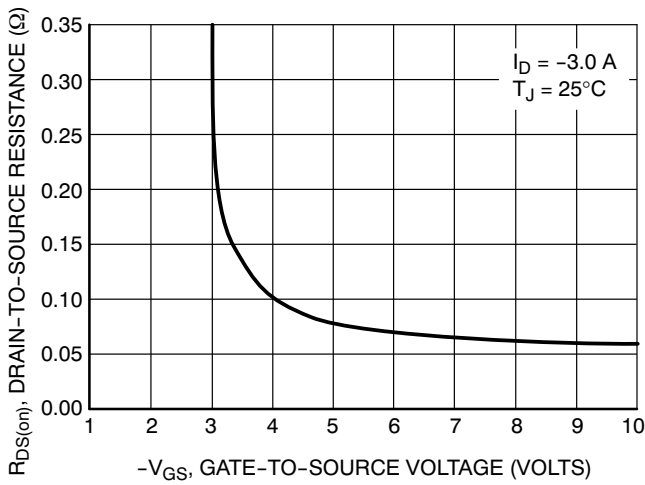


Figure 3. On-Resistance vs. Gate-to-Source Voltage

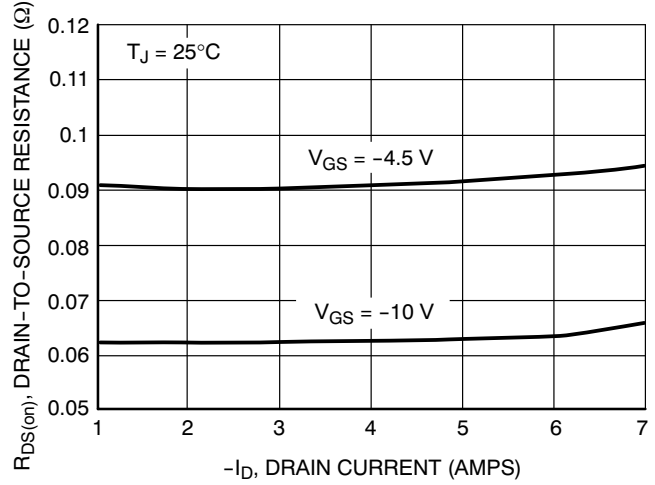


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

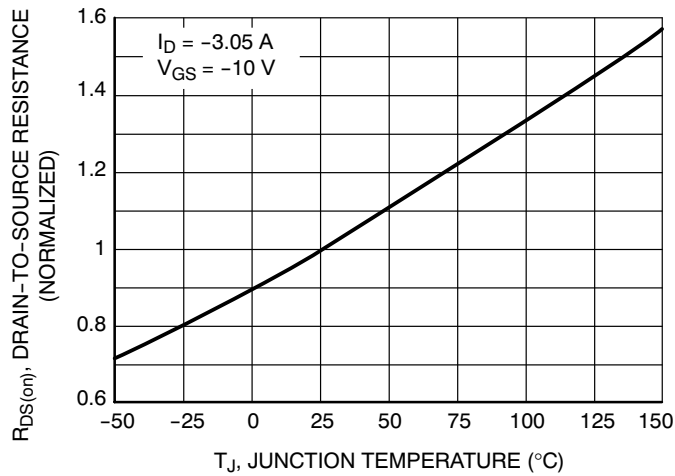


Figure 5. On Resistance Variation with Temperature

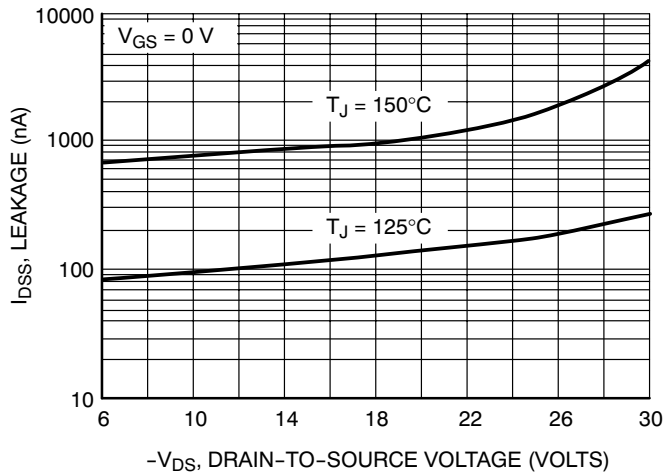


Figure 6. Drain-to-Source Leakage Current vs. Voltage

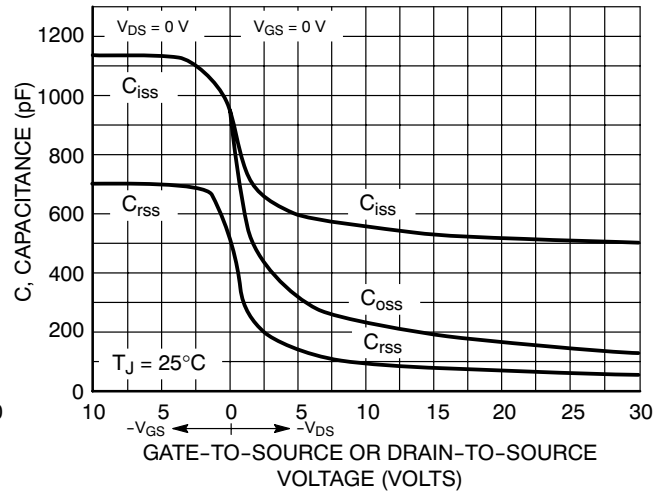


Figure 7. Capacitance Variation

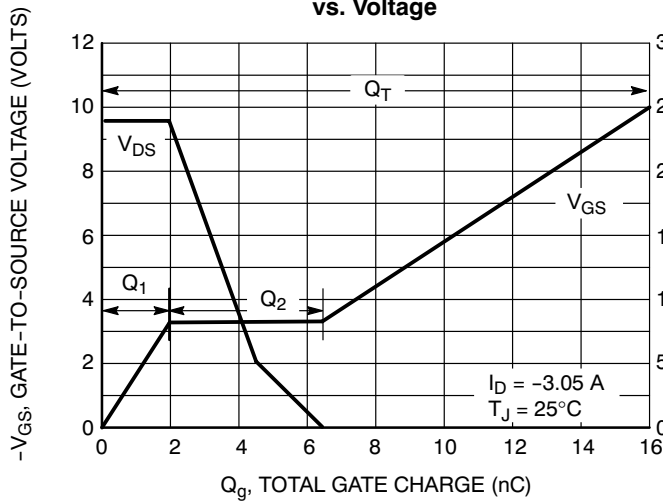


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

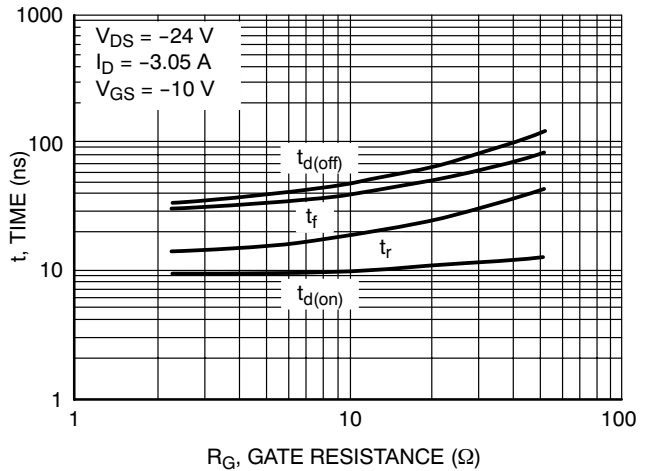


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

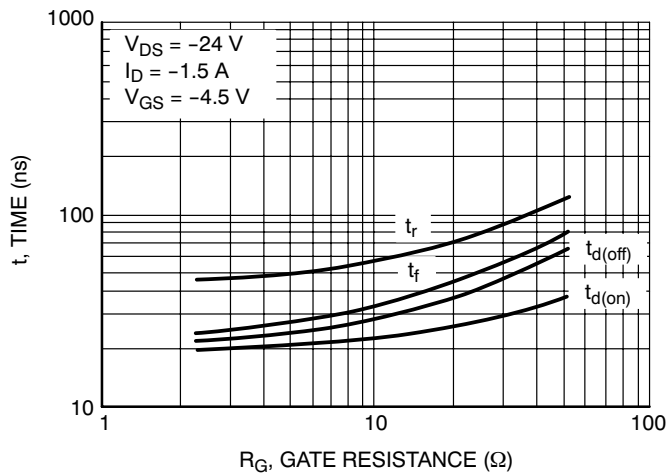


Figure 10. Resistive Switching Time Variation vs. Gate Resistance

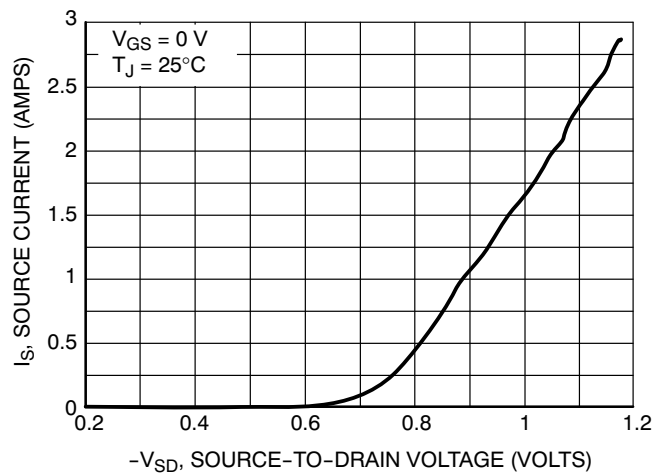


Figure 11. Diode Forward Voltage vs. Current

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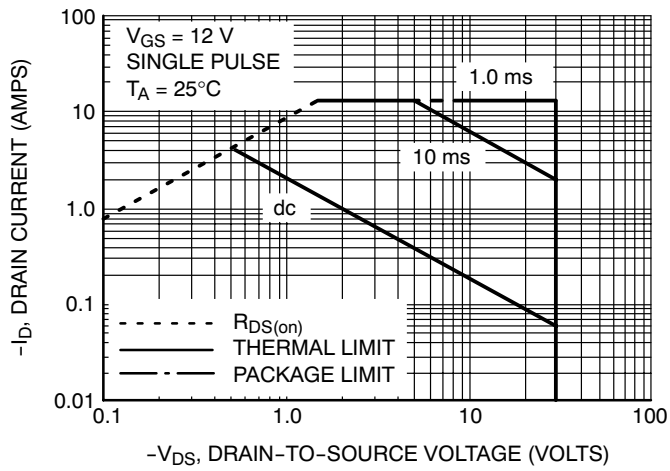


Figure 12. Maximum Rated Forward Biased Safe Operating Area

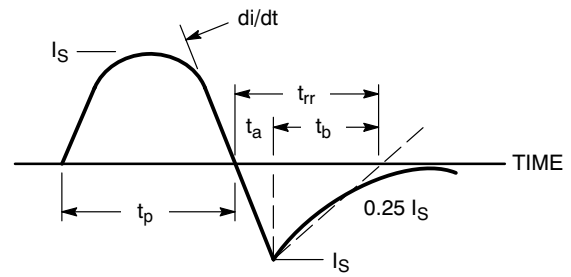


Figure 13. Diode Reverse Recovery Waveform

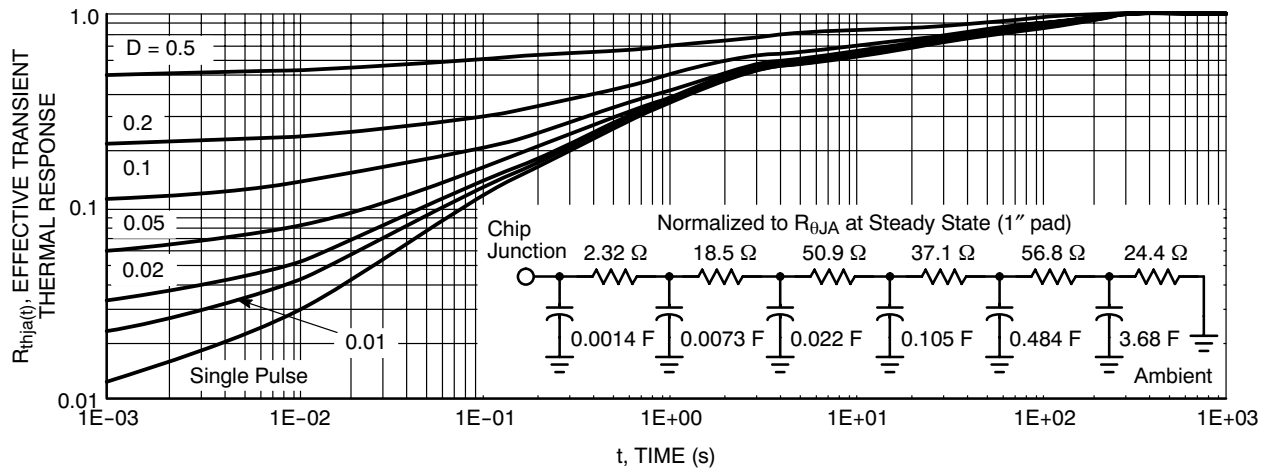
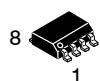


Figure 14. FET Thermal Response

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

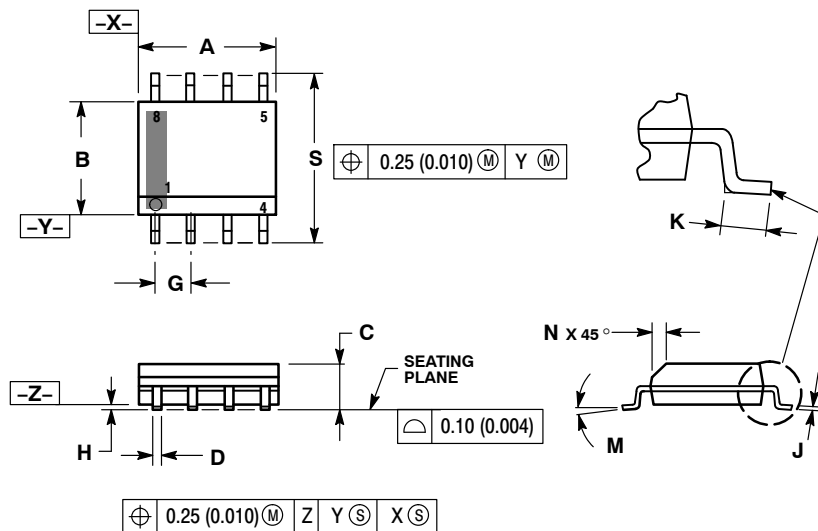
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SCALE 1:1

SOIC-8 NB
CASE 751-07
ISSUE AK

DATE 16 FEB 2011

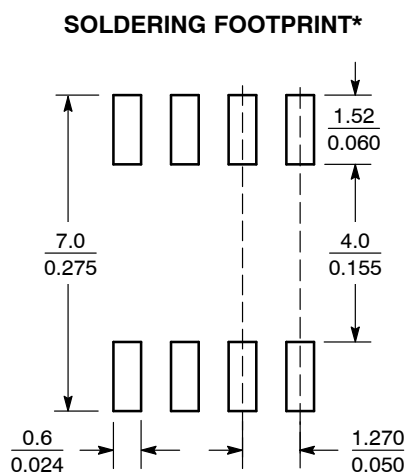


NOTES:

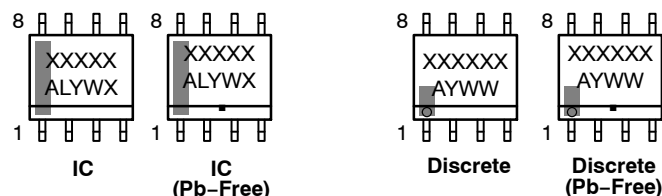
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL 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*



SCALE 6:1 (mm/inches)



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 ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

STYLES ON PAGE 2

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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		

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