NTMFS4H013NF

MOSFET – Power, Single, N-Channel, SO-8FL
25 V, 269 A

Features
- Integrated Schottky Diode
- Optimized Design to Minimize Conduction and Switching Losses
- Optimized Package to Minimize Parasitic Inductances
- Optimized material for improved thermal performance
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Applications
- High Performance DC-DC Converters
- System Voltage Rails
- Netcom, Telecom
- Servers & Point of Load

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

Parameter	Symbol	Value	Units
Drain-to-Source Voltage	V_{DSS}	25	V
Gate-to-Source Voltage	V_{GS}	±20	V
Continuous Drain Current $R_{\theta JA}$ (T_A = 25°C, Note 1)	I_D	43	A
Power Dissipation $R_{\theta JA}$ (T_A = 25°C, Note 1)	P_D	2.70	W
Continuous Drain Current $R_{\theta JC}$ (T_C = 25°C, Note 1)	I_D	269	A
Power Dissipation $R_{\theta JC}$ (T_C = 25°C, Note 1)	P_D	104	W
Pulsed Drain Current (t_p = 10 μs)	I_{DM}	505	A
Single Pulse Drain-to-Source Avalanche Energy (Note 1) (I_L = 51 A_{pk}, L = 0.3 mH)	E_{AS}	390	mJ
Drain to Source dV/dt	dV/dt	7	V/ns
Maximum Junction Temperature	$T_{J(max)}$	150	°C
Storage Temperature Range	T_{STG}	−55 to 150	°C
Lead Temperature Soldering Reflow (SMD Styles Only), Pb-Free Versions (Note 2)	T_{SLD}	260	°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. Values based on copper area of 645 mm^2 (or 1 in^2) of 2 oz copper thickness and FR4 PCB substrate.
2. For more information, please refer to our Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.
3. This is the absolute maximum rating. Parts are 100% UIS tested at T_J = 25°C, V_{GS} = 10 V, I_L = 33 A, E_{AS} = 164 mJ.

ON Semiconductor®

www.onsemi.com

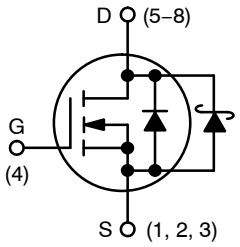
V_{GS}	MAX $R_{DS(on)}$	TYP Q_{GTOT}
4.5 V	1.4 mΩ	26 nC
10 V	0.9 mΩ	56 nC

PIN CONNECTIONS

SO8−FL (5 x 6 mm)

(Top View) (Bottom View)

N−CHANNEL MOSFET



ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

© Semiconductor Components Industries, LLC, 2014

THERMALCHARACTERISTICS

Parameter	Symbol	Max	Units
Thermal Resistance,			°C/W
Junction-to-Ambient (Note 1 and 4)	$R_{\theta JA}$	40.0	
Junction-to-Case (Note 1 and 4)	$R_{\theta JC}$	1.5	

4. Thermal Resistance $R_{\theta JA}$ and $R_{\theta JC}$ as defined in JESD51−3.

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 1.0 mA		25			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$				34.5		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 20 V	T_J = 25 °C			500	μA
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = +20 V				+100	nA
ON CHARACTERISTICS (Note 5)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 1.0 mA		1.2		2.1	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				4.6		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V	I_D = 30 A		0.72	0.9	mΩ
		V_{GS} = 4.5 V	I_D = 30 A		1.1	1.4	
Forward Transconductance	g_{FS}	V_{DS} = 12 V, I_D = 15 A			119		S
CHARGES, CAPACITANCES & GATE RESISTANCE							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1 MHz, V_{DS} = 12 V			3923		pF
Output Capacitance	C_{OSS}				2537		
Reverse Transfer Capacitance	C_{RSS}				114		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 4.5 V, V_{DS} = 12 V; I_D = 30 A			26		nC
Threshold Gate Charge	$Q_{G(TH)}$				2.9		
Gate−to−Source Charge	Q_{GS}				10.7		
Gate−to−Drain Charge	Q_{GD}				5.8		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 10 V, V_{DS} = 12 V; I_D = 30 A			56		nC
Gate Resistance	R_G	T_A = 25°C			1.0		Ω
SWITCHING CHARACTERISTICS, V_{GS} = 4.5 V (Note 5)							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 4.5 V, V_{DD} = 12 V, I_D = 15 A, R_G = 3.0 Ω			17.6		ns
Rise Time	t_r				55.1		
Turn−Off Delay Time	$t_{d(OFF)}$				29.4		
Fall Time	t_f				9.96		
SWITCHING CHARACTERISTICS, V_{GS} = 10 V (Note 5)							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 10 V, V_{DD} = 12 V, I_D = 15 A, R_G = 3.0 Ω			11.3		ns
Rise Time	t_r				44.2		
Turn−Off Delay Time	$t_{d(OFF)}$				39.2		
Fall Time	t_f				7.1		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 2.0 A	T_J = 25°C		0.38	0.6	V
			T_J = 125°C		0.297		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dIS/dt = 100 A/μs, I_S = 30 A			61.3		ns
Charge Time	t_a				30.4		
Discharge Time	t_b				30.9		
Reverse Recovery Charge	Q_{RR}				66		nC

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. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
6. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

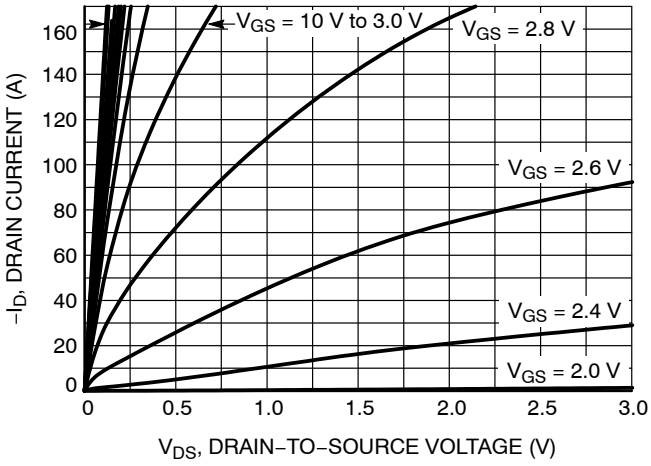


Figure 1. On–Region Characteristics

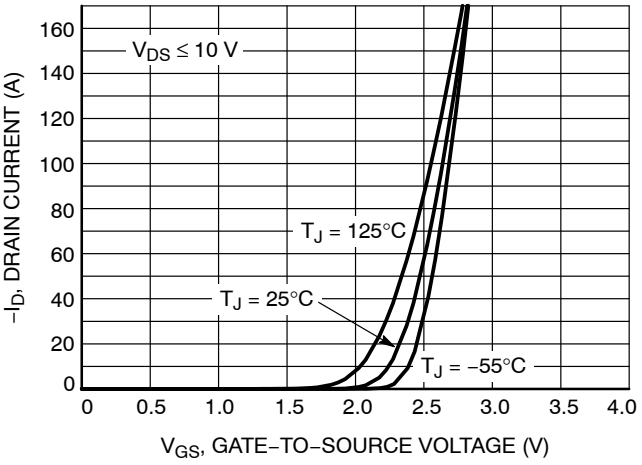


Figure 2. Transfer Characteristics

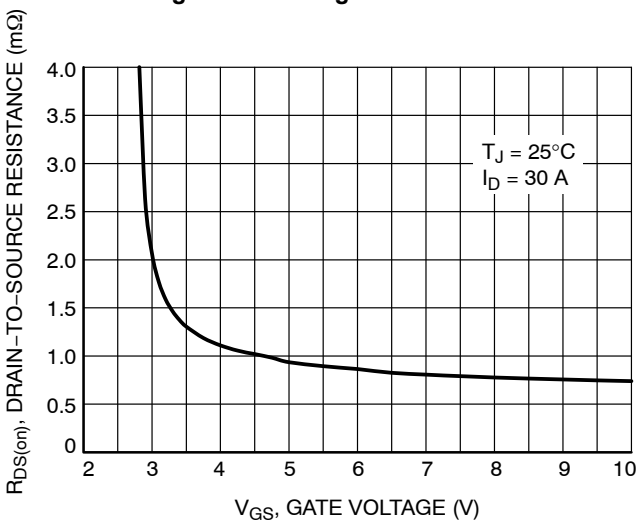


Figure 3. On–Resistance vs. Gate–to–Source Voltage

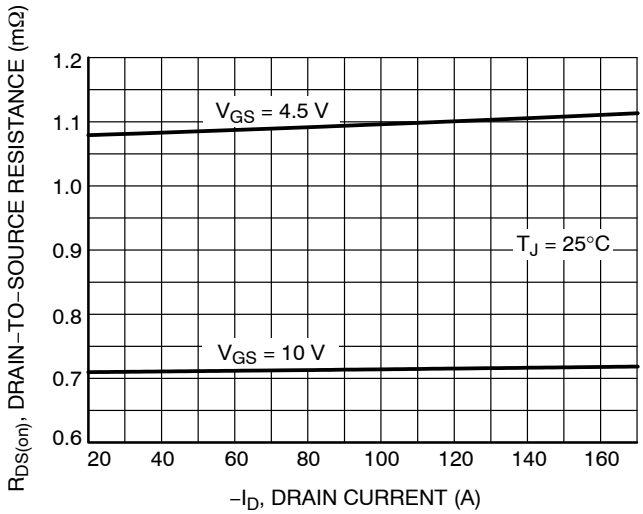


Figure 4. On–Resistance vs. Drain Current and Gate Voltage

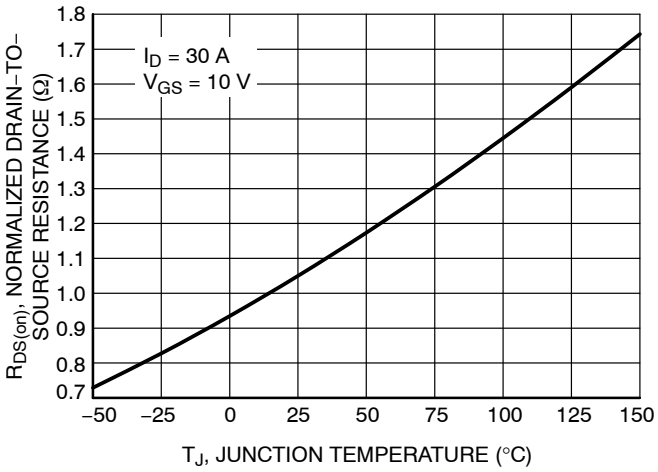


Figure 5. On–Resistance Variation with Temperature

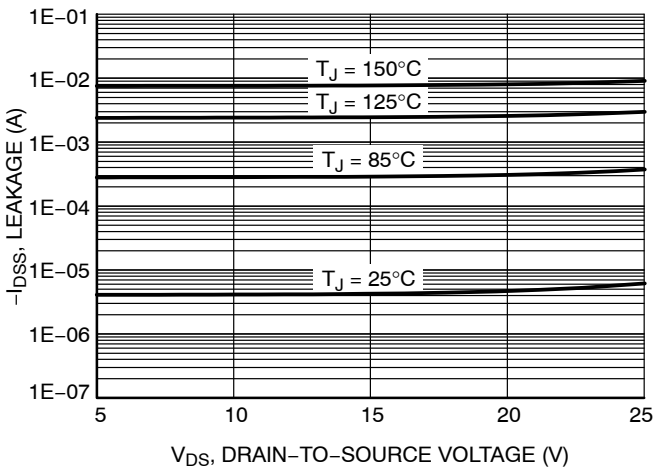


Figure 6. Drain–to–Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

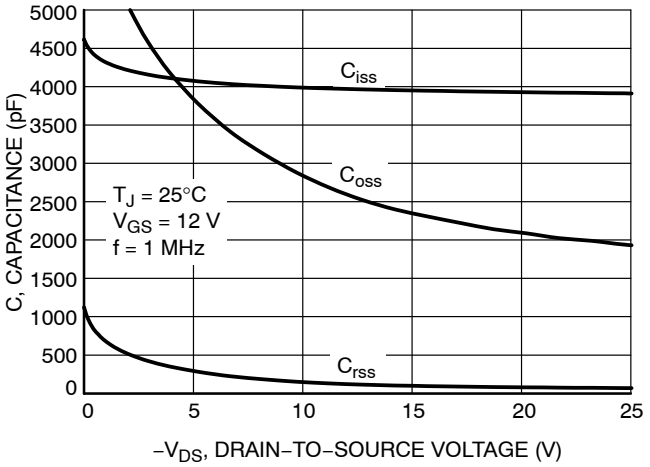


Figure 7. Capacitance Variation

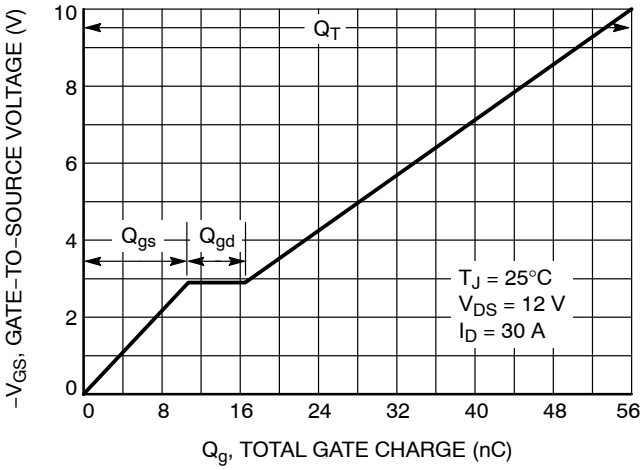


Figure 8. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge

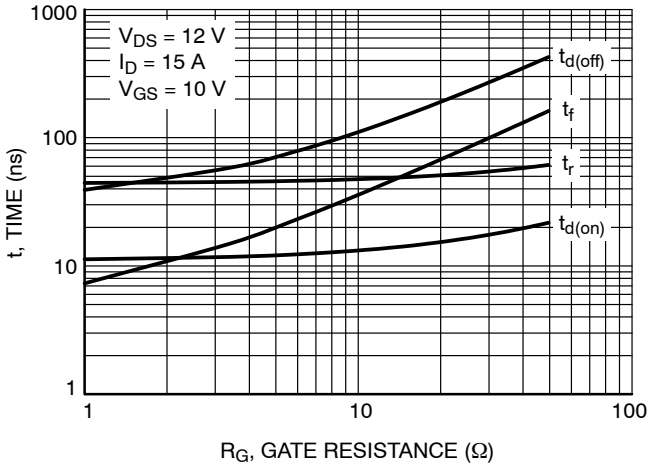


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

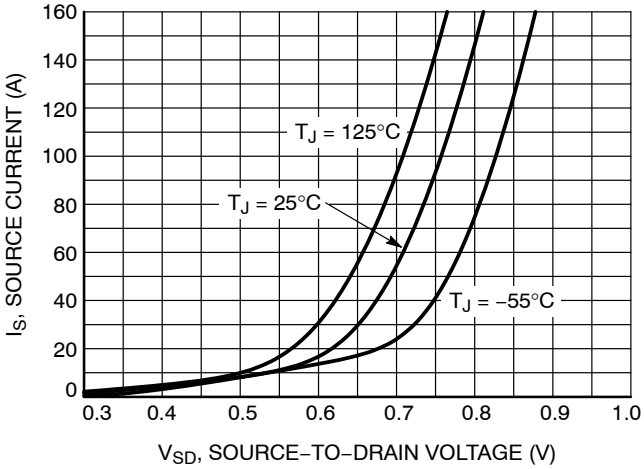


Figure 10. Diode Forward Voltage vs. Current

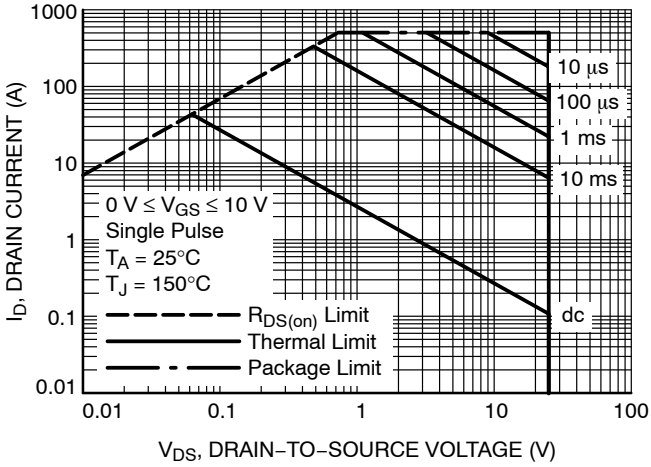


Figure 11. Maximum Rated Forward Biased Safe Operating Area

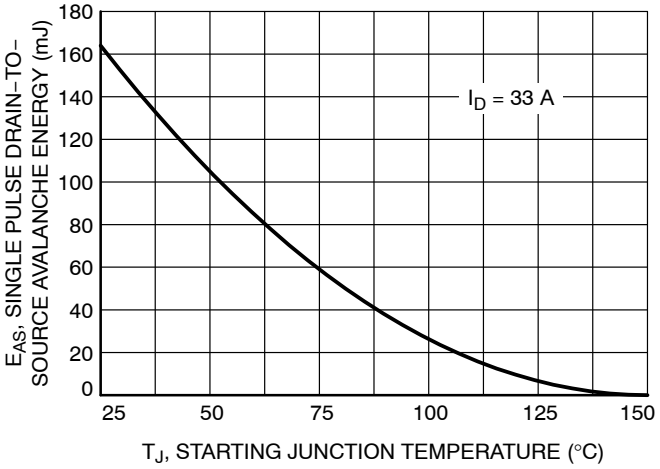


Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature

TYPICAL CHARACTERISTICS

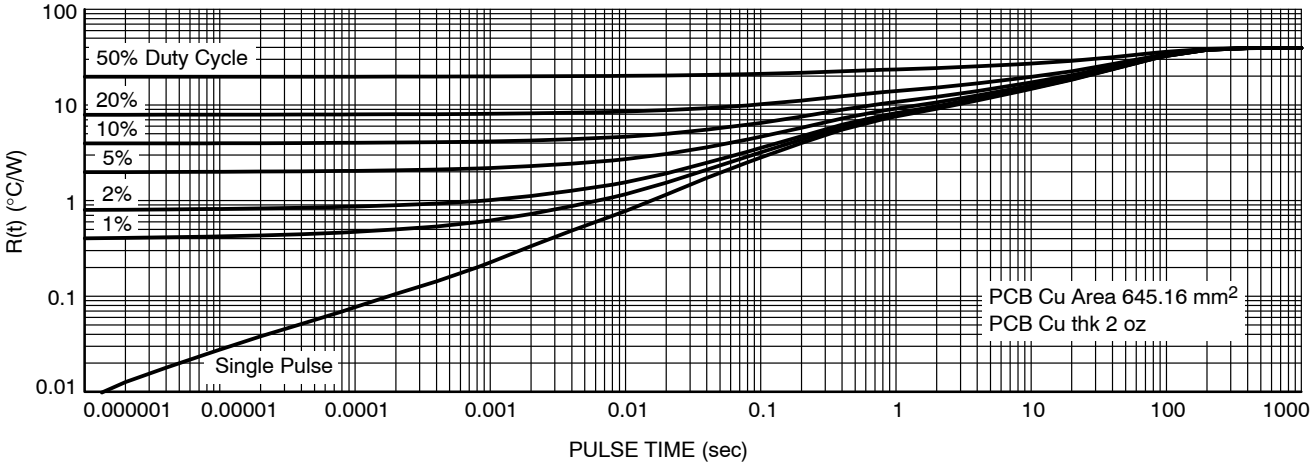


Figure 13. Thermal Characteristics

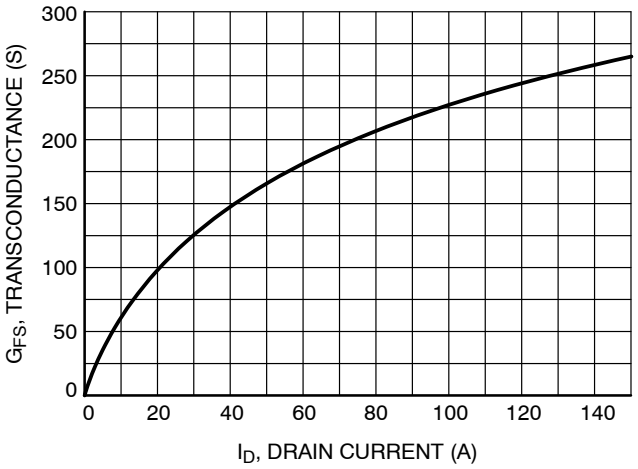


Figure 14. GFS vs. I_D

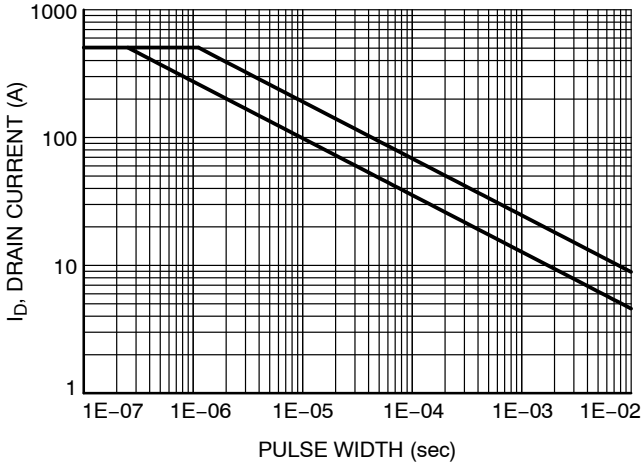
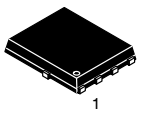


Figure 15. Avalanche Characteristics

ORDERING INFORMATION

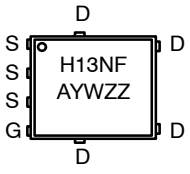
Device	Package	Shipping†
NTMFS4H013NFT1G	SO8−FL (Pb-Free)	1500 / Tape & Reel
NTMFS4H013NFT3G	SO8−FL (Pb-Free)	5000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.



SO−8 FLAT LEAD
CASE 488AA
STYLE 1

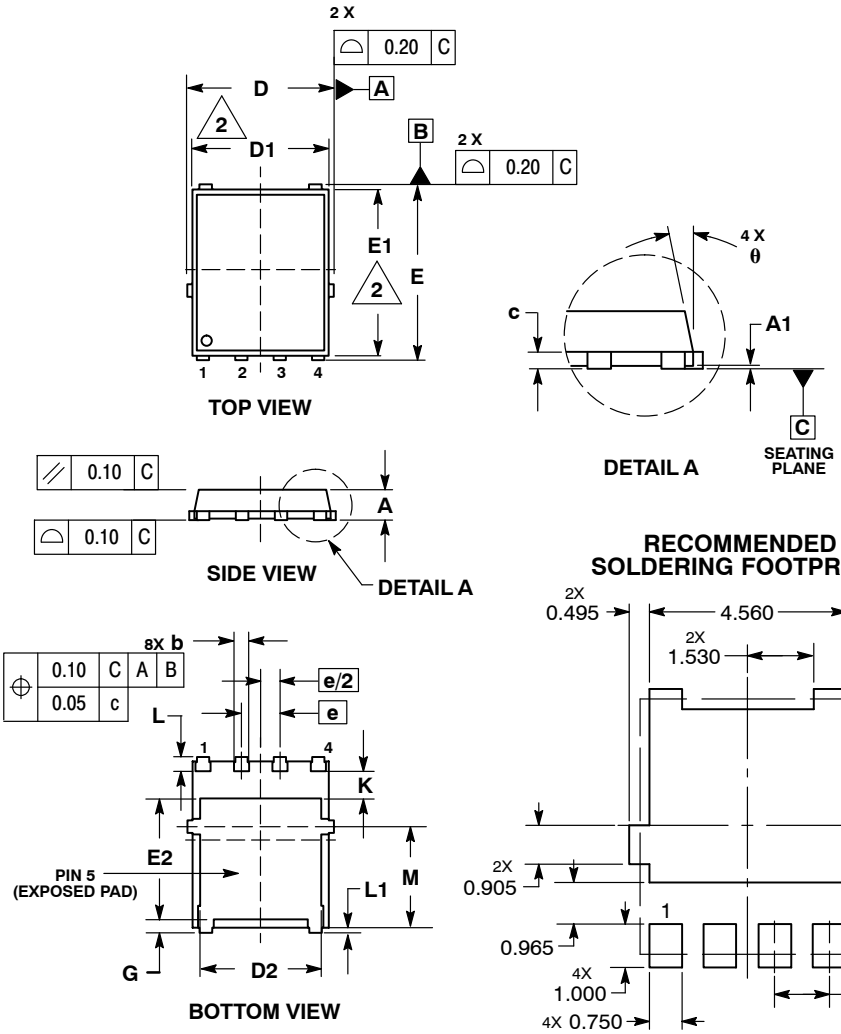
MARKING DIAGRAM



A	= Assembly Location
Y	= Year
W	= Work Week
ZZ	= Lot Traceability

PACKAGE DIMENSIONS

DFN5 5x6, 1.27P
(SO−8FL)
CASE 488AA
ISSUE K



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

	MILLIMETERS		
DIM	MIN	NOM	MAX
A	0.90	1.00	1.10
A1	0.00	−−−	0.05
b	0.33	0.41	0.51
c	0.23	0.28	0.33
D	5.00	5.15	5.30
D1	4.70	4.90	5.10
D2	3.80	4.00	4.20
E	6.00	6.15	6.30
E1	5.70	5.90	6.10
E2	3.45	3.65	3.85
e	1.27 BSC		
G	0.51	0.575	0.71
K	1.20	1.35	1.50
L	0.51	0.575	0.71
L1	0.125 REF		
M	3.00	3.40	3.80
θ	0 °	−−−	12 °

STYLE 1:
PIN 1. SOURCE
2. SOURCE
3. SOURCE
4. GATE
5. DRAIN

RECOMMENDED SOLDERING FOOTPRINT*

DIMENSIONS: MILLIMETERS

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

ON Semiconductor and ON are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent−Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor 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 ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor 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. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor 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 ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor 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 ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative