

MOSFET - Power, Single N-Channel, STD Gate, SO8FL

80 V, 2.6 mΩ, 154 A

NTMFS3D0N08X

Features

- Low Q_{RR} , Soft Recovery Body Diode
- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Q_G and Capacitance to Minimize Driver Losses
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Typical Applications

- Synchronous Rectification (SR) in DC-DC and AC-DC
- Primary Switch in Isolated DC-DC Converter
- Motor Drives

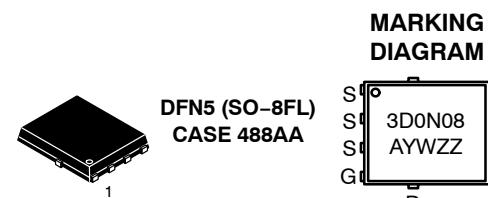
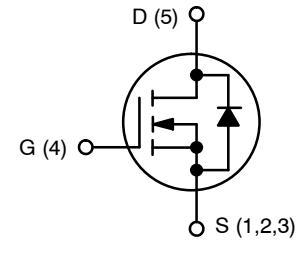
MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise stated)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	80	V
Gate-to-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current (Note 1)	I_D	154	A
		109	
Power Dissipation (Note 1)	P_D	133	W
Pulsed Drain Current	I_{DM}	634	A
Pulsed Source Current (Body Diode)	I_{SM}	634	
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to +175	°C
Source Current (Body Diode)	I_S	201	A
Single Pulse Avalanche Energy ($I_{PK} = 53$ A) (Note 3)	E_{AS}	140	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	T_L	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. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Actual continuous current will be limited by thermal & electromechanical application board design.
3. E_{AS} of 140 mJ is based on started $T_J = 25^\circ\text{C}$, $I_{AS} = 53$ A, $V_{DD} = 64$ V, $V_{GS} = 10$ V, 100% avalanche tested

$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D MAX
80 V	2.6 mΩ @ 10 V	154 A



3D0N08 = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
ZZ = Lot Traceability

ORDERING INFORMATION

Device	Package	Shipping [†]
NTMFS3D0N08XT1G	DFN5 (Pb-Free)	1500 / 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.

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THERMAL CHARACTERISTICS

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta,JC}$	1.12	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta,JA}$	39	

4. Surface-mounted on FR4 board using 1 in² pad, 1 oz. Cu.

5. $R_{\theta,JA}$ is determined by the user's board design.

ELECTRICAL CHARACTERISTICS ($T_J = 25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0 \text{ V}, I_D = 1 \text{ mA}$	80			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$\Delta V_{(\text{BR})\text{DSS}}/\Delta T_J$	$I_D = 1 \text{ mA}$. Referenced to 25°C		31.6		$\text{mV}/^{\circ}\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{\text{DS}} = 80 \text{ V}, T_J = 25^{\circ}\text{C}$		1		μA
		$V_{\text{DS}} = 80 \text{ V}, T_J = 125^{\circ}\text{C}$		250		
Gate-to-Source Leakage Current	I_{GSS}	$V_{\text{DS}} = 20 \text{ V}, V_{\text{GS}} = 0 \text{ V}$		100		nA

ON CHARACTERISTICS

Drain-to-Source On Resistance	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = 10 \text{ V}, I_D = 37 \text{ A}$		2.2	2.6	$\text{m}\Omega$
		$V_{\text{GS}} = 6 \text{ V}, I_D = 18 \text{ A}$		3.3	5.2	
Gate Threshold Voltage	$V_{\text{GS}(\text{TH})}$	$V_{\text{GS}} = V_{\text{DS}}, I_D = 184 \mu\text{A}$	2.4		3.6	V
Gate Threshold Voltage Temperature Coefficient	$\Delta V_{\text{GS}(\text{TH})}/\Delta T_J$	$V_{\text{GS}} = V_{\text{DS}}, I_D = 184 \mu\text{A}$		-7.5		$\text{mV}/^{\circ}\text{C}$
Forward Transconductance	g_{FS}	$V_{\text{DS}} = 5 \text{ V}, I_D = 37 \text{ A}$		115		S

CHARGES, CAPACITANCES & GATE RESISTANCE

Input Capacitance	C_{ISS}	$V_{\text{GS}} = 0 \text{ V}, V_{\text{DS}} = 40 \text{ V}, f = 1 \text{ MHz}$		3200		pF
Output Capacitance	C_{OSS}			930		
Reverse Transfer Capacitance	C_{RSS}			14		
Output Charge	Q_{OSS}			66		nC
Total Gate Charge	$Q_{\text{G}(\text{TOT})}$	$V_{\text{GS}} = 6 \text{ V}, V_{\text{DD}} = 40 \text{ V}, I_D = 37 \text{ A}$		28		
				45		
				10		
		$V_{\text{GS}} = 10 \text{ V}, V_{\text{DD}} = 40 \text{ V}, I_D = 37 \text{ A}$		15		
				7		
				4.7		V
Gate Plateau Voltage	V_{GP}	$f = 1 \text{ MHz}$		0.8		Ω
Gate Resistance	R_{G}					

SWITCHING CHARACTERISTICS

Turn-On Delay Time	$t_{\text{d}(\text{ON})}$	Resistive Load, $V_{\text{GS}} = 0/10 \text{ V}, V_{\text{DD}} = 40 \text{ V},$ $I_D = 37 \text{ A}, R_{\text{G}} = 2.5 \Omega$		24		ns
Rise Time	t_r			8		
Turn-Off Delay Time	$t_{\text{d}(\text{OFF})}$			35		
Fall Time	t_f			6		

SOURCE-TO-DRAIN DIODE CHARACTERISTICS

Forward Diode Voltage	V_{SD}	$V_{\text{GS}} = 0 \text{ V}, I_S = 37 \text{ A}, T_J = 25^{\circ}\text{C}$		0.82	1.2	V
		$V_{\text{GS}} = 0 \text{ V}, I_S = 37 \text{ A}, T_J = 125^{\circ}\text{C}$		0.66		
Reverse Recovery Time	t_{RR}	$V_{\text{GS}} = 0 \text{ V}, dI/dt = 1000 \text{ A}/\mu\text{s},$ $I_S = 37 \text{ A}, V_{\text{DD}} = 40 \text{ V}$		23		ns
Charge Time	t_a			13		
Discharge Time	t_b			11		
Reverse Recovery Charge	Q_{RR}			163		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.

TYPICAL CHARACTERISTICS

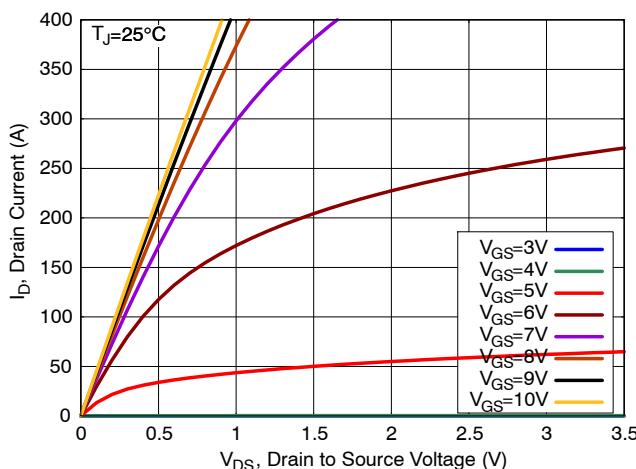


Figure 1. On-Region Characteristics

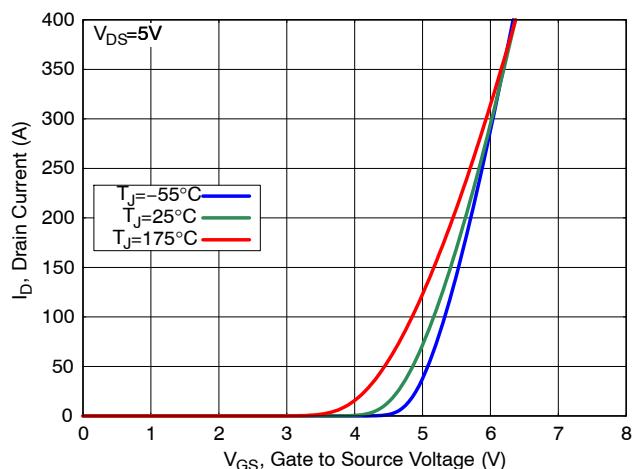


Figure 2. Transfer Characteristics

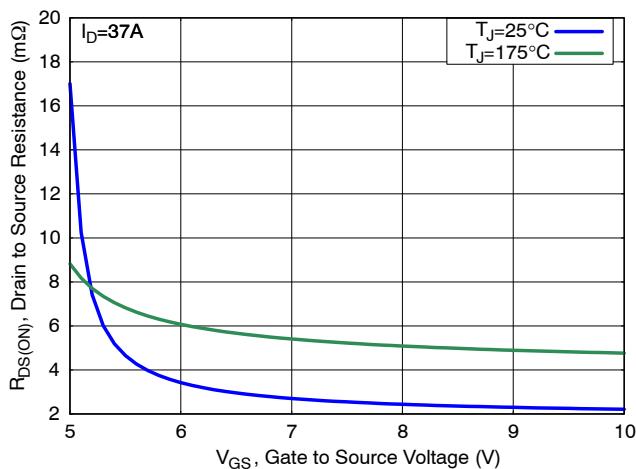


Figure 3. On-Resistance vs. Gate Voltage

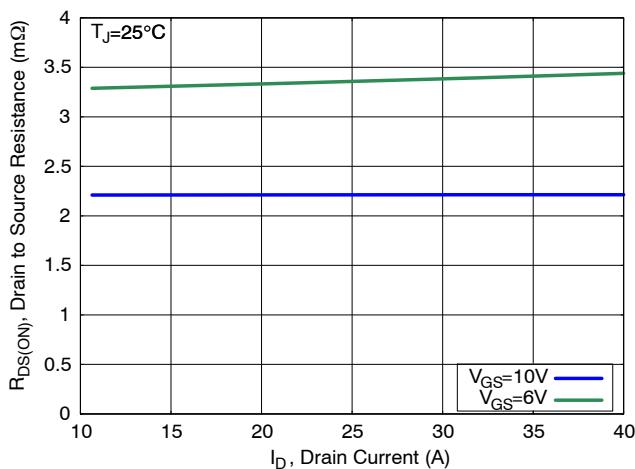


Figure 4. On-Resistance vs. Drain Current

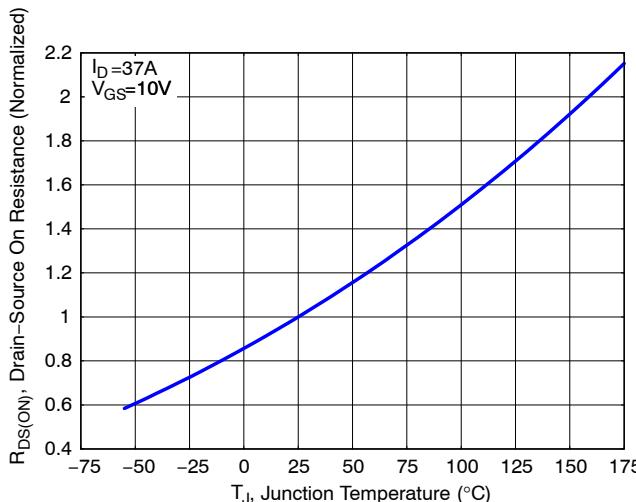


Figure 5. Normalized ON Resistance vs. Junction Temperature

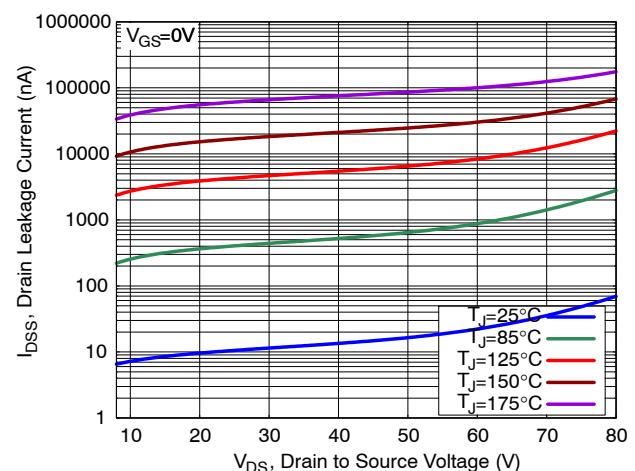
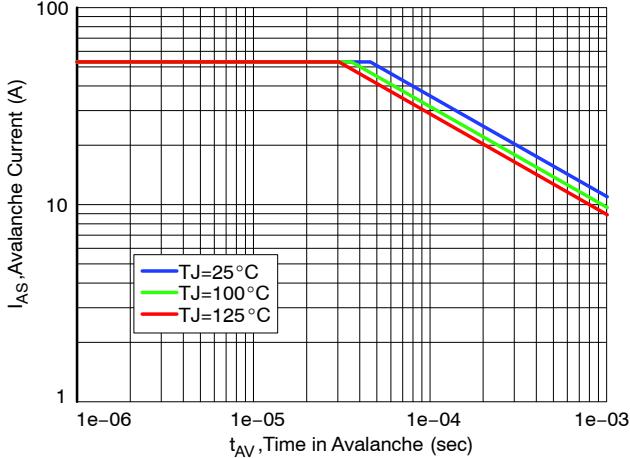
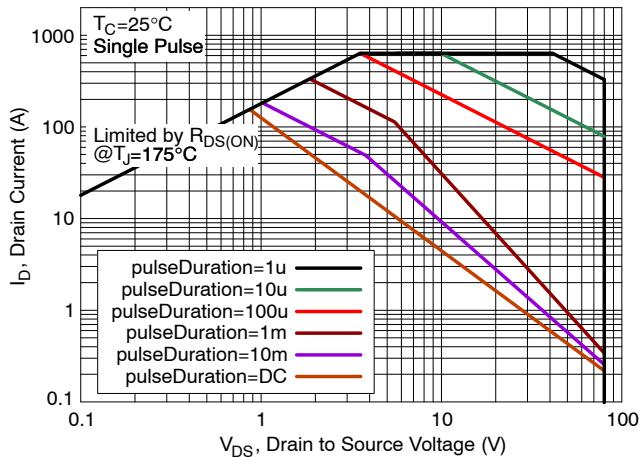
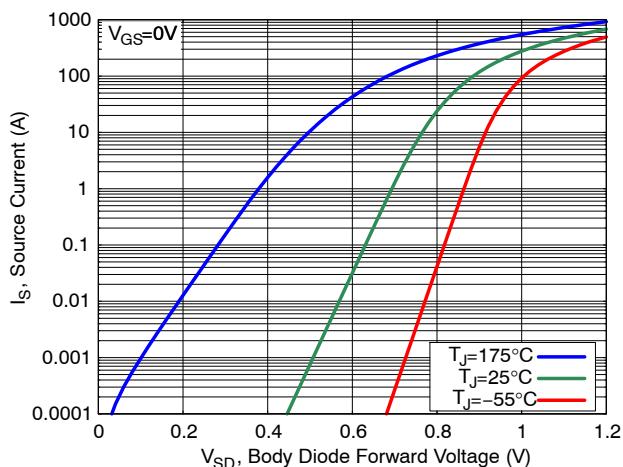
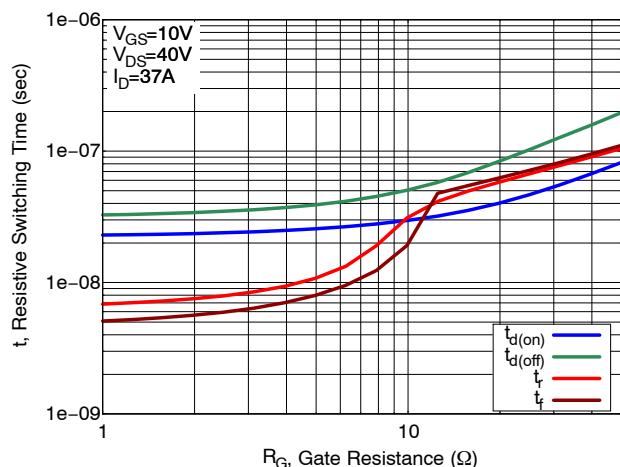
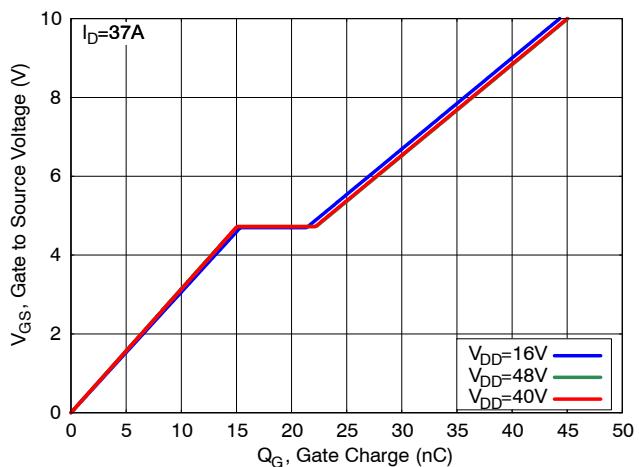
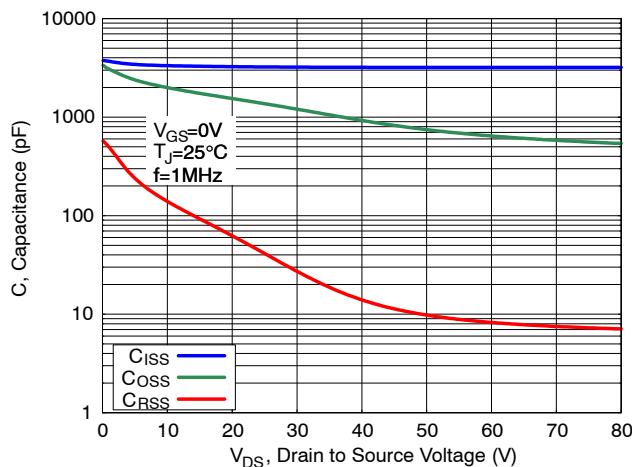


Figure 6. Drain Leakage Current vs. Drain Voltage

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS

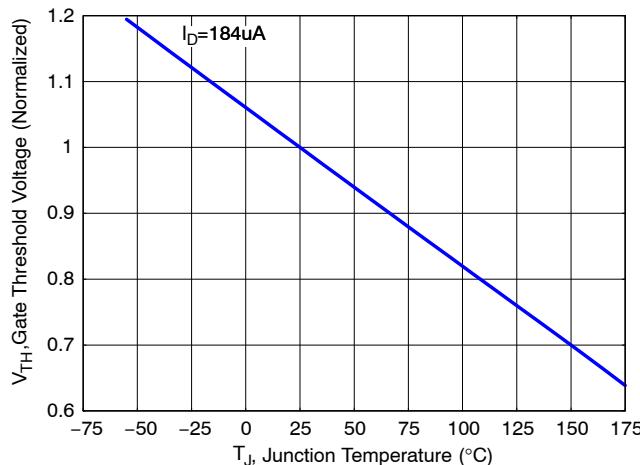


Figure 13. Gate Threshold Voltage vs. Junction Temperature

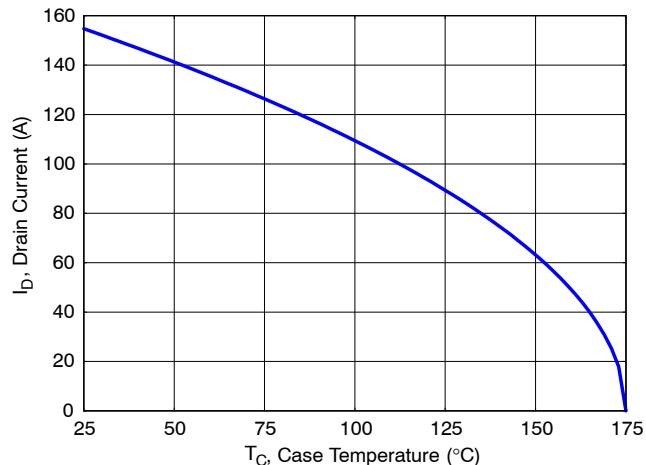


Figure 14. Maximum Current vs. Case Temperature

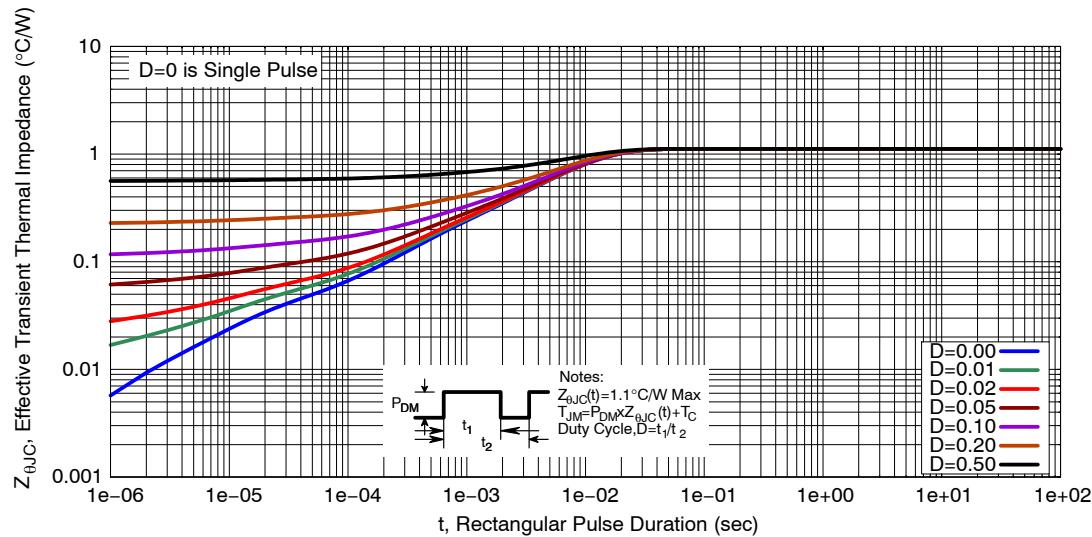
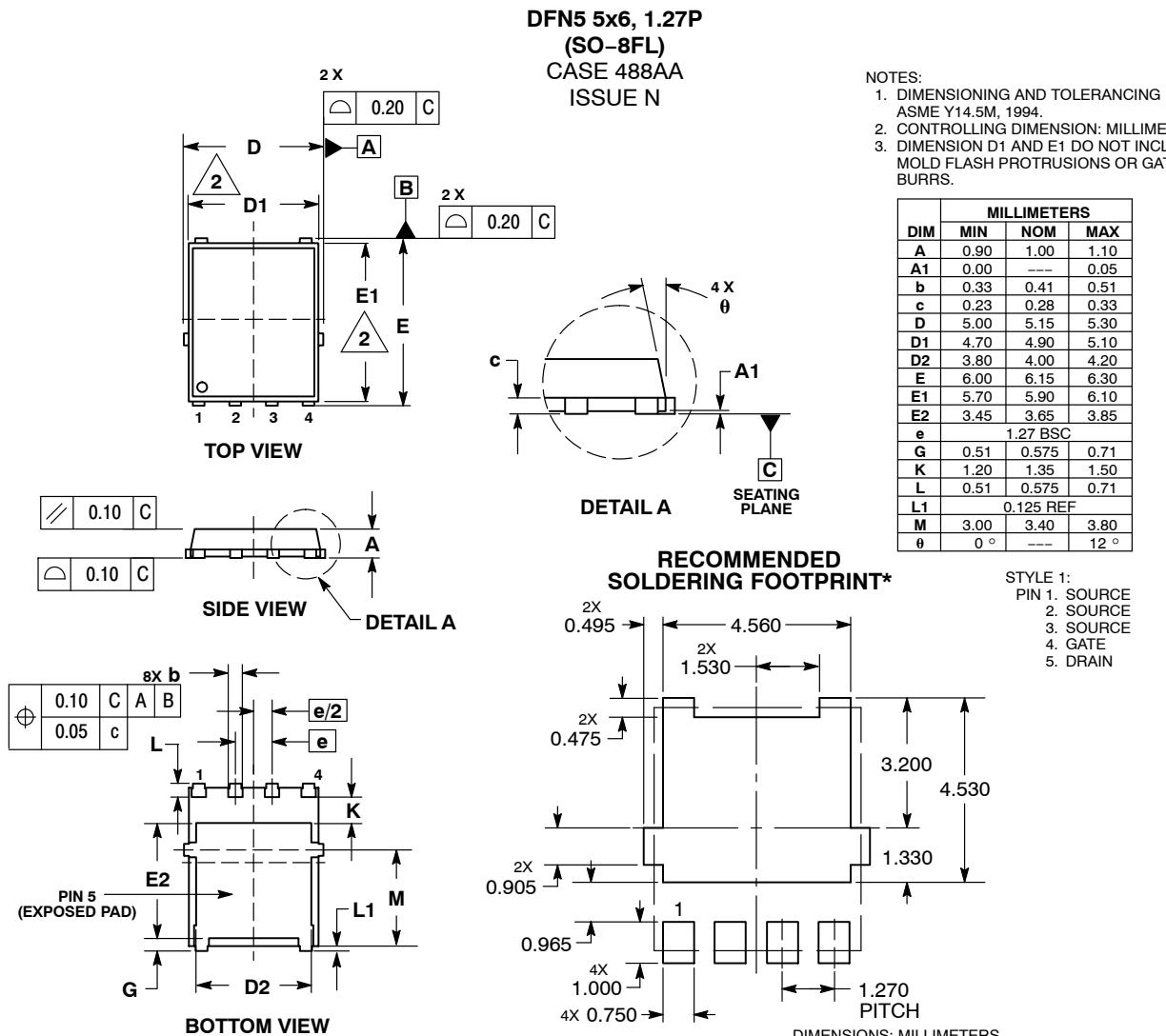


Figure 15. Transient Thermal Response

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PACKAGE DIMENSIONS



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

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