

NVMFS5833N

Power MOSFET

40 V, 7.5 mΩ, 86 A, Single N-Channel, SO-8FL

Features

- Low $R_{DS(on)}$
- Low Capacitance
- Optimized Gate Charge
- AEC-Q101 Qualified and PPAP Capable
- NVMFS5833NWF – Wettable Franks Option for Enhanced Optical Inspection
- These Devices are Pb-Free and are RoHS Compliant

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

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	40	V
Gate-to-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current $R_{\Psi J-mb}$ (Notes 1, 2, 3 & 4)	Steady State	$T_{mb} = 25^\circ\text{C}$	I_D 86 A
		$T_{mb} = 100^\circ\text{C}$	61
Power Dissipation $R_{\Psi J-mb}$ (Notes 1, 2, 3)	Steady State	$T_{mb} = 25^\circ\text{C}$	P_D 112 W
		$T_{mb} = 100^\circ\text{C}$	56
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 3 & 4)	Steady State	$T_A = 25^\circ\text{C}$	I_D 16 A
		$T_A = 100^\circ\text{C}$	11
Power Dissipation $R_{\theta JA}$ (Notes 1 & 3)	Steady State	$T_A = 25^\circ\text{C}$	P_D 3.7 W
		$T_A = 100^\circ\text{C}$	1.8
Pulsed Drain Current	$T_A = 25^\circ\text{C}, t_p = 10 \mu\text{s}$	I_{DM} 324	A
Operating Junction and Storage Temperature	T_J, T_{stg}	-55 to 175	$^\circ\text{C}$
Source Current (Body Diode)	I_S	86	A
Single Pulse Drain-to-Source Avalanche Energy ($T_J = 25^\circ\text{C}, I_{L(pk)} = 36 \text{ A}, L = 0.1 \text{ mH}$)	E_{AS}	65	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	T_L	260	$^\circ\text{C}$

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.

THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Mounting Board (top) – Steady State (Notes 2, 3)	$R_{\Psi J-mb}$	1.3	$^\circ\text{C}/\text{W}$
Junction-to-Ambient – Steady State (Note 3)	$R_{\theta JA}$	41	

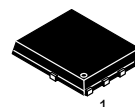
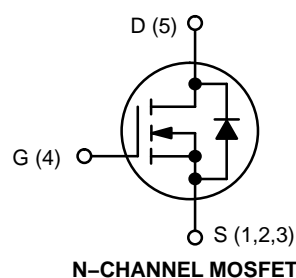
1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Psi (Ψ) is used as required per JESD51-12 for packages in which substantially less than 100% of the heat flows to single case surface.
3. Surface-mounted on FR4 board using a 650 mm², 2 oz. Cu pad.
4. Continuous DC current rating. Maximum current for pulses as long as 1 second are higher but are dependent on pulse duration and duty cycle/



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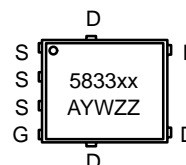
<http://onsemi.com>

$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
40 V	7.5 mΩ @ 10 V	86 A



SO-8 FLAT LEAD
CASE 488AA
STYLE 1

MARKING DIAGRAM



5833 = Specific Device Code
 xx = N (NVMFS5833N) or
 WF (NVMFS5833NWF)
 A = Assembly Location
 Y = Year
 W = Work Week
 ZZ = Lot Traceability

ORDERING INFORMATION

Device	Package	Shipping†
NVMFS5833NT1G	SO-8FL (Pb-Free)	1500 / Tape & Reel
NVMFS5833NT3G	SO-8FL (Pb-Free)	5000 / Tape & Reel
NVMFS5833NWFT1G	SO-8FL (Pb-Free)	1500 / Tape & Reel
NVMFS5833NWFT3G	SO-8FL (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.

NVMFS5833N

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 250 μA	40			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /T _J			32.6		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V, V _{DS} = 40 V	T _J = 25°C		1.0	μA
			T _J = 125°C		100	
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 = 250 μA	2.0		3.5	V
Threshold Temperature Coefficient	V _{GS(TH)} /T _J			-7.6		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 40 A		6.2	7.5	mΩ
Forward Transconductance	g _{FS}	V _{DS} = 5 V, I _D = 5 A		38		S

CHARGES AND CAPACITANCES

Input Capacitance	C _{iss}	V _{GS} = 0 V, f = 1.0 MHz, V _{DS} = 25 V		1714		pF
Output Capacitance	C _{oss}			210		
Reverse Transfer Capacitance	C _{rss}			144		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 10 V, V _{DS} = 32 V, I _D = 40 A		32.5		nC
Threshold Gate Charge	Q _{G(TH)}			2.77		
Gate-to-Source Charge	Q _{GS}			7.37		
Gate-to-Drain Charge	Q _{GD}			9		

SWITCHING CHARACTERISTICS (Note 6)

Turn-On Delay Time	t _{d(on)}	V _{GS} = 10 V, V _{DS} = 20 V, I _D = 40 A, R _G = 2.5 Ω		10.23		ns
Rise Time	t _r			19.5		
Turn-Off Delay Time	t _{d(off)}			23.60		
Fall Time	t _f			3.00		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V _{SD}	V _{GS} = 0 V, I _S = 40 A	T _J = 25°C	0.85	1.2	V
			T _J = 125°C	0.7		
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V, d _{IS} /d _t = 100 A/μs, I _S = 40 A		23.5		ns
Charge Time	t _a			13.5		
Discharge Time	t _b			10		
Reverse Recovery Charge	Q _{RR}			14		

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

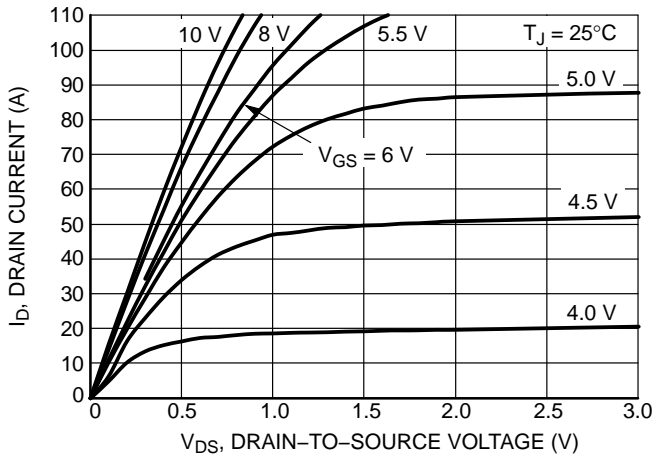


Figure 1. On-Region Characteristics

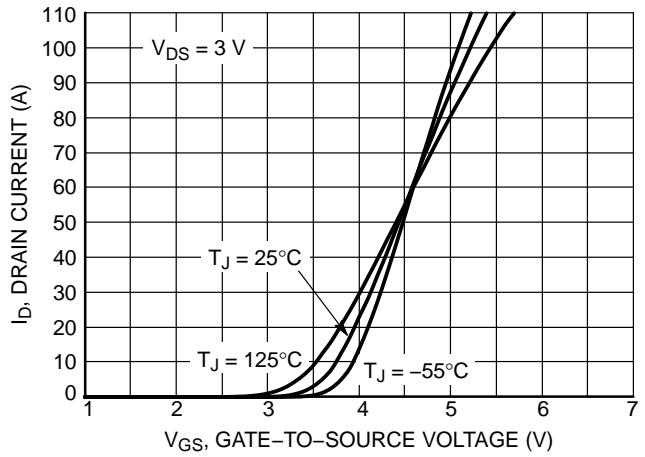


Figure 2. Transfer Characteristics

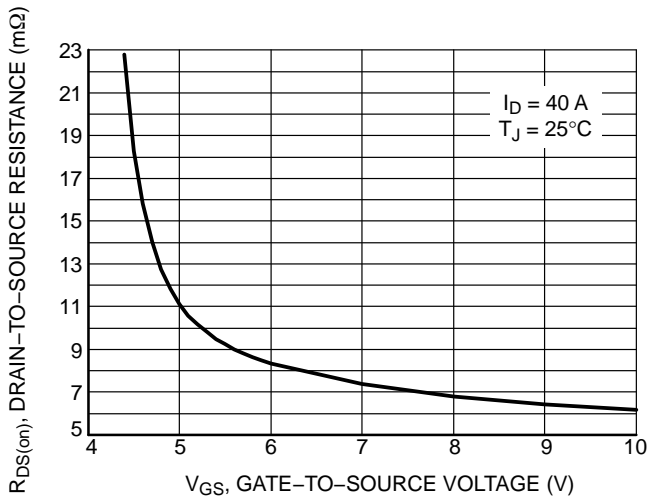


Figure 3. On-Resistance vs. Gate-to-Source Voltage

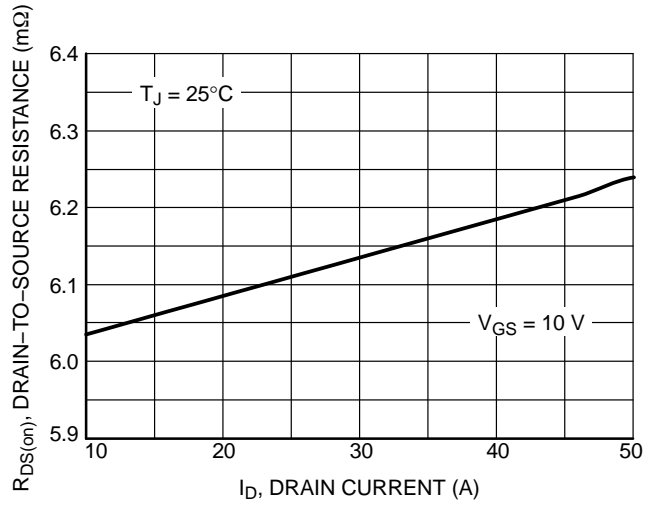


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

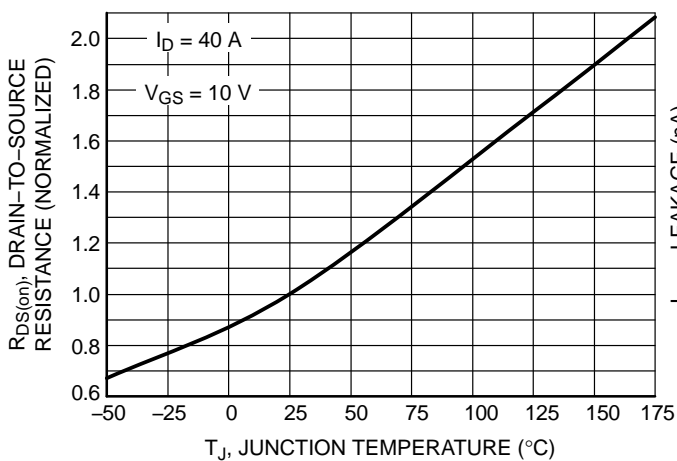


Figure 5. On-Resistance Variation with Temperature

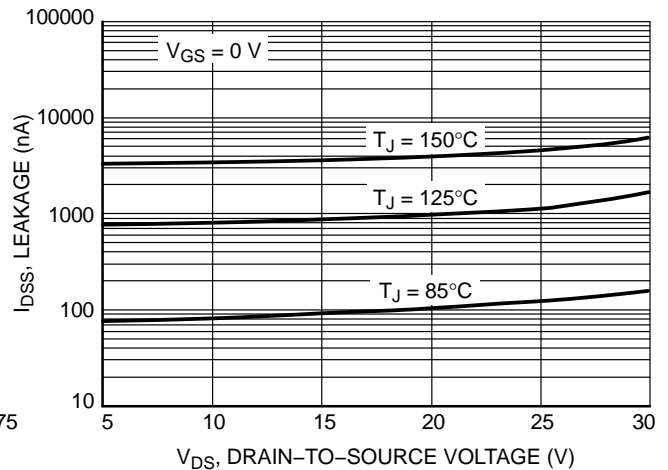


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

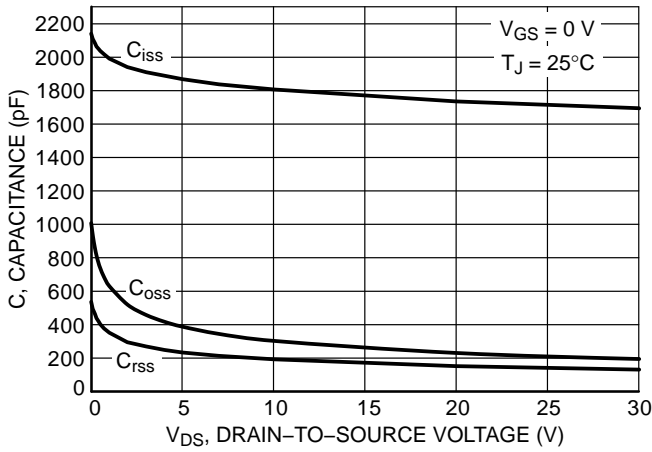


Figure 7. Capacitance Variation

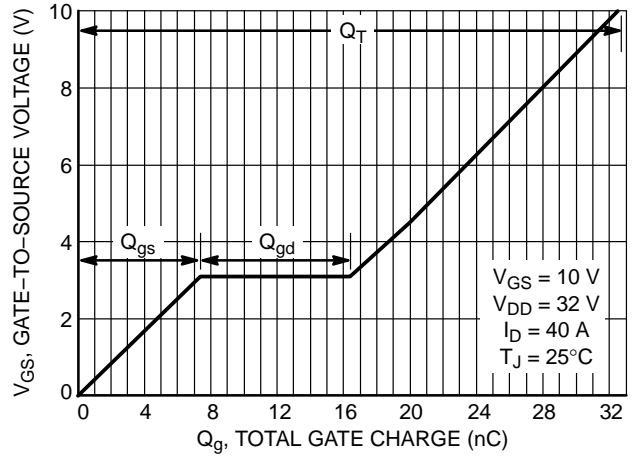


Figure 8. Gate-to-Source Voltage vs. Total Charge

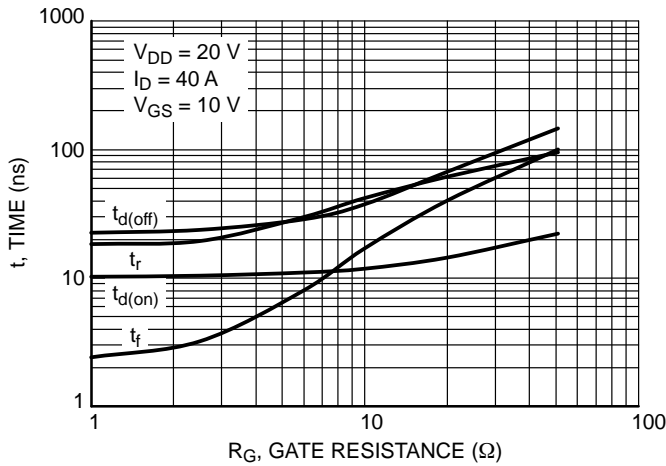


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

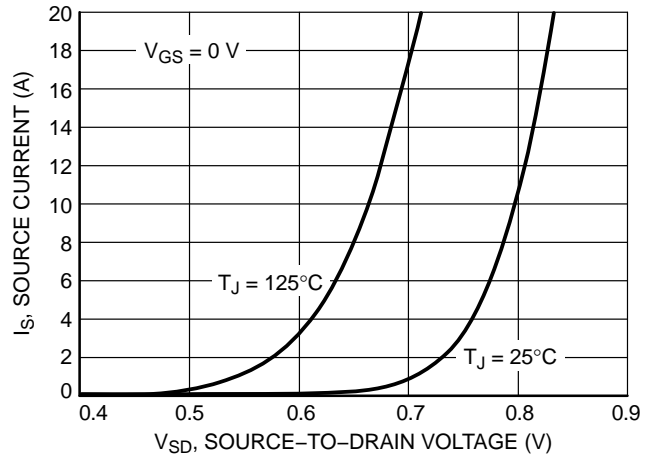


Figure 10. Diode Forward Voltage vs. Current

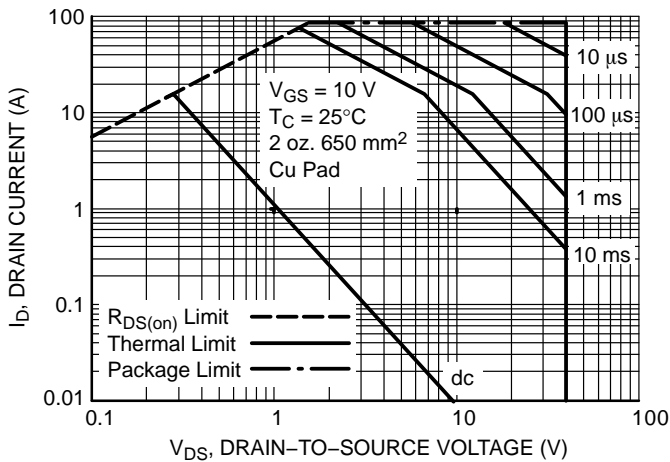


Figure 11. Maximum Rated Forward Biased Safe Operating Area

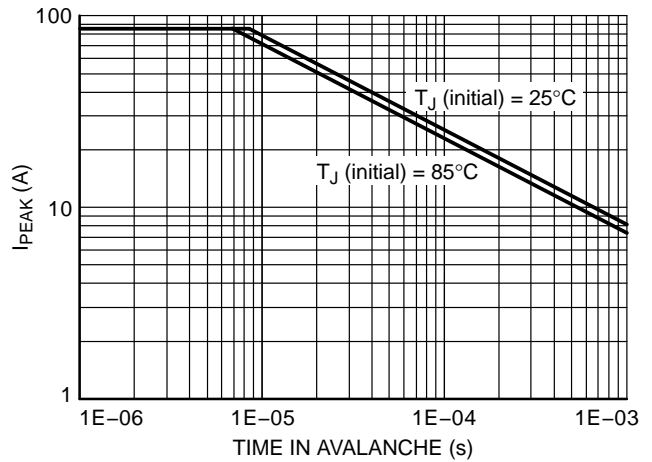


Figure 12. Avalanche Characteristics

NVMFS5833N

TYPICAL CHARACTERISTICS

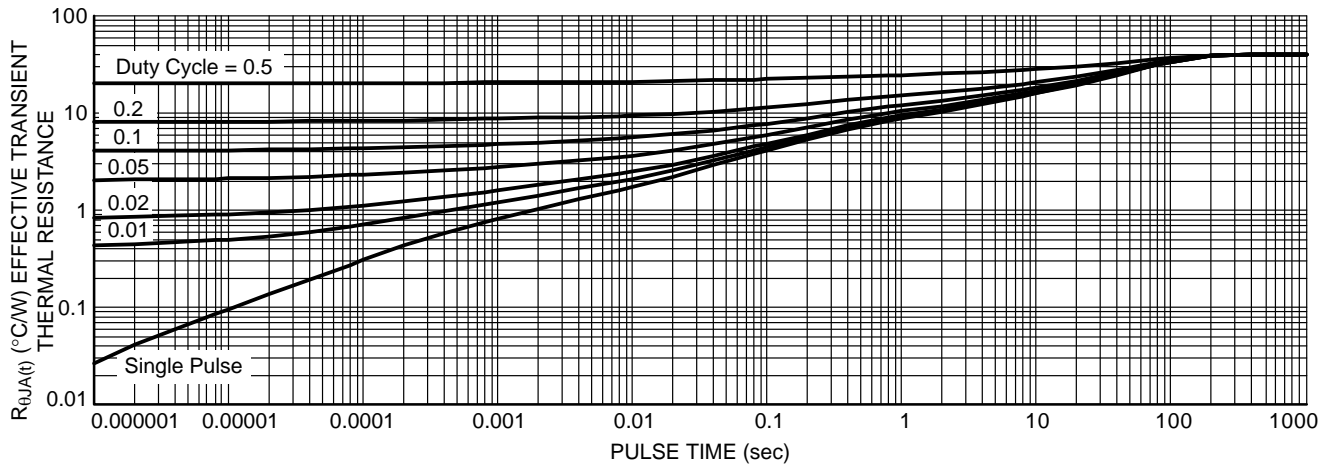
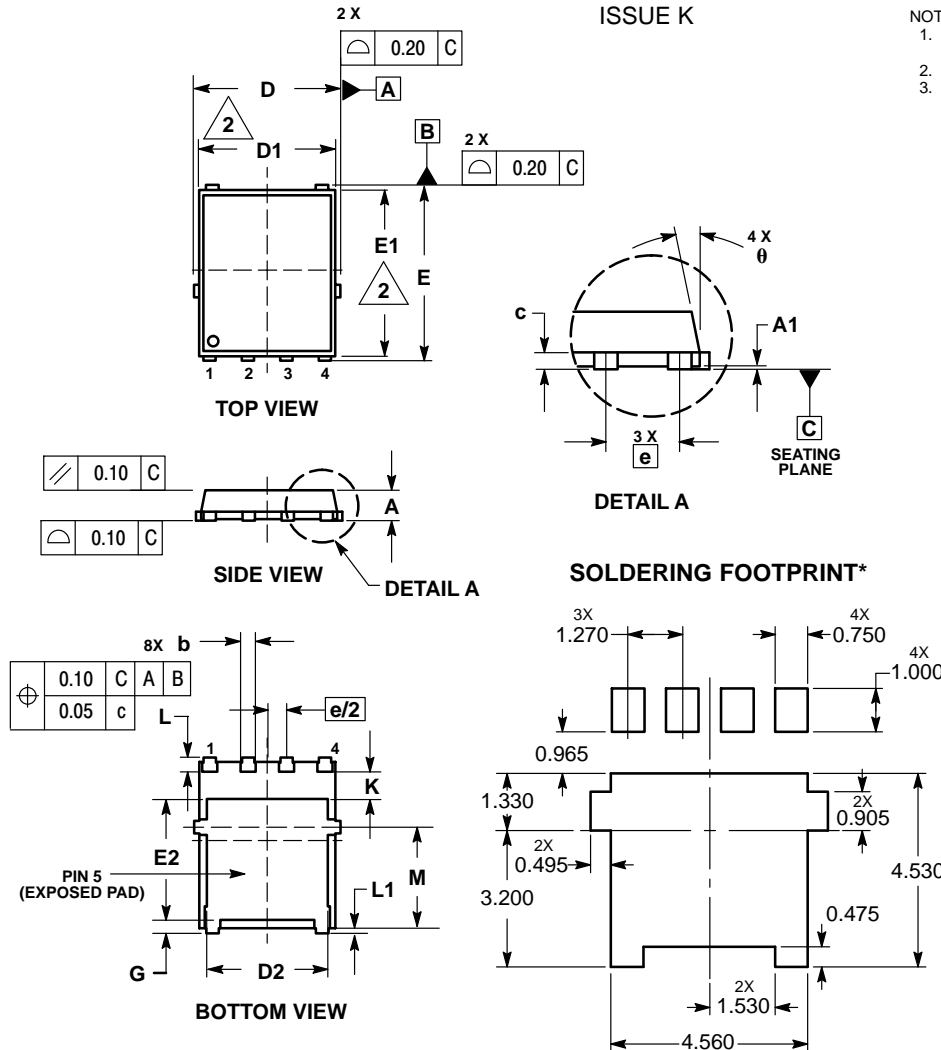


Figure 13. Thermal Response

NVMFS5833N

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.

DIM	MILLIMETERS		
	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	0.61	0.71
K	1.20	1.35	1.50
L	0.51	0.61	0.71
L1	0.125 REF		
M	3.00	3.40	3.80
θ	0°	---	12°

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

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

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