MOSFET - Power, Single N-Channel

120 V, 8.0 mΩ, 79 A

NTMFS008N12MC

Features

- Small Footprint (5x6 mm) for Compact Design
- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Q_G and Capacitance to Minimize Driver Losses
- Soft Body Diode Reduces Voltage Ringing
- These Devices are Pb−Free, Halogen−Free / BFR Free and are RoHS Compliant

Typical Applications

- Synchronous Rectification
- AC−DC and DC−DC Power Supplies
- AC−DC Adapters (USB PD) SR
- Load Switch

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

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	120	V
Gate−to−Source Voltage			V_{GS}	±20	V
Continuous Drain Current $R_{\theta JC}$ (Notes 1, 3)	Steady State	T_C = 25°C	I_D	79	A
		T_C = 100°C	I_D	50	
Power Dissipation $R_{\theta JC}$ (Note 1)	Steady State	T_C = 25°C	P_D	102	W
		T_C = 100°C	P_D	40	
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2, 3)	Steady State	T_A = 25°C	I_D	12	A
		T_A = 100°C	I_D	8	
Power Dissipation $R_{\theta JA}$ (Notes 1, 2)	Steady State	T_A = 25°C	P_D	2.7	W
		T_A = 100°C	P_D	1.1	
Pulsed Drain Current	T_A = 25°C, t_p = 100 μs		I_{DM}	352	A
Operating Junction and Storage Temperature Range			T_J, T_{stg}	−55 to +150	°C
Source Current (Body Diode)			I_S	85	A
Single Pulse Drain−to−Source Avalanche Energy (I_{AV} = 45 A, L = 0.1 mH)			E_{AS}	101	mJ
Lead Temperature Soldering Reflow 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.

THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction−to−Case − Steady State	$R_{\theta JC}$	1.22	°C/W
Junction−to−Ambient − Steady State (Note 2)	$R_{\theta JA}$	45	

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. Surface−mounted on FR4 board using a 650 mm^2, 2 oz. Cu pad.
3. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.

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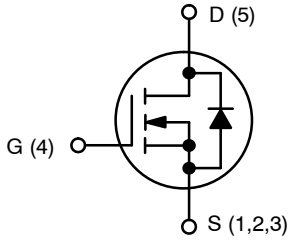
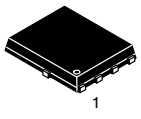
$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D MAX
120 V	8.0 mΩ @ 10 V	79 A
	20 mΩ @ 6 V	

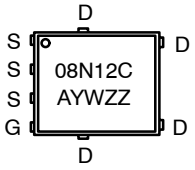


N−CHANNEL MOSFET



SO−8
FLAT LEAD
CASE 488AA

MARKING DIAGRAM



08N12C = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
ZZ = Lot Traceability

ORDERING INFORMATION

See detailed ordering, marking and shipping information on page 5 of this data sheet.

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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 = 250 μA		120			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	I_D = 250 μA, ref to 25°C			30		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 120 V	T_J = 25°C			1	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 4)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 200 μA		2.0		4.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$	I_D = 200 μA, ref to 25°C			−10		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 36 A			6.5	8.0	mΩ
		V_{GS} = 6 V, I_D = 18 A			11.5	20	
Forward Transconductance	g_{FS}	V_{DS} = 15 V, I_D = 36 A			111		S
CHARGES & CAPACITANCES							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1 MHz, V_{DS} = 60 V			2705		pF
Output Capacitance	C_{OSS}				1150		
Reverse Transfer Capacitance	C_{RSS}				4.9		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 10 V, V_{DS} = 60 V, I_D = 36 A			33		nC
Gate−to−Source Charge	Q_{GS}	V_{GS} = 6 V, V_{DS} = 60 V, I_D = 36 A			14		
Gate−to−Drain Charge	Q_{GD}				6.0		
Threshold Gate Charge	$Q_{G(TH)}$				8.0		
Plateau Voltage	V_{GP}				5.5		V
Output Charge	Q_{OSS}	V_{GS} = 0 V, f = 1 MHz, V_{DS} = 60 V			98		nC
SWITCHING CHARACTERISTICS (Note 4)							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 10 V, V_{DS} = 60 V, I_D = 36 A, R_G = 2.5 Ω			18.4		ns
Rise Time	t_r				4.0		
Turn−Off Delay Time	$t_{d(OFF)}$				22.8		
Fall Time	t_f				4.6		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 36 A	T_J = 25°C		0.9	1.2	V
			T_J = 125°C		0.8		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dI_S/dt = 300 A/μs, I_S = 36 A			50		ns
Charge Time	T_a				25		ns
Discharge Time	T_b				26		ns
Reverse Recovery Charge	Q_{RR}				165		nC
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dI_S/dt = 1000 A/μs, I_S = 36 A			34		ns
Charge Time	T_a				26		ns
Discharge Time	T_b				8		ns
Reverse Recovery Charge	Q_{RR}				372		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.

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

TYPICAL CHARACTERISTICS

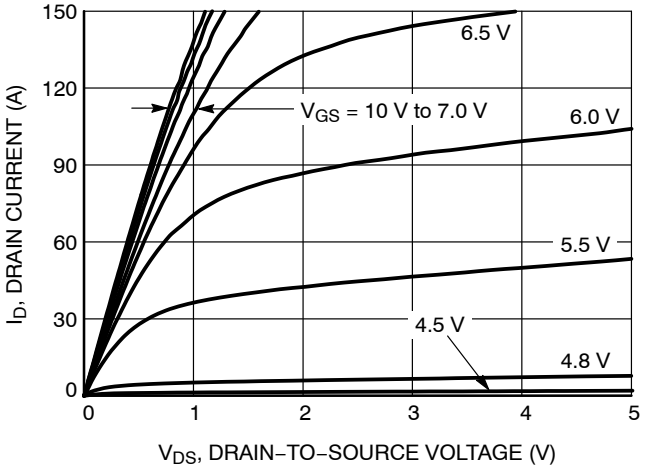


Figure 1. On−Region Characteristics

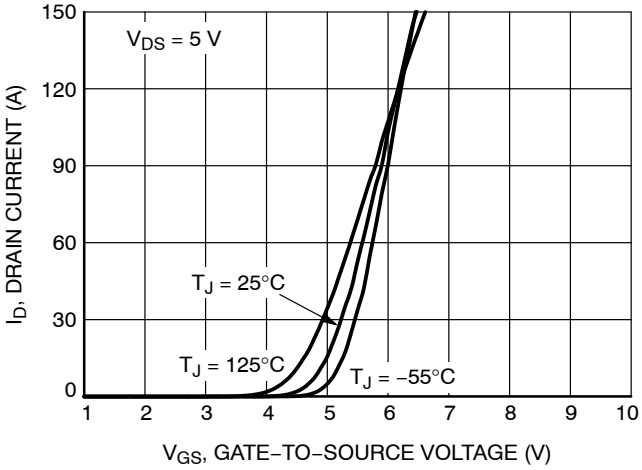


Figure 2. Transfer Characteristics

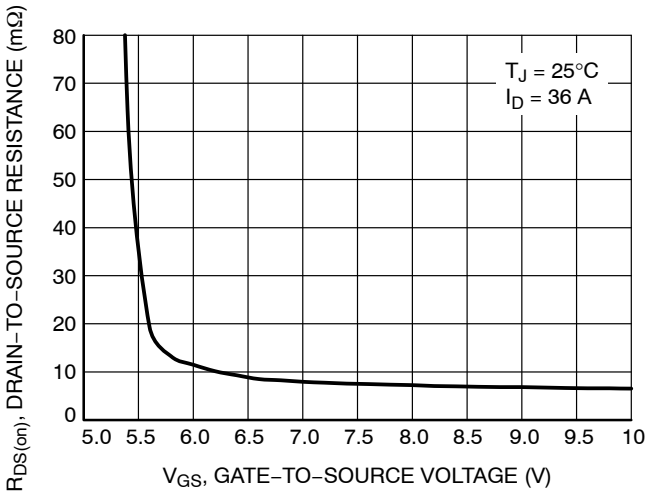


Figure 3. On−Resistance vs. Gate−to−Source Voltage

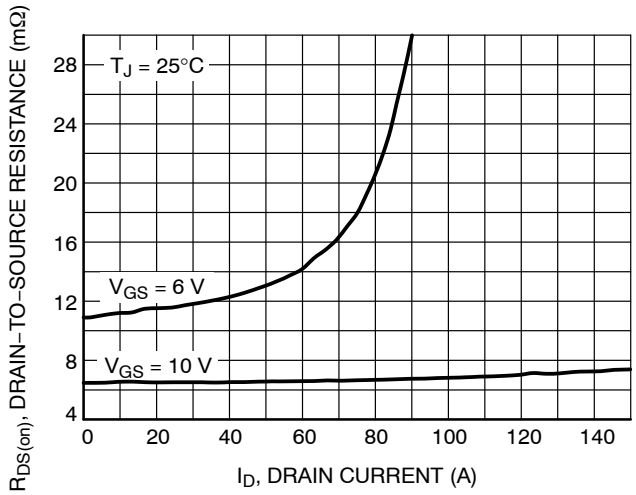


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

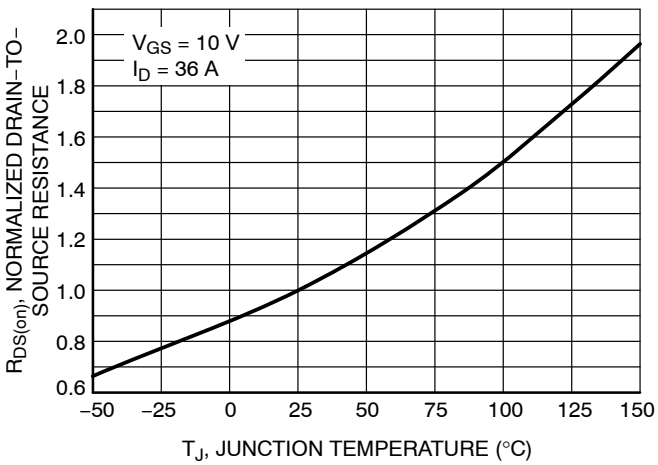


Figure 5. On−Resistance Variation with Temperature

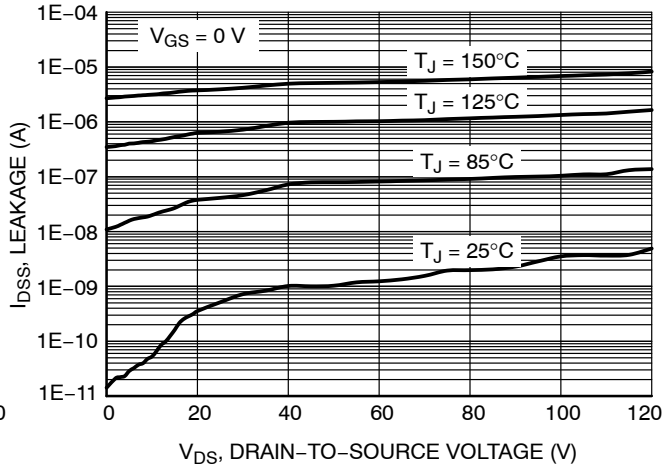


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

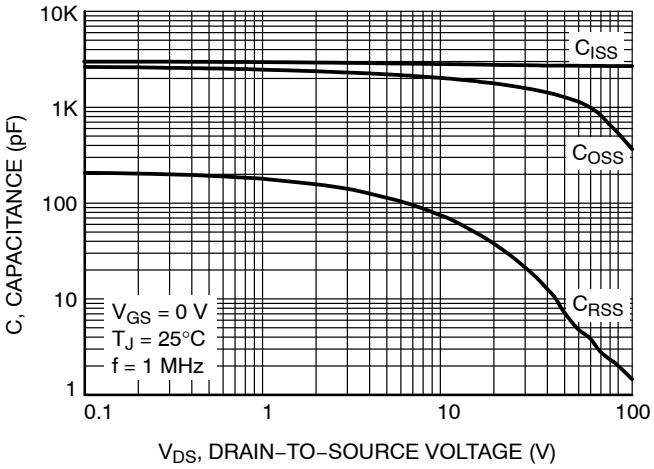


Figure 7. Capacitance Variation

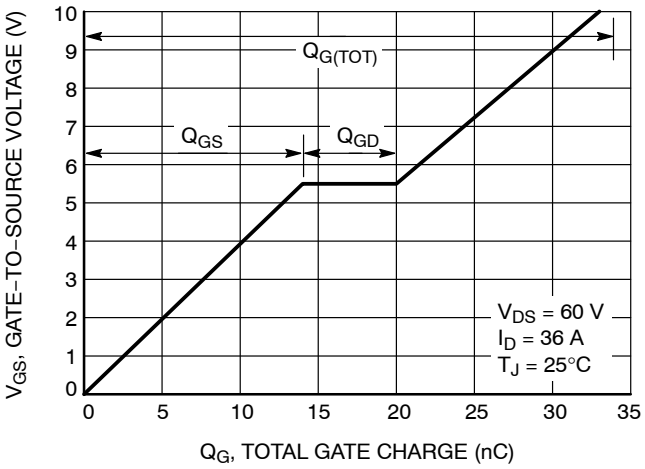


Figure 8. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge

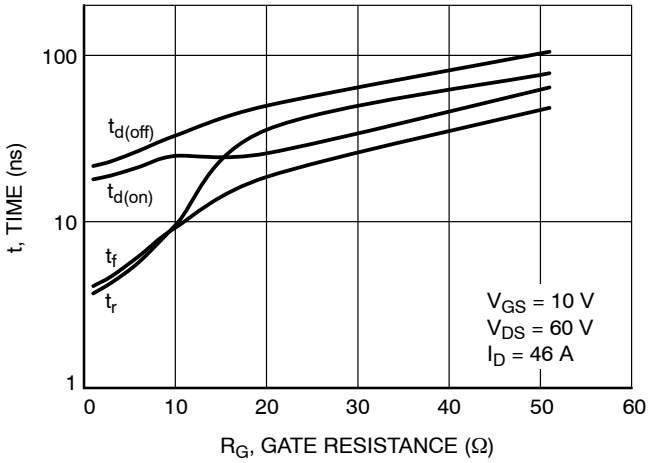


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

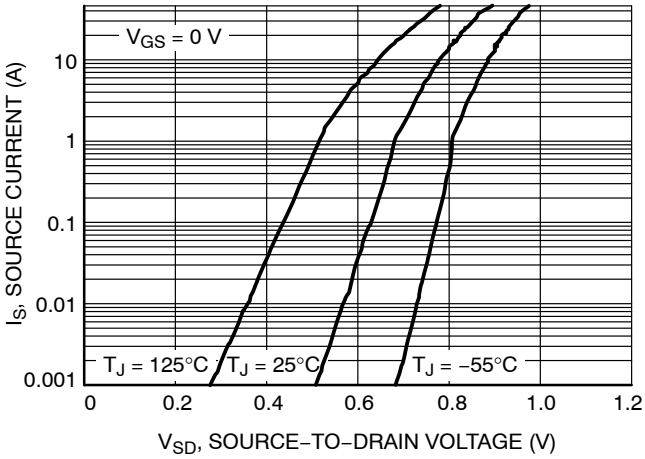


Figure 10. Diode Forward Voltage vs. Current

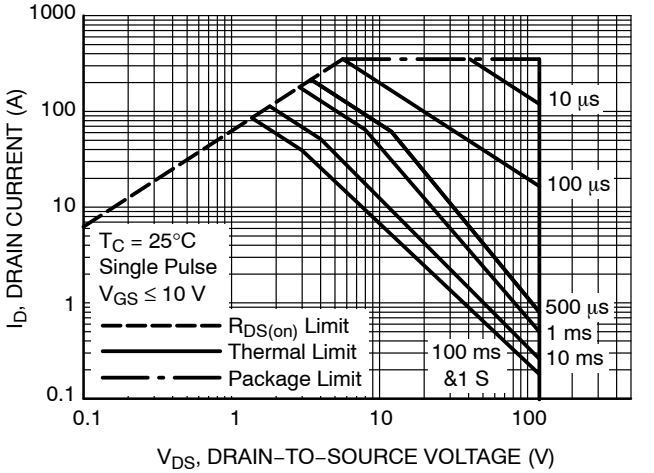


Figure 11. Safe Operating Area

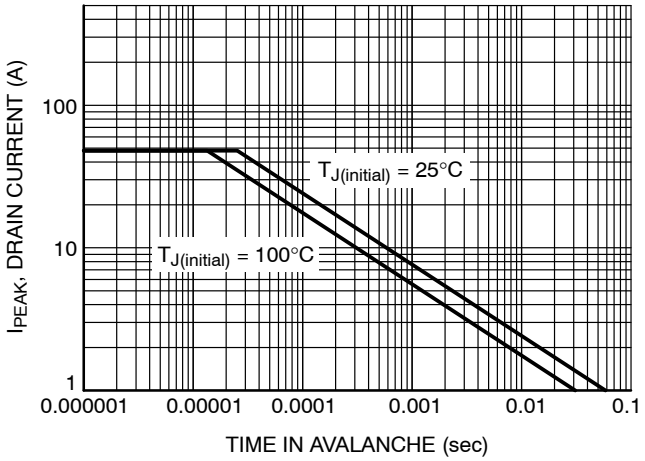


Figure 12. I_{PEAK} vs. Time in Avalanche

TYPICAL CHARACTERISTICS

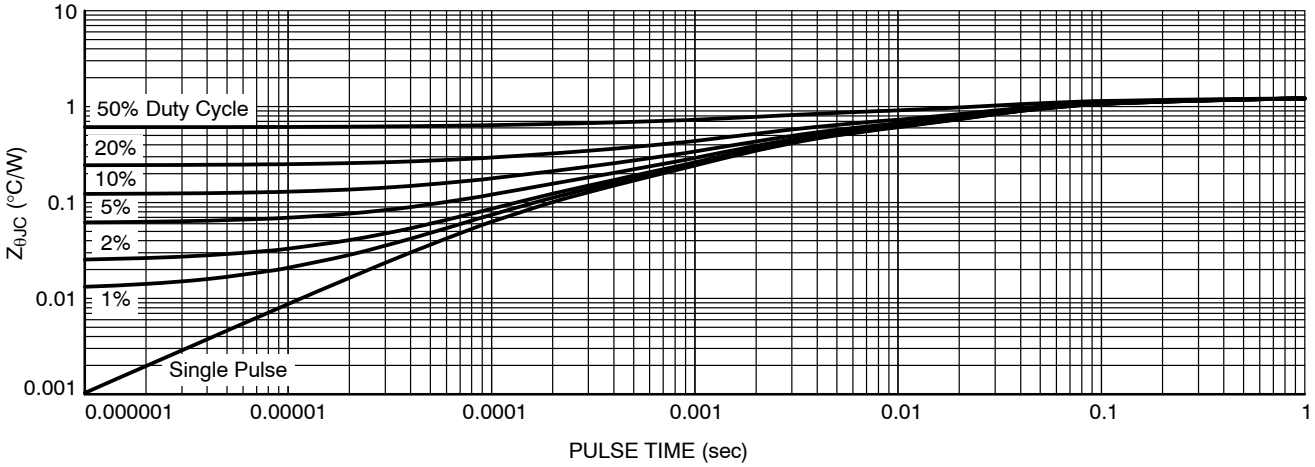


Figure 13. Thermal Characteristics

DEVICE ORDERING INFORMATION

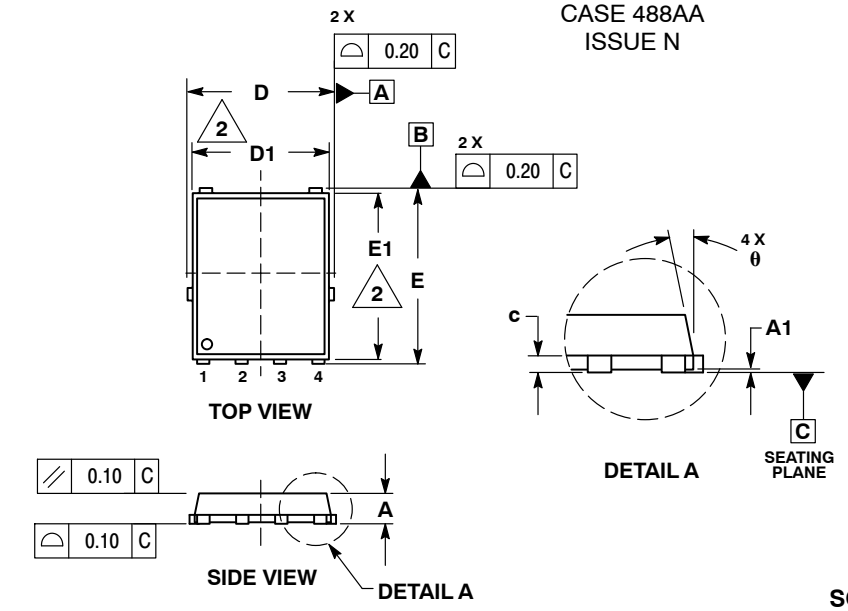
Device	Marking	Package	Shipping†
NTMFS008N12MCT1G	08N12C	DFN5 (Pb−Free)	1500 / Tape & Reel

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

NTMFS008N12MC

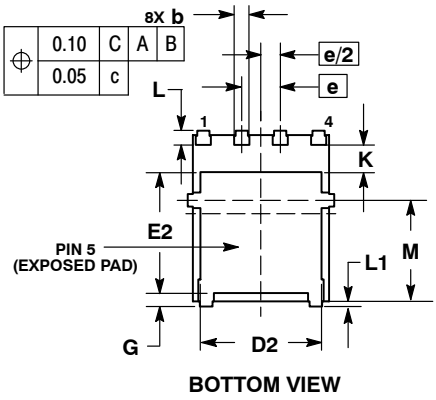
PACKAGE DIMENSIONS

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



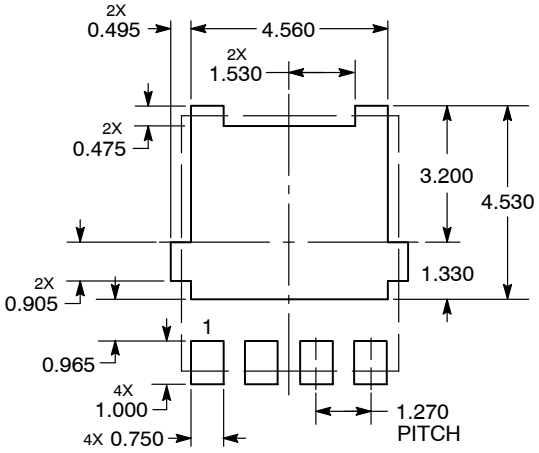
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

	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.

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