

MOSFET - Power, Single N-Channel

100 V, 2.8 mΩ, 175 A

NTMFS002N10MCL

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
- These Devices are Pb-Free, Halogen Free/BFR Free, Beryllium 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}	100	V
Gate-to-Source Voltage			V _{GS}	±20	V
Continuous Drain Current R _{θJC} (Note 1)	Steady State	T _C = 25°C	I _D	175	A
		T _C = 100°C		123	
Power Dissipation R _{θJC} (Note 1)		T _C = 25°C	P _D	189	W
		T _C = 100°C		94	
Continuous Drain Current R _{θJA} (Notes 1, 2)	Steady State	T _A = 25°C	I _D	22	A
		T _A = 100°C		15	
Power Dissipation R _{θJA} (Notes 1, 2)		T _A = 25°C	P _D	3	W
		T _A = 100°C		1.5	
Pulsed Drain Current	T _A = 25°C, t _p = 10 μs		I _{DM}	1536	A
Operating Junction and Storage Temperature Range			T _J , T _{stg}	-55 to +175	°C
Source Current (Body Diode)			I _S	145	A
Single Pulse Drain-to-Source Avalanche Energy (I _{L(pk)} = 40 A)			E _{AS}	328	mJ
Lead Temperature Soldering Reflow for Soldering Purposes (1/8" from case for 10 s)			T _L	260	°C

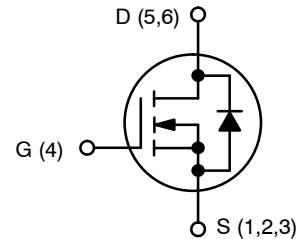
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL RESISTANCE RATINGS

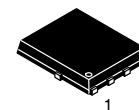
Parameter	Symbol	Value	Unit
Junction-to-Case – Steady State (Note 1)	$R_{\theta JC}$	0.79	$^\circ\text{C/W}$
Junction-to-Ambient – Steady State (Note 2)	$R_{\theta JA}$	50	

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 1 in² pad size, 2 oz. Cu pad.

$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
100 V	2.8 mΩ @ 10 V	175 A
	3.8 mΩ @ 4.5 V	

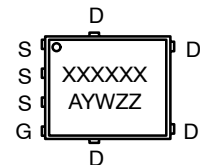


N-CHANNEL MOSFET



DFN5
(SO-8FL)
CASE 506EZ

MARKING DIAGRAM



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

ORDERING INFORMATION

Device	Package	Shipping†
NTMFS002N10MCLT1G	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.

NTMFS002N10MCL

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	100			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /T _J	I _D = 250 μA, ref to 25°C		70		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V, V _{DS} = 100 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

Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = 351 μA	1		3	V
Threshold Temperature Coefficient	V _{GS(TH)} /T _J	I _D = 250 μA, ref to 25°C		5.7		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 50 A		2.3	2.8	mΩ
		V _{GS} = 4.5 V, I _D = 50 A		3.0	3.8	
Forward Transconductance	g _{FS}	V _{DS} = 10 V, I _D = 50 A		200		S
Gate-Resistance	R _G	T _A = 25°C		0.40		Ω

CHARGES & CAPACITANCES

Input Capacitance	C _{ISS}	V _{GS} = 0 V, f = 1 MHz, V _{DS} = 50 V		7200		pF
Output Capacitance	C _{OSS}			2400		
Reverse Transfer Capacitance	C _{RSS}			36		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 4.5 V, V _{DS} = 50 V, I _D = 50 A		45		nC
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 10 V, V _{DS} = 50 V, I _D = 50 A		97		
Threshold Gate Charge	Q _{G(TH)}			11		
Gate-to-Source Charge	Q _{GS}			20		
Gate-to-Drain Charge	Q _{GD}			10		
Plateau Voltage	V _{GP}			3		V

SWITCHING CHARACTERISTICS (Note 3)

Turn-On Delay Time	t _{d(ON)}	V _{GS} = 10 V, V _{DS} = 50 V, I _D = 50 A, R _G = 6 Ω		24		ns
Rise Time	t _r			30		
Turn-Off Delay Time	t _{d(OFF)}			250		
Fall Time	t _f			105		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V _{SD}	V _{GS} = 0 V, I _S = 50 A	T _J = 25°C		0.83	1.3	V
			T _J = 125°C		0.71		
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V, dI _S /dt = 100 A/μs, I _S = 31 A		73			ns
Reverse Recovery Charge	Q _{RR}			93			nC
Charge Time	t _a			35			ns
Discharge Time	t _b			38			ns

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.

3. Switching characteristics are independent of operating junction temperatures

TYPICAL CHARACTERISTICS

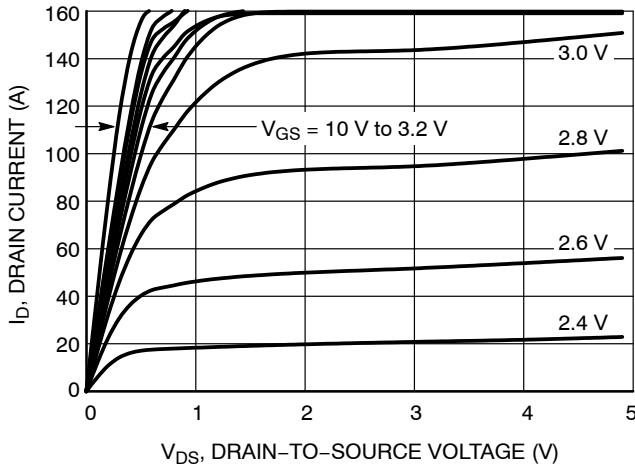


Figure 1. On-Region Characteristics

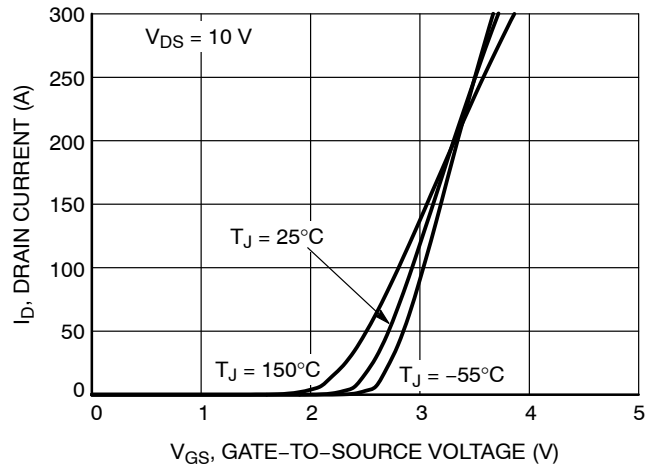


Figure 2. Transfer Characteristics

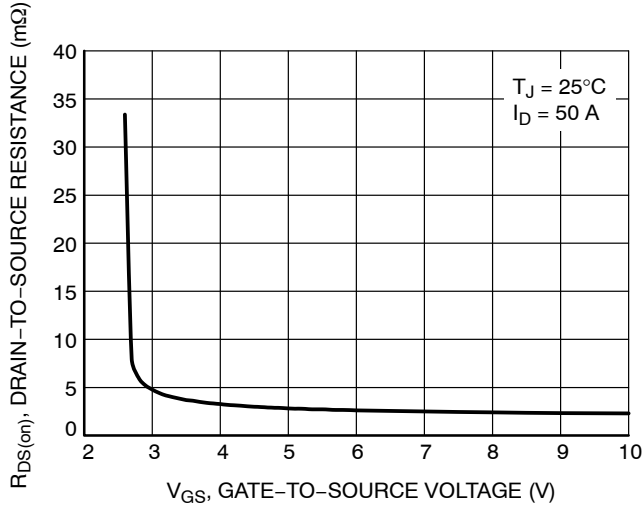


Figure 3. On-Resistance vs. Gate-to-Source Voltage

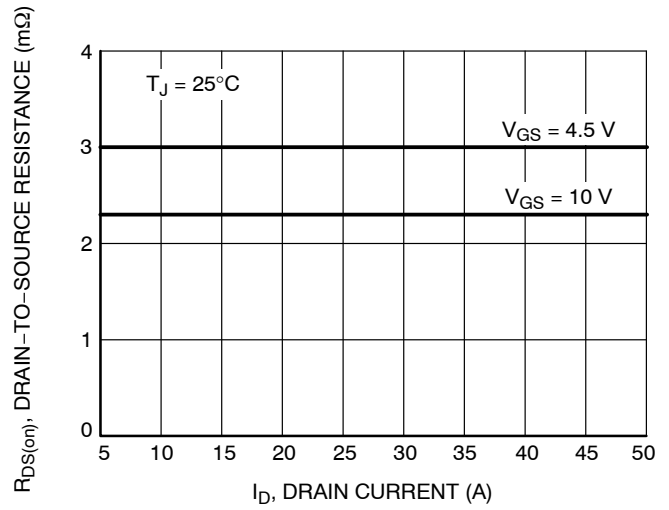


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

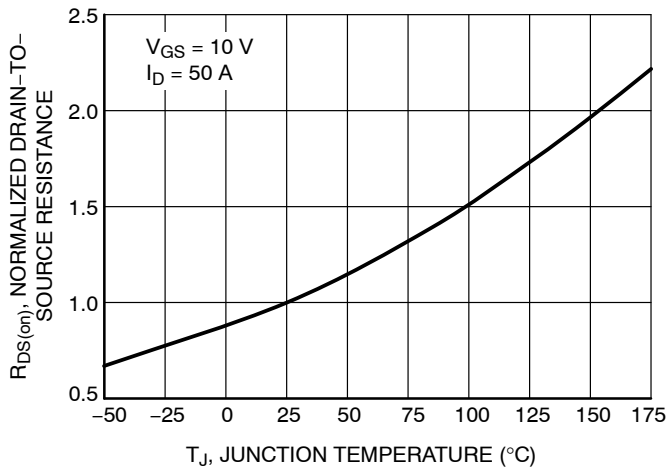


Figure 5. On-Resistance Variation with Temperature

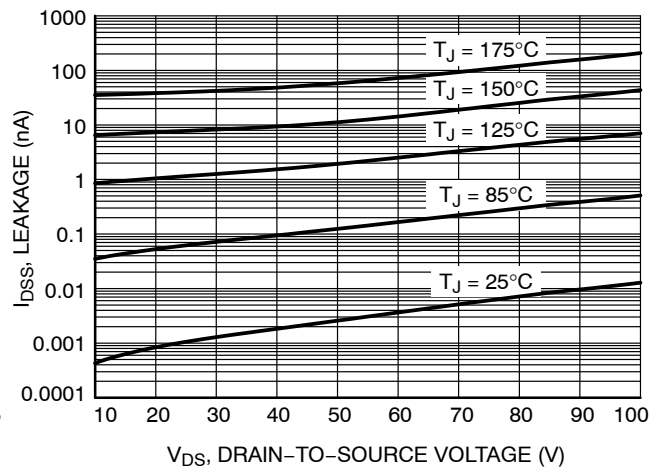


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

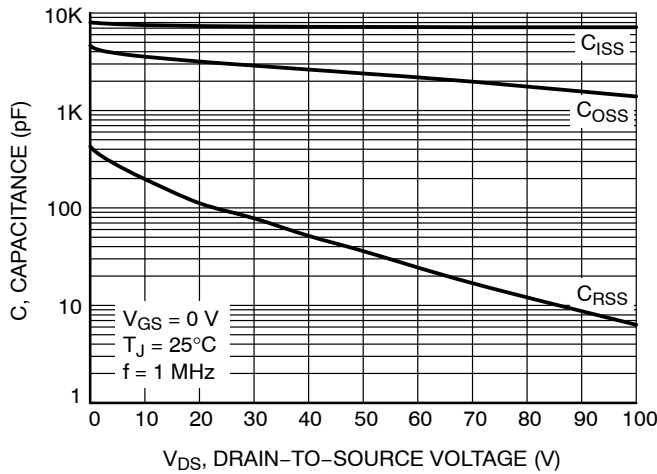


Figure 7. Capacitance Variation

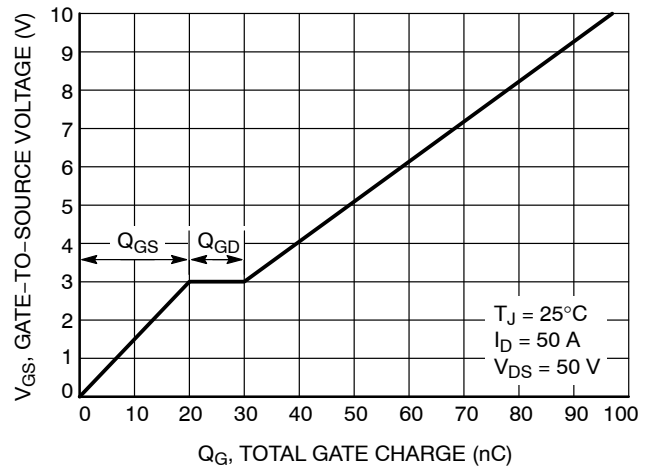


Figure 8. Gate-to-Source Voltage vs. Total Charge

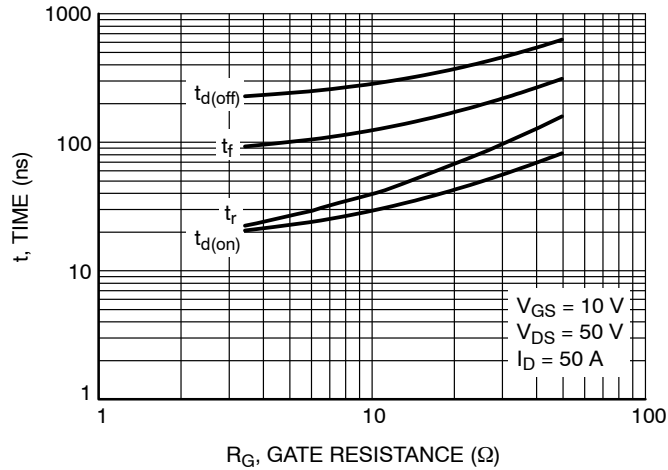


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

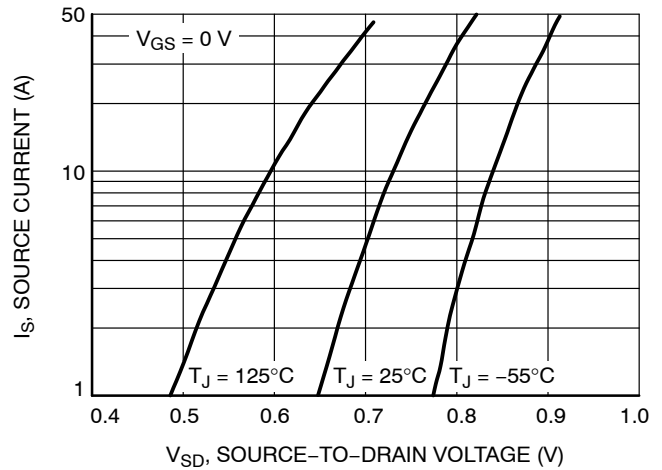


Figure 10. Diode Forward Voltage vs. Current

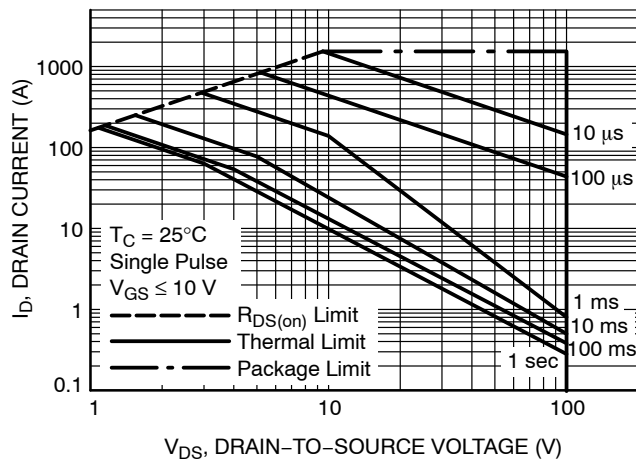


Figure 11. Maximum Rated Forward Biased Safe Operating Area

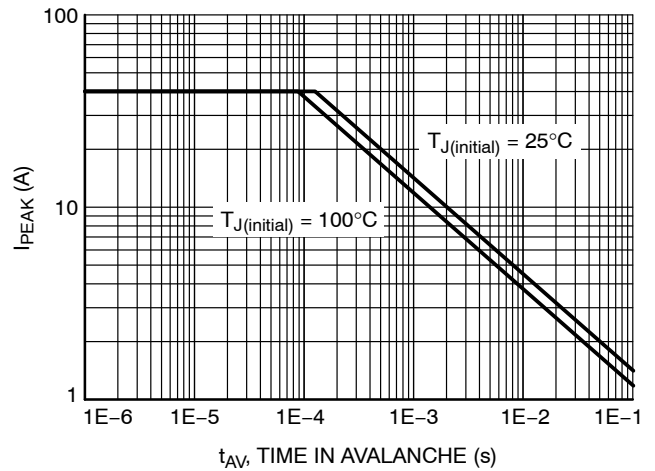


Figure 12. Maximum Drain Current vs. Time in Avalanche

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TYPICAL CHARACTERISTICS

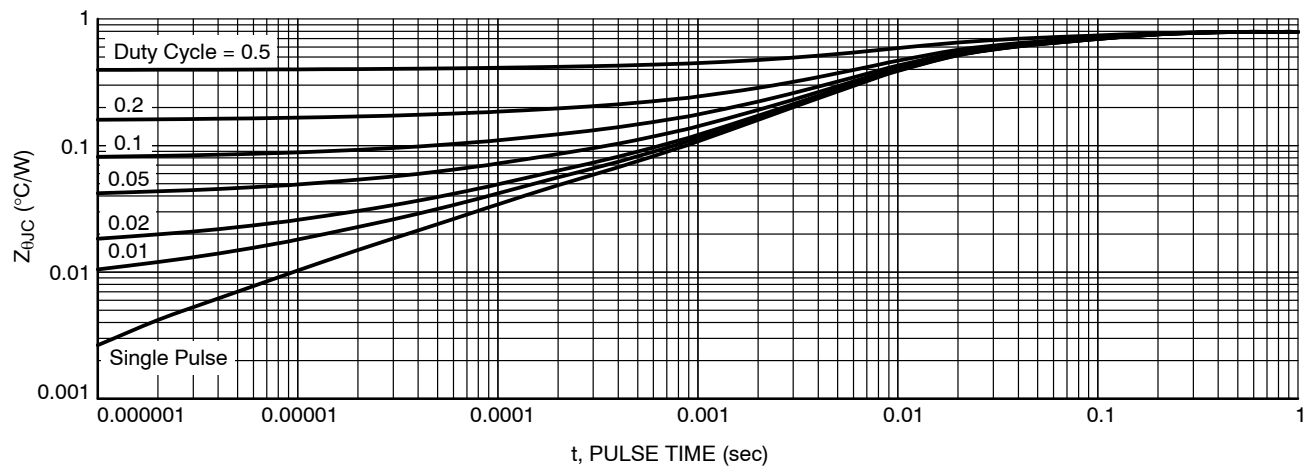


Figure 13. Transient Thermal Impedance

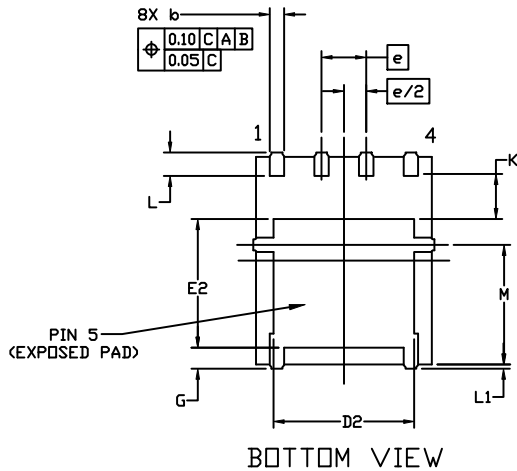
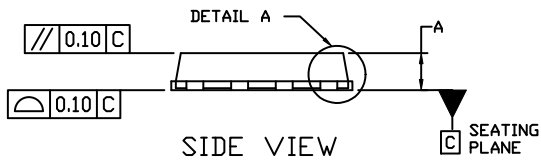
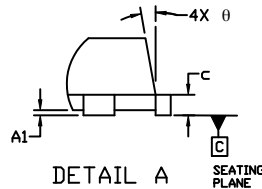
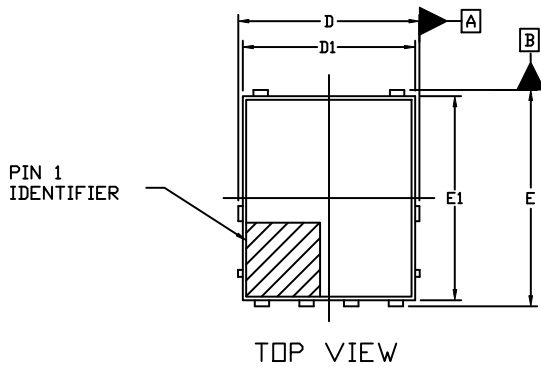
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PACKAGE DIMENSIONS

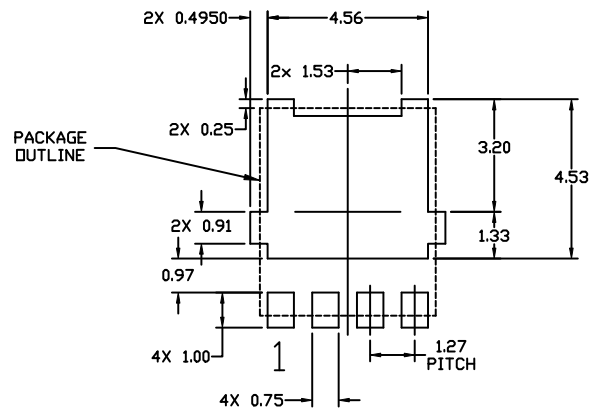
DFN5 5x6, 1.27P (SO-8FL)
CASE 506EZ
ISSUE A

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS 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	3.80	3.85
e	1.27 BSC		
G	0.51	0.575	0.71
k	1.10	1.20	1.40
L	0.51	0.575	0.71
L1	0.125 REF		
M	3.00	3.40	3.80
θ	0°	---	12°



RECOMMENDED MOUNTING FOOTPRINT

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

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