

MOSFET - Power, Single N-Channel, SO8-FL 40 V, 0.9 mΩ, 273 A

NTMFS0D9N04XM

Features

- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- Small Footprint (5x6 mm) with Compact Design
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

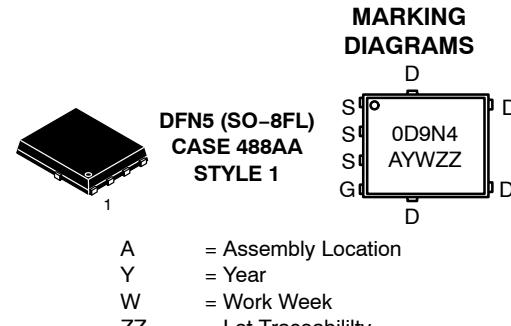
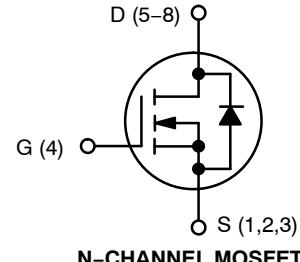
- Motor Drive
- Battery Protection
- ORing

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

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	40	V
Gate-to-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	$T_C = 25^\circ\text{C}$	I_D	A
	$T_C = 100^\circ\text{C}$	193	
Power Dissipation	$T_C = 25^\circ\text{C}$	P_D	W
Continuous Drain Current $R_{\theta JA}$	$T_A = 25^\circ\text{C}$	I_{DA}	A
	$T_A = 100^\circ\text{C}$	34	
Pulsed Drain Current	$T_C = 25^\circ\text{C}$, $t_p = 10 \mu\text{s}$	I_{DM}	A
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to +175	°C
Source Current (Body Diode)	I_S	100	A
Single Pulse Avalanche Energy ($I_{PK} = 17.7 \text{ A}$)	E_{AS}	390	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.

$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
40 V	0.9 mΩ @ 10 V	273 A



ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 5 of this data sheet.

THERMAL CHARACTERISTICS

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case (Note 2)	$R_{\theta JC}$	1.24	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient (Notes 1, 2)	$R_{\theta JA}$	39.5	

1. Surface-mounted on FR4 board using 650 mm², 2 oz Cu pad.
2. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0 \text{ V}, I_D = 1 \text{ mA}, T_J = 25^{\circ}\text{C}$	40			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		15		$\text{mV}/^{\circ}\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{\text{DS}} = 40 \text{ V}, T_J = 25^{\circ}\text{C}$			10	μA
		$V_{\text{DS}} = 40 \text{ V}, T_J = 125^{\circ}\text{C}$			100	
Gate-to-Source Leakage Current	I_{GSS}	$V_{\text{GS}} = 20 \text{ V}, V_{\text{DS}} = 0 \text{ V}$			100	nA

ON CHARACTERISTICS

Drain-to-Source On Resistance	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = 10 \text{ V}, I_D = 30 \text{ A}, T_J = 25^{\circ}\text{C}$		0.76	0.9	$\text{m}\Omega$
Gate Threshold Voltage	$V_{\text{GS}(\text{TH})}$	$V_{\text{GS}} = V_{\text{DS}}, I_D = 150 \mu\text{A}, T_J = 25^{\circ}\text{C}$	2.5	3.0	3.5	V
Gate Threshold Voltage Temperature Coefficient	$\Delta V_{\text{GS}(\text{TH})}/\Delta T_J$	$V_{\text{GS}} = V_{\text{DS}}, I_D = 150 \mu\text{A}$		-7.25		$\text{mV}/^{\circ}\text{C}$
Forward Trans-conductance	g_{FS}	$V_{\text{DS}} = 5 \text{ V}, I_D = 30 \text{ A}$		160		S

CHARGES, CAPACITANCES & GATE RESISTANCE

Input Capacitance	C_{ISS}	$V_{\text{GS}} = 0 \text{ V}, V_{\text{DS}} = 20 \text{ V}, f = 1 \text{ MHz}$		3918		pF
Output Capacitance	C_{OSS}			2793		
Reverse Transfer Capacitance	C_{RSS}			57.2		
Total Gate Charge	$Q_{\text{G}(\text{TOT})}$	$V_{\text{GS}} = 10 \text{ V}, V_{\text{DD}} = 20 \text{ V}; I_D = 30 \text{ A}$		61		nC
Threshold Gate Charge	$Q_{\text{G}(\text{TH})}$			3.66		
Gate-to-Source Charge	Q_{GS}			17.2		
Gate-to-Drain Charge	Q_{GD}			11.2		
Gate Resistance	R_{G}	$f = 1 \text{ MHz}$		0.84		Ω

SWITCHING CHARACTERISTICS

Turn-On Delay Time	$t_{\text{d}(\text{ON})}$	Resistive Load, $V_{\text{GS}} = 0/10 \text{ V}, V_{\text{DD}} = 20 \text{ V},$ $I_D = 50 \text{ A}, R_{\text{G}} = 0 \Omega$		24.3		ns
Rise Time	t_r			7.59		
Turn-Off Delay Time	$t_{\text{d}(\text{OFF})}$			36.7		
Fall Time	t_f			6.55		

SOURCE-TO-DRAIN DIODE CHARACTERISTICS

Forward Diode Voltage	V_{SD}	$V_{\text{GS}} = 0 \text{ V}, I_S = 30 \text{ A}, T_J = 25^{\circ}\text{C}$		0.79	1.2	V
		$V_{\text{GS}} = 0 \text{ V}, I_S = 30 \text{ A}, T_J = 125^{\circ}\text{C}$		0.64		
Reverse Recovery Time	t_{RR}	$V_{\text{GS}} = 0 \text{ V}, I_S = 50 \text{ A},$ $dI/dt = 100 \text{ A}/\mu\text{s}, V_{\text{DD}} = 20 \text{ V}$		59.6		ns
Charge Time	t_a			33.2		
Discharge Time	t_b			26.4		
Reverse Recovery Charge	Q_{RR}			107		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

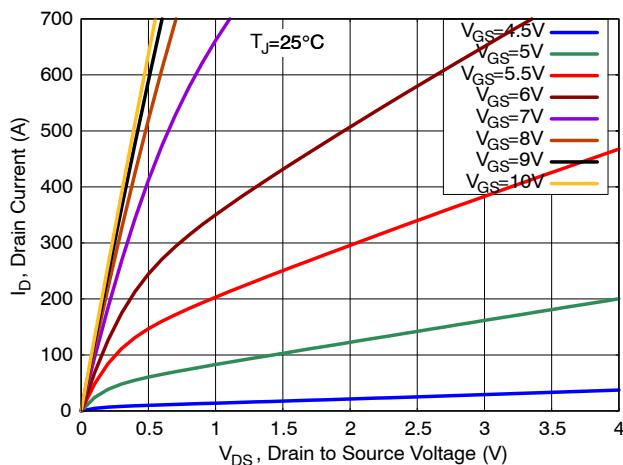


Figure 1. On-Region Characteristics

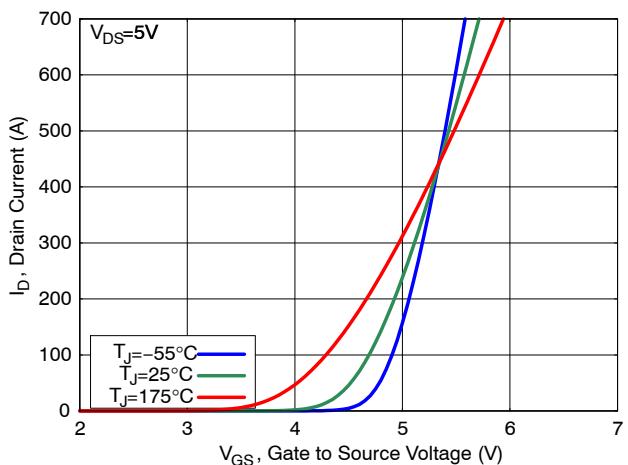


Figure 2. Transfer Characteristics

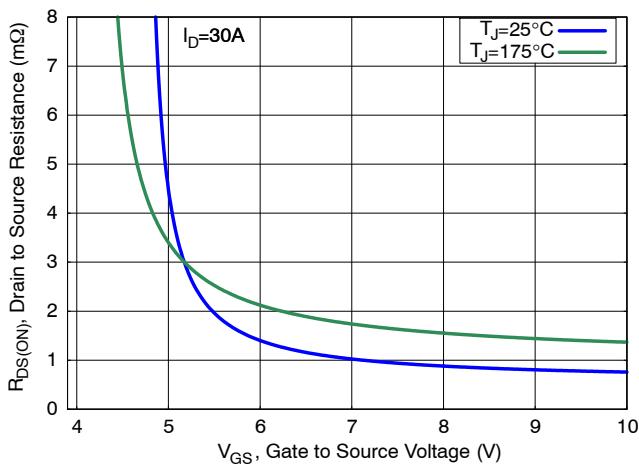


Figure 3. On-Resistance vs. Gate Voltage

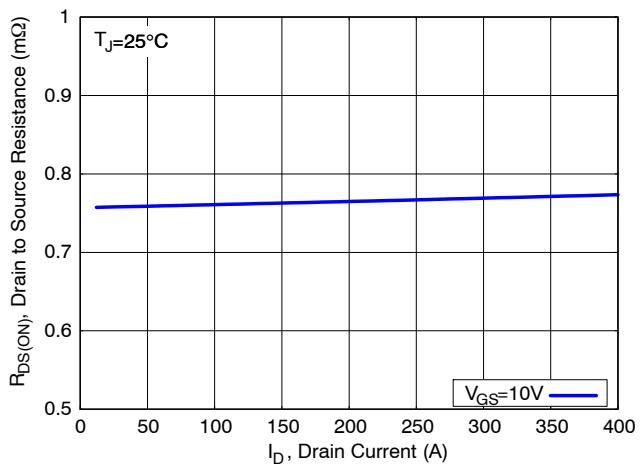


Figure 4. On-Resistance vs. Drain Current

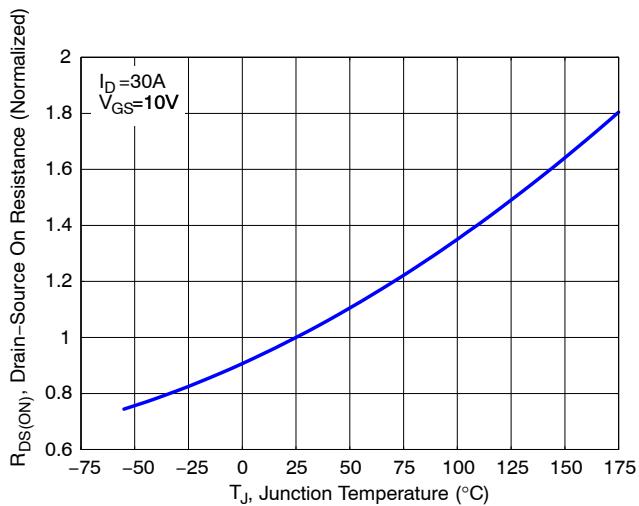


Figure 5. Normalized ON Resistance vs. Junction Temperature

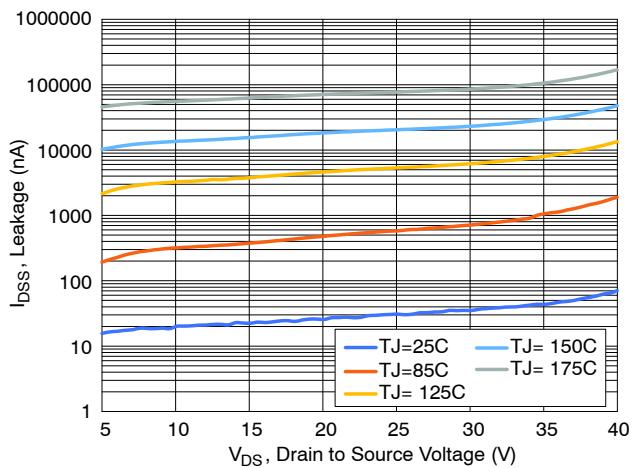
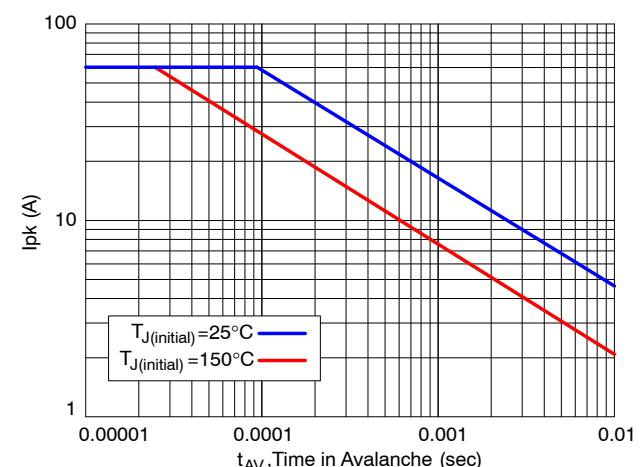
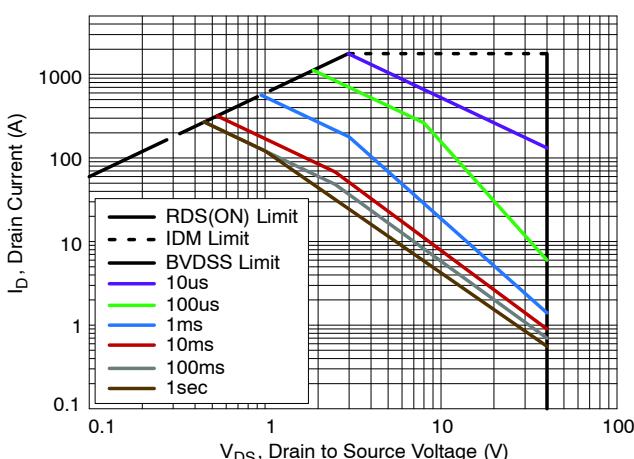
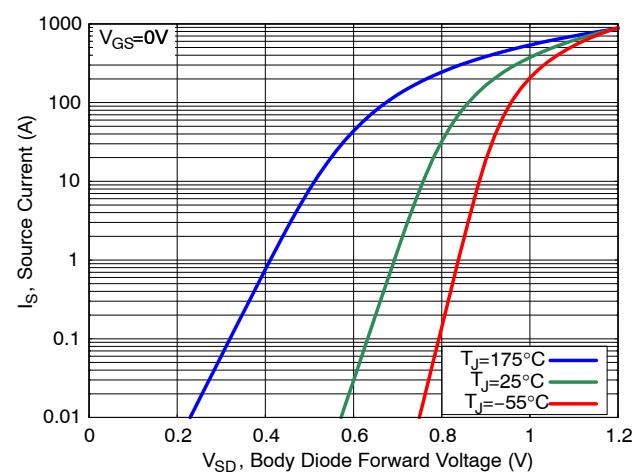
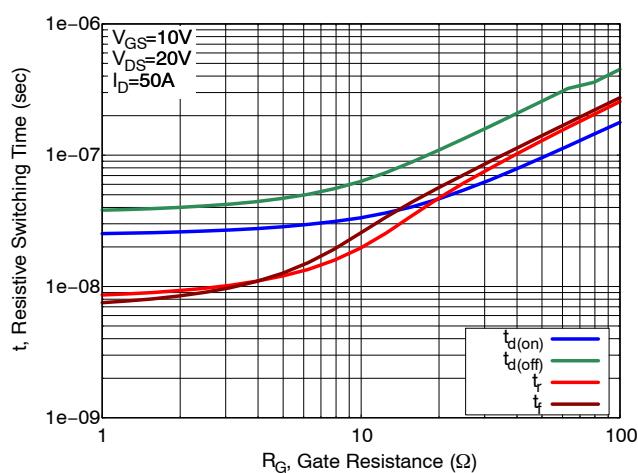
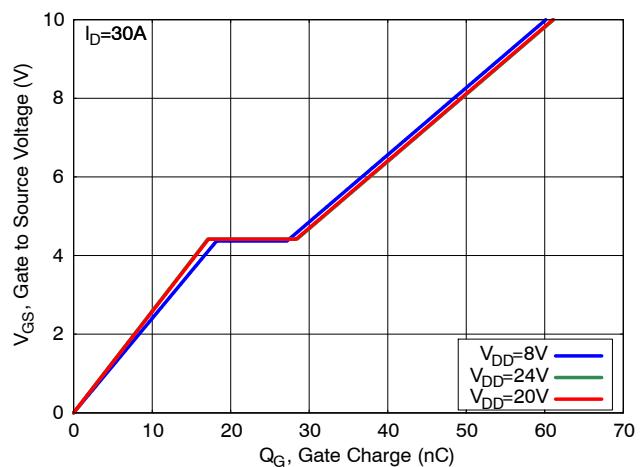
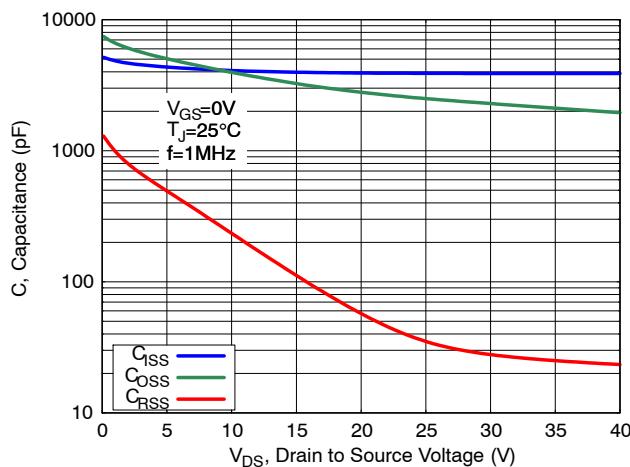


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS (Continued)



NTMFS0D9N04XM

TYPICAL CHARACTERISTICS (Continued)

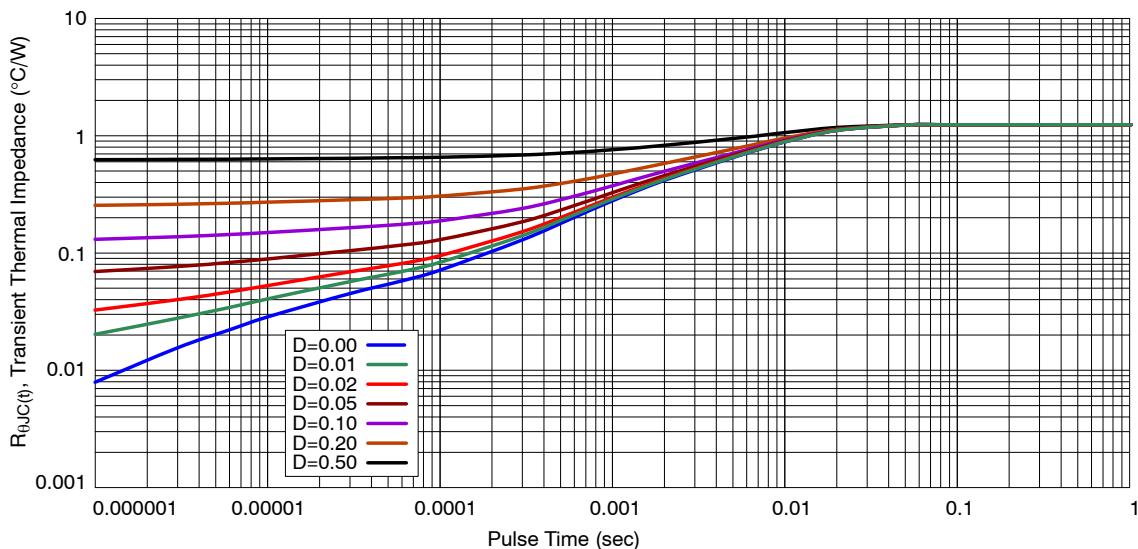
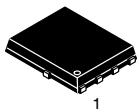


Figure 13. Transient Thermal Response

DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping [†]
NTMFS0D9N04XMT1G	0D9N4	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.



SCALE 2:1

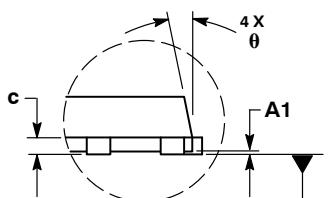
DFN5 5x6, 1.27P
(SO-8FL)
CASE 488AA
ISSUE N

DATE 25 JUN 2018

NOTES:

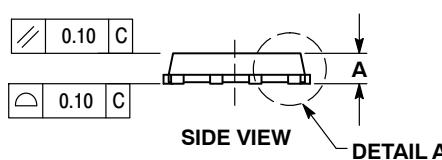
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

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	0.575	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 °

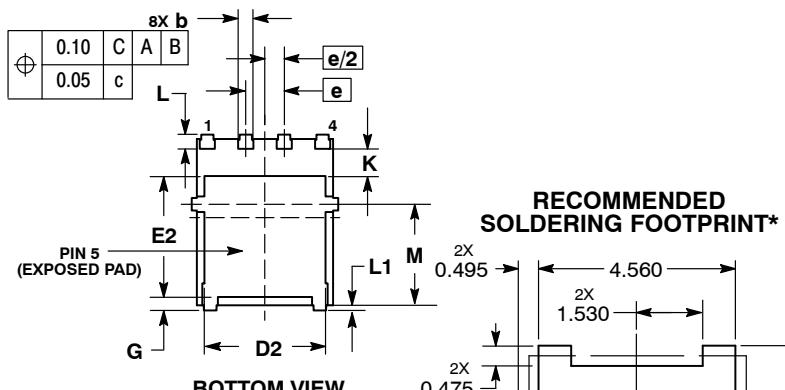


DETAIL A

SEATING PLANE



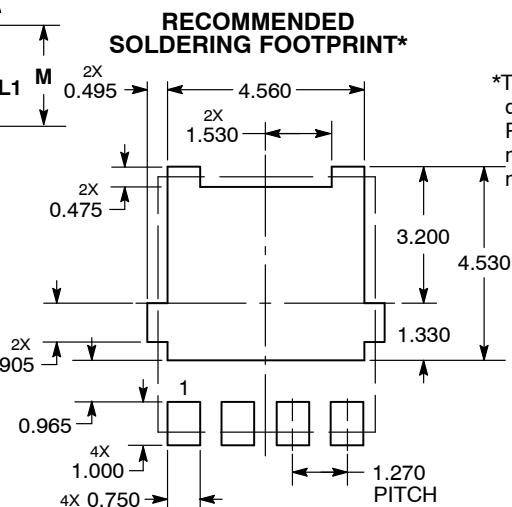
DETAIL A



BOTTOM VIEW

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

STYLE 2:
PIN 1. ANODE
2. ANODE
3. ANODE
4. NO CONNECT
5. CATHODE



DIMENSIONS: MILLIMETERS

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present. Some products may not follow the Generic Marking.

GENERIC
MARKING DIAGRAM*

XXXXXX = Specific Device Code

A = Assembly Location

Y = Year

W = Work Week

ZZ = Lot Traceability

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DESCRIPTION:	DFN5 5x6, 1.27P (SO-8FL)	PAGE 1 OF 1

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