

# MMDF3N06VL

## Power MOSFET 3 Amps, 60 Volts N-Channel SO-8, Dual

Designed for low voltage, high speed switching applications in power supplies, converters and power motor controls, these devices are particularly well suited for bridge circuits where diode speed and commutating safe operating areas are critical and offer additional safety margin against unexpected voltage transients.

### Features

- On-resistance Area Product about One-half that of Standard MOSFETs with New Low Voltage, Low  $R_{DS(on)}$  Technology
- Faster Switching than E-FET™ Predecessors
- Avalanche Energy Specified
- $I_{DSS}$  and  $V_{DS(on)}$  Specified at Elevated Temperature
- Static Parameters are the Same for both TMOS V and TMOS E-FET
- Miniature SO-8 Surface Mount Package – Saves Board Space
- Mounting Information for SO-8 Package Provided

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

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	$V_{DSS}$	60	Vdc
Drain-to-Gate Voltage, ( $R_{GS} = 1\text{ M}\Omega$ )	$V_{DGR}$	60	Vdc
Gate-to-Source Voltage – Continuous	$V_{GS}$	$\pm 15$	Vdc
Drain Current – Continuous @ $T_A = 25^\circ\text{C}$	$I_D$	3.3	Adc
	$I_D$	0.7	
	$I_{DM}$	10	Apk
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 1)	$P_D$	2.0	W
	Operating and Storage Temperature Range	$T_J, T_{stg}$	-55 to 150
Single Pulse Drain-to-Source Avalanche Energy – Starting $T_J = 25^\circ\text{C}$ ( $V_{DD} = 25\text{ Vdc}$ , $V_{GS} = 5.0\text{ Vdc}$ , Peak $I_L = 3.3\text{ Apk}$ , $L = 10\text{ mH}$ , $R_G = 25\ \Omega$ )	$E_{AS}$	54	mJ
Thermal Resistance, Junction to Ambient (Note 1)	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$
Maximum Lead Temperature for Soldering Purposes, 0.0625" from case for 10 seconds	$T_L$	260	$^\circ\text{C}$

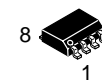
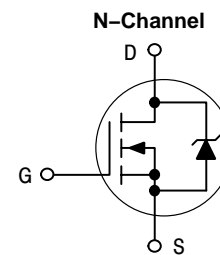
1 Mounted on G10/FR4 glass epoxy board using minimum recommended footprint.



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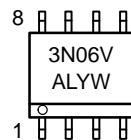
<http://onsemi.com>

$V_{DSS}$	$R_{DS(on)}$ TYP	$I_D$ MAX
60 V	130 m $\Omega$	3.0 A



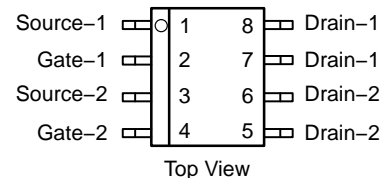
SO-8  
CASE 751  
STYLE 11

### MARKING DIAGRAM



A = Assembly Location  
L = Wafer Lot  
Y = Year  
W = Work Week

### PIN ASSIGNMENT



### ORDERING INFORMATION

Device	Package	Shipping†
MMDF3N06VLR2	SO-8	2500 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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## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Drain-to-Source Breakdown Voltage (V <sub>GS</sub> = 0 Vdc, I <sub>D</sub> = 0.25 mAdc) Temperature Coefficient (Positive)	V <sub>(BR)DSS</sub>	60 -	- 66	- -	Vdc mV/°C
Zero Gate Voltage Drain Current (V <sub>DS</sub> = 60 Vdc, V <sub>GS</sub> = 0 Vdc) (V <sub>DS</sub> = 60 Vdc, V <sub>GS</sub> = 0 Vdc, T <sub>J</sub> = 150°C)	I <sub>DSS</sub>	- -	- -	10 100	μAdc
Gate-Body Leakage Current (V <sub>GS</sub> = ± 15 Vdc, V <sub>DS</sub> = 0 Vdc)	I <sub>GSS</sub>	-	-	100	nAdc

## ON CHARACTERISTICS (Note 1)

Gate Threshold Voltage (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μAdc) Threshold Temperature Coefficient (Negative)	V <sub>GS(th)</sub>	1.0 -	1.5 3.0	2.0 -	Vdc mV/°C
Static Drain-to-Source On-Resistance (V <sub>GS</sub> = 5.0 Vdc, I <sub>D</sub> = 3.3 Adc)	R <sub>DS(on)</sub>	-	0.12	0.13	Ω
Drain-to-Source On-Voltage (V <sub>GS</sub> = 5.0 Vdc, I <sub>D</sub> = 3.3 Adc) (V <sub>GS</sub> = 5.0 Vdc, I <sub>D</sub> = 1.65 Adc, T <sub>J</sub> = 150°C)	V <sub>DS(on)</sub>	- -	- -	0.5 0.4	Vdc
Forward Transconductance (V <sub>DS</sub> = 15 Vdc, I <sub>D</sub> = 1.65 Adc)	g <sub>FS</sub>	1.0	3.0	-	Mhos

## DYNAMIC CHARACTERISTICS

Input Capacitance	(V <sub>DS</sub> = 25 Vdc, V <sub>GS</sub> = 0 Vdc, f = 1.0 MHz)	C <sub>ISS</sub>	-	340	480	pF
Output Capacitance		C <sub>OSS</sub>	-	110	150	
Transfer Capacitance		C <sub>RSS</sub>	-	27	50	

## SWITCHING CHARACTERISTICS (Note 2)

Turn-On Delay Time	(V <sub>DD</sub> = 30 Vdc, I <sub>D</sub> = 3.3 Adc, V <sub>GS</sub> = 5.0 Vdc, R <sub>G</sub> = 9.1 Ω)	t <sub>d(on)</sub>	-	10	20	ns
Rise Time		t <sub>r</sub>	-	30	60	
Turn-Off Delay Time		t <sub>d(off)</sub>	-	32	60	
Fall Time		t <sub>f</sub>	-	28	60	
Gate Charge	(V <sub>DS</sub> = 48 Vdc, I <sub>D</sub> = 3.3 Adc, V <sub>GS</sub> = 5.0 Vdc)	Q <sub>T</sub>	-	9.0	20	nC
		Q <sub>1</sub>	-	1.5	-	
		Q <sub>2</sub>	-	4.3	-	
		Q <sub>3</sub>	-	3.5	-	

## SOURCE-DRAIN DIODE CHARACTERISTICS

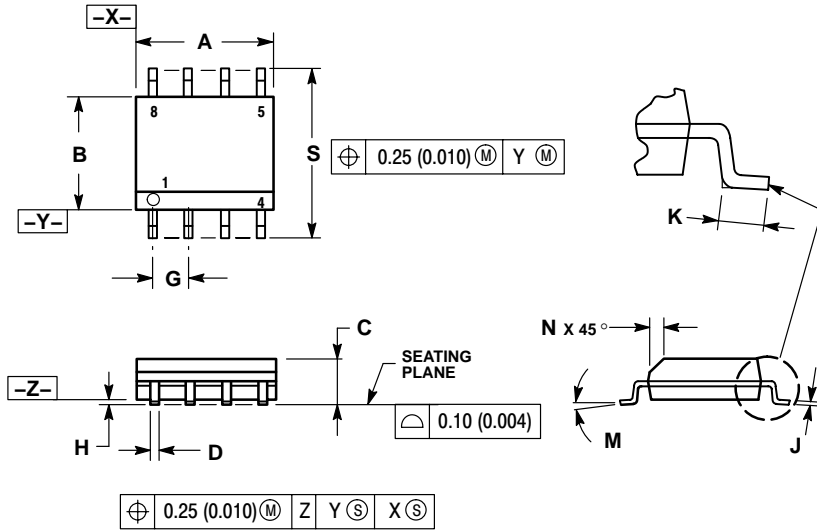
Forward On-Voltage (Note 1)	(I <sub>S</sub> = 3.3 Adc, V <sub>GS</sub> = 0 Vdc) (I <sub>S</sub> = 3.3 Adc, V <sub>GS</sub> = 0 Vdc, T <sub>J</sub> = 150°C)	V <sub>SD</sub>	- -	0.84 0.67	1.2 -	Vdc
Reverse Recovery Time	(I <sub>S</sub> = 3.3 Adc, V <sub>GS</sub> = 0 Vdc, dI <sub>S</sub> /dt = 100 A/μs)	t <sub>rr</sub>	-	58	-	ns
		t <sub>a</sub>	-	38	-	
		t <sub>b</sub>	-	20	-	
Reverse Recovery Storage Charge			Q <sub>RR</sub>	-	0.11	-

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
2. Switching characteristics are independent of operating junction temperature.

# MMDF3N06VL

## PACKAGE DIMENSIONS

SO-8  
CASE 751-07  
ISSUE AB



**NOTES:**

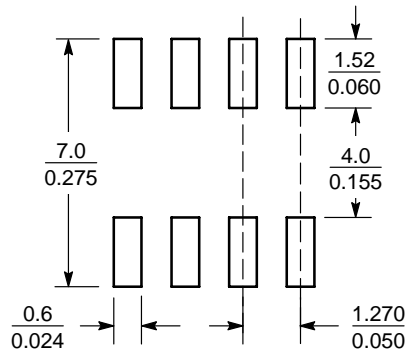
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0°	8°	0°	8°
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

**STYLE 11:**

- PIN 1. SOURCE 1
- 2. GATE 1
- 3. SOURCE 2
- 4. GATE 2
- 5. DRAIN 2
- 6. DRAIN 2
- 7. DRAIN 1
- 8. DRAIN 1

### SOLDERING FOOTPRINT\*




SCALE 6:1 ( $\frac{\text{mm}}{\text{inches}}$ )

\*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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