

Product Preview

TMOS V™

SO-8 for Surface Mount

N-Channel Enhancement-Mode Silicon Gate

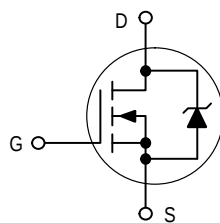
TMOS V is a new technology designed to achieve an on-resistance area product about one-half that of standard MOSFETs. This new technology more than doubles the present cell density of our 50 and 60 volt TMOS devices. Just as with our TMOS E-FET designs, TMOS V is designed to withstand high energy in the avalanche and commutation modes. 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.

New Features of TMOS V

- 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

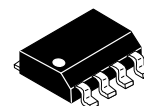
Features Common to TMOS V and TMOS E-FETS

- 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

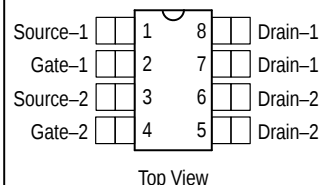


MMDF2N06VL

DUAL TMOS MOSFET
2.5 AMPERES
60 VOLTS
 $R_{DS(on)} = 0.130 \text{ OHM}$



CASE 751-05, Style 11
SO-8



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}	± 15	Vdc
Drain Current — Continuous @ $T_A = 25^\circ\text{C}$ — Continuous @ $T_A = 100^\circ\text{C}$ — Single Pulse ($t_p \leq 10 \mu\text{s}$)	I_D I_D I_{DM}	2.5 0.5 7.5	Adc Adc Apk
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ (1)	P_D	2.0	W
Operating and Storage Temperature Range	T_J, T_{stg}	-55 to 175	$^\circ\text{C}$
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 (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	$^\circ\text{C}$

DEVICE MARKING

2N6VL

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

ORDERING INFORMATION

Device	Reel Size	Tape Width	Quantity
MMDF2N06VLR1	7"	12mm embossed tape	500
MMDF2N06VLR2	13"	12mm embossed tape	2500

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MMDF2N06VL

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain-to-Source Breakdown Voltage ($V_{GS} = 0\text{ Vdc}$, $I_D = 0.25\text{ mAdc}$) Temperature Coefficient (Positive)	$V_{(BR)DSS}$	60 —	— 66	— —	Vdc mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current ($V_{DS} = 60\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$) ($V_{DS} = 60\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, $T_J = 150^\circ\text{C}$)	I_{DSS}	— —	— —	10 100	μAdc
Gate-Body Leakage Current ($V_{GS} = \pm 15\text{ Vdc}$, $V_{DS} = 0\text{ Vdc}$)	I_{GSS}	—	—	100	nAdc

ON CHARACTERISTICS(1)

Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{Adc}$) Threshold Temperature Coefficient (Negative)	$V_{GS(th)}$	1.0 —	1.5 3.0	2.0 —	Vdc mV/ $^\circ\text{C}$
Static Drain-to-Source On-Resistance ($V_{GS} = 5.0\text{ Vdc}$, $I_D = 2.5\text{ Adc}$)	$R_{DS(on)}$	—	0.12	0.13	Ohm
Drain-to-Source On-Voltage ($V_{GS} = 5.0\text{ Vdc}$, $I_D = 2.5\text{ Adc}$) ($V_{GS} = 5.0\text{ Vdc}$, $I_D = 1.25\text{ Adc}$, $T_J = 150^\circ\text{C}$)	$V_{DS(on)}$	— —	— —	0.4 0.3	Vdc
Forward Transconductance ($V_{DS} = 15\text{ Vdc}$, $I_D = 1.25\text{ Adc}$)	g_{FS}	1.0	3.0	—	Mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	$(V_{DS} = 25\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, $f = 1.0\text{ MHz}$)	C_{iss}	—	340	480	pF
Output Capacitance		C_{oss}	—	110	150	
Transfer Capacitance		C_{rss}	—	27	50	

SWITCHING CHARACTERISTICS(2)

Turn-On Delay Time	$(V_{DD} = 30\text{ Vdc}$, $I_D = 2.5\text{ Adc}$, $V_{GS} = 5.0\text{ Vdc}$, $R_G = 9.1\text{ }\Omega$)	$t_{d(on)}$	—	10	20	ns
Rise Time		t_r	—	30	60	
Turn-Off Delay Time		$t_{d(off)}$	—	32	60	
Fall Time		t_f	—	28	60	
Gate Charge	$(V_{DS} = 48\text{ Vdc}$, $I_D = 2.5\text{ Adc}$, $V_{GS} = 5.0\text{ Vdc}$)	Q_T	—	11	20	nC
		Q_1	—	1.5	—	
		Q_2	—	3.8	—	
		Q_3	—	3.5	—	

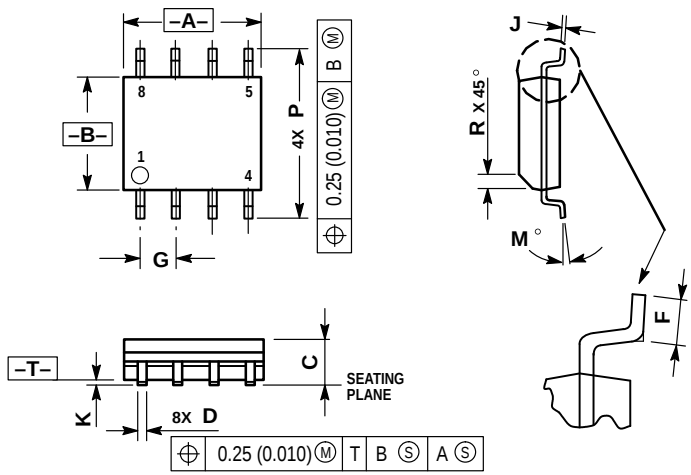
SOURCE-DrAIN DIODE CHARACTERISTICS

Forward On-Voltage(1)	$(I_S = 2.5\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$) $(I_S = 2.5\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$, $T_J = 150^\circ\text{C}$)	V_{SD}	— —	0.84 0.67	1.2 —	Vdc
Reverse Recovery Time	$(I_S = 2.5\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$, $dI_S/dt = 100\text{ A}/\mu\text{s}$)	t_{rr}	—	49	—	ns
		t_a	—	32	—	
		t_b	—	17	—	
Reverse Recovery Storage Charge		Q_{RR}	—	0.08	—	μC

(1) Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$.

(2) Switching characteristics are independent of operating junction temperature.

PACKAGE DIMENSIONS



- NOTES:
1. DIMENSIONS A AND B ARE DATUMS AND T IS A DATUM SURFACE.
 2. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 3. DIMENSIONS ARE IN MILLIMETER.
 4. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
 5. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
 6. DIMENSION D DOES NOT INCLUDE MOLD PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS	
	MIN	MAX
A	4.80	5.00
B	3.80	4.00
C	1.35	1.75
D	0.35	0.49
F	0.40	1.25
G	1.27 BSC	
J	0.18	0.25
K	0.10	0.25
M	0°	7°
P	5.60	6.20
R	0.25	0.50

- STYLE 11:
1. SOURCE 1
 2. GATE 1
 3. SOURCE 2
 4. GATE 2
 5. DRAIN 2
 6. DRAIN 2
 7. DRAIN 1
 8. DRAIN 1

CASE 751-05
SO-8
ISSUE P

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