Product Preview

TMOS V™

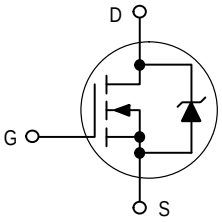
SOT-223 for Surface Mount

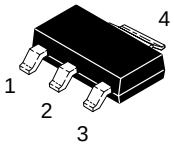
N–Channel Enhancement–Mode Silicon Gate

MMFT3055V

TMOS POWER FET
1.7 AMPERES
60 VOLTS
$R_{DS(on)}$ = 0.130 OHM

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.





CASE 318E–04, Style 3
TO–261AA

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
- Available in 12 mm Tape & Reel
  Use MMFT3055VT1 to order the 7 inch/1000 unit reel
  Use MMFT3055VT3 to order the 13 inch/4000 unit reel

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

Rating	Symbol	Value	Unit
Drain–to–Source Voltage	V_{DSS}	60	Vdc
Drain–to–Gate Voltage (R_{GS} = 1.0 MΩ)	V_{DGR}	60	Vdc
Gate–to–Source Voltage – Continuous – Non–repetitive ($t_p \le 10$ ms)	V_{GS} V_{GSM}	± 20 ± 25	Vdc Vpk
Drain Current – Continuous – Continuous @ 100°C – Single Pulse ($t_p \le 10$ µs)	I_D I_D I_{DM}	1.7 1.4 6.0	Adc Apk
Total PD @ T_A = 25°C mounted on 1” sq. Drain pad on FR–4 bd material Total PD @ T_A = 25°C mounted on 0.70” sq. Drain pad on FR–4 bd material Total PD @ T_A = 25°C mounted on min. Drain pad on FR–4 bd material Derate above 25°C	P_D	2.0 1.7 0.9 6.3	Watts mW/°C
Operating and Storage Temperature Range	T_J, T_{stg}	–55 to 175	°C
Single Pulse Drain–to–Source Avalanche Energy – Starting T_J = 25°C (V_{DD} = 25 Vdc, V_{GS} = 10 Vdc, Peak I_L = 3.4 Apk, L = 10 mH, R_G = 25 Ω)	E_{AS}	 58	mJ
Thermal Resistance – Junction to Ambient on 1” sq. Drain pad on FR–4 bd material – Junction to Ambient on 0.70” sq. Drain pad on FR–4 bd material – Junction to Ambient on min. Drain pad on FR–4 bd material	 $R_{\theta JA}$ $R_{\theta JA}$ $R_{\theta JA}$	 70 88 159	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8″ from case for 10 seconds	T_L	260	°C

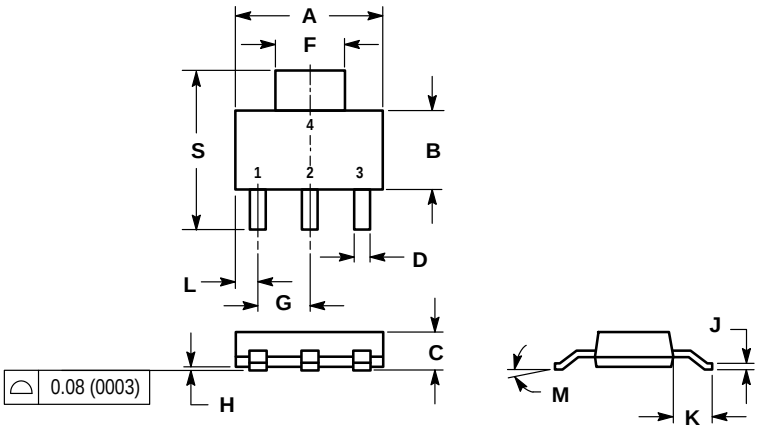
This document contains information on a new product. Specifications and information herein are subject to change without notice.
E–FET and TMOS V are trademarks of Motorola, Inc. TMOS is a registered trademark of Motorola, Inc.

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain–to–Source Breakdown Voltage (V_{GS} = 0 Vdc, I_D = 0.25 mAdc)	$V_{(BR)DSS}$	60	—	—	Vdc
Temperature Coefficient (Positive)		—	63	—	mV/°C
Zero Gate Voltage Drain Current (V_{DS} = 60 Vdc, V_{GS} = 0 Vdc)	I_{DSS}	—	—	10	μAdc
(V_{DS} = 60 Vdc, V_{GS} = 0 Vdc, T_J = 150°C)		—	—	100	
Gate–Body Leakage Current (V_{GS} = ± 20 Vdc, V_{DS} = 0 Vdc)	I_{GSS}	—	—	100	nAdc
ON CHARACTERISTICS (1)					
Gate Threshold Voltage (V_{DS} = V_{GS}, I_D = 250 μAdc)	$V_{GS(th)}$	2.0	2.8	4.0	Vdc
Threshold Temperature Coefficient (Negative)		—	5.6	—	mV/°C
Static Drain–to–Source On–Resistance (V_{GS} = 10 Vdc, I_D = 0.85 Adc)	$R_{DS(on)}$	—	0.115	0.13	Ohm
Drain–to–Source On–Voltage (V_{GS} = 10 Vdc, I_D = 1.7 Adc)	$V_{DS(on)}$	—	—	0.27	Vdc
(V_{GS} = 10 Vdc, I_D = 0.85 Adc, T_J = 150°C)		—	—	0.25	
Forward Transconductance (V_{DS} = 8.0 Vdc, I_D = 1.7 Adc)	g_{FS}	1.0	2.7	—	mhos
DYNAMIC CHARACTERISTICS					
Input Capacitance (V_{DS} = 25 Vdc, V_{GS} = 0 Vdc, f = 1.0 MHz)	C_{iss}	—	360	500	pF
Output Capacitance	C_{oss}	—	110	150	
Transfer Capacitance	C_{rss}	—	25	50	
SWITCHING CHARACTERISTICS (2)					
Turn–On Delay Time (V_{DD} = 30 Vdc, I_D = 1.7 Adc, V_{GS} = 10 Vdc, R_G = 9.1 Ω)	$t_{d(on)}$	—	8.0	20	ns
Rise Time	t_r	—	9.0	20	
Turn–Off Delay Time	$t_{d(off)}$	—	32	60	
Fall Time	t_f	—	18	40	
Gate Charge (V_{DS} = 48 Vdc, I_D = 1.7 Adc, V_{GS} = 10 Vdc)	Q_T	—	13	20	nC
	Q_1	—	2.0	—	
	Q_2	—	5.0	—	
	Q_3	—	4.0	—	
SOURCE–DRAIN DIODE CHARACTERISTICS					
Forward On–Voltage (1) (I_S = 1.7 Adc, V_{GS} = 0 Vdc)	V_{SD}	—	0.85	1.6	Vdc
(I_S = 1.7 Adc, V_{GS} = 0 Vdc, T_J = 150°C)		—	0.7	—	
Reverse Recovery Time (I_S = 1.7 Adc, V_{GS} = 0 Vdc, dI_S/dt = 100 A/μs)	t_{rr}	—	40	—	ns
	t_a	—	34	—	
	t_b	—	6.0	—	
Reverse Recovery Stored Charge	Q_{RR}	—	0.089	—	μC
INTERNAL PACKAGE INDUCTANCE					
Internal Drain Inductance (Measured from the drain lead 0.25″ from package to center of die)	L_D	—	4.5	—	nH
Internal Source Inductance (Measured from the source lead 0.25″ from package to source bond pad)	L_S	—	7.5	—	nH

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

PACKAGE DIMENSIONS



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.249	0.263	6.30	6.70
B	0.130	0.145	3.30	3.70
C	0.060	0.068	1.50	1.75
D	0.024	0.035	0.60	0.89
F	0.115	0.126	2.90	3.20
G	0.087	0.094	2.20	2.40
H	0.0008	0.0040	0.020	0.100
J	0.009	0.014	0.24	0.35
K	0.060	0.078	1.50	2.00
L	0.033	0.041	0.85	1.05
M	0 °	10 °	0 °	10 °
S	0.264	0.287	6.70	7.30

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

CASE 318E–04
ISSUE H

How to reach us:
USA / EUROPE: Motorola Literature Distribution;
P.O. Box 20912; Phoenix, Arizona 85036. 1–800–441–2447

MFAX: RMFAX0@email.sps.mot.com – TOUCHTONE (602) 244–6609
INTERNET: http://Design–NET.com

JAPAN: Nippon Motorola Ltd.; Tatsumi–SPD–JLDC, Toshikatsu Otsuki,
6F Seibu–Butsuryu–Center, 3–14–2 Tatsumi Koto–Ku, Tokyo 135, Japan. 03–3521–8315

HONG KONG: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852–26629298