Product Preview

Medium Power Surface Mount Products

TMOS Dual N-Channel Field Effect Transistors

MMDF3304

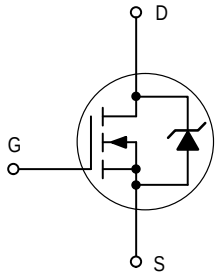
Motorola Preferred Device

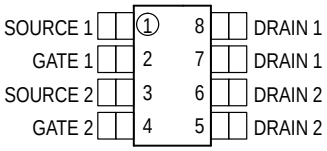
DUAL TMOS POWER MOSFET 7.3 AMPERES 30 VOLTS $R_{DS(on)}$ = 25 mΩ

CASE 751–06, Style 13 SO–8

WaveFET™ devices are an advanced series of power MOSFETs which utilize Motorola's latest MOSFET technology process to achieve the lowest possible on–resistance per silicon area. They are capable of withstanding high energy in the avalanche and commutation modes and the drain–to–source diode has a very low reverse recovery time. WaveFET™ devices are designed for use in low voltage, high speed switching applications where power efficiency is important. Typical applications are dc–dc converters, and power management in portable and battery powered products such as computers, printers, cellular and cordless phones. They can also be used for low voltage motor controls in mass storage products such as disk drives and tape drives. The avalanche energy is specified to eliminate the guesswork in designs where inductive loads are switched and offer additional safety margin against unexpected voltage transients.

- Ultra Low $R_{DS(on)}$ Provides Higher Efficiency and Extends Battery Life in Portable Applications
- Characterized Over a Wide Range of Power Ratings
- Logic Level Gate Drive — Can Be Driven by Logic ICs
- Diode Is Characterized for Use In Bridge Circuits
- Diode Exhibits High Speed, with Soft Recovery
- I_{DSS} Specified at Elevated Temperature
- Miniature SO–8 Surface Mount Package — Saves Board Space





DEVICE MARKING

ORDERING INFORMATION

	Device	Reel Size	Tape Width	Quantity
D3304	MMDF3304R2	13″	12 mm embossed tape	2500 units

This document contains information on a product under development. Motorola reserves the right to change or discontinue this product without notice.

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Preferred devices are Motorola recommended choices for future use and best overall value.

REV 2

MAXIMUM RATINGS (T_J = 25°C unless otherwise specified)

Characteristics		Symbol	Maximum	Unit
Drain–to–Source Voltage		V_{DSS}	30	V
Drain–to–Gate Voltage (R_{GS} = 1.0 MΩ)		V_{DGR}	20	
Gate–to–Source Voltage — Continuous		V_{GS}	±20	
1 Inch Square @ 10 seconds on FR–4 or G–10 PCB	Thermal Resistance — Junction to Ambient	$R_{\theta JA}$	62.5	°C/W
	Total Power Dissipation @ T_A = 25°C	P_D	2.0	Watts
	Linear Derating Factor		16	mW/°C
	Drain Current — Continuous @ T_A = 25°C	I_D	7.3	A
	— Continuous @ T_A = 70°C	I_D	4.9	A
	— Pulsed Drain Current (1)	I_{DM}	44	A
1 Inch Square @ Steady State on FR–4 or G–10 PCB	Thermal Resistance — Junction to Ambient	$R_{\theta JA}$	98	°C/W
	Total Power Dissipation @ T_A = 25°C	P_D	1.28	Watts
	Linear Derating Factor		10.2	mW/°C
	Drain Current — Continuous @ T_A = 25°C	I_D	5.8	A
	— Continuous @ T_A = 70°C	I_D	3.9	A
	— Pulsed Drain Current (1)	I_{DM}	35	A
Minimum Pad @ Steady State on FR–4 or G–10 PCB	Thermal Resistance — Junction to Ambient	$R_{\theta JA}$	166	°C/W
	Total Power Dissipation @ T_A = 25°C	P_D	0.75	Watts
	Linear Derating Factor		6.0	mW/°C
	Drain Current — Continuous @ T_A = 25°C	I_D	4.5	A
	— Continuous @ T_A = 70°C	I_D	3.0	A
	— Pulsed Drain Current (1)	I_{DM}	27	A
Operating and Storage Temperature Range		T_J, T_{stg}	–55 to 150	°C

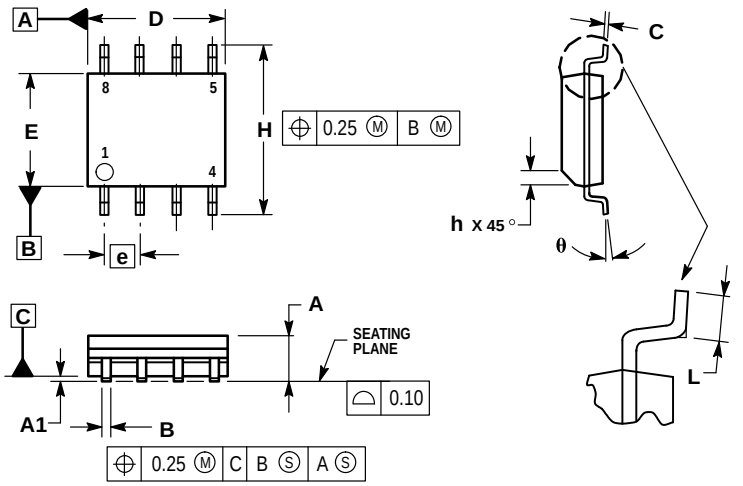
(1) Repetitive rating; pulse width limited by maximum junction temperature.

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

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain–to–Source Breakdown Voltage(1) (V_{GS} = 0 Vdc, I_D = 0.25 mAdc) Temperature Coefficient (Positive)		$V_{(BR)DSS}$	 30 —	 — TBD	 — —	Vdc mV/°C
Zero Gate Voltage Drain Current (V_{DS} = 24 Vdc, V_{GS} = 0 Vdc) (V_{DS} = 24 Vdc, V_{GS} = 0 Vdc, T_J = 125°C)		I_{DSS}	 — —	 — —	 1.0 10	µAdc
Gate–Body Leakage Current (V_{GS} = ±20 Vdc, V_{DS} = 0 Vdc)		I_{GSS}	—	—	100	nAdc
ON CHARACTERISTICS(1)						
Gate Threshold Voltage(1) (V_{DS} = V_{GS}, I_D = 0.25 mAdc) Threshold Temperature Coefficient (Negative)		$V_{GS(th)}$	 1.0 —	 — TBD	 — —	Vdc mV/°C
Static Drain–to–Source On–Resistance(1) (V_{GS} = 10 Vdc, I_D = 7.3 Adc) (V_{GS} = 4.5 Vdc, I_D = 5.8 Adc)		$R_{DS(on)}$	 — —	 TBD TBD	 25 TBD	mΩ
Forward Transconductance (V_{DS} = 15 Vdc, I_D = 7.3 Adc)(1)		g_{FS}	—	TBD	—	Mhos
DYNAMIC CHARACTERISTICS						
Input Capacitance	(V_{DS} = 15 Vdc, V_{GS} = 0 V, f = 1.0 MHz)	C_{iss}	—	TBD	TBD	pF
Output Capacitance		C_{oss}	—	TBD	TBD	
Transfer Capacitance		C_{rss}	—	TBD	TBD	
SWITCHING CHARACTERISTICS(2)						
Turn–On Delay Time	(V_{DS} = 15 Vdc, I_D = 1.0 Adc, V_{GS} = 10 Vdc, R_G = 6.0 Ω)(1)	$t_{d(on)}$	—	TBD	TBD	ns
Rise Time		t_r	—	TBD	TBD	
Turn–Off Delay Time		$t_{d(off)}$	—	TBD	TBD	
Fall Time		t_f	—	TBD	TBD	
Turn–On Delay Time	(V_{DD} = 15 Vdc, I_D = 1.0 Adc, V_{GS} = 4.5 Vdc, R_G = 6.0 Ω)(1)	$t_{d(on)}$	—	TBD	TBD	
Rise Time		t_r	—	TBD	TBD	
Turn–Off Delay Time		$t_{d(off)}$	—	TBD	TBD	
Fall Time		t_f	—	TBD	TBD	
Gate Charge	(V_{DS} = 15 Vdc, I_D = 5.0 Adc, V_{GS} = 10 Vdc)(1)	Q_T	—	TBD	TBD	nC
		Q_1	—	TBD	—	
		Q_2	—	TBD	—	
		Q_3	—	TBD	—	
SOURCE–DRAIN DIODE CHARACTERISTICS						
Forward On–Voltage	(I_S = 1.7 Adc, V_{GS} = 0 Vdc)(1) (I_S = 1.7 Adc, V_{GS} = 0 Vdc, T_J = 125°C)	V_{SD}	— —	TBD TBD	1.2 —	Vdc
Reverse Recovery Time	(I_S = 1.7 Adc, V_{GS} = 0 Vdc, dI_S/dt = 100 A/µs)(1)	t_{rr}	—	TBD	—	ns
		t_a	—	TBD	—	
		t_b	—	TBD	—	
Reverse Recovery Stored Charge		Q_{RR}	—	TBD	—	µC

(1) Pulse Test: Pulse Width ≤ 300 µs, Duty Cycle ≤ 2%.
(2) Switching characteristics are independent of operating junction temperatures.
(3) Repetitive rating; pulse width limited by max. junction temperature.

PACKAGE DIMENSIONS



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. DIMENSIONS ARE IN MILLIMETER.
3. DIMENSION D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 TOTAL IN EXCESS OF THE B DIMENSION AT MAXIMUM MATERIAL CONDITION.

	MILLIMETERS	
DIM	MIN	MAX
A	1.35	1.75
A1	0.10	0.25
B	0.35	0.49
C	0.19	0.25
D	4.80	5.00
E	3.80	4.00
e	1.27 BSC	
H	5.80	6.20
h	0.25	0.50
L	0.40	1.25
θ	0°	7°

STYLE 13:
PIN 1. N.C.
2. SOURCE
3. SOURCE
4. GATE
5. DRAIN
6. DRAIN
7. DRAIN
8. DRAIN

CASE 751–06
ISSUE T

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