Product Preview

Medium Power Surface Mount Products

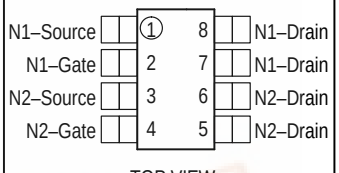
TMOS Dual N-Channel Field Effect Transistors

MMDF3200Z

Motorola Preferred Device

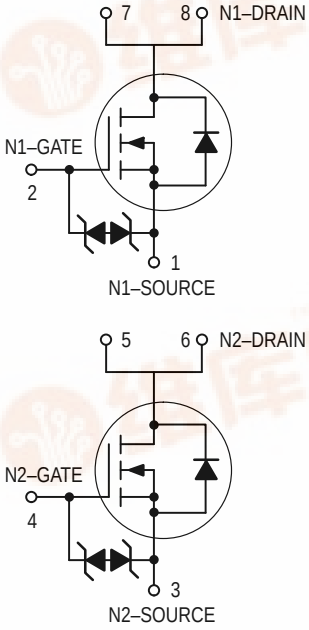
DUAL TMOS POWER MOSFET 11.5 AMPERES 20 VOLTS $R_{DS(on)}$ = 0.015 OHM

CASE 751–06, Style 11 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.

- Zener Protected Gates Provide Electrostatic Discharge Protection
- Designed to withstand 200 V Machine Model and 2000 V Human Body Model
- Low $R_{DS(on)}$ Provides Higher Efficiency and Extends Battery Life
- Logic Level Gate Drive — Can Be Driven by Logic ICs
- Miniature SO–8 Surface Mount Package — Saves Board Space
- Diode Is Characterized for Use In Bridge Circuits
- Diode Exhibits High Speed, With Soft Recovery
- I_{DSS} Specified at Elevated Temperature
- Mounting Information for SO–8 Package Provided



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

Rating	Symbol	Max	Unit
Drain–to–Source Voltage	V_{DSS}	20	V
Drain–to–Gate Voltage (R_{GS} = 1.0 MΩ)	V_{DGR}	20	V
Gate–to–Source Voltage — Continuous	V_{GS}	± 12	V
Operating and Storage Temperature Range	T_J, T_{stg}	– 55 to 150	°C

DEVICE MARKING

D3200

ORDERING INFORMATION

Device	Reel Size	Tape Width	Quantity
MMDF3200Z	13″	12 mm embossed tape	4000 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.

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

When mounted on 1 inch square (25.40 mm square) FR–4 or G–10 board (V_{GS} = 10 V @ 10 Seconds)

Parameter	Symbol	Maximum	Unit
Drain Current — Continuous @ T_A = 25°C	I_D	11.5	A
— Continuous @ T_A = 70°C	I_D	9.2	A
— Pulsed Drain Current (1)	I_{DM}	57.5	A
Total Power Dissipation @ T_A = 25°C	P_D	2.0	Watts
Linear Derating Factor		16	mW/°C
Thermal Resistance — Junction to Ambient	$R_{\theta JA}$	62.5	°C/W
Continuous Source Current (Diode Current)	I_S	TBD	A

When mounted on 1 inch square (25.40 mm square) FR–4 or G–10 board (V_{GS} = 10 V @ Steady State)

Parameter	Symbol	Maximum	Unit
Drain Current — Continuous @ T_A = 25°C	I_D	8.0	A
— Continuous @ T_A = 70°C	I_D	5.9	A
— Pulsed Drain Current (1)	I_{DM}	40	A
Total Power Dissipation @ T_A = 25°C	P_D	1.28	Watts
Linear Derating Factor		10.2	mW/°C
Thermal Resistance — Junction to Ambient	$R_{\theta JA}$	98	°C/W
Continuous Source Current (Diode Current)	I_S	TBD	A

When mounted on minimum FR–4 or G–10 board (V_{GS} = 10 V @ Steady State)

Parameter	Symbol	Maximum	Unit
Drain Current — Continuous @ T_A = 25°C	I_D	7.1	A
— Continuous @ T_A = 70°C	I_D	5.2	A
— Pulsed Drain Current (1)	I_{DM}	35.5	A
Total Power Dissipation @ T_A = 25°C	P_D	0.75	Watts
Linear Derating Factor		6.0	mW/°C
Thermal Resistance — Junction to Ambient	$R_{\theta JA}$	166	°C/W
Continuous Source Current (Diode Current)	I_S	TBD	A

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

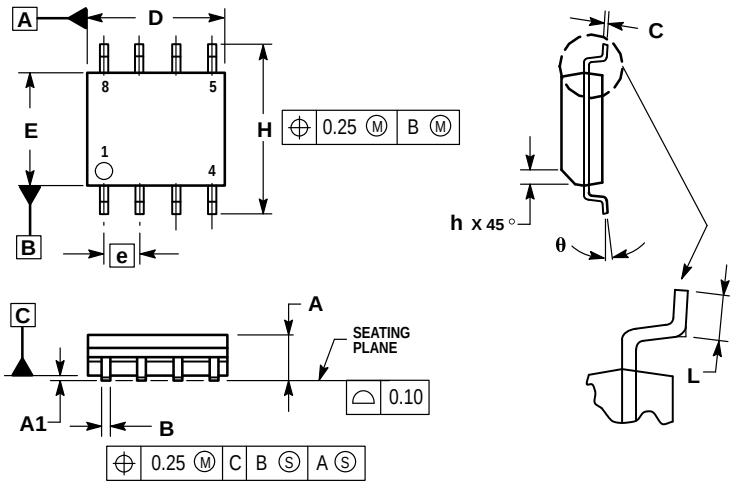
ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain–to–Source Breakdown Voltage (V_{GS} = 0 Vdc, I_D = 0.25 mAdc) Temperature Coefficient (Positive)		$V_{(BR)DSS}$	 20 —	 — TBD	 — —	Vdc mV/°C
Zero Gate Voltage Drain Current (V_{DS} = 20 Vdc, V_{GS} = 0 Vdc) (V_{DS} = 20 Vdc, V_{GS} = 0 Vdc, T_J = 125°C)		I_{DSS}	 — —	 — —	 1.0 10	μAdc
Gate–Body Leakage Current (V_{GS} = ± 12 Vdc, V_{DS} = 0 Vdc)		I_{GSS}	—	TBD	1.0	μA
ON CHARACTERISTICS(1)						
Gate Threshold Voltage (V_{DS} = V_{GS}, I_D = 0.25 mAdc) Threshold Temperature Coefficient (Negative)		$V_{GS(th)}$	 0.5 —	 0.8 TBD	 1.2 —	Vdc mV/°C
Static Drain–to–Source On–Resistance (V_{GS} = 4.5 Vdc, I_D = 11.5 Adc) (V_{GS} = 2.5 Vdc, I_D = 5.9 Adc)		$R_{DS(on)}$	 — —	 TBD TBD	 15 25	mΩ
Forward Transconductance (V_{DS} = 8.0 Vdc, I_D = 3.0 Adc)		g_{FS}	5.0	TBD	—	Mhos
DYNAMIC CHARACTERISTICS						
Input Capacitance	(V_{DS} = 15 Vdc, V_{GS} = 0 Vdc, 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_{DD} = 16 Vdc, I_D = 11.5 Adc, V_{GS} = 4.5 Vdc, R_G = 10 Ω)	$t_{d(on)}$	—	TBD	TBD	ns
Rise Time		t_r	—	TBD	TBD	
Turn–Off Delay Time		$t_{d(off)}$	—	TBD	TBD	
Fall Time		t_f	—	TBD	TBD	
Gate Charge See Figure 8	(V_{DS} = 16 Vdc, I_D = 11.5 Adc, V_{GS} = 4.5 Vdc)	Q_T	—	TBD	TBD	nC
		Q_1	—	TBD	—	
		Q_2	—	TBD	—	
		Q_3	—	TBD	—	
SOURCE–DRAIN DIODE CHARACTERISTICS						
Forward On–Voltage	(I_S = 11.5 Adc, V_{GS} = 0 Vdc) (I_S = 11.5 Adc, V_{GS} = 0 Vdc, T_J = 125°C)	V_{SD}	— —	TBD TBD	1.2 —	Vdc
Reverse Recovery Time	(I_S = 11.5 Adc, V_{GS} = 0 Vdc, dI_S/dt = 100 A/μs)	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 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 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

CASE 751–06
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