MOTOROLA
SEMICONDUCTOR TECHNICAL DATA

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Product Preview

Medium Power Surface Mount Products

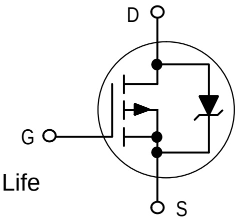
TMOS Single P-Channel Field Effect Transistors

MMSF3305

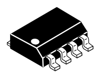
Motorola Preferred Device

SINGLE TMOS
POWER MOSFET
9.1 AMPERES
30 VOLTS
$R_{DS(on)}$ = 0.02 OHM

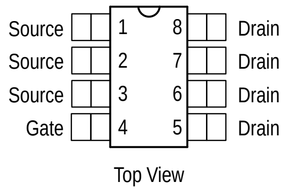
WaveFET™ devices are an advanced series of power MOSFETs which utilize Motorola's High Cell Density HDTMOS process. These miniature surface mount MOSFETs feature ultra low $R_{DS(on)}$ and true logic level performance. They are capable of withstanding high energy in the avalanche and commutation modes 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
- 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
- Avalanche Energy Specified
- Mounting Information for SO–8 Package Provided



CASE 751–05, Style 13
SO–8



DEVICE MARKING	**ORDERING INFORMATION**			
	Device	**Reel Size**	**Tape Width**	**Quantity**
S3305	MMSF3305R2	13″	12 mm embossed tape	4000 units

Preferred devices are Motorola recommended choices for future use and best overall value.
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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MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)
Negative sign for P–Channel devices omitted for clarity

Rating		Symbol	Max	Unit
Drain–to–Source Voltage		V_{DSS}	30	V
Drain–to–Gate Voltage (R_{GS} = 1.0 MΩ)		V_{DGR}	20	V
Gate–to–Source Voltage — Continuous		V_{GS}	± 20	V
1 inch SQ.	Thermal Resistance — Junction to Ambient	R_{THJA}	50	°C/W
FR–4 or G–10 PCB	Total Power Dissipation @ T_A = 25°C	P_D	2.5	Watts
	Linear Derating Factor		20	mW/°C
	Drain Current — Continuous @ T_A = 25°C	I_D	9.1	A
10 seconds	Continuous @ T_A = 70°C	I_D	7.3	A
	Pulsed Drain Current (1)	I_{DM}	50	A
Minimum	Thermal Resistance — Junction to Ambient	R_{THJA}	80	°C/W
FR–4 or G–10 PCB	Total Power Dissipation @ T_A = 25°C	P_D	1.56	Watts
	Linear Derating Factor		12.5	mW/°C
	Drain Current — Continuous @ T_A = 25°C	I_D	7.2	A
10 seconds	Continuous @ T_A = 70°C	I_D	5.8	A
	Pulsed Drain Current (1)	I_{DM}	40	A
Operating and Storage Temperature Range		T_J, T_{stg}	– 55 to 150	°C
Single Pulse Drain–to–Source Avalanche Energy — Starting T_J = 25°C (V_{DD} = 30 Vdc, V_{GS} = 10 Vdc, Peak I_L = 9.1 Apk, L = TBD mH, R_G = 25 Ω)		E_{AS}	TBD	mJ

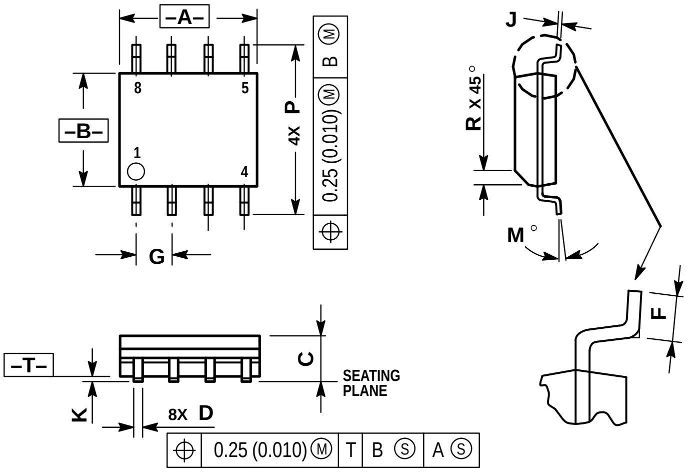
(1) Repetitive rating; pulse width limited by maximum junction temperature.

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

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain–to–Source Breakdown Voltage (1) (3) (V_{GS} = 0 Vdc, I_D = 0.25 mAdc) Temperature Coefficient (Positive)		$V_{(BR)DSS}$	 30 —	 — —	 — —	Vdc mV/°C
Zero Gate Voltage Drain Current (V_{DS} = 30 Vdc, V_{GS} = 0 Vdc) (V_{DS} = 15 Vdc, V_{GS} = 0 Vdc, T_J = 70°C)		I_{DSS}	 — —	 — —	 1.0 5.0	µAdc
Gate–Body Leakage Current (V_{GS} = ± 20 Vdc, V_{DS} = 0)		I_{GSS}	—	—	100	nAdc
ON CHARACTERISTICS(1)						
Gate Threshold Voltage (1) (3) (V_{DS} = V_{GS}, I_D = 0.25 mAdc) Threshold Temperature Coefficient (Negative)		$V_{GS(th)}$	 0.7 —	 — —	 1.4 —	Vdc mV/°C
Static Drain–to–Source On–Resistance (1) (3) (V_{GS} = 10 Vdc, I_D = 9.1 Adc) (V_{GS} = 4.5 Vdc, I_D = 7.3 Adc)		$R_{DS(on)}$	 — —	 — —	 20 30	mΩ
On–State Drain Current (V_{DS} ≤ 5.0 V, V_{GS} = 10 V) (V_{DS} ≤ 5.0 V, V_{GS} = 4.5 V)		$I_{D(on)}$	 40 10	 — —	 — —	A
Forward Transconductance (V_{DS} = 15 Vdc, I_D = 8.0 Adc) (1)		g_{FS}	—	—	—	Mhos
DYNAMIC CHARACTERISTICS						
Input Capacitance	(V_{DS} = 30 Vdc, V_{GS} = 0 Vdc, f = 1.0 MHz)	C_{iss}	—	—	TBD	pF
Output Capacitance		C_{oss}	—	—	TBD	
Transfer Capacitance		C_{rss}	—	—	TBD	
SWITCHING CHARACTERISTICS(2)						
Turn–On Delay Time	(V_{DD} = 15 Vdc, I_D = 1.0 Adc, V_{GS} = 10 Vdc, R_G = 6.0 Ω) (1)	$t_{d(on)}$	—	—	TBD	ns
Rise Time		t_r	—	—	TBD	
Turn–Off Delay Time		$t_{d(off)}$	—	—	TBD	
Fall Time		t_f	—	—	TBD	
Gate Charge See Figure 8	(V_{DS} = 15 Vdc, I_D = 4.6 Adc, V_{GS} = 10 Vdc) (1)	Q_T	—	—	TBD	nC
		Q_1	—	—	—	
		Q_2	—	—	—	
		Q_3	—	—	—	
SOURCE–DRAIN DIODE CHARACTERISTICS						
Forward On–Voltage(1)	(I_S = 2.1 Adc, V_{GS} = 0 Vdc) (1) (I_S = 2.1 Adc, V_{GS} = 0 Vdc, T_J = 125°C)	V_{SD}	— —	— —	1.2 —	Vdc
Reverse Recovery Time See Figure 15	(I_S = 2.1 Adc, V_{GS} = 0 Vdc, dI_S/dt = 100 A/µs) (1)	t_{rr}	—	—	TBD	ns
		t_a	—	—	—	
		t_b	—	—	—	
Reverse Recovery Stored Charge		Q_{RR}	—	—	—	µC

(1) Pulse Test: Pulse Width ≤ 300 µs, Duty Cycle ≤ 2%.
(2) Switching characteristics are independent of operating junction temperature.
(3) Reflects typical values. $C_{pk} = \left| \frac{\text{Max limit – Typ}}{\text{3 x SIGMA}} \right|$
(4) Repetitive rating; pulse width limited by maximum 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.

	MILLIMETERS	
DIM	**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	5.80	6.20
R	0.25	0.50

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

CASE 751–05
SO–8
ISSUE P

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