Product Preview

WaveFET™

Power Surface Mount Products

HDTMOS Single N-Channel Field Effect Transistor

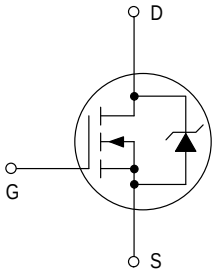
MTD3302

SINGLE TMOS POWER MOSFET 30 VOLTS $R_{DS(on)}$ = 10 mΩ

CASE 369A–13, Style 2 DPAK

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.

- Characterized Over a Wide Range of Power Ratings
- Ultralow $R_{DS(on)}$ Provides Higher Efficiency and Extends Battery Life in Portable Applications
- 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
- Avalanche Energy Specified
- Industry Standard DPAK Surface Mount Package



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

Parameter	Symbol	Value	Unit
Drain–to–Source Voltage	V_{DSS}	30	Vdc
Drain–to–Gate Voltage	V_{DGR}	30	Vdc
Gate–to–Source Voltage	V_{GS}	±20	Vdc
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} = 25 Vdc, V_{GS} = 10 Vdc, L = 126 mH, $I_{L(pk)}$ = 3.0 A, V_{DS} = 30 Vdc)	E_{AS}	500	mJ

DEVICE MARKING

D3302

ORDERING INFORMATION

Device	Reel Size	Tape Width	Quantity
MTD3302T4	13″	12 mm embossed tape	2500

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

Parameter		Symbol	Value	Unit
Drain Current — Continuous @ T_A = 25°C	Mounted on heat sink T_{case} = 25°C	I_D	30	Adc
— Continuous @ T_A = 100°C		I_D	30	Adc
— Single Pulse (tp ≤ 10 μs)		I_{DM}	70	Adc
Total Power Dissipation @ T_A = 25°C	V_{GS} = 10 Vdc	P_D	96	Watts
Linear Derating Factor			769	mW/°C
Thermal Resistance — Junction–to–Case	Steady State	$R_{\theta JC}$	1.3	°C/W
Continuous Source Current (Diode Conduction)		I_S	2.0	Adc

Parameter		Symbol	Value	Unit
Drain Current — Continuous @ T_A = 25°C	Mounted on 1 inch square FR–4 or G10 board	I_D	10.8	Adc
— Continuous @ T_A = 100°C		I_D	6.6	Adc
— Single Pulse (tp ≤ 10 μs)		I_{DM}	70	Adc
Total Power Dissipation @ T_A = 25°C	V_{GS} = 10 Vdc	P_D	1.8	Watts
Linear Derating Factor			14	mW/°C
Thermal Resistance — Junction–to–Ambient	Steady State	$R_{\theta JA}$	71.4	°C/W
Continuous Source Current (Diode Conduction)		I_S	2.0	Adc

Parameter		Symbol	Value	Unit
Drain Current — Continuous @ T_A = 25°C	Mounted on minimum recommended FR–4 or G10 board	I_D	8.3	Adc
— Continuous @ T_A = 100°C		I_D	5.2	Adc
— Single Pulse (tp ≤ 10 μs)		I_{DM}	60	Adc
Total Power Dissipation @ T_A = 25°C	V_{GS} = 10 Vdc	P_D	1.0	Watts
Linear Derating Factor			8.3	mW/°C
Thermal Resistance — Junction–to–Ambient	Steady State	$R_{\theta JA}$	120	°C/W
Continuous Source Current (Diode Conduction)		I_S	2.0	Adc

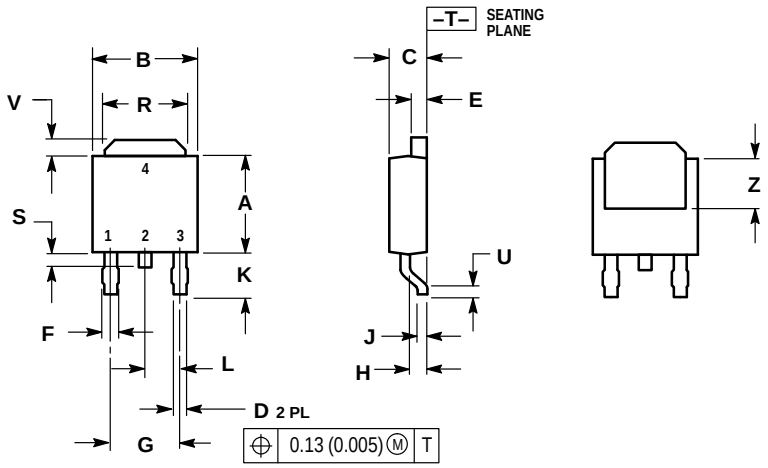
ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain–to–Source Breakdown Voltage (V_{GS} = 0 Vdc, I_D = 250 μAdc)		$V_{(BR)DSS}$	30	33	—	Vdc
Temperature Coefficient (Positive)			—	23	—	mV/°C
Zero Gate Voltage Drain Current (V_{DS} = 30 Vdc, V_{GS} = 0 Vdc)		I_{DSS}	—	0.02	1.0	μAdc
(V_{DS} = 30 Vdc, V_{GS} = 0 Vdc, T_J = 125°C)			—	0.5	10	
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)		$V_{GS(th)}$	1.0	1.9	—	Vdc
Threshold Temperature Coefficient (Negative)			—	4.7	—	mV/°C
Static Drain–to–Source On–Resistance (V_{GS} = 10 Vdc, I_D = 10 Adc)		$R_{DS(on)}$	—	8.9	10	mΩ
(V_{GS} = 4.5 Vdc, I_D = 5.0 Adc)			—	13	16	
Forward Transconductance (V_{DS} = 15 Vdc, I_D = 10 Adc)		g_{FS}	5	13	—	Mhos
DYNAMIC CHARACTERISTICS						
Input Capacitance	(V_{DS} = 24 Vdc, V_{GS} = 0 Vdc, f = 1.0 MHz)	C_{iss}	—	1810	—	pF
Output Capacitance		C_{oss}	—	165	—	
Transfer Capacitance		C_{rss}	—	595	—	
SWITCHING CHARACTERISTICS(2)						
Turn–On Delay Time	(V_{DD} = 25 Vdc, I_D = 1.0 Adc, V_{GS} = 10 Vdc, R_G = 6.0 Ω)	$t_{d(on)}$	—	9	—	ns
Rise Time		t_r	—	10	—	
Turn–Off Delay Time		$t_{d(off)}$	—	60	—	
Fall Time		t_f	—	43	—	
Turn–On Delay Time	(V_{DD} = 25 Vdc, I_D = 1.0 Adc, V_{GS} = 4.5 Vdc, R_G = 6.0 Ω)	$t_{d(on)}$	—	18	—	ns
Rise Time		t_r	—	32	—	
Turn–Off Delay Time		$t_{d(off)}$	—	42	—	
Fall Time		t_f	—	44	—	
Gate Charge	(V_{DS} = 15 Vdc, I_D = 2.0 Adc, V_{GS} = 10 Vdc)	Q_T	—	46	60	nC
		Q_1	—	5.3	—	
		Q_2	—	10.7	—	
		Q_3	—	10.3	—	
SOURCE–DRAIN DIODE CHARACTERISTICS						
Forward On–Voltage (1)	(I_S = 2.3 Adc, V_{GS} = 0 Vdc)	V_{SD}	—	0.75	1.1	Vdc
	(I_S = 2.3 Adc, V_{GS} = 0 Vdc, T_J = 125°C)		—	0.58	—	
Reverse Recovery Time	(I_S = 2.3 Adc, V_{GS} = 0 Vdc, dI_S/dt = 100 A/μs)	t_{rr}	—	36	—	ns
		t_a	—	21	—	
		t_b	—	15	—	
Reverse Recovery Stored Charge		Q_{RR}	—	0.041	—	μC

(1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

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

PACKAGE DIMENSIONS



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

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.235	0.250	5.97	6.35
B	0.250	0.265	6.35	6.73
C	0.086	0.094	2.19	2.38
D	0.027	0.035	0.69	0.88
E	0.033	0.040	0.84	1.01
F	0.037	0.047	0.94	1.19
G	0.180 BSC		4.58 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.102	0.114	2.60	2.89
L	0.090 BSC		2.29 BSC	
R	0.175	0.215	4.45	5.46
S	0.020	0.050	0.51	1.27
U	0.020	—	0.51	—
V	0.030	0.050	0.77	1.27
Z	0.138	—	3.51	—

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

CASE 369A–13
ISSUE Y

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