

Product Preview

WaveFET™

Power Surface Mount Products

HDTMOS Single N-Channel Field Effect Transistor



MTD3302

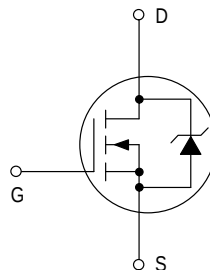
SINGLE TMOS
POWER MOSFET
30 VOLTS
 $R_{DS(on)} = 10 \text{ m}\Omega$



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



WaveFET™

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ 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	$^\circ\text{C}$
Single Pulse Drain-to-Source Avalanche Energy — Starting $T_J = 25^\circ\text{C}$ ($V_{DD} = 25 \text{ Vdc}$, $V_{GS} = 10 \text{ Vdc}$, $L = 126 \text{ mH}$, $I_{L(pk)} = 3.0 \text{ A}$, $V_{DS} = 30 \text{ Vdc}$)	EAS	500	mJ

DEVICE MARKING

ORDERING INFORMATION

D3302	Device	Reel Size	Tape Width	Quantity
	MTD3302T4	13"	12 mm embossed tape	2500

This document contains information on a product under development. Motorola reserves the right to change or discontinue this product without notice. HDTMOS and WaveFET are trademarks of Motorola, Inc. TMOS is a registered trademark of Motorola, Inc.



MTD3302**POWER RATINGS** ($T_J = 25^\circ\text{C}$ unless otherwise specified)

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

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

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

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain-to-Source Breakdown Voltage ($V_{GS} = 0\text{ Vdc}$, $I_D = 250\text{ }\mu\text{Adc}$) Temperature Coefficient (Positive)	$V_{(BR)DSS}$	30 —	33 23	— —	Vdc mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current ($V_{DS} = 30\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$) ($V_{DS} = 30\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, $T_J = 125^\circ\text{C}$)	I_{DSS}	— —	0.02 0.5	1.0 10	μAdc
Gate-Body Leakage Current ($V_{GS} = \pm 20\text{ Vdc}$, $V_{DS} = 0\text{ Vdc}$)	I_{GSS}	—	—	± 100	nAdc

ON CHARACTERISTICS(1)

Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{Adc}$) Threshold Temperature Coefficient (Negative)	$V_{GS(th)}$	1.0 —	1.9 4.7	— —	Vdc mV/ $^\circ\text{C}$
Static Drain-to-Source On-Resistance ($V_{GS} = 10\text{ Vdc}$, $I_D = 10\text{ Adc}$) ($V_{GS} = 4.5\text{ Vdc}$, $I_D = 5.0\text{ Adc}$)	$R_{DS(on)}$	— —	8.9 13	10 16	m Ω
Forward Transconductance ($V_{DS} = 15\text{ Vdc}$, $I_D = 10\text{ Adc}$)	g_{FS}	5	13	—	Mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	($V_{DS} = 24\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, $f = 1.0\text{ MHz}$)	C_{iss}	—	1810	—	pF
Output Capacitance		C_{oss}	—	165	—	
Transfer Capacitance		C_{rss}	—	595	—	

SWITCHING CHARACTERISTICS(2)

Turn-On Delay Time	($V_{DD} = 25\text{ Vdc}$, $I_D = 1.0\text{ Adc}$, $V_{GS} = 10\text{ Vdc}$, $R_G = 6.0\text{ }\Omega$)	$t_{d(on)}$	—	9	—	ns
Rise Time		t_r	—	10	—	
Turn-Off Delay Time		$t_{d(off)}$	—	60	—	
Fall Time		t_f	—	43	—	
Turn-On Delay Time	($V_{DD} = 25\text{ Vdc}$, $I_D = 1.0\text{ Adc}$, $V_{GS} = 4.5\text{ Vdc}$, $R_G = 6.0\text{ }\Omega$)	$t_{d(on)}$	—	18	—	ns
Rise Time		t_r	—	32	—	
Turn-Off Delay Time		$t_{d(off)}$	—	42	—	
Fall Time		t_f	—	44	—	
Gate Charge	($V_{DS} = 15\text{ Vdc}$, $I_D = 2.0\text{ Adc}$, $V_{GS} = 10\text{ Vdc}$)	Q_T	—	46	60	nC
		Q_1	—	5.3	—	
		Q_2	—	10.7	—	
		Q_3	—	10.3	—	

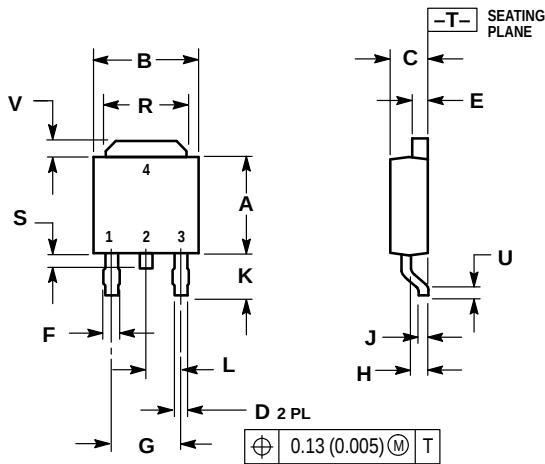
SOURCE-DrAIN DIODE CHARACTERISTICS

Forward On-Voltage (1)	($I_S = 2.3\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$) ($I_S = 2.3\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$, $T_J = 125^\circ\text{C}$)	V_{SD}	— —	0.75 0.58	1.1 —	Vdc
Reverse Recovery Time		t_{rr}	—	36	—	ns
Reverse Recovery Stored Charge	($I_S = 2.3\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$, $dI_S/dt = 100\text{ A}/\mu\text{s}$)	t_a	—	21	—	
		t_b	—	15	—	
		Q_{RR}	—	0.041	—	μC

(1) Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$.

(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.

DIM	INCHES		MILLIMETERS	
	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
 - DRAIN
 - SOURCE
 - DRAIN

CASE 369A-13
ISSUE Y

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters which may be provided in Motorola data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

Mfax is a trademark of Motorola, Inc.

How to reach us:

USA/EUROPE/Locations Not Listed: Motorola Literature Distribution;
P.O. Box 5405, Denver, Colorado 80217. 1-303-675-2140 or 1-800-441-2447

JAPAN: Nippon Motorola Ltd.: SPD, Strategic Planning Office, 141,
4-32-1 Nishi-Gotanda, Shagawa-ku, Tokyo, Japan. 03-5487-8488

Customer Focus Center: 1-800-521-6274

Mfax™: RMFAX0@email.sps.mot.com – TOUCHTONE 1-602-244-6609
Motorola Fax Back System – US & Canada ONLY 1-800-774-1848
– http://sps.motorola.com/mfax/

ASIA/PACIFIC: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

HOME PAGE: <http://motorola.com/sps/>



MOTOROLA

