

TM2302N FN-VB Datasheet

N-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY						
V _{DS} (V)	$R_{DS(on)}\left(\Omega\right)$	I _D (A) ^e	Q _g (Typ.)			
	0.028 at V _{GS} = 4.5 V	6 ^a				
20	0.042 at V _{GS} = 2.5 V	6 ^a	8.8 nC			
	0.050 at V _{GS} = 1.8 V	5.6				

FEATURES

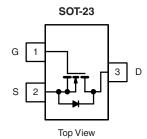
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET
- 100 % R_g Tested
- Compliant to RoHS Directive 2002/95/EC



ROHS COMPLIANT HALOGEN FREE

APPLICATIONS

- DC/DC Converters
- Load Switch for Portable Applications



ABSOLUTE MAXIMUM RATINGS T _A = 25 °C, unless otherwise noted						
Parameter	Symbol	Limit	Unit			
Drain-Source Voltage		V_{DS}	20	V		
Gate-Source Voltage		V_{GS}	± 12	v		
	T _C = 25 °C		6 ^a			
Continuous Drain Current (T. – 150 °C)	T _C = 70 °C	I _D	5.1			
Continuous Drain Current (T _J = 150 °C)	T _A = 25 °C		5 ^{b, c}			
	T _A = 70 °C		4 ^{b, c}	Α		
Pulsed Drain Current		I _{DM}	20			
Continuous Source-Drain Diode Current	T _C = 25 °C		1.75			
Continuous Source-Drain Diode Current	T _A = 25 °C	l _S	1.04 ^{b, c}			
	T _C = 25 °C		2.1			
Maximum Power Dissipation	T _C = 70 °C	Ь	1.3	w		
Maximum Fower Dissipation	T _A = 25 °C	P _D	1.25 ^{b, c}	VV		
	T _A = 70 °C		0.8 ^{b, c}			
Operating Junction and Storage Temperature Range		T _J , T _{stg}	- 55 to 150	°C		
Soldering Recommendations (Peak Tempera	ature)		260			

THERMAL RESISTANCE RATINGS								
Parameter		Symbol	Typical	Maximum	Unit			
Maximum Junction-to-Ambient ^{b, d}	t ≤ 5 s	R _{thJA}	80	100	°C/W			
Maximum Junction-to-Foot (Drain)	Steady State	R _{thJF}	40	60	O/ VV			

Notes:

- a. Package limited
- b. Surface Mounted on 1" x 1" FR4 board.
- c. t = 5 s
- d. Maximum under steady state conditions is 125 $^{\circ}\text{C/W}.$
- e. Based on $T_C = 25$ °C.

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Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit	
Static			l				
Drain-Source Breakdown Voltage	V _{DS}	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	20			V	
V _{DS} Temperature Coefficient	$\Delta V_{DS}/T_{J}$	I _D = 250 μA		25		mV/°C	
V _{GS(th)} Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	I _D = 250 μA		- 2.6			
Gate-Source Threshold Voltage	V _{GS(th)}	$V_{DS} = V_{GS}$, $I_{D} = 250 \mu A$	0.45		1.0	V	
Gate-Source Leakage	I _{GSS}	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 8 \text{ V}$			± 100	nA	
	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V			1	μΑ	
Zero Gate Voltage Drain Current		V _{DS} = 20 V, V _{GS} = 0 V, T _J = 70 °C	;		10		
On-State Drain Current ^a	I _{D(on)}	$V_{DS} \le 5 \text{ V}, V_{GS} = 4.5 \text{ V}$	20			Α	
	, ,	$V_{GS} = 4.5 \text{ V}, I_D = 5.0 \text{ A}$		0.028			
Drain-Source On-State Resistance ^a	R _{DS(on)}	$V_{GS} = 2.5 \text{ V}, I_D = 4.7 \text{ A}$		0.042		Ω	
	\ \ \ \ \	$V_{GS} = 1.8 \text{ V}, I_D = 4.3 \text{ A}$		0.050		┤	
Forward Transconductance ^a	9 _{fs}	V _{DS} = 10 V, I _D = 5.0 A		24		S	
Dynamic ^b	1			L		<u>,L</u>	
Input Capacitance	C _{iss}			865			
Output Capacitance	C _{oss}	$V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		105		pF	
Reverse Transfer Capacitance	C _{rss}	De la de		55		ρ.	
· ·		V _{DS} = 10 V, V _{GS} = 5 V, I _D = 5.0 A		12	18	+	
Total Gate Charge	Q_g	50 / GO / D		8.8	14	nC	
Gate-Source Charge	Q _{gs}	$V_{DS} = 10 \text{ V}, V_{GS} = 4.5 \text{ V}, I_D = 5.0 \text{ A}$		1.1			
Gate-Drain Charge	Q _{gd}	55 - 7 do - 7 b		0.7			
Gate Resistance	R _g	f = 1 MHz	0.5	2.4	4.8	Ω	
Turn-On Delay Time	t _{d(on)}			8	16		
Rise Time	t _r	V_{DD} = 10 V, R_L = 2.2 Ω		17	26	-	
Turn-Off Delay Time	t _{d(off)}	$I_D\cong$ 4 A, V_{GEN} = 4.5 V, R_g = 1 Ω		31	47	-	
Fall Time	t _f			8	16	-	
Turn-On Delay Time	t _{d(on)}			5	10	ns	
Rise Time	t _r	V_{DD} = 10 V, R_L = 2.2 Ω		13	20	1	
Turn-Off Delay Time	t _{d(off)}	$I_D\cong 4$ A, $V_{GEN}=5$ V, $R_g=1$ Ω		21	32	-	
Fall Time	t _f			6	12	-	
Drain-Source Body Diode Characteristic	<u> </u>		<u> </u>	<u> </u>			
Continuous Source-Drain Diode Current	Is	T _C = 25 °C			1.75		
Pulse Diode Forward Current	I _{SM}	-			20	A	
Body Diode Voltage	V _{SD}	I _S = 4 A, V _{GS} = 0 V		0.75	1.2	V	
Body Diode Reverse Recovery Time	t _{rr}	2 00		12	20	ns	
Body Diode Reverse Recovery Charge	Q _{rr}			5	10	nC	
Reverse Recovery Fall Time	t _a	$I_F = 4$ A, $dI/dt = 100$ A/ μ s, $T_J = 25$ °C		7		<u> </u>	
Reverse Recovery Rise Time t _b			—	5		ns	

Notes:

- a. Pulse test; pulse width \leq 300 $\mu s,$ duty cycle \leq 2 % b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

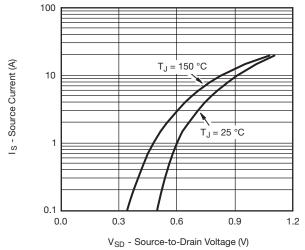


TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

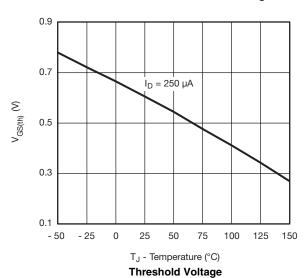




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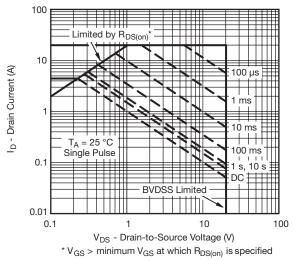
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



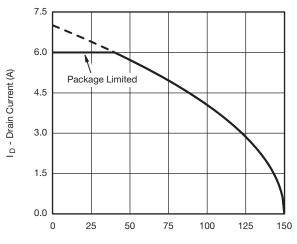
Single Pulse Power (Junction-to-Ambient)



Safe Operating Area, Junction-to-Ambient

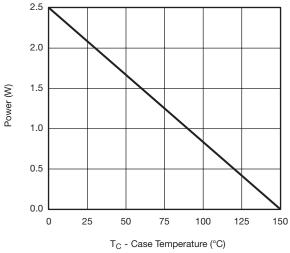


TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



T_C - Case Temperature (°C)

Current Derating*







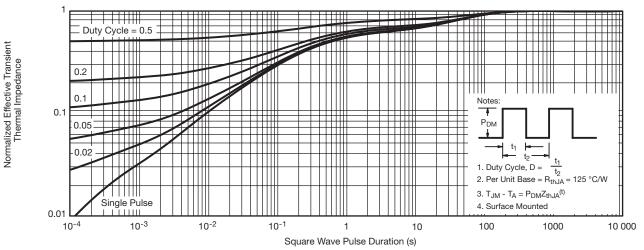
Power Derating, Junction-to-Ambient

^{*} The power dissipation P_D is based on $T_{J(max.)}$ = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

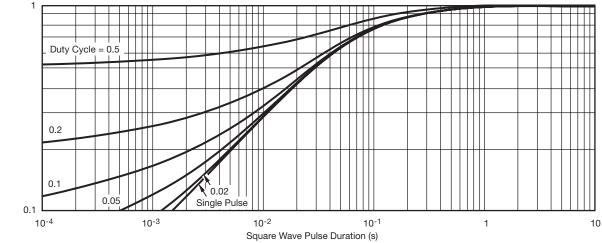
Normalized Effective Transient Thermal Impedance



TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



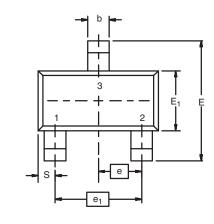
Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot



SOT-23 (TO-236): 3-LEAD







Dim	MILLI	METERS	INCHES		
	Min	Max	Min	Max	
Α	0.89	1.12	0.035	0.044	
A ₁	0.01	0.10	0.0004	0.004	
A ₂	0.88	1.02	0.0346	0.040	
b	0.35	0.50	0.014	0.020	
С	0.085	0.18	0.003	0.007	
D	2.80	3.04	0.110	0.120	
E	2.10	2.64	0.083	0.104	
E ₁	1.20	1.40	0.047	0.055	
е	0.9	5 BSC	0.0374 Ref		
e ₁	1.9	0 BSC	0.074	8 Ref	
L	0.40	0.60	0.016	0.024	
L ₁	0.64 Ref		0.025 Ref		
S	0.50 Ref		0.020 Ref		
q	3°	8°	3°	8°	
FCN: S-03946-Rev K 09-	Jul-01	•			

ECN: S-03946-Rev. K, 09-Jul-01

DWG: 5479



RECOMMENDED MINIMUM PADS FOR SOT-23



Recommended Minimum Pads Dimensions in Inches/(mm)



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