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Vishay Siliconix

N-Channel 20 V (D-S) MOSFET



Marking code: 02

PRODUCT SUMMARY						
V _{DS} (V)	20					
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 4.5 \text{ V}$	0.057					
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 2.5 \text{ V}$	0.075					
Q _g typ. (nC)	3.5					
I _D (A)	2.9					
Configuration	Single					

FEATURES

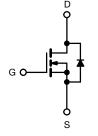
- TrenchFET® power MOSFET
- 100 % R_g tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



ROHS COMPLIANT HALOGEN FREE

APPLICATIONS

- Load switching for portable devices
- DC/DC converter



N-Channel MOSFET

ORDERING INFORMATION	
Package	SOT-23
Lead (Pb)-free and halogen-free	Si2302DDS-T1-GE3

ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C, unless otherwise noted)					
PARAMETER		SYMBOL	5 s	STEADY STATE	UNIT
Drain-source voltage		V_{DS}	20	20	V
Gate-source voltage		V_{GS}	± 8	± 8	V
Continuous drain current (T _J = 150 °C) ^a	T _A = 25 °C	I _D	2.9	2.6	۸
	T _A = 70 °C		2.3	2.1	
Pulsed drain current (t = 300 μs) ^b		I _{DM}	10	10	Α
Continuous source current (diode conduction) ^a		I _S	0.72	0.6	
Power dissipation ^a	T _A = 25 °C	P _D	0.86	0.71	W
	T _A = 70 °C		0.55	0.46	
Operating junction and storage temperature range		T _J , T _{stq}	-55 to +150	-55 to +150	°C

THERMAL RESISTANCE RATINGS					
PARAMETER		SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient ^a	t ≤ 5 s	R _{thJA}	120	145	°C/W
Maximum junction-to-ambient "	Steady state		140	175	
Maximum junction-to-foot	Steady state	R_{thJF}	62	78	

Notes

- a. Surface mounted on 1" x 1" FR4 board
- b. Pulse width limited by maximum junction temperature



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SPECIFICATIONS (T _A = 25 °C	C, unless o	therwise noted)					
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Static							
Drain-source breakdown voltage	V _{DS}	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	20	-	-		
Gate-threshold voltage	V _{GS(th)}	$V_{DS} = V_{GS}, I_D = 250 \mu A$	0.40	-	0.85	V	
Gate-body leakage	I _{GSS}	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 8 \text{ V}$	-	-	± 100	nA	
		$V_{DS} = 20 \text{ V}, V_{GS} = 0 \text{ V}$	-	-	1	μА	
Zero gate voltage drain current	IDSS	V _{DS} = 20 V, V _{GS} = 0 V, T _J = 70 °C	-	-	75		
On-state drain current ^a	I _{D(on)}	$V_{DS} \ge 10 \text{ V}, V_{GS} = 4.5 \text{ V}$	6	-	-	Α	
Data and an artifact	_	$V_{GS} = 4.5 \text{ V}, I_D = 3.6 \text{ A}$	-	0.045	0.057		
Drain-source on-resistance a	R _{DS(on)}	$V_{GS} = 2.5 \text{ V}, I_D = 3.1 \text{ A}$	-	0.056	0.075	Ω	
Forward transconductance ^a	9 _{fs}	$V_{DS} = 5 \text{ V}, I_D = 3.6 \text{ A}$	-	13	-	S	
Diode forward voltage	V_{SD}	I _S = 0.95 A, V _{GS} = 0 V	-	0.7	1.2	V	
Dynamic ^b							
Total gate charge	Qg		-	3.5	5.5		
Gate-source charge	Q _{gs}	$V_{DS} = 10 \text{ V}, V_{GS} = 4.5 \text{ V}, I_D = 3.6 \text{ A}$	-	0.6	-	nC	
Gate-drain charge	Q_{gd}		-	0.45	-		
Gate resistance	R_g	f = 1 MHz	2	4	8	Ω	
Switching							
Turn-on delay time	t _{d(on)}		-	8	15		
Rise time	t _r	$V_{DD} = 10 \text{ V}, R_L = 2.78 \Omega,$	-	7	15		
Turn-off delay time	t _{d(off)}	$I_D\cong 3.6$ A, $V_{GEN}=4.5$ V, $R_g=1~\Omega$	=.	30	45	ns	
Fall time	t _f		-	7	15		
Source-drain reverse recovery time	t _{rr}	I _F = 3.6 A, di/dt = 100 A/μs	-	8.5	15		
Body diode reverse recovery charge	Q _{rr}	$i_F = 3.0 \text{ A}$, $\alpha i/\alpha i = 100 \text{ A/} \mu \text{S}$	-	2	4	nC	

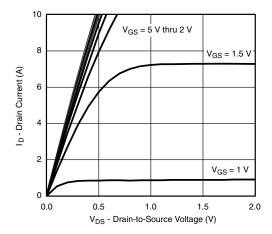
Notes

- a. Pulse test: Pulse width $\leq 300~\mu\text{s},$ duty cycle $\leq 2~\%$
- b. Guaranteed by design, not subject to production testing

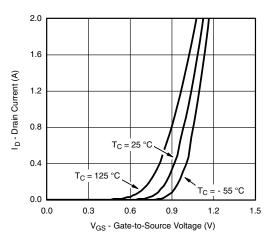
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



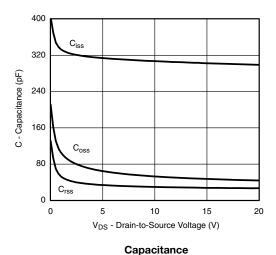
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

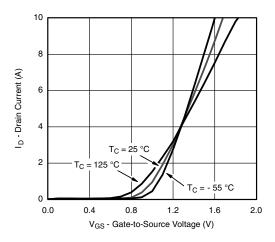


Output Characteristics

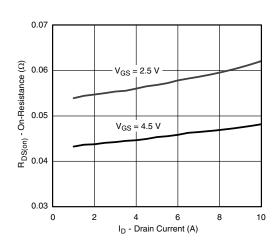


Transfer Characteristics

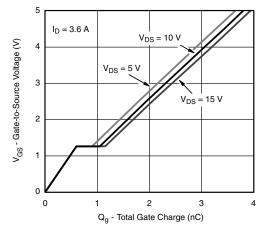




Transfer Characteristics



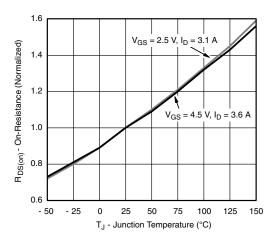
On-Resistance vs. Drain Current



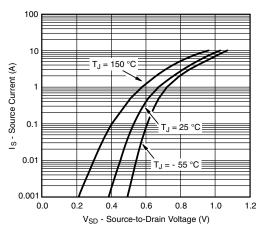
Gate Charge



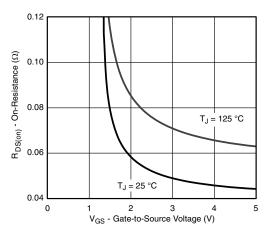
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



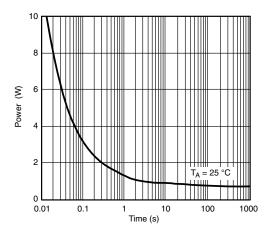
On-Resistance vs. Junction Temperature



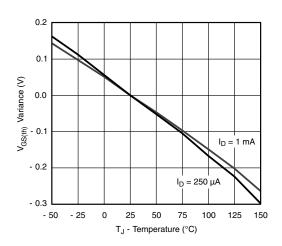
Source-Drain Diode Forward Voltage



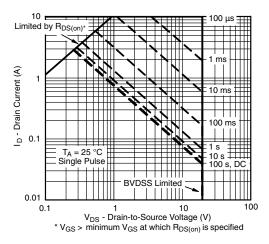
On-Resistance vs. Gate-to-Source Voltage



Single Pulse Power



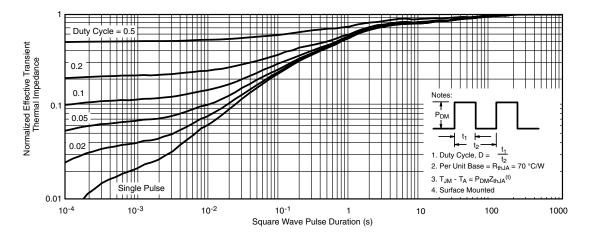
Threshold Voltage



Safe Operating Area, Junction-to-Ambient



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package / tape drawings, part marking, and reliability data, see www.vishay.com/ppg263653.



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







Dim	MILLIN	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	0.95 BSC		0.0374 Ref		
e ₁	1.90 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		0.50 Ref 0.020 Ref		
q	3°	8°	3°	8°	

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RECOMMENDED MINIMUM PADS FOR SOT-23



Recommended Minimum Pads Dimensions in Inches/(mm)

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APPLICATION NOTE



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