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Vishay Siliconix

N-Channel 40 V (D-S) MOSFET

SOT-23 (TO-236)



Top View

Marking code: P9

PRODUCT SUMMARY					
V _{DS} (V)	40				
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 10 \text{ V}$	0.042				
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 4.5 \text{ V}$	0.051				
Q _g typ. (nC)	2.9				
I _D (A) ^a	5.6				
Configuration	Single				

FEATURES

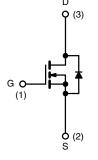
- TrenchFET® power MOSFET
- 100 % R_g tested
- Material categorization: for definitions of compliance please see www.vishav.com/doc?99912



ROHS COMPLIANT HALOGEN FREE

APPLICATIONS

- DC/DC converters
- Load switch
- Portable and consumer applications



N-Channel MOSFET

ORDERING INFORMATION	
Package	SOT-23
Lead (Pb)-free and halogen-free	Si2318CDS-T1-GE3

ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C, unless otherwise noted)					
PARAMETER		SYMBOL	LIMIT	UNIT	
Drain-source voltage		V _{DS}	40	V	
Gate-source voltage	Gate-source voltage		± 20	7 °	
	T _C = 25 °C		5.6 ^a		
Continuous drain surrent /T 150 °C)	T _C = 70 °C	Ι.	4.5	7	
Continuous drain current (T _J = 150 °C)	T _A = 25 °C	I _D	4.3 b, c	A	
	T _A = 70 °C	†	3.5 b, c		
Pulsed drain current		I _{DM}	20		
Continuous source dusin diada surrent	T _C = 25 °C	I _S	1.75	1	
Continuous source-drain diode current	T _A = 25 °C		1.04 ^{b, c}	7	
	T _C = 25 °C		2.1		
Maximum power dissipation	T _C = 70 °C		1.3	١٨,	
	T _A = 25 °C	P _D	1.25 ^{b, c}	W	
	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 temperature)			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	G/ VV	

Notes

a. Based on T_C = 25 °C

S10-2250-Rev. A, 04-Oct-10

- b. Surface mounted on 1" x 1" FR4 board
- c. t = 5 s
- d. Maximum under steady state conditions is 125 °C/W

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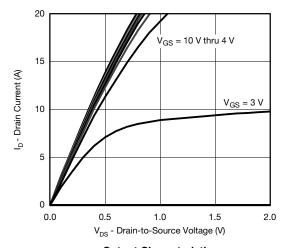
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Static							
Drain-source breakdown voltage	V_{DS}	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	40	-	-	V	
V _{DS} temperature coefficient	$\Delta V_{DS}/T_{J}$	Vpe/Tu		39	-	mV/°C	
V _{GS(th)} temperature coefficient	$\Delta V_{GS(th)}/T_J$	I _D = 250 μA	-	-4.7	-	mv/-C	
Gate-source threshold voltage	V _{GS(th)}	$V_{DS} = V_{GS}, I_D = 250 \mu A$	1.2	-	2.5	V	
Gate-source leakage	I _{GSS}	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$	-	-	± 100	nA	
Zawa mata waltana dunin awarat		V _{DS} = 40 V, V _{GS} = 0 V	= 40 V, V _{GS} = 0 V - 1		1		
Zero gate voltage drain current	IDSS	V _{DS} = 40 V, V _{GS} = 0 V, T _J = 70 °C	-	-	10	μA	
On-state drain current ^a	I _{D(on)}	$V_{DS} \le 5 \text{ V}, V_{GS} = 10 \text{ V}$	20	-	-	Α	
During and a second state of the second	5	$V_{GS} = 10 \text{ V}, I_D = 4.3 \text{ A}$	- 0.035 0.042		0.042		
Drain-source on-state resistance ^a	R _{DS(on)}	$V_{GS} = 4.5 \text{ V}, I_D = 3.9 \text{ A}$	-	0.041	0.051	Ω	
Forward transconductance a	9 _{fs}	$V_{DS} = 20 \text{ V}, I_D = 4.3 \text{ A}$	-	17	-	S	
Dynamic ^b						•	
Input capacitance	C _{iss}		-	340	-	pF	
Output capacitance	C _{oss}	$V_{DS} = 20 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	-	60	-		
Reverse transfer capacitance	C _{rss}		-	30	-		
Total gate charge	Q _g	$V_{DS} = 20 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 4.3 \text{ A}$	-	5.8	9		
			-	2.9	6		
Gate-source charge	Q _{as}	$V_{DS} = 20 \text{ V}, V_{GS} = 4.5 \text{ V}, I_D = 4.3 \text{ A}$		1.1	-	nC	
Gate-drain charge	Q_{gd}		-	0.9	-		
Gate resistance	R_g	f = 1 MHz	0.6	3.3	6.6	Ω	
Turn-on delay time	t _{d(on)}		-	12	20		
Rise time	t _r	$V_{DD} = 20 \text{ V}, R_1 = 5.7 \Omega$		50	75	1	
Turn-off delay time	t _{d(off)}	$I_D \cong 3.5 \text{ A}, V_{GEN} = 4.5 \text{ V}, R_g = 1 \Omega$	-	10	20		
Fall time	t _f		-	8	16		
Turn-on delay time	t _{d(on)}			7	14	ns	
Rise time	t _r	$V_{DD} = 20 \text{ V}, R_1 = 5.7 \Omega$	-	20	30		
Turn-off delay time	t _{d(off)}	$I_D \cong 3.5 \text{ A}, V_{GEN} = 10 \text{ V}, R_g = 1 \Omega$	-	14	21		
Fall time	t _f		-	8	16		
Drain-Source Body Diode Characteristic	cs		1	1	I.		
Continuous source-drain diode current	Is	T _C = 25 °C	-	-	1.75		
Pulse diode forward current	I _{SM}		-	-	20	Α	
Body diode voltage	V _{SD}	I _S = 3.5 A, V _{GS} = 0 V	-	0.85	1.2	V	
Body diode reverse recovery time	t _{rr}		_	15	23	ns	
Body diode reverse recovery charge	Q _{rr}	$I_F = 3.5 \text{ A}, \text{ di/dt} = 100 \text{ A/}\mu\text{s},$	-	7	14	nC	
Reverse recovery fall time	t _a	$T_{\rm J} = 25 ^{\circ}{\rm C}$	-	11	-		
, 	a			1	i	ns	

Notes

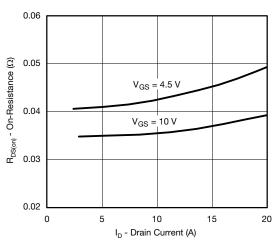
- a. Pulse test; pulse width \leq 300 μ s, duty cycle \leq 2 %
- b. Guaranteed by design, not subject to production testing

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.

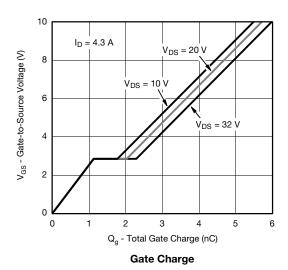


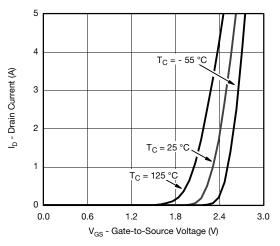


Output Characteristics

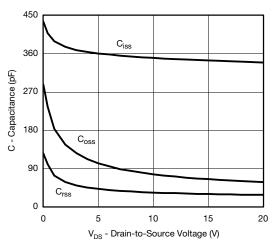


On-Resistance vs. Drain Current and Gate Voltage

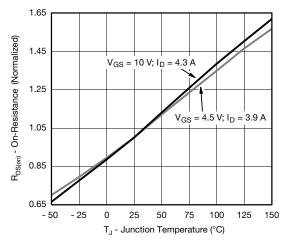




Transfer Characteristics

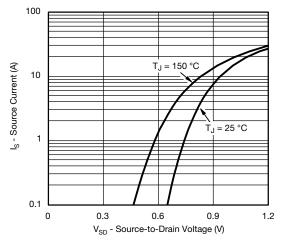


Capacitance

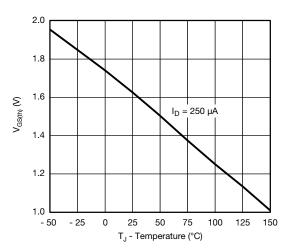


On-Resistance vs. Junction Temperature

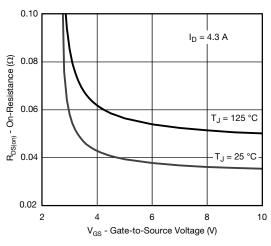




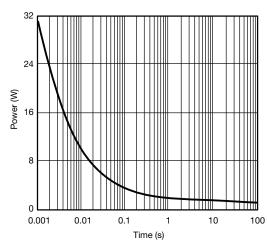
Source-Drain Diode Forward Voltage



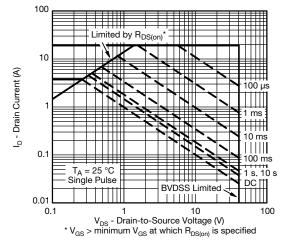
Threshold Voltage



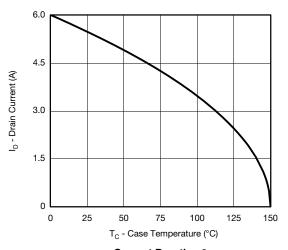
On-Resistance vs. Gate-to-Source Voltage



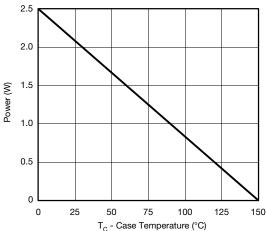
Single Pulse Power (Junction-to-Ambient)



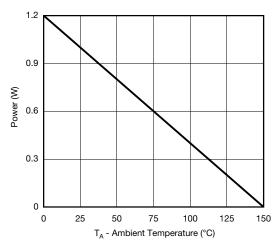
Safe Operating Area, Junction-to-Ambient



Current Derating a



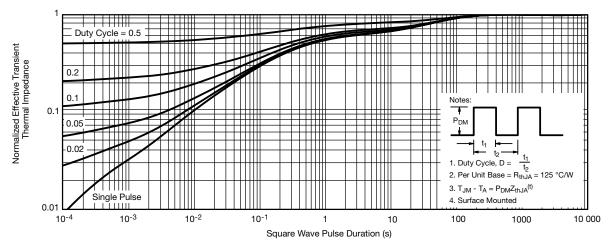




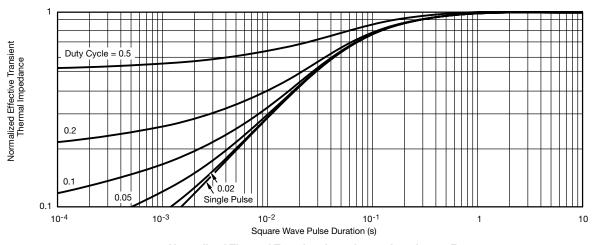
Power Derating, Junction-to-Ambient

a. 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 Thermal Transient Impedance, Junction-to-Ambient

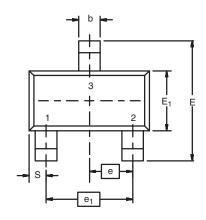


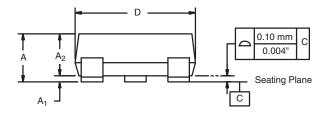
Normalized Thermal Transient Impedance, Junction-to-Foot

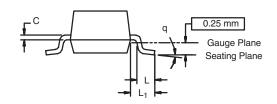
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SOT-23 (TO-236): 3-LEAD







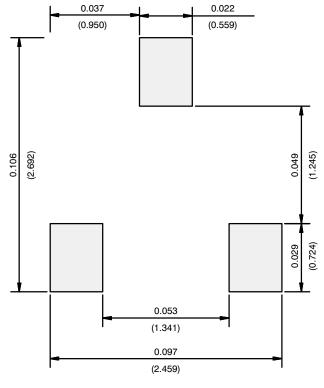
Dim	MILLIN	IETERS	INCHES		
	Min	Max	Min	Max	
Α	0.89	1.12	0.035	0.044	
A ₁	0.01	0.10	0.0004	0.004	
A ₂	0.88	1.02	0.0346	0.040	
b	0.35	0.50	0.014	0.020	
С	0.085	0.18	0.003	0.007	
D	2.80	3.04	0.110	0.120	
E	2.10	2.64	0.083	0.104	
E ₁	1.20	1.40	0.047	0.055	
е	0.95 BSC		0.0374 Ref		
e ₁	1.90 BSC		0.0748 Ref		
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°	
ECN: S-03946-Rev. K. 09-	Jul-01				

DWG: 5479

Document Number: 71196 www.vishay.com 09-Jul-01



RECOMMENDED MINIMUM PADS FOR SOT-23



Recommended Minimum Pads Dimensions in Inches/(mm)

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APPLICATION NOTE



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