Vishay Siliconix

P-Channel 40 V (D-S) MOSFET



Marking code: G4

PRODUCT SUMMARY					
V _{DS} (V)	-40				
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 10 \text{ V}$	0.075				
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 4.5 \text{ V}$	0.100				
Q _g typ. (nC)	6				
I _D (A)	-3.6 ^a				
Configuration	Single				

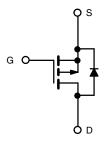
FEATURES

- TrenchFET® Gen III p-channel power MOSFET
- \bullet 100 % R_g and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



APPLICATIONS

- · Battery switch
- Motor drive control
- · Load switch



P-Channel MOSFET

ORDERING INFORMATION				
Package	SOT-23			
Lead (Pb)-free and halogen-free	Si2319DDS-T1-GE3			

ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C, ui		SYMBOL	LIMIT	UNIT
Drain-source voltage		V _{DS}	-40	
Gate-source voltage		V _{GS}	± 20	V
	T _C = 25 °C		-3.6	
O-ation	T _C = 70 °C	1	-2.9	
Continuous drain current (T _J = 150 °C)	T _A = 25 °C	I _D	-2.7 ^{b, c}	
	T _A = 70 °C	1	-2.2 ^{b, c}	
Pulsed drain current (t = 100 μs)		I _{DM}	-15	Α
	T _C = 25 °C	I _S	-1.4	
Continuous source-drain diode current	T _A = 25 °C		-0.8 b, c	
Single pulse avalanche current	1 04	I _{AS}	-5	
Single pulse avalanche energy L = 0.1 mH		E _{AS}	1.25	mJ
Maximum power dissipation	T _C = 25 °C		1.7	
	T _C = 70 °C	1	1.1	144
	T _A = 25 °C	- I _P	1 ^{b, c}	W
	T _A = 70 °C	1	0.6 b, c	
Operating junction and storage temperature range		T _J , T _{sta}	-55 to +150	°C

THERMAL RESISTANCE RATINGS							
PARAMETER	SYMBOL	TYPICAL	MAXIMUM	UNIT			
Maximum junction-to-ambient ^b	t ≤ 5 s	R _{thJA}	100	130	°C/W		
Maximum junction-to-case (drain)	Steady state	R_{thJF}	60	75	- C/VV		

Notes

a. Based on T_C = 25 °C

S17-1869-Rev. A, 25-Dec-17

- b. Surface mounted on 1" x 1" FR4 board
- c. t = 5 s
- d. Maximum under steady state conditions is 175 $^{\circ}\text{C/W}$



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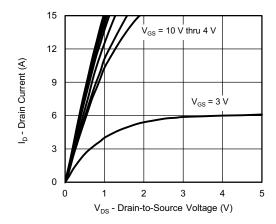
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Static							
Drain-source breakdown voltage	V _{DS}	$V_{GS} = 0 \text{ V}, I_{D} = -250 \mu A$	-40	-	-	V	
V _{DS} temperature coefficient	$\Delta V_{DS}/T_{J}$	J I _D = -250 μA		-27.5	-	\/00	
V _{GS(th)} temperature coefficient	$\Delta V_{GS(th)}/T_J$	I _D = -250 μA	-	3.2	-	mV/°C	
Gate-source threshold voltage	V _{GS(th)}	$V_{DS} = V_{GS}, I_{D} = 250 \mu\text{A}$	-1	-	-2.5	V	
Gate-source leakage	I _{GSS}	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$	-	-	100	nA	
Zava sata valta sa dusia sumant		$V_{DS} = -40 \text{ V}, V_{GS} = 0 \text{ V}$	-	-	-1		
Zero gate voltage drain current	I _{DSS}	V _{DS} = -40 V, V _{GS} = 0 V, T _J = 70 °C		-	-15	μA	
On-state drain current ^a	I _{D(on)}	$V_{DS} \ge -10 \text{ V}, V_{GS} = -10 \text{ V}$	-10	-	-	Α	
Duning and the second of the s	Б	$V_{GS} = -10 \text{ V}, I_D = -2.7 \text{ A}$	-	- 0.062 0.075		0	
Drain-source on-state resistance ^a	R _{DS(on)}	$V_{GS} = -4.5 \text{ V}, I_D = -2.4 \text{ A}$	-	0.081	0.100	Ω	
Forward transconductance a	9 _{fs}	$V_{DS} = -15 \text{ V}, I_D = -2.7 \text{ A}$	-	10	-	S	
Dynamic ^b							
Input capacitance	C _{iss}		-	650	-	pF	
Output capacitance	C _{oss}	$V_{DS} = -20 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	-	54	-		
Reverse transfer capacitance	C _{rss}		-	43	-	1	
	Q_g	$V_{DS} = -20 \text{ V}, V_{GS} = -10 \text{ V}, I_D = -2.7 \text{ A}$	-	12.5	19	nC	
Total gate charge			-	6	12		
Gate-source charge	Q _{gs}	$V_{DS} = -20 \text{ V}, V_{GS} = -4.5 \text{ V}, I_{D} = -2.7 \text{ A}$	-	1.8	-		
Gate-drain charge	Q _{gd}		-	2	-		
Gate resistance	R _g	f = 1 MHz	2	10	20	Ω	
Turn-on delay time	t _{d(on)}		-	10	20		
Rise time	t _r	$V_{DD} = -20 \text{ V}, R_{L} = 9.1 \Omega, I_{D} \cong -2.2 \text{ A},$	-	20	30	1	
Turn-off delay time	t _{d(off)}	$V_{GEN} = -10 \text{ V}, R_g = 1 \Omega$	-	20	30		
Fall time	t _f		-	12	24	1	
Turn-on delay time	t _{d(on)}		-	30	45	ns	
Rise time	t _r	$V_{DD} = -20 \text{ V}, R_L = 9.1 \Omega, I_D \cong -2.2 \text{ A},$	-	32	48		
Turn-off delay time	t _{d(off)}	$V_{GEN} = -4.5 \text{ V}, R_g = 1 \Omega$	-	20	30		
Fall time	t _f		-	15	30		
Drain-Source Body Diode Characterist	ics						
Continuous source-drain diode current	Is	T _C = 25 °C	-	-	-1.4	_	
Pulse diode forward current	I _{SM}		-	-	-15	A	
Body diode voltage	V_{SD}	$I_{S} = -2.2 \text{ A}, V_{GS} = 0 \text{ V}$	-	-0.8	-1.2	V	
Body diode reverse recovery time	t _{rr}		-	15	30	ns	
Body diode reverse recovery charge	Q _{rr}	1 00 A di/dt 100 A / 1 05 00	-	9	18	nC	
Reverse recovery fall time	t _a	$I_F = -2.2 \text{ A, di/dt} = 100 \text{ A/}\mu\text{s, T}_J = 25 ^{\circ}\text{C}$	-	10.5	-		
Reverse recovery rise time	t _b		-	4.5	-	ns	

Notes

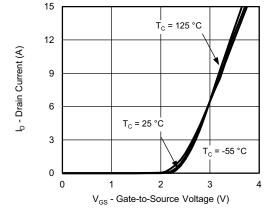
- a. Pulse test; pulse width $\leq 300~\mu s,~duty~cycle \leq 2~\%$
- b. Guaranteed by design, not subject to production testing

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.

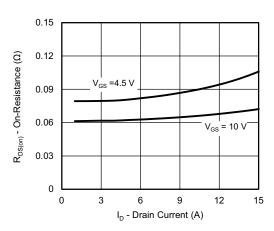




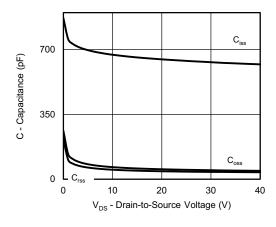
Output Characteristics



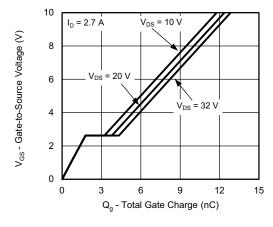
Transfer Characteristics



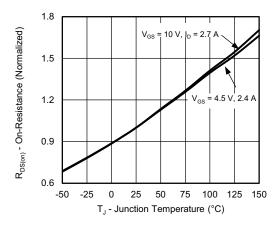
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

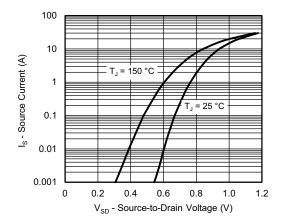


Gate Charge

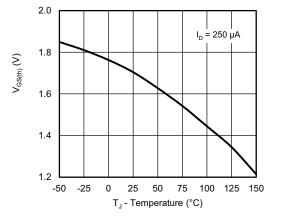


On-Resistance vs. Junction Temperature

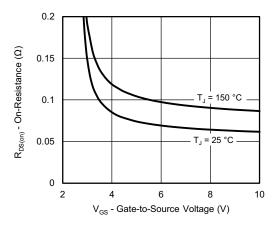




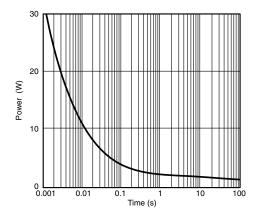
Source-Drain Diode Forward Voltage



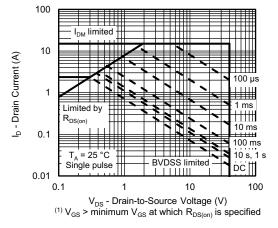
Threshold Voltage



On-Resistance vs. Gate-to-Source Voltage

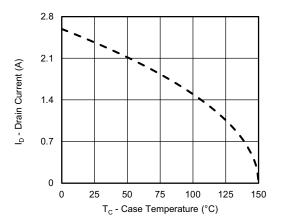


Single Pulse Power, Junction-to-Ambient

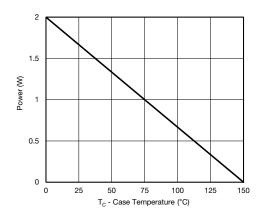


Safe Operating Area, Junction-to-Ambient

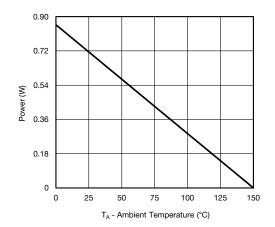




Current Derating a



Power, Junction-to-Case

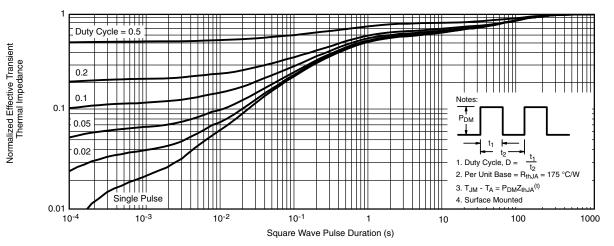


Power, Junction-to-Ambient

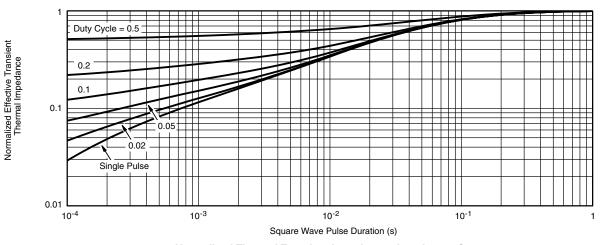
Note

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-Case

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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 PowerPAK® 8 x 8L Single



Dimensions in millimeters (inches)

Note

· Linear dimensions are in black, the same information is provided in ordinate dimensions which are in blue.



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