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Vishay Siliconix

Automotive N-Channel 40 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY				
V _{DS} (V)	40			
$R_{DS(on)}(\Omega)$ at $V_{GS} = 10 \text{ V}$	0.0032			
I _D (A)	100			
Configuration	Single			
Package	TO-252			



FEATURES

- TrenchFET® power MOSFET
- Package with low thermal resistance
- AEC-Q101 qualified
- 100 % R_a and UIS tested
- Material categorization: for definitions of compliance please see <u>www.vishay.com/doc?99912</u>



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N-Channel M	OSFET	S

ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)					
PARAMETER		SYMBOL	LIMIT	UNIT	
Drain-Source Voltage		V_{DS}	40		
Gate-Source Voltage		V_{GS}	± 20	V	
Continuous Drain Current	T _C = 25 °C ^a	- In -	100		
	T _C = 125 °C		92		
Continuous Source Current (Diode Conduction) ^a		I _S	100	Α	
Pulsed Drain Current ^b		I _{DM}	145		
Single Pulse Avalanche Current	L = 0.1 mH	I _{AS}	50		
Single Pulse Avalanche Energy	L=0.11IIII	E _{AS}	125	mJ	
Maximum Power Dissipation ^b	T _C = 25 °C	Ps	136	W	
	T _C = 125 °C		45]	
Operating Junction and Storage Temperature	re Range	T _J , T _{stg}	-55 to +175	°C	

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-Ambient	PCB Mount c	R_{thJA}	50	°C/W
Junction-to-Case (Drain)		R_{thJC}	1.1	C/VV

Notes

- a. Package limited.
- b. Pulse test; pulse width \leq 300 µs, duty cycle \leq 2 %.
- c. When mounted on 1" square PCB (FR4 material).



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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	
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} =	$V_{DS} = V_{GS}, I_D = 250 \mu A$		-	3.5	V	
Gate-Source Leakage	I _{GSS}	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$		-	-	± 100	nA	
		V _{GS} = 0 V	V _{DS} = 40 V	-	-	1		
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V	V _{DS} = 40 V, T _J = 125 °C	-	-	50	μΑ	
		V _{GS} = 0 V	V _{DS} = 40 V, T _J = 175 °C	-	-	250		
On-State Drain Current ^a	I _{D(on)}	V _{GS} = 10 V	$V_{DS} \ge 5 V$	50	-	-	Α	
		V _{GS} = 10 V	I _D = 30 A	-	0.00235	0.00320		
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V	I _D = 30 A, T _J = 125 °C		-	0.00460	Ω	
		V _{GS} = 10 V	I _D = 30 A, T _J = 175 °C	-	-	0.00540	İ	
Forward Transconductance b	9 _{fs}	V _{DS} = 15 V, I _D = 25 A		-	122	-	S	
Dynamic ^b								
Input Capacitance	C _{iss}			-	5465	7200		
Output Capacitance	C _{oss}	$V_{GS} = 0 V$	$V_{GS} = 0 \text{ V}$ $V_{DS} = 25 \text{ V}, f = 1 \text{ MHz}$		2825	3700	рF	
Reverse Transfer Capacitance	C _{rss}			_	210	300		
Total Gate Charge c	Qg			-	65	100		
Gate-Source Charge ^c	Q _{gs}	V _{GS} = 10 V	$V_{DS} = 20 \text{ V}, I_{D} = 50 \text{ A}$	-	22	-	nC	
Gate-Drain Charge ^c	Q _{gd}				7	-		
Gate Resistance	R_g	f = 1 MHz		0.7	1.49	2.3	Ω	
Turn-On Delay Time ^c	t _{d(on)}			-	15	25		
Rise Time ^c	t _r	$V_{DD} = 20 \text{ V}, \text{ R}_L = 0.4 \Omega$ $I_D \cong 50 \text{ A}, \text{ V}_{GEN} = 10 \text{ V}, \text{ R}_g = 1 \Omega$		-	19	30		
Turn-Off Delay Time c	t _{d(off)}			-	26	40	ns	
Fall Time ^c	t _f			-	10	15		
Source-Drain Diode Ratings and Char	acteristics b	•						
Pulsed Current ^a	I _{SM}			-	-	145	Α	
Forward Voltage	V_{SD}	I _F = 30 A, V _{GS} = 0 V		_	0.85	1.5	V	

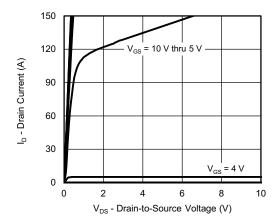
Notes

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

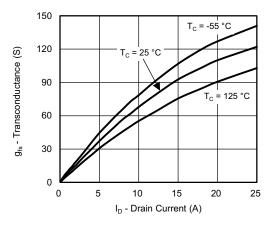
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



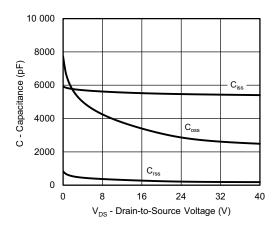
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



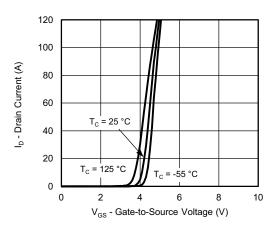
Output Characteristics



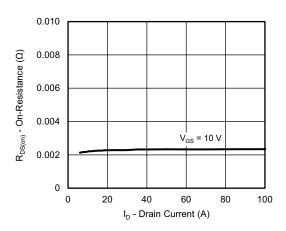
Transconductance



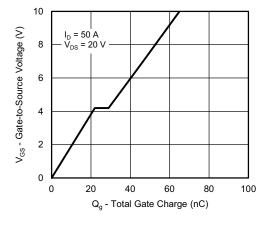
Capacitance



Transfer Characteristics



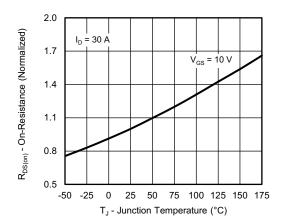
On-Resistance vs. Drain Current



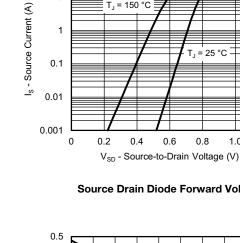
Gate Charge



TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



On-Resistance vs. Junction Temperature



100

10

T_{.1} = 150 °C

0.4

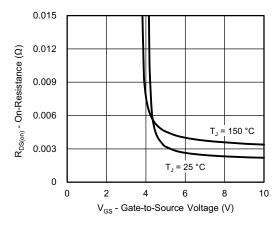
Source Drain Diode Forward Voltage

0.6

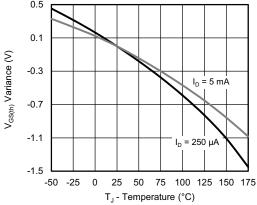
8.0

1.0

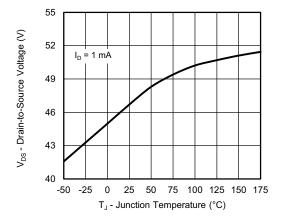
1.2



On-Resistance vs. Gate-to-Source Voltage



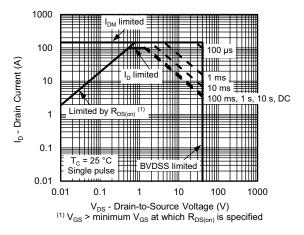
Threshold Voltage



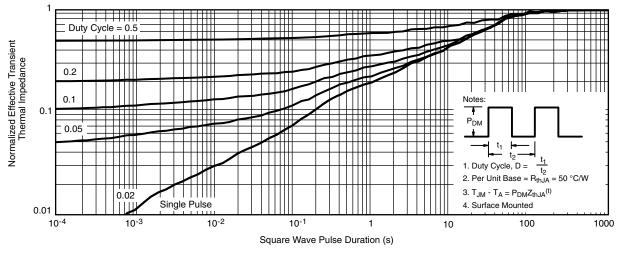
Drain Source Breakdown vs. Junction Temperature



THERMAL RATINGS ($T_A = 25$ °C, unless otherwise noted)



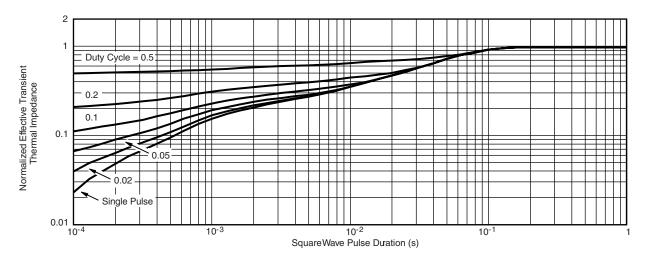
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



THERMAL RATINGS (T_A = 25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Case

Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction-to-Ambient (25 °C)
 - Normalized Transient Thermal Impedance Junction-to-Case (25 °C)

are given for general guidelines only to enable the user to get a "ball park" indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

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/ppg267155.





TO-252AA Case Outline





	MILLIN	METERS	INC	HES	
DIM.	MIN.	MAX.	MIN.	MAX.	
Α	2.18	2.38	0.086	0.094	
A1	-	0.127	-	0.005	
b	0.64	0.88	0.025	0.035	
b2	0.76	1.14	0.030	0.045	
b3	4.95	5.46	0.195	0.215	
С	0.46	0.61	0.018	0.024	
C2	0.46	0.89	0.018	0.035	
D	5.97	6.22	0.235	0.245	
D1	4.10	-	0.161	-	
Е	6.35	6.73	0.250	0.265	
E1	4.32	-	0.170	-	
Н	9.40	10.41	0.370	0.410	
е	2.28	BSC	0.090	BSC	
e1	4.56 BSC		0.180 BSC		
L	1.40	1.78	0.055	0.070	
L3	0.89	1.27	0.035	0.050	
L4	-	1.02	-	0.040	
L5	1.01	1.52	0.040	0.060	
ECN: T13-0592-Rev. A, 02-Sep-13					

DWG: 6019

Note

• Dimension L3 is for reference only.



RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)



Recommended Minimum Pads Dimensions in Inches/(mm)

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