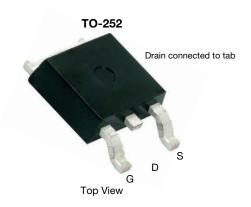


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Vishay Siliconix

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



PRODUCT SUMMARY					
V _{DS} (V)	-40				
$R_{DS(on)}(\Omega)$ at $V_{GS} = -10 \text{ V}$	0.0051				
$R_{DS(on)}(\Omega)$ at $V_{GS} = -4.5 \text{ V}$	0.0071				
I _D (A)	-100				
Configuration	Single				
Package	TO-252				

FEATURES

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



G O D	
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P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)					
PARAMETER		SYMBOL	LIMIT	UNIT	
Drain-source voltage		V_{DS}	-40	V	
Gate-source voltage		V_{GS}	± 20	V	
Continuous drain current	T _C = 25 °C ^a	L	-100		
	T _C = 125 °C	l _D	-60		
Continuous source current (diode conduction)	I _S	-97	Α		
Pulsed drain current ^b		I _{DM}	-300		
Single pulse avalanche current	L = 0.1 mH	I _{AS}	-41		
Single pulse avalanche energy	L = 0.1 111111	E _{AS}	84	mJ	
Maximum power dissipation ^b	T _C = 25 °C	Pn	107	W	
	T _C = 125 °C	r _D	35	VV	
Operating junction and storage temperature 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}	1.4	C/VV	

Notes

- a. Package limited
- b. Pulse test; pulse width $\leq 300~\mu\text{s},$ duty cycle $\leq 2~\%$
- c. When mounted on 1" square PCB (FR4 material)



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PARAMETER	SYMBOL	vise noted) TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static				L		l	
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 μA		-2.0	-2.5	V
Gate-source leakage	I _{GSS}	V _{DS} =	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$		-	± 100	nA
		$V_{GS} = 0 V$	V _{DS} = -40 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} ≥ -5 V	-50	-	-	Α
		V _{GS} = -10 V	I _D = -30 A	-	0.0042	0.0051	
Duning any una para state una interna a		V _{GS} = -10 V	I _D = -30 A, T _J = 125 °C	-	-	0.0079	
Drain-source on-state resistance a	R _{DS(on)}	V _{GS} = -10 V	I _D = -30 A, T _J = 175 °C	-	-	0.0094	Ω
		V _{GS} = -4.5 V	I _D = -25 A	-	0.0059	0.0071	
Forward transconductance b	9 _{fs}	V _{DS} :	= -30 V, I _D = 15 A	-	103	-	S
Dynamic ^b							
Input capacitance	C _{iss}			-	11 063	14 500	
Output capacitance	C _{oss}	$V_{GS} = 0 V$	V _{DS} = -25 V, f = 1 MHz	-	847	1100	pF
Reverse transfer capacitance	C _{rss}			-	757	1000	
Total Gate Charge ^c	Qg			-	185	280	
Gate-source charge ^c	Q _{gs}	V _{GS} = -10 V	$V_{DS} = -20 \text{ V}, I_{D} = -50 \text{ A}$	-	25	-	nC
Gate-drain charge ^c	Q _{gd}			-	30	-	
Gate resistance	R _g	f = 1 MHz		1.8	3.6	5.4	Ω
Turn-on delay time ^c	t _{d(on)}			-	15	25	
Rise time ^c	t _r	V _{DD} =	$=$ -20 V, R _L = 0.4 Ω	-	180	280	
Turn-off delay time ^c	t _{d(off)}	I _D ≅ -50 A,	$I_D \cong -50 \text{ A}, V_{GEN} = -10 \text{ V}, R_g = 1 \Omega$		145	220	ns
Fall time ^c	t _f	1		-	160	250	
Source-Drain Diode Ratings and Chara	acteristics b						
Pulsed current ^a	I _{SM}			-	-	-300	Α
Forward voltage	V_{SD}	I _F = -30 A, V _{GS} = 0 V		-	-0.84	-1.5	V
Body diode reverse recovery time	t _{rr}	I _F = -30 A, di/dt = 100 A/μs		-	59	120	ns
Body diode reverse recovery charge	Q _{rr}			-	90	180	nC
Reverse recovery fall time	t _a			-	32	-	
Reverse recovery rise time	t _b			-	27	-	ns
Body diode peak reverse recovery current	I _{RM(REC)}			-	-3.4	-	Α

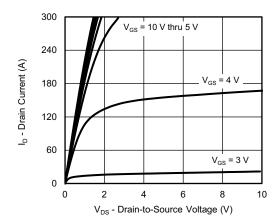
Notes

- 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

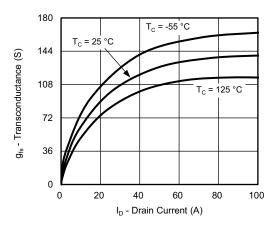
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



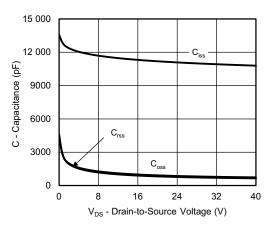
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



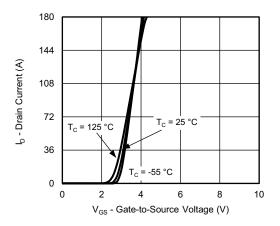
Output Characteristics



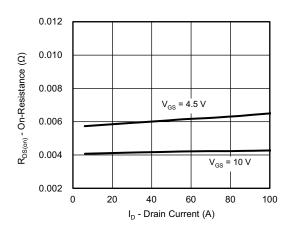
Transconductance



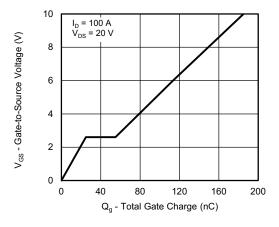
Capacitance



Transfer Characteristics



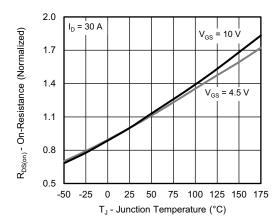
On-Resistance vs. Drain Current



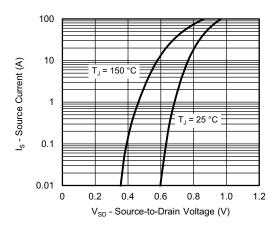
Gate Charge



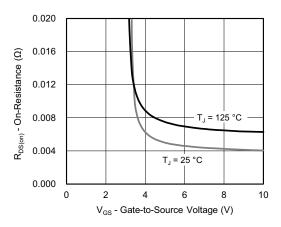
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



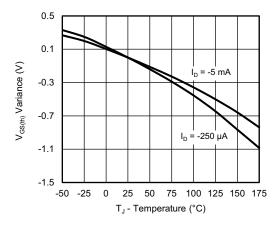
On-Resistance vs. Junction Temperature



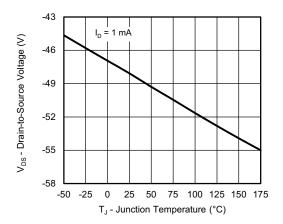
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



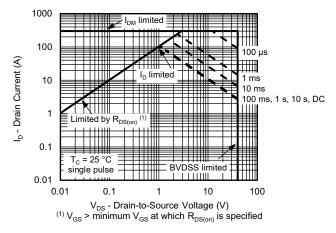
Threshold Voltage



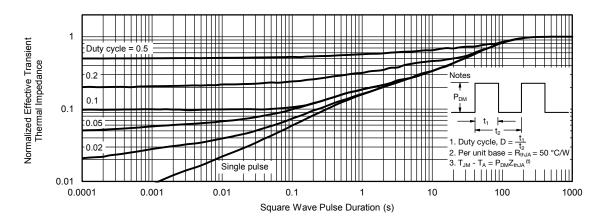
Drain Source Breakdown vs. Junction Temperature



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



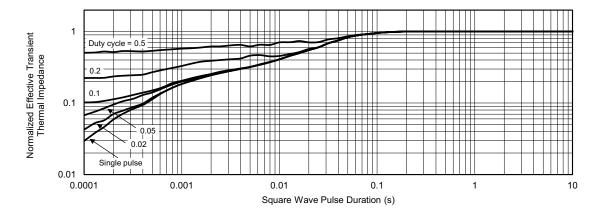
Safe Operating Area



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

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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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