SUP70101EL

www.vishay.com

Vishay Siliconix

S

TO-220AB

PRODUCT SUMMARY				
V _{DS} (V)	-100			
$R_{DS(on)}$ max. (Ω) at V_{GS} = -10 V	0.0101			
$R_{DS(on)}$ max. (Ω) at V_{GS} = -4.5 V	0.0150			
Q _g typ. (nC)	125			
I _D (A)	-120			
Configuration	Single			

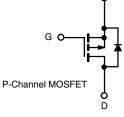
FEATURES

P-Channel 100 V (D-S) 175 °C MOSFET

- TrenchFET[®] power MOSFET
- · Package with low thermal resistance
- Maximum 175 °C junction temperature
- Low R_{DS(on)} minimizes power loss from conduction
 FREE
- · Compatible with logic-level gate driving
- 100 % R_g and UIS tested
- Material categorization: for definitions of compliance please see <u>www.vishay.com/doc?99912</u>

APPLICATIONS

- Battery protection
- Motor drive control
- Load switch



ORDERING INFORMATION	
Package	TO-220AB
Lead (Pb)-free and halogen-free	SUP70101EL-GE3

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °	°C, unless otherw	ise noted)			
PARAMETER		SYMBOL	LIMIT	UNIT	
Drain-source voltage		V _{DS}	-100	N	
Gate-source voltage		V _{GS}	± 20	V	
Continuous drain current ^d	T _C = 25 °C		-120		
(T _J = 175 °C)	T _C = 125 °C	I _D	-78		
Pulsed drain current (100 µs)	00 μs)		-240	A	
Avalanche current	L = 0.1 mH	I _{AS}	-75		
Single pulse avalanche energy ^a		E _{AS}	281	mJ	
Power dissipation	T_{C} = 25 °C °	Р	375	w	
	T _C = 125 °C ^b	- P _D	125] **	
Operating junction and storage temperature range		T _J , T _{stg}	-55 to +175	°C	

THERMAL RESISTANCE RATINGS					
PARAMETER		SYMBOL	TYPICAL	UNIT	
Junction-to-ambient	PCB mount ^b	R _{thJA}	40	°C/W	
Junction-to-case				0/10	

Notes

- a. Duty cycle \leq 1 %
- b. When mounted on 1" square PCB (FR4 material)
- c. See SOA curve for voltage derating
- d. Limited by package

1

RoHS

COMPLIANT

www.vishay.com

SUP70101EL

Vishay Siliconix

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Static							
Drain-source breakdown voltage	V _{DS}	V _{GS} = 0 V, I _D = -250 μA -100	-	-	V		
Gate threshold voltage	V _{GS(th)}	$V_{DS} = V_{GS}$, $I_D = -250 \ \mu A$	-1.5	-	-2.5	V	
Gate-body leakage	I _{GSS}	$V_{DS} = 0 V, V_{GS} = \pm 20 V$	-	-	± 100	nA	
Zero gate voltage drain current		$V_{DS} = -100 \text{ V}, \text{ V}_{GS} = 0 \text{ V}$	-	-	-1		
	I _{DSS}	V_{DS} = -100 V, V_{GS} = 0 V, T_{J} = 125 °C	-	-	-50	μA	
		V_{DS} = -100 V, V_{GS} = 0 V, T_{J} = 175 °C	-	-	-250	1	
On-state drain current ^a	I _{D(on)}	$V_{DS} \leq$ -5 V, V_{GS} = -10 V	-120	-	-	А	
Drain-source on-state resistance ^a	P	V _{GS} = -10 V, I _D = -30 A V _{GS} = -4.5 V, I _D = -20 A	-	0.0081	0.0101	Ω	
	R _{DS(on)}		-	0.0114	0.0150		
Forward transconductance ^a	g fs	V _{DS} = -15 V, I _D = -25 A	-	60	-	S	
Dynamic ^b							
Input capacitance	C _{iss}		-	7000	-	pF	
Output capacitance	C _{oss}	V_{GS} = 0 V, V_{DS} = -50 V, f = 1 MHz	-	2180	-		
Reverse transfer capacitance	C _{rss}		-	170	-		
Total gate charge ^c	Qg		-	125	190	nC	
Gate-source charge ^c	Q _{gs}	$V_{DS} = -50 \text{ V}, V_{GS} = -10 \text{ V}, I_D = -110 \text{ A}$	-	29	-		
Gate-drain charge ^c	Q _{gd}		-	30	-		
Gate resistance	Rg	f = 1 MHz	1.3	6.5	13	Ω	
Turn-on delay time ^c	t _{d(on)}		-	20	30		
Rise time ^c	t _r	$\begin{array}{l} V_{\text{DD}}=\text{-50 V},R_{\text{L}}=0.71\ \Omega\\ I_{\text{D}}\cong\text{-70 A},V_{\text{GEN}}=\text{-10 V},R_{\text{g}}=1\ \Omega \end{array}$	-	40	60	ne	
Turn-off delay time ^c	t _{d(off)}		-	110	200	ns	
Fall time ^c	t _f		-	40	60		
Drain-Source Body Diode Characte	ristics (T _C = 25	5 °C ^b)					
Continuous current	Is		-	-	-110	A	
Pulsed current	I _{SM}		-	-	-240	~	
Forward voltage ^a	V _{SD}	$I_F = -85 \text{ A}, V_{GS} = 0 \text{ V}$	-	-1	-1.5	V	
Reverse recovery time	t _{rr}	I _F = -85 A, dl/dt = 100 A/μs	-	110	170	ns	
Peak reverse recovery charge	I _{RM(REC)}		-	-7	-11	А	
Reverse recovery charge	Q _{rr}		-	0.38	0.57	μC	

Notes

a. Pulse test; pulse width \leq 300 µs, 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.

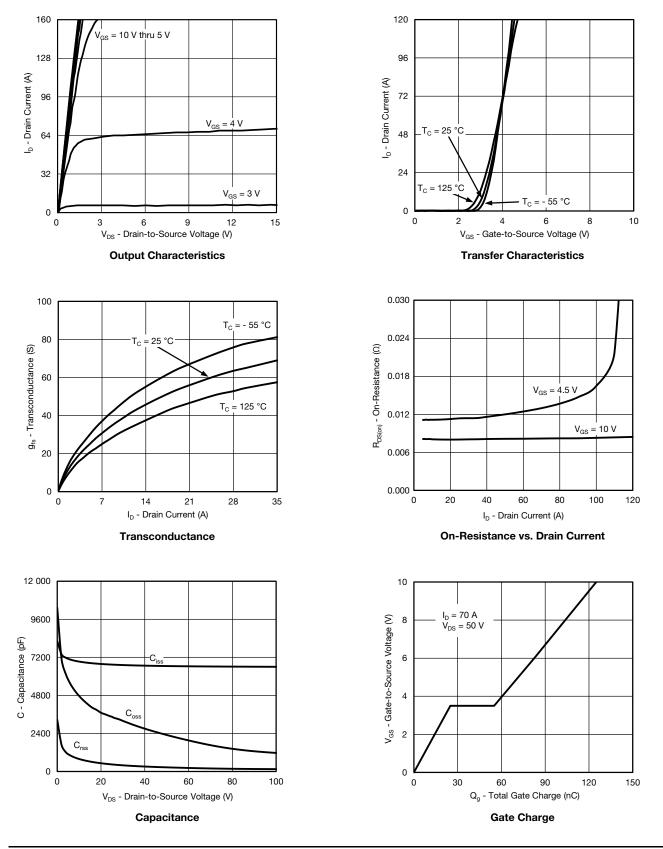
2



SUP70101EL

Vishay Siliconix

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



S17-0257-Rev. A, 20-Feb-17

3

Document Number: 77632

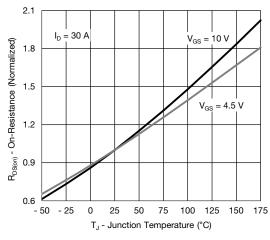
For technical questions, contact: <u>pmostechsupport@vishay.com</u> THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT <u>www.vishay.com/doc?91000</u>



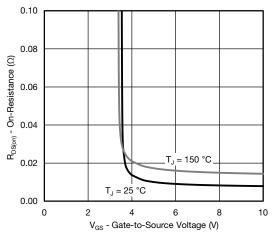
SUP70101EL

Vishay Siliconix

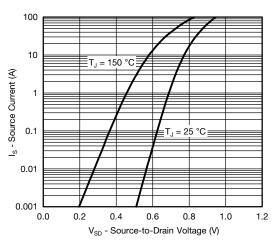
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



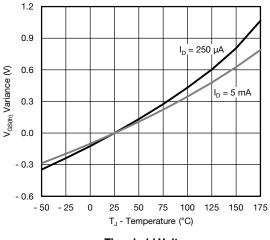
On-Resistance vs. Junction Temperature



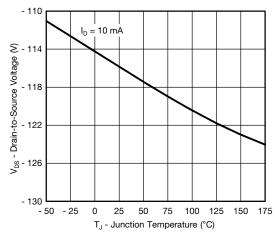
On-Resistance vs. Gate-to-Source Voltage



Source Drain Diode Forward Voltage







Drain Source Breakdown vs. Junction Temperature

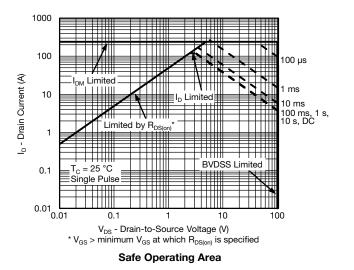
4

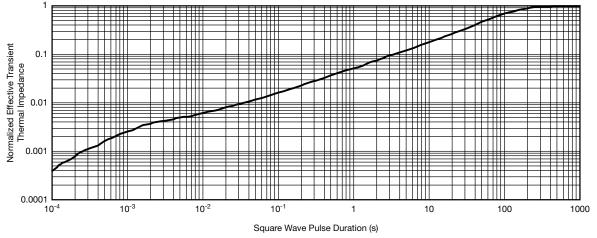
For technical questions, contact: <u>pmostechsupport@vishay.com</u> THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT <u>www.vishay.com/doc?91000</u>



Vishay Siliconix

THERMAL RATINGS ($T_A = 25 \text{ °C}$, unless otherwise noted)





Normalized Thermal Transient Impedance, Junction-to-Ambient

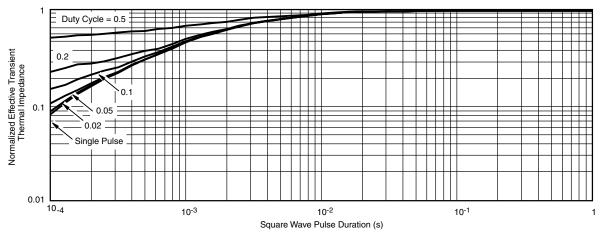




Vishay Siliconix

Document Number: 77632

THERMAL RATINGS ($T_A = 25 \text{ °C}$, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Case

Note

• The characteristics shown in the two graphs

S17-0257-Rev. A, 20-Feb-17

- 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/ppg?77632.

6



Vishay

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.