P-Channel 40-V (D-S) 175 °C MOSFET

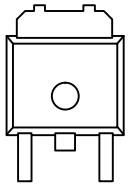
PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
- 40	0.013 at V_{GS} = - 10 V	- 60[a]
	0.022 at V_{GS} = - 4.5 V	- 48

FEATURES

- TrenchFET® Power MOSFET
- 175 °C Junction Temperature

RoHS COMPLIANT

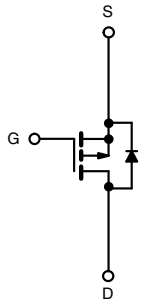
TO-252



G D S

Top View

Drain Connected to Tab



P-Channel MOSFET

Ordering Information: SUD50P04-13L-E3 (Lead (Pb)-free)

ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-Source Voltage		V_{DS}	- 40	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current[b]	T_C = 25 °C	I_D	- 60[c]	
	T_C = 100 °C		- 43	
Pulsed Drain Current		I_{DM}	- 100	
Continuous Source Current (Diode Conduction)		I_S	- 60[c]	
Avalanche Current	L = 0.1 mH	I_{AS}	- 40	
Avalanche Energy,		E_{AS}	80	mJ
Maximum Power Dissipation[b]	T_C = 25 °C	P_D	93.7[b]	W
	T_A = 25 °C		3[a]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS					
Parameter		**Symbol**	**Typical**	**Maximum**	**Unit**
Maximum Junction-to-Ambient[a]	t ≤ 10 sec	R_{thJA}	15	18	°C/W
	Steady State		40	50	
Maximum Junction-to-Case (Drain)		R_{thJC}	1.3	1.8	

Notes:

a. Surface Mounted on 1" x 1" FR4 board.

b. See SOA curve for voltage derating.

b. Calculated based on maximum allowed Junction Temperature. Package limitation current is 50 A.

SPECIFICATIONS T_J = 25 °C, unless otherwise noted						
Parameter	**Symbol**	**Test Conditions**	**Min**	**Typ**	**Max**	**Unit**
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = - 250 µA	- 40			V
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = - 250 µA	- 1.0		- 3.0	
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = - 40 V, V_{GS} = 0 V			- 1	µA
		V_{DS} = - 40 V, V_{GS} = 0 V, T_J = 125 °C			- 50	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} ≤ - 5 V, V_{GS} = - 10 V	- 50			A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = - 10 V, I_D = - 30 A		0.0105	0.013	Ω
		V_{GS} = - 10 V, I_D = - 30 A, T_J = 125 °C			0.020	
		V_{GS} = - 4.5 V, I_D = - 20 A		0.017	0.022	
Forward Transconductance[a]	g_{fs}	V_{DS} = - 15 V, I_D = - 30 A	15			S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = - 25 V, V_{GS} = 0 V, f = 1 MHz		3120		pF
Output Capacitance	C_{oss}			440		
Reverse Transfer Capacitance	C_{rss}			320		
Gate Resistance	R_g	f = 1 MHz		4.3		Ω
Total Gate Charge[c]	Q_g	V_{DS} = - 20 V, V_{GS} = - 10 V, I_D = - 50 A		63	95	nC
Gate-Source Charge[c]	Q_{gs}			13		
Gate-Drain Charge[c]	Q_{gd}			16		
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = - 20 V, R_L = 0.4 Ω I_D ≅ - 50 A, V_{GEN} = - 10 V, R_g = 2.5 Ω		15	25	ns
Rise Time[c]	t_r			18	30	
Turn-Off Delay Time[c]	$t_{d(off)}$			60	90	
Fall Time[c]	t_f			47	70	
Drain-Source Body Diode Characteristics						
Pulse Current	I_{SM}				- 100	
Forward Voltage[a]	V_{SD}	I_F = - 50 A, V_{GS} = 0 V		- 1.0	- 1.5	V
Source-Drain Reverse Recovery Time	t_{rr}	I_F = - 50 A, di/dT = 100 A/µs		36	55	ns

Notes:

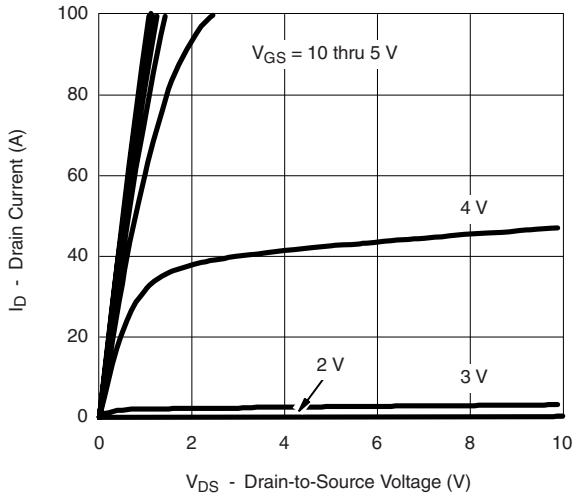
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.

b. Guaranteed by design, not subject to production testing.

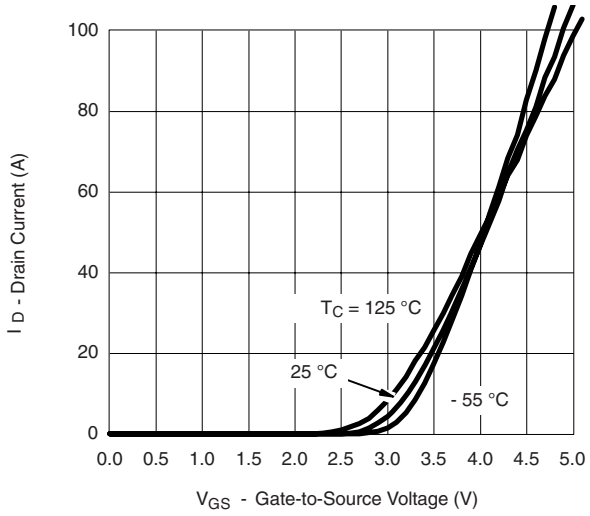
c. Independent of operating temperature.

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.

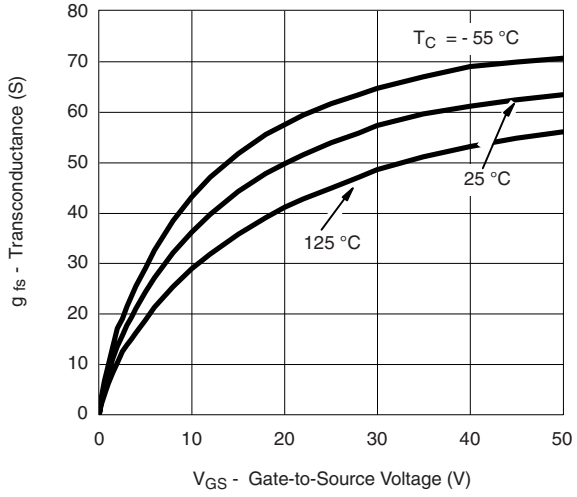
TYPICAL CHARACTERISTICS 25 °C unless noted



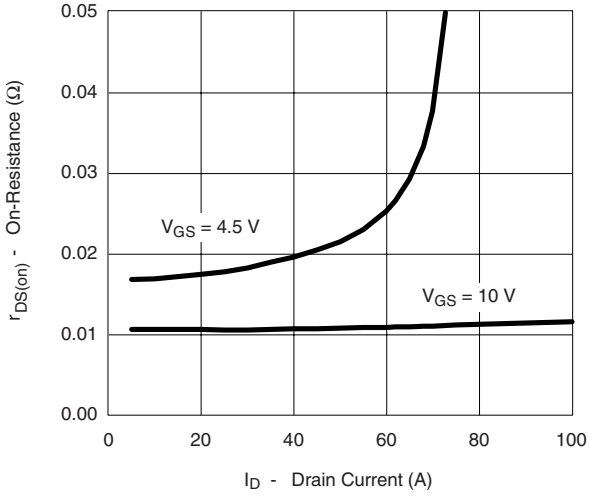
Output Characteristics



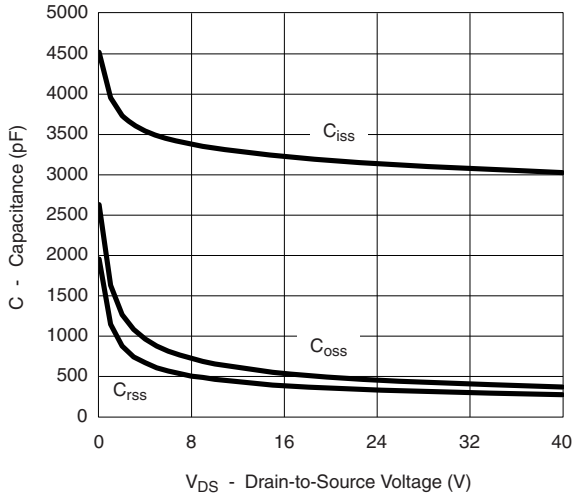
Transfer Characteristics



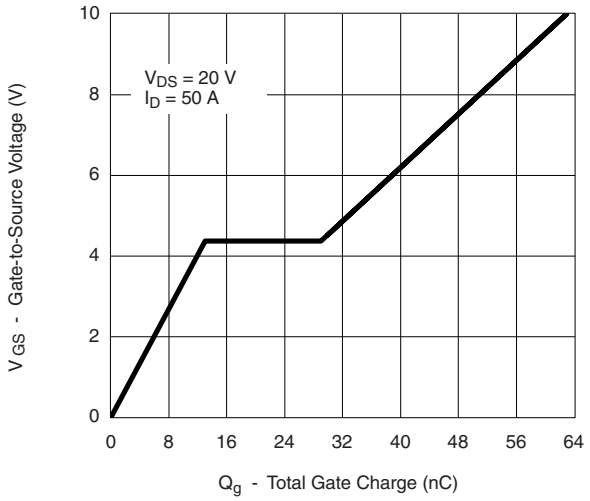
Transconductance



On-Resistance vs. Drain Current

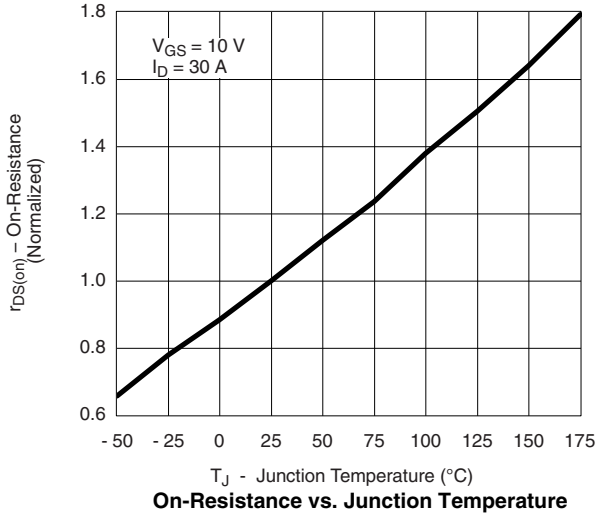


Capacitance

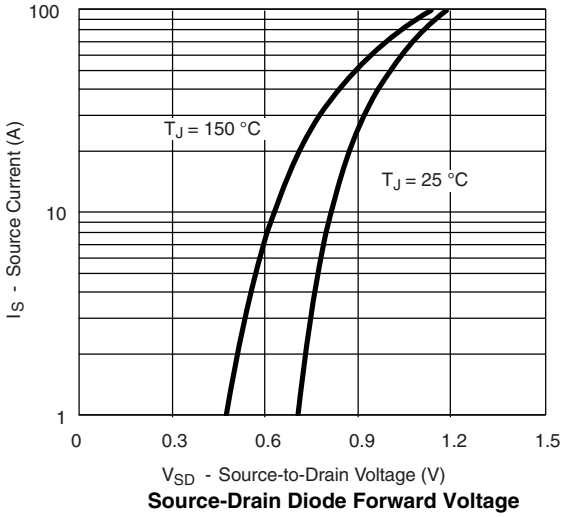


Gate Charge

TYPICAL CHARACTERISTICS 25 °C unless noted

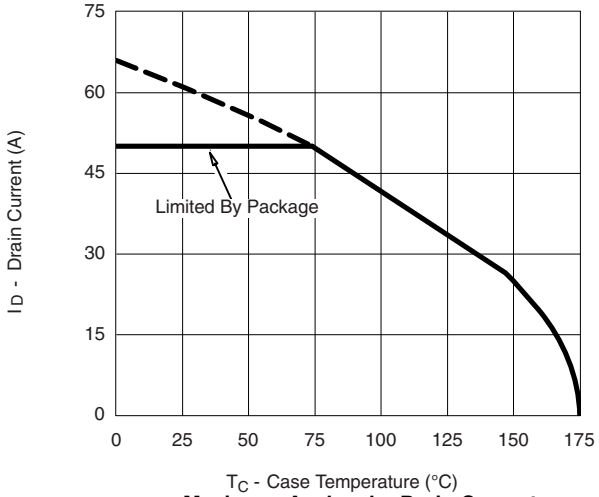


On-Resistance vs. Junction Temperature

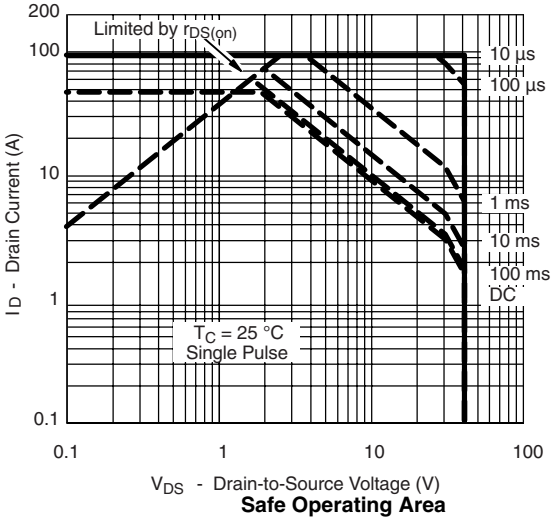


Source-Drain Diode Forward Voltage

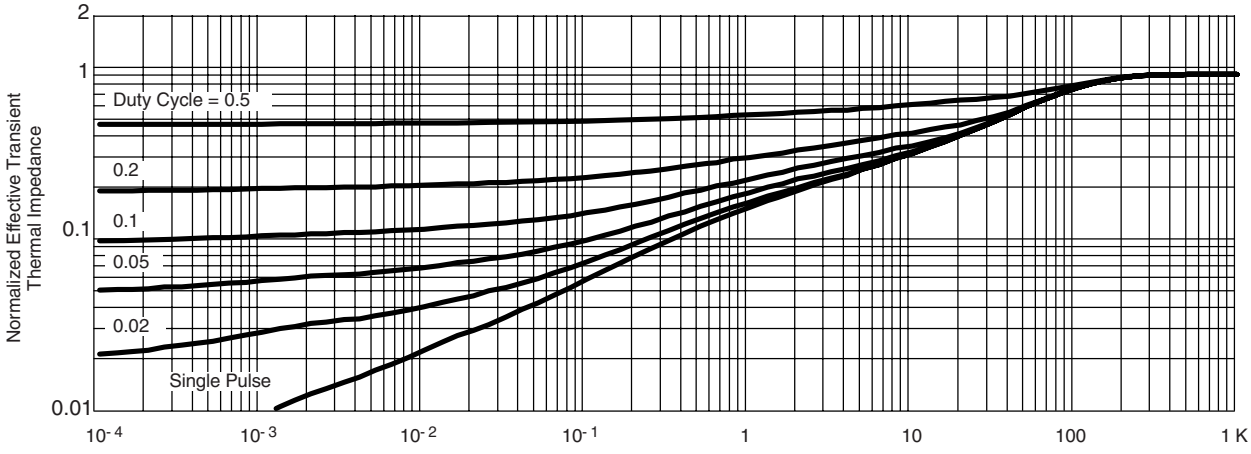
THERMAL RATINGS



Maximum Avalanche Drain Current vs. Case Temperature

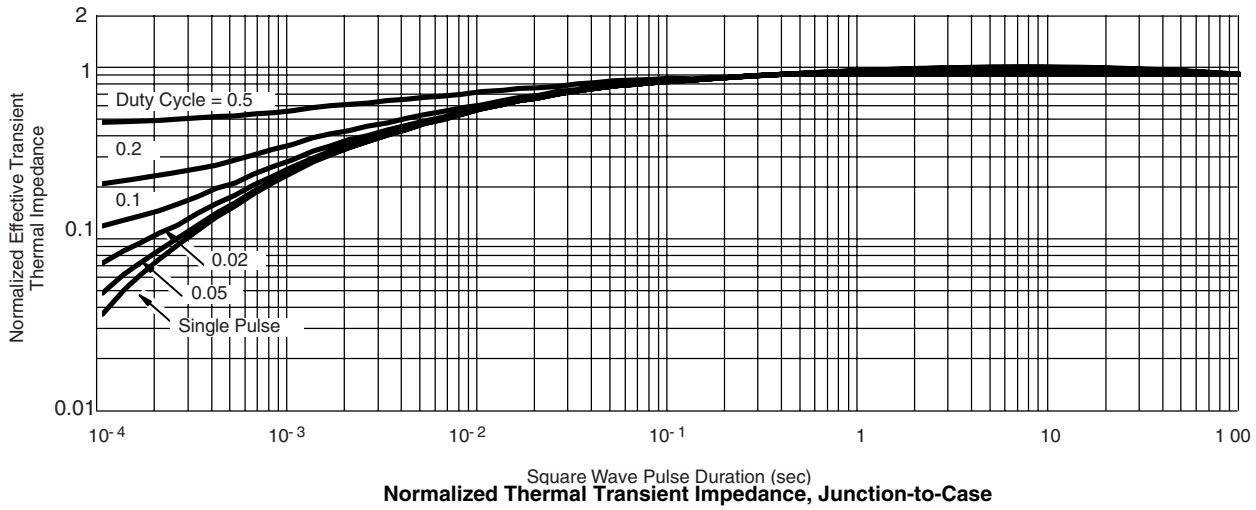


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

THERMAL RATINGS



Normalized Thermal Transient Impedance, Junction-to-Case

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 http://www.vishay.com/ppg?73009

Disclaimer

All product specifications and data are subject to change without notice.

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 herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

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.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.