P-Channel 40 V (D-S), 175 °C MOSFET

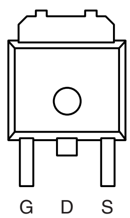
PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[d]
- 40	0.0094 at V_{GS} = - 10 V	- 50
	0.0145 at V_{GS} = - 4.5 V	- 50

FEATURES

- TrenchFET® Power MOSFETs
- 175 °C Junction Temperature
- Compliant to RoHS Directive 2002/95/EC

RoHS
COMPLIANT

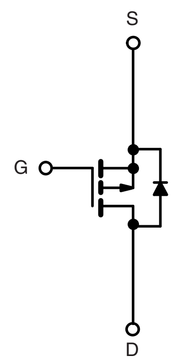
TO-252



Drain Connected to Tab

Top View

Ordering Information: SUD50P04-09L-E3 (Lead (Pb)-free)



P-Channel MOSFET

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 (T_J = 175 °C)	T_C = 25 °C	I_D	- 50[d]	A
	T_C = 125 °C		- 50[d]	
Pulsed Drain Current		I_{DM}	- 100	
Avalanche Current		I_{AS}	- 50	
Single Avalanche Energy[a]	L = 0.1 mH	E_{AS}	125	mJ
Power Dissipation	T_C = 25 °C	P_D	136[c]	W
	T_A = 25 °C		3[b, c]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS					
Parameter		**Symbol**	**Typical**	**Maximum**	**Unit**
Junction-to-Ambient[b]	t ≤ 10 s	R_{thJA}	15	18	°C/W
	Steady State		40	50	
Junction-to-Case		R_{thJC}	0.82	1.1	

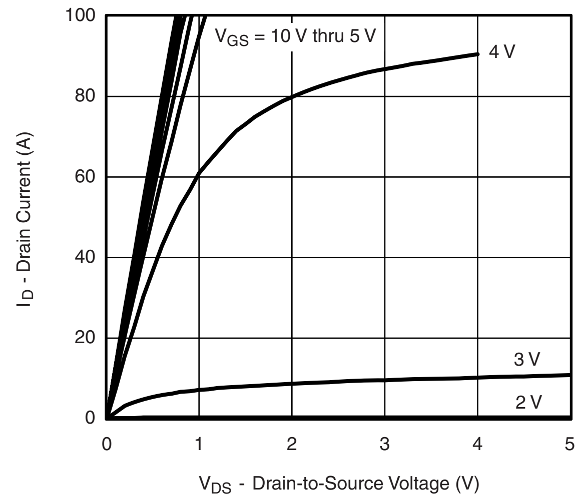
Notes:
a. Duty cycle ≤ 1 %.
b. When mounted on 1" square PCB (FR-4 material).
c. See SOA curve for voltage derating.
d. Package limited.

SPECIFICATIONS T_J = 25 °C, unless otherwise noted						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = - 250 µA	- 40			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = - 250 µA	- 1		- 3	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = - 32 V, V_{GS} = 0 V			- 1	µA
		V_{DS} = - 32 V, V_{GS} = 0 V, T_J = 125 °C			- 50	
		V_{DS} = - 32 V, V_{GS} = 0 V, T_J = 175 °C			- 150	
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 = - 24 A		0.0075	0.0094	Ω
		V_{GS} = - 10 V, I_D = - 50 A, T_J = 125 °C			0.014	
		V_{GS} = - 10 V, I_D = - 50 A, T_J = 175 °C			0.017	
		V_{GS} = - 4.5 V, I_D = - 18 A		0.0115	0.0145	
Forward Transconductance[a]	g_{fs}	V_{DS} = - 5 V, I_D = - 24 A		73		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = - 25 V, f = 1 MHz		4800		pF
Output Capacitance	C_{oss}			700		
Reverse Transfer Capacitance	C_{rss}			550		
Total Gate Charge[c]	Q_g	V_{DS} = - 20 V, V_{GS} = - 10 V, I_D = - 50 A		102	150	nC
Gate-Source Charge[c]	Q_{gs}			18.5		
Gate-Drain Charge[c]	Q_{gd}			27		
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = - 20 V, R_L = 0.4 Ω $I_D \cong$ - 50 A, V_{GEN} = - 10 V, R_g = 6 Ω		10	15	ns
Rise Time[c]	t_r			60	90	
Turn-Off Delay Time[c]	$t_{d(off)}$			145	220	
Fall Time[c]	t_f			140	220	
Source Drain-Diode Ratings and Characteristics T_C = 25 °C[b]						
Continuous Current	I_S				- 50	A
Pulsed Current	I_{SM}				- 100	
Forward Voltage[a]	V_{SD}	I_F = - 50 A, V_{GS} = 0 V		- 1.0	- 1.5	V
Reverse Recovery Time	t_{rr}	I_F = - 50 A, dI/dt = 100 A/µs		55	85	ns

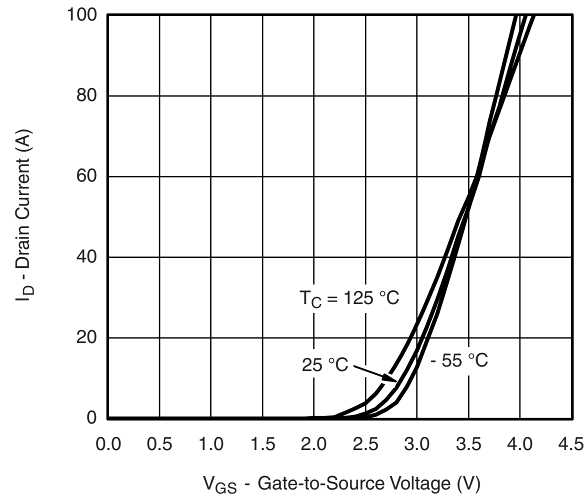
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

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.

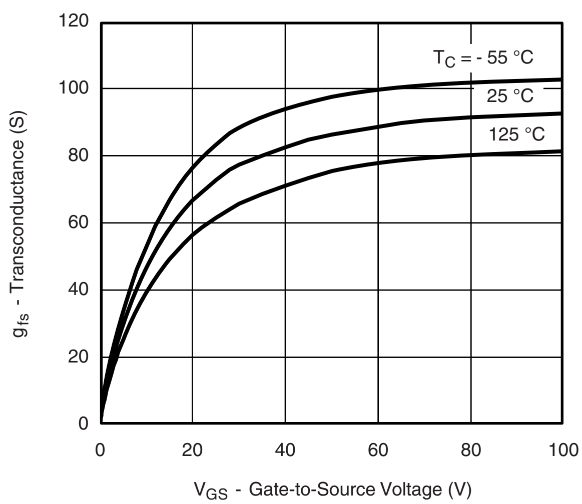
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



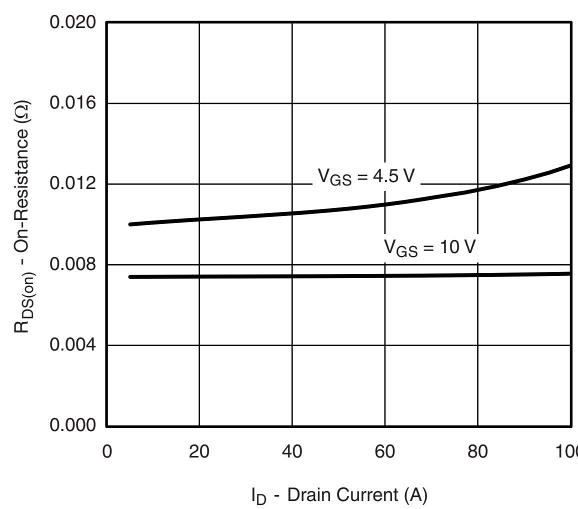
Output Characteristics



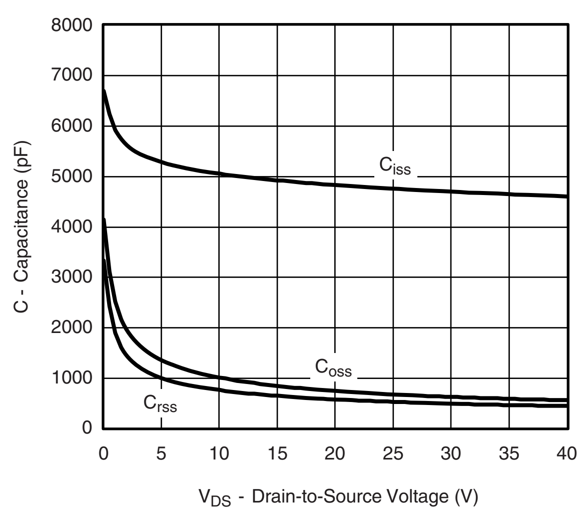
Transfer Characteristics



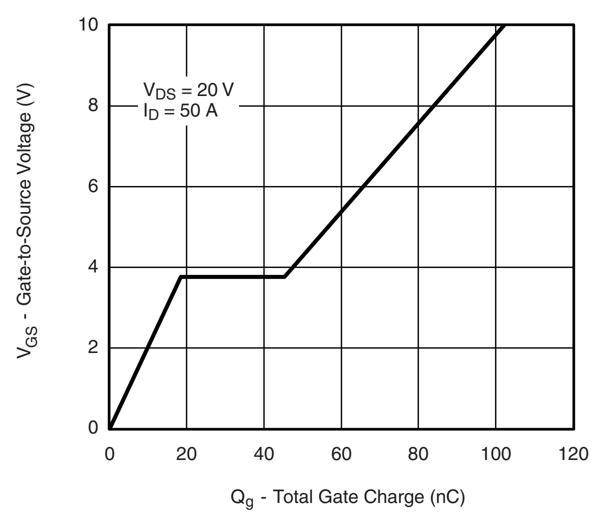
Transconductance



On-Resistance vs. Drain Current

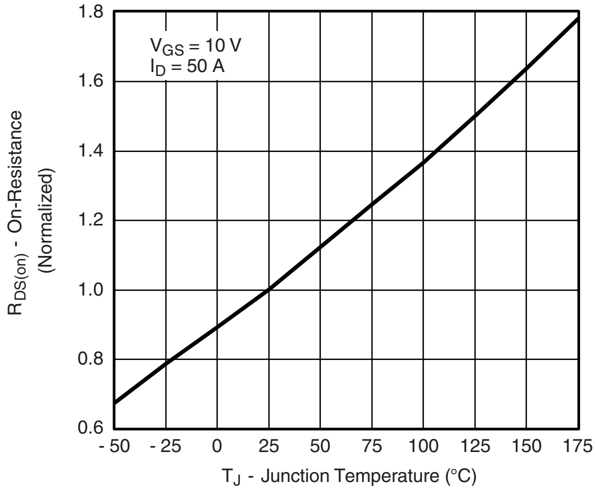


Capacitance

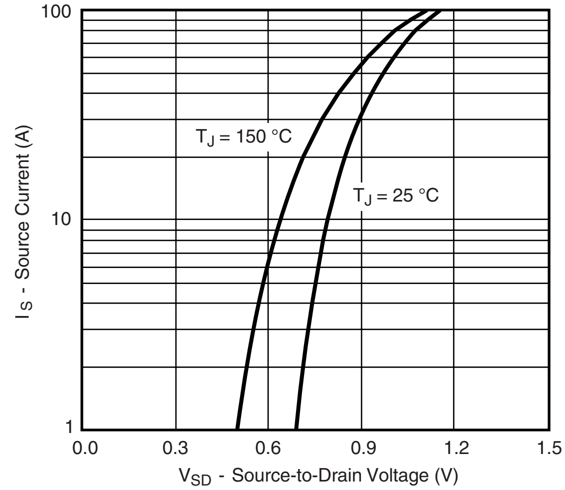


Gate Charge

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

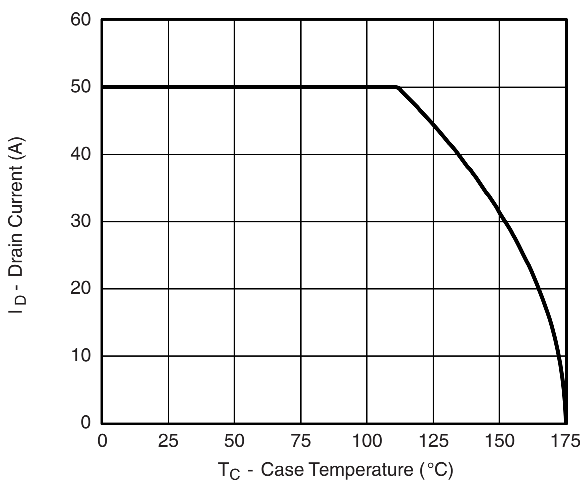


On-Resistance vs. Junction Temperature

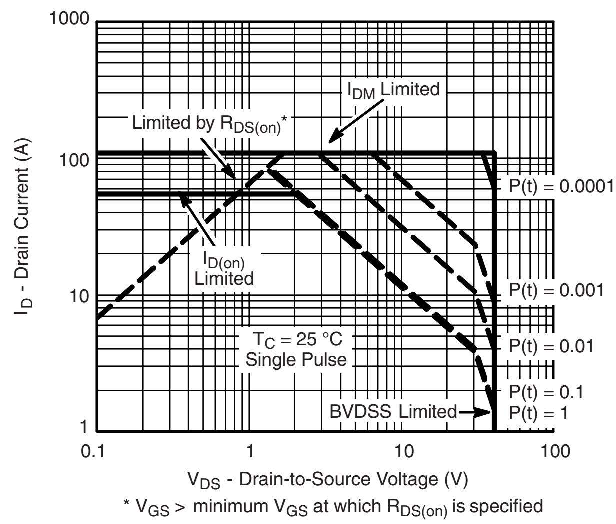


Source-Drain Diode Forward Voltage

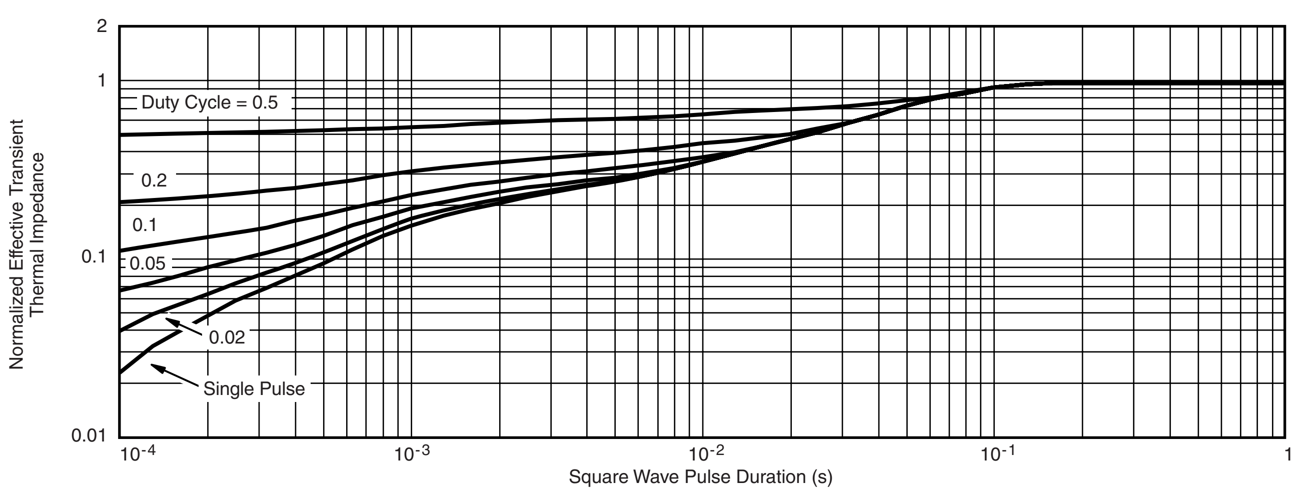
THERMAL RATINGS



Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

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