

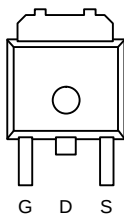


P-Channel 40-V (D-S), 175°C MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A) ^d
-40	0.0094 @ $V_{GS} = -10$ V	-50
	0.0145 @ $V_{GS} = -4.5$ V	-50

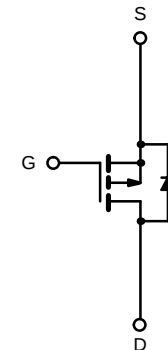
TO-252



Top View

Drain Connected to Tab

Ordering Information: SUD50P04-09L



P-Channel MOSFET

FEATURES

- TrenchFET® Power MOSFET
- 175°C Junction Temperature

APPLICATIONS

- Automotive 12-V Boardnet

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	-40	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current ($T_J = 175^\circ\text{C}$)	$T_C = 25^\circ\text{C}$	I_D	-50 ^d	A
	$T_C = 125^\circ\text{C}$		-50 ^d	
Pulsed Drain Current		I_{DM}	-100	
Avalanche Current		I_{AR}	-50	
Repetitive Avalanche Energy ^a	$L = 0.1$ mH	E_{AR}	125	mJ
Power Dissipation	$T_C = 25^\circ\text{C}$	P_D	136 ^c	W
	$T_A = 25^\circ\text{C}$		3 ^{b, c}	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 175	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient ^b	$t \leq 10$ sec	R_{thJA}	15	18	$^\circ\text{C/W}$
	Steady State		40	50	
Junction-to-Case		R_{thJC}	0.82	1.1	

Notes:

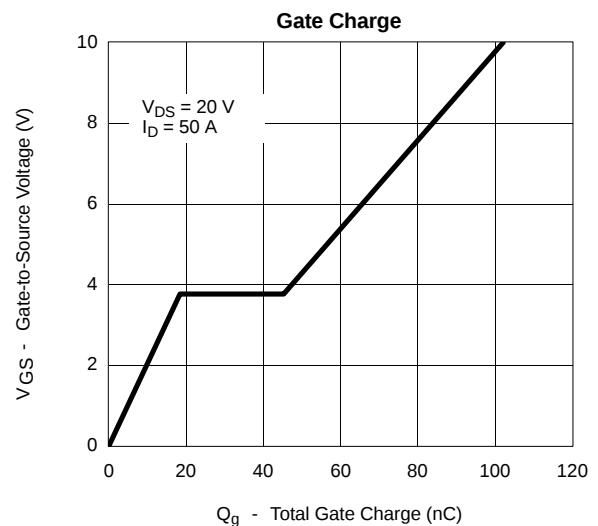
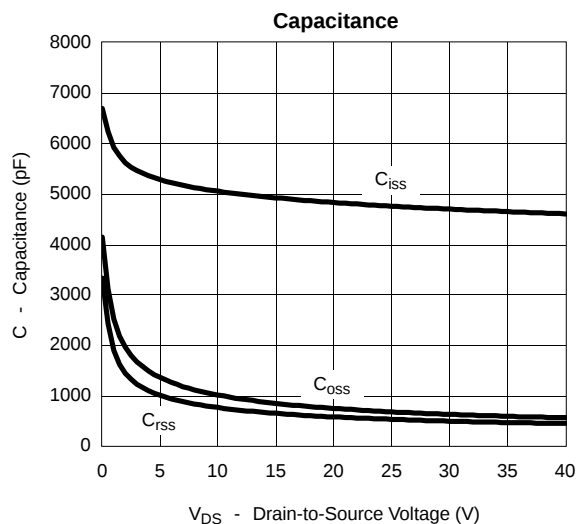
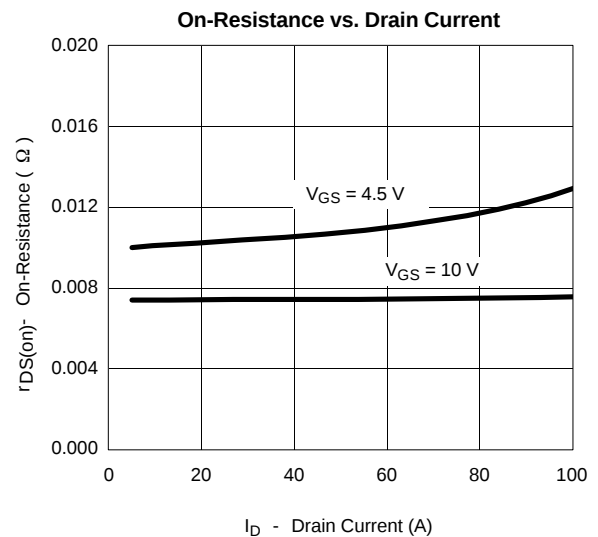
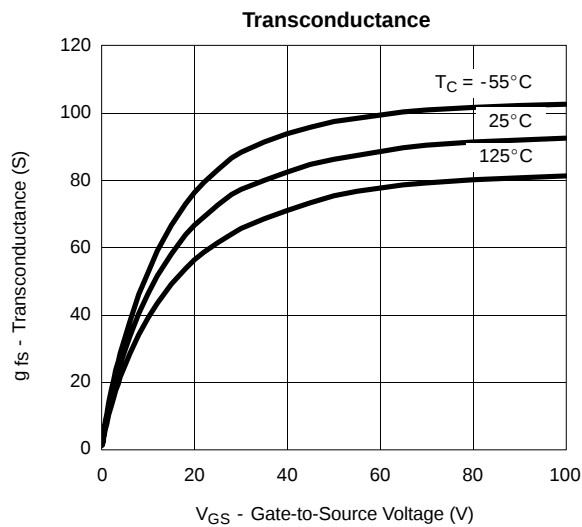
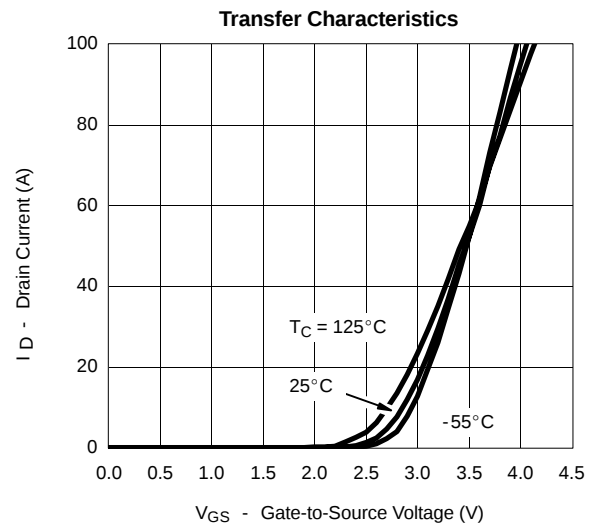
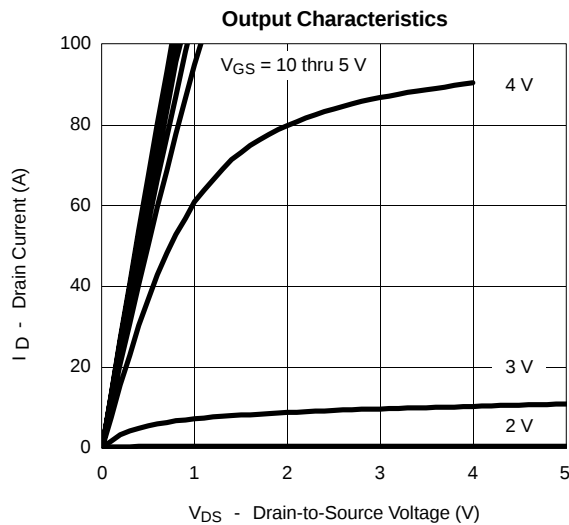
- Duty cycle $\leq 1\%$.
- When mounted on 1" square PCB (FR-4 material).
- See SOA curve for voltage derating.
- Package limited.

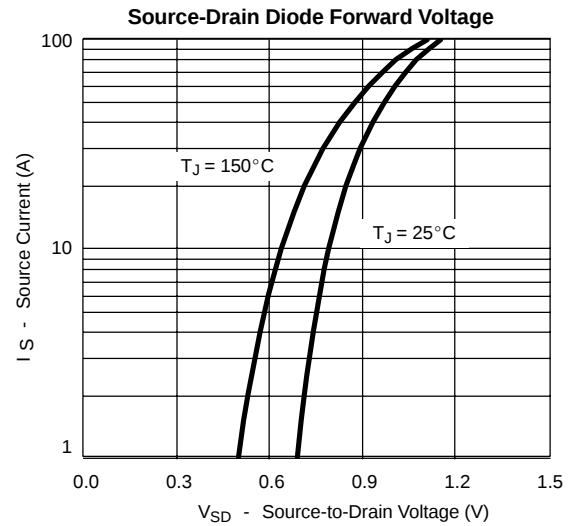
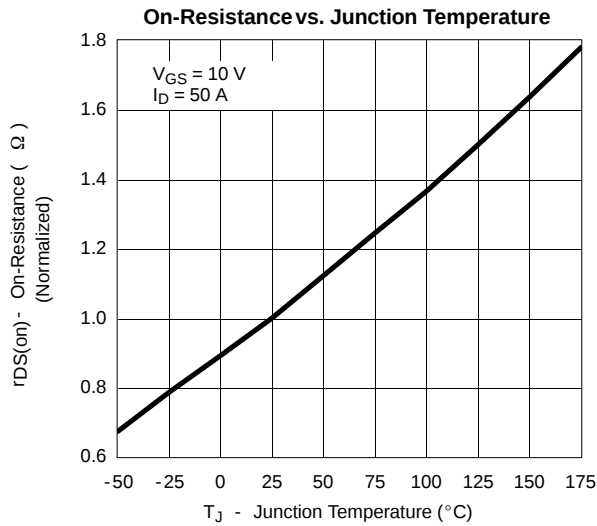
SPECIFICATIONS ($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	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		
Reversen 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 ≈ -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:

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

**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**

TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**THERMAL RATINGS**