

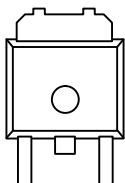


N-Channel 22-V (D-S) 175°C MOSFET

PRODUCT SUMMARY

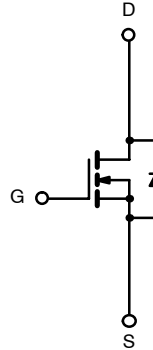
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A) ^d
24°C	0.0095 @ $V_{GS} = 10$ V	49
	0.017 @ $V_{GS} = 4.5$ V	36

TO-252



Top View

Drain Connected to Tab



N-Channel MOSFET

FEATURES

- TrenchFET® Power MOSFET
- 175°C Junction Temperature
- PWM Optimized for High Efficiency

APPLICATIONS

- High-Side Synchronous Buck DC/DC Conversion
 - Desktop
 - Server

Ordering Information: SUD50N024-09P
SUD50N024-09P—E3 (Lead Free)

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

Parameter		Symbol	Limit	Unit
Drain-Source Pulse Voltage		$V_{DS(pulse)}$	24°C	V
Drain-Source Voltage		V_{DS}	22	
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current ^a	$T_C = 25^\circ\text{C}$	I_D	49 ^d	A
	$T_C = 100^\circ\text{C}$		34 ^d	
Pulsed Drain Current		I_{DM}	100	
Continuous Source Current (Diode Conduction) ^a		I_S	4.3	
Avalanche Current, Single Pulse	$L = 0.1$ mH	I_{AS}	29	mJ
Avalanche Energy, Single Pulse		E_{AS}	42	
Maximum Power Dissipation	$T_A = 25^\circ\text{C}$	P_D	6.5 ^a	W
	$T_C = 25^\circ\text{C}$		39.5	
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	$t \leq 10$ sec	R_{thJA}	19	23	°C/W
	Steady State		40	50	
Maximum Junction-to-Case		R_{thJC}	3.1	3.8	

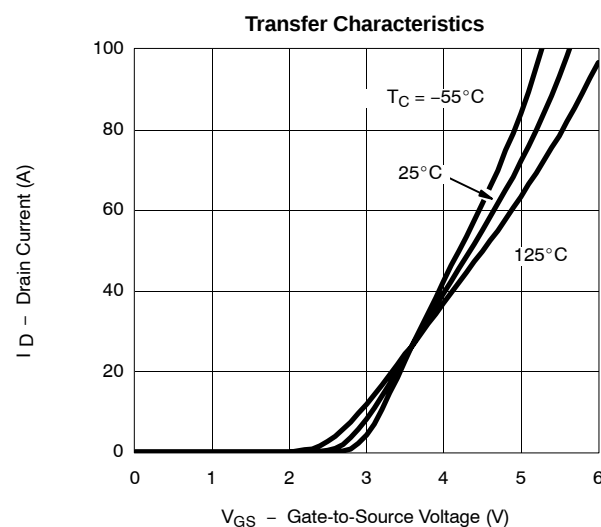
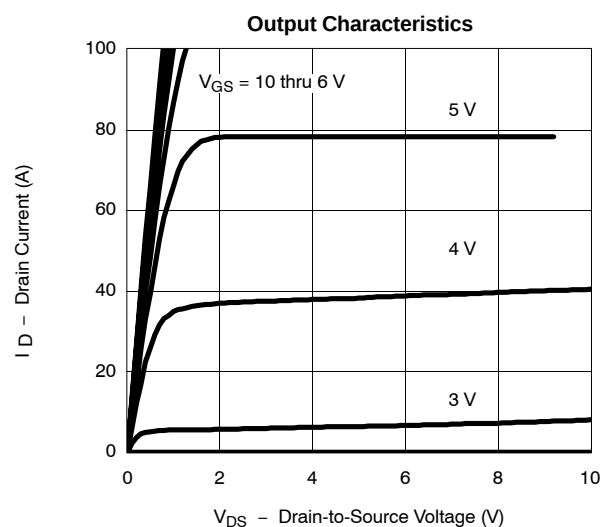
Notes

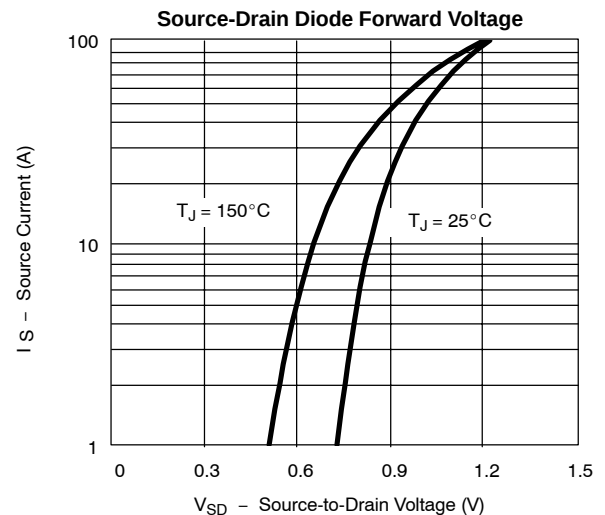
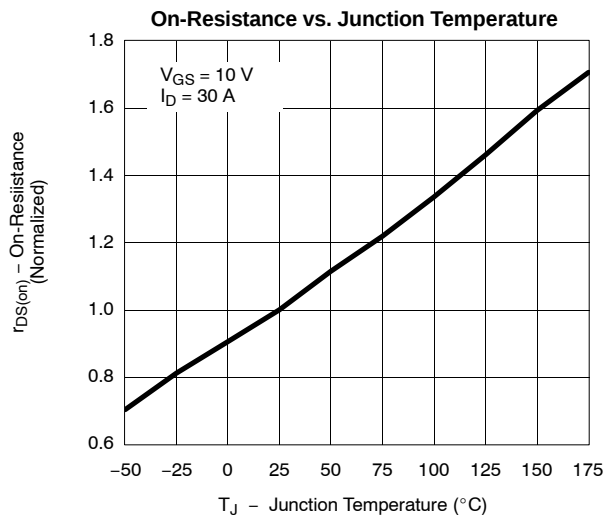
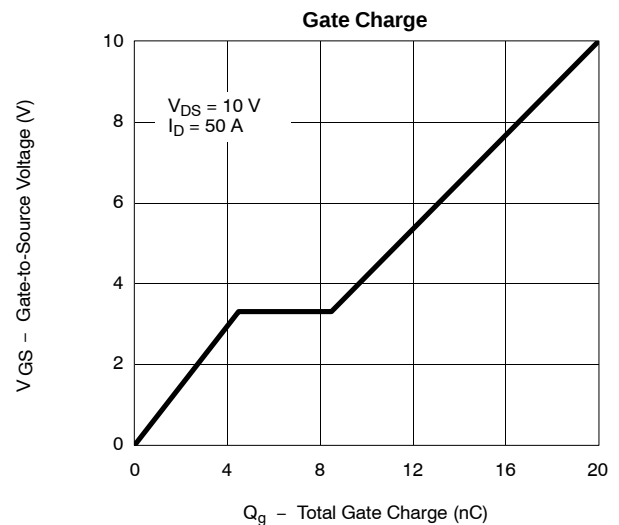
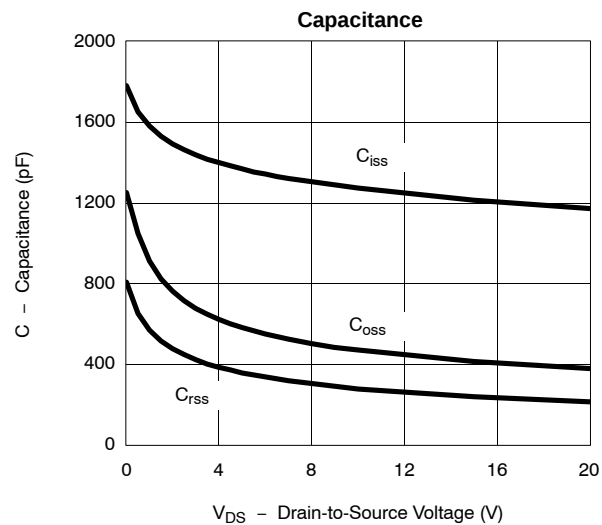
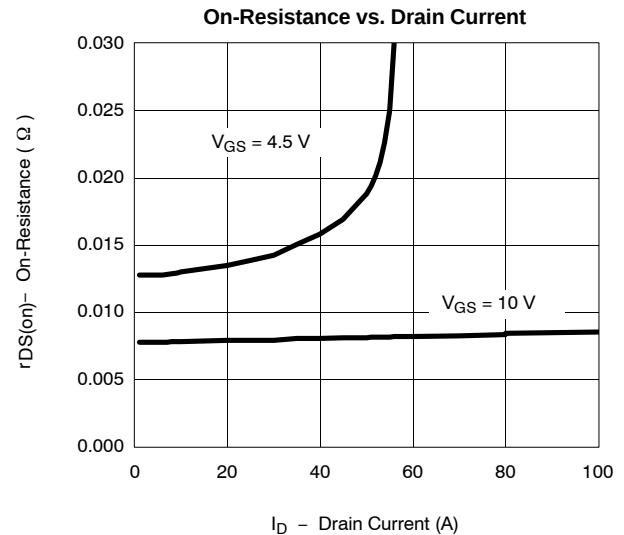
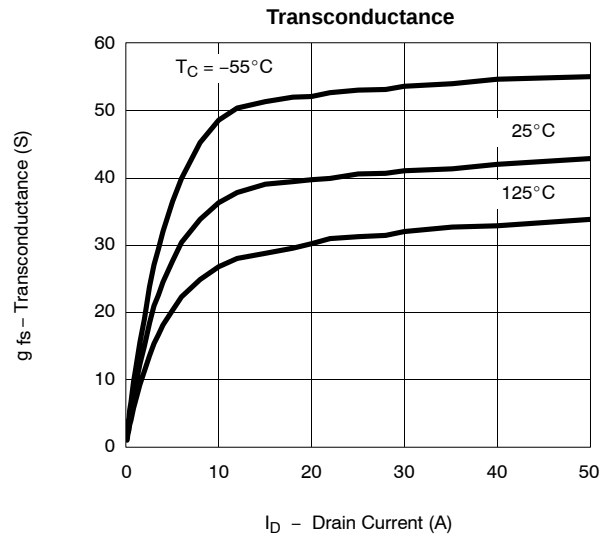
- a. Surface Mounted on FR4 Board, $t \leq 10$ sec.
b. Limited by package
c. Pulse condition: $T_A = 105^\circ\text{C}$, 50 ns, 300 kHz operation
d. Calculation based on maximum allowable Junction Temperature. Package limitation current is 25 A.

SPECIFICATIONS (T _J = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ ^a	Max	Unit
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 250 μA	22			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.8		3.0	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V			1	μA
		V _{DS} = 20 V, V _{GS} = 0 V, T _J = 125 °C			50	
On-State Drain Current ^b	I _{D(on)}	V _{DS} = 5 V, V _{GS} = 10 V	50			A
Drain-Source On-State Resistance ^b	r _{DS(on)}	V _{GS} = 10 V, I _D = 20 A		0.008	0.0095	Ω
		V _{GS} = 10 V, I _D = 20 A, T _J = 125 °C			0.014	
		V _{GS} = 4.5 V, I _D = 20 A		0.0135	0.017	
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 20 A	15			S
Dynamic ^a						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 10 V, f = 1 MHz		1300		pF
Output Capacitance	C _{oss}			470		
Reverse Transfer Capacitance	C _{rss}			275		
Gate Resistance	R _g		1.6	4.0	6	Ω
Total Gate Charge ^c	Q _g	V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 50 A		10.5	16	nC
Gate-Source Charge ^c	Q _{gs}			4.2		
Gate-Drain Charge ^c	Q _{gd}			4.0		
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 10 V, R _L = 0.2 Ω I _D ≅ 50 A, V _{GEN} = 10 V, R _g = 2.5 Ω		8	12	ns
Rise Time ^c	t _r			10	15	
Turn-Off Delay Time ^c	t _{d(off)}			25	40	
Fall Time ^c	t _f			12	20	
Source-Drain Diode Ratings and Characteristic (T _C = 25 °C)						
Pulsed Current	I _{SM}				100	A
Diode Forward Voltage ^b	V _{SD}	I _F = 50 A, V _{GS} = 0 V		1.2	1.5	V
Source-Drain Reverse Recovery Time	t _{rr}	I _F = 50 A, di/dt = 100 A/μs		35	70	ns

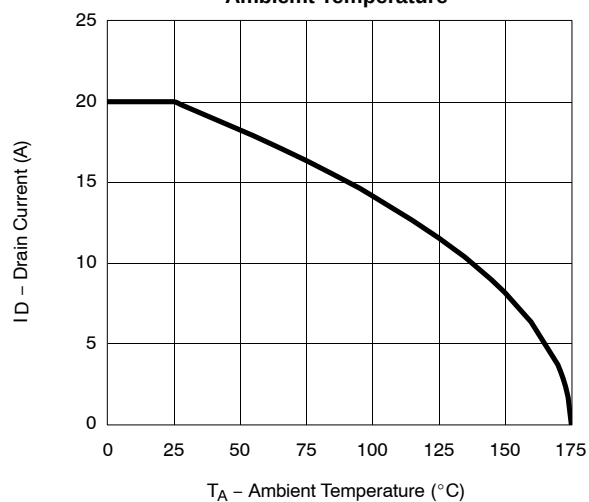
Notes

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

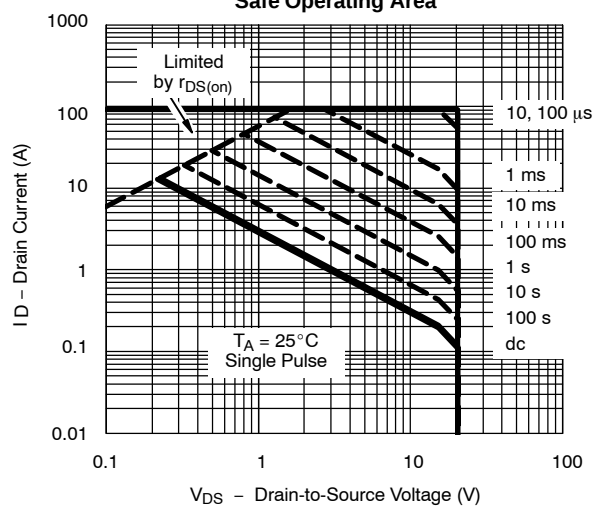
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

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

THERMAL RATINGS

Maximum Drain Current vs.
Ambient Temperature

Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

