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

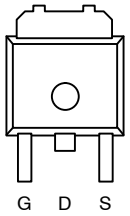
FEATURES

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

APPLICATIONS

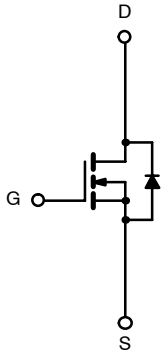
- High-Side Synchronous Buck DC/DC Conversion
  - Desktop
  - Server

TO-252



Top View

Drain Connected to Tab



N-Channel MOSFET

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

ABSOLUTE MAXIMUM RATINGS (T_A = 25°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°C	I_D	49d	A
	T_C= 100°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	
Avalanche Energy, Single Pulse		E_{AS}	42	mJ
Maximum Power Dissipation	T_A = 25°C	P_D	6.5[a]	W
	T_C = 25°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 ≤ 10 sec	R_{thJA}	19	23	°C/W
	Steady State		40	50	
Maximum Junction-to-Case		R_{thJC}	3.1	3.8	

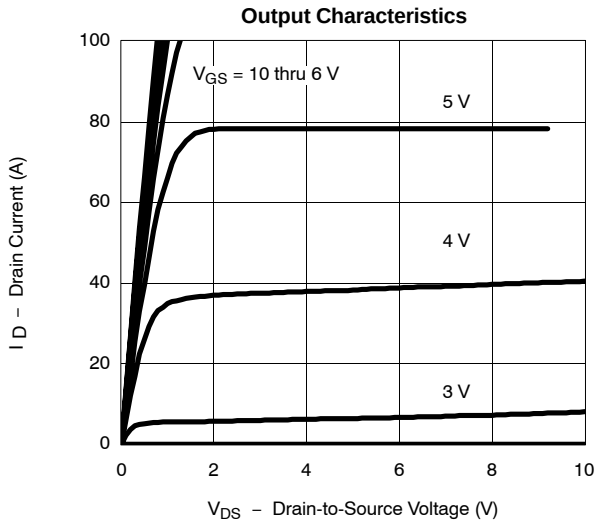
Notes
a. Surface Mounted on FR4 Board, t ≤ 10 sec.
b. Limited by package
c. Pulse condition: T_A = 105°C, 50 ns, 300 kHz operation
d. Calculation based on maximum allowable Junction Temperature. Package limitation current is 25 A.

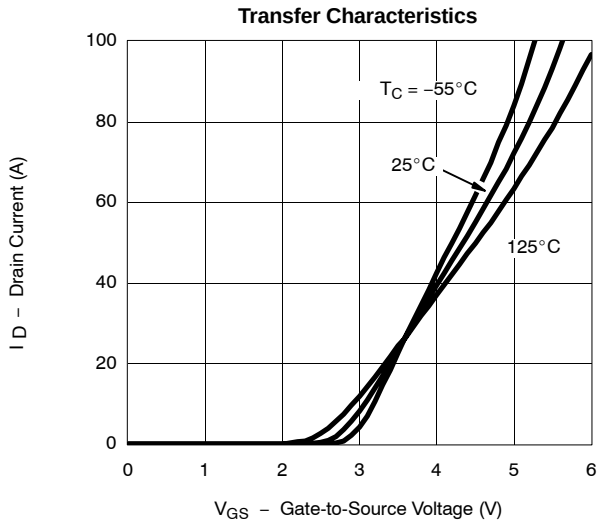
SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)

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 ≤ 300 μs, duty cycle ≤ 2%.
c. Independent of operating temperature.

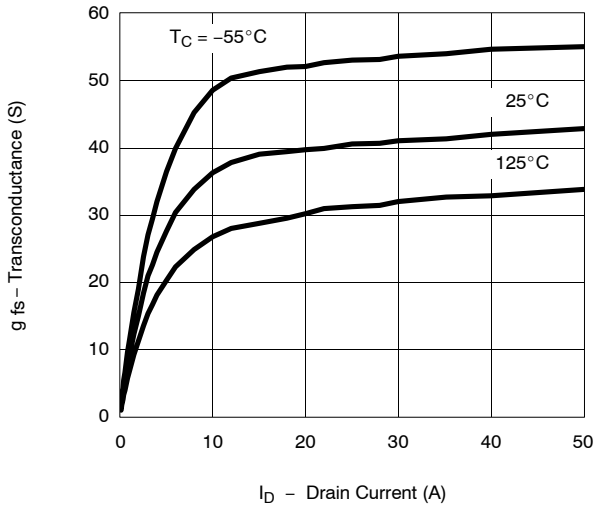
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)



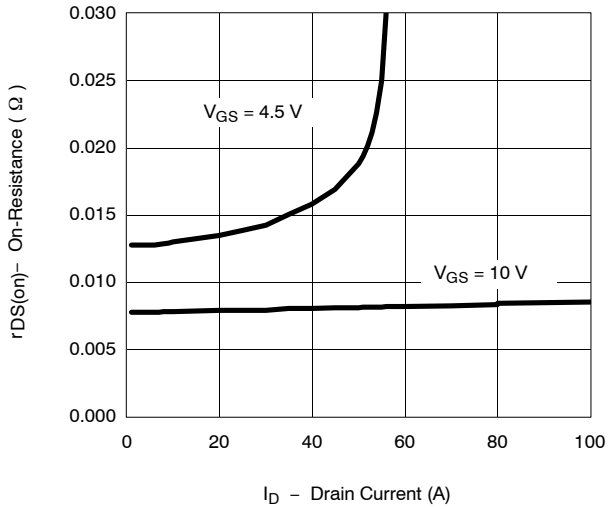


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

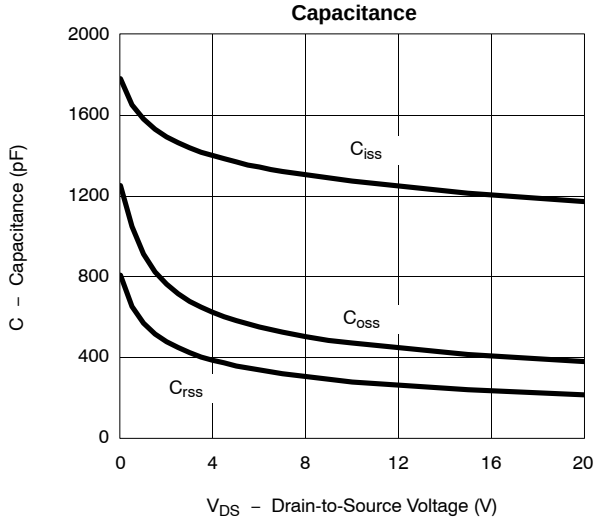
Transconductance



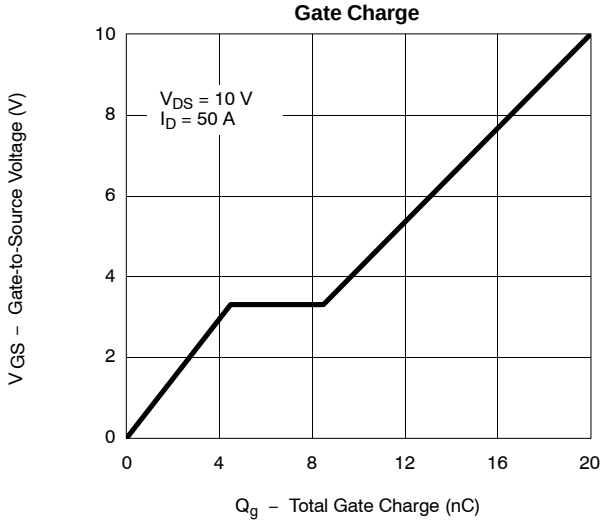
On-Resistance vs. Drain Current



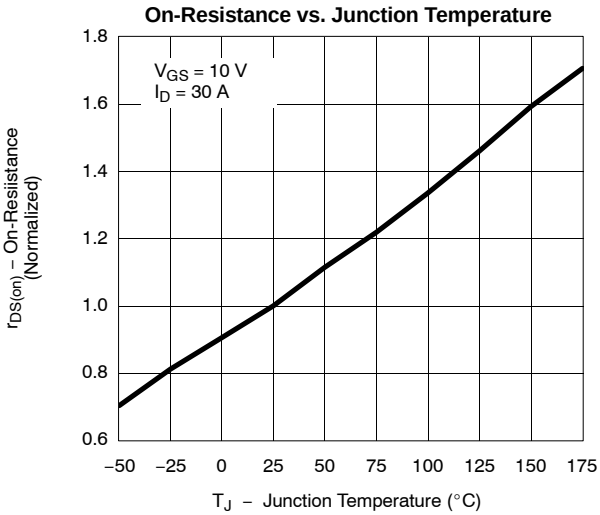
Capacitance



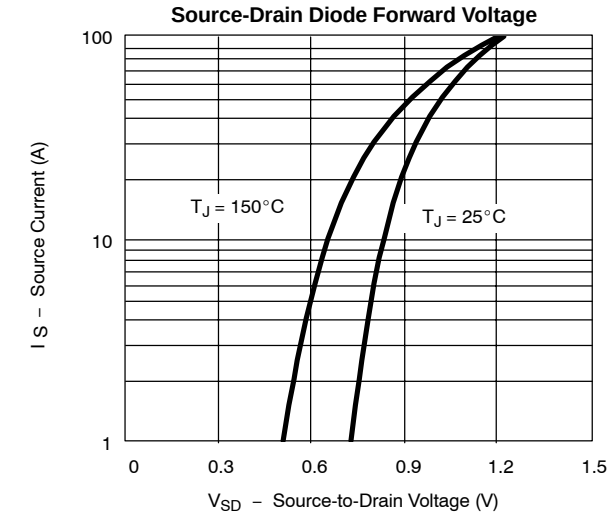
Gate Charge



On-Resistance vs. Junction Temperature

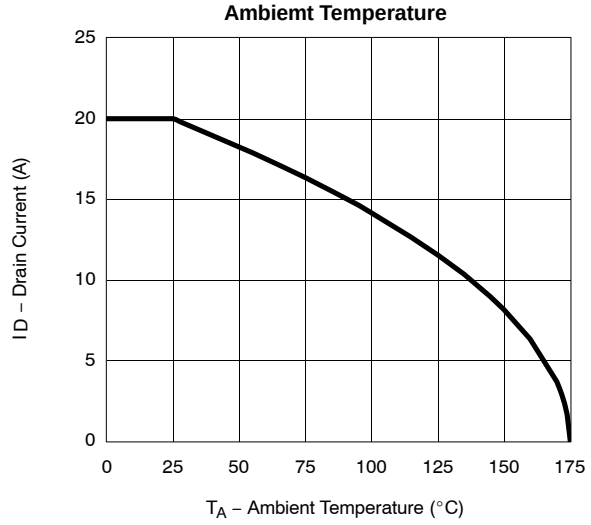


Source-Drain Diode Forward Voltage

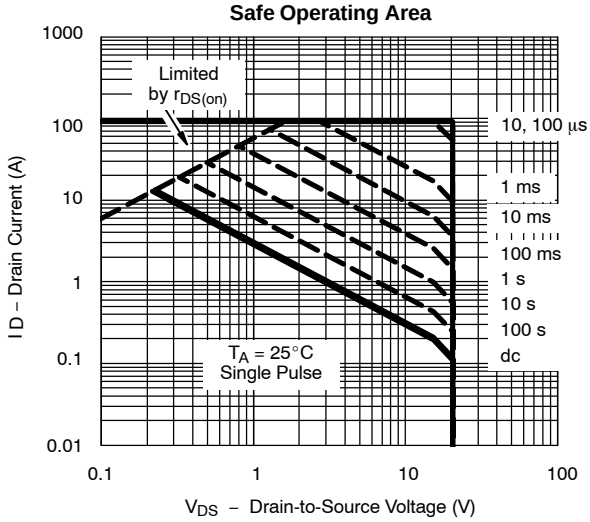


THERMAL RATINGS

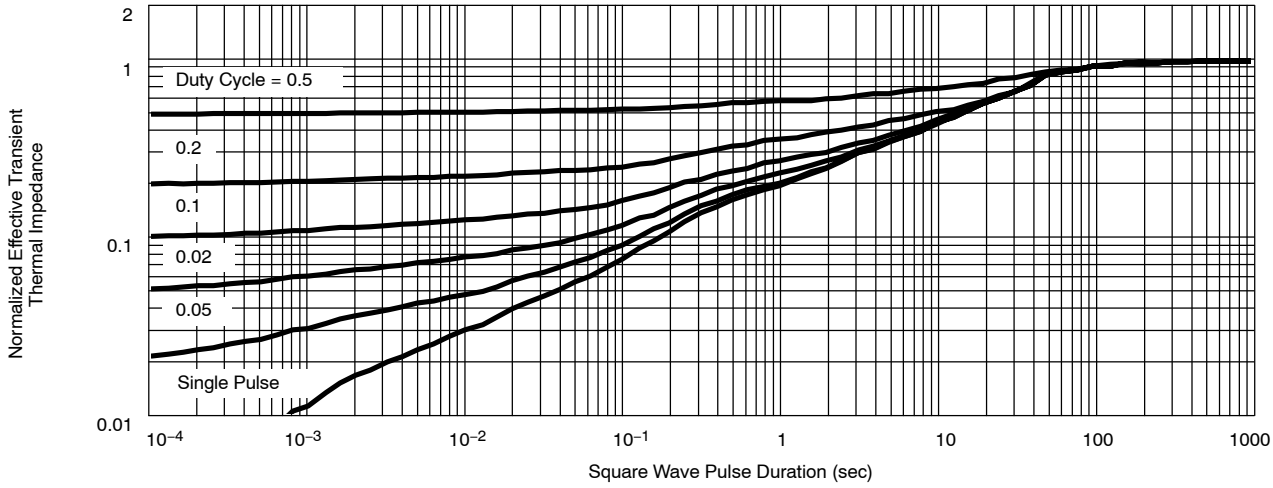
Maximum Drain Current vs. Ambiemt Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



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.