



## N-Channel 22-V (D-S) 175°C MOSFET



Pb-free  
Available

PRODUCT SUMMARY		
$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>d</sup>
24 <sup>c</sup>	0.006 @ $V_{GS} = 10$ V	80
	0.0095 @ $V_{GS} = 4.5$ V	64

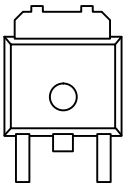
### FEATURES

- TrenchFET® Power MOSFET
- 175°C Junction Temperature
- PWM Optimized for High Efficiency
- 100%  $R_g$  Tested
- Lead (Pb)-Free Version is RoHS Compliant

### APPLICATIONS

- Synchronous Buck DC/DC Conversion
  - Desktop
  - Server

TO-252

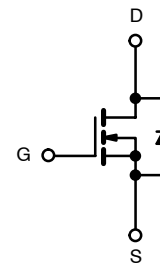


G D S

Top View

Drain Connected to Tab

Ordering Information: SUD50N024-06P  
SUD50N024-06P—E3 (Lead (Pb)-Free)



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Unit
Drain-Source Pulse Voltage		$V_{DS(pulse)}$	24 <sup>c</sup>	V
Drain-Source Voltage		$V_{DS}$	22	
Gate-Source Voltage		$V_{GS}$	$\pm 20$	
Continuous Drain Current <sup>a</sup>	$T_C = 25^\circ\text{C}$	$I_D$	80 <sup>d</sup>	A
	$T_C = 100^\circ\text{C}$		56 <sup>d</sup>	
Pulsed Drain Current		$I_{DM}$	100	
Continuous Source Current (Diode Conduction) <sup>a</sup>		$I_S$	26	
Avalanche Current, Single Pulse	$L = 0.1$ mH	$I_{AS}$	45	
Avalanche Energy, Single Pulse		$E_{AS}$	101	
Maximum Power Dissipation	$T_A = 25^\circ\text{C}$	$P_D$	6.8 <sup>a</sup>	W
	$T_C = 25^\circ\text{C}$		65	
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	-55 to 175	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>a</sup>	$t \leq 10$ sec	$R_{thJA}$	18	22	$^\circ\text{C/W}$
	Steady State		40	50	
Maximum Junction-to-Case		$R_{thJC}$	1.9	2.3	

Notes

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

**SPECIFICATIONS (T<sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)**

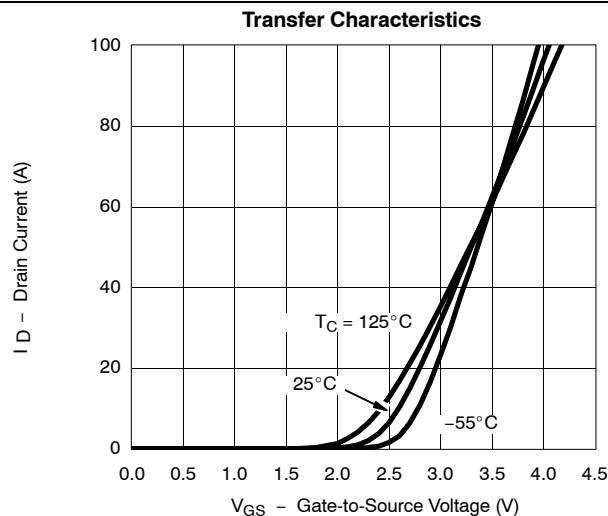
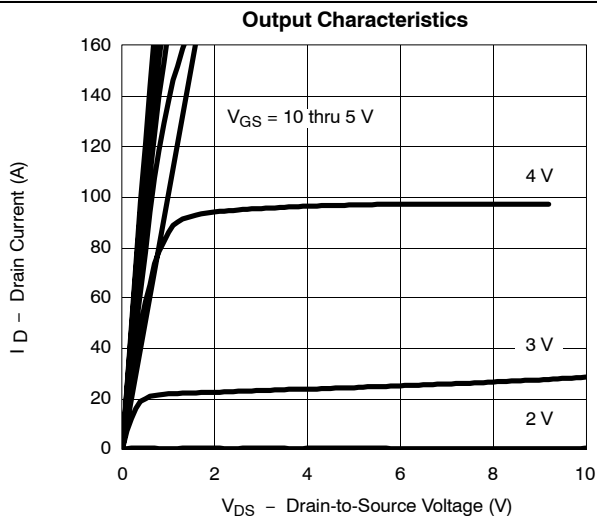
Parameter	Symbol	Test Condition	Min	Typ <sup>a</sup>	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	22			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	0.8		3.0	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C			50	
On-State Drain Current <sup>b</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = 5 V, V <sub>GS</sub> = 10 V	50			A
Drain-Source On-State Resistance <sup>b</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A		0.0046	0.006	Ω
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A, T <sub>J</sub> = 125 °C			0.0084	
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 20 A		0.0073	0.0095	
Forward Transconductance <sup>b</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 20 A	15			S
<b>Dynamic<sup>a</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 10 V, f = 1 MHz		2550		pF
Output Capacitance	C <sub>oss</sub>			900		
Reverse Transfer Capacitance	C <sub>rss</sub>			415		
Gate Resistance	R <sub>g</sub>		0.7	1.5	2.1	Ω
Total Gate Charge <sup>c</sup>	Q <sub>g</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 50 A		19	30	nC
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>			7.5		
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>			6.0		
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 10 V, R <sub>L</sub> = 0.2 Ω I <sub>D</sub> ≅ 50 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 2.5 Ω		11	20	ns
Rise Time <sup>c</sup>	t <sub>r</sub>			10	15	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>			24	35	
Fall Time <sup>c</sup>	t <sub>f</sub>			9	15	
<b>Source-Drain Diode Ratings and Characteristic (T<sub>C</sub> = 25 °C)</b>						
Pulsed Current	I <sub>SM</sub>				100	A
Diode Forward Voltage <sup>b</sup>	V <sub>SD</sub>	I <sub>F</sub> = 50 A, V <sub>GS</sub> = 0 V		1.2	1.5	V
Source-Drain Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 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.

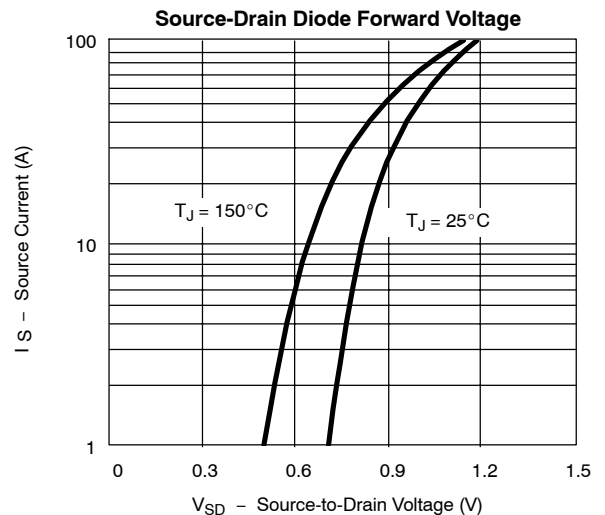
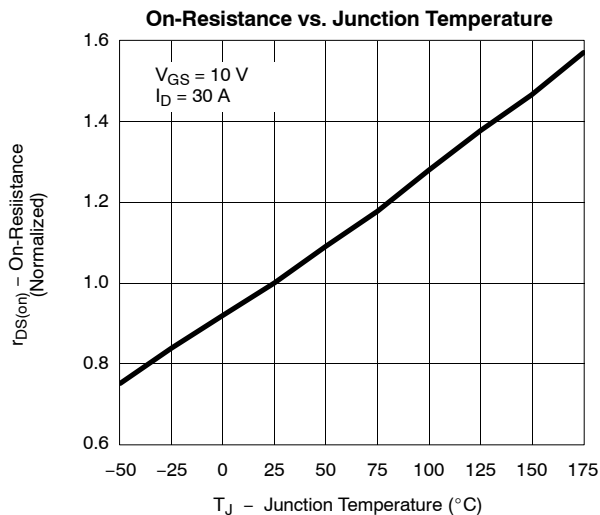
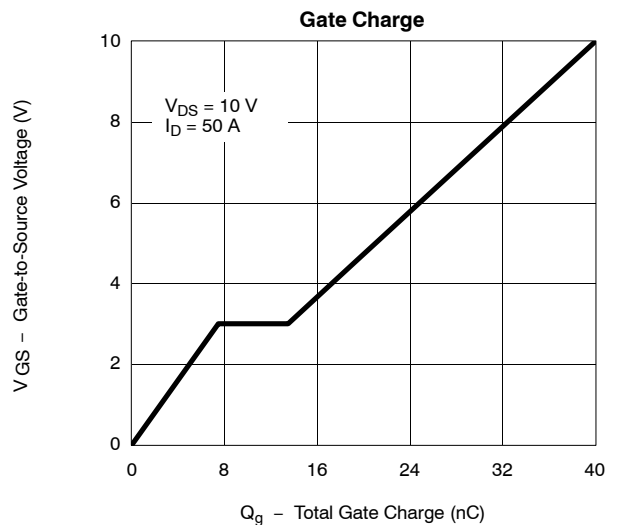
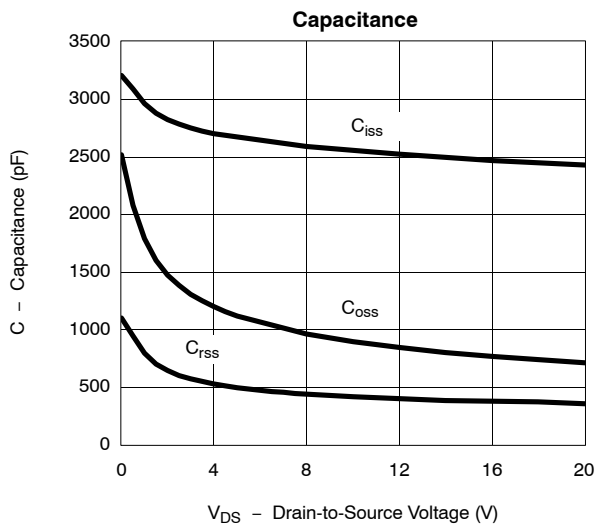
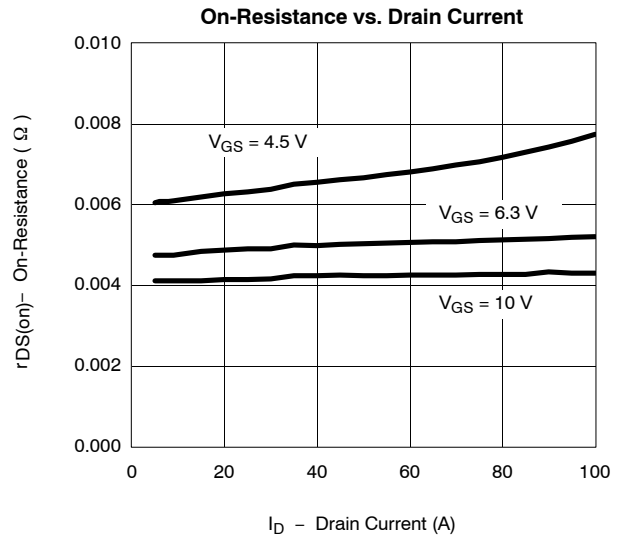
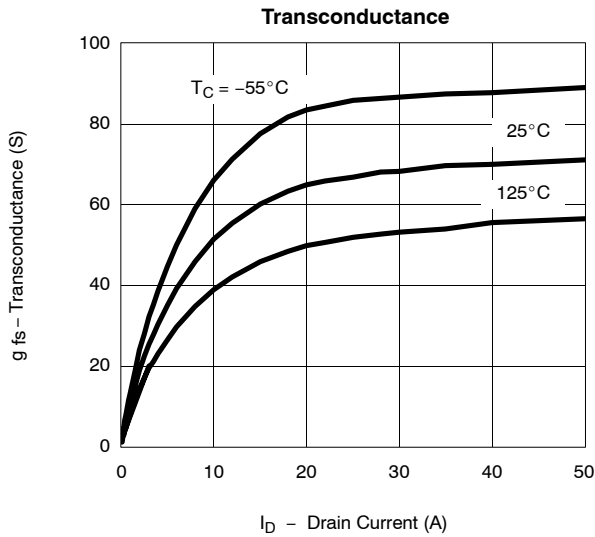
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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



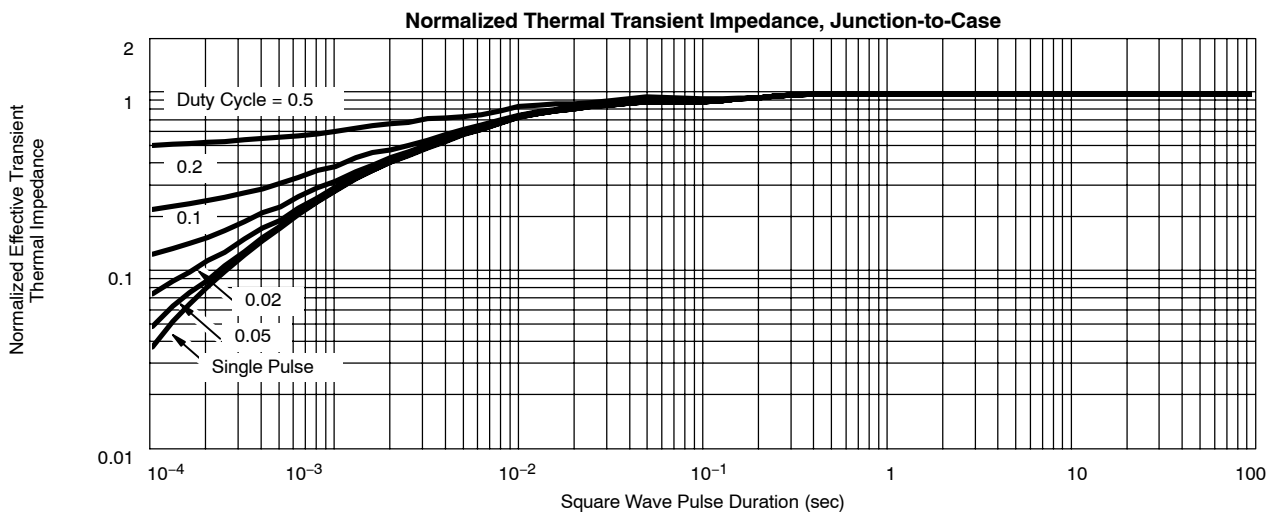
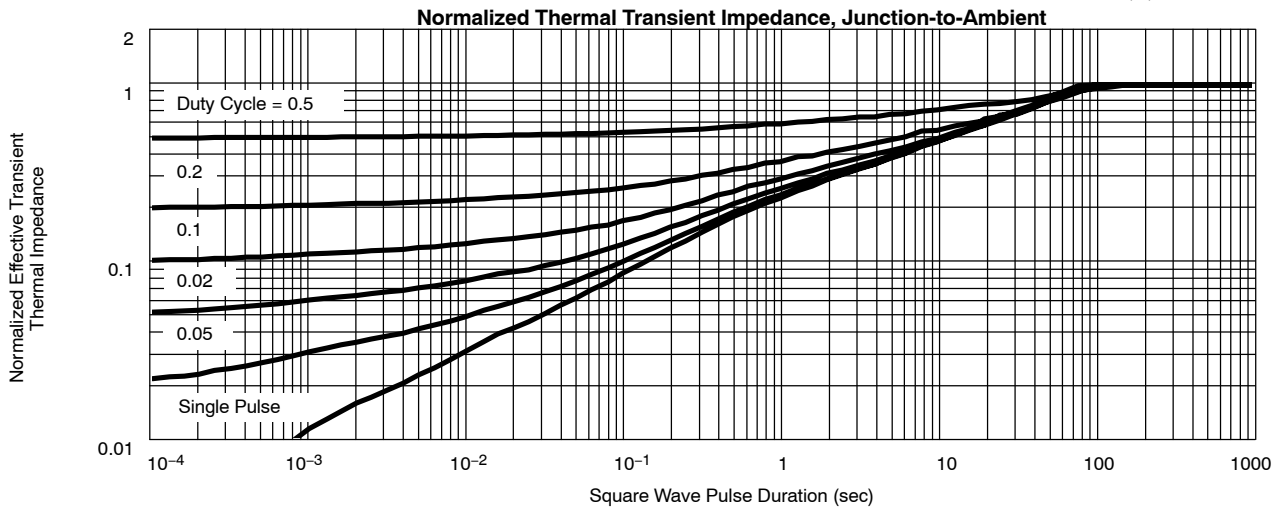
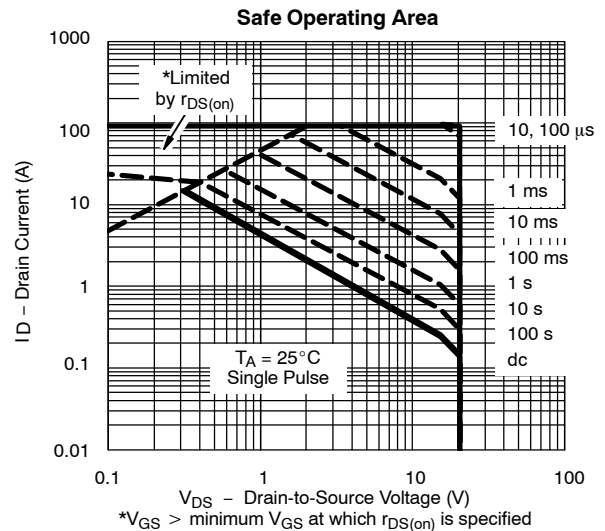
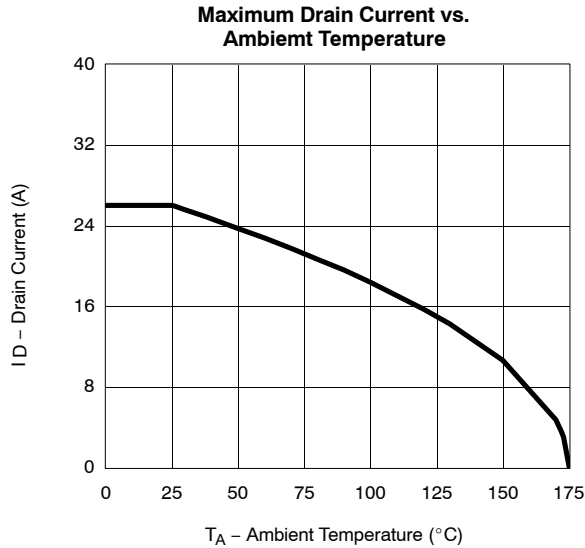


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**





**THERMAL RATINGS**



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