



## N-Channel 22-V (D-S) 175°C MOSFET

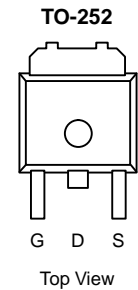
PRODUCT SUMMARY		
$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>d</sup>
24 <sup>C</sup>	0.006 @ $V_{GS} = 10$ V	80
	0.0095 @ $V_{GS} = 4.5$ V	64

### FEATURES

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

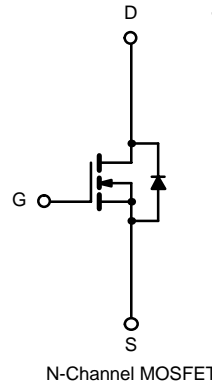
### APPLICATIONS

- Synchronous Buck DC/DC Conversion
  - Desktop
  - Server



Order Number:  
SUD50N024-06P

Drain Connected to Tab



### 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>	$I_D$	$T_C = 25^\circ\text{C}$	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	$I_{AS}$	45		
Avalanche Energy, Single Pulse	$E_{AS}$	101	mJ	
Maximum Power Dissipation	$P_D$	$T_A = 25^\circ\text{C}$	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>	$R_{thJA}$	$t \leq 10$ sec	18	$^\circ\text{C/W}$
		Steady State	40	
Maximum Junction-to-Case	$R_{thJC}$	1.9	2.3	

#### Notes

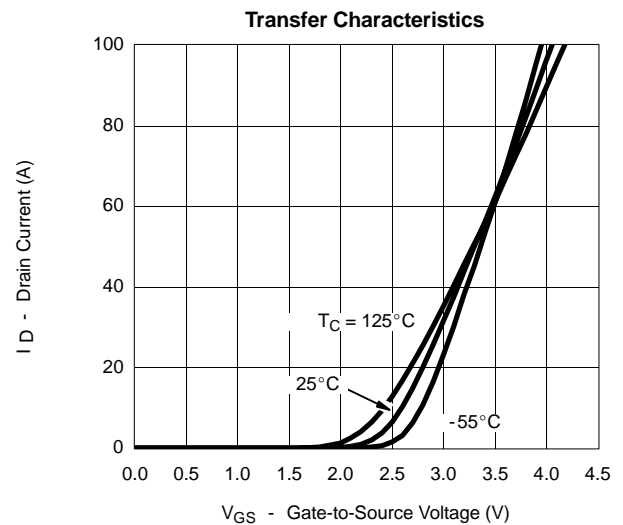
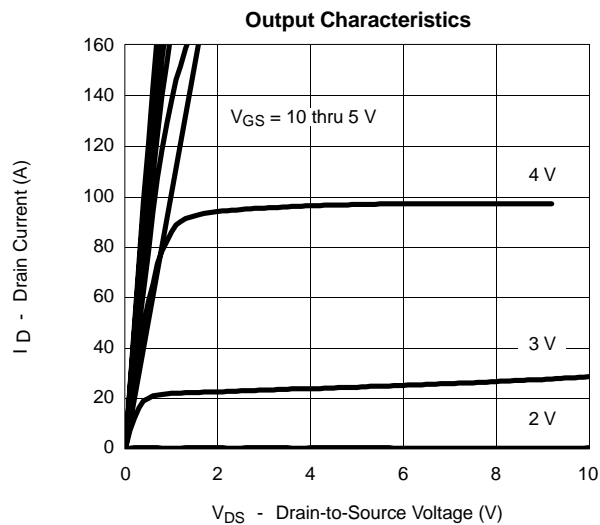
- Surface Mounted on FR4 Board,  $t \leq 10$  sec.
- Limited by package
- Pulse condition:  $T_A = 105^\circ\text{C}$ , 50 ns, 300 kHz operation
- Calculation based on maximum allowable Junction Temperature. Package limitation current is 50 A.

**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> = 16 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 16 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>			1.5		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

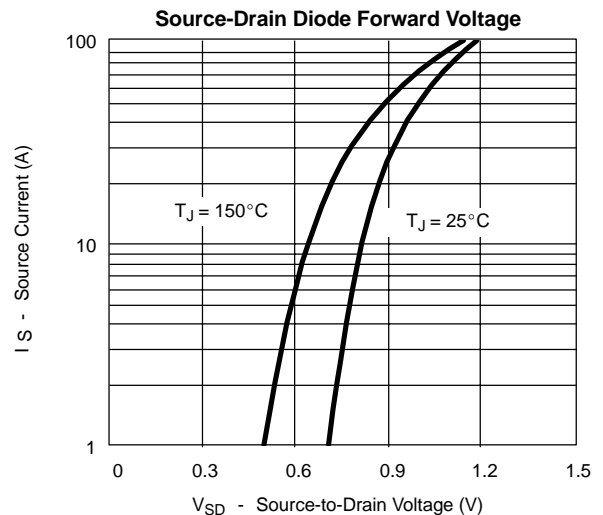
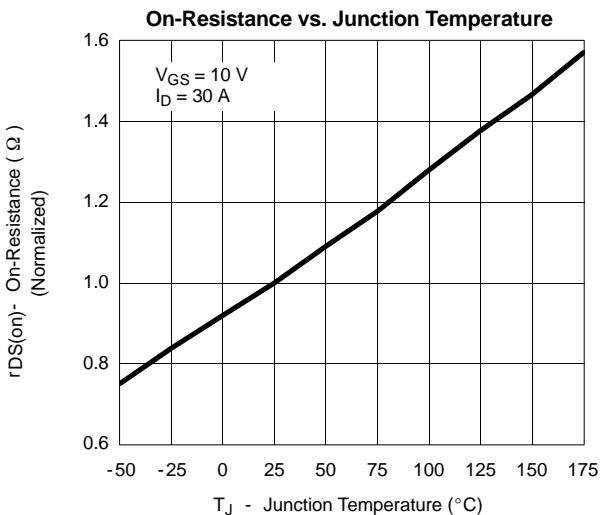
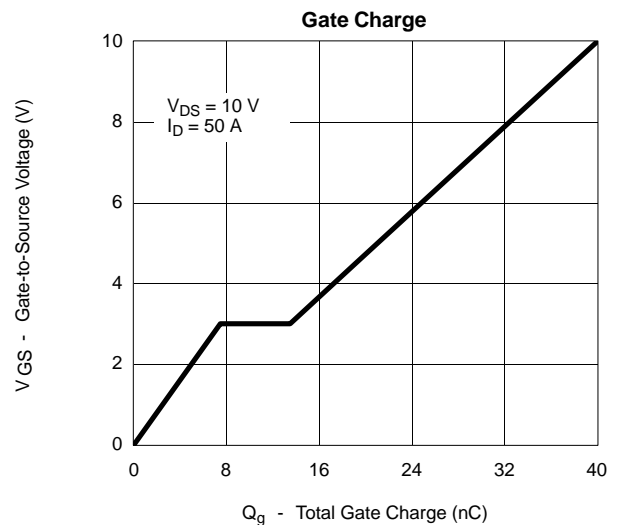
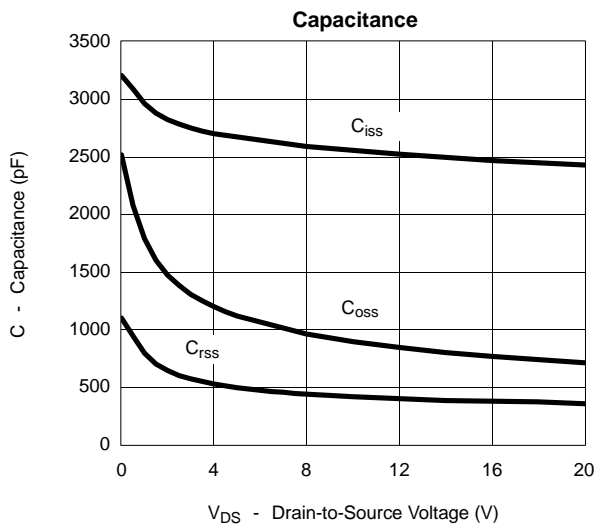
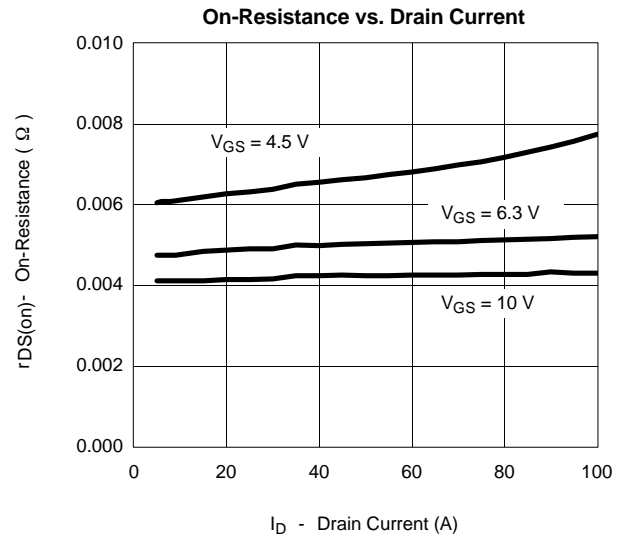
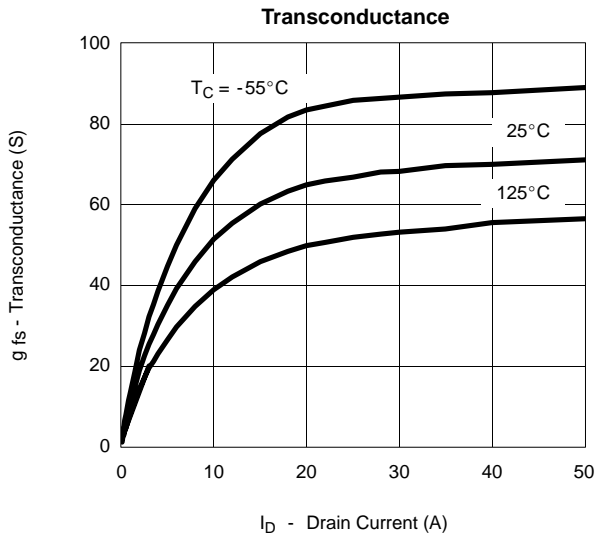
## Notes

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

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



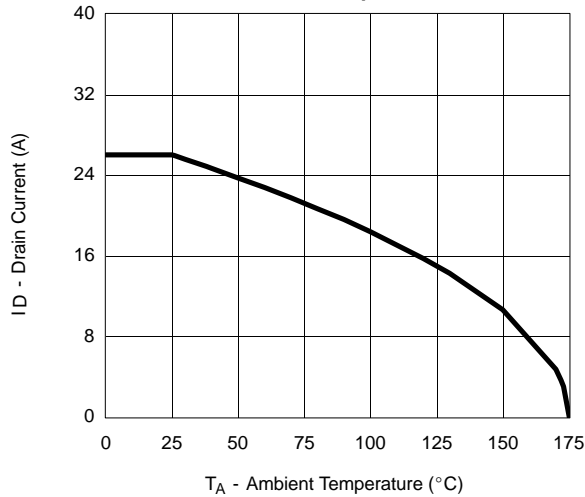
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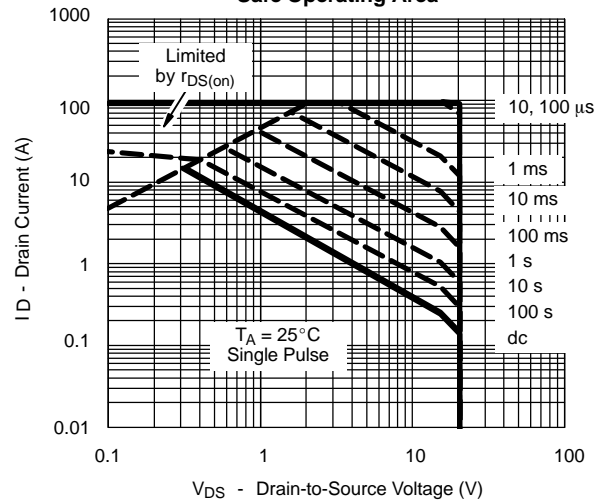


### THERMAL RATINGS

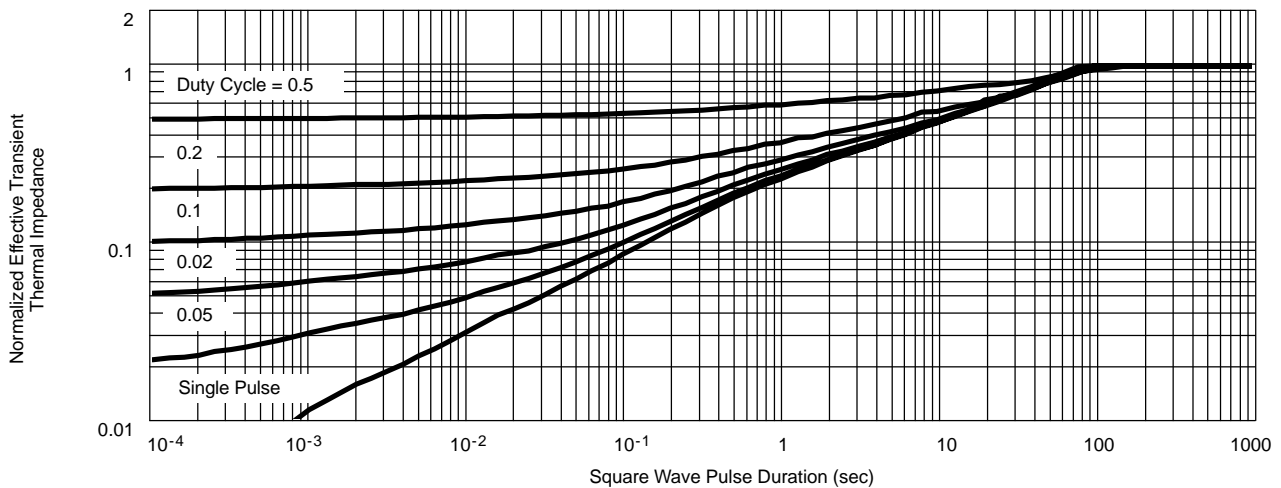
Maximum Drain Current vs. Ambient Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

