



## N-Channel 20-V (D-S) 175°C MOSFET

### PRODUCT SUMMARY

V <sub>DS</sub> (V)	r <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A) <sup>a</sup>
20	0.0037 @ V <sub>GS</sub> = 10 V	37
	0.0061 @ V <sub>GS</sub> = 4.5 V	29

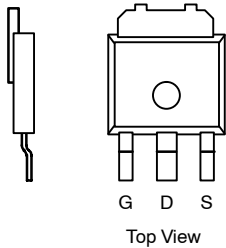
### FEATURES

- TrenchFET® Power MOSFET
- 175°C Junction Temperature
- PWM Optimized for High Efficiency
- 100% R<sub>g</sub> Tested

### APPLICATIONS

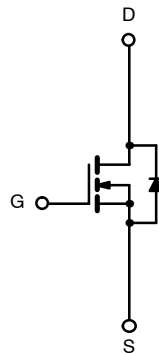
- Synchronous Buck Converter
  - Low Side
- Synchronous Rectifier
  - Secondary Rectifier

**TO-252  
Reverse Lead DPAK**



Drain Connected to Tab

Ordering Information:  
SUR70N02-04P—E3  
SUR70N02-04P-T4—E3 (alternate tape orientation)



N-Channel MOSFET

### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V <sub>DS</sub>	20	V
Gate-Source Voltage	V <sub>GS</sub>	±20	
Continuous Drain Current <sup>a</sup>	I <sub>D</sub>	T <sub>A</sub> = 25°C	37 <sup>a</sup>
		T <sub>C</sub> = 25°C	70 <sup>b</sup>
Pulsed Drain Current	I <sub>DM</sub>	100	A
Continuous Source Current (Diode Conduction) <sup>a</sup>	I <sub>S</sub>	37	
Single Pulse Avalanche Current	I <sub>AS</sub>	30	mJ
Single Pulse Avalanche Energy			
Maximum Power Dissipation	P <sub>D</sub>	T <sub>A</sub> = 25°C	8.3 <sup>a</sup>
		T <sub>C</sub> = 25°C	93
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to 175	°C

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>a</sup>	R <sub>thJA</sub>	t ≤ 10 sec	15	°C/W
		Steady State	40	
Maximum Junction-to-Case	R <sub>thJC</sub>	1.3	1.6	

Notes

- Surface Mounted on FR4 Board, t ≤ 10 sec.
- Limited by package

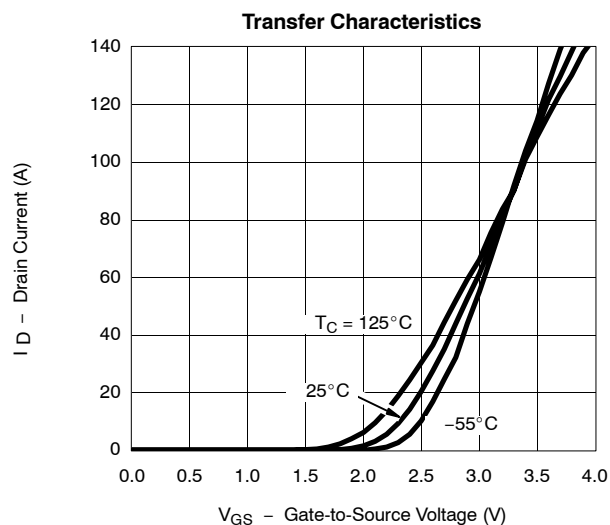
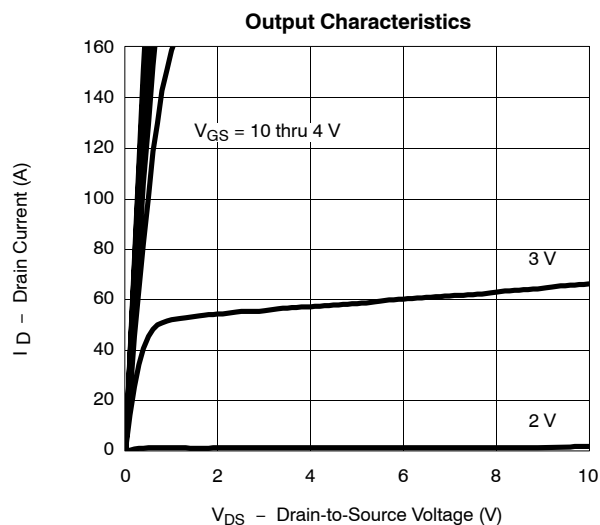
**SPECIFICATIONS (T<sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)**

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	20			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		0.0028	0.0037	Ω
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A, T <sub>J</sub> = 125 °C			0.0052	
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 20 A		0.0047	0.0061	
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		4500		pF
Output Capacitance	C <sub>oss</sub>			1520		
Reverse Transfer Capacitance	C <sub>rss</sub>			800		
Gate Resistance	R <sub>g</sub>		0.5	1.1	1.8	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		34	153	nC
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>			11		
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>			10		
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		15	25	ns
Rise Time <sup>c</sup>	t <sub>r</sub>			11	20	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>			35	55	
Fall Time <sup>c</sup>	t <sub>f</sub>			15	25	
<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		45	90	ns

**Notes**

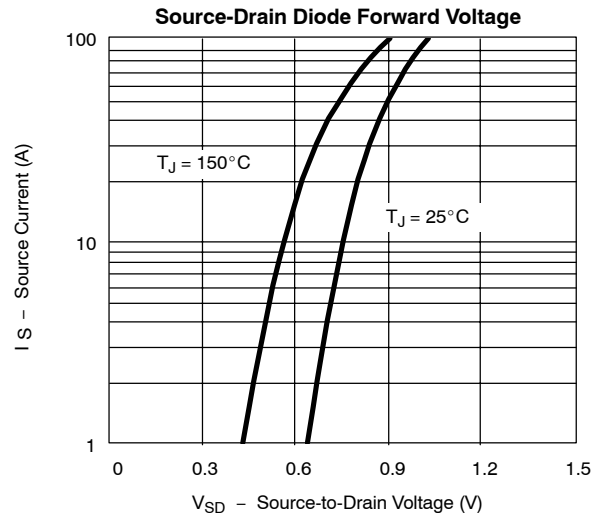
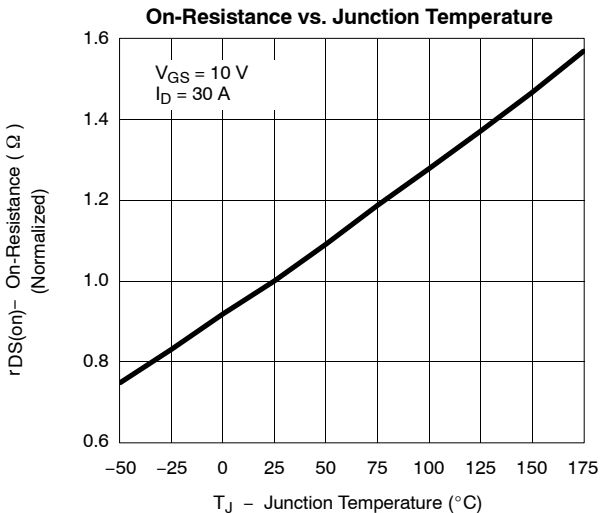
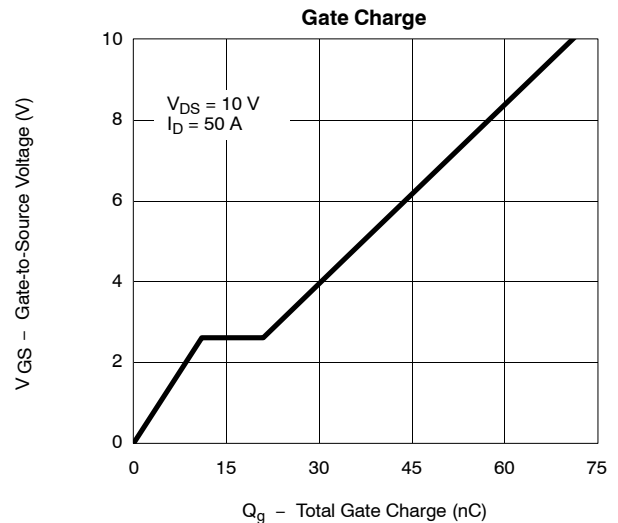
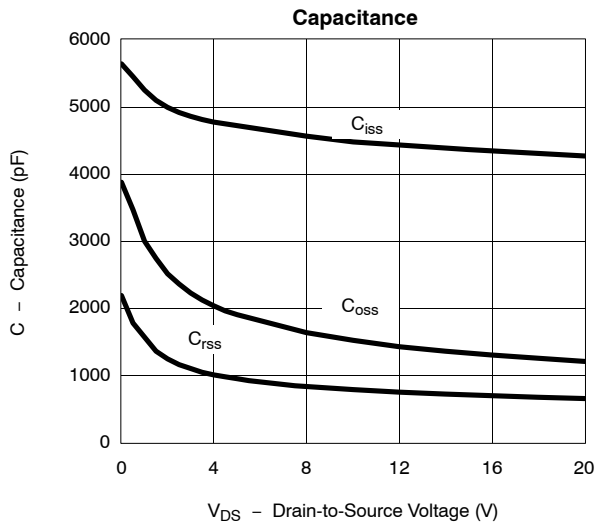
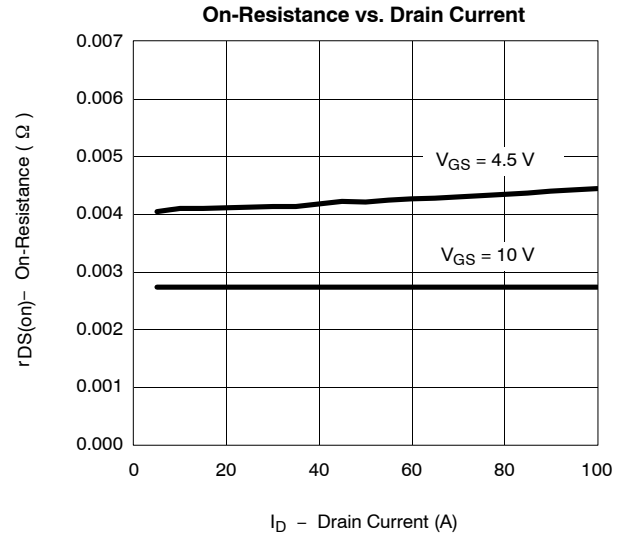
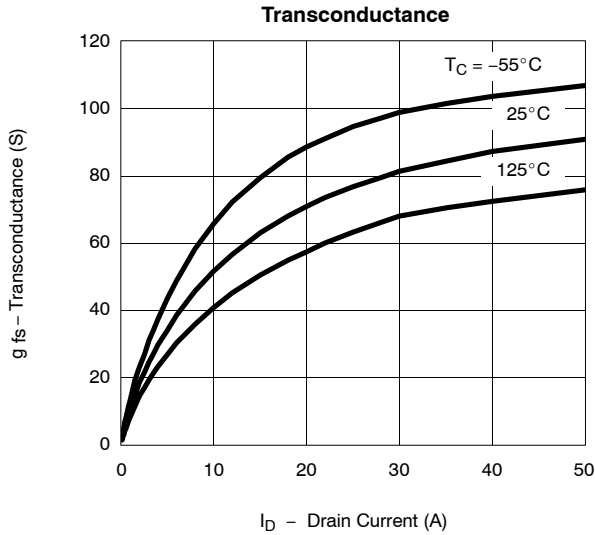
- a. Guaranteed by design, not subject to production testing.
- b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
- c. Independent of operating temperature.

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



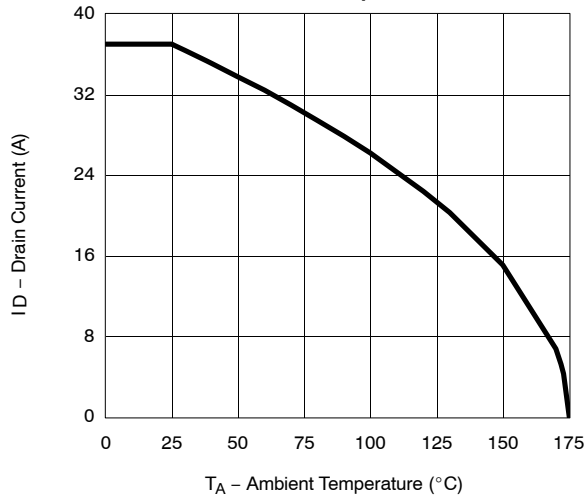


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

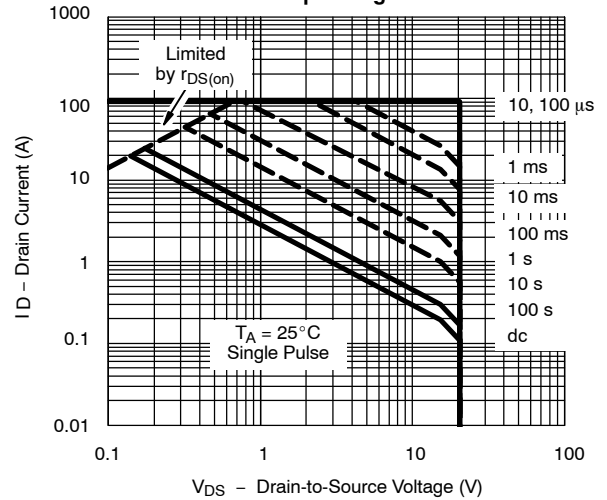


**THERMAL RATINGS**

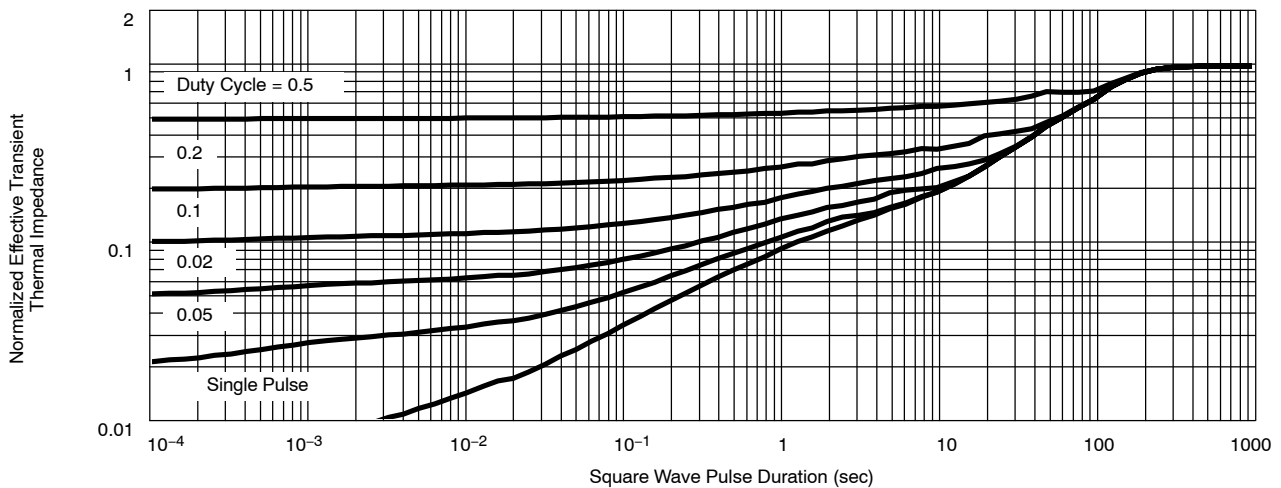
Maximum Drain Current vs. Ambient Temperature



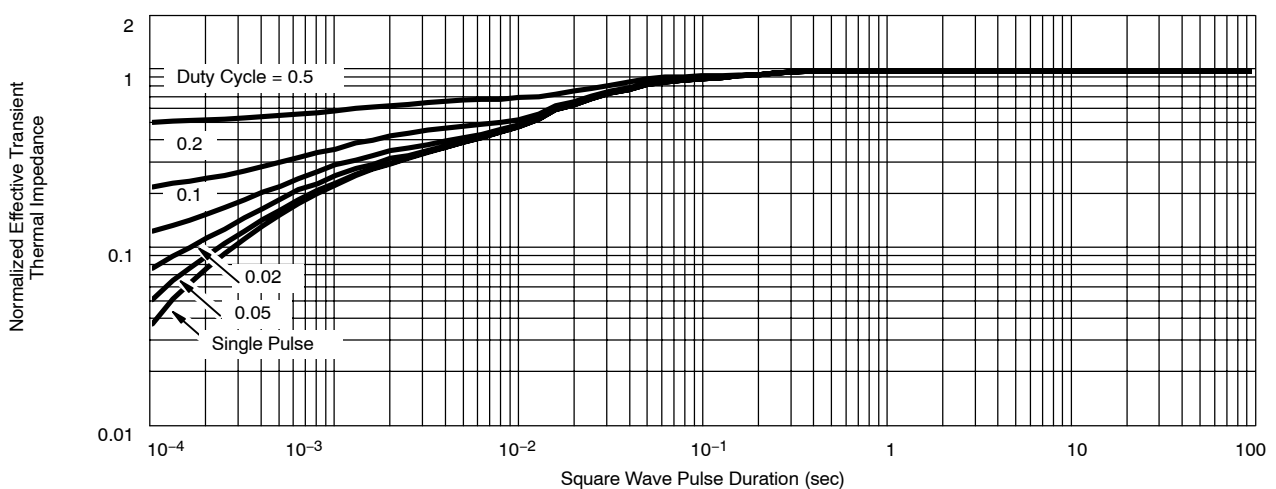
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case





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