



## N-Channel 30-V (D-S), 175°C, MOSFET PWM Optimized

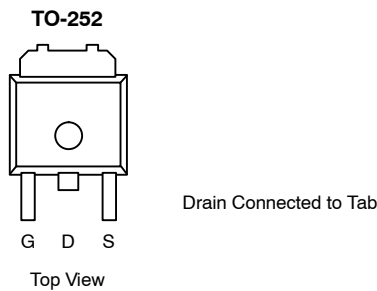
PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>a</sup>
30	0.010 @ $V_{GS} = 10$ V	62 <sup>c</sup>
	0.012 @ $V_{GS} = 4.5$ V	55 <sup>c</sup>

### FEATURES

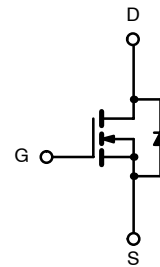
- TrenchFET® Power MOSFETS
- PWM Optimized for High Efficiency
- 100%  $R_g$  Tested

### APPLICATIONS

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



Order Number:  
SUD50N03-10CP



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 175^\circ\text{C}$ ) <sup>a</sup>	$I_D$	$T_C = 25^\circ\text{C}$	62 <sup>c</sup>
		$T_C = 100^\circ\text{C}$	44 <sup>c</sup>
Pulsed Drain Current	$I_{DM}$	100	A
Continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	20	
Maximum Power Dissipation	$P_D$	$T_C = 25^\circ\text{C}$	71 <sup>b</sup>
		$T_A = 25^\circ\text{C}$	8.3 <sup>a</sup>
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	15	$^\circ\text{C}/\text{W}$
		Steady State	40	
Maximum Junction-to-Case (Drain)	$R_{thJC}$	1.75	2.1	

Notes:

- a Surface mounted on 1" x 1" FR4 Board,  $t \leq 10$  sec.
- b See SOA curve for voltage derating.
- c Based on maximum allowable Junction Temperature. Package limitation current is 50 A.

MOSFET SPECIFICATIONS (T <sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	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	30			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>DS</sub> = 250 μA	1			
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> = 24 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C			50	
		V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 175 °C			150	
On-State Drain Current <sup>a</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>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 15 A		0.008	0.010	Ω
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 15 A, T <sub>J</sub> = 125 °C			0.016	
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 15 A, T <sub>J</sub> = 175 °C			0.020	
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 15 A		0.0105	0.012	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 15 A	20	60		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz		1725		pF
Output Capacitance	C <sub>oss</sub>			425		
Reverse Transfer Capacitance	C <sub>rss</sub>			120		
Total Gate Charge <sup>c</sup>	Q <sub>g</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 62 A		13	18	nC
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>			4.5		
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>			4.0		
Gate Resistance	R <sub>g</sub>		1	1.7	3.5	Ω
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 15 V, R <sub>L</sub> = 1 Ω I <sub>D</sub> = 62 A, V <sub>GEN</sub> = 10 V, R <sub>G</sub> = 6 Ω		10	15	ns
Rise Time <sup>c</sup>	t <sub>r</sub>			160	240	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>			30	45	
Fall Time <sup>c</sup>	t <sub>f</sub>			55	85	
<b>Source-Drain Diode Ratings and Characteristics (T<sub>C</sub> = 25 °C)<sup>b</sup></b>						
Continuous Current	I <sub>S</sub>				62	A
Pulsed Current	I <sub>SM</sub>				100	
Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>F</sub> = 15 A, V <sub>GS</sub> = 0 V		0.85	12	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 62 A, di/dt = 100 A/μs		80	110	ns

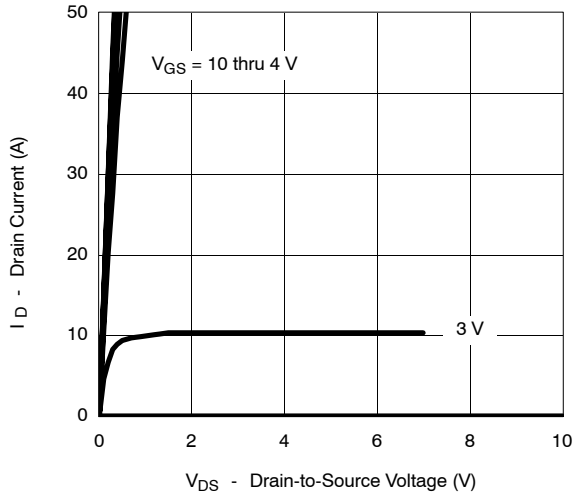
## Notes:

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

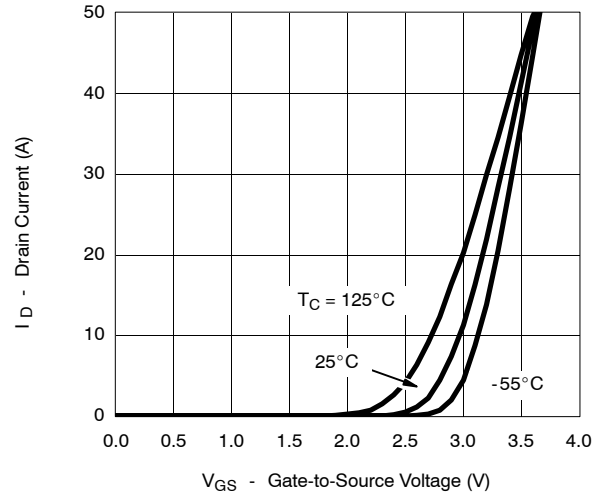


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

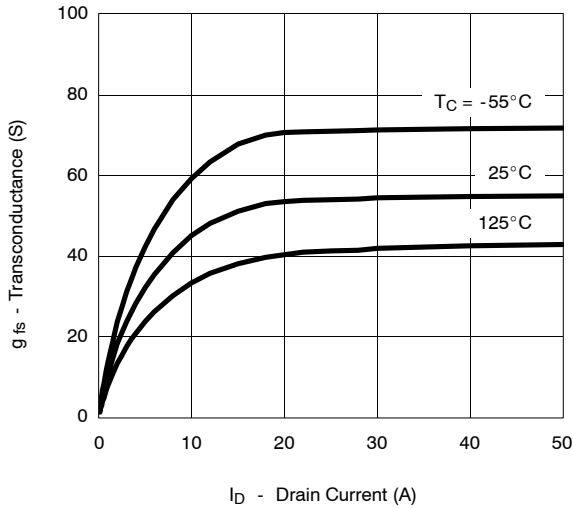
**Output Characteristics**



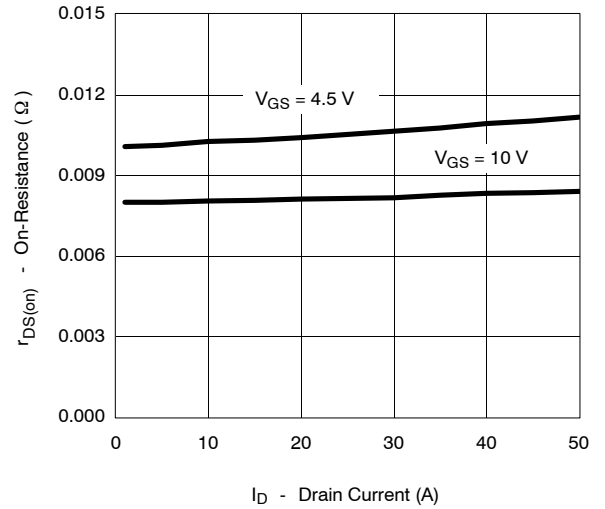
**Transfer Characteristics**



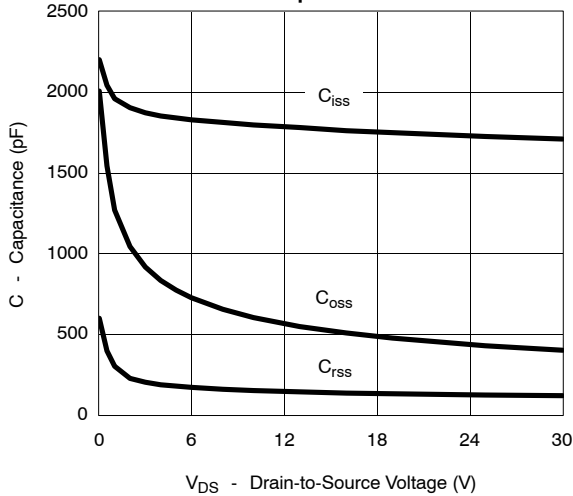
**Transconductance**



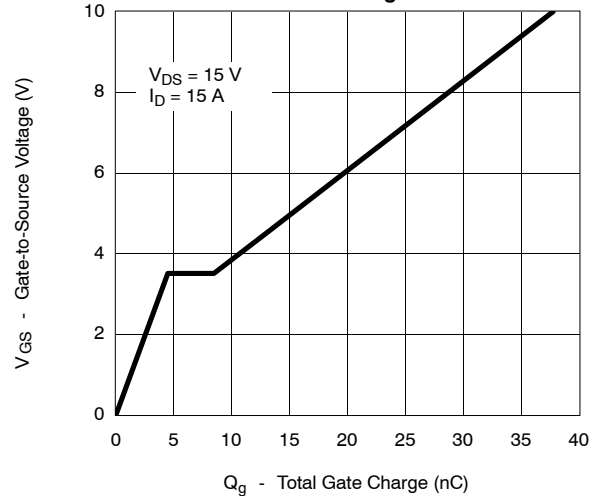
**On-Resistance vs. Drain Current**



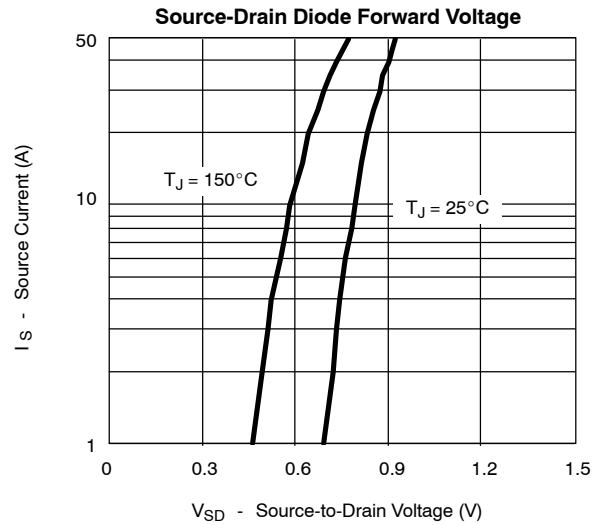
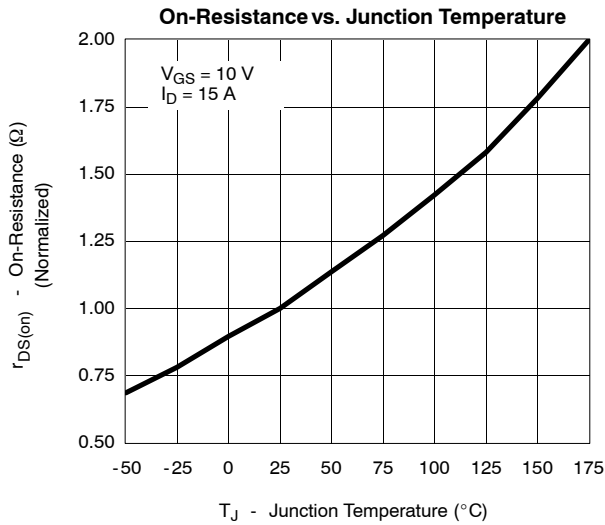
**Capacitance**



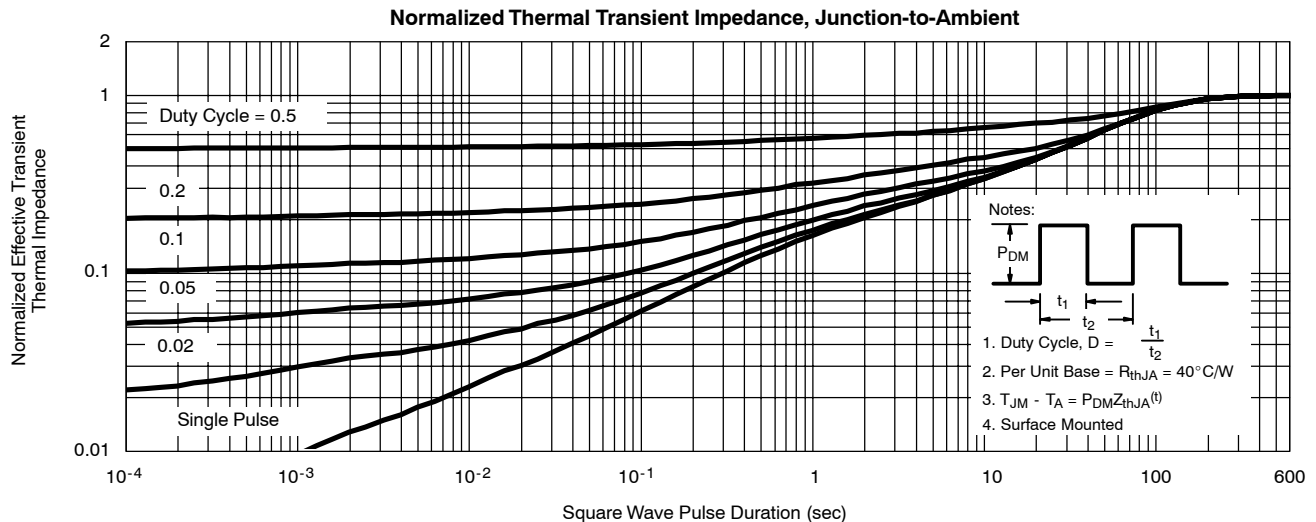
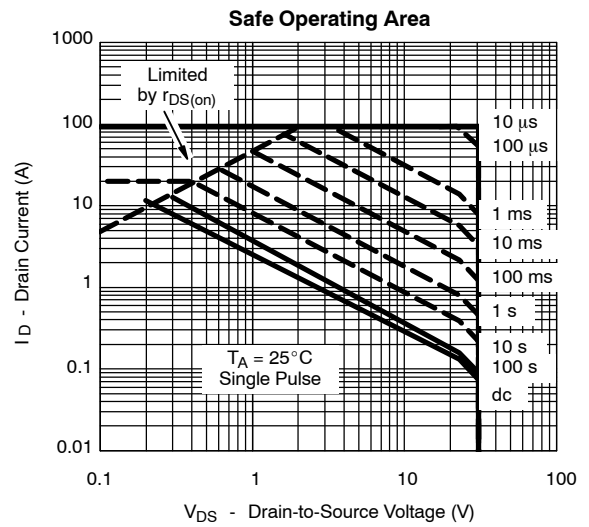
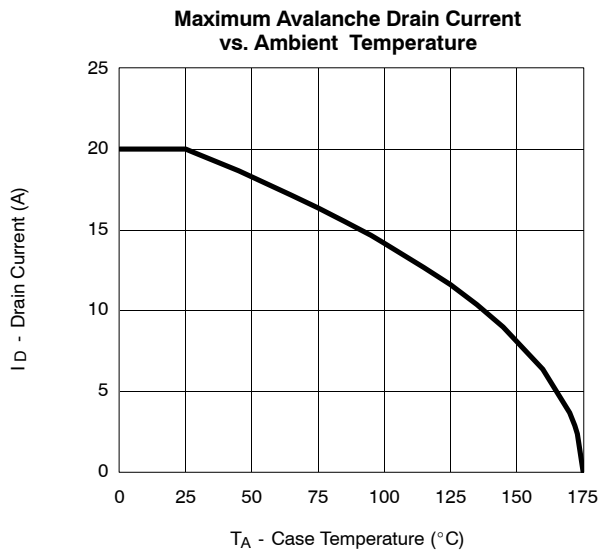
**Gate Charge**



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



### THERMAL RATINGS





**THERMAL RATINGS**

