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

FEATURES

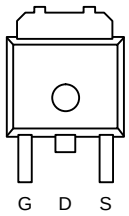
- TrenchFET® Power MOSFETS
- PWM Optimized for High Efficiency

APPLICATIONS

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

PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)[a]
30	0.010 @ V_{GS} = 10 V	62[c]
	0.012 @ V_{GS} = 4.5 V	55[c]

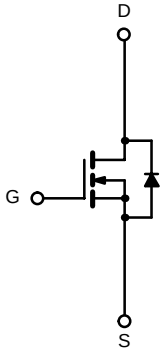
TO-252



Drain Connected to Tab

Top View

Order Number:
SUD50N03-10CP



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current (T_J = 175°C)[a]	T_C = 25°C	I_D	62[c]	A
	T_C = 100°C		44[c]	
Pulsed Drain Current		I_{DM}	100	
Continuous Source Current (Diode Conduction)[a]		I_S	20	
Maximum Power Dissipation	T_C = 25°C	P_D	71[b]	W
	T_A = 25°C		8.3[a]	
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}	15	18	°C/W
	Steady State		40	50	
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	1.75	2.1	

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

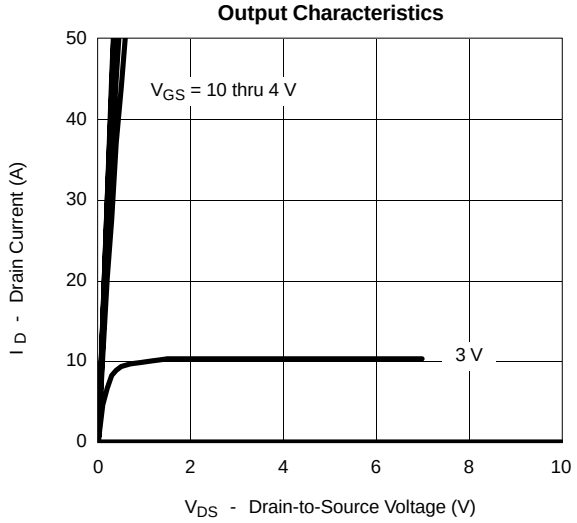
MOSFET SPECIFICATIONS (T_J =25°C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA	30			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_{DS} = 250 μA	1			
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 24 V, V_{GS} = 0 V			1	μA
		V_{DS} = 24 V, V_{GS} = 0 V, T_J = 125°C			50	
		V_{DS} = 24 V, V_{GS} = 0 V, T_J = 175°C			150	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} = 5 V, V_{GS} = 10 V	50			A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 15 A		0.008	0.010	Ω
		V_{GS} = 10 V, I_D = 15 A, T_J = 125°C			0.016	
		V_{GS} = 10 V, I_D = 15 A, T_J = 175°C			0.020	
		V_{GS} = 4.5 V, I_D = 15 A		0.0105	0.012	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 15 A	20	60		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		1725		pF
Output Capacitance	C_{oss}			425		
Reversen Transfer Capacitance	C_{rss}			120		
Total Gate Charge[c]	Q_g	V_{DS} = 15 V, V_{GS} = 4.5 V, I_D = 62 A		13	18	nC
Gate-Source Charge[c]	Q_{gs}			4.5		
Gate-Drain Charge[c]	Q_{gd}			4.0		
Gate Resistance	R_G			1.7		Ω
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 15 V, R_L = 1 Ω I_D ≃ 62 A, V_{GEN} = 10 V, R_G = 6 Ω		10	15	ns
Rise Time[c]	t_r			160	240	
Turn-Off Delay Time[c]	$t_{d(off)}$			30	45	
Fall Time[c]	t_f			55	85	
Source-Drain Diode Ratings and Characteristics (T_C = 25°C)[b]						
Continuous Current	I_S				62	A
Pulsed Current	I_{SM}				100	
Forward Voltage[a]	V_{SD}	I_F = 15 A, V_{GS} = 0 V		0.85	12	V
Reverse Recovery Time	t_{rr}	I_F = 62 A, di/dt = 100 A/μs		80	110	ns

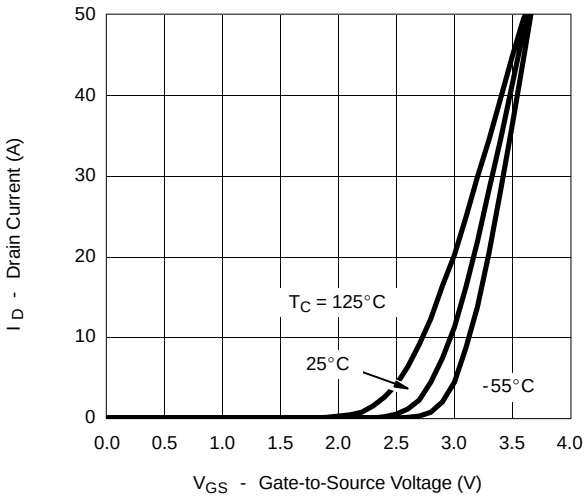
Notes:
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

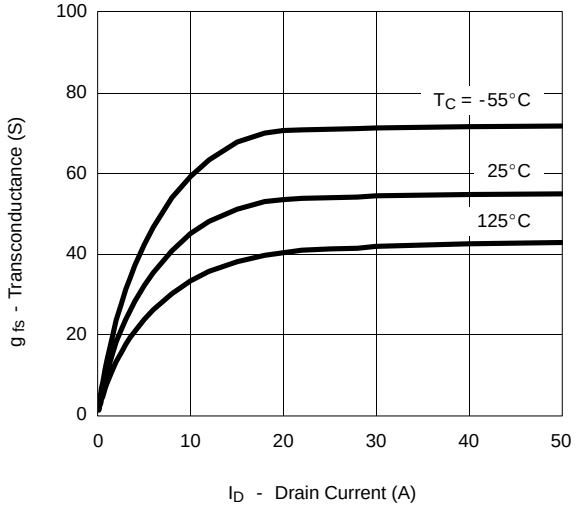
Output Characteristics



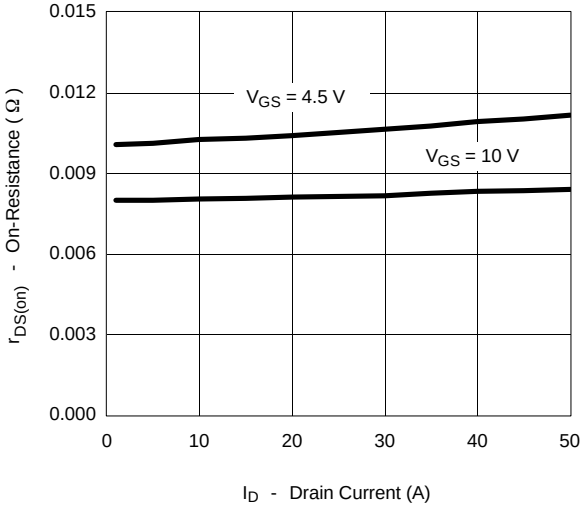
Transfer Characteristics



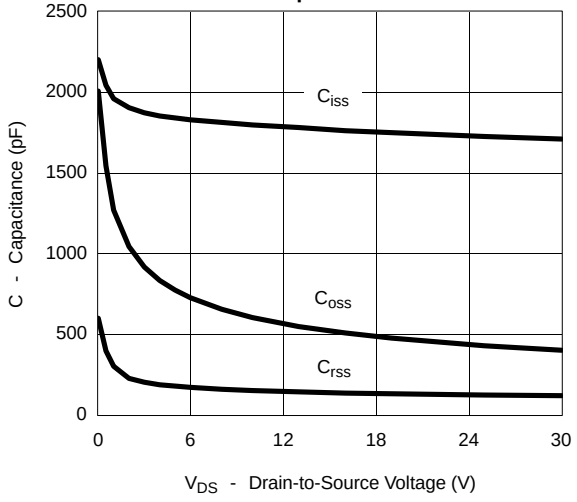
Transconductance



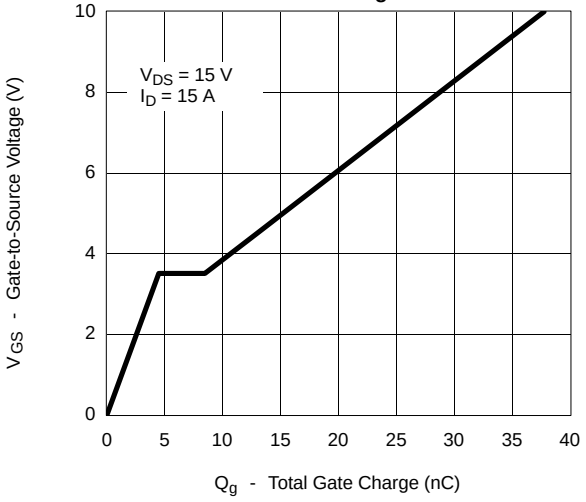
On-Resistance vs. Drain Current



Capacitance

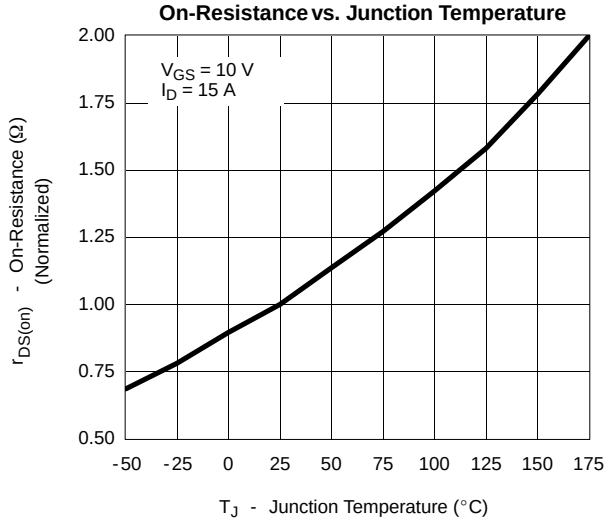


Gate Charge

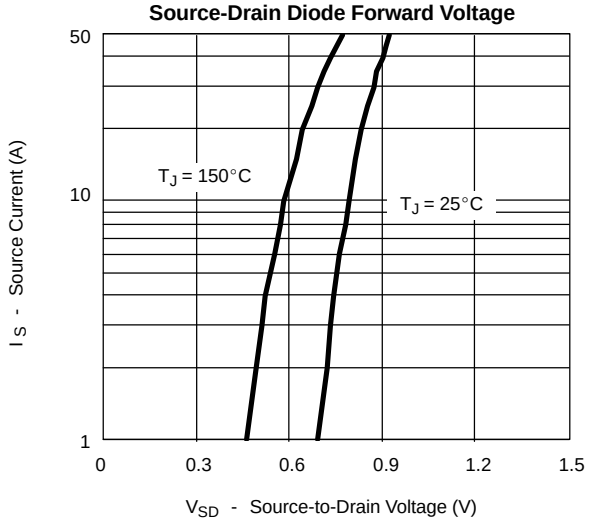


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

On-Resistance vs. Junction Temperature

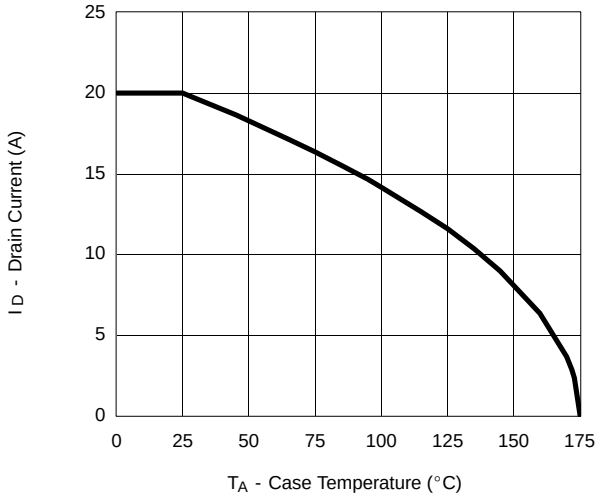


Source-Drain Diode Forward Voltage

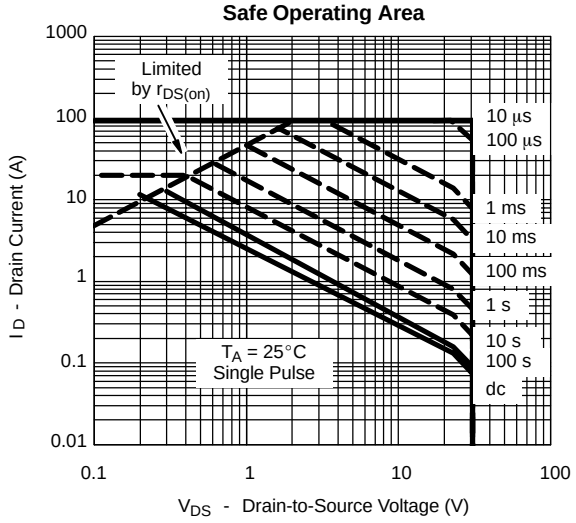


THERMAL RATINGS

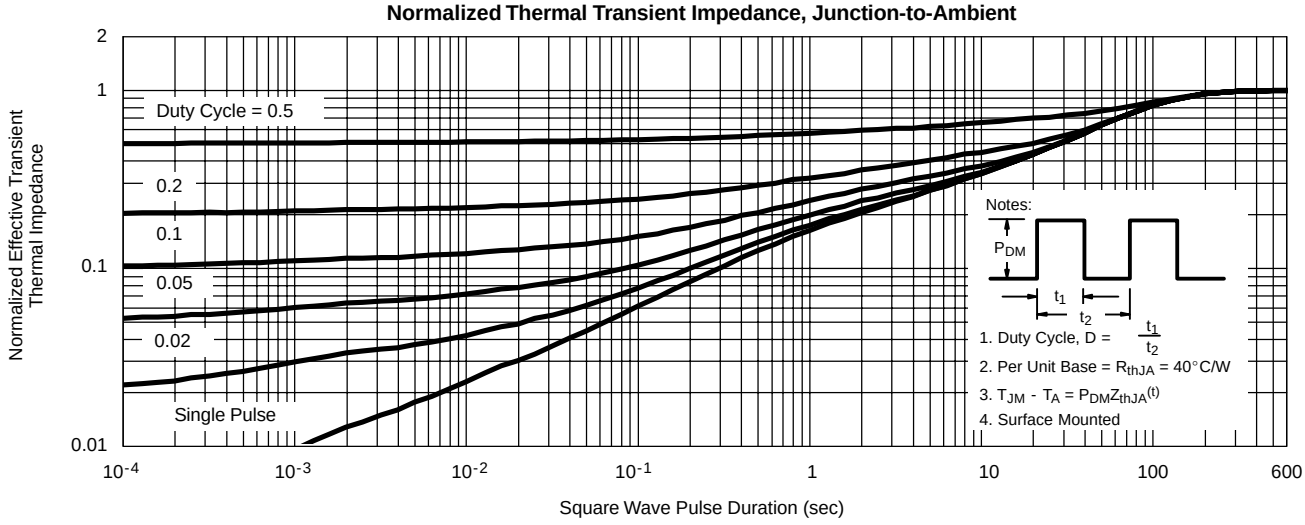
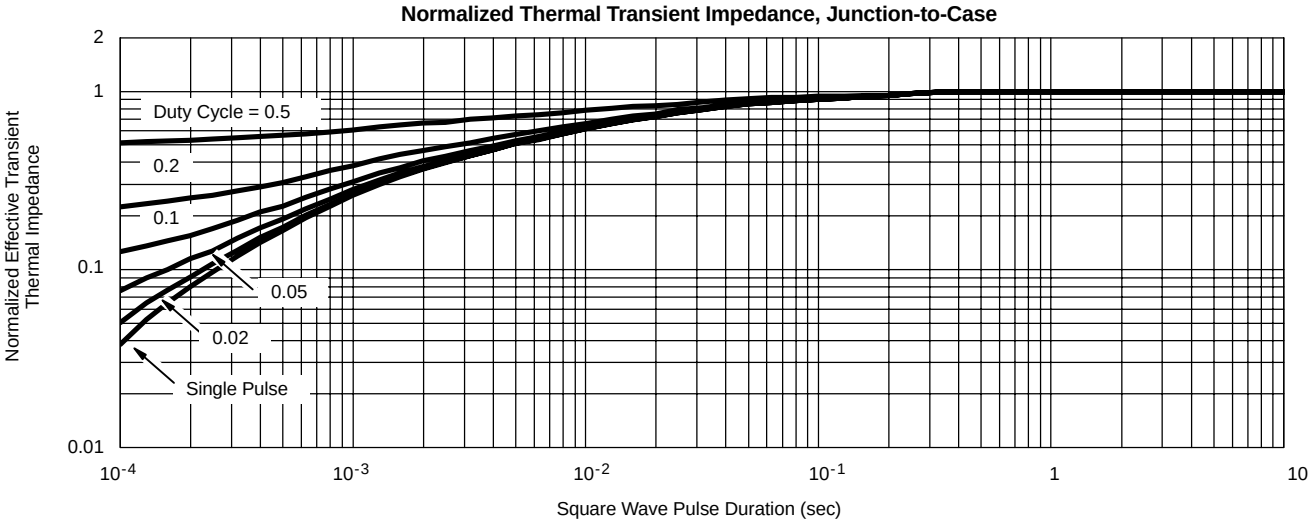
Maximum Avalanche Drain Current vs. Ambient Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



THERMAL RATINGS