



N-Channel 30-V (D-S) MOSFET

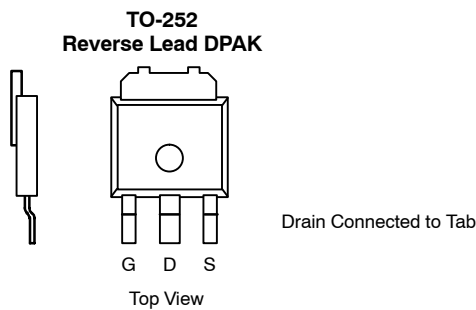
PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A) ^b
30	0.0095 @ $V_{GS} = 10$ V	63 ^b
	0.014 @ $V_{GS} = 4.5$ V	52 ^b

FEATURES

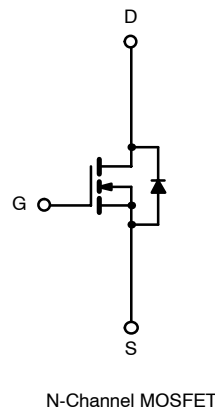
- TrenchFET® Power MOSFET
- Optimized for High- or Low-Side
- 100% R_g Tested

APPLICATIONS

- DC/DC Converters
 - Desktop CPU Core
- Synchronous Rectifiers



Ordering Information:
 SUR50N03-09P—E3
 SUR50N03-09P-T4—E3 (alternate tape orientation)



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}	± 20	
Continuous Drain Current	$T_A = 25^\circ\text{C}$	I_D	21	A
	$T_C = 25^\circ\text{C}$		63 ^b	
	$T_C = 100^\circ\text{C}$		44.5 ^b	
Pulsed Drain Current		I_{DM}	50	
Continuous Source Current (Diode Conduction) ^a		I_S	10	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	35	mJ
Single Pulse Avalanche Energy		E_{AS}	61	
Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	P_D	65.2	W
	$T_A = 25^\circ\text{C}$		7.5 ^a	
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 ^a	$t \leq 10$ sec	R_{thJA}	16	20	$^\circ\text{C/W}$
	Steady State		40	50	
Maximum Junction-to-Case		R_{thJC}	1.8	2.3	

Notes

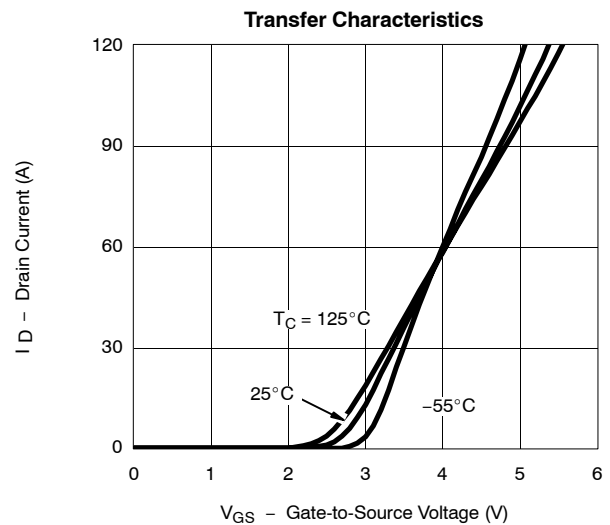
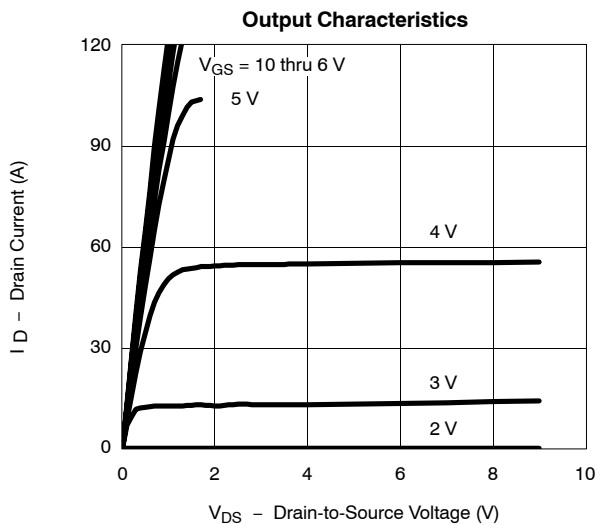
- a. Surface Mounted on FR4 Board, $t \leq 10$ sec.
 b. Based on maximum allowable junction temperature, package limitation current is 25 A.

SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ ^a	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 _D = 250 μA	1.0		3.0	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V			1	μA
		V _{DS} = 30 V, V _{GS} = 0 V, T _J = 125°C			50	
On-State Drain Current ^b	I _{D(on)}	V _{DS} = 5 V, V _{GS} = 10 V	50			A
Drain-Source On-State Resistance ^b	r _{DS(on)}	V _{GS} = 10 V, I _D = 20 A		0.0076	0.0095	Ω
		V _{GS} = 10 V, I _D = 20 A, T _J = 125°C			0.015	
		V _{GS} = 4.5 V, I _D = 20 A		0.0115	0.014	
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 20 A	20			S
Dynamic^a						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz		2200		pF
Output Capacitance	C _{oss}			410		
Reverse Transfer Capacitance	C _{rss}			180		
Gate Resistance	R _g		1	1.5	4.4	Ω
Total Gate Charge ^c	Q _g	V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 50 A		11	16	nC
Gate-Source Charge ^c	Q _{gs}			7.5		
Gate-Drain Charge ^c	Q _{gd}			5.0		
Turn-On Delay Time ^c	t _{d(on)}			9	15	
Rise Time ^c	t _r	V _{DD} = 15 V, R _L = 0.3 Ω I _D ≅ 50 A, V _{GEN} = 10 V, R _g = 2.5 Ω		80	120	ns
Turn-Off Delay Time ^c	t _{d(off)}			22	35	
Fall Time ^c	t _f			8	12	
Source-Drain Diode Ratings and Characteristic (T_C = 25°C)						
Pulsed Current	I _{SM}				100	A
Diode Forward Voltage ^b	V _{SD}	I _F = 50 A, V _{GS} = 0 V		1.2	1.5	V
Source-Drain Reverse Recovery Time	t _{rr}	I _F = 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.

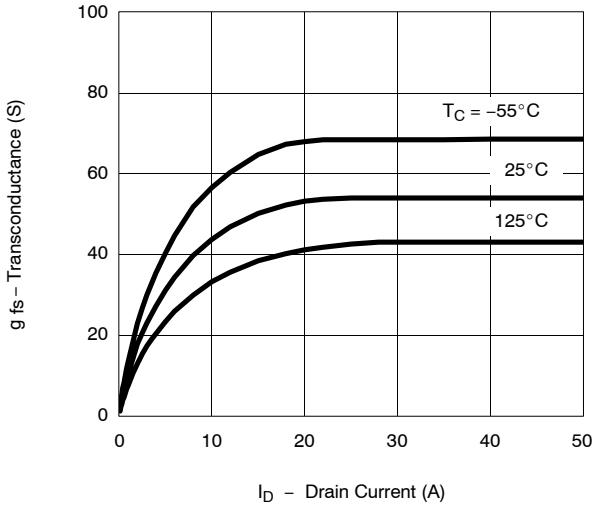
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)



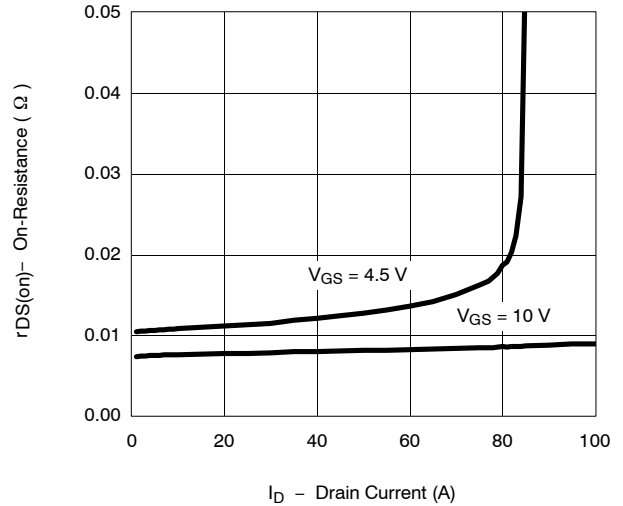


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

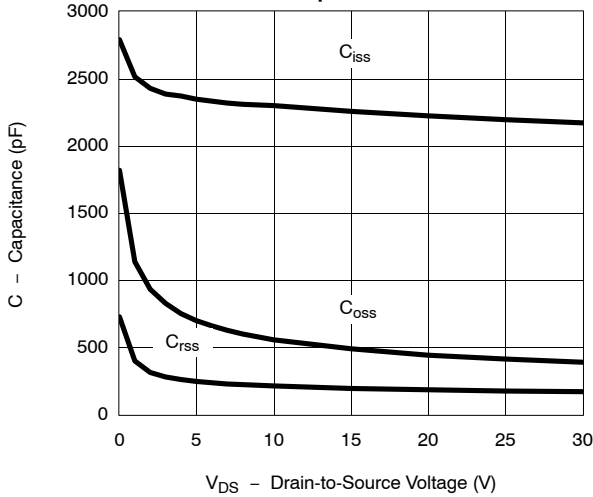
Transconductance



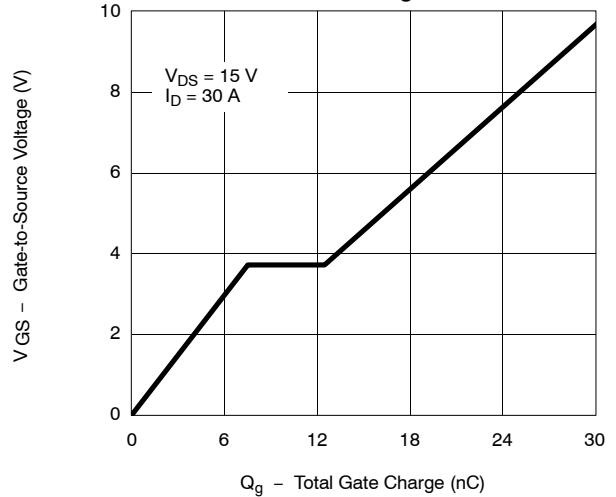
On-Resistance vs. Drain Current



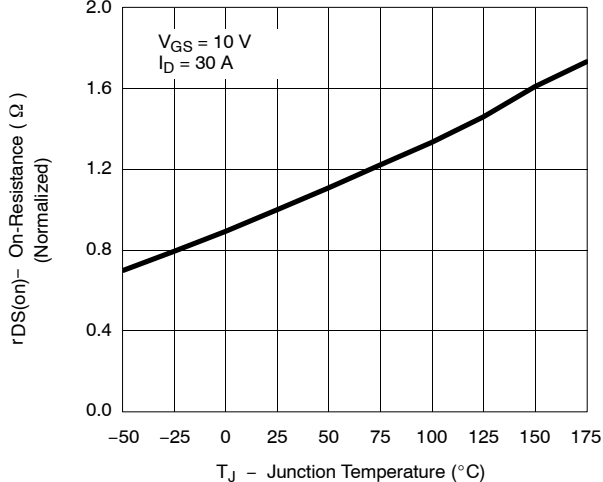
Capacitance



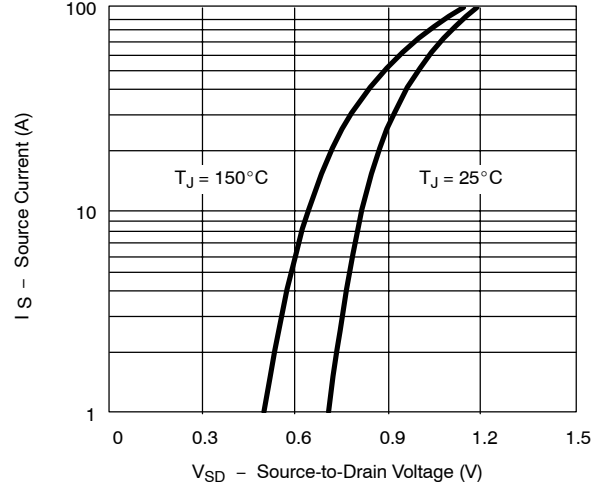
Gate Charge



On-Resistance vs. Junction Temperature

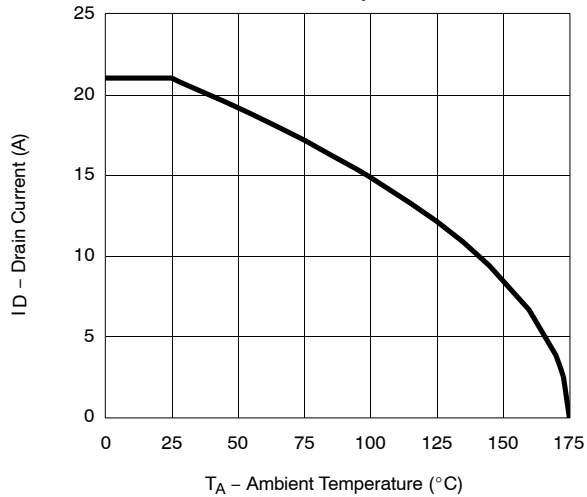


Source-Drain Diode Forward Voltage

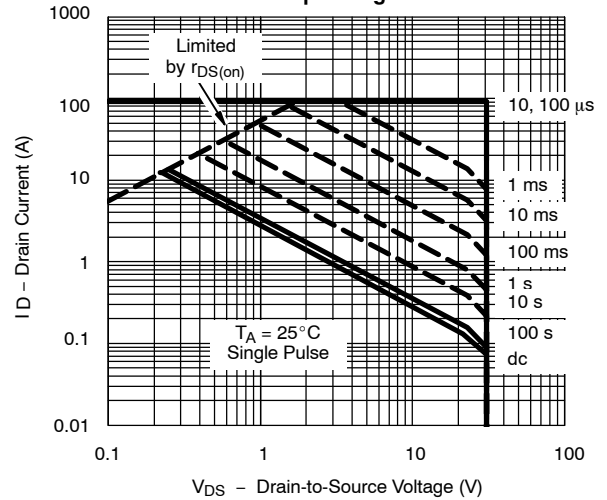


THERMAL RATINGS

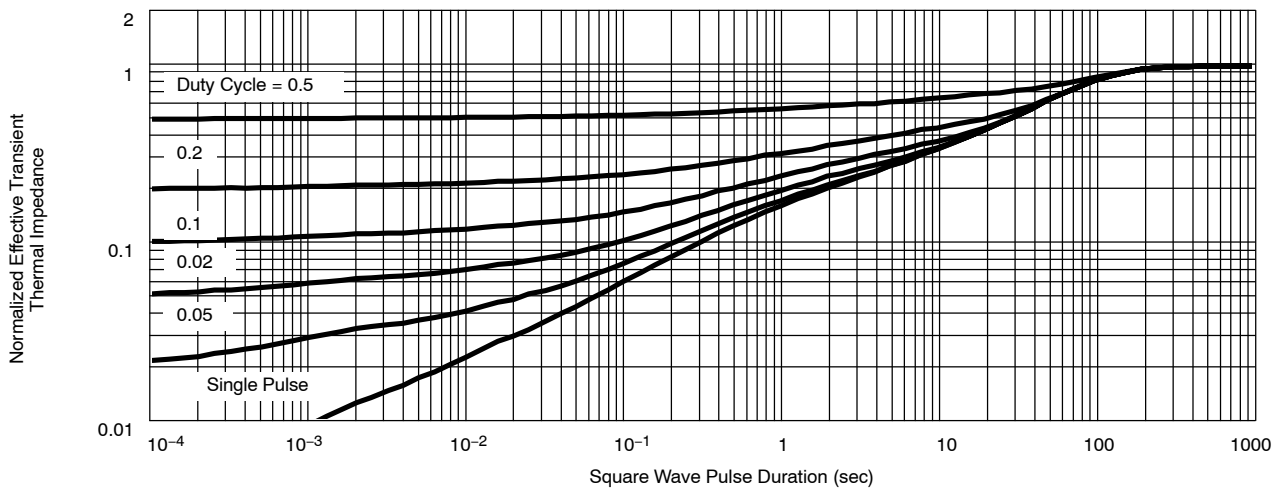
Maximum Drain Current vs. Ambient Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

