

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

PRODUCT SUMMARY			
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A) ^{a, e}	Q_g (Typ)
30	0.0057 @ $V_{GS} = 10$ V	90	30
	0.0078 @ $V_{GS} = 4.5$ V	77	

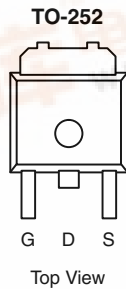
FEATURES

- TrenchFET® Power MOSFET
- Optimized for Low-Side Synchronous Rectifier Operation
- 100% R_g Tested



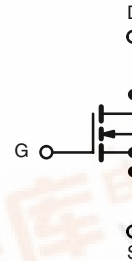
APPLICATIONS

- DC/DC Converters
- Synchronous Rectifiers



Drain Connected to Tab

Ordering Information: SUD50N03-06AP—E3 (Lead (Pb)-free)



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 ($T_J = 175^\circ\text{C}$)	$T_C = 25^\circ\text{C}$	I_D	90 ^{a, e}	A
	$T_C = 70^\circ\text{C}$		75 ^{a, e}	
	$T_A = 25^\circ\text{C}$		30 ^{b, c}	
	$T_A = 70^\circ\text{C}$		25 ^{b, c}	
Pulsed Drain Current		I_{DM}	100	
Continuous Source-Drain Diode Current	$T_C = 25^\circ\text{C}$	I_S	55 ^{a, e}	
	$T_A = 25^\circ\text{C}$		6.7 ^{b, c}	
Avalanche Current Pulse		I_{AS}	45	mJ
Single Pulse Avalanche Energy			E_{AS}	
Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	P_D	83	W
	$T_C = 70^\circ\text{C}$		58	
	$T_A = 25^\circ\text{C}$		10 ^{b, c}	
	$T_A = 70^\circ\text{C}$		7 ^{b, c}	
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 ^{b, d}		R_{thJA}	12	15	$^\circ\text{C/W}$
Maximum Junction-to-Case		R_{thJC}	1.5	1.8	

Notes:

- Based on $T_C = 25^\circ\text{C}$.
- Surface mounted on 1" x 1" FR4 board.
- $t = 10$ sec
- Maximum under steady state conditions is 50°C/W .
- Calculated based on maximum junction temperature. Package limitation current is 50 A.



SPECIFICATIONS (T _J = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	30			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		25		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			-6.3		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1.2		2.4	V
Gate-Source 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 = 55°C			10	
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 = 20 A		0.0046	0.0057	Ω
		V _{GS} = 4.5 V, I _D = 20 A		0.0062	0.0078	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 30 A		70		S
Dynamic^b						
Input Capacitance	C _{iss}	V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz		3800		pF
Output Capacitance	C _{oss}			615		
Reverse Transfer Capacitance	C _{rss}			305		
Total Gate Charge	Q _g	V _{DS} = 15 V, V _{GS} = 10 V, I _D = 30 A		62	95	nC
		V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 25 A		30	45	
Gate-Source Charge	Q _{gs}	V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 25 A		11		nC
Gate-Drain Charge	Q _{gd}			9		
Gate Resistance	R _g		f = 1 MHz		0.9	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 15 V, R _L = 0.5 Ω I _D ≅ 30 A, V _{GEN} = 10 V, R _g = 1 Ω		12	18	ns
Rise Time	t _r			10	15	
Turn-Off Delay Time	t _{d(off)}			30	45	
Fall Time	t _f			8	12	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 15 V, R _L = 0.6 Ω I _D ≅ 25 A, V _{GEN} = 4.5 V, R _g = 1 Ω		26	40	
Rise Time	t _r			230	345	
Turn-Off Delay Time	t _{d(off)}			25	40	
Fall Time	t _f			9	14	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25°C			55°	A
Pulse Diode Forward Current ^a	I _{SM}				100	
Body Diode Voltage	V _{SD}	I _S = 6.7 A		0.9	1.5	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 6.7 A, di/dt = 100 A/μs, T _J = 25°C		65	100	ns
Body Diode Reverse Recovery Charge	Q _{rr}			38	60	nC
Reverse Recovery Fall Time	t _a			50		ns
Reverse Recovery Rise Time	t _b			15		

Notes

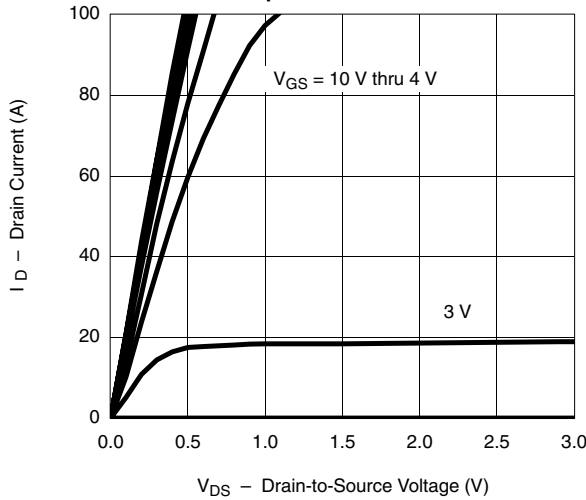
- Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
- Guaranteed by design, not subject to production testing.
- Calculated based on maximum junction temperature. Package limitation current is 50 A.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

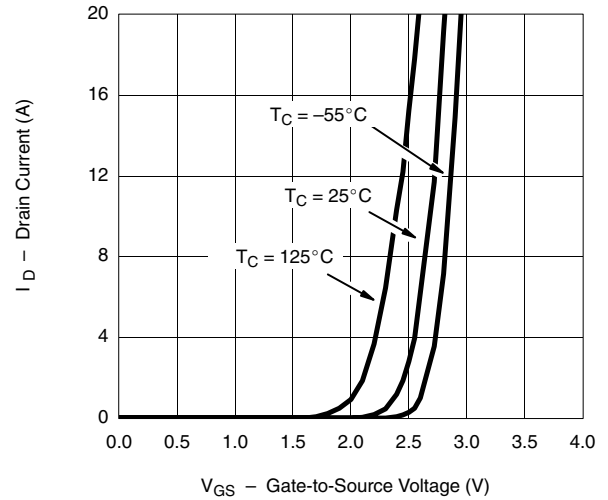


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

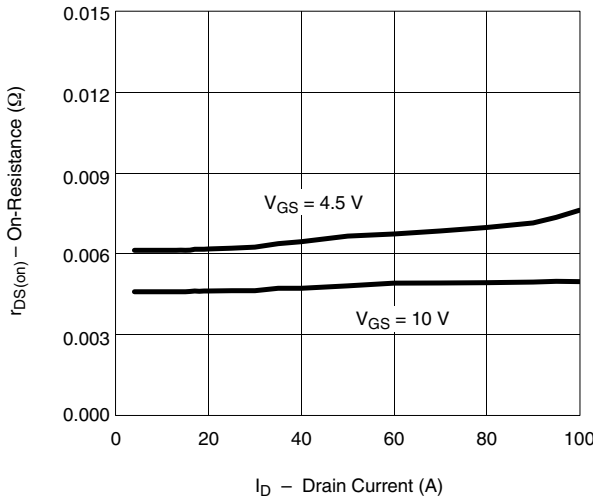
Output Characteristics



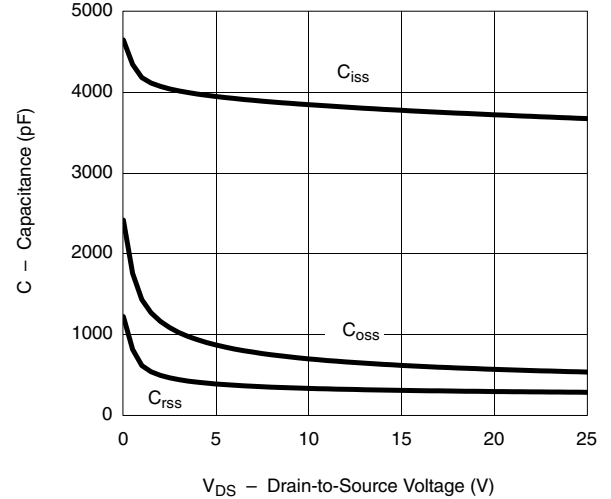
Transfer Characteristics



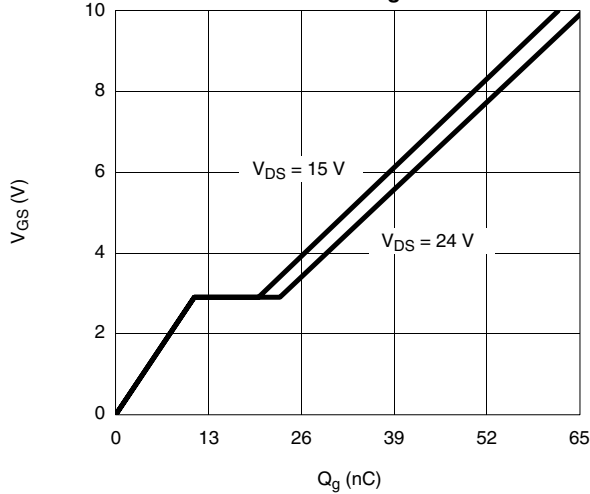
On-Resistance vs. Drain Current



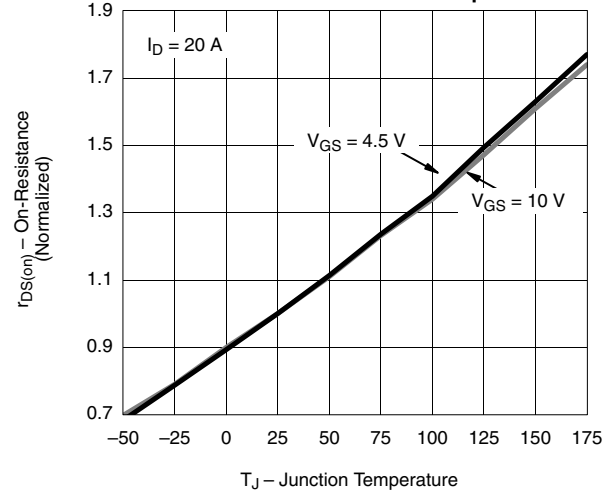
Capacitance



Gate Charge

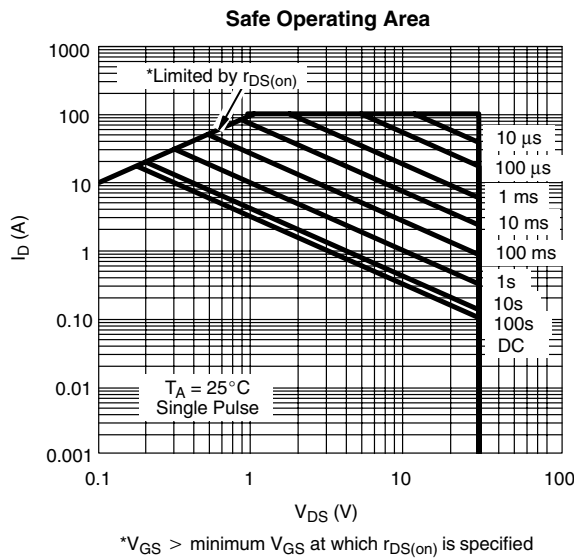
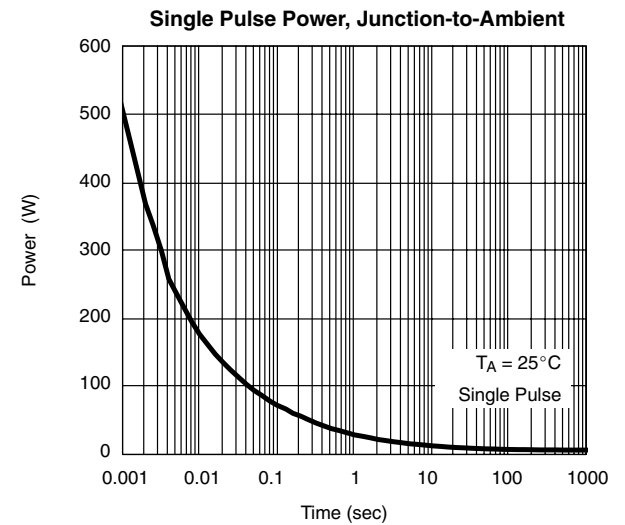
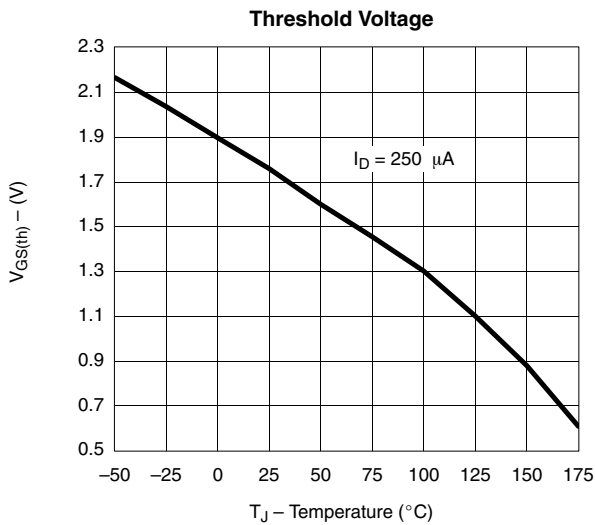
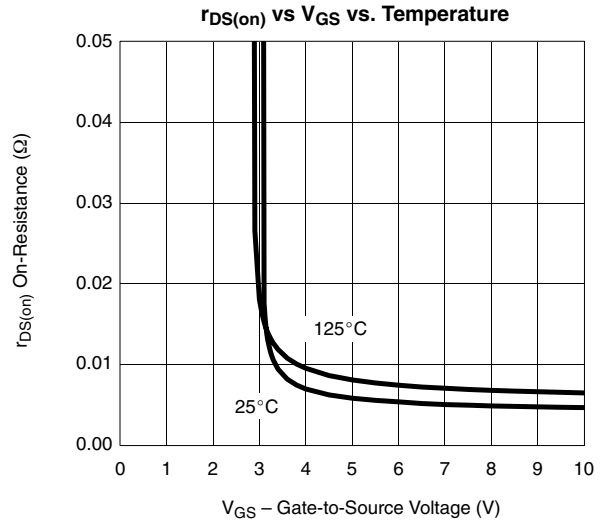
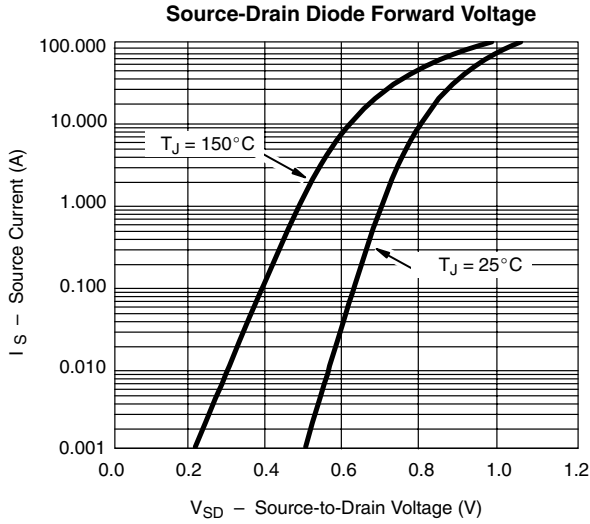


On-Resistance vs. Junction Temperature





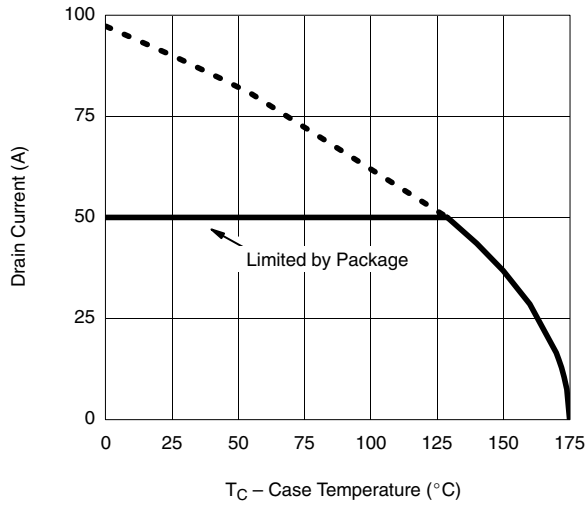
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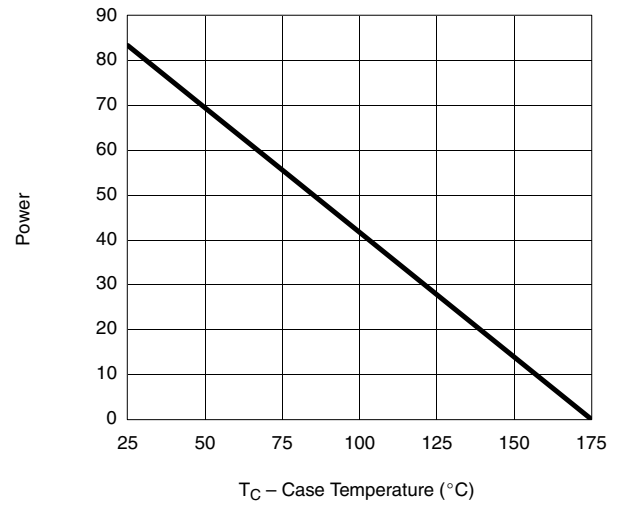


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

Current De-Rating

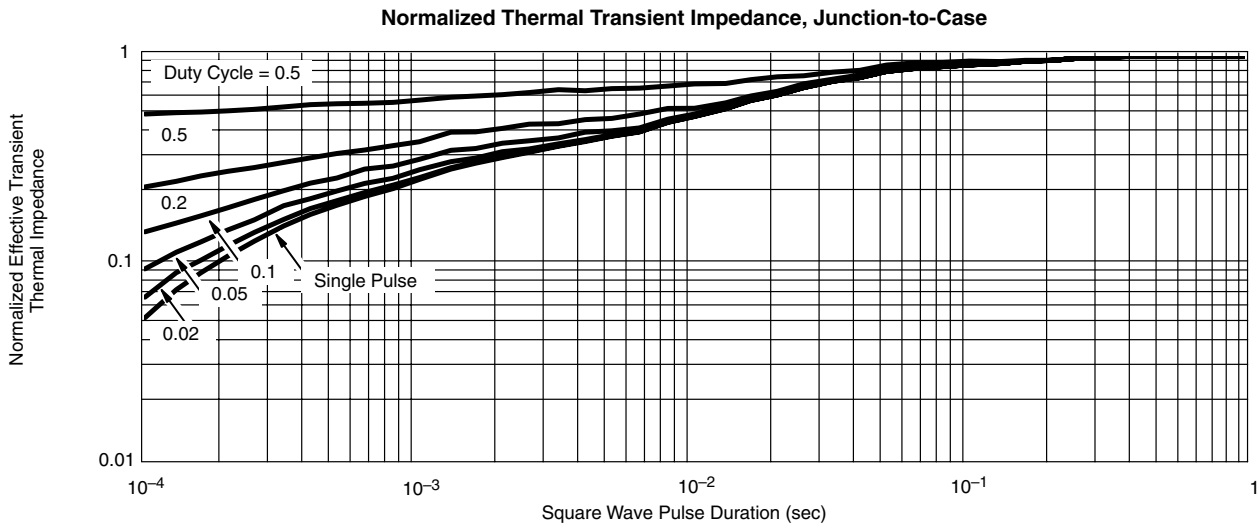
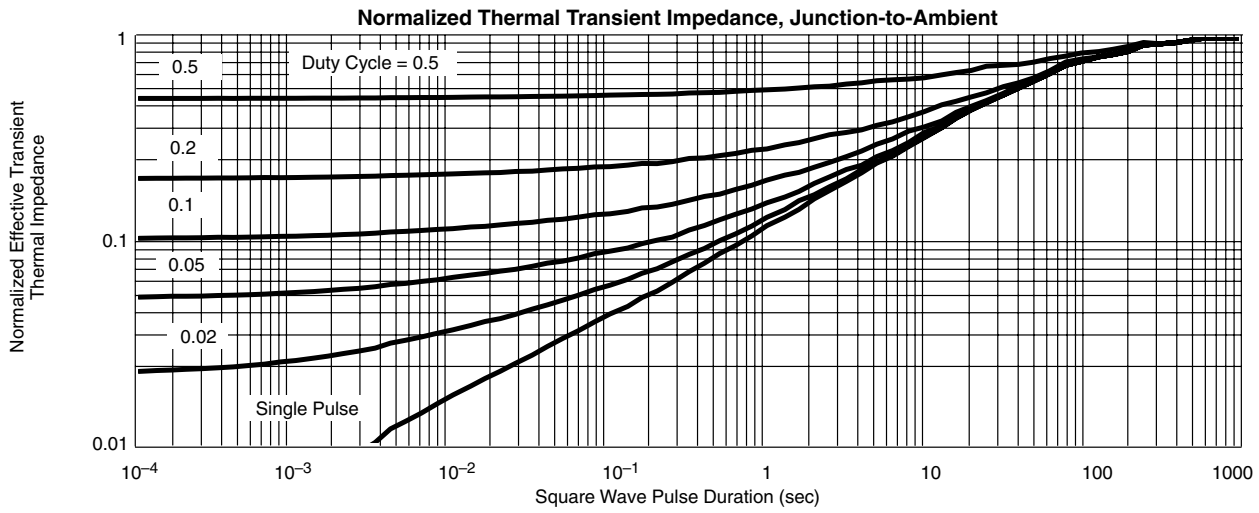


Power De-Rating





TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)



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