



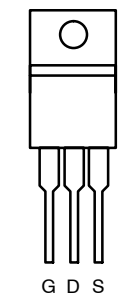
N-Channel 30-V (D-S) 175°C MOSFET

PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A) ^a
30	0.0043 @ $V_{GS} = 10$ V	85 ^a
	0.007 @ $V_{GS} = 4.5$ V	85 ^a

FEATURES

- TrenchFET® Power MOSFET
- 175°C Maximum Junction Temperature
- TO-263 (D²PAK) 100% R_g Tested

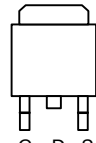
TO-220AB



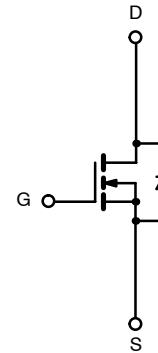
Top View
SUP85N03-04P

DRAIN connected to TAB

TO-263
(D²PAK)



Top View
SUB85N03-04P



N-Channel MOSFET

Ordering Information: SUP85N03-04P (TO-220AB)
SUB85N03-04P (TO-263, D²PAK)
SUB85N03-04P—E3 (TO-263, D²PAK, Lead 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 ($T_J = 175^\circ\text{C}$)	I_D	$T_C = 25^\circ\text{C}$	85 ^a	A
		$T_C = 100^\circ\text{C}$	85 ^a	
Pulsed Drain Current	I_{DM}	240		
Avalanche Current	I_{AR}	75		
Repetitive Avalanche Energy ^b	E_{AR}	280	mJ	
Maximum Power Dissipation ^b	P_D	$T_C = 25^\circ\text{C}$ (TO-220AB and TO-263)	166 ^c	W
		$T_A = 25^\circ\text{C}$ (TO-263) ^d	3.75	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to 175	$^\circ\text{C}$	

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	Limit	Unit	
Junction-to-Ambient	R_{thJA}	PCB Mount (TO-263) ^d	40	$^\circ\text{C/W}$
		Free Air (TO-220AB)	62.5	
Junction-to-Case	R_{thJC}	0.9		

Notes

- Package limited.
- Duty cycle $\leq 1\%$.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR-4 material).



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 _{DS} = 0 V, I _D = 250 μA	30			V
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1	2	3	
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	
		V _{DS} = 30 V, V _{GS} = 0 V, T _J = 175 °C			250	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	120			A
Drain-Source On-State Resistance ^a	r _{DS(on)}	V _{GS} = 10 V, I _D = 30 A		0.0035	0.0043	Ω
		V _{GS} = 10 V, I _D = 30 A, T _J = 125 °C			0.0065	
		V _{GS} = 10 V, I _D = 30 A, T _J = 175 °C			0.008	
		V _{GS} = 4.5 V, I _D = 20 A		0.0055	0.007	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 30 A	30			S
Dynamic^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz		4500		pF
Output Capacitance	C _{oss}			1380		
Reverse Transfer Capacitance	C _{rss}			615		
Gate Resistance ^d	R _g		0.7		3.8	Ω
Total Gate Charge ^b	Q _g	V _{DS} = 15 V, V _{GS} = 10 V, I _D = 85 A		71	90	nC
Gate-Source Charge ^b	Q _{gs}			15		
Gate-Drain Charge ^b	Q _{gd}			16		
Turn-On Delay Time ^b	t _{d(on)}	V _{DD} = 15 V, R _L = 0.18 Ω I _D ≅ 85 A, V _{GEN} = 10 V, R _g = 2.5 Ω		15	23	ns
Rise Time ^b	t _r			12	18	
Turn-Off Delay Time ^b	t _{d(off)}			50	75	
Fall Time ^b	t _f			22	35	
Source-Drain Diode Ratings and Characteristics (T_C = 25 °C)^c						
Continuous Current	I _S				85	A
Pulsed Current	I _{SM}				240	
Forward Voltage ^a	V _{SD}	I _F = 85 A, V _{GS} = 0 V		1.1	1.5	V
Reverse Recovery Time	t _{rr}	I _F = 85 A, di/dt = 100 A/μs		42	70	ns
Peak Reverse Recovery Current	I _{RM}			1.4	2.1	A
Reverse Recovery Charge	Q _{rr}			0.03	0.06	μC

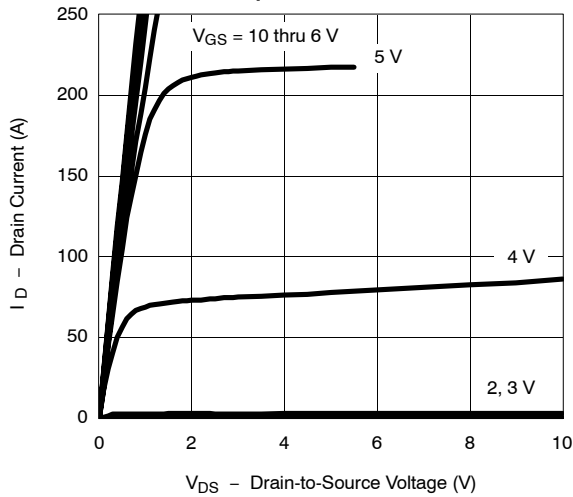
Notes

- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
- b. Independent of operating temperature.
- c. Guaranteed by design, not subject to production testing.
- d. TO-263 (D²PAK) only.

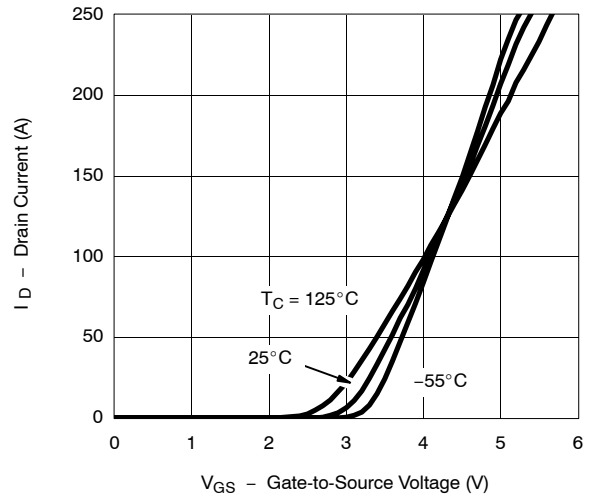


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

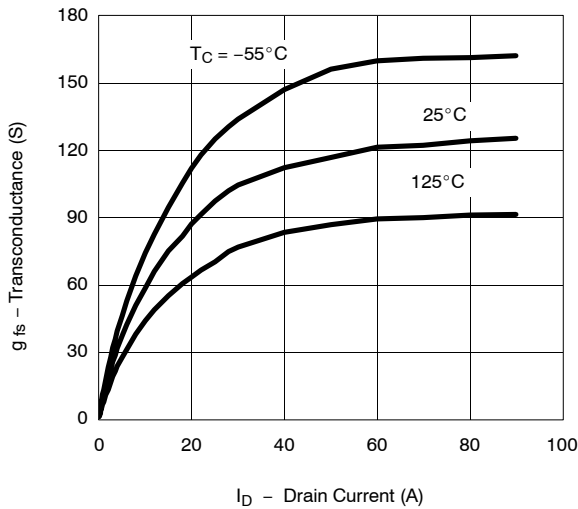
Output Characteristics



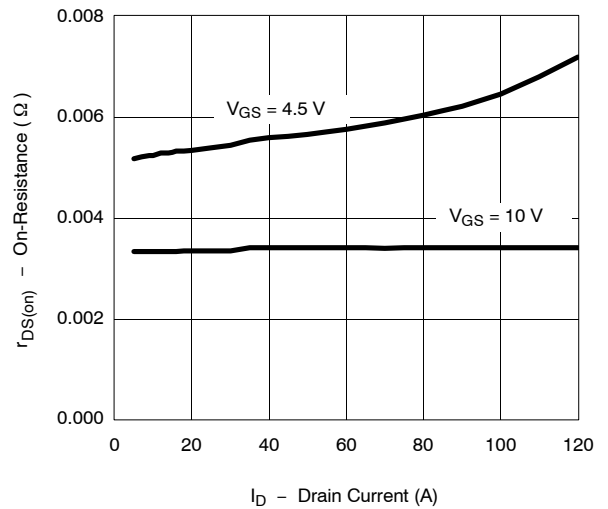
Transfer Characteristics



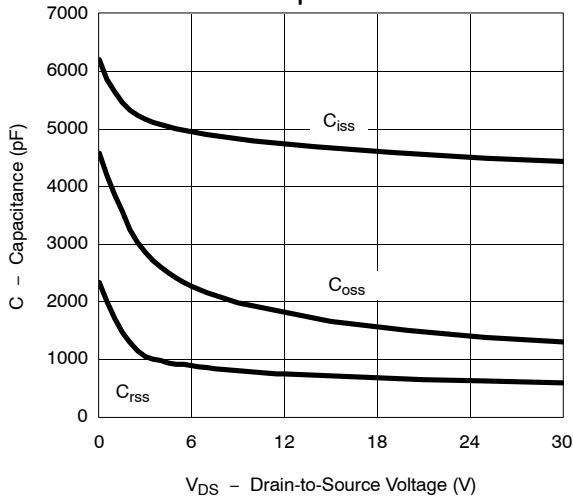
Transconductance



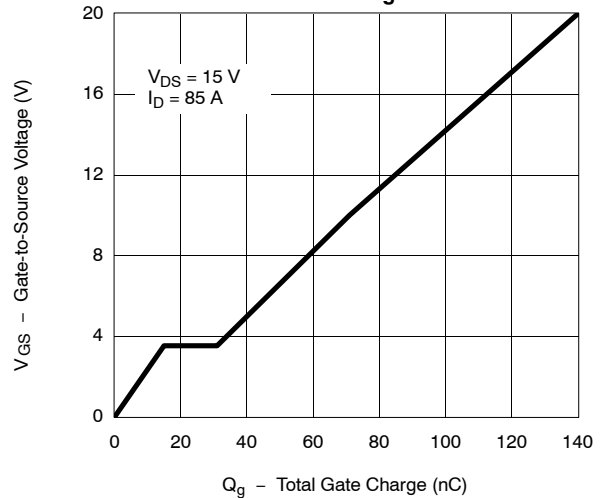
On-Resistance vs. Drain Current



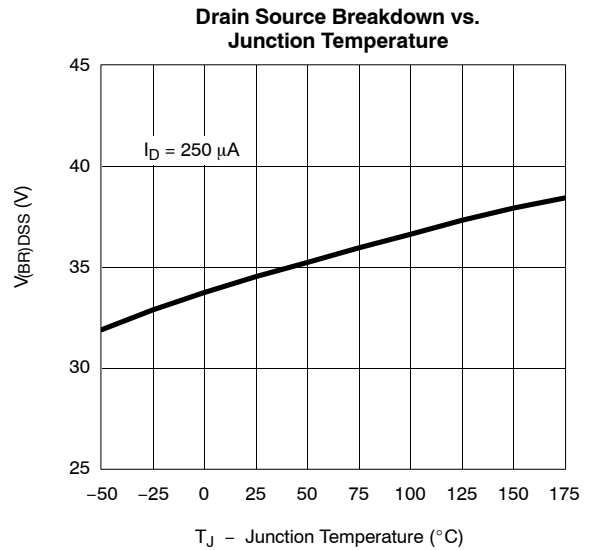
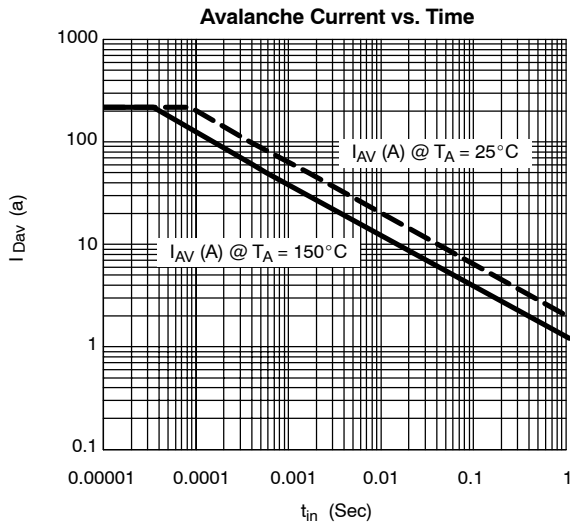
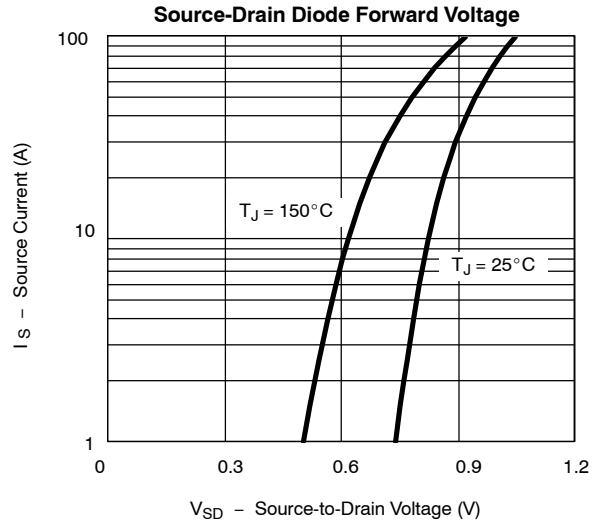
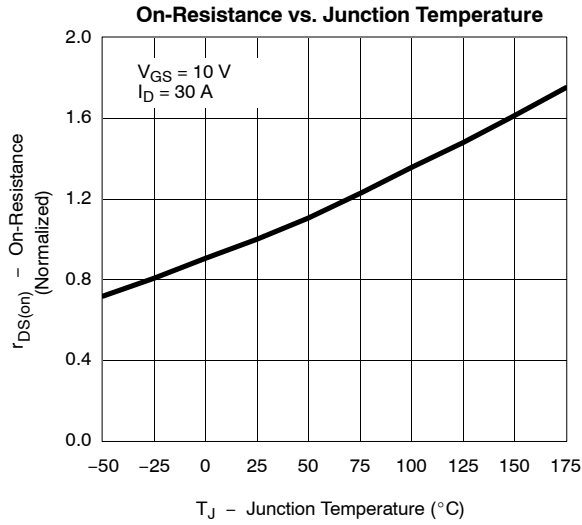
Capacitance



Gate Charge



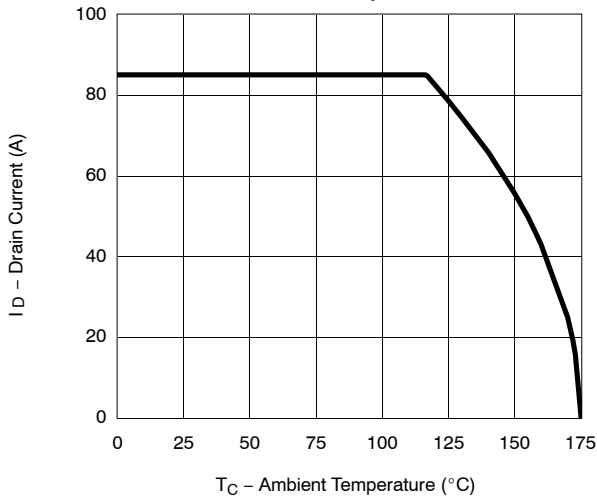
TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)



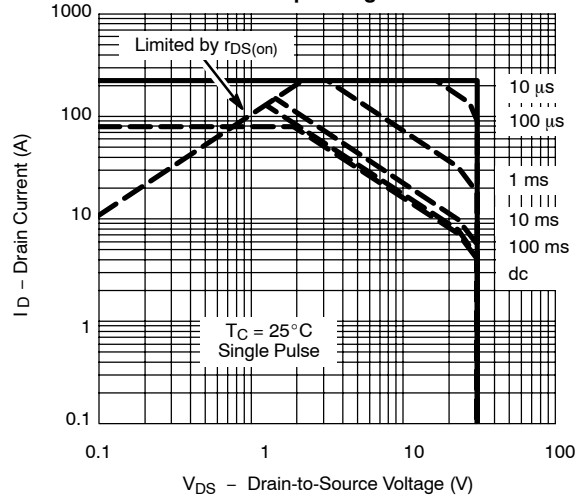


THERMAL RATINGS

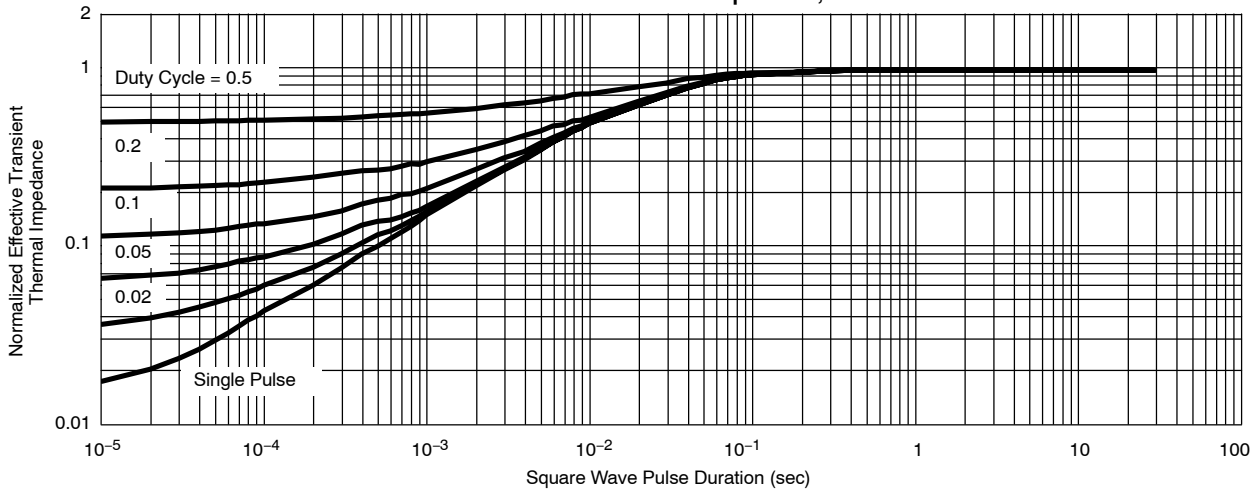
Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case





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