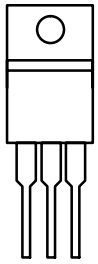
N-Channel 30-V (D-S) 175°C MOSFET

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 (D^2PAK) 100% R_g Tested

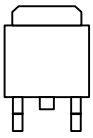
TO-220AB



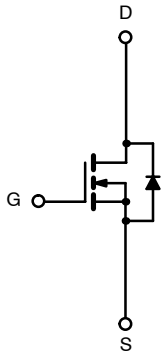
Top View
SUP85N03-04P

DRAIN connected to TAB

TO-263 (D^2PAK)



Top View
SUB85N03-04P



N-Channel MOSFET

Ordering Information: SUP85N03-04P (TO-220AB)
SUB85N03-04P (TO-263, D^2PAK)
SUB85N03-04P—E3 (TO-263, D^2PAK, Lead Free)

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)	T_C = 25°C	I_D	85[a]	A
	T_C = 100°C		85[a]	
Pulsed Drain Current		I_{DM}	240	
Avalanche Current		I_{AR}	75	
Repetitive Avalanche Energy[b]	L = 0.1 mH	E_{AR}	280	mJ
Maximum Power Dissipation[b]	T_C = 25°C (TO-220AB and TO-263)	P_D	166[c]	W
	T_A = 25°C (TO-263)[d]		3.75	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	–55 to 175	°C

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

Notes
a. Package limited.
b. Duty cycle ≤ 1%.
c. See SOA curve for voltage derating.
d. When mounted on 1" square PCB (FR-4 material).

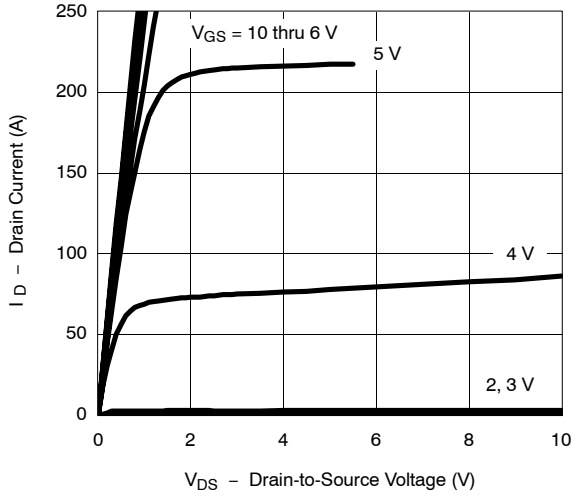
SPECIFICATIONS (T_J =25°C UNLESS OTHERWISE NOTED)

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

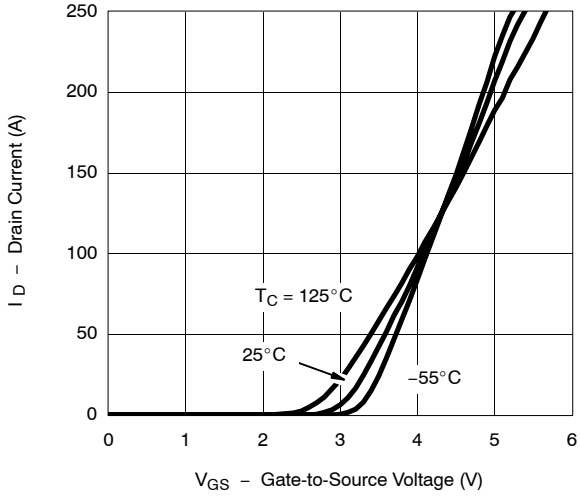
Notes
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
b. Independent of operating temperature.
c. Guaranteed by design, not subject to production testing.
d. TO-263 (D^2PAK) only.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

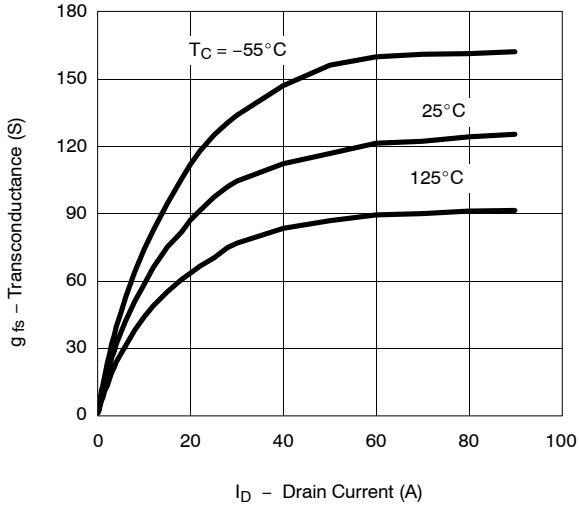
Output Characteristics



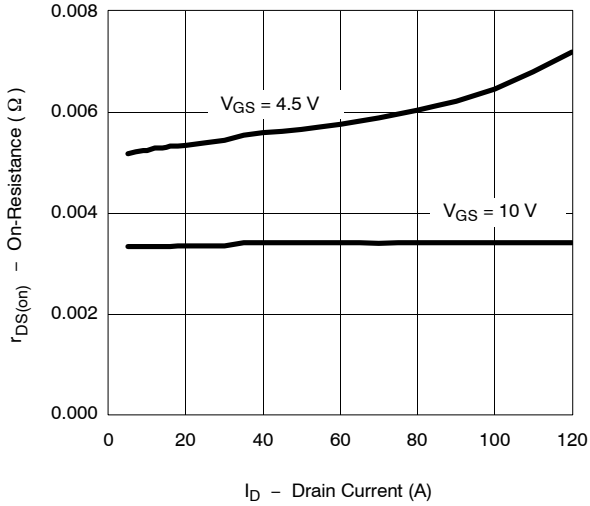
Transfer Characteristics



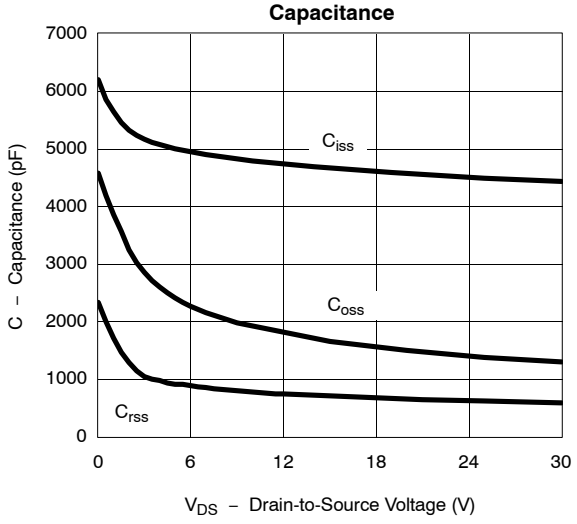
Transconductance



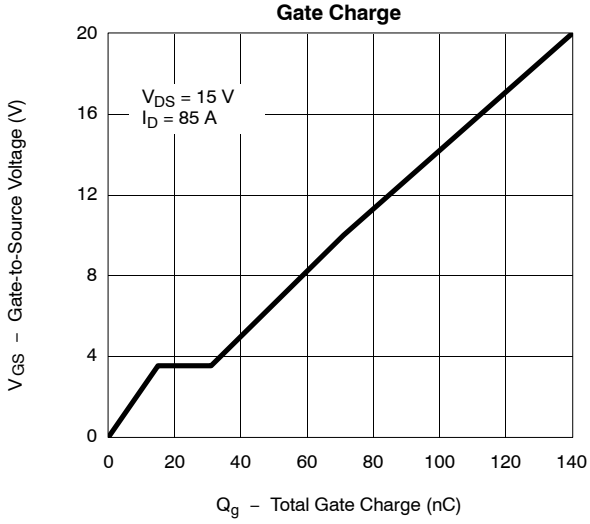
On-Resistance vs. Drain Current



Capacitance

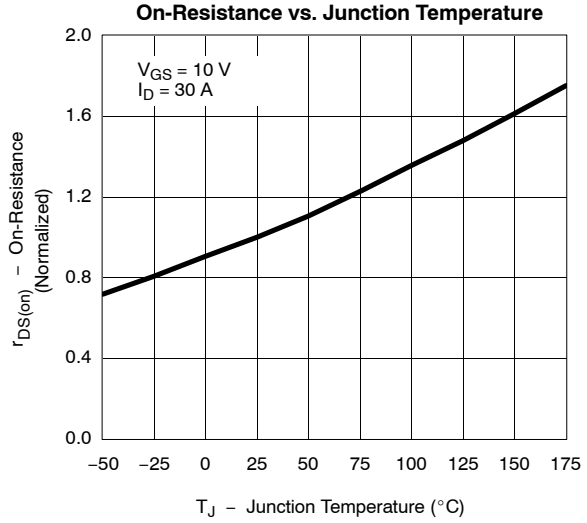


Gate Charge

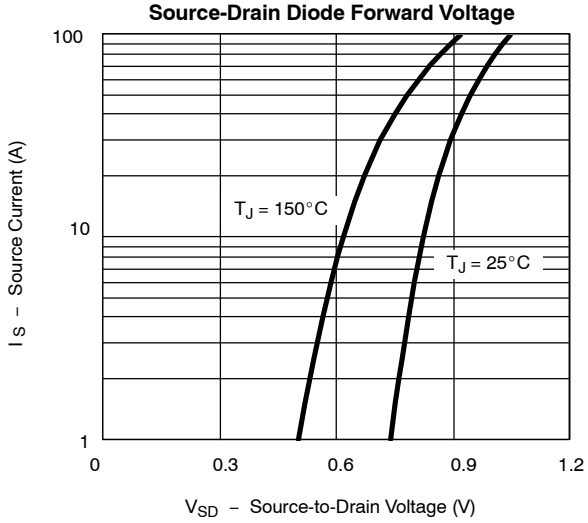


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

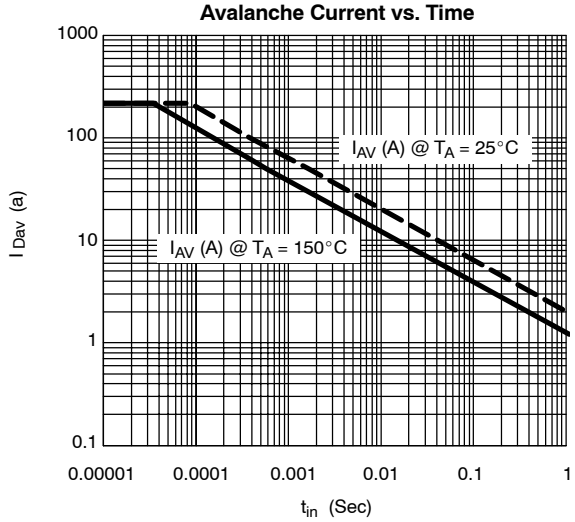
On-Resistance vs. Junction Temperature



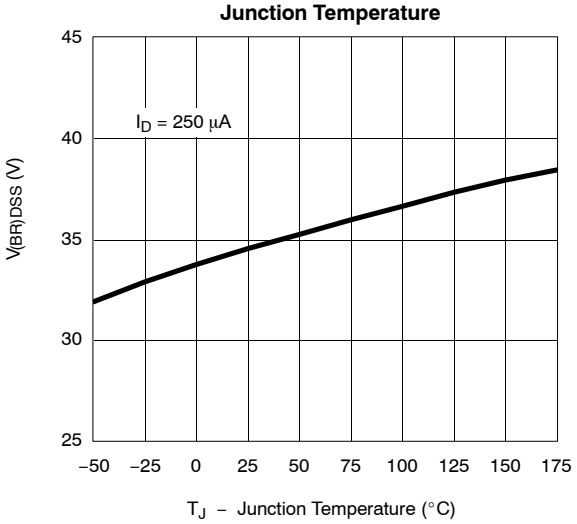
Source-Drain Diode Forward Voltage



Avalanche Current vs. Time

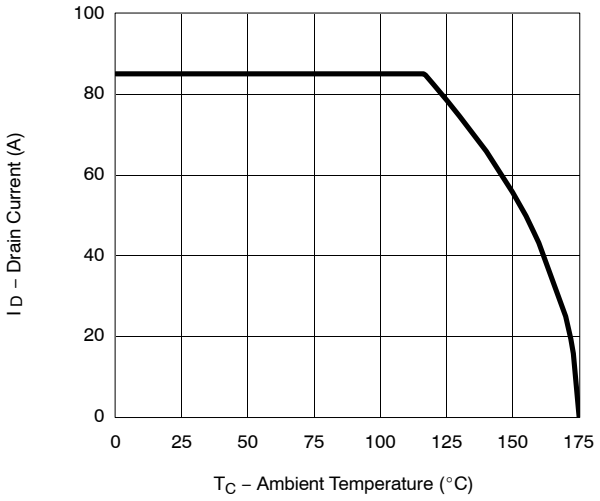


Drain Source Breakdown vs. Junction Temperature

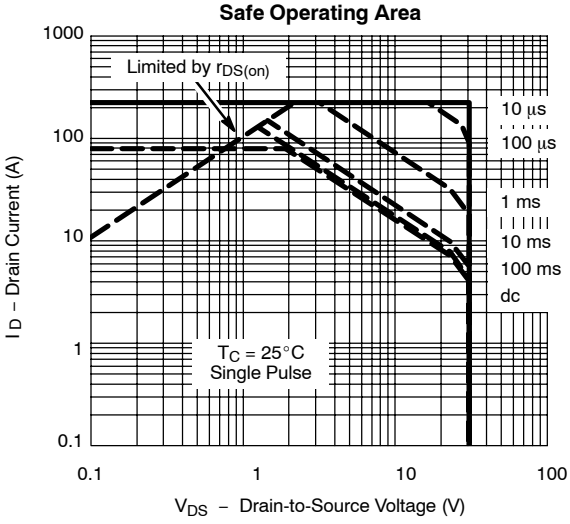


THERMAL RATINGS

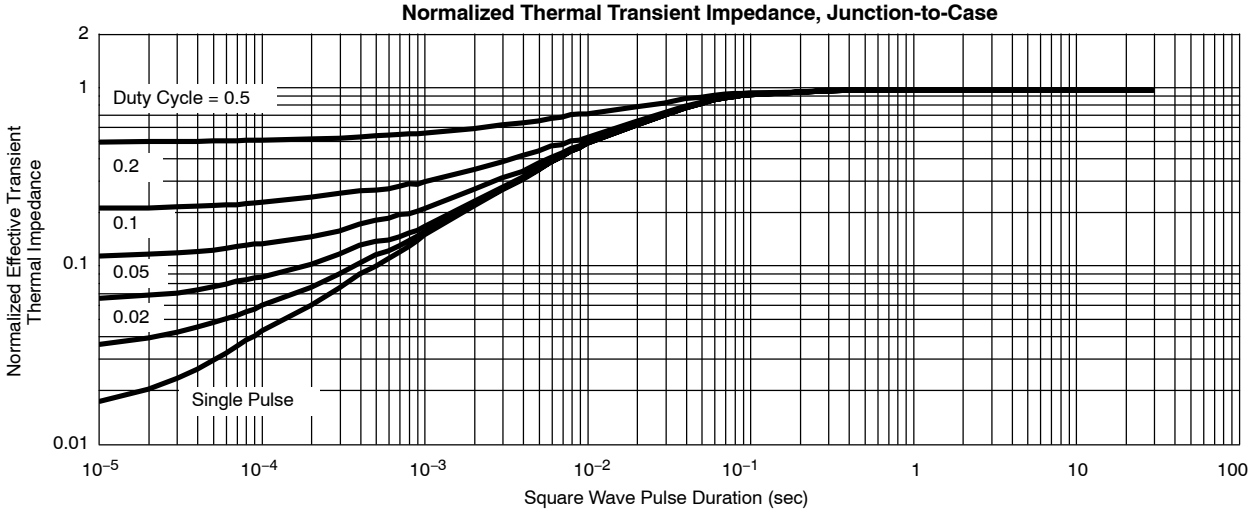
Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case



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