



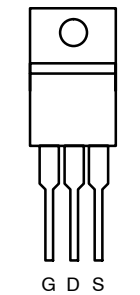
## N-Channel 30-V (D-S) 175°C MOSFET

PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>a</sup>
30	0.0043 @ $V_{GS} = 10$ V	85 <sup>a</sup>
	0.007 @ $V_{GS} = 4.5$ V	85 <sup>a</sup>

### FEATURES

- TrenchFET® Power MOSFET
- 175°C Maximum Junction Temperature
- TO-263 (D<sup>2</sup>PAK) 100% R<sub>g</sub> Tested

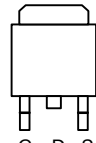
TO-220AB



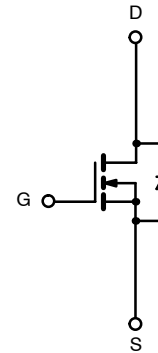
Top View  
SUP85N03-04P

DRAIN connected to TAB

TO-263  
(D<sup>2</sup>PAK)



Top View  
SUB85N03-04P



N-Channel MOSFET

Ordering Information: SUP85N03-04P (TO-220AB)  
 SUB85N03-04P (TO-263, D<sup>2</sup>PAK)  
 SUB85N03-04P—E3 (TO-263, D<sup>2</sup>PAK, 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	$V_{GS}$	$\pm 20$		
Continuous Drain Current ( $T_J = 175^\circ\text{C}$ )	$I_D$	$T_C = 25^\circ\text{C}$	85 <sup>a</sup>	A
		$T_C = 100^\circ\text{C}$	85 <sup>a</sup>	
Pulsed Drain Current	$I_{DM}$	240		
Avalanche Current	$I_{AR}$	75		
Repetitive Avalanche Energy <sup>b</sup>	$E_{AR}$	280	mJ	
Maximum Power Dissipation <sup>b</sup>	$P_D$	$T_C = 25^\circ\text{C}$ (TO-220AB and TO-263)	166 <sup>c</sup>	W
		$T_A = 25^\circ\text{C}$ (TO-263) <sup>d</sup>	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) <sup>d</sup>	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 <sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>DS</sub> = 0 V, I <sub>D</sub> = 250 μA	30			V
Gate-Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	1	2	3	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C			50	
		V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 175 °C			250	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ 5 V, V <sub>GS</sub> = 10 V	120			A
Drain-Source On-State Resistance <sup>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A		0.0035	0.0043	Ω
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A, T <sub>J</sub> = 125 °C			0.0065	
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A, T <sub>J</sub> = 175 °C			0.008	
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 20 A		0.0055	0.007	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 30 A	30			S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz		4500		pF
Output Capacitance	C <sub>oss</sub>			1380		
Reverse Transfer Capacitance	C <sub>rss</sub>			615		
Gate Resistance <sup>d</sup>	R <sub>g</sub>		0.7		3.8	Ω
Total Gate Charge <sup>b</sup>	Q <sub>g</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 85 A		71	90	nC
Gate-Source Charge <sup>b</sup>	Q <sub>gs</sub>			15		
Gate-Drain Charge <sup>b</sup>	Q <sub>gd</sub>			16		
Turn-On Delay Time <sup>b</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 15 V, R <sub>L</sub> = 0.18 Ω I <sub>D</sub> ≅ 85 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 2.5 Ω		15	23	ns
Rise Time <sup>b</sup>	t <sub>r</sub>			12	18	
Turn-Off Delay Time <sup>b</sup>	t <sub>d(off)</sub>			50	75	
Fall Time <sup>b</sup>	t <sub>f</sub>			22	35	
<b>Source-Drain Diode Ratings and Characteristics (T<sub>C</sub> = 25 °C)<sup>c</sup></b>						
Continuous Current	I <sub>S</sub>				85	A
Pulsed Current	I <sub>SM</sub>				240	
Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>F</sub> = 85 A, V <sub>GS</sub> = 0 V		1.1	1.5	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 85 A, di/dt = 100 A/μs		42	70	ns
Peak Reverse Recovery Current	I <sub>RM</sub>			1.4	2.1	A
Reverse Recovery Charge	Q <sub>rr</sub>			0.03	0.06	μC

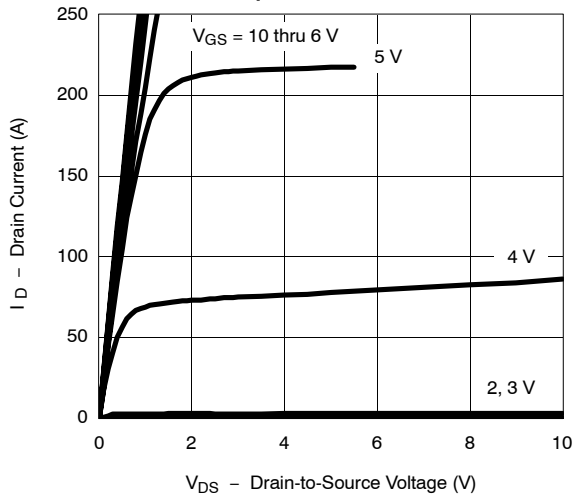
Notes

- 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<sup>2</sup>PAK) only.

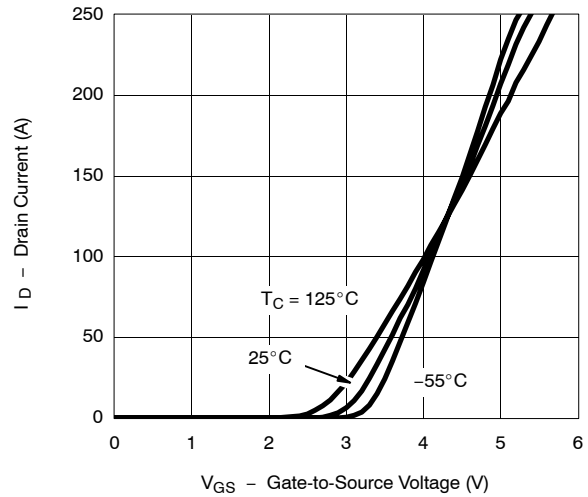


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

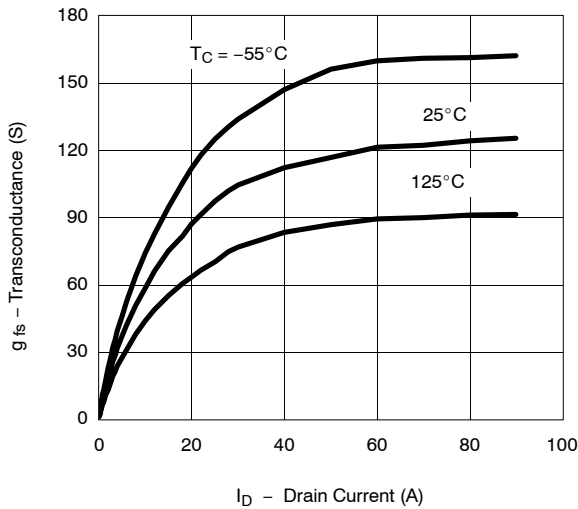
**Output Characteristics**



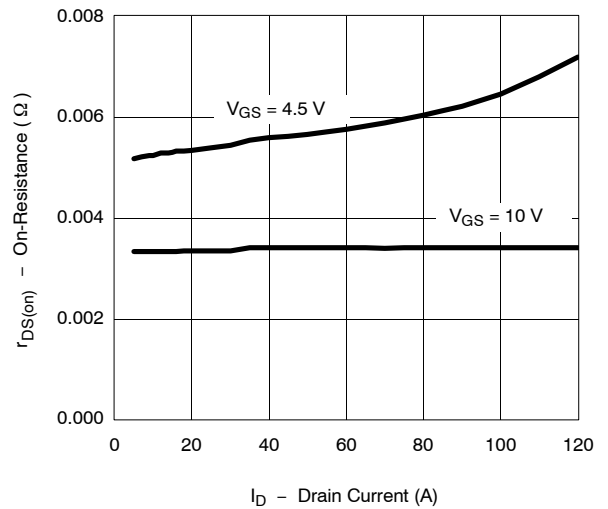
**Transfer Characteristics**



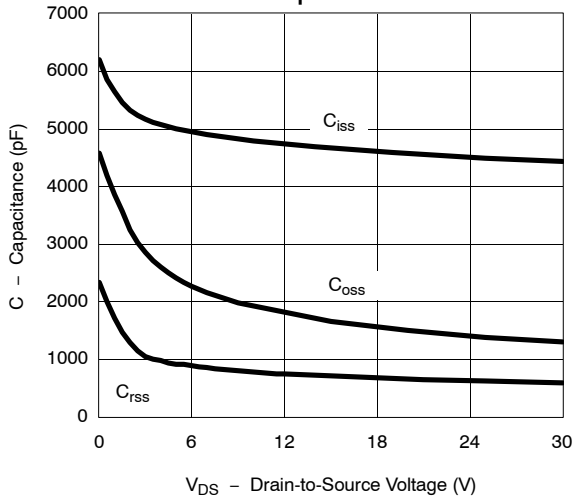
**Transconductance**



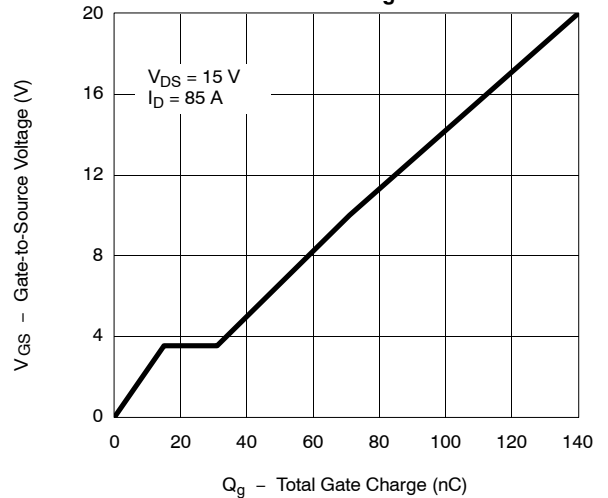
**On-Resistance vs. Drain Current**



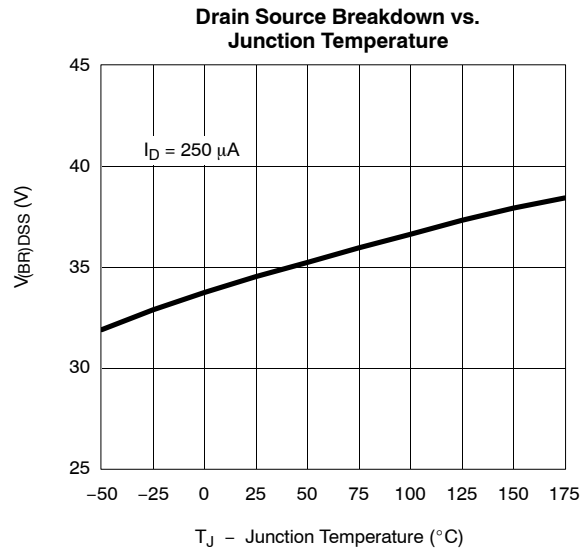
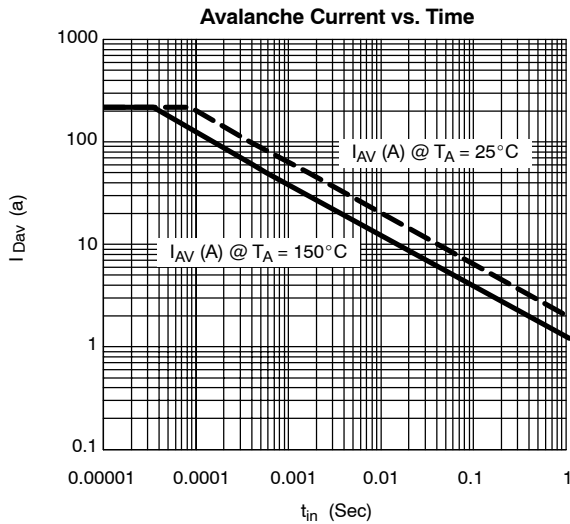
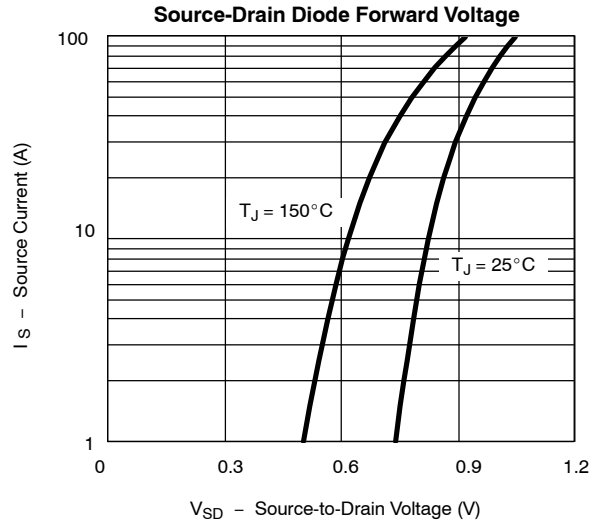
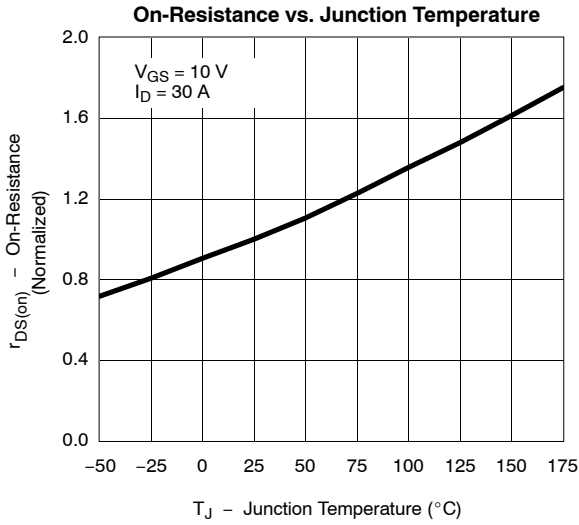
**Capacitance**



**Gate Charge**



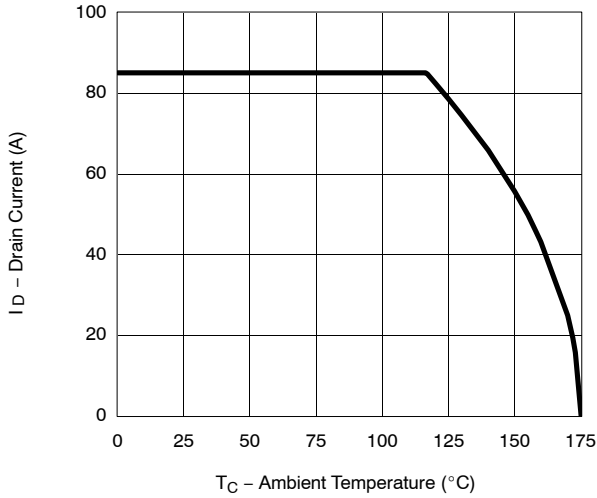
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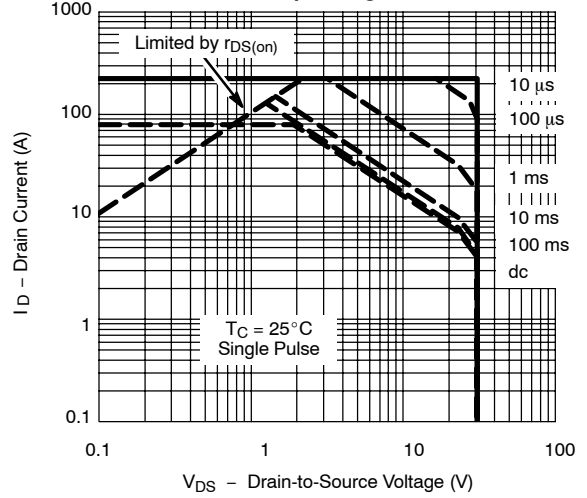


**THERMAL RATINGS**

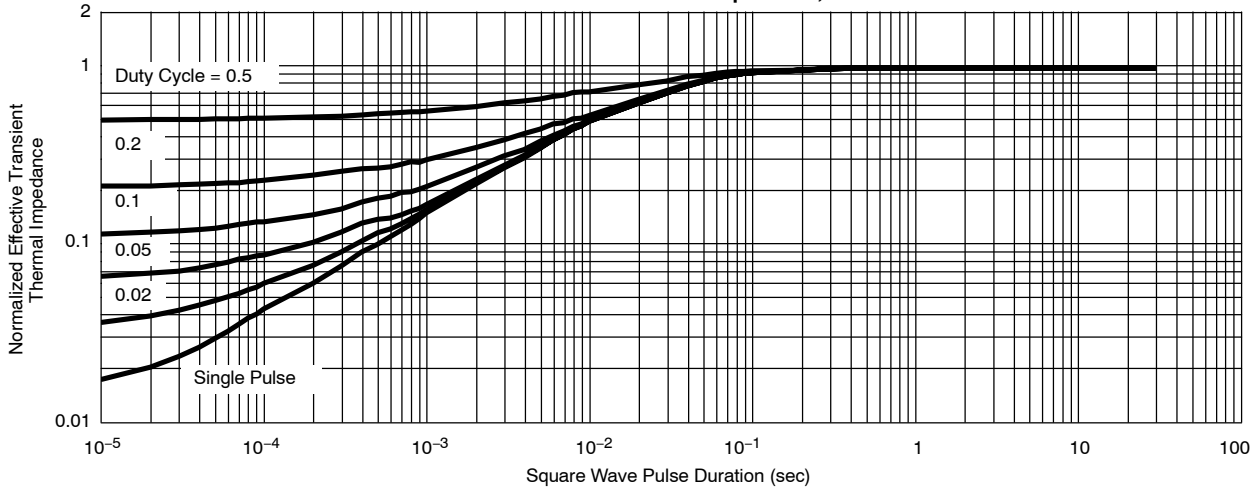
**Maximum Avalanche and Drain Current vs. Case Temperature**



**Safe Operating Area**



**Normalized Thermal Transient Impedance, Junction-to-Case**





## Disclaimer

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