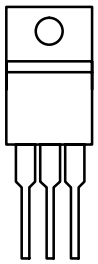
N-Channel 20-V (D-S) 175°C MOSFET

PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)[a]
20	0.003 @ V_{GS} = 4.5 V	85
	0.0034 @ V_{GS} = 2.5 V	85
	0.0038 @ V_{GS} = 1.8 V	85

175°C Rated
Maximum Junction Temperature
TrenchFET®
Power MOSFETs

TO-220AB

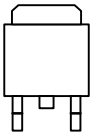


G D S
Top View

DRAIN connected to TAB

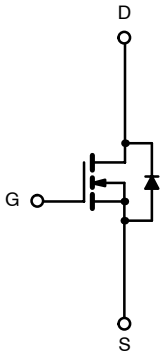
Ordering Information:
SUP85N02-03—E3 (Lead Free)

TO-263



G D S
Top View

Ordering Information:
SUB85N02-03—E3 (Lead Free)



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	±8	
Continuous Drain Current (T_J = 175°C)[a]	T_C = 25°C	I_D	85	A
	T_C = 100°C		85	
Pulsed Drain Current		I_{DM}	240	
Avalanche Current		I_{AR}	30	
Repetitive Avalanche Energy[b]	L = 0.1 mH	E_{AR}	45	mJ
Power Dissipation[a]	T_C = 25°C	P_D	250	W
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)[c]	R_{thJA}	40	°C/W
	Free Air (TO-220AB)		62.5	
Junction-to-Case		R_{thJC}	0.6	

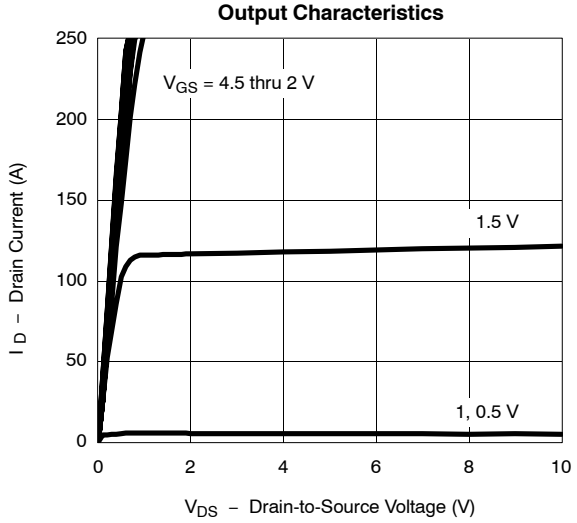
Notes:
a. See SOA curve for voltage derating.
b. Duty cycle ≤ 1%.
c. When mounted on 1" square PCB (FR-4 material).

MOSFET 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_{GS} = 0 V, I_D = 2 mA	20			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_{DS} = 2 mA	0.45			
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±8 V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20 V, V_{GS} = 0 V			1	µA
		V_{DS} = 20 V, V_{GS} = 0 V, T_J = 125°C			250	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} = 5 V, V_{GS} = 4.5 V	120			A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = 4.5 V, I_D = 30 A		0.0025	0.003	Ω
		V_{GS} = 4.5 V, I_D = 30 A, T_J = 125°C			0.0042	
		V_{GS} = 4.5 V, I_D = 30 A, T_J = 175°C			0.005	
		V_{GS} = 2.5 V, I_D = 30 A		0.0027	0.0034	
		V_{GS} = 1.8 V, I_D = 30 A		0.003	0.0038	
Forward Transconductance[a]	g_{fs}	V_{DS} = 5 V, I_D = 30 A	30			S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 20 V, f = 1 MHz		21250		pF
Output Capacitance	C_{oss}			2350		
Reversen Transfer Capacitance	C_{rss}			1520		
Total Gate Charge[c]	Q_g	V_{DS} = 10 V, V_{GS} = 4.5 V, I_D = 85 A		140	200	nC
Gate-Source Charge[c]	Q_{gs}			18		
Gate-Drain Charge[c]	Q_{gd}			24		
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 10 V, R_L = 0.12 Ω I_D ≃ 85 A, V_{GEN} = 4.5 V, R_g = 2.5 Ω		20	30	ns
Rise Time[c]	t_r			200	300	
Turn-Off Delay Time[c]	$t_{d(off)}$			450	670	
Fall Time[c]	t_f			320	480	
Source-Drain Diode Ratings and Characteristics (T_C = 25°C)[b]						
Pulsed Current	I_{SM}				240	A
Forward Voltage[a]	V_{SD}	I_F = 100 A, V_{GS} = 0 V		1.2	1.5	V
Reverse Recovery Time	t_{rr}	I_F = 50 A, di/dt = 100 A/µs		75	150	ns

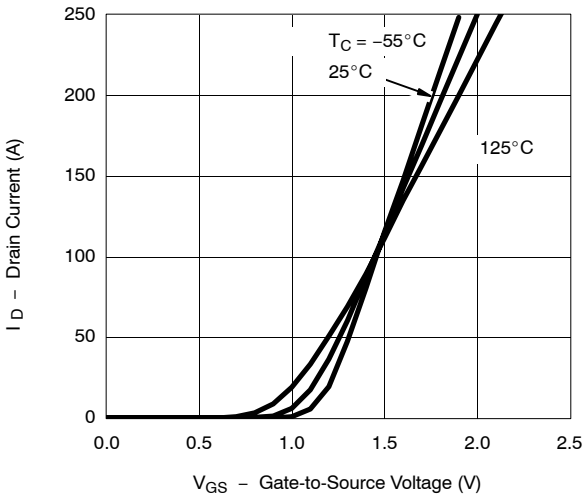
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

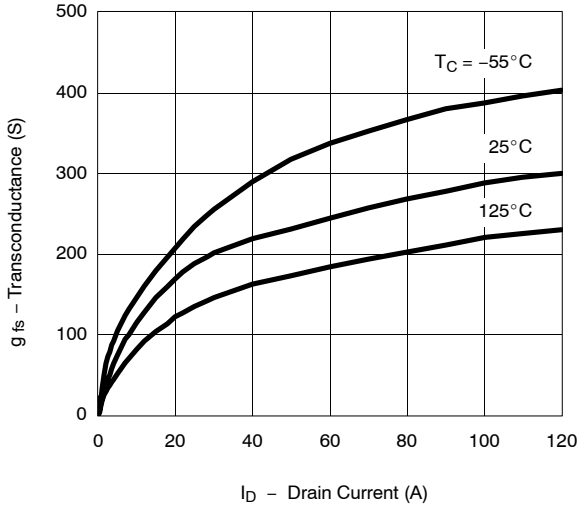
Output Characteristics



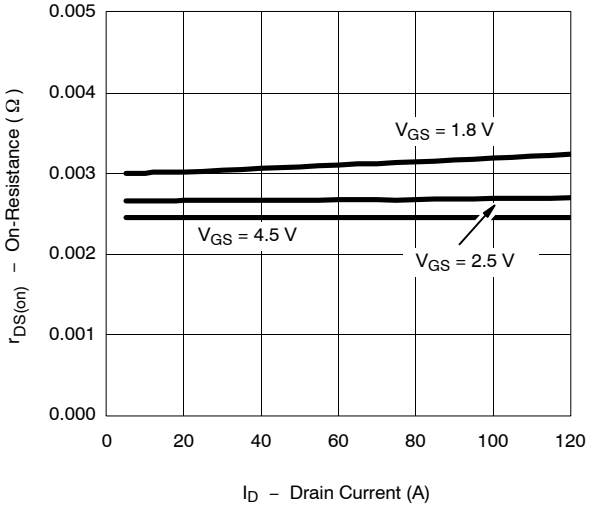
Transfer Characteristics



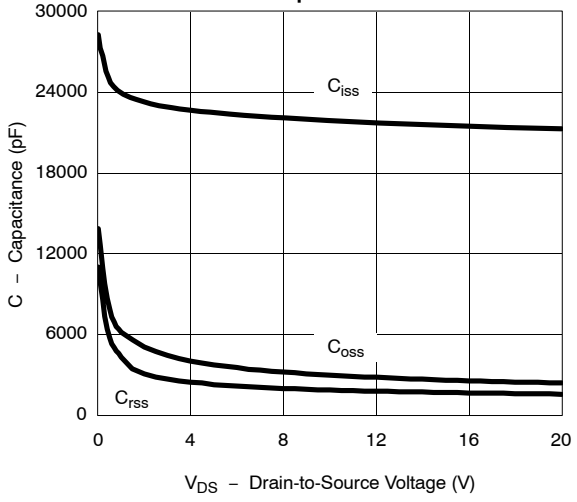
Transconductance



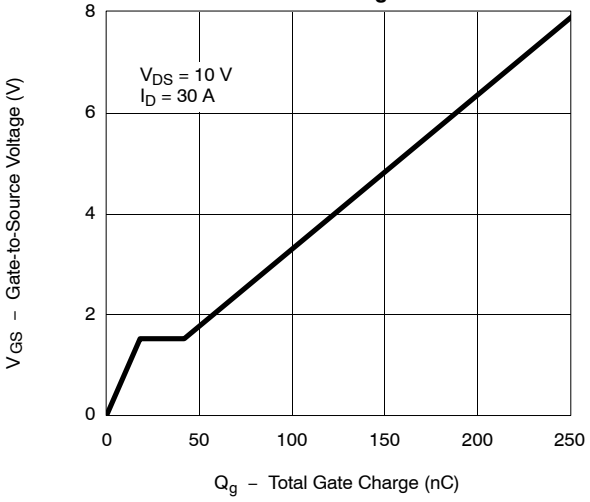
On-Resistance vs. Drain Current



Capacitance

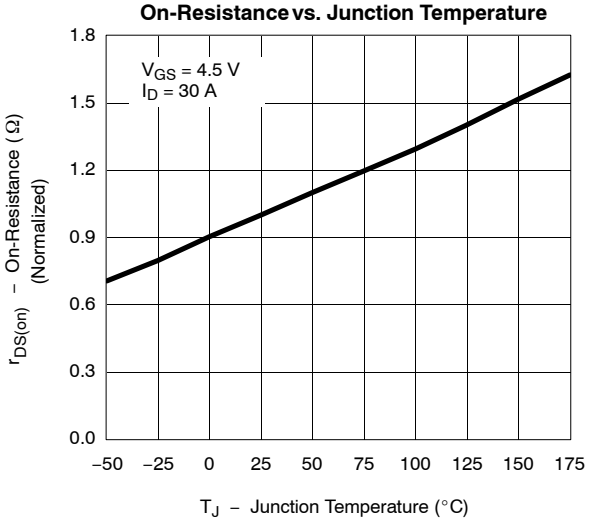


Gate Charge

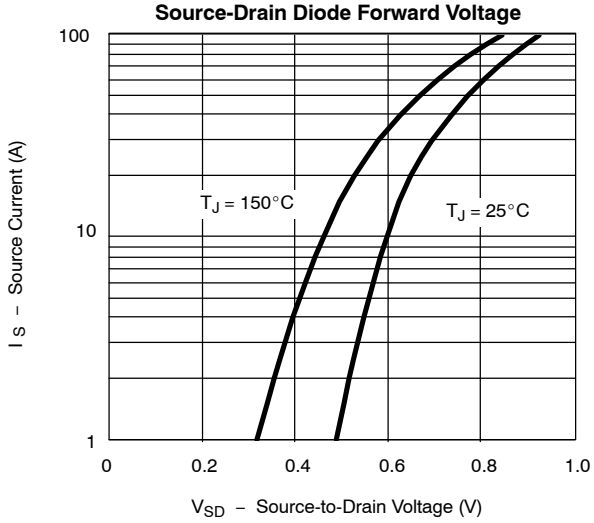


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

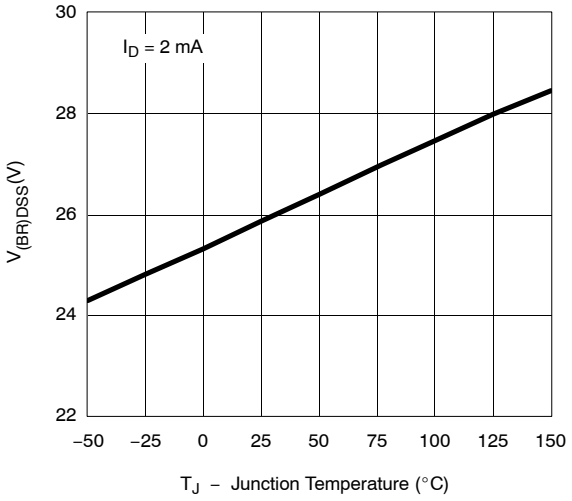
On-Resistance vs. Junction Temperature



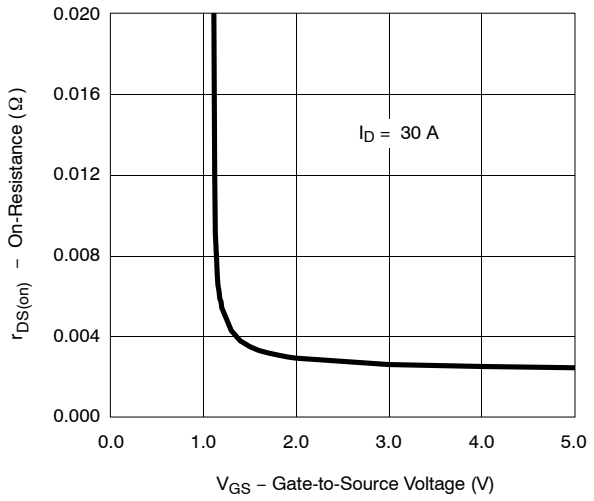
Source-Drain Diode Forward Voltage



Drain-Source Voltage Breakdown vs. Junction Temperature

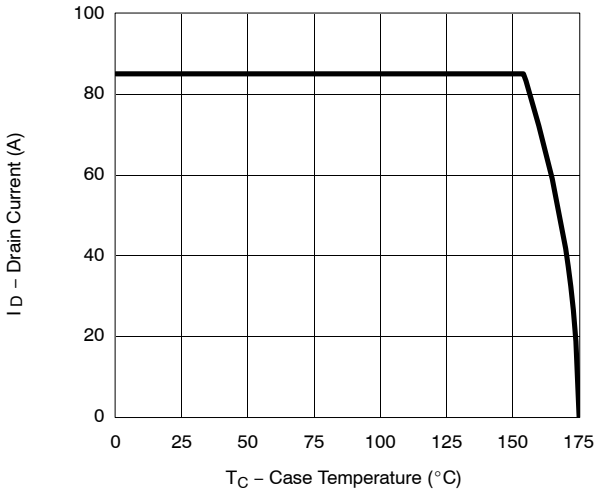


On-Resistance vs. Gate-to-Source Voltage

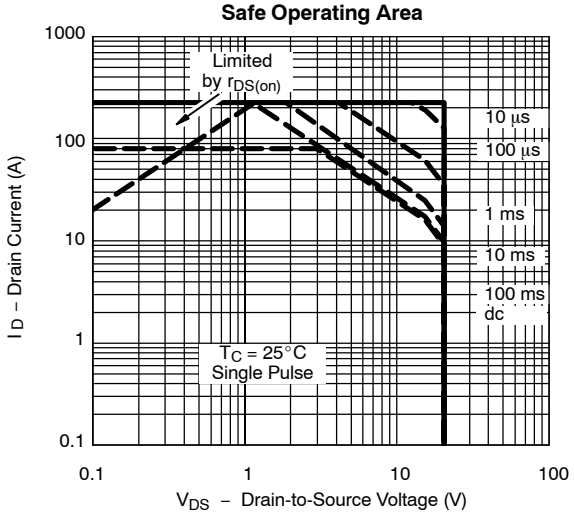


THERMAL RATINGS

Maximum Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

