

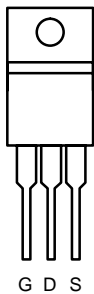


N-Channel 20-V (D-S), 175°C MOSFET

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

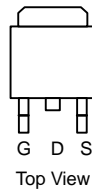
TO-220AB



Top View

SUP85N02-03

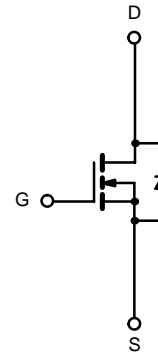
TO-263



Top View

SUB85N02-03

DRAIN connected to TAB



N-Channel MOSFET

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

Notes:

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

MOSFET SPECIFICATIONS ($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 2\text{ mA}$	20			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_{DS} = 2\text{ mA}$	0.45			
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 16\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 16\text{ V}, V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$			250	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = 5\text{ V}, V_{GS} = 4.5\text{ V}$	120			A
Drain-Source On-State Resistance ^a	$r_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 30\text{ A}$		0.0025	0.003	Ω
		$V_{GS} = 4.5\text{ V}, I_D = 30\text{ A}, T_J = 125^\circ\text{C}$			0.0042	
		$V_{GS} = 4.5\text{ V}, I_D = 30\text{ A}, T_J = 175^\circ\text{C}$			0.005	
		$V_{GS} = 2.5\text{ V}, I_D = 30\text{ A}$		0.0027	0.0034	
		$V_{GS} = 1.8\text{ V}, I_D = 30\text{ A}$		0.003	0.0038	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 5\text{ V}, I_D = 30\text{ A}$	30			S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 20\text{ V}, f = 1\text{ MHz}$		21250		pF
Output Capacitance	C_{oss}			2350		
Reverse Transfer Capacitance	C_{rss}			1520		
Total Gate Charge ^c	Q_g	$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 85\text{ A}$		140	200	nC
Gate-Source Charge ^c	Q_{gs}			18		
Gate-Drain Charge ^c	Q_{gd}			24		
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 0.12\ \Omega$ $I_D = 85\text{ A}, V_{GEN} = 4.5\text{ V}, R_G = 2.5\ \Omega$		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 ($T_C = 25^\circ\text{C}$)^b						
Pulsed Current	I_{SM}				240	A
Forward Voltage ^a	V_{SD}	$I_F = 100\text{ A}, V_{GS} = 0\text{ V}$		1.2	1.5	V
Reverse Recovery Time	t_{rr}	$I_F = 50\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		75	150	ns

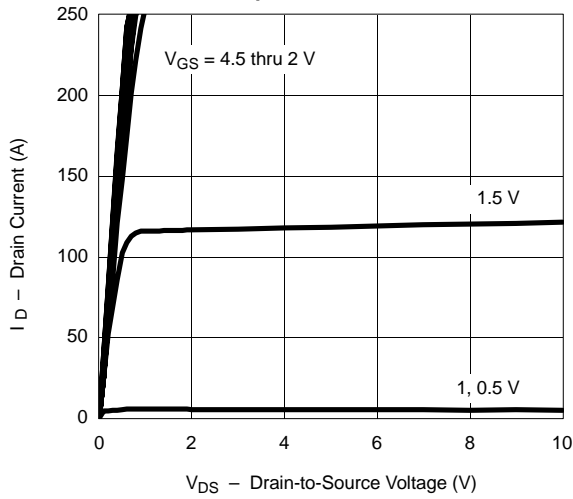
Notes:

- Pulse test; pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

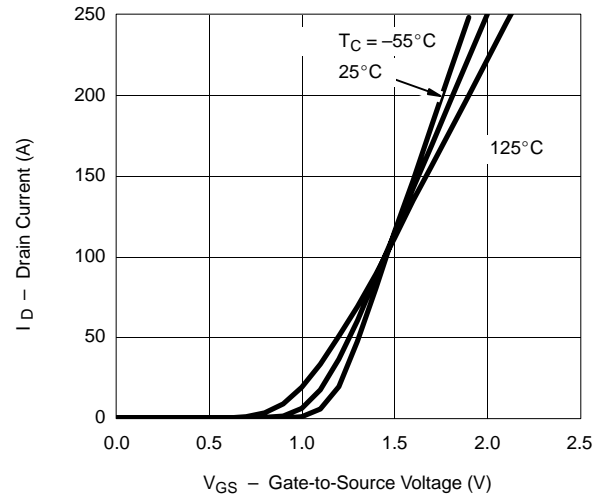


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

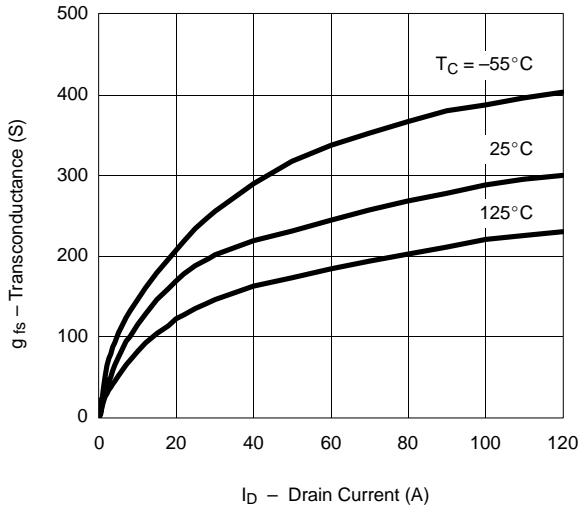
Output Characteristics



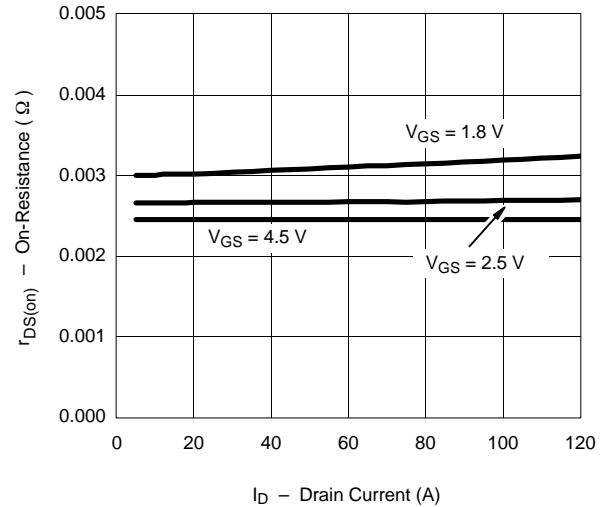
Transfer Characteristics



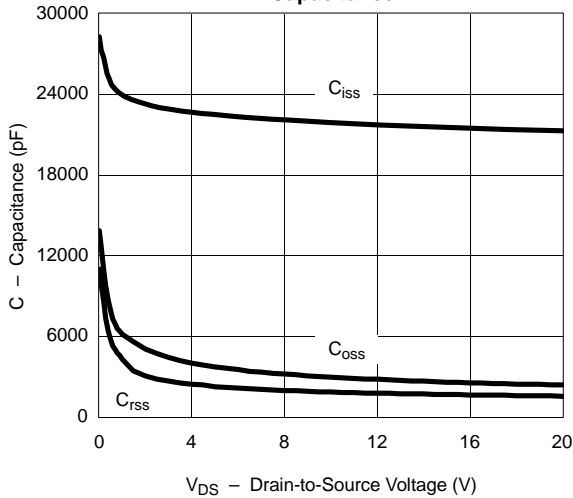
Transconductance



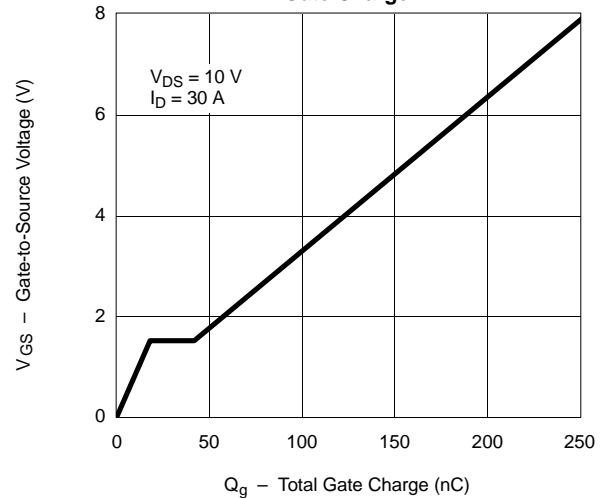
On-Resistance vs. Drain Current



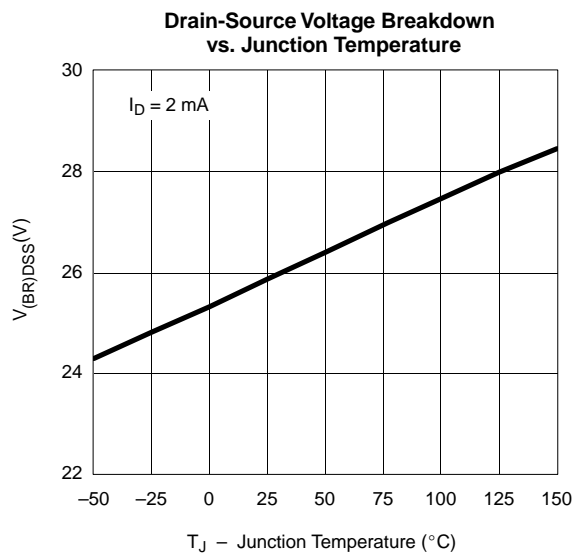
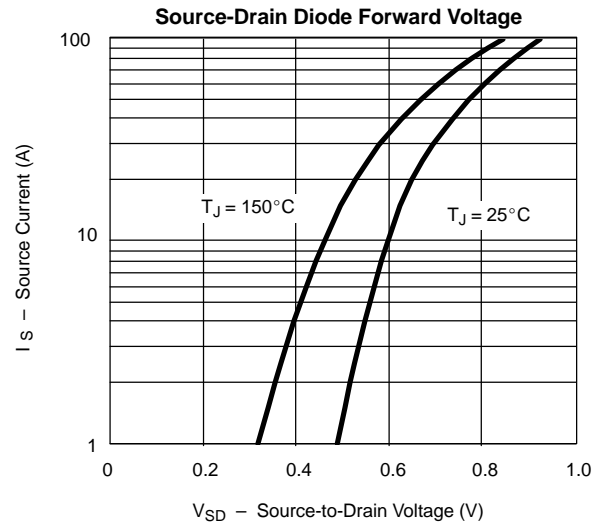
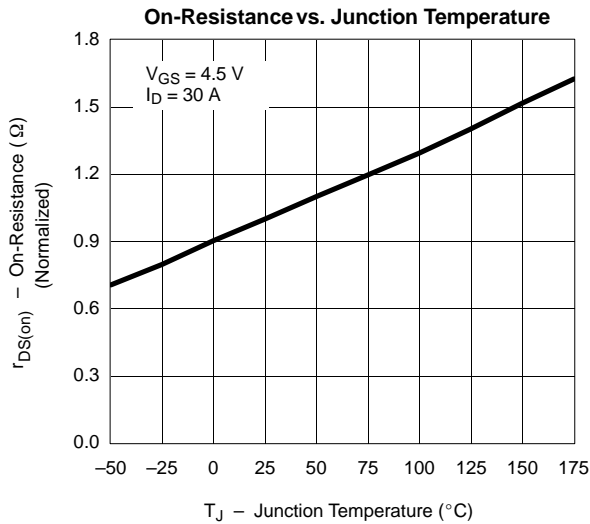
Capacitance



Gate Charge



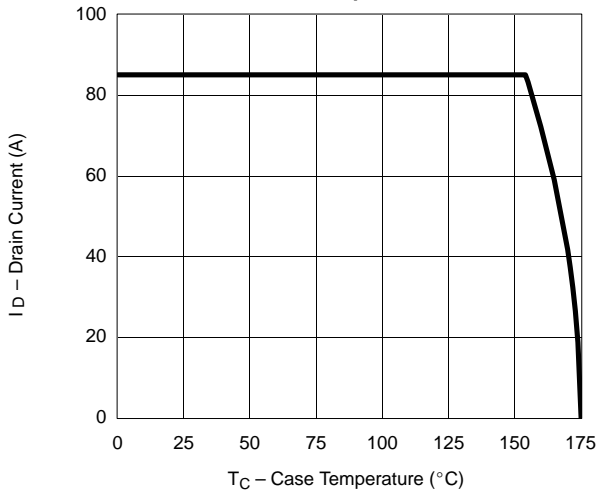
TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)



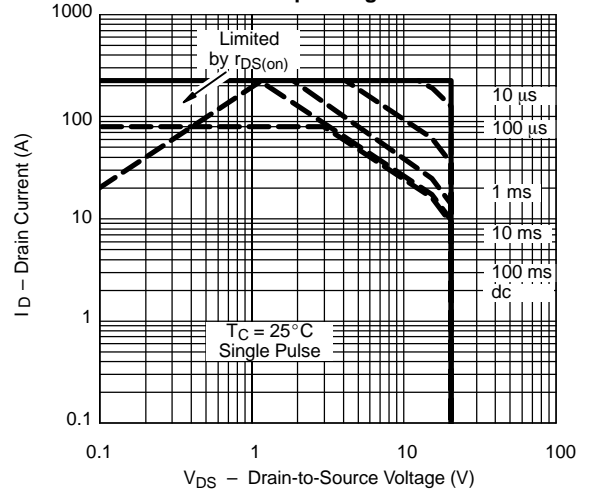


THERMAL RATINGS

Maximum Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

