



N-Channel 20-V (D-S), 175°C MOSFET

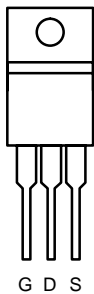
PRODUCT SUMMARY

$V_{(BR)DSS}$ (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

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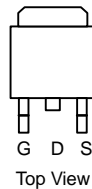
TO-220AB



Top View

SUP85N02-03

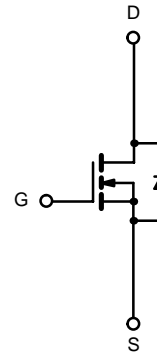
TO-263



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 °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} = 16 V, V _{GS} = 0 V			1	μA
		V _{DS} = 16 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		
Reverse 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

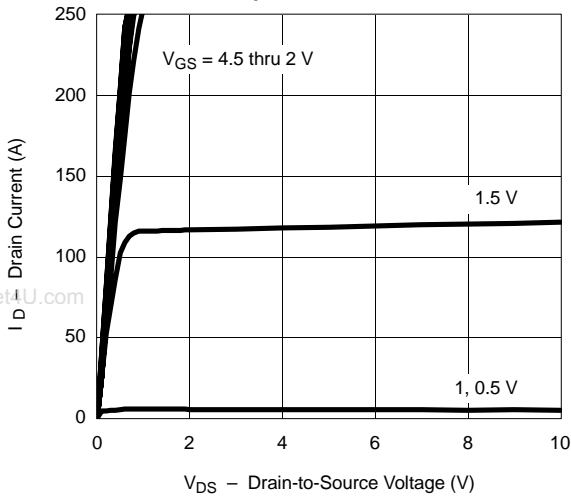
Notes:

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

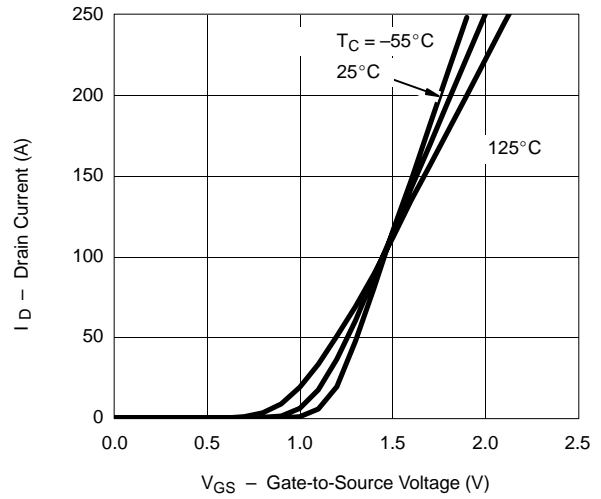


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

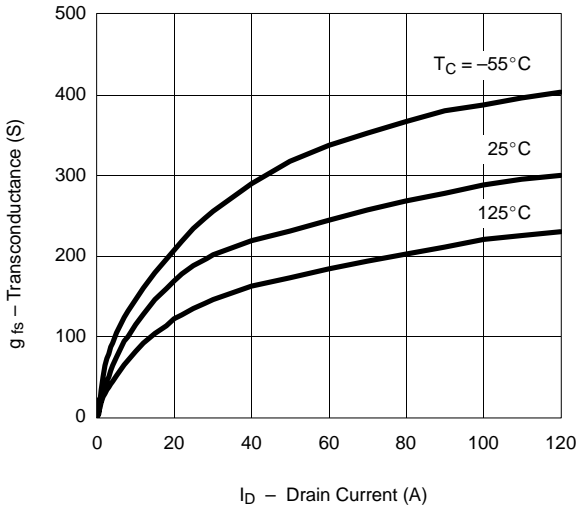
Output Characteristics



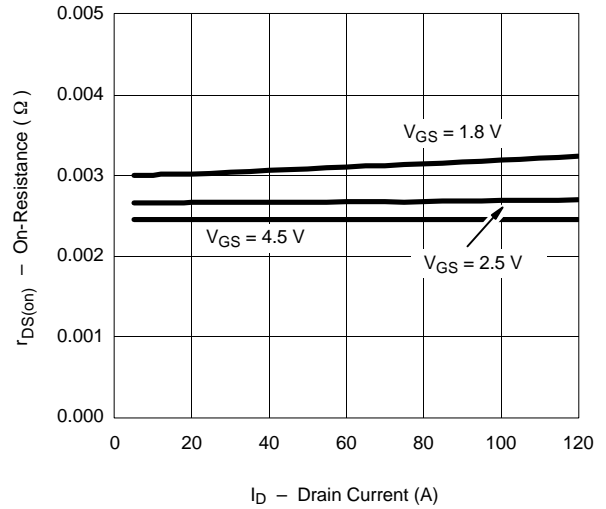
Transfer Characteristics



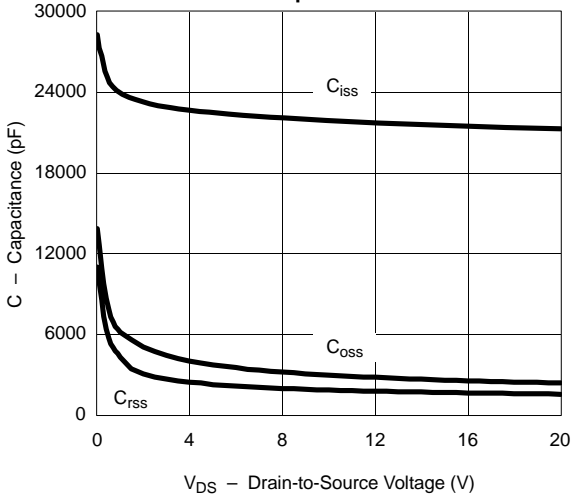
Transconductance



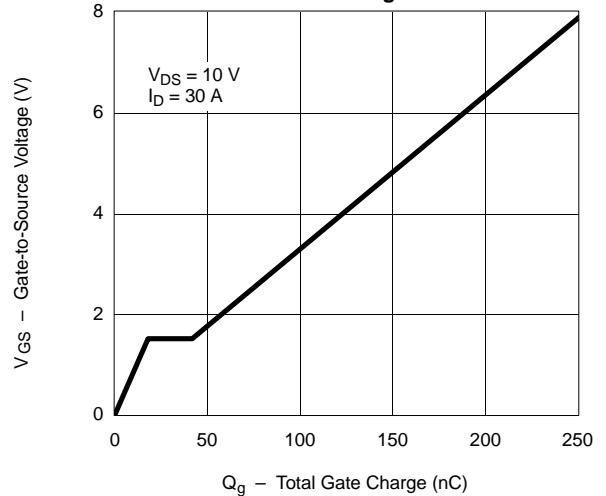
On-Resistance vs. Drain Current



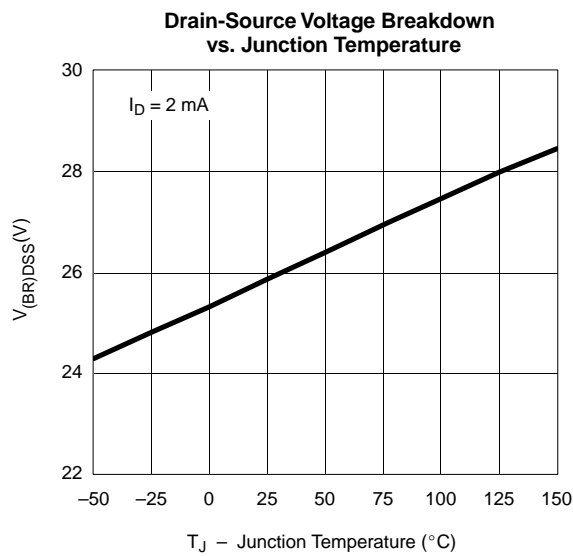
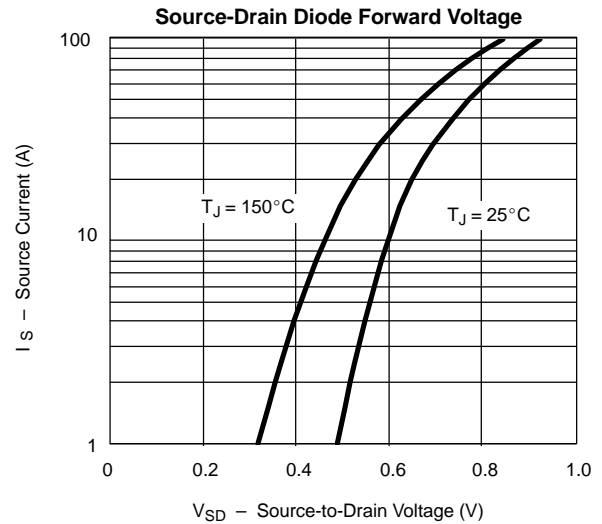
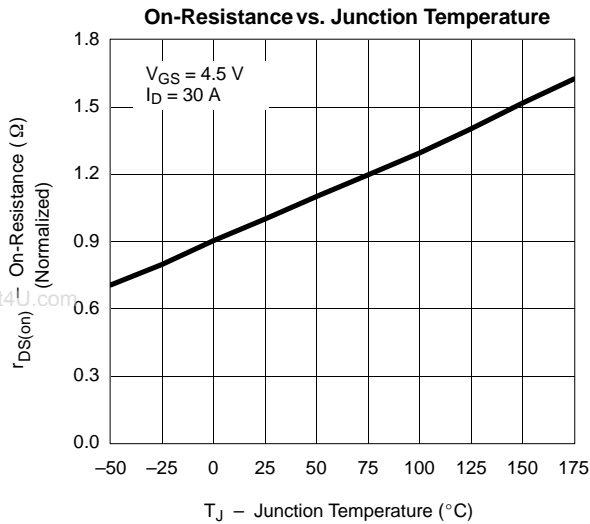
Capacitance



Gate Charge



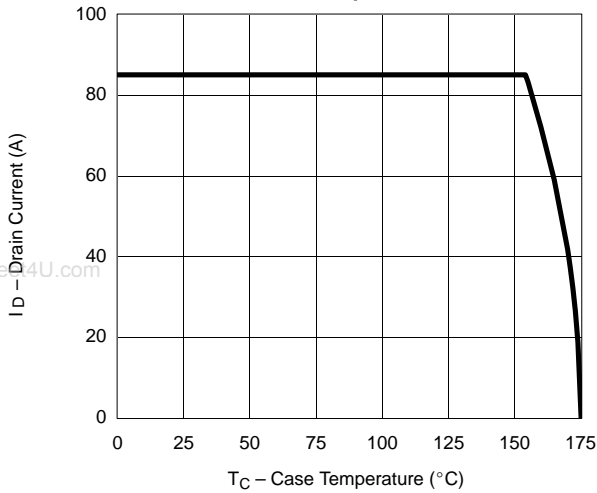
TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)



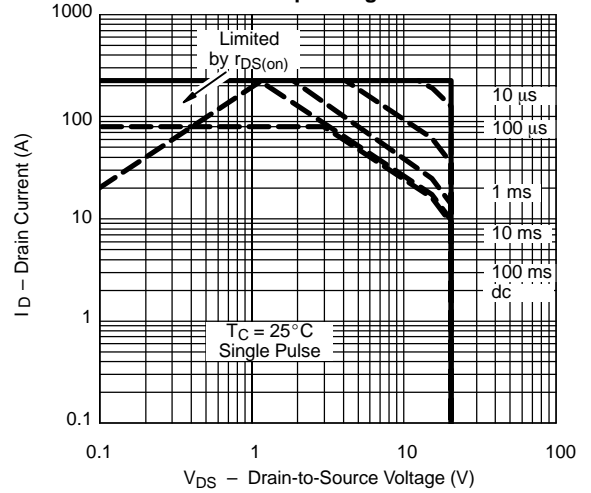


THERMAL RATINGS

Maximum Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

