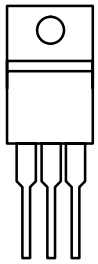
N-Channel 50-V (D-S), 175°C MOSFET, Logic Level

PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
50	0.018 @ V_{GS} = 10 V	±45 [a]
	0.020 @ V_{GS} = 4.5 V	

175°C Rated Maximum Junction Temperature TrenchFET® Power MOSFETs

TO-220AB

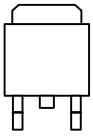


DRAIN connected to TAB

G D S

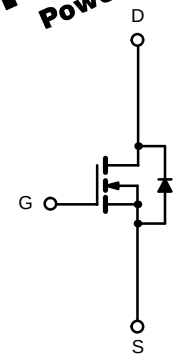
Top View
SUP45N05-20L

TO-263



G D S

Top View
SUB45N05-20L



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	50	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current (T_J = 175°C)	T_C = 25°C	I_D	±45[a]	A
	T_C = 125°C		±32	
Pulsed Drain Current		I_{DM}	±100	
Continuous Source Current (Diode Conduction)[a]		I_S	±45	
Avalanche Current		I_{AR}	±45	
Repetitive Avalanche Energy[b]	L = 0.1 mH	E_{AR}	100	mJ
Maximum Power Dissipation	T_C = 25°C (TO-220AB and TO-263)	P_D	93[c]	W
	T_A = 25°C (TO-263)[c]		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)		8.0	
Junction-to-Case		R_{thJC}	1.6	

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).

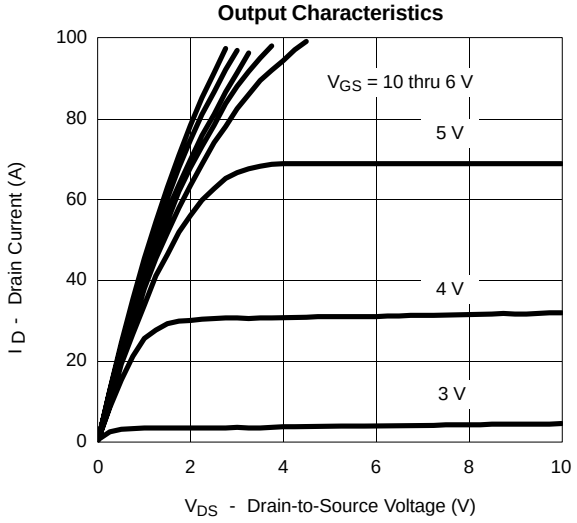
SPECIFICATIONS (T_J =25°C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{DS} = 0 V, I_D = 250 μA	50			V
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	1	2		
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 50 V, V_{GS} = 0 V			1	μA
		V_{DS} = 50 V, V_{GS} = 0 V, T_J = 125°C			50	
		V_{DS} = 50 V, V_{GS} = 0 V, T_J = 175°C			150	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} ≥ 5 V, V_{GS} = 10 V	45			A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 30 A			0.018	Ω
		V_{GS} = 10 V, I_D = 30 A, T_J = 125°C			0.030	
		V_{GS} = 4.5 V, I_D = 45 A			0.020	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 45 A	20			S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		1800	3600	pF
Output Capacitance	C_{oss}			370		
Reverse Transfer Capacitance	C_{rss}			130		
Total Gate Charge[c]	Q_g	V_{DS} = 25 V, V_{GS} = 10 V, I_D = 45 A		43	60	nC
Gate-Source Charge[c]	Q_{gs}			7		
Gate-Drain Charge[c]	Q_{gd}			10		
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 25 V, R_L = 0.6 Ω I_D ≅ 45 A, V_{GEN} = 10 V, R_G = 2.5 Ω		10	20	ns
Rise Time[c]	t_r			10	20	
Turn-Off Delay Time[c]	$t_{d(off)}$			32	60	
Fall Time[c]	t_f			7	15	
Source-drain Diode Ratings and Characteristics (T_C = 25°C)[b]						
Pulsed Current	I_{SM}				43	A
Forward Voltage[a]	V_{SD}	I_F = 45 A, V_{GS} = 0 V			1.5	V
Reverse Recovery Time	t_{rr}	I_F = 45 A, di/dt = 100 A/μs		49	100	ns

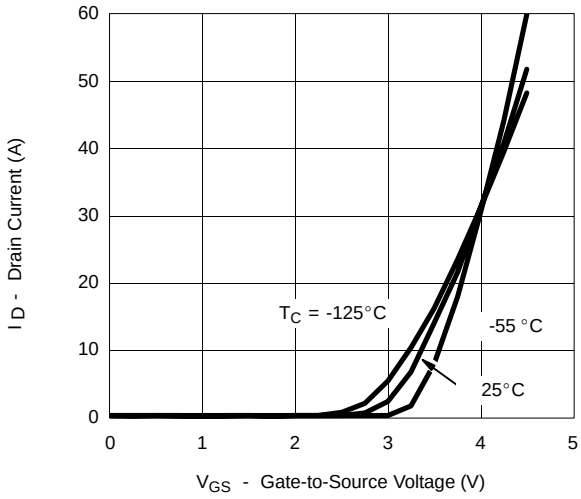
Notes
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

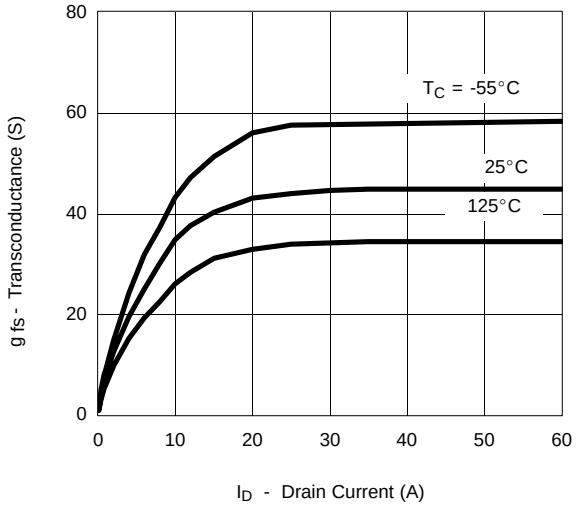
Output Characteristics



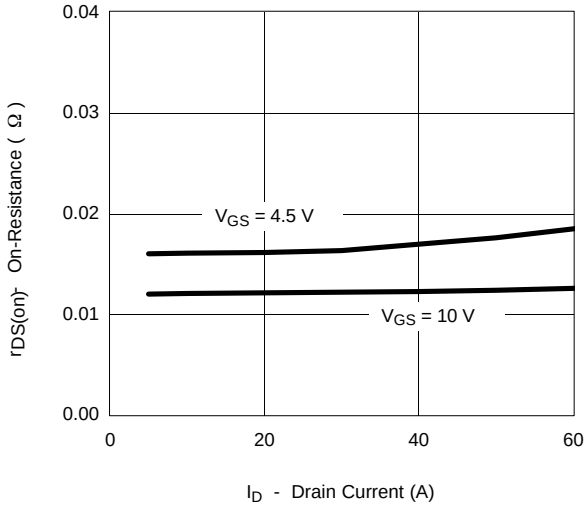
Transfer Characteristics



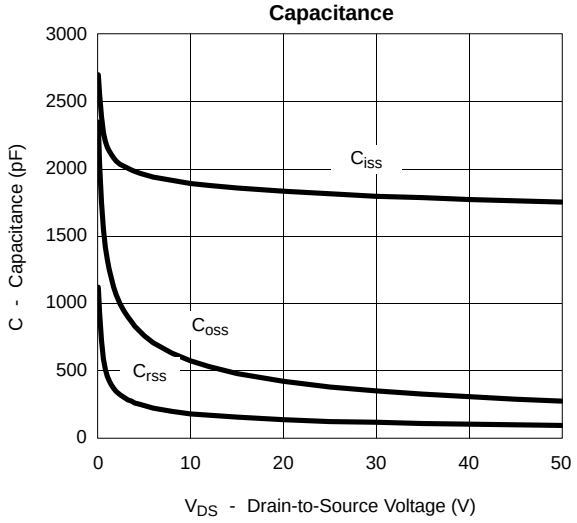
Transconductance



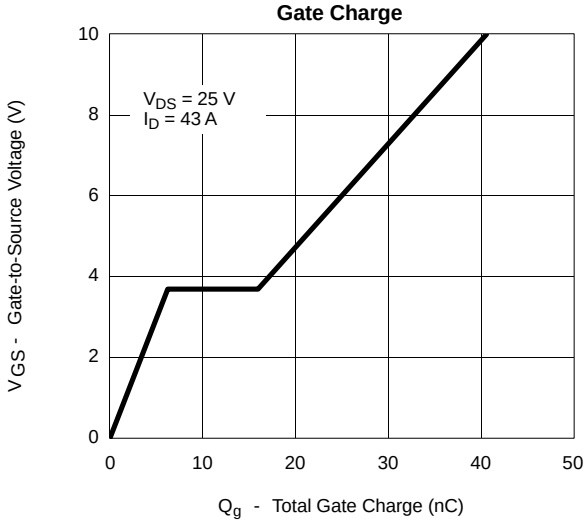
On-Resistance vs. Drain Current



Capacitance

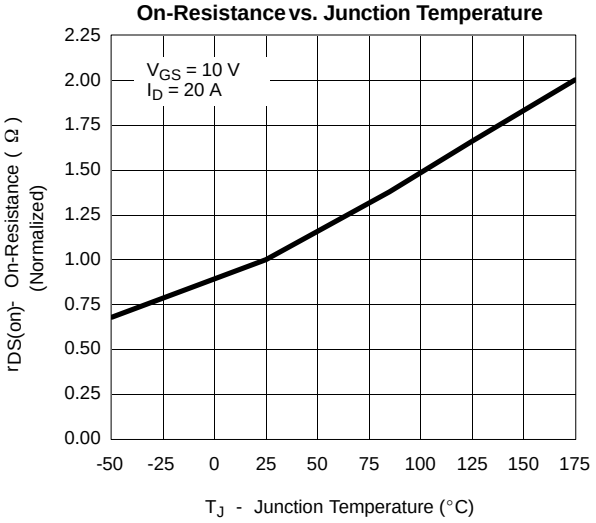


Gate Charge

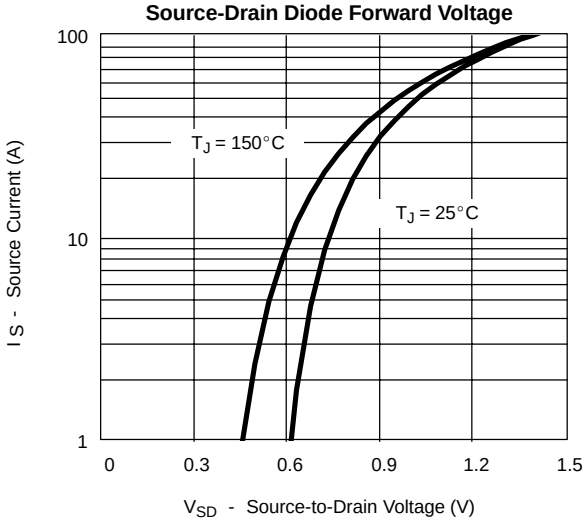


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

On-Resistance vs. Junction Temperature

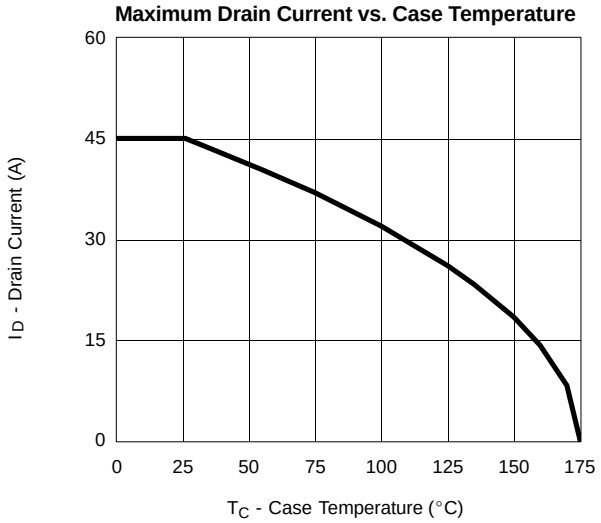


Source-Drain Diode Forward Voltage

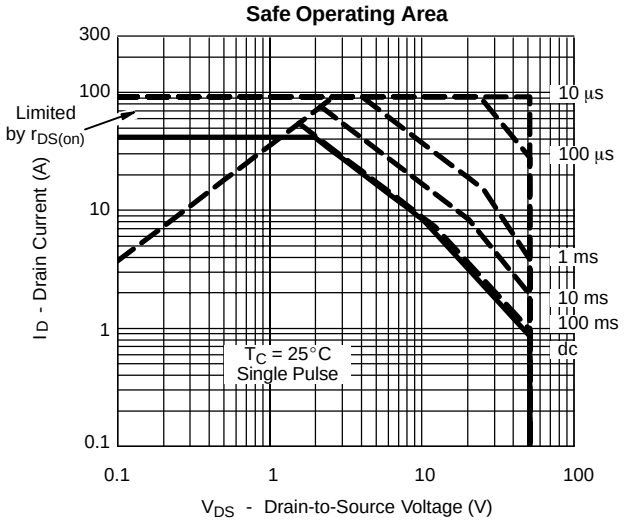


THERMAL RATINGS

Maximum Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case