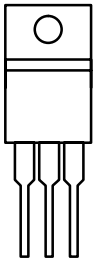
N-Channel 30-V (D-S), 175°C, MOSFET PWM Optimized

175°C Rated
Maximum Junction Temperature
TrenchFET®
Power MOSFETs

PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
30	0.009 @ V_{GS} = 10 V	70[a]
	0.013 @ V_{GS} = 4.5 V	60

TO-220AB



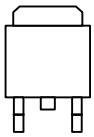
G D S

Top View

SUP70N03-09BP

DRAIN connected to TAB

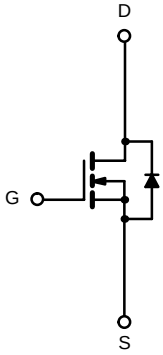
TO-263



G D S

Top View

SUB70N03-09BP



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current (T_J = 175°C)	T_C = 25°C	I_D	70[b]	A
	T_C = 100°C		50	
Pulsed Drain Current		I_{DM}	200	
Avalanche Current		I_{AR}	30	
Repetitive Avalanche Energy[a]	L = 0.1 mH	E_{AR}	61	mJ
Power Dissipation	T_C = 25°C	P_D	93[b]	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}	1.6	

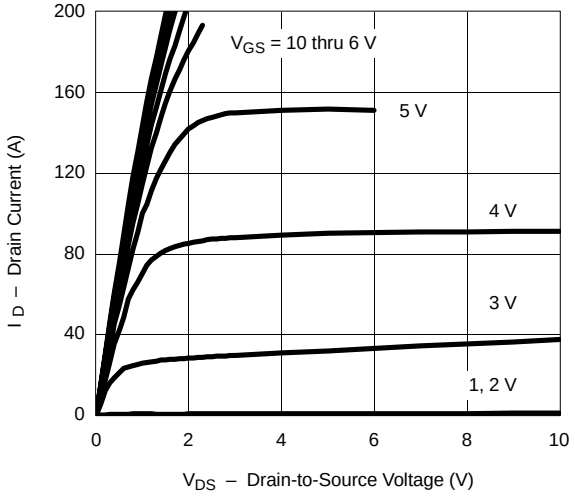
Notes:
a. Duty cycle ≤ 1%.
b. See SOA curve for voltage derating.
c. When mounted on 1" square PCB (FR-4 material).

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 = 250 μA	30			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_{DS} = 250 μA	0.8		2.0	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 24 V, V_{GS} = 0 V			1	μA
		V_{DS} = 24 V, V_{GS} = 0 V, T_J = 125°C			50	
		V_{DS} = 24 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	70			A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 30 A		0.007	0.009	Ω
		V_{GS} = 10 V, I_D = 30 A, T_J = 125°C			0.0135	
		V_{GS} = 10 V, I_D = 30 A, T_J = 175°C			0.017	
		V_{GS} = 4.5 V, I_D = 20 A		0.010	0.013	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 30 A	20	45		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		1500		pF
Output Capacitance	C_{oss}			530		
Reversen Transfer Capacitance	C_{rss}			240		
Total Gate Charge[c]	Q_g	V_{DS} = 15 V, V_{GS} = 5 V, I_D = 70 A		15.5	19	nC
Gate-Source Charge[c]	Q_{gs}			5		
Gate-Drain Charge[c]	Q_{gd}			6		
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 15 V, R_L = 0.21 Ω I_D ≃ 70 A, V_{GEN} = 10 V, R_G = 2.5 Ω		10	18	ns
Rise Time[c]	t_r			8	15	
Turn-Off Delay Time[c]	$t_{d(off)}$			25	45	
Fall Time[c]	t_f			9	16	
Gate Resistance	R_g			2		Ω
Source-Drain Diode Ratings and Characteristics (T_C = 25°C)[b]						
Continuous Current	I_S				70	A
Pulsed Current	I_{SM}				200	
Forward Voltage[a]	V_{SD}	I_F = 70 A, V_{GS} = 0 V		1.1	1.5	V
Reverse Recovery Time	t_{rr}	I_F = 70 A, di/dt = 100 A/μs		30	60	ns

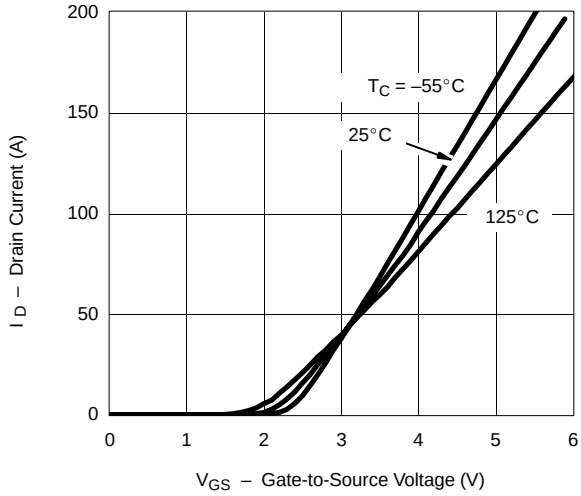
Notes:
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

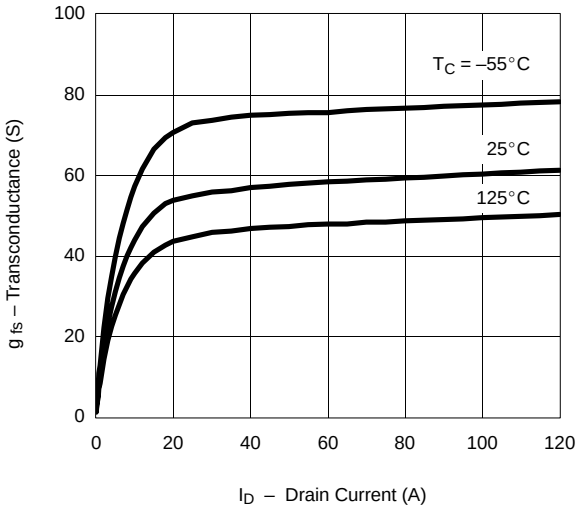
Output Characteristics



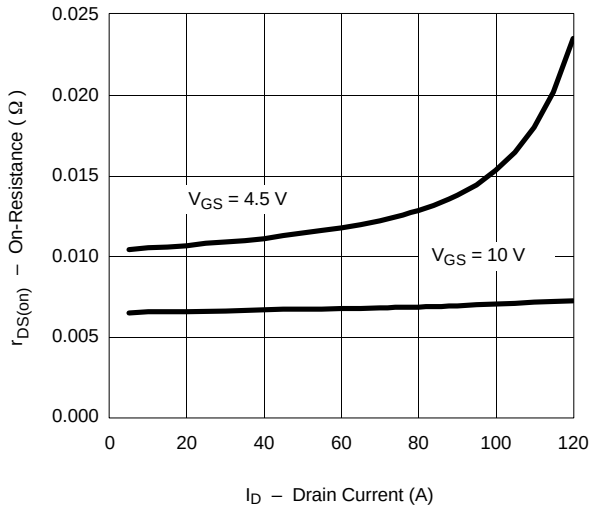
Transfer Characteristics



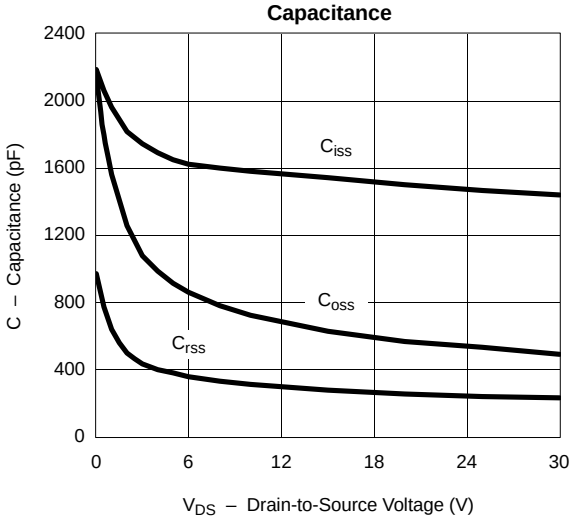
Transconductance



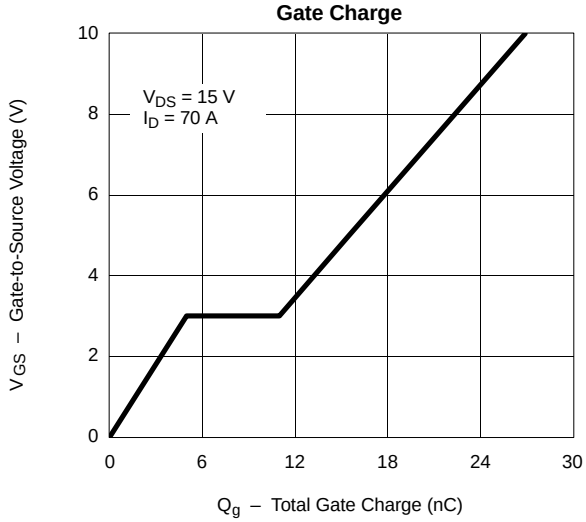
On-Resistance vs. Drain Current



Capacitance

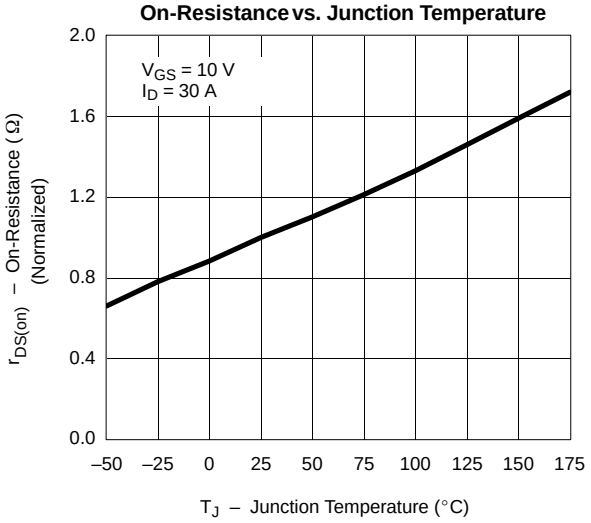


Gate Charge

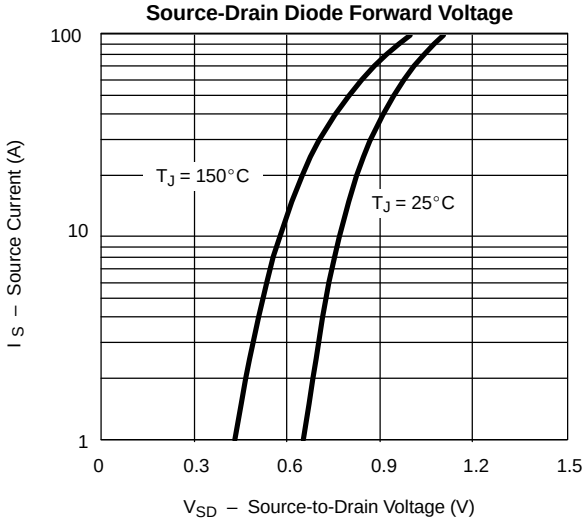


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

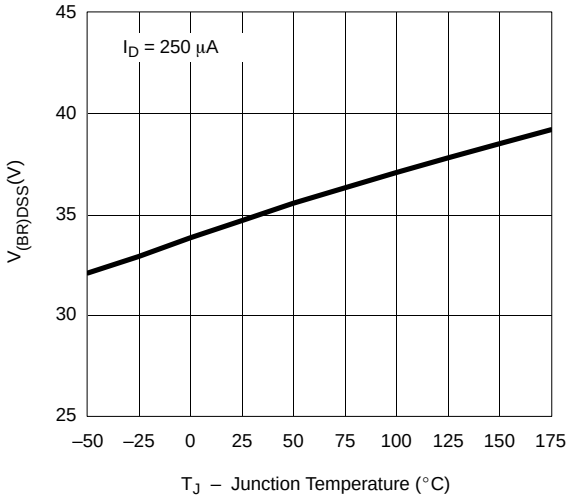
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

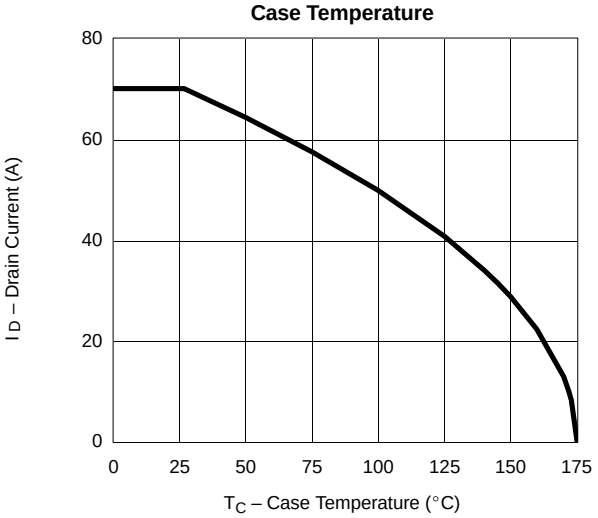


Drain-Source Voltage Breakdown vs. Junction Temperature

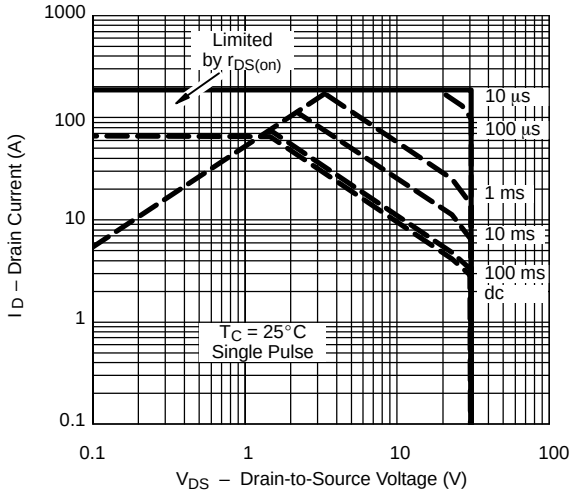


THERMAL RATINGS

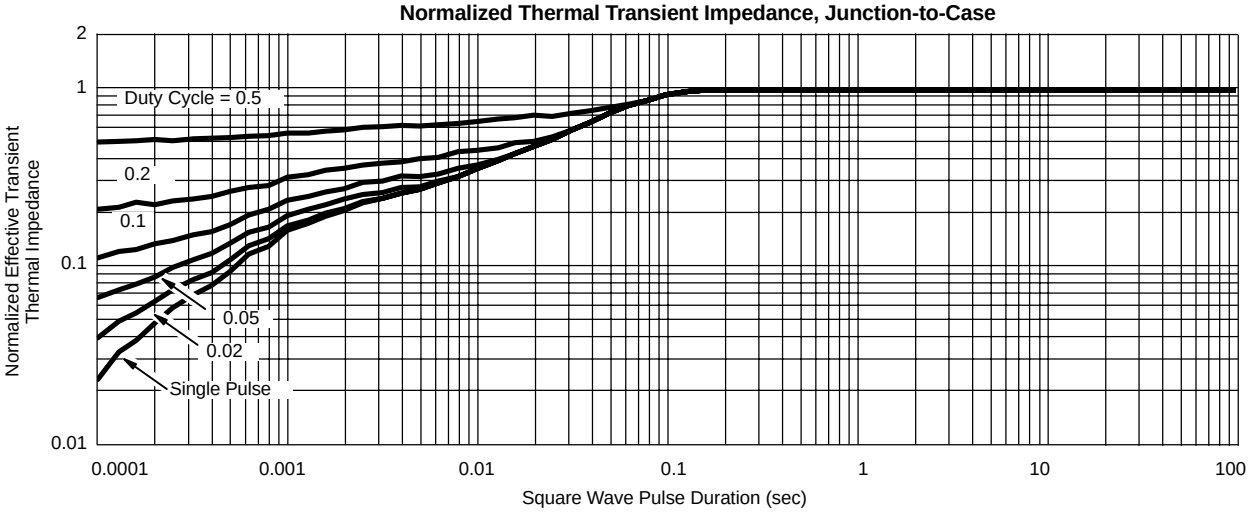
Maximum Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case



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