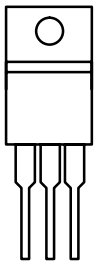
N-Channel 40-V (D-S), 175°C MOSFET

175°C Rated
Maximum Junction Temperature

PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
40	0.010 @ V_{GS} = 10 V	70
	0.014 @ V_{GS} = 4.5 V	58

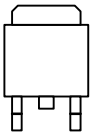
TO-220AB



Top View
SUP70N04-10

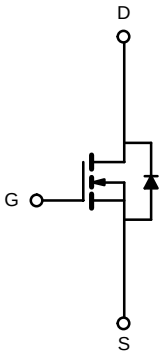
DRAIN connected to TAB

TO-263



Top View

SUB70N04-10



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current (T_J = 175°C)	T_C = 25°C	I_D	70	A
	T_C = 100°C		47	
Pulsed Drain Current		I_{DM}	140	
Avalanche Current		I_{AR}	60	
Repetitive Avalanche Energy[a]	L = 0.1 mH	E_{AR}	180	mJ
Power Dissipation	T_C = 25°C	P_D	107[b]	W
Operating Junction and Storage Temperature Range		T_J, T_{stg}	–55 to 175	°C

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient	PCB Mount (TO-263)[c]	R_{thJA}	35	40	°C/W
	Free Air (TO-220)		45	50	
Junction-to-Case		R_{thJC}	1.2	1.4	

Notes:
a. Duty cycle ≤ 1%.
b. See SOA curve for voltage derating.
c. Surface mounted on 1" FR4 board.

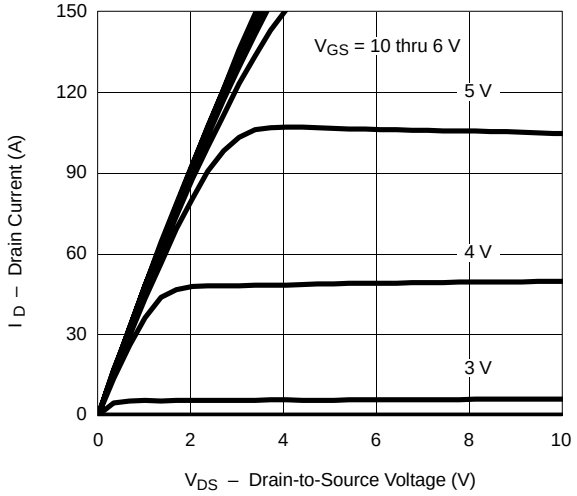
SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA	40			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_{DS} = 250 μA	1		3	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 40 V, V_{GS} = 0 V			1	μA
		V_{DS} = 40 V, V_{GS} = 0 V, T_J = 125°C			50	
		V_{DS} = 40 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		0.008	0.010	Ω
		V_{GS} = 10 V, I_D = 30 A, T_J = 125°C		0.014	0.017	
		V_{GS} = 10 V, I_D = 30 A, T_J = 175°C		0.0175	0.022	
		V_{GS} = 4.5 V, I_D = 20 A		0.011	0.014	
		V_{GS} = 4.5 V, I_D = 20 A, T_J = 125°C		0.019	0.024	
		V_{GS} = 4.5 V, I_D = 20 A, T_J = 175°C		0.024	0.031	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 30 A	20	57		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		2700		pF
Output Capacitance	C_{oss}			600		
Reversen Transfer Capacitance	C_{rss}			160		
Total Gate Charge[c]	Q_g	V_{DS} = 15 V, V_{GS} = 10 V, I_D = 70 A		50	100	nC
Gate-Source Charge[c]	Q_{gs}			10		
Gate-Drain Charge[c]	Q_{gd}			9		
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 15 V, R_L = 0.2 Ω I_D ≃ 70 A, V_{GEN} = 10 V, R_G = 2.5 Ω		14	30	ns
Rise Time[c]	t_r			12	30	
Turn-Off Delay Time[c]	$t_{d(off)}$			58	100	
Fall Time[c]	t_f			30	60	
Source-Drain Diode Ratings and Characteristics (T_C = 25°C)[b]						
Continuous Current	I_s				70	A
Pulsed Current	I_{SM}				140	
Forward Voltage[a]	V_{SD}	I_F = 70 A, V_{GS} = 0 V		1.0	1.5	V
Reverse Recovery Time	t_{rr}	I_F = 70 A, di/dt = 100 A/μs		50	100	ns

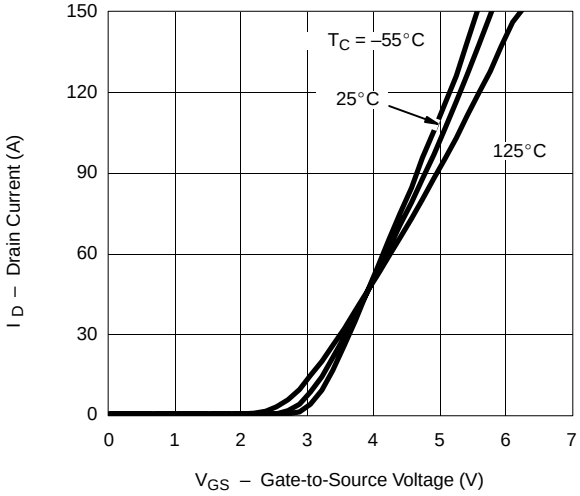
Notes:
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

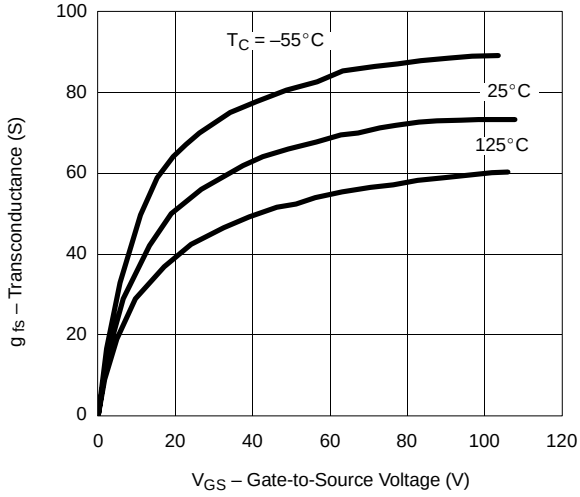
Output Characteristics



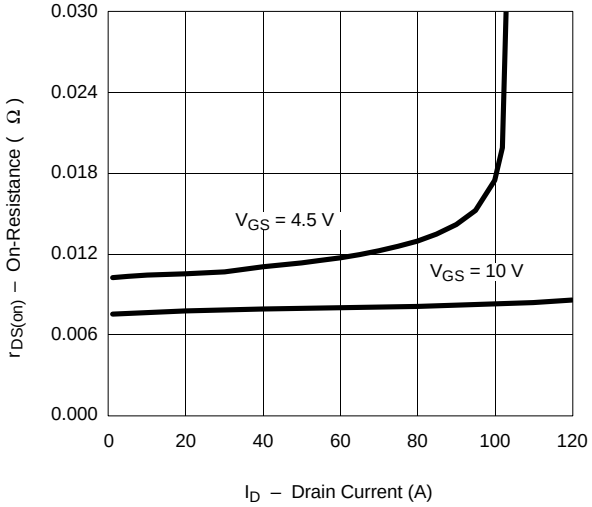
Transfer Characteristics



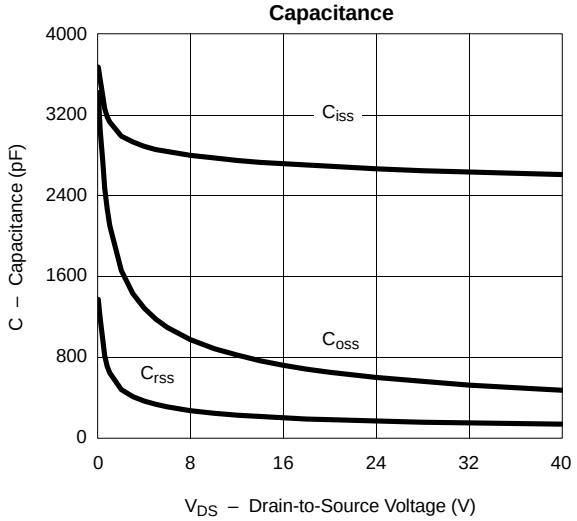
Transconductance



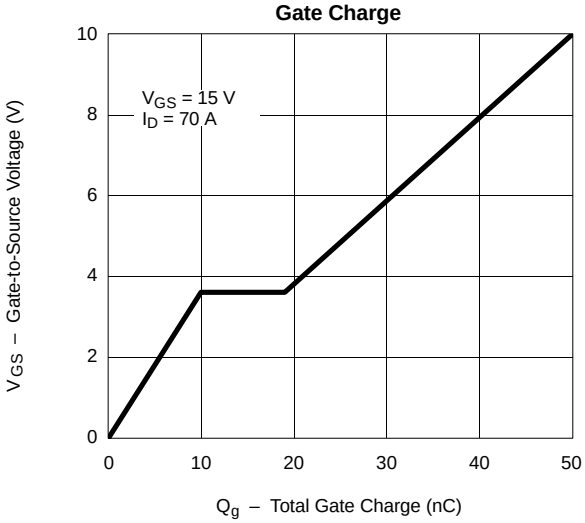
On-Resistance vs. Drain Current



Capacitance

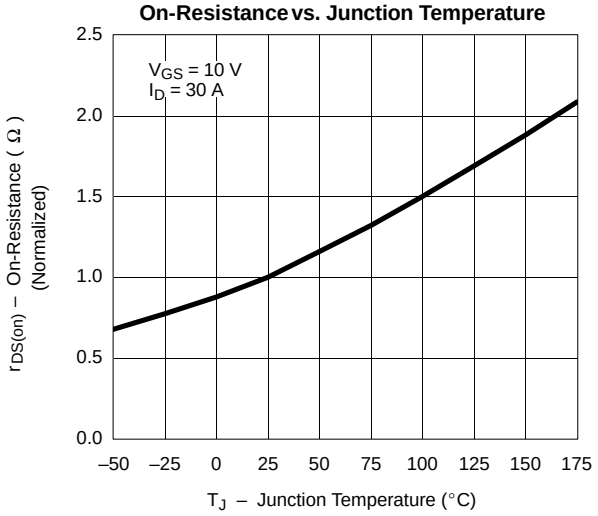


Gate Charge

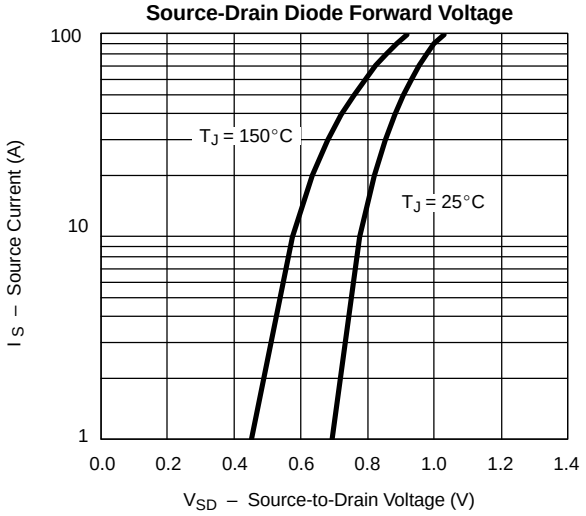


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

On-Resistance vs. Junction Temperature

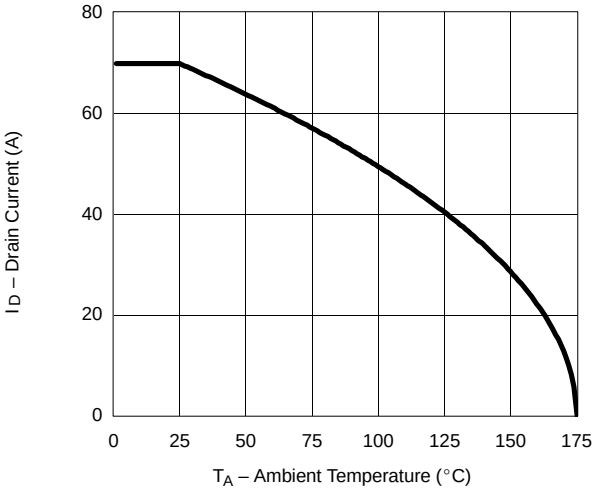


Source-Drain Diode Forward Voltage

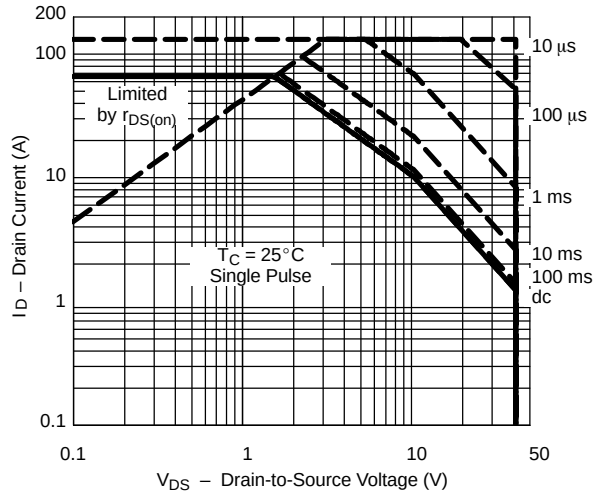


THERMAL RATINGS

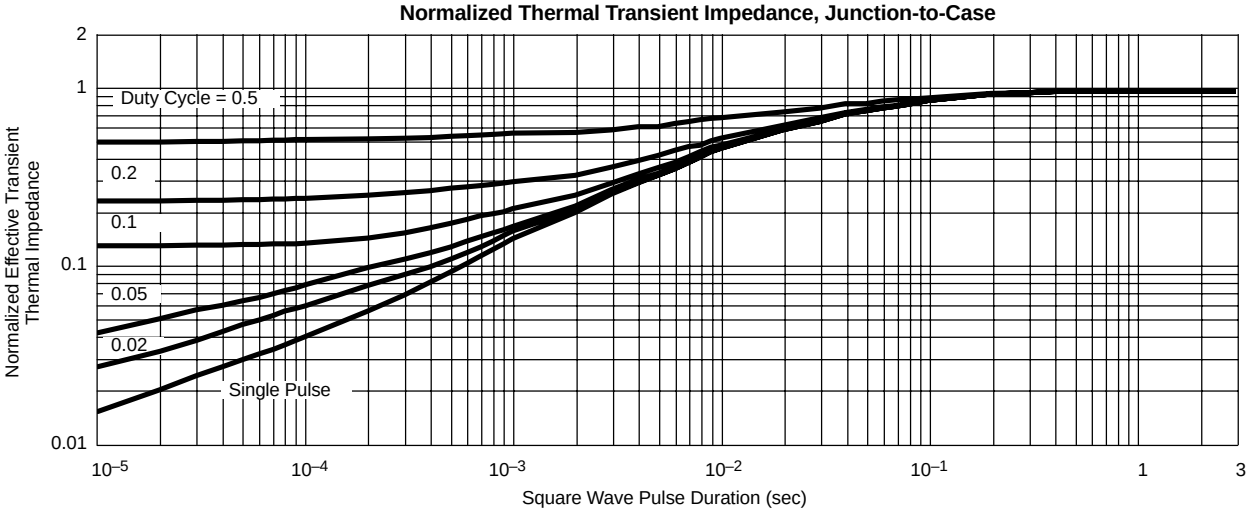
Maximum Drain Current vs. Ambiemt Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case



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