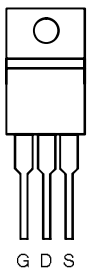
N-Channel 50-V (D-S), 175°C MOSFET

PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
50	0.006	75

TO-220AB

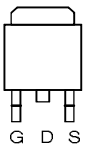


Top View

Ordering Information: SUP75N05-06A

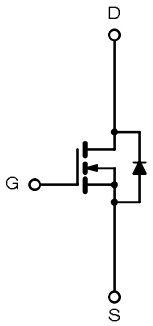
DRAIN connected to TAB

TO-263



Top View

Ordering Information: SUB75N05-06A



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Unit
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current (T_J = 175°C)	T_C = 25°C	I_D	75[a]	A
	T_C = 125°C		70	
Pulsed Drain Current		I_{DM}	240	
Avalanche Current		I_{AR}	75	
Repetitive Avalanche Energy[b]	L = 0.1 mH	E_{AR}	280	mJ
Power Dissipation	T_C = 25°C (TO-220AB and TO-263)	P_D	250[c]	W
	T_A = 25°C (TO-263)[d]		3.7	
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)		62.5	
Junction-to-Case		R_{thJC}	0.6	

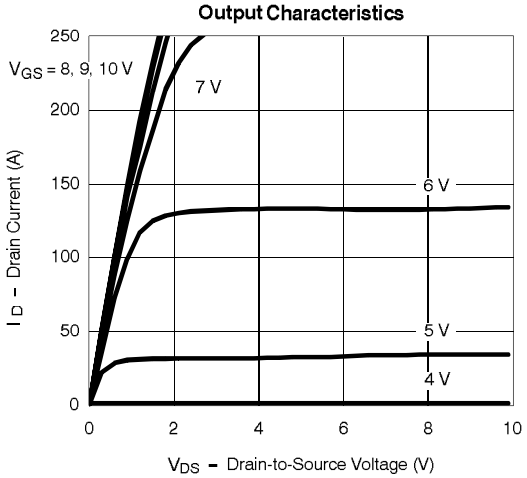
Notes
a. Package limited.
b. Duty cycle ≤ 1%.
c. See SOA curve for voltage derating.
d. When mounted on 1" square PCB (FR-4 material).

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_{GS} = 0 V, I_D = 250 µA	50			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS} I_D = 250 µA	2.0		4.0	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 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	120			A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 75 A		0.005	0.006	Ω
		V_{GS} = 10 V, I_D = 75 A, T_J = 125°C			0.010	
		V_{GS} = 10 V, I_D = 75 A, T_J = 175°C			0.012	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 60 A	30			S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		4500		pF
Output Capacitance	C_{oss}			1100		
Reverse Transfer Capacitance	C_{rss}			360		
Total Gate Charge[c]	Q_g	V_{DS} = 25 V, V_{GS} = 10 V, I_D = 75 A		85	120	nC
Gate-Source Charge[c]	Q_{gs}			25		
Gate-Drain Charge[c]	Q_{gd}			25		
Gate Resistance	R_g	f = 1.0 MHz		3		Ω
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 25 V, R_L = 0.33 Ω I_D ≅ 75 A, V_{GEN} = 10 V, R_g = 2.5 Ω		20	40	ns
Rise Time[c]	t_r			20	100	
Turn-Off Delay Time[c]	$t_{d(off)}$			50	100	
Fall Time[c]	t_f			20	40	
Source-Drain Diode Ratings and Characteristics (T_C = 25°C)[b]						
Continuous Current	I_S				75	A
Pulsed Current	I_{SM}				200	
Forward Voltage[a]	V_{SD}	I_F = 75 A , V_{GS} = 0 V		1.0	1.4	V
Reverse Recovery Time	t_{rr}	I_F = 75 A, di/dt = 100 A/µs		65	120	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			5	8	A
Reverse Recovery Charge	Q_{rr}			0.16	0.48	µC

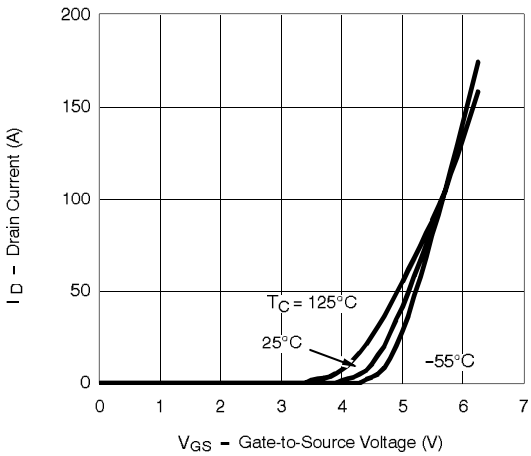
Notes
a. Pulse test: pulse width ≤ 300 µsec, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

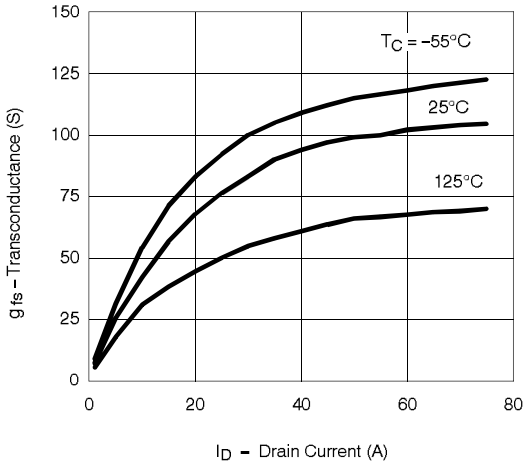
Output Characteristics



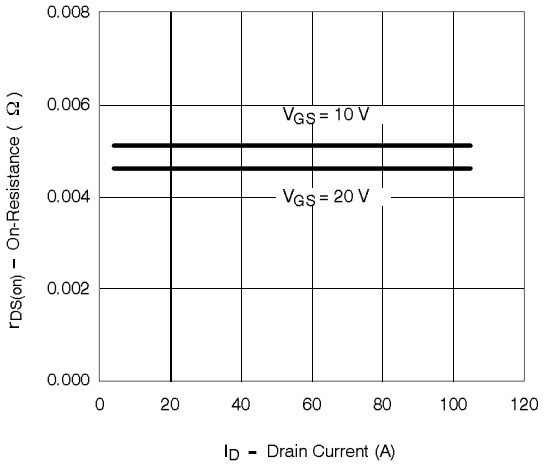
Transfer Characteristics



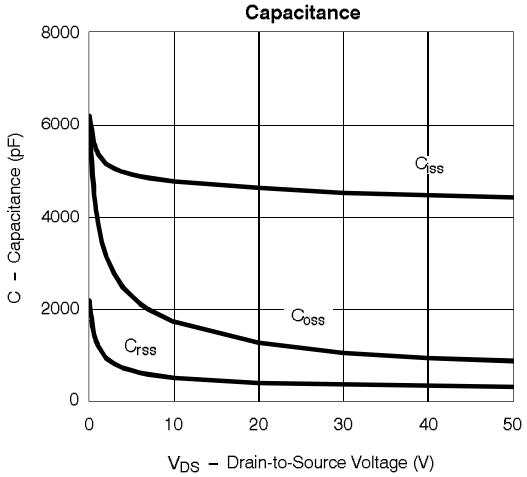
Transconductance



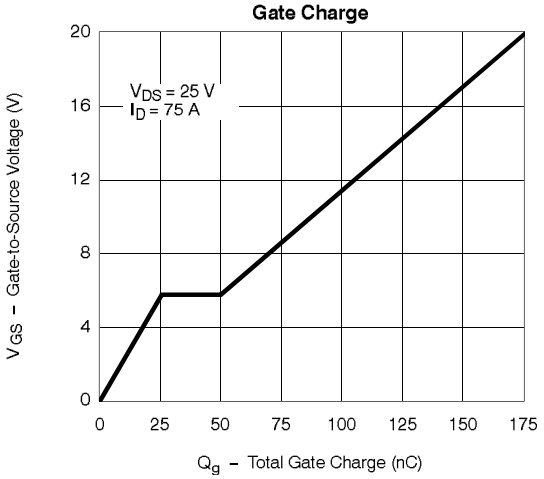
On-Resistance vs. Drain Current



Capacitance

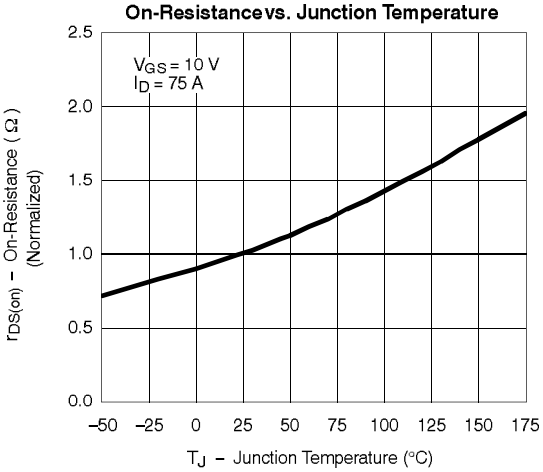


Gate Charge

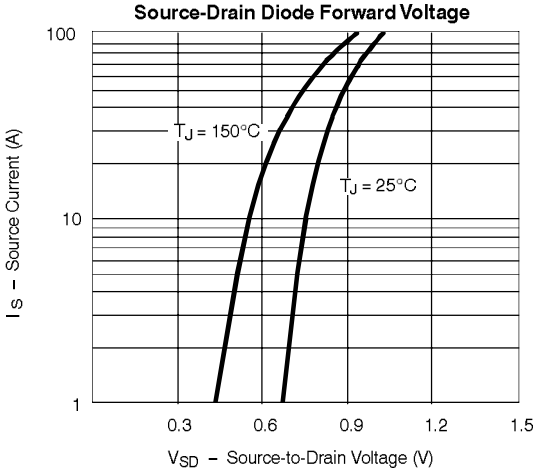


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

On-Resistance vs. Junction Temperature

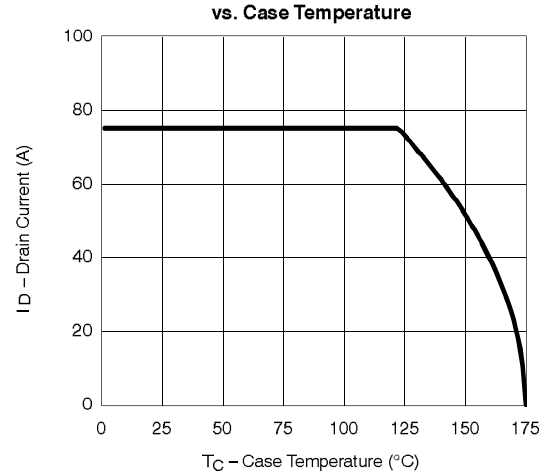


Source-Drain Diode Forward Voltage

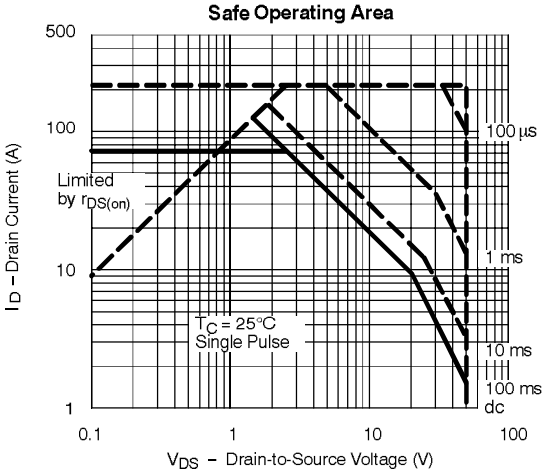


THERMAL RATINGS

Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case