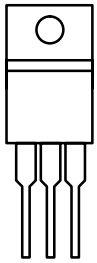
P-Channel 40-V (D-S) 175°C MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
–40	0.015 @ V_{GS} = –10 V	–65
	0.023 @ V_{GS} = –4.5 V	–50

TO-220AB

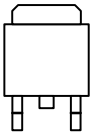


Top View

SUP65P04-15

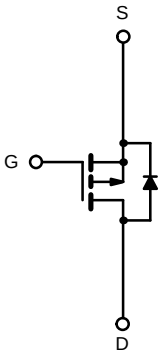
DRAIN connected to TAB

TO-263



Top View

SUB65P04-15



P-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	–65	A
	T_C = 125°C		–37	
Pulsed Drain Current		I_{DM}	–240	
Avalanche Current		I_{AR}	–60	
Repetitive Avalanche Energy[a]	L = 0.1 mH	E_{AR}	180	mJ
Power Dissipation	T_C = 25°C (TO-220AB and TO-263)	P_D	120[c]	W
	T_A = 25°C (TO-263)[b]		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)[b]	R_{thJA}	40	°C/W
	Free Air (TO-220AB)	R_{thJA}	62.5	
Junction-to-Case		R_{thJC}	1.25	

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

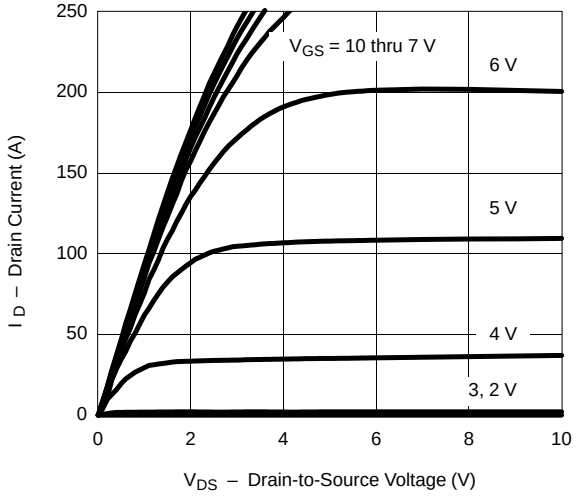
SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)

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_D = –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			–250	
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 = –30 A		0.012	0.015	Ω
		V_{GS} = –10 V, I_D = –30 A, T_J = 125°C			0.024	
		V_{GS} = –10 V, I_D = –30 A, T_J = 175°C			0.030	
		V_{GS} = –4.5 V, I_D = –20 A		0.018	0.023	Ω
Forward Transconductance[a]	g_{fs}	V_{DS} = –15 V, I_D = –50 A	20			S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = –25 V, f = 1 MHz		5400		pF
Output Capacitance	C_{oss}			640		
Reversen Transfer Capacitance	C_{rss}			300		
Total Gate Charge[c]	Q_g	V_{DS} = –20 V, V_{GS} = –10 V, I_D = –65 A		85	130	nC
Gate-Source Charge[c]	Q_{gs}			25		
Gate-Drain Charge[c]	Q_{gd}			15		
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = –20 V, R_L = 0.3 Ω I_D ≃ –65 A, V_{GEN} = –10 V, R_G = 2.5 Ω		15	25	ns
Rise Time[c]	t_r			380	580	
Turn-Off Delay Time[c]	$t_{d(off)}$			75	115	
Fall Time[c]	t_f			140	210	
Source-Drain Diode Ratings and Characteristics (T_C = 25°C)[b]						
Continuous Current	I_S				–65	A
Pulsed Current	I_{SM}				–240	
Forward Voltage[a]	V_{SD}	I_F = –65 A, V_{GS} = 0 V		–1.2	–1.5	V
Reverse Recovery Time	t_{rr}	I_F = –65 A, di/dt = 100 A/µs		40	80	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			2.0	4	A
Reverse Recovery Charge	Q_{rr}			0.04	0.1	µC

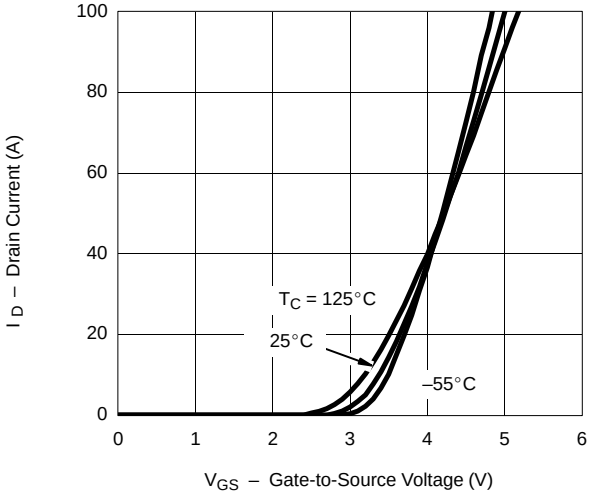
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

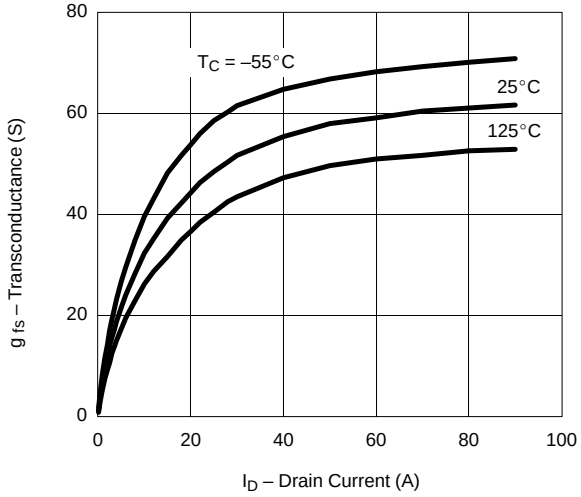
Output Characteristics



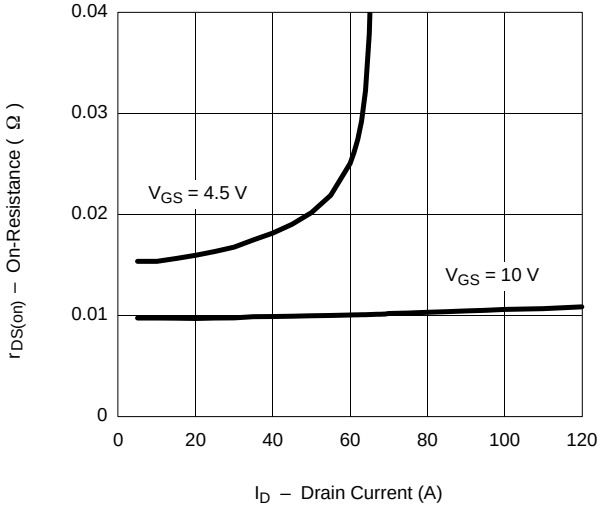
Transfer Characteristics



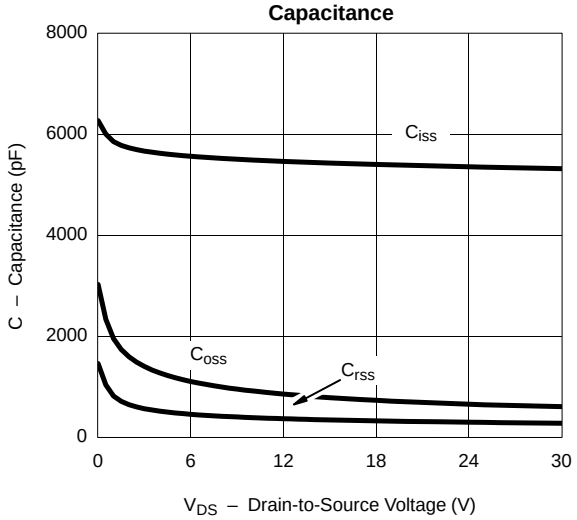
Transconductance



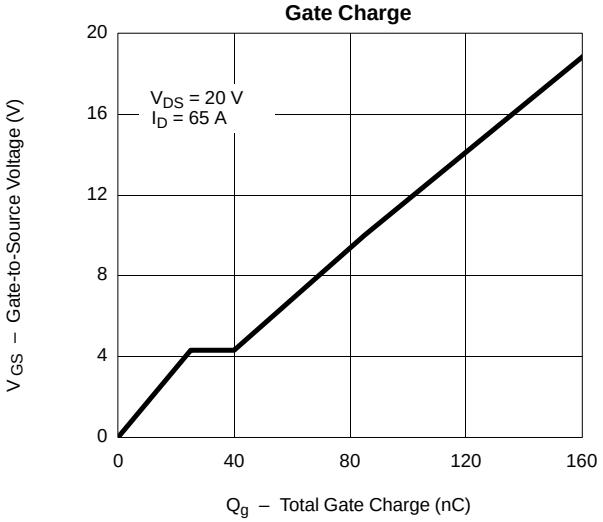
On-Resistance vs. Drain Current



Capacitance

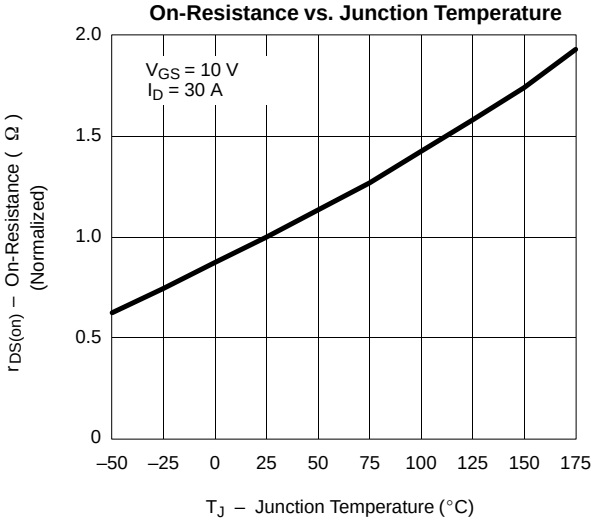


Gate Charge

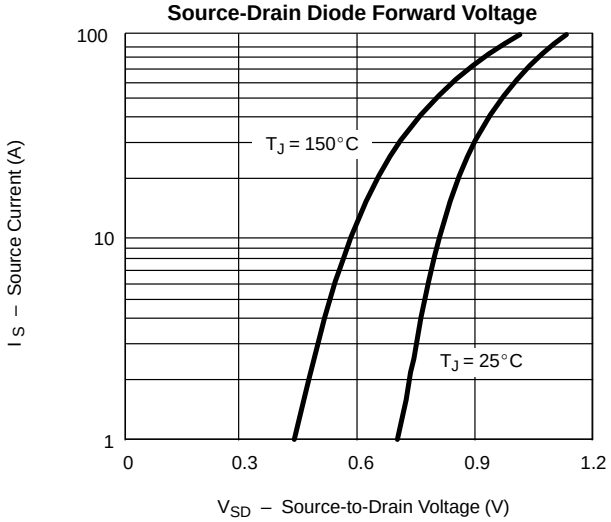


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

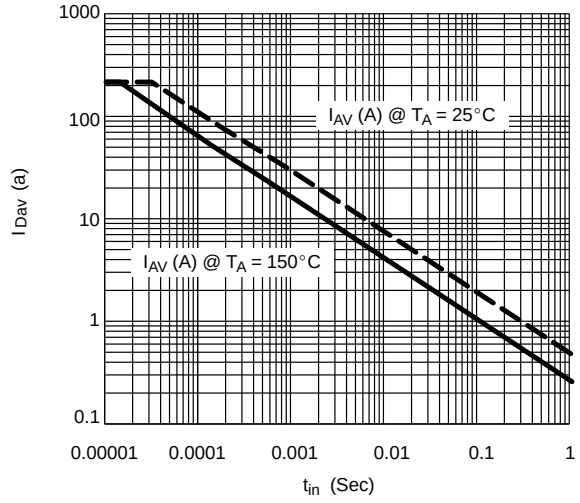
On-Resistance vs. Junction Temperature



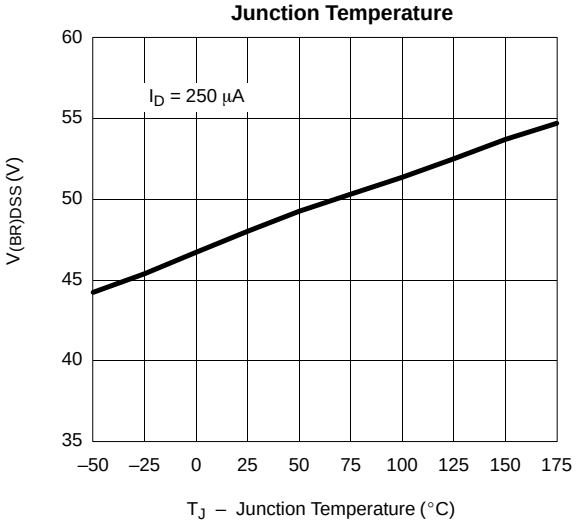
Source-Drain Diode Forward Voltage



Avalanche Current vs. Time

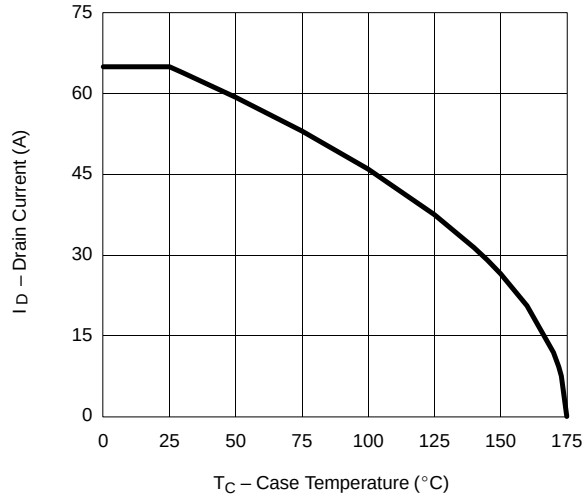


Drain Source Breakdown vs. Junction Temperature

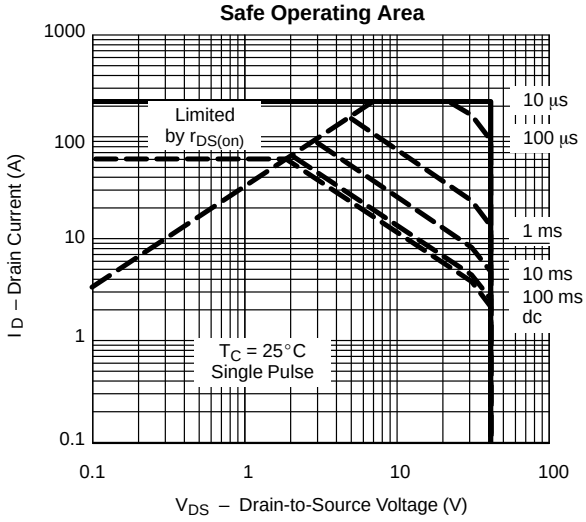


THERMAL RATINGS

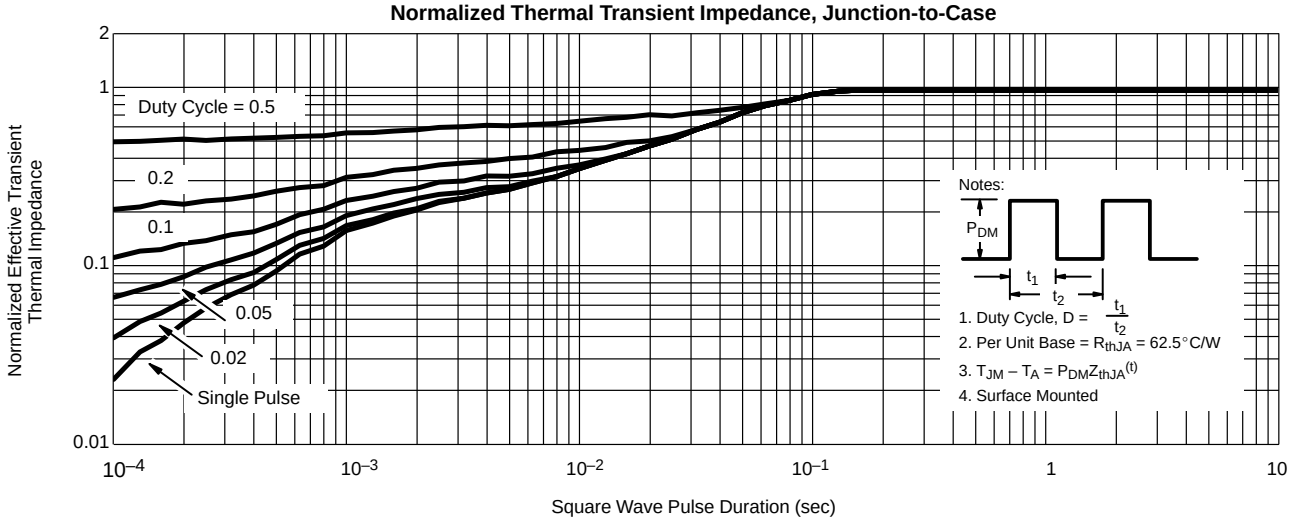
Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case



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