

P-Channel 60-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ.)
- 60	0.0195 at $V_{GS} = - 10$ V	- 53	76 nC
	0.025 at $V_{GS} = - 4.5$ V	- 42	

FEATURES

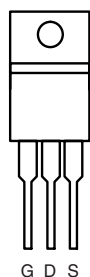
- TrenchFET® Power MOSFET
- 100 % UIS Tested

APPLICATIONS

- Load Switch


RoHS
COMPLIANT

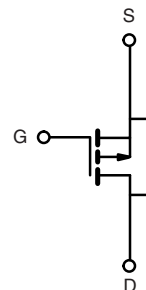
TO-220AB



Top View

DRAIN connected to TAB

Ordering Information: SUP53P06-20-E3 (Lead (Pb)-free)



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$, unless otherwise noted

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	- 60	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current ($T_J = 150^\circ\text{C}$)	$T_C = 25^\circ\text{C}$	I_D	- 53 ^a	A
	$T_C = 70^\circ\text{C}$		- 46.8	
	$T_A = 25^\circ\text{C}$		9.2 ^b	
	$T_A = 70^\circ\text{C}$		- 8.1 ^b	
Pulsed Drain Current		I_{DM}	- 150	mJ
Avalanche Current Pulse		I_{AS}	- 45	
Single Pulse Avalanche Energy		E_{AS}	101	
Continuous Source-Drain Diode Current	$T_C = 25^\circ\text{C}$	I_S	69 ^a	A
	$T_A = 25^\circ\text{C}$		2.1 ^b	
Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	P_D	104.2 ^a	W
	$T_C = 70^\circ\text{C}$		66.7 ^a	
	$T_A = 25^\circ\text{C}$		3.1 ^b	
	$T_A = 70^\circ\text{C}$		2.0 ^b	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^b	Steady State	R_{thJA}	33	40	$^\circ\text{C/W}$
	Steady State	R_{thJC}	0.98	1.2	

Notes:

a. Based on $T_C = 25^\circ\text{C}$.

b. Surface Mounted on 1" x 1" FR4 board.



SPECIFICATIONS T _J = 25 °C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = - 250 μA	- 60			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = - 250 μA		68		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 5.2		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 1		- 3	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = - 60 V, V _{GS} = 0 V			- 1	μA
		V _{DS} = - 60 V, V _{GS} = 0 V, T _J = 55 °C			- 10	
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		0.016	0.0195	Ω
		V _{GS} = - 4.5 V, I _D = - 20 A		0.020	0.025	
Forward Transconductance ^a	g _{fs}	V _{DS} = - 15 V, I _D = - 50 A	20			S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = - 25 V, V _{GS} = 0 V, f = 1 MHz		3500		pF
Output Capacitance	C _{oss}			390		
Reverse Transfer Capacitance	C _{rss}			290		
Total Gate Charge	Q _g	V _{DS} = - 30 V, V _{GS} = - 10 V, I _D = - 55 A		76	115	nC
		V _{DS} = - 30 V, V _{GS} = - 4.5 V, I _D = - 55 A		38	60	
Gate-Source Charge	Q _{gs}			16		
Gate-Drain Charge	Q _{gd}			19		
Gate Resistance	R _g	f = 1 MHz		5.2		Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 2.0 V, R _L = 2.0 Ω I _D ≅ - 10 A, V _{GEN} = - 10 V, R _g = 1 Ω		10	15	ns
Rise Time	t _r			7	15	
Turn-Off Delay Time	t _{d(off)}			70	110	
Fall Time	t _f			40	60	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			- 69	A
Pulse Diode Forward Current ^a	I _{SM}				- 150	
Body Diode Voltage	V _{SD}	I _S = - 30 A		- 1.0	- 1.5	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = - 50 A, di/dt = 100 A/μs, T _J = 25 °C		45	68	ns
Body Diode Reverse Recovery Charge	Q _{rr}			59	120	nC
Reverse Recovery Fall Time	t _a			29		ns
Reverse Recovery Rise Time	t _b			16		

Notes:

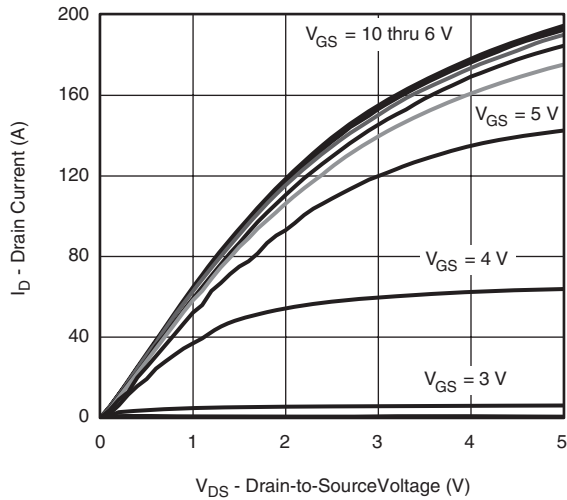
a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

b. Guaranteed by design, not subject to production testing.

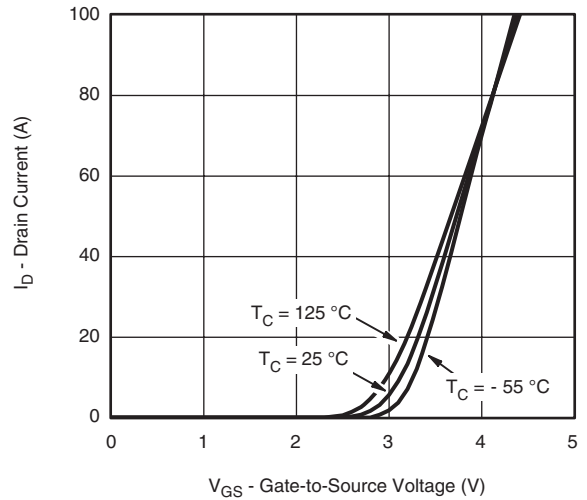
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



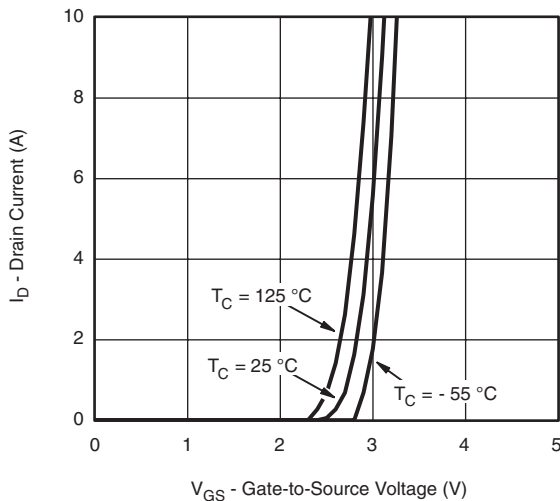
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



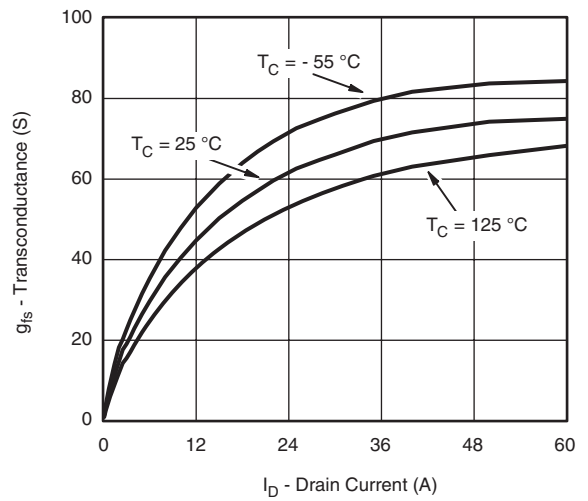
Output Characteristics



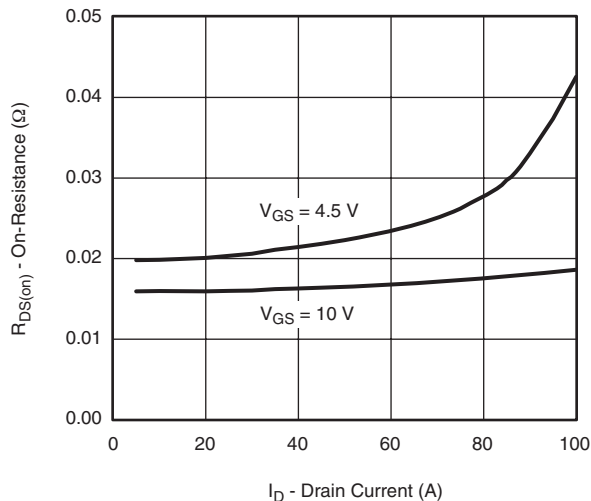
Transfer Characteristics



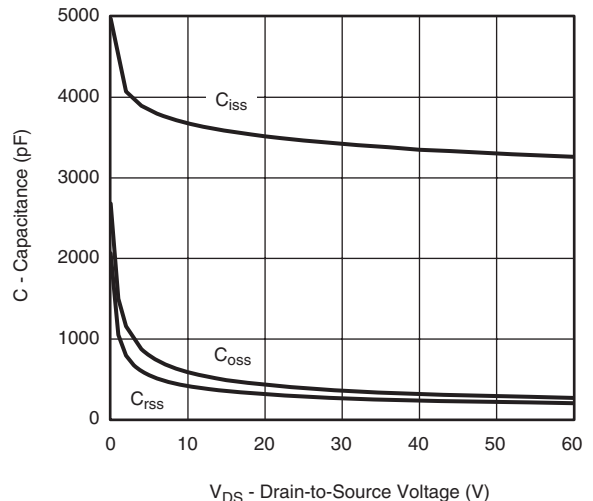
Transfer Characteristics



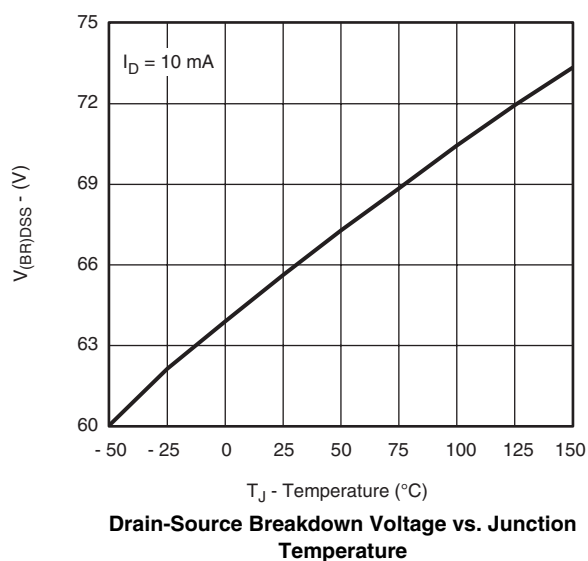
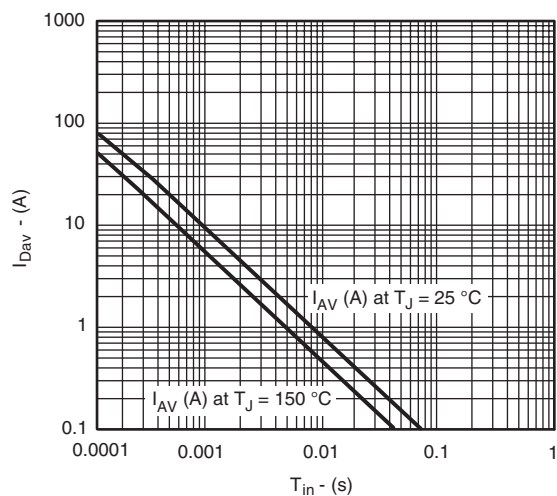
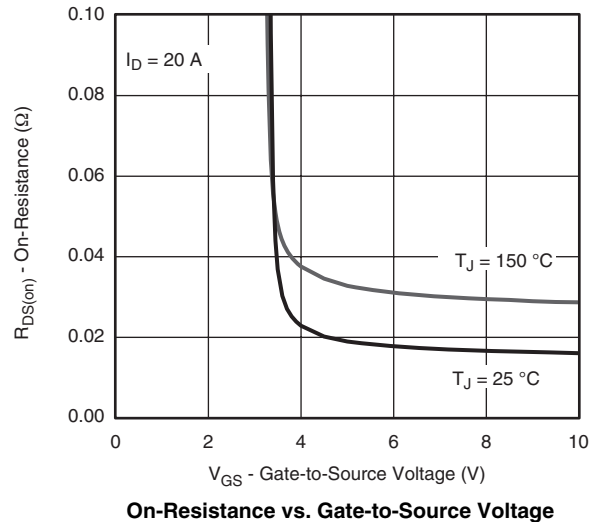
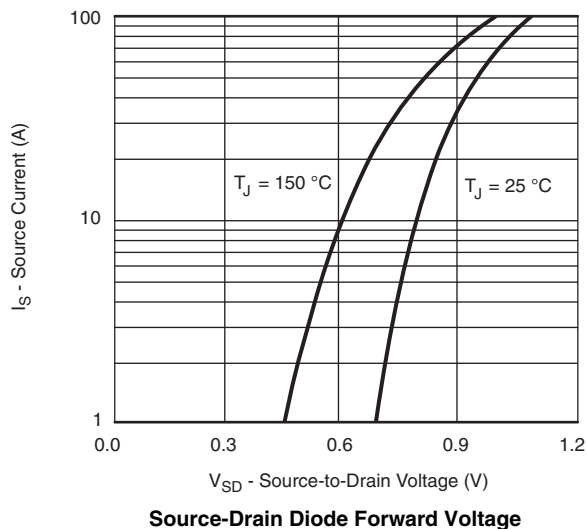
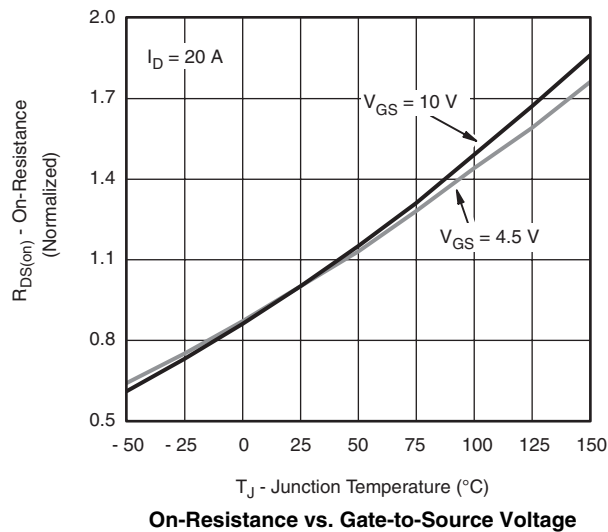
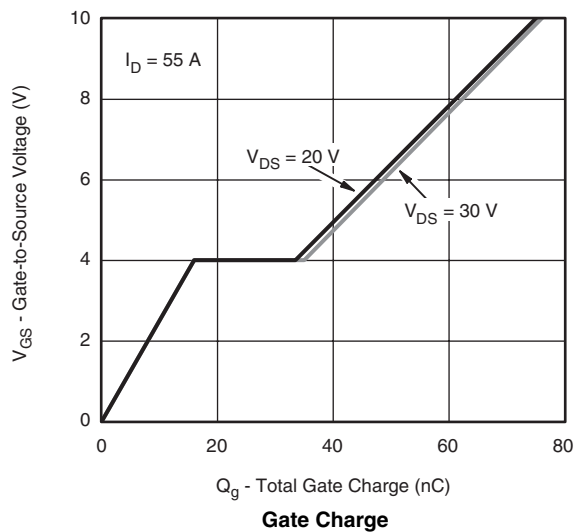
Transconductance

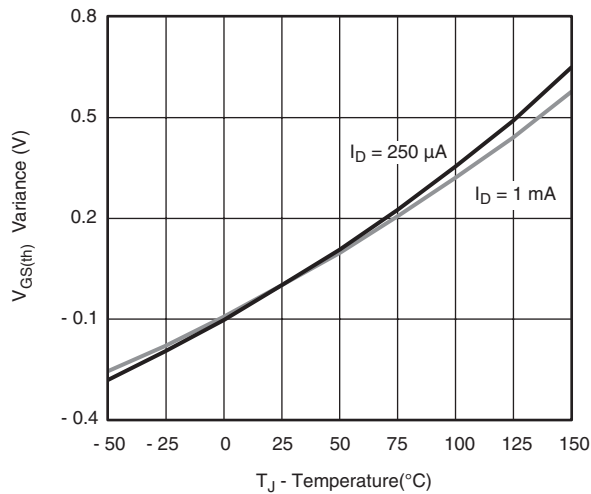
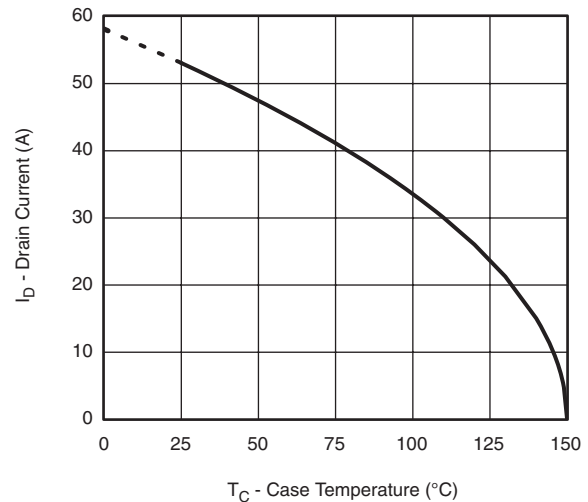
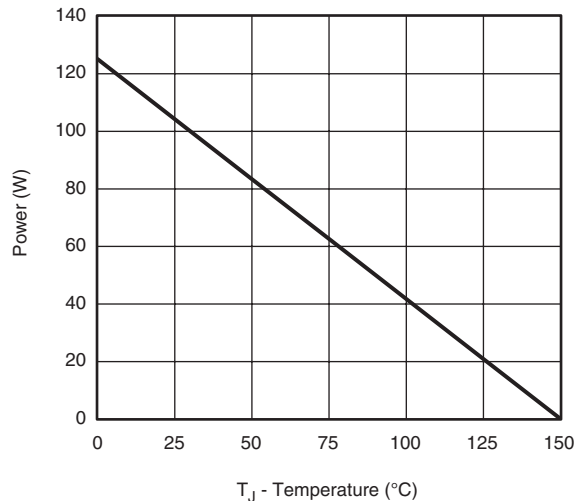
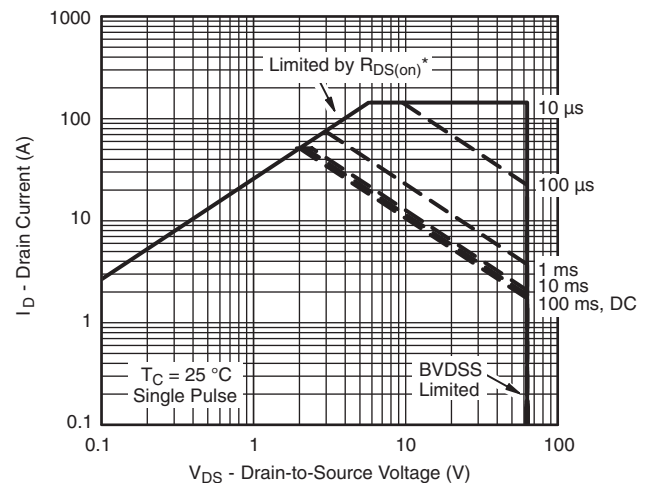
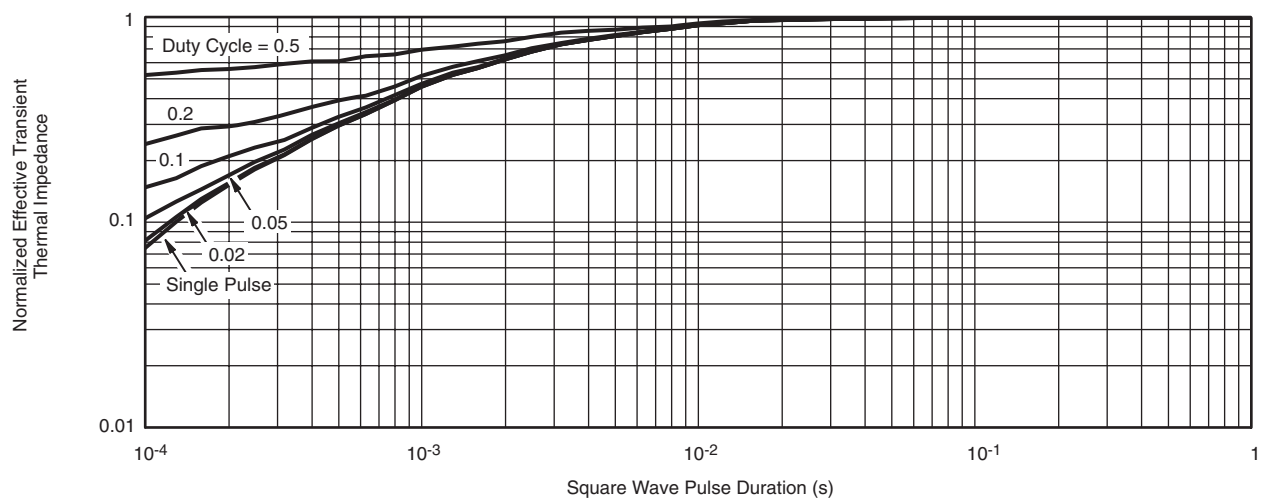


On-Resistance vs. Drain Current



Capacitance

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted**Threshold Voltage****Max. Drain Current vs. Case Temperature****Power Derating, Junction-to-Case*** $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified**Safe Operating Area, Junction-to-Ambient****Normalized Thermal Transient Impedance, Junction-to-Case**

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