



N-Channel 200-V (D-S) 175°C MOSFET

PRODUCT SUMMARY

$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
200	0.033 @ $V_{GS} = 10$ V	57

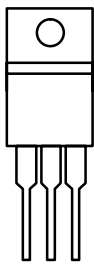
FEATURES

- TrenchFET® Power MOSFETS
- 175°C Junction Temperature

APPLICATIONS

- Automotive
 - 42-V EPS and ABS
 - DC/DC Conversion
 - Motor Drives
- Isolated DC/DC converters
 - Primary-Side Switch

TO-220AB

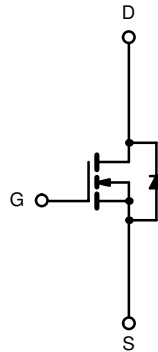


G D S

Top View

SUP57N20-33

DRAIN connected to TAB



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V_{DS}	200	V	
Gate-Source Voltage	V_{GS}	± 20		
Continuous Drain Current ($T_J = 175^\circ\text{C}$)	I_D	$T_C = 25^\circ\text{C}$	57	A
		$T_C = 125^\circ\text{C}$	33	
Pulsed Drain Current	I_{DM}	140		
Avalanche Current	I_{AR}	35		
Repetitive Avalanche Energy ^a	E_{AR}	61	mJ	
Maximum Power Dissipation ^a	P_D	$T_C = 25^\circ\text{C}$	300 ^b	W
		$T_A = 25^\circ\text{C}$	3.75	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to 175	$^\circ\text{C}$	

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limit	Unit
Junction-to-Ambient (PCB Mount) ^c	R_{thJA}	40	$^\circ\text{C}/\text{W}$
Junction-to-Case (Drain)	R_{thJC}	0.5	

Notes

- Duty cycle $\leq 1\%$.
- See SOA curve for voltage derating.
- 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 _{DS} = 0 V, I _D = 250 μA	200			V
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	2		4	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 160 V, V _{GS} = 0 V			1	μA
		V _{DS} = 160 V, V _{GS} = 0 V, T _J = 125 °C			50	
		V _{DS} = 160 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		0.027	0.033	Ω
		V _{GS} = 10 V, I _D = 30 A, T _J = 125 °C			0.069	
		V _{GS} = 10 V, I _D = 30 A, T _J = 175 °C			0.093	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 30 A	25			S
Dynamic^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz		5100		pF
Output Capacitance	C _{oss}			480		
Reverse Transfer Capacitance	C _{rss}			210		
Total Gate Charge ^c	Q _g	V _{DS} = 100 V, V _{GS} = 10 V, I _D = 85 A		90	130	nC
Gate-Source Charge ^c	Q _{gs}			23		
Gate-Drain Charge ^c	Q _{gd}			34		
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 100 V, R _L = 1.5 Ω I _D ≅ 65 A, V _{GEN} = 10 V, R _G = 2.5 Ω		24	35	ns
Rise Time ^c	t _r			220	330	
Turn-Off Delay Time ^c	t _{d(off)}			45	70	
Fall Time ^c	t _f			200	300	
Source-Drain Diode Ratings and Characteristics (T_C = 25 °C)^b						
Continuous Current	I _S				65	A
Pulsed Current	I _{SM}				140	
Forward Voltage ^a	V _{SD}	I _F = 65 A, V _{GS} = 0 V		1.0	1.5	V
Reverse Recovery Time	t _{rr}	I _F = 50 A, di/dt = 100 A/μs		130	200	ns
Peak Reverse Recovery Current	I _{RM(REC)}			8	12	A
Reverse Recovery Charge	Q _{rr}			0.52	1.2	μC

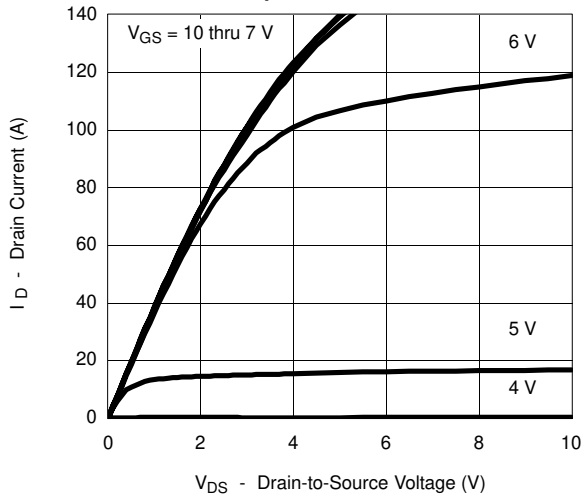
Notes

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

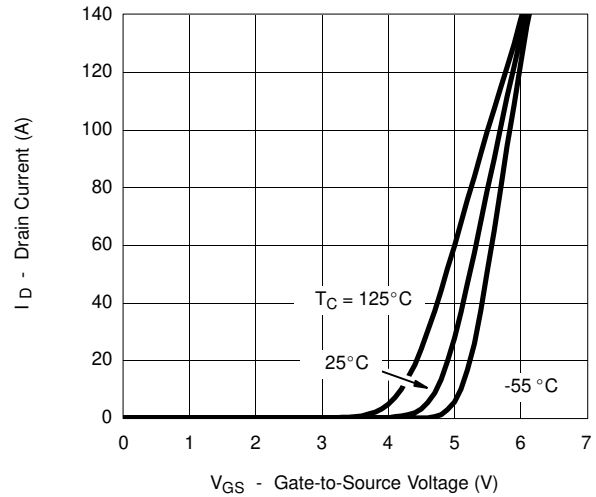


TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

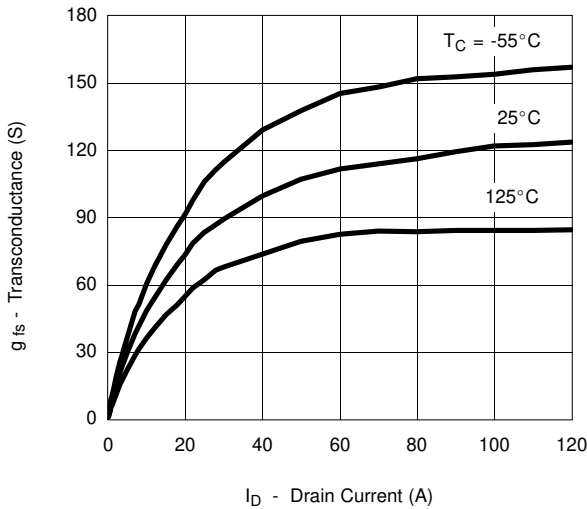
Output Characteristics



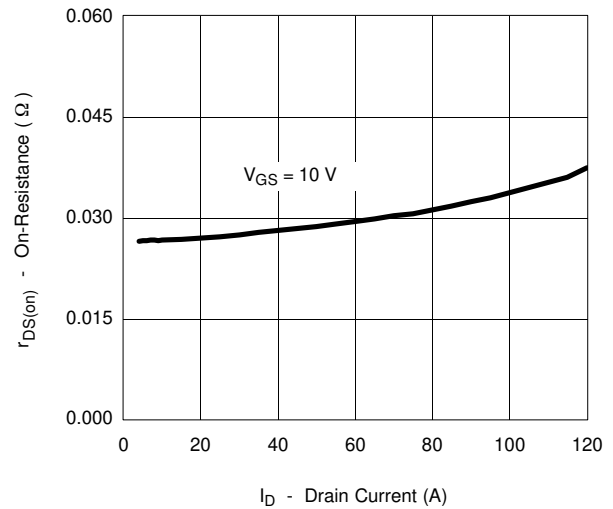
Transfer Characteristics



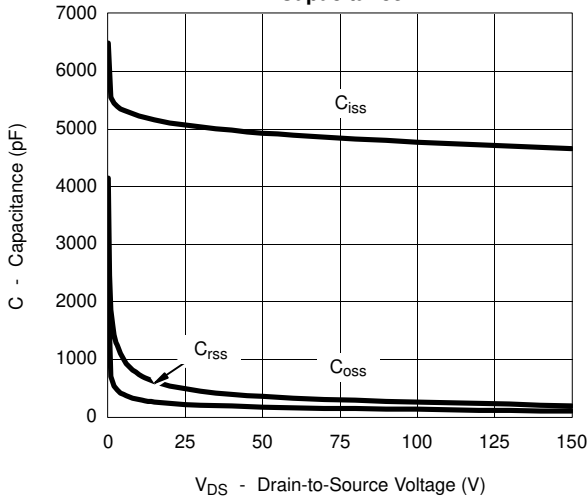
Transconductance



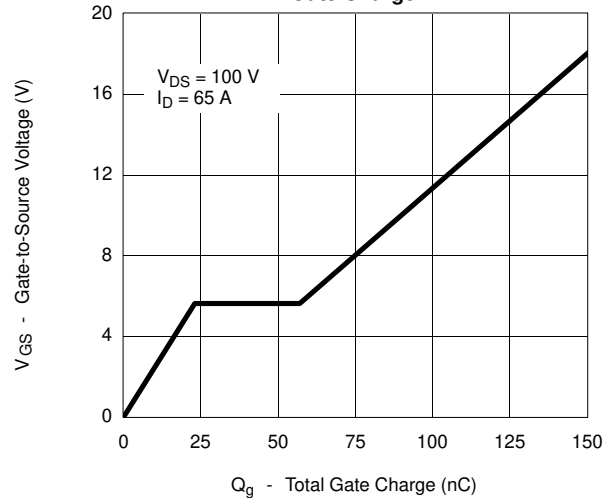
On-Resistance vs. Drain Current



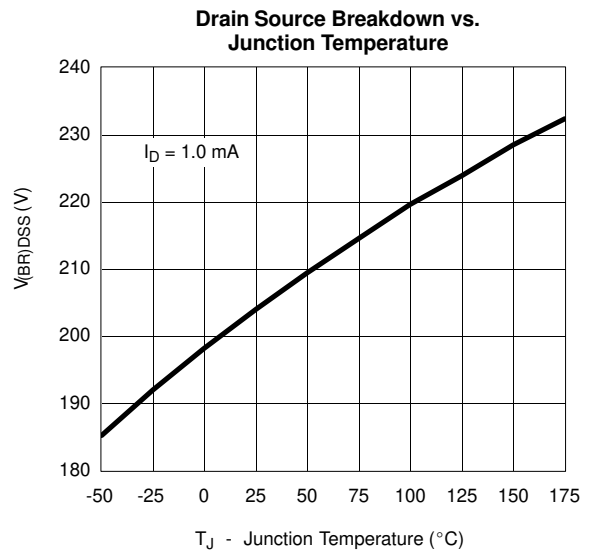
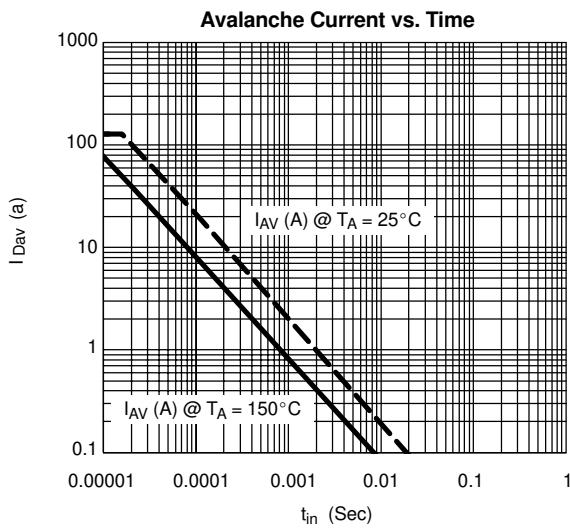
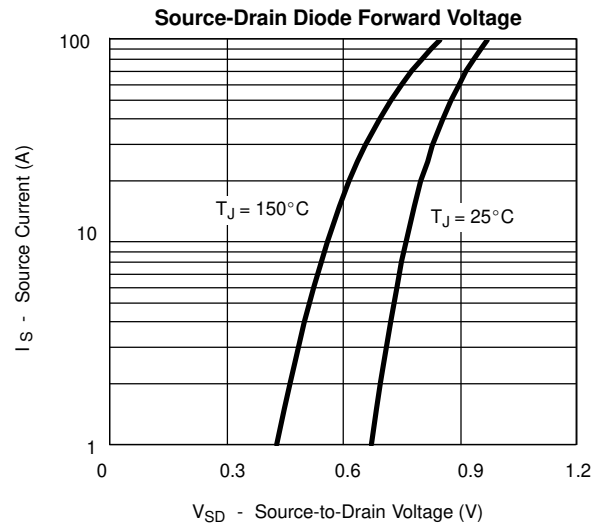
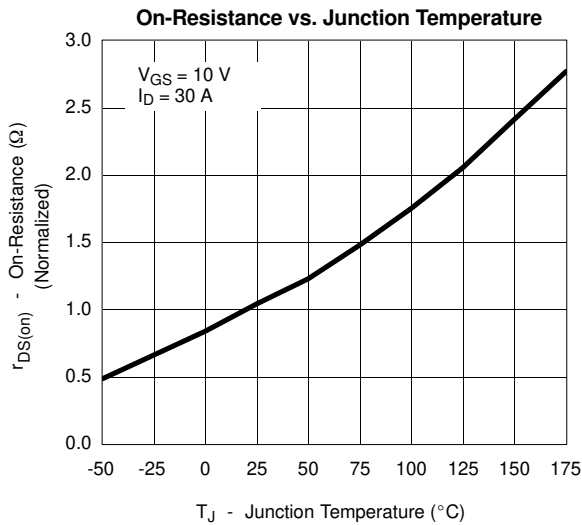
Capacitance



Gate Charge



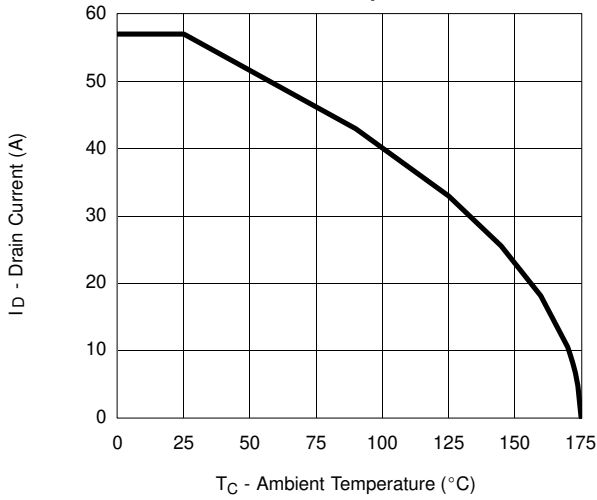
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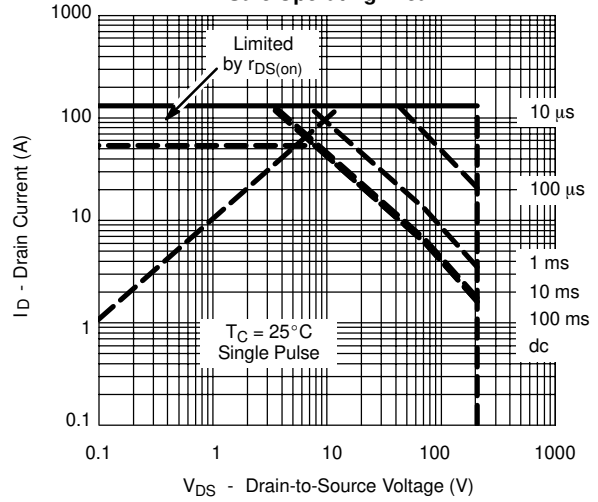


THERMAL RATINGS

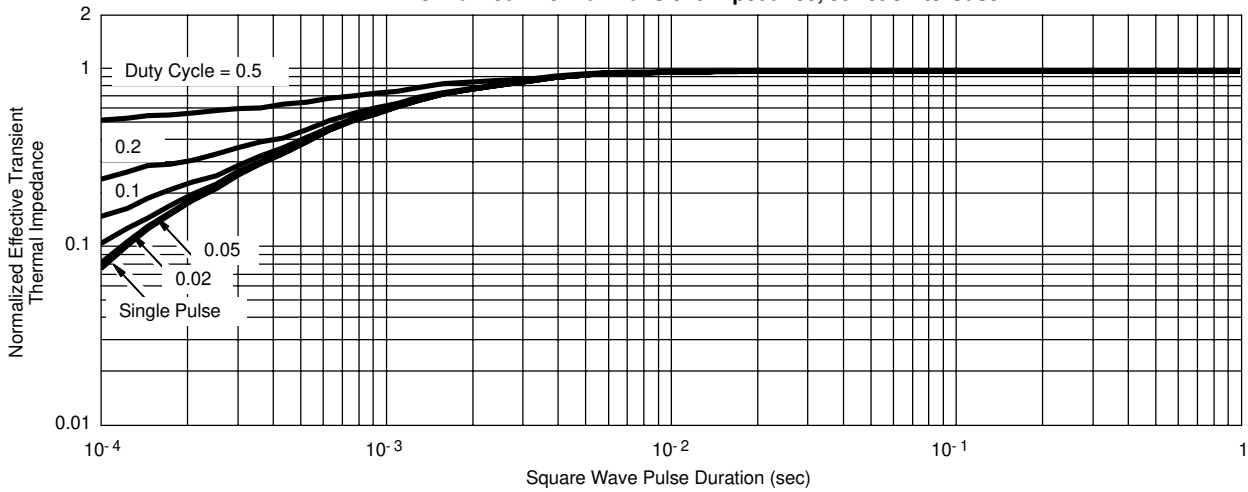
Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case



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