



N-Channel 100-V (D-S) 175°C MOSFET

PRODUCT SUMMARY

$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
100	0.0094 @ $V_{GS} = 10$ V	90 ^a

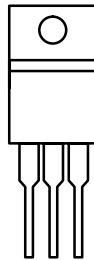
FEATURES

- TrenchFET® Power MOSFETS
- 175°C Junction Temperature
- New Package with Low Thermal Resistance

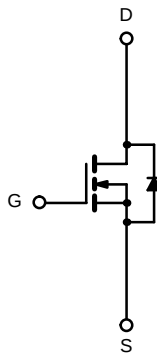
APPLICATIONS

- Automotive
 - 42-V Power Bus
 - DC/DC Conversion
 - Motor Drivers
 - Injection Systems

TO-220AB



G D S
Top View
SUP90N10-09



N-Channel MOSFET

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

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current ($T_J = 175^\circ\text{C}$)	$T_C = 25^\circ\text{C}$	I_D	90 ^a	A
	$T_C = 125^\circ\text{C}$		64 ^a	
Pulsed Drain Current		I_{DM}	240	
Avalanche Current		I_{AR}	75	
Repetitive Avalanche Energy ^b	$L = 0.1$ mH	E_{AR}	280	mJ
			300 ^c	
Maximum Power Dissipation ^b	$T_C = 25^\circ\text{C}$	P_D	3.75	W
	$T_A = 25^\circ\text{C}^d$			
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 Mounted) ^d	R_{thJA}	40	$^\circ\text{C/W}$
Junction-to-Case (Drain)	R_{thJC}	0.5	

Notes

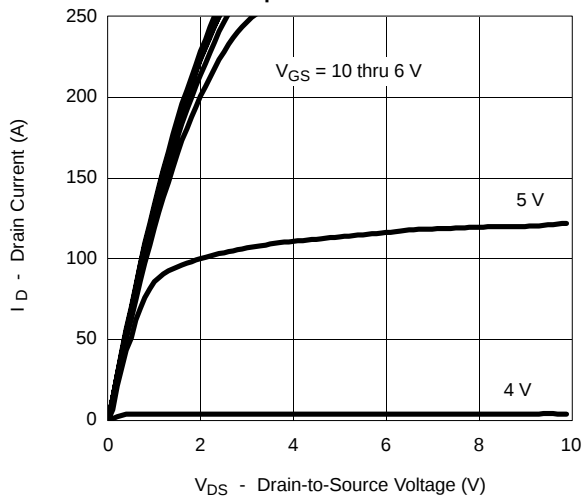
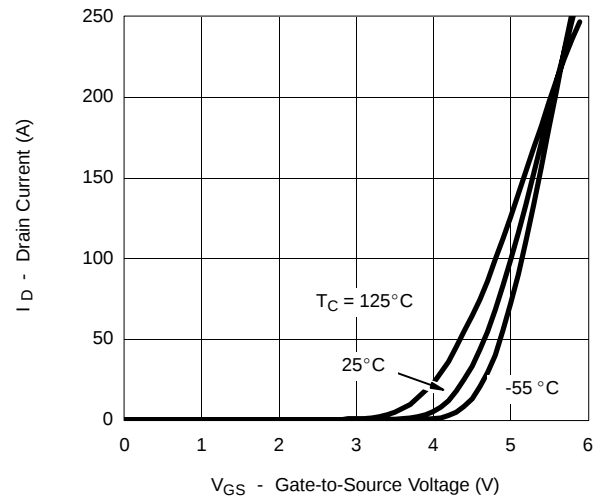
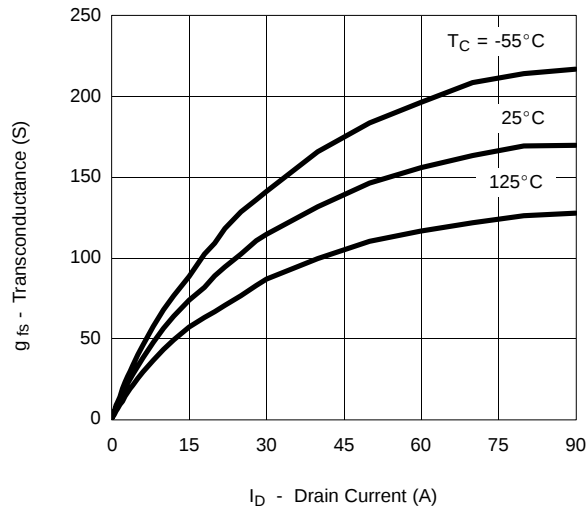
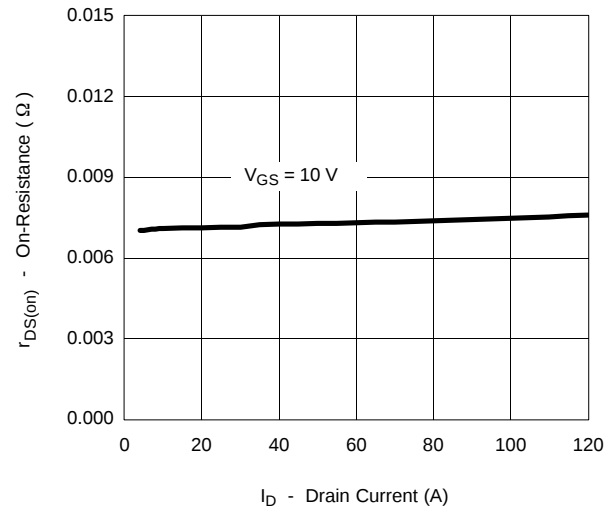
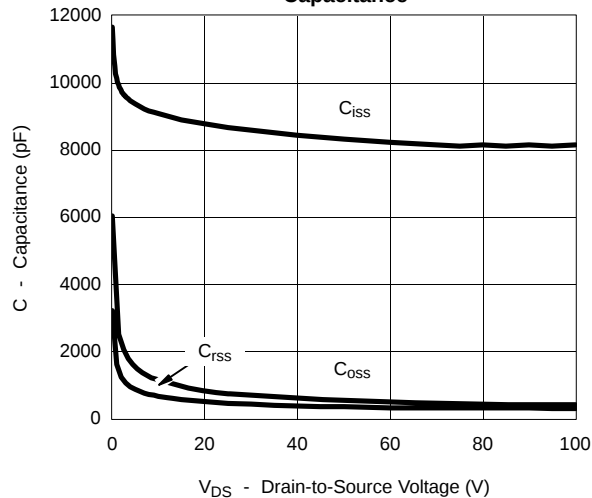
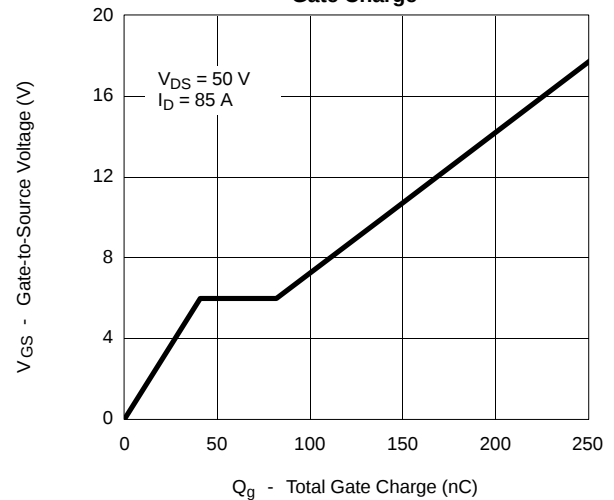
- Package limited.
- Duty cycle $\leq 1\%$.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR-4 material).

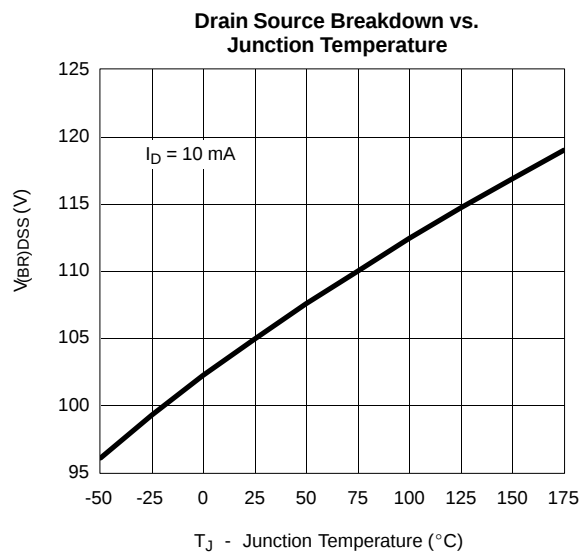
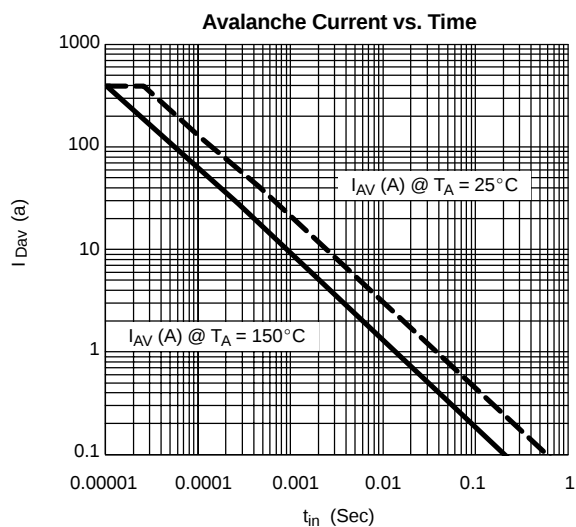
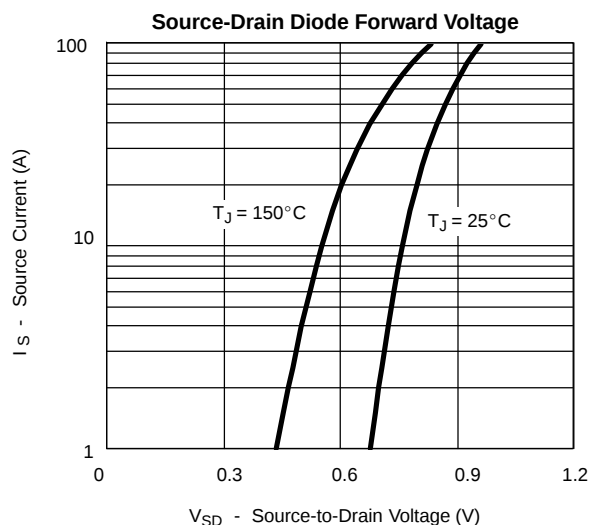
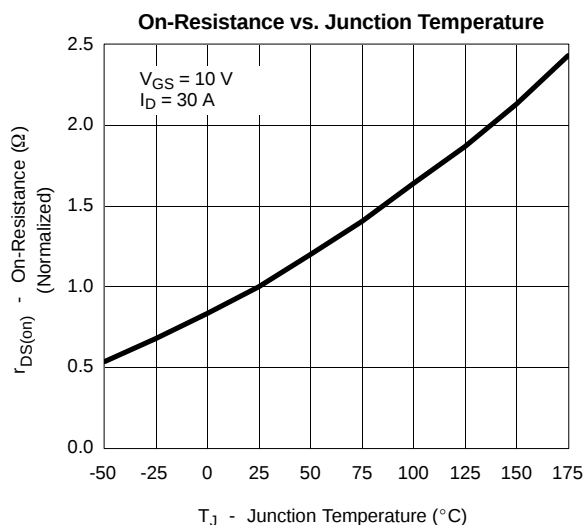
SPECIFICATIONS ($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{DS} = 0 V, I _D = 250 μA	100			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} = 80 V, V _{GS} = 0 V			1	μA
		V _{DS} = 80 V, V _{GS} = 0 V, T _J = 125°C			50	
		V _{DS} = 80 V, V _{GS} = 0 V, T _J = 175°C			250	mA
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		0.0075	0.0094	Ω
		V _{GS} = 10 V, I _D = 30 A, T _J = 125°C			0.017	
		V _{GS} = 10 V, I _D = 30 A, T _J = 175°C			0.024	
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		8700		pF
Output Capacitance	C _{oss}			740		
Reverse Transfer Capacitance	C _{rss}			450		
Total Gate Charge ^c	Q _g	V _{DS} = 50 V, V _{GS} = 10 V, I _D = 85 A		140	210	nC
Gate-Source Charge ^c	Q _{gs}			41		
Gate-Drain Charge ^c	Q _{gd}			41		
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 50 V, R _L = 0.6 Ω I _D ≅ 85 A, V _{GEN} = 10 V, R _G = 2.5 Ω		20	30	ns
Rise Time ^c	t _r			110	170	
Turn-Off Delay Time ^c	t _{d(off)}			65	100	
Fall Time ^c	t _f			100	150	
Source-Drain Diode Ratings and Characteristics (T _C = 25°C) ^b						
Continuous Current	I _S				90	A
Pulsed Current	I _{SM}				240	
Forward Voltage ^a	V _{SD}	I _F = 50 A, V _{GS} = 0 V		1.0	1.5	V
Reverse Recovery Time	t _{rr}	I _F = 50 A, di/dt = 100 A/μs		70	140	ns
Peak Reverse Recovery Current	I _{RM(REC)}			5.5	10	A
Reverse Recovery Charge	Q _{rr}			0.19	0.35	μC

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.
c. Independent of operating temperature.

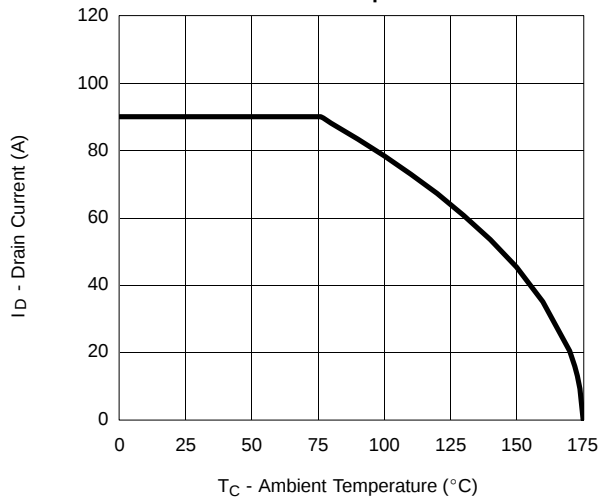
**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)****Output Characteristics****Transfer Characteristics****Transconductance****On-Resistance vs. Drain Current****Capacitance****Gate Charge**

TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)


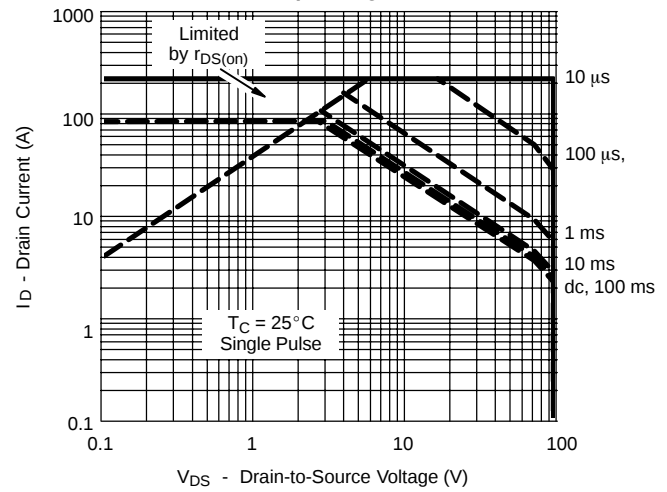


THERMAL RATINGS

Maximum Avalanche and Drain Current
vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

