



N-Channel 100-V (D-S) 175°C MOSFET

PRODUCT SUMMARY

$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
100	0.030 @ $V_{GS} = 10$ V	40
	0.034 @ $V_{GS} = 6$ V	37.5

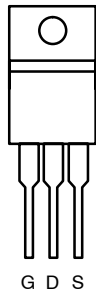
FEATURES

- TrenchFET® Power MOSFETS
- 175°C Junction Temperature

APPLICATIONS

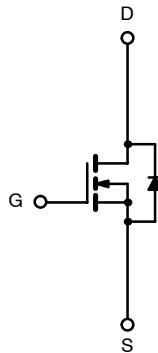
- Automotive
 - Motor Drives
 - 12-V Switches

TO-220AB



Top View

Ordering Information: SUP40N10-30



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	40	A
	$T_C = 125^\circ\text{C}$		23	
Pulsed Drain Current		I_{DM}	75	
Avalanche Current		I_{AR}	35	
Repetitive Avalanche Energy ^a	$L = 0.1$ mH	E_{AR}	61	mJ
Maximum Power Dissipation ^a	$T_C = 25^\circ\text{C}$	P_D	107 ^b	W
	$T_A = 25^\circ\text{C}^c$		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	$^\circ\text{C/W}$
	Free Air		62.5	
Junction-to-Case (Drain)		R_{thJC}	1.4	

Notes

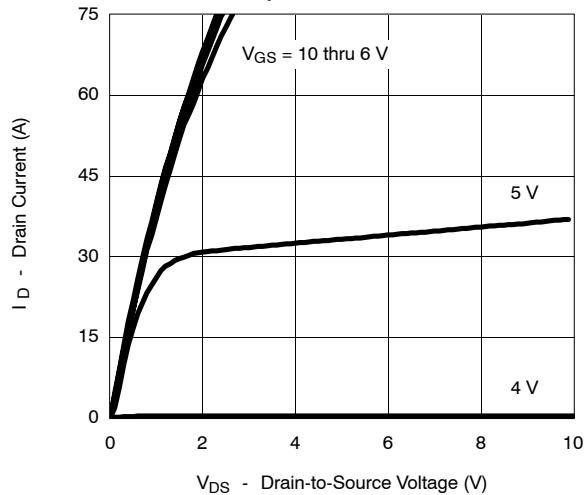
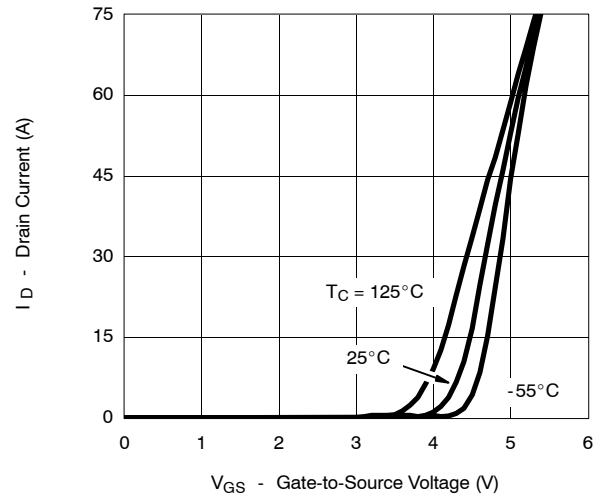
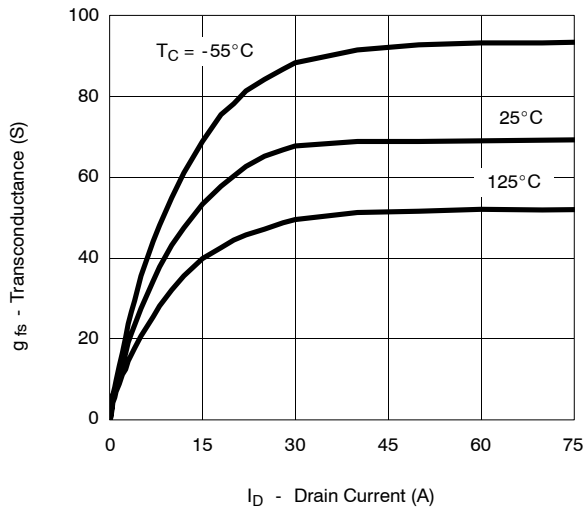
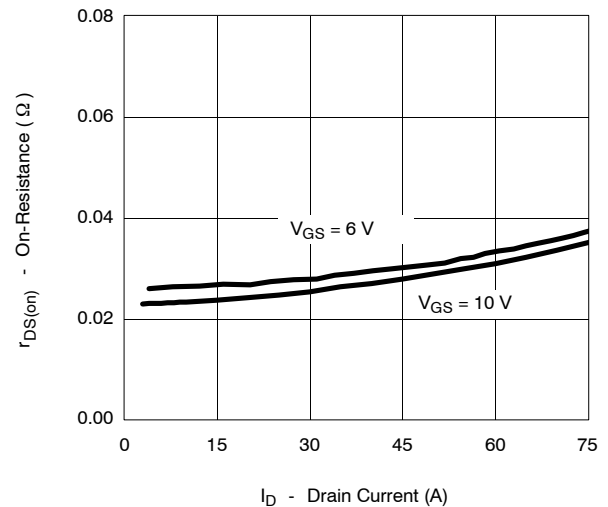
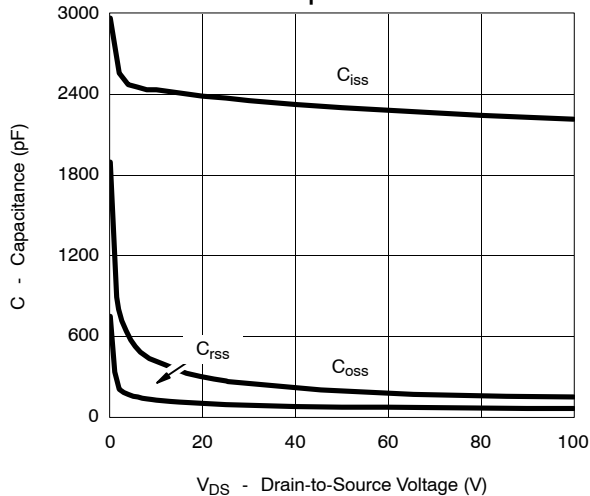
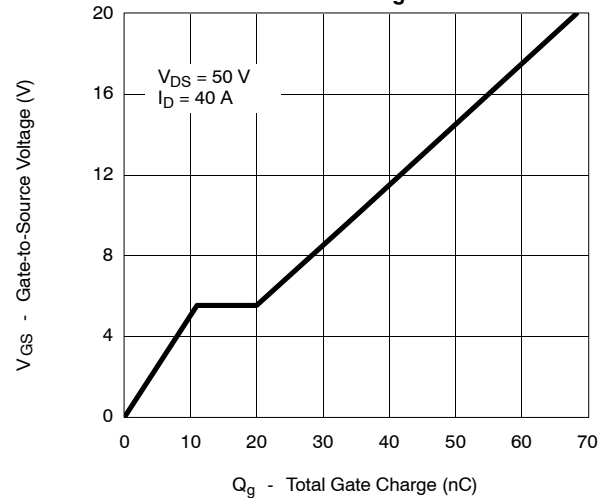
- Duty cycle $\leq 1\%$.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR-4 material).

SPECIFICATIONS (T_J = 25 °C UNLESS OTHERWISE NOTED)

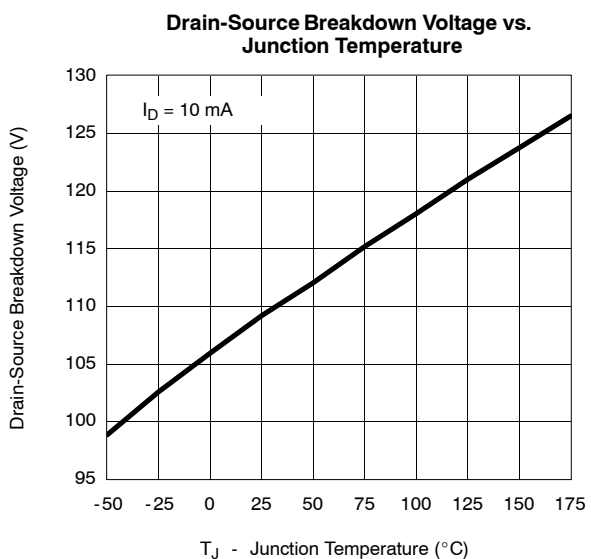
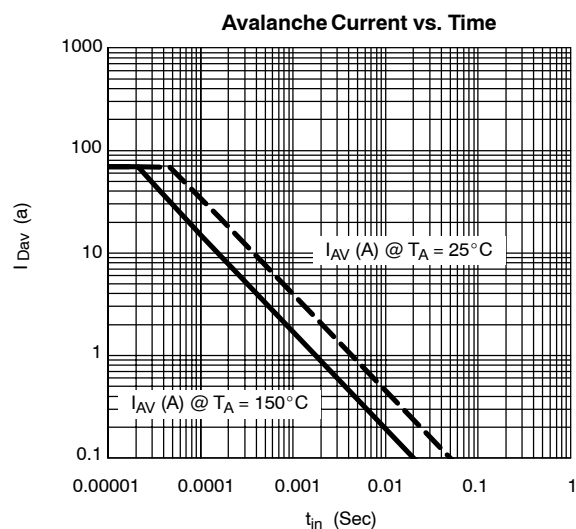
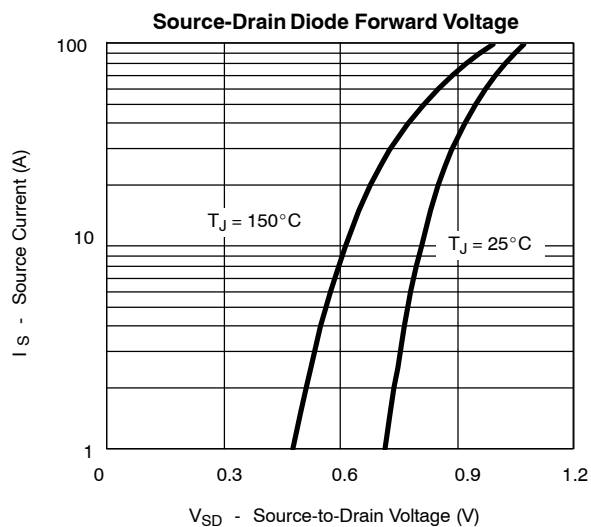
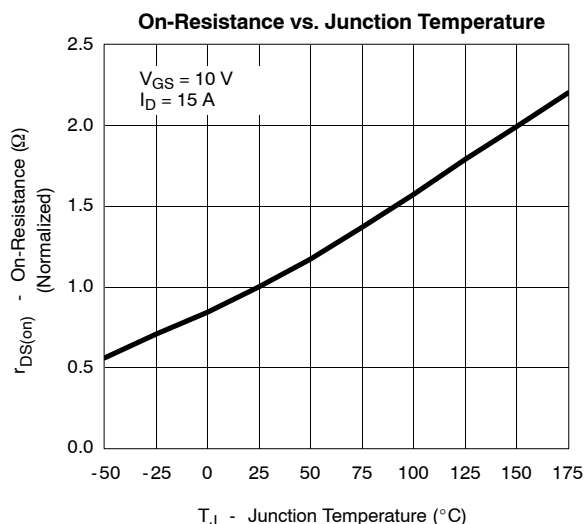
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 250 μA	100			V
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	2		4	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			±100	nA
Zero Gate Voltage 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	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	75			A
Drain-Source On-State Resistance ^a	r _{DS(on)}	V _{GS} = 10 V, I _D = 15 A		0.024	0.030	Ω
		V _{GS} = 6 V, I _D = 10 A		0.026	0.034	
		V _{GS} = 10 V, I _D = 15 A, T _J = 125°C			0.054	
		V _{GS} = 10 V, I _D = 15 A, T _J = 175°C			0.067	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 15 A	10			S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz		2400		pF
Output Capacitance	C _{oss}			270		
Reverse Transfer Capacitance	C _{rss}			90		
Total Gate Charge ^c	Q _g	V _{DS} = 50 V, V _{GS} = 10 V, I _D = 40 A		35	60	nC
Gate-Source Charge ^c	Q _{gs}			11		
Gate-Drain Charge ^c	Q _{gd}			9		
Gate Resistance	R _G			1.7		Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 50 V, R _L = 1.25 Ω I _D ≅ 40 A, V _{GEN} = 10 V, R _G = 2.5 Ω		11	20	ns
Rise Time ^c	t _r			12	20	
Turn-Off Delay Time ^c	t _{d(off)}			30	45	
Fall Time ^c	t _f			12	20	
Source-Drain Diode Ratings and Characteristics (T _C = 25°C) ^b						
Continuous Current	I _S				40	A
Pulsed Current	I _{SM}				75	
Forward Voltage ^a	V _{SD}	I _F = 30 A, V _{GS} = 0 V		1.0	1.5	V
Reverse Recovery Time	t _{rr}	I _F = 30 A, di/dt = 100 A/μs		60	100	ns
Peak Reverse Recovery Current	I _{RM(REC)}			5	8	A
Reverse Recovery Charge	Q _{rr}				0.15	0.4

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**

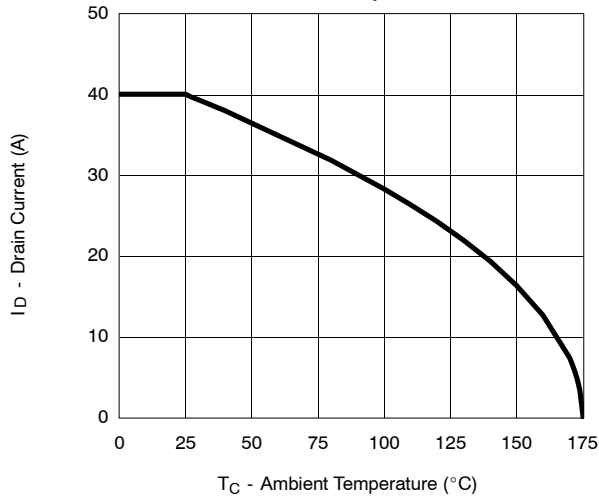
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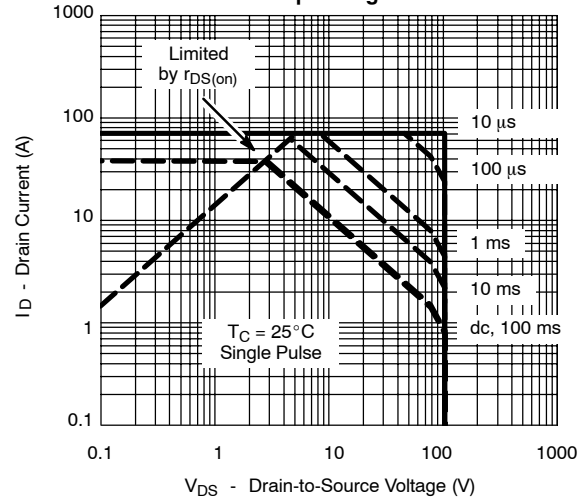


THERMAL RATINGS

**Maximum Avalanche and Drain Current
vs. Case Temperature**



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

