

90N4F3-VB TO262 Datasheet

N-Channel 40-V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

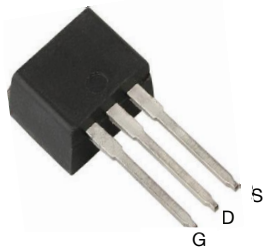
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
40	0.005 at $V_{GS} = 10$ V	100	95

FEATURES

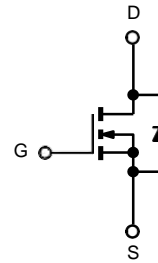
- Trench Power MOSFET
- 175 °C Junction Temperature
- High Threshold Voltage at High Temperature


RoHS
 COMPLIANT

TO-262



Top View



N-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	110	A
	$T_C = 125$ °C		70	
Pulsed Drain Current		I_{DM}	300	
Avalanche Current		I_{AR}	50	
Repetitive Avalanche Energy ^a	$L = 0.1$ mH	E_{AR}	125	mJ
Maximum Power Dissipation ^a	$T_C = 25$ °C	P_D	150 ^b	W
	$T_A = 25$ °C ^c		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 ^c	R_{thJA}	40	°C/W
Junction-to-Case		R_{thJC}	1	

Notes:

a. Duty cycle ≤ 1 %.

b. See SOA curve for voltage derating.

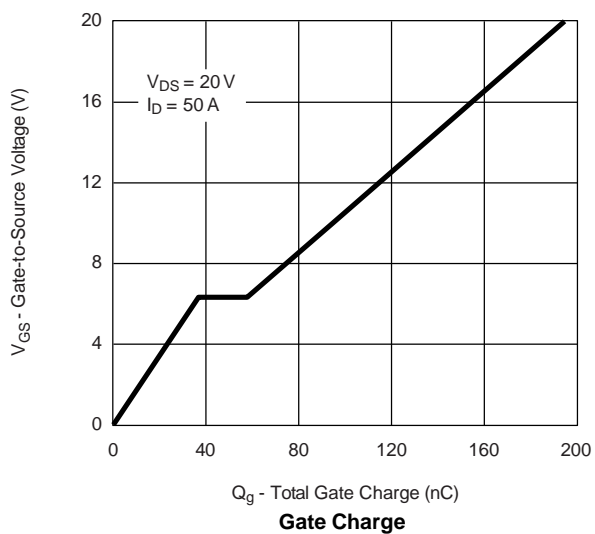
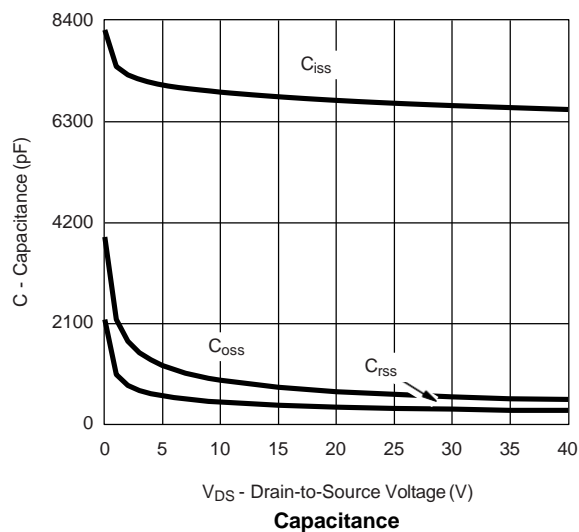
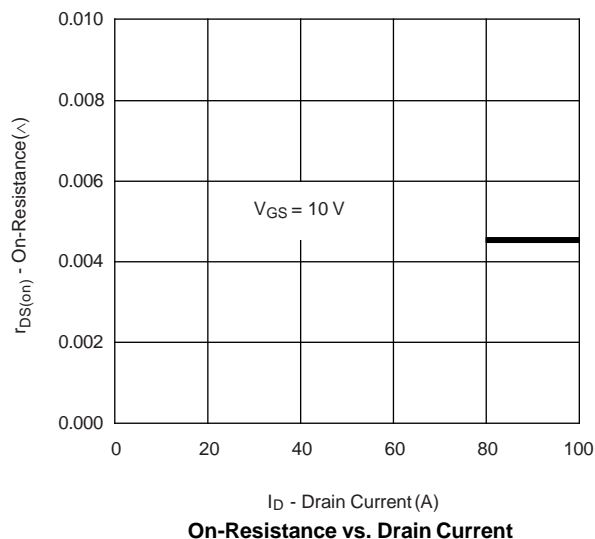
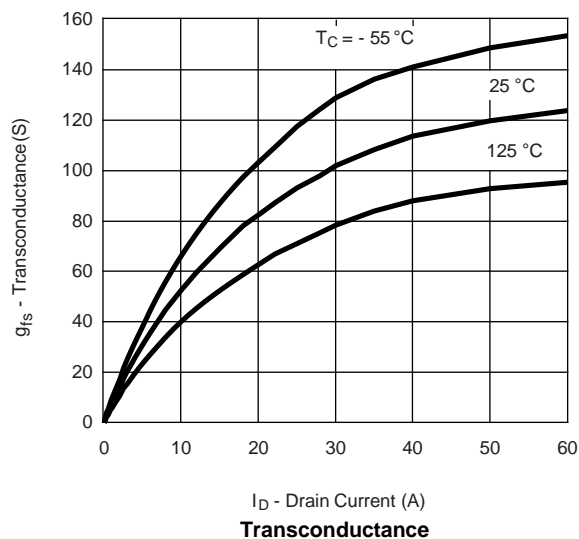
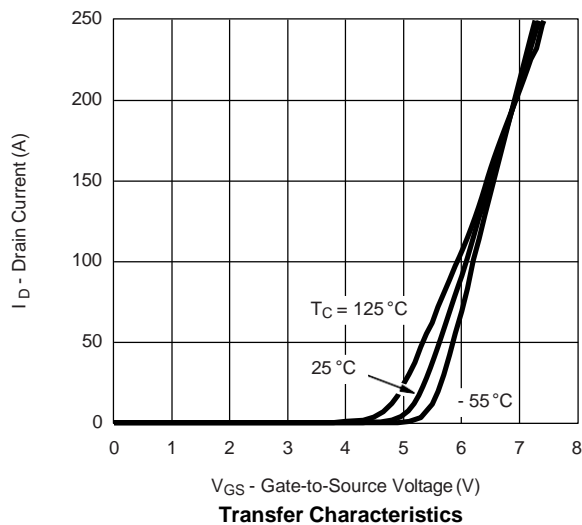
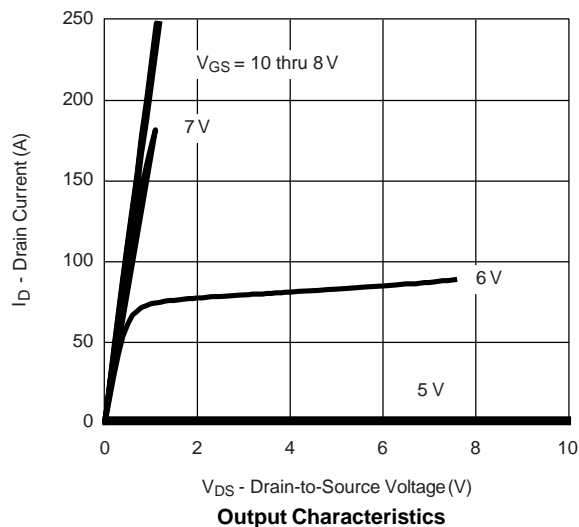
c. When Mounted on 1" square PCB (FR-4 material).

SPECIFICATIONS T _J = 25 °C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{DS} = 0 V, I _D = 250 μA	40			V
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1.0	2.0	4.0	
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 = 20 A		0.005		Ω
		V _{GS} = 10 V, I _D = 15 A, T _J = 125 °C		0.008		
		V _{GS} = 10 V, I _D = 15 A, T _J = 175 °C		0.0106		
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 15 A	20	50		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz		3200		pF
Output Capacitance	C _{oss}			600		
Reverse Transfer Capacitance	C _{rss}			320		
Total Gate Charge ^c	Q _g	V _{DS} = 20 V, V _{GS} = 10 V, I _D = 50 A		95		nC
Gate-Source Charge ^c	Q _{gs}			37		
Gate-Drain Charge ^c	Q _{gd}			21		
Gate Resistance	R _g	f = 1.0 MHz		1.7		Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 20 V, R _L = 0.4 Ω I _D ≅ 50 A, V _{GEN} = 10 V, R _g = 2.5 Ω		20	30	ns
Rise Time ^c	t _r			95	145	
Turn-Off Delay Time ^c	t _{d(off)}			50	75	
Fall Time ^c	t _f			12	20	
Source-Drain Diode Ratings and Characteristics T _C = 25 °C ^b						
Continuous Current	I _S				100	A
Pulsed Current	I _{SM}				300	
Forward Voltage ^a	V _{SD}	I _F = 30 A, V _{GS} = 0 V		0.90	1.50	V
Reverse Recovery Time	t _{rr}	I _F = 30 A, di/dt = 100 A/μs		40	60	ns

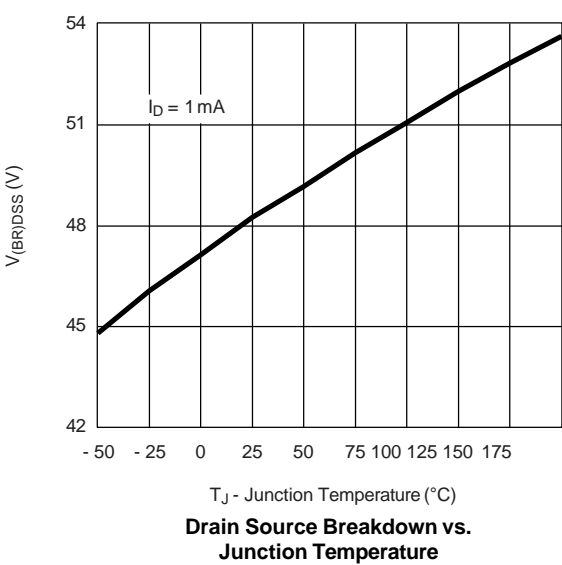
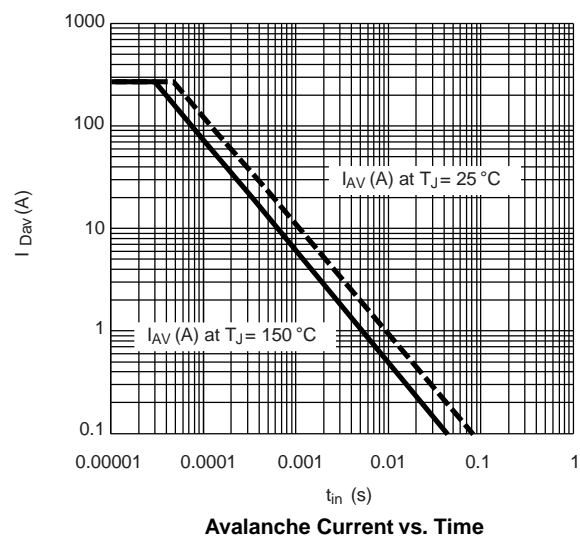
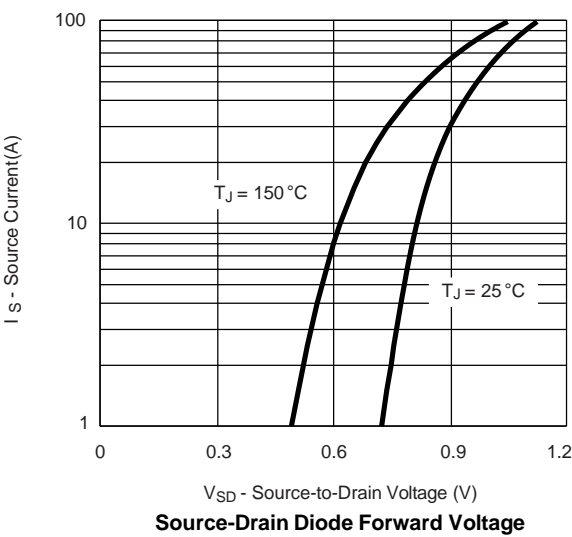
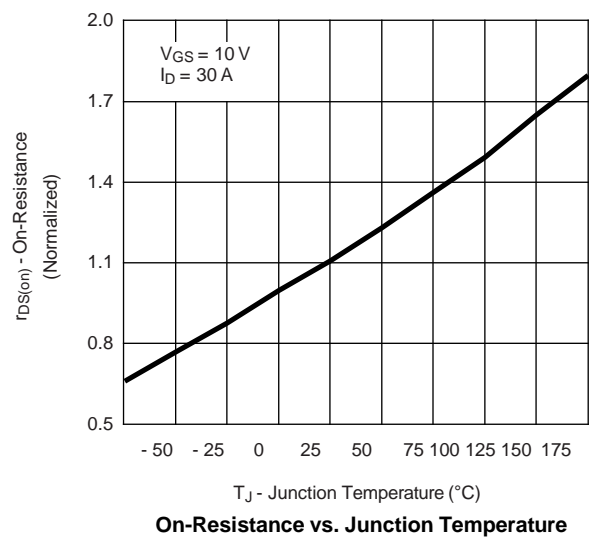
Notes:

- 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 otherwise noted



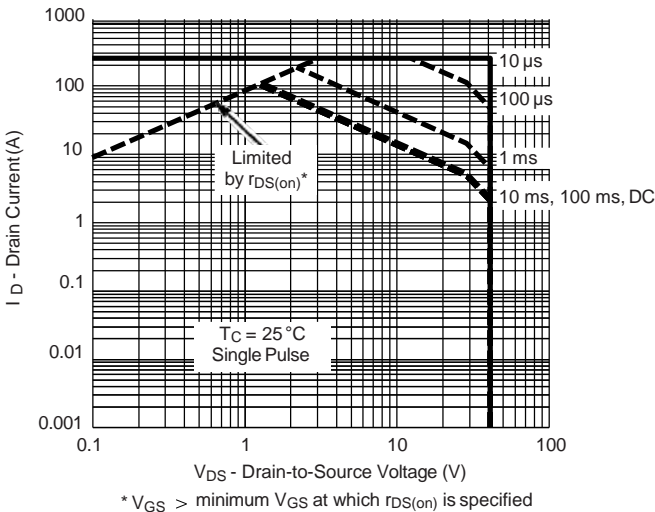
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



THERMAL RATINGS



Maximum Avalanche and Drain Current
vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

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