VBN1101N Datasheet

N-Channel 100-V (D-S) 175 °C MOSFET

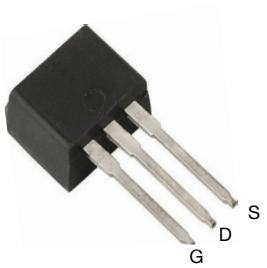
PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
100	0.0085 at V_{GS} = 10 V	100
	0.010 at V_{GS} = 6 V	85

FEATURES

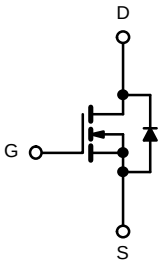
- Trench Power MOSFET
- 175 °C Maximum Junction Temperature
- Compliant to RoHS Directive 2002/95/EC

RoHS COMPLIANT

TO-262



Top View



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T_A = 25 °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 = 150 °C)	T_C = 25 °C	I_D	100	A
	T_C = 125 °C		75 [a]	
Pulsed Drain Current		I_{DM}	300	
Avalanche Current	L = 0.1 mH	I_{AS}	75	
Single Pulse Avalanche Energy[b]		E_{AS}	280	mJ
Maximum Power Dissipation[b]	T_C = 25 °C (TO-220AB and TO-263)	P_D	250[c]	W
	T_A = 25 °C (TO-263)[d]		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 (TO-263)[d]	R_{thJA}	40	°C/W
	Free Air (TO-220AB)		62.5	
Junction-to-Case		R_{thJC}	0.6	

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.

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.

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	100			V
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	1		3	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 100 V, V_{GS} = 0 V			1	µA
		V_{DS} = 100 V, V_{GS} = 0 V, T_J = 125 °C			50	
		V_{DS} = 100 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		0.0085		Ω
		V_{GS} = 4.5 V, I_D = 20 A		0.010		
		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		0.022		
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		6550		pF
Output Capacitance	C_{oss}			665		
Reverse Transfer Capacitance	C_{rss}			265		
Total Gate Charge[c]	Q_g	V_{DS} = 50 V, V_{GS} = 10 V, I_D = 85 A		105	160	nC
Gate-Source Charge[c]	Q_{gs}			17		
Gate-Drain Charge[c]	Q_{gd}			23		
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		12	25	ns
Rise Time[c]	t_r			90	135	
Turn-Off DelayTime[c]	$t_{d(off)}$			55	85	
Fall Time[c]	t_f			130	195	
Source-Drain Diode Ratings and Characteristics T_C = 25 °C[b]						
Continuous Current	I_S				85	A
Pulsed Current	I_{SM}				240	
Forward Voltage[a]	V_{SD}	I_F = 85 A, V_{GS} = 0 V		1.0	1.5	V
Reverse Recovery Time	t_{rr}	I_F = 50 A, dI/dt = 100 A/µs		85	140	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			4.5	7	A
Reverse Recovery Charge	Q_{rr}			0.17	0.35	µC

Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
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c. Independent of operating temperature.

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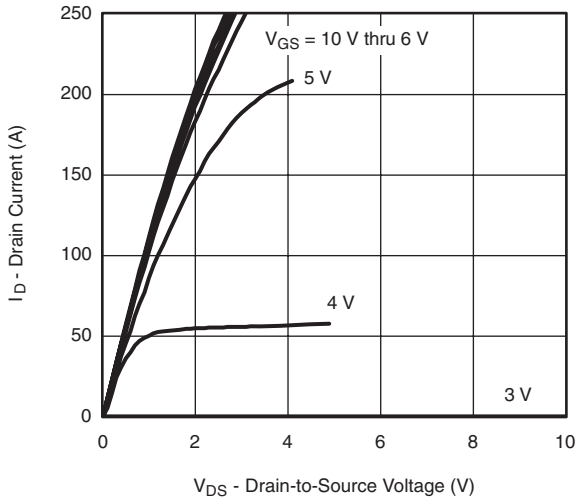
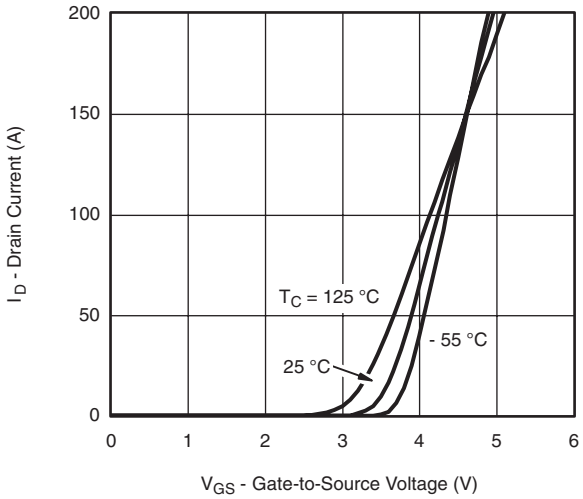
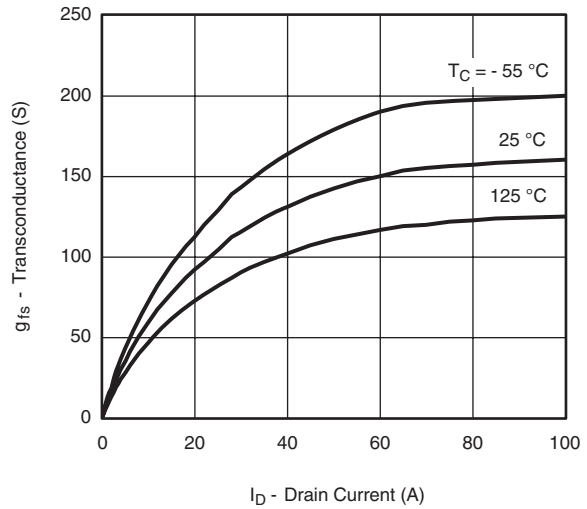
TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



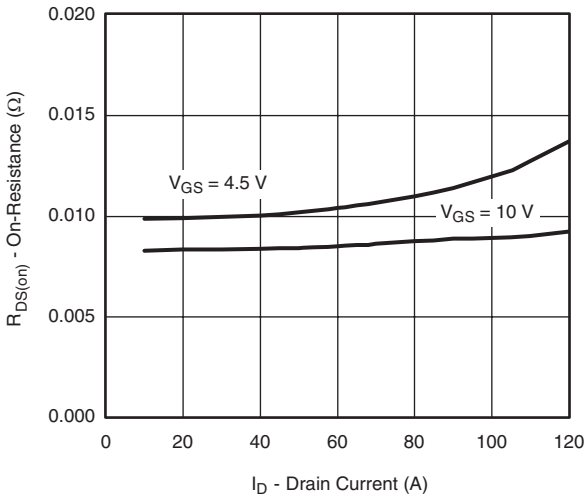
Output Characteristics



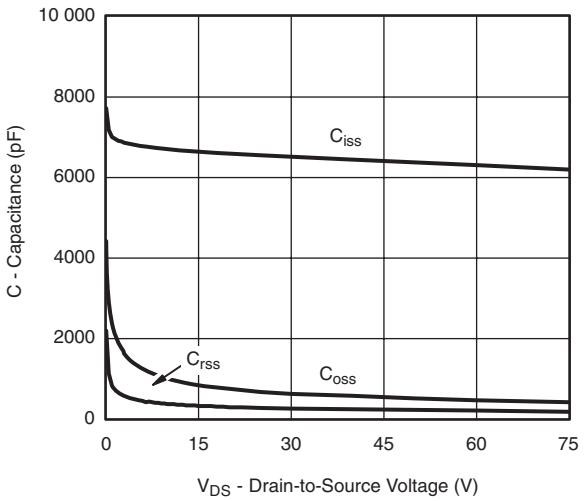
Transfer Characteristics



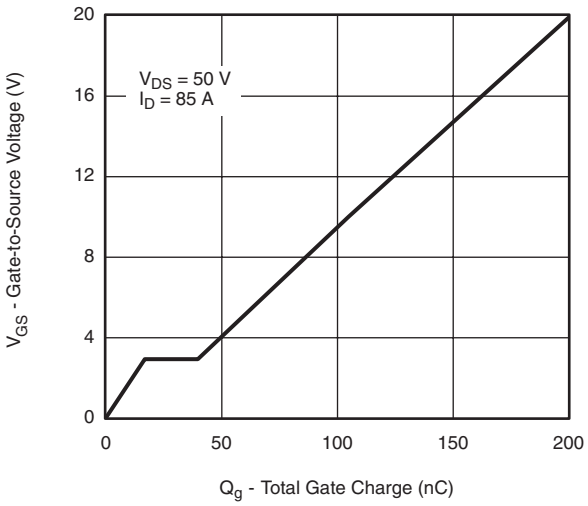
Transconductance



On-Resistance vs. Drain Current

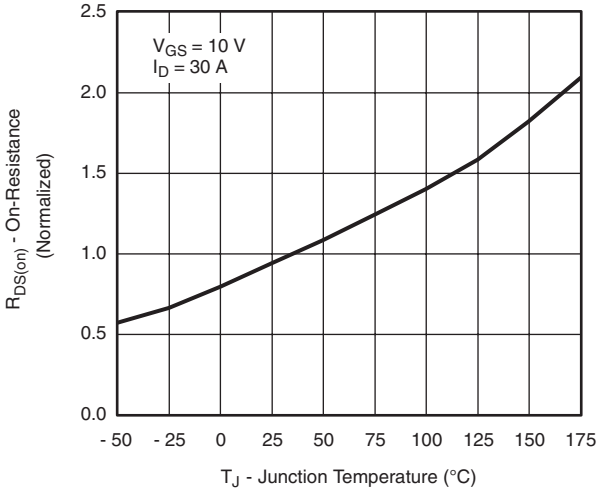


Capacitance

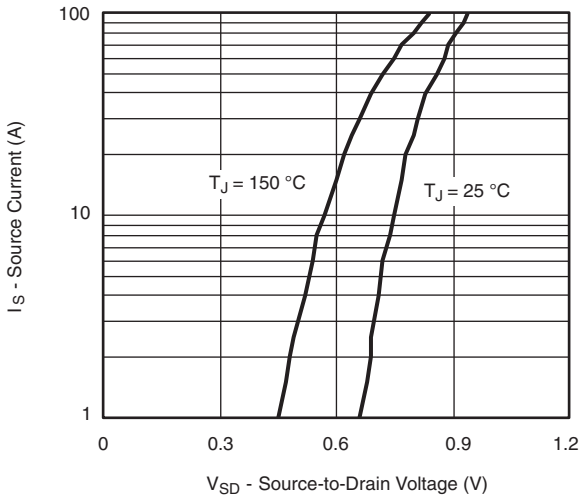


Gate Charge

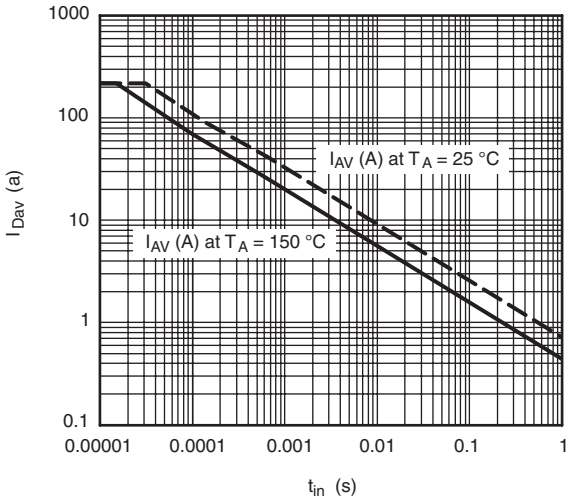
TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



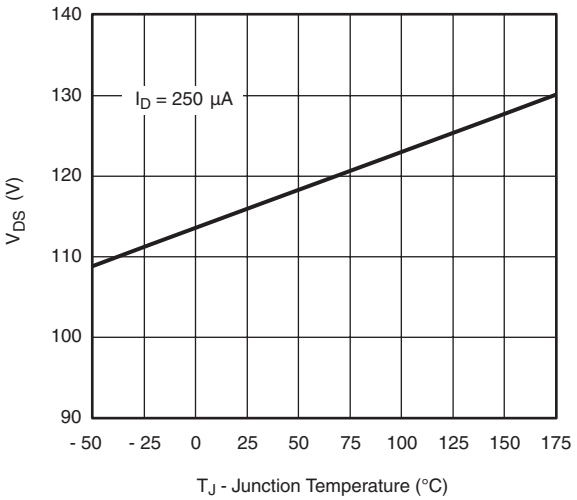
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

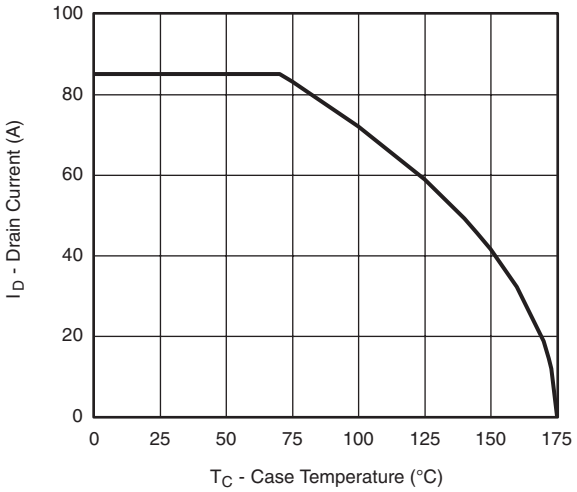


Avalanche Current vs. Time

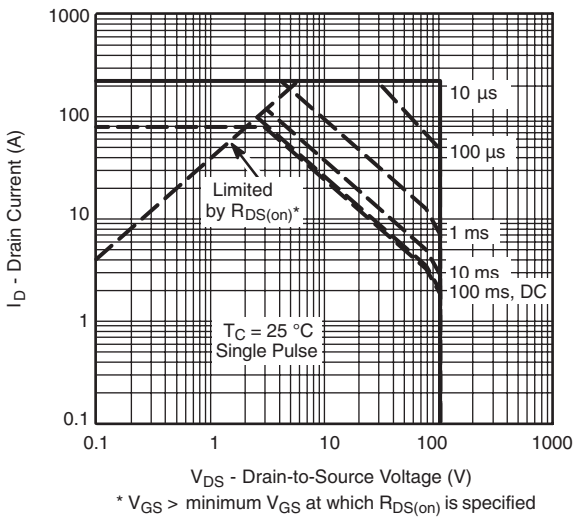


T_J - Drain-Source Breakdown vs. Junction-Temperature

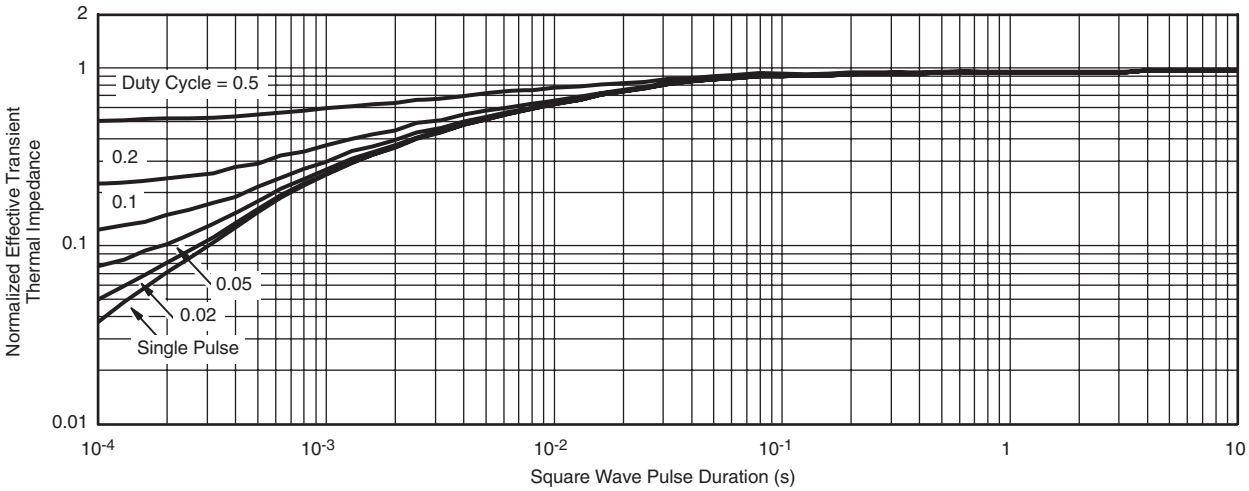
THERMAL RATINGS



Maximum Avalanche and Drain Current vs. Case Temperature

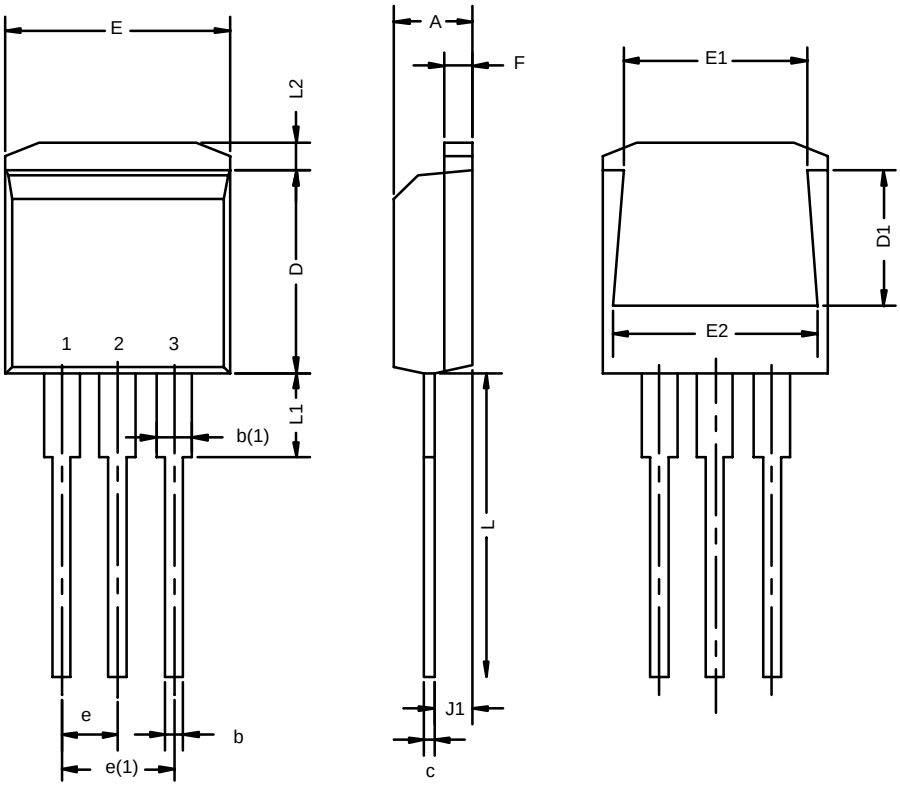


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

TO-262: 3-LEAD



Dim	MILLIMETERS*		INCHES	
	Min	Max	Min	Max
A	4.32	4.70	0.170	0.185
b	0.64	1.00	0.025	0.039
b(1)	1.14	1.40	0.045	0.055
c	0.36	0.50	0.014	0.020
D	8.64	9.65	0.340	0.380
D1	5.59	6.10	0.220	0.240
e	2.41	2.67	0.095	0.105
e(1)	4.95	5.33	0.195	0.210
E	10.03	10.41	0.395	0.410
E1	7.87	8.64	0.310	0.340
E2	9.02	9.53	0.355	0.375
F	1.14	1.40	0.045	0.055
J1	2.41	2.79	0.095	0.110
L	13.08	14.22	0.515	0.560
L1	-	3.81	-	0.150
L2	1.02	1.40	0.040	0.055
ECN: T-02234—Rev. C, 14-Oct-02 DWG: 5855				

*Use millimeters as the primary measurement

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