BORN SEMICONDUCTOR

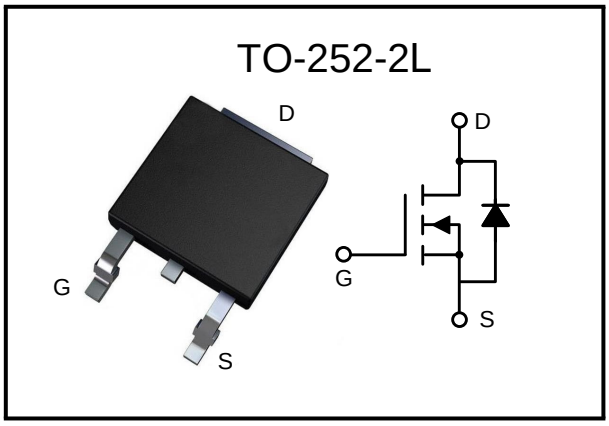
BMI03N820

N-Channel MOSFET

General Description

The BN103N820 uses advanced trench technology and design to provide excellent RDS(on) with low gate charge. It can be used in a wide variety applications.

Package



Features

- V_{DS}=30V
- I_D=45A
- $R_{DS(ON)}$@10V,TYP=8.2mΩ

Application

- Power faction correction (PFC)
- Switched more power supplies (SMPS)
- Uninterruptible power supply (UPS)
- LED lighting power

Absolute Maximum Ratings (T_A=25°C unless otherwise specified)

Symbol	Parameter		Value	Units
V_{DS}	Drain-Source Voltage		30	V
V_{GS}	Gate - Source Voltage		±20	
I_D	Drain Current	T_C=25°C	45	A
		T_C=100°C	29	
I_{DM}	Drain Current-Pulse(1)		180	A
P_D	Power Dissipation	T_C=25°C	45	W
		Derate above 25°C	0.35	W/°C
E_{AS}	Single Pulsed Avalanche Energy(2)		90	mJ
T_J	Operation Junction Temperature Range		-55 to +150	°C
T_{stg}	Storage Temperature Range		-55 to +150	°C
T_L	Maximum lead temperature for soldering purposes, 1/8” from case for 5 seconds		300	°C
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient		62.5	°C/W
$R_{\theta JC}$	Thermal Resistance From Junction to Case		2.0	°C/W

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N-Channel MOSFET

Electrical Characteristics (T_A=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D=250uA	30	–	–	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 30V, V_{GS}=0V	–	–	1	uA
Gate-Body Leakage Current	I_{GSS}	V_{GS} = ±20V, V_{DS}=0V	–	–	±100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D=250uA	1.0	1.5	1.8	V
Static Drain-source On Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=15A	–	8.2	11.0	mΩ
		V_{GS}=4.5V, I_D=10A	–	14.5	20.0	
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS} =15V, V_{GS} =0V, f = 1MHz	–	860	–	pF
Output Capacitance	C_{oss}		–	145	–	
Reverse Transfer Capacitance	C_{rss}		–	110	–	
Gate Resistance	R_g	V_{GS}=0V, f=1MHz	1	3	10	Ω
Switching Characteristics(3,4)						
Turn-on Delay time	$T_{d(on)}$	V_{DD}=20V, V_{GS}=10V, R_G =6Ω, I_D =15A	–	6.2	–	ns
Turn-on Rise time	T_r		–	31.5	–	
Turn -Off Delay Time	$T_{d(off)}$		–	38.6	–	
Turn -Off Fall time	T_f		–	13.5	–	
Gate to Drain Charge	Q_g	V_{DS}=15V, V_{GS}=10V, I_D=15A	–	18.8	–	nC
Gate to Source Charge	Q_{gs}		–	6.9	–	
Gate to Drain Charge	Q_{gd}		–	4.3	–	
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_S=15A	–	0.88	1.2	V
Continuous Source Current	I_S	Integral Reverse P-N Junction Diode in the MOSFET	–	–	45	A
Pulsed Sourse Current	I_{SM}		–	–	180	
Reverse Recovery Time	T_{rr}	I_F=15A, d_{IF}/d_t=100A/μs	–	48	–	ns
Reverse Recovery Charge	Q_{rr}		–	52	–	nC

Notes:

(1) Pluse width limited by maximum junction temperature.

(2) L=0.5mH, V_{DD}=15V, V_G=10V, R_G=25Ω, starting T_J=25°C.

(3) Pulse Test: Pulse Width ≤300μs, Duty cycle ≤2%.

(4) Essentially independent of operating temperature.

Typical Performance Characteristics(T_J = 25 °C, unless otherwise noted)

Figure 1:Output Characteristics

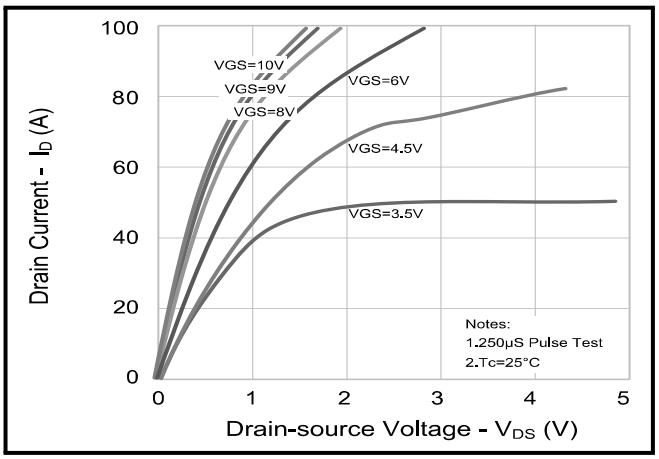


Figure 2:Transfer Characteristics

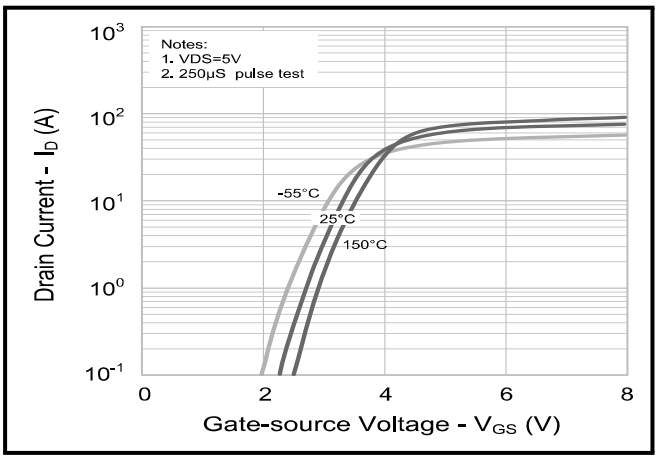


Figure 3:$R_{DS(ON)}$ vs. I_D

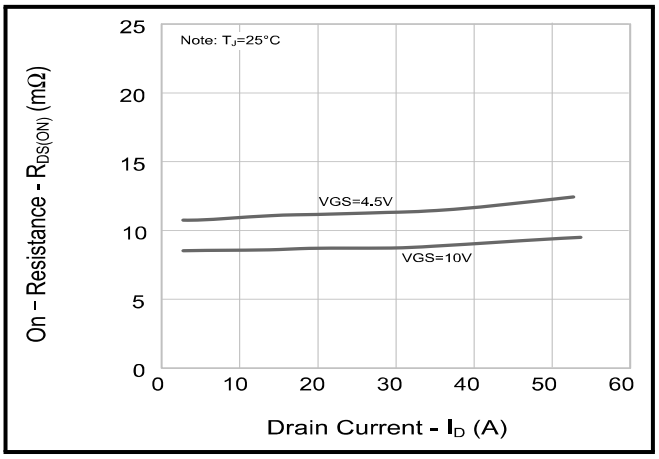


Figure 4:Body Diode Forward Voltage Variation vs. Sourse Current and Temperature

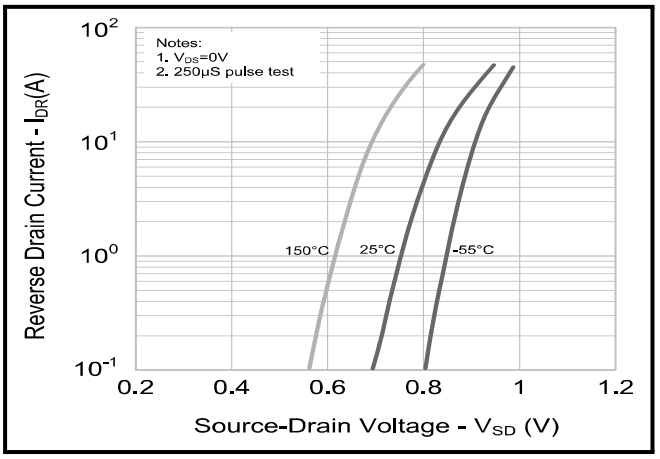


Figure 5:Capacitance Characteristics

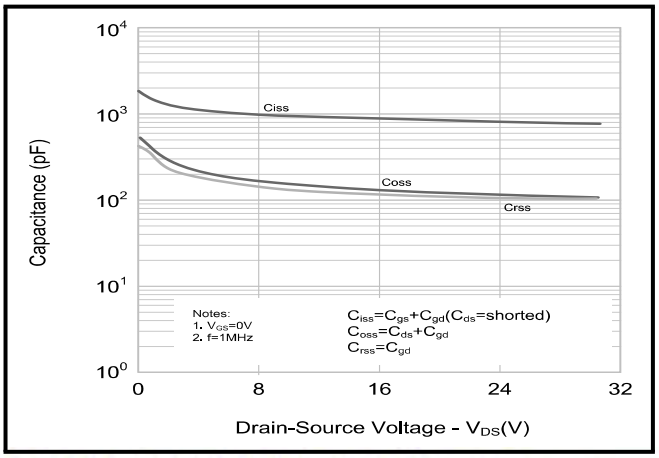
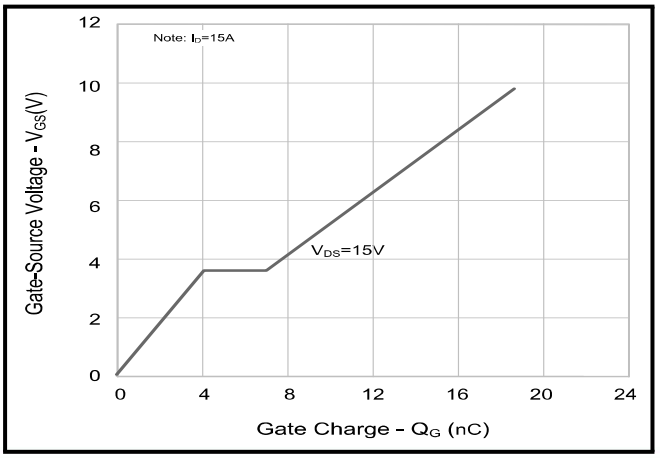


Figure 6:Gate Charge



Typical Performance Characteristics(T_J = 25 °C, unless otherwise noted)

Figure 7:Breakdown Voltage vs. Temperature Characteristics

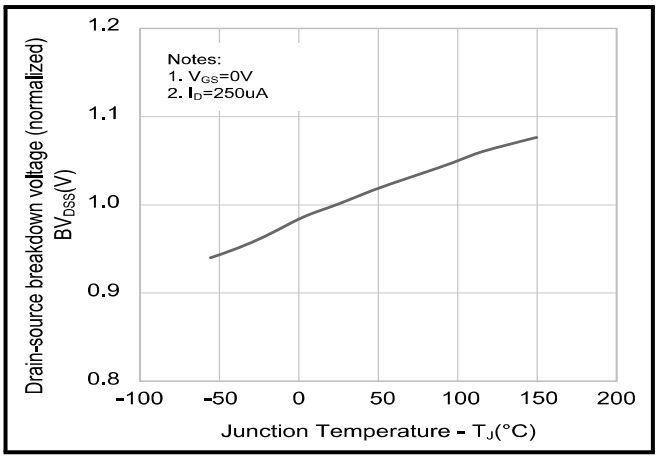


Figure 8:On-resistance vs. Temperature Characteristics

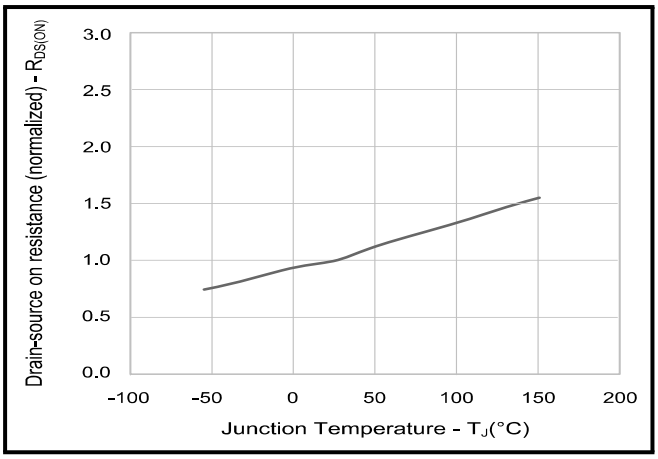
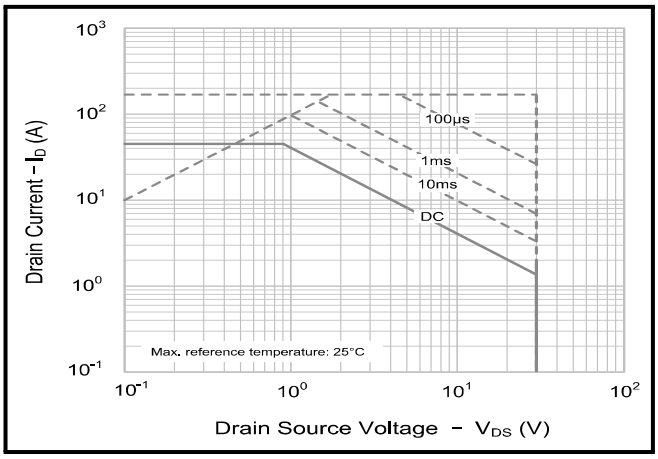


Figure 9:Max.Safe Operating Area



Test Circuit

Figure 10:Gate Charge Test Circuit

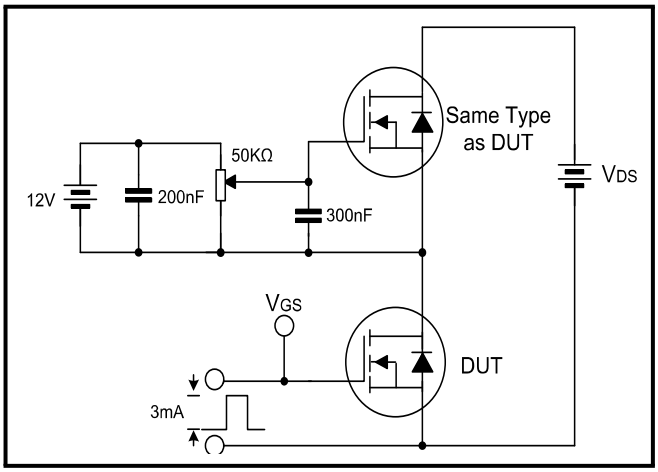


Figure 11: Gate Charge Waveform

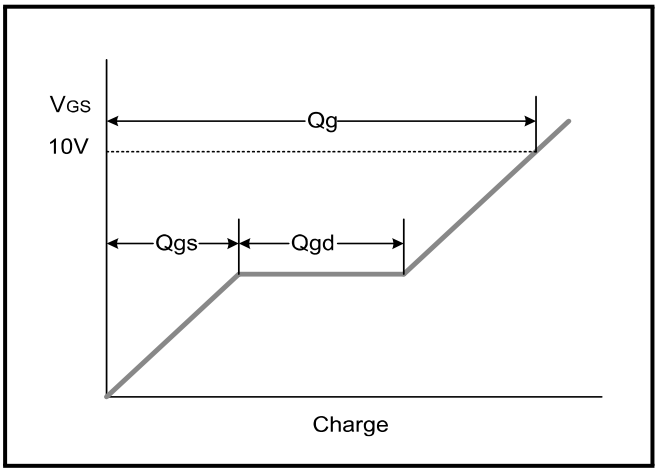


Figure 12:Resistive Switching Test Circuit

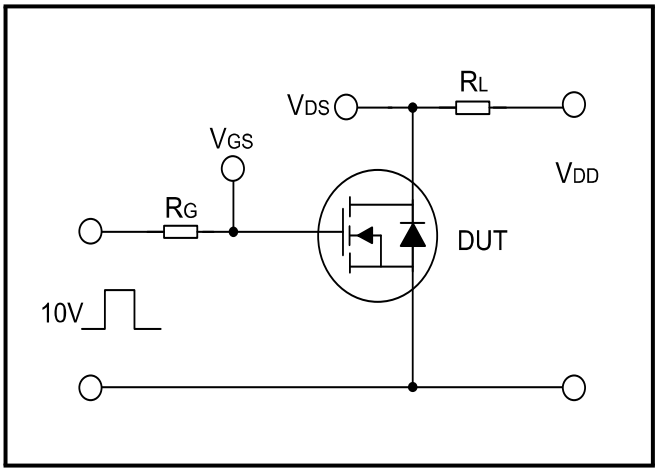


Figure 13: Resistive Switching Waveform

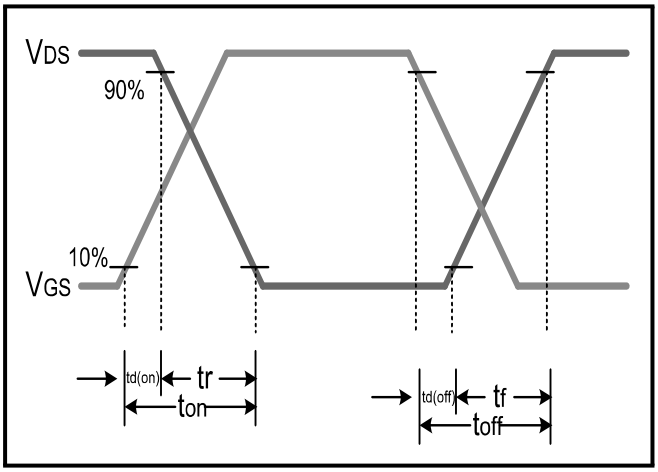


Figure 14:Unclamped Inductive Switching Test Circuit

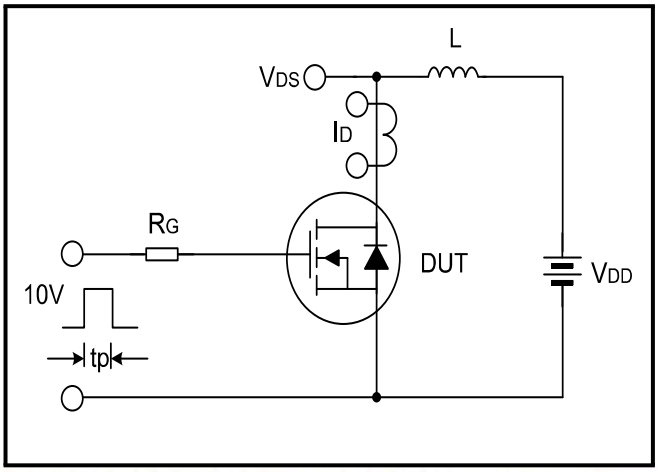
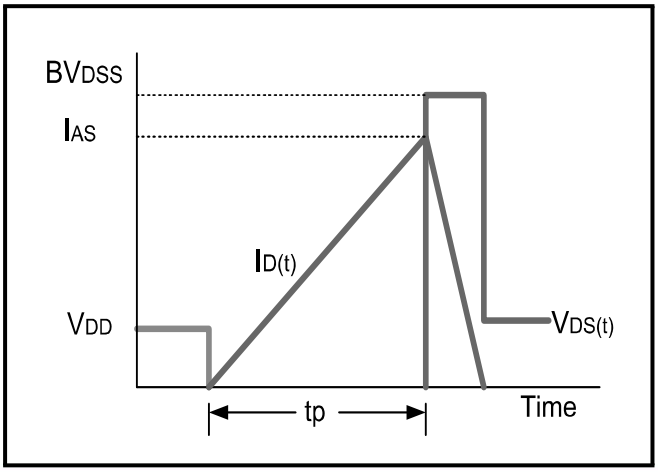
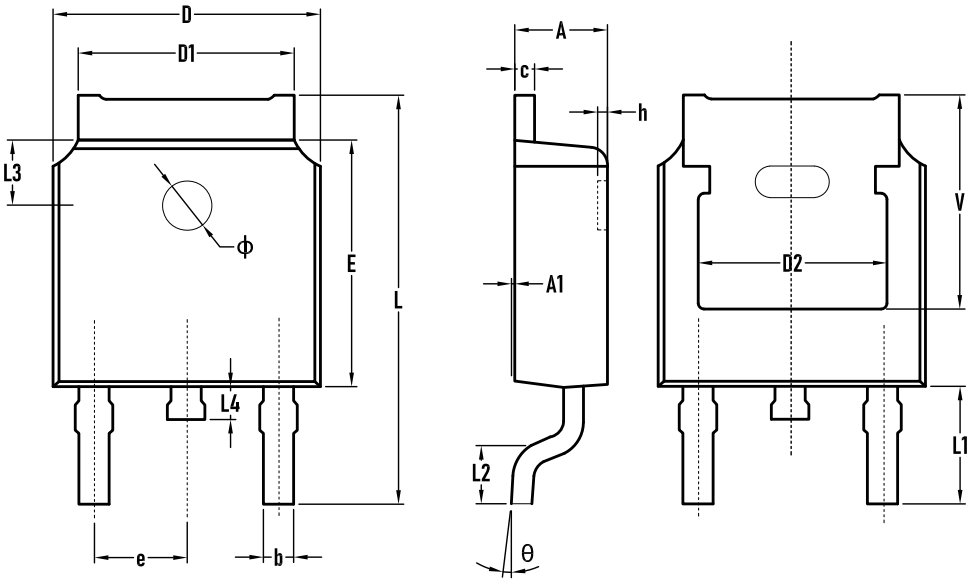


Figure 15: Unclamped Inductive Switching Waveform



Packaging Tape - TO-252-2



SYMBOL	Millimeters		Inches	
	MIN.	MAX.	MIN.	MAX.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
ϕ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	