

BSS100 / BSS123

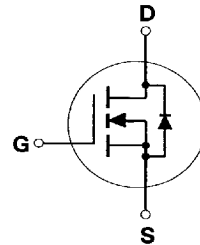
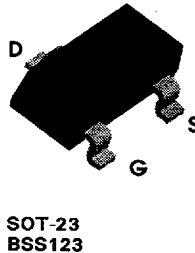
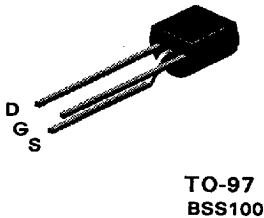
N-Channel Logic Level Enhancement Mode Field Effect Transistor

General Description

These N-Channel logic level enhancement mode power field effect transistors are produced using Nationals proprietary, high cell density, DMOS technology. This very high density process has been especially tailored to minimize on-state resistance, provide superior switching performance. This product is particularly suited to low voltage, low current applications, such as small servo motor controls, power MOSFET gate drivers, and other switching applications.

Features

- BSS100: 0.22A, 100V. $R_{DS(ON)} = 6\Omega @ V_{GS} = 10V$.
BSS123: 0.17A, 100V. $R_{DS(ON)} = 6\Omega @ V_{GS} = 10V$
- High density cell design for extremely low $R_{DS(ON)}$
- Voltage controlled small signal switch.
- Rugged and reliable.



Absolute Maximum Ratings

 $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	BSS100	BSS123	Units
V_{DS}	Drain-Source Voltage	100		V
V_{DGR}	Drain-Gate Voltage ($R_{GS} \leq 20K\Omega$)	100		V
V_{GSS}	Gate-Source Voltage - Continuous - Non Repetitive ($T_p < 50 \mu\text{s}$)	± 10		V
		± 20		
I_D	Drain Current - Continuous - Pulsed	0.22	0.17	A
		0.9	0.68	
P_D	Total Power Dissipation @ $T_A = 25^\circ\text{C}$	0.63	0.36	mW
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to 150		$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering Purposes, 1/16" from Case for 10 Seconds	300		$^\circ\text{C}$

THERMAL CHARACTERISTICS

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	200	350	$^\circ\text{C/W}$
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Electrical Characteristics (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Conditions	Type	Min	Typ	Max	Units	
OFF CHARACTERISTICS								
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	All	100			V	
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 100 V, V _{GS} = 0 V	BSS100			15	μA	
		V _{DS} = 100 V, V _{GS} = 0 V	BSS123			1	μA	
		V _{DS} = 100 V, V _{GS} = 0 V	T _J =125°C	All			60	μA
		V _{DS} = 60 V, V _{GS} = 0 V		BSS100			10	nA
		V _{DS} = 20 V, V _{GS} = 0 V	BSS123			10	nA	
I _{GSSF}	Gate - Body Leakage, Forward	V _{GS} = 20 V, V _{DS} = 0 V	BSS100			10	nA	
		V _{GS} = 20 V, V _{DS} = 0 V	BSS123			50	nA	
ON CHARACTERISTICS (Note 1)								
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 1 mA	All	0.8		2	V	
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 0.22 A	BSS100			6	Ω	
		V _{GS} = 10 V, I _D = 0.17 A	BSS123			6		
		V _{GS} = 4.5 V, I _D = 0.22 A	BSS100			10		
		V _{GS} = 4.5 V, I _D = 0.17 A	BSS123			10		
g _{FS}	Forward Transconductance	V _{DS} = 10 V, I _D = 0.22 A	BSS100	0.08			S	
		V _{DS} = 10 V, I _D = 0.17 A	BSS123	0.08				
DYNAMIC CHARACTERISTICS								
C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 MHz	All			60	pF	
C _{OSS}	Output Capacitance		All			15	pF	
C _{rss}	Reverse Transfer Capacitance		All			6	pF	
SWITCHING CHARACTERISTICS (Note 1)								
t _{D(on)}	Turn - On Delay Time	V _{DD} = 30 V, I _D = 0.28 A, V _{GS} = 10 V, R _{GEN} = 50 Ω	All			8	ns	
t _r	Turn - On Rise Time		All			12	ns	
t _{D(off)}	Turn - Off Delay Time		All			16	ns	
t _f	Turn - Off Fall Time		All			22	ns	
Q _g	Total Gate Charge	V _{DS} = 10 V, I _D = 0.22 A, V _{GS} = 10 V,	All			2	nC	
Q _{gs}	Gate-Source Charge		All			0.25	nC	
Q _{gd}	Gate-Drain Charge		All			0.4	nC	
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS								
I _S	Maximum Continuous Source Current		BSS100			0.22	A	
			BSS123			0.17		
I _{SM}	Maximum Pulse Source Current (Note 1)		BSS100			0.9	A	
			BSS123			0.68		
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 0.44 A	BSS100			1.3	V	
		V _{GS} = 0 V, I _S = 0.34 A	BSS123			1.3		

Note:

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

Typical Electrical Characteristics

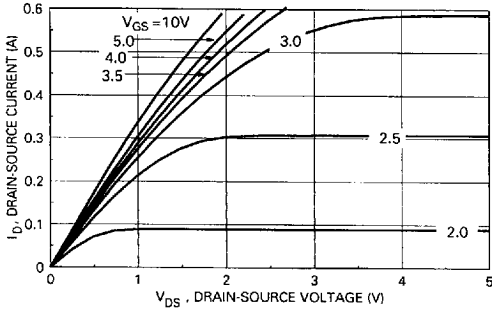


Figure 1. On-Region Characteristics.

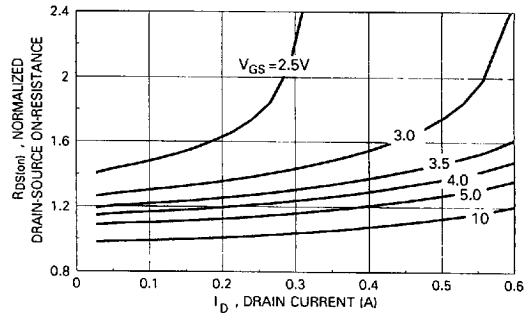


Figure 2. On-Resistance Variation with Gate Voltage and Drain Current.

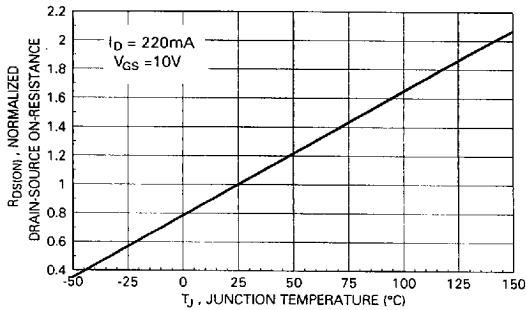


Figure 3. On-Resistance Variation with Temperature.

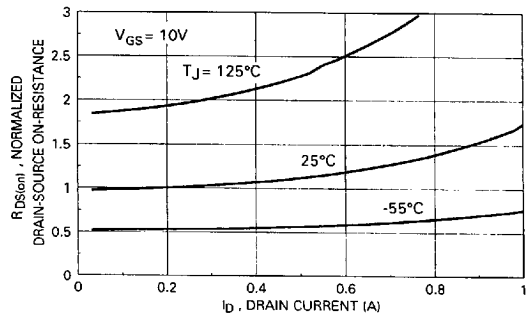


Figure 4. On-Resistance Variation with Drain Current and Temperature.

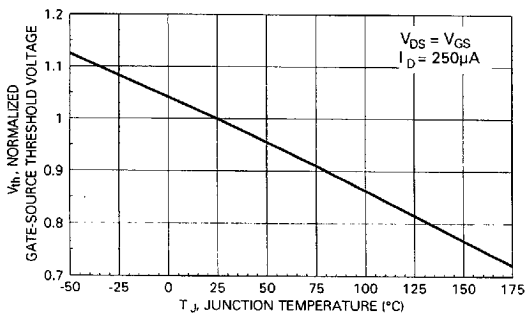


Figure 5. Gate Threshold Variation with Temperature

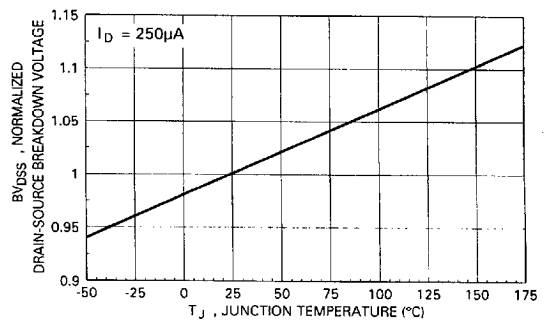


Figure 6. Breakdown Voltage Variation with Temperature.

Typical Electrical Characteristics (continued)

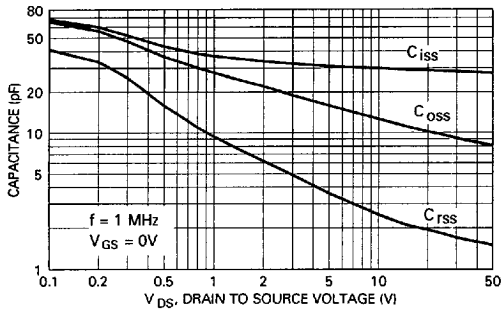


Figure 7. Capacitance Characteristics.

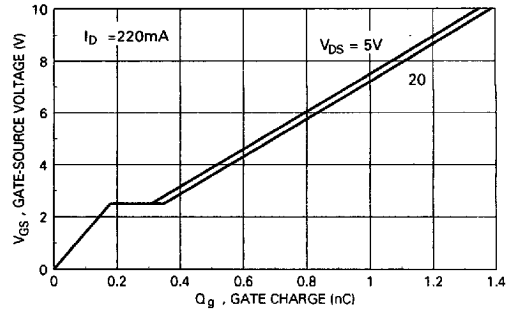


Figure 8. Gate Charge Characteristics.

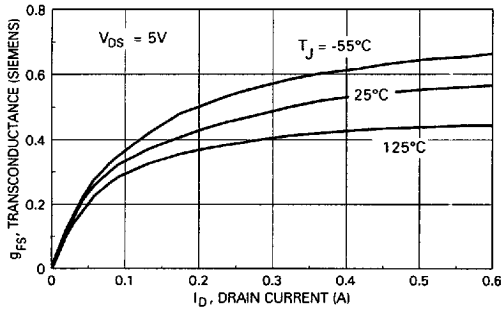


Figure 9. Transconductance Variation with Drain Current and Temperature.

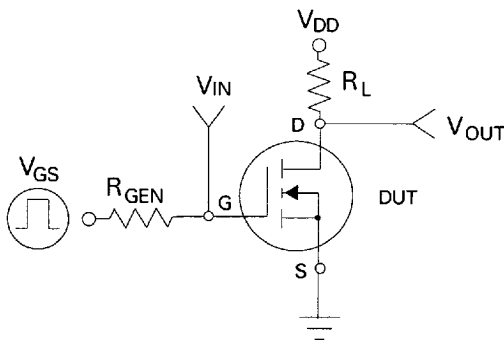


Figure 10. Switching Test Circuit

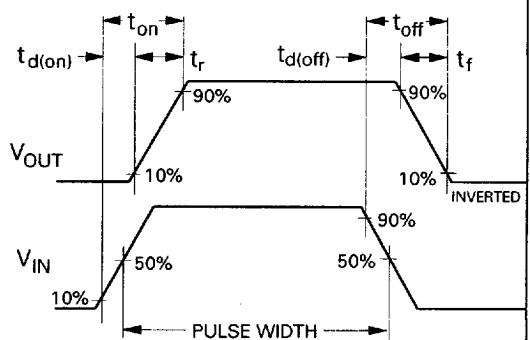


Figure 11. Switching Waveforms

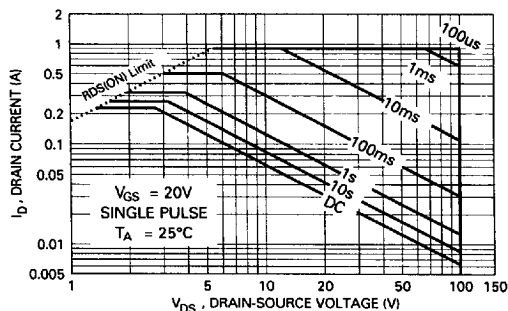


Figure 12. BSS100 Maximum Safe Operating Area.

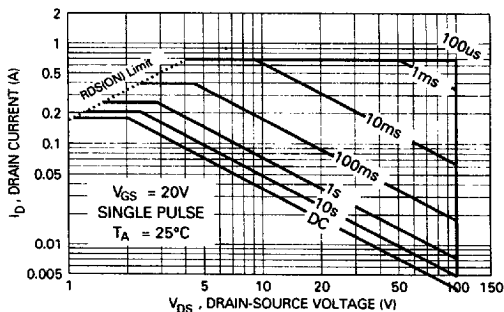


Figure 13. BSS123 Maximum Safe Operating Area.

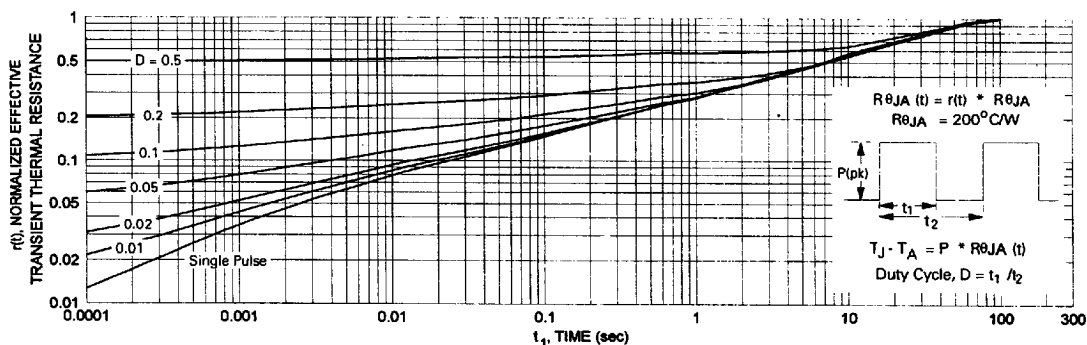


Figure 14. BSS100 Transient Thermal Response Curve

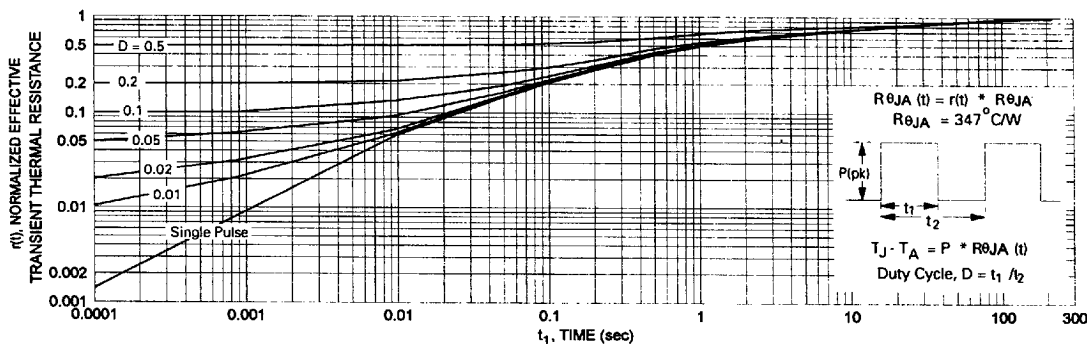


Figure 15. BSS123 Transient Thermal Response Curve