N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(ON)}$	I_D T_A = +25°C
100V	6.0Ω @ V_{GS} = 10V	170mA

Features and Benefits

- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- High Drain-Source Voltage Rating
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The BSS123WQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**
  https://www.diodes.com/quality/product-definitions/

Description and Application

This MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$) yet maintain superior switching performance, making it ideal for high-efficiency power-management applications.

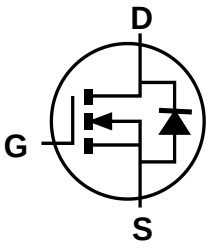
- Small servo motor controls
- Power MOSFET gate drivers
- Switching applications

Mechanical Data

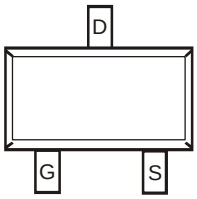
- Package: SOT323
- Package Material: Molded Plastic, "Green" Molding Compound, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Matte Tin Finish Annealed over Alloy 42 Leadframe (Lead Free Plating). Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.006 grams (Approximate)

SOT323

Top View



Equivalent Circuit



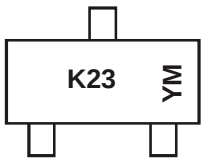
Top View

Ordering Information (Note 4)

Orderable Part Number	Package	Packing	
		Qty.	Carrier
BSS123WQ-7-F	SOT323	3000	Tape & Reel

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information



K23 = Product Type Marking Code
YM = Date Code Marking
Y or $\bar{Y}$= Year (ex: L = 2024)
M = Month (ex: 9 = September)

Date Code Key

Year	2014	-	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Code	B	-	L	M	N	P	R	S	T	U	V	W

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

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Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	100	V
Drain-Gate Voltage $R_{GS} \leq 20k\Omega$		V_{DGR}	100	V
Gate-Source Voltage	Continuous	V_{GSS}	±20	V
Drain Current (Note 5)	Continuous Pulsed	I_D I_{DM}	170 680	mA

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P_D	200	mW
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	625	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)						
Drain-Source Breakdown Voltage	BV_{DSS}	100	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1.0 10	µA nA	V_{DS} = 100V, V_{GS} = 0V V_{DS} = 20V, V_{GS} = 0V
Gate-Body Leakage, Forward	I_{GSSF}	—	—	50	nA	V_{GS} = 20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	$V_{GS(th)}$	0.8	1.4	2.0	V	V_{DS} = V_{GS}, I_D = 1mA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	— —	— —	6.0 10	Ω	V_{GS} = 10V, I_D = 0.17A V_{GS} = 4.5V, I_D = 0.17A
Forward Transconductance	g_{FS}	80	370	—	mS	V_{DS} = 10V, I_D = 0.17A, f = 1.0kHz
Drain-Source Diode Forward Voltage	V_{SD}	—	0.84	1.3	V	V_{GS} = 0V, I_S = 0.34A
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	—	29	60	pF	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	10	15	pF	
Reverse Transfer Capacitance	C_{rss}	—	2	6	pF	
SWITCHING CHARACTERISTICS (Note 7)						
Turn-On Rise Time	t_r	—	—	8	ns	V_{DD} = 30V, I_D = 0.28A, R_{GEN} = 6.0Ω, V_{GS} = 10V
Turn-Off Fall Time	t_f	—	—	16	ns	
Turn-On Delay Time	$t_{D(ON)}$	—	—	8	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	—	13	ns	

Notes: 5. Part mounted on FR-4 board with recommended pad layout, which can be found on our website at http://www.diodes.com.
6. Short duration pulse test used to minimize self-heating effect.
7. Guaranteed by design. Not subject to production testing.

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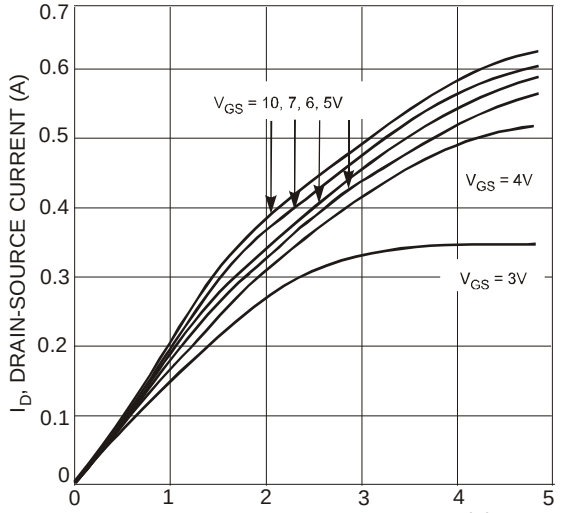

Fig. 1 On-Region Characteristics

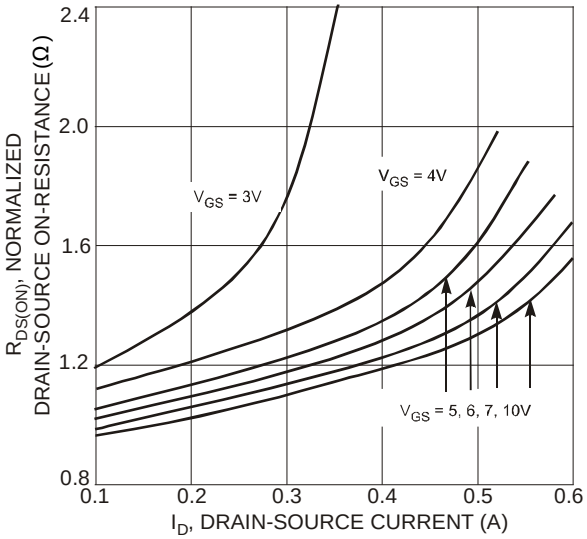

Fig. 2 On-Resistance Variation with Gate Voltage and Drain-Source Current

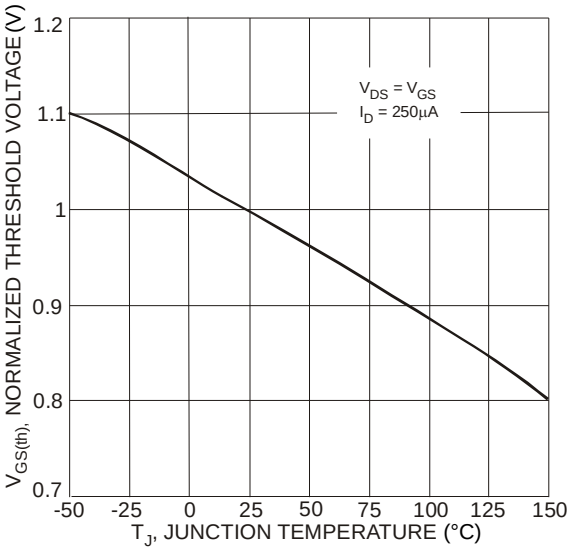

Fig. 3 Gate Threshold Variation with Temperature

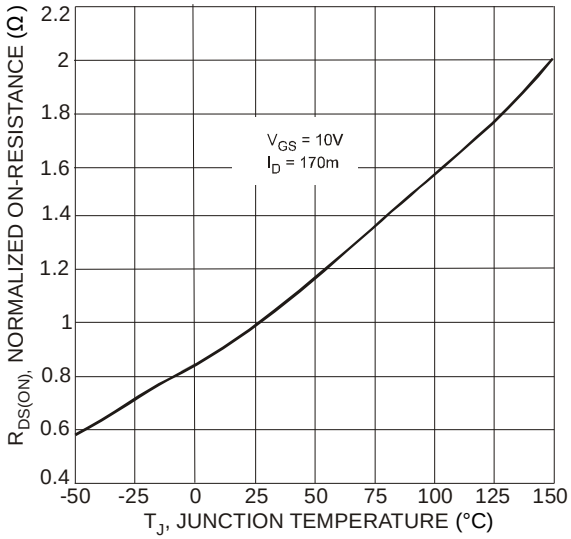

Fig. 4 On-Resistance Variation with Temperature

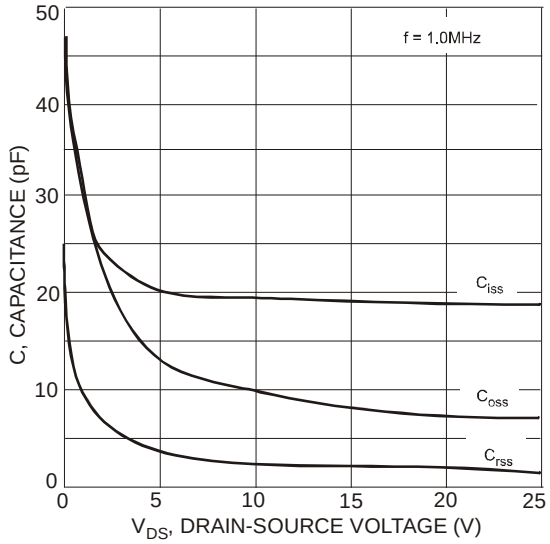

Fig. 5 Typical Capacitance

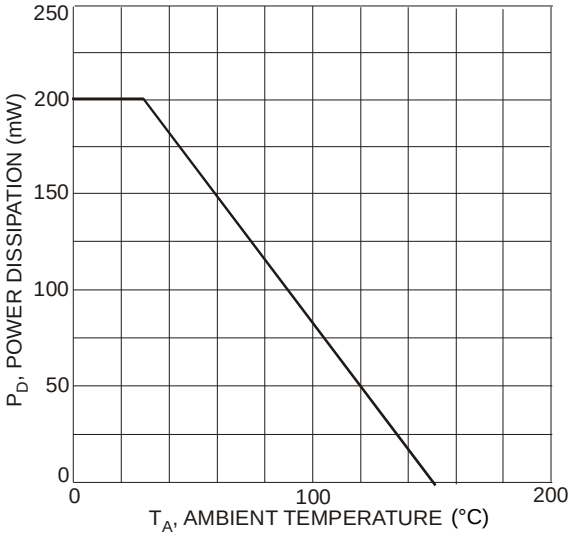

Fig. 6 Power Derating Curve, Total Package

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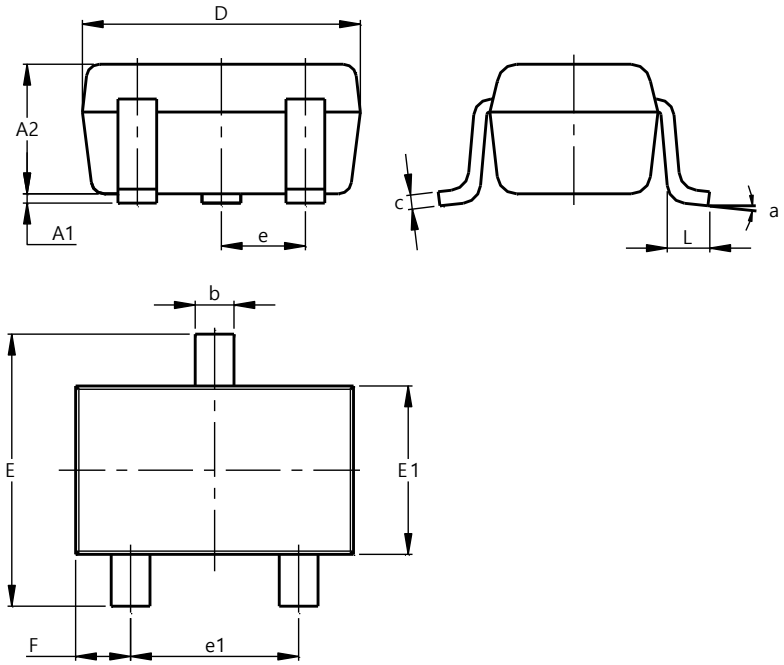
Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

SOT323

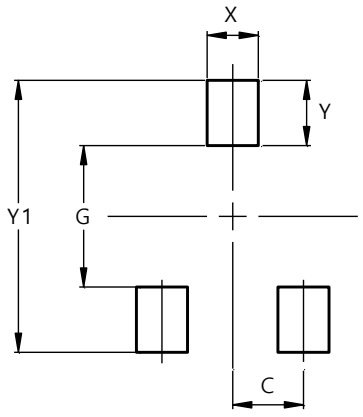


SOT323			
Dim	**Min**	**Max**	**Typ**
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.25	0.40	0.30
c	0.10	0.18	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
e1	1.20	1.40	1.30
F	0.375	0.475	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

SOT323



Dimensions	Value (in mm)
C	0.650
G	1.300
X	0.470
Y	0.600
Y1	2.500

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