

**N-CHANNEL ENHANCEMENT MODE MOSFET**
**Product Summary**

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

**Description**

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

**Applications**

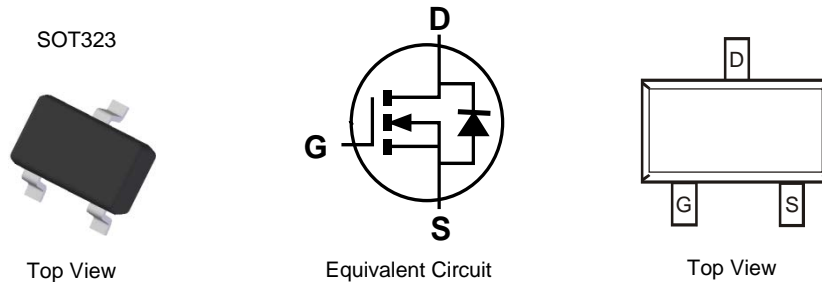
- Small Servo Motor Control
- Power MOSFET Gate Drivers
- Switching Applications

**Features**

- 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)**
- **Qualified to AEC-Q101 Standards for High Reliability**

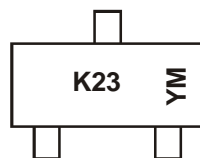
**Mechanical Data**

- Case: SOT323
- Case 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 208③
- Weight: 0.006 grams (Approximate)


**Ordering Information (Note 4)**

Part Number	Compliance	Case	Packaging
BSS123W-7-F	Standard	SOT323	3000/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) 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 <http://www.diodes.com/products/packages.html>.

**Marking Information**


K23 = Product Type Marking Code  
 YM = Date Code Marking  
 Y or Y = Year (ex: A = 2013)  
 M = Month (ex: 9 = September)

**Date Code Key**

Year	2002	2003	2004	2005	2006	...	2012	2013	2014	2015	2016	2017	2018	2019
Code	N	P	R	S	T	...	Z	A	B	C	D	E	F	G

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

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Drain-Source Voltage	V <sub>DSS</sub>	100	V
Drain-Gate Voltage R <sub>GS</sub> ≤ 20KΩ	V <sub>DGR</sub>	100	V
Gate-Source Voltage	V <sub>GSS</sub>	±20	V
Drain Current (Note 5)	I <sub>D</sub>	170	mA
	I <sub>DM</sub>	680	

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P <sub>D</sub>	200	mW
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	625	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 6)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	100	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1.0 10	μA nA	V <sub>DS</sub> = 100V, V <sub>GS</sub> = 0V V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V
Gate-Body Leakage, Forward	I <sub>GSSF</sub>	—	—	50	nA	V <sub>GS</sub> = 20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 6)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	0.8	1.4	2.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 1mA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	—	6.0 10	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 0.17A V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 0.17A
Forward Transconductance	g <sub>FS</sub>	80	370	—	mS	V <sub>DS</sub> = 10V, I <sub>D</sub> = 0.17A, f = 1.0KHz
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	—	0.84	1.3	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 0.34A
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
Input Capacitance	C <sub>iss</sub>	—	29	60	pF	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	10	15	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	2	6	pF	
<b>SWITCHING CHARACTERISTICS (Note 7)</b>						
Turn-On Rise Time	t <sub>r</sub>	—	—	8	ns	V <sub>DD</sub> = 30V, I <sub>D</sub> = 0.28A, R <sub>GEN</sub> = 6.0Ω, V <sub>GS</sub> = 10V
Turn-Off Fall Time	t <sub>f</sub>	—	—	16	ns	
Turn-On Delay Time	t <sub>D(ON)</sub>	—	—	8	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	—	13	ns	

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

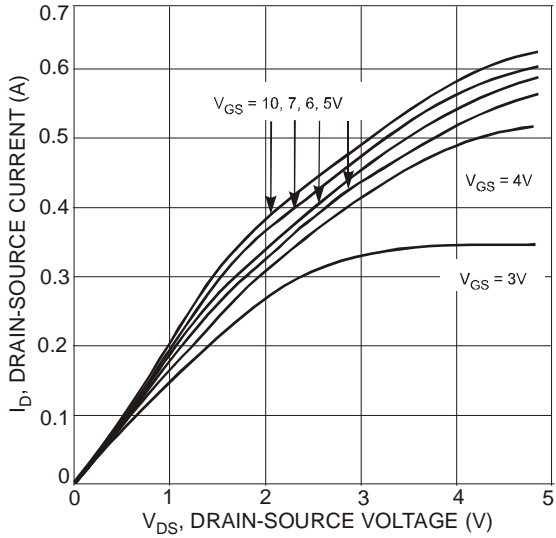


Fig. 1 On-Region Characteristics

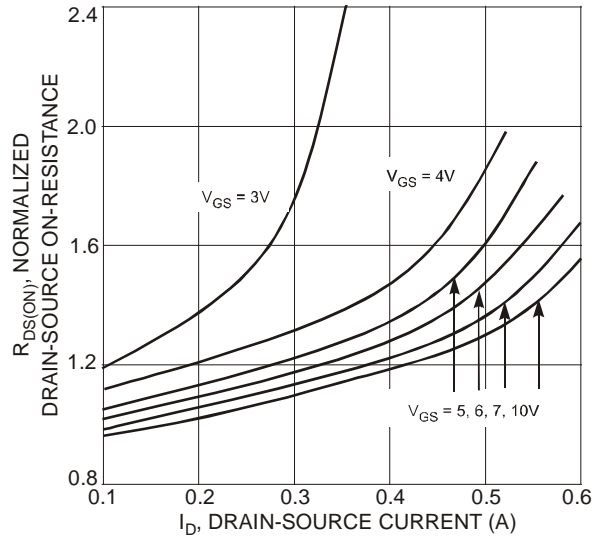


Fig. 2 On-Resistance Variation with Gate Voltage and Drain-Source Current

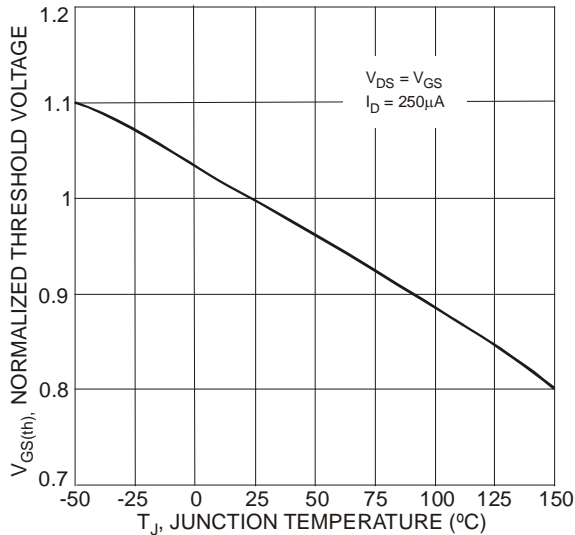


Fig. 3 Gate Threshold Variation with Temperature

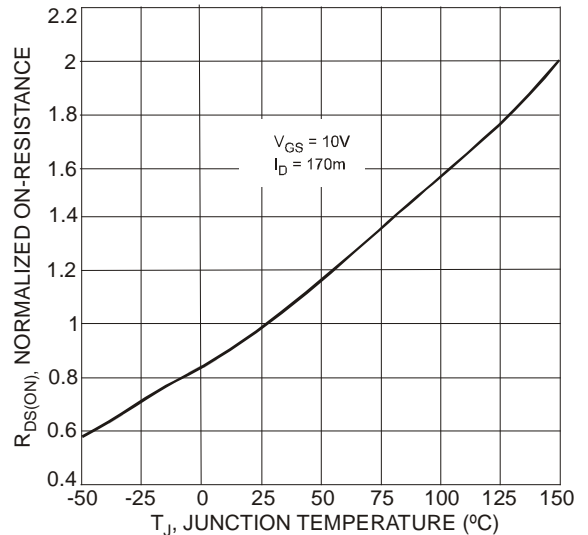


Fig. 4 On-Resistance Variation with Temperature

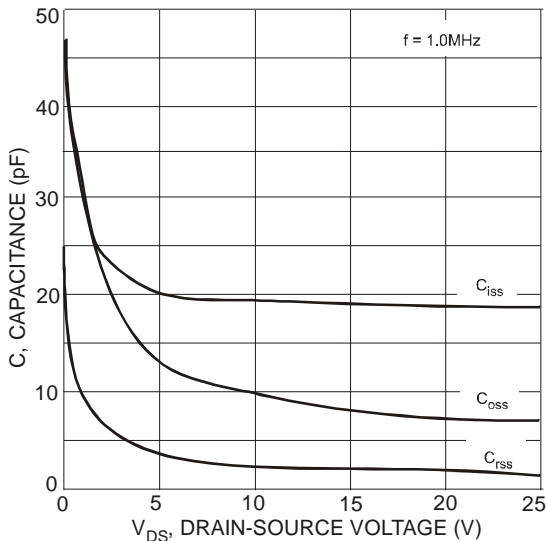


Fig. 5 Typical Capacitance

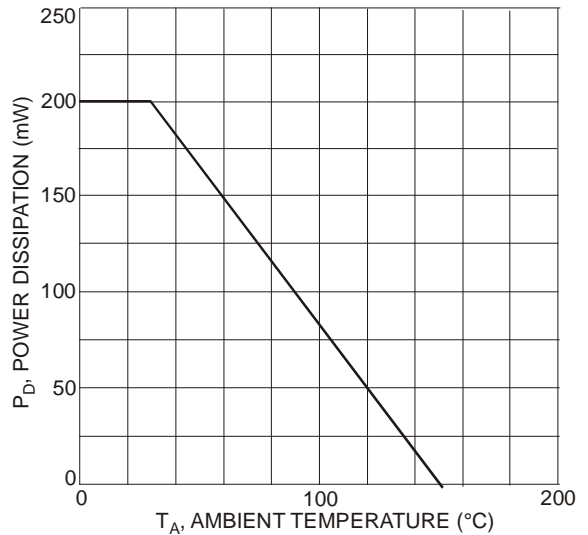
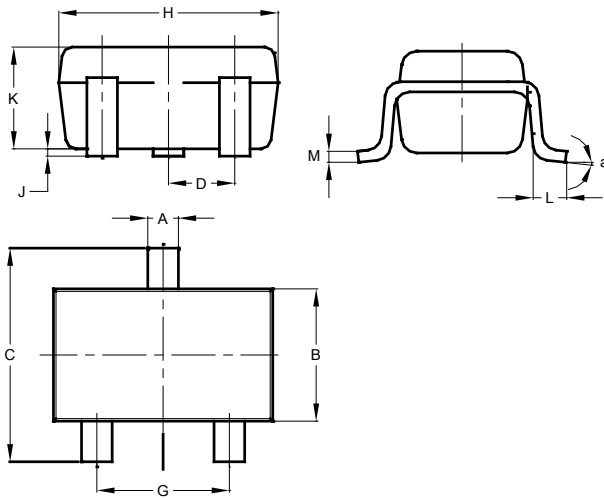


Fig. 6 Power Derating Curve, Total Package

## Package Outline Dimensions

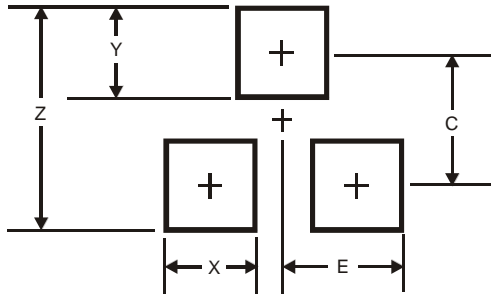
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SOT323			
Dim	Min	Max	Typ
A	0.25	0.40	0.30
B	1.15	1.35	1.30
C	2.00	2.20	2.10
D	0.650 BSC		
F	0.375	0.475	0.425
G	1.20	1.40	1.30
H	1.80	2.20	2.15
J	0.00	0.10	0.05
K	0.90	1.00	0.95
L	0.25	0.40	0.30
M	0.10	0.18	0.11
a	8° C		
All Dimensions in mm			

## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for latest version.



Dimensions	Value (in mm)
Z	2.8
X	0.7
Y	0.9
C	1.9
E	1.0

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