



**BS870** 

#### N-CHANNEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR

### **Features**

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Lead, Halogen and Antimony Free, RoHS Compliant "Green" Device (Notes 2 and 4)

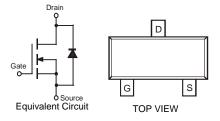
### **Mechanical Data**

- Case: SOT-23
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminal Connections: See Diagram
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Marking Information: See Page 3
- Ordering Information: See Page 3
- Weight: 0.008 grams (approximate)



TOP VIEW

SOT-23



## **Maximum Ratings** @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic		Symbol	Value	Units
Drain-Source Voltage		$V_{DSS}$	60	V
Drain-Gate Voltage $R_{GS} \le 1.0 M\Omega$		$V_{DGR}$	60	V
Gate-Source Voltage	Continuous	V <sub>GSS</sub>	±20	V
Drain Current (Note 1)	Continuous	$I_{D}$	250	mA

## **Thermal Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 1)	$P_d$	300	mW
Thermal Resistance, Junction to Ambient	$R_{ hetaJA}$	417	°C/W
Operating and Storage Temperature Range	T <sub>j</sub> , T <sub>STG</sub>	-55 to +150	°C

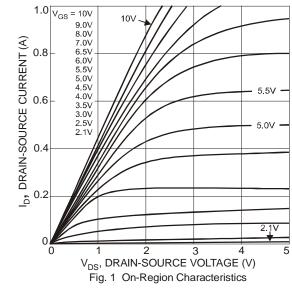
## **Electrical Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

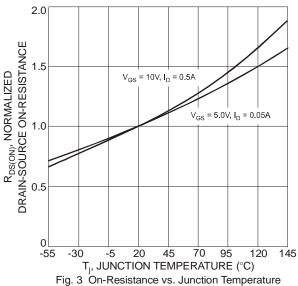
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 3)							
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	60	80	_	V	$V_{GS} = 0V, I_D = 100 \mu A$	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>			0.5	μΑ	$V_{DS} = 25V, V_{GS} = 0V$	
Gate-Body Leakage	I <sub>GSS</sub>	_	_	±10	nA	$V_{GS} = \pm 15V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 3)							
Gate Threshold Voltage	$V_{GS(th)}$	1.0	2.0	3.0	V	$V_{DS} = V_{GS}, I_D = 250 \mu A$	
Static Drain-Source On-Resistance	R <sub>DS (ON)</sub>		3.5	5.0	Ω	$V_{GS} = 10V, I_D = 0.2A$	
On-State Drain Current	I <sub>D(ON)</sub>	_	1.0	0.5	Α	$V_{GS} = 10V, V_{DS} = 7.5V$	
Forward Transconductance	g <sub>FS</sub>	80			mS	$V_{DS} = 10V, I_D = 0.2A$	
DYNAMIC CHARACTERISTICS							
Input Capacitance	C <sub>iss</sub>	_	22	50	pF	V 40V V 0V	
Output Capacitance	Coss		11	25	pF	$V_{DS} = 10V, V_{GS} = 0V$ -f = 1.0MHz	
Reverse Transfer Capacitance	C <sub>rss</sub>	_	2.0	5.0	pF	1 = 1.0IVITZ	
SWITCHING CHARACTERISTICS			•				
Turn-On Delay Time	t <sub>D(ON)</sub>		2.0	20	ns	$V_{ES} = 10V, R_L = 150\Omega,$	
Turn-Off Delay Time	t <sub>D(OFF)</sub>		5.0	20	ns	$V_{DS} = 10V$ , $R_D = 100\Omega$	

Notes:

- 1. Device mounted on FR-4 PCB 1.0 x 0.75 x 0.062 inch pad layout as shown on Diodes, Inc. suggested pad layout AP02001, which can be found on our website at http://www.diodes.com/datasheets/ap02001.pdf.
- 2. No purposefully added lead. Halogen and Antimony Free.
- 3. Short duration pulse test used to minimize self-heating effect.
- 4. Product manufactured with Data Code V9 (week 33, 2008) and newer are built with Green Molding Compound. Product manufactured prior to Date Code V9 are built with Non-Green Molding Compound and may contain Halogens or Sb<sub>2</sub>O<sub>3</sub> Fire Retardants.







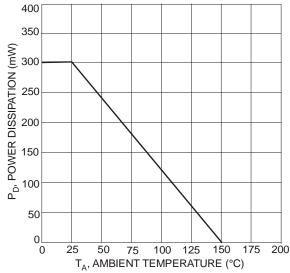


Fig. 5 Max Power Dissipation vs. Ambient Temperature

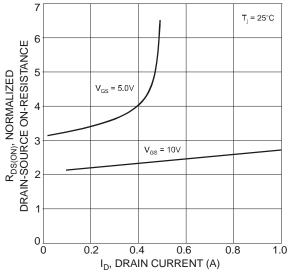
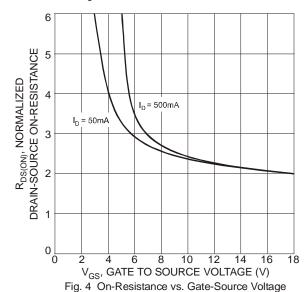


Fig. 2 On-Resistance vs. Drain Current



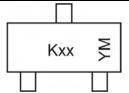


## Ordering Information (Note 5)

Part Number	Case	Packaging
BS870-7-F	SOT-23	3000/Tape & Reel

Notes: 5. For packaging details, go to our website at http://www.diodes.com/datasheets/ap02007.pdf.

### **Marking Information**



Kxx = Product Type Marking Code, K70 or K6Z

YM = Date Code Marking

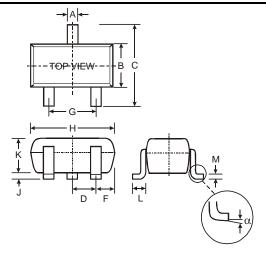
Y = Year ex: T = 2006

M = Month ex: 9 = September

Date Code Kev

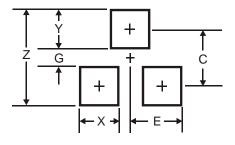
Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Code	J	K	L	М	N	Р	R	S	Т	U	V	W	Χ	Υ	Z
Month	Jan	Fe	b I	Mar	Apr	May	Ju	n	Jul	Aug	Sep	Oc	t	Nov	Dec
Code	1	2		3	4	5	6	;	7	8	9	0		N	D

## **Package Outline Dimensions**



SOT-23					
Dim	Min	Max			
Α	0.37	0.51			
В	1.20	1.40			
C	2.30	2.50			
D	0.89	1.03			
F	0.45	0.60			
G	1.78	2.05			
Ι	2.80	3.00			
J	0.013	0.10			
K	0.903	1.10			
L	0.45	0.61			
M	0.085	0.180			
α	0°	8°			
All Dimensions in mm					

# Suggested Pad Layout



Dimensions	Value (in mm)
Z	3.4
G	0.7
X	0.9
Υ	1.4
С	2.0
E	0.9

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