



N-CHANNEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR

#### **Features**

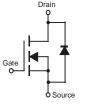
- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Lead, Halogen and Antimony Free, RoHS Compliant (Note 1)
- "Green" Device (Note 2)
- Qualified to AEC-Q101 Standards for High Reliability

### **Mechanical Data**

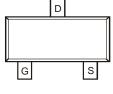
- Case: SOT-23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish annealed over Alloy 42 leadframe (Lead Free Plating). Solderable per MIL-STD-202, Method 208
- Terminal Connections: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



Top View



Equivalent Circuit



Top View

#### Ordering Information (Note 3)

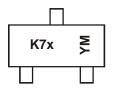
Part Number	Case	Packaging
2N7002-7-F	SOT-23	3000/Tape & Reel

Notes: 1. No purposefully added lead. Halogen and Antimony Free.

2. Product manufactured with Date Čode V12 (week 50, 2008) and newer are built with Green Molding Compound. Product manufactured prior to Date Code V12 are built with Non-Green Molding Compound and may contain Halogens or Sb<sub>2</sub>O<sub>3</sub> Fire Retardants.

3. For packaging details, go to our website at http://www.diodes.com.

### **Marking Information**



K7x = Product Type Marking Code, e.g. K72 YM = Date Code Marking Y = Year (ex: N = 2002) M = Month (ex: 9 = September)

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



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

Chara	cteristic	Symbol	Value	Units	
Drain-Source Voltage		V <sub>DSS</sub>	60	V	
Drain-Gate Voltage $R_{GS} \le 1.0 M\Omega$		V <sub>DGR</sub>	60	V	
Gate-Source Voltage	Continuous Pulsed	V <sub>GSS</sub>	±20 ±40	V	
Drain Current (Note 4)	Continuous Continuous @ 100°C Pulsed	ID	115 73 800	mA	

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

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 4)	P	300	mW
Derating above $T_A = 25^{\circ}C$	PD	2.4	mW/°C
Thermal Resistance, Junction to Ambient	R <sub>0JA</sub>	417	°C/W
Operating and Storage Temperature Range	TJ, TSTG	-55 to +150	°C

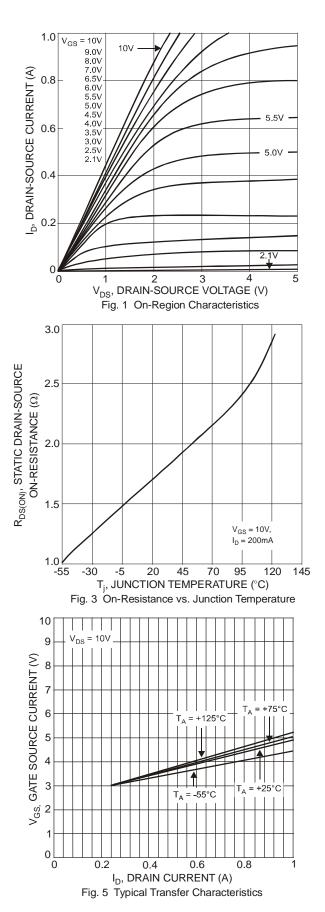
## Electrical Characteristics @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition		
OFF CHARACTERISTICS (Note 5)								
Drain-Source Breakdown Voltage		BV <sub>DSS</sub>	60	70	_	V	$V_{GS} = 0V, I_D = 10\mu A$	
Zero Gate Voltage Drain Current	@ T <sub>C</sub> = 25°C @ T <sub>C</sub> = 125°C	I <sub>DSS</sub>	_	_	1.0 500	μA	$V_{DS} = 60V, V_{GS} = 0V$	
Gate-Body Leakage		I <sub>GSS</sub>	_	_	±10	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 5)							•	
Gate Threshold Voltage		V <sub>GS(th)</sub>	1.0	_	2.5	V	$V_{DS} = V_{GS}, I_D = 250 \mu A$	
Static Drain-Source On-Resistance	@ T <sub>J</sub> = 25°C	R <sub>DS</sub> (ON)	_	3.2 4.4	7.5	0	$V_{GS} = 5.0V, I_D = 0.05A$	
	@ T <sub>J</sub> = 125°C				13.5	Ω	$V_{GS} = 10V, I_D = 0.5A$	
On-State Drain Current		I <sub>D(ON)</sub>	0.5	1.0		Α	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 7.5V	
Forward Transconductance		<b>g</b> FS	80	_		mS	V <sub>DS</sub> =10V, I <sub>D</sub> = 0.2A	
Diode Forward Voltage (Note 6)		V <sub>SD</sub>		0.78	1.5	V	$V_{GS} = 0V, I_{S} = 115mA$	
Continuous Source Current (Note 6)		Is		_	200	mA	_	
Pulse Source Current (Note 6)		I <sub>SD</sub>		_	2	Α	_	
DYNAMIC CHARACTERISTICS				•				
Input Capacitance		Ciss	_	22	50	pF		
Output Capacitance		Coss	_	11	25	pF	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V f = 1.0MHz	
Reverse Transfer Capacitance		Crss		2.0	5.0	pF		
SWITCHING CHARACTERISTICS				_				
Turn-On Delay Time		t <sub>D(ON)</sub>	_	7.0	20	ns	$V_{DD} = 30V, I_D = 0.2A,$	
Turn-Off Delay Time		t <sub>D(OFF)</sub>	_	11	20	ns	$R_L = 150\Omega, V_{GEN} = 10V,$ $R_{GEN} = 25\Omega$	

Notes: 4. 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.
5. Short duration pulse test used to minimize self-heating effect.

6. V<sub>sb</sub> measured in 250μs pulse, duty cycle = 2%; I<sub>sb</sub> measure in 10ms Repetitive Pulse, duty cycle = 2% , Pd\_Pulse is from Zth test data





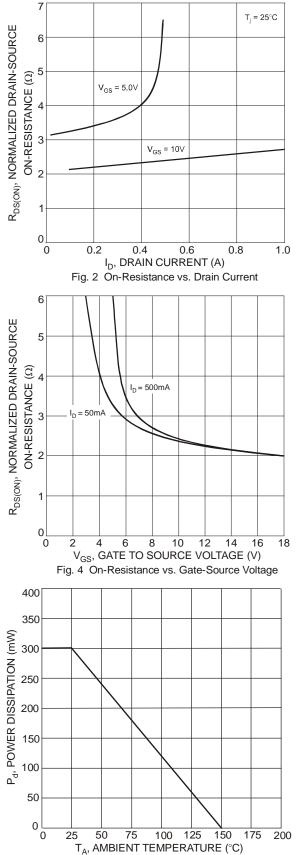
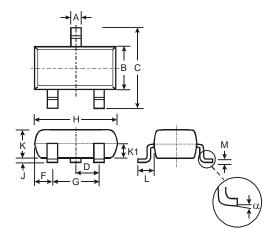


Fig. 6 Max Power Dissipation vs. Ambient Temperature

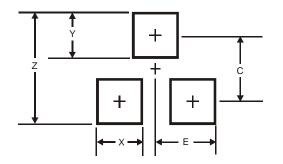


# Package Outline Dimensions



SOT23								
Dim	Min	Max	Тур					
Α	0.37	0.51	0.40					
В	1.20	1.40	1.30					
С	2.30	2.50	2.40					
D	0.89	1.03	0.915					
F	0.45	0.60	0.535					
G	1.78	2.05	1.83					
Н	2.80	3.00	2.90					
J	0.013	0.10	0.05					
κ	0.903	1.10	1.00					
K1	-	-	0.400					
L	0.45	0.61	0.55					
М	0.085	0.18	0.11					
α	0°	8°	-					
All Dimensions in mm								

# Suggested Pad Layout



Dimensions	Value (in mm)
Z	2.9
Х	0.8
Y	0.9
С	2.0
E	1.35



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