

N-CHANNEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR

Features

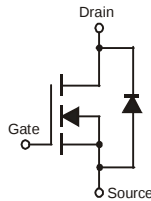
- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Lead, Halogen and Antimony Free, RoHS Compliant (Note 1)**
- **"Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

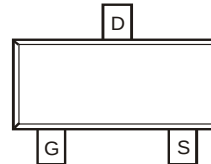
- Case: SOT-23
- Case Material: Molded Plastic, "Green" Molding Compound.
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish annealed over Alloy 42 leadframe
(Lead Free Plating). Solderable per MIL-STD-202, Method 208
- Terminal Connections: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



Top View



Equivalent Circuit



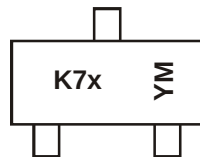
Top View

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 Code 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 Sb₂O₃ 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)

Date Code Key

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Code	J	K	L	M	N	P	R	S	T	U	V	W	X	Y	Z

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_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Units
Drain-Source Voltage	V _{DSS}	60	V
Drain-Gate Voltage R _{GS} ≤ 1.0MΩ	V _{DGR}	60	V
Gate-Source Voltage	V _{GSS}	±20	V
Continuous Pulsed		±40	
Drain Current (Note 4)	I _D	115	mA
Continuous		73	
Continuous @ 100°C Pulsed		800	

Thermal Characteristics @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 4)	P _D	300	mW
Derating above T _A = 25°C		2.4	mW/°C
Thermal Resistance, Junction to Ambient	R _{θJA}	417	°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 5)						
Drain-Source Breakdown Voltage	BV _{DSS}	60	70	—	V	V _{GS} = 0V, I _D = 10μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1.0 500	μA	@ T _C = 25°C @ T _C = 125°C V _{DS} = 60V, V _{GS} = 0V
Gate-Body Leakage	I _{GSS}	—	—	±10	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 5)						
Gate Threshold Voltage	V _{GS(th)}	1.0	—	2.5	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS (ON)}	—	3.2 4.4	7.5 13.5	Ω	V _{GS} = 5.0V, I _D = 0.05A V _{GS} = 10V, I _D = 0.5A
On-State Drain Current	I _{D(ON)}	0.5	1.0	—	A	V _{GS} = 10V, V _{DS} = 7.5V
Forward Transconductance	g _{FS}	80	—	—	mS	V _{DS} = 10V, I _D = 0.2A
Diode Forward Voltage (Note 6)	V _{SD}	—	0.78	1.5	V	V _{GS} = 0V, I _S = 115mA
Continuous Source Current (Note 6)	I _S	—	—	200	mA	—
Pulse Source Current (Note 6)	I _{SD}	—	—	2	A	—
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{iSS}	—	22	50	pF	V _{DS} = 25V, V _{GS} = 0V f = 1.0MHz
Output Capacitance	C _{oSS}	—	11	25	pF	
Reverse Transfer Capacitance	C _{rSS}	—	2.0	5.0	pF	
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{D(ON)}	—	7.0	20	ns	V _{DD} = 30V, I _D = 0.2A, R _L = 150Ω, V _{GEN} = 10V, R _{GEN} = 25Ω
Turn-Off Delay Time	t _{D(OFF)}	—	11	20	ns	

- Notes:
- 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>.
 - Short duration pulse test used to minimize self-heating effect.
 - V_{SD} measured in 250μs pulse, duty cycle = 2%; I_{SD} measure in 10ms Repetitive Pulse, duty cycle = 2% , Pd_Pulse is from Zth test data

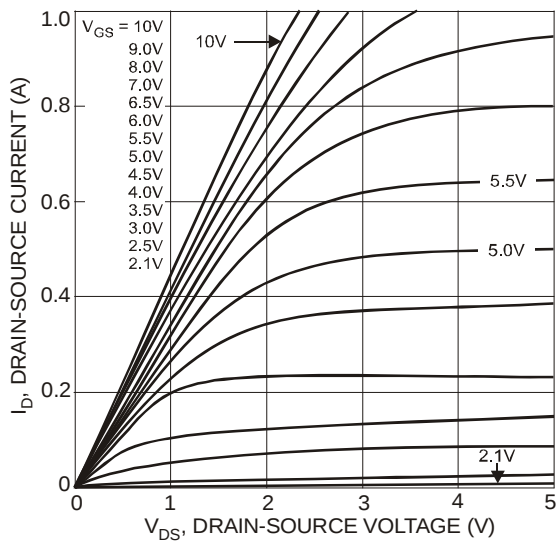


Fig. 1 On-Region Characteristics

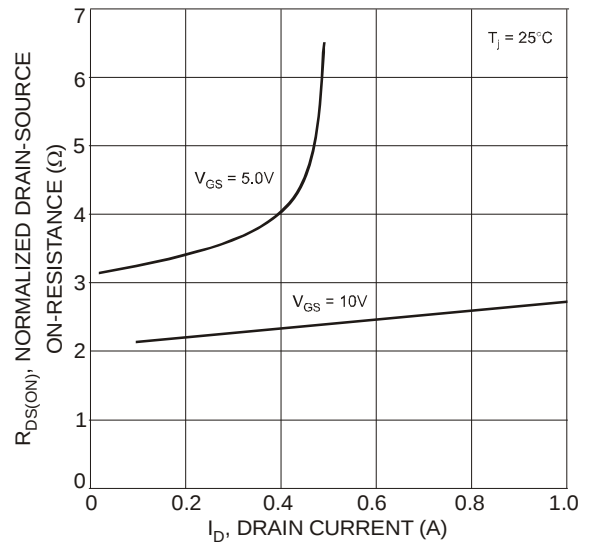


Fig. 2 On-Resistance vs. Drain Current

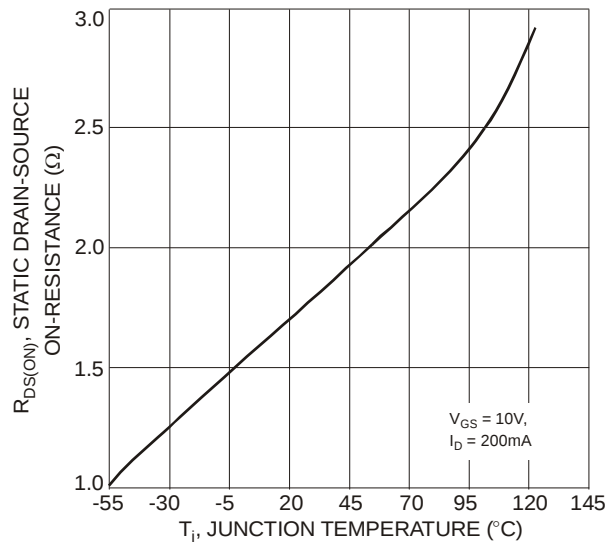


Fig. 3 On-Resistance vs. Junction Temperature

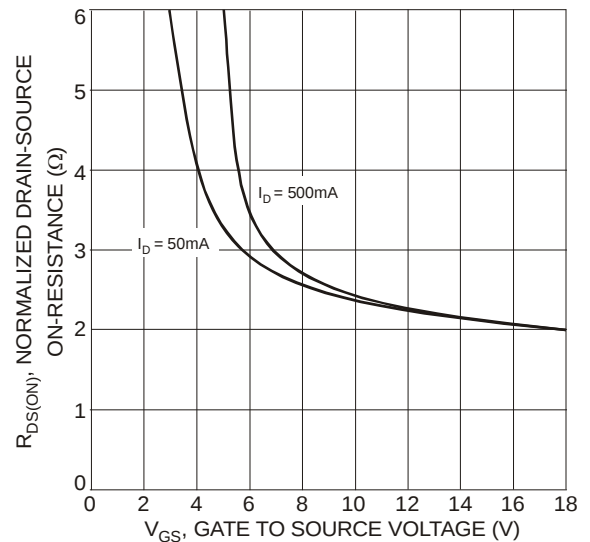


Fig. 4 On-Resistance vs. Gate-Source Voltage

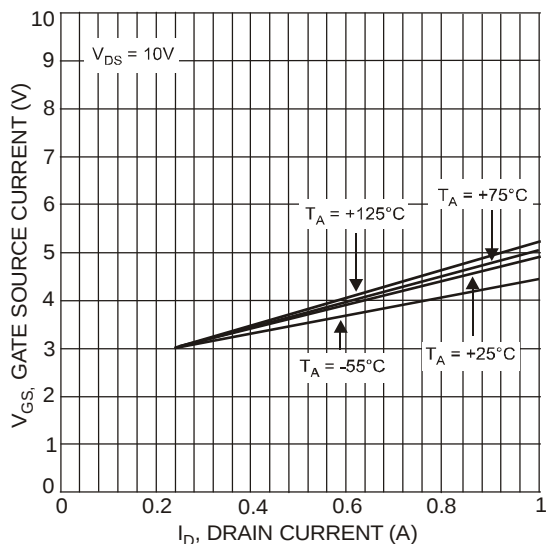


Fig. 5 Typical Transfer Characteristics

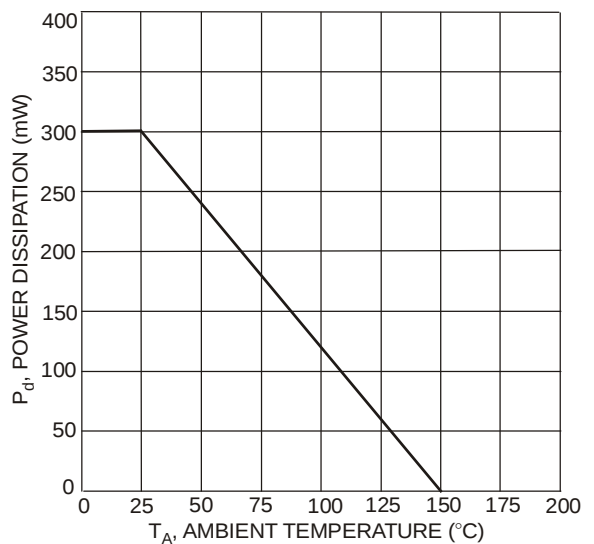
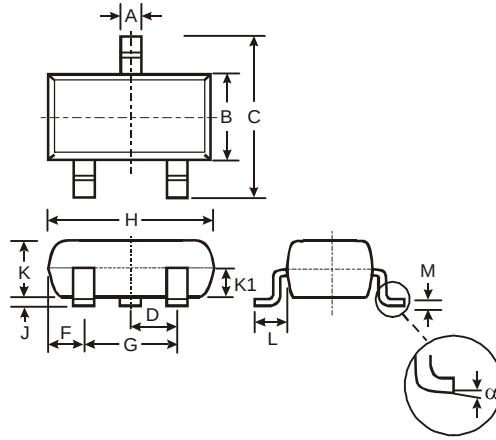


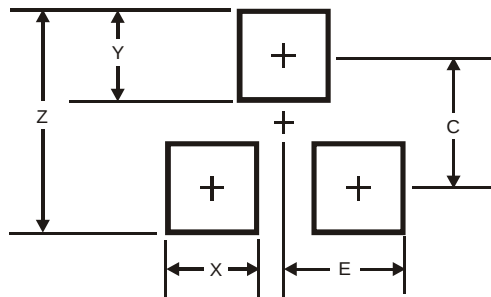
Fig. 6 Max Power Dissipation vs. Ambient Temperature

Package Outline Dimensions



SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	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
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.903	1.10	1.00
K1	-	-	0.400
L	0.45	0.61	0.55
M	0.085	0.18	0.11
α	0°	8°	-
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

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