





### N-CHANNEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR

## **Product Summary**

V <sub>(BR)DSS</sub>	R <sub>DS(ON)</sub>	I <sub>D</sub> T <sub>A</sub> = +25°C
50V	$1.6\Omega$ @ $V_{GS} = 10V$	500 mA
	$2.5\Omega$ @ $V_{GS} = 4.5V$	200 mA

## **Features and Benefits**

- Low On-Resistance
- Very Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- ESD Protected to 2KV
- 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
- PPAP Capable (Note 4)

## **Description and Applications**

This MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) and yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

### **Mechanical Data**

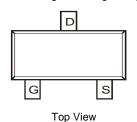
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish Annealed over Alloy 42 Leadframe (Lead Free Plating). Solderable per MIL-STD-202, Method 208 @3
- Terminal Connections: See Diagram
- Weight: 0.008 grams (Approximate)

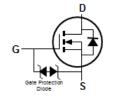




SOT23

Top View





**Equivalent Circuit** 

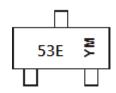
## **Ordering Information (Note 5)**

Part Number	Case	Packaging
DMN53D0LQ-7	SOT23	3,000/Tape & Reel
DMN53D0LQ-13	SOT23	10,000/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 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to http://www.diodes.com/quality/product\_compliance\_definitions/.
- 5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

# **Marking Information**



53E = Product Type Marking Code YM = Date Code Marking Y or = Year (ex: B = 2014) M = Month (ex: 9 = September)

Date Code Key

	Date Code Rey												
	Year	2014	20	)15	2016	2017	2	018	2019	2020	2	021	2022
	Code	В		С	D	Е		F	G	Н		1	J
Ī	Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ī	Code	1	2	3	4	5	6	7	8	9	0	N	D



# **Maximum Ratings** (@ $T_A = +25^{\circ}C$ , unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Drain Source Voltage	$V_{DSS}$	50	V
Gate-Source Voltage	$V_{GSS}$	±20	V
Drain Current (Note 7)	I <sub>D</sub>	500	mA

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 6)	$P_{D}$	370	mW
Thermal Resistance, Junction to Ambient (Note 6)	$R_{ hetaJA}$	344	°C/W
Total Power Dissipation (Note 7)	$P_{D}$	540	mW
Thermal Resistance, Junction to Ambient (Note 7)	$R_{ hetaJA}$	236	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

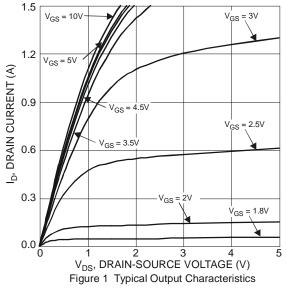
# **Electrical Character** istics ( $@T_A = +25^{\circ}C$ , unless otherwise specified.)

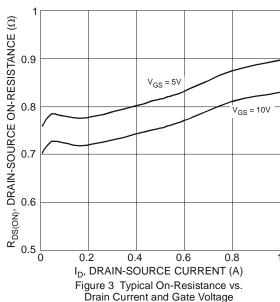
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition		
OFF CHARACTERISTICS (Note 8)	<u> </u>			u	I.	1		
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	50	_	_	V	$V_{GS} = 0V, I_D = 250\mu A$		
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	_	_	1.0	μΑ	$V_{DS} = 50V, V_{GS} = 0V$		
Gate-Body Leakage	I <sub>GSS</sub>	_	_	10	μΑ	$V_{GS} = \pm 20V, V_{DS} = 0V$		
ON CHARACTERISTICS (Note 8)								
Gate Threshold Voltage	V <sub>GS(th)</sub>	0.8	_	1.5	V	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$		
Static Drain-Source On-Resistance	Page (21)	_	_	1.6 2.5	Ω	$V_{GS} = 10V, I_D = 500mA$ $V_{GS} = 4.5V, I_D = 200mA$		
Static Drain-Source Off-Nesistance	R <sub>DS(ON)</sub>	_	_	4.5	12	$V_{GS} = 4.5V$ , $I_D = 200 \text{ mA}$ $V_{GS} = 2.5V$ , $I_D = 100 \text{ mA}$		
Source-Drain Diode Forward Voltage	$V_{SD}$	_	_	1.4	V	$V_{GS} = 0V, I_{S} = 500mA$		
DYNAMIC CHARACTERISTICS (Note 9)								
Input Capacitance	C <sub>iss</sub>	_	46	_	pF			
Output Capacitance	C <sub>oss</sub>	_	5.3	_	pF	$V_{DS} = 25V, V_{GS} = 0V$ f = 1.0MHz		
Reverse Transfer Capacitance	C <sub>rss</sub>	_	4.0	_	pF	-1 = 1.0IVII IZ		
Total Gate Charge	Qg	_	0.6	_	nC	\\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		
Gate-Source Charge	$Q_{gs}$	_	0.2	_	nC	$V_{GS} = 4.5V, V_{DS} = 10V,$ $I_{D} = 250 \text{mA}$		
Gate-Drain Charge	$Q_{gd}$	_	0.1	_	nC	ID = ZOUIIA		
Turn-On Delay Time	t <sub>D(on)</sub>	_	2.7	_	ns	V <sub>DD</sub> = 30V, V <sub>GS</sub> = 10V,		
Turn-On Rise Time	t <sub>r</sub>	_	2.5		ns			
Turn-Off Delay Time	t <sub>D(off)</sub>	_	19		ns	$R_G = 25\Omega, I_D = 200 \text{mA}$		
Turn-Off Fall Time	t <sub>f</sub>	_	11	_	ns			

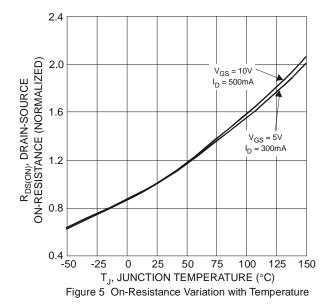
Notes:

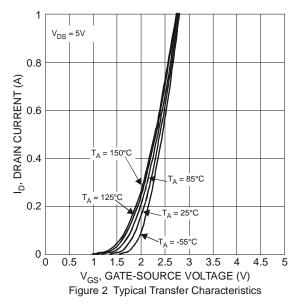
- 6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout
  7. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal vias to bottom layer 1inch square copper plate
  8. Short duration pulse test used to minimize self-heating effect.
- 9. Guaranteed by design. Not subject to product testing.

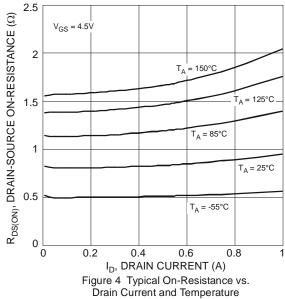












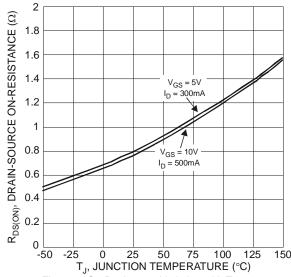


Figure 6 On-Resistance Variation with Temperature



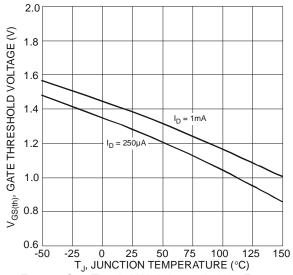
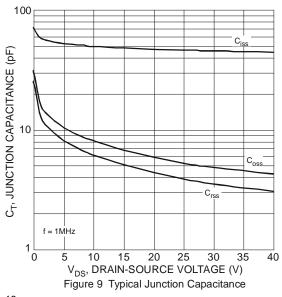
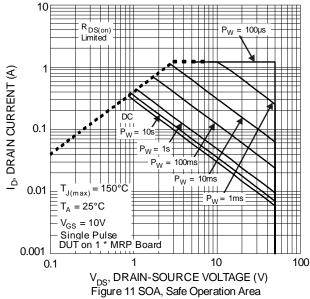
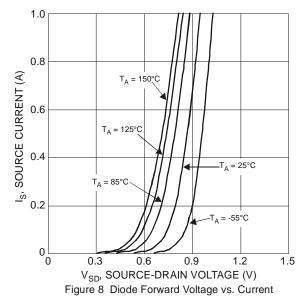
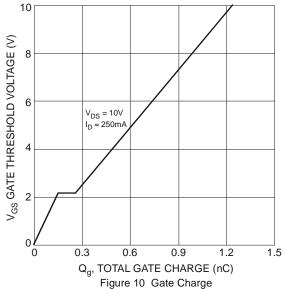


Figure 7 Gate Threshold Variation vs. Ambient Temperature

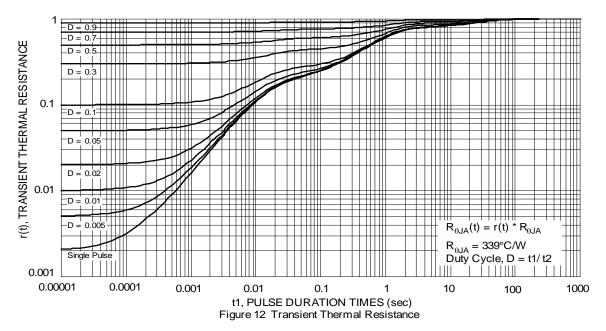












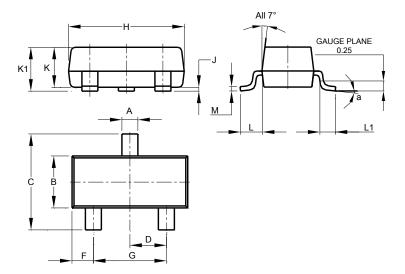
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# **Package Outline Dimensions**

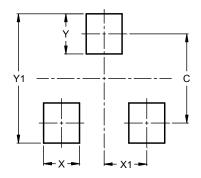
Please see AP02001 at http://www.diodes.com/\_files/datasheets/ap02001.pdf for the latest version.



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			
K	0.890	1.00	0.975			
K1	0.903	1.10	1.025			
L	0.45	0.61	0.55			
L1	0.25	0.55	0.40			
М	0.085	0.150	0.110			
а	0°	8°				
All Dimensions in mm						

# **Suggested Pad Layout**

Please see AP02001 at http://www.diodes.com/\_files/datasheets/ap02001.pdf for the latest version.



Dimensions	Value (in mm)
С	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9



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