



#### 20V N-CHANNEL ENHANCEMENT MODE MOSFET

### **Product Summary**

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> Max
201/	35mΩ @ V <sub>GS</sub> = 10V	4.6A
20V	40mΩ @ V <sub>GS</sub> = 4.5V	4.3A

### **Features and Benefits**

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen- and Antimony-Free. "Green" Device (Note 3)

### **Description and Applications**

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

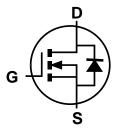
- Battery Charging
- Power Management Functions
- DC-DC Converters
- Portable Power Adaptors

#### **Mechanical Data**

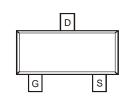
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound.
  UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish—Matte Tin Annealed over Copper Lead-Frame.
  Solderable per MIL-STD-202, Method 208 <sup>3</sup>
- Terminals Connections: See Diagram Below
- Weight: 0.009 grams (Approximate)



Top View



Internal Schematic



Top View

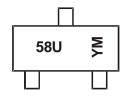
### **Ordering Information** (Note 4)

Part Number	Case	Packaging
DMN2058U-7	SOT23	3,000/Tape & Reel
DMN2058U-13	SOT23	10.000/Tape & Reel

Notes:

- 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
- See https://www.diodes.com/quality/lead-free/ 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 https://www.diodes.com/design/support/packaging/diodes-packaging/

# **Marking Information**



58U =Product Type Marking Code YM = Date Code Marking Y or  $\overline{Y} =$ Year (ex: H = 2020) M or  $\overline{M} =$ Month (ex: 9 = September)

Date Code Key

Year	2016		~	2020		2021	2022		2023	2024		2025
Code	D		~	H		ı	J		K	L		М
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec



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

Characteristic	Symbol	Value	Units		
Drain-Source Voltage	$V_{DSS}$	20	V		
Gate-Source Voltage			$V_{GSS}$	±12	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V	I <sub>D</sub>	4.6 3.7	А		
Maximum Body Diode Forward Current (Note 6)	Is	1.2	Α		
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%	)		I <sub>DM</sub>	24	A

# **Thermal Characteristics**

Characteristic	Symbol	Value	Unit	
Power Dissipation (Note 5)		$P_{D}$	0.74	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{ heta JA}$	172	°C/W
Power Dissipation (Note 6)		P <sub>D</sub>	1.13	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{ heta JA}$	111	°C/W
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

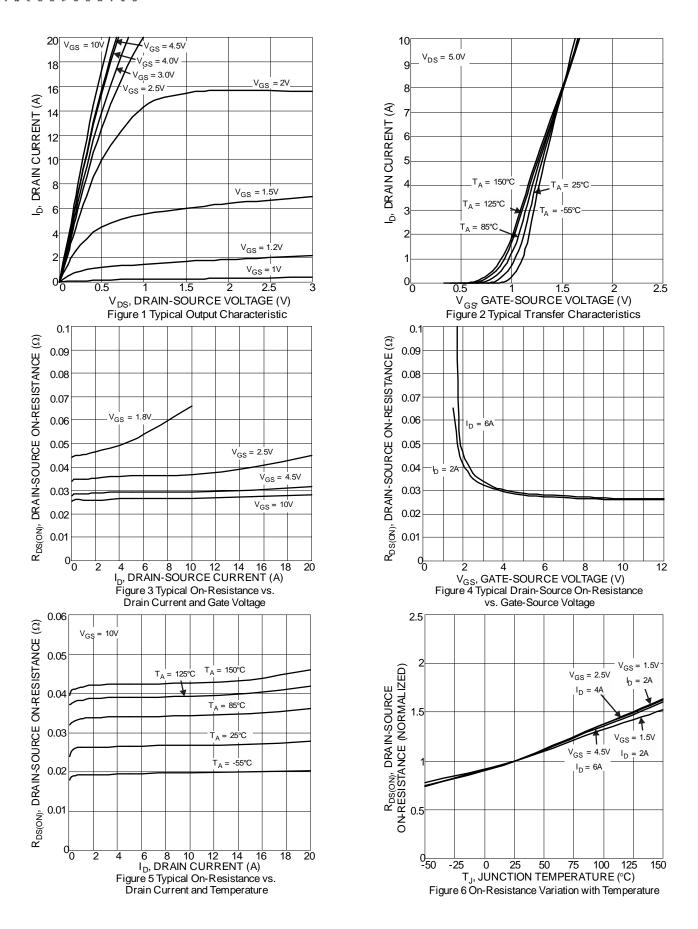
# Electrical Characteristics (@ T<sub>A</sub> = +25°C unless otherwise specified.)

Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 7)							
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	20	_		V	$V_{GS} = 0V, I_D = 250\mu A$	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	_	_	1	μΑ	$V_{DS} = 20V, V_{GS} = 0V$	
Gate-Source Leakage	I <sub>GSS</sub>	_	_	±100	nA	$V_{GS} = \pm 12V, V_{DS} = 0V$	
ON CHARACTERISTICS (Note 7)			•		•		
Gate Threshold Voltage	V <sub>GS(TH)</sub>	0.4	0.6	1.2	V	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	
		_	27	35		$V_{GS} = 10V, I_D = 6.0A$	
Static Drain-Source On-Resistance		_	30	40	mΩ	$V_{GS} = 4.5V, I_D = 5.0A$	
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	_	37	60	11122	$V_{GS} = 2.5V, I_D = 4.0A$	
		_	49	91		$V_{GS} = 1.8V, I_D = 2.0A$	
Diode Forward Voltage	V <sub>SD</sub>	_	0.7	1.2	V	$V_{GS} = 0V$ , $I_S = 1A$	
DYNAMIC CHARACTERISTICS (Note 8)			•		•		
Input Capacitance	C <sub>ISS</sub>	_	281	_		101/1/	
Output Capacitance	Coss	_	50	_	pF	$V_{DS} = 10V, V_{GS} = 0V$ f = 1.0MHz	
Reverse Transfer Capacitance	C <sub>RSS</sub>	_	39	_		1 = 1.0IVII IZ	
Gate Resistance	R <sub>G</sub>	_	3.1	_	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz$	
Total Gate Charge (V <sub>GS</sub> = 4.5V)	$Q_{G}$	_	3.6	_			
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>G</sub>	_	7.7	_	nC	101/1 004	
Gate-Source Charge	Q <sub>GS</sub>	_	0.5	_	nc nc	$V_{DS} = 10V, I_D = 6.0A$	
Gate-Drain Charge	$Q_{GD}$	_	0.9	_			
Turn-On Delay Time	t <sub>D(ON)</sub>	_	2.0	_			
Turn-On Rise Time	t <sub>R</sub>	_	4.9	_		$V_{GS} = 4.5V, V_{DD} = 10V, R_G = 6\Omega,$	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	_	9.9		ns	$I_{D} = 6.0A$	
Turn-Off Fall Time	t <sub>F</sub>	_	3.3	_			
Body Diode Reverse Recovery Time	t <sub>RR</sub>	_	5.4	_	ns	$I_F = 6.0A$ , di/dt = 100A/ $\mu$ s	
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	_	0.7	_	nC	$I_F = 6.0A$ , $di/dt = 100A/\mu s$	

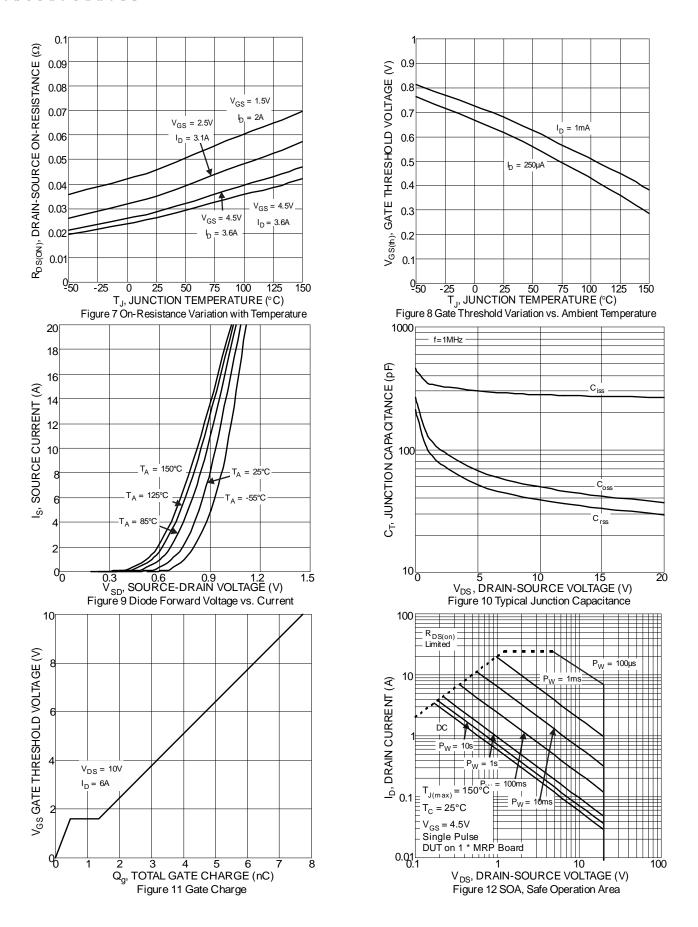
Notes:

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

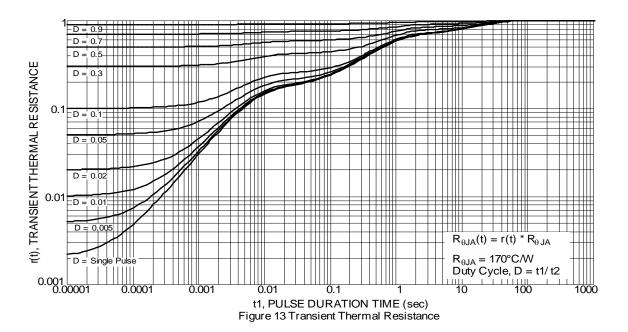










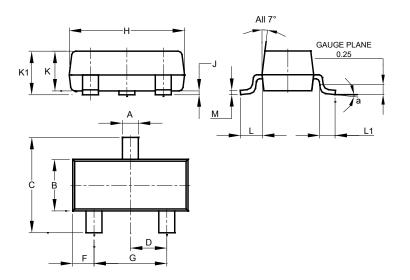




# **Package Outline Dimensions**

Please see http://www.diodes.com/package-outlines.html for the latest version.

#### SOT23

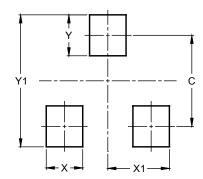


SOT23						
Dim	Min	Max	Тур			
Α	0.37	0.51	0.40			
В	1.20	1.40	1.30			
С	2.30	2.50	2.40			
D	0.89	1.03	0.915			
F	0.45	0.60	0.535			
G	1.78	2.05	1.83			
Η	2.80	3.00	2.90			
J	0.013	0.10	0.05			
K	0.890	1.00	0.975			
K1	0.903	1.10	1.025			
L	0.45	0.61	0.55			
L1	0.25	0.55	0.40			
М	0.085	0.150	0.110			
а	0°	8°				
All Dimensions in mm						

# **Suggested Pad Layout**

Please see http://www.diodes.com/package-outlines.html for the latest version.

#### SOT23



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



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