

Product Summary

BV _{DSS}	R _{D(S)} Max	I _D Max
20V	35mΩ @ V _{GS} = 10V	4.6A
	40mΩ @ V _{GS} = 4.5V	4.3A

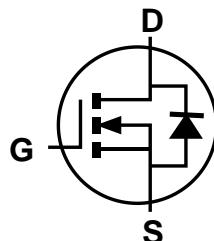
Description and Applications

This MOSFET is designed to minimize the on-state resistance (R_{D(S)}), yet maintain superior switching performance, making it ideal for high efficiency power management applications.

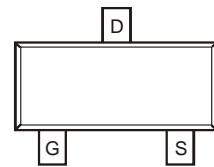
- Battery Charging
- Power Management Functions
- DC-DC Converters
- Portable Power Adaptors



Top View



Internal Schematic



Top View

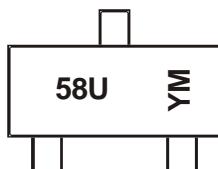
Ordering Information (Note 4)

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) 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. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



58U = Product Type Marking Code

YM = Date Code Marking

Y or YM = Year (ex: D = 2016)

M = Month (ex: 9 = September)

Date Code Key

Year	2016	2017	2018	2019	2020	2021	2022	2023				
Code	D	E	F	G	H	I	J	K				
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 (@ $T_A = +25^\circ\text{C}$ 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) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	4.6 3.7	A
Maximum Body Diode Forward Current (Note 6)			I_S	1.2	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)			I_{DM}	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	$R_{\theta JA}$	172	$^\circ\text{C}/\text{W}$
Power Dissipation (Note 6)		P_D	1.13	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	111	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

 Electrical Characteristics (@ $T_A = +25^\circ\text{C}$ unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	20	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	$V_{DS} = 20\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 12\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	0.4	0.6	1.2	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	27	35	m Ω	$V_{GS} = 10\text{V}, I_D = 6.0\text{A}$
		—	30	40		$V_{GS} = 4.5\text{V}, I_D = 5.0\text{A}$
		—	37	60		$V_{GS} = 2.5\text{V}, I_D = 4.0\text{A}$
		—	49	91		$V_{GS} = 1.8\text{V}, I_D = 2.0\text{A}$
Diode Forward Voltage	V_{SD}	—	0.7	1.2	V	$V_{GS} = 0\text{V}, I_S = 1\text{A}$
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{ISS}	—	281	—	pF	$V_{DS} = 10\text{V}, V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$
Output Capacitance	C_{OSS}	—	50	—		
Reverse Transfer Capacitance	C_{RSS}	—	39	—		
Gate Resistance	R_G	—	3.1	—	Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Total Gate Charge ($V_{GS} = 4.5\text{V}$)	Q_G	—	3.6	—	nC	$V_{DS} = 10\text{V}, I_D = 6.0\text{A}$
Total Gate Charge ($V_{GS} = 10\text{V}$)	Q_G	—	7.7	—		
Gate-Source Charge	Q_{GS}	—	0.5	—		
Gate-Drain Charge	Q_{GD}	—	0.9	—		
Turn-On Delay Time	$t_{D(ON)}$	—	2.0	—	ns	$V_{GS} = 4.5\text{V}, V_{DD} = 10\text{V}, R_G = 6\Omega, I_D = 6.0\text{A}$
Turn-On Rise Time	t_R	—	4.9	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	9.9	—		
Turn-Off Fall Time	t_F	—	3.3	—		
Body Diode Reverse Recovery Time	t_{RR}	—	5.4	—	ns	$I_F = 6.0\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Body Diode Reverse Recovery Charge	Q_{RR}	—	0.7	—	nC	$I_F = 6.0\text{A}, di/dt = 100\text{A}/\mu\text{s}$

Notes:

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

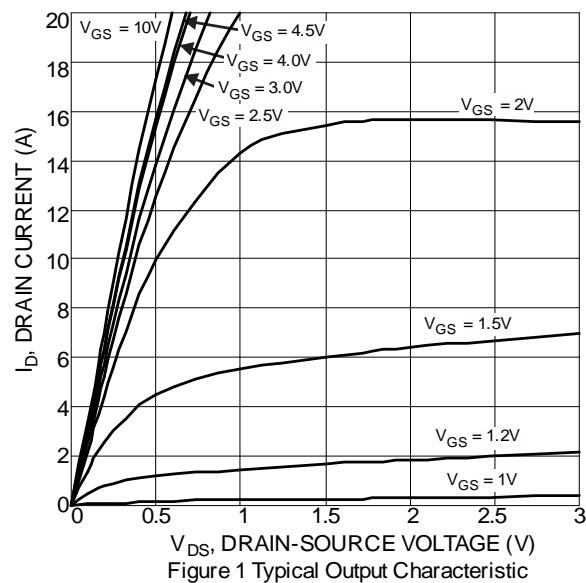


Figure 1 Typical Output Characteristic

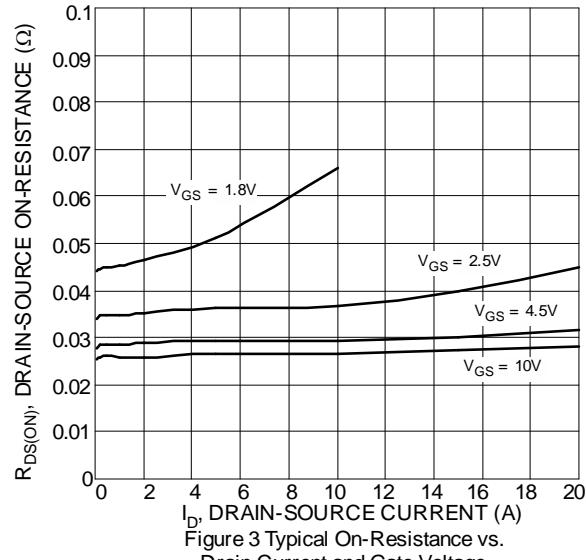


Figure 3 Typical On-Resistance vs.
Drain Current and Gate Voltage

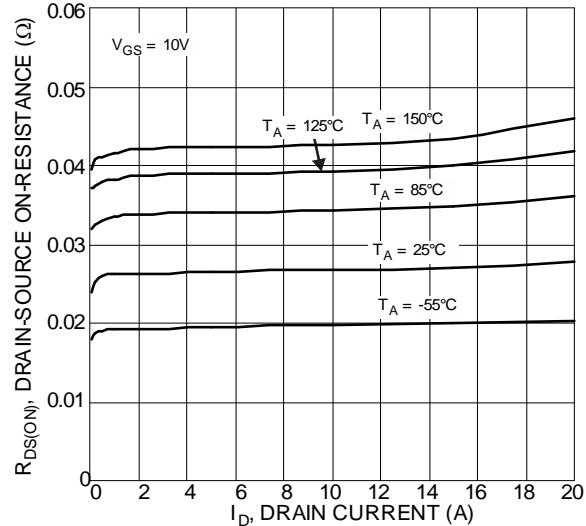


Figure 5 Typical On-Resistance vs.
Drain Current and Temperature

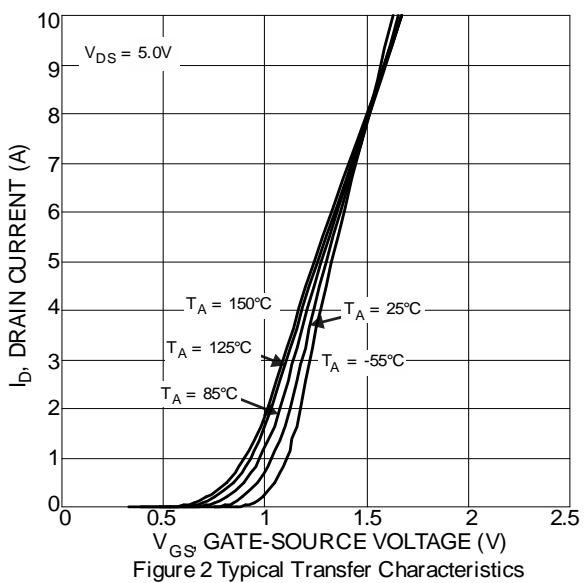


Figure 2 Typical Transfer Characteristics

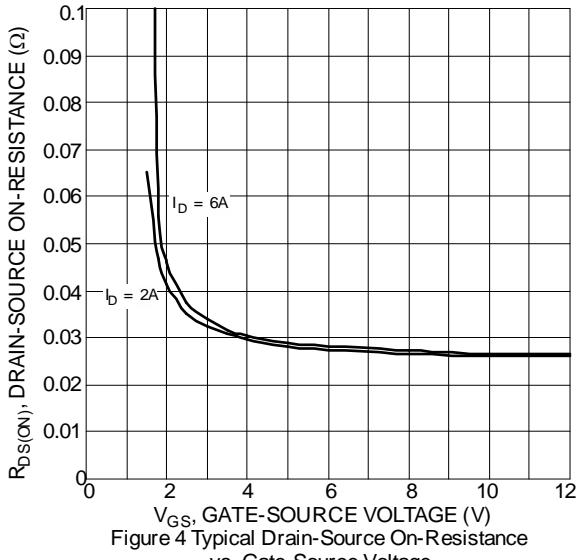


Figure 4 Typical Drain-Source On-Resistance
vs. Gate-Source Voltage

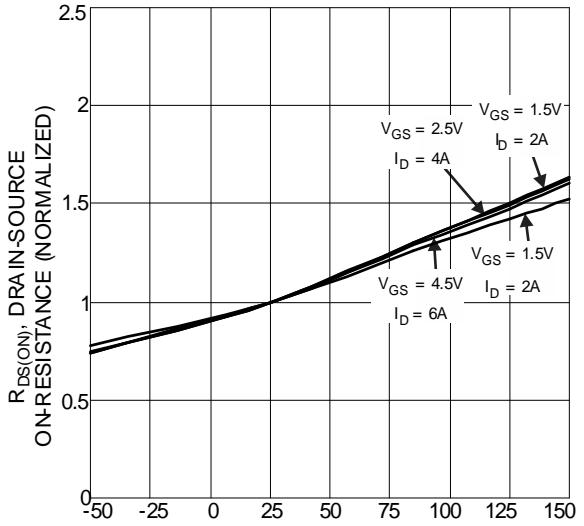
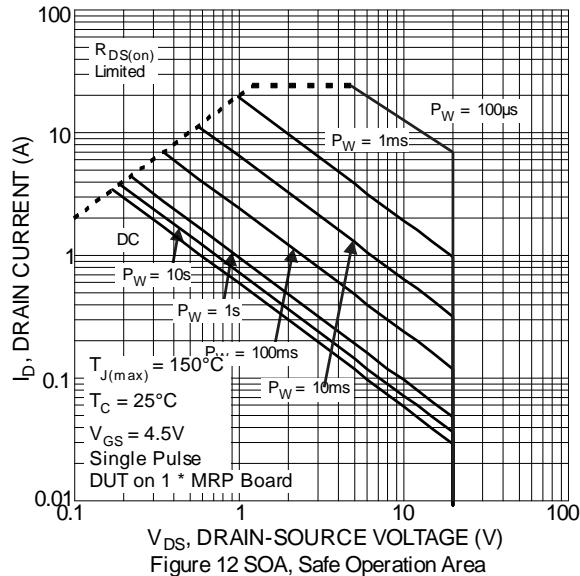
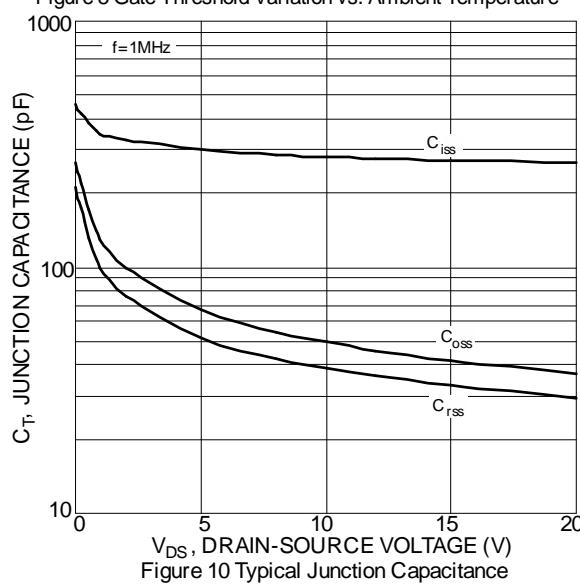
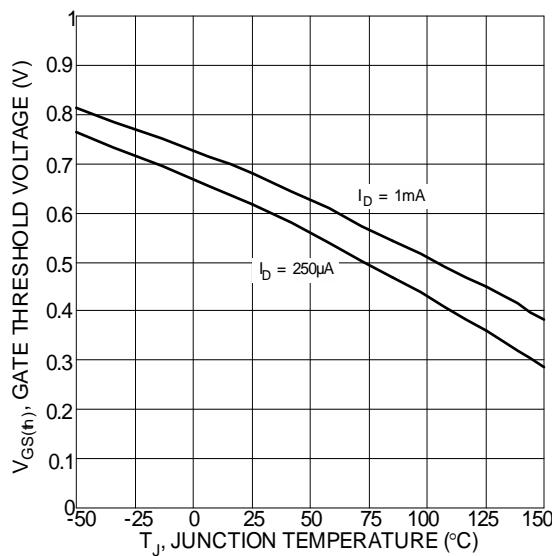
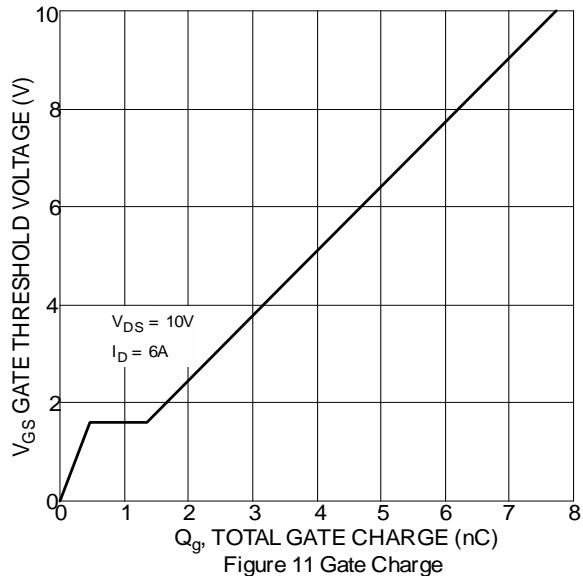
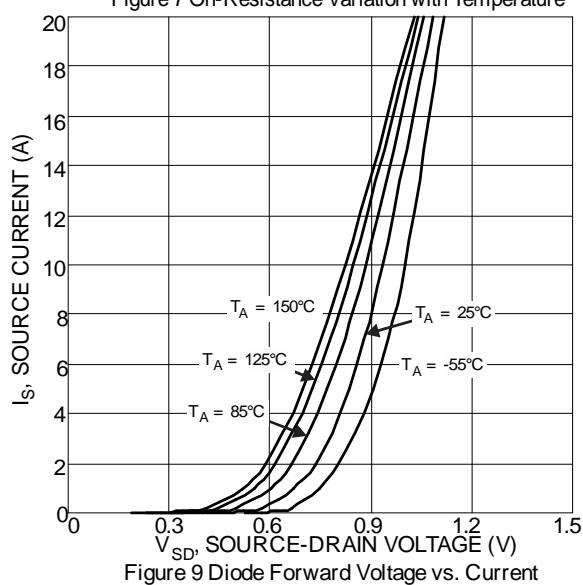
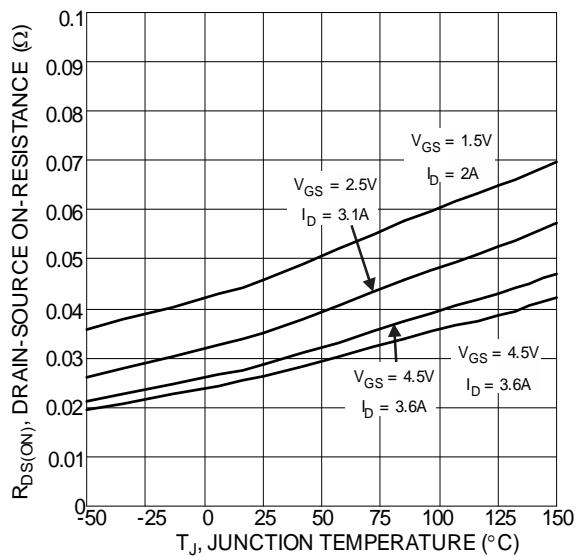


Figure 6 On-Resistance Variation with Temperature



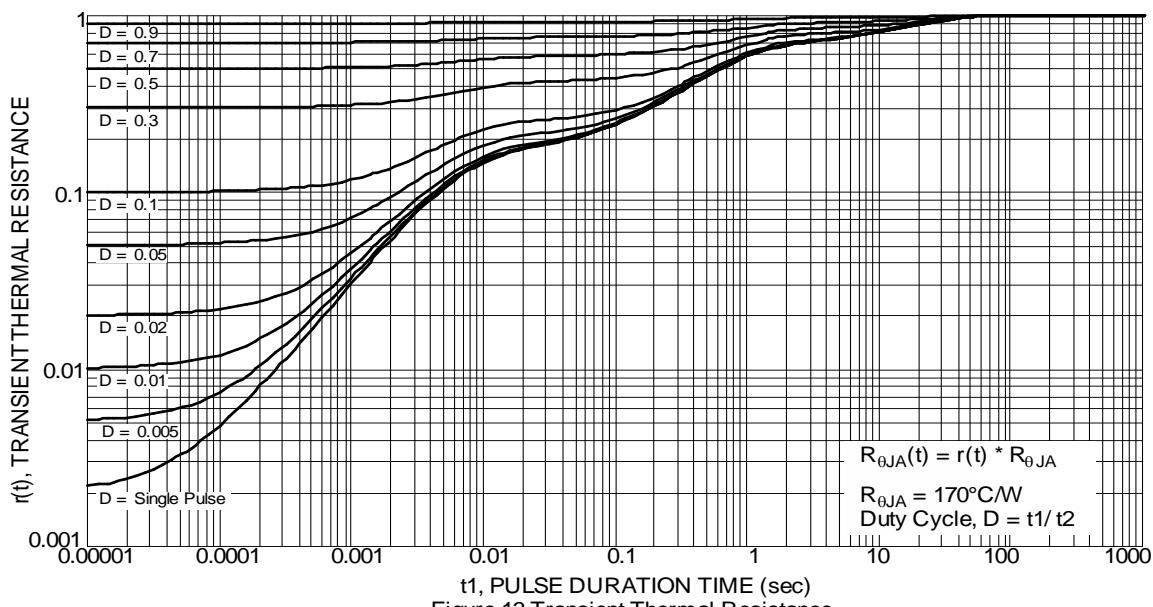
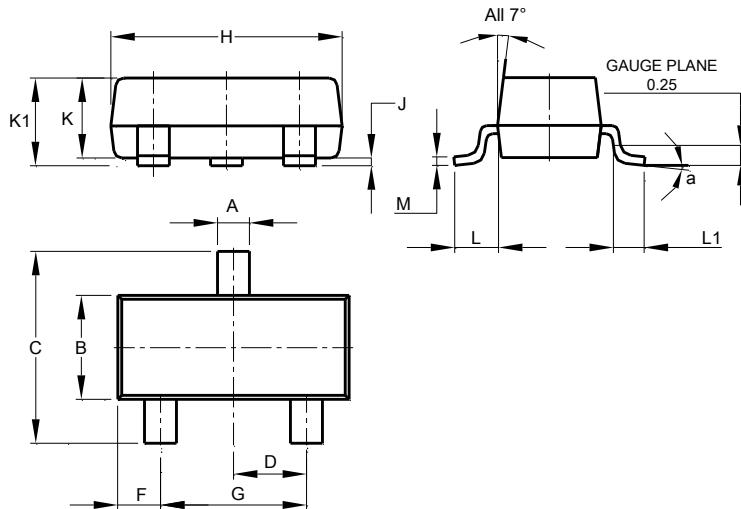


Figure 13 Transient Thermal Resistance

Package Outline Dimensions

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

SOT23



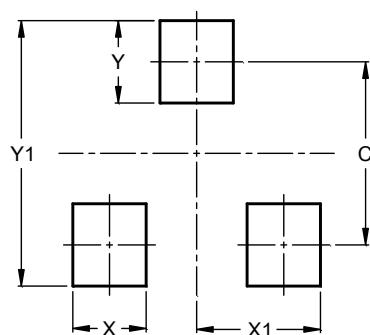
SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--

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)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

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