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USE DMP2040USS

Lead-free Green

DMP2038USS

20V P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max T_A = +25°C
-20V	38mΩ @ V_{GS} = -4.5V	-6.5A
	56mΩ @ V_{GS} = -2.5V	-5.0A

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)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Description and Applications

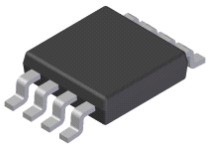
This MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Backlighting
- Power Management Functions
- DC-DC Converters

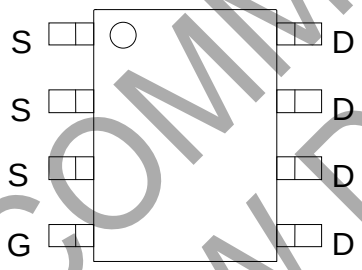
Mechanical Data

- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram
- Terminals: Finish - Matte Tin Annealed over Copper Lead Frame. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.072g (Approximate)

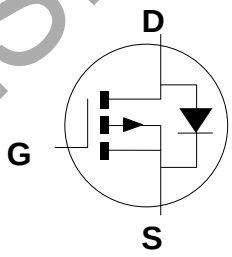
SO-8



Top View



Top View
Pin-Out



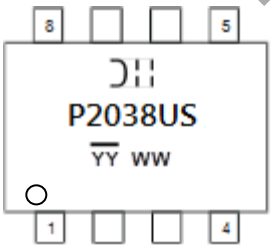
Equivalent Circuit

Ordering Information (Note 4)

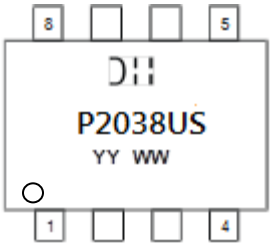
Part Number	Case	Packaging
DMP2038USS-13	SO-8	2500/Tape & Reel

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 https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information



Chengdu A/T Site



Shanghai A/T Site

= Manufacturer's Marking
P2038US = Product Type Marking Code
YYWW = Date Code Marking
YY or YY = Year (ex: 17 = 2017)
WW = Week (01 to 53)
YY = Date Code Marking for SAT (Shanghai Assembly/ Test site)
YY = Date Code Marking for CAT (Chengdu Assembly/ Test site)

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Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-20	V
Gate-Source Voltage			V_{GSS}	±8	V
Drain Current (Note 6)	Steady State	T_A = +25°C T_A = +70°C	I_D	-6.5 -5.2	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	-25	A
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	2	A
Avalanche Current (Note 7) L=0.3mH			I_{AS}	13.2	A
Avalanche Energy (Note 7) L=0.3mH			E_{AS}	26	mJ

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 6)	P_D	2.5	W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	50	°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 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	-20	—	—	V	V_{GS} = 0V, I_D = -250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	µA	V_{DS} = -16V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±8V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.4	—	-1.1	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	24	38	mΩ	V_{GS} = -4.5V, I_D = -5A
		—	33	56		V_{GS} = -2.5V, I_D = -4.3A
Diode Forward Voltage	V_{SD}	—	-0.7	-1.2	V	V_{GS} = 0V, I_S = -2.1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	1496	—	pF	V_{DS} = -15V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	130	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	116	—	pF	
Total Gate Charge	Q_g	—	14.4	—	nC	V_{DS} = -10V, V_{GS} = -4.5V I_D = -4.5A
Gate-Source Charge	Q_{gs}	—	2.6	—		
Gate-Drain Charge	Q_{gd}	—	2.7	—		
Turn-On Delay Time	$t_{D(ON)}$	—	13.7	—	ns	V_{DD} = -10V, V_{GS} = -4.5V, R_g = 6Ω, R_L = 10Ω, I_D = -1A
Turn-On Rise Time	t_R	—	14.0	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	79.1	—		
Turn-Off Fall Time	t_F	—	35.5	—		

Notes:
5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
7. I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

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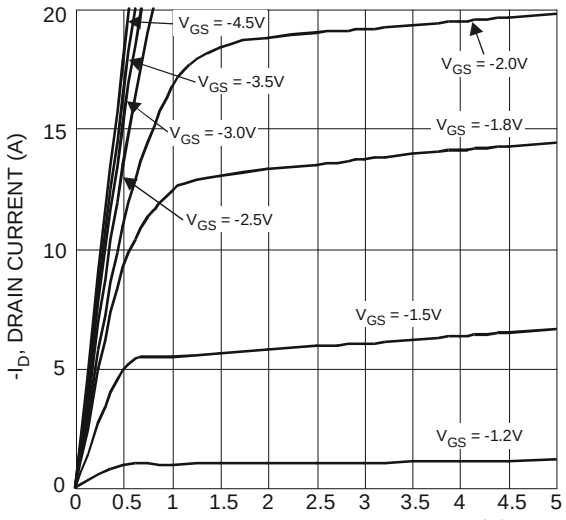

Figure 1 Typical Output Characteristics

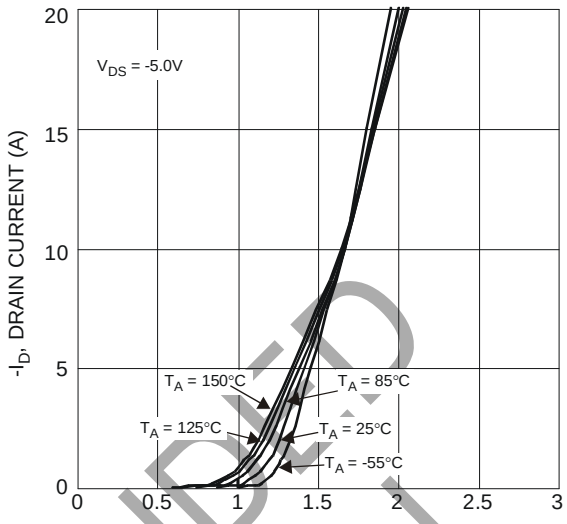

Figure 2 Typical Transfer Characteristics

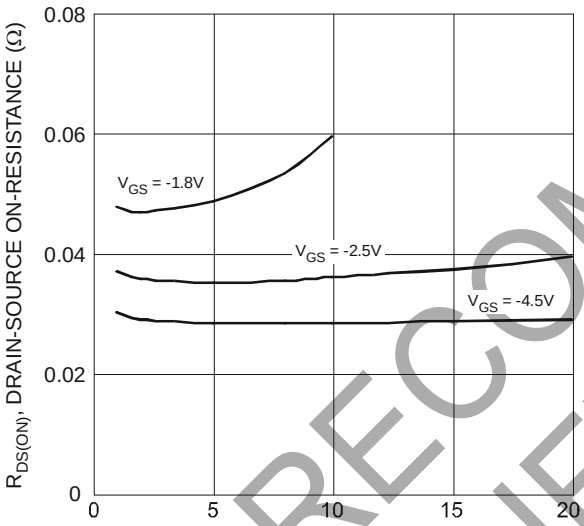

Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

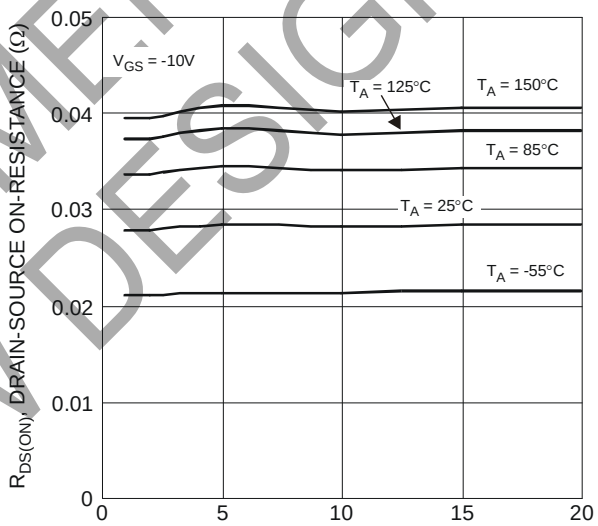

Figure 4 Typical On-Resistance vs. Drain Current and Temperature

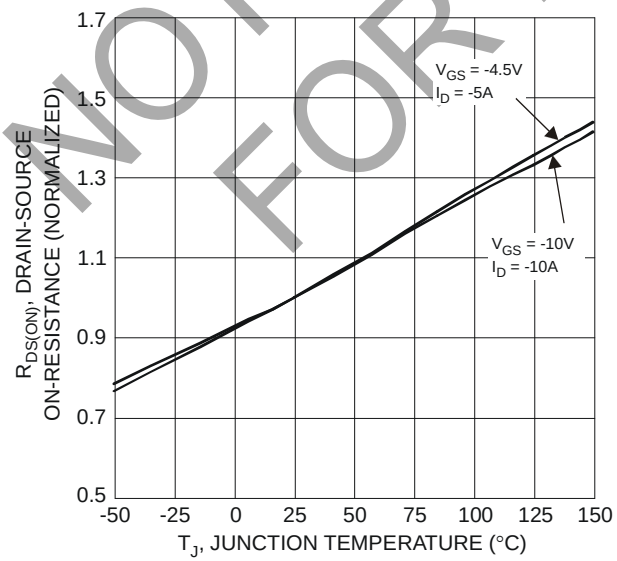

Figure 5 On-Resistance Variation with Temperature

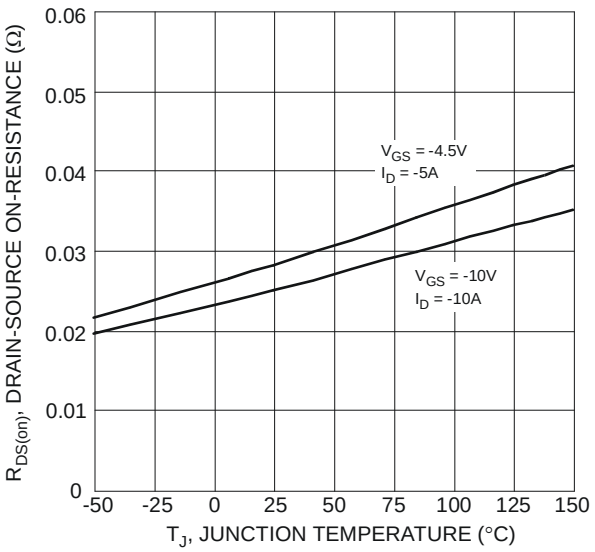

Figure 6 On-Resistance Variation with Temperature

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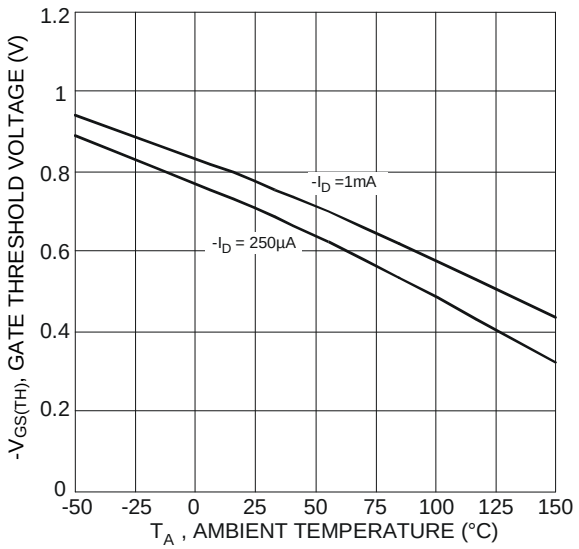

Figure 7 Gate Threshold Variation vs. Ambient Temperature

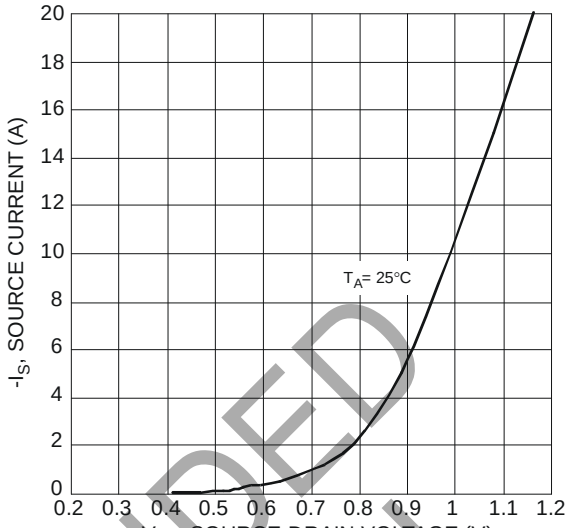

Figure 8 Diode Forward Voltage vs. Current

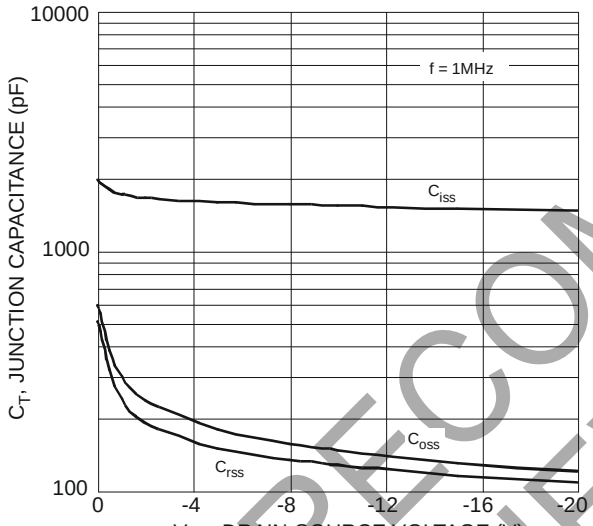

Figure 9 Typical Junction Capacitance

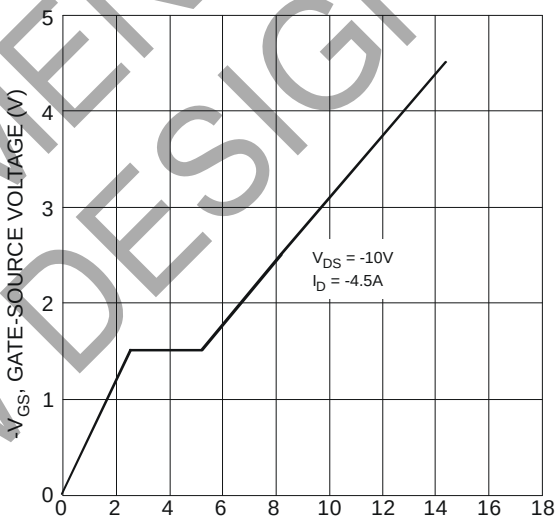

Figure 10 Gate-Charge Characteristics

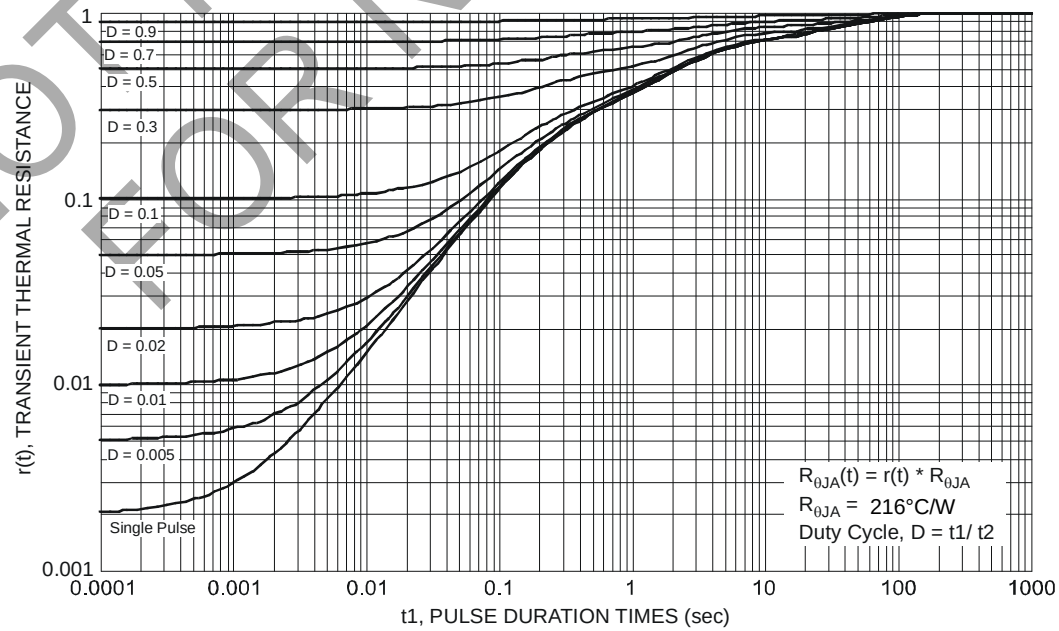

Figure 11 Transient Thermal Resistance

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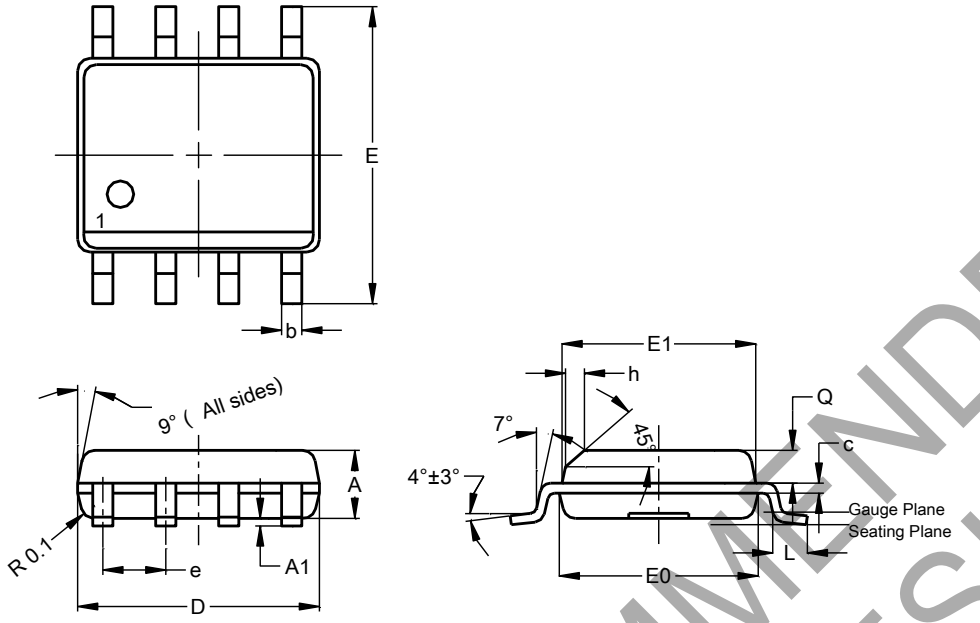
Package Outline Dimensions

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

SO-8

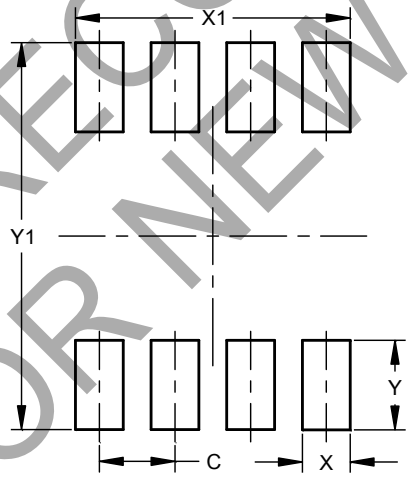


SO-8			
Dim	**Min**	**Max**	**Typ**
A	1.40	1.50	1.45
A1	0.10	0.20	0.15
b	0.30	0.50	0.40
c	0.15	0.25	0.20
D	4.85	4.95	4.90
E	5.90	6.10	6.00
E1	3.80	3.90	3.85
E0	3.85	3.95	3.90
e	--	--	1.27
h	-	--	0.35
L	0.62	0.82	0.72
Q	0.60	0.70	0.65
All Dimensions in mm			

Suggested Pad Layout

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

SO-8



Dimensions	Value (in mm)
C	1.27
X	0.802
X1	4.612
Y	1.505
Y1	6.50

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