

## Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	$I_D$ max $T_A = +25^\circ C$
-20V	75m $\Omega$ @ $V_{GS} = -4.5V$	-3.3A
	140m $\Omega$ @ $V_{GS} = -1.8V$	-2.4A

## Features and Benefits

- Low On-Resistance
- Very Low Gate Threshold Voltage  $V_{GS(th)} \leq 1V$
- 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-Q 101 Standards for High Reliability**

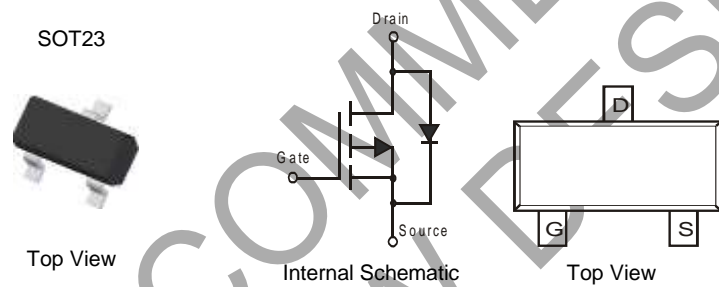
## Description and Applications

This MOSFET has been 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.

- 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 Connections: See Diagram Below
- Terminals: Finish - Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.008 grams (approximate)

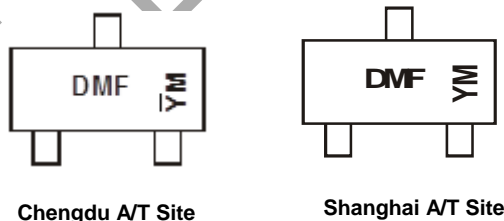


## Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2160U-7	SOT23	3000/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](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



DMF = Marking Code  
 YM = Date Code Marking for SAT (Shanghai Assembly/ Test site)  
 YM = Date Code Marking for CAT (Chengdu Assembly/ Test site)  
 Y or Y-bar = Year (ex: A = 2013)  
 M = Month (ex: 9 = September)

### Date Code Key

Year	2008	2009	2010	2011	2012	2013	2014	2015				
Code	V	W	X	Y	Z	A	B	C				
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<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units	
Drain-Source Voltage	V <sub>DSS</sub>	-20	V	
Gate-Source Voltage	V <sub>GSS</sub>	±12	V	
Continuous Drain Current (Note 5) V <sub>GS</sub> = -4.5V	I <sub>D</sub>	T <sub>A</sub> = +25°C	-3.3	A
		T <sub>A</sub> = +70°C	-2.6	A
Pulsed Drain Current	I <sub>DM</sub>	-13	A	

**Thermal Characteristics**

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P <sub>D</sub>	1.4	W
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	90	°C/W
Thermal Resistance, Junction to Case (Note 5)	R <sub>θJC</sub>	22	°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	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 6)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-20	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>	—	—	-1.0	μA	V <sub>DS</sub> = -16V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100 ±800	nA	V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V V <sub>GS</sub> = ±12V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 6)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-0.4	-0.6	-0.9	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	—	60	75	mΩ	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -1.5A
		—	73	96		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -1.2A
		—	92	140		V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -1.2A
Forward Transconductance	g <sub>FS</sub>	—	7	—	S	V <sub>DS</sub> = -10V, I <sub>D</sub> = -1.5A
Diode Forward Voltage (Note 5)	V <sub>SD</sub>	—	—	-1.0	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1.0A
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
Input Capacitance	C <sub>iSS</sub>	—	627	—	pF	V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>oSS</sub>	—	64	—	pF	
Reverse Transfer Capacitance	C <sub>rSS</sub>	—	53	—	pF	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V, f = 1.0MHz
Gate Resistance	R <sub>G</sub>	—	44.9	—	Ω	
Total Gate Charge	Q <sub>g</sub>	—	6.5	—	nC	V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V, I <sub>D</sub> = -3A
Gate-Source Charge	Q <sub>gs</sub>	—	0.9	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	1.5	—	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	—	12.5	—	ns	V <sub>DS</sub> = -10V, V <sub>GS</sub> = -4.5V, R <sub>L</sub> = 10Ω, R <sub>G</sub> = 1.0Ω, I <sub>D</sub> = -1A
Turn-On Rise Time	t <sub>r</sub>	—	10.3	—	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	—	46.5	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	22.2	—	ns	

- Notes:
- Device mounted on 1in<sup>2</sup> FR-4 PCB with 2 oz. Copper. t ≤ 10 sec.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

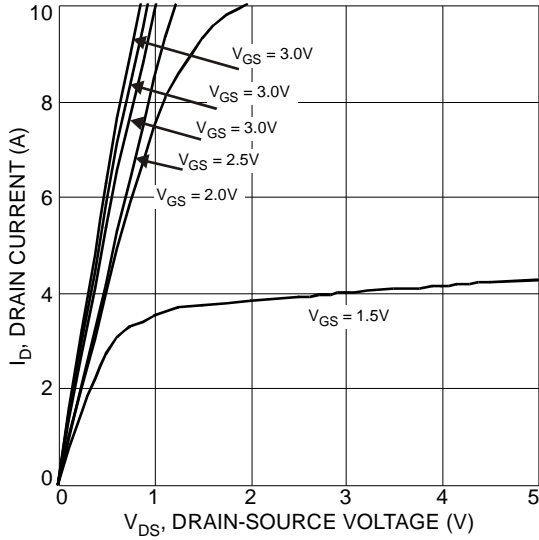


Fig. 1 Typical Output Characteristics

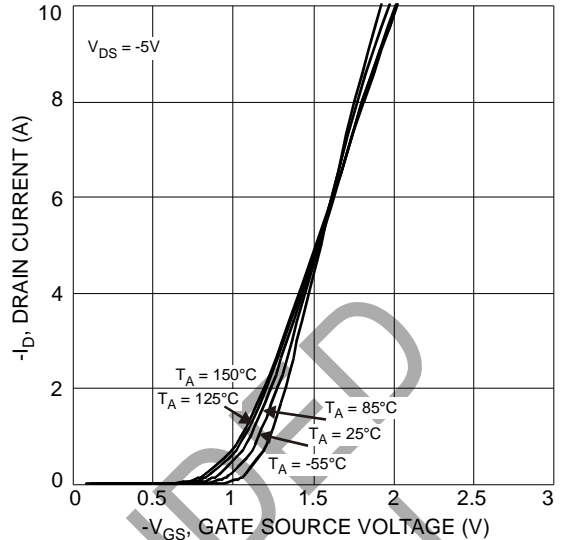


Fig. 2 Typical Transfer Characteristics

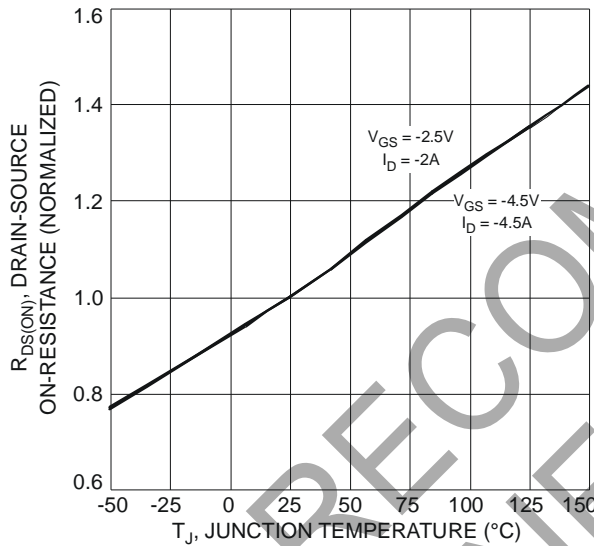


Fig. 3 On-Resistance Variation with Temperature

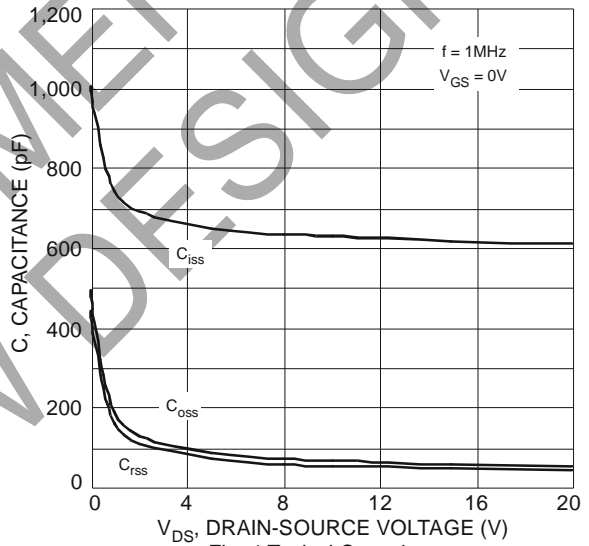


Fig. 4 Typical Capacitance

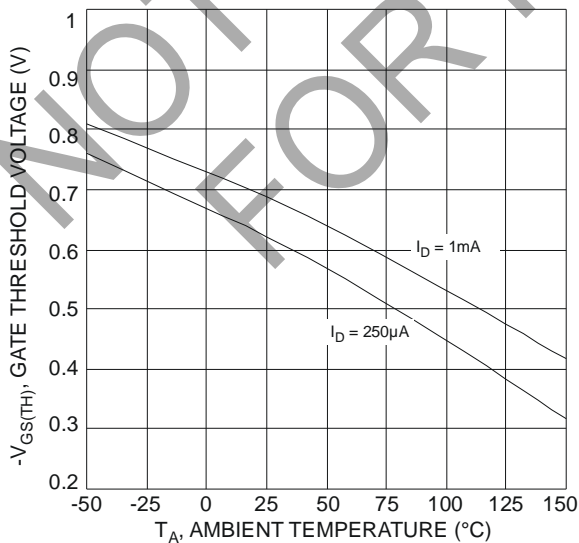


Fig. 5 Gate Threshold Variation vs. Ambient Temperature

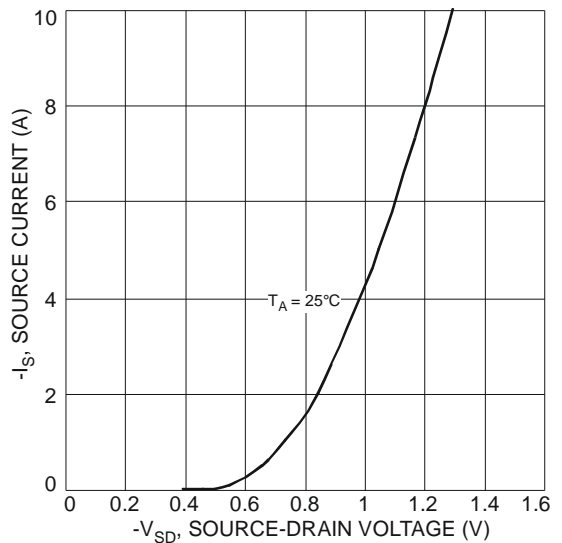


Fig. 6 Diode Forward Voltage vs. Current

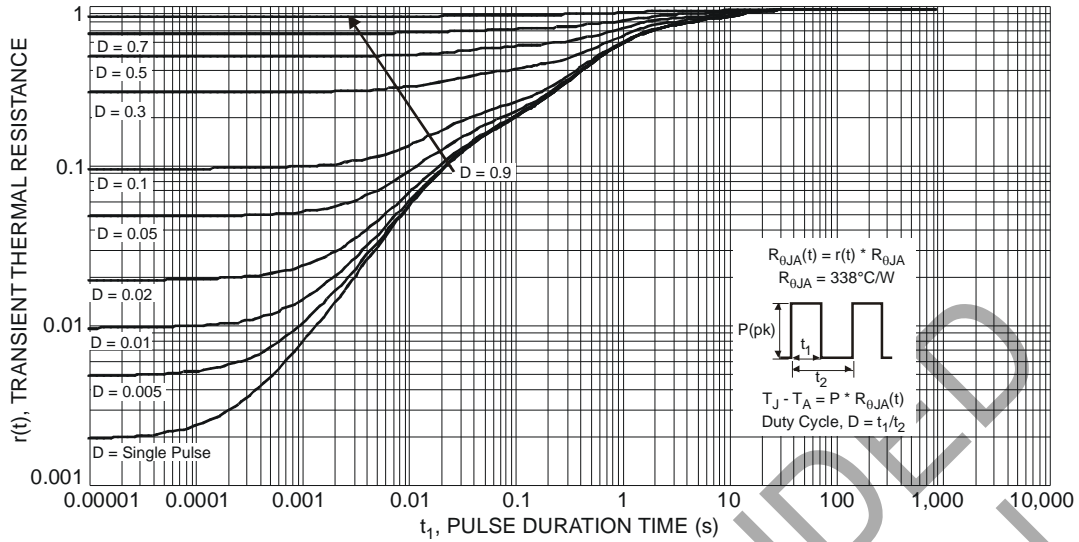
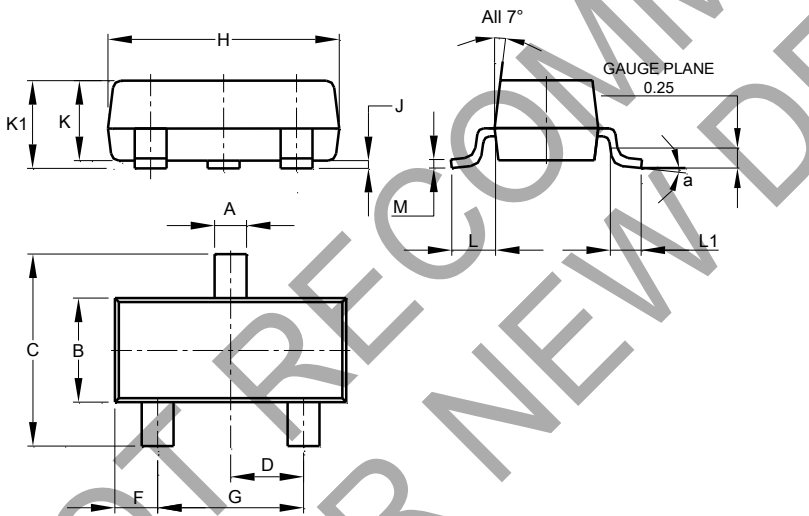


Fig. 7 Transient Thermal Response

**Package Outline Dimensions**

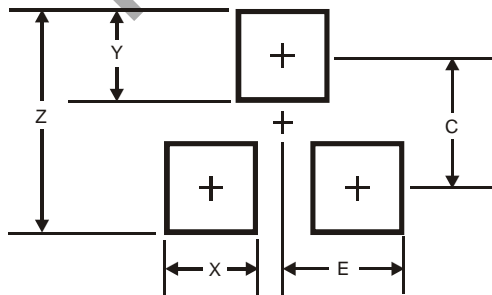
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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
α	8°		
All Dimensions in mm			

**Suggested Pad Layout**

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



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

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