60V P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(on)}$	I_D T_A = +25°C
-60V	150mΩ @ V_{GS}= -10V	-3A
	185mΩ @ V_{GS}= -4.5V	-2.7A

Features and Benefits

- 100% Unclamped Inductive Switch (UIS) test in production
- Low on-resistance
- Fast switching speed
- **Lead-Free Finish; 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 meet the stringent requirements of Automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

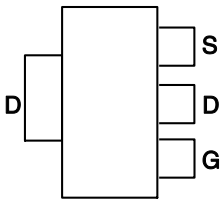
- Motor Control
- Transformer Driving Switch
- DC-DC Converters
- Power Management Functions
- Uninterrupted Power Supply

Mechanical Data

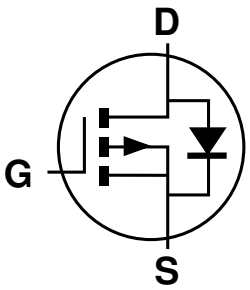
- Case: SOT223
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See diagram below
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.112 grams (Approximate)

SOT223

Top View



Pin Out - Top



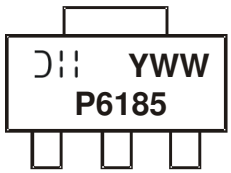
Equivalent Circuit

Ordering Information (Note 5)

Part Number	Case	Packaging
DMP6185SEQ-13	SOT223	2,500 / Tape & Reel

Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
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



= Manufacturer's Marking
P6185 = Marking Code
YWW or $\overline{Y}$WW = Date Code Marking
Y or $\overline{Y}$= Year (ex: 7 = 2017)
WW = Week (01 - 53)

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

Characteristic		Symbol	Value	Unit
Drain-Source voltage		V_{DSS}	-60	V
Gate-Source voltage		V_{GS}	±20	V
Continuous Drain current (Note 7) V_{GS} = -10V	T_A = +25°C	I_D	-3	A
	T_A = +70°C		-2.4	
Maximum Body Diode Continuous Current		I_S	-2	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)		I_{DM}	-15	A
Single Pulsed Avalanche Current (Note 8)		I_{AS}	-16	A
Single Pulsed Avalanche Energy (Note 8)		E_{AS}	13	mJ

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	1.2	W
	T_A = +70°C		0.8	
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	$R_{\theta JA}$	104	°C/W
	t<10s		51	
Total Power Dissipation (Note 7)	T_A = +25°C	P_D	2.2	W
	T_A = +70°C		1.4	
Thermal Resistance, Junction to Ambient (Note 7)	Steady state	$R_{\theta JA}$	60	°C/W
	t<10s		30	
Thermal Resistance, Junction to Case (Note 7)		$R_{\theta JC}$	7.6	
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 9)						
Drain-Source Breakdown Voltage	BV_{DSS}	-60	–	–	V	V_{GS} = 0V, I_D = -250µA
Zero Gate Voltage Drain Current	I_{DSS}	–	–	-1	µA	V_{DS} = -48V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	–	–	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(th)}$	-1	–	-3	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	–	110	150	mΩ	V_{GS} = -10V, I_D = -2.2A
			130	185		V_{GS} = -4.5V, I_D = -1.8A
Diode Forward Voltage	V_{SD}	–	-0.75	-0.95	V	V_{GS} = 0V, I_S = -1A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	–	708	–	pF	V_{DS} = -30V, V_{GS} = 0V, f = 1MHz
Output Capacitance	C_{oss}	–	39	–	pF	
Reverse Transfer Capacitance	C_{rss}	–	32	–	pF	
Gate Resistance	R_g	–	17	28	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = -4.5V)	Q_g	–	6.2	–	nC	V_{DS} = -30V, I_D = -12A
Total Gate Charge (V_{GS} = -10V)	Q_g	–	14	–	nC	
Gate-Source Charge	Q_{gs}	–	2.8	–	nC	
Gate-Drain Charge	Q_{gd}	–	3.1	–	nC	
Turn-On Delay Time	$t_{D(on)}$	–	5.2	–	ns	V_{DS} = -30V, R_L = 2.5Ω, V_{GS} = -10V, R_G = 3Ω
Turn-On Rise Time	t_r	–	23	–	ns	
Turn-Off Delay Time	$t_{D(off)}$	–	33	–	ns	
Turn-Off Fall Time	t_f	–	39	–	ns	
Body Diode Reverse Recovery Time	t_{rr}	–	22	–	ns	I_F = -12A, di/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q_{rr}	–	17	–	nC	

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 1inch square copper plate.
8. UIS in production with L = 0.1mH, starting T_A = +25°C.
9. Short duration pulse test used to minimize self-heating effect.
10. Guaranteed by design. Not subject to product testing.

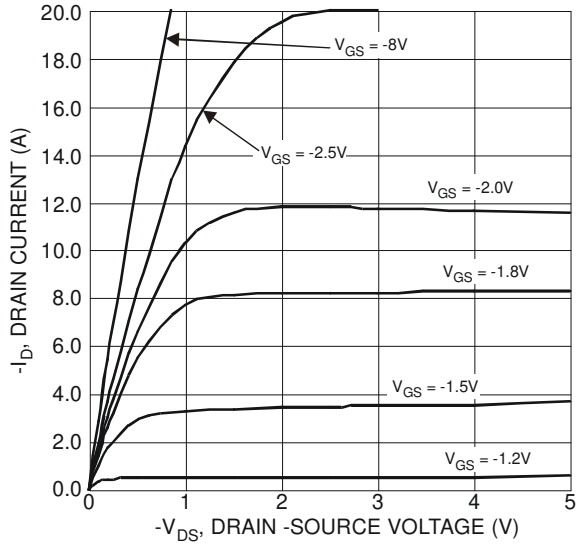


Figure 1 Typical Output Characteristics

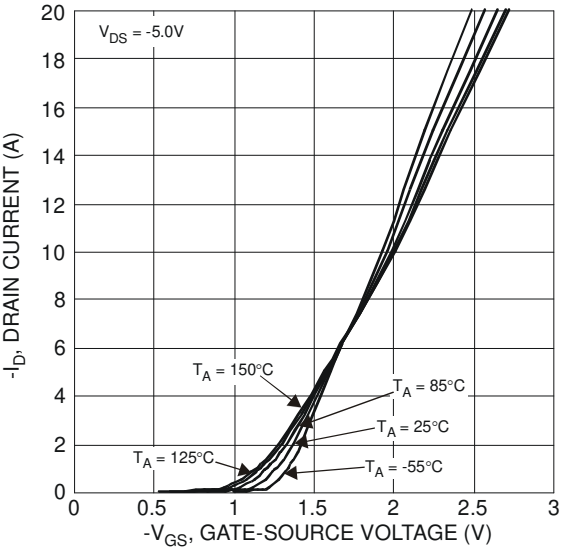


Figure 2 Typical Transfer Characteristics

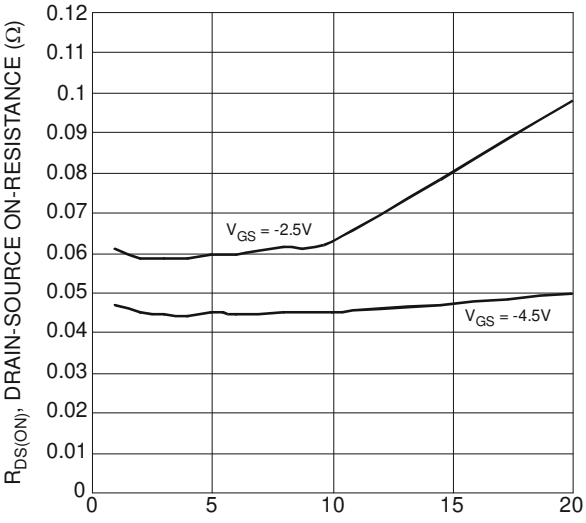


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

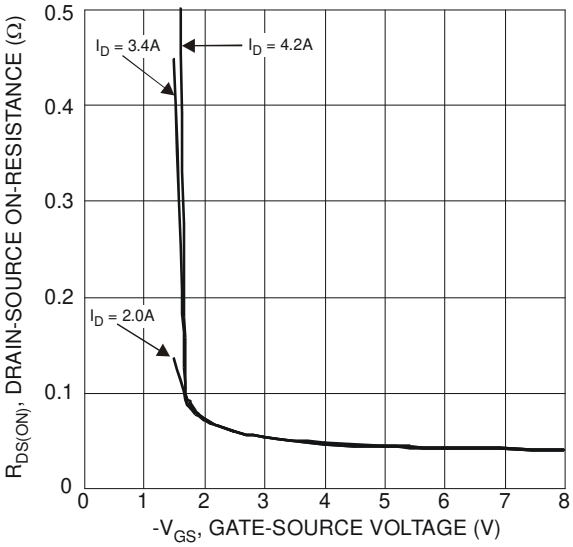


Figure 4 Typical Transfer Characteristics

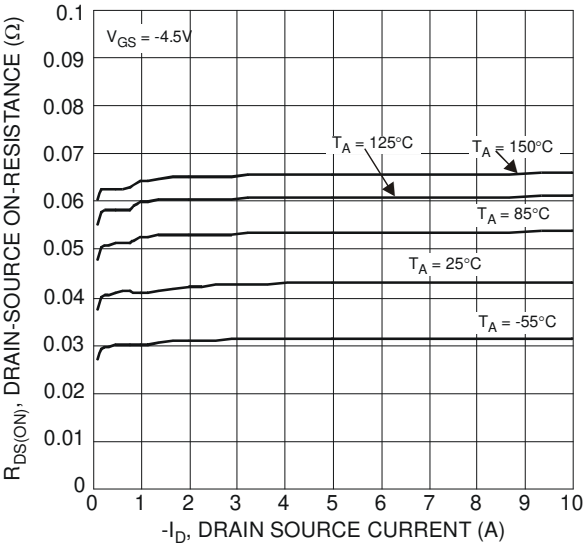


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

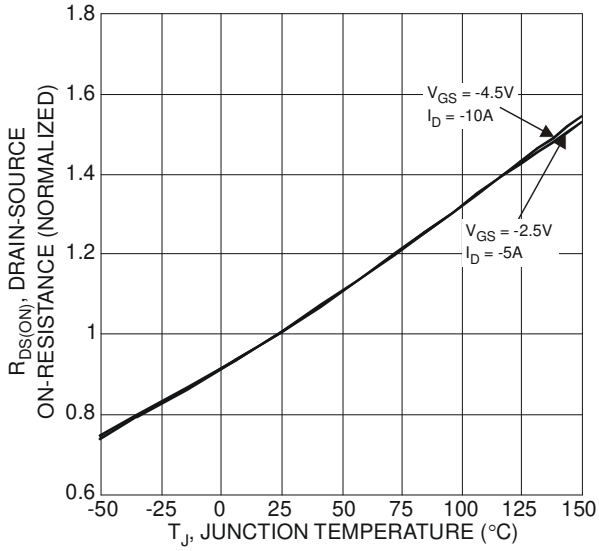


Figure 6 On-Resistance Variation with Temperature

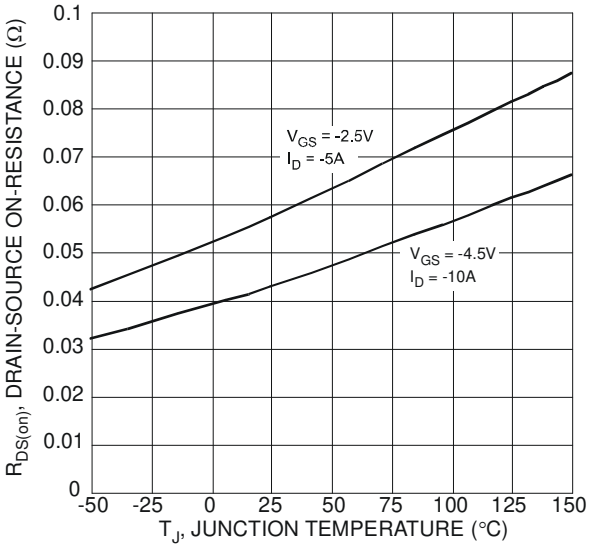


Figure 7 On-Resistance Variation with Temperature

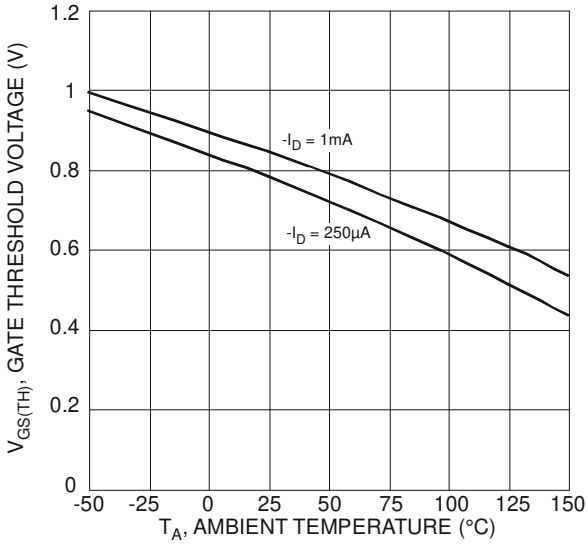


Figure 8 Gate Threshold Variation vs. Ambient Temperature

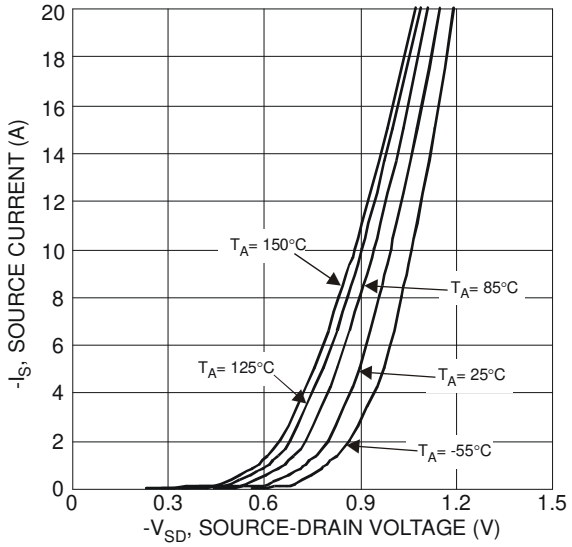


Figure 9 Diode Forward Voltage vs. Current

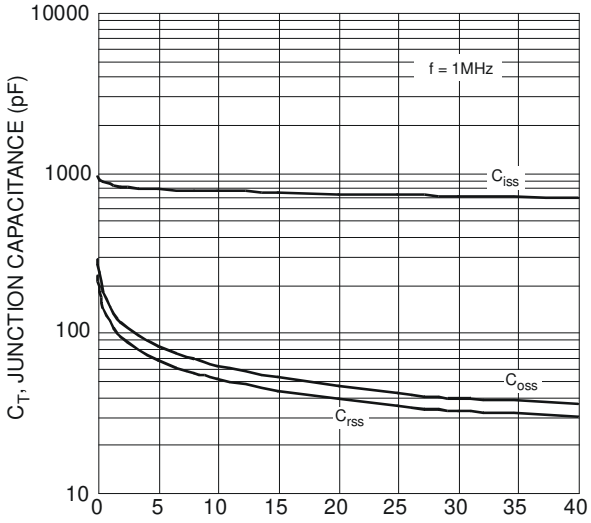


Figure 10 Typical Junction Capacitance

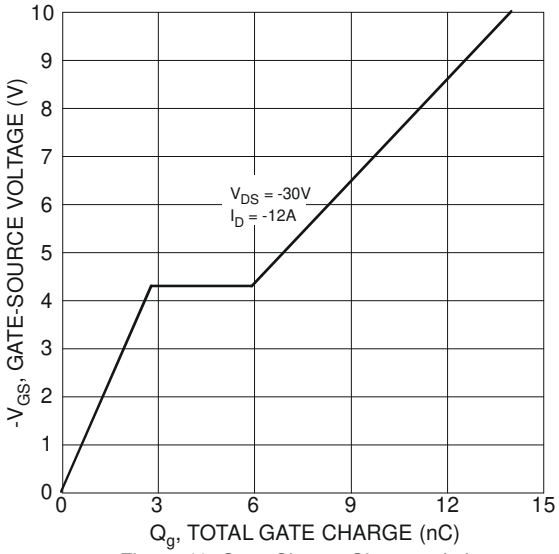


Figure 11 Gate-Charge Characteristics

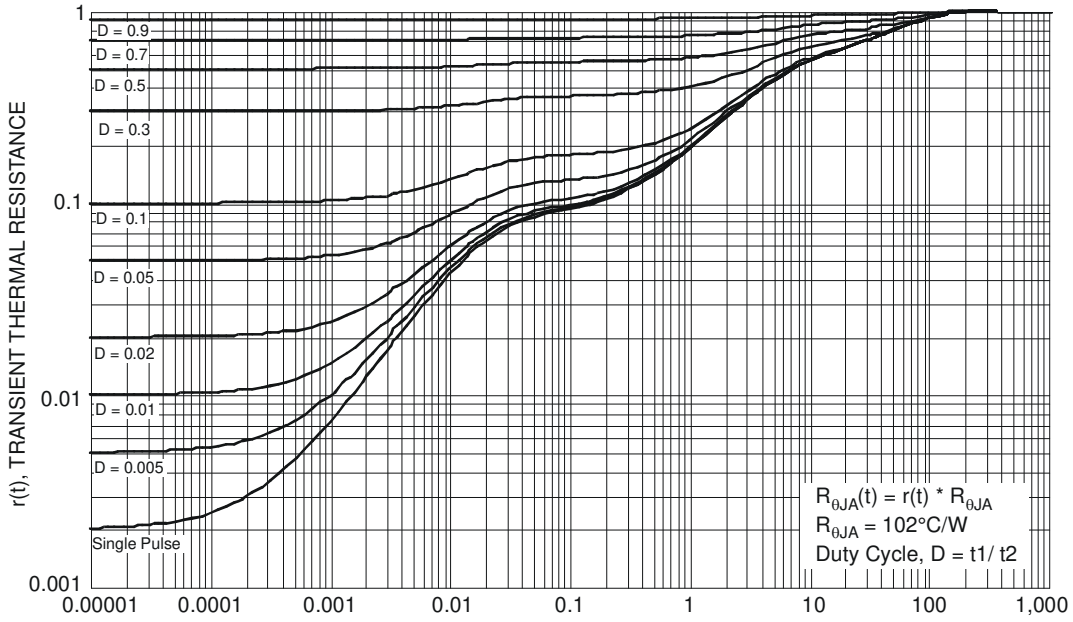
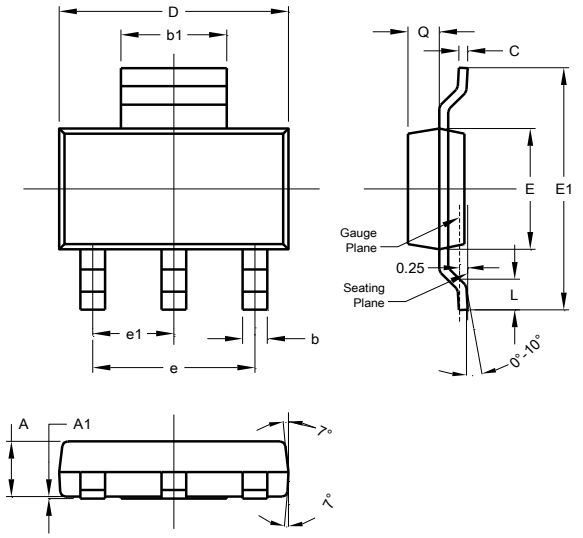


Figure 12 Transient Thermal Resistance

Package Outline Dimensions

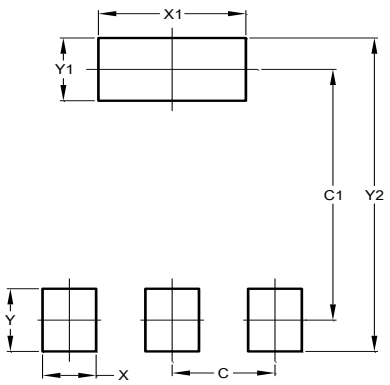
Please see http://www.diodes.com/package-outlines.html for the latest version.



SOT223			
Dim	**Min**	**Max**	**Typ**
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b1	2.90	3.10	3.00
b2	0.60	0.80	0.70
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	—	—	4.60
e1	—	—	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89
All Dimensions in mm			

Suggested Pad Layout

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



Dimensions	Value (in mm)
C	2.30
C1	6.40
X	1.20
X1	3.30
Y	1.60
Y1	1.60
Y2	8.00

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