

40V P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	I_D $T_A = 25^\circ\text{C}$
-40V	50m Ω @ $V_{GS} = -10\text{V}$	-6.0A
	79m Ω @ $V_{GS} = -4.5\text{V}$	-4.7A

Description and Applications

This MOSFET has been designed to minimize the on-state resistance and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

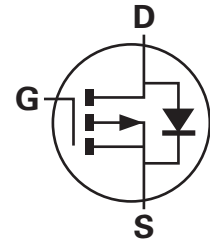
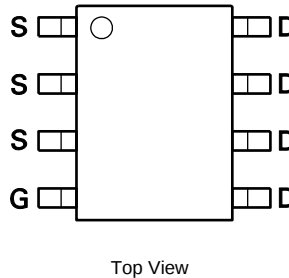
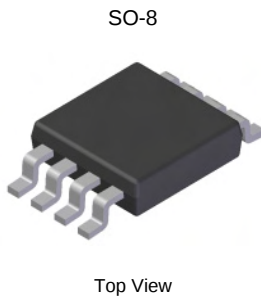
- Motor control
- Backlighting
- DC-DC Converters
- Power management functions

Features and Benefits

- Low on-resistance
- Fast switching speed
- “Green” component and RoHS compliant (Note 1)
- Qualified to AEC-Q101 Standards for High Reliability

Mechanical Data

- Case: SO-8
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See diagram below
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208
- Weight: 0.074 grams (approximate)

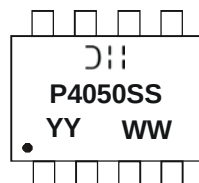


Ordering Information (Note 1)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DMP4050SSS-13	P4050SS	13	12	2,500

Note: 1. Diodes, Inc. defines “Green” products as those which are RoHS compliant and contain no halogens or antimony compounds; further information about Diodes Inc.’s “Green” Policy can be found on our website. For packaging details, go to our website.

Marking Information



JII = Manufacturer's Marking
 P4050SS = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 09 = 2009)
 WW = Week (01-53)

Maximum Ratings @T_A = 25°C unless otherwise specified

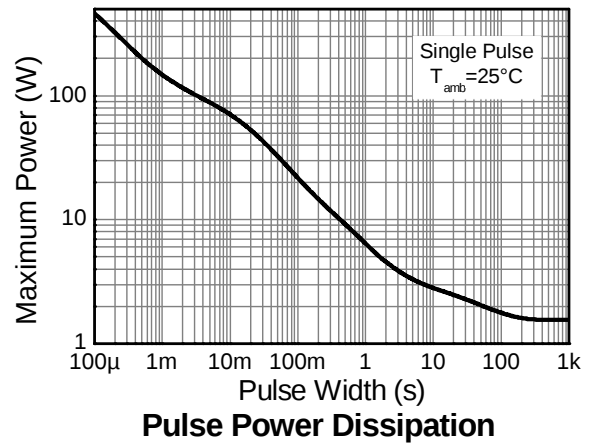
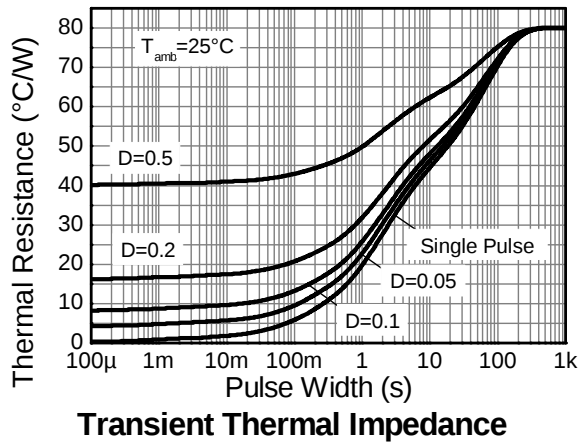
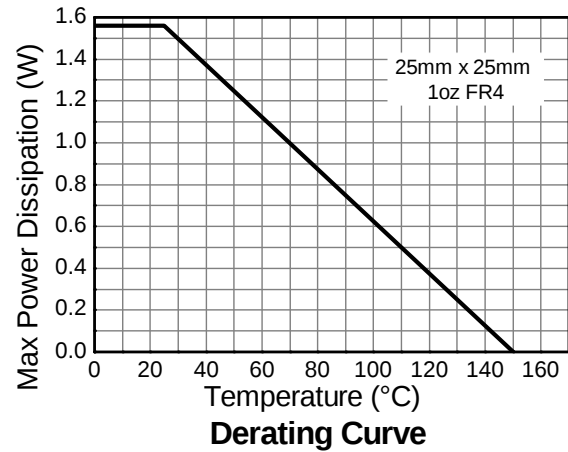
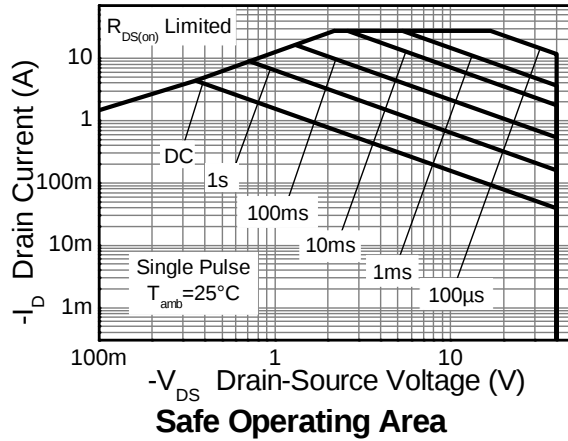
Characteristic			Symbol	Value	Unit
Drain-Source voltage			V _{DSS}	-40	V
Gate-Source voltage (Note 2)			V _{GS}	±20	V
Continuous Drain current	V _{GS} = 10V	(Note 4)	I _D	-6.0	A
		T _A = 70°C (Note 4)		-4.8	
		(Note 3)		-4.4	
Pulsed Drain current	V _{GS} = 10V	(Note 5)	I _{DM}	-27.0	A
Continuous Source current (Body diode)			I _S	-4.0	A
Pulsed Source current (Body diode)			I _{SM}	-27.0	A

Thermal Characteristics @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Value	Unit
Power dissipation Linear derating factor	(Note 3)	P _D	1.56	W mW/°C
			12.5	
	(Note 4)		2.8 22.5	
Thermal Resistance, Junction to Ambient	(Note 3)	R _{θJA}	80	°C/W
	(Note 4)		44.5	
Thermal Resistance, Junction to Lead	(Note 6)	R _{θJL}	35	
Operating and storage temperature range		T _J , T _{STG}	-55 to 150	°C

- Notes:
- AEC-Q101 V_{GS} maximum is ±16V.
 - For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
 - Same as note (3), except the device is measured at t ≤ 10 sec.
 - Same as note (3), except the device is pulsed with D= 0.02 and pulse width 300 μs. The pulse current is limited by the maximum junction temperature.
 - Thermal resistance from junction to solder-point (at the end of the drain lead).

Thermal Characteristics

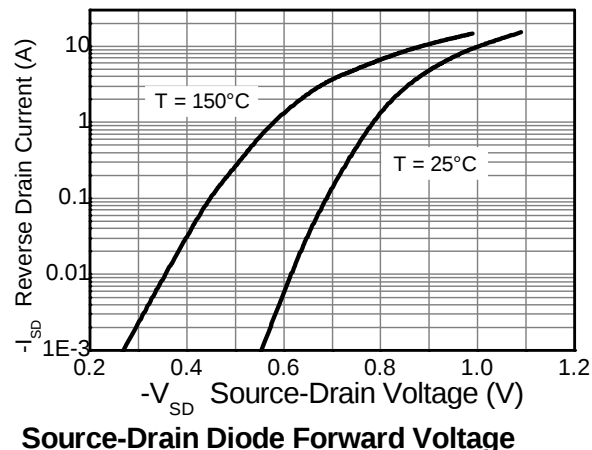
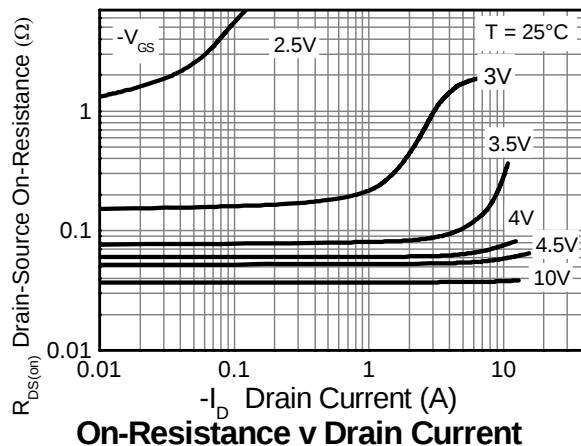
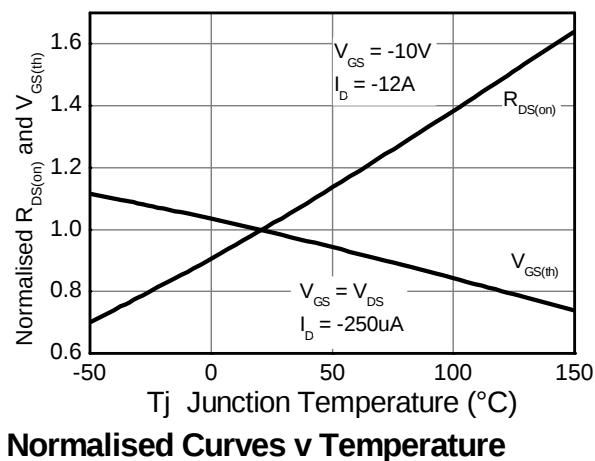
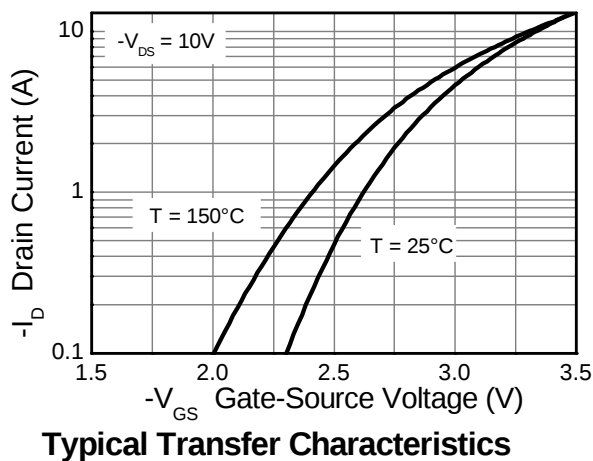
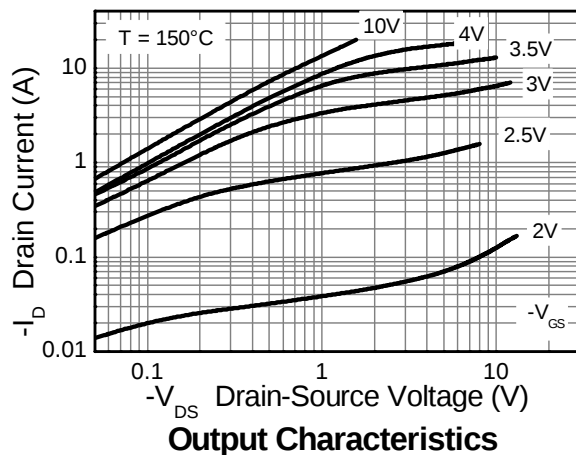
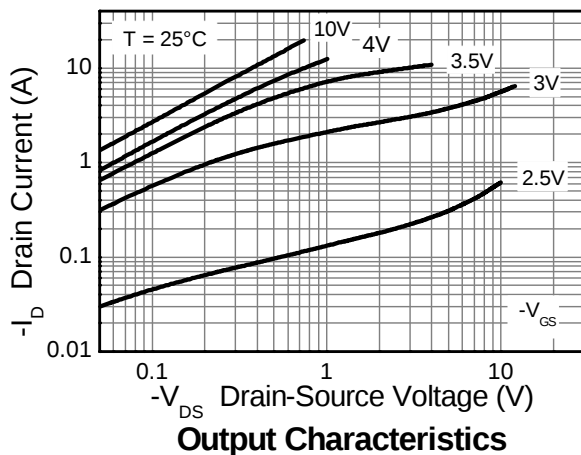


Electrical Characteristics @T_A = 25°C unless otherwise specified

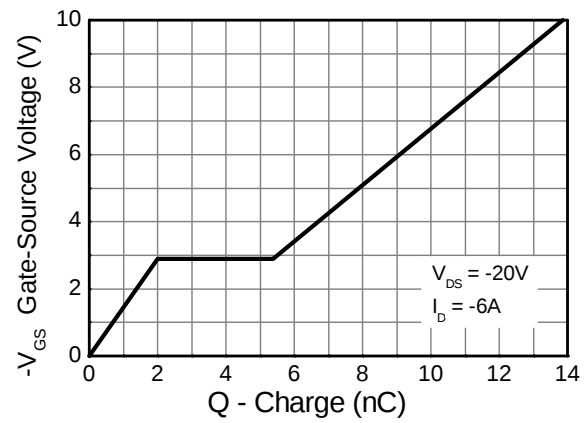
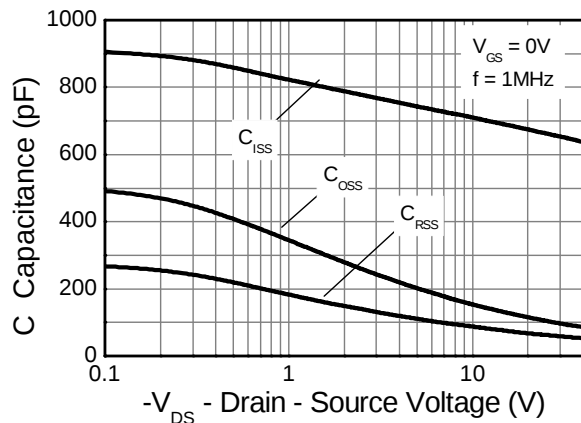
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition	
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	BV _{DSS}	-40	—	—	V	I _D = -250μA, V _{GS} = 0V	
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-0.5	μA	V _{DS} = -40V, V _{GS} = 0V	
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0V	
ON CHARACTERISTICS							
Gate Threshold Voltage	V _{GS(th)}	-1.0	—	-3.0	V	I _D = -250μA, V _{DS} = V _{GS}	
Static Drain-Source On-Resistance (Note 7)	R _{DS (ON)}	—	0.038	0.050	Ω	V _{GS} = -10V, I _D = -6A	
			0.055	0.079		V _{GS} = -4.5V, I _D = -5A	
Forward Transconductance (Notes 7 & 8)	g _{fs}	—	14	—	S	V _{DS} = -15V, I _D = -6A	
Diode Forward Voltage (Note 7)	V _{SD}	—	-0.86	-1.2	V	I _S = -6A, V _{GS} = 0V	
Reverse recovery time (Note 8)	t _{rr}		18.5	—	ns	I _S = -2.5, di/dt= 100A/μs	
Reverse recovery charge (Note 8)	Q _{rr}	—	15.6	—	nC		
DYNAMIC CHARACTERISTICS (Note 8)							
Input Capacitance	C _{iss}	—	674	—	pF	V _{DS} = -20V, V _{GS} = 0V f= 1MHz	
Output Capacitance	C _{oss}	—	115	—	pF		
Reverse Transfer Capacitance	C _{rss}	—	67.7	—	pF		
Total Gate Charge (Note 9)	Q _g	—	6.9	—	nC	V _{GS} = -4.5V	V _{DS} = -20V I _D = -6A
Total Gate Charge (Note 9)	Q _g	—	13.9	—	nC	V _{GS} = -10V	
Gate-Source Charge (Note 9)	Q _{gs}	—	2	—	nC		
Gate-Drain Charge (Note 9)	Q _{gd}	—	3.4	—	nC		
Turn-On Delay Time (Note 9)	t _{D(on)}	—	1.9	—	ns	V _{DD} = -20V, V _{GS} = -10V I _D = -1A, R _G ≅ 6.0Ω	
Turn-On Rise Time (Note 9)	t _r	—	3.1	—	ns		
Turn-Off Delay Time (Note 9)	t _{D(off)}	—	31.5	—	ns		
Turn-Off Fall Time (Note 9)	t _f	—	12.6	—	ns		

- Notes:
7. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%
 8. For design aid only, not subject to production testing.
 9. Switching characteristics are independent of operating junction temperatures.

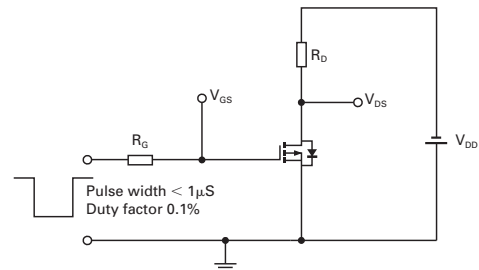
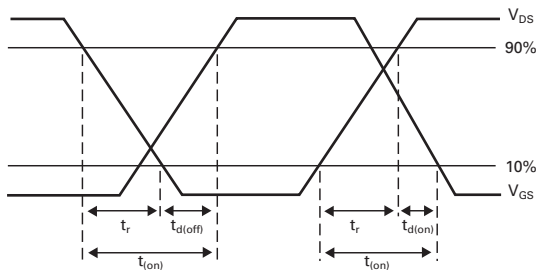
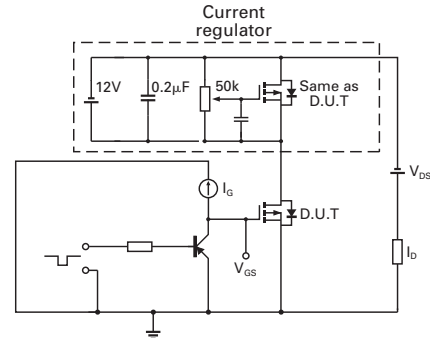
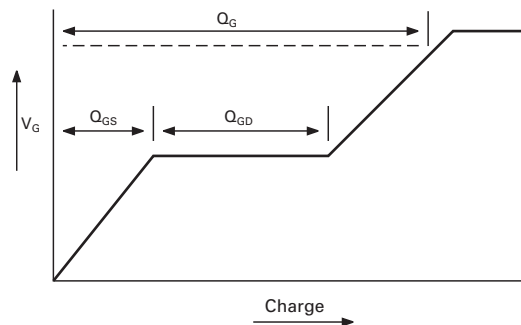
Typical Characteristics



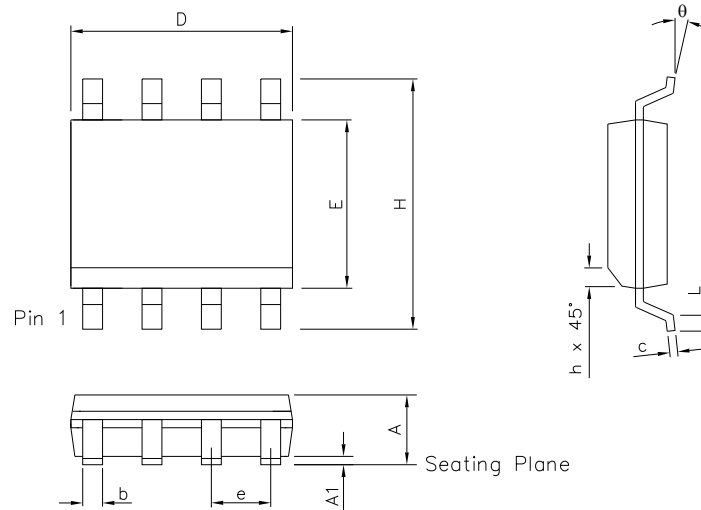
Typical Characteristics - continued



Test Circuits

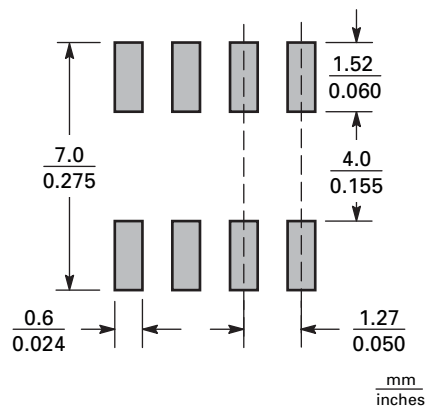


Package Outline Dimensions



DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.053	0.069	1.35	1.75	e	0.050 BSC		1.27 BSC	
A1	0.004	0.010	0.10	0.25	b	0.013	0.020	0.33	0.51
D	0.189	0.197	4.80	5.00	c	0.008	0.010	0.19	0.25
H	0.228	0.244	5.80	6.20	θ	0°	8°	0°	8°
E	0.150	0.157	3.80	4.00	h	0.010	0.020	0.25	0.50
L	0.016	0.050	0.40	1.27	-	-	-	-	-

Suggested Pad Layout



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