

## 40V P-CHANNEL ENHANCEMENT MODE MOSFET

### Product Summary

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

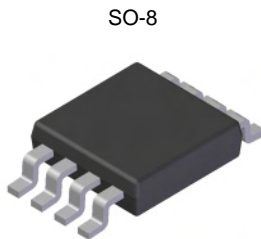
- Motor control
- Backlighting
- DC-DC Converters
- Power management functions

### Features and Benefits

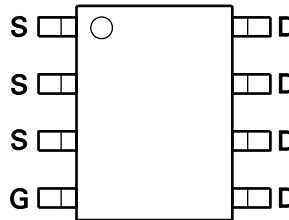
- Low on-resistance
- Fast switching speed
- “Green” component and RoHS compliant (Note 1)
- Qualified to AEC-Q101 Standards for High Reliability

### Mechanical Data

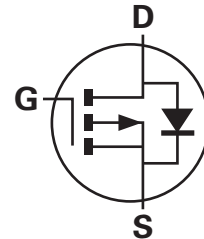
- Case: SO-8
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See diagram below
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202,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



Top View



Top View



Equivalent Circuit

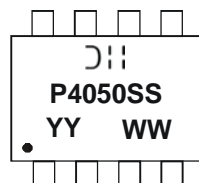
### Ordering Information (Note 1)

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

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

## Maximum Ratings @T<sub>A</sub> = 25°C unless otherwise specified

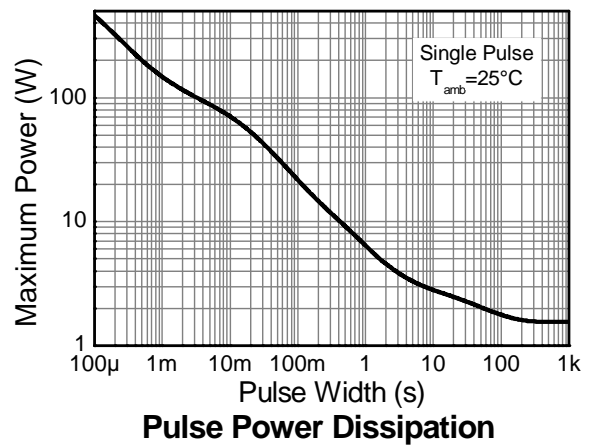
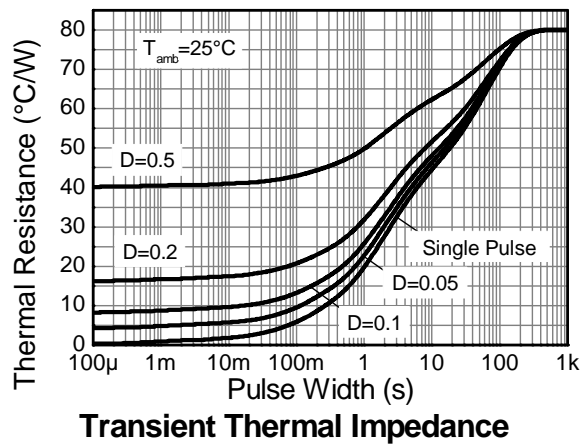
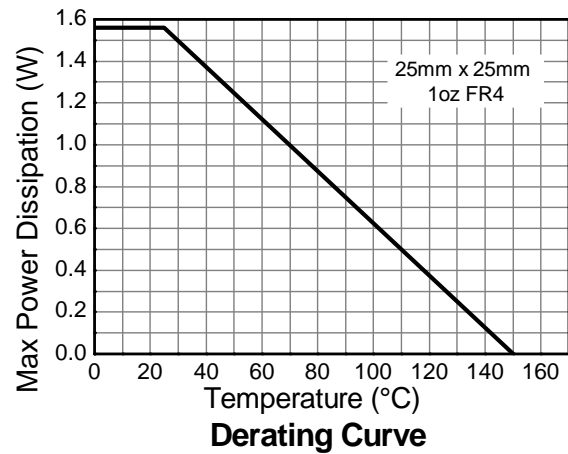
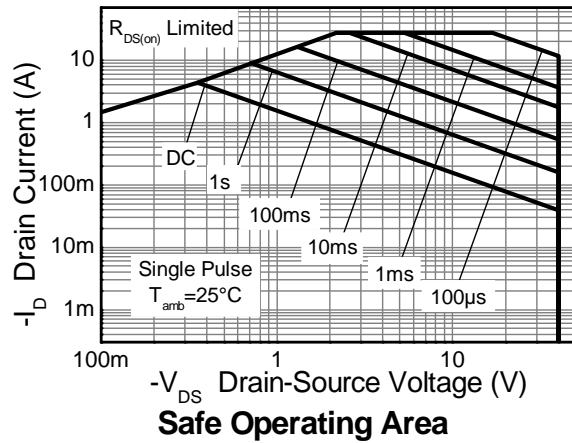
Characteristic			Symbol	Value	Unit
Drain-Source voltage			V <sub>DSS</sub>	-40	V
Gate-Source voltage (Note 2)			V <sub>GS</sub>	±20	V
Continuous Drain current	V <sub>GS</sub> = 10V	(Note 4)	I <sub>D</sub>	-6.0	A
		T <sub>A</sub> = 70°C (Note 4)		-4.8	
		(Note 3)		-4.4	
Pulsed Drain current	V <sub>GS</sub> = 10V	(Note 5)	I <sub>DM</sub>	-27.0	A
Continuous Source current (Body diode)			I <sub>S</sub>	-4.0	A
Pulsed Source current (Body diode)			I <sub>SM</sub>	-27.0	A

## Thermal Characteristics @T<sub>A</sub> = 25°C unless otherwise specified

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

- Notes:
- AEC-Q101 V<sub>GS</sub> 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

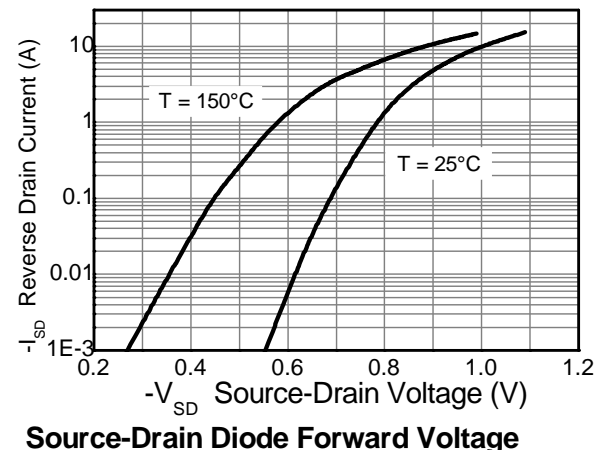
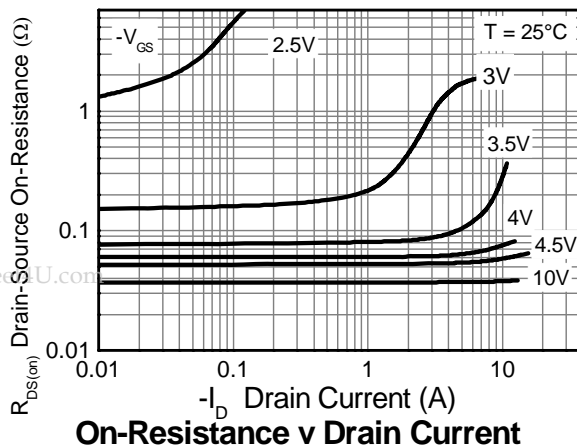
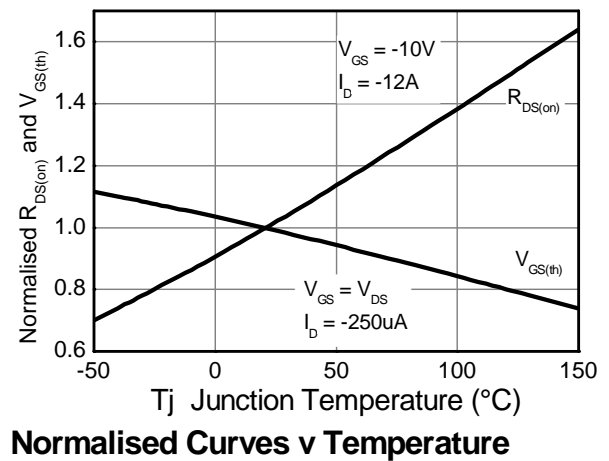
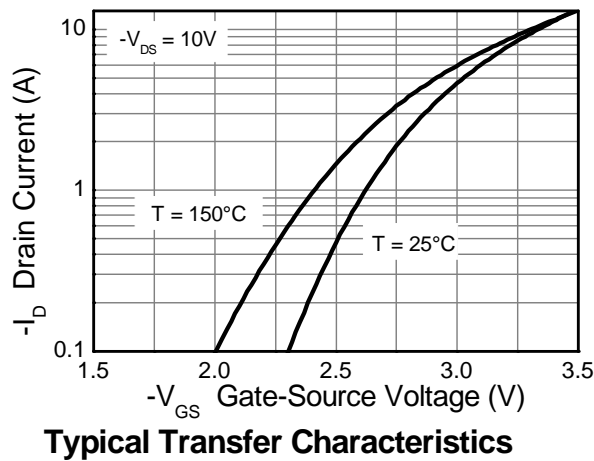
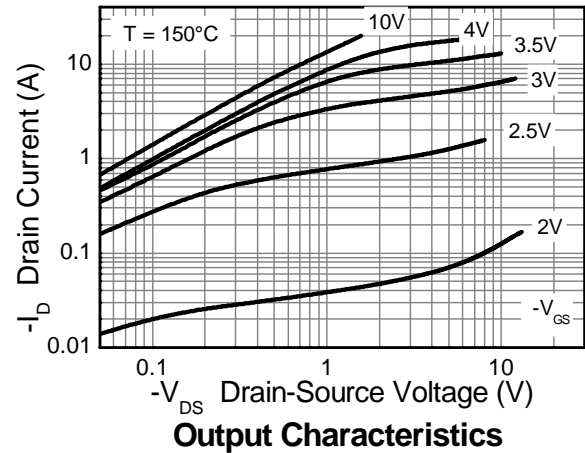
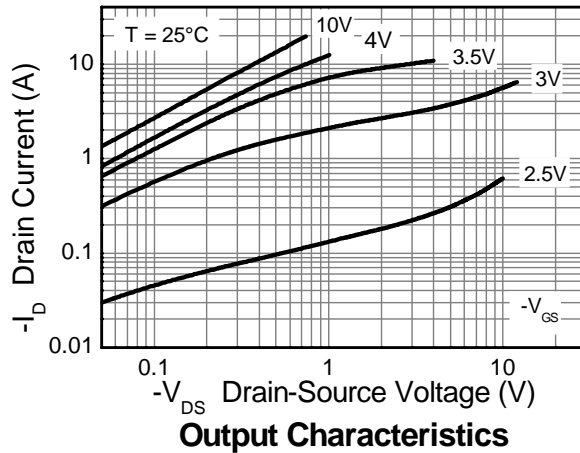


## Electrical Characteristics @T<sub>A</sub> = 25°C unless otherwise specified

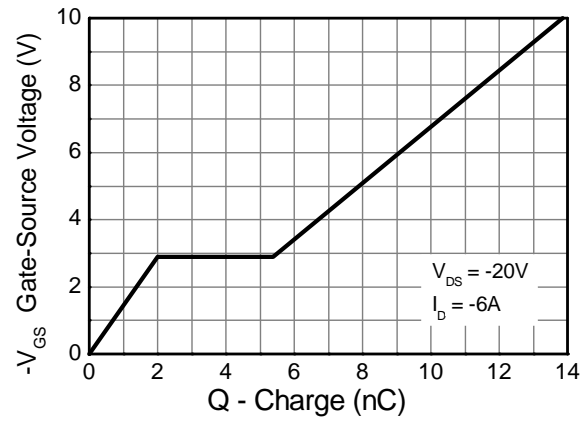
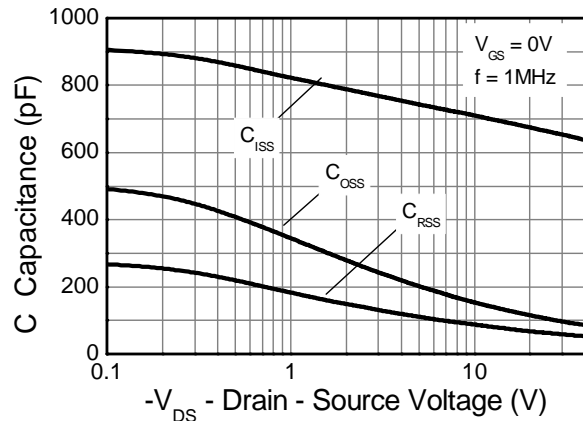
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition	
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-40	—	—	V	I <sub>D</sub> = -250μA, V <sub>GS</sub> = 0V	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	-0.5	μA	V <sub>DS</sub> = -40V, V <sub>GS</sub> = 0V	
Gate-Source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

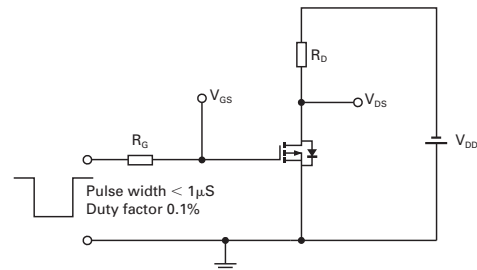
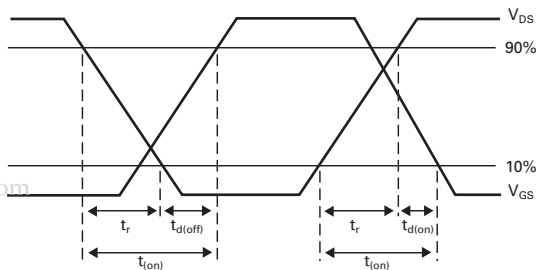
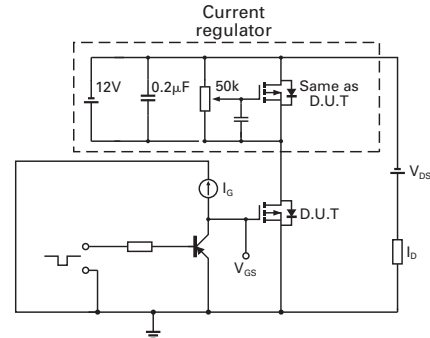
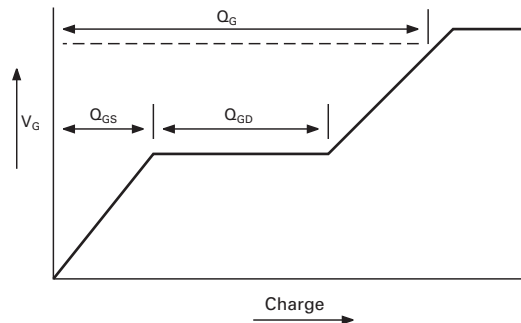
## Typical Characteristics



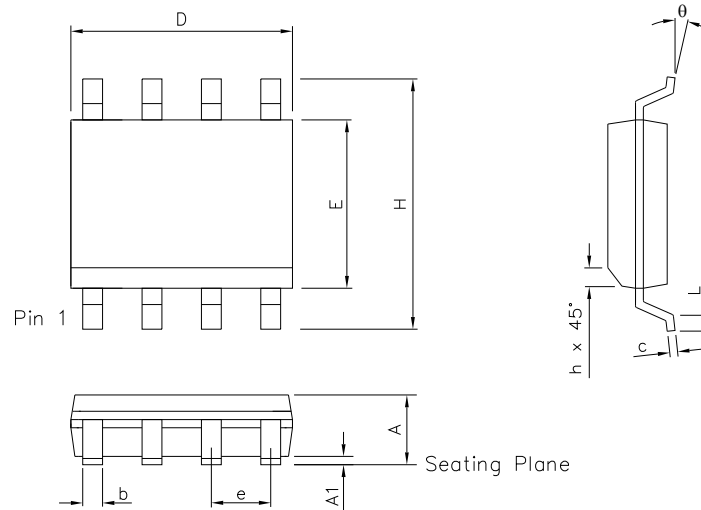
## Typical Characteristics - continued



## Test Circuits

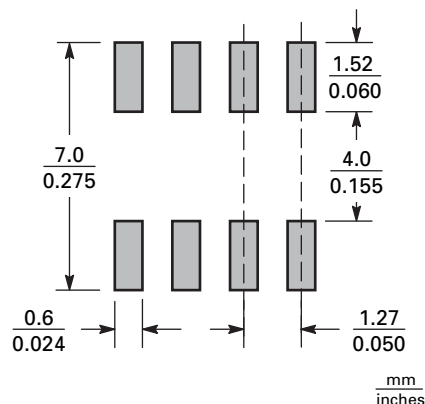


## Package Outline Dimensions



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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