

DMP4050SSD

40V DUAL P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

V _{(BR)DSS}	R _{DS(on)} Max	I _D T _A = +25°C
-40V	$50m\Omega$ @ $V_{GS} = -10V$	-5.2A
- 4 0V	79mΩ @ V _{GS} = -4.5V	-4.1A

Description

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.

Applications

- Motor Control
- Backlighting
- DC-DC Converters
- Power Management Functions

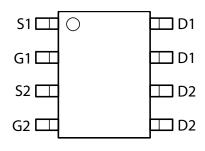
Features and Benefits

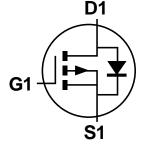
- Low On-Resistance
- · Fast Switching Speed
- Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability

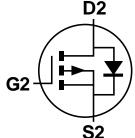
Mechanical Data

- 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 (3)
- Weight: 0.074 grams (approximate)









Top View

Top View

Equivalent Circuit

Ordering Information (Note 4)

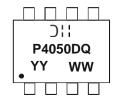
Part Number	Qualification	Case	Packaging
DMP4050SSD-13	Standard	SO-8	2500 / Tape & Reel
DMP4050SSDQ-13	Automotive	SO-8	2500 / Tape & Reel

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 http"//www.diodes.com/products/packages.html.

Marking Information





DII = Manufacturer's Marking
P4050SD = Product Type Marking Code for DMP4050SSD-13
P4050DQ = Product Type Marking Code for DMP4050SSDQ-13
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 5)	V _{GS}	±20	V
		(Notes 9 & 11)		-5.2	
Continuous Drain Current V _{GS} = 10V	T _A = +70°C (Notes 7 & 9)	I _D	-4.2	Α	
		(Notes 6 & 9)	1	-4.0	
Pulsed Drain Current	$V_{GS} = 10V$	(Notes 8 & 9)	I _{DM}	-20.0	А
Continuous Source Current ((Body Diode)	(Notes 7 & 9)	Is	-3.2	А
Pulsed Source Current (Bod	y Diode)	(Notes 8 & 9)	I _{SM}	-20.0	Α

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

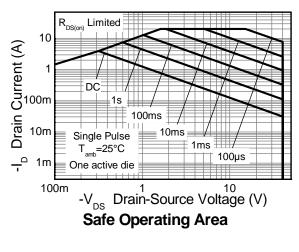
Characteristic		Symbol	Value	Unit
Power dissipation Linear derating factor	(Notes 6 & 9)		1.25 10.0	
	(Notes 6 & 10)	P _D	1.8 14.3	W mW/°C
	(Notes 7 & 9)		2.14 17.2	
Thermal Resistance, Junction to Ambient	(Notes 6 & 9)		100	
	(Notes 6 & 10)	R _{0JA}	70	0000
	(Notes 7 & 9)		58	°C/W
Thermal Resistance, Junction to Lead	(Notes 9 & 11)	$R_{ heta JL}$	53	
Operating and storage temperature range		T _J , T _{STG}	-55 to +150	°C

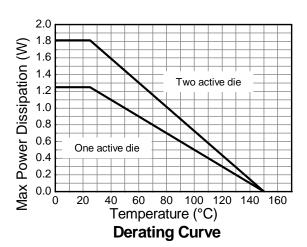
Notes:

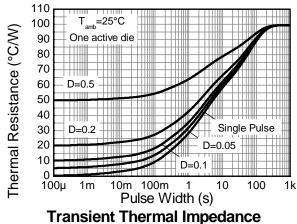
- 5. AEC-Q101 V_{GS} maximum is $\pm 16 \text{V}.$
- 6. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
- 7. Same as note (3), except the device is measured at $t \leq 10\mbox{ sec.}$
- 8. Same as note (3), except the device is pulsed with D = 0.02 and pulse width 300µs. The pulse current is limited by the maximum junction temperature.
- 9. For a dual device with one active die.
- 10. For a device with two active die running at equal power.
- 11. Thermal resistance from junction to solder-point (at the end of the drain lead).

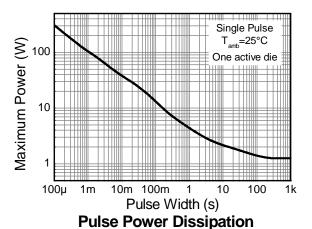


Thermal Characteristics











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

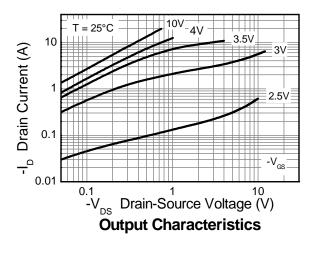
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition	
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	BV _{DSS}	-40	_	_	V	$I_D = -250 \mu A$, $V_{GS} = 0 V$	
Zero Gate Voltage Drain Current	I _{DSS}	_	_	-0.5	μΑ	V _{DS} = -40V, V _{GS} = 0V	
Gate-Source Leakage	I _{GSS}	_	_	±100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$	
ON CHARACTERISTICS							
Gate Threshold Voltage	V _{GS(th)}	-1.0	_	-3.0	V	$I_D = -250\mu A,\ V_{DS} = V_{GS}$	
Static Drain-Source On-Resistance (Note 12)	В		0.038	0.050	Ω	$V_{GS} = -10V, I_D = -6A$	
Static Dialii-Source Off-Resistance (Note 12)	R _{DS(ON)}	_	0.055	0.079	22	$V_{GS} = -4.5V, I_{D} = -5A$	
Forward Transconductance (Notes 12 & 13)	g _{fs}	_	14	_	S	V _{DS} = -15V, I _D = -6A	
Diode Forward Voltage (Note 12)	V _{SD}	_	-0.86	-1.2	V	I _S = -6A, V _{GS} = 0V	
Reverse recovery time (Note 13)	t _{rr}		18	_	ns	I _S = -2A, di/dt = 100A/μs	
Reverse recovery charge (Note 13)	Qrr	_	12.7	_	nC		
DYNAMIC CHARACTERISTICS (Note 13)							
Input Capacitance	C _{iss}	_	674	_	pF	V _{DS} = -20V, V _{GS} = 0V -f = 1MHz	
Output Capacitance	Coss	_	115	_	pF		
Reverse Transfer Capacitance	C _{rss}	_	67.7	_	pF		
Total Gate Charge (Note 14)	Qg	_	6.9	_	nC	V _{GS} = -4.5V	
Total Gate Charge (Note 14)	Qg	_	13.9	_	nC	V _{DS} = -20V	
Gate-Source Charge (Note 14)	Q_{gs}	_	2	_	nC	$V_{GS} = -10V$ $I_D = -6A$	
Gate-Drain Charge (Note 14)	Q _{gd}	_	3.4	_	nC	1	
Turn-On Delay Time (Note 14)	t _{D(on)}	_	1.9	_	ns	·	
Turn-On Rise Time (Note 14)	t _r	_	3.1	_	ns	$V_{DD} = -20V, V_{GS} = -10V$ $I_{D} = -1A, R_{G} \approx 6.0\Omega$	
Turn-Off Delay Time (Note 14)	t _{D(off)}	_	31.5	_	ns		
Turn-Off Fall Time (Note 14)	t _f	_	12.6	_	ns		

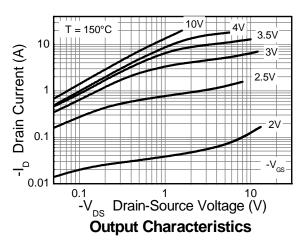
Notes:

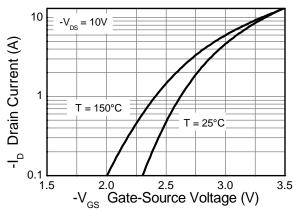
^{12.} Measured under pulsed conditions. Pulse width $\leq 300 \mu s$; duty cycle $\leq 2\%$ 13. For design aid only, not subject to production testing. 14. Switching characteristics are independent of operating junction temperatures.

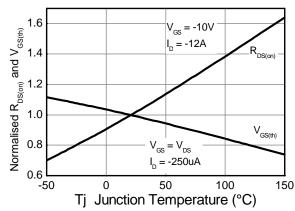


Typical Characteristics



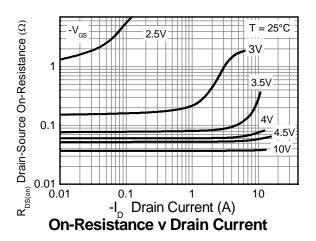


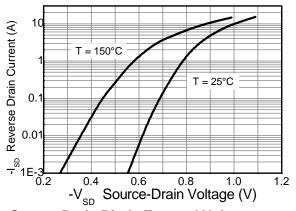




Typical Transfer Characteristics

Normalised Curves v Temperature

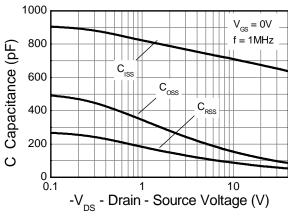




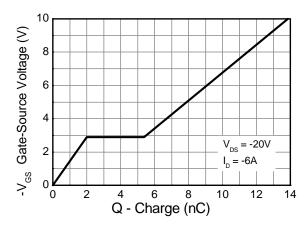
Source-Drain Diode Forward Voltage



Typical Characteristics – (cont.)

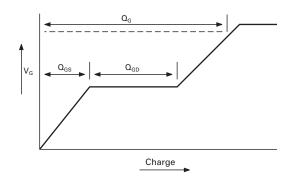


Capacitance v Drain-Source Voltage

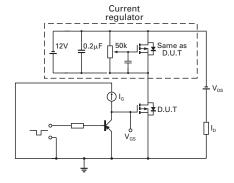


Gate-Source Voltage v Gate Charge

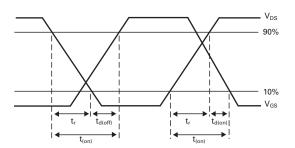
Test Circuits



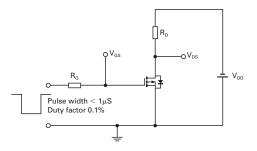
Basic gate charge waveform



Gate charge test circuit



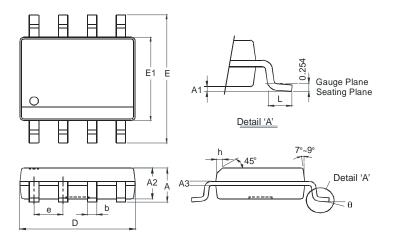
Switching time waveforms



Switching time test circuit

Package Outline Dimensions

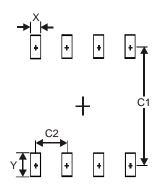
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



SO-8					
Dim	Min	Max			
Α	-	1.75			
A1	0.10	0.20			
A2	1.30	1.50			
A3	0.15	0.25			
b	0.3	0.5			
D	4.85	4.95			
Е	5.90	6.10			
E1	3.85	3.95			
е	1.27 Typ				
h	-	0.35			
١	0.62	0.82			
θ	0°	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)
Х	0.60
Υ	1.55
C1	5.4
C2	1.27





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