

# AP4953GM-VB Datasheet Dual P-Channel 30-V (D-S) MOSFET

G1 0

PRODUCT SUMMARY				
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A) <sup>d, e</sup>	Q <sub>g</sub> (Typ.)	
- 30	0.035 at V <sub>GS</sub> = - 10 V	- 7.3	17 nC	
- 30	0.045 at V <sub>GS</sub> = - 4.5 V	- 6.3	17110	

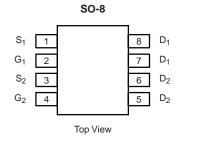
#### FEATURES

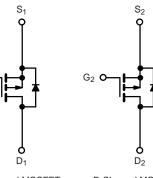
- Halogen-free
- Trench Power MOSFET
- 100 % UIS Tested

#### APPLICATIONS

Load Switches







P-Channel MOSFET

P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T	<sub>A</sub> = 25 °C, unless othe	erwise noted			
Parameter	Symbol	Limit	Unit		
Drain-Source Voltage	V <sub>DS</sub>	- 30	V		
Gate-Source Voltage		V <sub>GS</sub>	± 20	V	
	T <sub>C</sub> = 25 °C		- 7.3 <sup>e</sup>		
Continuous Drain Current ( $T_1 = 150 \ ^{\circ}C$ )	T <sub>C</sub> = 70 °C		- 7.0 <sup>e</sup>		
Continuous Drain Current (1) = 150°C)	T <sub>A</sub> = 25 °C	- I <sub>D</sub>	- 7.3 <sup>a, b</sup>		
	T <sub>A</sub> = 70 °C		- 5.9 <sup>a, b</sup>	Α	
Pulsed Drain Current		I <sub>DM</sub>	- 32 <sup>e</sup>		
Cantinuaux Courses Drain Diada Current	T <sub>C</sub> = 25 °C	la la	- 4.1		
Continuous Source-Drain Diode Current	T <sub>A</sub> = 25 °C	- I <sub>S</sub>	- 2.0 <sup>a, b</sup>		
Avalanche Current	L = 0.1 mH	I <sub>AS</sub>	- 20		
Single-Pulse Avalanche Energy	L = 0.1 IIIH	E <sub>AS</sub>	20	mJ	
	T <sub>C</sub> = 25 °C		5.0		
Maximum Dawar Dissinction	T <sub>C</sub> = 70 °C	P <sub>D</sub>	3.2	w	
Maximum Power Dissipation	T <sub>A</sub> = 25 °C	ГD	2.5 <sup>a, b</sup>	VV	
	T <sub>A</sub> = 70 °C	1 –	1.6 <sup>a, b</sup>		
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150	°C		

#### **THERMAL RESISTANCE RATINGS** Symbol Parameter Typical Maximum Unit Maximum Junction-to-Ambient<sup>a, c</sup> $t \le 10 \text{ s}$ $\mathsf{R}_{\mathsf{thJA}}$ 38 50 °C/W 25 Maximum Junction-to-Foot Steady State R<sub>thJF</sub> 20

Notes:

a. Surface mounted on 1" x 1" FR4 board.

b. t = 10 s.

c. Maximum under Steady State conditions is 85 °C/W.

d. Based on T<sub>C</sub> = 25 °C.

e. Limited by package.



Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit	
Static							
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = - 250 μA	- 30			V	
V <sub>DS</sub> Temperature Coefficient	$\Delta V_{DS}/T_{J}$	1 250 114		- 31		mV/°C	
V <sub>GS(th)</sub> Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	I <sub>D</sub> = - 250 μA		4.5			
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}, I_{D} = -250 \ \mu A$	- 1.0		- 3.0	V	
Gate-Source Leakage	I <sub>GSS</sub>	$V_{DS} = 0 V, V_{GS} = \pm 20 V$			± 100	nA	
		$V_{DS} = -30 \text{ V}, \text{ V}_{GS} = 0 \text{ V}$			- 1	1 uA	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = - 30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C			- 5		
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	$V_{DS} \ge -10 \text{ V}, \text{ V}_{GS} = -10 \text{ V}$	- 30			А	
		V <sub>GS</sub> = - 10 V, I <sub>D</sub> = - 6.3 A		0.035		- Ω	
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 6.2 A		0.040			
Forward Transconductance <sup>a</sup>	9 <sub>fs</sub>	V <sub>DS</sub> = - 10 V, I <sub>D</sub> = - 6.1 A		23		S	
Dynamic <sup>b</sup>	-			1	1	1	
Input Capacitance	C <sub>iss</sub>			1350			
Output Capacitance	C <sub>oss</sub>	V <sub>DS</sub> = - 15 V, V <sub>GS</sub> = 0 V, f = 1 MHz		215		pF	
Reverse Transfer Capacitance	C <sub>rss</sub>			185			
Total Gate Charge		$V_{DS} = -15 \text{ V}, \text{ V}_{GS} = -10 \text{ V}, \text{ I}_{D} = -6.1 \text{ A}$		32	50	nC	
	$Q_g$			15	25		
Gate-Source Charge	Q <sub>qs</sub>	V <sub>DS</sub> = - 15 V, V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 6.1 A		4			
Gate-Drain Charge	Q <sub>gd</sub>			7.5			
Gate Resistance	R <sub>q</sub>	f = 1 MHz		5.8		Ω	
Turn-On Delay Time	t <sub>d(on)</sub>			10	15		
Rise Time	t <sub>r</sub>	$V_{DD}$ = - 15 V, $R_L$ = 15 $\Omega$		8	15	-	
Turn-Off DelayTime	t <sub>d(off)</sub>	$I_D \cong$ - 1 A, $V_{GEN}$ = - 10 V, $R_g$ = 1 $\Omega$		45	70		
Fall Time	t <sub>f</sub>			12	25		
Turn-On Delay Time	t <sub>d(on)</sub>			42	70	ns	
Rise Time	t <sub>r</sub>	$V_{DD}$ = - 15 V, $R_L$ = 15 $\Omega$		35	60		
Turn-Off DelayTime	t <sub>d(off)</sub>	$I_D \cong$ - 1 A, $V_{GEN}$ = - 4.5 V, $R_g$ = 1 $\Omega$		40	70		
Fall Time	t <sub>f</sub>			16	30		
Drain-Source Body Diode Characterist	ics				•		
Continous Source-Drain Diode Current	ا <sub>s</sub>	T <sub>C</sub> = 25 °C			- 4.1	٥	
Pulse Diode Forward Current	I <sub>SM</sub>				- 32	A	
Body Diode Voltage	V <sub>SD</sub>	I <sub>S</sub> = - 2 A, V <sub>GS</sub> = 0 V		- 0.75	- 1.2	V	
Body Diode Reverse Recovery Time	t <sub>rr</sub>			34	60	ns	
Body Diode Reverse Recovery Charge	iode Reverse Recovery Charge $Q_{rr}$ $I_{r} = -2.2 \text{ d}//\text{d}t = 100 \text{ A/us } T_{r} = 25 ^{\circ}\text{C}$			22	40	nC	
Reverse Recovery Fall Time				11			
Reverse Recovery Rise Time	t <sub>b</sub>	1 1		23	İ	ns	

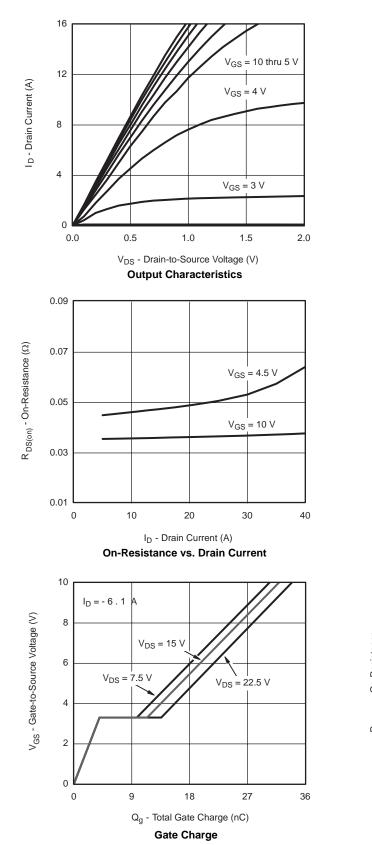
Notes:

a. Pulse test; pulse width  $\leq$  300 µs, duty cycle  $\leq$  2 %.

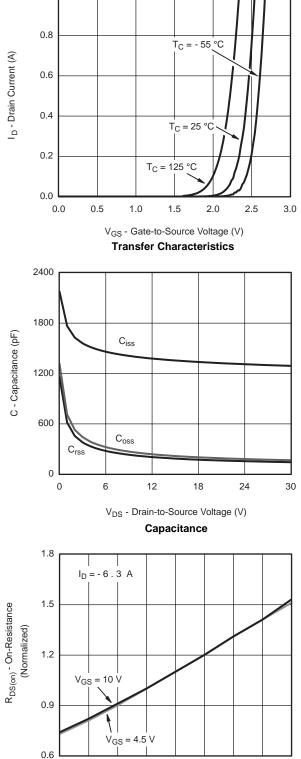
b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.





#### TYPICAL CHARACTERISTICS 25 C, unless otherwise noted



1.0

T<sub>J</sub> - Junction Temperature (°C) On-Resistance vs. Junction Temperature

50

75

100

125 150

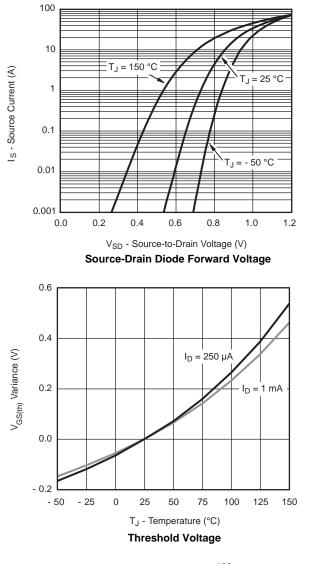
- 50

- 25

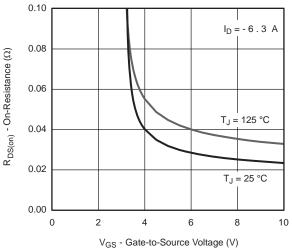
0

25





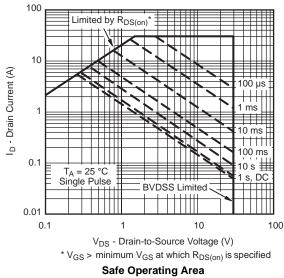
#### TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



On-Resistance vs. Gate-to-Source Voltage

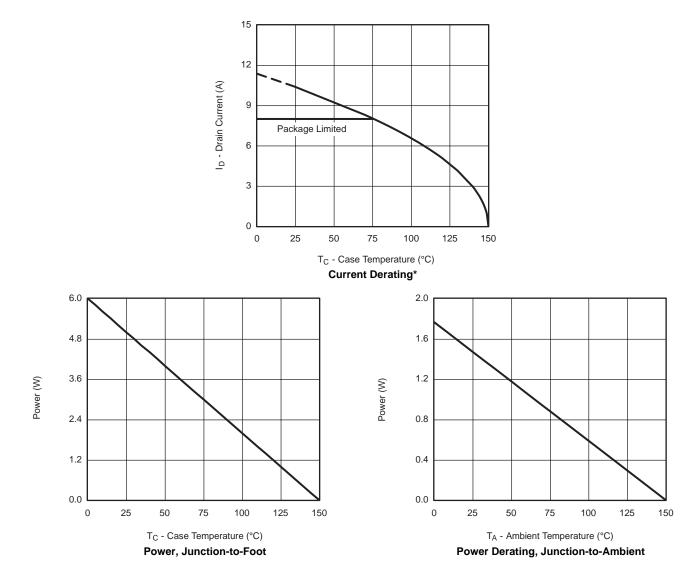


Single Pulse Power, Junction-to-Ambient





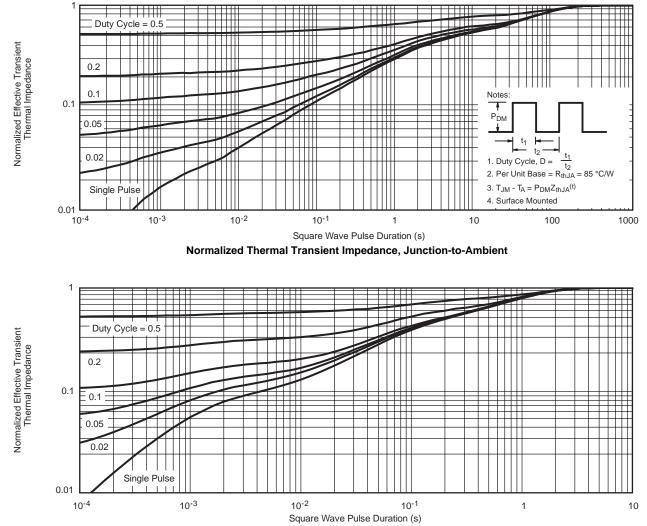
#### TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



\* The power dissipation  $P_D$  is based on  $T_{J(max)}$  = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.



### TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



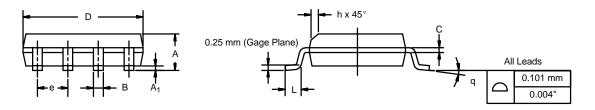
Normalized Thermal Transient Impedance, Junction-to-Foot



### SOIC (NARROW): 8-LEAD

JEDEC Part Number: MS-012





	MILLIMETERS		INCHES		
DIM	Min	Max	Min	Max	
A	1.35	1.75	0.053	0.069	
A <sub>1</sub>	0.10	0.20	0.004	0.008	
В	0.35	0.51	0.014	0.020	
С	0.19	0.25	0.0075	0.010	
D	4.80	5.00	0.189	0.196	
E	3.80	4.00	0.150	0.157	
е	1.27 BSC		0.050 BSC		
Н	5.80	6.20	0.228	0.244	
h	0.25	0.50	0.010	0.020	
L	0.50	0.93	0.020	0.037	
q	0°	8°	0°	8°	
S	0.44	0.64	0.018	0.026	
ECN: C-06527-Rev. I, 11-Sep-06 DWG: 5498					



**RECOMMENDED MINIMUM PADS FOR SO-8** 



Recommended Minimum Pads Dimensions in Inches/(mm)



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