

AP9585GM-VB Datasheet

P-Channel 100 V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	-100
$R_{DS(on)}$ max. (Ω) at $V_{GS} = -10$ V	0.110
$R_{DS(on)}$ max. (Ω) at $V_{GS} = -4.5$ V	0.155
Q_g typ. (nC)	5.65
I_D (A)	-4.5
Configuration	Single

FEATURES

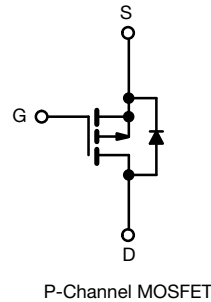
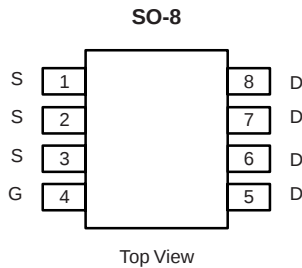
- Trench power MOSFET
- 100 % R_g and UIS tested

APPLICATIONS

- Active clamp in intermediate DC/DC power supplies
- LED Lighting
- Load switch



RoHS
COMPLIANT
HALOGEN
FREE



ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C, unless otherwise noted)

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V_{DS}	-100	V
Gate-source voltage		V_{GS}	± 20	
Continuous drain current ($T_J = 150$ °C)	$T_C = 25$ °C	I_D	-4.5	A
	$T_C = 70$ °C		-3.6	
	$T_A = 25$ °C		-2.8 ^{b, c}	
	$T_A = 70$ °C		-2.1 ^{b, c}	
Pulsed drain current ($t = 100$ μ s)		I_{DM}	-20	
Continuous source-drain diode current	$T_C = 25$ °C	I_S	-4.5 ^a	
	$T_A = 25$ °C		-2.8 ^{b, c}	
Single pulse avalanche current	$L = 0.1$ mH	I_{AS}	-15	
Single pulse avalanche energy		E_{AS}	11.25	mJ
Maximum power dissipation	$T_C = 25$ °C	P_D	27.8	W
	$T_C = 70$ °C		17.8	
	$T_A = 25$ °C		3.5 ^{b, c}	
	$T_A = 70$ °C		2.2 ^{b, c}	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +150	°C
Soldering recommendations (peak temperature) ^{d, e}			260	

THERMAL RESISTANCE RATINGS

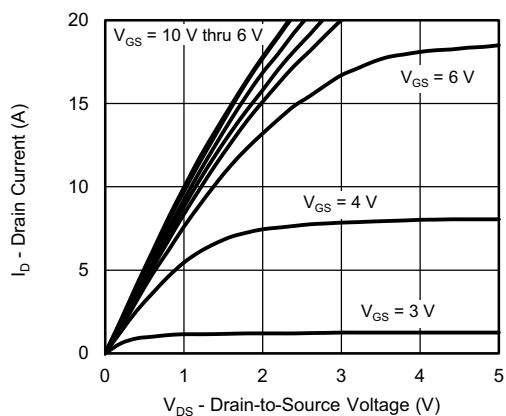
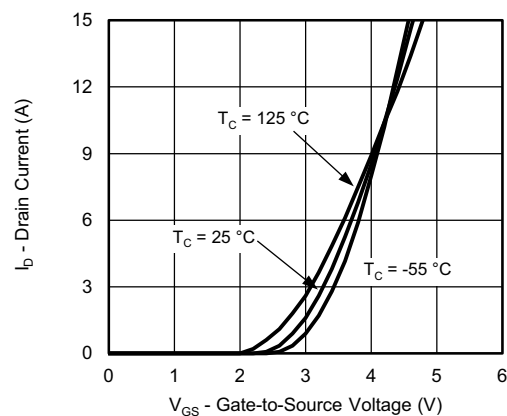
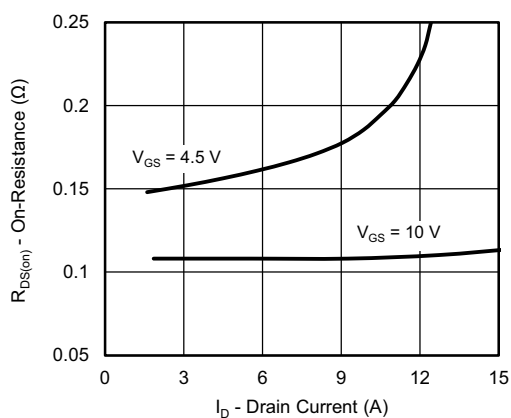
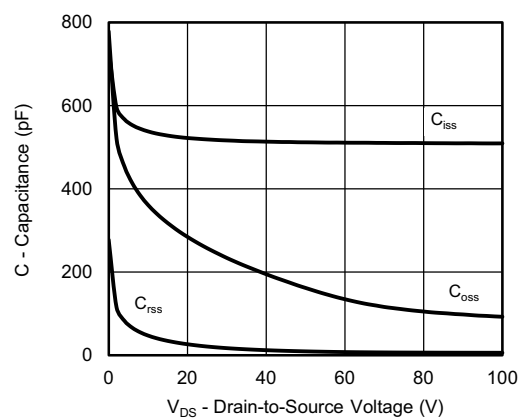
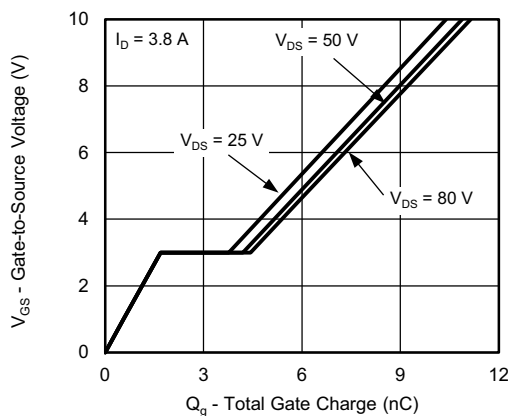
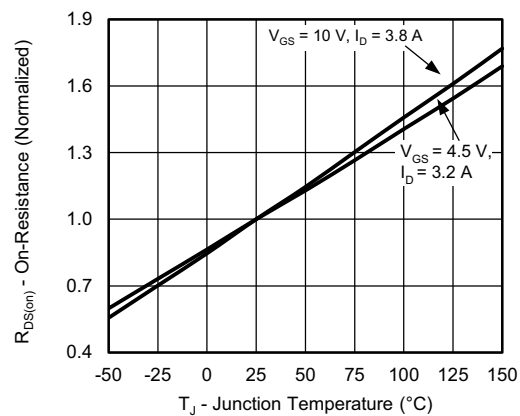
PARAMETER		SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient ^{b, f}	$t \leq 10$ s	R_{thJA}	29	36	°C/W
Maximum junction-to-case (drain)	Steady state	R_{thJC}	3.6	4.6	

SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V _{DS}	V _{GS} = 0 V, I _D = -250 μA	-100	-	-	V
V _{DS} temperature coefficient	ΔV _{DS} /T _J	I _D = -250 μA	-	-63	-	mV/°C
V _{GS(th)} temperature coefficient	ΔV _{GS(th)} /T _J		-	4.2	-	
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250 μA	-1.1	-	-2.6	V
Gate-source leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V	-	-	± 100	nA
Zero gate voltage drain current	I _{DSS}	V _{DS} = -100 V, V _{GS} = 0 V	-	-	-1	μA
		V _{DS} = -100 V, V _{GS} = 0 V, T _J = 70 °C	-	-	-10	
On-state drain current ^a	I _{D(on)}	V _{DS} ≥ -10 V, V _{GS} = -10 V	-15	-	-	A
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} = -10 V, I _D = -3.8 A	-	0.110	-	Ω
		V _{GS} = -4.5 V, I _D = -3.2 A	-	0.155	-	
Forward transconductance ^a	g _{fs}	V _{DS} = -10 V, I _D = -3.8 A	-	8	-	S
Dynamic ^b						
Input capacitance	C _{iss}	V _{DS} = -50 V, V _{GS} = 0 V, f = 1 MHz	-	515	-	pF
Output capacitance	C _{oss}		-	162	-	
Reverse transfer capacitance	C _{rss}		-	10	-	
Total gate charge	Q _g	V _{DS} = -50 V, V _{GS} = -10 V, I _D = -3.8 A	-	10.9	16.5	nC
Gate-source charge	Q _{gs}	V _{DS} = -50 V, V _{GS} = -4.5 V, I _D = -3.8 A	-	5.65	8.5	
Gate-drain charge	Q _{gd}		-	1.7	-	
Gate resistance	R _g		-	2.5	-	
Turn-on delay time	t _{d(on)}	f = 1 MHz	1.96	9.8	19.6	Ω
Rise time	t _r	V _{DD} = -50 V, R _L = 16.1 Ω, I _D ≅ -3.1 A, V _{GEN} = -10 V, R _g = 1 Ω	-	10	20	ns
Turn-off delay time	t _{d(off)}		-	22	40	
Fall time	t _f		-	20	40	
Turn-on delay time	t _{d(on)}		-	20	40	
Rise time	t _r	V _{DD} = -50 V, R _L = 16.1 Ω, I _D ≅ -3.1 A, V _{GEN} = -4.5 V, R _g = 1 Ω	-	35	55	
Turn-off delay time	t _{d(off)}		-	40	60	
Fall time	t _f		-	22	40	
Fall time	t _f		-	1622	40	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I _S	T _C = 25 °C	-	-	-16	A
Pulse diode forward current	I _{SM}		-	-	-15	
Body diode voltage	V _{SD}	I _S = -3.1 A, V _{GS} = 0 V	-	-0.8	-1.2	V
Body diode reverse recovery time	t _{rr}	I _F = -3.1 A, di/dt = 100 A/μs, T _J = 25 °C	-	43	65	ns
Body diode reverse recovery charge	Q _{rr}		-	80	120	nC
Reverse recovery fall time	t _a		-	36	-	ns
Reverse recovery rise time	t _b		-	7	-	

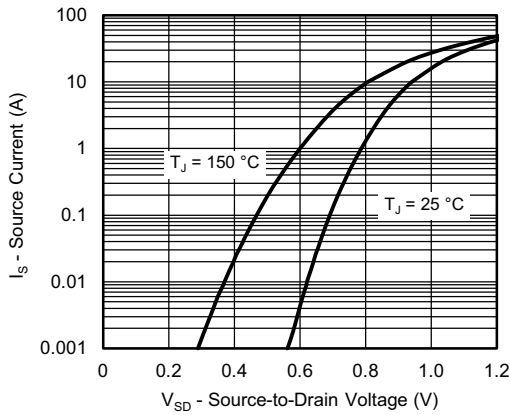
Notes

- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
 b. Guaranteed by design, not subject to production testing

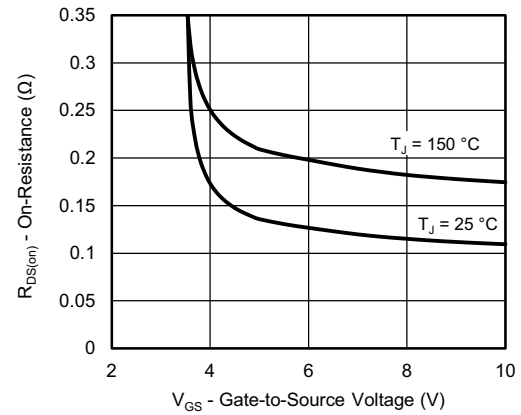
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Output Characteristics

Transfer Characteristics

On-Resistance vs. Drain Current and Gate Voltage

Capacitance

Gate Charge

On-Resistance vs. Junction Temperature

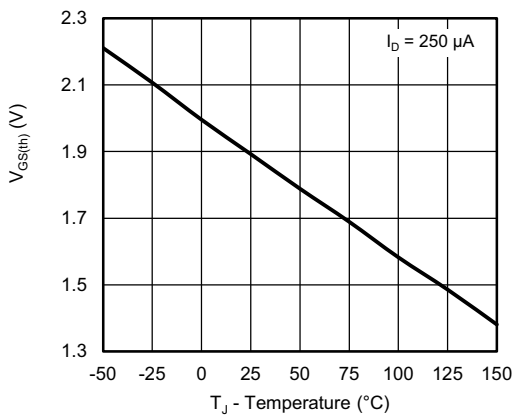
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



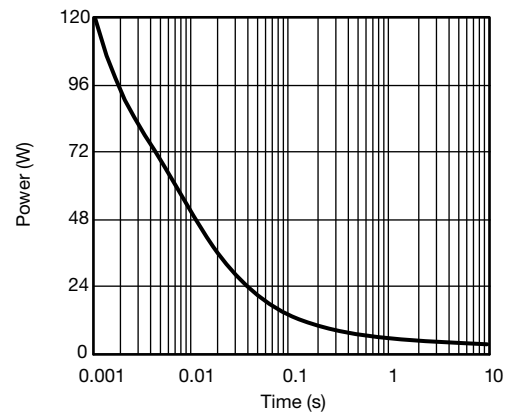
Source-Drain Diode Forward Voltage



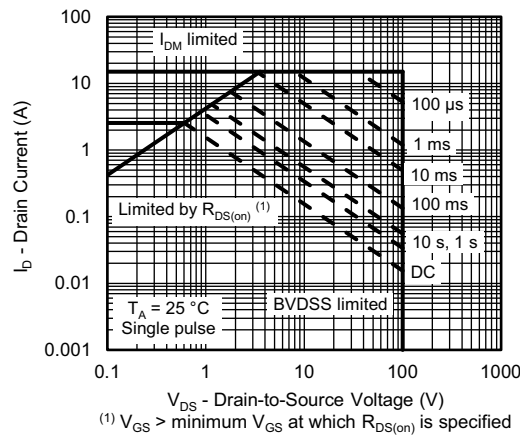
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

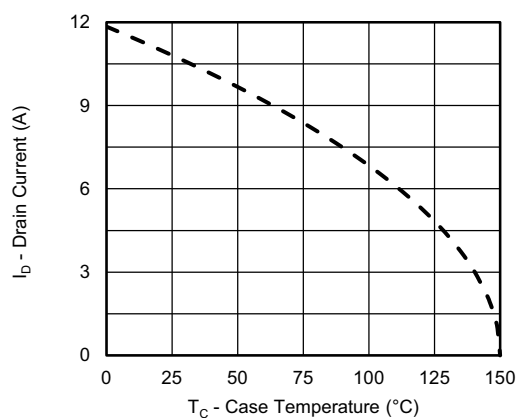


Single Pulse Power, Junction-to-Ambient

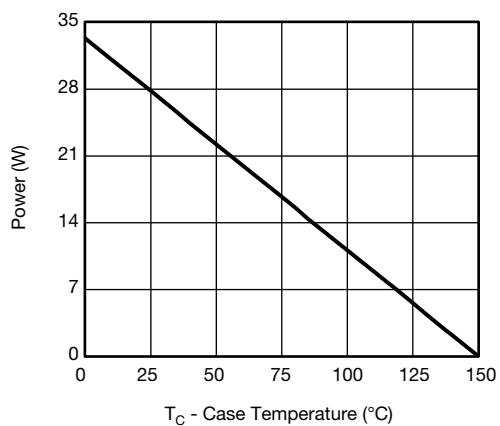


Safe Operating Area, Junction-to-Ambient

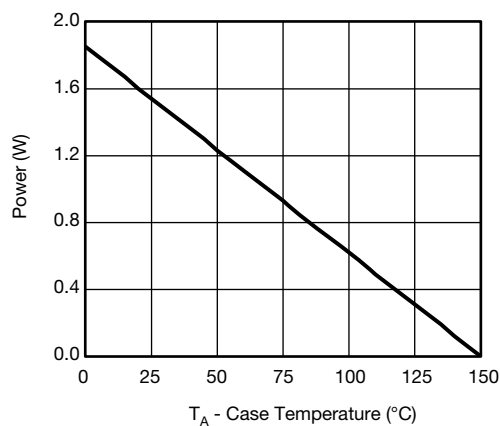
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating ^a



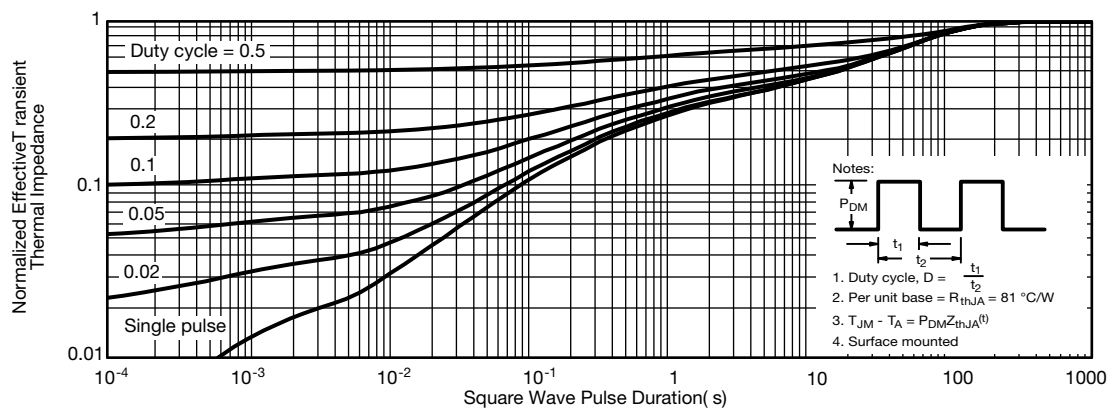
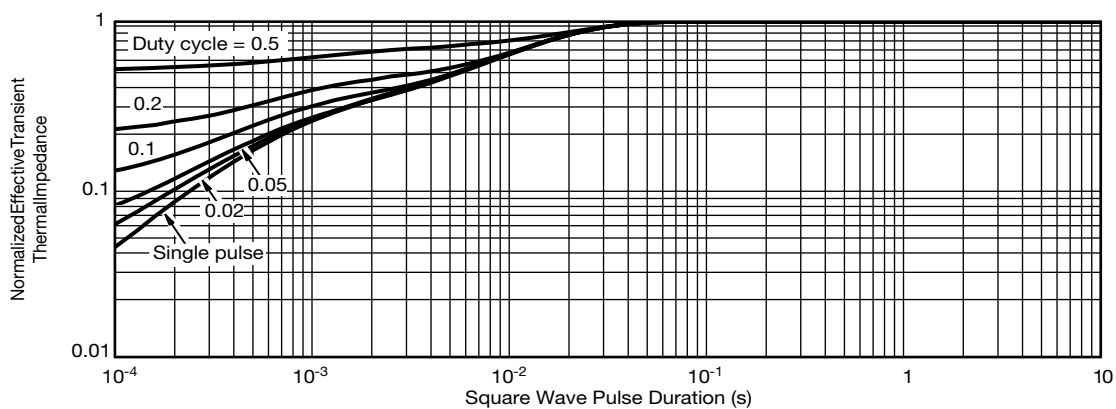
Power, Junction-to-Case



Power, Junction-to-Ambient

Note

- a. 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-Ambient

Normalized Thermal Transient Impedance, Junction-to-Case

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