

AP9987GJ-VB Datasheet

N-Channel 100 V (D-S) MOSFET

PRODUCT SUMMARY		
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A)
100	0.110 at V _{GS} = 10 V	15
	0.115 at V _{GS} = 6 V	15

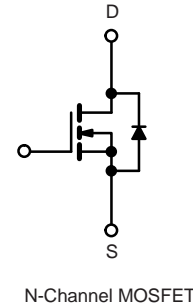
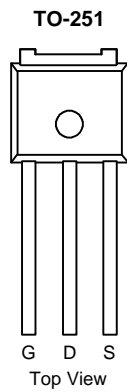
FEATURES

- DT-Trench Power MOSFET
- 175 °C Junction Temperature
- 100 % R_g Tested



APPLICATIONS

- Primary Side Switch



ABSOLUTE MAXIMUM RATINGS (T _C = 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 = 175 °C) ^b	I _D	T _C = 25 °C	15
		T _C = 125 °C	8.7
Pulsed Drain Current	I _{DM}	45	A
Continuous Source Current (Diode Conduction)	I _S	15	
Avalanche Current	I _{AR}	15	
Repetitive Avalanche Energy (Duty Cycle ≤ 1 %)	L = 0.1 mH E _{AR}	11.3	mJ
Maximum Power Dissipation	P _D	T _C = 25 °C	61 ^b
		T _A = 25 °C	2.7 ^a
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Junction-to-Ambient ^a	R _{thJA}	t ≤ 10 s	16	20	°C/W
		Steady State	45	55	
Junction-to-Case	R _{thJC}	2	2.4		

Notes:

- Surface mounted on 1" x 1" FR4 board.
- See SOA curve for voltage derating.

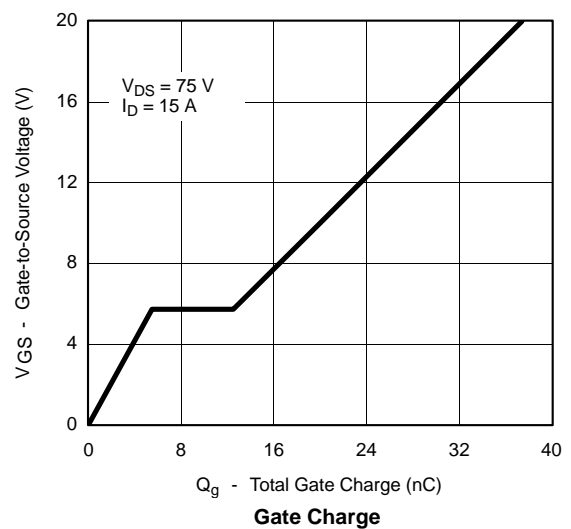
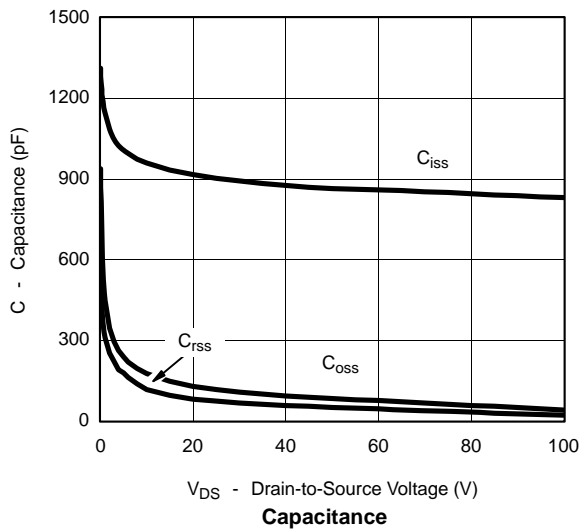
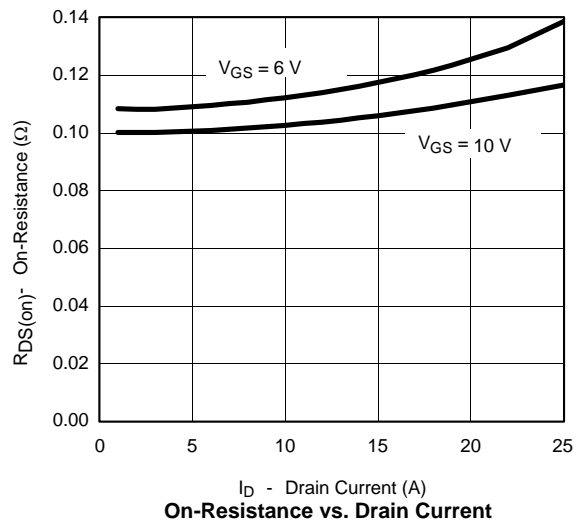
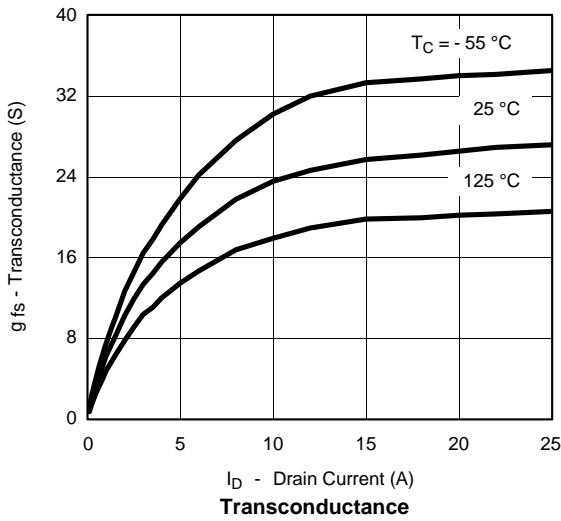
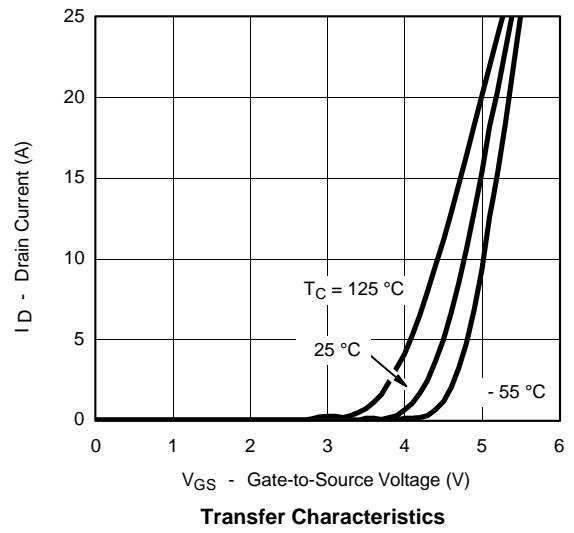
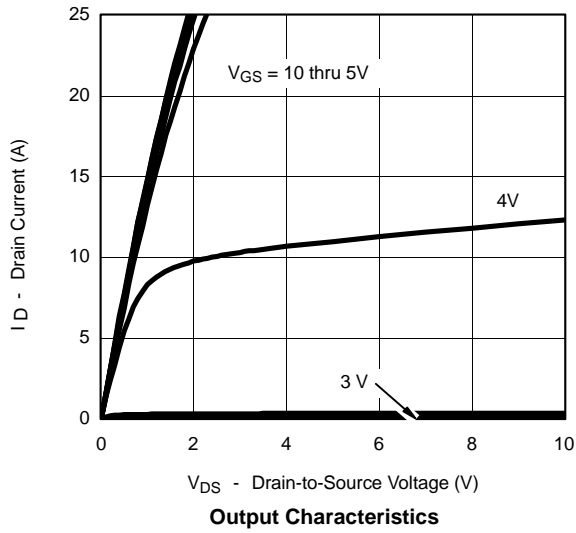
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ. ^a	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	100			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.0		3.0	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			50	
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$			250	
On-State Drain Current ^b	$I_{D(on)}$	$V_{DS} = 5\text{ V}, V_{GS} = 10\text{ V}$	15			A
Drain-Source On-State Resistance ^b	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 15\text{ A}$		0.110		Ω
		$V_{GS} = 10\text{ V}, I_D = 15\text{ A}, T_J = 125\text{ }^\circ\text{C}$		0.170		
		$V_{GS} = 10\text{ V}, I_D = 15\text{ A}, T_J = 175\text{ }^\circ\text{C}$		0.230		
		$V_{GS} = 6\text{ V}, I_D = 10\text{ A}$		0.115		
Forward Transconductance ^b	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 15\text{ A}$		25		S
Dynamic^a						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		892		μF
Output Capacitance	C_{oss}			110		
Reverse Transfer Capacitance	C_{rss}			70		
Total Gate Charge ^c	Q_g	$V_{DS} = 75\text{ V}, V_{GS} = 10\text{ V}, I_D = 15\text{ A}$		20	25	nC
Gate-Source Charge ^c	Q_{gs}			5.5		
Gate-Drain Charge ^c	Q_{gd}			7		
Gate Resistance	R_g		1		3.2	Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 75\text{ V}, R_L = 5\text{ }\Omega$ $I_D \cong 15\text{ A}, V_{GEN} = 10\text{ V}, R_G = 2.5\text{ }\Omega$		8	12	ns
Rise Time ^c	t_r			35	55	
Turn-Off Delay Time ^c	$t_{d(off)}$			17	25	
Fall Time ^c	t_f			30	45	
Source-Drain Diode Ratings and Characteristic ($T_C = 25\text{ }^\circ\text{C}$)						
Pulsed Current	I_{SM}				45	A
Diode Forward Voltage ^b	V_{SD}	$I_F = 15\text{ A}, V_{GS} = 0\text{ V}$		0.9	1.5	V
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 15\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		55	85	ns

Notes:

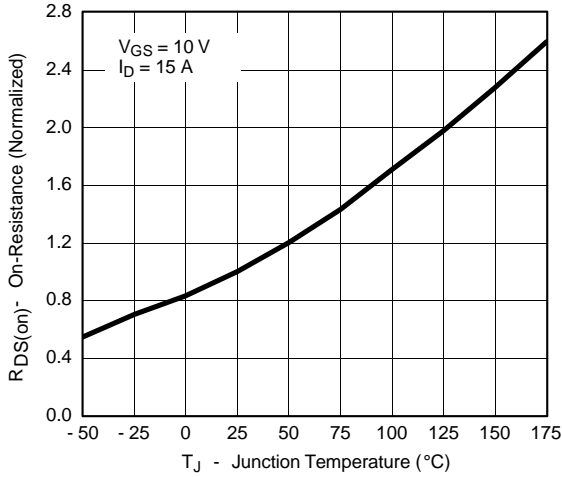
- Guaranteed by design, not subject to production testing.
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Independent of operating temperature.

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.

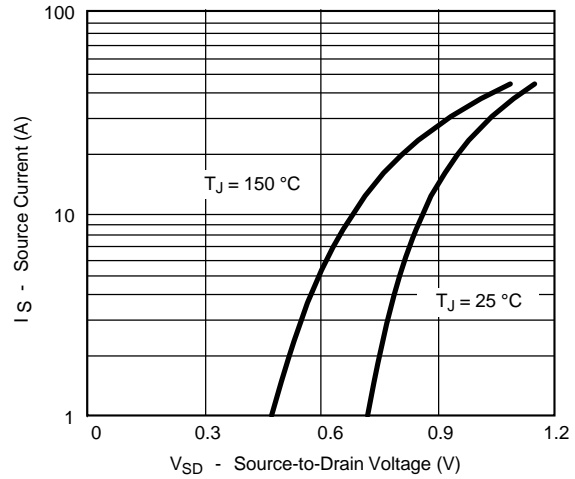
TYPICAL CHARACTERISTICS (25 °C unless noted)



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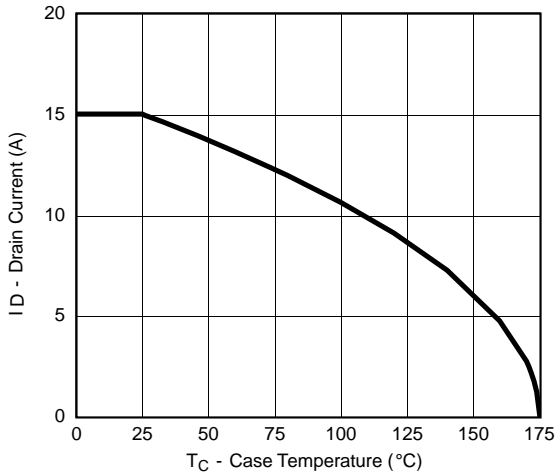


On-Resistance vs. Junction Temperature

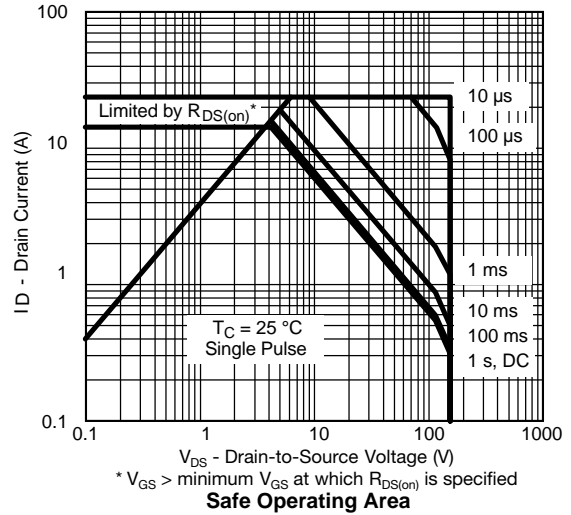


Source-Drain Diode Forward Voltage

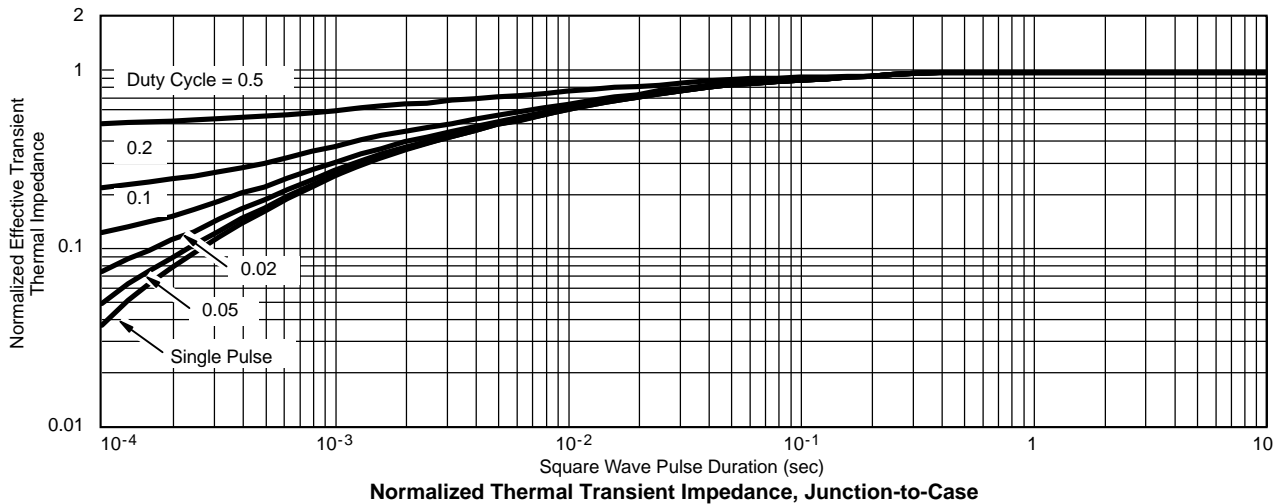
THERMAL RATINGS



Maximum Avalanche Drain Current vs. Case Temperature

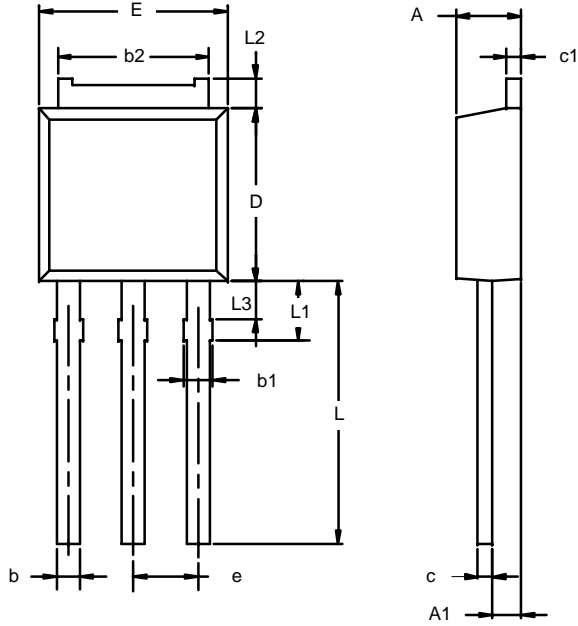


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

TO-251AA (DPAK)



Note: Dimension L3 is for reference only.

Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	2.21	2.38	0.087	0.094
A1	0.89	1.14	0.035	0.045
b	0.71	0.89	0.028	0.035
b1	0.76	1.14	0.030	0.045
b2	5.23	5.43	0.206	0.214
c	0.46	0.58	0.018	0.023
c1	0.46	0.58	0.018	0.023
D	5.97	6.22	0.235	0.245
E	6.48	6.73	0.255	0.265
e	2.28 BSC		0.090 BSC	
L	8.89	9.53	0.350	0.375
L1	1.91	2.28	0.075	0.090
L2	0.89	1.27	0.035	0.050
L3	1.15	1.52	0.045	0.060
ECN: S-03946—Rev. E, 09-Jul-01 DWG: 5346				

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