

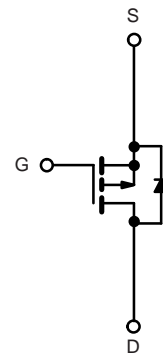
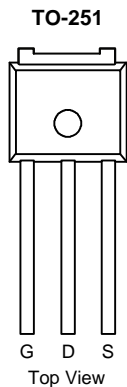
AP9561AGJ-HF-VB Datasheet

P-Channel 40 V (D-S) MOSFET

PRODUCT SUMMARY		
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a
- 40	0.010 at V _{GS} = - 10 V	± 55
	0.014 at V _{GS} = - 4.5 V	± 54

FEATURES

- Compliant to RoHS Directive 2002/95/EC



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)			
Parameter	Symbol	Limit	Unit
Gate-Source Voltage	V _{GS}	± 40	V
Continuous Drain Current (T _J = 175 °C)	I _D	T _C = 25 °C	- 55 ^a
		T _C = 125 °C	- 52
Pulsed Drain Current	I _{DM}	- 220	A
Avalanche Current	I _{AR}	- 60	
Repetitive Avalanche Energy ^b	E _{AR}	180	mJ
Power Dissipation	P _D	T _C = 25 °C	45
		T _A = 25 °C	3.75
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS			
Parameter	Symbol	Limit	Unit
Junction-to-Ambient	R _{thJA}	PCB Mount (TO-263) ^c	40
		Free Air (TO-220AB)	62.5
Junction-to-Case	R _{thJC}	0.8	°C/W

Notes:

- Package limited.
- Duty cycle ≤ 1 %.
- When mounted on 1" square PCB (FR-4 material).
- See SOA curve for voltage derating.

* Pb containing terminations are not RoHS compliant, exemptions may apply.

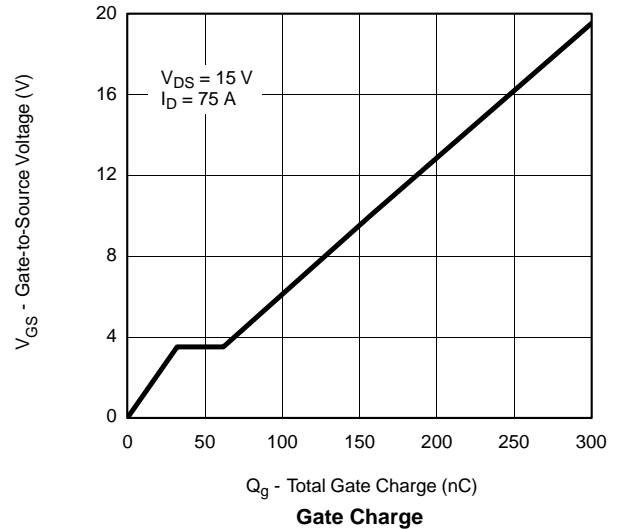
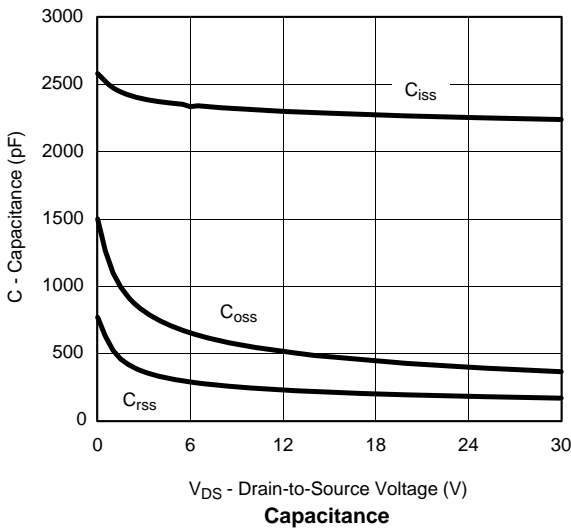
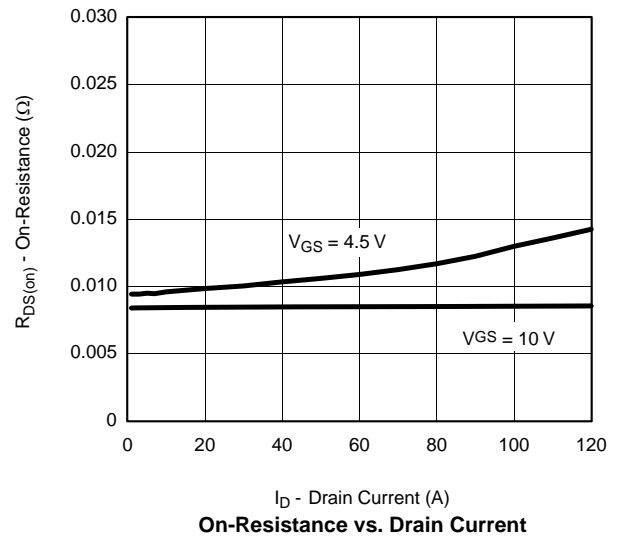
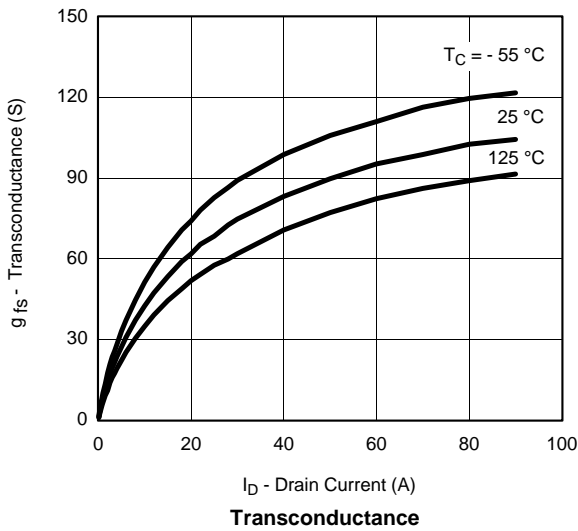
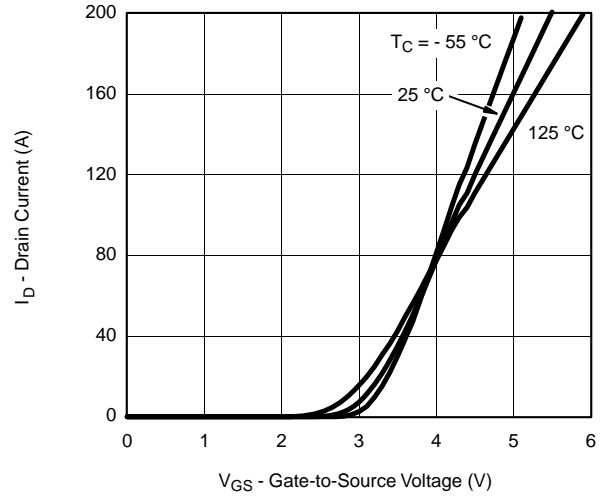
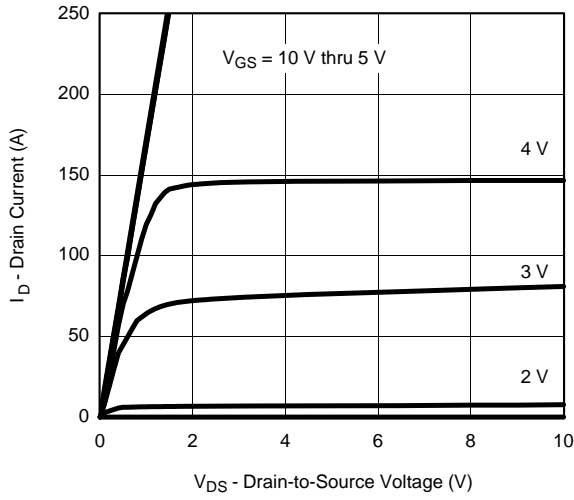
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	- 40			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	- 1.0		- 2.5	
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}	$V_{DS} = -40\text{ V}, V_{GS} = 0\text{ V}$			- 1	μA
		$V_{DS} = -40\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			- 50	
		$V_{DS} = -40\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$			- 250	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -10\text{ V}$	- 120			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -30\text{ A}$		0.010		Ω
		$V_{GS} = -10\text{ V}, I_D = -30\text{ A}, T_J = 125\text{ }^\circ\text{C}$		0.016		
		$V_{GS} = -10\text{ V}, I_D = -30\text{ A}, T_J = 175\text{ }^\circ\text{C}$		0.023		
		$V_{GS} = -4.5\text{ V}, I_D = -20\text{ A}$		0.014		
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}, I_D = -75\text{ A}$	20			S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = -25\text{ V}, f = 1\text{ MHz}$		3000		μF
Output Capacitance	C_{oss}			620		
Reverse Transfer Capacitance	C_{rss}			315		
Total Gate Charge ^c	Q_g	$V_{DS} = -15\text{ V}, V_{GS} = -10\text{ V}, I_D = -75\text{ A}$		160		nC
Gate-Source Charge ^c	Q_{gs}			32		
Gate-Drain Charge ^c	Q_{gd}			30		
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = -15\text{ V}, R_L = 0.2\text{ }\Omega$ $I_D \equiv -75\text{ A}, V_{GEN} = -10\text{ V}, R_g = 2.5\text{ }\Omega$		25	40	ns
Rise Time ^c	t_r			225	360	
Turn-Off Delay Time ^c	$t_{d(off)}$			150	240	
Fall Time ^c	t_f			210	340	
Source-Drain Diode Ratings and Characteristics^b ($T_C = 25\text{ }^\circ\text{C}$)						
Continuous Current	I_S			- 220		A
Pulsed Current	I_{SM}				- 240	
Forward Voltage ^a	V_{SD}	$I_F = -75\text{ A}, V_{GS} = 0\text{ V}$		- 1.2	- 1.5	V
Reverse Recovery Time	t_{rr}	$I_F = -75\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		55	100	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			2.5	5	A
Reverse Recovery Charge	Q_{rr}			0.07	0.25	μC

Notes:

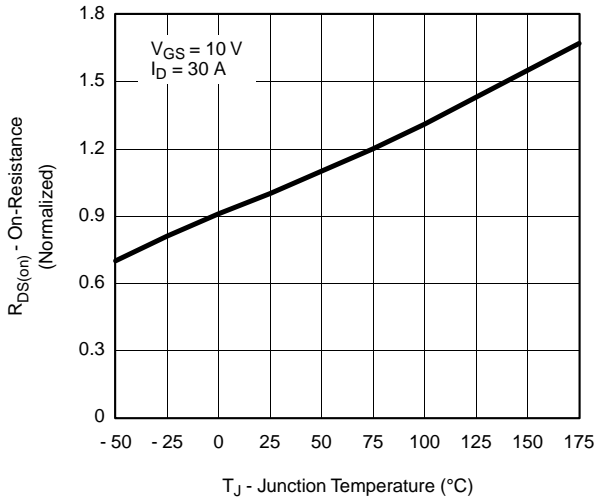
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

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.

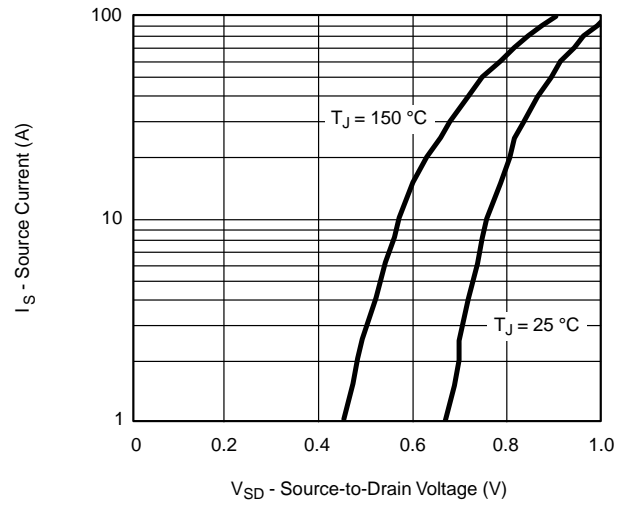
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



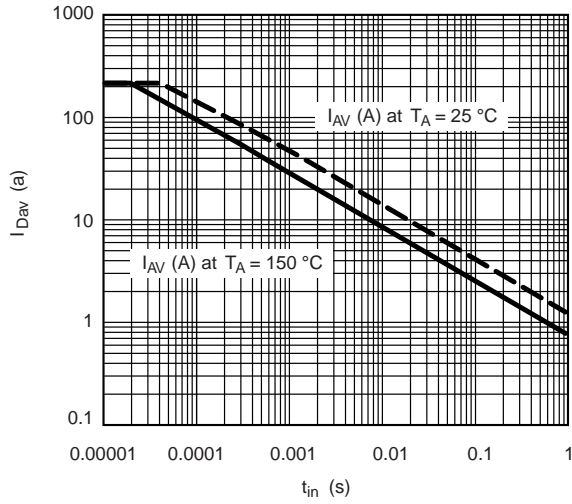
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



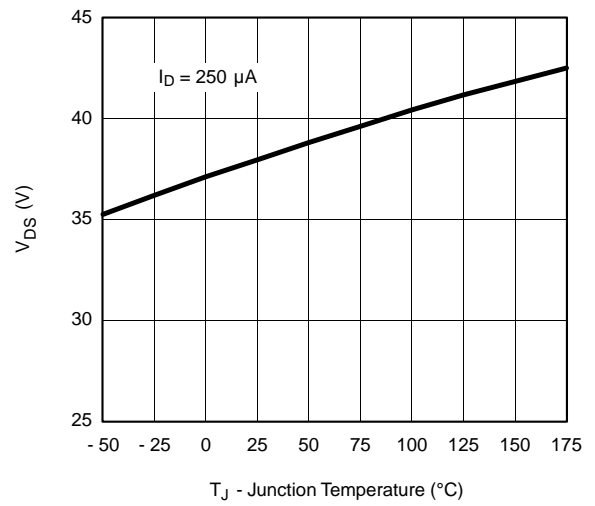
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage



Avalanche Current vs. Time

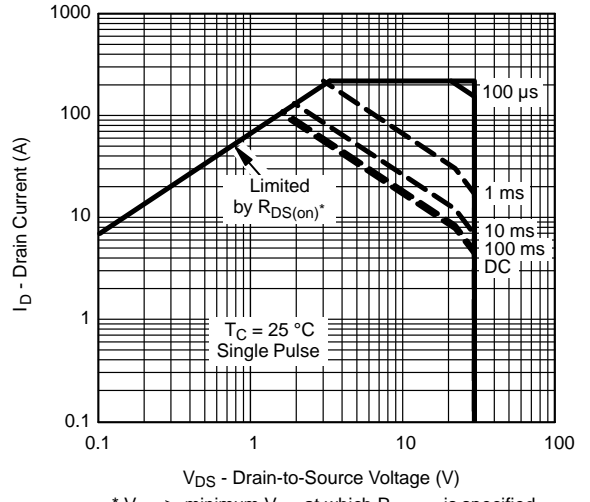


Drain Source Breakdown vs. Junction Temperature

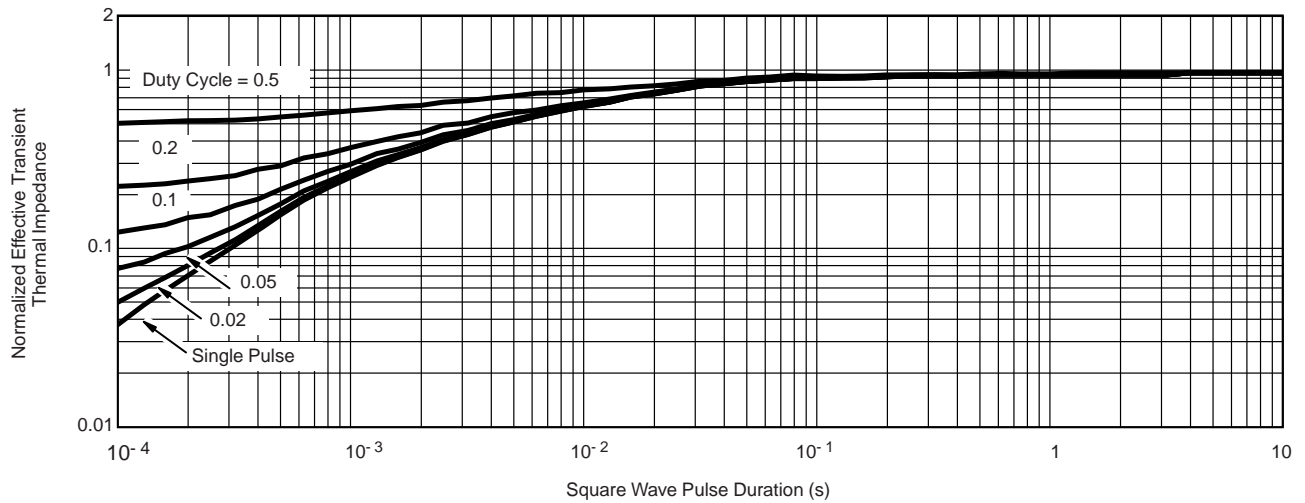
THERMAL RATINGS



Maximum Avalanche and Drain Current vs. Case Temperature

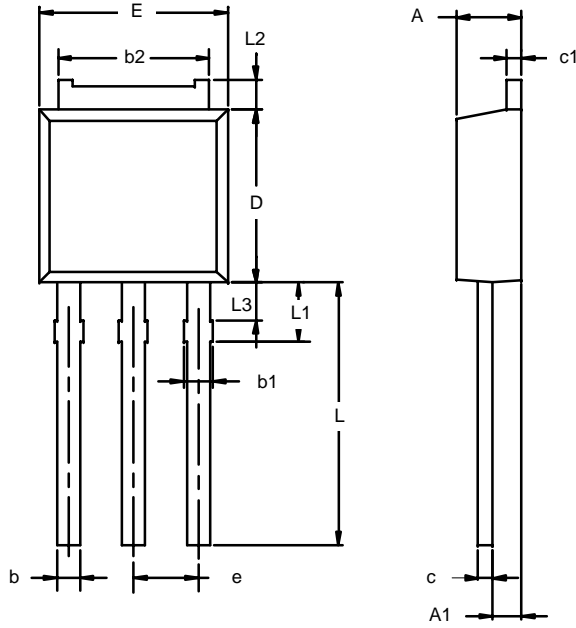


Safe Operating Area
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified



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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