

AP1310K

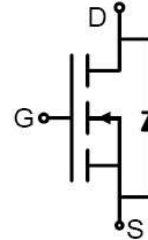
N-Channel Enhancement Mosfet

AIIPOWER

DATA SHEET

Feature

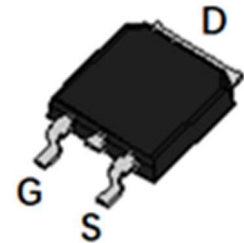
- 100V,50A
 $R_{DS(ON)} < 16m\Omega @ V_{GS}=10V$ (TYP:14m Ω)
- Split Gate Trench Technology
- Lead free product is acquired
- Excellent $R_{DS(ON)}$ and Low Gate Charge



Schematic Diagram

Application

- PWM applications
- Load Switch
- Power management



TO-252(DPAK) top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
1310	AP1310K	TO-252	13 inch	-	2500

ABSOLUTE MAXIMUM RATINGS ($T_a=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($T_a=25^{\circ}C$)	I_D	50	A
Continuous Drain Current ($T_a=100^{\circ}C$)	I_D	31.5	A
Pulsed Drain Current ⁽¹⁾	I_{DM}	200	A
Singel Pulsed Avalanche Energy ⁽²⁾	E_{AS}	32	mJ
Power Dissipation	P_D	68	W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	55	$^{\circ}C/W$
Junction Temperature	T_J	150	$^{\circ}C$
Storage Temperature	T_{STG}	-55~ +150	$^{\circ}C$

MOSFET ELECTRICAL CHARACTERISTICS ($T_a=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	100	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 80V, V_{GS} = 0V$	-	-	1	μA
Gate-body leakage current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	± 100	nA
Gate threshold voltage ⁽³⁾	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.2	1.8	2.5	V
Drain-source on-resistance ⁽³⁾	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 20A$	-	14	16	m Ω
		$V_{GS} = 4.5V, I_D = 10A$	-	18.5	23	
Forward Threshold Voltage	g_{fs}	$V_{DS} = 5V, I_D = 20A$	-	13.5	-	S
Gate Resistance	R_g	$V_{DS} = V_{GS} = 0V, f = 1MHz$	-	1.44	-	Ω
Dynamic characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 25V, V_{GS} = 0V, f = 1MHz$	-	1130	-	pF
Output Capacitance	C_{oss}		-	496	-	
Reverse Transfer Capacitance	C_{rss}		-	60	-	
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 50V, I_D = 20A,$ $V_{GS} = 10V, R_G = 3\Omega$	-	46	-	ns
Turn-on rise time	t_r		-	55	-	
Turn-off delay time	$t_{d(off)}$		-	249	-	
Turn-off fall time	t_f		-	105	-	
Total Gate Charge	Q_g	$V_{DS} = 50V, I_D = 20A,$ $V_{GS} = 10V$	-	30	-	nC
Gate-Source Charge	Q_{gs}		-	6	-	
Gate-Drain Charge	Q_{gd}		-	8.2	-	
Reverse Recovery Charge	Q_{rr}	$I_F = 20A, di/dt = 100A/\mu s$		224		nC
Reverse Recovery Time	T_{rr}	$I_F = 20A, di/dt = 100A/\mu s$		70		ns
Source-Drain Diode characteristics						
Diode Forward voltage ⁽³⁾	V_{DS}	$V_{GS} = 0V, I_S = 20A$	-	-	1.2	V
Diode Forward current ⁽⁴⁾	I_S		-	-	50	A

Notes:

1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition: $T_J = 25^\circ\text{C}, V_{DD} = 50V, R_G = 25\Omega, L = 0.5mH$
3. Pulse Test: pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
4. Surface Mounted on FR4 Board, $t \leq 10$ sec

Typical Performance Characteristics

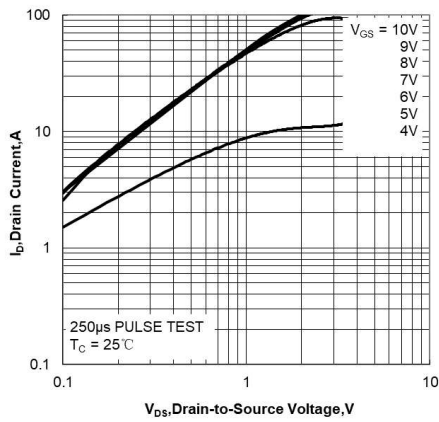


Figure 1. Output Characteristics

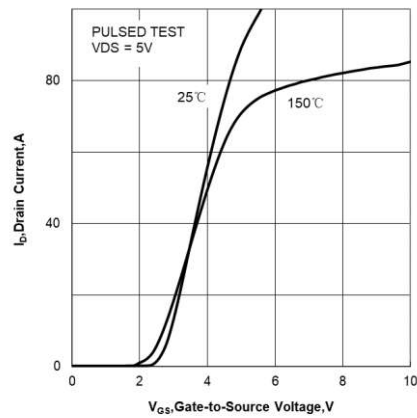


Figure 2. Transfer Characteristics

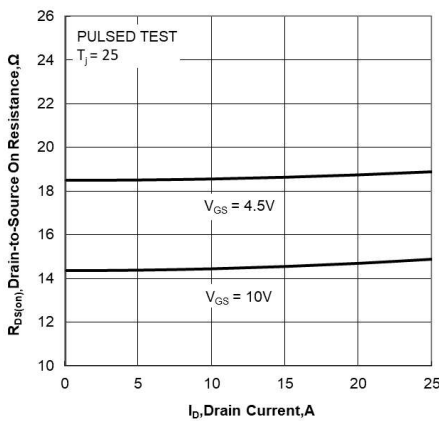


Figure 3. Drain-to-Source On Resistance vs Drain Current

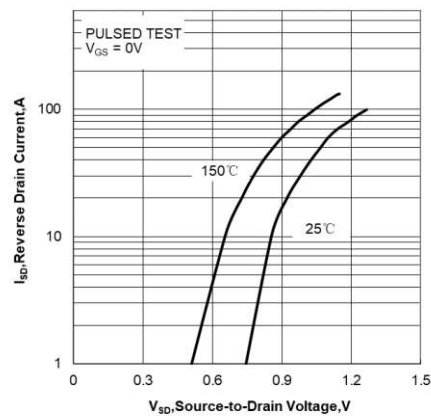


Figure 4. Body Diode Forward Voltage vs Source Current and Temperature

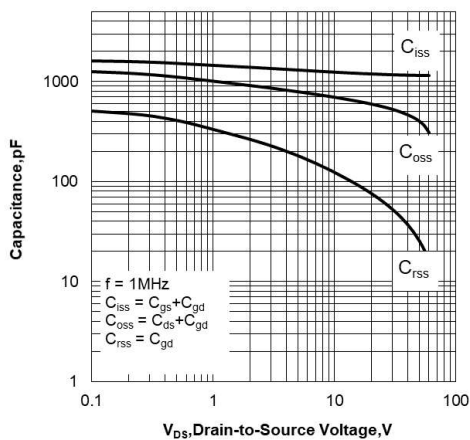


Figure 5. Capacitance Characteristics

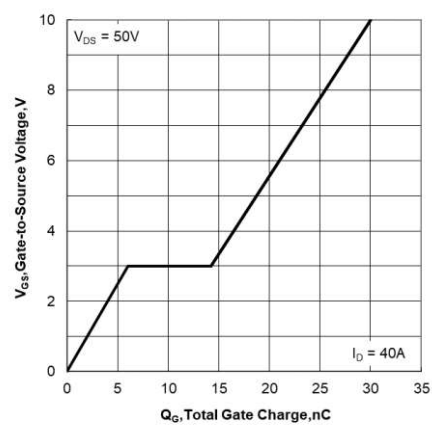


Figure 6. Gate Charge Characteristics

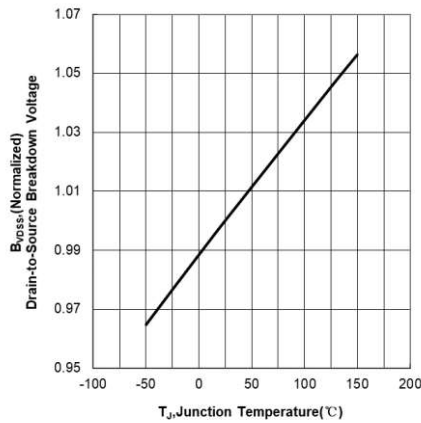


Figure 7. Normalized Breakdown Voltage vs Junction Temperature

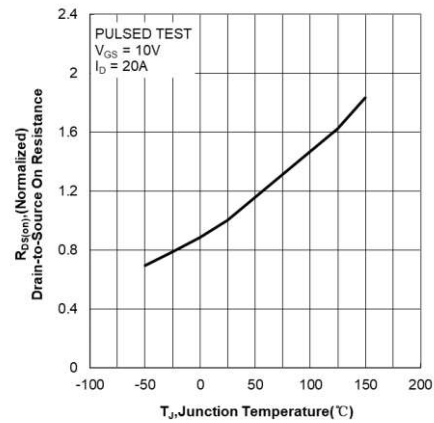


Figure 8. Normalized On Resistance vs Junction Temperature

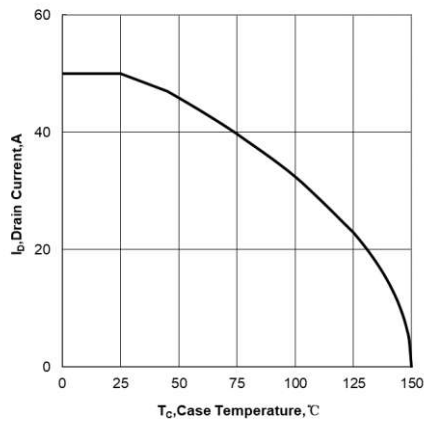


Figure 9. Maximum Continuous Drain Current vs Case Temperature

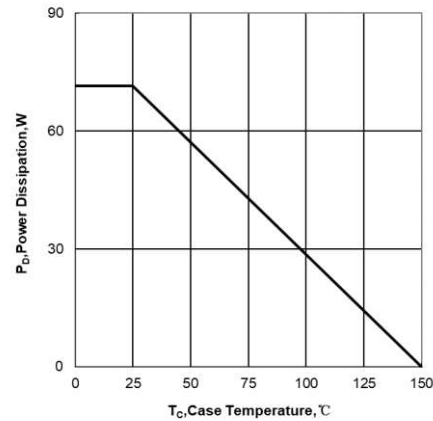


Figure 10. Maximum Power Dissipation vs Case Temperature

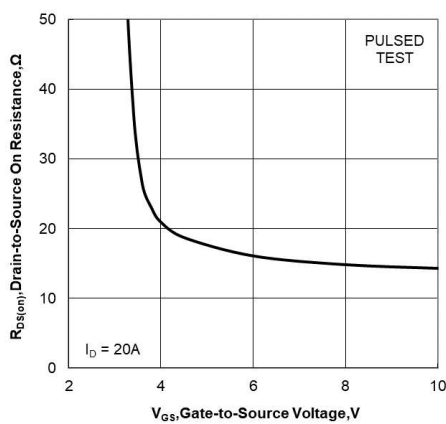


Figure 11. Drain-to-Source On Resistance vs Gate Voltage and Drain Current

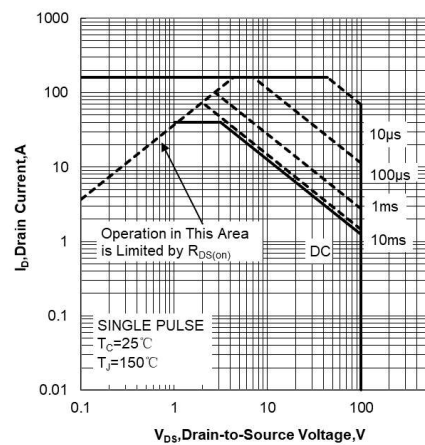


Figure 12. Maximum Safe Operating Area

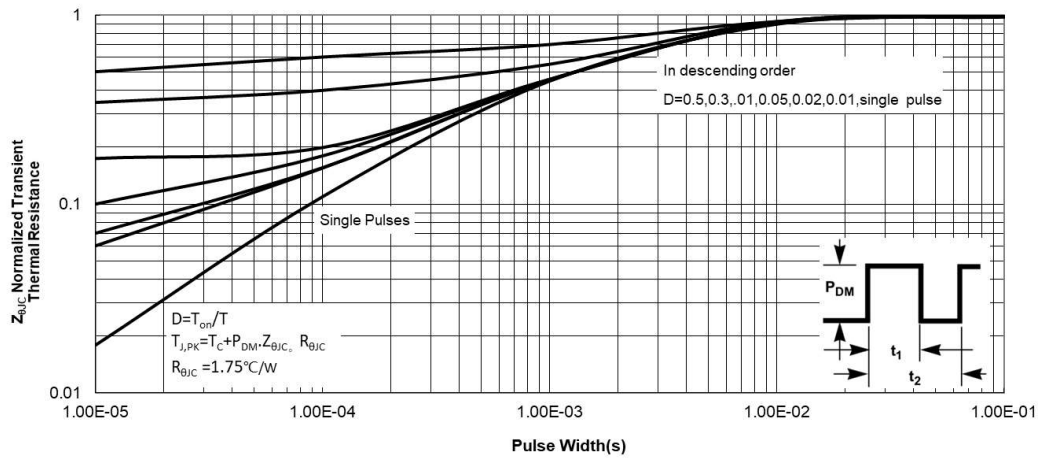
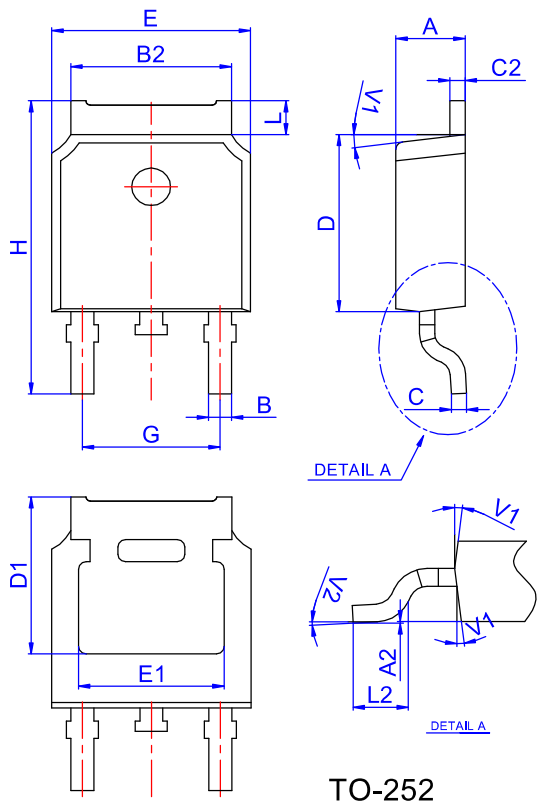


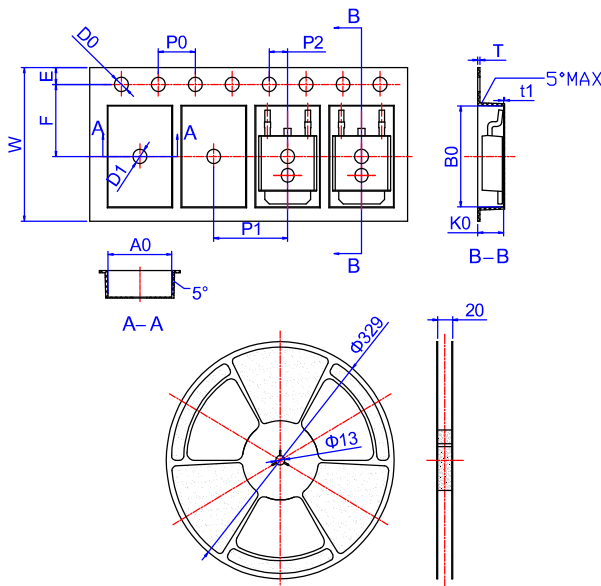
Figure 13. Maximum Effective Transient Thermal Impedance, Junction-to-Case

TO-252 Package Information



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Reel Specification-TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
W	15.90	16.00	16.10	0.626	0.630	0.634
E	1.65	1.75	1.85	0.065	0.069	0.073
F	7.40	7.50	7.60	0.291	0.295	0.299
D0	1.40	1.50	1.60	0.055	0.059	0.063
D1	1.40	1.50	1.60	0.055	0.059	0.063
P0	3.90	4.00	4.10	0.154	0.157	0.161
P1	7.90	8.00	8.10	0.311	0.315	0.319
P2	1.90	2.00	2.10	0.075	0.079	0.083
A0	6.85	6.90	7.00	0.270	0.271	0.276
B0	10.45	10.50	10.60	0.411	0.413	0.417
K0	2.68	2.78	2.88	0.105	0.109	0.113
T	0.24		0.27	0.009		0.011
t1	0.10			0.004		
10P0	39.80	40.00	40.20	1.567	1.575	1.583

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