

# AP1310

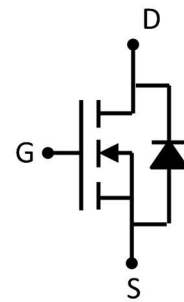
## N-Channel Enhancement Mosfet

# AIPOWER

## DATA SHEET

### Feature

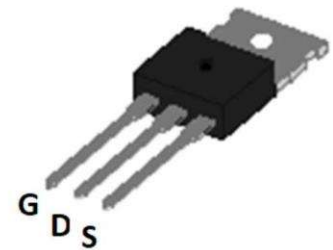
- 100V,50A  
 $R_{DS(ON)} < 16m\Omega @ V_{GS}=10V$  (TYP:14m $\Omega$ )
- Split Gate Trench Technology
- Lead free product is acquired
- Excellent  $R_{DS(ON)}$  and Low Gate Charge



Schematic Diagram

### Application

- PWM applications
- Load Switch
- Power management



TO-220C

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
1310	AP1310	TO-220	13 inch	-	1000

### 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	$V_{GS}$	$\pm 20$	V
Continuous Drain Current ( $T_a=25^{\circ}C$ )	$I_D$	50	A
Continuous Drain Current ( $T_a=100^{\circ}C$ )	$I_D$	32.5	A
Pulsed Drain Current <sup>(1)</sup>	$I_{DM}$	200	A
Singel Pulsed Avalanche Energy <sup>(2)</sup>	$E_{AS}$	32	mJ
Power Dissipation	$P_D$	70	W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	50	$^{\circ}C/W$
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
<b>Static Characteristics</b>						
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	$\mu A$
Gate-body leakage current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	$\pm 100$	nA
Gate threshold voltage <sup>(3)</sup>	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.2	1.8	2.5	V
Drain-source on-resistance <sup>(3)</sup>	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 20A$	-	14	16	m $\Omega$
		$V_{GS} = 4.5V, I_D = 10A$	-	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	-	$\Omega$
<b>Dynamic characteristics</b>						
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	-	
<b>Switching characteristics</b>						
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
<b>Source-Drain Diode characteristics</b>						
Diode Forward voltage <sup>(3)</sup>	$V_{DS}$	$V_{GS} = 0V, I_S = 20A$	-	-	1.2	V
Diode Forward current <sup>(4)</sup>	$I_S$		-	-	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

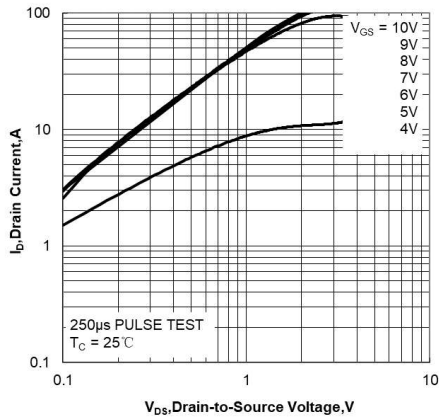


Figure 1. Output Characteristics

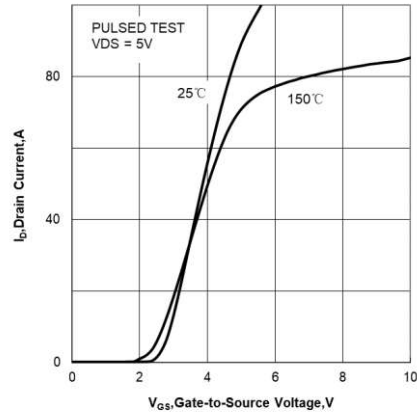


Figure 2. Transfer Characteristics

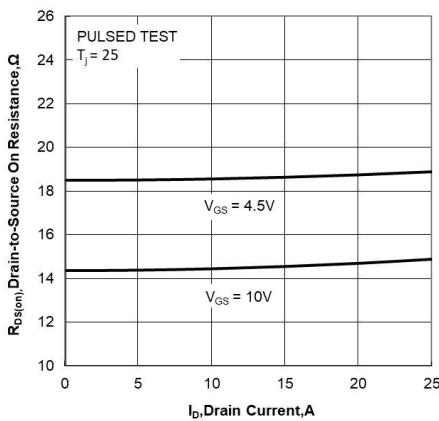


Figure 3. Drain-to-Source On Resistance vs Drain Current

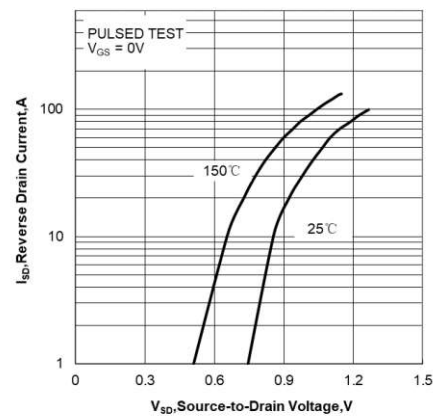


Figure 4. Body Diode Forward Voltage vs Source Current and Temperature

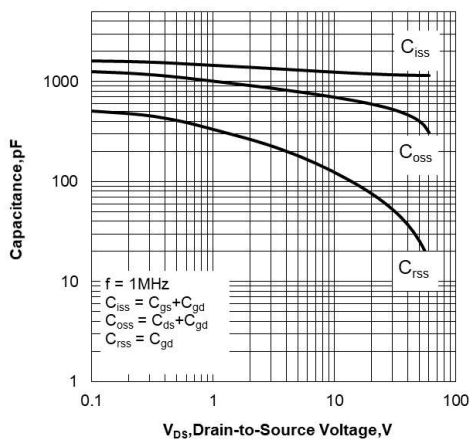


Figure 5. Capacitance Characteristics

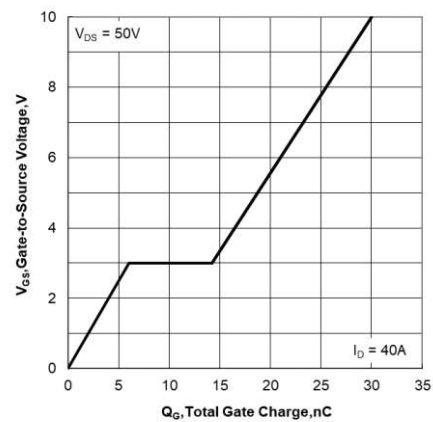
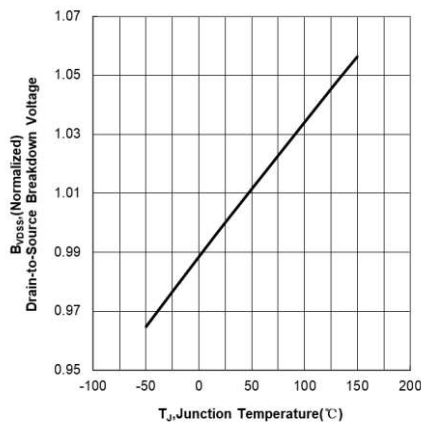
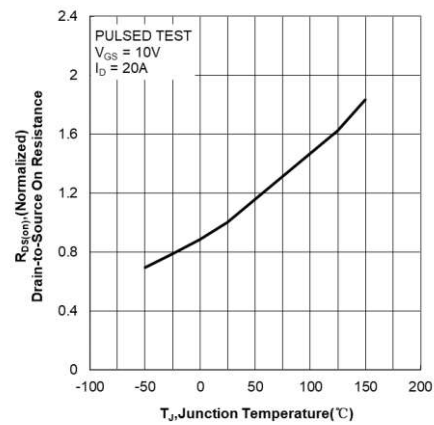


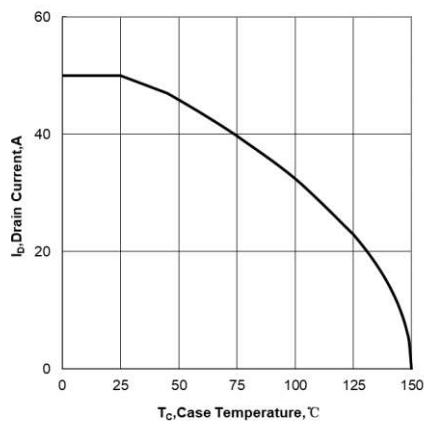
Figure 6. Gate Charge Characteristics



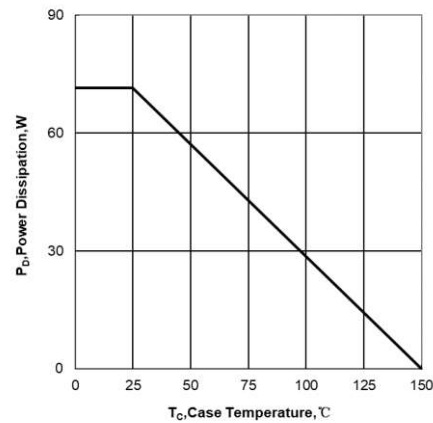
**Figure 7. Normalized Breakdown Voltage vs Junction Temperature**



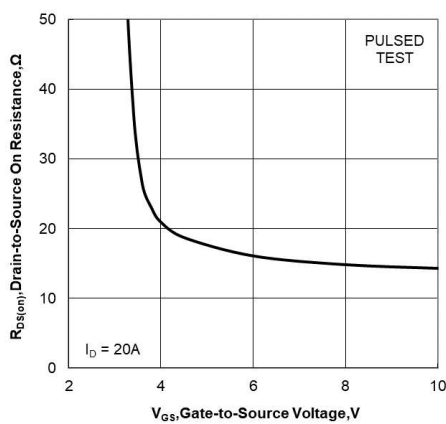
**Figure 8. Normalized On Resistance vs Junction Temperature**



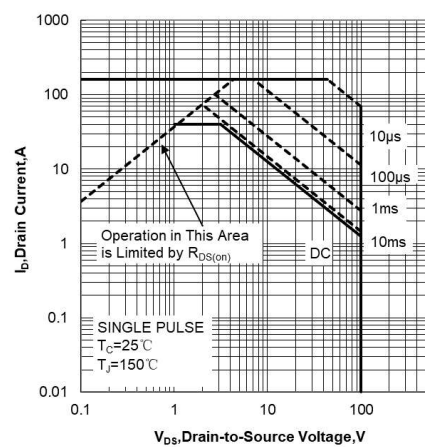
**Figure 9. Maximum Continuous Drain Current vs Case Temperature**



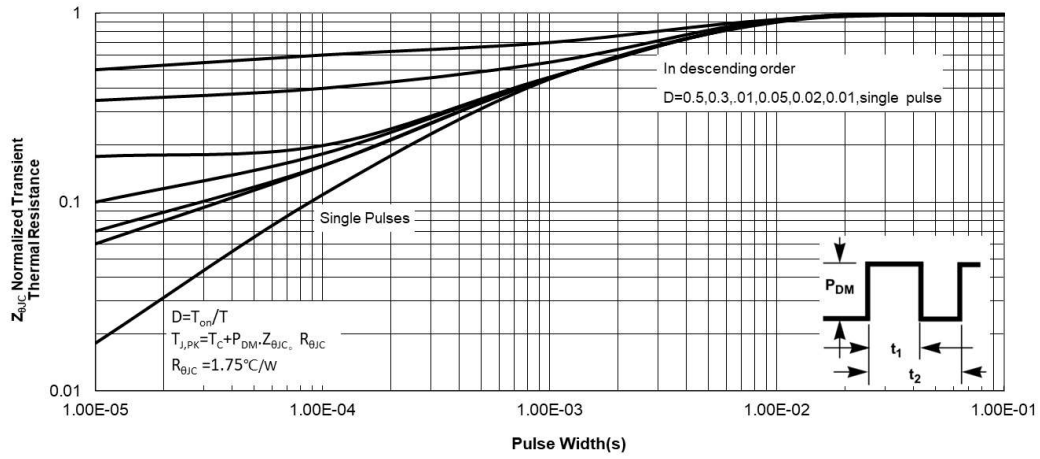
**Figure 10. Maximum Power Dissipation vs Case Temperature**



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



**Figure 12. Maximum Safe Operating Area**

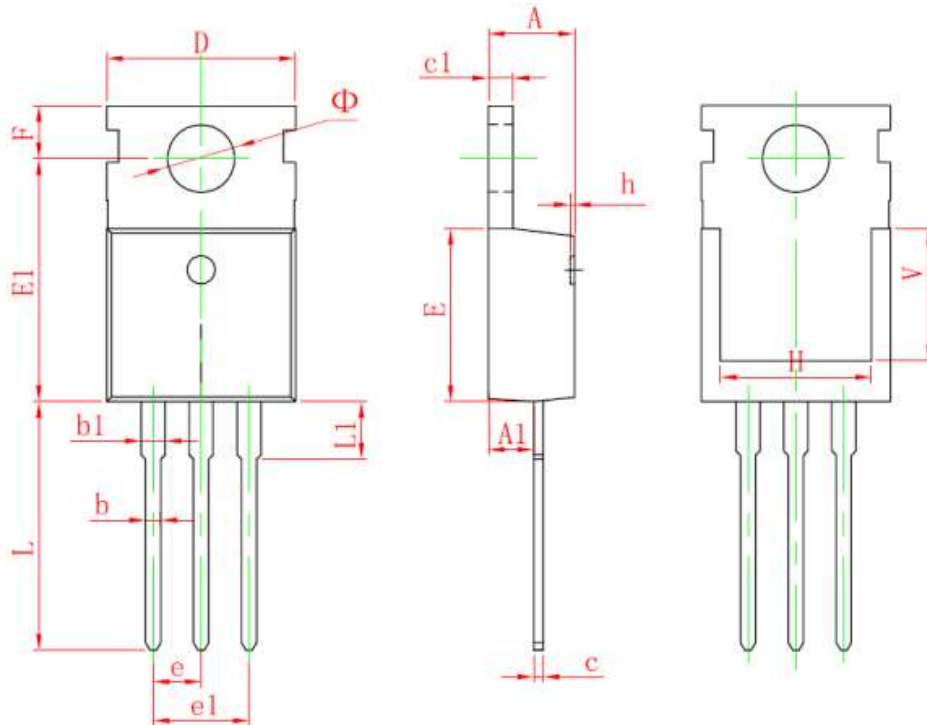


**Figure 13. Maximum Effective Transient Thermal Impedance, Junction-to-Case**

# AP1310

N-Channel Enhancement Mosfet

### TO220C Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.950	9.750	0.352	0.384
E1	12.650	13.050	0.498	0.514
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	6.900 REF.		0.276 REF.	
Φ	3.400	3.800	0.134	0.150