

20V N+N-Channel Enhancement Mode MOSFET

Description

The AP9928A uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

$V_{DS} = 20V$ $I_D = 10.5A$

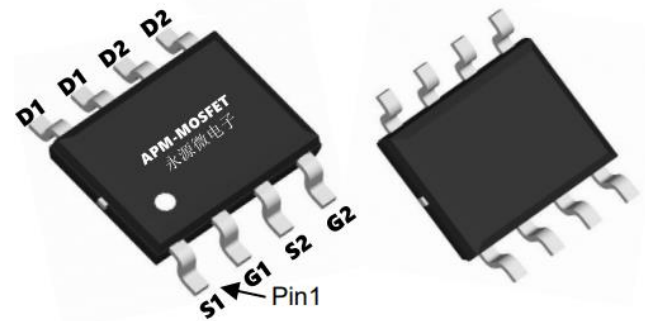
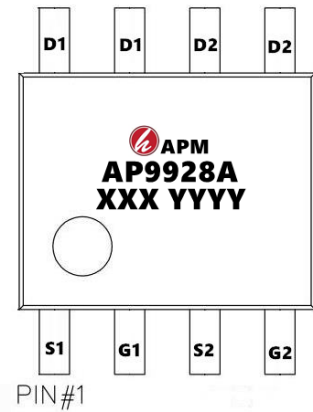
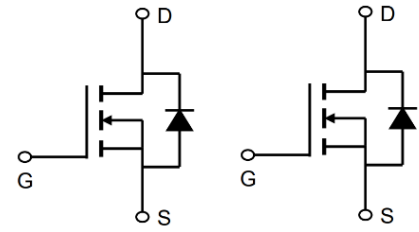
$R_{DS(ON)} < 18m\Omega$ @ $V_{GS}=4.5V$ (Type: $12m\Omega$)

Application

Battery protection

Load switch

Wireless charging



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP9928A	SOP-8L	AP9928A XXX YYYY	3000

Absolute Maximum Ratings ($T_c=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	± 12	V
$I_D @ T_A = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	10.5	A
$I_D @ T_A = 70^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	6	A
I_{DM}	Pulsed Drain Current ²	26	A
$P_D @ T_A = 25^\circ\text{C}$	Total Power Dissipation ⁴	1.25	W
TSTG	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	100	$^\circ\text{C/W}$



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Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V(BR)DSS	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	20	22	-	V
IDSS	Zero Gate Voltage Drain Current	$V_{DS}=20V, V_{GS}=0V,$	-	-	1.0	μA
IGSS	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 12V$	-	-	± 100	nA
VGS(th)	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	0.5	0.7	1.2	V
RDS(on)	Static Drain-Source on-Resistance note3	$V_{GS}=4.5V, I_D=6A$	-	12	18	m Ω
		$V_{GS}=2.5V, I_D=5A$	-	16	20	
Ciss	Input Capacitance	$V_{DS}=10V, V_{GS}=0V,$ $f=1.0MHz$	-	900	-	pF
Coss	Output Capacitance		-	220	-	pF
Crss	Reverse Transfer Capacitance		-	100	-	pF
Qg	Total Gate Charge	$V_{DS}=10V, I_D=3A,$ $V_{GS}=4.5V$	-	12	-	nC
Qgs	Gate-Source Charge		-	2.3	-	nC
Qgd	Gate-Drain("Miller") Charge		-	1.0	-	nC
td(on)	Turn-on Delay Time	$V_{DS}=10V, I_D=6A,$ $R_G=3\Omega, V_{GS}=4.5V$	-	10	-	ns
tr	Turn-on Rise Time		-	11	-	ns
td(off)	Turn-off Delay Time		-	35	-	ns
tf	Turn-off Fall Time		-	30	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	6.5	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	26	A
VSD	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_S=20A$	-	-	1.2	V

Notes:

- 1、Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
- 2、EAS condition : $T_J=25^{\circ}\text{C}$, $V_{DD}=30V$, $V_G=10V$, $L=0.5mH$, $R_G=25\Omega$, $I_{AS}=3.5A$
- 3、Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

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Typical Characteristics

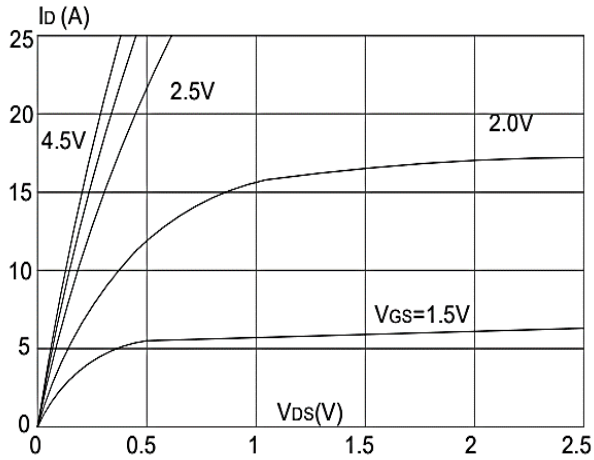


Figure1: Output Characteristics

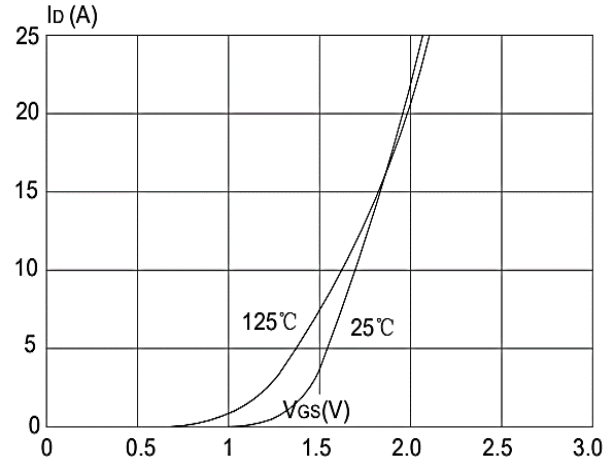


Figure 2: Typical Transfer Characteristics

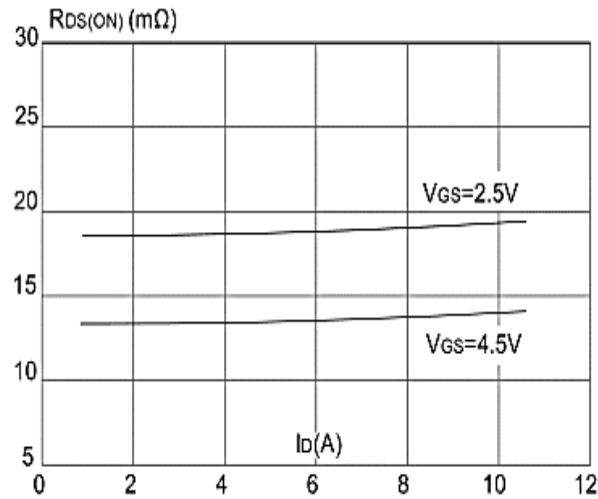


Figure 3: On-resistance vs. Drain Current

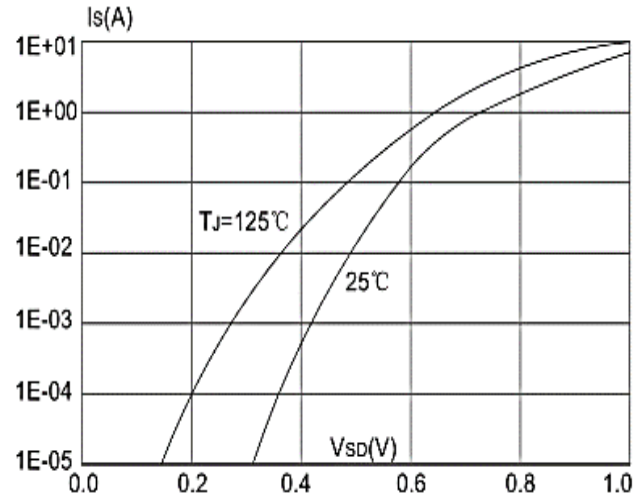


Figure 4: Body Diode Characteristics

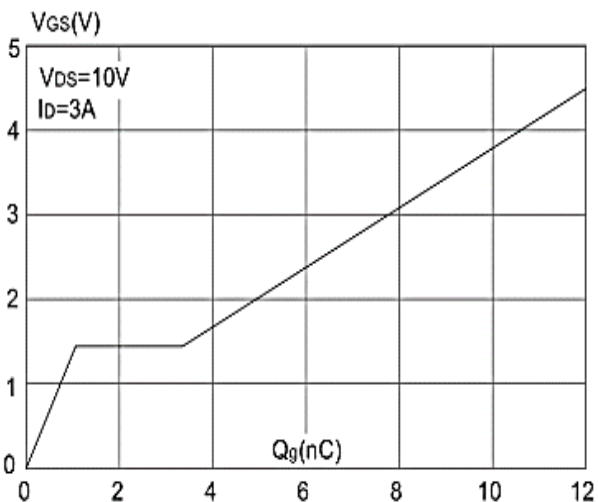


Figure 5: Gate Charge Characteristics

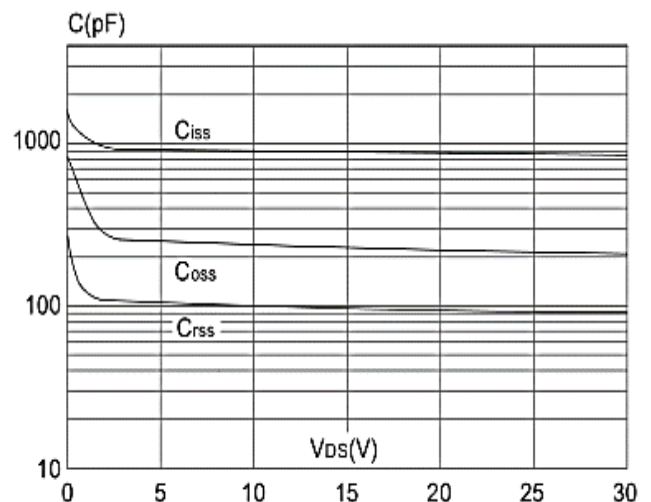


Figure 6: Capacitance Characteristics

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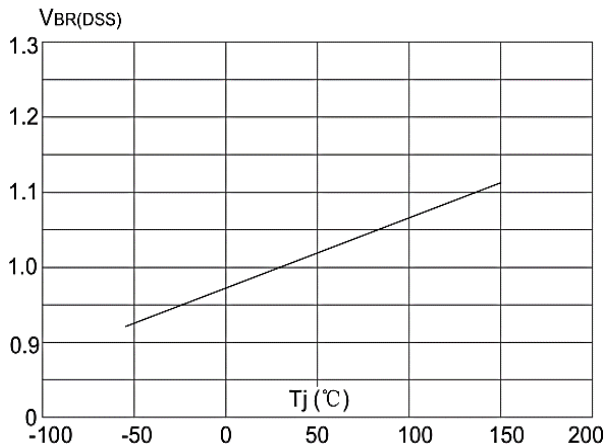


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

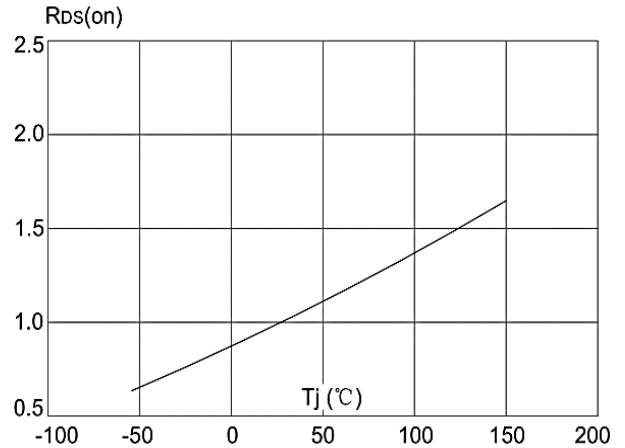


Figure 8: Normalized on Resistance vs. Junction Temperature

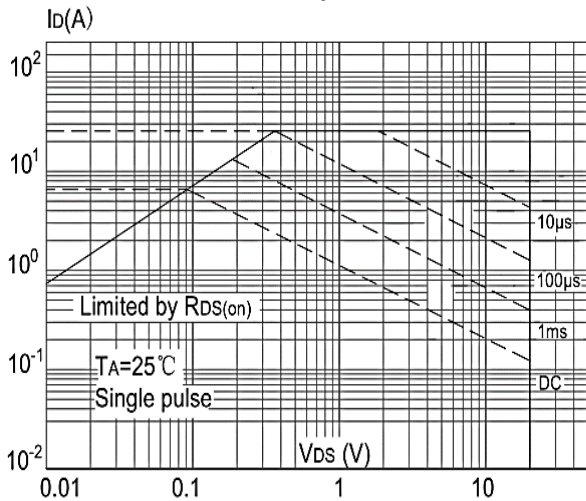


Figure 9: Maximum Safe Operating Area vs. Case Temperature

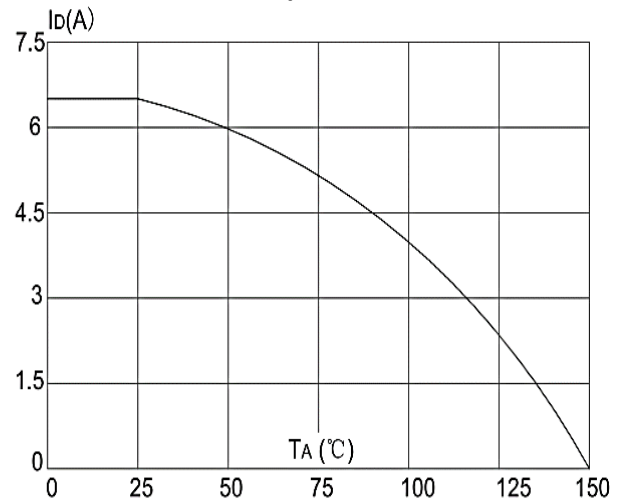


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

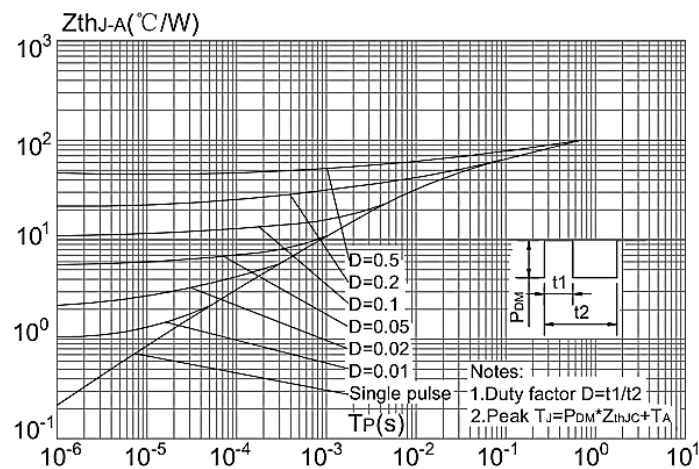
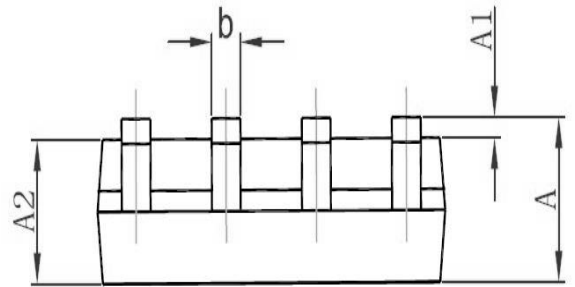
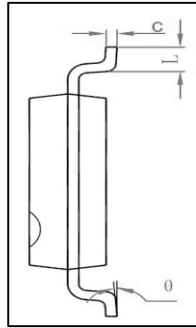
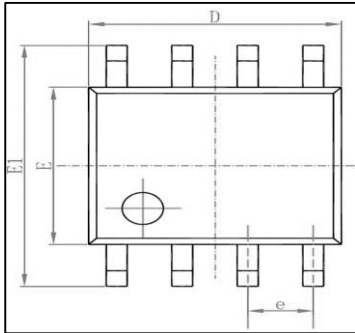
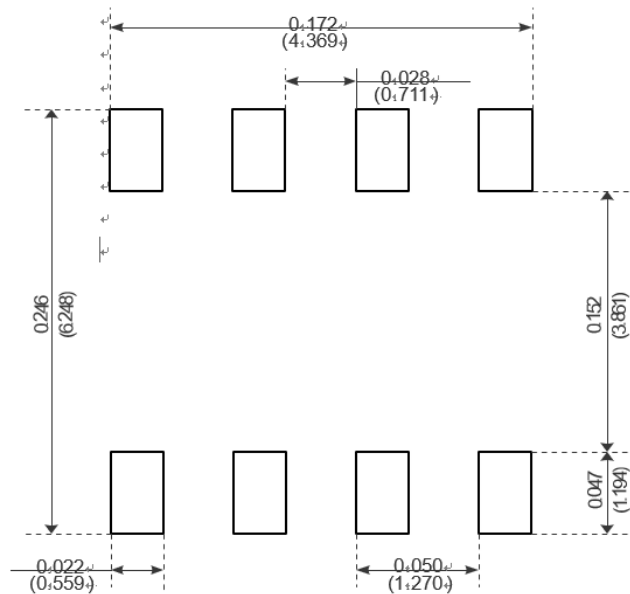


Figure 11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

Package Mechanical Data-SOP-8/ESOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



Recommended Minimum Pads

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Edition	Date	Change
Rve1.0	2021/4/21	Initial release

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