

## -30V P+P Channel Enhancement Mode MOSFET

### Description

The AP4959A uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

### General Features

$V_{DS} = -30V$   $I_D = -18A$

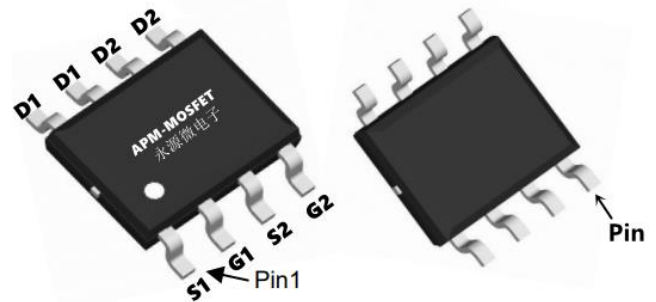
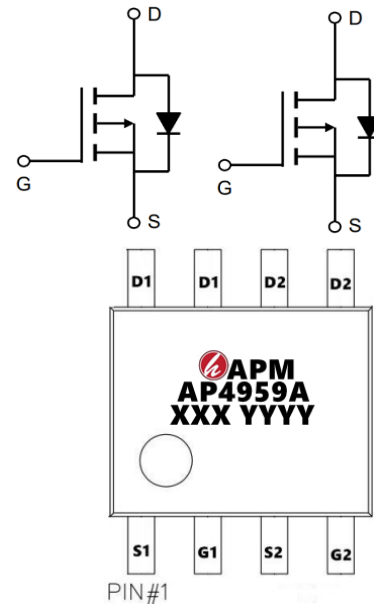
$R_{DS(ON)} < 18m\Omega$  @  $V_{GS} = -10V$  (Type: **12.5m $\Omega$** )

### Application

Lithium battery protection

Wireless impact

Mobile phone fast charging



### Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP4959A	SOP-8L	AP4959A XXX YYYY	300

### Absolute Maximum Ratings (TC=25°C unless otherwise noted)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-18	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-11	A
IDM	Pulsed Drain Current <sup>2</sup>	-48	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	168	mJ
$P_D @ T_A = 25^\circ C$	Total Power Dissipation <sup>4</sup>	310	W
TSTG	Storage Temperature Range	-55 to 150	°C
$T_J$	Operating Junction Temperature Range	-55 to 150	°C
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	85	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	4.5	°C/W



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### Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)

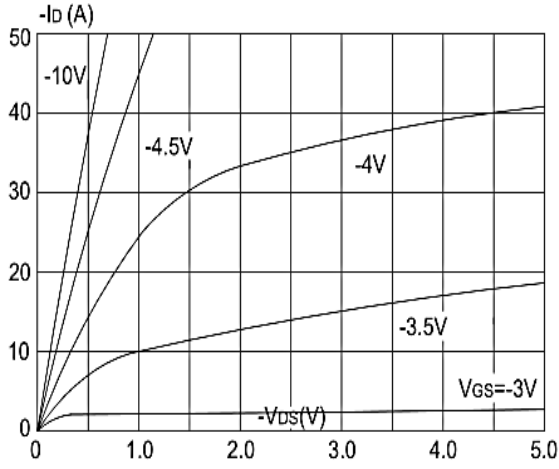
Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V(BR)DSS	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> = -250μA	-30	-32.5	-	V
IDSS	Zero Gate Voltage Drain Current	V <sub>DS</sub> = -30V, V <sub>GS</sub> =0V,	-	-	-1	μA
IGSS	Gate to Body Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V	-	-	±100	nA
VGS(th)	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> = -250μA	-1.2	-1.5	-2.5	V
RDS(on)	Static Drain-Source on-Resistance note3	V <sub>GS</sub> = -10V, I <sub>D</sub> = -10A	-	12	18	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -5A	-	18	25	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = -24V, V <sub>GS</sub> =10V, f=1.0MHz	-	2130	-	pF
C <sub>oss</sub>	Output Capacitance		-	280	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	252	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = -24V, I <sub>D</sub> = -1A, V <sub>GS</sub> = -10V	-	22	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	4	-	nC
Q <sub>gd</sub>	Gate-Drain("Miller") Charge		-	5.8	-	nC
td(on)	Turn-on Delay Time	V <sub>DD</sub> = -24V, I <sub>D</sub> = -1A, V <sub>GS</sub> = -10V, R <sub>GEN</sub> =7.0Ω	-	9	-	ns
t <sub>r</sub>	Turn-on Rise Time		-	13	-	ns
td(off)	Turn-off Delay Time		-	48	-	ns
t <sub>f</sub>	Turn-off Fall Time		-	20	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	-29.5	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-44	A
VSD	Drain to Source Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> = -1A	-	-0.74	-1.2	V

#### Note :

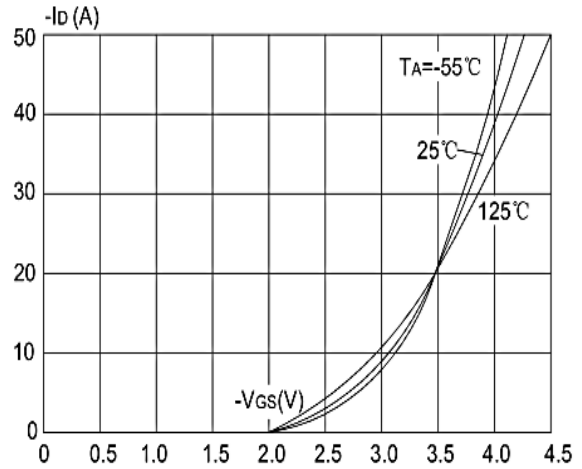
- 1、 The data tested by surface mounted on a 1 inch 2 FR-4 board with 2OZ copper.
- 2、 The data tested by pulsed , pulse width .The EAS data shows Max. rating .
- 3、 The power dissipation is limited by 175°C junction temperature
- 4、 The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

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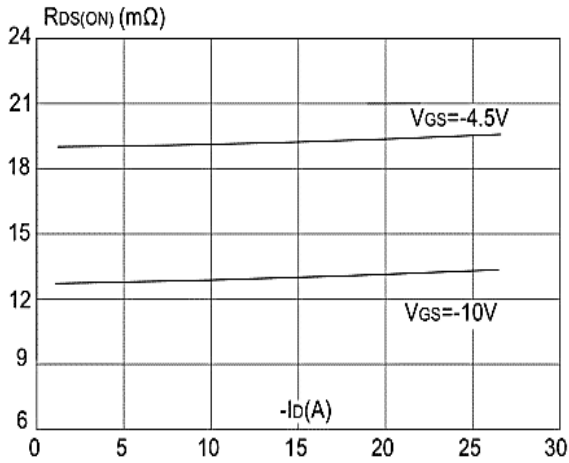
### Typical Characteristics



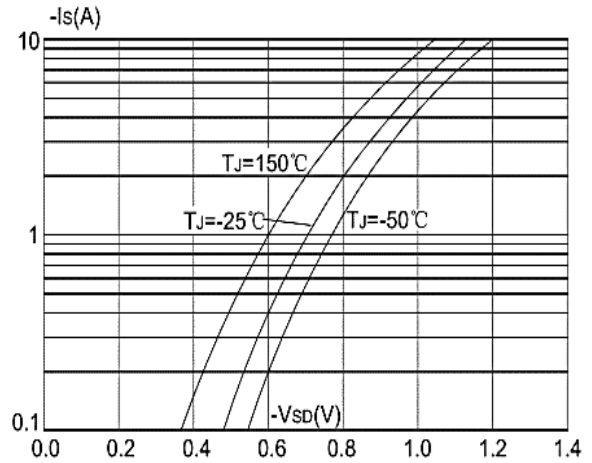
**Figure 1: Output Characteristics**



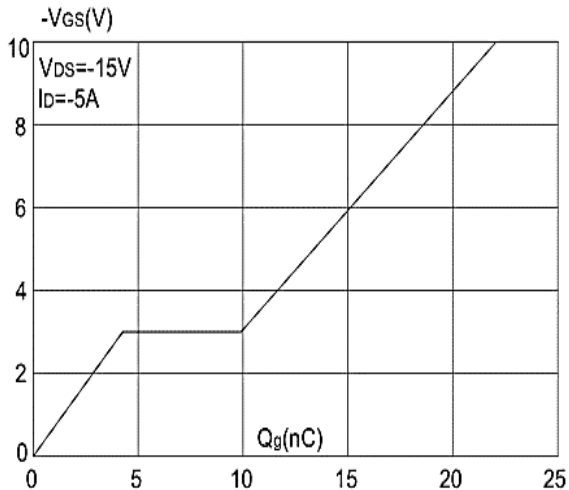
**Figure 2: Typical Transfer Characteristics**



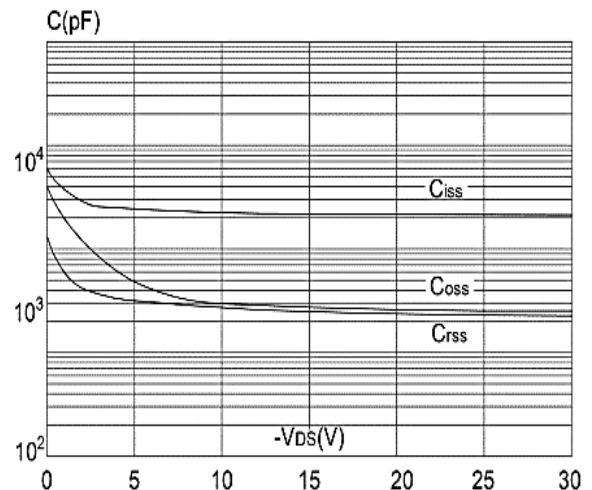
**Figure 3: On-resistance vs. Drain Current**



**Figure 4: Body Diode Characteristics**

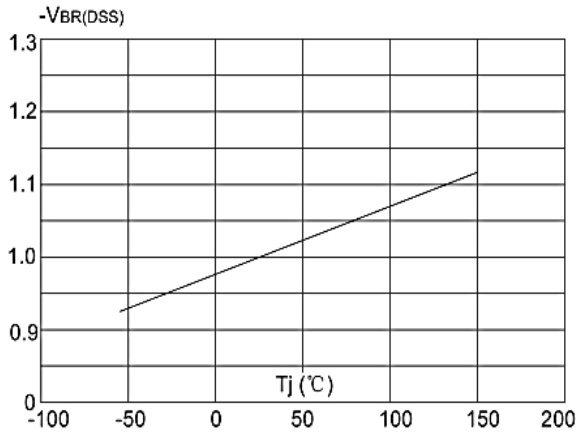


**Figure 5: Gate Charge Characteristics**

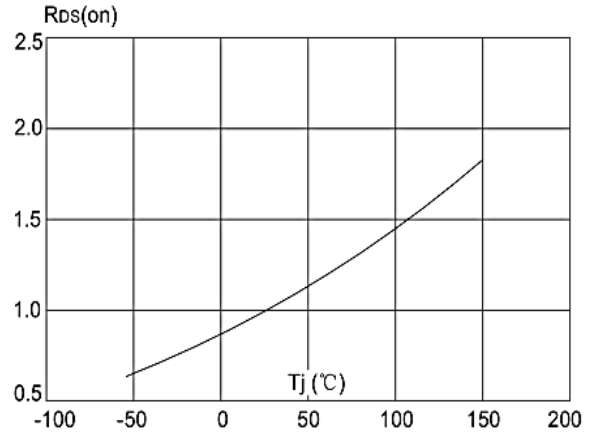


**Figure 6: Capacitance Characteristics**

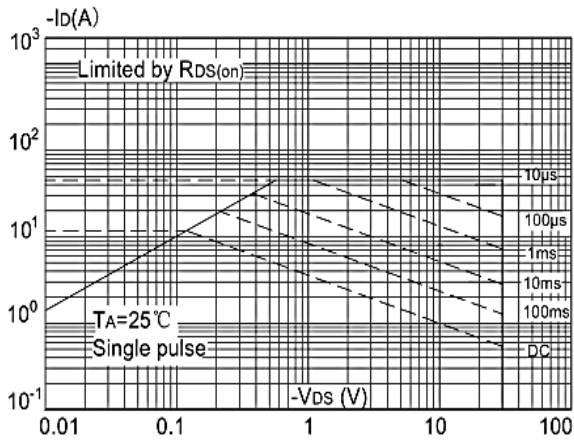
## -30V P+P Channel Enhancement Mode MOSFET



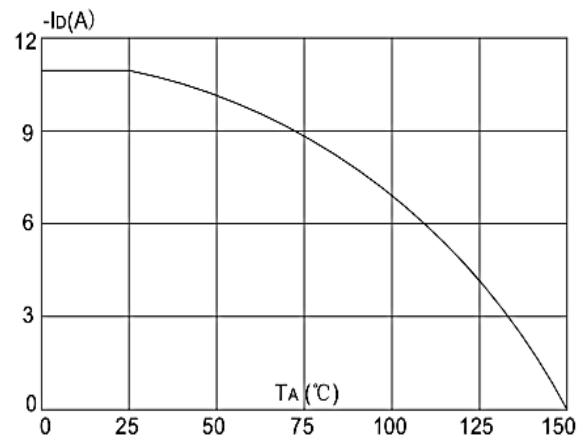
**Figure 7: Normalized Breakdown Voltage vs. Junction Temperature**



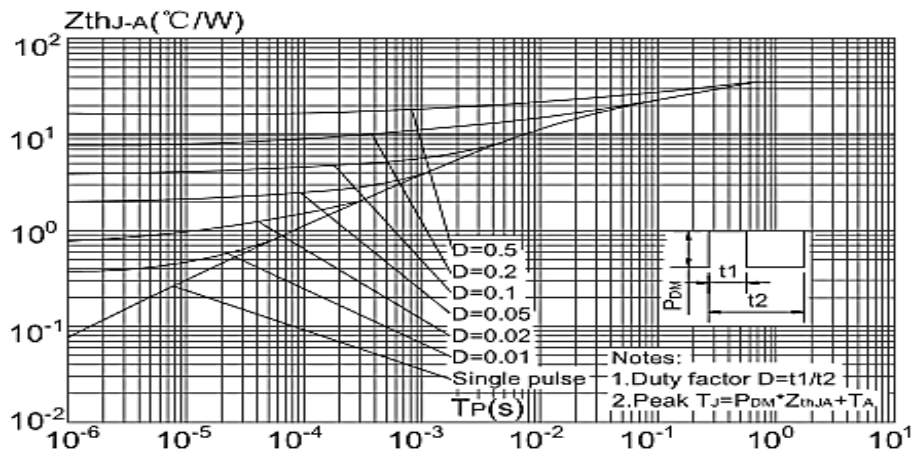
**Figure 8: Normalized on Resistance vs. Junction Temperature**



**Figure 9: Maximum Safe Operating Area**

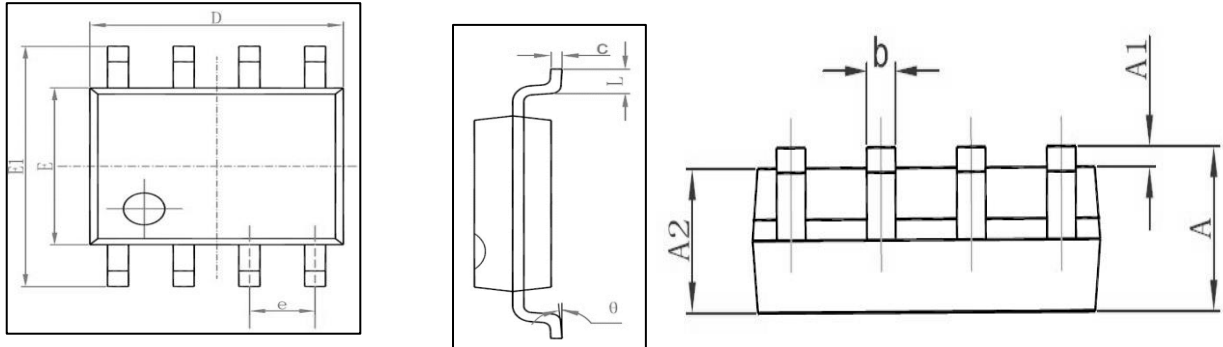


**Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature**

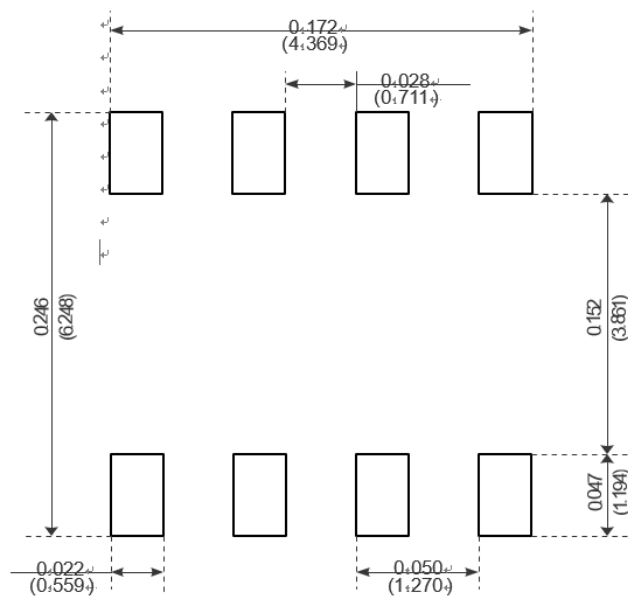


**Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient**

### Package Mechanical Data-SOP-8L



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

**-30V P+P Channel Enhancement Mode MOSFET****Attention**

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**AP4959A**

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Edition	Date	Change
Rve1.0	2021/1/10	Initial release

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