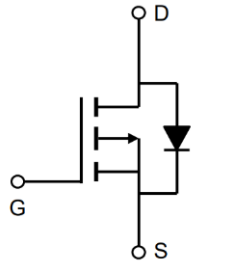
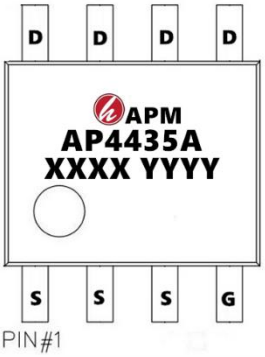
AP4435A

-30V P-Channel Enhancement Mode MOSFET

Description

The AP4435A 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} = -30V I_D = 9.5A

$R_{DS(ON)}$ < 20mΩ @ V_{GS}=10V

Application

Battery protection

Load switch

Uninterruptible power supply

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP4435A	SOP-8	AP4435A XXX YYYY	3000

Absolute Maximum Ratings (Tc=25℃ unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-30	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_A=25℃	Continuous Drain Current, V_{GS} @ -10V[1]	-9.5	A
I_D@T_A=70℃	Continuous Drain Current, V_{GS} @ -10V[1]	-7.6	A
I_{DM}	Pulsed Drain Current[2]	-50	A
EAS	Single Pulse Avalanche Energy[3]	72.2	mJ
I_{AS}	Avalanche Current	-38	A
P_D@T_A=25℃	Total Power Dissipation[4]	3.1	W
P_D@T_A=70℃	Total Power Dissipation[4]	2	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	75	℃/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1](t≦ 10s)	40	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	24	℃/W

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Electrical Characteristics (T_J=25℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-30	---	---	V
△BVDSS/△TJ	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=-1mA	---	-0.022	---	V/℃
RDS(ON)	Static Drain-Source On-Resistance[2]	V_{GS}=-10V , I_D=-6A	---	15	20	mΩ
		V_{GS}=-4.5V , I_D=-4A	---	23	32	
VGS(th)	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.0	1.6	-2.5	V
△$V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	4.6	---	mV/℃
IDSS	Drain-Source Leakage Current	V_{DS}=-24V , V_{GS}=0V , T_J=25℃	---	---	-1	uA
		V_{DS}=-24V , V_{GS}=0V , T_J=55℃	---	---	-5	
IGSS	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=-5V , I_D=-5A	---	17	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	13	---	Ω
Q_g	Total Gate Charge (-4.5V)	V_{DS}=-15V , V_{GS}=-4.5V , I_D=-6A	---	30	---	nC
Qgs	Gate-Source Charge		---	6	---	
Qgd	Gate-Drain Charge		---	9	---	
Td(on)	Turn-On Delay Time	V_{DD}=-15V , V_{GS}=-10V , R_G=3.3Ω, I_D=-6A	---	10	---	ns
T_r	Rise Time		---	26	---	
Td(off)	Turn-Off Delay Time		---	35	---	
T_f	Fall Time		---	8	---	
Ciss	Input Capacitance	V_{DS}=-15V , V_{GS}=0V , f=1MHz	---	1800	---	pF
Coss	Output Capacitance		---	305	---	
Crss	Reverse Transfer Capacitance		---	216	---	
IS	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	-10	A
ISM	Pulsed Source Current[2,5]		---	---	-50	A
VSD	Diode Forward Voltage[2]	V_{GS}=0V , I_S=-1A , T_J=25℃	---	---	-1.2	V
trr	Reverse Recovery Time	IF=-6A , dI/dt=100A/μs , T_J=25℃	---	16.3	---	nS
Q_{rr}	Reverse Recovery Charge		---	5.9	---	nC

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 ≦ 300us , duty cycle ≦ 2%

3.The EAS data shows Max. rating . The test condition is V^{DD}=-25V,V^{GS}=-10V,L=0.1mH,I^{AS}=-38A

4.The power dissipation is limited by 150℃ junction temperature

5 .The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

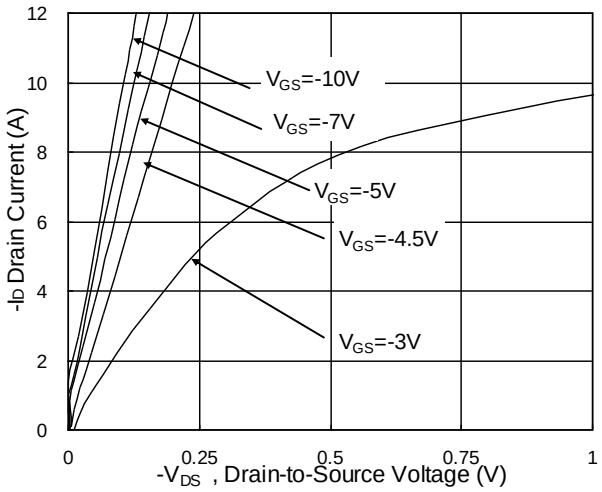

Fig.1 Typical Output Characteristics

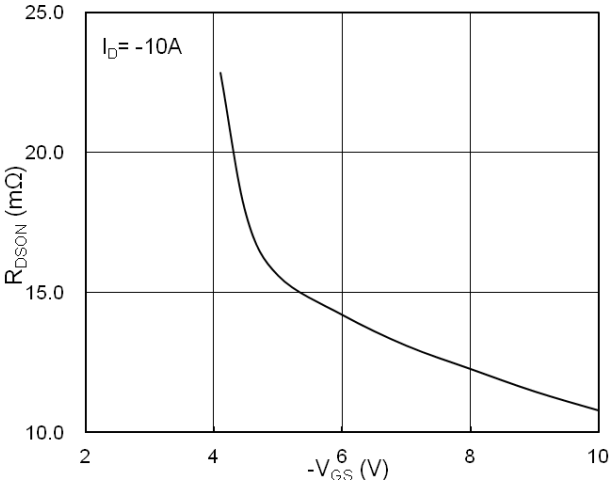

Fig.2 On-Resistance vs. G-S Voltage

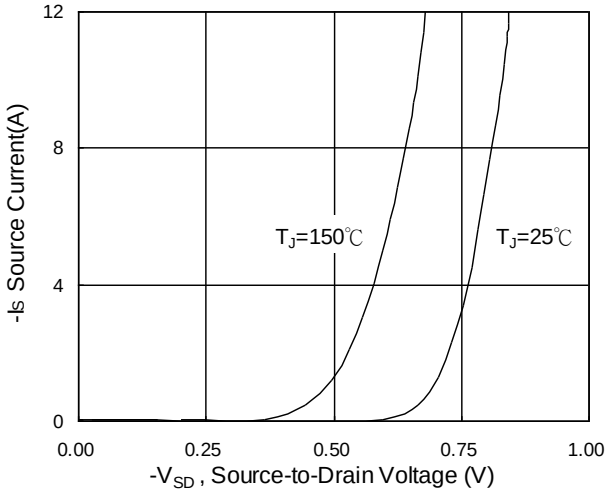

Fig.3 Forward Characteristics of Reverse

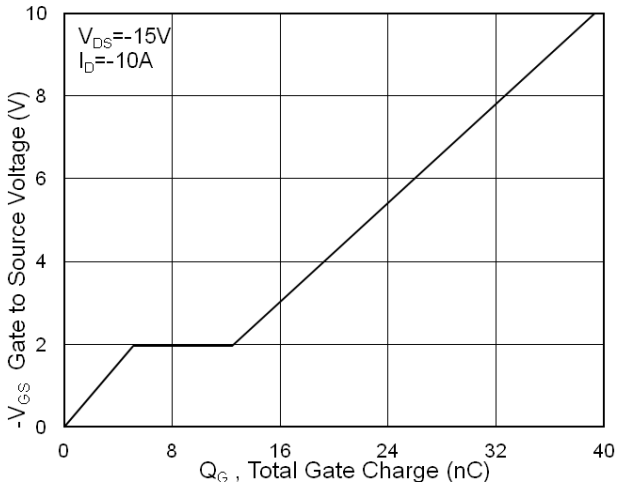

Fig.4 Gate-charge Characteristics

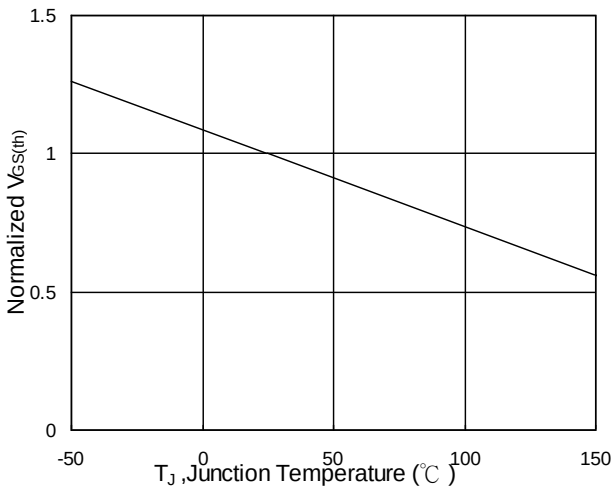

Fig.5 Normalized $V_{GS(th)}$ vs. T_J

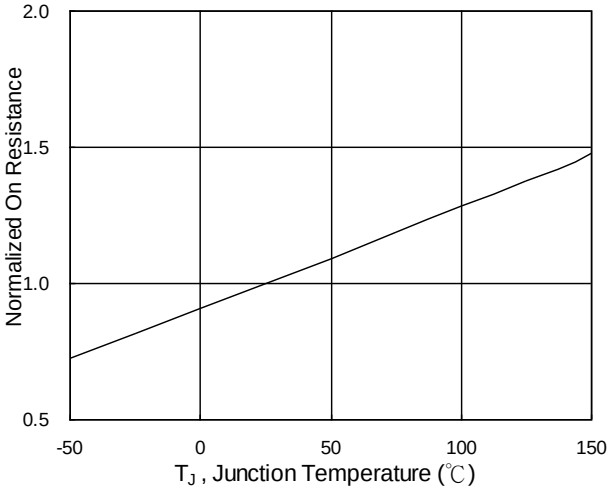

Fig.6 Normalized R_{DSON} vs. T_J

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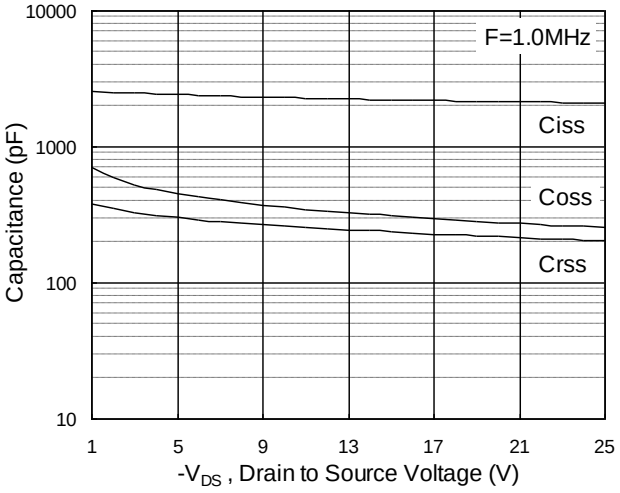

Fig.7 Capacitance

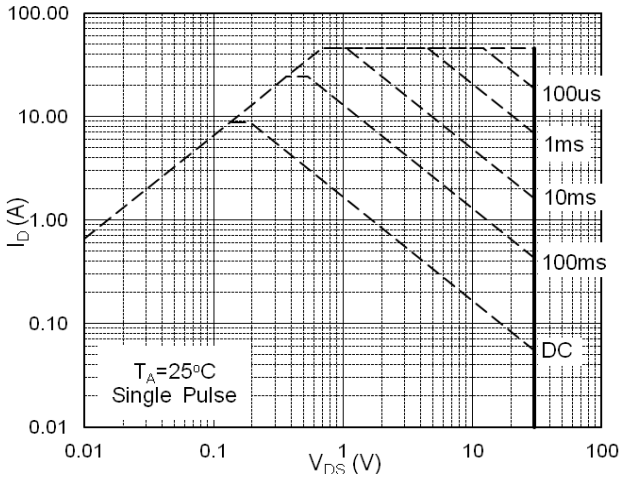

Fig.8 Safe Operating Area

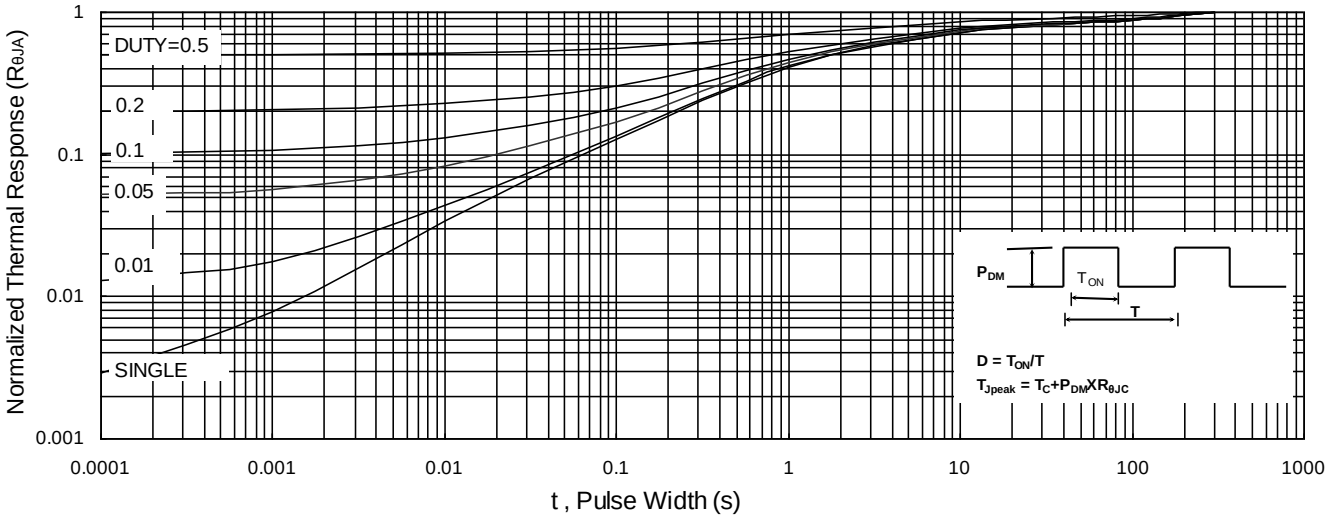

Fig.9 Normalized Maximum Transient Thermal Impedance

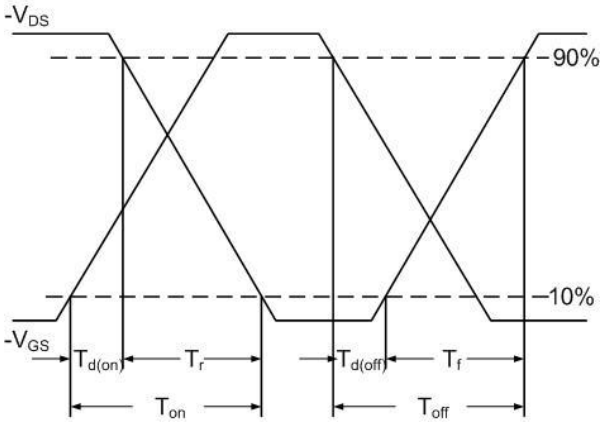

Fig.10 Switching Time Waveform

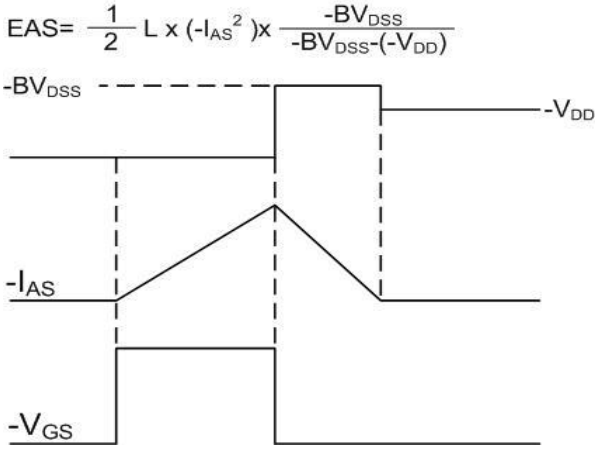

Fig.11 Unclamped Inductive Waveform

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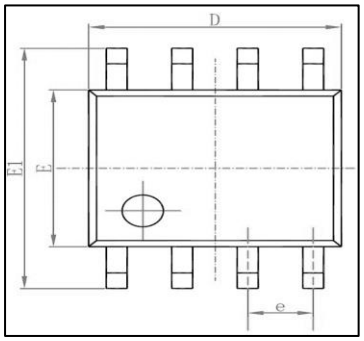
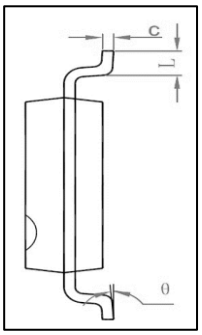
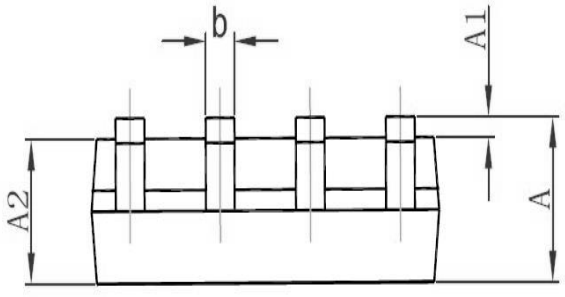
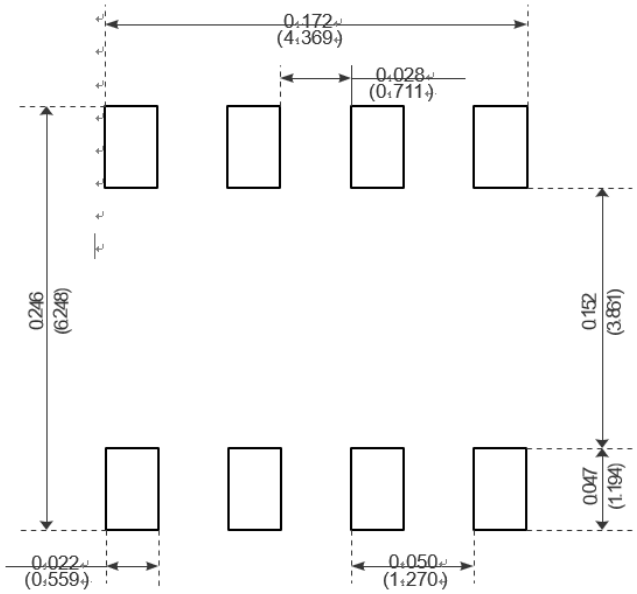
Package Mechanical Data-SOP-8







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	2018/1/31	Initial release
Rve1.2	2019/5/25	Reduce CiSS and QG

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