-30V P-Channel Enhancement-Mode MOSFET

General Description

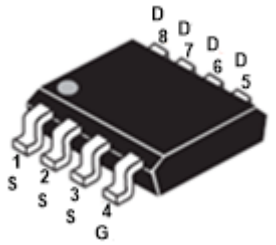
The AO4435 uses advanced trench MOSFET technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as -4.5V. This device is suitable for battery protection applications, used as a load switch or in PWM applications.

Features

- *V_{DS}=-30V*
- *I_D=-8.5A@V_{GS}=-10V*
- *Rds(on)=19mΩ(Typ.)@V_{GS}=-10V*
- *Rds(on)=29mΩ(Typ.)@V_{GS}=-4.5V*
- *Advanced high cell density Trench technology*
- *High power and current handing capability*
- *Super Low Gate Charge*
- *Package: SOP-8*
- *Pb-Free and Green devices are available*

Applications

- *PWM Applications*
- *Power Management*
- *Load Switch*
- *Battery Switch*



1. Source	8. Drain
2. Source	7. Drain
3. Source	6. Drain
4. Gate	5. Drain

Absolute Maximum Ratings (T_A=25ºC unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	-30	V
Gate-Source Voltage		V_{GS}	±20	V
Drain Current [a]	T_C=25ºC	I_D	-8.5	A
	T_C=70ºC		-4.68	
Drain Current –Pulsed [a]		I_{DM}	-30	A
Power Dissipation (T_C=25ºC)		P_D	3.0	W
Power Dissipation (T_C=75ºC)			2.0	
Storage Temperature Range		T_{STG}	-55 ~ +150	ºC
Operating Junction Temperature Range		T_J	-55 ~ +150	ºC
Thermal Resistance, Junction-to-Ambient1		$R_{\theta JA}$	60	ºC/W

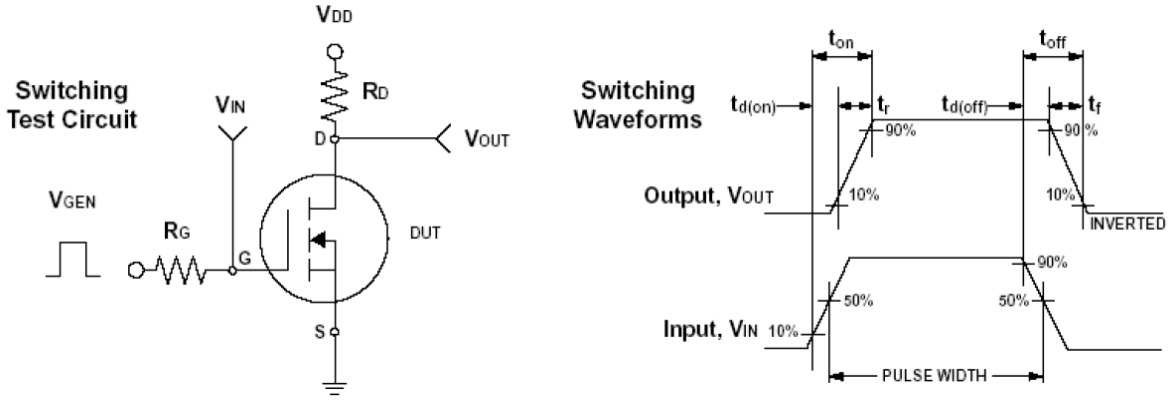
Electrical Characteristics (T_A=25ºC unless otherwise noted)

Parameter		Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=-250μA	-30	---	---	V
Zero Gate Voltage Drain Current	T_J=25°C	I_{DSS}	V_{DS}=-24V, V_{GS}=0V	---	---	-1	μA
Gate-Body Leakage		I_{GSS}	V_{GS}=±20V, V_{DS}=0V	---	---	±100	nA
On Characteristics [a]							
Gate Threshold Voltage		$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250μA	-1.0	---	-2.5	V
Drain-Source On-State Resistance		$R_{DS(on)}$	V_{GS}=-10V, I_D=-8.0A	---	19	26	mΩ
			V_{GS}=-4.5V, I_D=-6.0A	---	29	39	
Forward Transconductance		gfs	V_{DS}=-10V, I_D=-8A	---	16	---	S

Drain-Source Diode Characteristics [a]						
Continuous Source Current	I_S	$V_G=V_D=0V$, Force Current	---	---	-8.5	A
Pulsed Source Current	I_{SM}		---	---	-17	A
Diode Forward Voltage	V_{SD}	$V_{GS}=0V$, $I_S=-8.0A$, $T_J=25℃$	---	---	-1.2	V
Dynamic Characteristics [b]						
Input Capacitance	Ciss	$V_{DS}=-15V$, $V_{GS}=0V$, F=1MHz	---	930	---	pF
Output Capacitance	Coss		---	148	---	
Reverse Transfer Capacitance	Crss		---	115	---	
Switching Characteristics [b]						
Total Gate Charge	Qg	$V_{DS}=-20V$, $V_{GS}=-4.5V$, $I_D=-8A$	---	9.8	---	nC
Gate-Source Charge	Qgs		---	2.2	---	
Gate-Drain Charge	Qgd		---	3.4	---	
Turn-On Delay Time	Td(on)	$V_{DD}=-24V$, $V_{GS}=-10V$, $R_G=3.3\Omega$, $I_D=-1A$	---	16.4	---	ns
Rise Time	Tr		---	20.2	---	
Turn-Off Delay Time	Td(off)		---	55	---	
Fall Time	Tf		---	10	---	

Notes: a. Repetitive Rating: Pulsed width limited by maximum junction temperature.
b. Pulse test: pulse width ≤ 300us, duty cycle ≤ 2%.
c. Guaranteed by design, not subject to production testing.

Switching Time Test Circuit and Waveforms



Soldering Methods For Products

1. Storage environment : Temperature=10ºC~35ºC, Humidity=65%±15%
2. Reflow soldering of surface mount devices

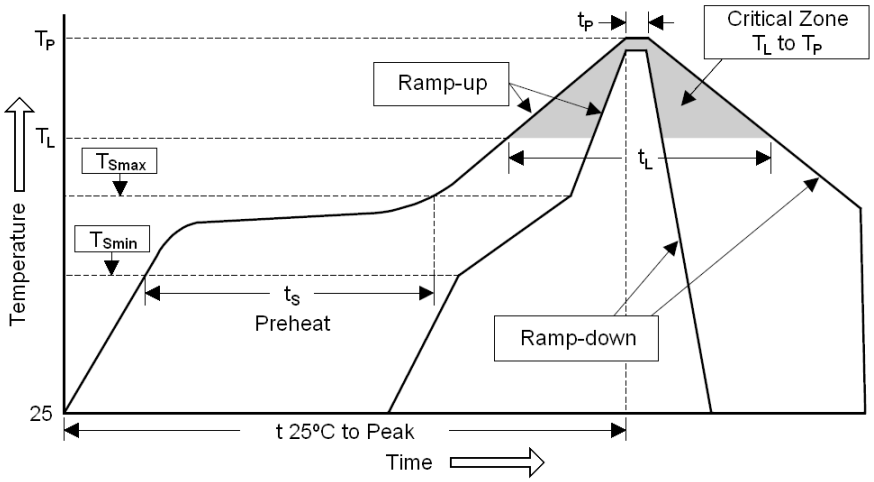


Figure : Temperature Profile

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	< 3ºC/sec	< 3ºC/sec
Preheat - Temperature Min (TSmin) - Temperature Max (TSmax) - Time (Min to Max) (ts)	 100ºC 150ºC 60 ~ 120 sec	 100ºC 200ºC 60 ~ 180 sec
TSmax to T_L - Ramp-up rate	 < 3ºC/sec	 < 3ºC/sec
Time maintained above: - Temperature (T_L) - Time (t_L)	 183ºC 60 ~ 150 sec	 217ºC 60 ~ 150 sec
Peak Temperature (T_P)	240ºC +0/-5ºC	260ºC +0/-5ºC
Time within 5ºC of actual Peak Temperature (t_P)	10 ~ 30 sec	20 ~ 40 sec
Ramp-down rate	< 6ºC/sec	< 6ºC/sec
Time 25ºC to Peak Temperature	< 6 minutes	< 8 minutes

3. Flow (wave) soldering (solder dipping)

Product	Peak Temperature	Dipping Time
Pb devices	245ºC ±5ºC	5sec ±1sec
Pb-Free devices	260ºC +0/-5ºC	5sec ±1sec

- 经锡炉或回焊炉的温度切勿超过 260 ºC (Max safe temperature: 260℃)。

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- MOS 管电路是静电敏感元器件，且对生产环境要求较严，建议在存放、运输及生产操作时一定要避免静电干扰。
- 由于每个 PCB 版图和设计都不同，每个 MOSFET 的结构也不同，因此，没有通用的流程可用来计算每个应用的最大允许电流，建议在选用 MOS 管器件时考虑到余量，以免 MOS 管因此而造成损坏。