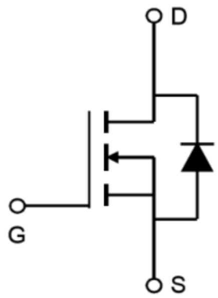
AP3406A

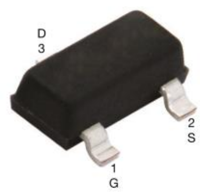
30V N-Channel Enhancement Mode MOSFET

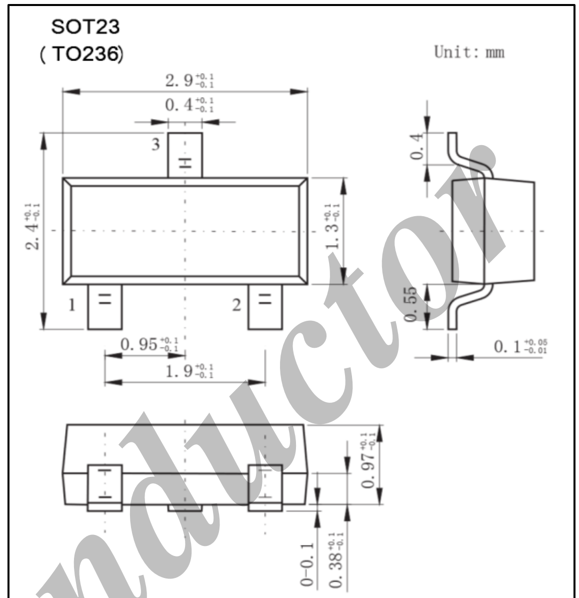
- **General Description**

AP3406A combines advanced MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is most suitable to load-switch or PWM applications.



Top View





- **Applications**

- DC/DC converter for portable devices
- Load switch

- **Product Summary**

V_{DS}	30V
I_D (at V_{GS} = 10V)	3.6A
$R_{DS(ON)}$ (at V_{GS} = 10V)	< 50mΩ
$R_{DS(ON)}$ (at V_{GS} = 4.5V)	< 70mΩ

- **Absolute Maximum Ratings Ta = 25℃**

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current	T_A=25℃	I_D	3.6	A
	T_A=70℃		2.9	
Pulsed Drain Current * [C]		I_{DM}	15	
Power Dissipation [B]	T_A=25℃	P_D	1.4	W
	T_A=70℃		0.9	
Thermal Resistance. Junction- to-Ambient [A D]	t ≤ 10s	$R_{\theta JA}$	90	℃/W
	Steady State		125	
Thermal Resistance. Junction- to-Lead (Steady State)		$R_{\theta JL}$	80	
Junction Temperature		T_J	150	℃
Storage Temperature Range		T_{STG}	-55 to 150	

* Repetitive rating, pulse width limited by junction temperature.

- ## Electrical Characteristics Ta = 25℃

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{DSS}	I_D=250µA, V_{GS}=0V	30			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=30V, V_{GS}=0V			1	µA
		V_{DS}=30V, V_{GS}=0V, T_J=55℃			5	
Gate-Body leakage current	I_{GSS}	V_{DS}=0V, V_{GS}=±20V			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250µA	1.5	2	2.5	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=3.6A		36	50	mΩ
		V_{GS}=10V, I_D=3.6A T_J=125℃		57	80	
		V_{GS}=4.5V, I_D=2.8A		48	70	
On State Drain Current	$I_{D(ON)}$	V_{GS}=10V, V_{DS}=5V	15			A
Forward Transconductance	g_{FS}	V_{DS}=5V, I_D=3.6A		11		S
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=15V, f=1MHz		170	210	pF
Output Capacitance	C_{oss}			35		
Reverse Transfer Capacitance	C_{rss}			23		
Gate Resistance	R_g	V_{GS}=0V, V_{DS}=0V, f=1MHz	1.7	3.5	5.3	Ω
Total Gate Charge	Q_g	V_{GS}=4.5V, V_{DS}=15V, I_D=3.6A		2	3	nC
		V_{GS}=10V, V_{DS}=15V, I_D=3.6A		4.05	5	
Gate Source Charge	Q_{gs}			0.55		
Gate Drain Charge	Q_{gd}			1		
Turn-On Delay Time	$t_{D(on)}$	V_{GS}=10V, V_{DS}=15V, R_L=2.2Ω, R_{GEN}=3Ω		4.5		ns
Turn-On Rise Time	t_r			1.5		
Turn-Off Delay Time	$t_{D(off)}$			18.5		
Turn-Off Fall Time	t_f			15.5		
Body Diode Reverse Recovery Time	t_{rr}	I_F=3.6A, d_I/d_t=100A/µs		7.5	10	ns
Body Diode Reverse Recovery Charge	Q_{rr}			2.5		nC
Maximum Body-Diode Continuous Current	I_S				1.5	A
Diode Forward Voltage	V_{SD}	I_S=1A, V_{GS}=0V		0.79	1	V

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A =25° C. The value in any given application depends on the user's specific board design.
B. The power dissipation P_D is based on $T_{J(MAX)}$=150° C, using ≤ 10s junction-to-ambient thermal resistance.
C. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150° C. Ratings are based on low frequency and duty cycles to keep initialT_J=25° C.
D. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to lead $R_{\theta JL}$ and lead to ambient.
E. The static characteristics in Figures 1 to 6 are obtained using <300µs pulses, duty cycle 0.5% max.
F. These curves are based on the junction-to-ambient thermal impedence which is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, assuming a maximum junction temperature of $T_{J(MAX)}$=150° C. The SOA curve provides a single pulse rating.

- ## Ordering Information

Ordering Part Number	Package	MOQ
AP3406A	SOT23 (TO236)	3,000 pcs / reel

- **Typical Characteristics**

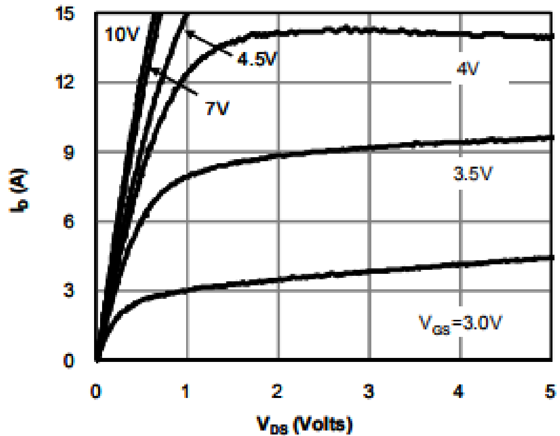


Fig 1: On-Region Characteristics (Note E)

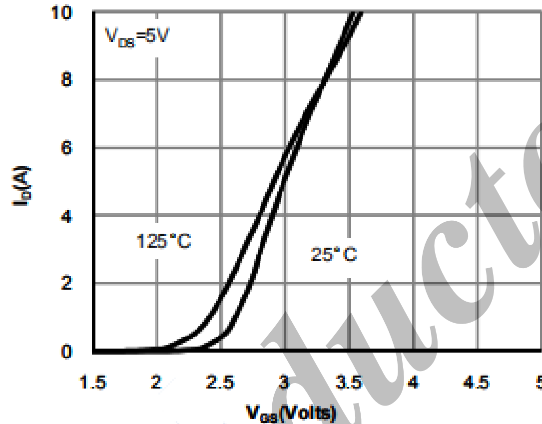


Figure 2: Transfer Characteristics (Note E)

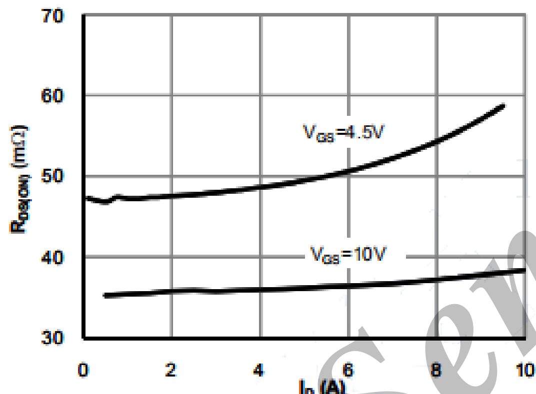


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

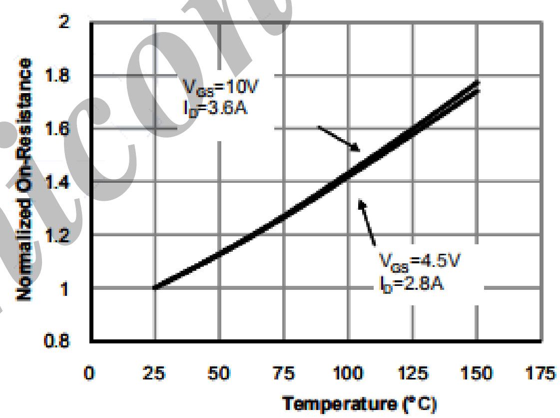


Figure 4: On-Resistance vs. Junction Temperature (Note E)

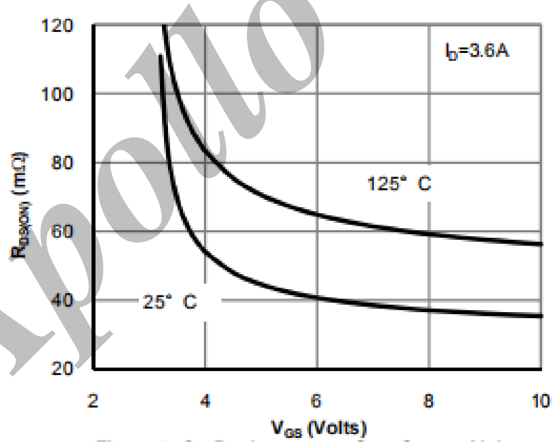


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

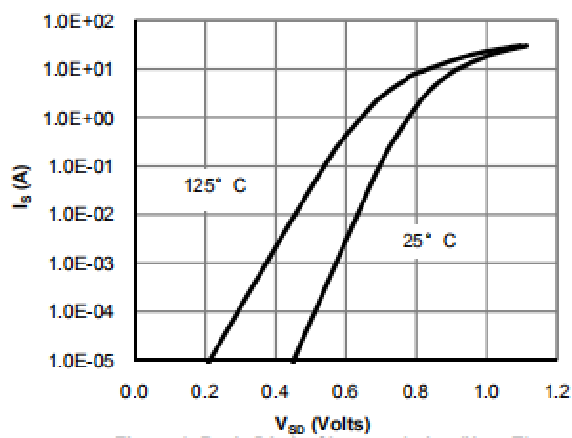


Figure 6: Body-Diode Characteristics (Note E)

- **Typical Characteristics**

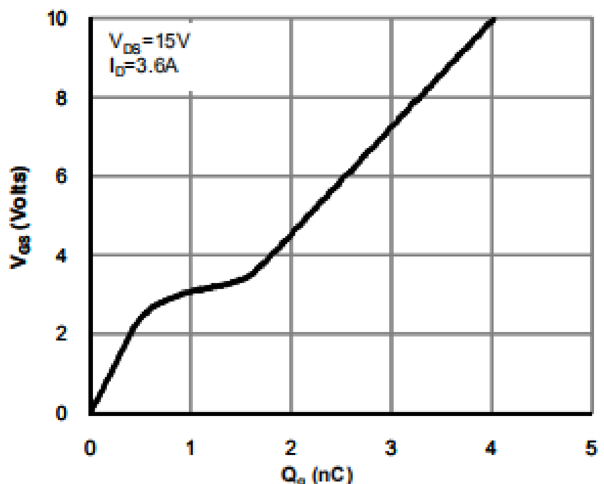


Figure 7: Gate-Charge Characteristics

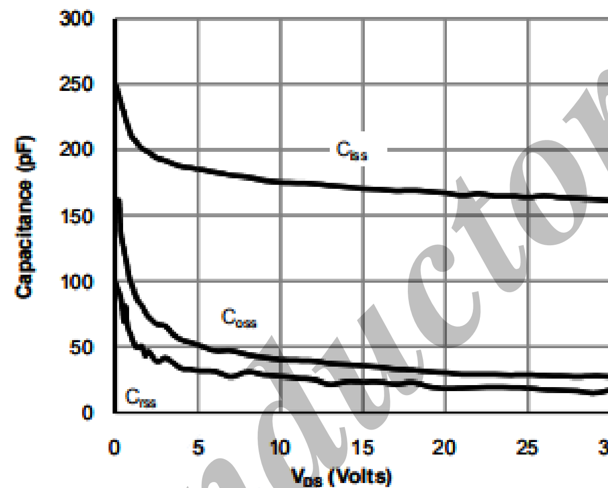


Figure 8: Capacitance Characteristics

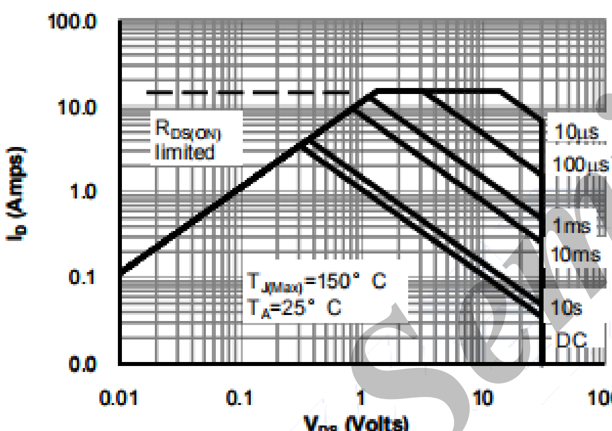


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

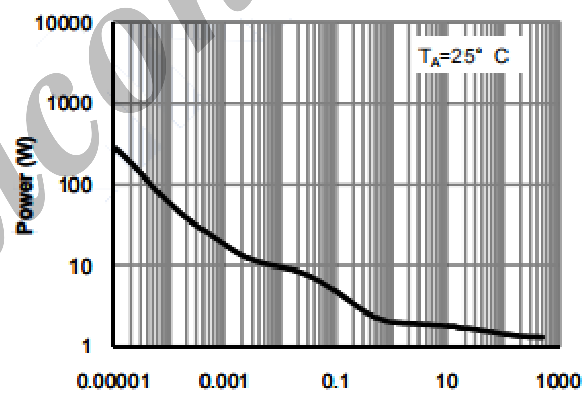


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

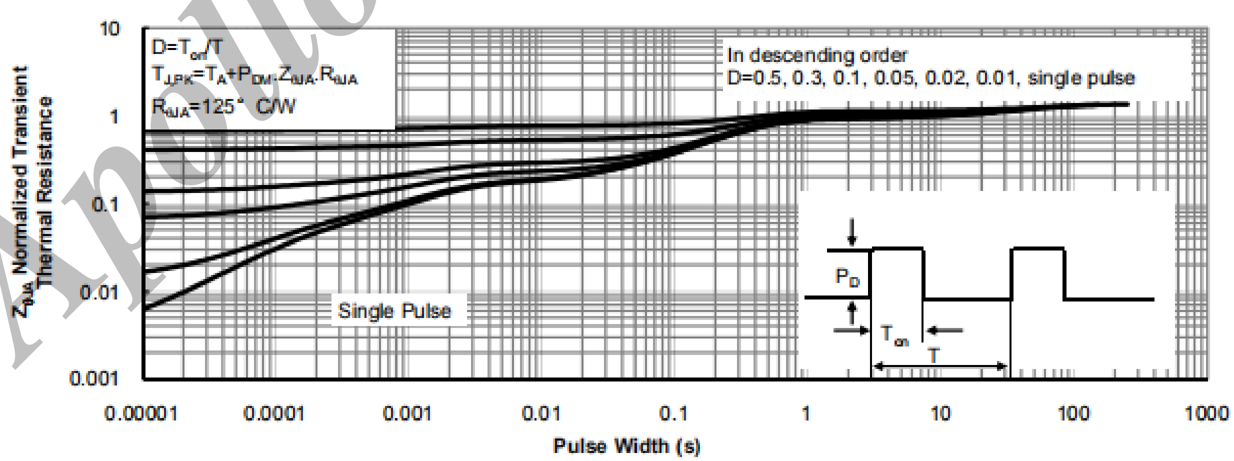


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

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