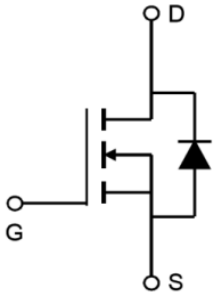
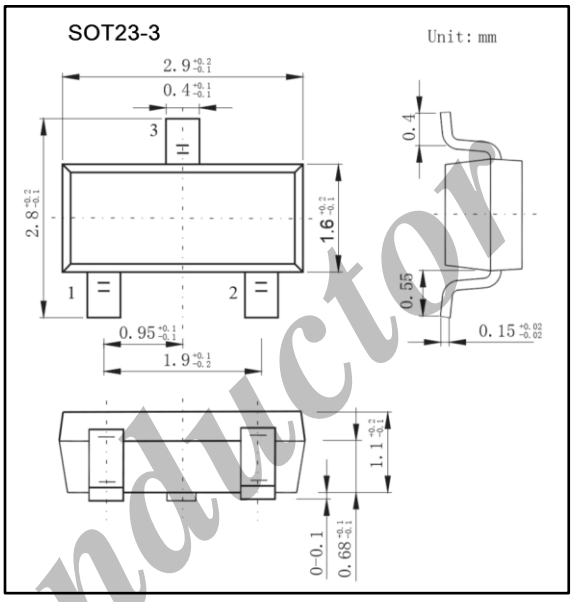
AP3406B
30V N-Channel Enhancement Mode MOSFET

- **General Description**

AP3406B 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.

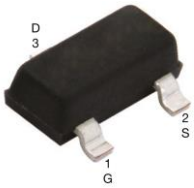




- **Applications**

- DC/DC converter for portable devices
- Load switch

Top View



- **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°C**

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

* Repetitive rating, pulse width limited by junction temperature.

- **Electrical Characteristics Ta = 25°C**

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°C			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°C		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
AP3406B	SOT23-3	3,000 pcs / reel

- **Typical Characteristics**

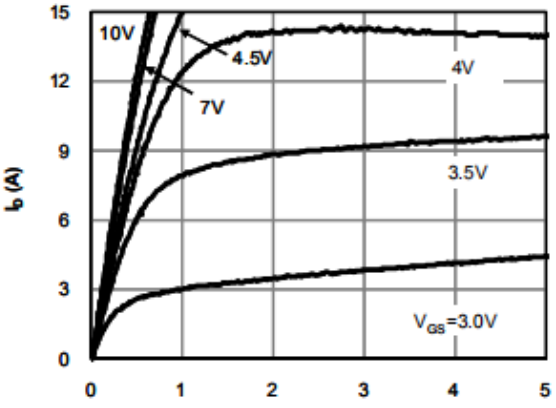


Fig 1: On-Region Characteristics (Note E)

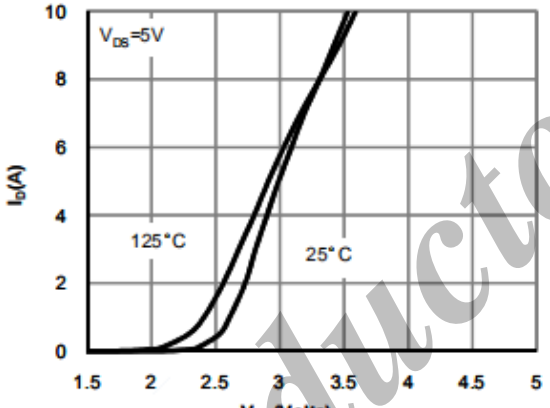


Figure 2: Transfer Characteristics (Note E)

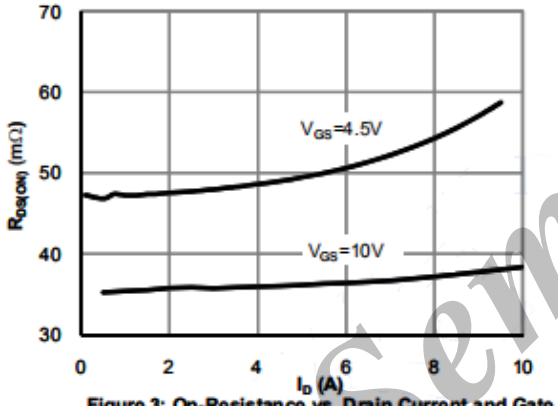


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

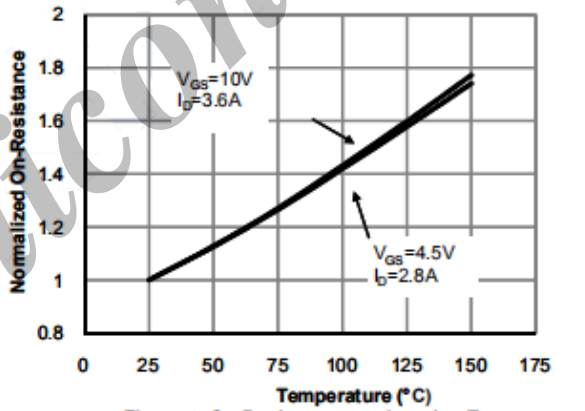


Figure 4: On-Resistance vs. Junction Temperature (Note E)

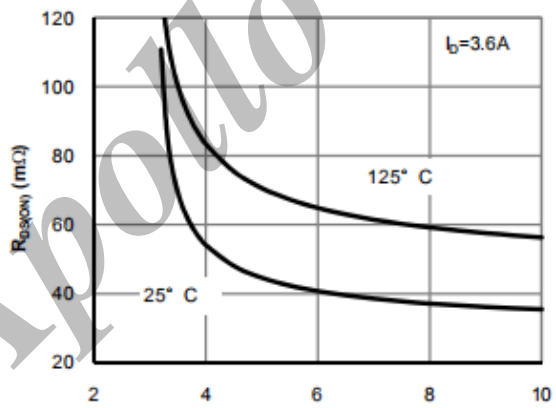


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

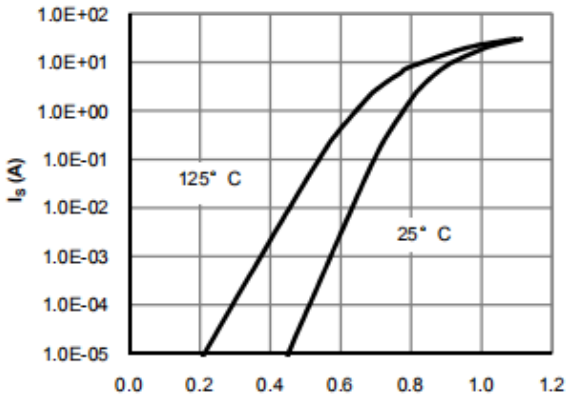


Figure 6: Body-Diode Characteristics (Note E)

- **Typical Characteristics**

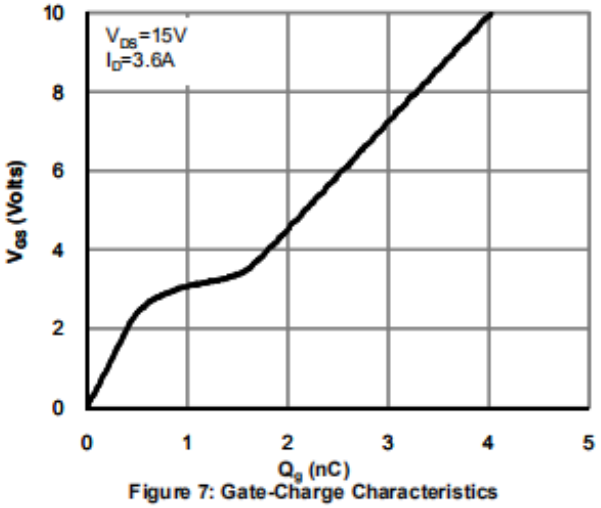


Figure 7: Gate-Charge Characteristics

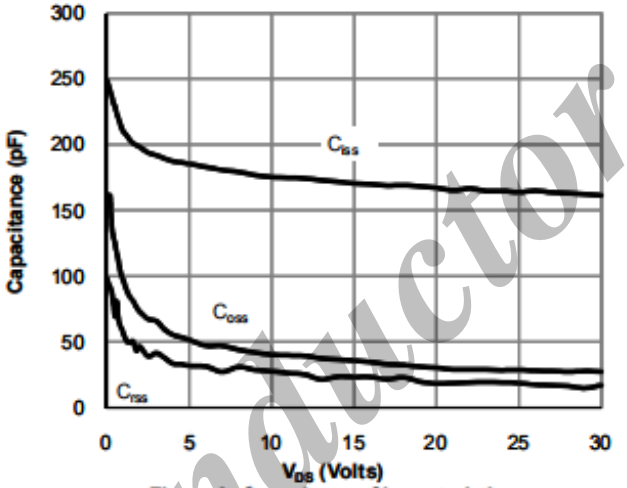


Figure 8: Capacitance Characteristics

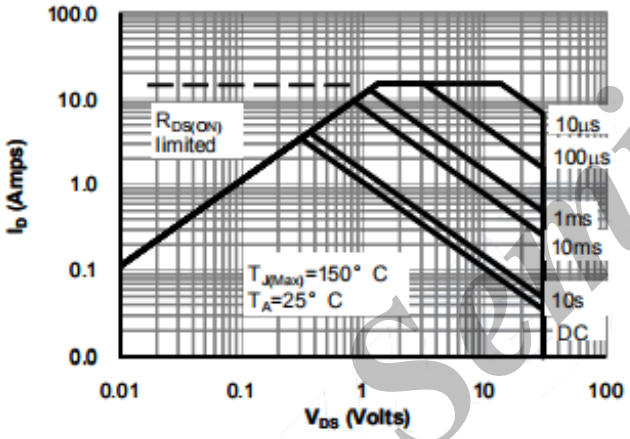


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

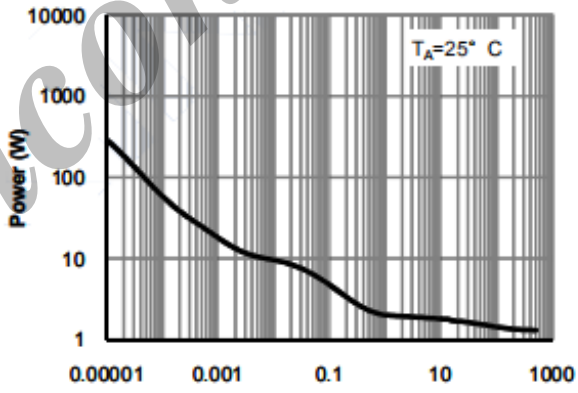


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

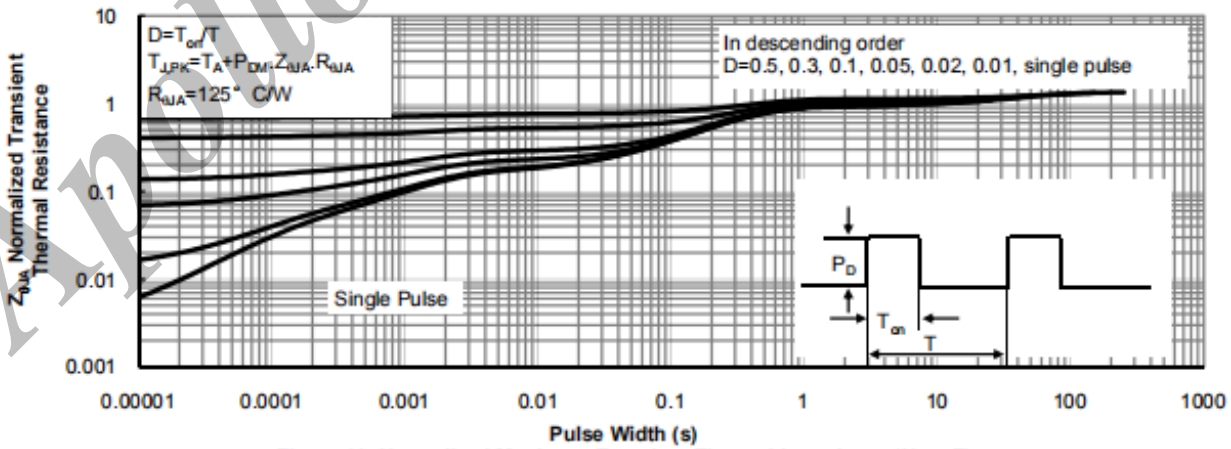


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Apollo Semiconductor Ltd., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Apollo"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Apollo makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Apollo disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Apollo's knowledge of typical requirements that are often placed on Apollo products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Apollo's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Apollo products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Apollo product could result in personal injury or death. Customers using or selling Apollo products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Apollo personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Apollo. Product names and markings noted herein may be trademarks of their respective owners.