

AP2305

P-Channel Power MOSFET

Description

The AP2305 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 load switch or in PWM applications.

General Features

- $V_{DS} = -20V, I_D = -4.1A$
 $R_{DS(ON)} < 75m\Omega @ V_{GS} = -2.5V$
 $R_{DS(ON)} < 42m\Omega @ V_{GS} = -4.5V$
- High power and current handling capability
- Lead free product is acquired
- Surface mount package

Application

- PWM applications
- Load switch
- Power management
- Halogen-free
- P/N suffix V means AEC-Q101 qualified, e.g:AP2305V

Package Marking and Ordering Information

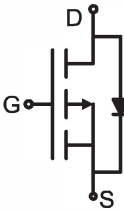
Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
A5SHB/2305	AP2305	SOT-23	Ø180mm	8 mm	3000 units

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

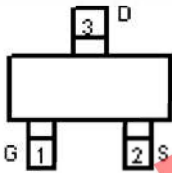
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V _{DS}	-20	V
Gate-Source Voltage		V _{GS}	±12	V
Continuous Drain Current	T _C =25°C	I _D	-4.1	A
	T _C =70°C		-3.2	
	T _A =25°C		-3	
	T _A =70°C		-2.3	
Drain Current -Pulsed (Note 1)		I _{DM}	-15	A
Maximum Power Dissipation		P _D	1.7	W
Operating Junction and Storage Temperature Range		T _J , T _{STG}	-55 To 150	°C

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient (Note 2)	R _{θJA}	74	°C/W
--	------------------	----	------



Schematic diagram



Marking and pin assignment



SOT-23 top view

AP2305

P-Channel Power MOSFET

Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A$	-20	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-20V, V_{GS}=0V$	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 12V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.45	-0.7	-1.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-4.5V, I_D=-4.1A$	-	32	42	m Ω
		$V_{GS}=-2.5V, I_D=-3A$	-	50	75	
Forward Transconductance	g_{FS}	$V_{DS}=-5V, I_D=-2A$	6	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{iss}	$V_{DS}=-4V, V_{GS}=0V,$ $F=1.0MHz$	-	740	-	PF
Output Capacitance	C_{oss}		-	290	-	PF
Reverse Transfer Capacitance	C_{rss}		-	190	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-4V, I_D=-3.3A,$ $R_L=1.2\Omega, V_{GEN}=-4.5V, R_g=1\Omega$ $V_{DS}=-4V, I_D=-4.1A, V_{GS}=-4.5V$	-	12	-	nS
Turn-on Rise Time	t_r		-	5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	30	-	nS
Turn-Off Fall Time	t_f		-	10	-	nS
Total Gate Charge	Q_g		-	7.8	-	nC
Gate-Source Charge	Q_{gs}		-	1.2	-	nC
Gate-Drain Charge	Q_{gd}		-	1.6	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 2)	V_{SD}	$V_{GS}=0V, I_S=-1.6A$	-	-	-1.2	V
Diode Forward Current (Note 2)	I_S		-	-	1.6	A

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

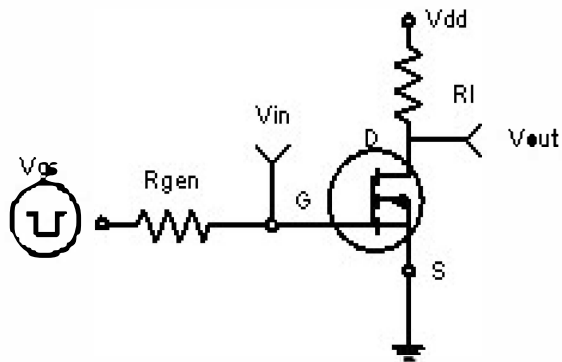


Figure 1:Switching Test Circuit

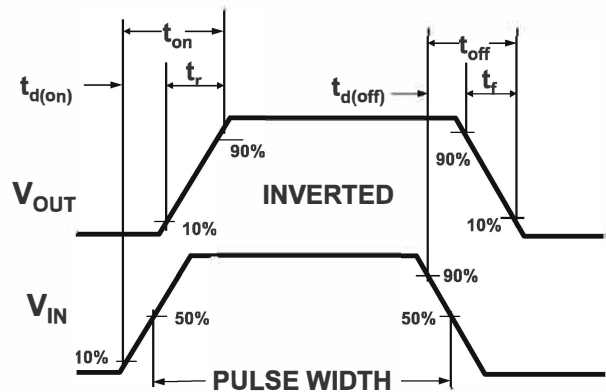


Figure 2:Switching Waveforms

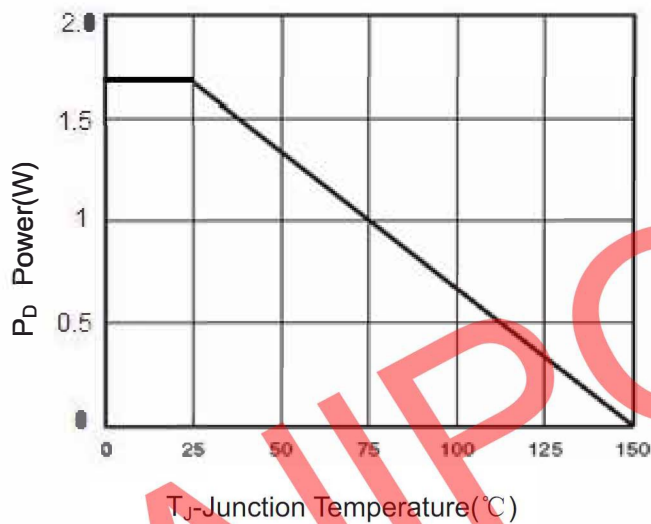


Figure 3 Power Dissipation

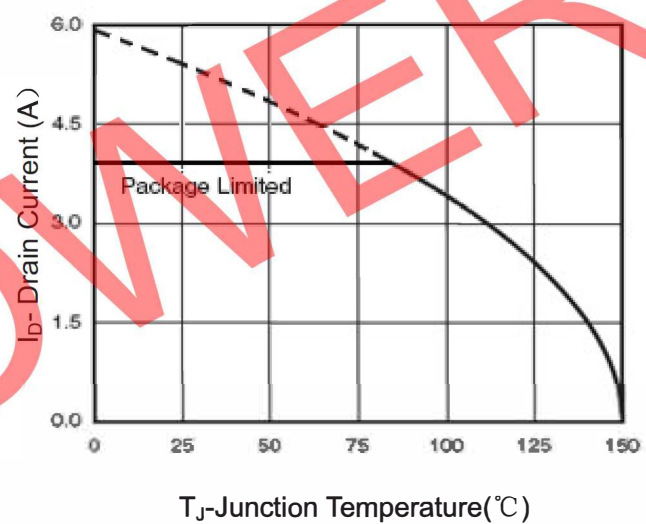


Figure 4 Drain Current

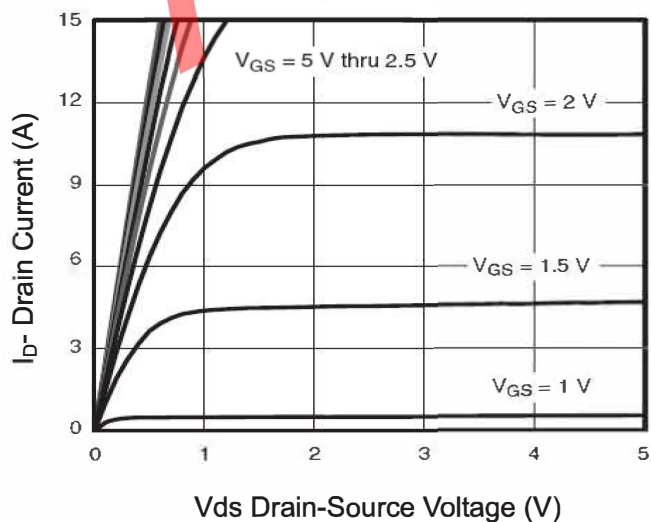


Figure 5 Output Characteristics

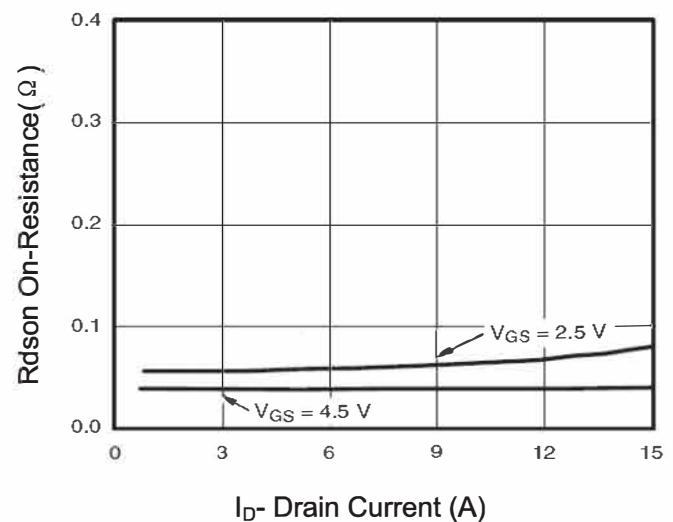


Figure 6 Drain-Source On-Resistance

AP2305
P-Channel Power MOSFET

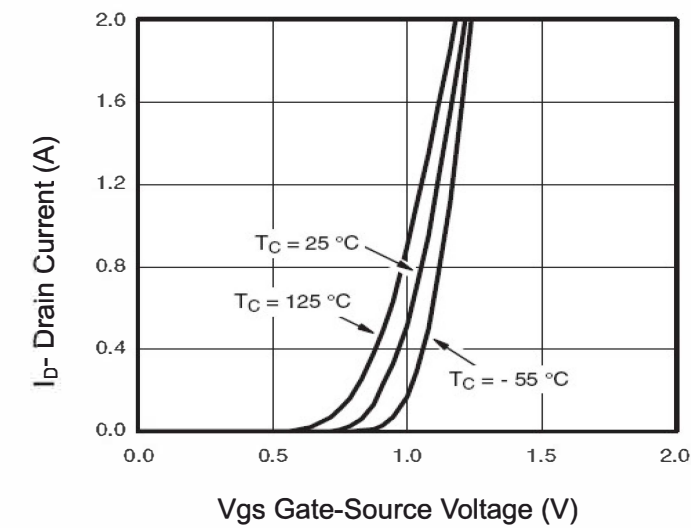


Figure 7 Transfer Characteristics

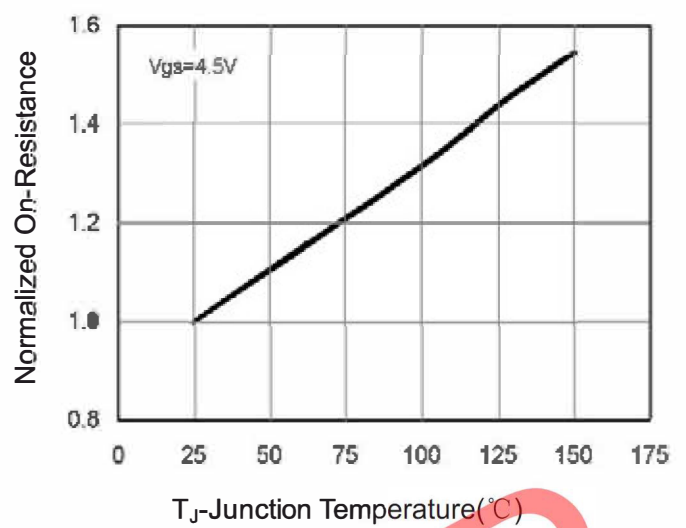


Figure 8 Drain-Source On-Resistance

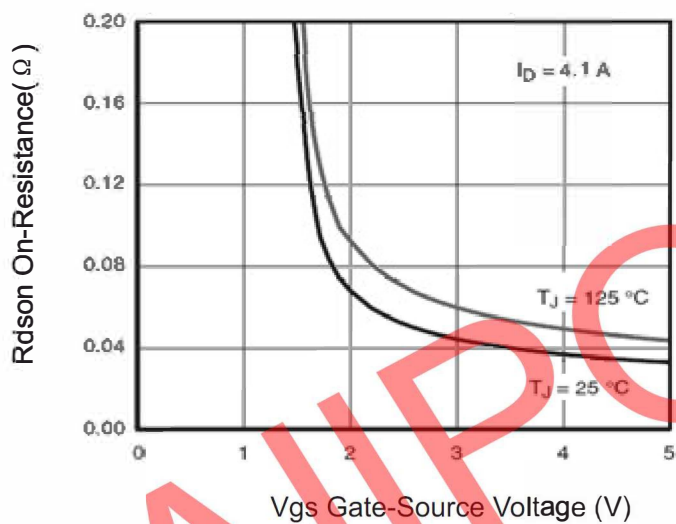


Figure 9 $R_{DS(on)}$ vs V_{GS}

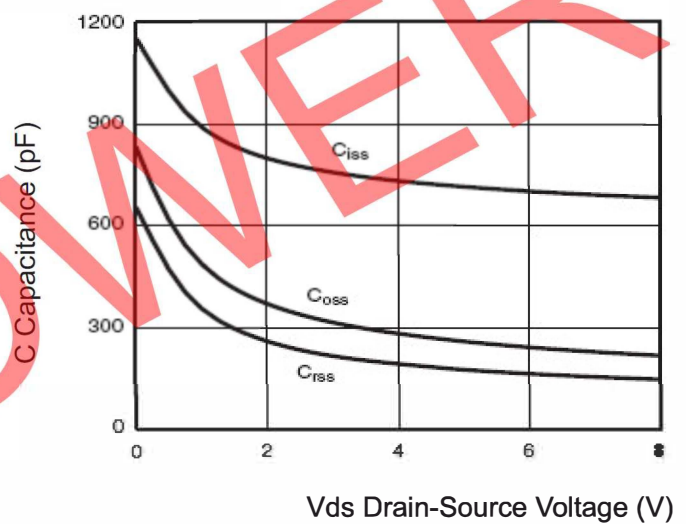


Figure 10 Capacitance vs V_{DS}

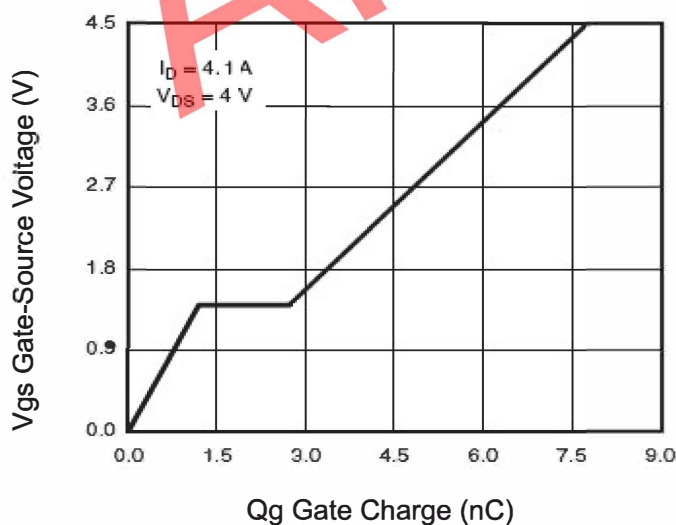


Figure 11 Gate Charge

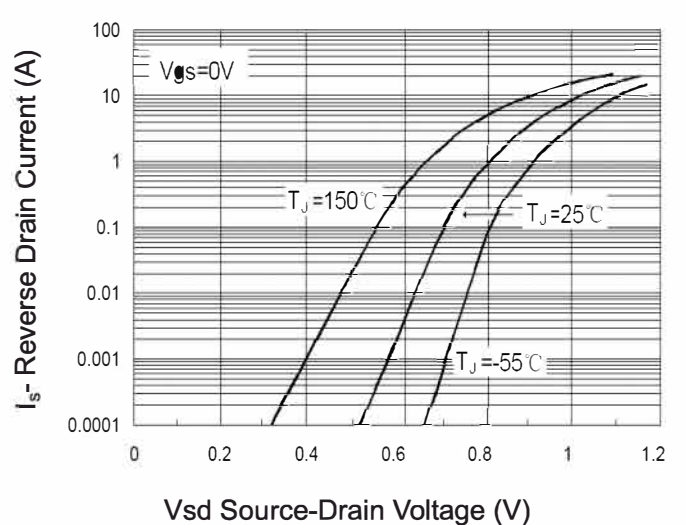


Figure 12 Source- Drain Diode Forward

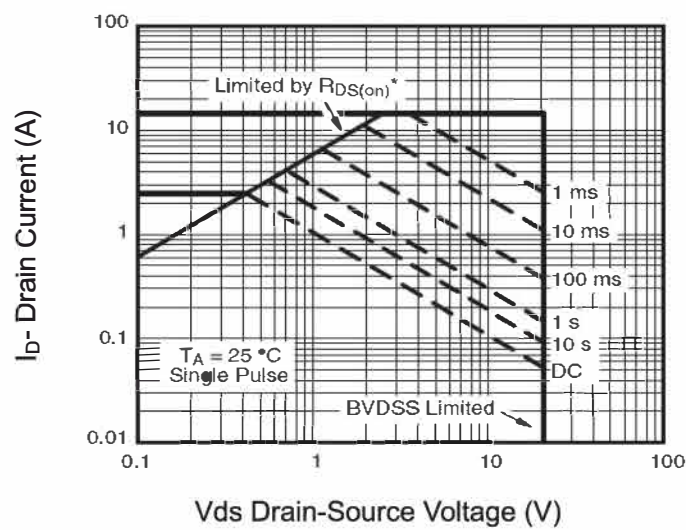


Figure 13 Safe Operation Area

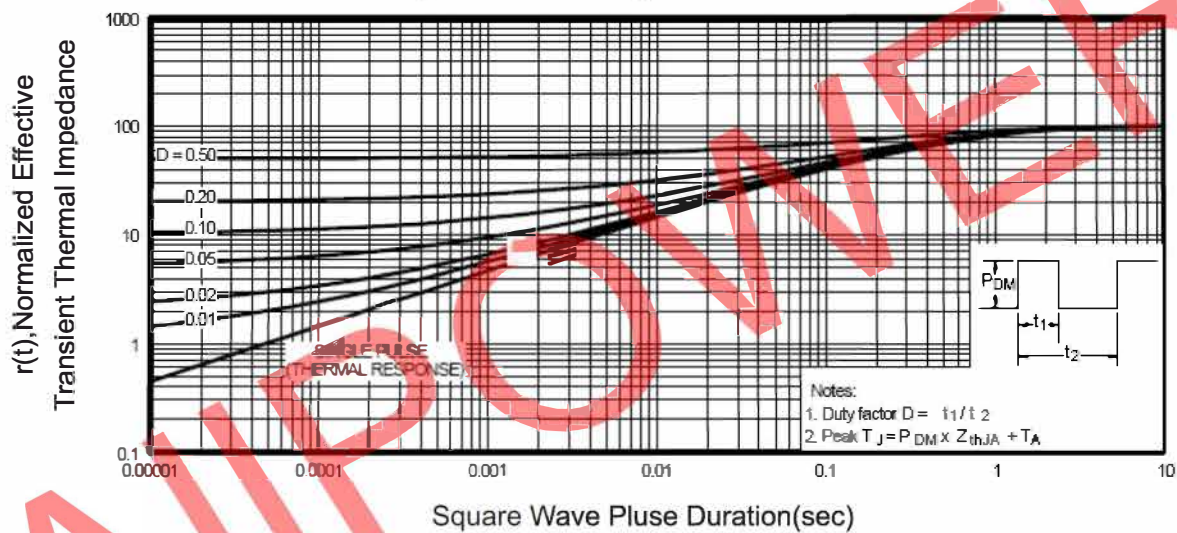
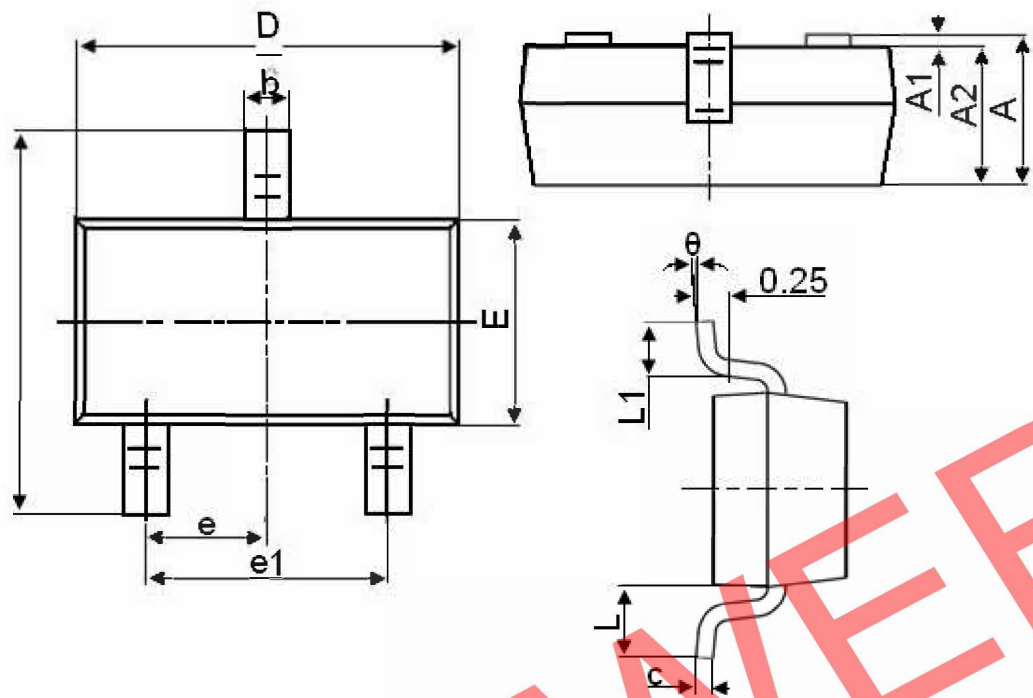


Figure 14 Normalized Maximum Transient Thermal Impedance

AP2305

P-Channel Power MOSFET

SOT-23 Package Information



Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°

Notes

- 1. All dimensions are in millimeters.
- 2. Tolerance ±0.10mm (4 mil) unless otherwise specified
- 3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
- 4. Dimension L is measured in gauge plane.
- 5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.