P-Channel Enhancement Mode Power MOSFET

Description

The HM2305B 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.
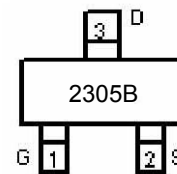
General Features

● V_{DS} = -12V, I_D = -4.1A

  $R_{DS(ON)}$ <78mΩ @ V_{GS}=-2.5V

  $R_{DS(ON)}$ < 55mΩ @ V_{GS}=-4.5V

● High power and current handing capability

● Lead free product is acquired

● Surface mount package

Application

● PWM applications

● Load switch

● Power management
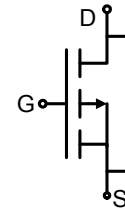
Schematic diagram

Marking and pin assignment

2305B

SOT-23 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
2305B	HM2305B	SOT-23	Ø180mm	8 mm	3000 units

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

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	-12	V
Gate-Source Voltage		V_{GS}	±12	V
Continuous Drain Current	T_C =25℃	I_D	-4.1	A
	T_C =70℃		-3.2	
	T_A =25℃		-3	
	T_A =70℃		-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	℃

Thermal Characteristic

	Symbol	Limit	Unit
Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	74	℃/W

Electrical Characteristics (T$_A$=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV$_{DSS}$	V$_{GS}$=0V I$_D$=-250µA	-12	-	-	V
Zero Gate Voltage Drain Current	I$_{DSS}$	V$_{DS}$=-20V,V$_{GS}$=0V	-	-	-1	µA
Gate-Body Leakage Current	I$_{GSS}$	V$_{GS}$=±12V,V$_{DS}$=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V$_{GS(th)}$	V$_{DS}$=V$_{GS}$,I$_D$=-250µA	-0.4	-0.7	-1.0	V
Drain-Source On-State Resistance	R$_{DS(ON)}$	V$_{GS}$=-4.5V, I$_D$=-4.1A	-	40	55	mΩ
		V$_{GS}$=-2.5V, I$_D$=-3A	-	55	78	
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$_L$=-1.2Ω,V$_{GEN}$=-4.5V,R$_g$=1Ω	-	12	-	nS
Turn-on Rise Time	t$_r$		-	35	-	nS
Turn-Off Delay Time	t$_{d(off)}$		-	30	-	nS
Turn-Off Fall Time	t$_f$		-	10	-	nS
Total Gate Charge	Q$_g$	V$_{DS}$=-4V,I$_D$=-4.1A,V$_{GS}$=-4.5V	-	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 3)	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 ≤ 10 sec.

3. Pulse Test: Pulse Width ≤ 300µs, Duty Cycle ≤ 2%.

4. Guaranteed by design, not subject to production

Typical Electrical and Thermal Characteristics

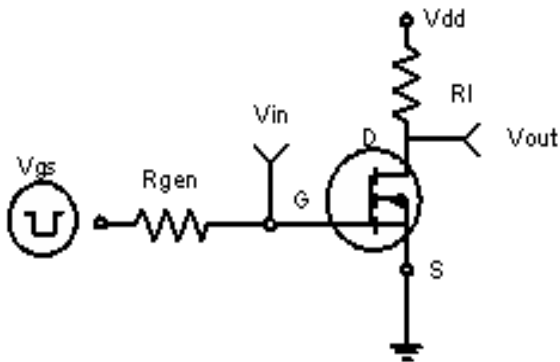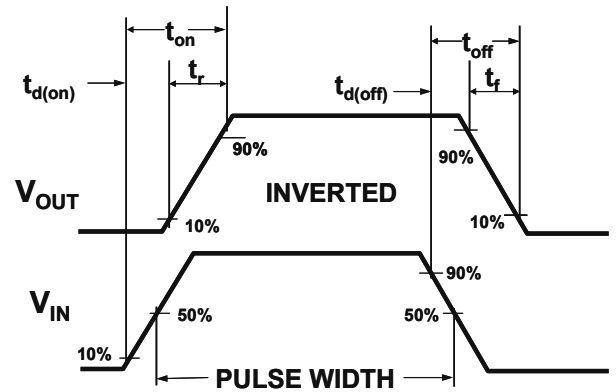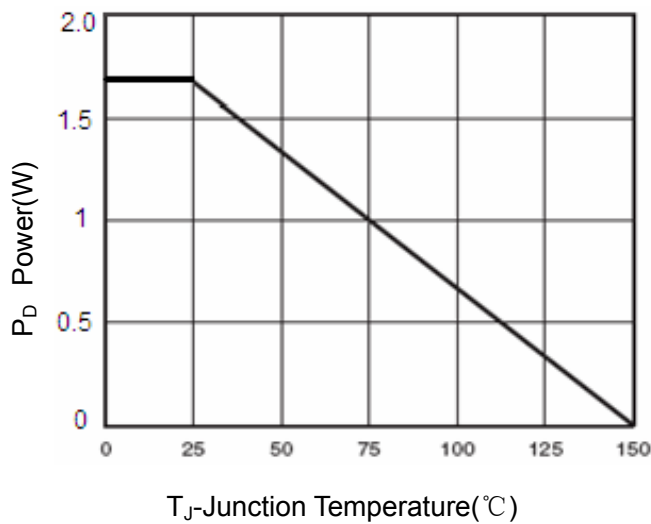**Figure 1:Switching Test Circuit**

Figure 2:Switching Waveforms

T_J-Junction Temperature(℃)

Figure 3 Power Dissipation
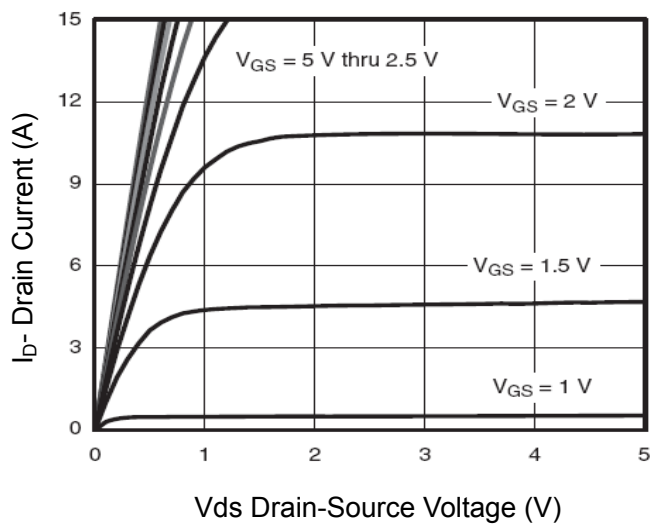

T_J-Junction Temperature(℃)
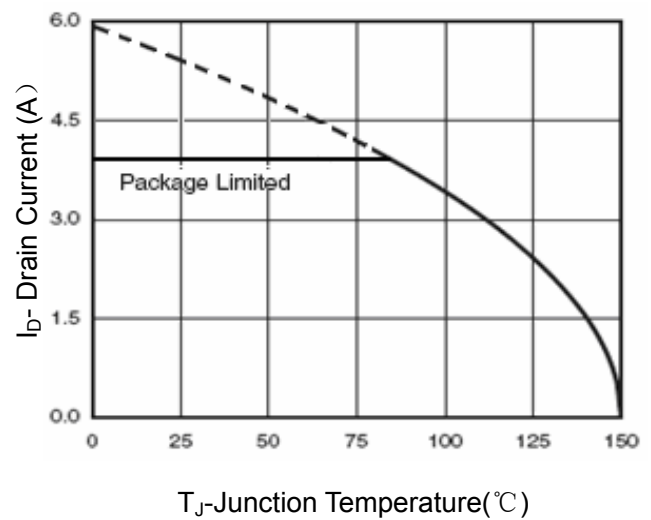
Figure 4 Drain Current

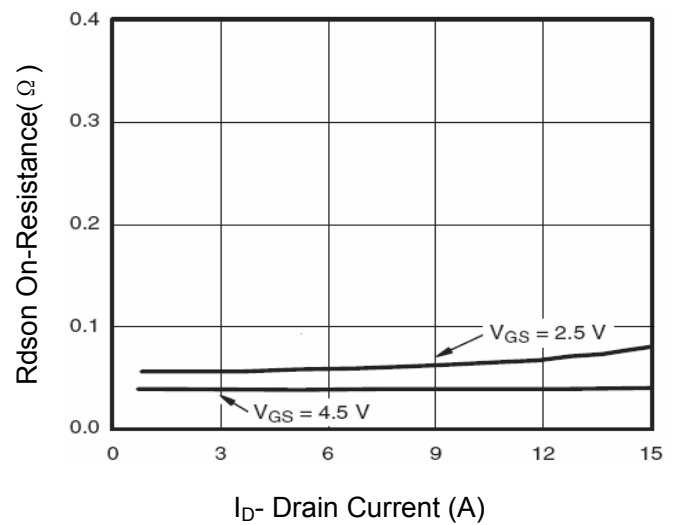Vds Drain-Source Voltage (V)

Figure 5 Output Characteristics

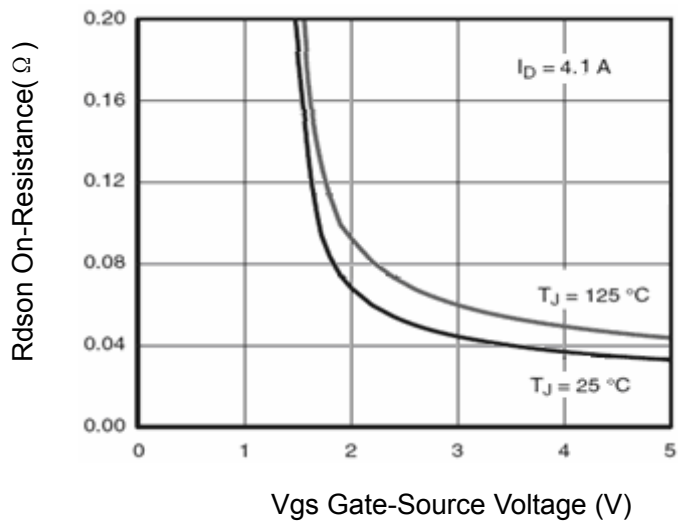

I_D- Drain Current (A)

Figure 6 Drain-Source On-Resistance

HM2305B
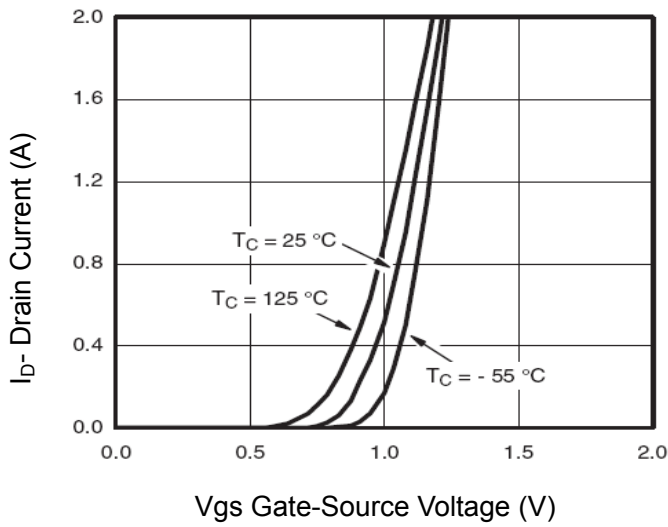
Figure 7 Transfer Characteristics

Figure 8 Drain-Source On-Resistance

Figure 9 Rdson vs Vgs
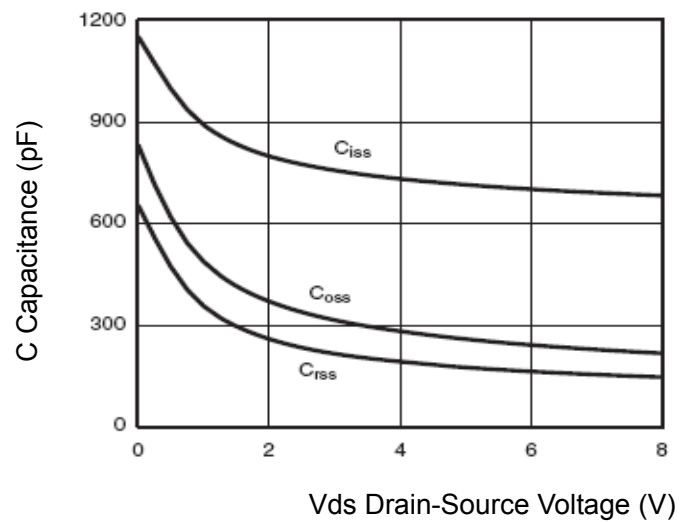
Figure 10 Capacitance vs Vds

Figure 11 Gate Charge
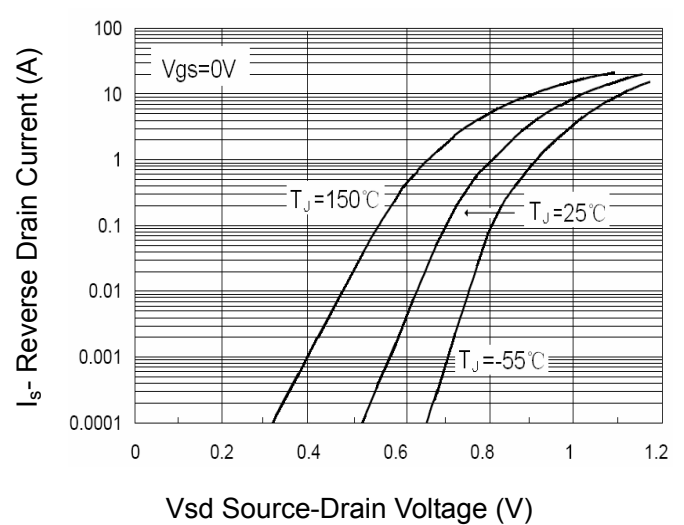
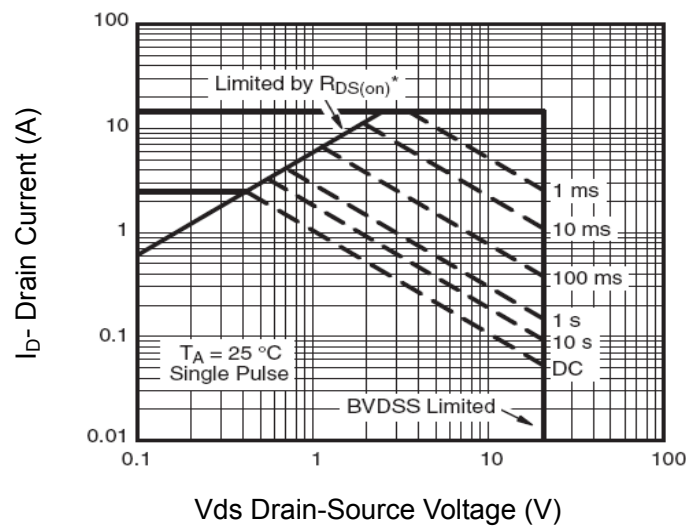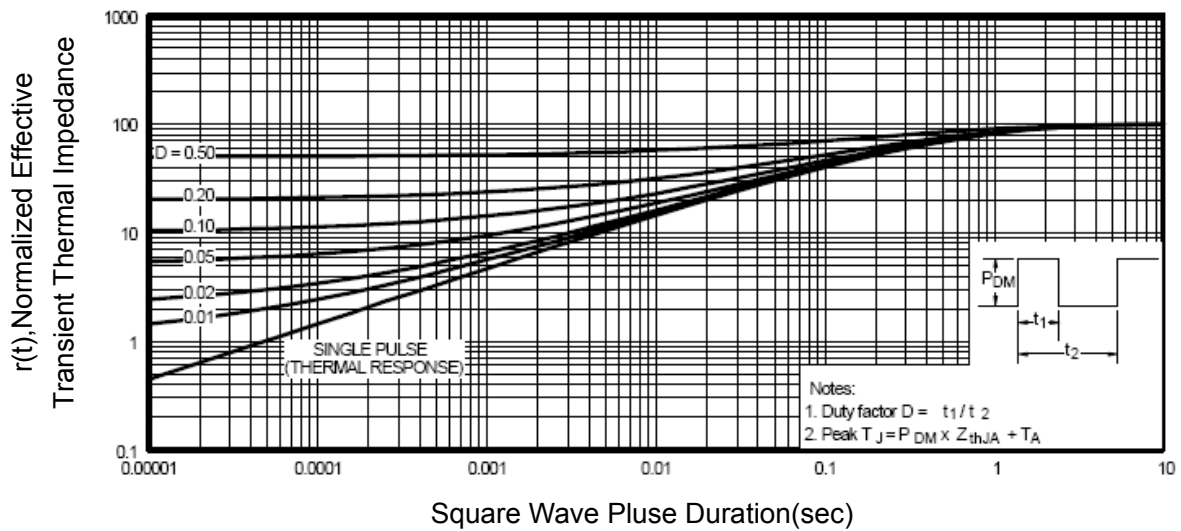**Figure 12 Source- Drain Diode Forward**

Figure 13 Safe Operation Area

Figure 14 Normalized Maximum Transient Thermal Impedance

SOT-23 Package Information
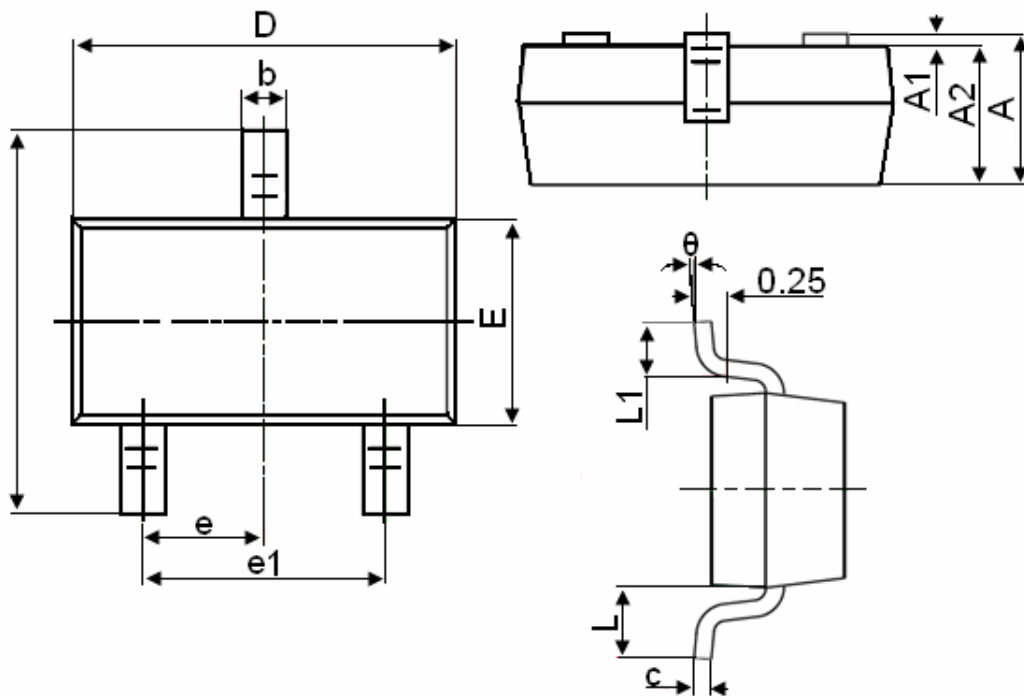
Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°

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.

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