N-Channel Enhancement Mode Power MOSFET

Description

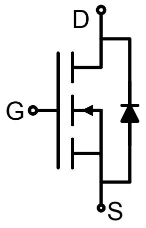
The HM2300PR uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a battery protection or in other switching application.

General Features

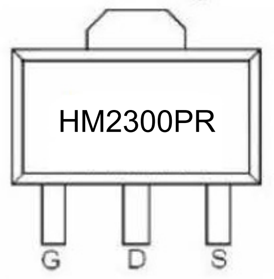
- V_{DS} = 20V,I_D = 5.5A
  $R_{DS(ON)}$ < 40mΩ @ V_{GS}=2.5V
  $R_{DS(ON)}$ < 33mΩ @ V_{GS}=4.5V
- High power and current handing capability
- Lead free product is acquired
- Surface mount package

Application

- Battery protection
- Load switch
- Power management



Schematic diagram



SOT-89 -3L top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
HM2300PR	HM2300PR	SOT-89-3L	Ø180mm	8 mm	3000 units

Absolute Maximum Ratings (T_A=25℃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_A =25℃	I_D	5.5	A
	T_A =70℃		4.4	
Drain Current-Pulsed (Note 1)		I_{DM}	16.5	A
Maximum Power Dissipation		P_D	1.25	W
Operating Junction and Storage Temperature Range		T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{θJA}$	100	℃/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	20	22	-	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	0.5	0.65	1.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=2.5V, I_D=4.0 A	-	33	40	mΩ
		V_{GS}=4.5V, I_D=5.5A	-	22	33	mΩ
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=4A	-	10	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=8V,V_{GS}=0V, F=1.0MHz	-	500	-	PF
Output Capacitance	C_{oss}		-	300	-	PF
Reverse Transfer Capacitance	C_{rss}		-	140	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=10V,I_D=1A V_{GS}=4.5V,R_{GEN}=6Ω	-	20	40	nS
Turn-on Rise Time	t_r		-	18	40	nS
Turn-Off Delay Time	$t_{d(off)}$		-	60	108	nS
Turn-Off Fall Time	t_f		-	28	56	nS
Total Gate Charge	Q_g	V_{DS}=10V,I_D=3A,V_{GS}=4.5V	-	10	15	nC
Gate-Source Charge	Q_{gs}		-	2.3	-	nC
Gate-Drain Charge	Q_{gd}		-	2.9	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=1A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	1	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

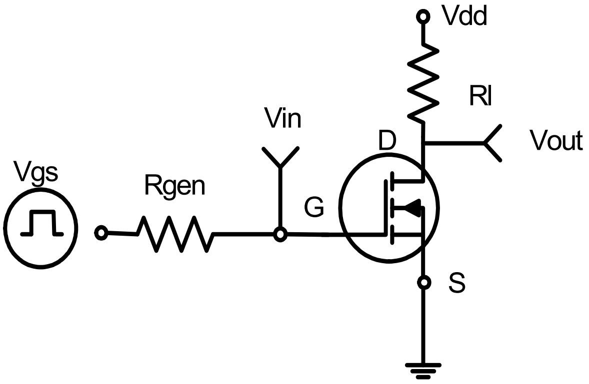


Figure 1:Switching Test Circuit

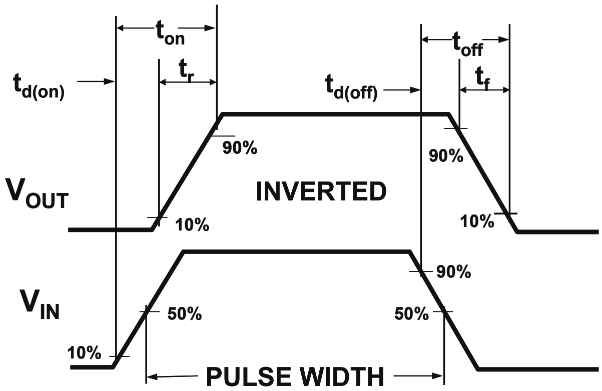


Figure 2:Switching Waveforms

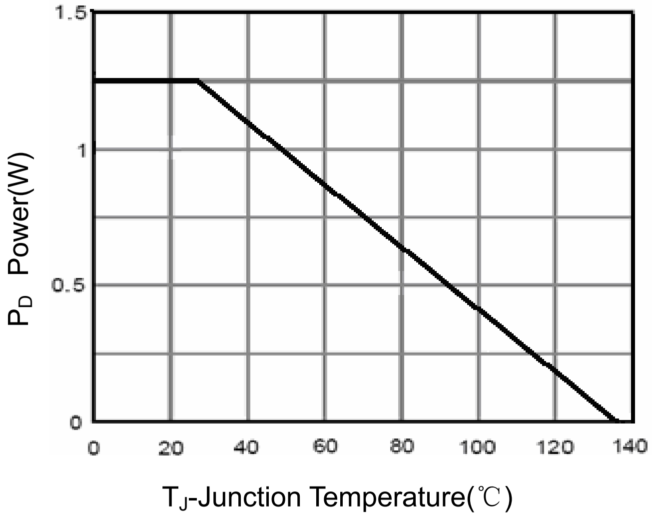


Figure 3 Power Dissipation

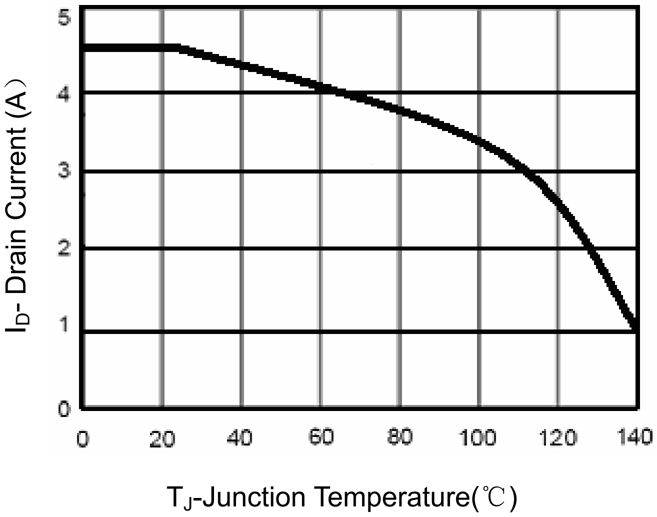


Figure 4 Drain Current

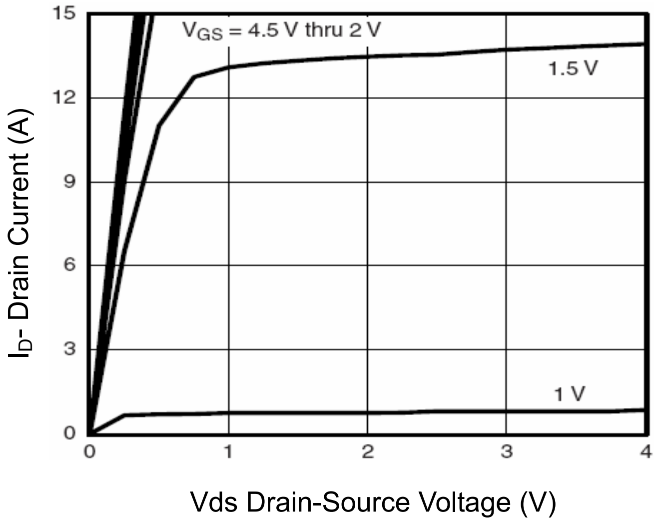


Figure 5 Output CHARACTERISTICS

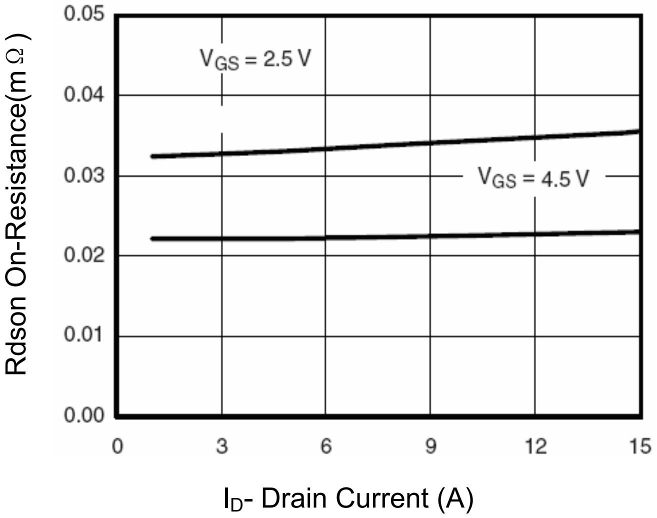


Figure 6 Drain-Source On-Resistance

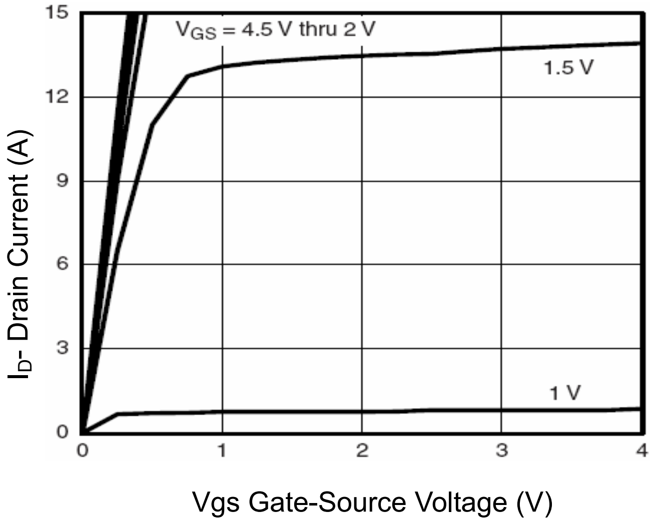


Figure 7 Transfer Characteristics

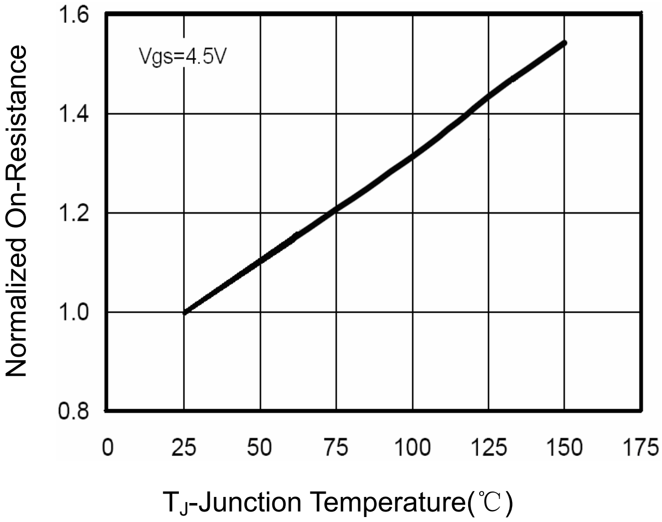


Figure 8 Drain-Source On-Resistance

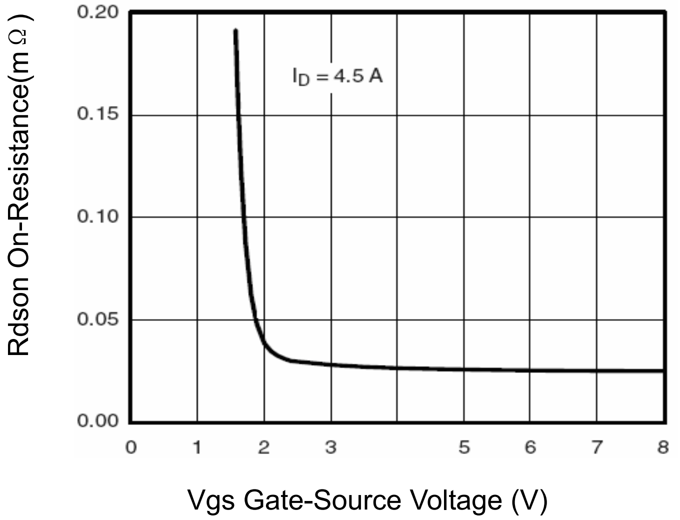


Figure 9 Rdson vs Vgs

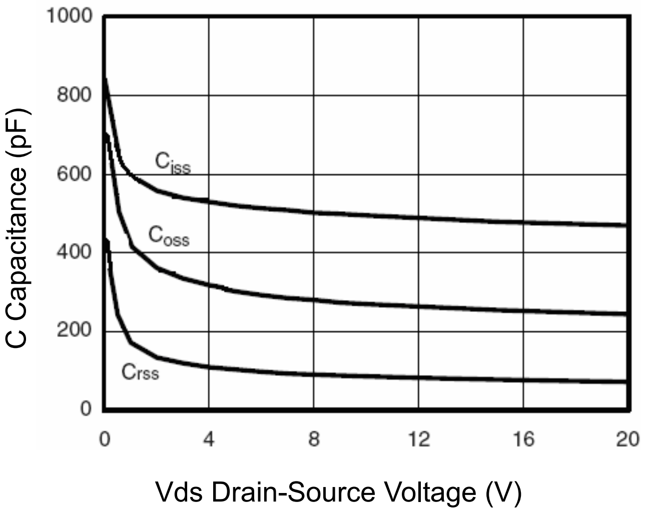


Figure 10 Capacitance vs Vds

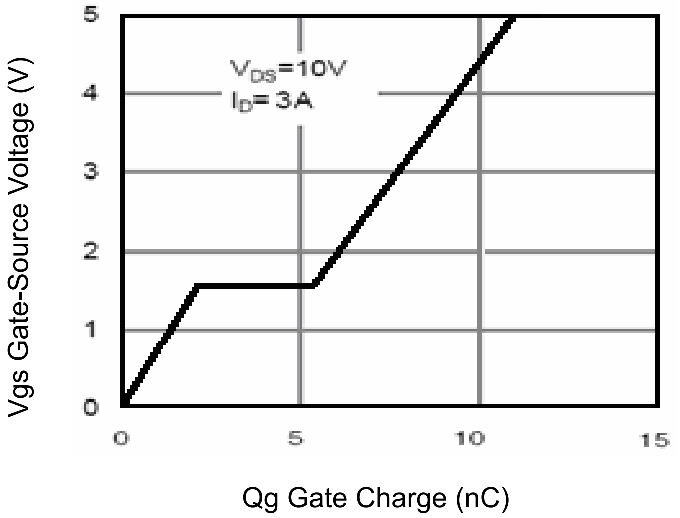


Figure 11 Gate Charge

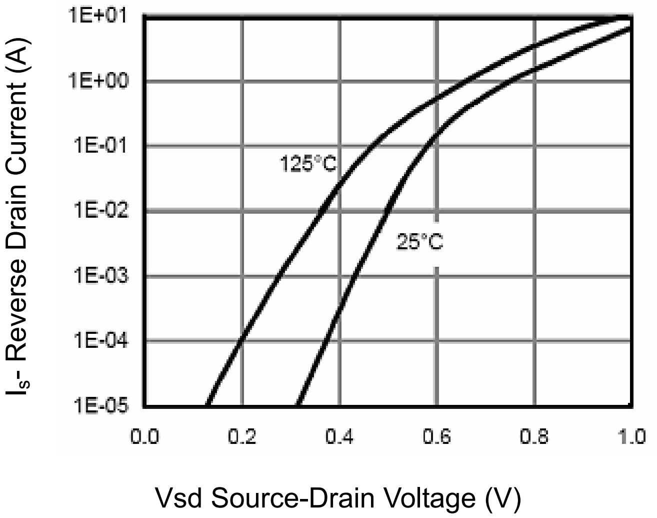


Figure 12 Source- Drain Diode Forward

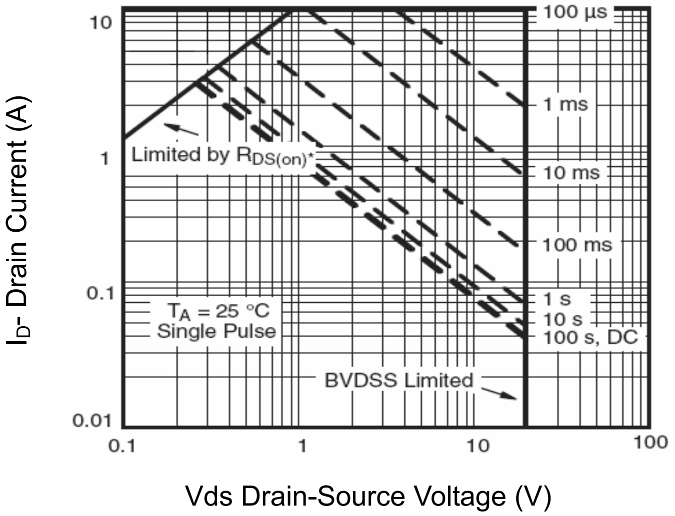


Figure 13 Safe Operation Area

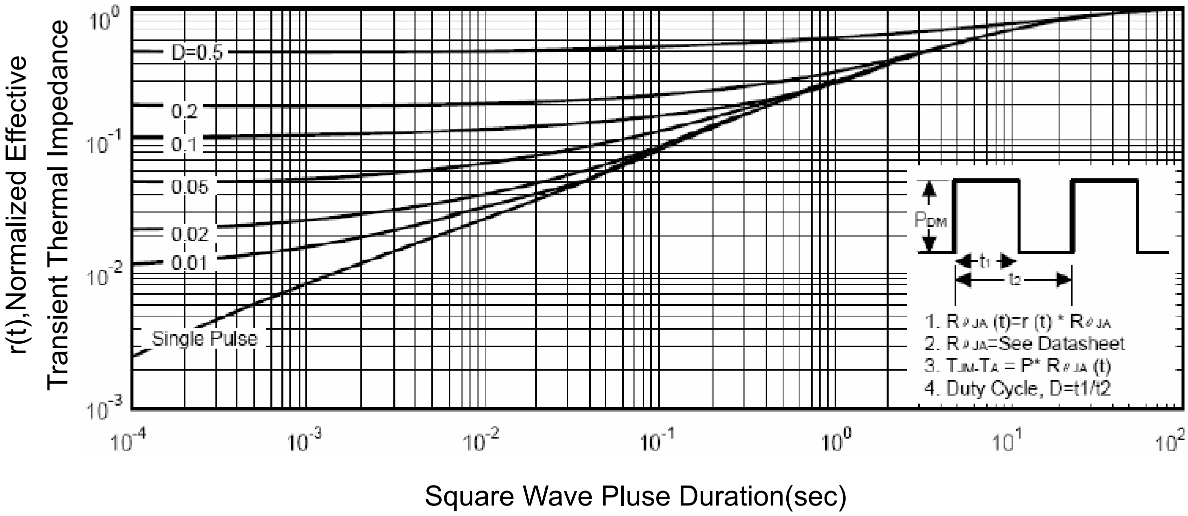
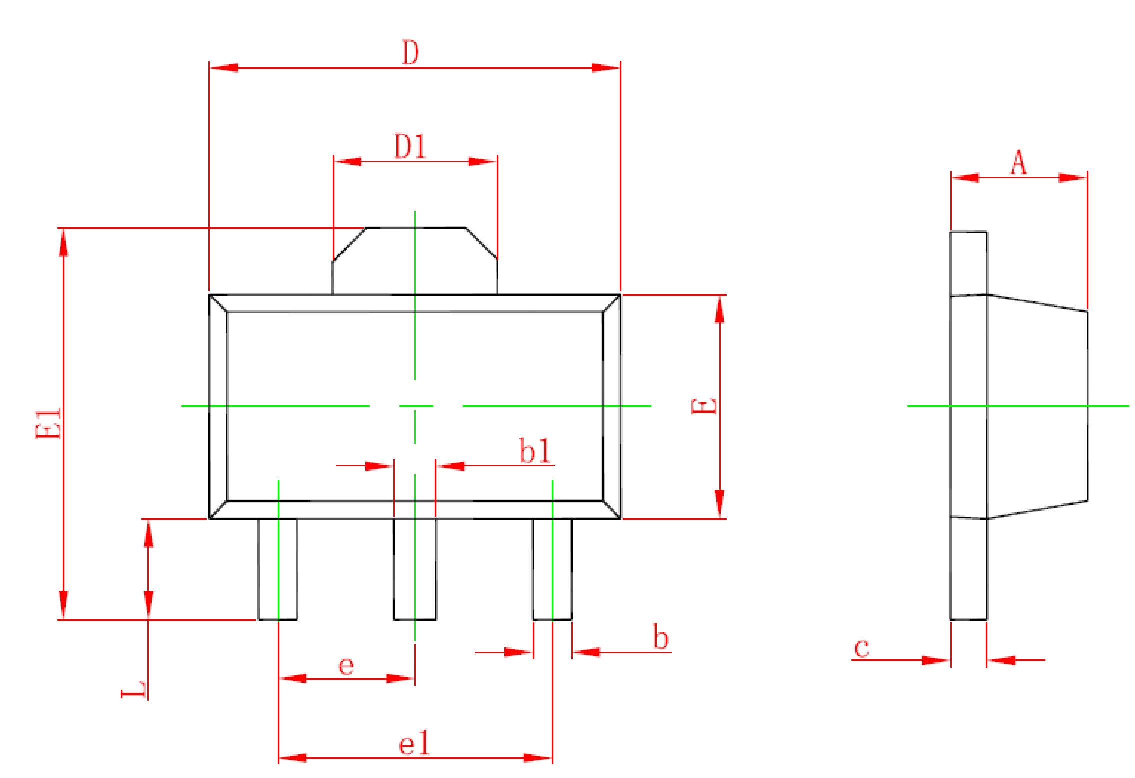


Figure 14 Normalized Maximum Transient Thermal Impedance

SOT-89-3L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047

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.