



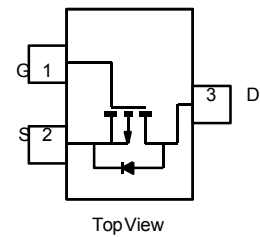
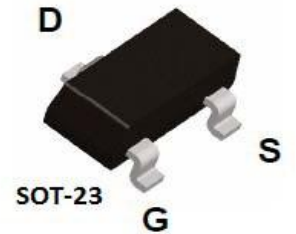
HCS2301

20V P-Channel MOSFET

Features:

- Low Intrinsic Capacitances.
- Excellent Switching Characteristics.
- Extended Safe Operating Area.
- Unrivalled Gate Charge : $Q_g = 3.3nC$ (Typ.).
- $BVDSS = -20V, I_D = -3A$
- $R_{DS(on)} : 110m\ \Omega$ (Max) @ $V_G = -4.5V$
- 100% Avalanche Tested

SOT-23



Marking:A1SHB

Absolute Maximum Ratings ($T_A = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	± 12	V
Drain Current-Continuous	I_D	-3	A
Drain Current -Pulsed (Note 1)	I_{DM}	-10	A
Maximum Power Dissipation	P_D	1	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	125	$^\circ C/W$
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20V P-Channel MOSFET

Electrical Characteristics (T_A=25°C 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	-24	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-20V, V _{GS} =0V	-	-	-1	μA
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±12V, V _{DS} =0V	-	-	±100	nA
On Characteristics (Note3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-0.4	-0.7	-1	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-4.5V, I _D =-3A	-	64	110	mΩ
		V _{GS} =-2.5V, I _D =-2A	-	89	140	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-2A	5	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =-10V, V _{GS} =0V, F=1.0MHz	-	405	-	PF
Output Capacitance	C _{oss}		-	75	-	PF
Reverse Transfer Capacitance	C _{rss}		-	55	-	PF
Switching Characteristics (Note4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-10V, I _D =-1A V _{GS} =- 4.5V, R _{GEN} =10Ω	-	11	-	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} =-10V, I _D =-3A, V _{GS} =- 2.5V	-	3.3	12	nC
Gate-Source Charge	Q _{gs}		-	0.7	-	nC
Gate-Drain Charge	Q _{gd}		-	1.3	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note3)	V _{SD}	V _{GS} =0V, I _S =1.3A	-	-	-1.2	V
Diode Forward Current (Note2)	I _S		-	-	-3	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 Characteristics

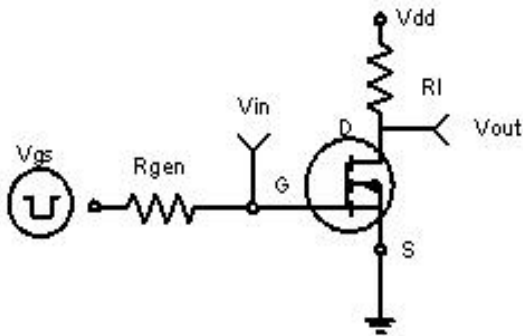


Figure 1: Switching Test Circuit

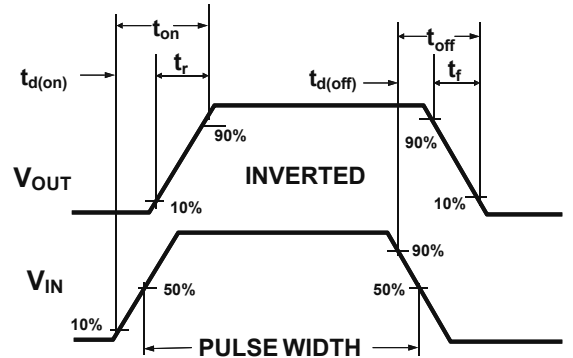


Figure 2: Switching Waveforms

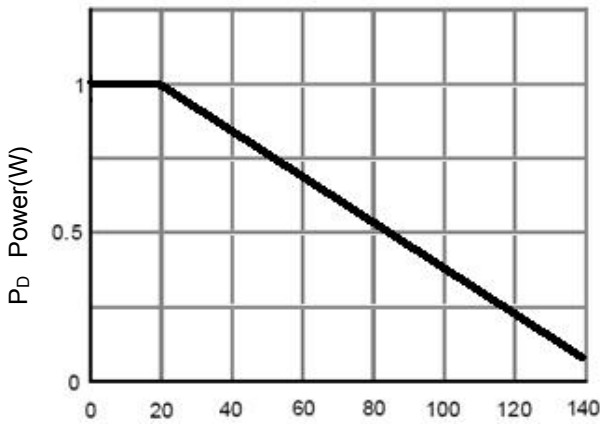


Figure 3 Power Dissipation

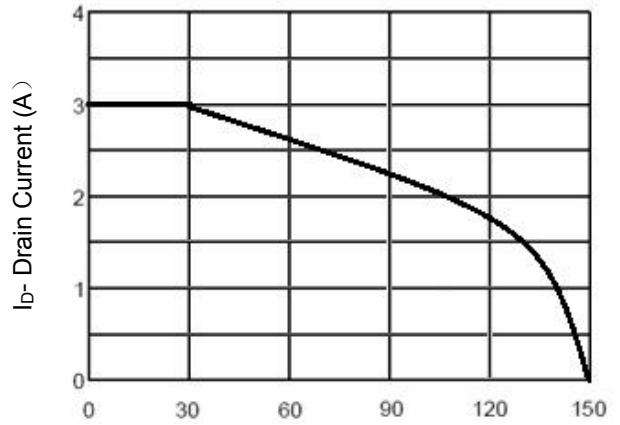


Figure 4 Drain Current

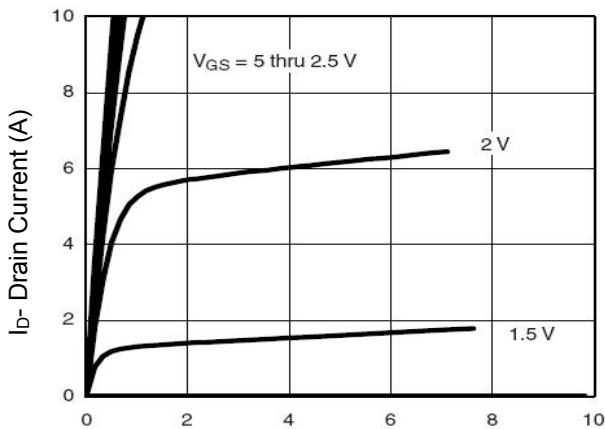


Figure 5 Output Characteristics

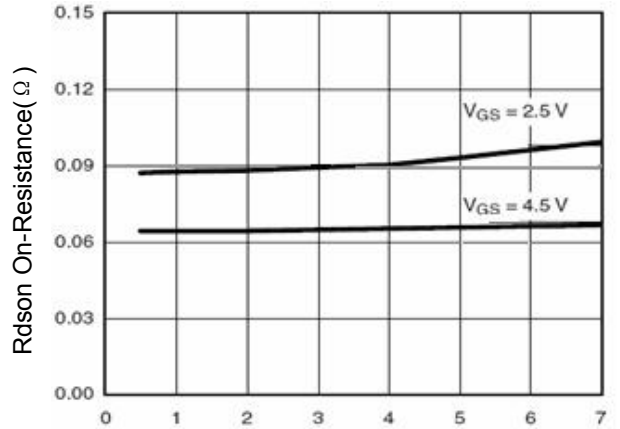


Figure 6 Drain-Source On-Resistance



Typical Characteristics (Continued)

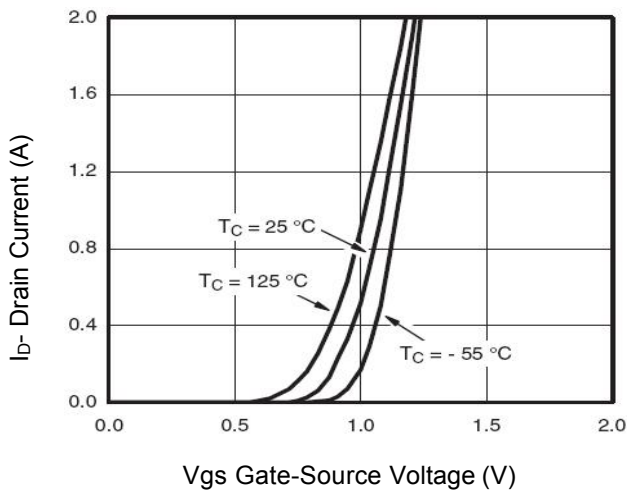


Figure 7 Transfer Characteristics

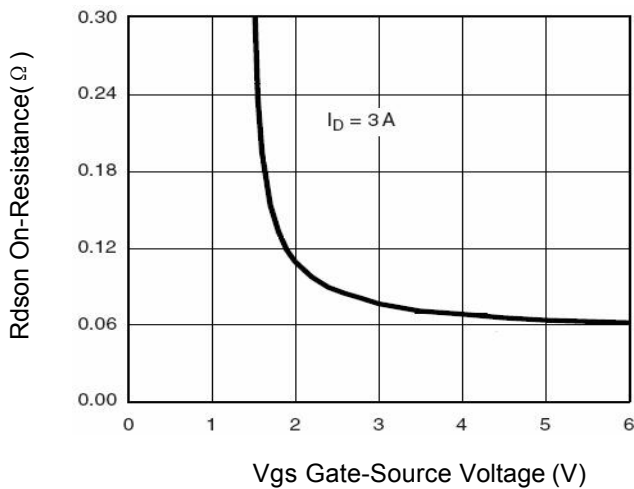


Figure 9 Rdson vs Vgs

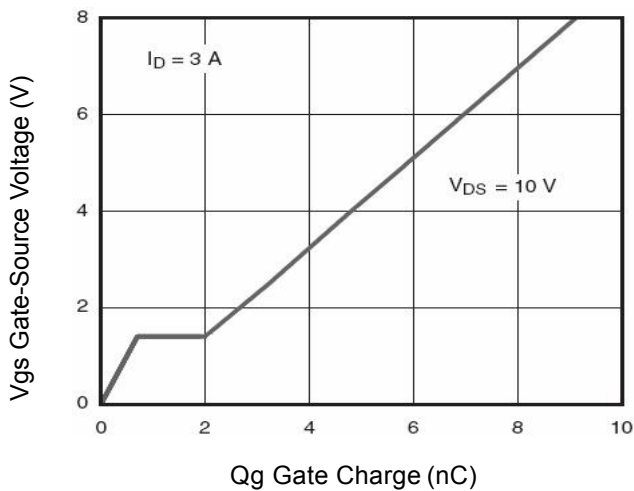


Figure 11 Gate Charge

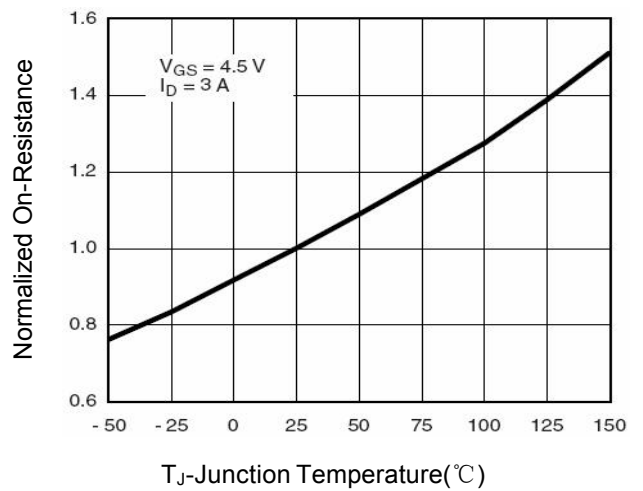


Figure 8 Drain-Source On-Resistance

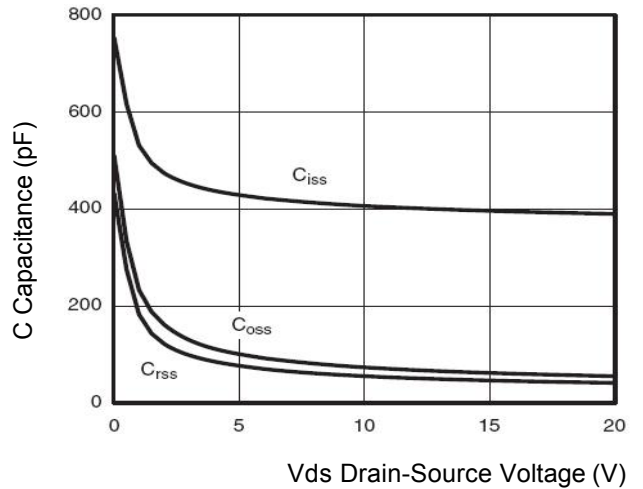


Figure 10 Capacitance vs Vds

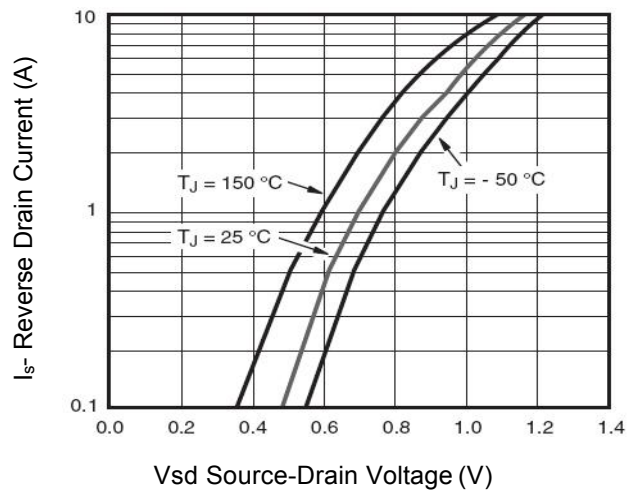


Figure 12 Source-Drain Diode Forward



Typical Characteristics (Continued)

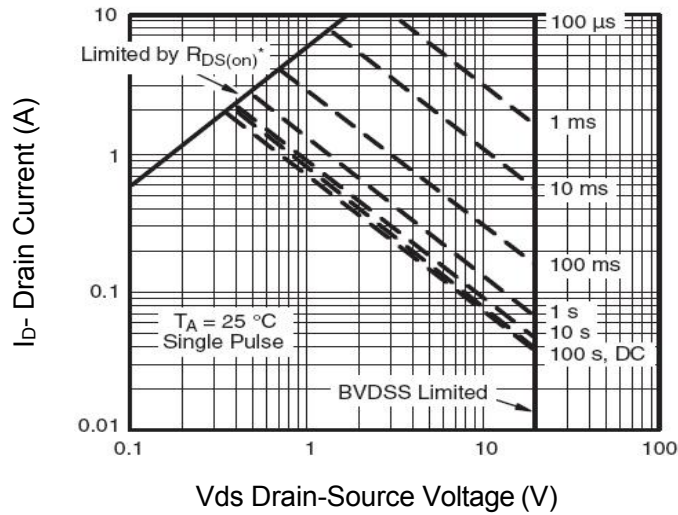


Figure 13 Safe Operation Area

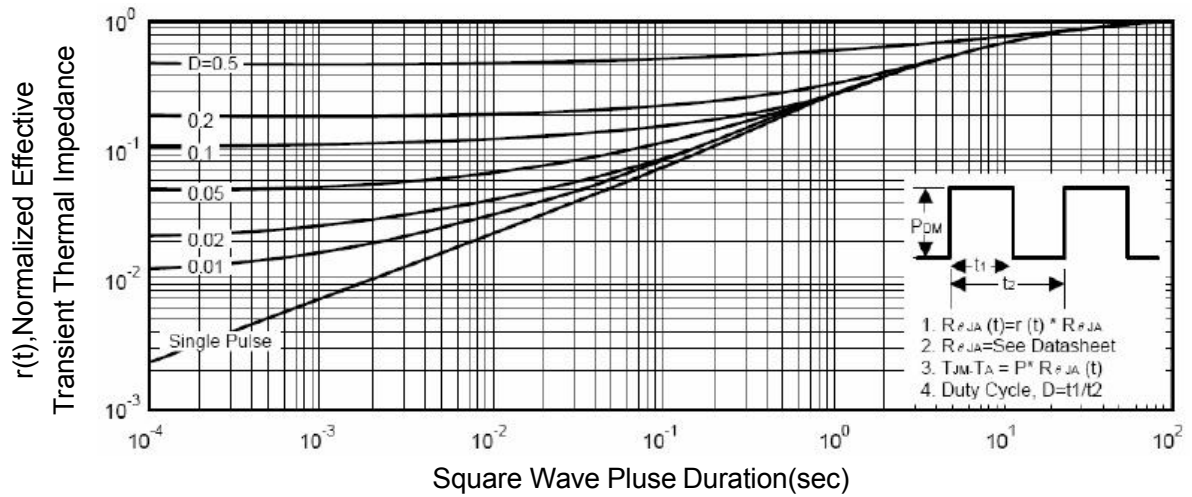


Figure 14 Normalized Maximum Transient Thermal Impedance