

P-Channel Enhancement Mode Power MOSFET

CN2305

General Description:

The CN2305 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.

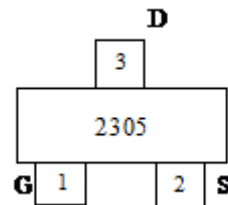
Applications:

- Battery protection
- Load switch
- Power management

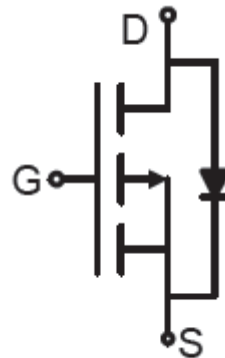
Features:

- $V_{DS} = -20V, I_D = -4.1A$
 $R_{DS(ON)} < 75m\Omega @ V_{GS} = -2.5V$
 $R_{DS(ON)} < 52m\Omega @ V_{GS} = -4.5V$
- High power and current handling capability
- Lead free product is acquired
- Surface mount package
- Available in 3 pin SOT23 Package
- Pb-free, rohs compliant and halogen free

Pin Assignment



Schematic diagram



Top view



Ordering Information

Part Number	Device Marking	Package	Operating Ambient Temperature
CN2305	2305	SOT-23	-40°C to 85°C

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

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	-20	V
Gate-Source Voltage		V_{GS}	± 12	V
Drain Current-Continuous	$T_C = 25^{\circ}\text{C}$	I_D	-4.1	A
	$T_C = 70^{\circ}\text{C}$		-3.2	
	$T_A = 25^{\circ}\text{C}$		-3	
	$T_A = 70^{\circ}\text{C}$		-2.3	
Drain Current-Pulsed (Note 1)		I_{DM}	-15	A
Maximum Power Dissipation		P_D	1.2	W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	$^{\circ}\text{C}$

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	100	$^{\circ}\text{C/W}$
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Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	B _{VDSS}	V _{GS} =0V I _D =-250μA	-20	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-20V,V _{GS} =0V	-	-	-1	uA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±10V,V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =-250μA	-0.45	-0.7	-1	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-4.5V, I _D =-4.1A	-	45	52	mΩ
		V _{GS} =-2.5V, I _D =-3A	-	60	75	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-5V,I _D =-4.1A	-	8.5	-	A/V
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	td(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	tr		-	35	-	nS
Turn-Off Delay Time	td(off)		-	30	-	nS
Turn-Off Fall Time	tf		-	10	-	nS
Total Gate Charge	Qg	V _{DS} =-4V,I _D =-4.1A, V _{GS} =-4.5V	-	7.8	-	nC
Gate-Source Charge	Qgs		-	1.2	-	nC
Gate-Drain Charge	Qgd		-	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

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Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. $R_{\theta JA}$ is measured with the device mounted on 1 in² FR4 board with 2oz. copper, in a still air environment with $T_A=25^{\circ}\text{C}$, $t \leq 10$ sec. The value in any given application depends on the user's specific board design.
3. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

Typical Electrical and Thermal Characteristics

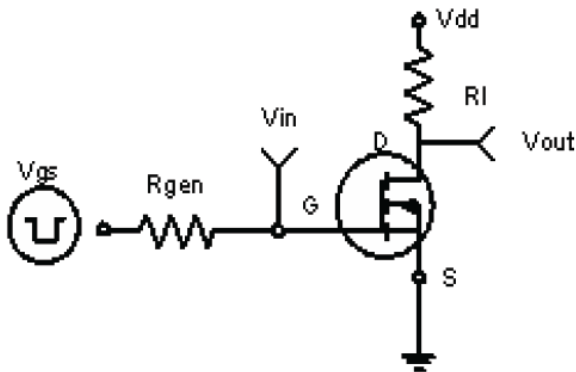


Figure 1 Switching Test Circuit

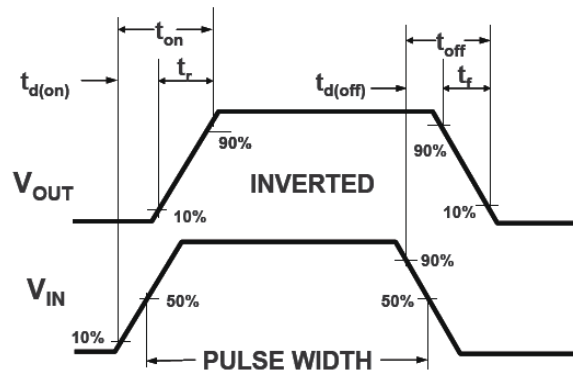


Figure 2 Switching Waveforms

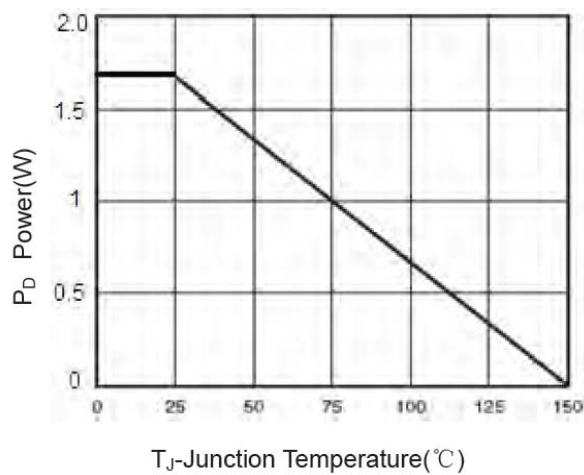


Figure 3 Power Dissipation

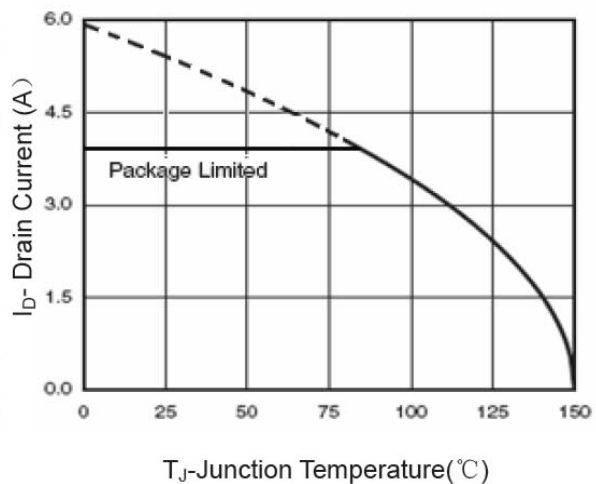


Figure 4 Drain Current

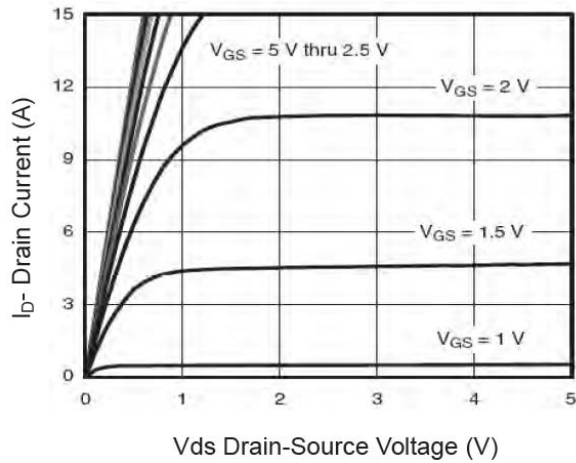


Figure 5 Output Characteristics

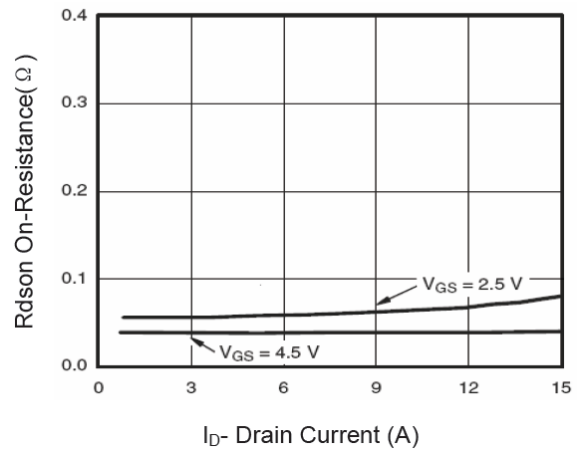


Figure 6 Drain-Source On-Resistance

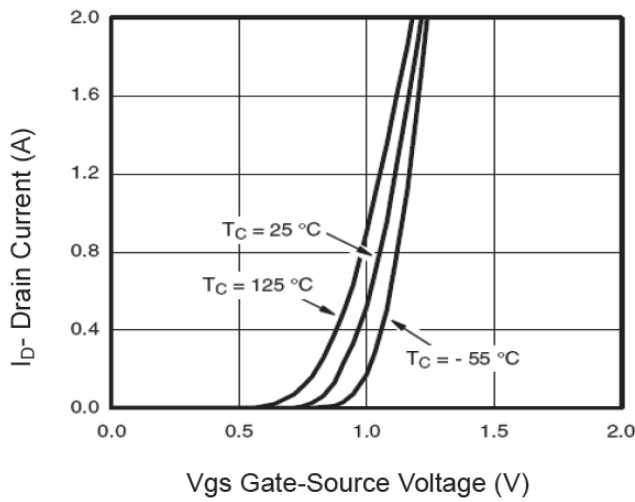


Figure 7 Transfer Characteristics

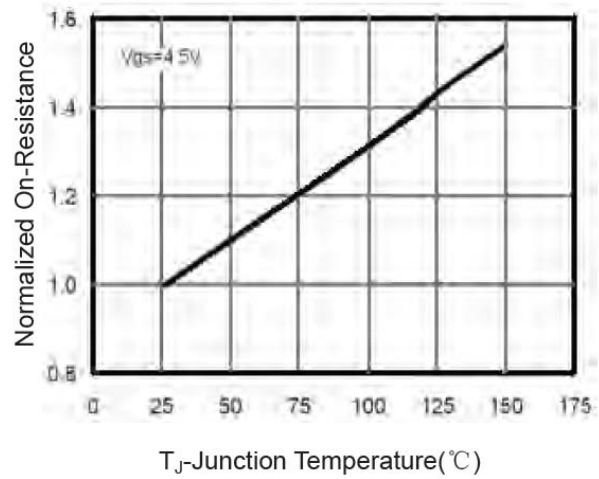


Figure 8 Drain-Source On-Resistance

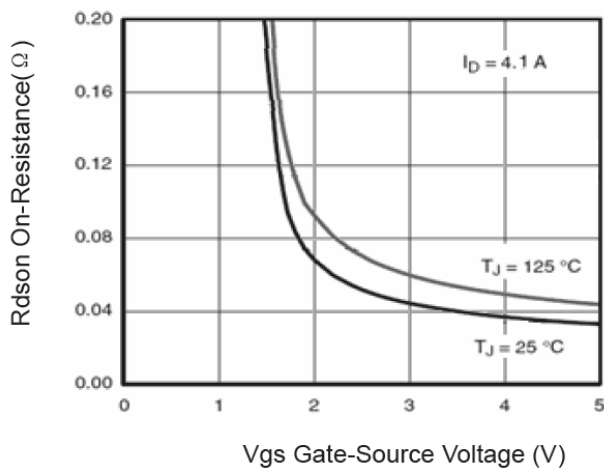


Figure 9 $R_{DS(on)}$ vs V_{GS}

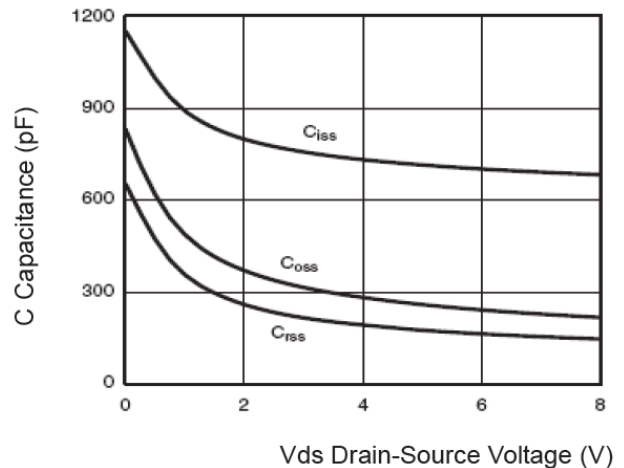


Figure 10 Capacitance vs V_{DS}

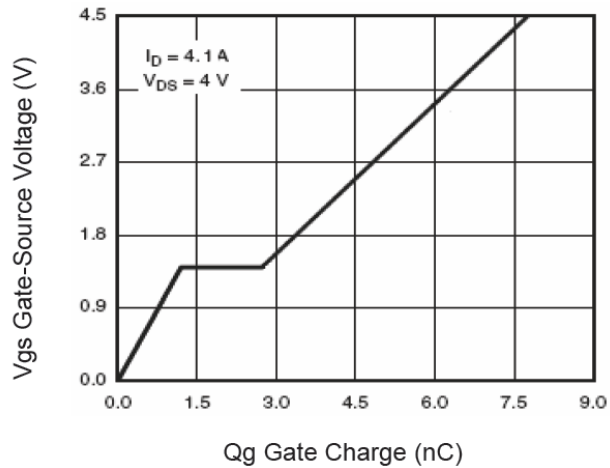


Figure 11 Gate Charge

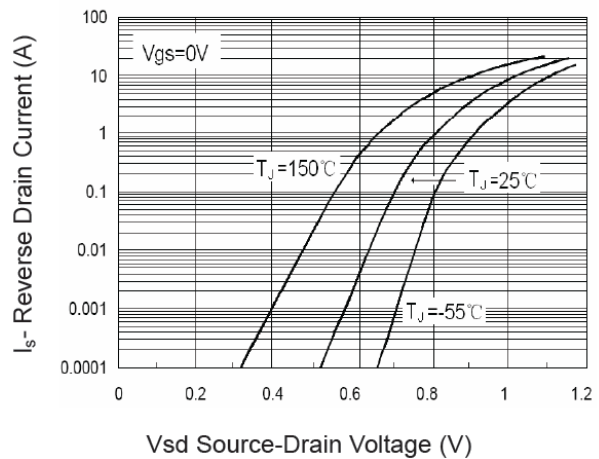


Figure 12 Source- Drain Diode Forward

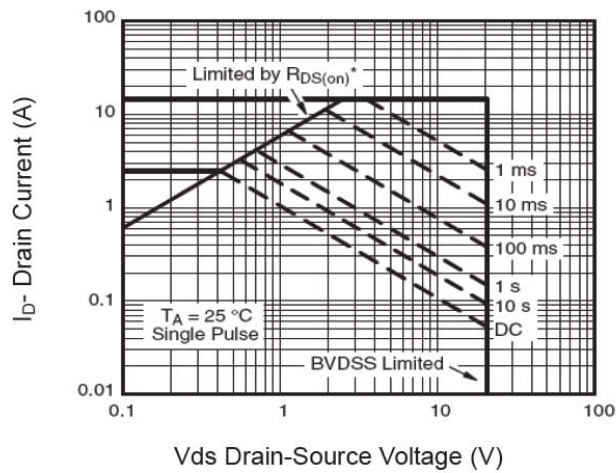


Figure 13 Safe Operation Area

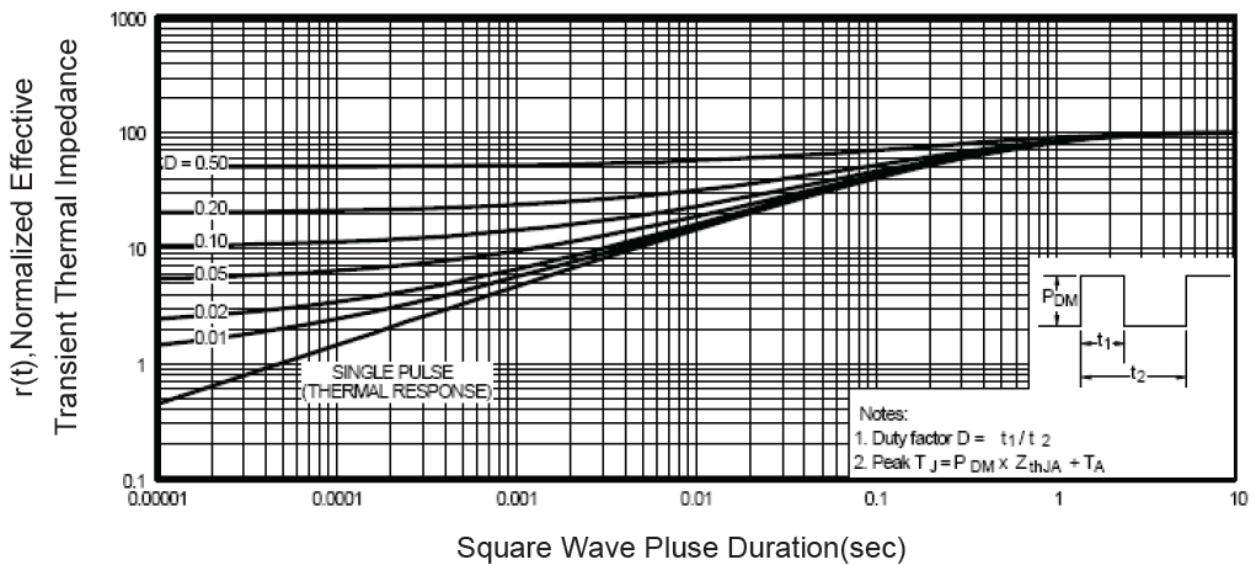
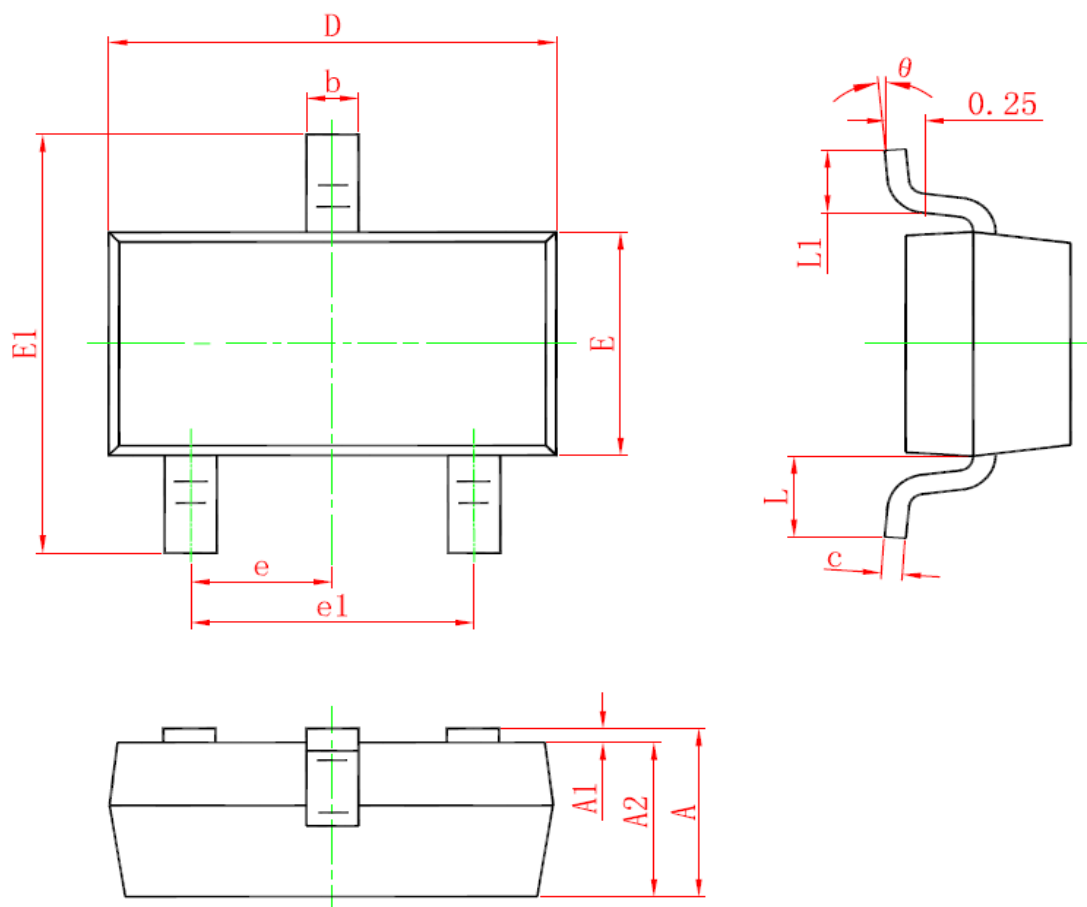


Figure 14 Normalized Maximum Transient Thermal Impedance

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Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

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