

20V N-Channel Enhancement Mode MOSFET

Description

The NP2300 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and high density cell Design for ultra low on-resistance. This device is suitable for use as a load switch or in PWM applications.

General Features

- ◆ $V_{DS} = 20V$, $I_D = 5A$
 $R_{DS(ON)}(Typ.) = 32m\Omega$ @ $V_{GS} = 2.5V$
 $R_{DS(ON)}(Typ.) = 26m\Omega$ @ $V_{GS} = 4.5V$
- ◆ High power and current handling capability
- ◆ Lead free product is acquired
- ◆ Surface mount package

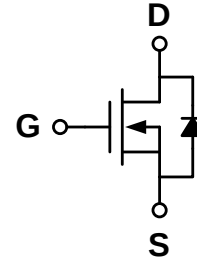
Application

- ◆ PWM applications
- ◆ Load switch

Package

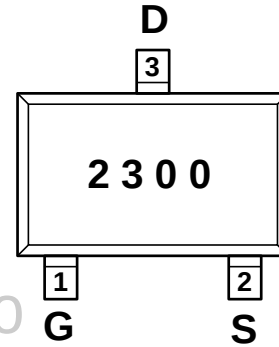
- ◆ SOT-23

Schematic diagram



Marking and pin assignment

SOT-23
(TOP VIEW)



Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP2300VR-G	-55°C to +150°C	SOT-23	3000

Absolute Maximum Ratings (TA=25°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 ^a @Tj=125°C -pulse d^b	I_D	5	A
	I_{DM}	20	A
Drain-source Diode forward current	I_S	1.6	A
Maximum power dissipation	P_D	1.25	W
Operating junction Temperature range	T_J	-55—150	°C

Electrical Characteristics (TA=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	-	-	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =20V, V _{GS} =0V	-	-	1	μA
Gate-body leakage	I _{GSS}	V _{DS} =0V, V _{GS} =±12V	-	-	±100	nA
ON Characteristics						
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	0.45	0.65	1.0	V
Drain-source on-state resistance	R _{DS(ON)}	V _{GS} =4.5V, I _D =5A	-	26	30	mΩ
		V _{GS} =2.5V, I _D =4A		32	40	
Forward transconductance	g _{fs}	V _{GS} =5V, I _D =5A	-	5	-	S
Dynamic Characteristics						
Input capacitance	C _{ISS}	V _{DS} =10V ,V _{GS} =0V f=1.0MHz	-	240	-	pF
Output capacitance	C _{OSS}		-	45	-	
Reverse transfer capacitance	C _{RSS}		-	23	-	
Switching Characteristics						
Turn-on delay time	t _{D(ON)}	V _{DD} =10V R _L =3.3 ohm V _{GEN} =4.5V R _{GEN} =6ohm	-	2.3	-	ns
Rise time	t _r		-	3.1	-	
Turn-off delay time	t _{D(OFF)}		-	21	-	
Fall time	t _f		-	2.6	-	
Total gate charge	Q _g	V _{DS} =10V I _D =5A V _{GS} =4.5V	-	2.7	-	nC
Gate-source charge	Q _{gs}		-	0.4	-	
Gate-drain charge	Q _{gd}		-	0.5	-	
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode forward voltage	V _{SD}	V _{GS} =0V,I _S =5A	-	0.76	1.16	V

Notes:

- surface mounted on FR4 board, $t \leq 10sec$
- pulse test: pulse width $\leq 300\mu s$, duty $\leq 2\%$
- guaranteed by design, not subject to production testing

Thermal Characteristics

Thermal Resistance junction-to ambient	$R_{th\ JA}$	100	$^{\circ}C/W$
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Typical Performance Characteristics

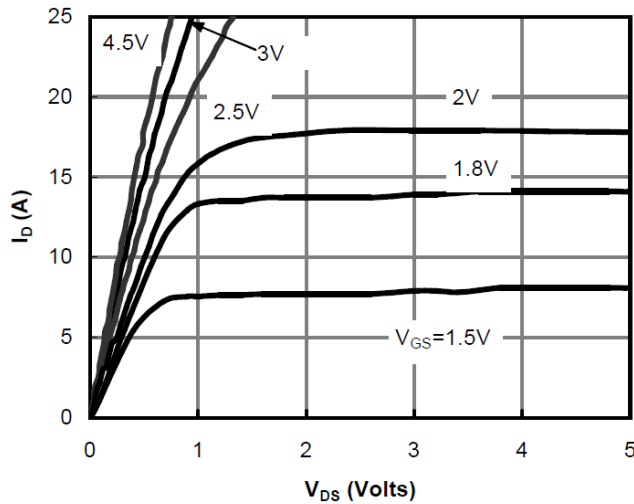


Figure 1: On-Region Characteristics

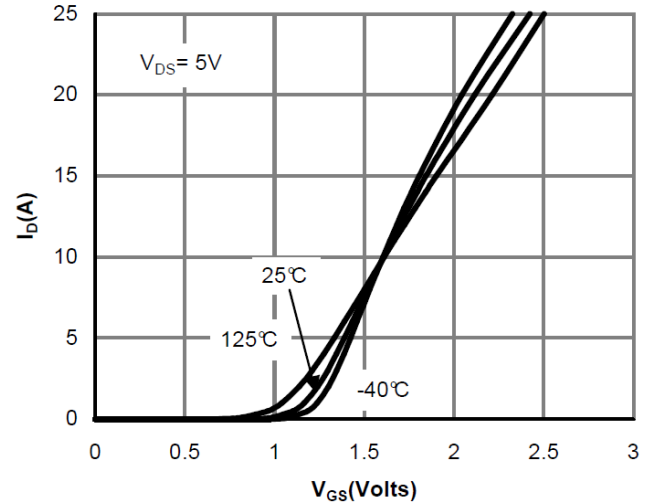


Figure 2: Transfer Characteristics

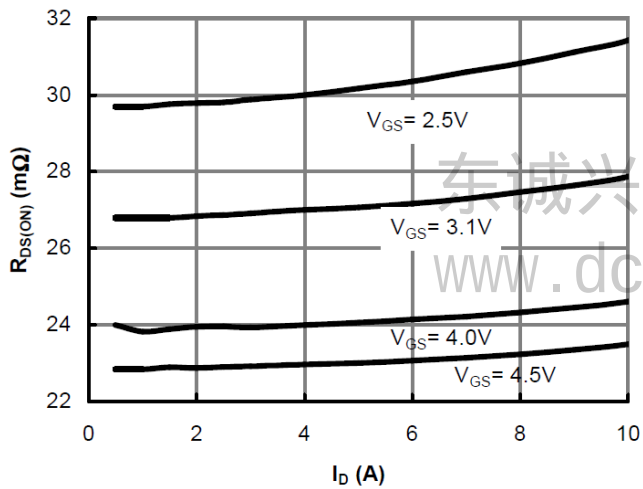


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

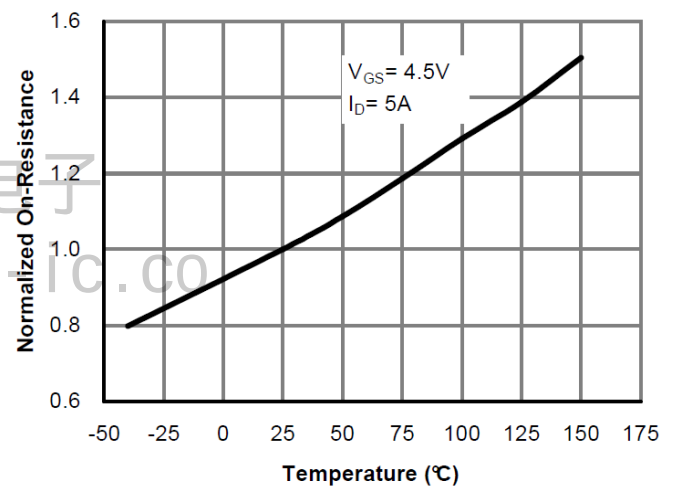


Figure 4: On-Resistance vs. Junction Temperature

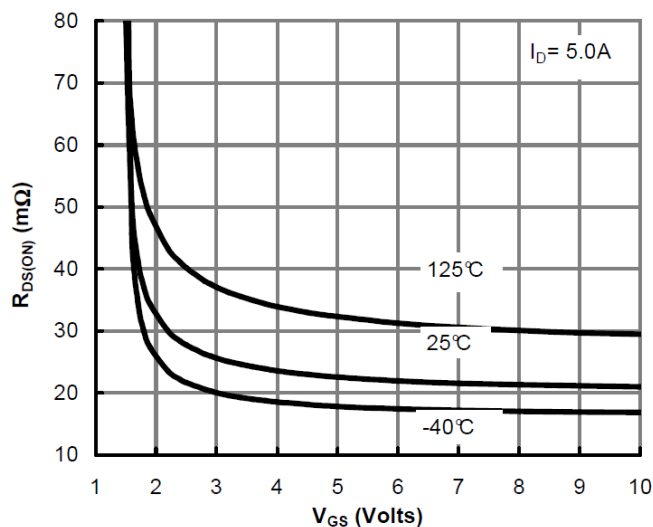


Figure 5: On-Resistance vs. Gate-Source Voltage

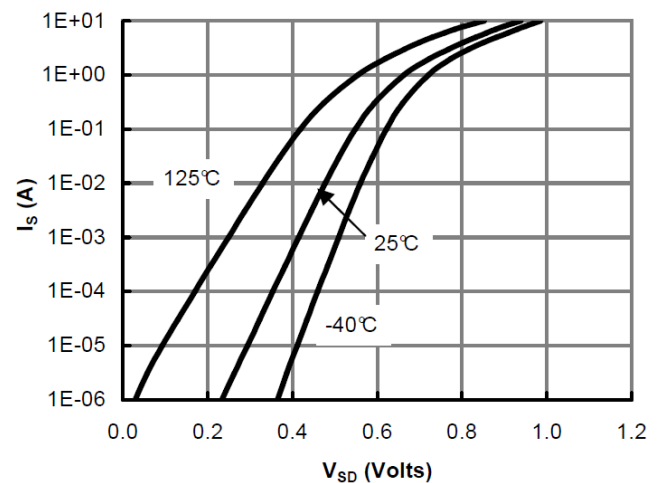


Figure 6: Body-Diode Characteristics

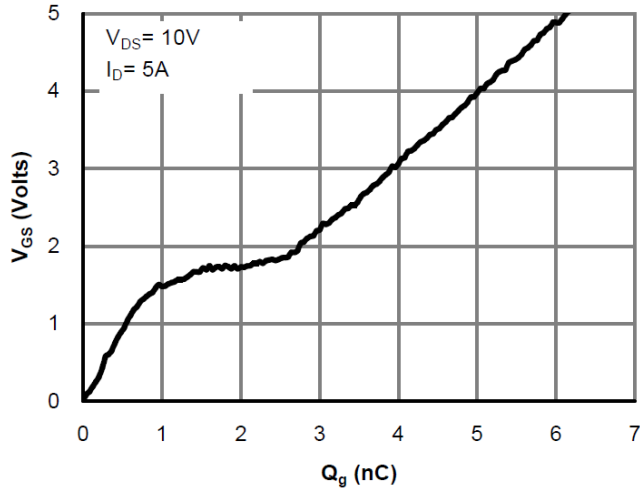


Figure 7: Gate-Charge Characteristics

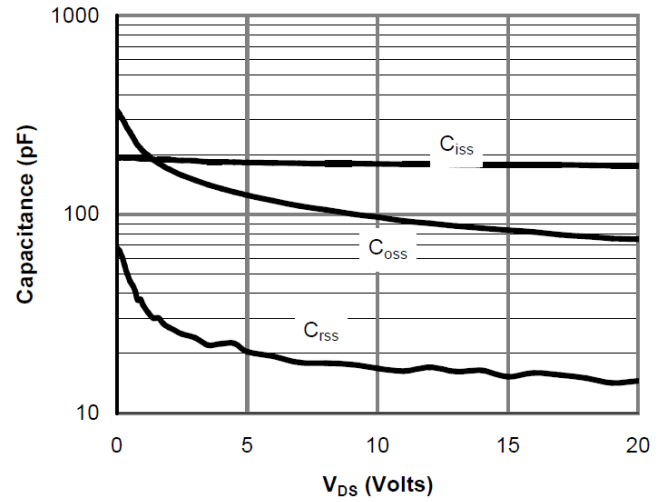


Figure 8: Capacitance Characteristics

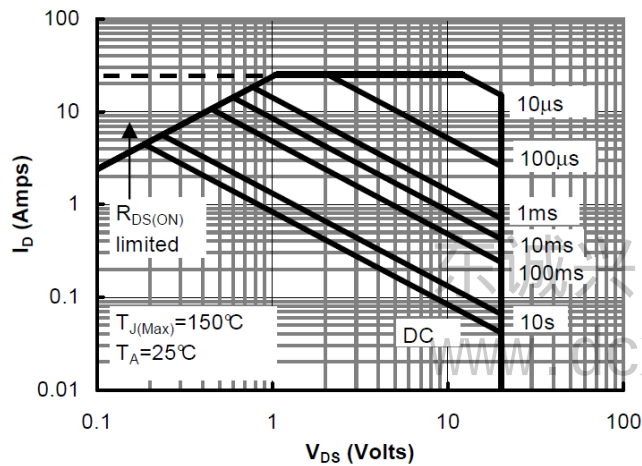


Figure 9: Maximum Forward Biased Safe Operating Area

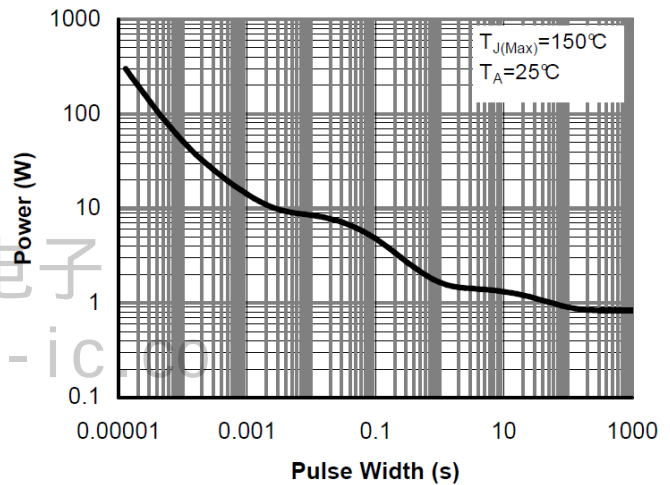


Figure 10: Single Pulse Power Rating Junction-to-Ambient

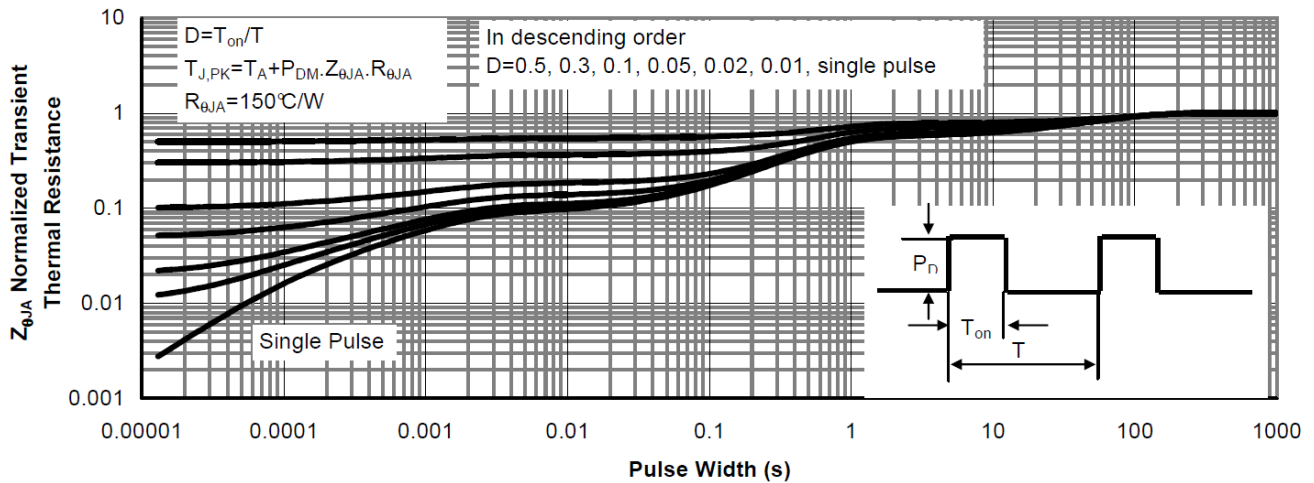
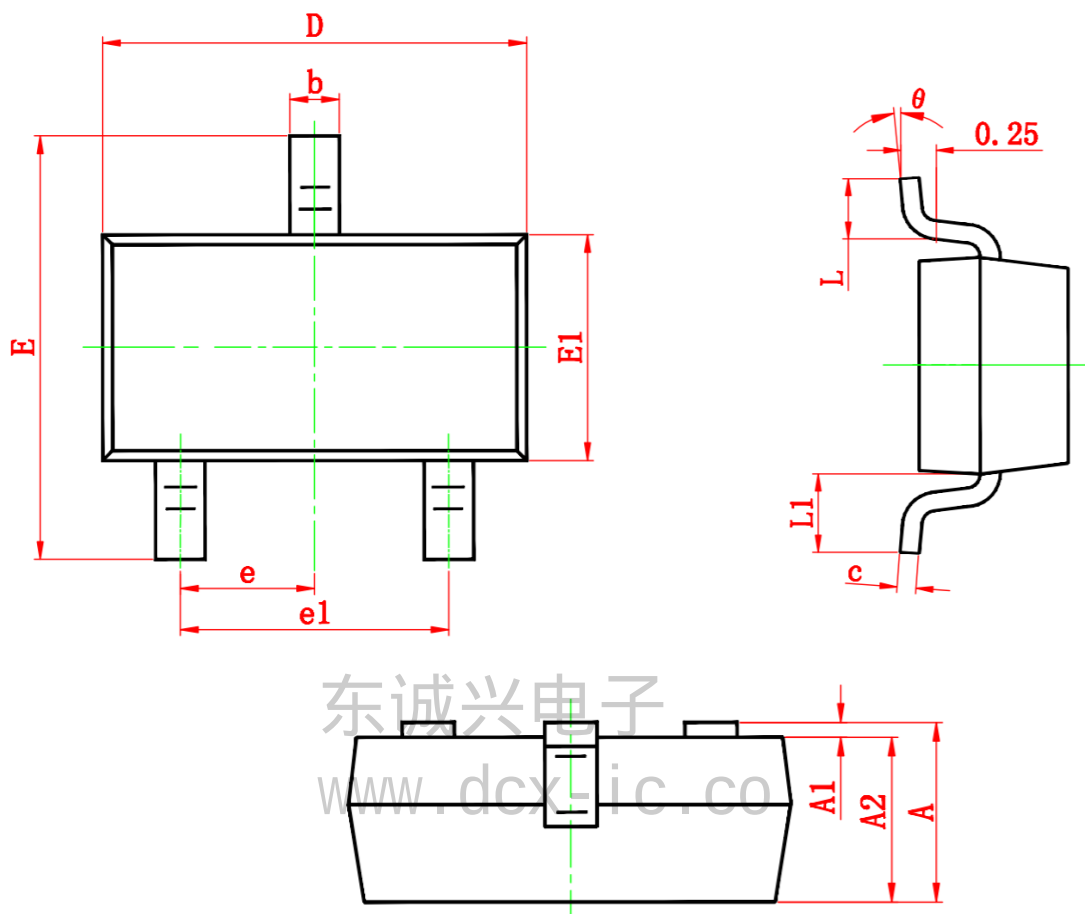


Figure 11: Normalized Maximum Transient Thermal Impedance

Package Information

- SOT-23



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	2.250	2.550	0.089	0.100
E1	1.200	1.400	0.047	0.055
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.300	0.500	0.012	0.020
L1	0.550 REF.		0.022 REF.	
θ	0°	8°	0°	8°