

NCE N-Channel Enhancement Mode Power MOSFET

DESCRIPTION

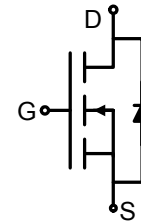
The NCE2302 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

GENERAL FEATURES

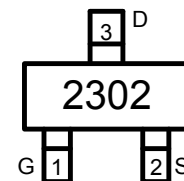
- $V_{DS} = 20V, I_D = 2.9A$
 $R_{DS(ON)} < 60m\Omega @ V_{GS}=2.5V$
 $R_{DS(ON)} < 40m\Omega @ V_{GS}=4.5V$
- High Power and current handling capability
- Lead free product is acquired
- Surface Mount Package

Application

- Battery protection
- Load switch
- Power management



Schematic diagram



Marking and pin Assignment



SOT-23 top view

Package Marking And Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
2302	NCE2302	SOT-23	Ø180mm	8 mm	3000 units

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}	±10	V
Drain Current-Continuous	I_D	2.9	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	°C

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	125	°C/W
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Electrical Characteristics (TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	20			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=20V, V_{GS}=0V$			1	μA

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	0.5	0.75	1.2	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =2.5V, I _D =2.5A		40	60	mΩ
		V _{GS} =4.5V, I _D =2.9A		33	40	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V,I _D =2.9A		8		S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{ISS}	V _{DS} =10V,V _{GS} =0V, F=1.0MHz		300		PF
Output Capacitance	C _{OSS}			120		PF
Reverse Transfer Capacitance	C _{RSS}			80		PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =10V,I _D =2.9A V _{GS} =4.5V,R _{GEN} =6Ω		10	15	nS
Turn-on Rise Time	t _r			50	85	nS
Turn-Off Delay Time	t _{d(off)}			17	45	nS
Turn-Off Fall Time	t _f			10	20	nS
Total Gate Charge	Q _g	V _{DS} =10V,I _D =2.9A, V _{GS} =4.5V		4.0	10	nC
Gate-Source Charge	Q _{gs}			0.65		nC
Gate-Drain Charge	Q _{gd}			1.2		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V,I _S =2.9A		0.75	1.2	V
Diode Forward Current (Note 2)	I _S				2.9	A

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

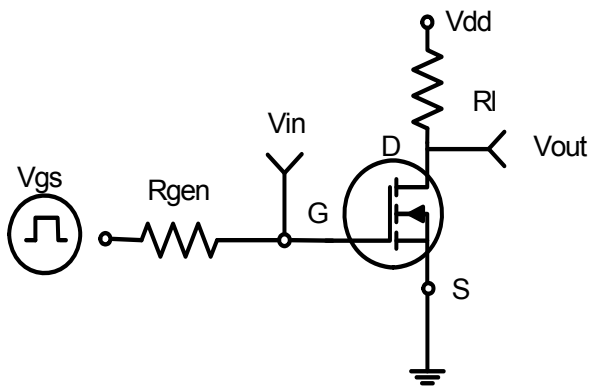


Figure 1: Switching Test Circuit

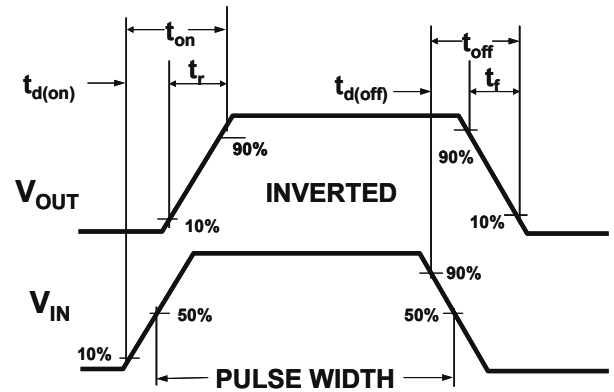


Figure 2: Switching Waveforms

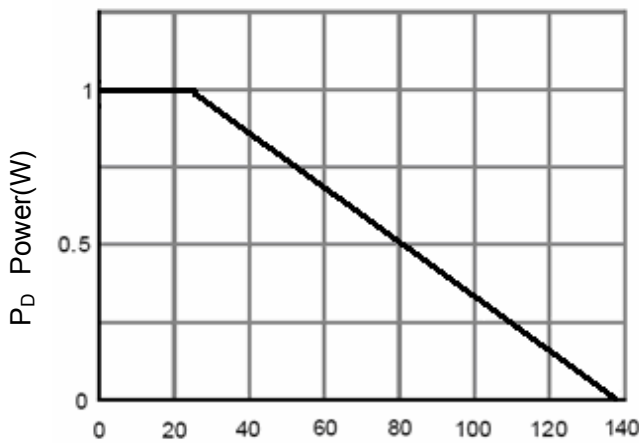


Figure 3 Power Dissipation

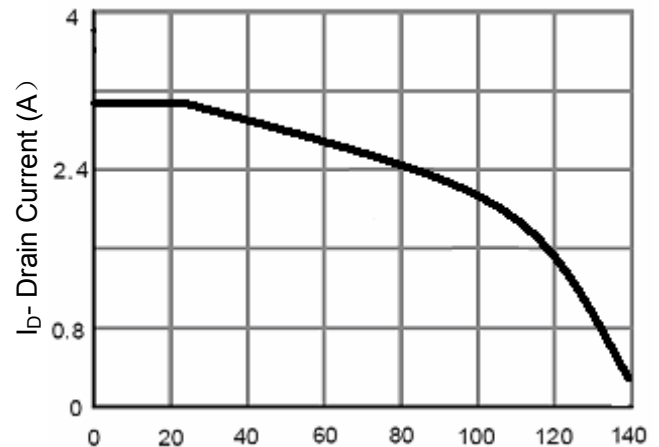


Figure 4 Drain Current

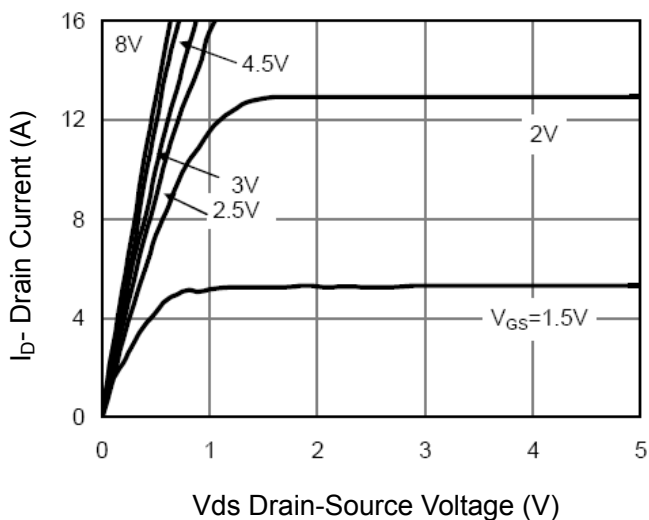


Figure 5 Output CHARACTERISTICS

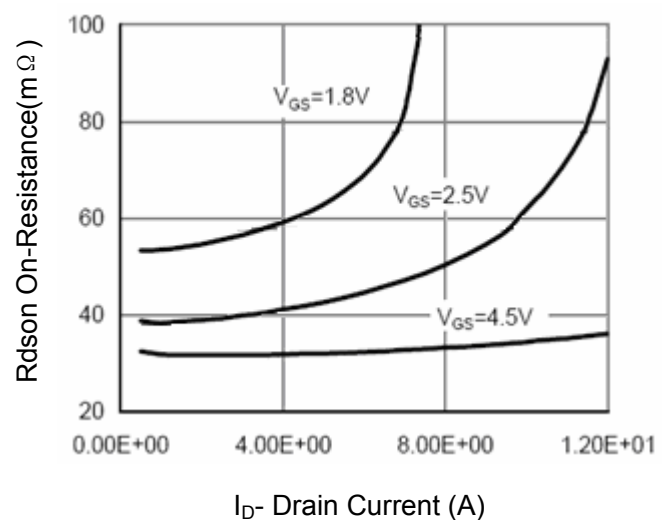
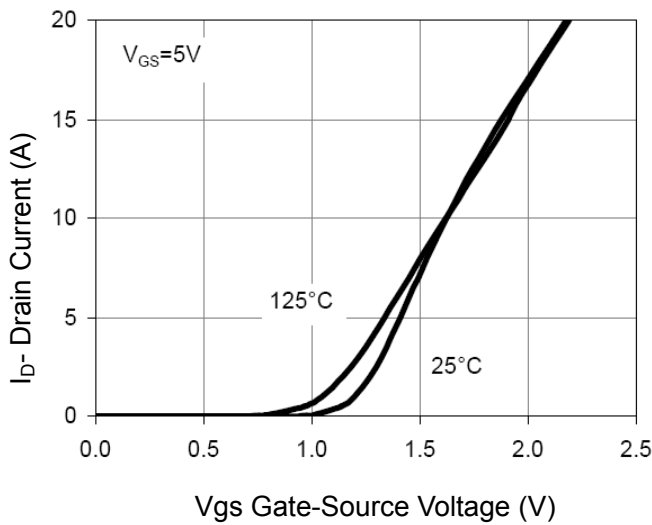
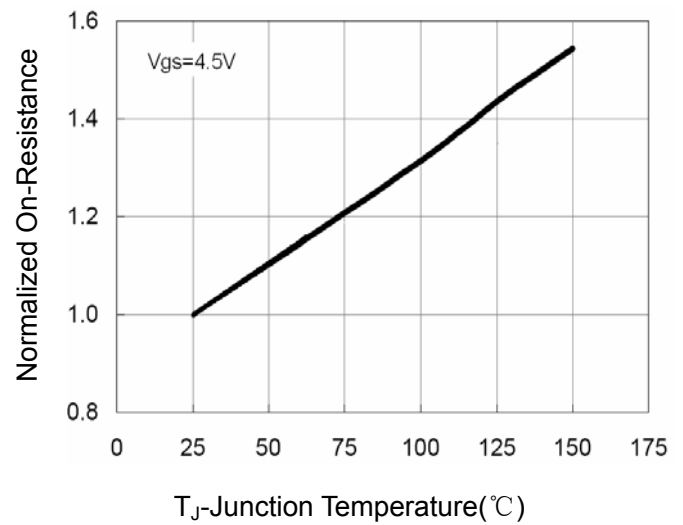
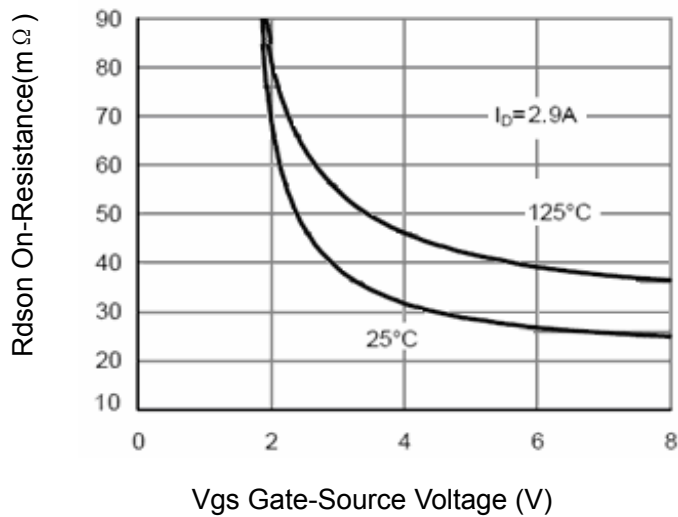
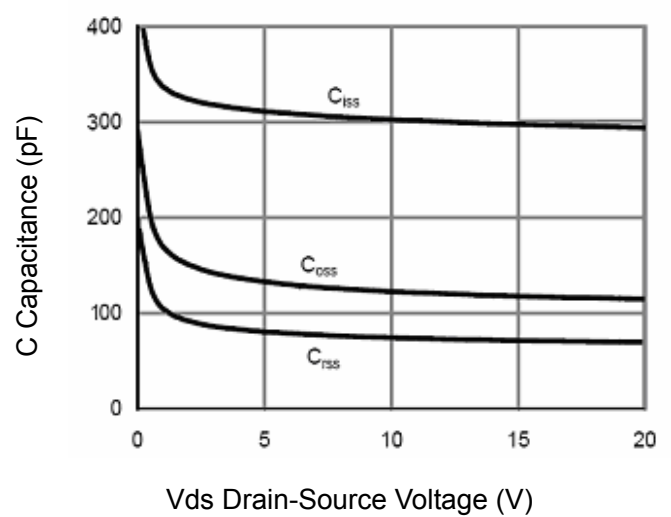
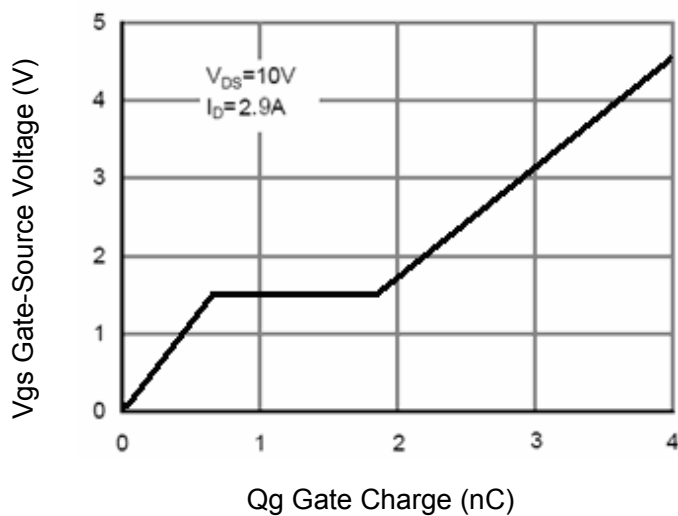
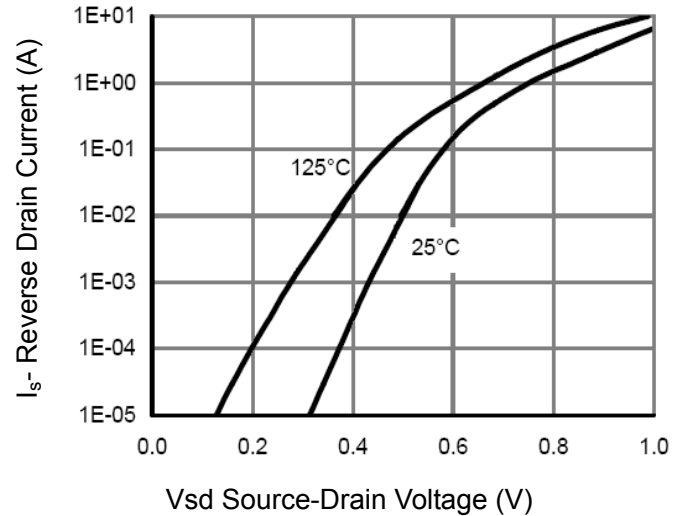


Figure 6 Drain-Source On-Resistance


Figure 7 Transfer Characteristics

Figure 8 Drain-Source On-Resistance

Figure 9 Rdson vs Vgs

Figure 10 Capacitance vs Vds

Figure 11 Gate Charge

Figure 12 Source- Drain Diode Forward

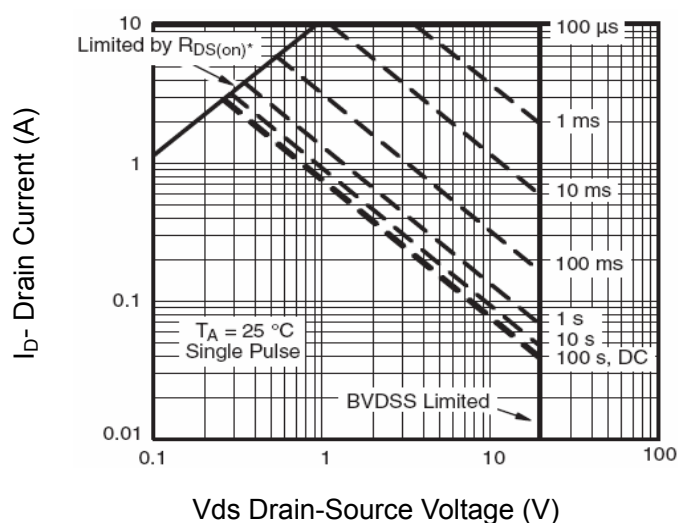


Figure 13 Safe Operation Area

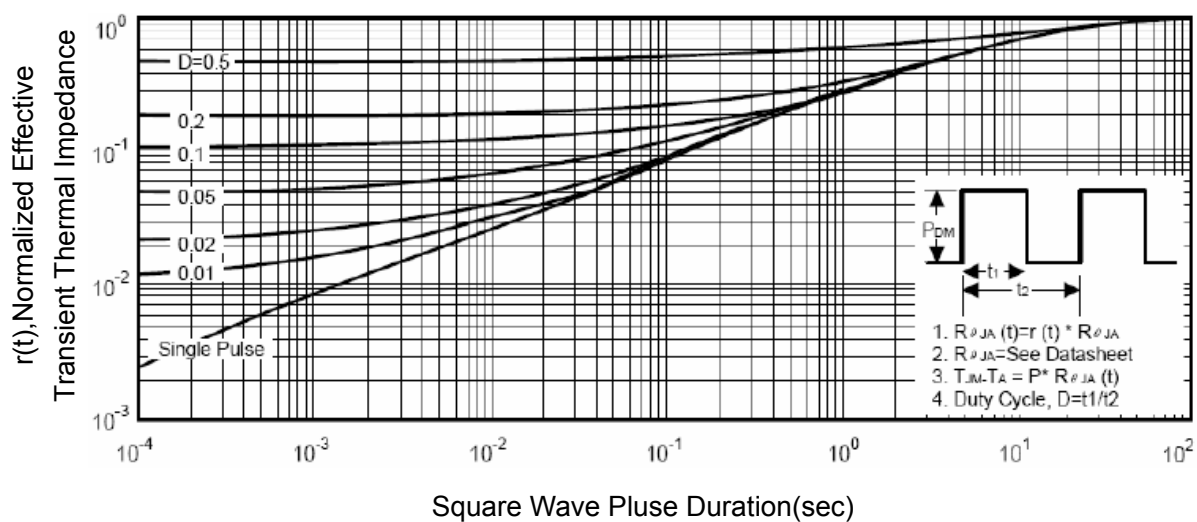
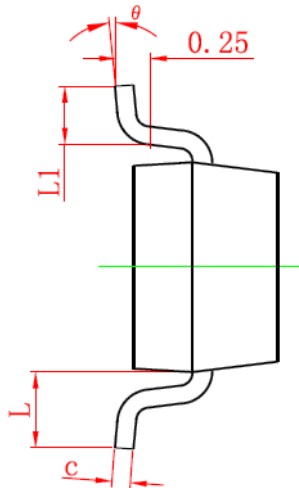
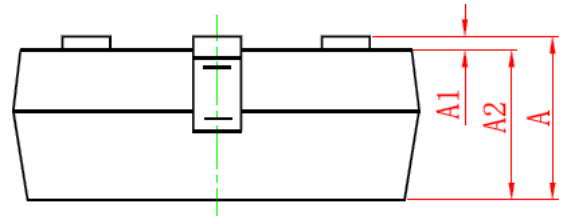
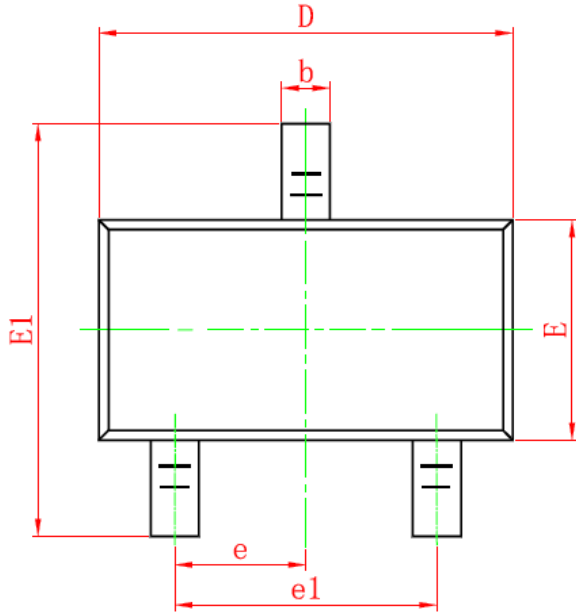


Figure 14 Normalized Maximum Transient Thermal Impedance

SOT-23 PACKAGE INFORMATION

Dimensions in Millimeters (UNIT:mm)



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 $\pm 0.10\text{mm}$ (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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