SEMiONE

## N-Channel Enhancement Mode Power MOSFET

DESCRIPTION

The PE2302A 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.
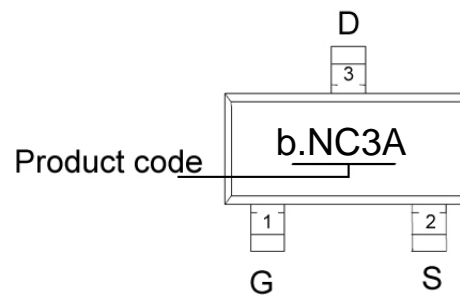
GENERAL FEATURES

● V_{DS} = 20V, I_D = 3A

　$R_{DS(ON)}$ < 55mΩ @ V_{GS}=2.5V

　$R_{DS(ON)}$ < 45mΩ @ 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
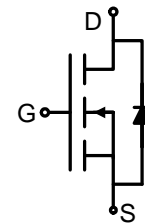
Schematic diagram

Marking and pin Assignment

Product code b.NC3A

SOT-23 top view

Absolute Maximum Ratings (TA=25℃ 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	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	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	125	℃/W

Electrical Characteristics (TA=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		-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=20V,V_{GS}=0V	-	-	1	µA

Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm10V, V_{DS}=0V$	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.5	0.7	1.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=2.5V, I_D=2.5A$	-	45	55	mΩ
		$V_{GS}=4.5V, I_D=2.9A$	-	35	45	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	$t_{d(on)}$	$V_{DD}=10V, I_D=2.9A$ $V_{GS}=4.5V, R_{GEN}=6\Omega$	-	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 ≤ 10 sec.

3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

4. Guaranteed by design, not subject to production

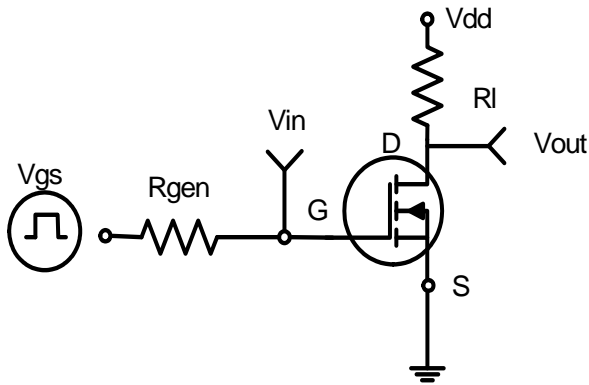## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS
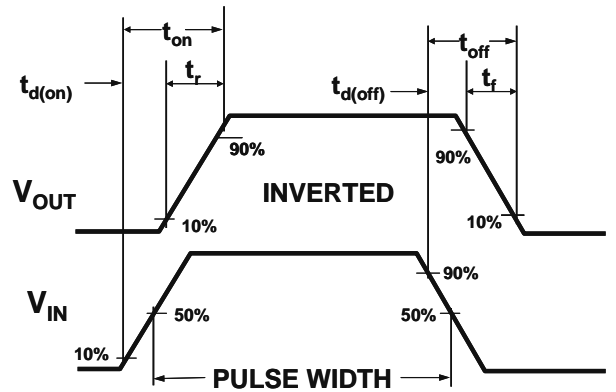
Figure 1:Switching Test Circuit
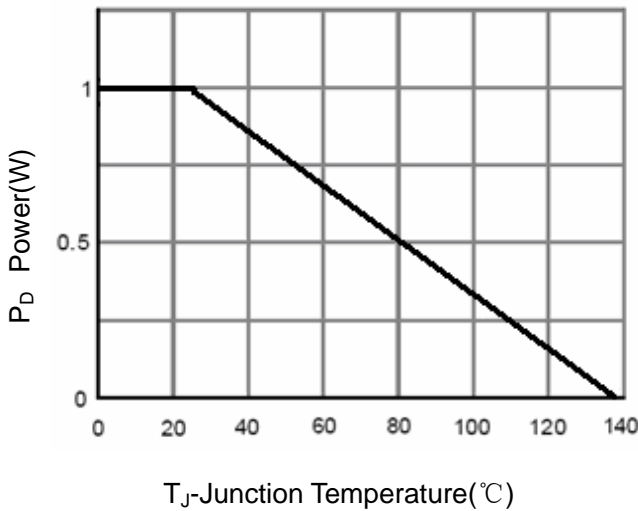
Figure 2:Switching Waveforms

Figure 3 Power Dissipation

T_J-Junction Temperature(℃)

P_D Power(W)

Figure 4 Drain Current

T_J-Junction Temperature(℃)
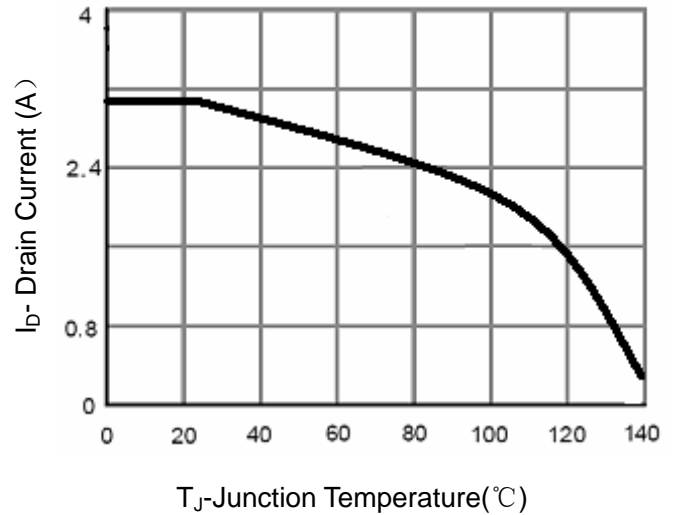
I_D- Drain Current (A)
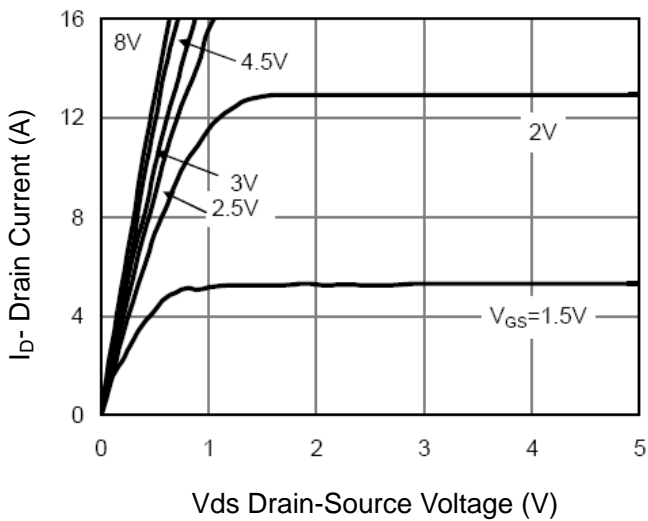
Figure 5 Output CHARACTERISTICS

Vds Drain-Source Voltage (V)

I_D- Drain Current (A)
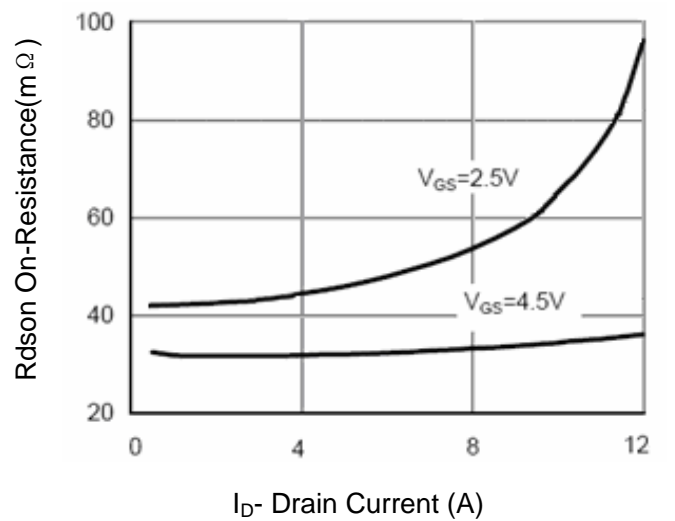
Figure 6 Drain-Source On-Resistance

I_D- Drain Current (A)

Rdson On-Resistance(mΩ)

$V_{GS}=2.5V$

$V_{GS}=4.5V$
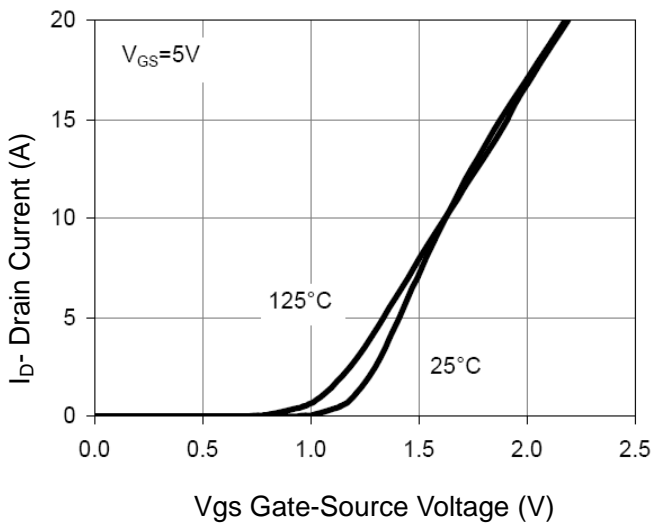
Figure 7 Transfer Characteristics
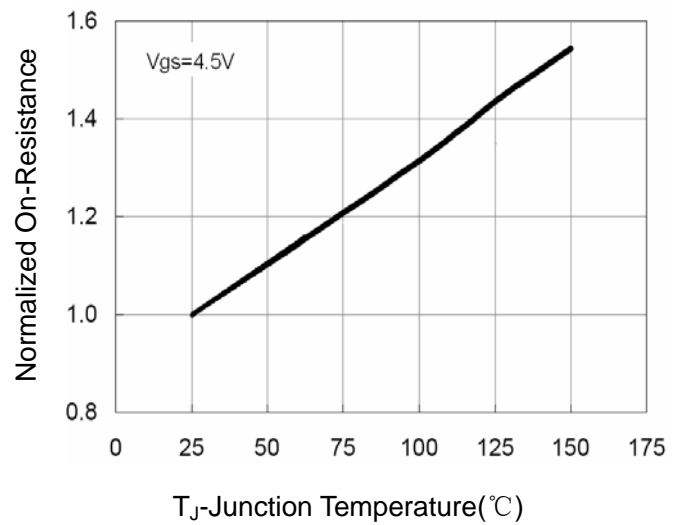
Figure 8 Drain-Source On-Resistance
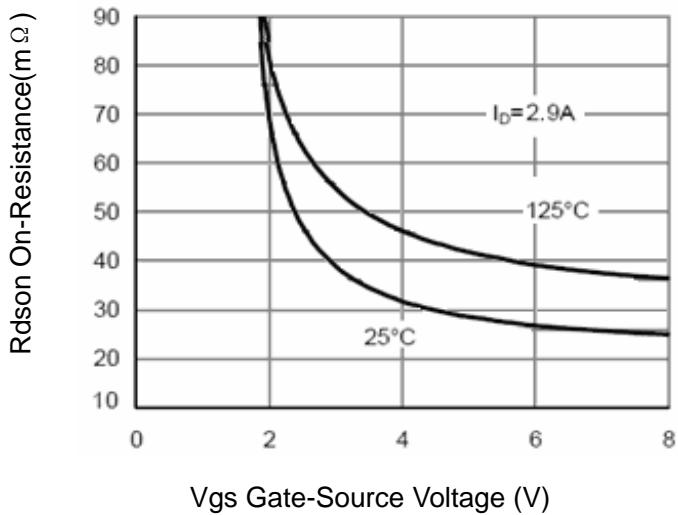
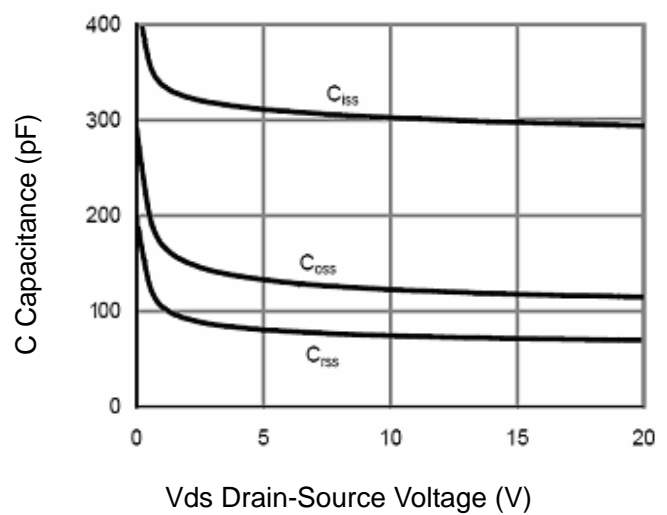**Figure 9 Rdson vs Vgs**

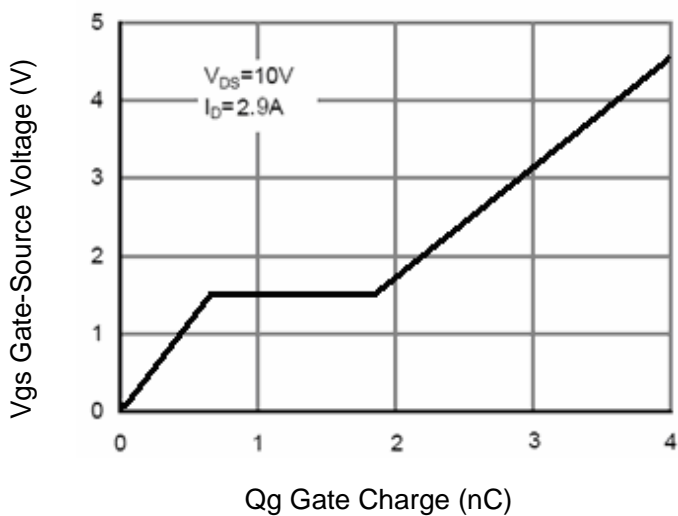**Figure 10 Capacitance vs Vds**

Figure 11 Gate Charge

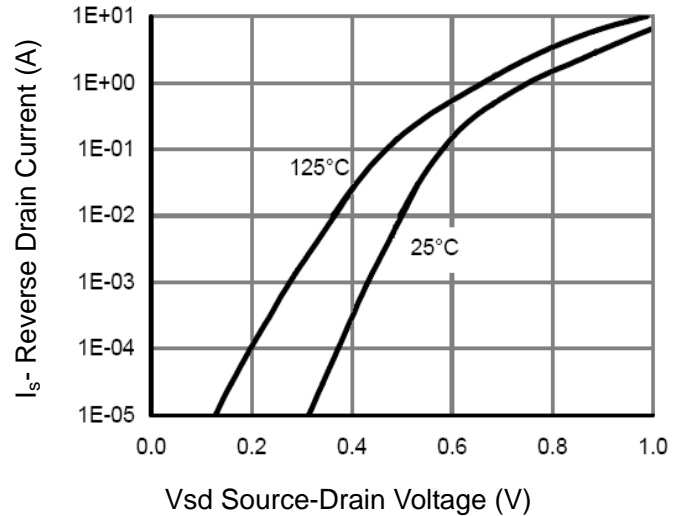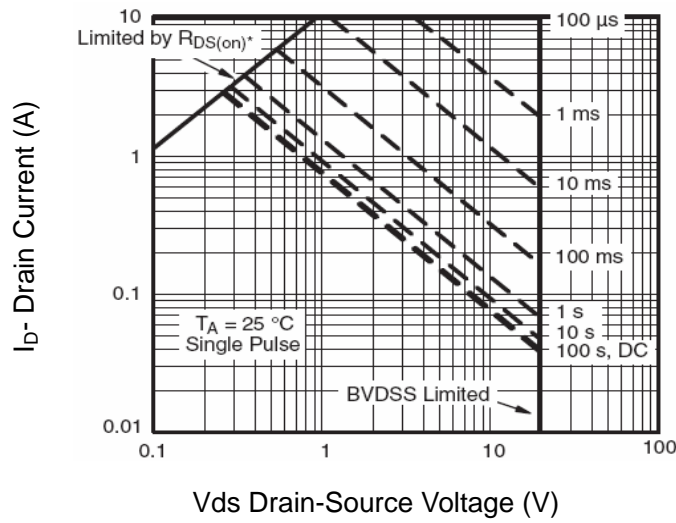**Figure 12 Source- Drain Diode Forward**

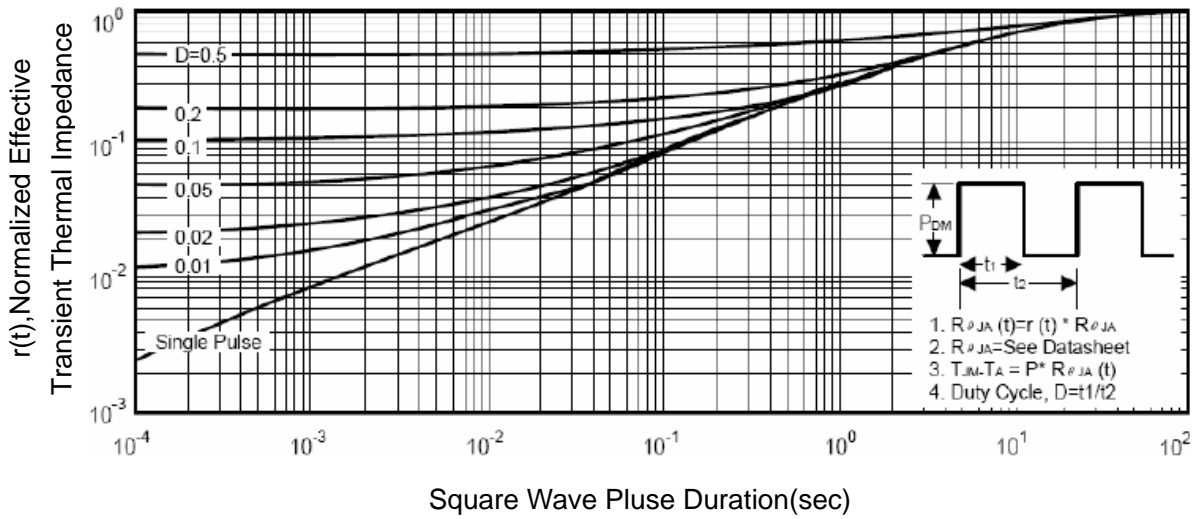Figure 13   Safe Operation   Area
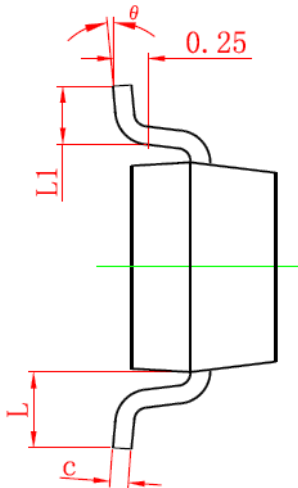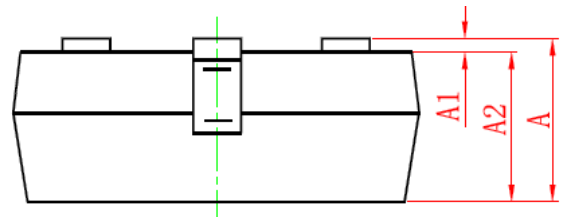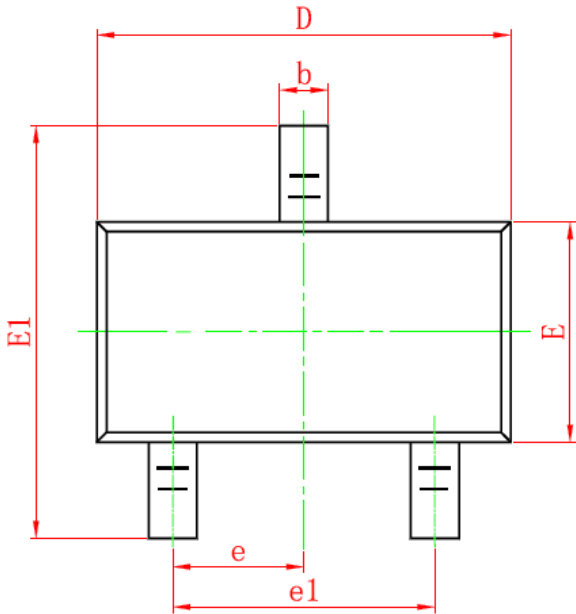

Square Wave Pluse Duration(sec)

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 ±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.