

Description

The HSBE2738 is the low RDSON trench N-CH MOSFETs with robust ESD protection. This product is suitable for Lithium-ion battery pack applications.

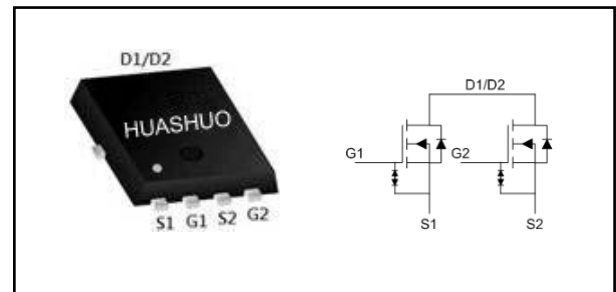
The HSBE2738 meet the RoHS and Green Product requirement with full function reliability approved.

- Low drain-source ON resistance
- Green Device Available
- ESD Protected Embedded

Product Summary

| | | |
|------------------|-----|------------|
| V_{DS} | 20 | V |
| $R_{DS(ON),max}$ | 9.5 | m Ω |
| I_D | 12 | A |

PRPAK3X3 NEP Pin Configuration



Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|----------------------|---------------------------------------|------------|------------|
| V_{DS} | Drain-Source Voltage | 20 | V |
| V_{GS} | Gate-Source Voltage | ± 12 | V |
| $I_D@T_A=25^\circ C$ | Continuous Drain Current ₁ | 12 | A |
| $I_D@T_A=70^\circ C$ | Continuous Drain Current ₁ | 9.6 | A |
| I_{DM} | Pulsed Drain Current ₂ | 72 | A |
| $P_D@T_A=25^\circ C$ | Total Power Dissipation ₃ | 1.47 | W |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ C$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | $^\circ C$ |

Thermal Data

| Symbol | Parameter | Max. | Unit |
|-----------------|--|------|--------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient ₁ | 95 | $^\circ C/W$ |



N-Ch 20V Fast Switching MOSFETs

Electrical Characteristics (T_J=25 °C, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|--|--|------|-------|------|-------|
| B _V DSS | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =250uA | 20 | --- | --- | V |
| ΔB _V DSS/ΔT _J | B _V DSS Temperature Coefficient | Reference to 25°C, I _D =1mA | --- | 0.014 | --- | V/°C |
| R _{DS(ON)} | Static Drain-Source On-Resistance ² | V _{GS} =4.5V, I _D =3A | --- | 8 | 9.5 | mΩ |
| | | V _{GS} =4.0V, I _D =3A | --- | 8.5 | 9.8 | mΩ |
| | | V _{GS} =3.1V, I _D =3A | --- | 10.5 | 12.5 | mΩ |
| | | V _{GS} =2.5V, I _D =3A | --- | 12 | 15 | mΩ |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 0.5 | --- | 1.5 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | -2.09 | --- | mV/°C |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =16V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | uA |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±8V, V _{DS} =0V | --- | --- | ±5 | uA |
| R _g | Gate Resistance | V _{DS} =0V, V _{GS} =0V, f=1MHz | --- | 1.83 | --- | Ω |
| Q _g | Total Gate Charge (4.5V) | V _{DS} =15V, V _{GS} =4.5V, I _D =10A | --- | 13 | --- | nC |
| Q _{gs} | Gate-Source Charge | | --- | 2.3 | --- | |
| Q _{gd} | Gate-Drain Charge | | --- | 7.2 | --- | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =15V, V _{GS} =4.5V, R _G =6Ω, I _D =6A | --- | 22 | --- | ns |
| T _r | Rise Time | | --- | 85 | --- | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 125 | --- | |
| T _f | Fall Time | | --- | 46 | --- | |
| C _{iss} | Input Capacitance | V _{DS} =10V, V _{GS} =0V, F=1MHz | --- | 735 | --- | pF |
| C _{oss} | Output Capacitance | | --- | 256 | --- | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 230 | --- | |

Diode Characteristics

| Symbol | Parameter | Conditions | Max. | Unit |
|-----------------|--|---|------|------|
| I _S | Continuous Source Current ^{1,6} | V _G =V _D =0V, Force Current | 12 | A |
| V _{SD} | Diode Forward Voltage ² | V _{GS} =0V, I _S =1A, T _J =25°C | 1.2 | V |

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The power dissipation is limited by 150°C junction temperature.
- 4.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.



N-Ch 20V Fast Switching MOSFETs

Typical Characteristics

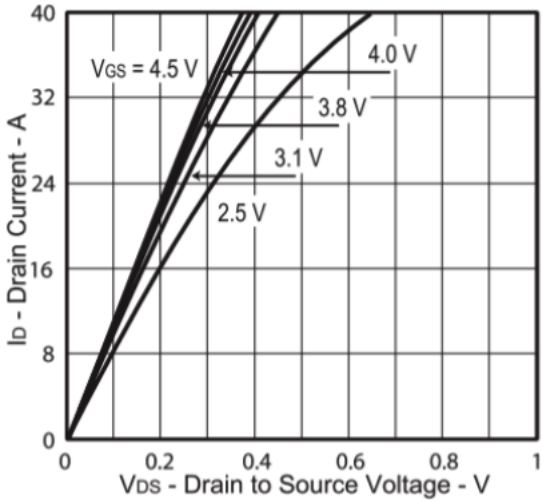


Fig.1 Typical Output Characteristics

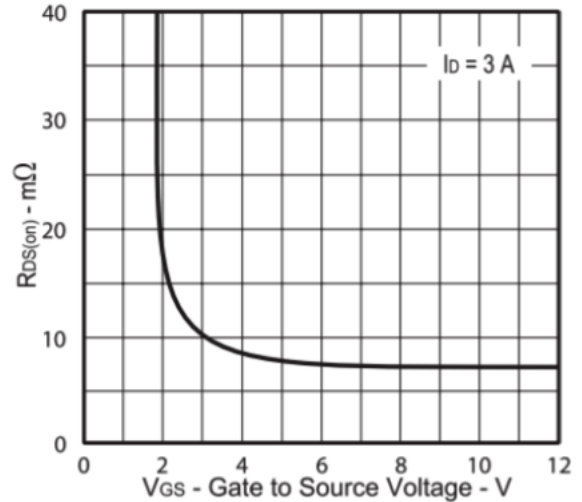


Fig.2 On-Resistance vs. Gate-Source Voltage

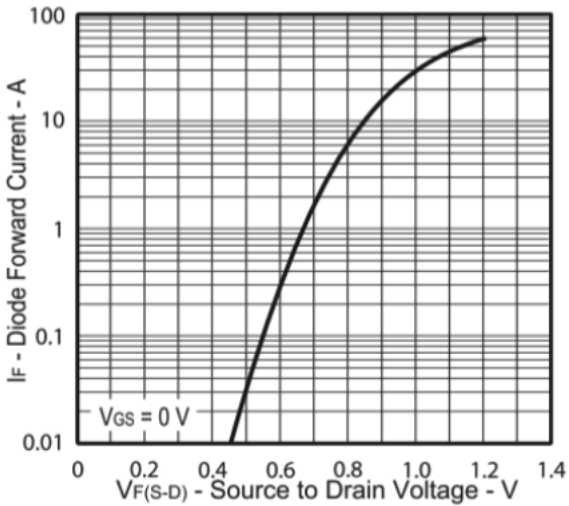


Fig.3 Forward Characteristics of Reverse

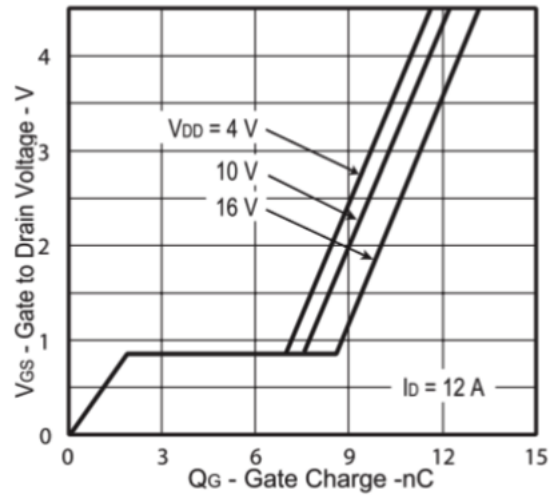


Fig.4 Gate-Charge Characteristics

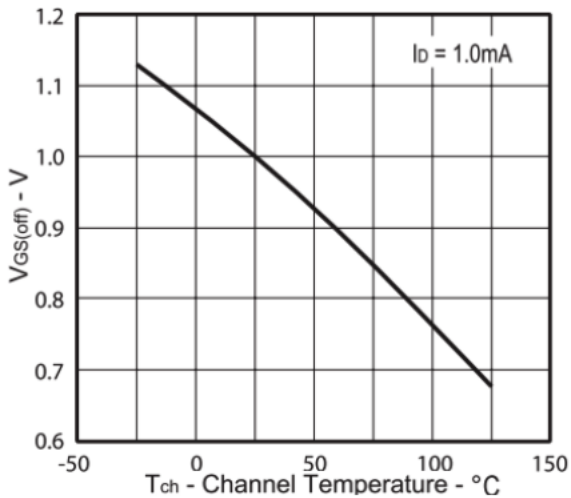


Fig.5 $V_{GS(th)}$ vs. T_{Ch}

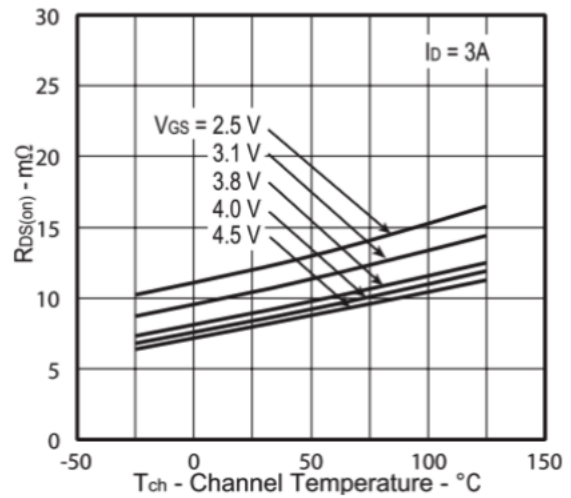


Fig.6 Normalized $R_{DS(on)}$ vs. T_{Ch}



N-Ch 20V Fast Switching MOSFETs

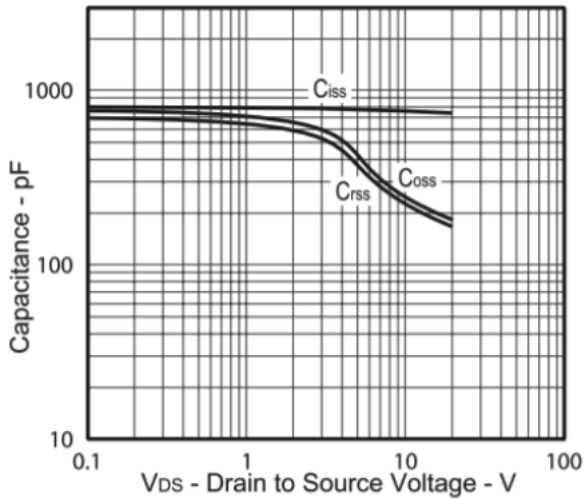


Fig.7 Capacitance

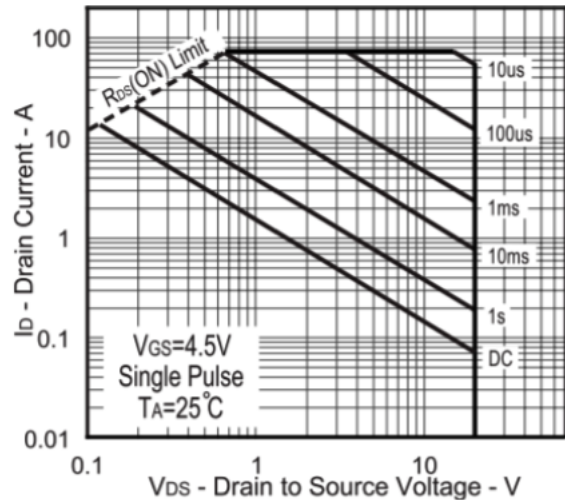


Fig.8 Safe Operating Area

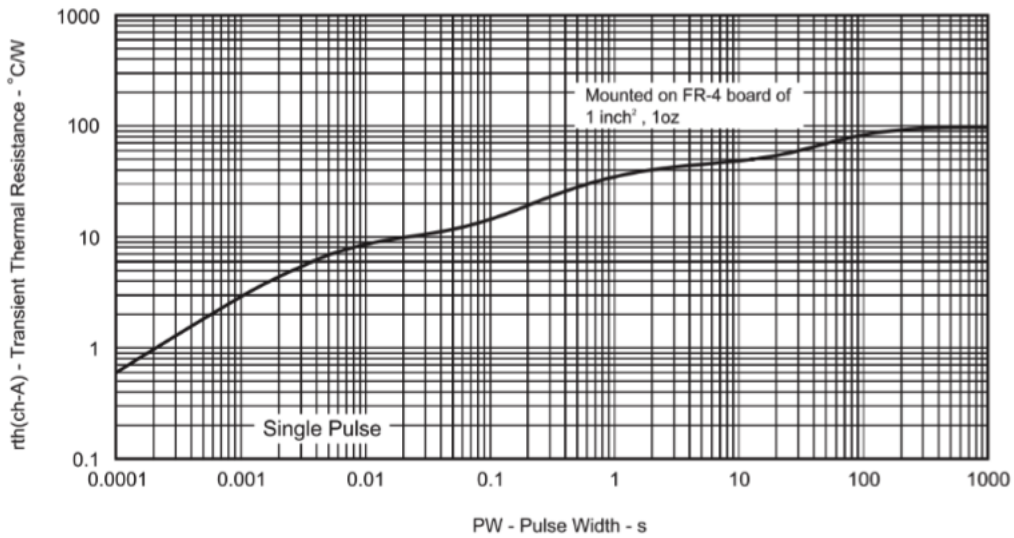


Fig.9 Normalized Maximum Transient Thermal Impedance

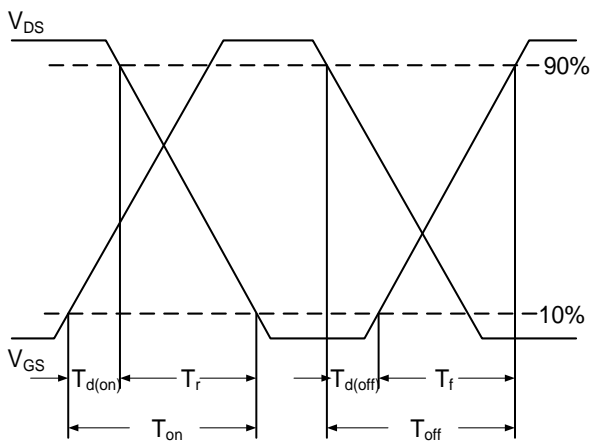


Fig.10 Switching Time Waveform

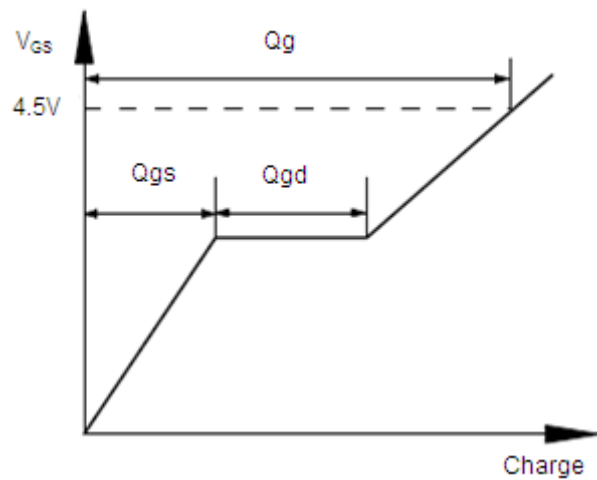
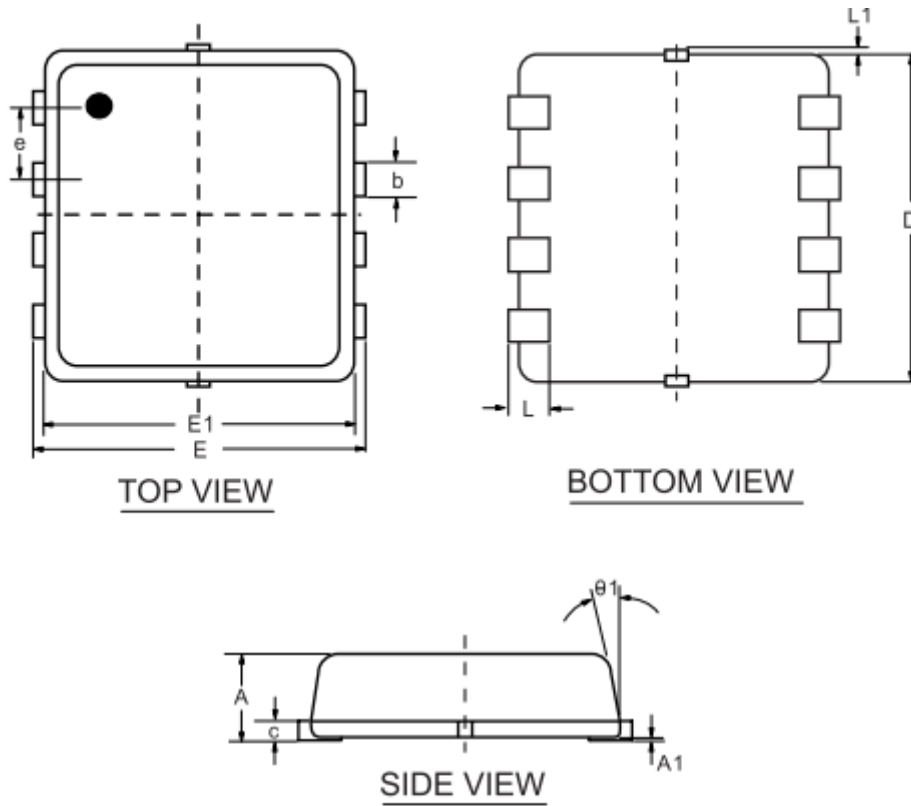


Fig.11 Gate Charge Waveform



PRPAK3X3 NEP Package Outline Dimensions



| SYMBOLS | MILLIMETERS | | |
|------------|-------------|-------|-------|
| | MIN | NOM | MAX |
| A | 0.700 | 0.800 | 0.900 |
| A1 | 0.000 | — | 0.050 |
| b | 0.240 | 0.300 | 0.350 |
| c | 0.080 | 0.152 | 0.250 |
| D | 2.800 | 2.900 | 3.000 |
| E | 2.700 | 2.800 | 2.900 |
| E1 | 2.200 | 2.300 | 2.400 |
| e | 0.650 BSC | | |
| L | 0.200 | 0.375 | 0.450 |
| L1 | 0.000 | — | 0.100 |
| $\theta 1$ | 0° | 10° | 12° |