

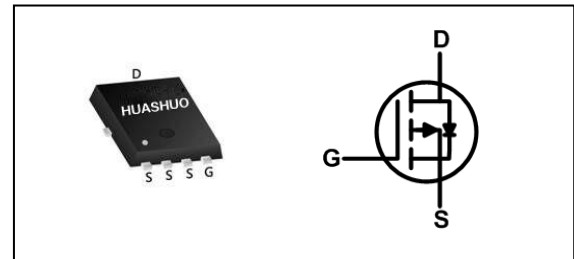
Description

The HSBA70P06 is the high cell density trench P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications. The HSBA70P06 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

- Super Low Gate Charge
- 100% EAS Guaranteed
- Green Device Available
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology

Product Summary

| | | |
|------------------|-----|------------|
| V_{DS} | -60 | V |
| $R_{DS(ON),typ}$ | 6 | m Ω |
| I_D | -72 | A |

PRPAK5*6 Pin Configuration

Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|-----------------------|--|------------|------------|
| V_{DS} | Drain-Source Voltage | -60 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| $I_D@T_C=25^\circ C$ | Continuous Drain Current, $-V_{GS}$ @ $-10V^1$ | -72 | A |
| $I_D@T_C=100^\circ C$ | Continuous Drain Current, $-V_{GS}$ @ $-10V^1$ | -46 | A |
| I_{DM} | Pulsed Drain Current ² | -268 | A |
| EAS | Single Pulse Avalanche Energy ³ | 310 | mJ |
| I_{AS} | Avalanche Current | 100 | A |
| $P_D@T_C=25^\circ C$ | Total Power Dissipation ⁴ | 150 | 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 | Typ. | Max. | Unit |
|-----------------|--|------|------|--------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient ¹ | --- | 62 | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ¹ | --- | 0.88 | $^\circ C/W$ |



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

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|--|--|------|--------|------|-------|
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =-250uA | -60 | --- | --- | V |
| ΔBV _{DSS} /ΔT _J | BV _{DSS} Temperature Coefficient | Reference to 25°C, I _D =-1mA | --- | -0.036 | --- | V/°C |
| R _{DS(ON)} | Static Drain-Source On-Resistance ² | V _{GS} =-10V, I _D =-20A | --- | 6 | 7 | mΩ |
| | | V _{GS} =-4.5V, I _D =-10A | --- | 8 | 9 | |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =-250uA | -1.0 | -2.0 | -3.0 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | 4.28 | --- | mV/°C |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =-48V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | uA |
| | | V _{DS} =-48V, V _{GS} =0V, T _J =55°C | --- | --- | 10 | |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±20V, V _{DS} =0V | --- | --- | ±100 | nA |
| g _{fs} | Forward Transconductance | V _{DS} =-10V, I _D =-3A | --- | 15 | --- | S |
| Q _g | Total Gate Charge | V _{DS} =-30V, V _{GS} =-10V, I _D =-5A | --- | 85 | --- | nC |
| Q _{gs} | Gate-Source Charge | | --- | 13 | --- | |
| Q _{gd} | Gate-Drain Charge | | --- | 10 | --- | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =-48V, V _{GS} =-10V, R _G =6Ω, I _D =-1A | --- | 60 | --- | ns |
| T _r | Rise Time | | --- | 186 | --- | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 390 | --- | |
| T _f | Fall Time | | --- | 188 | --- | |
| C _{iss} | Input Capacitance | V _{DS} =-30V, V _{GS} =0V, f=1MHz | --- | 5200 | --- | pF |
| C _{oss} | Output Capacitance | | --- | 890 | --- | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 50 | --- | |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|--|--|------|------|------|------|
| I _S | Continuous Source Current ^{1,5} | V _G =V _D =0V, Force Current | --- | --- | -72 | A |
| I _{SM} | Pulsed Source Current ^{2,5} | | --- | --- | -144 | A |
| V _{SD} | Diode Forward Voltage ² | V _{GS} =0V, I _S =-1A, T _J =25°C | --- | --- | -1 | 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 EAS data shows Max. rating. The test condition is V_{DD}=-50V, V_{GS}=-10V, L=0.1mH, R_G=25Ω, I_{AS}=-100A
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.



Typical Characteristics

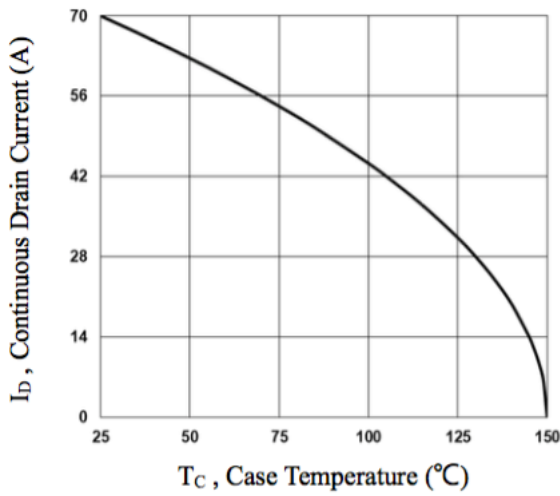


Fig.1 Continuous Drain Current vs. T_C

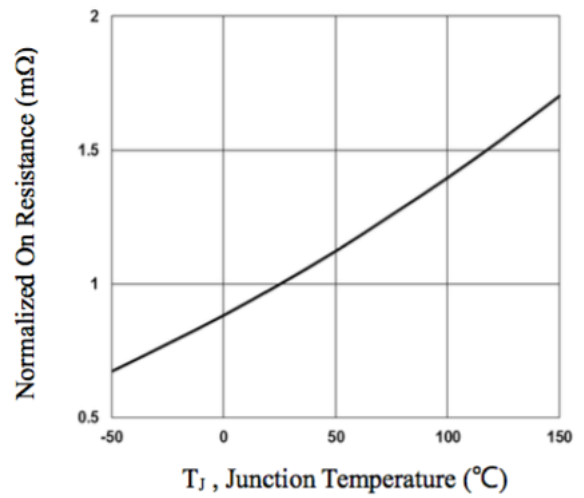


Fig.2 Normalized $R_{DS(on)}$ vs. T_J

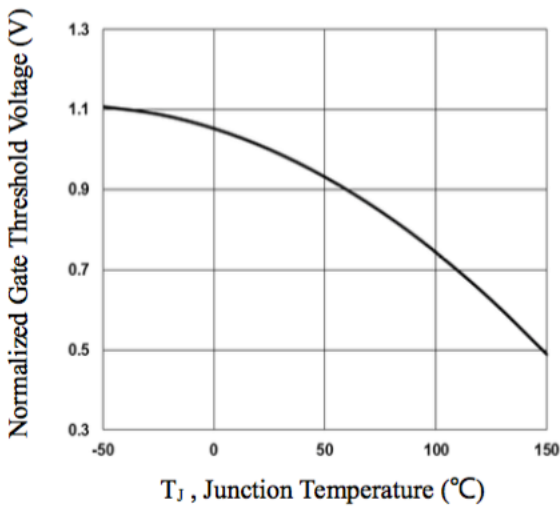


Fig.3 Normalized V_{th} vs. T_J

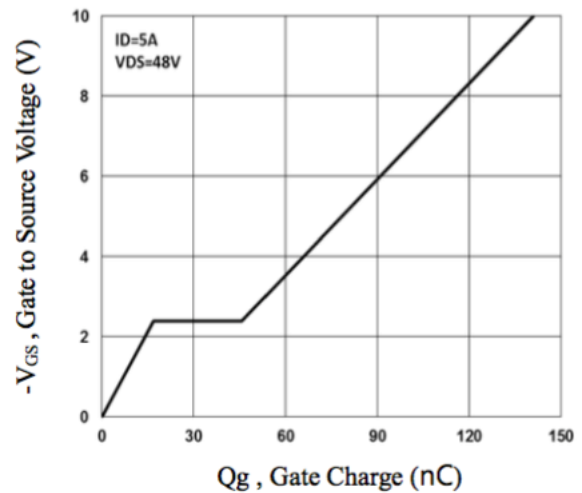


Fig.4 Gate Charge Waveform

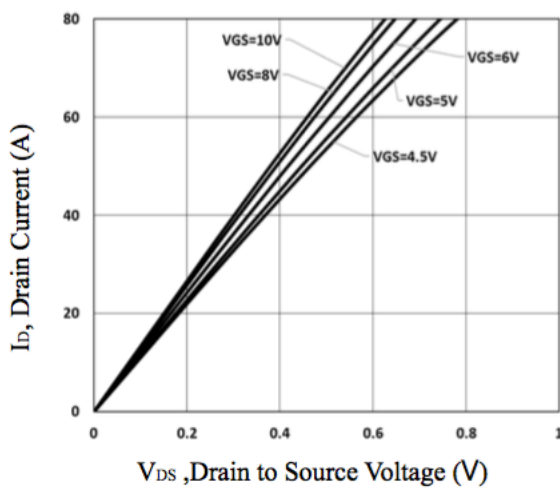


Fig.5 Typical Output Characteristics

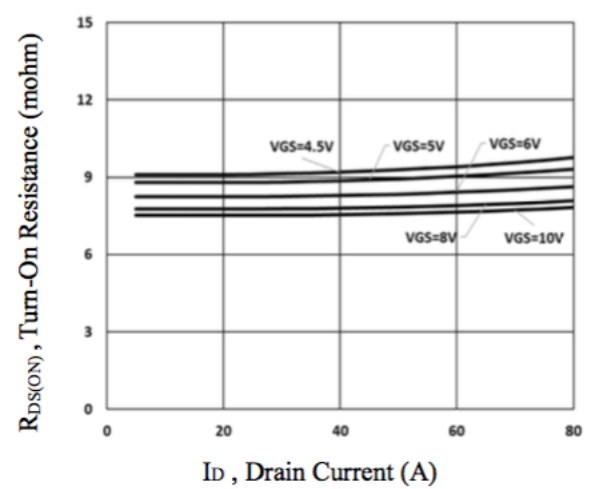


Fig.6 Turn-on Resistances vs. I_D



P-Ch 60V Fast Switching MOSFETs

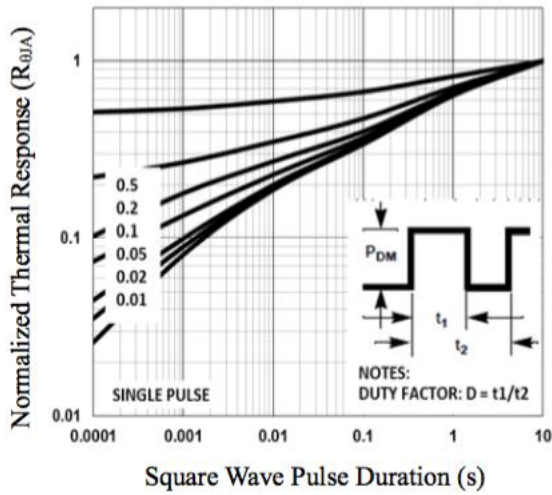


Fig.7 Normalized Transient Impedance

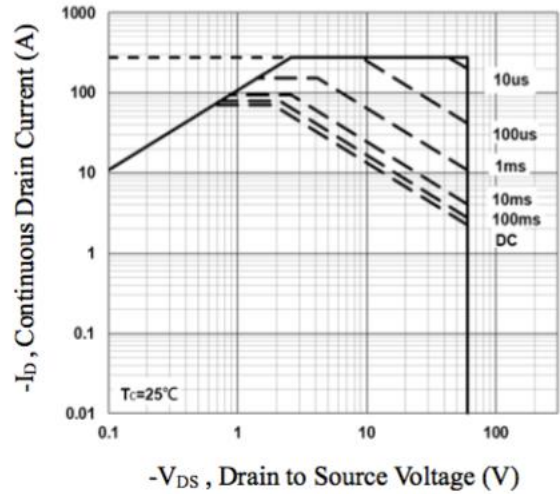


Fig.8 Maximum Safe Operation Area

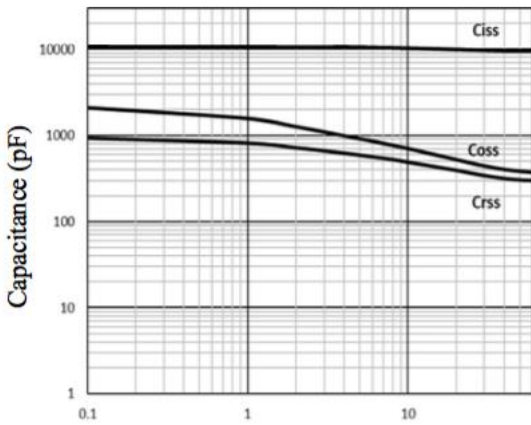


Fig.9 Capacitance Characteristics

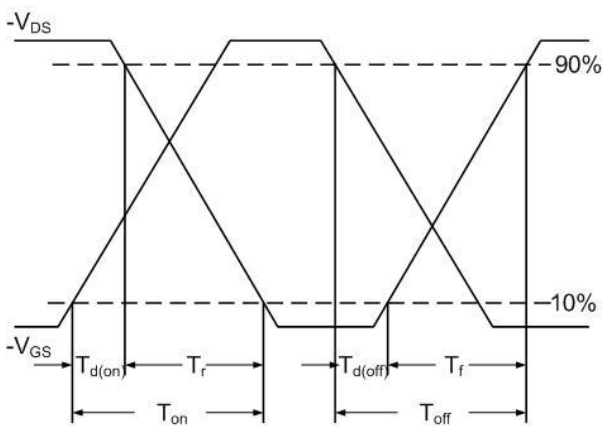


Fig.10 Switching Time Waveform

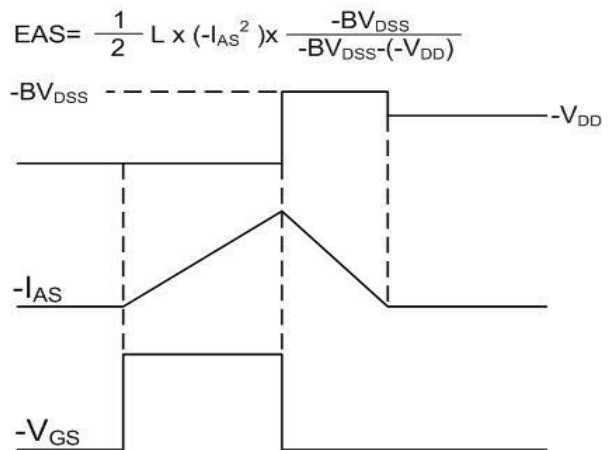
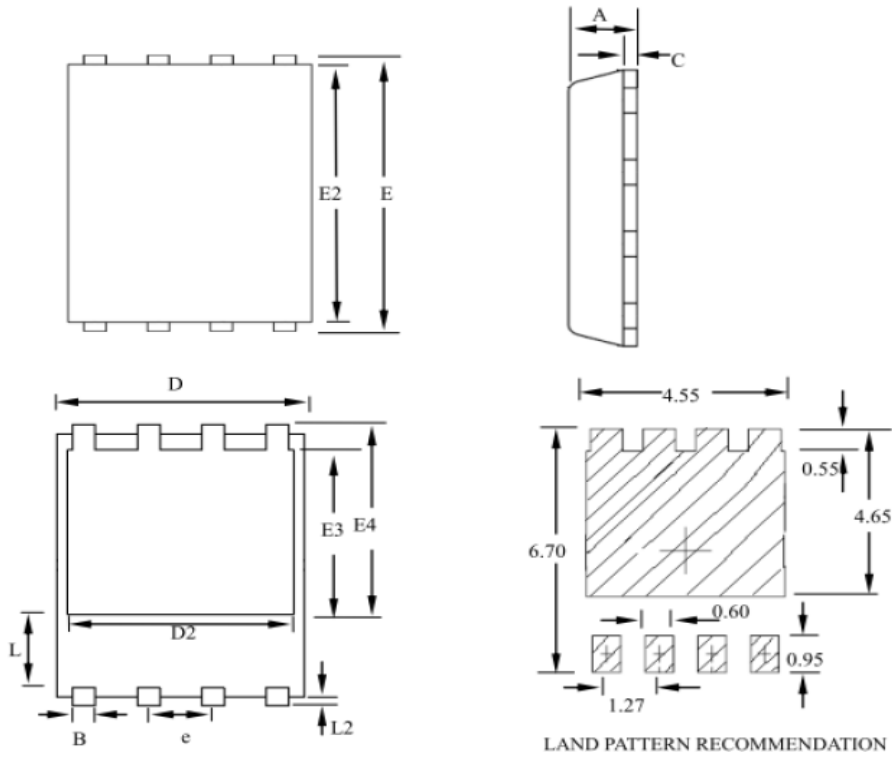


Fig.11 Unclamped Inductive Waveform



Ordering Information

| Part Number | Package code | Packaging |
|-------------|--------------|----------------|
| HSBA70P06 | PRPAK5*6 | 3000/Tape&Reel |



| SYMBOLS | MILLIMETERS | | | INCHES | | |
|---------|-------------|------|------|--------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.80 | -- | 1.20 | 0.031 | -- | 0.047 |
| B | 0.30 | -- | 0.51 | 0.012 | -- | 0.020 |
| C | 0.15 | -- | 0.35 | 0.006 | -- | 0.014 |
| D | 4.80 | -- | 5.30 | 0.189 | -- | 0.209 |
| D2 | 3.61 | -- | 4.35 | 0.142 | -- | 0.171 |
| E | 5.90 | -- | 6.35 | 0.232 | -- | 0.250 |
| E2 | 5.42 | -- | 5.90 | 0.213 | -- | 0.232 |
| E3 | 3.23 | -- | 3.90 | 0.127 | -- | 0.154 |
| E4 | 3.69 | -- | 4.55 | 0.145 | -- | 0.179 |
| L | 0.61 | -- | 1.80 | 0.024 | -- | 0.071 |
| L2 | 0.05 | -- | 0.36 | 0.002 | -- | 0.014 |
| e | -- | 1.27 | -- | -- | 0.050 | -- |

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